



RECONNECTED TO AN ANCIENT CANAL

THE CHANGE OF CANAL CORBULO
IN DYNAMIC COASTAL LANDSCAPE

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CONTENT

I. INTRODUCTION	II. METHODOLOGY	IV. VISION	VI. COMPLETION
1.1_Fascination	2.1_Theoretical Framework	4.1_General Vision	6.1_Conclusion
1.2_Brief Infomation of Site	3.1.1_Place and Placelessness	4.2_Design Strategies	6.2_Reflection
1.2.1_What is Limes?	3.1.2_Cultural Sustainability	4.3_Pilot Design Site Focuses	
1.2.2_What is Lower German Limes?	3.1.3_Theoretical Concept		
1.2.3_A Zoom in on Location: A Canal in Coastal Area	2.2_Methodological Framework		
1.2.4_The Rise and Fall of Canal Corbulo			
1.2.5_Roman Settlements in a Coastal Landscape			
1.2.6_Interlink Between Universal and Local			
1.3_Problem Fields	III. ANALYSIS	V. DESIGN EXPLORATION	BIBLIOGRAPHY
1.3.1_Invisible Heritage	3.1_the Matrix: Area x Time	5.1_Pilot: From Monologue to Dialogue	
1.3.2_Precarious Environment	3.2_Scale in Time	5.2_Reconnection in Heritage	
1.3.3_Placeless Society	3.2.1_Marco Scale: Natural Landscape	5.2.1_A Tale on Human-Landscape Relations	
1.3.4_Problem Statement	3.2.2_Meso Scale: Landscape in Making	5.2.2_Different Rhythms of Time	
1.4_Research Questions	3.2.3_Micro Scale: Urban Landscape	5.3_Reconnection in Environment	
1.4.1_Research Questions & SubRQ	3.3_Scale in Research Area	5.3.1_Water Mechanism	
1.4.2_Objectives	3.3.1_Marco Scale: Context	5.3.2_Construction Materials	
1.4.3_Relevance	3.3.2_Meso Scale: Community & Groups	5.3.3_Vegetation Succession&Management	
	3.3.3_Micro Scale: Around the Line	5.4_Reconnection in Society	
	3.4_Crossover Selection for Research	5.4.1_Program Associations	
	3.4.1_Extent of Modification	5.4.2_Joining Local Development	
	3.4.2_Integretion Between Topics	5.5_Further Reconnections	

ABSTRACT

In light of increasing global divisions, it has been questioned whether human beings are able to connect and communicate with each other when encoutering geopolitical conflicts. The author's experiment on this matter and proposal for this project begins with what was once united but is now divided - *the Limes*, a legacy left from one of the most powerful rulings in history, the Roman Empire.

After UNESCO's approval and nomination, *the Limes* is now a linear connection covering three continents, laying the groundwork for the reconstruction of a shared cultural identity.

By zooming in on the research location in the northwest portion of *the Limes*, the land between old rivercourse Rhine and Meuse (now the Hague - Leiden metropolitan area) in the Netherlands, where there was once a Roman canal called *Canal Corbulo* now with few traces remaining on a socio level, we can see that heritage faces the same threat of vanishing and obvilion just as nature in this area.

This project seeks to investigate the past landscape, the potential of connections between

time and space, and the future cooperation between heritage, environment and society.

This project's objective is to illustrate a heritage-led solution based on the concept of 'in place' to build an open-air museum that reflects the regional development of the human-landscape relationship through the presentation of narratives at diverse time scales.

This thesis focuses on applying the theory of cultural sustainability as a method in research and design to generate a landscape framework, allowing integration from monoculture lands on site to a dialogue between heritage, ecology, and human, projecting the long history of man-made landscape in this region, and reflecting the boundaries and limits humans push with nature.

Moreover, with the pilot design, prototypes of representing heritage will be adapted and implemented on to the entire *Canal Corbulo* line, with the optimism of serving as a template for future research and design explorations on *the Limes*, realising the idea of connection from place to place.

KEYWORDS

- Canal Corbulo
- Landscape Heritage
- Human-Landscape Relationship
- Cultural Sustainability
- Place and Placelessness
- Transdispilinary Research

This chapter introduces the research topic, the *Canal Corbulo of the Limes*, a Roman-era civil engineering project along the west coast of the Netherlands that no longer exists due to the end of Roman rule in the second century. The focus lays upon the canal's unique location and how its situation has changed for over nearly two millennia due to the unstable delta landscape, Roman history and its impact on local culture, the canal's journey to becoming a heritage site, and the threats it faces today. Finally, the problems were categorised into three distinct groups: heritage, environment, and society.

I

I N T R O D U C T I O N

I. INTRODUCTION

I.I_FASCINATION



Figure 1.1: Impression of the Limes
Made by Author, Source:
1) Pigeon Photography by Author,
2) UNESCO World Heritage Centre. (n.d.-a). *Frontiers of the Roman Empire*. Retrieved September 26, 2022, from <https://whc.unesco.org/en/list/430>
3) UNESCO World Heritage Centre. (n.d.-a). *Frontiers of the Roman Empire – The Danube Limes (Western Segment)*. Retrieved September 26, 2022, 4) from <https://whc.unesco.org/en/list/1608>
4) UNESCO World Heritage Centre. (n.d.-c). *Frontiers of the Roman Empire – The Lower German Limes*. UNESCO. Retrieved September 26, 2022, from <https://whc.unesco.org/en/list/1631>
5) UNESCO World Heritage Centre. (n.d.-a). *Archaeological Site of Volubilis*. Retrieved September 26, 2022, from <https://whc.unesco.org/en/list/836>
6) View of Back Photography by Author,
7) Roman Road Network by M. McCormick et al. (2013), https://www.reddit.com/r/MapPorn/comments/jw3e0e/map_of_roman_roads/?utm_name=iossmf&fbclid=IwAR2jCPOTIH1ooF4_C_gT34znNcyUZjN6MrGV19ePXIVbGcvfi1CfFOgzo

As someone who's not Dutch or even European, studying and living here often feels like a mis-place, or as someone would put it, an outsider. Although for me it is not a problem, but rather an opportunity to reflect by observing myself and others: what is the *relationship* between people and a particular location? How do we establish our *identities* in different *contexts*? On the other hand, we know that people need connections more than ever in this post-covid era, which was cut off even before this pandemic due to an increasingly divided and conflicted

world, so I cannot help but wonder: has there ever been a culture that transcended geospatial context? Can individuals *appreciate a shared culture while preserving their local identities*?

Luckily, I discovered something that provides me with additional insights into these questions, that is a recently nominated transcultural UNESCO heritage site: the Lower German Limes in the Netherlands.

I.2_BRIEF INTRODUCTION OF SITE

1.2.1_What is Limes?



Figure 1.2: Map of Roman Empire
Source: Colenbrander, B. (2005). *Limes atlas*. Uitgeverij 010.

The Limes is the border of the Roman Empire. From the coast of northern Britain to the Black Sea in Europe, thence to the Red Sea in Asia, and finally across North Africa to the Atlantic coast, the Roman frontier spanned more than 7,500 kilometres. In what were once the Limes, only walls, ditches, forts, fortresses, and ruins of civilian settlements are visible today. (UNESCO World Heritage Centre, 2021)

1.2.2_What is Lower German Limes?

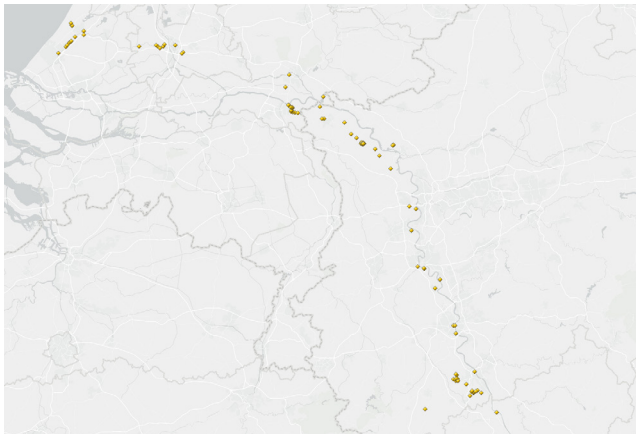


Figure 1.4: Lower German Limes Sites Approved by UNESCO (2021)
Source: UNESCO World Heritage Centre. (n.d.-c). *Frontiers of the Roman Empire – The Lower German Limes*. UNESCO. Retrieved September 26, 2022, from <https://whc.unesco.org/en/list/1631>

The Lower German Limes once divided Roman province of Germania inferior (Lower Germany) and Germania Magna (Greater Germany). This part of Limes follows the left bank of the Lower Rhine for approximately 400 kilometres from the Rhenish Massif in Germany to the North Sea coast in the Netherlands, the transnational property consists of 102 components from one section of the Roman Empire's borders.

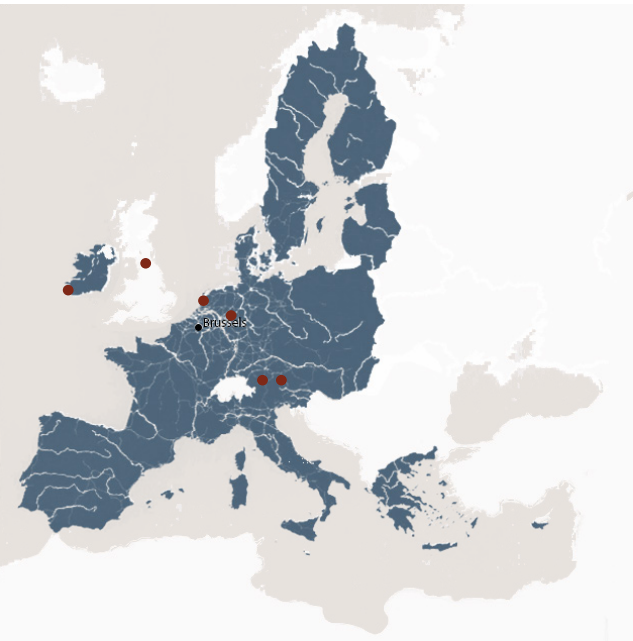


Figure 1.3: Limes Related Sites Approved by UNESCO in EU (2022)
Made by Author, Base map source: Colenbrander, B. (2005). *Limes atlas*. Uitgeverij 010.

Category	Quantity	Sites
Legionary Fortresses and other Large Bases		23-Nijmegen-Hunerberg
Forts	8	1-Valkenburg-Centrum 5-Leiden-Roomburg 10-Woerden-Centrum 13-Utrecht-Hoge Woerd 15-Utrecht-Domplein 16-Bunnik-Vechten 22-Nijmegen-Valkhof 24-Nijmegen-Kops
Fortlets and Towers	2	12-Utrecht-Limes road 14-Utrecht-Groot Zandveld
Temporary Camps Fleet Base and Bridgehead Fort		
Civil Settlements and Cemeteries	8	2-Valkenburg-De Woerd 18-Arnhem-Meinerswijk 5/13/16/22/23/24
Limes Road	3	2-Valkenburg-De Woerd 12-Utrecht-Limes road 16-Bunnik-Vechten
Kiln Sites	1	26-Berg en Dal-Holdeurn
Aqueduct	1	25-Berg en Dal-aqueduct
Towns and Governor's Palace	1	3-Voorburg-Arentsburg
Sanctuaries	1	20-Elst-Grote Kerk
Riverine Infrastructure and Deposits	5	4-Corbulo's canal 5/13/16/24



Figure 1.5: Lower German Limes Sites Categories in the Netherlands
Made by Author, Based on Source: UNESCO World Heritage Centre. (n.d.-c). *Frontiers of the Roman Empire – The Lower German Limes*. UNESCO. Retrieved September 26, 2022, from <https://whc.unesco.org/en/list/1631>

There are legionary fortresses, forts, fortlets, towers, temporary camps, roads, harbours, a fleet base, a canal, and an aqueduct on the property, as well as civilian settlements, towns, cemeteries, sanctuaries, an amphitheatre, and a palace. The vast majority of these artefacts are buried underground. The property's waterlogged deposits have enabled a high degree of preservation of both structural and organic materials from the Roman occupation and use periods. (UNESCO World Heritage Centre, 2021)

According to UNSECO's assessment, the Frontiers of the Roman Empire – The Lower German Limes is of high integrity and authenticity, providing solid foundation for further research.

1.2.3_A Zoom in on Location: A Canal in Coastal Area

Due to the Netherlands' unstable landscape (van Dinter, 2013), the old Rhine's rivercourse is no longer visible (Ministerie van Onderwijs, Cultuur en Wetenschap, 2020). Among the typical west coastal landscape, there is one stretch out of old River Rhine, a canal supervised by a Roman general named Corbulo to connect the River Maas and the River Rhine around 50 A.D.

The Canal Corbulo was located on a slightly elevated terrain, on the sharp transition between sandy dunes and peatland (Ministerie van Onderwijs, Cultuur en Wetenschap, 2020), suggesting complex landscape evolutions over time and an abundance of plant life.

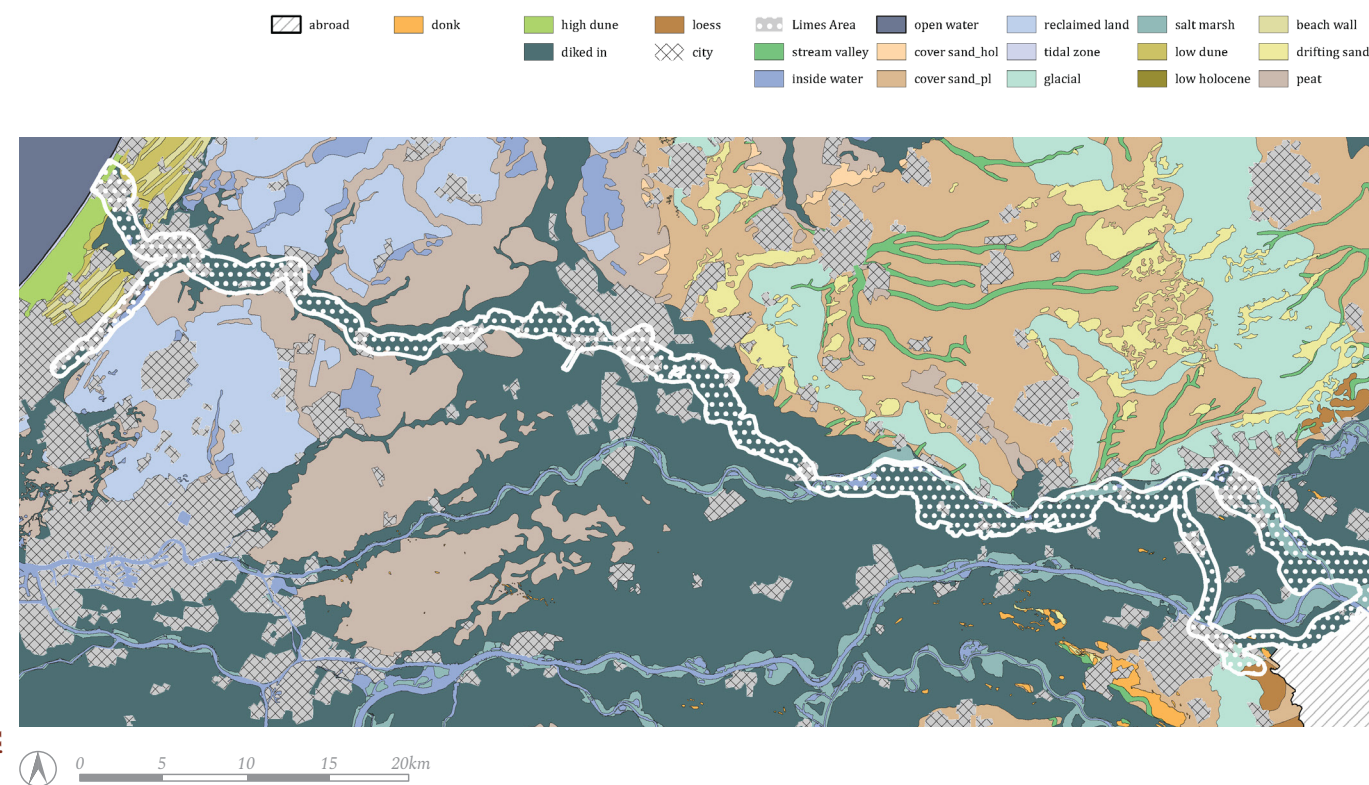


Figure 1.6: Paleogeography 2000 A.D. Intersect with Lower German Limes Area in the Netherlands

Made by Author, Base on Source:

Ministerie van Onderwijs, Cultuur en Wetenschap. (2020, March 17). *Paleogeografische kaarten*. Bronnen En Kaarten | Rijksdienst Voor Het Cultureel Erfgoed. <https://www.cultureelerfgoed.nl/onderwerpen/bronnen-en-kaarten/overzicht/paleografische-kaarten>

1.2.4_The Rise and Fall of Canal Corbulo

When Claudius I decided it would be safer and quicker to go directly from Rijn to Maas rather than sailing around the coast, General Corbulo was appointed as the canal project's supervisor, which is why it was called Canal Corbulo (de Kort & Raczynski-Henk, 2014).

According to de Kort & Raczynski-Henk, the canal was not completely dug out of the ground; instead, it utilised existing streams and rivers to increase the efficiency of the project. Once the canal was completed, it was initially used to transport troops, equipment, and supplies. However, as settlements were established, the canal was also used for civil transportation (2014).

It may be the beginning of human's efforts to modify the landscape in this region using engineering techniques, laying foundation for the human-nature relations in west coastal area of the Netherlands.

At the point where the canal meets the River Rhine in the north is Fort Matilo, and at the turning point in the middle of Canal Corbulo is Forum Hadrian, which eventually became the second largest city in the Netherlands during Roman times.

The canal was filled with debris due to a flood near the end of Roman reign in this area around 270 A.D., people left and no formal settlements has ever appeared until the middle ages (Buijtendorp, 2010), by then the canal was already buried in peat and also in collective memories.

The discover of Canal Corbulo in modern time happened in 1989 (Buijtendorp, n.d.), the existence of an artificial canal along this route was first confirmed thanks to archeology. According to excavations, it was approximately 12-14 metres wide and 1.5-2.0 metres deep on average (de Kort & Raczynski-Henk, 2014). Along the majority of its length, either or both sides of the canal were reinforced with rows of wooden posts. In some instances, the posts were made of softwood, while in others they were made of oak (Buijtendorp, 2010).

With the remains of other Roman heritage found (Nederlandse Limes Samenwerking, n.d.), Canal Corbulo is now a World Heritage Site under the name of *Lower German Limes*. While it cannot stop the speed of urbanization, the reveal of history is a starting step for cultural heritage protection.

1.2.5_Roman Settlements in a Coastal Landscape

During the Roman era (55BC - 410AD) (de Bruin, J. 2019), this region was dominated by extensive peat, resulting in a landscape that has previously been regarded as inaccessible and marginal. As with the upper Rhine and Danube, the Roman empire ensured that the river Rhine in the Lower Rhine delta was completely supervised through landscape engineering.

The natural landscape had a significant impact on settlement decisions in this region. Due to the proximity of the sea and the wetland nature of the majority of the area, the possibilities for human use were limited; however, these obstacles presented opportunities for shipping, commerce, fishing, and salt collection (de Bruin, J. 2019).

The area was subdivided during the 2nd Century, suggesting that rural sites were incorporated into a planned landscape in which land ownership may have played a significant role. The marketplace near present-day Voorburg was granted Municipium status and name as Forum Hadrian, transforming it into the regional civic centre. This change in the town's official urban status was likely due to infrastructure developments, such as the construction of Canal Corbulo and the connection of Roman roads.

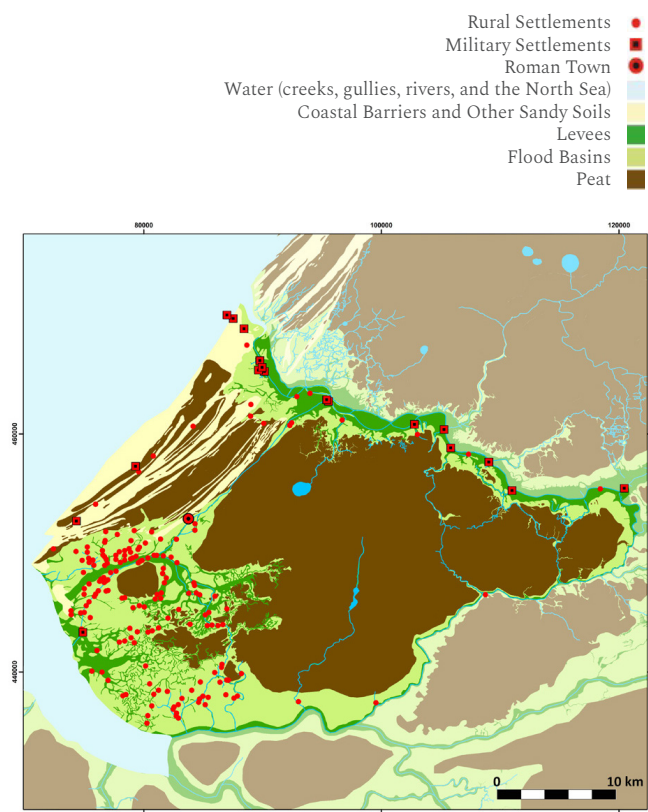


Figure 1.7: Settlements in Coastal Area during Roman Time, Source: de Bruin, J. (2019). *Border Communities at the Edge of the Roman Empire: Processes of Change in the Civitas Cananefatium*. Amsterdam University Press.



Figure 1.8: Reconstruction Model Photos of Forum Hadriani, From City Gate to Backyards
Photography by Author, Made by Museum Swaensteyn

1.2.6_Interlink Between Universal and Local

During the Roman Empire, Forum Hadriani was not only a settlement, but also a commercial centre where people from both empire states and Germania tribes came to conduct business. Indicating that the forum was not only a symbol of exceptional civil engineering, but also an excellent example of intercultural communication.

The excavation of Forum Hadrian began in the 1820s, making it one of the earliest archaeology activities in the Netherlands (Buijtendorp, 2010). A few more excavations were conducted in the following century, and it provided substantial evidence of Roman-era life in the area (de Bruin, J. 2019). Some typical forms in town planning and architecture were imported from Rome, but the practise on waterways and natural geography was purely localised, making this town a symbol of where universal regulations and local contexts joining together, in the presentation of daily life (Buijtendorp, 2010).



Figure 1.9: Hypothetical life in Forum Hadriani
Source: B. Brobbel made for Buijtendorp (2010) *Forum Hadriani. De vergeten stad van Hadrianus: Ontwikkeling, uiterlijk en betekenis van het "Nederlands Pompeji"* [PhD Thesis]. Vrije Universiteit Amsterdam.

1.3_PROBLEM FIELDS

1.3.1_Invisible Heritage

Most tangible heritage are often discovered thanks to archeology, the traditional archaeology process was to excavate, organise valuable discoveries, make records on soil or underground structures, some of which may also be moved away for further study, put the findings to a museum or a warehouse, then refill the soil, restore the site to its pre-excavation condition. This has led to the traditional way of showing heritage: exhibiting objects in an indoor environment, with no trace left on its original location. Meanwhile the excavation is normally a very delicate cut in the ground due to the densified urbanisation and out of the protection for ancient structures beneath, even though what's underground can be modulated thanks to advanced technology, these results often directly go to database, without ever being shown to the public. This is an invisibility in general between academic field and the public.

What happened in the study area is even more complex. As mentioned before, Forum Hadrian was abandoned in 270 A.D. due to plague and flood, and so was Canal Corbulo. During the Middle Ages, River Vliet was built in nearly the same location, possible reason is that this is the

farthest a river can get before it reaches sandy soil, resulting in the historical underground structure of Canal Corbulo also being partly dammed. Fortunately, River Vliet is mostly parallel to Canal Corbulo, so there is still some undeveloped area that might contain ancient evidences, but it does not make up a significant portion of the total area.

In spite of the landscape structure, the representation of Roman heritage offered to the public is also unsatisfying. Only Park Matilo (which is outside the Canal Corbulo research area) created a strong sense of 'heritage' by erecting replicas of Roman forts, and Park Arensburch (location of Forum Hadrian) used illustrations and small portions of excavation findings to show the history. Other than these two locations, the long range (over 10km) of ancient Canal Corbulo has no visual features to show the Roman history, much less heritage.

Overall, the heritage in the Canal Corbulo region is neither visible in large-scale structures nor in human-scale experiences; nothing is displayed above ground, and there is a high probability that there are few evidences buried as well.



Figure 1.10: Representation of Heritage in Form, Park Matilo
Made by Author

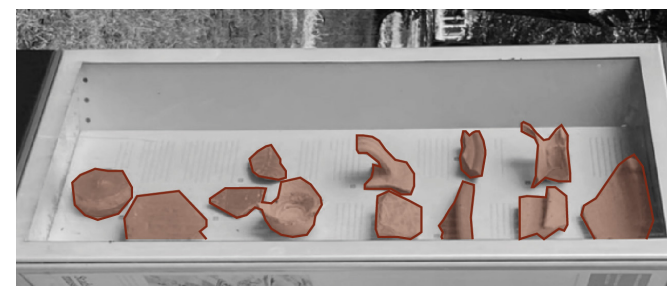


Figure 1.11: Representation of Heritage in Objects, Park Arensburch
Made by Author

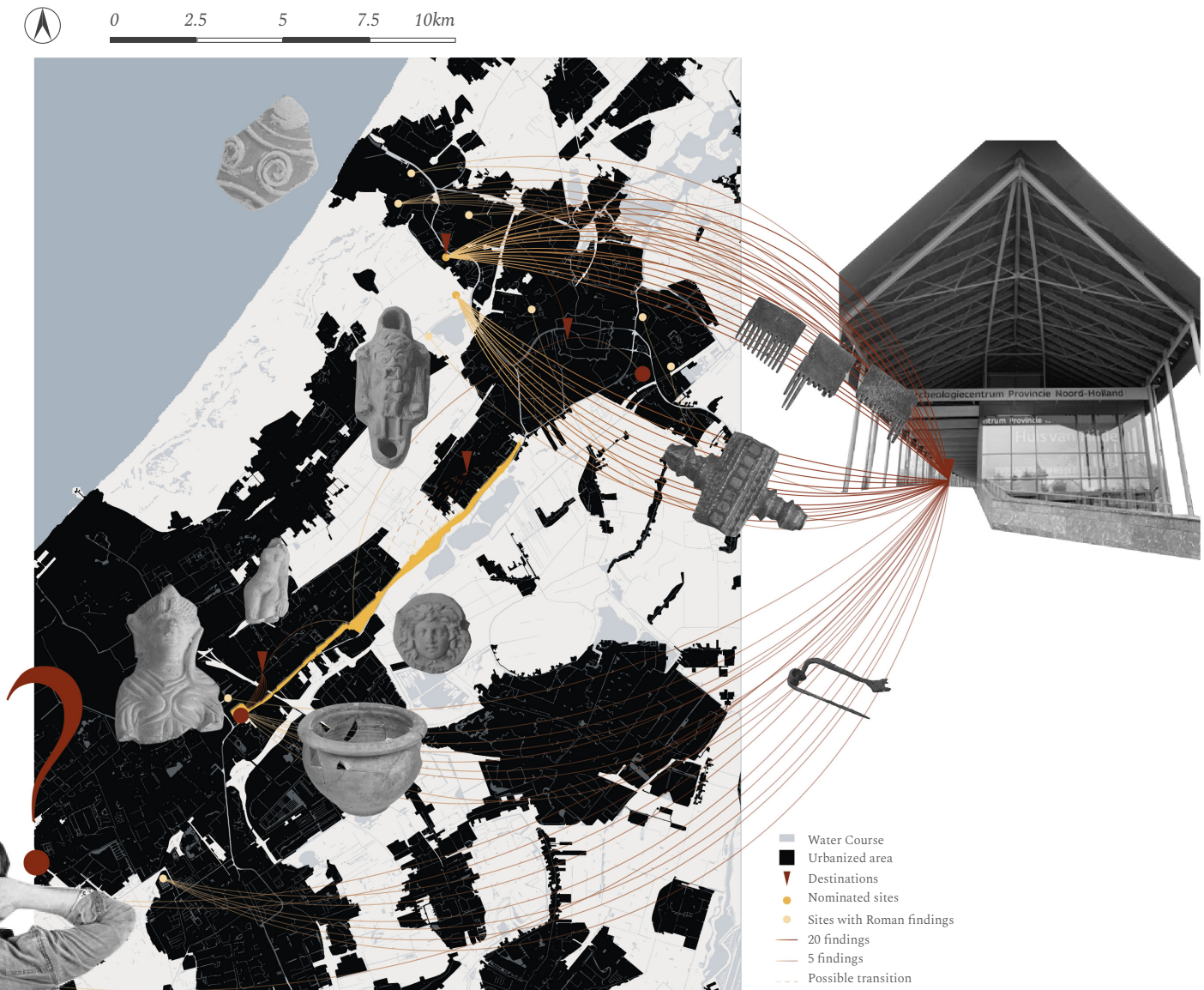


Figure 1.12: Transition of Roman Related Archeology Findings: From Site to Museum / Warehouse
Made by Author, Based on Database:

1) Collectie - Provinciaal Archeologisch Depot Zuid-Holland. (n.d.). Collectie - Provinciaal Archeologisch Depot Zuid-Holland. Retrieved October 29, 2021, from <https://archeologie.zuid-holland.nl/collectie?category=romeinsetijd>
2) Collectiezoeker - Rijksmuseum Van Oudheden. (n.d.) Retrieved November 15, 2021, from <https://www.rmo.nl/collectie/collectiezoeker/>

1.3.2_Precarious Environment

This coastal area experiences a constant aeolian circulation: marine wind blow sands inland, inland wind blows sand to the shore, creating shifting dunes in between. Due to the strong force of marine wind, the older the dunes, the further they are from the coast. Just behind the oldest dunes, peat was gradually enveloping the dune slacks. The Romans chose this location on purpose so that the canal could remain within the peat layer, avoiding the infiltration problem associated with sandy deposits underneath (de Kort & Raczyński-Henk, 2014). However, human force was weak in the face of nature, and this region's dynamic landscape over the past two millennia has revealed its inherent instability.

With the overlap of the present satellite map and the Roman map, it is apparent that the original characteristic water system no longer

exists in the research area, and that the coastline changed as a result of the unstable coastal and delta landscape, submerging the Roman settlement in Katwijk.

Through time, people seem to be taking control over nature by water management, like polder digging or but making the most out of nature also led to a burnout of natural resources.

The situation is critical for the remaining parts as well. According to the *climate impact atlas*, the extent of flooding in the southeast of the research area is high, and the surrounding areas also have a risk of subsurface soil compaction. Although the precise location of Canal Corbulo may be able to withstand these two impacts due to the sandy ridges below, the threat of urban infiltration is generally real.

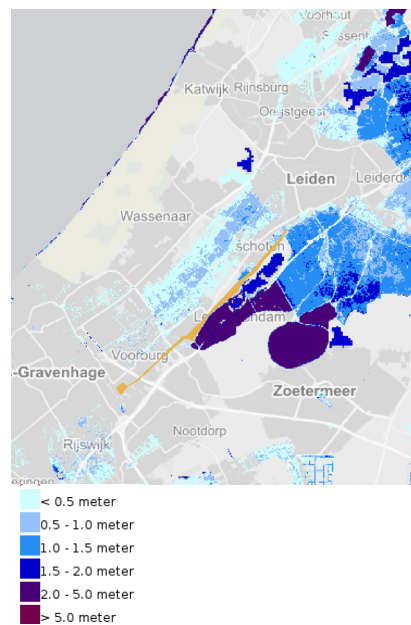


Figure 1.13: Flooding from Failure of all Regional Defences

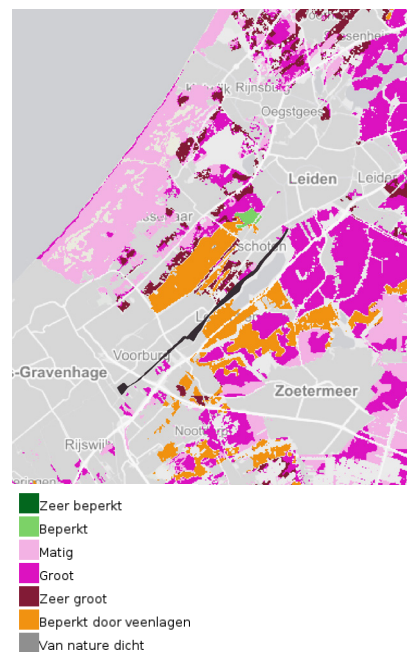


Figure 1.14: Current Risk of Subsurface Soil Compaction

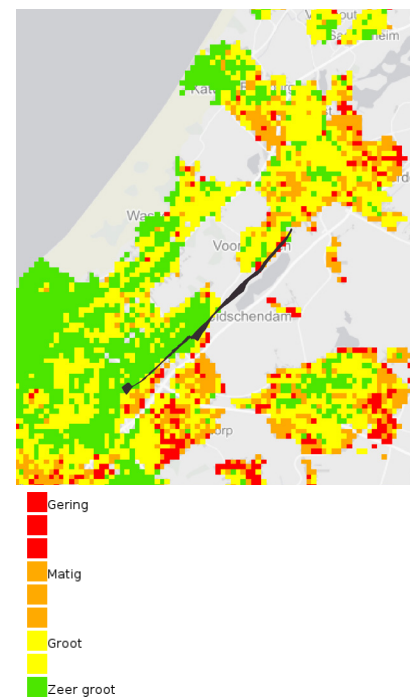


Figure 1.15: Urban Infiltration Opportunities

Source: Viewer - Klimaateffectatlas. (n.d.). Climate Impact Atlas. Retrieved January 25, 2022, from <https://www.klimaateffectatlas.nl/en/>



Figure 1.16: The Lost Land and Settlements, by Overlapping Roman Map and Current Map
Made By Author, Based on Source:

- 1) Colenbrander, B. (2005). *Limes atlas*. Uitgeverij 010.
- 2) PDOK download viewer. (n.d.). Pdok. Retrieved January 16, 2022, from <https://app.pdok.nl/brt/top10nl/download-viewer/>
- 3) de Bruin, J. (2019). *Border Communities at the Edge of the Roman Empire: Processes of Change in the Civitas Cananefatium*. Amsterdam University Press.

1.3.3 *Placeless Society*

To understand the society in this project, the author chose to specifically look into impressions and collective memories related to Roman history.

To find out the impressions from visitors, author collected data from the internet (in this case, route planner website like www.alltrails.com & www.routeyou.com), it shows how people view this site and what attracts them the most. It is hypothesized from the data that the site itself lacks a strong identity that distinguishes itself from other Dutch suburban areas in a horizontal observation.

Here, the typical landscapes include: peat meadow landscape in a coastal dunes region; open polder landscape, forests, lake view and country estate. Except for the last one, the other landscapes are also widely distributed in the whole Netherlands, without placing a site specific experience.

Placing the images to a different location would not raise any doubts because these land-

scapes not only look but also feel identical to the rest of the country. Briefly, while this can contribute to a Dutch landscape impression, the distinction between this region and the larger context is vague.

Collective memories, shows how people memorize history and heritage. By searching in megadata for street name related to Roman or Corbulo, it appears that no main street has ever been named after these two, also they're much separated, totally unconnected.

There're two streets that are closely together outside of Leiden, also one in Katwijk, other than that, the rest streets don't really have the right location of Roman heritage, it's hard to say whether it's a misplace or an act trying to gain identity, now that the precise location of Canal Corbulo is settled, surprisingly that no modern location takes the name after Corbulo in its original area.

Within the research area, there is also no experiences with emphasis placements at differ-

ent parts. Along more than 10 kilometres of the River Vilet, there are no landmarks or places for people to stop, so the river is conveyed as a simple line with a mono view. All of these factors, along with the fact that Canal Corbulo is a recent discovery in the region, result in a failure to recognise the significance of the location in question. The reason may be that the cur-

rent river is only appointed with function value, so it is preferable to maintain the primary focus. Nevertheless, with the recent discovery of Canal Corbulo in this region, the existing programmes should be expanded with a greater emphasis on experiencing and recognising specific locations.



Figure 1.19: Location of Roman Related Street Name and Possible Influence Range

Made by Author, Based on: PDOK download viewer. (n.d.). pdok. Retrieved January 16, 2022, from <https://app.pdok.nl/brt/top10nl/download-viewer/>

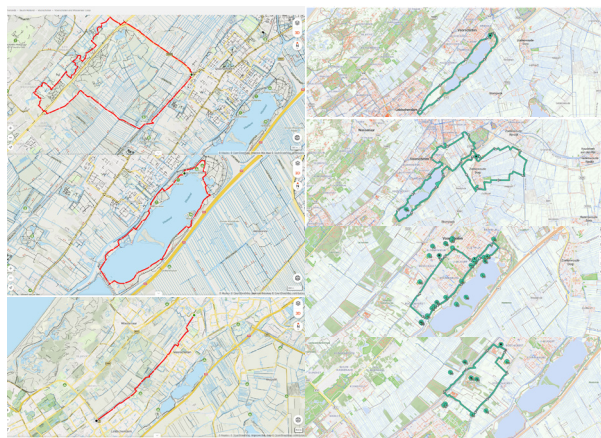


Figure 1.17: Popular Hiking and Cycling Route Passing the Site
Source: www.alltrails.com & www.routeyou.com



Figure 1.18: Pictures Uploaded by People Who Experienced These Routes
Source: www.alltrails.com & www.routeyou.com

1.3.4_Problem Statement

The problem fields are concentrated in three aspects: heritage, environment, and society. Each of these has a primary concern that requires attention:

Invisible Heritage

- 1) Heritage itself often has a great gap between academic field and the public knowledge.
- 2) The Roman cultural heritage is not visible on-site in this region, from large-scale structures to human-scale experiences.
- 3) What's below ground is also slowly covered by new developments.

Precarious Environment

- 1) The general context is a dynamic, unstable coastal dune landscape
- 2) With a sinking background of the peatland, the surroundings are facing high risks environmental threats like flooding, subsurface soil compaction, infiltration
- 3) Human's dense occupation in this area is cutting off key steps in nature process

Placeless Society

- 1) The landscape feature here holds a vague distinction between itself and its larger context.
- 2) There's also no emphasized experiences within the area itself.

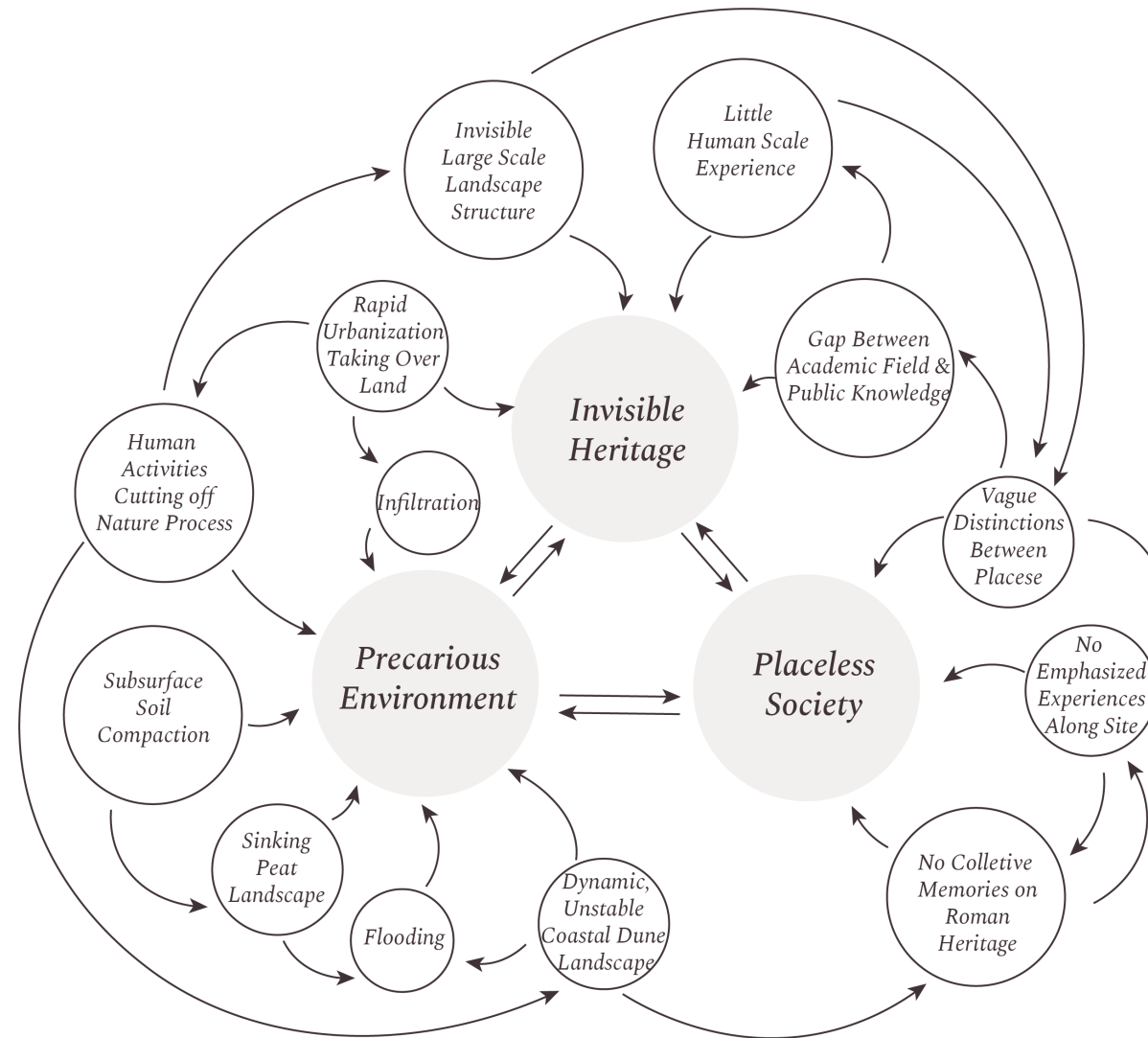


Figure 1.20: Complexity Diagram
Made by Author

In conclusion, the challenges have multiple historical roots, but the recent discovery of Canal Corbulo requires a more delicate approach to this highly populated region. This project focuses on human-nature relationship, only it dates back from 2000 years ago - which corresponds with society, environment and heritage.

I.4_RESEARCH QUESTIONS

Given what was previously discussed, the following questions arise:

How will Canal Corbulo changed under dynamic design in a coastal landscape area?

Practices	Sub Research Questions
To Understand local landscape features from different time	What are the kept and lost landscape on site? ● ●
To organize a new cultural heritage Canal Corbulo with present ecological/social structures	What and how ecological/social aspects can be revealed and developed after the discovery of Canal Corbulo? ● ● ●
To create adaptive relations between human and nature	How did the human-nature relations develop and what's the proposed future of it? ● ●
To apply a reconnection between space and time	What kind of principles can be summarized to be applied onto similar heritage (e.g. the other parts of Lower German Limes) sites so that culture can be shared between different places and eras? ● ● ●
● heritage related ● environment related ● society related	

1.4.2_Objectives

1.4.3_Revelence

From heritage perspective:

- 1) Look into landscape biography to set foundations for research and design
- 2) Use cultural heritage Canal Corbulo as key to investigations on past and solutions for future

Through the discovery of a new Roman cultural heritage Canal Corbulo, individuals will be able to locate themselves more precisely in history and in society; it provides an alternative opinion for community belonging and human-nature relationship.

From environment perspective:

- 1) Make ecological force more visible in human-nature relationship
- 2) Explain heritage and society as an underlying cause

By establishing a solid society foundation, for the scientific community, it provides insight into how the past can influence the future by utilising ancient wisdom and by learning from the nature force. It also helps to shift the commonly held belief that culture is an intangible concept: even if the heritage remains in the past, it continues to leave traces on contemporary society.

From society perspective:

- 1) Review human's role in landscape development with heritage
- 2) Obtain connections across groups, regions and time in a socio level

Methodology is raised as a tool to answer the research questions proposed by the problem statment. The problems were addressed in the first chapter, and the research questions served as a transition between the problem and theory. In this chapter, the prior preparations will be presented theoretically and will be used to construct a network where everything has a cause and effect. This chapter directly addresses the project's three main focuses - heritage, environment, society - and how to build up practical interpretations between them for further research and design.

II

M E T H O D O L O G Y

2.1 THEORETICAL FRAMEWORK

The theories applied for this project will also be based on the three main topics: *heritage, environment and society*.

Heritage is considered as a leading factor in the theoretical framework, for it runs through every stage of research.

In history, *heritage* refers to events or processes that have a special meaning in group memory, and as an important notion in UNESCO, *cultural heritage* refers to those legacy of physical artefacts and intangible sttributes of a group of society, which implying that heritage itself has a strong link to human activities and cognition, it is human-centered, and a guardian of human history.

The following theories are considered as the application of heritage onto other two topics. For society, as mentioned in chapter 2, a dedicated attention is given to the identity of a place, which in this case is the connection between location and heritage. When it comes to environment, the focus rest on how cultural heritage can be a stimulation to environmental improvement as well.

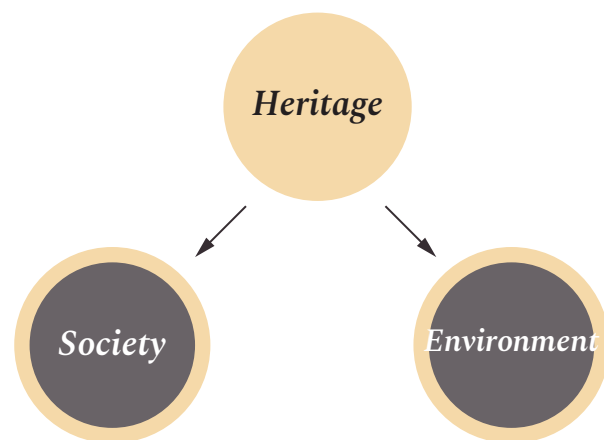


Figure 2.1: Basic Theoretical Foamework: the Idea of Adapting Heritage to Other Two Topics
Made by Author

2.1.1 Place and Placelessness

In Edward Relph's famous theory *Place and Placelessness*, his key intention was to study the nature and meaning of place (1976).

To achieve this goal, firstly two modes of spatial experience were provided by Relph: physical mode and mental mode. The physical mode of spatial experience focuses on: (1) pragmatic space, (2) perceptual space, (3) existential space; while the mental mode holds (1) planning space, (2) cognitive space, (3) abstract space as essentials.

They were not opposites but rather a living, indivisible whole. Instead of making them parallel, it's more accurate to regard mental mode as an abstract intepretation of physical mode.

After the experience people perceived within a certain space, the quality of place is formed and can then be described as *identity*, which in this project is the heritage's adaptation on society.

In Relph's work, people's identity of place and with place is carefully distinguished, the former concept is where people differentiate one place from other, while the latter one helps people to identify themselves, a spectrum is created between insideness and outsideness to locate people's relationship with a place: (1) existential outsideness, (2) objective outsideness, (3) incidental outsideness, (4) vicarious insideness, (5) bahavioural insideness, (6) empathetic insideness, (7) existential insideness.

While *place* is a highly acclaimed value in this theory, Relph also defined the concept of placelessness: the casual eradication of distinctive places and the making of standardized landscapes that results from an insensitivity to the significance of place. This may refer to a 'global

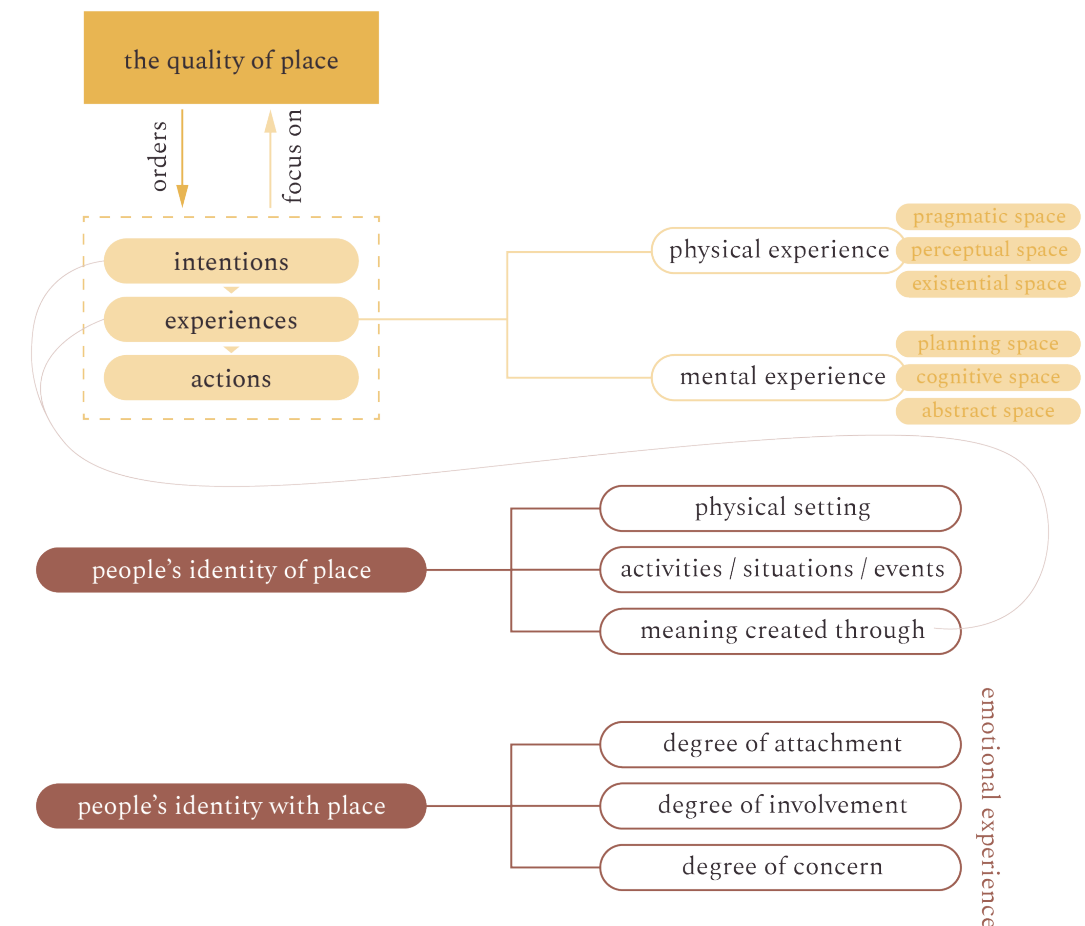


Figure 2.2: Relations Between Human and Place
Made by Author, Based on Source: Relph, E. C. (1976). *Place and Placelessness*. Pion.

sense of place' under the trend of globalization.

To achieve *place* in qualitative research, phenomenology needs to be used to translate common scene (landscape) and daily activities (human), uncovering the obvious is an important means to realize this mission, whether in the realm of everyday experience or in the realm of conceptual perspectives and explanations, in all, it is a research towards how people interact with a place, making Relph's *Place and Placelessness* theory an important tool.

By studying the existing or past place, designers will be able to design new place that follow the same logic, that is, describe before prescribe, which makes the new design easier to be accepted while proposing new ideas.

As was introduced, the formulation of a place's identity has one essential feature: being in the *place*, and this is where this project will start with: reconnect one identity to its original location when there is nothing physically there.

2.1.2_Cutural Sustainability

When *cultural sustainability* was first put forward as a theory in Joan Nassauer's article in 1997, it was referring to the survival of landscape that depends on human attention, as a critique to people's pursuit of 'natural' looklike picturesque landscape while ignoring the ecological functions (Nassauer, 1997).

Nassauer declared 'human perception of the landscape will ultimately affect how every landscape is used and protected', putting human in a responsible position where culture should include nature as much as we could.

However, the concept changed after UNESCO put forward its agenda for 2030, when they promote culture as driver and enabler for sustainable development in 2015 at 70th United Nations General Assembly.

Often is *sustainable development* strongly linked with *sustainability*, but there has been some criticism that *sustainable development* focus more on development (always some degree of improvement, favouring growth and technique) rather than sustainability itself, while *sustainability* is a procedure or continuously evolving 'imaginary world'. Based on this acknowledgement, in this project, *sustainability* is chosen to represent author's attitude.

First of all, culture is a complex concept due to its broad meanings, in this project, culture is another adaptation for heritage, as the valuable historical evidence compose the foundation of modern life.

When it comes to the relation between culture and sustainability, Soini and Dessein proposed three representations and eight structuring dimensions to explain their definition on this.

This discussion based on the previously acknowledged pillar system that ecological, social and economic sustainability is the roots for sustainability, to add another kind of sustainability is to restructure the present pillars.

Culture in sustainability is considered as an independent role just like other three, they together forms a parallel but intertwined system. *Culture for sustainability* is when culture serves as a mediating role to achieve other sustainability pillars, this means both tangible and intangible culture are essential resource for future. *Culture as sustainability* is the where culture takes the fundamental role for meeting all aims of sustainability.

In practice these three are not clearly divide but often one within another, the new conceptual framework is just to point out their characteristic part to categorize different actions and ideas, so they are more on an axis than individual beings. From culture in sustainability to culture as sustainability, the role of culture becomes more important, and the integration between culture and social-ecological is rising, as well as the overall dynamics, diversity, openness of three representations.

Among eight dimensions, the ones that will be adapted into this project are: culture and society, culture and nature and research approach. They are, of course, following the gradient that the three representations are having.

In *culture and society*, the first representation means complementary, while the second means affording and the third means transforming, where culture takes the lead.

Culture and nature is focused on the human -

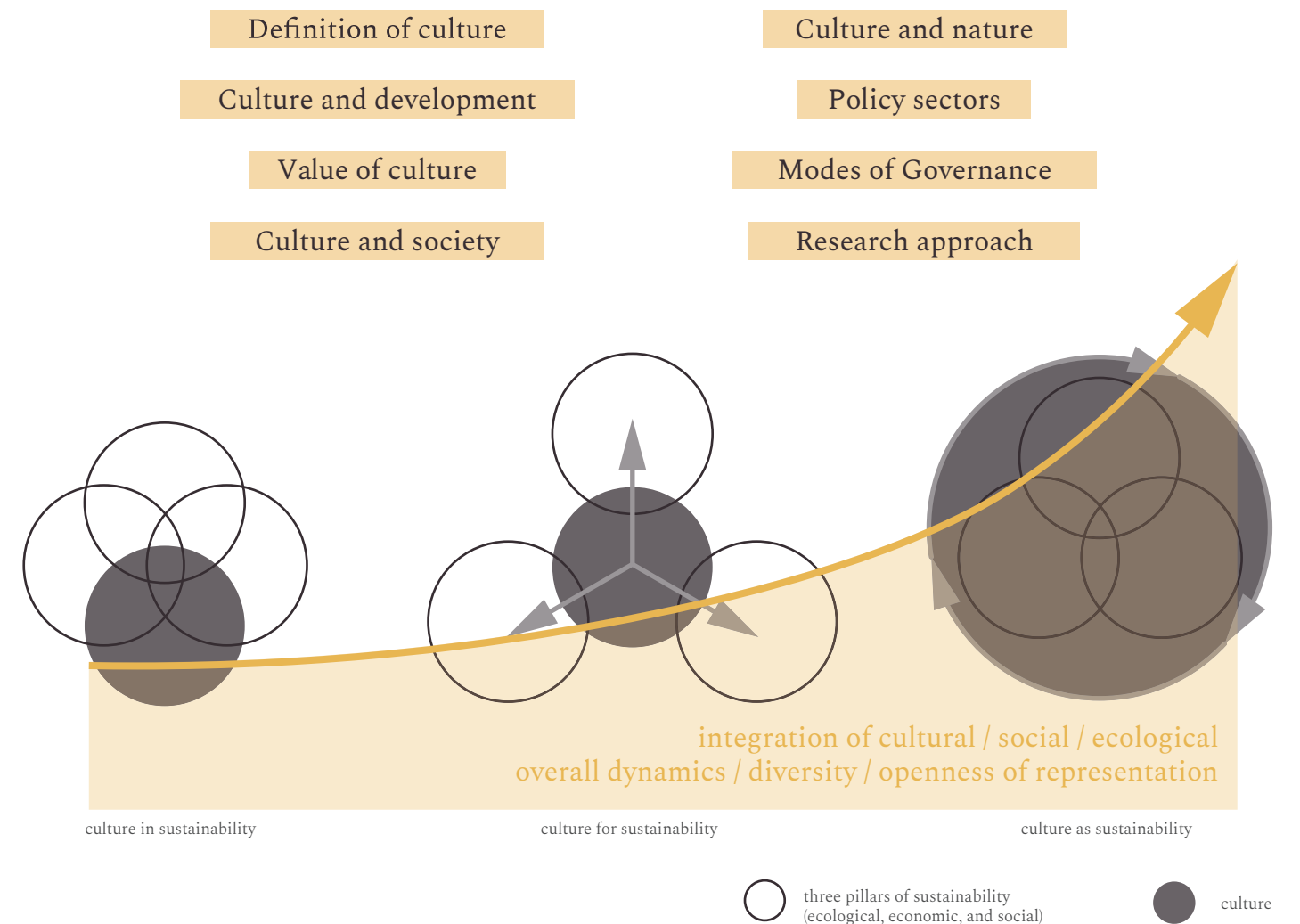


Figure 2.3: Relations Between Culture and Sustainability
Made by Author, Based on Source: Dessein, J., & Soni, K. (2016, February). *Culture-sustainability relation: Towards a conceptual framework*. Sustainability, <https://doi.org/10.3390/su8020167>

nature relationship, when the first one is mainly from human perspective, the second falls on the interaction between them, and third one has revolutionarily pointed out that nature is constituent of culture that can be (re)shaped by meanings and symbols.

Research approach here is on a broad concept of disciplinary, ranging from mono-, multi-, inter- and finally transdisciplinary, each repre-

sentation takes the closest two and thus form a gradually braver practice between disciplines.

As the three representations are in an evolution, the complexity are rising as well, the framework itself can not answer questions and solve problems of all, but merely serves as a starting point.

2.1.3_Theoretical Concept

For a Roman cultural heritage like Canal Corbulo, its position in the empire and the excellence of engineering that it represents, has placed this project in a bigger map: whether it's a connection of cross culture communication and transitional territory, or the interaction human made with nature while making landscape. The former one requires constant comparison between other locations from Limes, and how it changed under different rules, the latter one, however, focuses on less study of differentiations but more on similarities, between different period and also locations.

By translating heritage into another two concepts, identity and culture, while integrating with environment and society, theoretical concept for this project is built up through *place* and *cultural sustainability*.

Place and Placelessness is a strong tool to identify a place and its users, the theoretical system Relph created can be totally applied onto this project, but eventually will focus on the human interaction with landscape, which is quality of place and people's identity with/of a place.

The three representations *Cultural Sustainability* offer an interesting tool to show the extent that culture drives development, and the influence it has on environmental potential.

With the integration between heritage and society, heritage and environment, the intersection of society and environment is where the research by design begins.

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2.2 METHODOLOGICAL FRAMEWORK

When applying *place* and *placelessness* onto the project, preliminary work was to study the Canal Corbulo area's current identity, which is to find and categorize the existing *places*, as it is a concept created by human's interaction with space, observation of human activities and analysis on spatial elements are needed.

Cultural Sustainability will play an essential role in final design, strategies along Canal Corbulo will vary between these three according to site features. Overall, this project's main attitude is positioned between *cultural for sustainability* and *cultural as sustainability*.

Phasing of Methodology

Phase 1: Canal Corbulo as Research Location
- understand present context
- define site's characteristics

Phase 2: Canal Corbulo as Cultural Heritage
- study history and settings in a broader range
- search for differentiations and similarities

Phase 3: Canal Corbulo as Design Experiment
- spatial analysis based on key topics
- strategies design

Phase 4: Canal Corbulo as Reflection
- application, circulation and synthesis between theory and design
- reflect onto other *Limes* sites

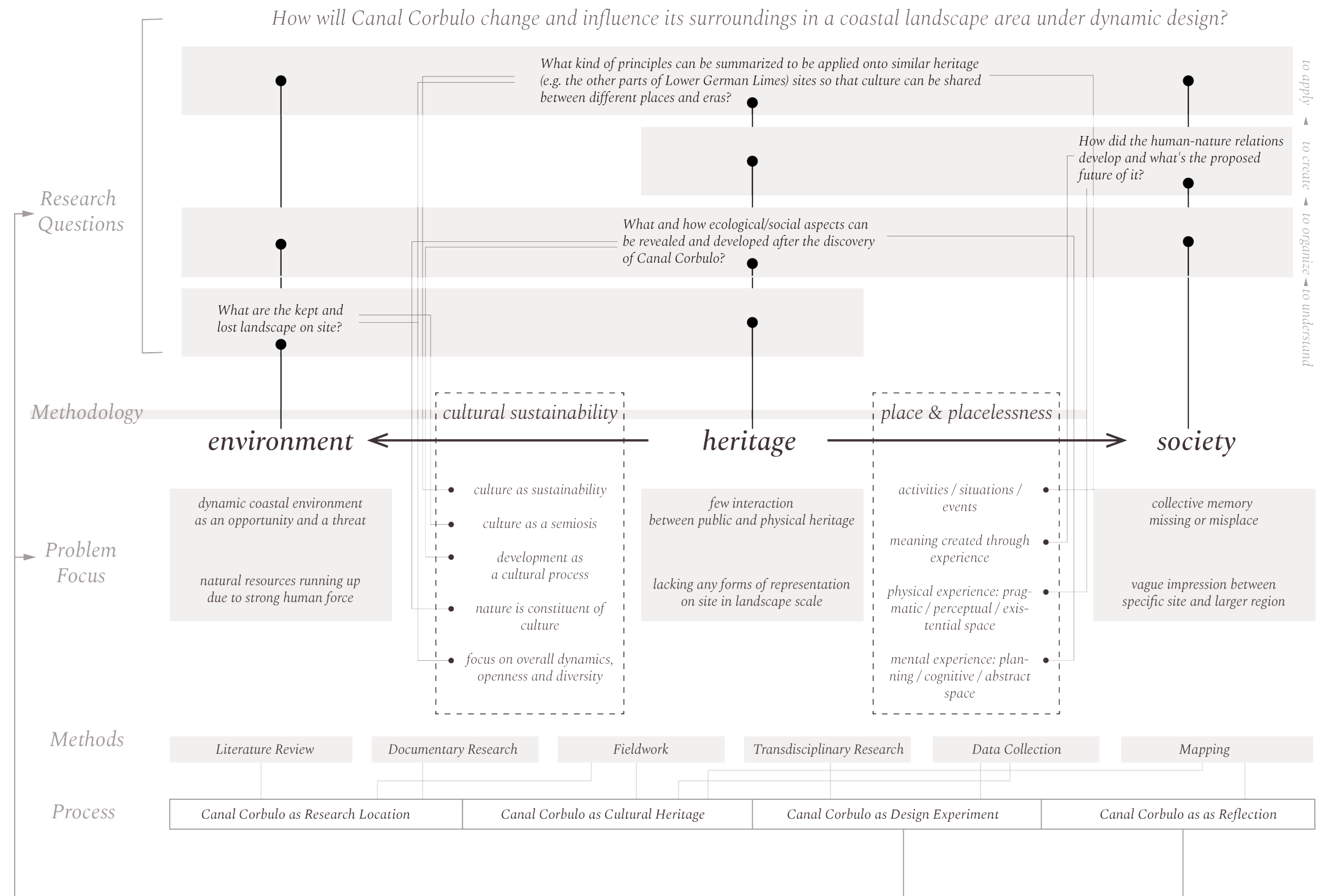


Figure 2.4: Methodological Framework
Made by Author

This project proposes analysis strategies from two perspectives: space and time. The jump between scales is commonly used in the research field when designers are attempting to grasp the essence of a problem or to describe the focus they have chosen from reality; it can also be used when analysing from a chronological point of view. After the matrix of general context is completed, a more topic-specific analysis will be conducted, explaining the current identity of the region and its connection to Roman history.

III

A N A L Y S I S

3.1 THE MATRIX: TIME X SPACE

The part of understanding site is to discover what makes a place, a cross analysis between time and space is introduced to better describe a heritage site.

Understanding site by time will lead to the development of landscapes, as explanation for nature course and human activities, laying foundation for categorizing time into different period.

Understanding site by scale will offer research a rich insight, the large scale often influence the small scale, while a specific site can obtain various understandings in different scales. The constant jump between scales would form a comprehensive implications under certain topics.

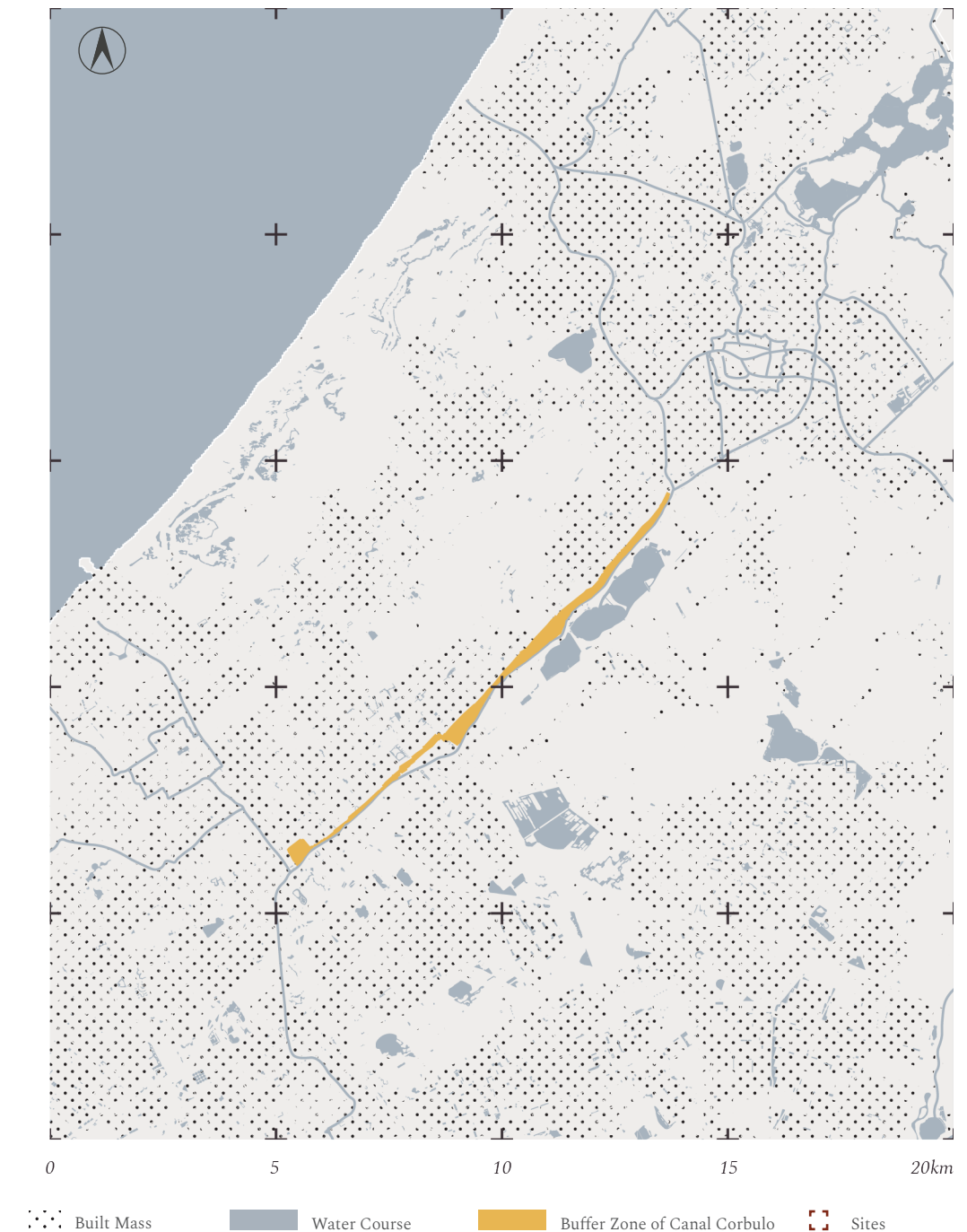


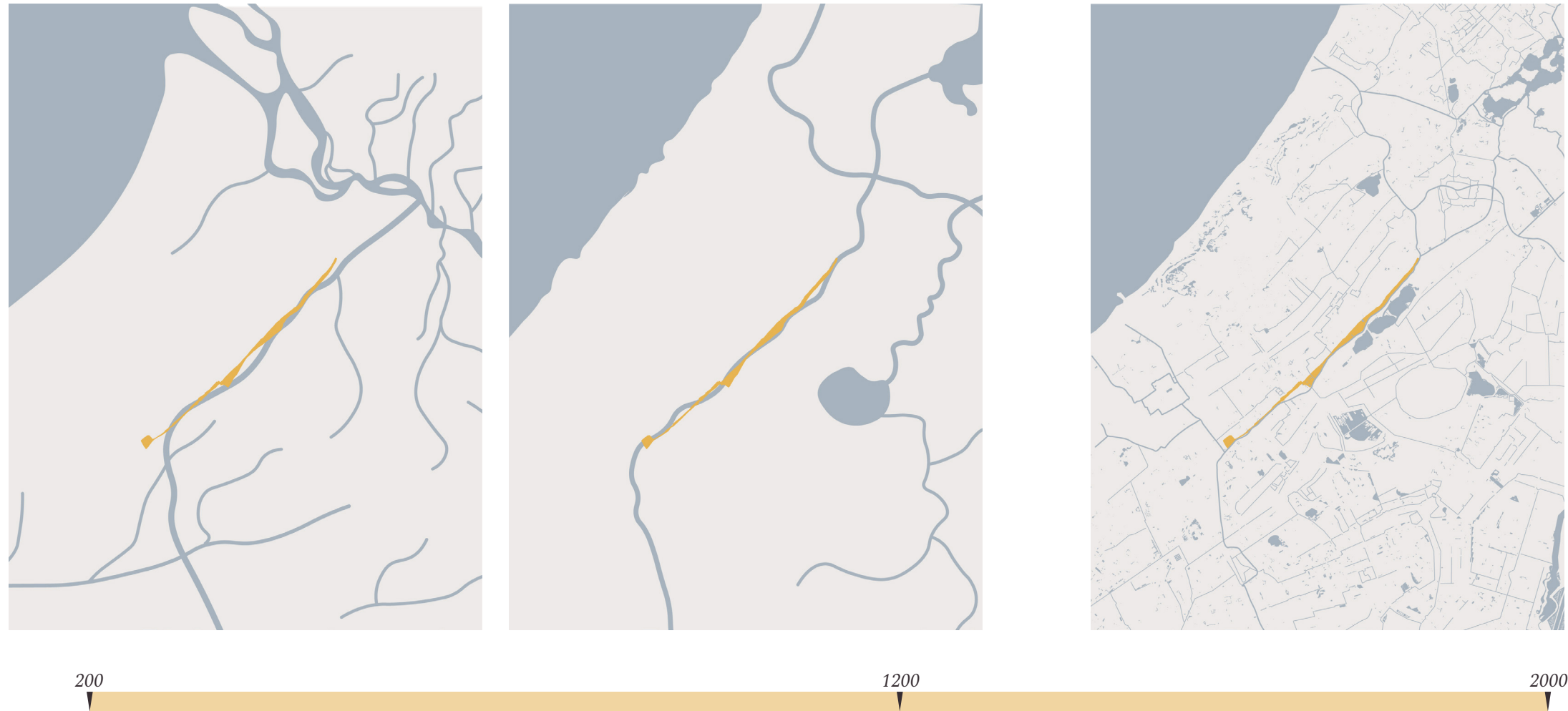
Figure 3.1: Research Area Map, Marco Scale

Made by Author, Based on Source:

PDOK download viewer. (n.d.). pdok. Retrieved January 16, 2022, from <https://app.pdok.nl/brt/top10nl/download-viewer/>

3.2_SCALE IN TIME

3.2.1_Macro Scale: Natural Landscape



The water structure has changed a lot for the past 2000 years, the characteristic Rijn has disappeared completely, and in the middle ages, river Vliet took up the location of Canal Corbulo in a very close distance.

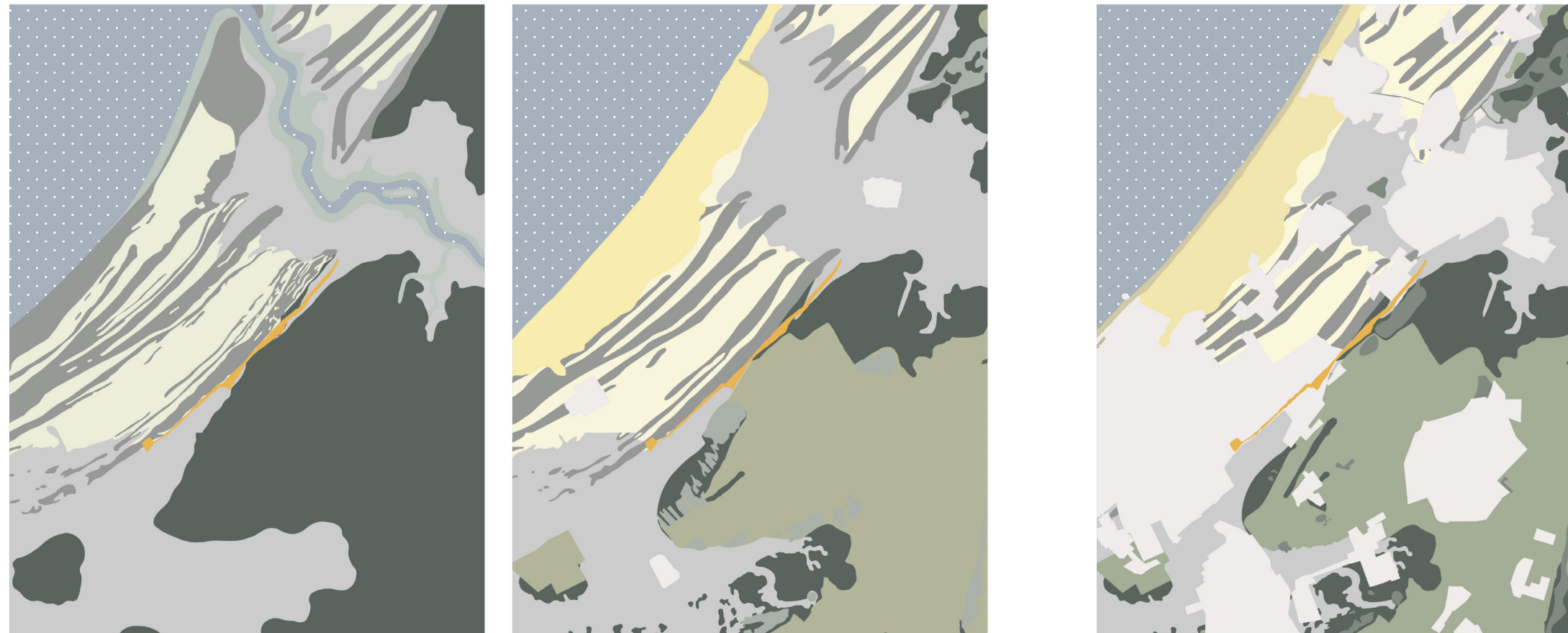
With the systematic reclaiming of land, more and more ditches appeared in this area, forming a new characteristic water structure.

In all, the water structure has more segmentations, and water retention in this area are getting stable by strong human force, main water courses are often developed with important towns, make the hierarchy of water also the hierarchy of management.

Figure 3.2: Water System Development
Made by Author, Based on Source:

1. Ministerie van Onderwijs, Cultuur en Wetenschap. (2020, March 17). *Paleogeografische kaarten. Bronnen en kaarten* | Rijksdienst voor het Cultureel Erfgoed. Retrieved January 16, 2022, from <https://www.cultureelerfgoed.nl/onderwerpen/bronnen-en-kaarten/overzicht/paleografische-kaarten>
2. PDOK download viewer. (n.d.). pdok. Retrieved January 16, 2022, from <https://app.pdok.nl/brt/top10nl/download-viewer/>
3. Colenbrander, B. (2005). *Limes Atlas*. Uitgeverij 010.
4. FRE-LGL Part II A - Annex 1 - Netherlands. (2019, September 26). Romeinse Limes. Retrieved October 28, 2021, from <https://www.limeswerelderfgoed.nl/project/fre-lgl-part-ii-a-annex-1-netherlands/>

3.2.1_Macro Scale: Natural Landscape



As is shown in the map, Canal Corbulo is located on the sharp transition between sandy ridges and peatland, while the ridges got cut off due to the urbanization, the peatland is also slowly occupied by polder. High dunes along the coastline is also getting fragmented, with the urbanized area stretching out everywhere, it might be an advantage for accessibility between people and heritage sites, but it also indicates the continuity of landscape is harder to maintain in a large scale.

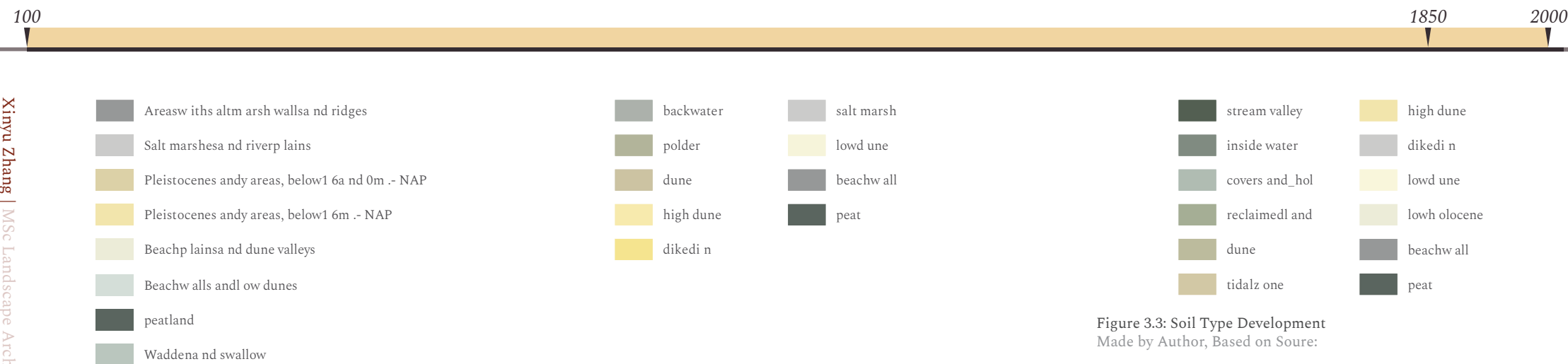


Figure 3.3: Soil Type Development
Made by Author, Based on Source:

1. Ministerie van Onderwijs, Cultuur en Wetenschap. (2020, March 17). *Paleogeografische kaarten. Bronnen en kaarten* / Rijksdienst voor het Cultureel Erfgoed. Retrieved January 16, 2022, from <https://www.cultureelerfgoed.nl/onderwerpen/bronnen-en-kaarten/overzicht/paleografische-kaarten>
2. FRE-LGL Part II A - Annex 1 - Netherlands. (2019, September 26). Romeinse Limes. Retrieved October 28, 2021, from <https://www.limeswerelderfgoed.nl/project/fre-lgl-part-ii-a-annex-1-netherlands/>

3.2.2_Meso Scale: Landscape in Making



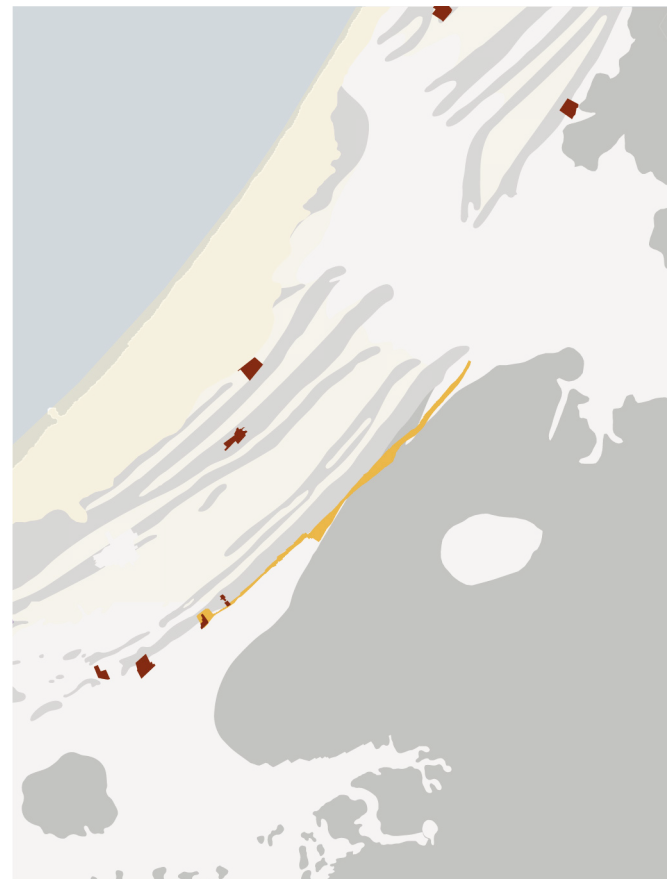
Facing the threats directly from sea, Dutch has been reclaiming land for thousands of years, but only from middle ages that this management of land and water became systematic. However, maps back then are not traceable for today, the earliest polder map of this area are from 17th century, when the research area already filled with polders, so the order of constructed polders remains a myth.

Nevertheless, between 1870 and 2020, polders are coming back for the coastal region, while the ones in southeast of site were being dismantled into fragments. This is the result of urbanization, which means water management is now also tightly connected to urban area.

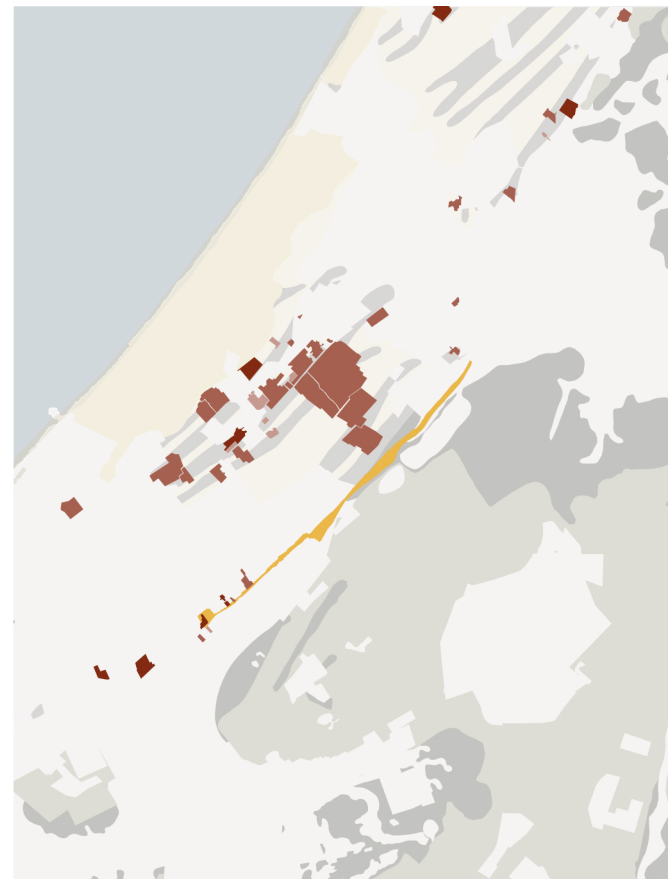
Figure 3.4: Polder Development
Made by Author, Based on Source:

1. Ministerie van Onderwijs, Cultuur en Wetenschap. (2020, March 17). *Paleogeografische kaarten. Bronnen en kaarten* | Rijksdienst voor het Cultureel Erfgoed. Retrieved January 16, 2022, from <https://www.cultureelerfgoed.nl/onderwerpen/bronnen-en-kaarten/overzicht/paleografische-kaarten>
2. VVare afbeeldinghe vant Dyckgraefschap van Delfland. (n.d.). *Atlas Factice of Kaartboek van Rijnland, Delfland En Schieland*. Retrieved January 22, 2022, from <https://images.wur.nl/digital/collection/coll21/id/995>
3. FRE-LGL Part II A - Annex 1 - Netherlands. (2019, September 26). *Romeinse Limes*. Retrieved October 28, 2021, from <https://www.limeswerelderfgoed.nl/project/fre-lgl-part-ii-a-annex-1-netherlands/>

3.2.2_Meso Scale: Landscape in Making

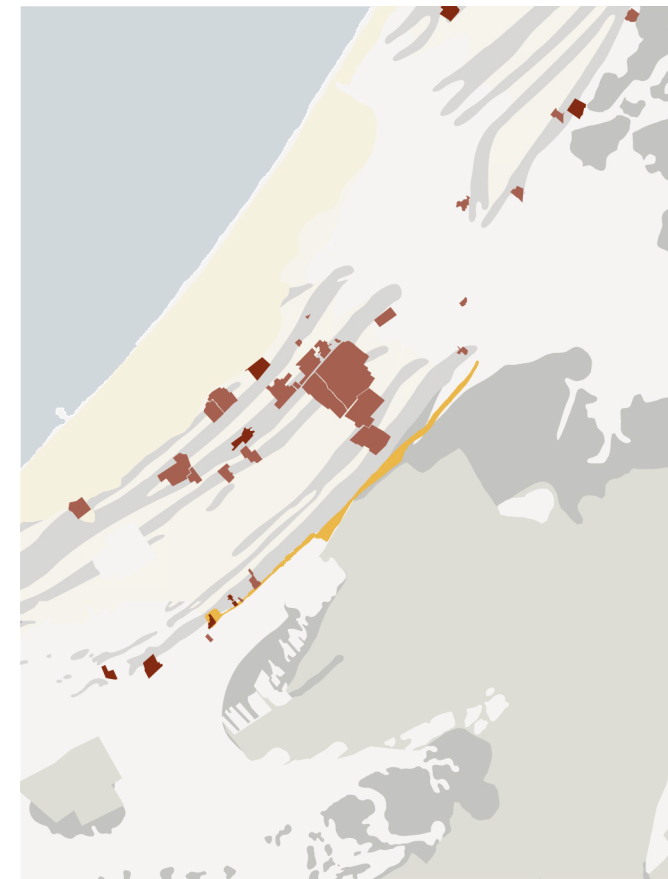


before 1600



1600-1850

0 2.5 5 7.5 10km



after 1850

polder peat estate built before 1600
 dune beach wall estate built between 1600 and 1850
 high dune tidal zone estate built after 1850
 low dune

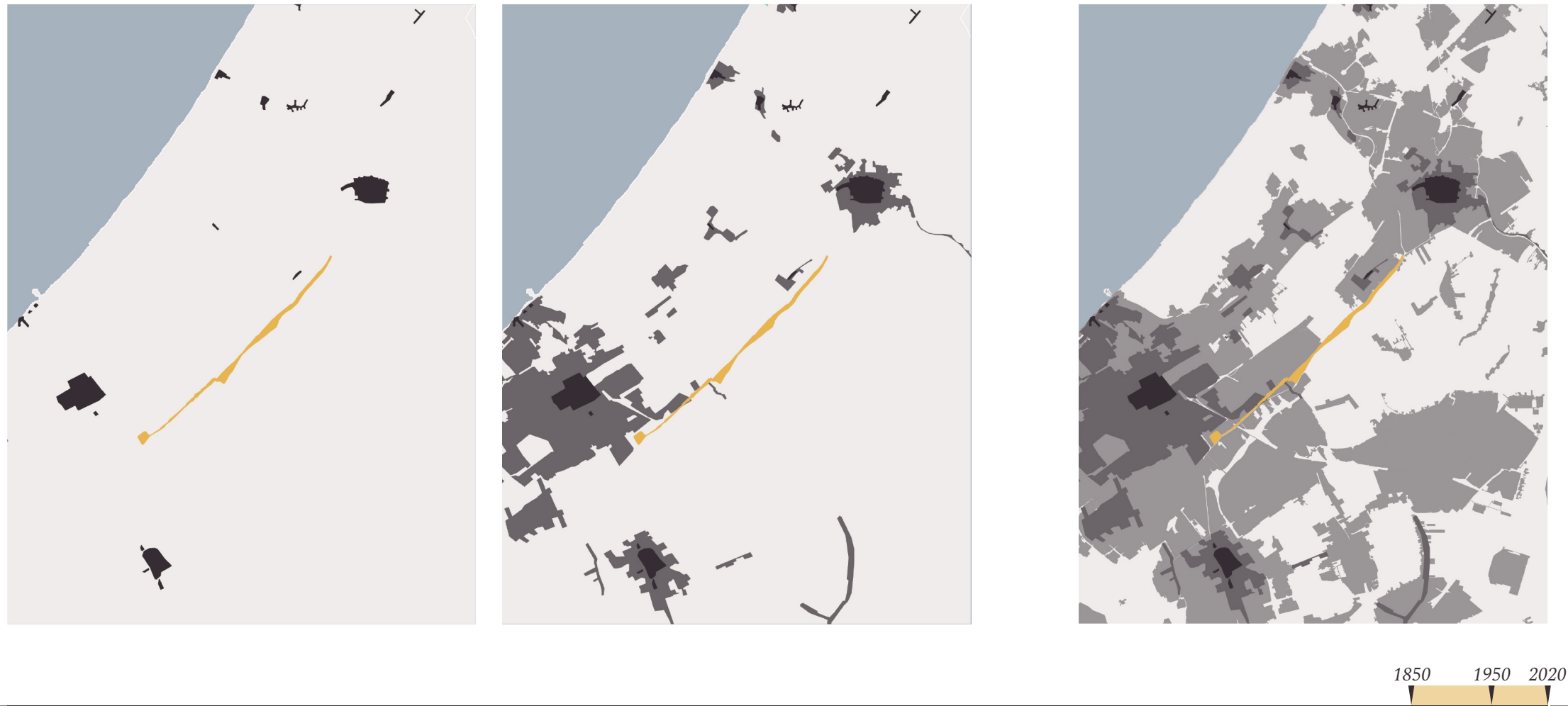
As one of the most featured view in the coastal area, the affection for private luxury land like castles and country estate also shows how people enjoy landscape.

Firstly the estae were either on the oldest dunes, meaning the highest locations in this area, or on the youngest dunes, which are closet to sea. Later on more and more estae appears on the sandy ridges in between, making the most of the view, from the sea and from the polder.

Figure 3.5: Castles and Country Estates Locations through Time
Made by Author, Based on Soure:

1. Ministerie van Onderwijs, Cultuur en Wetenschap. (2020, March 17). *Paleogeografische kaarten. Bronnen en kaarten* | Rijksdienst voor het Cultureel Erfgoed. Retrieved January 16, 2022, from <https://www.cultureelerfgoed.nl/onderwerpen/bronnen-en-kaarten/overzicht/paleografische-kaarten>
2. *Buitenplaatsen in Nederland - Bijna alle buitenplaatsen in Nederland*. (2022, July 29). <https://www.buitenplaatsennederland.nl/>
3. *FRE-LGL Part II A - Annex 1 - Netherlands*. (2019, September 26). Romeinse Limes. Retrieved October 28, 2021, from <https://www.limeswerelderfgoed.nl/project/fre-lgl-part-ii-a-annex-1-netherlands/>

3.2.3_Micro Scale: Urban Landscape



For a long time before 12th century, cities have not appeared in the Netherlands, but after that, the growing of cities were very slow that even in the 19th century before industrial revolution, the cities stayed almost the same.

However, this situation went into a sharp turn right after 1850s, cities are occupying land faster and faster, that they take up most of the space in research area.

Figure 3.6: Urban Expansion
Made by Author, Based on Source:

1. Ministerie van Onderwijs, Cultuur en Wetenschap. (2020, March 17). *Paleogeografische kaarten. Bronnen en kaarten* | Rijksdienst voor het Cultureel Erfgoed. Retrieved January 16, 2022, from <https://www.cultureelerfgoed.nl/onderwerpen/bronnen-en-kaarten/overzicht/paleografische-kaarten>
2. Rutte, R., & Abrahamse, J. E. (2016). *Atlas of the Dutch Urban Landscape* (1st ed.). Thoth Uitgeverij.
3. *FRE-LGL Part II A - Annex 1 - Netherlands*. (2019, September 26). Romeinse Limes. Retrieved October 28, 2021, from <https://www.limeswerelderfgoed.nl/project/fre-lgl-part-ii-a-annex-1-netherlands/>

3.3_SCALE IN SPACE

3.3.1_Macro Scale: Context

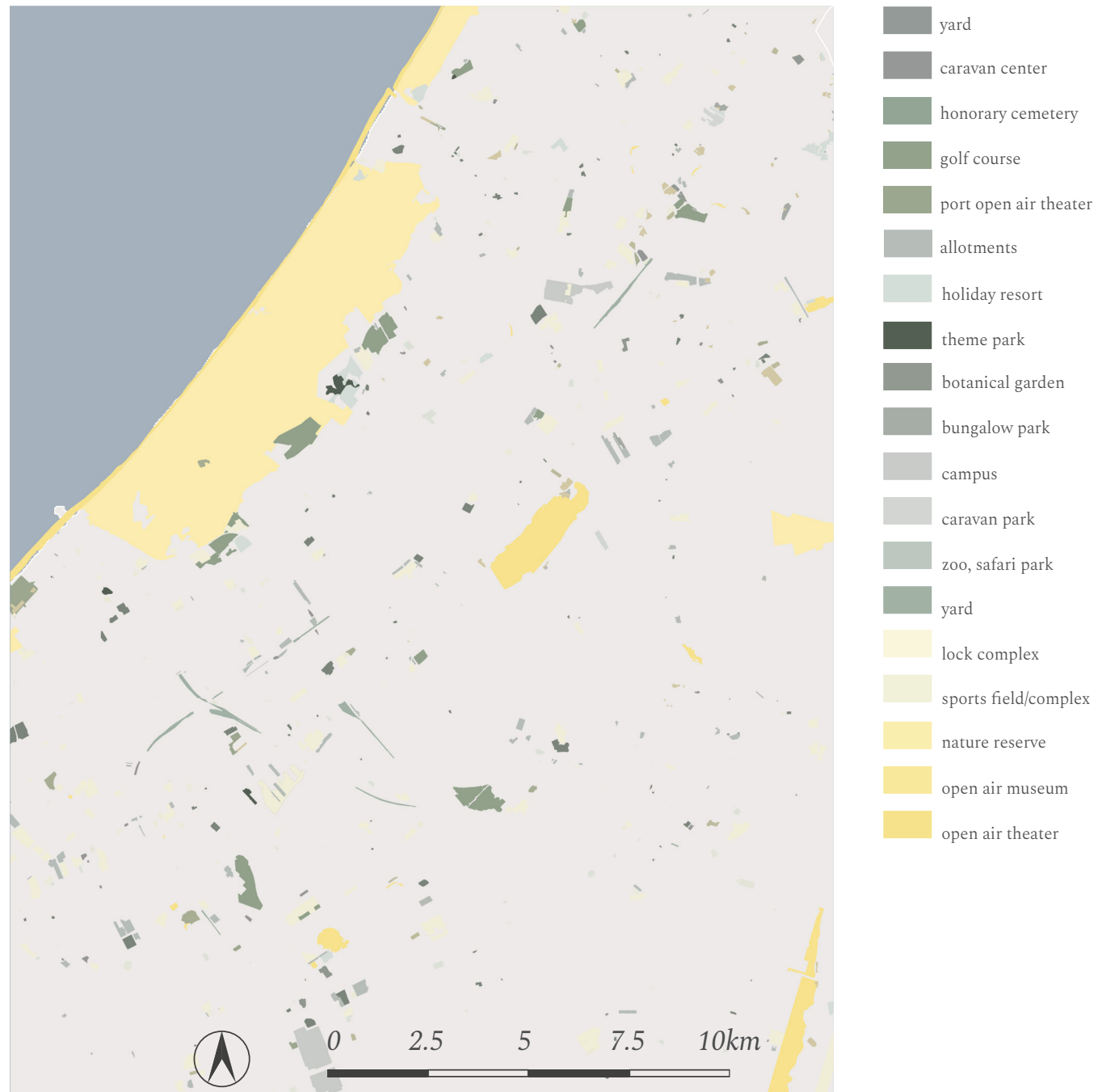


Figure 3.7: Public Space Distribution, Macro Scale
Made by Author, Based on Source:

1. PDOK download viewer. (n.d.). Pdok. Retrieved January 16, 2022, from <https://app.pdok.nl/brr/top10nl/download-viewer/>

Reconnected to An Ancient Canal: the Change of Canal Corbulo in Dynamic Coastal Landscape



Figure 3.8: Public Space Distribution, Meso Scale
Made by Author, Based on Source:

1. PDOK download viewer. (n.d.). Pdok. Retrieved January 16, 2022, from <https://app.pdok.nl/brr/top10nl/download-viewer/>

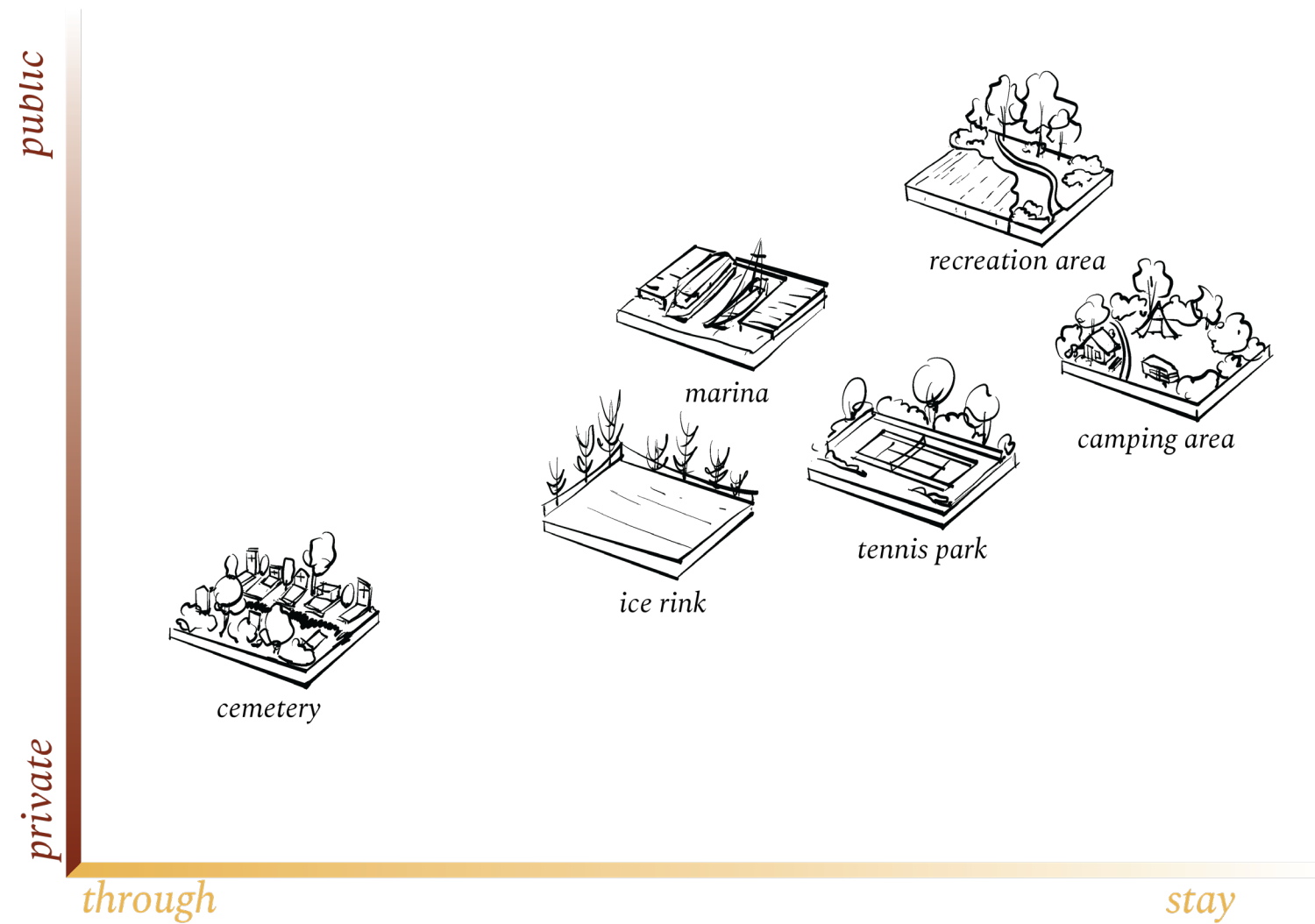
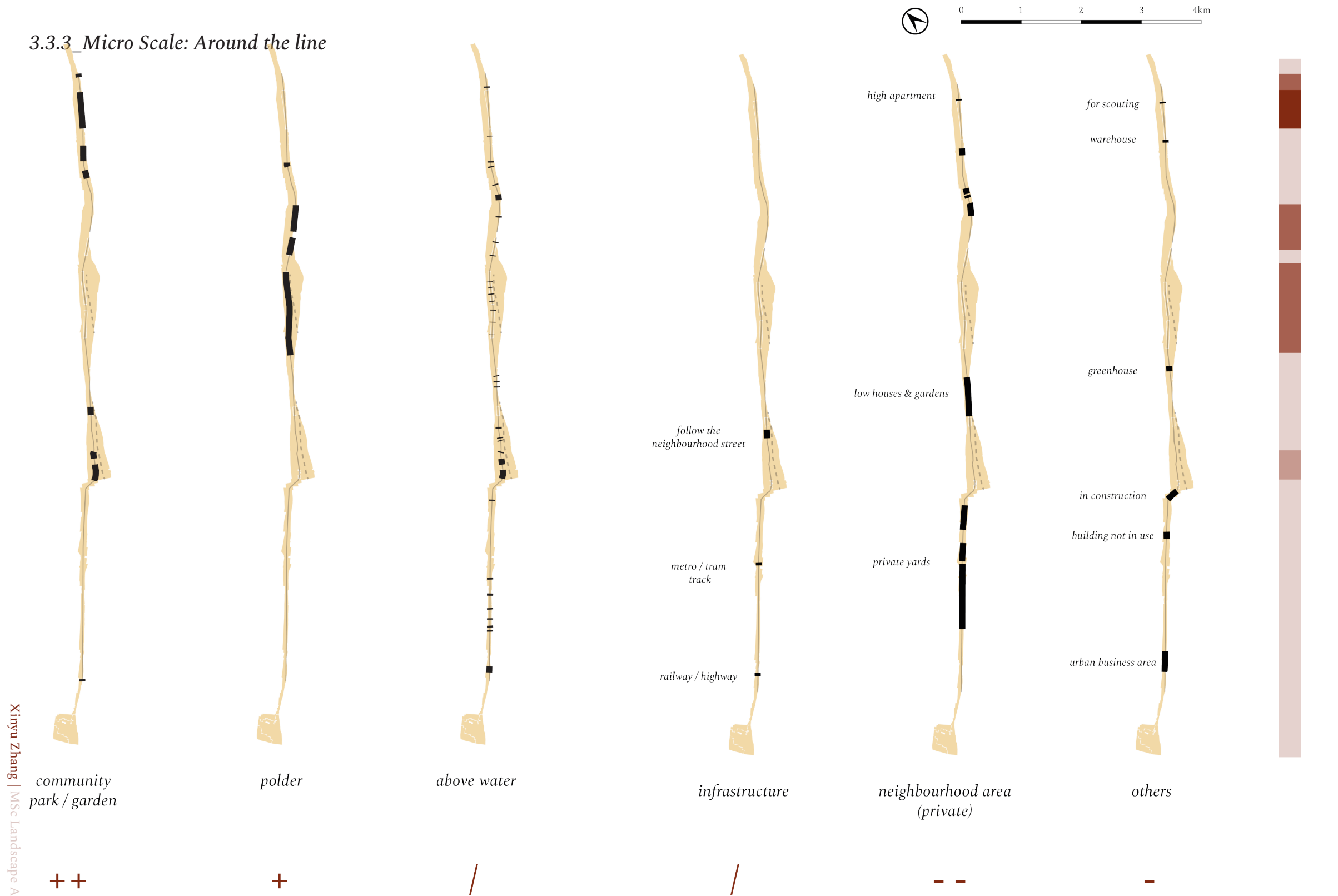


Figure 3.9: Public Space Function Axis
Made by Author

The backbone of design of course, lies with its users. Society as common ground is an ideal description for open space, zooming in on chosen sites, there're several characteristic open space that can be further studied into.

Two evaluation dimensions were given for them, one is from private to public, the other decides whether it's a place for staying or just passing through. Due to its suburban advantage, lots of sports field are within this area, meaning that people often have certain purpose to a public space. To make open space part of daily life, we need more space like recreation area. This perspective will be further researched and designed within the shortest time scale, the middle and smallest size scale.

3.3.3_Micro Scale: Around the line



If the research scope is restricted to the line itself, it appears that the line is scattered through gardens, parks, neighborhoods, infrastructure, and once again, polders.

By defining the influence these functional area has on the extent of modification, whether is a strength or a weakness, there appeared to be some areas more open to design than others, which can be the pilot design sites.

What's more open to design has one key factor: public or private. If it's a public space like community park, then it already has the foundation of public conversations and an atmosphere of sharing what's essential in the place. Polder are normally private but here listed as a bouns, due to the need of transformation of intensive farming, there is a high possibility to negotiate with farmers about the new function.

Figure 3.10: Functions Along the Line
Made by Author



Figure 3.11: Access Variations towards Canal Corbulo Line
Made by Author, Base on Source:
PDOK download viewer. (n.d.). Pdok. Retrieved January 16, 2022, from <https://app.pdok.nl/brt/top10nl/download-viewer/>

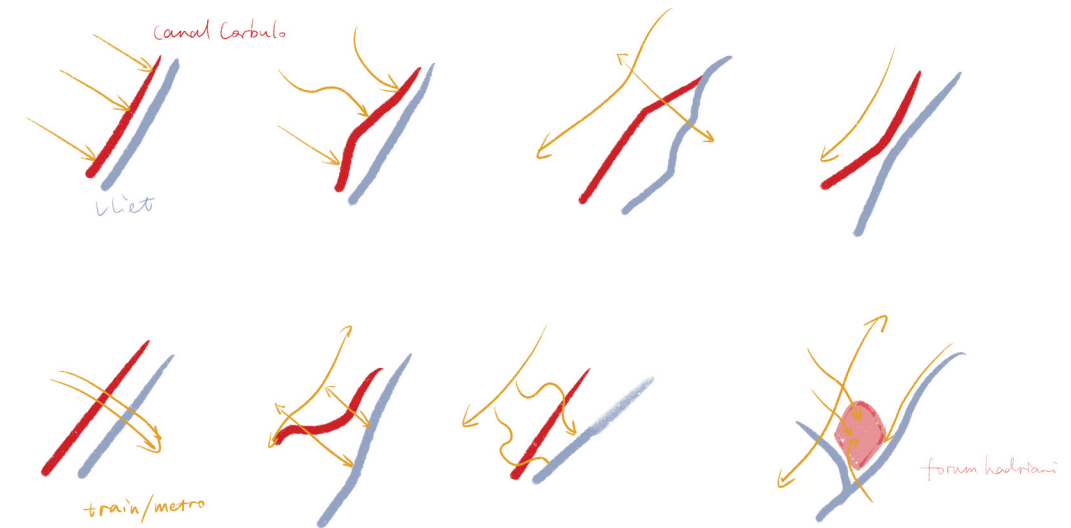


Figure 3.12: Approaching the Line in Different Type of Space
Made by Author

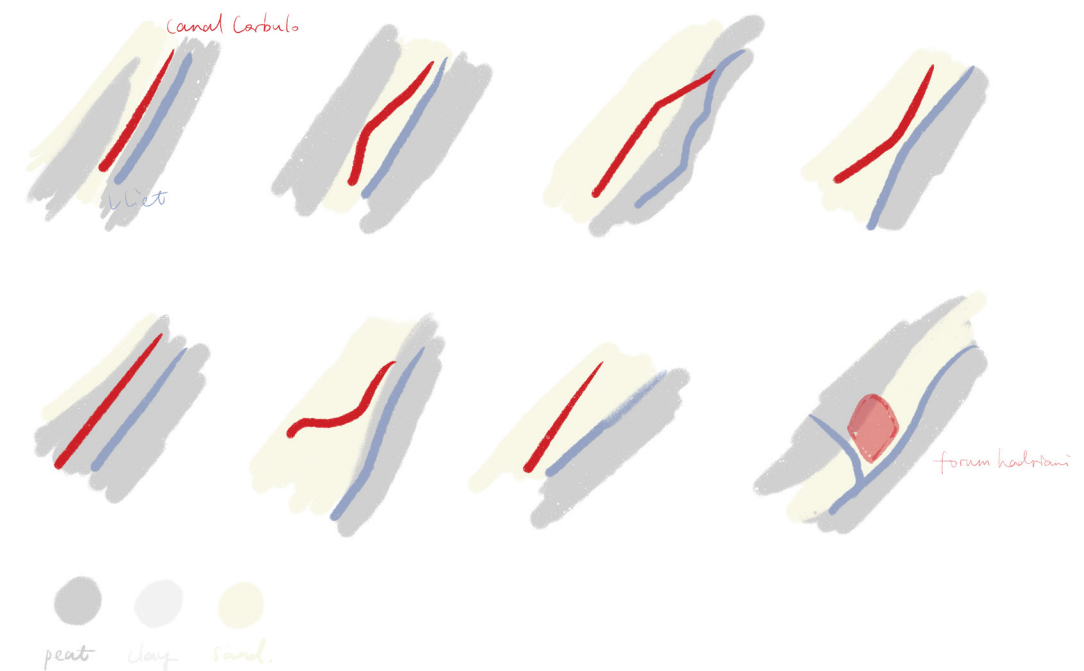


Figure 3.13: Soil Types Under Aligned Spatial Types
Made by Author

As is shown in the last page, the line of Canal Corbulo is now largely separated by private land, also with densified functions. By looking into the remaining public spaces, some prototypes of accessibility can be concluded.

With the study on soil types, it is also clear that the location of Canal Corbulo and river Vliet are defining lines between sandy soil and peat, indicating the influence of natural landscape onto manmade landscape.

3.4_CROSSOVER SELECTION FOR RESEARCH

3.4.1_Extent of Modification



3.4.2_Integretion between Topics

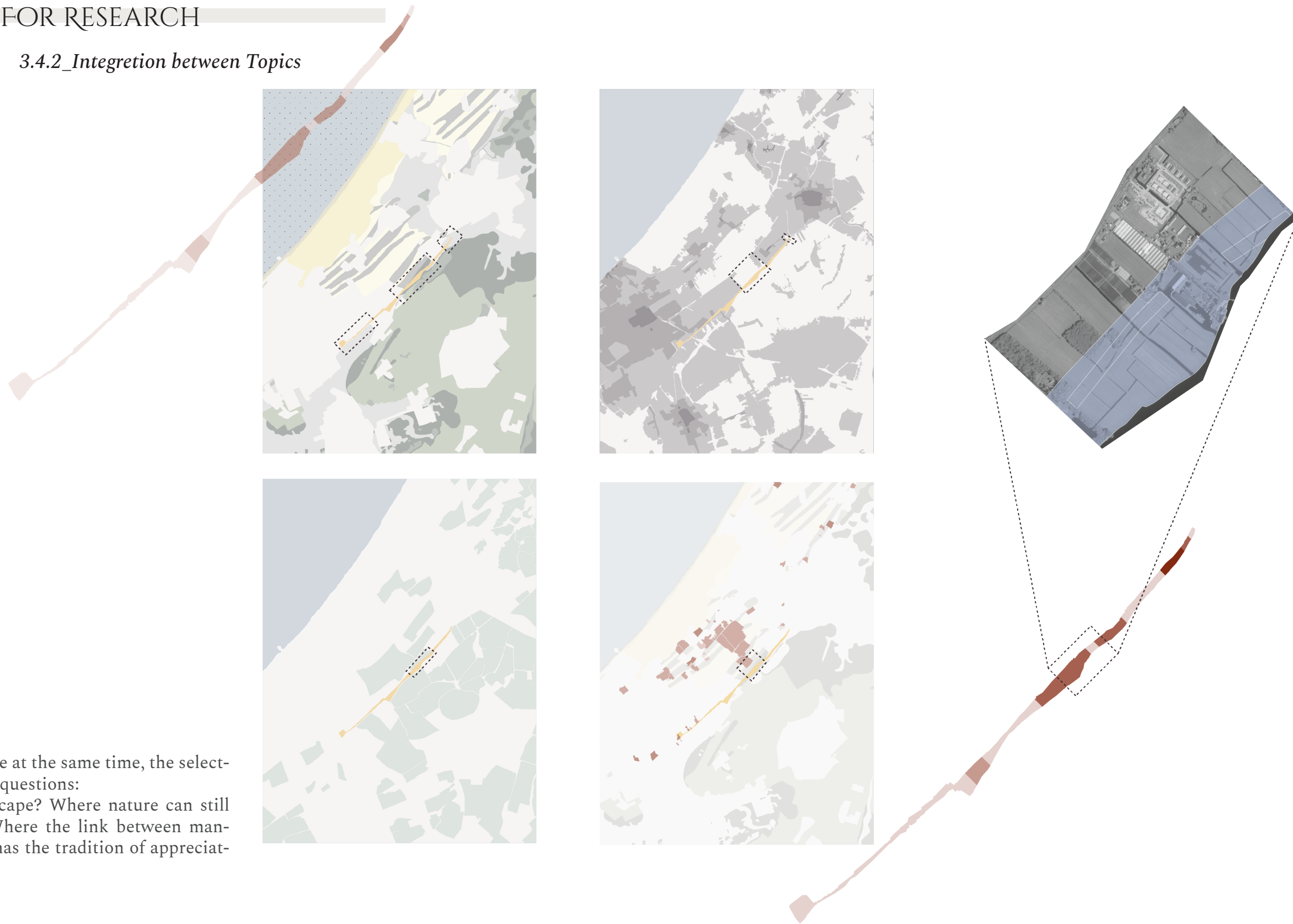


Figure 3.14: Extent of Modifications
Made by Author

If we compare marco scale and micro scale at the same time, the select-ed site would be the intersection of these questions:
Where still remains traces of past landscape? Where nature can still breath between intense urbanization? Where the link between man-made landscape was not cut off? Where has the tradition of appreciat-ing landscape itself?

Figure 3.15: Topics Integretion Diagram
Made by Author

In this chapter, plans and designs for the future are proposed based on the solid foundations of previous analysis. The general vision will hopefully serve as a point of reference for the rest of Lower German Limes. It will benefit in the construction of a regional landscape structure, if not as a definitive guideline. Design itself with the intent of providing an educational space for both international Roman history enthusiasts and locals.

IV

V I S I O N

4.1_GENERAL VISION

By choosing a pilot site, the design will explore the representation of heritage in scope of environment and society.

The idea is to add this new discovered heritage to the already multilayered landscape, by choosing a site with mono focus but rich context, it's challenging to introduce the long history into one particular site.

This design will act as an experiment of organizing stories from different time and space scale, while making use of basic natural elements, soil and water to integrate this narrative. Programs between design and surroundings will also be applied as a practice of a wider range of design.

With pilot design, prototypes can be concluded to represent heritage especially other Limes sites.

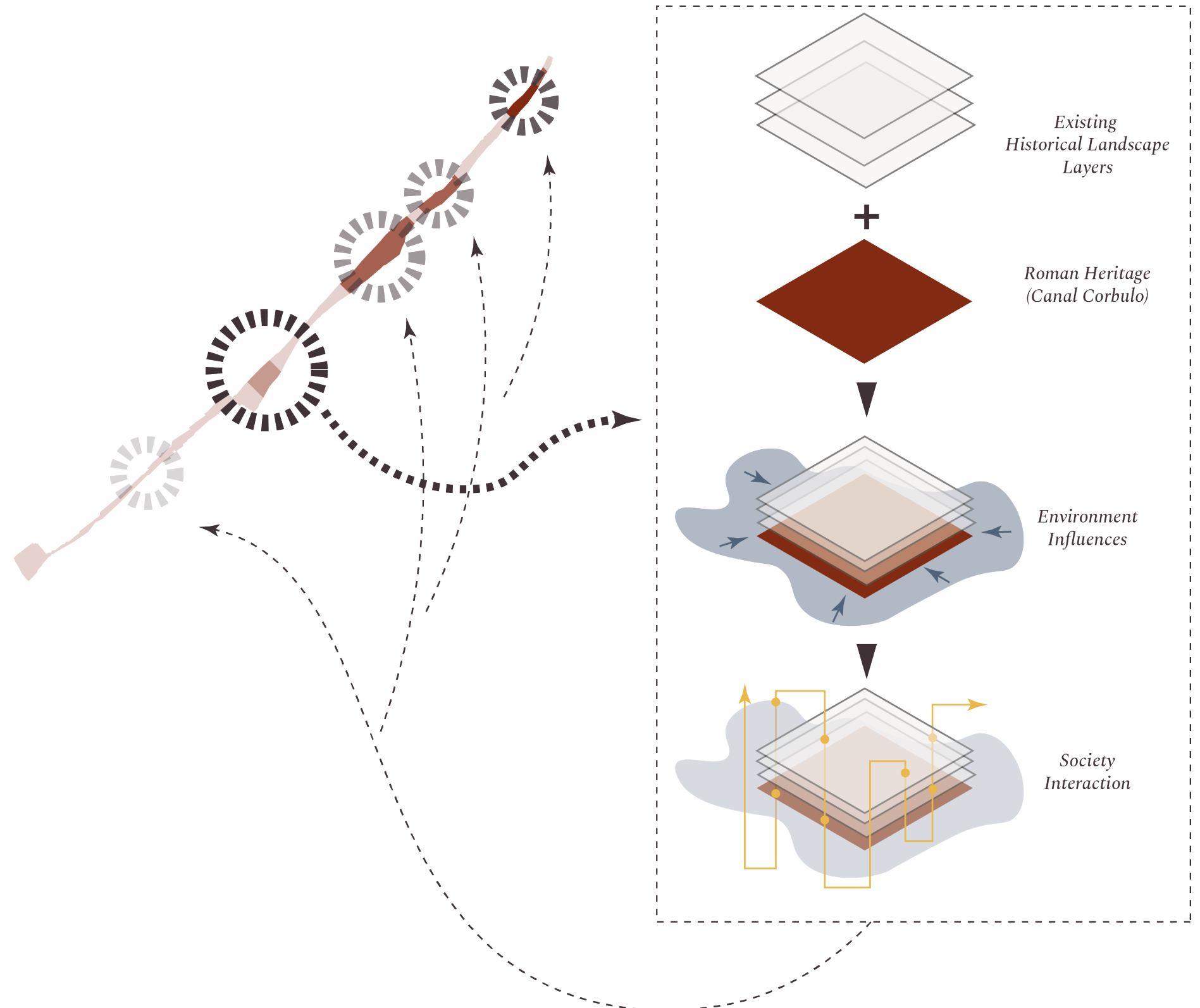


Figure 4.1: General Vision Steps
Made by Author

4.2_DESIGN STRATEGIES

Heritage as approach:

- 1) the storyline is based on heritage, in this case, a tale of human - landscape relationship, an overall history as well as the story of Canal Corbulo
- 2) heritage is embedded in design across scales, including natural process in site, the changing perspective while experiencing, and the engineering or mechanism details

Society as common ground:

- 1) making use of present functions in the surroundings, in this site, business like restaurant, boat renting and plant nursery
- 2) value the traceability of each social practice, the existings programs will be viewed as a inheritance of past landscapes

Environment as medium:

- 1) landscape organization starts with water system and soil types, in this case an improvement of existing water mechanism and new planting solution catering to original soils instead of blind intensive farming
- 2) physical environment will affect how visitors experience the site, special attention to circular, reourring events, in this case wet-dry season, sunny-rainy days etc.

4.3_PILOT DESIGN FOCUSES

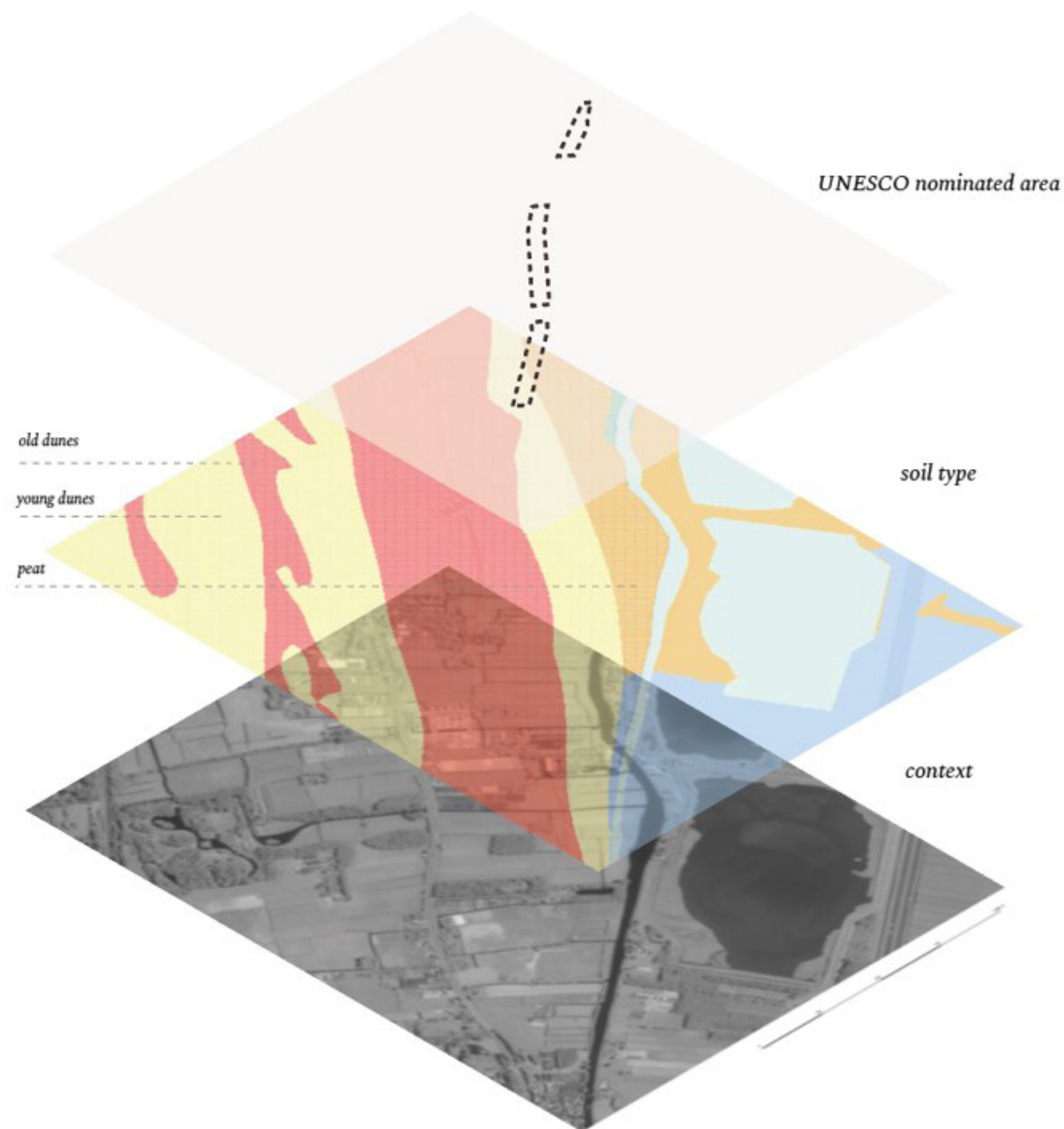


Figure 4.2: Pilot Design Focuses
Made by Author

The context from socio aspect was fully analyzed in previous chapters, the detailed surroundings of pilot site will be further looked into in the next chapter, from a method combining spatial and time point of view.

By understanding the basic natural landscape on site, the design focus would start with water system and soil types. Soil can be of use in two ways, one is that the top layer will affect how vegetation grows and the the deep layes from archeology geography records the process of landscape evolution.

Water in the Netherlands is strongly managed, as is in the research area. Which means there's a desinated level and flow for each watercourse, this can be a more engineering aspect than natural aspect during design exploration.

UNESCO nominated sites here are not allowed for solid construction, for the heritage itself is burried 3m deep, massive construction would destroy the preserved archeology evidence that are left intact. Design would then take place in a parallel location within the buffer zone.

Each layer in the diagram represents the topic of heritage, environment and society.

Design will begin with the representation of heritage; typically, function, form, and structure are key elements to "bring back" a spatial heritage. However, in our densely populated research area, this is limited. Detailed design in a polder landscape site will provide multiple perspectives in terms of "representation." To build up a linear continuation, more subtle but similar micro design will be introduced to the communities along the line. Finally, this practise on the representation and experience of heritage across scales can be applied to generate prototypes for future research.



DESIGN EXPLORATION

5.1_PILOT DESIGN: FROM MONOLOGUE TO DIALOGUE

Due to the abundance of information provided by the surroundings, the pilot design site now has a complete but separated narrative of the long process of land modification by human.

However, the site's singular focus is on intensive farming. The site's heritage can be better conveyed through increased exploration of the surrounding landscape, which will reveal hidden meanings and connections.

Or as the author sees it, a *dialogue* in landscape.

To achive this, the design will start by recon-
nections to three key topics of this thesis again,
heritage, environment and society.

The design is composed of two important
parts: a pathway called the landscape walk, and
a sunken museum to explain the story of Canal
Corbulo.

- Main Entrance 1
- Information Box & Check in / Out 2
- 'the Landscape Walk' Pathway 3
- 'the Canal' Sunken Museum 4
- Museum Cafe (with Store & Toilet)5
- Dry Grassland 6
- Water Retention 7
- Reformed Historical Dune Slack Forest 8
- Wet Pasture 9
- Dune Slack Meadow 10
- Humid Peat Meadow 11
- Parking lot 12
- Dock 13

Figure 5.1: Pilot Site Plan
Made by Author



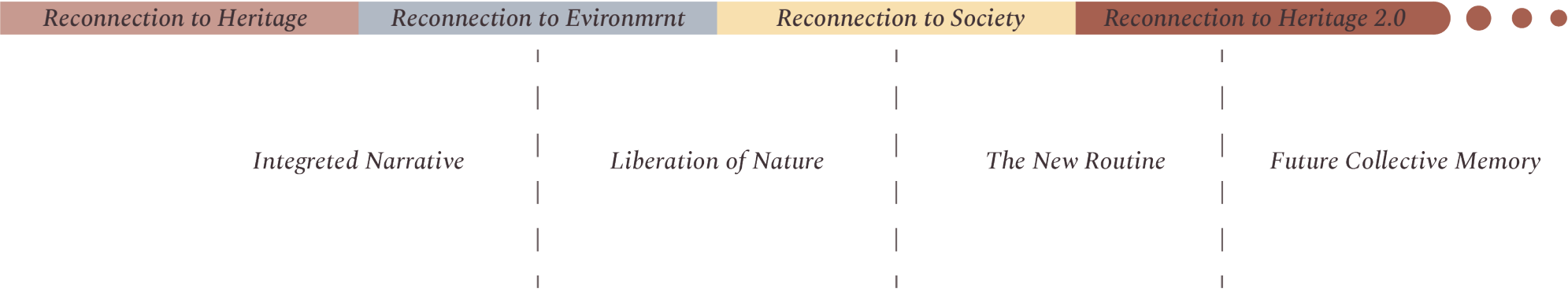


Figure 5.2: Landscape Practice Iteration On Site
Made by Author

Phase 1: Integrated Narratives

Reconnection in Heritage, Environment

By telling stories from different time scale, the history of manmade landscape in this region and the evolution of Canal Corbulo will resonate with each other, in the form of a gradient landscapes from dry to wet, penetrate from above ground to underground.

Phase 2: Liberation of Nature

Reconnection in Environment, Society

Making use of the unique soil divisions and water mechanism on site, a intensive farming land will be transformed into a self growing scape with daily and seasonal changes, allowing nature to perform its dynamics while offering diverse experiences for visitor in different segments.

Phase 3: The New Routine

Reconnection in Society, Heritage

With the integretion of pilot site and its surroundings, joint programs can be of economy benefit by becoming added layers to the existing experience, whether is new routings or enriched experience for each segment. Stimulating local development will be a way for community to embrace heritage into their daily life.

The Future Collective Memory

Reconnection in Heritage, Environment, Society

If the previous steps were successfully conducted, chances are people would take a pause on the path of discords with nature, and reflect on the long history of human-landscape relationship, with heritage Canal Corbulo as a starting point. And hopefully there would be a future where people are willing to take a step back when nature needs it.

5.2_RECONNECTION IN HERITAGE

5.2.1_A Tale on Human-Nature Relationship

Previous recorded history of land making dated back to 12th century in this area before the discovery of Roman history.

In the 12th century, the river Vliet was excavated to drain Zoetermeer's polders. Beginning in the 13th century, castles began to appear on sandy ridges in this region, where the view to the west was of the sea and the view to the east was of expansive plain polders. During this time, the first windmills also appeared.

Later, in the 16th century, it was discovered that dunes, particularly dune slacks, contain nutrient-rich soil that is highly profitable for flower cultivation, and thus the business began. Country estates also appeared during this time, as the same purpose of castles.

Due to the industrial revolution, modern greenhouses were widely constructed in the 18th century. Even though Knipmolen is a traditional windmill as opposed to a modern one, it was not constructed until the 19th century, indicating that ancient wisdom is still applicable even as new technology emerges.

In the 20th century, Vlietland was emptied of sand and peat due to the need for construction materials, but this area was quickly transformed into a recreational lake, symbolising two of the most important needs of modern life: the desire to create new things and the desire to enjoy life to the fullest.

Figure 5.3: Development of Human-Landscape Relationship in Surroundings
Made by Author

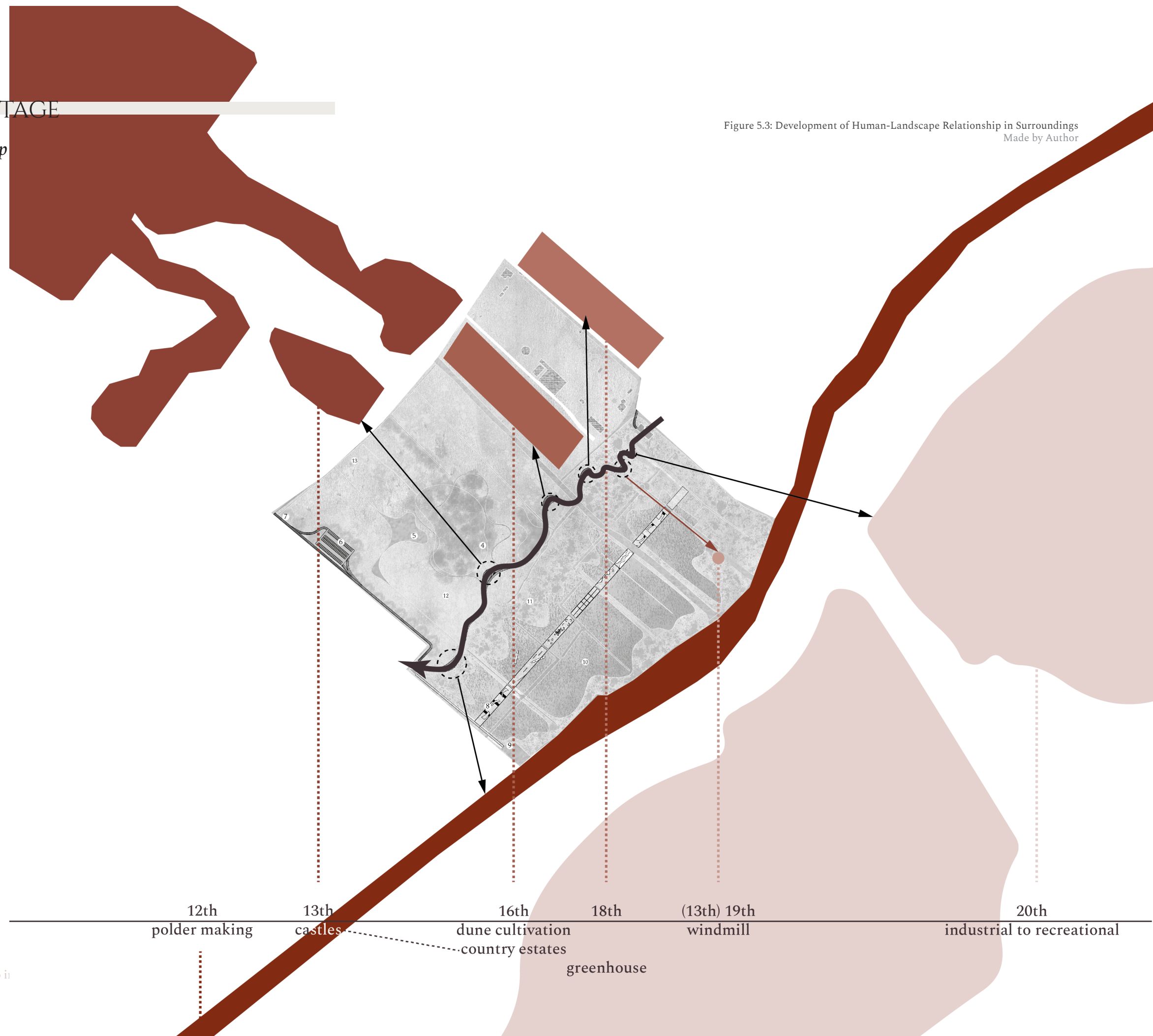
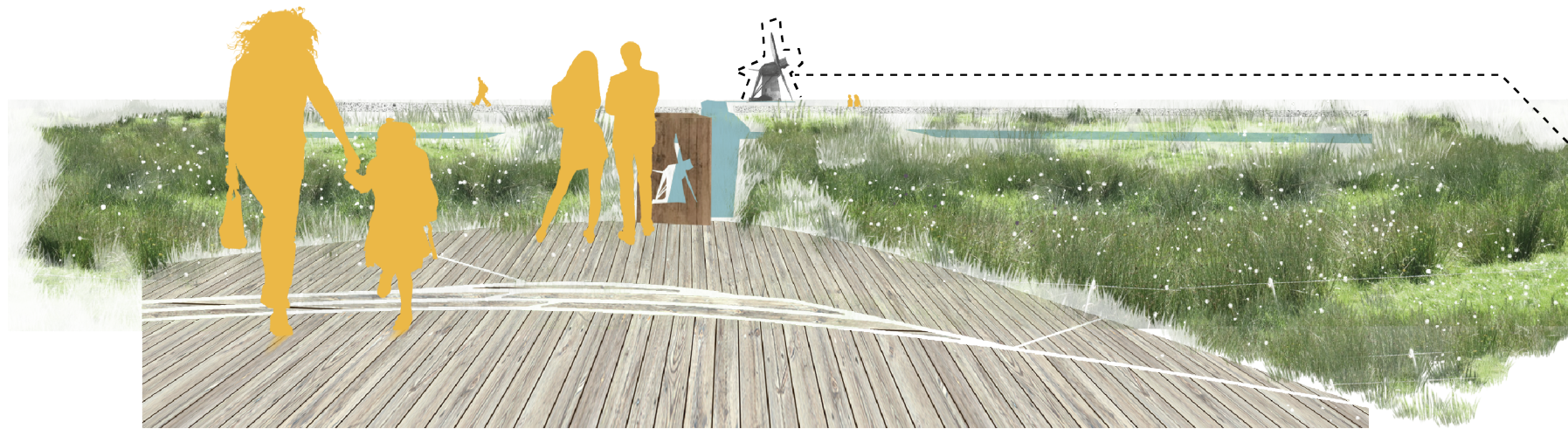
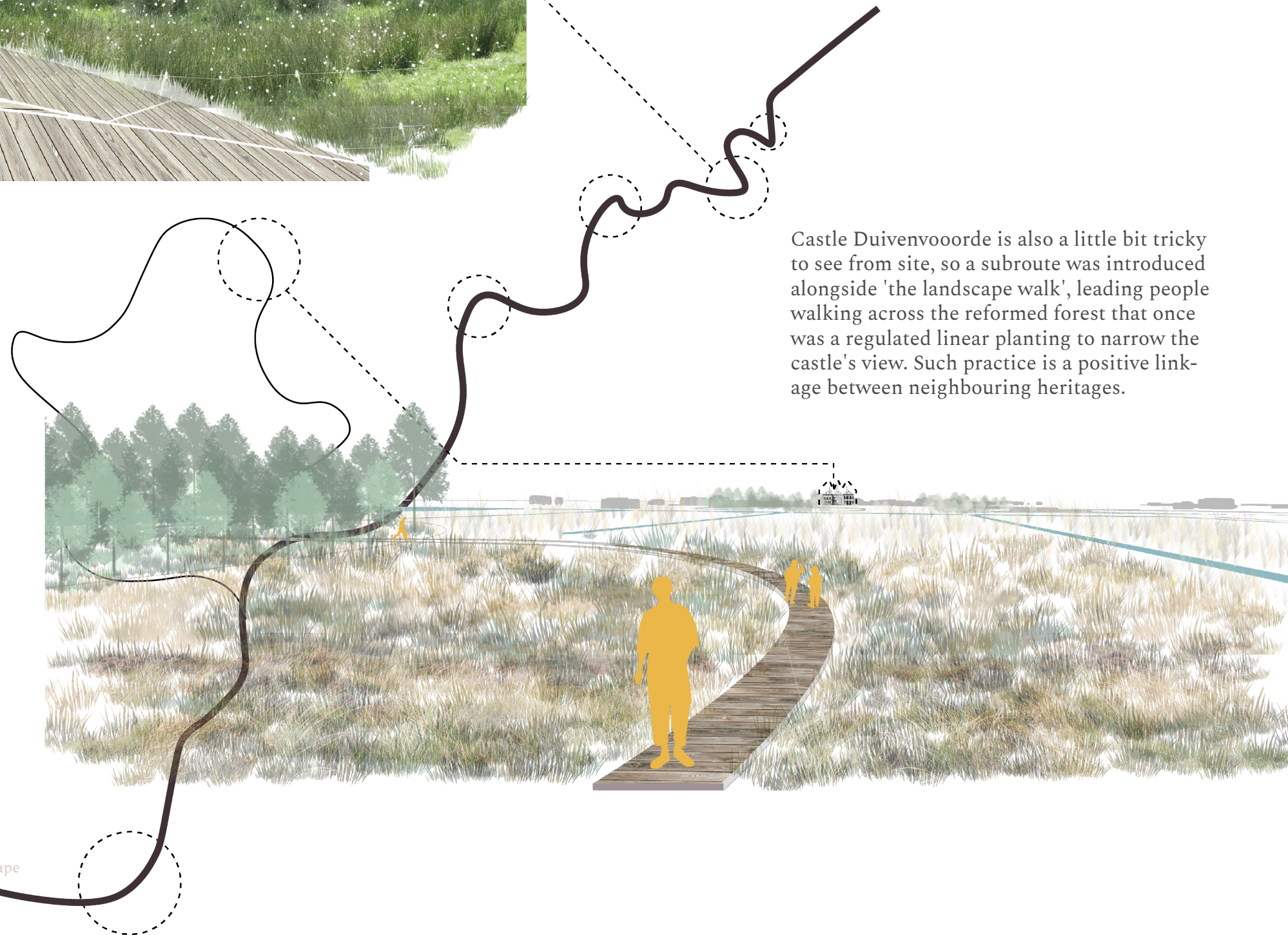


Figure 5.4: Impressions on 'the landscape walk'
'Made by Author



Due to the blockage of planting and terrain, the most visible corresponding scenery on 'the landscape walk' is the 19th century windmill and the 13th century castle.

By putting up a wooden signage board with certain cutouts of narrative elements, it not only guides the direction of people's sight, but also offers a overview of the past landscape when people are sitting on the pathway, enriching visiting experience.



Castle Duivenvoorde is also a little bit tricky to see from site, so a subroute was introduced alongside 'the landscape walk', leading people walking across the reformed forest that once was a regulated linear planting to narrow the castle's view. Such practice is a positive linkage between neighbouring heritages.

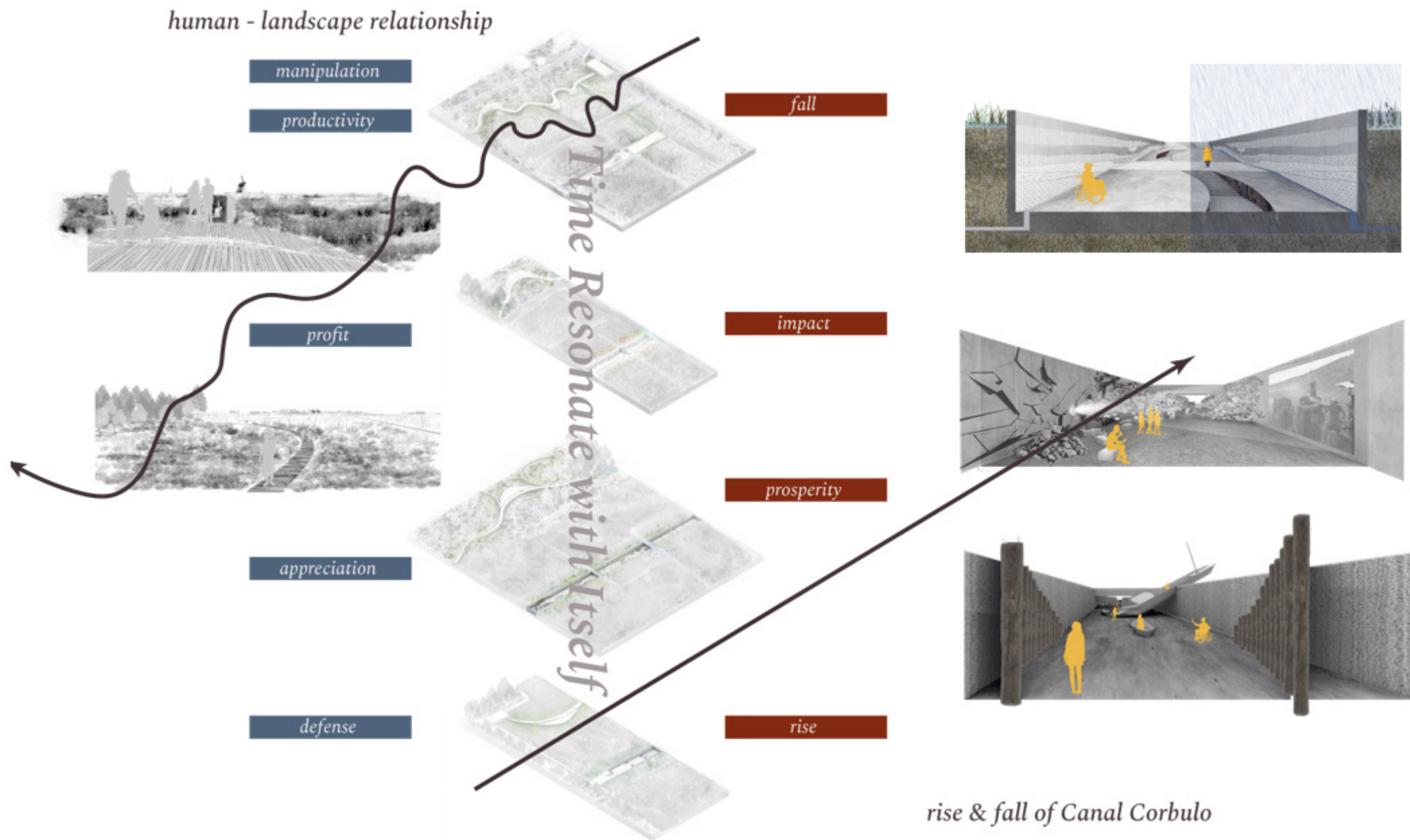


Figure 5.5: Narrative Phasing of Two Lines
Made by Author

On the other hand, while this lengthy history of land development appears positive, the brief history of Canal Corbulo is a bit depressing, as are all historical tales.

When Roman Empire first established its border in the Old Rhine area, engineers used existing streams and valleys here to dig out a canal. To stabilize the bank, oak timber was introduced as embankment, then the canal went into a period of prosperity with the settlements along its side.

As a representation of Roman ships in the Netherlands, replicas of ships in the sunken museum are modelled using data from De Meern 1 in Utrecht. The largest of them all settlements, Forum Hadriani developed a mature trading culture. As the most important town on the west coast, Forum Hadriani's water and sewage system followed typical Roman practice, with the exception that the land was too flat for the city to have more fountains than wells. These aspects of Roman life in the Netherlands are depicted through spatial language in the museum. This area was abandoned in the third century due to the effects of tides and floods, leaving the canal itself being filled with wastes and sands. This section of the museum can be used for documentary and reflective purposes.

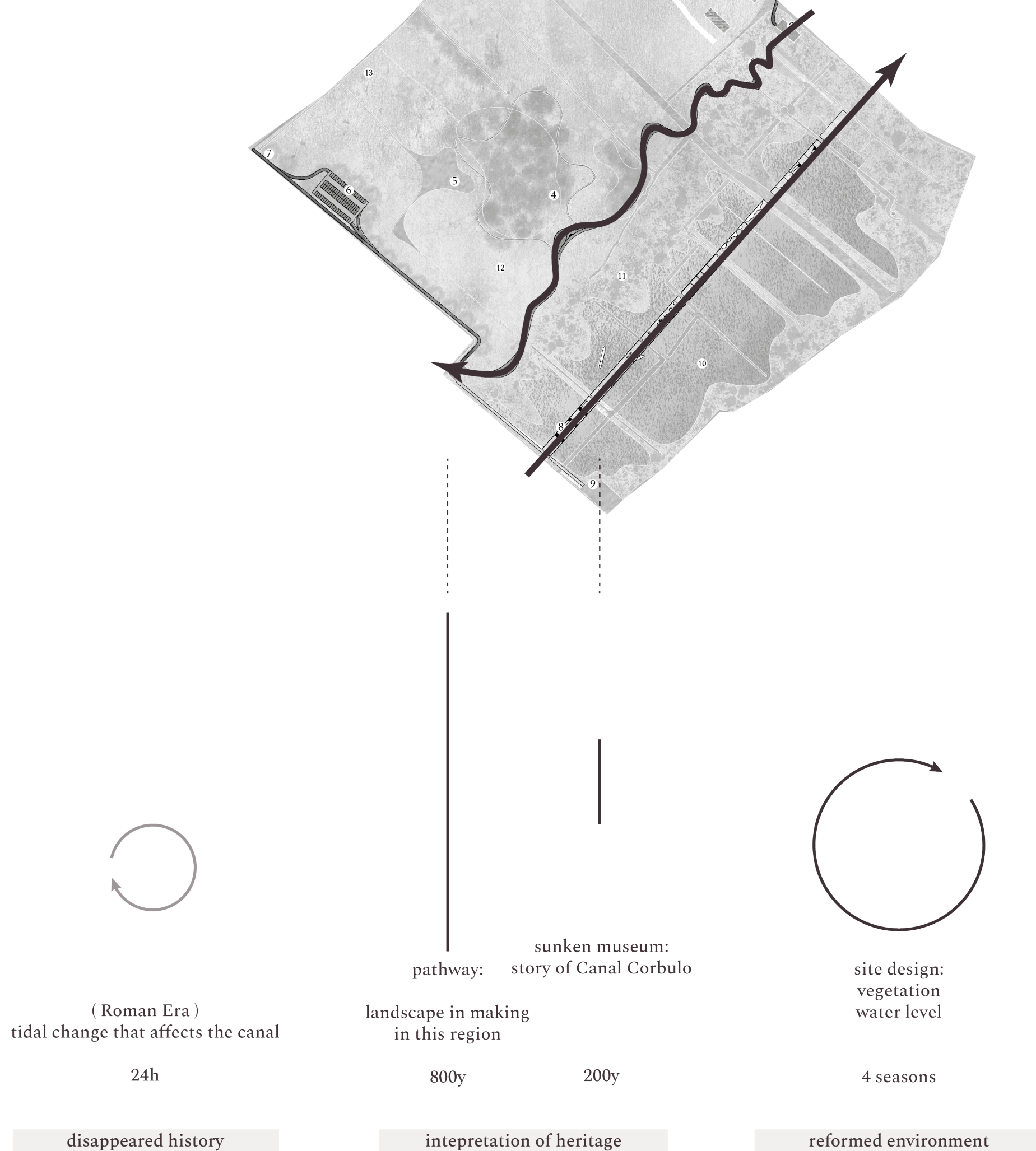
In all, the story of Canal Corbulo is divided into 4 parts: rise, prosperity, impact and fall. The story of human-landscape relationship here is interpreted as: defense, appreciation, profit, productivity and manipulation.

5.2.2_Different Rythms of Time

Figure 5.6: Disappeared and Rebuilt Rythms on Site
Made by Author

Although the daily tidal change is long gone in this area due to strict management over water, other rythms of time can still be represented in design.

The pathway and the museum are representing man-land relation in an abstract way by directing people's view and movement, and the landscape reformation of site is allowing nature perform its annual change through vegetation and water.



5.3_RECONNECTION IN ENVIRONMENT

5.3.1_Water Management

The water system is not always isolated from other elements on site, even when that element is partly artificial.

As an extension of scenery from Castle Duiven-voorde, two lines of trees reached Knip Polder. However, as times goes, the tree clusters outside of polder has changed their outline due to the freedom the open land offers, the remaining two clusters within polder are still strongly restricted by the ditch pattern. In other word, the two clusters did not follow the trace of time. By looking into the morphology of tree clusters and comparing their evolution, design proposal for the two clusters left in polder is to get rid of the limited boundary from ditch, and aimed for a more free form of forest and more diverse habitat.

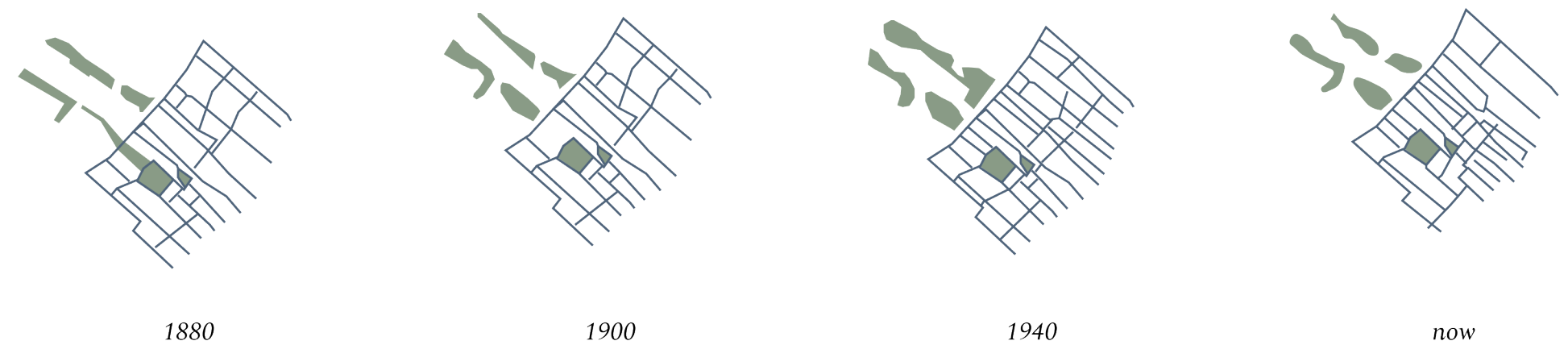


Figure 5.7: Evolution of Tree Clusters
Made by Author

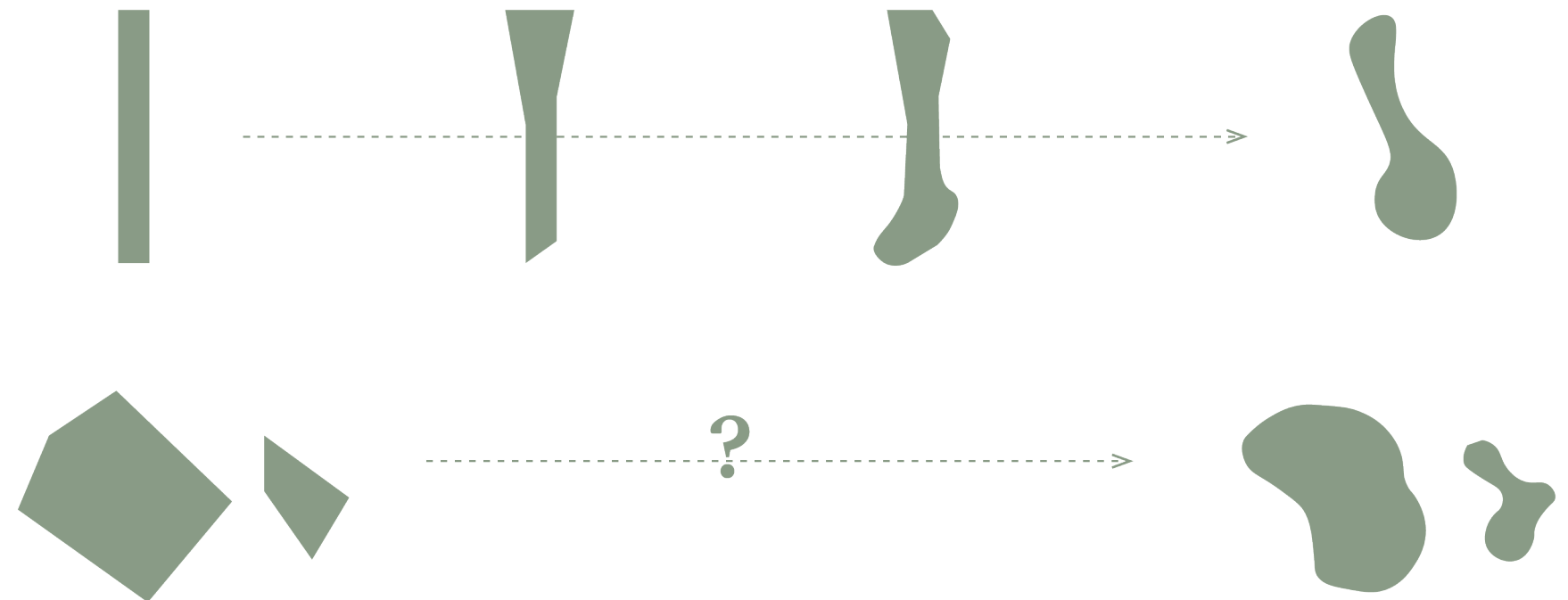


Figure 5.8: Concluded Change of Tree Clusters is Proposed in Design
Made by Author

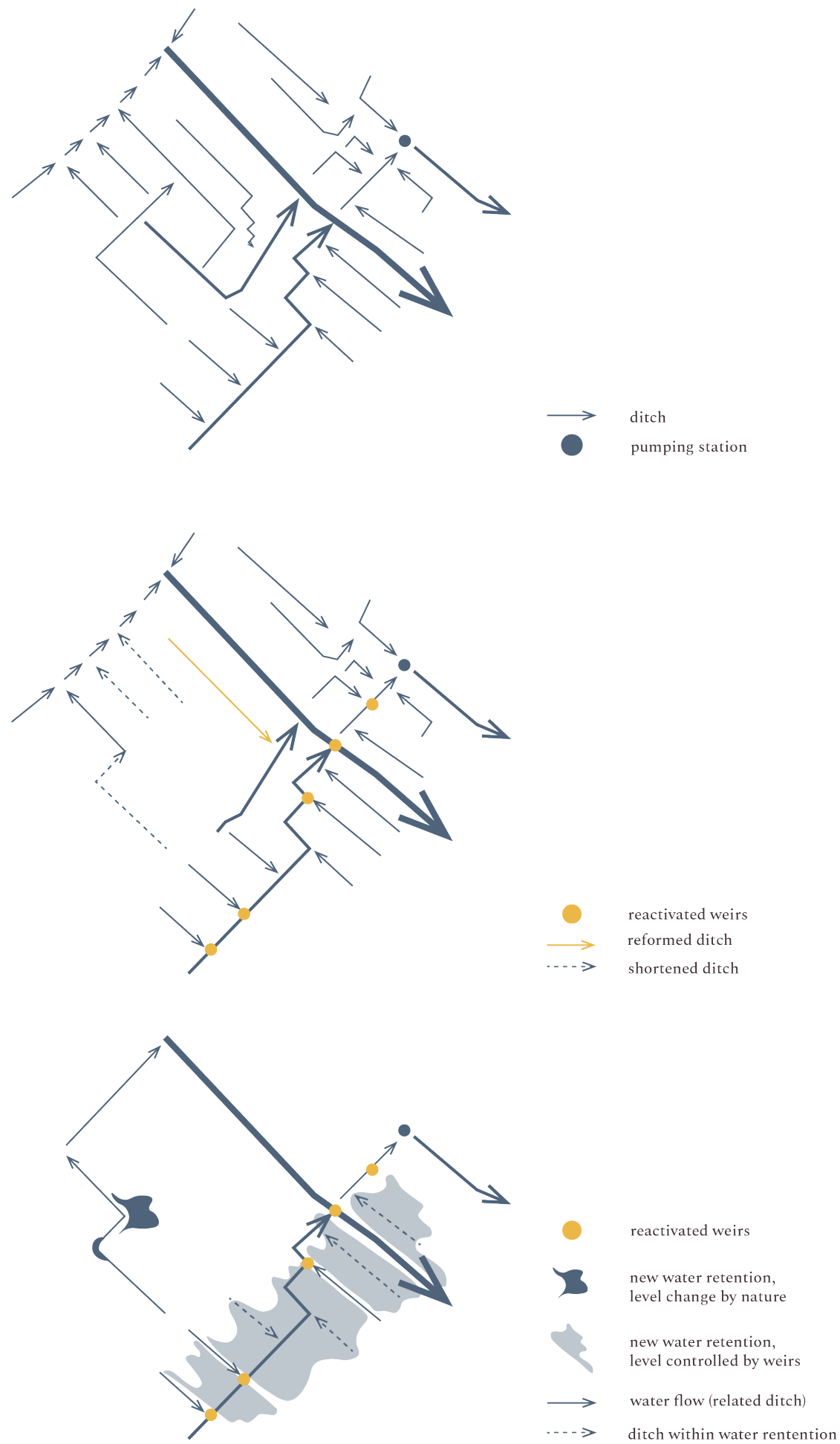


Figure 5.9: Water System Reformation
Made by Author

To remove the limits added to tree clusters in polder, the first act is to cut loose the regulated ditch around them. This will lead to an issue of drainage in the northwest part of the polder, so design offers a water retention instead.

Also, to provide diverse habitats in the south-east part of the polder, multiple weirs in site were reactivated, between each two weirs there will be a different water level in both summer and winter, this also requires a removal of top-

soil in the first place, the new form of seasonal humid peat meadow is adapted from the tidal history of this area and also the existing terrain.

Before modification, the water level in peat area was always 0.8m lower than land level due to the farming activities, which will accelerate the speed of evaporation of peat. After design experiment, the peat area will always be kept wet, lowering the risk of soil compaction here.

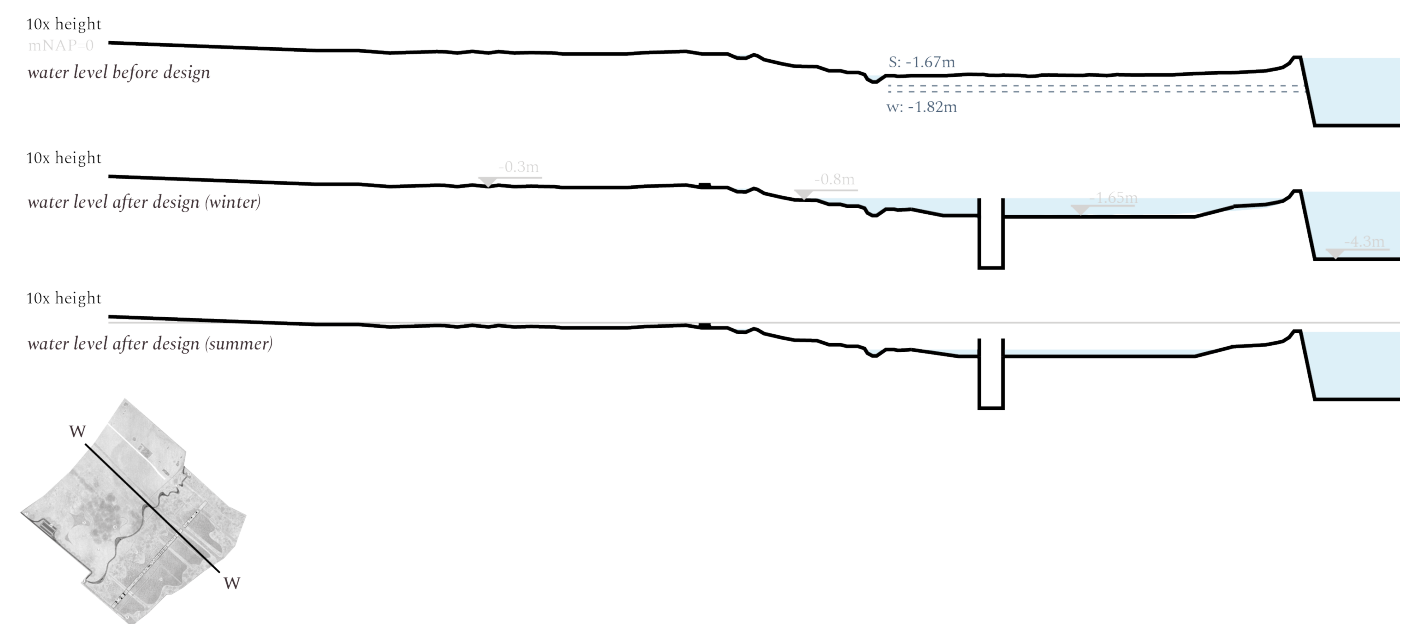


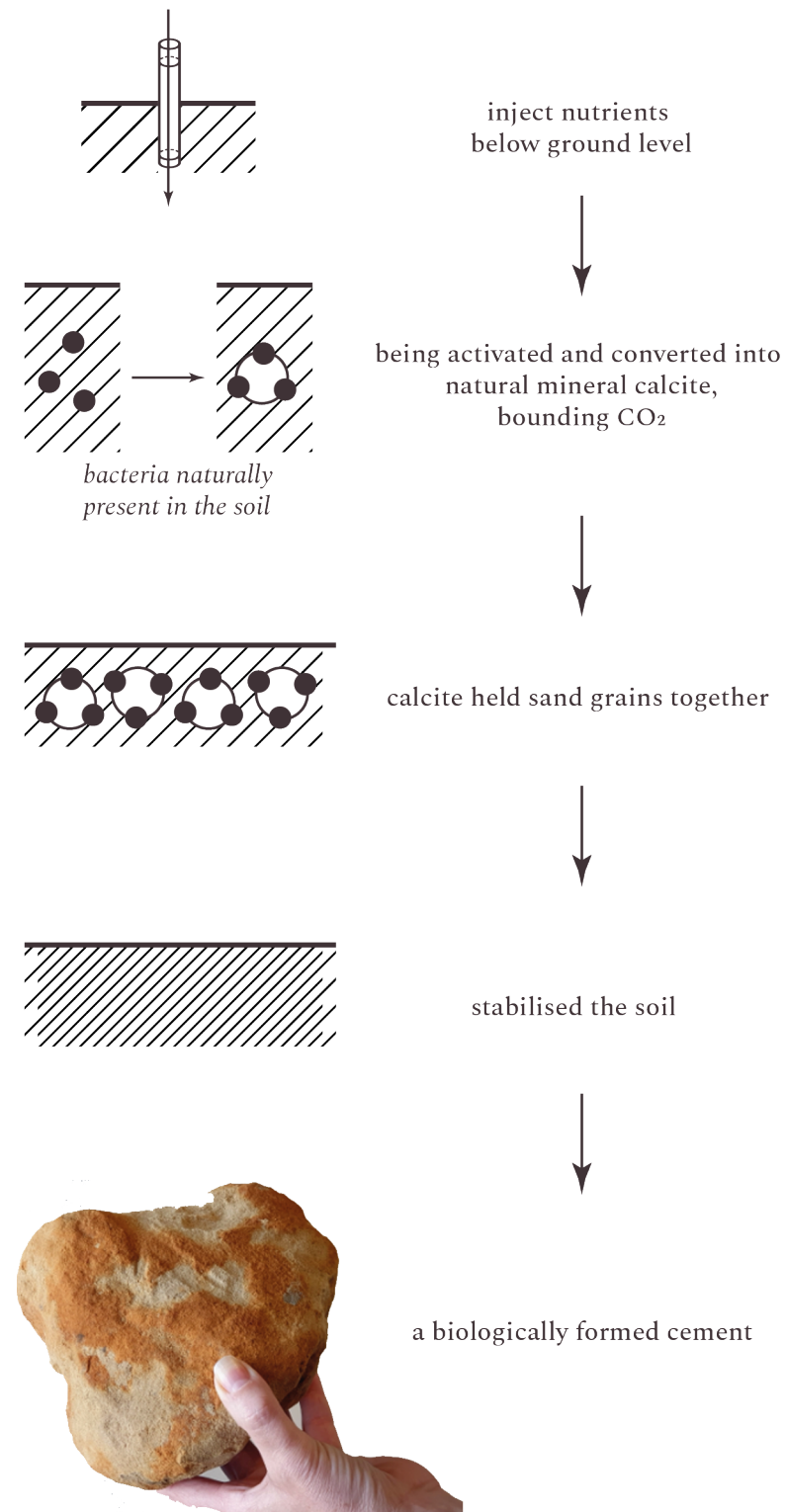
Figure 5.10: Water Level Before and After Design
Made by Author

5.3.2_Construction Materials & Details

Peat has been considered as a diminishing material for a long time, for its constant evaporation, which also brings challenges when solid construction needs to be built upon, in or even under.

However, there has been technology to turn peat into natural cements, by injecting nutrients below ground level, making use of the bacteria naturally present in the soil, and activate and convert them into natural mineral calcite. Calcite can hold sand grains together and stabilised the soil, making surrounding peat strong enough for construction structure.

This technology is introduced in the project to ensure the sunken museum being of more environmental benefit.



Cement	60 y
Peat (predicted)	15 y
Natural Peat	50 y
Manufactured Stone	100 y
Concrete	120 y
Concrete : GGBS = 1:3	

*GGBS: Ground granulated Blast furnace slag

Figure 5.12: Materials Lifespan Comparison
Made by Author

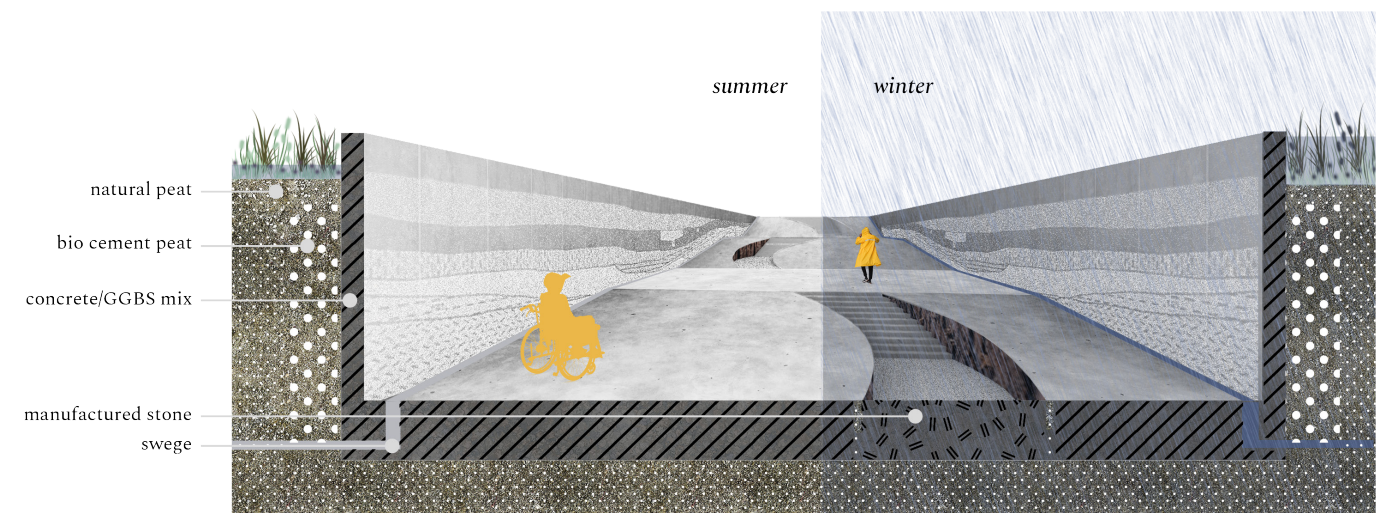


Figure 5.13: Wall Detail of Sunken Museum
Made by Author

Figure 5.11: Process of Biologically Formed Cement from Peat
Made by Author

5.3.2_Vegetation Succession & Management

By crossover the existing soil types and the designed wetness of site, there appeared various habitat landscape, the nearest to national road is dry grassland, than dune slack meadow with a part of the land being dune slack forest, strating in the wet area is the wet pasture, the other side of the sunken museum is humid pear meadow.

The atmosphere differs a lot between summer and winter, in the diagram it is briefly introduced and would be displayed more in detail in the following pages.

When it comes to the management related to vegetation, here the author emphasized on the soil management. The dry grassland and humid peat meadow requires the removal of top soil in the first place, and the realization of forming biological cement also needs action after these. After construction, the dune slack meadow and wet pasture area needs mowing yearly. To keep the dry grassland and the nearby dune slack meadow scenery, every five years the removal of top soil would be conducted.

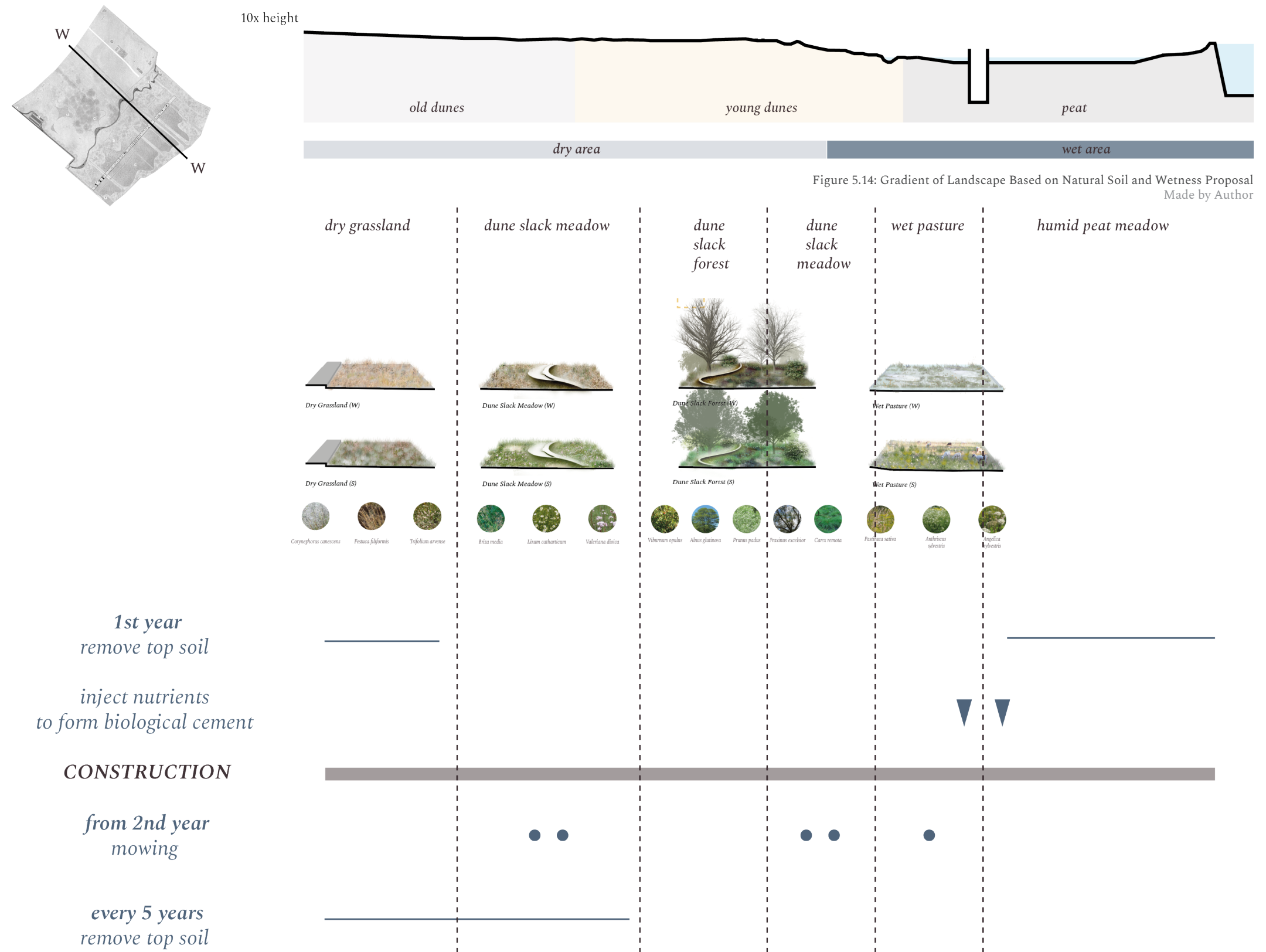


Figure 5.16: Management over Years
Made by Author

'the landscape walk' pathway:
defense

'the canal' sunken museum:
rise

In the beginning of the narratives, the atmosphere is consistent, that people were finding ways to face the challenges offered by nature, so planting scheme in this segment is overall a light appearance, from color to the shape of flower and fruits.

The blossom time in all covers most time of the year, ensuring there is always highlight in the view.

Water level in winter time is shallow in the summer, allowing mowing in the wet pasture area.

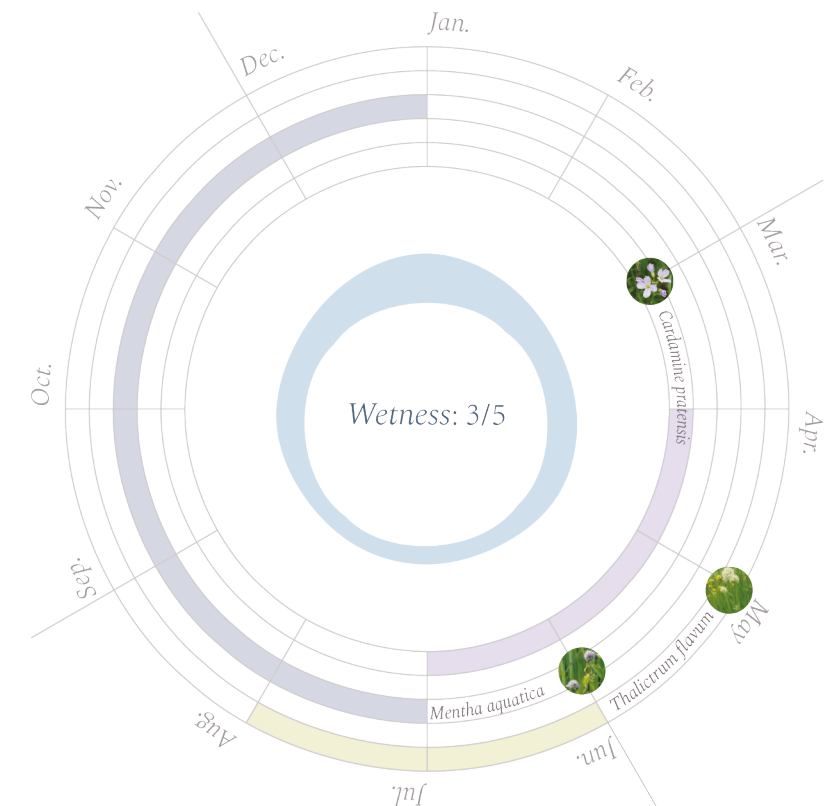


Figure 5.17: Vegetation Blossom Time & Water Level Change of Segement A
Made by Author

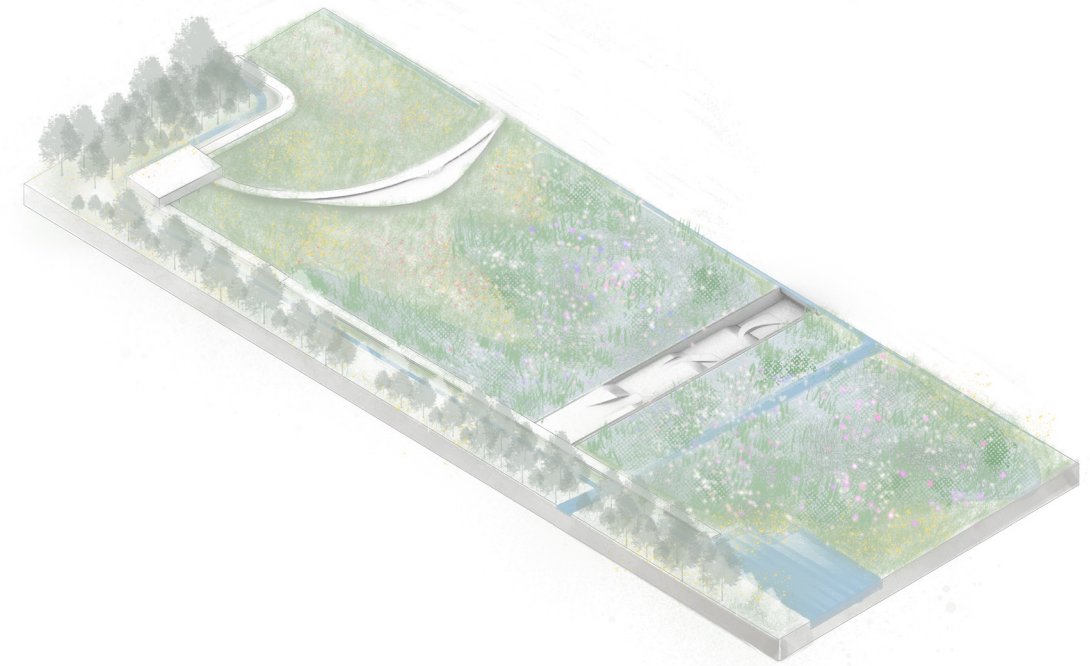


Figure 5.18: Summer Atmosphere of Segement A
Made by Author

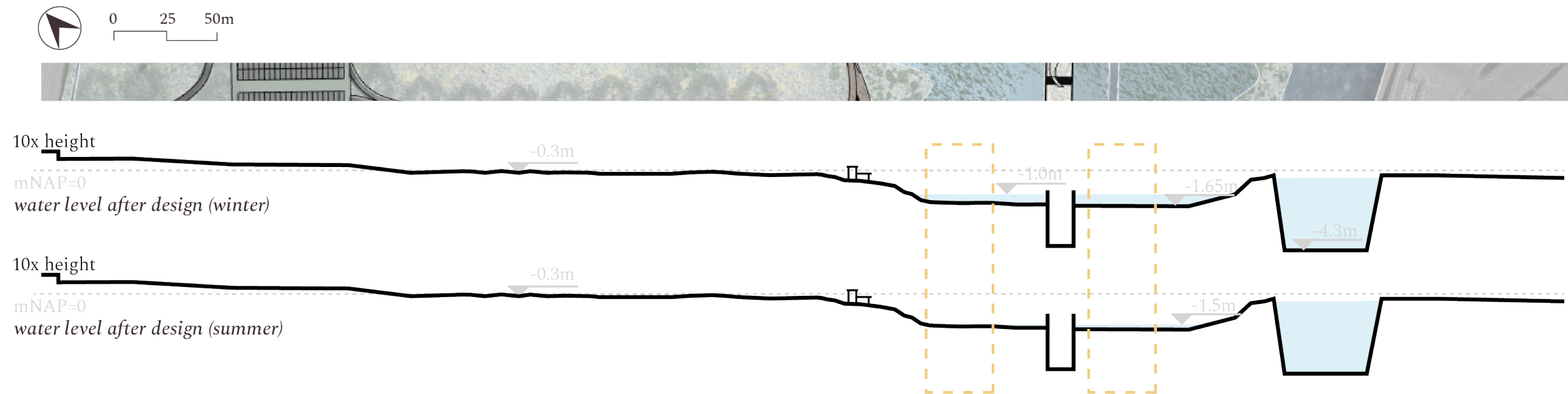


Figure 5.19: Water Level Change Section of Segement A
Made by Author

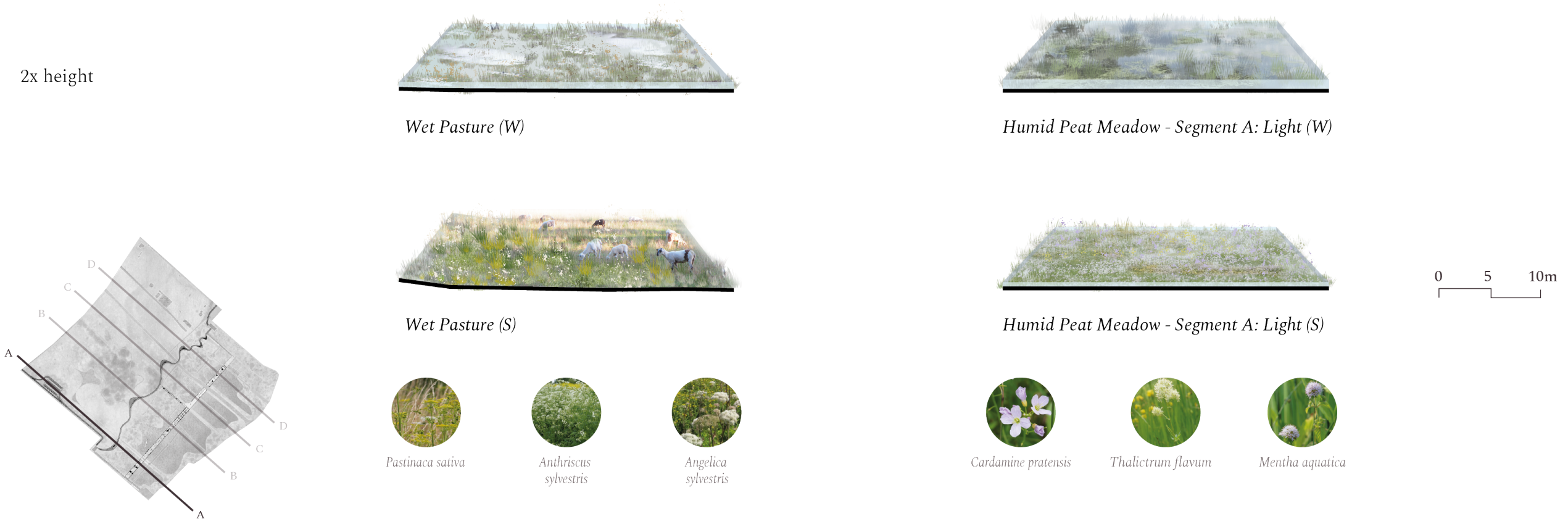


Figure 5.20: Seasonal Vegetation Scenery of Segement A
Made by Author

'the landscape walk' pathway:
appreciation

'the canal' sunken museum:
prosperity

As the most vivid segment in the whole story, the 'appreciation' and 'prosperity' led to a diverse selection of vegetation, whether it's for the humid peat meadow area or the dune slack forest area.

Colors during blossom time are mostly warm, with the yellow throughout most of the year, resulting from the effort of marsh ragwort, meadow buttercup and oxeye daisy.

Experience in the sunken museum is also very active, with the leaning of a rebuilt model of Roman ship, people can climb up and enjoy the joyful landscape in the centre of the museum.

There's also facilities like cafe and toilet alongside this segment, a long stair to connect between two narratives, in expectation of making this segment the most lively one.

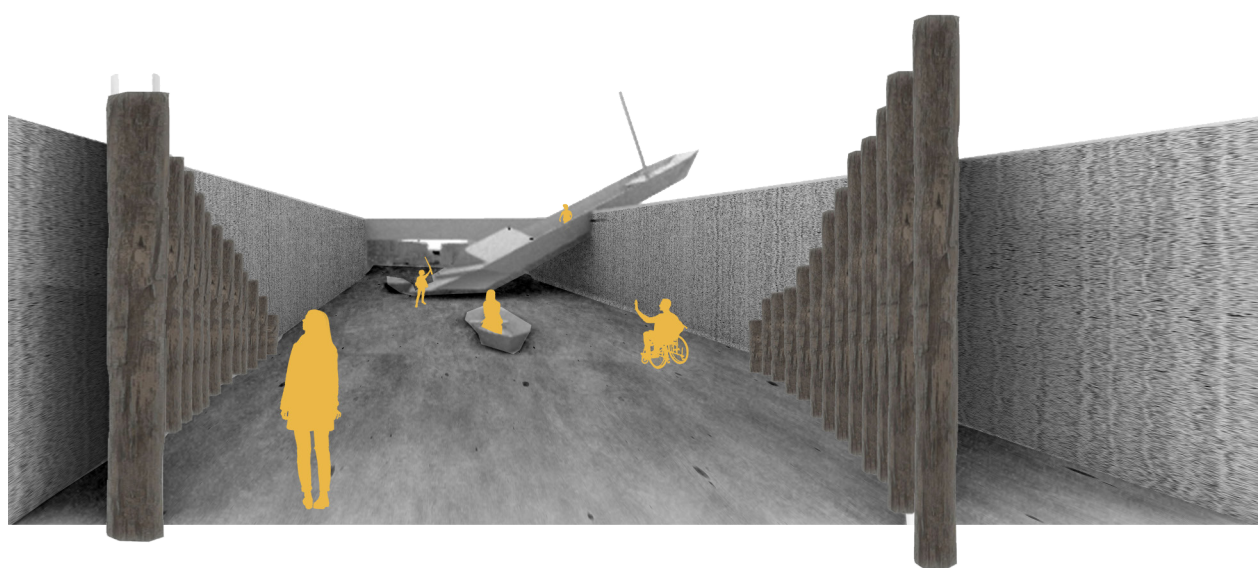


Figure 5.21: Impression of Chapter One 'Embankment' in Segment B
Made by Author

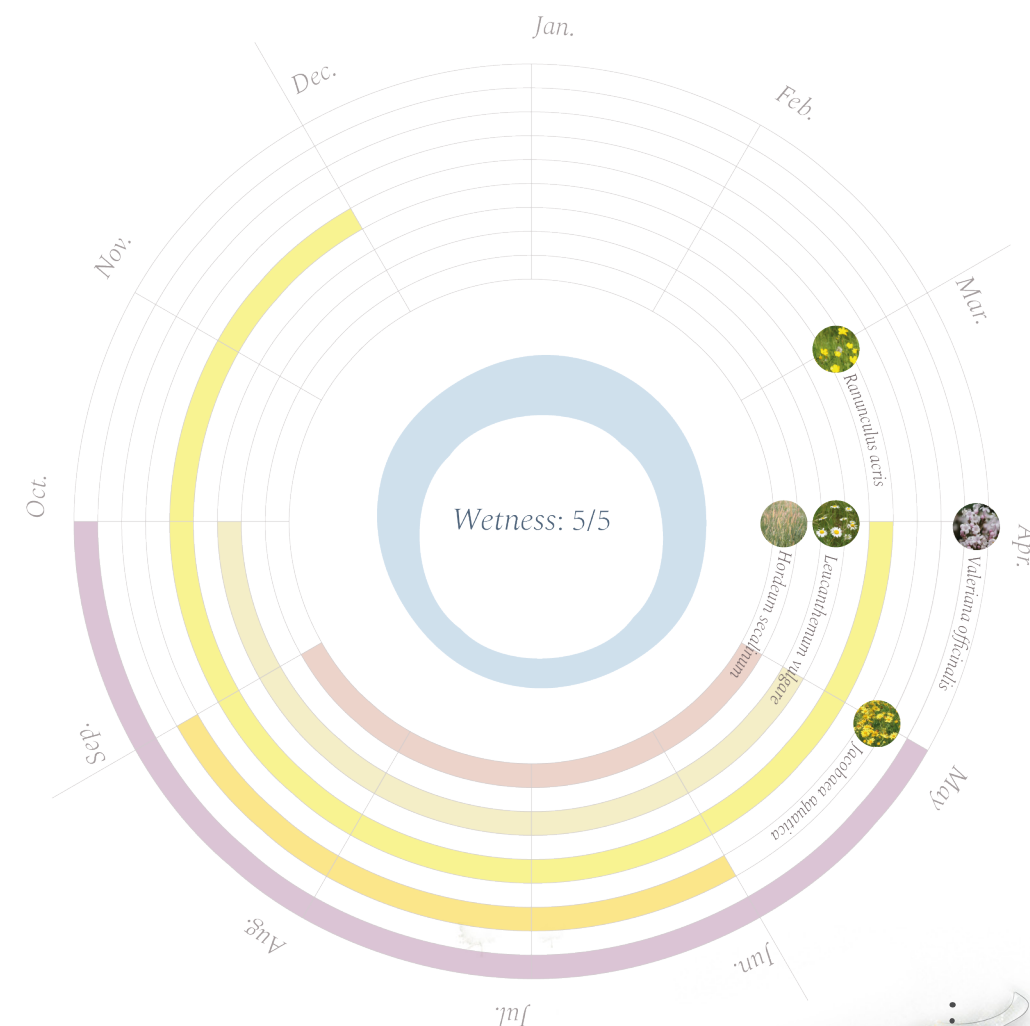


Figure 5.22: Vegetation Blossom Time & Water Level Change of Segment B
Made by Author

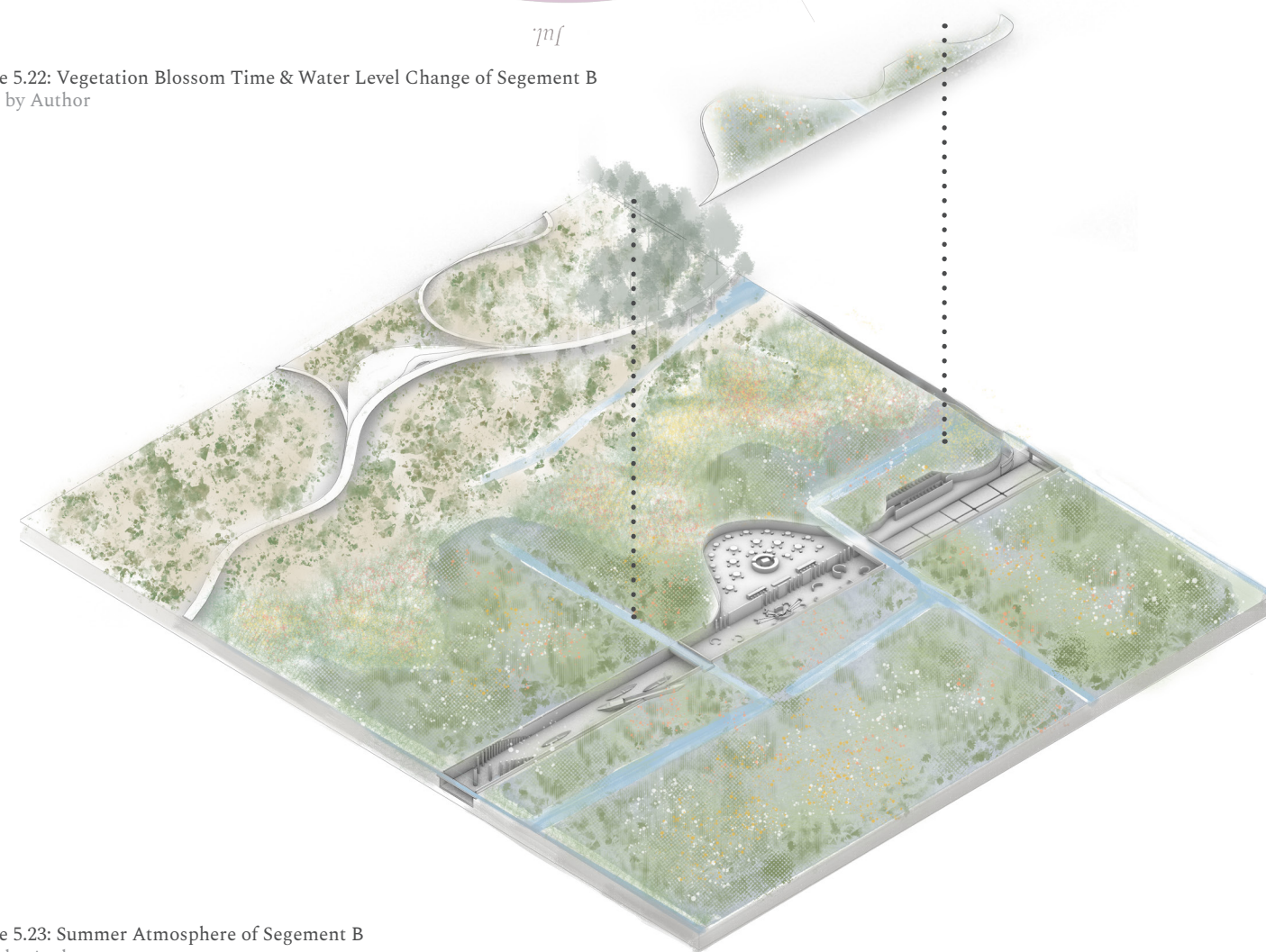


Figure 5.23: Summer Atmosphere of Segment B
Made by Author

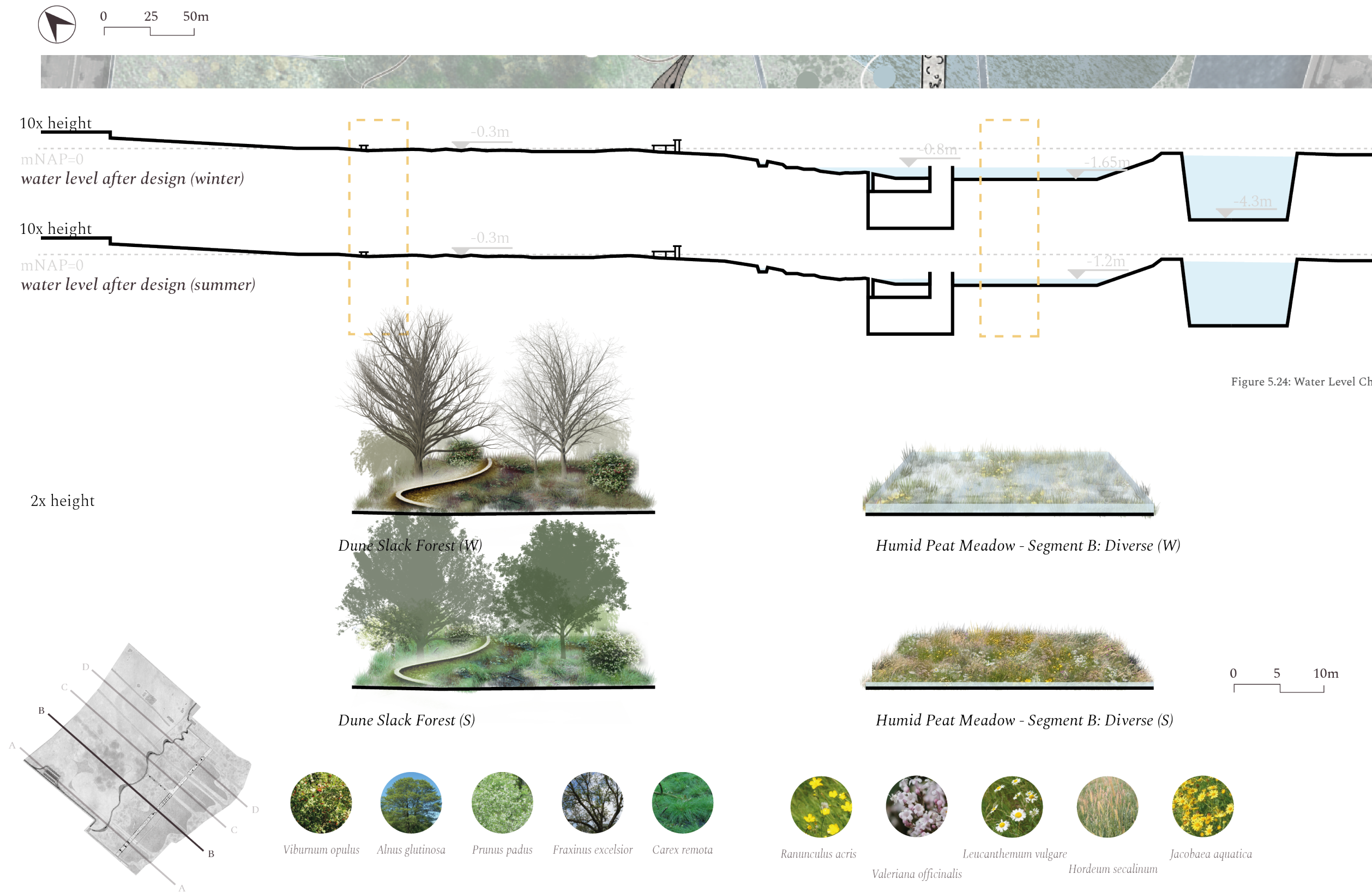


Figure 5.24: Water Level Change Section of Segement B
Made by Author

Figure 5.25: Seasonal Vegetation Scenery of Segement B
Made by Author

'the landscape walk' pathway:
profit

'the canal' sunken museum:
impact

This is where two narratives went different but still corresponding ways, vegetation in segment C present an atmosphere of in all similarity but with one dissent, the meadow saffron.

The exhibition experience is also unique by actually setting up a place that looks like has been hit with great impact, and people will see the replicas of archeology findings related to Canal Corbulo in pile of stones.



Figure 5.26: Exhibition Space in Chapter Two 'Collapse', Segement C
Made by Author

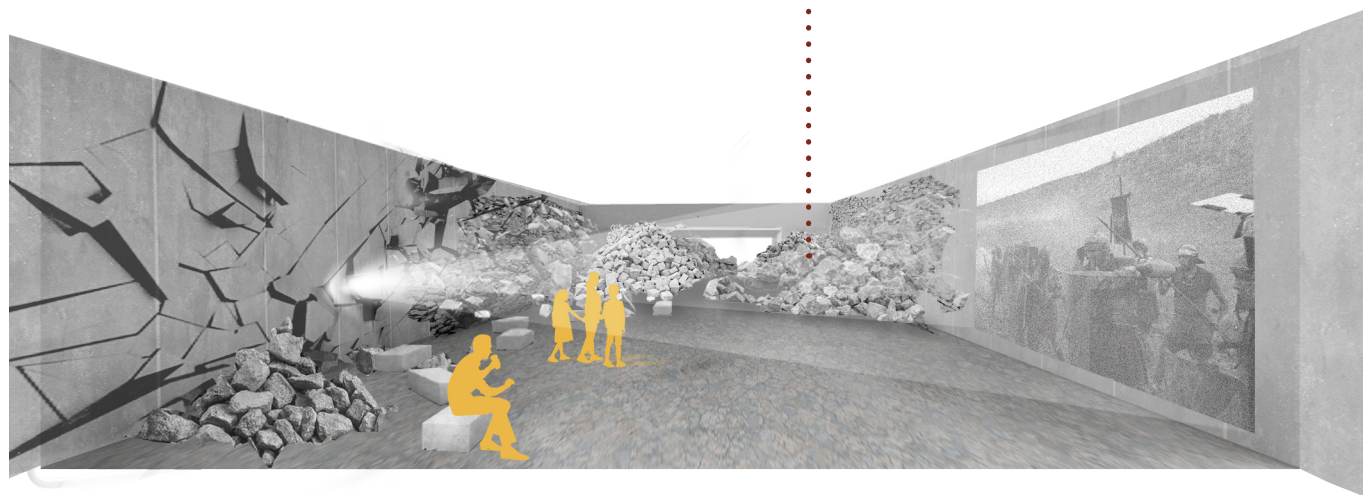


Figure 5.27: Impression of Chapter One 'Flood' in Segement C
Made by Author

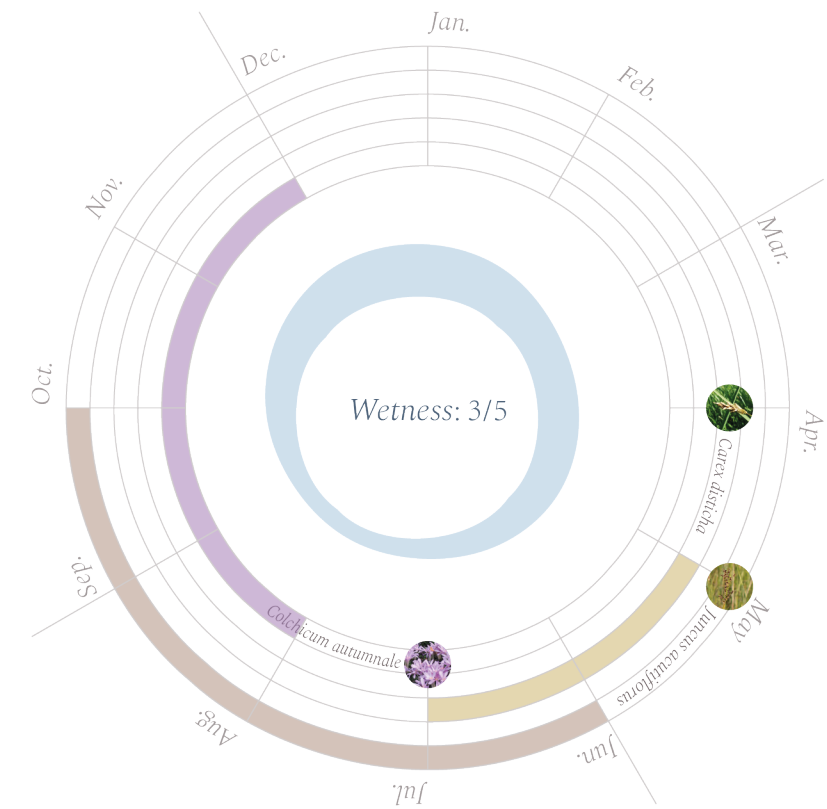


Figure 5.28: Vegetation Blossom Time & Water Level Change of Segement C
Made by Author

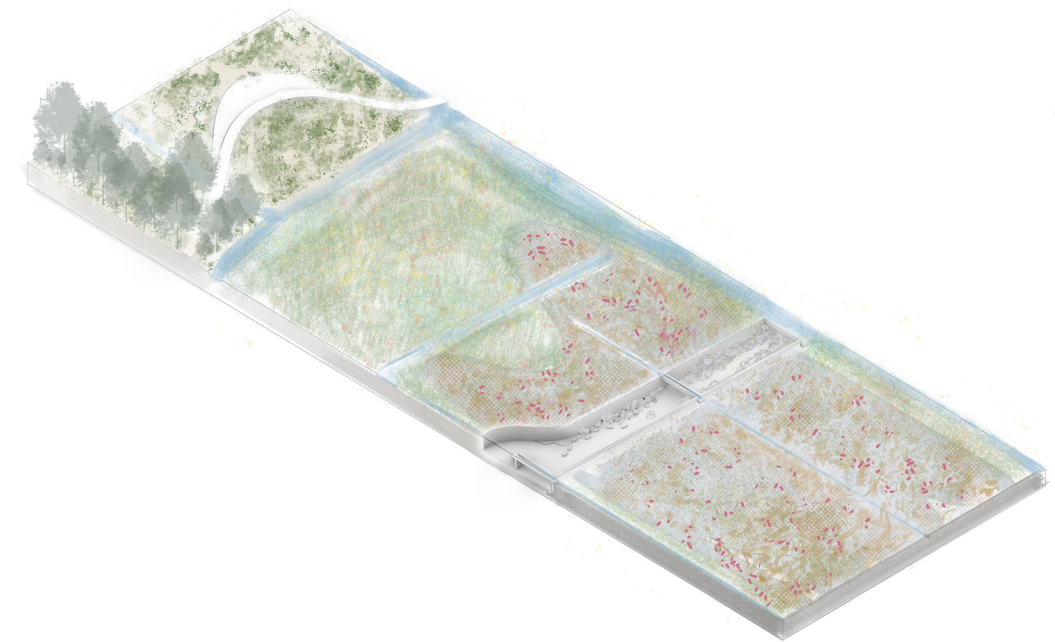


Figure 5.29: Summer Atmosphere of Segement C
Made by Author



Figure 5.30: Water Level Change Section of Segment C
Made by Author

2x height



Dune Slack Meadow (W)



Humid Peat Meadow - Segment C: Contradictory (W)

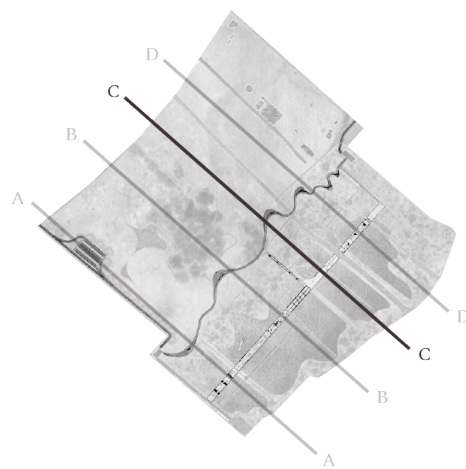


Dune Slack Meadow (S)



Humid Peat Meadow - Segment C: Contradictory (S)

0 5 10m



Briza media



Linum catharticum



Valeriana dioica



Carex disticha



Juncus acutiflorus



Colchicum autumnale

Figure 5.31: Seasonal Vegetation Scenery of Segment C
Made by Author

*'the landscape walk' pathway:
productivity & manipulation*

*'the canal' sunken museum:
fall*

The end of the story went totally separate ways, as 'the landscape walk', that is, in our modern time, seeks productivity and gained control over nature little by little, while the physical form of Canal Corbulo was lost in history for good.

Vegetation here shows the dark color both inside and outside blossom time.

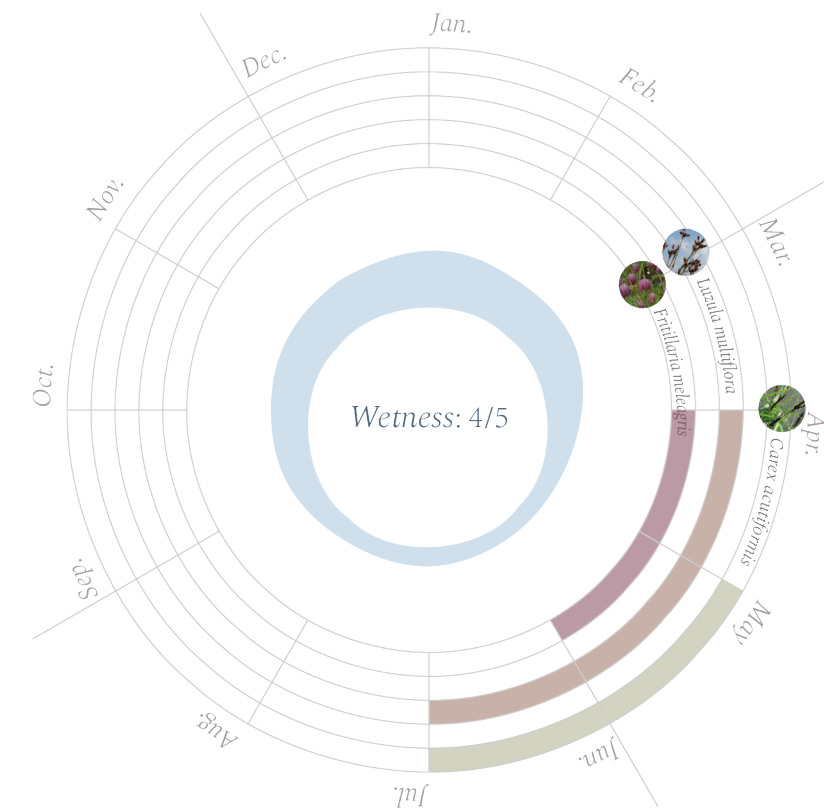


Figure 5.32: Vegetation Blossom Time & Water Level Change of Segement D
Made by Author

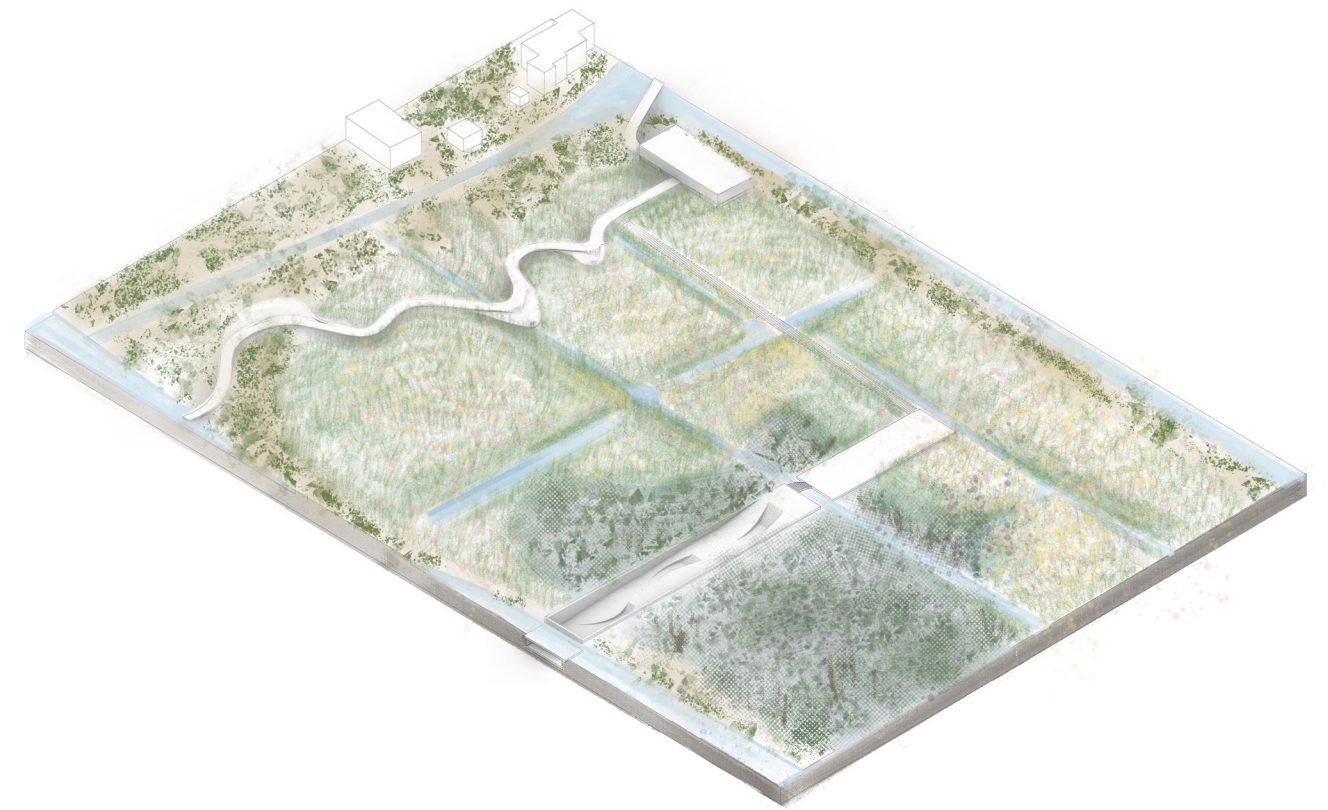


Figure 5.33: Summer Atmosphere of Segement D
Made by Author

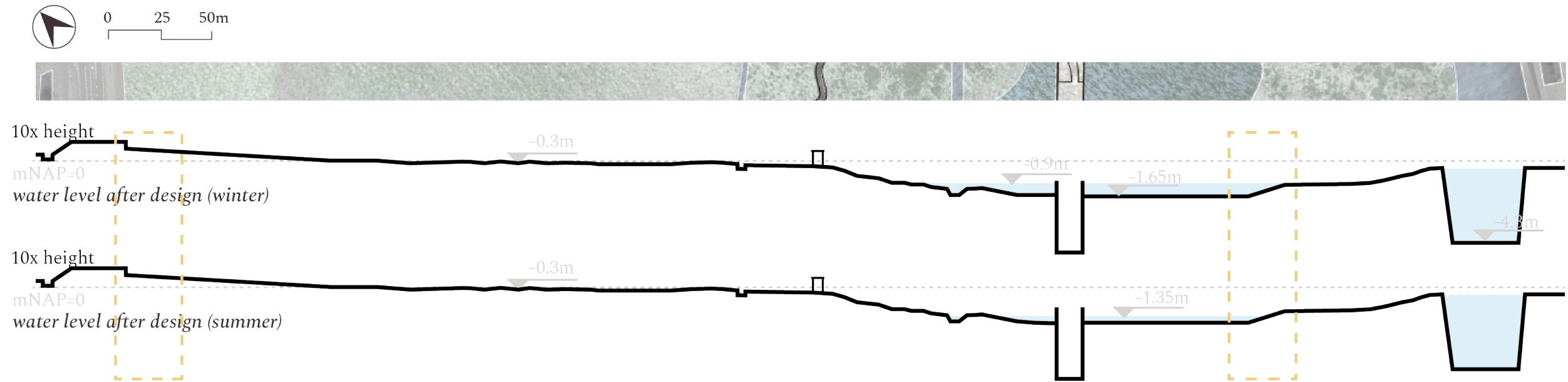


Figure 5.34: Water Level Change Section of Segment C
Made by Author

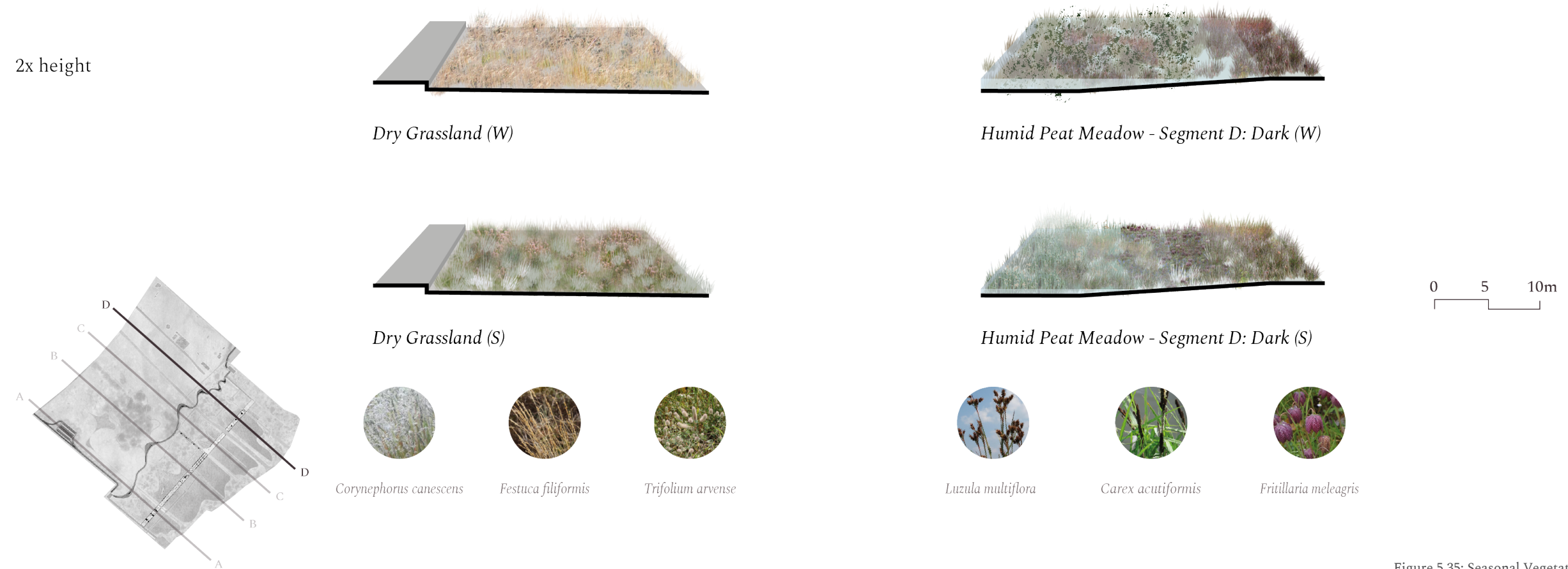
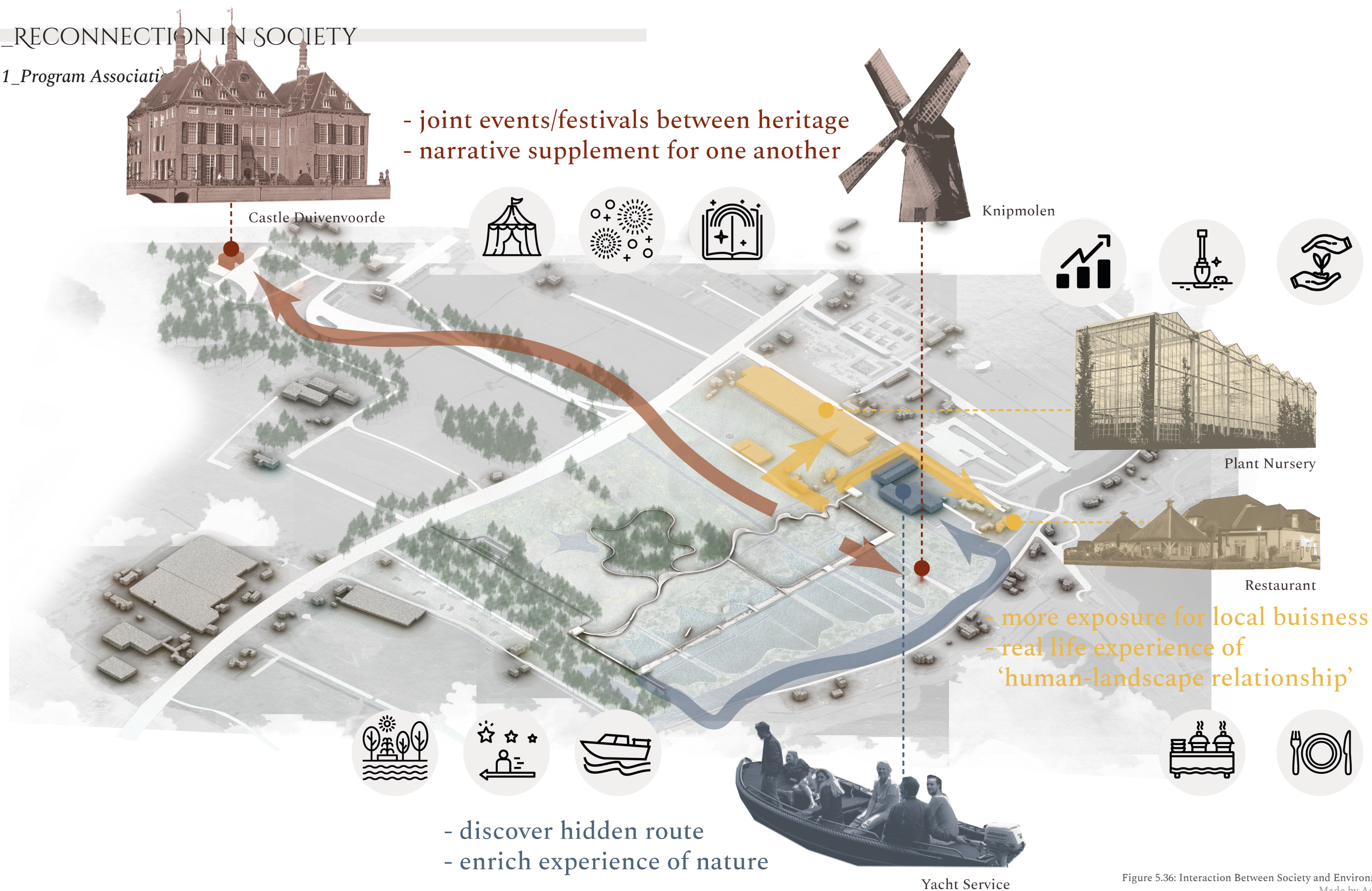


Figure 5.35: Seasonal Vegetation Scenery of Segment C
Made by Author

5.4_RECONNECTION IN SOCIETY

5.4.1_Program Association



For farmers just outside the heritage site, it would be a great chance of exposure in business with the opening of the pathway and the museum. The envision of a nature oriented landscape will limit their expansion in size of the plant nursery, but would offer huge flow of people travelling from the direction of the museum.

New connection can be built by means of adding subroute, linking the 'landscape walk' the 16th century 'dune cultivation' point to the flower farmers, which also enrich the experience for visitors.

This would act as the example of the collective memory in the shortest distance, the local business perspective.



As mentioned before, segment B in narratives is the most vivid and lively one, here shows the chapter two in 'prosperity' segment, telling the story of how trading developed in this area thanks to Canal Corbulo, the space of curved stone walls is the representation of different phase in trading. With the cafe aside, this area is perfect for workshop and other educational activities, for it offers indoor gathering and outdoor playground at the same time.

This would act as the example of the collective memory in the community scale, the children's perspective, in the hope of passing this heritage identity to the next generation.



Figure 5.38: Collective Memory from Next Generation's Perspective
Made by Author

This polder was often a passby landscape next to the national road, now that it no longer serves intensive farming purpose, it will appear as a natural patch in this metropolitan area.

In the future when high speed cars pass through, the southeast side of the road will attract their attention and thus mark the deep impression of this site.

This would act as the example of the collective memory in the regional scale, the visitors' perspective.

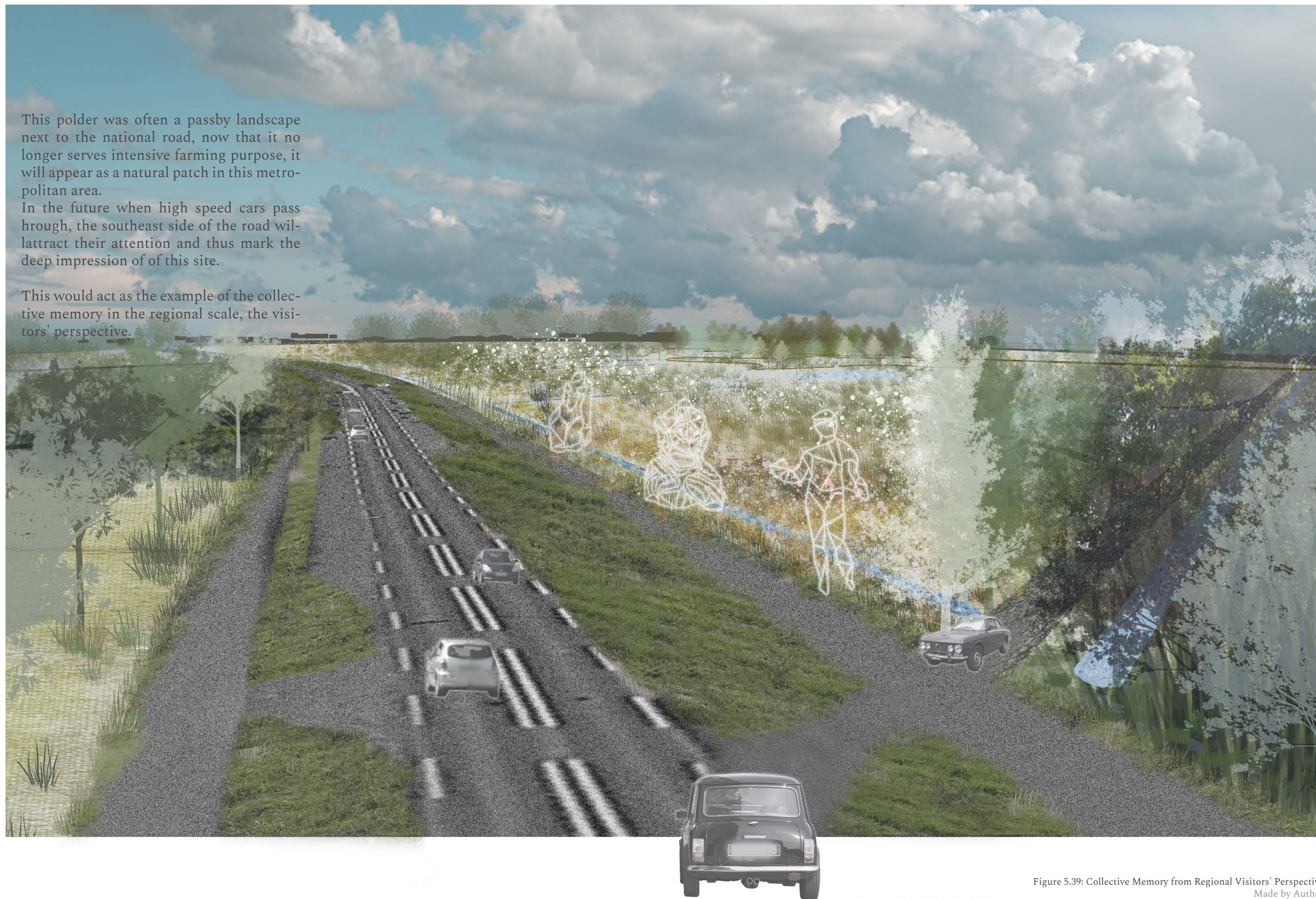
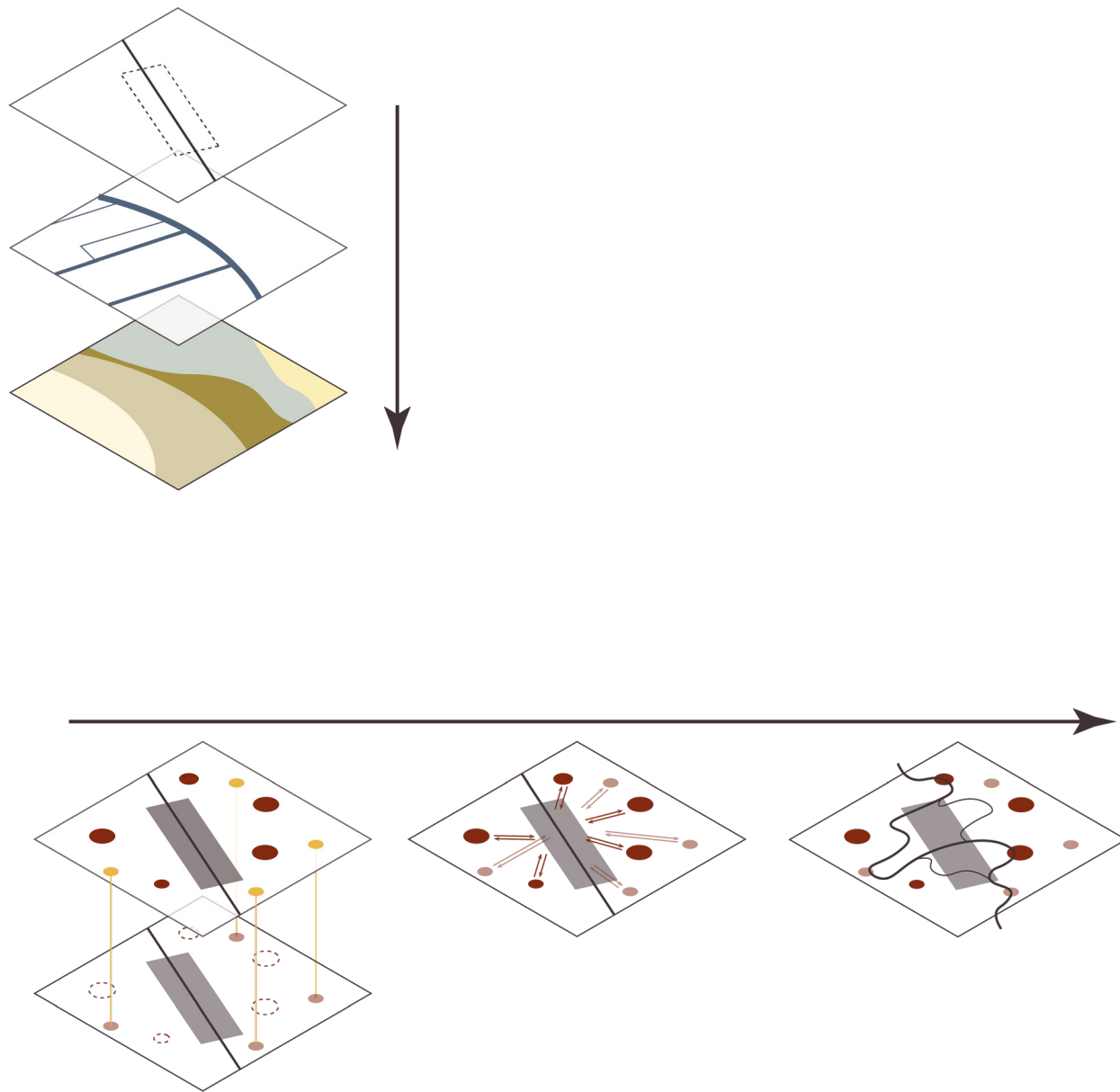


Figure 5.39: Collective Memory from Regional Visitors' Perspective
Made by Author

5.5_FURTHER RECONNECTIONS



To reconnect to the heritage, it can be achieved through two kinds of practice.

The first one is based on the vertical components, like soil layers and water system, soil differences can be interpreted as division or gradients, while water system can be interpreted as connection or cutoff. Site of landscape heritage is often bounded with these two, while they are often comprehended as environmental aspects, they also explain where the heritage comes from, so the vertical approach is the heritage led design practice.

The other practice is to look for surrounded heritages and socio features, what's concluded from this project is that socio aspect can also be the result or indication of some historical event, making it a secondary heritage. This will then lead to the relations between target heritage and others, releasing the target from isolation. By creating different kind of connections, it can be translated into spatial language, whether to link directly or create more subtle interactions.

Figure 5.40: Design Process Concluded from Pilot Design, "Reconnection" & "Heritage"
Made by Author

VI

C O M P L E T I O N

6.I_CONCLUSIONS

What are the kept and lost landscape on site?

As the most 'lost' landscape on site, Canal Corbulo was an indication for all the other lost landscapes in this area: the unstable coastal landscape destroys and keeps them deep. The kept landscapes on site are often the result of both low degree of urbanization and inner land that is further from sea, which points out the pressure from two sides. To keep the past landscape, mangement towards city and nature should be counterpart, instead of weighing one over another.

What and how ecological/social aspects can be revealed and developed after the discovery of Canal Corbulo?

Upon the discovery of Canal Corbulo, it takes this area's history of manmade landscape to a more ancient time, which largely enriched the variations of how people treat nature and landscape. It also reveals an urgent need to connect public with academic focus, which can be a strong force to help protect heritage itself. Research and design should be practiced as means to integrete Canal Corbulo with current

environmental challenges and social expectations.

How did the human-nature relations develop and what's the proposed future of it?

By designing a site for reflection, the history of human-landscape relationship was conveyed through a reformed scape, acting as a pause on the rapid development process. Each period in history is a negotiation between human and landscape, as time goes by, people are neglecting the voice from nature more often, and the fall of Canal Corbulo can be a warning to a possible collapse in the future. But if the reflection works, it will lead to a moderation between this intense situation, and allow more space for nature.

What kind of principles can be summarized to be applied onto similar heritage (e.g. the other parts of Lower German Limes) sites so that culture can be shared between different places and eras?

The integretion with surroundings will help heritage attach more to its location, which will

provide more site specifc experience for the visitors, instead of isolating the heritage, turning landdscape into an object. Landscape heritage, especially linear ones like Canal Corbulo, can be viewed as a cut through onto modern society, but designers should always bear in mind that heritage is always grounded with its context, despite the huge differences that are assigned by time. The practice in vertical dimension should be handled carefully, as it may harm the heritage itself, this would also be decided according to local materials.

How will Canal Corbulo changed under dynamic design in a coastal landscape area?

In the positive future, the design would live alongside with the coming generations, but there's also a possiblity that the environmental threats arrive too soon, that the design itself would be destroyed again by the unstable coastal landscape. In this matter, the story of Canal Corbulo is more important to be remembered and told than actually stayed in landscape. By preparing for both futures, integretion between social programs and sustainable materials are applied, no matter the future hu-

man-landscape story echoes with 'the landscape walk' or 'the sunken museum', there will always be a deep remark in collective memories.

6.2_REFLECTIONS

Relation Between Graduation Project, Flowscape and Urban Fabrics

The project Reconnected to An Ancient Canal is part of both Flowscape Studio from Landscape and Urban Fabric Studio from Urbanism. Flowscape offers a profound understanding on how the landscape developed not only in time but also in scales, the natural – cultural – urban landscape layer approach is an essential in almost every landscape projects, especially when my project is related to heritage, the changes through time is the starting point and also a featured tools to investigate a new place.

Based on such grand narratives from the perspective of landscape, Urban Fabric Studio offers an insight into society, the combination between two however is not included under a systematic guideline, so there was much space for the students to explore, to argue from different aspect and finally reach a proposal: the reconnection is not only between collective memories from different times, but also between the everchanging relationship of human and nature.

Research and Design

Research and design went through the whole process of this thesis. One may take the lead over another at some certain stages, but they are always a great inspector for each other, this has led to the close collaboration between two. Research in this thesis covers more transdisciplinary knowledge like archeology and ecology, while the latter one has always been a strong tool for landscape designers, the former one is also more closely connected to ecology and society than expected. The research stage is not only about how the site looks now, but also how it has come to this, what affected its development path and what essence was kept from ancient times.

Design is not a savior for societal problems, to what extent it can do has been a discussion through the thesis. While the goals might be ambitious, design itself only act as an imitation, an indicator and a starting point. By focusing on the representation of heritage, design should be able to enhance the experience of getting to know a place and its history, and furthermore, to help create a new collective memory and civil life.

The collaboration of research and design conducts analysis, synthesis, perception, evaluation and reflection. During which the research sometimes takes more control because there are always so many new knowledge to stimulate the brainwork, the ideas spread out and it took quite a strength to form a simple and coherent narrative.

Method and Approach

Method and approaches varies in different stages of thesis. During research, charted diagram often helps make the clues clear, there has been some new inventions on diagrams, it's also part of the exploration that happened due to transdisciplinary. Mapping on the other hand connects analysis with design, it offers solid background information for certain sites, which can convert literal understanding into landscape design.

Heritage and Social Importance

Heritage often pops up during landscape projects, but stating it as a main focus means other aspects need to provide for heritage in the end, it's mutual benefits but still the design changes revolving around 'Heritage'. While this heritage is under the Roman Empire topic, as the far west border of a strong empire, Netherlands then did not participate much in power politics but more focused on civilization life. This is normal and maybe plain in some opinions but also much more consistent than geo-politics, and this is where all the connections come together in the first place.

To connect to heritage can offer an anchor for modern society, because it answers the classic question 'where do we come from' in a sense. Now with more and more virtual reality in daily life, it's easy to fall into nihilism, and the physically nicer environment can keep people's feet on the ground.

Limitation

The influence on society is a long and unpredictable process, this project is now focusing on proposing a nicer environment and a connection to ancestors, whether it's always good for people or whether people are willing to accept it still remains a question.

To include the societal perspective entirely, this project still needs to propose plans and negotiate with local stakeholders, and more detailed and precise design on ecology / playground instrument will call for experts from other field.

Lesson Learned

This research by design project has been a thorough inspect on the skills I've obtained, what makes heritage a heritage, how to present heritage to the public who have little knowledge of, and on what level that design can be of help has been the lesson I learned. The exploring process has taught me that landscape will always need to work with multidisciplinary, so it's important to know how to interact with experts from other fields like archeology, and also make the most of the work they have done, and how designers should always go back to landscape and see if all the questions have been answered.

Integration is another skill to master between different disciplines, the translation from one to another can be easily lost and when that happens, the spatial quality are the guiding light through the mass information.

Research and design can never really be over, and it is not a linear process, I always jump back and forth, or wondering around these two to see whether there can be another breakthrough. It's significant to stay consistent to the initial fascination, but it's also necessary to realign yourself over and over again.

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