

HOW TO
REDESIGN LAWNS
WITH AN
ECOLOGICAL APPROACH?

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Title: How to redesign lawns with an ecological approach?

Titel: Hur kan gräsmattor omvandlas med ett ekologiskt förhållningssätt?

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A close-up photograph of green grass blades and purple seed heads, serving as the background for the text.

THANKS & **FOREWORD**

We would like to thank the people who guided and supported us with their knowledge and wisdom through this master thesis.

Special thanks to Maria Ignatieva, Marcus Hedblom, Jörgen Wissman, Karin Ahrné and Madeleine Granvik.

Hopefully this thesis will inspire and enlighten you just as we were enticed by this current, complex and interesting subject.

ABSTRACT

Conventional lawn is the dominating element in green space in Swedish cities. This is not unique. As a result of globalisation the conventional lawn is a universal element, which covers up to 70 per cent of open green areas in cities in many parts of the world. The lawn symbolizes the good life and has been a norm in modern western society for at least a century. Most people have a personal connection to lawns and associated lawns with well-kept green areas and being a safe place.

But being the most common green space element in the urban environment with almost exactly the same appearance and plant species composition in different cities around the world, regardless climatic conditions, it plays a significant role in threatening both biodiversity and place significant identity. The on-going process of globalisation requires sustainable development of urban areas with well-functioning natural processes. The homogenous conventional lawn's contribution to ecological function is very limited and it also offers few experiential values and requires intensive maintenance. In recent years, the high prevalence of conventional lawns, have therefore started to be questioned. The conventional lawn although has many functional advantages, and it should still be used in urban environment for these reasons. But in many places conventional lawns exist only because they always have. In these places we argue for replacing the lawn with more sustainable alternatives that increases ecological as well as experiential values.

This thesis focuses on redesign of conventional lawns in Swedish residential areas. The aim is to combine theoretical knowledge with practical lessons in order to obtain a result, which deals with new approaches and also is realistic to implement. To get a comprehensive understanding of the subject the main focus is ecology, design and maintenance. We present selected ecological principles and experiential values, to apply when redesigning conventional lawn in Swedish residential areas. We also present range of more sustainable alternatives to the conventional lawn and explain how they should be established and managed.

A case study in a residential area in Gothenburg shows how this approach can be applied. By introducing a varied composition of elements such as meadows, grass-free lawns, trees and shrubs the proposal transforms a homogenous residential area dominated by

conventional lawn, into a heterogeneous area that offers rich experiences and high ecological values. The proposal is presented in neighbourhood scale followed by selected design interventions in detail were applied ecological principles, experiential values, establishment methods and maintenance are explained.

"The homogenous conventional lawn's contribution to ecological function is very limited and it also offers low experiential values and requires intensive maintenance."

SAMMANFATTNING

Här följer en kort sammanfattning av examensarbetet. Vi beskriver syftet med varje del av arbetet och ger en kort beskrivning av huvudresultaten.

FORSKNINGSFRÅGA

Hur kan konventionella gräsmattor omvandlas i svenska bostadsområden med målet att uppfylla ekologiska värden och upplevelsevärden, samtidigt som omvandlingen är realistisk att genomföra och förvalta?

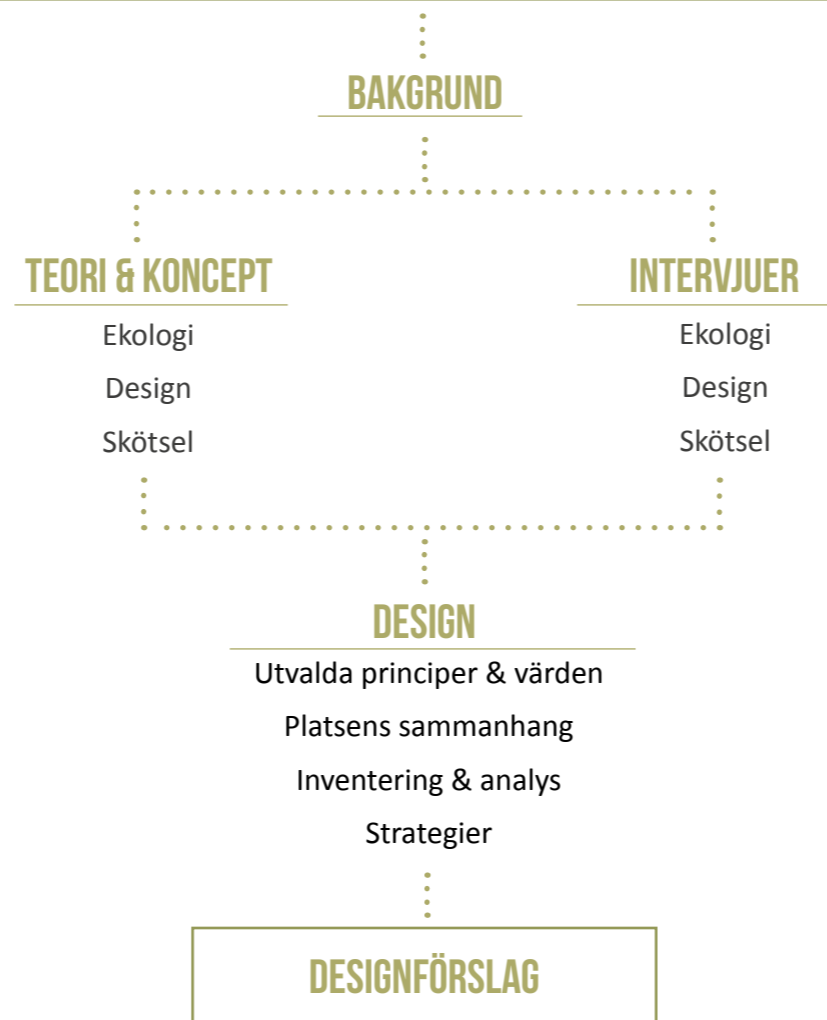


Figure 1: Examensarbetets upplägg. De olika delarna bidrar till att svara på forskningsfrågan.

SAMMANFATTNING

Rapporten framför dig är ett examensarbete i landskapsarkitektur gjort i samarbete med forskningsgruppen *the LAWN-project* på Sveriges lantbruksuniversitet under våren 2015. Syftet med arbetet är att kombinera ett ekologiskt perspektiv med design och skötsel aspekten av gräsytor i svenska bostadsområden. Huvudämnen i uppsatsen är därmed ekologi, design och skötsel. Rapporten har två huvudresultat. Det ena är att formulera ekologiska principer och upplevelsevärden som är relevanta för gräsytor och bör beaktas vid omvandling av dessa. Det andra resultatet är att applicera dessa principer och värden genom att omvandla gräsmattor i ett bostadsområde i en fallstudie. En viktig del av resultatet är att det ska vara realistiskt att förverkliga och hållbart över tid.

METOD

Uppsatsen är uppbyggd i fyra delar; bakgrund, litteraturstudie, intervjuer och design (figur 1). Bakgrunden och litteraturstudien grundades på litteraturstudier och kompletterades av samtal med experter inom *the LAWN-project*. I intervjudelen av arbetet intervjuades yrkesverksamma ekologer, landskapsarkitekter, parkförvaltare och skötselentreprenörer som var strategiskt utvalda. I designdelen utformade vi inventering och analys utifrån framtagna ekologiska principer och upplevelsevärden. Utifrån analysen utvecklades sedan strategier för området som styrde designförslaget.

BAKGRUND

Gräsmattor är idag ett universellt element som täcker cirka 70 % av öppna grönytor i städer världen över. Det är framförallt den traditionella gräsmattan, en gräsyta med kortklippt gräs för rekreativt bruk och aktiviteter, som är vanligt förekommande. Normerna kring denna yta är starka, de flesta anser att ytan ska vara just kortklipp och välskött och relaterar den till trygghet och säkerhet. Men den traditionella gräsmattans homogena utseende, krävande skötsel och låga ekologiska värden gör att den blivit ifrågasatt under senare år.

TEORI & KONCEPT

EKOLOGI

En hållbar utveckling är beroende av välfungerande naturliga processer. I en tid av urbanisering är det allt mer viktigt att urbana områden bidrar till att skapa en miljö som gynnar dessa processer. Ekosystemtjänster är det ekosystemen bidrar med till människors välbefinnande och bygger på ekosystemens funktion. Forskning visar till exempel att biodiversitet har en positiv inverkan på ekosystemens funktion och det finns även ett positivt samband mellan biodiversitet och hur människors upplever en miljö. Kopplingen mellan specifika ekosystemtjänster och ekosystemens funktion är dock komplex. Vi har därför valt ut ett antal ekologiska principer med målet att de ska bidra till ekosystemets funktion vilket i sin tur, indirekt, genererar ekosystemtjänster. Syftet med sammansättningen av de olika principerna är att ge en helhetsbild av de ekologiska aspekter som bör tas i beaktande vid omvandling av konventionella gräsmattor i bostadsområden. Principerna använder vi oss sedan av i utvecklingen av vårt förslag i design-delen av arbetet.

DESIGN

När en utemiljö skapas är det viktigt att förhålla sig till miljöns fysiska element men även människors upplevelse av miljön. Våra preferenser för vad vi upplever i utemiljön påverkas bland annat av kulturellt sammanhang, förändring över tid, den totala strukturen och hur miljöns olika delar är arrangerade. Exempelvis har flera studier visat på att människor i allmänhet föredrar välskötta, kortklippta gräsytor men även ytor med naturkaraktär och stor artrikedom uppskattas. Från olika studier har vi valt ut upplevelsevärden i utomhusmiljön som vi anser går att applicera på gräsytor i bostadsområden. Dessa skapas och uppnås i den kommande designdelen.

SKÖTSEL

Olika typer av gräsytor har olika skötselkrav. Gräsmattor klipps ungefär 12-20 gånger per säsong medan högt gräs och äng slås 1-3 gånger. En

hög skötselintensitet är inte bara kostsam utan har också en negativ påverkan på artrikedomen i gräsytan. Gräsytor etableras oftast med fröer, rulle eller plantor. Frösådd är en billig metod men etableringen tar längre tid än de andra alternativen. När en äng ska etableras kompletteras frösådd ofta med exempelvis ängsplantor för att blomning ska ske redan första året.

EKOLOGISK SKÖTSEL

Det finns metoder som gör skötseln mer miljövänlig; att ändra till ytor som kräver mindre skötselintensitet, utesluta miljöfarliga ämnen och att välja maskiner med mindre miljöpåverkan. Till exempel har forskning visat att mindre frekvent klippning av gräsytor bidrar till lägre energiförbrukning, en förbättring för växter och djur att sprida sig samt att fler arter tillåts blomma och därmed gynna pollinerare och insekter. Andra miljövänliga metoder är att klippa gräs med häst och slätterbalk eller att låta djur beta av gräsytor.

OLIKA YTOR FÖR EN MER VARIERAD UTMILJÖ

För att skapa en utomhusmiljö med ökad heterogenitet kan olika gräsytor eller liknande gröna ytor användas.

GRÄSMATTOR

Kortklippa vegetationsytor med frekvent klippning.

KONVENTIONELL GRÄSMATTA- klipps 12-20 gånger/säsong. Kortklippt, inte högre än tio centimeter.

GRASS-FREE LAWN- lågväxt vegetationsyta med perennväxter. Ytan har ett varierande och dynamiskt utseende. Den tål att folk trampar på den med inte intensiv användning. Vegetationsytan klipps 3-9 gånger/säsong. Klippning främjar blomning.

ÄNGAR

Ytor med högre gräs och inslag av örter. Slås 1-3 gånger/säsong och gräsklipppet tas upp för att magra av jorden. En äng bör slås mellan

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mitten till slutet av juli för att främja blomning och spridning av fröer. Vi har valt att presentera följande ängstyper: **NORMALÄNG**, **FUKTÄNG**, **TORRÄNG** och **SKUGGÄNG**.

HÖGT GRÄS

En yta som tidigare varit en gräsmatta men som nu har samma skötselkrav som en äng, och därmed har en hög gräsvegetation. På grund av markförutsättningar och artkomposition har högt gräs inte blommande inslag i lika stor utsträckning som en äng.

PICTORIAL MEADOWS

Pictorial meadows är ängsplanteringar som plöjs och planteras varje år med ettåriga växter. Arter med olika blomningsperioder väljs ut för att ytan ska få en lång ihållande blomning.

Bilder på olika typer av gräsytor som presenteras i arbetet och används i designförslaget.

(Konventionell gräsmatta: own photo.)

Grass-free lawn: Maria Ignatieva, 2015.

Äng: Inger Runesson, 2009.

Högt gräs: Maria Ignatieva, 2015.

Pictorial meadow: Inger Runesson, 2014.

INTERVJUER

För att få inblick i det nuvarande kunskapsläget och praxis bland yrkesverksamma intervjuades ekologer, landskapsarkitekter och parkförvaltare samt skötselentreprenörer. Alla intervjupersoner är ense om att gräsmattan har ett funktionellt värde och därför inte bör uteslutas helt, men samtidigt måste ifrågasättas på grund av dess kostsamma skötsel och låga ekologiska värden. En av de största skillnaderna vi fann var gällande skötseln av hög-gräsytor och ängar, där till exempel tidpunkten för slagning i kommunens riktlinjer och ekologernas kunskaper för att uppnå önskvärda ekologiska och estetiska kvaliteter, inte stämmer överens.

DESIGN

Genom fallstudien ska utvalda ekologiska principer, upplevelsevärden och typer av gräsytor och skötselmetoder tillämpas i en omvandling av gräsytor i ett bostadsområde i Lundby, Göteborg. Området är ett typiskt



SAMMANFATTNING

folkhemsområde som byggdes på 50-talet. Från inventering och analys av området formulerades fem strategier som är ihopkopplade med de utvalda ekologiska principerna och upplevelsevärden. Strategierna styr utformningen av designförslaget. De fem strategierna är:

- 1 SKAPA EN MER HETEROGEN UTEMILJÖ, både gällande biodiversitet och upplevelsevärden
- 2 FÖRSTÄRK BERGKNALLARNAS KVALITÉER, genom att bevara deras starka identitet och öka tillgängligheten
- 3 ALLA YTOR SKA HA ETT SYFTE, genom att bidra till ekologiska värden och/eller upplevelsevärden
- 4 PARKER MED STARK IDENTITET & KARAKTÄR, bevara befintliga värden men även skapa nya och ge de två parkerna distinkta karaktärer
- 5 INSLAG SOM FASCINERAR & INFORMERAR, för att öka intresse och förståelse för naturen

DESIGNFÖRSLAG

Förslaget innebär att mängden ytor med högt gräs och äng ökar, medan ytor med konventionell gräsmatta minskar. Framförallt har fler olika typer av vegetationsytor introducerats för att öka heterogeniteten och gynna biodiversitet. Ytor som 'pictorial meadow', 'grass-free lawn' och en variation av ängar finns nu i området. Förslaget ämnar att förstärka befintliga och lyfta fram potentiella upplevelsevärden för att skapa mer identitetsstarka ytor. Några av bostadsgårdarna och större, öppna ytor i parkerna har gjorts om till större ytor av äng eller högt gräs. Klippta gångar skapar formationer och gör det möjligt för folk att komma nära och befinna sig i ytorna. Designförslaget innehåller även träd, buskar, lökväxter och odlingslotter, för att komplettera gräsytorerna samt bidra med rumsliga egenskaper och en större artrikedom.



Gestaltningen av 'Pictorial meadow & High grass walkway'. Element som stenmur, pictorial meadow och en häck av rödvide bidrar till ökad heterogenitet samt gynnar pollinatörer.

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PART ONE
INTRODUCTION

In this part we present the objective, research question and methodology of the thesis. The part starts with a brief introduction to the subject.

INTRODUCTION

INTRODUCTION TO THE SUBJECT

The conventional lawn is a common and universal element that covers roughly 70% of open green spaces in cities all over the world (Ignatieva, 2014). Many people appreciate the lawn for its functional benefits since it serves good possibilities for social activities such as sports and play (Bormann, et al., 2001). It is also appreciated for its aesthetical values of being an area that looks well kept and is perceived as a safe place (Eshraghi, 2014). For these reasons the lawn is also valuable for municipalities and other people that have an economical interest in how an area is perceived. To achieve these qualities although requires intensive maintenance, which is both time-consuming and expensive as well as results in significant environmental impact.

Despite being represented in different climates and cultures the lawn tend to have the same appearance (Ignatieva & Stewart, 2009). This homogeneity is also represented in species richness, where the intense maintenance result in a monoculture which holds low biodiversity and contributes to poor ecological quality (Ignatieva, 2014).

By redesign and promoting alternatives to the conventional there is potential to contribute to a higher biodiversity in cities, decrease maintenance costs and pollution, and at the same time increase experiential values. (Ignatieva & Stewart, 2009)

As part of a research group on the *Swedish University of Agricultural Sciences* (Sveriges lantbruksuniversitet), this thesis aims to find a more sustainable design alternative for large areas in our cities that today are covered by conventional lawns. We will introduce other types of vegetation by focusing on finding sustainable solutions that promote ecological qualities as well as they are appreciated by people and realistic to implement and maintain.

THE LAWN PROJECT

The project 'Lawn as ecological and cultural phenomenon, searching for sustainable lawns in Sweden' is an interdisciplinary collaboration of ecologists, biologists, sociologists, landscape architects and experts in soil and carbon sequestration as well as stakeholders. The aim of

the project is to *"study lawns from different perspectives as social and ecological phenomenon in order to understand their roles in sustainable urban planning, design and management."* (Swedish University of Agricultural Sciences, 2015). The project is founded by the *Swedish Research Council FORMAS* and runs from 2013 to 2016 with the long-term objective *"to deliver results in the form of an urban greening manual, demonstration sites, and different management packages for municipalities and communities with recommendations on how to establish and manage sustainable lawns"* and *"to be a model for future interdisciplinary studies of lawns in Europe."* (Swedish University of Agricultural Sciences, 2015)

OUR ROLE IN THE PROJECT

Our task was to mediate the research of lawns through visual design proposals in order to make the research intelligible for the public, stakeholders and professionals. Throughout the project, we had creative freedom and made own choices on how to distribute our work. We have also participated in the research group's meetings and taken part of ongoing results.

AIM & OBJECTIVE

The field of landscape architecture includes planning, design and management of the outdoor environment in order to create, maintain and enhance places that answers to social and ecological needs as well as being functional, attractive and sustainable (ECLAS, 2015).

With our thesis we combine ecology with design and maintenance of grass areas in order to achieve a sustainable design. The design aspect of grass areas is investigated through experiential values. Planning is not addressed as a separate aspect in our thesis but is linked to the planning perspective of design and maintenance. The aim is to combine theoretical knowledge with practical lessons in order to obtain a result which deals with new approaches but also is realistic to implement. The thesis has two main objectives, which help answer the research question.

INTRODUCTION

The first objective is to find relevant ecological principles, experiential values, alternatives to conventional lawn as well as appropriate maintenance regimes, which can be applied when redesigning conventional lawns in Swedish residential areas.

The second objective is to show how these principles, values and alternative surfaces can be applied when redesigning conventional lawns in a Swedish residential area.

RESEARCH QUESTION

How can conventional lawns in Swedish residential areas be redesigned with the aim to fulfil ecological values combined with experiential values, which at the same time are realistic to implement and manage?

LIMITATIONS

The main aspects of the thesis are ecology, design and maintenance of grass areas, which have steered the content. The thesis focus on conventional lawns in Swedish residential areas and specifically one neighbourhood in Gothenburg, but with some references to other countries. The neighbourhood was chosen out of residential areas in Gothenburg where the research group have done inventories and social surveys. The area for the thesis was selected because it had vast conventional lawns representable for residential areas in general. The delimitation of the area was selected from site visits and infrastructural barriers such as roads.

AUDIENCE

This aim of this thesis is to provide examples, knowledge and inspiration for landscape architects, landscape architect students, municipalities, managers and other stakeholders connected to development of the outdoor environment. In order to reach an international audience the report is written in English.

METHODOLOGY

The thesis consists of 'background', 'theory & concepts', 'interviews' and 'redesign'. The methods combine theory and practice. The 'background' and 'theory & concepts' are investigated through literature studies complemented with personal communications. The literature studies and interviews answers to the thesis first objective while the redesign answers to the second objective.

LITERATURE STUDIES

The purpose of the literature studies was to get an understanding of lawns and its effect on the environment as well as to find and describe ecological principles and experiential values, which can be applied when redesigning conventional lawns in residential areas. The literature study is divided into 'background' and 'theory & concepts'. The 'background' cover the development of lawns meanwhile 'theory & concepts' look into the three main aspects; ecology, design and maintenance. Ecological principles are addressed in the ecological chapters and experiential values in the design chapter.

We started off the literature studies by talking to our supervisor Maria Ignatieva, who is leading the *LAWN-project* at the *Swedish University of Agricultural Sciences* and has been researching lawns for several years. She provided us with relevant literature and articles. We followed up on references mentioned in the literature and found other sources on the subject. This was how we found most sources for the report.

As a complement, we searched on the sites *Libris*, *Epsilon*, *Google Scholar* and *Google* for sources relevant for the topic. The search was useful in order to find recently published sources. We used the same search words on all sites and in both Swedish and English. The following words and combinations were used; lawns + history, lawn + history + Sweden, lawn + maintenance, grass + ecology, ecosystem services, ecosystem services + lawn, ecosystem services + urban, sustainable + lawns, sustainable + design, ecological + design, ecological + maintenance.

INTERVIEWS

The aim of the interviews was to get an idea of the state of knowledge and current working practice in selected professions. The aim was not to get a comprehensive understanding of the state of knowledge and working practice in the selected professions as a whole. The interviews were divided into the three aspects; ecology, design and maintenance. The people we interviewed in each part were strategically selected, according to their area of expertise and interest, working experience and current working position.

The focus of the interviews was how grass areas are designed, managed and perceived, frequently occurring problems and thoughts on the direction of development. The same main topics were discussed in all interviews. We also asked specific questions regarding implementation of alternatives to conventional lawn, what measures are done today and the interviewees own ideas of different opportunities.

All interviews followed a semi-structured interview technique where predetermined questions and themes are brought up but still leave room for respondents to freely formulate answers and bring up issues (Bryman 2008, p. 415). The selected questions for contractors and park managers were based on questionnaires developed by the research group which we modified according to the aim of our thesis. The questions for park managers and contractors were used as a base when developing the questionnaires for landscape architects and ecology experts, keeping the same main topics to be able to find differences and similarities in opinion between the professions. Before the interviews were conducted, we emailed questions and topics to be discussed during the interviews so the respondents could prepare themselves (Appendix A-E). The interviews were recorded, after approval by the interviewees, and then transcribed to be analysed.

ECOLOGY INTERVIEW

For the ecology interviews we decided to interview two researchers familiar with the ecological and biological issues related to grass areas. We interviewed Jörgen Wissman and Marcus Hedblom, who both are part of the *LAWN-project*.

Jörgen Wissman is a researcher at the *Swedish Biodiversity Centre* and works with questions related to biodiversity in infrastructure, urban environment and agricultural landscape. In the *LAWN-project* Jörgen Wissman is one of the coordinators and also involved as a researcher of plant biodiversity.

Marcus Hedblom is a researcher at the *Department of Forest Resource Management c/o Department of Ecology* with focus on urban ecology. He is well acquainted with issues regarding for example urban biodiversity and ecosystem services and studies how humans perceive nature and biodiversity. In the *LAWN-project* Hedblom is responsible for the large scale data collection.

DESIGN INTERVIEW

The design of green areas is mainly performed by landscape architects and we decided to interview two experienced landscape architects with special interest in planting design. Therefore, we interviewed Sofia Eskilsdotter and Håkan Qvarnström.

Sofia Eskilsdotter is working part-time teaching planting design at the landscape architecture programme at the *Swedish University of Agricultural Sciences* and part-time as supporting consultant in plant and storm water issues.

Håkan Qvarnström works at *Uppsala Municipality's* performance division, *Technology and Service*. He has worked as a landscape architect for more than thirty years.

MANAGEMENT INTERVIEW

The aim for this chapter was to get an overall idea of the whole work process regarding grass maintenance, from the planning stage at the municipality to the actual performed maintenance. Since our study area for the redesign proposal is situated in Gothenburg, we decided to interview people from *Gothenburg Municipality* who are involved in grass maintenance, and contractors who have grass procurements with the municipality. The goal was to get both an understanding regarding current practice of grass maintenance in Gothenburg and site-specific maintenance directions for our selected area.

INTRODUCTION

The management of green areas in Gothenburg is divided into seven organizational districts, each administered by a park manager and with separate procurement for lawn maintenance. We chose to interview the park manager and associated contractor for two different districts in order to reduce the impact of individual differences in the work process. To strengthen the understanding of the work process as a whole we also interviewed Johan Blomqvist who is a project leader at the *Park and Nature Department* of the municipality. He has previously worked as a park manager and has long experience of grass maintenance within the municipality.

The park managers we interviewed were Jens Larsen who is responsible for Lundby-Biskopsgården and Patrik Svensson who is responsible for Angered and Kortedala/Bergsjön. On the contractors side we interviewed Niklas Alfredsson, production manager at *Svensk Markservice* that have the management procurement for Lundby-Biskopsgården and Robert Gustavsson, maintenance worker at *HTE-Garden* that have procurement for Angered.

REDESIGN

The redesign answers to the thesis' second objective: 'to show examples on how the principles and values found in previous parts can be applied when redesigning grass areas in a Swedish residential area'. The ecological principles and experiential values are applied to a specific site according to the method of a spatial defined case study (Miles & Huberman, 1994). The aim is to apply the approach to a context and practical reality (Stake, 1998), in order to see if the principles and values actually function to guide the design process.

The site was inventoried and analysed based on the selected ecological principles and experiential values from previous parts. From the analysis we developed strategies for redesigning the site, which then were connected to related principles and values. The strategies then steered the redesign proposal. The proposal is shown in a neighbourhood scale and zooms in on selected design interventions to show how the ecological principles and experiential values. It also explains appropriate establishment and maintenance methods.

INTRODUCTION

A figure of the structure of the thesis. It shows how the different parts are connected and lead to the redesign proposal.

RESEARCH QUESTION

How can conventional lawns in Swedish residential areas be redesigned with the aim to fulfil ecological values combined with experiential values, which at the same time are realistic to implement and manage?

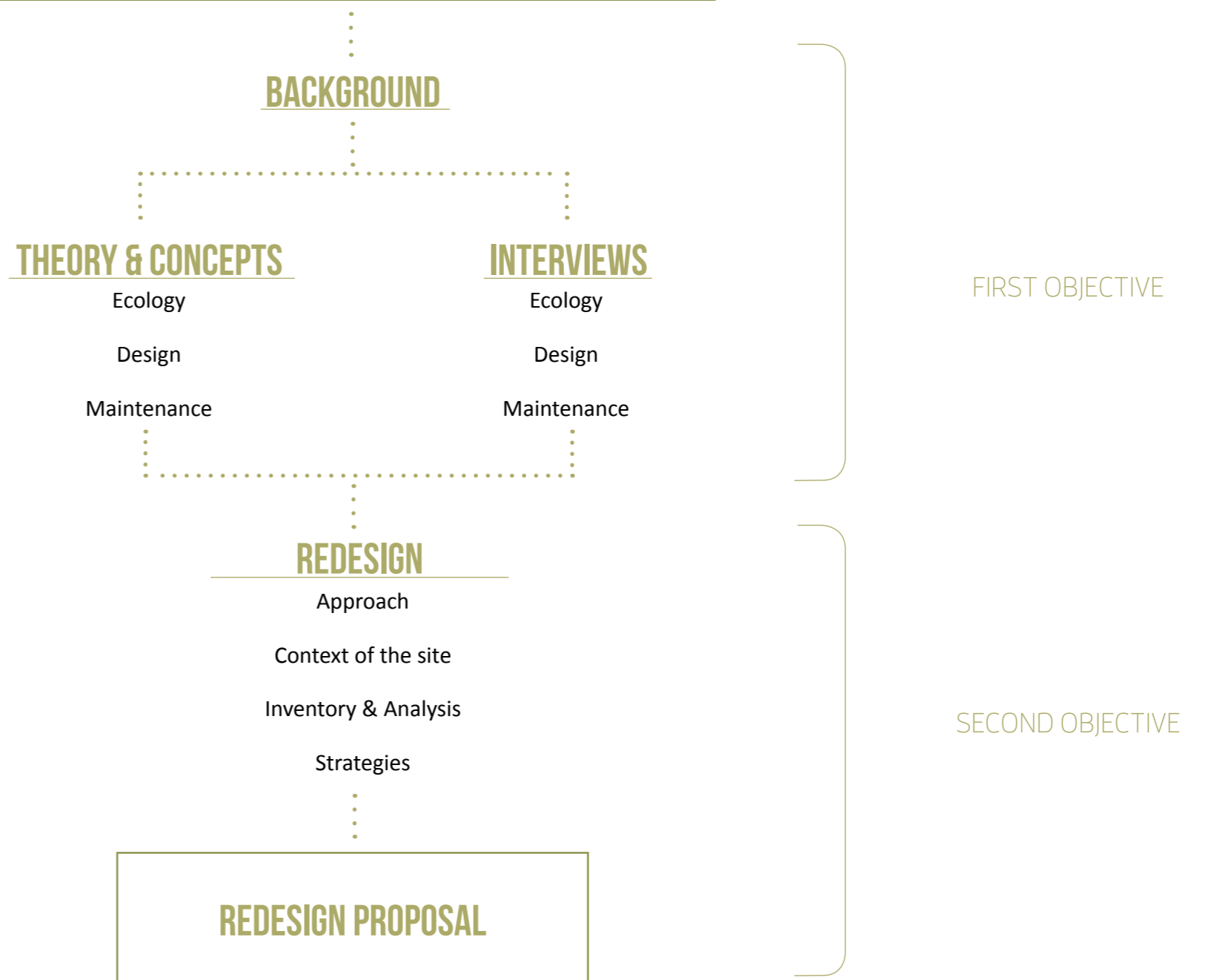


Figure 2: Structure of the thesis. The 'background', theory & concepts' and 'interviews' aim to answer the first objective. The second objective is answered by the 'redesign'.



PART TWO **BACKGROUND**

In this part we cover the historical development of conventional lawns, which give clues to why the lawns is such a universal element and connected to a strongly rooted norm.

BACKGROUND

DEFINITIONS

DEFINITIONS OF MAIN CONCEPTS

CONVENTIONAL LAWN

A grass area with short kept grass, no higher than ten centimetres.

GRASS-FREE LAWN

An area of perennial plants which should not contain any grass species.

HIGH GRASS

A grass area not intended for use, where the grass is allowed to grow higher than ten centimetres.

MEADOW

An area consisting of high grass but also of herbs and perennials which is to be cut once or twice per year.

PICTORIAL MEADOW

An area of flowering annuals which is ploughed and replanted each year.

ECOSYSTEM

"A dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit." (Secretariat of the Convention on Biological Diversity (SCBD), n.d.)

ECOSYSTEM SERVICES

"The direct and indirect contributions of ecosystems to human well-being." (TEEB 2010, p.33)

BIODIVERSITY

"The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems." (Secretariat of the Convention on Biological Diversity (SCBD), n.d.)

SUSTAINABLE DEVELOPMENT

"Development which meets the needs of current generations without compromising the ability of future generations to meet their own needs." (United Nations, 1987)

ECOLOGICAL DESIGN

"Any form of design that minimizes environmentally destructive impacts by integrating itself with living processes." (Van Der Ryan & Cowan, 1996, p. X, foreword)

PATCH

When talking about a 'patch' in our thesis we mean an area of a certain type of vegetation/plantation, like for example a lawn.

EXPERIENTIAL VALUES

Certain values of the outdoor environment people especially value.

BACKGROUND

DEVELOPMENT OF LAWNS

In the historical aspect we cover how the role and appearance of grass areas, and conventional lawns in particular, have changed through time.

WHY LAWNS?

The lawn symbolizes the good life and has been a norm in modern western society for at least a century where it has become an essential and generic element in the urban vegetation (Bormann, et al., 2001). According to research, the public regard well-kept green surfaces as habitable and safe (Eshraghi, 2014). How did it come to this? Why is the lawn seen as a symbol of stability and a universal element in global urban landscapes?

By looking into the historical context of lawns, these are questions we are trying to find answers to.

FINDING COMFORT IN GRASS VEGETATION

In studies it has been shown, however debated, that humans have an inherent preference for grass vegetation over other biomes, which is argued to originate from humans evolving in the savannahs of Africa (Balling & Falk, 1982). People migrated from Africa and ever since

humans went from being hunters to farmers, cultivating their surrounding and kept grazing livestock, grass vegetation has existed as an element in human settlement (History World, u.d.).

It is difficult to say exactly when grass dominated plots created for entirely decorative purposes appeared in European gardens (Ignatieva & Ahrné, 2013). In the Medieval times the garden's main function was to provide medicine and food for the local community. However, in monasteries and castles pleasure gardens existed with variety of grasses and herbaceous plants that were brought from surrounding meadows (Ignatieva & Ahrné, 2013). The pleasure garden enhanced the beauty of nature (Ignatieva & Ahrné, 2013) and became the archetype of paradise (Blennow, 2009). Meadow pieces in gardens were transferred to low cut green areas by proper maintenance. Some garden historians connect the origination of short grass dominated areas in European gardens with political stability (Fort, 2000).

*Kerongwe, South Africa, 2010.
Humans have an inherent preference for grass vegetation over other biomes, which is argued to originate from humans evolving in the savannahs of Africa.*



BACKGROUND

DEVELOPMENT OF LAWNS

Peak District National Park, England, 2013.

Pastures were the ideal for the English landscape park style.



LAWNS BECOMING ICONIC

Lawn became an important garden element in the 17th century through development of French formal gardens (Bormann, et al., 2001). Short cut ornamental surfaces were important parts of parterres and tapis vert (green carpets) (M Ignatieva 2015, pers. comm., 23 April). The grass was not meant to be walked on, but was mere a decorative element that could be viewed from the house (Bormann, et al., 2001). It symbolized human control over nature (Möller, 1992). The style resulted in a garden taken out of its context with no relation to its surrounding nature (Bormann, et al., 2001).

The lawns as a vast and dominated element, started its triumph development with the progression of English landscape park at the beginning of the 18th century (Schultz, 1999). This style's intent was to reconnect the garden with surrounding natural landscape (Blennow, 2009). It was both a salute to the undulating pasture landscape and a protest against the French chastised style representing royal oppression and absolute power (Bormann, et al., 2001). Grass played an impor-

tant role in British agriculture where it sustained cattle and sheep. In order to make the garden look 'natural', human traces like hedges and buildings were demolished or covered up by added natural elements such as rocks and scattered groups of trees (Bormann, et al., 2001). The garden designer Lancelot 'Capability' Brown was a front figure in the British landscape park style, he contributed in making the lawn iconic by creating sweeping and undulating green surfaces as the key element of the garden (Blennow, 2009).

BECOMING UNIVERSAL

Since the end of 18th century the English landscape park style became the universal movement in England, and also in greater parts of Europe and colonial countries (Elmqvist, et al., 2013). The English brought their preference for lawns and grass areas with them to colonies (Ignatieva & Stewart, 2009). In many areas the native grass species were not resilient enough for grazing livestock, which resulted in colonizers bringing

BACKGROUND

DEVELOPMENT OF LAWNS

grass species from their homeland (Schultz, 1999). Although some climate were not suitable for lawns, the colonialists persistently cultivated them (Bormann, et al., 2001). The movement of the landscape park style and colonization contributed in lawns becoming a universal element in human society and in it consisting of similar grass species (Ignatieva & Stewart, 2009).

The English landscape park was also introduced to Sweden in the 18th century, where larger estates and castles were layout with vast and undulating lawns (Waern, 2013). Lawns in Sweden were established by either cut turf taken from meadows or through seeding. The choice of seeds depended on soil type and moisture (Möller, 1992).

Lawns in Europe and Sweden during the 18th and 19th century were kept short and maintained by men with scythes who cut grassed areas two to three times a week. Grazing sheep and cattle were also used and added to the appearance of 'pastoral ambience'. The costly labour of maintaining lawns limited its expansion in towns and they were mainly prerogatives of the upper class. (Möller, 1992)



Gothenburg, Sweden, 2015.
A continuous lawn ties together these chain houses in a suburb.

EXPANSION INTO THE CITY & SUBURBS

With the industrial revolution and the introduction of the lawnmower to Sweden in 19th century the lawn started to expand from the upper classes to parks and suburban green areas. The mechanical lawn mower was first invented in England in 1830 by Edwin Budding. It made the maintenance of lawns less expensive and time consuming. (Möller, 1992)

To deal with the problems of denser and cramped cities, public parks were introduced to offer recreation and a healthier environment for the citizens (Bormann, et al., 2001). Among the first public parks in Sweden were *Kungsparken* (established in 1872) in Malmö (Blennow, 2009) and *Slottsskogen* (1876) in Gothenburg (Göteborgs Stad, 2013). At that time parks had some restrictions, for example children were denied access to the park without adult company and people were prohibited to step on lawns (Blennow, 2009). The working class in Malmö opposed these rules and as a result, the *People's Park (Folkets Park)* was established in 1891 where lawns were allowed to be used more freely (Blennow, 2009).

Private houses surrounded by a large, green lawn was common in American suburbs in the 20th century. The front lawn unified the houses, creating similar looking neighbourhoods (Bormann, et al., 2001). This pattern of suburbs became influential for development of private neighbourhoods in many colonial countries and eventually all over Europe and in Sweden (Ignatieva & Stewart, 2009).

As the urban suburbs were built in the 20th century, the lawn mower became more common (Schultz, 1999). In contrast to grazing animals, the mower does not select what species to cut, it cuts them all, which creates conditions that favours a few species and contribute to a more monoculture lawn (Schultz, 1999). The even surface made the lawn ideal for outdoor sports such as tennis and golf (Müller, 1990). As sport activities grew in popularity they contributed in manifesting lawns in the outdoor environment (Hobhouse, 2004).

LAWNS CHANGING ROLE IN SWEDEN

Public parks continued to establish in Swedish cities during the 1900's.

DEVELOPMENT OF LAWNS

Following the English landscape style was the Gardenesque style, which was characterized by exuberance and artificiality. Gardenesque became the dominating style in Swedish parks and private gardens (Wilke, 2006). The trend was to use lawns to accentuate other garden features such as flower beds, exotic plants and architectural elements (Wilke, 2006). According to the Gardenesque style, nature should be manicured and shaped. However, as the decades passed the view on nature altered and the wildness and meagre Northern beauty of nature was once again valued in Sweden in the 1930's (Andersson, 2000). In the edges of the garden, meadows with flowers were let up, making a transition to surrounding forest and symbolized simplicity and beauty (Wilke, 2006).

The electric mower was introduced to Swedish households in the 1940's and further contributed to the expansions of lawns in public and private green areas (Müller, 1990)

By the end of the 20th century the term 'green desert' were coined about conventional lawns in the United States during the 1950's, in which the lawn's 'noble' character and accessibility was questioned (Teyssot, 1999). Despite the opposition, the conventional lawn continued its expansion even in the 21st century. With the new idea of suburbia, house in parks, the lawn got its final breakthrough with the functionalism in the 1960's (Blennow, 2009). Tall and large blocks of houses with a small footprint were put in a park-like environment to enable an as large green area as possible. Le Corbusier, the 'father' of modernism, proclaimed "*This could save nature for humankind*" (Blennow, 2009, p. 322).

However, with this movement nature was not saved but overlooked when the ideals were manifested by the *Million Program* (1966-1975) in Sweden. The program aimed to build 100 000 housings a year for ten years (Andersson, 2013). To enable this, the building process and houses were standardized to minimize cost and increase efficiency. The outdoor environment was designed to be as easy to maintain as possible (Ignatieva & Ahrné, 2013). Local conditions were disregarded and green areas were designed in a large-scale approach with vast lawns and plantings with uniform plant material (Andersson, 2000). For example were *Berberis* (berberis) and *Dasiphora fruticosa* (ölandstok)

commonly used (Lager & Kignell, 2006).

The vast urban landscapes became too large for the municipal park management to handle and when the Swedish municipalities had economic problems in the 1980's, the maintenance of green spaces was lessened in order to save money (Andersson, 2013). To decrease the frequent and costly maintenance of lawns, trees and shrubs which needed less care, were planted in replacement (Fritidsnämnden, 1982).

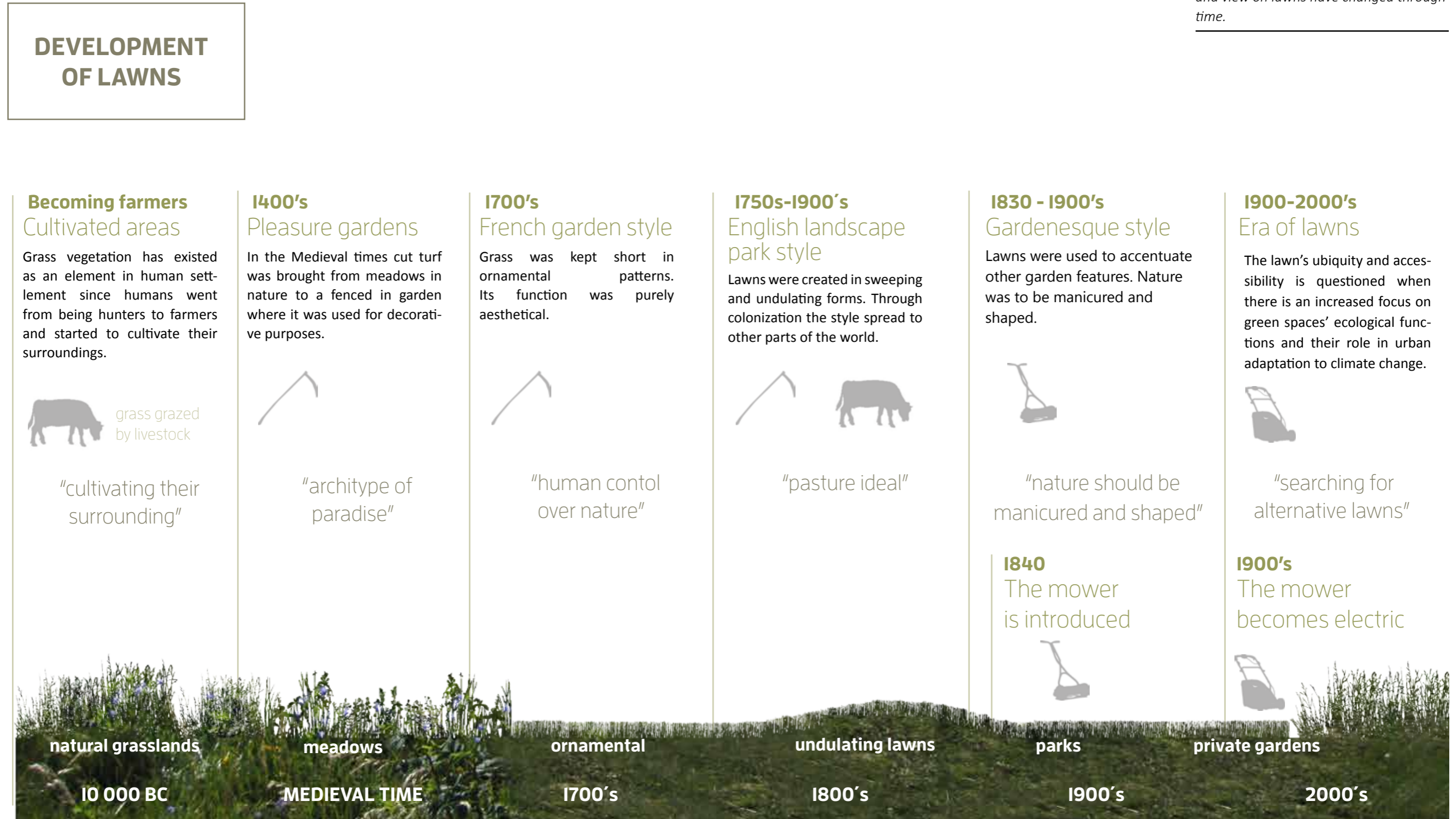
The Swedish economy continued to have an effect on the outdoor environment. Impaired municipal economy in the 1990's led to further reduced maintenance of green spaces and degradation in quality of these. In some cases, the reduced maintenance led to increased biodiversity where lawns for example were turned into high grass. But in other cases, lack of maintenance reduced the quality and the attractiveness of natural green spaces, which create arguments for these spaces to be removed in the ongoing densifications of cities. (Boverket, 2007)

The Swedish *National Board of Housing, Building and Planning* (Boverket) has statistics since the 1970's showing that the proportion of green spaces in Swedish urban areas have decreased in number and size, and there is no indication to suggest the reduction is decreasing (Boverket, 2007). In recent years, new features and an increasing level of use has led to ground material with better durability have been introduced to where there previously were lawns. Today concrete, rubber asphalt and synthetic grass are common in parks (Kling, 2013). However, lawns are still the most prevalent element in the urban environment (Ignatieva & Ahrné, 2013) and covers roughly 70% of open green spaces in the urban environment (Stewart, et al., 2009).

BACKGROUND

DEVELOPMENT OF LAWNS

Figure 3: Development of lawns.
A brief overview of how the appearance and view on lawns have changed through time.



BACKGROUND

REFLECTIONS

Concluding reflections of the background and aspects important to highlight and keep in mind for the theory & concepts part and when redesigning.

STRONGLY ROOTED NORM

The lawn has gone from being a privilege for the upper class to becoming a universal element in everyman's garden. We are all effected by the lawn and its prevalence, where most people seem to have an opinion about its appearance and what a lawn is. This means that the lawn has become a strongly rooted norm, which is something we have to respect and take into consideration when redesigning lawns in a residential area.

ROMANTIC NOTION OF MEADOWS

The history overview shows there is a romantic notion connected to the naturalistic and meadows. This view of nature does not lie far beneath the surface and is something we can use in our approach to create a design integrated with natural processes and which promotes ecological values. As shown in the historic overview, people have an inherent preference for grass vegetation, not restricted solely to lawns.



PART THREE **THEORY & CONCEPTS**

In this part we go through the main aspects; ecology, design and maintenance. The result is a range of ecological principles and experiential values that can be applied when redesigning conventional lawns in Swedish residential areas. We also present a palette of grass areas as well as explain how they are established and managed.

THEORY & CONCEPTS

ECOLOGY

In the first section of ecology we give a brief introduction to why it is important to aim for a sustainable urban development. We further explain the connection between sustainable development and ecosystem services, and why biodiversity is an important aspect to consider. To conclude this part we place the conventional lawn in the context of globalisation.

AIMING FOR A SUSTAINABLE DEVELOPMENT

200 years ago 90 percent of Sweden's population lived on the countryside and only 10 percent in small cities (Statistiska centralbyrån, SCB, 2015). Today the situation is almost the opposite with 85 percent of the population living in urban areas (Statistiska centralbyrån, SCB, 2015). This process, when people move from rural to urban areas, is called urbanisation. But the concept of urbanisation can also be used to describe how the population in urban and rural areas relate to each other. In Sweden the relocation of people from rural to urban areas is essentially completed but *National Board for Housing, Building and Planning* (Boverket, 2014) predict the urbanisation trend, in terms of an increased portion of the people living in cities, will continue.

When cities are built and developed rapidly the questions of how to do this in a suitable way, is constantly present. The concept 'sustainable development' was first presented in the so called *Brundtland Commission's* report in 1987, defined as "development which meets the needs of current generations without compromising the ability of future generations to meet their own needs." (United Nations, 1987). It was a successful approach that helped form the international agenda regarding economic, social and environmental development and it also played an important role in shaping the international community's approach around these issues (Bärlund, n.d.). The concept has been widely used ever since. Although, one problem was soon noted; it is a very broad and vague concept that leaves room for a wide range of interpretations (Bärlund, n.d.). When looking into research and publications related to sustainable development and more specifically how to make appropriate planning and design decisions, this is an issue that becomes very evident.

URBANISATION & ECOSYSTEM SERVICES

"Humanity is increasingly urban, but continues to depend on nature for its survival."

- Bolund & Hunhammar, 1999, p. 293

The spreading urbanisation destroys or modifies native ecosystems and its processes, and has an impact on natural disturbance regimes that affect ecological patterns over space and time. But urbanisation also leads to creation of new ecosystems within the urban environment (Müller, Ignatieva, Nilon, Werner, & Zipperer, 2013).

In the following text we will explain how this can be connected to the long-term quality of human life and focus on aspects that are important to consider when developing green areas in urban environment.

Values and advantages that human get from nature are in many situations difficult to value and often taken for granted. A well-used model for connecting the function of ecosystems to human welfare is the concept ecosystem services. It was popularised by *United Nations Secretary-General Kofi Annan's* initiative of the *Millennium Ecosystem Assessment* (MA) in 2001. The work of the MA board has involved more than 1360 experts from all over the world with the aim to; "assess the consequences of ecosystem change for human well-being, and establish the scientific basis for actions needed to enhance the conservation and sustainable use of those systems, so that they can continue to supply the services that underpin all aspects of human life." (foreword of Millennium Ecosystem Assessment, MA, 2005).

In detail ecosystem services can be described as all the practical, technical and economic benefits human can obtain from natural and cultivated ecosystems (MA, 2005). As presented by the MA board, ecosystem services are often divided into four main categories:

- *supporting services*, which are necessary for the production of all other services, for example nutrient cycling and soil formation
- *provisioning services*, which provides for example food and fuel

THEORY & CONCEPTS

ECOLOGY

- *regulating services*, such as climate regulation and water purification

- *cultural services*, like recreational, educational and aesthetic values. (MA, 2005)

Since ecosystem services affect people's lives in such a large extent, they can be a way to define and measure sustainability. To value ecosystem services economically can also be a helpful tool in order to implement them in the planning and design process when developing or re-developing our cities.

Cities are dependent on ecosystems outside urban areas (Jansson, 2013). The production of food and fuel are examples of services that today mainly take place in rural areas and often far away from the place they are consumed (Jansson, 2013). But some services, for example improvement of air quality and noise reduction, cannot be transferred any substantial distances. Ecosystems that provide these services therefore need to be implemented in the urban context (Bolund & Hunhammar, 1999). In the article *Ecosystem services in urban*

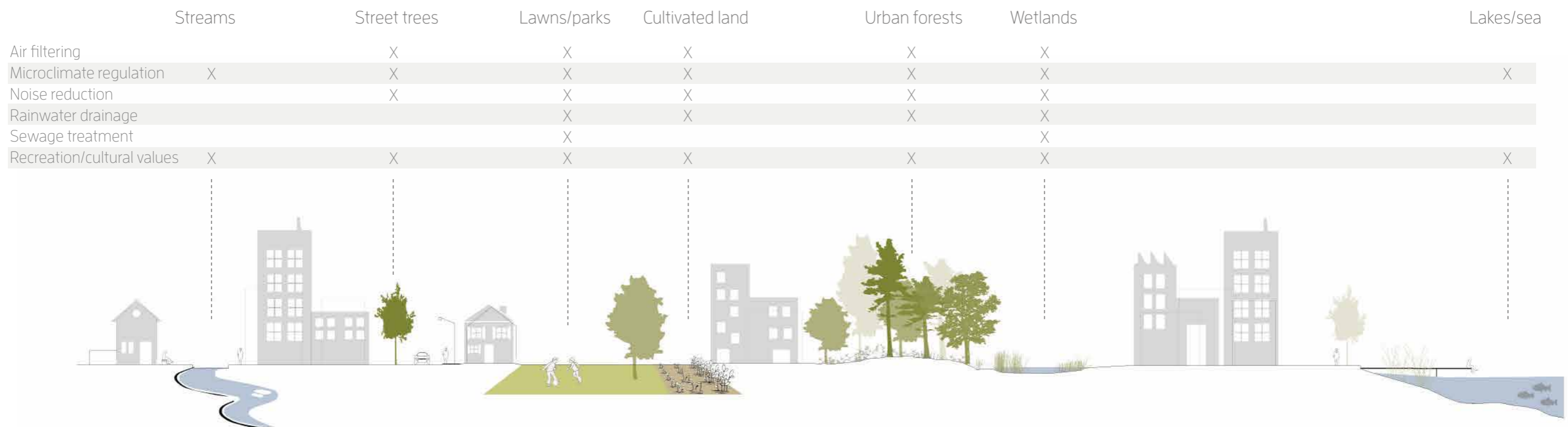
areas, Bolund and Hunhammar (1999) identified six local and direct ecosystem services that are relevant for the city of Stockholm, these six ecosystem services were then related to seven identified ecosystems within the urban context. In the figure below (figure 4) you can see how each of these ecosystems are connected to certain services.

THE IMPORTANCE OF BIODIVERSITY

When discussing issues regarding sustainable development and ecosystem services the concept biodiversity is often brought up. Biodiversity means "the variability among living organisms" and "includes diversity within species, between species, and between ecosystems" (TEEB, 2010). The common opinion is that biodiversity has a clear positive effect on the function of ecosystems and therefore to the production of ecosystem services, but exactly how they are connected is not fully investigated.

Often biodiversity is regarded as a supporting service, a service

Figure 4: Ecosystem services in urban areas.
The figure show how ecosystem services, relevant for urban areas, can be connected to identified urban ecosystems.
Source: Bolund & Hunhammar, 1999



necessary for the functioning of ecosystems and hence for the production of all other services. But biodiversity, the variety of species and habitats, can also be connected to people's appreciation of nature and outdoor environment (Beery & Jönsson, 2015), and is therefore linked to the cultural ecosystem services. For example Fuller, Irvine, Devine-Wright, Warren, & Gaston (2007) show that the psychological benefits human get from contact with nature are in positive correlation with increased species richness.

Regarding the function of ecosystems, it is the contribution and function of certain species and the complex interaction in between different species, rather than the diversity and richness of species that is important (MA, 2005). Although, there are research indicating that an increased amount of species within an ecosystem utilize the available resources more efficiently, which means that an increased biodiversity in this point of view contributes to improved function of the ecosystem and the services it produces (Johansson & Henriksson, 2007). But the exact function of all living organisms and their interrelations is far away from known, and no matter how deeply we investigate which species are important today we will never know the exact circumstances of tomorrow. The complex network of plants and animals in an ecosystem also depend on each other for survival. This means that the extinction of one species can lead to the extinction of others, and in worst-case scenario the collapse of a whole ecosystem (Johansson & Henriksson, 2007). Genetic variety within species, diversity of species and a landscape containing a wide range of habitat is therefore necessary in order to secure the function of ecosystems during varying circumstances like for example environmental changes (Cleland, 2011).

HOMOGENISATION DUE TO GLOBALISATION

An other aspect that is strongly affecting the structure and appearance of urban areas is the on-going globalisation, which for example is spreading ecological homogeneity (Ignatieva & Stewart, 2009). This has led to remarkably similar flora and fauna in different cities in different parts of the world with different climatic conditions, where a large part of the native plant species has been replaced by a small number of

non-native aggressive species (McKinney, 2006). Modern way of urban development is threatening both the general native biodiversity and local identity (Ignatieva & Stewart, 2009).

The conventional lawn is one of the clear and visible results of homogenisation due to globalisation. It is the most common green space element in our urban environment (Smith, Broyles, Larzleer, & Fellowes, 2014), with almost exactly the same appearance and plant species composition in different cities around the world, regardless climatic conditions. Lawns can therefore play a significant role in threatening both biodiversity and place significant identity.

THEORY & CONCEPTS

ECOLOGY

In this section of ecology we start with a brief introduction of the concept ecological design in general. We then describe our approach of ecological landscape design and present selected principles to consider when redesigning conventional lawns in residential areas of Swedish cities.

ECOLOGICAL DESIGN CONCEPT

Van Der Ryn and Cowan (1996, p. X, foreword) define ecological design as “any form of design that minimizes environmentally destructive impacts by integrating itself with living processes”. In the book *Ecological Design* (1996), they address the infusing of a rich and detailed understanding of ecology in the design of products, buildings and landscapes as a necessity in order to create a sustainable environment.

Rottle and Yocom (2010) argue for applying ecological design is to go one step further than being mere ‘sustainable’, to not only maintaining existing qualities but also improve conditions by enhancing existing biological function. Examples of a range of possibilities offered by ecological design are; “to enrich biodiversity, work with natural processes, stimulate natural processes to become self maintaining, and regenerate resources for continued use by human and other species” (Rottle & Yocom, 2010, p. 6).

On a scale that is relevant for landscape designers, ecology is the science that most accurately describes how natures work. In its essence ecology can be described as the study of interconnections between different species and their surrounding environment (Cain, Bowman, & Hacker, 2011). To apply this knowledge of nature, in order to create high-performing landscapes with a design aim compatible with natural processes, can be described as ecological landscape design (Beck, 2013). This means that ecological landscape may include natural processes; however an ecological landscape is always designed or constructed by humans (Beck, 2013).

“What if, instead of depicting nature, we allow nature in?
What if, instead of building and maintaining artistic creation,
we worked to develop and manage living systems?”

-Beck, 2013, p. 3

OUR APPROACH OF ECOLOGICAL DESIGN

On the coming pages we present a range of principles for ecological design that can be applied when redesigning green space in residential areas, which currently are dominated by conventional lawns. We have selected principles with the aim to contribute to the function of the city’s ecosystem, which indirectly implies the production of ecosystem services. But since ecosystem services are a relatively unexplored concept and often a result of different functions within an ecosystem we decided to not base the principles directly on this concept, although some of the selected principles are regarded as ecosystem services. When selecting and principles describing the ecological principles we used Travis Beck’s book *Principles of Ecological Landscape Design* (2013) as a starting point.

We have divided the selected principles into three sections. The **FUNDAMENTAL PRINCIPLES** are to be considered as a base in all parts the design. They steer the development and planning on a neighbourhood scale, which then serve as a starting point for site-specific design proposals regarding choice of plant and other materials as well as how to develop the site with its unique context and surrounding in mind. **PRINCIPLES OF PLANTING DESIGN** describe how to proceed and what aspects to consider when selecting and arranging plant material for a specific site. These principles are to be applied in every place where new plant material is added. The third and last section, **PRINCIPLES TO CONSIDER IN SELECTED PLACES**, address and describe aspects important to consider when developing a sustainable neighbourhood as a whole. All those principles do not have to be included in each and every site within a neighbourhood. They are although important to apply in selected places so the area as a whole holds the values those principles contributes to.

In all three sections we describe each principle and then shortly explain how the principle can be applied when redesigning conventional lawns in residential areas.

THEORY & CONCEPTS

ECOLOGY

In the coming pages we present our selected principles of ecological landscape design and how we propose them to be applied when redesigning conventional lawns in residential areas.

FUNDAMENTAL PRINCIPLES

a place as a part of the whole system
primarily native plant species
use of regenerative materials

PRINCIPLES OF PLANTING DESIGN

right plant, right place
consider patch shape & edges
counting on disturbance
planning for succession

PRINCIPLES FOR SELECTED PLACES

increase knowledge & interest
increasing biodiversity
promoting pollinators
'cues to care'

FUNDAMENTAL PRINCIPLES

The 'Fundamental principles' describe the basic approaches for redesigning the whole neighbourhood. These principles permeate every aspect of the design regarding the selection of material and how to connect the area to its surrounding landscape.

A PLACE AS A PART OF THE WHOLE SYSTEM

Ecosystems consists of communities of living organisms in conjunction with non-living components (such as air and soil) and could be of global size or extremely local such a root systems of one tree. Though it can be helpful to break down the landscape into several ecosystems with clear boundaries set by the aim of a certain study, ecosystems are in reality open systems with no clear borders between for example city and countryside (M Hedblom 2015, pers. comm., 13 March). This means that in order to understand a selected entity, like for example a city or a site within a city, also the connections to the surrounding landscape needs to be studied (Blicharska, 2015). For example a bird can have certain preferences for a tree for nesting, but use a whole park for foraging (McCaffrey & Mannan, 2012).

When talking about a 'patch' in our thesis we mean an area of a certain type of vegetation/plantation, like for example a lawn. The size of a patch, in which a population is situated, and its distance and connection to surrounding patches determine for example how sensitive the population is for disturbances. A disturbance occurring in an isolated patch might lead to that a population goes extinct, but if instead the patch is well connected to surrounding patches the same disturbance might not be worse than that the population can recover (Beck, 2013).

Ecosystems in urban areas are regarding many aspects different from natural ecosystems, which need to be considered in planning and design. One of the strongest characteristics is that green areas, patches, in a city to a large extent are isolated from each other (Elmqvist, Folke, Colding, & Wirén, 2002), which is a result of fragmentation due to different types of human development such as roads and buildings. Although, the current relatively small size of Swedish cities means that

there is always some kind of connectivity between green areas as well as to the surrounding landscape (Hedblom & Söderström, 2010).

HOW THE PRINCIPLE SHOULD BE APPLIED

When developing a design proposal for a green area in an urban setting, the context of the site always needs to be considered. Is the site for example situated in the outskirts of the city or close to the city centre? Is it situated in a major green wedge stretching from the surrounding landscape or closed-in by fragmenting objects such as roads and buildings?

The character of the surrounding landscape might also hold unique habitats that are advantageous to promote in a local or regional perspective, or maybe is there specific species that needs special consideration, to take into account in the redesign.

PRIMARILY NATIVE PLANT SPECIES

The local flora is naturally adapted to prevailing conditions (Stewart et al., 2009) and is therefore often a safe bet when selecting plants suited for a certain place or area. To use local plant material can also be a way to strengthen local identity. But is it necessary to limit the search of plant material to native species in order to achieve ecological quality? Or can the use of well-adapted plants from other regions of the globe also be ecologically justifiable?

Whether or not to include non-native plants in an ecologically sustainable design is widely discussed. Often native plants are seen as an appropriate ecological choice and exotic plants as the opposite. Unless the exotic species are considered in their context and country of origin, in which they instantly are seen as ecological again (Hitchmough & Dunnet, 2008). In Sweden today, thanks to our northern climate, the problem with invasive exotic species is not as extensive as is in tropical and warm temperate regions (SLU, 2014). Although, climate change leading to increasing temperatures, can provide more favourable environment for species that today are problematic in central Europe. This might result in that they will spread and become a problem even in Sweden (SLU, 2014).

Hitchmough and Dunnett (2008) argue that to entirely use native species in an urban context is simply unworkable since such vegetation in many situations would not meet the public demand that the non-native flora contributes with visual and functional characteristics that cannot be found in the native flora. Even if some non-native species are invasive or poorly suited for a naturalistic plantation, there are others that are perfectly robust without being invasive and therefore are suitable to use in anthropogenic plant communities (Hitchmough & Dunnet, 2008). Decision of the most appropriate plant community in a certain place, considering native and/or non-native plants, should instead be based on an understanding of the site and its context (Makhzoumi & Pungetti, 1999).

HOW THE PRINCIPLE SHOULD BE APPLIED

We propose to use primarily native plant material in order to promote local ecotypes, but preserve the possibility to include non-native when lacking a selection of appropriate native alternatives. When including non-native plants this should be done in a thoughtful manner and special attention should be given to thoroughly investigate the risk of the plant being invasive in the particular environment the site is situated.

Meadow consisting of species native to Sweden.

Photo: Inger Runesson, 2014.



THEORY & CONCEPTS

ECOLOGY

USE OF REGENERATIVE MATERIALS

In order to fully integrate an ecological approach into landscape design it is important to consider the impact of all used materials. Keeping the ecological concept in the selection and use of materials means to reduce the use of materials and energy, to design in re-use, recycling, flexibility, ease of repair and durability (Van Der Ryan & Cowan, 1996). This implies the importance of keeping the environmental impact of the whole life cycle of used materials in mind.

HOW THE PRINCIPLE SHOULD BE APPLIED

When redesigning outdoor environment we propose to first of all, use as much as possible of materials already existing on site. Secondly use as little other material as possible to retain the desired character and functional qualities. When selecting additional materials we propose to keep some questions to keep in mind; How is the material produced? For how long is it durable? What kind of maintenance does it require? Can it be re-used or re-cycled?



*Uppsala, Sweden, 2015.
Granite cobblestones are a durable material which can be re-used many times.*

PRINCIPLES OF PLANTING DESIGN

'Principles of planting design' describe how to select and arrange plant material. All principles in this section should be applied in all places where new plant material is added.

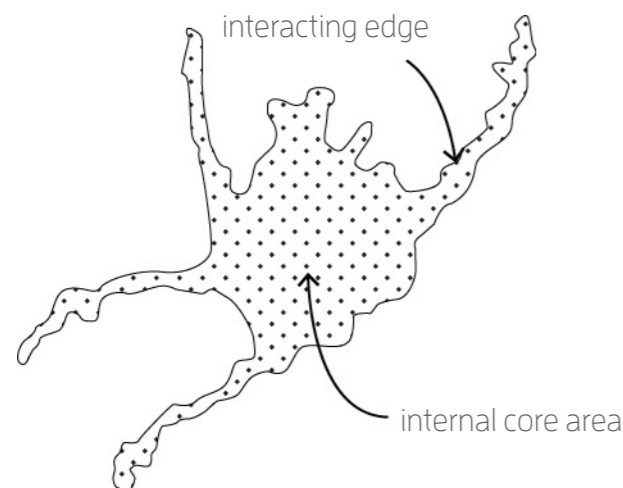
RIGHT PLANT, RIGHT PLACE

One of the key principles of ecological design is the selection of plant material appropriate for a specific site. A landscape consists of heterogeneous patches with various environments and different biotopes. In a natural landscape this leads to differences in vegetation that can be seen in a range of scales. In the very detailed scale differences in vegetation can be found as a result of small environmental changes regarding for example temperature or moisture like a warm, sunny place or a wet depression (Beck, 2013). Examples of aspects that are important to consider when selecting plants are; relative humidity, air temperature, soil type and moisture, available sunlight and exposure to wind.

HOW THE PRINCIPLE SHOULD BE APPLIED

The first step in the process of developing an ecological design with a self-sustaining plant community is a detailed inventory and analysis of the current soil and microclimatic conditions, for example; relative humidity, air temperature, moisture, available sunlight and exposure to wind, and soil type.

Figure 5: Convoluted shape.
Convoluted shape of a patch is beneficial for interaction with other patches.



CONSIDER PATCH SHAPE & EDGES

As well as how a patch relate to other patches, the size and shape of the patch itself also influences the ecological function (Beck, 2013). Often patches in an urban development are determined by for example roads and development but in the smaller scale, like regarding a planting or grass area, the shape is determined by the designer (Beck, 2013). An appropriate way of selecting patch shape is by following topography and microclimatic conditions, because a shape that matches the natural processes, will be easier to maintain (Beck, 2013).

It is also important to consider the intended ecological function when deciding the shape of a urban biotope. Maximizing the internal core area is beneficial if the aim is to preserve a certain habitat or microclimate. If the aim instead is to increase the interaction with other patches, a convoluted shape is to prefer (Beck, 2013). Edges, where two contrasting patches meet, can be found in many urban biotopes for example between a lawn and flower border. Due to ecological peculiarities edges are one of the most difficult areas to manage. Grass from a lawn easily gets into a plantation and brushwood often pop up in a plantation adjacent to a wood- or shrub land area. Edges can also be of significance regarding the species diversity in a certain area, which can be taken advantage of in design. For example this applies to conventional lawn were the edge zone always is more species rich, and if paths are cut through a meadow it provides a greater variety in microclimate that can be beneficial in terms of species richness (J Wissman 2015, pers. comm., 28 May).

HOW THE PRINCIPLE SHOULD BE APPLIED

Microclimatic conditions and topography should serve as starting point when deciding the shape of an area, for example a certain type of meadow. But this principle also needs to be combined with soil condition and desired experiential values. Edges always have to be paid special attention in order to achieve a design that as far as possible is self-sustaining and requires as low maintenance as possible. The ecological values in different types of edges should also be addressed and taken advantage of.

COUNTING ON DISTURBANCE

“A disturbance is a physical force that disrupts the physical or biological structure of a system” (Beck, 2013). All ecosystems, no matter type and place, are frequently disturbed. Taking it to the extreme a disturbance is environmental catastrophes like flooding, storms and fires, but a disturbance can also be frequent trampling or wind exposure. Many of the disturbances occurring in urban environment are of anthropogenic origin and this includes for example all type of development, maintenance and human wear. A lawn in a park is for example exposed to continuous disturbance in form of maintenance, which is necessary in order to achieve the desired qualities.

The time perspective for a disturbance can be everything from an immediate impact of for example a lightning strike to a slow and diffuse drought. An important aspect of designing an ecological landscape is to not only prepare for destructive disturbances, but also to create a landscape that embraces disturbances as an integrated part of its processes (Beck, 2013).

For the ecological function of a landscape to be retained when exposed to disturbances the diversity of species is of significance (Beck, 2013). If several species are involved in performing a certain function the function might be retained even if some of the species become extinct (Cleland, 2011).

Regarding disturbances, in this ecological part of the thesis, we will exclude aspects regarded as disturbances for people, which will be discussed in the design chapter under the experiential value ‘Tranquility’.

HOW THE PRINCIPLE SHOULD BE APPLIED

Plan for locally and regionally common disturbances, but above all design to be flexible for the unexpected. For example if an area is situated in a region with yearly flooding it is necessary to take this into account early in the planning and design process. By inventory and analysis, common disturbances can be identified and possibly prevented. But the most important aspect is to design with natural processes, to design with room for change. This allow for a plant community to adjust according to changed conditions that follow an occurring disturbance. In general, a variety of plants with different niches should be included since it increases the stability in the plant community as a whole. In the small scale, human use and wear of an area is important to consider. It can for example be appropriate to place a footpath that guides human movement and therefore protects wear-sensitive areas.



*Uppsala, Sweden, 2015.
A path created by people's trampling is an example of an anthropogenic disturbance.*

PLANNING FOR SUCCESSION

Succession is the regrowth after disturbance and can be used to describe how a plant community evolve over time (Sjöman, Slagstedt, Wiström, & Ericsson, 2015). In a designed landscape this often means how plants develop over time after establishment. This is for example how growing trees provide an increased amount of shade for plants growing underneath, which gradually changes their living conditions and also results in gradual change in species composition.

Maintenance manipulates vegetation to a selected stage of succession. If for example a lawn is left for many years without cutting it will eventually turn into a forest plant community, which is a dominant vegetation type in Sweden (M Ignatieva 2015, pers. comm., 3 June). In conventional landscape design the practice is often to achieve the state of climax, a 'final' result, directly after a disturbance, which in this case means establishment (Beck, 2013). To instead work with the succession stages in which plant communities develop will give a series of different appearances of the site as the plant community evolve. To work actively with instead of against succession also lessen maintenance requirements since not such a large effort need to be made to counteract the natural processes. This can be done for example through arranging plants from different successional stages (Beck, 2013). For example, early succession plants are adapted to establish on bare soil and can quickly fill a space. Although, they are often not adapted to sustain in the long run, which give late-successional species opportunity to grow and develop (Beck, 2013).

To plan for succession also means to keep in mind the functional aspect of certain plants. If for example a bush in a facade planting after a few years overgrows the windows, it will require regular cutting in order to retain the desired quality. This will be costly regarding both time consuming management and the environmental effect of machine usage.

HOW THE PRINCIPLE SHOULD BE APPLIED

To plan for succession is as important in an ecological point of view as out of aesthetical and functional reasons, and in order to reduce frequency of maintenance. By accepting change even if it does not follow the predicted or intended pattern and not trying to manage in order to counteract the natural process, is an important aspect of ecological design. This means that long-term development of a design and not just the present outcome needs to be considered. For example the amount of shade growing plants will provide later on and the inherent competition in a plant community as the living conditions change. Another example is the plantation of early succession species, which helps to quickly fill a space and in turn reduces maintenance like for example weeding.

*Uppsala, Sweden, 2015.
Trees in different succession stages. As a tree grows also the microclimate underneath changes.*



PRINCIPLES FOR SELECTED PLACES

'Principles for selected places' address values important to apply in the area as a whole, but all of these principles do not need to be applied in all places within the area.

INCREASE KNOWLEDGE & INTEREST

Urbanisation leads to that an increasing amount of people only get in contact with 'nature' in green areas within the urban environment like parks and gardens. A big part of the understanding and emotional empathy for environmental issues comes from own experience of nature (Emanuelsson in Lundvall & Isaksson, 2006). Within the research field of urban social-ecological systems, there are arguments for the need of a pedagogical perspective of ecosystem services in cities (Barthel, 2015). And further on for the importance of developing our cities with this in mind, to encourage and create opportunities to learn about our relationship with nature (Barthel, 2015). Giusti, Berthel and Marcus (2014) conclude in a study of preschool children that regular contact

with nature has a positive correlation with children's knowledge and positive emotions of nature. The study further indicates that children with daily routines in a natural environment also have a higher ability of understanding the connections between ecological resources and the products we consume in our daily life (Giusti, Berthel, & Marcus, 2014).

HOW THE PRINCIPLE SHOULD BE APPLIED

Urban green areas such as green space in residential areas are as mentioned above increasingly important for the mediation of knowledge about the values of nature. By integrating a variety of experiences in these spaces more people are given the opportunity to develop an interest for nature. And if there is an interest, we think there is a higher possibility that understanding and knowledge will follow. Interesting features to include can be for example; edible plants, both wild and domestic animals as well as flowers that attract for example bees, birds and butterflies. To contribute to increased knowledge and understanding for the value of a certain element or feature, explaining signs can be of great contribution.



Uppsala, Sweden, 2015.
A sign informing about the vegetation on site can increase visitor's knowledge about nature.

INCREASING BIODIVERSITY

In this set of principles for ecological landscape design we have chosen to focus on higher vascular plant and habitat biodiversity, which indirectly can create good prerequisites for a diversity of animals and other organisms.

One way of supporting a wider range of species in a plantation is by applying a more nature-like structure (Hitchmough & Dunnet, 2008), which often is described as naturalistic planting. These naturalistic plantings are also likely to be increasingly open to dynamic processes (Hitchmough & Dunnet, 2008), which also help to retain the function of an ecosystem. Other examples of promoting biodiversity (Lundvall & Isaksson, 2006):

- » To create an edge zone next to bush plantations where grasses and herbs are let to grow more freely
- » By establishing meadows, biodiversity in urban parks can be largely improved
- » High grass are to prefer over short cut lawns and is especially beneficial if the area is allowed to flower before cutting
- » Trees and bushes with seeds, fruits or berries are a good food resource for animals
- » Dead wood and tall stumps (högstubbar) provide food and habitat for many species of mosses, lichens, insects and birds
- » Adding elements such as nesting boxes for birds or bird feeders for winter months
- » Culinary herbs are coveted for many insects like for example butterflies

HOW THE PRINCIPLE SHOULD BE APPLIED

Increase the amount of species and habitats but do so with the function of ecosystem in mind. Thoroughly inventory and analysis of a place to determine which kind of habitats and species are suitable. Also consider how new habitats can be created. Natural-structured plantations are preferable and other ways of promoting different species can be seen in the list above.

PROMOTING POLLINATORS

‘Promoting pollinators’ is strongly connected to the previous principle ‘Increasing biodiversity’, but since it is an important aspect of biodiversity we present it as a separate principle.

Pollination is important for food production and to maintain a rich flora and fauna. The main problem for many pollinators is the low occurrence of flowers (Lundvall & Isaksson, 2006). Improved conditions for pollinators by providing food and nesting sites in the urban environment can be a way to counteract the current global decrease of pollinators (Colding, Marcus, Andersson, Gren , & Borgström, 2013).

Today, the state of knowledge about the significance of pollinators and their population dynamic in urban areas is relatively low (Colding, Marcus, Andersson, Gren , & Borgström, 2013). To design in order to promote pollinators entomologist Karin Ahrné (2015, pers. comm., 6 May) suggests an overall variation of plants and habitats and to include plants that flower in different time periods during the season. Various *salix* species (videarter) are very valuable for pollinators since they produce large amounts of pollen and nectar, and flower early in the spring when almost no other species are flowering (Lundvall & Isaksson, 2006). Spring bulbs like *Crocus* (Krokus) is another example of species flowering relatively early in the season that can be a food resource for bees.

If certain pollinator species is to be present on a specific site, also other prerequisites than food providing plants might be necessary to be present on site or in adjacent areas. Examples of such substrates are surfaces of open sand in south facing areas as well as dead wood of trees and bushes. (K Ahrné 2015, pers. comm., 6 May)

HOW THE PRINCIPLE SHOULD BE APPLIED

Provide food and habitats for pollinators. Make sure to include a variety of plants with different time for flowering, and particularly species flowering early in the spring. Include suitable habitats in selected places, like for example surfaces of open gravel or sand in especially south facing areas and if possible leave dead wood on site.

THEORY & CONCEPTS

ECOLOGY

'CUES TO CARE'

'Cues to care' is design details that show that a place is intended and taken care of. Ecological quality can be difficult to identify.

People tend to connect ecological value with the look of nature, which is not always the case, and especially not the only way to achieve ecological quality (Nassauer J. I., 1995b). Another difficulty with ecological quality is that it tends to look messy, giving the impression the area is not taken care of (Nassauer J. I., 1995b). In areas where people expect to see the look of human intention, like in parks and gardens close to development, it is especially important to take this aspect into account in the design.

High ecological quality can thus be connected with unattractiveness, and an area perceived as attractive may have poor ecological qualities. In order to achieve a sustainable urban environment this is an issue needed to be addressed. *"Although designers and managers may believe in the inherent benefits of a naturalistic approach, and may appreciate its aesthetic qualities, if it is not accepted by those that have to live, work and play in such a setting, then these plantings can never be truly sustainable."* (Jorgensen, The social and cultural context of ecological plantings, 2008, p. 295).

But how do we design attractive areas with high ecological quality that is appreciated and valued by the public? Nassauer (1995b) points out that the contradiction between people's expectations of the neat and orderly look of urban environment and ecological quality essentially is a design problem. The ecological function is rarely enhanced by neatness and order but it is still possible to design orderly frames, to place the undesirable, messy forms in a familiar and attractive package, making the ecological quality aesthetically appealing. For people to appreciate the beauty of a place and therefore maintain it appropriately the design clues of human intention may be crucial. Places without obvious signs of human intention may be mistaken for neglected land or land awaiting development. (Nassauer J. I., 1995b)

HOW THE PRINCIPLE SHOULD BE APPLIED

Consider and provide 'cues to care' in every aspect of the design to show that the area is intentional and taken care of. This can be for example; a proper framing with architectural details, familiar bold patterns and well-managed edges. Also signs explaining the values of natural-looking vegetation can help to change people's perception of what is aesthetically appealing.

The shape and neat edges of the meadow give signs of 'cues to care'.

Photo: Maria Ignatieva, 2015.



THEORY & CONCEPTS

DESIGN

This section looks into why it is important to consider how people perceive and experience the outdoor environment as well as what qualities people generally prefer and value.

DESIGNING WITH PEOPLE'S PERCEPTION IN MIND

As a landscape architect, or anyone with the task to transform a landscape, it is important to emphasize on the physical landscapes and its contents as well as how people's preferences affect their experience (Hägerhall, 2001). When walking through a landscape, we are unconsciously and consciously perceiving the surroundings with the information our senses receive from what we see, hear, feel and touch. The visual perception is the dominant sense and affected by "space, distance, colour, texture, shape and contrast gradients" (Porteous 1996 in Carmona, et al., 2010, p. 110). People's aesthetical experience is often referred to as preference in research and is seen as a product of an individual's beliefs, attitudes and values, which are formed in a cultural context and change over time (Hägerhall, 2005). People's preferences are affected by the overall structure or forms depending on how elements in the environment are arranged (Ulrich, 1983). Some research also argue that preference for a certain landscape type can increase if a person is repeatedly exposed to it (Zajonc, 1980). Most often, the designer's own experience and insights are insufficient to design for the public (Kaplan, et al., 1998) and therefore looking at research of people's preferences is a necessary complement.

EXPERIENCES OF THE GREEN ENVIRONMENT

Previous research has found that presence of well-kept grass areas with trees can contribute to an increased feeling of security in residential areas (Kuo & Sullivan, 2001). Meanwhile vegetation with a wilder, nature-like character under certain conditions has been described as more insecure (Jorgensen, et al., 2002). Although nature-like vegetation can evoke feelings of insecurity, there are studies indicating that naturalistic vegetation in different layers, such as high grass, is highly valued and appreciated for its beauty (Schroeder & Andersson, 1984).

These two mentioned characters, well-kept grass areas and nature-like vegetation, are both highly valued in the outdoor environment and a balance between these different characters is often desired by people in general (Schroeder & Andersson, 1984). In a study with 1325

respondents from seven different Swedish cities, respondents prioritized from a list of 35 qualities what they value most for the green environment close to their homes. A beautiful nature that is well managed and holds a wide variety of species and fascination were among the highest prioritized qualities (Boverket, 2007b). In an international study, where respondents could choose from 51 different qualities of the green environment, a similar result was found; the qualities and character of a wide variety of species and nature-like character were valued the highest (Berggren-Barring & Grahn, 1995).

PERCEPTION OF GRASS AREAS

"When we design spaces we create experiences."

- Robinson, 2011, p. 45.

Vegetation make up elements in the outdoor environment that constitutes a framework which defines and orders, and therefore effect our perception. In order to create an aspired quality in an environment it is important to be aware of how plant characteristics provide different aesthetical qualities and functional purposes. For example, grasses height, colour, structure, flowering and maintenance regime (such as how often it is cut) contribute to affect people's perception of space. The height of a plant is largely contributing to the spatial factor, as it affects line of sight, movement and physical experience. In comparison, high grass has stronger spatial qualities than a lawn, meanwhile a lawn serves functional purposes better such as sports. (Robinson, 2011)

Many people have specific and strong opinions about how grass areas should be designed and managed. The prevailing norm is to have a short cut lawn in the garden, and to deviate from it represents a risk to be considered sloppy and may even be seen as a problem for the whole neighbourhood. Therefore, few areas in the urban environment deviate from this norm by having areas of example high grass. (Wissman, et al., 2015)

Many people complain and believe there are dangerous animals in high grass, such as snakes, ticks and other insects (Wissman, et al.,

THEORY & CONCEPTS

DESIGN

2015). People's fear for example ticks is one of the identified disadvantages of alternatives to lawn (Ignatieva & Stewart, 2009), which implies both the actual occurrence and people's fear and concern about health and safety. Ignatieva and Stewart (2009) emphasize that these issues in most cases are possible to eliminate by applying appropriate design.

In a smaller survey focused on lawns, fifty people in Uppsala, were asked about their perception of lawns in their neighbourhood. A majority of the respondents answered they mostly use lawns in their neighbourhood for aesthetical values and social activities since they find lawns suitable for leisure and socializing. Most respondents associated lawns with well-kept green areas and being a safe place. (Eshraghi, 2014)

*Uppsala, Sweden, 2015.
In a survey people responded they associate lawns with well-kept green areas and being a safe place.*



THEORY & CONCEPTS

DESIGN

In this section we present different research on what experiential values people generally prefer in the outdoor environment. From these we select experiential values we believe should be experienced in residential areas, which we later apply in the redesign.

CONCEPT OF EXPERIENTIAL VALUES

When designing it is important to identify what qualities people value and take them into consideration when making design choices. To help make decisions regarding design and management, different research have identified qualities people generally prefer to experience in the outdoor environment. The different research mention these values with different terms; preferences, qualities, character, factors, variables and experiential values. Further on we will use the term experiential values. An experiential value can be described with certain qualities and characters.

Different research have concluded what experiential values in the outdoor environment people generally prefer. In the figure below results from research is presented (figure 6). The research differ in approaches and outcome result. No research have the same experien-

tial values listed. However some values reoccur in the lists or are similar in description.

Figure 6: Research on experiential values. The figure show what experiential values research list as what people generally prefer.

THE PARK FOR HOMO URBANIS - THE CITY PERSON

Gunnar Sorte (2005)

This research describe qualities with the concept of qualities.

- Pleasantness
- Complexity
- Coherence
- Powerfulness
- Spatiality
- Social status
- Affection
- Originality

WITH PEOPLE IN MIND

Kaplan, Kaplan and Ryan (1989)

This research describe qualities with the concept of preferences.

- Coherence
- Complexity
- Legability
- Mystery
- Being away
- Extent
- Fascination
- Compatibility

GREEN SPACES IN URBAN AREAS

Swedish Environmental Protection Agency (Naturvårdsverket, 2011)

This research describe qualities with the concept of experiential values.

- Care
- Context
- Disturbance
- Historical connection
- Scale
- Uniqueness
- Complexity
- Naturalistic
- Variability

THE IMPORTANCE OF GREEN STRUCTURE FOR USE

Swedish University of Agricultural Sciences (SLU, 1995)

This research describe qualities with the concept of characters.

- Variety of species
- Tranquility
- The common
- Togetherness
- Space
- Robust
- Culture/History
- Wild

THE LANDSCAPE'S EXPERIENTIAL VALUE

National Board of Housing, Building and Planning (Boverket, 2007)

This research describe qualities with the concept of experiential values.

- Beautiful
- Ability to be refreshed and in better spirits
- Ability to be soothed and relaxed
- That it is clean
- Safe and secure environment
- Free from noise
- Plants and animals in natural environment
- Possibility to stay in shape and be healthy
- Natural character
- Quiet and peaceful character
- Plenty of trees
- Privacy
- A versatile environment
- Large and unrestricted
- Park with lawns

OUR APPROACH OF EXPERIENTIAL VALUES

From the range of experiential values we have selected values we consider to be relevant and achievable for experiences of the outdoor environment in residential areas dominated by grass surfaces. The selection also take into consideration what experiential values are common for the different research as well as if different values with similar description can be connected.

The selected experiential values will further on be applied in the redesign where it is important to inventory and analyse what values exists and where. Are some areas without distinct values and other with multiple? A design should make sure all selected experiential values are represented in a neighbourhood scale. When redesigning, existing values should be retained and new ones created.

On next page we present our selected experiential values and what research supports the selection (figure 7). In following pages we describe each selected experiential value.

OUR SELECTED EXPERIENTIAL VALUES

TRANQUILLITY

NATURALISTIC

SPATIALITY

COHERENCE

COMPLEXITY

IDENTITY

FASCINATION

OUR SELECTED EXPERIENTIAL VALUES

TRANQUILLITY

- Care (Naturvårdsverket, 2011)
- Tranquility (SLU, 1995)
- Ability to be soothed and relaxed (Boverket, 2007)
- Quiet and peaceful character (Boverket, 2007)
- That it is clean (Boverket, 2007)
- Social status (Gunnar Sorte, 2005)

COMPLEXITY

- Complexity (Gunnar Sorte, 2005)
- Complexity (Kaplan, Kaplan and Ryan, 1989)
- Mystery (Kaplan, Kaplan and Ryan, 1989)
- Variety of species (SLU, 1995)
- A versatile environment (Boverket, 2007)

NATURALISTIC

- Naturalistic (Naturvårdsverket, 2011)
- Wild (SLU, 1995)
- Plants and animals in natural environment (Boverket, 2007)
- Natural character (Boverket, 2007)

SPATIALITY

- Spatiality (Gunnar Sorte, 2005)
- Space (SLU, 1995)
- Privacy (Boverket, 2007)

IDENTITY

- Historical connection (Naturvårdsverket, 2011)
- Culture/History (SLU, 1995)
- Uniqueness (Naturvårdsverket, 2011)
- Originality (Gunnar Sorte, 2005)

COHERENCE

- Context (Naturvårdsverket, 2011)
- Scale (Naturvårdsverket, 2011)
- Coherence (Gunnar Sorte, 2005)
- Coherence (Kaplan, Kaplan and Ryan, 1989)

FASCINATION

- Fascination (Kaplan, Kaplan and Ryan 1989)
- Variability (Naturvårdsverket, 2011),
- Mystery (Kaplan, Kaplan and Ryan, 1989)

Figure 7: Our selected experiential values. The figure show what source each selected experiential value is connected to.

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DESIGN

In following pages we describe selected experiential values from the previous page.

EXPERIENTIAL VALUES

- tranquillity
- naturalistic
- spatiality
- complexity
- coherence
- identity
- fascination

TRANQUILLITY

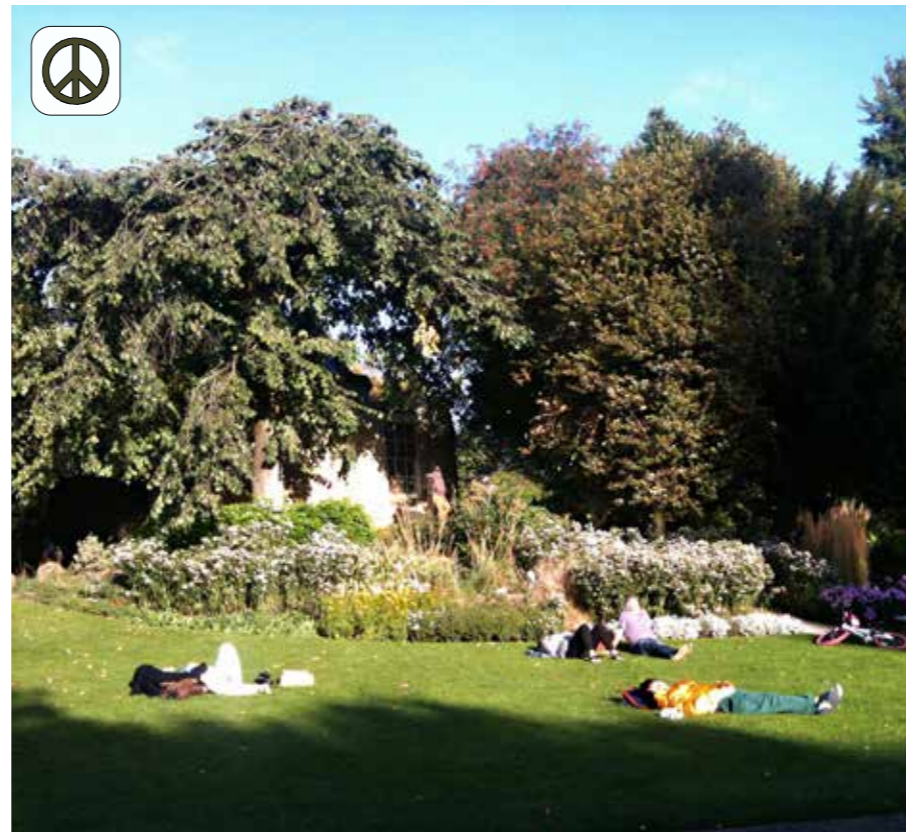
An outdoor environment with a tranquil character offers silence, peace and has visible traces of human presence. Noise, clutter and other disturbances can ruin this character (Berggren-Bärring & Grahn, 1995). Visible care for the environment has proved to be significant for people's preferences (Nassauer, 1995a). A well-managed green space signals that someone cares about the area. The feeling of well-managed can be achieved by adapting the design and maintenance after how a site is used, or how we want it to be used (Göteborgs Stad, 2009). The degree of maintenance is strongly linked to the valued status of a place and may affect the visitor's sense of security (Sorte, 2005).

NATURALISTIC

A natural character is considered by environmental psychologists to be an important component of restorative environments, which are environments that can help us recover from stress and are beneficial for our health (Naturvårdsverket, 2011). Nature has an ability to intrigue people with its processes and elements with varying shapes, sizes and colours (Berggren-Bärring & Grahn, 1995). Preferably, the vegetation should not seem to be planted by humans and a variety of habitats increases the perception of a rich nature (Berggren-Bärring & Grahn, 1995). The degree to which a green space is perceived as natural can be described by occurring vegetation, what different patterns and texture look like and to what extent there is water (Naturvårdsverket, 2011). Areas with character of nature and a high species richness are in general the most sought after qualities of park environments (Boverket, 2007b).

*Tranquillity.
A well manged space that offers silence
and comfort.*

*Naturalistic.
The vegetation should not look like it has
been planted by humans.*



SPATIALITY

A place with a positive spatial value offers both spaces with a good overview as well as more secluded spaces. The sense of spatiality is affected by scale, shape, variety and degree of openness (Naturvårdsverket, 2011). An outdoor environment that offers a variety in both types of spaces are often highly preferred (Appleton, 1996).

The English landscape park is an example of this value with its sweeping lawns that at irregular intervals are broken up by groves of trees (Sorte, 2005). A preference for this kind of landscape can be argued to result of dominance of this style for at least 250 years (M Ignatieva 2015, pers. comm., 3 June).

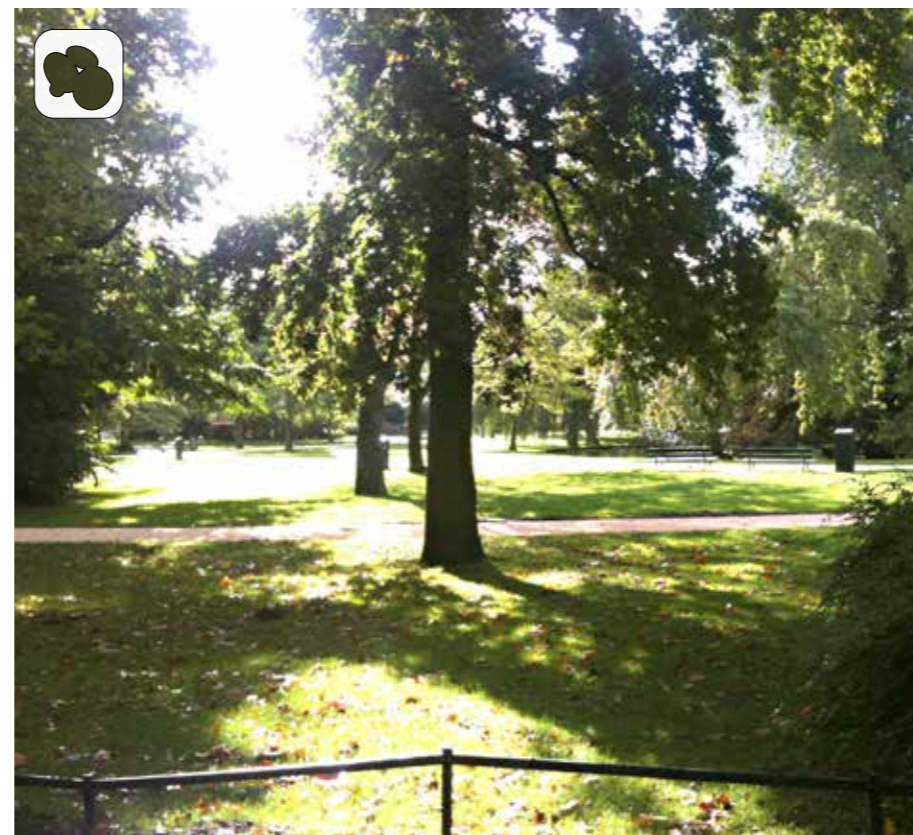
There is a tendency for older people to prefer a more open character whereas younger prefer a more closed off character. (Sorte, 2005)

COMPLEXITY

A complex value can be described by three different aspects; quantity and diversity of elements, spatial distribution and the degree to which there is variation and contrast between present elements (Naturvårdsverket, 2011). An example of an urban area with low degree of complexity is the vast grass surfaces created in the 1960-70's during the *Million Program*. For a complex value to be perceived as positive, and not chaotic, factors such as organization and context play important roles (Naturvårdsverket, 2011). There are also arguments that the growing awareness and interest in biodiversity to characterize the outdoor environment could be an expression of a desire for a more nuanced and vibrant complexity (Sorte, 2005).

*Spatiality.
Offers both open and more secluded spaces.*

*Complexity.
The contrasting and various elements give a sense of complexity.*



COHERENCE

A coherent character is perceived as logical and comprehensible (Naturvårdsverket, 2011). Coherence can be increased by connection between natural conditions and structures by unifying texture, repeating themes and colours (Naturvårdsverket, 2011) as well of rhythm and continuity (Sorte, 2005). Everything that helps to organize what is in the environment into larger units increase the sense of cohesion. The perceived coherence decrease if there are elements that stand out in scale, form and function (Hägerhäll, 2005).

IDENTITY

A place with strong identity has the value of conveying a strong visual image, which makes it memorable and distinct (Naturvårdsverket, 2011). It can be created from the landscape as a whole or from specific elements that can be described as spectacular, unique or iconic. An example of this is a piece of artwork placed in a grass area (Naturvårdsverket, 2011). It can also be a distinct natural character such an accent tree.

A strong identity and sense of uniqueness can contribute to an experience of surprise and something that is out of the ordinary. It can also create a feeling of getting away and being a part of something that completely differs from the everyday life in the urban environment. (Sorte, 2005)

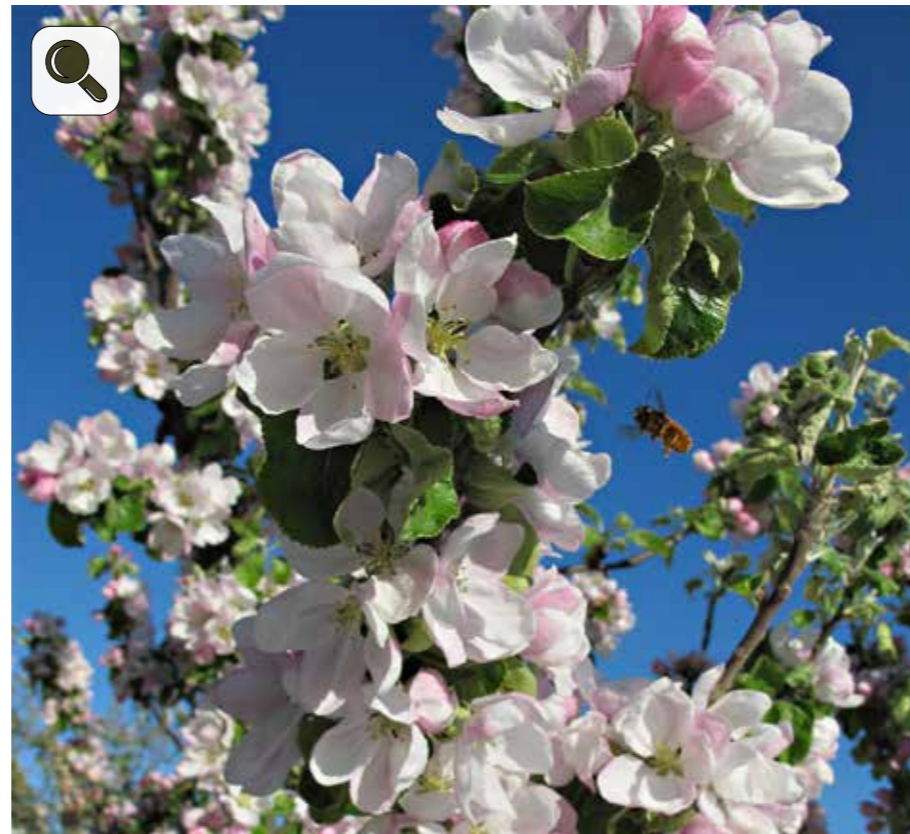
Coherence.
Reoccurring elements in regular intervals give a space a look of coherence.

Identity.
Elements that are memorable and stands out contribute to the identity of an area.



FASCINATION

Fascination can be caused by striking impressions but also by soft impressions from trees and flowers that captures one's attention without shouting their message. How vegetation varies with season is an example of a soft fascination. An environment that stimulates thought processes and makes you wonder is fascinating as there is a fascination in figuring things out, by predicting and recognizing as well as to be challenged by uncertainty. Activities such as bird watching and watching grazing animals are examples on what we find fascinating. Mystery caused by something that is partially hidden and evokes visitors to go and take a closer look also contribute to fascination. (Kaplan, et al., 1998)



*Fascination.
Natural processes, such as bees pollinating, and seasonal change contribute to fascination.*

THEORY & CONCEPTS

MAINTENANCE

In this chapter we cover practical aspects of establishment and maintenance for different types of grass areas. The instructions in this chapter answer to how grass areas in the redesign proposal should be established and managed as well as what species to choose.

Figure 8: Types of grass areas in Sweden. The table show how four common types of grass areas differ in function, height and cutting frequency. Source: Andrén, 2008.

DIFFERENT TYPES OF GRASS AREAS

Swedish national guidelines for grass maintenance have divided grass areas into four types; ornamental lawn, conventional lawn, high grass and meadow. The main differences between these types are grass height and intensity of cutting (figure 8). By comparison, high grass requires to be cut 2-5 times per season meanwhile conventional lawns require more frequent cutting, 12-20 times per season. The function for each type of grass area varies, the ornamental lawn's main function is to have a high aesthetical value whereas conventional lawn aims to be utilized for sports activities and play. (Andrén, 2008)

In 2001, conventional lawns covered roughly 55% of the Swedish municipalities' 206 million m² of grass areas (figure 9). This is followed by high grass (30%), meadow (11%) and ornamental lawn (4%) (Svenska Kommunförbundet, 2002). Since ornamental lawns are rarely occurring, especially in residential areas, we are not going to cover them further.

MAINTENANCE EFFECTS SPECIES COMPOSITION

Same grass species are distributed over the world through seed mixtures with similar species composition (Ignatieva & Stewart, 2009). Standardization in establishment of lawns, maintenance and species composition have resulted in minimized local differences, despite different conditions (Müller, 1990). After establishment, factors such as local climate, intensity of use and maintenance regimes can although affect how the species composition of a lawn evolve (Stewart, et al., 2009; Thompson, et al., 2004; Müller, 1990). Research show that species richness in grass areas decline with increasing continuous area, leavings of grass clippings and amount of clay in the soil (Stewart, et al., 2009). After comparing lawns all over Germany, Müller (1990) found that the most influent factor in determining the species composition in lawns is cutting frequency. Mowing benefits cutting-tolerant species and distributes cut plant material over the lawn so that new areas can be occupied by species in short time.

Malmö Municipality, in Sweden, present an example on how

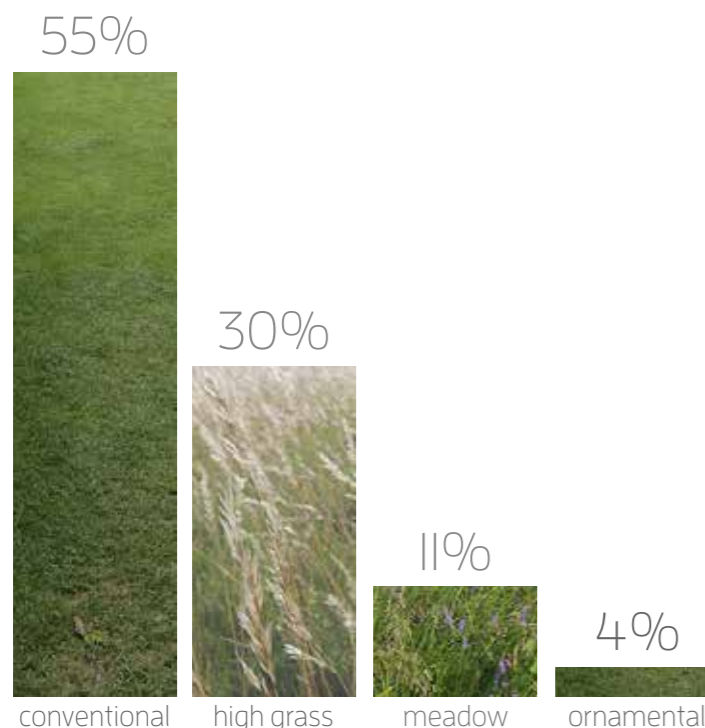
TYPES OF GRASS AREAS				
	ORNAMENTAL LAWN	CONVENTIONAL LAWN	HIGH GRASS	MEADOW
GRASS HEIGHT	2,5 - 6,0 cm 	4,0- 10 cm 		
CUTTING	18-25/season	12- 20/season	2-5 /season	1-2/season
FUNCTION	aesthetical value	for active use, play and sports	natural values	natural values, flowers

THEORY & CONCEPTS

MAINTENANCE

Figure 9: Distribution of grass areas. Statistics showing distribution of grass types in all Swedish municipalities in 2001. The conventional lawn is the most common grass type while ornamental lawn rarely occurs.

Source: Svenska Kommunförbundet, 2002.



maintenance regime effect species richness in their *Nature Conservation program for Malmö City* (Naturvårdsplan för Malmö Stad, 2012). A conventional lawn consists of about 10 plant species and 100 animal species on a surface of 100 m². A meadow on the other hand can accommodate about 50 plant species and 500 animal species in the same area. *Malmö Municipality* therefore aspire to turn more lawns into meadows. (Malmö Stad, 2012)

DESIGNING WITH MAINTENANCE IN MIND

Grass areas in Sweden are mainly managed by mowing. Irrigation and fertilization seldom occurs (J Blomqvist 2015, pers. comm., 17 January).

Therefore, when designing grass areas it is important to create surfaces that are accessible for mowers. For example, it is easier to cut open, continuous surfaces with smooth corners than rectangular surfaces with sharp corners. The longer continuous movement a mower can do, the higher is the capacity of the machine. Slopes can be difficult to cut, but by designing slopes with rounded top and foot better facilitates maintenance. Also, objects too close together in a design should be avoided since they restrict the accessibility of mowers. It is also important that objects can be detected from the mower. (Jacobson, 1992)

ECOLOGICAL MAINTENANCE

A more ecological maintenance can be achieved by changing to less intensive management regimes, excluding toxic substances and choosing equipment and fuels that are more environmental friendly. (Van Der Ryan & Cowan, 1996)

Research on reduced maintenance, such as less frequent cutting, show several advantages such as reduced energy usage. An other advantage is increased diversity of plants and animals that have chances to spread. For example when grass is let to grow undisturbed for a period, species such as *Trifolium repens* (vitklöver), *Lotus corniculatus* (kärringtand), *Medicago lupulina* (humlelusern) and *Prunella vulgaris* (brunört) can start flowering. Letting plants flower also favours other species such as pollinators and seed-eating insects. (Wissman, et al.,

2015)

In Malmö between year 2007-2010, a full-scale project on ecological management was carried out in *Bulltoftaparken*. The objective was to test the limits of ecological management by developing and evaluating various maintenance and management concepts. In the preface of the project it became evident that few similar projects had been done and that there is a lack of knowledge in this field. Compared with traditional methods the project used methods such as cylinder mowers drawn by horses, grazing and technologies to reduce emissions of greenhouse gases. Conventional lawns were also turned into high grass areas cut once per season. The carbon dioxide emission were ten times higher (m²/season) when cutting short grass with lawnmower compared to high grass. As a result the project showed that the total emissions were about 30 times higher (m²/season) with a lawn mower than mowing with a horse. The report about the project concluded that is appropriate to discuss if the relationship between lawns and high grass should change, and where lawns are needed the surfaces should be cut by horses. (Johansson, et al., 2011)

An ecological approach to maintenance can be less costly, if for example areas are converted from conventional lawn to high grass areas. The cost in Bulltoftaparken for high grass was less than conventional lawn, 0,88 kr/m² compared to 0,99 kr/m² (Johansson, et al., 2011). However, these costs vary in Sweden depending on site and procurement. In Gothenburg, can the cost for high grass maintenance be both more and less costly than conventional lawn depending on how many times the high grass is cut and if uptake of grass clippings is needed (J Blomqvist 2015, pers. comm., 17 March). Whether or not machines with more environment friendly fuels are less costly than standard lawn mowers for conventional lawns depends on if new equipment need to be purchased and the local cost for certain fuel is (Johansson, et al., 2011)

GRAZING AS ALTERNATIVE MAINTENANCE

Grazing animals make a selection of which species they graze, which can result in uneven surfaces and favours species that are not grazed.

THEORY & CONCEPTS

MAINTENANCE

Figure 10: Animals per hectare for bait. Approximate numbers of animals for grazing on one hectare for a whole season.

Source: J Wissman 2015, pers. comm., 19 March

Approximately...



1 cow/hectare/season



5 sheep/hectare/season



Grazing animals can also be a disadvantage to species sensitive to trampling which damage their root systems. It is a constant disturbance, unlike mowing, where the occasions of cutting provide brief disturbances and longer periods of no disturbance to flora and fauna. Recommendations on how many grazing animals can bait on one hectare to have sufficient bait for one season depends on the specific conditions on a given area but can approximately be estimated to one cow or five sheep per hectare (figure 10). (J Wissman 2015, pers. comm., 19 March)

There are different aspects to consider when choosing appropriate animals for a specific place. If people are let into the pasture sheep are appropriate. Goats eating of leaves, woody and thorny plants also give a neat looking result as well as the parasite pressure is reduced. A herb-rich flora suits horses and cows while sheep and goats are better for pastures with woody materials. (Johansson, et al., 2011)

ESTABLISHMENT METHODS

An area of vegetation can be established by several methods. We will describe the most common methods; seeding, plug plants and prefabricated rolls.

SEEDING

Seeding is an economical and effective way to establish larger vegetation areas. However, establishment takes longer than the other alternatives. For example, for the first year of a seeded meadow it is not certain the vegetation will be dense and flowering (Vegtech, 2015c). To get a rich flowering meadow takes several years (Pratensis, 2015a). Therefore, seeding can be complemented with annuals or plug plants.

In order for seeds to establish in an existing lawn, grass turf needs to be removed. The soil cannot contain perennial weeds such as *Cirsium* (tistlar), *Elytrigia repens* (kvickrot), *Urtica* (nässlör) and *Aegopodium podagraria* (kirskål). Occurrence of perennial weeds can be reduced by keeping soil in tread the season before seeding. To sow in an existing lawn does not work because grass smoothers herb plants. One solution is to remove grass and its roots in several squares of at least 1m²

and then to sow seeds in the squares. The seeds do best in a nutrient poor soil without grass. A method to meagre the soil is to cultivate nutrient-absorbing crops, such as potatoes, and then through harvest remove nutrients from the soil. After harvest the topsoil is removed and seeds are sow into the less nutrient rich subsoil. The best time for sowing is from August to September, but in southern parts of Sweden sowing can be done into October. It is also possible to sow in April and May. Some seeds such as *Primula veris* (gullviva) and *Rhinanthus angustifolius* (höskallra) need cold weather to germinate and will not grow the first year if planted in spring. (Pratensis, 2015a)

PLUG PLANTS

Seeding is often combined with small seedlings called plug plants. These will flower the first year after establishment and give an immediate result. Since plug plants have been growing for a couple of weeks it is easier to accurately establish desired species than with for example seeding (Vegtech, 2015c). To establish plug plants in existing meadow, existing vegetation needs to be removed where plug plants are planted. Plug plants are planted from March to October and should be planted before sowing when combined with seeding (Pratensis, 2015g).

PREFABRICATED ROLLS

Prefabricated rolls of vegetation are used for example when a well-established meadow is striven. The vegetation of the rolls is well-developed and the roots can quickly establish. Therefore, fabricated rolls can be used as an effective erosion on slopes (Vegtech, 2015a). Rolls are also often used when a new playground is constructed, since it is difficult to establish a grass area by seeding where children run and play.

THEORY & CONCEPTS

MAINTENANCE

In this section we describe different types of grass areas and how they should be managed. We propose that the approach of ecological maintenance (described on page 38) should be applied to all types of grass areas.

CONVENTIONAL LAWN

A conventional lawn is supposed to be robust and able to withstand different types of activities such as play and ball games. The grass height is generally between 4-10 centimetres. Ideally, the grass should grow slowly so it requires to be cut less frequent. Lawns need sunlight, in shade the grass becomes sparse and vulnerable. (Andrén, 2008)

Seed mixtures for conventional lawns consist of a combination of species, where each species contribute with positive abilities (Nordström, 1990). Important characteristics for lawn species are drought tolerance, frost resistance, wear resistance against trampling, wintering resistance, low growth rate, resistance to diseases, cut tolerance and colour (Nordström, 1990). Mainly *Festuca rubra* (rödsvingel) and *Agrostis capillaris* (rödven) are used for conventional lawns, but also *Phleum pratense* (turftimotej), *Lolium perenne* (engelskt rajgräs), and *Festuca brevipila* Tracey (hårdsvingel) are commonly used (Andrén, 2008). *Festuca rubra* (rödsvingel) is the most commonly used grass in Sweden. It is suitable for most lawn types and is tolerant for cutting

and drought as well as it spreads easily. *Poa annua* (vitgröe) is by some regarded as a weed but is the dominant species in many intensely kept lawns (National Encyklopedin, 2015).

MAINTENANCE OF CONVENTIONAL LAWN

Public lawns do not need to be irrigated and grass clippings are not collected (Göteborgs Stad, 2015a). The frequency of mowing depends on type of lawn, but is in general cut 12-20 times per season in Sweden (Andrén, 2008). After mowing the edges are trimmed to give a more well-kept appearance (Göteborgs Stad, 2015a).

Example of conventional lawn.



SPECIES FOR CONVENTIONAL LAWN:

Festuca rubra (rödsvingel)

Agrostis capillaris (rödven)

Phleum pratense (turftimotej)

Lolium perenne (engelskt rajgräs)

Festuca brevipila Tracey (hårdsvingel)

(Andrén, 2008)

THEORY & CONCEPTS

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SPECIES FOR GRASS-FREE LAWN:

Achillea millefolium (rölleka)
Armeria maritime (trift)
Bellis perennis (tusensköna)
Campanula rotundifolia (liten blåklocka)
Dianthus deltoids (backnejlika)
Galium verum (gulmåra)
Hieracium pilosella (gråfibbla)
Hypochoeris radicata (rotfibbla)
Leucanthemum vulgare (prästkraige)
Lotus corniculatus (kåringtand)
Plantago media (rödkämpar)
Potentilla argentea (femfingerört)
Potentilla erecta (blodrot)
Primula veris (gullviva)
Prunella vulgaris (brunört)
Silene vulgaris (smällglim)
Thymus serpyllum (backtimjan)
Veronica spicata (axveronika)
Viola tricolor (styvmorsviol)

(Swedish University of Agricultural Sciences, 2015)

GRASS-FREE LAWN

Research on grass-free lawns have mainly been done in England, but there is also ongoing research in Sweden. The following information and maintenance instructions comes from projects and research in England but the *LAWN-project* have a test site on grass-free lawn in Uppsala, Sweden. The list of species is based on this test-site.

Grass-free lawns are characterized by a high level of plant diversity. The plants are perennial, so the lawn does not need to be replanted each year, and are preferably clonal so they will spread within the planting. As many different species as possible should be used, ideally more than twelve species, in order to decrease the risk of one species dominating the lawn. For example, in the *Avondale Park* in London, which shows examples of grass-free lawns, more than sixty species were used. Some plants will not survive, so by using a large amount of plants the smaller will the impact of plant loss be. (Grass-Free Lawns, 2015a)

The appearance of the grass-free lawn changes as the internal structure changes with years and seasons. Choosing plants with unusual coloured flowers or leaves makes the lawn more visually interesting and the coloured leaves provides colour when no plants are flowering. (Grass-Free Lawns, 2015a)

Grass-free lawns can be walked upon but are not suited for more intense activities like football (Grass-Free Lawns, 2015a). Some may hesitate to enter the flowery lawns with species people are unfamiliar to walk up on. However, plants benefits from being occasionally pressed down because they then “*maintain in contact with the soil and helps encourage them to stay low growing*” (Grass-Free Lawns, 2015a). Several of the plant species used in grass-free lawns can already be found in conventional lawns. Compared to conventional lawns, these grass-free lawns produce 20 times as many flowers and are visited by an increased number of pollinators (Grass-Free Lawns, 2015b).

MAINTENANCE OF GRASS-FREE LAWN

The amount of cuttings per year vary for types of grass-free lawn but is in general 3-9 times a year and lessens as the lawn becomes older

(Grass-Free Lawns, 2015a). Grass-free lawns in a Swedish climate may need to be cut less frequent (M Ignatieva 2015, pers. comm., 3 June).

Mowing generates more flowering and when the lawn has been mowed new flowers reappear in about three weeks’ time. Mowing also provide repeated stress that changes which group of plants has the advantage at different occasions. The mower can be of a regular kind but needs to be able to collect clippings, which is necessary in order to prevent it from reducing access to light. (Grass-Free Lawns, 2015a)

When establishing a grass-free lawn, all existing plants, especially grasses, should be removed. To keep grass-free lawns free from grass, removal of grasses is required. “*It is the absence of grass that allows the grass-free lawn to exist.*” (Grass-Free Lawns, 2015a). After a few years the lawn might need to be complemented with some new plantings. (Grass-Free Lawns, 2015a)

Example of grass-free lawn.

Photo: Maria Ignatieva, 2014.



MEADOWS

A meadow consists of vegetation with a high content of flowering plants, which has an undisturbed first season and thereafter is cut. Traditional meadows in Northern Europe are cut once a season but in urban environments are also two cuttings per season fairly common. Meadows are not associated with specific grass or flower species since meadows can grow on soils that are both rich and poor in nutrients, and hence attract different species. (J Wissman 2015, pers. comm., 20 April)

Meadows in the rural landscape are a result of a long tradition of human cultivation through grazing, cutting and removal of plant material (Jacobson, 1992). They are characterized by a high biodiversity of plants, lichens and mosses, but also hold a great diversity of fungi, insects, birds, amphibians and reptiles (Jordbruksverket, 2012). This diversity is dependent on humans and also has a direct benefit to mankind through, for example, bumblebees and bee pollination of crops (Jordbruksverket, 2012). Especially, borders to surrounding vegetation are rich in species and hold a greater biodiversity than for example conventional lawns (Wissman, et al., 2015).

What species of herbs and grasses to choose depend on the given biotope (Andrén, 2008). The species composition of meadows depends on nutrients in the soil, access to water and maintenance regime (Jordbruksverket, 2012). For example, high levels of nitrogen and phosphorus favour a few species that may outcompete other species. The largest species richness is found in dry and calcareous rich soils (Jacobson, 1992).

In parks and neighbourhoods it can be difficult to create flowery meadows. One occurring problem is that urban green spaces usually are nutrient rich, which makes it difficult to create right conditions for a high number of plant species. Transforming high grass area to meadow may take several years, five to ten years of consistent management is not unusual. (Jacobson, 1992)

We have selected types of meadows we find appropriate for redesigning grass surfaces in residential areas, and are to be chosen depending on soil conditions and microclimate.

MAINTENANCE OF MEADOWS

The types of meadow we present in following section all have the same maintenance requirements.

A meadow is usually cut 1-2 times per season. The first cut should occur between mid and the end of July, after most plant species have flowered and been able to spread their seeds (Jordbruksverket, 2012). If the meadow is cut too early, dispersal of seeds and flowering are compromised (Wissman, et al., 2015). If the meadow is cut too late low-growing species will be shaded by higher growing plants (Wissman, 2015) and may also result in decreased diversity of vascular plants, especially if there are problems with unwanted vegetation (Jordbruksverket, 2012).

Ideally, the grass remains a few weeks before it is collected so that seeds from herbs have time to loosen to be germinated next coming season (Andrén, 2008). Uptake of grass clippings is an important part of maintenance of meadows in order to meagre the soil (Jordbruksverket, 2012), since meadows thrive best in nutrient-poor soils (Andrén, 2008). Continuous uptakes contribute to less nutrient rich soil and thereby a higher species richness (Jordbruksverket, 2012). Also, if the clippings are left they can smother low growing and less competitive species (Wissman, et al., 2015). Since the plant production is lower for dry meadows, uptakes are not always necessary (J Wissman 2015, pers. comm., 20 April).

Nutrients are added to meadows through trees and shrubs, periodic flooding and via precipitation (Jordbruksverket, 2012). By cutting and uptake of clippings a certain amount of nutrients are removed from the soil each year. If the meadow is cut a second time even more nutrients are taken away (Jordbruksverket, 2012). When meadows are cut twice a season, the first cut should be in the beginning of July and the second cut in the end of August or beginning of September (J Wissman 2015, pers. comm., 20 April).

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MAINTENANCE

For full list of species, see Appendix E.

SPECIES FOR COMMON MEADOW:

HERBS:

Achillea millefolium (rölleka)
Centaurea jacea (södklint)
Centaurea scabiosa (säddklint)
Galium verum (gulmåra)
Geum rivale (humleblomster)
Knautia arvensis (åkervädd)
Plantago media (rödkämpar)
Primula veris (gullviva)
Prunella vulgaris (brunört)
Rumex acetosa (ängssyra)
Silene dioica (rödblära)
Silene vulgaris (smällglim)

(Pratensis, 2015d)

SPECIES FOR WET MEADOW:

HERBS:

Achillea ptarmica (nysört)
Angelica sylvestris (strätta)
Caltha palustris (kabbleka)
Filipendula ulmaria (älgört)
Geum rivale (humleblomster)
Lysimachia vulgaris (videört)
Ranunculus acris (smörblomma)
Serratula tinctoria (ängsskära)
Succisa pratensis (ängsvädd)
Trollius europaeus (smörboll)
Prunella vulgaris (brunört)
Silene dioica (rödblära)

(Pratensis, 2015c)

GRASSES:

Anthoxanthum odoratum
(vårbrodd)
Helictotrichon pratensis
(ängshavre)
Helictotrichon pubescens
(luddhavre)
Festuca ovina (fårsvingel)
Festuca rubra (rödsvingel)

COMMON MEADOW (NORMALÄNG)

Normal meadow is a general type of meadow appropriate for normal to dry or moist soil, for example clay soil (Pratensis, 2015d).

Example of common meadow.

Photo: Inger Runesson, 2009.



WET MEADOW (FUKTÄNG)

This type is chosen for areas which are occasionally wet but usually dries up in summer (Jordbruksverket, 2012). Common for moist meadows are a rich vegetation of herbs with streaks of broadleaf and fairly broad leaved grass (Den virtuella floran, 2015). The high abundance of herbs makes it important for many insects, especially butterflies as well as bees bird life (Naturvårdsverket, 2011).

Example of wet meadow.

Photo: Inger Runesson, 2008.



THEORY & CONCEPTS

MAINTENANCE

For full list of species, see Appendix E.

SPECIES FOR DRY MEADOW:

HERBS:

Achillea millefolium (rölleka)
Armeria maritima (trift)
Antennaria dioica (kattfot)
Galium verum (gulmåra)
Rumex acetosella (bergsyra)
Silene uniflora (strandglim)
Plantago media (rödkämpar)
Trifolium arvense (harklöver)
Veronica spicata (axveronika)

(Pratensis, 2015f)

GRASSES:

Agrostis capillaris (rödven)
Festuca rubra (rödsvingel)
Festuca ovina (fårsvingel)
Luzula campestris (knippfryle)
Bromus hordeaceus (luddlosta)

SPECIES FOR GROVE MEADOW:

HERBS:

Campanula latifolia (hässleklocka)
Campanula trachelium (nässelklocka)
Myosotis sylvatica (skogsförgätmigej)
Potentilla erecta (blodrot)
Silene dioica (rödblära)
Stellaria holostea (buskstjärnblomma)
Veronica officinalis (ärenpris)

GRASSES:

Agrostis capillaris (rödven)
Deschampsia flexuosa (kruståtel)
Festuca rubra (rödsvingel)
Melica nutans (bergslok)
Milium effuse (hässlebrodd)
Poa nemoralis (lundgröe)

(Pratensis, 2015e)

DRY MEADOW (TORRÄNG)

This type is appropriate for dry and meagre soil (Borgå, 2012). Dry meadows generally have low productivity, which increase their richness of plants and animal species (Vegtech, 2015d). Dry meadows are drought tolerant and require little maintenance (VegTech, 2015b).

Example of dry meadow.

Photo: Inger Runesson, 2005.



GROVE MEADOW (SKUGGÄNG)

This type is appropriate for areas partly shaded by vegetation or buildings. The combination shade and light is favourable for a large number of plant and animal species, for example butterflies. (Jordbruksverket, 2012)

Example of grove meadow.

Photo: Inger Runesson, 2008.



THEORY & CONCEPTS

MAINTENANCE

HIGH GRASS

A high grass area is often a residual area and primarily not intended to be used for activity (Persson 1988). Since high grass areas are often created by lessening the cutting frequency on conventional lawns and rarely planted, the species composition varies. High grass should have the same maintenance regime as meadows (Göteborgs Stad, 2015a). The goal is primarily to keep the surface open and neat (Jacobson, 1992).

To convert high grass in urban environments into more aesthetically appealing flower-rich meadows, require many years of uptake of clippings to meagre the soil, which few municipalities do in a larger scale. High grass areas have greater potential in contributing to biodiversity than conventional lawns because they usually are allowed to flower. (Wissman, et al., 2015)

MAINTENANCE OF HIGH GRASS

The maintenance regime for high grass is similar to the maintenance for meadows. High grass are cut 1-3 times a year (Göteborgs Stad, 2015a), depending on site, weather and aim of the surface's function and appearance. When cut once, the cut should occur between mid to the end of July. When cut twice a season the second cut should occur in the end of August or beginning of September (J Wissman 2015, pers. comm., 19 March). When cut three times a season, the first cut is performed in June, the second in July and the last in September (Göteborgs Stad, 2015a). A high grass area can have uptake of grass clippings if the goal is to meagre the soil.

*Example of high grass.
Photo: Maria Ignatieva, 2015.*



SPECIES OFTEN FOUND IN HIGH GRASS:

Phleum pratense (turftimotej)
Festuca rubra (rödsvingel)
Agrostis capillaris (rödven)
Poa pratensis (ängsgröe)

(Andrén, 2008).

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MAINTENANCE

PICTORIAL MEADOW

A pictorial meadow is created with annual plants with different flowering periods. A small amount of plants which flower early (usually flower within eight weeks from sowing) are used to get a quick result and have short growth height to not shade other plants (Pictorial Meadows, 2015). The high abundance of flowers and seeds is beneficial for pollinators.

Pictorial meadow can be used in a larger scale to quickly create an impressionistic effect with strong flowering. When *Malmö Municipality* planted pictorial meadows the estimated cost for an area larger than one hectare was approximately 15 kr/m² (Svensk Byggtjänst, 2014). This can be compared to the approximate cost of maintenance of conventional lawn, 3,20 kr/km², and the most expensive type of high grass/meadow, 6,00 kr/m² (see page 60, figure 13)(J Blomqvist 2015, pers. comm., 17 January). The cost of establishment is not included in these prices and therefore the prices are not really comparable but give an indication.

MAINTENANCE OF PICTORIAL MEADOW

A pictorial meadow is ploughed, sowed each year and easy to establish. It is established through seeding and requires nutritious poor soil. Most often the topsoil needs to be removed and a nutritious poor soil added. The seeds are planted in autumn and flower in spring and summer. A pictorial meadow can also be used as a successional planting the first year until a meadow is fully established. The plantings only require occasional weeding (Hellener & Vilkenas, 2014) and are not fertilized (Svensk Byggtjänst, 2014).

Example of pictorial meadow.

Photo: Inger Runesson, 2014.



SPECIES FOR PICTORIAL MEADOW:

Agrostemma githago (klätt)
Anthemis arvensis (åkerkulla)
Centaurea cyanea (blåklint)
Papaver rhoeas (kornvallmo)
Papaver dubium (rågvallmo)

(Pratensis, 2015b)

THEORY & CONCEPTS

MAINTENANCE

Here we present a summary of previous instructions (page 40-47) on how to establish and manage different types of grass areas. The proposal of the redesign will be based on these instructions.

Figure 11: Our recommendations for maintenance and establishment.

ESTABLISHMENT & MAINTENANCE RECOMMENDATIONS				
	CUTTINGS PER YEAR	WHEN TO CUT	ADDITIONAL MAINTENANCE	METHOD OF ESTABLISHMENT
CONVENTIONAL LAWN	12-20	depending on site and weather	trimming	seeding, role, plug plants
GRASS-FREE LAWN	3-9	depending on plant composition	weeding of grass	plug plants
MEADOWS	1-2	1 cut: mid to end of July 2 cuts: mid to end of July & end of August to September	uptake, trimming	distribution centers, seeding, plug plants
HIGH GRASS	1-3	1 cut: June 2 cuts: mid to end of July & end of August to September 3 cuts: June, July and September	uptake, trimming	less frequent cutting of conventional lawn
PICTORIAL MEADOW	-	-	weeding	plough and seeding

THEORY & CONCEPTS

REFLECTIONS

Concluding reflections of the literature study and what aspects are important to highlight and keep in mind when redesigning.

ECOLOGY

PROBLEMATIC TO DESIGN WITH ECOSYSTEM SERVICES IN MIND

Ecosystem services are not a new invention, human have always obtained for example food and clean water from functioning ecosystems, but the concept ecosystem services was not popularized until 2001. When searching for information it was obvious that there is little research on exactly how ecosystem services are connected to certain functions of an ecosystem and further on how these functions can be affected by human impact or be translated into design actions. Clear is that well-functioning ecosystems have a positive impact on the quality on human life and that it is necessary to take this functionality into account even in an urban environment since not all so called ecosystem services can be transported from outside cities. Due to the current, relatively low, state of knowledge about how to promote ecosystem services by design we have chosen to not take this concept further to our redesign proposal. We will instead focus on selected principles of ecological design, which aim to strengthen the ecosystem function and thereby indirectly contribute to the production of ecosystem services.

DESIGN

CHALLENGE BUT AT THE SAME TIME RESPECT THE NORM

People's preferences should be respected and taken into account when designing the outdoor environment. But it is equally important to challenge these preferences and search for new ways of doing things. Otherwise, things will continue to be as they always have been, which might disregard ecological values and concerns. New ways can turn into new preferences. Research argue that after being repeatedly exposed to a type of landscape, the preference for it can increase. For example, if we are repeatedly exposed to areas of high grass one can develop a preference for it.


MAINTENANCE

USE A SPECTRUM OF GRASS AREAS

There is not just *one* type of lawn, high grass or meadow. Each type of grass area can be divided into a spectrum of nuances that offers different spatial characters, flowering, colours and seasonal changes. These nuances paints a brighter and wider picture of nature as well as they contribute to an overall heterogeneity. Using a bigger palette also give possibilities to choose an appropriate type of grass area that fits with a given green space's conditions. When selecting appropriate type the maintenance requirements can also be lessened.

ECOLOGICAL APPROACH ON MAINTENANCE

An ecological approach to maintenance of grass areas results in lesser environmental impact and a higher species richness. It can constitute of maintenance regimes such as grazing which also contributes with other values such as pedagogic as well as it fascinates. Ecological and economical benefits with ecological maintenance are still relatively unexplored subjects. With more research and information stronger arguments can be found to turn ecological maintenance in to standard procedure. Present research, however thin, show indications of positive benefits. We advocate an ecological approach on maintenance, which we will apply in our redesign.



PART FOUR INTERVIEWS

In order to get an idea of the current state of knowledge and insight about practice we interviewed professionals working with ecology, design and maintenance related to grass areas. Different types of grass, maintenance, social perception and thoughts on the future are discussed in all interviews.

INTERVIEWS

ECOLOGY

To get an insight and understanding of the ecological value of grass areas in urban environment, we have interviewed two ecologists on their perception of grass areas and how to promote ecological qualities by design and maintenance. The interviews took place 13 and 19 March 2015. For questionnaire see Appendix A.

DIFFERENT TYPES OF GRASS AREAS

CONVENTIONAL LAWNS

Jörgen Wissman, researcher at *Swedish Biodiversity Centre*, explains that in a frequently cut lawn, species with growth zone above clipping height will never make it. *“If you cut an area very often, you will get almost no flowering”* he says. He continues; *“the only exception is if the soil is very nutrient poor, then low-growing white clover (*Trifolium repens*, vitklöver) which is nitrogen-fixing and therefore have an advantage in nutrient poor situations, might grow. But if you start to fertilize, clover will disappear after a while since it no longer has an advantage of being nitrogen-fixing.”*

Regarding species composition of seed mixtures for conventional lawns, which usually include different types of *Agrostis capillaris* (rödven) and *Festuca rubra* (rödsvingel), Wissman says that the different types within each species have no significance for biological or ecological values. *“From my point of view I think more species should*

be included, and then it is more herbs, not grasses, that are interesting” he says. Another advantage of having more herbs in lawns is that since herbs have longer roots, it makes them cope better with drought, he adds. Examples of species he would like to see included are *Prunella vulgaris* (brunört), which have rich flowering and is only five to six centimetre high. Wissman also refers to a grass-free lawn project in England in which lawns only consisting of different kinds of herbs are developed.

HIGH GRASS & MEADOWS

“Generally speaking, it can be said that extensive maintenance on nutrient poor soil leads to more flowering and other interesting plants”, Wissman explains. *“But if the soil is nutritious, extensive maintenance will lead to an increased portion of thistles (*Cirsium*, tistlar) and tall grass species”*, he continues. Nutrient rich areas with extensive management therefore tend to look messy and might be difficult to anchor as a design alternative. Wissman emphasizes that even if for example



NAME: Jörgen Wissman
EDUCATION: Doctoral degree in Ecology and Conservation biology
POSITION: Researcher, *Swedish Biodiversity Centre*



NAME: Marcus Hedblom
EDUCATION: Doctoral degree in Urban Ecology and conservation
POSITION: Researcher/Analyst, *Department of Forest Resource Management c/o Department of Ecology*

Cirsium species (tistlar) might be perceived as messy, they are a food resource for many species and great in the biological perspective. On the question if there are other more aesthetical appealing plant species that can cope with the competition on nutritious soil, he replies that he believes it is a field where few studies have been done. He tells that plants usually growing in high grass areas in this type of soil are *Anthriscus sylvestris* (hundkex), *Arrhenatherum elatius* (knylhavre) and broad-leaved grass such as *Alopecurus pratensis* (ängskavle).

MAINTENANCE OF GRASS AREAS

HIGH GRASS & MEADOWS

“The best way of manage meadows is to cut once a year after flowering and to leave cuttings on the ground in order to let seeds leave the plant and then remove it,” urban ecologist Marcus Hedblom, says. He adds that cutting twice a year also can be an option, depending on the species you want to promote. On the question on how important uptake of



Cirsium (tistlar).
Cirsium (tistlar) are positive in biological perspective but might be perceived as messy by the general public.

cuttings is, he says that if the seed bank is large enough, it might not be a major problem if uptake is not performed every time. But he adds that if cuttings are left on the ground the nitrogen levels will increase which eventually will be a disadvantage to some species, meaning that the uptake is fairly important for the long-term maintenance.

Also Wissman emphasizes the importance of uptake. *“It gives two effects. One is that if you do not remove cuttings, the soil is slowly fertilized due to nitrogen-fixing species. The other effect is that if you perform uptake you do not get litter accumulation that benefit only the most competitive species.”* he says. When talking about the appropriate time period to cut high grass Wissman says that the plants propagated by seeds usually are most difficult to get to survive. He continues to explain that you need these plants to flower and to set seeds before you cut, but you do not want to cut too late because then the plants have transported nutrients down to their roots, which is a disadvantage if you want to meagre the soil. To let plants flower before cutting is also important for pollinators. Wissman explains that the time period when a high grass area should be cut depends on species composition, but looking generally at meadows or high grass areas he thinks that an appropriate time period is between mid to end of July.

Wissman continues to explain *“In grassland ecology it is a well-known paradox that no species benefit from being cut down, but for some species it is better to be cut down and get a beneficial regrowth rather than being overshadowed and having no possibilities at all.”* If you for example look at pastures there are many plants that do not get especially high. Those plants manage to survive since not the entire plant will be cut down and afterwards they have a beneficial period when they can grow and possibly flower, he says. He adds that it is beneficial to cut an area at different times each year to promote a variety of species. If you cut at the same time every year, the same type of species are favoured every year. In practice he thinks it could be appropriate to cut all areas in a certain order and then reverse the order next year.

MEAGRE THE SOIL

Wissman says that if you want to meagre the soil you want to remove as much vegetation as possible. Therefore he thinks it is appropriate to cut two or three times a year; once in the middle of June, possibly in the middle of July and the last time in September. In the situation when you want to meagre the land he highlights the importance of removing vegetation after cutting, *“If you do not remove the clippings is completely meaningless”*. He adds that in manmade surfaces it is possible the soil initially was fertilized, and in clay rich soil the effect can sustain for a long time. *“I would suggest that if you have a nutritious soil and dislike for example *Cirisium species (tistlar)*, *Filipendula ulmaria (älgört)* and *Anthriscus sylvestris (hundkax)*, you should cut it more than once a year and remove the material”* he says. *“If you leave clippings on the ground only the most competitive species that can grow through thick layer of organic material will survive”* he continues.

When talking about the time-perspective for meagre a nutrient rich soil, Wissman makes a comparison to a fertilized agricultural field. *“If you look at a fertilized grassland it takes only tree years without fertilizer until you have reduced the outtake significantly, in some cases you get these results even within one year”* he says. He continues to explain that he thinks the effect when meagering a soil is not a linear function, the effect will decline gradually as the land gets more meagre and less vegetation is taken away each time. *“Generally I do not believe it when people say it is not possible to meagre a soil. I think the issue is that people wants to see effect immediately and want the result to be a meagre meadow. And it is certain that a really heavy clay soil never will become a meagre meadow. It doesn't matter how many years you harvest”* Wissman concludes.

SOCIAL PERCEPTION

Hedblom says that it is commonly known that experience of biodiversity is connected to people's appreciation of landscape. But he continues to explain that research have shown that it might be the impression of species richness like for example many different colours and not be

the actual biodiversity, which contributes to the positive experience. Hedblom also tells that if people experience nature of certain qualities in their everyday life they have a deeper understanding for nature than people who do not come in touch with nature. This is especially true for children. Thus, emphasizing the perception of nature. Hedblom also tells about an example where it has been scientifically proven that additional knowledge influence people's experience. In this research people were taken out on a walk in a species rich forest. The first time they found it unpleasant and unattractive, but when they were told about the positive effects of biodiversity and were taken out on another walk in the same forest, they changed opinion.

THOUGHTS ON GRASS AREAS IN THE FUTURE

Both Hedblom and Wissman agrees that the large amount of conventional lawns in the urban environment really needs to be challenged. But both points out this doesn't mean conventional lawns needs to be completely eradicated; it can still be used in some places of functional and aesthetical reasons. Hedblom explains that if we want the maximal sustainable development, it would be some kind of natural state. But the pure natural state with for example falling dead trees do not have a high aesthetical value, unless we teach people in aesthetics and in some way force them to think it is aesthetical appealing, he concludes.

INTERVIEWS

DESIGN

We have interviewed two landscape architects about their perspective on the practical side of grass areas and what aspects they consider to be important when designing. The interviews took place 8 and 9 April 2015. For questionnaire see Appendix B.

THE ROLE OF THE LANDSCAPE ARCHITECT

"Our role as landscape architects is to start from the human experience." Sofia Eskilsson, who has worked as a landscape architect for thirteen years, explains. Nature is a major part of our experience, she continues. Eskilsson therefore believes it is important to take part of an ecologist's knowledge about nature and its processes. For the landscape architect it is important to ask questions and understand that working with nature is about understanding at a species level. Eventually you understand the principles on the basis of understanding the details, she says.

DIFFERENT TYPES OF GRASS AREAS

CONVENTIONAL LAWN

Sofia Eskilsson explains that conventional lawns are chosen because they look green and are soft to walk on as well as they are robust and durable. These are important characteristics for grass areas, especially

in central parts of a city with high visitor pressure. Another positive side to lawns, Eskilsson adds, is that each time it is cut a fresh new surface is created.

HIGH GRASS

Håkan Qvarnström, landscape architect at *Uppsala Municipality*, tells that in the 1980's, after the *Million Program* era, the acreage of conventional lawn in cities was at its peak. But while the acreage of lawns had increased, the resources to manage them had decreased. He explains that the municipality in Uppsala began to look at alternative ways of managing green areas, and as an outcome, high grass areas started to occur. At this point it was not about introducing new qualities to parks and green areas, it was about saving money, he concludes.

High grass can be used as a quick and efficient way to create a design as it is simple to vary from year to year, Eskilsson explains. By cutting paths and formations in high grass, surfaces that give a sense of spatiality are created.



NAME: Sofia Eskilsson
EDUCATION: Landscape architect
POSITION: Works part-time at the *Swedish University of Agricultural Sciences* and part-time as supporting consultant in plant and storm water issues.



NAME: Håkan Qvarnström
EDUCATION: Landscape architect
POSITION: Works at *Uppsala Municipality's* performance division, *Technology and Service*.

One reason why high grass is rare in the urban environment is because it can look untidy and is less durable than conventional lawns. Eskilsson explains that with heavy rain or if someone trampled into it, high grass will look bad. However, Eskilsson points out that high grass can look tidy if the edges are neat.

MAINTENANCE OF GRASS AREAS

Lawns are frequently occurring in cities, even where they are not practical for human use. Eskilsson believes this originates from lawns being easy to manage and above all, it is general knowledge on how they are managed.

“I think it’s because it’s easy, people know how to manage lawns and you get to drive a lawn mower, which is fun.” she expresses. She emphasizes the importance of creating a design for green space where maintenance is easy to understand and perform. It is a fundamental factor for a design to work. *“If you change a green space into something*

where it is necessary to understand a bit more about species composition, it gets complicated. Being able to explain the management is essential.” she points out.

Eskilsson further explains that if landscape architects like herself want to see a change in how grass areas are managed, it is their role to convey and explain, for example how nature works at the level where maintenance workers understand. She thinks it is not enough with making a management plan, that someone at best will read. Instructions on how a surface should be managed is usually done verbally. *“We need to find a way to tell about nature, make people understand that it is not rocket science”* she says.

In general Eskilsson thinks one should overlook what parts of a green area should be managed more frequently. *“You can have a more detailed maintenance on some spots, like jewellery on strategic points. Think about what is seen from certain places and be more selective. It doesn’t need to be equally managed everywhere”* she comments.



*Uppsala, Sweden, 2015.
Grass areas exposed to high visitor
pressure need to be durable.*

MIMIC NATURE TO LESSEN MAINTENANCE

A proactive way to lessen maintenance is to mimic nature. Qvarnström tells that nature-like plantings emerged in the 1980's in an economic crisis as an alternative to lessen maintenance, just like the increase of high grass areas.

Eskilsson likes the idea of nature-like plantings; *"I have always been interested in weeds, or species we regard as weeds in urban areas, because it is usually this which is nature."* She explains that mimic nature is linked to a maintenance which is effective and long-term economic in an ecological and biological perspective.

ALTERNATIVE MAINTENANCE

Qvarnström tells that he initiated to have sheep graze the slopes of the castle in Uppsala, since the slopes previously have had a long history of grazing animals to keep off brushwood. The grazing sheep became a popular and public event, he says. Unfortunately, the sheep were only allowed to graze one season due to high costs and a reluctant governor.

He mentions a similar project that also has been a popular public event; the high grass in the *Carolina Park* in Uppsala which is cut by horse and cutting bar. Because of the positive response, he explains that the municipality would like to cut more surfaces with horses. But the problem is they are hold back by high costs and that there are few areas with high grass in the central parts of the city.

ESTABLISHMENT

Eskilsson tells about a project, *Paddeborgsparken*, in Enköping she was involved in where they worked with formations of high grass. She explains that since a seed mixture with meadow species is more expensive than a standard park seed mixture, the use of meadow mixtures were for financial reasons focused around areas where people circulated most frequently. On large areas away from where people circulated, ordinary park seed mixtures were used. Meadow seeds were planted directly in the subsoil, because it is poor in nutrients, which is important for creating a meadow, says Eskilsson. The seed mixture

with meadow seeds are collected by hand from the company *Pratensis*, which is the only company which collect native seeds in Sweden, she explains.

There are different ways to establish high grass species in conventional lawn. In the *Carolina Park*, Qvarnström says that they for some parts of the park used a method with distribution centres, where spots of turf were removed. New growing substrate and species are then added in the spots. It is necessary to remove turf in order to get rid of competitive species, he explains. He think the results was positive since a large amount of herbs were established, such as *Primula veris* (gullviva) and *Melampyrum pratense* (kovall).

SOCIAL PERCEPTION

"In general, green areas in the city are continuously getting reduced and the visitor pressure increases. This is hard to combine with high grass areas" says Håkan Qvarnström. He mentions an example of this, where high grass areas in the *Carolina Park* in Uppsala haven't been fully utilized because people are afraid of ticks. To increase the visitor rate, the municipality turned 20% of the high grass area into conventional lawn. *"It became a remarkable difference in how people started to use the grass areas."* he tells. But he explains that when they cut the high grass, they tried to save the naturalistic character by only cutting certain areas so the high grass were still holding together the character of the park. Qvarnström believes that transforming high grass to lawn is highly accepted by the public, however, the opposite transformation when lawn is turned in to high grass areas is usually less accepted.

One reason why high grass is rare in urban environments is because it can look untidy, Eskilsson says. She thinks that if a high grass area is perceived as untidy or not largely depends on the edges and framing. *"I don't think people perceive high grass as negative. It's not per definition something that is managed less is ugly, it's the edges and framing that effects the appearance"* she expresses.

She further explains that if you have some areas that are more manicured it is usually accepted to have some areas that are less managed. An interesting question to ask is - *"How little can be done? What*



*The Carolina Park, Sweden, 2015.
The method of establishing herbs with
distribution centres has been successful in
the park.*

level of maintenance is accepted as long as you keep some areas well kept?” Eskilsson expresses. It takes time to change people perception of what is okay or not, she concludes.

THOUGHTS ON GRASS AREAS IN THE FUTURE

Until a few years ago, assigning high grass to green areas, was a matter of economics, Eskilsson explains. Then suddenly there was a shift, people started to talk about ecosystem services as if it were something new and cool, she continues. Sofia Eskilsson believes that ecological values will come into increasing focus. She also believes that people will start questioning grass areas. *“How low amount of grass can grass areas contain? Could they contain moss? What is green in the winter? Must all surfaces be durable for use?”* she says. Eskilsson continues to explain there are some surfaces people don’t walk on and use. On these you could use herbs that cannot withstand as much wear and tear but can tolerate a little. Qvarnström on the other hand is less certain there will be changes regarding grass areas, from his horizon he sees no changes approaching.

INTERVIEWS

MAINTENANCE

We have interviewed people from the Park and Nature Management (Park och naturförvaltningen) at Gothenburg Municipality (Göteborgs Stad) and contractors who have grass management procurements with the municipality. The aim was to discuss issues and opportunities related to the maintenance of grass areas, the collaboration between the municipality and contractor, and their responsibility to the public. The interviews took place 16-18 January 2015. For questionnaires see Appendix C and Appendix D.

Figure 12: Correlation between interviewed people at Gothenburg Municipality and contractors.

JENS LARSEN
Park manager
Lundby/Biskopsgården

PATRIK SVENSSON
Park manager
Angered &
East Gothenburg

JOHAN BLOMQVIST
Project leader

Gothenburg Municipality

NIKLAS ALFREDSSON
Production manager
Svensk Markservice

ROBERT GUSTAFSSON
Maintenance worker
HTE-Garden

contractors

SUBCONTRACTOR
For lawn maintenance



NAME: Jens Larsen
EDUCATION: Landscape engineer
POSITION: Park manager, Lundby/Biskopsgården



NAME: Patrik Svensson
EDUCATION: Landscape engineer
POSITION: Park manager, Angered and Eastern Gothenburg



NAME: Johan Blomqvist
EDUCATION: Horticulturist
POSITION: Project manager, has previously worked as park manager



NAME: Niklas Alfredsson
EDUCATION: Worked his way up from field worker to production manager
POSITION: Production manager, Svensk Markservice



NAME: Robert Gustafsson
POSITION: Field worker, HTE-garden
TIME AT POSITION: Since 2007

COLLABORATION

The *Park and Nature Management* (Park och naturförvaltningen) has divided Gothenburg into seven organisational districts, each administered by a park manager. The park managers are responsible for management and development of all public land such as parks and squares, as well as green areas in the traffic environment. They handle procurements for maintenance, communication with entrepreneurs and response to public complaints and questions (figure 12).

All maintenance of grass areas in Gothenburg, as well as all other green space maintenance in the outer parts of the city, is performed by contractors. The park managers at the municipality explain that it is too expensive and complicated for the municipality to take care of grass areas. It requires the latest machinery in order to meet environmental requirements, as well as seasonal staff. The contractors carry out the work at a lower cost even though they often hire subcontractors for grass maintenance.

The park managers have frequent meetings with contractors to discuss changes in classifications of grass, complaints from citizens and improvements needed in each area. The *Technical Manual* (Teknisk Handbok) and *Park Management Description* (Parkvårdsbeskrivning) govern procurements for maintenance and execution of construction projects in the city. These documents are used as a base for their inspections to ensure the contractor is fulfilling their obligations. Grass areas are inspected at least two times per season. If the contractor does not pass the inspection they get three days to correct it and if they don't, they risk to get fined.

Jens Larsen, park manager for Lundby/Biskopsgården, explains that money is the main motivation for the contractors. *“The only thing that works in this business is money. That’s how it is. The contractors may say they want to do a good job and they think this is really important and they’ve honed their scissors and knives, but it’s all about money”* says Larsen.

DIFFERENT TYPES OF GRASS AREAS

CLASSIFICATIONS OF GRASS AREAS

The procured grass areas are divided into different classifications of grass areas (figure 13), which have different functional requirements and intensity of maintenance.

In the most recent version of the *Park Management Description* (2015), which gives instructions on maintenance of green areas, the classifications of grass were revised; the former Meadow types were renamed to High grass even though the maintenance requirements stayed the same. Larsen explains that if you call a grass area for meadow people expect there to be lots of flowers.

The park manager’s express they would like to see fewer classes to minimize the risk of confusion with contractors. Also the contractors see benefits with fewer classes and Niklas Alfredsson, production manager at *Svensk Markservice*, agrees that the numerous classifications lead to unnecessary discussions.

“We think there are too many classes and there is always a discussion about some types. Meadow type A, Meadow type B, High Grass type A, B and C... they are so many. There needs to be a more simple way” he says.

But it seems like the many classifications will be around for a while. *“The numerous classifications still exist because we do not agree”* says Johan Blomqvist, Project manager at *Gothenburg Municipality*. Blomqvist continues to explain that in recent years, the department have looked over existing classes to see what changes can be made. For example, last year, they had a workshop with contractors about ‘Lawn type D’, which has been very difficult to manage, he explains. The class is something in between the other lawn types and high grasses. The rather high grass (>20 cm) makes it difficult to cut with a lawn mower and it doesn’t have the function of a lawn. ‘Lawn type D’ has therefore often been reclassified to ‘Lawn type C’ or a type of ‘High grass’.

Reclassification of an area is a tool to use when the department wants to save money or relocate money to increase the maintenance in another area. The class chosen for a certain area can therefore

INTERVIEWS

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Figure 13: Gothenburg's grass classifications.

Gothenburg municipality's grass classifications are divided into types of lawns and high grass.

Source:

J Blomqvist 2015, pers. comm., 17 March
Park and Management Description 2015

depend on the budget for the district it is located within, but which type is chosen depends mainly on the area's conditions and function. For example, a high grass area close to a playground may be classified as 'High grass type A', which is the type of high grass with the most intense management. This to make the high grass perceived as more safe, Larsen explains.

HIGH GRASS

Larsen has recently increased the amount of surfaces with high grass in his district significantly and he points out the importance of adjusting the type of grass to the desired function. In many places he also adapted the type according to complaints from the public. For example if people point out a certain area used for football and there is no other area suitable for this in the neighbourhood, he will change the whole or parts of the area, back to conventional lawn. But in some places where it is another football field just a short distance away, he argue for the positive values until people get used to it and accept the high grass. In

some areas where he has changed lawn to high grass, he has kept a cut edge around the area. The cut edge makes the area appear to be taken care of and still enables people to use it. Usually the cut edge is in the width of one (1,8m) or two mowers (3,6m).

MAINTENANCE OF GRASS AREAS

Other than mowing there is little other maintenance performed on grass areas. Occasionally if the surface is in poor condition it gets complementary seeding. Neither fertilization nor irrigation is used other than for very exclusive areas, like in the *Garden society of Gothenburg* (Göteborgs Trädgårdsförening), explains Alfredsson. He further explains they don't fertilize because it would mean they would have to cut the grass more often. Larsen confirms that this is the case, "We don't fertilize, the soil is sufficient enough".

CONVENTIONAL LAWN

Most lawns are cut every week during the summer season, which makes

GOTHENBURG'S GRASS CLASSIFICATIONS	LAWN TYPES				HIGH GRASS TYPES					
	A	B	C	D	with uptake of clippings			without uptake		
	A	B	C	D	A	B	C	A	B	C
HEIGHT	2- 4 cm	3-6 cm	4-8cm	<20 cm						
COST PER YEAR *			3,20 kr/m ²	2,60 kr/m ²	6,00 kr/m ²	4,00 kr/m ²	2,00 kr/m ²	1,70 kr/m ²	1,20 kr/m ²	
CUT FREQUENCY per season					3	2	1	3	2	1
DISTRIBUTION	0,5 %	0,05 %	36,7 %	27,4 %	0,6 %	2,1 %	0,7 %	2,0 %	28,3 %	1,6 %

*approximate cost

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it the most frequently managed green space. Alfredsson explains that a higher frequency in mowing keeps the grass short and makes it easier and faster to cut. It also gives less problem with weeds and reduces the risk of complaints. He says that when his company estimates the cost for lawn maintenance, they use numbers for a normal grass mower with 1,8 meter in width, which cuts 30 000 m² of open lawns per day.

Both the park managers and the contractors comment that cutting grass is not as simple as one might think. *“The fact is that one would need more knowledge. To cut grass and take care of it is not as easy as people think. It’s just grass some say, but it is not just that”* expresses Alfredsson. The workers who cut grass are usually seasonally employed and it is hard to keep the competence and hold continuity in the workforce.

The difficulty of cutting grass and citizens’ concern for lawns can statistically be shown in the complaints for green areas, where grass areas top the list of most complaints, Blomqvist says. The most common complaint is that it doesn’t look neat enough. Often this is due to that trimming, which should be done in connection with mowing, has not been performed, which makes the area look unkempt and unfinished, Blomqvist explains.



*Angered, Gothenburg, 2015.
Grass areas with trees are difficult and
time consuming to cut.*

INTERVIEWS

MAINTENANCE

HIGH GRASS & MEADOWS

"If people don't use the lawns, why do we cut them again and again and again?"

- Johan Blomqvist

Gothenburg Municipality have three main types of high grass and each type can be performed with uptake or not, leading to six different alternatives to choose from (see figure 7). In very public spaces the High grass types with uptake are often selected to make it look neater. Alfredsson mostly have missions for 'High grass type B', which is cut twice per season with no uptake and he thinks that this is a very sufficient classification. He explains that you cut High grass type B for the first time around Midsummer, and when it gets cut the second time in September the grass has barely grown.

Since high grass is cut less frequent than lawns, the grass gets

stronger and is harder to cut, which means it requires more powerful machines. Alfredsson says that except for using tractors or special mowers when cutting high grass it is also possible to put special devices on regular lawn mowers, which enables them to cut high grass. If you do not use these supplement devices you need special mowers, which are expensive. Alfredsson explains that they currently get too few assignments on high grass maintenance for it to be finance in purchase of this equipment.

Another difficult step in maintenance of high grass, which requires special equipment and is more expensive and time consuming than cutting, is the uptake of clippings. John Blomqvist explains that the amount of clipping needed to be collected sets the cost for the uptake. If you cut high grass several times during the season you get less to transport at each occasion.

Unfortunately, the clipping is usually not interesting for farmers and contractors therefore usually leave it to the dump. One way of taking advantage of the biomass produced is to transform it into biogas



High grass in residential area.
Photo: Inger Runsson, 2010.

in a digestion plant. Blomqvist has investigated to initiate a collaboration with a municipal environmental company in waste management and recycling, *Renova*, that have the preconditions of performing this. But when we contacted them to ask if they could take care of the grass in order to produce energy they asked us how much we are paying, continues Blomqvist. In cases like this the decision must come from higher up in the hierarchy. If there is a political decision, *Renova* will get it implemented in their organization and we will get it implemented in ours. Only then we can collaborate, Blomqvist concludes.

ALTERNATIVE MAINTENANCE

At *Silverkällan* in Majorna, a neighbourhood in central Gothenburg, there was a large grass field next to a disused playground, describes Johan Blomqvist. The grass field was going to be transformed into allotments and pigs were chosen as a way to prepare the soil. “People were very excited about the pigs, so the result was amazing” he says. He continues to explain that their goal is to get the people of Gothenburg out of their homes to actually use the green areas and the pigs in Majorna is a very good example of this. Kindergarten classes were visiting and people came from all over town to just look at them.

Blomqvist describes that green wedges are needed in the city, but emphasises that not all of them have to be functional areas such as conventional lawns, with room for activities. In some places, it may instead be a suitable alternative to have grazing animals such as sheep, cows and horses. Patrik Svensson, park manager Angered and East Gothenburg, mention a few other examples with animals in the urban environment in Gothenburg like the grazing field with Highland Cattle in Välen and the mini farm in *Galaxenparken* in Bergsjön. In several places in the city you can also find bee colonies. The hives are owned by private individuals that have signed a maintenance agreement with the municipality.

Larsen tells about a citizens’ initiative in one of his areas where a woman wants to keep sheep on a grass field next to a residential area with single-family houses. He has made sure that it is permitted as long as the whole villa association has agreed to it and the only thing he

is waiting for at the moment is her initiative to go through with the idea. In this case the initiator would contribute with sheep and the municipality would provide the land. Larsen explains that in citizens’ initiatives like this, the municipality can take no responsibility for the animals. Instead they write a management agreement with people who commit to take care of the animals and make sure that no harm is made to either animals or people. The municipality could possibly contribute with fences and land but no other means, he continues. Larsen argues that in such collaborations it is a win-win situation for both parties, the municipality gets sheep that manage grass areas and brings joy to children and visitors meanwhile the initiator gets grazing fields for their animals. He further explains that one problem that has previously occurred is that the animals finishes all the bait in the field

*Grazing cows.
To have grazing animals in the urban environment is on the agenda for the Park and Nature Mangement in Gothenburg.*



and are in need for expansion of surface area, which is important to take into consideration when starting off a new project.

SOCIAL PERCEPTION

In 2009-2010, one episode occurs that has had a major impact on the perception and implementation of high grass areas in Gothenburg. Blomqvist describes that *Gothenburg Municipality* had financial problems and that all departments was asked what they could do to contribute. The *Park and Nature Management Department* already thought they had been short of finance for several years before this and therefore decided to reclassify a large number of areas from lawn to high grass or simply not cut at all, in order to get a reaction. And the reaction didn't wait. People thought it looked terrible and complained to the municipality. When the public complained the politicians reacted, leading to that *Park and Nature Management Department* received a larger budget for management. The areas with the most complaints, like areas where children played football, were soon reverted back into conventional lawns. But in some areas the reclassification is still holding today. *"At first, the reclassification was a purely economic action but eventually the positive effects started to become clear"* continues Blomqvist. *"We will, for example, reduce the environmental impact if we don't cut the surfaces as often and in some places the result was more beautiful than the previous 'lawn desert'"* he says.

During the interviews it becomes clear that the park manager still experience that high grass is not fully accepted by the public. Larsen expresses his experience of people's perception *"For an area to look managed, according to 99 percent of people, it should be cut. We try to deviate from it by having high grass occasionally"*

The largest high grass areas are usually situated in the outskirts of the city. Blomqvist thinks this has more to do with political acceptance and demand for well-maintained lawns in the centre of the city than being based on a general opinion from the public. *"I think that no matter where you live you want the same standard, even if for example, high grass is better suited in certain places than others"* he says. Svensson agrees on this, but think that there could be more high grass in the

city. *"It doesn't have to look unkempt just because it is high grass"* he says.

THOUGHTS ON GRASS AREAS IN THE FUTURE

If grazing animals are to be a more common sight in Gothenburg in the near future, Patrik Svensson believes that the initiative have to come from above. But like in the sheep project next to the villa area, Larsen also points out that there can be a major advantage if the initiative comes from below, since the public then is more likely involved and convinced about the advantages of the project from the start.

Another issue that also needs to be reviewed in a larger perspective is how high grass or meadows can be established on a larger scale and generate a qualitative result. On the question if all existing high grass areas are former lawns or if there are any examples where the municipality have established high grass areas already from the start, Blomqvist reacts straight away. *"How do we establish rational high grass areas or meadows?"* He continues to explain that he hasn't found any information on how to do it, what groundwork is needed, how to implement it in a rational way and so on.

INTERVIEWS

REFLECTIONS

Concluding reflections of the interviews with important aspects to keep in mind when redesigning. The reflections discuss also differences and similarities between professionals in the different fields.

CONVENTIONAL LAWNS SHOULD HAVE A FUNCTIONAL PURPOSE

All interviewees agree that the conventional lawn should be used for its functional benefits. Like Eskilsson describes; a lawn looks green, is soft to walk on as well as robust and durable. In the interviews with the ecological experts it becomes clear that the reason for questioning lawns occurrence for ecological reasons is strong. For the municipality a conventional lawn is expensive to maintain which means that reducing the amount of conventional lawn also is beneficial in the economical aspect.

Our conclusion is that the most important thing is to have a strong critical view on where a lawn should be used, but not to exclude it completely in the urban environment. Nevertheless, used in the right place, a lawn has many advantages.

DIFFERENCES IN THEORY AND PRACTICE

Regarding the maintenance of high grass and meadows there is a significant gap between ecological theory and the current maintenance practice within *Gothenburg Municipality*. This applies to both the time period appropriate for cutting and the performance of uptake. The ecology experts highlights the importance of cutting the grass area after flowering (mid to end of July) and means that it is enough to cut once a year. The ecologists also emphasize uptake as a crucial factor in order to promote a species composition with both higher ecological and aesthetical value. The only reason for cutting two or three times a year according to the experts on ecology is if the intention is to meagre the soil, and then uptake is especially important. In *Gothenburg Municipality* there are six different classifications of maintenance of high grass; cutting one, two or three times per year and each of these can be performed with or without uptake. The classification with three cuttings including uptake would in an ecological perspective be appropriate in order to meagre the soil but is seldom used by the municipality for that reason. To follow ecological recommendations the classifications with one or two cuttings a year, the time period for cutting could be postponed to mid - end of July. Uptake is not a prioritized matter at the municipality and when discussing this subject with the contractors

it becomes clear that uptake is one of the first aspect prioritized away when short on time or money.

In the municipality the reason for cutting earlier than after flowering is probably most out of old habit, but there are also reasons of cutting more often like increasing the feeling of safety that a more maintained area might mediate. We think that if knowledge about benefits of cutting grass in an appropriate time period and performed uptake would be improved among park managers and contractors, the maintenance regime could be adjusted quite easily, which would make an significant difference for the appearance of high grass areas and meadows.

FINDING NEW WAYS

In the future perspective old ways are questioned and new ideas are emerging. Common for the different professional fields is a belief in a tendency towards finding alternatives to how things are done today. Eskilsson see that the ecological perspective is coming into a greater focus and makes designers look at grass areas in new angles. Maybe conventional lawns can contain other species than grasses? And maybe should grazing become a common feature and maintenance regime in the urban environment? The park managers raise similar questions and are looking for answers on how to establish meadows with rational methods. The ecologists emphasize that new, more ecological alternatives need to be combined with other aspects such as functional and aesthetic. To integrate these aspects are also important in order for the alternatives to be accepted by the public.

We share their questions and concerns, and will in our redesign apply less common solutions and find answers. The chosen alternatives should be looked at in several perspectives, not mere an ecological, in order to properly value and implement them.



PART FIVE REDESIGN

This part answers to the second objective – how to redesign conventional lawns in a residential area. We will use knowledge and information from literature studies and interviews by applying selected ecological principles and experiential values to a case study. The result is a redesign proposal in a neighborhood scale with selected design interventions presented in detail.

REDESIGN APPROACH

Selected ecological principles and experiential values from 'theory & concepts' serve as a base for what aspects to inventory and analyse for the redesign (figure 14). The aspects; 'context of the site', 'inventory of the site' and 'function' are standard aspects to consider when designing but can also be connected to some of the principles. Since all experiential values are to be inventoried and analysed in the same manner they are only presented as 'experiential values'.

FIRST OBJECTIVE

To find relevant ecological principles and experiential values, alternatives to conventional lawns as well as appropriate maintenance regimes, which can be applied when redesigning conventional lawns in Swedish residential areas.

SECOND OBJECTIVE

Show how these principles, values and alternative surfaces can be applied when redesigning conventional lawns in a Swedish residential area.

ECOLOGICAL PRINCIPLES

- Part of the whole system
- Primarily native plant species
- *Use of regenerative materials
- Right plant, right place
- Consider patch shape & edges
- Counting on disturbance
- *Planning for succession
- Increase knowledge & interest
- Increasing biodiversity
- Promoting pollinators
- *'Cues to care'

EXPERIENTIAL VALUES

*Principles to apply in the redesign proposal, which do not need to be inventoried or analysed.

INVENTORY & ANALYSIS

- Context of the site
- Inventory of the site
- Function
- Green connections
- Climatic conditions
- Vegetation and habitats
- General soil conditions
- Microclimatic conditions
- Experiential values

STRATEGIES

REDESIGN PROPOSAL

Figure 14: Structure of the redesign
The principles and values answer to the first objective and act as base for chosen aspects to inventory and analyse.

REDESIGN

CONTEXT OF THE SITE

As a part of the inventory, we start by looking at the context of the site with focus on landscape characteristics and green connections. We begin with a brief introduction to the city of Gothenburg and the district of Lundby, where the site for redesign is located.

*Keillers Park, Gothenburg, 2015.
Outlook over the city of Gothenburg from one of the parks in the Lundby district.*



GOTHENBURG

The landscape in Gothenburg consists of mountains, coast, valleys and forests, and the city has emerged where the *Göta River* (Göta älv) meets the sea (Göteborgs Stad, 2007). Gothenburg is hilly and settlements are mainly located in low-lying and flat parts. Because of this, green areas in Gothenburg for most part consist of rocky hills surrounded by buildings (Göteborgs Stad, 2009a). Gothenburg has a number of unique species and habitats that are important to preserve. This greatly depends on the variety of the landscape, which the city is built upon (Göteborgs Stad, 2014a).

In Gothenburg's *Park Program* (Parkprogram, 2007) ten landscape characters have been identified in order to strengthen the experience of the city. The characters are; archipelago, rocky forest, rock crown, valley, fractured woodland, industry, mountain slope, forest landscape, undulating farmlands with woodlots and coastline.

In the city's *Comprehensive plan* (Överiktsplan för Göteborg, 2014) these characters are seen as opportunities to create interesting,

unique and varied places that can contribute to rich life both from a social and ecological perspective.

The ecological and social perspectives are also echoed in the *Green Strategy* (Grönstrategi, 2014) where they form two goals on how Gothenburg should develop the next 20 years. One of the goals for Gothenburg is to be *"a dense and green city where public places contribute to a rich and healthy urban living as well as with a rich flora and fauna and where ecosystem services are utilized."* (Göteborgs Stad, 2014a, p. 6). To achieve the goals, nine strategies have been developed to be used in different stages of planning. (Göteborgs Stad, 2014a)

Gothenburg Municipality see complexity and variation of environments in Gothenburg as opportunities to create an attractive city. One of the *Comprehensive Plan's* (2014) strategies, an attractive urban environment, complexity is seen as an essential aspect in order to create attractive environments.

"An attractive city is characterized by complexity with mix of features, a visual diversity and opportunities for interaction between people."

- Gothenburg's *Comprehensive plan*, 2014, p. 35.

REDESIGN

CONTEXT OF THE SITE



MAP: GOTHENBURG'S LOCATION

Where Gothenburg is situated in Sweden.



MAP: LUNDBY'S LOCATION

Where Lundby is situated within Gothenburg Municipality.

LUNDBY

The site for redesign is located in the city district, Lundby, which is located on Hisingen Island within bike distance to central parts of Gothenburg. The district is characterized by its location along the river and has been part of Gothenburg's shipping yard. Lundby is the fastest growing district in Gothenburg, which is mainly because old industries in the harbour have over the last decade been converted into residential areas. (Göteborgs Stad, 2014b)

Lundby is described by *Gothenburg Municipality* as a good example of the mixed city, with a balanced mix between housing and businesses, access to university, developed infrastructure and has the qualities sought in a city. (Stadsbyggnadskontoret Göteborg, 2008)

SETTLEMENT

With its proximity to the river, the area has had a long tradition of fishing and shipbuilding that have provided strong characteristics and important job opportunities. Lately, these businesses have closed down or been relocated to ports further out in the harbour in favour of residential areas (Stadsbyggnadskontoret Göteborg, 2008). Lundby has a diversity of urban characters with villas, modern high-rise buildings, industrial buildings and 'landshövdingehus' (a building type unique to Gothenburg with one ground storey built of brick and two upper storeys of wood), but the majority consist of apartment buildings. A major part of the housings are built after 1990 (Göteborgs Stad, 2014b).

Through its location in Hisingen, close to three connections across the river, Lundby is easy to reach but also suffer from major traffic transits. Three of Hisingen's busiest roads extends through Lundby, all in the west-east direction. This is noticeable on the green structure, which in the present situation have no clear directions in the north-south direction. (Stadsbyggnadskontoret Göteborg, 2008)

REDESIGN

CONTEXT OF THE SITE



MAP: LUNDBY DISTRICT

A satellite photo of Lundby district and where the site for redesign is located.

Background map, source: © Lantmäteriet, i2015/764

⌚ I: 40 000 (A3)
I: 60 000 (A4)

GREEN AREAS

The landscape in Lundby is typical for Gothenburg with buildings dominating low-lying and flat portions while green areas for most part consist of rocky hills surrounded by buildings (Stadsbyggnadskontoret Göteborg, 2008). Out of the identified landscape characters in Gothenburg large parts of the district have the character of rocky hills whereas the eastern part and the river bank have the character of river valley (Göteborgs Stad, 2009a).

The *Park Program* for the district talks about investing in the larger districts parks. Especially *Hisingsparken*, *Flunsåsparken* and *Keillers Park* are seen as parks to focus on.

Figure 15: Statistics for Lundby.

Source: Samhällsanalys och Statistik, Göteborgs stadsledningskontor, 2014

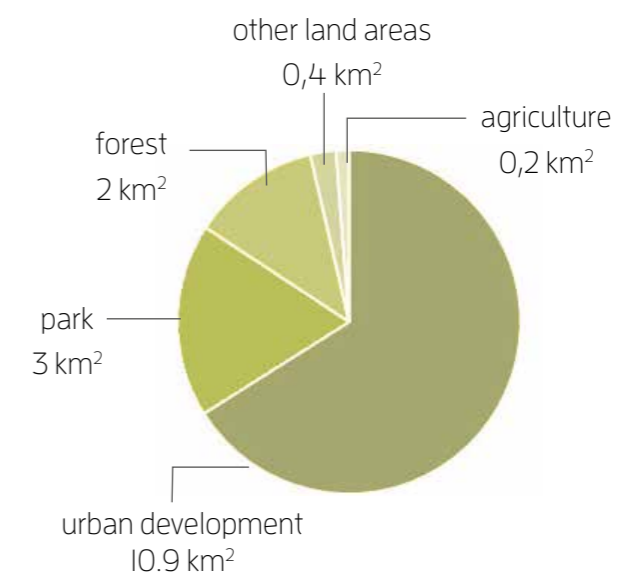
LUNDBY

POPULATION: 46 058 (year 2013)

DENSITY: 2 791 people/km² (Gothenburg: 1 186 people/km²)

GREEN SPACE PER PERSON: 65 kvm/citizen

LAND USE: 16,5 km² in total



REDESIGN

INVENTORY & ANALYSIS

In this section we present our inventories and analysis of the site. We based inventory and analysis on site visits (16 February and 17 March), maps, literature and discussion with researchers from the LAWN-project who have performed inventories in the area.



MAP: OVERALL INVENTORY

A satellite photo of the site and what it contains.

Background map, source: © Lantmäteriet, i2015/764

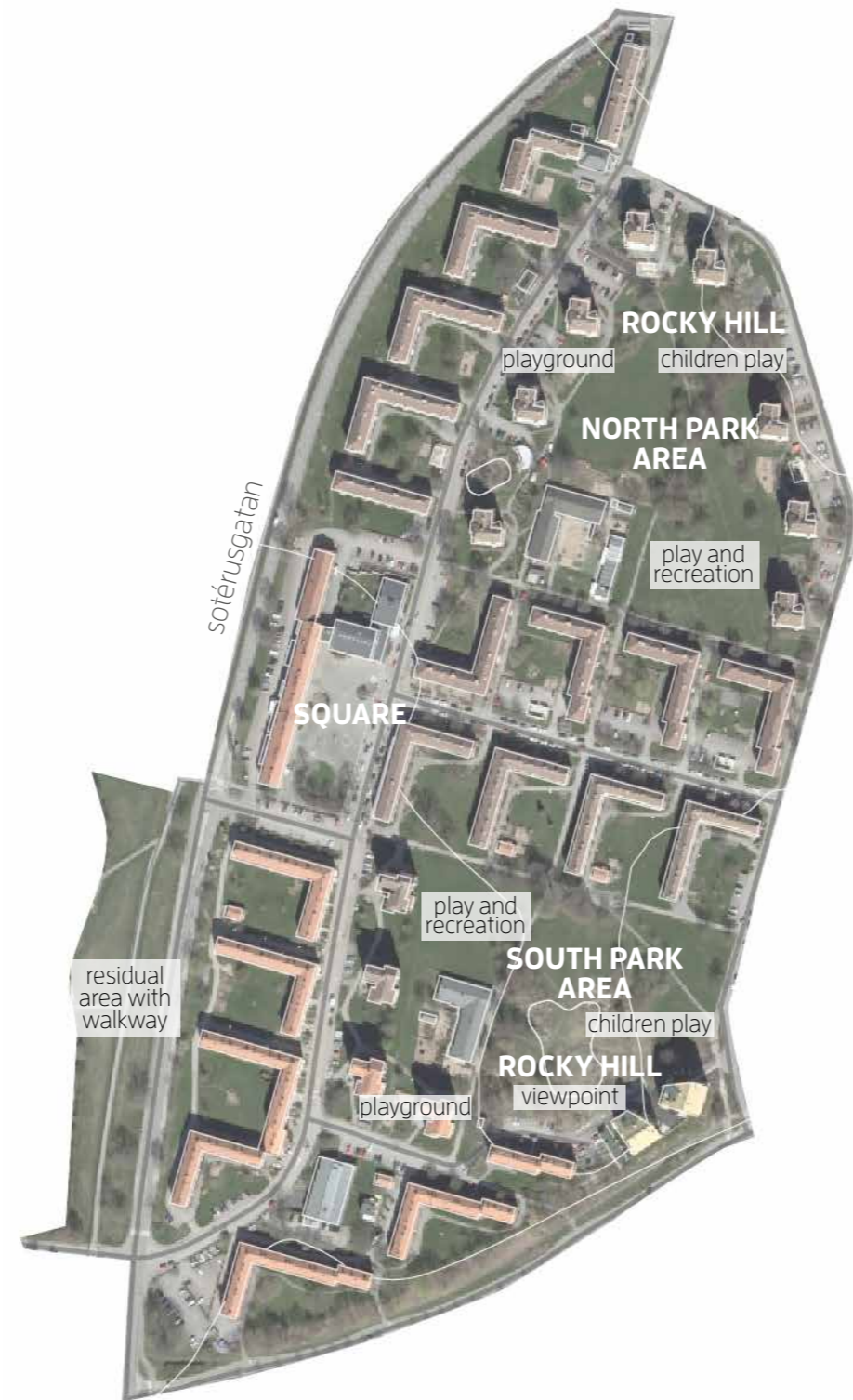
OVERALL INVENTORY OF THE SITE

The intense housing construction going on in Lundby at large is not presented in our site, an area located in the south-western part of Lundby. The site is essentially a residential area with multi-family housings from the 1950's (Stadsbyggnadskontoret Göteborg, 2008). In the 50's, new constructions were positioned to adapt to old pastures in the area. The result is a sparsely populated area with open, park-like spaces between buildings (Poseidon Bostads AB, 2015). The area has plenty of green spaces, with two larger park areas, the North and South Park area. The residential courtyards are large and open, and mainly consist of conventional lawns. There are two smaller playgrounds with play equipment such as swings. The square offers a smaller range of local services such as supermarket, pharmacy and restaurants. In the western part, the site is bordered by Sotérusgatan, which creates a barrier to other areas. The site has two kindergartens with smaller playgrounds nearby.

Two football fields are located outside the site, west of Sotérusgatan. The site is surrounded by residential and industrial areas as well as two cemeteries and a smaller area with allotments.

REDESIGN

INVENTORY & ANALYSIS



FUNCTION

INVENTORY

The green spaces of the two park areas mainly consist of vast conventional lawns and a rocky hill with no allocated functions other than recreation and spontaneous play. The rocky hill in the 'South Park' area also functions as viewpoint over the area as well as surrounding areas. The two smaller playgrounds have clear function of children play. The residential courtyards mainly consist of conventional lawn, plantings and some benches and play equipment, which function for recreational activities such as resting. The larger residual area in the south-western part is desolate and offers no function other than a walkway where people are passing by.

ANALYSIS

The park areas have vast lawns which are too large in proportion to how much they are utilized. The 'South Park' areas' function as viewpoint could be enhanced by for example putting benches at the top of the hill. More functions could be added to the residential courtyards and the large residual area, especially more ecological functions.

MAP: INVENTORY OF FUNCTION

A satellite photo of the site and what functions it contains.

Background map, source: © Lantmäteriet, i2015/764

0 50 100 200 m
I: 4000 (A3)
I: 6000 (A4)



REDESIGN

INVENTORY & ANALYSIS

*Park areas with vast lawns.
The two park areas mainly consist of
large surfaces of conventional lawn and
have few allocated functions.*



*Residential courtyards.
In general, the courtyards consist of
few elements and could be given more
functions.*



*Residual surfaces.
The area has plenty residual surfaces
which offer no function and give no
reason for people to stay in a place.*



GREEN CONNECTIONS

This part of Gothenburg, in which our site is situated, consists of residential and industrial areas where park areas act as incoherent islands interspersed in the settlement. The North and South park areas in the neighbourhood are classified as important parts of the green structure in Lundby but have no clear green connections to surrounding areas. (Göteborgs Stad, 2009)

The green areas within the site are broken off by roads and buildings, but are overall well connected since the houses originally were adapted to the landscape.

ANALYSIS

Since the site has no significant connections to the landscape outside the city or other large green areas we will focus on strengthening ecological values within the site. The park areas have recreational value for people living outside the neighbourhood, since there is no other park area in the close surrounding of the site, which should be taken into account in the proposal.

DISTURBANCES

There are no known major disturbances like frequent flooding in this area. Human wear always have to be counted for in urban environment and during our inventory we found examples of where people cut corners and takes shortcuts on for example grass areas. Due to the site's location outside the city centre and the large amount of green areas within the site, there are although no areas with significant disturbance of high visitor pressure. Areas on top of the large rocky hill in the south park area can be exposed to wind.

ANALYSIS

There are no major disturbances to consider. Surfaces exposed to human wear should be studied in site-specific scale. The design and choice of materials should then be adjusted to human wear as well as desired function. Exposure to wind on the south rocky hill is not considered to be of significant impact.

CLIMATIC CONDITION

The site is located within hardiness zone 2 (Svensk Trädgård, 2015). Gothenburg is one of the areas in Sweden with most precipitation (SMHI, 2015). This means even if the soil condition is nutrient poor and relatively dry, the outcome growing condition might be slightly more nutritious than the same soil condition in other parts of Sweden, with less abundant rainfall (J Wissman 2015, pers. comm., 28 May). In the Gothenburg area, vegetation on this type of soil therefore has a higher productivity (J Wissman 2015, pers. comm., 28 May).

ANALYSIS

The climatic condition like for example hardiness zone, should serve as a starting point when selecting plant material. But the final choice should always be based on microclimatic and soil conditions, which we will study further in the inventory and analysis on the coming pages. Due to the high precipitation in the region the species composition of for example dry meadows might need to be adapted to a more moist soil than would be the case in other parts of the country.

REDESIGN

INVENTORY & ANALYSIS

Here we present an inventory of 'vegetation & habitats', which is relevant for the ecological principles 'Right plant, right place', 'Increase knowledge & interest', 'Increasing biodiversity' and 'Promoting pollinators'.

VEGETATION



MAP: VEGETATION & HABITATS

A map showing what type of vegetation occur in the area.



1: 4000 (A3)
1: 6000 (A4)



VEGETATION & HABITATS

INVENTORY

Two large rocky hills and areas of conventional lawns with scattered groups of trees characterize the area. The residential yards mainly consist of open lawns with smaller plantations, trees and hard surfaces in some places. Many large mature trees are found in both park areas and residential courtyards. The most common tree species are; *Acer platanoides* (lönn), *Tilia cordata* (lind) and *Prunus avium* (körsbär). Common plant species in plantations are; different species of *Rhododendron* (rhododendron) and *Cornus* (kornell).

The two large rocky hills are of a more nature-like character and hold a higher diversity of plant species than the surrounding lawns with scattered trees. Tree species found in these areas are for example *Sambucus nigra* (fläder) and *Prunus padus* (hägg).

ANALYSIS

Large parts of the neighbourhood are relatively homogenous with vast areas of conventional lawns and a few different tree species. The homogenous areas of conventional lawns hold a low plant biodiversity and provide poor habitats for animals and other organisms. Therefore ecological qualities could be improved by increasing the diversity of species and habitat. Also the conditions for pollinators are in general relatively poor, which needs to be taken into consideration in the design. Mature trees are of great advantage for both ecological and experiential reasons and these should be preserved in as many places as possible.

The two large rocky hills with diverse nature-like vegetation provide a range of varied habitats, which is beneficial in terms of supporting a diversity of species (J Wissman 2015, pers. comm., 19 March). It is therefore beneficial to preserve and enhance the existing qualities in these areas. More detailed inventory and analysis of vegetation and habitats will be shown in the inventory for the site specific proposals.



REDESIGN

INVENTORY & ANALYSIS

Here we present an inventory of 'general soil conditions', which is relevant for the ecological principles 'Right plant, right place', 'Consider patch shape & edges', 'Increasing biodiversity' and 'Promoting pollinators'.



SOIL CONDITIONS

-  normal
-  dry & nutrient

MAP: SOIL CONDITIONS

A map showing the general soil conditions in the area.



l: 4000 (A3)
l: 6000 (A4)



GENERAL SOIL CONDITIONS

INVENTORY

The area has been divided into two different types of soil conditions; normal and dry & nutrient poor. No area with significant moisture was found during the inventory. The soil conditions are analysed based on general assumptions due to existing vegetation, topography and where the soil most likely has been dug up during construction. The assumptions have also been discussed with Jörgen Wissman (2015, pers. comm., 19 March), ecologist, who is responsible for the plant inventories the *LAWN-project* have performed on three sites in the neighbourhood. Since the analysis is based on general assumptions, only broad classifications are done and the site-specific conditions within each classification can therefore vary. Further analyses with for example soil samples are needed to determine these site-specific conditions in detail.

Most of the area is characterized by normal soil condition. These areas can vary from fairly dry to fairly moist as well as fairly nutrient poor to fairly nutrient rich. The soil on the rocky hills is assumed to be dry and nutrient poor due to the thin soil-layer.

ANALYSIS

The soil conditions within the site are assumed to be relatively homogenous with normal soil condition in all places except for the rocky hills. Wissman explains that looking at material from the inventory of the three selected sites within the neighbourhood, it can be assumed that the soil in the two park areas are slightly towards dry and nutrient poor, although classified within the range of 'normal'. The soil in the residential courtyards have most likely been dug up during construction followed by application of artificial soil, and are therefore difficult to analyse in more than a general manner. And if looking at specific sites within the area like for example plantation-surfaces the soil condition can vary out of the range of normal. More detailed inventory and analysis of soil conditions will be shown in the inventory for the site specific proposals.

REDESIGN

INVENTORY & ANALYSIS

Here we present an inventory of general 'microclimatic conditions', which is relevant for the ecological principles 'Right plant, right place', 'Consider patch shape & edges', 'Increasing biodiversity' and 'Promoting pollinators'.

VEGETATION



MAP: MICROCLIMATIC CONDITIONS

A map showing occurring microclimatic conditions in the area.



1: 4000 (A3)
1: 6000 (A4)



MICROCLIMATIC CONDITIONS

INVENTORY

In the two park areas in the north and south part of the neighbourhood there are larger areas of open, sun exposed conventional lawns. The surrounding buildings and hills frames the open areas, providing a relatively wind sheltered climate. Also the residential courtyards are in general open and sun exposed as well as the high grass area next to the bike and pedestrian path in the southwest part of the neighbourhood. The two park areas also have some areas where trees provides shade for underlying ground, which provides a slightly moist condition. The two large rocky hills provide a more exposed environment in terms of both wind and sun. Detailed microclimatic conditions such as shade provided by buildings is not shown in the map on this scale.

ANALYSIS

In Gothenburg, grass areas partly or completely covered by trees are most common, which means that open, sun exposed and mainly flat areas are relatively unique (J Wissman 2015, pers. comm., 19 March). For example can more diverse grass areas in these places provide good opportunities for a high biodiversity. Also the dry and exposed conditions on the rocky hills provide a microclimatic (and soil) condition, which is beneficial in terms of biodiversity. More detailed inventory and analysis of microclimatic conditions will be shown in the inventory for the site specific proposals.

REDESIGN

INVENTORY & ANALYSIS

The inventory and analysis of experiential values identifies existing and missing values in the area.

*Park area.
The rocky hill in the 'South Park' area has a naturalistic character and strong identity.*



*Residential courtyard.
A courtyard with weak identity and spatiality but offers coherence.*



*'Other surfaces'.
The walkway with a symmetrical pattern of lawn and high grass give a coherent character.*



EXPERIENTIAL VALUES

For the inventory and analysis of the site's experiential values, we have divided the site into different type of areas; 'park areas', 'residential courtyards' and 'other surfaces'. These types of areas are used, valued and experienced differently and we therefore believe there are different needs for experiential values in these areas. Based on our comprehension and knowledge we have assigned a range of the selected experiential values we believe should be found in each type of area. By inventory existing values we recognise which existing values need to be retained and created through redesign.

PARK AREAS

A 'park area' is a larger, public green space used by people living in the area, and also by visitors. The two park areas on site should together contain all selected experiential values: **TRANQUILITY, NATURALISTIC, SPATIALITY, COMPLEXITY, COHERENCE, IDENTITY, FASCINATION**

RESIDENTIAL COURTYARD

A 'residential courtyard' is the green space adjacent to a residential building, which is designed for recreational purposes and used primarily by those living in the building. These areas benefit from containing all selected values, but should primarily contain the following values: **TRANQUILITY, SPATIALITY, COHERENCE, IDENTITY**

'OTHER SURFACES'

'Other surfaces' are residual spaces with no clear purpose and function. Desired experiential values for these areas depend on a place's context. There is no requirement for specific experiential values for these types of areas, depending on context appropriate values should be applied: **TRANQUILITY, NATURALISTIC, SPATIALITY, COMPLEXITY, COHERENCE, IDENTITY, FASCINATION**

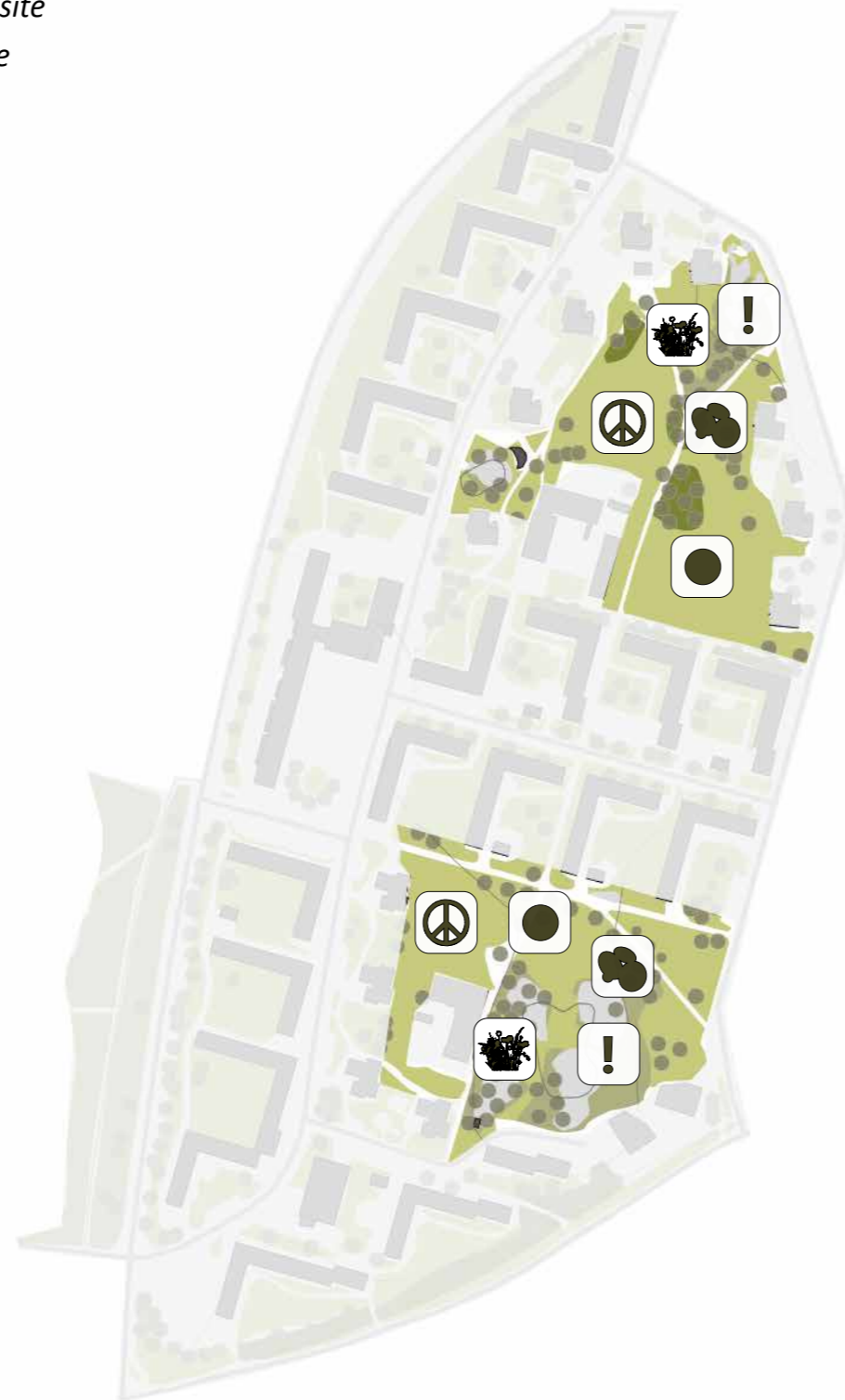
REDESIGN

INVENTORY & ANALYSIS

The inventory of experiential values is based on our personal experiences and valuations of the site which we have related to the descriptions of the selected experiential values (p. 34-37).

EXPERIENTIAL VALUES

tranquillity	
naturalistic	
spatiality	
complexity	
coherence	
identity	
fascination	



MAP: PARK AREAS

A map showing inventory of experiential values in 'Park areas'.

PARK AREAS

INVENTORY

The two park areas consist of same experiential values; tranquillity, coherence, spatiality, naturalistic, and identity. Both park areas are missing the values of complexity and fascination.

The vast conventional lawns of the park areas are well-kept and relatively quiet, which offer a calm and tranquil environment. Conventional lawns and trees planted alongside walkways give a coherent character as well as they offers a sense of spatiality as they create both open and more secluded spaces.

Both park areas have rocky hills surrounded by high grass and trees, which offer a naturalistic value. The higher grass contrasts against the rocky hills and irregular occurrence of trees add to the feeling of the vegetation not being planted by humans. The rocky hill in the 'South Park' area is the neighbourhood's highest point, which makes it an element with strong identity and it acting as a landmark.

ANALYSIS

Both park areas have several desired experiential values, which should be retained when redesigning.

The value of spatiality could be strengthened by adding elements such as various kind of shrubbery and trees, as well as it contribute to a more heterogeneous environment. The strong character of the rocky hills can withstand more natural elements without ruining the naturalistic character and the strong identity of the exposed bedrock. The value of fascination can be created by adding elements that stir an interest and intrigue, such as rooting pigs and the strong flowering of pictorial meadows.

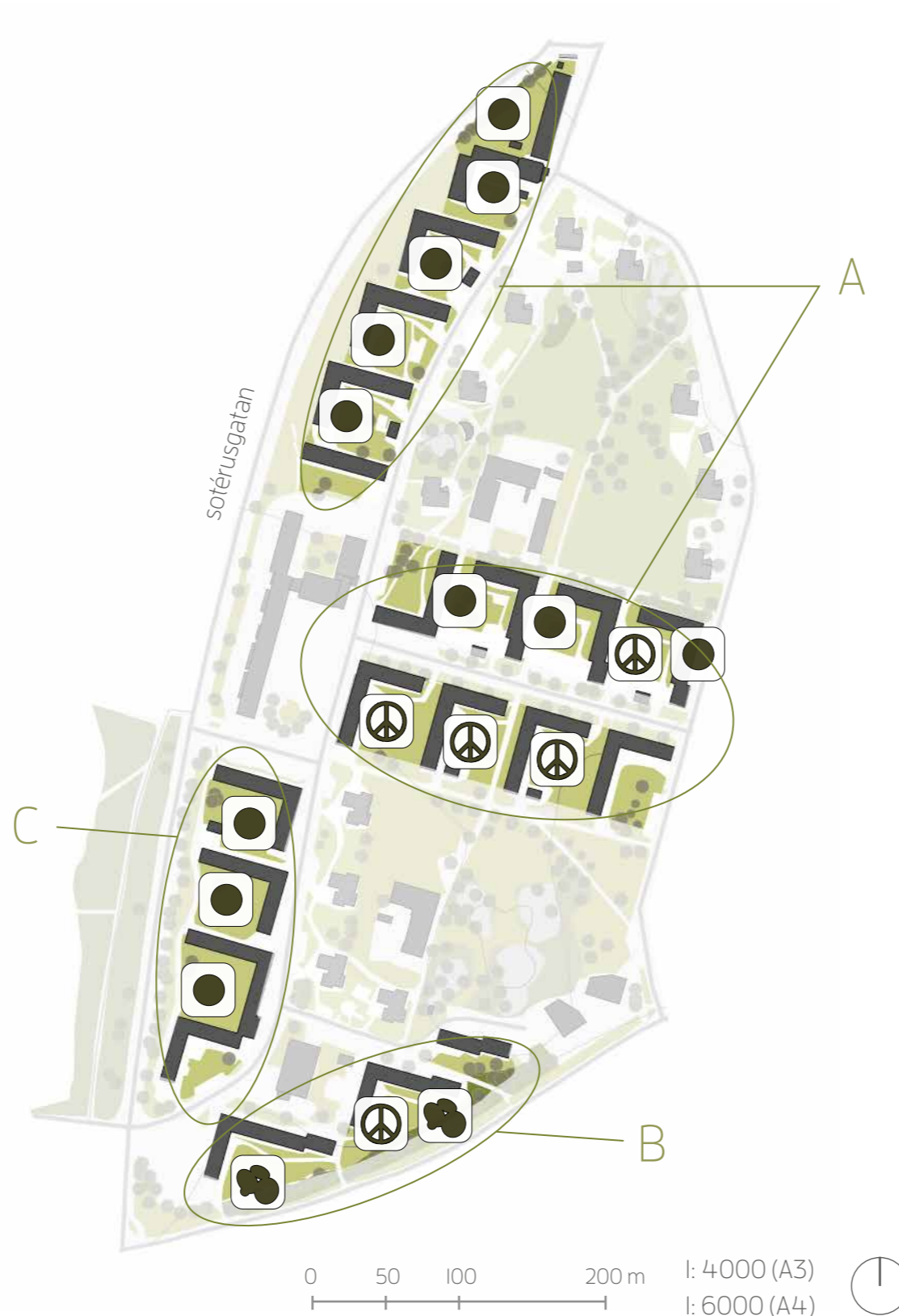
The overall character of the two parks areas is similar and could be differentiated in order to create distinct identities and a more diverse environment. The experiential value of complexity should be created in either or both park environments. All experiential values do not need to exist in both park areas, but should be achieved in the areas together.

REDESIGN

INVENTORY & ANALYSIS

EXPERIENTIAL VALUES

tranquillity	
naturalistic	
spatiality	
complexity	
coherence	
identity	
fascination	



MAP: RESIDENTIAL COURTYARDS

A map showing inventory of experiential values in 'Residential courtyards'.

RESIDENTIAL COURTYARDS

INVENTORY

In general the courtyards have experiential values of spatiality and some also of coherence and tranquillity. All courtyards are lacking a strong identity since most of them look similar or have few distinct elements. The tower blocks situated in the park areas are not experienced as residential courtyards, and are therefore not inventoried.

A | Residential courtyards adjacent to Sotérusgatan are exposed to noise from passing traffic which ruins the tranquil value. The most northern courtyard has shelter beds of shrubs next to the road which improve conditions slightly. These courtyards have values of coherence since they have few elements and mainly consist of conventional lawn. However, this contribute to a poor value of spatiality. The courtyards in the centre of the site have an experiential value of tranquillity which is strengthen by the overview of the 'South Park' area.

B | These courtyards benefit from being adjacent to a larger patch of vegetation, consisting of trees and undergrowth, which contribute to the values of naturalistic and spatiality being experienced.

C | Courtyards in the south-western part next to Sotérusgatan have few elements and mainly consist of open conventional lawns, and are therefore perceived as coherent.

ANALYSIS

The redesign of the courtyards needs to create distinguished identities for the different sets of courtyards.

A | The shelterbelt should be extended to decrease noise disturbance and enable a tranquil value. In these courtyards spatiality can be strengthen by spatial elements such as high grass and trees.

B | Elements with strong character could be added in order to create a strong identity and spatiality.

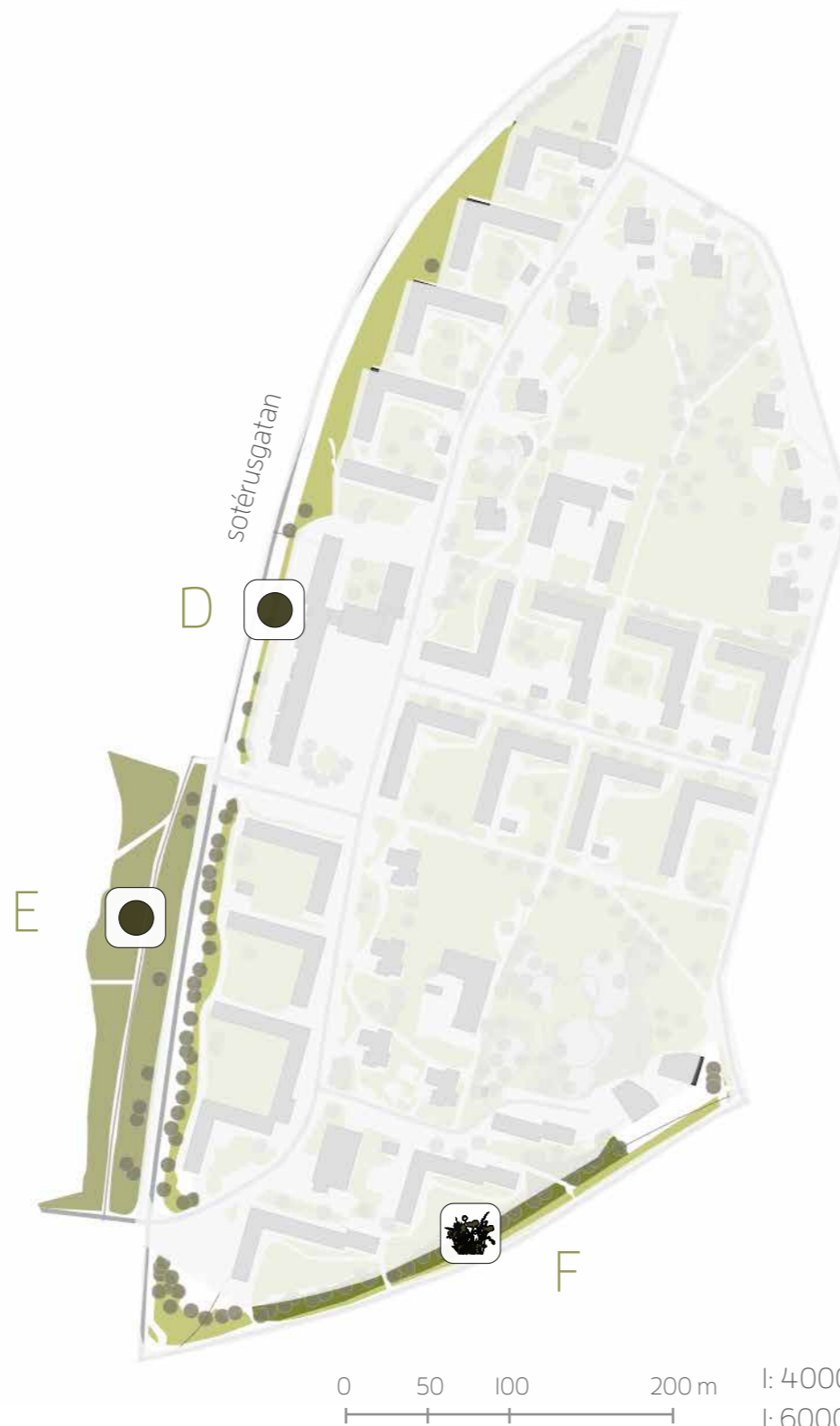
C | The naturalistic character of the patch of vegetation should be enhanced to further strengthen existing values. It can also contribute in creating an identity since few other courtyards have the quality of the patch.

REDESIGN

INVENTORY & ANALYSIS

EXPERIENTIAL VALUES

tranquillity	
naturalistic	
spatiality	
complexity	
coherence	
identity	
fascination	



MAP: OTHER SURFACES

A map showing inventory of experiential values in 'Other surfaces'.

OTHER SURFACES

INVENTORY

The only found experiential values for these areas are coherence and naturalistic.

D | Positioned in-between a parking lot and road, a long and narrow patch of conventional lawn and trees lawn is perceived as coherent. The place offers no other values.

E | A walkway in the south-western part of the site is on both sides symmetrically divided into conventional lawn and high grass, which give a coherent character. Because the place does not look cared for and is strongly affected by the impact of nearby traffic, the place is not experienced as tranquil. The homogenous grass areas and few trees are not enough to create a naturalistic value.

F | In the south-eastern part of the area, a gravel path along a car road have a naturalistic value since it is also bordered by irregular bushes and high grass.

Other than these places, the areas mainly consist of residual patches of conventional lawn with no values.

ANALYSIS

More experiential values should be applied to these areas to give them a more clear purpose and strengthen arguments for their existence. By giving the areas a more clear function, whether it is an ecological or practical function, the value tranquillity can be created by indicating they are taken care of.

E | *The larger residual area along the walkway have potential to fulfil several experiential values and become a place with a clear identity, while still retaining the value of coherence.*

D + F | *Both the narrow patch of conventional lawn and the place of the gravel path have potential to created and further establish a naturalistic value.*

REDESIGN

STRATEGIES

Here we present strategies as a conclusion from previous analysis.

STRATEGIES

As a conclusion of previous analysis we have developed five strategies, which answer to identified issues and highlights potentials of the area. The strategies steer the development of the proposal by prioritizing what aspects and places to focus on in the area as a whole. All five strategies are equally important.

1 **CREATING A HETEROGENEOUS ENVIRONMENT**

The heterogeneity in all parts of the area should be improved in terms of both biodiversity and variety of experiences.

2 **ENHANCE THE QUALITIES OF THE ROCKY HILLS**

The natural character and strong identity of the two large rocky hills should be preserved, and ecological values further enhanced. The accessibility and function as a viewpoint should be retained.

3 **ALL SURFACES SHOULD HAVE A PURPOSE**

All surfaces, especially 'other surfaces', should be given a purpose by contributing to ecological and/or experiential values as well as indicating that the area is taken care of.

4 **PARK AREAS WITH STRONG IDENTITY & HIGH VALUES**

Create high experiential values while retaining existing values of the two park areas as well as distinguish their identities.

5 **FEATURES THAT FASCINATE & INFORM**

Create features of fascination and pedagogic values by enhancing and making natural processes intelligible in order to increase knowledge and awareness of the values of nature.

REDESIGN INSPIRATION

Inspirational pictures that embodies our ecological intentions and aspired result.

*Mont Evrin Park, France, 2011.
Paths of low cut grass create a pattern
through the larger surface of high grass.
Photo: Charles Delcourt, 2011.*



*High Line, New York, USA, 2013.
In the heart of the urban context a
walkway above the streets is bordered by
high grass and perennials.*



*Mont Evrin Park, France, 2011.
Signs of 'cues to care', such as the low
cut grass and wooden planks, make the
bench an attractive place to sit.
Photo: Michel Reuss, 2009.*



*Mont Evrin Park, France, 2011.
The park in Mont Evrin functions both
as a park and as storm-water basin with
high ecological values.
Photo: Charles Delcourt, 2011.*

REDESIGN PROPOSAL

Here we present the overall redesign proposal. We describe how the overall proposal answers to the strategies and how ecological principles and experiential values are applied. The overall approach for establishment and maintenance are also explained. In the following pages the proposal is divided into 'Park areas', 'Residential courtyards' and 'Other surfaces' to present selected design interventions.

REDESIGN PROPOSAL



MAP: OVERALL REDESIGN PROPOSAL
A map of the overall redesign proposal for the selected site.

OVERALL REDESIGN PROPOSAL

The redesign proposal transform a homogenous residential area dominated by conventional lawn into an area that offers rich experiences and high ecological values. It aims to highlight the site's potential and different characters by enhancing varying conditions with appropriate green surfaces. The proposal contains a greater diversity of green surfaces such as grass-free lawn, pictorial meadow and different types of meadow. Other types of vegetation, such as trees, shrubs and allotments, have been added in order to complement grass surfaces with spatial qualities, different habitats and an overall increase in heterogeneity of vegetation. Some areas of conventional lawn and edges of areas transformed into meadow or high grass, in both the 'North' and 'South park' areas as well as in residential courtyards, are retained because of their functional value. The preserved areas of conventional lawn also contribute to a coherent appearance and mediate that the area is taken care of, as a sign of 'cues to care'.

HOW THE OVERALL PROPOSAL RESPONDS TO THE STRATEGIES

The strategies have steered the development of the redesign proposal by formulating what issues to focus on.

1. CREATING A HETEROGENEOUS ENVIRONMENT

This strategy is fulfilled by the proposal as a whole and in specific places with a wide range of vegetation, materials and functions.

2. ENHANCE THE QUALITIES OF THE ROCKY HILLS

The natural character and strong identities of the rocky hills are strengthened by increased areas of high grass around the exposed rock. The accessibility is retained by improved paths leading to the hills and extended towards a new meeting place on top of the south rocky hill.

3. ALL SURFACES SHOULD HAVE A PURPOSE

Many areas within the neighbourhood have been redesigned with new functions, plant material and maintenance regime that make the surface contribute to experiential and ecological purposes. For selected small residual surfaces of conventional lawn, such as patches next to entrances or roads, smaller measures have been taken. These have for example been given a better ecological purpose by less demanding maintenance regime such as less frequent cutting.

Due to consideration of what is reasonable to redesign in an economic aspect and to propose a level of transformation towards a more naturalistic environment that is still accepted by residents, the proposal do not fulfil this strategy completely. For example some residual surfaces of conventional lawn are preserved as they are. To achieve the area's full potential of ecological quality we propose these surfaces to be transformed in the long-term perspective.

4. PARK AREAS WITH STRONG IDENTITIES & VALUES

The redesign proposal aims to retain existing experiential values and create values identified as missing, as well as to create distinguished identities for the two park areas. Various elements contributing to the experiential values of for example spatiality, fascination and naturalistic are added. A grove meadow, pictorial meadow and meadow-labyrinth contribute to creating an identity for the 'North Park'. The 'South Park' area is distinguished by a naturalistic impression with the rocky hill in focus, with extended high grass areas and a meeting place on top of the hill.

5. FEATURES THAT FASCINATE & INFORM

Flowering plants attracting bees and butterflies, allotments and rooting pigs are examples of added features that can awake fascination. Signs informing residents of occurring species and natural processes contribute to informing and highlighting fascinating features for residents and visitors.

ECOLOGICAL PRINCIPLES

All our selected ecological principles have been applied to the redesign proposal. How 'Principles for selected places' and 'Principles of planting design' are applied is shown in the following pages where various design interventions are presented. The 'Fundamental principles' are explained here for the overall proposal and are not presented specifically for each design intervention.

A PLACE AS A PART OF THE WHOLE SYSTEM

Since the site has no significant connections to larger green areas the proposal focus on strengthening ecological qualities within the site with for example increasing biodiversity. The proposal strengthens the values of the park areas, which is beneficial also for people living outside the area. The character of the park areas cannot be found in any surrounding areas and the site therefore contribute to a unique experience in the city district.

PRIMARILY NATIVE PLANT SPECIES

In general added vegetation primarily consists of native plant species where local biotopes are promoted. In some places non-native plant species can be used because of aesthetical, functional or ecological reasons.

USE OF REGENERATIVE MATERIALS

The proposal utilizes existing materials on site as far as possible and there are relatively few places where additional materials are used, other than for example benches. The added materials are considered in the regenerative aspects where for example sustainable produced wood is used for benches.

EXPERIENTIAL VALUES

The redesign proposal aims to achieve all experiential values which we have assigned for the three types of areas. The various design interventions give possibilities for new values to be experienced. How experiential values are applied in each place of the area is shown in more detail in the following pages where various design interventions are presented.

ESTABLISHMENT & MAINTENANCE

The approach of ecological maintenance is proposed to be applied to all maintenance of the area. Instructions for maintenance of the grass surfaces in the proposal can be found in figure 11 (p. 48). In general the maintenance regime for most areas are changed to be less intensive, by for example less frequent cutting.

The proposal have increased the amount of high grass and meadows surfaces. These are mainly established by cutting conventional lawn less frequently and allowing the vegetation to grow higher, distribution centres and seeding. In one place, the soil is proposed to be rooted by pigs to eventually be turned into pictorial meadows.

REDESIGN PROPOSAL

In the following pages we present selected design interventions for 'Park areas'.

REDESIGN PROPOSAL

	exposed bedrock
	stone wall
	conventional lawn
	high grass
	meadow
	pictorial meadow
	grass-free lawn
	spring bulbs
	allotments
	shrubs
	tree



PARK AREAS

Five selected design interventions for 'Park areas' (1-5). Design interventions 1-4 are presented with an illustrative picture and a short description and instructions for establishment and maintenance. The design intervention '5. THE GROVE MEADOW' is presented in an increased level of detail after the other proposals. It fully describes how the redesign answers to the strategies and how ecological principles and experiential values are applied. Instructions for establishment and maintenance in an increased level of detail are also provided.

5 THE GROVE MEADOW

1 LABYRINTH OF COMMON MEADOW

2 PICTORIAL MEADOW

3 TRIANGULAR MEADOW

4 ROCKY HILL WITH VIEWPOINT

MAP: REDESIGN FOR PARK AREAS

A map of specific design interventions in 'Park areas'.

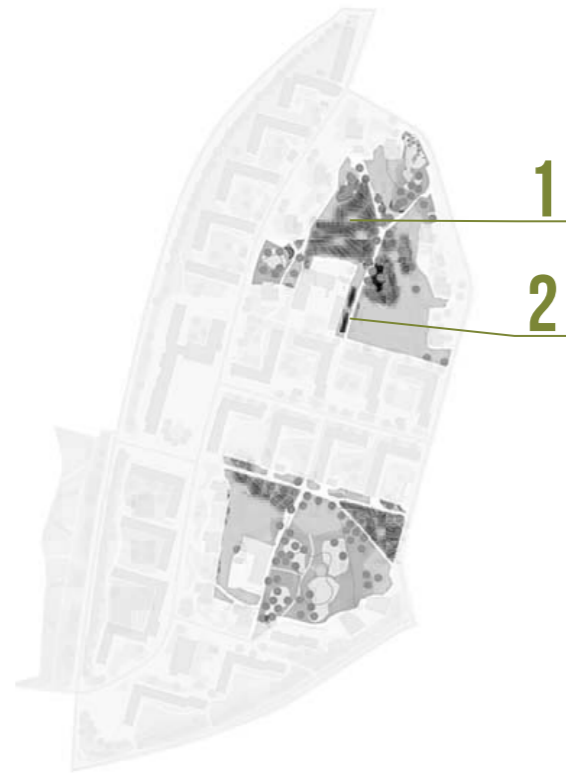
0 50 100 200 m

l: 4000 (A3)

l: 6000 (A4)



REDESIGN PROPOSAL



1. LABYRINTH OF COMMON MEADOW

The current vast area of conventional lawn is one of the open sun exposed areas that holds great opportunities for a higher biodiversity. The area is therefore turned into a large common meadow with cut paths that connects several places to stay within the area, inspired by a labyrinth. The many edges of the meadow can be positive in the aspect of biodiversity since they provide variations in microclimate and also improves the spatiality in the area during the summer season. From the playground area at the west side a half-circle of conventional lawn stretches into the meadow and extends the play area as well as mediating the feel of safety close to the playground. This area of large meadow is also one of the elements that give a clear identity to the 'North Park' area and distinguish it from the South Park area. The cut paths and edges towards the walkways are managed as a conventional lawn to ensure access for people and mediate the area is taken care of, a sign of 'cues to care' and also serves as a coherent element in the area. This also strengthens the value of tranquillity.



Illustration showing 'Labyrinth of common meadow'. Symbols show fulfilled experiential values.

Illustration showing 'Pictorial Meadow'. Symbols show fulfilled experiential values.

2. PICTORIAL MEADOW

In the existing conventional lawn in between the kindergarten and the walkway two rectangle-shape areas are turned into colourful pictorial meadows, which awakes fascination and give a strong identity for this part of the park. The continuous flowering provides an interesting view from the windows of the kindergarten building and is also beneficial for pollinators. The conventional lawn is preserved next to the walkway and the kindergarten building as well as between the two areas so that people can come close and see the flowers and visiting animals like bees and butterflies, in detail. It also preserves the coherent character of the area and strengthens tranquillity. To further inform about the ecological value and what flower species that can be seen, a sign is put up in between the two areas. On the other side of the walkway two-sided benches provides the choice of overlooking the meadow or the adjacent lawn kept for activity.



REDESIGN PROPOSAL



3. THE TRIANGULAR MEADOW

In the South Park area there are already several open lawn areas suitable for activities. This area bounded by walkways in the east corner of the South Park is therefore suitable to be converted into a common meadow. The height of the meadow vegetation together with existing and complementary planted trees along the edge of the road give a slight shield from impact of traffic and improves spatiality. *Salix caprea* (sälg) are chosen for the complementary planting of trees in order to promote pollinators. Together with the rocky hill to the left (not pictured), the meadow and scattered trees mediates a somewhat naturalistic character.

The sparse turf in this area means that it can be enough to only harrow the area before seeding, without removing the turf completely, which is beneficial in both an economic and ecologic point of view. To increase the amount of flowers the first year after planting, seeds of annual plants are included in the seed mixture. Towards walkways, an edge is cut as a conventional lawn in order to give a well-kept appearance and preserve the coherent character with lawn as a binding element.



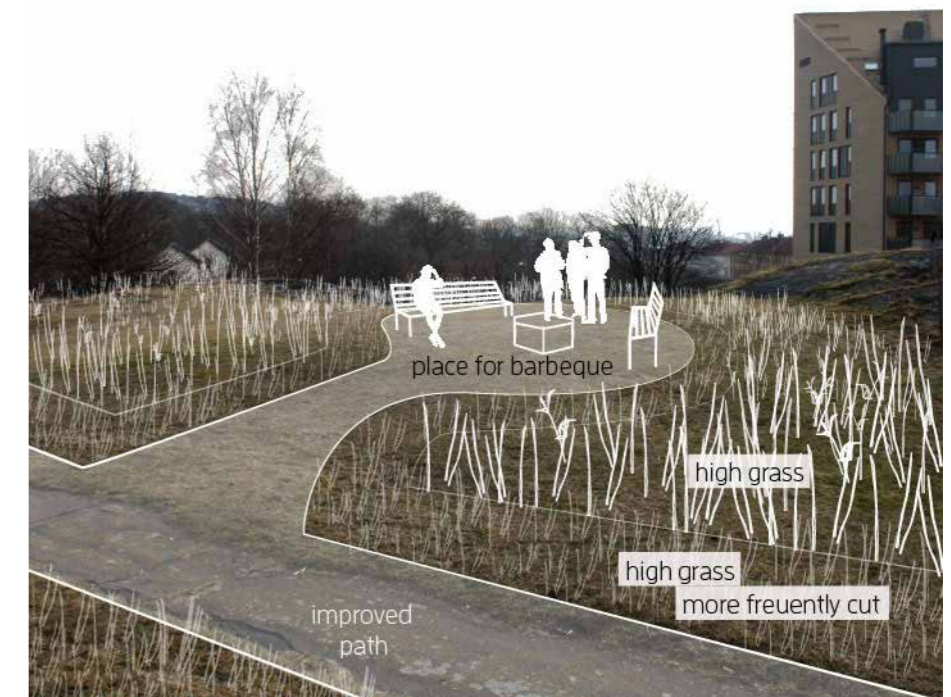
Illustration showing 'The triangular meadow'. Symbols show fulfilled experiential values.



Illustration showing 'Rocky hills with viewpoint'. Symbols show fulfilled experiential values.

4. ROCKY HILL WITH VIEWPOINT

The relatively thin soil on the rocky hill is assumed to hold high biodiversity. The character the hill gives the area a strong identity and high experiential values. To further improve the ecological values such as biodiversity and prerequisites for pollinators. Also in the surrounding area around the hill the strong naturalistic character of the hill allows for a natural character of vegetation and high grass are let up in selected places. To maintain a well-kept appearance and mediate the experiential value of tranquillity, improvement of the path is proposed. On top of the hill meeting place with seating and barbeque possibilities are also created. From this place an appealing view is given, overlooking the area and the faraway bridge *Älvsborgsbron* and cranes of the harbour.



REDESIGN PROPOSAL

We start with an inventory and analysis of the place today. After the analysis we present our proposal 'The Grove Meadow' followed by description of how it responds to our strategies as well as the ecological principles, experiential values and how the proposal should be established and managed.

Inventory of the place for 'the Grove Meadow'.

5. THE GROVE MEADOW

THE PLACE TODAY

Today, the place is rather homogenous with conventional lawn and few mature maple trees. Surrounding multi family houses and the kindergarten building, together with the mature trees, give the place a pleasant framing. There is no middle vegetation, which gives the area an open coherent character where the whole area can be easily overlooked.

FUNCTION

The shady area under the trees is assumed not to be used for other activities than occasional children play or someone taking a shortcut. The adjacent open, sun exposed areas of conventional lawn are used for recreation and other activities such as sports and exercise. In this part of the park there are few arranged seating.

PROBLEMS

The current homogeneity of the place holds low biodiversity and only the experiential values of coherence, tranquillity and spatiality. The shade under the trees provides poor growing condition for conventional lawn, leading to that the ground is poorly covered. The open character of the area gives a somewhat exposed feeling.

OPPORTUNITIES

Increased heterogeneity would strengthen and create ecological and experiential values of the place. The shady condition under the trees is suited for grove meadow. To divide the area into smaller sub-units although preserving the overall coherence would improve the spatial qualities of the place. The whole area of conventional lawn does not need to be preserved in order to meet the demand for activity space.



REDESIGN
PROPOSAL

PROPOSAL
+3 YEARS



REDESIGN PROPOSAL



ABOUT THE DESIGN INTERVENTION

To enhance the grove character additional trees of for example *Corylus avellana* (hassel) and *Quercus robur* (ek) are planted. Under the trees a grove meadow is established. Stepping-stones provide access into the area and offer an interesting experience when being enclosed by the naturalistic vegetation. In the outer parts of the meadow, before reaching the open conventional lawn, the stepping-stones are replaced with short cut paths of conventional lawn. Additional plants with stronger character of leaf structure or flowering to further increase the grove character complement the centre of the grove, next to the walkway. Example of such plants is *Dryopteris filix-mas* (träjon, which have a characteristic leaf structure. Nesting boxes for birds are placed and logs of dead wood should if possible be left on site. This further enhances the naturalistic and fascinating values, as well as being beneficial in terms of biodiversity. The added vegetation in the place also enhances the varied experience of closeness and openness while travelling along the walkway.

HOW THE REDESIGN RESPONDS TO THE STRATEGIES

1. CREATING A HETEROGENEOUS ENVIRONMENT

The variety of elements and plant species in the grove contributes to both a variety of experiences and increased biodiversity. Also the pictorial meadow seen in the background contributes to a more varied experience in this place.

2. ENHANCE THE QUALITIES OF THE ROCKY HILLS

Not applicable for this place.

3. ALL SURFACES SHOULD HAVE A PURPOSE

In this place all surfaces are given a more clear purpose of both ecological and experiential values. Most surfaces are transformed to a heterogeneous grove meadow but some parts are kept as conventional lawn for functional values.

4. PARK AREAS WITH STRONG IDENTITY & VALUES

The grove meadow with stepping-stones together with the pictorial meadow seen in the background gives this part of the 'North Park' area a strong identity, which differs from the 'South Park' area.

5. FEATURES THAT FASCINATE & INFORM

The stepping-stones allow for people to enter the grove and come close to the vegetation under the trees. They also function as a play element for children. A sign next to the grove explains what plant species to find and what ecological values it holds.

PRINCIPLES OF PLANTING DESIGN

RIGHT PLANT, RIGHT PLACE

The poorly adapted conventional lawn under the trees is replaced by a grove meadow suitable for the shady condition. The exact species composition is although difficult to decide in advance. See ecological principle 'planning for succession' for further explanation.

CONSIDER PATCH SHAPE & EDGES

The shape of the grove meadow is adjusted to the microclimatic condition provided by existing and planted trees. When the added trees grow and provide shade for a larger area, the shape of the grove meadow should be adjusted following the changed microclimatic conditions. The undulating edge extends the length of the edge, which is beneficial for biodiversity.

COUNTING ON DISTURBANCE

Stepping-stones allow access into the grove and protect plants from human wear. Together with cut paths and a relatively large preserved area of conventional lawns suitable for activity, the aim is to protect the more sensitive surfaces of grove meadow by directing human movement.

REDESIGN PROPOSAL

PLANNING FOR SUCCESSION

The exact plant composition of a grove meadow in a certain place is very difficult to decide in advance and as the microclimatic conditions change. The planting should therefore be done in stages. The first year a wide range of plant species are planted. The following years when seeing what plants that thrives in this specific location and following the gradual microclimatic change, the surface will be complement by additional new plug plants.

PRINCIPLES TO CONSIDER IN SELECTED PLACES

INCREASING KNOWLEDGE & INTEREST

See explanation for strategy '5. Features that fascinate & inform'.

INCREASING BIODIVERSITY

The grove meadow together with the added trees increases both the diversity of plants and habitats. Logs of dead wood provide habitats for

a diversity of animals and also nesting boxes for birds are beneficial.

PROMOTING POLLINATORS

The increased variety of plant species is also beneficial for pollinators. The early flowering plants in the grove meadow are especially important and logs of dead wood left on site provide suitable habitats.

'CUES TO CARE'

'Cues to care' are provided by well-maintained edges of the meadow and added elements of stepping-stones, benches and corten steel edge in between the grove meadow and walkway.

EXPERIENTIAL VALUES

TRANQUILLITY

Due to provided measures of 'cues to care' the value of tranquillity have good prerequisites, the outcome result is although strongly connected



*The Grove Meadow.
The stepping stones invite people to enter the grove meadow and come close to the vegetation.*

REDESIGN PROPOSAL

to the quality of the long-term maintenance.

NATURALISTIC

The grove meadow together with added trees give the place a high naturalistic value.

SPATIALITY

Additional trees and the height of the grove meadow improve the spatiality of the place and to some extent divide the area visually into smaller subunits, which increases differences between openness and closeness.

COMPLEXITY

The variety of elements and high diversity of plants in the grove meadow offers the value of complexity.

COHERENCE

The grove meadow together with the mature trees and surrounding area of conventional lawn mediates the value of coherence.

IDENTITY

See explanation for strategy '4. Park areas with strong identity & values'.

FASCINATION

See explanation for strategy '5. Features that fascinate & inform'.

ESTABLISHMENT & MAINTENANCE

To establish the grove meadow we propose to remove patches of turf in which species of grove meadow are seeded. Seeding is complemented by plug plants with focus on the area next to the walkway, where most people are passing by.

The grove meadow is cut once a year with uptake. The central parts of the meadow with stepping-stones and several trees are managed by trimming. The outer parts of the meadow with fewer trees can be cut with a mower. To maintain access to the stepping-stones additional trimming is performed when necessary, adapted to the growth rate and flowering of the vegetation.

REDESIGN PROPOSAL

In the following pages we present selected design interventions for 'Residential courtyards'.

REDESIGN PROPOSAL

- exposed bedrock
- stone wall
- conventional lawn
- high grass
- meadow
- pictorial meadow
- grass-free lawn
- spring bulbs
- allotments
- shrubs
- tree



RESIDENTIAL COURTYARDS

Three selected design interventions for 'Residential courtyards' (6-8). These design intervention show example of different approaches to use when redesigning and by adjusting the design each yard is given its own identity. Design interventions 6 and 7 are presented with an illustrative picture, a short description and instructions for establishment and maintenance. The design intervention '8. MEADOW COURTYARDS' is presented in an increased level of detail after the other proposals. It fully describes how the redesign answers to the strategies and how ecological principles and experiential values are applied. Instructions for establishment and maintenance in an increased level of detail are also provided.

6 ELEMENTS WITH HIGH ECOLOGICAL VALUES

8 MEADOW COURTYARDS

7 LAYERS OF VEGETATION

MAP: REDESIGN FOR COURTYARDS
A map of specific design interventions in 'Residential courtyards'.

REDESIGN PROPOSAL



6. ELEMENTS WITH HIGH ECOLOGICAL VALUES

For these courtyards we propose examples elements to complement the conventional lawn in these yards in order to improve the ecological and experiential values. These are for example:

- » berry bushes
- » fruit trees
- » allotments
- » grass-free lawn
- » patches of high grass
- » groundcovers

The conventional are kept in many places to give the yards a coherent and tranquil impression and to enable human activities. Higher vegetation of fruit trees, berry bushes and high grass as well as allotments, improves spatiality as well as being positive for biodiversity. The grass-free lawn can be planted on smaller surfaces close to entrances and significantly increase biodiversity and prerequisites for pollinators compare to conventional lawn. The variety of how to combine these elements in different yards gives each yard its own identity. The illustration below show an example of a residential courtyard with this approach of design applied.

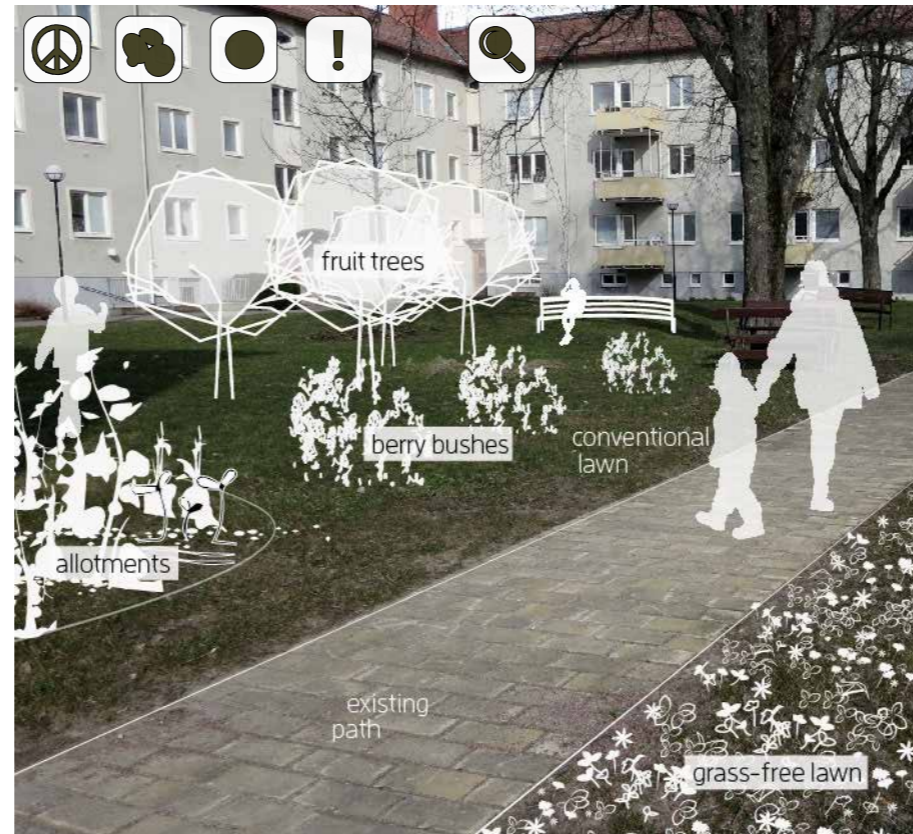
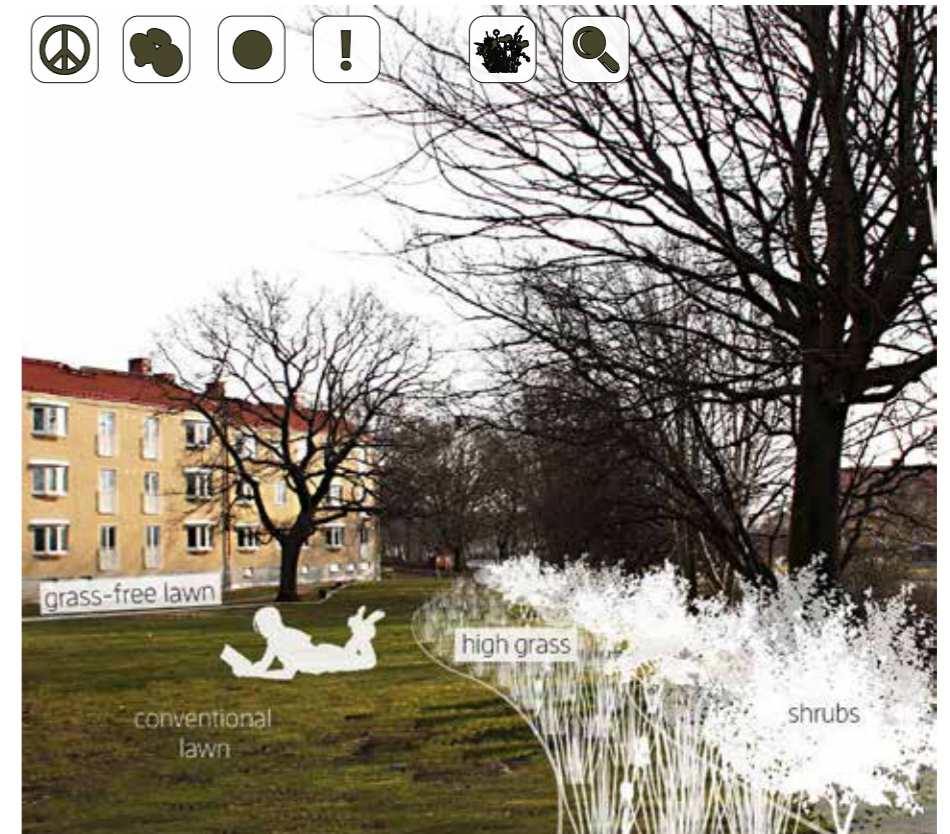


Illustration showing 'Elements with high ecological values'. Symbols show fulfilled experiential values.

Illustration showing 'Layers of vegetation'. Symbols show fulfilled experiential values.

7. LAYERS OF VEGETATION

In these courtyards the edge of the grove is extended inspired by a forest edge to increase the naturalistic experiential values and biodiversity of plants and habitats. This character also gives these courtyards their own identity and the additional vegetation further improves spatiality. Next to the existing groves of trees additional shrubs are planted, followed by a border of high grass with bulbs flowering in the spring. A part of the lawn close is kept as conventional lawn to provide rooms for activity and to strengthen the values of coherence and tranquillity. The small areas of conventional lawn next to the facade of the building, which do not need to be used for activity, are replaced by grass-free lawn that will increase both the experiential and ecological qualities such as biodiversity and prerequisites for pollinators.



REDESIGN PROPOSAL

We start with an inventory and analysis of the place today. After the analysis we present our design intervention MEADOW COURTYARDS followed by description of how it responds to our strategies as well as the ecological principles, experiential values and how the design interventions should be established and managed.

Inventory of the place for 'Meadow courtyards'.



8. MEADOW COURTYARDS

THE PLACE TODAY

The courtyard mainly consists of conventional lawn with a meeting place in the centre and some scattered trees of *Acer platanoides* (lönn) and *Sorbus acuparia* (rönn) (not pictured). The few elements and continuous lawn give the courtyard a coherent impression. The meeting place is surrounded by a perennial planting with decorative grasses, plants and evergreen shrubs. Multi-family housing frames the courtyard in three directions which gives it a sheltered feeling. In the fourth direction towards Sotérusgatan, a smaller walkway goes by the courtyard.

FUNCTION

The meeting place in the centre and the conventional lawn are intended to be elements for recreation and leisure for residents.

PROBLEMS

Lack of elements and intended functions make the courtyard appear desolate and offers no spatiality. The courtyard is homogeneous in appearance and vegetation, and therefore offers poor ecological values and low biodiversity. Since there are no entrances from surrounding buildings the courtyard becomes desolate. The lone meeting place in the centre does not invite and is put in an exposed position.

OPPORTUNITIES

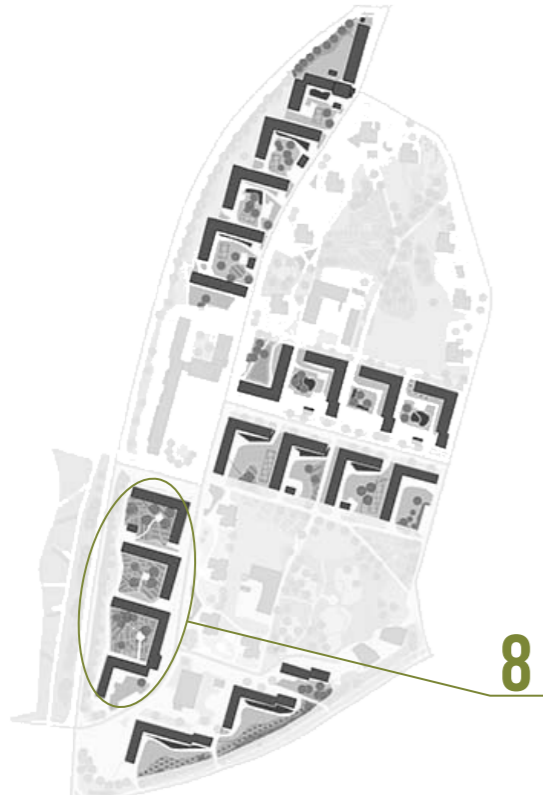
The rather large courtyard holds opportunities to strengthen ecological values by increasing biodiversity both in terms of plant species and habitats. Interventions for improving ecological values can be integrated with strengthening experiential values. A more diverse appearance also provides a more stimulating view from the windows and may attract residents to visit the courtyard. Improved recreational possibilities could better serve the needs of the residents.

REDESIGN
PROPOSAL

PROPOSAL
+3 YEARS



REDESIGN PROPOSAL



ABOUT THE DESIGN INTERVENTION

We propose to turn most part of the courtyard into common meadow with paths of conventional lawn and pavement. The design creates a more varied and interesting courtyard that contributes with high ecological values and strengthens experiential values. The meeting place in the centre is retained and complemented with additional plantings. An orchard of fruit trees and allotments are added to create more spatiality and increase biodiversity as well as being reasons for people to visit the courtyard.

HOW THE REDESIGN RESPONDS TO THE STRATEGIES

1. CREATING A HETEROGENEOUS ENVIRONMENT

The variety of added vegetation, such as meadow, fruit trees and allotments, creates diversity in appearance and experiences as well as it generates an increased biodiversity.

2. ENHANCE THE QUALITIES OF THE ROCKY HILLS

Not applicable for this place.

3. ALL SURFACES SHOULD HAVE A PURPOSE

The added elements signals and give that the courtyard a more clear purpose of function, ecological values and experiential values. The allotments and improved meeting place give reasons for people to meet and stay.

4. PARK AREAS WITH STRONG IDENTITY & VALUES

Not applicable for this place.

5. FEATURES THAT FASCINATE & INFORM

The allotments and orchard give pedagogic values which can inform people what vegetables, fruits and herbs look like and how they are

managed. Their change in appearance over the year contribute to a fascination of natural processes. Bird feeders that provide food for birds in wintertime are place over the courtyard and further contribute to fascinate and allow people to observe birds in a close distance. The pathways going through the meadow create a pattern which can be seen from overlooking windows. The pattern are also a playful element for children as well as it enables people to come close to the flowering meadow.

PRINCIPLES OF PLANTING DESIGN

RIGHT PLANT, RIGHT PLACE

The place is sun-exposed with normal soil condition, which is appropriate for common meadow. Fruit trees are suited for the sunny and sheltered courtyard.

CONSIDER PATCH SHAPE & EDGES

The pattern of the meadow creates multiple edges which are beneficial for biodiversity.

COUNTING ON DISTURBANCE

Paths through the meadow leading to the meeting place and through the courtyard allow access as well as they protect the meadow from human wear.

PLANNING FOR SUCCESSION

As cuttings are removed from the courtyard the soil will become less nutrient rich and the species composition will alter. The exact species composition is difficult to decide in advance. As the fruit trees grow and provide more shade for underlying ground this area can be complemented with plug-plants for grove meadow.

REDESIGN PROPOSAL

PRINCIPLES TO CONSIDER IN SELECTED PLACES

INCREASING KNOWLEDGE & INTEREST

See explanation for strategy '5. Features that fascinate & inform'.

INCREASING BIODIVERSITY

Adding groves of trees, meadow and allotments create new habitats as well as contribute to increased biodiversity.

PROMOTING POLLINATORS

The flowering meadow, fruit trees and allotments provide food for pollinators.

'CUES TO CARE'

The cut paths of conventional lawn and paved path show signs of human presence and that the high vegetation of meadow is intended.

If the allotments are well managed, they show signs of human care.

EXPERIENTIAL VALUES

The experiential values 'tranquillity', 'naturalistic', 'spatiality', 'coherence', 'identity' and 'fascination' are achieved by the redesign.

TRANQUILLITY

The allotments show sign of human presence and that the place is cared for. The higher grass vegetation and orchard give additional framing and contribute with peace.

NATURALISTIC

The meadow and orchard contribute with naturalistic values.

SPATIALITY

The high vegetation of meadow and added trees creates secluded



Meadow courtyard.
The paths through the meadow give signs of 'cues to care' as well as provide a strong identity for the courtyard.

REDESIGN PROPOSAL

places within the courtyard even though it is still possible to have an overview over the whole courtyard.

COHERENCE

The repeated pattern and texture of the meadow organizes the space and makes the place legible and coherent.

IDENTITY

The dominant element of meadow, which is quite unique for residential courtyards in the area, creates a strong identity. The place conveys different type of identities depending from what perspective the place is experienced from. From overlooking windows the pattern of meadow conveys a strong image and is strongly associated with the courtyard. From people passing the pattern is less visible and instead the mass of meadow is memorable.

FASCINATION

See explanation for strategy '5. Features that fascinate & inform'.

ESTABLISHMENT & MAINTENANCE

The meadow is established by less frequent cutting and by creating distributions centres with seeds of meadow species. The meadow should be cut once a season and clippings should be removed in order to meagre the soil. Cut paths are of conventional lawn. The paths can be changed every other year to vary the design. The allotments are established with planting boxes. The trees of the orchard are planted directly in the soil. The trees should be trimmed every year.



*Harvest in autumn.
The orchard and allotments can be
harvested in autumn and bird feeders
provide food for birds in wintertime.*

REDESIGN PROPOSAL

In the following pages we present selected design interventions for 'Other surfaces'.

REDESIGN PROPOSAL

- exposed bedrock
- stone wall
- conventional lawn
- high grass
- meadow
- pictorial meadow
- grass-free lawn
- spring bulbs
- allotments
- shrubs
- tree



'OTHER SURFACES'

Three selected design interventions for 'Other surfaces' (9-11). Design interventions 9 and 10 are presented with an illustrative picture, a short description and instructions for establishment and maintenance. The design intervention '11. PICTORIAL MEADOW & HIGH GRASS WALKWAY' is presented in an increased level of detail after the other proposals. It fully describes how the redesign answers to the strategies and how ecological principles and experiential values are applied. Instructions for establishment and maintenance in an increased level of detail are also provided.

9 LINE OF HIGH GRASS

11 PICTORIAL MEADOW & HIGH GRASS WALKWAY

10 PATH WITH 'CUES TO CARE'

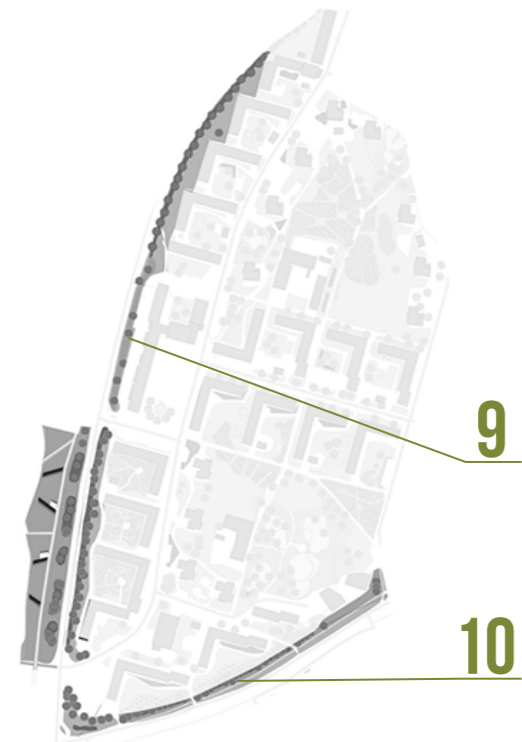
MAP: REDESIGN FOR OTHER SURFACES
A map of specific design interventions in 'Other surfaces'.



l: 4000 (A3)
l: 6000 (A4)



REDESIGN PROPOSAL



9. LINE OF HIGH GRASS

A small surface of conventional lawn between the parking lot and Sotérusgatan are turned into high grass. The grass serves as a small shield between the parking and traffic and also reduce the maintenance of the area. The transformation from conventional lawn to high grass increases the naturalistic character and is also beneficial for biodiversity. The simplicity in vegetation types, with only high grass and mature trees, mediates a coherent character. The edges are proposed to be cut three times per season to give a well-maintained appearance, as a sign of 'cues to care', and to prevent the grass from leaning out in traffic and obstruct the view.

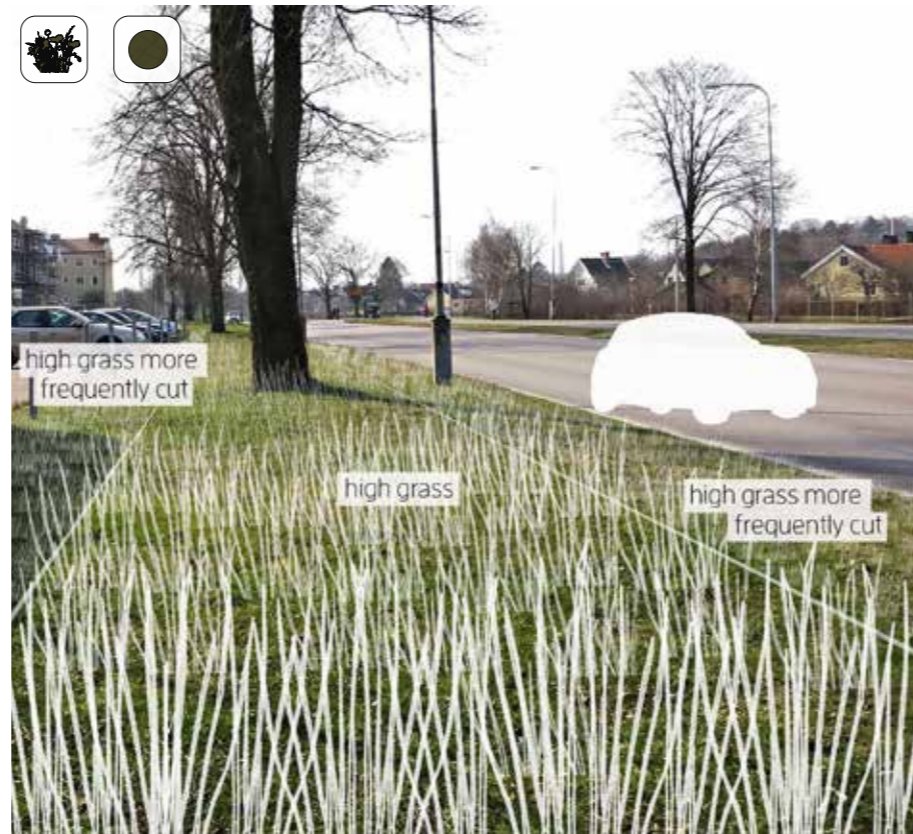


Illustration showing 'Line of high grass'. Symbols show fulfilled experiential values.

Illustration showing 'Paths with cues to care'. Symbols show fulfilled experiential values.

10. PATH WITH 'CUES TO CARE'

The path goes in between the road and natural plantations in the edge of the residential yards in the south part of the area.

To create the experiential value of tranquillity the path is proposed to be improved with distinct edges and stone dust material. Improvements of the path can also be seen as 'cues to care', which allow for a natural character of the vegetation to be preserved but still increasing the feeling of that the area is being cared for. Some more trees and shrubs are planted in groups towards the road to provide a slight shield of from traffic. Along the path and in between plantings of trees and shrubs conventional lawn is kept, which preserves the value of coherence.

The vegetation with natural character towards the residential yards is regularly culled to promote a desired composition of species. The shrub plantation needs weeding in the first years after establishment until vegetation covers the ground and occasional rejuvenation pruning later on.



REDESIGN PROPOSAL

We start with an inventory and analysis of the place today. After the analysis we present our design intervention 11. 'PICTORIAL MEADOW & HIGH GRASS WALKWAY' followed by description of how it responds to our strategies as well as the ecological principles, experiential values and how the design interventions should be established and managed.

Inventory of the place for 'Pictorial meadow & high grass walkway'.

11. PICTORIAL MEADOW & HIGH GRASS WALKWAY

THE PLACE TODAY

The place is characterized by a walkway going through a flat area with larger parts of high grass and edges of conventional lawn, which gives it a coherent character. On the west side, it is bordered by a larger area of detached houses, and on the east side by Sotérusgatan and its traffic. A few trees grow in the high grass between the walkway and road.

FUNCTION

Today the place holds no clear functions and are therefore little used. It provides no reason for people to stop or stay for a longer time. People mainly pass by on the walkway on their way to some other location. Some residents in the area walk their dog here.

PROBLEMS

Lack of elements and intended functions make the area appear desolate and offers poor spatiality. It also offers low experiential values for people passing by. This homogeneous area of mainly grass has poor biodiversity.

OPPORTUNITIES

This place holds potential to better fulfil ecological values by creating a naturalistic character. With details that show that the place is taken care of and have a clear purpose the character of tranquillity can be achieved. By adding elements along the walkway, such as benches, people have reason to uphold in the place.

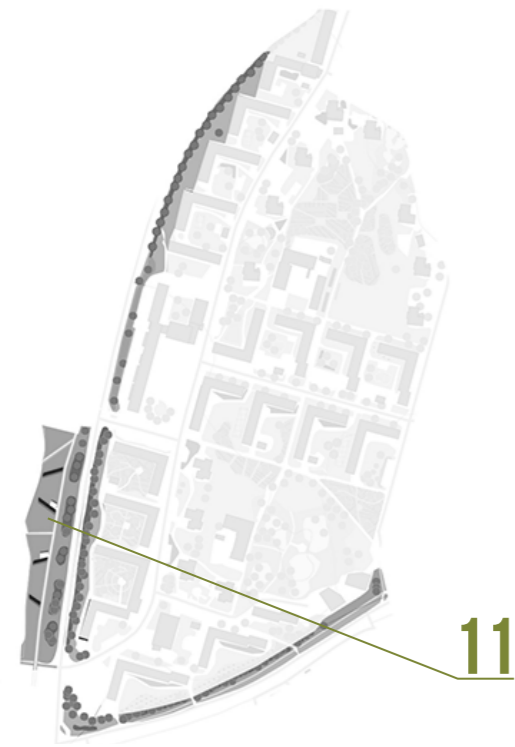


REDESIGN PROPOSAL

PROPOSAL
+10 YEARS



REDESIGN PROPOSAL



ABOUT THE DESIGN INTERVENTION

We propose to keep the areas of high grass and to add features of pictorial meadows with adjacent meeting places, stone walls, hedge and groves of vegetation. The eastern side of the walkway is planted with groves of trees and shrubs to create spatiality, increase the naturalistic character and to shield off traffic. During the first year pigs roots on surfaces where pictorial meadows are to be planted in order to prepare the soil. The stone walls and hedge provide shelter and habitats for pollinators who visit is the pictorial meadow as well as they frame the meeting place. Benches and lampposts are added along the walkway so people can remain on site and to give an appearance of care.

HOW THE REDESIGN RESPONDS TO THE STRATEGIES

1. CREATING A HETEROGENEOUS ENVIRONMENT
Added features of pictorial meadow, stone walls, trees and shrubs contribute in creating a more heterogeneous environment as they benefit different kinds of animals and provide different types of habitats and plant diversity. The species composition of the pictorial meadows can be changed each season and further help to generate heterogeneity over the years.
2. ENHANCE THE QUALITIES OF THE ROCKY HILLS
Not applicable for this place.
3. ALL SURFACES SHOULD HAVE A PURPOSE
The overall design give the place a purpose of being a valued green space close to residential areas where people can meet up and stay.

First year of establishment.
Rooting pigs can be an option to prepare the soil for pictorial meadow.



REDESIGN PROPOSAL

Details such as pictorial meadow, benches and lampposts add to the impression of the area being valued and taken care of.

4. PARK AREAS WITH STRONG IDENTITY & VALUES

Not applicable for this place.

5. FEATURES THAT FASCINATE & INFORM

Signs about pictorial meadows together with rooting pigs are features that fascinate and inform people about values of nature. In connection to the establishment of the design, residents are informed about upcoming changes and the positive impact they contribute to. This to inform and increase understanding of why the changes are positive.

PRINCIPLES OF PLANTING DESIGN

RIGHT PLANT, RIGHT PLACE

The place's soil conditions are normal and appropriate plant material are chosen accordingly. The high grass area west of the walkway is still open and sun-exposed and fitted for high grass and pictorial meadows.

CONSIDER PATCH SHAPE & EDGES

Since the place was rather homogeneous in microclimates and soil conditions they guided little with decisions of patch shape and edges. Added elements such as stone wall, pictorial meadow and groves creates new patches and edges are beneficial for biodiversity. The pictorial meadows are shaped in diagonals to evoke interest from people passing by on the walkway and contribute to a fascinating experiential value.

*Proposal after three years.
The groves and hedges behind the benches are establishing and contributing in spatiality. Pictorial meadows are now growing where rooting pigs were preparing the soil.*



REDESIGN PROPOSAL

COUNTING ON DISTURBANCE

The design intervention continues to count on low disturbance on the large high grass areas and they are therefore sustained. Programmed surfaces for people to stay and move around are designated to meeting places next to two of the pictorial meadows in order to direct human movement. Disturbance is used as a maintenance regime to secure succession of the groves as they are occasionally culled.

PLANNING FOR SUCCESSION

To further stimulate succession and contribute to heterogeneity, besides disforested groves, different species of trees and shrubs with different growth rate are chosen for the groves. Clippings from the high grass surfaces are removed, and successional these surfaces may over-time developed into types of meadows or high grass with features of flowering.

PRINCIPLES TO CONSIDER IN SELECTED PLACES

INCREASING KNOWLEDGE & INTEREST

See explanation for strategy '5. Features that fascinate & inform'.

INCREASING BIODIVERSITY

The pictorial meadows, stone walls, hedge and groves creates new and various habitats beneficial for a wider range of species and thereby contribute to increase biodiversity. By meagre the soil of the high grass areas by uptake, these areas can turn into areas with higher species richness since meadows or high grass areas with less nutrient rich soils generally holds a higher diversity of species.

PROMOTING POLLINATORS

The pictorial meadows flowers for a long period and the *Salix caprea* (sälge) in the groves provide important food opportunities for pollina-



*Proposal after ten years.
The groves have grown tall but are
occasionally culled. The species for the
pictorial meadow can be changed each
year.*

tors, especially early in spring. The stone walls and hedges make the high grass areas less exposed and improve conditions for pollinators to visit the pictorial meadows and flowers in the high grass.

'CUES TO CARE'

Added details such as benches, lampposts and paved stones framing surfaces give signs of the area being taken care of. The straight shapes of the pictorial meadows and the maintained groves make nature look well-ordered.

EXPERIENTIAL VALUES

The redesign proposal aims to retain the experiential value of 'coherence' as well as creating values of 'tranquillity', 'naturalistic', 'spatiality', 'identity' and 'fascination'.

COHERENCE

The design intervention retain the value of coherence with repeating elements and shapes that are well-ordered.

TRANQUILLITY

The groves give a tranquil character by shielding the place from surrounding milieu and noise disturbances. The pictorial meadows, benches and details such as paved stones framing the seating areas make up a tranquil character as the area look taken care off and offer places to stay and rest. The edges of conventional lawn gives the surfaces of high grass an ordered frame.

NATURALISTIC

The groves with various species and succession stages give a naturalistic character. As the soil of the high grass gets less nutrient rich and more flowers starts to occur, this element contribute to a stronger experience of naturalistic.

SPATIALITY

The groves along the walkway shield traffic, which creates a spatial value and character. The hedge, benches, pictorial meadow, stone wall as well as high grass, frame the meeting place and creates more secluded spaces, which also contribute to spatiality.

IDENTITY

The strong flowering of the pictorial meadow, stone walls and adjacent meeting places contribute in giving the place an identity.

FASCINATION

See explanation for strategy '5. Features that fascinate & inform'.

ESTABLISHMENT & MAINTENANCE

For detailed instructions of maintenance and establishment see pages 39-28.

Pigs are chosen to root the ground, as an option to ploughing, in order to prepare the soil for pictorial meadows. The edge of conventional lawn next to the walkway is decreased from the width of two lawnmowers to one, where left over space is turned into high grass. The groves are planted in huddles of trees and shrubs, which are ordered in different sizes in order to give a dynamic impression and save costs.

The groves are occasionally culled to provide stronger and more valuable trees and shrubs. Through the years, logs of dead wood are saved to provide valuable habitats for example pollinators. The pictorial meadows only need occasionally weeding. High grass areas are cut with uptake once a year between the mid and end of July.

A close-up photograph of green grass and clover leaves. The background is a soft-focus field of similar vegetation. In the foreground, several blades of grass and a clover leaf with three distinct leaflets are visible. The lighting is bright, creating a vibrant green color palette.

PART SIX **DISCUSSION**

This part discuss the result, method and approach of the thesis as well as issues related to grass that emerged during the process.

DISCUSSION

OUR RESULT

How can conventional lawns in Swedish residential areas be redesigned with the aim to fulfil ecological values combined with experiential values, which at the same time are realistic to implement and manage?

DID WE ANSWER THE RESEARCH QUESTION?

We believe the research question is answered by our redesign proposal. From gathered knowledge we have selected and organized elements that aim to promote ecological and experiential values. During the design process we have discussed design solutions with professionals to get their point of view and connect the proposal with reality. The proposal is possible to implement and manage. However, some of the proposed maintenance regimes and plant material have been less tried in the Swedish climate which makes it difficult to predict the outcome.

DOES IT FULFIL ECOLOGICAL VALUES?

We selected a range of ecological principles for landscape design with the aim to contribute to the function of ecosystems. A function that creates ecosystem services, the benefits humans obtain from nature.

Theoretically we think that the result of our proposal with the applied principles resulted in creating green space with relatively high ecological value. For example our proposal consists of a greater diversity of plants and habitats, which increases biodiversity, and significantly increase the amount of flowering plants in the area, which is beneficial for pollinators. We also apply theories of for example succession and take the dynamic character of plant communities into consideration. Further research and deeper knowledge in the field of ecological landscape design could although be of advantage to further develop the proposal in terms of ecological values.

CONTRADICTION BETWEEN ECOLOGICAL QUALITY & PEOPLE'S APPRECIATION?

People's perception and experiences can be somewhat delimiting in an ecological approach to design. Although high ecological values many times can be combined with high experiential values, the general public might perceive ecological qualities as messy. One of the very important tools to change attitude towards 'untidy' nature is education but this needs to be combined with appropriate design interventions. By having the principle of 'cues to care' in mind and applying it in selected places to show that the area is taken care of, we aim to find a balance with high ecological qualities that also are appreciated by people. But in reality this is a sensitive balance, were the result depends on the individuals living in and visiting the area. To truly find the answer to how to create high ecological quality in a residential area, which is accepted by the public, design interventions also needs to be tried in reality by testing out and evaluating different options.

DOES THE PROPOSAL FULFIL EXPERIENTIAL VALUES?

Taking people's general preferences for the outdoor environment into account in the design process (and in theory) serves possibilities for them to also be fulfilled in reality. But, whether or not intended experiential values are fulfilled can only be answered when the proposal is realized.

Some of the intended experiential values may not be possible to experience immediately after establishment. It takes many years for vegetation to grow, for example, the experiential value of naturalistic and spatiality may not be experienced until years after establishment.

Even if the proposal promotes experiential values and aims to create an environment appreciated by people, it may falter by not fitting current norms. The proposal pushes the norm on appearance of grass areas and how they are used. However, the proposal does not suggest alien interventions. It just pushes and challenges the norm slightly as the proposal show a wider range of vegetation and widens the impression on what is 'normal'.

To implement and carry out changes, stakeholders such as the public, need to be on the same page in order for a proposal to be posi-

tively experienced and comprehended. However, if we were to only make a proposal on current norms and perception, it would be a short story to tell with no new characters. It is important to understand and respect current preferences and experiential values. But it is equally important to push the norm and offer new experiences.

IS THE PROPOSAL REALISTIC TO IMPLEMENT AND MANAGE?

Our redesign proposal, although implementing knowledge about current maintenance practise, is purely theoretical. We found few comparable examples in Sweden where interventions like our proposal have been developed. One by one the proposed establishment methods, maintenance regimes or plant species, are not previously unknown. Although, how they are combined and applied in a Swedish residential area are not of common knowledge and the proposal demands commitment and interest of doing things in a new way. We therefore argue that with sufficient guidance and descriptions for people performing establishment and maintenance, the proposal should be realistic both to implement and manage. However, the subject is current and similar projects have started to evolve even in municipality level. In some years we will probably know more about if the interventions are realistic and passable.

OUR SELECTED TYPES OF GRASS AREAS

The conventional lawn is widely used and there is long experience of appropriate establishment and maintenance methods. Regarding grass-free lawn, meadows and pictorial meadow the knowledge about establishment and maintenance is not as profound. For meadows and pictorial meadows there are some existing examples in urban environments in Sweden, but more practical experience would be beneficial in order to be able to propose more elaborated methods of establishment and general directions of maintenance. This applies especially to establishment of meadows in areas that currently consists of conventional lawn, where we only found vague directions for rational establishment. The safe way of establishing meadows in these areas is to completely remove the turf and if the soil layer is not meagre enough, to replace

it with nutrient poor soil. But this method is costly and irrational. On the question on how to do this in a more rational way we found few answers, but one way is to establish through distribution centres in the lawn and allow added species to spread into the remaining grass area.

For the grass-free lawn we found no example in urban environment in Sweden except for the Lawn project's test site in Uppsala (Swedish University of Agricultural Sciences, 2015). Even though the test site show promising results more testing is needed in order to provide rational methods for establishment and appropriate species composition.

INCREASE KNOWLEDGE, DECREASE MAINTENANCE

The long-term outcome for design interventions largely depends on the performed maintenance. Therefore a great deal of an area's appearance and function after establishment is dependent on the knowledge, interest and ambition of the people working with maintenance. During our interviews with professionals at *Gothenburg Municipality* and contractors we found an aspiration to rationalize maintenance by decreasing the number of classifications and simplify descriptions for grass maintenance in the *Park Management Description* (Parkvårdsbeskrivningen, 2015). We found out that several of the used classifications have no clear, purpose and only exist because they always have, and in these cases simplification would be appropriate. But to proceed to far in the process of simplification could also be process that counteracts heterogeneity in the outdoor environment.

We believe that a homogenous maintenance more likely leads to a homogenous environment, and in order to create a heterogeneous environment maintenance would preferably be performed adjusted to a specific place. For example the ecologist points out in the interviews that the decision of when to cut a meadow should be connected to the time period of flowering. To for example adapt the time for cutting to the time of flowering in a specific area does not necessary implement less rational maintenance, but it does require knowledge and understanding about ecology. We argue for the possibility of decreasing maintenance by focusing on the selected places and doing things in the

appropriate time adjusted to the growing stage of the vegetation and not a date in the calendar.

The ecological values of a place are although not always easy to detect, what is perceived as high ecological value may not be and the other way around (Nassauer, 1995). In order to achieve an environment with high ecological values it is important that not only the designers and planners are well acquainted with the subject but also the people with the assignment to manage the area. It is thus important to apply theories of succession to maintenance. To see the result after establishment only as a starting position and not as the final result. Vegetation is a dynamic and ever-changing element that needs to be consciously worked with in a process instead of trying to constraint it in an unreasonable shape. This of course implies that appropriate decisions need to be made from the start, where succession and related maintenance is predicted and accounted for already in the planning phase of a new development.

PREREQUISITES FOR IMPLEMENTATION

In order to implement our redesign proposal people living in the area, the municipality, property owners as well as people working with maintenance need to be taken on-board with the transformation. This is necessary in order to create an area that is appreciated by the public, managed in a way that further enhances the desired qualities and therefore also contribute to a long-term sustainable development.

The proposal pushes the norm of how a Swedish residential area 'should' look. If people living in and visiting the area does not accept the change it will not be truly sustainable and for them to understand the benefits of the transformation, education to increase the understanding of nature is of great importance. In this specific area connected to our proposal, it can be done by informing residents about the transformation before development. After development by for example explaining signs next to certain elements. To let people be involved in the design and transformation is another way of adapting the proposal to the interest of residents and visitors. This would for example help to make sure that areas of conventional lawn frequently used for acti-

vities are preserved and that the alternative solutions are applied are adjusted to their interest. Important to keep in mind is although that in order to implement this kind of alternative design solutions, people's perception of what is normal needs to be challenged and to do so means that the proposal for sure will not please all people, at least not to start with.

The maintenance for green areas belonging to the municipality in Gothenburg follows as we found out during our interviews the Park Management Description (Parkvårdsbeskrivning), which explains for example the required maintenance for different types of lawns or high grass areas. For some of our proposals, like for example the grass-free lawn, there is currently no description for maintenance. In order to implement this kind of vegetation a description for management therefore need to be added. Although, we believe the park management description is good to have as a base when describing required maintenance of an area like for example how many times a year it should be cut. But it does need to be complemented by increased knowledge, collaboration and aspiration of improved qualities in the outdoor environment. For example increased knowledge about ecological processes and how to benefit these means to cut in the right time in a specific place. To describe this approach to maintenance only in a text document would be very difficult and we therefore believe that education and explanation in field would be of advantage.

LIMITATIONS OF REDESIGN

We provide a redesign proposal for an existing area with the aim to propose interventions that are realistic to implement and manage, which implies an economical thinking behind how much of the area to redesign. In an ecological point of view it is also not sustainable to redevelop many areas where the impact of development would overshadow the earned ecological values achieved by the new environment. The positive side of redesigning an area is for example mature vegetation like large trees. But to maximize ecological and experiential values these aspects needs to be considered already during the development of a new area. For example we found many small surfaces of conven-

tional lawn in within the site, which not are realistic to redesign all at once.

FOCUS ON SUMMER SEASON TO HIGHLIGHT SEASONAL CHANGE

The conventional lawn has a homogeneous appearance that looks somewhat the same all-year-round. In order to create and present a redesign proposal that promotes seasonal changes we focus on the time of the year (spring to autumn) where these changes are most visible and effective. The visualizations of the more detailed design interventions present solutions in this period to illustrate intended functions and how they are experienced since it is during this time of the year where these surfaces are most used. This time of the growing season is when most of the ecological and experiential values as well as maintenance efforts are in effect. In wintertime, some of our added proposals show less divergence to conventional lawns and much of their function and values is less tangible.

We have focused the design to this time of the year but still include features that benefit ecological and experiential values all-year-round. Added elements such as trees, bushes and stone walls contribute with ecological and experiential values all-year-round.

Chosen focus does not imply that how the proposal is experienced and effective in wintertime is not an interesting aspect. On the contrary, it is an interesting aspect to investigate further and can strengthen arguments for the proposal as a whole and for specific features.

METHODOLOGY

WERE CHOSEN METHODS FEASIBLE?

The aim and objective with the thesis were to connect theory with current practice. Therefore was the gathering of information based on both a literature study and interviews with professionals in selected fields. The two methods sometimes provided different answers on how to do things. Concepts in theory may not be fully implementable in practice, and practice may not be updated on new theories and

continues to do things like they 'always have been'. It was therefore very useful to gather information from both methods in order to get a well-grounded comprehension of the subject and related issues.

WAS THE SUBJECT DELIMITED ENOUGH?

The literature study and interviews looked into the aspects; ecology, design and maintenance. Initially, the focus of the thesis was to redesign conventional lawns with solely an ecological approach. But we quickly realized that in order for the proposal to be realistic to implement and sustainable over time we needed to apply an interdisciplinary approach. We therefore added the aspects of design and maintenance. Together they make up a broad focus of interest, which we found to be difficult. Each aspect is complex and can be studied into infinity. How do we delimit what to cover in each aspect? How do we get a complete and justified picture of each aspect related to grass areas? Although there were advantages with a broad focus, the broad focus itself was delimiting.

CHOOSING ECOLOGICAL PRINCIPLES & EXPERIENTIAL VALUES

We found no studies where ecological values and experiential values are selected to be applied for a redesign of conventional lawns in residential areas in Sweden. Therefore it was necessary to find, select and create an approach on how these can be applied when redesigning.

We aimed to find ecological values that provide a holistic approach for ecological design and choose principles we found relevant and could be applied when redesigning conventional lawns in residential areas. How we divided them (into fundamental, planting design and selected places) was not based on reference or a tried method, but was what we believed suited the approach. We think this method worked out well for the aim of the thesis.

The same issue goes for experiential values. In the literature study we found that different theories about experiential values make different conclusions about what values are important for the outdoor environment and what values people generally prefer. The main reason for this is that experiential values are very personal, which makes it

difficult to determine what people generally prefer. In the literature study we selected experiential values common for different theories that we believed can be connected to conventional lawns in residential areas. Our combination of selected experiential values could not be connected to a methodology based on the same set of values. This meant that it is difficult to validate our choice of values. There were also no studies that connected them especially to grass areas and described how they should be applied. We found the selected experiential values passable for the redesign and the aim of the thesis.

FINDING A METHOD TO APPLY SELECTED PRINCIPLES & VALUES

The literature study and interviews were straightforward approaches. The design process, with inventory, analysis and developing strategies, is also well-tried. Although we found no tried method of how to combine and apply ecological principles and experiential values in a redesign for residential areas. For this part we had to develop a method on how to apply selected ecological principles and experiential values. Changes to the method were made as we were applying it to the case study. In the end, we found the approach and method to be workable.

Although we found the method passable in theory, how it works and is effective in practice is another matter. Only when a proposal based on our method has been realized and used over a period of time we will know if we succeeded in combining and applying the selected experiential values and ecological principles.

WAS THE INVENTORY & ANALYSIS SUFFICIENT?

To strengthen for example ecological values the place specific conditions are of great importance. We have inventoried and analysed all aspects of the selected ecological principles we think are of relevance when redesigning conventional lawns in residential areas. Due to time constraints the depth of the inventory and analysis of each aspect were limited but we believe our inventory and analysis provides an acceptable level of detail for the aim of our work. In our place specific design interventions we show inventory and analysis in the level of detail that should be applied to the whole neighbourhood. A more detailed inven-

tory of plant species and site-specific soil conditions could although be beneficial to further strengthen the outcome qualities in the proposal, especially to increase the certainty that those qualities sustain over time.

LITERATURE & SOURCES

BACKGROUND

Overall, it was difficult to find information linked to conventional lawns in Sweden. The historical context of lawns is mainly reported in the American and English aspect and effect how the context of lawns is presented. We related to this information by using larger historical events that have a clear impact on the development of lawns in Sweden.

ECOLOGY

In our search for information on how to connect ecological theories for design and planning interventions we found few examples that gave a comprehensive picture of the subject. There are also relatively few examples where research has been translated into design actions and the ecological approach as a whole is clearly described. Continuous research, especially how to connect research to design, is therefore necessary in order to be able to give a complete view and understanding of ecological landscape design.

DESIGN

There are numerous studies done on how people experience the outdoor environment, but only a few are connected to grass areas. Also, many of the sources for this part had different aspects on how they researched experiential values. The limited literature meant that we had to make assumptions and use general conclusions about the outdoor environment in order to draw connections to grass areas.

MAINTENANCE

Literature on maintenances of grass areas is mainly focused on conventional lawns, and little on other types of grass areas. This made it difficult to gather correct and versed information about how to manage grass areas other than conventional lawns. Discussions with people from the *LAWN-project* and interviews with professionals helped to give answer. It was also difficult to find literature about current practice and for this reason the interviews were also an important complement of information.

Research on grass-free lawns are on-going in for example England and Sweden, but little is published. The source used for this subject were English, however list of species composition was chosen from a the *LAWN-projects* test sites.

Also, we found few studies on ecological maintenance. This effected our result since it made it difficult to present arguments and hard facts about the benefits and positive effects of ecological maintenance compared to standard maintenance regimes. It was especially difficult to find numbers on costs of ecological maintenance compared to standard maintenance.

COLLABORATION

COLLABORATION WITH THE RESEARCH GROUP

The collaboration with the research group, *LAWN-project*, was an valuable asset. The researchers are experts on different aspects of this particular subject and contributed with useful information and point of views. Throughout our thesis they were available for discussions and guided us into what to focus on and disregard. Unfortunately their research of the specific site in Gothenburg was not completed in time of this thesis and we could not take part of their results. If we could have taken part of their general conclusions and specific result for the site, our redesign could have been more fitted to the specific site and conclusions based on assumptions could have been avoided.

OUR COLLABORATION

Throughout the work we found a great advantage of writing the thesis in pair, both in the working process and for the outcome result. For us it meant a constant discussion, which we believe brought our thesis much further than would be the case if working on our own. We also complement each other with knowledge and approaches to the subject.

We have continuously collaborated in all parts of the report but to be able to get a comprehensive understanding of each field, we divided the main responsibility each part of the literature study in between us. Sara was more versed with the ecology part and Ulrika with the design and maintenance part. For our redesign proposal we integrated our main responsibilities and together developed the redesign. This means we are both well acquainted with all aspects brought up in the report.

FURTHER DEVELOPMENT OF THE SUBJECT

The following questions and issues are topics we would like to see further research on.

HOW CAN ECOLOGICAL AND EXPERIENTIAL VALUES BE COMBINED

We would like to see further research on how the aspects of ecology, design and maintenance can be integrated and combined. As we experienced with this thesis, they are important aspects to take into consideration and by combining them we believe the end result will accomplish more effective results and high values.

BALANCE BETWEEN WELL-KEPT AND NATURALISTIC

It would be interesting to explore how naturalistic an area can look and still not be perceived as messy. Where is the balance? How high is the grass allowed to grow and how close to anyone's home can high grass areas exist, without people complaining and actually appreciate them?


DISCUSSION

APPLICABLE ECOLOGICAL PRINCIPLES WITH PRACTICAL SOLUTIONS

Throughout our thesis we found few examples of ecological principles that suited our objective on how to achieve high ecological values in Swedish residential areas. We believe this is an important matter that needs further investigations in order to give clear instructions that are practicable.

HIGH ECOLOGICAL VALUES ALL-YEAR-ROUND

The proposal of the thesis focus on the summer season when ecological activities and values are high and at its peak. But how can this season be extended to wintertime and still offer high ecological values? What elements and features can be added to further enhance the ecological values all-year-round? And also, how can grass areas further be designed and used to offer more values over the year?



PART SEVEN
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PART EIGHT
APPENDIX

Appendix with questionnaires for the interviews and full lists of species for presented types of meadows.

APPENDIX

APPENDIX A

Appendix A show questionnaire used for interviews with ecologists. The first page present how the questions were formulated in Swedish and the following page show the same questions translated to English.

EKOLOGI, EKOLOG

Namn:

Utbildning:

Position:

Tid på position:

1. Berätta om dina arbetsuppgifter.

OLIKA TYPER AV GRÄSYTOR & SKÖTSEL

2. Hur kommer du i kontakt med och arbetar med gräsytor i ditt yrke?

3. Hur ser du som ekolog på olika typer av gräsytor och skötsel kopplad till dessa?

4. Ser du några problem kopplade till gräsytor?

5. Vet du något exempel där man har arbetat på ett annorlunda sätt med gräsytor?

6. Hur du några tankar om hur man kan arbeta med andra typer vegetation istället för traditionell gräsmatta?

ALLMÄNHETENS UPPLEVELSE AV GRÄSYTOR

7. Upplever du att synen på gräsytor har förändras de senaste åren?

8. Hur upplever du att allmänhetens förväntningar och åsikter om gräsytor är?

TANKAR OM FRAMTIDA UTVECKLING

9. Vad har du för tankar rörande den framtida utvecklingen och utformning av gräsytor?

ECOLOGY, ECOLOGIST

Name:

Education:

Position:

Time at position:

1. Tell about your work assignments.

DIFFERENT TYPES OF GRASS AREAS & MAINTENANCE

2. How do you get in contact and work with grass areas in your profession?

3. As an ecologist, how do you regard different grass areas and related maintenance?

4. Do you see any issues/problems related to grass areas?

5. Do you know of any example where a different approach for grass areas has been used?

6. Do you have any thoughts on how to work with different types of vegetation instead of conventional lawn?

SOCIAL PERCEPTION

7. Do you believe that the view on grass areas has changed in recent years?

8. What do you think is the current state of public expectations and opinions on grass areas?

THOUGHTS ON FURTHER DEVELOPMENT

9. What are your thoughts regarding the future development and design of grass areas?

APPENDIX

APPENDIX B

Appendix B show questionnaire used for interviews with landscape architects. The first page present how the questions were formulated in Swedish and the following page show the same questions translated to English.

DESIGN, LANDSKAPSARKITEKT

Namn:

Utbildning:

Position:

Tid på position:

1. Berätta om dina arbetsuppgifter.

OLIKA TYPER AV GRÄSYTOR

2. Hur kommer du i kontakt med och arbetar med gräsytor i ditt yrke?

3. Vilka problemaspekter brukar komma upp vid gestaltning av gräsytor?

EXEMPEL PÅ GENOMFÖRDA PROJEKT

4. Vet du något exempel där man har arbetat på ett annorlunda sätt med gräsytor?

5. Hur du några tankar om hur man kan arbeta med andra typer vegetation istället för traditionell gräsmatta?

ALLMÄNHETENS UPPLEVELSE AV GRÄSYTOR

6. Upplever du att synen på gräsytor har förändras de senaste åren?

7. Vilka krav/attityder är vanliga hos beställarna?

8. Hur upplever du att allmänhetens förväntningar och åsikter om gräsytor är?

TANKAR OM FRAMTIDA UTVECKLING

9. Vad har du för tankar rörande den framtida utvecklingen och gestaltningen av gräsytor?

KOPPLING TILL EKOLOGI

10. Vilka värden och aspekter gestaltar ni för ur ett miljö- och hållbarhetsperspektiv? Vilka val gör ni?

DESIGN, LANDSCAPE ARCHITECT

Name:

Education:

Position:

Time at position:

1. Tell about your work assignments.

DIFFERENT TYPES OF GRASS AREAS & MAINTENANCE

2. How do you get in contact and work with grass areas in your profession?

3. What issues regarding design of lawns is reoccurring?

EXAMPLES OF COMPLETED PROJECTS

4. Do you know of any example where a different approach for grass areas has been used?

5. Do you have any thoughts on how to work with different types of vegetation instead of conventional lawn?

SOCIAL PERCEPTION

6. Do you believe that the view on grass areas has changed in recent years?

7. What requirements/attitudes are common for clients?

8. What do you think is the current state of public expectations and opinions on grass areas?

THOUGHTS ON FURTHER DEVELOPMENT

9. What are your thoughts regarding the future development and design of grass areas?

CONNECTION TO ECOLOGY

10. What values and aspects are you designing for from an environmental and sustainability perspective? What choices do you make?

APPENDIX

APPENDIX C

Appendix C show questionnaire used for interviews with a Project manager and Park managers at Gothenburg Municipality. The first page present how the questions were formulated in Swedish and the following page show the same questions translated to English.

PLANERING & FÖRVALTNING, KOMMUN

Namn:

Utbildning:

Position:

Tid på position:

1. Berätta om dina arbetsuppgifter.
2. Berätta om kommunens riktlinjer och förhållande till entreprenörer.

OLIKA TYPER AV GRÄSYTOR

3. Hur arbetar du med gräsytor i ditt yrke?
4. Vilka problemspekter brukar komma upp vid planering och skötsel av gräsytor?

KOMMUNAL FÖRVALTNING AV GRÄSYTOR

5. Hur har förvaltning av gräsytor förändrats de senare åren?
6. Vilka aspekter, exempelvis ekologiska och ekonomiska, väger tyngst vid planering- och förvaltningsfrågor?
7. Hur du några tankar om hur man kan arbeta med andra typer vegetation istället för traditionell gräsmatta?
8. Vet du något exempel där man har arbetat på ett annorlunda sätt med gräsytor?

ALLMÄNHETENS UPPLEVELSE AV GRÄSYTOR

9. Upplever du att synen på gräsytor har förändrats de senaste åren?
10. Hur upplever du att allmänhetens förväntningar och åsikter om gräsytor är?

KOPPLING TILL EKOLOGI

11. Vilka värden och aspekter planerar ni för ur ett miljö- och hållbarhetsperspektiv?
12. Hur ser era miljökrav ut?

TANKAR OM FRAMTIDA UTVECKLING

13. Vad har du för planer och tankar rörande den framtida utvecklingen av gräsytor i kommunen?
14. Hur skulle du vilja göra med utformning och förvaltning av gräsytor om du får bestämma själv?

PLANNING & MANAGEMENT, MUNICIPALITY

Name:

Education:

Position:

Time at position:

1. Tell about your work assignments.
2. Tell about municipal policies and relationship with contractors.

DIFFERENT TYPES OF GRASS AREAS & MAINTENANCE

3. How do you get in contact and work with grass areas in your profession?
4. What problems aspects usually come up in the planning and maintenance of lawns?

MUNICIPAL MANAGEMENT OF GRASS AREAS

5. How has management of lawns changed in recent years?
6. What aspects such as ecological and economic, are the most important in planning and management issues?
7. Do you have any thoughts on how to work with different types of vegetation instead of conventional lawn?
8. Do you know of any example where a different approach for grass areas has been used?

SOCIAL PERCEPTION

9. Do you believe that the view on grass areas has changed in recent years?
10. What do you think is the current state of public expectations and

opinions on grass areas?

CONNECTION TO ECOLOGY

11. What values and issues are you planning for from an environmental and sustainability perspective?
12. What are your environmental requirements?

THOUGHTS ON FURTHER DEVELOPMENT

13. What are your plans and thoughts regarding the future development for municipal grass areas?
14. How would you design and manage grass areas if you can decide for yourself?

APPENDIX

APPENDIX D

Appendix D show questionnaire used for interviews with contractors managing grass areas in Lundby and Angered. The first page present how the questions were formulated in Swedish and the following page show the same questions translated to English.

FÖRVALTNING, ENTREPRENÖR

Namn:
Utbildning:
Position:
Tid på position:

1. Berätta om dina arbetsuppgifter.
2. Hur ser ert samarbete med kommunen ut?
3. Hur arbetar du med gräsytor i ditt yrke?

OLIKA TYPER AV GRÄSYTOR

4. Vilka typer av gräsytor förvaltar ni idag och vilken skötsel är kopplad till dessa?
5. Vilka problemaspekter brukar komma upp vid planering och skötsel av gräsytor?

FÖRVALTNING AV GRÄSYTOR

6. Hur ser förvaltningsrutinerna ut för gräsmattor i ditt arbetsområde?
7. Hur har förvaltning av gräsytor förändrats de senare åren?
8. Hur har kostnaderna för förvaltning förändrats?
9. Hur du några tankar om hur man kan arbeta med andra typer vegetation istället för traditionell gräsmatta?
10. Vet du något exempel där man har arbetat på ett annorlunda sätt med gräsytor?

ALLMÄNHETENS UPPLEVELSE AV GRÄSYTOR

11. Upplever du att synen på gräsytor har förändras de senaste åren?
12. Hur upplever du att allmänhetens förväntningar och åsikter om gäsytor är?

KOPPLING TILL EKOLOGI

13. Vilka värden och aspekter planerar ni för ur ett miljö- och hållbarhetsperspektiv?
14. Hur ser era miljökrav ut?

TANKAR OM FRAMTIDA UTVECKLING

15. Vad har du för planer och tankar rörande den framtida utvecklingen av gräsytor?
16. Hur skulle du vilja göra med utformning och förvaltning av gräsytor om du får bestämma själv?

MANAGEMENT, CONTRACTOR

Name:

Education:

Position:

Time at position:

1. Tell about your tell assignments.
2. What does your cooperation with the municipality look like?
3. How do you work with grass surfaces in your profession?

DIFFERENT TYPES OF GRASS AREAS

4. What types of grass areas do you manage today and what maintenance is linked to these?
5. What problems aspects usually come up in the planning and maintenance of lawns?

MAINTENANCE OF GRASS AREAS

6. What are the management practices for grass in your area?
7. How has the management of grass areas changed in recent years?
8. How has the cost of management changed?
9. Do you have any thoughts on how to work with different types of vegetation instead of conventional lawn?
10. Do you know of any example where a different approach for grass areas has been used?

SOCIAL PERCEPTION

11. Do you believe that the view on grass areas has changed in recent years?
12. What do you think is the current state of public expectations and opinions on grass areas?

CONNECTION TO ECOLOGY

13. What values and issues are you planning for from an environmental and sustainability perspective?
14. What are your environmental requirements?

THOUGHTS ON FURTHER DEVELOPMENT

15. What are your plans and thoughts regarding the future development for grass areas?
16. How would you design and manage grass areas if you can decide for yourself?

APPENDIX

APPENDIX E

Appendix F show full lists of species to be used for different types of meadows.

FULL LIST OF SPECIES FOR MEADOWS

SPECIES FOR COMMON MEADOW:

HERBS:

Achillea millefolium (rölleka)
Campanula persicifolia (stor blåklocka)
Centaurea jacea (södklint)
Centaurea scabiosa (säddklint)
Filipendula vulgaris (brudbröd)
Galium verum (gulmåra)
Geum rivale (humleblomster)
Hieracium umbellatum (flockfibbla)
Hypericum maculatum (fyrok. johannesört)
Hypericum perforatum (äka johannesört)
Hypochoeris maculata (slätterfibbla)
Knautia arvensis (åkervädd)
Leontodon hispidus (sommarfibbla)
Leucanthemum vulgare (prästkraze)
Plantago lanceolata (svartkämpar)
Plantago media (rödkämpar)

Primula veris (gullviva)
Prunella vulgaris (brunört)
Ranunculus acris (smörblomma)
Rhinanthus serotinus (höskallra)
Rumex acetosa (ängssyra)
Silene dioica (rödblära)
Silene vulgaris (smällglim)
Succisa pratensis (ängsvädd)

GRASSES:

Anthoxanthum odoratum
(vårbrodd)
Helictotrichon pratensis
(ängshavre)
Helictotrichon pubescens
(luddhavre)
Cynosurus cristatus (kamäxing)
Festuca ovina (fårsvingel)
Festuca rubra (rödsvingel)

(Pratensis, 2015d)

SPECIES FOR DRY MEADOW:

Achillea millefolium (rölleka)
Armeria maritima (trift)
Antennaria dioica (kattfot)
Anthyllis vulneraria (getväpling)
Dianthus deltoides (backnejlika)
Galium verum (gulmåra)
Hypochaeris radicata (rotfibbla)
Jasione montana (blåmunkar)
Lotus corniculatus (kärringtand)
Lychnis viscaria (tjärblomster)
Rumex acetosella (bergsyra)
Saxifraga granulata (mandelblomma)

Silene uniflora (strandglim)
Plantago media (rödkämpar)
Pulsatilla vulgaris (backsippa)
Trifolium arvense (harklöver)
Veronica spicata (axveronika)
Veronica officinalis (ärenpris)

(Pratensis, 2015f)

SPECIES FOR WET MEADOW:

HERBS:

Achillea ptarmica (nysört)
Angelica sylvestris (strätta)
Caltha palustris (kabbleka)
Eupatorium cannabinum (hampfflockel)
Filipendula ulmaria (älgört)
Geranium sylvaticum (midsommarblomster)
Geum rivale (humleblomster)
Hypericum maculatum (fyrok. johannesört)
Lychnis flos-cuculi (gökbloster)
Lysimachia vulgaris (videört)
Lythrum salicaria (fackelblomster)
Myosotis scorpioides (äka förgätmigej)
Prunella vulgaris (brunört)
Ranunculus acris (smörblomma)
Serratula tinctoria (ängsskära)
Silene dioica (rödblära)
Succisa pratensis (ängsvädd)
Trollius europaeus (smörboll)

Valeriana officinalis (läkevänderot)

GRASSES:

Alopecurus pratensis (ängskavle)
Briza media (darrgräs)
Carex elata (bunkestarr)
Cynosurus cristatus (kamäxing)
Deschampsia caespitosa (tuvtåtel)
Festuca pratensis (ängssvingel)
Festuca rubra (rödsvingel)

(Pratensis, 2015c)

SPECIES FOR GROVE MEADOW:

HERBS:

Campanula latifolia (hässleklocka)
Campanula trachelium (nässelklocka)
Myosotis sylvatica (skogsförgätmigej)
Potentilla erecta (blodrot)
Silene dioica (rödblära)
Stellaria holostea (buskstjärnblomma)
Veronica officinalis (ärenpris)

GRASSES:

Agrostis capillaris (rödven)
Deschampsia flexuosa (kruståtel)
Festuca rubra (rödsvingel)
Melica nutans (bergslok)

Milium effuse (hässlebrodd)

Poa nemoralis (lundgröe)

(Pratensis, 2015e)