From Industrial Past to Sustainable Future

- Arboretum Lövholmen; Generating Trees for a Greener Stockholm

A visionary competition entry as a master's thesis

Lisa Hedenkvist and Carolina Horn

Master's Thesis

Landscape Architect programme, Uppsala 2014

Department of Urban and Rural Development

Swedish University of Agricultural Sciences

Swedish University of Agricultural Sciences
Faculty of Natural Resources and Agricultural Sciences
Department of Urban and Rural Development, Division of Landscape Architecture, Uppsala
Master's thesis for the Landscape Architect programme
EX0504 Degree Project in Landscape Architecture, 30 HEC
Level: Advanced A2E

Title in English: From Industrial Past to Sustainable Future - *Arboretum Lövholmen*; *Generating Trees for a Greener Future*
Titel på svenska: Från industriellt förflutet till en hållbar framtid - *Arboretum Lövholmen*; *Träd för en grönare framtid*
Supervisor: Maria Ignatieva, Department of Urban and Rural Development
Examiner: Camilo Calderon, Department of Urban and Rural Development
Assistant examiner: Ulla Berglund, Department of Urban and Rural Development
Cover image: Illustration by authors

Original format: A3
Key words: Arboretum, visionary competition, Ecological design, industrial site
Nyckelord: Arboretum, idétävling, ekologisk design, industriområde
Online publication of this work: http://epsilon.slu

Acknowledgment

We want to thank Maria Ignatieva and Tuula Eriksson for reflecting thoughts, sharp tutoring and for providing us with latest research in the field. For great inspiration and motivation in an early stage we want to thank Hildegun Nilsson Varhelyi. At last but not least we want to thank our families for support.

Contents

Preface

Our personal aim with this last project on the landscape architects programme has been to accumulate new experiences. We wanted to challenge ourselves with a mission not yet experienced during our education. We believe a multidisciplinary field such as that of landscape architecture requires curiosity, a desire for experimentation and a will to actively search alternative solutions and ways of working. For us this desire was strongly associated with design and the aesthetical dimensions of our profession. This will to acknowledge the importance of artistic research as an equally valuable method as scientific ones like inventories and literature studies, shows in our working process.

Our strive to try alternative ways of developing and completing a project resulted in the decision to partake in a competition. Participation in competitions is getting more and more common in the practice of landscape architects. We wanted to try this working method we had not yet encountered during our studies and to be able to experience what effects it can have on the working process. This decision resulted in an additional challenge, to handle an idled and degraded site, which was another unfamiliar situation for us.

Landscape architects have a broad expertise, which is a valuable asset in many contexts, providing us with the possibility to overview complex problems in planning and design. Our understanding of the profession of landscape architects is that our knowledge consists of three different components; a technical, a theoretical and an aesthetical. All of these three approaches are equally valuable and we have aimed at integrating all of them in our work. In the design, the technical, theoretical and aesthetical come together. This thesis gives an account of the first stage of design; the visions.

Fig 1. Model photo

Abstract

Old industrial sites bear witness of the unsustainable industrial developments in the past. Today many of them stand abandoned and empty, old structures lacking function in our present society. We have in this thesis participated in a visionary student competition arranged by IFLA, International Federation of Landscape Architecture by developing a proposal based on a vision of how Stockholm can stimulate a greener development. We have done this by turning an unsustainable industrial site in the city into an ecological node; Arboretum Lövholmen.

Our aim is to develop an entry for IFLA's visionary student competition by creating a new sustainable design for the industrial area of Lövholmen in Stockholm. We have worked with the following research questions: *How can we create a visionary design proposal for Lövholmen that promotes sustainable development with the help of ecological design? How can the competition format be a design tool? How can the working process developing a competition entry progress?*

The competition demands have shaped our working process and functioned as a platform for the structure of this thesis. Design and site research have been a parallel process, later accompanied by a theoretical study. The competition influenced the choice of working with the industrial site of Lövholmen in Stockholm. As a partly abandoned and degraded urban area it fitted requirements of the competition. The competition emphasized the need of thorough research. Since Lövholmen is privatly owned, closed and hard to explore we were forced to find alternative ways of doing this. Model making became an important tool in both research and design phases. Based on our analysis of the problems of Lövholmen, we chose to do a theoretical literature study on Ecological design, Brownfields and remediation processes.

We have in this project made our own interpretation of the concept sustainability and ecological design and and these definitions have shaped our design proposal. We consider that an ecological design needs to recognize each site as a being a part of a bigger ecological system. Ecological design should promote biodiversity as well as rising awareness in the community considering ecology. Sustainability is according to us a long term development that takes in social, ecological and cultural aspects.

The vision of our proposal is based on the idea of reversed processes. Instead of spreading pollution over the city, Lövholmen could be turned into a green catalyst producing new city trees to be planted in the city. Our interpretation of an Arboretum is that it can be a green public space where trees grow, with focus on knowledge, recreation and social activity.

We succeeded in handing in the competition entry and it fulfilled all formal requirements. Some aspects of ecological design and sustainablity could have been developed further, for example biodiversity. Our proposal did not give detailed solutions but focused on main structures and visions. We believe the growing city needs its green areas to be sustainable. The proposal we handed in was a vision based on visionary thoughts about the growing city and the need for a vital green structure within it.

Fig 2. Industrial traces on site

Sammanfattning

Många post- industriella landskap har inte anpassats efter de strukturella förändringar som format vårt samhälle under det senaste århundradet och har idag tappat sin förut så viktiga roll i staden. I många fall har de lämnats öde och därefter gradvis förfallit. De har i många fall förlorat sin koppling till omgivande landskap och tappat i värde och identitet. Dessa områden utgör idag ett stort problem i våra stadsmiljöer. Det finns ett behov av att återuppliva och hitta alternativa sätt att använda dessa outnyttjade ytor. Idag finns ett brett forskningsfält inom ämnet; Brownfields. Eftersom landskapsarkitektur till sin natur är tvärvetenskaplig, kan yrkesutövande landskapsarkitekter ha en nyckelroll i att hantera problematiken kring öde industriella landskap. Genom att ta hänsyn till flera olika aspekter, både tekniska, teoretiska och estetiska, har landskapsarkitekten en möjlighet att skapa helhetslösningar så dessa områden åter kan bli värdefulla och betydelsefulla platser i vår stad.

Detta examensarbete har främst haft två syften. Det ena syftet har varit att prova tävlingsformen som arbetsmetod och hur den kan påverka arbetsprocessen. Detta har vi gjort genom att delta i den visionära studenttävling som arrangerades av till IFLA, International Federation of Landscape Architecture, vårterminen 2014. Detta andra syftet har varit att skapa en ny hållbar design för det industriella området Lövholmen i Stockholm. I vår design har vi velat låta våra egna tolkningar av begreppet hållbarhet och ekologisk design styra gestaltningen.

Examensarbetet har behandlat följande frågeställningar:
Hur kan vi skapa ett visionärt designförslag för Lövholmen som främjar hållbar utveckling med hjälp av ekologisk design?
Hur kan man använda sig av tävlingsformatet som ett designverktyg?
Hur kan arbetsprocessen bakom ett tävlingsförslag te sig?

Tävlingen som format har betydelse för arbetsprocessen eftersom det ofta finns tydliga inlämningskrav av tävlingsarrangörerna. Presentationssättet hamnar i tydlig fokus, då tävlingar innebär att flera olika förslag jämförs med varandra vilket ställer höga krav på tydlighet och slagkraft hos förslaget. Temat för tävlingen var “akut hotade urbana landskap”. Studenter runt om i världen, uppmanades att ta sig an en ödelagd och nedgången plats i stadsmiljö och komma med nytänkande förslag på hur dessa åter skulle kunna aktiveras. Vikten av att göra grundliga undersökningar om platsen ur flera olika aspekter betonades. Historiska, ekonomiska, ekologiska, kulturella och sociala aspekter nämndes som några faktorer som var viktiga att redogöra för. Denna forskning skulle ligga som grund för framtagningen av ny design med syfte att återskapa essensen av platsens identitet och värde. Formatet för tävlingen var en idé- och visionstävling där de stora strukturella frågorna, som platsens geografiska, sociala och kulturella kontexter, var relevanta. Inga krav fanns på detaljlösningar, materialval eller projektering. Studenterna uppmanades använda sig av innovativa och hållbara tekniker. Inlämningskraven för tävlingsförslagen var begränsade till tre liggande planscher i A1 format som digitalt skulle skickas till Argentina den 5:e maj 2014.

Tävlingens krav fungerade som en ram för examensarbetet och påverkade vår arbetsgång starkt, den var därmed vår huvudsakliga metod. Den påverkade vårt val av plats, tema, skala, samt angav tidsramen för tävlingsbidragets framtagande. Även arbetsmetoder för designprocessen var format av vår tolkning av tävlingskraven; temat påverkade val av plats som i sin tur påverkade arbetsmetoderna. Tävlingen tryckte på vikten av grundliga förstudier. Därför var platsbesök och inventeringar naturliga delar i vår process. Lövholmens otillgänglighet gjorde att vi behövde komplettera förstudierna genom alternativa sätt att utforska och lära känna platsen. Vårt arbete med experimentering av form, skala och material i modellform, har därmed utgjort en viktig del av examensarbetet.

Den teoretiska delen av examensarbetet har sin grund i tävlingens krav på att skapa hållbara platser. Vi valde att studera teorier som ekologisk design, Brownfields samt undersöka två naturliga remedieringsprocesser. Vi ville även ha exempel på hur teori kan appliceras i praktiken. Efter dessa studier gjorde vi en egen tolkning av vad begreppen ekologisk design och hållbarhet innebär för oss och hur vi skulle kunna använda oss dem i vårt projekt. Hållbarhet definierade vi som långsiktigt hållbar utveckling som inkluderar sociala, ekologiska och kulturella aspekter. Ekologisk design definierades som gestaltning som tar hänsyn till att platser är delar i ett större komplext sammanhang och som har målsättning att gynna biologisk mångfald och öka medvetenhet om ekologi i samhället.

Det inlämnade tävlingsbidraget hade sin grund i visionära tankar om den växande staden och behovet av grönytor för att främja en långsiktig hållbar utveckling. Vår vision bestod i att låta Lövholmen verka som symbolisk nod och katalysator för Stockholms växande gröna strukturer. Vårt största tillägg i gestaltningen av Lövholmen har varit träd. Tävlingsförslaget fick namnet Arboretum Lövholmen: produktion av träd för en grönare framtid. Vi tolkade konceptet Arboretum som en grön nod i staden med en funktion som plantskola, som skulle kunna generera kunskap och ha rekreativa och sociala värden.

Vi skickade in ett tävlingsbidrag till IFLA som fyllde alla formella krav. Vi hade kunnat vidareutveckla många aspekter för att få förslaget att svara på våra definitioner av hållbarhet och ekologisk design på ett djupare plan. Vårt förslag fokuserade inte på detaljlösningar, som skulle kunnat koppla förslaget tydligare mot ekologisk design och förklarat förslagets ekologiska värden mer utförligt. I stället kom förslaget att fokusera på större sammanhang och strukturer. Vi tror att en växande stad kräver gröna ytor för att utvecklas hållbart. Vårt förslag grundar sig i dessa tankar om stadsplanering och behovet att sammanhängande grönstrukturer i våra stadslandskap. Vårt förslag utgör ett exempel på hur en specifik plats kan sporra en grön utveckling som får effekter i ett större sammanhang.

Definitions

Arboretum
According to Webster's Dictionary an arboretum has two definitions, firstly as *"a place where many kinds of trees and shrubs are grown; a botanical or tree garden cultivated for scientific purposes"* and secondly as *"a wooded public park"* (Webster1977 pp. 95-96). Our interpretation of an Arboretum is that it can be a green public space where trees grow, with focus on knowledge, recreation and social activity.

Brownfields
"Brownfields are abandoned, idled or underused industrial or commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination"
(Kirkwood 2001 p. 61)

Remediation
"Remediation technologies are environmental cleanup solutions for contaminated soils and groundwater" (Hollander et al 2010 p. 30).

Mycoremediation
Mycoremediation is a remediation process that uses different kinds of fungi to degrade pollutants from contaminated environments (Hansen 2012).

Phytoremediation
A cleanup technology that restores and remediates contaminated soils, sediments and water with use of plants (McCutcheon & Schnoor 2003 p. 5).

Ecological Design
"design interventions that constitute an integration of human needs and desires while supporting the health of natural systems" (Rottle & Yocom 2010 p. 6). We consider that an ecological design needs to recognize each site as a part of a bigger ecological system and that it should promote biodiversity as well as rising awareness of ecology in the community.

Environmental Aesthetics
"The investigation of the aesthetic appreciation of natural environments. Since its early stages, the scope of environmental aesthetics has broadened to include not simply natural environments but also human and human-influenced ones." (Carlson 2010)

Sustainability
The most quoted definition of the term is by the United Nations that describes sustainability as developments that *"will meet the needs of present without compromising the needs for future genarations*." (UN 1987). We use this broad definition as a guiding tool to our design, as a vision of long term development that takes in many aspects social, ecological and cultural.

Fig 3. Tree in Champaign

Structure and Chapter outlines

This thesis is structured into six chapters, to bring clarity in how our participation in the competition, the designprocess and theoretical studies have worked as a whole. The first chapter is an overall introduction to our project; our aims and objectives with it as well as choice of methodology. The second chapter consists of our site research, containing background information over the working area, inventories and analysis. The third chapter contains a theoretical background for our design proposal. The fourth chapter contains our design; our vision for the site as well as the final proposal. In a fifth chapter our working process is shown, with focus on choice of material and model making. Additionally a sixth chapter sums up the thesis with conclusions, discussion and results.

The challenges have been to see the thesis as a part of the competition entry and vice- versa. We have in our working process adapted to the demands of the competition we chose to enter, but also made a choice to include a theoretical background to deepen our understanding of hurt landscapes and sustainable design. This was not a competition requirement, but necessary for us since we have not before proposed any design solutions for degraded urban spaces, which was the theme for the competition. This theoretical part was fully developed after the competition entry was handed in, due to the strict time limit of the competition. Thus the content of the thesis includes aspects not included in the competition entry. No changes have been done in the actual design proposal during the completion of the thesis even if our knowledge was broader after completing our theoretical studies. This due to the fact we wanted to give an accurate account for how our participation in a competition had worked, and not alter the entry afterwards.

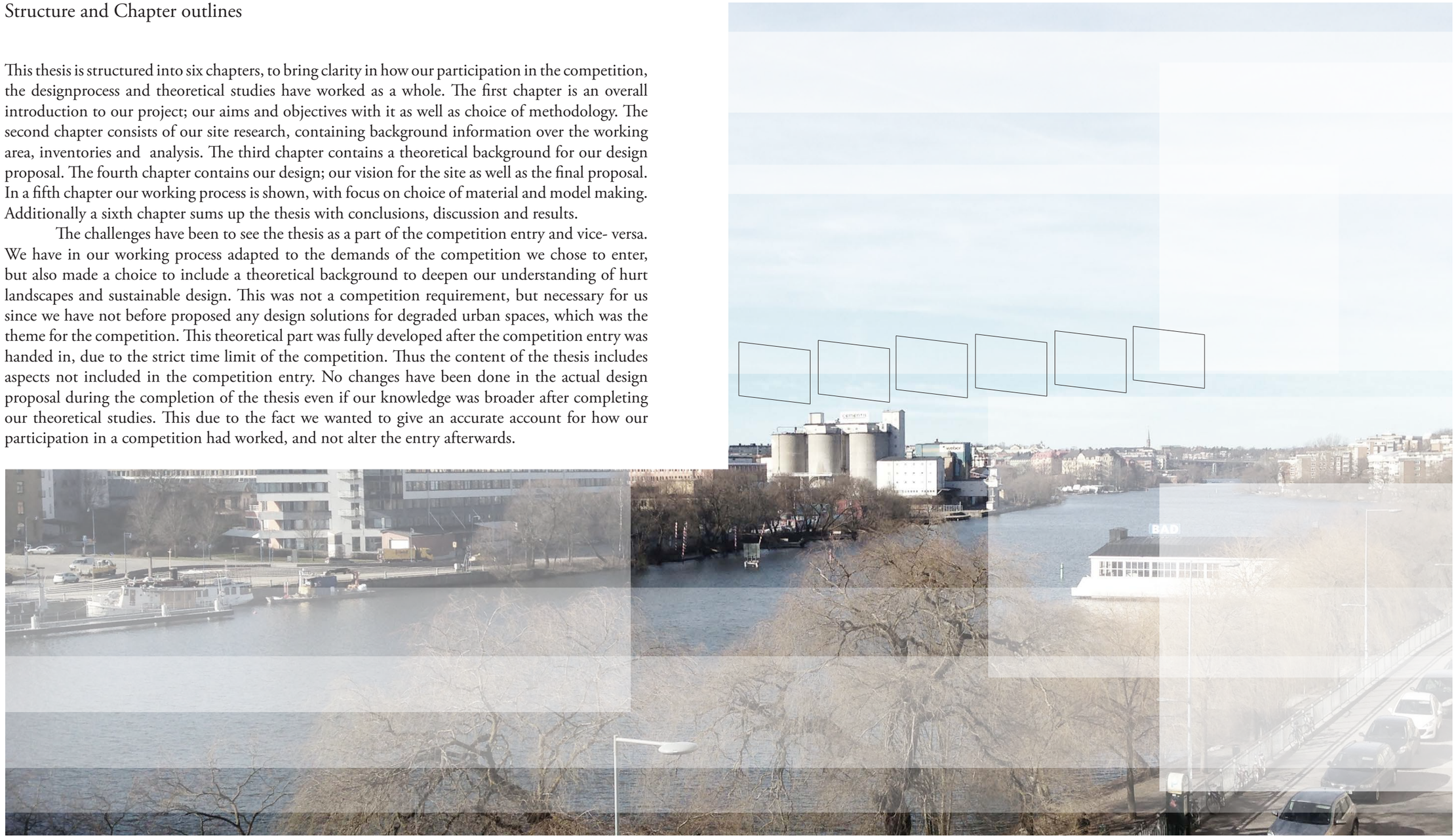


Fig 4. Collage Lövholmen

Fig 5. Model photo

This chapter will guide the reader to the overall structure of the master thesis. It includes an introduction to the issue of the thesis, our aims and objectives with it, methodology and delimitations.

Introduction

Landscapes are dynamic systems, constantly shaped and reshaped over time by different forces. The impact of human actions on landscapes has increased. As our society evolves, advanced technology and increasing populations trigger developments at a pace hard to control. It is difficult to predict the full consequences of our actions on our environment. But we can see the traces our past activities have left in the landscape. Old industrial sites bear witness of the unsustainable and rapid industrialization of yesterday. Today many of them stand abandoned and empty, old structures lacking function in our present society. At times even dangerous, surrounded as they are by contaminated soil, a legacy from the industrial production processes.

The current situation calls for action, but the future of these sites is a delicate matter. Although problematic both socially and ecologically, these sites hold great historical and cultural values. There is not always time for reflections on the past when these obsolete urban places are cleaned up to meet new demands in our society. The need for taking action over these sites, also known as Brownfields, and reconsider and valuate them as viable sites of regeneration and recovery is a broad field of research today (Kirkwood 2001 p. 4). How can we handle these environments properly? How can landscape architects learn from past mistakes and promote a sustainable and flexible urban environment that can meet future challenges?

IFLA, The International Federation of Landscape Architects, is highlighting these problems by arranging an international student competition with the theme: *"Urban Landscapes in Emergency – Creating a landscape of places".* Students all over the world are being encouraged to participate with innovative visions and strategies of how to handle obsolete, abandoned and degraded urban environments. The competition emphasizes the importance of profound research of the site and its surroundings. An understanding of the unique qualities of each place, their history and the part they play in a broader context, are seen as prerequisites for a successful transition of these sites to sustainable urban environments for the future (IFLA 2014). Is it possible that the key to future development of these places, lie in their rich historical layers? Can a conscious and sensible redesign enhance and preserve our cultural- and historical heritage and promote new visionary developments in the urban fabric?

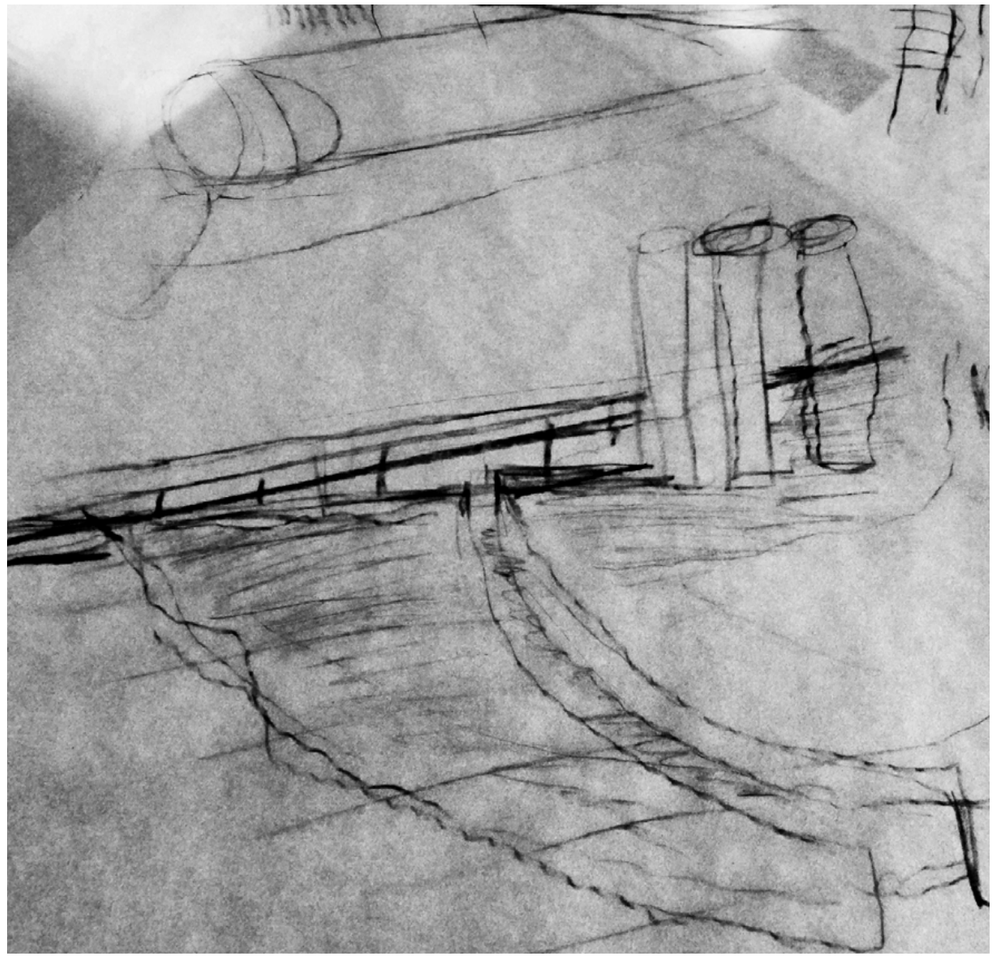


Fig 6. Sketch

Aims and Objectives

We have for this master thesis participated in an international student competition, arranged by IFLA, International Federation of Landscape Architects, that challenges students to create a vision and a redesign for an obsolete, abandoned and degraded landscape in an urban environment. Our aim is to develop an entry for IFLA's visionary student competition by creating a new sustainable design for the industrial area of Lövholmen in Stockholm. With a new sustainable and innovative design our vision is to turn Lövholmen into an attractive urban area generating a new recreational public space in central Stockholm.

In this mission we want to apply our interpretation of the concept of sustainability including ecological, social and cultural dimensions. In our design our aim is to integrate ecological solutions that give the site a clear environmental profile. By also making this closed site accessible and enhancing how the character of Lövholmen has evolved over time and propose how it can be adapted in a future context we hope to strenghten its social and cultural values as well. In this way we hope the proposal will answer to our broad definition of sustainability.

The competition format is getting more and more common as a working method. We want to account for how the working process developing a competition entry can progress. A clear and appealing visual presentation is important for a competition entry, making aesthetical and artistic working methods necessary in addition to other research methods like inventories and analyses. Thus our aim is to show how a broad working process is essential in developing a project under these circumstances.

As landscape architecture is a broad and multidisciplinary field, we have a key role in creating solutions for old industrial places that take many aspects into consideration. We hope that this thesis can help us identify catalyses of transformation for obsolete and degraded landscapes and provide an example of how landscape architects can activate degraded urban places.

This thesis is mainly directed to professions involved in urban planning and landscape architecture, both students and practitioners, but it strives to be readable even for a broad public.

In this master's thesis we have worked with following questions. The first one is the main research question:

- **How can we create a visionary design proposal for Lövholmen that promotes sustainable development with the help of ecological design?**
- How can the competition format be a design tool?
- How can the working process developing a competition entry progress?

Fig 7. Photo of the site

Methodology

Two main factors have greatly shaped the way we have worked; our choice to enter a student competition as our master's thesis and the practical rather than theoretical aim to create a new design to the specific site of Lövholmen. The entered competition and its requirements have in many ways been the platform that has shaped our working process (fig 8). The competition format is thus our main method for the thesis. The broad theme of the competition has nevertheless required that we limit our work based on own interpretations and preferences.

It was the competition theme and format that affected the choice of site to work with. In an early stage of the master's thesis we searched degraded and unused sites in Stockholm to match competition demands. Lövholmen struck us as an interesting site that matched the requirements. We knew of the site from before for two reasons; firstly from visiting the art gallery Färgfabriken located in the area and secondly for the plans the city has made for the future development of the site. An initial site inventory and research was done by visiting the site and searching for information about the area. The research data was acquired mainly from the city of Stockholm, Stockholm City Museum and the library of the Swedish University of Agricultural Sciences.

Parallel to the gathering of information our design process evolved by sketching, modeling and designing in different materials. Understanding the site properly has to a great extent been done by artistic exploration with sketches and models since only a fraction of the site was accessible for us to visit. Working in models in different scales has been an important tool in both research and design phases.

Taking part in a competition requires a specific way of working, where presentation lies in focus. This is why we have dedicated a large part of our work to the design and presentation of the design. The early deadline of the competition stimulated us to start experimenting with form at an early stage. Research and theoretical studies were done parallel to this as shown in figure 8. Due to the visionary nature of the competition our design process was less focused on detail solutions and more with main structures such as creating hierarchy in spaciality with buildings and green structures, creating new nodes and poinst of interest at the site and making new possibilities for circulation and movement with paths and boardwalks.

The competition format and demands also influenced our choice of background theory to back up our design proposal. The theoretical part consists of several parts due to the complex nature of the site, the broad mission of the competition and our own multileveled working process. With more knowledge about Ecological Design, Brownfields and remediation processes we felt we could better handle the challenges of the site as unsustainable and contaminated area. By exploring the working processes of the firm Vogt Landscapes, we found inspiration of how theory can be applied in practice. This office focuses on research and inventory but has alternative methods to do this for example applying aesthetics and artistic methods in both stages of research and design. We saw a strength in this way of working that matched our own ambition of combining technical, theoretical and aesthetical dimensions in our work. This part was completed after handing in the competition proposal as shown in figure 9.

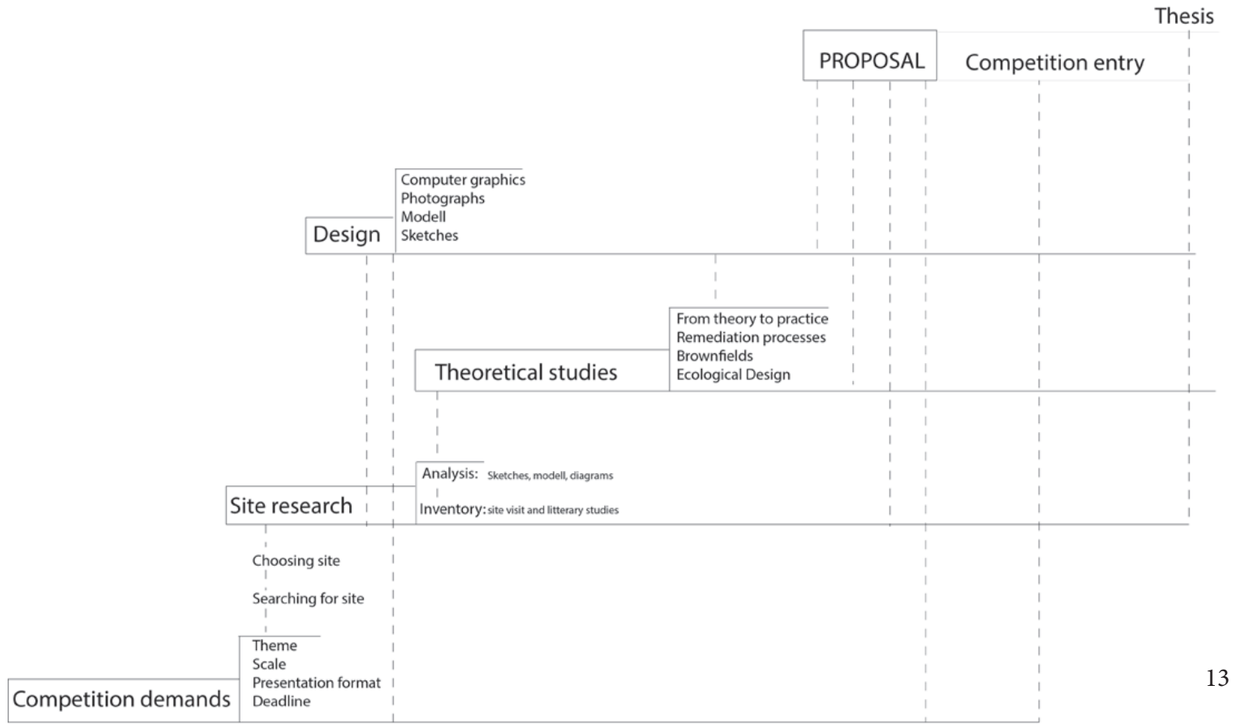


Fig 8. Diagram methodology

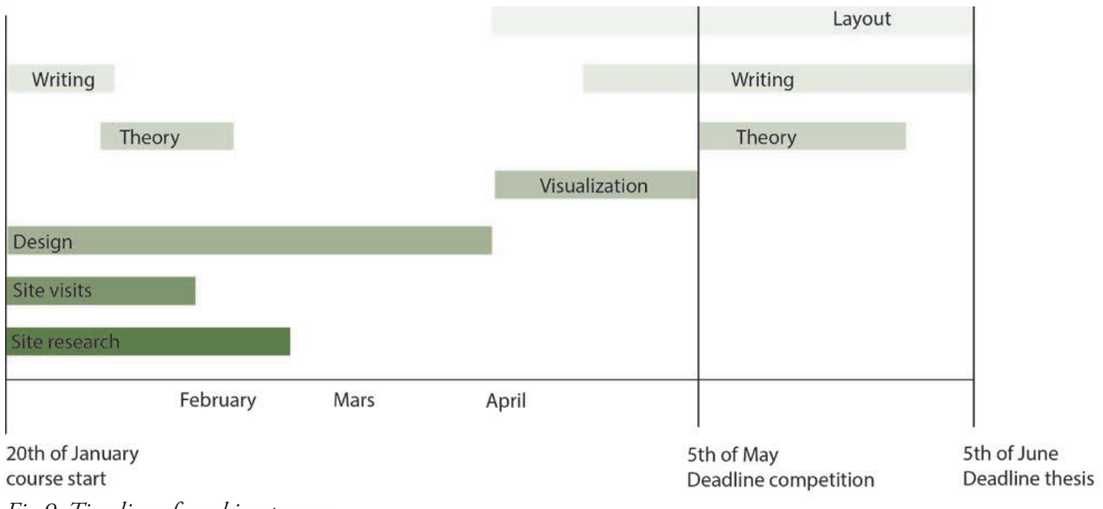


Fig 9. Timeline of working process

Introduction; Methodology

Competition format

When participating in a competition the mission is described in a basis containing specific demands the design should meet and formal requirements for the presentation of it. There is a limited possibility to communication, clarifying questions can be asked anonymously to the organizers. It is up to the participant to interpret the basis and produce a proposal that meets it's requirements.

IFLA, International Federation of Landscape Architects, arranged a visionary international student competition with the theme: *"Urban Landscapes in Emergency – Creating a landscape of places"* during the spring semester of 2014. The missions was to choose and investigate a degraded and obsolete place, in an urban context, study it through profound analyses and thereafter create a new vision for the place. The competition promoted reflections not only of the present situation but also on the historical layers that in different ways have changed the use, function and identity of the site. Thus the competition was emphasizing the need for a deep understanding and respect when handling these kind of landscapes in our urban environments. Broad interdisciplinary submissions were encouraged but it was important that the design focuses on the configuration of landscapes (IFLA 2014).

IFLA challenges students with a multileveled and complex task. The visionary nature of the competition, its focus on the importance of research followed by reflection in the design process and the intricate situation of degraded urban landscapes all contribute to this. The broad question formulation of the competiton remains open for very different kinds of solutions.

"The competition aim is to promote a reflection on the importance of "thinking and action on landscape" as a conceptual and operative tool to guide the deep and global transformations in their changes. The intention is to reconnect places to the geographic, social and cultural context that contains them, and to recover the essence of their identity and values. It is intended that students investigate the dynamic process of landscapes in their different complexities (ethical, aesthetic, functional, ecological, socio-cultural, historic-patrimonial, economic-productive, etc.) redefining and identifying new and old spaces, applying innovative and sustainable technologies, generating formal and environmental certainties; and humanizing the places and their landscape." (IFLA 2014).

- Theme: Obsolete and degraded urban space
- Scale: 20 000- 100 000 m^2
- Deadline: 5th of May 2014
- Presentation format: Three A1

Site research

Our site research contained searching for background information of the site by exploring historical maps and documents, doing site visits and inventories and later processing this information by reflections and analyses. Since the site was partially inaccessible we made several models of the site in varying scales, using different materials. Model making was a research tool that enabled us to understand the closed site better. We evaluated the built structure with the help of our models and figure and ground analysis.

Theoretical background

The theoretical part of the master thesis will contain *Ecological Design, Brownfields* and *remediation processes* in the theoretical and technical field of landscape architecture. We have found them relevant for the site of Lövholmen, since the contaminations on the area are affecting the ecological balance making it unhealthy for humans, animals and plants. There is also a real threat of the site contaminations affecting the whole city through the spreading of heavy metals into the water.
This theoretical part also includes research about how theory can be applied in practice. This research was interesting since it added the aesthetical field of landscape architecture into the master's thesis. We found the firm Vogt Landscapes and landscape architect Udo Weilacher inspiring and important for our working process in developing a visionary proposal.

We found the literature to this theoretical part with the help of our supervisor, Maria Ignatieva, who recommended literature to ecological design and Brownfields. We searched on the database Epsilon for other master´s thesis that handled remediation and post industrial landscapes. By chance we came across a tv series of a new remediation process used in the US called mycoremediation, that we have included as well. From previous courses we were familiar with the firm Vogt landscapes and the landscape architect Udo Weilacher. We felt they were relevant to our subject and wanted to include them in this part. Udo Weilacher also gave us some recommendations on literature and reference projects that could be useful.

By building up a platform of different approaches to landscape architecture; the theoretical of Ecological Design, the aesthetical of Vogt Landscapes and Udo Weilacher and the technical of Brownfields and Remidiation processes we want to recognize them all as important aspects in our profession and thereby equally valuable for developing the visionary approach the competition requested.

Design

Our design process has been multileveled consisting of many different phases. Firstly we made sketches and illustrations to find new shapes for the site. Secondly we made models in several scales and experimented with different materials and forms. Finally we made a physical presentation model. Sketches, aerial- and historical maps all served as a base for the creation of the physical model. In a first step we reconstructed the current topography of the site using cardboard of the format A1. Then we altered the topography inspired by previous sketches. After this we proposed new functions for the preserved buildings, cut them out in oasis, which we painted in a light colour. The buildings were now revitalized as nodes and could attract visitors to the site. Then the walkways were cut out of the remaining cardboard. The paths merged in relation to the nodes on the site that got linked by these paths. Trees were illustrated with needles with a canopy of moss. The final complement to the model was to add cut out people in plastic.

The final model was documented with photos that were used as a base for visualizations. We took pictures of the model in three phases. First showing only the topography, the second time including buildings and tree structure with needles and finally with the added moss on top of the needles symbolizing leafage. To complete the visualizations, the photos were altered using computer programs such as Photoshop and Illustrator.

Delimitations

As previously mentioned, the program for the competition specifies explicit frames for the competitive entries. These frames will therefore affect and navigate our entry. Our thesis will thematically be delimited by the theme for the competition: "*Urban Landscapes in Emergency – Creating a landscape of places"*, dealing with abandoned environments in an urban context. The competition is a visionary one, the competition specifications will limit our proposal in the way that we will not create a detailed design solution for the site. The competition has no geographic delimitation, just the fact that it handles an urban environment. The area is specified from a range of 20 000m^2 up to 100 000m^2. The presentation should be illustrated on three pages in A1-format and digitally sent to Argentina the 5th of May (IFLA 2014). The deadline delimited any further work with the competition entry. During the writing of the thesis additional information only considered clarifying the proposal, not altering it.

Our entry will be delimited geographically to the industrial site of Lövholmen in Liljeholmen, south west of Stockholm. Our working area for the competition will be a part of this industrial site. We found the site interesting and exciting, containing many characteristic elements that bear witness of Stockholm as an important industrial city in the 20th century. Additionally we saw potentials in working with a place near Stockholm, as it could ease the inventory, site analysis and background research. The site also answers to the demands of the competition.

Our site research was limited by the fact that the site is privately owned and some parts even fenced, which complicated site visits. This delimited our experience and understanding of the whole site. Even documents showing measurements of the contaminations on site were hard to come by.

Our theoretical part deals with Ecological Design principles and Brownfields, which we considered essential to our chosen site and its possibilities for future development. Remediation being an obvious need for an industrial site, we have also included a smaller study of natural remediation processes; phytoremediation and mycoremediation. Finally the theoretical background includes a study of how theory can be applied in practice, limited to the firm Vogt Landscapes and the ideas of landscape architect Udo Weilacher.

Fig 10. Photo of the site

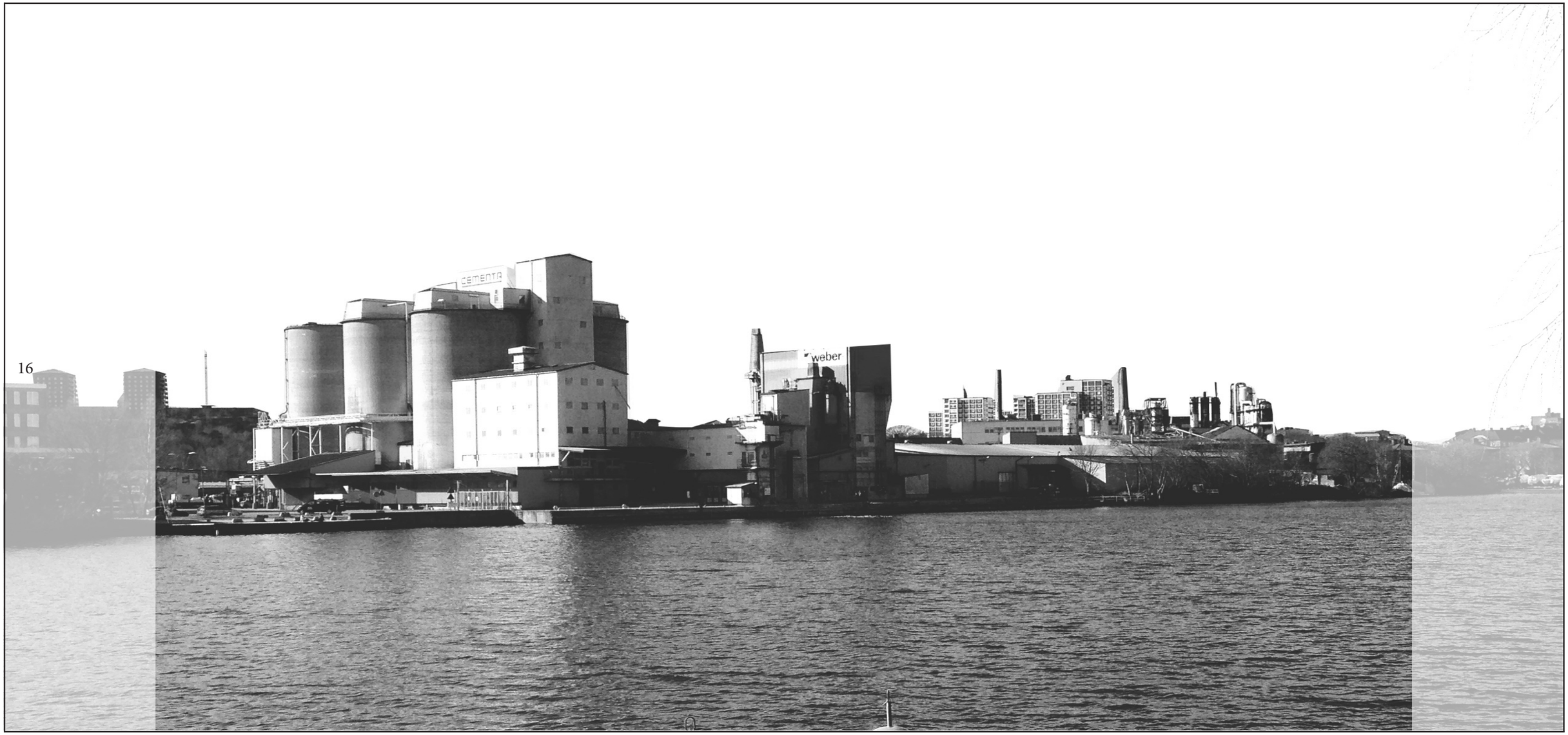


Fig 11. View of the site

Research; the site

This part describes the studied site chosen according to the competition demands. It will introduce the reader to its part in a broader context in Stockholm city, its past development and history and existing future development plans for the area. Maps and photos illustrate inventories and analyses of the site.

Urban Development of Stockholm

As Sweden is situated in northern Europe large parts of the country lies within the climate zone humid continental, traditionally covered by forest (fig 12). The major cities in Sweden follow the trends of urbanisation that can be seen all over the world. The capital, Stockholm, is no exception. An urban development that marginalizes green and blue structures and decreases public space is the main problem we want to address in our proposal.

Located by the Baltic Sea the city of Stockholm through time has related to two landscape elements: the hilly topography of the terrain and the watercourse that links Lake Mälaren to the Baltic sea. These two elements have in many ways shaped the urban development of Stockholm and strongly characterize the capital (Stockholms stad 2005 p.3). The location by the coast increased the possibilities to trade with surrounding countries and later on eased industrialization processes (Åström 1993 p.14). The industrialization strengthened the economy and turned Sweden from one of the poorest nations into a welfare state (a.a. p. 33). During the modernistic era, around 1930-1960 landscape architecture in Stockholm gained recognition world wide for its sensitivity to terrain and surrounding nature. This tradition of taking inspiration from existing nature was later referred to as “Stockholmsskolan” (Andersson 2000, p. 219). In 1970 the expanding city decided to start to work with densification strategies. In the layout plan in 1999 it was declared that the city should grow inwards (Ståhle 2006 p. 60). At the end of the 20th century environmental issues like bio diversity and coherent green structures started to play a more important role in urban planning in Stockholm. (ibid.)

The city values its green and blue image and works on protecting the quality of the water and preserving a vital green structure. The Swedish Planning and Building act from 1996 include preservation of green structure within cities. Stockholm has had a conscientious strategy for maintaining greenery in the city and the urban settlements and trafficed zones have developed as a star shaped structure leaving green wedges of undeveloped areas between them (fig 13). These areas were traditionally restricted areas, such as royal or military grounds. They have over time gradually transformed into recreational, forestry or agricultural areas (Florgård 2007 p. 241).

Unfortunately urban densification and privatization of land are a threat to these public resources. The possibilities to save greenery when building new areas, like Stockholmsskolan did in the past, are limited by current densification strategies. Stockholm is already one of the densest cities in Europe: from -98 to -09 the total amount of hard surfaces in the city has increased from 44.3 to 51.9 percent (Miljöförvaltningen 2012). Almost twelve hectare of green areas has disappeared yearly in the city (Miljöpartiet 2010). The remaining greenery is struggling with tough urban conditions. Urban trees have to manage despite a lack of space both above and beneath the ground (Göteborgs stad 2005 p. 5). A majority of the trees in Stockholms are older trees planted between 1880 and

Fig 12. Map of Europe

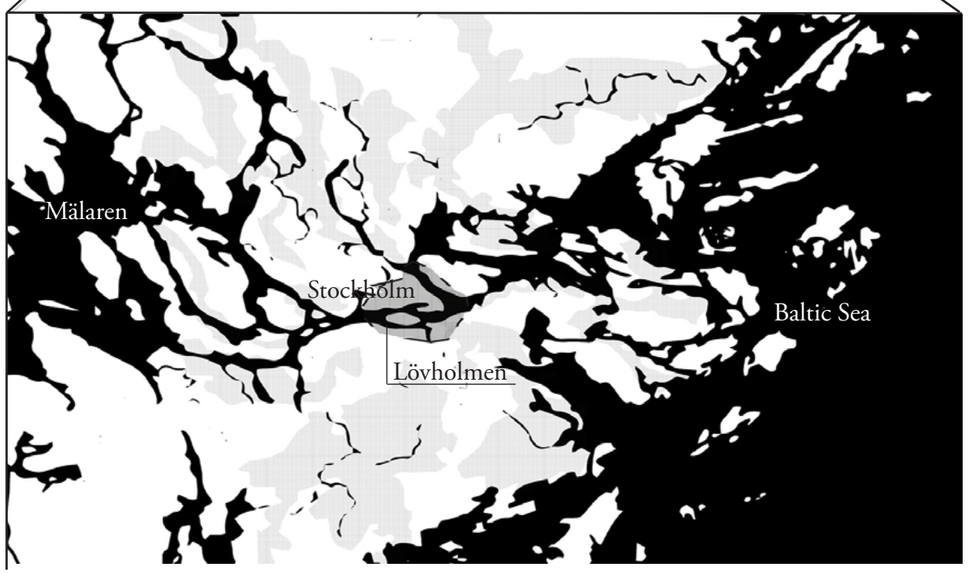


Fig 13. Green and blue infrastructure of Stockholm. The green wedges (marked in grey) penetrate the city core as a contious planning strategy to maintain a vital green structure in the city. Lake Mälaren and The Baltic Sea connects and generates the beautiful watercontact that characterizes Stockholm.

1930 (Stockholm stad 2012). Several of these older trees will in the near future need to be replaced by new plants.

As for privatization of land, it is especially areas along the waterfront that have a high value for the developers. Often they become residential areas accessible for a limited group of people. Hammarby sjöstad is one relatively new example of this type of scenario in Stockholm. But exploitation is not without problems; The County Administrative Board of Stockholm is recognizing the danger of flooding as a huge problem. In 2005 the flooding was five centimetres from entering the subway system in Stockholm. So far rising water levels has been handled within the technical field, levelling up floors and placing houses on piles (Länsstyrelsen 2012 p.35). In the future new sustainable solutions will be needed.

Lövholmen

The chosen site, the industrial landscape of Lövholmen, is located by the water in the district of Liljeholmen in Stockholm. The site is at present a degraded and obsolete place, due to unsustainable industrial activity in the 19th and 20th century. A change of interests and needs in the present informational society compared to the former industrial one, has left large parts of the site abandoned and empty. Today the city is planning for new developments at the site.

The site has an area of 60 000 m^2 and is today privately owned by several landowners. A large part of the site is due to this closed and therefore hard to explore with both fences and dogs keeping the public away from the site. The industrial activities in the area have left the soil contaminated with different toxic substances, including heavy metals. In 1995 one of the old industrial buildings, formerly used for color production, was turned into an art gallery. At present creativity has continued to infiltrate the site with smaller workshops and an art association.

Urban sites like Lövholmen are intriguing places. They provoke simultaneously negative associations and positive ones. They have great historical and cultural values to be handled with care, but are also environmentally unsustainable urban places in need of change.

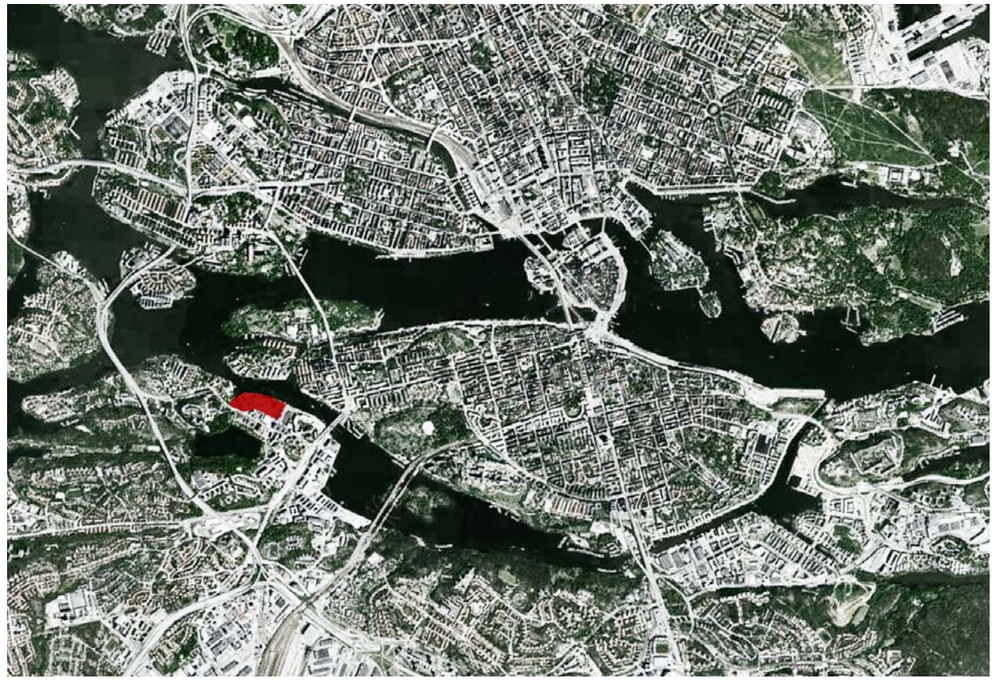


Fig 14. Lövholmen in Stockholm. Red dot show the location of the site

Fig 15. Few signs of activity at site

Fig 16. Stalks and silos at the site.

Fig 17. Fenced site.

Fig 18. Abandoned factories at Lövholmen.

Fig 19. The industrial skyline is visible at a distance.

Fig 20. Well maintained factory building used as art gallery

Historical brief

Lövholmen and its surroundings play an important role in the industrialization of Stockholm. The built structures also tells an interesting story of a place in constant transformation and succession, a place that has gone through many changes over time. The 17th century city plan of Stockholm shows that the district was rural and not considered a part of the city (Eriksson 2003 p. 111). During the 19th century the area was called Lustigkulla and was at that time the last stopping point before entering the city of Stockholm (Nyréns Arkitektkontor 2008 p.11). The name indicates that there were good hunting grounds in the area round Lake Trekanten, an area where the bourgeois, in the early 20th century established their summer residences (Arfwidsson-Thedéen 1992 p.11). Some residences are still left, and bear witness of the idyllic character of the site in the past.

Lövholmen became together with Liljeholmen, Gröndal and Årstadal the first industrial suburb in Stockholm, where the heaviest industries were established in the early 19th century (Nyréns Arkitektkontor 2008 pp.10-11). One main reason for this was the railway. When the main railway line was established in Liljeholmen in 1860, it became the first station outside the Stockholm city boundary. The location right by the waterfront and the harbour were also important for the rising industry (a.a. p.11). Liljeholmen became, in the beginning of the 20th century, one of the most densely populated suburbs in Stockholm with six thousand inhabitants. The living conditions near the industries were bad, lacking both public drain systems and waste disposal. Although the industrial activities in the area were very lucrative, the area was considered a poor and socially problematic area (ibid.).

The introduction of industrial activities made huge imprints on the site. Even today these factory buildings are strong features characterizing the site (a.a. pp.10-11). A railway workshop hall, a plant nursery, paint workshops and timber yards are some examples of industries that were set up at the site (a.a. p.11). Three main industries have had particular importance for the development of Lövholmen; Alcro Beckers color factory, the production of carbonic oxide in Kolsyrefabriken and the production of concrete at Cementa. When Liljeholmen became a part of Stockholm the industries had to undergo many changes. The area was decontaminated and some industries were demolished and replaced with more modern buildings. This was something that happened gradually, which left Lövholmen with a mix of industrial structures dating from between the late 19th century up to the 20th century. Today only a few of the oldest buildings are left including the building of Palmcrantz and Kolsyrefabriken (ibid).

Fig 21. Summer residenses

Fig 22. Timber yard

Fig 23. Colour production at Beckers

Fig 24. Railway

Tracing time

Timeline showing the changes the site has gone through from the 16th century to today.

16th-17th century;
Rural periphery

Early 19th century;
Summer residences

19th century;
Industry

1860;
Railway

Early 20th century;
Suburb

20th century;
Part of the City

2014;
Future development

Fig 25


Fig 26


Fig 27


Fig 28


Fig 29


Fig 30


Fig 31

Fig 32


Fig 33


Fig 34


Fig 35


Fig 36


Fig 37


Fig 38

Today

At present the district of Liljeholmen is considered a natural part of Stockholm city. It has a central location close to the city centre with good infrastructural facilities. The city of Stockholm recognizes Liljeholmen as an important area for future urban development. Lövholmen located on the northern shoreline, with a view over Lake Mälaren facing Reimersholme and Hornstull, is an interesting area to develop. Today there are already initial plans waiting to be settled (Eriksson 2003, pp.111-113). Currently this industrial site contains both active factories and dismantled ones. The whole district contains a broad range of urban structures in different scales, characters and functions. Thus the surroundings around Lövholmen constitute a diverse urban fabric containing many strong characters (Stadsbyggnadskontoret 2008 p.4).

The area is today privately owned by several different landowners; Cementa AB, Skanska, Lindéngruppen and Veidekke that all hold different activities on the site. An art gallery is located in one of the old color factories, owned by Lindéngruppen AB. On Skanska's grounds, there is a new color factory, an old smithy and a building that used to make part of the wood industry on Lövholmen. Veidekke owns the old factory, Kolsyrefabriken, formerly used for production of carbon oxide. Cementa AB is still active as a producer of concrete in the area (Stadsbyggnadskontoret 2008 p.10). The access to the site is very limited for the public.

Land owners Lövholmen

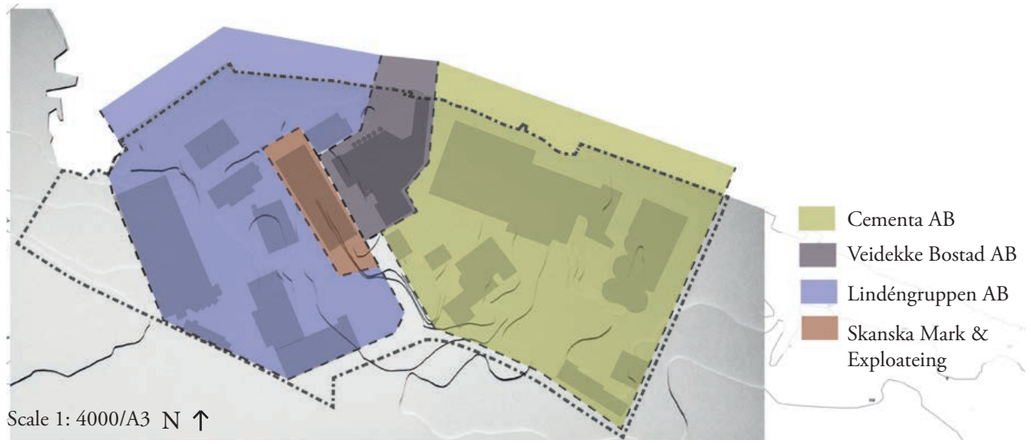


Fig 43. Land owners Lövholmen

Fig 39. Central location in Stockholm; view from Reimersholme

Fig 40. Though the site boarders to lake Mälaren the contact with the water is hindered by bushwood and fencing

Fig 41. Both buildings and soil contain high levels of contamination

Fig 42. Good communications by the site by public transport

Future development

The different industries and productions on site, both currently active ones and the dismantled ones, have greatly influenced the character of Lövholmen. They also constitute great challenges for future development of the area. The industry has not only left physical marks on the grounds, as both topography and shoreline have been reshaped to fit the needs of the large scale buildings, it has also altered the image of it, how the site is conceived and appreciated by people. The industries are associated with pollution and contamination. Veidekke has for example received complaints from the residents in neighbouring areas that the poor state of some of the buildings effects the skyline of Stockholm in a negative way (Lönngren 2004).

In the layout plan for Stockholm city of 1999 Lövholmen, together with Liljeholmen and Årstadal, were assigned as areas for urban growth considered having good potentials for development. The municipality of Stockholm does not own the grounds of Lövholmen, which means that this planning process is different from other urban development processes. The time for when the project can be carried out, the distribution of costs involved in it and other fundamental questions connected to the development plans, are influenced by the owners (Stadsbyggnadskontoret 2008 p. 14).

In 2008 the city of Stockholm produced a program to guide future development of the area. The city of Stockholm is today growing inwards with densification of the city core. Lövholmen is considered a good location for this and its industrial character is recognized as an asset to the heterogeneous district of Liljeholmen, worthy of preservation. Good infrastructural facilities with bus, tram and subway and the close connection to Stockholm city have contributed to the fact that building companies acquiring real estates in Lövholmen are hoping for possibilities for new development in the area. The municipality of Stockholm has initiated collaboration with the real estate owners to make this possible (ibid.).

The active industries of Cementa will due to future plans be moved to the Värta harbour. This is a way of liberating ground for new housings. Other structural changes that will affect the site are the replacement of the old industrial buildings of Kolsyrefabriken and Nitrolackfabriken with newer ones. Lövholmen will be facing many structural changes in a near future (Stadsbyggnadskontoret 2008 p.22).

In a broader context the city aims to strengthen the connections of Liljeholmen to surrounding districts and the city core (Stadsbyggnadskontoret 2008 p.18). As a part of this development strategy, particular effort is to be put in creating sustainable and ecological solutions for the two areas Norra Djurgårdsstaden and western Liljeholmen/Lövholmen, which are to be developed as environmental profiles. Lövholmen should be transformed to a diverse urban environment with a clear connection with the waterfront and an obvious environmental profile. (Stockholm stad 2010 p. 34)

Fig 44. Photo from the site. The future of Lövholmen is still under debate. Complications with land owners having different intrests, have been slowing down new development plans.

Research; Inventory

This following part will show inventories made on site presented in maps and photos.

Context and surroundings

Lövholmen is a part of the district of Liljeholmen bordering the district of Gröndal. Liljeholmen is growing rapidly and its built structures consist mainly of modern residential buildings, shopping centres and squares. Gröndal, on the other hand, is a multi-family housing area with characteristic terraced houses and star shaped buildings. Across the water, seen from Lövholmen, there are park-like housing areas in Reimersholme and grid-like block structures in Hornstull. Along the quay of Liljeholmen, to the east, there are large-scale office buildings. To the south you find Lake Trekanten, a popular recreational area. To the west the harbour of Gröndal is located. In this heterogeneous urban fabric Lövholmen is a closed and privately owned area that is hard to visit.

Fig 45. Liljeholmen

Fig 46. Gröndal

Fig 47. Reimersholme

Fig 48. Lake Trekanten

Activities and use

Though many of the industries have shut down their production, there is some activity on the site. Some of the unused and degraded industrial buildings are being filled with new functions, such as art galleries, studios and a café. Several schools are located close by. The site can easily be reached thanks to good infrastructural facilities. Bus, tram and subway stops are located near by, but it is hard to enter the site due to fencing and walls.

Fig 49. Art activities

Fig 50. Tram stop

Fig 51. Schools

Fig 52. Fencing and walls

Context and surroundings

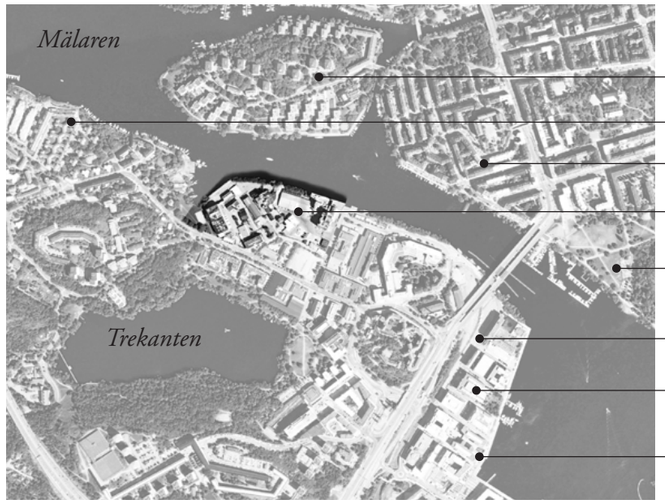


Fig 53. Map of Lövholmen and it´s surroundings

Activities and use

Fig 54. Aerial photo of the site

Topography, geology and water levels

The ground on the site consists of moraine, rock and clay and has a central high point, reaching eight meters above sea level. The terrain descends gradually towards the waterfront of Lake Mälaren. There are two low parts in the area, on both the sides of the height, where storm water naturally moves (Göransson 2013 p.26). The site has gone through some changes as the former shoreline indicates (fig 58). Earth filling was used to enlarge the area, making it possible for the site to hold more industrial activities in 1930 (Bivegård & Vikström 2008 p.41). As the map shows the levels in the terrain and the location close to the water makes it vulnerable for flooding. At heavy rains the water level of Lake Mälaren can rise up to 1, 3 meters from the current level and make the site flooded leaving the buildings demolished. At extreme flooding the estimation is that the levels can rise as far as 2, 3 meters above normal levels.

Built structure

Many of the buildings on site have a value representing the early industrialization of Stockholm. Factories used for color production and carbon oxide are some examples of the oldest kept industrial buildings on the site. They bear witness of a significant industrial history (Nyréns Arkitektkontor 2008 p.11). Some of the buildings have not been active for many years, not been looked after properly and are now degraded and worn down. Some factories are even contaminated and pose a health risk to visitors. On the right side of the map all the built structures are listed.

Fig 55. Degraded carbon oxide factory

Fig 56. Nitrolacksfabriken from 1944 stands empty

Fig 57. Factories of Cementa in use

Topography, geology and water levels

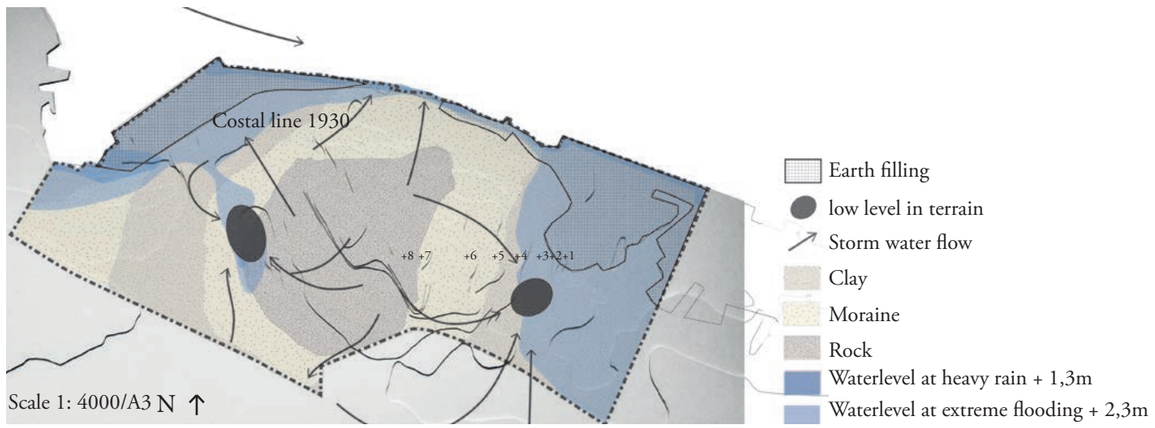


Fig 58. Map of topography, geology and water levels

Built structure

Fig 59. Map of built structure

1. *Kolsyrefabriken (1896)*
2. *Spredfabriken* (1953)
3. *Cementa AB* (1945)
4. *Nitrolackfabriken* (1944)
5. *Workshop hall and storage* (1962)
6. *Steam-boiler central* (1945)
7. *Färgfabriken* (1889); art gallery and café
8. *Smedjan* (1889); oldest building on site
9. *Förbandsfabriken* (1915)
10. *Platform Stockholm*;Artist Association(1926)
11. Stalk from the steam-boiler central (1945)
12. Silos fron the Carbon oxide factory (1896)
13. *CAGA*, Concrete Art Gallery and Acedemy
14. Liljeholmen studio/ workshop Association
15. Silos from the concrete factory of *Cementa*

Contaminations

The industrial activity and use of the site have left high contents of heavy metals in the soil. The contaminations come mainly from the former productions of carbon oxide and the color production (Länsstyrelsen 2007 pp.30-31). Measurements of contamination in the soil show increased contents of a great number of metals. The highest contents are those of barium, quicksilver, lead and zinc (Sweco Environment AB 2011 pp.3-4). Assumptions made by the County Administrative Board of Stockholm, estimate high levels of contaminations in some of the buildings and in the sediment of Lake Mälaren (Länsstyrelsen 2007 pp.30-31). Due to the hilly topography on site the storm water, and therefore also contaminations, move towards lower parts and the waterfront. The map shows areas with medium and high levels of contaminations and the test points that Skanska and the art gallery Färgfabriken have made as a base of information for the upcoming development plans of the area (Sweco Environment AB 2012 pp. 6-8).

Movement and nodes

Liljeholmen is a district with good infrastructure that connects the area with the city centre of Stockholm. Lövholmen is easy to reach with bus, tram and subway but quite hard to enter. Due to the fact that the site is privately owned and partially still holding industrial activities, most of the site is not accessible for the public. Only one central road leading to the art gallery (Färgfabriken) is public. Cars can drive around the site but not enter the actual area. Neither pedestrians nor bikers can reach the area from the waterfront or travel along the water. The map shows which buildings are public and which are private.

Fig 60. Biking lanes

Fig 61. Tram stop

Fig 62. The only public road on site

Fig 63. Fences and walls hinder visitors from entering the site

Levels of contamination

Fig 64. Map of levels of contaminations

Movement and nodes

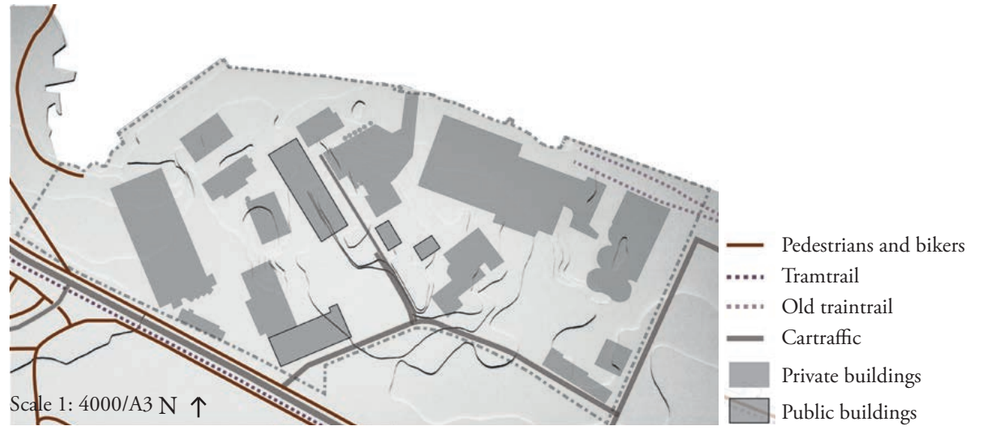


Fig 65. Map of movement and nodes

Vegetation and hard surfaces

As the map show, the site lacks intense green structure. Some brushwood of willow (Salix) and alder (Alnus) trees grows along the shoreline. The inventories showed that the vegetation on site consists mainly of deciduous trees with only a few coniferous trees on the hilly parts of the site. Species found on site were aspen, alder, maple, birch, ash, chestnut and pine. The area is almost entirely covered by asphalt; only small patches reveal the ground or are covered by grass. In the surrounding area there is more greenery. By the main road leading past Lövholmen Acer platanoides and Ulmus glabra grow as street trees. The area around lake Trekanten near by has traditional regional species growing in the park. Examples of traditional species are *Acer platanoides, Alnus glutinosa, Betula pendula, Betula pubescens, Crataegus, Fraxinus exelsior, Juniperus communis, Malus, Popula tremula, Picea abies, Pinus sylvestris, Prunus avium, Quercus robur, Salix caprea, Salix fragilis, Sorbus aucuparia, Tilia cordata, Prunus padus, Salix pentandra, Ulmus glabra* (Markkontoret 2006 p.55)

Vegetation and hard surfaces

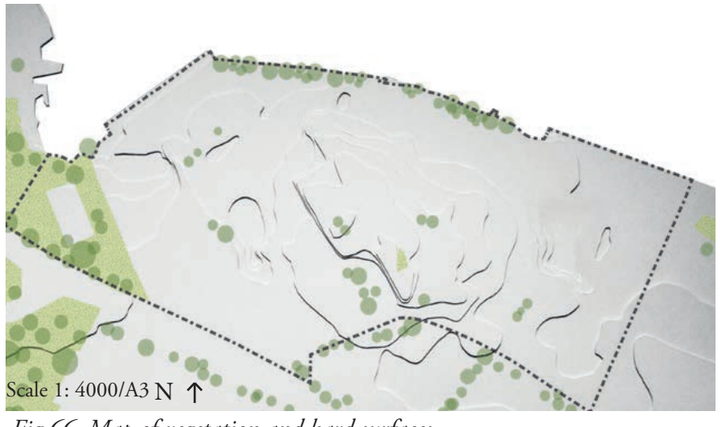


Fig 66. Map of vegetation and hard surfaces

Vistas

From the site: Standing on the site looking over the water, built structures and housing are the features dominating the view (fig 69 & 74). In some places parts of the site the view by the water is blocked by brushwood (fig 71).

Towards the site: Walking over Liljeholmsbron or when looking at the site from Reimersholme and Hornstull, the characterizing industrial landscape can be seen from a long distance (fig 68). The most dominating features are the silos and the high stalks.

Vistas

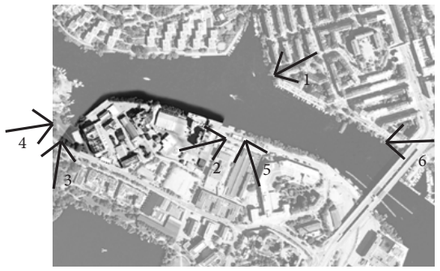


Fig 67. Aerial map

1. 

Fig 68. Vista from Reimersholme

2. 

Fig 69. Vista towards Hornstull

3. 

Fig 70. Vista over the harbour of Gröndal

4. 

Fig 71. Vista towards the site

Fig 72. Old stalk

Fig 73. Silo of Cementa

5. 

Fig 74. Vista towards Reimersholme

6. 

Fig 75. Vista from the bridge of Liljeholmen

Research; Analysis

This part contains analysis of the site and evaluating standpoints. These are shown in maps and photos.

Green and blue structures over time

The site has gone through many changes over time, considering blue and green structures. This analysis shows an overlay of different historical maps illustrating the gradual regression of the blue and green structures on Lövholmen and how the coastal line has changed. The site has evolved from a green hunting ground into a heavily industrialized area, finally to the present partly abandoned state. Some historical traces on the site bear witness of its gradual succession; the old costal line and a hill reshaped during industrialization (Bivegård & Vikström 2008 p.41). The new exploitations in the surrounding areas of Lövholmen claim green space and the green structure in the district is gradually shrinking. Today the nature area around Lake Trekanten undergoes changes that will marginalize the green space in the area even more (Stadsbyggnadskontoret 2013 p.2).

Fig 76. Illustration of changing green and blue structures on site.
Overlay of historical maps 1733-2014

Green and blue structures over time

Fig 77. Map from 1733

Fig 78. Map from 1934

Fig 79. Map from 1940

Fig 80. Map from 1976

Figure and ground

A figure and ground analysis reveals the problematic relationship of the built structure and the open spaces. Both the built structure and the open space are fragmented due to a lack of hierarchy and organisation of the elements. The built structure creates an unorganized site as it consists of buildings of varying shape and size that do not relate to each other. This leaves the surrounding spaces lacking definitive shapes, and a coherent structure. Some of the big scale buildings occupy a large area and block potential entrances and access to the site.

This relationship of figure and ground has its explanation in the aim of industrial interests to maximize their production within the factories and in conjunction to them. There has been little or no incentives to shape the space surrounding the built structure into coherent areas since no one is allowed to enter and make use of it. If the area is turned into a public area, the organization of open space becomes important to the experience of the site, influencing aspects as accessibility and vistas.

Private and public space

The site is privately owned and a large part of it is closed for public making the area hard to access. The amount of surface accessible for public is only 7ooo m^2 of the total area 60 000 m^2, approximately 12 percent. Already from a distance the site appears closed and inaccessible. The fences and the large-scale industrial character of the area gives an impression of being private and semiprivate even at places that are open to the public. Only buildings holding artistic activities: the art gallery, art association Platform Stockholm and the smaller art studios, are really accessible. We see the area of Lövholmen as having great potential to become a more accessible and visited space, since it has close connections to tram- and bus stops and the subway. Situated by the waterfront, near the city centre and close to valuable green areas the site is an attractive spot for new developments.

Figure and ground

Fig 81. Map of figure and ground analysis

Private and public space

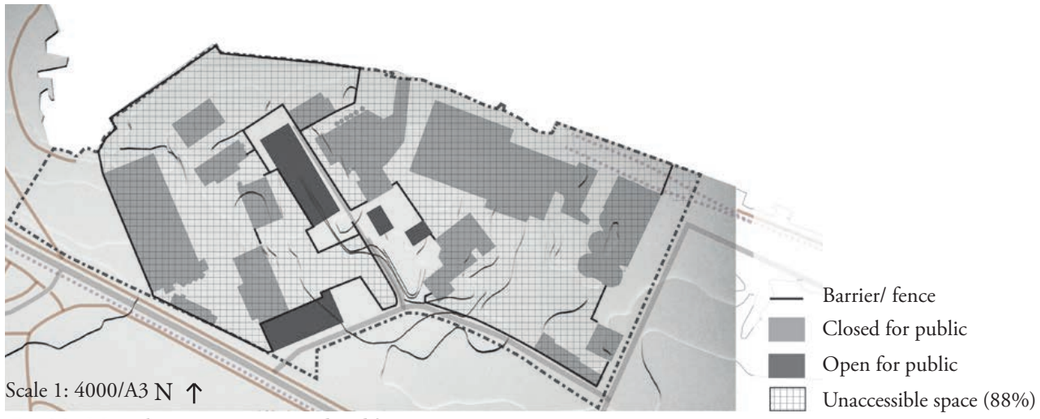


Fig 82. Map showing private and public space

Evaluating built structures

Some of the built structure should be removed to create a more coherent spatiality and an improved hierarchy between space and volume. Several criteria influenced the evaluation of which buildings to remove and which to preserve. Present activity in building, its location, current state and condition (well-maintained, moderately maintained or degraded), possible value as landmark, as well as the capacity of the building to hold new alternative functions, are factors that were taken into consideration. Some of the buildings are situated low in the terrain on clay ground making them vulnerable for flooding which also affected the decisions. Below the buildings are listed with criteria to motivate preservation or removal of each specific building.

Buildings and elements worthy of preservation

A. *Färgfabriken* (1889) art gallery and café; well maintained building holding cultural activities
B. *Smedjan* (1889); oldest building on site, landmark with potentials of holding new functions
C. *Förbandsfabriken* (1915); well maintained, possibility to hold new functions
D. *Platform Stockholm*; Artist Association (1926); current activity, well maintained
E. Stalk from the steam-boiler central (1945); landmark, possibility to hold new functions
F. Silos from the Carbon oxide factory (1896); landmark
G. *CAGA*, Concrete Art Gallery and Acedemy; current activity, well maintained
H. Liljeholmen studio/ workshop Association; current activity, well maintained
I. Silos of concrete factory *Cementa;* landmark, well maintained, possibilities for new functions

Buildings that will be removed

1. *Kolsyrefabriken (1896);* factory for production of Carbon Oxide. Today the production has ended and the factory building is unused and worn down. High levels of contaminations have been measured in the building.
2. *Spredfabriken* (1953); functions today as warehouse. Located in a risk zone for water flooding on clay ground. Blocks the main entrance to the public space. Building degraded.
3. *Cementa AB* (1945); provide the Stockholm region with concrete. The factory is still in use but will, according to future plans, be moved.
4. *Nitrolackfabriken* (1944); intended for nitrocellulose lacquering for the colour activities in the area. Rebuilt to office in 1990. Located in risk zone for water flooding and on clay ground.
5. *Workshop hall and storage* (1962); low building lacking connection to the neigbour building. Located in risk zone for water flooding. Blocks an important entrence.
6. *Steam-boiler central* (1945); located in risk zone for water flooding.

Evaluating built structures

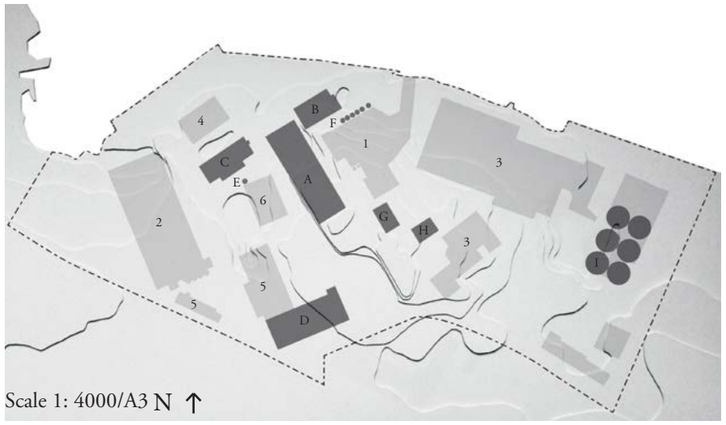


Fig 83. Map showing preserved and removed buildings

Buildings and elements worthy of preservation

Fig 84. A. Färgfabriken

Fig 85. F. Silos of the Carbon oxide factory

Fig 86. G+H. Art galleries and studios

Buildings that will be removed

Fig 87. 1. Carbon oxide factory

Fig 88. 3. Cementa AB

Fig 89. 4. Spredfabriken

Conclusions

Through our research we accumulated a greater understanding of the site. Lövholmen has many qualities to highlight and potentials to be put to use, but it is also a problematic site requiring a conscious strategy for action. The research process helped us build up an idea of what kind of role Lövholmen could and should play in the future.

The strategic central location of Lövholmen, close to many schools and other points of interest can create opportunities for people in Stockholm to meet, learn and influence their surroundings if opened for the public. Though the site is mainly private and closed, parts of the site is currently being activated as an art gallery and studios draws visitors. This shows that the site does have a force of attraction. Additionally close connections to tram- and bus traffic and the green area around Lake Trekanten provides the area with great potential of becoming a more accessible and visited space.

The studied site lacks intense green structure. Lake Trekanten and its surroundings have a great green value that could be enhanced and linked to the industrial area, in this way stretching the green structure from southwest to northeast. Current trends in Stockholm show decreasing greenery in the city and privatization of land by the water. By introducing Lövholmen as a public green space with water contact, the city could show an active will to preserve these public goods for common use.

Lövholmen has an important history to acknowledge and has gone through many stages in the past. The industrial activities that shaped Sweden, turning the country marked by poverty into a welfare state, found a strategic location at Lövholmen, due to its preconditions and location. These historical and cultural values of the site are an asset and should be treasured. We feel Lövholmen should remain as a site in succession; transformations from an idyllic summer residence for the bourgeoisie, via nursery and timber-yard, through an era of industrialization could in the future be followed by a more sustainable development.

The site is currently an environmentally unsustainable urban place in need of change. The contaminations in the buildings and soil are in risk of spreading out in the city and needs decontamination. Areas with low topography on the site could be used for storm water storing. The proximity to the water, low topography and clay on large parts of the site makes the place problematic to build on.

We see possibilities of developing the city's vision of turning lövholmen into an area with a sustainable profile. However we find current development plans promoting new housing in the area problematical. Stockholm is expanding and the need for new housing great, but this has to be put into relation with a trend where public spaces by the water keep decreasing in the city. The area is also, as previously mentioned, problematic to build on. We propose the site be opened up for public use and recreation with a clear sustainable profile.

Fig 90. Photo of the site

Fig 91. Model photo

To study a post industrial site with the aim of creating a new design demands explicit background research, not only about the physical site but also about theories that can be applied on it. In this chapter we will explore current views on ecologically sustainable design. This field is broad and we have limited this part to contain three approaches. Firstly ecological design defined by landscape architects Nancy Rottle and Ken Yocom from the US, secondly environmental aesthetics as understood by German landscape architect Udo Weilacher and thirdly the philosophy of practitioners at the office Vogt landscape. This part is followed by an introduction to Brownfields and remediation processes that can be applied when handling contaminated soil. We have limited this part to contain natural remediation processes that treat the soil on site (in-situ). This way we hope to build up a platform of theoretical, practical and technical knowledge to apply on the case Lövholmen.

Ecological Design

”At the beginning of the twenty-first century all disciplines concerned with designing and shaping the environment see themselves confronted with new, exceptionally dynamic development trends shaping the image of the landscape as well as our perception of nature and ideas of the environment... There is decreasing confidence in the effectiveness of human attempts to make corrections in a complexly interlinked heterogeneous environmental system.”
(Weilacher 2007 p.81)

The quote highlights the complex task of landscape architecture in a rapidly transforming society to create a design that is ecologically viable and sustainable at present as well as in future scenarios. The site of Lövholmen has not succeeded in adapting to future context of our now informational rather than industrial society. In many ways the site is an environmental ticking bomb.

Since the 1970’s several aesthetical ideologies has been interested in involving natural processes and environmental systems in design. Vast areas of derelict industrial landscapes became at this time of common concern (Weilacher 2004 p. 116). Many designers, planners and artist struggled to restore these hurt landscapes into liveable and appealing places (Strelow 2004 p. 156). Ian McHarg wrote the much quoted book ”Design with nature” in 1969 and artistic movements like Land art and Reclamation art all speak of a paradigm shift to abandon formal aesthetics in favour for ecology (Weilacher 2004 p 116).

According to Landscape Architects Nancy Rottle and Ken Yocom current ecological design: *”proposes design interventions that constitute an integration of human needs and desires while supporting the health of natural systems”* (Rottle & Yocom 2010 p. 6). Thus the ecological design and planning should promote a symbiosis of industrial, cultural, social and environmental values. The theory aims at finding strategies for several different interests to coexist within landscapes. To become truly sustainable different components in our landscapes need to be in balance. These interests need not always be in contradiction to each other. Ecologically conscious developments are mutually beneficial for man and his surroundings. When possibilities for human interaction with nature grows, this increases the well being of people which is proved in many research studies (Rottle & Yocom. 2010 p. 6). In the long run the social sustainability of the whole community benefits from this. In urban settings the possibilities for people to interact with nature are most limited and there is a need to develop a stronger and more coherent green structure in cities. The role of Central park in New York is given as an example of a socially and recreationally indispensable green space in an urban context (Ibid).

Statistics show that climate change is real. Nevertheless science fails to predict all the consequences current environmental changes will have on our ecosystem. Although future challenges remain unknown, ecological design provides possibilities to take action for our environment. The concept of diversity often comes up as a strategy. It has been proven to improve the environments resilience and its chance to adaptation. *”Diverse ecological systems are known for their ability to withstand catastrophic change: fire, storms even wilful human destruction”* (Collins 2004 p.172) By actively promoting biodiversity in our planning strategies, our community can strive for ecological balance (Ibid). There are different ways of doing this. One example of promoting biodiversity is by restoring diverse environments like wetland areas. When regenerating landscapes native plants are more likely to have a successful establishment since they are adapted to local nutritional networks and animals (Rottle & Yocom. 2010 p. 110).

Rottle argues that planning strategies fighting climate change have been worked on mainly on a global scale. On a local level the tradition has been rather to focus on adaption to different impacts of climate change, for example managing rising sea levels. There are unused potentials to actively mitigate climate change on a local level by working with green infrastructure: *”...in the urban context at the local level, green infrastructure practices may both protect the overall global climate by mitigating or reducing destructive anthropogenic greenhouse gases while simultaneously providing adaptive buffering from inevitable climate change impacts.”* (Rottle 2013 p. 42). It is important to continue planning for sustainability and fight climate change at both a local and a global level, and not only handle the different symptoms the phenomenon results in.

Yocom and Rottle goes further beyond promoting that landscapes be sustainable to striving for an even richer ecological environment. There should be possibilities for a wide range of natural processes to work more freely in our landscapes. (Rottle & Yocom. 2010 p. 6). Examples of natural processes that can be promoted by ecological design is collection of rain water by shaping the terrain, planting pioneer species that can provide the soil with nitrogen thus improving the preconditions to other vegetation to thrive and canalizing rainwater to wetlands (a.a p.110).

Theory; From theory to practice

This part contains examples of projects and working methods showing how ecological theory can be applied in practice.

Environmental Aesthetics

German landscape Architect Udo Weilacher emphasizes the importance of finding a general environmental aesthetics; one that is open and can allow different kinds of expressions. The ecological design trends of the 70's was according to Weilacher often more focused on reproducing ideal pictures of ecology instead of trying to achieve true environmental values (Weilacher 2004 s.116). He identifies and accounts for three important features of current environmental aesthetics.

Firstly there is sensitivity to stratification in key projects of ecological design today. The design is focused on highlighting the unique qualities of a place and its location (a.a. s. 117). Since many layers of past events have shaped sites the new design has to relate to these layers, otherwise the special character of the site can be lost. By letting traces of past activities remain in the landscape the importance of history is acknowledged. The park Duisberg Nord by Latz + Partner from 1991 is perhaps the most well known example of this kind of approach. The old industrial site has been turned into a park. Lantz + Partner left the industrial structures to remain on site, but allowed the wild nature to take over these man made elements over time (Ibid.).

Secondly the new projects tend to be process-oriented. Since space constantly changes and is reshaped over time design has to acknowledge and relate to this fact. A project clearly influenced by this is Oerliker park. The park is an example of an urban design that strives to make change visible in our everyday environment. Landscape architect Rainer Zulauf had the intention when designing the park not to make a "ready-to-move-into" park (Weilacher 2004 p.118) and people are able to witness the gradual growth and succession of a thousand young trees in the city. The design of the park is minimalistic with few other materials (Weilacher 2005 p.130). Thus the natural processes of growth and succession are allowed to remain the driving force and main attraction of the design.

Further Weilacher states that traditional ecological aesthetics is inadequate and new reference images of nature is needed (ibid.) Present development in our society requires a new understanding of nature. Our mental picturesque images of nature and beauty can stand in the way of true environmental development, ecological diversity being characterized by dynamism, complexity, symbiosis and contradiction as opposed to classical aesthetics with focus on unity, regularity and proportion. Weilacher gives an example this new language in the form of a small courtyard by the firm Kienast Vogt Partner. (Weilacher 2005 p. 125). The small courtyard's main element is a light tufa wall. Small amounts of water pouring down the wall keeps it moist and allows moss, small plants, lichen and algae to grow (a.a. p.127). The expression of the wall changes daily due to changing humidity and succession of growing vegetation.

The tufa wall of Kienast Vogt and Partners is "an intellectual challenge" and a "provocation" since it challenges common images of natural beauty (Weilacher 2007 p.92). To learn to read the signs of a healthy environment in ecological balance and learn to appreciate it aesthetically takes time (Collins 2004 p.172). Thus ecological design cannot be achieved solely with professional effort, it requires a civic dialogue that engages the whole community.

Features of environmental design according to Udo Weilacher

Sensitivity to stratification:

Fig 92. Landschaftspark Duisburg-Nord

Process orientated design:

Fig 93. Oerliker Park

A new design language:

Fig 94 and 95. Courtyard Basler + Partner

Theory; From theory to practice

Vogt Landscapes

Gunter Vogt, former partner in Kienast Vogt Partner, started a new firm after his collaboration with Dieter Kienast. Vogt Landscapes is today an office stationed in Zurich, London and Munich. The firm continues the tradition of Kienast Vogt Partner, to search for new methods of doing sustainable and innovative design, like the example of the courtyard of Basler + Partner. We felt their working philosophy related to Rottle and Yocoms description of ecological design, applied to many of Weilachers ideas on environmental aesthetics, and matched the competitions requests to put research in focus. In this way the office became a source of inspiration showing how theory can become practice, and what this working process can look like.

Vogt Landscapes emphasize the need to *"walk the landscape*" to understand it (Vogt 2010 p.8). These visits to the physical place and following reflections are a quest to find the unique qualities of a place. One that can build up a future design. Project and research should develop side-by-side, influencing and conditioning each other. By developing design and research simultaneously the work veers between distance and engagement, objectivity and personal commitment, both positions being equally important for a successful outcome (a.a. p.9). The need to allow sufficient time for research, is legitimized by the following quotes:

"Seeing landscape in static terms and treating it as an aesthetic unity is a practice corresponding less and less to reality." (Vogt 2010 p. 15). *"The design of urban open spaces always entails altering something: the water supply, soil resources or social structures. Every change produces further changes that can ultimately reach a geological scale..."* (Vogt 2010 p. 14)

If landscapes are recognized as complex ecological systems, the impact of human actions on this system make the concept of sustainability essential Gunter Vogt argues (a.a. p.14) Thus landscape architects have a responsibility to understand different processes affecting a site, in order to create sustainable design solutions. The research has yet another important dimension. During the process of searching, a proximity to natural phenomenon can grow, a proximity that is otherwise often lost in today's society (a.a. p.15). *"The searching for the unknown requires engagement and proximity to the investigated object. It is the searching rather than the finding that creates this proximity."* (Vogt pp. 14-15) In a way searching and researching can sometimes be more vital for the landscape architect than the actual finding.

The design process of the office is described as both analogue and digital. A broadness of methods is important since different tools can promote different perspectives and insights. The model is given a special value as working method for both research and design:

"When applied as a tool for analysing existing spaces, the model enables us to develop a fundamental and far-reaching understanding of a location and reveals initial possibilities for design interventions. When the model of existing conditions becomes the design model, design emerges quite concretely from these pre-existing conditions. Modelling not only abrogates the division between analysis and design, it also provides a point of contact between the local context and its further development through planning," (Vogt 2010 p. 21)

Fig 96. Gunter Vogt was involved in designing the courtyard for Basler + Partner. Later on he founded Vogt Landscapes. The photo shows the courtyard in 2005.

Fig 97. The appearance of the wall changes with the level of humidity and succession of plants. The photo shows the courtyard in 2010.

Brownfields

"By taking full advantage of existing infrastructure, cleaning up contamination, and leaving greenfields untouched in their virgin states, brownfields take center stage in a sustainable planning strategy of thwarting sprawl, preserving open space, reducing greenhouse-gas emissions, and reinvesting in urbanized areas and their communities." (Hollander et.al 2010 pp. 2-3).

Brownfileds are common features in cityscapes today and can be found in every country, all around the world (Ignatieva 2013). The term originates from the early 1990s and refers to abandoned, under-used or idled industrial and commercial sites (Kirkwood 2001 p. 4). Redevelopment of Brownfields are complicated due to real or perceived environmental contamination on the sites, which is also the greatest problem and an obstacle to putting them back into use (Hollander et. al 2010 p. 1). The need for taking action over these sites along with reconsideration and valuating them as viable sites of regeneration and recovery has resulted in a broad field of research. The potential for economic redevelopment of land, putting empty and polluted industrial buildings or lots into use, is also an essential association to the raising research (Kirkwood 2001 p. 4).

Of all real estate transfers in the United States, twenty percent are Brownfields (Ignatieva 2013). Brownfield environments can be exemplified as gas stations, oil-tank farms, chemical manufacturing and light-industrial factory sites among others (Hollander et.al 2010 p. 2). The reasons for the need of redevelopment are many; protection of environmental and public health, usage of existing infrastructure, avoidance of green space development, job creation and quality of life issues. Parks, gardens and waterfront promenades are some examples of how Brownfields can be redeveloped and reused and become viable natural sites in our cities (Ignatieva 2013). The redevelopment encourages productive use, reuse and cleanup of idled sites rather than new development of open green spaces and can easily be integrated in the urban fabric (Kirkwood 2001 p. 20). One example of Brownfield redevelopment is the Gas Works Park in Seattle (fig 98). The park is 19.1 acres and opened for the public in 1975 (a.a. p.162).

While redeveloping Brownfields some general processes have to be done like inventories, investigations as well as remediation of the site. An estimated timeline for each redevelopment, dependent on the contaminations, has to be made. The timeline could be as follows; investigation (18 months), feasibility study (6 months), remediation development (6 months) and remediation (years). The total time requires approximately 5- 7 years (Ignatieva, 2013).

Cleanup solutions of Brownfields aim to reduce, remove or isolate the contaminations from the soil and can be done using different remediation methods such as Bioremediation and Phytotechnology (Kanaplue 2003 p.15).

Fig 98. Gas Works Park, Seattle

Theory; Remediation Processes

There are many ways of cleaning contaminated soil. This part gives an introduction to two natural remediation processes, Phytotechnologies and Bioremediation that are applied in-situ and therefore sustainable methods of cleaning contaminated grounds. Phytotechnologies (also called phytoremediation) is the gathered term of technologies that uses plants to remediate or clean pollutants from the contaminated water and soil while Bioremediation being a process using microorganisms as fungi or bacteria to convert contaminated water and soil to nontoxic (Kanaplue 2003 p.15). This goes in line with the mission of the competition and the visions of sustainability we are striving for.

Phytoremediation

Phytoremediation is a cleanup technology that remediates and restores contaminated soils, sediments and water, by means of plants. It involves the use of vascular plants, fungi and algae to control or remove wastes. The process is based on the innate ability of plants to stabilize, absorb and transform contaminations and is primarily sun powered. It is thus a more sustainable way of taking care of contaminations. The remediation process can be divided into subcategories as phytoextraction or Hyperaccumulation, rhizofiltration and phytostabilization (Kanaplue 2003 p.15).

Phytoremediation can be applied on site, in-situ, which means a cheaper way of treating contaminations when no large quantities of soil have to be excavated. Phytoremediation can also serve as an aesthetic effect on environments, treating the soil with plants. The method can be used when handling areas contaminated with for example heavy metals, radionuclides, nutrients, salts and air pollution (McCutcheon & Schnoor 2003 p.5).

Willows and poplar species are some plants that are commonly used for cleanup. While containing contaminations within the trees they can continue grow and live on site for 25 -50 years (Ignatieva 2003 p. 36). For being a slow remediation process the method is often neglected due to the need for faster solutions of handling degraded and contaminated areas. But as Falk and Ronnheden highlights in their master thesis the time aspect can be turned into an advantage.

"Phytoremediation holds a series of advantages in comparison to other remediation methods. What makes it of high interest for us as landscape architects is the opportunity to transform unavailable spaces into available, green areas. The time aspect can be turned into an advantage through the making of aesthetically pleasing, interesting and recreational areas." (Falk & Ronnheden 2010 p.6)

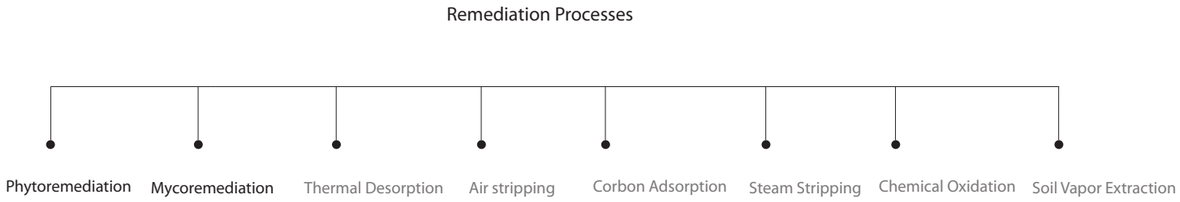


Fig 99. Diagram of different types of remidiation.

Fig 100. Species of salix are often used for phytoremediation. Here is a photo of an on going experiment plantation at The Swedish University of Agricultural Sciences.

Theory; Remediation Processes

Mycoremediation

Mycoremediation is a remediation process that uses different kinds of fungi to degrade pollutants from contaminated environments. Fungi can grow under extreme conditions considering temperature, pH, concentration of metals and accessibility to nutrients, making them multifaceted. Fungi can dismantle long-chained toxins into elementary less toxic chemicals due to their ability to partition molecules. Since the fungi canalize heavy metals from the ground into their fruit bodies, toxins are removed from the soil. There are two ways of using mycelium either mycelietal mats that are placed over the contaminated sites or by mixing the mycelium into the contaminated soil (Hansen 2012).

When placing sawdust spawn containing mycelium over contaminated area the fungi will penetrate the soil, breaking down toxins on its way (see figure). As the soil is gradually cleaned, microbes can start to grow as the fungi provides a nutrient source for them. Experiments in the US show that soil treated with mycelium contain high amount of nutrients (Vetenskapens värld 2014). This is important for establishment of plants and a continued ecological restoration process. The ecological values of mycelium are described in the following quote;

"Mycelium contribute to biodiversity in nature by providing a nutrient source for microbes aiding in the decomposing process when there is an imbalance in the environment caused by the presence of a pollutant. Mycoremediated areas also provide the framework to jumpstart the ecological restoration process. When selecting mushrooms for remediating a toxic site, choose species that naturally grow there first. Spent mushroom compost is much more bio diverse and thus more effective than a pure culture in remediating a polluted site." (Hansen 2012)

Fig 101. Growing mycelium can penetrate the ground and clean it from toxins.

Conclusions

The theoretical literature study gave us an insight in the current thoughts and ideas on designing ecologically. There is much debate in the area and a broad range of literature has been written. We have only explored a small fraction of it. The challenges of aiming at an ecological design soon became evident, but there is also an optimism to be found in ecological design practice and exciting examples to be inspired by. Since the term is frequently used in our profession it can be useful to have a personal opinion of it and a critical eye when looking at design proposals that claim to be ecological. Our understanding of ecologic design has been shaped to consist of the following aspects:

- Environments are complex systems, which require a design that takes into account the interrelationship of spaciality. Each site is unique and exists as a part of a bigger ecological system. We can aspire to understand these connections by doing thorough background research and working actively in different scales considering for example green infrastructure.
- An aim for ecological design should be to promote diversity and the possibility of natural processes to work on a site. This strengthens the resilience of the environment and can also add experiential values to the site.
- A stronger awareness of ecological values in the community is essential for a successful outcome of environmental design. An improved awareness in society can be promoted actively with design and aesthetics, for example including pedagogical features in urban spaces.

In our design we aim to incorporate these aspect. The investigation of how theory can work in practice has been valuable. We have been inspired by various examples of environmental friendly aesthetics by different reference projects and the experience of the firm Vogt Landscapes. These have given us ideas both of how to work and how to think. But even with these projects in mind, the most important knowledge we take with us, is the need of site specific solutions that are adapted to the special circumstances of the specific project. This we believe is the key to sustainable design.

By exploring natural remediation processes we wanted to find a solution to treat the soil in Lövholmen in an ecological way. We thought it necessary to find methods to clean the site in-situ to be able to claim that our proposal is sustainable. Due to the visionary approach of the competition and the strive for new innovative technologies we searched for methods to meet these requirements. We became especially interested in mycoremediation; a method that has not yet won ground in Sweden but could be an alternative solution to current methods to treat degraded and unused post- industrial landscapes. We will use the method of Mycoremediation to treat current contaminations on Lövholmen. The method of phytoremediation has become a rather well known method that also could be applied on our choice of site. The method of Phytoremediation calls for a detailed and substantial lists of plants, something that is out of the mission for this competition. To use vegetation is a slower process to clean soil than using fungi, but it is also an alternative that makes the remediation long term, since the vegetation can clean soil in-situ up to 50 years. We have recognized the values of phytoremidiation as an interesting remediation process that also provides a design possibility. We would like to find a way to apply it on the site, but will not work out a planting scheme for how this could take form since this is beyond the aims of this study.

Fig 102. Model photo

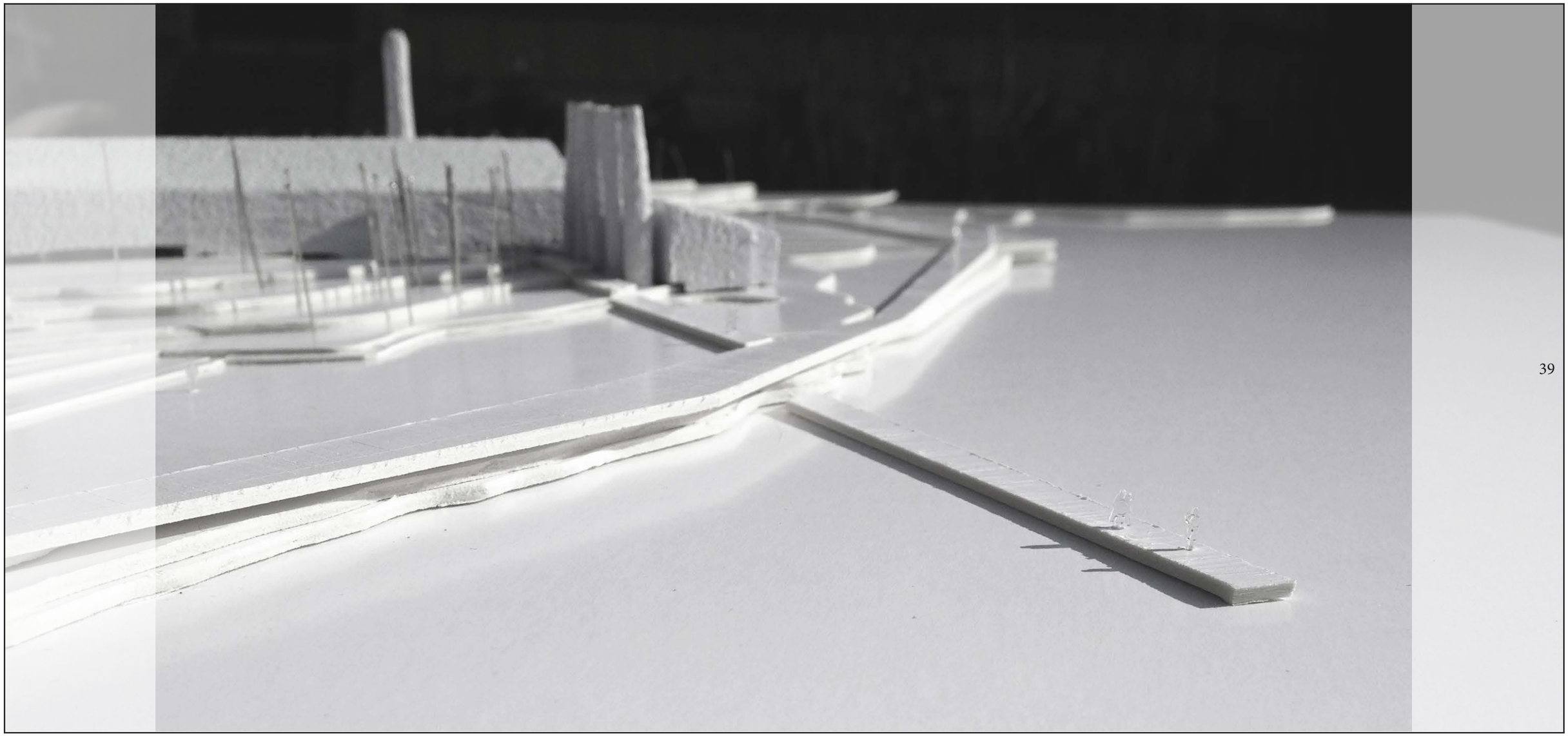


Fig 103. Model photo

Design and Competition Proposal

This chapter focuses on our participation in the competition entry. We will account for the underlying inspiration for our entry, the vision and concept that guided the design and present the final proposal. The competition entry consists of several design levels, from large-scale visions down to site specific solutions.

Vision and concept

We suggest a vision where the municipality of Stockholm introduces new rules for how Stockholm can develop in a sustainable way in the future. Stockholm is one of the fastest growing cities in Europe, claiming space for housing, service and parking lots in our urban landscapes. Our vision suggests a compensating intervention for these exploitations; a green compensation. The degraded industrial site Lövholmen is through a self cleaning process turned into a symbolic spot that promotes diversity and sustainability instead of contaminations: *Arboretum Lövholmen*. The arboretum will act as a central catalyst for the green structures of Stockholm city as a productive nursery that generates trees for urban settings.

As the former polluted and inaccessible site is opened up and transformed to an ecological node the site gets a reversed function within the city. The planted vegetation will be used in future city projects in Stockholm promoting the maintenance of a green city. Planted species will over time create a network of related trees in Stockholm, integrating the whole city as an extension to the Arboretum. It will also be a source of knowledge of our common responsibility, nature in the city. Visitors can get to know the trees of Lövholmen and learn more about their future in a setting where old industrial landmarks still remind them of an unsustainable past. In this way the area opens up possibilities for people in Stockholm to get evolved and engaged in a greener development.

Lövholmen glances back at its history as an idyllic green place, nursery and timber-yard, through an era of human actions and industrialization and looks ahead into the future as a valuable green growing forest in the city of Stockholm. Thus *Arboretum Lövholmen* provides a possibility for Lövholmen to remain as a site in succession. The ever growing arboretum will stand as a symbol and provide knowledge about our fast growing cities. It will be administrated by the city of Stockholm and will make place for new plants and trees when needed. The Arboretum in Lövholmen is developed according to our own definition of the term. *Arboretum Lövholmen* will be an urban public place for activities, knowledge and storytelling.

Definition: Arboretum

According to Webster's Dictionary an arboretum has two definitions, firstly it can be *"a place where many kinds of trees and shrubs are grown; a botanical or tree garden cultivated for scientific purposes"* and secondly *"a wooded public park"* (Webster 1977 pp. 95-96). We see potentials of using the botanical concept of arboretum in a wider more popular sense. Our interpretation of an Arboretum is that it can be part of the urban cityscape as a green node for knowledge, recreation, social activity and tree production. The Arboretum spreads knowledge and represents the green fabric in an urban context.

Fig 104. Conceptual image: The industrial site of Lövholmen has spread pollution over the city. The proposal Arboretum Lövholmen suggest a reversed function of the site, turning it into a green catalyst.

Fig 105. Conceptual image of trees from Lövholmen

Three Scales Design

Our vision aims to integrate a broader context into the site specific design. We search identity and meaning from the green expansion of Stockholm and its green wedges (see p.16). The ambition with three scales is to integrate the regional nature of the important green wedges (fig 107), with Lövholmen as a strategic node in the city (fig 106) down to the site specific trees that will grow in the Arboretum and later be distributed within the city (fig 108).

We have seen the degraded post- industrial site of Lövholmen as a potential node of the green structures in Stockholm, but as a visionary one. Our proposal aims to see the trees, the details, as a part of a whole. The trees become links that connect Lövholmen to the city of Stockholm. The historical layers of the urban development of Stockholm, has served as a bank of knowledge creating an understanding of green infrastructure and how it tends to change over time as built structures claim space in the urban landscapes. We have seen the site of Lövholmen as an important spot for maintaining green growing urban landscapes. It is a site that can spread and work as a green distributor in a continuously expanding Stockholm. The trees will be the symbolic new green layer in Stockholm.

Fig 106. Lövholmen is a strategic node that can play a central role in linking these green wedges, connecting the green structure in the city from west to east.

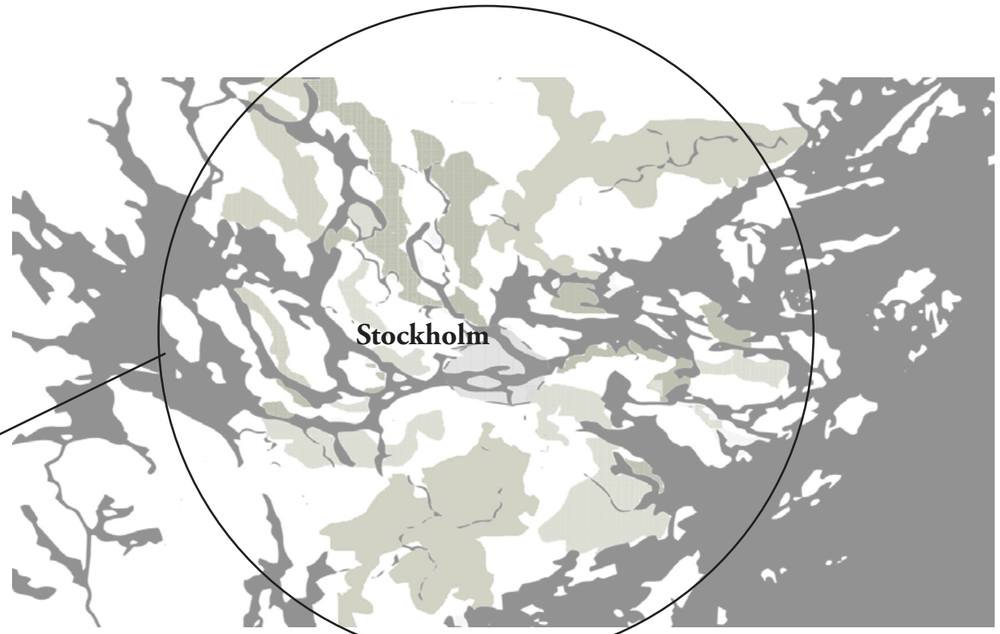


Fig 107. In Stockholm green wedges characterizes the city. Greenery from the outskirts of Stockholm is allowed to infiltrate deep in to the core of central Stockholm.

Fig 108. Model photo; The trees in Lövholmen are the new green layer in the city.

Inspiration and motivation

The symbolic value of trees and the role they play in urban environments has been a great inspiration for us in our participation in the competition. In Stockholm people have shown great commitment to the preservation of old trees in the cityscape. The ”Battle of the Elms” in 1971 is a historically important event in Stockholm when people protected elms standing in Kungsträdgården for several days. A new subway entrance through the area was being planned and the elms standing in its way were to be taken down (Sporrenstrand 2009). In the end the city had to change the original plan and place the entrance further away, preserving the trees. The trees still stand in Kungsträdgården, in central Stockholm and have become a popular social meeting point with a café. A more recent example of public action happened in 2011 when people fought for the rights to a greener city literally tying them selves to an old oak, the so called ”TV-Oak”. This time the plans were not put aside and the tree was removed (TV-eken har fallit 2011).

These examples show that trees engage and involve us. They are the spine of our urban green structures. But the situation of trees in urban settings is getting tougher. An increasing amount of hard surfaces along with pollution results in a short life span of urban trees and only a fraction of the trees grow up to their potential size (Göteborgs stad 2005 p. 5). We have been inspired by the need to keep reacting and caring for nature, understanding and appreciating the role of trees in our cities. It is not only important to protect old individuals, but also to secure a new generation of vital urban trees for the future. In our design we want create opportunities for people to participate in the development and establishment of urban trees and also add pedagogical features that can result in a stronger ecological awareness.

In Lövholmen the engagement for greenery in the city is visible as signs show there is an active opposition against development plans that will decrease the green space around Lake Trekanten (Stadsbyggnadskontoret 2013 p.2). A growing city with sustainable visions demands committed citizens. The history of Stockholm shows there have been visions and commitments to influence the development of the city; that trees can engage and involve the whole community. In our design we see a possibility to turn Lövholmen, formerly excluding and closed, into an open public space.

Fig 109. “Save the park of Trekanten”. This sign is fastened on some trees in the green area next to Lövholmen. People engage against current plans to develop parts of the park, decreasing the green space.

Fig 110. ‘The battle of the Elms’ at Kungsträdgården 1971

Fig 111. People protecting trees 1971

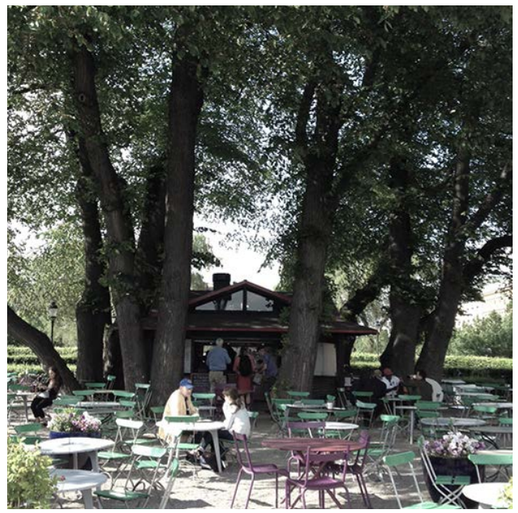


Fig 112- 113. The elmes today. The site has become a popular social meetingpoint in the heart of Stockholm.

Program

The site research and analysis resulted in a program for future development of the site. The program focuses on three main issues: accessibility, sustainability and experience.

Accessibility
- make the site attractive and accessible to the public by turning it in to an open park
- create coherent spatiality by removing parts of the built structure
- open up the site towards the waterfront

Sustainability
- alter the degraded, static and unsustainable image of the site by promoting different natural processes on the site
- make the site into a sustainable ecosystem by taking care of storm water on the site and gradually cleaning the contaminated area by natural means
- create a green spine in and around Lövholmen that connects to the green structure of Lake Trekanten and work with a variety of vegetation species and age with different ecological values
- production of trees in the *Arboretum* that can be used in urban projects in and around Stockholm

Experience
- highlight historical elements on site
- work with a variation of vegetation-types with different ecological and experiential values

By removing buildings we can create new spatiality that can contribute to a more open and a more widely used space. Lake Trekanten and its surroundings have a great green value that we want to enhance and link to the industrial area with walkways, stretching the green structure from southwest to northeast. We see these future scenarios as something that contributes and strengthens the unique character of the site. The future Lövholmen is a place that has to be able to accept changes in water levels, some buildings are removed for that reason. This opens up larger coherent spaces that can become new public areas. Some historical elements, stalks and silos, will be saved and will act as historically important features in the open space.

Fig 114. Program map

- Private, closed an excluding site will be opened up for public use
- Important built elements acting as landmark and bearing witness of the rich history of the site will remain but hold new functions
- The site will link surrounding green structures and actively promote a green and sustainable development of Stockholm city
- The site will be cleaned from contamination in an ecological way and provided with a storm water management system

Strategies for development

The site will emerge gradually and will undergo three stages for future development with focus on accessibility, decontamination and planting.

The first stage: **Accessibility and nodes** 1-3 years

The degraded industrial area is an inaccessible place with fences and closed structures separating the site from its surroundings. The site has a strategic location near the waterfront and should be open for everyone. The first stage in our vision welcomes people, movement and activities. Thus the public becomes involved in the future development of the site. By creating new entrances and walkways, across the site and along the waterfront, the site is made accessible to the public. As a first stage of development for Arboretum Lövholmen one of the oldest buildings on the site, Smedjan, is transformed into a visitor center. The center will guide and inform people about the future project of Arboretum Lövholmen. The building Nitrolacksfabriken, is transformed into a green house where seeds to the source plants of the park will be brought up during three years before being planted in the park. These nodes will welcome people to take part in the rising park.

The second stage: **Spatiality and decontamination** 2 years

The contaminated soil in Lövholmen is a part of its history. We see the succession of the human actions and the industrial history as important features for the identity of the site. Instead of removing the contaminated soil we want to highlight the process of the environment healing itself. We see this recovery as an important process for the sustainable vision for the new site. According to the municipality of Stockholm, the existing industrial activity will be moved to Värta harbour in Stockholm. When buildings disappear, new open structures create spatiality and the decontamination of the site can start. We will use the method of *Mycoremediation* applied on the site as an ecological way to clean the soil. It is a method that uses fungi to degrade pollutants from the environment. The treated soil will after 2 years be moved to the silos for storage. The soil will be used for future plantings of the trees in the park.

The third stage: **Tree planting and wetland establishment** 1-3 years

The vision is based on an ecological idea of cleaning the site of Lövholmen with new green and blue structures. We see the new blue layer of water as a self-cleaning process by phytoremediation and the new green layer of trees in the park as catalysts; new seeds are planted for a future Stockholm. The grown trees, brought up in the green house, will be planted in the park and will be the permanent green structure in the rising Arboretum. They will grow and create spatiality and variety in species. They will also be the source trees for the production of city trees in Lövholmen. The planted trees will also create a green spine around the site that links, strengthens and connects to the green structure of Lake Trekanten.

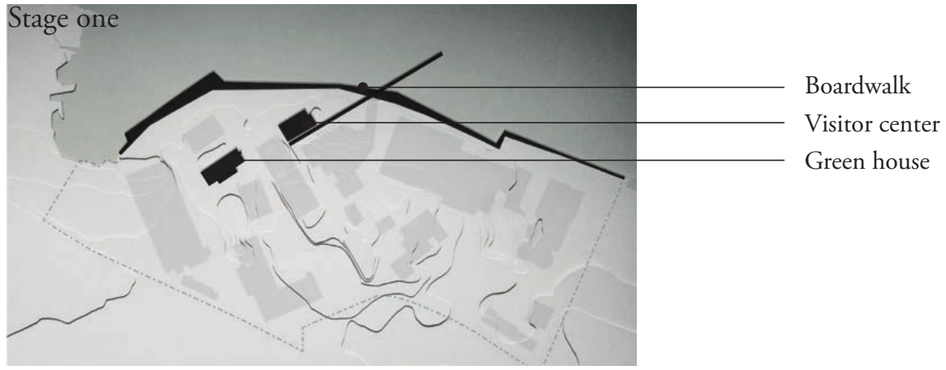


Fig 115. Illustration of stage one

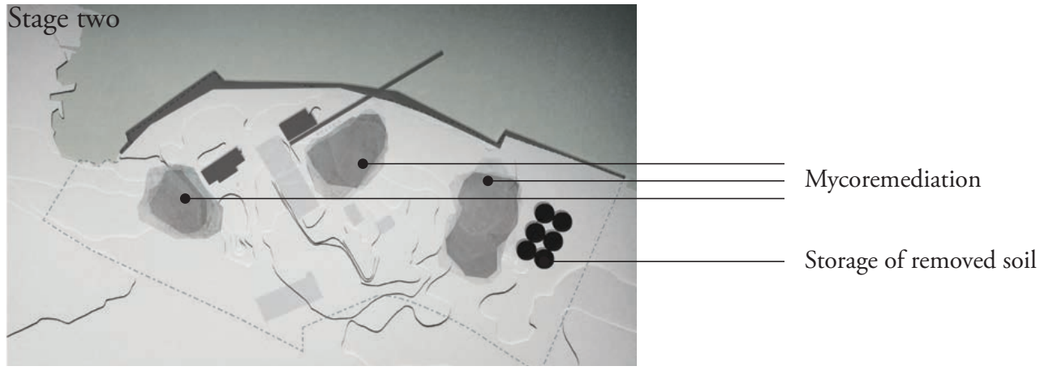


Fig 116. Illustration of stage two

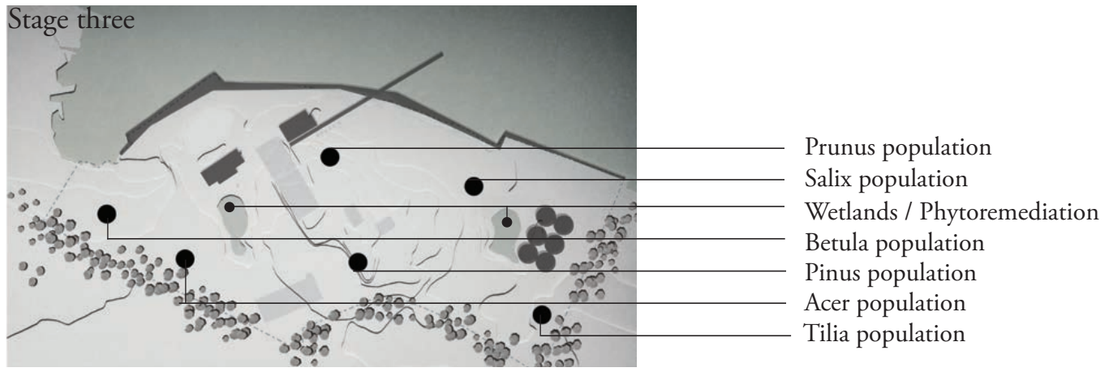


Fig 117. Illustration of stage three.

Site plan

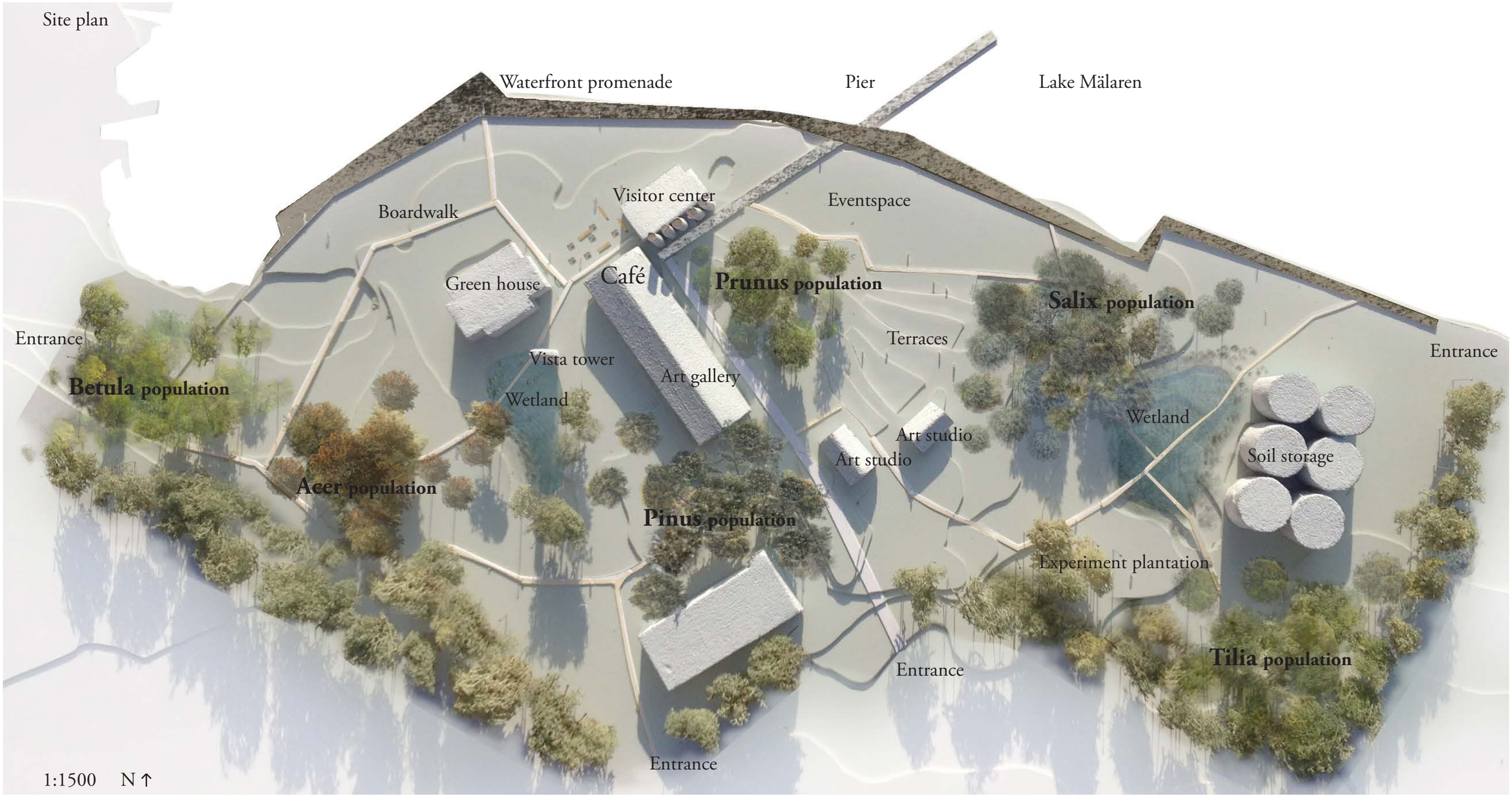
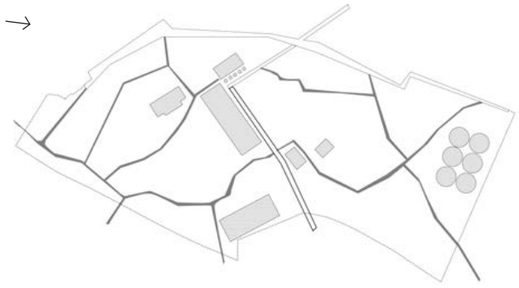


Fig 118. Site plan

Perspective

Fig 119. Perspective over the site towards Arboretum Lövholmen

→



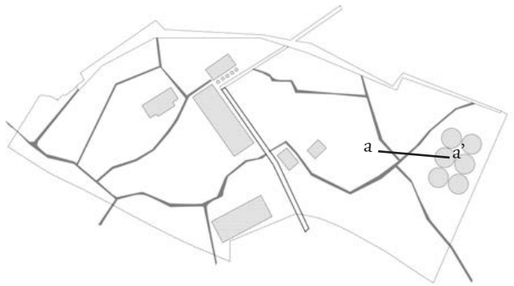
Design and Competition Proposal

Treatment of contaminations on site; Mycoremediation and Phytoremediation

We want to use an ecological way of removing current contaminations at the site using a method that heals the soil in a sustainable way. We see the human actions and the industry as important features for the identity of the site, something that represent the history of Lövholmen. Instead of removing the contaminated soil, a part of the history, we want to highlight the process of healing itself. We will use the method of mycoremediation applied on the site of Lövholmen.

It is also important to have a strategy to deal with future contaminations affecting the site. The waterfront is an important element on site and was one of the main reasons for the location of the industry in Lövholmen. The waterfront has gone through many changes during the years. It was for example pushed away with earth fillings to optimize the capacity of the industries, and it has served as a yard. The natural low points on the site are today at a risk of flooding. With a storm water management system the site will not only be cleaned from current contaminations but also have the capacity to continuously handle waste water in a sustainable way. Vegetation with cleaning capacities like poplar, alnus and salix trees will be planted in these wetland areas. In this way the phytoremediation is integrated as a cleaning method within the storm water management.

Fig 120. Illustration of the wetlands. Silos provide possibilities to store soil from the excavations.



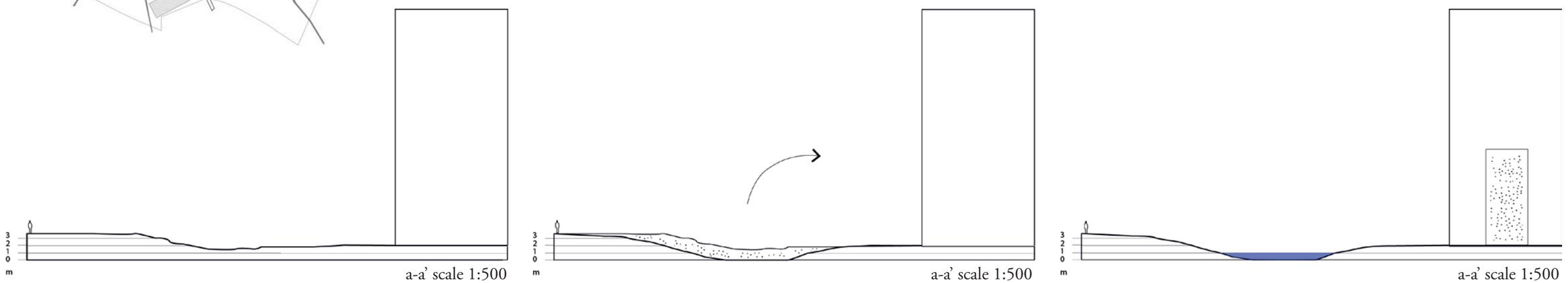


Fig 121. Soil will, after decontamination, be placed in the silos for storage

Tree species according to three scales design

Our ambition is to integrate the regional nature into the local site by design in three scales. The concept of three scales design was used for identifying how the green structures can take form in different scales in Lövholmen. It can also be a tool for choosing specific tree species for the site. The regional species from the green wedges of Stockholm are invited into the site as a part of the large scale approach, commonly used urban species represent the next scale of the city of Stockholm and site specific species constitute the final detailed scale in Lövholmen. Trees according to these three scales are listed below.

Regional species in Stockholm area are:
Acer platanoides, Alnus glutinosa, Betula pendula, Betula pubescens, Crataegus, Fraxinus exelsior, Juniperus communis, Malus, Popula tremula, Picea abies, Pinus sylvestris, Prunus avium, Quercus robur, Salix caprea, Salix fragilis, Sorbus aucuparia, Sorbus intermedia, Tilia cordata, Prunus padus, Salix pentandra, Ulmus glabra, Aesculus hippocastanum (Stockholms stad 2006 p.54)

Urban species suitable for street evironments:
Alnus cordata, Ailanthus altissima, Acer campestre, Pinus nigra, Platanus x hispanica (Tönnersjös plantskola 2014) and Populus alba (Göteborgs stad 2005).

Site specific species fom inventories are:
Alnus glutinosa, Betula pendula, Acer platanoides, Pinus sylvestris, Salix caprea, Populus tremula, Aesculus hippocastanum, Fraxinus excelsior and Tilia cordata

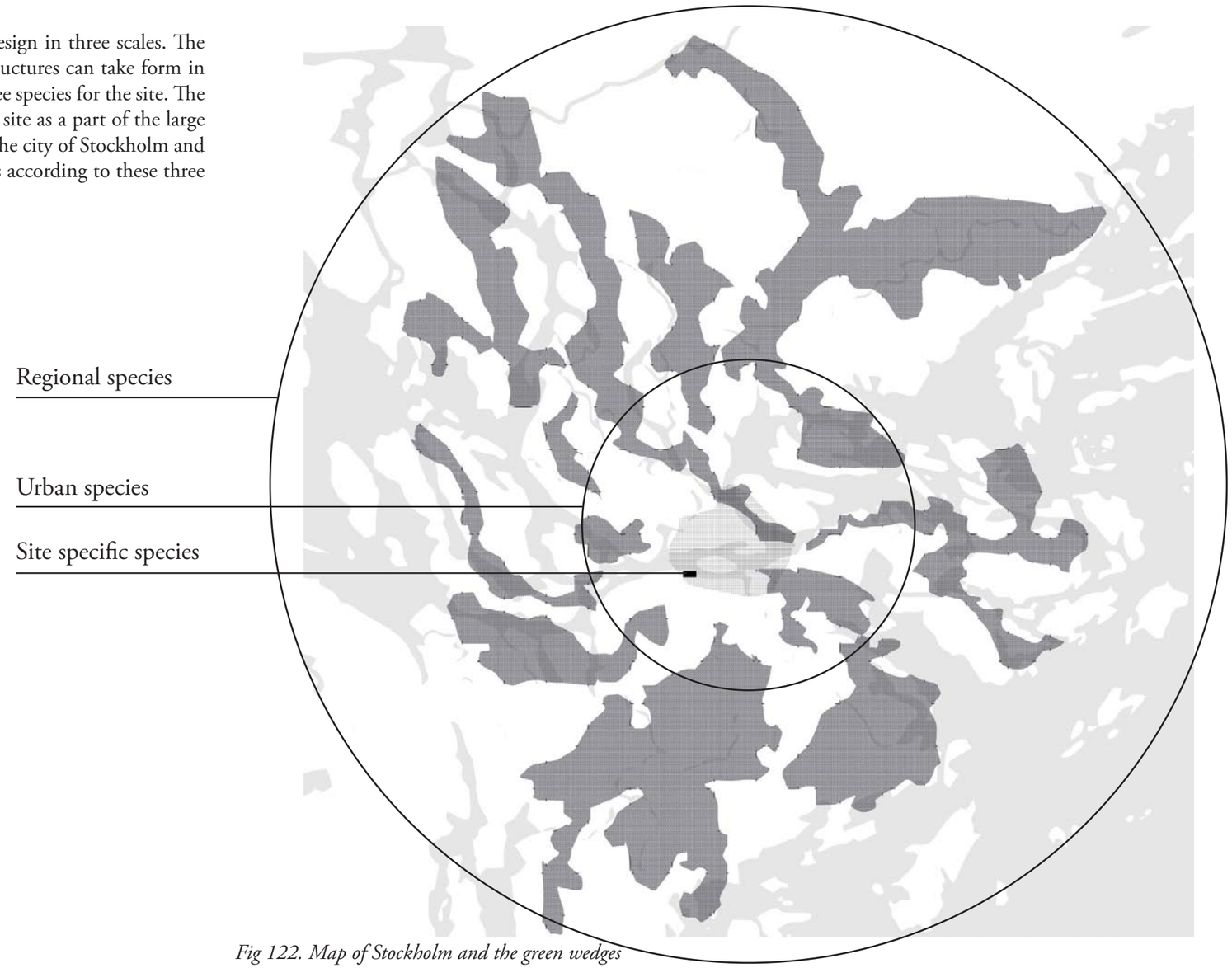


Fig 122. Map of Stockholm and the green wedges

Criteria for choice of tree species

Both traditional species and more exotic ones are to be found in Arboretum Lövholmen. The choice of species is grounded on different criteria, based on the varying purposes of the tree structure: *Connecting tree structure, nursery activity, experiment plantation* and *storm water management* all demand different capacities from the tree. The different tree structures are listed below followed by examples of tree species that match the requirement of each function. We have based our choice of trees according to our inventories of regional, urban and site specific species as well as the tolerance for urban conditions and capacity for cleanup.

The connecting tree structure in the Arboretum consists of tree species that the parks in Stockholm traditionally are composed of and characterize the regional nature. These species have taken a natural part in the proposal, as our vision is to connect the Arboretum with the surrounding nature. Native plants are also more adapted to local conditions, which is shown in establishment phases (Rottle & Yocom. 2010 p. 110). The green link will expand from Lövholmen to green surrounding areas. Examples of species we have used for this are:
Acer platanoides, Crataegus, Fraxinus excelsior, Quercus robur, Sorbus intermedia, Prunus padus, Salix pentandra, Pinus sylvestris and Aesculus hippocastanum

The intention with the Arboretum is also to nurse and distribute trees for future use in the city of Stockholm. Trees species intended for distribution around Stockholm should tolerate urban street environments and therefore be able to cope with conditions of salt, draught and pollution. Simultaneously our vision is that these urban trees should represent the special character of the site Lövholmen. Therefore some of the species are the ones we found on the site when doing inventories. Examples of species we have used for distribution are:
Acer campestre, Prunus avium, Salix alba, Pinus nigra, Betula pendula and Tilia cordata

To try the hardiness of new tree species applied to the Swedish climate an experiment garden is located in the Arboretum. Knowledge is a fundamental criteria for an Arboretum and species planted in the experiment garden can generate knowledge of new species. Examples of species we have used in the experiment garden are:
Magnolia Kobus, Ginkgo biloba, Liriodendron tulipifera, Metasequoia glyptostroboides, Ailanthus altissima, Fraxinus angustifolia, Platanus acerifolia, Paulownia tomentosa and Ostrya carpinifolia.

Some trees have the unique capability of cleaning soil from contaminations. Some species are more suitable for the remediation of special contaminations than others. Tree species with the capacity of cleaning the soil from the specific contaminations in Lövholmen are:
Alnus, Poplar and Salix trees (see p.35)

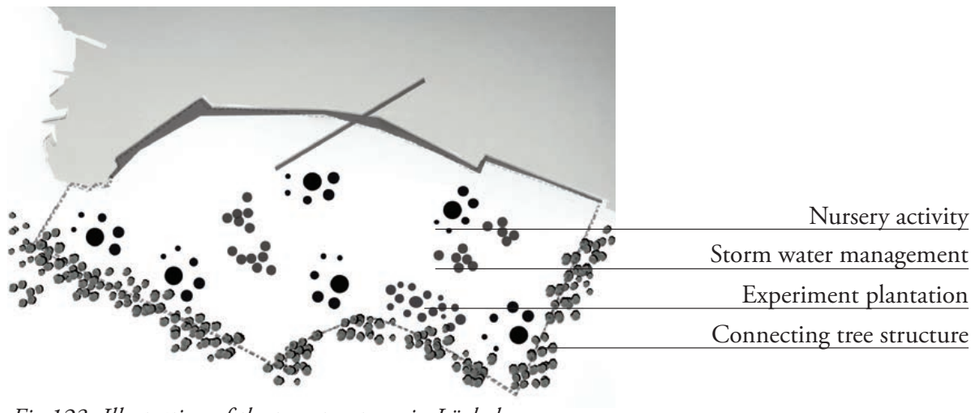


Fig 123. Illustration of the tree structures in Lövholmen

Fig 124. Connecting tree structure

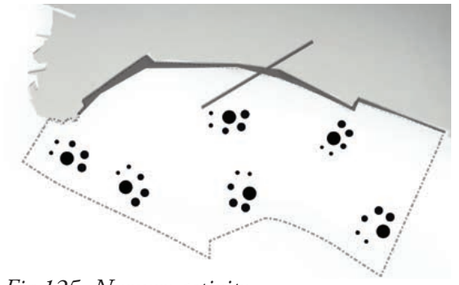


Fig 125. Nursury activity

Fig 126. Experiment plantation

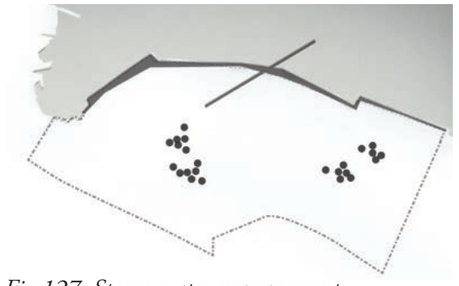


Fig 127. Storm water management

Establishment and distribution of trees

The vision is based on the idea that the planted trees in the future will be used in city projects around Stockholm. When establishing trees in the *Arboretum,* seeds will grow in the green house and after three years they will be planted on site. After ten years the trees can be used in city projects and new trees can be planted in the *Arboretum.* The *Arboretum* will in this way be an ever-growing park in constant succession with variety in species and age, producing trees for a greener Stockholm. The capacity of the site to generate trees is limited. The trees from Lövholmen will therefore have a symbolical value being a fraction of the total amount of trees needed in Stockholm.

We have used native tree species suitable for urban environments. The chosen trees can stand the urban conditions such as traffic, deicing salt and pollution. The trees the Arboretum will nurse for tree production are; Acer campestre, Prunus avium, Salix alba, Pinus nigra, Betula pendula and Tilia cordata. The permanent structure of planted trees, that link the site to the surrounding green structure, consists of a variety of species. They will grow old, create spatiality and represent variety in appearance and size on site.

This succession of plants creates possibilities for people to actively engage in the Arboretum. The yearly planting of trees from the greenhouse out in the arboretum is an example of this. Volunteers are invited to participate when plants from the greenhouse are established in the park. Under the guidance and supervision of the staff the activity can be a fun outdoor activity that makes people involved in the Arboretum and strengthens the whole community socially. In this way the Arboretum can evolve as a common interest and pride.

Planting strategy Arboretum Lövholmen	*Plants in greenhouse* *Age 0-3 years*	*Plants in Lövholmen* *Age 3-10 years*	*Yearly distribution to districts in Stockholm* *Age 10 years*
Acer campestre	*15*	*35*	*5*
Prunus avium	*15*	*15*	*5*
Salix alba	*9*	*21*	*3*
Pinus nigra	*6*	*14*	*2*
Betula pendula	*15*	*35*	*5*
Tilia cordata	*15*	*35*	*5*
Total	*75*	*175*	*25*

Fig 128. Diagram of planting strategy

Fig 129. A seed is planted
Coming from the source plants in Arboretum Lövholmen

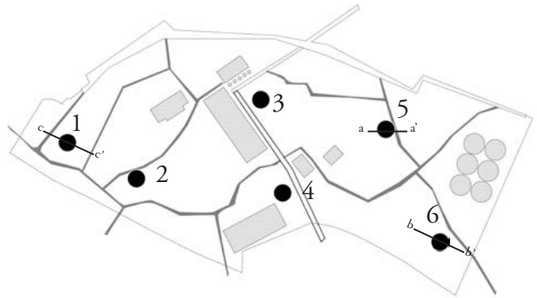
Fig 130. Grows up
Ready to move out from the greenhouse

Fig 131. Tells a story
In four years time I will be planted in the district of Kungsholmen

Fig 132. And finds a place in the city
We are a part of a greener future

The Tree Populations

Sections showing the principles of the tree structure of Arboretum Lövholmen. The oldest individuals of each species create a permanent tree structure in the Arboretum. They become the nodes of the population. Younger individuals are planted and grow up to be distributed to different parts of Stockholm at the age of 10. Variety in species of trees creates different characters and spatialities and turns a visit to Lövholmen into a diverse experience. The systematic structure also has pedagogical values.



1. Betula population
2. Acer population
3. Prunus population
4. Pinus population
5. Salix population
6. Tilia population

Fig 133. Salix population; a city tree that stands hard conditions

Fig 134. Tilia population; a common city tree

Fig 135. Betula population; a tree that preferes humid grounds

Pinus population | Prunus population | Tilia population | Betula population | Salix population

Fig 136. Schematic section over the site

Network of Nodes and Paths

We have in our proposal suggested a network of paths and nodes that help people find their way around the Arboretum. They lead through the diffrent spatialities and characters of the site linking cultural, visual, social and natural points of interest. Old industrial buildings with new functions such as greenhouse, café and visitor center become cultural nodes that attract visitors. The existing art gallery is included as a cultural node. The waterfront with views over the water becomes social nodes with visual values. The old stalk from the steam-boiler central has been turned into as a vista tower and provides the site with another visual node as well.

Clusters of different tree species make nature nodes that enable people to experience the different features of tree species. In these nodes the visitors can learn more about trees such as their ecological values, special features of different species and information of the life cycle of specific trees on the site. The old industrial relics are contrasting landmarks that hold new functions in the maintenance of the Arboretum. Our vision is that a visit to the site will be a broad experience offering something new each time.

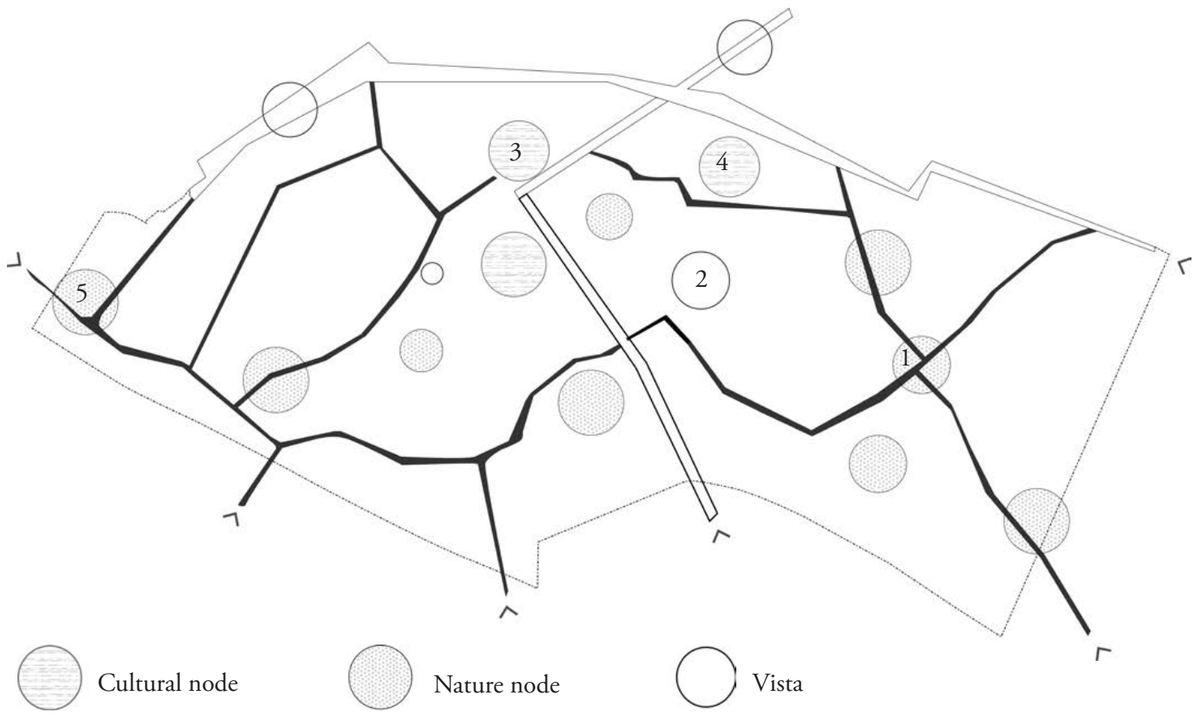
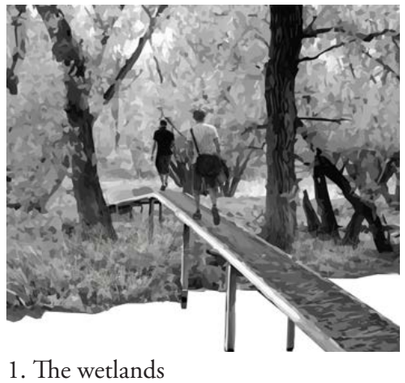


Fig 137. Diagram showing how the network of paths and boardwalk link cultural, visual and natural points of interest.



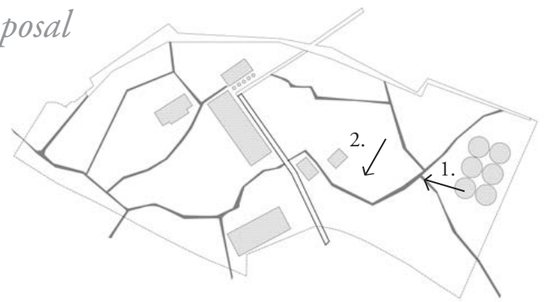
1. The wetlands

2. The experiment garden

3. Visitor Center, Greenhouse, Café and Vista Tower

4. Terraces and Event Space

4. Tree Populations



The Wetlands

The lowest parts on site have in our proposal become natural wetland areas. The wetlands are storm water retention areas were vegetation helps store the water and clean it before it infiltrates the ground or flows into Lake Mälaren. As the appearance of the water has changed over time we found it interesting to add water to the site instead of removing it, as has been done in the past. Wetlands do not only have the function of cleaning storm water by vegetation, they can also attract animals to the city and become recreational spots. Thus the wetlands are vibrant places that can offer new possibilities to experience wildlife in the city. The old silos from the industrial activity of the concrete production remain on the site. We propose a new function of the buildings as storage for decontaminated soil, left over from the excavation of the wetlands. The decontaminated soil will be used on site when new trees are planted.

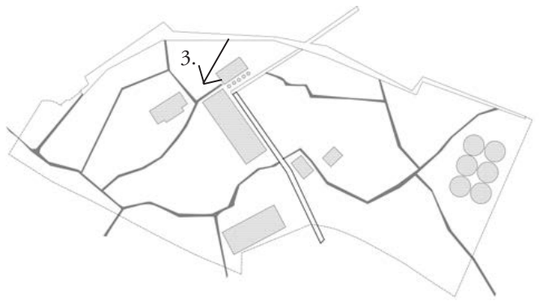
Fig 138. The Wetlands

The Experiment Garden

Due to changes in climate and diseases striking native species it is important to create an area on site where alternative tree species can be tested for future use. We have proposed an experiment garden to try the hardiness of new tree species for the Swedish climate. The garden is located right behind the highest point on site with protection from northern winds. In the garden visitors can read about the tree species, what their qualities are and how they could be used in an urban context. Our vision suggests a new design that allows changes; the specific species that are relevant to test can change due to changing needs and preferences in the future.

The exotic plant material in the experiment garden can add to the experience of the visit to Lövholmen. Children may recognize trees from their holiday trips to other countries, growing right next to their school.

Fig 139. The Experiment Garden

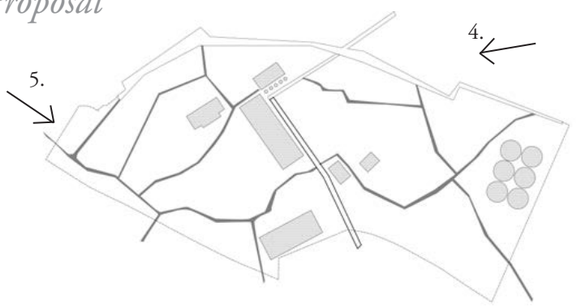


Visitor Center, Greenhouse, Café and Vista Tower

In the northwestern part of the site we have identified and located important social nodes in the Arboretum. The nodes are gathered near the boardwalk and the western entrance, which make them easy to reach. When entering from the south they will be the first thing you reach. One of the oldest buildings, Smedjan, has been transformed into a visitor center. The visitor center is one of the first established nodes on site. Here people can get information of the different development stages of the merging arboretum during the first years of its establishment. You can also get involved in the continuous work of Arboretum Lövholmen as nursery and ecological node. The visitors center is a possible location to hold workshops and lectures for the students from surrounding schools.

The old building, Förbandfabriken, is also an important node as it is turned into both a greenhouse and office building. An existing café is preserved in the art gallery and functions as a social node close by the visitor center and the greenhouse. The old stalk from the steam-boiler central has been transformed and used as a vista tower with views over the site and the water towards the center of Stockholm.

Fig 140. Café and Vista Tower



Terraces and Event Space

The waterfront is an asset in Lövholmen that can be fully enhanced by making it accessible for people. The waterways in Stockholm are important features of the city. By opening up the shoreline visually, the site gets a stronger sense of place as a part of Stockholm and better connections to surrounding areas. That is why the area close to the water is left relatively open. Where the highest part on site descends toward the waterfront we have proposed terraces that provide possibilities for picnics and sunbathing. At its feet an event surface can hold different activities. This part is open for all kinds of spontaneous cultural activities to take place such as concerts, outdoor cinemas and theatre plays.

Fig 141. Terraces and Event Space

Tree Populations

A main idea in our proposal is that the site can show a variety of tree species in a way that makes their special features and characters clear to visitors. By having tree populations with separate species the difference in appearance, height, leaf and bark texture, the framing and the color of each species become more obvious. These populations create volumes you can enter and get surrounded by. Thus the arboretum generates knowledge in both a straightforward sense, through signs and educational activities, and in this less direct way. The mere experience of walking and experiencing the site builds reference images of natural processes like the life cycle and succession of trees. The life story of the trees can be follow by the visitors. They are able to read about their past, witness their present situation and visualize their future role.

A birch forest welcomes people approaching the site from the western entrance. Through the delicate foliage of birch trees visitors can catch sight of the waterfront promenade, the greenhouse and preserved industrial elements (fig 142).

Fig 142. Tree Populations

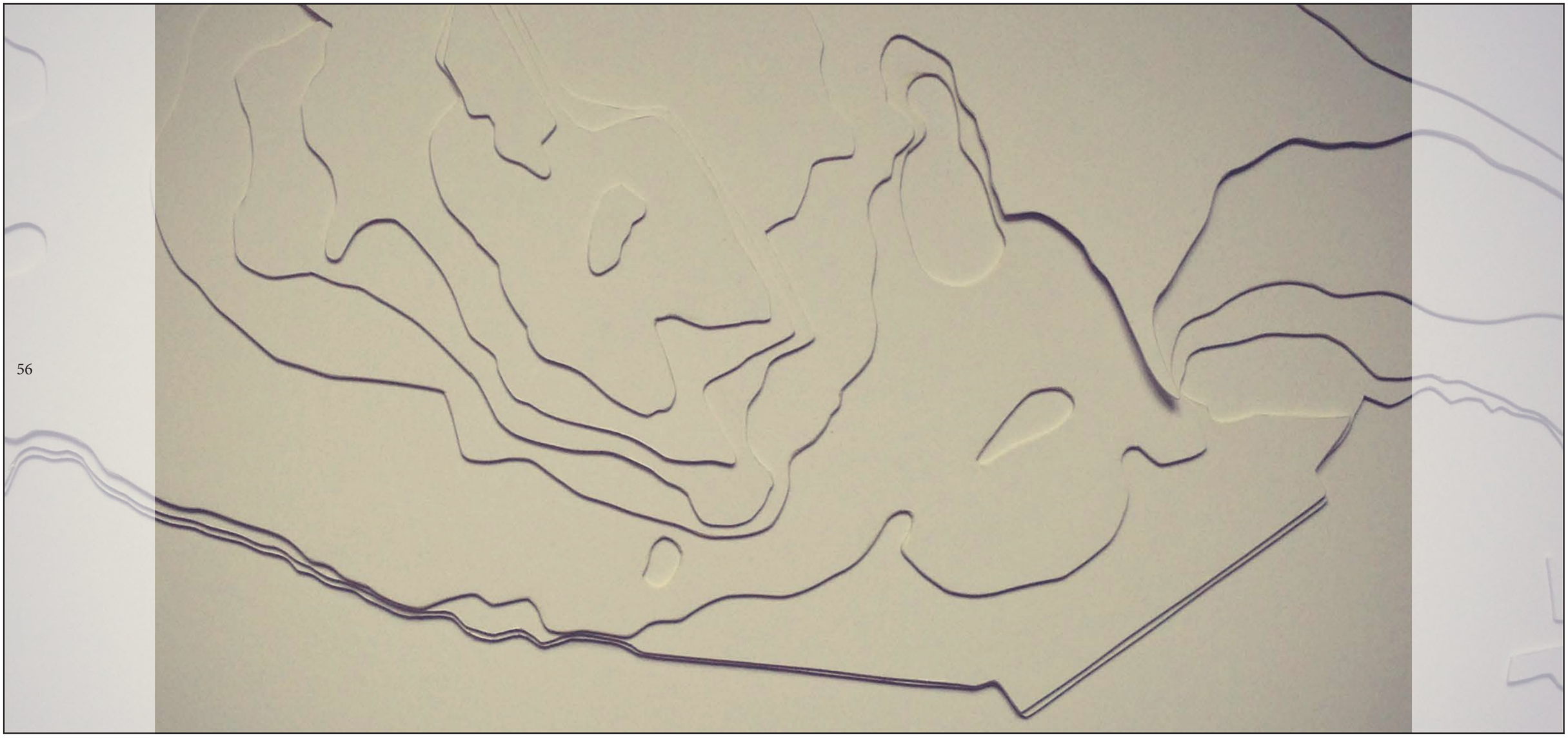


Fig 143. Model photo

Working Process

The design process has been important for us and it is summarized in this part of the master's thesis. In this chapter we show the reader how we have worked; how we have translated our impressions of the site into sketches and illustrations, how we have experimented with form and material and finally how we made our presentation model.

Translating our impressions of the site into sketches and illustrations

When starting up the project we focused on getting to know the site and its surroundings. The fenced and private site made it complicated for us to get an overall view of the site. Due to the fact we could not visit the whole area, we tried to translate our personal impressions, experiences and photos of the site into maps and sketches in an early stage. Some features were more evident than others. The impression of the lack of public orientation on the site made a huge impact on us, which is why we thought it important to find a solution in our future program. The waterfront, the lack of green structure and the dominance of the built structure were also important features we saw as essential to handle in our competition entry.

We found an early inspiration in the relationship between topography and the water movement on the site. These elements we recognized as exciting natural forces, that in many ways has shaped Lövholmen, both past and current development. We saw potentials of re-inviting some of the natural processes that interaction between earth and water generate. The old historical maps had showed us the location of the old costal line of Lövholmen, which had been altered during the industrial era. Making this historical trace once again visible, could reconnect the site to its past. Many of our sketches was made in a search for how this could take a shape on the site.

The industrial character of the site is obvious. The built structures are the main thing you see when visiting the site and these volumes are also dominant in maps and visual documentation of the site. They are clear signs of man, but the site is in fact as empty of people as can be. Sketching and illustrating the site without these built element we tried to understand what the site was beneath all this. Beneath the surface of man shaped space in search for something more essential, that could help us do a design that is not just focusing on human activity and marks of it, but allows other actors as well. This was a search for ways to, ambiguously, both invite and repress mankind from the site.

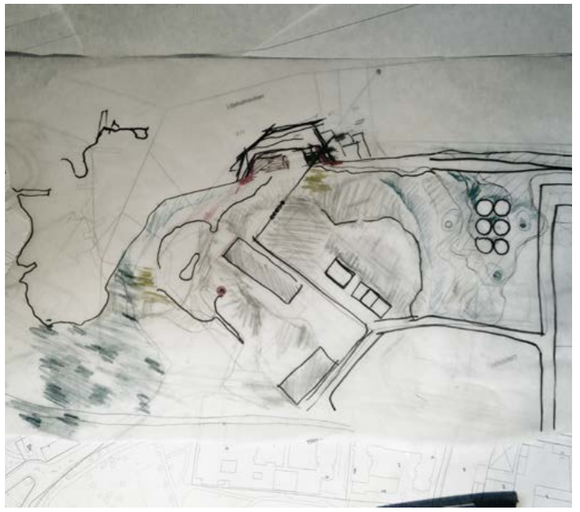


Fig 144. Early illustration over the site

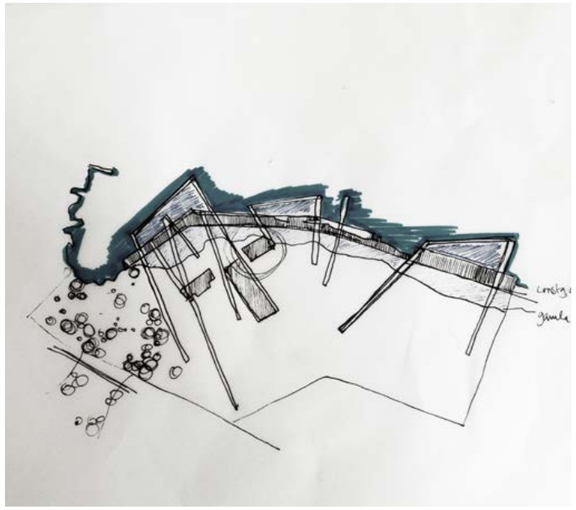


Fig 145. Sketch

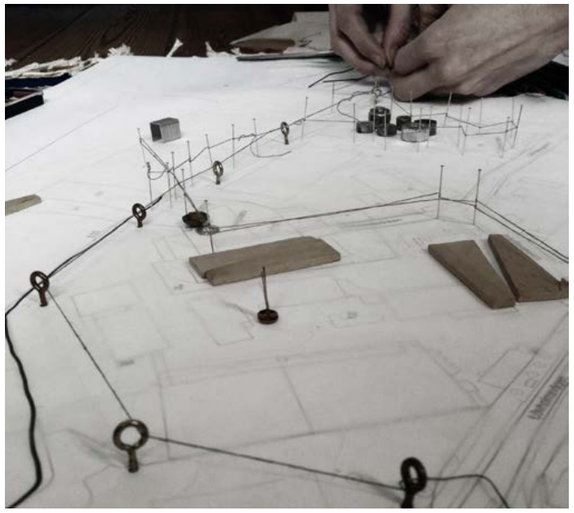


Fig 146. Movement and directions

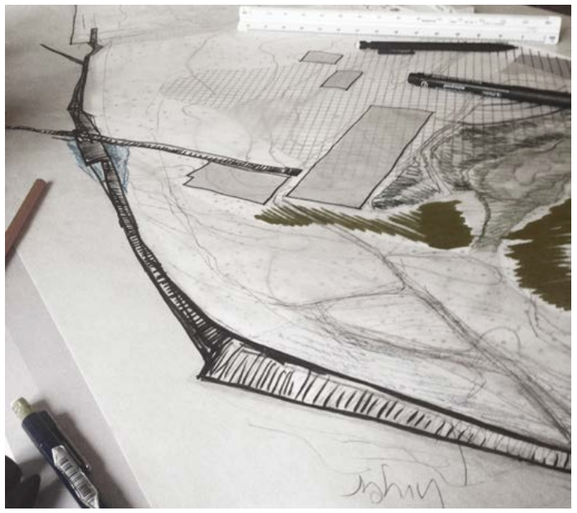


Fig 147. Illustration

Experimenting with form, material and scale

We wanted our sketches to give a deeper understanding of the site. This is why we found it important to continue our process using a broad range of different materials in order to understand for example the spatiality of the site. By working in different scales we got a better understanding of the site and its elements; the topography, water levels and the structure the buildings formed. We made models in different scales that worked as sketch models for the redesign and transformation of the site.

As an example we experimented with clay, building up the current built structures and made a small model out of paper. This first model we made out of hard paper and clay, was in the scale 1:2000. This scale provided us with a 3D effect of the major structures without any focus on details on site. This was a fast way of realizing the unorganized structure the industrial buildings created on site as well as where the highest and the lowest part were located. Cotton was used for tree structures in this scale. In our analysis of the site we had identified a relationship of space and volume that was fragmented. The reason for this was indeed the industrial use of the area that made the capacity of buildings to hold different productions inside essential, not the quality of the space between. If we were to make the site attractive for public use, this relationship needed a clearer hierarchy. The capacity of models to show volumes and space was a necessary aid in this phase and it helped us take decisions on which buildings to keep and which to remove.

A model out of breadcrumbs, applied on a printed map, made it possible to change and experiment with existing features like the waterfront and topography on site. Recreating the site using different materials helped us get a nuanced picture of the site and become more creative in shaping a new design for it. Breadcrumbs, paper, clay and cotton all have different aesthetical qualities and expressions that can result in a more diverse form in the final design. Our impression is that there is inspiration to be found in almost any material and the most unexpected solutions to merge when trying alternative methods. For us it was worth allowing these kinds of experiments to take time and we believe it has helped us to find new innovative solutions.

Fig 148. Creating forms with clay

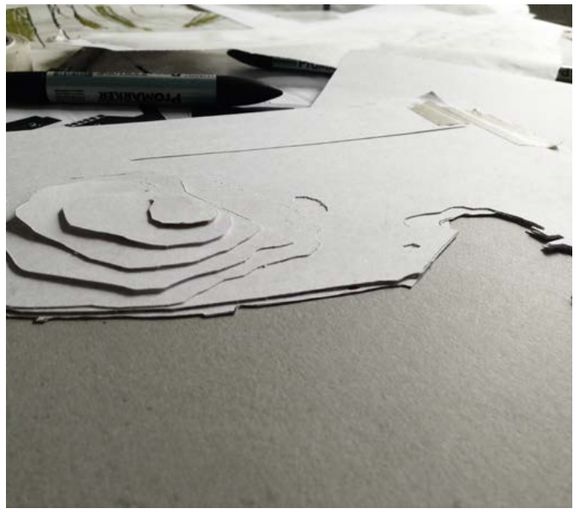


Fig 149. Model in paper

Fig 150. Shoreline in breadcrumbs

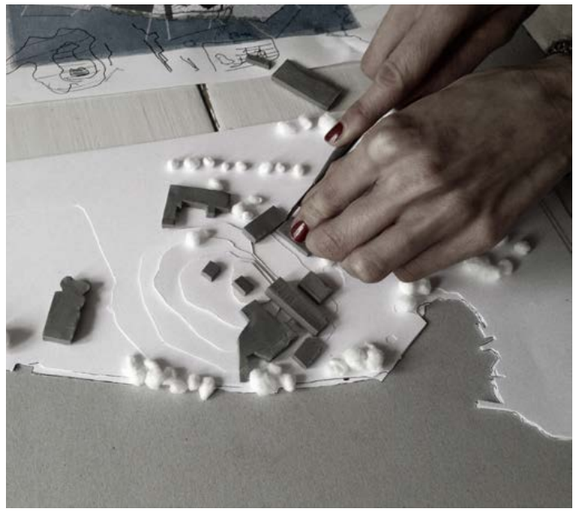


Fig 151. Work in process

Working Process; Making the Model

Making a model was part of both research and design processes.

Model of current condition

Building the model was as previously mentioned at the same time an artistic experimental research method as well as designing. The scale of the site, 60 000 m^2, influenced our decision to work in the scale 1:500. We believed that working in this scale could generate a model large enough to take us closer to our design without becoming difficult to realise in practice. In a first step we reconstructed the current topography of the site using cardboard of the format A1. Each level of cardboard gave a height of one meter in the model. The highest point on site being eight meters, the model had this many levels of cardboard on top of each other.

Then we altered the topography inspired by previous sketches. By doing this in the model, we gained an understanding of the masses at hand, that the sketches had failed to provide. We ended up doing a smaller interference than the sketches show. The sheets of cardboard were then fastened to each other with glue in order to make the model stable.

Constructing a model of the actual conditions on site, is a process taking more time than looking at a map or drawing lines with a pencil; the process made us respectful of the site.
"When the model of existing conditions becomes the design model, design emerges quite concretely from these pre-existing conditions." (Vogt 2010 p. 21) With a model you can look at the site from different angles, zoom in and out in a way that is not possible during inventories on the actual site. The close contact with the material when working with analogue design techniques has the strength of involving several senses, instead of relying on visual information, as is the case when using computer programs for design.

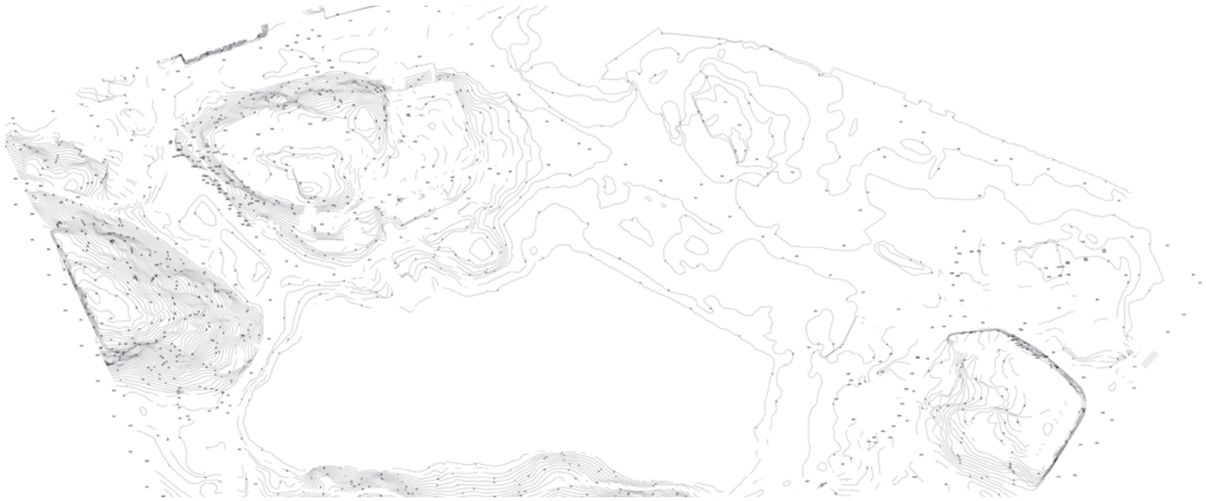


Fig 152. Map of topography

Fig 153. Aerial view of the site

Fig 154. Model with current topography

Fig 155. Model with new topography

Working Process; Making the Model

New design

The next step was to add the built structure, based on previous analysis of buildings valuable to preserve. These were cut out in oasis and painted in a lighter colour. This material, which is normally used for watering plants, was chosen since it was easy to shape using a knife. We proposed new functions for the preserved buildings. This way they could be revitalized as nodes and attract visitors to the site. When the buildings were ready, the walkways were cut out of the remaining cardboard. The paths merged in relation to the nodes on the site that got linked by these paths.

We wanted to create a base with sober materials that wouldn't compete with the tree structure. The trees are our main design element and we wanted to highlight them with a more detailed and diverse material. For this we ended up choosing moss that we collected and attached on top of needles fastened on the model. The final complement to the model was to add cut out people in plastic. This helped to make the scale of the model more apprehensible.

It was important to create a model which was detailed enough to be useful in the presentation of the proposal. The strengths of creating a model of a new design are that they are easy to read and appreciate by a broad public, not only practitioners. Being able to examine a site from different angles can also make the design more convincing. As both competition and thesis required a digital presentation, the physical model had to be photographed. Thereafter the pictures could be handled using different computer programs.

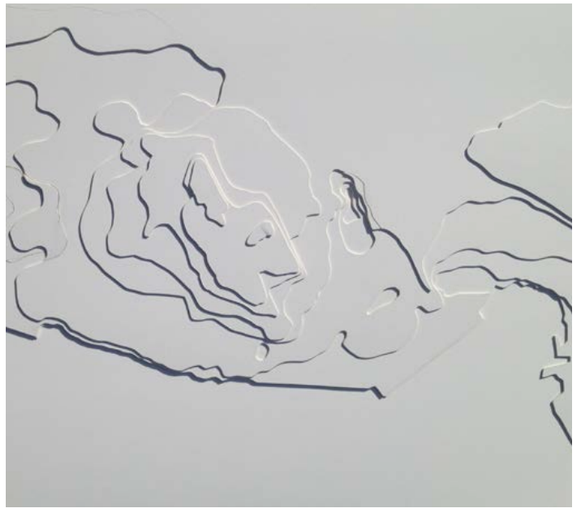


Fig 156. Making topography

Fig 157. Oasis as buildings

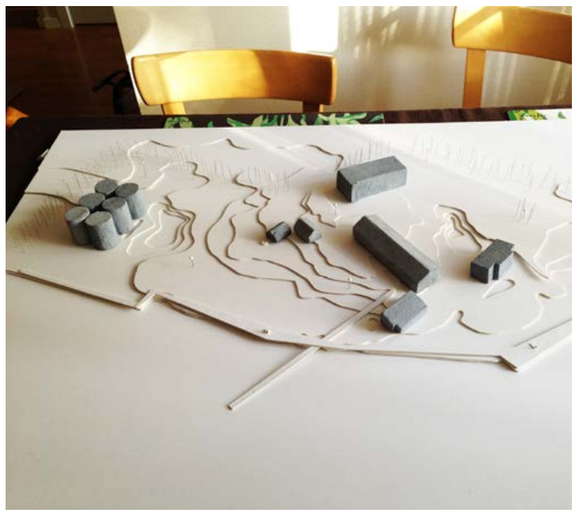


Fig 158-159. Changing color of buildings

Fig 160. Moss and needles as trees

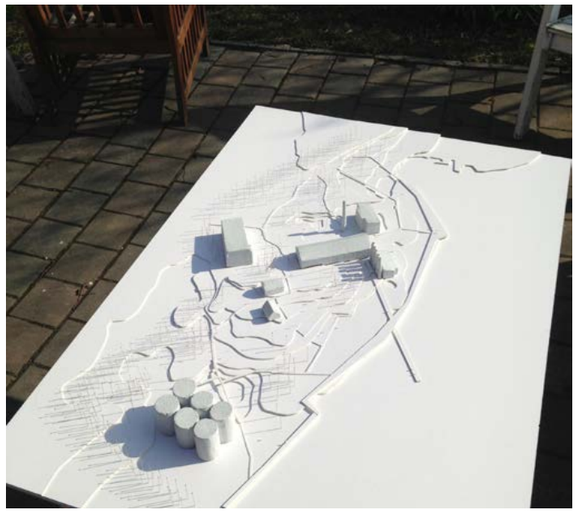


Fig 161. Model

Documenting the model

The model was brought outside in the middle of the day to be photographed. Photographing in daylight had the advantage of creating interesting shadow effects. The model was documented in three phases. First showing the topography, secondly including buildings and tree structure of needles and finally with moss on top of the needles symbolizing leafage. We expected it could be hard to maintain the model in good shape since we had used fragile materials like moss and focused on taking all the photos we estimated to need in the presentations, both entry and thesis, at once.

What stroke us while photographing in daylight was that the shadow effect created illusions of lower and higher topography depending on the angle the sun was shining from. It was important to angle the model with north facing the sun. Otherwise the low points of the topography looked like heights and vice versa (fig 163). By documenting the model in daylight we were able to capture the fine shadows from the cut out people, the trees and the buildings. These gave depth to the photographs and were important for making the pictures more realistic (fig 164 & 165). The clear daylight gave a distinct quality and clearness to the photos.

Capturing the design by photographing the model was in many ways a challenge. One challenge in photographing the model was to know from which angle and distance they were ought to be taken for getting the best groundwork for future presentations. Some elements that were clear and easy to read in the physical model were harder to distinguish in the photos. Some photos needed to be taken close up in order to capture details essential for describing parts of the proposal more thoroughly (fig 166).

Fig 162. Photography outside

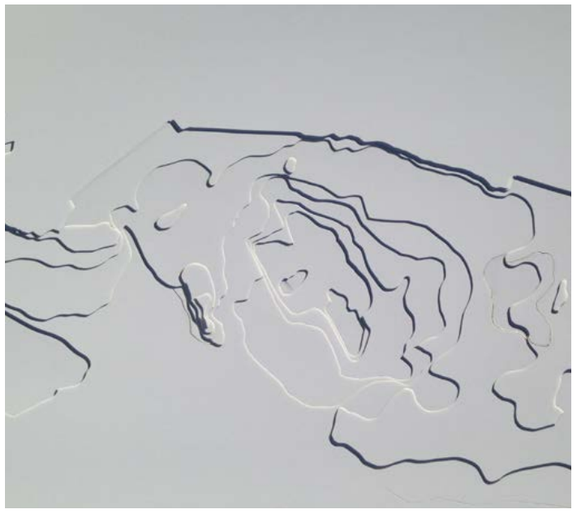


Fig 163. Misleading modelphoto where hights appear as low points

Fig 164. Shadow effects of trees

Fig 165. Model

Fig 166. Detail from model

From photographs to computer graphic

In order to be able to communicate our vision the model photos had to be worked on with the help of various computer programs. We tried to clarify the possible atmosphere on the site and the activities and functions it could hold by using cut out people and applying and manipulating with color and textures. This was necessary since our model and the photos taken of it only showed the main structures of the design. To further help the reader understand our design, details and sections were produced as complementing material.

The computer programs we used during this visualization process were Photoshop, Illustrator and Indesign. During this stage it was helpful to have a large quantity of personal photos to use when building up perspectives. Otherwise it can be difficult to have enough material to be able to compound a realistic visualization.

When making visualizations there is sometimes a fine line between producing pictures that shows a new design coming to life or building up unrealistic scenarios. Since our proposal was visionary we felt a need to explain possibilities the site had to be revitalized but we still wanted our material to look realistic and trustworthy. We felt using photographs taken on the site was a way of getting closer to reality in our pictures and keeping our material realistic.

A photo from the site as it looks today (fig 167) has been used as a base for creating the perspective in the upper right corner (fig 168). For the making of the aerial perspective a photo from the model served as a base. These examples can illustrate the way we have worked for the visualization to the competition entry. The first example shows a more photo realistic approach and the second a more visionary and sketchy approach.

Fig 167. Photo

Fig 168. Computer graphics

Fig 169. Photo

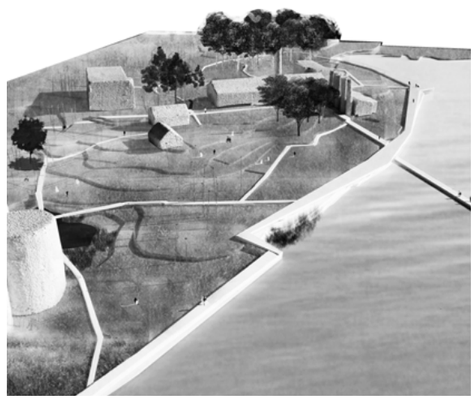


Fig 170. Computer graphics

Fig 171. Photo

Fig 172. Computer graphics

Fig 173. Model photo

Discussion

In this final chapter we summarize our work. We begin by discussing the research questions concerning how our participation in a competition has worked; *How can the competition format be a design tool? , How can the working process developing a competition entry progress?*
Finally we discuss our main research question; *How can we create a visionary design proposal for Lövholmen that promotes sustainable development with the help of ecological design?*

Competition format as a design tool

Working with a competition entry is an exciting and challenging task. The theme of degraded urban places and the need for a sustainable future development of cities was something we felt was important and were motivated to work with. Initially we had hoped that a competition program would be a greater help for us in limiting our project, with specific demands and requirements. But the problem formulation of IFLA's visionary competition was very broad; the guidelines of the competition required a broad range of aspects to be taken into consideration. In a way the most definitive limitation of the competition was the time limit. The deadline was set for May the 5th, which gave us approximately 10 weeks to find a suitable site and complete our proposal. The thesis was developed simultaneously which means that this time was not only assigned to the competition entry. A strict time limit has the effect that you cannot develop several ideas, it is important with quick decisions in order to have enough time to develop them further.

During our work we have had to get back to the competition demands several times, each time finding something new to take into consideration. We struggled to succeed in doing a thorough research and present this well, without losing the creative vision and making our entry attractive and visionary. The visionary approach of the competition also made it challenging to appreciate the level of details the entry should contain. As landscape architect students school projects have requested a more detailed level of presentation. The visionary demand was a new challenge for us, but something we also saw as an opportunity for trying to design and create landscape architecture in a new dimension and scale. We tried to grasp a bigger picture and to see the site as something else than just a polluted site. Rather as a part of a bigger structure in the urban fabric. We saw the importance in trying to understand degraded sites and their transformation as something that is part of the transformation of the cityscape as well. Degraded sites are as much a part of our cities as the active ones. They have just been put aside waiting for a new stage to set in. The transformation and changes in our urban fabric has also raised questions of how to handle degraded and unused sites. In fast growing cities where space is increasingly valuable, unused and degraded sites are desired for exploitation within the expanding cities. As Stockholm grows bigger we saw the need to save Lövholmen as a site to be kept for expansion of the green structure instead of the grey one. We believe the growing city needs its green areas to be sustainable. The proposal we handed in was a vision based on visionary thoughts about the growing city.

The date of handing in the competition entry was about a month before the deadline for the master thesis. In an early stage we both agreed on what we wanted to focus on and what was important for us when participating in a competition as a master's thesis. For us it was the desire to design and doing this through experimenting with different material that was the most important aspect. This became the main reason for letting the proposal be dominant in the master's thesis. We saw the deadline as a trigger to give priority to the competition right from the beginning. We estimated to be able to give full attention on writing the master thesis after the deadline of the competition, since the visual material was to be done by then.

When writing the thesis we considered revising some of our visual presentation, like for example bringing more colour into the images to be able to strengthen our proposal, but decided to keep it the way it appeared in our entry. We felt it would be misleading to show material that had been modified. Maybe the most evident feature of the competition format as a design tool is that there is no possibility to change the design afterwards. There is no communication in that sense that you only have written demands in a basis to guide the design. In other projects the designer can develop the design in collaboration with the client. The proposal can be altered and developed based on common discussions.

Fig 174. Conceptual image. Trees from Lövholmen spreads out in the city

Fig 175. Conceptual image

The working process

As has been mentioned previously in this thesis, participation in a competition affected our work in many ways and guided many decisions during our process. The importance of research in design processes was one of the key demands highlighted by IFLA. We started doing research with the ambition that it should be thorough and cover many different aspects. We wanted to get a nuanced picture of the site. We had seen many benefits in redesigning a site near Stockholm, since we believed this would make it easier to make site visits, inventories and analyses. In the end we still had trouble getting access to the site and we had to rely on alternative methods to get to know the site. The public areas we visited frequently, but the accessible space of the site being no more than 12 percent of the total area, it was but a fraction of the area we wanted do redesign. The firm Vogt Landscapes emphasizes the need to walk the landscape in order to know it. This physical contact with the site is important for their working process and seen as essential to be able to handle an area properly when redesigning it. We were confronted with the fact that sometimes this is not possible. A more thorough research of the physical site would have been an advantage, but we had to find alternative ways instead. Though our full experience and understanding of the site was limited by these circumstances it was an interesting challenge to apply new visionary thoughts on a site that in parts had to be discovered through aerial photos and maps. It triggered us in our working process by forcing us to think differently and use methods like model making.

The search for information became even more important for us since visiting the site had been so complicated. Thanks to the broad and public documentations of Stockholm at the Stockholm City Museum this was relatively uncomplicated. Nevertheless we had some trouble gathering information. The site is at present an object for new development plans. Though public documents from the city were available; the landowners seemed more reluctant to hand over information at this time of uncertainty about the future of Lövholmen. The research we found complicated to obtain was the measurements of the contaminations made on site by the private owners. Due to the private landowners even the city of Stockholm had problems finding these documents. Due to all these factors, the gathering of information and doing research took far more time than we have initially planned. We have learnt to value time and to make use of it. Even at times when we were left waiting for answers not being able to proceed with a specific task we could continue developing our proposal from other angles, and try to search for the needed information at other locations.

Since the studied site clearly battled with problems of sustainability as it contained high amounts of contamination, we wanted the theoretical background to deal with this kind of problems. Sustainability is a really wide concept and we wanted a theoretical background to help us develop our design in a sustainable direction. We needed more information in this field that was totally new for us; inputs and facts that we could apply to our site in order to make us feel more comfortable in our design process. Research about Ecological Design, Brownfields and remediation processes enriched our thoughts in the subject. We found the research very interesting adding new dimensions to the profession of landscape architecture and deepening our understanding and respect for degraded urban landscapes and how they should be dealt with. Since the theoretical part was explored in a deeper way after handing in the competition entry, it gave us insights that could have been applied on the proposal strengthening the aspects of sustainability.

The competition demands required innovative and sustainable techniques to be applied on the chosen site. The theories we found interesting were the remediation processes of Phytoremediation and Mycoremediation. One reflection we made while studying the processes was the need for detailed information they both required; the exact levels of contaminations in the ground and the total amount of contaminated soil for example. The visionary approach contra the detailed level required that we would have to make a decision of how detailed this part could be. We did not want the remediation processes as a technical solution to be the focus of our project. We felt our visionary thoughts on urban planning were more important. Another reflection we made was that especially one of these techniques has not yet won ground in Sweden: Mycoremediation. This was of course an obstacle for further research about local case studies, but we decided to adopt the techniques in our proposal as a visionary experiment. The time given for remediation of the site (two years) is an assumption, and it is possible that this process requires more or perhaps less time than that. To be able to give a complete technical solution for adequate remediation of the site further research is needed; for example more measurements of the soil and detailed lists of plants and fungi suitable for the site, would have to be made. This was beyond the scope for our project.

Fig 176. Experimenting with different materials as a part of the working process

Discussion

The competitions theme of degraded and obsolete sites made us choose Lövholmen as working area. Since Lövholmen was a closed site hard to access we needed to find alternative ways of getting to know the site. We saw the model as a potential solution. Model making would give us the opportunity to make use of the experience our education had given us, but also inspire us to try something new. As a final project of the education we wanted to experiment. We have strived to be creative in the way we have worked and open for alternative working methods. Our philosophy from the beginning has been to see the project and site as unique, therefore needing a unique working process. This has partly been achieved. Allowing aesthetical working methods to play a crucial role in our project, made us realize it was something we both had lacked during the education. The artistic working methods should be equally legitimate as any other.

This is why we decided to make a physical model as an important working method and design tool. Learning to understand a landscape or a site through building an actual model was something we valued greatly. This aesthetical approach liberated our creativity and generated ideas and visions in a way that made us see our working process as equally important as the participation in the competition and the writing of the master thesis. To quote Gunter Vogt; *"The searching for the unknown requires engagement and proximity to the investigated object. It is the searching rather than the finding that creates this proximity."* (Vogt 2010 pp. 14-16). We "*walked the landscape"* by building our model and found this proximity with the model rather than the actual site. Even if the physical model had lots of advanatges, it also limited us in a way. Since we used a photo of the model in the presentation of our site research and analysis, these show the situation of the site in quite a detailed level. The surroundings were discussed in text, but are not presented visually in the same way. Discovering and experimenting new methods take time, it is often easier to plan your time when using familiar tools and working methods. The inspiration of other landscape architects and firms has been a major asset for us. We believe that curiosity and a will to try new things have been a strenght in our working process and something we will strive to continue to apply in our future working life.

Almost without exception landscape architects work in groups with their projects. In this thesis we have been two people involved. For one person to complete an entry for the competition during this time would have been a difficult task. We have commuted between two different cities, Uppsala and Stockholm and have had to plan our work given this fact. Some days we worked together. Other days we discussed what needed to be done and how and then we devided the workload to be able to work at different locations. Our experience of working together has been positive. Having someone to discuss your ideas with and share the workload with has made the work more rewarding and the results more nuanced. It is always important to continuously analyse and question what you are doing. When several people work together you have to find this common drive that makes the work meaningfull and enjoyable for everyone. In order to find this common aim it can be necessary to make compromises. We have had a continuous dialogue while working. Both of us have been engaged in every part of the working process. We have seen our collaboration in this master thesis as strength both for the final results and for our working process. Discussions, argumentation's and responses to each other has been the groundwork that has shaped the whole thesis.

During our work we have had to make priorities and limit ourselves to certain methods. When reflecting on our working process in retrospect we can see some dimensions that have gone missing. Alternative methods that would have been useful for our project are for example interviews and surveys. Using these methods we could have acquired more information of how people percieve and appreciate the site and what kind of development they wish for the site. These aspects would have added an important social dimension to our work, but were not possible to carry out due to lack of time. Thorough case studies and study trips to sites that formely tackled with similare problems as Lövholmen, is another alternative method we did not use. Studies and trips of that kind could have provided us with examples of possible design solutions as well as how well they have turned out in reality. We included some examples of projects in the theoretical part, but these are very briefly described and could have been developed further.

As model making and presentation techniques claimed a lot of time and attention, detailed solutions and going in depth in the theoretical background, were put aside. Our theoretical backround became broad. We felt we needed insights in many different fields to complete the project, as the theme of degraded places in the city was new for us. We suppose this has to do with the fact that the field of landscape architecture is broad and multidiciplinary, often we will have to rely on other professions to provide additional information and knowledge. IFLA encouraged in the competition basis multidisciplinary collaborations (see p. 14). Since we both study landscape architecture we lacked knowledge that is important when dealing with places like Lövholmen. In our working process we wanted to recognize the broadness of our profession to contain theoretical, technological and aesthetical dimensions and see it as an asset but it is also, as recently mentioned, a challenge.

Fig 177. Collage, sketching phase.

Discussion

The design proposal

We succeeded in handing in our proposal in time and the proposal met all the formal requirements of the competition. Our main design element and addition to the site Lövholmen in our competition entry was the planting of trees for future use in urban projects. Trees used to cover the whole country, before agriculture and urban developments claimed space. Today the trees are the most important source to greenery in the city and we felt it was important to acknowledge this important role. The competition required a visionary proposal, that is why we proposed a solution for how Lövholmen, that has been associated with negative environmental aspects, such as pollution and hard surfaces of asphalt can be turned into quite the opposite. How it could promote greenery in the whole city even though the site is limited area-wise. Our focus on the visionary may have limited our proposal as we produced rather schematic visualizations. We could have showed how our ideas are turned into site specific solutions for Lövholmen in a more clear way. As an example our sections over the tree populations could have included preserved buildings and the possible activities with boardwalks and pedagogical components, instead of only showing the trees.

Our visualisations were in a grey scale; color could have made the idea of spreading greenery more explicite and clear. We wanted to promote greenery in a grey landscape, but in fact some of our images do not live up to this. One reason to the grey tones in our images may have been the model building. We created a sober model to add details by computer programs. But in the end we were proud of the model and wanted it to show in our presentation. This made us careful not to cover the model photos by bringing in lots of colors and textures. Another reason for including grey tones in the presentation were the first impressions of the site. We instantly found Lövholmen dramatic and interesting, a harsh grey landscape that intrigued us lacking idyllic features. We were inspired to capture this in our presentation, and let the robust industrial character of the site show in our visualisations.

As for how well our vision meets requirements of ecological design, we feel we have succeeded partially. Certain aspects could have been developed further, for example the concept of diversity often listed as one of the key aspects of a truly ecological design. We propose developing wetlands in areas suitable for this on the site, that is known to promote diversity in both flora and fauna (see p. 32). If given more time we could have produced a more detailed plan of the site and showed more diversity in the choice of species. We have tried to show how the site can be an area containing aspects that are beneficial for the environment such as having storm water cleaning. Our proposed remediation processes, Mycoremediation and Phytoremediation are both solutions that clean the soil using fungi and vegetation and are applied in-situ. In this way these processes are a way of integrating natural processes on the site, which is another aim of ecological design.

We have strived to show how Lövholmen can promote community engagement for a sustainable development and how a limited area can trigger changes on a larger scale, both physically and mentally. A main aim for our vision is to raise awareness in the community of ecology in general and urban trees in particular, even though these aspects could have been developed further in the proposal providing detailed solutions. We have tried to show how a public space can plant a seed in people's minds that it is possible for everyone of us to be a part of changing our community's development into a more sustainable path. This in addition to the role of the Arboretum as a public open space, where every one is allowed and its function as a social meeting point can promote social sustainability.

The symbolic value of places can be as important as the physical space. To turn Lövholmen into a site that is associated with positive and sustainable development instead of the degraded image it has today, takes time. That is why we felt it was important to allow people to witness the gradual growth of the Arboretum. To see how the soil is cleaned, how the plants grow, grow up and grow old. This process oriented design that involves the community is something we from the beginning found very important and got backed up with our literature studies of Ecological Design. We felt it was important to integrate these issues in our project plan for Lövholmen and we hope to be able to actively work for this in our future role as practitioners as well.

The great cultural values of Lövholmen are important assets. Our historical research made us more convinced of the importance to preserve and highlight the past functions and values of the site. Even though we needed to transform the site, in order to make it accessible, we tried to find alternative uses for some of the structures and buildings on the site, preserving historical traces on site and integrating them with present needs and preferences in the community. The oldest building, Smedjan, was in our proposal transformed to a visitor's center. It has thus become one of the main attractions of our Arboretum. We felt it was important not only to preserve some of the old buildings, but also to revitalize them. Many of the buildings that have historical and cultural values, have in our proposal been removed. This might be controversial and contrary to our will to value the identity of the site, but since measurements have shown high amounts of contaminations within these buildings, we made a decision to remove them and clean the soil. Different interests are sometimes in collision and urban planning is about considering benefits and drawbacks.

Looking back at our participation in the competition and evaluating our own entry, we feel we could have mediated our design in a more clear way. Three sheets in A1 format is a limited space to channel your ideas. With more distance to our project we could have done a better job evaluating what really was necessary to show and what wasn't. We used a lot of space to show our inventories and analysis since we thought we needed this to convince the jury of the relevance of our own design. In the end this could have been a disadvantage, resulting in a more explaining entry than a really convincing visionary proposal.

Future questions

Landscape architects will have to continue to struggle to find methods that can handle places and structures that are degraded and abandoned. We also need to reflect on how new developments today should be designed not to result in problems of this kind in the future. We have taken part in interesting thoughts in the discourse of current landscape architecture, mentioning process oriented design and flexible spaces, but sometimes the gap between theory and reality leads to compromises with environmental aspects. For example we find present plans for Lövholmen in danger of this. Different private economical interests can hinder the common interests and the sustainable long-term outcome of the plans. In this field landscape architects with their broad expertise, have an important part to play identifying and acknowledging different interests and finding ways of integrating them in a physical design. By integrating theoretical knowledge, aesthetical qualities and technical solutions landscape architecture has a chance to generate urban landscapes that are socially, ecologically and culturally sustainable.

Bibliography

Andersson, T. (2000). Erik Glemme och Holger Blom. In: Andersson, T., Jonstoij, T. & Lundquist, K. (red.) *Svensk trädgårdskonst under fyrahundra år.* Stockholm: Byggförlaget

Arfwidsson-Thedéen, C. (1992). Axplock ur Liljeholmen historia - Förr gick det vilt till runt Trekanten. *ÖCBs personaltidning UrVerket* (1992:7). pp 10-11.

Bivegård, L. & Vikström, J. (2008). *Beckers färgtillverkning på Lövholmen i Stockholm. En industrihistorisk undersökning.* [Västerås]: Nätverket för Byggnadsvård i Västmanlands län available on internet ://http://www.stockholmskallan.se/PostFiles/SMF/SD/Beckers.pdf [2014-06-02]

Carlson, A. (2010-12-13). Environmental aesthetics. In: *Stanford Encyclopedia of Philosophy*. http://plato.stanford.edu/entries/environmental-aesthetics/ [2014-05-23].

Collins, T. (2004). Towards an aesthetic of diversity In: Strelow, H. (ed.) *Ecological aesthetics. Art in Environmental Design: Theory and Practice*. Basel:Birkhäuser, pp.170-172

Eriksson, E. (ed.) (2003). *Stockholms stränder. Från industri till bostäder.* Värnamo: Ordfront förlag/ Samfundet S:t Erik

Falk, M. & Ronnheden, J. (2010) *Succession Landskapsarkitekten & fytoremedieringen.* Master's thesis. Ultuna: Sveriges lantbruksuniversitet.

Florgård, C. (2007). Stockholm's Blue-Green lnfrastructure. ln: Lahti, P., Calderon, E., Jones, P., Rijsberman, M. & Stuip, J. (eds). *Towards Sustainable Urban lnfrastructure - assessment, tools and good practice*, pp 247-245

Göransson, S. (2013). *En ny mötesplats i Lövholmen, Stockholm En studie om hur anpassning till ett förändrat klimat med ökade vattennivåer kan integreras i gestaltningen av offentliga platser.* Master's thesis. Ultuna: Sveriges lantbruksuniversitet.

Göteborgs stad (2005). *Träd i Göteborg. Katalog över lämpliga gatu- och platsträd i Göteborg.* Göteborg: Park- och Naturförvaltningen.

Göteborgs stad (2005). *Trädpolicy Göteborgs stad. En gemensam syn på plats- och gatuträd i staden.* Göteborg: Göteborgs stad.

Hansen, J. (2012). *Mycoremediation.* http://rydberg.biology.colostate.edu/phytoremediation/2012/Mycoremediation%20by%20James%20Hansen.pdf [2014-05-20]

Hollander, J., et al. (2010). *Principles of Brownfield Regeneration : Cleanup, Design, and Reuse of Derelict Land*. (2nd Edition) Island Press.

IFLA (2014). IFLA International student landscape architecture design competition basis. http://www.iflaargentina2014.com/contenido/6292568.pdf [2014-05-23].

Ignatieva, M. (2013). *LPS Brownfields.*[2014-05-29]

Kanaplue, J. (2003) S. Salina St. Brownfields, Syracuse, NY. *Integrating Innovative and Conventional Remedial Techniques into the Design of a Temporary Demonstration Park*. Master's work. SUNY ESF, USA

Kirkwood, N. (ed.) (2001). *Manufactured Sites: Re-thinking the Post-Industrial Landscape*. London, UK: Spon Press.

Länsstyrelsen (2007). *Förorenade områden- inventering av sågverk, industrier för tillverkning av fiberskivor, massa och papper samt oorganisk kemisk industri i Stockholms län* (Report 2007:17) Stockholm: Länsstyrelsen.

Länsstyrelsen (2012). *Klimatanpassning i fysisk planering – Vägledning från länsstyrelserna.* Länsstyrelsen.

Lönngren, I., (2004) *Ärendet avser klagomål beträffande rostiga cisterner.* Unpublished material*. [Stockholm: Stadsbyggnadskontoret. 2004-05-10, Dnr 1998-05756-576]

Markkontoret (2006). *Stockholms parkprogram. Handlingsprogrammet 2005–2009 för utveckling och skötsel av Stockholms parker och natur.* Stockholm: Stockholms stad.

McCutcheon, S.& Schnoor, J. (2003) *Phytoremediation: Transformation and Control of Contaminants*. New Jersey: John Wiley & Sons, Inc.

Miljöförvaltningen (2012). *Stockholms stads biotoper. Reviderad databas för Stockholms biotopkarta och övergripande analys av förändringar mellan 1998 och 2009* (Report 2012:1) Stockholm: Miljöförvaltningen.

Miljöpartiet (2010). *200 miljoner i satsning på träd i Stockholm* (Pressrelease from Miljöpartiet 2010).

Bibliography

Nyréns Arkitektkontor (2008): *Kolsyrefabriken, Lövholmen 13. Antikvarisk förundersökning*. Stockholm: Veidekke AB

Rottle, N. (2013). Urban Green Infrastructure for Climate Benefit: Global to Local. *Nordic Journal of Architectural Research.* 2013:2. pp. 43-66.

Rottle, N & Yocom, K. (2010). *Basics Landscape Architecture 02: Ecological Design*. Singapore: AVA Publishing.

Sporrenstrand, S. (2009). En Kungsträdgård för alla tider. *Östermalmsnytt,* 14th August.

Stadsbyggnadskontoret (2008). *Lövholmen. Program för stadutveckling, diskussionsunderlag juni 2008.* Stockholm: Stadsbyggnadskontoret.

Stadsbyggnadskontoret (2013). *Startpromemoria för planläggning del av Liljeholmen 1:1 i stadsdelen Liljeholmen (skola).* Stockholm: Stockholms stad.

Stockholms stad (2005). *Program för Stockholms vattenarbete 2006 – 2015.* Stockholm: Stockholms stad.

Stockholm stad (2010). *Promenadstaden. Översiktsplan för Stockholm.* Stockholm: Stockholms stad

Stockholms stad (2012). *Stockholms träd.* http://www.stockholm.se/KulturFritid/Park-och-natur/Trad/ [2014-05-29]

Strelow, H. (ed.) (2004). *Ecological Aesthetics. Art in Environmental Design: Theory and Practice.* Basel: Birkhäuser.

Ståhle, A. (2006). Sociotope Mapping. Exploring public open space and its multiple use values in urban and landscape planning practice. *Nordic Journal of Architectural Research,* 19(4), pp. 59-71

Sweco Environment AB (2011). *Analysrapport. Miljöprovtagning av mark intill Fägfabriken, Liljeholmen.* (Report 2011-08-19). Stockholm: Färgfabriken.

Sweco Environment AB (2012). *Markundersökning kting större fabriksbyggnad, kv. Lövholmen 11. Provtagning av jord och grundvatten inför exploatering.* (Report 2012-01-23). Stockholm: Skanska AB.

TV-eken har fallit (2011). *Svenska Dagbladet,* November 25th.

Tönnersjö plantskola (2014). *Tönnersjös trädguide*. Halmstad: Boarding Halmstad AB.

World Commission on Environment and Development (1987). *Our Common Future.* [Nairobi] : [United Nations Environment Programme]

Vetenskapens värld (2014). Svampar på frammarsch [TV-series]. Sveriges Television, February 3rd.

Vogt, G. (2010). Between Search and Research. In: Foxley, A. *Distance and Engagement. Walking, Thinking and Making Landscape*. Baden: Lars Muller Publishers pp. 7-25.

Webster, N. (1977). Webster's New Twentieth Century Dictionary of The English Language. US: Collins+World Publishing Co., Inc.

Weilacher, U. (2007). The Garden as the Last Luxury Today: Thought-Provoking Garden Projects by Dieter Kienast (1945-1998). In: Conan, M. (ed): *Contemporary Garden Aesthetics, Creations and Interpretations.* Harvard University Press 2007. pp. 81-95

Weilacher, U. (2004). Ecological aesthetics in landscape architecture today? In: Strelow, H. (ed.) *Ecological aesthetics. Art in Environmental Design: Theory and Practice*. Basel: Birkhäuser, pp. 116-119

Weilacher, U. (2005). *In Gardens. Profiles of Contemporary European Landscape Architecture.* Birkhäuser: Basel.

Åström, K. (1993). *Stadsplanering i Sverige*. Stockholm: Byggförlaget

List of Illustrations

106. Aerial map, © Lantmäteriet, i2012/901. Transformed by authors.
107. Map of Stockholm by authors
108. Photo of model by authors
109. Save Lake Trekanten. Photo by authors
110. The battle of the elms in Kungsträdgården 1971, http://www.stockholmskallan.se/Soksida/Post/?nid=23183 by Stockholmskällan http://www.stockholmskallan.se/ (© Stockholmskällan) [2014-05-10].
111. People protecting trees in 1971, http://www.stockholmskallan.se/Soksida/Post/?nid=22709 by Stockholmskällan http://www.stockholmskallan.se/ (© Stockholmskällan)[2014-05-10].
112- 113. Elms in Stockholm. Photos by authors
114- 117. Illustrations by the authors
118. Site plan by authors
119. Perspective by authors
120-121 Illustrations of treatments on site by authors
122. Map of Stockholm by authors
123. Map of vegetation by authors
124- 127 Illustrations by authors
128. Diagram of planting strategy by authors
129- 132. Illustrations by authors
133- 136. Illustrations by authors
137. Diagram of nodes and walkways by authors
138- 142. Illustrations by authors
143- 151. Photos of models by authors
152. Map of topography, © Stockholms stadsbyggnadskontor
153. Aerial photo Stockholm, by Lennart Johansson for Stadsbyggnadskontoret in Stockholm (© Lennart Johansson) [2014-05-05].
154- 161. Photos of model by authors
162- 166 Photos of the model by authors
167- 172 Visualizations by authors
173. Photo of model by authors
174- 175. Conceptual images by authors
176. Image by authors
177. Collage by authors
178. Hamburg, Carolina Horn (© Carolina Horn) [2013-10-09].

Fig 178. Installation in Hamburg

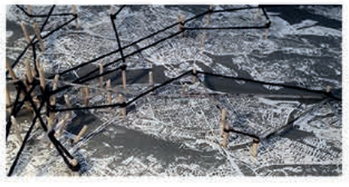
ARBORETUM LÖVHOLMEN

– Production of Trees for a Greener Future

Arboretum Lövholmen is the symbolic node for Stockholm as a sustainable city, A city where green values are recognized and treasured. The *Arboretum* acts as a central catalyst for the green structures of Stockholm city, both as a productive nursery generating trees for urban settings, as well as a source of knowledge of our common resource and responsibility, the nature in the city. *Arboretum Lövholmen* spreads awareness and gets people involved and engaged in a greener development. Get to know the trees of Lövholmen and learn more about their future in a dramatic setting where the old industrial landmarks still bear witness of the past. A former polluted and inaccessible site has finally been opened up for the whole community to enjoy.

Vision

We suggest a vision that introduces new rules for how Stockholm should develop in a sustainable way in the future. A vision where green spaces are no longer allowed to be put aside. Stockholm is one of the fastest growing cities in Europe where urban space is increasingly claimed by housing, service and parking lots. Our vision suggests that the growing grey structures should be compensated for by a growing green structure. The former industrial site of Lövholmen acts a symbolic spot for Stockholm taking an active position against unsustainable land use in the past, promoting a future urban landscape in balance with nature, where focus lies on public life and green development. The ever-growing Arboretum represents our fast growing cities and the need for a vital green infrastructure in it. It will be administrated by the municipality of Stockholm. Staff will work in the park and green houses will nurse plants and activate the site all year round. As the Arboretum generates plants to be planted all over the city, a network of related trees are created incorporating the whole city as an extension of the Arboretum. By getting to know the individual trees and understanding the work of the Arboretum, an awareness of common responsibility of these plants, spreads in the community. Arboretum Lövholmen will be an attractive urban public space for activities, knowledge and storytelling.



Conceptual image: The industrial site of Lövholmen has spread pollution over the city. The proposal Arboretum Lövholmen suggests a reversed function of the site, turning it into a green catalyst spreading trees over the city.

Inspiration; Trees that engage and involve

In Stockholm people have showed great commitment to the preservation of old trees in the cityscape. During the *"Battle of the Elms"* in 1971 and the riot around the famous *"TV-Oak"* in 2011, people fought for the rights to a greener city literally tying themselves to the old trees. It is evident that trees engage and involves us. They are the spine of our urban green structures. Increasing amount of hard surfaces along with pollution results in a short life span of urban trees and only a fraction of the trees grow up to their potential size. We need to keep reacting and caring for nature and understand and appreciate the role of trees in our city. Not just protecting old individuals, but securing a new generation of vital urban trees for the future.

Photos: af Petersens, Lennart. Stockholms Stadsmuseum. cc

ARBORETUM LÖVHOLMEN

— Production of Trees for a Greener Future

The site today

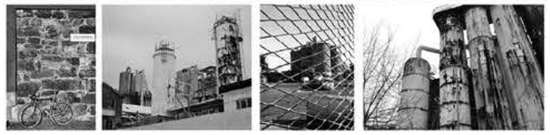
Country: Sweden
City: Stockholm
District: Liljeholmen
The site: Lövholmen
Area: 60 000 m²

Sweden

Stockholm Eniro/© Lantmäteriet,/2012/901

Lövholmen Photo: Johansson, Lennart, Stockholms Stadsbyggnadskontor.

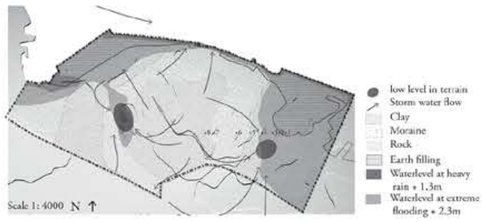
Activities
- Art studios
- Liljeholmens center; modern buildings and square
- School
- *Cementa AB*; concrete production
- Lake Trekanten; park, recreation
- Art Association; platform Of Stockholm
- Bus- and tram stop /Café /Restaurant / Health Center
- *Färgfabriken*; Art gallery
- *Kolsyrefabriken*; former carbon oxide industry
- Harbour of Gröndal



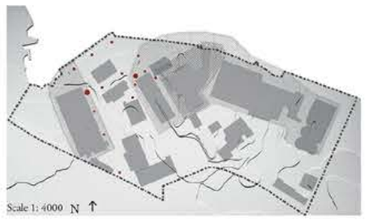
Surroundings
- *Reimersholme*; smallscale housing
- *Gröndal*; multifamilyhousing and terrace houses
- *Hornstull*; traditional city with blockstructure
- *Lövholmen*; industrial area
- *Tantolunden*; alotment gardens, park, recreation
- *Nybohov*; typical housing from the 60's
- *Marievik*; Officebuildings
- *Sjöviks square and Liljeholmskajen*; modern residential buildings,recreation and swimming

© Lantmäteriet,i2012/901

Natural conditions



Contaminations



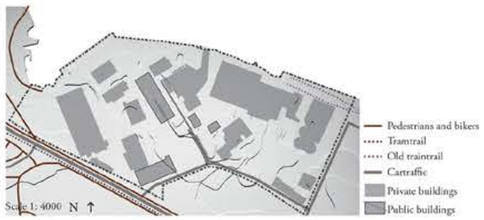
Measurements show increased contents of metals in the soil. Highest are the contents of barium, quicksilver, lead and zinc. County Administrative Board of Stockholm, estimate high levels of contaminations in the buildings and the sediment of Lake Mälaren.

Medium contamination
High contamination
Test point
Test point with highest amount of contamination

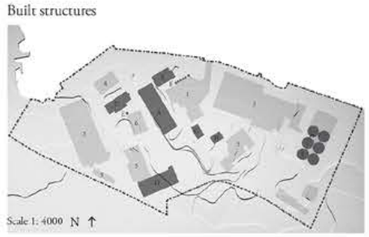
Decontamination by Mycoremidiation

When Sawdust spawn containing mycelium is placed on contaminated areas the fungi will penetrate the soil, breaking down toxins on its way down in the profile. Experiments show that soil treated with mycelium contains high amounts of nutrients after the cleaning process. This is important for and a continued ecological restoration process and future establishment of plants

Movement and nodes



Built structures



To preserve

A. *Färgfabriken* (1889); art gallery, café
B. *Smithy* (1889); the eldest building
C. *Förbandsfabriken* (1915)
D. *Platform Stockholm*; Artist Association (1926)
E. Stalk from the steam-boiler central (1945)
F. Silos from the Carbon oxide factory (1896)
G. *CAGA*. Concrete Art Gallery
H. Liljeholmen art studio
I. Silos of the concrete factory
J. Railway tracks
K. Wall

To remove

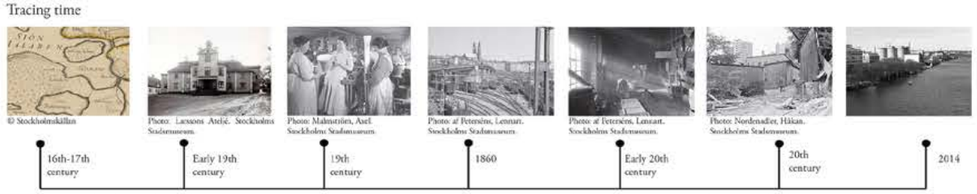
1. *Kolsyrefabriken (1896)*; Closed Carbon Oxide factory, worn down, contaminated.
2. *Sprödfabriken* (1953); Closed factory in risk zone for flooding, blocking main entrance.
3. *Cementa AB* (1945); Active concrete factory. Production will move to another site.
4. *Nitrodalsfabriken* (1944); Closed factory in risk zone for flooding.
5. *Workshop hall and storage* (1962); In risk zone for flooding. Blocks important entrence.
6. *Steam-boiler central* (1945); in risk zone for flooding.

History

Green and blue structures over time

Overlays of historical maps show a gradual regression of the blue and green structures on Lövholmen and how the coastal line has changed. The site has evolved from an idyllic hounting ground into a heavily industrialised area and finally to the present partly abandoned state. In all fases the site has in some way been excluding, accessible only to a fragment of the population.

Tracing time



The idyllic green spot
The district is not a part of the city of Stockholm. The area was at this time an idyllic green spot and the last stopping point before entering the city.

Summer residences
The bourgeois established summer residences in the area. Some residents are still left in the area, reminding us about the idyllic character of the place at that time.

Industry
Lövholmen became the first industrial suburb in Stockholm with heavy industries. The production of color, carbonic oxide and concrete were the most important industries.

Railway
The railway line was established 1860 and Lövholmen the first station outside the city. New activities like plant nursery, paint workshops and timber yards were set up in the area.

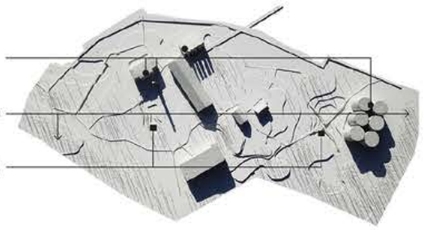
Suburb
Liljeholmen became the biggest and most densely populated suburb in Stockholm. Though the industrial activities were lucrative, the area was a poor and socially problematic area.

Part of the City
As Lövholmen became a part of Stockholm, the area was decontaminated. Some industries were demolished and replaced with more modern buildings.

Future development
The site of Lövholmen is considered an interesting object for future urban development in Stockholm.

Program

- Private, closed an excluding site will be opened up for public use
- Important built elements acting as landmark and bearing witness of the rich history of the site will remain but hold new functions
- The site will link surrounding green structures and actively promote a green and sustainable development of Stockholm city
- The site will be cleaned from contamination in an ecological way and provided with a storm water management system

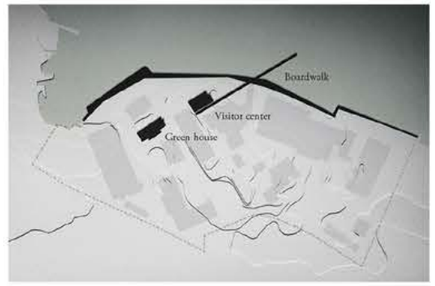


Three stages for future development

Accessibility and nodes 1-3 years

Reflection; the degraded industrial area is an inaccessible place with fences and closed structures separating the site from its surroundings. The site has a strategic location near the waterfront and should be open for everyone. The first stage in our vision welcome people, movement and activities. Thus the public becomes involved in the future development of the site.

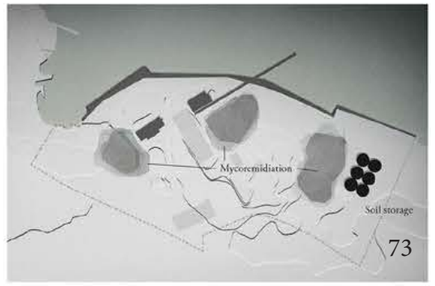
Action; by creating new entrances and walkways, across the site and along the waterfront, the site is made accessible to the public. As a first stage of development for Arboretum Lövholmen one of the oldest buildings on the site, the smithy, is transformed into a visitor center. The center will guide and inform people about the future project of Arboretum Lövholmen. The building Nitrolacksfabriken, is transformed into a green house where seeds to the source plants of the park will be brought up during three years before entering the park. These nodes will welcome people to take part of the rising park.



Spatiality and decontamination 2 years

Reflection; the contaminated soil in Lövholmen is a part of its history. We see the succession of the human actions and the industrial history as important features for the identity of the site. Instead of removing the contaminated soil we want to highlight the process of the environment healing itself. We see the recovery as an important process for the sustainable vision for the new site.

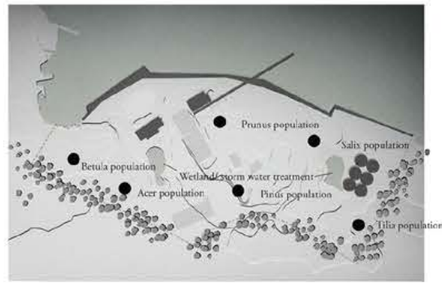
Action; according to the municipality of Stockholm, the existing industrial activity will be moved to Värtta harbor in Stockholm. When buildings disappear, new open structures create spatiality and the decontamination of the site can start. We will use the method of *Mycoremediation* applied on the site as an ecological way to clean the soil. It is a method that uses fungi to degrade pollutants from the environment. The treated soil will after 2 years be moved to the silos for storage. The soil will be used for future plantings of the trees in the park.



Tree planting and wetland establishment 1-3 years

Reflection; the vision is based on an ecological idea of cleaning the site of Lövholmen with new green and blue structures. We see the new blue layer of water as a self-cleaning process and the new green layer of trees in the park as catalysts; new seeds are planted for a future Stockholm.

Action; the grown trees, brought up in the green house, will be planted in the park and will be the permanent green structure in the rising Arboretum. They will grow and create spatiality and variety in species. They will also be the source trees for the production of city trees in Lövholmen. The planted trees shall also create a green spine around the site that link, strengthen and connects to the green structure of Lake Trekanten.



Establishment and distribution of trees

Planting strategy Arboretum Lövholmen	*Plants in greenhouse*	*Plants in Lövholmen*	*Yearly distribution to districts in Stockholm*
	Age: 0-3 years	*Age: 3-10 years*	*Age: 10 years*
Acer campestre	15	35	5
Prunus avium	15	15	5
Salix alba	9	21	3
Pinus nigra	6	14	2
Betula pendula	15	35	5
Tilia cordata	15	35	5
Total	75	175	25

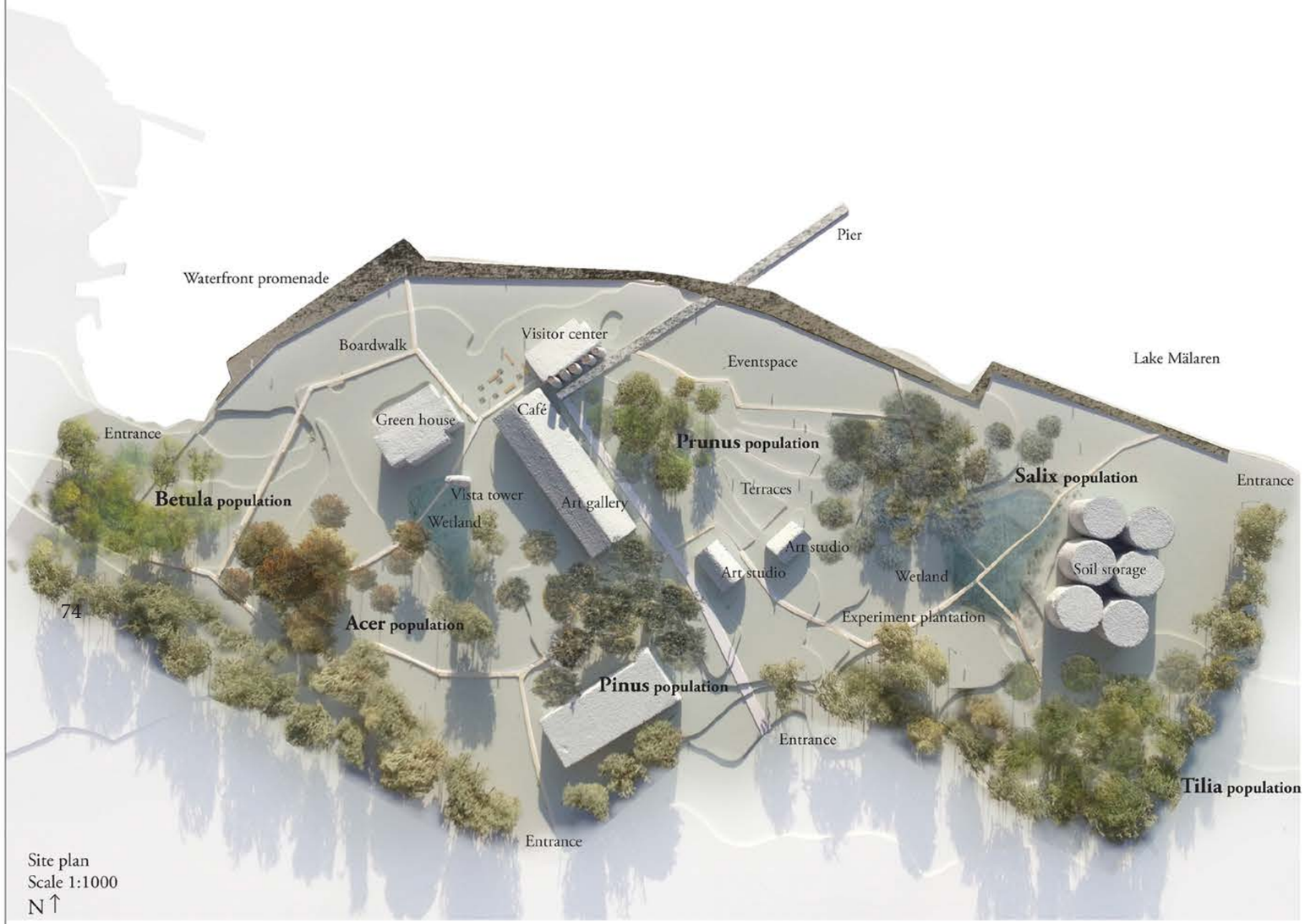
Permanent tree structure

The source plants will be planted in the Arboretum after three years in the green house. They will act as the green structure in the Arboretum and will produce seeds for the nurcery.

The yearly planting of trees is a big event in Lövholmen. Volunteers are welcome to participate under the guidance of the staff. The activity becomes a fun outdoor activity that gets people involved in the Arboretum. The Arboretum truly evolves as a common interest and pride.

ARBORETUM LÖVHOLMEN

– Production of Trees for a Greener Future



Site plan
Scale 1:1000
N ↑

Walk of knowledge

A network of paths and boardwalks helps visitors find their way around the Arboretum. They lead through different spacialities and characters on the site, like the delicate birch forest, the dark pine slope or perhaps the sunny terracing field that ends in an event surface holding concerts and activities by the waterfront. A visit to the Arboretum is a broad experience containing something new and exiting each time. On your way you learn more about trees: their ecological values, distinguishing features of different species and information of specific tree individuals. The old industrial relics are existing contrasting landmarks that hold new functions in the maintenance of the Arboretum.

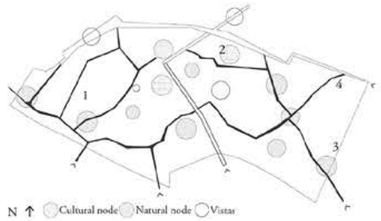
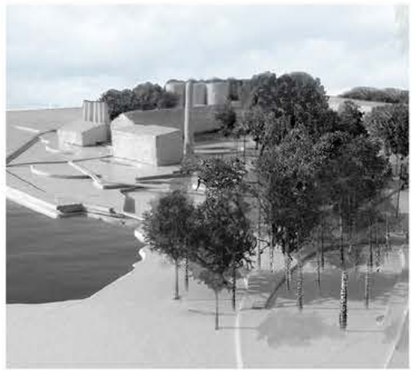


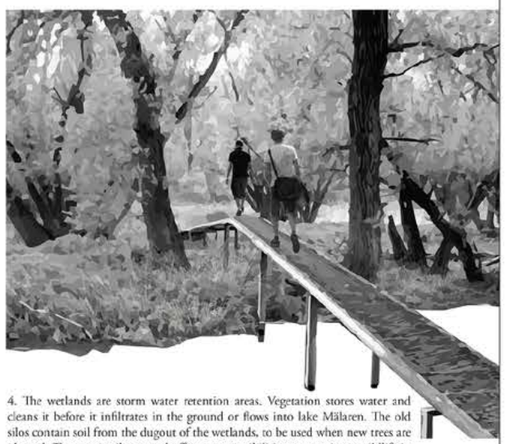
Diagram over how the network of paths and boardwalks link cultural, visual and natural points of interest.



1. A birch forest welcomes at the western entrance of the Arboretum. Through the delicate foliage of the trees you can see glimpses of the waterfront promenade and the Arboretum greenhouse where new trees are waiting to be planted in the park.

2. The café at the Art gallery draws visitors in need of a relaxing break. The courageous ones can climb the vista tower and get an overview of the Arboretum as well as a beautiful view across the water towards the center of Stockholm.

3. The experiment garden is protected behind the hill, which makes it an excellent spot to try the hardiness of new tree species. Changing climat and diseases striking native species make it important to experiment with alternative tree species and how they tolerate the Swedish climate.



4. The wetlands are storm water retention areas. Vegetation stores water and cleans it before it infiltrates in the ground or flows into lake Mälaren. The old silos contain soil from the dugout of the wetlands, to be used when new trees are planted. The area is vibrant and offers new possibilities to experience wildlife in the city.

Populations of trees

Section showing the principles of the tree structure of Arboretum Lövholmen. The oldest individuals of each species create a permanent tree structure in the Arboretum. They become the nodes of the population. Around younger individuals are planted and grow up to be distributed to different parts of Stockholm at the age of 10. Variety in species of trees creates different characters and spacialities and turns a visit to Lövholmen into a diverse experience. The systematic structure also has pedagogical values.

Pinus population | Prunus population | Tilia population | Betula population | Salix population