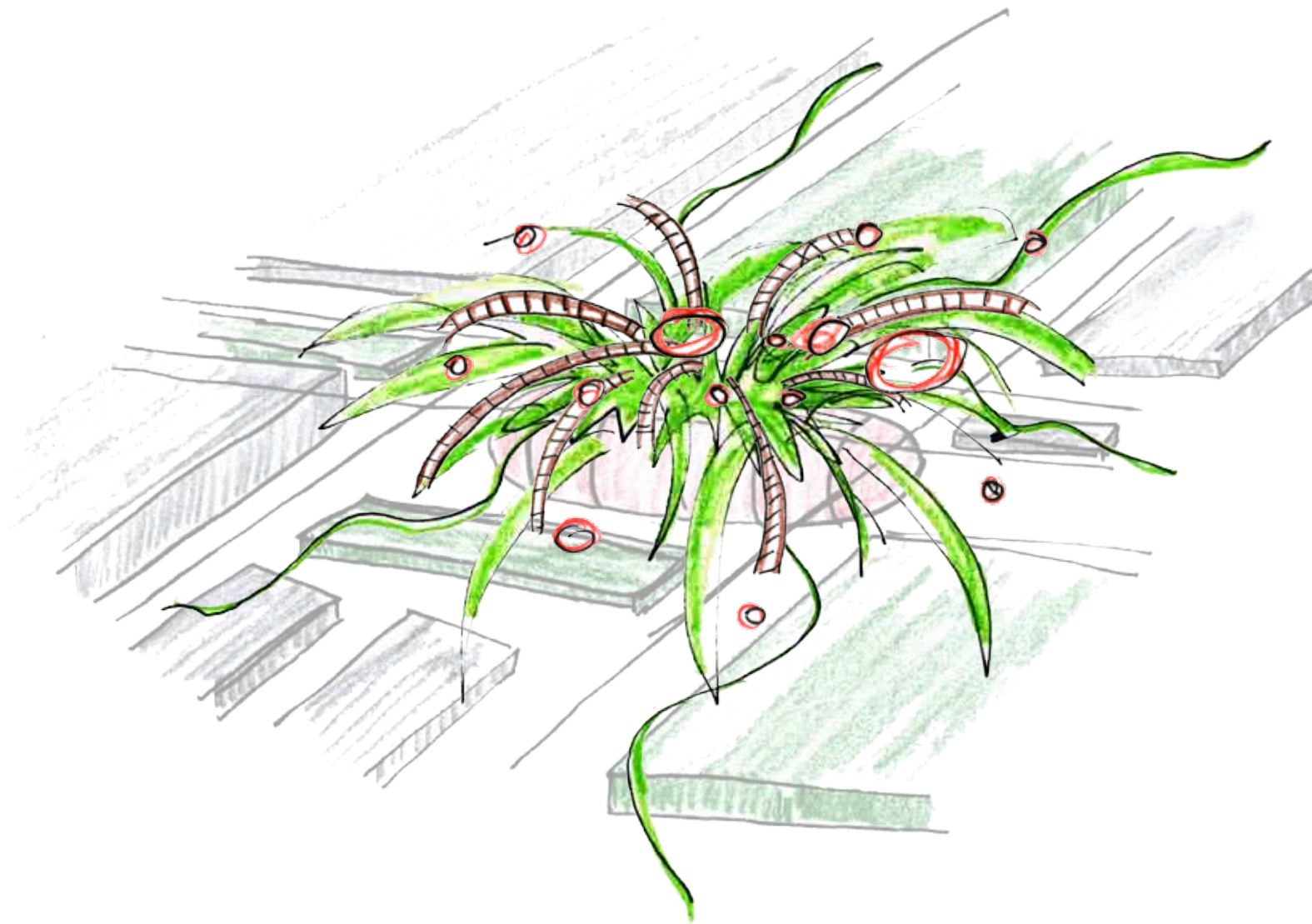


Growing Suburb

Farming as social and physical binder in a Swedish urban context



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Gothenburg, 22 May 2012

Abstract

Farming has a crucial role to play in the sustainable city. It is important that cities prepare for a future scenario with increasing request for urban farming land, due to consequences of climate change and peak oil. This master thesis explores the subject urban farming and investigates how farming can be applied on a closed landfill site, Rösered Fields in Angered, Gothenburg.

The thesis considers different forms of urban farming in Gothenburg, Sweden and the world today. The report consists of three main parts. The first part explores the concept urban farming through literature, reports, media, blogs, study visits, interviews and spontaneous conversations. The second part is a site analysis of Rösered Fields and an analysis of the conditions of the landfill. The final part presents an analysis of the site in relation to urban farming and a conceptual design programme for urban farming on Rösered Fields, that includes a market place for crops that are produced within the city.

In the design programme, the qualities of urban farming are utilised to achieve social and physical connections between humans and built structure in the urban landscape. The project touches upon issues such as the value of urban space in relation to urban farming and how to manage contaminated sites such as landfills, in urban planning. The point of departure is local and global aspects of sustainable urban development.

The thesis concludes that it is possible to prepare contaminated sites and landfills so that exposure pathways of contaminants are cut and that it becomes safe to farm on the site.

Rösered Field is an appropriate spot for farming because of its position in Angered and its possibilities to work as an interconnecting place between different residential areas. Urban farming on Rösered Fields can strengthen other urban farming activity in Angered and Gothenburg and thereby contribute to increased local resilience.

Key words: urban farming, landfill, contaminated soil, sustainable development, local resilience, urban planning

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Introduction

1.1 Background

Behind this project lies the vision of reaching a sustainable urban development. The human population on earth is growing and increasing urbanisation is a strong global trend. Consequently, cities today are facing challenges of which this project brings up a few: food supply, contaminated soil, unemployment, lack of access to public space, social and economical inequity, stress and lack of connection in the urban structure. Future generations will most certainly face similar problems, and may have to deal with severe consequences of decreasing biodiversity, climate change and the peaking of access to many natural resources that are the result of the development of the industrial society.

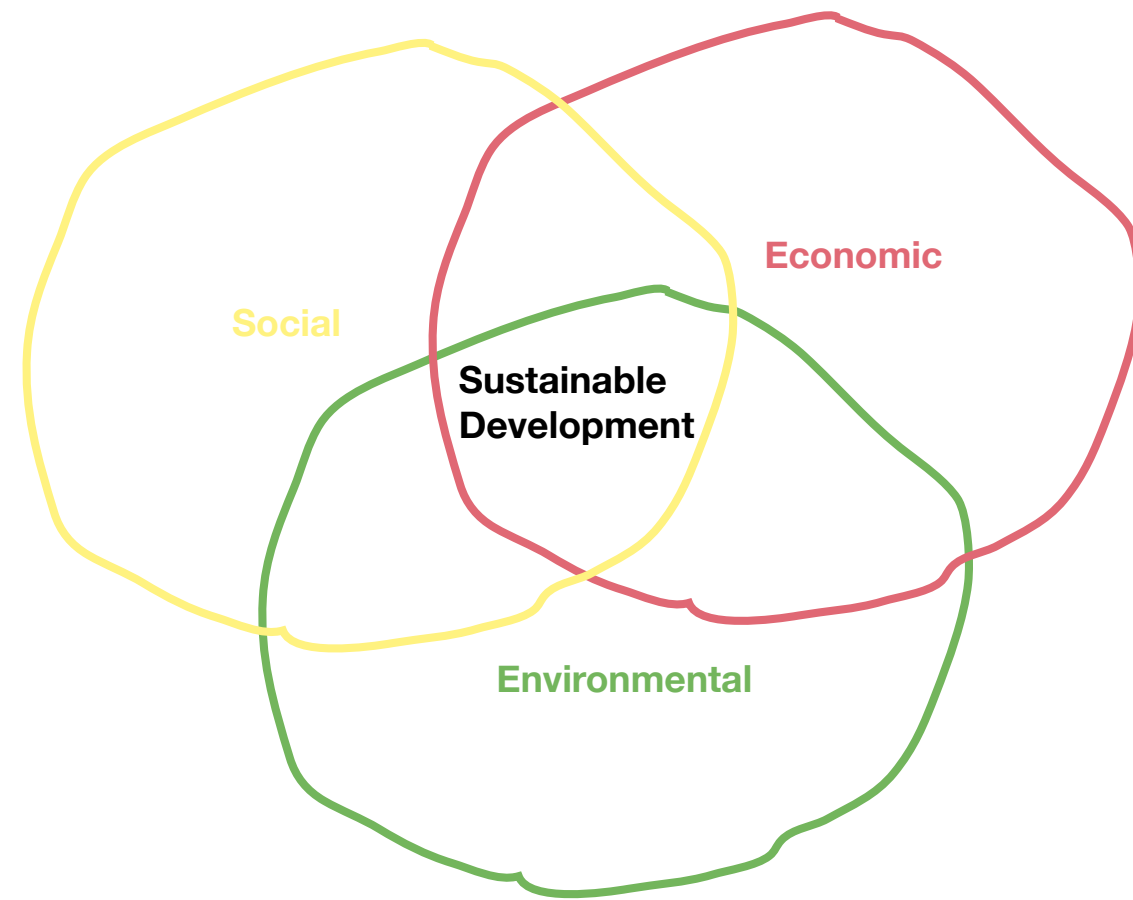
Sustainable development as it was defined by the Bruntland Commission in 1987:

"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

(The World Commission on Environment and Development, 1987)

When discussing sustainable development, it is important to consider several aspects of human society. A common way of illustrating this is by looking at human development from the points of view of social, environmental and economical factors. In order to reach a sustainable society, all these factors must be taken into account on global and local levels. It is crucial to understand that global and local sustainability interact and are affecting each other.

The main theme of this master thesis is urban farming, a concept which has evolved in the discussion of sustainable urban development. According to some researchers, urban farming is one of the keys to securing our future supply of food. Urban farming is often mentioned as an important ingredient in a decentralised and resilient urban system. In this project the qualities of urban farming will be used to achieve social and physical connections between humans and built structure in the urban landscape. This urban farming concept will be applied in a Swedish context, in a suburb in Gothenburg and on a site that contains a closed landfill.



The three aspects of sustainability that should be considered on local and global levels of our society.

Introduction

1.2 Aim

The aims of this master thesis are

- to study and analyse the concept of *urban farming* to find out *why* farming should be implemented in the city, *how* it could be implemented in order to achieve a more sustainable society and *why* it is important to consider contaminated sites, such as landfills, for farming,
- to analyse the site Rösered Fields in its urban context in order to find out why the site is suitable for urban farming,
- to analyse the site Rösered Fields in terms of landfill conditions,
- to investigate how urban farming can be applied on Rösered Fields,
- to bring up a conceptual design programme that applies sustainable urban farming on Rösered Fields.

Apart from these aims, the thesis analyse long-term social, ecological and economic consequences of urban farming on Rösered Fields, discuss how urban farming is valued in urban space, illustrate a future scenario in and around Rösereds Fields in relation to the design.

The thesis contains an analysis on the subject urban farming, the need for it and how it can be practised. The research on urban farming is together with the site analysis the basis for the design programme on Rösered Fields. The site analysis consider Rösered Fields, both above and under ground. Above ground: the role of the design in the neighbourhood and in the city; Under ground: over-bridge the obstacles that follow farming on contaminated land. The design programme illustrates what kind of farming that could be applied on Rösered Fields and how it can be organised. The design programme consider sustainability from an ecological, social and economical point of view.

Questions that this project addresses:

1. What measures should be taken to limit risk of exposure to humans from toxic waste or other contaminants in the soil, when implementing urban farming on a landfill?
2. To what extent is it possible to grow food, that is safe for humans to eat, on a landfill?
3. Why is the selected site an appropriate spot for farming in its urban context?
4. What measures needs to be taken for farming to work on Rösered Fields.
5. What can sustainable farming on a landfill look like?

1.3 Limitations

Due to limitation of scope, no deeper analysis of costs for any design suggestion on Rösered Fields has been considered.

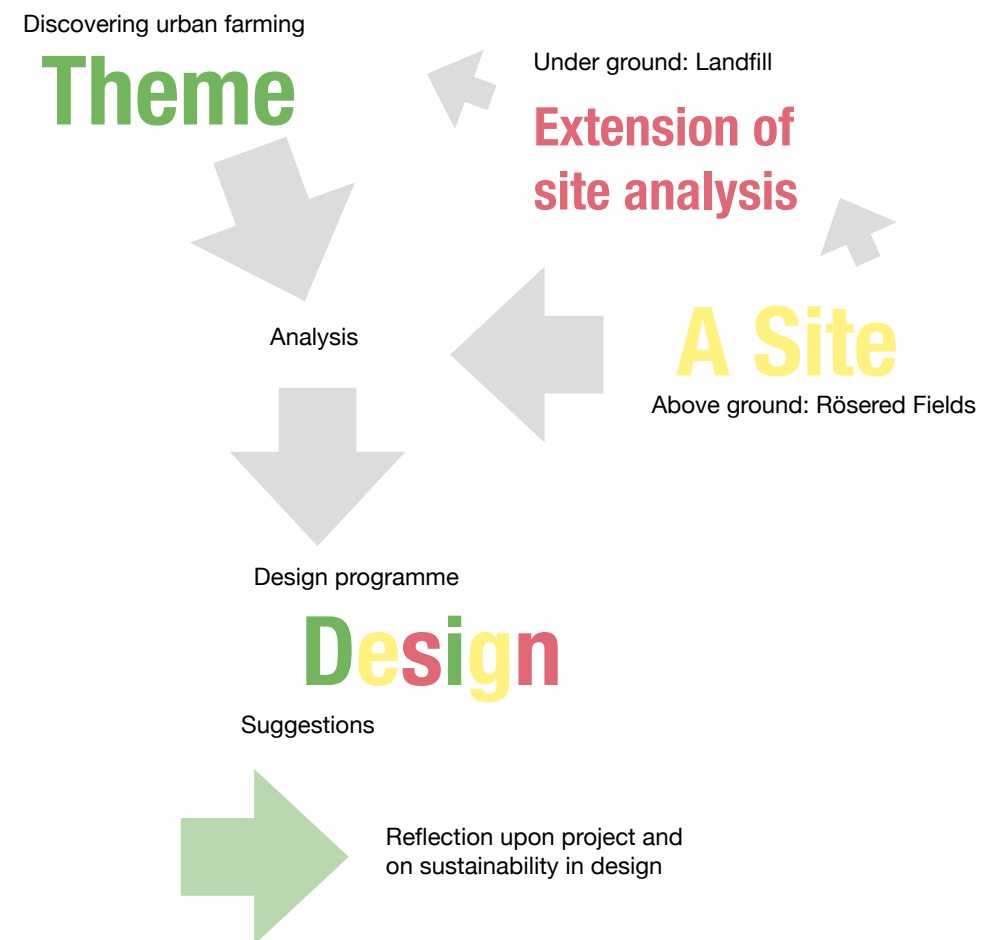
The research and proposal do not go deeper into methods for farming or recommendations for plants and crops.

1.4 Project structure

The report consists of three main parts. The first part explores the concept urban farming through literature, reports, media, blogs, study visits, interviews and spontaneous conversations. The second part is a site analysis of the Rösered Fields area and an analysis of the conditions of the landfill.

The figure below will help the reader to grasp the structure and evolvement of the project.

Logical progression of project



Outline for the project's evolvement. The figure should be read starting in *A Site* in yellow and *Theme* in green, simultaneously and then follow the arrows.

Introduction

1.5 Method

Research

The point of departure for learning about urban farming, has been through a combination of literature, site studies, study visits and occasional lectures. Literature has been chosen with the aim of finding contemporary examples of urban farming, ways of implementing farming in the city and city planning from a point of view of sustainability. Sites for study visits in Gothenburg and Malmö were selected with the ambition of understanding what urban farming is in the city today. The visits started on “traditional” allotments and continued with looking at newer sites and projects that contains forms of farming that are differently organised from the traditional. The project includes study visits in London, where a couple of sites were chosen that relate to experience of farming in the city and the role of agriculture in the urban environment.

Study visits have in some cases included interviews with people related to the project on that particular site. The method for interviews has been such that questions have been prepared in advance, but during the course of the conversation, the topic has been allowed to shift.

When looking at reference projects and preparing study visits, web-pages and blogs have been of great use, since they often provide background information about new organisations and projects. Newspapers have provided much information about how urban farming is pictured in public media.

Rösered Fields in Angered was chosen as the site to implement urban farming on. The site analysis on Rösered Fields is limited to observations on site and in the closest neighbourhoods, Hammarkullen, Angered Centrum, Storås and Rösered. However more parts of Angered have been in mind when creating the solution for urban farming on Rösered Fields, including for example Gårdsten and the forest areas around the river Lärjeån.

Photography has been a much used method for documentation and analysis. Sketching has been a continuous method for analysing the site and to tie the project together.

To reach a deeper understanding for the patterns of the natural and built environment around Rösered Fields, maps have been studied. The project contains some analyse of technical reports on landfills and recommendations for contaminated sites.

Design

The design proposal is based on the research on urban farming and the site analysis on Rösered Fields and landfill.

I have chosen to draw the proposals in the design programme by hand. The reason for this is that I want to keep the mind of the reader free in interpretation of possibilities at the site. The idea is to give an sketchy impression that opens up for future development of the design. Drawing by hand is also a more organic form of expression, which connects to the theme of urban farming.

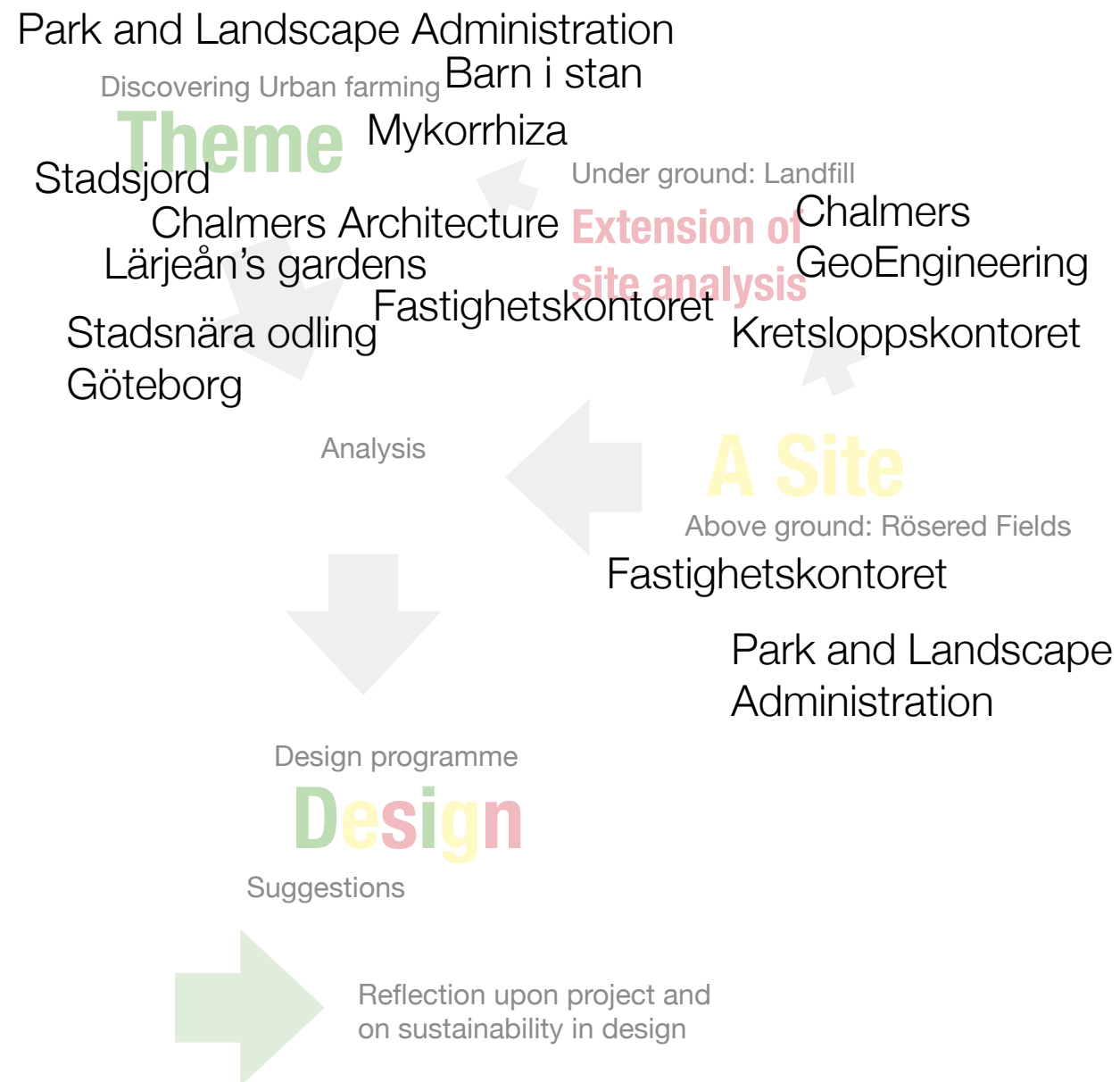
Distribution of methods in the different stages of the project



Methods used at different stages of the project, applied in the outline for the project's evolution.

Introduction

Distribution of contacts in the different stages of the project



Contacts made at different stages of the project, applied in the outline for the project's evolvement.

1.6 Working with *Growing Suburb*

From the very start of the project I have been in contact with Fastighetskontoret [the Property Management Administration] in Gothenburg City. I wanted to do a thesis that considered new approaches to urban planning, so when I got the chance to do a project on urban farming at Fastighetskontoret, I was very excited. From the start, the theme was “How to initiate spontaneous urban farming in Gothenburg?”. Together with Ann-Sofie Jeppson, my supervisor at Fastighetskontoret, I discussed different sites in Gothenburg on which it could be interesting to apply this theme. Rösered Fields came up as one of the suggestions and I was caught by the complexity of the site. After having visited a couple of different, potential sites in Gothenburg, my choice was to work with Rösered Fields.

Rösered Fields are situated in-between Hammarkullen, Storås, Rösered and Angered Centrum and is enclosed by roads and hillsides. Add to this the fact that it holds a possibly leaking landfill – it is a challenging area to work with! However, Rösered Fields has an interesting geographical position in Angred and beautiful nature with varying topography and vegetation.

With the choice of site, the project took an unexpected turn. The scope changed into “How can urban farming work on a site like Rösered Fields?”. It became necessary to consider aspects of the site such as accessibility, people’s general view on landfills, the condition of soil and the complexity of management that is connected with closed landfills. Still, the original theme, spontaneous urban farming, has lingered through the project and is visible in the design programme outcome.

At Fastighetskontoret I was offered a desk and access to the city’s map archive. I was also introduced to a number of people who had knowledge about Rösered Fields and about urban farming.

The project has meant plunging into new fields of knowledge: Learning about urban farming - which was for me a totally new field - and getting to know the site on which I was supposed to implement this newly acquired knowledge. These two lines have been following me throughout the whole project to be finally merged together in the design programme.

1.7 About Me

For the reader to grasp the scope of this master thesis it is useful to know a little about the author’s academic background: my bachelor degree is in Civil Engineering at Chalmers, while my master will be in Design for Sustainable Development. This is why this project, apart from analysis from a spatial and architectural point of view, also contains some technical elements, in the chapters Farming on contaminated land and Rösered Landfill.

Discovering Urban Farming

2.1 Beginning to understand - urban farming

Urban farming is a hot topic at the moment - it is more popular than ever to grow your own tomatoes and to potter about in the soil. As a student of architecture and engineering, I ask myself if this is just a trend that will eventually fade, or whether this is actually a process in which we begin to understand more about the cycle of food and material that we are part of. If it is true, that it is a lasting and developing tendency in society, increased urban farming will affect how we regard the city and the built environment.

More and more people are realising the benefits of small scale agriculture. As with most trends, there are sceptics and believers. In order to place myself in the debate, to learn more about what is going on in the world to understand how urban farming influences our society, and how it can be of use in a Swedish context, I have explored the subject from many different points of view.

This chapter aims to sort out the concept urban farming and to answer the question of why we should farm in the city – and how. My research is based partly on literature and published research. Another great part is based on study visits in Gothenburg, Malmö and London. Study visits have been combined with interviews, when there has been a possibility for this. There has also been many spontaneous conversations occurring on the different sites.

To get the most recent updates on the subject and to get an understanding for how urban farming is discussed in public media, web-based newspapers and blogs have been regularly visited. The conclusions from my investigations on urban farming will later be applied in the design program for Rösered Fields.



Farming in Archbishop's Park in central London.

List of study visits that have been carried out during the project and that will be presented in this chapter

Municipal allotments, Gothenburg
Allotments at Komettorget, Gothenburg
Kvatersodlingen Kvillebäcken, Gothenburg
Lärjeholm's gardens, Gothenburg
Mykorrhiza, Malmö
Barn i Stan, Malmö
Mudchute farm, London
Archbishops Park, London
Brockwell Park, London

Discovering Urban Farming

2.2 Definition and vocabulary

In contemporary literature and in daily talk, *urban farming* or *urban agriculture* are two commonly used terms concerning farming in and near the city. Urban agriculture, however seem to be the more processed and defined term in available literature. Different authors chose different definitions for this term; Luc J. A. Mougeot, Canadian professor and expert on the subject, defines urban agriculture as an industrious activity, implying a commercial element (Mougeot, 2005).

"Urban agriculture is an industry located within (intra-urban) or on the fringe (peri-urban) of a town, a city or a metropolis, which grows and raises, processes and distributes a diversity of food and non-food products, (re-)using largely human and material resources, products and services found in and around that urban area, and in turn supplying human and material resources, products and services largely to that urban area." (Mougeot, 2005, page 2)

In the book *Continuous Productive Urban Landscapes* from 2005, André Viljoen and his research colleagues takes a more general approach to the term stating that

"Urban agriculture is agriculture that occurs within the city" (Viljoen, 2005, page xviii)

Their definition is more descriptive when it comes to where and how urban agriculture can occur, and also includes fish production and animal farming.

Having compared these two definitions, which are both relatively broad and give the reader space for personal interpretation, I decided to come up with my own definition and choice of vocabulary for this project.

Urban agriculture refers to the industry of production of food and plants, as it has been defined, it also has economical and recycling dimensions, all of which are included in this research. However, this project also consider the activity of farming, together with social and human dimensions, and therefore the term urban farming will be the most used expression, as it in the author's opinion also can include urban agriculture.

Production of food and the activity of farming include animals. Animal farming is only mentioned briefly in this project.

Definition of urban farming in the Growing Suburb project:

Urban agriculture according to Mougeot and Viljoen
Allotment gardening
Farming as leisure activity
Farming as alternative employment, for social benefits and personal food supply
Commercial farming in the city
Temporary or mobile farming
Community organised farming
Common gardens /common farming
Guerilla farming

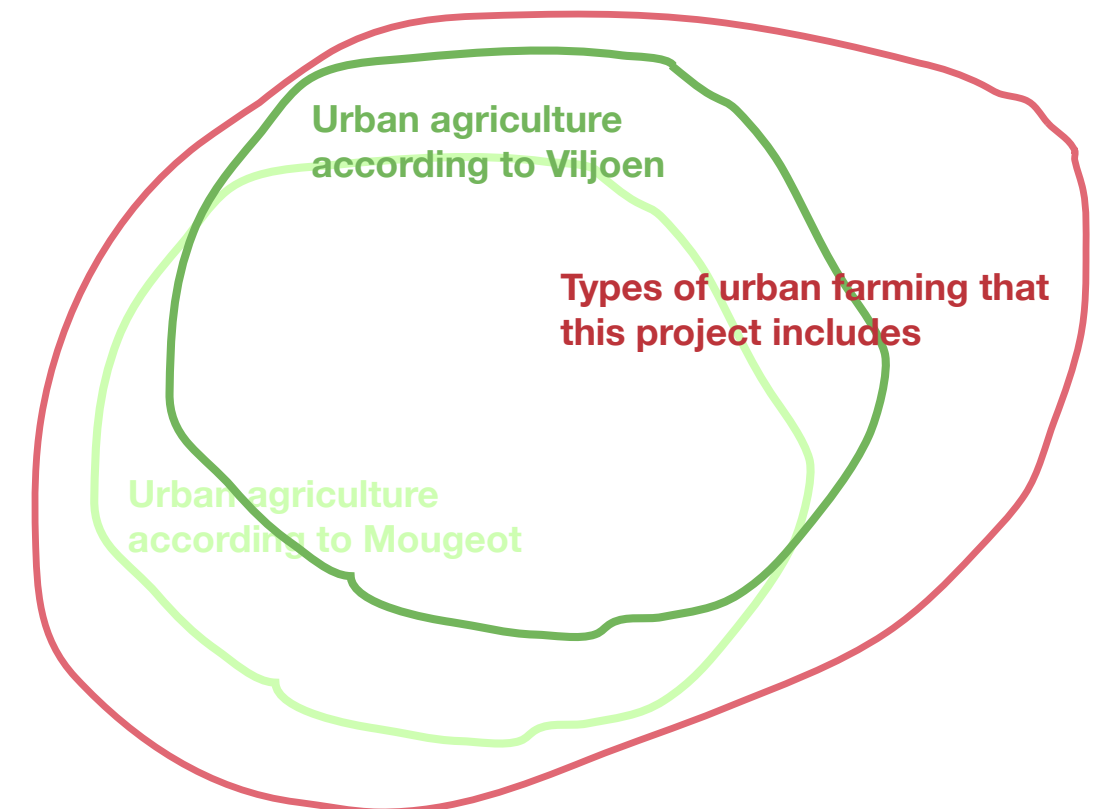


Illustration of how the terms urban farming and urban agriculture are related in this project and according to two important sources. The circles are somewhat exaggerated in proportion with the intention of making a point out of what the term urban farming includes as it is defined in this project.

Discovering Urban Farming

2.3 Why farming in the city?

Peak Oil and Climate Change

According to leading American and British expert economists, the world is approaching an economic crisis never before seen. Among the reasons for this are the peaking of oil resources and climate change. Two well known reports that predict this economic crisis are the Hirsch Report, that was created by request for the US government and predicts that peak oil may occur within 10 to 15 years (from 2005 when the report was published) (Hirsch, 2005), and the Stern Review, released for the British government in 2006 concerning economic consequences of climate change (Stern, 2006). A significant rise of oil price will put hard pressure on our oil dependent society and our food production. This will result in higher costs for transport and large scale industrial agriculture, it will affect production of oil based products together with energy and electricity use, according to Swedish journalist Gunnar Lindstedt (Lindstedt, 2008).

"Food production requires 20 percent of the total oil consumption and is the cause of more than a third of the green house gas emissions."
(Lindstedt, 2008)

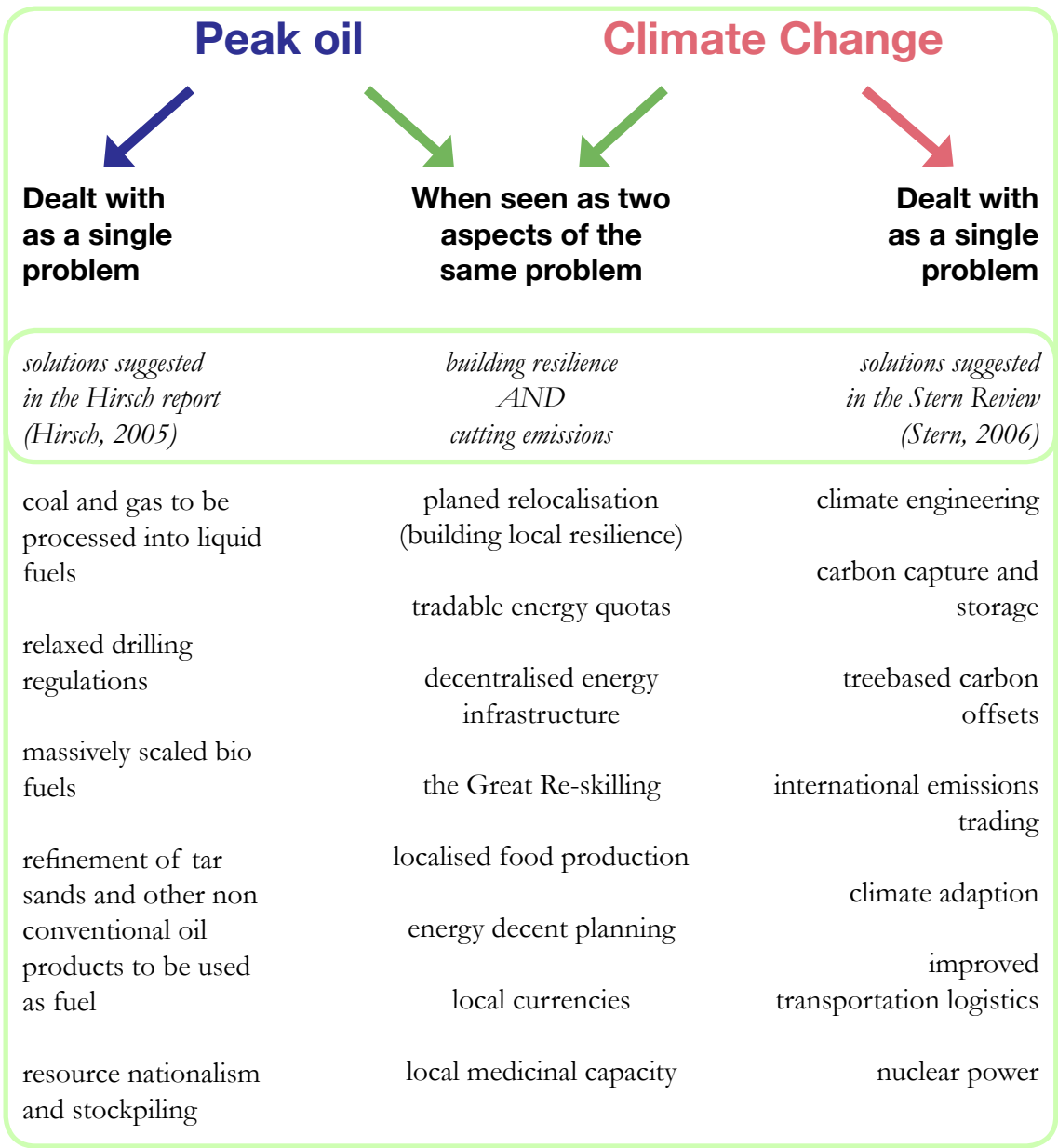
Climate change will bring about incalculable costs and material loss. The Stern review concludes that it is no longer possible to prevent the changes in climate, the question is rather how severe the rise of temperature and sea levels will be and what effects flooding and drought will have in terms of migration of people and loss of cultivable land (Stern, 2006).

The last few years a new discussion has been rising that addresses how the issues of climate change and peak oil relate to each other. Rob Hopkins, founder of the Transition movement and teacher of permaculture, describes this relation in a pedagogic way and from a solution seeking point of view (Hopkins, 2008). Hopkins stresses the importance of regarding peak oil and climate change as two sides of the same coin and that the problems should be addressed as one when looking for solutions. This is illustrated in the figure to the right.

Hopkins points out that one of the keys to meeting the peak oil and climate change crisis is through urban planning with local resilience that includes density of urban structure where decentralisation, tight feedback loops and diversity are important ingredients. Examples of such a resilience-adding to the urban system is, according to Hopkins, productive tree-planting, local composting, industries, food production, currencies and energy production. To understand the effects of our actions, it is important to have an urban system with tight feedback loops, where the result of change in action is immediately.

Urban food production

According to the UN-Habitat, more than 50 percent of the world's population are living in urban cities. In a couple of years, this figure may grow to about 70 percent. Although the tendency is global, it is predominantly developing countries that have the largest urban growth. In Sweden we have been adjusting to this urbanisation for many decades. Despite of this future city planning in both rich and poor countries must adjust food production and distribution to cope with the changes that follow increased urbanisation, peak oil and climate change.



Figure, inspired by Rob Hopkins, showing relation of solutions to peak oil and climate change, when regarded as separate problems or as one (Hopkins, 2008, p. 38).

Discovering Urban Farming

The strongest argument pro urban food agriculture may be that it is one of the fundamental pieces in the puzzle of supporting the earth's future population on with food, but it is not the only one.

Benefits that can be achieved from producing local and ecological food :

Richer taste in food (life quality)

More nutritious food that has not been stressed during cultivation and transport (health)

Less carbon emissions and oil consumption from transport of food (global benefits, energy saving)

Lower toxicity without pesticides and synthetic fertilisers being used (health)

More efficient farming* (energy saving)

Less waste of crops that are not perfect in shape (energy saving, life quality)

Higher degree of biodiversity (global and local benefits)

Greater variety of food (life quality, health)

More accessible food (life quality, energy saving)

A healthy hobby - industrial society's approach to urban farming

In Sweden the heaviest arguments for urban farming during the last decades have been social and health related. Closeness to nature and the possibility to create and influence your own environment is something that brings happiness to many people. Other arguments have been that keeping a garden can also be a way of expressing your cultural background and sense of beauty (Horgby, 1991). Besides the happiness factor, moving about and working in a garden gives exercise. Gardening work is calming, the farmer needs to adjust to a more cyclic way of regarding time depending on sunrise and sunset, weather and seasonal variations. Thanks to its health related and social benefits, urban farming and gardening have been recommended activities for elderly, and as a method for people to deal with unemployment or stress related diseases (Horgby, 1991). These arguments are still valid and urban farming and gardening as hobby activity for people of different ages and background should be prioritised in urban planning.

A meeting place in the public urban space

Urban gardening and farming is a way of allowing people to meet. For the farmers it is a chance to get to know people with similar cultural background - or with entirely different background. Also for other people in the city, that do not have the time or interest to farm, moving in outdoor environment, seeing greenery and human activity, is a positive thing. As stated by Danish architect Jan Gehl, and confirmed by many others, "people come where people are", meaning that people will go where there already are people (Gehl, 2010, page 81). Gardening is also an excellent opportunity for people of different ages to meet. Grownups that are outside working inspire children to play and learn, and make them feel safer outside (Horgby, 1991).

Perhaps the foremost argument why people should be given the possibility to farm in the city is the request for it. Many sources tell of the will people have to do farming and gardening (Wennberg, 2012) (Hogby, 1991) (Fastighetskontoret, 2012). The challenge for architects, planners and engineers is to prepare the urban structure and to prepare for farming on good conditions.

*Research published at the University of Michigan concludes that farming with organic fertilisers require less space than when using synthetic and that small farms have a greater production per unit area than large farms have (Badgley, 2006). de la Salle and Holland emphasise the importance of how we relate to the food that we eat and how the uncertainty about the origin of the food that we eat, impact us in a negative way (de la Salle & Holland, 2010).



Skansberget, Gothenburg (Photo: Tom Marlow).

Discovering Urban Farming

2.4 Farming in the city in practice

Farming reclaims place in the urban structure

How is urban farming valued in the city today? Traditionally urban farming or gardening has been highly valued in connection to private housing such as villas or row housing. Today, old and established allotment garden areas that have been part of the urban landscape during many years are appreciated and allowed to be a part of the city's structure. Many allotments are however not as present in the everyday urban environment. These allotments are often placed on less attractive spots where few people pass by on bike or by foot, which can perhaps explain why some of these allotments are badly maintained.

According to a bachelor thesis in Human Ecology, by Annie Frid at the University of Gothenburg, there is a scepticism among people in Gothenburg to farming in the central city, due to risk of pollution from traffic (Frid, 2009). There is also a common view that the inner city is lacking space for farming. Frid argues that this is a misunderstanding - there is much land available for farming in the central parts of Gothenburg. About 20 meters should be enough to limit the risk for pollution from metals and acids from a road. Also it is argued that most crops do not take up these pollutions and that it is enough to rinse the vegetables in water. This argument is also supported by Tor-Leif Bramryd at Lund University (Bramryd, 2011). More important is then to evaluate risks of human exposure to contaminants, for example when working in the soil, and to do adequate research on the soil, to determine if it is suitable for farming.

Lately differently organised urban farming is beginning to claim value in the urban space, the Prinzessinnengarten project in Berlin is one example that has been acknowledged. The project started in 2009, when a number of people got together and started to prepare a park in Kreuzberg for farming (Prinzessinnengarten, 2012). Vegetables are grown in transportable bags and boxes. The initiator had been inspired by how urban farming was done in Cuba and the aim was not just to produce local food, but also to create meeting places for work, learning, living and relaxing. More examples of urban farming today are presented later in this chapter as places for study visits.

Andre Viljoen and Kathrin Bohn argue that there is a neglect of attention to urban farming due to lack of quantified and comparative research on the subject (Viljoen, 2005). There is a lack of support to agriculture in mixed-use development which affects the outcome in city planning. The foremost reason for not implementing farming in urban environment is that it is seen as less financially rewarding compared to other built infrastructure and buildings. It is also seen as a problem that very few people are able to imagine or visualise how a city that includes farming would be like to live in. The authors argue against densification of built environment, and instead underline the importance of green and productive landscapes as part of the urban space.

The importance of recycling: Peak phosphorus

Phosphorus is an essential ingredient in our food, our bodies need around 0.4 kg phosphorus every year (Sustainable Phosphorus Futures, 2009). Agriculture today is dependent on phosphorus extracted from phosphate rock as fertilisers. The phosphate rock has long been considered as an almost unlimited source, however, lately research shows that also phosphorous may peak in a couple of decades, with economic and food crisis as a consequence (Burns, 2010). The industrious extraction of phosphorus that we have today, in average 22,5 kg phosphorus per person and year,

is not only a tremendous waste of resources, but also leads to eutrophication of rivers, lakes and oceans from leaking agriculture.

In order to close the human-phosphorus cycle, Burns recommends the three R's: reduce, reuse and recycle. Reducing intake of meat and dairy-based products in a way of reducing your personal phosphorus use. Phosphorous is an element, and can therefore be recycled and reused again in agriculture. Swedish scientists have come far in the research of reusing human urine as fertiliser. A separating flushing toilet that immediately take care of traces of medical products through a cheap and relatively easy method is right now under development (Ottosson, 2011).

It is important to have the cycles of material, water and waste in mind when designing for urban farming. Also to visualise these cycles in order to increase understanding of how we live and the impact we have on our environment is of crucial importance.

Possibilities for food production in Sweden

Sweden has good possibilities for being self-sufficient when it comes to food production with urban farming adding to what can be produced in the rural agriculture. According to an investigation done by students from the Swedish University of Agriculture Sciences, the space available in Swedish private gardens and allotments could support 4 million people with food in an extreme situation (Andersson, 2008).



Turnips in Gothenburg in January 2012.

Discovering Urban Farming

2.5 Farming on contaminated sites

Contaminated sites in the city

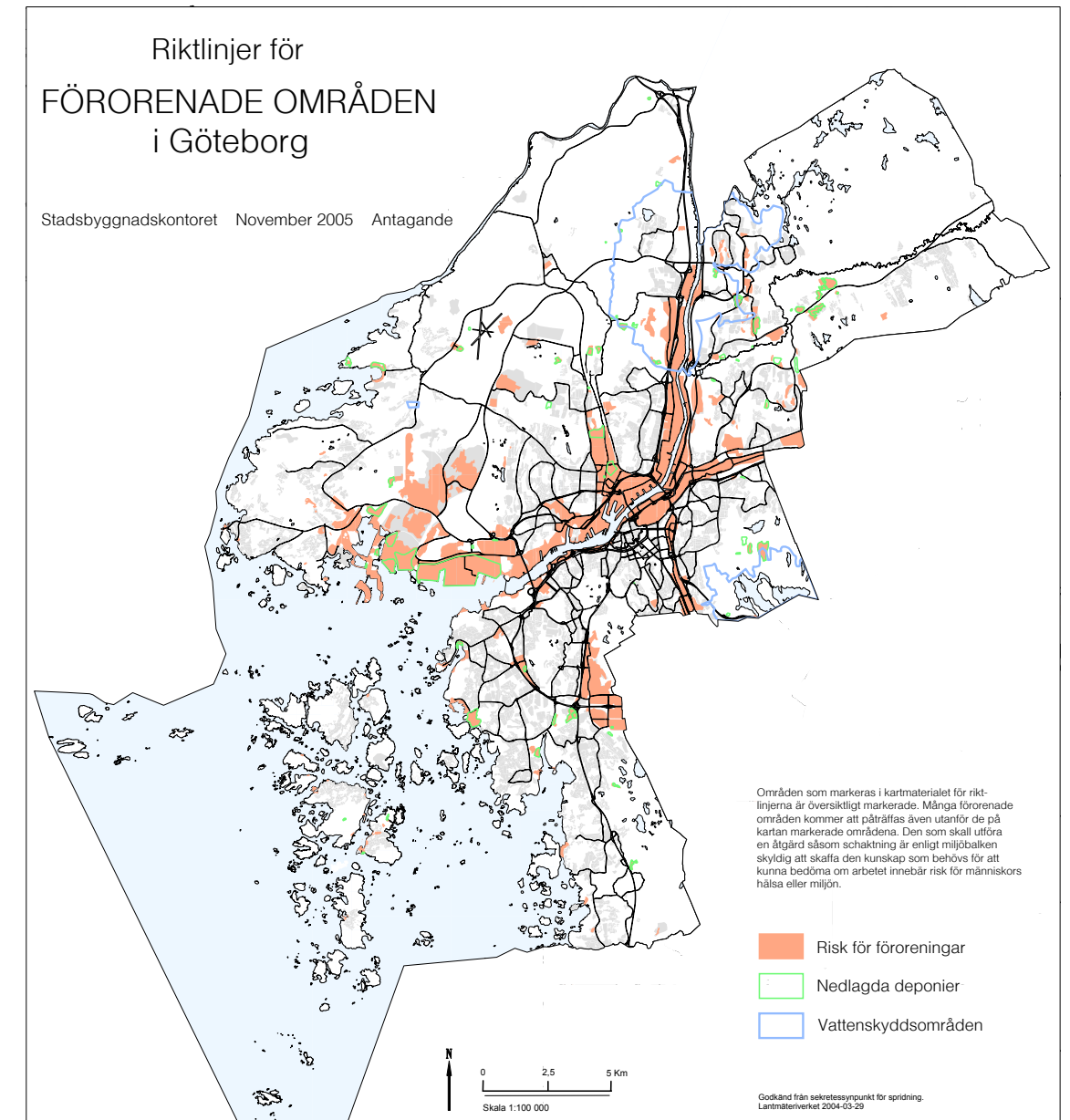
A large part of the land in urban areas is contaminated. In Gothenburg, much of the soil has been affected by pollution from industries related to the harbour. There are also a number of waste deposits and landfills within the city. The municipality manages around 20 closed landfills that were mapped out during the 1980's and deposits that were closed before 1998 (Porse, 2012). Depending on how old these landfill sites are, the regulations for what has been allowed to deposit have been changing, therefore some landfills contain more dangerous substances than others. The landfills in Gothenburg contain household waste, construction waste, left-over soil, waste from sewage and sometimes also industrial waste (Kretsloppskontoret, 2004).

In relation to a rising request for farming land within the city, also contaminated sites may become more interesting spots for farming. Therefore it is important to work out strategies for how to prepare contaminated sites for safe farming.

Such strategies could be to evaluate the possibility for farming on a site depending on to what extent it is possible to remediate the soil from contaminants, or if the site can be covered in such a way that contaminants do not affect humans and farmed crops. In the case of landfills and waste deposits, it is also important that the area is protected so that the contents of the deposit are not disturbed and the environmental impact from the site thereby worsened. A frequent problem related to landfills is the risk of leakage of water through the deposit that could lead to pollution of the ground water.

Elisabet Porse is working at *Kretsloppskontoret*, the municipal Recycling Administration that is responsible for the regular control of a number of landfills in Gothenburg, one of which is the landfill in Rösered. Because of the high risk of investment for developers and because of the municipal responsibility for the landfill content, Kretsloppskontoret only allow temporary building under very special premises on these sites (Porse, 2012). In case EU-regulations are changed, if a landfill should start to leak or if there should be methane gas emissions from the landfill, buildings would have to be demolished at a high cost. There is a great uncertainty about the content and exposure risks of many landfills in Gothenburg, and little is known about how these deposits will behave over time.

Another problem associated with landfills is how we perceive them in the urban environment. If there is uncertainty about personal safety on a site, and if this uncertainty is reinforced by passivity in urban planning, the feeling of unsafety, related to the place, will increase. The challenge of farming in the city, on possibly contaminated or contaminated land, is also a question of how to communicate the risks and the possibilities on each specific site. It is important to consider what fears and preconceptions people have, and do not have, about contaminated sites and landfills. As a planner, you must be ready to meet these fears, mediate a realistic picture and to inform about the risks and possibilities of a site. This may be difficult enough in a short term perspective, but it will be even more challenging to regulate and to bring this information on to future generations.



Closed landfill sites and possibly contaminated soil in Gothenburg (Stadsbyggnadskontoret, 2009)

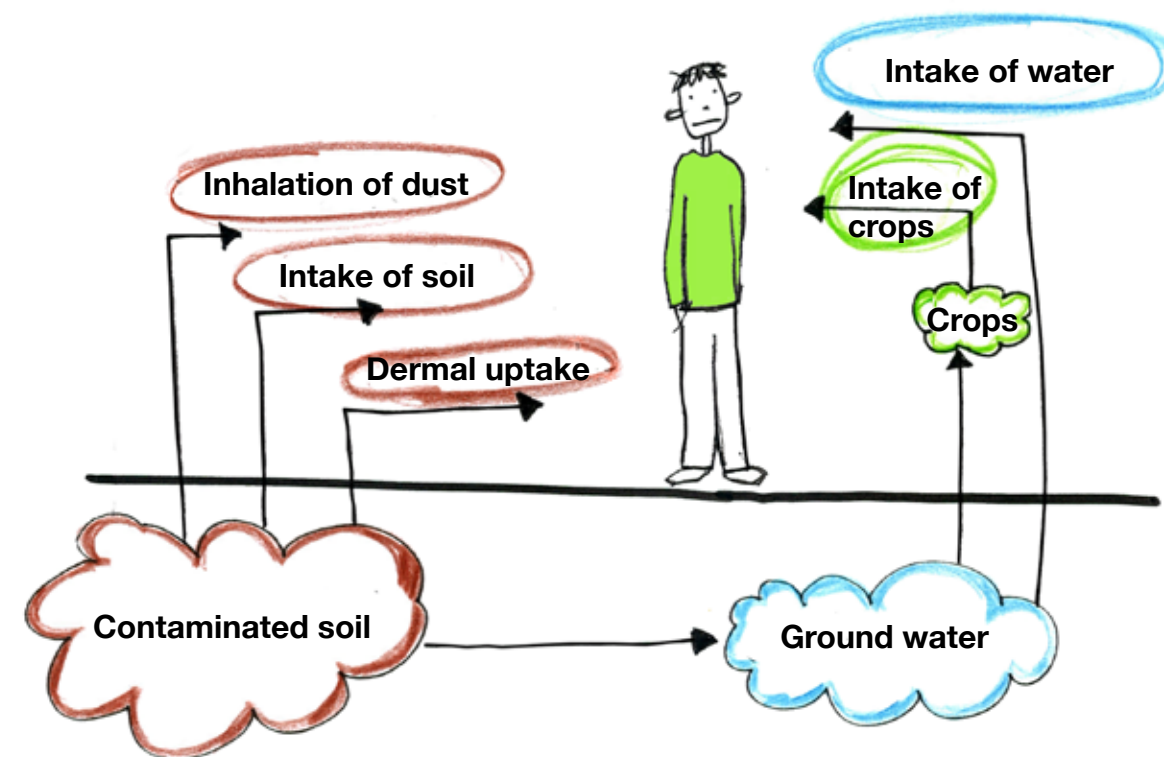
Discovering Urban Farming

Risks with residing on contaminated soil

For all humans and animals, there are risks associated with residing on contaminated soil. The risks that follow long-time exposure to many substances are not known to us. The regulations for dealing with contaminated soil in Sweden are relatively sharp, which means that very small amounts of contaminants are allowed in the soil in areas where people are expected to spend much time (SNV, 2009). The reasons for keeping a sharp attitude towards safety on contaminated soil are to beware of people's immediate safety, to beware of known or unknown future health impacts from exposure and to protect future generations from exposure.

Having considered the risks, if land is prepared well in advance for farming, and information about safety on the site is provided to the users, safe farming on contaminated land can be possible.

If contaminated soil is suspected on a site where urban farming is planned for, it is important to do a risk assessment that considers possible exposure pathways. When farming in contaminated soil, a person can be exposed to contaminants in many different ways. As shown in the illustration below, some examples of possible exposure pathways are uptake directly from the soil; either from inhalation of dust, intake of soil through the mouth or uptake of contaminants through the skin. Indirect uptake can be through contaminated groundwater, that affects crops or animals that we eat.



Conceptual model that describes potential exposure pathways to humans at contaminated sites (SNV, 2009).

Management of contaminated sites and landfills

Depending on the type of contamination and on the type of activity that is planned for on the site, it may be necessary to cut off some of these exposure pathways or to remove the source of contamination.

For contaminated sites in the city, it is common to remove the source by doing a remediation of the soil. There are different ways of "cleaning" the soil. One method is phytoremediation, which uses certain plants that take up the hazardous substances. This is a relatively slow method, cleaning a site may take many decades, the plants are burnt and the ashes that contain the contaminants are deposited. In this way the dangerous decay products are controlled.

There is also the alternative of cleaning the soil mechanically or chemically, or to replace it with clean soil. This remediation is relatively costly, but very common on sites for property development. On very dangerous sites, fences can be put up as to hinder humans from being exposed to contaminants.

On landfills, it is more common to plan for leaving the contaminants in the soil and to cut exposure pathways by a protective seal of mud or clay. By using clay, direct exposure through the soil is hindered and transport of contaminants with water is decreased, because of lowered permeability.

Another way of cutting exposure pathways is to add a protective textile layer. Such a layer can prevent the upward movement of large soil particles and mixing of contaminated and uncontaminated soil. Geotextiles are foremost a visual indicator of how deep you can dig before you reach contaminated levels (Terram, 2012). This means that direct exposure pathways from soil are only cut to a certain extent and exposure pathways through water are not affected. Contaminated particles and water can still move through the textile. It is therefore recommended that the protective barrier is placed on top of the textile layer.



Orange geotextile was used in London when building for the Olympic Games in 2012. The soil underneath is heavily contaminated and radioactive (Photo: Games Monitor).

Discovering Urban Farming

How to seal a landfill

Since this thesis especially regards a closed landfill site, the management of landfills will here be considered more thoroughly. In Gothenburg, the process of preparing safe landfills, is allowed to take time since the sites are not interesting for development of built structure. The reason why some landfills are being sealed, is to protect the landfill itself from water or air infiltration and/or for the sake of protecting human beings and the environment from dangerous emissions from the deposit.

A common way of sealing the surface of a waste deposit is to cover it in sludge, from for example sewage plants (Porse, 2012). The sludge is compact the first years after it has been applied, but the permeability increases with time. The sludge is very nutritious, which is good for the growth of vegetation, but can contain contaminants that may even add to the concentration of harmful substances in the top layer of the landfill.

Another way to decrease infiltration in the landfill is to cover it with clay. This is a more permanent way of sealing the landfill which to a greater extent also protects humans from exposure of contaminated soil.

In Gothenburg the supply of left over clay from building roads and tunnels in the city is extensive. Some of this clay is clean and some is contaminated.

Elisabet Porse has been involved in the sealing of a landfill site in Gårdsten, a bit north from Rösered (Porse, 2012). The landfill in Gårdsten was covered with a 4-5 meter thick layer of clay. It is important to put more than 3 meters of clay, to be sure that the clay does not dry out, since this typically creates fractures in the clay. The type of clay found in Gothenburg is deformed once it has been dried and does not recover its original tightness.

In the case of Gårdsten, much effort was put into reinforcing the ground around the landfill, so that it would be able to take the load from the thick clay layer.

The Gårdsten landfill will be an area for recreation and there is an ongoing discussion on whether the site is also suitable for allotment gardens.

Discovering Urban Farming

2.6 Urban Farming worldwide

For any urban farmer, there is much to be learnt from other farmers around the globe. Poor urban dwellers generally have a much smaller ecological footprint than richer ones, they also have a greater tendency to practice urban farming, to support their own families with food and to sell.

The capital of Namibia, Katutura, is one example of where poverty and starvation is being fought by urban farming. Katutura has had a rapidly growing urban population for the last twenty years (Mougeot, 2005). In the beginning of the 90's, 70 % of population in the city had serious food problems, unemployment was reported to be almost the same percentage, 67 %. In five years, the figure of serious food problems had decreased to 30 %, with unemployment rates consistently high and no change in conditions in the rural area. The explanation to this contradictory figures turned out to be urban agriculture in combination with effective system for supplying the city with food from rural areas.

An example from Togo brings up the problem with extensive use of pesticides in urban market gardens (Mougeot, 2005). The farmers are often aware of the risks they take using various pesticides, but are lacking in knowledge about how to treat pests and fungus. This leads to experimenting and mixing of different substances and pesticide resistance in turn force the farmers to increase doses. "Good" pest-controllers are too costly and therefore farmers are left to use cheap alternatives and thereby violating the health of themselves and others.

Experiences in Latin America

Gabriella Jorge is a researcher at the Faculty of Agriculture in Montevideo and has done research on urban farming in Cuba, Argentina, Brazil and Uruguay. Jorge points out that the objectives for urban farming differ between cities, for example food supply, fighting poverty, fighting crisis and achieving green cities (Jorge, 2012).

During 2002 Brazil and Argentina went through a major economic crisis that affected a great part of South America. Unemployment rates were high and many people fell into poverty. To deal with the crisis, different actions were taken from the governmental side. In Rosario in Argentina, families with low income were allowed to be part of the forming of social programmes containing urban farming and farmers were allowed to take part in the municipal decision making. In connection with the crises people started to farm and process food in the city.

In Uruguay the urban population is about 95 % of the total but during the 20th century urban farming traditions have been gradually lost. Many people still live in shanty towns and some of the poor keep pigs which they feed with collected garbage. During the crises unemployment rates rose. In Montevideo the university started giving courses in farming and helped people to form groups, to begin to farm. Families came together and grew food in peri-urban areas. Even though the main objectives for farming in Uruguay during the time of crisis were employment, urban farming contributed to people eating more nutritious food containing less chemicals, peoples self esteem grew and poverty was fought. Today employment rates are rising again which results in the fact that people do not have time to take care of their gardens and therefore the urban agriculture movement is loosing strength. The big question here, according to Jorge is how to achieve continuous urban farming also when people are recovering from poverty.

Cuba went through a major post Soviet crisis, and the government prepared for large scale urban farming. In 2011 one million tonnes of food was produced in urban settlements, on 1500 ha of farming land. The objective for urban farming in Cuba was mainly to fight poverty and starvation. Also in Cuba, there appeared problems with intoxication because too much chemicals were used in the farming.

According to Jorge, driving forces pro urban farming in Sweden today are mainly to diminish ecological footprint of cities, social sustainability and fighting building on empty lots.



Urban farming alongside a road in Nairobi, Kenya.



A university tree nursery in Kenya.

Discovering Urban Farming

The Transition movement, London

The Transition movement is working towards a sustainable society that cope with effects of peak oil and climate change by applying resilient methods on local level in cities. The Transition Network constitutes of people working for and supporting community-lead responses towards an oil independent and climate neutral society (Transition Network, 2012). Transition movement started in England, but has been spreading also to other countries, in Sweden it is known as “Omställningsrörelsen”.

Together with the mayor of London's project Capital Growth, which is an earlier initiative, and other organisations that encourages urban food growing (Capital Growth, 2012), the Transition Network is working towards more urban farming in London.

In London the Transition movement has branches in many areas, two of these which can be found on the Transition Network web-page are in Brixton and Lambeth:

An example of where public space has been taken in use for farming is in Archbishop's park in Lambeth, London. One of the reasons for starting the project was lack of funding for maintaining the park. The project called Archbishop's Park Gardening Group have received funding from Capital Growth, among others, in form of money and specialist knowledge on urban gardening.

Brockwell park community greenhouses are situated in the centre of Brockwell park in Brixton. Since 1998, the greenhouses serve the local community. The association arranges workshops and organises voluntary work in the garden with the purpose of learning and sharing.(Brockwell Greenhouses, 2012).



Urban farming in Archbishop's Park in Lambeth.

Another example of urban farming in public space is the Edible Bus Stop near Lambeth Hospital, which is a normal bus stop surrounded by crops and plants that enthusiasts in the nearby community are bringing there (The Edible Bus Stop, 2012).

Since February 2012, the Transition movement is supporting London's first cooperatively owned solar power station in Brixton (Transition town Brixton, 2012).

Observations in Brixton and Lambeth:

Learning through farming
Urban farming for maintaining public space
Agriculture brought forward in urban space



Greenhouses in Brockwell Park in Brixton.



Cabbage in Brockwell Park in Brixton.

Discovering Urban Farming

Mudchute Farm, London

London has many city farms, Mudchute Farm is the largest of them and situated near the new financial district in Canary Wharf (Mudchute Farm and Park, 2012). The farm has traditional English livestock animals of rare breeds but also lamas and donkeys. The farm holds many different activities such as kids' nursery, café, allotment gardens and riding lessons.

The Mudchute was created from the spoil of construction from development of docks along the River Thames. For many years the Mudchute was untouched and a place for plants and animals to establish undisturbed. In the 1970's it was decided that the area should be protected from development of built environment and instead be kept as a resource for education and recreation. Mudchute Farm Allotment Society has two different areas on the farm. The soil was recently tested and no contaminants were found.



Mudchute Farm, overlooking patient sheep and Canary Wharf financial centre.



Mudchute Farm, has a kitchen and a café.

Observations at Mudchute Farm:

Mixed activities

Learning about animals, farming and cooking for children and adults

Green oasis in the middle of the city

Allotments with focus on farming



Mudchute Farm allotment association.



One of the activities at the Mudchute.

Discovering Urban Farming

2.7 Traditional urban farming in Sweden

Urban farming is not a new invention, in the pre industrial society, there were pigs and cows in the city and people were growing vegetables for their own household supply in their kitchen gardens on the backyard or in “cabbage gardens” just outside the city, as is described in *Lägenhetsträdgårdar* by Charlotte Horgby and Lena Jarlöv (Horgby, 1991). As the population grew in the cities, built environment was prioritised at central spots and also more advance transport methods made it possible to feed larger cities with food from the countryside, city farming was phased out, in its previous form. Sewage systems and water supply was centralised, urban farming in the dense city was not considered hygienic. In the beginning of the 20th century, however, the request arose from people in the city to access land for gardening in the city. This was partly a romantic longing for a distant countryside, and partly a need for poor families to grow their own food. This was when the modern allotment system in Sweden took form. The tradition has developed since. In the early 20th century came the inspiration from Germany, to have a little house on the lot.

During the first and second world war, allotments and gardens were again used for food production in the city. Also parks were used for potato cultivation. These times are actually comparable to a future scenario if prices for fuel should rise dramatically, since limited transport possibilities were one of the main reasons why the city land was used for farming during the wars.



Allotments with houses in Delsjön, one of the first allotment associations in Gothenburg.

2.8 Urban farming according to Gothenburg City

The municipality of Gothenburg encourages urban farming as leisure activity, for the sake of personal well-being among the citizens but are also starting to recognise that more aspects of sustainability can be covered by increased agricultural activity within the city (Fastighetskontoret, 2012). Commercial farming in the city is not as encouraged as amateur farming is though. There are rules that regulate which of the crops that are produced in the city, that can be sold; soil must be guaranteed free from contaminants, the farming must have been done with a certain distance to highways and there are also specific rules for irrigation and fertilisation (Frid, 2009).

At the moment, the municipal departments have a couple of political missions to follow through that relate to urban farming; increase the number of allotments in the city, work towards more ecological allotments, support urban farming in the city and to give the people in Gothenburg the possibility of spending their holiday in the city.

To increase urban farming in Gothenburg, beyond the traditional frame that the allotment societies provide, the project *Stadsnära odling Göteborg* [Urban farming in Gothenburg] was initiated in the spring 2011. The project is run by Fastighetskontoret and aims to support spontaneous urban farming on municipal land. So far the project has sponsored a few specific projects within the city, handed out free seeds and is running a blog about urban farming.

Within Gothenburg there is need for both adults and children to be able to spend vacations and spare-time in the city, and still have the possibility to enjoy nature, relax and practice outdoor activities. The *Semestra hemma* [Holiday at home] project is an attempt of meeting this need.

Gothenburg already has quite a large number of allotments, right now the biggest request is for allotments with a small house. In Gothenburg, many of the allotments are used as “summer vacation” houses in the city and therefore the aim to increase the number of allotments is as much a part of the Semestra hemma project as a way to encourage urban farming.

Ekologiska koloni- och odlingsområden i Göteborg is a booklet that contains the basis of knowledge about urban farming in Gothenburg, and is compiled by Fastighetskontoret. The booklet contains some basic guidelines for how to make allotments in Gothenburg more ecological. The program includes social and economical sustainability and non-toxic farming, meaning use of clean soil and no use of synthetic pesticides and fertilisers. It also includes use of non-toxic building material and paint. For the common facilities such as water, sewage and energy, there will be stricter demands. Use of heat-exchangers between sewage water and clean water is encouraged, as is local energy production from solar-panels and wind. Public transport will be encouraged among the farmers, and parking places will be limited and there will be mainly short time parking.

Not all allotment societies in Gothenburg follow these “guidelines” for ecological farming today. New farmers will have to sign contracts where they agree not to use toxic pesticides and synthetic fertilisers.

Discovering Urban Farming

Spontaneous urban farming in the public space is encouraged by Gothenburg City. It is regarded as a good thing that people take part in the public space. When it comes to maintaining public green areas, private initiatives of farming can also contribute to the municipality as an economic relief. Areas that would otherwise have been empty green lawns can be turned into more interesting and lively gardens if an individual citizen or group are interested in using a plot for farming and take over the responsibility for maintenance.

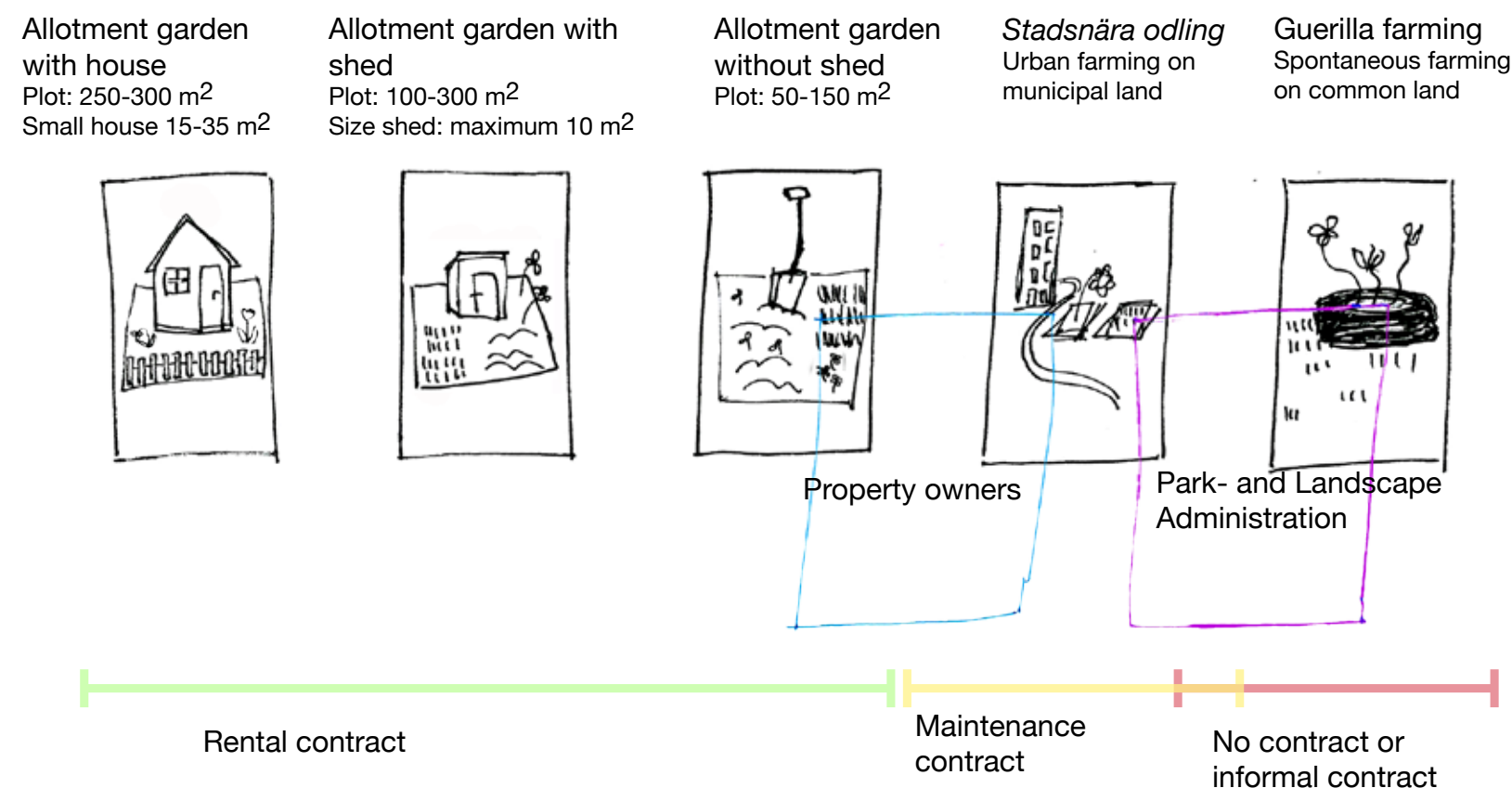
How Fastighetskontoret regards urban farming

Fastighetskontoret is the department that manages the municipally owned land. In Gothenburg, the municipality owns much of the land in the city, why Fastighetskontoret administer a great deal of the land in the city that is dedicated to farming. When it comes to allotments, Fastighetskontoret, writes contracts with associations and never with private citizens (Park- och Naturförvaltningen, 2011). Larger areas for farming in the city outskirts, can be sharecropped by individuals or communities. The illustration below shows how different types of farming are categorised according to the municipality. Fastighetskontoret is involved in the four first black boxes in this illustration, the last box, “guerilla farming” is by definition not organised, however, it is something that the municipality highly encourages. The blue and purple boxes show urban farming that is administered by other instances; property owners that allows farming near apartment houses or on other available land, and the Park and Landscape administration that allow farming on some of

the common municipal land. Farming on common land is allowed as long as it is “available” for all citizens, meaning that you are allowed to enter the allotment, but should not pluck anything.

Fastighetskontoret is positive to new organisation forms when it comes to urban farming, but does not think that these matters should be organised within the municipality, due to lack of financial means for this within Fastighetskontoret (Fastighetskontoret, 2012). Regarding form of tenure, it is important for the municipality that allotment land is accessible to everyone in the city, not only people with a lot of money. Lately, however, allotment houses have been sold for over one million Swedish kronor in Gothenburg - that says something about how popular some of these allotment areas are.

Although the municipality encourages sustainable urban farming, lack of financial means and knowledge about how to enhance new types of urban farming limits the present development of publicly governed urban farming. There is a tendency of not wanting to push the development too much from the side of the municipal administrations, in many cases the municipality is waiting for the initiative to urban farming to come from the public. The political strategies on urban farming have changed very recently and it is yet difficult to see any result of the measures that have been taken so far.



How Fastighetskontoret regards urban farming (illustration with inspiration from Ann-Sofie Jeppson).

Discovering Urban Farming

Municipal allotments in Gothenburg

Gothenburg is a city with many allotment areas. According to Fastighetskontoret, there are 20 allotment areas with small houses and 12 allotments where you are allowed to build a small shed and 27 where the plot is for farming only (Fastighetskontoret, 2012). In total this means around 3 000 allotment houses and almost 4 000 allotments. These areas are very different from each other, depending on where in the city they are located. The allotments nearest to the city centre, are old and more traditional in style. Some of these old allotment associations still have a clear agricultural focus, however, most of the allotments with houses have the purpose of recreation rather than production. In the allotment areas near the sea, the forest and on mountain sides, it is common with very small gardens or no gardens at all, in relation to the allotment and the small house. These areas are more oriented towards vacation in the city than urban farming.

In other allotment areas in Gothenburg, there is a much larger focus on farming and food production. One example is Lärjeholm's which is an area with many people of foreign background. In Lärjeholm, the farming has a very industrious character, and there seem to be a great knowledge about farming within the area. Here houses and sheds are built out of recycled material and the level of creativity in shape and building is high.

In some of the allotment areas in Gothenburg, there have been a lot of conflicts between different cultural groups. During the study visits to the areas, it was noticed that there were many beware-of-the-dog signs and fences around the houses. This shows that there is a great tendency to of wanting to guard your property (which is rental!). Maybe these are places where underlying conflicts, not necessarily related to farming, appear.



Larger scale urban farming and food production at Lärjeholm's allotment association.

Observations at Gothenburg's public allotments:

Knowledge about agriculture
Local food production
Creativity
Vacation
Commitment
Socialising
Conflicts



Allotment with house and farming, in Torpa.



Torpa allotments is an example of the type of plot where you are not allowed to build a shed.

Discovering Urban Farming

Urban farming outside the usual: Komettorget in Bergsjön

By the end of the tram line to Bergsjön in Gothenburg, lies Komettorget. Since a couple of years there are allotments here, between the square, the tram station and the housing areas.

When I visited Komettorget, the square at the end of the tram line to Bergsjön, on a cold day in the middle of January, the plots were empty of people. Traces of human activity were however unmistakable. The allotments are neatly arranged, sheds and fences are all built of recycled building material and the farming here has a focus on food production but the atmosphere is relaxed and friendly.

A couple of days later, I learnt more about these allotments through a seminar, held by the City Museum. Here a film about the farming at Komettorget was shown and a discussion was held that included people that had been involved in the project.

The allotments on Komettorget lie on Fastighetskontoret's land, but the contract here differs from usual allotment contracts. Since the land is not programmed for farming, the agreement between the farmers and the municipality has been unofficial. The initiative to the project came from the City District Council that saw the need for allotments in Bergsjön. The empty area used for car parking near Komettorget turned out to be suitable for the purpose of temporary allotments. Soon the land was prepared, water posts were installed and those interested started to grow their crops on the lots. Eventually they also started to build little sheds to keep tools in and to be able to take a cup of tea in when the weather was bad. Since there were no proper contracts for the allotments, building of sheds was not regulated.

Through the film it became obvious that the farmers were worried about if they would be allowed to stay on their plots. There were rumours circulating around Komettorget about plans for housing and shopping malls. These rumours turned out to be false, but it was obvious that the city had failed in communicating this to the farmers. It also turns out that the municipality can support the farmers with subsidies to maintain paths and drainage, on the condition that they form a proper association with yearly meetings. The farmers have been unwilling to do this, probably due to the fact that many of them find it difficult to communicate in Swedish and that they have little knowledge about the way non-profit associations and other organisations are usually run in Sweden. The allotments in Bergsjön show that urban farming can be organised in other ways and still be functioning.

The allotments have been very well received in Bergsjön, people think it is safer to move from the tram stop to the housing areas when there is activity going on on the square. The farmers often stay by their plots during the whole day and evening, especially during the summer months. The central spot may also be a spur to keep one's allotment in nice shape, when so many people pass by it every day.

Observations at Komettorget's allotments:

- Efficient farming
- Activation of urban space
- Safety near the square
- Resource-economic farming
- Good example of how knowledge about agriculture can be brought forward in urban space
- Alternative employment for older people with foreign background
- Unregulated organisation of farming
- Request for more space for similar farming



Komettorget's allotments in the winter 2012.

Discovering Urban Farming

2.9 New urban farming projects in Sweden - more study visits

Lärjeån's gardens, Gothenburg

Lärjeån's gardens is a biodynamic market garden that started as a non-profit organisation project in 1999 (Lärjeåns Trädgårdar, 2012). The organisation had difficulties to break even and is now run as a business. Lärjeån's gardens have very mixed activities, such as handicraft, café and restaurant, workshops, farming and green houses, all of which are based on principles such as waste recycling and taking care of what is produced in the garden. The gardens engage unemployed, people in treatment and ex-criminals to work on the farm, in the kitchen and with the handicraft. All products that are produced are being sold on the farm.

The café arranges music evenings and invites artists from the whole of Gothenburg to perform. Lärjeån's gardens lie near Angered Centrum and have a close connection to Angered, and cooperates with other cultural activities there.



Activities at Lärjeån's gardens include both commercial hothouses and old fashion ploughing (Lärjeåns Trädgårdar, 2012).



Observations at Lärjeån's gardens:

- Farming as alternative employment and therapy for unemployed, people in treatment and ex-criminals
- Taking care of waste and water
- Smalls scale hothouse with plants for sale and for own use
- Parallell activities that strengthen the farming

Mykorrhiza, Malmö

Mykorrhiza is an association initiated by a group of young people, working with practical methods towards a change through local sustention of food. The Mykorrhiza association is, according to their web-page, at the moment active in Malmö, Stockholm, Gothenburg, Örebro and Värmland. Mykorrhiza network aims to be autonomous and to develop continuously.

Axel is one of the farmers in Mykorrhiza and he showed me around in Enskifteshagen, a park between the areas Möllan and Rosengård in Malmö.

The concept of the farming in Enskifteshagen is that anyone passing through the neighbourhood is allowed to plant and harvest crops on the lot. All the farming in Enskifteshagen is commonly maintained and all the space for farming is commonly shared.



The boxes for farming are commonly shared and numbered.



The Mykorrhiza association invites anybody to farm and harvest on their plot.

Discovering Urban Farming

Malmö City are positive to their initiative, and are supporting Mykorrhiza with land. They have access to water and have been given a fence with gates and a container for keeping tools in. Malmö city encourages Mykorrhiza to expand their farming.

During the autumn 2010 it appeared that the ground in Enskifteshagen contained high merits of carcinogenic PAH (Polycyclic Aromatic Hydrocarbons), lead and quicksilver. Therefore it was decided that the vegetables should not be harvested and that food crops in the future should be grown in ground sealed containers (Mykorrhiza, 2012).



Farming on municipal land in Enskifteshagen.

Observations in Enskifteshagen:

- Linking neighbourhoods together
- Maintaining green spaces in the city
- Local food production
- Accessibility

Barn i stan [Kids in the city], Malmö

Through Axel in Mykorrhiza, I got in contact with Anna who was involved in Barn i stan, a three year long project run by a Somalian association and financed by Arvsfonden (Mougart, 2012). The idea was to allow children and elderly people from different cultures to meet, and together practice beekeeping, gardening, cooking and other activities in their neighbourhood. The project was finished in the summer 2011. Malmö City are now employing youths, of which Anna is one, to keep the gardens and the beekeeping running (Barn i Stan, 2011).



Farming outside the Somalian Association's premises in Malmö.

Observations at Barn i stan:

- Social interaction between people from different age groups and cultural background
- Learning about farming and the cycle of food and waste

Discovering Urban Farming

Stadsjord in Mölnlycke

Stadsjord is a big actor in the urban farming field in Gothenburg. In February I met Niklas Wennberg, the initiator to Stadsjord for an interview about their current projects and to help feeding the pigs in Mölnlycke. At the moment there are 11 pigs working for Stadsjord. Until now they have had missions in Högsbo and Torslanda in Gothenburg, that have included preparing the ground for farming by rooting, manuring and eating of bugs and unwelcome roots and plants (Wennberg, 2012). For three pigs it takes about three months of rooting before these sites can be used for farming. Since April, some of the pigs are busy working in Majorna and Lundby. This Thursday, however, corn, avocados, tomatoes and bananas were on the menu. Niklas collects leftover food from grocery stores as complement to the grain that is the base of the pigs' dinner. The pigs in Mölnlycke are of the breed Linderöd swine that can stay outside all year around.

Niklas refers to Stadsjord as a “group project” that wants to work with allotment farming, gardening and peri-urban agriculture. Stadsjord are interested in collaborating with tenant associations and allotment associations among others and are regularly communicating with Chalmers and Swedish University of Agriculture Sciences.



Sötnos and one of her piggies enjoying dinner outside their house in Mölnlycke.

Observations in relation to the pigs in Mölnlycke:

- Pigs in the city create awareness of other species and the food that we consume
- Pigs can work as social catalysers
- Pigs are efficient and quick when preparing soil for farming
- Pigs require attention and care from humans
- The urban system is lacking space for and knowledge about animal farming
- Pigs can teach us about food and waste cycles
- Personal commitment from the side of the project leader

Niklas points out that the organisation of urban agriculture can be a problem but that the interest for it is wide the among the public. Municipal funding should support different forms of organisation of farming, food hygiene and safety.

What happens before and after farming are issues that interest Niklas: Crops farmed in the city needs to be taken care of and conserved. For example school kitchens could be used for preparing large amounts of fruit and berries. There should be green houses with plants accessible for small scale farmers. Food waste and human waste should be taken care of, for example human urine could be used as fertiliser. The problem there is all the rests of medicines that the urine contains at the moment, says Niklas.

Temporary farming on contaminated soil in Östra Kvillebäcken, Gothenburg

Östra Kvillebäcken is a former colour industry area in Gothenburg that is now being developed with housing and parks. The ground is heavily contaminated from the old industries, and at the moment soil remediation is being done in the area. *Kvartersodlat* is a cooperation between Stadsjord, the property developers in Östra Kvillebäcken and Lundby City Distric Board. The idea is to use the empty ground plots for farming until the companies are starting to build. All of the farming is being done in sealed containers with external soil, such as plastic bags, wooden boxes and pots and is mobile. Farming in Kvillebäcken has been very popular, the farmers are mainly amateurs and every each one is responsible for their own box, it is a sort of mini-allotment (Wennberg, 2012) (Stadsjord, 2012).

Observations in Kvillebäcken:

- Temporary farming
- Great public interest to participate
- People are daring to farm on contaminated soil

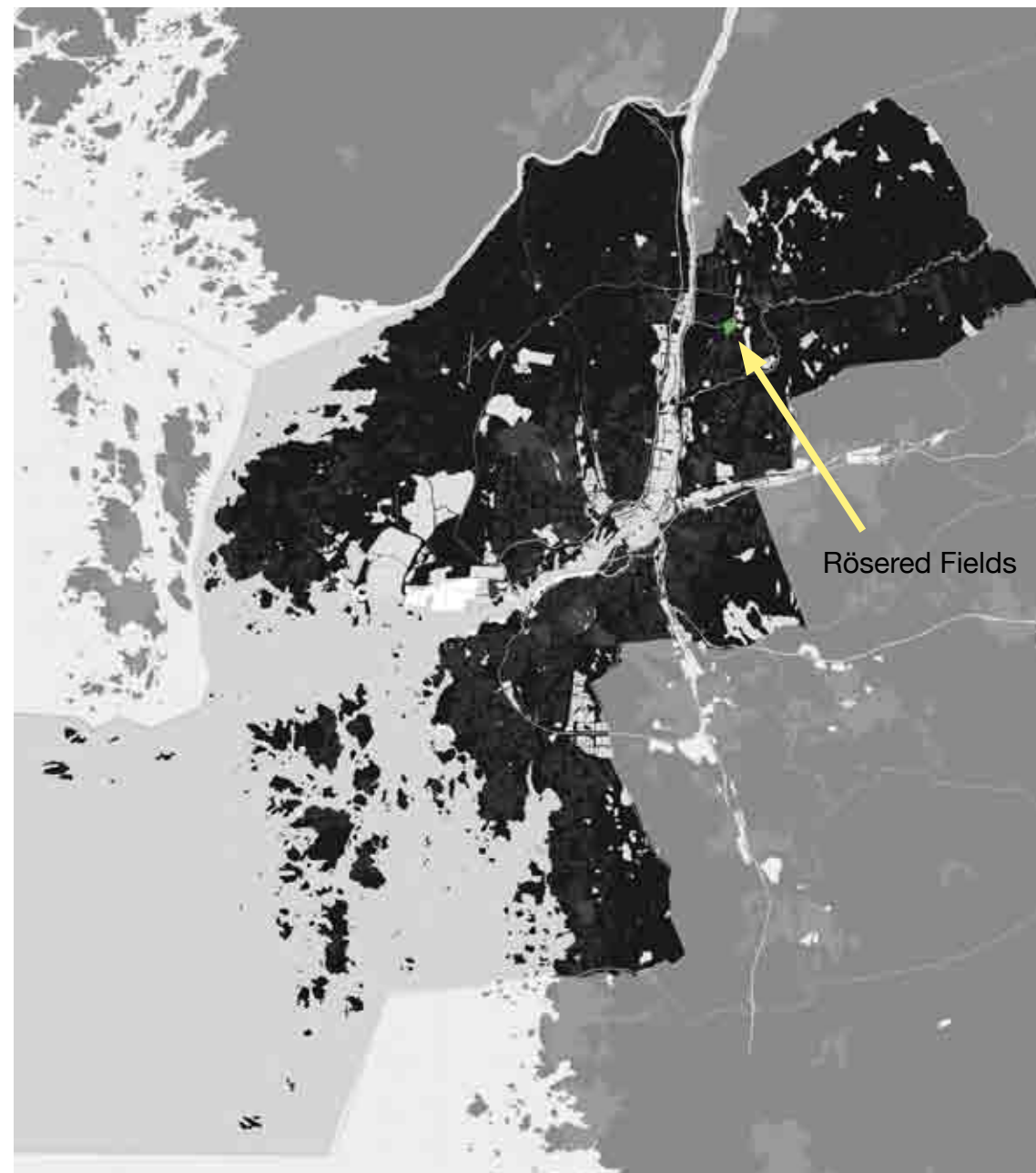


Farming on heavily contaminated land in Kvillebäcken.

Rösered Fields

3.1 Background

Rösered Fields is an undeveloped area in the Angered city district in Gothenburg. Geographically, Rösered Fields connect to a number of different suburb areas - Angered city in the north east, Storås in the east, Hammarkullen in the south and Rösered village in the north west. The area is characterised by its fields and its hill with pine and birch trees. A communication tower on top of the hill is an important landmark in the area.



Rösered Fields in Gothenburg.

The area of Rösered Fields used to be a gravel pit during a greater part of the 20th century. From the 1970's until 1992, the pit was used as a landfill (Karlsson, Seth, 2005). Since the close of the landfill, the area has been in limited use. Apart from the football field and the communication tower, Rösered Fields are unused. After the closing, there has been attempts to develop a park in the area, but these plans have been postponed due to uncertainties concerning risks associated with leakage from the landfill. Still, Fastighetskontoret, that manages the land, is interested in activating Rösered Fields to make use of the land and to meet the increasing request for allotment gardens and the political mission to increase urban farming in the Gothenburg.

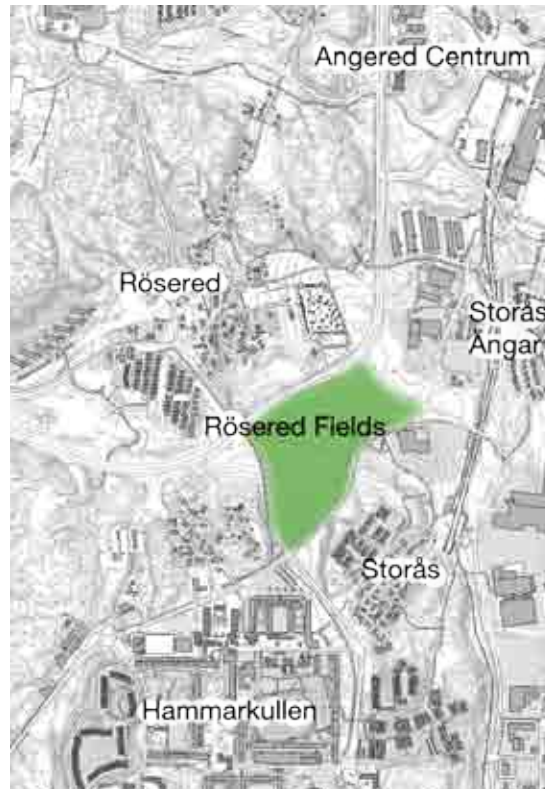
The site analysis that follow in this chapter focus on the approximately 50 000 m² large area, Rösered Fields, marked in yellow and green in the illustration below. The analysis also includes how Rösered Fields relates to its neighbouring suburb areas.

The name Rösered Fields has been introduced by the author with the purpose of giving the area a unifying, neutral name that refer to the area as a whole, and not only to the landfill.



Tower landmark.

Rösered Fields



Rösered Fields and surrounding areas.



Rösered Fields from above, with names of surrounding roads.
Yellow marks grass land and green, steep hillsides with trees or forrest.



A typical pine tree.



Gothenburg inner city.

Rösered Fields and surroundings.



Comparison of scale, Rösered Fields and Gothenburg inner city.

Rösered Fields

3.2 Topography

Rösered Fields has a varying topography. In the southern area and the north eastern corner are grassy meadows, the ground is very moist here even though the fields are higher situated than the surrounding roads. The hill cuts the area in two and gives a beautiful contrast to the meadows. The hillsides have taller vegetation, trees and bushes that almost forms a forest towards the east. The top of the hill has a grass plateau, from where you have a good view over all the surrounding areas, Hammarkullen, Storås, Angered Centrum and Rösered.



Hammarkullen seen from the top of the hill.

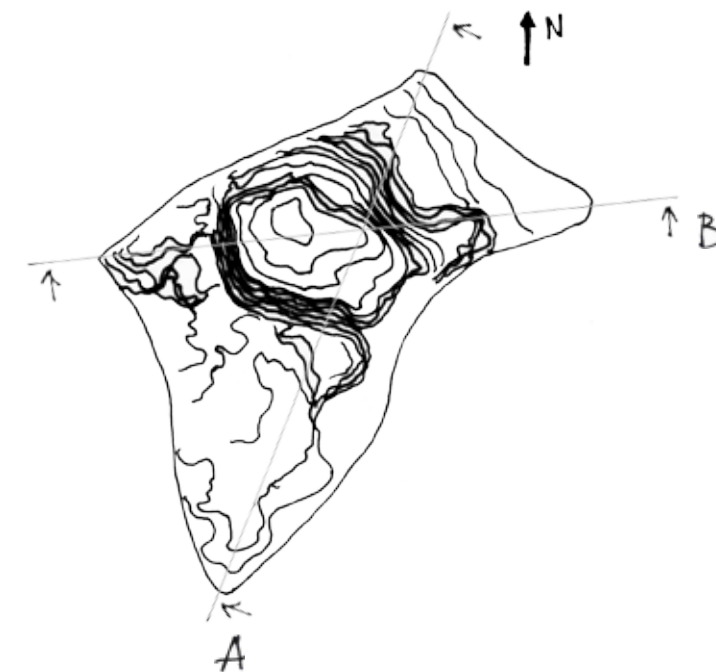
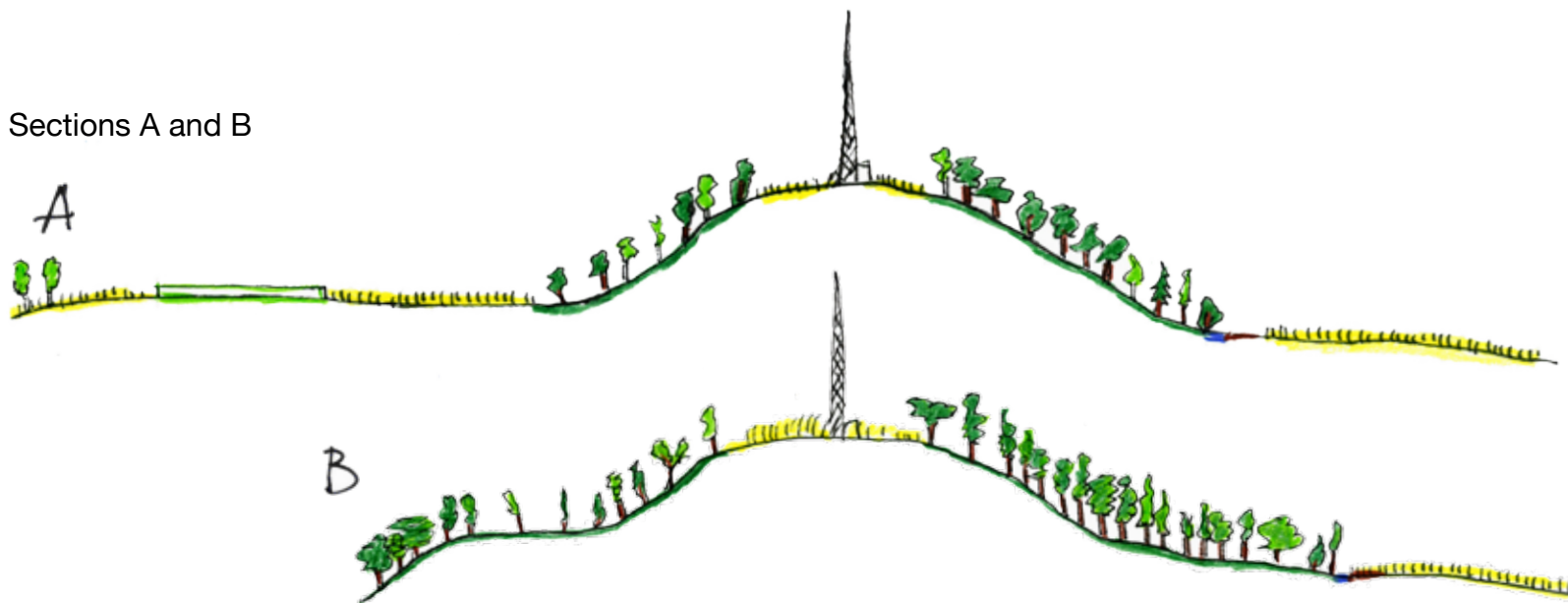


Satellite picture of Rösered Fields from 2008.



Hights and football field, Rösered Fields.

Sections A and B

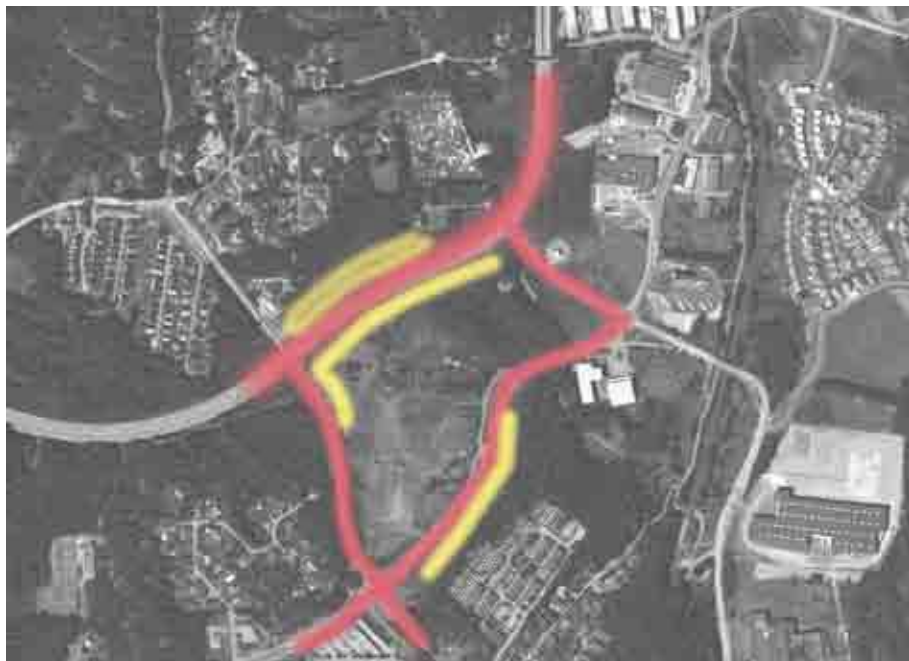


Rösered Fields

3.3 Barriers

Roads are the main barriers around Rösered Fields, but there are also natural barriers such as steep slopes and forest.

Rösered Fields are difficult to enter for pedestrians and bikers, not only due to traffic, but also because the roads are broad and sometimes fenced, and there are very few crossings.



Red marks road barriers and yellow marks natural barriers.



Angeredsleden is a busy 90 km/h road.



Grusåsvägen in January, a less busy reach.

3.4 Entrances

The entrances to Rösered Fields are directed towards Hammarkullen and Storås. The entrances are mainly walkways for pedestrians and bikers. The most eastern entrance, is a badly maintained dirt road that leads up to a junk yard.



Yellow markers show entrances to Rösered Fields.



The entrance to Rösered Fields from Storås is via a bridge over Hjällbovägen. From Hammarkullen it is possible to enter over a zebra crossing or through a pedestrian underpass.

Rösered Fields

3.5 The surrounding areas; neighbourhoods and buildings

Rösered village

The housing areas around Rösered Fields represent the typical suburban sprawl that characterise Gothenburg's peri-urban areas. Before the 1960's this area was the countryside. Rösered village, north west from the fields witness of these times. Compared to most of the built environment in the area, old Rösered village has a different morphology. On the map, houses seem sporadically placed alongside the village road. The houses, that often have extensive gardens, some with farmland attached, are climbing the hillside, as if they have all found the perfect spot to sit on. Rösered still has this country village atmosphere, even though old houses are mixed with newer buildings and has complemented with a semi-detached housing area in the south west.



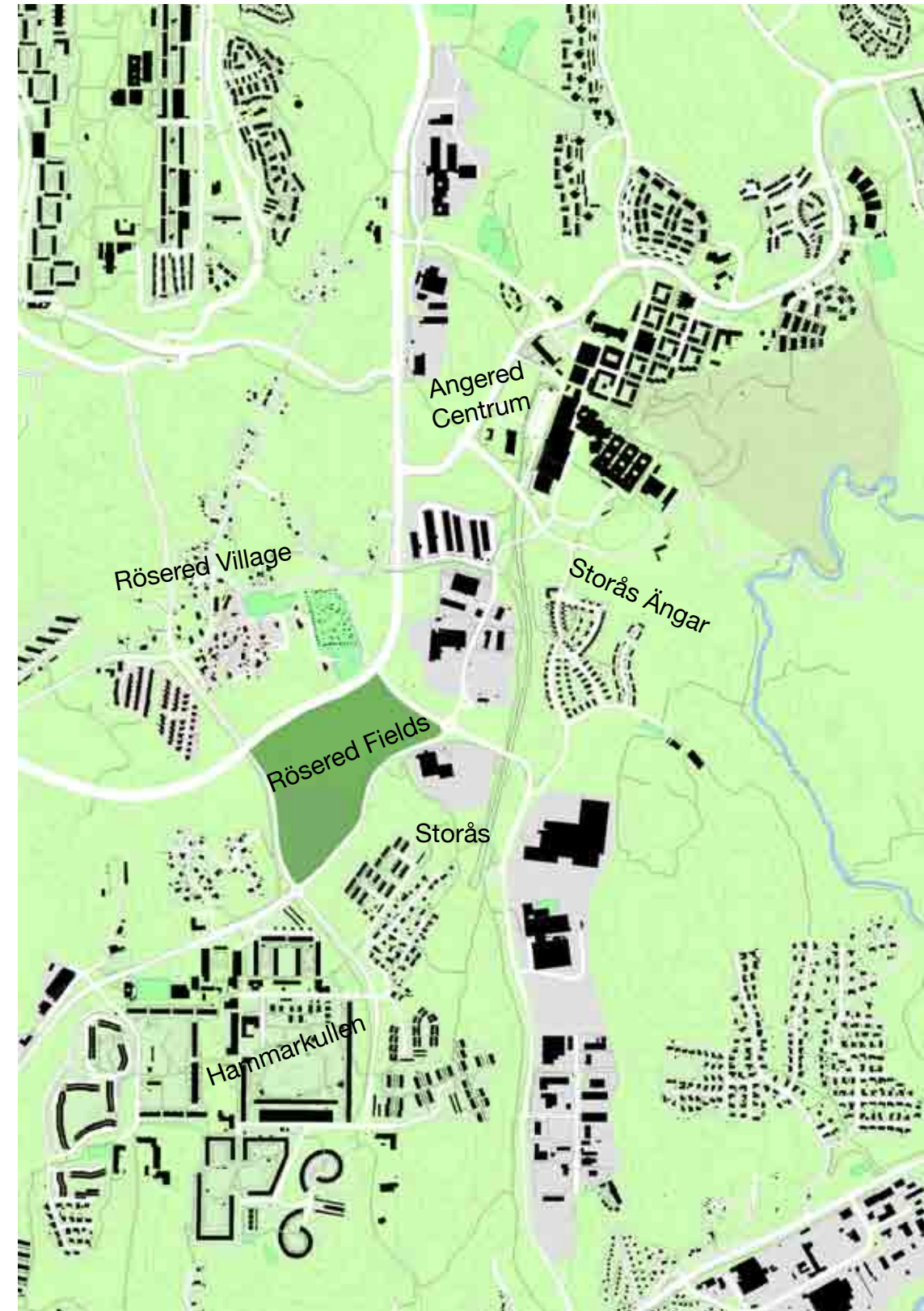
Rösered old village, house from the early 20th century.



Rösered village, semi-detached housing form the 1970's.

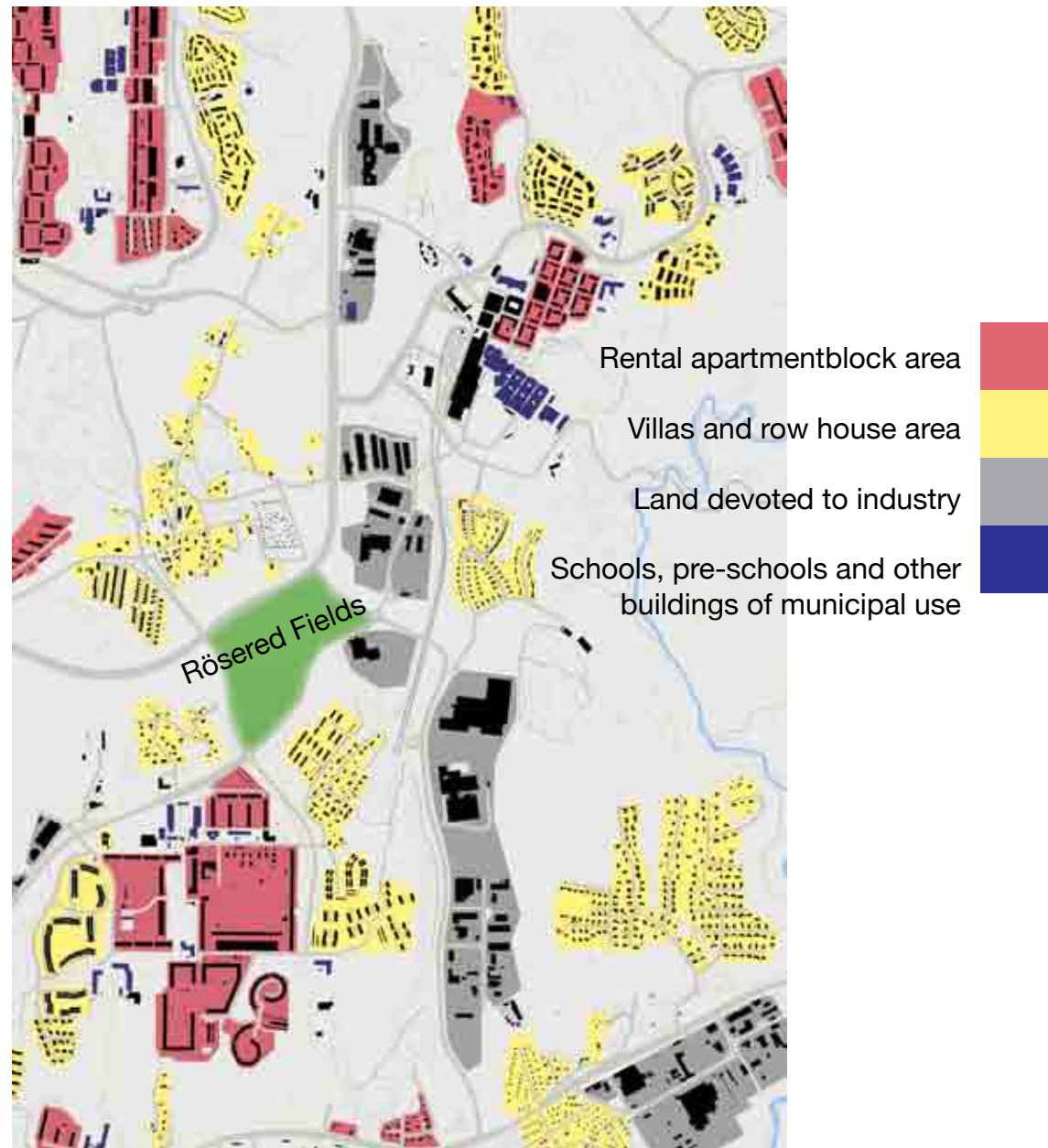
Angered Centrum

It is possible to walk from Rösered to Angered Centrum. A bridge over Angeredsleden, leads you into an industrial area and further on to Angered Centrum. This part of Angered has the largest commercial centre in the area, with shopping malls. Here are also the City District Council situated and the important cultural centre Blå Stället. Angered Centrum was constructed in the 1960's and 1970's as part of the Swedish Million Programme, a project initiated by the government and that had the intention of providing the Swedish population with convenient housing. Angered Centrum has both areas with slab buildings, semi-detached housing and detached housing.



Patterns of the built environment around Rösered Fields.

Rösered Fields



Zoning of built environment in the areas around Rösered Fields.



Industrial buildings near Rösered Fields.



Hammarkullen

The nearest rental apartment area to Rösered Fields is Hammarkullen, a typical example of the Swedish Million Programme that was completed in the 1960's and 70's. Hammarkullen has many of the features that characterise suburban areas in larger Swedish cities. Around the centre and the tram stop are mainly large scale slab houses and in the peripheral areas are row houses and semi-detached houses. In Hammarkullen, the buildings are embraced by hills, forests and parks. Together with its inhabitants, greenery and nature are giving this area its unique character. Hammarkullen has a population with high variety of ethnicity and cultural background and is famous for its yearly carnival in May. In the 90's Hammarkullen became known to the Swedish TV-audience through a series where the area was described as a rough stigmatised suburb.



Recently renovated 1960's slab houses in Hammarkullen.



Gropens Gård in Hammarkullen is a highly stigmatised housing area and situated near to Rösered Fields.

Storås and Storås Ängar

East from Rösered Fields, are Storås in the south and Storås ängar in the north. The areas are in fact more connected by name, than by place. Storås is part of the Million Housing program and consist of one-family-houses; row houses, detached and semi-detached houses. Storås Ängar is a new one-family-house area built in 2004 and situated near the tramway line between Storås and Angered Centrum.



Storås Ängar, a new one- family-housing area.

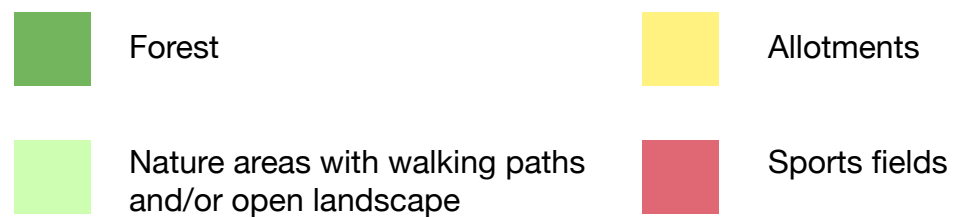
Rösered Fields

3.6 The surrounding areas; nature and leisure

Angered is known for its beautiful hills and forests. The built environment, both high-rise apartment blocks and row houses, have a strong connection to the surrounding nature. For those who appreciate a walk in the forest, there are many walkways to choose between.

Other outdoor leisure activities in the area nearest to Rösered Fields are the football fields and the Rösered allotments gardens which are situated just north of the fields.

The valley along the river Lärjeån is especially known for its cultural landscape. Lately the areas around Lärjeån have been more emphasised in Gothenburg. Lärjeåns garden's is an example of the increased activity related to nature and urban farming in this area.



Green areas for walking and other leisure activities around Rösered Fields.



Rösered allotment gardens.



The football field on Rösered Fields.

Rösered Fields

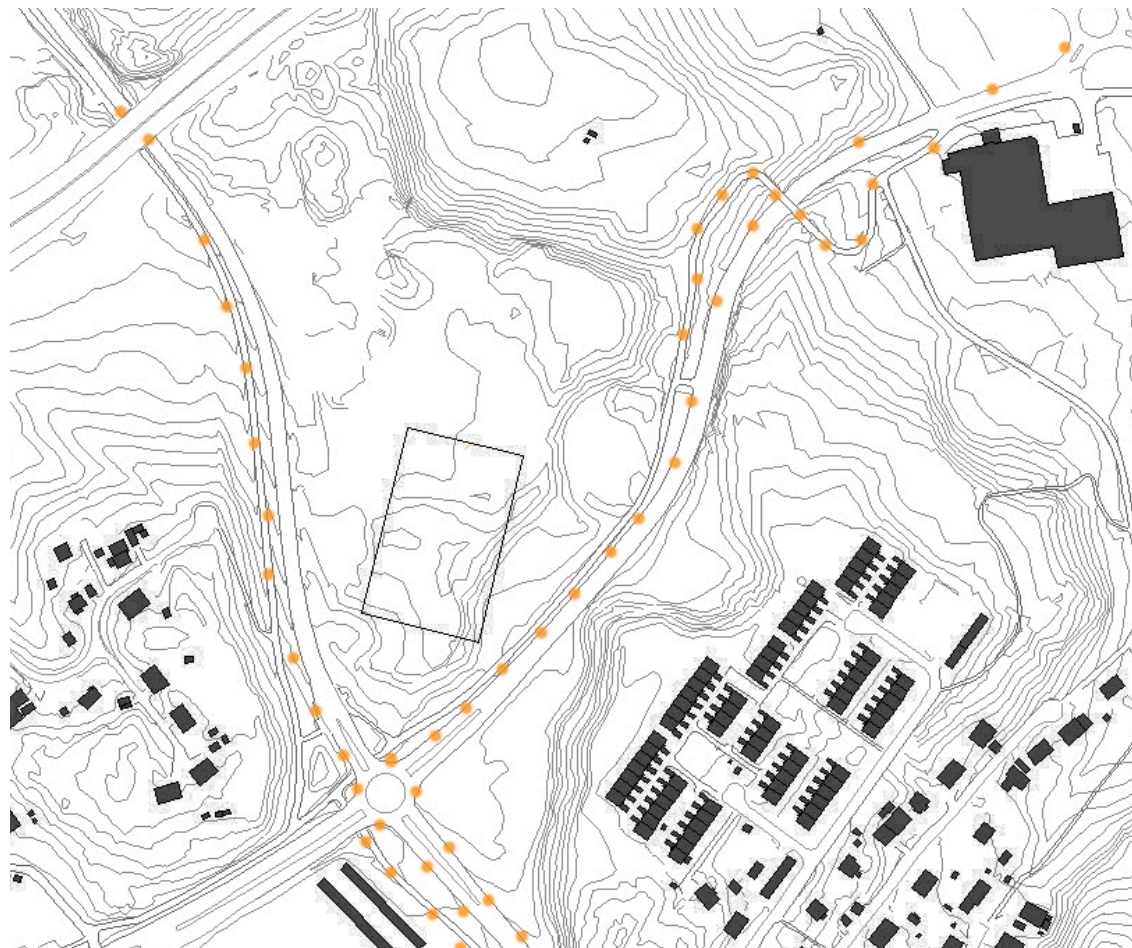
3.7 Accessibility

Hammarkullen, Storås and Angered Centrum are easy to reach by tram. From central Gothenburg the travel takes about 10 to 15 minutes. Within Angered, there are also bus connections, one of which connects Rösered and Angered Centrum, through Rösered Fields.

The roads around Rösered Fields are dimensioned for car traffic. Speed limits are 70 km/h, except for Angeredsleden that have 90 km/h. Pedestrian walkways and car roads are separated by grass barriers and there are very few pavements right next to the roads, which allows cars to take up more space and drive at a higher speed, which in term creates more noise around the fields.

Rösered Fields have no parking lots.

There are street lighting along the walkways. Along Hjällbovägen, pedestrians and bikers share the lighting from the car road.



Lighting near walkways.



Nearby bus- and tram stops, and routes. Yellow and light blue are bus lines, dark blue is the tram line, dotted tram line is under ground.



Car roads, and paths for bicycle and walking. Thick red line is the 90 km/h car road, thin red lines are 70 km/h car road, yellow is bicycle lanes and green is walk ways.

Rösered Fields

3.8 Impressions



Rösered Landfill

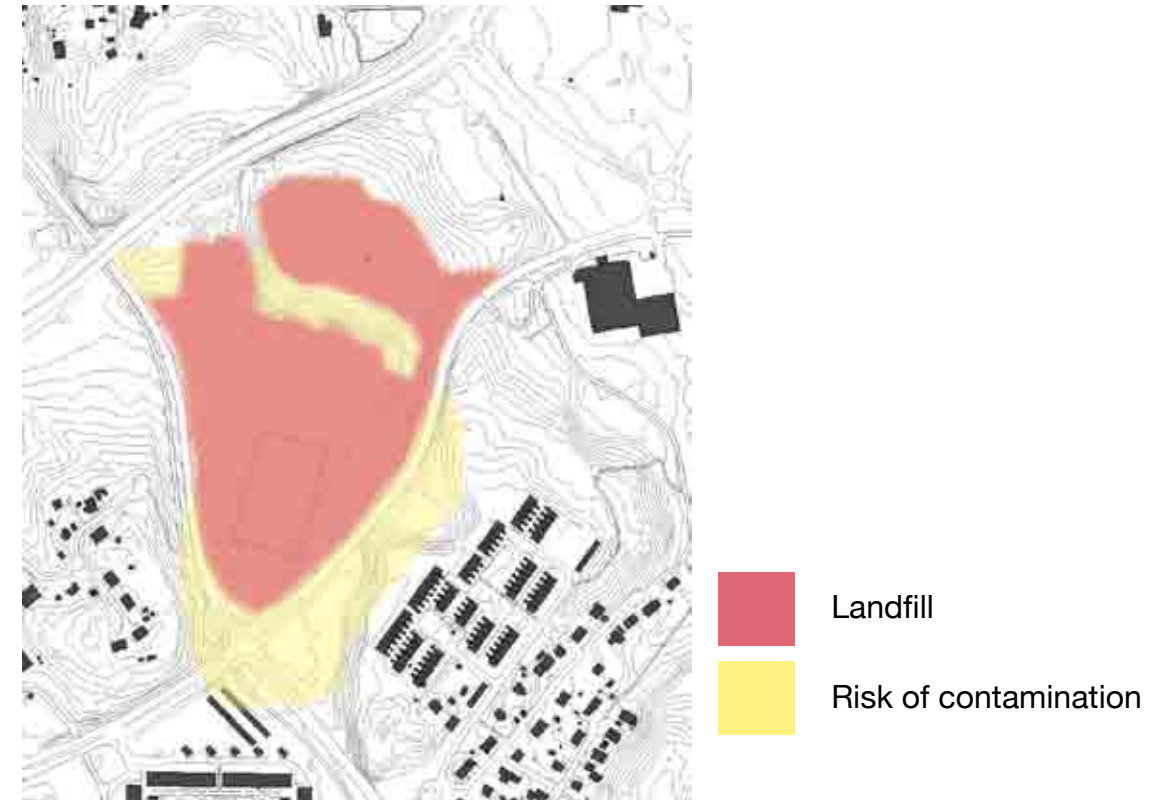
4.1 From gravel pit to landfill

In the beginning of the 20th century, Angered was a rural area and Rösered Fields was exploited as a gravel pit. Gravel was transported from Rösered to different parts of Gothenburg to be used in the city's construction. In 1979, the Rösered gravel pit was closed, and it had at that time already started to serve as a landfill. Initially, unapproved material was deposited but after 1975 the waste was more controlled. Material that was deposited was mainly concrete, brick, soil and broken rock, but also building waste and kitchen appliance (Kretsloppskontoret, 2007). In 1992, the landfill was closed and covered with a layer of permeable soil containing rubble and clay. Grass was sown and a couple of trees were planted on the plot. The bottom of the pit was never sealed (Karlsson, 2005).

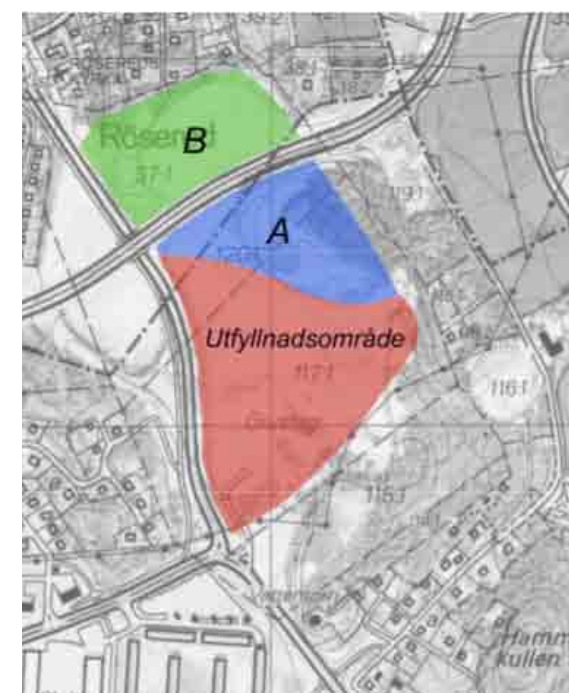
4.2 The landfill today

Some research has been made on Rösered landfill. In 2005, Joakim Karlsson and Kristian Seth from the department of Earth Sciences at Gothenburg University made a master thesis investigation on the conditions of the landfill in order to propose a control programme. The thesis was made in consultation with Kretsloppskontoret. The main conclusions of the thesis was that Rösered landfill is "...a relatively clean landfill with minor hazards or threats towards the surroundings" (Karlsson, 2005, page 105). In 2007, Sweco made another report, assigned by Kretsloppskontoret. The purpose was to investigate the ground water flow around Rösered landfill in order to measure it and decide whether it contains leakage water from the waste deposit (Kretsloppskontoret, 2007). The investigation concludes that the calculated leakage from the deposit is low. However, the effort to take samples of groundwater did not succeed which means that there are no measured result on leakage water.

The information about the sprawl of the landfill is contrarious. All sources agree that the southern part of Rösered Fields is the main waste deposit, and that this is the area that has the highest probability of containing contaminants. According to Karlsson and Seth (2005), the area on the north western side of the highway, Angeredsleden, and the top of the hillside were also used as landfill, but were only covered with soil, rock and clay masses. Fastighetskontoret defines the landfill area according to the upper illustration to the right, and specify a fairly large area to be at risk of contamination. *Risk of contamination* is a way for Fastighetskontoret to brand land areas where the soil has not been tested, but where it is recommended that deeper investigation of the soil and water conditions should be made, before building or other development is being made on the spot.



Rösered landfill and area at risk of contamination according to Fastighetskontoret's definition.



Rösered landfill according to Karlsson and Seth. Coloured areas indicates former gravel pit area. Area A and B were filled with clean soil. The red area, marked "Utfyllnadsområde" shows the site for the waste deposit (Karlsson, 2005).

Rösered Landfill

4.3 Risks and precaution

In the case of Rösered landfill, the greatest threat the landfill constitute is leakage of contaminants to the ground water. It has been assumed that the environmental impact from leakage is little today (Karlsson, 2005). However, depending on what activity that may be planned for at the site, for example farming or gardening, the landfill may be disturbed and leakage of harmful substances increase.

If contaminants are present in the top soil layer of the landfill, or if there is a risk of such substances being released when working the soil, humans may be affected by this. These risks should be taken into account when programming Rösered Fields.

Another problem that is rising on Rösered Fields is lack of management and programming of the area, which has led to that informal junk yards are taking form there. This is contributing to the unwelcoming atmosphere on the site and could confirm people's negative associations with Rösered Fields.



In the northern part of Rösered Fields, in-official junkyards are being formed.



When the landfill was running, it was maintained by Gatukontoret, now Trafikkontoret [Traffic and Public Transport Authority]. This sign, near one of the entrances, has never been removed.

Issues that should be considered regarding the landfill when developing Rösered Fields

- Health risks due to exposure of contaminants from soil should not be neglected
- Soil needs to be tested before any development is initiated on the site
- Depending on the outcome of the testing, appropriate measures to cutting exposure pathways should be taken to safety for people residing on the site
- There is a risk of leakage from the landfill to the ground water
- A planning programme that communicates the potential and importance of the site will help dealing with illegal dumping.

Interlude

5.1 Understanding the project I

- sketching urban farming, the site and the landfill....

In order to better understand the project that I was working with, I sat down one day and tried to sketch it. The purpose was then not to make these very abstract pictures a part of a report but, rather to clear my own head - and so it did. And I also figured that however unlikely to the reader at this point, it may help understanding the proceeding analysis.



Interlude

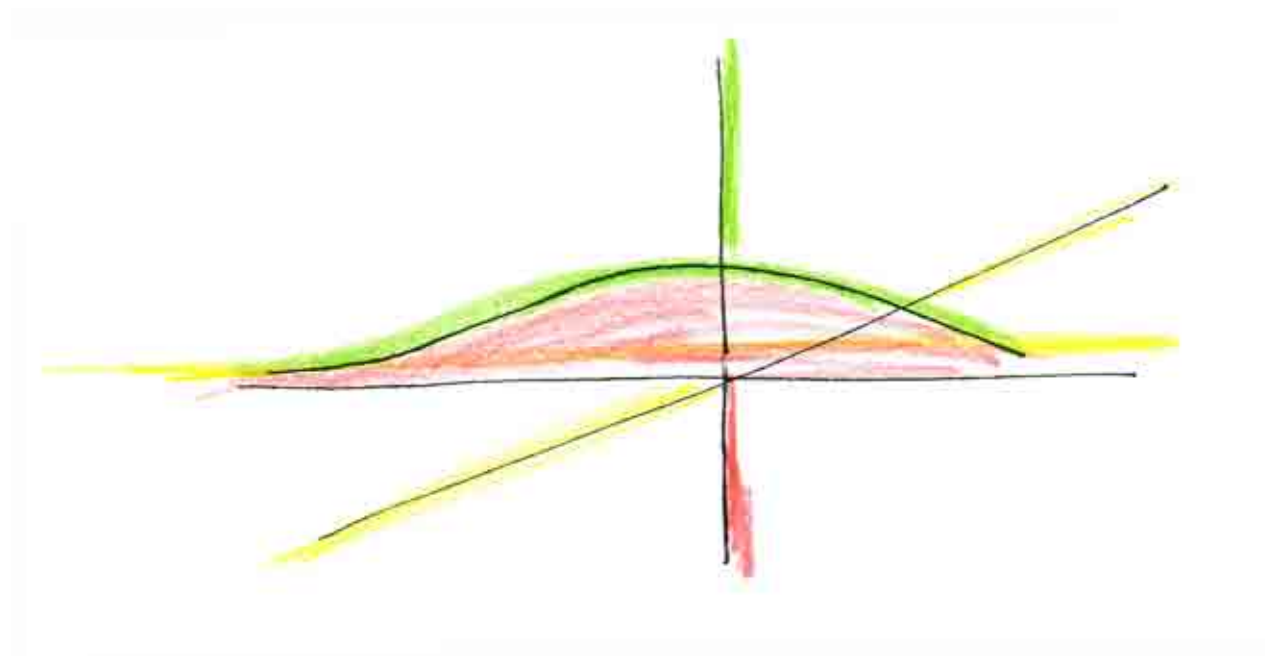
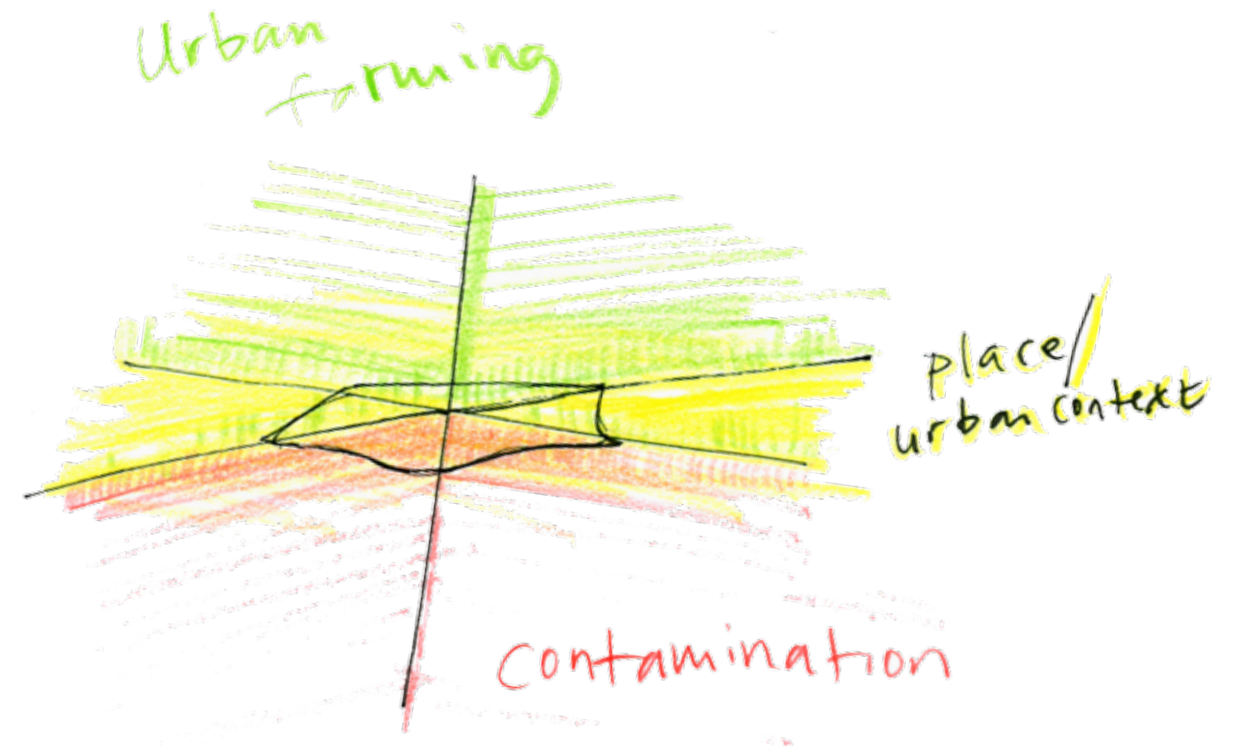
5.2 Understanding the project II

- an image with three dimensions takes form

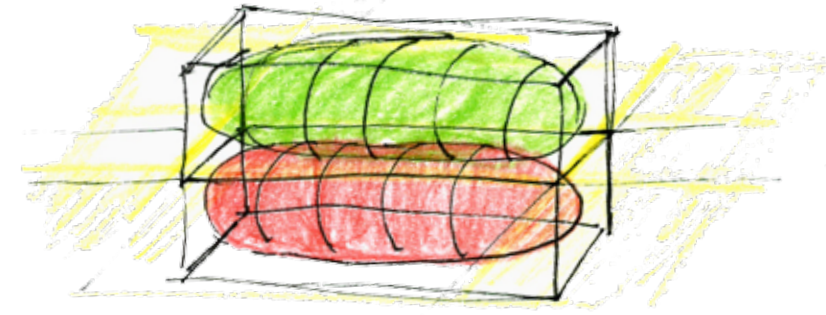
I have been regarding this project as an object with three dimensions. The horizontal plane symbolises a site on earth in its urban context, in this case Rösered Fields. The horizontal plane is part of a larger extremely complicated blanket that covers our planet. The blanket consist of things that we can see or perceive in our environment; forest, cities, buildings, hills, people, bikes and tram stations. The pattern of the blanket never repeats itself, it is always unique in its structure, and needs to be treated as such.

The three-dimensional underlying element, the red bulb, symbolises an undefined threat, in this case a landfill. This undefined element can be perceived through the patterns of the blanket and it affects it. The undefined must be dealt with and taken into account before dealing with the visible effects on the blanket.

The final element, which symbolises a constructed future, is the design that will be applied, in this context urban farming. This is a foreign element which will be applied to the blanket and if successful, merge into it and add value.



Sketch that shows topography in relation to the other three dimensions.



Urban farming and the landfill as bulbs that connect in the horizontal plane, the urban context.

Analysis

6.1 Summary of conclusions of research on urban farming

In order to reach an answer to the question about what farming on Rösered Fields could look like, a list of observations and conclusions from the research on urban farming was made. The “observed factors” are mainly based on experiences from study visits, but some conclusions are also drawn from literature studies. This is knowledge that needs to be brought into the discussion about farming on Rösered Fields

Observed factors that support sustainable urban farming

- Knowledge about agriculture
- Common interest for farming
- Personal commitment
- Accessibility to the site for farming
- Visibility of farming in urban space
- Various forms of organisation of farming
- Taking care of waste and water
- Use of non-toxic pesticides
- Use of non-synthetic fertilisers
- Using recycled material when building constructions related to the farming
- Parallel activities

Observed positive outcomes of urban farming

- Activation of urban space
- Lower cost of maintenance of urban space in relation to achieved quality
- Linking neighbourhoods together
- Socialising
- Employment
- Creativity
- Greater understanding for and increased learning about urban farming among people in the city
- Possibility for children to learn about and participate in farming
- Local food production
- Examples of efficient urban farming

Challenges related to increasing urban farming in Gothenburg

- Request for more space for farming
- Farming on contaminated soil
- Taking care of and distribute produced crops
- Cultural conflicts
- More knowledge about urban farming is needed among all actors in the city: municipality, urban planners, architects, developers, urban farmers, citizens

6.2 Why is Rösered Fields a good place for urban farming?

To understand why Rösered Fields could be an appropriate site for farming, conclusions from the site analysis were compared in a SWOT diagram. The SWOT-analysis regards strengths, weaknesses, opportunities and threats to successful urban farming on Rösered Fields. In this analysis, some of the conclusions from the study of Rösered landfill were also considered in the SWOT.

The SWOT diagram makes it easier to overlook the possibilities for farming on Rösered Fields. In order to achieve sustainable farming activity, threats and weaknesses on the site must be dealt with in the design. At the same time opportunities and strengths should be brought forward.

Analysis

	Helpful to achieving the objective	Harmful to achieving the objective
Internal origin (attributes of the site)	Strengths <ul style="list-style-type: none">• The southern fields are sunny and protected on the northern side by the hill• Beautiful, varying landscape• Viewpoints• Visual contact with housing area, creates a bond between Rösered Fields and surrounding areas• Central position in Angered city district	Weaknesses <ul style="list-style-type: none">• Too many barriers• Lack of entrances• Disturbing noise from motor traffic• Lack of lighting in the area• Lack of parking and entrance for motor vehicles• Inaccessibility due to moist ground• Contaminants in the soil• Difficulties to develop permanent activities on the site due to regulations from Kretsloppskontoret
External origin (attributes of the surrounding environment)	Opportunities <ul style="list-style-type: none">• Rösered Fields have the potential of forming a connecting link between different suburb areas and becoming a meeting place for people living in the neighbourhood.• This area is “no mans land“ and therefore it has the possibility of becoming a neutral urban place on which people from different parts of Angered can meet on equal conditions.• Urban farming in Rösered Fields could be strengthened through connections to already existing urban farming, nature areas and parks.	Threats <ul style="list-style-type: none">• Cultural conflicts• Lack knowledge about urban farming among all actors in the city: municipality, urban planners, architects, developers, urban farmers, citizens• The area may be perceived as unpleasant because of fear of contaminants from the landfill

The SWOT diagram, with the objective of reaching successful urban farming on Rösered Fields.

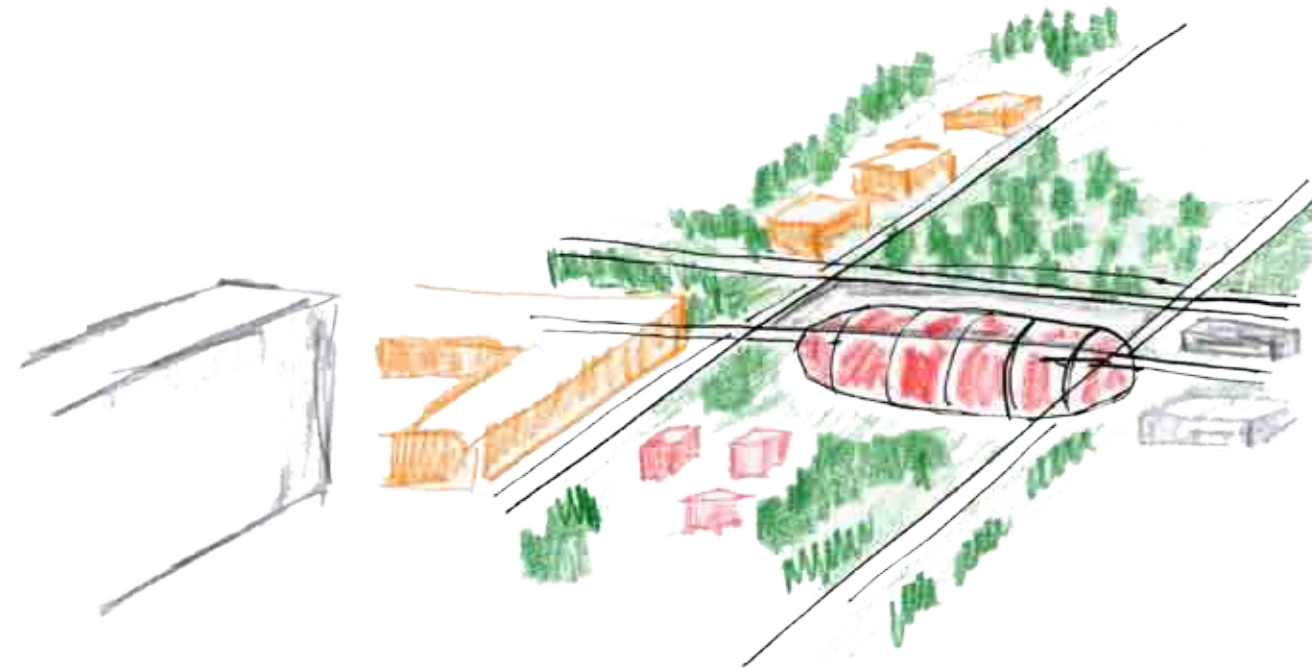
Analysis

6.3 Spatial analysis of the site

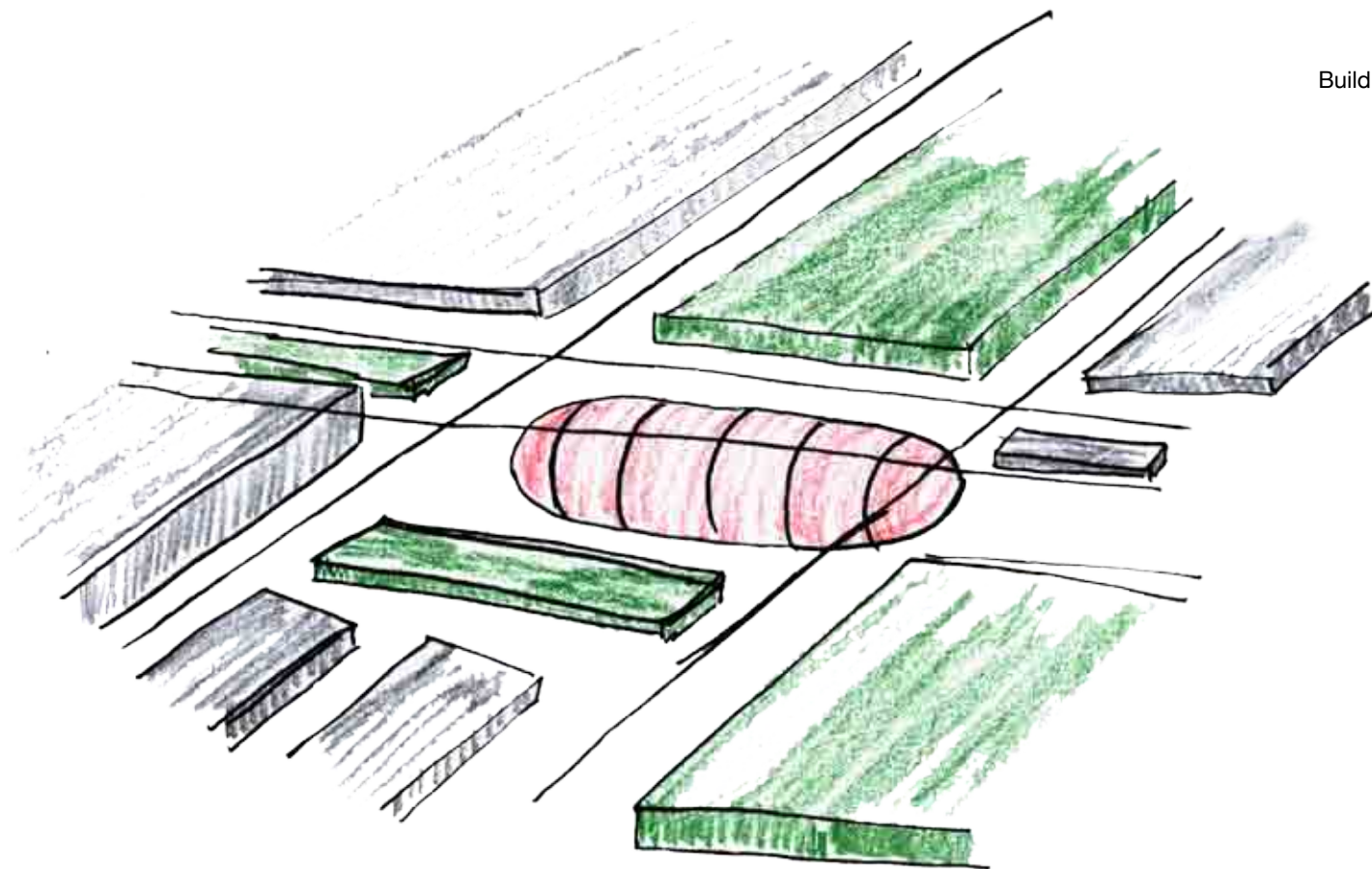
These pictures show Rösered Fields, its surroundings and the landfill in very schematic way. The pictures illustrate the lack of connection and human scale that characterise this place.

The emptiness of the area above the landfill is evident.

The site Rösered Fields was not chosen as a suitable place for urban farming because of lack of urban space for farming in Gothenburg or because of lack of clean soil in the city. It was chosen because it is a site that needs to be taken care of and be involved in the urban context of Angered.



Buildings and forest around Rösered Field in a very simple sketch. The red bulb symbolises the landfill.



Grey and green blocks illustrate housing areas and forest/green areas respectively. The red bulb symbolises the landfill.

Problems that the design needs to address

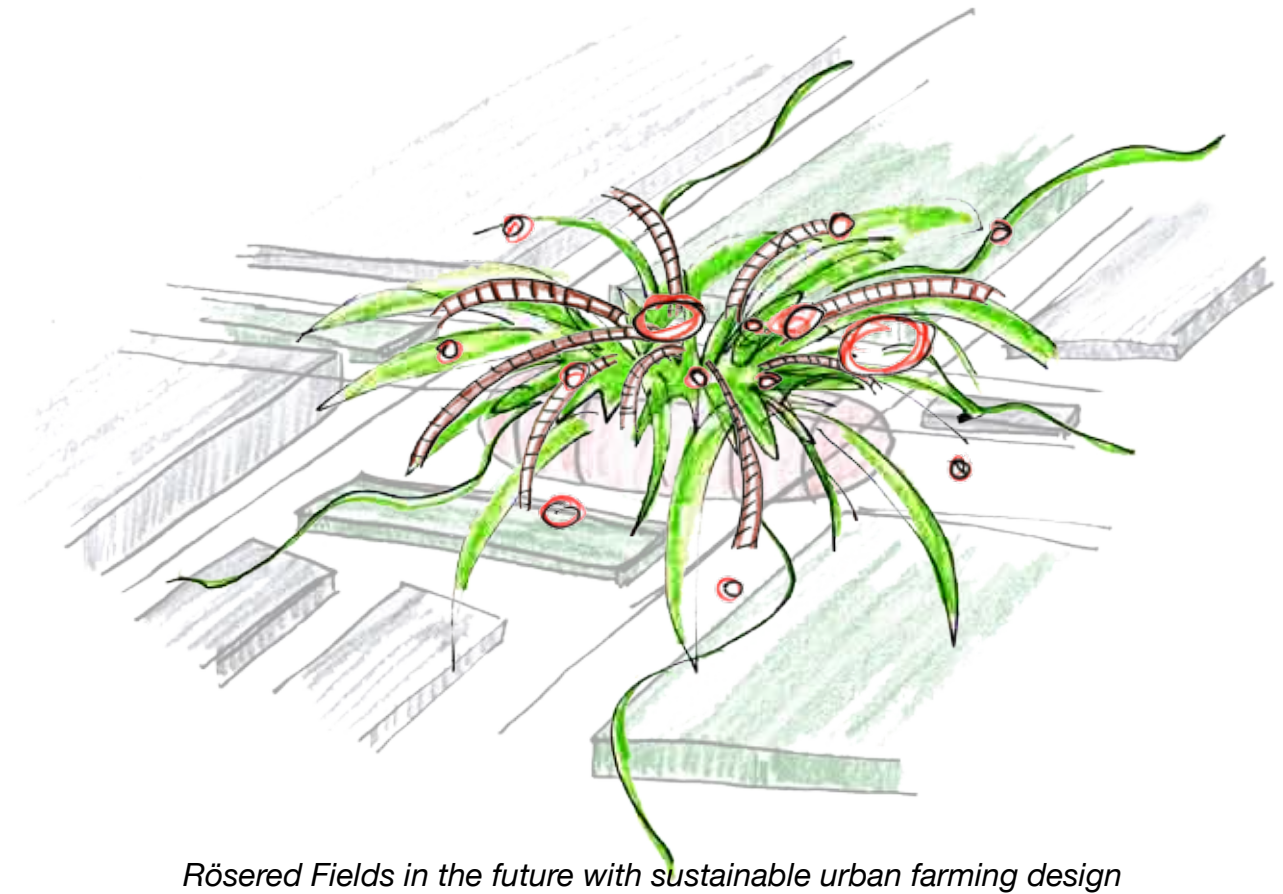
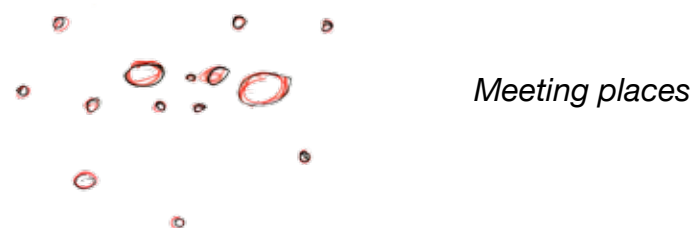
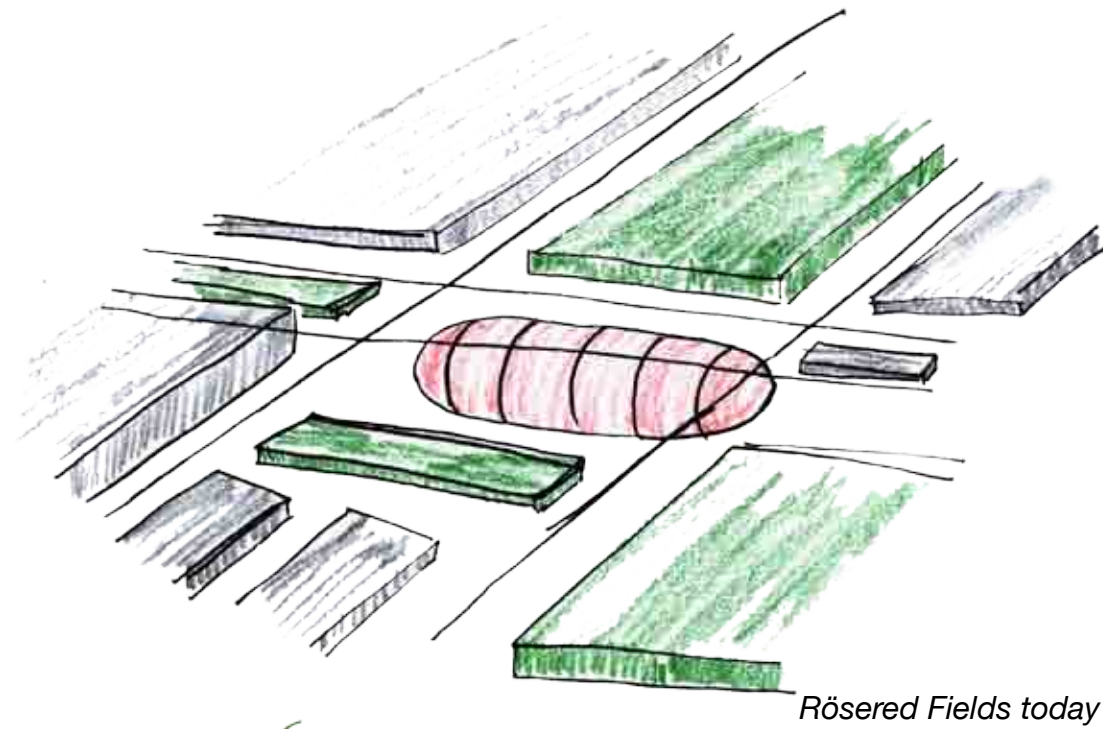
Lack of connection

Confusion about semi planned space

Lack of human scale

Analysis

6.4 How the design should affect the site



Analysis

6.5 Protective “layer” between humans and landfill

To be able to implement urban farming on the site, risks related to the landfill must be taken into consideration.

In order to eliminate risk of contamination for humans, a protective “layer” must be included in the design. Depending on the risks and on other specific features on the site, this layer could differ in appearance. It is important that the layer is long-lasting so that future generations will also be aware of the landfill and its complications.

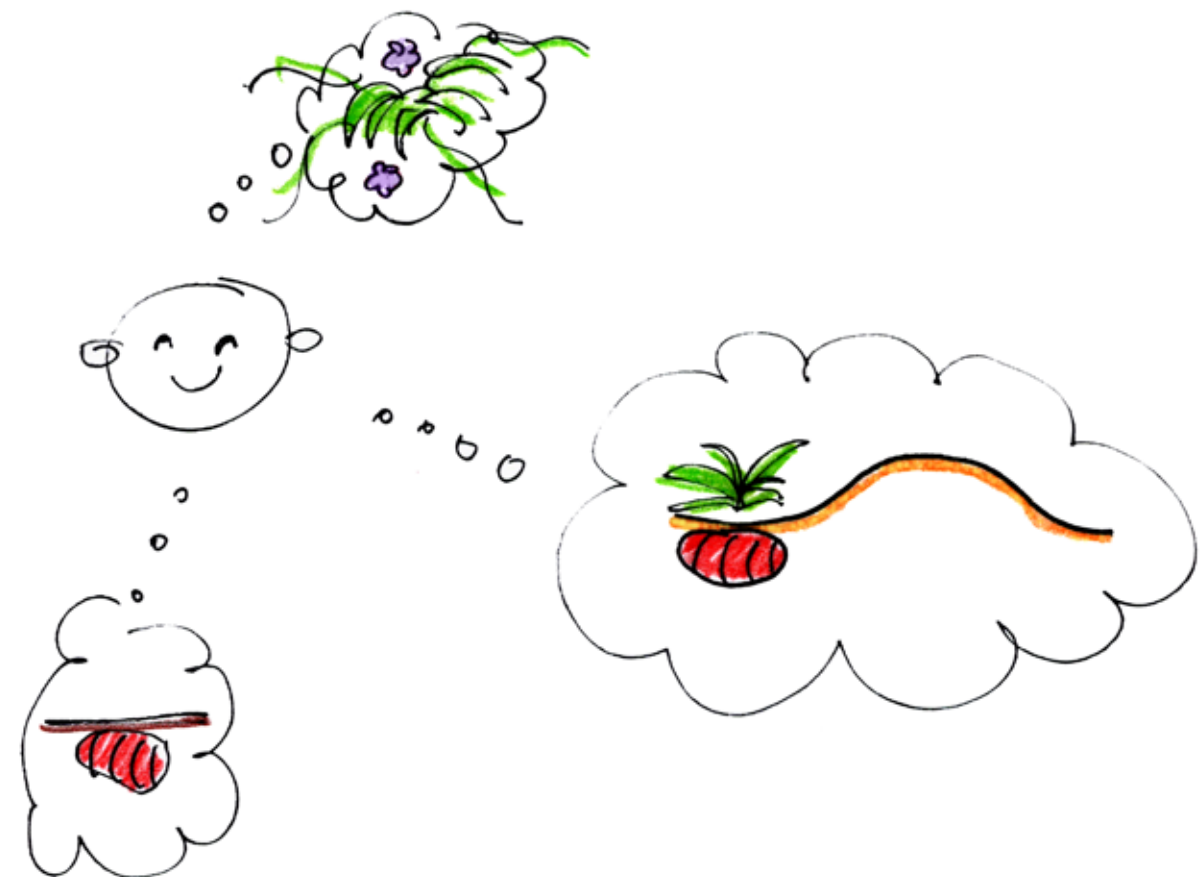
The layer can be a physical barrier such as a thick layer of clay or it can be the knowledge about which plants are safe to grow or in which part of the field you are allowed to dig in the soil.



The orange “layer” that protects humans from being affected negatively by the landfill. This layer could be both physical and mental.

6.6 Citizen's understanding/perception of Rösered Fields

For farming to succeed on a site such as Rösered Fields, it is of crucial importance how the place is regarded among citizens. To achieve a creative and safe environment, the farmer needs to be aware of the risks and possibilities related to the landfill. For example, farmers need to know where, and how deep, it is safe to dig and what plants are appropriate for planting.



In order for Rösered Fields to be a blossoming area, people must be aware of the landfill and what you are allowed/what is safe to do above it. Knowledge and feeling of security will inspire to creativity in farming.

Design Programme

7.1 Requirements for sustainable urban farming on Rösered fields

In this design programme, prerequisites for sustainable farming on Rösered Fields are listed. Some of the requirements and goals are illustrated with the intention of inspiring further development on the Fields.

All the factors below must be considered for the establishment of long-term, sustainable urban farming on Rösered Fields.

Accessibility

Increased accessibility to Rösered fields by foot, bike, car and public transport.
Increased accessibility through Rösered fields by foot, bike, car and public transport.

Social factors and safety

Prepare for safe farming and other activities by good foundation of the ground.
Increase safety and feeling of safety in, and around Rösered fields...
...for people moving near Rösered fields during day and night, all year around.
...for people attending activities on Rösered fields during day and night, all year around.
Eliminate exposure pathways related to the landfill, through soil and air.
Minimise exposure of pollution from motor traffic on farming.

Functions (farming and other activities)

Create a neutral and inspiring name for Rösered fields.
Create meeting places within Rösered fields.
Involve citizens in Gothenburg and especially in Angered in the design.
Clear rules and/or guidelines for ...
...how to behave when farming on the landfill.
...organisation of farming and other activities.

Many different types of activities that will attract different people:

Farming
Park
Walking
Flowers
Sports
Playgrounds
Sunbathing
Socialising

Ecological methods for farming.

Encourage users to recycle material.
Encourage small recycling systems.
Encourage use of ecological and non harmful products in farming.
Encourage spontaneous farming and organisation of farming.
Take care of harvest for distribution in the local community.
Take care of, reuse and reduce waste water and sewage.
Organise farming and other activities in a way that the area is easily maintained.
High degree of self maintenance.
Farming and activities should be well rooted among citizens.
Farming and other activities should preserve, adjust to and make use of today's natural and spatial values on Rösered fields.

Neighbourhood

Connect areas around Rösered fields through Rösered fields.
Connect and relate activities to other functions in Angered and Gothenburg:
Angered city park
Lärjeån's gardens
Rösered allotment gardens
Blå Stället

Accessible and clear information about rules and guidelines on Rösered fields.

Written signs by the entrances
Information in schools and pre-schools
Internet
Phone applications

Design Programme

7.2 Safe farming with proper foundation

Protective layers

The area where people will be farming and digging in the soil must be separated from the present soil, if this is found to contain harmful substances. If no contaminants are found in the top soil, it is still advantageous to seal the former waste deposit area to protect it and to prevent leakage through the landfill to ground water.

It is recommended that this seal consists of a layer of clay thicker than 3 meters. The area should also be covered with a layer of orange textile to mark the position of the landfill for people digging in the soil today and in the future. Also the orange textile should hinder people from digging through, and breaking, the sealing layer of clay. The top layer should consist of 50 cm of top soil. For safe farming and activities, all the clay and soil that is put on the area should be clean.

It is important that the border between sealed ground and not sealed ground on Rösered Fields is marked, to prevent people from digging or farming outside prepared areas. A way of doing this could be to mark the border in some way. For example with water or plants, or with a low fence.



Example of borders that indicate where it is safe to farm and where it is not.

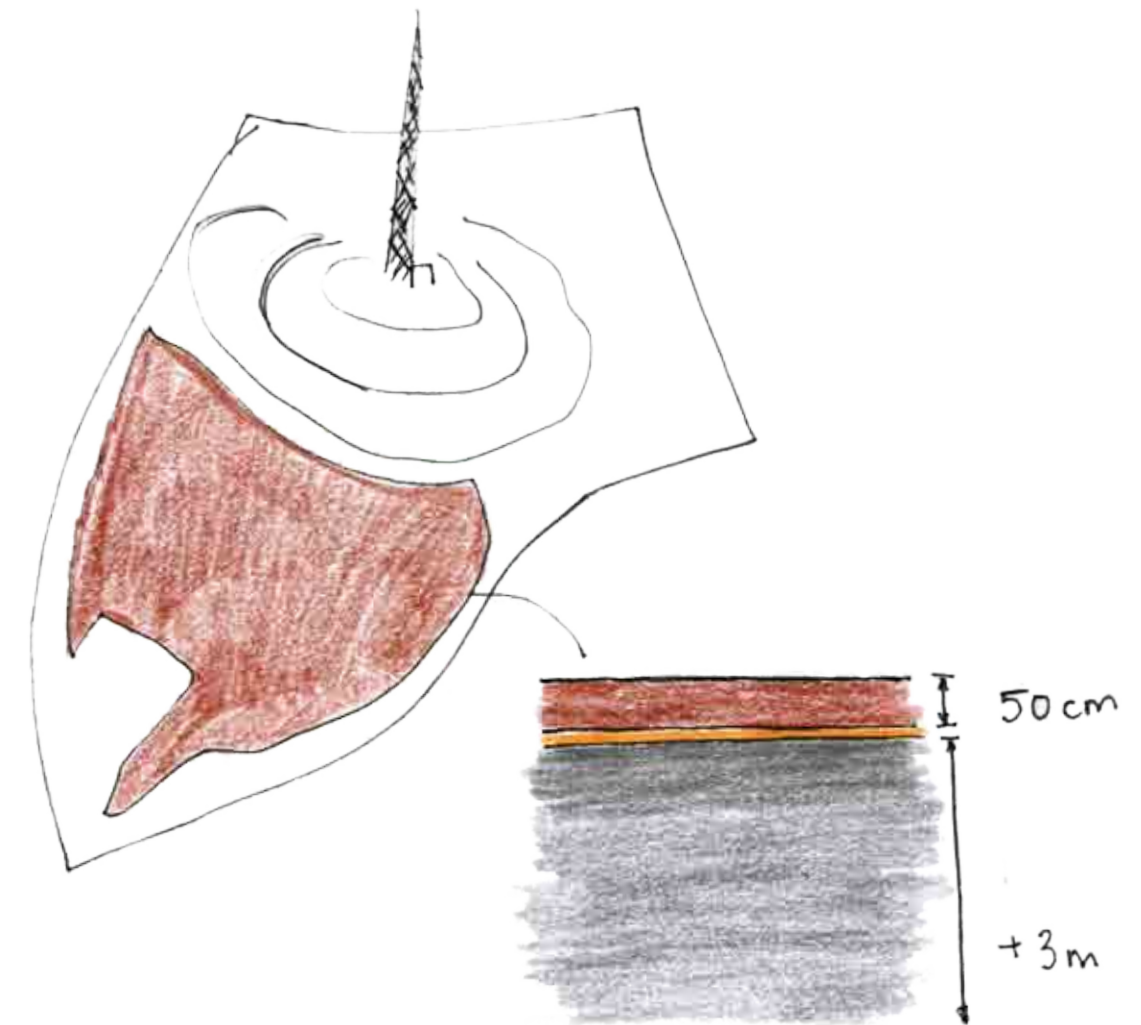
Information about Rösered Fields

To strengthen people's awareness about the conditions for farming on Rösered Fields, there should be a web-page about the site, containing information about recent activities, information about the landfill and the protective layers and possibility for communication between farmers and other actors on the fields.

There should also be a smart-phone application containing the same information and possibilities for communication directly on the Fields.



Smart-phone applications and web-page should be part of the design.

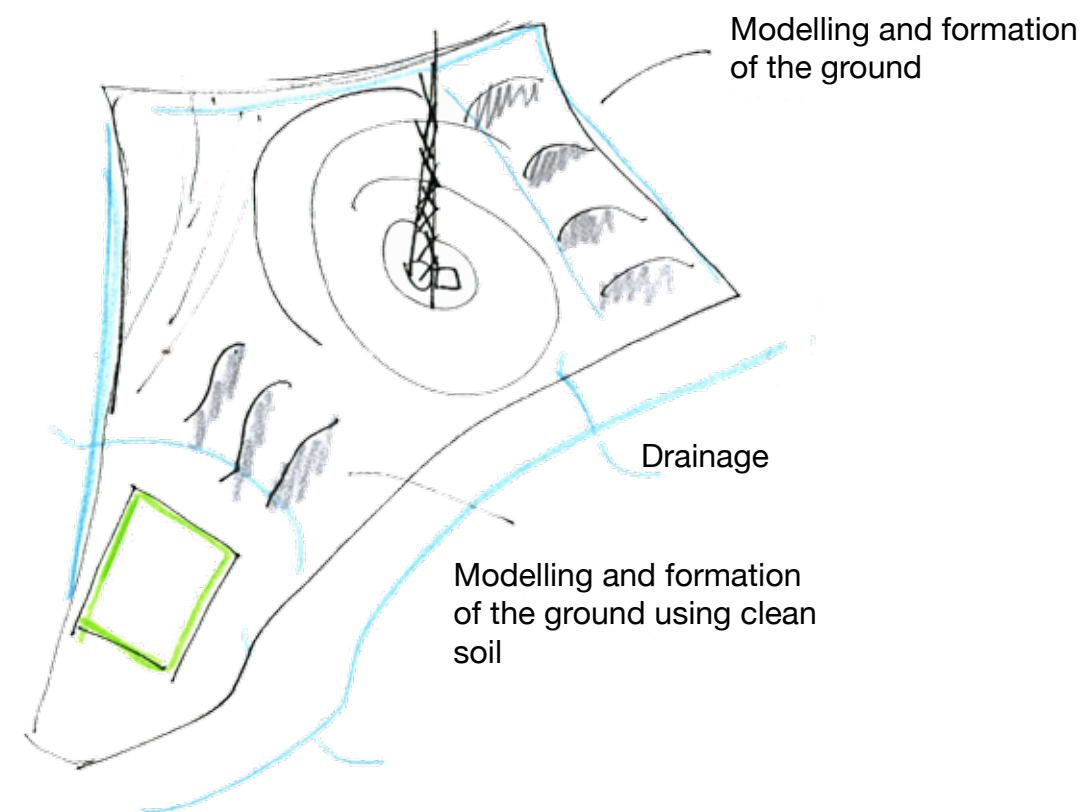


Parts of the landfill that may hold contaminants in the soil and that are intended for farming.
brown = addition of clean top soil
orange = geotextile layer that indicates the position of the landfill
gray = clay

Design Programme

7.3 Foundation and drainage

To give some of the fields a more interesting character, and to adjust the landscape for drainage, the ground should be modelled with clay and soil. It is important to take good care of the rain water on Rösered Fields since the ground easily gets moist here. Water will be needed for irrigation for the farming and the gardens and should be taken care of for that purpose.



Suggestions for modelling and formation of the ground and drainage on Rösered Fields.

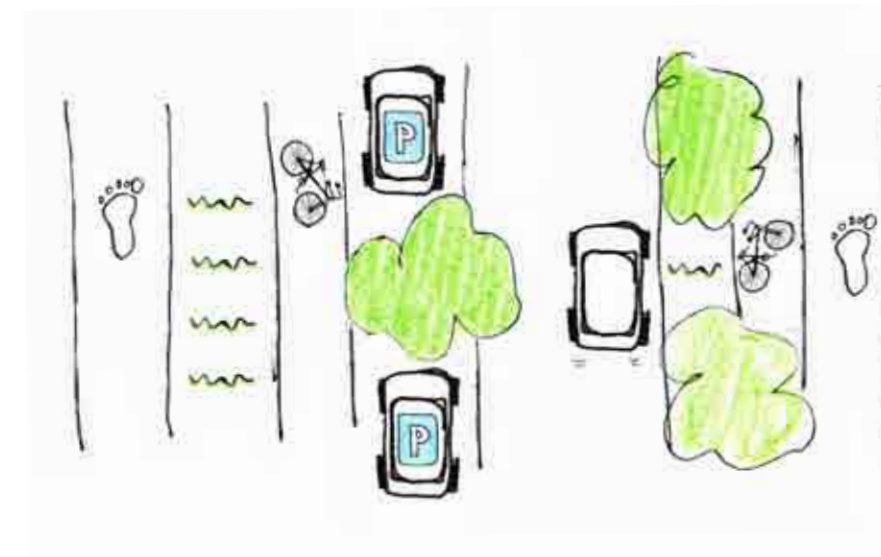
7.4 Access to Rösered Fields

For any interconnecting urban development to succeed on Rösered Fields, the site needs to be accessible. Rösered Fields should be accessible by foot, bike, bus and car. Walkers and bikers should be prioritised when it comes to accessibility. The site must also be reachable by car. There should be parking lots with the possibility for loading and discharging goods and tools that will be needed for the farming.

The speed-limits for Hjällbovägen and Grusåsvägen, should be lowered from 70 km/h to 50 km/h. It is necessary to adjust these two roads in order for Rösered Fields to become a living place, these measures will also affect the area around the southern roundabout in a positive way.



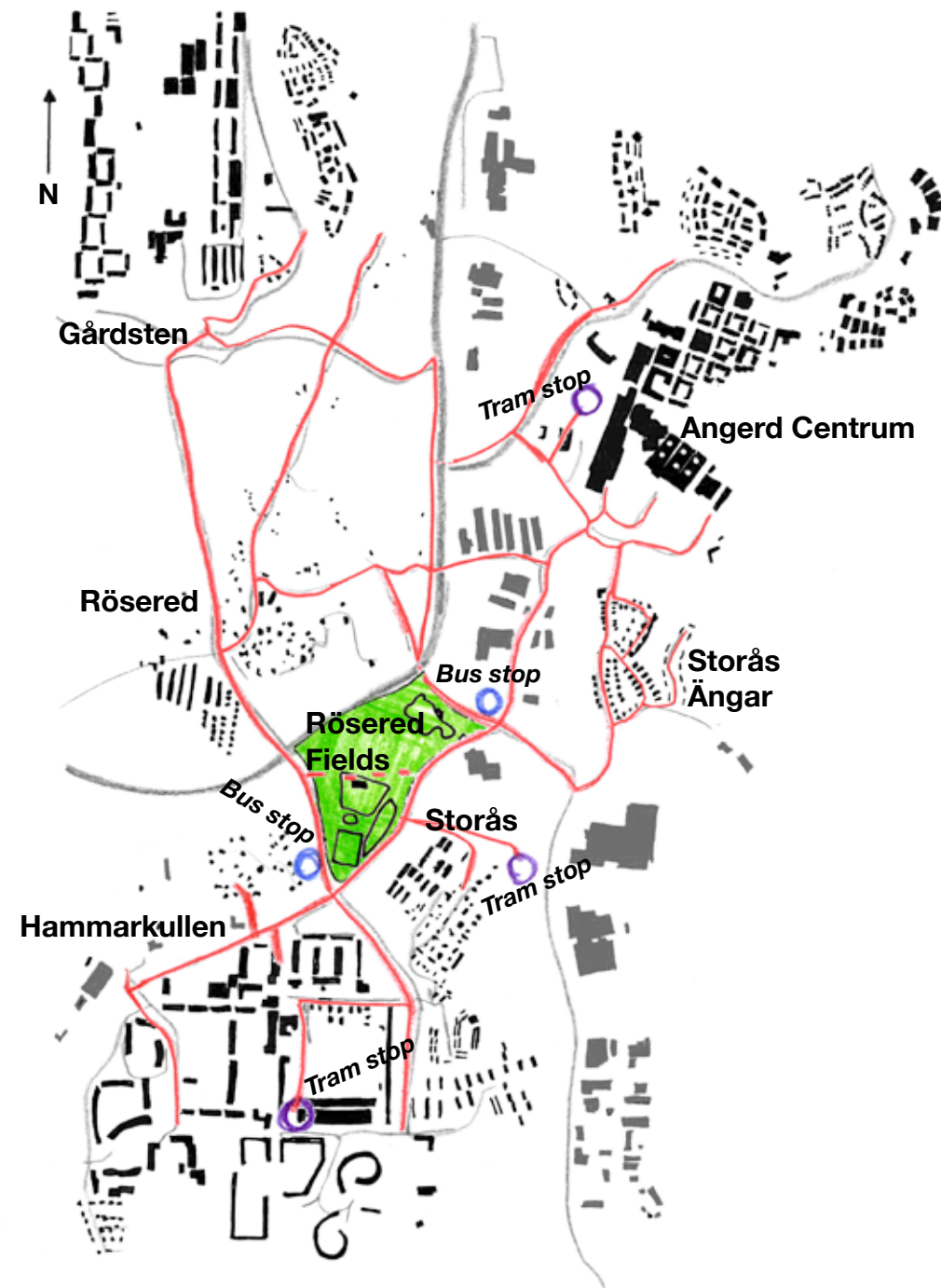
Section of safe and welcoming road suitable for Hjällbovägen. Bikers lane elevated from the pedestrian level. A narrow road, framed with greenery gives a more attractive and varied landscape and keeps drivers alert.



The same road seen from above. Parking lots alongside the road are mixed with tree plantations.

Design Programme

It is of great importance that the activities on Rösered Fields are easy to reach by bike and foot. Existing roads between residential areas and places for other activity, should be supplemented with pedestrian paths and bicycle lanes. Examples of important nodes to connect to are stations for public transport, Blå Stället cultural centre in Angered, Rösered allotments and Lärjeån's gardens. Also shopping areas in Angerd Centrum and Hammarkullen should be easy to reach.



Possibilities of reaching Rösered Fields from the surrounding residential areas and from central Gothenburg. Red lines = suggested walking and biking lanes that should either be strengthened or developed, blue/purple circles = important nodes for connection with public transport, that should be easy to reach on foot.

Rösered Fields should be one of many places in Angered that relate to farming, cultural happenings and socialising. There should be many common venues between activities on these sites.



Some nodes and activities that connect to Rösered Fields.

Design Programme

7.5 Overview of Rösered Fields' Farming Market and attached activities

This proposal is about enhancing local creativity and knowledge, making locally produced food available to inhabitants in Angered and Gothenburg at a reasonable cost and opening up for employment. The purpose is to awaken this part of Angered and make it a safe place where people are and pass by, and a place that interconnects many areas. The proposal is also about exchange, learning and meeting through farming, bringing up opportunities to find extra household income and bringing forward farming and farmers in urban space.



Suggestions for activities on Rösered Fields including a farming market, area for farming of crops and plants, a common garden, extended walking paths and bicycle lanes, a moped racing course, a view point and a water play ground.

Design Programme

7.6 Functions

Having many different functions and activities around the farming market is important in order to make this area a place for everyone. The activities and the organisation of activities do not have to relate, the idea is to make Rösered Fields attractive to people of different age groups and background. The functions should be placed so that they strengthen each other without disturbing any activity.

The moped racing course for example is placed on the north side of the hill, so that it will not disturb the farming. In this location, sound and dust from the racing will not be of disturbance to any housing areas or parks, since the area is facing the car road and industrial area.

In the southern part of the area, the football field will be kept. The water playground will be interconnecting the farming area, the market, the common garden and the football field. The idea is that the playground should be visible from the other functions in the area, and that this is a place for children to play in while the parents, and other adults are occupied in the surrounding activities. The water playground can be involved in a system for taking care of the water on Rösered Fields. Because of the landfill, pipe lines that supply water to the area must be placed in the surface soil and arranged in a way that they can easily be demolished.

The commonly maintained garden will be for public use. The idea is that anyone should be able to work in it or just relax in this garden under the premises that it is a common public space. It is important to consider what plants can be grown here. For example trees with deep roots may disturb the landfill cover. Information about this should be mediated to the public in a way that everyone that visit the site can understand it.

Already existing walk paths should be kept and emphasised, also new pathways should be designed to make it easy to move between different functions and for people to be able to enjoy the area by walking.

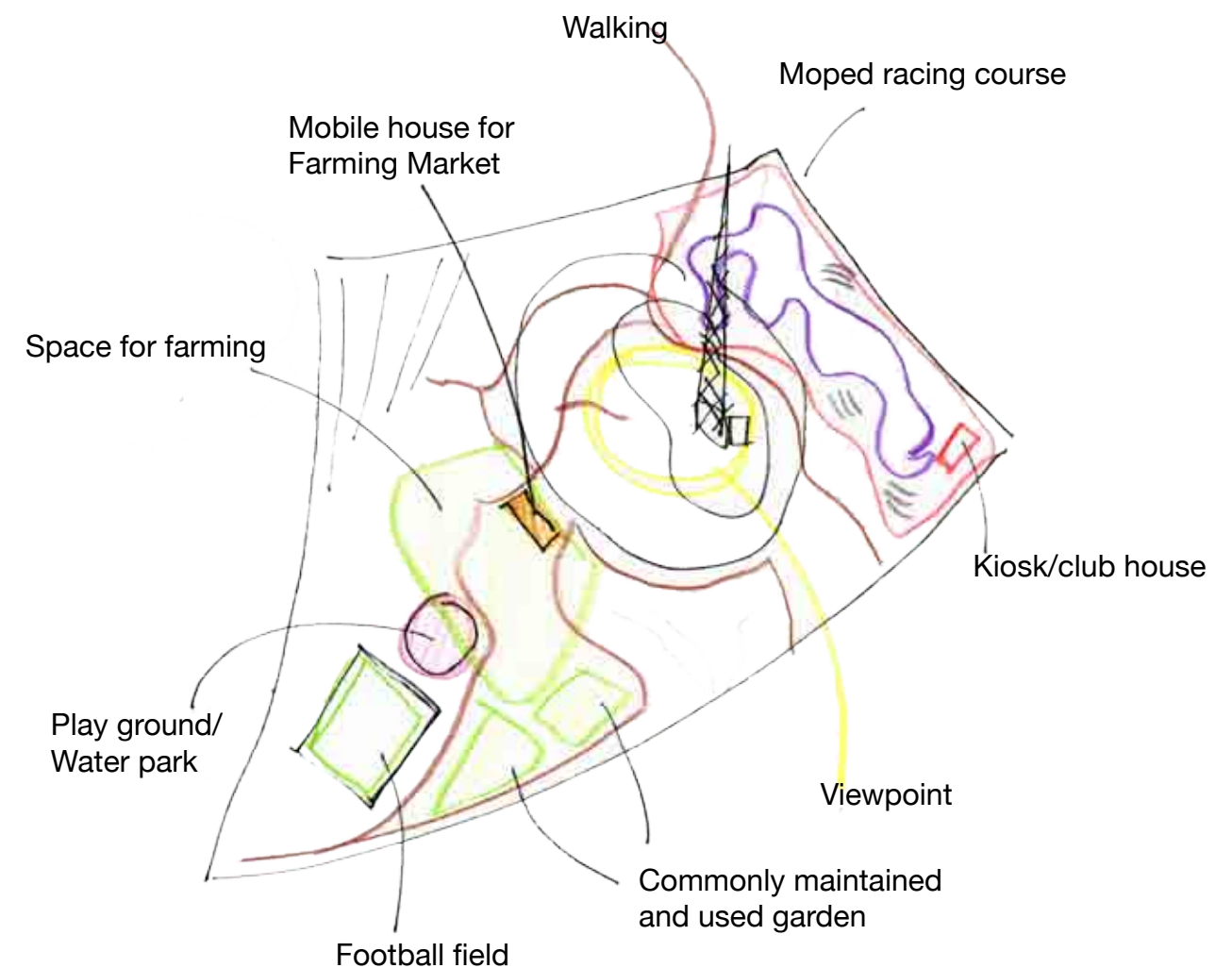
The view point on top of the hill should be prepared with benches and tables. This area could also be suitable for farming or gardening and should be prepared to be used for such activities if there is a request for it.



Inspiring water play ground Flamingokvintetten in Kålltorp, designed by Per Agelii (Photo: Per Agelii)



Inspiration to racing course, from Mudchute Farm



Design Programme

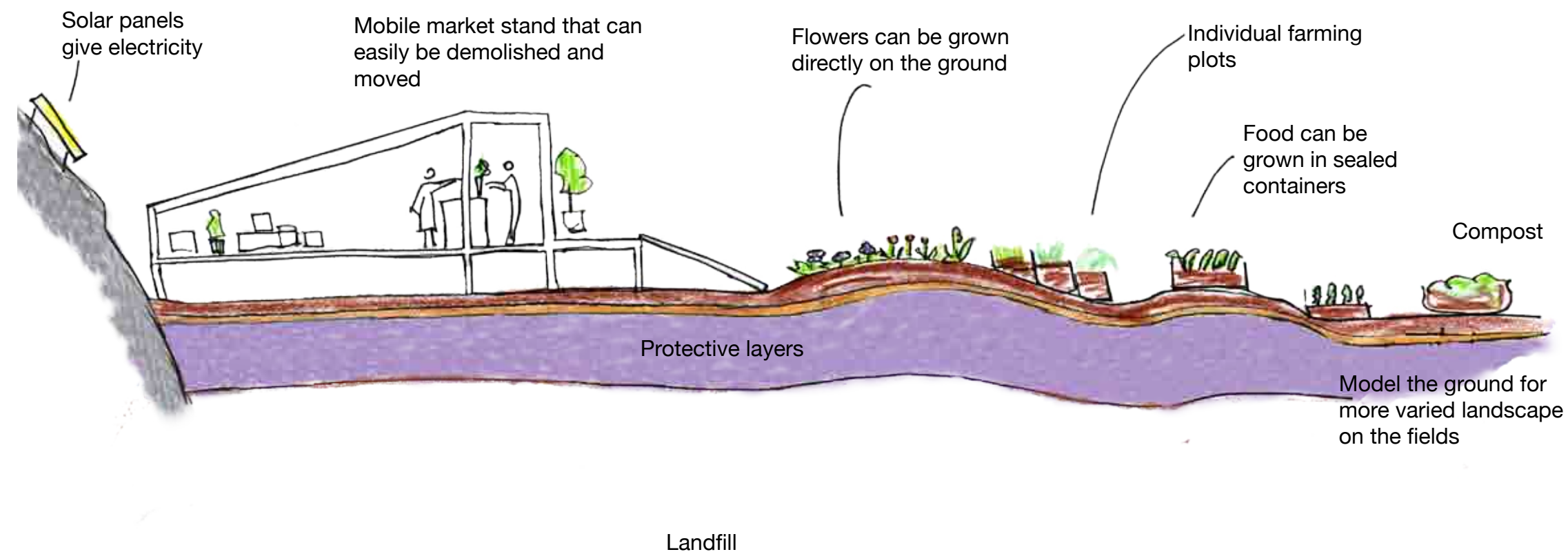
7.7 A local resilient food production and distributional system

The farming market should be easy to demolish and reconstruct on another site, should the landfill become more sensitive to human activity in the future or need to be rearranged for other reasons.

The market and farming area should be self-sufficient when it comes to energy as well as waste and water management. Toxic pesticides or synthetic fertilisers should not be allowed. The farming market and the farmers on Rösered Fields should interact and share the managing of compost, waste water system and irrigation system.

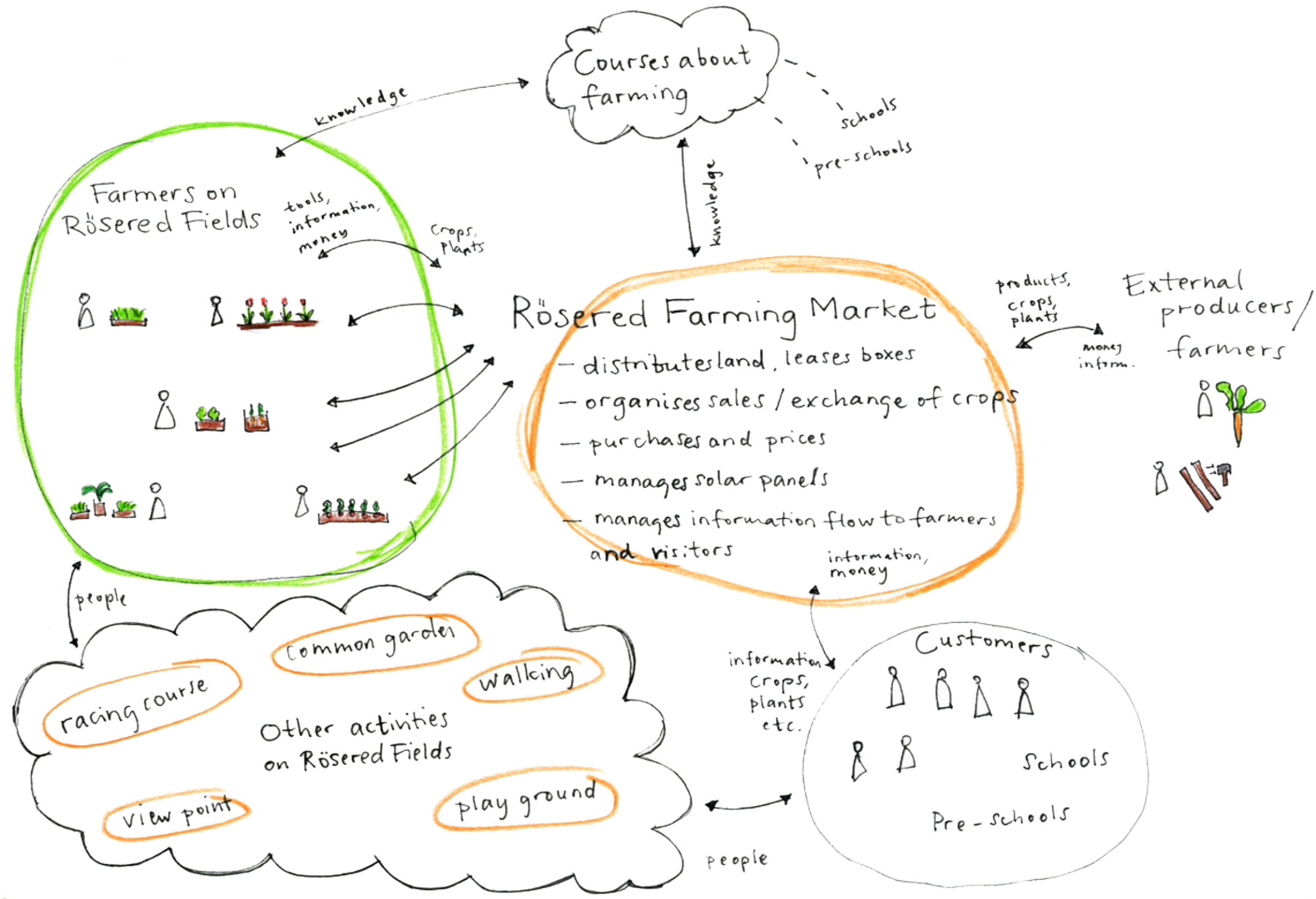
The ground will be prepared so that no harmful substances will reach people on Rösered Fields. In order to increase feeling of security for farmers and customers, edible crops should be grown in sealed containers. This will give the area a certain character and contribute to a tradition on the site, that will help reminding future farmers of the landfill underneath.

The farming market should foremost attract farmers and customers from Angered. The farming market should be easy to reach by foot, bike and by bus.



Rösered Fields' Farming Market with mobile market stand and farming area. Protective layers makes it possible for people to spend time on the Fields without risk of exposure from contaminated soil.

Design Programme



The farming market system in relation to other functions on Röserved Fields.

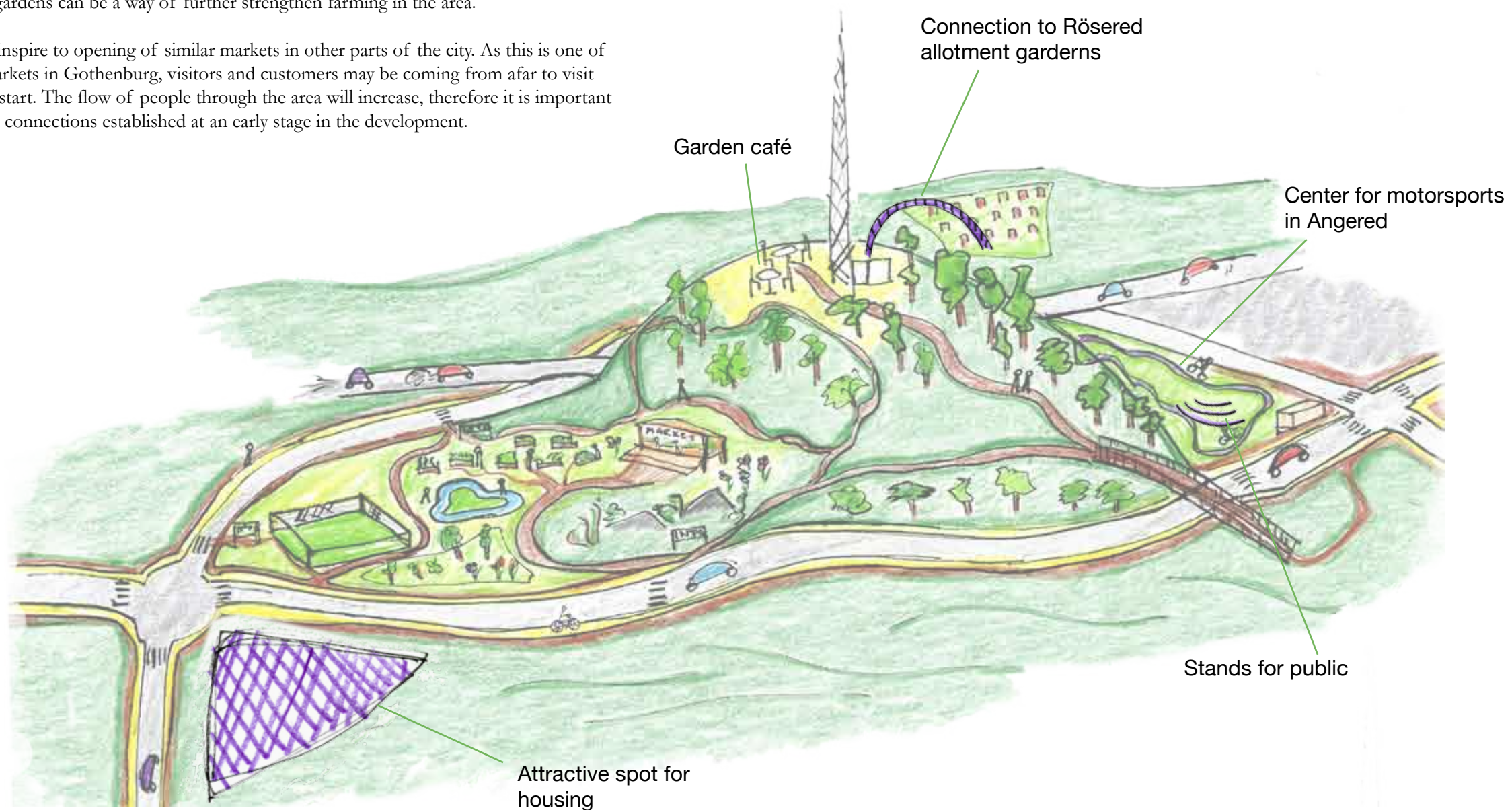
Design Programme

7.8 Future development on Rösered Fields

Rösered Fields should become a natural part of Angered, a place where people go, refer to, spend summer evenings in and bring their friends to.

As the Farming market and other activities become a natural part in the Angered context, opportunities for opening cafés and kiosks in the area will increase. Empty lots near the field will be attractive spots for continued urban development and housing. The moped racing course could be the first step towards developing motorsports in Angered. Connections and co-operations with Rösered allotment gardens can be a way of further strengthen farming in the area.

The intention is to inspire to opening of similar markets in other parts of the city. As this is one of the first farming markets in Gothenburg, visitors and customers may be coming from afar to visit Rösered Fields at a start. The flow of people through the area will increase, therefore it is important to have the physical connections established at an early stage in the development.



Some ideas and examples of what a the future development may look like on Rösered Fields.

Conclusion

Farming has a crucial role to play in the urban landscape of the sustainable city. It is important that cities prepare for a future scenario when the request for farming land in the city will rise dramatically due to consequences of climate change and peak oil.

Urban farming contribute to a varied and vivid urban landscape. Urban farming can function as a binder or glue between people, and groups of people in the city, and between different physical elements in the city, such as housing districts. Urban farming is beneficial when it comes to health, it contributes to increased employment and greater understanding for farming and nature.

Urban farming can, and should be implemented in cities in many different ways to achieve a sustainable society. A diversity in organisation of urban farming can attract many different people and the organisation can be supported by their wishes and the knowledge about agriculture. Small scale farming and tight food and waste cycles contribute to building a more resilient city. “Rich“ and “poor“ countries can learn from each other when it comes to sustainable farming, for example in terms of use of resources and use of pesticides.

Increasing urban farming result in a greater request for space and farmland in the city therefore it is important to consider the possibilities for farming on contaminated sites such as landfills.

Answers to the five question presented in chapter 1.2.

1. Urban farming can be implemented on a landfill

-*if* it can be guaranteed that the landfill content do not affect the quality of the soil on the site and the soil is not hazardous for humans to be in contact with.
-*or if* current exposure pathways such as inhalation of dust, intake of soil and dermal uptake of contaminants in the soil are cut. Depending on the level of contamination and the danger of exposure from a specific contaminant, different measures can be made to hinder exposure. For example, the landfill can be covered and sealed with a layer of clay and/or a layer of geotextile that indicates where the contamination is and that marks the border between safe and not safe soil. Safety for future generations should be considered, for example information about risks associated with the landfill, should be passed on to future users of the site.

2. Urban farming that includes food production that is safe for humans to eat, is possible if the measures for guaranteeing safe farming on the site are taken, and also exposure pathways for contaminants through crops are eliminated.

3. Rösered Field is an appropriate spot for farming because of its position in Angered and its possibilities to work as an interconnecting place between different residential areas. Urban farming on Rösered Fields can strengthen other urban farming activity in the area and thereby contribute to increased local resilience.

4- Urban farming can be implemented on Rösered Fields

-*if* the soil is tested and proven harmless *or if* possible exposure pathways are cut,
-*if* the site is made more accessible through bicycle paths, walkways and car parking
-*if* a positive dialogue is initiated around the site that involves the public and that informs about the conditions for farming on Rösered Fields.

5. The design programme for Rösered Fields is *one* example of what sustainable urban farming on a landfill can look like.

Discussion

Relating urban farming to contaminated sites

At some point, in the development towards an urban environment that involves farming and agriculture, contaminated sites will have to be taken into consideration for farming land. This thesis has dug into this subject with the intention of opening up for a broader discussion on the subject and to point at possibilities for spontaneous and safe urban farming in the future.

It may be a heartily initiative to encourage farming in the city from the side of the municipality, but considering the amount of contaminated sites in Gothenburg, spontaneous farming may also be dangerous if people start growing plants on places where the soil contains toxics. To prevent farming on dangerous sites, and at the same time encourage spontaneous farming, the municipality should see to that sites such as Rösered Fields are prepared for safe farming. The example of Rösered Fields could be compared to a common municipal park. It is a piece of land that is intended for the public for recreation, but instead of letting the municipality take care of costs and maintenance, this is dealt with by the public and by assigned associations on the site.

It could be discussed, how much of the contaminants in the soil affect farmers and other people in comparison to other toxics from plastic, air pollution et cetera, that we are exposed to every day. When it comes to contaminants that may be transferred through the crops, the risks should also be compared to the degree of toxics that we take in through non-ecological food from the grocery shop, that may have been treated with pesticides. Contaminants are often only present in the outer layers of vegetables and in the soil that is stuck to it. Therefore toxics can be removed if the vegetable is rinsed and peeled.

On a site like Rösered where contaminations have been estimated to be rather low, it can be discussed whether it is reasonable to make such big efforts to cover the site. Long-term effects on humans of some contaminants are not known and contaminated soil should therefore be dealt with carefully in relation to the lack of knowledge. It should also be noted that the covering is not only there to protect the farmers on the Fields, but also to protect the landfill itself.

Another issue that needs to be more considered is responsibility when it comes to risk of contamination. The municipality is responsible for the landfill, in the case of Rösered Fields, and should therefore also manage the sealing of it. On other contaminated sites in the city, there is the possibility of allowing every each farmer to take samples and test the quality of the soil where he or she is about to farm. For the sake of the customer of urbanely farmed crops, it could be possible for the farmer to have crops tested to guarantee that there are no contaminants.

Animal farming could contribute with much value to the city. Animals should be involved in the discussion about increased urban agriculture. In the Rösered Fields design programme, I decided not to include animal farming because of the landfill. For example animals do not respond the same way as humans to information about contamination below orange geotextile. In the case of Rösered Fields, animals like pigs could damage the protective layers on the landfill.

Developing urban farming in Gothenburg

The design programme uses urban farming to interconnect residential areas and people in a Swedish suburban context. The design wants to make use of knowledge, ability and creativity within people to reach local resilience, decrease global environmental impact, open up for

employment and a healthier food consumption.

This thesis does not consider actors in the development of Rösered Fields, except for the public and the municipality. However the project raises a number of questions about how to initiate and maintain farming on the site. Should the municipality initiate the project, or wait for a request to come from the public or from a developer? The municipal administrations have a lot of knowledge about the technical possibilities for the site that the public does not have. Therefore could be argued that the municipality *has* to be the initiator to farming on Rösered Fields, in order to bring a development about.

In order to achieve completely sustainable farming on Rösered Fields, it is necessary to involve citizens in Angered and Gothenburg in the design. This is evident for knitting activities to the Fields, that will be appreciated and that will mutually strengthen each other. One way of doing this could be to make the project available to the public, for it to evolve and new ideas for farming and other activities to come forward. For example, there could be a virtual interactive forum for local participation in design before the development on the site is started. Also, workshops that reaches out to people that would otherwise not attend an urban development fora, should be arranged. For example the staff at a pre-school, could find out if any of the children's parents are interested in farming. Women's associations is another forum where less outgoing people could be reached.

Involving citizens in the design for urban farming is a way to help releasing unused resources of knowledge and abilities that people possess, but can not, for different reasons, express or use in practice.

In the project, I have been careful not to identify categories of people that would attend the activities on Rösered Fields. The intention has been to attract *all* people in Angered in one way or the other. The reason why I do not illustrate any *types* of people is that I do not want to get stuck in the trap of pointing out excluded groups in the city and thereby confirm that exclusion.

Successful urban farming on Rösered Fields will increase movement in the area. It is important that these connections are made to encourage and facilitate for pedestrians and bikers so that the transport system to and from the Fields do not depend on transport by car.

Further questions to consider:

- How can citizens be involved in the design for urban farming?
- Who is responsible for the quality of the food that is produced on for example Rösered Fields? The municipality? Customers? Farmers? Other?
- Are there other ways than citizen participation, for knowledge about for example farming, to be brought forward in society? And how can people be given space to practice their skills?
- How can outcome of investments in urban farming such as social relations, happiness and health be measured in economical terms?

Reflection

The project has to a great extent adapted the transition-movement-point of view towards sustainable development, around which there is not a common consensus, neither among architects nor among engineers. Sustainable solutions on urban farming that uses high technology and that adjust to regional and global solutions and systems have not been given as much space in the investigations. The focus on local resilience has been partly a choice from the author's side and partly a result of lack of available research material and examples, that points towards sustainable development in all three aspects, of the opposite.

The research on contemporary urban farming, through study visits could be made more thorough, in order to find more examples of urban farming that could be suitable for Rösered Fields. For example there are projects in Germany that involves urban farming on contaminated soil that could be interesting to compare to this project, that have not been brought up in this report.

Regarding the study visits made during the project, a more systematic approach to interviews might have been useful in order to reach more official and unofficial information about the sites.

Further research should be made on systems for the farming market. As it is the first of its kind, this market will need to undergo some testing before a functioning system is reached. This could be part of a citizen participation project.

In the implementation of farming on Rösered Fields, the connections to similar activities in Angered is important. This project brings up *a few* examples, but far from all. The more connections that can be made between such nodes of activity the better. Before implementation of the design programme, further research is required on related activities in the area.

For further analysis on the site, it would be interesting to investigate the borders between urban and rural areas, this is highly relevant in the case of Angered, that have both features. How your home or your house is perceived, as part of an urban or rural structure, may depend on the person. If an area or parts of an area is by some perceived as rural, can we then talk about urban farming?

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