

An aerial architectural rendering of a suburban development. The scene shows a mix of residential buildings, including small houses and larger structures, interspersed with numerous trees. A winding road or path cuts through the landscape. In the upper left, several birds are shown in flight. The overall style is a soft, illustrative architectural drawing with muted colors like greens, greys, and browns.

FRINGE **INTENSIFIED**

PROJECT VOLUME / LOGBOOK

Koen Marcelissen | Graduation studio | FHK Master of Architecture | 2022



FRINGE INTENSIFIED

GRADUATION PROJECT

Master of Architecture
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Academy of Architecture and Urbanism (MA+U)

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INTRODUCTION

Urban fringes in general have a dynamic and unpredictable character. Here, precisely what is impossible in the city or the countryside is possible. This area between town and country is full of unexpected encounters and special landscapes.

The northern outskirts of Tilburg also have this special character. In places like this, there is space, experimentation takes place and we find a special variety. A variety of living, working, recreation, and even illegal activities take place here. In many of these areas, there is no clear policy and it remains a mess. It is difficult to get a grip on it, and everything seems possible.

What happens if we embrace this character and intensify it? The municipality of Tilburg also has the ambition to transform this area into a 'water landscape'. And even to make it part of a landscape park. I see opportunities to connect this place even better with the city, and still let it keep its special character.

The current users of the place are central to this. This gives rise to a connection between the spatial character and the (future) user of the place. The aim is to intensify this place with the qualities it now has. Thus, a special recreational, residential and working landscape can emerge. The experience as described in the essay has been for me a starting point for a design assignment for this place.

HYPOTHESIS

The current character of the urban fringe is an incentive to intensify it. From the inside out, a special landscape and ecosystem emerge. Here the current identity is preserved but the freedom of the user provides an experimental and dynamic character.

FRINGE **INTENSIFIED**

Intensifying the character of the urban fringe, as a responsible extension of our living environment

ESSAY



ESSAY

EXPERIENCE

Almost daily I move through the urban fringe. From the train's window, I see the urban structure change into a somewhat rougher and harder environment. The buildings become grayer, larger and slowly I see the green landscape coming towards me through these 'industrial boxes'. Sports fields, scrap iron dealers, a riding school, allotments, all sorts of things functions pass by. Until one day I find myself in the middle of the Brabant landscape. Here, cultivated farmland with farms, viaducts, and high-voltage pylons has taken over the landscape.

In this transition zone between city and countryside, I notice special functions. Functions that do not fit in the city, or too far outside it. It is a place where years of experimentation and tinkering give it a dynamic character. If the city shifts, the urban periphery shifts with it. The architecture is strikingly rural and spacious. Farms, stables, and sheds seem to have been built without much thought or adherence to zoning rules. This experience made me think about the way we expand our living environment. I find the quality of this 'transitional zone' so special that it has inspired me to further research.

DEFINITION AND QUALITIES

There is a sea of peace and space here. This can be used in a responsible and future-proof way. For the living environment of people who long for their place. A place of their own with space, sight, nature, and still the ideals of the city within reach. So, we must not forget that everyone who leaves the city also moves through this area. Whether for recreational purposes or because we move 'from A to B',

Following my perception of the urban periphery, I investigated why the architecture here has a rural character. Building arises from a functional demand for more space. For example, a farmer builds a barn when he needs that space. This is not an architectural feat, but 'just' a functional structure.

It is other elements that better define the urban edge. Elements that are not part of a building perhaps best describe the character of the urban periphery. I'm talking about fences, fields, construction huts, dead-end paths, and even temporary housing in the middle of a cornfield. Nothing seems impossible here. It is precisely these elements that give rise to design in this project.

These features can generally be found in urban fringes in the Netherlands and abroad. But with this project, I focus on the northern urban fringe of Tilburg. This place has the above characteristics, but it also has its qualities, as every place has.

CHARACTERISTICS OF THE PLACE

An urban fringe is located "everywhere," which makes it difficult to define a place and determine where such an intervention would land. Research on the urban fringe of Tilburg tells me that in recent years there has been better thinking about the transition zone. The urban fabric of the city and the countryside. A better connection between the two is being sought. The municipal ambition and vision are clear in this. Important elements are the water landscape, landscape park, and the desire to better connect the city on a social level.

For me, choosing the location was a difficult task. Eventually, I arrived at the current agricultural fields. Those fields provide a monotonous landscape and nature., and now those fields are designated as a water buffer for the city. This can be combined with more elements.

The landscape is enhanced by retaining its cultural-historical character and is going back to the wet heathlands of the past. These wet heathlands are grazed by sheep. They provide natural management of the area. This is one user, but if the aim is to use the current characteristic for the future, there are more users needed.



USER-CENTRIC

The characteristics of the urban fringe have an attraction for current residents. For example, people who need space or do not want to live in the city, but do want to live close by, live in the fringe. The somewhat anarchistic person has long since taken up residence in this type of area. Precisely because ‘everything’ seems possible here. But who exactly are these users?

According to my findings, users can be divided into two groups. The permanent and the temporary user. This characteristic is my finding during my visit. Little can be done without actually being seen. Because an ‘urban fringer’ keeps a close eye on what is happening in and around his yard. It became clear to me that I was the temporary visitor who came to take a look. When I visit the urban fringe I feel like a guest in someone else’s area.

I see the permanent user as the resident or the one who works in the fringe. He/she is looking for a place to live, makes use of functions, and has made a conscious choice not to live in the city. The most temporary user of the urban fringe is mainly recreational. You will find people walking their dogs, cyclists, and fishermen. Even temporary users who for example use an allotment. Often the urban fringe is visited to escape the busy city. This subdivision between permanent use and temporary use inspires me. It can add more layers to this project.

FREEDOM AND COMMUNITY

Allotment model - The Gardens

There are quite a few allotments scattered around the urban fringe of Tilburg. It fascinates me that everyone maintains their own piece of land and takes care of it with love. Without the gardeners realizing it, they work together on one big garden. This can be seen as an ecosystem, containing social aspects but also very good for biodiversity. For me a very interesting thought. If we look at this in a larger picture, we are collectively working on a special landscape. This principle fascinates me and got me thinking. Individually, as the ‘urban fringer’ can be, collectively the big picture is being worked on. There is a system in it that connects with flora and fauna, working, and even living (yes, there is bound to be illegal living in allotments).

Community

The permanent resident thus chooses a permanent place in the landscape. A private garden. In this case, inspired by the allotments. A conscious choice is made to live in the fringe because one is free here. So this freedom is an important basic fact in this system. Yet, if you put a lot of people with different opinions in a smaller place there will be friction. This location and context give me a unique opportunity to test this principle. I believe that people with different opinions and customs can together determine the content of the landscape. As mentioned earlier, this place lends itself to experimental initiatives and functions.

The role of architecture

In this case, architecture can serve as a stimulus for the residents. Because the residents make their own choices, it is impossible to make a total design beforehand. I propose to apply incentives that can be a guide to architecture, use of space, and social aspects. The architecture here does not have to be ‘perfect’ like in the city. It is the individual interpretation and coincidences in a building or area that match the current character.



NOT AN URBAN EXPANSION, BUT AN INTENSIFICATION OF THE PLACE

Underlying the special character of the fringe is the urban expansion of the past. These expansions, such as today's monofunctional business parks and residential areas are now impoverished. They do not work. Do we want to continue expanding cities in this way? No, we need to think more intelligently about the layout of the landscape around the city.

Intensify

Using the current ingredients of the urban periphery ensures that the city does not expand according to its predictable pattern. Thus, I do not see this project as a new piece of the city, but as a living-working landscape in the fringe. It arises from within. Making use of the qualities of the landscape in the transition zone between city and countryside. The local intensification of this character leads me to a design of a 'living landscape'. This strengthens the local ecosystem. The character of the current urban fringe is not disrupted but intensified and used for the future.

Experimental incubator for the city

I believe that the 'fringe community' provides unpredictable outcomes. In an intensified and partly free form, there is also room for experimental functions. The freedom that can be used here gives a reason for this. Functions that cannot be found in the city or further afield are given a place here. They can arise here because there is often no unambiguous policy for them.

In the intensified fringe they are collectively conceived and considered. Because there is so much freedom, forms of living can arise that we don't know yet. But which in the future could be interesting for the development of the city. The area continues to develop itself. I believe that the current dynamics of the fringe here in an intensified way will be a signboard for its special character. It will be an interesting experience for all users.



RESEARCH

DEFINITION OF AN URBAN FRINGE

Definition of the urban periphery: neither city nor country
“City and country cannot be seen separately and one cannot be defined without the other. This is not only because they are each other’s contrast and the difference between them can be explained in quantitative terms (more or less green space, higher or lower population density, more or less cultural facilities), they also make up each other’s physical boundary.” (Betsky, 2006)

“If the city is our home and the landscape is our garden, then the urban fringe is the pantry of society. The boots are there next to the freezer, the road salt, the waste container, the flower bulbs and the tools. Precisely because of the combination of indeterminacy and utility, of decision and coincidence, the anthropology of the use of space in the Netherlands is best read in the transitional area between city and countryside.”



RESEARCH

With my research into the urban fringe, I look for openings that the urban fringe can offer. I hope to find out what development it undergoes historically and what its morphology is. In the outskirts of Tilburg, ecology is an interesting starting point. All in all, I try to grasp the definition of this particular transition zone.

THE URBAN FRINGE SCAN

DIFFUSE & FROM CENTRAL HISTORIC CORE

For this study, the focus is on two types of cities, both with different morphological development.

Development from historic core

Historic cities have expanded several times over the course of their history around the oldest core. Most owed this growth to their function as regional market and administrative centers. A few examples of such a city are Amsterdam, Utrecht, Groningen and Den Bosch.

Diffuse development

These towns are often amalgamations of several historic cores. Sandy soils that were unsuitable for waterways were developed through the construction of railroads. Village cores and hamlets developed into large industrial cities; Tilburg, Eindhoven, Helmond, Enschede, Almelo, Hengelo. Often these kind of cities had certain specializations in which they developed; example is textile, cigar, machine factories etc.

DEVELOPMENT FROM HISTORICAL CORE
(CONCENTRIC)



GRONINGEN
UTRECHT

DIFFUSE DEVELOPMENT
(RADIAL)



TILBURG
EINDHOVEN



HISTORICAL DEVELOPMENT <1945

FORTRESS LAW

The Dutch fortified cities had a defensive function that was adhered to in most cases until the 19th century. The often medieval city centers did not extend beyond the wall. Outside the city walls were mainly pest houses and agricultural landscape with farms.

1847 Fortification Act:

On April 18, 1847, the Fortress Act came into effect. There was a need for a new defense plan. Inundation (the defensive use of water by flooding land) was the main objective. The army was to withdraw to the area around Amsterdam. A number of positions were established by law, traces of which can still be seen in the landscape today:

- New Dutch Waterline
- Grebbelinie
- Defence Line of Hollands Diep and Volkerak
- Defence Line of Amsterdam
- Zuider Waterlinie

The Fortress Act ensured that the area immediately outside the city became available for urban-industrial use. Before that time, it had to be kept clear as a field of fire. The law also made it possible for barracks to be built outside the city.

Construction of railroads

Railroads have had a major influence on urban development in the city outskirts. In the historic cities, stations are often situated just outside the fortress. In this case study this is clearly visible in the cities of Utrecht and Groningen. New industrial cities that often developed diffusely were able to develop quickly due to their strategic location on the railroad network (Tilburg, Eindhoven, Enschede).

ELEMENTS IN THE HISTORICAL FRINGE

In city walls we find typical functions that serve the city. These are often deviating elements from the elongated mass that forms the wall. These elements give rise to not only forming a 'wall', but can also be a contemporary interpretation of that specific place.

In historic fortified towns, the edge of the city was a distinct feature. The Fortress Act provides for the breaking of these edges.



The fortress of Groningen

HISTORICAL DEVELOPMENT <1945

ESTATES

From the 17th century onwards, many country houses were built. The rich escaped the bustle and stench of the city and liked to spend the summer months in nature. Here they built a monumental house, which forms a whole together with the outbuildings and garden or park that surrounds it.

At the end of the 18th century there came a freer view of nature, and at country estates parks were often laid out with ornamental ponds and nature in "whimsical" forms. Many country houses were designed in the English landscape style.

The difference between a country house and an estate lies in the economic model behind it. An estate has an economic function in which the owner often leases homes or businesses. With a country estate, recreation is often the main purpose.



Country Estate 'Jaffa' near Utrecht in 1782

ORIGINS OF CITY PARKS

City parks often originated along one of the following routes:

- 1. Repurposing of estates, country estates and production forests.
- 2. Redesign of former earth, bulb and fortifications into city parks.
- 3. Newly designed city parks.

The peak of public park design lies in the nineteenth century. Then began to design parks in public spaces for the first time. They were systematically incorporated into the urban structure.

The first concrete ideas about the construction of a public park can be found in Germany. From the eighteenth century onward, many princely gardens and parks here were opened to the common people. The people were co-users of the park but there was no real public park yet. (Den Dulk, 2013)



Noorderplantsoen Groningen, repurposing of fortification to city park

GARDEN CITIES

GARDEN CITIES

The Garden City Model Concept was introduced in 1898 by social reformer Ebenezer Howard. The model promised to provide a solution to industrial society in both social and spatial terms. New cities arose in the countryside near industry and were separated by green areas. This provided space for recreation and relaxation.

The city was no longer seen as a closed entity, but as a place where greenery from the surrounding area entered the city. The landscape no longer lay on the edge of the city, but came to lie in the city itself to provide air and relaxation for residents. (De groene tuinstad van Ebenezer Howard, 2020)

SOCIAL CITY: THE GARDEN CITY

The garden city as an ideal socio-spatial construction

- 1. Modest size as a commercial and industrial city that is part of a regional social city.
- 2. Close relationship with the agricultural environment through a green belt.
- 3. Harmonious social set-up, a balanced community in districts of approximately 5000 inhabitants with adequate facilities: stores, socio-cultural accommodations and recreational areas.
- 4. Functional land allocation within the city
- 5. Perfect internal accessibility and regional traffic accessibility
- 6. Modest housing density that guarantees light and air, gardens and recreational areas, within the limits of urbanity.
- 7. Architecture that focuses on harmony, not standardisation.
- 8. Construction of the city on cheap wasteland.
- 9. Communal land ownership and leasehold, by the municipality or a private development company democratically controlled by residents.
- 10. Harmony between public interests, freedom of choice and entrepreneurship.



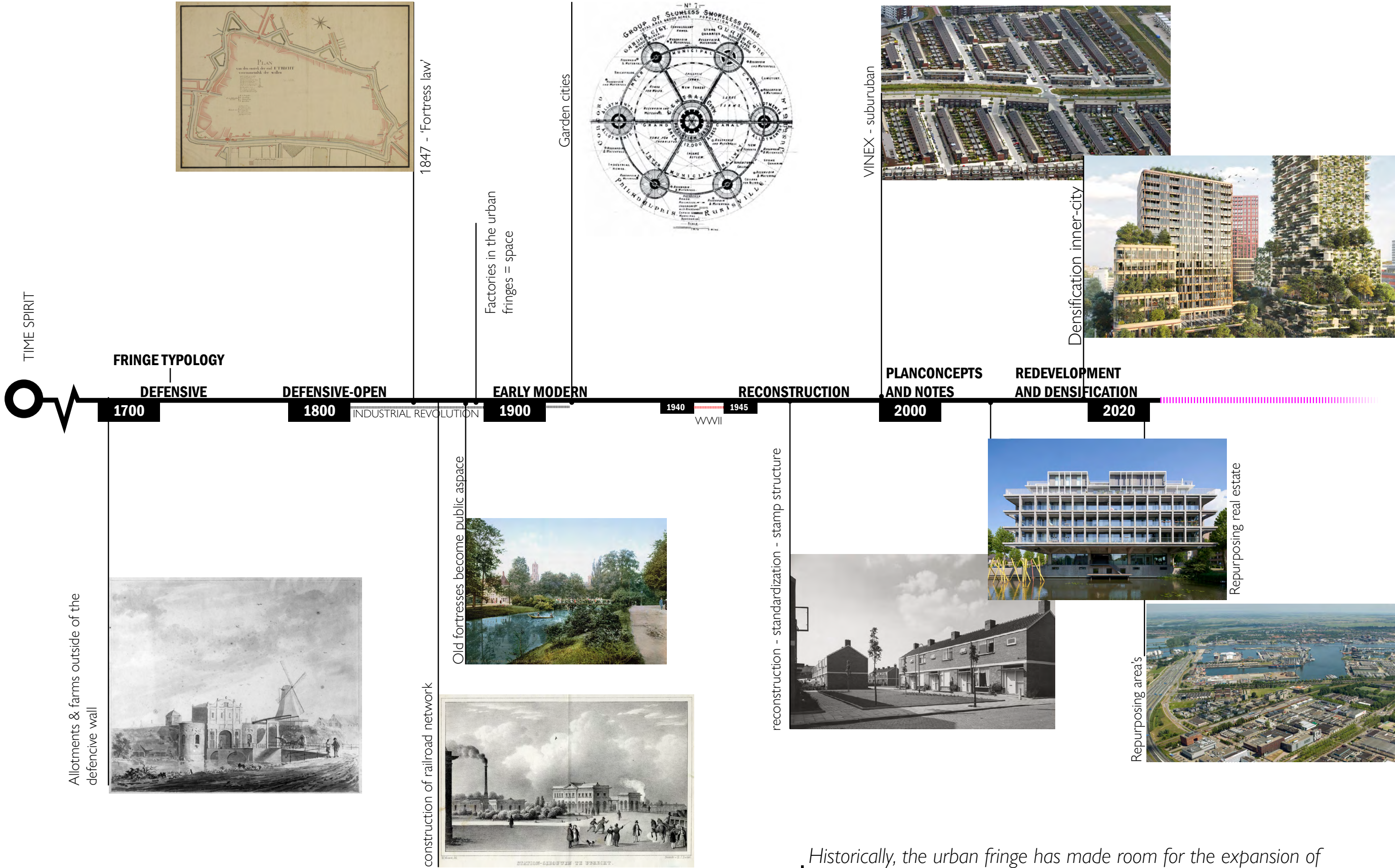
IS THE PRINCIPLE OF THE GARDEN CITY A REASON TO CHANGE THE URBAN FRINGE OF THE FUTURE?

“Research densification in the urban fringe”

Densification on ‘cluster’ level

What are the chances for the urban fringe when we allow (clustered) densification?

TIMELINE: THE ROLE OF THE URBAN FRINGE IN THE NETHERLANDS
FROM THE NEEDS OF THE CITY



FUNCTIONS END UP IN THE OUTSKIRTS OF THE CITY

In the past twenty years, the largest new locations for living, working and recreation ended up in the outskirts of the city. The urban periphery zone still has a predominantly green character, but the urbanization pressure is high. Between 1996 and 2003, more than five times as much living space was realized per square kilometer as in the urban area, and almost fourteen times as much as in the outlying area.

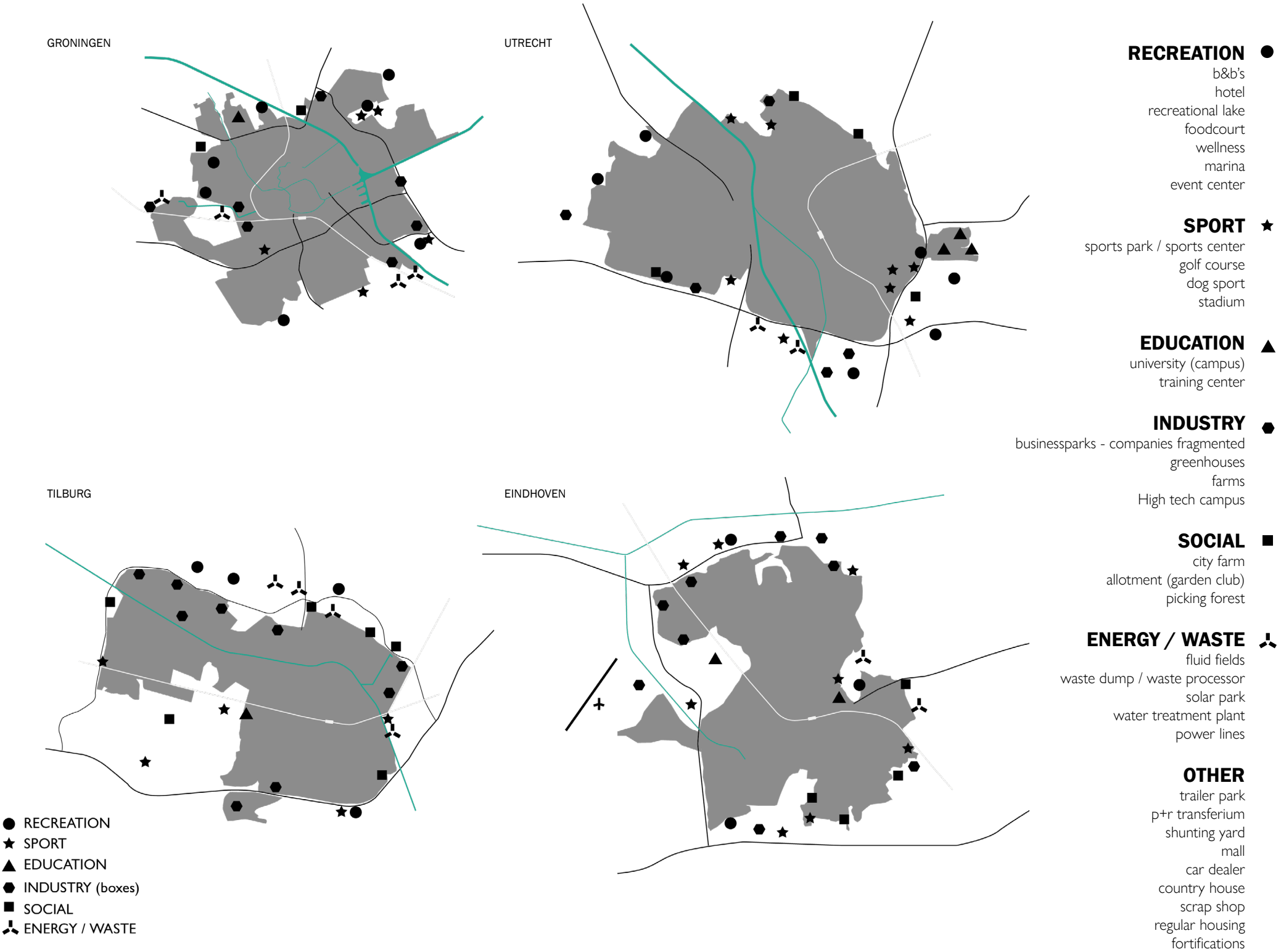
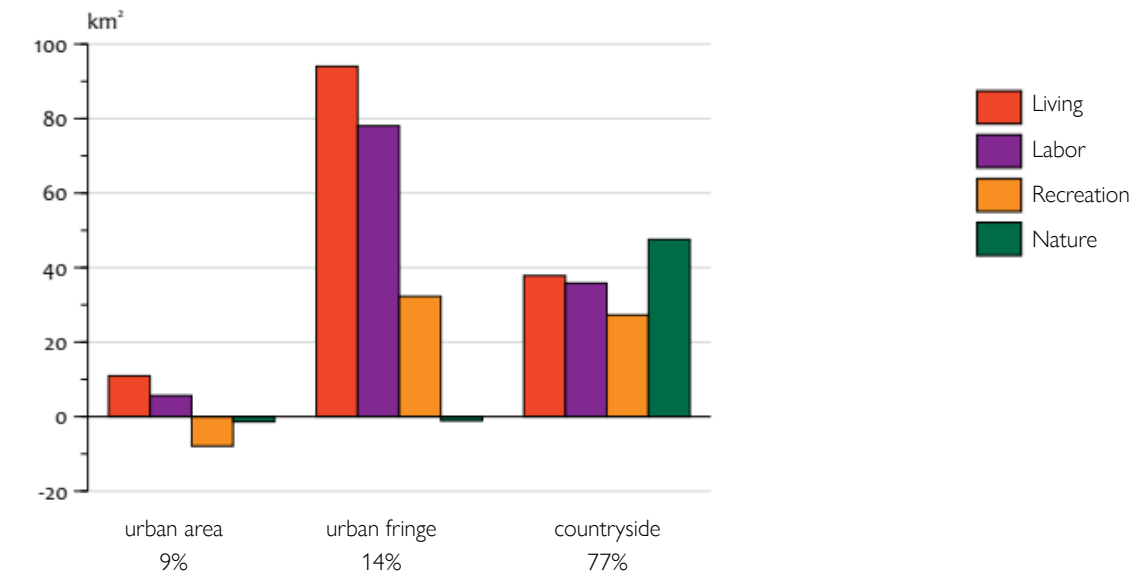
The area where new companies are located is respectively more than eight times and almost twelve times larger in the urban periphery zone than elsewhere. The recreational area in the urban periphery zone also increased considerably; per square kilometer almost six and a half times as much as in the outlying area. In the city, on the other hand, the surface recreation decreased.

Implicitly, the urban periphery zone has functioned in government policy as an expansion area, in which the search for new space for living, working, shopping and recreation has so far largely been regarded as separate tasks.

Urbanisation in the urban periphery zone fits within the bundling policy (urbanisation close to existing built-up areas). At the same time, the developments are at odds with the original objective of maintaining and reinforcing the contrast between city and country: a rather fragmented, amorphous urban periphery zone has been created in which the contrast has faded.

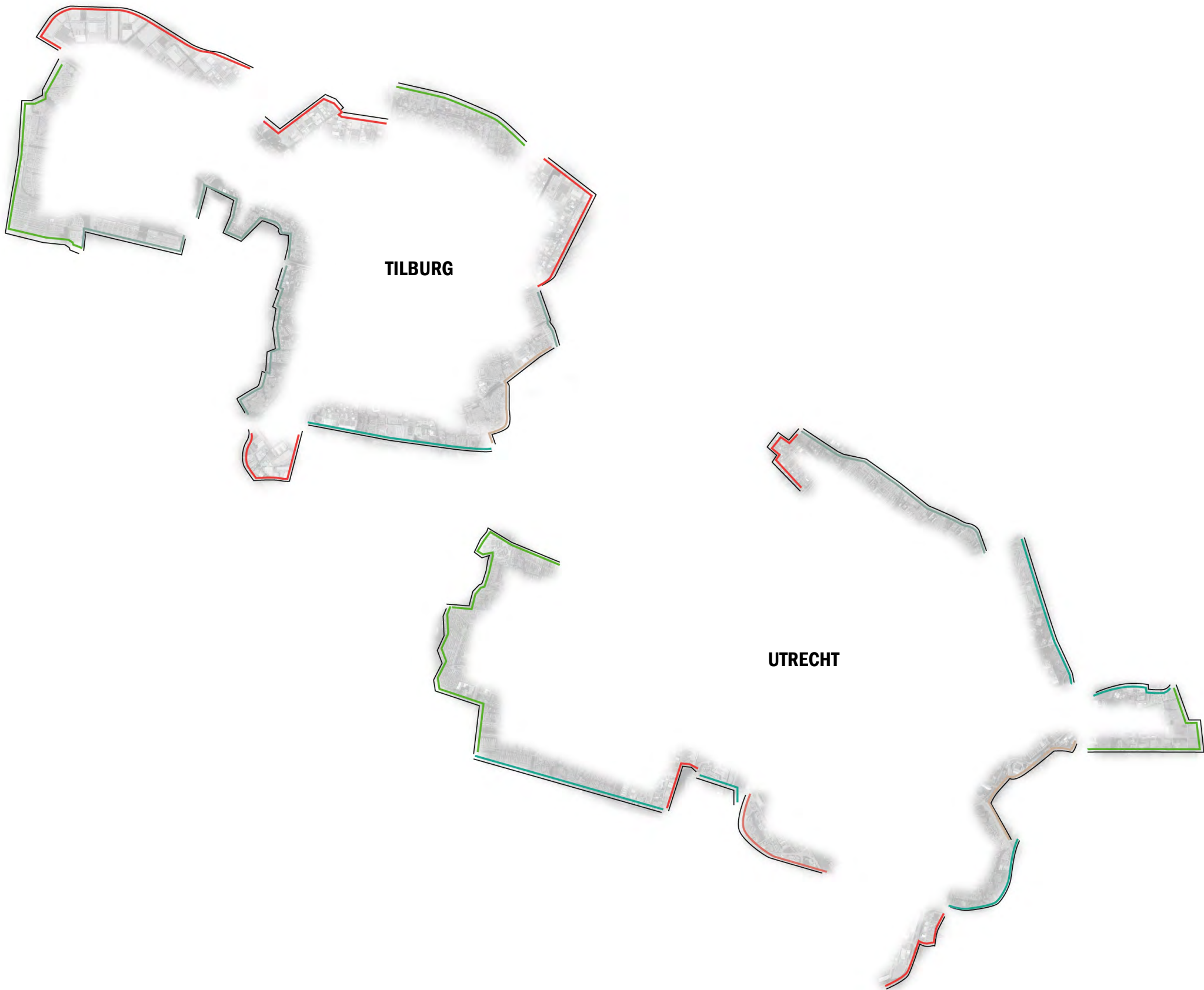
Large-scale infrastructure creates a barrier between city and country, for example for recreationists. In addition, the business parks are often poorly integrated into the (green)environment. (Bijlsma et al., 2018)

Net change in use of space in the Netherlands, 1996-2003



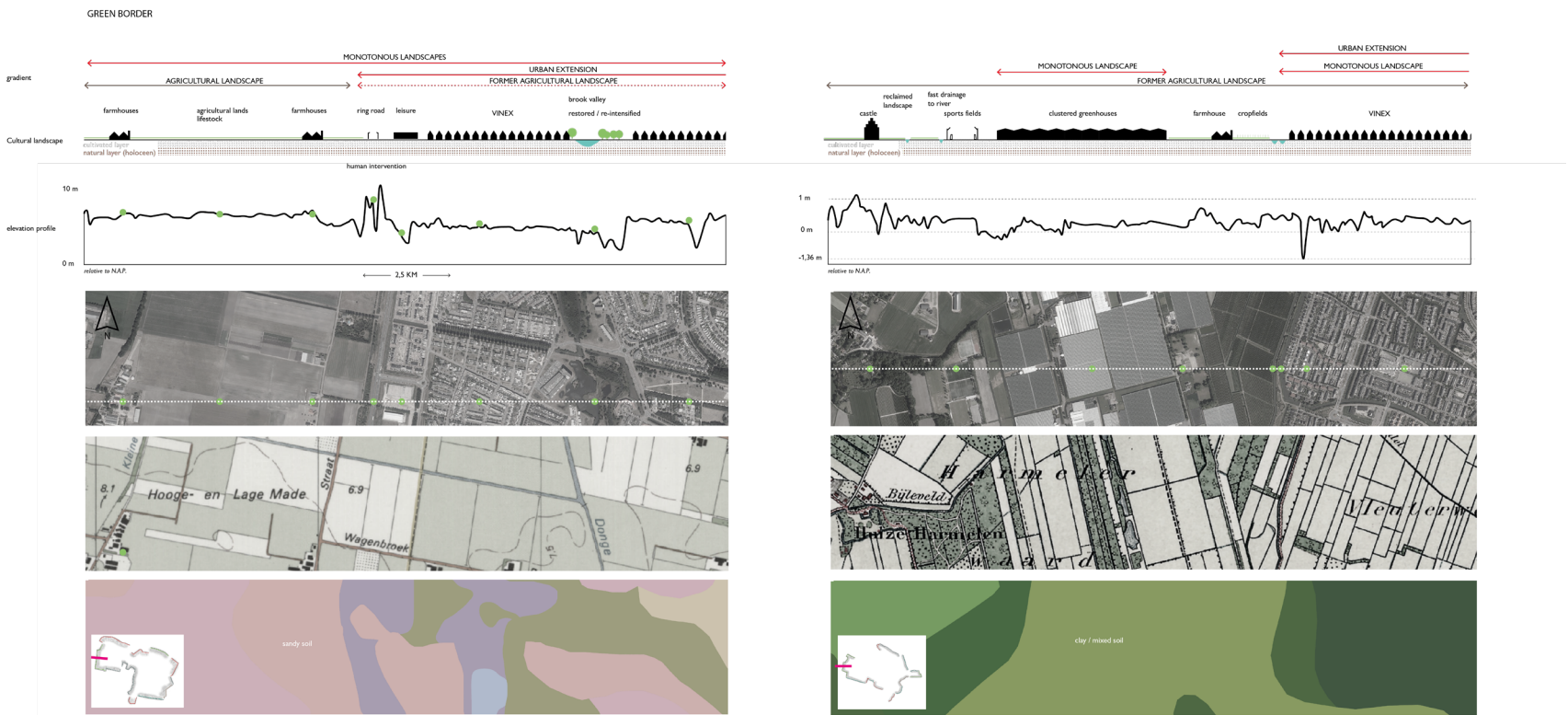
“A rather fragmented, amorphous urban periphery zone has been created in which the contrast has faded”

CATEGORIZED FRINGES
URBAN PERSPECTIVE

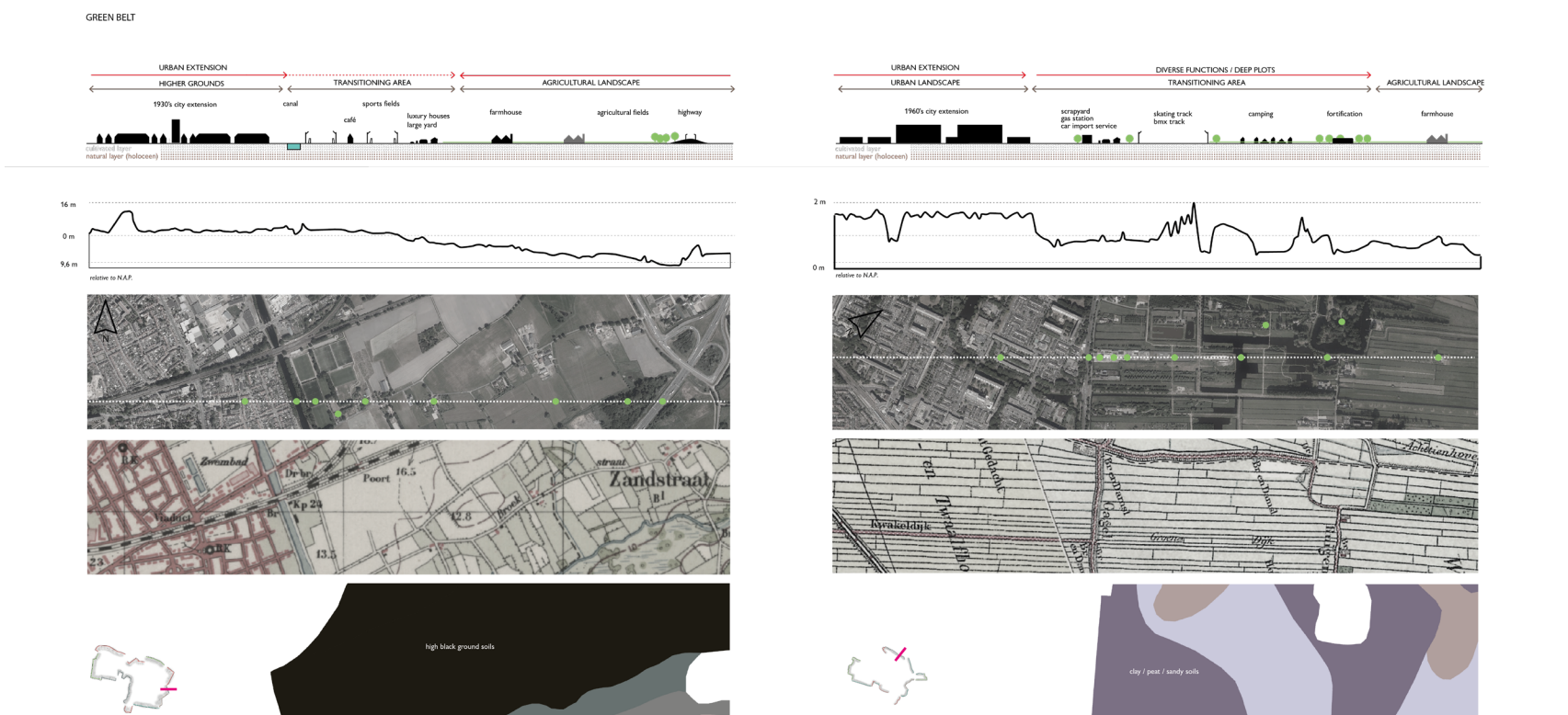


- GREEN BORDER**
It can be defined as a “hard” edge in which the residential area borders the farmland. There is little interaction between town and countryside.
- GREEN BELT**
This is the urban fringe area which changes into farmland or recreational area. In contrast to the green border, the typology of the city transitions smoothly into the agricultural landscape. The border can be defined as soft.
- FRAYED EDGE**
In this zone many functions can be found that are seemingly undesirable in other places. For example, in this type of location we find a car lot next to an garden allotment.
- INFRASTRUCTURAL BORDER**
The edge of the city is clearly marked by linear infrastructure. This can be a highway, railroad or waterway. Often a great contrast between town and country.
- BOXED FRINGE**
Here the monotonous business or industry park borders the farmland. The introverted buildings have no relationship with the adjacent landscape. Often this area is enclosed by infrastructure which is optimally tuned to serve the function.
- TRAPPED FRINGE**
This zone is enclosed by urban landscape and is often characterized by infrastructure networks. Often they are sight locations which are benefited by companies in terms of visibility.
- TENSION FIELD**
An organically grown mix of living, working and relaxing on the land side, without a clear edge between city and country.

CATEGORIZED FRINGES
URBAN PERSPECTIVE



GREEN BORDER



GREEN BELT

CONCLUSION

Clear division: agriculture - transition zone - urban area with mono-function living

Architecture of the city comes from countryside

CONCLUSION

Overlapping functions make the fringe

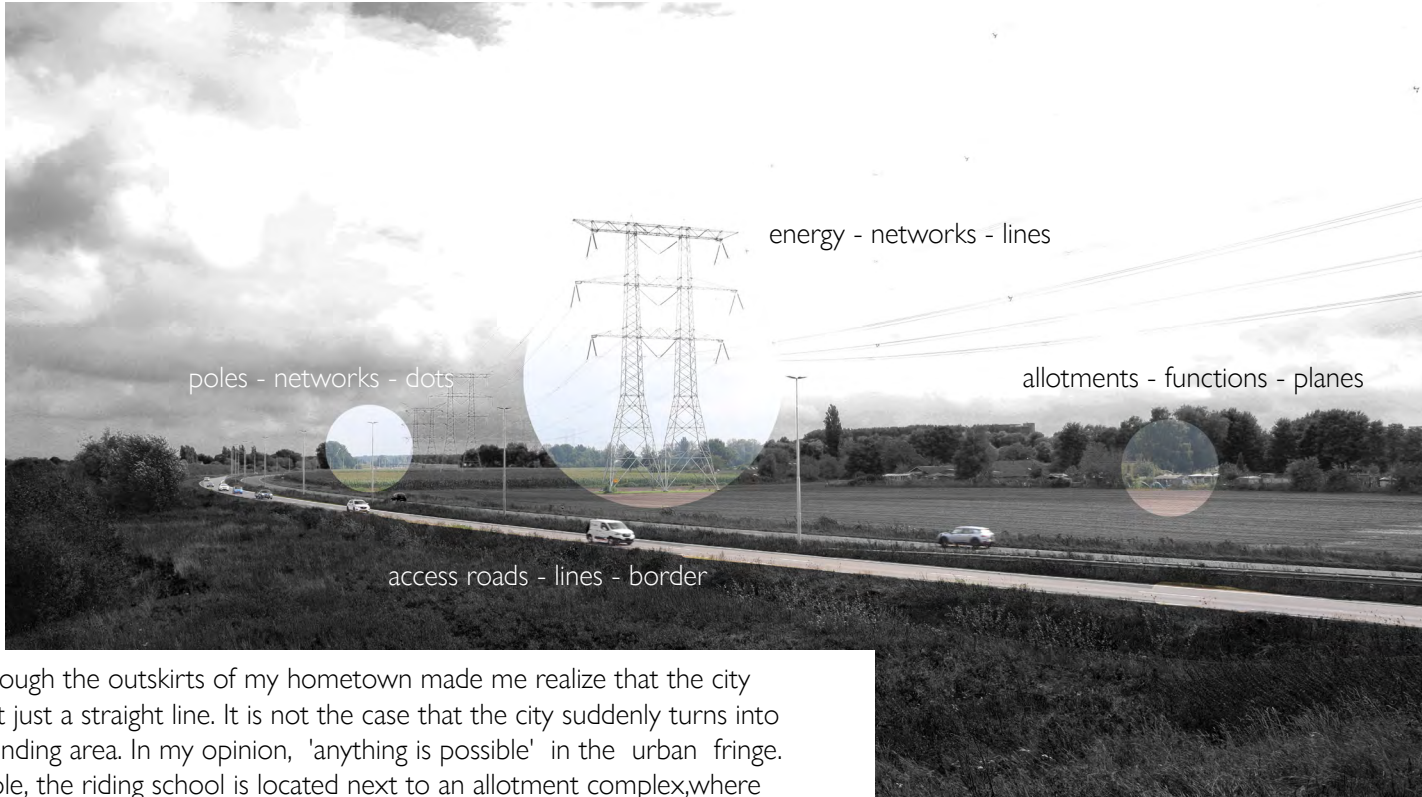
The 'transition zone' with a big differentiation of functions is messy

These functions are placed in the structure of the surrounding countryside (agricultural landscape)

Cities or urban centers, consist of many kinds of transitions between urban structure and the countryside. There is no answer to the question of what the urban fringe is exactly.

ANALYSE THE FRINGE

A tour in the urban fringe of tilburg



A tour through the outskirts of my hometown made me realize that the city edge is not just a straight line. It is not the case that the city suddenly turns into the surrounding area. In my opinion, 'anything is possible' in the urban fringe. For example, the riding school is located next to an allotment complex, where power lines cross all this and windmills dominate the horizon. I also came across temporary housing that seems to be placed in the middle of a corn field.

“Current ‘clutter’ as a basis for densification”

“The urban fringe retains its special identity”

STRANGE ENCOUNTERS & LANDMARKS



“The different landmarks in the urban fringe, we are not surprised, it simply belongs to the landscape.”

NO MAN’S LAND

In the book ‘no man’s land’, David Hamers has written down a number of impressions that in my opinion perfectly describe the frayed edge:

- There are no accurate maps of the intermediate country and certainly no tourist maps, or it falls off the map.
- Between, in addition to, in and on (often disappeared) old use, new activities emerge.
- Use other than originally intended.
- Inventive use of fallow land.
- Space is left.
- What is the front and back of buildings and lots is unclear.
- Addresses are missing or unclear.
- Activities that you do not associate with each other can be found next to each other.
- You can get in, but whether that is allowed is unclear. The ‘private-open-trap’: on the one hand you can get in, on the other hand you can’t get out.
- You easily walk right through everything, do not use the beaten track.
- There are often ‘dixie-toilets’ and containers.
- There are old tracks and roads.
- Roads often get dead.
- There are pipes, stones, heaps of sand and the like, but they do not seem to be built, temporarily or for a longer period of time.
- You are often sent away, either immediately or after a while looking around and photographing.
- Men can easily urinate there, women can’t.
- You often see 4x4 cars.
- A business park, high-quality office park, conference centre, cultural institution or amusement park is often planned, if there is nothing to see of it for the time being.
- Often advancing new construction in the background.

Source: No Man’s Land, David Hamers



The fringes has various encounters and characteristic. We can also call it no man’s land. Here ‘everything’ is possible, and nothing is crazy.

COMMON ARCHITECTURE IN THE URBAN FRINGE AREA

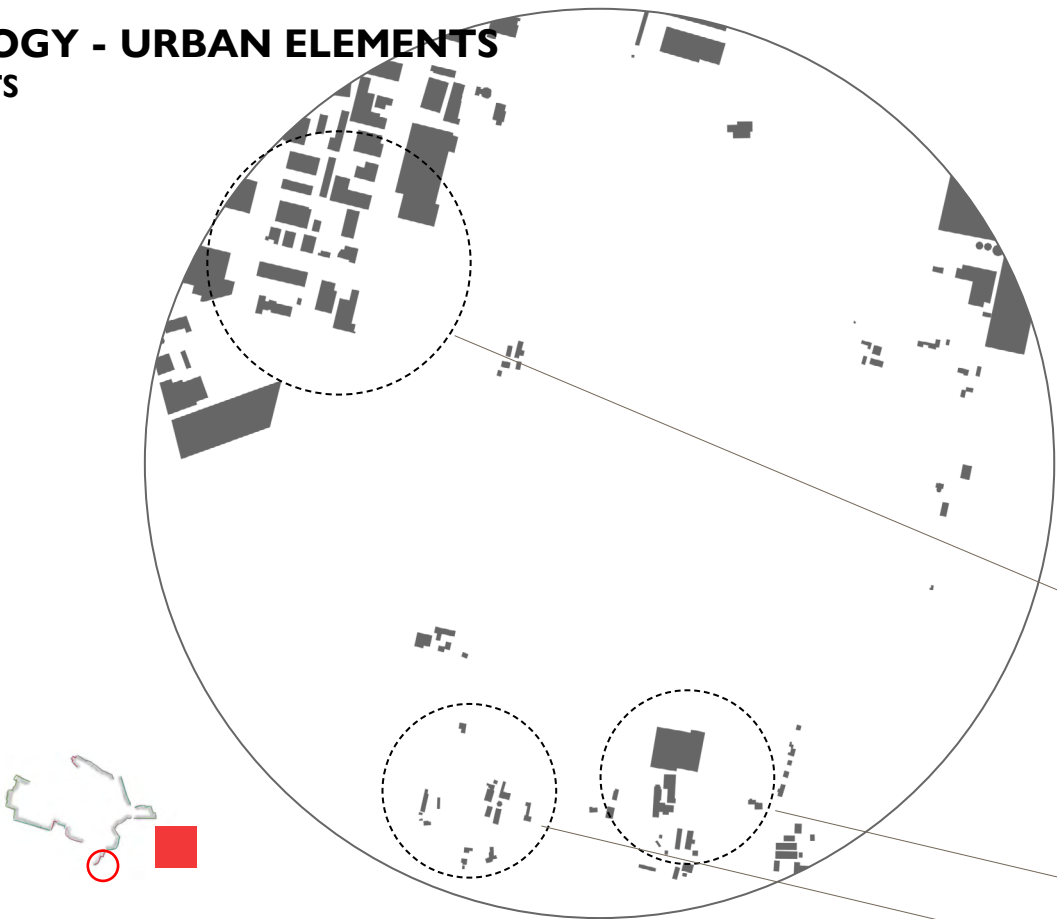
“A distinguishing feature of every city, and therefore also of the urban aesthetic, is the tension that has been and is being created between place and buildings, areas and elements. This tension is generated by the difference between the existing urban facts in a particular place, and it has not only a spatial but also a temporal dimension. By this I mean both the historical process in which phenomena of a permanent character with all their implications are present, and a purely chronological process in which urban facts can be identified that occurred in successive periods.”

(Rossi, 2002).

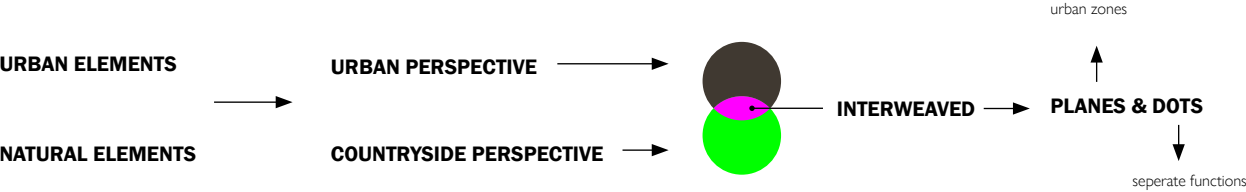


The architecture in the urban fringe is derived from the countryside

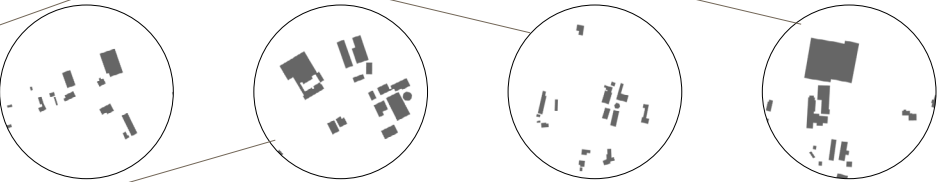
MORPHOLOGY - URBAN ELEMENTS
PLANES & DOTS



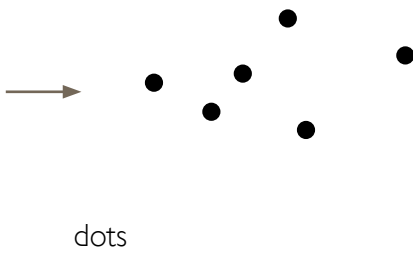
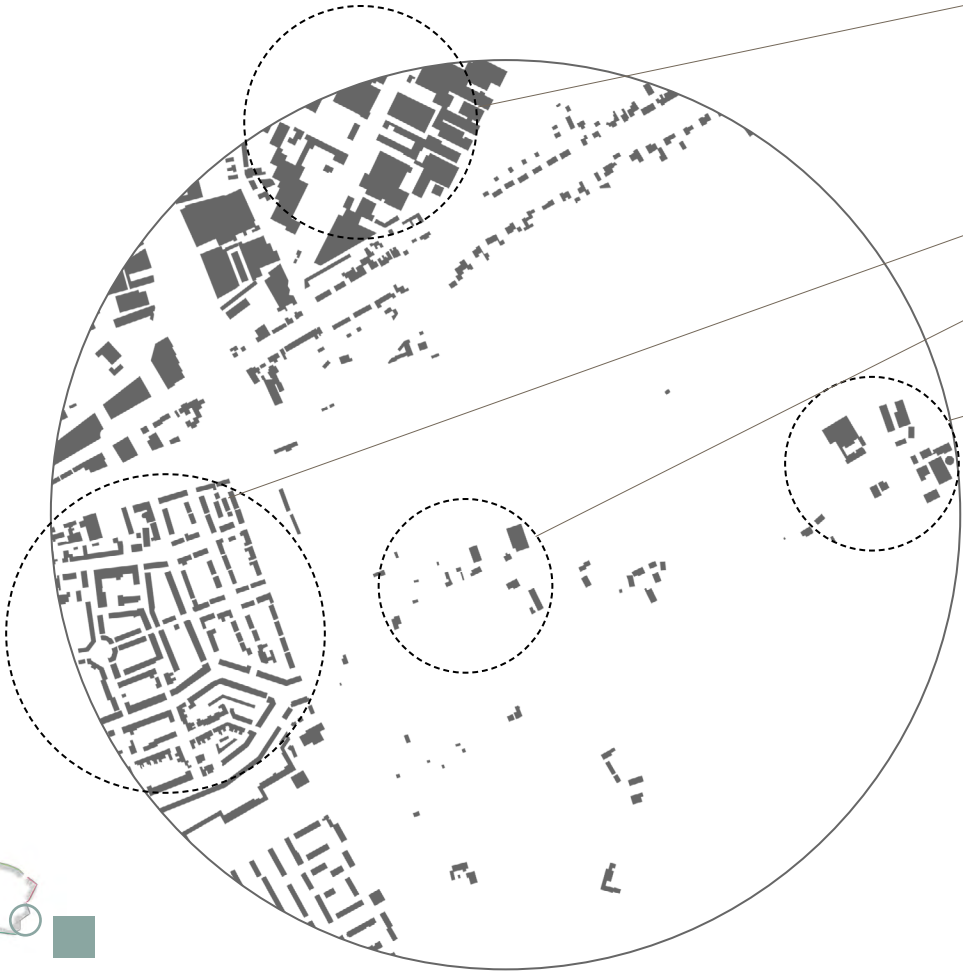
Interweaved
The fringe consists of several parts. It is an interweaving of urban functions and rural functions. In order to be able to make an analysis, I am looking for a different approach.



URBAN ZONES
small plots
relatively high land price
monofunctional



SEPARATE FUNCTIONS
big plots
relative low land price
experimental character



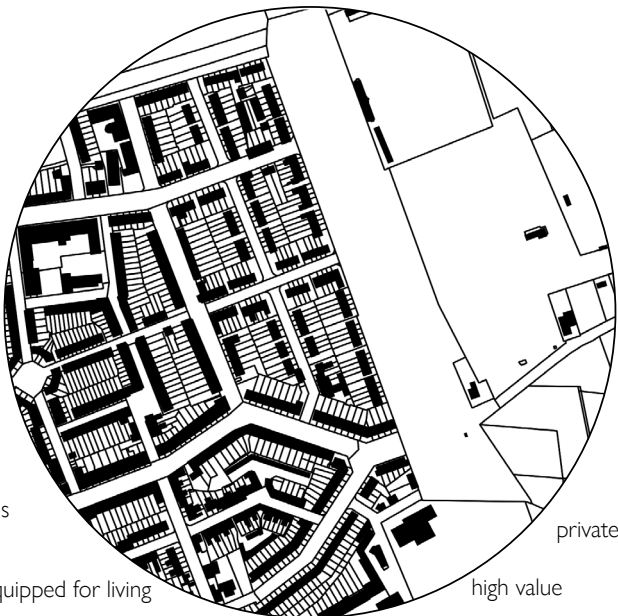
MORPHOLOGY - URBAN ELEMENTS
PLANES



AERIAL VIEW



MORPHOLOGY



gardens
equipped for living
monofunctional
small plots
private
high value

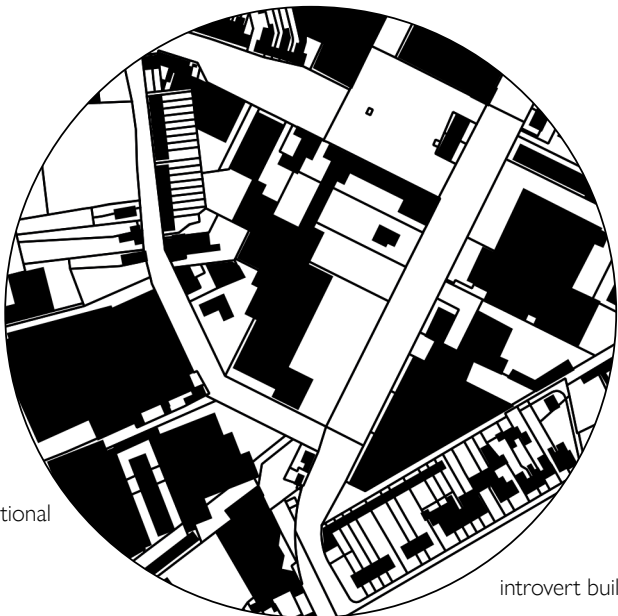
URBAN LANDSCAPE



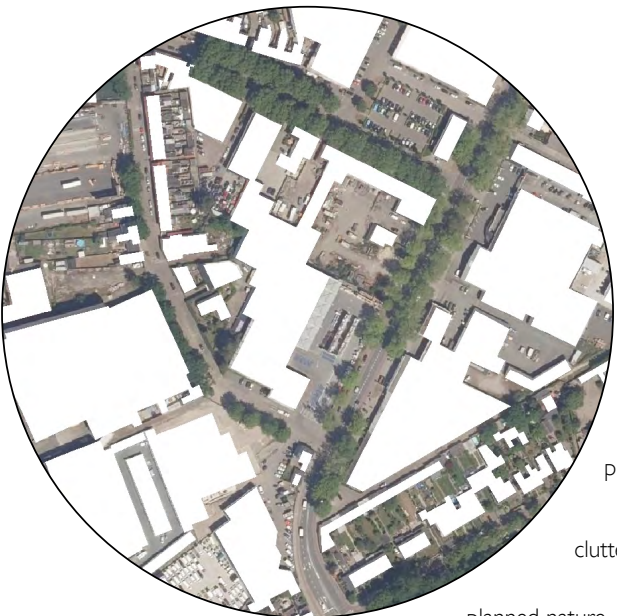
contrast
urban landscape to culture landscape

CONCLUSION

Small plots, high price/ m²
Monofunctional area's on a large scale
Ordered urban landscape

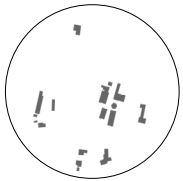
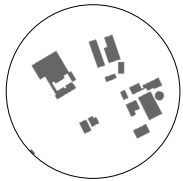
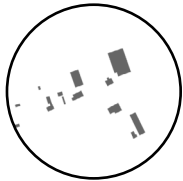


monofunctional
equipped for work, not for living
storage halls
industrial functions
introvert buildings



planned nature
cluttered appearance
planned nature
paved terrain
heat island

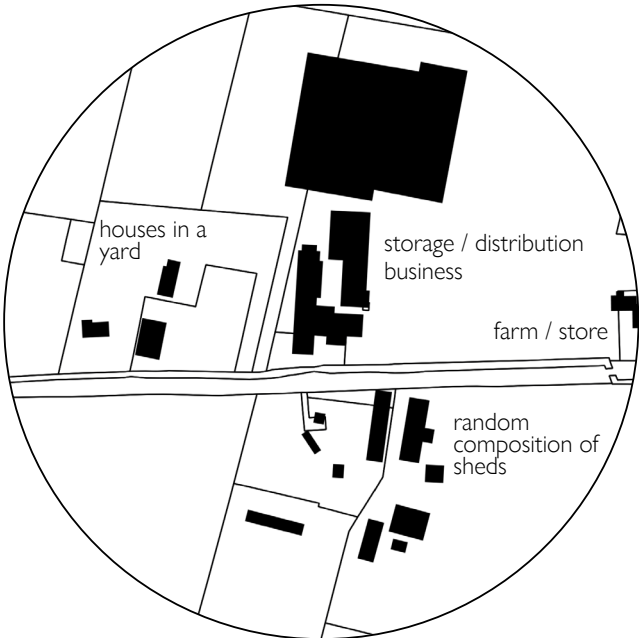
MORPHOLOGY - URBAN ELEMENTS
DOTS



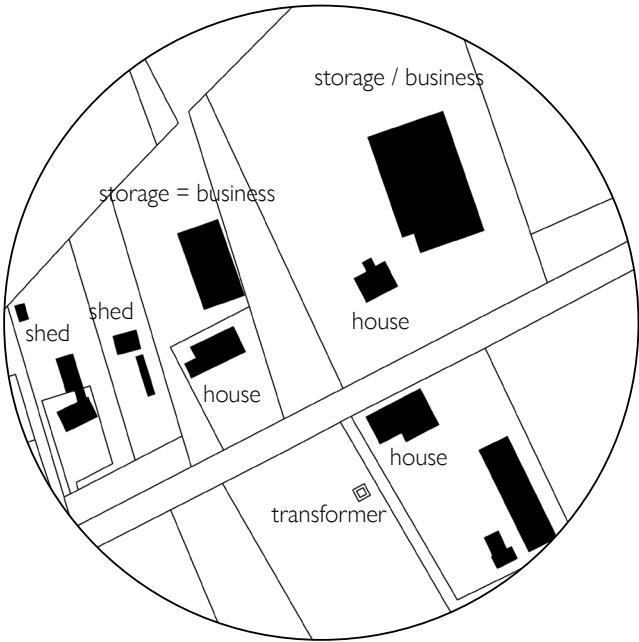
AERIAL VIEW



MORPHOLOGY



CULTURE LANDSCAPE



CONCLUSION

Unlimited transformation possible due to a lot of space

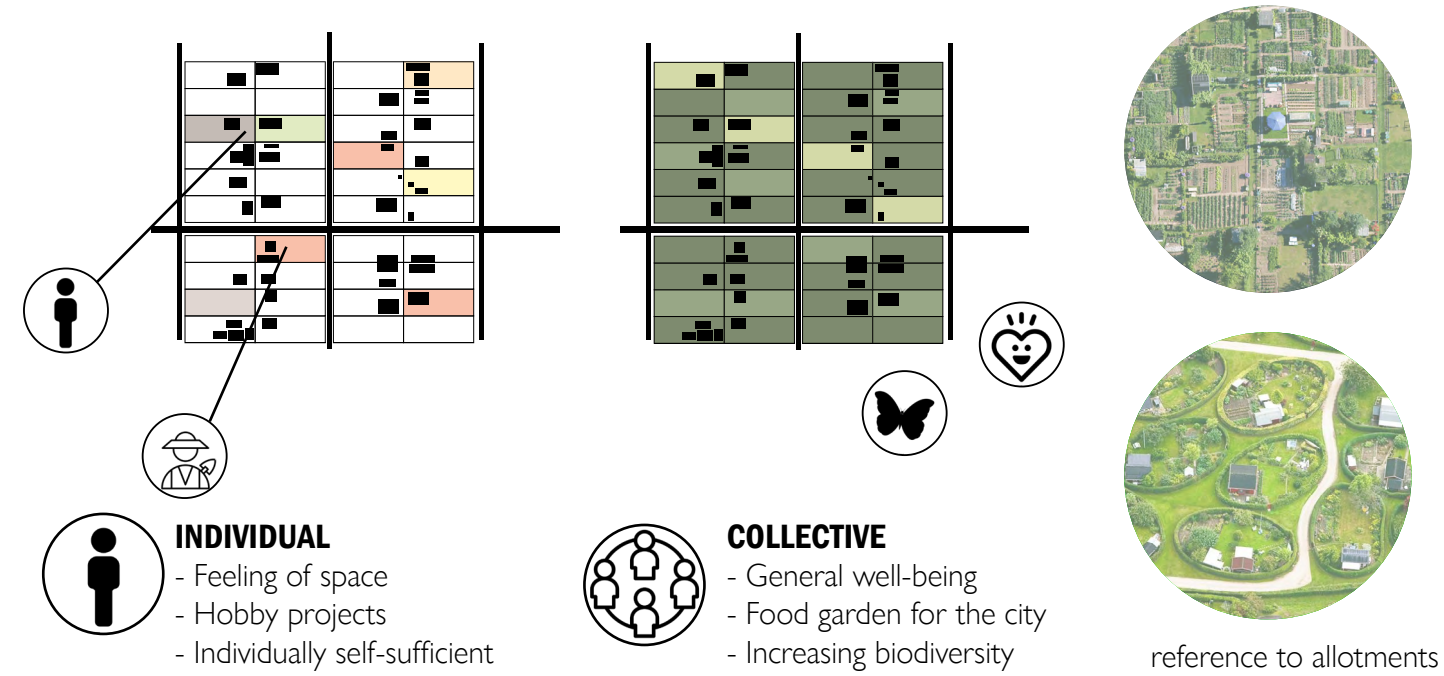
Urban elements and landscape is developed from coincidences

Concatenation of buildings = random / off-grid

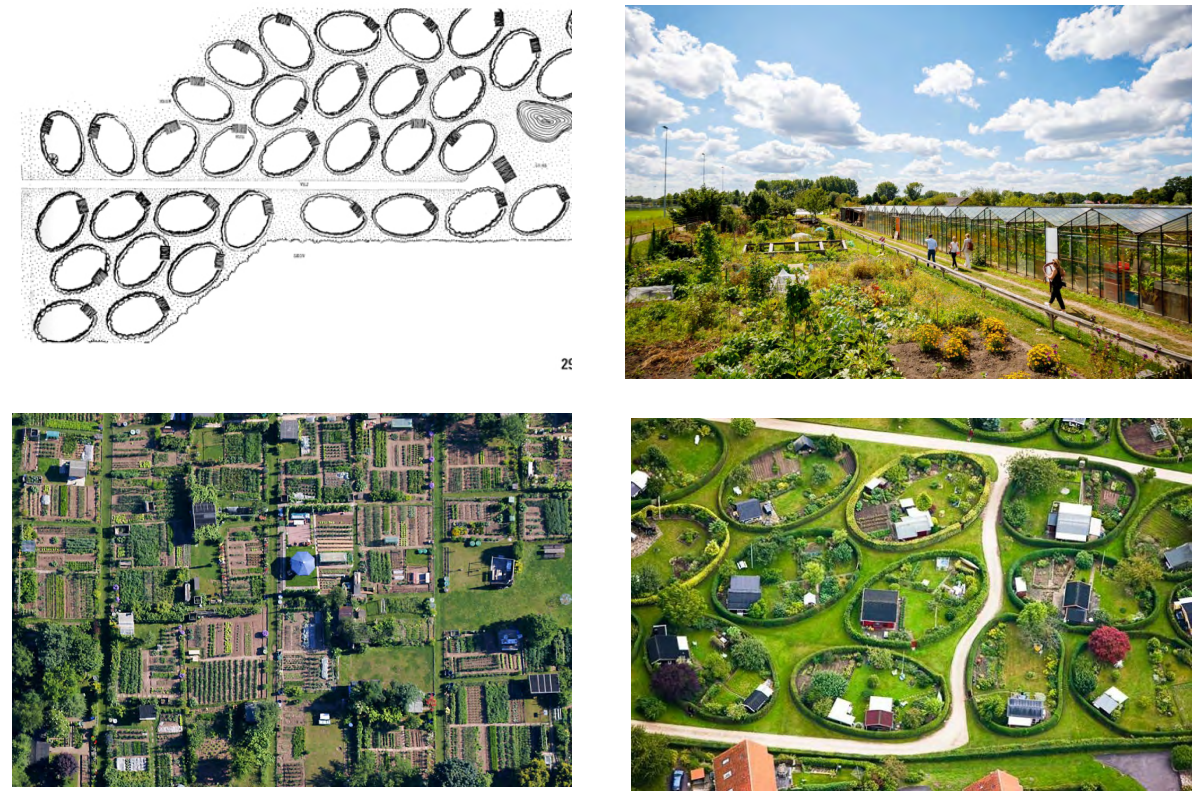
Diversity of plots (size and layout)

Functional layout gives cluttered character

ALLOTMENT GARDENS



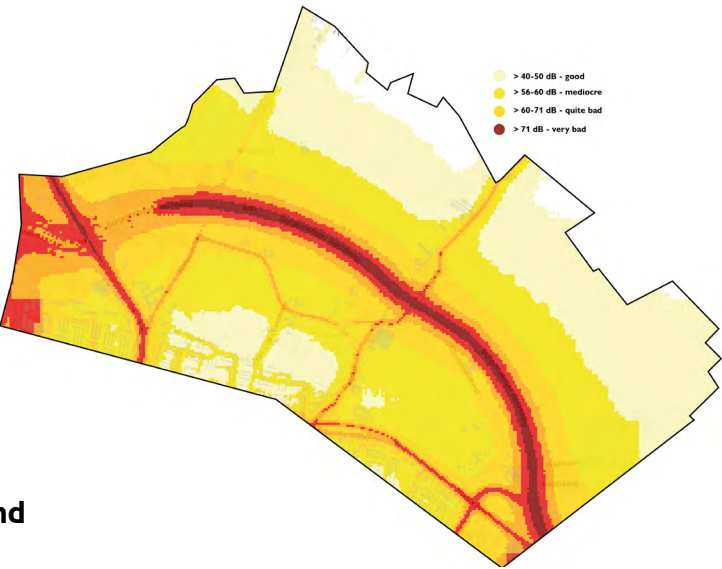
The allotment garden continues to arouse my interest. It provides starting points for allotment, growing food and biodiversity in a larger area.



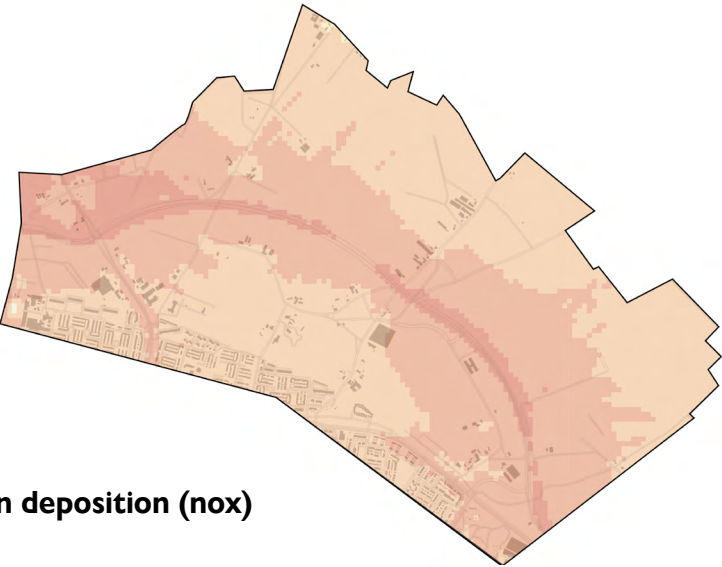
Monty Don. (1991). Garden [Foto]. <https://www.montydon.com/thegarden>
Naerum Allotment Gardens. (z.d.). [9foto]. <https://denmark.net/allotment-gardens/>
Nederlandse volkstuinten razend populair. (2020, 30 september). [Foto]. [voordewereldvanmorgen.nl](https://www.voordewereldvanmorgen.nl/artikelen/nederlandse-volkstuinen-razend-populair). <https://www.voordewereldvanmorgen.nl/artikelen/nederlandse-volkstuinen-razend-populair>

ANALYSIS
ECOSYSTEM

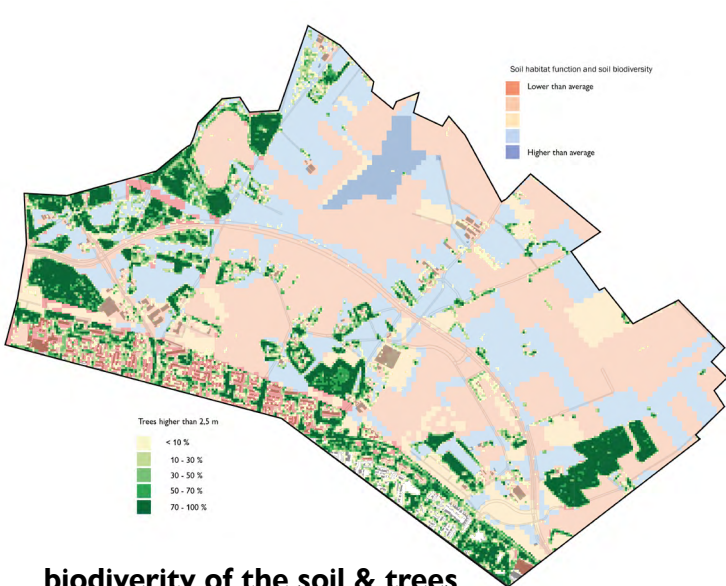
Research into the landscape and the ecosystem gives me indications that we are dealing with fertile soil here. Cultural-historical research indicates that wet heathland used to be present here. These conclusions give me a good picture of the ecosystem of the urban fringe.



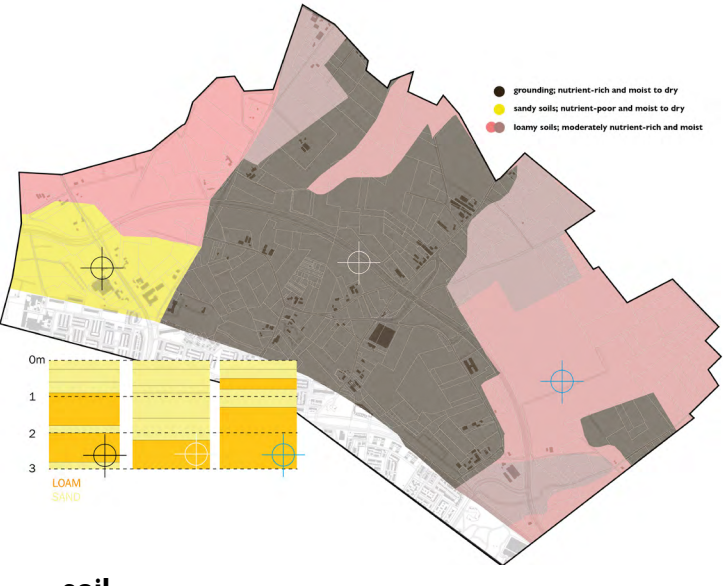
sound



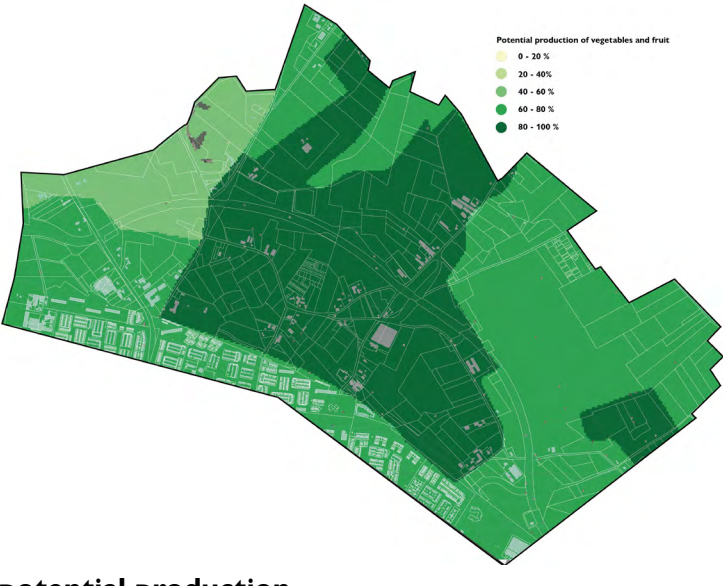
nitrogen deposition (nox)



biodiversity of the soil & trees



soil



potential production



cultural historical elements

LANDSCAPE PARK PAUWELS

To the north of the city of Tilburg lies a vast area labelled Landscape Park Pauwels. The area has a unique environment where nature, agriculture, recreation, water, cultural history and industry come together.

The municipality of Tilburg has drawn up a course document in which ambitions have also been expressed for the northern urban periphery. A number of ambitions relevant to this project are described below.

Urban water storage

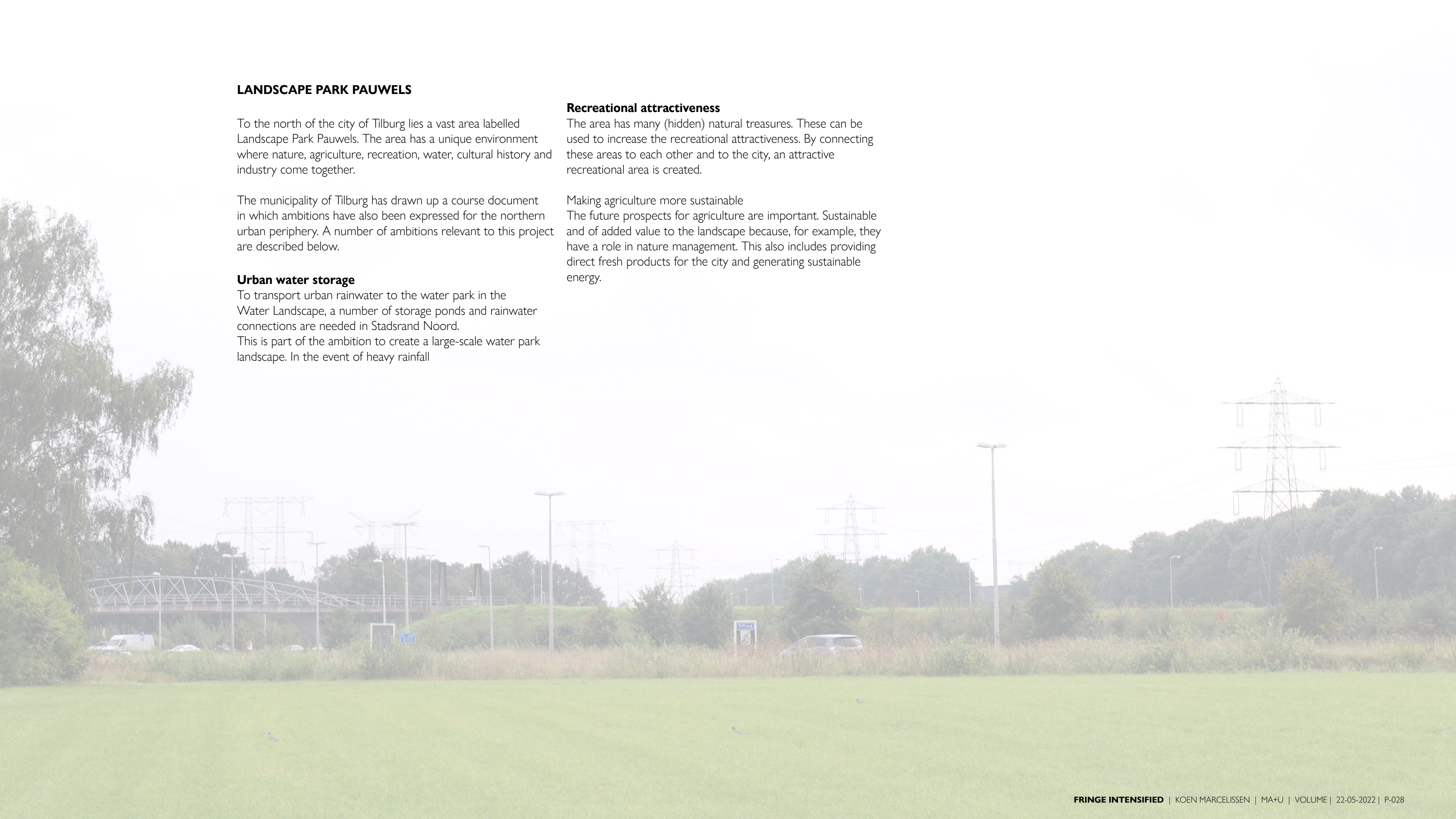
To transport urban rainwater to the water park in the Water Landscape, a number of storage ponds and rainwater connections are needed in Stadsrand Noord. This is part of the ambition to create a large-scale water park landscape. In the event of heavy rainfall

Recreational attractiveness

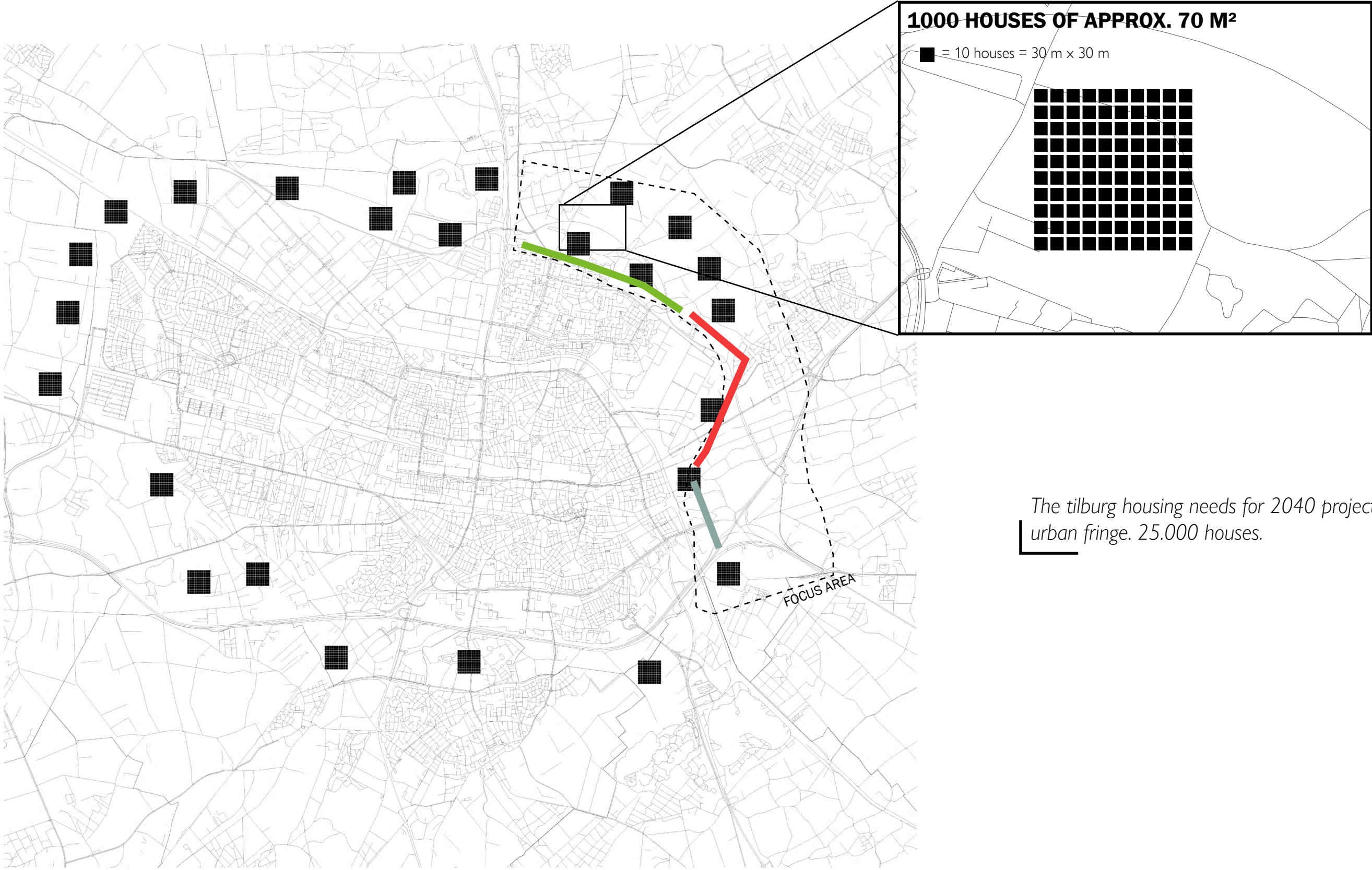
The area has many (hidden) natural treasures. These can be used to increase the recreational attractiveness. By connecting these areas to each other and to the city, an attractive recreational area is created.

Making agriculture more sustainable

The future prospects for agriculture are important. Sustainable and of added value to the landscape because, for example, they have a role in nature management. This also includes providing direct fresh products for the city and generating sustainable energy.

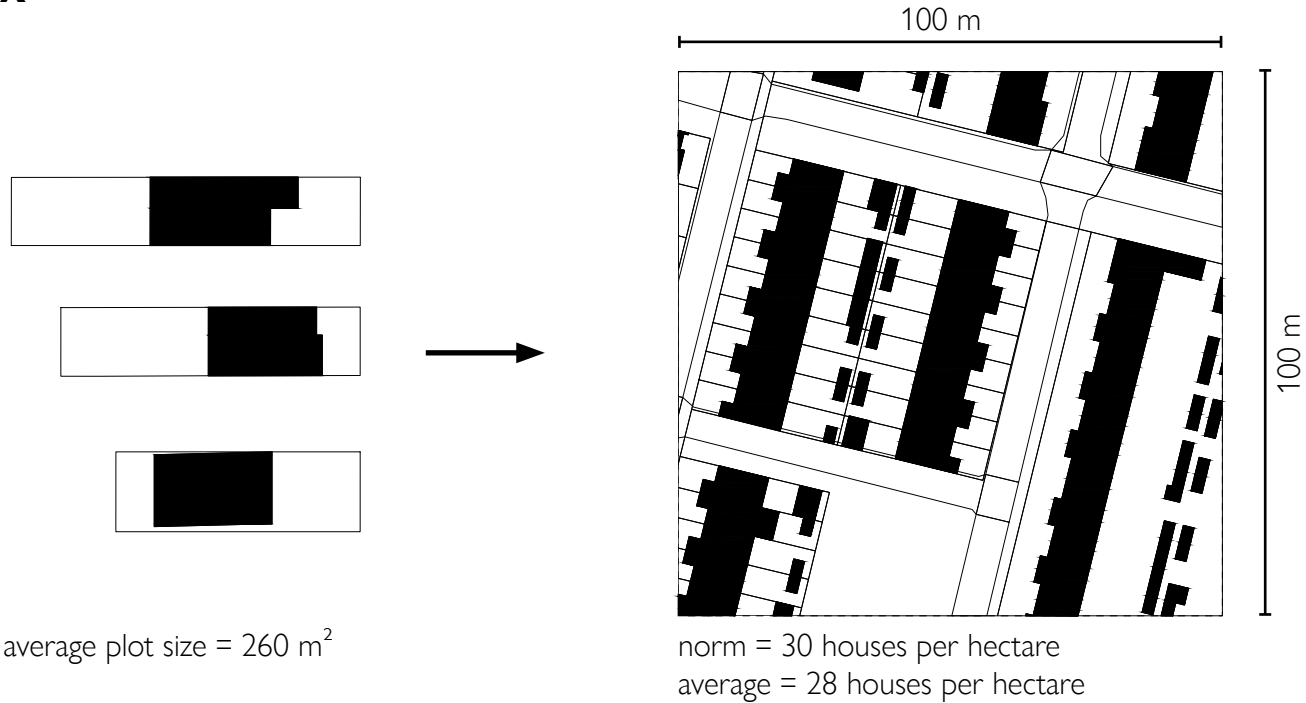


PROJECTION OF SHORTAGE ON THE FRINGE



The tilburg housing needs for 2040 projected on the urban fringe. 25.000 houses.

CASE STUDY VINEX



Ministerie VROM. (2005). Evaluatie Verstedelijking VINEX 1995 tot 2005 (Nr. 1).

What if this area was developed as a ‘VINEX’ district?

With this amount of homes it is impossible to maintain the character of the urban fringe. This indicates that the intensity of housing is determined by the characteristics of the current locations.

What if the current focus area would have been marked as a VINEX location?



approx. 1,45 km² = 1450 hectares



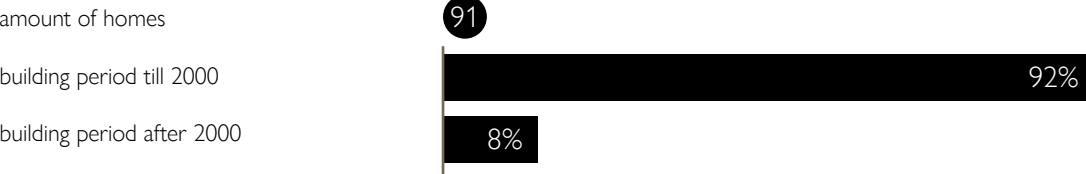
= 39.000 houses

NORHTERN OUTLYING AREA

INHABITANTS



HOMES



HOMES BY PROPERTY



HOMES BY TYPE



COMPANIES BY SECTOR



source: cbsinuwbuurt.nl (CBS)

The low population density and the number of homes per square kilometer clearly indicate that this is a dispersed area. Most of the houses are single-family homes from the last century. The 'densification' of this area could have an impact on its current character.

KEYSTONES FOR THE DESIGN

DEFINITION & CHARACTERISTICS

- Pantry of society
- The boots are there next to the freezer
- The antropology of use of space in the Netherlands is best read here.
- Anything seems to be possible
- Random structured rural arrangement
- Transition
- New activities emerge
- Space is left
- Front and back of buildings and lots is unclear
- Activities that you do not associate with each other can be found next to each other.
- Rural architecture

MORFOLOGY AND SPACE

- Developed from coincidences
- Functional layout gives cluttered character
- Allotment gardens – individual: give user/owner feeling of space
- Allotment gardens – collective: One big garden, increasing biodiversity, collective production.
- Projection of densification leads to character disturbance = conclusion

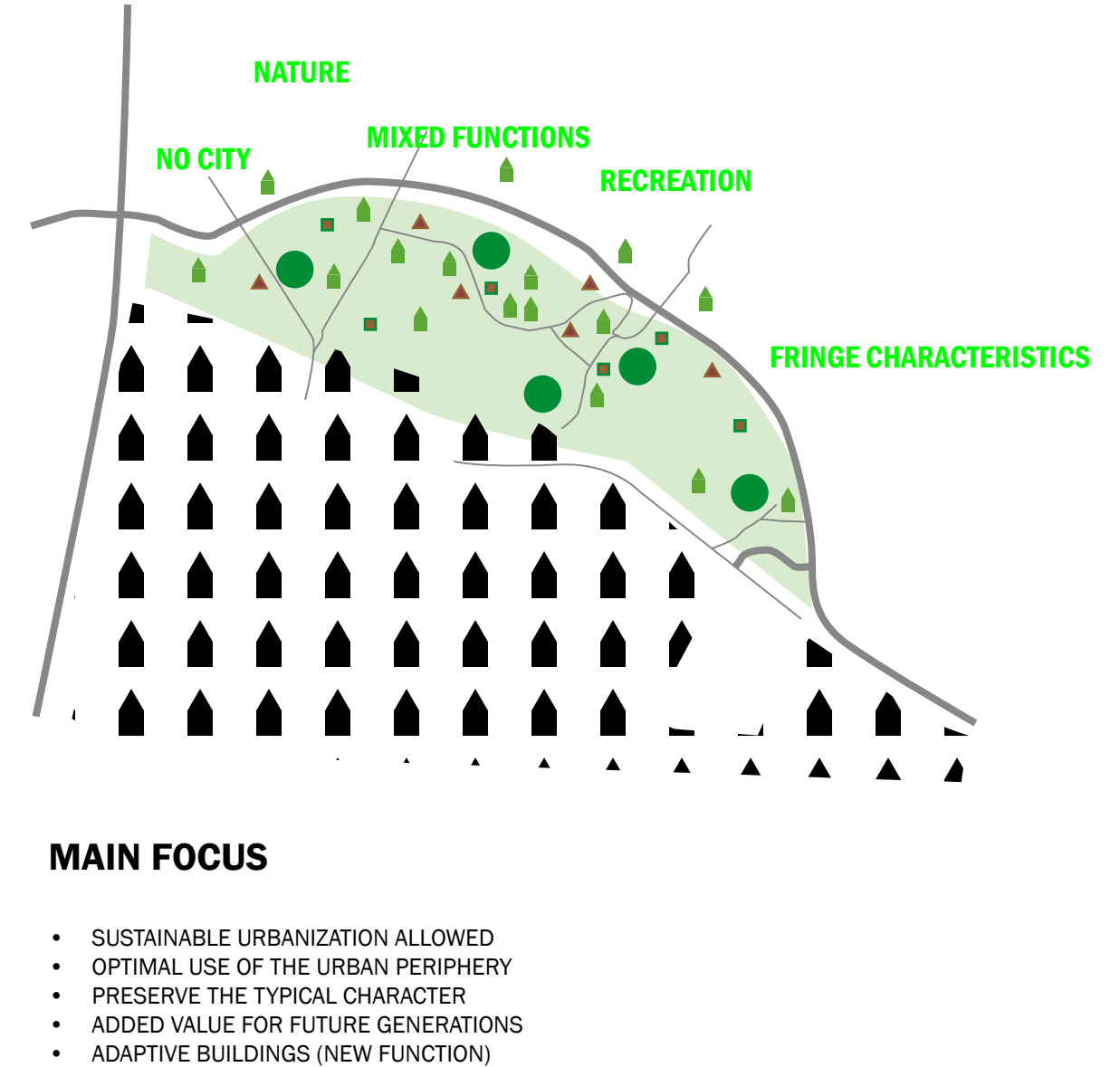
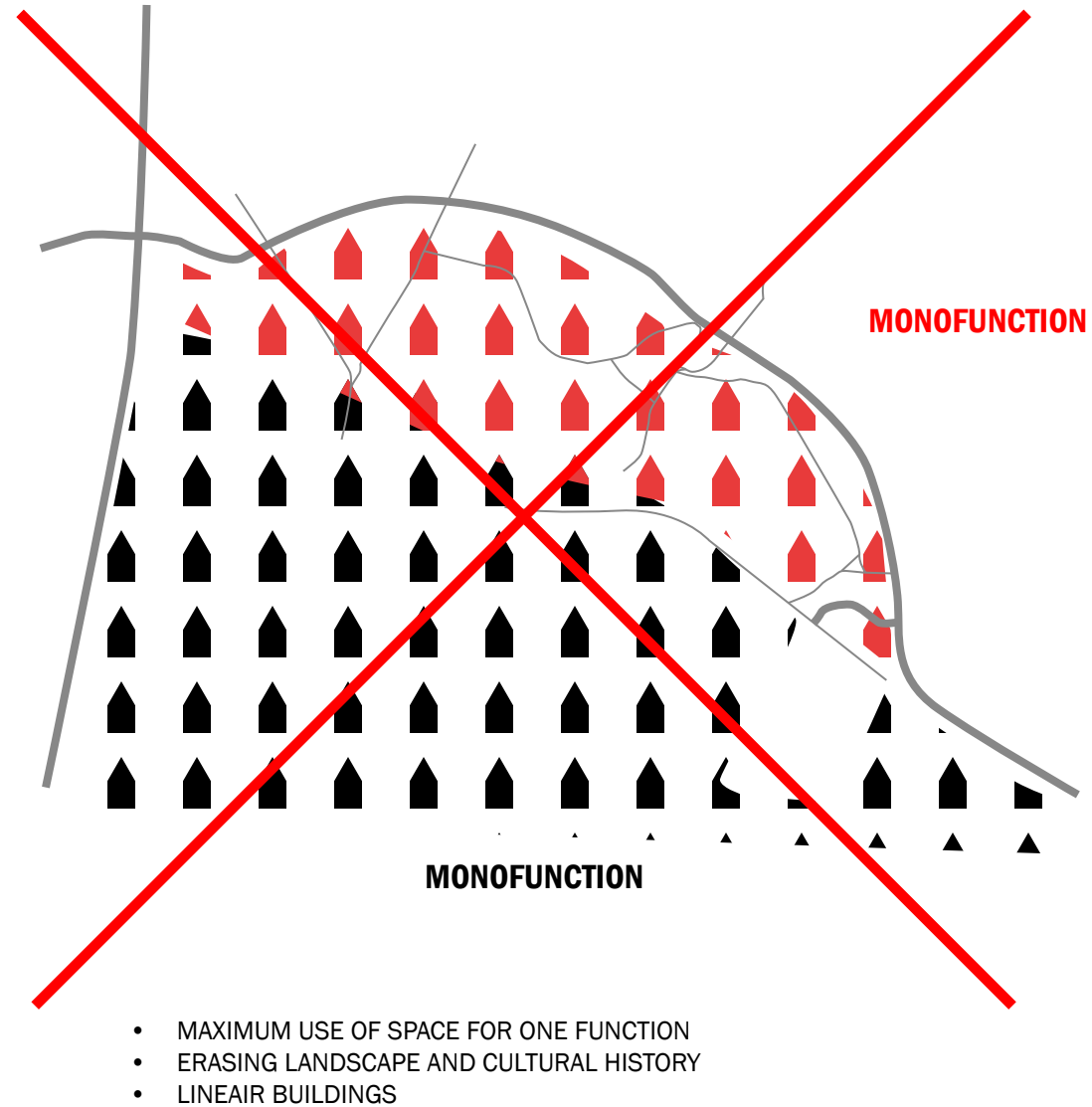
ECOSYSTEM

- The landscape has a high potential for food production
- Water retention leads to creating a water-biotope. The current place already indicaties that.
- The ecosystem defines the structure of the plan.

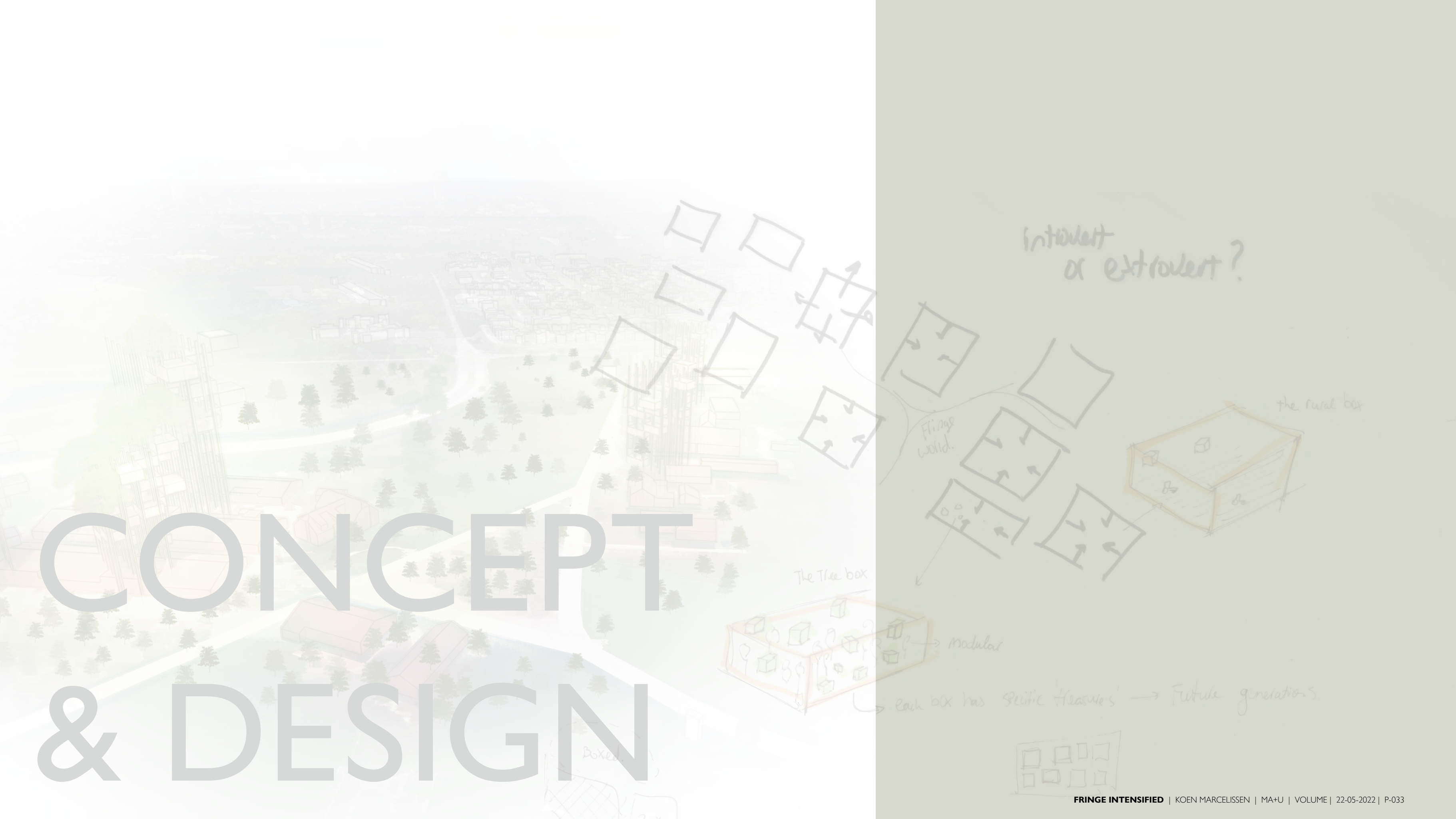
PRECONDITIONS FOR DESIGN:

- Spatial setup
- Mix of activities and living
- Coincidence, not expecting something
- Architecture in a rural atmosphere
- Transition from private to public is an important factor (outside-inside big difference?/unexpected)
- Optimally functional -> form follows from that (form follows function)
- Secondary functions (storage, processing, production) in sight, leading for atmosphere/space.
- Allotment gardens metaphor for own place, own rules, together an enclave, anarchistic.
- Recreational feels comfortable

At this point, I was forced to start using leads from the research to design. An important component, which also came out of the pre-design feedback is the target audience.



*During the process the idea arose to densify (in the end intensify) the urban fringe. This means adding living space in the special character of the urban fringe.
A challenge is to use and enhance the current character.*



CONCEPT & DESIGN



introvert
or extrovert?

Fringe
world.

the rural box

The Tree box

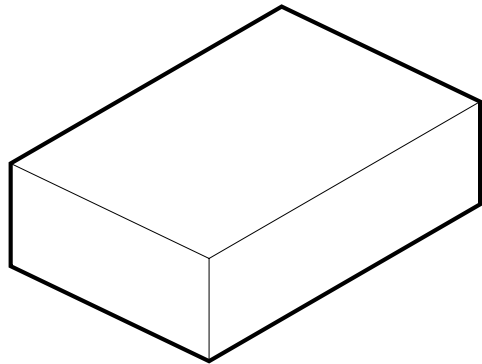
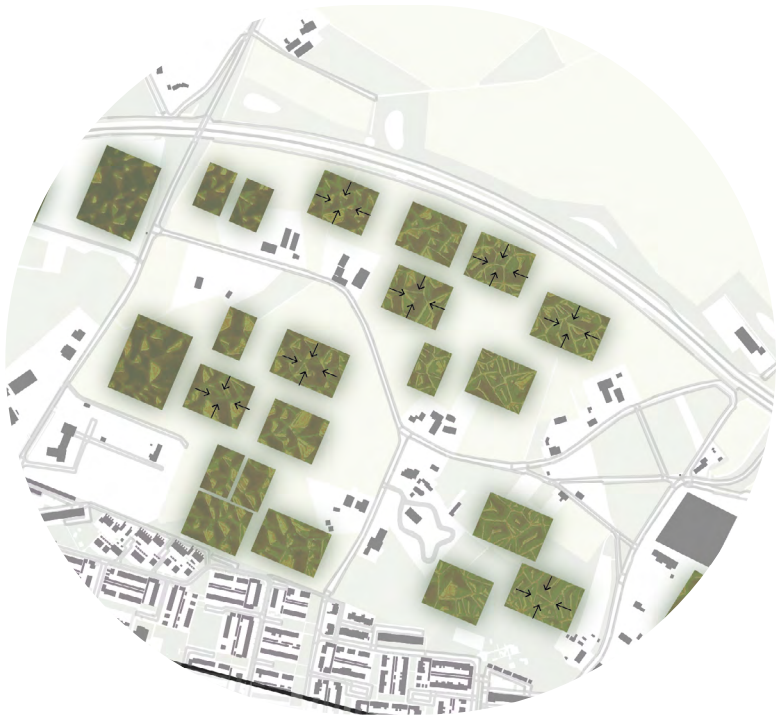
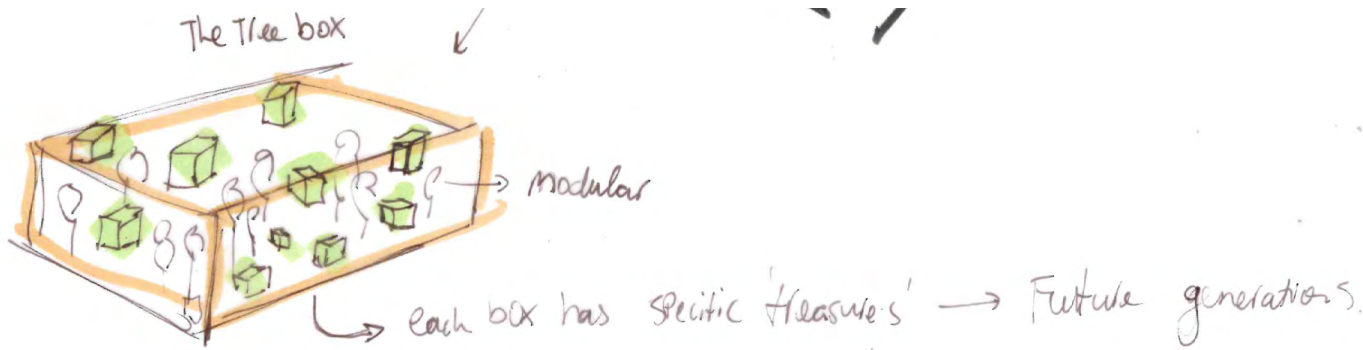
modular

each box has specific 'features' → Future generations

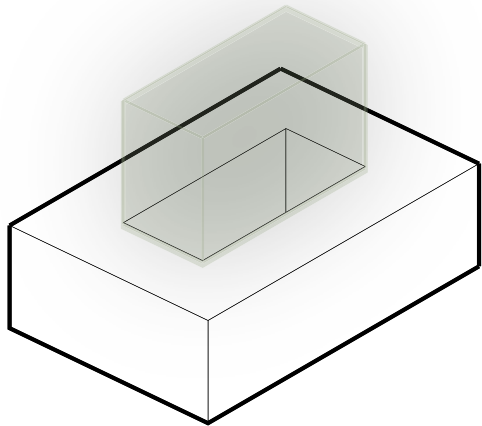


DEFINE A CONCEPT: ANOTHER BOXED LANDSCAPE

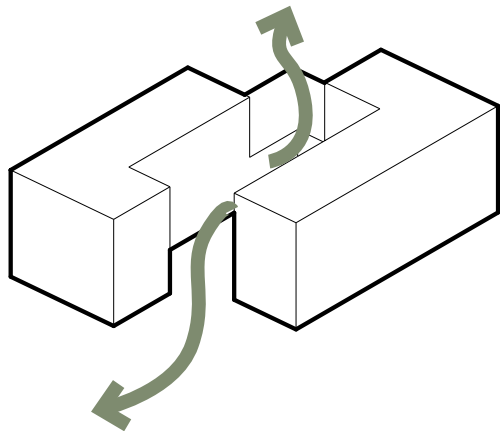
Testing locally compacted 'boxes' in the landscape. Not a gray logistics hall but an ecological paradise to live in.



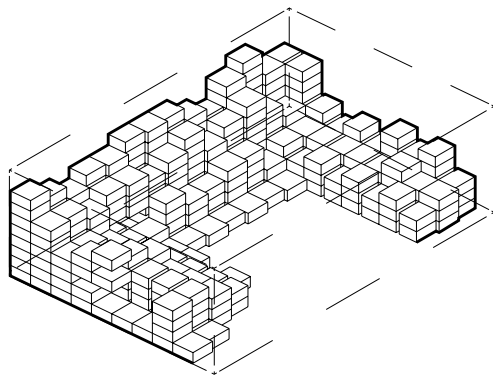
The shape of a 'box' as a form concept



Core = ecosystem



Connection nature networks

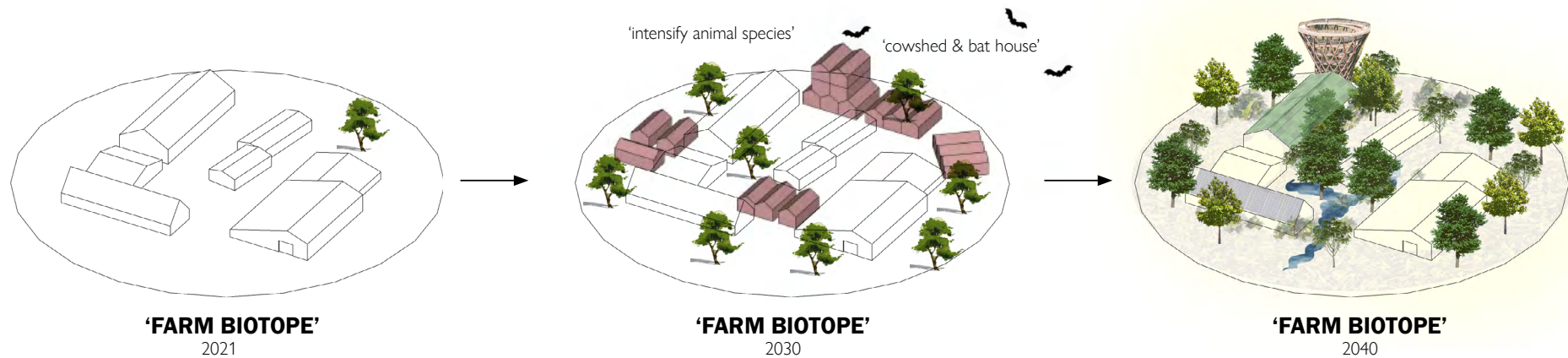
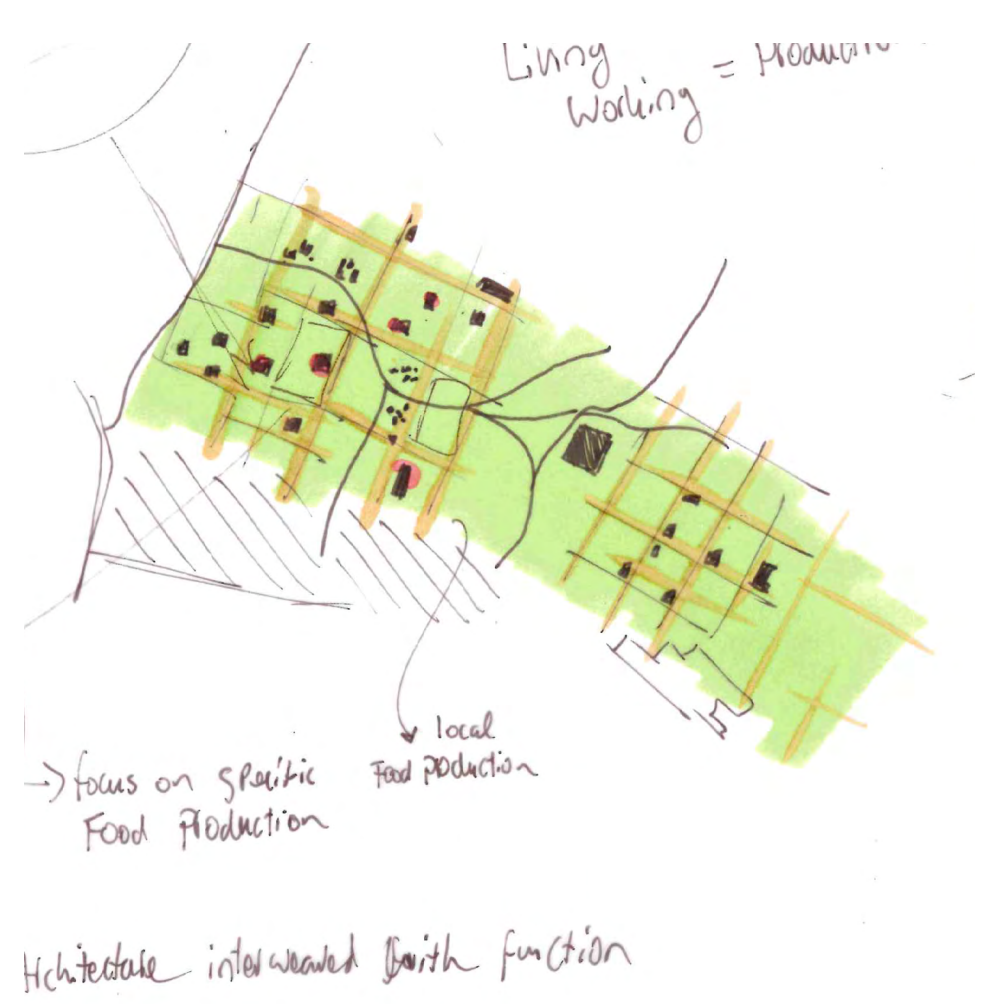


Human territory

Testing locally compacted 'boxes' in the landscape. Not a gray logistics hall but an ecological paradise to live in.

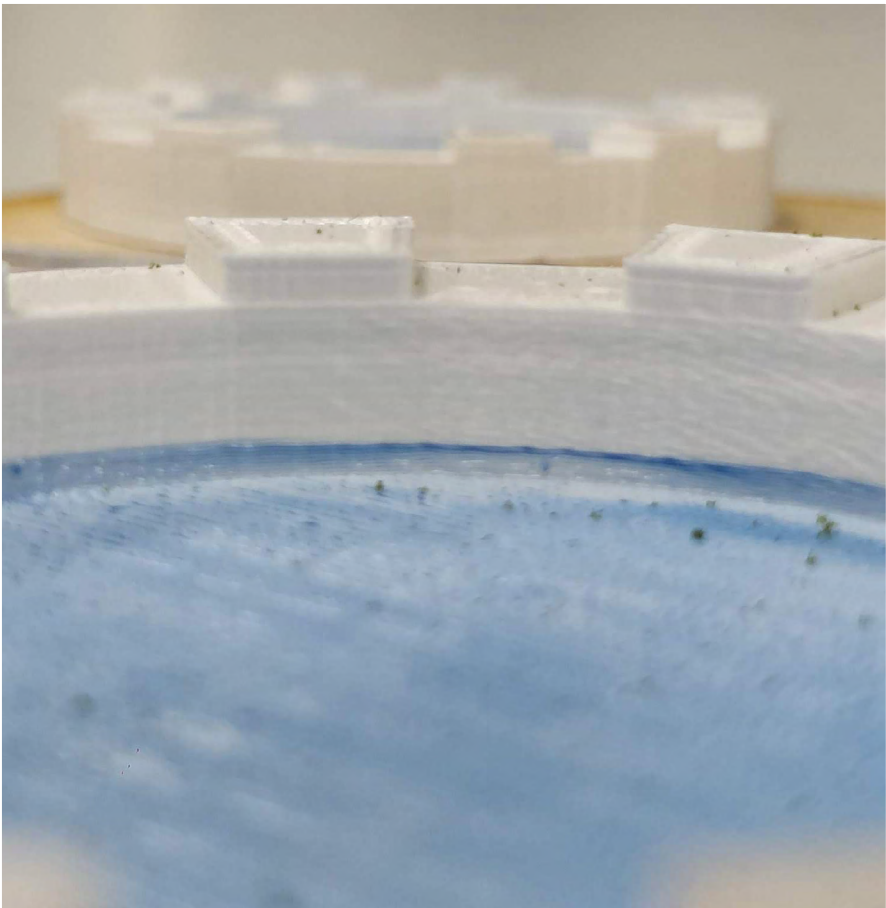
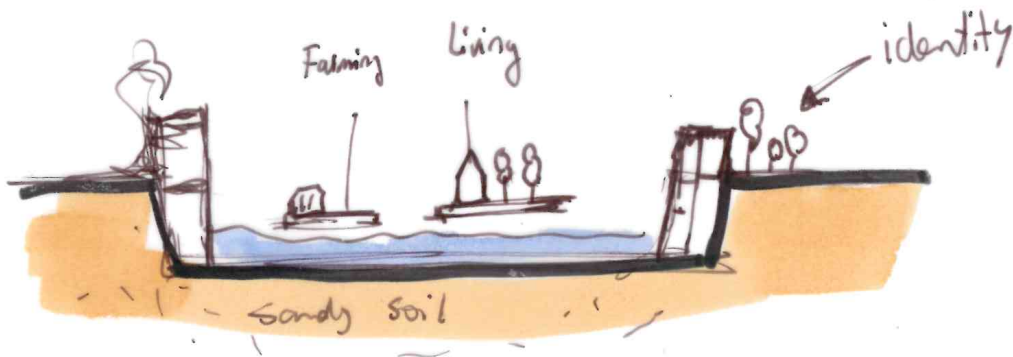
DEFINE A CONCEPT: COLONIZED ALLOTMENTS

The high fertility of the area as a basis for a food landscape. Focus on improving existing plots . Consider biotopes per plot.



DEFINE A CONCEPT: WATERFRONT

With this concept I try to go along with the water landscape designated by the municipality. Can compaction occur in the edge that is part of the water system?



REFERENCE

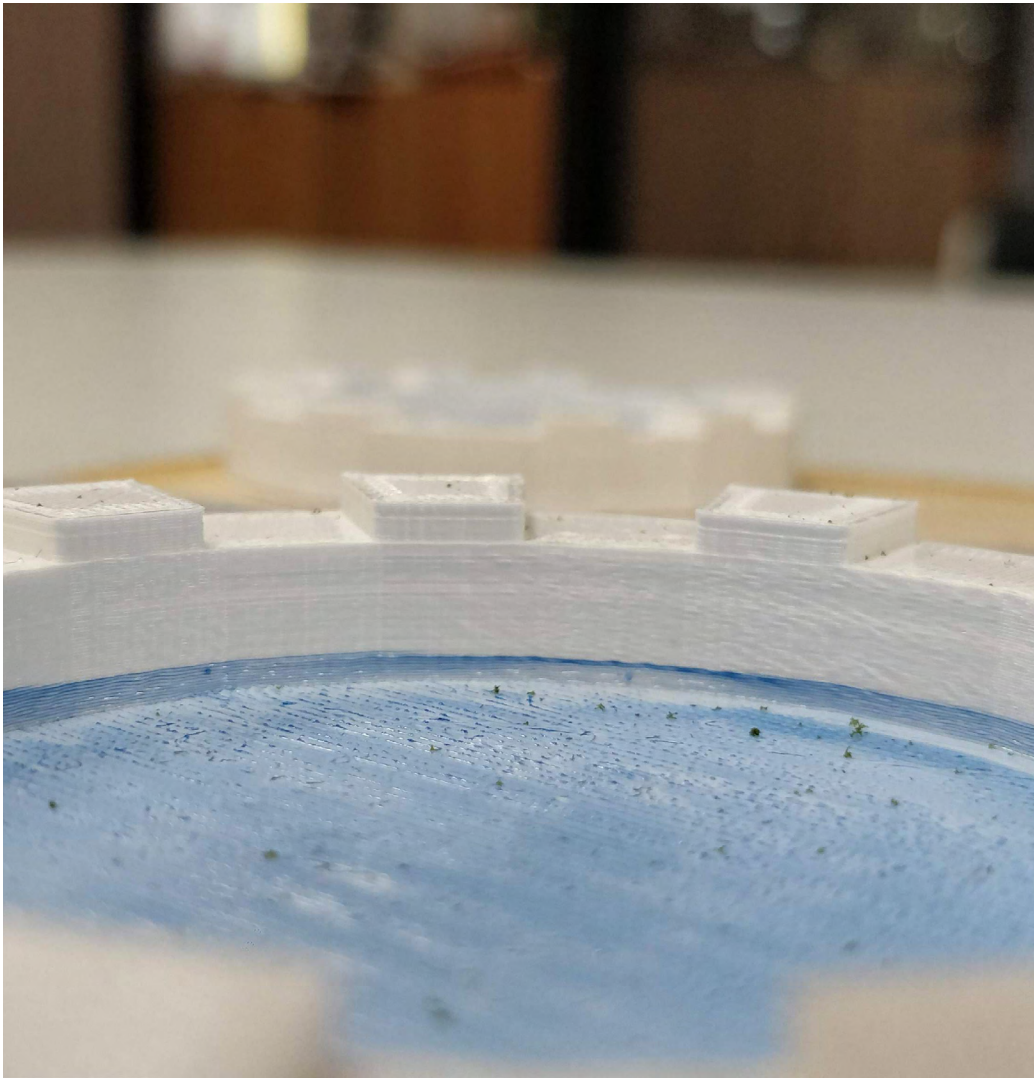


source: Nina Aalbers, architectuurMAKEN

DEFINE A CONCEPT



ANOTHER BOX
“Finish the ‘boxed’ landscape of Tilburg’s urban fringe”



WATERFRONT
“Live in harmony with the water landscape”



COLONIZED ALLOTMENTS
“Live in harmony with the water landscape”

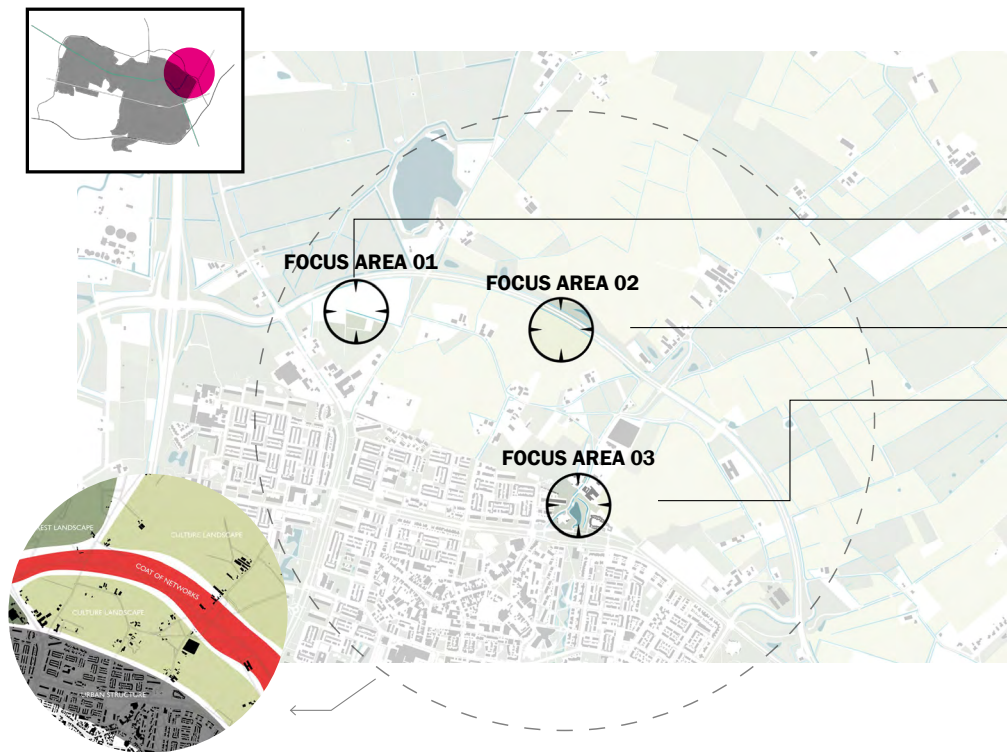
DEFINE A CONCEPT

For weeks I had 'the densification of our living environment, outside the city', in my head. I have tried to express this in a number of concepts that are in line with the starting points of the research. In the end, all three elements were more or less incorporated in the final design.



3 concepts in the fringe

THE NORTHERN FRINGE OF TILBURG



AREA



DESIGN CRITERIA

- The designs should be in line with the characteristic of the place. An integrated solution.
- The design should ensure a sense of spatial living.
- The design gives a view of landscape, a view of the city.
- The existing network ('coat of networks') gives direction

WHAT'S EVERYONE DEFINITION OF THE URBAN FRINGE?

Fast sketch



AREA SPECIFICATIONS

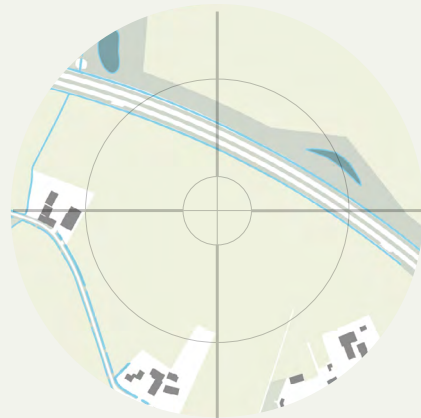
FOCUS AREA 01



Area specifications

- Forest biotope
- Spot has a relation with the ring road
- The place does not give the feeling of being in the urban fringe
- Thinking from nature

FOCUS AREA 02



Area specifications

- Open rural landscape
- Spot has a relation with the ring road
- The cultural-historical character is clearly present in this place
- In the middle of the 'coat of networks'

FOCUS AREA 03



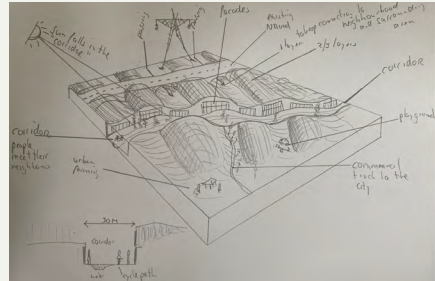
Area specifications

- The spot is in the 'first layer' of the fringe
- Directly on the border of the urban area and the countryside.
- Existing networks can be used

CREATING A CONCEPT



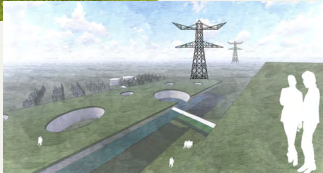
Reference for the different spots in the fringe



Creation of different levels. Where the 'city' cuts the landscape. The current character of the fringe won't be harmed this way.



The current water buffering can be extended. By doing this, it will follow the edge where the urban part of the city transits to the countryside. To keep the view through the fringe, the building will 'hoover' through the fringe. This way the character is not harmed.



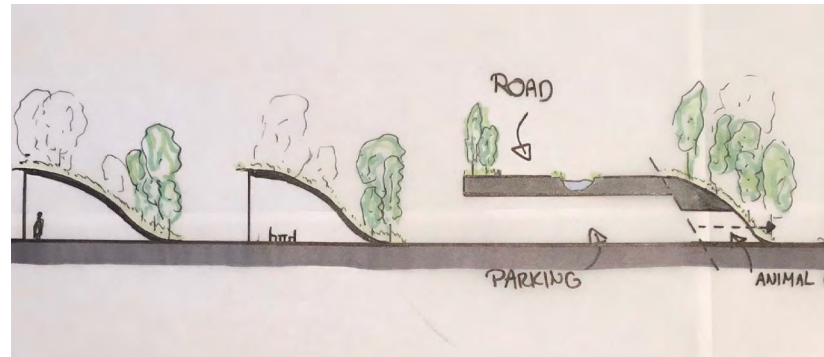
WINTERSCHOOL

During winter school, densification of the fringe was tested at various locations.

The idea was to take nature as a starting point. I have used this week as a source of inspiration for new ideas. Because there was so much that was possible, I found out that I had to frame my project more.



PLAN OVERVIEW

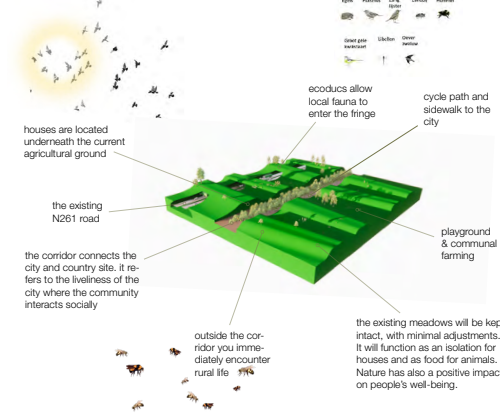


SECTION NEW



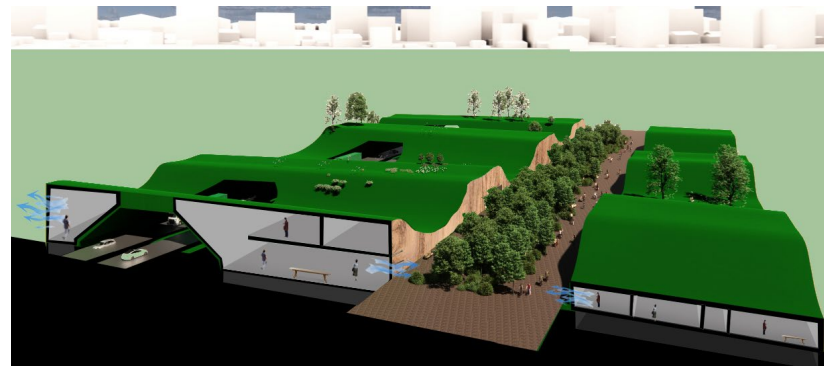
IMPRESSION

FOCUS LOCATION 01

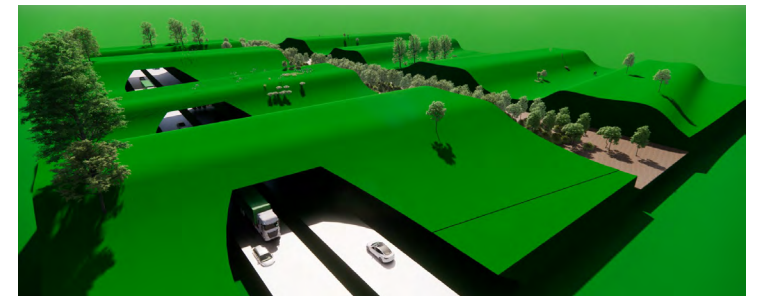
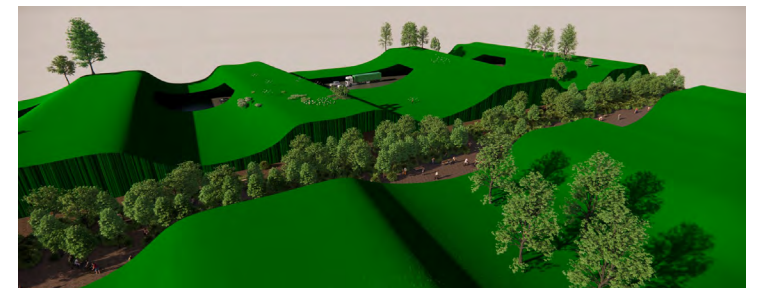


The fringe is a transitional area between the city and the country life, the corridor represents the liveliness of the city while outside it you immediately witness rural life. The landscape and physical connection between the city and rural areas allows and encourages flora and fauna from outside the city to enter the fringe.

This area of the fringe is created for families that embrace city life but prefer to be more into contact with nature. Here they experience rural life and are very well connected with the social community and facilities of the city.

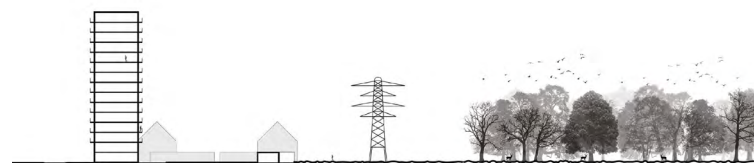


3D SECTION OF INTERVENTION

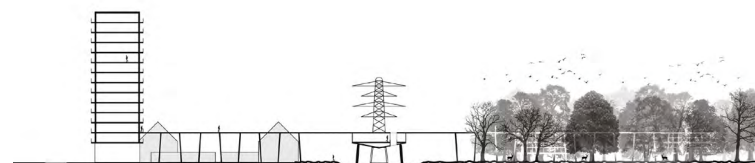


IMPRESSION

FOCUS LOCATION 02



SECTION EXISTING



SECTION NEW








IMPRESSION

FOCUS LOCATION 03

DEFINITION OF THE PLACES

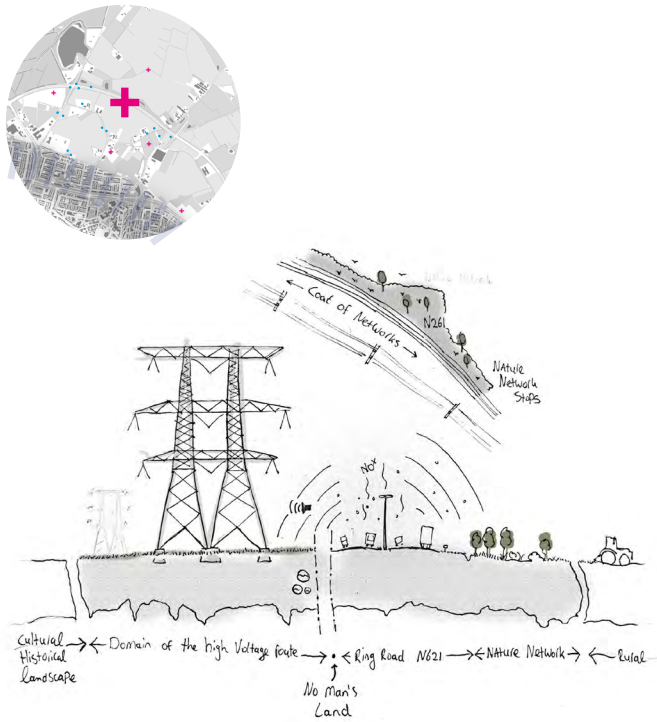


I had trouble landing the concept in place. A further study into leads should be a decisive factor in this.

-  **POINT OF INTEREST**
-  **URBAN STRUCTURE**
-  **TYPICAL URBAN FRINGE FUNCTIONS (NO HOUSING)**
-  **LANDSCAPE TYPE**
-  **HIGH VOLTAGE**

DEFINITION OF THE PLACES

+ INBETWEEN NETWORKS



No man's land where nothing is allowed and in advance nothing is 'possible'
Unattractive to humans
nature network
Beacons in the landscape
Connecting 'coat' around the city
Separation between culture historical and modern Brabant's landscape
Placed around culture historical landscape it to avoid cultural-historical zone
Disturbing factor for the city (noise, pollution, aesthetics)
Transparent

DEFINITION & CONDITIONS

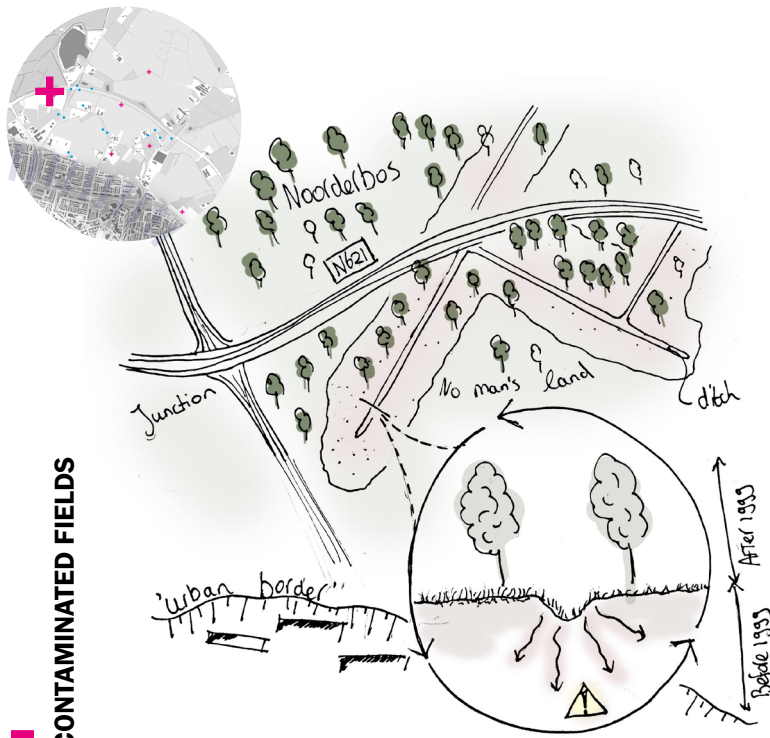
Enlarge the nature network (which already runs parallel to the N261)
Show that the area can be given a supporting function (park/relaxation/connection/nature network)
Consciously created separation between 2 areas. No reason to create a transition here.
Leaving existing network in its value = functional -> over (N261) or under (high voltage route)
Use disruptive factor -> cause for improvement

PRECONDITIONS FOR DESIGN

Giving existing structure a value by giving it to nature as a green mantle around the city
The new nature network can connect different places (+) in the fringe

ADDED VALUE

+ CONTAMINATED FIELDS



Former flow fields (textile factories)
Place restores itself and is breeding ground for new nature
Nature is recovering
Scars in the landscape
Road as disruptive barrier
100 meters away, someone grows his food
Diffusion/settling of water

DEFINITION & CONDITIONS

Place where housing can land as a second layer (Ceuve)
Structure of flow fields gives direction of masses
New nature - future living environment
Housing (intervention) can help with the remediation of the underground

PRECONDITIONS FOR DESIGN

Polluted soil cannot simply be removed
Part of a larger concept (Noorderbos)

ADDED VALUE

+ THE DNA OF TILBURG



Northernmost 'herdgang' of Tilburg
'Schans', high place
The rugdijk derives its name from roughness and a higher dike
Not further developed into city / incorporated into urban fabric
Illustration of the Tilburg city of the past -> start for the future? pivot point
Hertgang structure is the breeding ground for the city (Tilburg DNA)
Diamond for the city
Construction marked seems randomly placed -> First disruption by the city

DEFINITION & CONDITIONS

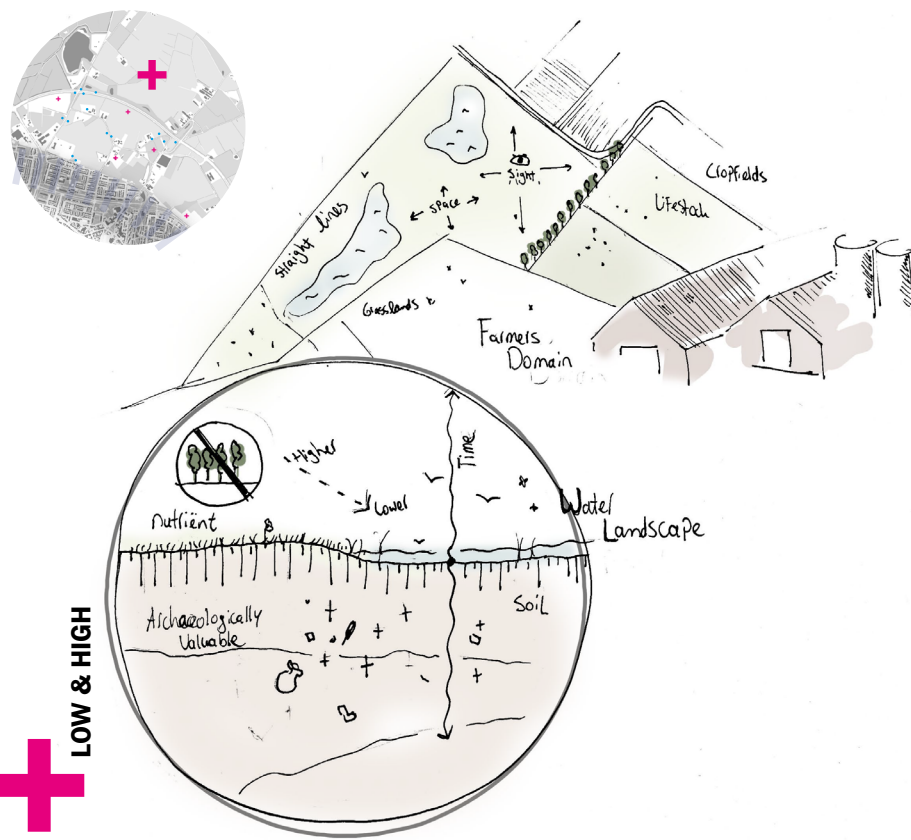
Preservation of cultural-historical character
The densification of this area respects the filling of the historic ribbon structure

PRECONDITIONS FOR DESIGN

The place as a junction of roads
A wink to more ribbon construction possible, provided that it is 'secondary' to the place

ADDED VALUE

+ LOW & HIGH



Farmer's domain
water landscape
Transition from low point to higher ground
Agricultural destination
Archaeologically valuable
Acquisition Area
Tree cultivation excluded

DEFINITION & CONDITIONS

Designated water buffer for the city
Agricultural destination preserved

PRECONDITIONS FOR DESIGN

Urban farming
Combine waterbuffering with housing

ADDED VALUE

DESIGN OF THE ELEMENTS

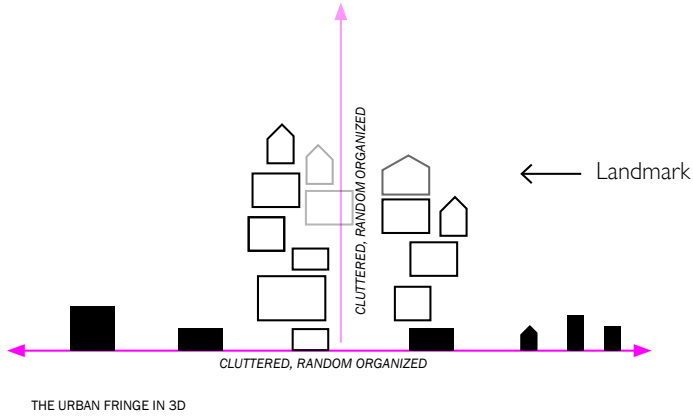
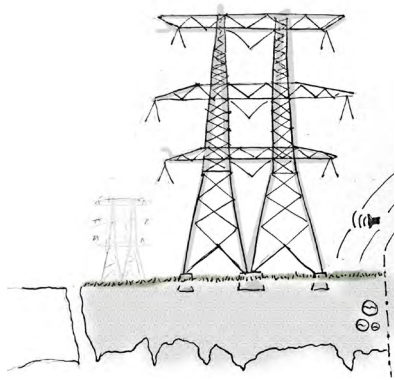
FROM MY TOUR THROUGH THE NORTHERN URBAN FRINGE OF TILBURG



How do you distil the spatial design language and materials from such a large area? I started looking at the recurring features that might be magnified and that lead to design elements.

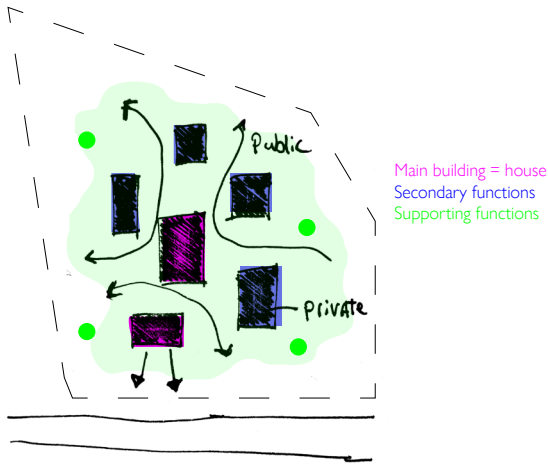
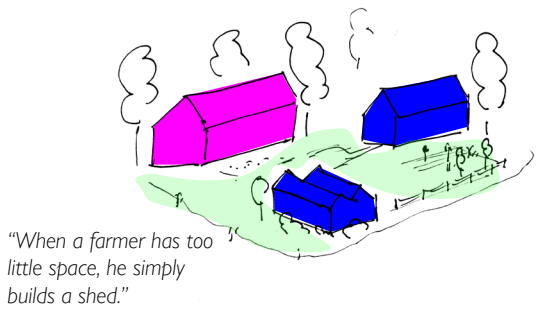
CONCEPT STUDY: CLUSTERED INTENSITY

Landmark in the landscape



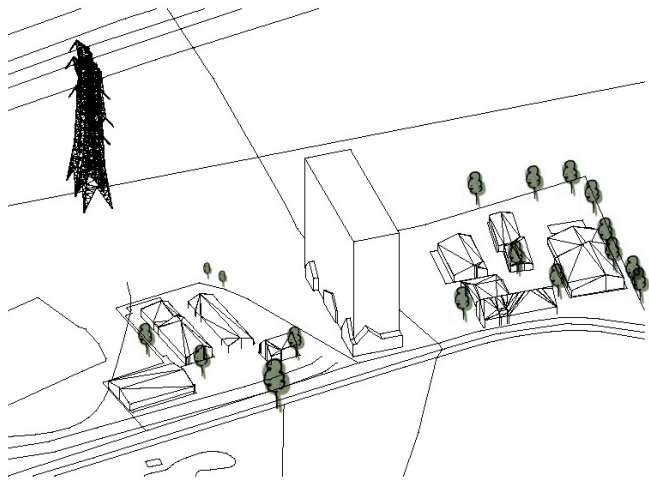
Solitary elements are not a strange appearance in the urban fringe

Layout of a typical yard

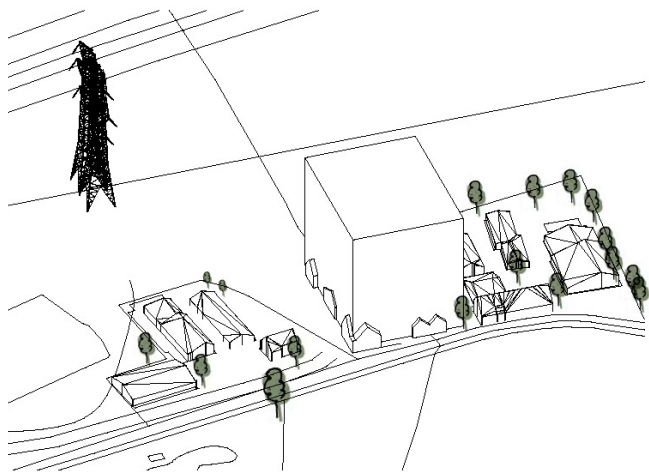


“A landmark to show the identity of the place by densification”

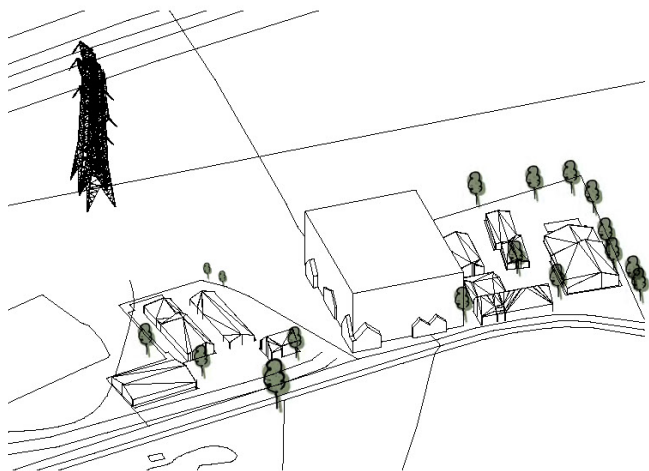
CONCEPT STUDY: CLUSTERED INTENSITY



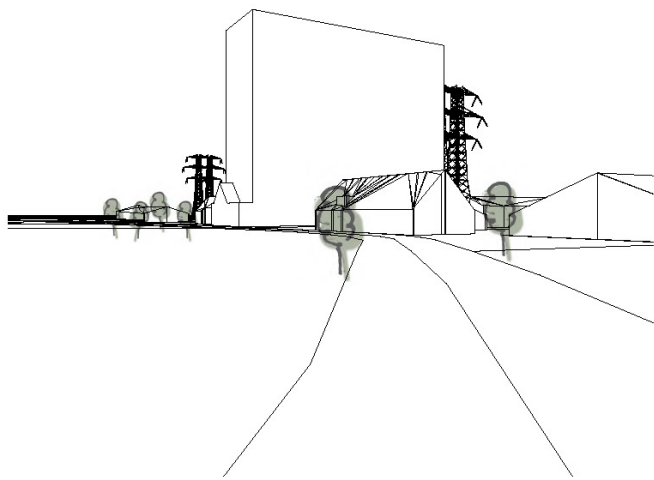
TIGHT



MASSIVE

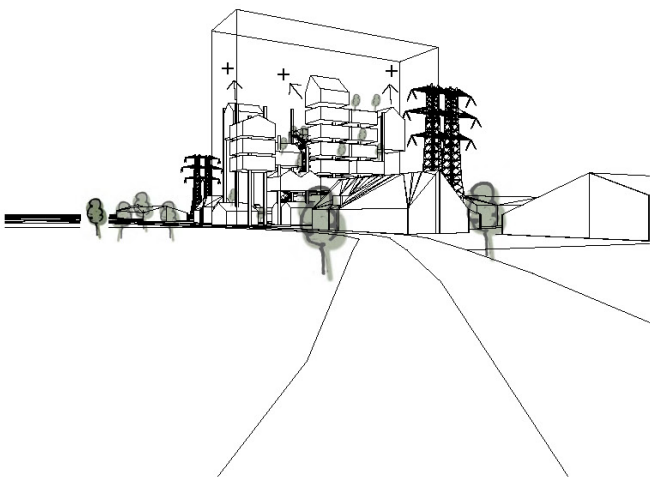


MASSIVE LOW

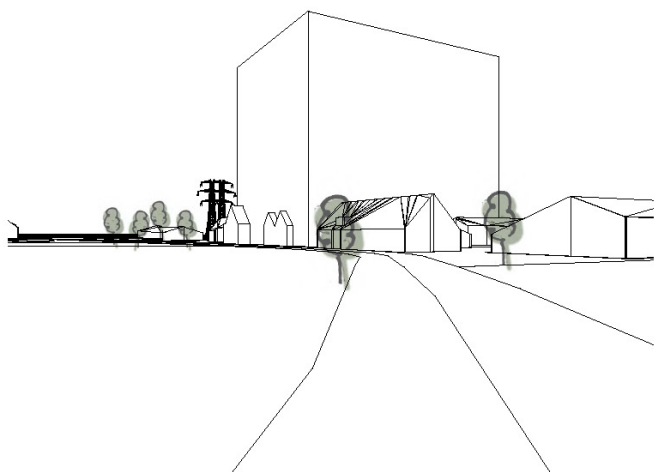


+/-

- + compaction
- + well-fitting in some spaces
- Less space for extension
-



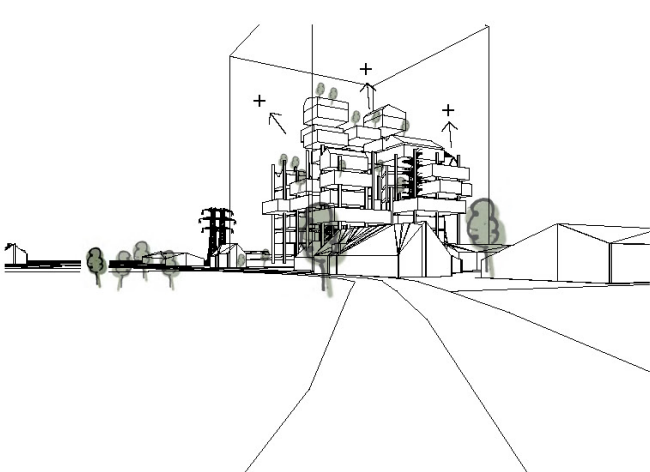
conceptual structure



+/-

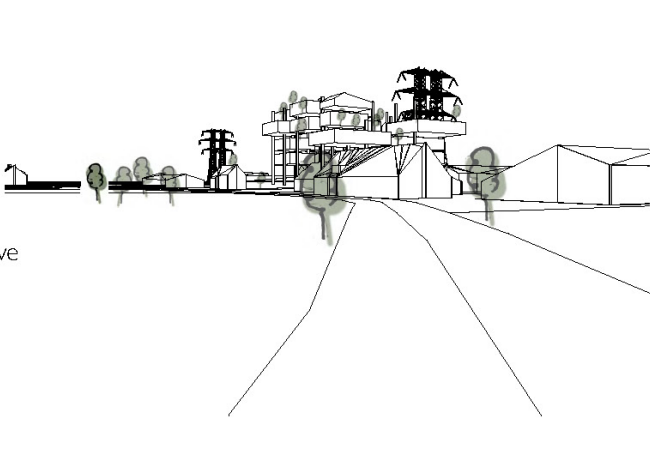
- + space for extension
- + clearly present in the outskirts of the city
- + chance to also form an own identity
- danger of losing proportions
- danger of losing connection with the fringe

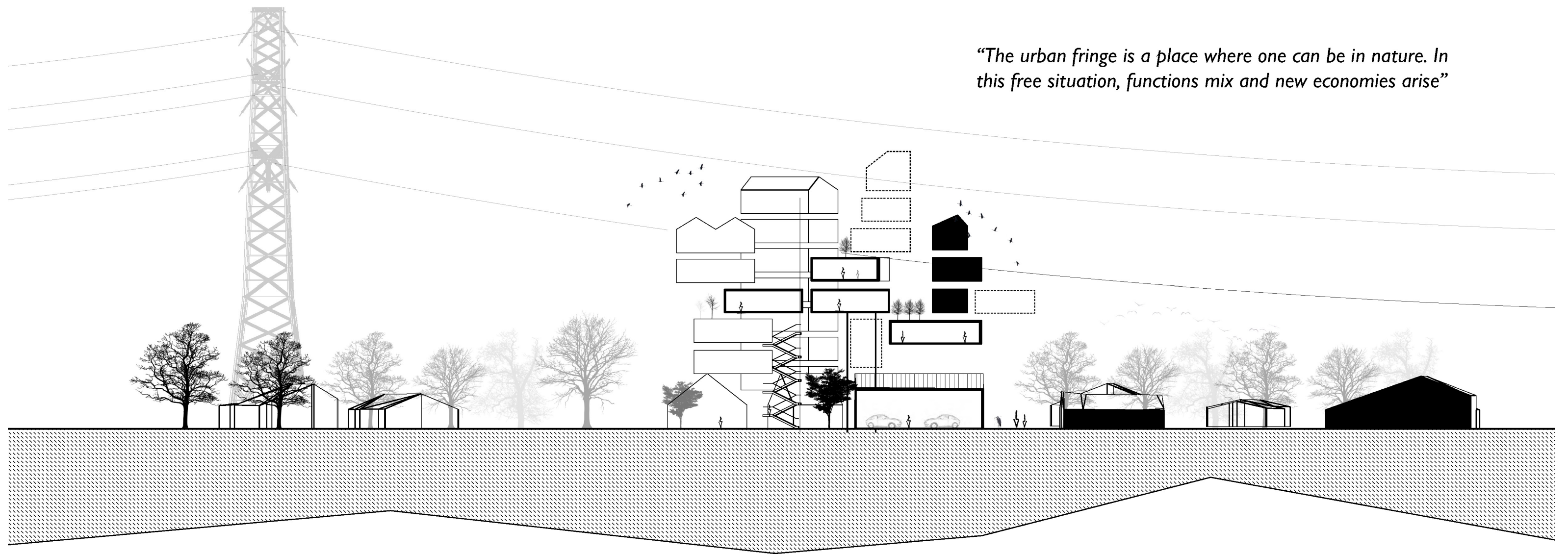
Yet this gives an opportunity to design the characteristic of the fringe at height



+/-

- + space for extension
- + Better connection with the ground level
- + chance to also form an own identity
- Typical 'fringe functions' at the ground floor leave little room for further development.





CONCEPTUAL SECTION

This concept design does not fit well with the principles of the research. I have to look for the qualities of the landscape and the place itself.

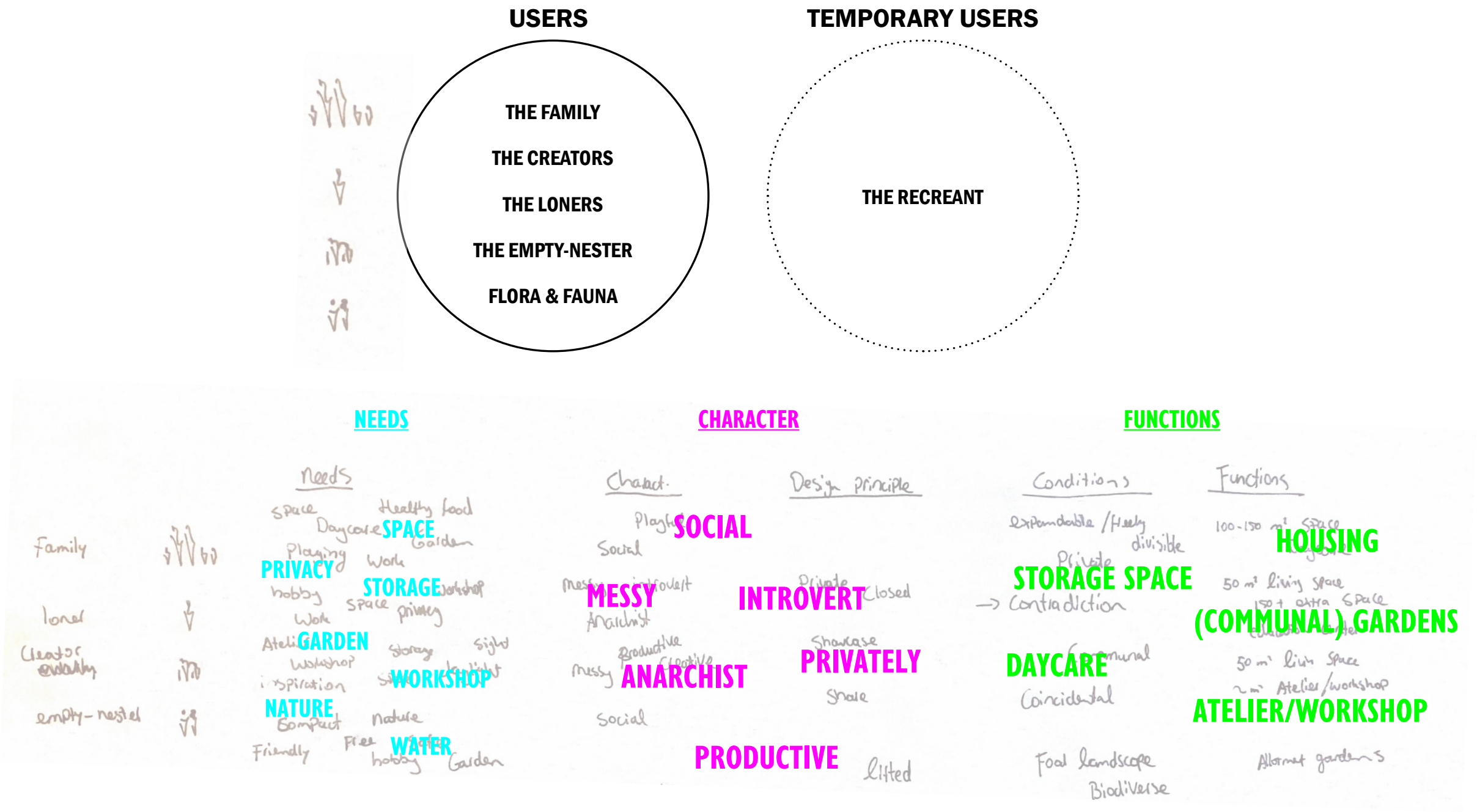
CONCEPT STUDY: CLUSTERED INTENSITY



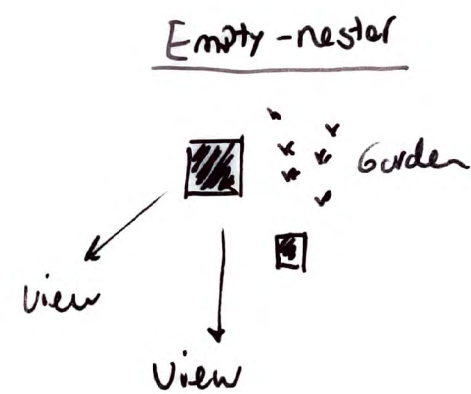
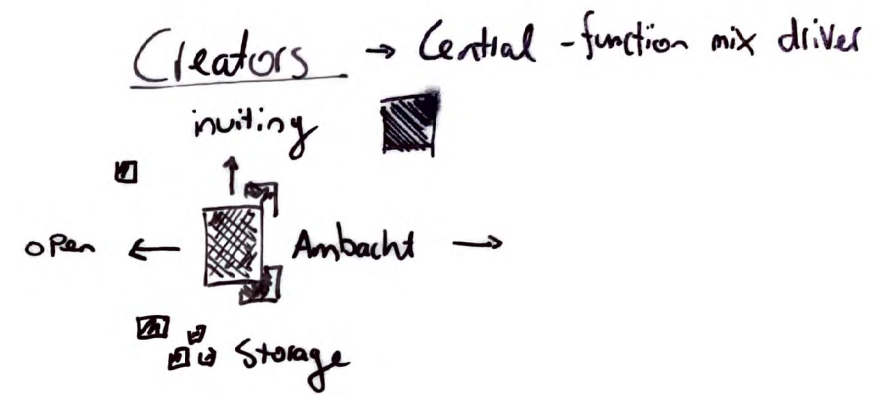
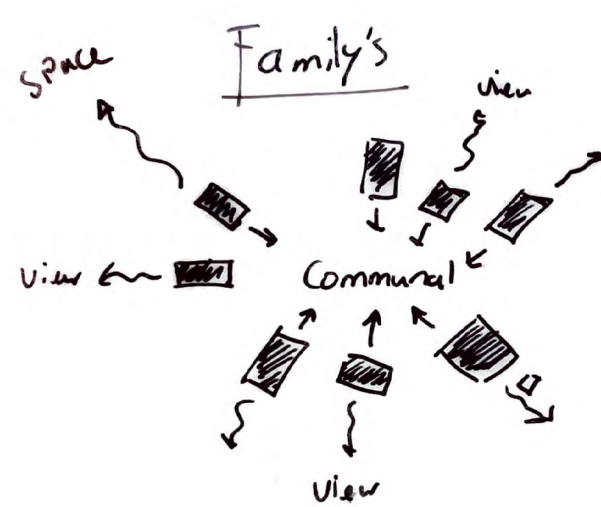
This design direction made me think about the role of the user in the concept. Who am I making it for? I conclude that I am going to contradict myself with this design. What I conclude in my research does not correspond to a 'stacked' representation of the urban fringe. Nevertheless, I have come to the insight that I am looking to intensify the character of the urban fringe of tilburg. For that I will have to have a better idea of who the user will be.

THE RESIDENT OF THE FRINGE

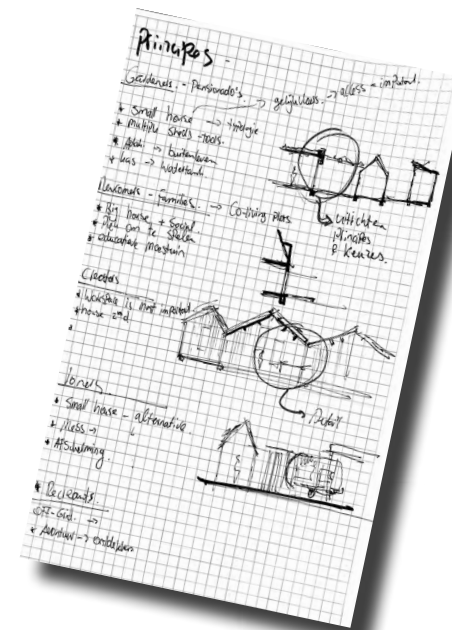
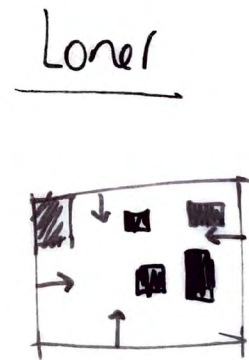
What if we analyze current residents of the fringe, which characteristics then emerge?



DEFINING THE IDEA OF A COMMUNITY

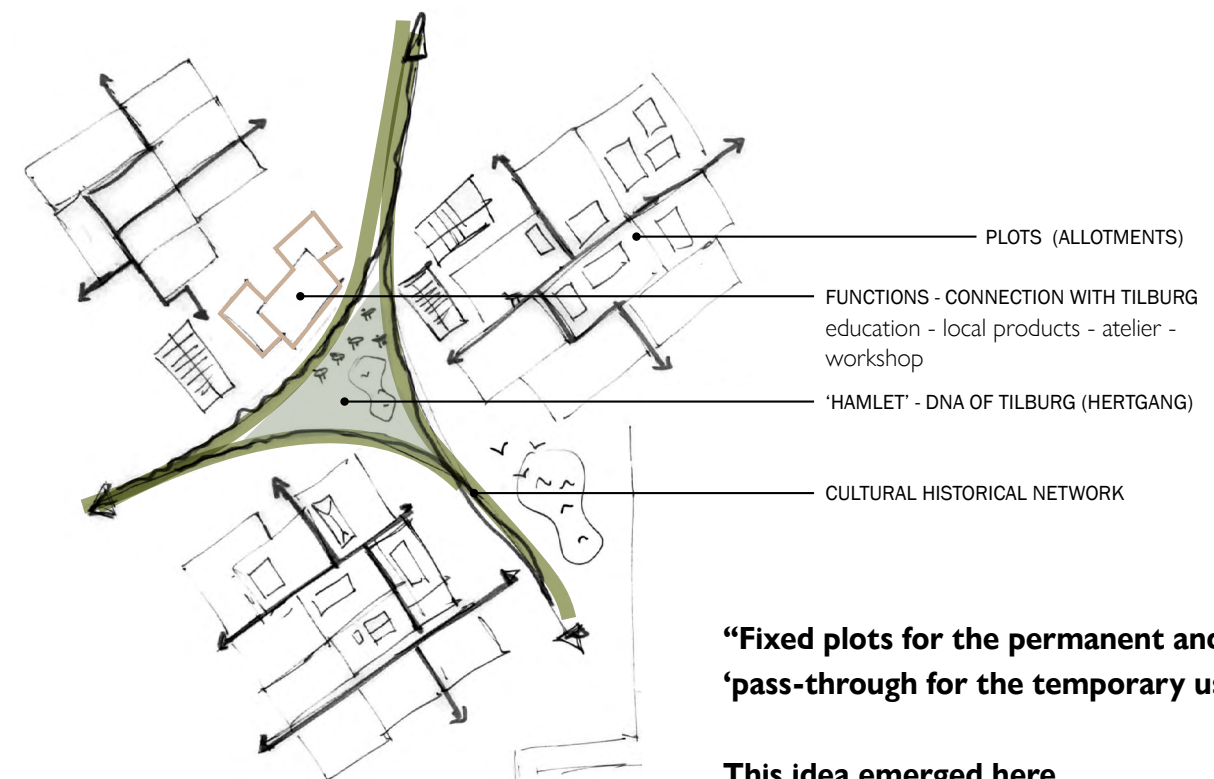
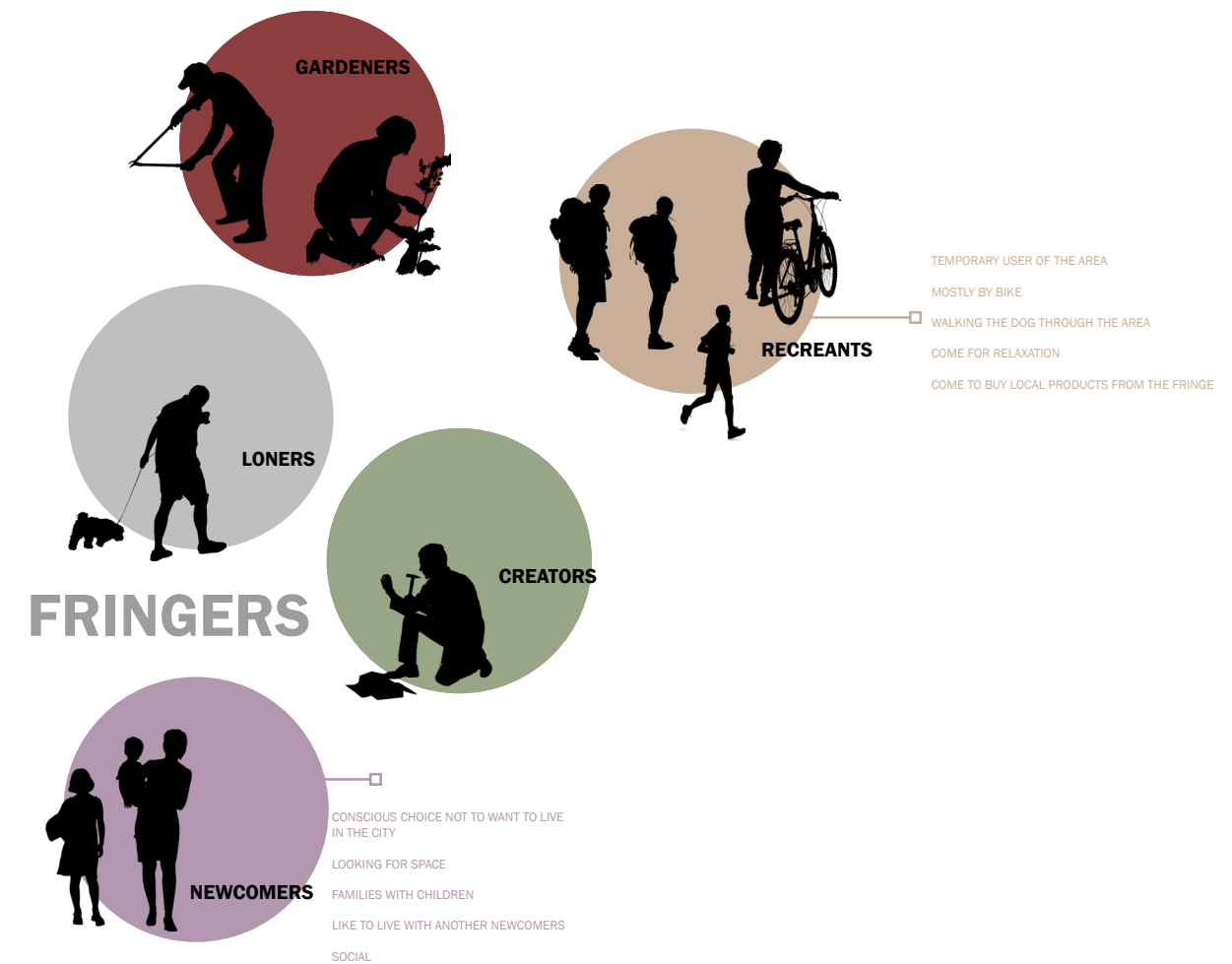


“Needs lead to different spots, different ways of living”



PERMANENT & TEMPORARY USERS

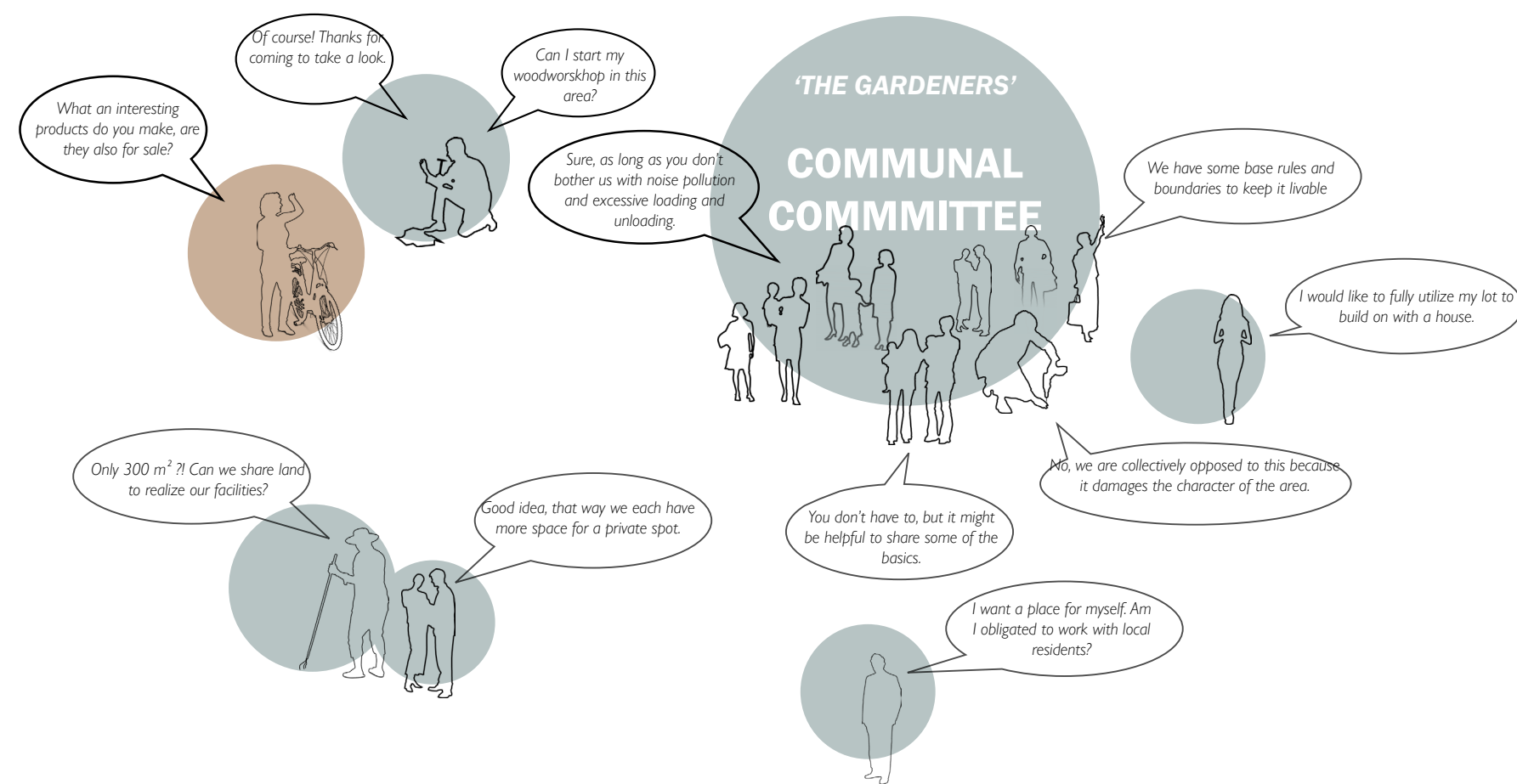
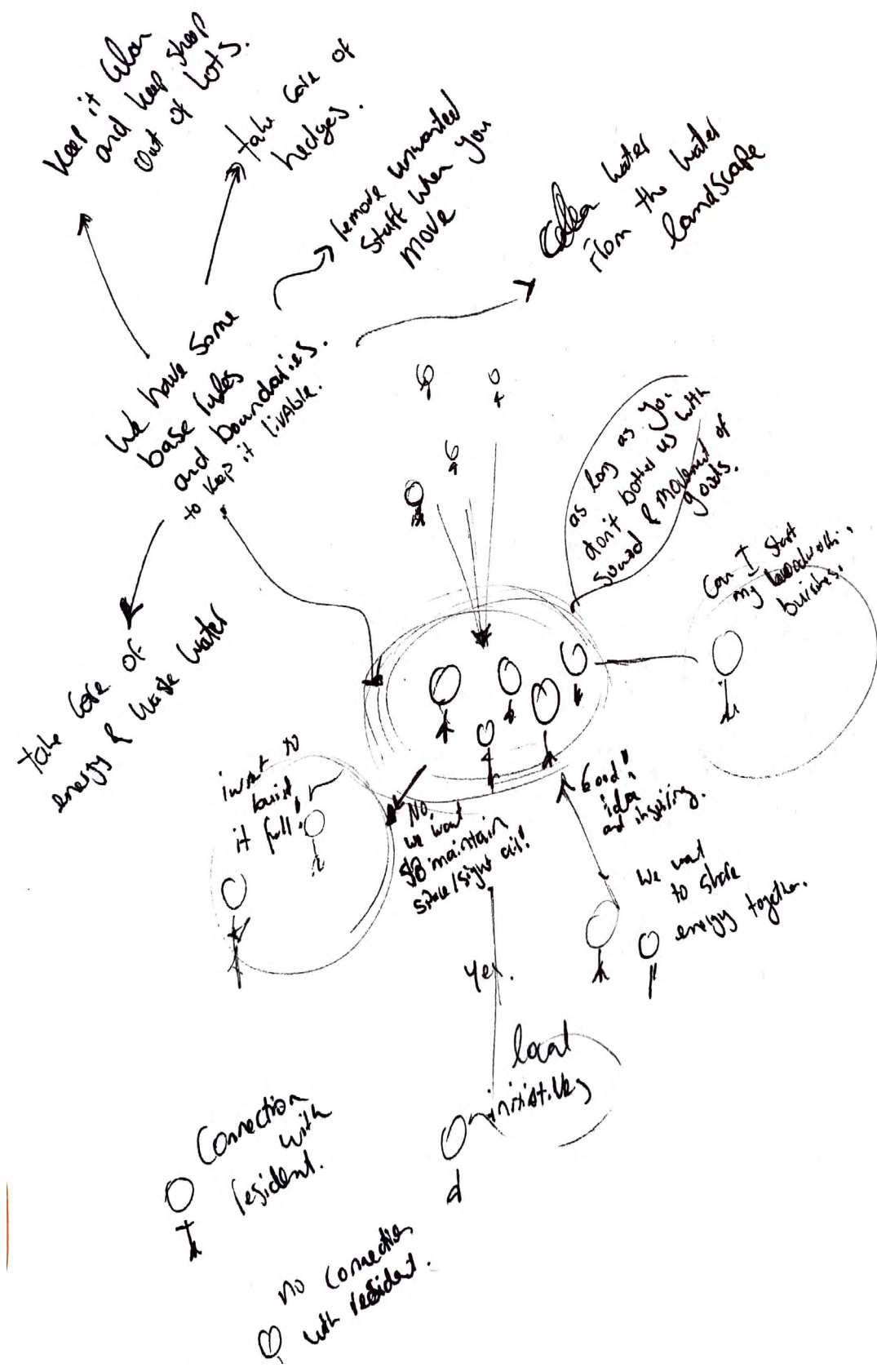
While writing the essay, it emerged that the users can be divided into two types. The permanent and the temporary users. In a 'new' system in the urban fringe, this gave me a better trigger for design elements and design choices. Is it possible to make a division in the landscape where in they both have their own place, but also merge functions in a way?



“Fixed plots for the permanent and a ‘pass-through for the temporary user”

This idea emerged here

THE COMMUNITY



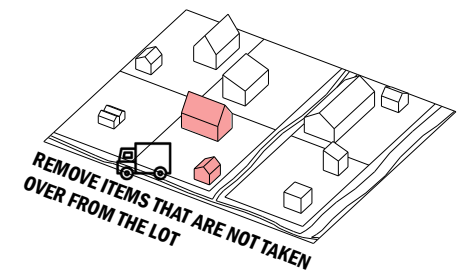
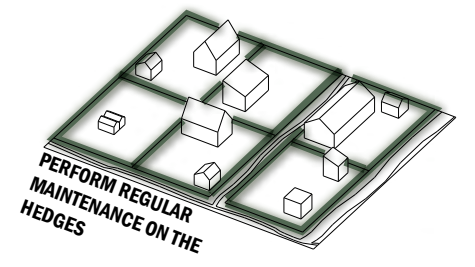
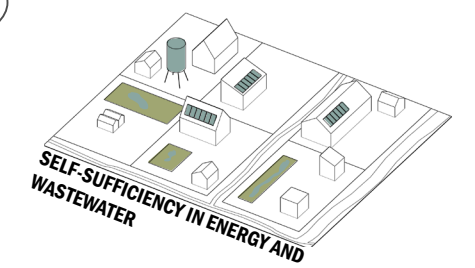
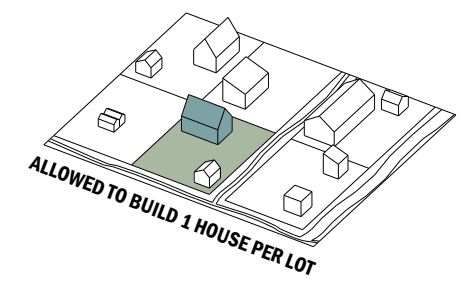
WHAT ARE THE RULES, REGULATIONS AND HOW DOES THE COMMUNITY OPERATE

DIY BUILDING?

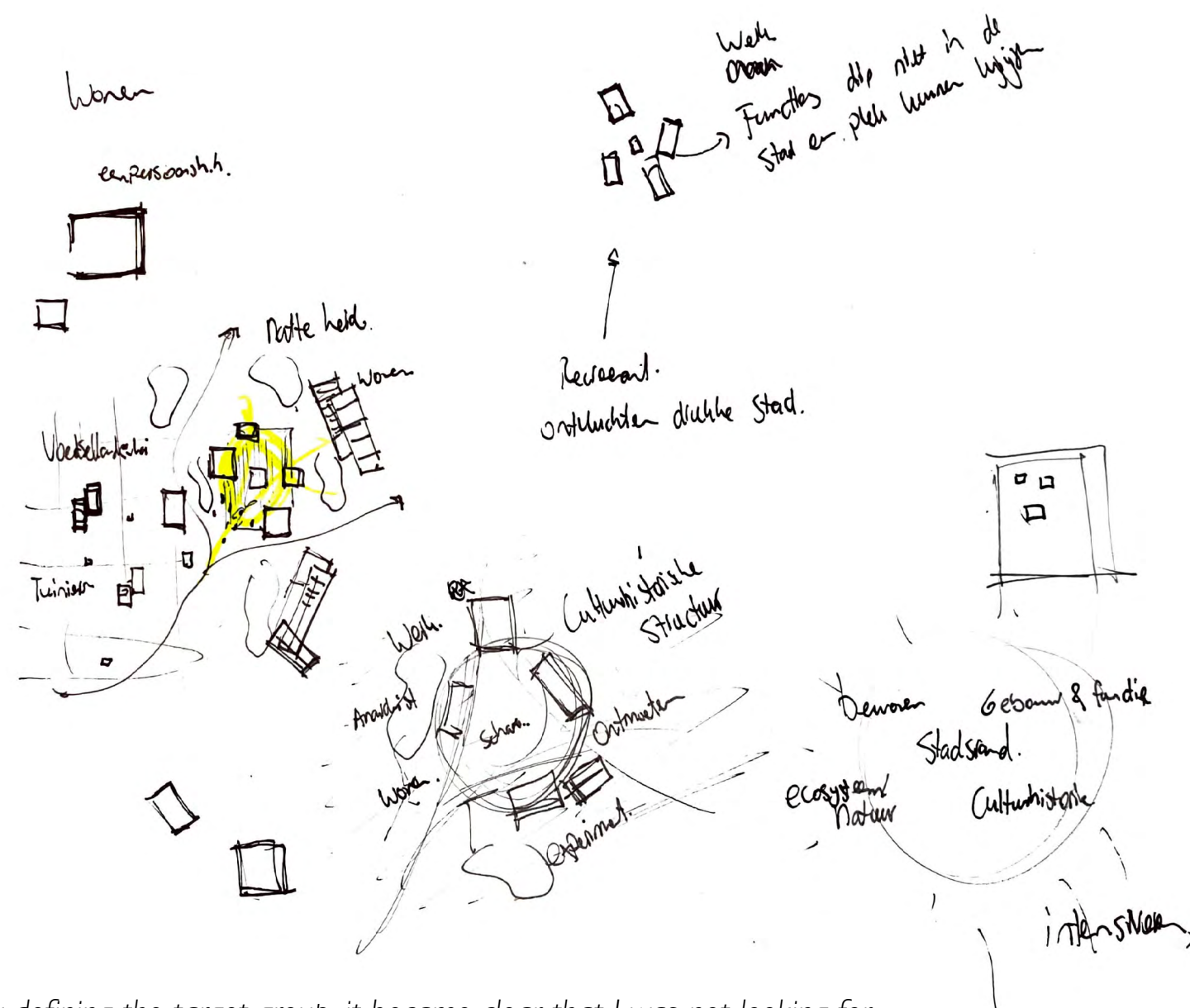
WHAT DO I HAVE TO DESIGN THEN?

The idea of a community started to become more and more concrete. This has been a response to the fact that I want the resident to be as free as possible. No rules means a different system. A system in which the residents themselves decide. This was fodder for interesting discussions with my tutor. Are there rules? Or just incentives?

BASE RULES OF THE GARDENS

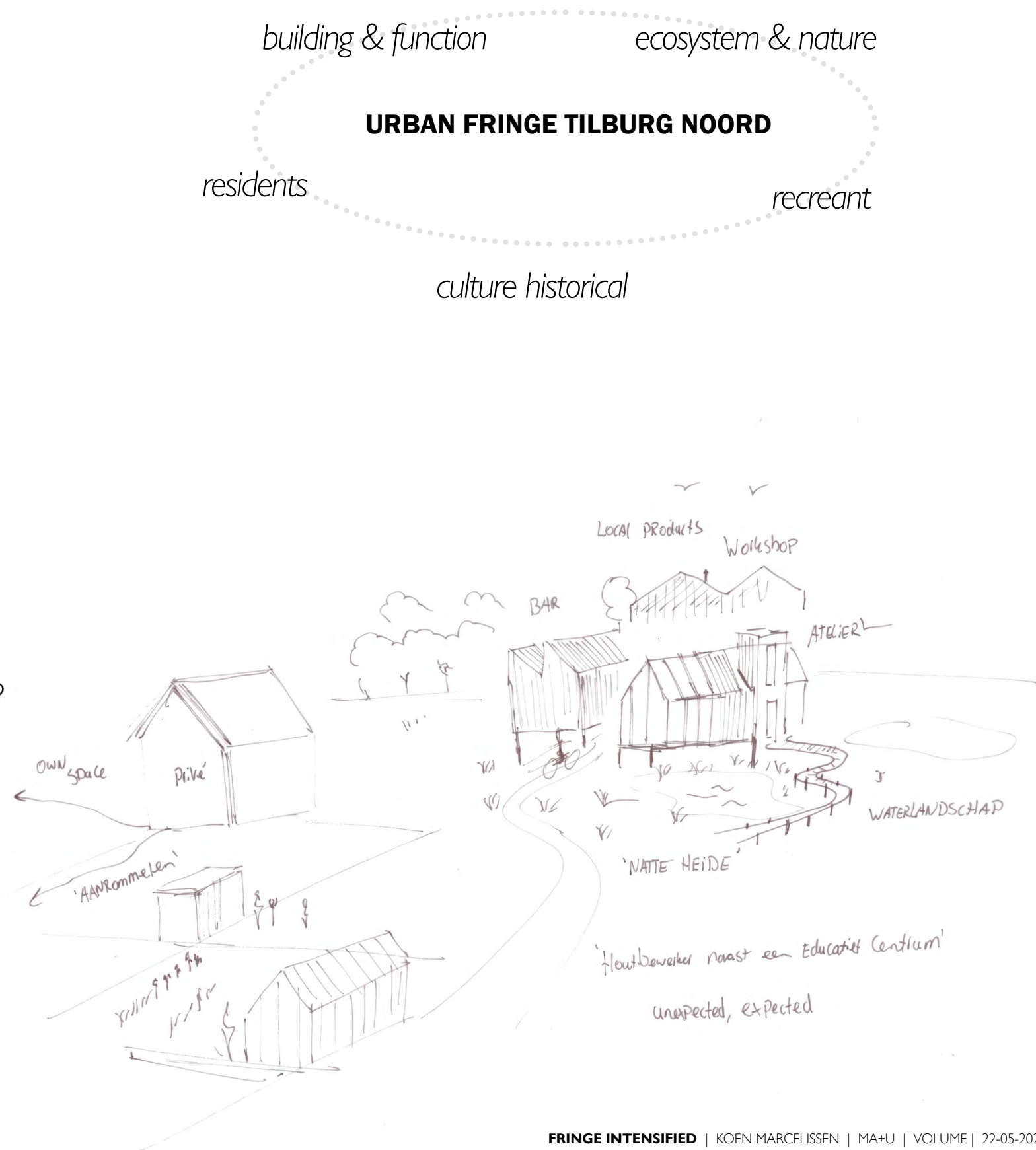


HOW DOES THE TEMPORARY VISITOR BEHAVE IN THE LANDSCAPE?

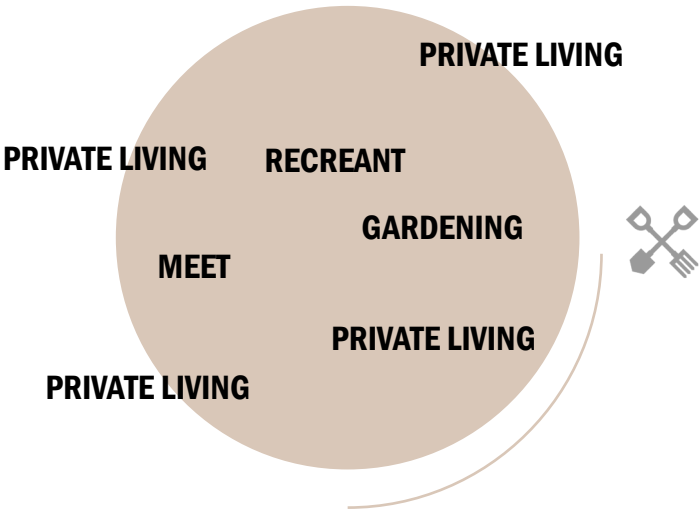
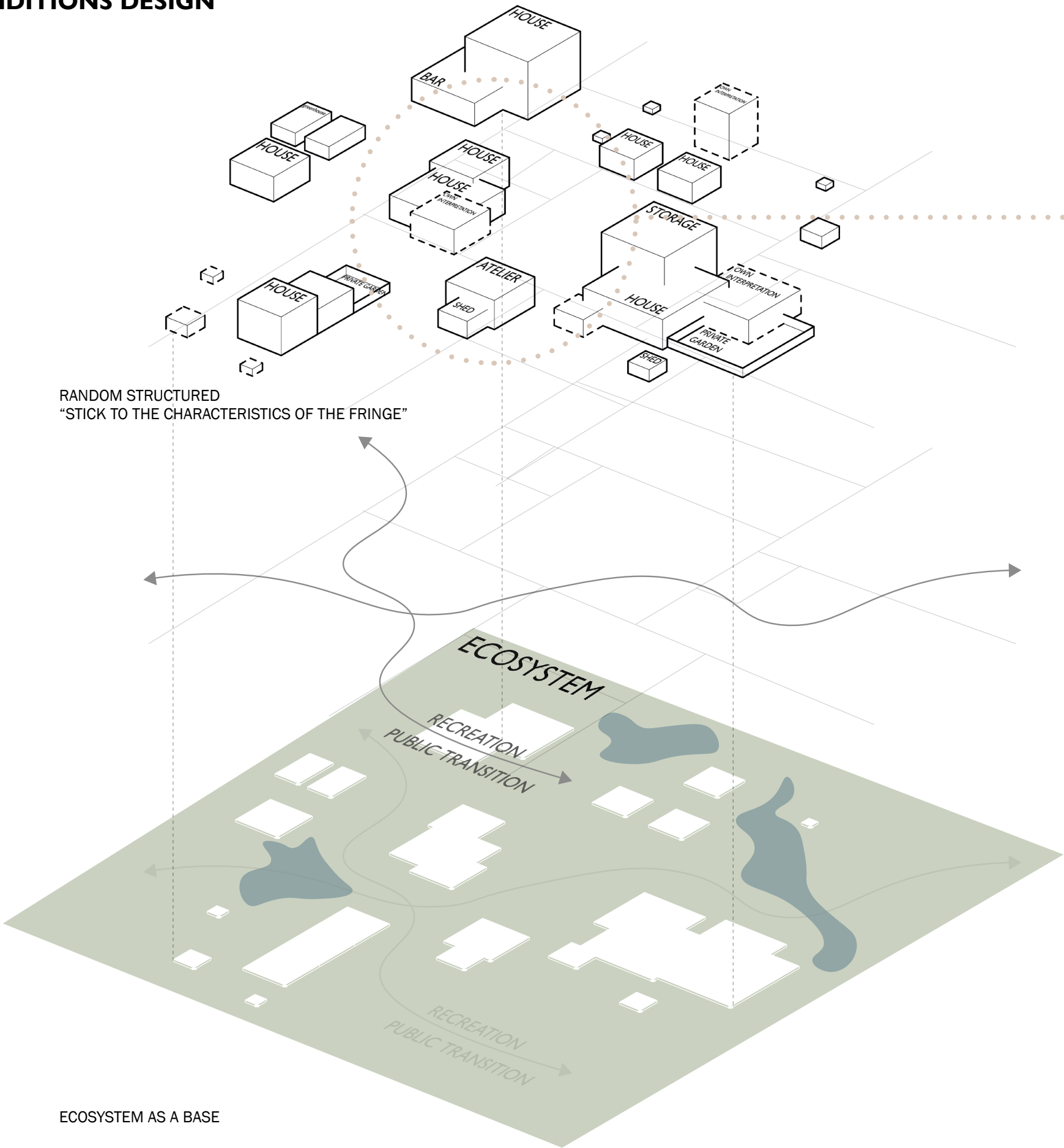


By defining the target group, it became clear that I was not looking for densification, but for an intensification of the character of the urban periphery. The fringe is unique in itself, this could be magnified. Creating a community gives me something to hold on to, which helped me get into the design process better.

In the essay I describe the urgency of connecting the city. I came up with the idea to invite the temporary user and get them excited about the area. To achieve this, I started testing by placing striking, multifunctional elements in the area.



PRECONDITIONS DESIGN

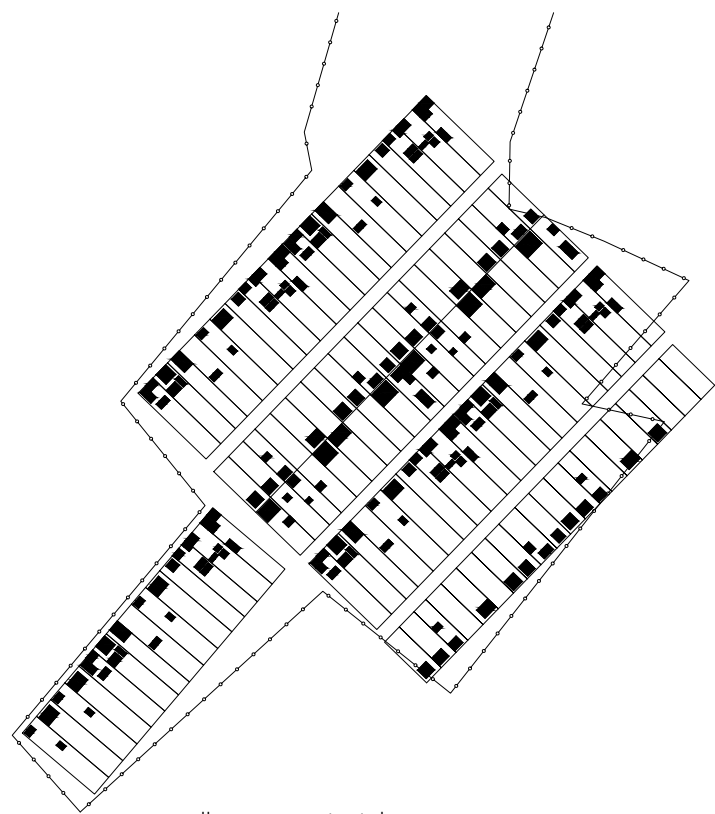


RELATION BETWEEN PRIVATE & PUBLIC = IMPORTANT

- USAGE OF MATERIALS

The design leads me towards small plots which can be arranged with different sizes of buildings and functions. Here again I did not yet directly saw a connection with the allotment principle from the research. I knew the landscape would be an imporant factor in the design. The permanent user can have a permanent place here, the temporary user makes use of the wet heath landscape (transition).

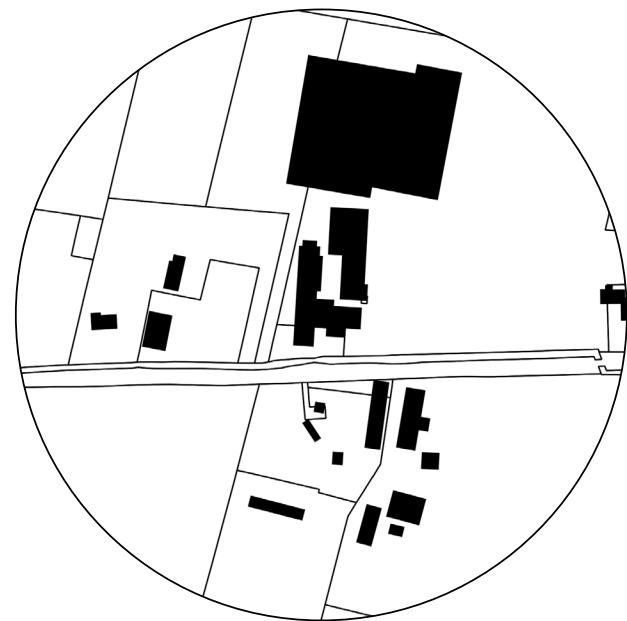
ECOSYSTEM AS A BASE



allotment principle



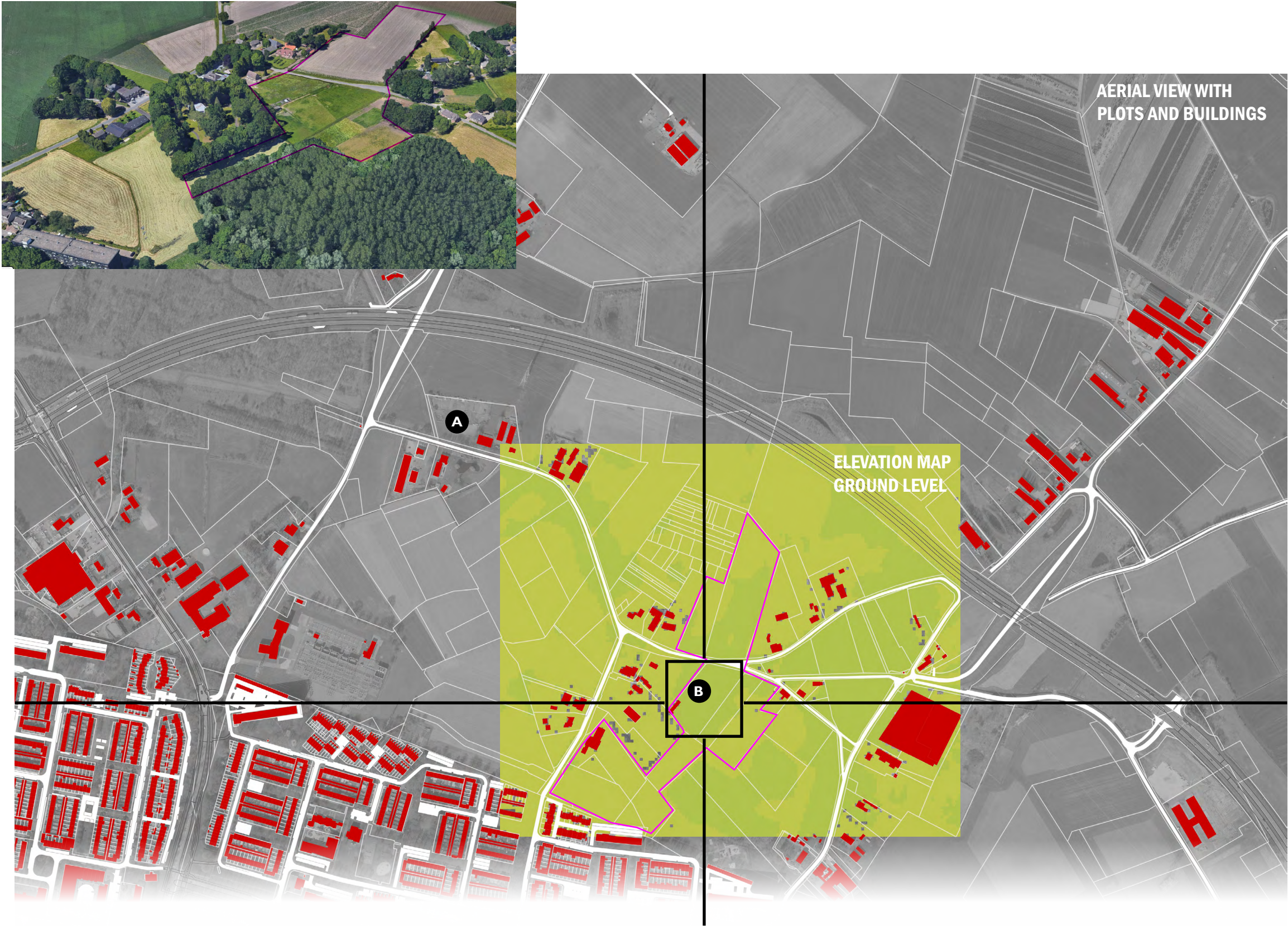
allotment principle bigger scale



example from research

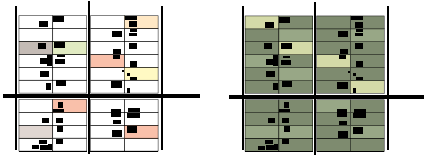
I tested the allotment garden principle in several morphological setups. In order to get the best out of the concept, I decided to stick to small, equal plots.

PARCELS



A Example of division of plots

This principle is reminiscent of the division of land in allotments.



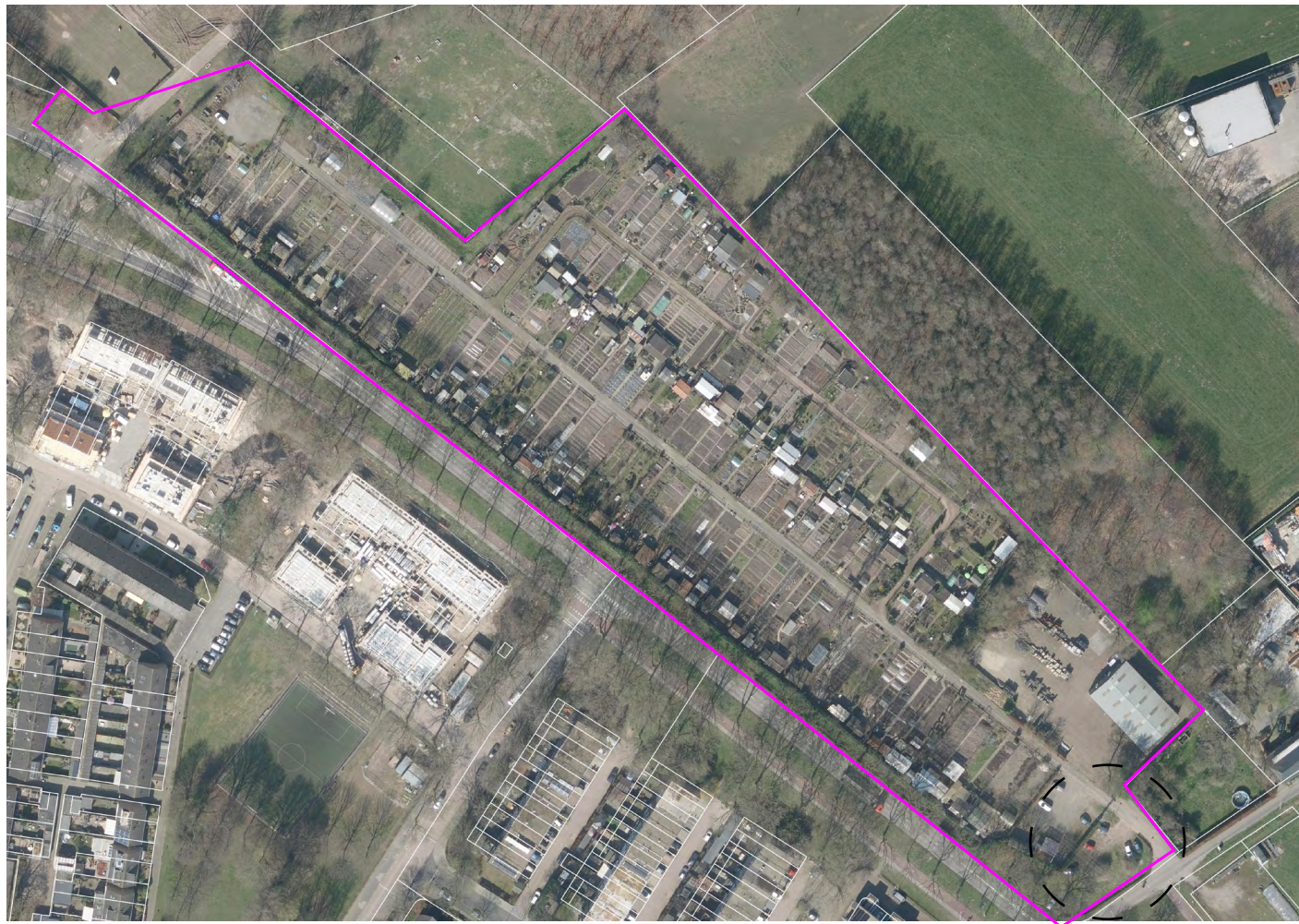
B Low location relative to its surroundings. Ideal for buffering water and creating a water biotope

Enclosed in the structure of the existing buildings.

Building on the existing structure

Meanwhile I started thinking further into subdividing land into smaller plots. By looking for the lowest point, there is also a good opportunity to create wet heath landscape. Thus, different parts of the research are slowly coming together into a system.

INSPIRATION BY ALLOTMENT GARDENS



general parking
collective entrance = security -> not needed in this project

Above you see the allotment complex De Vlashof. One of the many allotment complexes in the urban fringe of Tilburg.

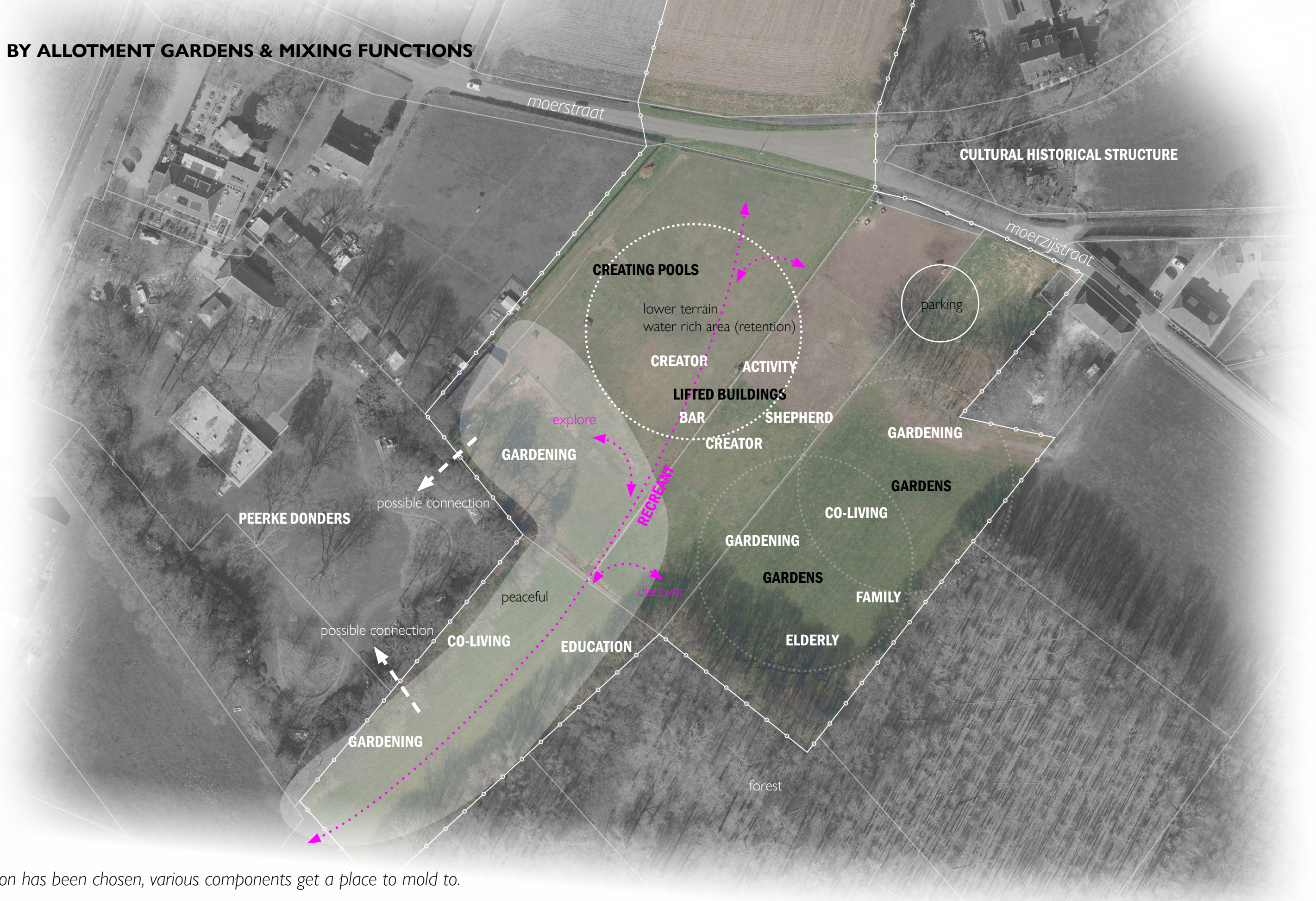
It is striking that this often concerns one or a few plots to which a sub-allotment has been applied. By testing this principle on a larger scale, and with multiple functions, I am curious whether this can work as an urban design for the new living landscape in the urban fringe.



In order to give everyone their own place, the plot will have to be divided into sub-plots. However, the structure of allotment in allotments is straightforward. This is in contrast to the rest of the urban fringe. From this I conclude that suballotment works, but that I want to continue testing with suballotment sizes.

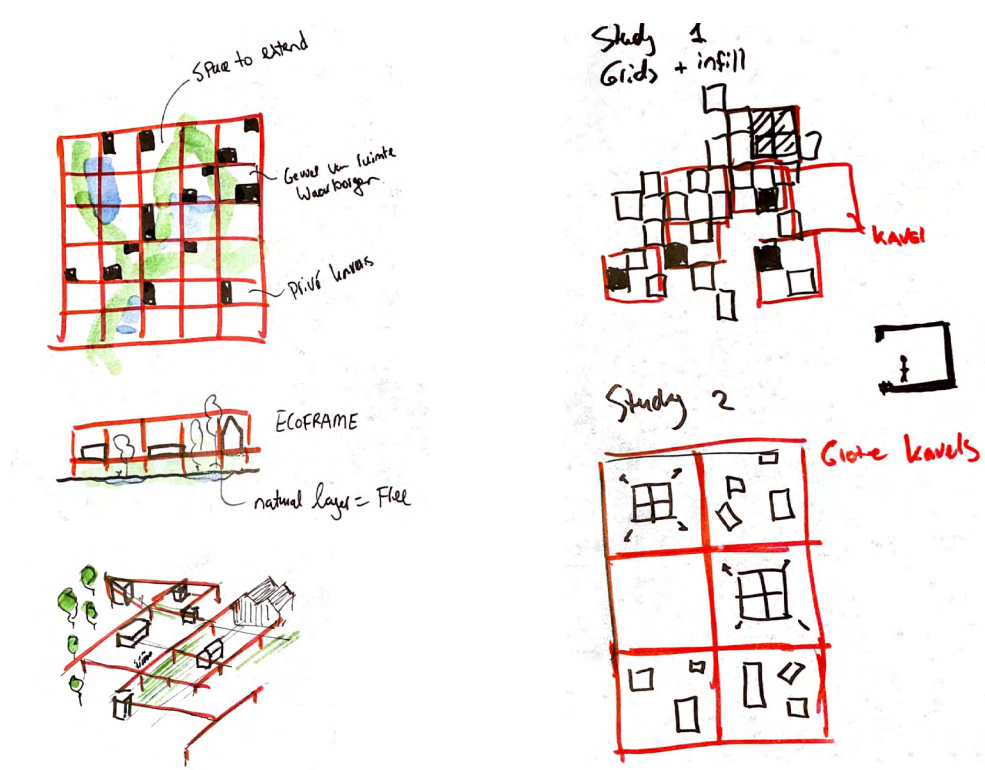
The wet subsoil will also play an important role in determining allotment and the buildings placed on it

INSPIRATION BY ALLOTMENT GARDENS & MIXING FUNCTIONS

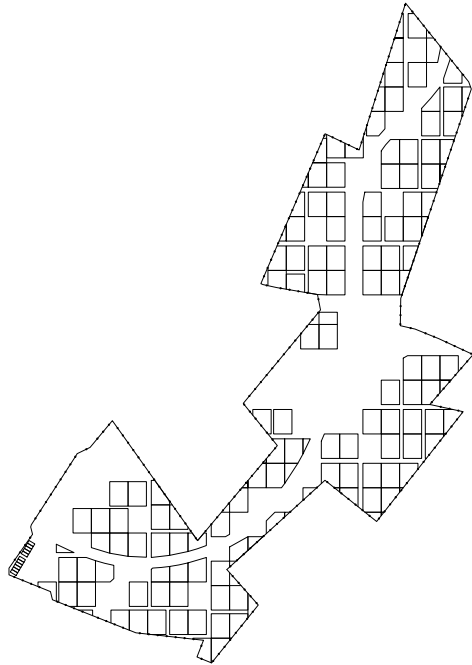
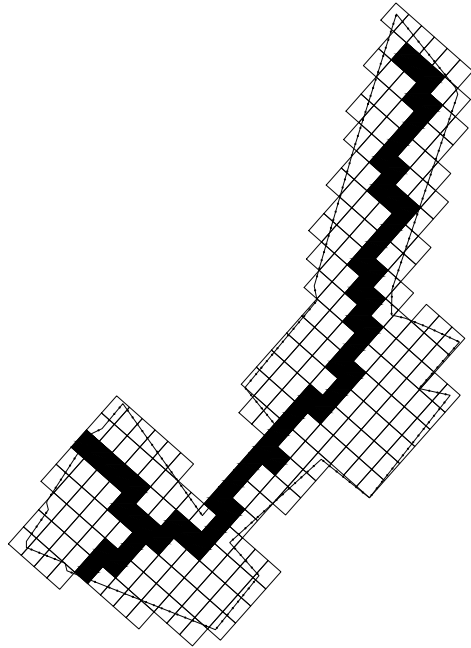
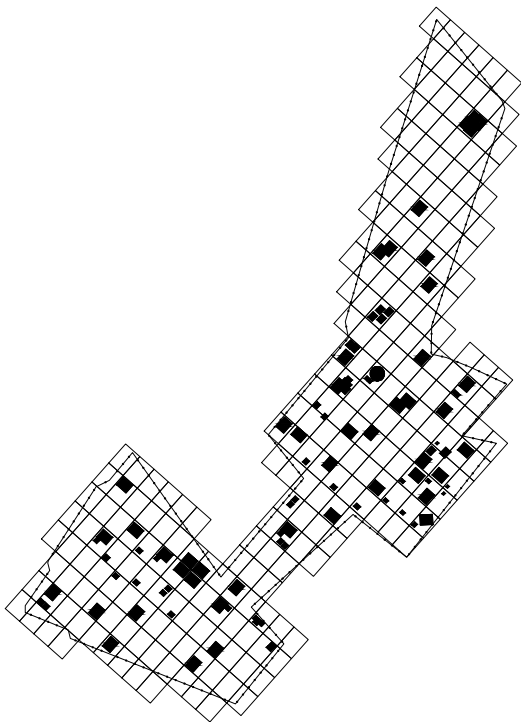
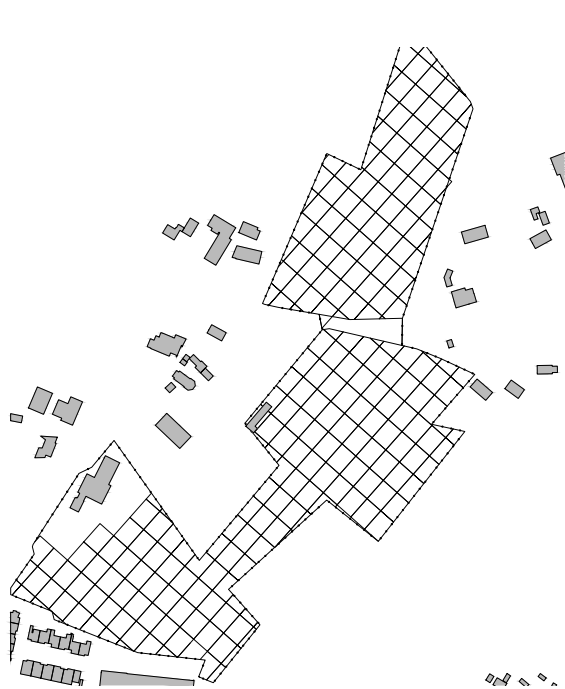
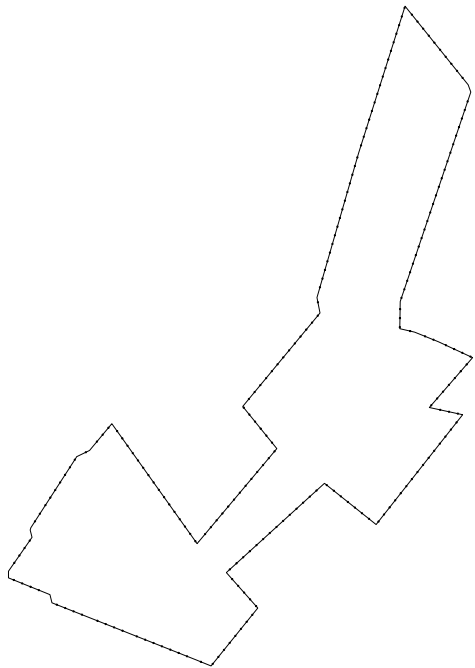


Now that a location has been chosen, various components get a place to mold to.

INSPIRATION BY ALLOTMENT GARDENS & MIXING FUNCTIONS

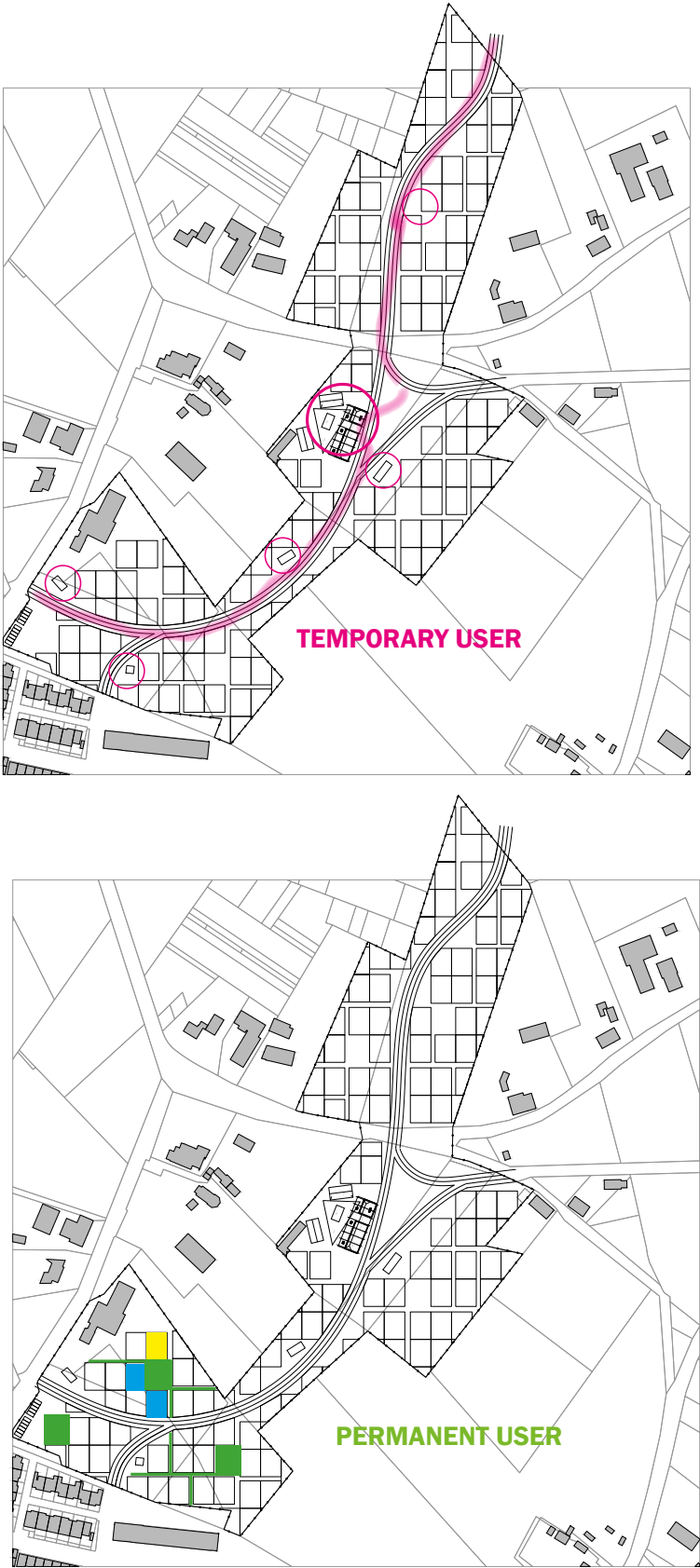
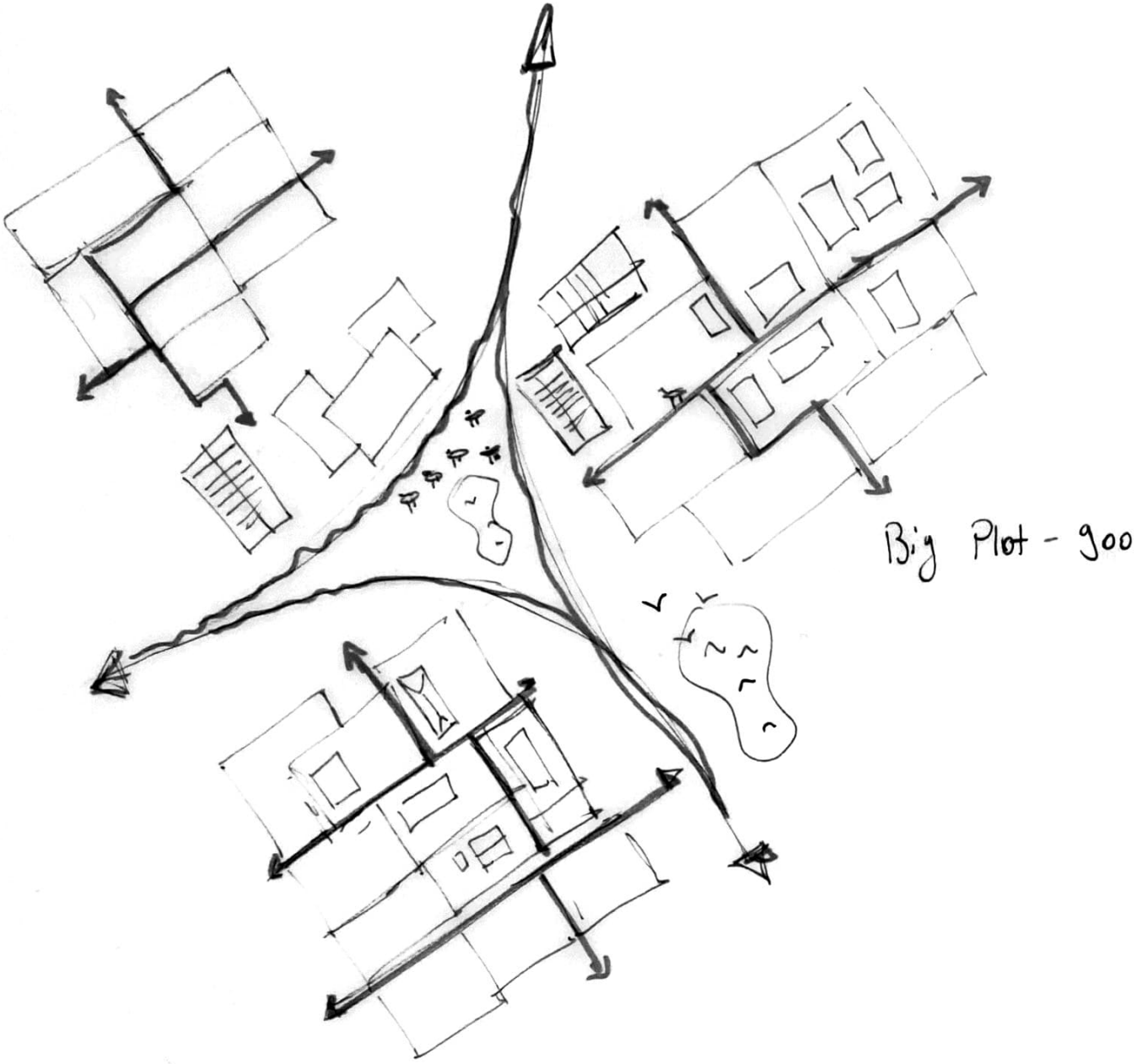


I was looking for a combination of a landscape layer in combination with the plots. With the sketches I came up with the idea of an 'ecoframe'. Later I discussed the usefulness of such a frame? Is this necessary? Why not a hedge?



Composition of plots in the landscape

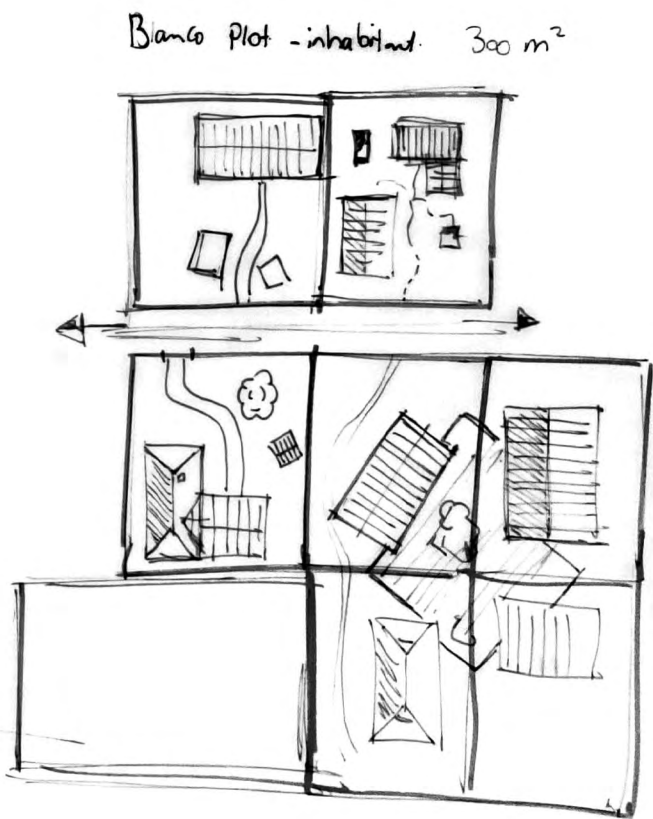
TEMPORARY VS. PERMANENT USERS



RELATIONS BETWEEN PLOTS



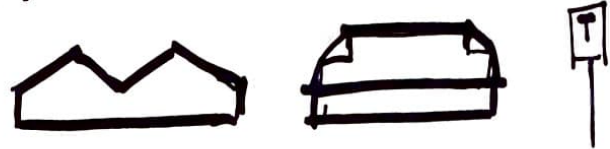
Subdivision in which fordability is important



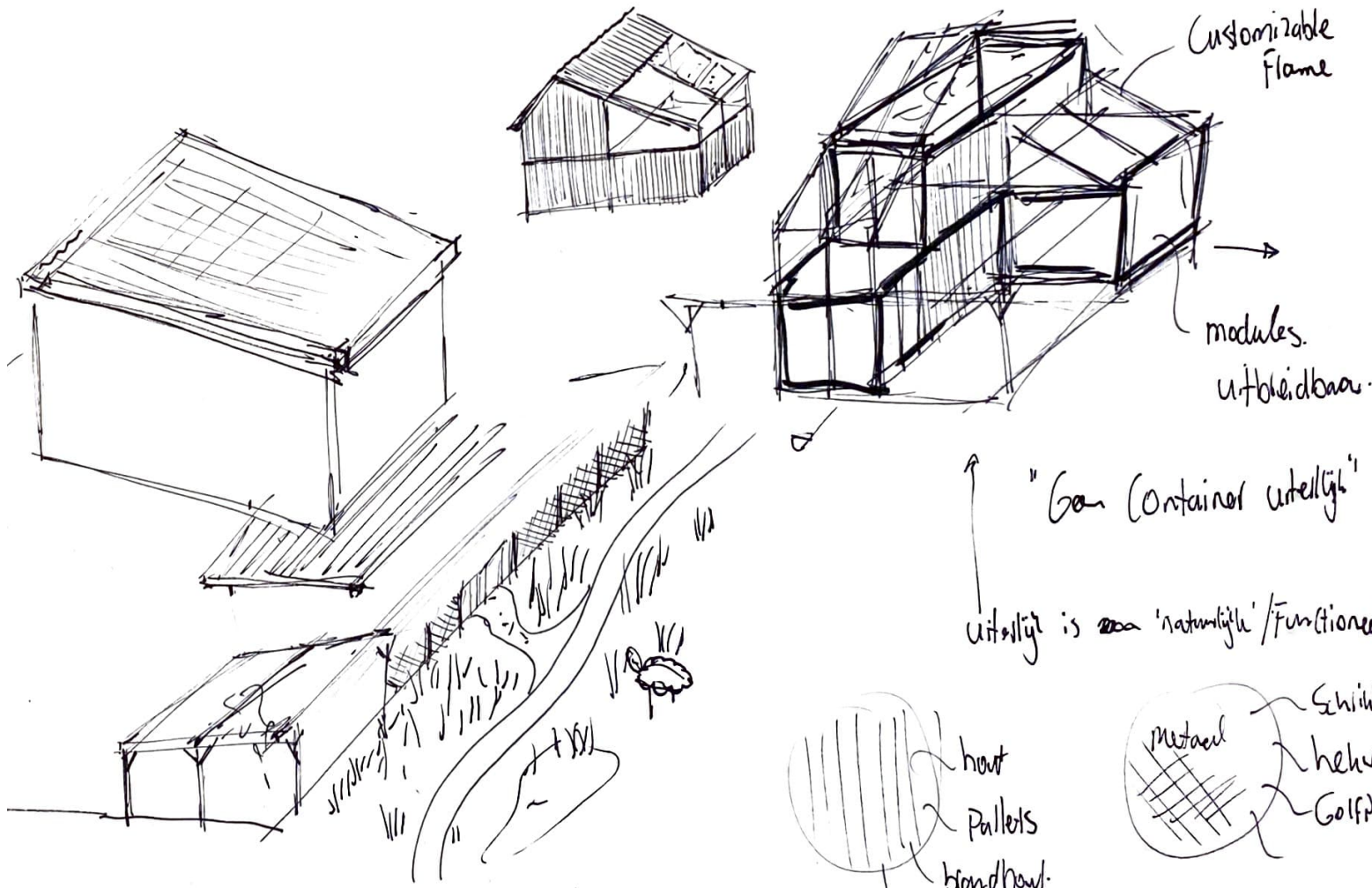
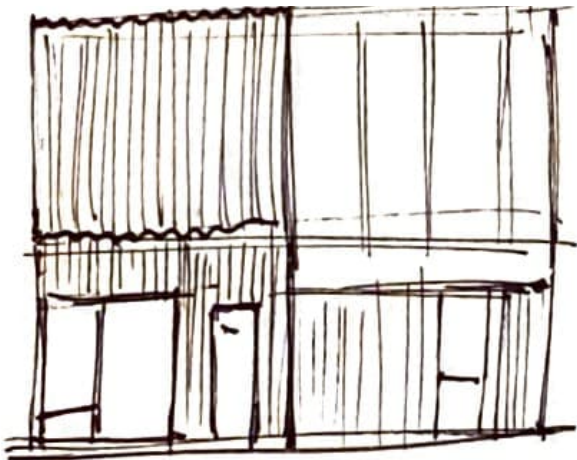
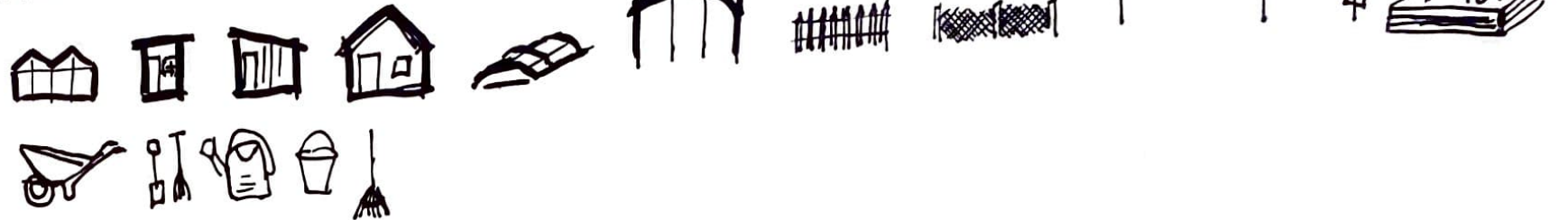
With endless sketches I looked for relationships between the lots. Also with the role of the permanent and temporary user in mind. In those sketches the first idea of the 'wild' wet-heather as veins through the landscape, emerged.

FREE ARCHITECTURE OF THE DO-IT-YOURSELFER

Fringe elements.

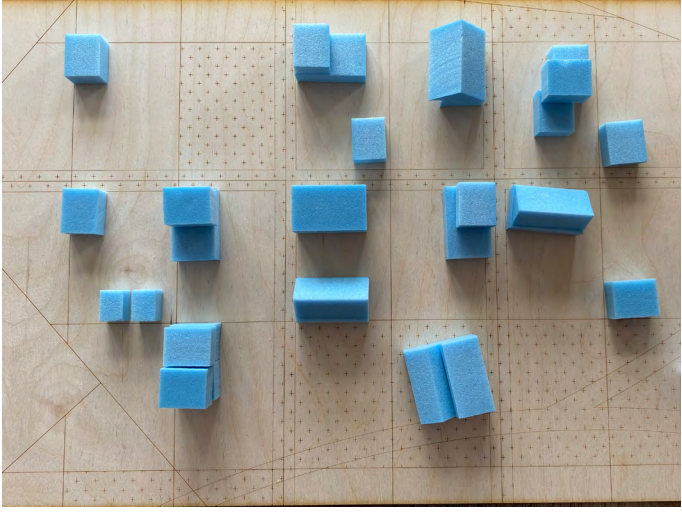
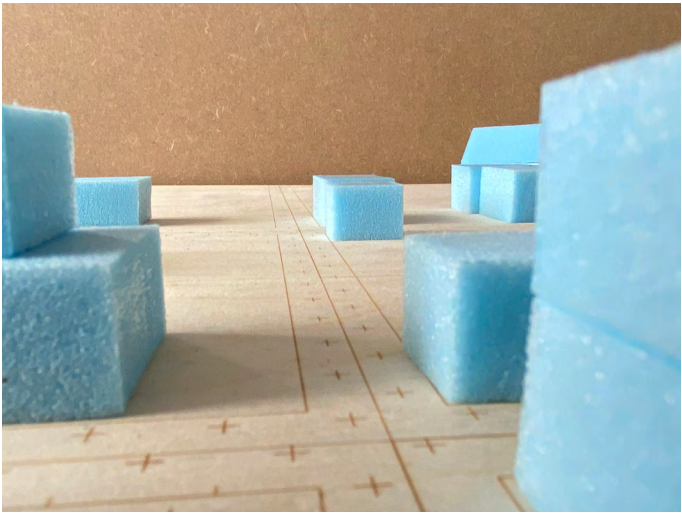
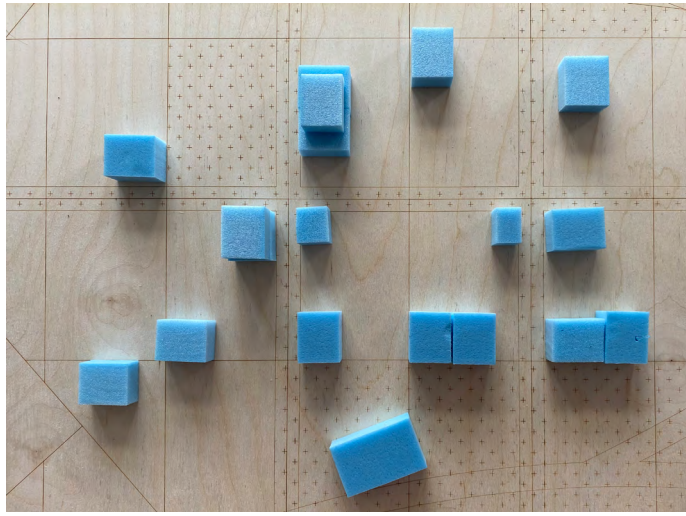
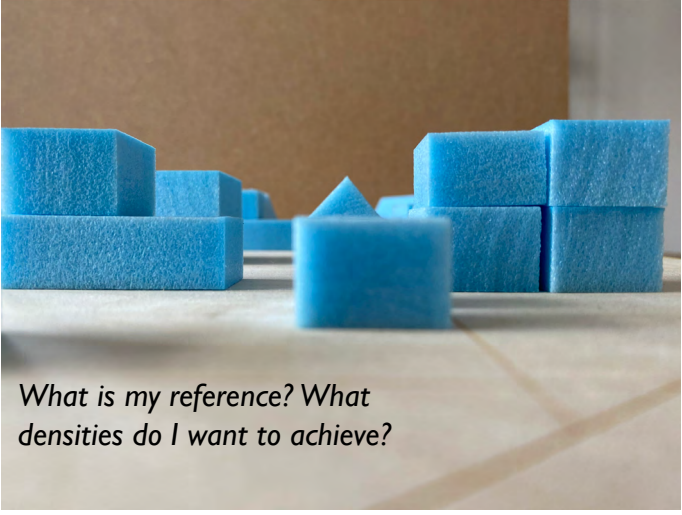
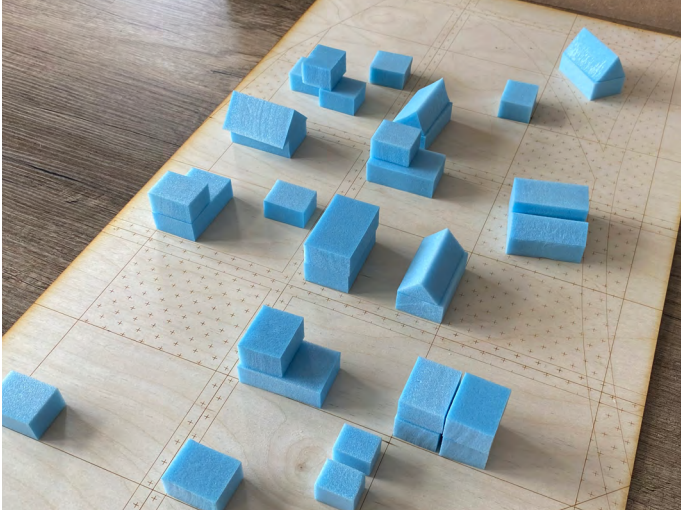
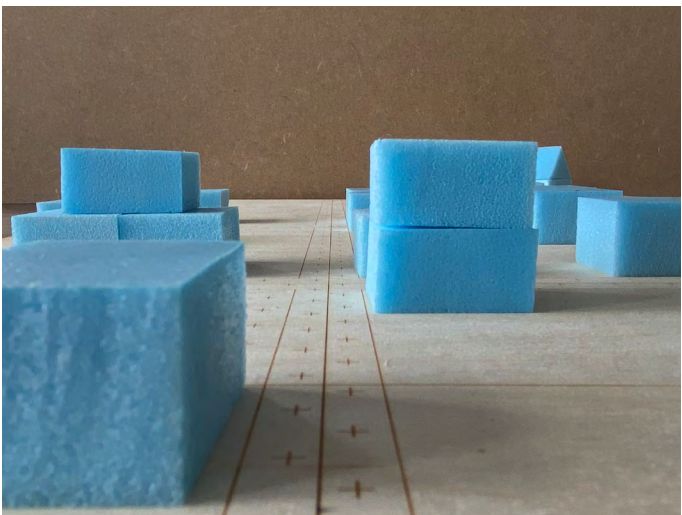
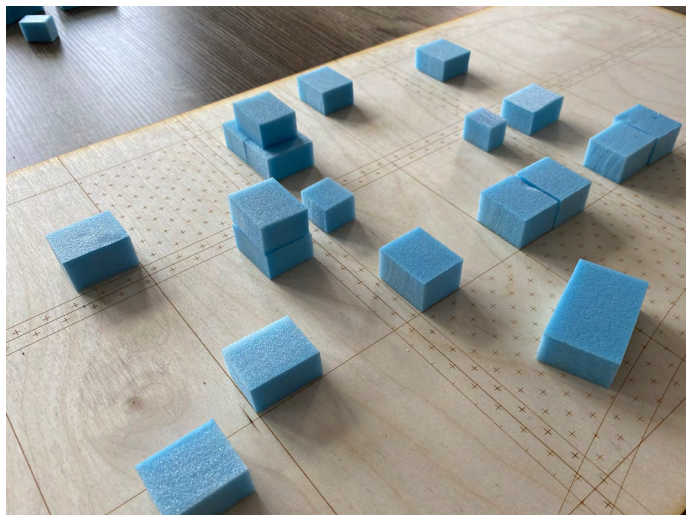


Allotment elements



How would the resident translate his freedom into architecture? With these sketches I try to put myself in the shoes of such a resident. I notice that I try to put current characteristic elements such as fencing, wood and elements from an allotment into the design. But would it really look like that?

DESIGN OF THE ELEMENTS ON THE PLOTS
MODULES INSPIRED OF GARDEN HOUSING ON ALLOTMENTS

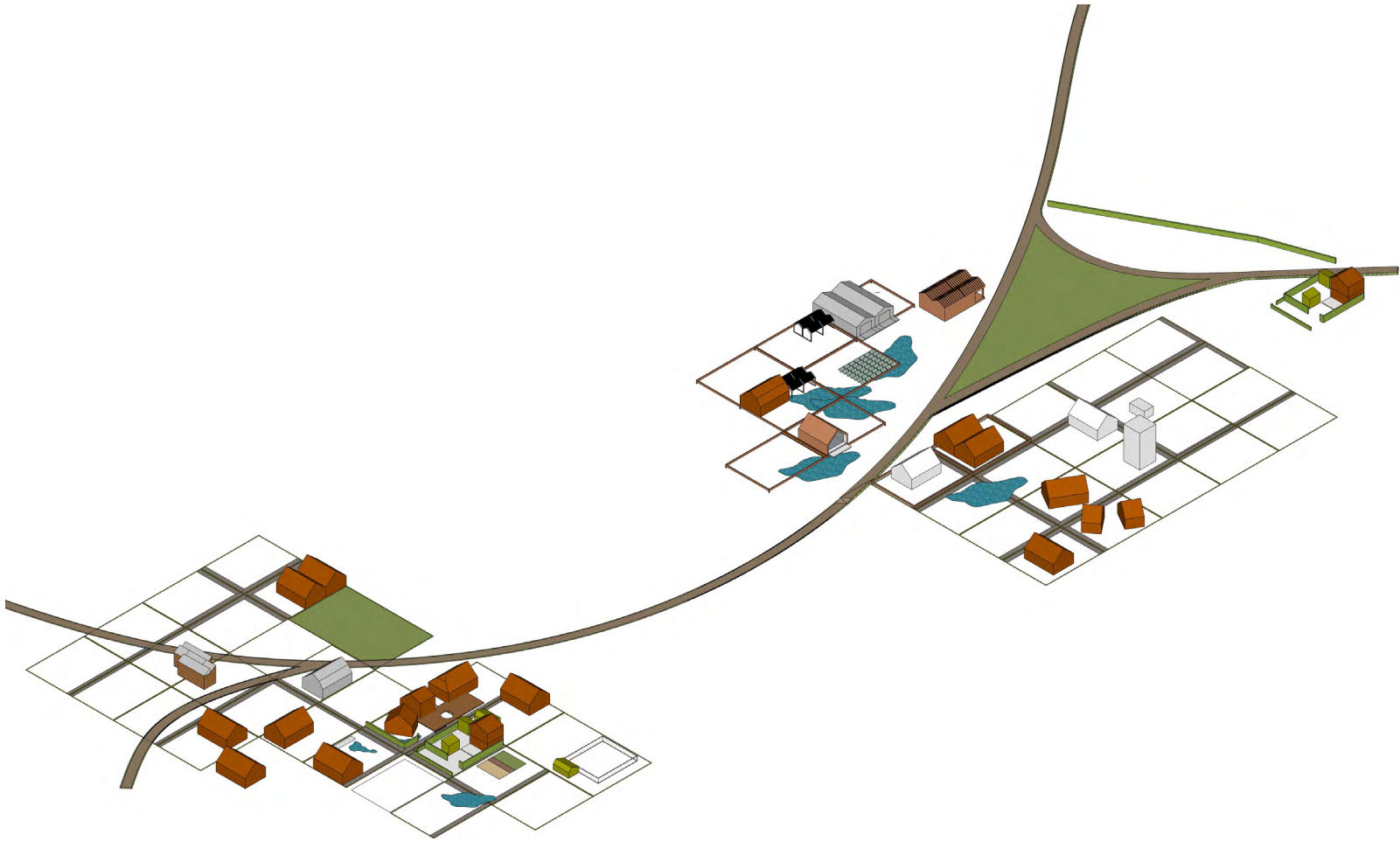


HANDLING ARCHITECTURE

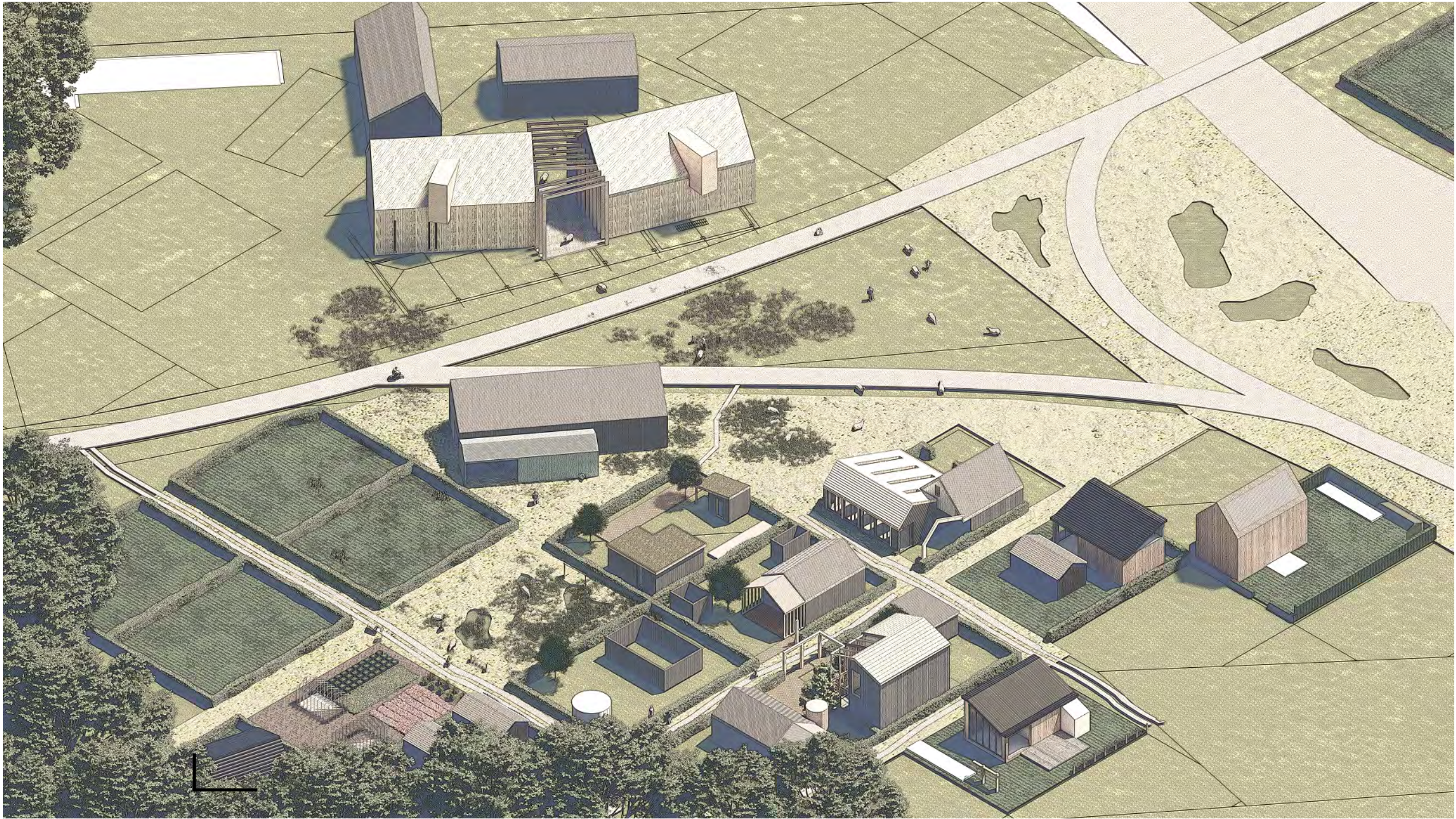
“Between people who have designed and conceived a neighborhood together, there is an automatic bond. The cohesion in such neighborhoods is great.” Those who design their own homes are also proud. The pleasure of living is great. The chance that he lets his home and its surroundings deteriorate is small.”

Because I want to give the resident ultimate freedom, it feels very strange to design this myself. I also did not progress with mass studies because 'everything was possible'. The guidance forced me to think of a community that could arrange it itself. I can then come up with rules or guidelines that they follow, instead of coming up with them myself.

DESIGN OF THE ELEMENTS ON THE PLOTS



DESIGN OF THE ELEMENTS ON THE PLOTS



Testing it on a bigger scale

MULTIFUNCTIONAL BUILDING AS A CENTRAL POINT

REFERENCE

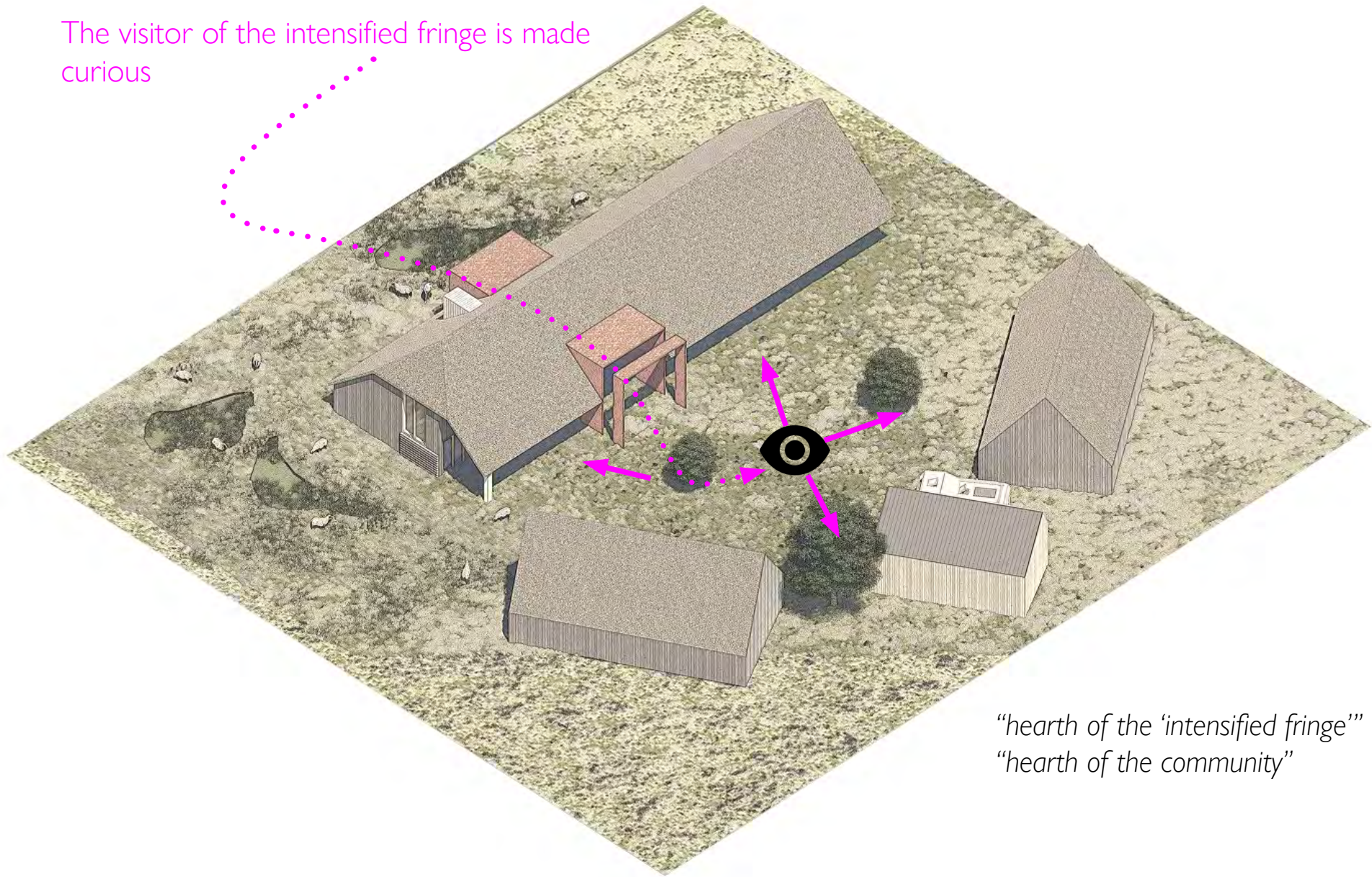


BUURTSCHAP DE GAST
Collective functions in a hamlet, forming a small community.

FUNCTIONS - CONNECTION TILBURG WITH FRINGE

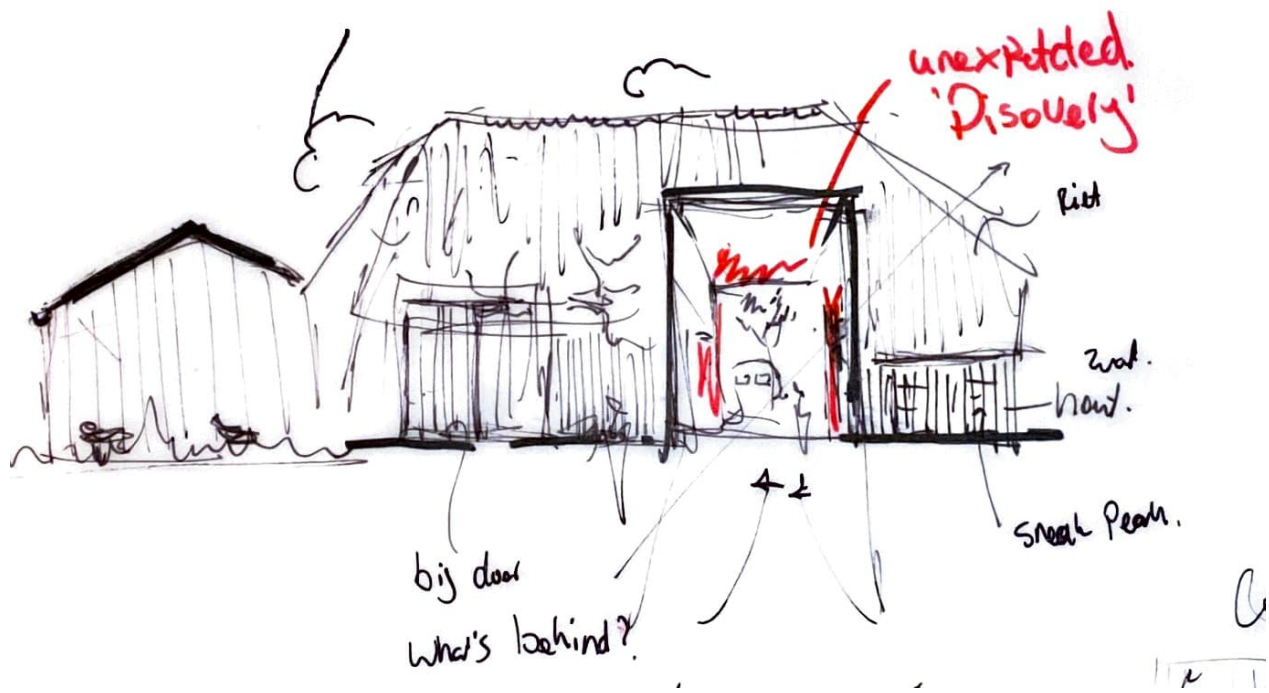
education - local products - atelier - workshop

The visitor of the intensified fringe is made curious



“hearth of the ‘intensified fringe’”
“hearth of the community”

MULTIFUNCTIONAL BUILDING AS A CENTRAL POINT

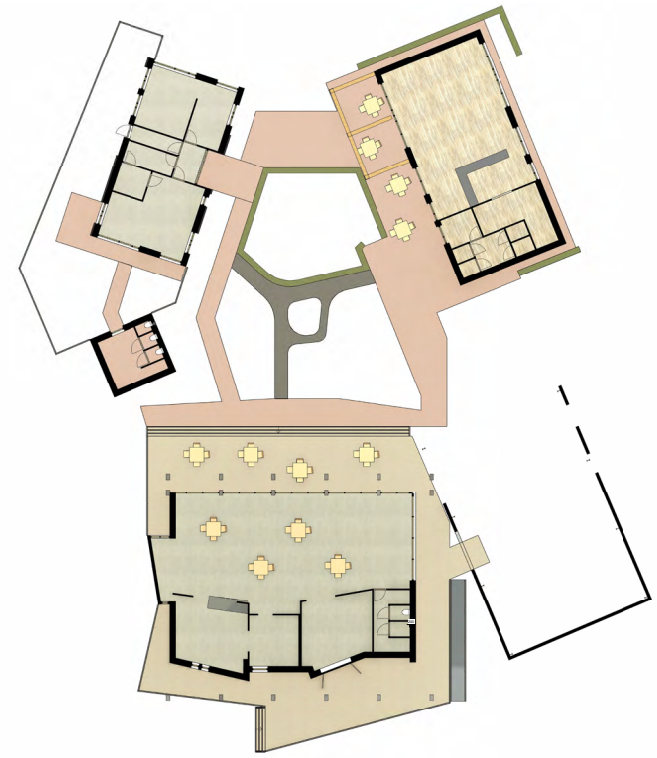
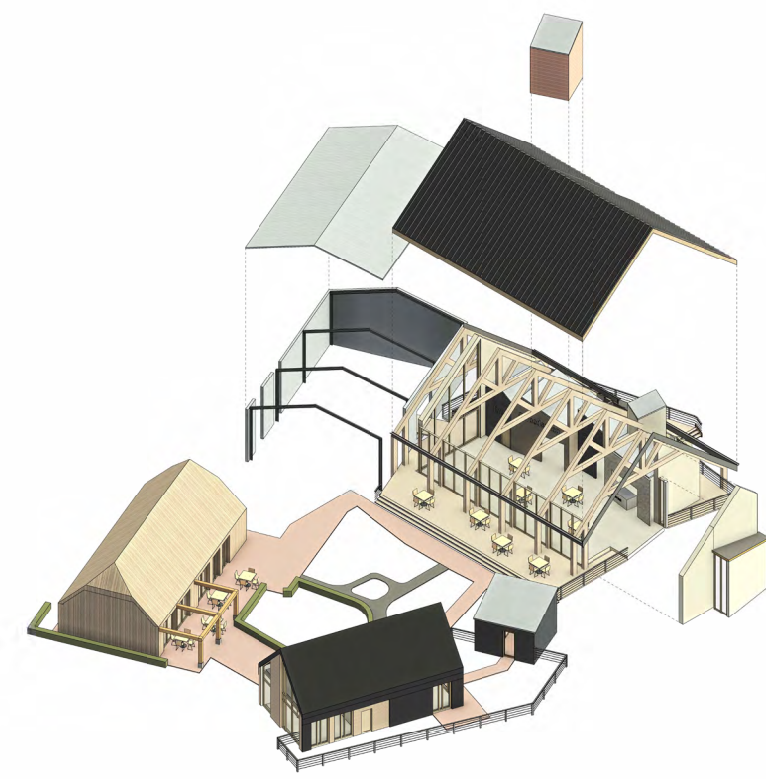
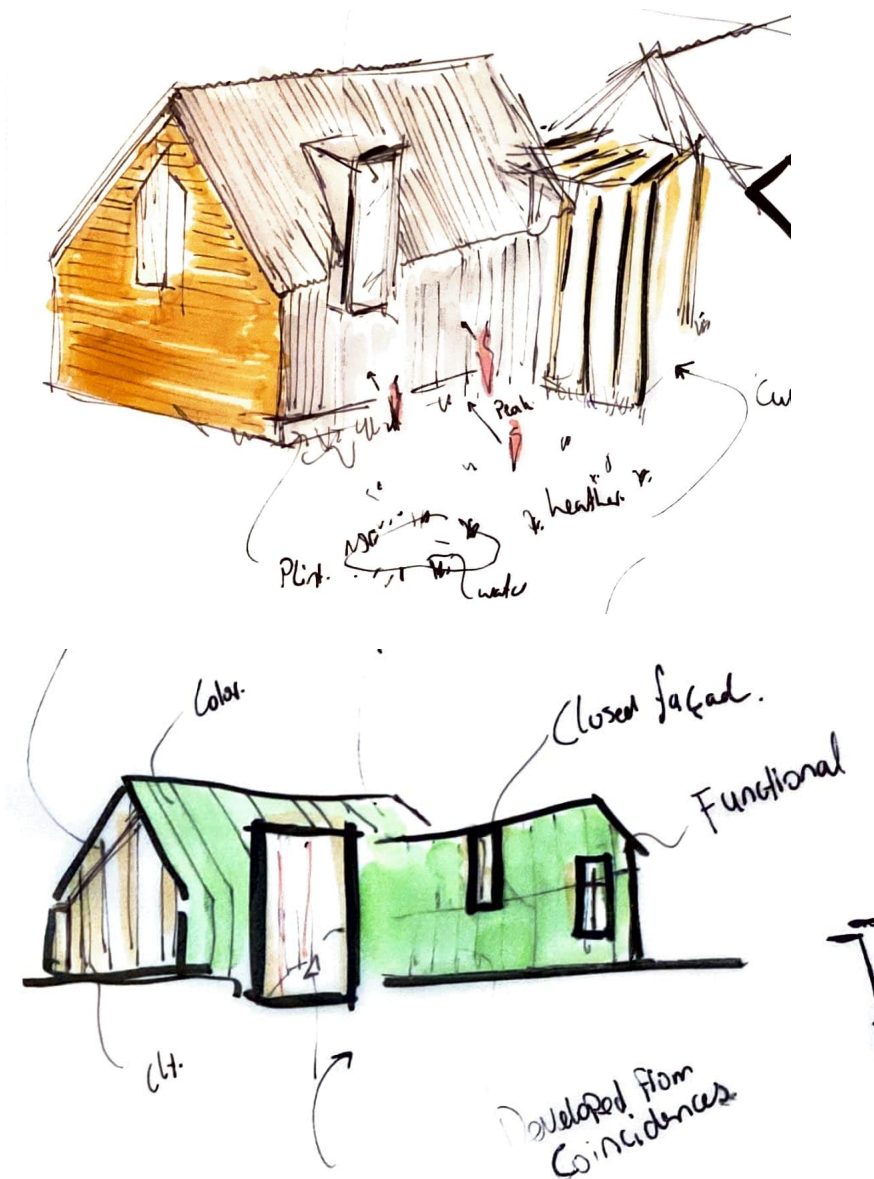


Coincidence, not expecting something

One of the characteristics of the urban fringe is that you don't expect something. "A Sudden Encounter"



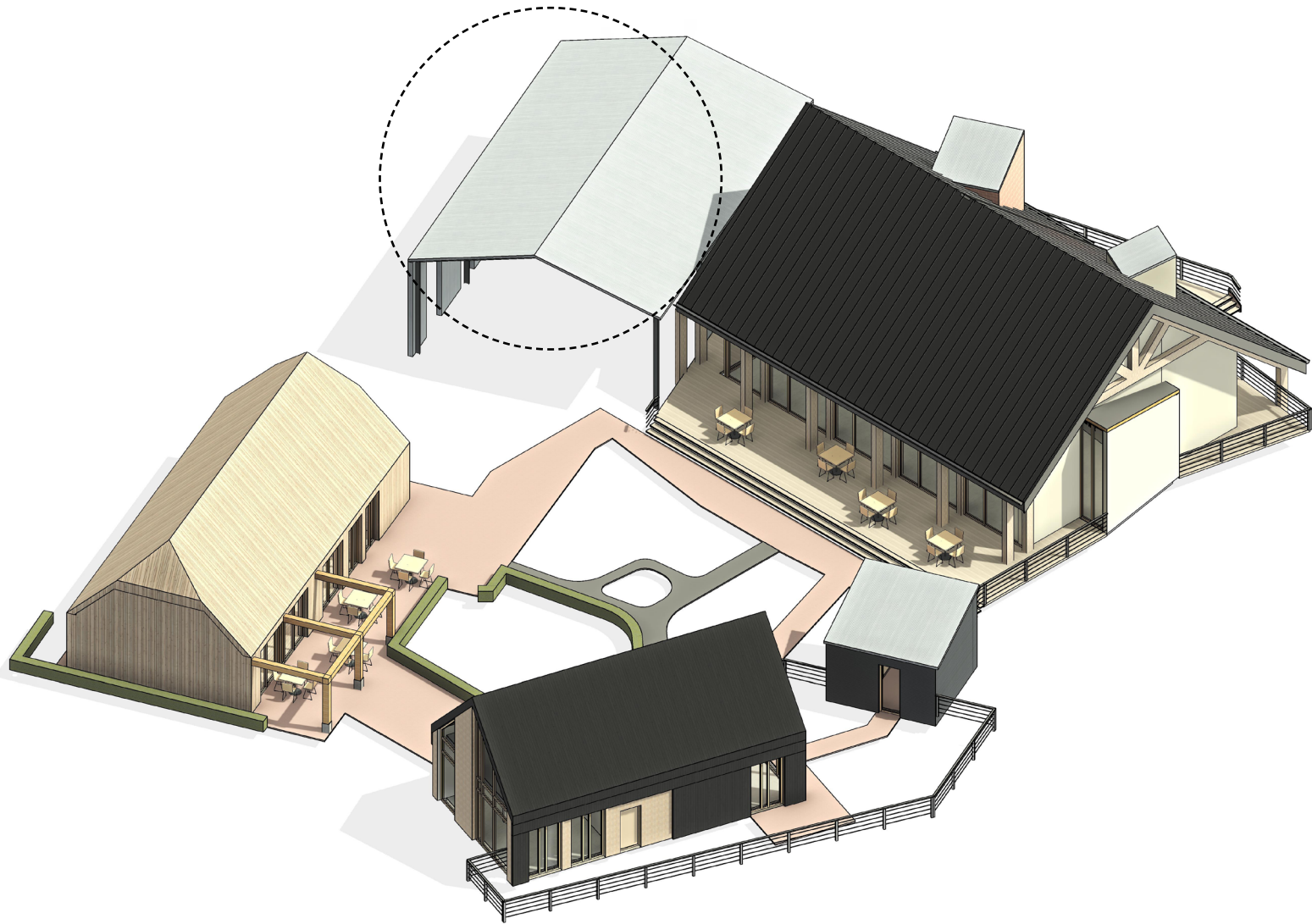
THE YARD DESIGN



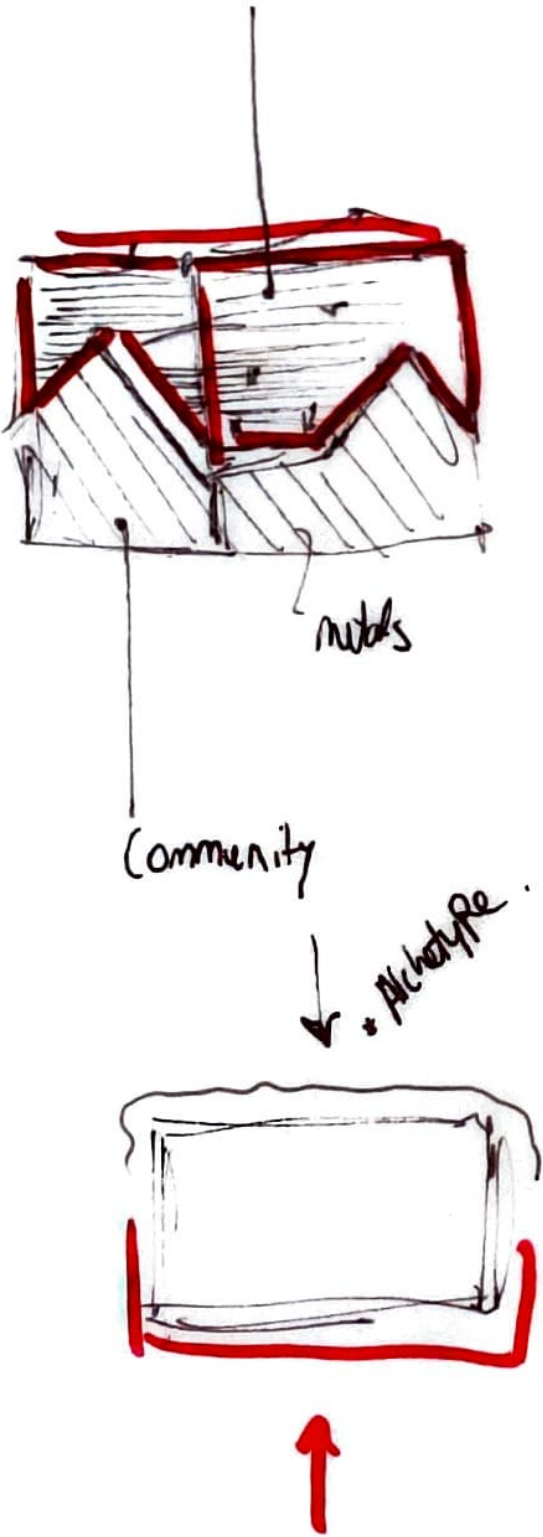
An arrangement of a yard. With a main house and outbuildings/barns.

MORE EXPRESSIVE

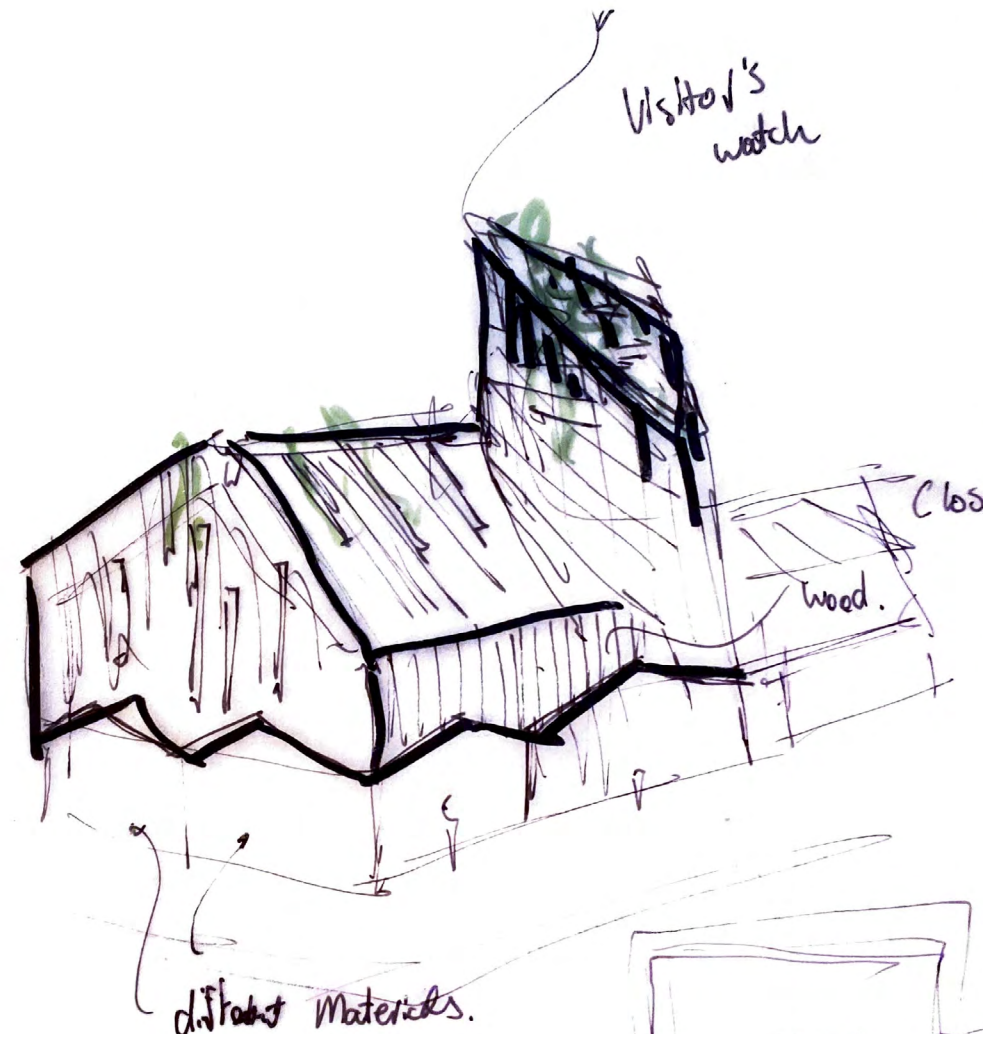
The random placement of the shed is good, in my opinion a better solution can be devised. Maybe it can be more central. Or no building at al?



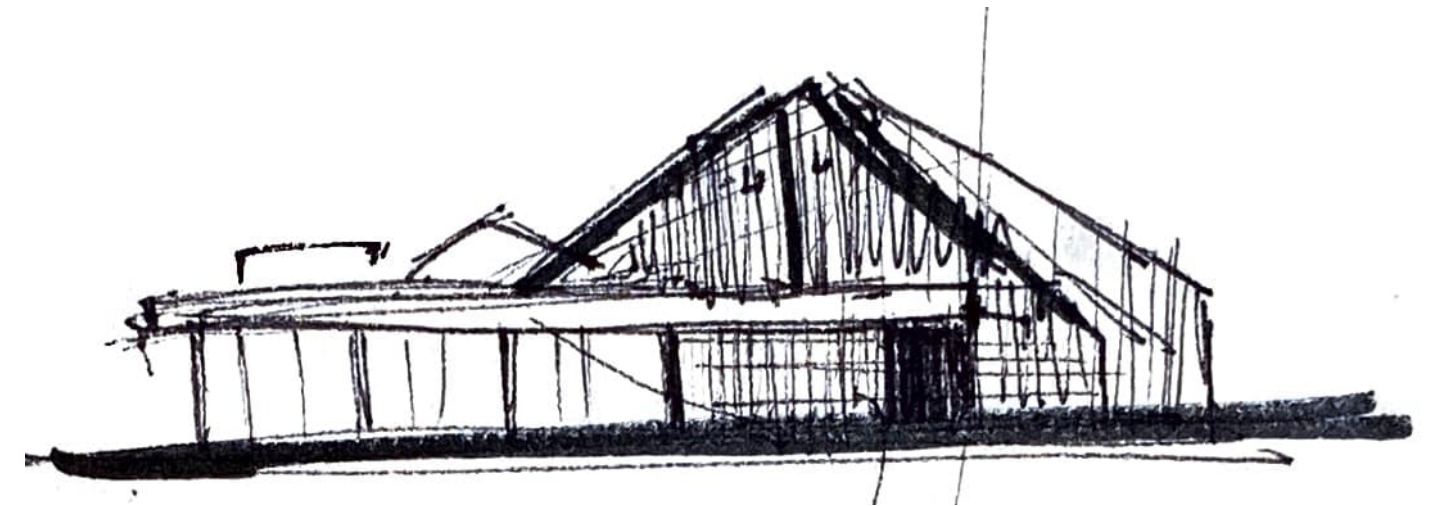
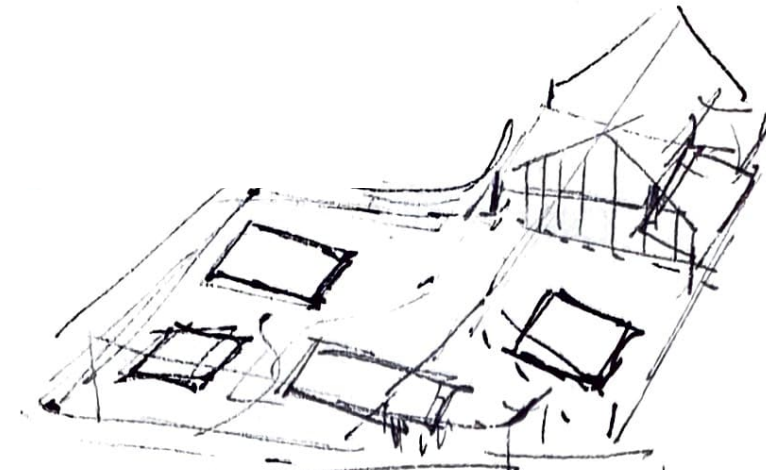
Expressive elements are interesting, but are now too underexposed in the design. The whole is now archetypal, which fits in with the environment, but the tension in the design is missing, as is the case with 'Shepherds Place'. This invites the visitor to take a look. In my opinion, the urban design of the 'yard' is good. I'm just looking for a more expressive form for the whole.



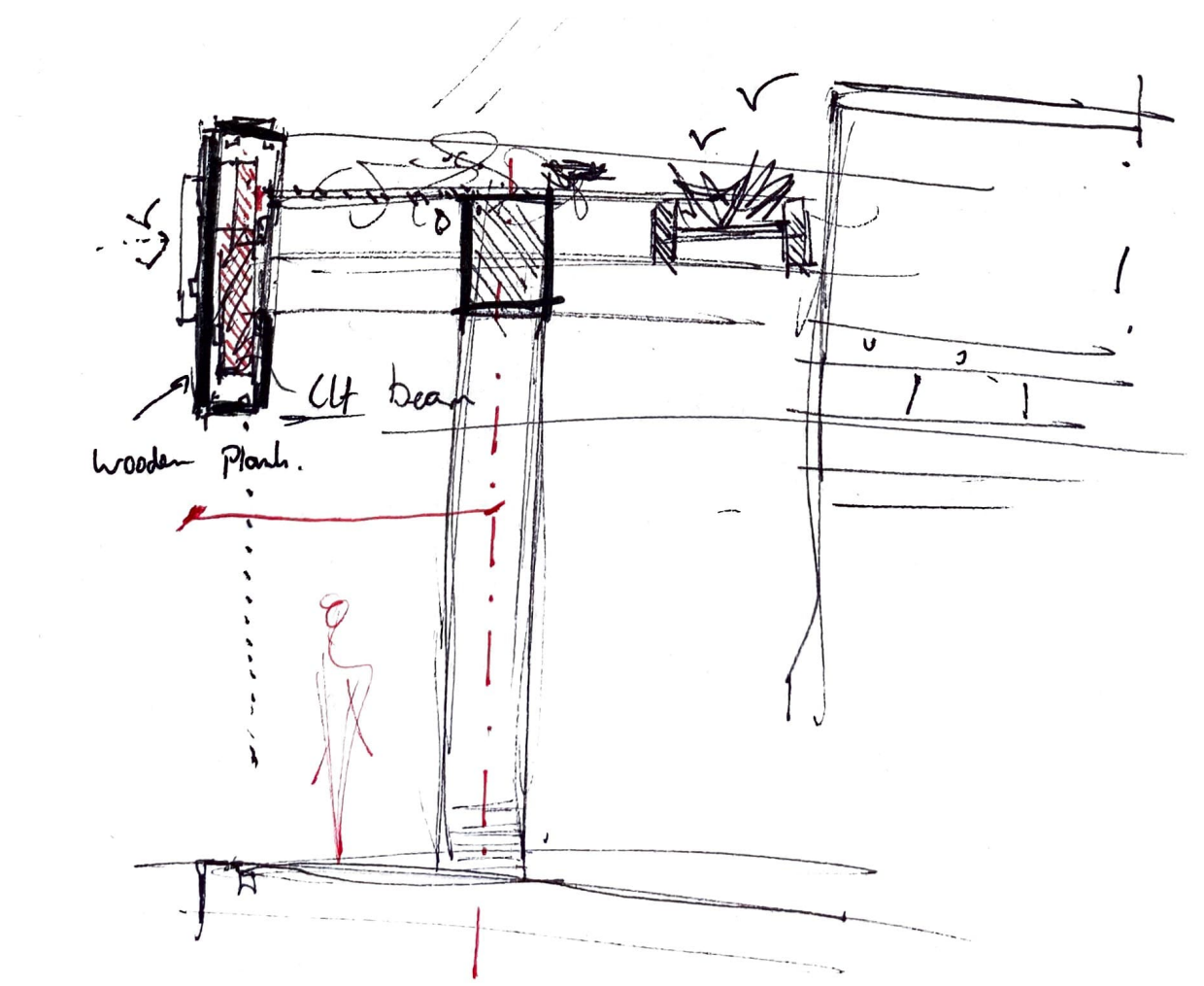
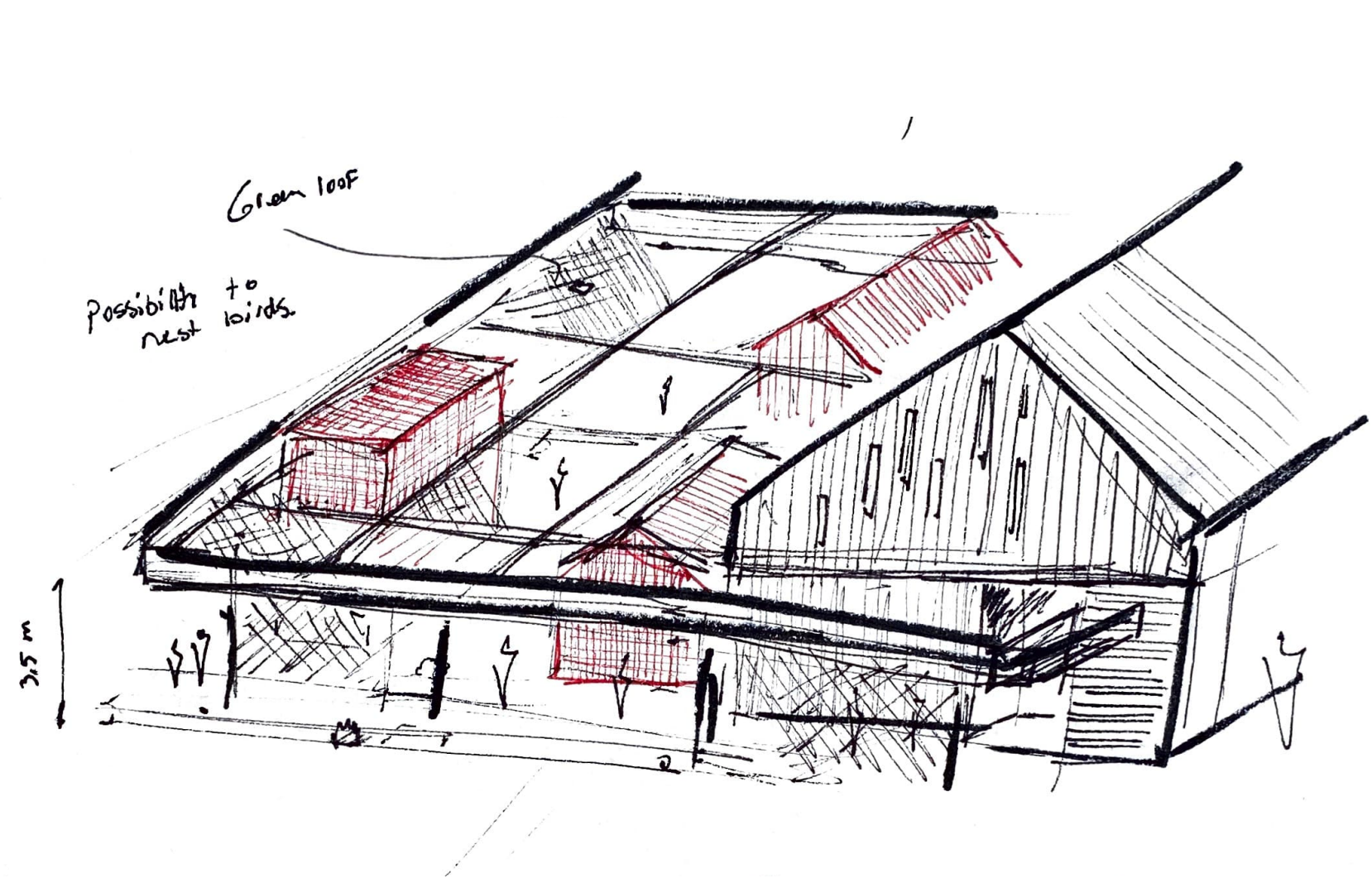
MORE EXPRESSIVE



Changing the 'main building with outbuildings' typology doesn't feel right. It is precisely the 'yard' that can become an important center point in this design.

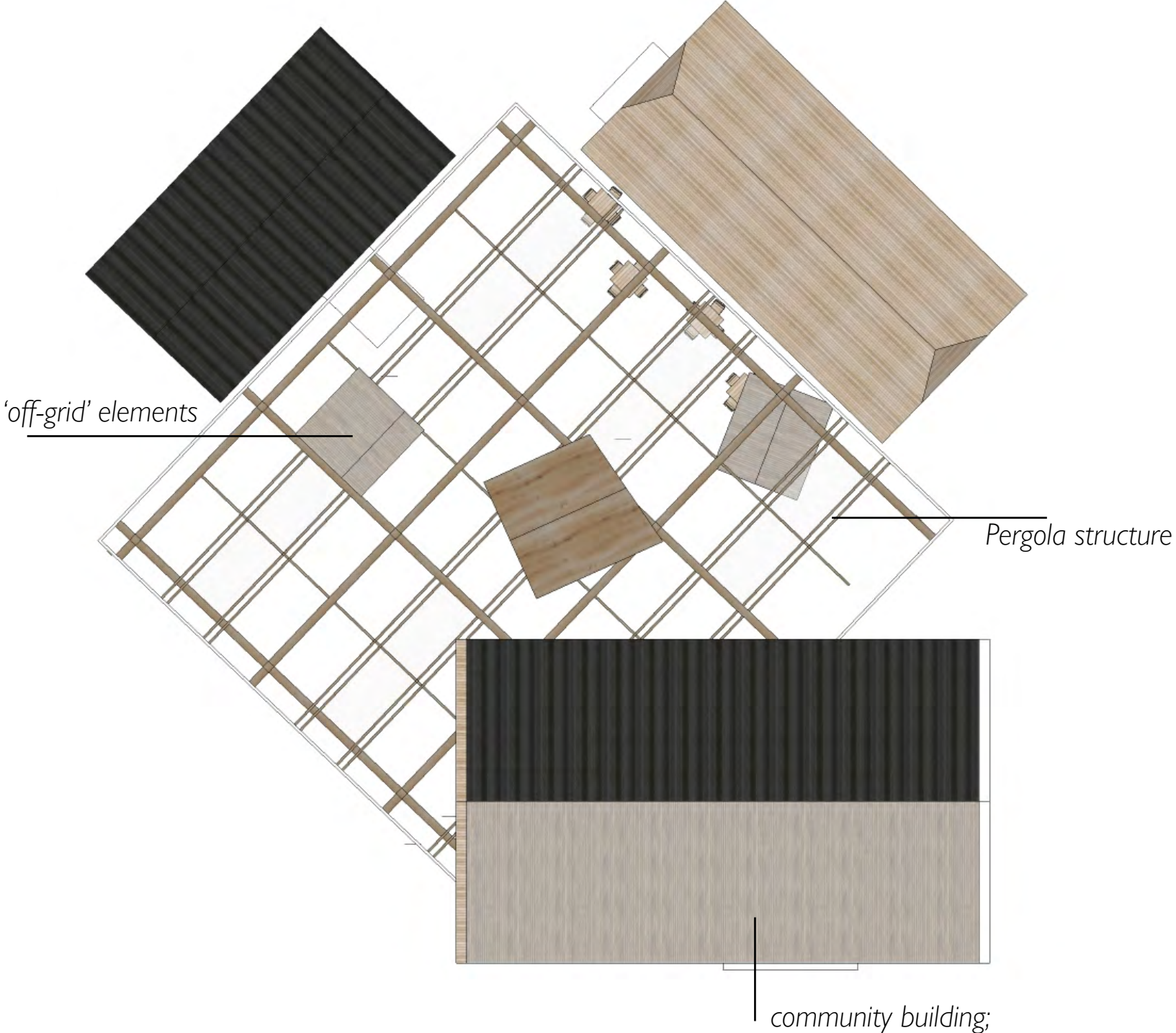


Start sketching a pergola construction. This is where I started to realize that this could actually be the connecting factor. Functions such as 'garden houses', used to connect the users, could be placed here. Only then does the building really become a connecting element in the fringe.

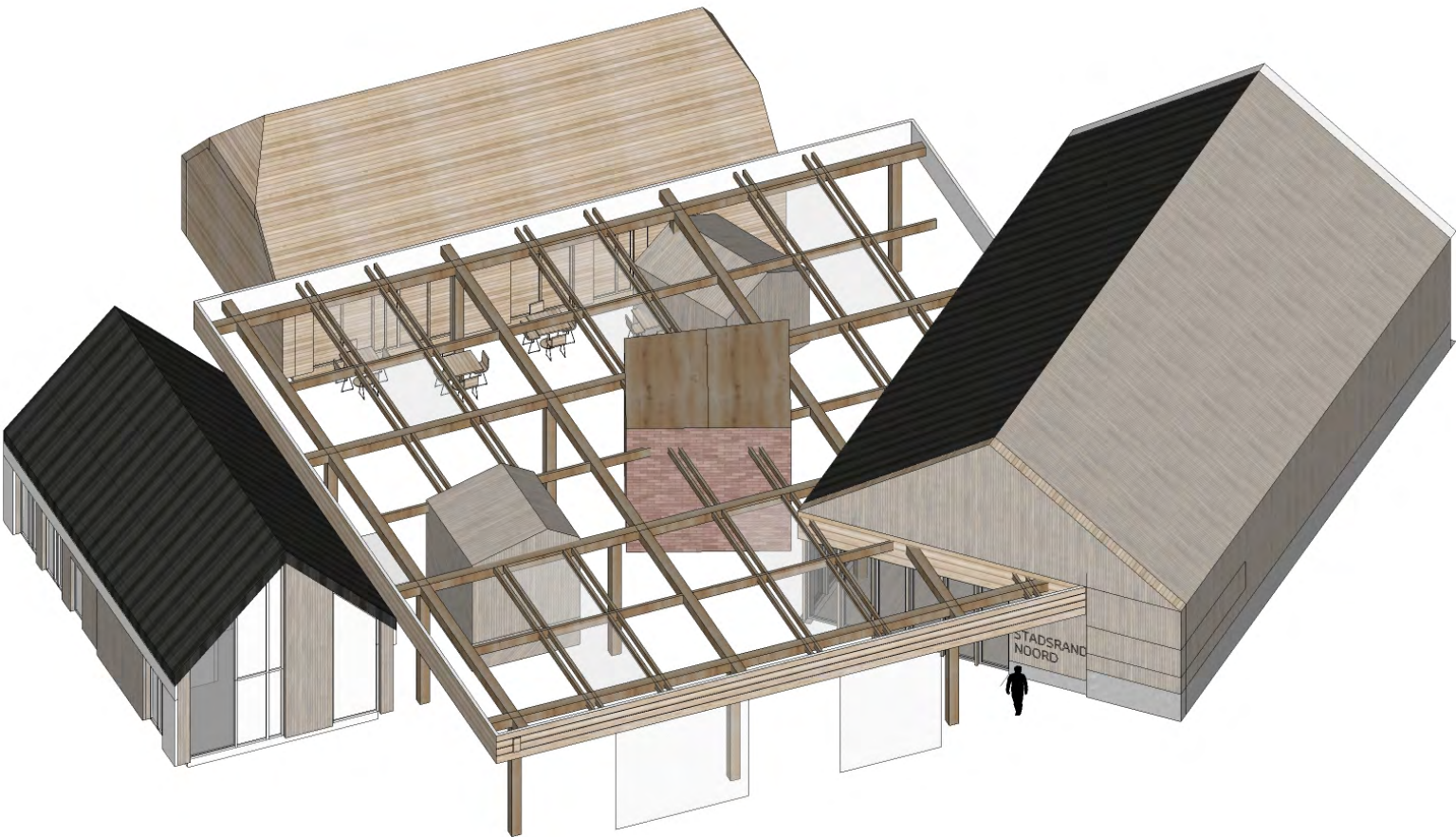


Nature inclusive pergola

CONNECTING PERGOLA FRAME

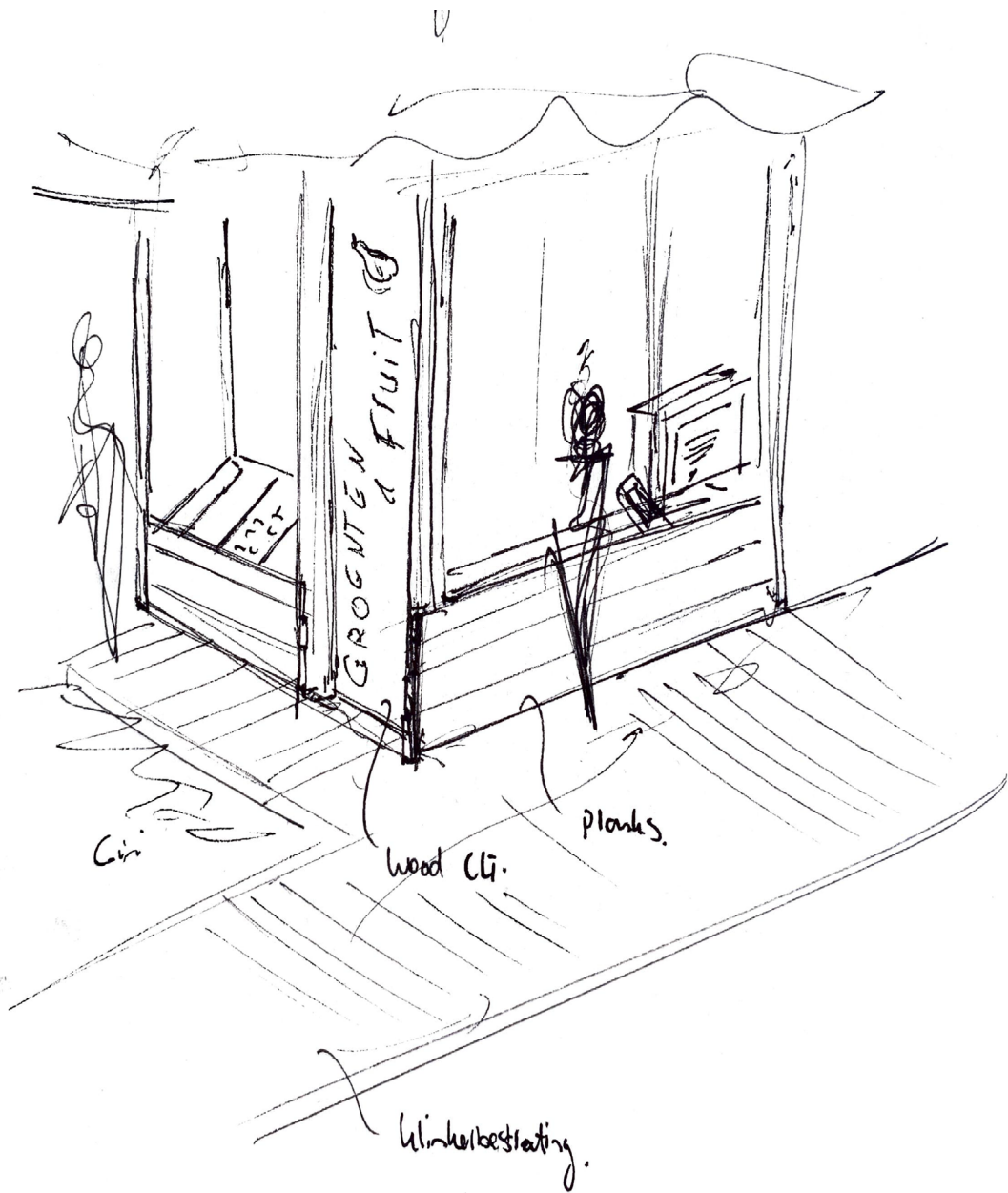


The pergola structure provides a visual connection, shade and is nature-inclusive

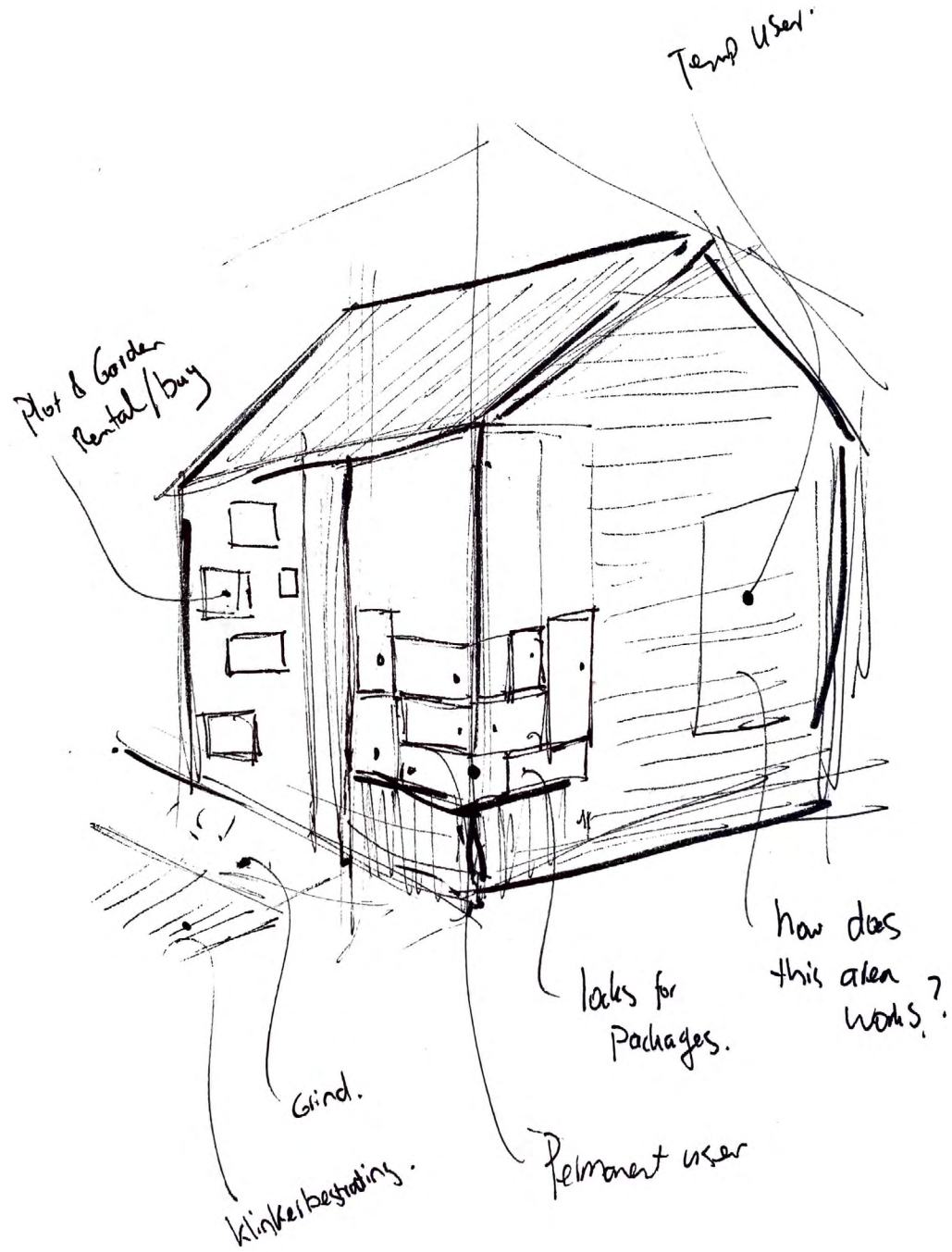


FUNCTIONS THAT SERVES AND CONNECT THE USERS

ALLOTMENT SHOP



COMMUNITY POINT



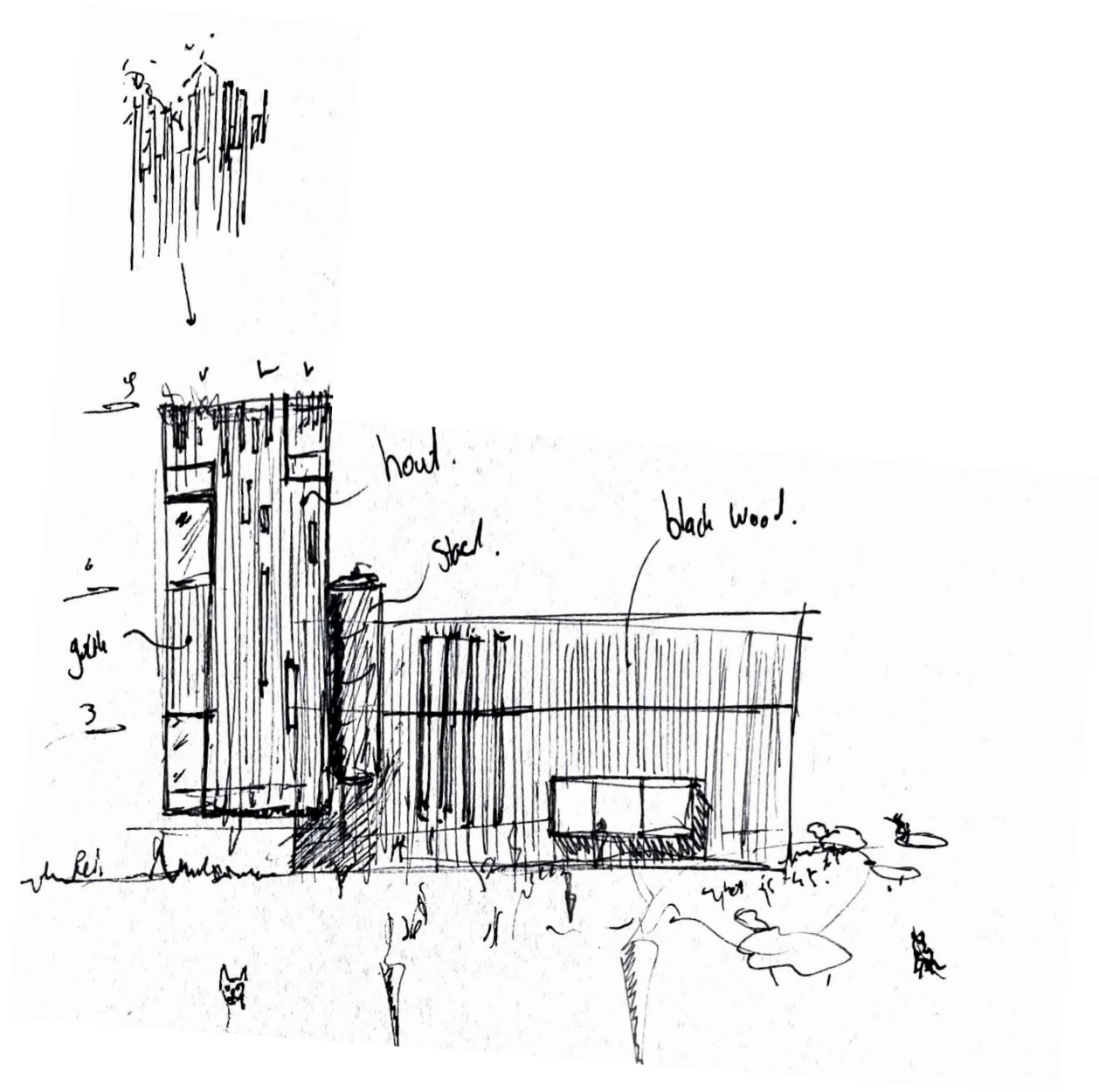
SCALE MODEL: FRINGE INTENSIFIED



SCALE MODEL: FRINGE INTENSIFIED

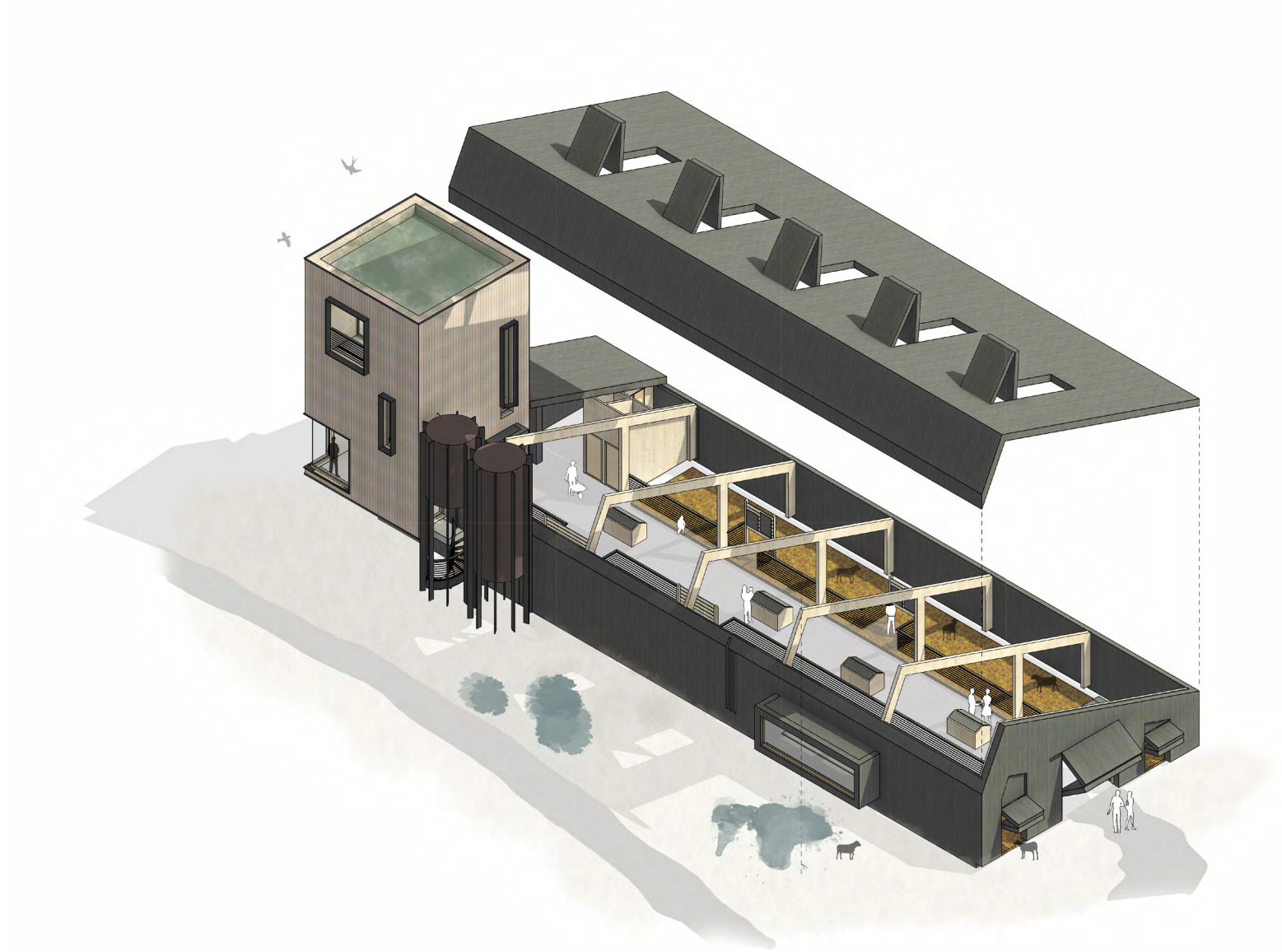


SHEPHERDS PLACE



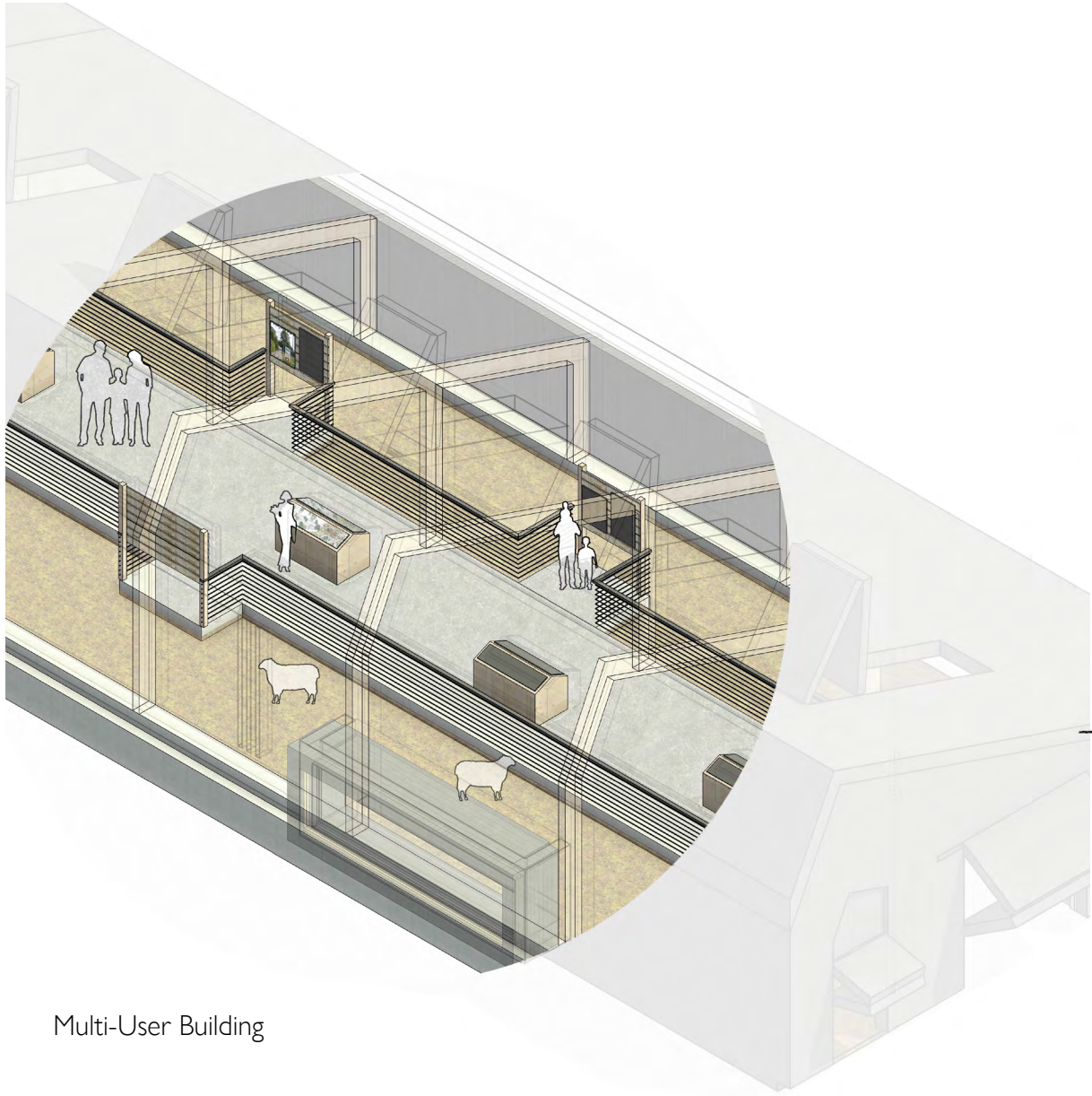
“I want it to be a landmark and a ‘strange encounter’ in the landscape. It has to be an identity for the intensified fringe.

Designing a place for the shepherd. While designing, I came up with the idea of making the building multifunctional. Education of the landscape can have a great place here for the temporary user.

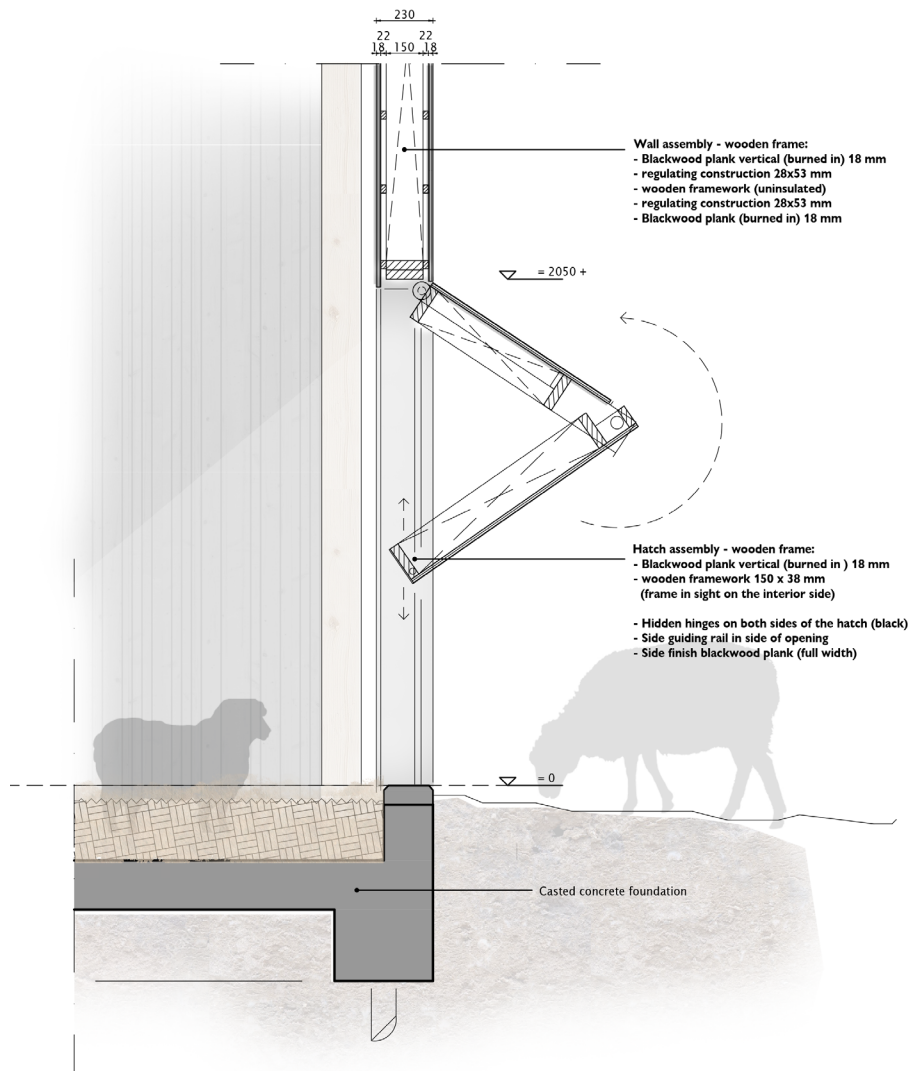
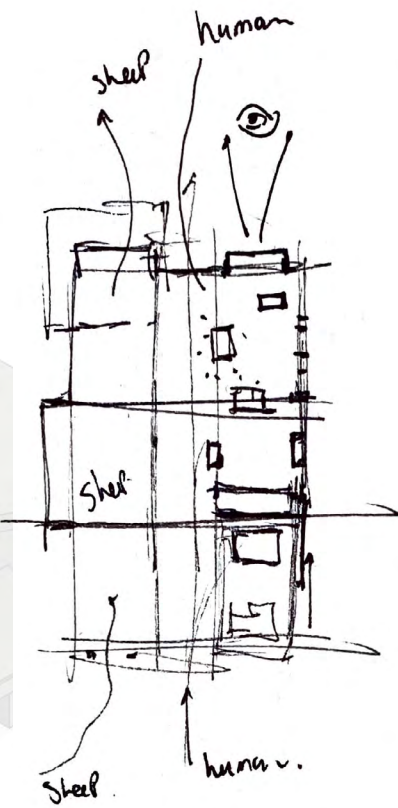


The recreant learns about the ecosystem. The Sheperd needs an overlook to keep an eye on his flock.

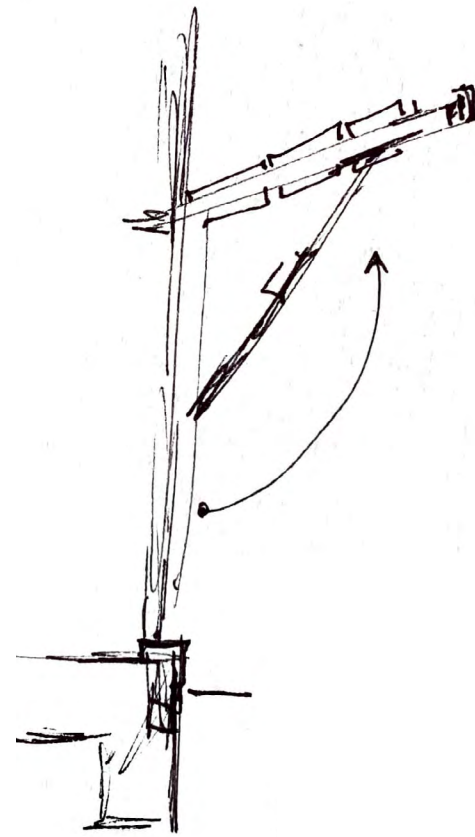
SHEPHERDS PLACE



Multi-User Building



Creating 'unexpected' elements



With this building I wanted to test the principle whereby the permanent user and the temporary user come together in one building. Because of this I discovered that mixing users gives interesting reason for design. The building is not designed for one target group, but serves more. This creates the mix of experimental functions that I am looking for.

SHEPHERDS PLACE



Cross section of the Shepherd's place

SHOWING SCENARIO'S



During the presentation of the final design, I worked out experiences in the area. This helped visualize the project and show the connection between architecture, social elements and the landscape. This has made me aware that I can further develop a number of these scenario's for the final design. I can clearly explain 'The Gardens' with this.

REFLECTION & CONCLUSION

The urban periphery, it's a very interesting area where a lot can be explored. In order to come up with a good concept, many interesting things have come by. Because it is such a relatively 'unknown' subject, I had trouble defining the place.

I soon found out that the current character in which 'everything' is possible, is a good starting point to create habitation and experience. The findings of the permanent and temporary occupants provided a basis for the design. Although it took a while before I had these principles in order for myself.

From that (relatively late) moment on there were many elements in the landscape that could be designed. And in the end many connections with the research are visible. I find it special to see that from a landscape scale I started to zoom in further and further. Once I had a clear idea of the location, it was mainly a matter of puzzling out the right configuration. Mainly of plots and relationships with the landscape from an urban planning perspective. Once that was clear I started to focus more on the architecture of the buildings. Landscape, urban planning and architecture seemed to come together in this process. In my logbook this is also clearly visible.

All in all, I am satisfied with the final result. By intensifying the current character, I have created a unique concept in the urban fringe of Tilburg

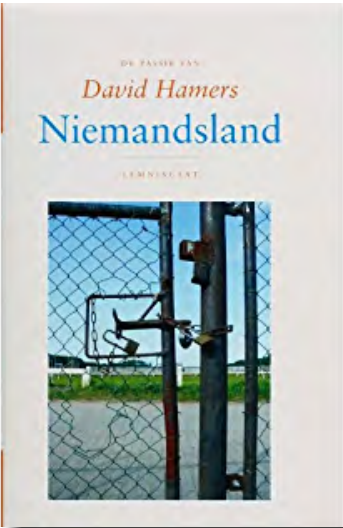


BOOKS & EXPERTS



Randverschijningen
“Het leven op de stadsrand”

Marieke Kijk in de Vegte
Sabina Theijs



Niemandsland

David Hamers



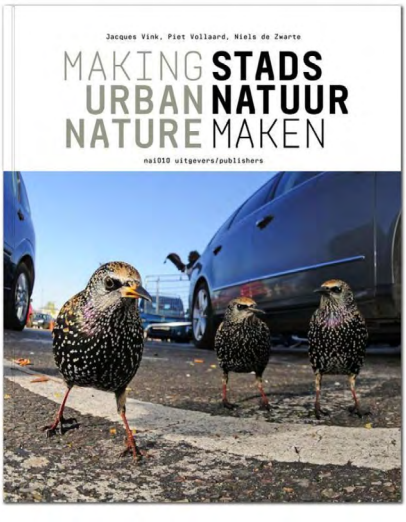
Darwin in de stad

Menno Schilthuizen



Expeditie Stadsranden

LAMA Landscape Architects



Stadsnatuur maken

Jacques Vink, Piet Vollaard, Niels
de Zwarte



**Community architecture
in Nederland**

Henk van der Woude



**De architectuur van de
stad**

Aldo Rossi

SIDNEY VAN WELL
ARCHITECT / FORESHORE

Notes & interests:

- Experience with designing in the ecosystem
- Bigger context

BART DE ZWART
LECTOR REAL ESTATE

Notes & interests:

- Dynamics of the fringe
- Forming a definition - example of his own experience in Utrecht.

ERNA HUSUKIC
PROF. RESEARCHER

Notes & interests:

- Thinking in stages of developments
- Helped with observing the spot
- “Search for strategic points, generators”

MAURICE SPECHT
PARTICIPATION EXPERT

Notes & interests:

- “First the functions, living will follow”
- De Ceutel as a reference, time projection of 10 years.
- Choose for interventions in time.

REFERENCES & LITERATURE

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Documents & maps

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An architectural site plan for a residential development. The plan shows a central cluster of buildings, including a large multi-story structure with a flat roof and several smaller houses. A winding path or road cuts through the site, surrounded by numerous trees. The surrounding area includes existing buildings and open fields. The title 'FRINGE INTENSIFIED' is prominently displayed in the lower-left quadrant.

FRINGE **INTENSIFIED**

PROJECT VOLUME / LOGBOOK

Koen Marcelissen | Graduation studio | FHK Master of Architecture | 2022