Master in Landscape Architecture Thesis 2021 | Hochschule Anhalt

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Master in Landscape Architecture Thesis 2021

Esha Kundu | 4068651



Resilient City as a Climate Garden

from Grey to shades of Green

Case of Wolfsburg, Germany

Submitted in the partial fulfilment of the degree Master of Landscape Architecture

Supervised by

First : Prof. Dr. Nicole Uhrig *Second* : Prof. Dr. Torsten Lipp

Declaration of Authorship

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Edden Hunder

Signature

Sketch on right : Burg Neuhaus Castle, Wolfsburg, 1371 AD



"When I'm working on a problem, I never think about its beauty, I just think about how to solve the problem, but when I finish it, if the solution is not beautiful, I know it's wrong."

- Richard Buckminster Fuller

to my dearest Mummy and Papa. It would not have been possible to reach until here without your support. My talent, strength and vision, I owe it all to my upbringing as your child.

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RESILIENT CITY AS A CLIMATE GARDEN FROM GREY TO SHADES OF GREEN

CASE OF WOLFSBURG GERMANY Envisioned graphic of Climate Gardens

GARDEN TYPOLOGY 5 : VIEW OF THE PAUSE POINT OVERLOOKING THE STREAM LANDSCAPE

22. ~

Plant Combination 3 - 6

Special plants that are intended to be planted around the stream to quantify the water. These species can help retain moisture in the atmosphere to keep temperatures optimum. Tree canopies are a very good place for the resident animal species.

In general this typology of space is intended to create a microclimate of its own.

GARDEN ELEMENT 8

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LL LTL

2 mail

Pause point that is the intersection of green path and stream offering idyllic views into the landscape around stream that is designed to preserve the flowing water.

Material of contruction TYPE 1 : Wood at places where there are tree canopies.

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1 INTRODUCTION

1.1 Abstract

Much is in our hands to stop our own climate from changing. Changes to the environment, built and landscape need sensitive approaches to revert from the evident symptoms of drying landscapes leading to temperature rise and loss of biodiversity. At present, several ecological links are at brink that need immediate attention in terms of self-sustaining methods to safeguard sound continuity of life processes. This research aims at rediscovering the landscape assets in today's context, green models of antiquity such as cultural landscapes that have proved to be the means of self-sustaining as separate entities, with the aspects of culture and landscapes being deviated, transforming cities greatly giving a new face.

Wolfsburg is one such example. Among the newly founded cities of 20th century, its origin dates back to 942 AD. An ever evolving city has a rich history, is noteworthy for the several faces it holds in its timeline of city transformation. Lately, the city's growth has been parallel to the emergence of Volkswagen factory from individual auto production facilities into a globally active company that makes it closely associated to be known as the automobile city of today. Amidst its evolution, the natural setting of Wolfsburg cannot be ruled out in early years of its formation. What makes it special are the cultural landscapes together with many castles that embellish its heritage, out of which from Wolfsburg Castle (1302 AD), the city draws its name. Amidst the flourishing side of the automobile industry in Wolfsburg, since 50 years after the high point of post – war modernism, a rapid transformation has been observed evident of leaving voids within the city. Metaphoric to a green thread (landscapes) that stitched history, architecture together with urbanity, today leaves a major disconnection with the historical landscapes in regard to resilience and sustainability, and the very historical landscape faces immense threat of being disregarded.

The **main goal** of this research is to come up with **landscape design solutions**/ **interventions** that will help regard the landscape assets as crucial elements of sustenance. The specific contribution of this research is to make Wolfsburg futureproof, taking cues from history thereby reinvigorating the missing links, recreating ecological networks intrinsic to any landscape, identifying potential sites to demonstrate design transformations that can become generic models, making it highly potent city of the future divulging hidden layers and stitching back the city in green thread with help of the needle of technology. The focus of this research remains with discovering the landscape design solutions/ interventions integral to the site, where technological solutions shall act as subordinated add-ons.

Thus, envisioning Wolfsburg to be a **resilient**, green, smart (innovative), sustainable, culturally rich city, with **climate** gardens as the new futuristic green typology.

1.2 Question & looking at Big picture

What are the impacts of climate change in Wolfsburg that the city is facing today? What is causing this impact? What role does gardens and green spaces as a part of whole nature have in reducing the impacts of climate change in cities like Wolfsburg? Is Wolfsburg *resilient* to this global change?

• Working field 1 : Combat Climate Change creating livable microclimates and making cities *Resilient* Wolfsburg is one of the cities going through global change like the climate change. What are the missing links that make cities succumb to degeneration. The increasing atmospheric temperatures and the sea level rise have already been showing the deadly signs that are not instantaneous, but sheerly regressive. What are the key features needed at human level interactions for nature to respond in compliance. Is it still possible to revert the man made changes and adopt a more nature friendly symbiotic design? Is it possible to create microclimates in regard with the neighbourhood scale that if applied to the entire city, could create a new livable atmosphere?

Working field 2 : Securing biodiversity, experience wild nature towards attaining Resilience

A lot needs to be addressed in the design of pubic spaces for people to feel freedom and celebrate healthy lives where the landscape is taken care of, nature serves as a retreat within cities for the people, strengthening cities towards attaining resilience. At the same time, contemporary urban design also needs to address situations like the present day pandemic, cities characteristic of being resilient. This leads to the question about the kind of design of outdoor spaces that shall address these challenges. What role does the futuristic design play in making cities *resilient*?

Is it possible to go back in timeline to see the possible roots that are the anchors of the city of Wolfsburg. Is it possible to revive the hidden layers of the city for its hidden treasures that have the potentials to transform Wolfsburg city exposing its *resilient* side, strengthening human interactions with the surroundings.

from Grey to shades of Green | 21

1.3 'Resilience' in landscape architecture

In literal meaning, the term '*Resilience*' is an ability to recover from or adjust easily to change¹. In relevance to landscape architecture, resilience is to retrofit communities to recover more quickly from extreme events, in present and in the future².

The concept of resilience encompasses ecological, social, economic, and infrastructure systems (Curtin and Parker 2014). The focus of this research is on *landscape resilience* or ecological resilience, that is one of the main dimension of resilience. *Landscape resilience* is the ability of a landscape to sustain desired ecological functions, robust native biodiversity, and critical landscape processes over time, under changing conditions, and despite multiple stressors and uncertainties³.



1. Meriam Webster Dictionary

2. www.asla.org

3. Operationalizing landscape resilience, enhancing biodiversity & ecological function at landscape scale. www.resilientsv.sfei.org

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1.4 Seven principles of landscape resilience¹

1 Introduction

1.4.1 Setting

Unique geophysical, biological, and cultural aspects of a landscape that determine potential constraints and opportunities for resilience.

1.4.2 Process

Physical, biological, and chemical drivers, events, and processes that create and sustain landscapes over time.

1.4.3 Connectivity

Linkages between habitats, processes, and populations that enable movement of materials and organisms.

1.4.4 Diversity and Complexity

Richness in the variety, distribution, and spatial configuration of landscape features that provide a range of options for species. Some of the key components of this principle are:

• *Richness of landscape features :* Landscape-scale diversity of habitat types and connections between different habitat types; physical heterogeneity in topography, groundwater, soils.

• *Within - habitat diversity and complexity :* Site or habitat scale vegetative diversity (eg: in species, structures or height) and physical heterogeneity in topography, ground water and soils.

• *Diversity in strategy and approach :* Response diversity and a diversity of life history strategies both within and between species.

• Genetic and phenotypic variability : Diversity in genes and traits within species populations.

1.4.5 Redundancy

Multiple similar or overlapping elements or functions within a landscape that promote diversity and provide insurance against loss.

1.4.6 Scale

The spatial extent and time frame at which landscapes operate that allows species, processes, and functions to persist.

1.4.7 People

The individuals, communities, and institutions that shape and steward landscapes.

1. Operationalizing landscape resilience, enhancing biodiversity & ecological function at landscape scale. www.resilientsv.sfei.org

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1.4 Seven principles of landscape resilience



Graphic source : Operationalizing landscape resilience, enhancing biodiversity & ecological function at landscape scale. www.resilientsv.sfei.org

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1.5.1 Strategies for attaining Resilience : Social - ecological systems

1. Biodiversity¹

A resilient world would promote and sustain diversity in all forms (biological, landscape, social, and economic).

2. Build urban ecological network, creating ecological variability and manage connectivity

A resilient world would embrace and work with ecological variability (rather than attempting to control and reduce it).

3. Plan and design for modularity, multifunctionality, thus building resilience into design A resilient world would consist of modular components.

4. Acknowledging slow variables

A resilient world would have a policy focus on "slow," controlling variables associated with thresholds.

5. Tight feedbacks²

A resilient world would possess tight feedbacks (but not too tight).

6. Social capital

A resilient world would promote trust, well-developed social networks, and leadership (adaptability).

7. Innovation

A resilient world would place an emphasis on learning, experimentation, locally developed rules and embracing change.

8. Overlap in Governance

A resilient world would have institutions that include "redundancy" in their governance structures and a mix of common and private property with overlapping access rights.

9. Ecosystem services

A resilient world would include all the unpriced ecosystem services in development proposals and assessments.

10. Incorporating these Principles into Cultural settings

Taking hints from models of history based on principles of sustainability and applying in the present.

1. Ahern Jack, Urban landscape sustainability and resilience: the promise and challenges of integrating ecology with urban planning and design, Springer, September 2012

2. The role of landscape architecture in designing for urban transformations and adaption after disaster, Landscape architecture Master Thesis, Nicki Copley, Lincoln University, New Zealand, 2014

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1.5.2 Strategies for attaining Resilience : Landscape design¹

1. Natural systems as structure

Urban systems such as infrastructure should be designed in relation to underlying natural systems such as hydrology and topography. (Bélanger 2012; Lister 2007; Morrish 2008; Mossop 2006; Poole 1998, 2004; Strang 1996)

2. Multifunctionality

Infrastructure should perform multiple functions, i.e. ecological, social, economic etc. (Czerniak 2011; Morrish 2008; Mossop 2006; Strang 1996)

3. Multidisciplinary

The design process of urban systems and infrastructure should be one of inter-disciplinary collaborations. (Allen 1999; Bélanger 2012; Corner 2003; Lister 2007; Poole 1998; Strang 1996)

4. Community participation

Community participation should be enabled through every stage of development and subsequent operation. (Lister 2007; Morrish 2008; Poole 1998)

5. Placemaking

Infrastructure should engage with people's sense of place and community (Meyer 2008; Morrish 2008; Spirn 1989; Strang 1996)

6. Legibility

Infrastructure should be made legible to the people who are supported by it. (Morrish 2008; Poole 1998; Strang 1996)

7. Staging uncertainties

Infrastructure should be designed to incorporate uncertainties and encourage adaptation. (Allen 1999; Bélanger 2012; Czerniak 2011)

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^{1.} The role of landscape architecture in designing for urban transformations and adaption after disaster: a design-directed inquiry within the context of post-earthquake Christchurch, Landscape architecture Master Thesis, Nicki Copley, Lincoln University, New Zealand, 2014

1.5.1 Strategy systhesis and interpolation

Interpolating the above two conjectural areas, many concepts appear to be connected and nested in a number of ways. A sysnthesis of this examination is shown in the following table¹:

Strategies that provide overarching goals to be enhanced through supporting strategies	Strategies in support of dominant goal
Natural systems as structure (landscape-led)	 Ecological variability Diversity Acknowledging slow variables (in nature) Ecosystem services
 Staging uncertainties (landscape-led) 	 Innovation (the notion of embracing change)
Social capital (resilience-led)	 Community participation Legibility Placemaking
Diversity (resilience-led)	• Multifunctionality Multi-disciplinary
 Modularity (resilience-led) Overlap in governance (resilience-led) Innovation (resilience-led) 	

Tight feedbacks (resilience-led)

Acknowledging slow variables (resilience-led)

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^{1.} The role of landscape architecture in designing for urban transformations and adaption after disaster: a design-directed inquiry within the context of post-earthquake Christchurch, Landscape architecture Master Thesis, Nicki Copley, Lincoln University, New Zealand, 2014

1.6 The Approach

Role of Landscape urbanism

Landscape urbanism is a way forward to the design of cities, and their components, aiming to make good places through a creative integration of natural, human and cultural process layers (Tom Turner, 2015). According to Charles Waldheim, 'Urbanism describes a disciplinary realignment currently underway in which landscape replaces architecture as the basic building block of contemporary urbanism. For many, across a range of disciplines, landscape has become both the lens through which the contemporary city is represented and the medium through which it is constructed'. In congruence to this, James Corner describes 'dynamics and merging terms of landscape with urbanism suggests an exciting new field of possibilities' ¹.

1.7 Goal

With the example of Wolfsburg, the main goal of this research is to come up with landscape design solutions/ interventions that will help regard the landscape assets as crucial elements of sustenance, where landscape design is the prime focus in attaining resilience and technological solutions will act as subordinated add - ons.

The specific contribution of this research is to make Wolfsburg futureproof, can be achieved by focusing on the very cultural landscapes at first that are under constant threat of erosion, thereby reinvigorating the missing links, recreating ecological networks intrinsic to any landscape, identifying potential sites to demonstrate design transformations that can become generic models, making it highly potent city of the future divulging hidden layers and stitching back the city in green thread with help of the needle of technology. The idea is to redefine the car centric aspect of Wolfsburg in accordance with the principles of Smart Mobility and further remodeled to bring it to a resilient future. Thus, envisioning Wolfsburg to be a green, smart (innovative), sustainable, culturally rich resilient city.

Attaining Resilience

• The idea is to **redefine** the car centric aspect of Wolfsburg in accordance with the principles of Smart Mobility and further **remodel it** to bring it to a **resilient future**.

^{1.} www.landscapearchitecture.org.uk/landscape-urbanism-definitions-and-history



1.8 Climate change measures

In context with the goal to make Wolfsburg resilient, it is necessary to reflect upon the factors that are causing climate change. Most glaring are the green house gas emissions. However, the following data is an overview of Germany's national Climate Change measures or targets until the year 2030.

Germany, like the European Union, aims to become greenhouse gas neutral by 2050. It has set the preliminary target of cutting emissions by at least 55 percent by 2030 compared to 1990 levels. The country's first national climate law, passed in 2019, states annual reduction targets for individual sectors such as industry and transport until the year 2030. These are set in line with the European greenhouse gas emission reduction plans. In case a target is missed or overshot, the law states that the difference will be spread out evenly over the remaining annual emissions budgets of the sector until 2030. The ambition of Germany's national climate targets can be raised but not lowered.

Germany's climate law also states that new emission budgets for the years after 2030 will be set in 2025, and that these must be in line with the goals of the law and the requirements of the European Union – hence, climate neutrality by 2050. An independent council of experts on climate issues will be set up by the federal government to evaluate emissions data, changes in climate action programmes and more¹.

Germany's 2030 sector targets for greenhouse gas emission reduction and 2019 status

CLEAN ENERGY WIRE

Sector	2019 status (cut from 1990 levels)	2030 target (cut from 1990 levels)		
Energy	45.5 %	62.5 %		
Buildings	41.9 %	66.7 %		
Transport	0.6 %	42.1 %		
Industry	33.8 %	50.7 %		
Agriculture	24.4 %	35.6 %		
Other	76.3 %	86.8 %		
Total	35.7 %	56.6 %		

Data: UBA (2020) / Climate Action Law.

Note: Without emissions from land use, land use change and forestry (LULUCF), 2019 data preliminary.

1. www.cleanenergywire.org

1.8.1 Green house gas emissions status¹

The economic effects of the coronavirus pandemic has greatly influenced Germany's total greenhouse gas emissions in 2020. German energy consumption was at a "historic low" in 2020, as per sources. The researchers said energy-related CO_2 emissions in Germany dropped 80 million tonnes in 2020, which means that the country is set to easily surpass its original 2020 target to reduce total greenhouse gas emissions by 40 percent over 1990 levels.



Due to the economic impact of measures to control the spread of the coronavirus, emissions are expected to plunge even deeper in 2020, making it extremely likely that Germany will meet its original 2020 target after all. The country is, however, still struggling to cut emissions in the transport and heating sectors and is facing a slow-down in the roll-out of renewable energy. These trends indicate that it will require continued efforts to meet Germany's future climate targets, even in the event of a severe recession caused by the pandemic and consequent steep drop in emissions. Climate experts have warned that a recession will not bring about structural changes to ensure further reduction, and that emissions could rebound with the economy.

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^{1.} www.cleanenergywire.org

1.8.2 Climate change targets

Can be divided into three main target groups :

- 1. Energy transition targets
- 2. Renewable targets
- 3. Energy efficiency targets

The most important tools for Germany to reach its targets on emission reduction are the roll-out of renewable energies, bringing down energy consumption, and ending the use of fossil fuels in all sectors of the economy. In order to do this, the country has also set a range of energy transition targets which primarily relate to the expansion of renewable energies and reducing energy demand.



Graph source : www. cleanenergywire.org

1.8.2.1 Energy transition targets¹

The latest Energiewende progress report from June 2019 illustrates the structure of the country's targets in a chart:



As per the latest Energiewende progress report stating that the energy transition lagged behind in key areas and the government had failed to provide answers on how to get the country back on track.

Since then, the government has, however, presented a climate package and its Climate Action Programme 2030 which lay the bedrock for future climate policy. It has introduced a carbon price in the buildings (heating) and transport sectors which will come into force in 2021 and adopted Germany's first climate law, which sets more ambitious targets – aiming for climate neutrality by 2050. New more ambitious targets are currently being put into legislation – such as reaching a share of 65 percent renewables in power consumption already by 2030.

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^{1.} www.cleanenergywire.org

1.8.2.2 Renewable targets¹

Germany has made significant progress on the expansion of renewable energies. More than 40 percent of the country's power consumption was covered by renewables in 2019, exceeding the 2020 target of 35 percent one year ahead of time. The government is now taking aim at 65 percent by 2030, as is stated in its Climate Action Programme 2030.

Their share in the country's gross final energy consumption, however, remains comparatively low. By 2030, the government aims for a share of 30 percent.

Germany is ahead of many other industrialised nations (note that the share of hydropower in the German energy mix is comparatively low, with most renewable power coming from wind, solar and biomass).

A recent slump in renewables expansion has, however, led the renewable energy industry and environmental organisations to warn that Germany's targets in this area may fail if the government does not take speedy action.

Germany's renewable energy targets and status 2019

Data: BMWi, Second Progress Report on the Energy Transition (2019) / BMWi, AGEE-Stat (2020).

	Status		Targets			
	2018	2019	2020	2030	2040	2050
Share of renewable energies						
Share in gross final energy						
consumption	16.5 %	17.5 %	18 %	30 %	45 %	60 %
Share in gross power	37.8 %	421%	min 35 %	65 %*	65 %	min 80 %
consumption	57.070	42.1 70	11111 33 70	00 70	05 /0	
Share in heat consumption	14.3 %	14.5 %	14 %			
Share in transport sector	5.6.04	5.00/	10 %			
	5.6 % 5.6 %	(EU goal)				

*Target from Climate Action Programme 2030

CLEAN

WIRE

1. www.cleanenergywire.org

1.8.2.3 Energy efficiency targets¹

Germany has made notably less progress on its targets to reduce energy demand than on its renewables targets. Increasing energy efficiency is generally seen as a main pillar of the Energiewende and essential to reaching climate neutrality by 2050. But saving energy on a large scale – by insulating buildings, changing behaviour and introducing many new and often expensive technologies in different sectors – requires everyone's participation, and has proven a hard sell so far.

Emissions in a historical context

A look back on Germany's historical emissions track record since 1850 reveals that the country's greenhouse gas emissions have been very much dependent on economic fluctuations and alternations between war and peace. WW1, followed by economic and political crises of 1920s - 30s, had a very visible influence on emissions, followed by WW2. Since then, Germany's greenhouse gas emissions were on a constant climb until they peaked in 1979 at 1,390 million tonnes CO2 equivalents.



Germany's greenhouse gas emissions 1850-2019 and reduction targets

1. www.cleanenergywire.org

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1.9 Vision

Wolfsburg as a smart, climate adaptive self-sustaining model city where history and culture coincide with the automobile industry, are the forerunners of city growth, making Wolfsburg people centric, nurtured with human scale public places and greens (animal friendly). Cities that can combat climate change (climate gardens) and are resilient (15 minute city) has the potential to become generic examples for creating future cities across the country.



Visuals from the movie Avatar, 2009, Cameron James

Image source : www.mortentolboll.weebly.com

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1.9.1 Design approach tools

Looking at the climate change targets, following the vision of this research there is a need to bring down the green house gas emissions within cities, an appropriate *landscape design* could prove to be a *sensitive tool* in helping Wolfsburg attain the climate change targets, whereby smaller microclimates could be designed addressing present day issues. some of the important design approach tools that emanate from the design philosophy of this research have been discussed in detail as following points :

1. Water efficiency

Research has shown that temperature increases will have an effect on the hydrologic cycle. An increase in evaporation rates may lead to decreases in precipitation amounts, timing and intensity rates, this can lead to longer periods of drought and a slower groundwater recharge process. Design approaches that respond to the need of higher water efficiency through design elements like rain gardens, bioswales, constructed wetlands, permeable pavers, rooftop gardens can help rain water and storm water penetrate into the ground instead of running off. It is desirable to have these tools in the design.

2. Recycled materials

Using local and recycled materials reducing construction waste by salvaging and reusing on-site materials, which in turn would help improve air quality, produce less landfill waste, and save old growth timber products. By transforming on-site materials into unique artwork or reformed design features, we hope to bring sustainability and originality into design.

3. Reduce heat islands effect

Green roofs, open space, hardscape and softscape elements can reduce the heat-island effect of a space. Urban heat island effect is recognized as a rise in temperature of an urban center compared to that of the surrounding rural area by 5-9 degrees Fahrenheit (F). This unnatural rise leads to the emission of more Greenhouse Gases which in turn contributes to global warming. A major contribution is the massive amounts of heat that urban structures generate where they consume and re-radiate solar radiations and produce additional anthropogenic heat sources (i.e. vehicles, power plants, etc.). To help mitigate this problem, urban trees, open green space, light colored paving material, vegetative roofs, and photovoltaic shade canopies can be accounted into design, eg: **urban forests**. By providing shade coverage to shelter buildings as well as outdoor spaces, urban trees are able to lower the temperature down in the city. Furthermore, it also mitigates climate change through its ability to store and sequester carbon dioxide as well as evapotranspiration.

4. Promote regional material

Carbon footprint can be reduced by shortening the transportation distance and the choice of materiality in design, eg, urban farming, on-site nurseries, and rain water harvesting, self-sufficient and sustainable design can be encouraged.

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1 | Introduction

1.9.1 Design approach tools

5. Encouraging low carbon alternative travel methods

Carbon Dioxide released by automobiles plays a significant role in adding to the green house gases responsible for global warming. This has encouraged to rethink the way we commute assorting for low carbon alternative travel through designs like complete streets (which includes bike paths, trails, sidewalks, and bus stations) to encourage sustainable modes of travel. In the design demonstration cases, the effort has been on tailoring the design in response to fit cohesively within the community to ensure they will be used.



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1.10 Literature review & Inspirations

1 | Introduction

The city of Pandora in the movie Avatar.

Highlights : Clear nature, sun and the moon, the *idyllic* landscape assuring that it is possible to recreate our earth instead thinking about migrating to another planet.

Inspiring Social movements

Cittaslow is a movement and network founded in Italy in 1999. The association is inspired by the slow food movement. The main goals are to improve quality of life in cities and to prevent the unification and Americanization of cities in which franchise companies dominate. The support and emphasis of cultural diversity, own and special values of the city and its surroundings are also central Cittàslow goals. In a broader sense, Cittàslow can be attributed to the trend of the so-called slow movement¹.

Theoretical inspirations

Transcendentalism is an idealistic, philosophical and social movement developed in New England around 1838 in reaction to rationalism. It taught about divinity pervades all nature and humanity. The main highlights were upon views on communal living, and that is exactly how this research shall try to develop in the design. It is inspired by Immanuel Kant's idea, "in order to understand the nature of reality, one must first examine and analyse the reasoning process which governs the nature of experience"².

German transcendentalism that emerged from the German Romanticism, as well as the Indian scriptures along with several others were sources to the original idea that turned in the search for a liberating philosophy. It was also strongly influenced by Hindu texts on philosophy of the mind and spirituality, especially the Upanishads. Upanishads are late Vedic Sanskrit texts of ideas revered in Hinduism. Global future threats like environmental degradation, climate change, overconsumption, depletion of natural resources, fossil fuel etc. have forced mankind to think beyond. The idea was borrowed from Dr. Charulata's work on 'Statement on Sustainability': Wisdom from 'Isha Upanishad'³ that reflects a deeper connection in the ancient roots between Upanishads and self-sustenance, thereby revisiting ancient Indian knowledge and wisdom of 'Isha Upanishad' to understand 'Sustainability'.

^{1.} de.wikipedia.org/wiki/Citt%C3%A0slow

^{2.} dictionary.com and britannica.com

^{3.} Londhe, Dr Charulata. (2016). 'Statement on Sustainability': Wisdom from 'Isha Upanishad'.

1.11 The *idyllic* landscape

To proceed further in the design, it is important to understand what exactly is meant by the term idyllic in a landscape. With the reference of the beautiful creations made by Thomas Kinkade, a painter whose works revolved around painting beautiful and picturesque landscapes are an hint towards describing idyllic. The idea is to draw inspirations for imagining what could be the foundations for designing an idyllic landscape.



Image source : www.thomaskinkade.com

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Furthermore, finding inspirations in the learning at school in MLA curriculum, seminar on 'Nature as a Metaphor', the initial seed of ideas was laid for dealing with lost connection between men and nature. The term idyllic enriches the aesthetic experience with a **cultural component**, by idealizing the **relationship between man and nature** masking the reality. The contrast between nature and culture, the **alienation** of man to nature seems repealed, so the "**idyllic**" is connected with associations such as **harmony, security, tranquility, timelessness** and **enjoyment**¹.



1. History and Theory of Landscape Architecture seminar taught by Prof. Dr. Nicole Uhrig, Semester 2, MLA, Hochschule Anhalt

from Grey to shades of Green | 41

1.11.1 Hints from history, Landscape gardens

The Landscape Garden or the English Garden evolves around the early 18th century and took the Baroque Garden to an end. It finally broke the geometrical order of garden design and was connecting the garden with the landscape by hiding its enclosure. As per the noble savage, Jean Jacques Rousseau (1712 - 1778) who said "back to nature" was trying to rebuild the lost connection, aiming for certain principles that are discussed as follows.



View of La Crescenza by Lorrain

Image source : www.tripimprover.com

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- · Harmonic relationship between man and nature
- Idealizing Nature
- Reflect a democratic civil society in garden design
- Picturesque settings

Some of the characteristics of Landscape Gardens are - working with the existing landscape, naturalistic, organic forms, winding pathways, choreographed pathways, surprising visual axis, no visual break between garden and landscape, invisible fences, space design with clumps of trees, solitary trees, wide lawns, shades of greens in plant species, architectural folies, pastoral settings¹.

An example of English Landscape Garden can be seen in the painting by **Claude Lorraine (1604–1682)** "**Father of European Landscape Painting**" as on the adjoining page together with observing most of the above garden features.

The idyllic landscape picture is furthermore inpired by the Furthermore, the imaginative garden that has been born out of the several inspirations isnt complete without discussing the critical features of Wild Gardens.



^{1.} History and Theory of Landscape Architecture seminar on 'The English Landscape Garden' taught by Prof. Dr. Nicole Uhrig, Semester 2, MLA, Hochschule Anhalt.

1.11.2 Hints from history, Wild gardens

■ "A garden exists, for them, not primarily to serve human beings; rather nature and especially plants and animals have equal rights. The ideal nature garden does not require the care of a gardener; indeed such care is to be avoided - for example leaves should not be removed but should remain on the ground to provide habitat for plants and animals."¹



Some of the principles of Wild Gardens are,

- · an integrated approach between man and nature
- focussing on nature (nature as a gardener)
- · encouraging wild plants and animals
- the image of a naturally grown space
- organic, nature-inspired forms
- sustainable construction
- little maintenance

William Robinson virtually invented the idea of the wild-ish English garden, in contrast with more regular, formal, classical ancient gardens. Robinson traveled the world, collected several plany species, came back to Sussex and a property called Gravetye Manor, a thousand acres of rolling hills, lakes, and hayfields, where he lived for fifty years and thoroughly practiced his ideas of the wild garden. His ideas seem surprisingly and mostly modern to us today -- minimal tilling, use of local wild flora as much as possible, basically letting nature take its course in all sorts of ways, with the human hand (and labor) being involved as minimally as possible.

His ecological approach to gardening is very up to date, even including the idea of eschewing mulch in favor of plants that naturally provide cover with their dropped leaves to keep the weeds down and the weeding labor to a minimum. The book itself is beautiful, and a compendium of plants that will do well in various settings, and to solve various challenges. Subsequent editions have added examples from around the world, a lot of color photography, and forwards by various modern experts. Robinson's knowledge of plants and how they grow was encyclopedic, and this book reflects both the expertise and the love that lay behind it.

^{1.} Wolschke-Bulmahn, J,: The Wild Garden and the Nature Garden - Aspects of the Garden Ideologie of William Robinson and Willy Lange

1.11.3 Louis Le Roy (1924 - 2004)¹

As per Roy, designing a garden

Covering the "cultural desert" with construction debris, then digging with the residents, then planting trees, flowers, bushes, and finally let it all grow.

Principles of Le Roy's Theory

- · A Garden is primarily ecological awareness, aesthetics and use are secondary
- · Participation: People should be encouraged to change old ways of thinking
- The Horticultural activities are kept to a minimum ("nature arranges itself")
- · Development and processes are allowed (succession)
- Interventions as a starter for the growth of the garden (rubble mound, seeding, selective plantings)
- Using handicraft instead of machines
- · Minimal care and energy costs

"In the garden, **nature has to be the master** and the owner has to be apprentice."

- Louis Le Roy, 1973



1. History and Theory of Landscape Architecture seminar on 'Wild Gardens' taught by Prof. Dr. Nicole Uhrig, Semester 2, MLA, Hochschule Anhalt.







1.12 An eye opener

• Found my hands on the book 'Machine in the Garden, Technology and the Pastoral Ideal in America' by Leo Marx. It highlights the very conflicts between the landscape and the machine, whereby the context of the project matches my question. As my research is in context to Wolfsburg, which is a car city, the initial ideas were to dig deeper into the history of the city establishing roots and connection with nature, landscape and the very elements being the most important layer that beholds cities.

Following are some excerpts from the book that truly inspire in envisioning Wolfsburg for everything that can be dealt with today and is in our hands, can be of great learning in identifying the missing link with nature.

"Nowhere is the ill-defined feeling for "nature" more influential than in the realm of imaginative expression". "No single motive can account for these disparate phenomena. Yet each does express something of the yearning for a simpler, more harmonious style of life, an existence "closer to nature," that is the psychic root of all pastoralism genuine and spurious that such desires are not peculiar to Americans goes without saying; but our experience as a nation unquestionably has invested them with peculiar intensity. The soft veil of nostalgia that hangs over our urbanised landscape is largely a vestige of the once dominant image of an undefined, green republic, a quiet land of forests, villages, and farms dedicated to the pursuit of happiness.¹"

• Drawing lines from what Leo Marx talks in his book, and Wolfsburg being a city in Germany, it is imperative to take forward the research in context with the current discussions on remedies for climate change in Europe more precisely in context with Germany. Academia, businesses, civil society and associations have gathered invaluable experiences and skills in framing these transformations.

Sustainable Mobility – Made in Germany²

"Sustainable Mobility – Made in Germany" stands for sustainable, proven, resource efficient, innovative, trustworthy and flexible solutions for all domains of mobility and logistics services. Germany has a long history of successful changes and transformations in the transport sector – including

- the re-emergence of walking and cycling as safe and viable modes of transit
- the continual improvement of the public transport sector
- the development of progressive regulations and planning methods and efficient propulsion systems
- the integration of different modes of transport, including multimodality in logistics
- the establishment of comprehensive funding schemes

^{1.} Tolstoy L., The Machine in the Garden, Oxford University Press, 1964, 2000

^{2.} www.german-sustainable-mobility.de

The route towards a German Partnership for Sustainable Mobility¹



German Partnership for Sustainable Mobility

Sustainable Mobility - Made in Germany



Infrastructur



General Policies for Sustainable Transport





Smart Mobility



Public Transport

Logistics



Clean Air



Cycling



Out of the many focus areas of GPSM including, **Smart Mobility** will be of particular importance in my thesis research in reference to the car centric aspect of Wolfsburg. However, conclusions would still reflect upon the holistic strategies derived from every focus area concerning the theme for Wolfsburg, especially, Cycling, Clean Air and Technology besides Smart Mobility.

Image source : www.german-sustainable-mobility.de



^{1.} www.intelligenttransport.com

1.12.1 Smart Mobility¹

A high level of connectivity and flexibility is the hallmark of the German mobility system. Smart mobility is the intelligent combination of shared mobility options, such as carpooling, car sharing and bike sharing programs, and well-developed public transport services. Integrated information, booking and payment systems help to achieve seamless mobility and high user-friendliness across the various modes. Smart mobility can offer significant cost-benefits over vehicle ownership, reducing the need for private cars.

The route towards a German Partnership for Sustainable Mobility²

The German objective to reduce greenhouse gas emissions (GHG) by 40% by 2020 and up to 95% by 2050 (compared to levels from 1990) is an ambitious one. Transport is among the top emitters of GHG and especially urban transport, which accounts for nearly half of the tpercentage. With this in mind the German Federal Ministry for Economic Cooperation and Development (BMZ) and the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) initiated the German Partnership for Sustainable Mobility (GPSM). It provides a strong illustration of Germany's aspiration to be a trailblazer in progressive climate policy. It is also a follow-up to the Rio+20 process, to lead other international forums on sustainable development and in European integration.

Successes in Germany are based on solid knowledge, strategies and innovations that is resilient to climate change. With such innovation, Germany has become one of the global frontrunners in environment-friendly politics and technologies offering sustainable solutions in mobility services. Therefore, German expertise is very valuable to enhance the mobility world, can be a good example when designing futuristic cities.

In an attempt to take forward the main aim of this research, goals and policies of the GPSM is taken into consideration zooming in at smaller scales with respect to Wolfsburg city and the neighbourhoods within.

Sustainable transport as a solution for modern challenges

Sustainable transport solutions in cities are crucial, not only as a means to fight the peril of climate change, but in order to better serve the mobility demands of our growing numbers of commuters, and maintain healthy liveable environments.

GPSM Objective

Attempting to remove the walls of division that impede the creation of inclusive, sustainable, innovative and better mobility solutions. By gathering German knowledge and expertise, the GPSM contributes to the international dialogue on smart transportation and to sustainable development worldwide.

^{1.} www.german-sustainable-mobility.de

^{2.} www.intelligenttransport.com

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Image source : www.german-sustainable-mobility.de

Car sharing vehicles can be combined with clean electric propulsion, and thus additionally contribute to reducing pollutant and climate emissions. Shared mobility reduces costs associated with private cars. Bike sharing programs can eliminate the need for certain car trips. Both car sharing and car-pooling allow for a more efficient use of vehicles and can reduce the need for private car ownership. Car-pooling offers have enjoyed high popularity for more than two decades, and car sharing programs—including station-based, free-floating, peer-to-peer and corporate car sharing are quickly expanding in many German cities.

The environmental benefits of smart mobility can be further enhanced through the use of clean and innovative technologies. Electric propulsion in public transport, car and bike sharing programs and public utility fleets contribute to better air quality in our cities; when driven by renewable energy sources, the transport sector lessens its climate change impact.

The passionate collaboration of municipalities, service providers, research institutions and customers promises further advances in the field of smart mobility.

1.13 Research methodology

My master's thesis is a design thesis with the background research work, analysis and how that helps in shaping the design thereby outlining the process and finally leading to a design. The thesis research work method is a qualitative study, inductive and exploratory backed with a strong analysis of history and landscape in context of Wolfsburg and its environs followed by landscape design interventions.

As this research is based on a live competition 'Wolfsburg AWARD for Urban Vision 2020' has been discussed further in thesis research framework in detail, this has opened up several trajectories leading towards strengthening the knowledge base necessary for a comprehensive analysis, for example the earlier proceedings of ideas workshop and exposition named ZUKUNFTSSTADT 2017. Excerpts from the summary report of Phase 2 that constitutes public participation shall be studied for a deeper understanding about the work that has been happening in Wolfsburg.

The first phase supported funding projects with a vision for the future development of the municipality, focusing on the structure of the city in the form of recommendations for action and implementation proposals. The goal was to develop a vision based on key needs of the citizens. In order to bring the concepts from first phase closer to implementation, ideas and recommendations from citizens were scientifically examined and jointly further developed in the second phase.

Phase 2 : January 2017 - September 2018

Visions for living in Wolfsburg 2030+ Digitally networked into the future¹

Panning and implementation concepts. Results from the second phase of the competition, scientific review and collaborative development of citizens' ideas until the vision is ready for planning and implementation. 23 municipalities



^{1.} www.wolfsburg.de/zukunftsstadt

Overview of the **Future City Competition** and ViWo Wolfsburg 2030+ Project

The competition is part of the flagship initiative "City of the Future" of the Framework Program "Research for Sustainable Development" (FONA) and the Year of Science 2015. A total of 51 cities,

municipalities and districts were selected in the first phase to develop a sustainable vision 2030+ for their communities together with citizens, science and administration. The early participation of future users of new technologies and social innovations ensures the transfer of the results into practice.

1 Introduction

The project idea¹

Re-thinking Wolfsburg together and preparing it for the future Wolfsburg is facing many challenges: Today's positive development in the labor market, influx of families and young, highly qualified employees, different demand groups, and tight housing market place different demands on every aspect of future living and life in Wolfsburg. The first phase of the competition has shown that there are many ideas and design wishes for the city of the future. But cities are also living spaces. Nowadays, lifestyles and needs are not only considerably differentiated in terms of housing layouts, sizes and furnishings, but are also expressed in a wide range of requirements for a well-connected, integrated and vivid living environment. As the residential population increases, issues such as traffic and mobility must be taken into account. A sustainable energy supply with efficient infrastructures is also part of a livable residence and work location.

The stakeholders involved in phase 1 saw the digital transformation in particular as an opportunity and a necessity for future quality, but at the same time also considered low-tech products to be sensible for reasons of energy and resource efficiency. It is clear that the focus cannot be on new construction alone - the existing buildings must also be taken into account for a sustainable and future-oriented design of the entire city.

The Goal

Sustainable urban development with innovative ideas from the citizenry. The city of Wolfsburg decided to focus on the ongoing development of the city more on the aspect of networking and digital transformation of living and working areas. For the generation of "digital natives," digital services and smart applications are already a matter of normality in everyday life. However, in order to counteract a digital divide in urban society, all citizens should be involved at an early stage and especially at an advanced age. For this reason, not only high-tech but also low-tech solutions should be created and deployed in a targeted manner, with the aim of testing transferable solutions in existing structures for other districts and the new urban neighborhoods.

Digital services, smart applications and new solutions are to be considered in an integrated manner, adapted to urban structures and to the needs of users. To this end, it is important to find out how citizens envision a future "Smart City Wolfsburg".

The aim of the "ViWoWolfsburg 2030+" project is to **involve citizens** directly in the development of the future Wolfsburg as "**designers of the city**" and thus to generate ideas and solutions from the middle of the population that are capable of achieving consensus.



^{1.} www.wolfsburg.de/zukunftsstadt



ViWo**Wolfsburg** 2030+

EDE

The implementation¹

Online participation and workshops with citizens, children and experts.

The visions of the future and ideas already developed on the three topics of housing diversity, mobility and energy were taken up in the second phase, taking into account the digital transformation, on the basis of a selection of approaches relevant to implementation, were transformed into a concrete planning and implementation concept in the course of the process. The prerequisite for this was that the final project proposals had a digital connection or could be seen as "smart innovations" for Wolfsburg that could be tested in real laboratories. The topics, approaches and ideas were also linked to each other and to existing structures and approaches. Citizens as users of future services and solutions, as well as experts, were involved through a series of workshops, surveys by students at the Technical University of Berlin, and the use of the city's new urban online participation platform. A part of this data, given as a participation process shall be studied that matches the aims of this research and design thesis.

The fields of action

The original five topics of housing diversity, neighborhood qualities, mobility, energy and open space were expanded in the course of the funding project into three that have a special connection to developments in the field of digitization: Housing diversity, mobility, energy. For each of these central topics, fields of action were derived based on the needs from the citizenry, which set a framework for the development of the project proposals:

1. Housing diversity

• Concept and digital solutions for self-determined living • Creation of lively neighborhoods

• Creation of diverse and flexible housing offers, concepts as well as establishment of innovative financing models

2. Mobility

• Creating traffic-optimized, compact and safe infrastructure Attracting sustainable mobility (public transport, walking and cycling)

Provision of user-friendly and digital offers

3. Energy

- Resource efficiency in existing buildings
- Resource-efficient infrastructures
- · Information and consulting services in the field of energy

Furthermore, the workshop participation process Phase 2, following in the dcument would be further studied for the participation tools. A public participation of this regard is very helpful in drawing conclusions for this research thesis.



WOHNVIELFALT

MOBILITÄT





^{1.} www.wolfsburg.de/zukunftsstadt

1.14 Study framework + Competition participation

As I was looking for a topic that matches my interests in relevance to the current hot topics in landscape architecture, and the role this field has in shaping chities towards a livable environmentally sound future, Wolfsburg students competition caught my attention where I could take forward my research that matched perfectly the objectives of the competition platform.

Thus, the project is a competition entry¹ for Wolfsburg Award for Urban Vision 2020, theme *City Space History*.

OFFER OF AWARD

WOLFSBURG AWARD for urban vision 2020



A competition of ideas

held by the City of Wolfsburg for innovative student projects on the theme "Wolfsburg: City Space History"

Type of process

An open competition of ideas designed for students in a master's degree program at a European university, contest entries were submitted anonymously. The prize is awarded every two years. Guidelines for the competitive process are set in coordination with the architectural advisory board of the City of Wolfsburg.

Competition specifications

The potential entries are not limited by topic, range is defined by the fields of urban and **landscape** planning, building construction, building history, historical preservation and structural engineering with the themes: "City Space History." There is a desire for contributions that further develop the architectural and urban development qualities of the City of Wolfsburg, works that grapple with the special history of its emergence, and new models for further consideration. Value is placed on innovative or experimental approaches that promise new stimuli. The limits of technology and thinking can be plumbed. Work with interdisciplinary results were encouraged as well.

^{1.} My design entry in the competition, guided by Prof. Dr. Nicole Uhrig, won one of the three main honors and was conferred the Recognition Award, 3rd prize along with prize money by the esteemed jury.

WOLFSBURG AWARD for urban vision_2020

1.15 Study flow and process







1.16 Scope of work

As the thesis is envisioned to be a design thesis, the project is backed with an analysis of context that digs deeper into the history of Wolfsburg city with landscape in focus, leading to design strategies adressing the need of transformation and a viable design outcome. The thesis does not entail planning of the whole city of Wolfsburg, however, a conceptual plan at regional scale is envisioned to strengthen the whole idea behind.

In order to understand the kind and nature of transformation intended, demonstration of design at smallest scale, it is crucial to understand the landscape character at macro scale. The scope of this research is also limited within the boundaries of Wolfsburg city when it comes to selection of masterplan site and design demonstrations, however boundaries are not adhered when it comes to understanding natural systems and their phenomena. Several scales will delve deeper into identifying appropriate technological methods that will help enhance man and nature interactions.

The first scale ais a kind of landscape system, the unique Papenteicher landscape that comprises of several ponds and wetland systems, flanking an area from southern district of Gifhorn, part areas of district Helmstedt and the urban areas of Braunschweig and Wolfsburg. Two of the main sub-systems within the aforementioned landscape system are Barnbruch wetland on west and Dromlings swamp towards the east lie perfectly across the breadth of the city. Second scale zooms into Vorsfelder Werder that is a topographical name for river islands diked or drained from swamp and reclaimed as a moorland. Wipper teich served to be among the largest ponds in Vorsfelder Werder.

The research further zooms into the third scale, earliest village models known as Angars prevalent in 1218 AD that proved to be the green models of antiquity from where hints of self-sustenance can be collected, example Vorsfelde neighborhood. Typologically Angars were green spaces with often a church or an administrative building in the center surrounded by residences. Sometimes green spaces were left open for breeding livestock and community gardening. This however, transformed over the years in principle, space management, planning and design into what are presently known as Schreiber Gartens (allotment gardens). Today, allotment gardens are not only common to Wolfsburg, but to entire Germany. They serve as breathing pockets within cities offering perfect retreat into natural spaces away from the city hustle, yet located within its heart. On the contrary, these green havens are facing immense threat due to the precious landscape being commodified in the name of development, where land is being converted into another use. It is imperative to mention here that these keystone landscape elements have also been the main source of livelihood during the World Wars and still hold immense potential, cues in making cities self-sustainable combating pandemics and climate change. The very cues help zoom into the design site (masterplan) that has the scope for identifying futuristic landscape elements (the climate gardens) together with neighborhood farming, technology driven methods for documenting and preserving landscapes, thus envisaging self-sustaining futuristic transformation.

1.17 Timeline

1 Introduction

Landscape Architecture Master Thesis 2020 Time Table (Revised 23.07.2020) : Esha Kundu, Matrikel Number 4068651

	Targets <u>Semester III</u>	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Targets achieved
	Thesis preliminary self research Theme, topic, background data, site, ongoing competitions, aim and initial ideas														Yes 🗸
0 Date	Semester IV Meeting 1 with Supervisor (Did not happen) Tuesday, April 14, 2020 (my Internship presentation could be combined with the first meeting with you in Bernburg)			- Int deliv - Firs (Cor	ernship pre vered on en st meeting v ona)	sentation nail witheld dia while									Yes 🗸
Deliverables (are as per my Thesis First Supervisor's guidance, applicable to deliverables as under)	* Presentation of the topic / if necessary limiting and focusing the topic //dentifying type of thesis design focused, theory focused, mixed / discussion algorabach = methodology. Uterature / rough outline of content-structure / schedule has been carry forwarded in Meeting 2 as point no. 5 below!			wait from - Bac (Jul) - Rec	ing for doci Wolfsburg t to Germa (14, 2020) ceived docu	uments iny iments									Carry forwarded
Date (revised)	Meeting 1 with Supervisor / email feedback														Pending
Deliverables	Delivery + discussion of a "First Essay"/" Work Plan"/ Main design concept July 22, 2020														Yes 🗸
	2. Change of work schedule/ Time table July 23, 2020					an	M n here:	:)							Yes 🗸
	3. Mailing design graphics and receiving feedback (if possible) August 7 - August 12, 2020 (posters will be mailed on August 13, 2020														Pending
	4. WOLFSBURG WETTBEWERB AWARD Submission 17 August 2020														Awaited
	* 5. Presentation of the topic // if necessary limiting and focusing the topic /identifying type of thesis: design focused; theory focused; mixed / discussion of approach + methodology / Literature / rough outline of content-structure / schedule August 16, 2020														Awaited
2 Date (revised)	Meeting 2 with Supervisor / email feedback Wednesday, August 19, 2020														Awaited
Deliverables	 After reading the rough version of your thesis: Clarification of critical points and problems. Giving feedback for the last steps. 														Awaited
	 Submission of Form for Application of Start of Thesis at the Examination Office by end of July (Exactly 20 weeks before presenting Master Thesis in between November 2020 - January 2021) August 20, 2020 														Awaited
3 Date Deliverables	Meeting 3 with Supervisor / email feedback Tuesday, September 15, 2020 (shall be updated)														Awaited
	<u>Semester V</u>														
Date (new) 4 Date	Meeting 4 with Supervisor / email feedback Thursday, October 15, 2020 Last chance for last questions							1							Awaited
	Submission and signed reports from Exam Office before final presentation date														Awaited
Final Day!	Prospective thesis presentation date betweenJanuary 2021February 2021												;),	Paths	Awaited
						froi	m G	rey to	o sha	ides	of Gre	en	61		

2 ANALYSIS

2.1 Wolfsburg city

• Wolfsburg is one of the very few newly founded cities of the 20th Century in Europe. In a unique way, its city planning has been tied to the political, social and economic trends and upheavals of the past 80 years. The growth has run parallel to the emergence of the Volkswagen factory from individual auto production facilities into a globally active company. The time between 1951 in 1972, meaning the epoch of postwar modernism, is viewed as its most exciting time period from an architectural standpoint. Other attractions are outstanding individual examples of architecture that architects such as Alvar Aalto, Hans Scharoun und Zaha Hadid realized in Wolfsburg and that must be respectively understood as the impetus for new areas of city development.

Sending my design entry for the WOLFSBURG AWARD is the starting point of this thesis project and is intended to help further strengthen the architectural-cultural dynamism of Wolfsburg as a model city with landscape as the focus of the project. Fifty years after the high point of postwar-modernism, many individual buildings and residential districts are facing modernization. The principles of a modern city suited to the automobile are being increasingly called into question. New urban developments will be generated, especially in housing. From 119.000 inhabitants in the year 2007 an increase in population up to over 130.000 in the year 2025 is expected. At the moment the city has approximately 125.000 inhabitants.



Wolfsburg sketch by Matthäus Merian in 1600's

Image source : Topographia Germaniae, 1654

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2.2 Wolfsburg context

Wolfsburg is an independent city in the east of Lower Saxony, founded in 1938 as the headquarters of the Volkswagen factory. It has 125,000 inhabitants and is the fifth largest city in Lower Saxony with an area 204 sq. km.



Wolfsburg city in 2020

Image source : geoportal.stadt.wolfsburg.de

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Landuse map of Wolfsburg in 2020

Image source : geoportal.stadt.wolfsburg.de

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2 I Analysis

2.4.1 Topography



Satellite image of Wolfsburg and its environs in 2020

Image source : openstreetmap.org

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2.4.1 Map key



Legend source : openstreetmap.org



Waterbodies and green areas of Wolfsburg in 2020

Image source : geoportal.stadt.wolfsburg.de

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2.4.3 Habitats and Birds Directive Sites



Biodiversity map of Wolfsburg and surroundings

Map source : natura2000.eea.europa.eu. Map key on page 71.

2.4.3.1 Biogeographical regions



Waterbodies and green areas of Wolfsburg in 2020

Map source : natura2000.eea.europa.eu

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2.4 Landscape analysis

2.4.3.1 Map key

Legend

Natura2000 Sites

Habitats Directive Sites (pSCI, SCI or SAC)

- Habitats Directive Sites (pSCI, SCI or SAC)
- Birds and Habitats directives
- Birds Directive Sites (SPA)



Birds Directive Sites (SPA)

Birds and Habitats directives

Natura2000 Species

Type of site use

- Concentration
- Permanent
- Reproducing
- Wintering
- Missing information

Population size

- 1 10 individuals 0
- 11 100 individuals
- 101 1.000 individuals
 - 1.001 10.000 individuals
 - > 10.000 individuals

Natura 2000 Habitat type

Degree of conservation of habitat types



Biogeographical Regions

Biogeographical regions

Alpine Bio-geographical Region Anatolian Bio-geographical Region Arctic Bio-geographical Region Atlantic Bio-geographical Region Black Sea Bio-geographical Region Boreal Bio-geographical Region Continental Bio-geographical Region

Legend source : natura2000.eea.europa.eu



2.5 Hardiness zone map of Germany : Choice of tree species



Map source : www.plantmaps.com/interactive-germany-hardiness-zone-map-celsius.php

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2.5.1 Hardiness zone map of Wolfsburg

2 I Analysis



Map source : www.plantmaps.com/interactive-germany-hardiness-zone-map-celsius.php



2.7 Wolfsburg : from 'Castles' to Car city

Among the earliest castles of Wolfsburg were Rotheburg built in 1200 AD and Alte Haus in 1218 AD, both were destroyed during 1300s due to conflict between the Bartersleben family and neighboring kingdoms. The castles that survive today are,

2.7.1 Wolfsburg Castle 1302 AD



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Wolfsburg sketch by Matthäus Merian in 1600's

Image source : Topographia Germaniae, 1654

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2.7.3 Burg Neuhaus 1371 AD





The then-leader of the German Labour Front (DAF), Dr Robert Ley, was commissioned with initiating the construction of a car factory. This is where the Volkswagen designed by Ferdinand Porsche was to be built. The newly founded 'Gesellschaft zur Vorbereitung des deutschen Volkswagens GmbH' (Company for the Preparation of the German People's Car) is responsible for choosing the location of the plant and the city. In October 1938, the company is renamed Volkswagenwerk GmbH¹. This further led to the planning of residential areas for 90,000 - 1,00,000 inhabitants.

^{1.} die-region.de

2.9 Landscape evolution



Landscape changes over the ages in context with Germany

Architecture over the years have had a lasting impression on the face of Wolfsburg from the earliest castles to Volkswagon factory, where all the forms have an association with the special landscapes that Wolfsburg is bestowed with, being a part of the larger regional Papenteicher landscape (discussed further). Besides forests and the green cover having occupied a large portion throughout the city and surroundings, however with urbanity, the forest cover was pushed back. Here it is important to trace the green cover that are in direct connection with the ponds and together are responsible for a thriving biodiversity.

Forest history

The history of the forest is long - it begins after the end of the last ice age approx. 12,000 years ago and the gradual reforestation of the barren landscape. Until the beginning of Middle Ages, Germany among several countries in Europe was largely covered by forest that has been pushed back by the people in many areas. This development continued until the Thirty Years War. Then a number of villages fell desolate - the old desert areas Detmerode and Hohnstedt, for example, bear witness to this, as do the many vaulted bakers, whose gentle arches can still be seen in many places in the forest. During this time, the forest has reclaimed some fields. Today almost a third of the federal territory is still covered with forest¹.

^{1.} stadt.wolfsburg.de

2.10 Historical landscapes in the region around Wolfsburg

2 I Analysis



SCALE 1 : Papenteicher landscape

Papenteicher landscape is a historical landscape comprising of several ponds and wetlands system.

A werder is a topographical name for river islands. Also refers to land that is diked or drained from swamp and reclaimed as a moorland. Vorsfelder werder comprised of several teichs or lakes. One of these teichs was known as the *Wipper teich* that does not survive today due to city growth and change of water table. The idea is to protect the existing historical landscape from geting erased, thereby guiding transformations towards sustainability, taking hints from historical landscapes.



Image source : Google maps

2.11 Cultural landscapes of Wolfsburg



SCALE 3 : Vorsfelde neighbourhood

Within scale 2 exists the Vorsfelde, a neighbourhood that is among the earliest village settlement traced back in history. It lies on the east side of Wolfsburg close to Drömlings swamp. It had the Alte Haus castle with a tower fortification and was destryoyed due to conflict between the then ruling parties.

The village model of Vorsfelde comprised of *angar design* with central greens that was used for community gardening and church services. This model proved to be a boon during the world wars times as the neighbourhoods could self - sustain, however a new typology of gardens was then introduced, solely for the purpose of attaining self sufficiency. The idea is to reflect these models of sustenance into the present, in order to combat the challenges of 'Global warming' and 'Pandemics' thereby making Wolfsburg a 'RESILIENT CITY AS A CLIMATE GARDEN'.

The waterbody may well be the reason the angar was chosen.

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Historical map of Leopoldau, Vienna, an Angedorf

An *Angerdorf* is a type of village characterised by houses and farmsteads laid around a central grassed area, the *angar* (from the Old High German *angar* is a pasture or grassy place), a village green which was a common land, owned jointly by the village community, shaped as a lens or an eye, may also take other forms, a rectangle, triangle, circle or semi - circle (illustrated on the following pages). The buildings are oriented with their eaves facing the road. Livestock stalls and barns are at the rear of the plot and may be linked by a farm track that runs around the village forming an outer ring.

There is often a village pond on the *angar* and sometimes a stream flows through, may not be easy to recognise today due to the changed groundwater levels. Originally, there were no buildings on the *angar*, but in the course of time, other community facilities were built on it, such as the village church, school or a smithy. *Angerdörfer* occur in Central Europe, especially on ground moraine plates and in loess-covered terrain. In Germany they are common in East and east Central Germany.

Map source : www.en.wikipedia.org/wiki/Angerdorf

2 I Analysis

2.12 Angar : Ancient neighborhood typology







Village pond in the angar of Hönbach, Thuringia

Dorfanger of Schilda, Brandenburg

A case study of the heritage site, Village Center Blankenburg, Berlin



• 1831 AD : The below picture is an extract from the first Prussian Land Survey. On eastern part of the village green a small puddle is drawn, approximately at the same place where water puddles regularly stood on the northern side of the village green until the beginning of 20th century. A windmill can be seen on the eastern edge of the section.



Image source : www.en.wikipedia.org, www.dorfanger-blankenburg.de

2.12 Angar : Ancient neighborhood typology



Angar of Schmorda, Thuringia

• 1836 : Interesting is the elongated pond at the western end of the village center, missing in 1831 map. Here, too, the pond on the village green is clearly recognizable. South of the village center there is Upstall, an enclosed pasture area, which the farmers of the village could use together for their cattle.

• 1852 : The triangular square of the village green is shown for the first time. The pond from the previous maps have disappeared, and a new pond behind the church appears instead.

The elongated pond at the western edge of the village is shown considerably larger. Railroad, inaugurated in 1842, is also marked. The elevations in terrain are shown for the first time with contour lines (isolines).

• 1986 : Enlargement of the Blankenburg village center from the military topographic map of the GDR as of 1986.



Aerial photograph of Immendorf, Hollabrunn, Lower Austria Image source : www.en.wikipedia.org

2.13 Connecting history with present, envisioning future

2 I Analysis

Most of the traditional angar typologies have **transformed** today, with some remaining without the ponds, thus the direct connection with water being lost, what is necessary is to imbibe in the function of greens as a **new typology** in present day context for example the **Schreber Gartens** that shall help in reconnecting natural green areas, such as the forests with parks and existing garden typologies.

• For this, it is necessary to study the existing green spaces in Wolfsburg. Following analysis is an account of the different kinds of green spaces and the landscape experience with a special focus on Klein Gartens, or the Schreber Gartens that in present day context function to offer as retreat areas within cities, yet are vulnerable towards landuse change.

• The analysis has also revealed a connection in offering community spaces, thus deciphering the lineage between the earlier *Angar* models.

The idea is to **preserve** the existing greens, create a balance, guiding transformation towards a **sustainable landscape design**, sensitive to **combat climate change**.



The new garden typology is referred to as **Climate gardens**.

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2.14 Landscape experience



Sketch made by author as a part of imaginative sketching at AO Landschaftsarchitekten

2.14.1 Landscape experience



As per the above map, it is noted that the most pristine and very high value of landscape experience can be felt around the wetlands towards the west, and forest areas of Wolfsburg. The experience is high towards the east side of the city. Whereas the experience weakens or is of medium value in the urban areas of the city. It is intended to overlap the natural structuring elements map on the landscape experience map to witness the exact landscape areas that lie on the very high experiential value.

Map source : stadt.wolfsburg.de

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2.14.2 Landscape experience



Wetland Forest Big lakes Small lakes - Canals Wolfsburg city

It is clearly evident that the Barnbruch wetlands on the west side of Wolfsburg, together with the Aller river, and areas around Allersee, Hohnstedler Holz and Barnstorfer Wald lie on the highest experiential value. Furthermore, areas like Wendschotter and Drömling lie on high value of landscape experience.

Image source : geoportal.stadt.wolfsburg.de

2 | Analysis

2.15 Green spaces in Wolfsburg

2.8.1 Nature reserves & Forests

The city of Wolfsburg has around 950 hectares of forest. A large part of this was given to the city by the country as an "urban development area" in the 1950s. 44% of the urban forest are predominantly old oak forests. In the north, pine approx. 21% in area. Beech, alder, ash, birch and other deciduous trees occupy 26%. Spruce and Douglas fir have only small proportions.

The oak in particular is in great demand and the acorns are sought after as fodder for the cattle. Therefore, today we can admire the many, old and mighty oaks. Without this influence, the common beech would be the dominant tree species in the local forests of Wlofsburg¹. (*History of forests in general Wolfsburg being a part in context with Germany has been given in the following pages under 'landscape evolution'* supported with graphics).

2.8.2 Urban and neighbourhood parks

There are numerous parks in Wolfsburg, among which Aller park is the most famous and biggest, located centrally.

2.8.3 Agriculture fields

Wolfsburg has mainly wheat and maize as main crops growing among other cities of Lower Saxony.

2.8.4 Klein/ Allotment Gartens

There are a total of 31 affiliated allotment gardening associations in Wolfsburg and above 5000 allotment gardens throughout the city.











Allertal

Barnbruch

Schiller Teich (Barn. W.) Barnstorfer Wald

Düpenwiesen

Key observation :

Water in the form of Teichs and Canals exist in all nature reserves. Symbiosis between green and blue.





Drömling

llkerbruch

^{1.} stadt.wolfsburg.de

Map showing the green spaces in Wolfsburg



2.15 Green spaces in Wolfsburg

Klein/ Allotment Gartens

Industrialization in Europe led at the beginning of the nineteenth century to large parts of the population living in poverty; many people suffered from malnutrition. So-called "poor gardens" were intended to allow families who had little money to cultivate fruits, vegetables and cereals. The first German allotment garden association was founded in 1814, in Kappeln an der Schlei, at the suggestion of Landgrave Carl von Hessen. Kappeln was located in the then Danish-ruled Duchy of Schleswig, which was inhabited both by Germans and Danes.



Gardens in Europe during industrialization

Image source : © VISDA

Throughout Europe, the working-class movement was taking up the idea of allotment gardens and became committed at the beginning in the mid-nineteenth century to the establishment of workers' gardens in and around European industrial cities. Having your own garden was no longer a privilege of the middle-class¹.

^{1.} goethe.de

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2.15 Green spaces in Wolfsburg

In Germany, the Leipzig doctor Moritz Schreber studied the medical and social aspects of urban life. Especially for children he prescribed exercise in the fresh air. The first allotment colony in Leipzig was built in 1864; at the time it was still called a "children's plot". In honor of the Dr. Schreber, the parcels of land were colloquially called "Schrebergärten" – Schreber's gardens.

In Germany, the garden house remains a temporary refuge. Year-round living is not allowed. The popularity of allotments gardens decreased sharply in the second half of the twentieth century. Today allotment gardens are again very popular.



Allotment gardens today

Image source : Daniel Urhøj © Goethe-Institut Dänemark

Many people make a short family holiday, a break from big city bustle. In Berlin, 12,000 people are waiting for an allotment garden to become free. A sense of community, earth under fingernails or just being offline: these are some reasons for the new popularity of allotment gardens. Almost one in ten is a member of national allotment garden association. Today there are more than 3 million allotment gardens all over Europe¹.

^{1.} goethe.de

3 CASE STUDIES





3.1 Case study 1 : Jewel Changi Airport, Singapore

A project that is a human discovery yet very close to nature, can be possible only if the ideas in that particular project are inspired from nature to resonate its elements and cause minimum impact on the surrounding environment.

Inspiration and selection criteria

One such project is the Jewel Changi Airport, Singapore designed by architect Moshe Safdie and landscape design by PWP Landscape Architecture. Integrated project that creates a multi-sensory experience of nature within a climatecontrolled glass dome. An eight-acre garden over interior retail space integrates unexpected features that attracts adventurers of all ages. Gardens terrace down 30 meters to a central gathering space with informal amphitheater seating.



Restaurants and cafes as well as an event plaza can all be accessed from within the garden. Visitors can experience a light and water show at the center of the building, where water and captured rain fall from the roof becoming a projection screen. Following are the main reasons for choosing this as a case study,

Reasons

- 1. Its iconic relevance in design that is so close to nature.
- 2. Landscape design elements that create a natural indoor atmosphere.
- 3. Public spaces that create amusing experiences for people.
- 4. Principles and technology using renewable sources of energy in its design.
- 5. The building and surroundings cause minimum impact on the surroundings.
- 6. Plant species from around the world creating the iconic tropical gardens, together making the whole place to be a piece of marvel.

Image source : Google maps



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PLAN OF GARDEN

- I Forest Valley
- 2 Rain Vortex Pool
- 3 Forest Valley Terraced Planting
- 4 Valley Trail and Overlook Terraces
- 5 Palm Canyon
- 6 Bamboo Canyon
- 7 Airport Train

- Event Plaza
- 9 Cafés

8

- 10 Flying Bridge
- 11 Overlook
- 12 North Gateway Garden (Below)
- 13 South Gateway Garden (Below)
- 14 East Gateway Garden
- 15 West Gateway Garden
- 16 Elevator

Image source : www.pwpla.com/projects/jewel-changi-airport/



Sectional views

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3.1.1 Sustainable design features

1. Water

• World's tallest indoor waterfall was engineered, with tens of thousands of litres of water cascading over seven storeys. The idea of a waterfall running through the dome (toroid) : Collecting rainwater that falls on the entire building and funnelling it into the structure through the oculus. The surface can bring, on a good Singapore rainfall –12,000 gallons (about 45,430 litres) a minute tumbling 40m from the oculus, through ground level, and to the bottom of basement 2. Water can be recirculated and used.





Image source : www.pwpla.com/projects/jewel-changi-airport/

3.1.1 Sustainable design features

2. Garden

• The air-conditioned terraces were lined with thousands of trees, plants, ferns and shrubs brought in from around the world. According to architect Moshe Safdie, the garden is a magical place of nature. He notes that nature works in much the same way: The landscape collects the rain; brings it into valleys, brings it into rivers, brings it into waterfalls. "And here you're discovering it inside a building." was quoted by the architect.

• In all, there are 2,000 trees and palms and more than 100,000 shrubs from 120 species.

• Such plants generally come from tropical climates and high altitudes, so the team established the geographic range where they would be sourced from: Malaysia, Thailand, Australia, China, the United States and Spain. The architect wanted tropical plants that had been used over and over, and mostly selected for their indestructibility.

• "I want things that have delicate foliage, that resonate in the light, and so we aimed for plants, many of which are not familiar in an interior environment, but remind us of being out there in a mountain forest. I like being in a mountain forest."



Sectional view

Image source : www.pwpla.com/projects/jewel-changi-airport/

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Image source : www.departures.com

Children and

3.2 Case study 2 : Comenius Garten, Berlin

The Comenius Garden is a public garden located in Berlin-Neukölln that is designed according to the work of Johann Amos Comenius. The philosopher and educator Comenius campaigned for a reform of education in the 17th century, and his theses are still part of the education system today.



Comenius Garten site plan

Map source : comenius-garten.de

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The tour through the garden traces the life path of man who, according to Comenius, goes through several schools. Different plants stand for the individual stages of the life path. The Comenius Garden is rich in plants that are otherwise rarely found in this abundance in urban areas. At the same time, the garden is a popular meeting point for the neighborhood¹.

Garden Concept and Design parameters²

It is designed according to Comenius' conception of society as a life path through eight school areas. In the "school of prenatal becoming", at the entrance from Karl-Marx-Platz, stands a walnut as a tree of life. Then the playground follows as a maternity school area. The entrance to the fenced garden, to which the local educational institutions have a key, marks the beginning of the six-class "common school" with its violet bed, rose grove, meadow carpet, maze, little medicinal garden, and paradise of the soul, the arbor. After that, the path of life leads past the Comenius monument to the Latin school area and further to the academic area.

The Comenius Garden has been around for 25 years. But its roots can be traced back through several hundred years of European history. Not only does the garden reconstruct the work of Johann Amos Comenius (1592-1670), it is also a part of the Bohemian Village in Berlin-Neukölln. Descendants of Bohemian religious refugees still live here today who in 1737 found refuge in what was then Rixdorf near Berlin. In traces, they have kept alive Comenius' philosophy. This helps his garden thrive every day. After many decades, during which the property was built on, and even a tenement barracks was located here, the Comenius Garden was established in 1992 on the site where was once Bohemian-Rixdorf farmland. Thus, today's migrant children have a garden between Sonnenallee, Karl-Marx-Strasse and the S-Bahn Ring, and experience something that is rare in the middle of the big city : profound village life. All ages are described by Comenius as schools to be understood as social reform.

Comenius describes three categories of books: Didactic, Informatory and textbook. Crucial in his work is the comparison of the school to a garden. In the garden, didactics corresponds to the garden fence. It provides the shelter, the enclosed area. The textbooks for the children stand for the beds in which experiments are made and solutions are found. And then there are the paths that correspond to the informatories. At the same time, the paths structure a garden making it walkable. Thus blossoms not only the meadow, but also the discourse of interlocutors in the garden. This tolerance makes possible, a biodiversity that is unparalleled in the middle of Berlin. And this flourishing life creates an atmosphere of serene tranquility for which the children flock to the garden.

^{1.} www.visitberlin.de

^{2.} www. comenius-garten.de


Designed by : **Ramboll Studio Dreiseitl** Client: **National Parks Board (NParks)** Landscape Architecture: **Ramboll Studio Dreiseitl** Water Engineer: **Ramboll Studio Dreiseitl, CPG Conslt.** Playground Designer: **Ramboll Studio Dreiseitl, Kukuk** Architect: **CPG Corporation Pte Ltd** Playground Contractor: **CT-Art Creation** Main Contractor: **Hon Industries** Softscape Contractor: **Prince's Landscape** Project location: **Singapore** Design year: **2014-2015** Year Built: **2016-2019**



Identified as the first phase of development of Jurong Lake Gardens, Singapore's third national garden and the first in the heartlands, is a 53-hecare site that looks to restore the landscape heritage of the freshwater swamp forest as a canvas for recreation and community activities. The development is envisioned to be a "people's garden" accessible to all segments of the community and is a conscious effort to bring back nature that was once unique to the area.

Before the early-mid 1900s, the area was a swamp that was teeming with flora and fauna. The freshwater swamp, woodlands and grasslands are the primary ecotones that makes up the garden. The ecotones are then further broken down into key habitat spaces, each with unique characteristics and plant types that are suited for the respective fauna. Over 3000 existing trees are preserved within the site, with 200 trees transplanted. Existing big trees such as banyans and yellow flames are preserved carefully, which provide a connected corridor for wildlife and biodiversity. Bird, butterfly and dragonfly attracting trees and shrubs are specially selected to provide food source and nesting opportunities, ensuring a vibrant habitat with rich biodiversity. Rare species such as hornbills, buffy fish owls and otters are spotted to be regular inhabitant of the garden.

Planted predominantly with Alstonia spatulate to reflect the natural history of the area, the Alstonia Island's conditions are greatly influenced by changes in the water level of Jurong Lake. The island has conditions similar to that of a fresh-water swamp, as it is constantly flooded when there are changes in Jurong Lake's water levels. The dense vegetation and almost-permanently waterlogged conditions of the Freshwater Swamp Forest have led to the development of a unique habitat for flora and fauna. Singapore has lost many of its freshwater swamp forests since the early 1800s, largely due to development and land conversion for commercial agriculture, such as pineapple and rubber plantations. The area was a mangrove swamp forest before it was developed into an industrial estate in 1961.

As a series of braided waterways that adds up to 900m winding around islands of trees, Neram Streams was previously a straight concrete drain that led from the road outside to the lake. With excavation depth as much as 6m, the streams banks are precisely engineered through various bioengineering technique to ensure slope stability. The banks of the Neram Streams are planted with collections of tree species commonly found in tropical riverine forests, such as the Dillenia, Syzygium, Diospyros, Saraca and Barringtonia species. Clusters of Neram trees (Dipterocarpus oblongifolius) can also be found along the streams' bends.

The picturesque Grassland sits in between the Garden streams and the wooded areas. It forms part of the intertidal habitat, transiting from dry grassland of the inland area towards wet grasslands at the shore edge. With over 3.5 hectare in size, it aims to create a transition that provides refuge areas for both migratory and resident avian population, as well as food sources and nesting grounds.

Image source : www.nparks.gov.sg/juronglakegardens/





A series of mounds are located at the periphery of vast open grasslands, where 3 birdhides are located at these mounds for bird watching activities. At dusk, grassland birds are seen to be hiding amongst the tall waving grasses, jumping from cluster to cluster, or flying in a flock against the sky in the vast grasslands. Besides being a hotspot for biodiversity, the soft yellow hues of the Grassland have also become the most popular spot for Instagram-worthy photos. The charming, alluring space is one of the rare spots in urbanised Singapore that is shared by both humans and wildlife in a non-intrusive manner.

Rooted in the middle of the open grasslands amongst the tall grasses is a sculpture in the shape of a bare tree made from recycled iron reinforcement bars salvaged from demolished steel-reinforcement from the site's old pathways. Named as the Lone Tree, it is not just an artistic sculpture piece. This tree aims to serve similar ecological function as a snag or a dead tree in a wild meadow. This bare tree form becomes the perfect resting locations for either a feeding predator that is scouring the horizon for his meal, or temporary resting points for a flock of migratory bird of their journey. With long grasses waving in the foreground, the Long Tree with a perfect sculptural form is also found to be one of the most photogenic element within the garden.

Meandering along the water's edge, the 300m barrier free Rasau Walk offers visitors the opportunity to get up close with nature along the shoreline. Winding around islands of special palm collection and existing trees, moments of the tranquil grasslands and serene lakeside scenery are uncovered at various viewing spots. With a carefully engineered slope edge, the boardwalk sits within the transitional tidal edge that has varying water depths. Plants along Rasau walk such as the sealing wax palms, nibong palms, are adapted to cope with constant inundation. In the evening, the boardwalk will be illuminated with a soft glow along the edge, accentuating the curvatures of the meandering boardwalk.

Lakeside Garden is home to the largest children's nature play garden in the heartlands. At Forest Ramble, a biophilic play space, children are encouraged to mimic the actions and motions of animals that inhabit freshwater swamps which were common in the Jurong Lake area. They can hop about like a frog on the trampolines at the Frog Play zone, cruise in the air on a zipline and pretend to be a Heron flying from one nest to another, test their balance and agility by bouncing from one platform to another like a Squirrel, or glide down the slithering slide at the Snake Play zone. At this biophilic nature playground, they are also encouraged to come out with their own way of pretending to be any animal imaginable that looks to conquer the place and find their own path to an adventure within the garden.

To add to play experience in the Garden, Clusia Cove is a fascinating, interactive water playground where children can experience water movements mimicing tidal pattern, surface ripples and directional currents similar to coastal shores. A three-hectare closed-loop water recycling system that treats water naturally is used for the water playground.

Cleansing biotope which serves as a natural water treatment system and UV treatment are used to disinfect the water before being pumped into this play area. The cleansing biotope makes up of a series of cells filled with sand filter media, as well as semi-aquatic plants which absorbs excess nutrients from the water. It serves as a natural water treatment system before finer filtration and disinfection take place in the underground UV control room.

To improve the drainage system in the garden, Water Sensitive Urban Design (WSUD) elements such as vegetated swales and gravel swales are introduced as drainage conveyance measures. As a result, 12,000m concrete drain was demolished, and a new 8,500m concrete drainage and 4,750m swales and streams was constructed. 100% of the catchment is conveyed through WSUD elements drainage before being released to Jurong Lake. Three concrete drains were transformed into completely naturalised streams, which provides new spaces for community and ecology along the streams.



View of Clusia Cove, a part of the lakeside garden

Image source : www.nparks.gov.sg/juronglakegardens/

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3.3.1 Sustainable design features

Zero Energy Buildings

In 2018, Building and Construction Authority (BCA) launched the new Green Mark scheme for Super Low Energy (SLE) and Zero Energy Buildings (ZEB). Jurong Lake Gardens aspires to be a showcase of sustainability. The Gardens took up the challenge of operating its main buildings with zero energy. A Waste-to-Energy (WTE) system will be implemented to convert the Gardens' horticultural waste into electricity to power these buildings. Apart from electricity, horticultural waste will be converted into biochar for use in the Gardens. Thermal energy generated in the process can also be used to power water heaters.

Water systems

To promote climate resilience, water-sensitive urban designs have been incorporated in the Gardens. Being located around the lake, Jurong Lake Gardens has many features such as swales and bioretention basins to cleanse the water runoff from the rain. Rain water is then collected in the inland ponds and harvested to water the plants within the Gardens. The water is also circulated through biotopes and phytoremediation ponds, which clean the water over time. These water systems help to maintain the water quality in the inland ponds and prevent algal blooms.



Image source : www.nparks.gov.sg/juronglakegardens/



3.3.2 Phasing



Bird's eye view of Jurong gardens





People mover system





Image source : www.nparks.gov.sg/

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3.3.3 Smart technology

1. Autonomous vehicle

The National Parks Board (NParks), in collaboration with ST Engineering Land Systems and Willers, will be deploying an 11-seater autonomous vehicle (AV) as part of a people mover system trial at Lakeside Garden, the western section of Jurong Lake Gardens. The trial is to test the efficacy and sustainability of running a people mover system in the Gardens to enhance accessibility. The trial begins 3 December 2020 and will run for two years. This is the first time that an AV is being tested in a public garden in the heartlands of Singapore.

Due to the length and size of Jurong Lake Gardens, a people mover system would be able to enhance visitor experience at the Gardens and increase accessibility for elderly visitors and families with young children.

A core facet of Jurong Lake Gardens is the utilisation of smart technology to enable sustainable operations in the Gardens. In this aspect, the Gardens serves as a testbed for green innovation that seeks to reduce environmental impact. This includes identifying the infrastructural costs of operating the vehicle, and solutions to running the vehicle with optimised efficiency and safety. This will be critical for the implementation of a full-scale people mover system that links Lakeside Garden to the Chinese and Japanese Gardens when Jurong Lake Gardens is complete.

The AV will ply a 1.2 km route shuttling between the Entrance Pavilion and Grasslands – near the North and South Carpark respectively. It will operate from 10am to 4pm on weekdays and visitors currently can ride for free. NParks will review the usage during the trial period and fares may be applied later.



An 11 seater autonomous vehicle

Image source : www.nparks.gov.sg/juronglakegardens/

3.3.3 Smart technology

2. Integrated Management System

An Integrated Management System (IMS) will be implemented at Jurong Lake Gardens. IMS will aid in the monitoring and control of multiple systems in an automated and centralised manner. This is commonly used for buildings, where it is known as a Building Management System (BMS). This is the first time such a system is implemented in a park or garden. There are plans to eventually implement this across the Jurong Lake District and in various parks throughout Singapore.



3.3.4 Smart yet close to nature perspective

In nutshell, Jurong Lake Gardens is Singapore's new national gardens in the heartlands. A people's garden, where spaces are landscaped and created for families and communities to come together. The 90-hectare Gardens comprises Lakeside Garden, Chinese and Japanese Gardens and Garden Promenade. Lakeside Garden was opened for visitors in April 2019, and Chinese Garden, Japanese Garden and Garden Promenade will be completed in 2021.



Terraced water gardens featuring largest collection of water lilies

Image source : www.nparks.gov.sg/juronglakegardens/





4 DESIGN CONCEPT

4.1 Design Idea

Automobiles and factories emit massive amounts of heat into the environment (according to the sources, an analysis of the emissions and their respective causes in the graph below). As per the existing analysis, Wolfsburg being at the epitome of car manufacturing has an identity of a very automobile centric city. The idea is to redefine the car centric aspect of Wolfsburg and remodel it to bring it to a resilient future focussing on the cultural aspect and the technologies.



In reference to the topic of 'Emissions in a historical context' given on Page 33, since the World War periods, Germany's greenhouse gas emissions were on a constant climb until they peaked in 1979 at 1,390 million tonnes CO2 equivalents. And in today's context, is the need of the hour to bring down the green house gas emissions through the different sources as given in the above graph by the potential landscape design methods.

Graph source : www.cleanenergywire.org



4.2 Abstract diagram

The connections show the network of green as a new layer that is envisioned upon the existing city of Wolfsburg. These connections are also a means to connect the big chunks of green for enabling a continuous biodiversity corridor. The abstract diagram closely resembles a diagram of planet earth that has the relationship of nature and mankind intact in all sense.



'NATURE TRAIL' as a city scale **Climate Garden**, green lungs connecting history with present



Base map source : https://geoportal.stadt.wolfsburg.de/

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5 DESIGN STRATEGIES

functionality of the new designed spaces.

Base map source : https://geoportal.stadt.wolfsburg.de/

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5.1 Design Strategies_"Power of 6"

STRATEGY 1 Deciphering the link between natural elements, connecting green chunks and water as potential open spaces at city scale, the making of 'Nature trail'.

STRATEGY 2 Creating a new layer of structure, the public realm across the city connecting natural systems, the teichs for instance.

STRATEGY 3 The climate garden connects history with present and proposed green typologies, through the means of existing points of public interests reviving culture.

STRATEGY 4 The city scale climate gardens connecting smaller scales of neighborhood climate gardens together with existing cycle paths making it a cultural cum regenerated environmental experience.

STRATEGY 6

Developing the new garden typologies with help of placemaking ideas and thus enhancing the



Drömlings swamp













5.1.1 Design Strategy 1

STRATEGY 1 Deciphering the link between natural elements, connecting green chunks and water as potential open spaces at city scale, the making of 'Nature trail'.



Base map source : https://geoportal.stadt.wolfsburg.de/



IMAGINATION 1

The idea is to experience these overlaps of the green and the blue, where the 'Nature Trail' is is linking element. Sketch made by author as a part of imaginative sketching at AO Landschaftsarchitekten

from Grey to shades of Green | 133

5 I Design Strategies

5.1.2 Design Strategy 2

STRATEGY 2 Creating a new layer of structure, the public realm across the city connecting natural systems, the teichs for instance.



Base map source : https://geoportal.stadt.wolfsburg.de/



IMAGINATION 2

imagining placemaking areas with water as the main element of design, for example a Wasserspielplatz or a lake edge design. Sketch made by author as a part of imaginative sketching at AO Landschaftsarchitekten

5.1.3 Design Strategy 3

STRATEGY 3 The climate garden connects history with present and proposed green typologies, through the means of existing points of public interests reviving culture.



Base map source : https://geoportal.stadt.wolfsburg.de/

5 I Design Strategies





IMAGINATION 3

The 'Nature Trail' is a continuous tourist path connecting historical areas with climate gardens, offering seamlessexperiences of city.Sketch made by author as a part of imaginative sketching at AO Landschaftsarchitekten

5.1.4 Design Strategies 4

STRATEGY 4 The city scale climate gardens connecting smaller scales of neighborhood climate gardens together with existing cycle paths making it a cultural cum regenerated environmental experience.



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IMAGINATION 4

Community gardens and the existing cycle paths around Wolfsburg are and extension of this 'Nature Trail', offering a holistic cycling experience.

5.1.5 Design Strategies 5

STRATEGY 5 Climate gardens as the new precursors of intelligent landscapes, whereby the designed elements function on the principles of digital landscape architecture ensuring sustainability and maintenance.



• An experience in a modern and livable district that shall function as a real laboratory, where the residents can experience new forms of mobility, technologies and services. Base map source : https://geoportal.stadt.wolfsburg.de/

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5.1.6 Design Strategies 6

STRATEGY 6 Developing the new garden typologies with help of placemaking ideas and thus enhancing the functionality of the new designed spaces.



Base map source : https://geoportal.stadt.wolfsburg.de/





IMAGINATION 6

Placemaking special areas on the 'Nature Trail' will allow more number and variety in points of interests. Sketch made by author as a part of imaginative sketching at AO Landschaftsarchitekten

5.2 Design parameters

2. Green loop connecting the open green spaces and parks. For this ownerships have to be taken into account, private and public.

3. New typologies of climate gardens are introduced and are in turn become an integral part of the green loop.

4. The so called tourist loop is merged with the newly deciphered green loop.

5. At the culmination of tourist attractions, open green spaces and climate gardens exist the green core or green markers. These could act as primary precursor or the main lungs of the entire green mesh (the new green layer or the green pattern) that shall be known to overlap with the existing city patterns.

6. This new green layer is a larger system comprising of smaller systems that together shall bring the atmospheric temperature to optimum and work towards the growth of Wolfsburg city that emit nearly zero carbon and green house gases into the air, thus balancing the heat generated from industries, automobiles and other sources. Basically this new green layer that has life shall absorb the carbon emissions from air, cleansing and neutralizing the emitted toxins.

7. The green layer shall be accessorized with several smaller systems comprising of environmental, social, economic and political aspects.

8. Design of animal friendly spaces and biodiversity corridor.
5.3 Public participation¹

On Friday, May 25, 2018, the big public closing event for the 2nd phase of the Future City competition took place in the Bürgerhalle of Rathaus A. There was a diverse series of lectures on the topics of mobility, energy and living diversity in Wolfsburg as well as insights into the area of data protection.

Numerous interested parties found out about the project proposals for the future Wolfsburg that had been worked out jointly with citizens and experts as part of the Future City competition and gave suggestions and feedback on the implementation of the projects. An overview of the projects, results from the online citizens' survey from April 2018 on the subject of *"What does the Smart City Wolfsburg look like from the point of view of the citizens?"* have been given in the following paragraphs. They are important parameters pivotal in conceiving the design in this research and have been considered thoroughly, wide coverage of topics and themes in relevance to making Wolfburg city smart and futuristic. All the public experiences, facts and conclusions as per the **'Abschlussbroschüre zur Phase 2 des Wettbewerbs Zukunftsstadt. Visionen zum Wohnen in Wolfsburg 2030+ digital und vernetzt in die Zukunft'** have been referrred to as background research towards framing the design strategies and consequently the design. Stakeholder wishes, doubts, questions and answers, and the already presented fields of action, ideas support my proposal.

In the following paragraphs, main stakeholders, public engagement through several surveys and ideas workshop have been provided that have been referred to undergo the research in this thesis.



Iterative process of Urban Design Thinking (Jeutner/Pahl-Weber; based on the Design Thinking concept of the Institute of Design at Stanford University)

^{1.} www.wolfsburg.de/zukunftsstadt. Abschlussbroschüre zur Phase 2 des Wettbewerbs Zukunftsstadt. Visionen zum Wohnen in Wolfsburg 2030+ digital und vernetzt in die Zukunft. Ergebnisse aus der zweiten Wettbewerbsphase.

THINKING, SPEAKING AND PARTICIPATING IN SHAPING THE FUTURE

In order to methodically involve the urban community in the development of the future goals of the city of Wolfsburg, a series of workshops was held using the "Urban Design Thinking Method" - an approach to creative co-production whose application in urban space is being researched by the Technical University of Berlin. The process of Urban

Design Thinking consists of several phases, which should not be seen as linear, but can be repeated in the search for the best solution. Newly gained insights, information from literature research as well as feedback from experts and future potential users can flow into the individual work phases and change the previous results. The figure on the earlier page illustrates the process with an example:

- needs and problem situations are to be *identified, felt and understood* through observation and
- · documentation in order to reduce them to the essentials and
- to develop concrete *questions* for which solutions must be found.
- The collection of diverse ideas for finding solutions is made more and more concrete by actually *visualizing the ideas* and *building prototypes*, and

• finally backed up with a **business model**. Both together are best tested spatially located and if necessary adjusted and optimized again before it can be implemented in the end in reality. The method is characterized by the fact that work is user-centered. Potentials and challenges are analyzed on site.

The aim is to **understand people's problems** and **needs** precisely, and to **develop solutions** together with the various actors in the city that are tailored to them and as **local** as possible. By involving those affected and involved at an early stage, a **higher level of acceptance** for the subsequent **solutions** is to be achieved.

THE "SMART CITY WOLFSBURG" FROM THE PERSPECTIVE OF CITIZENS

In April 2018, citizens and employees in Wolfsburg had the opportunity to take part in an online survey on the topic of *"Smart City from the perspective of citizens"* as part of the *Future City competition*. The aim was to find out which topics are important to the people of Wolfsburg for the city of the future and which offerings they would like to see. A total of just over 60 people took part in the survey.

Data protection and security

The topics of data protection and data security are very important to the respondents. They demand a high level of transparency in the handling of personal data.

Some do not want data to be passed on or sold to companies and service providers without the users' consent. Others would like to see complete anonymization of the data in order to prevent evaluation of user behavior and profiling, for example for advertising purposes, as well as tracking. In terms of data security, respondents are particularly interested in secure, encrypted data storage, trustworthy servers located in Germany or regionally or locally, protection against data misuse and external attacks and the userfriendliness of solutions.

1. Living diversity

Wolfsburg carries out the **sustainable transformation** of the city by implementing measures in different **neighborhood typologies** and ensures **functionality** of tomorrow's urban structures.

Future vision from phase 1 : Project ideas from the workshops

• Project Approach 1: Cluster Living Plus - Community and Networking in the Neighborhood

The overarching questions of the first project approach of the thematic area of housing diversity were "How can needs - based housing be provided?" and "How can good neighborhoods be started and support in the neighborhood be promoted?" These are based on the previously identified needs for the creation of needs-based housing. This includes not only **neighborhood connectivity** and fostering **good neighborhoods**, but also **better access to local amenities** as well as **affordable housing** and more **flexible apartment sizes** that can be adapted to residents' needs.

Reducing individual living and ownership in favor of shared spaces and community uses (sharing economy: sharing instead of owning) can save costs (in general and for the individual). The combination of private enclosed retreats and public common spaces also enables older people, single people or newcomers to establish contact and community as needed. In summary, *"Cluster Living Plus" can be described as a modular building with flexibly usable apartments, common spaces and public meeting places.* Their combination with *energy-efficient sharing* and digital services serves to promote neighborhood contacts and mutual assistance. The creation of public spaces in the surrounding area to linger and promote community and mutual support throughout the neighborhood, as well as equipping them with *smart furniture* and *smart light poles*, is also being considered.



• Project approach 2 + 3: *Live2gether* (matching platform) + *The Future Neighborhood* (neighborhood management, also digital)

The three overarching questions of this project approach are: "How can needs-based housing be provided?", "How can self-determined living be ensured for as long as possible?" and "How can good neighborhoods begin and support be promoted in the neighborhood?". These questions are based on the desire for housing that meets needs, *networking in the neighborhood* and *neighborhood support*, as well as *better access to local services*.

The project idea "*Live2gether*" is an online matching platform for people looking for housing who would like to live in communal living arrangements. After the initial digital contact, further planning takes place in the real world at offline meetings, which can, however, be further accompanied by digital services via the platform. This idea is merged with the project idea "*Future Quarter*": A citywide network of decentralized neighborhood platforms and a central needs platform for the city center with the *goal of improving the exchange between Wolfsburg residents.*

The platform collects the needs of the population and points out possible alternative solutions, existing offers and assistance. The platforms can support the development of a *neighborhood management system* in Wolfsburg, in which neighborhood management can be carried out both digitally via the online platforms and by neighborhood managers on site.

The digital house palm - Integrated, networked and informed at all times "objectives"

- · Fast and convenient information on daily topics
- Pointing out free resources in the city area, e.g. sharing offers or in case of future possibly autonomously driving buses.
- Contribution to the promotion of neighborly contacts, support and networking among people in real life via the contents on the house board
- Facilitation of the daily life of users

Classification fields of action

- · Concept and digital solutions for self-determined living
- Creation of vibrant neighborhoods

In this pilot project, the classic "bulletin board" is to be replaced by *digital bulletin boards* in new construction projects in multi-party buildings, and the use, benefits, possibilities and limits of this technical solution are to be tested. Retrofitting in existing buildings and cooperation with other partners is possible after the test operation. Here, the municipal housing company NEULAND acts as a cooperation partner in the Future City competition.



The *digital house board* is used for fast and clear communication in addition to the usual media such as smartphones. It not only enables central control of its content and relevant updates, but also the simultaneous, rapid and flexible publication and distribution of information for all equipped houses in the NEULAND stock. Tenants can thus be informed by their landlords in an up-to-date and professional manner without tedious paperwork. The content can be synchronized remotely from anywhere in a user-friendly manner, resulting in faster and always up-to-date information being passed on to tenants. Further positive effects of the *digital house board* are possible interfaces, for example, to public transport, current news, various offers and new projects from the neighborhood. Also with regard to the planned expansion of sharing offers, digital (house) information boards offer a variety of possibilities to display currently available resources or to book the offers - even without own smartphone or internet connection. The boards of the individual houses are networked with each other through an internet connection across all districts.

The digital house board was specially developed for public areas. The metal housing is shock-proof, robust and virtually vandal-proof due to reinforced screen glazing. Designed for continuous use and has low power consumption. A WLAN connection is a prerequisite where operation is to be kept low-threshold and takes place via a touch screen. The panel can provide a wide range of information via flexible headings and tabs. An integrated light sensor ensures display switches on automatically and adjusts to the brightness of the environment.

In addition, it is possible to equip boards with a USB port that can be used to charge smartphones or MP3 players. They are generally placed in the hallways near the entrance. Example contents of the digital house board are :

- A newsfeed or news in real time
- Selectable language of the menu
- Display of timetables for public transport and regional transport coupled with real-time information
- Map function with route planning option
- · Interface to booking software for sharing vehicles
- Offer/search function
- · Retrieval of important service or emergency numbers

Cluster living plus - Communal and flexible living with networking in the neighborhood

Living in clusters is a communal form of living, which makes it possible to live individually, but communally. A cluster housing unit consists of a large apartment in which there are several smaller detached apartments. These are designed for one-person use and have their own bathrooms and kitchenettes. It is possible to retreat to one's own apartment at any time, but at the same time there are common rooms with a large usable area as meeting places for the apartment community. There is enough space for activities with several people. Thus, despite the smaller private living space, it is possible to receive and accommodate several guests. Cluster living functions according to the idea of *"sharing instead of owning"* and *communal use*.



The residents give up part of their private living space in favor of rooms that can be used together. The floor plans and sizes of the rooms are designed in such a way that the apartments can be used flexibly and can be converted into large residential units with little effort in the course of the building's life cycle. In addition to communal living, neighborly life among the residents and in the residential environment is also to be strengthened.

The project includes a *public mobility station* with various mobility and sharing services that are available to residents of the building, and neighborhood. *The aim is that this offer is also used for neighborhood assistance and strengthens the community in the neighborhood.* The rental of the vehicles and neighborhood are ideally organized via a platform and/or app solution.

Neighborly needs and offers can be communicated via the digital, modular house board.

Goals

- To create flexible, affordable housing that meets the needs of the community.
- Saving costs in favor of shared spaces and community uses (principles: Sharing Economy "sharing instead of owning" and "sharing: saving together").

• Possibility of reducing private housing and living costs for single-person households in a cluster housing unit through the use of sharing vehicles and reduction of individual living space, without foregoing large spaces for special occasions.

- · Promote networking in the neighborhood and thus reduce anonymity
- Promoting neighborhood support and making neighborhoods a tangible experience by creating community
- Make it easier for single households to get in touch with neighbors by using common rooms.

Classification fields of action

- · Creating diverse and flexible housing offers and concepts and establishing innovative financing models
- Creation of lively neighborhoods

Networking, security and support in everyday life - digital smart products and services for life at home

Older people want to remain safe and self-determined at home for as long as possible. Younger people often have little time in their daily lives. A high level of living comfort and an increase in quality of life play a role for both groups. Smart home technologies and products and services for age-appropriate living - also known as Ambient Assisted Living (AAL) - can help here. But lowtech solutions and conventional smart products and solutions can also provide support. However, the large selection of providers and products often overwhelms the target groups. Moreover, some systems are not available in different combinations on the open market, which makes flexible adaptation to the target group seem impossible. The project takes up these points and combines them into an overall approach. A certain number of mixed - age test households will be able to select and test suitable smart home and AAL products and services over a test period of one year in order to find the right solution for all their needs.



For this purpose, they put together a product package suitable for them personally with the support of a "caretaker". In the event that the existing smart home/AAL system does not make everyday life easier for the target group or does not offer sufficient functions, it is possible to exchange the selected product package once during the test period. The "caretaker" acts as a contact partner and interface between the various households and other project partners, such as housing companies, handicraft businesses or care services. The participating test households are to exchange information regularly, both in person and via an app, so that they can network and share their experiences. In addition, various lectures and training sessions for the public will accompany the test period and draw attention to the topic and the possibilities. In addition, accompanying research on the project is planned, e.g. on possibilities of long-term financing and a final overall evaluation at the end of the project period through discussions and interviews with the test households.

Goals

• To make needy (and possibly not very tech-savvy) groups of people aware of innovative and/or intelligent technical support options in everyday life, to inform and advise them, as well as to familiarize them with their use and to accompany them in the event of questions or problems.

- Enable older or impaired persons to live independently in their own homes for a longer period of time.
- Support for (caring) relatives and care services.
- Enable better compatibility of family, care, household & work increase (living) comfort and quality of life for test households and, if applicable, relatives.
- Enable encounters and generational dialog.

• Counteract singularization and loneliness (especially among the elderly) by using simplified communication options (e.g., receiving pictures, video telephony, neighborhood app), but also personal exchange among the test households.

Classification fields of action

- Concept and digital solutions for self-determined living.
- Create diverse and flexible housing options and concepts, establish innovative financing models.
- Creation of vibrant neighborhoods.

Create diverse, flexible housing options and concepts, establish innovative financing models, digital solutions for self-determined living towards **creating vibrant neighborhoods.**

Future vision from phase 1

2. Mobility

Wolfsburg offers in the future a **multimodal, climate** friendly and healthy mobility



Project ideas from the workshops

Project Approach 1: Multimodal Mobility Stations

The overarching question of the first project approach of the mobility was: "How can physical and digital offers facilitate the and digital offerings make it possible to switch easily and conveniently between modes of transportation succeed?" This was based on the previously identified together with the citizens, the core need and desire and desire for a simple and convenient change between the modes of transport and an attractive supplement to the public transport and non-motorized individual transport.

The core idea behind the project approach was to create and equipment of transfer points as well as the integration of services and physical features that can make transferring easier. The main feature of the multimodal mobility station MX is its modular design. Stations can be expanded on demand, or deconstructed to include certain functions, they can be subdivided into three categories according to equipment and size. Quality and social security are to be ensured and the combination of different offers with good visibility, recognition value as well as easy accessibility are envisaged. Sharing offers charging infrastructures for bicycles, small vehicles and electric cars are also to be integrated. Optional building blocks could include (depending on the size of the station) weather protection, toilets, luggage boxes, parcel stations and WLAN hotspots. In general, however, the provision of information through display boards inside terminals is envisaged, which could be combined with an app as a mobility patron on the road.

In summary, the Multimodal mobility station can be described as a modular and demand-oriented and expandable transfer point, which facilitates the use of communal use of shared transport and non-motorized modes of transportation.

Project approach 2: Mobility app WOBility - Change, Options, Movement (Wandel, Optionen, Bewegung)

The overriding question of the second project approach is: "How can local transport be designed so that it represents a good a good alternative to the car?". This too resulted from the previously expressed needs for easy and convenient switching between modes of between the different modes of transport and for attractive additions to public transport and non-motorized individual transport.

5 I Design Strategies

5.3.3 Public participation phase 2 : Mobility

The core idea of the project's approach was to communicate mobility as a whole and linking it with emotions, as well as improving the image of public transport and non-motorized modes of transport. Furthermore, it was a matter of guaranteeing fast, uncomplicated access to use of public transport and the transition between systems. New citizens are provided with an information package on public and collective mobility services in the city. The integration of value-added services, such as transporting of purchases or goods, is also planned. The app combines main features: a route planner, which indicates the most convenient options in terms of time or price, and points out the possible connection with other activities or services. In addition, the app takes different activities and route chains into planning. It shows the mobility balance at the end of a certain period of time with a reward system and, last but not least, integrates a billing system.

In summary, WOBility makes sustainable mobility in Wolfsburg visible and usable. The solution contributes as a mobile application to the shaping of individual mobility behavior. With the help of the app, everyday journeys and trips and travel chains can be planned according to individual wishes.

New approaches for the promotion of **multimodality** via an **innovative sharing** offer in the neighborhood

Together with the city of Wolfsburg and associated partner companies from the housing industry, municipal companies trade and commerce, as well as the cultural, adventure, and leisure sectors a sharing offer can be created from a wide range of means of transportation (from bicycles to (e-)bikes and e-cars) for the public and the partner companies can be organized. The project is to be understood as an integrated overall approach, the elements of which are to be will initially be tested in two subprojects.

In a sub-project, the partner companies use the vehicles for business trips for business trips and thus reduce the expenses for their own vehicle fleet. They can also make these vehicles available to their offer these vehicles to their clientele as a means of customer loyalty. The service is available to the public at mobility hubs and in neighborhoods throughout the city and in neighborhoods.

In a second subproject, it is planned to develop various smaller (e-)vehicles and (e-)bikes with different design variants at mobility and available at mobility and sharing stations. Depending on local needs, the modular stations will offer a different range of vehicles and variants, which can be booked via a common system and a coordinated via a common system and a booking app, in order to operate as efficiently and economically as possible. The more partner companies and citizens that use the system, the use the system, the denser the network of stations can become and the more traffic-related burdens can be reduced.

5.3.3 Public participation phase 2 : Mobility

5 I Design Strategies



To the sharing approach beyond the pilot and test phase in a real-lab and test phase in a real laboratory,

continuous accompanying research and evaluation is planned. The public will be informed about the public relations measures to introduce the public to the use of the individual (e-)vehicles and thereby introduced to the new mobility offer and accompanied and accompanied. Research will be conducted into the overall system, which user needs exist for public sharing, so that the offer can be the offer can be adapted, optimized and thus perspectively can be made permanent.

Goals

Determining suitable bicycle and vehicle types as well as model variants for specific purposes in public sharing
Determination of user requirements for the permanent and economic economic establishment of an innovative and multimodal mobility offer in Wolfsburg, which may also be transferable to other cities and the region is transferable.

- A significant reduction in traffic-related in the urban area
- · Promotion of multimodality
- Research into suitable booking and and billing procedures as well as an accepted pricing among private users and users
- Research into suitable methods for ensuring personal data protection

Classification fields of action

- Traffic-optimized, compact and safe infrastructure
- · Making sustainable mobility more attractive (public transport, walking and cycling)
- Provision of user-friendly and digital offers

Future vision from phase 1 : Project ideas from the workshops

Climate protection through competence, quality and innovation.



3. Energy

Project approach 1: The commuter combiner - the innovative parking garage

The overarching question of the first project approach in the field of in the field of energy was: "How can the interplay between energy and of energy and mobility can be used to create a practical, everyday reference to the energy supply be established?". This encompasses the previously expressed needs for consulting and practical information offers, e.g. on energy cycles, the production of alternative energies, energy saving energy, energy saving, and storage and grid capacities in Wolfsburg. The core idea of the project approach was the search for solutions for the problems caused by the planned increase in electromobility. This concerns the congestion of the grids (temporal peaks in the demand for electricity) as well as the sufficient provision of energy. Accordingly, a multi-component solution is envisaged, whose components support or complement each other: The combination of the need for larger storage facilities with staggered charging during the course of the day and the use of scarce parking space. parking space. The commuter combiner thereby combines the following characteristics: Parking in scarce space in a kind of shelf system for e-cars, charging of the cars or delivery of the electricity as required (bi-directional charging) between cars by means of large-scale storage units as well as the possibility to charge other e-vehicles (e.g. e-bikes) to be charged. Surplus electricity could also be fed into the municipal grid. A PV system on the roof of the building provides additional power supply. In summary, the available parking space in an optimal way, enables the generation of electricity as well as bi-directional charging by means of storage and controls the charging states on the basis of individually predicted mobility demand.

The overarching questions of the project approach 2 and 3 were: "How can the interplay of energy and mobility be used to create a practical and mobility can be used to create a practical link to the topic of energy supply? and "How can future information and consulting services in Wolfsburg be and consulting services in Wolfsburg can be designed and clear responsibilities be created and communicated? The basis of the questions was also the desire for consulting and practical information offers.

Two core ideas define the solar bike path "Erfahrbar": Firstly decentralized energy generation and direct supply of electric bicycles; secondly, the communication of information on the subject of secondly, the communication of information on the subject of energy in public space along a test route. For this purpose, the route is to be equipped with photovoltaic modules and will make it possible to charge electric bicycles by induction electric bicycles directly while riding.

5.3.4 Public participation phase 2 : Energy

Also a compatible sharing bikes as well as numerous other infrastructure infrastructure elements along the test route that are supplied with electricity from photovoltaic elements, is planned. This ranges from "smart" street lamps with their own photovoltaic elements, which switch on and off by sensor depending on the use of the path, charging stations, places to stay and displays with information on energy with information on the subject of energy.

In summary it is a cycle path that generates energy, emits it and, through and, through additional on-site information, makes renewable energies in the double sense of the word.





5.3.4 Public participation phase 2 : Energy

The information offered here also refers to the project approach 3 of the energy topic area, the so-called "coupling" as the Wolfsburg's energy presence in the network. This combines all aspects and and information on energy saving, generation and supply for all stakeholders in for all stakeholders in Wolfsburg and includes several modules:

Information about renewable energies in general and specifically in Wolfsburg, e.g., about which (neighborhood) projects with related to the topic of energy are being implemented in the city; Information on energy-efficient renovations/ modernizations, subsidy opportunities and various ways of saving energy; Information on all relevant actors and contact persons contacts and, last but not least, information on Ambient Assisted Living and Smart Home functions, e.g. through the simulation of a 360° walk-through smart home and a 3-D video game.

The modular, multimodal and **energetically sustainable mobility** and **sharing station**

Covering mobility needs and producing the necessary energy on-site is a major challenge in a smart city. Public transport, cycling, sharing services, P+R stations and ride-sharing benches at an innovative mobility station on one hand combines individual means of transport into a multimodal mobility. On the other hand, traffic handling becomes more efficient. The most suitable means of transport is always available for a trip, and the same distances are covered by shared means. In addition, the necessary energy can be produced and consumed on site. Photovoltaic modules on bicycle parking facilities, roofing and innovative solar ground coverings generate energy, can be used on-site in charging stations and e-vehicles. The implementation of novel battery exchange systems in the parking facility make it possible to move on directly when things have to move quickly, as there is always a charged battery available for the corresponding e-vehicle.

For safe charging, modern bike parking facilities and bike cages are used, equipped with weather protection electronic locking system, will be made available to all users throughout the region with just one standardized access card. Where many people come together, further services are available: WLAN can be used to bridge short waiting times, and an integrated display in the style of a digital house board in rented premises provides access route planners, timetables with real-time information, booking and billing system for vehicles directly on site, even without their own smartphone. Integrated and intelligent parcel stations with roofing, store online orders such as washed and ironed clothing from the dry cleaner or even sensitive goods such as food or medicine can be kept cool in special compartments.

Goals

- · Promotion of multimodality through attractive offers
- · More energy-efficient and resource-saving transport

Goals

• Reduction of traffic-related burdens by shifting from individual mobility to resource-conserving, low-emission vehicles and shared use of means of transport

Classification fields of action

Resource-efficient infrastructures

100% E- mobility park range with **load management** and **sustainable power generation** from own **photovoltaic system**

Electromobility still raises many questions for future and users: Where do I charge my vehicle in a residential area without my own charging facilities and where does the energy come from? A parking place in immediate vicinity of the apartment with 100 percent charging station coverage and its own electricity generation is one possible answer. A powerful photovoltaic system on the roof generates electricity that can be consumed directly on site via charging or can also be fed into storage facilities. Intelligence prevents load peaks and problems in the building's network when too many users want to charge at the same time. If more electricity is needed than is produced by the photovoltaic system, electricity is taken from the general grid or drawn from the storage facilities. If less power is needed than the photovoltaic system produces, energy is sold to the power grid or temporarily stored in storage facilities. In this way, a reliable and weather-protected charging system can be set up in one place for the users and charge directly "at the front door".

And because the load on the power grid is much less, more e-cars can be charged in each neighborhood than would be the case per individual residential unit. Those who do not own a car can take advantage of sharing services with electric vehicles or e-bikes, which can be quickly accessed and securely located directly on the ground floor.

Goals

- · Contribution to the creation of sufficient charging possibilities for the expansion of E-mobility
- · Grid compatibility of increased charging infrastructure facilities in residential neighborhoods
- · Integrated sharing offers in the neighborhood reduce traffic congestion
- · Contribution to climate protection by reducing of CO2 emissions

Classification fields of action

- Resource efficiency in existing buildings
- Resource-efficient infrastructures

5.3.4 Public participation phase 2 : Energy

Energy saving tutorials

The project is an information and educational offer for interested citizens of Wolfsburg on questions such as "How can I save energy and use it efficiently?", or "How can can I renovate my house to make it more energy-efficient and what subsidies are available?". With the medium "film" the Wolfsburger Energie Agentur wants to meet the wishes of users and have a film series in 3D. Citizens can be sensitized as per the topic and their interest aroused in saving energy.

Goals

- · Anchoring energy efficiency and resource conservation regionally
- · Publicize local consulting services and responsible contact persons in Wolfsburg
- · Raise awareness of climate protection
- · Mobilize savings potential in the home
- Improve the energy balance of single and two-family homes through energy-efficient renovation and generation of heat and electricity through the use of renewable energies
- · Supporting the city of Wolfsburg in achieving its goal of reducing CO2 emissions by 2020

Classification fields of action

- · Resource efficiency in existing buildings
- · Information and consulting services in the field of energy

CONCLUSIONS

1. Offering practical added value, networking in everyday life, using modern technologies, live in a resource-efficient and climate-friendly way, being mobile - were the core elements of the projects developed for ViWoWolfsburg 2030+ in the second phase of the City of the Future competition.

2. Seven project proposals in the areas of housing diversity, mobility and energy are the result of the exchange and workshops with citizens, experts and children.

3. The contents show where there is a need for action and where Wolfsburg is on the right track. For example, in the new residential areas planning or modernization of existing ones.



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5.3.5 Public participation phase 2 : Conclusion

4. Practical assistance for tenants in their everyday lives, sensible use of new technologies and forms of housing will become increasingly important in the future. Good housing also needs good infrastructures. Flexible, modern and climate-friendly mobility options that enable people to get around quickly, comfortably and user-friendly are important to people.

5. Wolfsburg wants to be recognized here with exemplary and innovative projects. For this reason, urban-friendly and increasingly shared mobility options are already being taken into account in new neighborhood planning, multimodal mobility options are being developed for the city as a whole, where modes of transport will be networked through a digital platform in the future. All of this can be done sustainably, if resources are used efficiently, emissions are avoided and renewable energies are used.

The findings from the workshops and the concrete project proposals developed will be used to project proposals, existing plans are to be supplemented and new projects initiated. After the second phase of the competition, the aim is to raise funds available for the planning and implementation, as well as to continue the processes together with the citizens of Wolfsburg and other stakeholders in the urban society.

4.6 Stakeholders involvement

People of Wolfsburg, City Council, public organizations like the city environment cell, health organizations, city landscaping cell, non-government organizations like Cittaslow and similarly private organizations including commercial sectors, schools and colleges, students, visitors and tourists.



6 DESIGN

A GARDEN IS NOT AN OBJECT, BUT A PROCESS.

A GARDEN IS NEVER FINISHED, NEVER COMPLETE, NEVER THE SAME, IT IS A NEVER - ENDING QUEST. A GARDEN IS A LOVE AFFAIR WITH THE LAND, A DEEPLY PERSONAL EXPRESSION OF CONNECTION BETWEEN A PERSON AND THEIR ENVIRONMENT. IT'S A RELATIONSHIP THAT CHANGES EVERY SECOND, EVERY HOUR, EVERY WEEK AND EVERY YEAR.

LIKE THE EVER UNFOLDING NOVELTY OF THE DIVINE LOGOS; IT'S NEVER STATIC ; ALWAYS IN MOTION.

- Ian Hamilton Finlay



Outdoor sketching at excursion, Gonwanaland, Leipzig with Prof. Dr. Wolfram Kircher, Dec 16, 2018 Photo credits (right) : Mohd. Robiul Alam



6.1 Choice of site

Satellite image of Wolfsburg city showing 4 different site choices.



Image source : www.googlemaps.de

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6.2 Site aerial view

Krummer Teich



Image source : www. www.googlemaps.de

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Frauen Teich

Zeigel Teich

6.3 Base drawing



CHOICE OF SITE : Combination of '*historical landscape elements'*, water bodies precisely the horshoe ponds.

Base map source : City base map of the city of Wolfsburg, IT division - 15-3 GIS, 2001-2006 Orthophotomosaik of the city of Wolfsburg, IT division - 15-3 GIS, 2001-2006

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6.4 Masterplan

Stream, neighbourhood having transformational opportunities community farming, towards attaing self-sustainence.



6.5 Site section

Section showing the proposed activities on site and the fruits trees as new highlights.



SECTION AA

1:250

Introducing new activities like :

- 1. Community gardening
- 2. Floriculture
- 3. Fisheries and Aquaculture
- 4. Neighbourhood organic market for local produce (shown in Masterplan)



A. Ecological breakwater with green walls

IDEA 1 : LAKEFRONT DESIGN TYPOLOGIES



6.6 Animal aided design

Proposed forest canopy design for attaining stronger ecosystem together with environmentally rich experiential areas.



Designing a 'Rain Garden for enhancing microclimate bringing down MLA Thesis 2021 | Esha Kundu



6.7 Innovative approach and uniqueness

There are several aspects that have been catered to when it comes to innovation and uniqueness in design. Following are a few basic design features, however there are more in the following pages.



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INNOVATION 3 : TERRACED GARDENS

These are the flower beds around the lake area and towards the north - east part of the site where floriculture will be practiced for growing different perrinials, annuals and bienials native to the site. This will enhance the nature trail experience.



INNOVATION 4 : BERM DESIGN





6.8 Climate garden typologies

What makes a Climate Garden?

and more native plant species. LEGEND FOR CLIMATE GARDEN TYPOLOGIES 6. LAKESIDE STONE EDGE CANOPY + VIEWING DECK 1. WILD PRAIRIE GARDENS 7. RAIN GARDENS 2. MARKTPLATZ AND STORAGE BERM LANDSCAPE 8. COMMUNITY GARDENS 9. GREEN PATH **3. GREEN LEISURE POCKETS** 4. ARTIFICIAL WETLANDS 5. STREAM LANDSCAPE

1. Choice of plants : best choices are a variety of perennials native to the region around Wolfsburg, because they

already thrive in this climate, are generally less vulnerable to insect, pests, require less care. The idea is to grow more

Landscape plan showing Climate Garden Typologies Base map source : City base map of the city of Wolfsburg, IT division - 15-3 GIS, 2001-2006 Orthophotomosaik of the city of Wolfsburg, IT division - 15-3 GIS, 2001-2006

50M 20

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6 | Design

6.9 Climate garden design

6 I Design

2. Sustainable landscape design.

3. Animal friendly design, attracting various species to build the ecosystem towards an optimal balance.

4. Choice of Materials in the garden that absorb heat and radiate less into the atmosphere.

5. Have a microclimate of their own. Many such climate gardens in the city together will help bring down temperature rise, especially the native plant species. Climate garden typologies are designed to be generic in different neighborhoods, with same principles and the new context.

6. Making of futuristic gardens equipped with 'smart' landscape elements that will help monitor specific plant processes, retain renewable sources of energy, for example sunlight during the day and emit light in the dark + healthy Vitamin D.



6.9 Climate garden design

7. Interesting feature would be to install bioluminiscent trees and plants in between that shall behave as light source in the dark.

What is a Climate Garden?

A place of retreat into complete nature. It functions a s a place of relaxation, experiencing tranquility within greens, surrounded by flora and fauna who are members of the ecosystem that is intended to be recreated with the climate garden design.

What is a Climate Garden Typology?

A specific type or a prototype of a garden that can be generic in its principles of design and can be made in other neighborhoods with varying contexts. It is the ambience granting experience.

3. What are the Climate Garden Elements?

The elements from nature that help recreate the natural atmosphere constitute the garden elements. They are the elements inside a specific garden typology. Example Rain Gardens, Artificial Wetlands, fragrant flowers in the wild prairie gardens, bioluminiscent plants, stone edge seating, planting beds in community gardens, green path, etc.



PERENIALS

An exhaustive list of native plant species has been chosen depending on the context of Wolfsburg.

CHOICE OF PERENIALS AND NATIVE PLANT SPECIES FOR THE WILD PRAIRIE GARDEN TYPOLOGY

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6.10 Climate garden typology 1 & 2



CLIMATE GARDEN TYPOLOGY 1 & 2 : WILD PRARIE GARDENS + BERM

6.11 Planting wheel design

What is a wild prairie garden?

• A prairie is a natural-looking garden of native grasses and wildflowers. They are easy to establish and virtually maintenance free. Plus, they add color and attract pollinators to the landscape.

Why chosing a wild prairie garden?

· Because in principle, wild prairie gardens behave like large rain gardens.

• Selected plants are tolerant of both wet and dry conditions. It's a good idea to put plants that prefer drier soil at the edges and the ones that like "wet feet" at the lowest part of your garden. Especially consider varieties which attract bees, birds and butterflies.

 Once they are well established, they will probably only need watering during extended dry spells. The planting environment is also a reserve for moisture and water content in the air that doesn't let the microclimate dry out easily. Completely natural as this garden type will attract many animal species. It serves as a natural rain garden attracting birds, butterflies and a resident box turtle.

Planting wheel showing different categories of plants, that are perenials, special featured plants (fruit trees and bio-luminiscent trees), subtropical evergreen and evergreen plant species native to Wolfsburg region.



KEY MAP OF WILD PRAIRIE GARDENS AND VIEWING DIRECTION



PLANTING WHEEL FOR WILD PRAIRIE GARDENS PLANT COMBINATION 2
1212272 **GARDEN ELEMENT 3** 0 Native perenials that require very low maintenace as wild garden theme has been proposed, where the garden shall grow on its own **GARDEN ELEMENT 5** 0 Artificial wetlands **GARDEN ELEMENT 4** Dynamic lake edge (here oshown as a parapet wall!) **GARDEN ELEMENT 6** 0 Green leisure pockets that offer Material: Stone complete retreat into nature surrounded (locally available) by flower gardens. The idea is to relax on pristine earth rather than furniture installations. 0 Garden typologies 3 : View of Green leisure pockets along with wild prairie gardens in the background. Plant combination 2 CLIMATE GARDEN TYPOLOGY 3 : GREEN POCKETS from Grey to shades of Green 8

6.12 Climate garden typology 3 : Green pockets

6.13 Detail demonstration 1 : Section through artificial wetlands



SECTION THROUGH THE ARTIFICIAL WETLANDS, BERM GRANARIES AND THE MARKTPLATZ

1:250

CLIMATE GARDEN TYPOLOGY 4 : ARTIFICAL WETLANDS

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Highlight : Green leisure pockets that offer complete retreat into nature surrounded by flower gardens. The idea is to relax on pristine earth rather than furniture installations. Primary activities include star gazing, sunbathing, mesmerizing into the natural fragrances while surrounded by nature.





KEY MAP OF GREEN LEISURE POCKETS ALONG WITH VIEWING DIRECTION

6.13.1 Detail demonstration 1 : Construction



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DEMONSTRATION PLAN 1 : PRAIRIE GARDENS, MARKTPLATZ, BERM GRANARIES, ARTIFICIAL WETLANDS & PAUSE POINT

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6.14 Climate garden typology 4 : Artificial wetlands



GARDEN TYPOLOGY 5: VIEW OF THE ARTIFICIAL WETLANDS ALONG WITH OUTLET STREAM IN THE BACKGROUND CLIMATE GARDEN TYPOLOGY 4: ARTIFICAL WETLANDS

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6.14.1 Construction and choice of plant species

Artificial wetlands construction

Floating landmass anchored with the help of big rocks positioned at the bottom of the pond.

Choice of plant and animal secies : Typhas Phragmites Locally grown non - predatory fish

Berm design

Sedum telephium 'Herbstfreude' Sedum spurium 'Fuldaglut' Sedum spurium 'Red Carpet' Sphagnum moss (substrate) Sedum spurium 'Voodoo'



KEY MAP OF ARTIFICIAL WETLANDS ALONG WITH VIEWING DIRECTION

animal species. In general this typology of space is intended to o 711 create a microclimate of its own. LL LT 200 GARDEN ELEMENT 8 O Pause point that is the intersection of green path and stream offering idyllic views into the landscape around stream that is designed to preserve the flowing water. Material of construction TYPE 1: Wood at places where there are tree canopies. VIEW OF THE PAUSE POINT OVERLOOKING THE STREAM LANDSCAPE

CLIMATE GARDEN TYPOLOGY 5 : STREAM LANDSCAPE

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6.15 Climate garden typology 5 : Stream landscape

Special plants that are intended to be planted around the stream to quantify the water. These species can help retain moisture in the atmosphere to keep the temperature optimum. Tree canopies are a very good place for the resident animal species.

6.16 Bioluminiscent plant species

MLA Thesis 2021 | Esha Kundu

As per the technology developed by Massachusetts Institute of Technology where specialized nano particles are injected into little plant sapplings and then planted on the site are capable of emitting light during the dark, known as glowing plants eliminating the need of artificial street lights. The idea is to utilize this technology and equip certain plant species with such unique luminiscence particles so as a full grown tree or the shrub can be a highlight as well as lighting source within the climate gardens especially in the evenings and during nights.

As per the research, the particles are at present injected into specific plant species, in coming years it is said that this can be possible with any kind of plant species, groundcovers, shrubs or even trees.



6.17 Detail demonstration 2



DEMONSTRATION PLAN 2 : STONE EDGE CANOPY, GREEN PATH, VIEWING DECK, RAIN & COMMUNITY GARDENS

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6.18 Climate garden typology 6.1 : Viewing deck

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CLIMATE GARDEN TYPOLOGY 6 : VIEWING DECK



6.19 Climate garden typology 6.2 : Stone edge canopy

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6.21 Climate garden typology 7.1 : Rain gardens

6.21.1 Rain gardens

What is a Rain Garden?

• A rain garden is a planned depression inviting rainwater from roofs, driveways, and sidewalks to be absorbed gently into the ground. The addition of such a garden in the neighborhood greens also adds charm and beauty while helping to reduce erosion, flooding and water pollution.

• They capture runoff, slowing it down and allowing it to filter through the soil. This helps prevent poisoning of clean water by keeping the pollutants from entering our waterways.

• It's estimated that a rain garden helps absorb as much as one-third more water than the same area of lawn. Other benefits include lessening the potential for home flooding, reducing standing water in yard and—the distinctly positive side effect of eliminating spots for mosquitoes to breed.

• Rain garden design is a great way to attract birds, butterflies and beneficial insects that eliminate insect, pests. And, once established, rain gardens are not only appealing, they reduce the time required for yard maintenance.

• Choice of plants are a variety of perennials native to Wolfsburg region because they already thrive in this climate, and are less vulnerable to insects, pests, and require less care.

• Selected plants are tolerant to both wet and dry conditions. It is preferred to put plants that prefer drier soil at the edges and the ones that like "wet feet" at the lowest part of the garden as water collects only towards the lowest point. Plant species have been specially considered with varieties intended to attract bees, birds and butterflies.

• They are ompletely natural, will also attract many animal species, birds, butterflies or even a resident box turtle.

CLIMATE GARDEN TYPOLOGY 7 Rain gardens



KEY MAP OF RAIN GARDENS ALONG WITH VIEWING DIRECTION

6.21.1 Rain gardens

Why choose native plants for Rain Gardens?

- Choosing plants native to the area offers distinct advantages like:
- They are adapted to soils and climate.
- They are hardy and will survive without special care such as fertilizers or pesticides.
- They provide food and shelter for some of the keystone species in wildlife including birds and butterflies.

• They will often self-seed or spread to fill the space, resulting in lower planting costs. And that is why large prairies wild gardens have been associated to be large size rain gardens in this project that in itself serve to be *Climate gardens of the future* together with the designed garden typologies and garden elements.



KEY MAP OF RAIN GARDENS ALONG WITH VIEWING DIRECTION

Choice of plant species for the Rain Garden

Monarda didyma (bee balm) Chelone glabra (white turtlehead) Osmunda regalis (royal fern) llex verticillata (vinterberry holly) Clethra alnifolia (sweet pepperbush) Osmunda cinnamomea (cinnamon fern) Lobelia cardinalis (red lobelia) Cornus stolonifera (red - osier dogwood)

RAIN GARDEN DESIGN

A simple rain garden design, with red lobelia and royal fern occupying the lowest wettest zone.

Image source : www.catawbariverkeeper.org/state-of-the-river/



VIEW OF RAIN GARDEN INSIDE NEIGHBORHOOD GREENS





RAIN GARDENS BETWEEN TWO NEIGHBORHOODS These gardens are generally maintained by

professional landscape workers, however the



VIEW OF RAIN GARDEN NEAR MAIN ROADS



6.22 Demonstration 3 : Community gardens

The plan demonstrates the spatial analysis of the community gardens and rain gardens in a neighborhood.



DEMONSTRATION 3 : NEIGHBORHOOD RAIN GARDEN + COMMUNITY GARDEN PROTOTYPE

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6.22.1 Community Garden design

These are special plan beds, some are high, and some are low in height creating an interesting plant sculptural pattern to suit all age groups, old, adults as well as small children depending on the height of every age group.



VIEW OF THE LAKE SIDE VIEWING DECK + BIOLUMINESCENT GREEN PATH

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VIEW OF DYNAMIC GREEN PATH WITH AN EXPERIENCE OF FRAGRANT FLOWER GARDENS CLIMATE GARDEN TYPOLOGY 9: DYNAMIC GREEN PATH

PLANT COMBINATION 1

7 PHASING

7.1 Project Phasing

Phase 1 (0 months – 6 months)

i. Conducting an initial survey to collect feedback from the people about the idea of transforming Wolfsburg to a more people centric city. Incorporating the changes in the design and showcasing the same in the Wolfsburg Award Competition jury.

ii. An examination of the existing garden types along with the study of their ownerships.

Phase 2 (6 months – 1 year)

i. A single neighbourhood unit shall be picked up as a model for community participation towards initiating a 'pilot initiative' making design changes within the gardens and other greens.

ii. Results shall be observed after the growing season along with community response.

Phase 3 (1 year – 2.5 years)

i. Depending on the success as well as accounting the low points of the pilot initiative, more neighbourhood units shall be sensitized. This shall be accompanied with amended changes observed as per the low points to ensure a higher success rate in the newly created network of gardens.

ii. A new type of greens shall be added to these gardens and these are the connections between neighbourhood gardens in the form of access or hedges.

iii. Small scale transformational ideas shall be incorporated within the communities towards enabling a 15 minute city and slowly growth of the neighbourhoods shall be anticipated towards resilient communities.

Phase 4 (2.5 – 4 years)

i. This phase shall take care of the parks in between the neighbourhoods along with the in between connections. This particular scale shall be observed for a time span of 4 years that will allow us to investigate the challenges faced. Most important aspect during this phase will be the people's participation with the new typologies of gardens, known as the climate gardens. The maintenance

ii. Potential vacant lands shall be considered towards converting them into climate gardens

7.2 Financing, Execution and Governance

Call for participation for making Wolfsburg resilient to calamities and climate change

People who would like to be the founding members shall be invited for voluntary work who would take care in setting up a treasury as per the following steps discussed in detail. This group could be named as "WE the Wolfsburg Futurists". Following could be the major sources of funding the project :

1. Crowd funding

The idea of Wolfsburg city as a climate garden shall be brought to people's notice and crowd funding from people shall be encouraged.

2. Incentive/ loan from the City Council of Wolfsburg

An initial corpus requested from the City Council of Wolfsburg will allow for the pilot initiative to begin that will set forth the way for more funds incoming. This could be also requested in terms of loan and shall be later repaid.

3. Organizations (Product branding and publicity)

Success of the pilot initiative would invite organizations public, private and non-government to participate. Private organizations can further help in product branding and publicity of the initiative. This is the first step towards having a product label under the initiative. This label will take up familiarity with the levels of governance hierarchy discussed further.

4. Token amount from the institutions like schools and colleges

Outdoor classes could be held in these climate gardens that are futuristic healthy places of learning in return of small token amount for the preservation and upkeep of gardens.

5. Supermarkets and vegetable stores

A percentage of food sharing will be sold at the markets in return of income from the sales.

6. Charity

Contributions from local people especially people involved in food sharing who would like to come forward shall be encouraged.



7.2 Financing, Execution and Governance

Following is also a brief account of the hierarchy of Governance envisioned

7. Birth of the institution "Wolfsburg Climate Garden"

From the inception of "WE the Wolfsburg Futurists" group, a way forward to "Wolfsburg Climate Garden" is envisioned to be a little institutional set up that will primarily encourage public entrepreneurship at a very nascent stage for like-minded people to come forward towards forming a new group. Success of this individual group will be seen in terms of growth of Climate Gardens as well as the institution. With the success of the produce, soon the locally grown fruits and vegetables can be sold at low rates for letting people access home grown, healthy produce.

8. Neighbouring City Councils

The idea of "Wolfsburg Climate Garden" entrepreneurship can be shared among neighbouring cities of the state of Niedersachsen with the permission of their respective city councils, with patenting purchased in return of some amount given back to the parent organization branch in Wolfsburg. Neighbouring cities will thus be allowed to proper the idea with their city names, eg : Hannover Climate Garden, Braunschweig Climate Garden, Lüneburg Climate Garden or the Göttingen Climate Garden initiative.

9. Niedersachsen State government

Depending on the success of this network of climate garden initiative, the idea could be acknowledged by the State government of Niedersachsen. Consequently, funds from the State to execute the idea could be requested. A loan could also be requested from the state to be able to pursue a public program that shall be repaid in the due course of time as per the program success.

10. Neighbouring State governments or the Federal States

An attempt to further sensitize the neighbouring state governments about the roaring Wolfsburg Climate Garden initiative. There could be a possibility that the neighbouring state governments could themselves approach Niedersachsen for the idea promotion in their states. Again, patenting in other cities of these states shall give some funds to the parent organization in Wolfsburg, eg : Magdeburg Climate Garden, Wernigerode Climate Garden or the Bernburg Climate Garden initiative.

7.2 Financing, Execution and Governance

11. Federal Council or Bundesrat

A network of member cities sweeping across the northern states of Germany could be quickly noticed by the topmost body of the German government for the proven benefits transpired among people and the very transformation. It could be possible that the Federal Councils steps in investing in funds to build this initiative throughout Germany. This will strengthen Wolfsburg's popularity for the brainchild of "Climate gardens a new way" in making futuristic cities along with more funds to the parent organization in Wolfsburg. This can perhaps help in repaying all the loans that were initially collected from the Wolfsburg City Council and Niedersachsen State government.

12. World forums

The green initiative can be adopted internationally. This will further catapult the dire need to save the world from the unforeseen disasters, calamities and the soaring climate change. Besides sharing funds for borrowing expertise from Germany.



8 SYNTHESIS

8.1 Conclusion

Optimum atmospheric temperatures attained. (supported with comparable graphics showing difference in temperatures from urban heat island effect in the present and envisioned Wolfsburg city. Elevated moods of the people when there is so much of sharing in the environment, especially between nature and mankind. Transfer of energy between species, just like how it was in the movie Avatar, where nature is the profound source of all immortal remains.

Attaining self - sufficiency, 15 minute city, high quality life

The project envisions a transformation in the lifestyle of people pushing towards a higher quality of life. In other words, the connection with nature will let nature do all the work for keeping the environment healthy. It is quintessential on the part of we as people to safeguard this precious link, intact and active at smaller scales, for every individual is responsible, and together we make a difference at the macro scale in bringing down the atmospheric temperatures to optimum.

Transformational changes at human scales will ensure compact cities that are exceptionally robust and self-sufficient. It is a way forward towards preparedness in recovery from disasters and pandemics.

Food sharing

As more and more people will be involved in this initiative, it will be an opportunity to make local food accessible to all, a main step towards reaching self-sustenance. This will also reduce costs from importing food products from far off places, encouraging people healthy eating. Because food that is grown locally is fresh and have all nutrients intact. They are free from chemicals that are otherwise applied to increase food shelf life.



INTENDED EFFECT OF MICROCLIMATES GENERATED THROUGH THE DIFFERENT TYPOLOGIES ON THE NEIGHBORHOODS

8.1.2 Intended effect on cities beyond

 Neighborhood as a pilot initiative energizes other neighborhoods of Wolfsburg and beyond the city boundaries.

• Generic design that is contextual to Wolfsburg.

• Plant combinations of native tree species have been extensively studied and utilized to create beautiful atmospheres that shall enhance the experiencial value of urban spaces within Wolfsburg city.

• Design model that can be adapted to other growing cities of Germany.

• Proposed design project through its strategies, goals and typologies help envision making Wolfsburg *resilient, climate adaptive, sustainable, healthy and independently food sufficient, water sufficient, reflecting culture and tradition through landscapes and design of city and last but not the least self dependent and futuristic.*



Germany map showing Wolfsburg and major cities. *Map source : www.artiksdesign.de/germany-map-poster*



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8.1.3 Generic model, can be applied to world cities

• Since Wolfsburg is among the present day growing cities that has its own challenges, the design solution can be applied to other growing cities across the world having similar challenges depending on their context.

• Design typologies of Climate Gardens can be taken as a generic example to combat cilmate change, however selection of plant species shall be as per the geographical location of the city concerned, focussing on the native tree species of that region.



World map showing Wolfsburg, Germany at the focus.

Map source : www.memoriesvideography.com



9 APPENDIX

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9.2 Wolfburg Award for Urban Vision 2020 entry posters

Following entry comprising of two A1 size posters as a part of my thesis work was granted a Recognition Award, Third prize along with prize money. All winning entries can be accessed on the website link as under. https://www.wolfsburg.de/kultur/architektur/wolfsburgaward

