



farming for future

-combining sustainable farming with sustainable housing in Skedala

Master's candidate: Mikaela Ledin
Supervisor: Andreas Olsson
Examiner: Lars-Henrik Ståhl

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Thank you from the bottom of my heart.

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 purpose & research questions



abstract

The ecological footprint of mankind has made a large impact on the world and is one of the main reasons for climate change, which is now the greatest threat faced by humanity. The world's population is getting larger and food production is running high to meet our needs. Food is being shipped all over the world, even though many countries have the capacity to grow crops on their own. Sweden and other countries with high class farming still choose to import a large proportion of their food supply. The world will face a lot of future challenges due to climate change. With that said, we need to reconsider our way of thinking regarding food supply. Why must an apple be imported from Italy, when they are also grown in Skåne and why must rice be bought from China when oat rice can be produced in Sweden?

At the same time, one has to take into account that the world's population is rapidly growing, consequently increasing the need of food and housing.

At the same time, the human population on earth is increasing and we all need somewhere to live. There is a conflict whether to build on farmland to house more people or letting the farmland be as it is so it can continue to supply people with crops both now and even more so, in the future.



Introduction

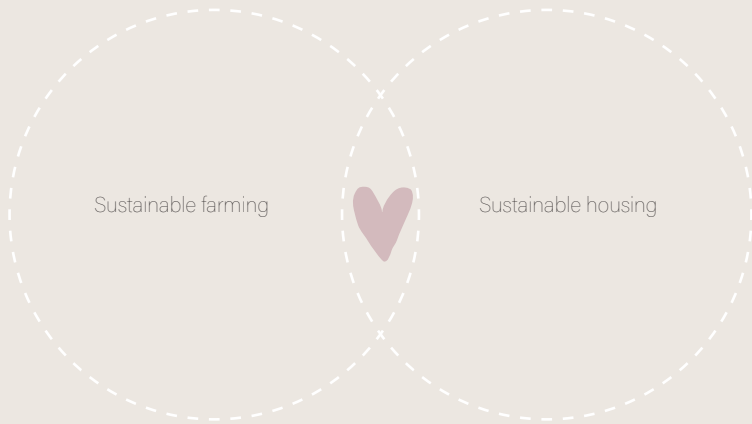
This work is going to focus on the conflicting interests between building on farmland because of the need of supplying people with homes and the need of keeping the existing farmland due to an increased need and demand for self-sufficiency and local production of food.

The world's population is continuously increasing and people need somewhere to live. The climate is changing all over the world and a large number of places where people used to live are soon uninhabitable. People are going to have to move away from their homes because of changing climate zones. Although, Sweden will have an advantageous growing zone in the future.

At the same time, Sweden's cities are growing and urban sprawl is a common problem. Many of the cities are built around fertile soils, now a target for the cities expansion. If farmland is being built on, it is hard to reverse back into fertile soil again. As the population increases, the farming fields are decreasing, an equation that doesn't add up evenly. Every year, we are losing 24 billion tons of fertile soil and 13 million hectares of forests worldwide.

Aim

The aim of this project is to look at the conflict between farmland exploitation to solve the housing shortage and saving the farmland for future needs. The project will also seek a way to combine the two interests; continuing on exploiting the farmland while compensating for the lost valuable agricultural land in order to produce crops for the people living there.

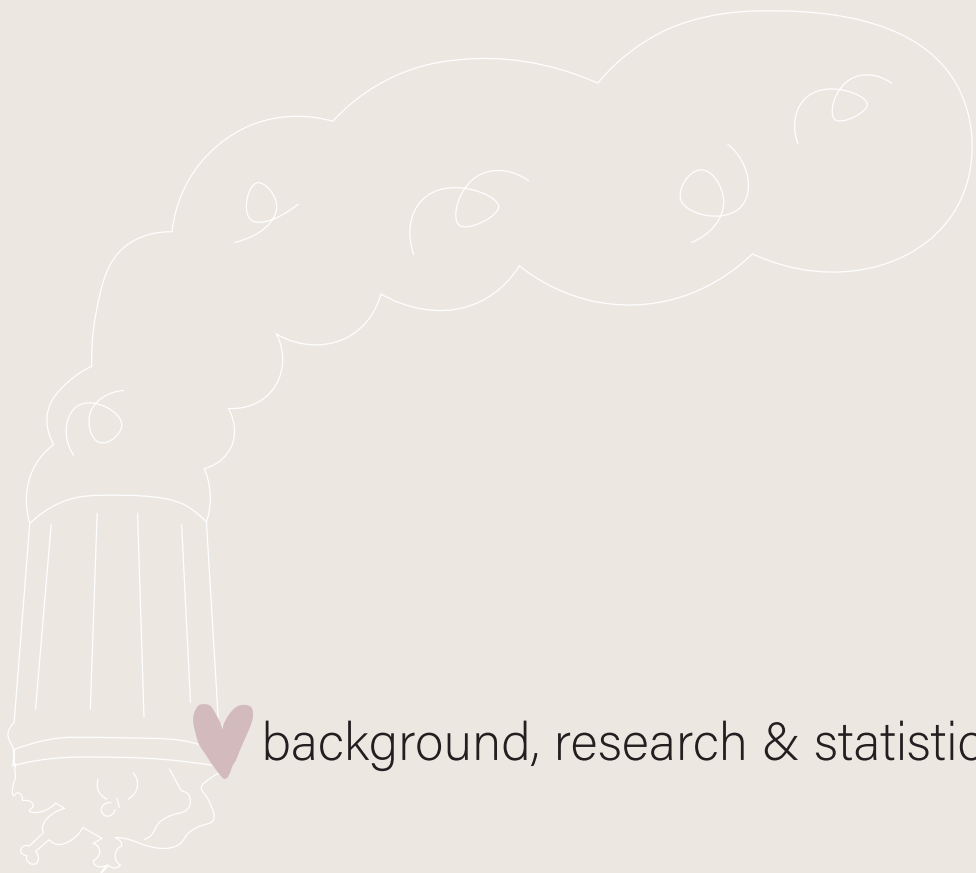




Research questions

Is there a way to build on farmland and still maintaining its productivity?

How could such a housing area be designed?



background, research & statistics

agriculture today

All over the world, the need of highly productive farmland is increasing as the demand for and consumption of food is growing rapidly. Today one in nine people don't have enough to eat and one in three people worldwide suffer from malnutrition.

The farmland today is a result of many generations of hard working farmers, in order to provide people with food. Both Sweden and other countries in the world has joined the UN convention regarding biodiversity. The surface of Sweden is approximately 45 million hectare and 2,6 million of those are farmland, almost the size of Småland. (Jorden vi ärvde 2021)

The amount of farmland in Sweden has continually decreased over the last decades. On a national level it has reduced by 14% between 1975 and 2017. The amount of lost farmland in percentage varies depending on where in Sweden we look. As an example, we have the region of Norrbotten on one end of the scale with a decrease of 33% while on the other end, there is Gotland with an increase of 4%. When looking at the decrease in hectare, the regions of Skåne and Västra götaland has lost the largest amount of farmland with around 60 000 hectare each. The decrease is a result of exploitation for expansion of housing areas and infrastructure. (Jordbruksverket 2019:4)

Every year Sweden loses nearly 600 hectare of farmland, 10-15% of the farmland in Skåne is lost due to exploitation and therefore some of the worlds best farmland is laying under asphalt and concrete. Arable land per person has decreased by 50% the last five years and globally the size of 30 football yards is being lost every minute due to exploitation of industry, roads and expanding cities. (Jorden vi ärvde. 2021) The farmland is a nature resource that, if used properly, has the potential to provide food and other products for a very long time. Therefore, it is not just of high interest to cherish the agriculture land today but also for the coming generations. (Jordbruksverket 2019:1)

one in nine people don't have enough to eat



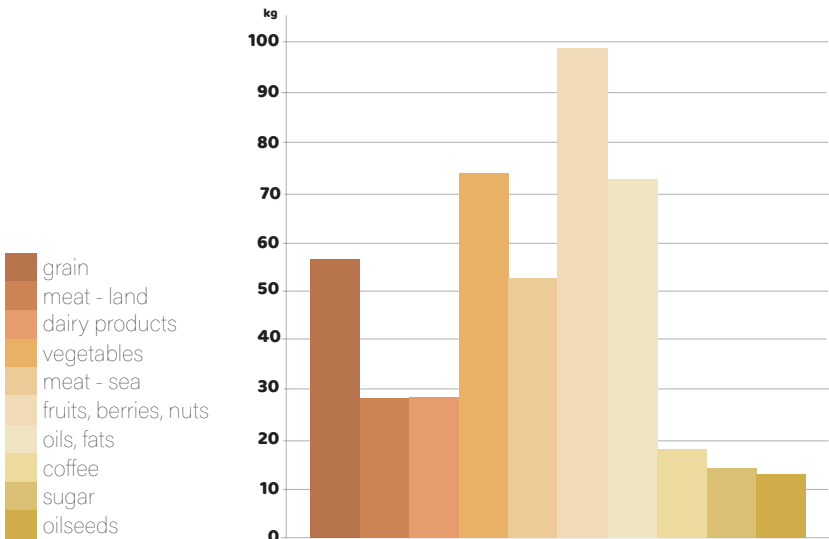
one in three people worldwide suffer from malnutrition



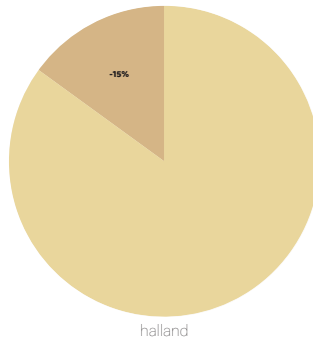
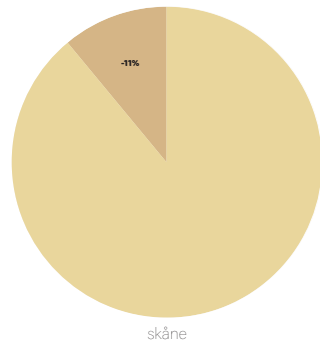
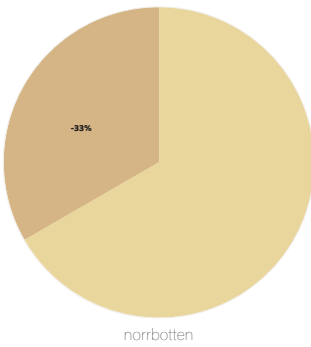
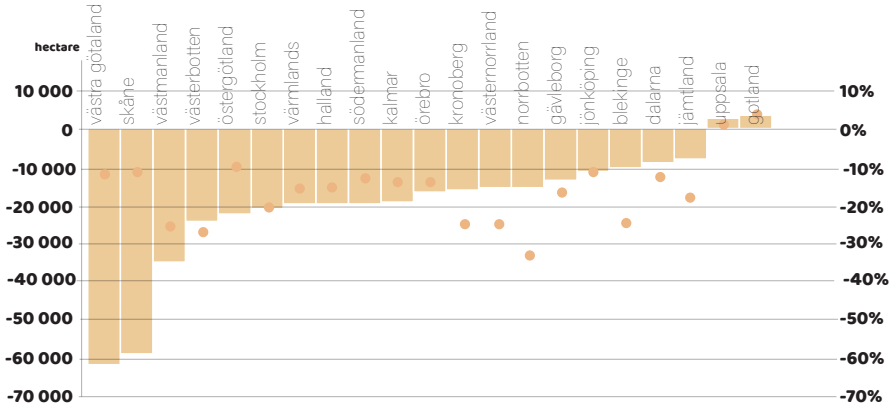
74 kg

of vegetables per capita was imported in 2008

import of groceries per capita in sweden in 2008

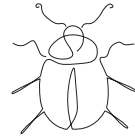


change in hectares of farm land between the years 1975-2017 in sweden



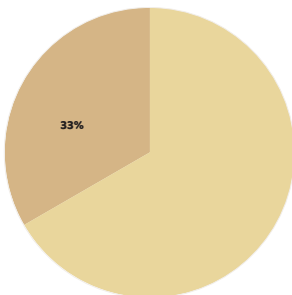
other facts

There are around 4200 red-listed species in Sweden and 33% of them are connected to the agriculture land and another 22% of them are using the agriculture land occasionally. The most vulnerable species linked to the farmland are the organism groups beetles, butterflies and vascular plants. (Jordbruksverket 2019:7)

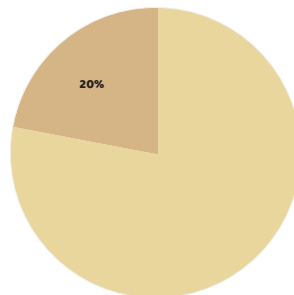


Studies show that the food waste in EU produces 50 million ton of greenhouse gas emissions yearly (Jordbruksverket, 2015:12). As a comparison, Sweden's total emission of greenhouse gases in 2019 was 50 million ton (Naturvårdsverket 2020). In Sweden we are producing on average 107 kilos of food waste per person/year. A study from 2010 shows that we throw away 49% vegetables, 21% fruit and 21% bread (Jordbruksverket 2015:13).

there are around **4200 red-listed** species in Sweden



connected to the agriculture land



using the agriculture land from time to time

facts about crops



spring

brussels sprouts
endive
kale
turnip
onion
carrots
potatoes
parsnip
radish
beetroot
cabbage
pumpkin



summer

beans
chives
fennel
Kale
cucumber
kohlrabi
turnip
onion
corn
pepper
parsley
spinach
tomato
broccoli
parsnip
tomato
cabbage
salad
beans
cauliflower
dill
chive
basil
carrots
nettles
parsnip
parsley
potatoes
leek
radishes
beetroot
lettuce
rucicola
sugar peas



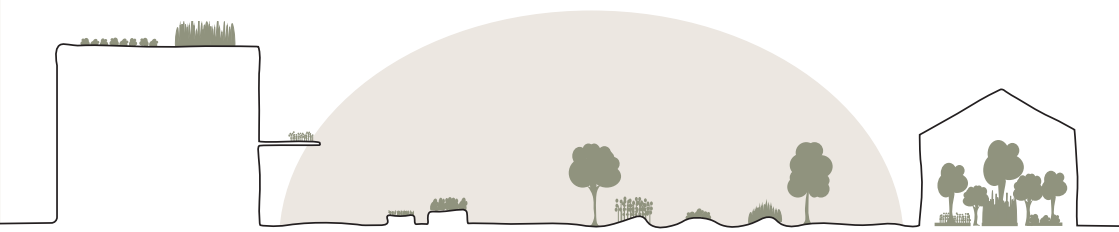
autumn

celery
cauliflower
broccoli
brussels sprouts
dill
chive
kale
cucumber
artichoke
turnip
onion
carrots
potatoes
leeks
celery
radish
root Celery
squash
beetroot
parsnip
tomato
cabbage
salad
beans
chives
fennel
cucumber
kohlrabi
turnip
onion
corn
pepper
parsley
spinach
tomato



winter

brussels sprouts
endive
kale
turnip
onion
carrots
potatoes
root Celery
parsnip
radish
beetroot
red cabbage
black root
cabbage
pumpkin



crops suitable for greenhouses

- squash
- tomato
- beans
- cucumber
- pepper

minimum sowing depth

7cm
basil
coriander

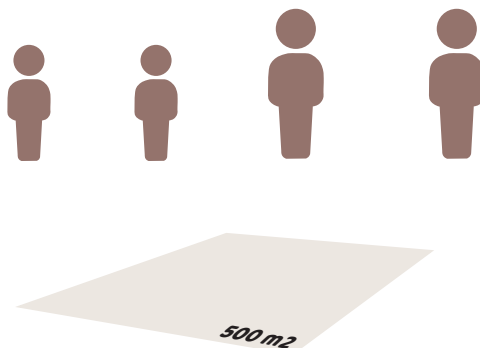
10cm
chive
marjoram
rucicola
salad

15cm
beans
garlic
kohlrabi
onion
peas
mint
savory
thyme

20cm
green beans
aubergine
bean
cabbage
kale
Carrot
endive salad
leek
parsnip
maize
melon
strawberries
yellow herb
lavender

25cm
beetroot
broccoli
cauliflower
dill
kale
lemongrass
libbsticka
tarragon
corn
potato
rhubarb
currant
gooseberry
autumn raspberries

30cm
corn
potato
rhubarb
currant
gooseberry
autumn raspberries

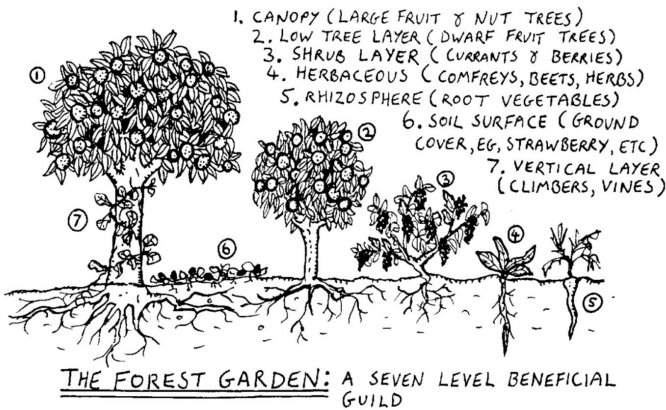


Studies are showing that a family of two adults and two teenagers can be self sustainable in crops for one year, with a plot of 500 square meters (Linde & Granefelt 2014:9).

permaculture & gardening

The farming design of permaculture is very gentle towards the nature and also very productive. It is based on a "whole-system"-thinking on the principles that nature do not produce any waste. There are 12 design principles that guides the user to different perspectives regarding permaculture design. The principles have a wide range of holistic thinking around sustainability on different levels. When using the design principles it is important to adapt them to the specific site with the specific

prerequisites in mind. One plot of land can differ greatly in terms of what crops will thrive and not, compared to another plot of land just one or two kilometers away. Microclimate, soil quality and other resources provides different conditions for growing crops. Some crops are taking advantage of each other, for example: one trees gives shadow to a crop that do not like the sun and then that crop in turn helps stabilize the soil, giving nutrition to a flower and so on. (Holmgren & Telford 2021)



permaculture design principles

creatively use & respond to change
use & value renewable resources
use edges & value the marginal
intergrate rather than segregate
design from patterns to details
apply self-regulation & accept
use small & slow solutions
use & value diversity
catch & store energy
observe & interact
produce no waste
obtain a yield



♥ introducing the site

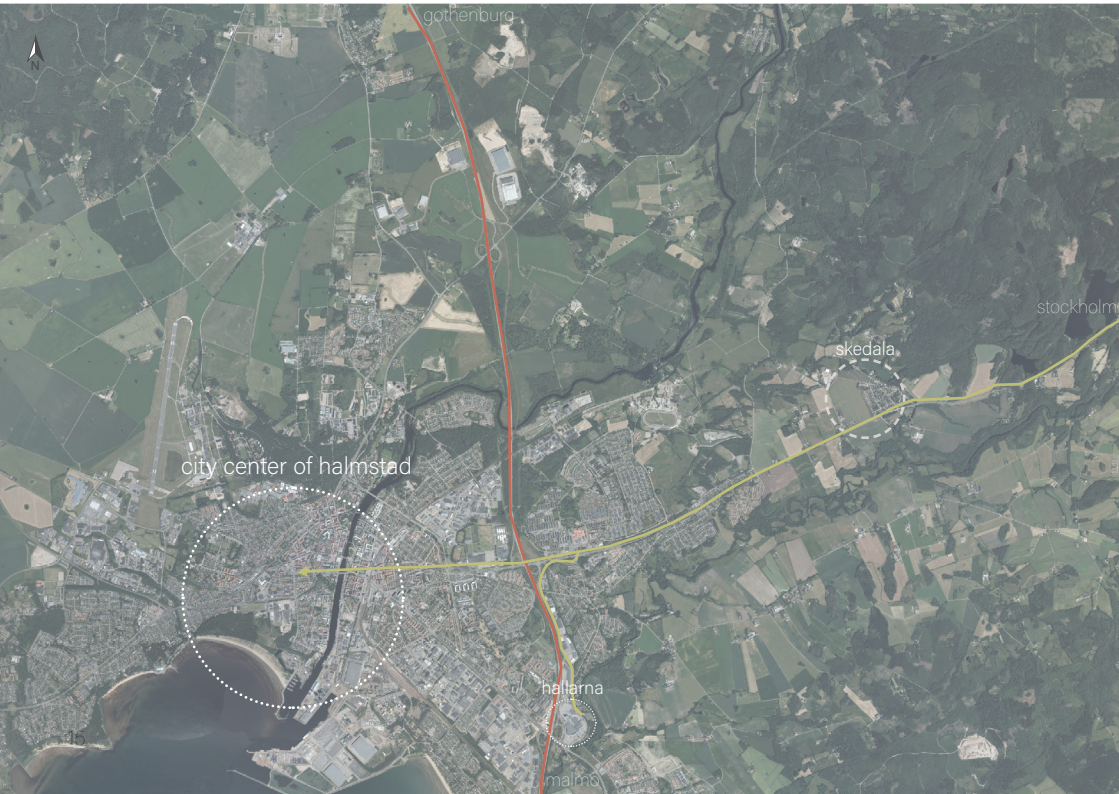
the site

I have chosen to work with a plot of farmland in the village of Skedala, located just outside the city of Halmstad in Sweden. Halmstad has two nodes, the city centre and the external shopping mall, Hallarna, located along the Europe road 6, south of the city centre. The area is about 23 hectare and is located about 20 minutes away from the city centre with a car.

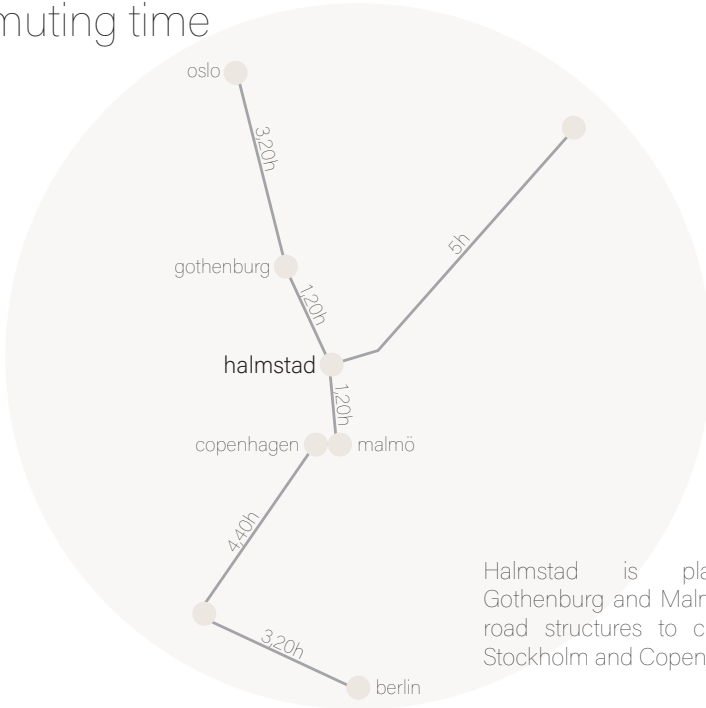
Halmstad is located between Gothenburg and Malmö and is well connected to capitals like Oslo, Stockholm and Copenhagen.



Halmstad



commuting time



Halmstad is placed between Gothenburg and Malmö and has great road structures to capitals like Oslo, Stockholm and Copenhagen.

skedala - city center 8 km



30 min



15 min



25 min

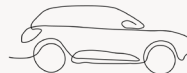


10 min

skedala - hallarna 7.5 km



20 min



10 min



15 min



25 min

halmstad municipality

Halmstad had 102 767 inhabitants in 2019 and is planning for a population growth up to 150 000 inhabitants by 2050. The municipality is expecting that the group of people over 85 years are going to increase the most. They are predicting that there will be a surplus of elderly people needing care and a deficit of younger people taking care of them. (Halmstad kommun 2020)

The municipality is working on a new comprehensive plan, planning for Halmstad's future towards 2050 that will be accepted in the shift of 2021/2022. The plan declares a need of 24 000 new housing until 2050 (Halmstad kommun 2021).

farming history

The year of 1758 was the start of a reform regarding the redistribution of the Swedish agriculture land. The houses on the Swedish countryside was before 1758 often placed next to each other, along a road with small plots of land around them. After the shifting reform, the plots were bundled together and therefore, many people had to move from the villages

to their own plot of land (Länsstyrelsen 2021). There was both pros and cons to this shift, one advantage was that the plots of farmland became bigger and therefore the productivity increased. On the other hand, since villages were shattered, the sense of community was often lost. The collectivism shifted to individualism (sorrummet 2017).

future challenges

Halmstad municipality have worked with an analysis about the challenges we are facing in the future. Five main challenges were found and all planning is supposed to consider these.

En varmare värld Klimatförändringar	En uppkopplad och självgående värld Digi, auto, AI	En återställd värld Kina och Indien reser sig	En tätare värld Urbanisering	En silvrigare värld Fler äldre
Ökat fokus på hållbarhet	Mot smärta städer	Ökad kunskapsintensitet	Mobilitetsrevolutionen	Ökad och mer flerdimensionell ojämlikhet
Företag som samhällförbättrare	E-handelsexplosion och leveransrevolution	Everything as a service	Upplivelsesnäringen växer	Resursbrist i världsfärden

the east direction

The municipality is planning the countryside of Halmstad in five directions. In every directions, there are some smaller villages and at least one larger with services such as a grocery store, a post office and a restaurant.

The east direction is located along the river Fylleån and the important transport road 25 that runs towards the town Ljungby in Småland. Three villages are located along this direction, first Skedala, then Marbäck and lastly Simlångsdalen which has services as described above. Halmstad comprehensive plan wishes to keep and develop the east direction with more recreation nodes and make them more accessible. New housing should be built in the existing villages by densification and larger development areas should be built nearby the existing villages, where valuable sight lines won't get disturbed.

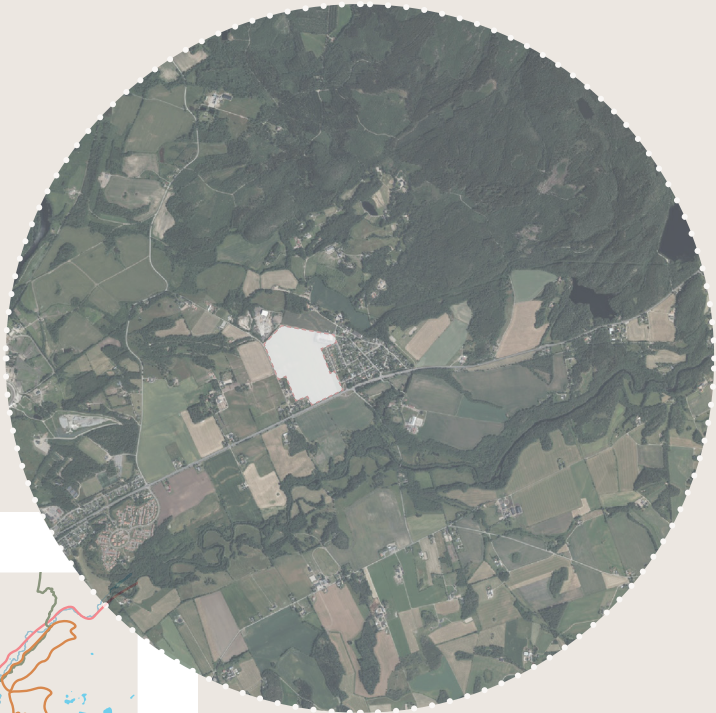


skedala

Skedala is located in a surrounding landscape dominated by an undulating agriculture landscape and in the north-east , the area is dominated by forest with recreational tracks. The Skedala forest is used for recreational use by the inhabitants. Skedala is divided in the middle by road 25, an important transportation route. The dominated housing topology in Skedala is small villas in the northern part where a community centre also is located. In the southern part some small villas, a

manor and farmland are located. There used to be a train track along road 25 that went from Halmstad to Bolmen but today it has been transformed into a bicycle lane. There are no kindergartens or schools in the area at the moment and the closest schools are Snöstorpsskolan (grade F-5) and Östergårdsskolan (grade 5 and older). No grocery store exist in the Skedala today, although it has in the past. The area is lacking these kinds of services today.

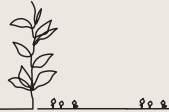
This map is showing different hiking and bicycling paths in the area.



the design site

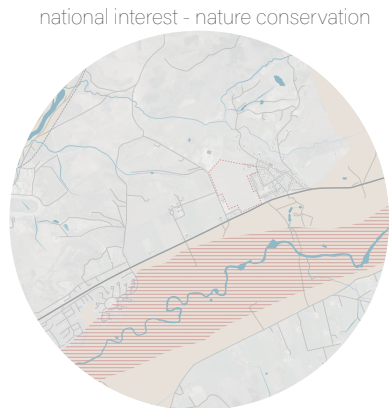
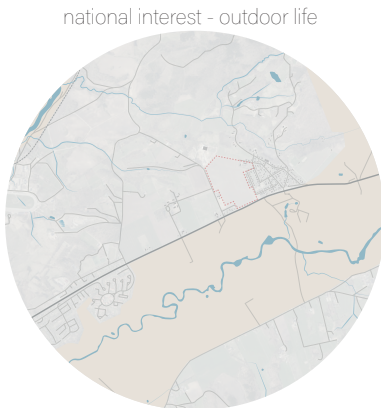
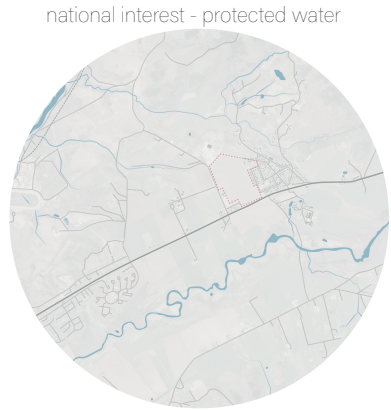
The area that I have decided to chose as the site for design is a 25 hectare plot of farmland, placed in the western part of Skedala. The site is flat and there is no running water through. Today, the main use of the site is the growing of hay. The soil type for the underlying

layer is clay - silt and for the ground layer, the soil type is glacial sediment, sand (SGU 2021). North-east of the site is a municipality owned area that is paved with asphalt and currently holds two buildings that functions as storehouses. The site is integrated with the existing housing area.



maps of considerations

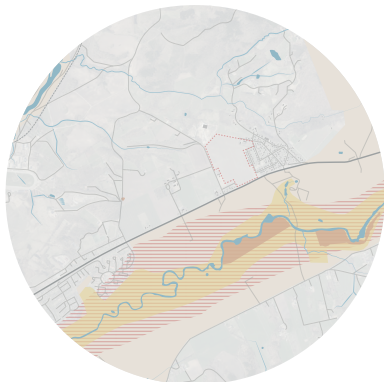
The maps of considerations are showing different protected areas and other aspects that is important to understand regarding the surroundings of Skedala and how it affects the site. Road 25 runs along the south part of the site and should not only be seen as a barrier, but also as an asset that connects the site to other cities. The bus line runs along road 25 and two bus stops are placed in the area. The nature around the area is of high value and an asset in terms of hiking and recreational activities. There is a community centre in the eastern part of Skedala, which is only open for booked events.



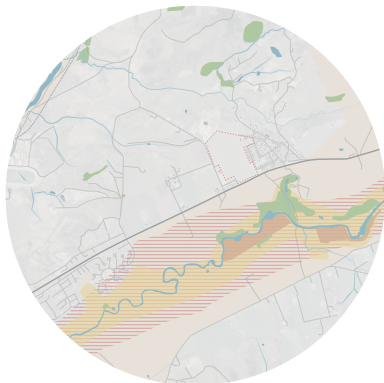
nature reserve & natura 2000



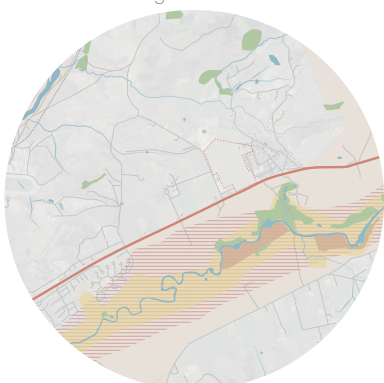
ramсар



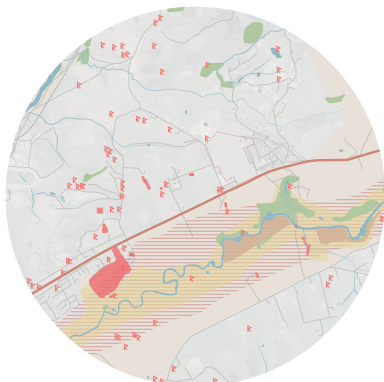
biotope protection



dangerous traffic



ancient remains

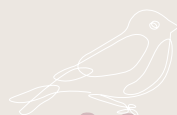


generators



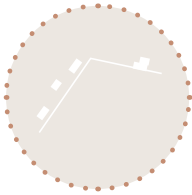
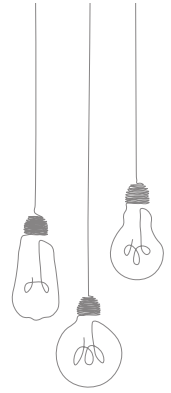
sight visit





my proposal

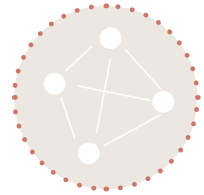
strategies



efficient building placement
-use the existing road structure
-design principles*



efficient cultivation
-permaculture
-flexible growing space



connect to surroundings
-immediate ways
-make farming accessible

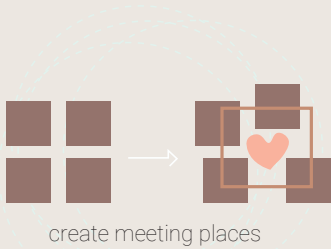
By using the existing road structure when placing the buildings you don't need to claim valuable land that can be used for farming. Fertile soil is valuable for food production and once the ground is built on, it is hard to make it usable for farming again. By being careful of how the ground is being exploited, a lot of work is saved if the land would need to be reversed back into farmland in the future.

The cultivation of the farmland can be made more efficient and diverse, by farming with permaculture instead of using industrial farming with only one type of crop. By letting the crops take advantage of the sites condition, each other and by having a holistic thinking, the cultivation needs less maintenance. The cultivation can also be more efficient by letting the farmland meet the residents requests regarding if they want to grow crops by themselves in allotments, or letting other's farm for them.

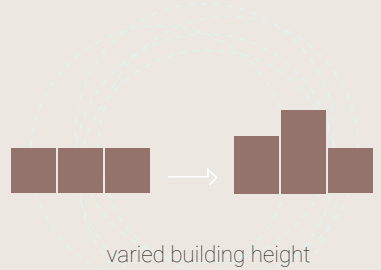
Immediate ways and shortcuts can make people more interested in using different parts of the area and therefore connect to it and to people from other parts of the village. Immediate ways can also encourage people to use more sustainable modes of transportation, choosing to walk or bike instead for taking the car. Letting people get involved in the planning and producing of the farming can also make it more accessible. By making the farming accessible it will become easier for the residents to be involved and feel closer to the growing process of their food.



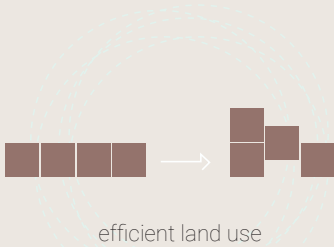
design principles*



Creating meeting places where neighbours can meet and together create a sense of community will strengthen the social sustainability.



A varied building height adaptable to the sun, can both enable sun spots on the courtyards where neighbours can meet and provide the farming on the courtyards with sun. It can also create a diverse housing area that will be exciting to stroll around in.

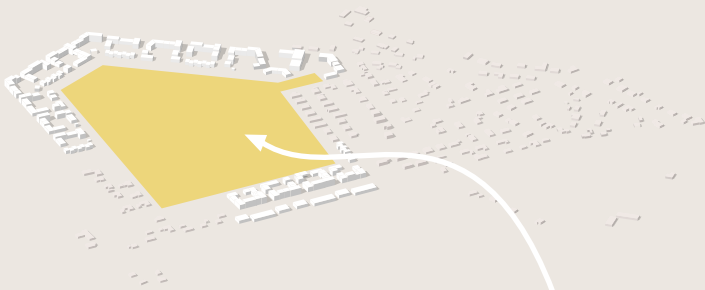


Elevating some buildings and narrowing the width of the houses liberates valuable ground space that can be used for other purposes such as farming.



Varied facades can create a diverse and inspiring housing area that is pleasant to both live and to stroll around in.

the food park



permaculture farming

vision of the food park

The area of the permaculture will work as an area for farming and a food park, where people can stroll around and enjoy the nature. The whole park is going to welcome the inhabitants to get close to and create a connection with the food they are growing. If humans get involved and get invested in the growing process, they may start to evaluate and appreciate the food more and that will have a positive effect on the problems with food waste.

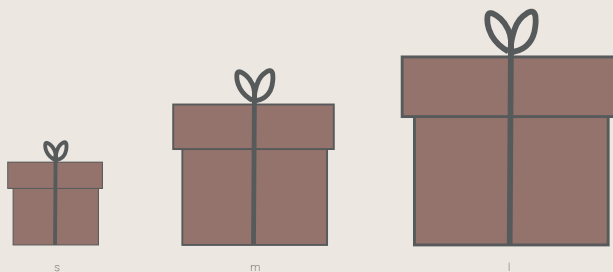
The vision is that the park will contain fragrant flowers, poring streams, large fruit trees and ground-growing vegetables. In the middle of the park is a taste area located where people can taste produce from the the food park. The design of the permaculture farming is a whole master thesis in itself. Every site is special and needs to be studied in detail in order to know what crops and trees are suitable for the specific conditions. Designing the permaculture farming is the next step in the designing process.



the toolbox

I have looked into the farming design of permaculture. Permaculture is very gentle against the nature and it is also very productive and do not need as much maintenance as conventional farming. I imagine that the permaculture fields belongs to all the residents, who will have a share of the harvest. The plantations are run by gardeners and volunteering residents. The maintenance and salaries for the workers are funded by all the inhabitants, through a small part of the monthly rent. You don't have to love to grow crops in order to live here.

I have made three farming boxes that the residents can choose between when living

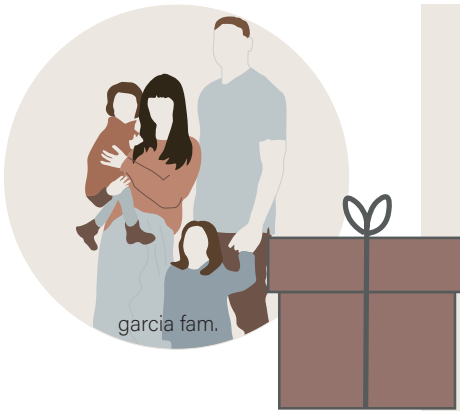


- The small box is for the people who just wants to grow crops on their own balcony or do not want to grow crops at all. The small box includes distribution of the permaculture harvest.
- The medium box is for those people who wants to grow their crops at an allotment of 30 m². The medium box includes distribution of the permaculture harvest.
- The large box is for those people who wants to take part of the permaculture farming, they can also choose to rent an allotment of 30 m² or 60 m². The large box includes distribution of the permaculture harvest.

The people already living in Skedala today will also be able to both take part of the permaculture harvest and be able to rent the allotments through a small fee. It is important to invite the whole Skedala to the farming process in order to not make the new area feel like a segregated island. It is therefore important to create good public spaces within the new area, where people can meet.

future residents

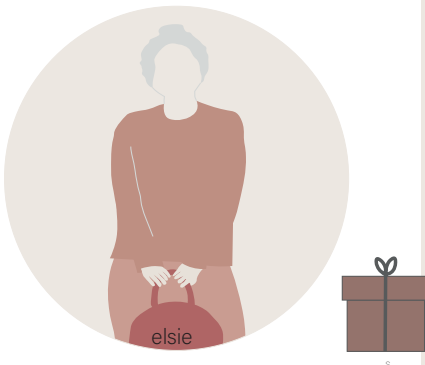
So, who will live here and take part of the harvest in the future? I will present three potential families, all inspired by people in my life.



Meet the Rydberg family, Hedvig and Maja. They just moved from Malmö because Maja, who grew up in Halmstad, wants to be closer to her family now when they are expecting their first child. They both love to garden and therefore, chooses the medium box with an allotment. Since they are both working full time, they can only grow crops in their spare time.

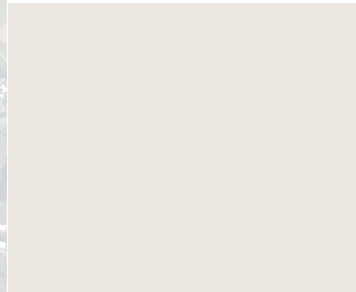
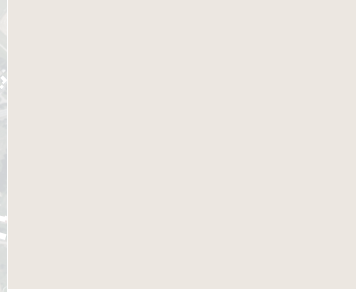
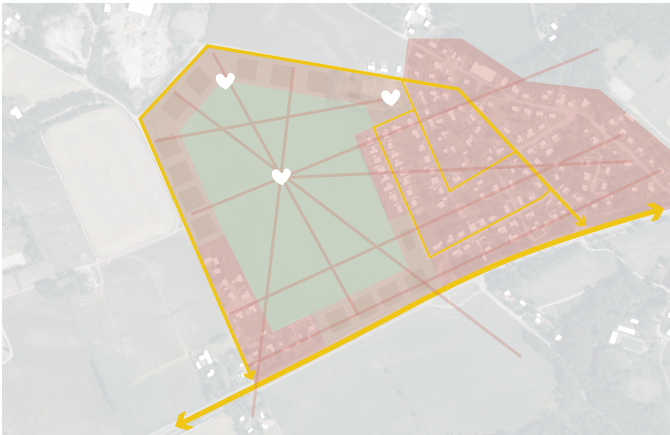
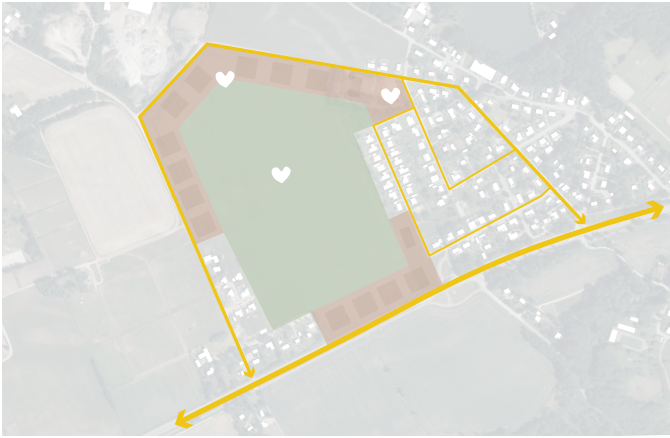
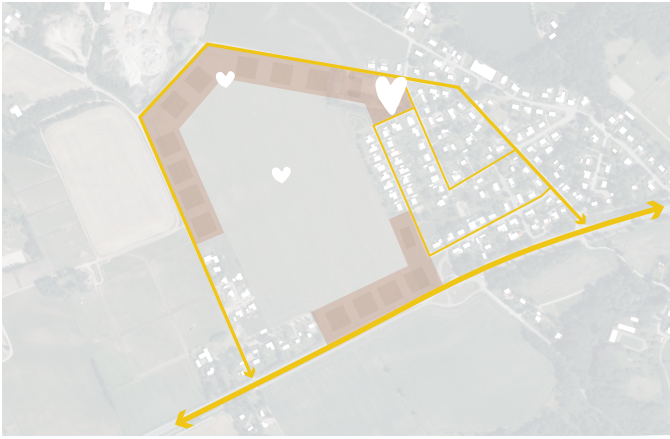


Meet the Garcia family Ina, José and their two children Alma and Luis. They are moving from the inner city of Halmstad because they want to live closer to nature. Ina is working full time in Gothenburg and she is commuting but Louie is a hardcore farmer and wants to be a part of the permaculture farm, so they choose the large box.



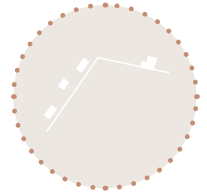
Here is Elise, she is a retired 78 year old lady that have lived her last 30 years in Skedala but feels that it is time for her to leave her big house in the area and move to an apartment. But she wants to be close to her neighbours, who she have gossiped and laughed with for almost half her life. With the new area being built, she can both stay in Skedala and move into a new apartment. As she loves to grow flowers on the balcony, but is not really able to do much more when it comes to farming, she chooses the small box.

the strategies on sight



efficient building placement

The buildings are placed along the existing roads and infrastructure to minimize the footprint on the ground, saving the valuable farmland from getting exploited. Three bigger meeting places are placed in the area. One meeting point is at the houses in the north to encourage neighbours to meet each other near the residence area. One meeting point is in the middle of the farmland to encourage people to spend time in the nature and to be close to the growing of their food. The biggest meeting point is the new centre of Skedala and will also work as the link between the existing and the new. The typology will be a block structure, creating spaces where neighbours can meet and a community feeling can be encouraged. The new houses next to the existing houses either row house or multiple family houses with a lower building height, this to make a smooth transition from the old to the new.



efficient building placement
-use the existing road structure
-design principles*

efficient cultivation

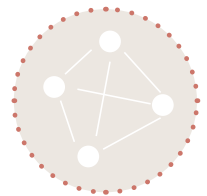
Farming in the form of permaculture is placed in the middle of the new area and it is going to supply the residents with locally produced food. The allotments are placed in the parts closest to the houses so the residents will be close to their crops. The idea is that the farming spaces are flexible, with numbers and sizes depending on how many of the inhabitants who are interested in their own allotment. The areas that are not occupied by allotments are going to be permaculture farming.



efficient cultivation
-permaculture
-flexible growing space

connect to surroundings

The new houses, the farming and the old Skedala is connected by walking paths. The paths are going through the whole new area and leading the visitors to the meeting places, making sure that no barriers are created and separating different parts. The farming will also connect the new with the old inhabitants, by letting everybody get a chance to take part of the allotments and the permaculture farming.



connect to surroundings
-immediate ways
-make farming accessible

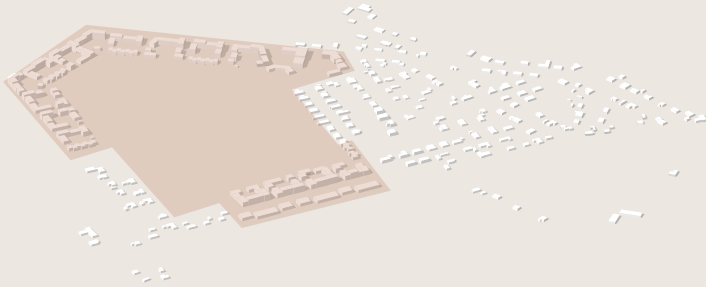
urban plan - 1:2000 (a1)





the different functions of the area

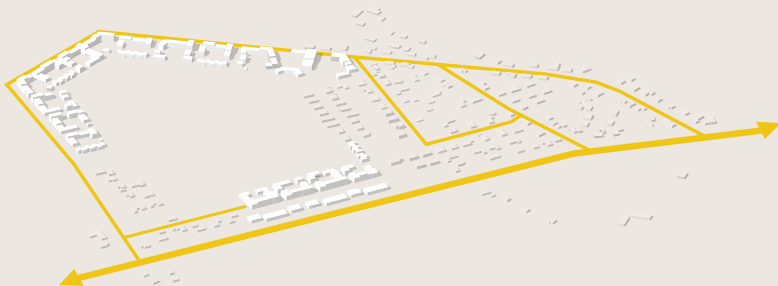
my site



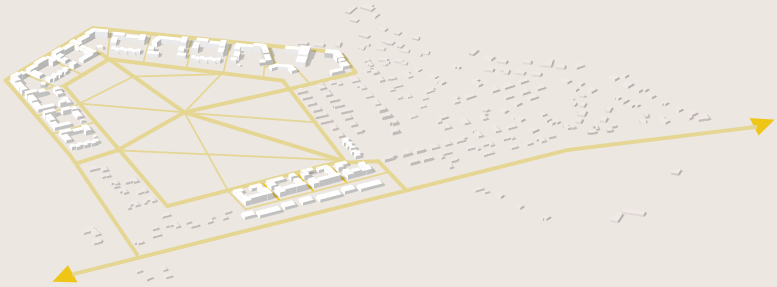
existing buildings



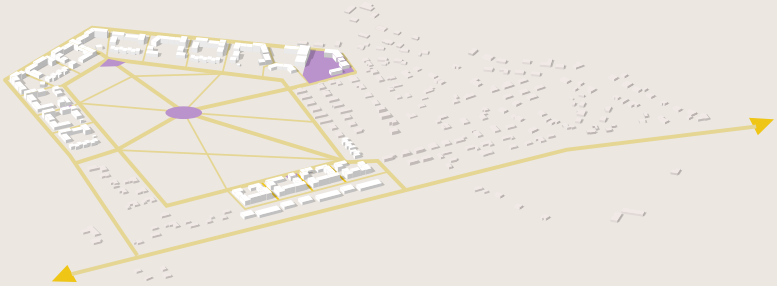
main roads



pedestrians / bicyclers

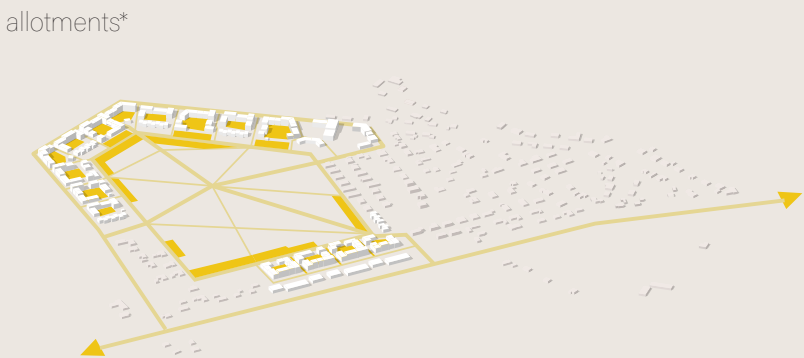
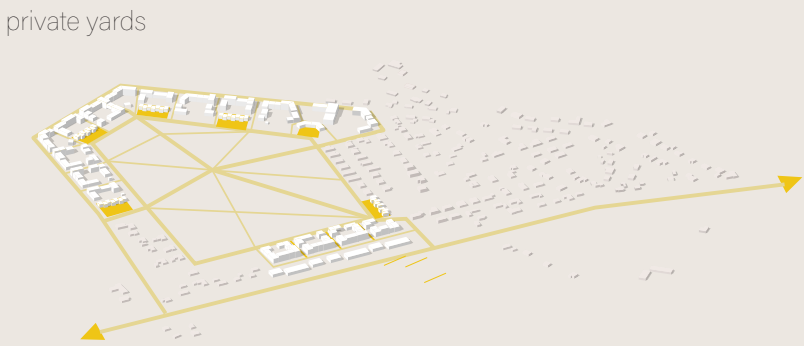
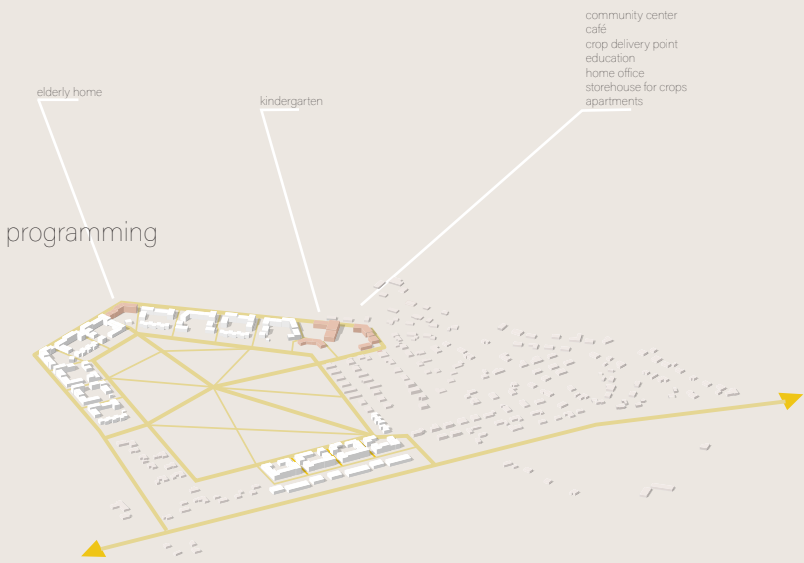


main meeting places

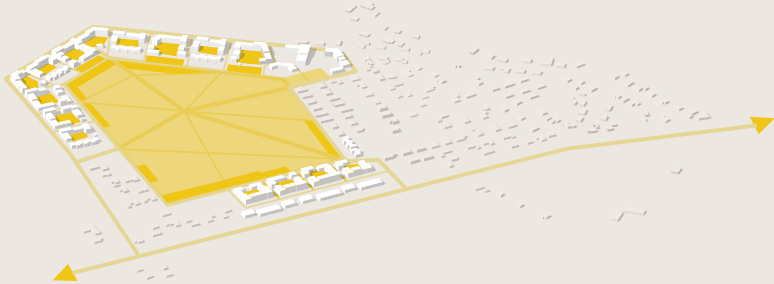


community meeting places

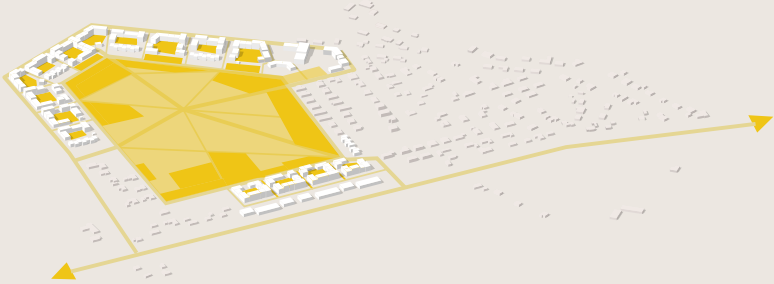




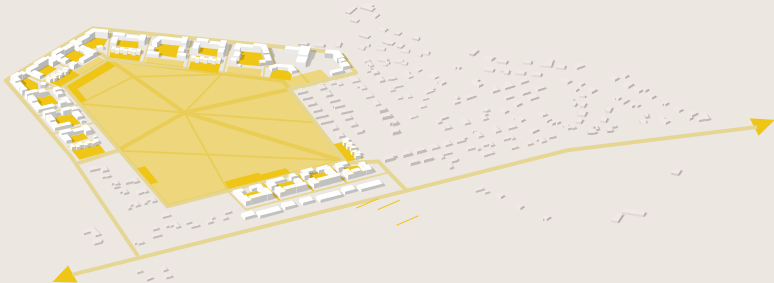
exemple of permaculture / food forest*



exemple of permaculture / food forest*



exemple of permaculture / food forest*

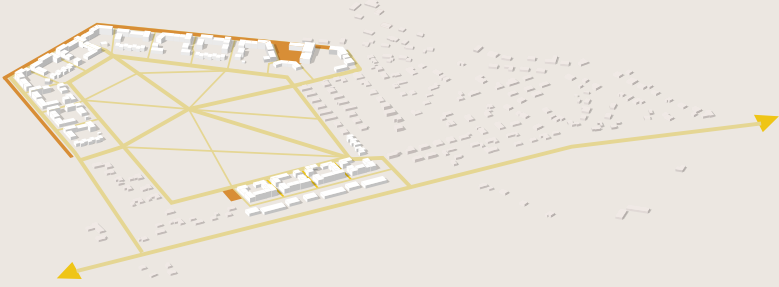


*example of amount of used growing space, depending on the residents requests and desire to cultivate

areas where people can taste what is growing



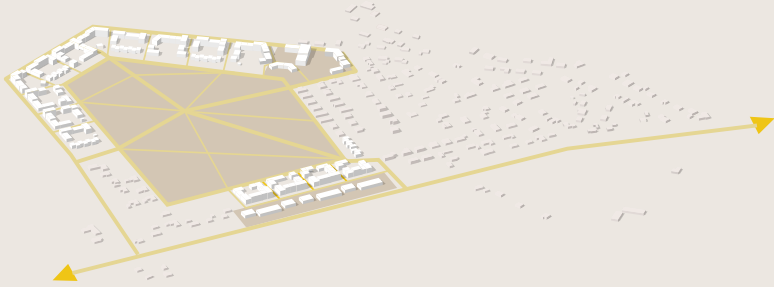
parking



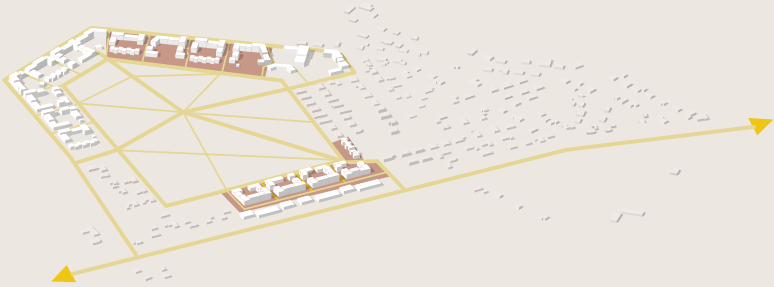
building height



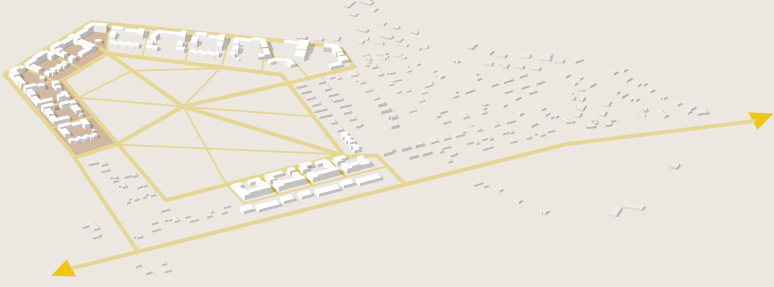
development phase 1



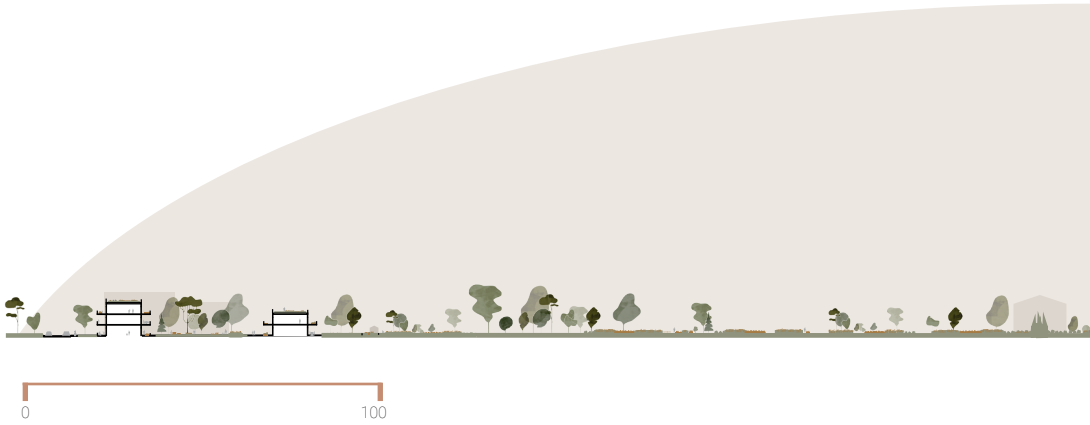
development phase 2



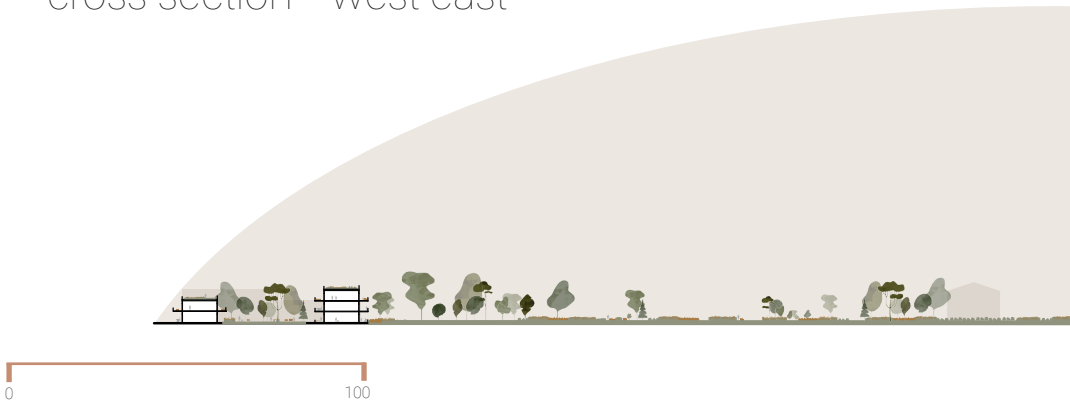
development phase 3

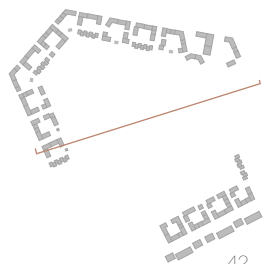
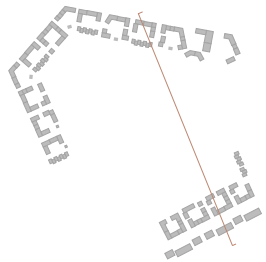


cross section - north south



cross section - west east





A

detailed plan - center

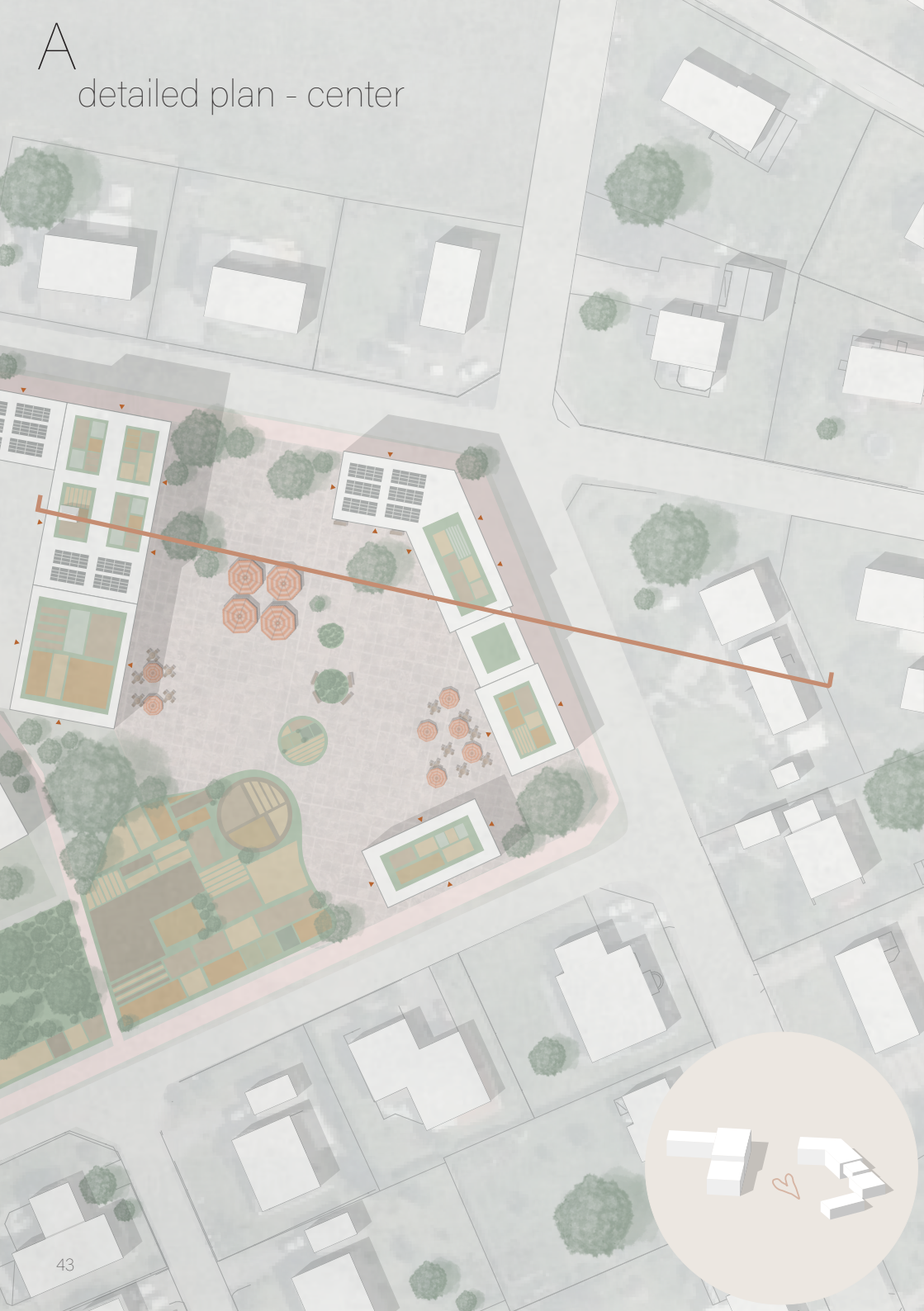




illustration - center

This is the centre of the area and will function as the main meeting place and a bridge linking the new with the old area. Today the area is paved with asphalt and municipality owned storehouses are currently located on the site. This part is integrated with the existing housing area but also adjacent to the design site. Therefore it is suitable as the

link between the two. The food forest will spill over on the square and connect the farming with the people visiting the centre, people can taste what is growing on the fields and feel intrigued to discover more of the food forest. The vision is to create a place where inhabitants from different parts of Skedala and visitors can meet, interact and create a social and lively hub.

section - center



B

detailed plan - neighborhood square



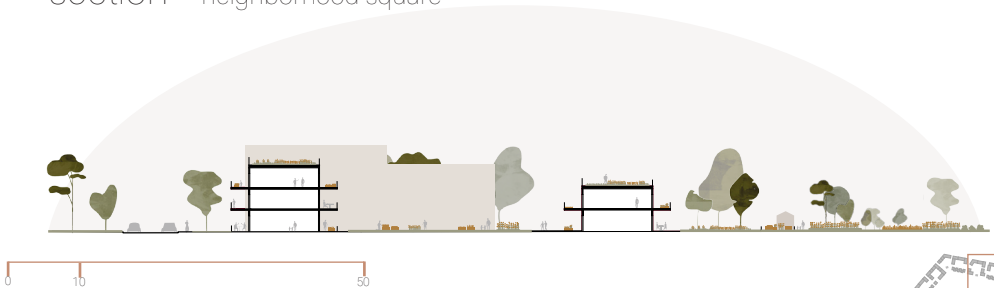


illustration - neighborhood square

The detailed plan is showing a part of the residential area with an example of how the food forest can be designed in the southern part. Permaculture farming are located on the rooftops and compensates some parts of the lost agricultural areas due to exploitation. Solar panels are also located on the roofs to create sustainable energy to the households.

The neighbourhood square is located between the block structures and will function as a transitional area and meeting place for the neighbours. Benches and tables are placed along the street to give the opportunity of using the neighbourhood square as a living room. Here people can eat their dinner, chat with a neighbour or just watch people walking by.

section - neighborhood square



C

detailed plan - courtyard

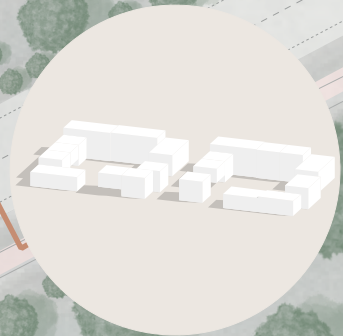




illustration - courtyard

The detailed plan is showing a part of the residential area with an example of how the food forest can be designed in the north and the taste area with the green houses in the south. Allotments and areas where people can socialize with their neighbours are located within the block structure. An alley

with fruit trees is designed between the green houses and the residential houses to activate the area and to give people an opportunity to connect with the growing food. The green houses will work as a barrier towards the road, it will produce a lot of crops for the residents and make people driving by curious and eager to explore the area.

section - courtyard



0 10 50



rydberg fam.



The Rydberg family decided to live here in the row houses because they want a garden of their own to grow their crops in, they also have an allotment just outside their home.



garcia fam.



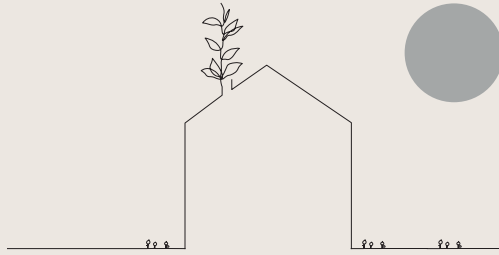
The Garcia family is living here in an apartment, they think it is relaxing not to have to take care of a whole garden, so they are having a small allotment in the courtyard and José is working with the permaculture farming.



elsie

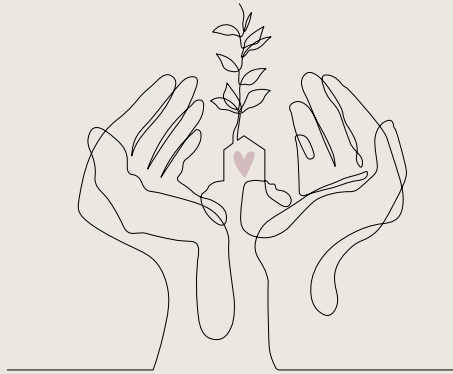


Elsie is renting an apartment in the north part of the area because it is close to her old neighbours and close to the centre where she loves chatting with people.



next steps

The prerequisites of the site needs to be studied in detail in order to success with the permaculture farming. Parameters like sun, wind, water and soil has to be taken into consideration when designing the permaculture areas so that it can be as effective as possible. Further investigations can also be about the sustainable entirety when it comes to electricity and water supply, to see if the area can be totally self sustainable.



my reflections

When I started this project I did not know how complex it actually would be to design a sustainable area that will both be sustainable now and in the future. In my opinion, there is a way to build on farmland without losing its productivity, but caution with the valuable ground is required. Once valuable farm land has been exploited it is difficult to reverse the soil and make it usable again, therefore it is important to consider the pros and cons before building on valuable farmland. There are perhaps better areas to exploit that do not function as a supplier of food. If the world's gas emission are to be reduced to the required levels that are necessary, we need to start living more self sustainable lives.

We need to act now on every level of society to try to mitigate the consequences of the climate crisis. Nature does not produce any waste, the processes happens in symbiosis with each other. We as humans should adapt a more holistic and circular thinking regarding our way of living so that we do not burden the earth. I think that it should be easy to live sustainable and the way to do that is to create sustainable solutions where everyday life is happening. If solar panels on the roofs are giving the residents electricity, it is going to be easy to live sustainable because the decision and the work of using sustainable power is being done for you. It should be a norm that everything you plan for is sustainable, both now and in and the future. We only have one earth and we should be careful with it, therefore we have to have a more holistic and sustainable thinking on all levels.

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