



Designing Intermediate Community Use during Brownfield Phytoremediation in a Post-Industrial Urban Redevelopment Project

A Case Study in Nyhamnen, Malmö

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Independent project • 30 credits

Swedish University of Agricultural Sciences, SLU

Faculty of Landscape Architecture, Horticulture and Crop Production Science

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Keywords: applicability analysis of phytoremediation, brownfield, intermediate community use, landscape architecture, post-industrial city of Malmö, sense of place

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Abstract

Malmö, once flourished with industries, has been transitioning since its decline in the 1980s. The redevelopment of Nyhamnen, one of the post-industrial areas, started in 2018 to accommodate the expected increasing population until 2050.

The City of Malmö focuses on redeveloping within instead of expanding the city. Land reuse is efficient; however, there is an issue of contamination from previous industrial use. The risk classification phase 1 of MIFO, A Methodology for Inventory of Contaminated Areas, divides brownfields into four categories. The two highly contaminated groups become the target for remedial actions, and the two less polluted groups are often left behind. It leads to moderately contaminated sites, the highest in case numbers, being left untouched.

Phytoremediation, in-situ remediation utilising the plant mechanism to absorb or decompose contamination, is an environmentally and economically friendly method. It may take an extended application period, depending on the condition. Hence, this thesis investigates phytoremediation's applicability in a long-term redevelopment plan.

Furthermore, this paper explores the potential of community creation through phytoremediation and community gardening as an instance of bottom-up initiation. The long-term application of phytoremediation may allow community development in a newly developing area. Container community gardening, which does not choose on-site soil conditions, is flexible and contributes to community formation that individualisation alienated.

Communities in society are fundamental in supporting autonomous behaviour and being active citizens. By understanding behaviours, sense of place, communication and the supporting system, Landscape Architecture may encourage forming a space for communities.

A design as an example of intermediate community spatial use during phytoremediation conducts on the brownfield Medusa 1 in Nyhamnen. There is a potential for phytoremediation's application in Nyhamnen, Malmö, in line with the aims of the City of Malmö and the County Administrative Board of Scania, despite the difficulties of project planning in terms of time and technique. Community gardening, an example of intermediate use of brownfields, may contribute to community formation and promote active citizen engagement by supporting their autonomous behaviour.

Keywords: applicability analysis of phytoremediation, brownfield, intermediate community use, landscape architecture, post-industrial city of Malmö, sense of place

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Abbreviations, Terms and Translations

The following list displays abbreviations and translations of English, Japanese and Swedish words. Translations conducted by the author are shaded in grey. Terms are written in *italics*. The categories are the following:

Code: the ISO 630-1 language codes

Original: the original words

Translation: if the word is not in English

Meaning: if the word implies different from the original meaning

Abbrev.: abbreviation in this thesis

Code	Original	Translation	Meaning	Abbrev.
ja	アミューズメントパーク / <i>Amusement Park</i>	Amusement Park	Space with a designated use	-
ja	場所性 / <i>Bashosei</i>	Placeness	-	-
en	<i>Citymakers</i>	-	Actors who compose the complex situation of the city from citizens, authorities and anyone in between through practice	-
en	<i>Citymaking</i>	-	The act of composing the complex situation of the city through practice	-
en	The City of New York	-	-	CNY
ja	コモナリティ・コモナリ ティーズ / <i>Commonalities</i>	Commonalities	A shared understanding of space	-
en	East New York	-	-	ENY
sv	EBH-Portalen / Efterbehandling av förorenade områden- Portalen	EBH-Portal/ The Post Treatment of the Contaminated Areas Portal	-	-
sv	MIFO / En metodik för inventering av förorenade områden	A Methodology for Inventory of Contaminated Areas	-	MIFO
sv	Fastighets- och gatukontoret	The Property and Street Office	-	FG
sv	Förorenade områden	Polluted Areas	-	-

en	Geologic Information System	-	-	GIS
ja	Hanami	Flower Viewing	Japanese cherry blossom bloom viewing	-
en	The New York City Department of Housing Preservation and Development	-	-	HPD
ja	原風景 / <i>Genfūkei</i>	Primal Scene	-	-
ja	原っぱ / <i>Harappa</i>	Field	Brownfield	-
sv	Känslig markanvändning	Sensitive Land Use	-	KM
sv	Kolonilotter	Allotment gardens	-	-
sv	Malmö stad	The City of Malmö	-	MS
sv	MIFO	En metodik för inventering av förorenade områden	A Methodology for Inventory of Contaminated Areas	MIFO
sv	Mindre känslig markanvändning	Less sensitive land use	-	MKM
sv	Mindre än ringa risk	Less than slight risk	-	MRR
sv	Naturvårdsverket	The Swedish Environmental Protection Agency		NVV
sv	Odlingslotter	Allotment gardens	-	-
en	<i>Steward</i>	-	An actor practicing <i>Stewardship</i>	-
en	<i>Stewardship</i>	-	Activities that can lead to activism, consisting of impacts on politics	-

1. Introduction

My Bachelor thesis *Intermediate Community Use during Brownfield Remediation: Phytoremediation's Applicability Analysis in the Post-Industrial City of Malmö* investigated if phytoremediation could be suitable for remediating brownfields, Swedish *förorenade områden*, 'with a temporal to permanent spatial use during the application in [...] Malmö by understanding brownfields, their use, and remediation structure and methods by literature studies and reviews, case studies and GIS analysis' (Chimura 2022:3). The investigation found 203 potential sites based on previous land use.

Based on the result of previous research, this thesis focuses on Nyhammen, the current large-scale urban redevelopment and post-industrial area in Malmö, to explore the potential of phytoremediation and the intermediate use of urban agriculture.

1.1 Background

1.1.1 Malmö from Industrial to Knowledge-Based City

Malmö, the city in the south with the third largest population of Sweden, is facing a large-scale transition over decades. In the 1980s, 'medium to large industries' faced a decline (Chimura 2022:45 see Dannestam 2009:113). With the new visions of 'city of knowledge', a 'city of experience' (Chimura 2022:45 see Nilsson 2016:15, Dannestam 2009:121) and a 'creative city' (ibid.) in *The Comprehensive Plan for Malmö 2000*, the City aimed at a transition to a knowledge-based city to fill in the loss and develop further.

The increasing population confirms the success of the vision. In the following financial crisis of the 1990s (Chimura 2022 see Nilsson 2016:4; Dannestam 2009:114), 'about 30,000 residents moved out, and immigrants came in' (Chimura 2022 see Nilsson 2016:13; Dannestam 2009:114).

With the effective policy, Malmö expects a population increase from 350,000 (Malmö stad n.d.a) in 2021 to 500,000 in 2050 (Malmö stad n.d.b), while some cities in the world are facing shrinkage. Some former industrial areas, such as Västra Hamnen and Nyhamnen, are transitioning into residential areas to accommodate the increasing population.

Furthermore, The County Administrative Board of Scania 'aims to densify within cities partly by remediating contaminated sites, which have environmental issues, by 2050 (Länsstyrelsen Skåne n.d.b) with the principles of protecting Scanian water and agricultural land (ibid.)' (Chimura 2022:41).

Project Area Selection

The criteria for the area selection in Malmö are a post-industrial area awaiting or undergoing redevelopment and a space for admitting new ideas in the City of Malmö's planning scheme.

The redevelopment of Nyhamnen newly took place in 2018, and there is time to include new elements until its completion. Also, the planning scheme, inventive and flexible approaches (Kommunstyrelsen 2019b:9) to include landowners, property developers, authorities and planners (Kommunstyrelsen 2019b:52) for meeting place creation and management (Kommunstyrelsen 2019b:37) indicates a potential to accommodate intermediate community use during brownfield phytoremediation.

Moreover, Nyhamnen previously had a community garden, Vintergatan Urban Garden. Reintroducing community gardening is likely relevant to community formation in the new mixed-use redevelopment area.

1.1.2 Crisis of Collective Sense of Place

The word *identity* can be interpreted in various ways. Sense of place is an understanding of place identity by several Japanese scholars, and their understanding may be new insights to a western audience. Sense of place forms through people's interaction with the surrounding environment, contributing to the city's 'scent or atmosphere' (Chimura2022:24).

Transformation influences people's connections to a place built up over time; for example, individual or collective memories and everyday uses. Thus, physical transformation raises questions about how to address the resulting conflicts. This thesis approaches the question from the perspective of a sense of place.

Harappa, the concept first introduced by the former Japanese Literary Critic Takeo Okuno in the 1970s, connotes brownfield in Japanese even though it means *field* in direct translation. Brownfields, abundant in Japanese cities before and after World War II until mass reconstruction, were the playgrounds for children (Chimura 2022:22, 23). 'Ferociousness and playfulness' (Chimura 2022:23 see Aoki 2019:19), evoked by being at a brownfield, let them play 'involuntarily and aimlessly' (Chimura 2022:24 see Okuno 1972; Aoki 2019:19), the act of tracing back the site history to be a 'bare human nature' (ibid.).

Genfūkei, meaning *primal scene* in direct meaning, is another concept of Okuno. The *primal scene*, according to the former Professor of the College of Liberal Arts at International Christian University Akira Hoshino and the former Professor of the Literature Department at Aoyama Gakuin University Kouichi Hasegawa's description, is:

A mental image that, among the landscapes and scenes that an individual experienced in his or her childhood life environment, is recollected many times later in life, which has some effect or meaning on the current psychological process (1983:45-75 see Koizumi 2014:228).

Research about the primal scene in cultural anthropological, agricultural, human geographical, architectural and psychological aspects has been conducted since the concept's introduction in the 1970s (Koizumi 2014:229). It claims that 'each ethnic group and climate has a common primal scenery' (Chimura 2022:23 see Ueda et al.

2005:127; Koizumi 2014:228; Okuno 1972), meaning a collective sense of place. Today, the share of the collective sense of place based on ethnicity may be less by nature in the diverse society. On the other hand, tracing the city's sense of place's origin is still relevant for developing it.

The Japanese Architect Jun Aoki warns that *amusement parks*, 'spaces with a designated use' (Chimura 2022:25 see Aoki 2019:28) as a metaphor, threaten the existence of *fields* (Chimura 2022:25 see Aoki 2019:27). In other words, developments dominate the raw state of land and its sceneries (ibid.), or redevelopments take over brownfields.

Accordingly, children without an encounter with *fields* are less likely to have a chance to connect to a place as primitive human beings. Experience in a *field* aids the formation of a *primal scene* that is a lifetime image in one's mind.

1.1.3 Landscape Architecture and Brownfields' Circumstances

The Catalan Architect, Historian and Philosopher Ignasi de Solà-Morales Rubió (Chimura 2022:20 see Solà-Morales 1995:122-123) writes in his text *Terrain Vague* that the void in the city is a possibility to refill from the standpoints of Architecture and Urban Design. In contrast, Landscape Architecture plays a vital role in understanding and approaching certain states of brownfields and the post-industrial legacies of urban voids, potentially influencing the new understanding of Architecture and the authority to acknowledge an alternative definition of public space and its users. The Architect and a Lecturer in Landscape Architecture at the Harvard University Graduate School of Design Sergio Lopez-Pineiro suggests *urban voids* as an alternative public space 'that is truly significant in both sociocultural and ecological terms' (Chimura 2022:20 see Lopez-Pineiro 2020:71).

1.1.4 Brownfields and Necessity of Remediation

Land contamination, left from industrialisation, is an urban problem in the city. Limited land in urban areas constantly redevelops for efficient use, and less contaminated lands receive new functions without being remediated.

Brownfield connotes polluted land. Swedish term *Förorenade områden* (Länsstyrelsen Skåne n.d.a), polluted areas, is equivalent to brownfield. A brownfield or land contamination is a recurring condition for urban lands due to previous site use, which remains without remediation. The condition may affect redevelopment by, such as contaminating groundwater. Moreover, land contamination may hinder certain activities, such as food foraging, on re-naturalising land to preserve 'sociological and ecological' (Chimura 2022:20 see Lopez-Pineiro 2020:71) values on site. Remediation is crucial when concerning the long-term environmental effect.

The Swedish national database *EBH-stödet, The Post Treatment of the Contaminated Areas Support*, maps out potential and actual brownfields in risk levels 1. Significant risk to 4. Minor risk in phase 1. After the initial classification, class 1 and 2 brownfields are the only targets for detailed investigation, which especially leaves class 3, Moderate risk brownfields. Many of the brownfields in the Scanian region fall in class 3 (Chimura 2022:40 see Länsstyrelsen Skåne n.d.b). Moreover, it is the second largest group in Malmö (Chimura 2022:47 see Persson

& Lindqvist 2018:26). Class 3 brownfields may still negatively influence human health and the environment even though they may not immediately harm new functions and people above ground. Another concern is that the contamination will spread in the area over time, especially with slant and to the surrounding water outlets through groundwater.

Traditional soil remediation methods significantly affect the microbial environment and are high-cost (Chimura 2022:27). Moreover, the high cost holds many contaminated lands untouched. Phytoremediation is an alternative, cheap and relatively unapplied method. Specific vegetations are applied to take up certain chemicals, such as 'heavy metals and organic pollutants' (Raza et al. 2020:4) in soil, water (Chimura 2022:28 see Svenska Geotekniska Föreningen 2019) and air (Raza et al. 2020:4). Phytoremediation can treat up to moderate contamination by typical chemicals (ibid.) and is one of the most sustainable and cheapest among the existing remediation methods. Although the method may be suitable according to the condition, risk class 3 and 4 brownfields with up to moderate contamination are often untreated after the initial investigation (Chimura 2022:42 see Länsstyrelsen Skåne n.d.b) in Sweden. The reason may be due to the cost of traditional remediation. Moreover, phytoremediation often needs an extended application time of over a decade (Chimura 2022:28-29), which may be why the application of the method is limited.

Taking the extended period of phytoremediation application time as an advantage, it may maintain brownfields closer to *harappa* and moderate the balance between brownfields and *amusement parks* within the city, in Aoki's words. By doing so, site history can be recognised and contributes to gradually building an extended sense of place.

The trend of recent years is Landscape Architecture combined with nature-based solutions applied to mitigate environmental problems. Various areas, such as rainwater management and urban greening against extreme weather and temperature rise caused by global warming, are developed and have already been practised widely. Phytoremediation, one of the cheapest methods, is already applied to Landscape Architecture in the form of parks, such as Landschaftspark Duisburg-Nord, in post-industrial sites for an extended period. If phytoremediation application in the urban context is possible, more urban lands may turn out to be clean, and the potential risk to public health and the environment will diminish.

1.1.5 Urban Agriculture's Significance

Urban agriculture's significance for community development and its various benefits are proven worldwide, such as accessibility to fresh harvests, health promotion through harvest intakes and gardening, vocational training, creating business opportunities, community formation, learning through communication, and action to climate change (Dewey 2020).

Community gardens often find a place on brownfields, *fields* in Okuno's term, abandoned or contaminated from previous use, hindering development. For example, Gemeinschaftsgarten Allmende-Kontor is built on Berlin's reclaimed former airport park Tempelhof Field. Many garden lots contact the ground, although the ground is contaminated. Some gardeners apply tree branches to isolate gardening soils from the ground, and edible plants that likely absorb contaminants

are not allowed to be planted (Chimura 2022:33). The biggest park in Berlin suffers from being the redevelopment target to solve the city's housing shortage issue (ibid.). The existence of an iconic garden, which attracts many visitors, contributes to saving the extraordinary green space.

Malmö has another example. The students of Malmö University initiated the former community garden Vintergatan Urban Garden in Malmö, Sweden to create 'a garden for students to reduce stress' (Chimura 2022:31 see Vintergatan Urban Garden n.d.) in Nyhamnen in cooperation with the landowner Skanska Öresund, bridged by the City of Malmö. Due to the contaminated ground mentioned by the gardener and one of the initiators, Jenny Sjölin¹, the garden applied a container growing method. The garden opened in 2018 and moved to a nearby district, Västra hamnen, in 2021. According to Sjölin¹ in her interview, one reason for the closure was the garden's location in the middle of an industrial area with no residents. The garden struggled to gain stable members¹. Despite the development plan from 2018, the garden could not wait for the future residents of the area.

Phytoremediation and the intermediate use of brownfields, such as urban agriculture, in maintaining the share of *fields* and citizen-oriented local sense of place formation may add value to lively neighbourhood creation.

1.2 Purpose

The purpose is to research the sense of place development by reflecting on site history in the intermediate use of brownfields during phytoremediation from the perspective of Landscape Architecture to reveal its potential for further expansion of the field and the application of phytoremediation as a remediation method.

1.2.1 Research Question

The central research questions of this master thesis are; *How does intermediate community use of brownfields during phytoremediation's application in post-industrial urban redevelopment contribute to the ground-up local appropriation on top of the site history to shape a sense of place? What could a design proposal for the currently ongoing post-industrial urban redevelopment area of Nyhamnen, Malmö look like?*

1.3 Method and Limitations

Design Concept

Inspirations for the design concept come from phytoremediation and community gardening. The design aims to approach the issues of abandoned land contamination, the societal issue of dissolving communities and the loss of historical sense of place at a district redevelopment in the urban environment.

¹ Sjölin, J., a community gardener and initiator, Vintergatan, Interview 2022-03-03

General Approach

The research project method is *the constructive model and the artistic model of research through design in the research-based landscape design*. *Research-based landscape design* is research into, through and for art and design (Frayling 1993 see Jansson et al. 2019:12), of which *research through design* investigates learning outcomes, experiences and interactions through the designing process (Jansson et al. 2019:13). The method contributes to expanding the discipline of Landscape Architecture through academic and design knowledge including other fields of study frequently (Lenzholzer & Brown 2016 see Jansson et al. 2019:14). *Research through design* consists of (post)positivist, constructivist, advocacy or participatory and pragmatic models (Creswell 2003, Lenzholzer et al. 2013, Lenzholzer et al., 2016 see Jansson et al. 2019:14).

Besides, this research takes *the constructivist model*. *The constructivist model* is context-based and is significant in Landscape Architecture (Jansson et al. 2019:14), for which ‘techniques, theories or concepts are explored by testing something new’ (ibid.). This thesis examines the expression of intermediate use of brownfield during phytoremediation through Landscape Architecture and how the design example of community gardening as an outcome may influence potential users and identify the design process.

Another applicable model in *research-based landscape design* is *the artistic model*. Milburn and Brown (2003 see Jansson et al. 2019:21) introduce *the artistic, intuitive, adaptive, analytical and systematic models*. Concept creation does not reflect the research (Milburn & Brown 2003:62 see Jansson et al. 2019:21) in the artistic model; thus, the concept development of this research project took place before the research. At the same time, research reinforces and adjusts the design (ibid.).

Research Methods

The research applies literature and case studies to investigate the intermediate use of community gardening on brownfields from ecological, societal and social perspectives. It examines theories, structural function, planning schemes, brownfields’ situation, the state of contaminations, phytoremediation plants and post-industrial and temporal design. This research’s origin is a previous study of the same topic in my Bachelor thesis *Intermediate Community Use during Brownfield Remediation: Phytoremediation's Applicability Analysis in the Post-Industrial City of Malmö*; therefore, this paper reflects its literature, case studies and an interview as a base.

The use of literature is solely for explaining the background of and supporting the process and ideas in design and structural planning. As the focus lies on designing spatial use, this paper does not investigate the phytoremediation mechanism and previously covered aspects in the Bachelor thesis in-depth.

The case study of East New York in Chapter 3 is a literature study that mainly refers to the book *Citymakers: The Cultural and Craft of Practical Urbanism* by Cassim Shepard from the perspective of how the actors, such as active citizens and organisations apart from planners, expand the city. Analysing and understanding the actual *citymakers* who contribute to city creation would be a clue for supporting bottom-up initiations’ prosperity for community creation.

The area of Nyhamnen in Malmö, Sweden, is a case study site for the design proposal. Chapter 4 investigates Nyhamnen's history and development plan from the City of Malmö to find the existing area identity and determine the potential of intermediate community use during phytoremediation. The site visit complemented the understanding of the current situation of the site. Furthermore, this paper integrates an interview with the initiator and a gardener Jenny Sjölin of the previous Vintergatan Urban Garden from my Bachelor thesis to illustrate the relevance of bringing back a community garden to the area.

Moreover, document analysis of brownfields in Nyhamnen selected the suitable project site. The state of contamination of Nyhamnen's brownfields refers to the internal documents provided by Scania County Administrative Boards and the City of Malmö's Environmental Administration.

Graphic Tools

Visual materials of tables, photos and drawings complement understanding. Mapping and visualisation of design utilise computer software, ArcGIS, Vectorworks, Adobe Photoshop, Illustrator and InDesign.

2. Public Space for the Local Identity

This chapter reconsiders the meaning of public in public spaces. It discusses how to make public spaces centred around *commonalities* (Tsukamoto 2019a:8), the term of the Estonian-American Architect and former Professor at Yale School of Architecture Louis Kahn.

The following sections will discuss the term *commonalities*, *commonalities* for hosting social relationships, the background of commons' disappearance, hinders of Architecture for *commonalities*, behaviorology, behaviours, the structure of biopower suppressing autonomy, and behaviour production in Architecture.

2.1 Commonalities

Commonalities can be apprehended as a shared understanding of space. The Japanese Architect Yoshiharu Tsukamoto reviews *commonalities* as the word that reflects 'the root of architecture' (Tsukamoto et al. 2019:169) even though Kahn does not describe the word clearly. Tsukamoto further mentions that *commonalities* make us resonate with ancient architecture with communication 'through space in the depths of human beings, transcending time and place' (Tsukamoto 2019a:8). People can relate to ancient architecture because they have an intrinsic understanding of ancient life in the space.

Curiously, brownfields own the same spatial quality. The term *field* meaning brownfield, by the former Japanese Literary Critic Takeo Okuno and interpretation by the Japanese Architect Jun Aoki, 'has a shared and fundamental sense for everyone beyond physical space, time and generation' (Aoki 2019:21-22).

This feature of brownfield supports the character of *commonalities*; the place enables communication from current to past time (Tsukamoto 2019a:8). Therefore, the interpretation of *commonalities* can be shared behaviour produced in the interaction with and within the space.

2.1.1 Commonalities for Hosting Social Relationships

Architecture has a potential in public space creation centred around *commonalities*. Contemporary Architects inherit and develop Kahn's theory. The Japanese Architects Tsukamoto and Momoyo Kaijima comprehend people's behaviours and backgrounds within the societal system, intending to actively engage Architectural *commonalities* to design in public space in their book *Commonalities: Production of Behaviors*.

Tsukamoto and Kaijima (2019:42) believe that autonomous behaviour enables people to create and terminate space in their responsibility. Therefore, Tsukamoto

(Kaijima et al. 2019:42, Tsukamoto 2019b:51) intends to encourage people's autonomy to guide them from individualities to *commonalities* through Architecture and public spaces, which become the hosting ground for social relationships (Kaijima et al. 2019:42).

Placeness, the relationship between place and behaviour, is the key to guiding design to the intertwined relationships among public components (Tsukamoto 2019b:51).

For approaching design for *commonalities*, the first step is to understand the mechanism of the current highly-regulated society and rediscover poeticness, inhibited in space and Architecture (Kaijima 2019:41).

2.1.2 Commons' Disappearance in the City

Understanding the commons' situation is crucial for understanding the importance of *commonalities*. Commons were dissolving due to industrialisation. Tsukamoto (2019b:51) understands that the industrialisation and specialisation of industries resulted in the dissolution of life in the urban environment. As a result, people lost communal life and became detached from nature in return for freedom from food production and environmental protection (Kaijima et al. 2019:18). Urbanisation encouraged individualism, and individualism weakened commons, shared spaces in society.

Also, individualism prevents citizens from understanding the character of the local area, and it dissatisfies people despite their economic wealth (Kaijima et al. 2019:18). The price for freedom and anonymity in the city is isolation.

At the same time, commercialisation is encroaching on publically open spaces, which corners citizens to react against and 'autonomously and publicly' (ibid.) form their spaces. Individualism can promote privatisation, such as enclosed courtyards of private apartment buildings. Hence, privatisation directly supports commercialisation.

2.1.3 Architecture's Struggle in Common Space Creation

Accordingly, the Architectural approach towards the commons is also struggling (Kaijima et al. 2019:18) in the flow of individualism. Tsukamoto describes the failure of Architectural design for community creation, the concept from the 1960s, allocating the remaining part of the building for a common space (Kaijima et al. 2019:18), a shared yet not common space in a true meaning of a lower value than other building functions. Moreover, management responsibilities and unestablished community within the building users are the issues for the space to remain empty (Kaijima et al. 2019:18). Individualism hinders Architecture's attempts at common space creation.

In the apartment building where my family lives in Tokyo, there was a 150cm ornamental plant in the shared entrance hall for many years, cared for by the caretakers. One day, it disappeared with a poster stating the reduction of expenses decided by the residents' meeting. The pot was the only organic element supplementing the inorganic and empty stone hall. The living plant was the connection between the residents and the building, stretching and bringing in the quality of greenery right outside the entrance to the indoor environment. The plant

was removed for economic reasons, even if the common element was managed. The entrance hall lost life, a natural element that used to be a part of spatial identity and a connecting point among the residents, and is now empty. Disinterest in commons, led by individualism, espouses anonymous space reproduction.

Public spaces are also facing a struggle to host commons. One of the causes behind the empty public spaces is the highly regulated society, according to Kaijima (2019:41). Kaijima (ibid.) indicates that the regulations and disciplines dictate Architecture to stay within the frame. Tsukamoto (Kaijima et al. 2019:21) brings up an example of the large city hall's plaza, created quantitatively to accommodate numbers of people, which considers people as a mass public rather than their identities. Tsukamoto (ibid.) argues that such public spaces remain empty because they aim at users without utilising skills and not inviting skilled users. Although located indoors, the entrance hall of the building where my family lives in Tokyo ended up in the same situation. All in all, individualism and a highly regulated society drive against hosting commons both in and outdoors.

2.1.4 Structure of Biopower and the Effect on Autonomy

Biopower controls citizens in society and negatively affects the diffusion of autonomous behaviour.

Tsukamoto (2019b:44-45) points out the French Philosopher Michael Foucault's description of biopower that the nation takes care of security over citizens' lives, seen in the form of regulations, and states that it also regulates their behaviour.

Biopower, the societal system with industries, authorities and academics, takes care of people's life and manages their behaviour (Tsukamoto 2019b:44-45) by regulations. Although it looks good to maintain the standard at first sight, biopower discourages people from 'sharing autonomous behaviour' (Tsukamoto 2019b:45) by regulating them. For these reasons, awareness of biopower is unavoidable in discussing autonomous behaviour.

Moreover, Tsukamoto is concerned that in a society with no commons, isolated individuals without a choice may fall into the market society (Tsukamoto 2019b:45-46) as a resulting influence of biopower.

2.2 Behaviorology

Behaviorology can be considered a component of *commonalities*. Tsukamoto's notion of *behaviorology* is that people, nature, such as light and wind, and Architecture, such as the repetition of buildings and their change over time in the cityscape, can behave naturally in the shared spaces, and the actors have self-control (Kaijima et al. 2019:22, 41-42). People's behaviour in *behaviorology* is grounded in the skills in their background of community and culture, which can be updated (Kaijima et al. 2019:21, 42) by learning from others. For example, Music and exercise (Kaijima et al. 2019:21) are worldwide behaviours of people.

2.2.1 Behaviour as a Component of Public Space

In public spaces, the behaving actors are people's bodies and nature, in Tsukamoto's theory (2019b:46-47). Tsukamoto (2019b:47) thinks that humans are endowed with essential knowledge of spatial appropriation, which shows up with 'tools and companions' (ibid.) at the right place.

In Tsukamoto's understanding, behaviour tends to be infectious, appears under certain circumstances and transmits to others in the environment. This cycle will continue and spread the behaviour to other people and generations. Therefore, Tsukamoto explains that behaviour is shared, and 'individuals cannot monopolise' (Kaijima et al. 2019:22) a place because people inherit behaviour over time. For this reason, Tsukamoto describes that his meaning of behaviour exists between individuals and places and cannot disrupt the connection (ibid.).

Figure 1. Hanami, Yoyogi Park. (Sakuraba 2007) (CC BY-NC 2.0)

In Tsukamoto's theory, nature is an actor who subjectively behaves in public spaces, interacting with human behaviour. An example of nature's behaviour forming people's behaviour is *Hanami*, cherry blossom bloom viewing in Japan (Kaijima et al. 2019:22). People gather under the trees to drink to embrace the coming of spring. Visitors' behaviour causes *Hanami*, which occurs by interaction with the behaviour of cherry blossom trees. Hence, this thesis argues that Landscape Architecture design can contribute to creating settings for behaviour productions.



Further, Tsukamoto (2019b:47-48) explains how weather and seasons affect nature's behaviour. Paved streets, the artificial structure, turn fallen leaves into rubbish that has to be dumped (ibid.), which occurs with human intervention. In this way, humans perceive nature's behaviour in Landscape Architecture. Besides, plant management creates 'a joint behaviour' (Tsukamoto 2019b:48) of humans and nature, such as urban agriculture, which reflects the growers' and consumers' food culture, local history of farming, and densification and works with growing, weather conditions, rebuilding in the cityscape and garbage issue (ibid.).

Tsukamoto (Kaijima et al. 2019:22) further explains that 'overlapping one's own behaviour with the others' behaviour may be one's experience of public space' (ibid.). Therefore, behaviour can constitute public space.

2.3 Behaviour Production in Architecture: Public Spaces for Commonalities

As to the theoretical sources invoked above, Architectural design may indirectly contribute to autonomous behaviours. Tsukamoto states that Architecture designs ‘the time scale and rhythm inherent in behaviour’ (Kaijima et al. 2019:22) and incorporates behaviours in it (ibid.). The production lines of behaviour in the city are ‘buildings and constructions’ (Tsukamoto 2019b:50) as well as ‘weather, the behavior of nature, tools and vehicles, cultural skills such as sports, music and food’ (ibid.), which create behaviour in connection with ‘social infrastructure and buildings’ (ibid.). Accordingly, behaviour bridges multiple dimensions in society (ibid.).

Initially, the design should invite individuals to the community (Tsukamoto 2019b:45-46). That means preventing them from falling into neoliberalism individualisation tendencies (ibid.). It also should support autonomous behaviours and their approach to ‘society, nature, culture and the economy’ (Tsukamoto 2019b:46) under the influence of biopower by going against its system (ibid.).

Supporting autonomous behaviour means comprehending the local living condition in a city (Tsukamoto 2019b:50); thus, the design should depart from understanding the existing site-specific natural and autonomous behaviour of people in publicly shared spaces (Tsukamoto 2019b:44).

At the same time, the production element in the line of ‘buildings and constructions [...] weather, the behavior of nature, tools and vehicles, cultural skills such as sports, music and food’ (Tsukamoto 2019b:50) should be recognised.

The qualities required for public space supporting behaviours, according to Tsukamoto (2019b:46), are supporting repetition of certain behaviours by various users and the coexistence of ‘multiple intimate spaces’ (Tsukamoto 2019b:47) for the transformation of the promenade into a public space (ibid.).

Regarding the requirements of public space creation, Tsukamoto (2019b:46) introduces that the place produces behaviour when certain behaviours are recurrent by various users, and ‘multiple intimate spaces are juxtaposed’ (Tsukamoto 2019b:47) for the transformation of the promenade into a public space (ibid.), as an example of the emergence of public space.

The design of this thesis engages with community creation to support people’s autonomous behaviour, as defined by Tsukamoto and Kaijima, beyond biopower and in line with Foucaultian ideas. For this reason, the research focuses on bottom-up design approaches in the following chapters.

3. Stewardship as a City's Identity

Figure 2. Brooklyn neighborhoods map. (Fitzgerald 2009) (CC BY 3.0)



This chapter will review the case of the urban agriculture renaissance in East New York as a case to study a successful approach to bottom-up design.

East New York, in the southeast of the borough of Brooklyn and Kings County facing Jamaica Bay in the megacity of New York-Newark, is a remarkable example of thriving communities with urban agriculture from the 1970s until today.

The Adjunct Assistant Professor at Columbia Graduate School of Architecture Planning and Preservation Cassim Shepard (2017:44)

investigates the actual *citymaking* and the actors by reviewing a series of New York projects in the United States as examples in his book *City Makers: The Culture and Craft of Practical Urbanism*. Shepard (2017:20) adopt the word *citymakers*, which implies actors who compose the complex situation of the city from citizens, authorities and anyone in between through practice. Thus, *citymakers* are *citymaking* that contrasts urbanism, which is ‘the legacies of the visual language of design and planning that incubated it’ (Shepard 2017:59) of conceptualisation by professionals (ibid.).

‘Environmental remediation, housing policy, land use litigation, community organizing, asset mapping, youth development, and food justice’ (Shepard 2017:58) converted East New York’s debts of abandoned lands. ‘The highest proportion of community gardens citywide’ (Shepard 2017:43) is there today, according to Lenny Librizzi, the Former Director of Green Infrastructure at GrowNYC.

3.1 The History of East New York

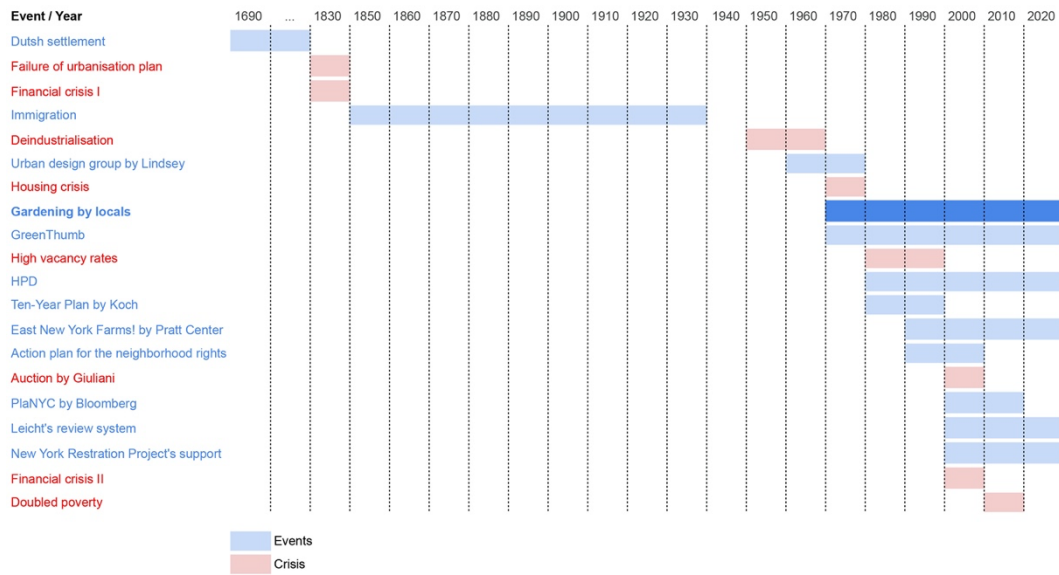


Figure 3. Events and Crisis in the History of East New York.

East New York, ENY, has been at the mercy of the legislation and economy of each period. In 1690, the area was a Dutch settlement with ten farms (Thabit 2003:9). In 1835, the first transformation with a top-down planning scheme came in, the ‘dream of metropolitan grandeur’ (Thabit 2003:10) of Colonel John R. Pitkins to build ‘the Market Garden of the United States’ (ibid.) with the function of the urban quarter. However, the financial crisis of 1937 turned ENY into rather sparsely patches of land (Shepard 2017:50). Shepard (ibid.) writes that the financial crisis was akin to current crises, such as the bubble burst of land prices and speculative property lending.

Immigration is another factor. From the 1850s to the 1930s, political planning directed excessive immigrants from dense districts to move to ENY, which was ‘one of the only places people of colour could move’ (Shepard 2017:50). The planning lasted only a short time due to unemployment following the decline of industrialisation (Shepard 2017:51-52). Immigrants moved out, and housing abandonment and arson were prominent in the 1970s (Shepard 2017:52).

Although the governments worked on the price rise and poverty, the accelerated situation caused landlords not to take care of their properties to pay the tax (ibid.). Eventually, the City of New York, CNY, obtained them with an arrearage of taxes due to in rem foreclosure (ibid.), for which the aim was to make full use of the property for housing at a reasonable price (The City of New York n.d.b). Hence, CNY became the second biggest landlord (New York University Furman Center for Real Estate and Urban Policy 2006:2), and ENY became one of the most city-owned areas in New York (Shepard 2017:49) by the early 1980s (Shepard 2017:52-53). Many properties ended up fenced and empty (Shepard 2017:52). Until the 90s, the area suffered from violence (Shepard 2017:42). In 2010, employment was getting stabilised (Aaron et al. 2010) from the effect of the 2007-2008 economic crisis. Since then, property value has become twice as high (Shepard 2017:42).

Behind the economic struggles of the area, bottom-up urban agriculture was growing. Debora Greig, the coordinator of East New York Farms!, a non-profit organisation established in 1995 targeting youth in urban agriculture, mentions that locals started gardening in these vacant lots (Shepard 2017:56), which eventually became an urban agriculture renaissance in ENY (Shepard 2017:49).

Since 1978, GreenThumb, part of the New York City Department of Parks and Recreation of CNY, has provided planning and equipment to community gardens (New York City Department of Parks and Recreation n.d.), a part of the New York City Department of Parks and Recreation of the City of New York. It lends out the city's vacant land to 'energetic community groups willing to [...] encourage grassroots neighborhood revitalisation efforts' (The City of New York n.d.a). The economic crisis allowed ENY spaces, people and support to grow. East New York gained spaces to grow through the abandonment caused by the economic crisis, which became public lands later, with public support.

3.2 The City's Deal with Real Estate Developers

Mayor John Lindsey, in the Department of City Planning of the City of New York, CNY, formed the Urban Design Group. Planning policies included real estate developers from 1967 to 1980 (Shepard 2017:47). The aim was to receive public goods from them in return (ibid.) Public goods are 'essential to the smooth function of the society —economically, politically, and culturally' (Reiss 2021), such as security, education and science, infrastructure, environment and public health (ibid.). The negotiation settled with the developers' provision of quality public spaces in return for allowance of exceeding size and height limits of the zoning regulation (Shepard 2017:47). The agreement was for competitive areas and failed East New York, where vacancy was significant (Shepard 2017:49).

Although it could mislead the policies closer to the market economy, it had the opposite aim. In the book *Urban Omnibus* interview, an Architect and an Urban Design Group member Raquel Ramati mentions that the developers will eat up the city without their involvement in the policy (Shepard 2017:47). CNY was successful in communicating with the developers who are involved in and in the middle ground of *citymaking*.

3.3 Key Actors to Urban Agriculture Renaissance

In East New York, where the City's policy with the developers to provide public spaces did not reach, the area residents took an opportunity and began gardening (Shepard 2017:56) in the condition of abandoned vacant lots since the 1970s (Shepard 2017:51-52) and insufficient availability of fresh food in the area (Shepard 2017:56-57). The actors' involvements were crucial for the success. Urban agriculture renaissance (Shepard 2017:49) occurred through the cooperation of residents in the area, promoters of non-profit organisations and the City of New York (Shepard 2017:43).

3.3.1 Bottom-Up Initiations

Apart from the lack of fresh food in the area, citizens' motivation comes from their background. The coordinator of New York Farms! Debora Greig names reasons for urban agriculture flourishing in East New York as the residents' rural origin and farming experience of settled African-American and Latino families and new immigrants, especially Caribbeans, West Africans and Bengalese (Shepard 2017:56-57). It can be considered that their familiarity to farming drove them to start cultivating in a new neighbourhood.

3.3.2 The City's Involvement

The City supports citizens' initiation. GreenThumb, providing planning and equipment to community gardens in New York City (New York City Department of Parks and Recreation n.d.), is part of the New York City Department of Parks and Recreation. The department handles land of more than one acre (Shepard 2017:54).

The New York City Department of Housing Preservation and Development, HPD, was established in the early 1980s when the City took over many unmanaged private properties through in-rem closure (Shepard 2017:52-53), the court's decision over a property (Cornell Law School Legal Information Institute n.d.). The department's duty was to 'make strategic investments that will improve and strengthen neighbourhoods while preserving the stability of [New York City's] existing housing stock' (ibid.). HPD intended to support 'open space and other amenities for people to make a community livable' (Shepard 2017:55) in the densified city, according to Holly Leicht, the previous Deputy Commissioner for HPD and a lawyer working for protecting open spaces and affordable housing. Leicht and her colleagues brought public goods, such as open space, as a functional element of housing (Shepard 2017:53-54). Leicht emphasises HPD's objective (Shepard 2017:54) that housing is essential for people's lives, yet neighbourhoods are the foundation of housing (Shepard 2017:53-54) in her interview for the book *Urban Omnibus*.

3.3.3 Planning Schemes and A Lawsuit

On the City's land, the survival of community gardens depended on the planning scheme. Mayor Edward Koch's \$5.1 billion Ten-Year Plan to 'renovate 82,000 units in occupied in rem buildings, rebuild 47,000 units in vacant in rem buildings, build 37,000 new units and upgrade 87,000 apartments in privately owned buildings' (New York University Furman Center for Real Estate and Urban Policy 2006) addressing the foreseen housing crisis had executed since 1985 (Shepard 2017:53-54). The objective was carried on to the successors, David Dinkins, from 1990 to 1993 and Rudy Giuliani's governance from 1994 until Giuliani brought in an auction for the disposal of land owned by the City of New York (Shepard 2017:54), CNY.

The decision brought locally shared spaces into a crisis (ibid.). Leicht, who was in-house counsel at the Municipal Art Society at that time, filed a lawsuit with a wide range of partners to introduce a 'review system' (ibid.) at the land

developments where a community garden exists (ibid.) for the gardening lands not to be taken away.

In Michael Bloomberg's administration in 2002, the lawsuit concluded with CNY's agreement to maintain about 500 community gardens and the construction of 2000 apartments on other lands (Steinhauer 2002). The verdict also mentioned a non-profit organisation's support, the founder of the New York Restoration Project, NYRP, a non-profit organisation founded in 1995, Bette Midler, to offer administration and monetary support to green spaces in neighbourhoods in need (Shepard 2017:55).

PlaNYC, with its first release in 2007, was introduced from 2002 until 2013. It addresses the 'Renaissance' (Shepard 2017:55) of parks and fresh foods (ibid.). Leicht reflects that the planning favoured urban agriculture's existence (ibid.), which saved some gardens in New York.

3.3.4 Research-Based Project

Pratt Center for Community Development in Brooklyn is an organisation for community planning with the most extended history of university background in the U.S. (Shepard 2017:55-56) since 1963. Pratt Centre aims 'to develop affordable housing and community facilities' (Shepard 2017:56), such as 'manufacturing, transportation, and community planning efforts' (ibid.).

Perry Winston, an Architect and a long-term member of the Centre (Shepard 2017:56), explains that Winston and the team identified that East New York, ENY, has the largest community by the newly introduced tool of the time, Geographic Information System software, GIS. More than 1/6 of GreenThumb community gardens in New York City, 10629 out of 58230, are in ENY (ibid.). The discussion among the Pratt Center and partners on how to apply gardens as a resource to the neighbourhood's needs led the community visioning meetings (Shepard 2017:56).

Based on the community needs of 'employment, security, health, and recreation' (ibid.), the non-profit organisation East New York Farms! was established in 1995. The strategy is to engage local youth to enhance garden production for creating products at the markets to save the existence of community gardens by becoming a part of the food chain (ibid.). The organisation is rooted and still active today (East New York Farms! n.d.).

3.3.5 *Citymakers* of Urban Agriculture in East New York

To summarise the actors for urban agriculture in East New York, the citizens' engagement in urban farming with their skills to access fresh food has raised GreenThumb of the City department to support. Urban agriculture became a part of the plan because it was rooted in and reflected the needs of the communities. The policies of each Mayor have shifted the situation around urban agriculture. Behind the Ten-Year Plan by Koch, community gardens survived in undeveloped plots. When the City land was about to be lost, Leicht and colleagues in HPD legally resisted. Pratt Centre's academic-based project with meetings with citizens has been successful in finding out their needs and involving them in practice. Shepard argues that *citymakers* are a wide variety of actors, top-down planners of 'designers, planners, builders, and elected officials' (Shepard 2017:44) and 'in between' (ibid.)

of ‘the engaged citizens, community advocates, and public servants, as well as their professional allies’ (ibid.) apart from bottom-up citizens.

All the City’s and organisations’ supports exist upon continuous interest and engagement of the local grower in the gardens that promote ‘public life for all’ (Shepard 2017:43).

3.4 Stewardship

Stewardship is a key behind more than half a decade of community gardens as public spaces in East New York. The long-term practice of *stewardship* ‘would enlarge our conception of public goods, a crucial component to an emerging definition of *citymaking*’ (Shepard 2017:58). Public goods give the impression of governmental provision; however, societal needs and requests are behind, characterising the city. *Stewardship* refers to ‘a diverse range of practices at the intersection of volunteerism, environmentalism, civic engagement, neighbourhood activism, and leisure’ (Shepard 2017:63). The interpretation can be activities that can lead to activism, consisting of impacts on politics. It is advocated through their acts, protesting in specific public spaces, confronting the government, and taking over the authority behind ‘the history of protest’ (Shepard 2017:44). Shepard (2017:58) states that the urban agriculture practice exhibit design, *citymaking*, citizenship and democracy. Shepard (2017:58-59) also criticises the fragility of places with *stewardship* and that they need regular management not to vanish. Even though community gardening practice is not directly protesting, it challenges individualism, the industrial food system, typical science classes in school, standardised vocational training and ordinary public spaces.

3.4.1 The Stewardship Ethic

Stewardship comes from The Land Ethic. The American naturalist and Author Aldo Leopold introduced the concept of The Land Ethic in the essay *A Sand County Almanac* in 1949. The Land Ethic considers ‘the Earth, as well: soils, waters, and animals’ (The Aldo Leopold Foundation n.d.) as ‘community’ (ibid.) as well as humans, and he calls them as ‘the land’ (ibid.) as a whole for the issue around ‘The land-relation’ (Shepard 2017:60), which is economically bounded with benefits without liabilities (ibid.). The Land Ethic is now known as The Stewardship Ethic. Leopold viewed people’s encounters with nature as ‘primarily aesthetic and consumptive’ (Shepard 2017:61) and wished them to be ‘stewards rather than consumers’ (ibid.). The formation of ‘our ability to extend our ethics beyond our own self-interest’ (The Aldo Leopold Foundation n.d.) takes place through the individual connection to nature (ibid.).

3.4.2 *Stewardship* in Public Spaces

Back in his time, Leopold ‘was among the first to criticize’ (Shepard 2017:60) not to extinct predator species to preserve the natural balance (ibid.). Shepard (2017:61) reflects that the understanding of public spaces in the urban environment should be active spaces for exercising collective and political citizenship rather than facilities

and recreation spaces. By nature, active citizens eager to take space fight for it. The activism of taking space in the city makes the actors feel connected to the space they protect and care for.

A counter-example of a place with a Stewardship Ethic is Central Park in New York City. The gigantic park took over private lands in the city's centre to create a picturesque scenery, considered by Leopold as 'the exclusive preserve of the rich' (Shepard 2017:61). For construction, 20,000 builders from abroad came (Shepard 2017:61-62). Moreover, the responsibility of management took a few decades to settle between the States and the City (ibid.) over the limited public resources (Shepard 2017:63).

3.4.3 *Stewardship Mapping*

Stewardship contributes to the development of the urban landscape. The Stewardship Mapping and Assessment Project, Stew-MAP, locates 'local citizen groups that are involved in stewardship action in their local communities' (NOAA Web Operation Center 2021), presently covering six big cities across the States (ibid.). The map contains information, such as 'their interactions with government agencies, NGOs, funding sources, and each other' (Shepard 2017:64) for research purposes (Shepard 2017:66). Stew-MAP indicates the importance of horizontal connection and economic flow among the actors. All the actors benefit from the authorities for an understanding of the situation to future *stewards* to find a suitable organization (Shepard 2017:65). Furthermore, it provides lawyers like Leicht, who supports bottom-up initiations with general information.

3.4.4 *Reason to Become a Steward*

Rebecca Solnit, a Writer and Activist from the United States whom Shepard interviewed in a public conversation, mentions that people desire *stewardship* activities, such as managing the common resources of community gardening, to gain a sense of connection to the local area (Shepard 2017:65-66). Shepard (2017:68) thinks that it is due to the counter-reaction to individualism pushing forward the economic system, the situations around climate, and citizens' detachment from civic activities, such as voting, community gatherings and free-time activity groups.

Stewards tend to become active citizens taking civic responsibilities. Shepard (2017:66) points out that active citizens in green *stewardship* are also keen to take other civic actions. Therefore, active engagement should gain support in the city.

4. Project Location: Nyhamnen, Malmö

This chapter conducts site selection for the case study project site of intermediate use of community gardening while phytoremediation's application in Nyhamnen. 4.1 and 4.2 reflect the City's policy, which can support the idea of phytoremediation's application and intermediate community gardening. 4.3 addresses the inspiration for the project, the former community garden in Nyhamnen. 4.4 is the site selection method, and 4.5 is the result.

4.1 The City of Malmö's Sustainability Policy

Malmö, currently the third biggest city in terms of population, flourished with industry from the 19th to 20th century with immigration for work (Malmö stad 2021a). The City of Malmö's policy of transition of the city from an industrial to a knowledge-based city on *The Comprehensive Plan for Malmö 2000* (Nilsson 2016:15 see Dannestam 2009:121) is expanding further in collaboration with the neighbouring city Lund 'to create good conditions for social balance, green growth, increased mobility, varied business life, innovation and knowledge' (Kommunstyrelsen 2019b:24).

The Municipal Board of the City of Malmö, MS, writes in the *Comprehensive Plan for Nyhamnen* from 2019 that Malmö sets the city's aim by referring to the United Nations Social and Environmental Sustainability Goals to be 'a socially, economically and environmentally sustainable city' (Kommunstyrelsen 2019b:6, 61). The Board further addresses the consequential impact of city development on the aims of:

Making cities inclusive, safe and resilient, to work for economic growth, well-being and good health for all, preserving marine resources and reducing loss of biodiversity. Kommunstyrelsen (2019:7)

MS's aim suggests its consciousness of environmental and sustainable development.

4.2 Nyhamnen and the Development Plan

Nyhamnen, located northeast of and near Malmö Central Station, is undergoing district redevelopment from 2018 to 2050 (Kommunstyrelsen 2019b:52) in the city's continuous transition. According to *the Comprehensive Plan for Nyhamnen*, the former industrial and currently anonymous district, which emerged by land

reclamation in the 19th century in the industrialisation (Kommunstyrelsen 2019b:32), is planned to be redeveloped into a mixed-used area (Kommunstyrelsen 2019b:2, 6-7). Nyhamnen's planning objectives are to be an inclusive and attractive place to 'live, work and visit' (Kommunstyrelsen 2019b:7, 36), rooted in the general aim of the City of Malmö, MS.

MS aims to take inventive and flexible approaches to compensate for the traditional planning method (Kommunstyrelsen 2019b:9) by including landowners', property developers', authorities' and planners' contributions (Kommunstyrelsen 2019b:52) in the planning to creating and running meeting places and maintaining a sense of security (Kommunstyrelsen 2019b:37). As reviewed in the case of East New York in Chapter 3, involving actors in planning is a socially sustainable approach. It is even more important because many sites of Nyhamnen are either owned or rented by MS, as seen in Figure 4. Careful planning is required to fulfil and balance various users' needs in the City-owned lands.

MS suggests Nyhamnen's historical activities of emigration, food handling and port operations as the basis for the development (Kommunstyrelsen 2019b:37). In the 19th century, Nyhamnen was the centre of food handling by the port and near the railway (Malmö stad 2021b). Slagthuset, the public slaughterhouse and Smörkontrollen, the eggs and dairy products control located (ibid.). In other words, food was raw or semi-processed when it arrived in Nyhamnen before final processing and distribution to the city. Community gardening offers the raw state of harvests, which city youth do not have a chance to see (Shepard 2017:42), discussed in section 2.2.2.

Slagthuset's and Smörkontrollen's buildings remain today (Malmö stad 2021b); however, their use has changed. Reintroducing the elements of unprocessed food may supplement the historical identity as a whole.

Moreover, practising food production and environmental protection in the neighbourhood, which urbanisation released people from (Kaijima et al. 2019:18) in the city, discussed in section 2.1.1., can lead citizens to retrieve lost connection with the neighbourhood, community and nature to find a lifestyle beyond the current individual era.

The Comprehensive Plan for Nyhamnen also mentions the integration of renovation and new buildings in the historical context and urban landscape (Kommunstyrelsen 2019b:32). Those suggest the development of the existing district identity. However, the landscape's and people's perspectives are missing. The reason may be that they are currently not apparent in the area. There is no park or recreational facilities in Nyhamnen today (Kommunstyrelsen 2019b:38). To complement, the City puts weight on creating indoor and outdoor meeting spaces (Kommunstyrelsen 2019b:37) where community formation takes place through activities, which enriches life and contributes to social sustainability (Kommunstyrelsen 2019b:38) in society on a broader scale.

Despite its environmental efficiency of reclaiming the land within the city to save lands from expansion toward the outskirts, the challenge lies in soil contamination of the area. There were environmentally harmful activities previously, although they do not exist in the area today. Therefore, land surveys have started.



Figure 4. Land Ownership of Nyhamnen. (Kommunstyrelsen 2019a).

4.3 The inspiration: Hamnen 22:26

Although the *Comprehensive Plan for Nyhamnen* (Kommunstyrelsen 2019b) does not mention the area’s existing landscape and people’s perspectives, it was previously present. The community garden Vintergatan Urban Garden on the Skanska Öresund’s empty plot, Hamnen 22:26, existed from 2018 to 2021 in Vintergatan, Nyhamnen. My Bachelor thesis investigated the Vintergatan Urban Garden as a case study of the temporal use of brownfields. As a part of Nyhamnen’s history of people and landscape, the community garden is the inspiration for the design in the development.



Figure 5. Hamnen 22:26 in Summer 2021 (Left) and Spring 2022 (Right).

The recent history of Hamnen 22:26 on Vintergatan begins with the demolition of the building due to vandalism, as explained in the interview with one of the

community garden initiators and gardeners, Jenny Sjölin (Chimura 2022:31). Demolition took place between 2018 and 2019, confirmed on the maps.

The City of Malmö, MS, connected the landowner Skanska Öresund, who was interested in their empty plot's sustainable use, and Sjölin and two other initiators from Malmö University (Chimura 2022:30). With the help of a Landscape Architect, the community garden opened in 2019 (ibid.). Site contamination, reported by Sjölin (Chimura 2022:32), consequently decided the growing method of container planting.

However, the latest investigation of documents provided by the Environment Administration (Malmö stad Miljöförvaltningen 2007) and the Environment Committee (Malmö stad Miljönämnden 2007a, 2007b & 2007c) of MS revealed that the site already went through PCB remediation in 2007. The taken container growing method may be due to the concern about the remaining chemicals. Because of the harsh condition of heavy traffic and no residents in the area², the garden moved to the rooftop of STPLN, Västra Hamnen, in 2021. Despite different settings, Vintergatan Urban Garden's establishment took a similar path to the urban agriculture renaissance in East New York, which was the collaboration of bottom-up, middle-ground and top-down actors.

4.4 Site Selection

Firstly, the site's suitability for phytoremediation is essential for the project. An analysis of the shared documents of contamination of a total of 31 sites within the Nyhamnen area by the Scanian County Administrative Boards and the City of Malmö's Environmental Administration is conducted to find relevant sites for phytoremediation.

Overall, 31 sites form 26 individual sites and two groups, a total of 29 reformed sites. Godsfinkan 1, 2, 3 are called Innerstaden 33:11, and Skeppsbron is in two parts, Hamnen 22:3 and Hamnen 22:118 with Hamnen 22:164.

The sites are classified into five categories based on their suitability and available information. These 31 sites are the registered potentially contaminated sites in the City of Malmö.

4.4.1 Materials

The initial information for the categorisation is the extracts from the EBH-Portal, *Objects Summary* with MIFO, A Methodology for Inventory of Contaminated Areas, risk class and *Notification of Remedial Action*. Other information is from the documents, such as Maps of the sites, Site History and Previous Hazardous Activity Reports, Land Survey Reports and Emails, Maps of contamination distribution, Decisions of Remediation and *Remediation Reports*. Dekka Enviro Co Ltd, The City of Malmö The Environment Committee, The County Boards, COWI, Malmö City Environmental Management, Ocab, PQ Geotechnics & Environment, Skanska, SPIMFAB, Tyréns, WSP issued these documents. Hence, the County

² Sjölin, J., a community gardener and initiator, Vintergatan, Interview 2022-03-03

Administrative Board Skåne and the Malmö City Environmental Management provided all documents.

4.4.2 Criteria and Categorisation Method

Table 1. MIFO Risk Classification. (Naturvårdsverket n.d.)

Classification	Risk Level
1	Significant risk
2	High risk
3	Moderate risk
4	Minor risk

Due to the nature of plants in phytoremediation, tolerant from minor to moderate contamination (Svenska Geotekniska Föreningen 2019), the categorisation refers to the applicable condition as MIFO risk classification: 3= Moderate risk and 4= Minor risk. MIFO, A Methodology for Inventory of Contaminated Areas, is the Swedish national measurement for classifying each site's contamination level based on the health and environmental hazard (Naturvårdsverket n.d.).

The categorisation is in six categories, from A. Most suitable to E. Least suitable to phytoremediation's application, based on the available information. The categories are the following: A= Amount of contaminants available on the land survey and remediation conceivably completed, B= Already remediated to meet the standard MKM, less sensitive site use with the potential to meet KM, sensitive site use by phytoremediation, C= Name of contaminants available, D= Contaminants unknown and E= Unsuitable for various reasons, such as remediation's completion, MIFO risk class too high or unknown for phytoremediation or hard to apply due to the landfill.

4.4.3 Results

Table 2. Classification of the Suitability of Brownfields in Nyhamnen.

Category	Plot Name	Remarks	MIFO risk classification
A	Medusa 1	Amount available, shaft remediation suggested, remediation maybe completed	3
B	Innerstaden 31:11 (Godsfinkan 2) Hamnen 22:33 Skeppsbron (Hamnen 22:3)	Remediation complete (MKM)	(0) [Phase1]/ (-) [Phase2] (2) (3)
C	Flintrännan 1 Hamnen 22:28 Järnvägen 1:1 Polstjärnan 1 Polstjärnan 2	Name of contaminants available	1 3 2 [Phase1]/ 3 [Phase 2] 3 3
D	Atlanten 1 Atlanten 2 Börshuset 1	Contaminants unknown	3 3 0

	Hamnen 22:164 Kattegatt 1 Kolga 4 Medusa 4 Skeppsbron (Hamnen 22:118, 22:164) Söderhavet 4		3 3/ 2-3 [Rail track] 0 0 3 0
E	Atlanten 3 Atlanten 4	Rubbish filled in the ground	3 3
	Hamnen 22:26	PCB remediation completed	(-)
	Hamnen 22:27	Indoor remediation completed	(-)
	Innerstaden 31:11 (Godsfinkan 1, 3)	MIFO risk class 0/ -	0 [Phase1]/ - [Phase2]
	Ran 3 Ran 8 Östersjön 1	MIFO risk class 0 - no action	0 0 0
	Hamnen 22:31 Sirius 3 Slagthuset 1	MIFO risk class 2	2 2 2

References: (Castellum AB 2019), (COWI 2018a & 2018b), (Deka Enviro AB 2021), (Gad Olausson 2016), (Karlström, J. M. 2016a & 2016b), (Lalloo 2004, 2006a, 2006b, 2006c, 2006, 2006e, 2006f, 2006g, 2006h & 2006i), (Lalloo & Möller 2004a, 2004b, 2004c, 2004d, 2004e & 2006), (Länsstyrelsen Skåne 2003a, 2003b & 2022a), (Länsstyrelserna 2014a, 2014b, 2014c, 2014d, 2015a, 2015b, 2015c, 2015d, 2015e, 2017, 2018, 2019a, 2019b, 2019c, 2019d, 2019e, 2019f, 2019g, 2019h, 2020a, 2020b, 2020c & 2021), (Malmö stad Miljöförvaltningen 2007, 2008, 2016 & 2019), (Malmö stad Miljönämnden 2000, 2007a & 2007b), (Montelius 2009a & 2009b), (Möller 1994 & 2001), (Ocab 2022), (Persson 2009), (PQ Geoteknik & Miljö 2003), (Skanska 2000), (SPI Miljösaneringsfond AB 2000), (Stjernhav 2004a, 2004b & 2004c), (Sweco 2019), (Tyréns 2019a, 2019b, 2019c, 2020a & 2020b) & (WSP Environmental Sverige 2019a, 2019b & n.d.)

The classification results are one site in A, three in B, five in C and nine in D and eleven in E. Medusa 1, the only site of category A, is the most suitable for phytoremediation. The categorisation is based on available documentation. Often, the sites in lower categories have yet to be through detailed investigations. Therefore, lower categories do not imply the difficulty of phytoremediation application. However, sites with MIFO class 2 are generally unsuitable for phytoremediation due to the high risk of contamination. MIFO risk class with parenthesis is the previous mark before remediation.

4.5 The Project Site

Medusa 1



Figure 6. The Current State of Medusa 1, Occupied by Construction Facility for the Neighbouring Building.



Image capture: Aug 2019 © 2023 Google

Figure 7. Medusa 1 before the Occupation of Temporal Construction Facility. (Google 2023)

According to the document study, Medusa 1, the most suitable site, is selected as the project site.

The documentation *Nyhamnen, Malmö: Overview Environmental Survey General Environmental Investigation, DP2* by Cowi Co., Ltd indicates the latest permanent site use of Medusa 1 from 2018, the dog daycare (2018:12,20) citydoggies and the cat homecare citycat (Google 2011). The site is empty in the

image from 2019 (Google 2019). Skanska's construction facility for 7Stjärnan, the Electricity Company E.ON's new headquarters, stood in 2021 (Google 2021) and 2022 (Google 2022).

Historically, scrap company Helge Nilsson Skrot och Metaller existed (Lalloo 2006g:1, Länsstyrelserna 2020c:3, 16) in the 1940s trading scraps (Länsstyrelsen Skåne 2022a:1). Before that, the handling of general breakbulk cargo (Cowi 2018:5) took place. There is no recorded report of a spilling accident (Länsstyrelsen Skåne 2022a:16). For this reason, the Phase 1 MIFO risk classification of Medusa 1 is 3 (ibid.), moderate contamination. Phase 2 is unmarked (ibid.).

Figure 8 demonstrates the current site. *The Comprehensive Plan for Nyhamnen* indicates that half of the plot to the west will be a part of the widened road in the future.

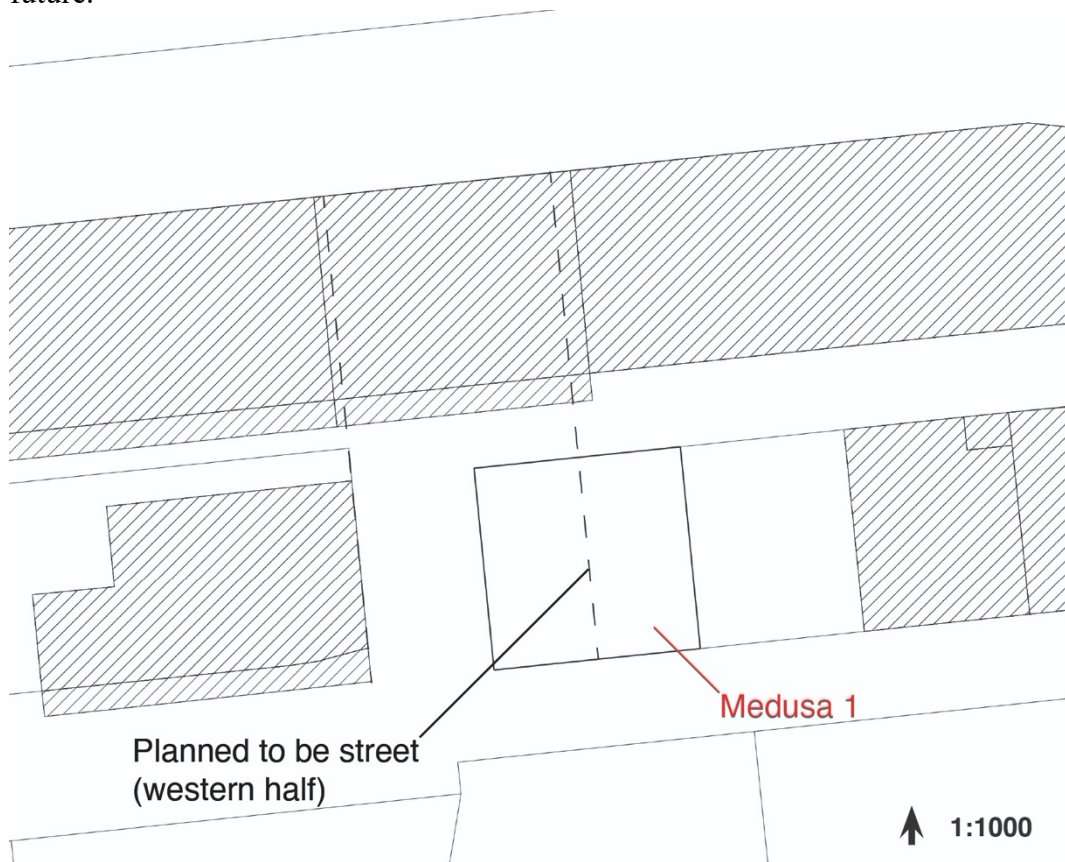


Figure 8. Current Site Plan of Medusa 1. [Map]. © Lantmäteriet & SCB.

5. Designing Intermediate Community Use during Brownfield Phytoremediation in the Urban Redevelopment Project

5.1 Design Guideline

This section looks at the project site from the community garden, brownfield and phytoremediation perspective to set a general design guideline.

The design aims to create a public space that offers active spaces to meet the need for *stewardship* (Shepard 2017:65-66) of lacking collective and political citizenship caused by individualism (Shepard 2017:68).

Hence, the space should make actors feel connected to the area and thus protect and take care of it rather than offer facilities and recreation (Shepard 2017:61) to support active citizens' engagement in contributing to the area's sense of place and city's identity in the case study site of Nyhamnen, Malmö.

5.1.1 Guidelines for Spatial Design

Understanding the Character of Area

By Tsukamoto's *commonalities* creation, going against the process of individualism is a bottom-up method to support citizens' autonomous behaviour to recreate *commonalities*, which envisions working on biopower.

Understanding the character of the local area, namely existing site-specific natural and autonomous behaviour of people in publicly shared spaces (Tsukamoto 2019b:44), is the starting point (Tsukamoto 2019b:50). Section 4.3 reflected on the former community garden Vintergatan Urban Garden on Hamnen 22:26 in Nyhamnen.

Tsukamoto's understanding of the production elements of behaviour is 'buildings and constructions [...] weather, the behavior of nature, tools and vehicles, cultural skills such as sports, music and food' (Tsukamoto 2019b:50).

Section 4.2 reviews the cultural elements of Nyhamnen, especially the history of food handling (Malmö stad n.d.c) in the industrial area is relevant.

Designing a Community Garden as a Public Space

In a community garden setting, the repetition of certain behaviours that are recurrent by various users and the coexistence of 'multiple intimate spaces'

(Tsukamoto 2019b:47) embodies effortlessly. A community garden is where people with multiple aims gather around food cultivation, such as learning about food (Shepard 2017:42), youth development (Shepard 2017:57) and inclusive and safe environment creation (Shepard 2017:42-43), among others.

Designing a Brownfield

Considering currently unutilised space as brownfields, the design of brownfields also applies to the context.

The criteria of the designing method of urban voids, according to Lopez-Pineiro, are the following:

- ‘The space should prevent fixed usage or occupation by ‘a singular form of expression (religious, political, racial, or commercial, for example)’ (Chimura 2022:20 see Lopez-Pineiro 2020:209).
- ‘Urban voids should enhance existing characteristics and not introduce new qualities to generalise different sensibilities’ (ibid.).
- ‘Absence of codification’ (Chimura 2022:20 see Lopez-Pineiro 2020:211) is necessary to define urban voids as an alternative to public spaces’ (Chimura 2022:20 see Lopez-Pineiro 2020:209).

A community garden may suggest political expression of challenges to individualism, the industrial food system, typical science classes in school, standardised vocational training and ordinal public spaces. Allowing various uses are the aim of the ‘absence of codification’ (Chimura 2022:20 see Lopez-Pineiro 2020:211). Moreover, collectiveness (Shepard 2017:61) is on top of the uses. All in all, the design should start with the existing character, similar to Tsukamoto’s comprehension.

Designing Phytoremediation of a Brownfield

Phytoremediation is not a standardised method due to its little application and site and chemical specificities. Therefore, research and information on effective plants for chemicals will be the source for the design in this paper.

5.1.2 References for Spatial Design

Inspirations for the design come from several post-industrial landscape projects.

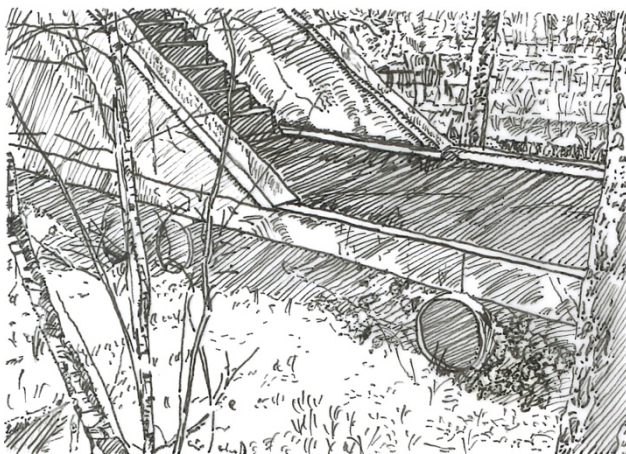


Figure 9. The Natur Park Südgelände's Walkway on the Rail Track.

The Natur Park Südgelände

The Natur Park Südgelände is a reclaimed park transformed from a former railway switchyard (Grün Berlin 2013) by Planland, Büro ÖkoCon with

the artist group Odious in 2000 (Heinze GmbH 2022) in Berlin, Germany. The walkway is placed on a metal tube on the rail track in the nature conservation area, guiding visitors, protecting nature and preserving the railway function.

The Temporary Park Fredericia C

The temporary park Fredericia C is a transformation of an industrial to a temporal waterfront landscape in an urban development project by Stig. L Andersson, SLA (Landezine 2013) in Fredericia, Denmark. The project introduces wooden benches, plant beds, and movable weathering steel planting boxes with tires that inherit industrial heritage.



Figure 10. Fredericia C. Movable Containers. (Stig L. Andersson 2013)

The Movable Seatings outside of Wingårdh Architects AB

Figure 11. The Movable Seatings Outside of Wingårdh Architects Co Ltd.

The movable seatings outside of Wingårdh Architects Co Ltd, built by an unknown in Malmö, also reflect the industrial history of Västra hamnen by reusing the rail track with its scale and use of metal.



5.1.3 Curating Actors' Connection

Together, top-down, bottom-up and middle-ground actors are the *citymakers* (Shepard 2017:44). To promote 'public life for all' (Shepard 2017:43) through community gardening, local growers' continuous interest and engagement draw the City's and organisations' support (ibid.).



Figure 12. Ismael buys chives from Nabil for his mother's homemade Afghani Bolani in Navets Odlingsområde at Rosengård, Malmö.

Expected Citizens' Engagement

Debora Greig, the coordinator of East New York Farms!, a non-profit organisation, stated that residents' rural origin and the farming experience of the immigrants for one of the reasons behind urban agriculture flourishing in East New York (Shepard 2017:56-57). One-third of Malmö's population is foreign-born, making it the biggest city in Sweden's proportion of foreign-born citizens (Malmö stad n.d.a). Some people grow vegetables for themselves or sell others for the need for specific dishes from their cultures.

Community gardening supports citizens' interest in food and suggests them food issues. Sweden's food self-sufficiency rate is 50 per cent (Lantbrukarnas Riksförbund 2022). Although 'more than 70 per cent of vegetables, fruit and berries are grown' (ibid.) in the Scania region, fruits and vegetable provision relies on imports (ibid.). The lack of fresh food as a motivation for gardening in East New York (Shepard 2017:56-57) could also apply to the new citizens of Nyhamnen.

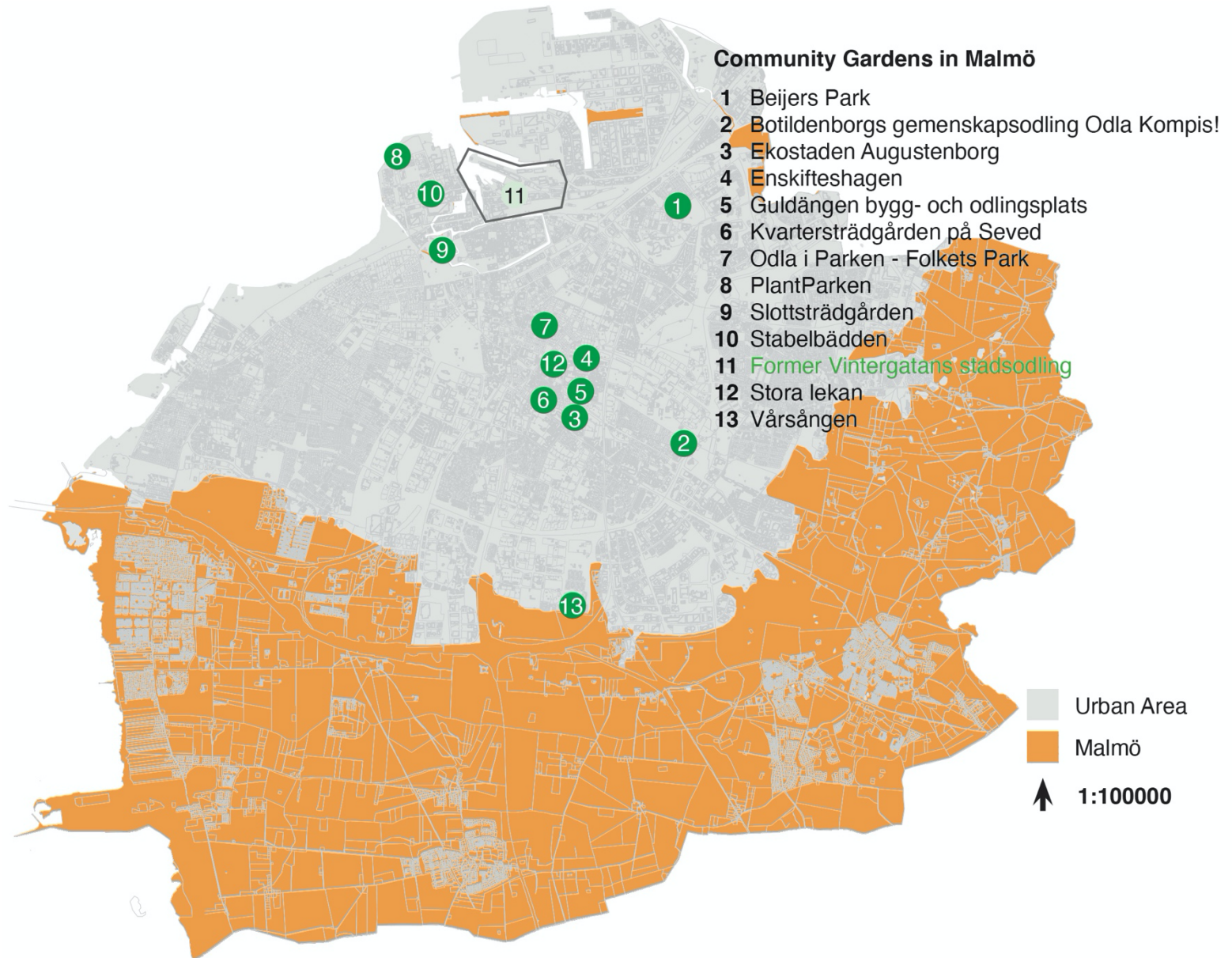


Table 3. Malmö's Community Gardens.

	Community Garden	Organisation	Features & Foucs
1	Beijers Park	<i>Beijers parks odlingsgrupp</i>	-
2	Botildenborgs gemenskapsodling Odlå Kompis! (2014-)	The innovation project <i>Stadsbruk</i> run by the Company Xenofilia, SLU and the City	<ul style="list-style-type: none"> • Urban residents to grow and supply for their needs • Creating jobs by profit
3	Ekostaden Augustenborg (2012-)	<i>Augustenborgs Odlargrupp</i>	<ul style="list-style-type: none"> • Market garden • Ground, box and forest cultivation, municipality's pot • Organic

			<ul style="list-style-type: none"> • Neighbouring cooperation
4	Enskifteshagen	Initiated by Mykorrhiza, Run by the Non-Profit Association Odlingarnätverket Seved	-
5	Guldängen bygg- och odlingsplats	Run by the Non-Profit Association Växtvärdet	-
6	Kvartersträdgården på Seved	-	-
7	Odling i Parken - Folkets Park	-	-
8	PlantParken	Initiated by K3 institution in Malmö University	<ul style="list-style-type: none"> • Social meeting place for residents and visitors • Knowledge forum for sustainable cultivation on a smaller surface
9	Slottsträdgården	Run by Föreningen Slottsträdgårdens Vänner The Street Office of the City	The first urban gardening project in Malmö 20 years ago
10	Stabelbädden (2021-)	Initiated by the students of Malmö University	
11	Former Vintergatans stadsodling (2019-2021)	Initiated by the students of Malmö University	<ul style="list-style-type: none"> • Shared growing • Social function
12	Stora lekan	-	-
13	Vårsången	Malmö Wing Tsun School	<ul style="list-style-type: none"> • Courses and workshops • Knowledge • Socialise • Cultivate • Harvest • Biodiversity

Reference: (Stadsodlingarnätverket n.d.a & n.d.b)

Stadsodlingarnätverket, the Urban Cultivation Network, lists 13 community gardens (Stadsodlingarnätverket n.d.a) in Malmö today.

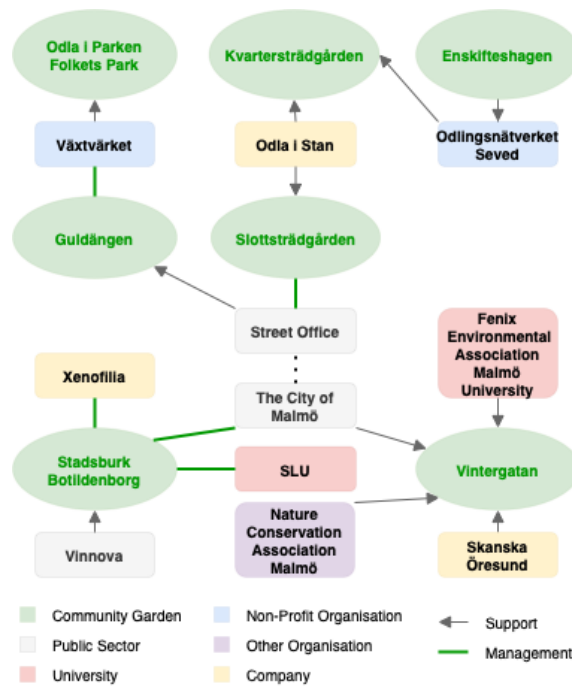
Malmö's, Stadsodlingar i Malmö, Urban Farms in Malmö, equivalent to Steward-MAP in the U.S., exists on the webpage Stadsodling Malmö, Urban Cultivation Malmö. The map contains information about the association, initiator, and supporting non-profit organisations.

To upgrade *Urban Farms in Malmö* Map, it can contain interactions with the public sector and funding information (Shepard 2017:64) for research purposes (Shepard 2017:66) to attract and exhibit the choices to future *stewards* (Shepard 2017:65) and make the horizontal connection and economic flow among the actors stronger.

As Figure 14 indicates, the network, with the contact people in the Property and Street Office, FG, of the City, connects community gardeners, the interested public, garden associations, public education and the City (Stadsodlingarnätverket n.d.c.).

The meeting, open to anyone, every three months (ibid.) maintains the horizontal network.

Figure 14. Community Gardens' Relations in Malmö. (Stadsodlingsnätverket n.d.a & n.d.b)



The City's Involvement in Community Gardening

East New York became one of the most city-owned areas in New York (Shepard 2017:49) because HPD took over many unmanaged private properties through in-rem closure (Shepard 2017:52-53). Although the background is unknown, the City of Malmö, MS, owns many parts of Nyhamnen, as seen in Figure 4. The situation will be favourable for introducing phytoremediation and the intermediate use of community gardens if there is good communication with MS.

As PlaNYC directly addresses the ‘Renaissance’ (Shepard 2017:55) of parks and fresh foods (ibid.), the planning scheme is vital for gardens’ existence. *The Comprehensive Plan for Nyhamnen* plans for redevelopment on top of the area’s history, such as food handling (Kommunstyrelsen 2019b:32). Together with its focus on green (Kommunstyrelsen 2019b:6), community gardening could be integrated into the detailed plan.

In MS, FG is responsible for nature and outdoor life. The office manages kolonilotter, private allotment gardens, and odlingslotter, city-owned cultivation lots. For community gardens, MS lends out a plot to the association of community gardens (Malmö stad 2020). Vintergatan Urban Garden was an exception to locate on private land.

Although there is not a specific group in charge of community gardens, the Environmental Administration, the Service Administration, the Street Office, the Property Office, and Pedagogical Inspiration/Primary School Management (Stadsodlingsnätverket n.d.c.) of MS cooperate with community gardening in Malmö.

Communication within departments of MS has yet to be discovered. Communication with MS may be smoother if there is a specialised group for community gardens, such as GreenThumb, in the New York City Department of Parks and Recreation. On the other hand, Malmö’s city governing system may operate differently from New York City. In the case of Vintergatan Urban Garden, the private company Skanska Öresund provided tools and a growing environment³.

³ Sjölin, J., a community gardener and initiator, Vintergatan, Interview 2022-03-03

Middle Ground Involvement

Botildenborg, in Västra Skrävlinge, has been the project of Stadsbruk since 2014, the collaboration of company Xenofilia, SLU and the City with support from the research and development company Vinnova (Stadsodlingsnätverket n.d.b). The project has aimed to educate urban citizens to supply their needs for greens and create commercial income and job supply (ibid.). Although the process and aim may differ from East New York Farms! by the Pratt Center, there is an academic-involved project in Malmö. Among many other purposes, both projects target integration and production for needs.

5.2 Proposal

The design proposal covers the eastern half of the Medusa 1 plot, considering the western half's development into a street. The design excludes the left half before its transformation into the street due to the future soil contamination by tarmac and petrol from traffic.

Currently, the construction equipment for the 7Stjärnan building on the neighbouring plot to the west occupies Medusa 1 and the adjacent plot to the east. The development plan of the adjacent plot to the east is unknown; therefore, the plot remains as a brownfield on the plan.

5.2.1 Phytoremediation Plan

Phytoremediation

Various phytoremediation processes occur throughout plants' bodies. Plants absorb contaminants in their tissue, in the original or volatilised form, stored or released in the air. Phytoextraction, phytoaccumulation, phytostabilisation and phytodegradation are examples, among others.

Phytoextraction is the absorption of heavy metals and the migration to the upper parts (Bhat et al. 2022). Phytoaccumulation takes up contaminants in the original form; thus, it requires the disposal of the harvest (United States Environmental Protection Agency 2002). Phytostabilisation stabilises contaminants and limits the flow (Bhat et al. 2022). Phytodegradation is the plant enzymes' degradation of chemicals in tissues (Bhat et al. 2022).

Besides plants, arbuscular mycorrhizal fungi, which penetrate roots, promote phytoremediation in plants (Raza et al. 2020:26-28). Various fungi species grow in the roots of each plant species.

Phytoremediation Planning

Phytoremediation is planned based on soil analysis results. The Engineering Company COWI, on the request of the Real Estate and Street Office of the City of Malmö, conducted a soil and water survey of Medusa 1 in 2018. Two sampling points exist within the eastern half of the plot, CW11 and CW12 and two others on the western half (Nilsson 2018).

Degree of Contamination

According to the sampling results of COWI (2018b), CW11 on the northeastern side of the plot contains lead, quicksilver, cadmium and PAH-H from 0 to 0.8m below ground, over the guideline of less than slight risk, MRR of the Swedish Environmental Protection Agency, NVV. CW12 on the southeastern side contains lead, quicksilver and cadmium from 0.3 to 1.3m below ground. Figures 15 and 16, CW11 and CW12 Phytoremediation Vegetation Plan illustrate contamination levels.

All the chemicals in both locations indicate MRR and KM levels. The Manual, Recycling of Waste in Construction Works by NVV (2010:10) indicates MRR, which cannot remain within protected areas and areas with flood risk and landslides. Despite not flooding, Nyhamnen faces expected sea level rise until 2100 (Länsstyrelsen Skåne 2021:13). Therefore, remediation of MRR is inevitable. Ecological function protection applies to KM and MKM sites, and NVV allows the creation of schools, arable lands and housing on KM sites under complete protection (Naturvårdsverket 2009:17).

Method and Condition

Phytoremediation depends on the type and degree of contaminants. The plant selection procedure is the following. First, the research identifies on-site and laboratory-tested phytoremediation plants for found contaminants. Second, suitability, contaminant, soil, adaptability and root length make a selection. Suitability factors, such as temperature, soil adaptability and native plants, correlate to survival. European native plants are presuppositions, tolerant to the climate and not invasive. Besides, soil preference and flexibility are other significant factors.

CW11 has layers of concrete cover, sandy loam and sandy loam with brick fill. CW12 is the layers of concrete cover, clay, loamy, gravelly sand, and sandy loam. Root length is crucial to reach out to the contaminants.

Result

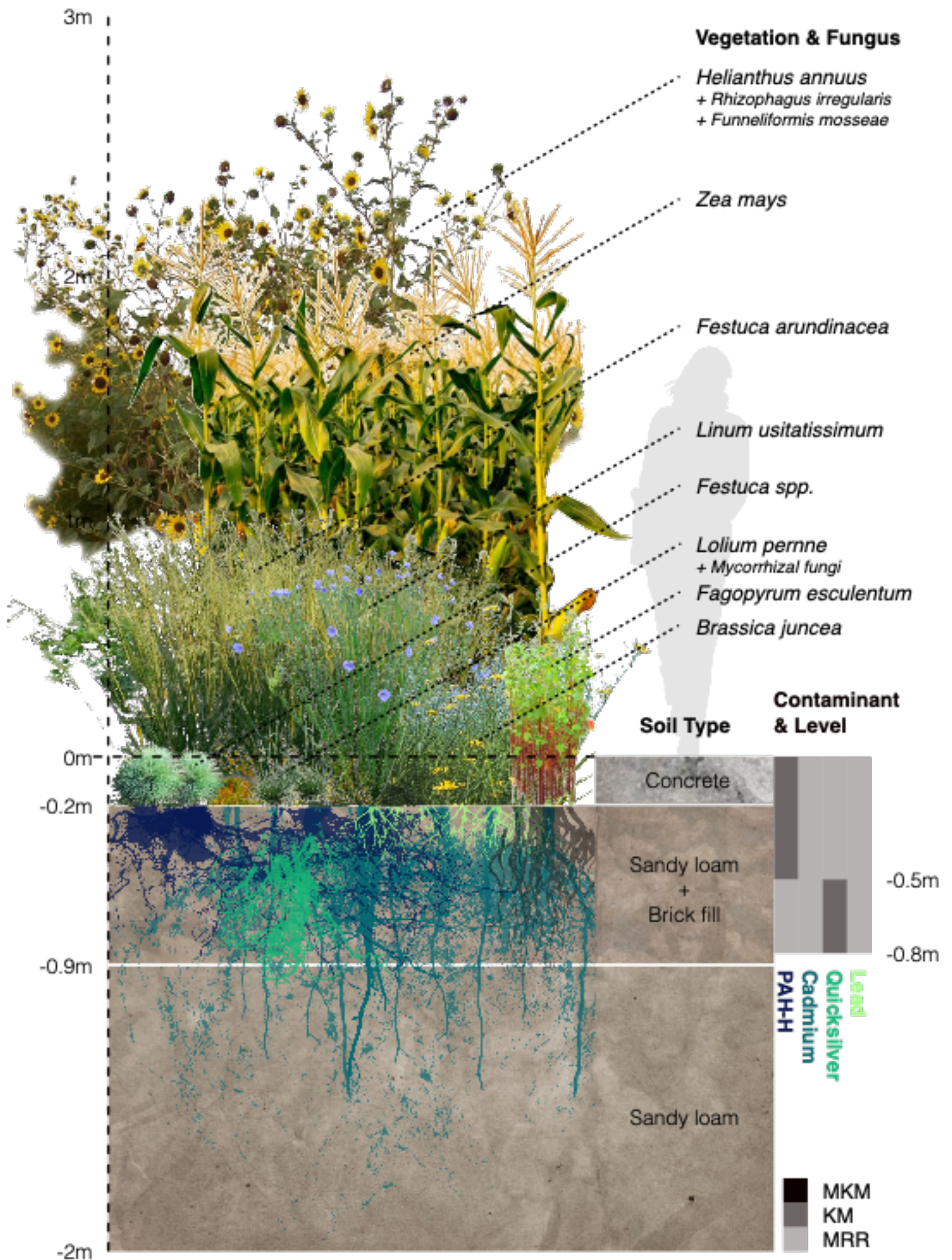
The plants suitable to the condition in Medusa 1 are in Table 4.

Due to the unsuitability of plants to the climate, lead phytoremediation may be limited. *Brassica juncea*'s root grows up to 30cm and may not reach 80cm in CW11 and 130cm in CW12. On the other hand, *Fagopyrum esculentum* with a maximum of 120cm root depth and other plants may compensate.

Table 4. Phytoremediation Plants with Fungi for CW11 and 12 in Medusa 1.

Chemical Phytoremediation process	<i>Latin name</i> Common name Fungi name	Soil preference	Roots (cm)	Height (cm)	Annual/ Perennial
Metal Phytoextraction Phytoaccumulation (Raza et al. 2020:6)	<i>Fagopyrum esculentum</i> Buckwheat (Raza et al. 2020:6)	Well- drained Sandy loams Loams Silt loams	90-120	90	Annual
Lead Phytoaccumulation	<i>Brassica juncea</i> Brown mustard	Firm Fertile	30	90	Annual

<i>(United States Environmental Protection Agency 2000:5)</i>	<i>(Raza et al. 2020:3, 11, 18)</i>	Naturally-draining			
Cadmium Phytoextraction Phytostabilisation <i>(Raza et al. 2020:27)</i>	<i>Helianthus annuus</i> Common sunflower <i>Rhizophagus irregularis</i> <i>Funneliformis mosseae</i> <i>(Raza et al. 2020:27)</i>	Moderately fertile Humus-rich Moist Neutral to alkaline Well-drained Tolerates poor soils	150-270	90-300	Annual
Cadmium Phytostabilisation <i>(Raza et al. 2020:27)</i>	<i>Zea mays</i> Corn <i>(Raza et al. 2020:27)</i>	Well drained Fertile	180	250	Annual
Cadmium Phytoextraction <i>(Raza et al. 2020:27)</i>	<i>Linum usitatissimum</i> Flax <i>(Raza et al. 2020:27)</i>	Average to sandy Well-drained	90-120	90-120	Annual
Mercury	<i>Lolium perenne</i> Perennial ryegrass Mycorrhizal fungi <i>(Raza et al. 2020:11)</i> <i>(Leudo et al. 2020:1, 3)</i>	Fertile Well-drained Adaptable	75	30-60	Perennial
PAH Degradation <i>(Liu et al. 2015)</i>	<i>Festuca arundinacea</i> Tall fescue <i>(Liu et al. 2015)</i>	Adaptable Best on clay High organic matter	60-90	105-120	Perennial
PAH Degradation <i>(Liu et al. 2015)</i>	<i>Festuca spp.</i> Festuca <i>(Liu et al. 2015)</i>	-	15	20-30	Perennial



CW11
Scale 1:20

from NVV's
General Guideline

Figure 15. CW11 Phytoremediation Vegetation Plan, Illustrating Contamination Levels. (Leudo et al. 2020:1, 3), (Liu et al. 2015), (Raza et al. 2020:3, 6, 11, 18, 27), (United States Environmental Protection Agency 2000:5)

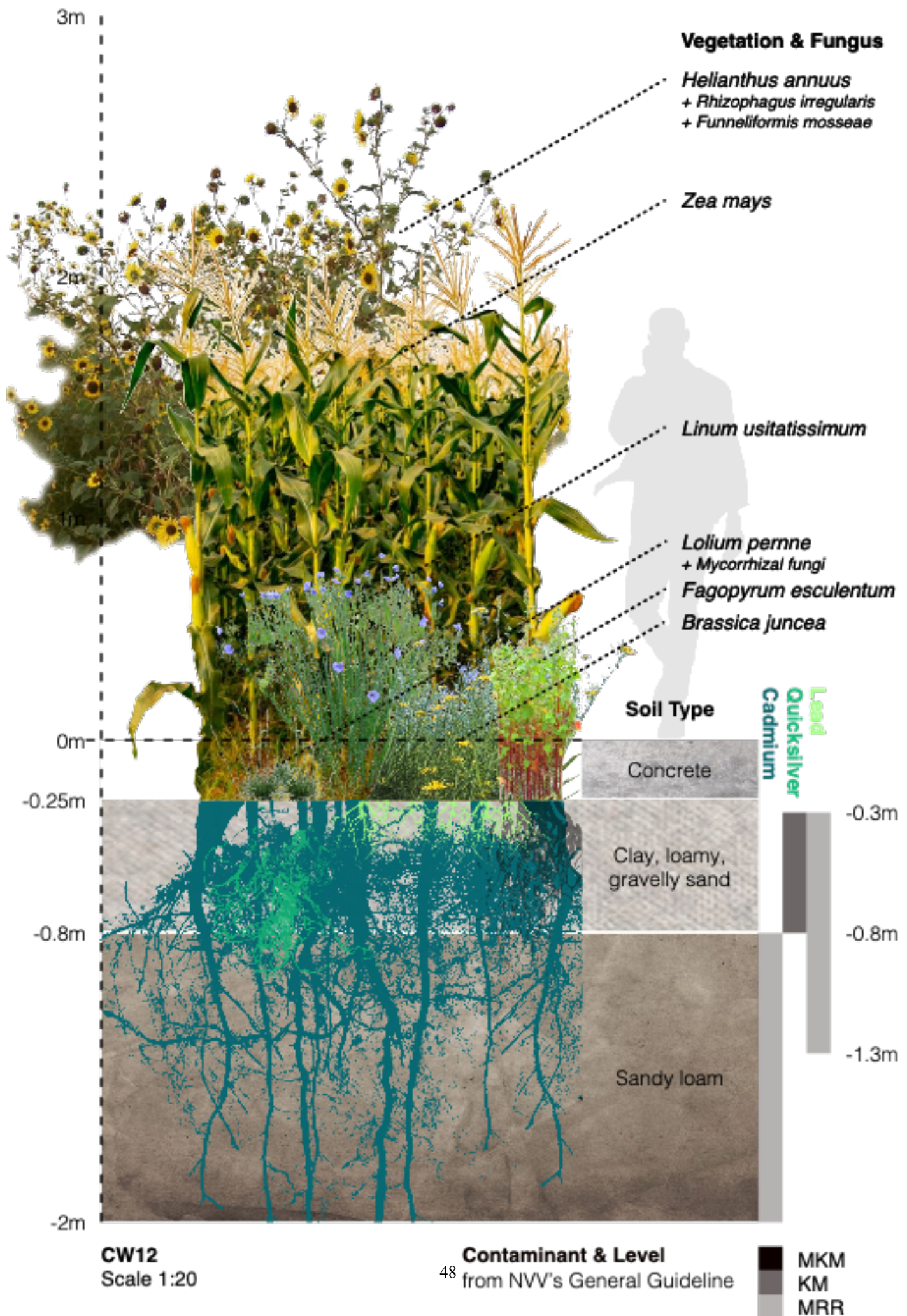


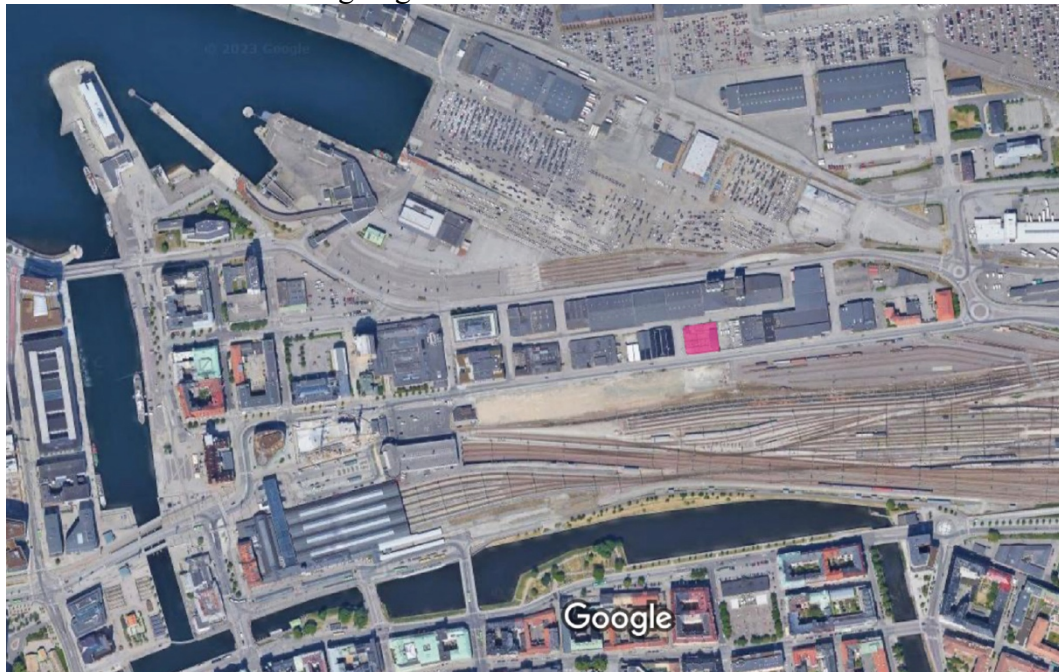
Figure 16. CW12. Phytoremediation Vegetation Plan, Illustrating Contamination Levels. (Leudo et al. 2020:1, 3), (Raza et al. 2020:3, 6, 11, 18, 27), (United States Environmental Protection Agency 2000:5)

5.2.2 Design Process

Site Condition

Since the western half of the plot will be a part of the broadened street, the design takes place on the eastern half of Medusa 1. The adjacent plot to the east is a brownfield on the plan due to its unknown future use.

The physical legacy of the previous site use, dog and cat nursery and scrap trading, have entirely vanished due to the current use of construction equipment placement. It probably swept out naturally inhabiting plants on site as well. The current condition burdens to ‘enhance existing characteristics’ (Chimura 2022:20 see Lopez-Pineiro 2020:209), which is a lack of definition in public space and is one of the criteria for designing urban voids.



Imagery ©2023 Aerodata International Surveys, CNES / Airbus, Lantmäteriet/Metria, Maxar Technologies, Map data ©2023 100 m

Figure 17. Nyhamnen Aerial View with Medusa 1 in Pink, Scale 1:1000 (Google Maps ©Aerodata International Surveys, CNES / Airbus, Lantmäteriet/Metria, Maxar Technologies, Google 2023)

The site locates in between rails to the north and south, and the port’s placement is diagonal. The northern part of the rail tracks does not exhibit today.

The Design

The design shows one possible scenario. Phase 1, Figure 15, takes in the historical context of the location. Now partly covered, rail tracks have historically been dominant in Nyhamnen. The design follows the rail tracks’ angles on the plot’s north and south and takes horizontally diagonal placement of growing container lines, resembling train containers. A community garden reconnects historical shipping and food handling (Malmö stad n.d.c) in design. The garden’s reintroduction after Vintergatan Urban Garden’s move targets new residents.

Fifteen large containers and a gathering table are 180 by 300 cm. Three square containers, an equipment box, and a compost corner are 180 by 180 cm.

Two vertical walking paths connecting the southwest to the north sides have a standard railway track width of 143.5cm. Phytoremediation plants grow on the rest of the surfaces with concrete surface removal.

Phase 2, Figure 16, switches the areas of phytoremediation and the community garden. The garden moves on bare soil, which underwent phytoremediation in phase 1. The placement of the containers is to fit in the space.

Plant placement is according to the height order to avoid shadow casting.

Limited chemical information of only two chemical sampling points simplified the plant placement. Detailed placement planning is possible with more sampling information.

Edges, also in the width of a rail track, create a buffer between the pedestrian walk and the community garden, and the transition of the phases does not affect the planted perennials. The northern half's plants are for CW11 remediation, and perennials in the southern half are targeted to remediate CW12.

A Public Space for Commonalities

Despite planned elements on site from historical context and phytoremediation plants, the design focuses on anonymity and flexibility.

By offering the essential equipment to the actors, they are free to use the tools of space and gear on their terms, supporting autonomous behaviour to recreate *commonalities* in Tsukamoto's terms.

Community gardening's collectivity expression and spatial flexibility do not codify nor define space, as Lopez-Pineiro suggests in designing criteria for urban voids (Chimura 2022:20 see Lopez-Pineiro 2020:211). Therefore, it can be a potential use of a brownfield as a thriving alternative public space.



- *Helianthus annuus*
- *Zea mays*
- *Festuca arundinacea*
- *Linum usitatissimum*
- *Brassica juncea*
- *Fagopyrum esculentum*
- *Lolium perenne*
- *Festuca spp.*

Cultivation Container
Compost

Table 180 x 300cm
Cultivation container
Storage

Figure 18. Site Plan Phase 1.

↑ Scale 1:200



Figure 19. Site Plan Phase 2.

Site Plan (Phase 2)

Scale 1:200



5.2.3 Development over Time

‘Phytoremediation may take several years’, according to the United States Environmental Protection Agency (2012). It depends on the plants’ growing period and season (ibid.), even if plant selection reflects local climate, contamination level and depth in the soil. Secondary factors of ‘extreme weather, pests, or animals’ may prolong the application; thus, the period may vary due to various factors. Continuous monitoring and management are required.

Nyhamnen development takes over time from area to area with several phases. Nyhamnens mitt, where Medusa 1 is located, is undergoing development between 2018 and 2030 (Kommunstyrelsen 2019b:52). Some areas have a development plan from 2030 until 2050; for example, Nyhamnen öster, the eastern area, despite currently no data about potential brownfields (ibid.). Although the community garden ideally should stay where it is grounded, the garden could move to the other phytoremediation locations within Nyhamnen if there is a development plan on Medusa 1.

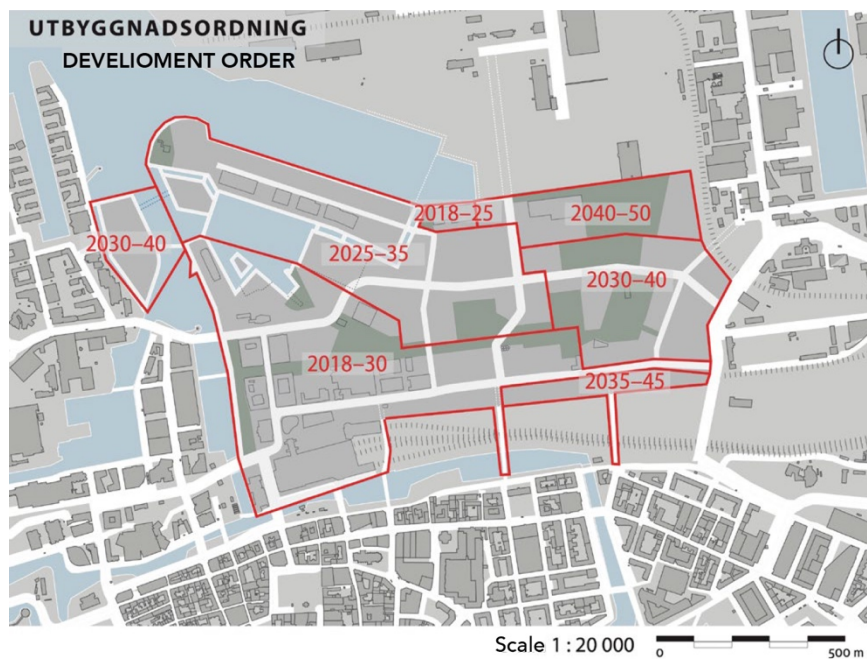


Figure 20. Development Order. (Kommunstyrelsen 2019a:52)

6. Discussion

This Master-thesis project has been investigating the potential for a sense of place development of the area based on site history with the application of phytoremediation and the intermediate use of urban agriculture as an example of community use in the current post-industrial and large-scale urban redevelopment project of Nyhamnen in Malmö, Sweden, through literature reviews and site information for the design from ecological, societal, and social perspectives.

My Bachelor thesis research project of *Intermediate Community Use during Brownfield Remediation: Phytoremediation's Applicability Analysis in the Post-Industrial City of Malmö* shaped the design concept.

Research-based landscape design is conducted by literature and case studies examining theories, structural function, planning schemes, brownfields' situation, the state of contaminations, phytoremediation plants and post-industrial, temporal design with the reflection of my Bachelor thesis.

The central research question of this master thesis is; *Does the intermediate community use of brownfields during phytoremediation's application in post-industrial urban redevelopment contribute to the ground-up local appropriation on top of the site history to shape a sense of place?*

All in all, phytoremediation and intermediate community use of abandoned former industrial sites may emerge ground-up local appropriation for community creation.

Long-term yet temporal community site use dates back to the pre-industrial site in history. Physical site characteristics may inherit industrial character. On the other hand, community spatial appropriation supports people's autonomous behaviour. Autonomous behaviour approaches individualisation, biopower and the disappearance of communities caused by industrialisation.

Although the suggested design is an example, by puzzling the limited amount of available contamination information, it indicates potential in maintaining the brownfields' state of the *field* longer in area redevelopment by the long-term application of phytoremediation. The bare state of public space without fixed target users and uses offers a ground for the autonomous behaviour of people. The bottom-up local identity contributes to the formation of *Genfūkei*, which will remain as a sense of place.

To help form dissolving communities (Kajijima et al. 2019:18) again, the design should support autonomous behaviours, which resist biopower (Tsukamoto 2019b:45-46) in a highly regulated society. The first step is apprehending the local character created by people's behaviour in public spaces (Tsukamoto 2019b:44). In the former industrial area of Nyhamnen, the design for the brownfield Medusa 1 is

inspired by and reformulates the former community garden Vintergatan Urban Garden on Hamnen 22:26.

This thesis introduced community gardening as an example of intermediate community use of brownfields. People gather in community gardens with various aims, such as learning about food (Shepard 2017:42), youth development (Shepard 2017:57) and inclusive and safe environment creation (Shepard 2017:42-43), among others apart from food cultivation. In line with Tsukamoto's concept (2019b:46) of required qualities for public space supporting behaviours, the setting of community gardening entices the repetition of certain behaviours of people that other users repeat to create and the coexistence of 'multiple intimate spaces' (Tsukamoto 2019b:47).

The case study of East New York exhibits that although bottom-up engagement (Shepard 2017:43) is essential, middle-ground actors are crucial for communication and support, as well as top-down in the system. Adding information on *the Urban Farms in Malmö* map to make the connection visible among actors will help all actors better comprehend the urban agriculture situation in Malmö and strengthen contact among them. The City's support seems vital for community gardens' existence both in East New York and Malmö. Organising a specialised group within the City of Malmö, if not any, may clarify the communication with actors.

Reflection on the Design on Medusa 1 in Nyhamnen, Malmö

The following part reflects on the applicability of the design of Medusa 1 in Nyhamnen, Malmö, as a case study.

Medusa 1 resulted as the most suitable plot for phytoremediation by the analysis based on the MIFO risk class and the site status according to the documents about potential and actual brownfields in Nyhamnen provided by Scania County Administrative Boards and the City of Malmö's Environmental Administration. On the other hand, the current temporal occupation of the construction site for the nearby building did not allow on-site analysis.

The design of Medusa 1 reflects the historical context of the location in the area since the current temporal use of the construction facility swept off on-site historical elements. The placement of cultivation containers in the community garden follows the rail tracks on the north and south of the plot. The location of the container switch and phytoremediation is conducted in two phases. None of the elements is permanently fixed; hence, the flexibility allows users to customise space according to their needs.

The in-situ phytoremediation application period may vary according to the external and internal conditions of the plants (United States Environmental Protection Agency 2012). The community garden model with phytoremediation application could move to other undeveloped areas in Nyhamnen. However, it should settle within the area for the community of Nyhamnen's residents in the future.

Community gardens apply to Nyhamnen's redevelopment plan for several reasons. First, *The Comprehensive Plan for Nyhamnen* mentions the City's interest in creating indoor and outdoor meeting spaces (Kommunstyrelsen 2019b:37) and the inclusive approach to creating and running those places and maintaining a sense of security (ibid.). Second, harvests complement the historical identity of food handling (Kommunstyrelsen 2019b:37). Third, citizens' involvement in food

production and environmental protection retrieves lost connection to the neighbourhood, community, and nature. It intervenes in individualistic lifestyles and contributes to social sustainability (Kommunstyrelsen 2019b:38), one of the plan's aims.

Moreover, community gardening is relevant in Malmö due to the high foreign-born ratio. Those may have farming experience or request vegetables from other cultures, and community gardening offers people with diverse backgrounds and experiences a place to communicate.

The Current Limitation of Phytoremediation Application

Due to dependency on vegetation conditions, the uncertainty of phytoremediation remediation effects may hinder setting a concrete project schedule. A planned date for site redevelopment directly after the phytoremediation application on a brownfield may challenge the implementation of phytoremediation. Therefore, a phytoremediation time plan should consider including extra time. Also, reviewing the phytoremediation mechanism would complement the planning and evaluate the project model's feasibility. Although it is impossible to standardise phytoremediation due to the dependency on site specificity, setting a measure may help in planning a project applying phytoremediation.

Reflection of the Methods

Research-based landscape design is conducted by literature and case studies examining theories, structural function, planning schemes, brownfields' situation, the state of contaminations, phytoremediation plants and post-industrial, temporal design with the reflection of my Bachelor thesis.

The applied method, a constructive model of research through design in the research-based landscape design, examines anticipatory results and experiences in the design procedure (Jansson et al. 2019:13). This method describes the project well, supporting an interdisciplinary study to develop the field of Landscape Architecture (Lenzholzer & Brown 2016 see Jansson et al. 2019:14). This is a trend and becoming crucial to deal with essential topics the world is facing, such as environmental issues.

Landscape Architecture has the potential to address evidence-based information, such as land contamination, express societal needs and support ecology. On the other hand, the study field expands extensively. Because it can cover various fields, defining the role of Landscape Architecture in the method is crucial and may be challenging.

The artistic model of research-based landscape design defines a general concept based on brief information on the topic. The background research took place in the Bachelor thesis, and this Master thesis investigated the potential of the design. Research and facts, such as land contamination information, supported the idea.

Therefore, applying constructive and artistic models is inherently suitable for the topic's development. Handling the same topic in other areas apart from Landscape Architecture may result in pragmatic solutions, which means engineering solutions and redevelopment.

Case Studies and Impact on the Results

The choice of East New York as a case study is taken upon the need for investigation in the established model of a citizen-organised community movement and its supporting structure of the City and organisations and integration into the policy. The establishment process of community gardening in East New York indicates how citizen-organised community movements can be supported to thrive.

In terms of community gardening, the need, community garden network, City's support and organisation's engagement already exist in Malmö. The analysis of the case of East New York strengthens the significance of the structure in Malmö and implies the potential for expansion.

The reason for Nyhamnen as the chosen project area is that it is a currently redeveloping post-industrial area, which asks for landowners', property developers', authorities' and planners' engagement (Kommunstyrelsen 2019b:52) in the development process, within Malmö.

The City's partially inclusive and participatory planning scheme and the part of *the Comprehensive Plan* to create and manage meeting places and security (Kommunstyrelsen 2019b:37) are in line with the aim of the model of space for the community. When planning policy favours, the possibility to complete the long and uncertain application time of phytoremediation may be more likely to be high without being developed in the middle of the project. Therefore, the project could be genuine to remediation of brownfield rather than fighting and proving the project itself in the chase of space in the City.

Implementation

Based on the case of East New York and Malmö's existing structure, an urban agriculture renaissance in Malmö may be possible theoretically. However, the sense of place and behaviour varies from place to place. There may be a reason why it is not already occurring. Community gardening is thoroughly an example of intermediate community use. It is more important to follow the design guideline to find the original expression of the city rather than implementing an idea from one place to another. On the other hand, the model could be tested since there is an existing structure, which could offer support.

Future Research

This thesis targets brownfields contaminated by industries. The County Administrative Board of Scania, the region Malmö belongs to, aims to 'densify within cities partly by remediating contaminated sites [...] by 2050' (Länsstyrelsen Skåne n.d.b). Nyhamnen's redevelopment plan is also expected to complete in 2050 (Kommunstyrelsen 2019b:52). These conditions indicate the phytoremediation's relevance in the project site and suitable occasion to implement. It would even contribute to 'a socially, economically and environmentally sustainable city' (Kommunstyrelsen 2019b:6, 61) of the United Nations Social and Environmental Sustainability Goals in a bigger picture by promoting a clean environment and health, which the City of Malmö refers to as the aim.

Overcoming the difficulties of undefinable application time and complex procedures of especially vegetation management in the implementation of phytoremediation would be the first step for the implementation by comprehending

the actual phytoremediation method and establishing a guideline despite the challenge of standardisation.

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