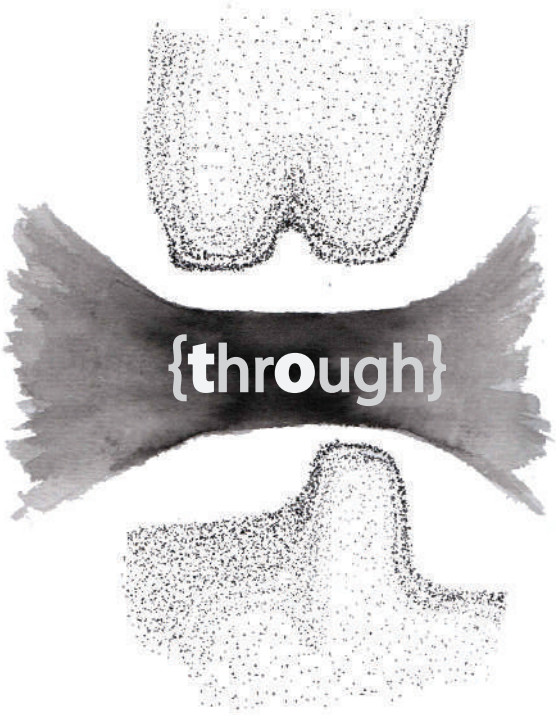
Returning {through} the origin



The gateway to Pretoria

Roan de Wet

Returning {**t**hr**o**ugh} the origin

A cultural project at the origins of Pretoria
A physical and symbolic gateway to the genesis of a city.
A critique on the lost, once integral, relationship with the natural.

Facilitating an extension of the natural threshold to allow nature to penetrate from the peripheries of the city, through a bio-integration of infrastructures to mediate between urban and nature. Through a middle ground natural resources facility, offering development through recreation and education.

Author:
Roan de Wet

Submitted in fulfilment of part of the requirements of the degree
Master of Architecture (Professional)
in the
Faculty of Engineering, Built Environment and Information Technology
University of Pretoria

November 2019

Course Coordinator:
Prof. Arthur Barker

Study Leader:
Abre Crafford

Project summary

Address
271 Willow Road Pretoria Central

GPS Coordinates
25°45'43.7"S 28°11'44.1"E

Programme
Natural Resources Facility

Research Field
Heritage and Cultural Landscapes

Client
City of Tshwane
UNISA

Declaration

In accordance with Regulation 4 (c) of the General Regulations (G.57) for dissertations and theses, I declare that this thesis, which I hereby submit for the degree Master of Architecture)Professional) at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution. I further state that no part of my thesis has already been, or is currently being, submitted for any such degree, diploma or other qualification.

I further declare that this thesis is substantially my own work. Where reference is made to the works of others, the extent to which that work has been used is indicated and fully acknowledged in text and list of references.

Abstract

A long-standing problem has been that humans have removed themselves from the natural lifecycle and are, therefore, acting in a dominant role, allowing the anthropogenic to overshadow the ecological. The lost relationship with nature is accentuated by our railways and highways, connecting people on a large scale, but isolating and homogenizing environments on a more intimate scale. The "green" infrastructure is suppressed and seen as an afterthought.

This dissertation explores the potential for a bio-integration of infrastructures to assist in defining the space, currently in disarray, surrounding the chosen site at the Southern gateway to the city of Pretoria. This gateway is the only entrance to the city with a neigbouring nature reserve (Groenkloof) and, therefore, deemed a suitable site to facilitate an extension of the natural threshold. This will allow nature to penetrate from the peripheries of the city, by addressing the rigid boundaries created by grey infrastructure and envisioning ways to bio-integrate these.

The highway running through the gateway (Nelson Mandela Drive) will be developed as a celebratory route, on the basis of existing city frameworks. Therefore, my scheme will focus on recreation and handcraft skills development as a means to establish a lasting relationship with the natural and take advantage of the rich cultural history and strong educational presence of the area.

The project I am proposing is a natural resources training facility. It will serve as a critique on the lost, once integral, relationship with the natural, manifesting as a physical and symbolic gateway to the genesis of a city. The objective is to explore how architecture can biointegrate the different layers of a city to restore the equilibrium in the relationship between humans and nature and thereby contributing to the ecological health of a city. A city infrastructural rethinking, where architecture can become a green infrastructural asset to the city.

The landscape, through its mountains, valleys and rivers, will act as a practical and moral guide to the users of the city. A positive, sustainable relationship and education surrounding environmental literacy will be promoted by exposing ecological systems, specifically that of water, for what they are and could be.

The existing spatial boundary between nature and urban will be re-envisioned to allow overlapping and a blur between the two, through the introduction of a series of smaller thresholds, morphing the urban with the natural. The newly invigorated natural relationship will serve to offer a sense of identity to the city dweller; an identity found in the natural and the origins of the city.

Thank you

To my family for the support throughout this difficult year

To Jean for the encouragement and the editing of my work

To Abre for the assistance and guidance.

To Arthur for the reassurance

To my Heavenly Father for giving me the strength to persist and the opportunity to delve deeper.

Contents

List of figures

List of figures

List of figures

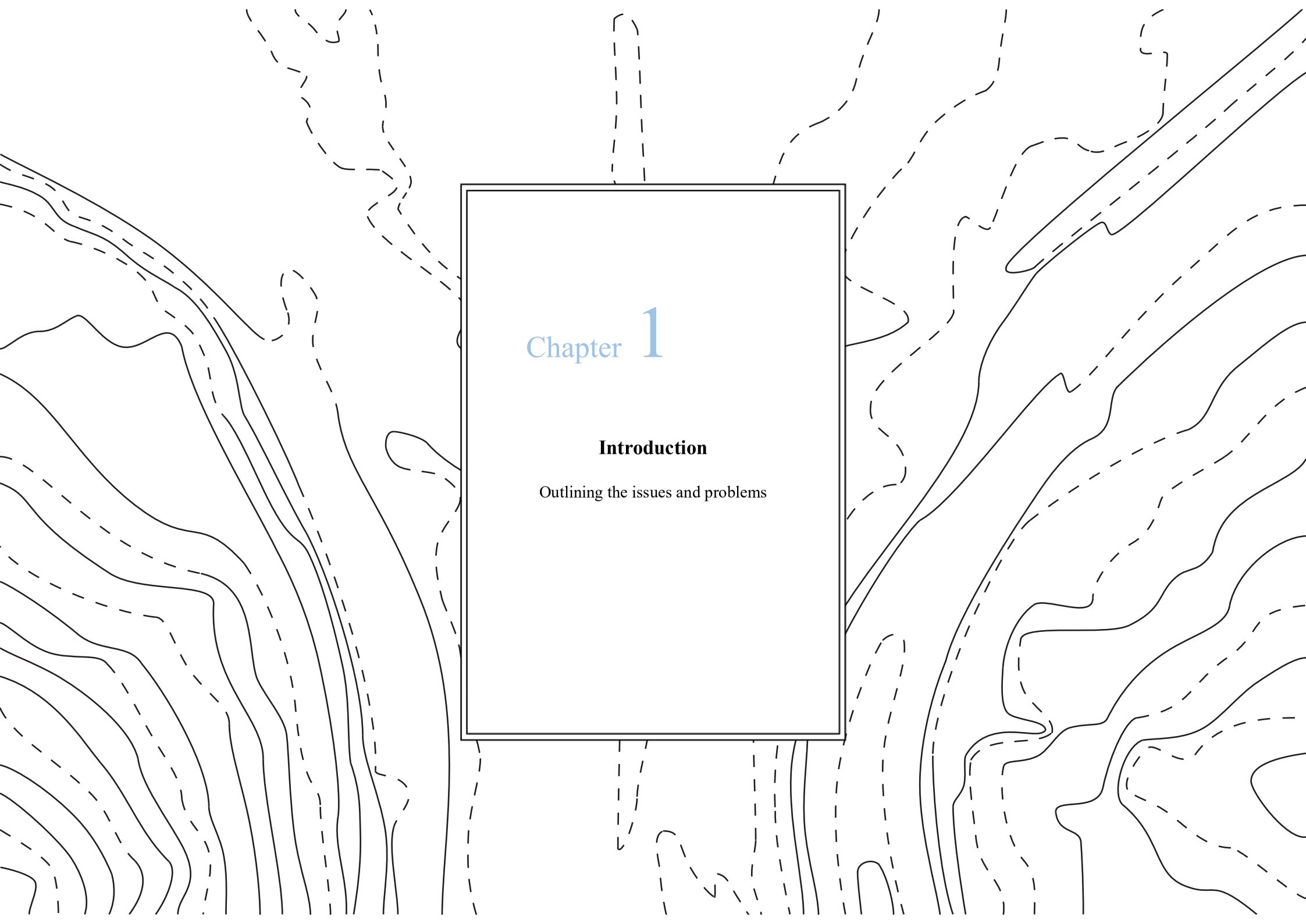
Chapter 8

Chapter 9

All diagrams and figures not referenced can be assumed to be created by the author

Abbreviations:

ZAR – Zuid Afrikaansche Republiek
NZASM – Nedrlandsche Zuid-Afrikaansche Spoorwegmaatschappij
GNR – Groenkloof Nature Reserve



Chapter 1

Introduction

Outlining the issues and problems

Human-Nature relationship imbalance

Global issue

Figure 1.1: Left: City-Nature boundary (Unknown source, 2019)
Figure 1.2: Middle: Industry in smoke cloud (Unknown source, 2019)
Figure 1.3: Right: Industry dominating the natural (Unknown source, 2019)

According to Kosoy (2012), the technological age has seen nature shifted into the position of largely being used for the benefit of people. Any environmental problem is seen as fixable through technology. Climate change, loss of biodiversity, desertification and the disruption of natural lifecycles are the causes of our disregard for nature and its ecosystems.

The crisis of our deteriorating natural environment has already seen the dwindling of biodiversity at nearly all geographic locations of the past century. This scenario threatens to eradicate our evolutionary inheritance and cause irreversible damage to our everyday human experience, now and for our future generations. The responses to reduce the rate of destruction of these threats to our biodiversity and ecosystem function loss, have largely been unsuccessful.

The atmosphere is struggling to absorb the large amounts of gases emitted into the air daily. The oceans are chemically changing and facing overfishing past the point of recovery. This is only a glimpse of the damage we are causing to the environment.

According to Kosoy, there have been several attempts to address the issues at hand by developing mechanisms to combat the human-driven environmental degradation. The green economy is seen as one of the potential mechanisms to value eco-system services and internalize the cost of externalities. Green economy is defined as an economy that focusses on improving human well-being and social equity, while reducing or eradicating environmental risks and ecological resource depletion.

Therefore, the need for addressing and developing an economy that prioritizes a flourishing Earth is more evident than ever before. The illusion of unlimited growth or believing in technological miracles is showing itself to be unrealistic when confronted with our thermodynamic reality. It is our responsibility as humanity to rethink our economic goals in realistic relation to the Earth's limits (Kosoy, 2012).

Lost relationship with the natural

Local issue

Figure 1.4: Left: Quarry exposing water (Unknown source, 2019)
Figure 1.5: Middle: Natural extraction (Unknown source, 2019)
Figure 1.6: Right: Plastic pollution (Unknown source, 2019)

South Africa's (SA.'s) admittance to the BRICS (Brazil, Russia, India, China, South Africa) association has highlighted the fact that the rest of the countries in the association, see the demographic opportunity of SA as the gateway to the rest of Africa. Hart (2013) claims that SA's economy is dwarfed by size and less dynamic than those of China or Brazil. The discovery of diamonds in Kimberley in 1868 and of gold in the Rand around the same time, propelled SA as a major exporter of precious minerals since the 1870s. From the 1880s onwards, for three decades, SA participated in globalisation driven by imperial rivalry and haute finance (Polanyi 1944), both orchestrated by Britain. Cecil Rhodes and the British planned to conquer the African continent from the Cape to Cairo. After the Boer war, the British placed a large part of their global and private investments into SA's infrastructure.

The mine owners needed stable political and economic conditions and felt that the Boer government of the Transvaal did not guarantee this. The weakness of elite farmers and a lack of industrial opportunities led to the concentration on the SA economy around mining (Hart, 2013). The need to rethink and redesign our infrastructure ecologically, has become imperative.

Ecological design is defined by Orr (2001) as the careful meshing of human purposes with the larger patterns and flows of the natural world and the interpretation of those patterns and flows to inform our human actions. When designing ecologically, we are continually instructed by the fabric of our everyday life. Pedagogy informs our infrastructure, which in turn informs us. Ecologically designed communities become a tool to teach about land-use, landscapes and human connections, while the restoration of wildlife corridors and habitats becomes a way of engaging with animals.

The main aim of ecological design then becomes a way to expand our awareness of nature and ecological competence. The Philosopher, Bruce Wilshere (2001) writes that, "we have encased ourselves in controlled environments, called building and cities. Strapped into machines, we speed from place to place whenever desired, typically, only slightly knowing any particular place and its regenerative rhythms and prospects." We have alienated ourselves from nature that formed our needs over millions of years, resulting in alienation from ourselves. This has led to the deprivation of one of our primal needs as organisms, namely, to engage with nature. We now find ourselves in an alienated world of our own making, separated from the cycles of nature. Ecological design aims to reconnect us, as sensuous beings, to a sensuous and living world. A world that does not need to be remade, but rather revealed.

Suppressed green infrastructure

Architectural issue

Figure 1.7: Left: Highways through vegetation (Unknown source, 2019)
Figure 1.8: Middle: Grey infrastructure suppressing green infrastructure (Unknown source, 2019)
Figure 1.9: Right: Cut in the earth by a road (Unknown source, 2019

Historically, there have been proponents of the idea of ecologically prioritised designas has been revealed in literature. One such example is Ebenezer Howard and his idea of the "garden city" (1968), which would focused on the incorporation of green open spaces in the form of gardens and parks and the preserved natural landscape. In the 1960's, Jane Jacobs focused on the idea of including elements of the "neighbourhood" in her planning. The community space, was the space where multi-functional space and short travelling distances were emphasized (Shu-Yang, 2004). Ian McHarg (1967) advocated that ecological systems, evident in the natural landscape, should become the central core of decision making towards human involvement with land development.

Research questions

Main questions

1. How can architecture biointegrate the different infrastructural layers of a city to restore the equilibrium in the relationship between humans and nature?

2. How can architecture act as a green infrastructural asset and contribute to the ecological health of the city?

3. In which ways could architecture rekindle a relationship with a natural resource, which was integral to a city's genesis?

Sub questions

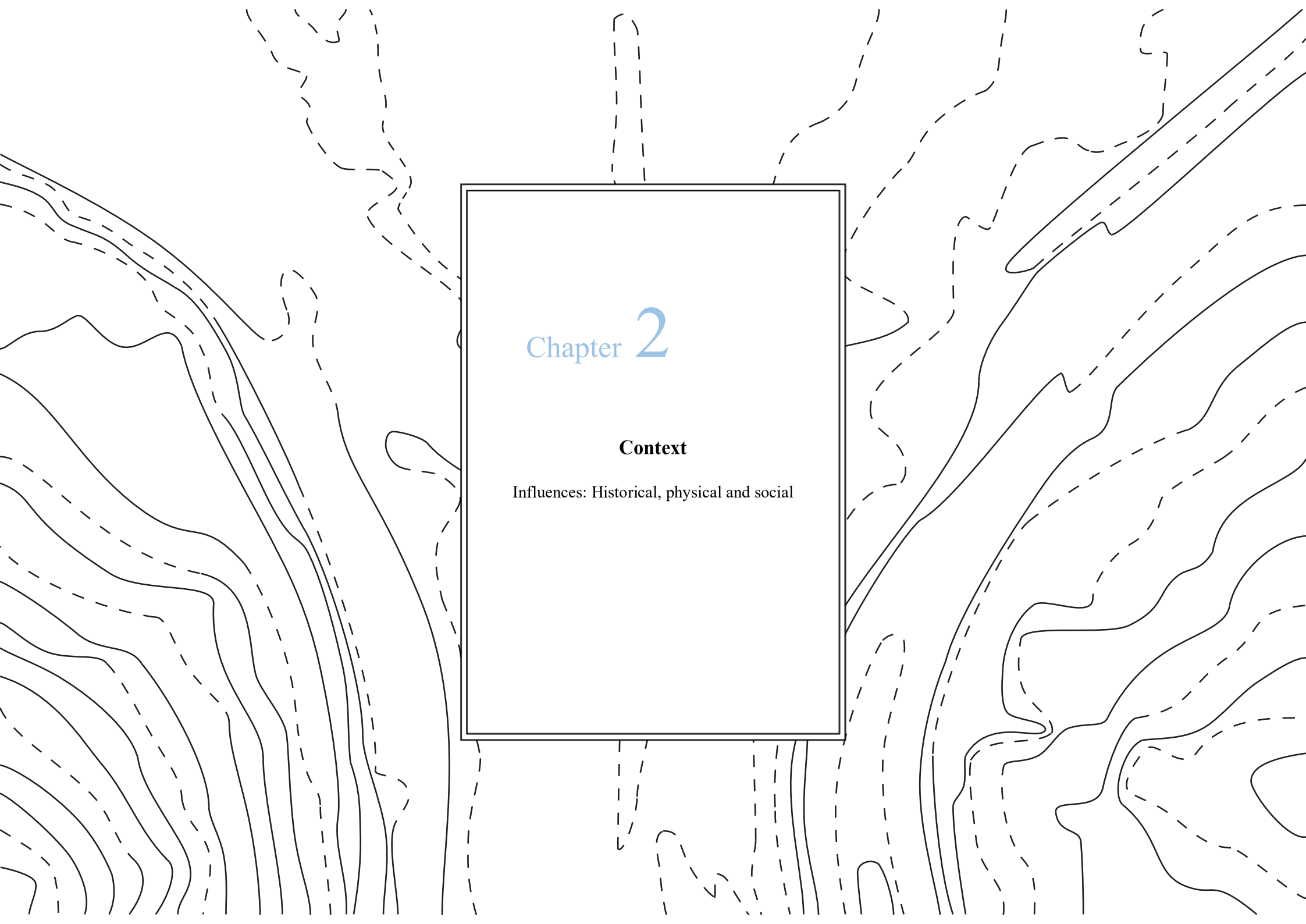
1. To what extent can the positive display and education surrounding natural materials have the capacity to change public perceptions surrounding the natural environment?

2. How can architecture extend and bend the boundaries between urban and natural environments?

3. How effective will a recreational facility be as a bridge to mediate between high density residential, sport facilities, public park and nature reserve?

Research methodology

This dissertation will offer a brief history of Pretoria's origin and highlight the integral role nature has played in its genesis. Unfortunately, the role has now largely become lost through the development of the city and the implementation of a rigid city grid system on a natural landscape. The dissertation will explore the biointegration of infrastructures to allow the urban citizen to rekindle an active relationship with the natural. The Apies river will be "deconstructed" to allow the public to establish a lasting relationship with the natural once again. A solution will be offered on how to deal with the coming together of two different orientating grid layouts, leading to an isolated nature reserve, on the edge of Pretoria CBD, the physical and symbolic origin of the city. Green infrastructure and its role as mediatior from urban to natural will be discussed as a means to ease the transition of people living in homogenous high-density residential areas to that in a nature reserve.



Chapter 2

Context

Influences: Historical, physical and social

The Genesis of Pretoria

Natural – Agricultural Settlement - Town

According to van der Vyver, (2015), in order to understand the significant role the natural environment has played in the Genesis of Pretoria, the evolution of the area needs to be investigated. The area of Pretoria evolved from a natural environment, to an agricultural settlement, before it was established as a town and the capital city of the country. The first remnants of human activity in the area, dates back as far as 2000BCE. Stone Age and Iron Age groups moved through and temporarily settled in the area. Activity areas, classified as workshops, were found on the embankments of the Apies river, overlooking the valley and the river in Groenkloof Nature Reserve.

A Late Iron Age Moloko[1] potsherd was also found in a cave in the reserve. In the 1600's the Southern Transvaal Ndebele tribe occupied the area. They were in all likeliness the first people to see the potential of the river valley, which later became Pretoria, as a suitable place in which to reside. In the 1820's Mzilikazi, breakaway Zulu chief who founded the Matabele tribe, arrived in the area. He slaughtered the Bakwena tribe, who had already driven the San people out of the area (van Vollenhoven, 2008).

Furthermore, van der Vyver continues to explain that during the Difaqane[2], Mzilikazi built two military kraals on the banks of the Apies river. In 1836 he launched an attack on the Potgieter Trek. The Voortrekkers retaliated in 1837 and Mzilikazi fled to Limpopo. 1840 marks the period when Pretoria transformed from a natural environment to an agricultural settlement, established by Lucas and Gert Bronkhorst. Lucas built his house at the origins of the Apies River, and the Fountains were known for years as the Bronkhorst fountains. Voortrekkers initially settled on farms and not in towns. The towns however, developed around the settlements to support the farming community. These were either government sponsored or church towns (Floyd, 196; van der Vyver, 2015). Marthinus Wessel Pretorius and Piet Potgieter suggested that the Volksraad be moved to a single location in the middle of the country and deemed Elandspoort as a suitable location for establishing this new town.

Pretorius then bought the farms of Prinsloo, van der Walt and Bronkhorst on the banks of the Apies River (van der Vyver, 2015). Pretorius made many attempts at establishing the new town, but farmers further down the river objected.

The Volksraad hesitated to permit the establishment of a new town with its financial implications. Only after Pretorius concentrated his efforts of establishing a new town through the church, did he become successful (van der Vyver, 2015). In November 1853, Elandspoort and Koedoespoort were declared a town, known as Pretoria Philadelphia. The official date recorded is 1855, when the Volksraad gave its permission for establishing a town. The construction of a church began in 1856. The Dutch Reformed church needed a large space for "nachtmaal" meetings, attended by widely dispersed farmers. Church square was then formed.

The Genesis of Pretoria

Town – Capital City

The next series of events marks the beginning of the deterioration of the relationship between humans and the natural. In 1857 A.F. du Toit commenced the process of setting out the rigid city grid, with Church square as the starting point. Du toit used an east-west, north-south axis to lay out the first city blocks (Kraehmer, 1978; van der Vyver, 2015). The road layout followed the same orientation and did not respond to any actual requirements and lines between different points of interest in the city. The result was a grid pattern with no natural considerations and one that ignored topography. The grid pattern was even imposed on steep ridges (Kraehmer, 1978; van der Vyver, 2015). The ridges, valley and river, which were so integral to the Genesis of the city were dominated by the rigid grid layout, resulting in the natural landscape being changed forever. The basic principle for applying a grid pattern, was water. This is evident in the copying of the water system used in other Voortrekker towns and defending the grid as it had a “civilized” status attached to it.

In 1860 Pretoria became the capital city and the seat of government.

At this stage of the evolution, the city began to expand rapidly and most city development decisions were made in the name of progression. This manner of thinking could be seen in the decision to channelize the Apies River, after a flood occurred in 1880. Visual connection with the river was lost in 1890, when a weir was constructed to feed water along the streets (Peres, 2015). The separation of man and nature was accentuated by the creation of a physical boundary between the city and the natural, when the Nederlandsche Zuid-Afrikaansche Spoorwegmaatschappij (NZASM) railway was built in 1893. The railway was the answer for the Zuid Afrikaansche Republiek (ZAR) to establish an independent link to a port in Delagoa Bay that was not occupied by the British. The ZAR saw the importance of having a relationship with the pristine natural, when president Paul Kruger proclaimed Groenkloof a protected nature reserve. This was the first nature sanctuary in South Africa (van Vollenhoven, 2005).

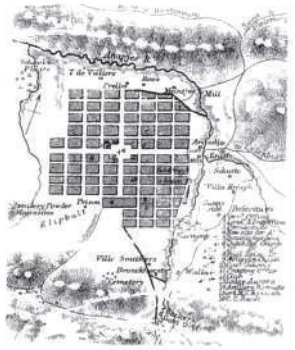
The diagram on the following page visually depicts the Genesis of Pretoria and its relation to the natural.

The Genesis of Pretoria and its relationship with the natural

The lost relationship between people and the natural

Du Toit pegged the city's first blocks orientated east-west and north-south (Kraehmer 1978:9). The road layout was not organic and did not cater for actual requirements and lines between different points of interest in the city. This resulted in a grid pattern that ignores topography and other natural considerations. The grid pattern went as far as imposing itself on steep ridges (Kraehmer, 1978:10; van der Vyver, 2015).

This is the beginning of the deterioration of the relationship between humans and the natural. The ridges, valley and river, which was so integral for the genesis of the city is dominated by the rigid grid layout. Resulting in the natural landscape changed forever.



(source: Van der Waal Collection) - van der Vyver, 2015

2000 BCE | 1600 | 1836 | 1840 | 1855 | 1860 | 1880 | 1895

Natural

Natural springs leading into Apies River


Fountains Valley natural spring - IMIESA, 2012

Stone Age and Iron Age groups of people moved through and temporarily settled in the area

Moloko potcherd found in a cave at Groenkloof Nature Reserve. Moloko is an Iron Age pottery style linked to proto Sotho-Tswane people.

Southern Transvaal Ndebele tribe occupied the area.

The Ndebele were in al likeliness the first people to recognise the suitability of the river valley, which later became the city of Pretoria.
In the 1820's Mzilikazi, breakaway Zulu chief who founded the Matabele nation arrived in this area and slaughtered the Bakwena tribe, who in turn already drove the San people out (A.C. van Vollenhoven, 2008).


Mzilikazi

Image source : http://www.umthwakazireview.com/index-id-news-dk-545.html

Mzilikazi built two military kraals on the Apies River during the Difecane (1820 - 1832).

In 1836 Mzilikazi launched an attack on the Potgieter Trek.
In 1837 the Voortrekkers retaliated and Mzilikazi fled to Limpopo (van der Vyver, 2015).

Lucas and Gert Bronkhorst establishes an Agricultural Settlement.

"Voortrekkers initially settled on farms and not in towns, but the Boer towns developed to serve the farming community - either government sponsered or church towns" (Floyd, 196; van der Vyver, 2015).

Marthinus Wessel Pretorius and Piet Potgieter requested that the Volksraad be moved to a single location, situated in the middle of the country.
Pretorius suggested Elansdspoort as a suitable location for a new town.
Pretorius then bought the farms of Prinsloo, van der Walt, and Bronkhorst on the banks of the Apies River.

Pretorius had many attempts at establishing the new town objected by farmers further down the Apies River and by the Volksraad's hesitation on the idea of a new town and its financial implications.

Only after Pretorius concentrated his efforts of establishing a new town through the church, did he become successful.

Agricultural Settlement

Map showing the farmsteads of both Bronkhorst brothers and Andries van der Walt
(source: Van der Waal Collection) - van der Vyver, 2015

Elandspoort and Koedoespoort declared a town in November 1853, known as Pretoria Philadelphia.

1855 Volksraad gives its permission for establishing a town.


Map of Pretoria by A.F. du Toit, 1859
- (source: Allen, 1971:9) - van der Vyver, 2015

1857 A.F. du Toit commenced the process of setting out the city grid, starting at church square. The official date for the establishment of Pretoria Philadelphia is recorded as 1855.

1856 Construction of the church commenced. A large space was needed for "nachtmaal" meetings by members of the Dutch Reformed church, widely dispersed on surrounding farms. Thus, Church Square was formed.

Town

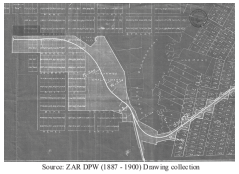
Pretoria becomes the capital and the seat of government.

The basic principle for applying a grid pattern, is water.
Copying the water system used in other Voortrekker towns. Another defense for the grid layout was the notion that it has a "civilised" status attached to it.

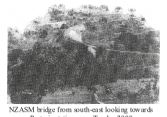

Apies River in flood 1897 Van der Waal Collection
University of Pretoria - van Tonder, 2008

After a flood in 1880, the decision was made to canalize the Apies River.

Visual connection with water was lost in 1890, when a weir was constructed to feed water along the streets.


Source: ZAR DPW (1887 - 1900) Drawing collection

Map showing the NZASM railway, built in 1893, folowing the contours of the ridges and creating a physical boundary between the city and the natural.

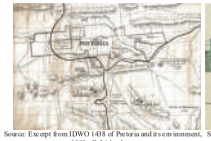

NZASM bridge from south-east looking towards Pretoria station - van Tonder, 2008

Capital city


Remnants of original water furrows at WF Nkomo street - Deppenaar, 2013


Groenkloof Nature Reserve - van Vollenhoven, 2008

President Paul Kruger proclaimed Groenkloof a protected nature reserve. The first nature sanctuary in South Africa.


Source: Excerpt from IDWO 1438 of Pretoria and its environment, 1899 - E. Liebenberg

Map showing the railway weaving around the ridges and through the gateway to the city.


Source: Plan of Pretoria as an inset on Jeppe's 1899 map of the Transvaal - E. Liebenberg

The River caused the shift in the city grid orientation towards the south gateway to the city.


NZASM bridge main next to the Apies River - Author, 2019

References used for diagram:
Botha, N. (2017). "THE STORY BEHIND THE ESTABLISHMENT AND THE NAMING OF THE TOWN OF PRETORIA AND THE DUBIOUS EXISTENCE OF A PERSON CALLED "TSHWANE"." SAJCH 31(1): 134-158.
Dippenaar, M. A. (2013). "Hydrogeological Heritage Overview: Pretoria's Fountains - Arteries of life."
Peres, E; Barker, A; Du Plessis, C. (2015). "Architecture for life: Exploring Regenerative and Resilience thinking" Architecture SA Jun/Feb(71).
SCHALKWYK, J. A. V. (1993). "'N ARGEOLOGIESE ONDERSOEK VAN DIE FONTEINEDALGEBIED, GELEË OP DIE PLAAS GROENKLOOF 358-JR, PRETORIA." National Cultural History Museum.
Tonder, L. v. (2008). "ACULTURAL HERITAGE MANAGEMENT PLAN FOR THE GROENKLOOF NATURE RESERVE., CITY OF TSHWANE."
Vollenhoven, A. C. v. (2005). "Die eerste blanke bewoner van die Pretoria-omgewing." SA Tydskrif vir Kultuurgeskiedenis.
Vyver, Y. v. d. (2015). "Situating Geography and the powers of Law, State and Church in the dynamic of Change that lead to the establishment of Pretoria." SAJAH 30(1): 151-171.
(2012). "Pretoria's fountains still the cleanest water around : water and wastewater." IMIESA 37(9).

Figure 2.1: Pretoria Genesis diagram (Author, 2019)

Southern Gateway to Pretoria CBD

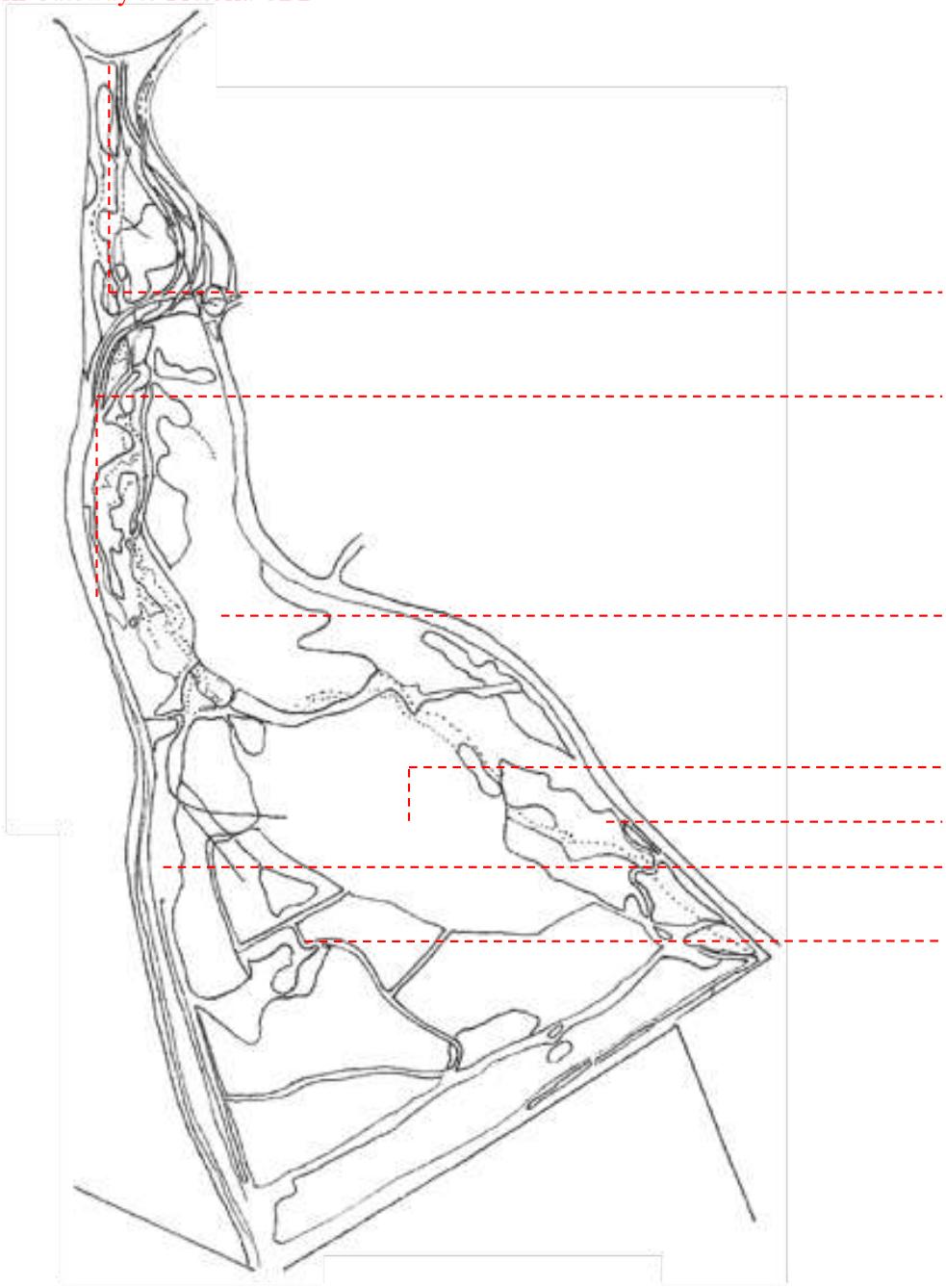


Figure 2.2: Map of Groenkloof Nature Reserve (van Tonder, 2008, edited by Author)

Groenkloof Nature Reserve – a cultural heritage resource

Findings and points of cultural and historic importance found in the Groenkloof Nature Reserve. Highlighting the fact that the reserve is a major underutilized asset to the city.

NZASM Bridge ruin

Pump station.
GPS: S25º 47'06.2";O28º11'39.9"

Bronkhorsthouse ruins. Stone and clay
GPS: S25º 47'11.9";O28º11'49.1"

Cave site. Definite prehistoric sheltering space. Moloko potsherd was found here. Educational and tourist potential is high as this site is one of few of this nature.
GPS: S25º 47'07.7";O28º11'55.6"

Finding 4 - GPS: S25º47'37.7";O28º12'24.1"

Finding 1 - GPS: S25º47'31.5";O28º12'48.2"

Finding 2 - GPS: S25º47'42.7";O28º11'49.4"

Finding 3 - GPS: S25º47'54.4";O28º12'12.7"

Context

Groenkloof Nature Reserve

Data have been presented in literature by J.A Van Schalkwyk (1993) that archeologists found objects and remnants of civilizations dating back to the Stone Age, approximately 120 000 years ago, in Groenkloof Nature Reserve. The reserve holds great tourist and educational potential and should be used as an asset to the city. The reserve stretches from the fountains valley all the way to the edge of the city, where it is cut off by a fence and the railway. The isolated and overgrown nature of the reserve has lured a vagrant element and some parts are considered as dangerous.

Figure 2.3: Photograph of the Northern edge of GNR (Author, 2019)

Railways and Highways

The chosen site for the project at the Southern gateway to the city is seen as an appropriate location to biointegrate the previously defined four infrastructures. The site is completely dominated by grey infrastructure through highways and railways separating the city from the nature reserve and creating isolated homogenous environments. The mighty Apies River has been demoted to the category of grey infrastructure by serving mainly as a stormwater channel. The opportunity exists to lift the green and blue infrastructures and allow them to take their rightful place in the working of the city.

Figure 2.4: Photograph of the Apies River and grey infrastructure at the Southern gateway (Author, 2019)

Transition and Flow

The Apies river caused a shift in the grid orientation towards the south gateway to the city. By applying Bernard Tschumi's point, line and surface principles on a larger scale, the site can be treated as an urban park. The goal is to mesh together the different orientated grid geometries to allow the green infrastructure to penetrate the threshold of the city. The project site will serve as the transition between urban and natural and allow the flow of water, people and green infrastructure to occur. Groundwater is usually a hidden resource, removed from the daily lives of the urban citizen. Dippenaar (2015) states the fact that Pretoria is a great example of a city using the groundwater for urban water supply. There is however a need for creating awareness and appreciation for the fountains valley's natural springs. The deconstructing of the Apies River canal will allow the urban citizens to rekindle a relationship with the water once again and create awareness surrounding this natural asset.

Latent potential of the gateway

Figure 2.5: Site diagram illustrating the green belt at the gateway

The diagram illustrates the green flow being constricted by the bottleneck caused by the ridges when entering the city. The railway clearly serves as a boundary to a physical connection to the nature reserve.

The canalized Apies river is dominated by the highway and bridged on more than one occasion. The latent potential of creating a physical and symbolic connection to the nature reserve, with its rich cultural history, is clear and should be exploited.

Du Preezhoek

The photograph below shows historically significant remnants that were discovered or noted before construction of the Gautrain bridge commenced. Skeletal remains was found and concluded that they belonged to one of the pioneer farmer families that resided in the area. The poplar grove, also referred to in historic writings about the area, can still be seen today. The site clearly posses a rich heritage of varying value and serves as a tangible link to the past.

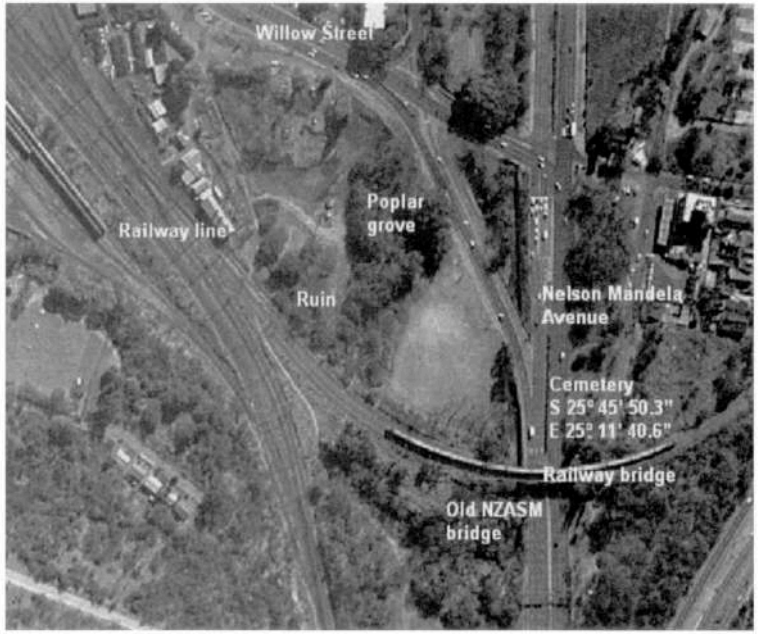


Figure 2.6: Aerial photograph of Du Preezhoek at the Southern gateway to the city (CSIR, 2015)

Latent potential of the gateway

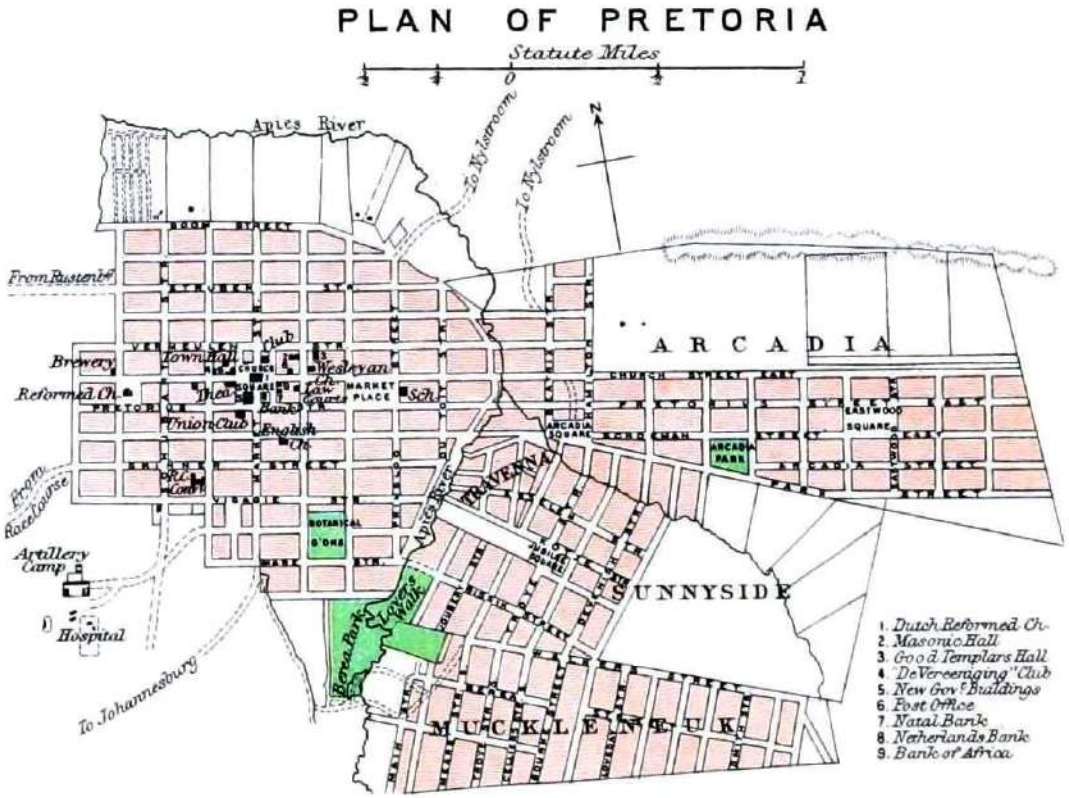


Figure 2.7: Plan of Pretoria (The Castle line atlas of South Africa, 1895)

Figure 2.8: Hand coloured picture postcard circa 1908 showing a horse tramcar crossing the Tram bridge over the Apies river en route to Sunnyside via Carol Hardijzer (www.theheritageportal.co.za, 2019)

The map shows the significance of the green belt as recreational space. The green area next to Berea Park sporting grounds is referred to as Lovers Walk. Burgers Park is referred to as Botanical garden. The green spaces in the city was seen as more than mere leftover space. They had function and were driven by events and activities.

The photograph above depicts the desired biointegration of infrastructures to create a balanced space. It highlights the massive latent potential of the lost relationship with the Apies River. There is a level of respect towards the way the river and space in general is treated. The crossing of the river does not overpower or inhibit the functioning of the flowing water and the possibilities it created for both humans and animals.

General open green space loss in Pretoria

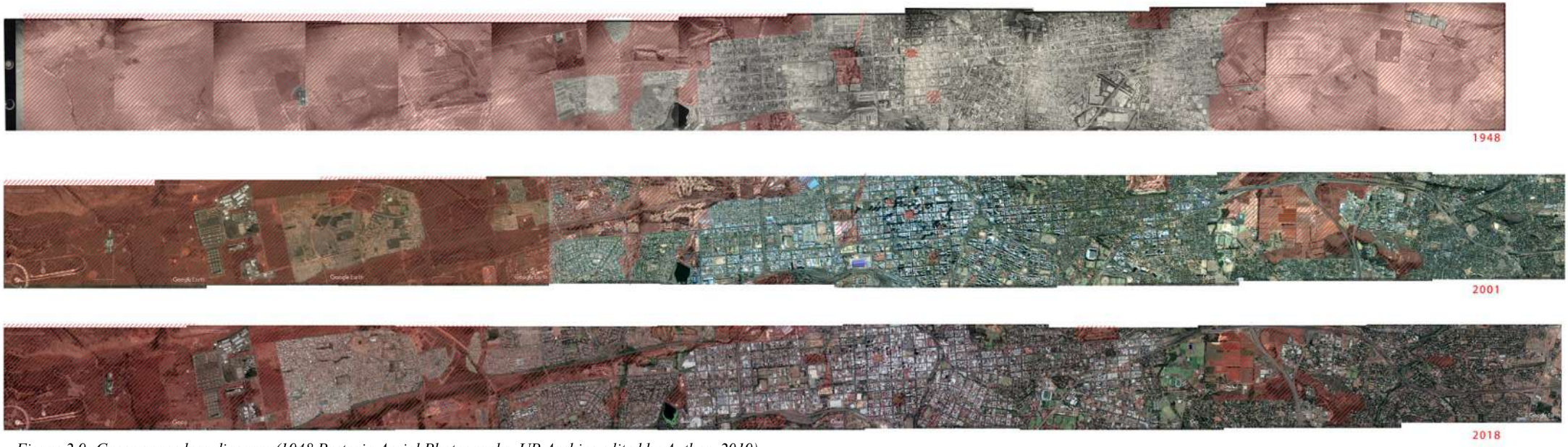
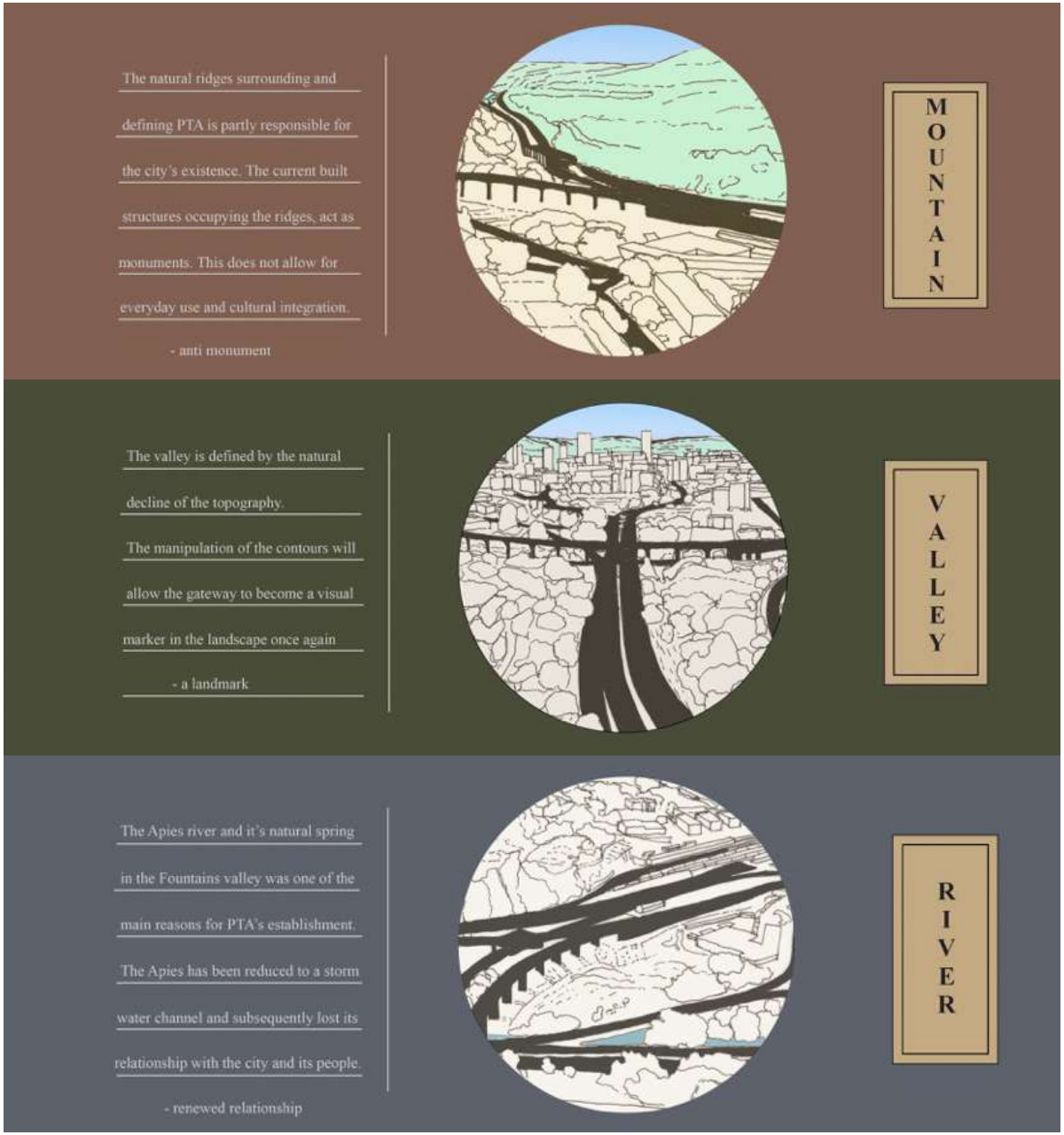


Figure 2.9: Green space loss diagram (1948 Pretoria Aerial Photographs, UP Archive edited by Author, 2019)

The aerial photography mapping indicates the decreasing of green spaces over 70 years from 1948 to 2018. The red hatching shows the green spaces still remaining. Agricultural land has been included as green spaces for this study. The results indicate that the city has expanded at the expense of open green spaces. The remaining green spaces have not taken priority and have been regarded as leftover spaces.

Natural phenomena of Pretoria



Pretoria is placed on a classical landscape. This sort of landscape is described by Norburg-Schulz (1980) as a landscape with strongly defined places with valleys and mountain ranges. The settlement's form is sympathetic to the landscape. Nature is allowed to exist on the fringes of the city while defining the boundaries of the city. Pretoria is an example of such a city and is further defined by its natural rivers and gateways (Jordaan, 1989). Many past plans, some partially realized, have not taken into consideration these natural principles. The rivers, once seen as natural boundaries, are covered and degraded to storm water channels.

David Adjaye (2011) describes Pretoria as "the only colonial city that presents a dual phenomenon." He furthers his explanation of Pretoria as an "explicitly European city in the middle of the Savanna that deals with the indigenous context as an afterthought." He emphasizes that colonial Pretoria probably has more squares surrounded by public buildings, than anywhere in Africa. This inward looking arrangement turns its back on the impressive landscape surrounding the city (Adjaye, 2011).

Figure 2.10: Pretoria natural phenomena diagrams (Author, 2019)

Natural phenomena

Occupying of the ridges – critique on the dominance of the natural

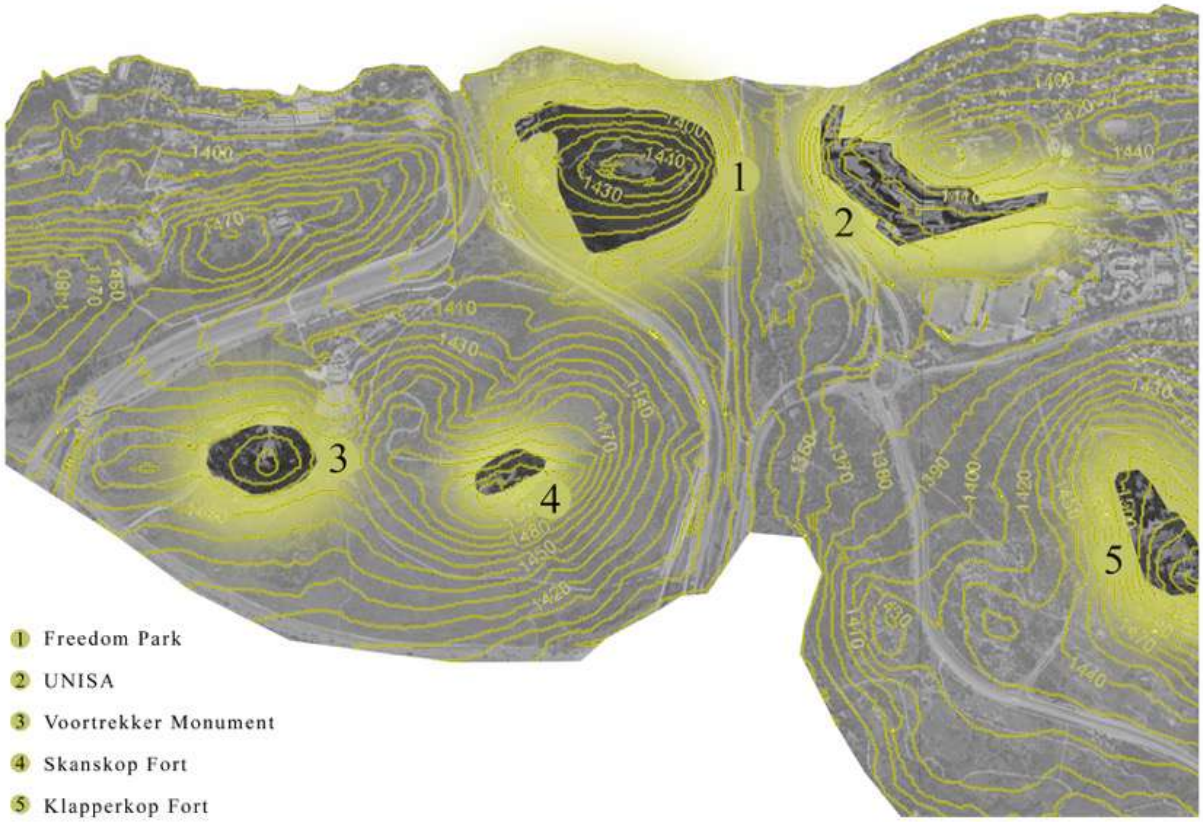


Figure 2.11: Natural dominance diagram (Author, 2019)

The natural hills and ridges have been occupied by a number of different political or military driven structures. They are playing a dominance game and further isolate the citizen from the natural. There should be a mind shift in the way the natural phenomena is treated and exploited to serve the political agenda of the time. The placing of a single structure on a hill and restricting accessibility, creates an isolated environment and can not continue to be the norm. It creates a separation between man and landscape, where the landscape merely serves as a podium.

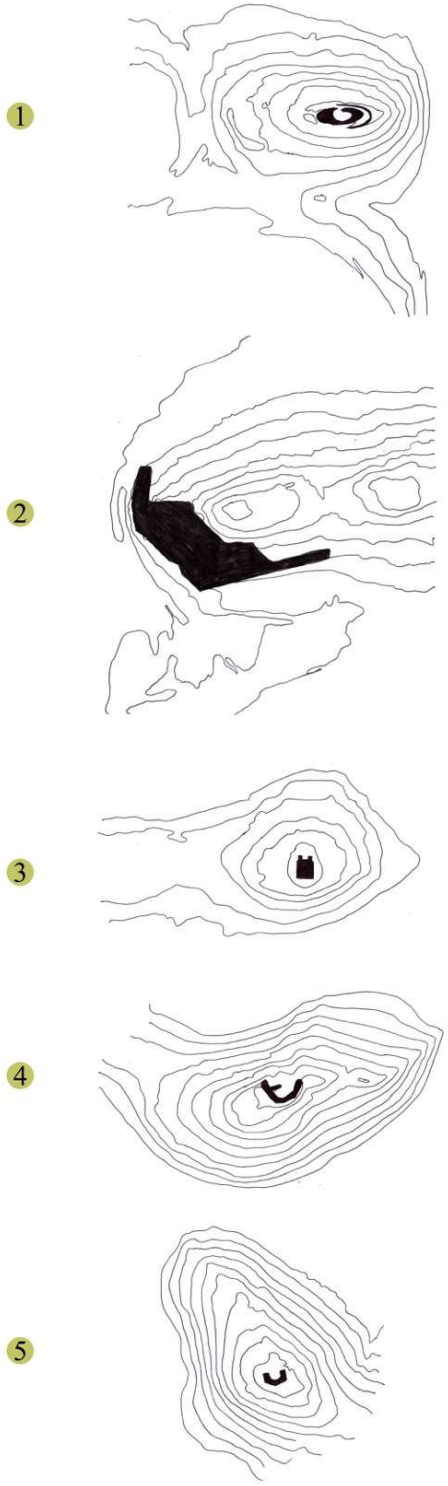


Figure 2.12: Ridge occupation diagrams (Author, 2019)

City Frameworks

Pretoria CBD frameworks

Figure 2.13: City of Tshwane restoration framework 3d (Arup, 2013)

The Arup framework strategy revolves around identifying strong social and economic activity zones. They then propose to focus energy and investment attention towards these zones to create high activity zones. These will in turn create change and transformation. They place focus on creating a walkable city and implementing a new rapid transport system. They propose that the green and recreational spaces will improve and form part of a green network running throughout the city. This will in turn mitigate the effects of climate change and create more livable environments.

Figure 2.14: City of Tshwane restoration framework masterplan (Arup, 2013)

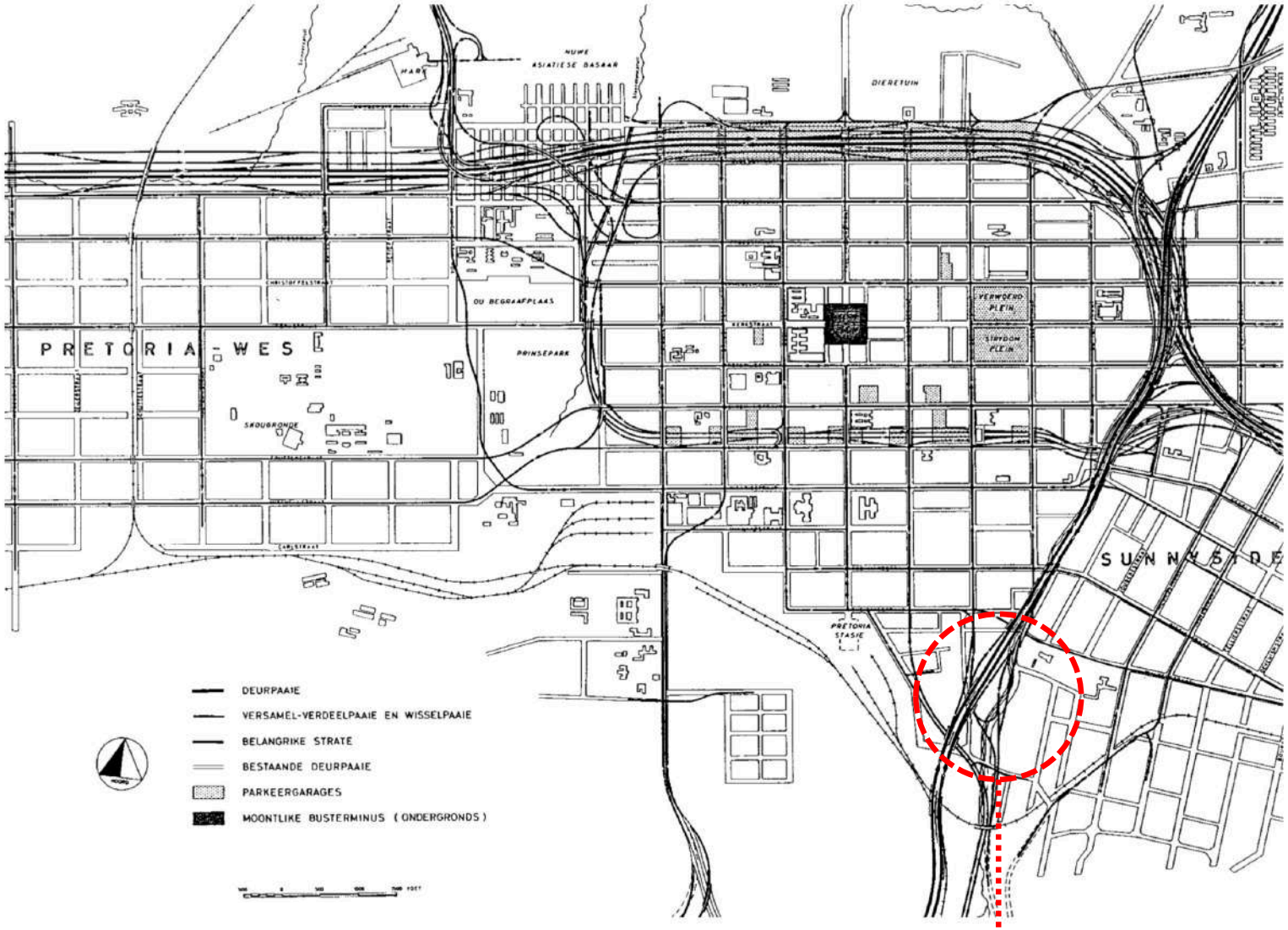
The Tshwane vision 2055 framework aims to create, compact urban form, promote ease of transportation, encourage better use of municipal infrastructure and restructure spatial from through urban design. The framework describes the city of Tshwane in 2055 as livable, resilient and inclusive. Citizens will have access to increased social, economic and political freedoms and have a high quality of life.

Tshwane open space framework focuses on creating a cohesive whole by connecting a series of open spaces. This framework categorizes the open spaces along a spectrum of soft/natural/green and hard/urban/brown. The soft end of the spectrum would be spaces with functions like a nature reserve, whereas the hard end would be spaces like a public square. The framework categorizes Nelson Mandela drive as a red way and states that developments adjacent to red ways must be of landmark quality. Further stating that commercial, retail , motor showroom and petrol filling station developments can not be supported here. The framework also has a similar strict guide for development surrounding gateways to the city.

All the frameworks consulted, place importance on the development of a connected green link that is walkable and given appropriate function to sustain activity and earn its rightful place in the city.

City Frameworks

Partially implemented ring road scheme



The 1967 Freeway scheme or ring road scheme was a partially implemented highway focused framework. The scheme proposed to have large areas demolished, such as Marabastad, to accommodate the large grey infrastructural additions. The scheme's remnants can still be seen today in roads such as Nana Sita road. The scheme would have demolished the open green space in my focus area, surrounding Berea Park. Adding more grey infrastructure to an already grey dominated area. The existence of the framework confirms the fact that through city development and in the name of progression, decisions to allow transport and freeways to dominate the city, were being made. This is in stark contrast to the pedestrian centered, green corridor focused frameworks that have been developed recently.

Figure 2.15: 1967 Proposed Freeway scheme, edited by Author, 2019)

Pretoria gateways/poorte

Ridges defining and controlling access to the city centre

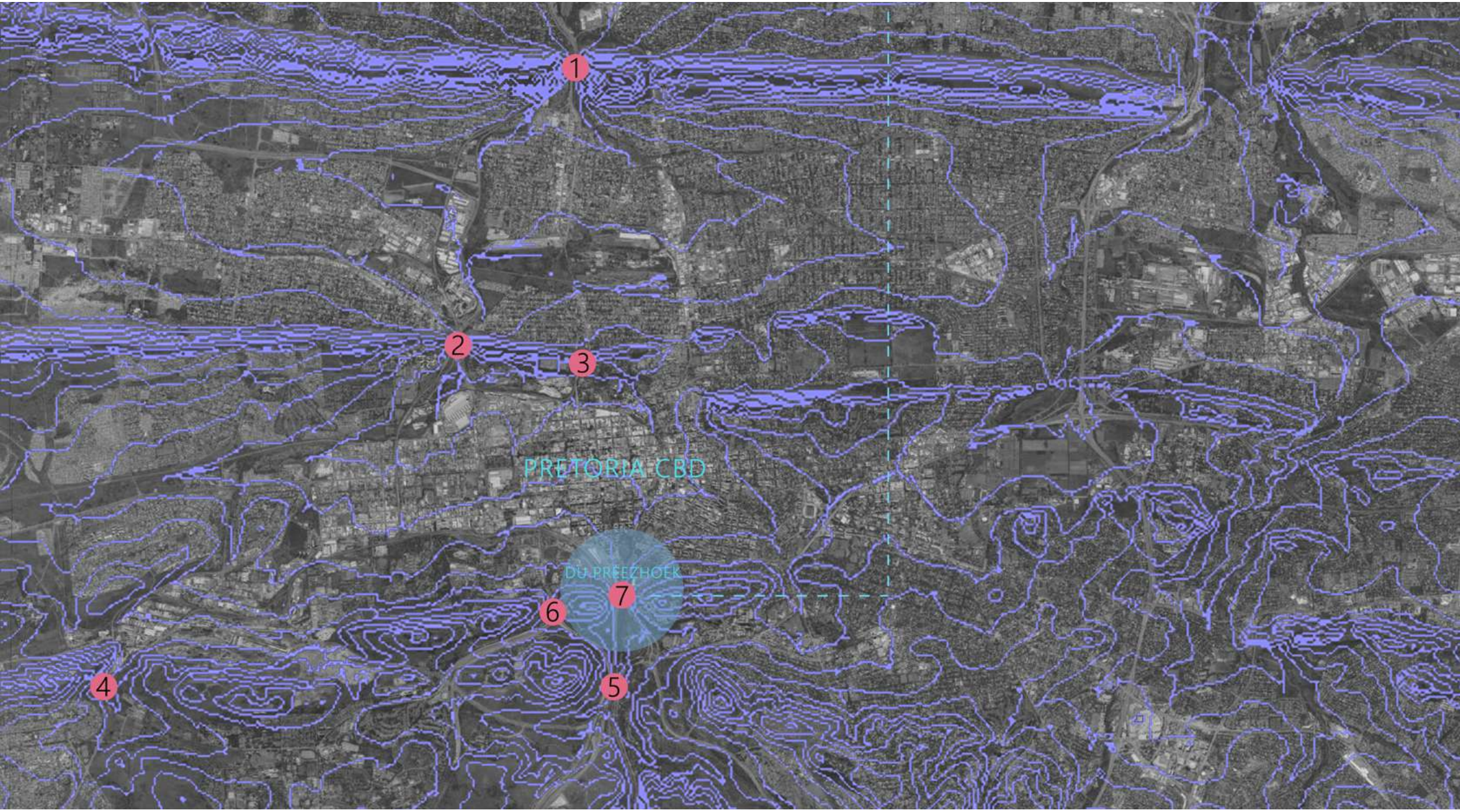


Figure 2.16: Pretoria gateways diagram (Author, 2019)

Pretoria gateways/poorte

Ridges defining and controlling access to the city centre

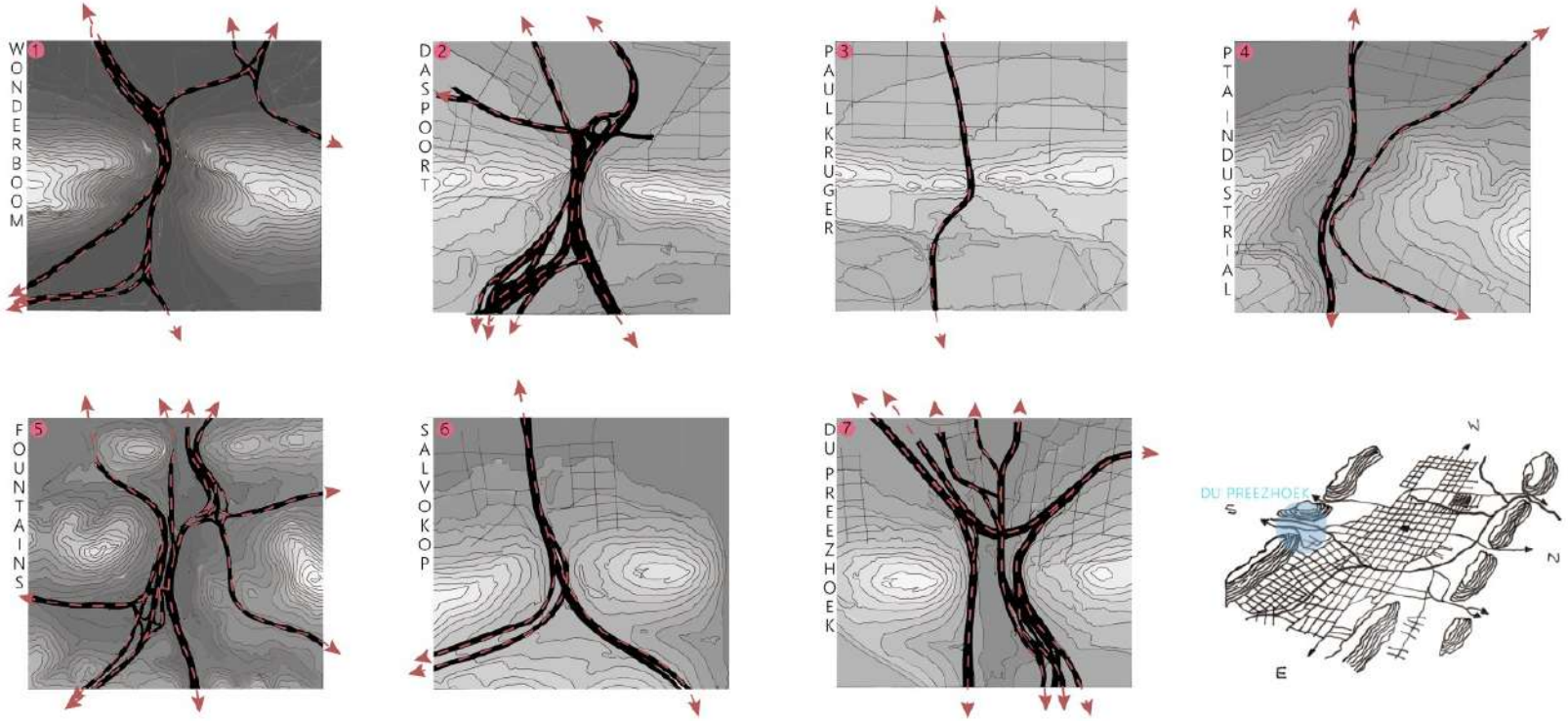
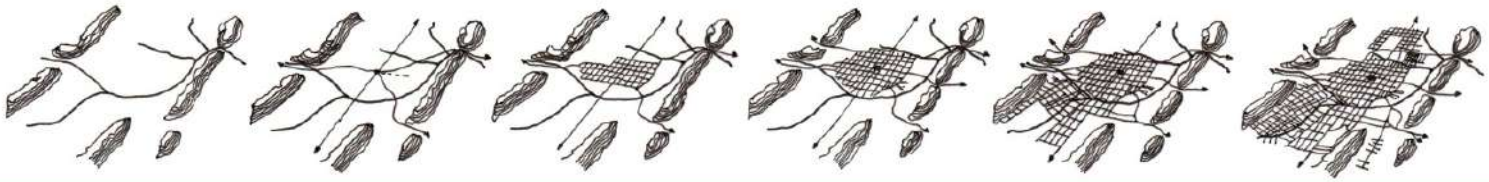


Figure 2.17: Pretoria gateways diagram (Author, 2019)



Pretoria city development

Figure 2.18: Pretoria development diagram (Jordaan 1989, adapted by Author)

Figure 2.19: First farmsteads (Van der Waal Collection, van der Vyver, 2015)

Map showing the farmsteads of both Bronkhorst brothers and Andries van der Walt in relation to church square. Natural features such as the Apies river and its source, Fountains, is shown along with Walkerspruit.

Chosen gateway/poort to re-introduce the nature-human connection. Southern gateway to the city, formerly known as Du Preezhoek. The gateway was selected because of its location as a potential mediator between the city and nature (Groenkloof Nature Reserve). The railway crossing the two ridges and the highway, serves as a boundary between city and beyond.

Pretoria's cartographical grid development

1859

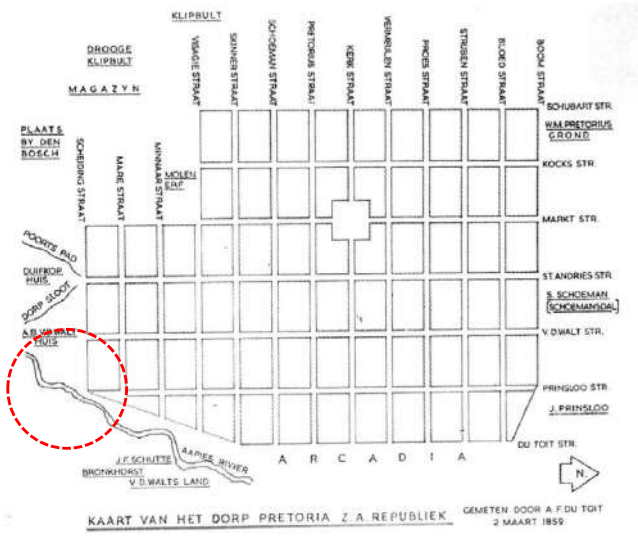


Figure 2.20: Map of Pretoria by A.F. du Toit, 1859 (Allen, 1971:9, van der Vyver, 2015

Both maps show the original farms and natural features on the fringes of the city. The emphasis is clearly on the superimposed grid system dominating the natural. The focus area is left open as the grid is constricted by the river and rise in landscape, caused by the ridge.

1878

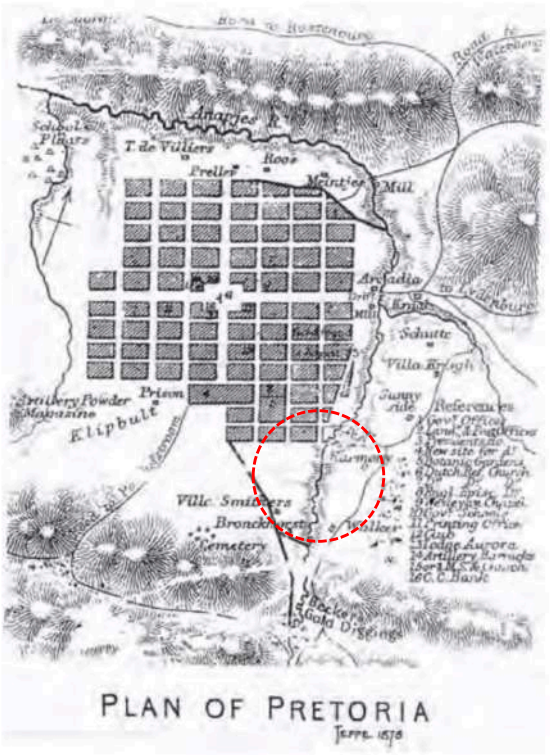


Figure 2.21: Plan of Pretoria, Jeppe 1878 (Van der Waal Collection, van der Vyver, 2015)

1890

Figure 2.22: Map of Pretoria ZAR by J van Vooren and JH Oerder, 1889 (Liebenberg, 2015)

The map clearly shows the newly adopted grid orientations caused by the Apies River. The focus area can already be identified as a problem area, as the different grids come together to meet at the bottleneck. The space is left open and not dealt with in a way that will preserve the open space as recreational green space, connecting to the nature reserve.

1890

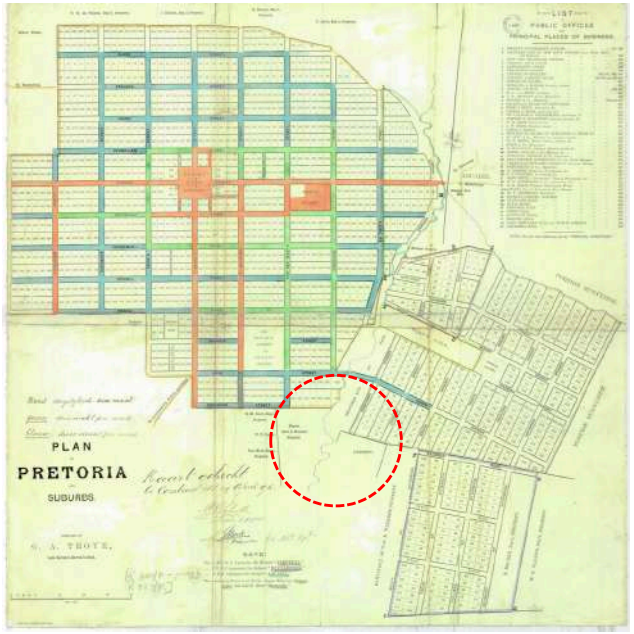


Figure 2.23: Plan of Pretoria by GA Troye, 1890 (Liebenberg, 2015)

The map focuses on the suburbs and continues the logic plot demarcation of the grid.

1890

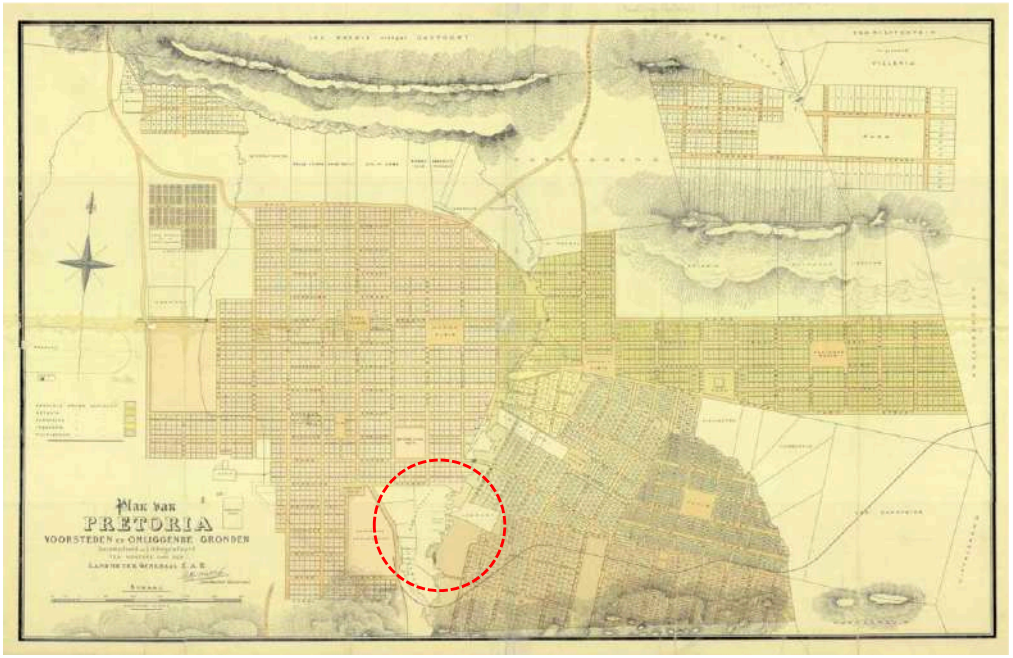


Figure 2.24: Plan of Pretoria by GR von Wielligh, 1890 (Liebenberg, 2015)

Natural ridges are still drawn as important markers. The NZASM line is visible. The strict city grid is continued and only disrupted by the the Apies River. Plots are drawn on steep inclines, where the grid meets the ridge.

1899

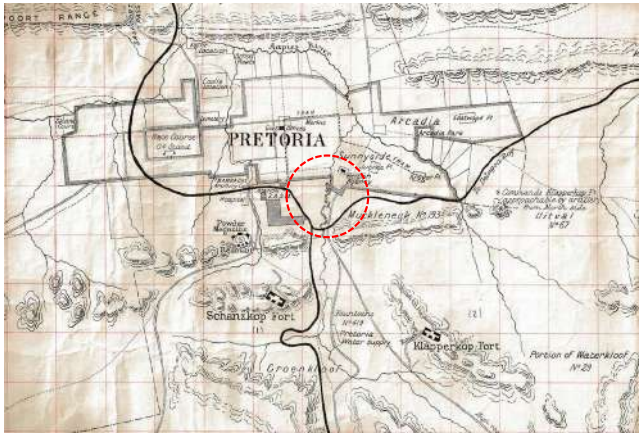


Figure 2.25: Map of Pretoria and its environment, 1899 (Liebenberg, 2015)

The above map is more abstract and focuses on the envelope of Pretoria within the valley. The NZASM line being recently completed at the time period, is prominently expressed. The natural ridges with their forts, are still noted as important landmarks. The map indicates a "ZASM" station to the left of the focus area, where the railway station is situated today. The map also shows racial locations within Pretoria, as well as tram lines.

1900

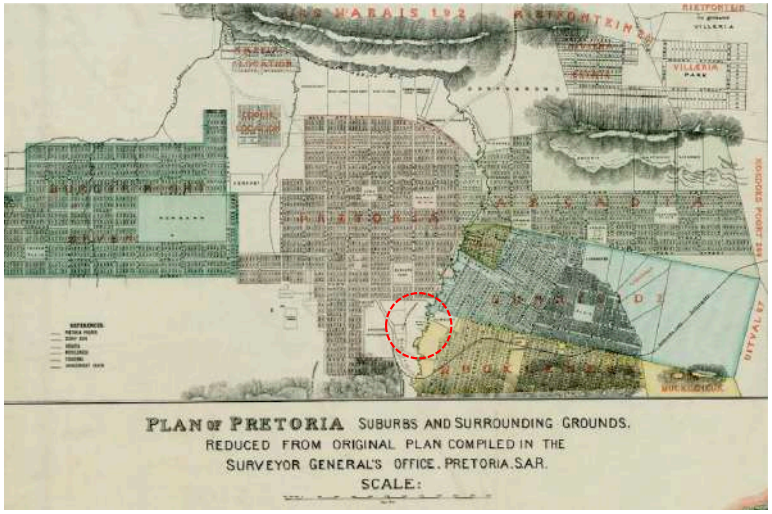


Figure 2.26: Plan of Pretoria as an inset on Jeppe's 1899 map of the Transvaal (Liebenberg, 2015)

The above map shows the different areas within Pretoria. The focus area remains undeveloped and underutilized as both green space and built environment.

1899

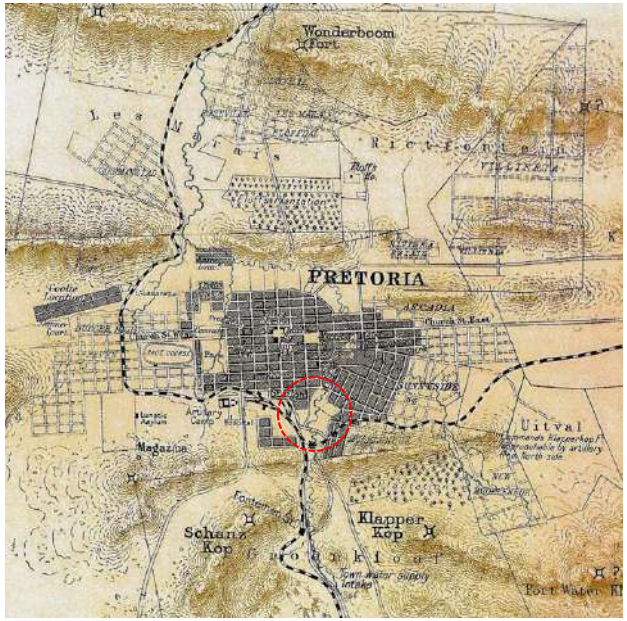


Figure 2.27: Pretoria and Surrounding Country, 1900 (Liebenberg, 2015)

The above map focuses on the railway line and specifically how it stretches to the North of Pretoria CBD towards Wonderboom poort. The initial origin grid is expressed and shows how the city development has stemmed from that. The way it is superimposed onto the landscape is clear. There is still an emphasis on the "koppies" or hills and farms can be seen on the edges of the city.

Pretoria's cartographical natural depiction

1857

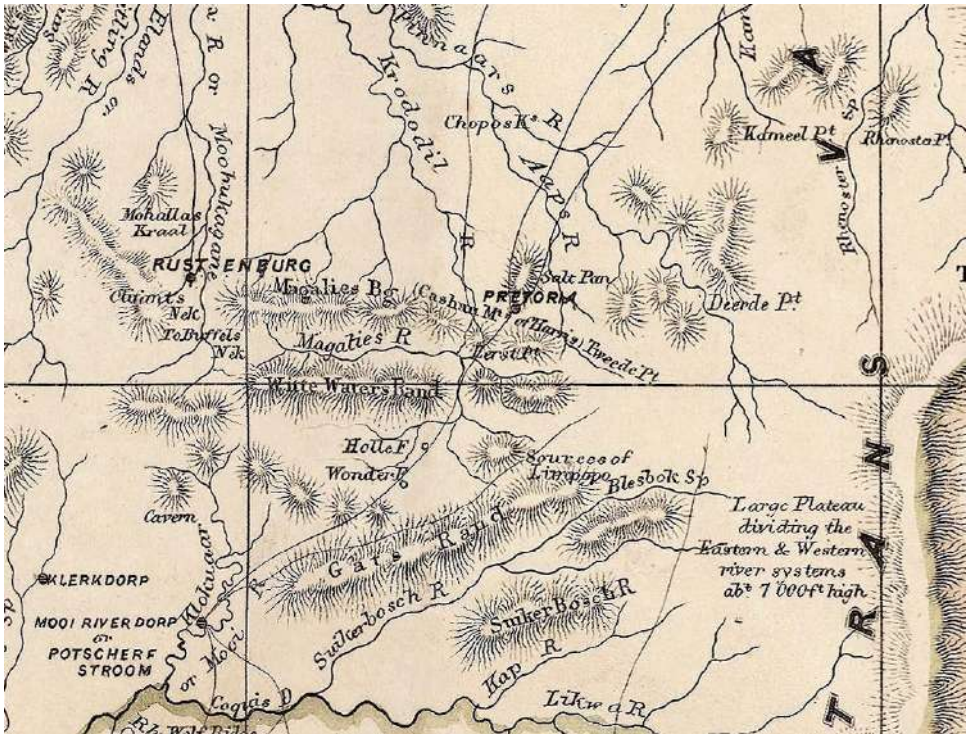


Figure 2.28: Excerpt from Hall's 1857 map indicating Pretoria on the northern side of the Cashan Mountains (Magaliesberg) (Liebenberg, 2015)

1881

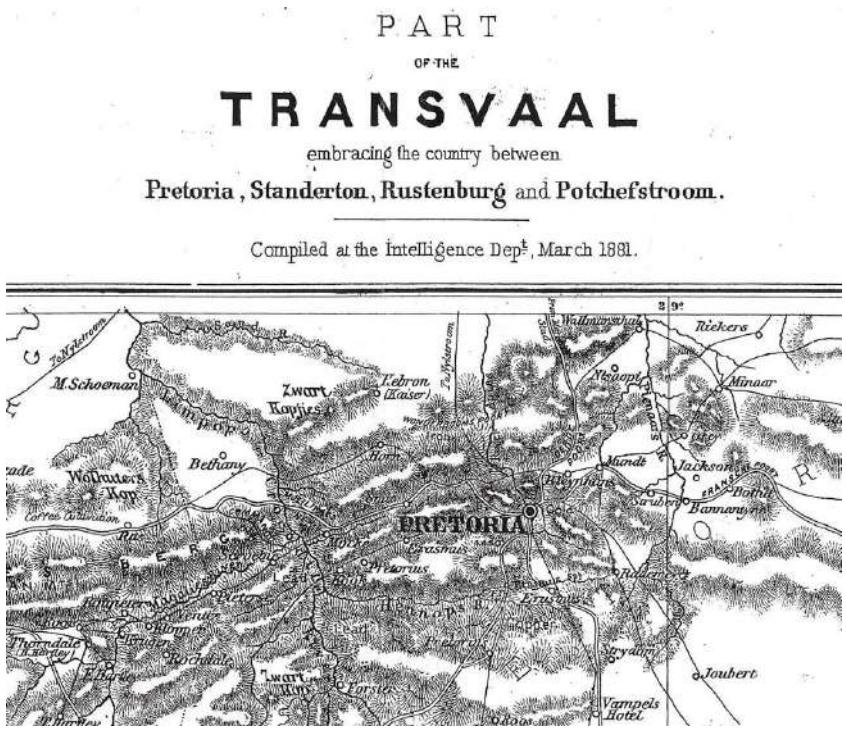


Figure 2.29: Map of Pretoria as depicted on the map IDWO 11, March 1881 (Liebenberg, 2015)

These maps show a stronger emphasis on the natural and how through the city's development, the ridges have remained of importance. The map on the left essentially shows mountains and rivers, including the "Aaps" river. The map on the right is a map of part of the Transvaal. The map is dominated by a mountainous landscape with Pretoria in the centre with all transportation networks stemming from there.

Figure 2.30: Excerpt from the Pretoria sheet of the Major Jackson's Series (Liebenberg, 2015)

This diagrammatic map shows the prominent railway with the city grid placed in the middle. The grid orientation shift is apparent.

1908

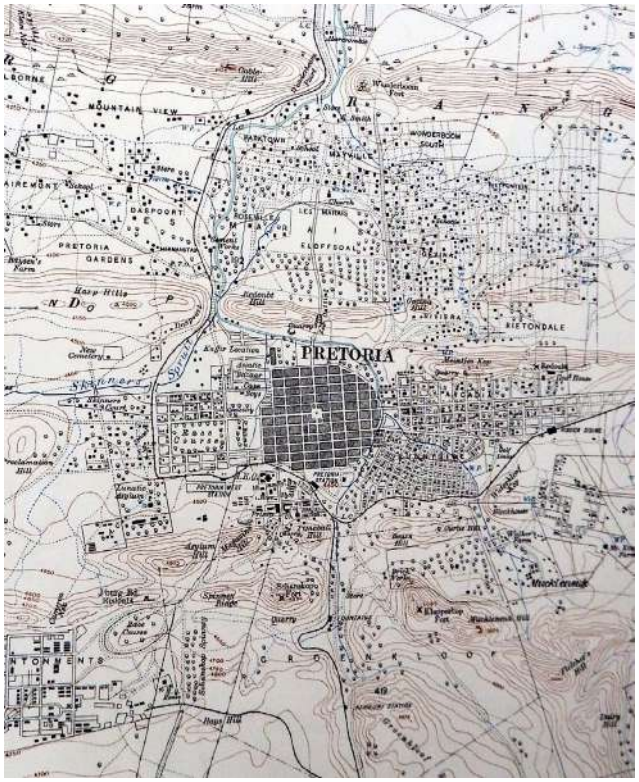


Figure 2.31: Military survey map of Pretoria and surrounding country, 1908 (Liebenberg, 2015)

The above military map shows the initial grid superimposed onto the landscape with the edges compromised by the ridges and the river. Gateways are clear links to the city from the farmlands. The ridges are clearly depicted as boundaries.

1899

Figure 2.32: Jeppe's map of the Transvaal of 1899 (Liebenberg, 2015)

The above map only shows the prominent Magaliesberg ridge with a few transportation routes cutting through. The map is a reflection of the importance of private landownership at the time.

NZASM Railway line

President Paul Kruger and the Transvaal government had been trying to break free from the dependence of the British-ruled South Africa for some time. This meant that they would have to find their own rail-link to a port not occupied by the British. President Kruger tried to raise capital to construct a rail-link from Pretoria to Delagoa Bay in Mozambique. The NZASM line was eventually completed in 1894.

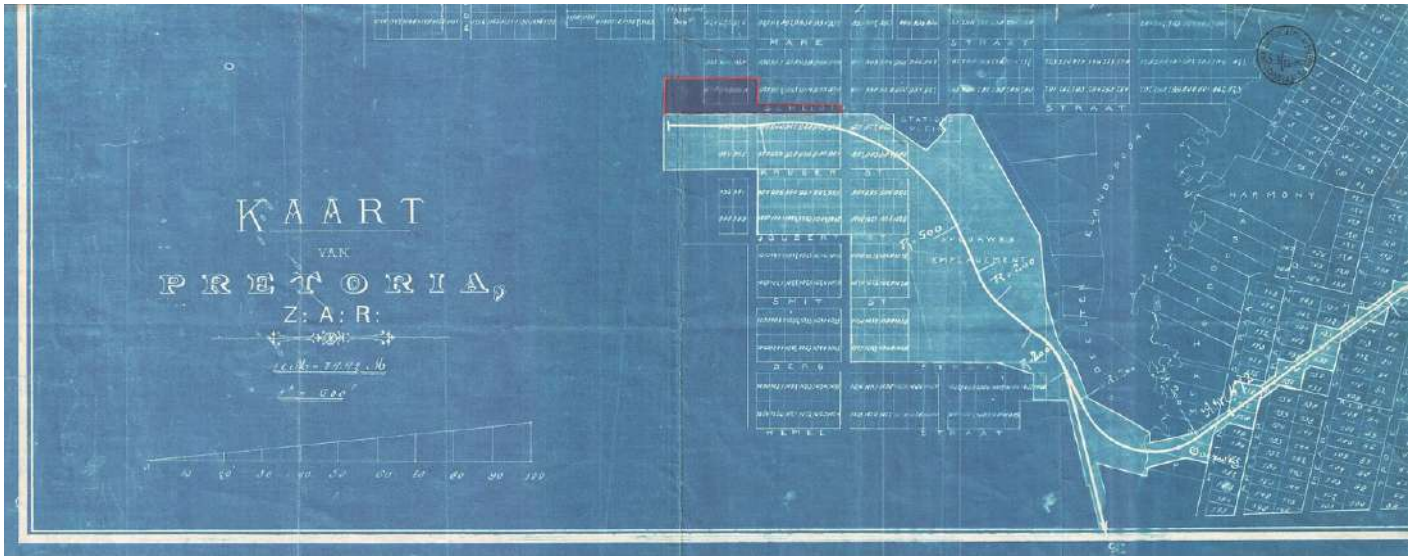


Figure 2.33: Map of Pretoria ZAR DPW 1887 – 1900 (Department of Public works 2014)

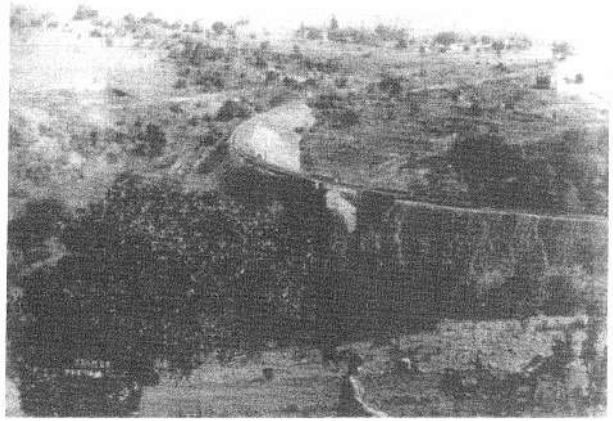


Figure 2.34: NZASM bridge in the foreground, taken from the south-east. Looking towards where Pretoria Station is today (van Tonder, 2008)

Figure 2.35: Photograph by R.C. de Jong of Old arched culvert under the previous NZASM railway (Pretoriana no. 091, 1987)

Figure 2.36: Photograph of NZASM bridge ruin taken from the highway next to the Apies River canal (Author, 2019)

The railway follows the natural contours of the topography and bridges at the bottleneck. The Gautrain and Metrorail eventually followed this railway trajectory. Remnants of the NZASM bridge can still be seen at the edge of GNR. The railway culvert is heavily overgrown, but recognised for its heritage value.

The structure holds potential to serve as foundation for a new pedestrian bridge, linking Salvokop to the city, as well as a new entrance to GNR, directly from the city's edge.

Groenkloof Nature Reserve / Fountains Valley

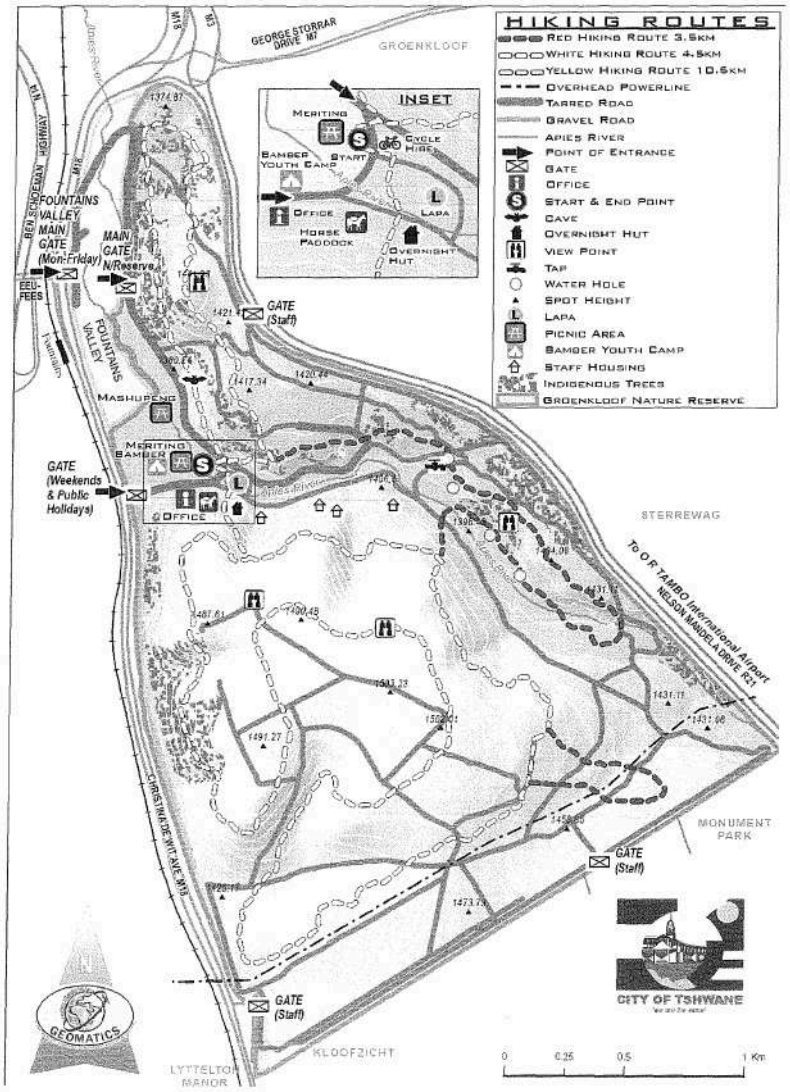


Figure 2.37: Map of hiking routes in GNR (van Tonder, 2008)

Figure 2.38: View of the Fountains and the natural water stream(van Tonder, 2008)

The Reserve is in the shape of a triangle that stretches from North to South. It is bound by two highways that flow into the gateway to the city. The southern border is adjacent to Waterkloof Airforce Base.

The map shows the great recreational value GNR possess with its multitude of hiking and cycling routes.

Groenkloof Nature Reserve / Fountains Valley

Figure 2.39: Cave where Moloko potsherd was found (van der Vyver, 2015)

Figure 2.40: Man-made terrace at the mouth (van der Vyver, 2015)

Figure 2.41: One of Pretoria's natural springs (van der Vyver, 2015)

Figure 2.42: The second of Pretoria's natural springs (van der Vyver, 2015)

Pretoria's two natural fountains. The one on the left has its source in the Fountains valley and the one on the right in the Groenkloof Nature Reserve. They join to form a single stream, known as the Apies River.

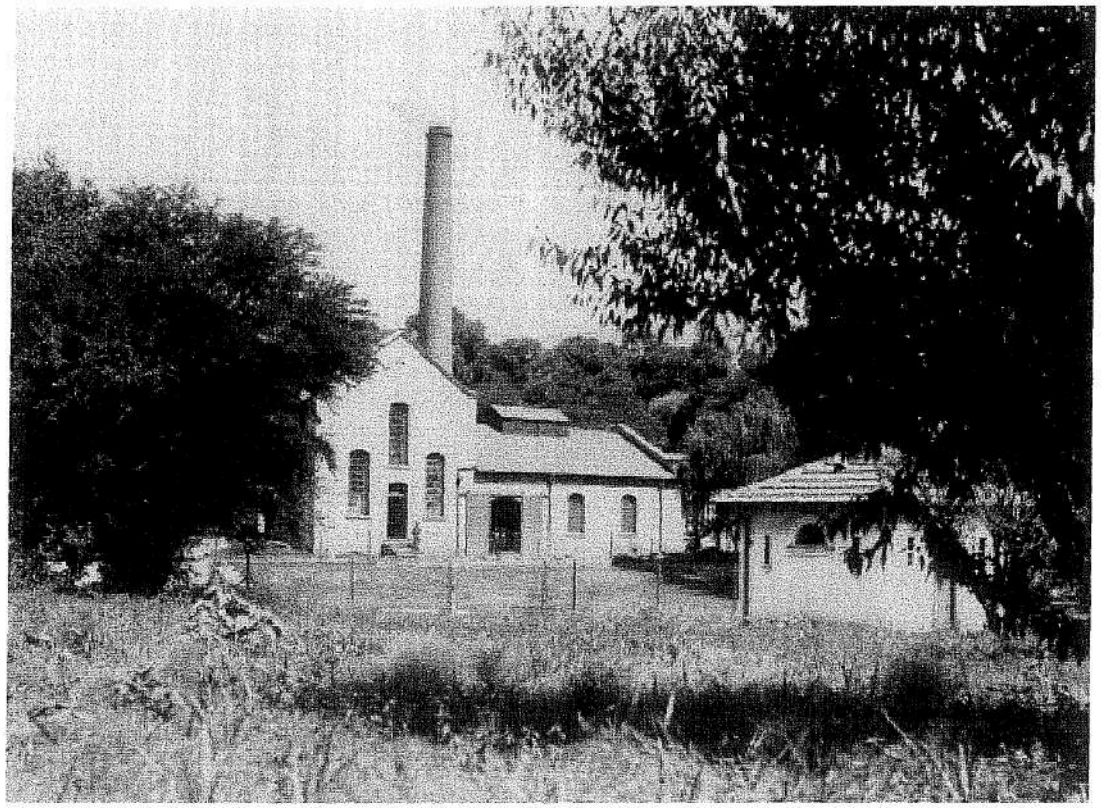


Figure 2.43: ZAR pumping station, Van der Waal collection, University of Pretoria Archives (van Tonder, 2008)

Up until 1930, Pretoria's only water source was that of the fountains valley. Today the springs only constitute about 8% of the city's principal water production, delivering high quality, unpolluted water to the city. The source is one of the strongest, most consistent springs in the country (van Tonder, 2008).

The old ZAR pumping station has massive heritage value. There exists an opportunity for re-using the station as a museum, preserving the building as far as possible.

Figure 2.44: Remnants of original water furrows at WF Nkomo street (Dippenaar, 2013)

Figure 2.45: Fountains Valley hotel, Van der Waal collection, University of Pretoria Archives (van Tonder, 2008)

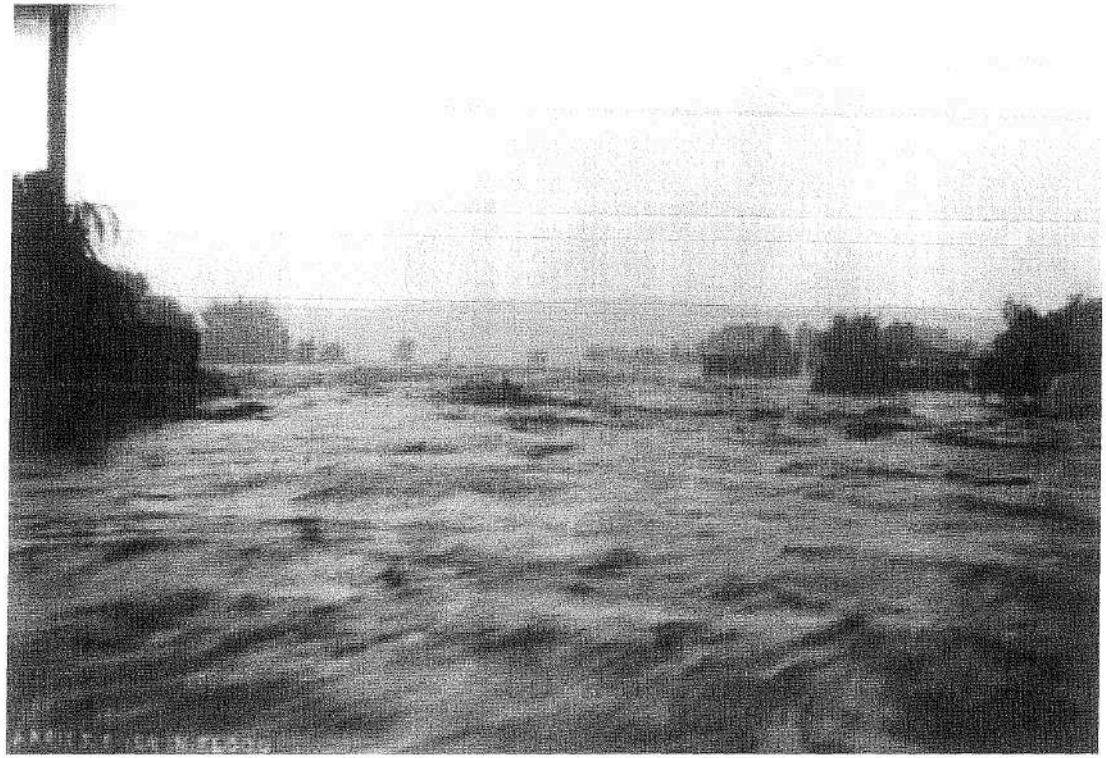


Figure 2.46: Apies River in flood 1897, Van der Waal collection, University of Pretoria Archives (van Tonder, 2008)

Du Preezhoek floodline

1992 – 50 year floodline

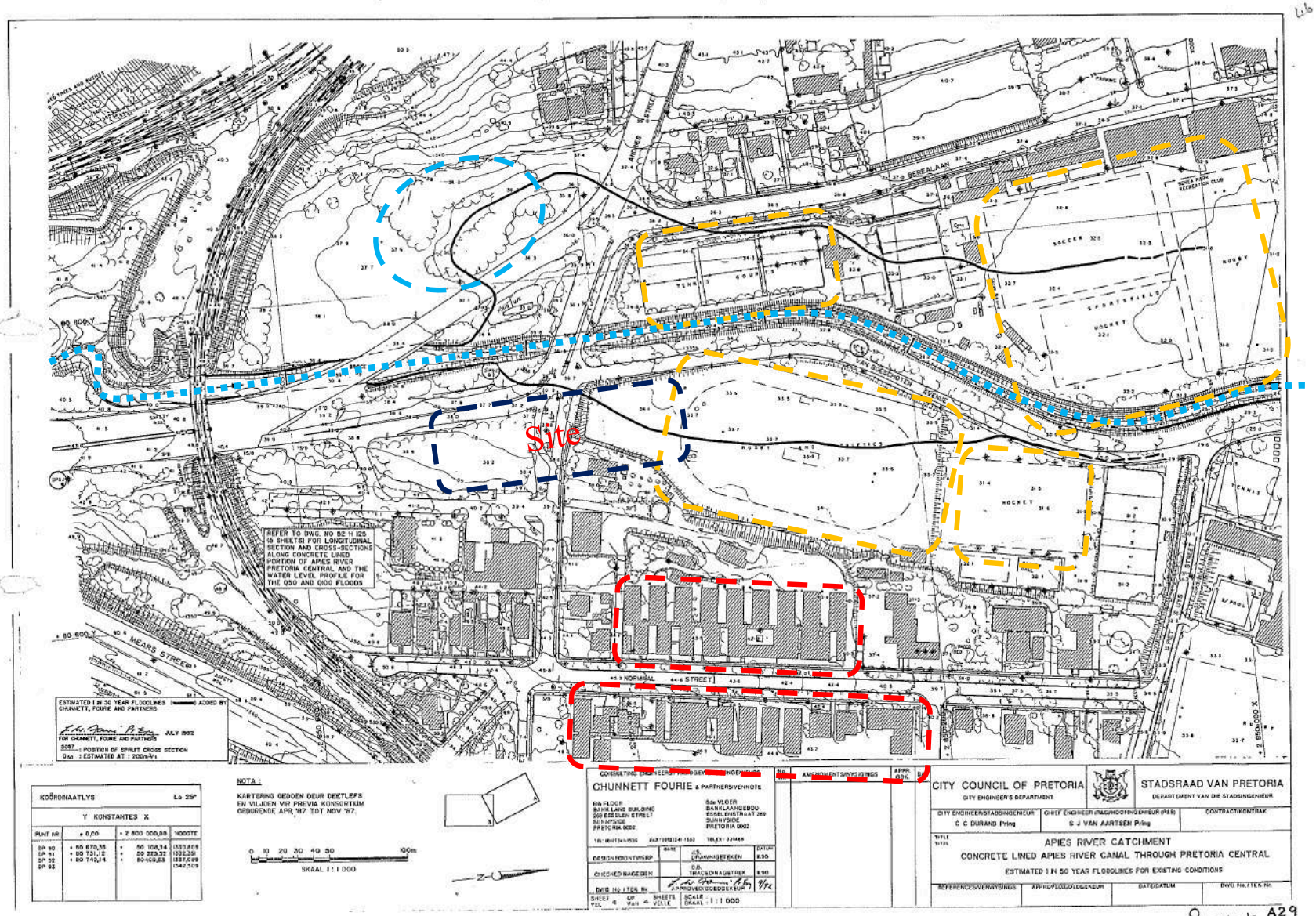


Figure 2.47: 1992 Engineers drawing by Chunnet Fourie of 50 year flood plane at Du Preezhoek (adapted by author, 2019)

The drawing shows the Apies River floodline and the significance it has on the site and surroundings.

The red outline indicates demolished residential buildings and an eroded built environment.

The orange outline indicates the sporting facilities that have become largely derelict and abandoned.

The blue outline indicates the proposed damming area. The contours and a stormwater outlet has created a small wetland.

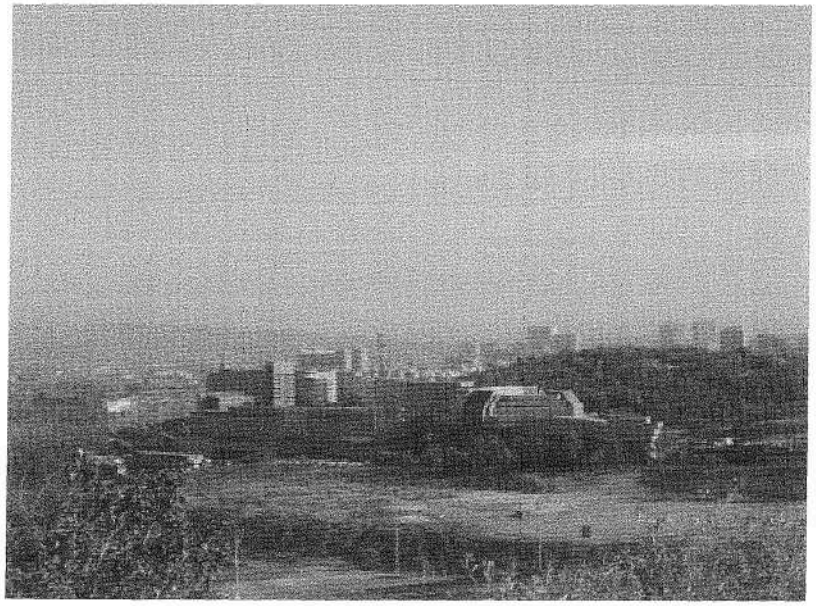


Figure 2.48: Photograph taken from Klapperkop in 2006 by Petrus Potgieter of UNISA main campus in Pretoria (van Tonder, 2008)

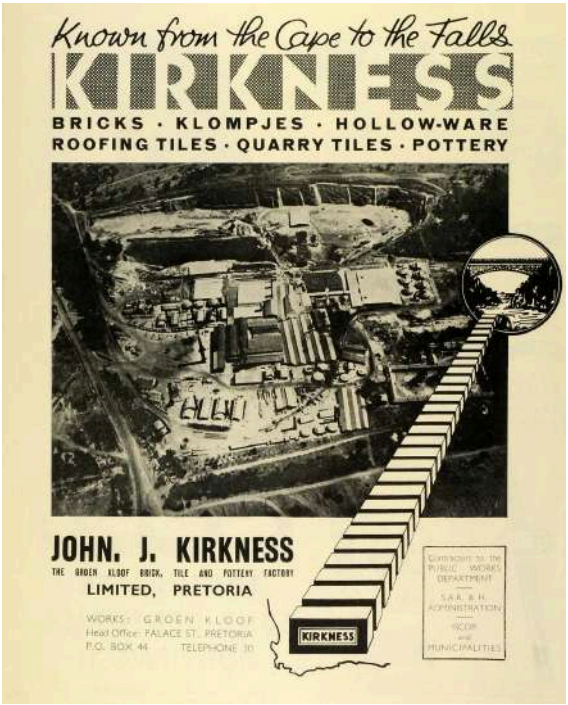


Figure 2.49: 1939 Black and white print ad for John. J. Kirkness promoting bricks and other clay products, located in Pretoria (www.theheritageportal.co.za, 2019)

The image shows the progression and development of the city and the nation, harnessing the natural raw materials to its advantage. However, the balance between man and nature was lost and the equilibrium thrown out.

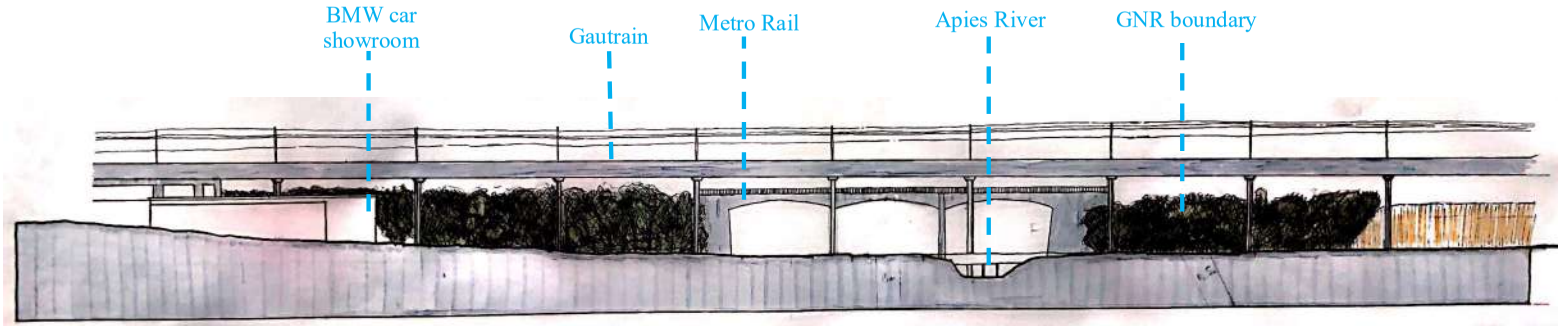


Figure 2.50: Section through the valley, looking south towards the dominant grey infrastructure at the gateway (Author, 2019)

Figure 2.51: The waterwheel and mill on the banks of the Apies River, West of the Lions Bridge / Arcadia bridge, painted by WH Throne, 1887 (www.theheritageportal.co.za, 2019)

Figure 2.52: Photograph illustrating the waterwheel and mill, driven by the Apies River on the left hand side (www.theheritageportal.co.za, 2019)

The mill on the photographs was located further down the valley and the river, next to the Lion bridge, also known as Arcadia bridge. It is noted that another mill was located where the dilapidated tennis courts of Berea Park is situated today. This mill existed before 1890 and it can be assumed that it would have had a similar appearance to the one depicted in the images above.

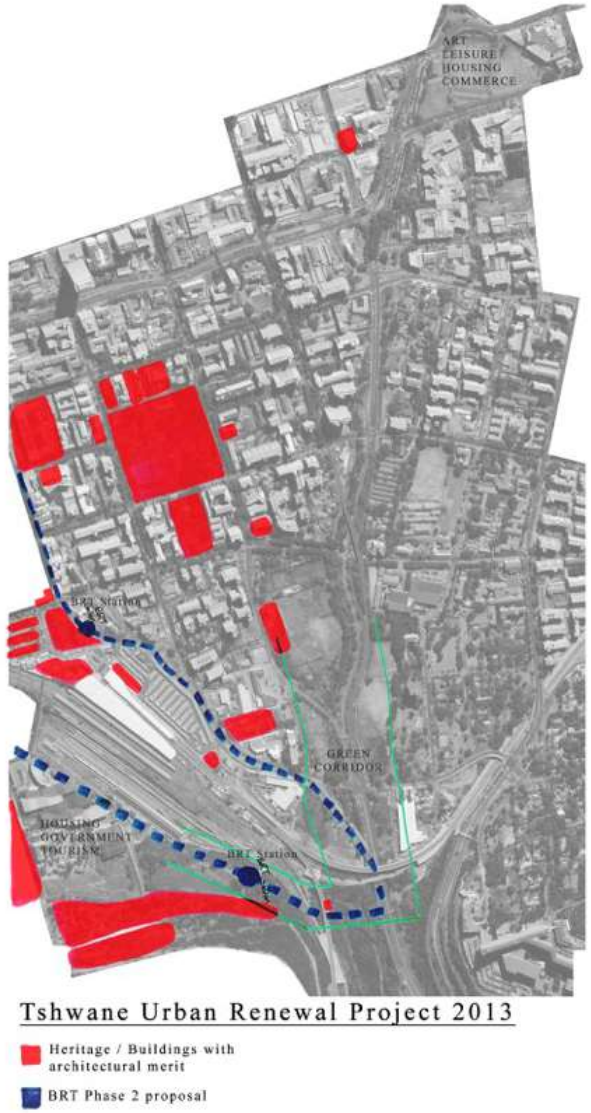
Macro Site Analysis

Infrastructures

Figure 2.53: Infrastructures Macro site analysis (Author, 2019)

Usage

Figure 2.54: Usage Macro site analysis (Author, 2019)



Tshwane Urban Renewal Project 2013

Heritage / Buildings with architectural merit

BRT Phase 2 proposal

Figure 2.55: Tshwane Urban Renewal project, 2013 Macro site analysis (Author, 2019)

Macro Site Analysis

Figure 2.56: Zoning Macro site analysis (Author, 2019)

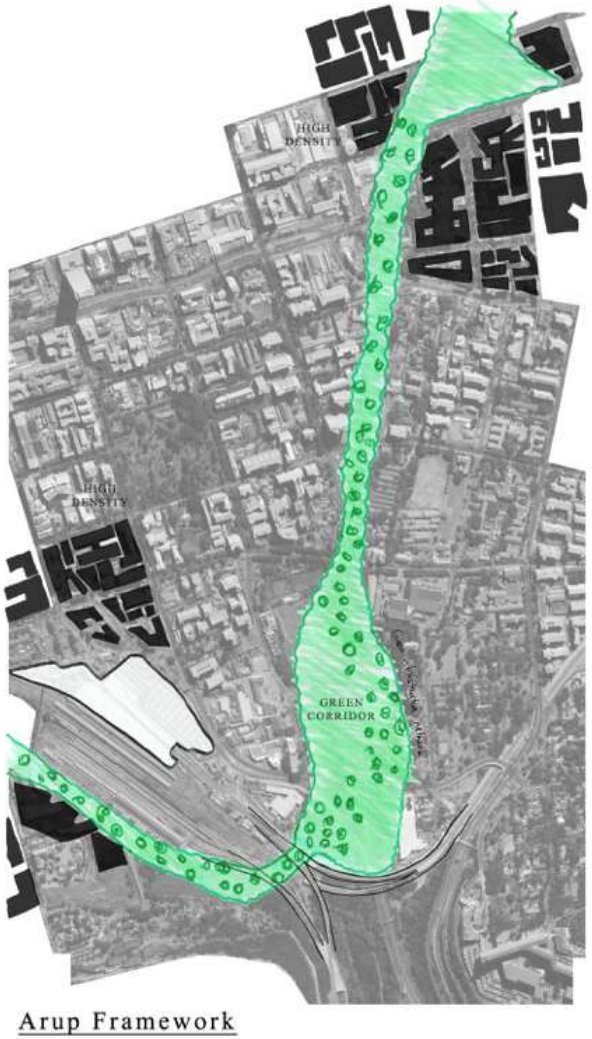


Figure 2.57: Arup Framework Macro site analysis (Author, 2019)

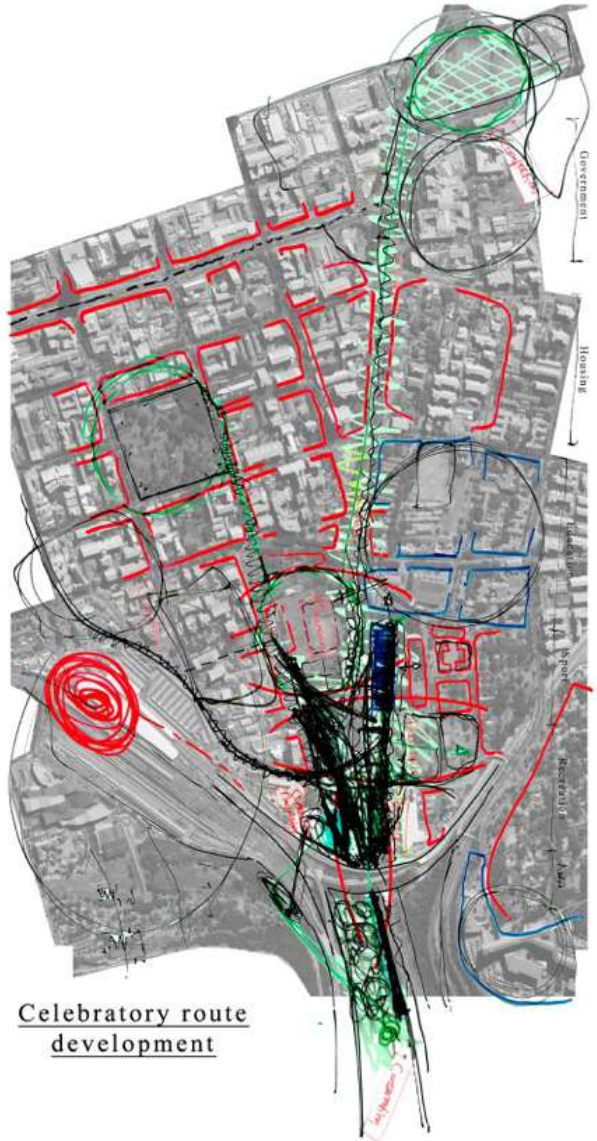


Figure 2.58: Celebratory route development Macro site analysis (Author, 2019)

Macro Site Analysis

The Macro site analysis and the analysis of the existing city frameworks revealed the potential of the gateway to biointegrate the 4 infrastructures. This will allow a more balanced sustainable way of living for the urban citizen.

The zoning and usage diagrams revealed a strong residential component, specifically surrounding Burgers Park. However, the area has become homogenous and the Berea Park sporting grounds, which would have aided in this condition, has become derelict. There exists a strong educational component, through various UNISA buildings and some schools. These facilities are currently very internalized, fenced off campuses, that does not allow public interaction.

The gateway to the city is clustered with motor showrooms and petrol stations. This observation is of note, as the Tshwane open space framework, specifically warns against these developments. The framework prefers having appropriate developments of landmark quality and not commercial buildings at the gateway to the city.

Creating a physical link between the isolated Salvokop community and the city is also a point of interest in the frameworks. These are either proposed as pedestrian bridges or BRT links. The green corridor link is also prominent is many of the frameworks, developing the link along Nelson Mandela Drive.

The main objective taken from the analysis and frameworks is to create a more balanced human-nature relationship. This relationship will manifest itself in the form of a green corridor stretching through the city, as well as re-appropriating building functions surrounding the gateway. The functions will manifest from more urban towards the city and slowly morphing into more nature orientated programs. This will allow the harsh city-nature reserve boundary to be broken into smaller transition boundaries and in turn connect the city to the nature reserve, both physically and symbolically.

The following diagrams will outline the main focuses of the framework

Nature

Human-Nature Relationship

Human-Nature relationship is beneficial to our health, economy and for ecological services

Man removing itself from the Natural life cycle

We are exploiting our natural resources and show a general lack of compassion towards the natural.

Anthropogenic vs Ecological

The anthropogenic world is overpowering the ecological. A new balance needs to be found between the two.

Eco infrastructures

Infrastructure

Ken Yeang categorizes infrastructures in four groups. GREY, RED, BLUE and GREEN.

The green infrastructure needs to be "lifted" and seamlessly integrated with the dominant infrastructures.

This will allow the city to be re-connected with nature and its ecological systems.

Landscape Urbanism

Seen as the most appropriate and relevant medium through which to construct a meaningful and viable public realm.

Frampton(1990) stated that we need to conceive of a remedial landscape that is capable of playing a critical role in relation to the ongoing, destructive commodification of the man-made world.

Dormant Ecology

The architecture and urban form should uncover and reveal Pretoria's unique ecology and culture

Sustainable ways should be implemented in using our natural assets to be co-beneficial.

Figure 2.59: Framework focus diagram (Author, 2019)

Intentions - Master plan & Framework

Nelson Mandela Avenue as Celebratory Route

Ecology
Uncovering, conserving and restoring ecological systems.

Connect
Connecting communities and infrastructures.

Densify
Densifying and developing selected urban districts in order to preserve others.

Educate
Encouraging environmental literacy and social support for protection of the natural world.

Diversify
Diversify the land uses in order to accommodate a diverse economic opportunities.

Re-envision
Re-envisioning the gateway to the city, partially based on existing frameworks to develop a gateway of landmark quality.

Figure 2.60: Masterplan intentions (Author, 2019)

Word diagram, depicting the general intentions and ingredients at the gateway

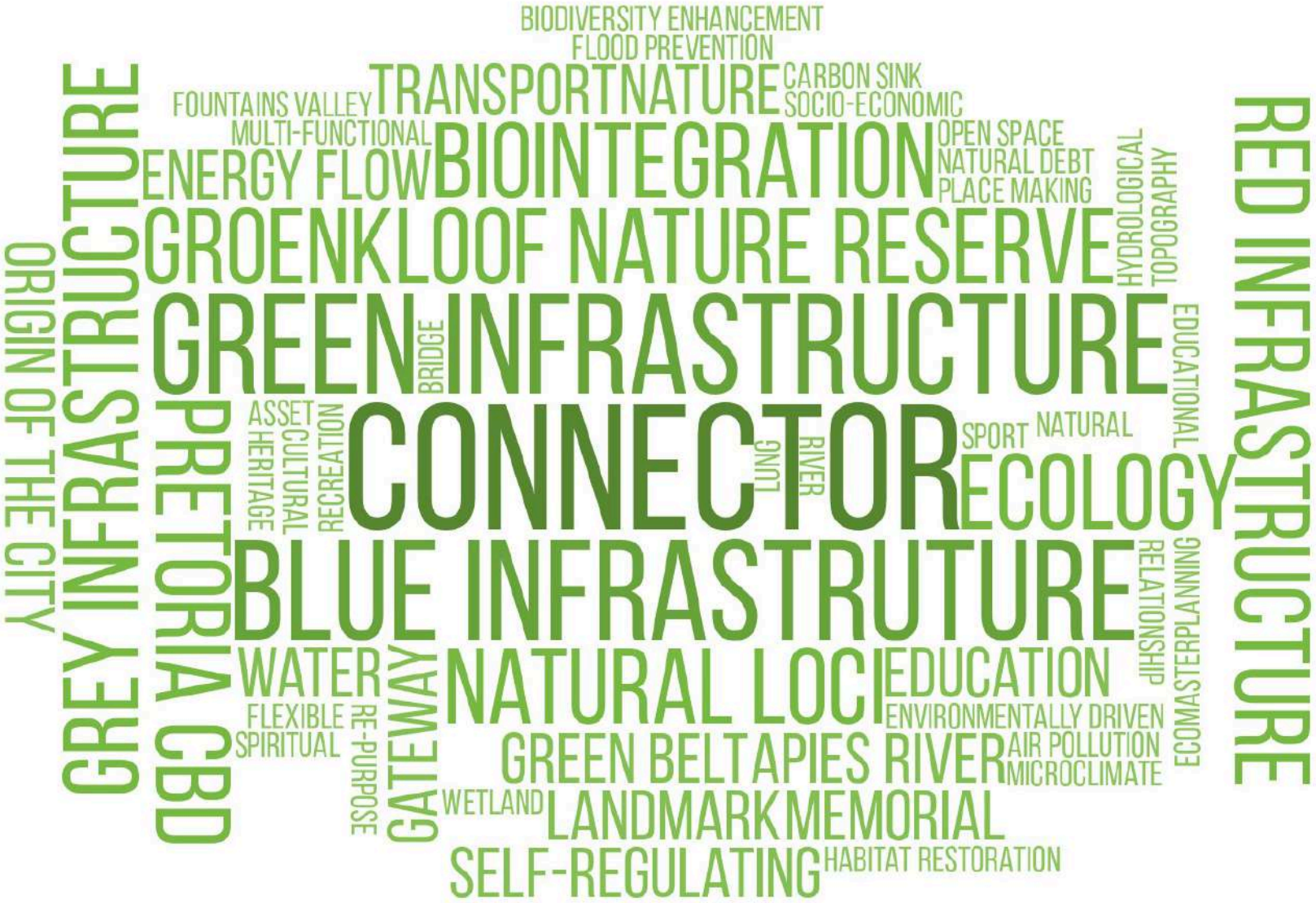
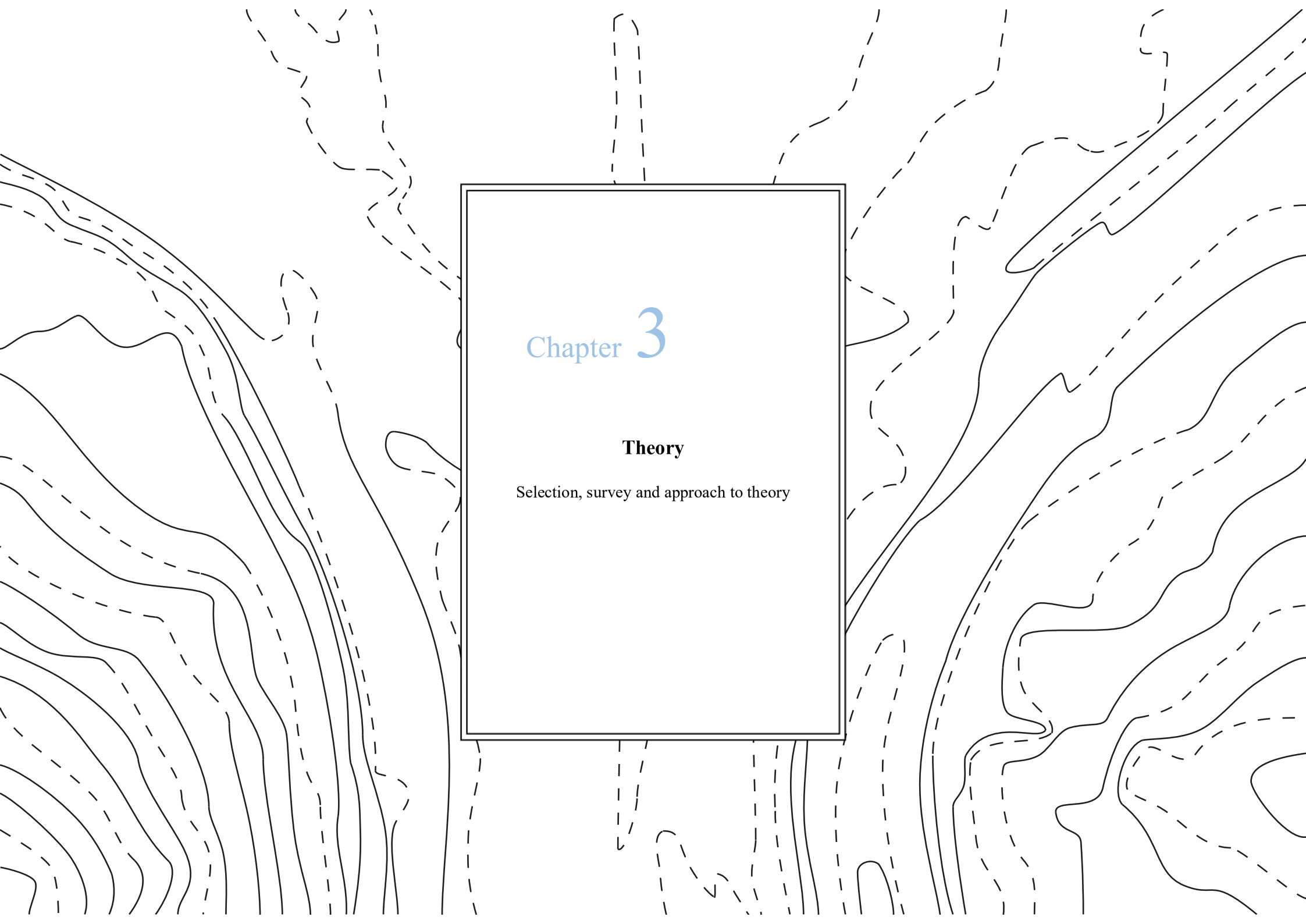


Figure 2.61: General intentions word diagram (Author, 2019)



Chapter 3

Theory

Selection, survey and approach to theory

Theoretical Influences

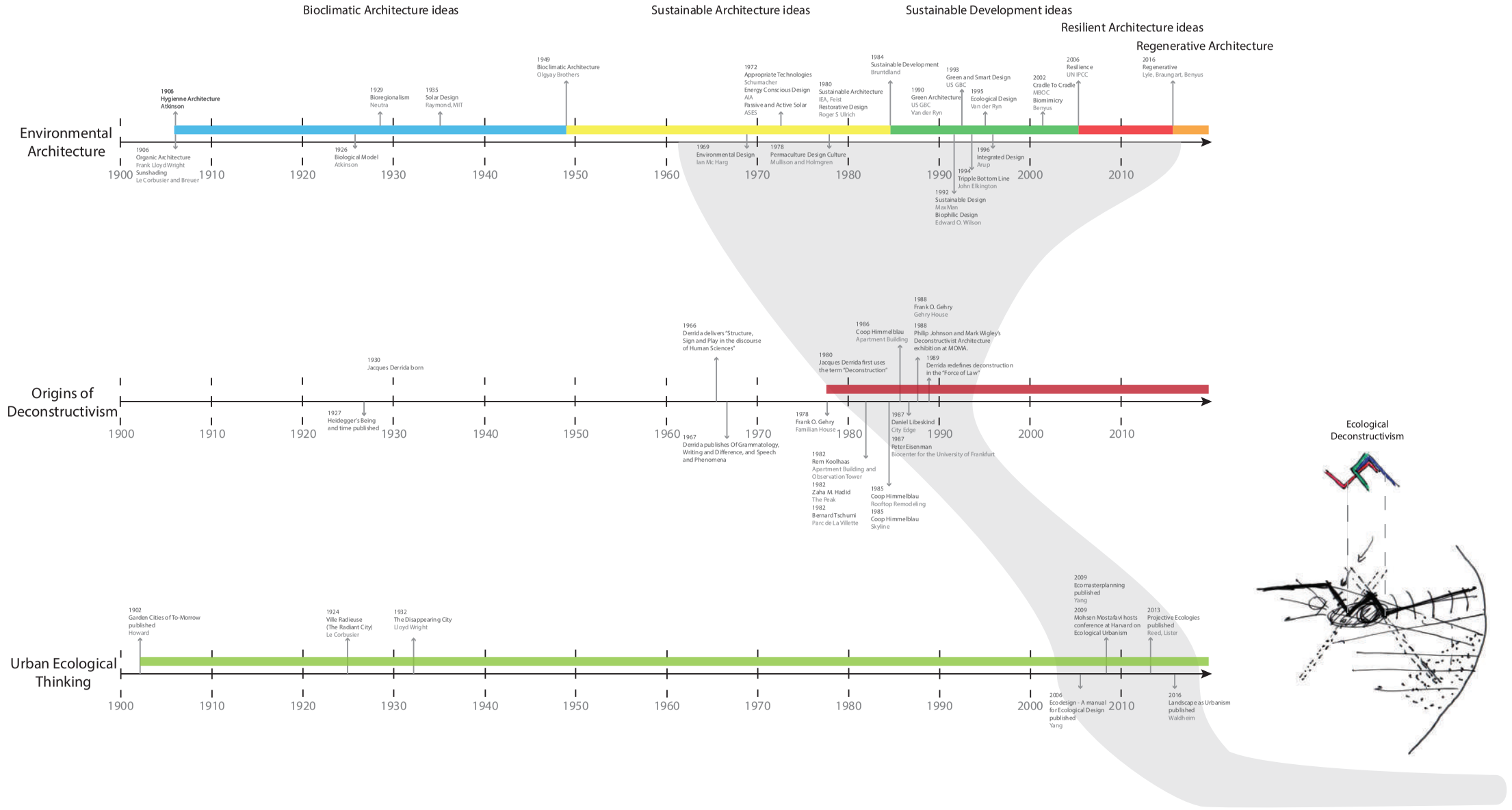


Figure 3.1: Theoretical influences diagram (Author, 2019)

Theoretical Precedent

Parc de la Vilette – Bernard Tschumi

Bernard Tschumi's Parc de la Vilette was chosen as an appropriate way of defining a vast ill-defined urban green space. The general aim of Tschumi's project was to develop an organizing structure that could operate independently of the functional use. A system without a centre or hierarchy, that could function without the usual relationship between program and the resulting architecture. The point grid system was thus implemented (Tschumi, 1987). Tschumi further argued that the point grid system could become a tool against functionalist approaches, showcasing that there does not have to be a cause-and-effect relationship between program and architecture. His approach marked a shift in thinking towards social and historical circumstances.

A counter notion to the utopia of unity. Tschumi's competition entry was one of the first in recent architectural history, to propose a new program, namely, that of the "Urban Park", arguing for the combination of different juxtaposed programs to offer new perspectives and attitudes to the urban dweller.

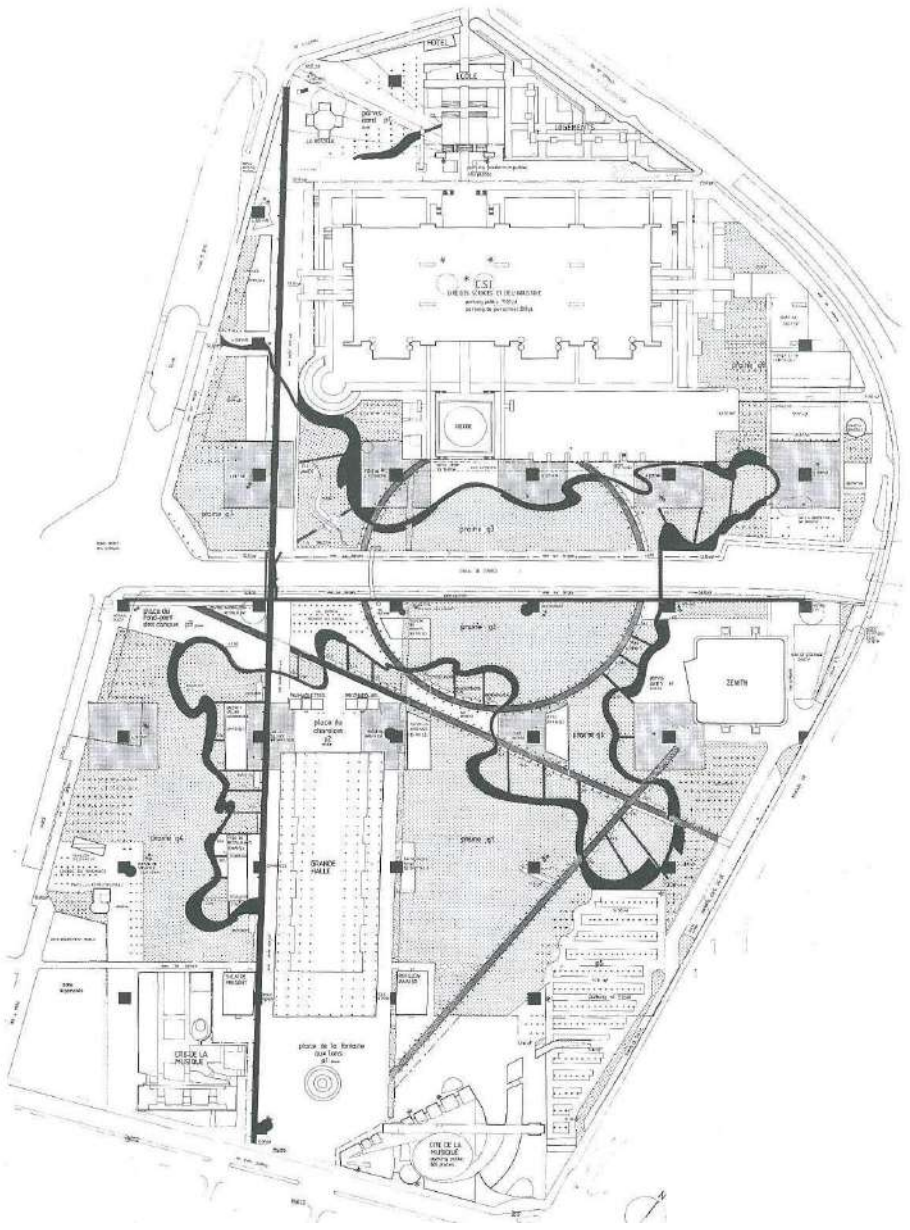


Figure 3.2: Parc de la Vilette Masterplan (Tschumi, 1987)

The important distinction that Tschumi makes is that during the 20th century, the concept of the park has changed. It can no longer be separated from the concept of the city, the park and the city should be seen as an entity. The park can no longer be seen as an image of nature within the city. The utopian idea of the pristine, protected from the grim reality park, is no longer valid.

Tschumi opposed Olmsted's notion of "in the park the city is not supposed to exist", and states that "to create falls and hills hiding the highway, ignores the power of urban reality."

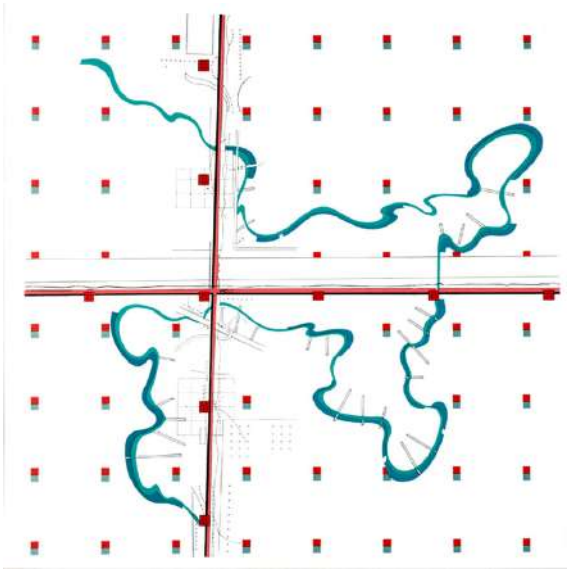


Figure 3.3: Parc de la Vilette site diagram (Tschumi, 1987)

Figure 3.4: Parc de la Vilette perspectives (Tschumi, 1987)

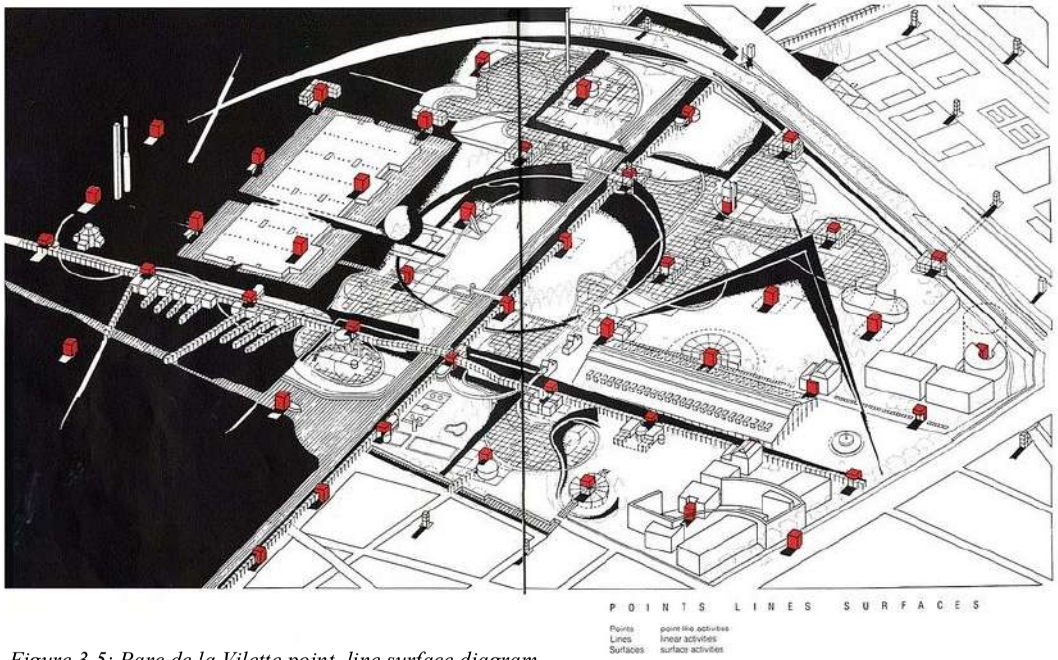
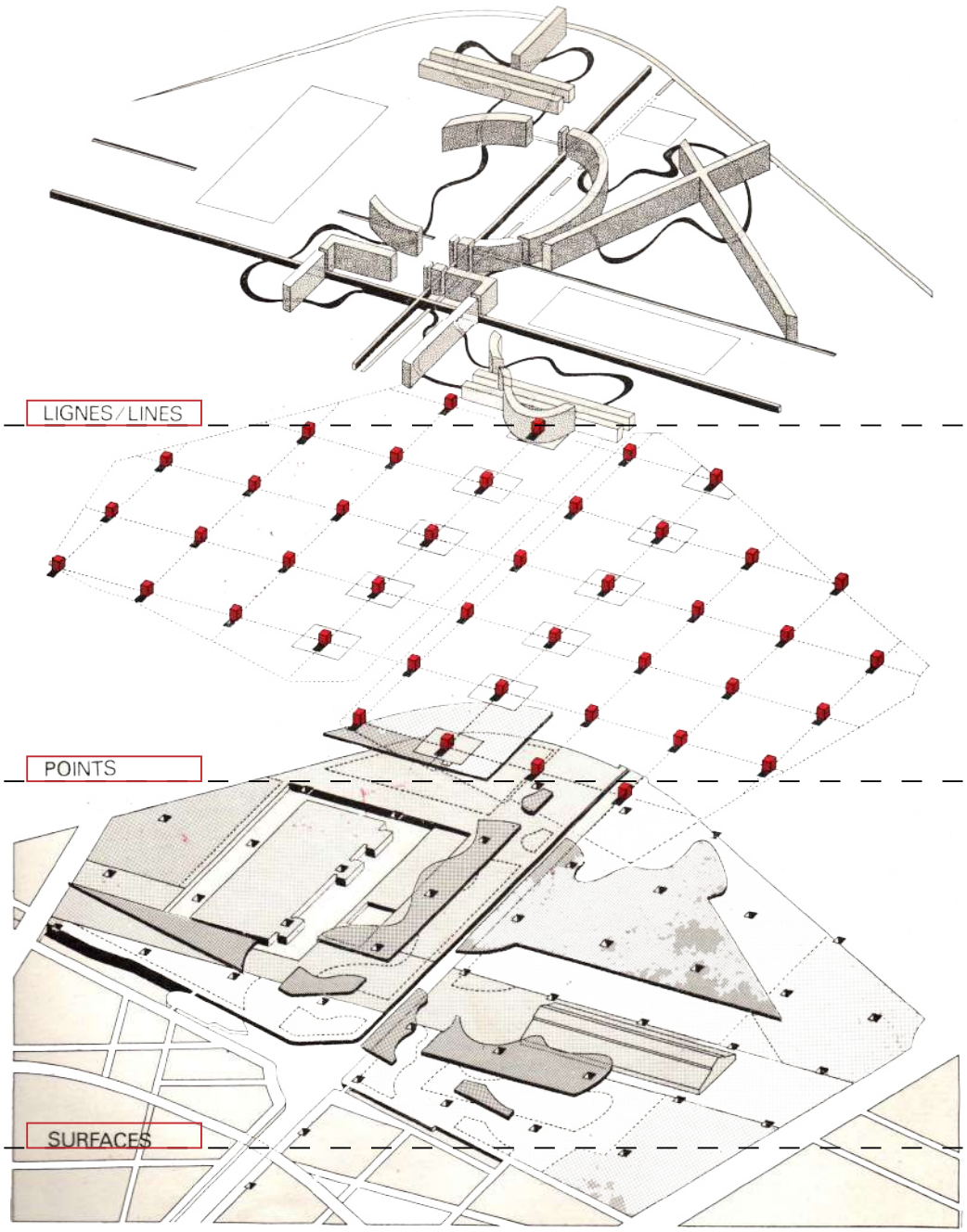


Figure 3.5: Parc de la Vilette point, line surface diagram (Tschumi, 1987)

Parc de la Vilette - Bernard Tschumi

Bernard Tschumi used three distinct, seemingly arbitrary layers in the design for Parc de La Vilette. The superimposition of the three layers (point, line and surface) creates a controlled tension, reinforcing the dynamism of the place. The three layers, or systems each have their own logic and independence.

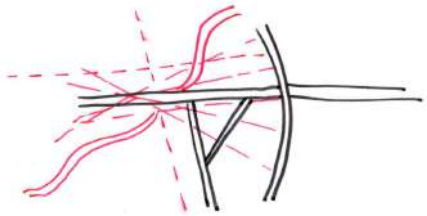


Shift in the grid

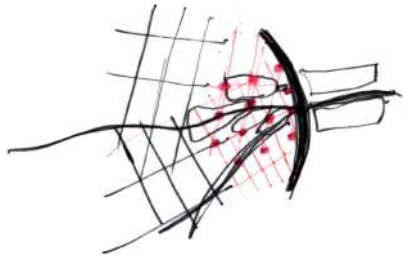
The terrain and context surrounding the site is ill-defined. This is partly because of the shift in the city grid and partly because of the Apies river flowing through the valley. Therefore, the approach of the point, line and surface was adopted to give order to the terrain and to attempt to stitch together the two differently orientated grids with a point grid system.

Figure 3.6: Pretoria overlay map (adapted by Author, 2019)

Roads
Railways
Movements
Watercourse
Flow
Circulation



Order
Points of interest
Exposed ecology



Placemaking
Park
Leisure
Connecting landscape

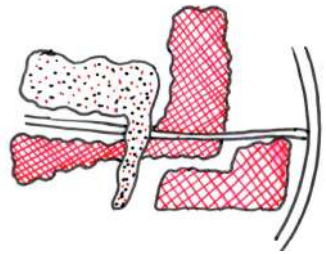


Figure 3.7: Diagram by Tschumi, 1987 (adapted by Author, 2019)

Biointegration of Green infrastructure

Ken Yeang

Ken Yeang (2017) compares the analogy of his architecture to a prothesis. Prosthesis is defined as an artificial, human made device, that is connected to its organic host. The organic host, in the case of a prosthesis, is the human body. In order for the prosthesis to function properly, a seamless, biointegration with the host is needed.

Yeang defines the goal of prosthetic design as providing solutions that will enable the appropriate biointegration of the artificial with the organic. Yeang continues the analogy by defining our built environment as the prosthetic device, a synthetic, human made object, latching onto a host organism, which is the human body, or the ecosystems in which our built environment must seamlessly and benignly biointegrate. Our built environment has largely failed to biointegrate and this has led to a global environmental decline.

Furthermore, Yeang sets the challenge that we as designers are tasked to do. He states that we must strive to achieve "an environmentally seamless biointegration of our human-made, built environment as a constructed ecosystem with the naturally occurring ecosystems in a reciprocal and symbiotic relationship, as opposed to one that is estranged, inert, and parasitic."

The project focuses on uncovering and enhancing the green infrastructure of the city.

A system that can be likened to a cleansing organ like a lung or a kidney, offering social and ecological support to the city.

The diagram on the following page depicts the application of Ken Yeang's 4 infrastructures and ecomasterplanning methods to the chosen site.

The 4 infrastructures are defined as:

Grey – Engineering infrastructure

Red – Human infrastructure (Buildings)

Blue – Water management infrastructure

Green – Ecoinfrastructure

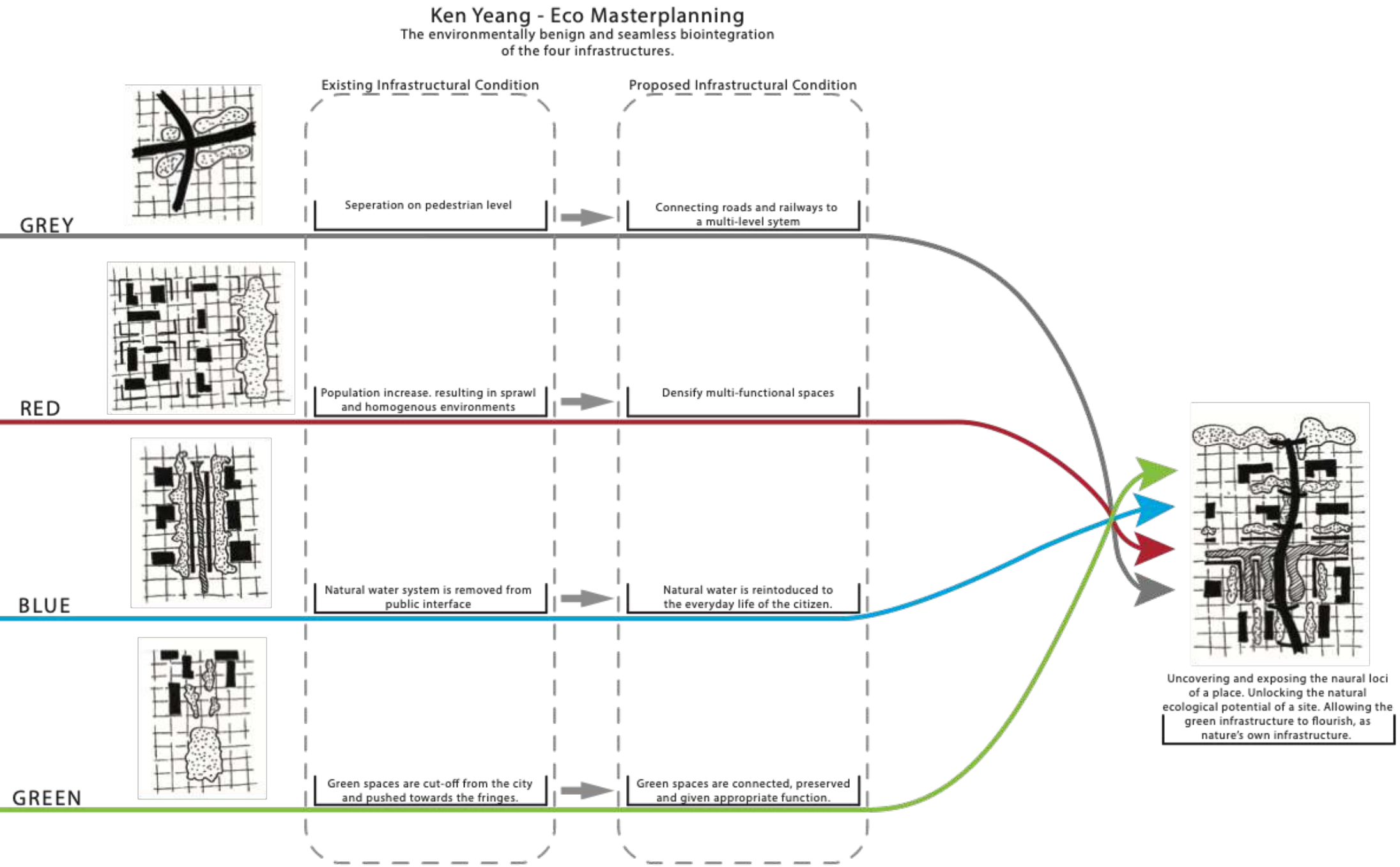


Figure 3.8: Ken Yeang Eco Masterplanning diagram (Author, 2019)

Urban scheme

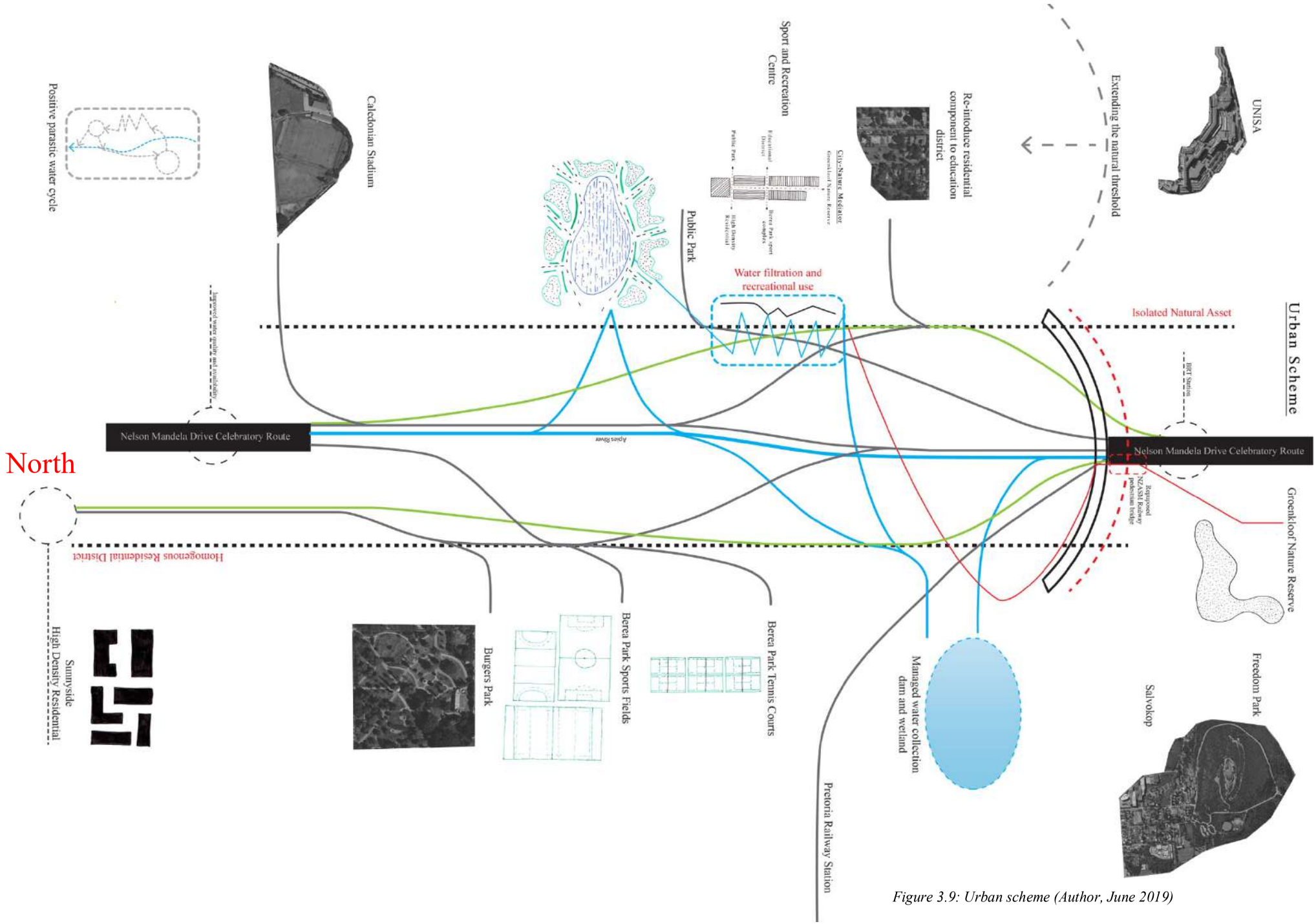


Figure 3.9: Urban scheme (Author, June 2019)

An Urban mind shift

Landscape urbanism

According to Waldheim (2016), Stan Allen stated, “increasingly, landscape is emerging as a model for urbanism”. Architecture and urban designs’ inability to produce rational, satisfactory contemporary urban conditions have shone a light on landscape urbanism as a possible solution. Architecture is no longer seen as the sole building block of urban form. Peter Rowe identified that a priority should be afforded to landscape rather than freestanding built form. One of the main statements landscape urbanism claims to make is the, “conflation, integration, and fluid exchange between environmental (natural) and infrastructural (engineered) systems.

Waldheim continues and states that, usually the landscape project is placed in the shadow of the infrastructural object, which is seen as more important than the field into which it is placed. However, the landscape is an element through which all ecological transactions must pass, it is seen as the infrastructure of the future.

Waldheim further maintained that landscape has the ability to stitch infrastructure into urban fabrics. Rethinking the relationship between ecology and infrastructure, landscape removes the emphasis from the middle scale architectural or urban work and places the emphasis instead on large-scale infrastructural diagram and the small-scale material condition.

The most intriguing aspect landscape urbanism has to offer is the complex interweaving of natural ecologies with the social, cultural and infrastructural layers of the city. This more complex urbanism is capable of providing a cultural alternative to traditional urban form, while developing an urbanism in which environmental wellbeing, social welfare and cultural aspiration morph into one.

Rem Koolhaas (1998) stated that, “architecture is no longer the primary element of urban order; increasingly landscape is the primary element of urban order.”

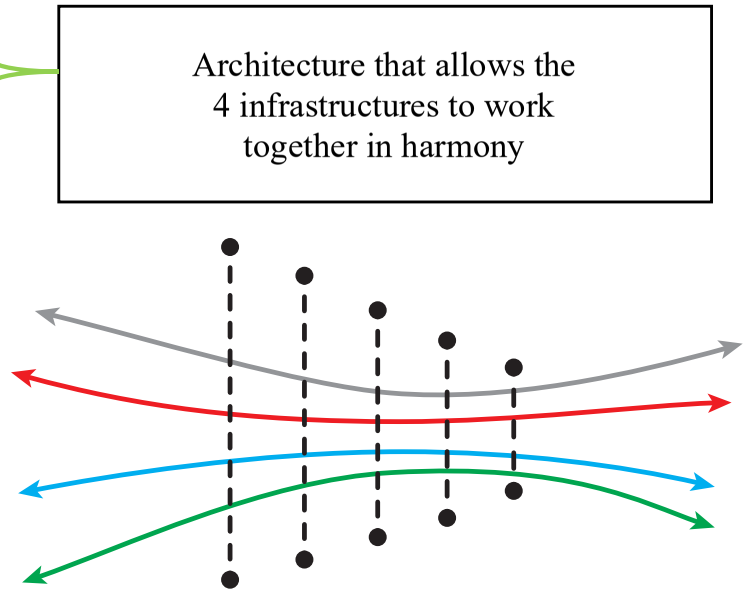


Figure 3.10: Infrastructural harmony diagram (Author, 2019)

Green infrastructure in a grey world

South Africa is the most urbanized sub region in Africa, with 61% of its population now residing in cities (UNHabitat, 2010; Schäffler, 2013). Although the demographic growth is slowing down, the migration from rural to urban continues unhindered. This is placing immense pressure on cities ill-equipped to handle the ever growing population (Sanyal, 2011).

The increase in infrastructural demand is often met with a response by cities in a manner to reduce resource consumption and increase resource efficiency through redesigning grey infrastructure, roads and railways, as the energy and resource supply systems (Weisz and Steinberger, 2010; Schäffler, 2013). It is evident that the green infrastructure or urban biophysical networks, with the ability to provide ecosystem services and improve the overall resilience of a city, is being overlooked (Schäffler, 2013).

From a South African perspective, Schäffler (2013) makes the point that planning and research surrounding environmental issues is often not catered for as seemingly more pressing issues such as service delivery deficit, poverty and economic exclusion take precedent.

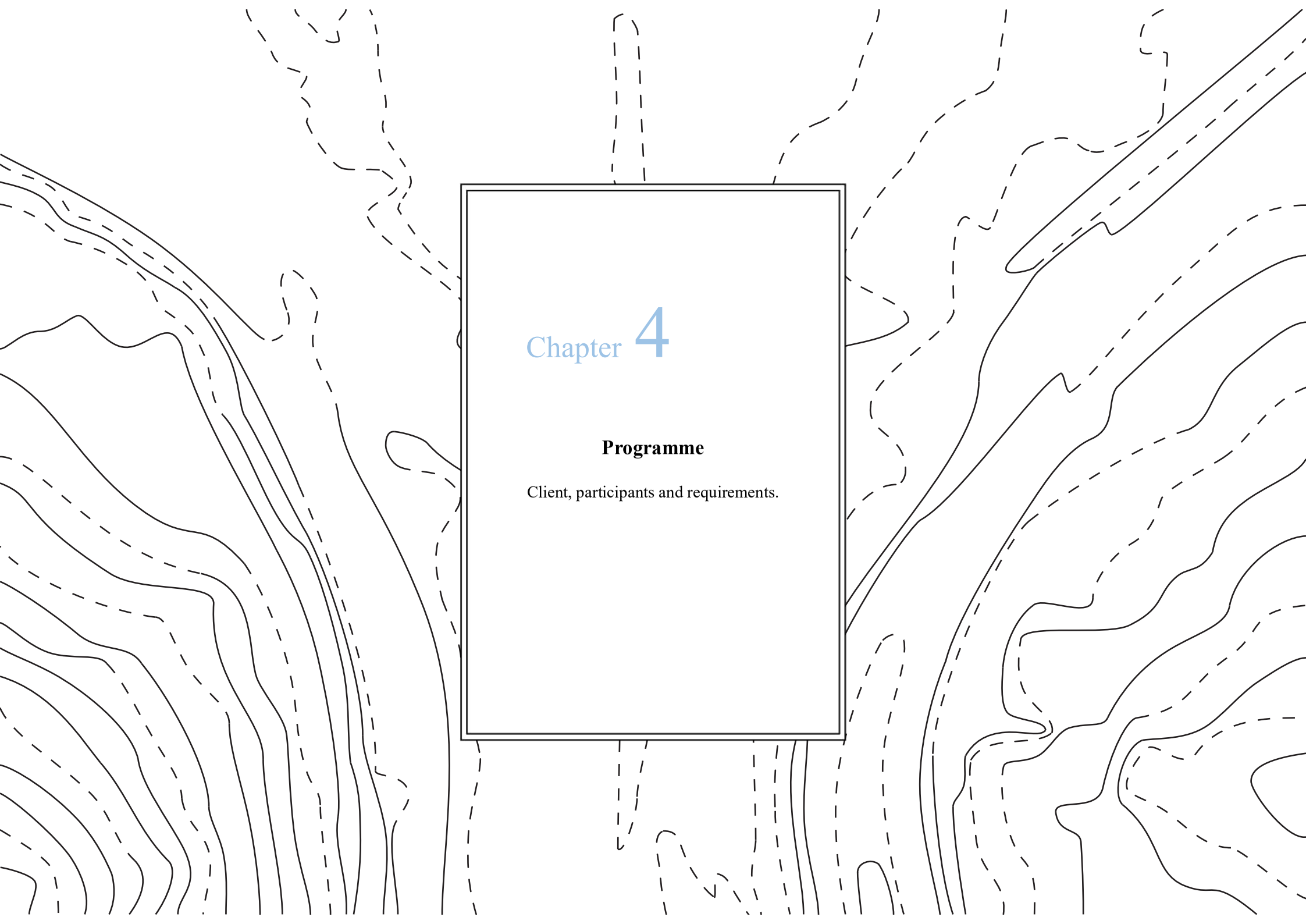
Furthermore, Schäffler states that rapidly expanding cities, need to consider the important role green assets play in the broader infrastructural development strategy. This will only happen if these assets are recognized as integral parts of a city planning process and integrated in city budgeting and accounting systems (Schäffler, 2013).

Green infrastructure is defined as a "connected network of multifunctional, predominately unbuilt, space that supports both ecological and social activities and processes" (Kambites & Owen; Schäffler, 2013). All cities have green spaces, yet they are not all considered green infrastructure. Ecological and natural assets are only seen as green infrastructure when they contribute to providing social, environmental and economic functions (Landscape Institute, 2009; Schäffler, 2013).

Schäffler, (2013) maintains that green spaces need to be seen as systems, so that they can be designed and incorporated into cities as a whole. Grey infrastructure, like roads, would not be built piece by piece. Green infrastructure needs to be administered in a similar way and treated as a functioning entity.

There are two aspects to consider when trying to achieve this, namely, unlocking the ecosystem services potential, and smoother transitions between different infrastructures. This will improve urban resilience in a city with constant increase of demands placed on it. Many cities often see urban green space as something nice to have and fail to see the ecological and social benefits these systems have on an environment.

Resilient ecosystems are normally overlooked in African contexts, as the socio-economic issues and demands such as poverty and job creation demand funds and attention. Green corridors and infrastructures provide an important function to cities through removing air pollutants. Johannesburg is a prime example of a city combating the gold mine boom's effect on air quality by constructing an urban forest (Mcpherson et al. 1997). The green spaces also help to manage microclimates and fight the urban heat island effect (Schäffler, 2013).



Chapter 4

Programme

Client, participants and requirements.

Natural Resources Facility

Programmatic Development Diagram

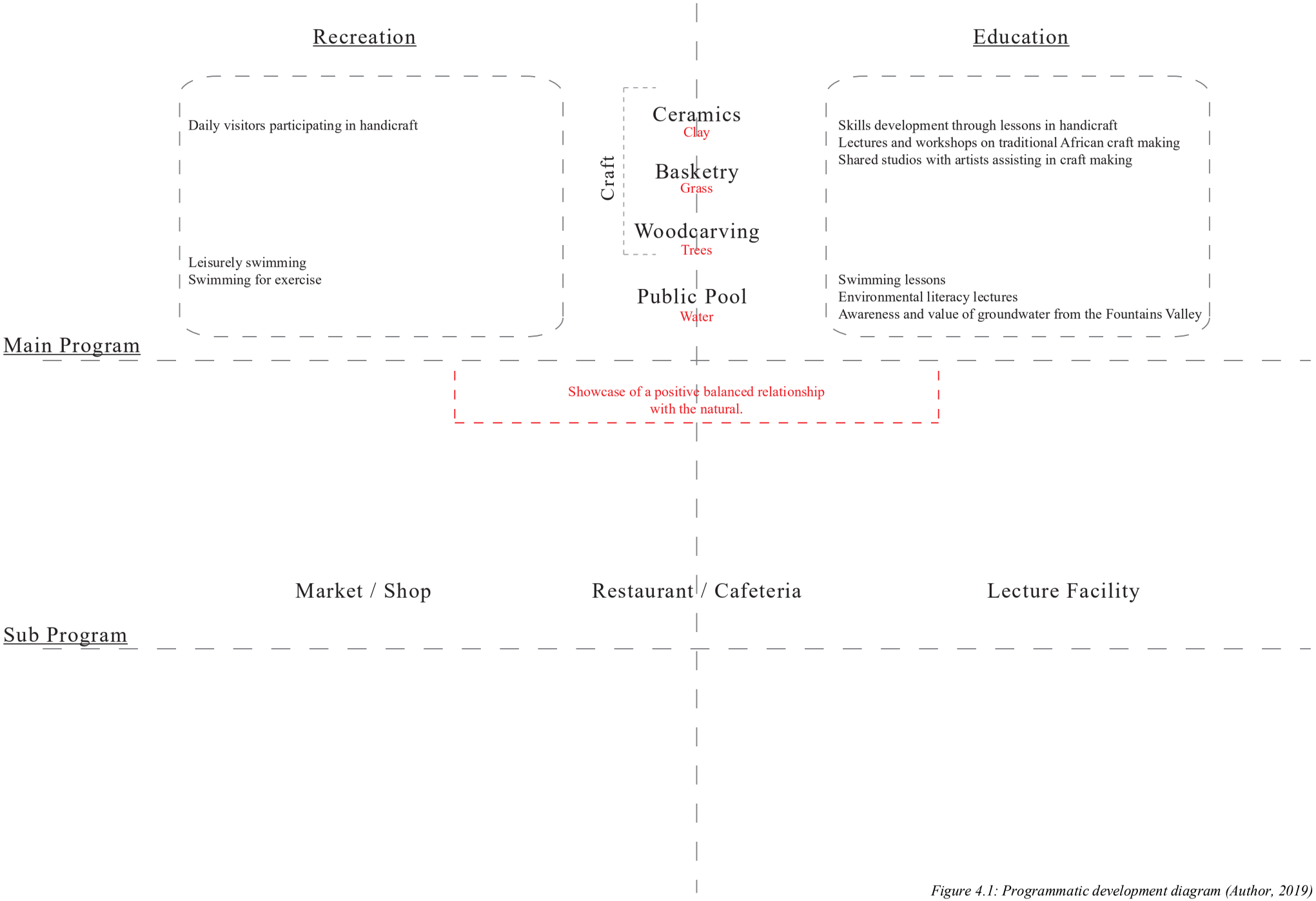


Figure 4.1: Programmatic development diagram (Author, 2019)

Crafts

Adolf Loos (1982) ponders the question: Which has more worth? A kilogram of stone or a kilogram of gold? He states that this question would seem ridiculous. Ridiculous to the merchant, not to the artist, who sees all materials as having equal value. The artist's goal is to master the material in a way that his work becomes of value independent of the inherent value of the raw material. It is generally accepted that the world in which we live, gives precedence to quantity of work, as this is easily controlled and measured. It is evident for all to see and judge, without the need for special knowledge or skills. Therefore, the error rate is decreased significantly.

William Morris (1888) argues that for art workmanship to have value, the individual workman's hand should be visible within the piece of work. The workman should add his value to a piece of work, independent of the design of the artist who has planned the work, but not executed it.

David Pye (1968) concluded that although the goal of design is to impose order onto something, the worker performing the design task must be allowed his own spontaneity and individuality to come to the fore. This is an important element often overlooked in the valuing of workmanship.

Nature showcases this example through the natural environment and through all naturally grown things, showing individuality on a basis of order and uniformity. Pye further argues that human sensibility grew from the aesthetic nature possesses, order permeated by individuality. Highly regulated workmanship was in admiration in the early days of civilization, as it was rare, and difficult to imitate. Today, that dynamic has completely reversed, and we are striving for an environment more to the like of our natural one.

Good workmanship exploits the diversity quality in its work and goes beyond the elements controlled by design. Diversity mimics in our built environment something that we have lost from our natural environment. Those small-scale deviations in a craft are often celebrated, as it shows an opposition to the regulated design template of the large-scale product (Pye, 1968).

Pye (1968) differentiates workmanship in two distinct categories, workmanship of risk and workmanship of certainty. The workmanship of risk entails the type of work that posseses a unique aesthetic quality, the type of work that is not assisted by regulated machinery that performs a task without fault.

The workmanship of certainty on the other hand, is defined as work that cannot be spoilt by the operative performing the job. He is regulated by a system or machine, safeguarding the product's regulated outcome. Speed and precision are often the motive for this type of workmanship. This workmanship can do nearly everything well, apart from creating diversity. Workmanship of risk took advantage of diversity, by exploiting the inherent qualities of a natural material.

Pye further states that workmanship of risk is in no way superior or a protest against the workmanship of certainty. The crafts should rather be seen as a complementary addition to our environments dominated by workmanship of certainty. The crafts being a complement to industry.

Pye (1968) argues that there are no born designers, and that people are born with or without the makings of a designer in them. This can however, only be extracted through much hard work and practice. He states that a willing individual can learn something in two minutes through experience, where an indifferent one will not learn this skill in two weeks. The value of work lies in the amount of passion poured into the craft, and not in the time spent on it.

African Art and its religious connotations to nature and the cosmos

Ba (1976) states that art was not seen as a separate activity from life, in the traditional African way. Ancient Africa viewed the universe as an all-encompassing religious one, and acts of creation were seldom performed without an intention or ritual. In traditional Africa, there was no separation between the sacred and the profane. Everything was seen under the umbrella of the unity of life and, therefore, interconnected. Everything was seen as art and nothing was done for mere recreation or utilitarian purposes. They were activities with religious weight and integral to the way of living. Art, meaning the work of the hands, was defined as everything at which people worked and which could contribute to the development of the individual. This included knowledge transfer and the means and methods of putting something together.

The traditional ironsmith's forge was seen as a scared space, which one could not enter or use without the specific rituals accompanying the task. The traditional African ironsmith did not arbitrarily see the craft as the making of an object, but rather the participation in the act of creation and the mystery of life. Art objects were used to translate knowledge through different means, like deciphering patterns of tapestry. The traditional African saw art as a porthole into which one can see the infinite horizon of the cosmos. Therefore, most works of art had several meanings, a religious one, an educational one and a recreational one. This is the meaning of initiation, "the profound knowledge of that which is taught through things, through appearances, and through nature itself".

Several writers expressed their differences on their views of nature and its influence on workmanship. Nature is defined by the historian, Jacques Barzun (2000) as something that has no intentions, friendly or unfriendly. It does not exist as an entity. Man has constructed it from man's experiences and needs. Once seen as such a construct, it feeds him and the sight of it gives him endless joy (Stevens, 2008).

If one considers the appropriateness of nature as a source of inspiration and the relevance it holds for design and art, one does not have to look far to find the camp that responds in the negative. The modernists, in particular Adolf Loos (1998), through "Ornament is crime" and form follows function, rejected the idea of nature in art and design, although in the Western world, nature was often only used as a source of ornament (Stevens, 2008).

Barzun (2000) stated that the gravitation towards nature throughout Western history resounds as the Great Aboslute, with nature seen as the handiwork of God and, therefore, never wrong. This resulted in the way of living according to nature. John Ruskin saw the unique aesthetic qualities that free and rough workmanship brought (Pye in Stansky 1985). He admired the "naturalness" and the traces of the individual maker left in the art (Stevens, 2008).

According to Harvey & Press, (1991) William Morris was influenced by Ruskin's love for the "naturalness" and thus believed in "truth to materials". The inherent qualities of each material had to be brought out in each design. A piece of furniture should not hide the methods or process in which it was made and which materials it made use of. The nature of the material determined the "naturalness" and the limitations of the design (Stevens, 2008).

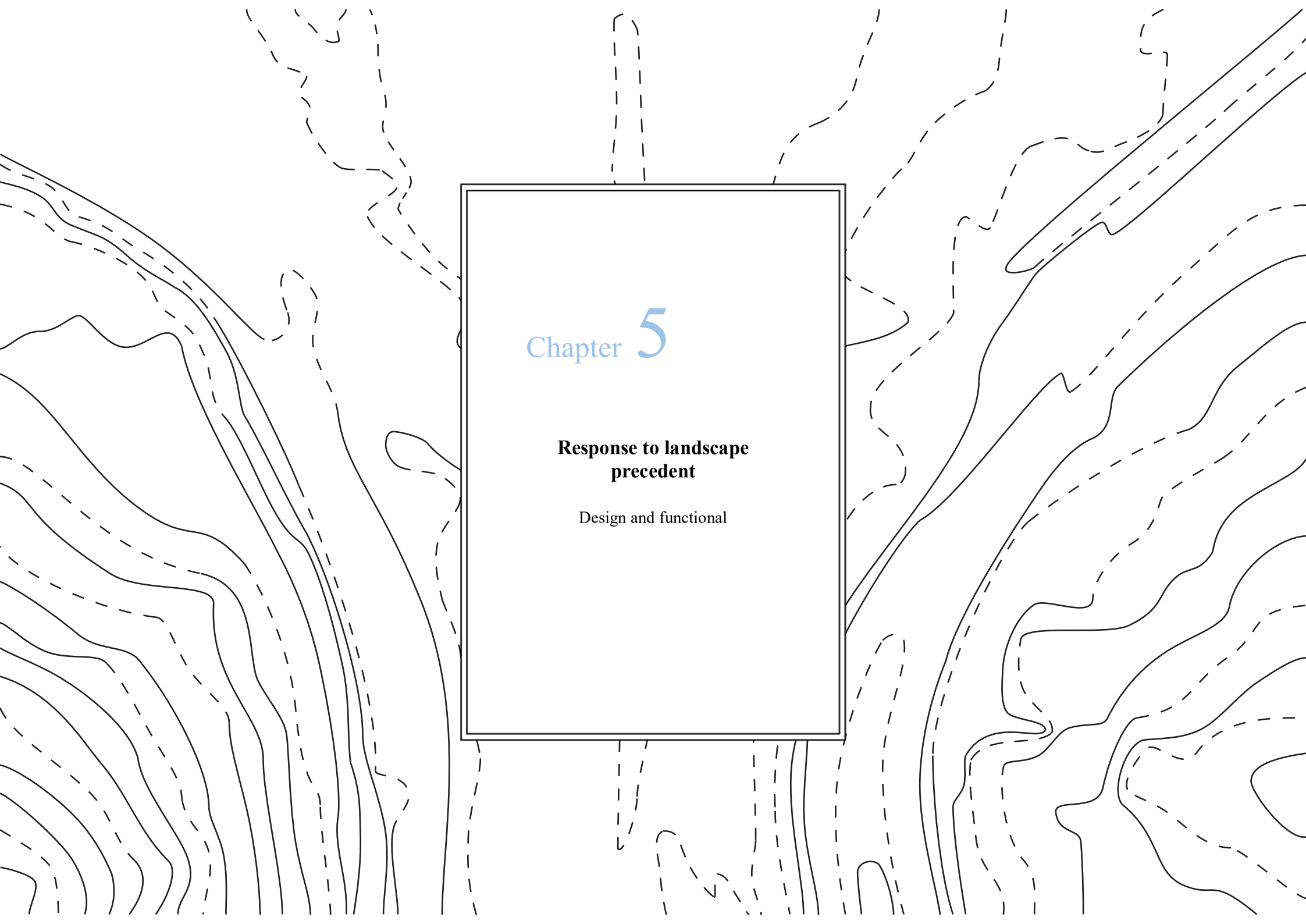
Stevens (2008) concluded that nature is an important source in the development of decorative South African arts, where the aim is to create art that is associated with Africa. She likened this to the way William Morris used nature as a symbol to signify a better, simpler life with improved social conditions.

Natural Resources Facility

South African crafts have a similar take on this as they deal with social ideologies, such as the renaissance of crafts, cultivation of creativity in craft workers and social improvements like, job creation and poverty alleviation. This shows that although nature might have lost its link to the larger cosmos, it still serves as a symbol of ideals and aspirations.

Figure 4.2: South African handmade crafts (West Elm, 2019)

Education through crafts is deemed an appropriate program, as the diversity element will assist in redefying a homogenous residential environment. The surrounding community will have the opportunity to learn a practical skill during the night schooling sessions. They will have access to three different streams of craft, namely, pottery, woodworking and weaving. The facility will promote using natural materials and offer access to a platform to eventually sell their crafts through the market, as a means to generate an extra income. The facility will also be used as a purely recreational one during the day, where users are assisted by freelance artists sharing the studio with them. Ultimately the goal of using crafts of natural materials, is to showcase a condition of humans and nature thriving in a balanced co-dependant relationship. A facility that strengthens the bond between humans and the natural, as it was in the Genesis of Pretoria. The project becomes a celebration of Pretoria's natural water supply from the Fountains valley, through creating awareness and appreciation by deconstructing the Apies River storm water channel, to create an environment of mutual respect between nature and humans, similar to the conditions at the Genesis of Pretoria.



Chapter 5

Response to landscape precedent

Design and functional

Design Precedent

Olympic Archery Range by Enric Miralles and Carme Pinós

Charles Waldheim (2016), describes two main streams of thought around landscape and urbanism. The first line of thought stems from the critical architectural discourse and results in highly sculpted horizontal surfaces. The second line of thought places emphasis on natural systems and the implementation of these, either literally or through metaphor. He states that the first line of thought remains an influence although the criticality of the discourse might have been eroded over time.

An example of the first line of thought can be seen in the work of Enric Miralles and Carme Pinós. The Igualada Cemetery (1986-89) and the Olympic Archery Range (1989-92) are both examples of projects originating from rubbing drawings over found topographic lines. The resulting buildings are highly sculpted, complex forms contradicting the landscape. Both are read as constructed architectonic landscapes that happen to contain some buildings.

The projects are experienced as horizontal landscapes with complex sectional relations between the form and the found topographical condition. The buildings are a result of an expressive architectural method rather than one of a rational or ordered system applied through program or tectonics. The building's place in the landscape is carefully considered. Located in an outlying neighbourhood in Barcelona, the Archery Range comprises of two distinct elements, namely, an exposed concrete wall and a retaining wall placed within the hill from which the building emerges.

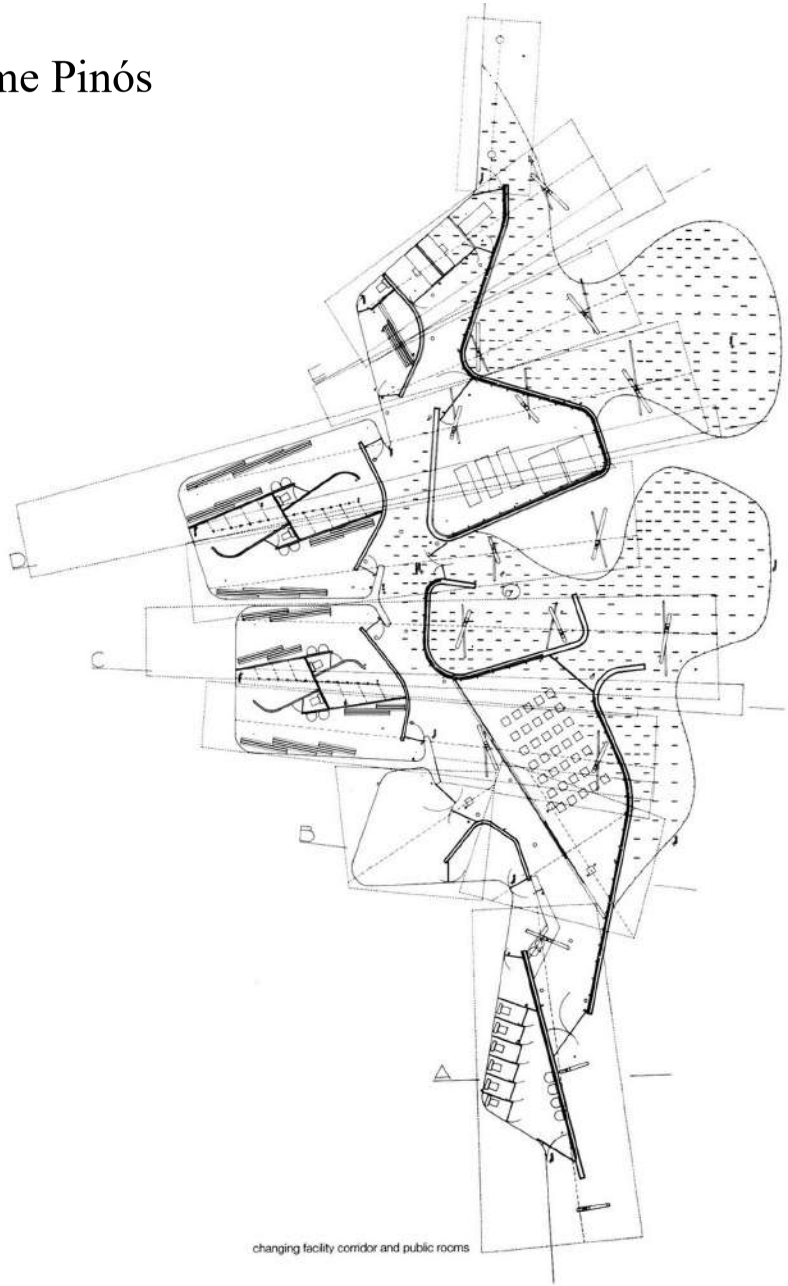


Figure 5.1: Olympic Archery Range Ground Floor plan – Enric Miralles and Carme Pinós (www.Archdaily.com, 2019)

Figure 5.2: Olympic Archery Range perspective – Enric Miralles and Carme Pinós (www.Archdaily.com, 2019)

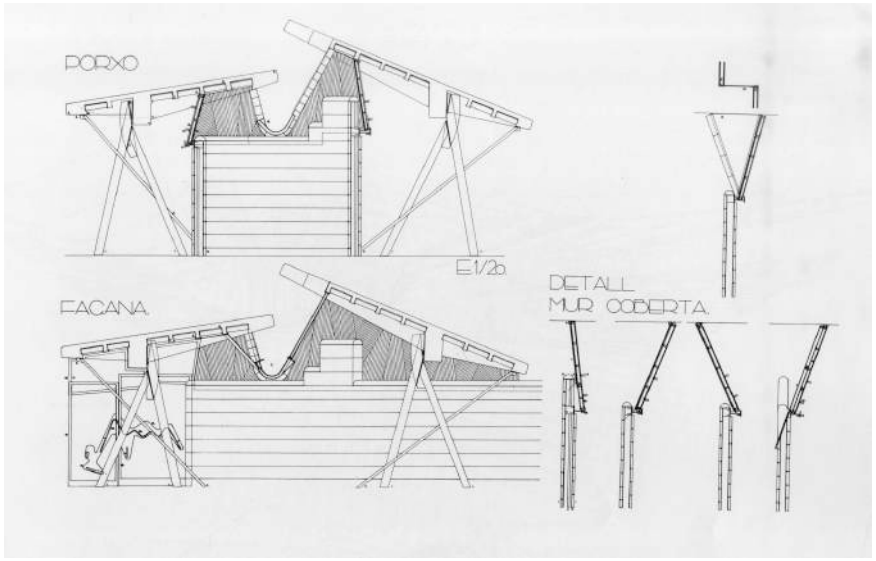


Figure 5.3: Olympic Archery Range section – Enric Miralles and Carme Pinós (www.Archdaily.com, 2019)

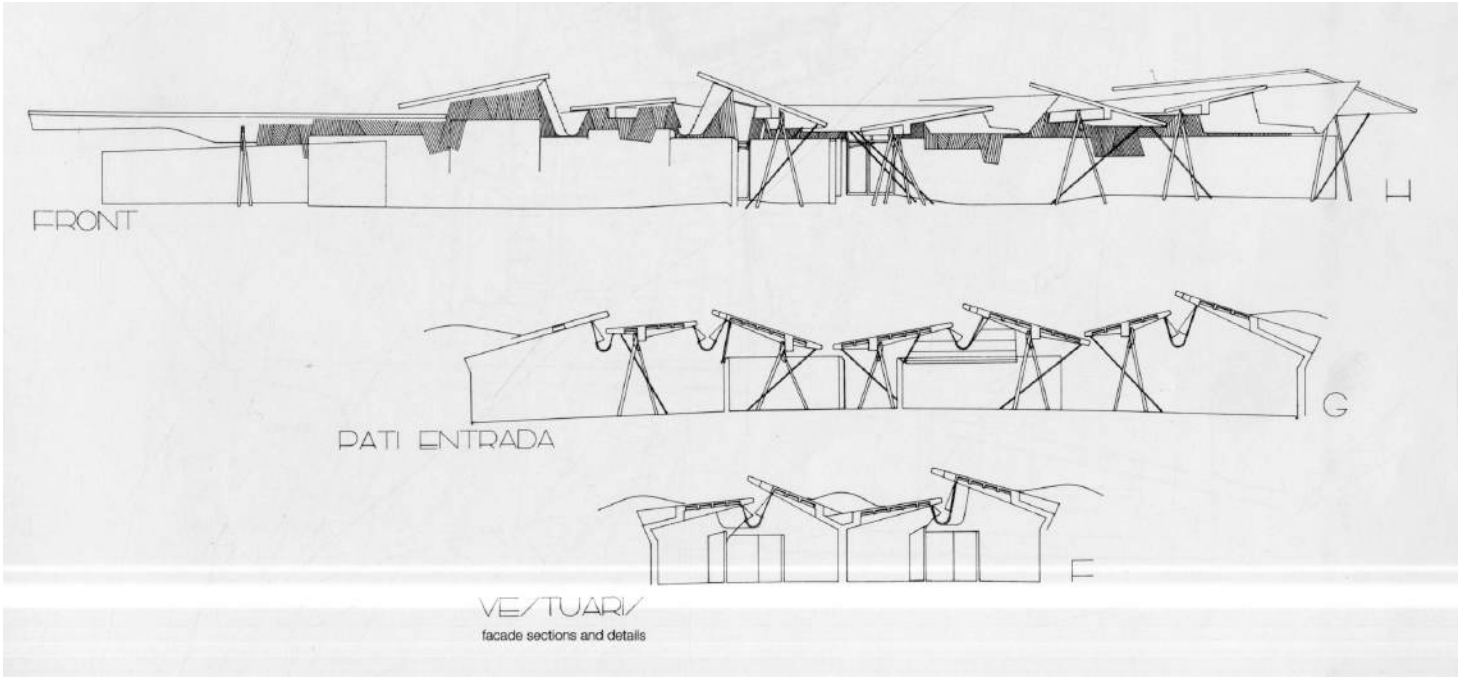


Figure 5.4: Olympic Archery Range elevations – Enric Miralles and Carme Pinós (www.Archdaily.com, 2019)

Functional Precedent

Bellinzona Bathouse - Aurelio Galfetti, Flora Ruchat-Roncati, Ivo Trümpy Architects

The project is located in Bellinzona, Switzerland and was completed in 1967. It is referred to as the Bellinzona bathouse, although it manifests itself more as a public pool than bathouse.

The structure combines a number of functions within a large reinforced concrete element placed in the landscape. The open linear structure connects the town to the river, while also organizing the surrounding territory. This is done by raising the walkway six meters above the flood plain level, which is a large empty space. The public pools latch onto this linear structure while relating to the plain, the hill, the town, the mountains and the sky surrounding the site. The structure is organized as a whole, functionally and programmatically, which will allow flexibility. The concrete walkway serves as a physical urban connector to the town, it also allows the town to feel more open. The structure houses an underlying metal structure to shape the different specific programmatic functions (Aguirre, 20170. The project succeeds in creating a physical connection, while allowing a public space to attach itself to the walkway. It creates a multifunctional element in the landscape.

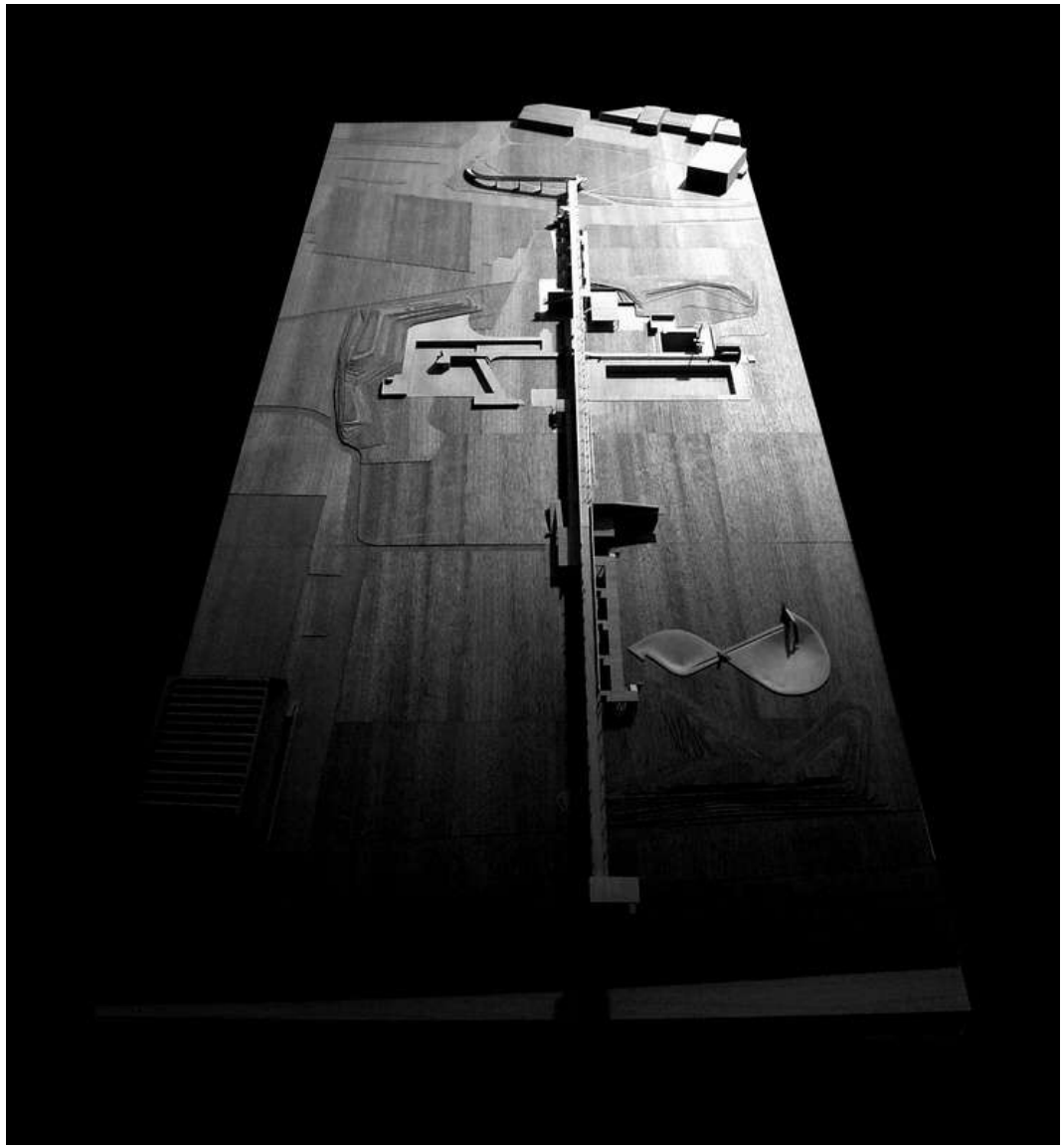


Figure 5.5: Bellinzona Bathouse model – Aurelio Galfetti, Flora Ruchat-Roncati (www.Hiddenarchitecture.net, 2019)

Figure 5.6: Bellinzona Bathouse perspective of pools – Aurelio Galfetti, Flora Ruchat-Roncati (www.Hiddenarchitecture.net, 2019)

Figure 5.7: Bellinzona Bathouse aerial photograph– Aurelio Galfetti, Flora Ruchat-Roncati (www.Hiddenarchitecture.net, 2019)

Figure 5.8: Bellinzona Bathouse aerial photograph– Aurelio Galfetti, Flora Ruchat-Roncati (www.Hiddenarchitecture.net, 2019)

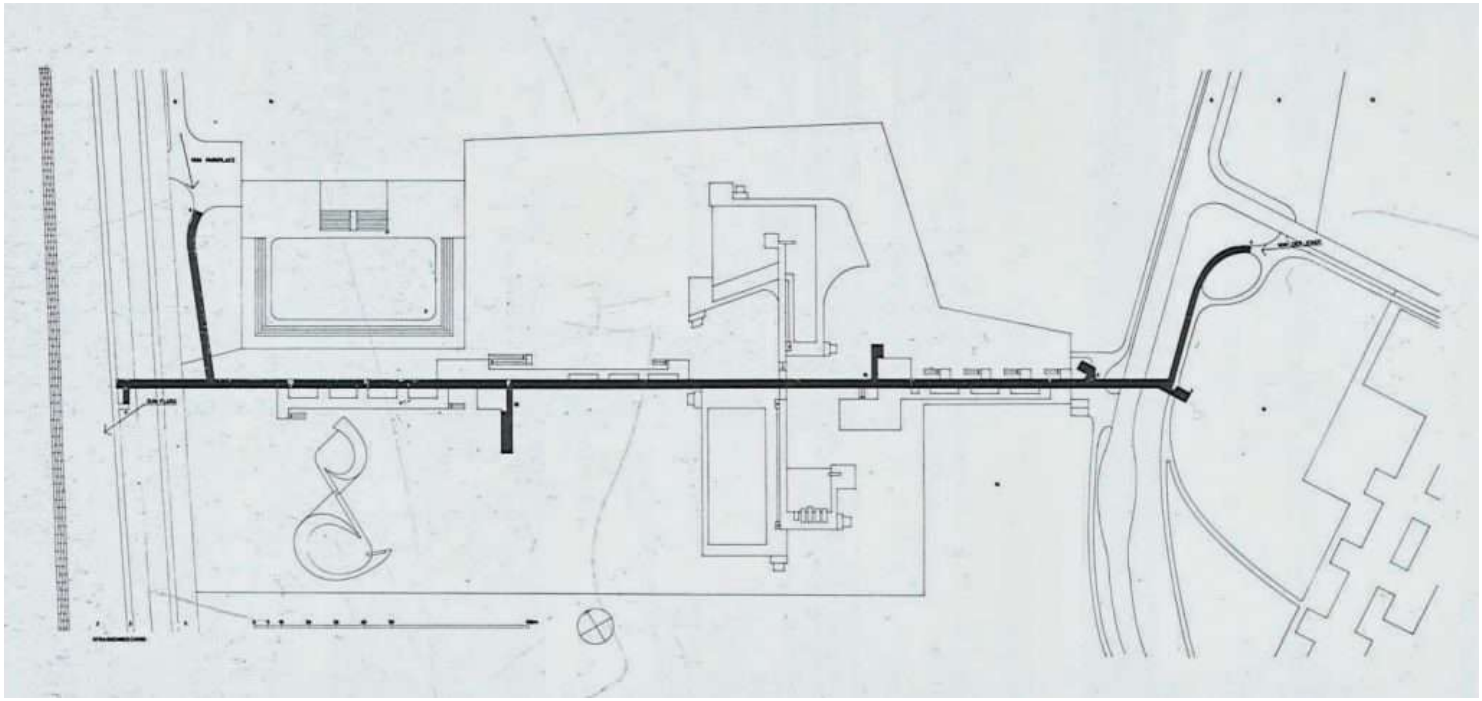
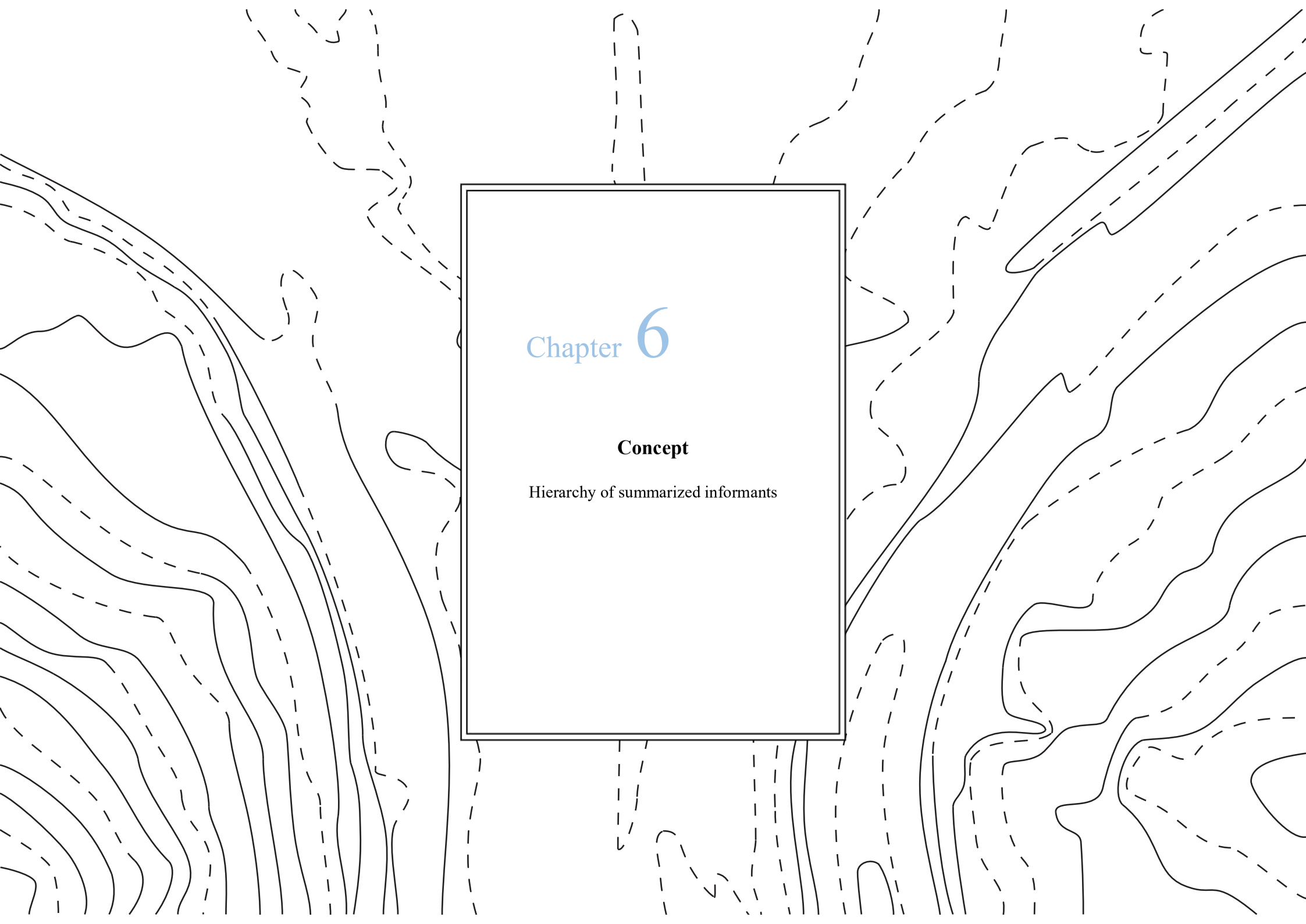


Figure 5.9: Bellinzona Bathouse site plan– Aurelio Galfetti, Flora Ruchat-Roncati (www.Hiddenarchitecture.net, 2019)



Chapter 6

Concept

Hierarchy of summarized informants

Unlocking the latent potential

Utilizing the recreational potential of the gateway to facilitate the urban-nature connection

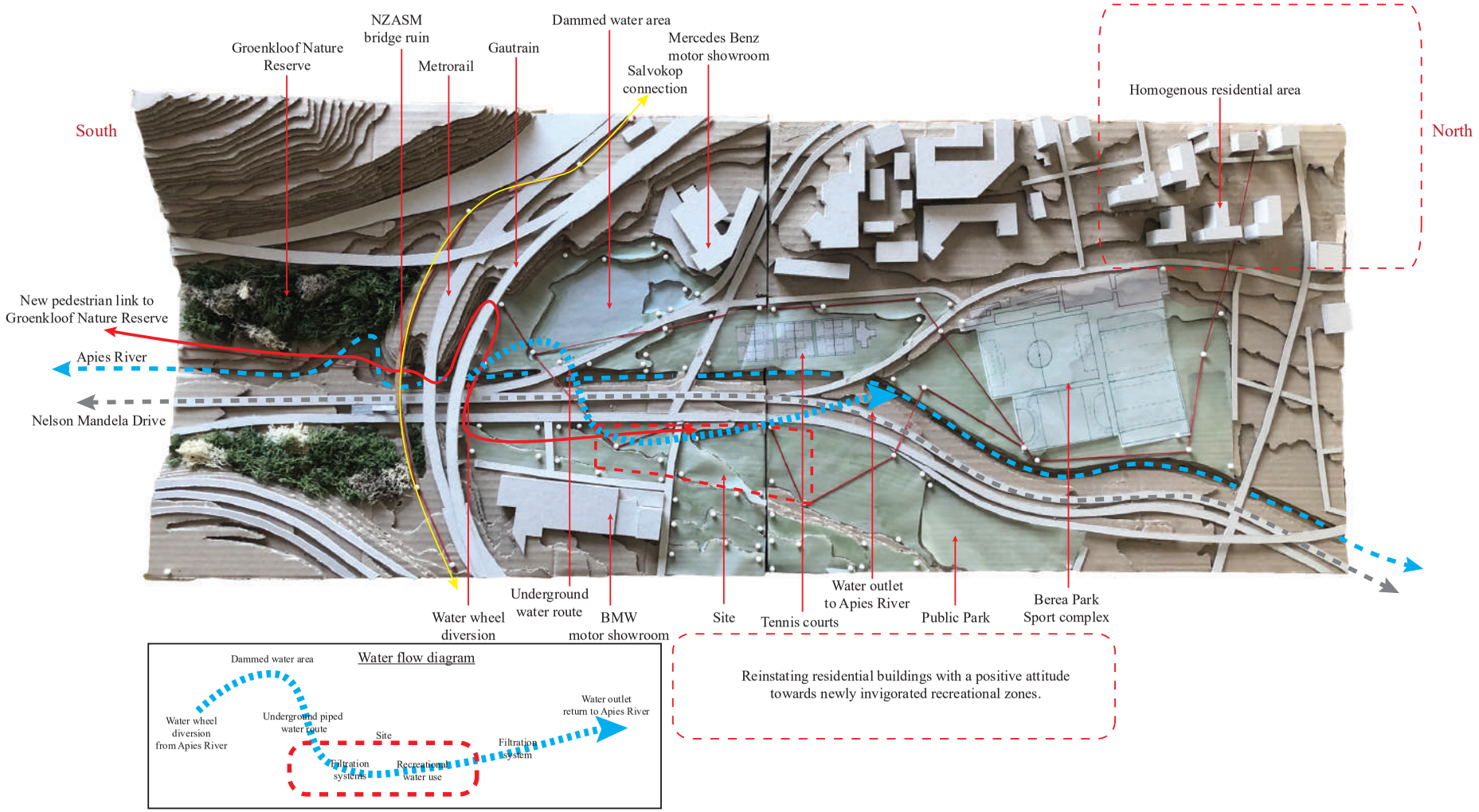


Figure 6.1: Latent potential model diagram (Author, 2019)

*Figure 6.2: P*hotograph of model looking south towards the gateway (Author, 2019)

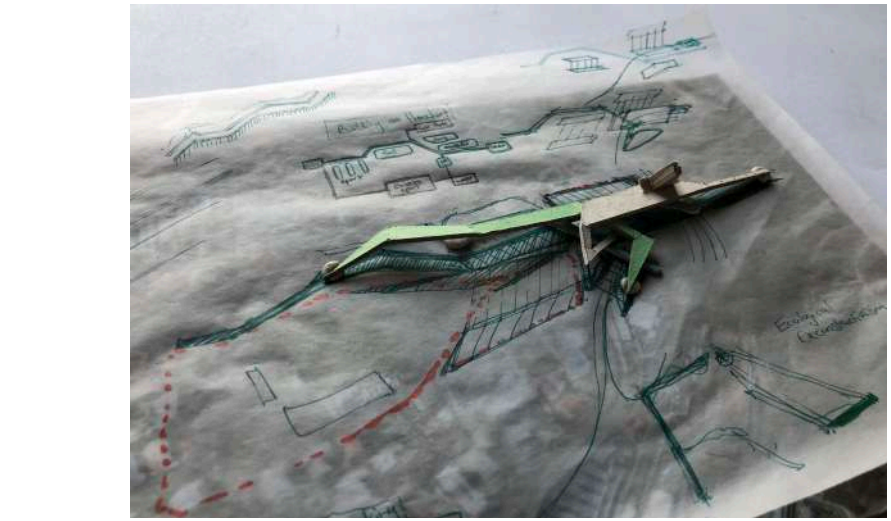
*Figure 6.4: P*hotograph of model looking south at the focus area (Author, 2019)

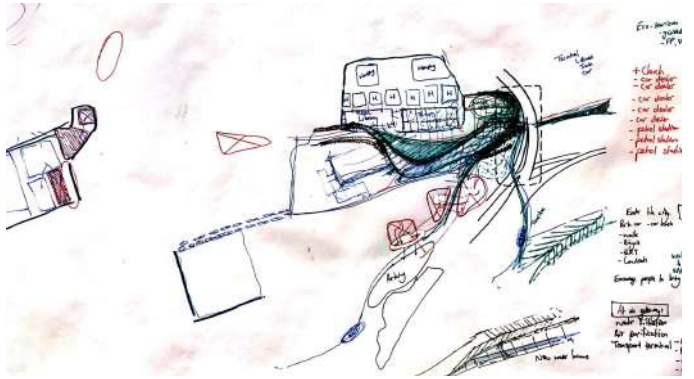
*Figure 6.3: P*hotograph of model looking north towards the gateway (Author, 2019)

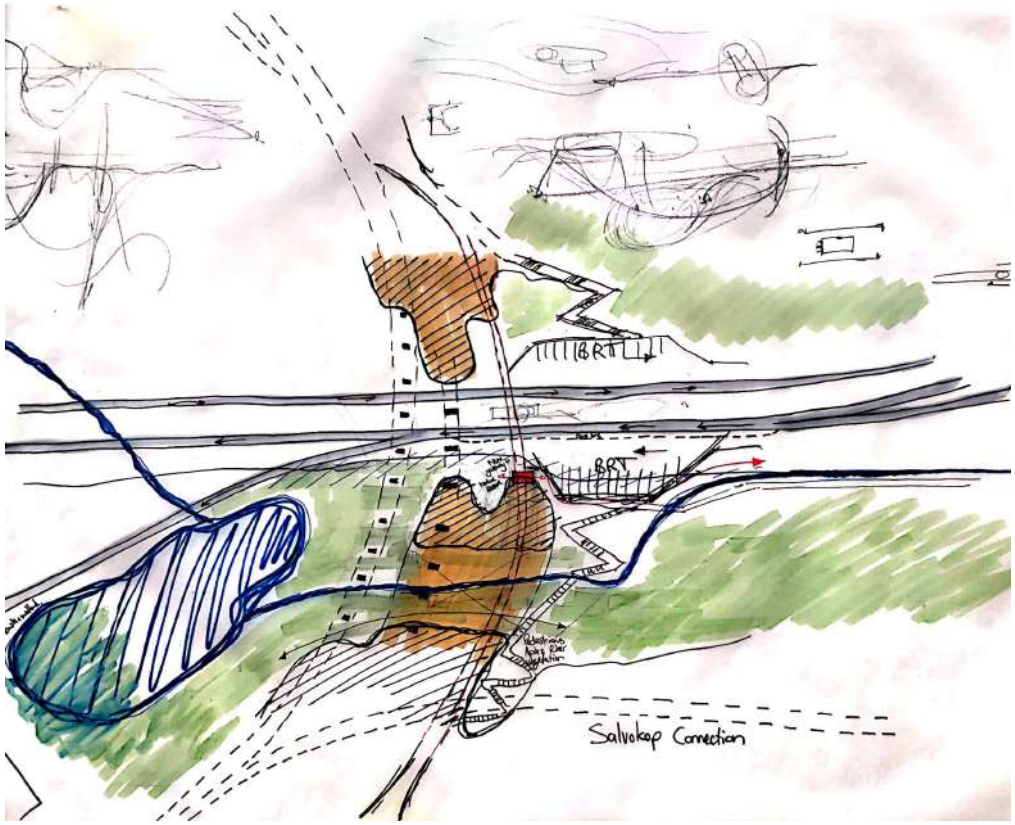
*Figure 6.5: P*hotograph of model looking south at the sports complex (Author, 2019)

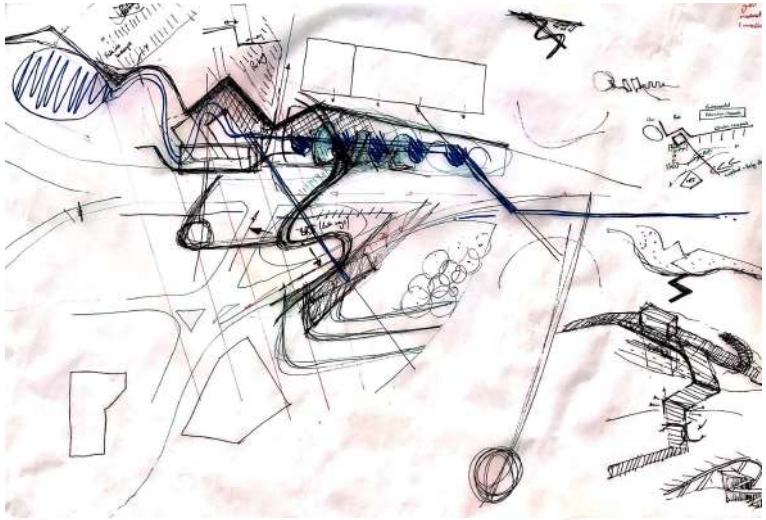
The gateway has the potential to use recreational activities as a transition zone from urban to nature. The ill-defined, derelict green spaces will be re-invigorated and become public sports facilities once again. The educational component of the project will overlook the facilities and ensure its sustainability.

The site facilitates flow and transition. The flow of traffic, people, water and greenery. The flow should be rearranged and enhanced to allow the equilibrium to find its balance again.









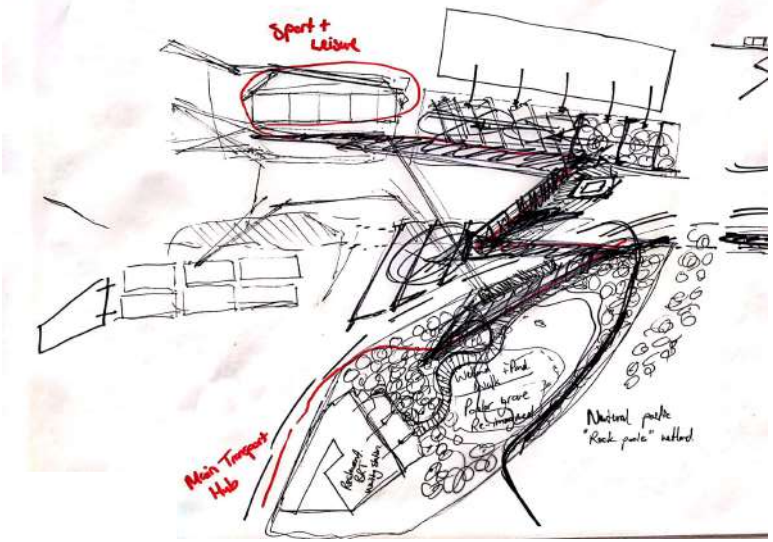


Figure 6.6: Concept generation process diagrams (Author, 2019)

Human-Nature Equilibrium

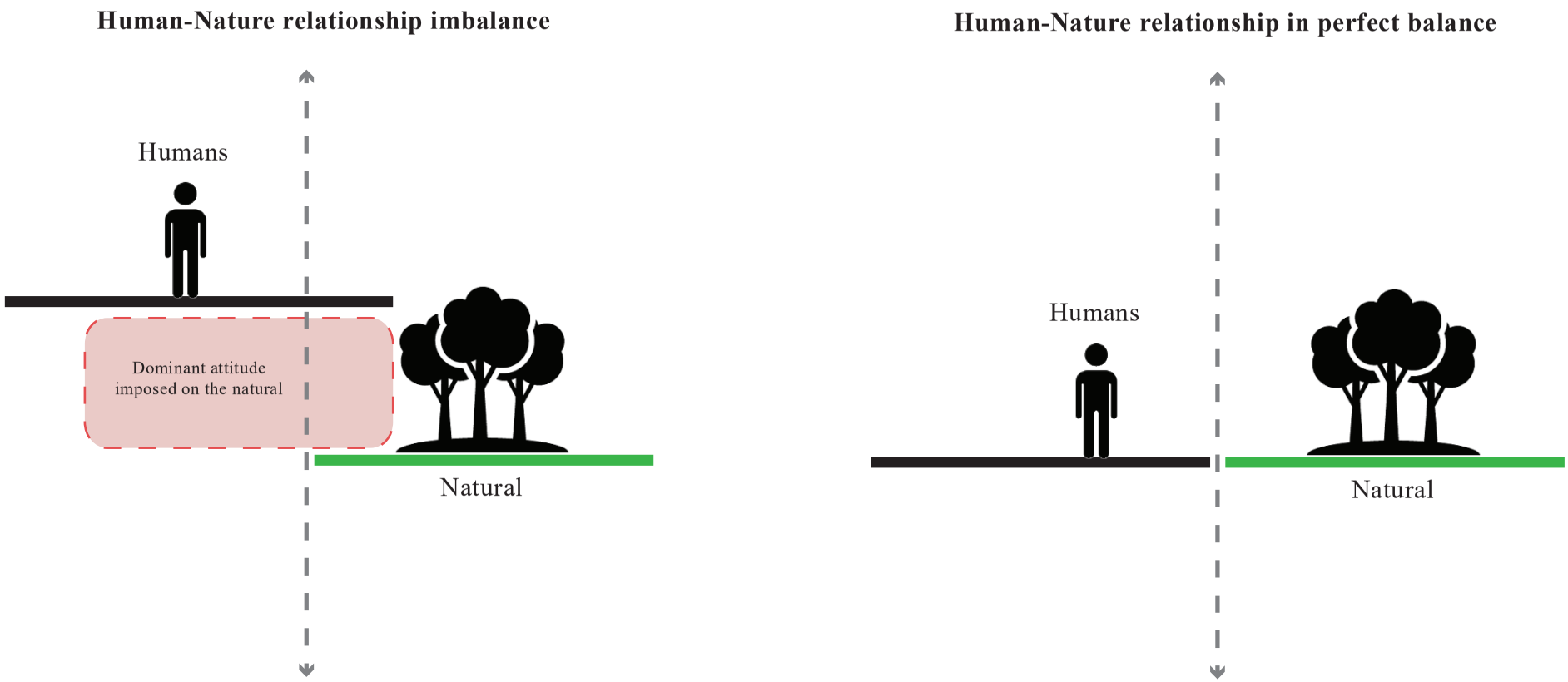


Figure 6.7: Human-Nature concept diagram (Author, 2019)

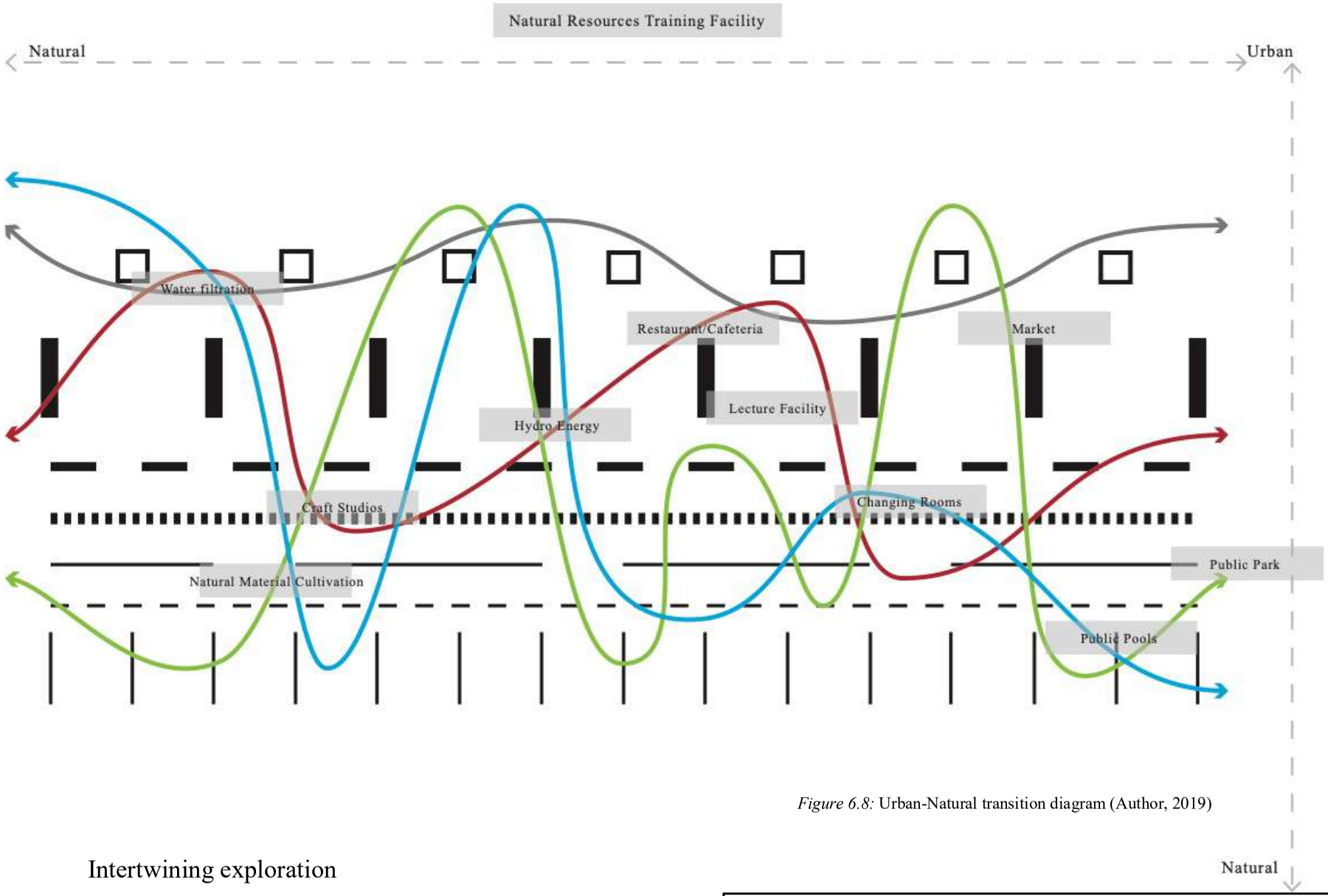


Figure 6.8: Urban-Natural transition diagram (Author, 2019)

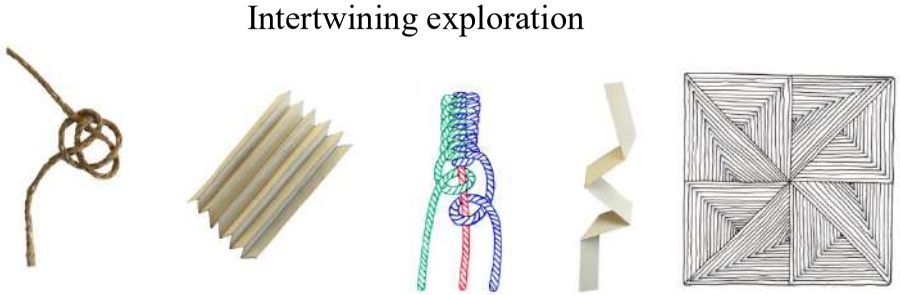
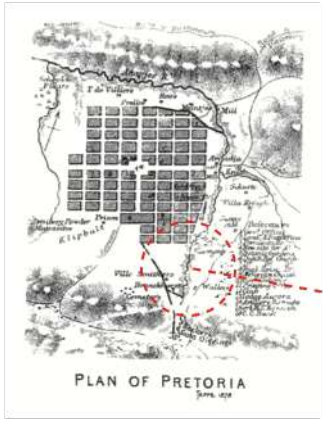


Figure 6.9: Intertwining exploration (Author, 2019)

A depiction of the intertwining of infrastructures through the architecture that morphs and transitions from urban to natural. This is translated in the function and the architecture. The diagram is conceptual and placement of functions may vary in the design.

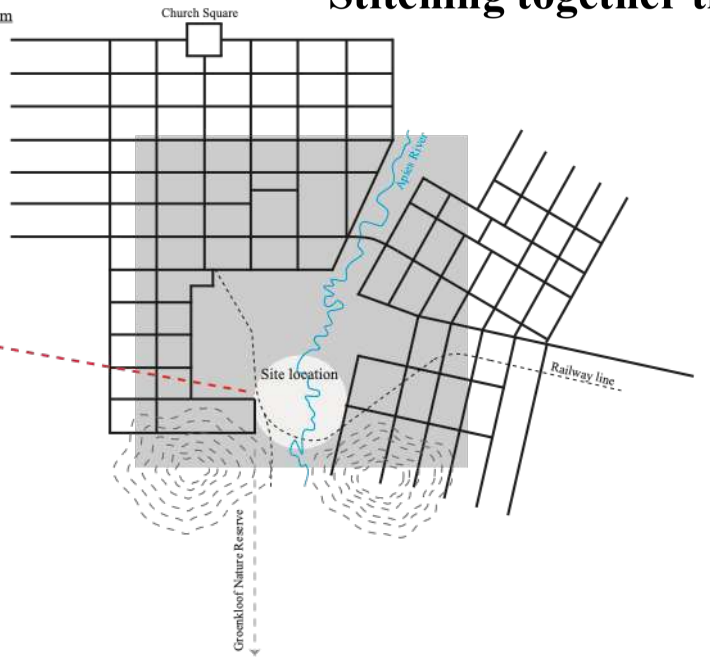
Stitching together the city grid

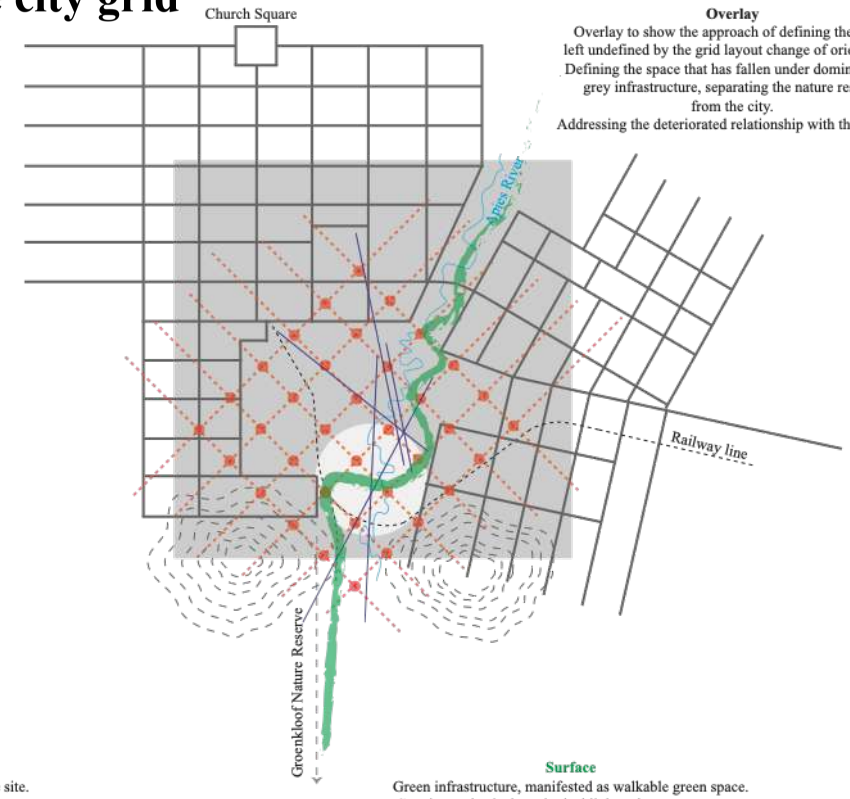
Applying Bernard Tschumi's Parc de la Vilette organizing system to develop an Urban Park



Map of Pretoria 1878 (Van der Waal Collection) - van der Vyver, 2015

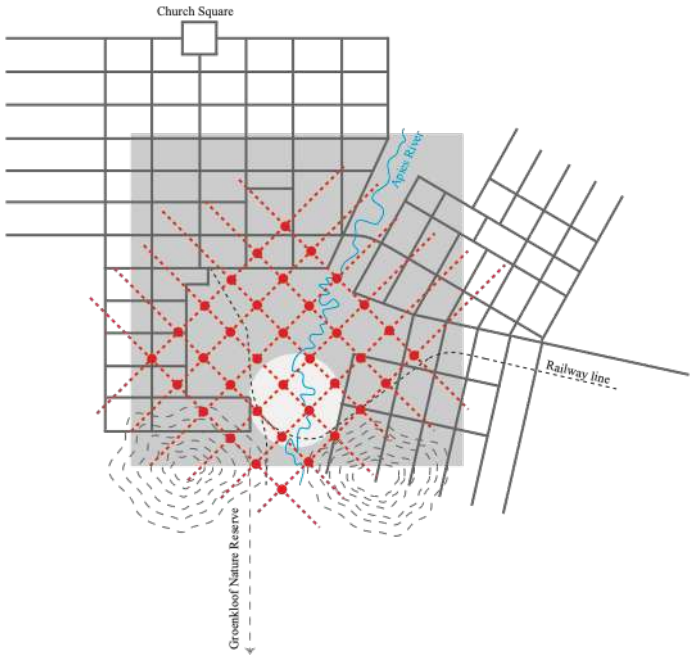
Map showing the implementation of the rigid grid layout on the natural landscape. The beginning of man's dominant attitude over the natural. The chosen site, (Southern Gateway) to the city, shows the complication of applying a rigid grid, when confronted with the natural. The river and the narrow bottleneck between the ridges, means the grid cannot continue.





Overlay
Overlay to show the approach of defining the space left undefined by the grid layout change of orientation. Defining the space that has fallen under domination of grey infrastructure, separating the nature reserve from the city.
Addressing the deteriorated relationship with the natural.

Point
Point grid system applied to mesh together the two different oreintated city grids through program, mediating gradually from urban to natural.



Line
Axial lines of interest having a direct impact on the site.
Main movement corridors.

Surface
Green infrastructure, manifested as walkable green space.
Creating a physical, ecological link to the nature reserve.

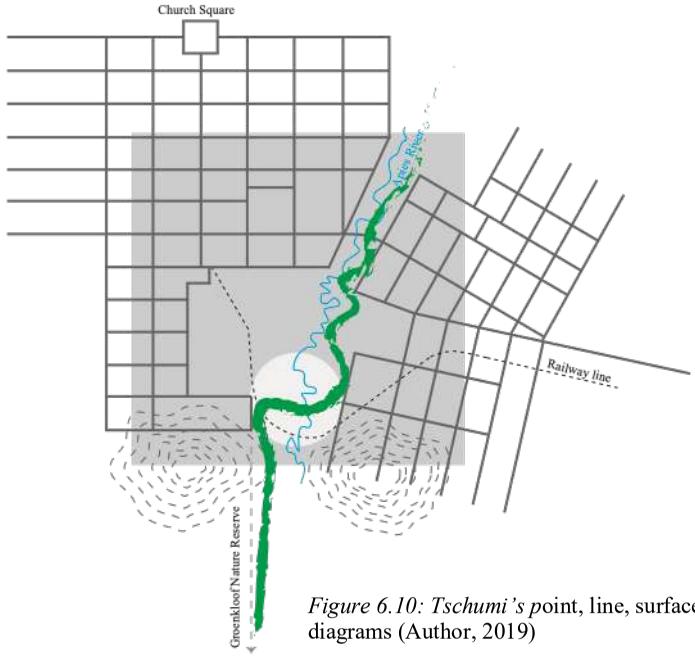


Figure 6.10: Tschumi's point, line, surface diagrams (Author, 2019)

Chapter 7

Design Development

Design exploration and intent

Design development
Iteration 1

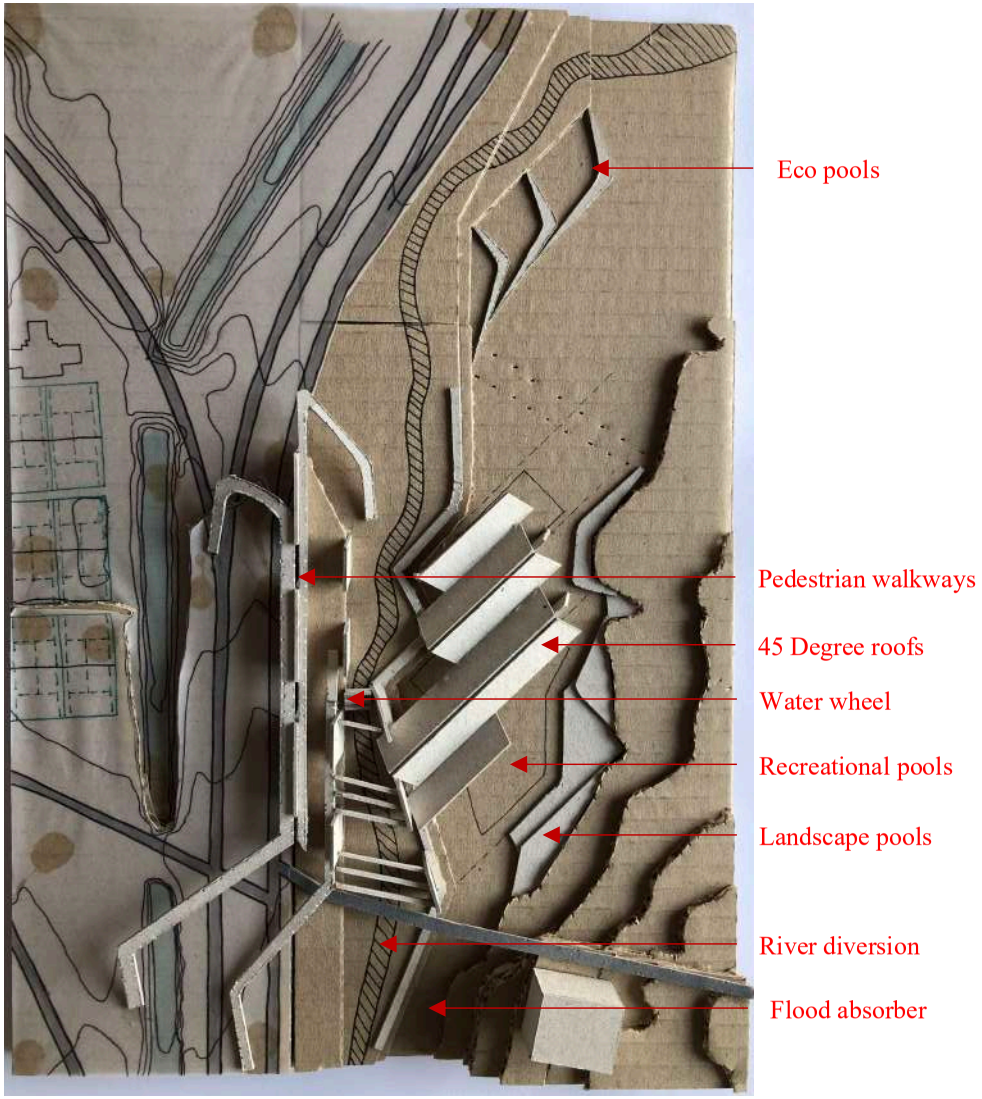


Figure 7.1: Photograph of iteration 1 model in plan view (Author, 2019)

Figure 7.2: Photograph of iteration 1 model at angle (Author, 2019)

Figure 7.3: Photograph of iteration 1 model looking West (Author, 2019)

Design development
Iteration 2

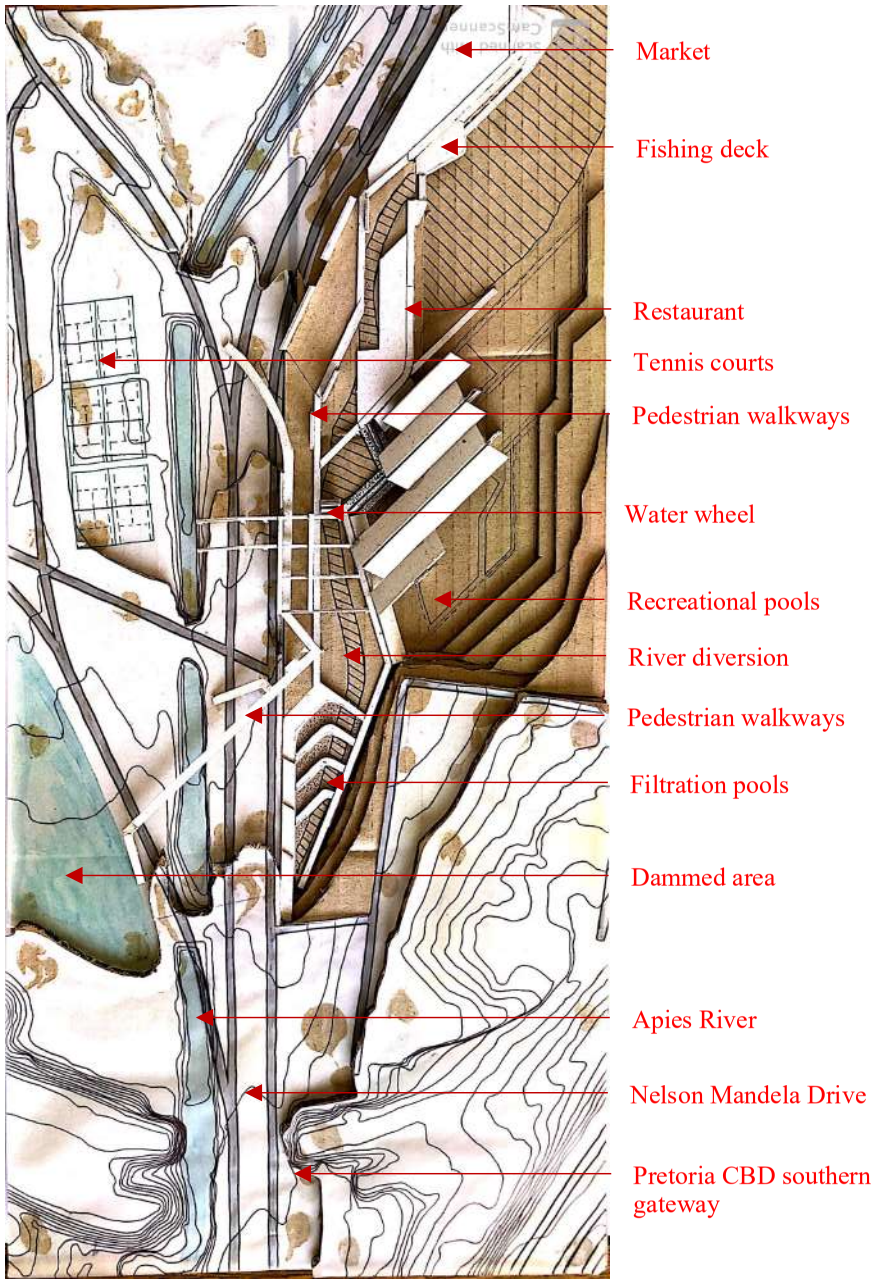


Figure 7.4: Photograph of iteration 2 model in plan view (Author, 2019)

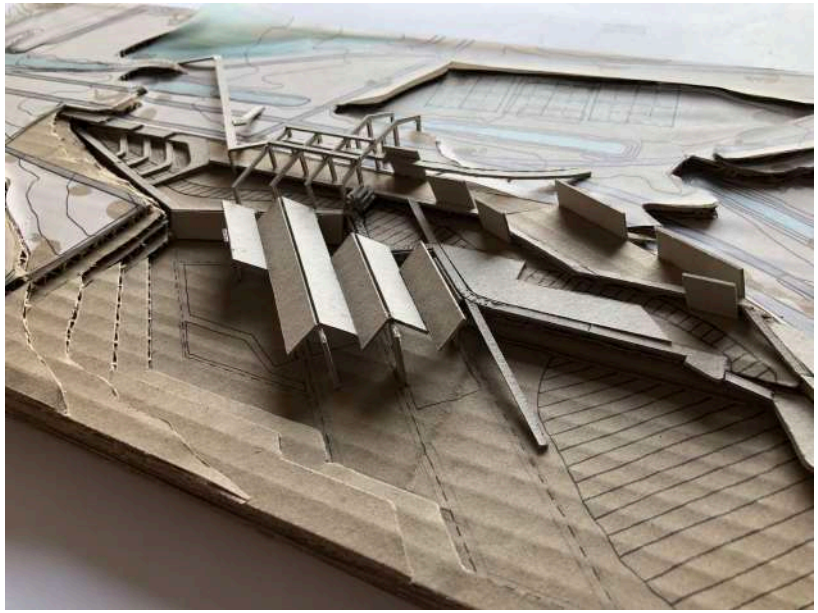


Figure 7.5: Photograph of iteration 2 model at angle (Author, 2019)

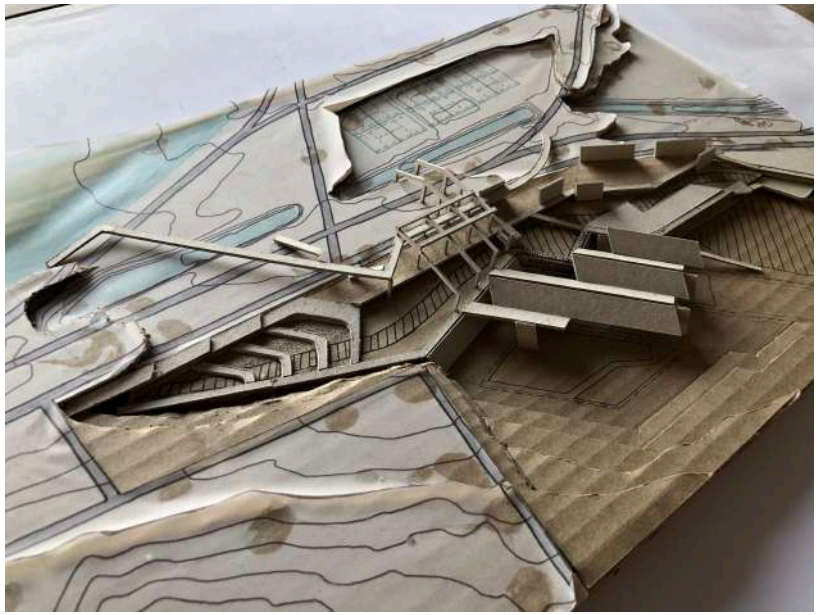


Figure 7.6: Photograph of iteration 2 model looking North-West (Author, 2019)

Design development

Iteration 2

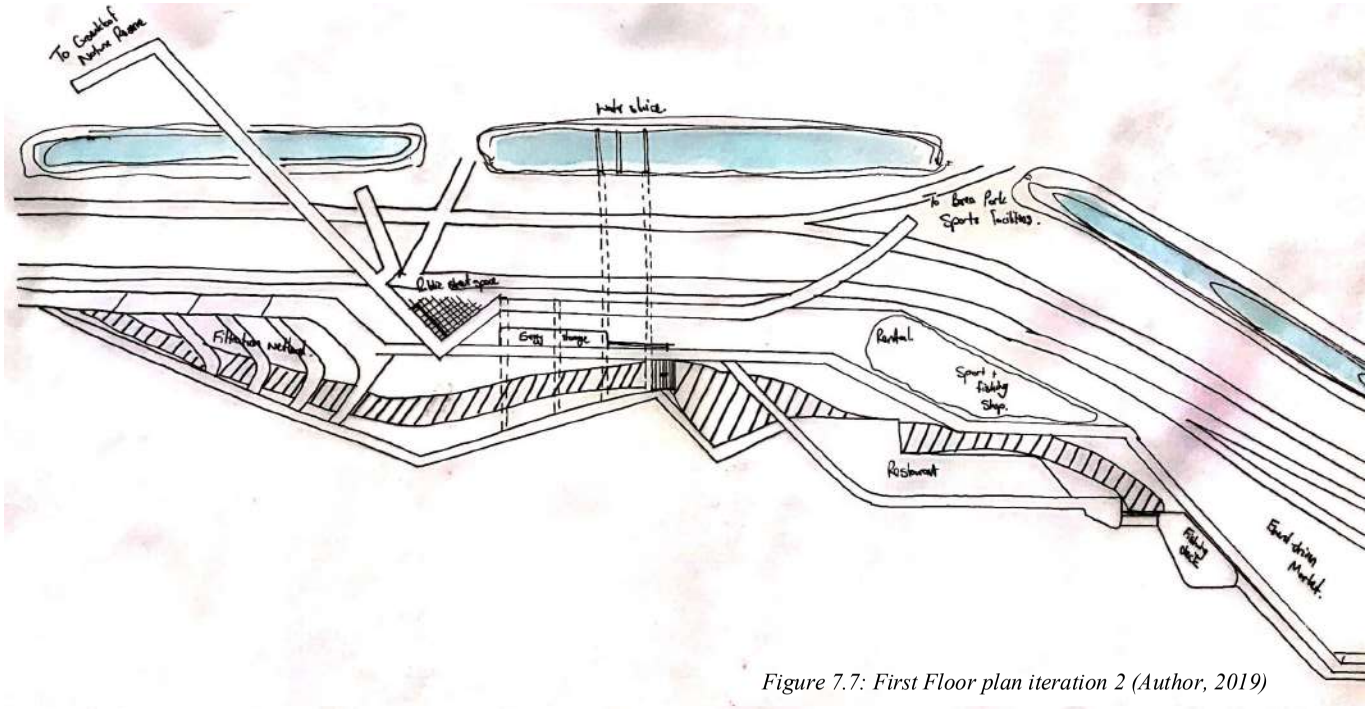


Figure 7.7: First Floor plan iteration 2 (Author, 2019)

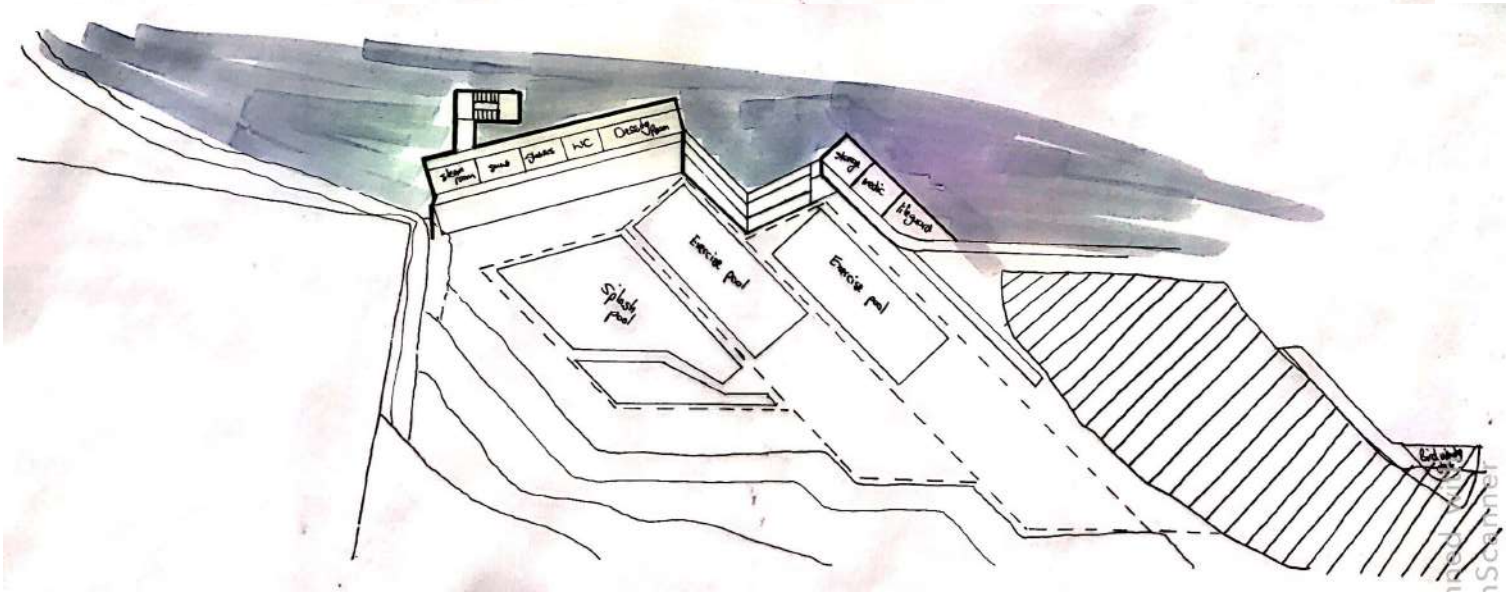


Figure 7.8: Ground Floor plan iteration 2 (Author, 2019)

Connection and flow

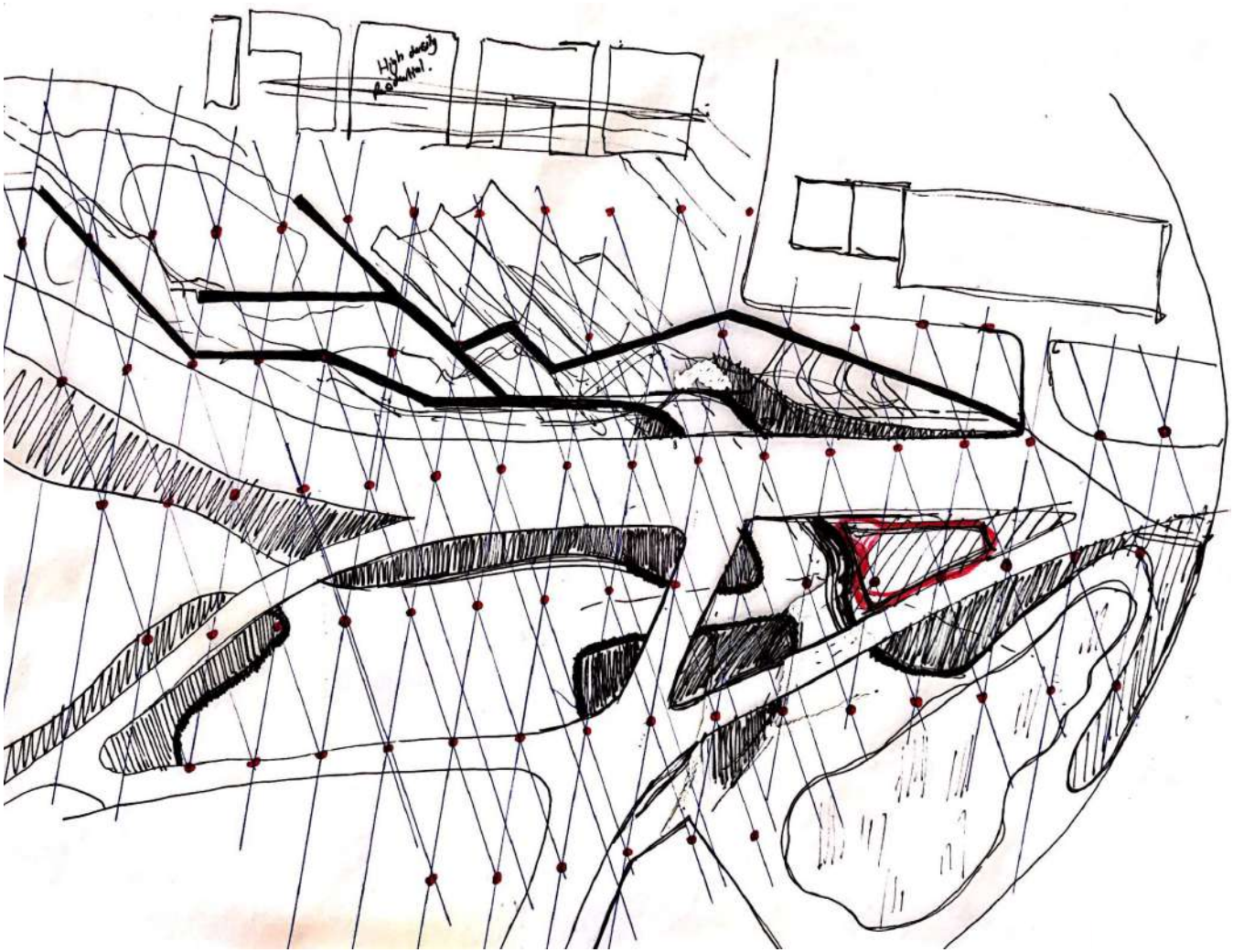


Figure 7.9: Pedestrian connection exploration diagram (Author, 2019)

The design form and placement on the site required a physical connection to the edge of the nature reserve, where the new entrance will be made. At this stage of the design process, the Apies River would have been completely diverted through the project and therefore created the opportunity to use the old canal system as pedestrian links underneath the highway. This iteration was adapted upon advice that the flood absorption of the current Apies River canal was integral to the functioning of the city, should a flood occur. It was concluded that the water connection from the dammed area to the project site, via an underground pipe line would still be possible. The water from the Apies River would be transferred via a water wheel to the dammed area. This was implemented to mitigate the height difference between the existing canal and the dammed area.

45 Degree grid

Figure 7.10: 45 degree grid exploration diagram (Author, 2019)

The 45 degree grid superimposed onto the gateway, will allow a smoother transition from urban to natural. The grid creates programmatic zones to ensure the relationships between programmes remain transitional. The grid serves as a guide rather than a physical implementation.

Design development

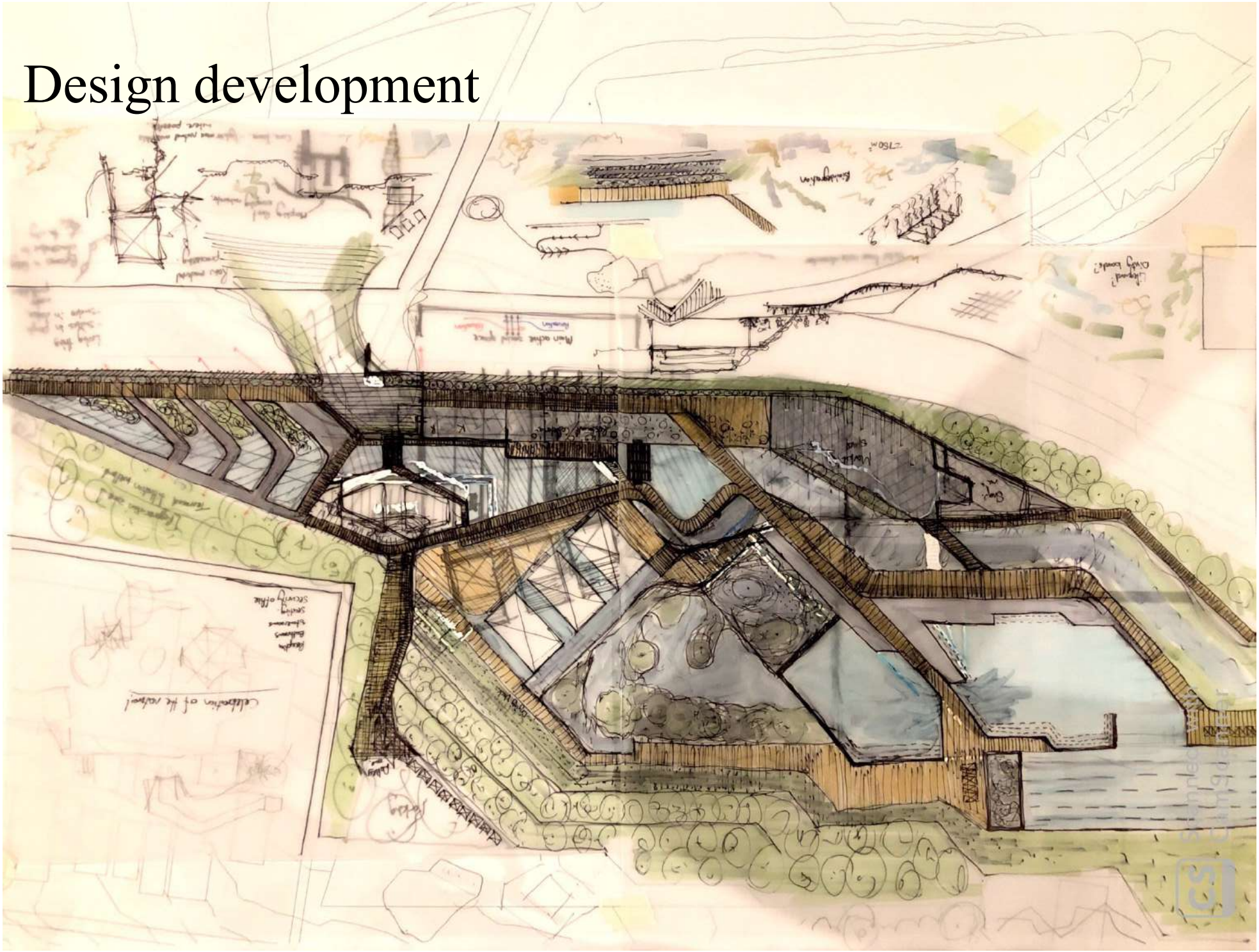


Figure 7.11: Design iteration , planning and flow (Author, 2019)

Design development

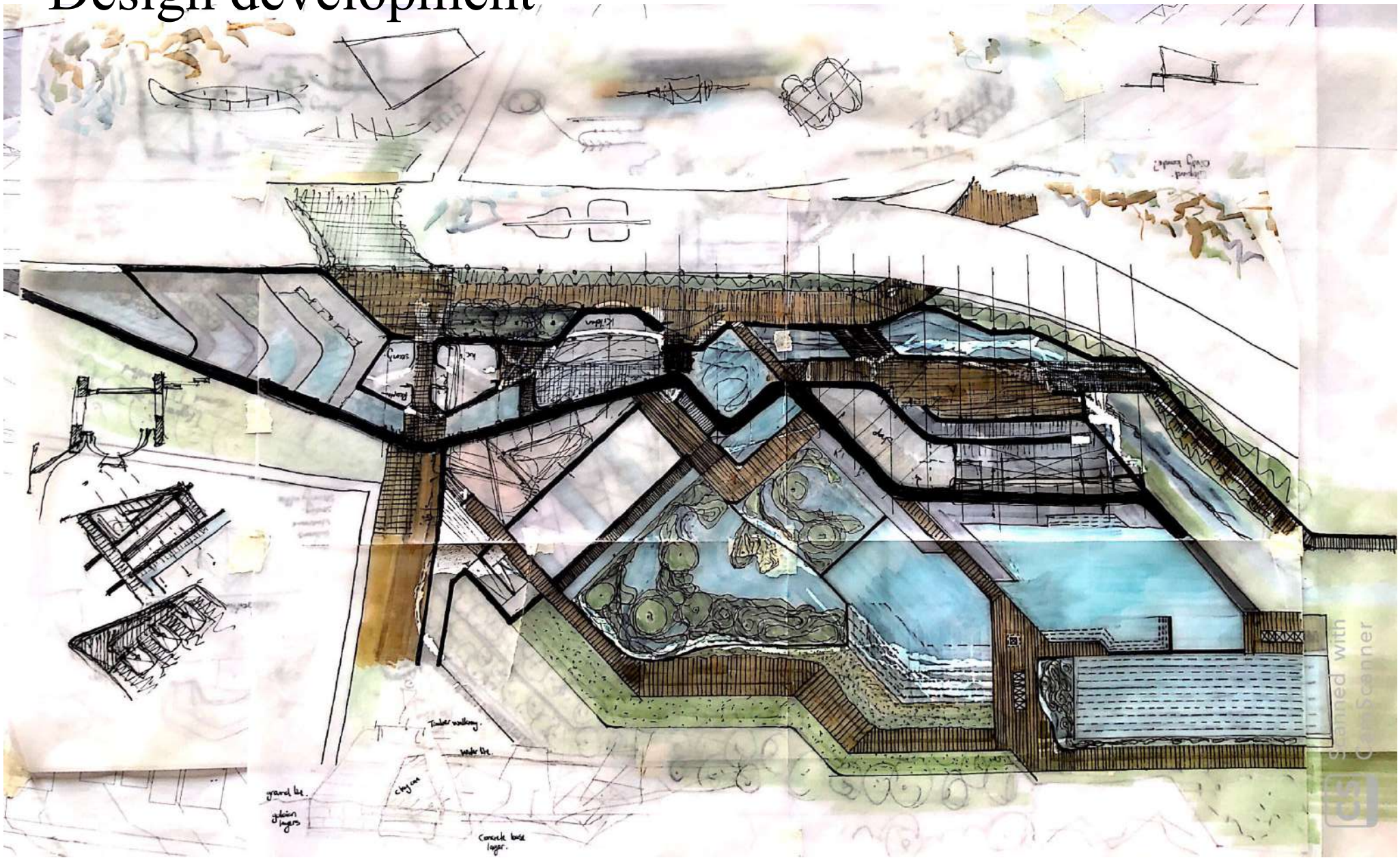


Figure 7.12: Design iteration , planning, circulation, function (Author, 2019)

Design development

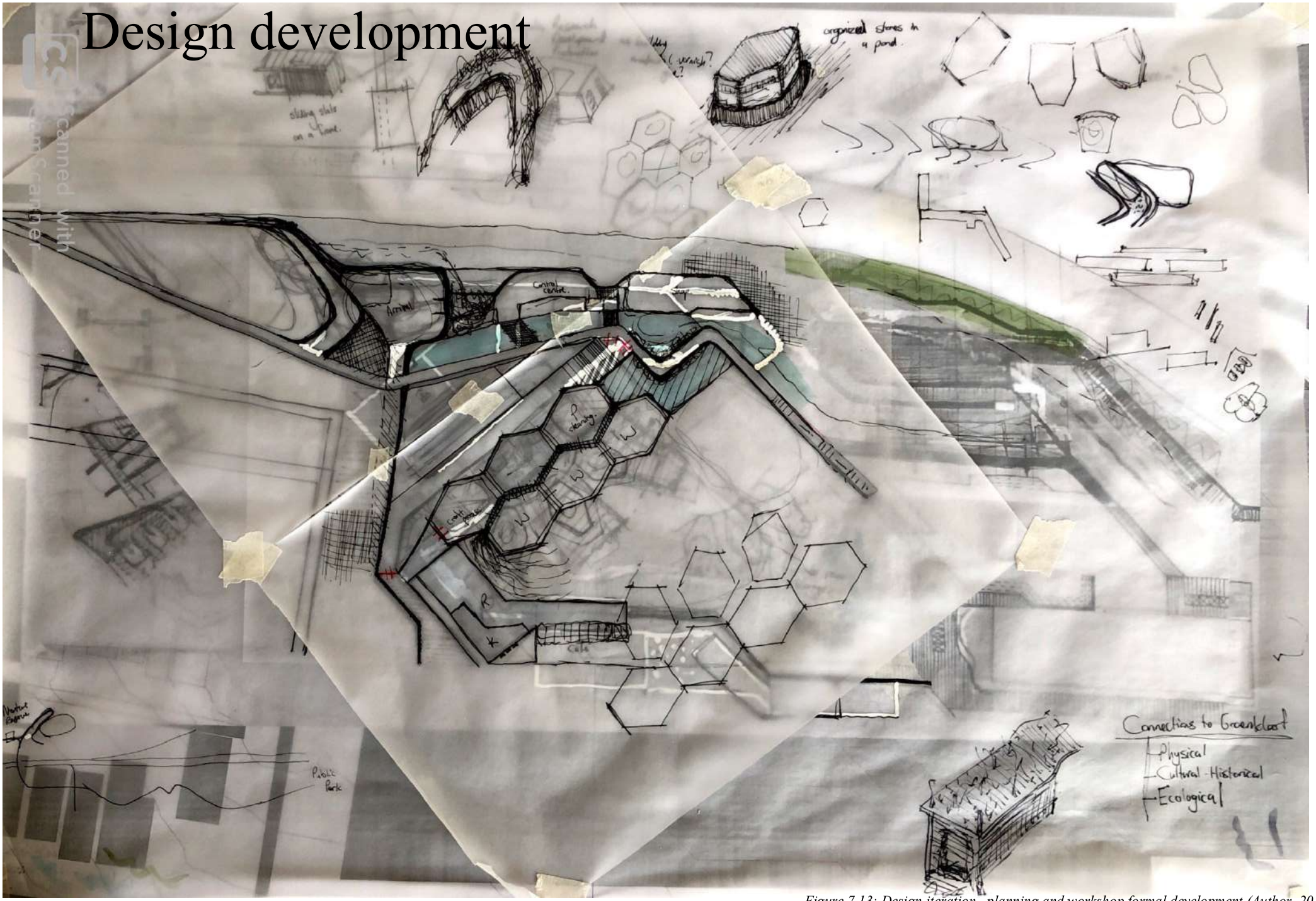


Figure 7.13: Design iteration , planning and workshop formal development (Author, 2019)

Design development

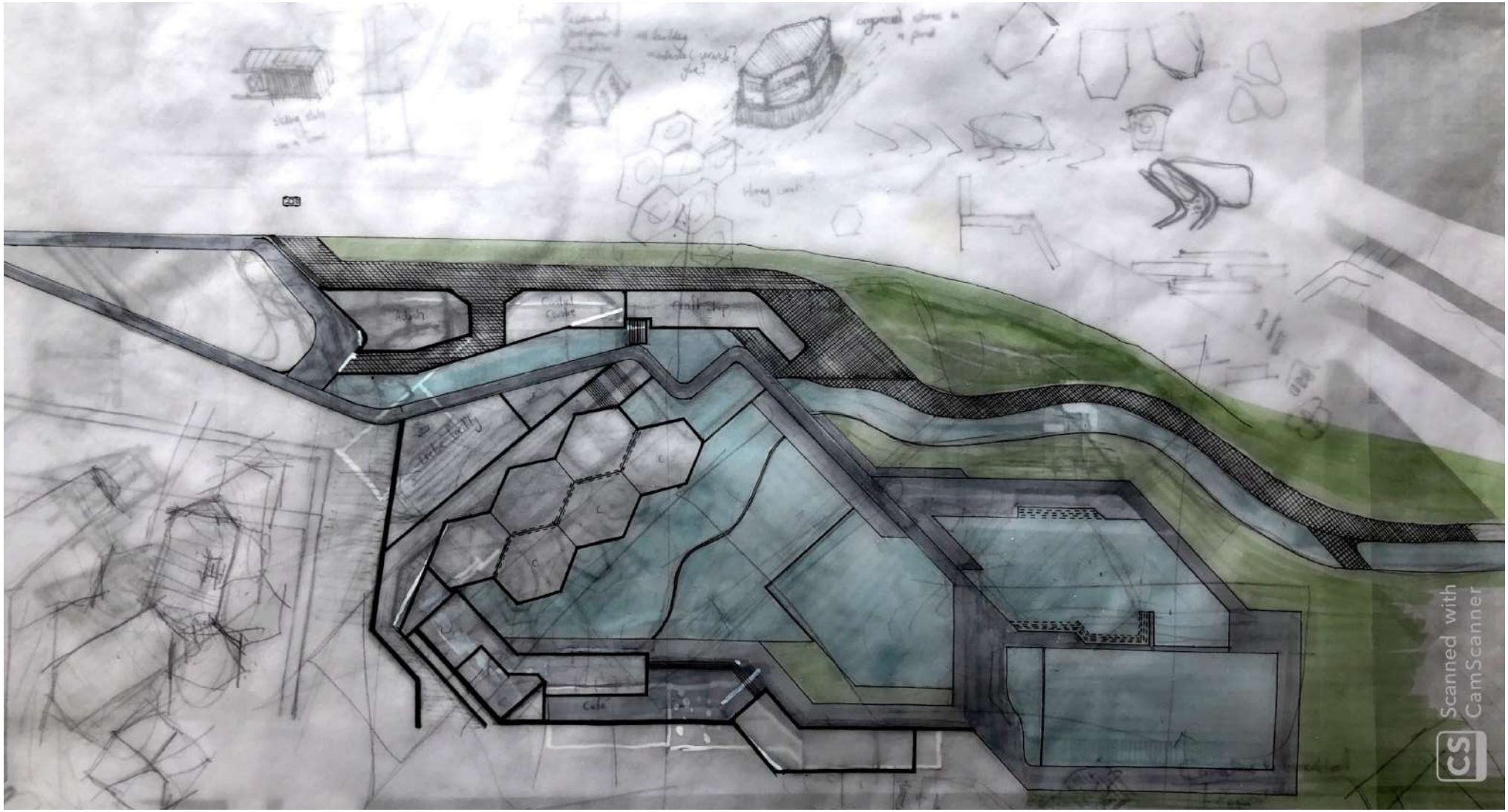
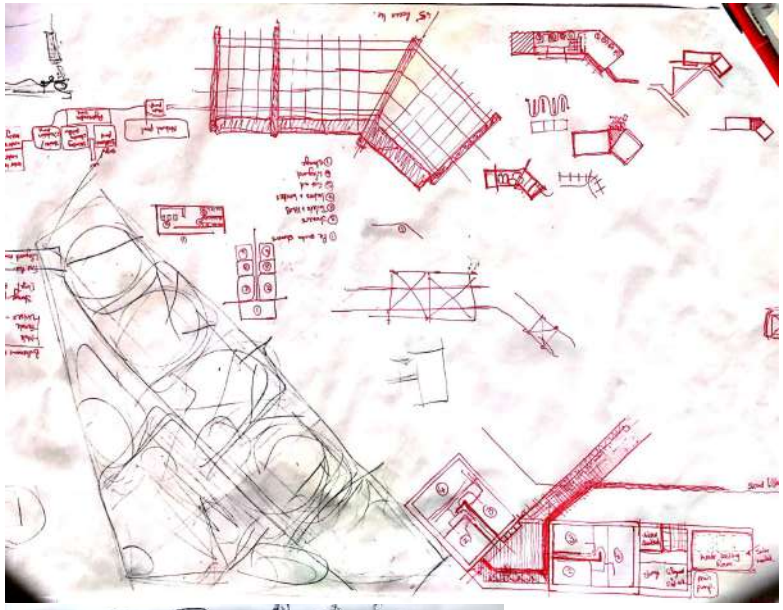
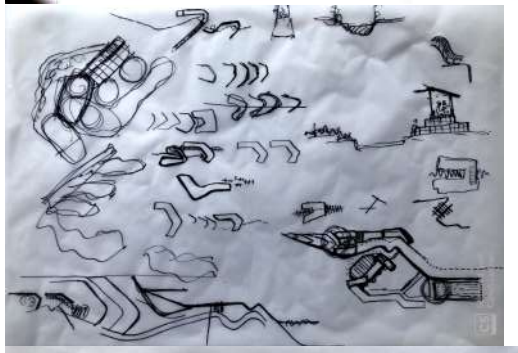


Figure 7.14: Design iteration , Restaurant, dressing rooms planning (Author, 2019)

Design development





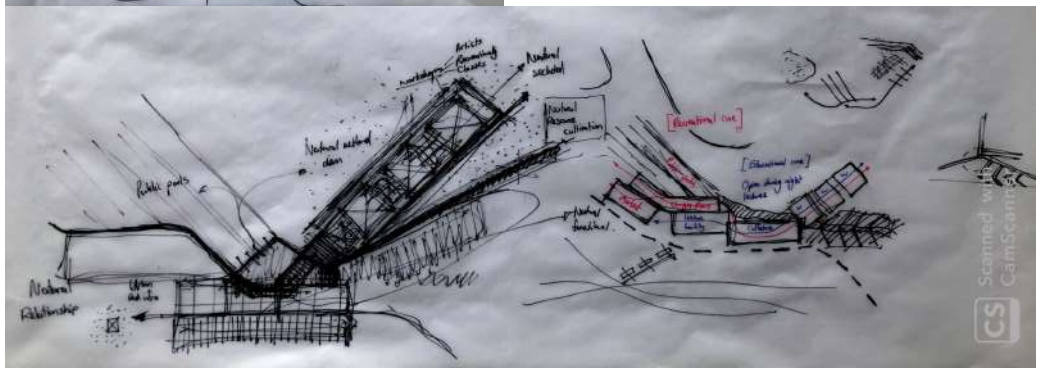
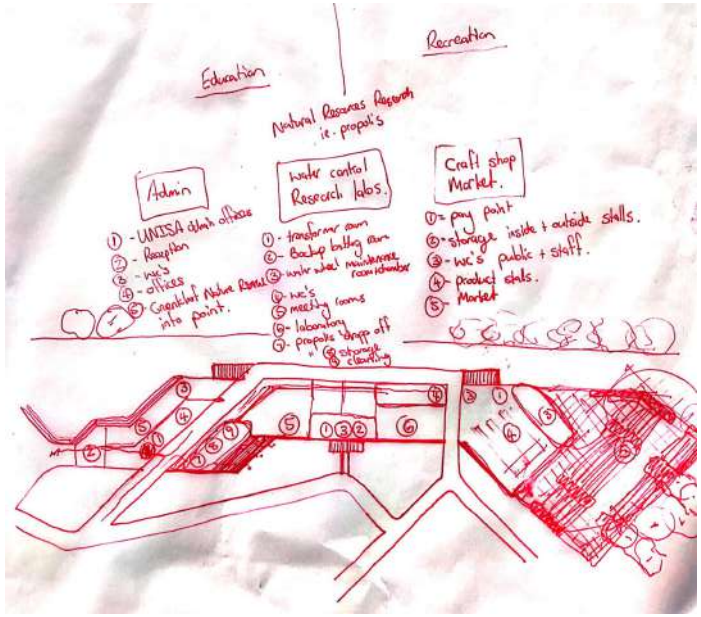


Figure 7.15: Design iteration , Functional and spatial relationship development (Author, 2019)



Design development

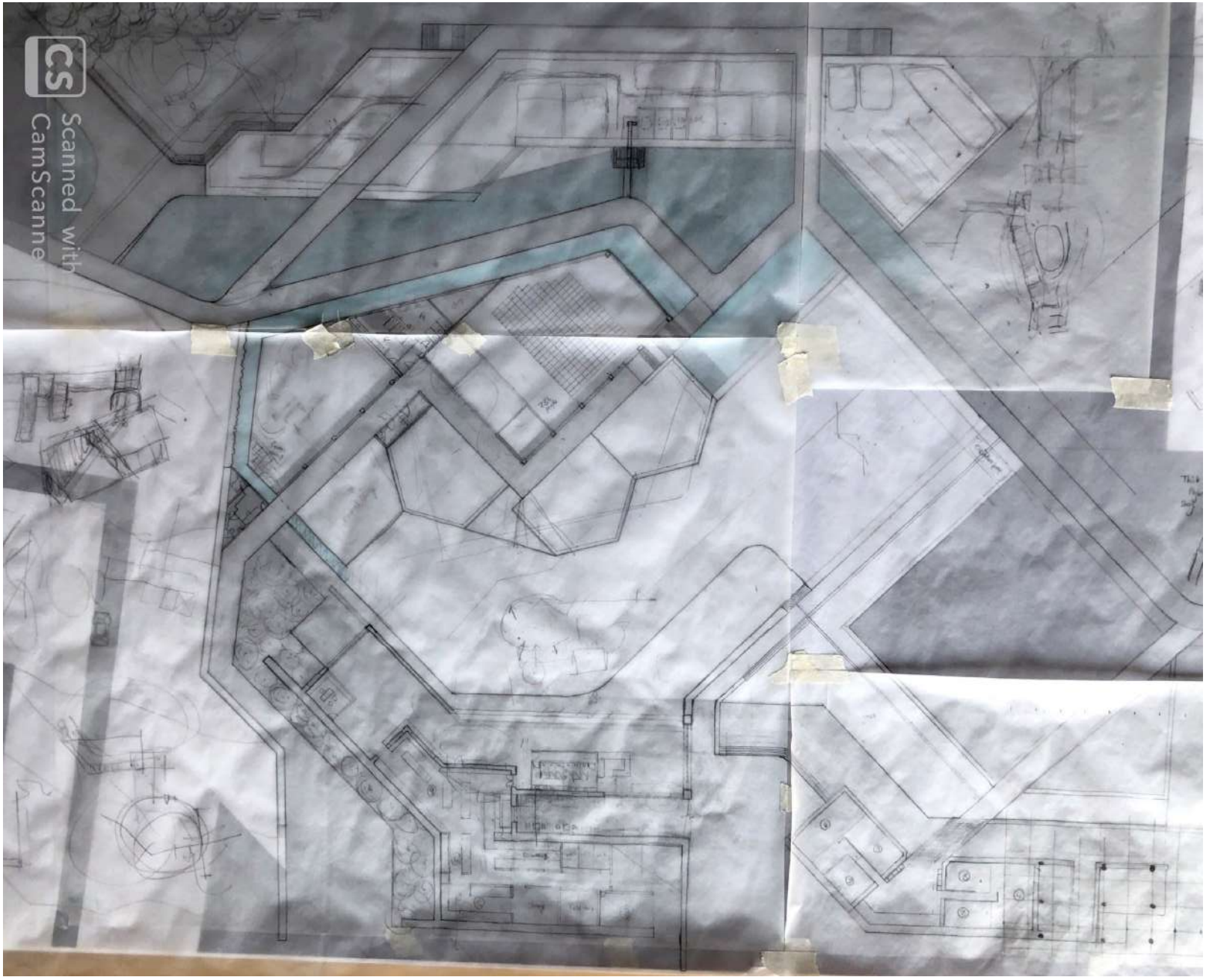


Figure 7.16: Design iteration , Restaurant, dressing rooms development (Author, 2019)

Design development

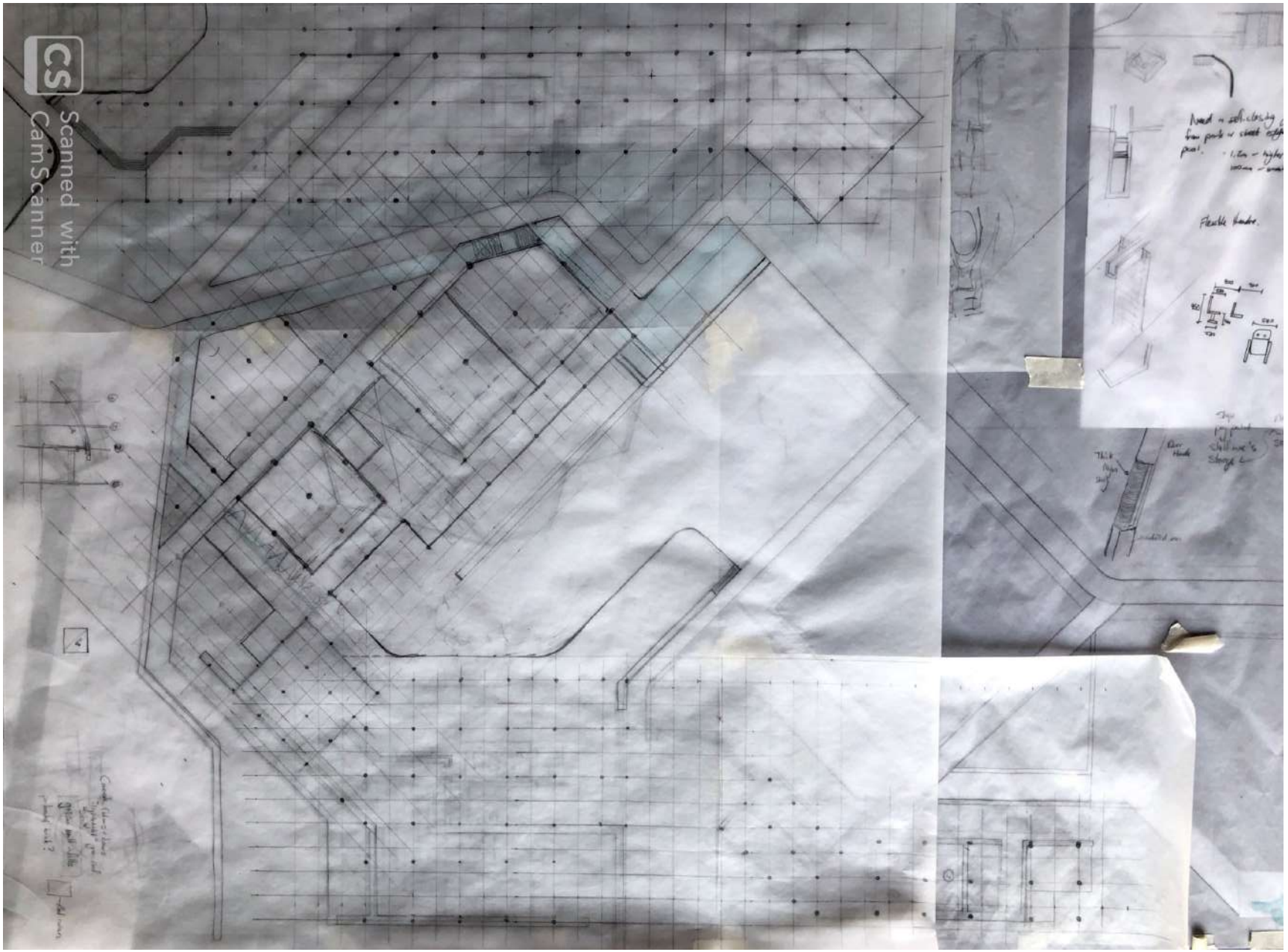


Figure 7.17: Design iteration , Workshop development, column grid layout (Author, 2019)

Design development

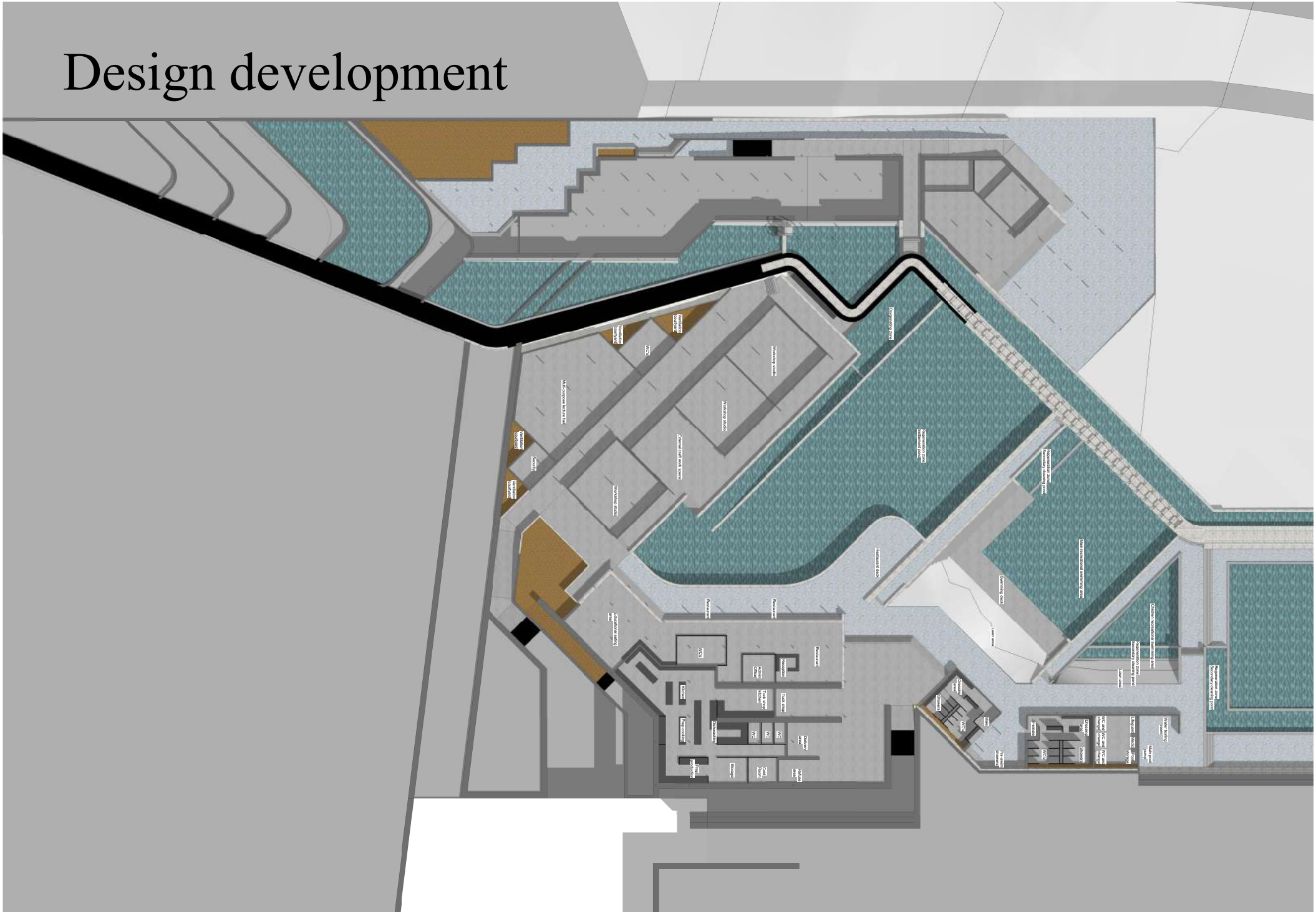


Figure 7.18: Design iteration , Ground Floor plan (Author, 2019)

Design development

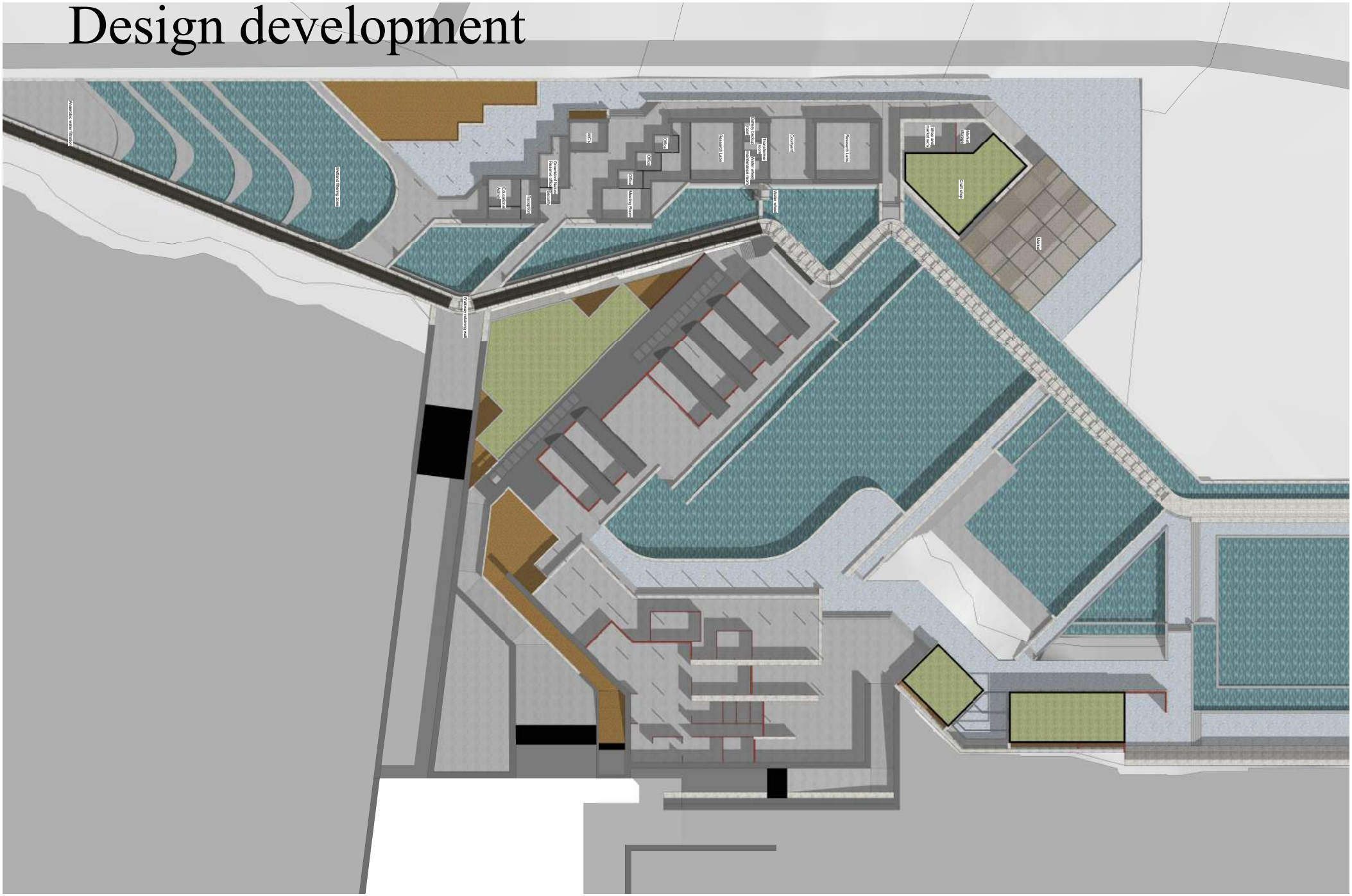


Figure 7.19: Design iteration , Highway Ground Floor plan (Author, 2019)

Design development

Figure 7.20: Design iteration , Roof plan (Author, 2019)

Design development

Figure 7.21: Design iteration , Axonometric looking south-west (Author, 2019)

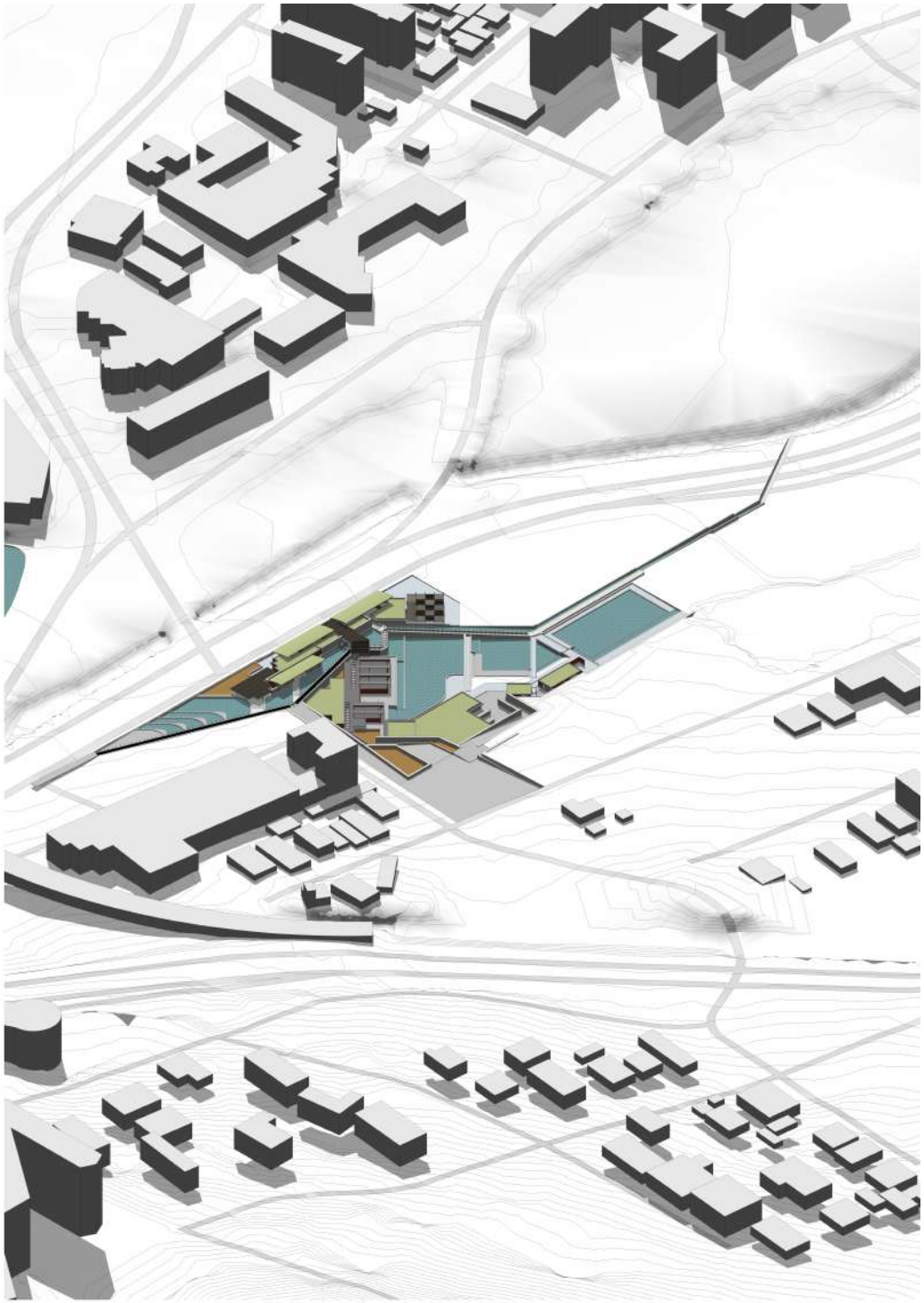


Figure 7.22: Design iteration , Axonometric looking north-west (Author, 2019)

Design development

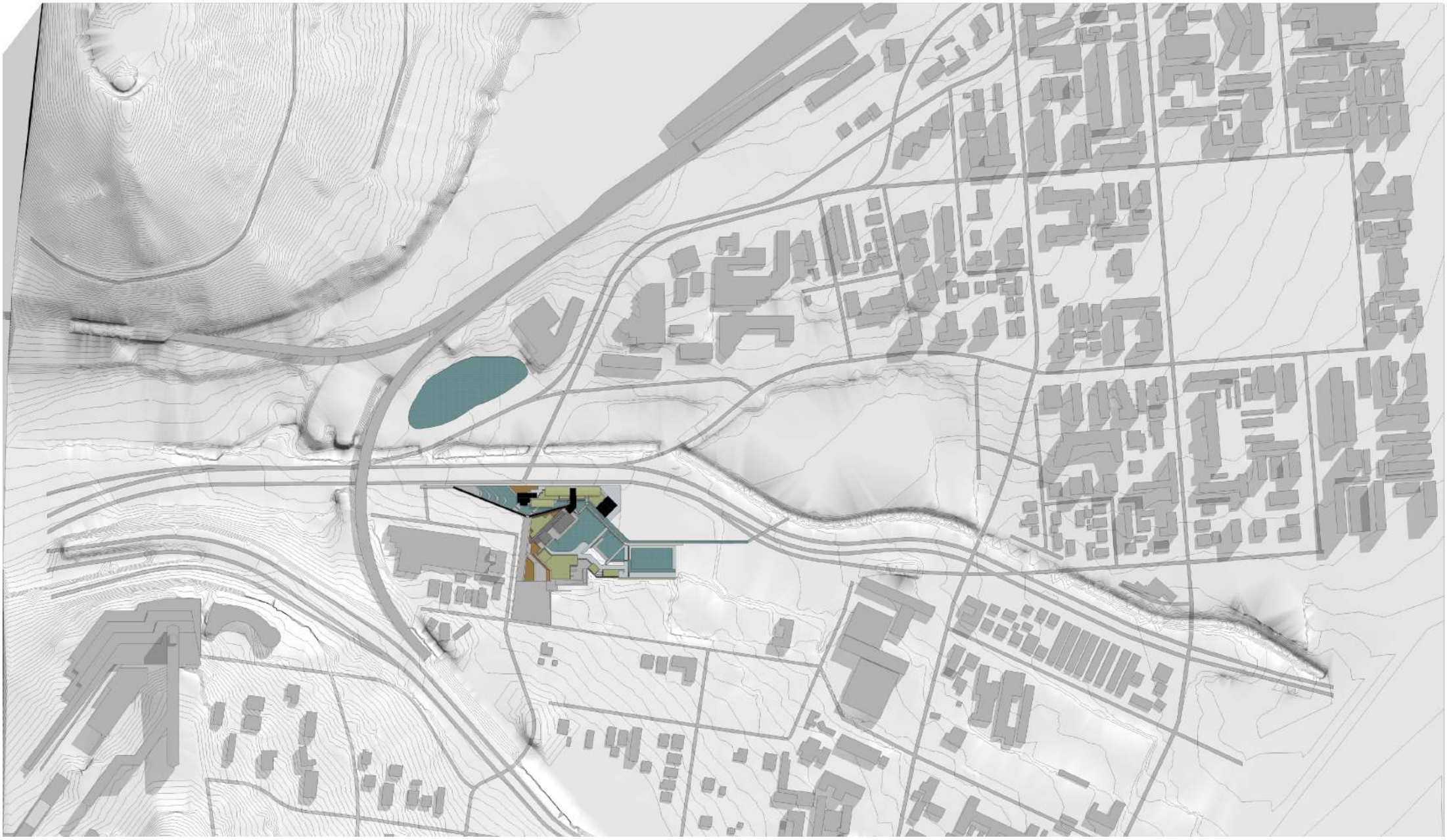


Figure 7.23: Design iteration , Site plan (Author, 2019)

Design development
Iteration 3

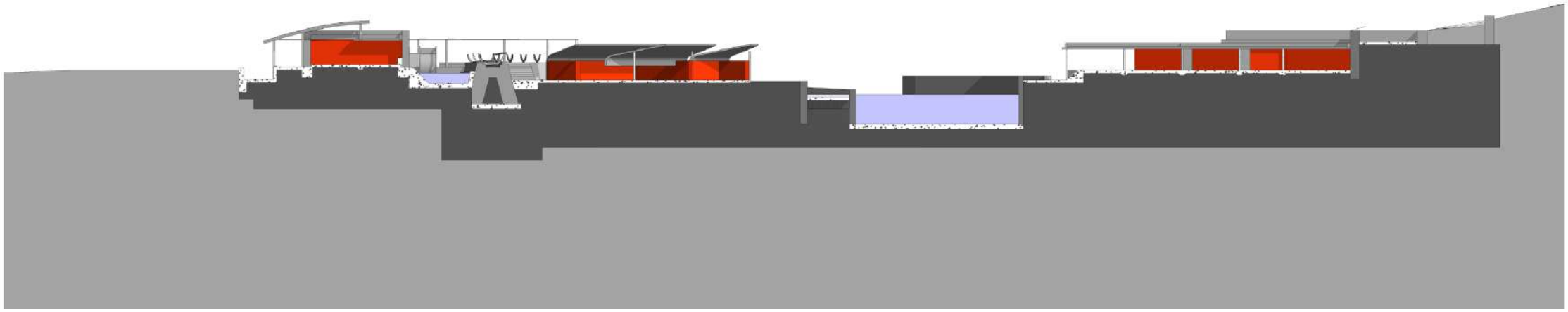


Figure 7.24: Design iteration , Section, facing north (Author, 2019)

Design development

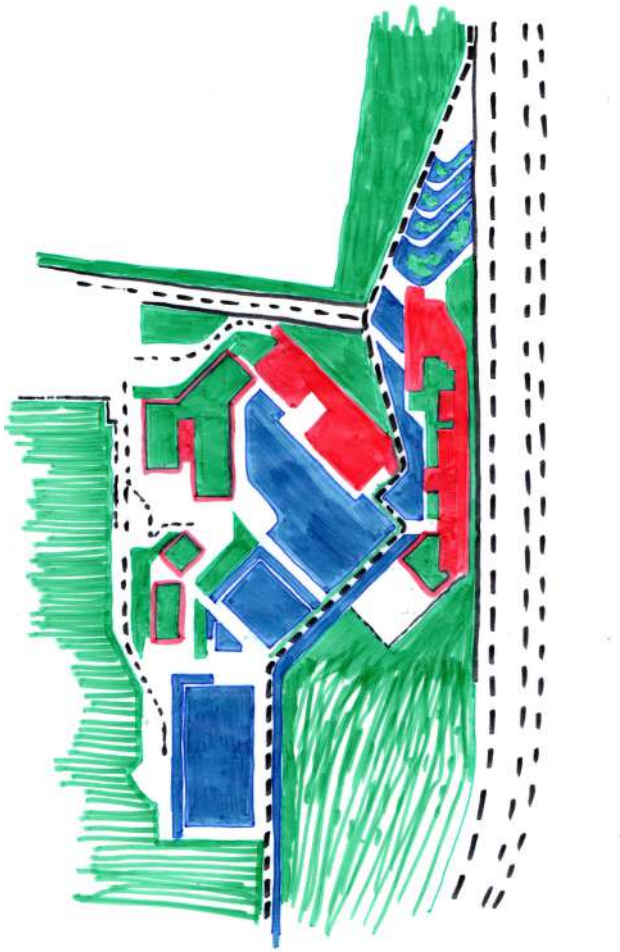


Figure 7.25: Design development diagram: Infrastructures (Author, 2019)

4 Infrastructure biointegration

The diagram shows the biointegration of the four infrastructures and the balanced environment this creates.

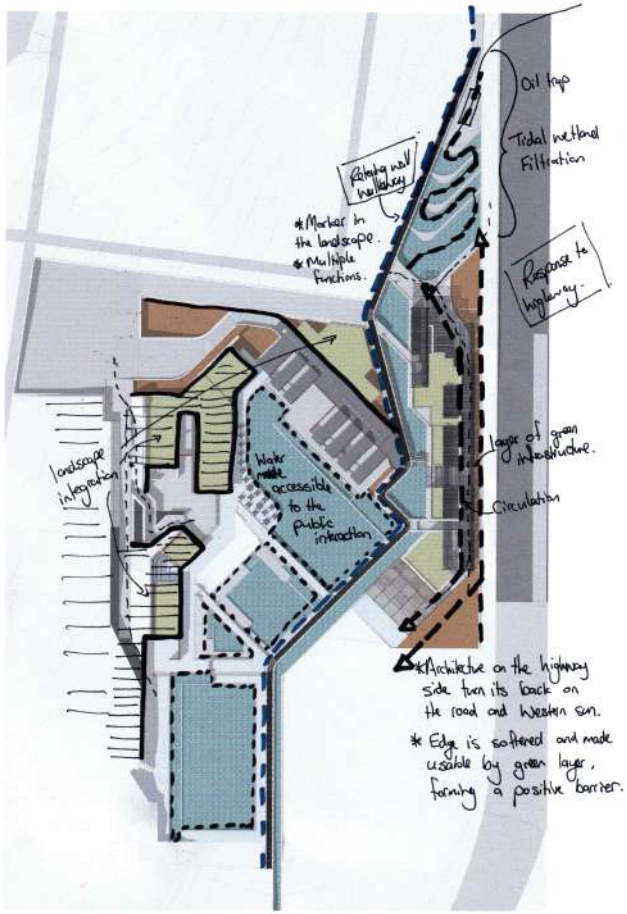


Figure 7.26: Design development diagram: Site response (Author, 2019)

Site response

The structures on the left hand side of the diagram aims to integrate with the landscape. This is done through excavation and implementing green roofs. The structures adjacent to the highway responds to the linear nature of the roads, as well as turning its back on the road. The functions live towards the water and the western side is used for circulation and furthering the green infrastructure.

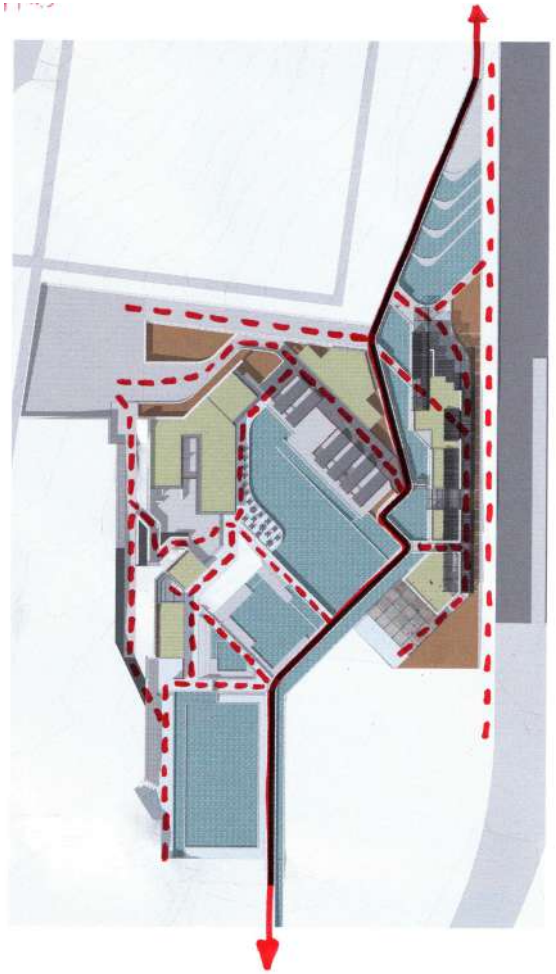


Figure 7.27: Design development diagram: Circulation (Author, 2019)

Circulation

The diagram indicates the circulation of the site, adopting the flowing nature of the project. The walkway, retaining wall, serves as the main linking spine through the project with all routes eventually meeting this spine.

Design development

Figure 7.28: Design development diagram: Passive cooling (Author, 2019)

Passive cooling

The large water bodies will be used as a way to cool air by sucking it into the buildings both actively and passively through stack ventilation.

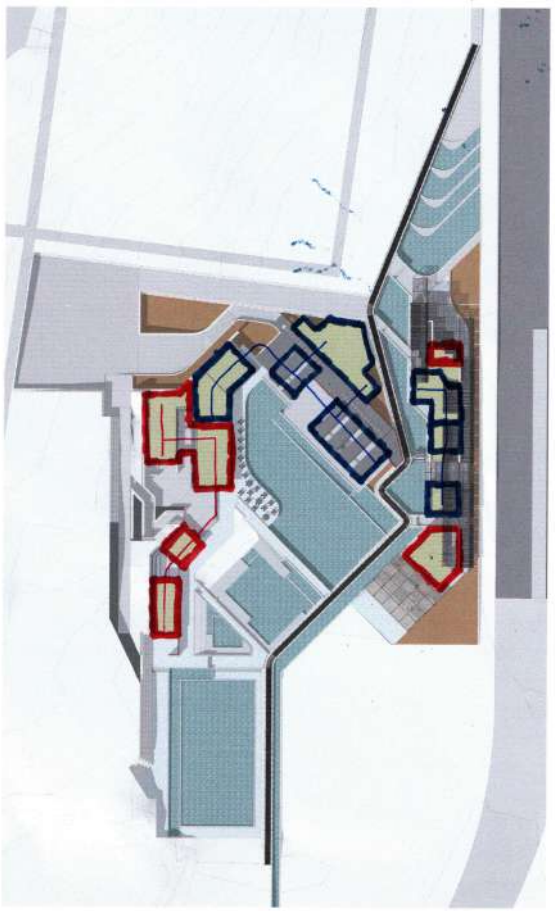


Figure 7.29: Design development diagram: Functional relationship (Author, 2019)

Functional relationship

The building placement creates a recreation/education relationship. The res indicates the recreation and the blue the education. These overlap, specifically at the craft workshops, where the craft making is done through both learning and for pleasure.

Design development

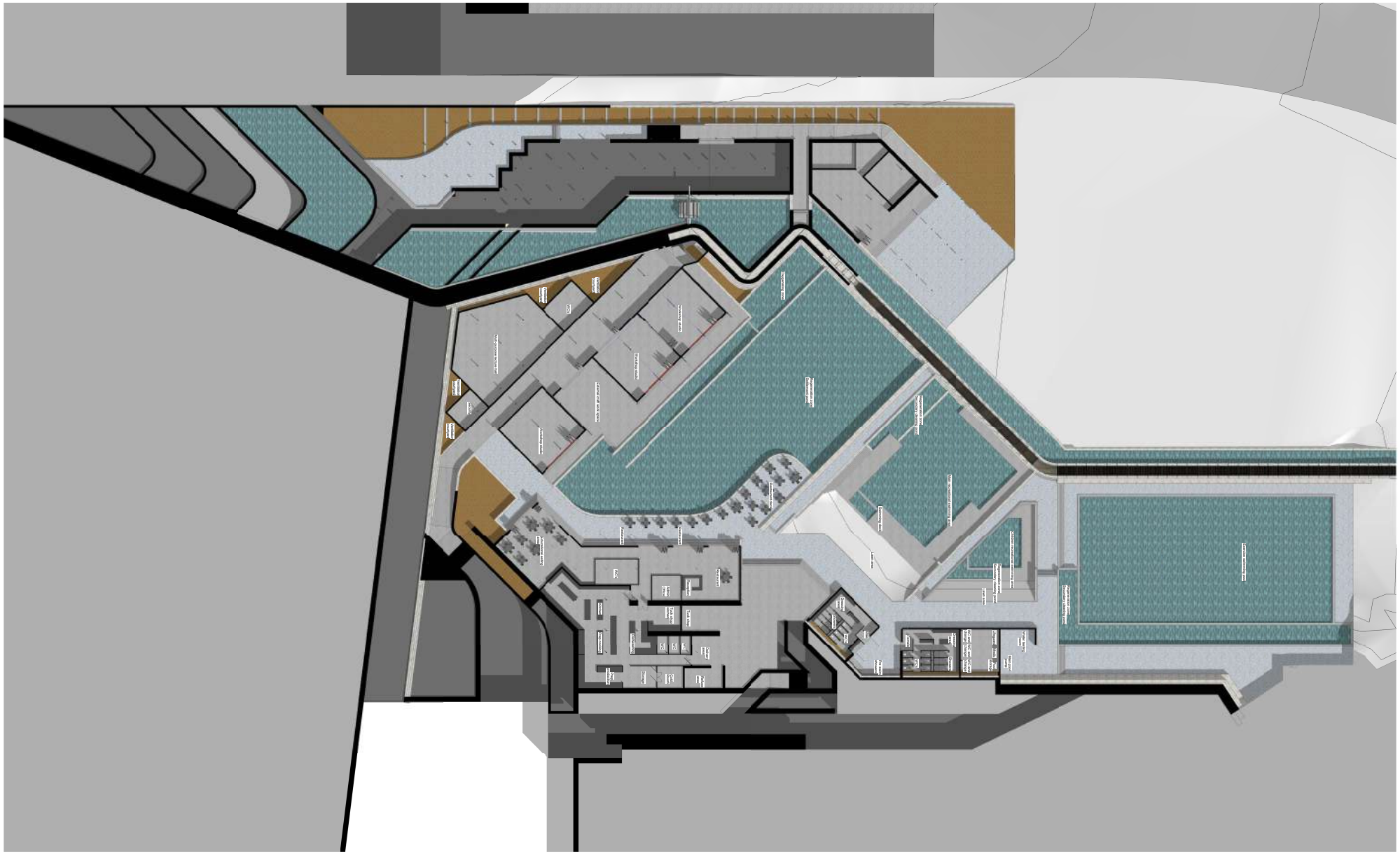


Figure 7.30: Design development Ground Floor plan (Author, 2019)

Design development

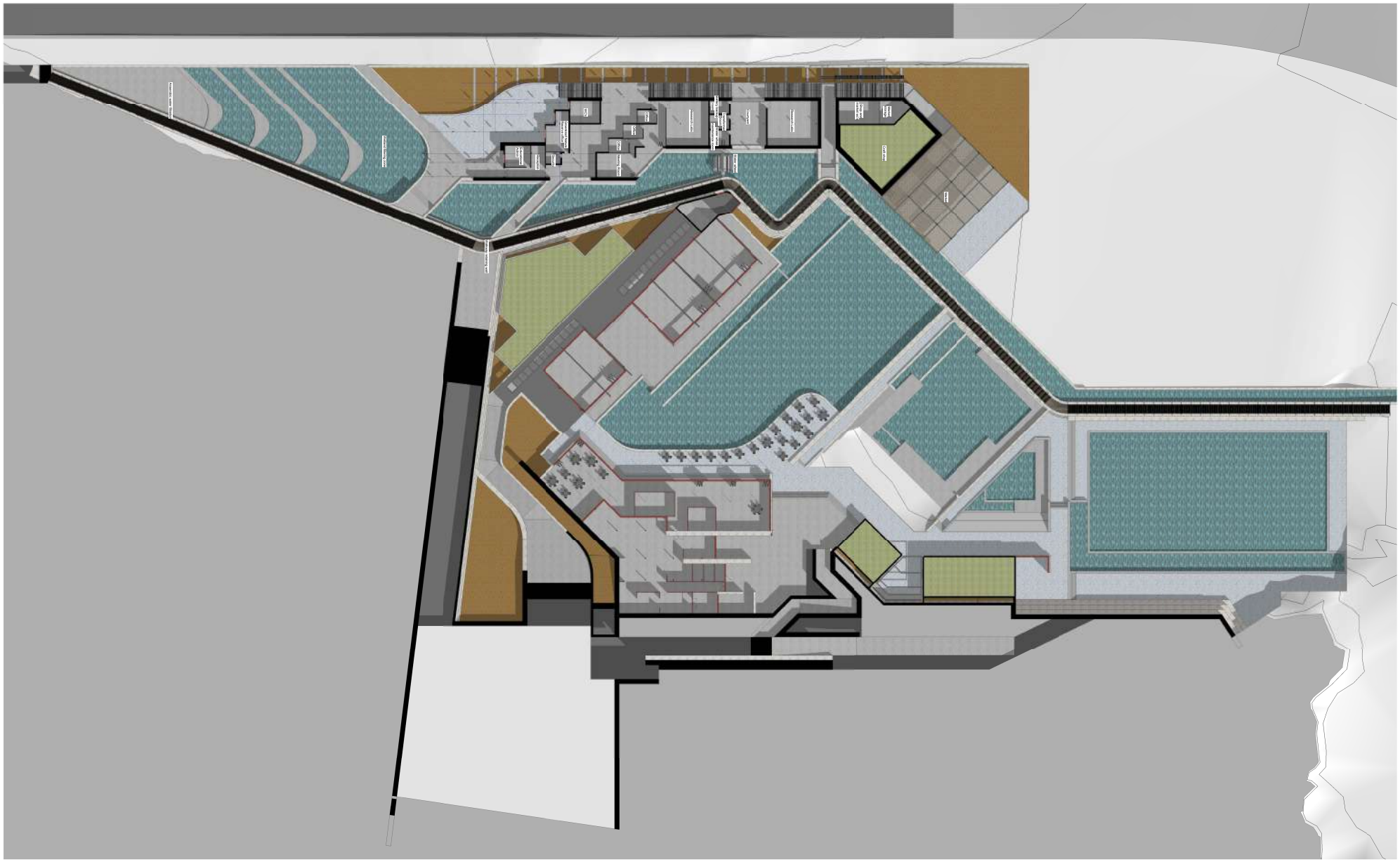


Figure 7.31: Design development Highway Ground Floor plan (Author, 2019)

Design development

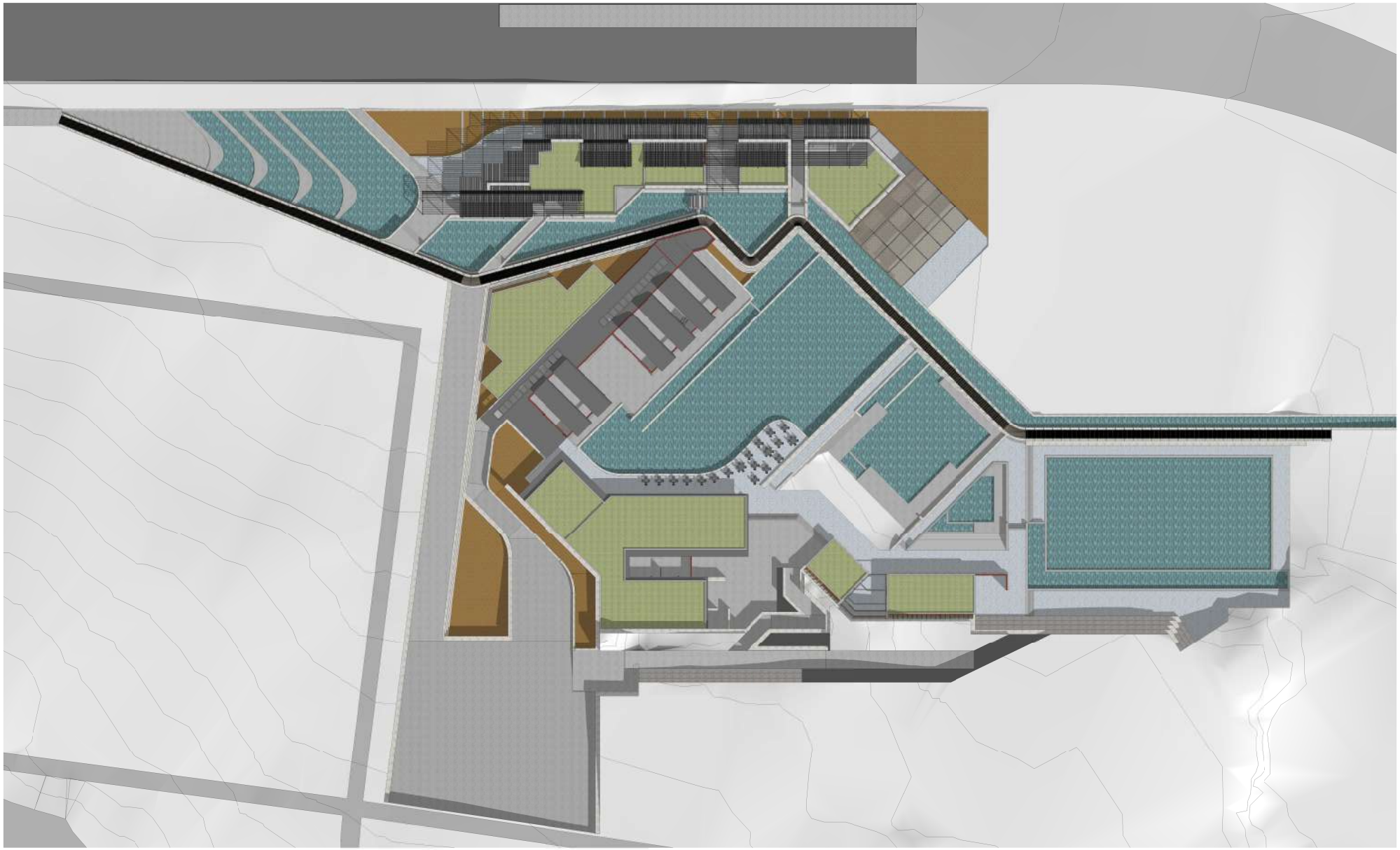
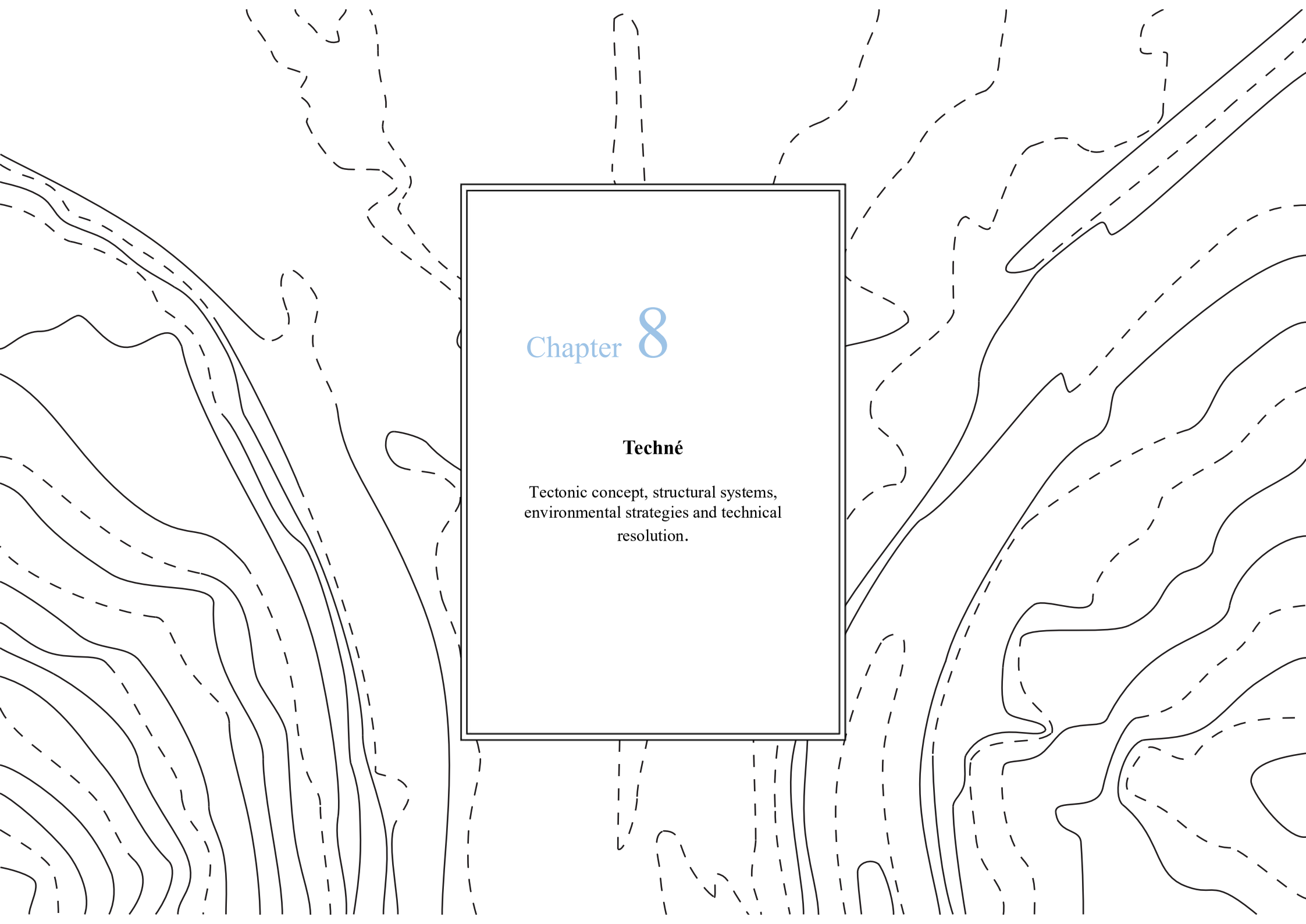


Figure 7.32: Design development Roof plan (Author, 2019)



Chapter 8

Techné

Tectonic concept, structural systems, environmental strategies and technical resolution.

Tectonic Concept

Biointegration – The complete fusion between artificial and biological materials.

The implant of an artificial element to allow the natural to work and flow in a cohesive manner.

The flowing and transition of the four infrastructures are held by the natural gabion walls. The internal brick infill walls are enclosed by the gabion wall and revealed at certain points. This deconstructivist reveal, exposes and celebrates the architecture and the biointegration of the structure. The round columns are separated from the walls and act as the main roof supporting structure. The columns and brick walls are either expressed or swallowed by the natural gabion walls encasing the internal functions.

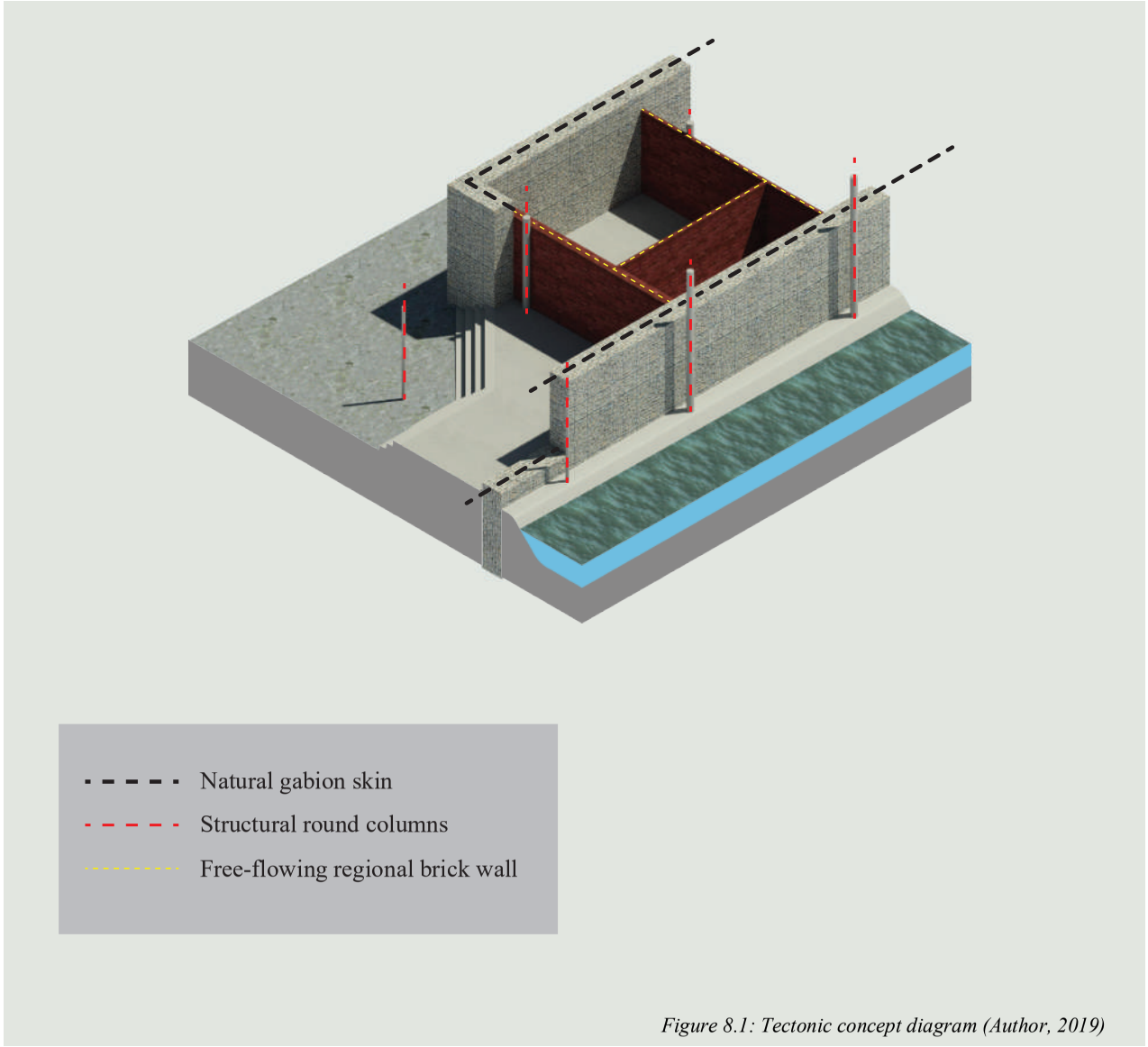


Figure 8.1: Tectonic concept diagram (Author, 2019)

Technical section
(iteration)

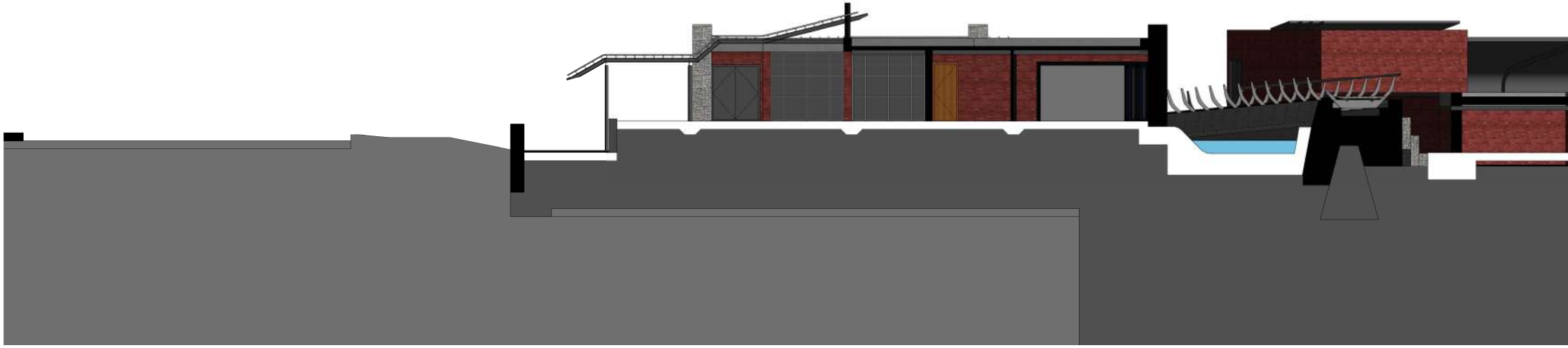


Figure 8.2: 1:20 Section (Author, 2019)

Sectional perspective
(iteration)

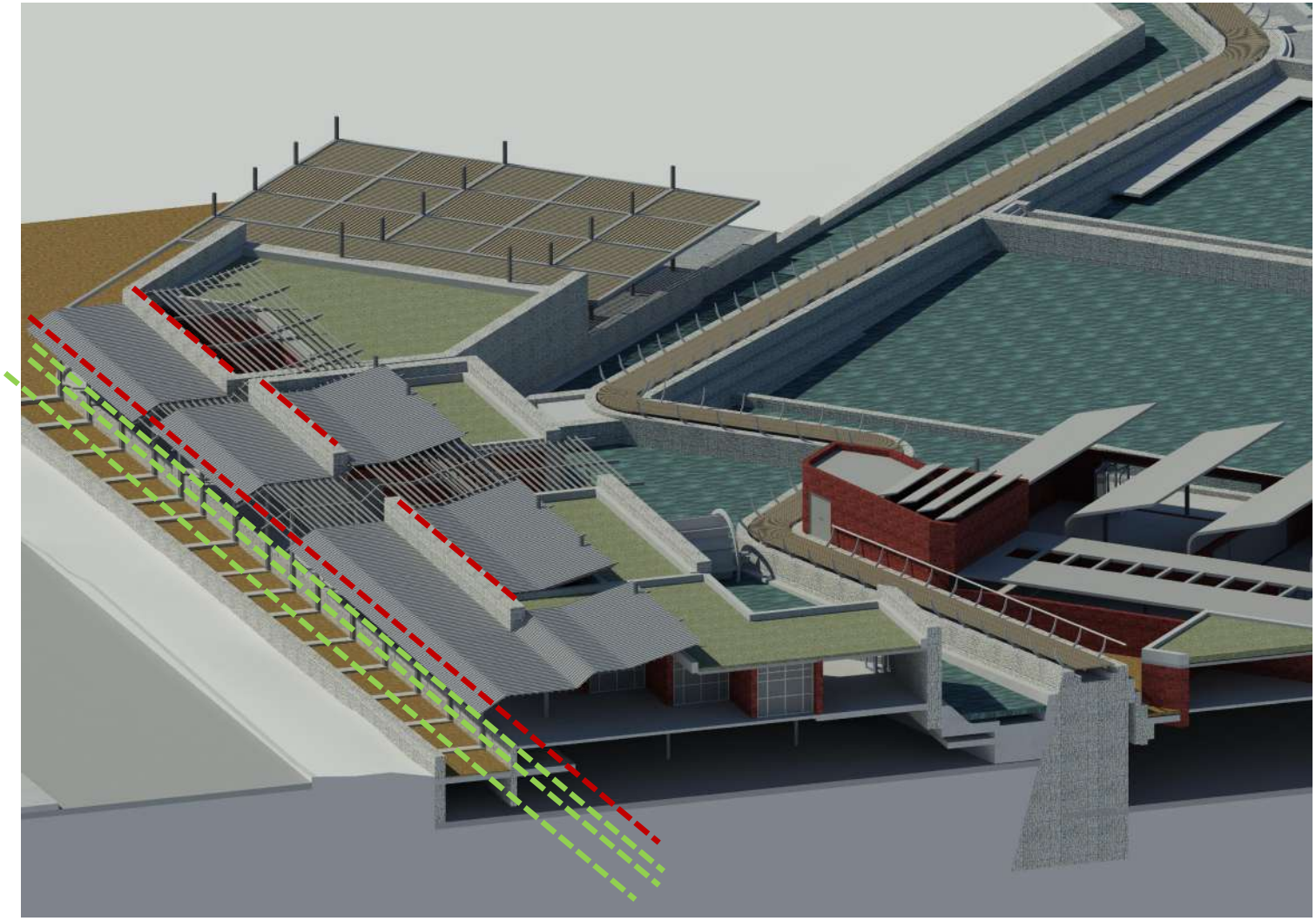
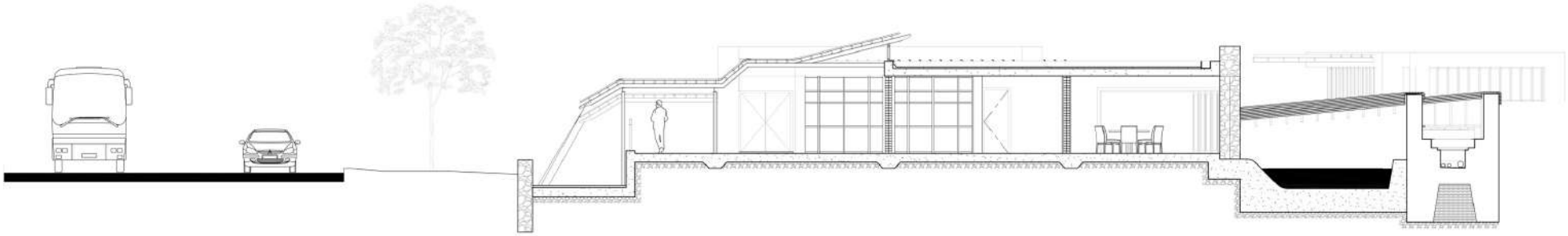


Figure 8.3: Sectional perspective(Author, 2019)

The Western façade adjacent to the highway needs to be protected from noise and harsh sun. This is achieved through a layer of planting as well as a “green curtain” growing from planters. The roofs curve down to create an enclosed walkway and open up on the Eastern side to allow light back in. The strategy has created a dark environment and needs more natural light. The gabion walls will provide a vertical platform from which skylights and ventilation stacks will be developed from.

Technical section



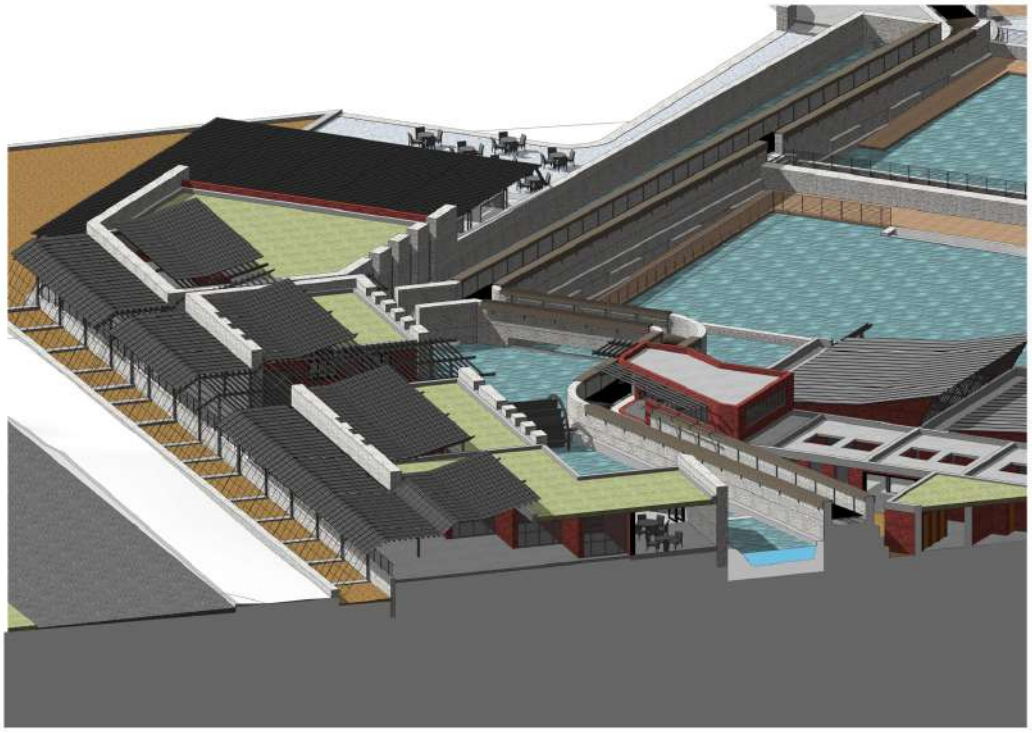


Figure 8.4: 1:20 Section development (Author, 2019)

Living wall
(iteration 1)

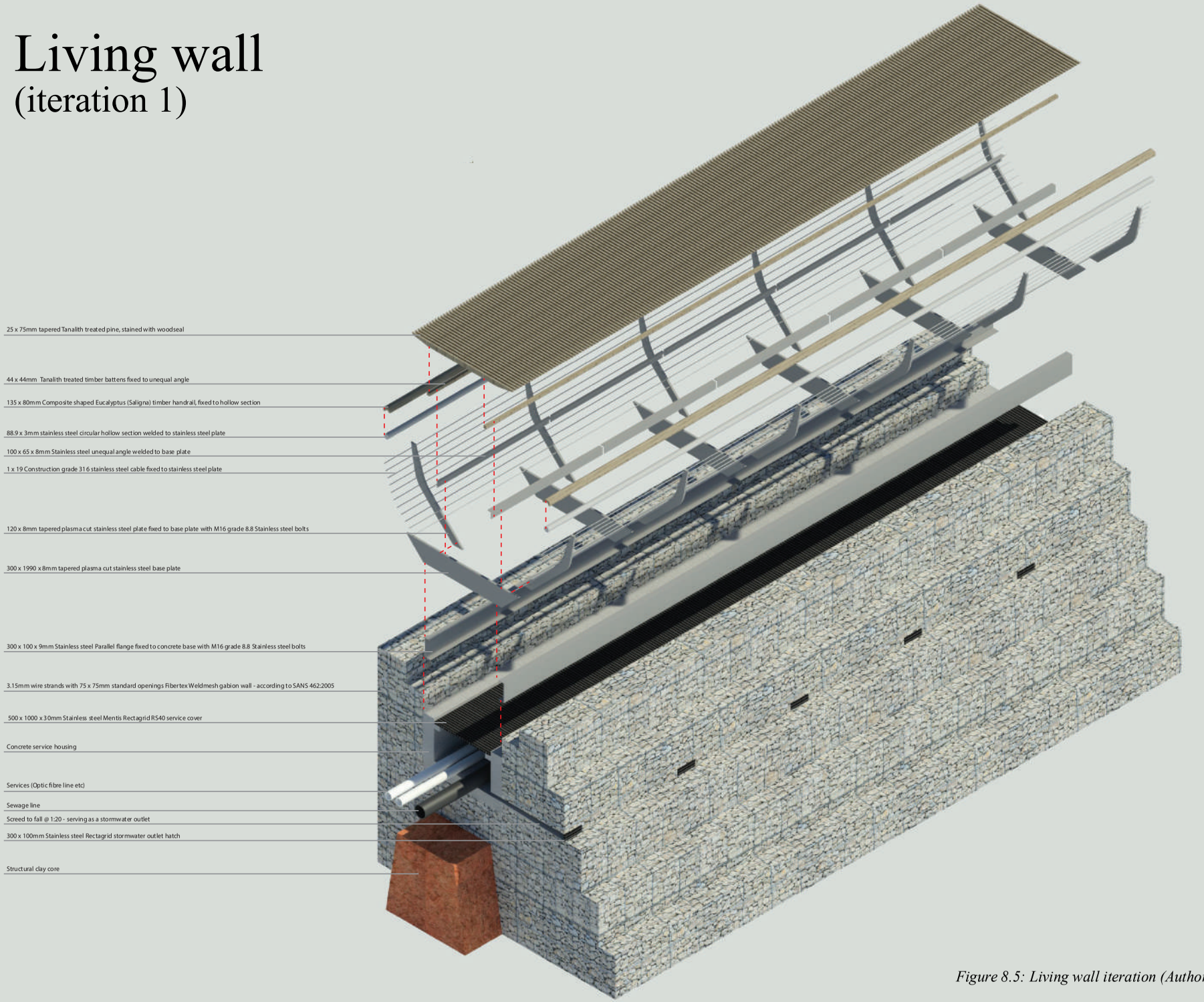


Figure 8.5: Living wall iteration (Author, 2019)

Living wall

Living wall river line walkway

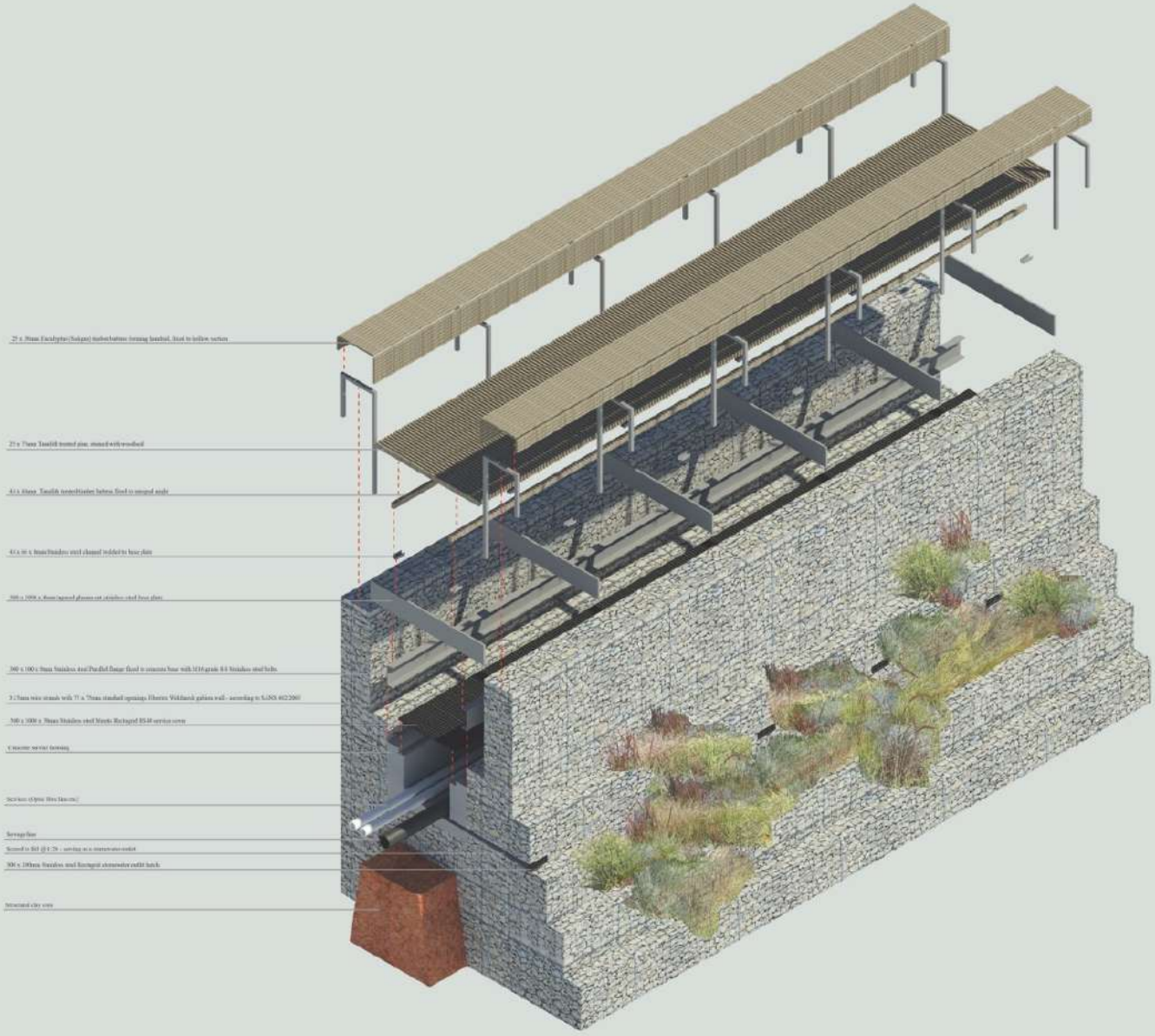


Figure 8.6: Living wall exploded axonometric (Author, 2019)

Living wall

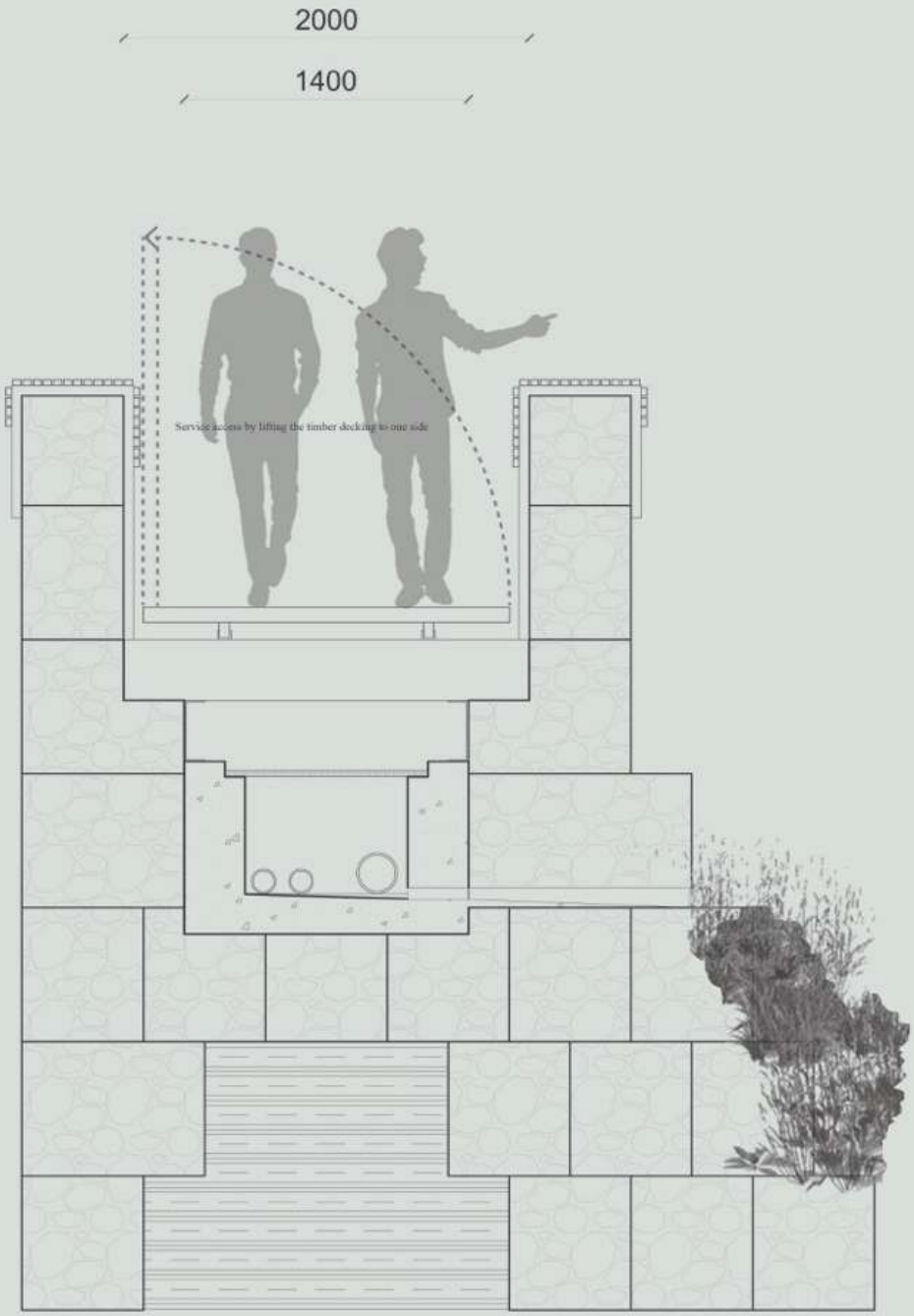


Figure 8.7: Living wall section (Author, 2019)

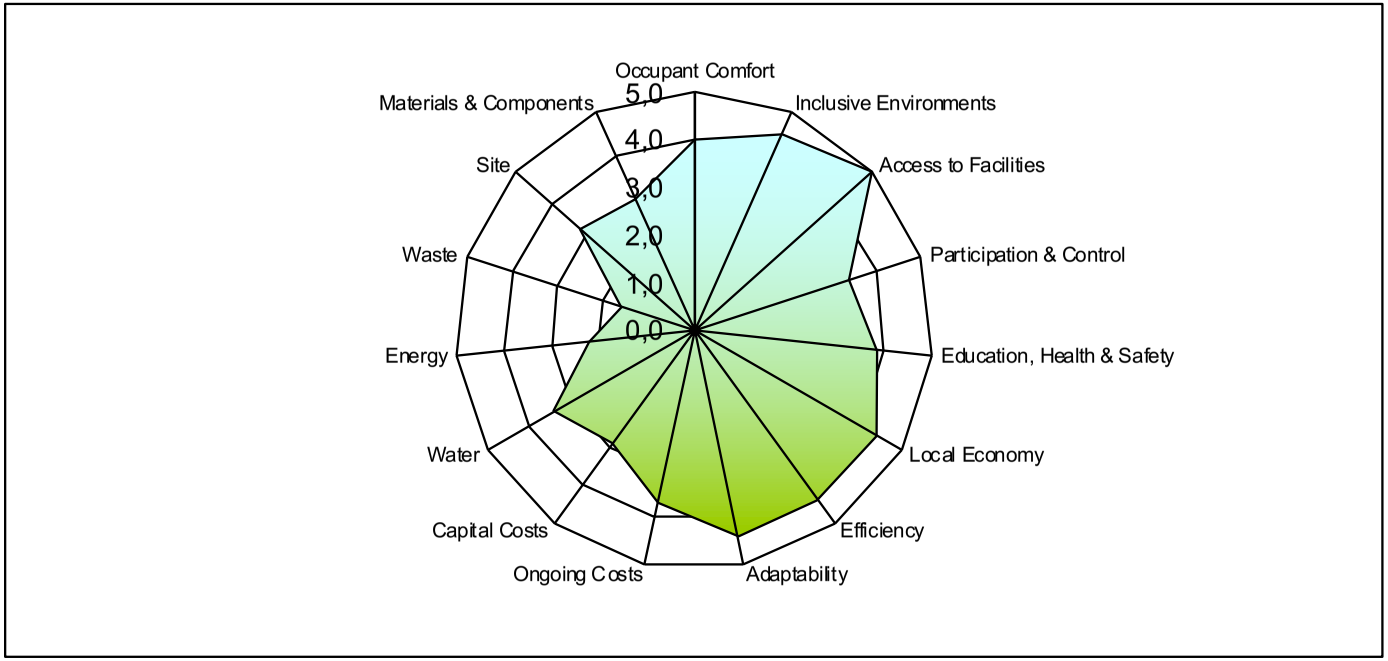
Figure 8.8: Water filtration and circulation, passive ventilation diagram (Author, 2019)

SBAT rating

The SBAT assessment indicates a good overall rating. The environmental contribution did not score as high as hoped. This is largely because of the limited on site waste disposal facilities. The location of the site at the gateway to Pretoria CBD, makes the on site waste treatment difficult. The project is a highly public one and will make use of natural materials in a sustainable way through its craft program. The project will however make use of rocks found in excavation in its many gabion walls. The location and its proximity to major public transport facilities ensured a high social rating.

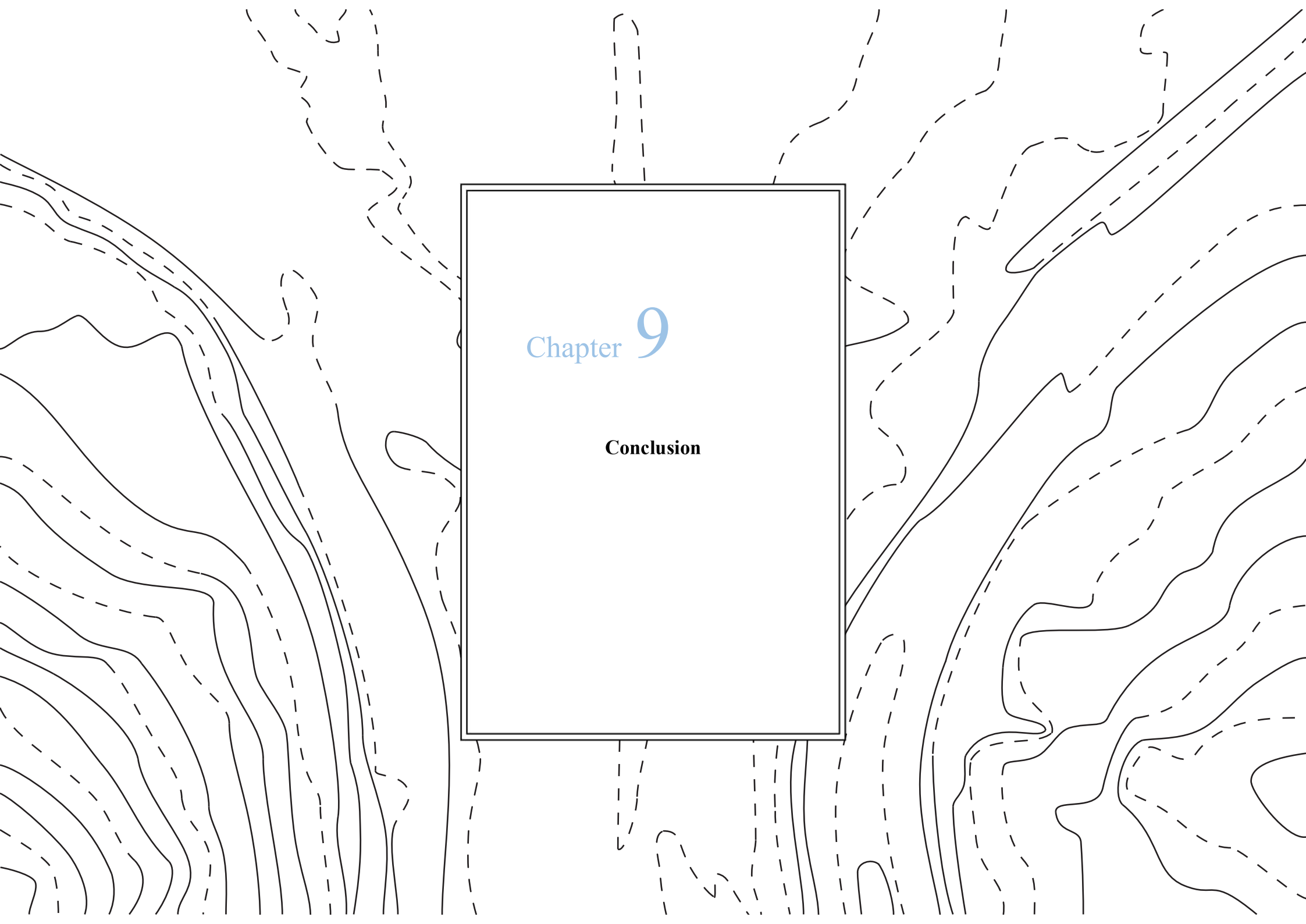
SUSTAINABLE BUILDING ASSESSMENT TOOL (SBAT- P) V1

PROJECT		ASSESSMENT	
Project title:	Returning through the origin	Date:	27-Oct-19
Location:	Pretoria CBD	Undertaken by:	R de Wet
Building type (specify):	Public	Company / organisation:	
Internal area (m2):		Telephone:	Fax:
Number of users:	100	Email:	
Building life cycle stage (specify):	Design		



Social	4,2	Economic	4,0	Environmental	2,7
		Overall	3,6		

Figure 8.9: SBAT rating diagram (Author, 2019)



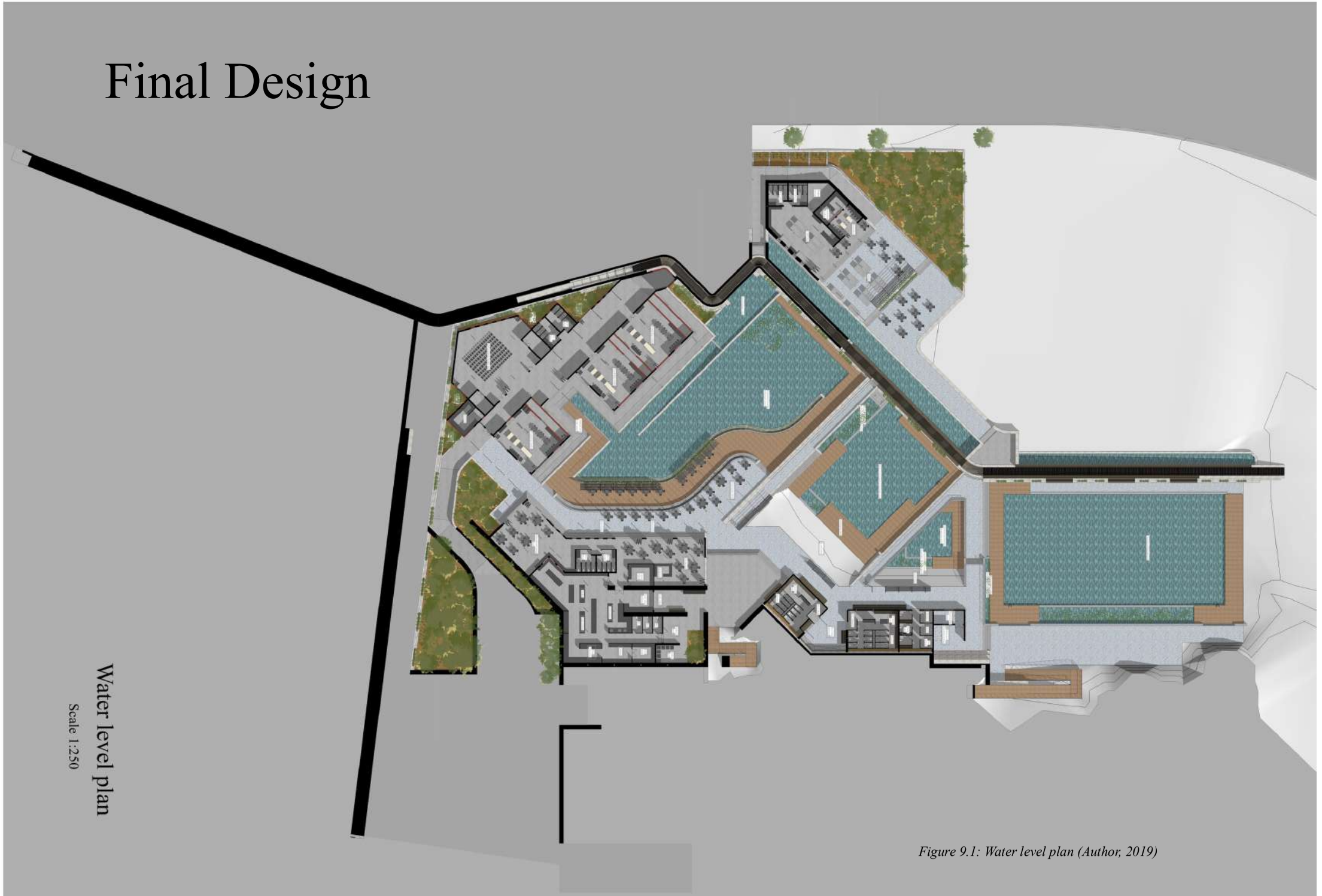
Chapter 9

Conclusion

Conclusion

Architecture as a standalone solution has many limitations when it comes to ecological and infrastructural problems. The model of landscape urbanism is seen as a suitable solution to deal with the particular obstacles that the site present. In order to reset the human-nature relationship equilibrium, the green infrastructure needs to be developed from the nature reserve all the way into the city. The project attempts to make an urban contribution through the application of the point, line and surface principles on a larger scale. The system will allow the meshing of the street grid layout and the connecting of city and nature reserve. As a result, the green infrastructure will be able to flow into the city and next to Nelson Mandela drive as a result. Through creating public pool facilities through the filtering of the water from the Apies River and the introduction of a handcraft facility, the formal and functional contribution will be made. The flow and transition of people, water and green infrastructure will alleviate the current strain caused by the bottleneck of the ridges. The technological contribution will be made by the use of predominately natural materials, blurring the threshold between urban and natural through biointegration.

Final Design



Water level plan

Scale 1:250

Figure 9.1: Water level plan (Author, 2019)

Final Design

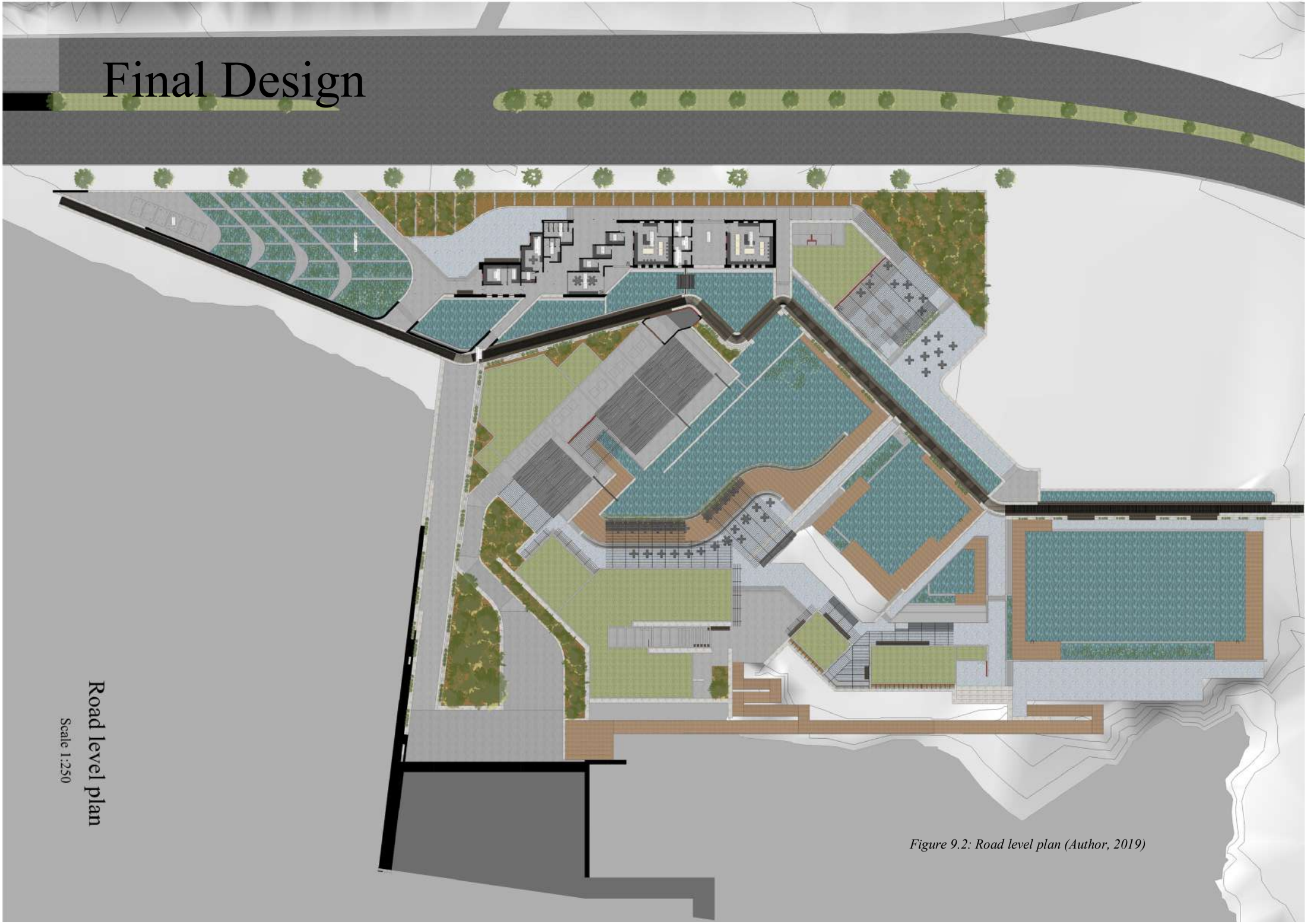


Figure 9.2: Road level plan (Author, 2019)

Final Design

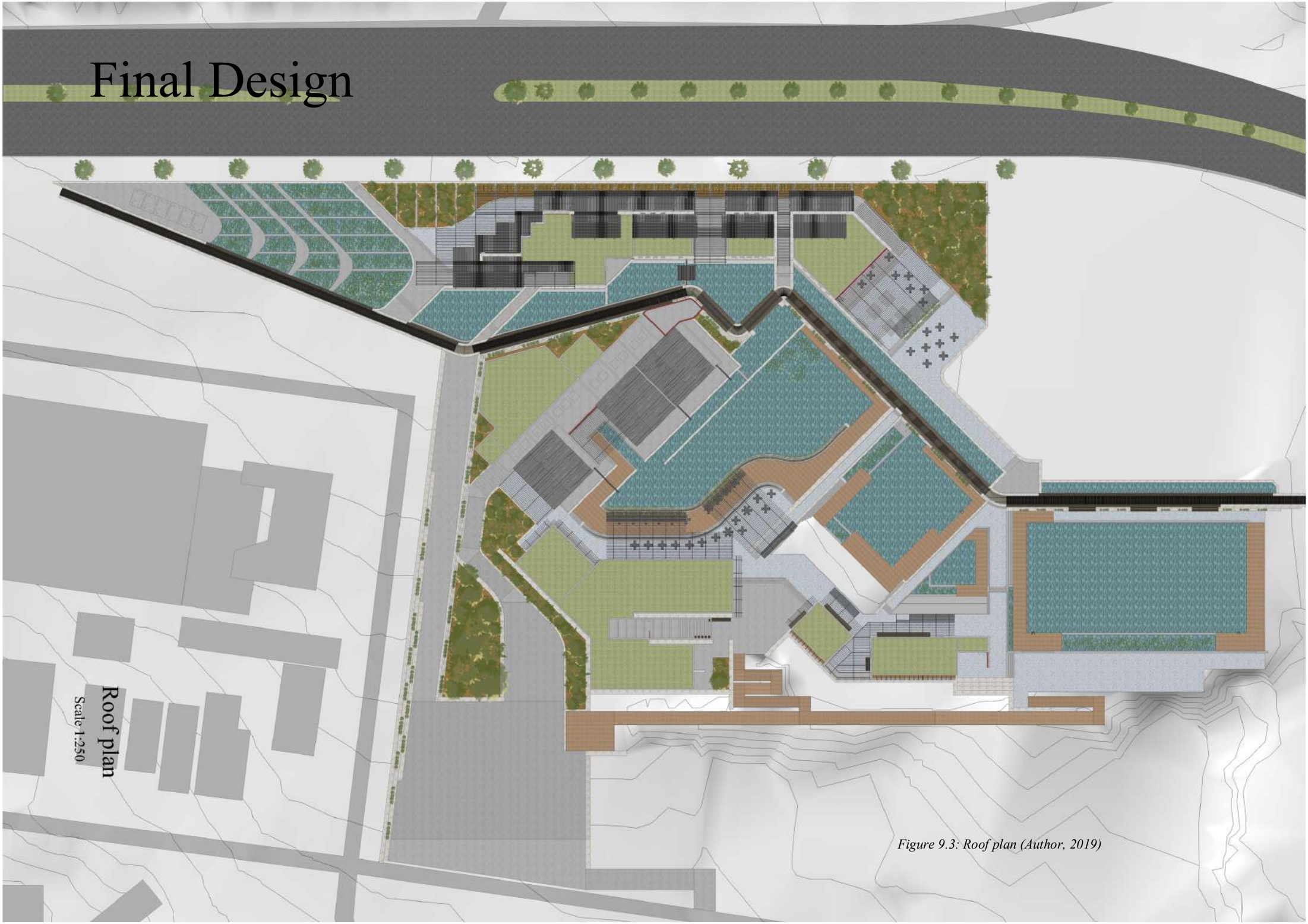


Figure 9.3: Roof plan (Author, 2019)

Perspective views

Figure 9.4: Perspective view 1 (Author, 2019)

Perspective views

Figure 9.5: Perspective view 2 (Author, 2019)

Perspective views

Figure 9.6: Perspective view 3 (Author, 2019)

Perspective views

Figure 9.7: Perspective view 4 (Author, 2019)

Perspective views

Figure 9.8: Perspective view 5 (Author, 2019)

Perspective views

Figure 9.9: Perspective view 6 (Author, 2019)

Perspective views

Figure 9.10: Perspective view 7 (Author, 2019)

Perspective views

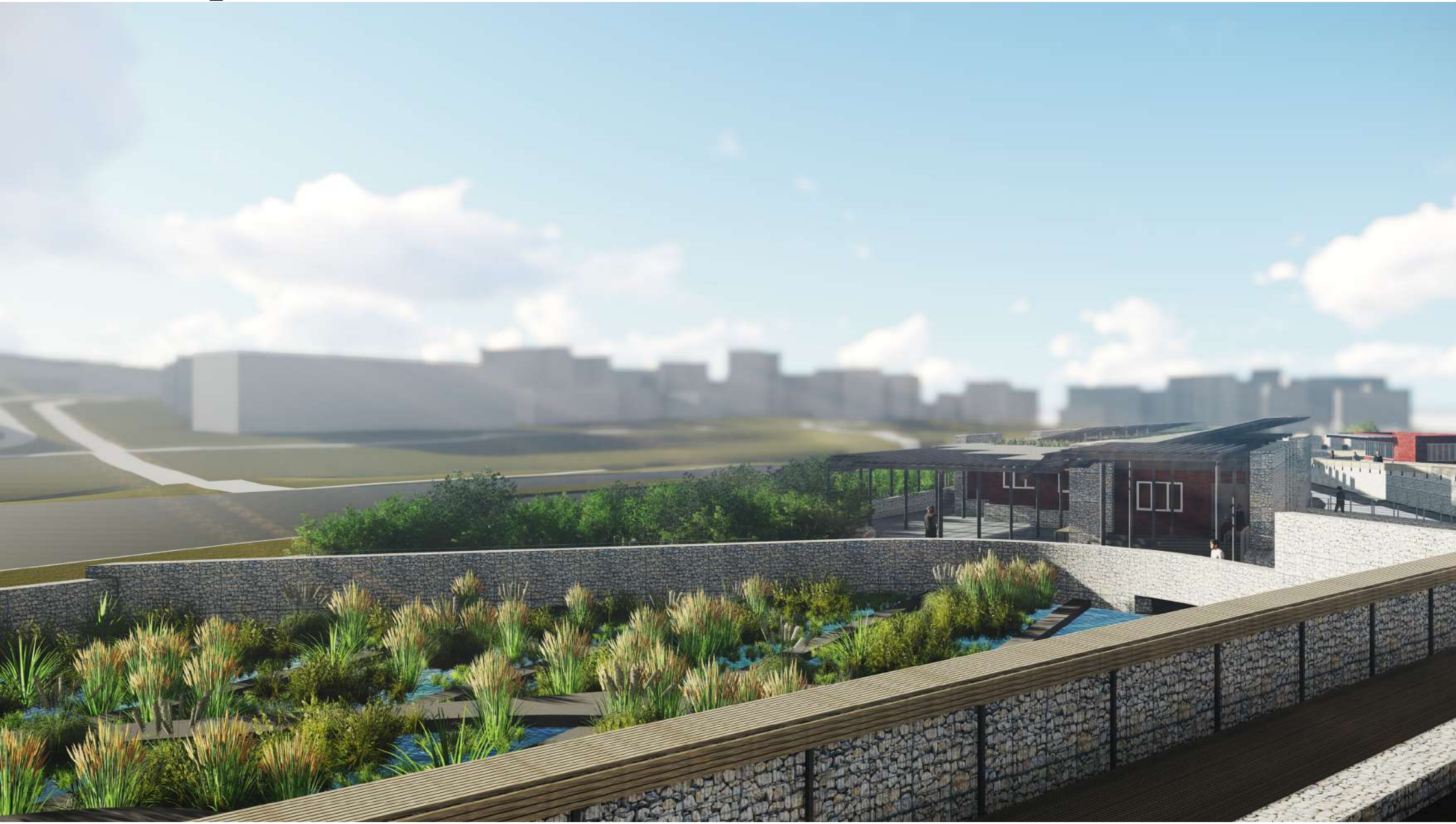


Figure 9.11: Perspective view 8 (Author, 2019)

Perspective views

Figure 9.12: Perspective view 9 (Author, 2019)

Perspective views

Figure 9.13: Perspective view 10 (Author, 2019)

Perspective views

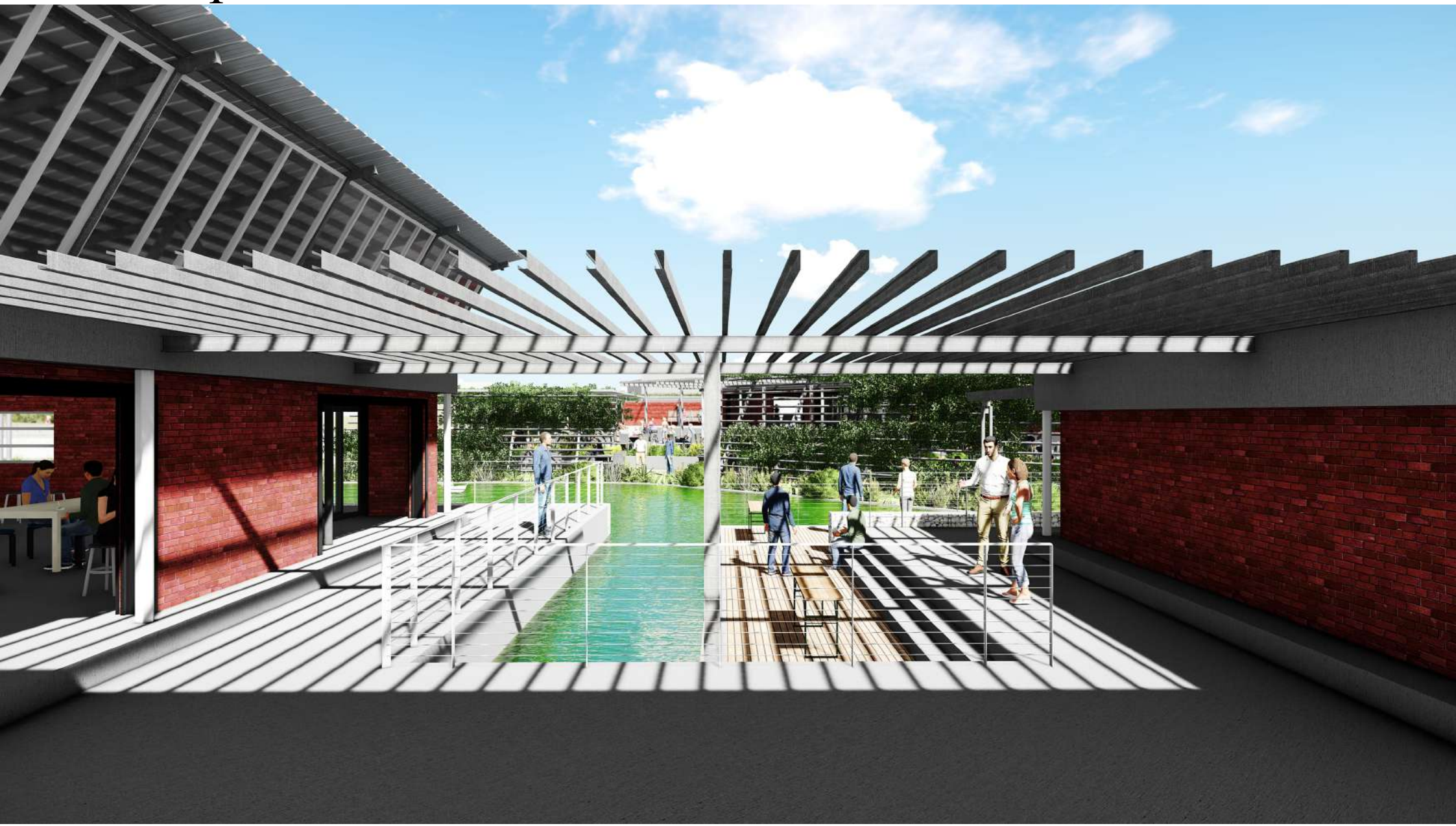


Figure 9.14: Perspective view 11 (Author, 2019)

Perspective views

Figure 9.15: Perspective view 12 (Author, 2019)

Perspective views

Figure 9.16: Perspective view 13 (Author, 2019)

Perspective views

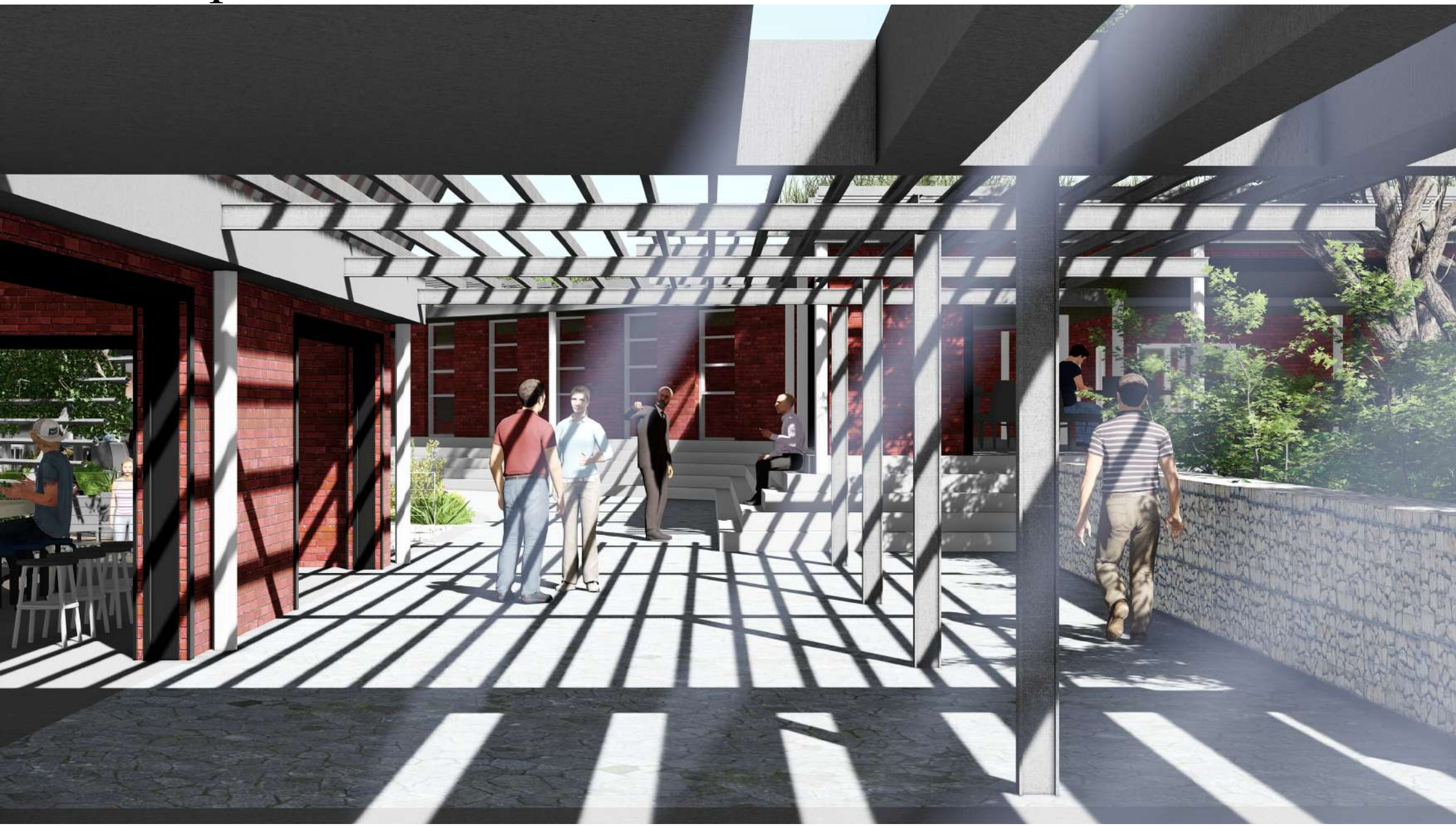


Figure 9.17: Perspective view 14 (Author, 2019)

Perspective views

Figure 9.18: Perspective view 15 (Author, 2019)

Perspective views

Figure 9.19: Perspective view 16 (Author, 2019)

Perspective views

Figure 9.20: Perspective view 17 (Author, 2019)

Perspective views

Figure 9.21: Perspective view 18 (Author, 2019)

Perspective views

Figure 9.22: Perspective view 19 (Author, 2019)

Perspective views

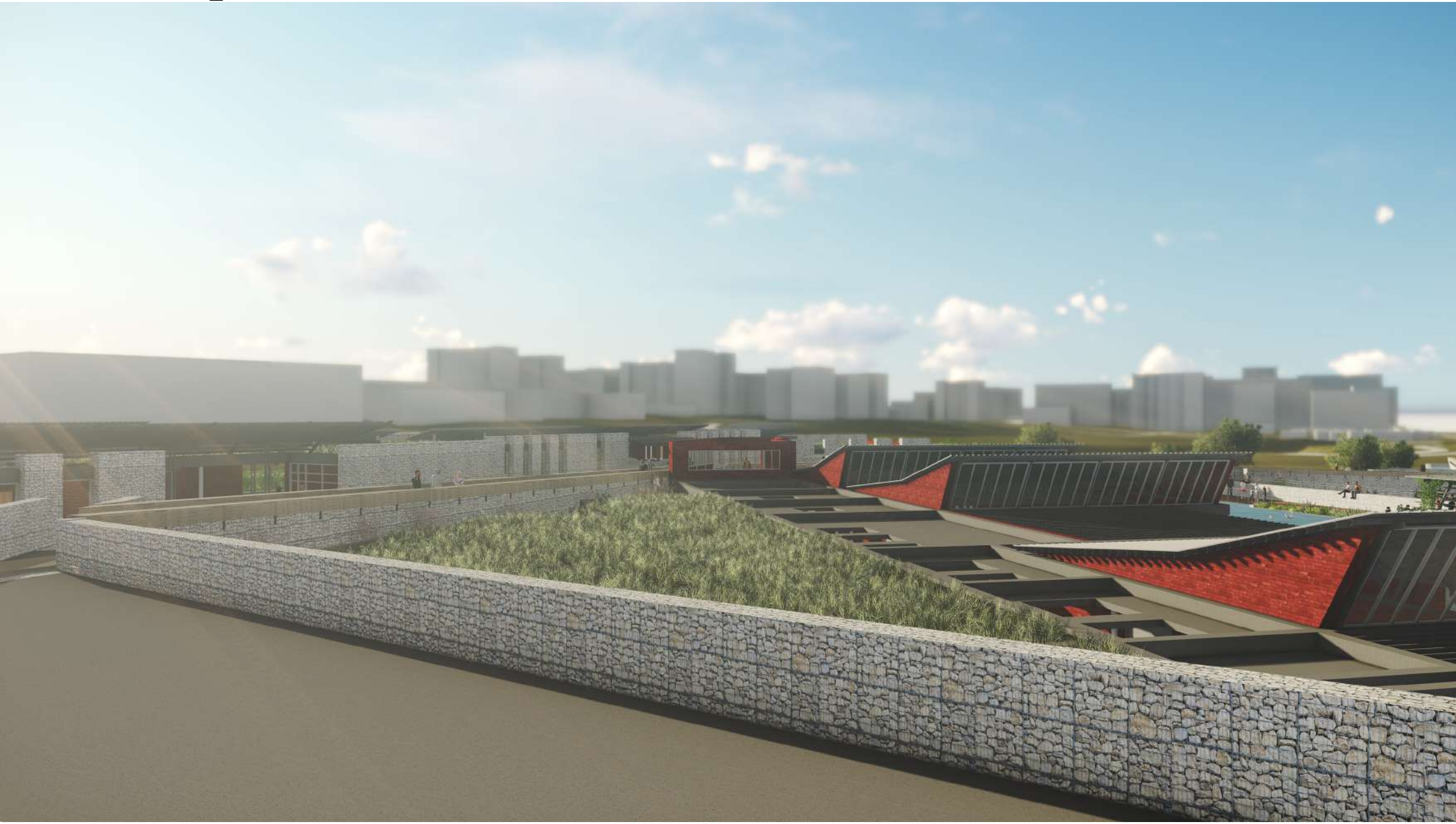
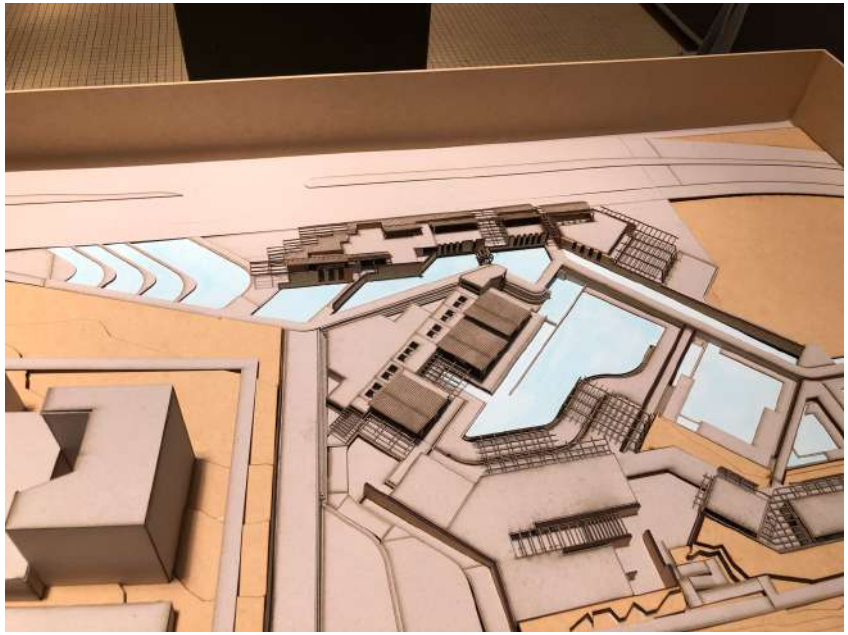
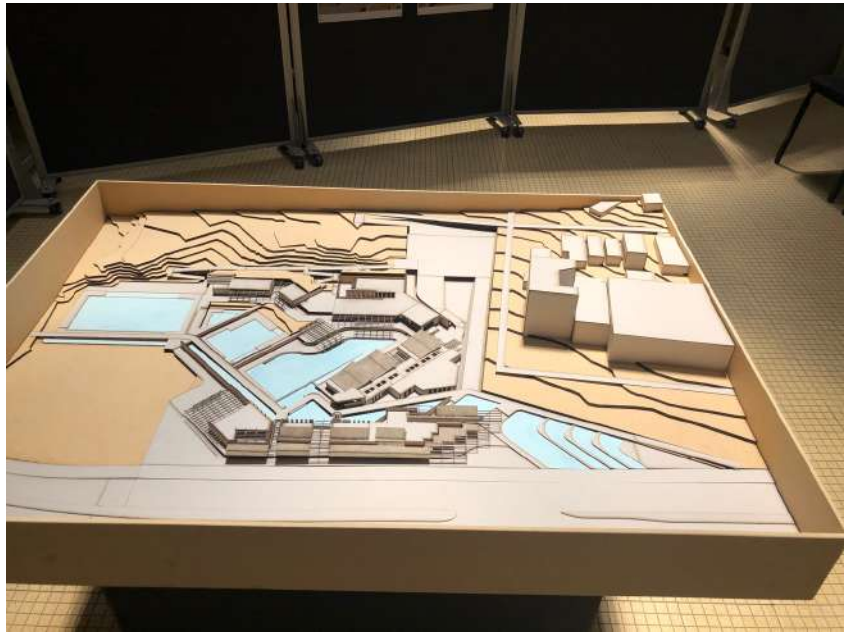


Figure 9.23: Perspective view 20 (Author, 2019)

Model photos





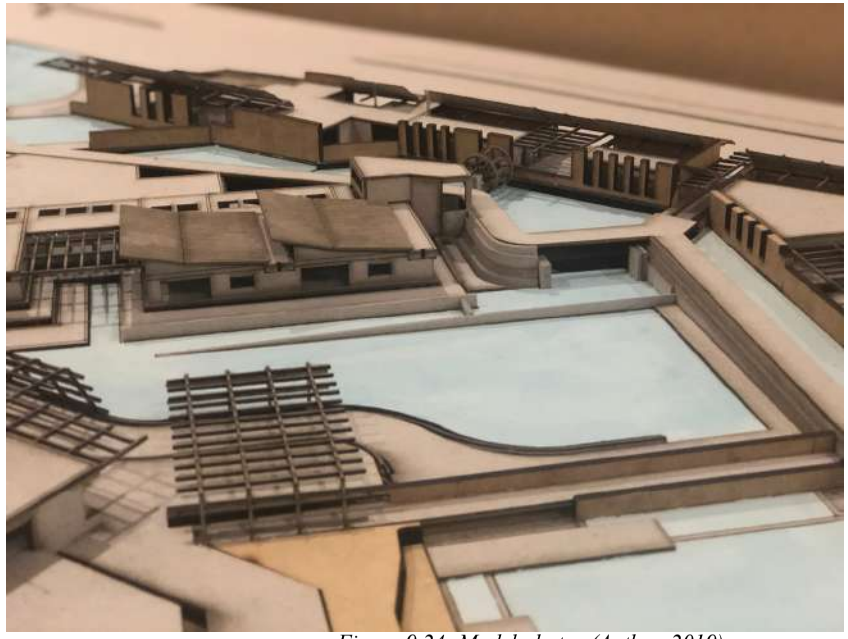
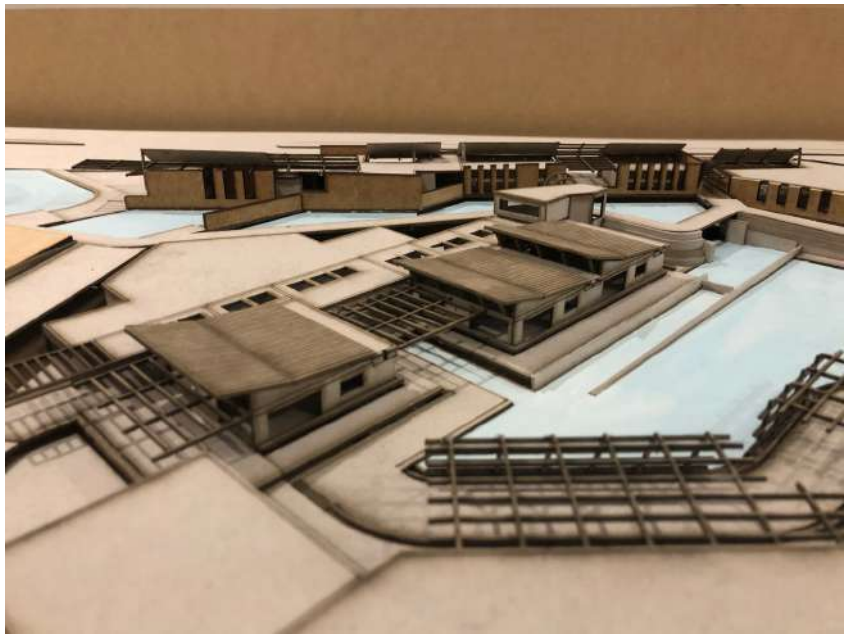
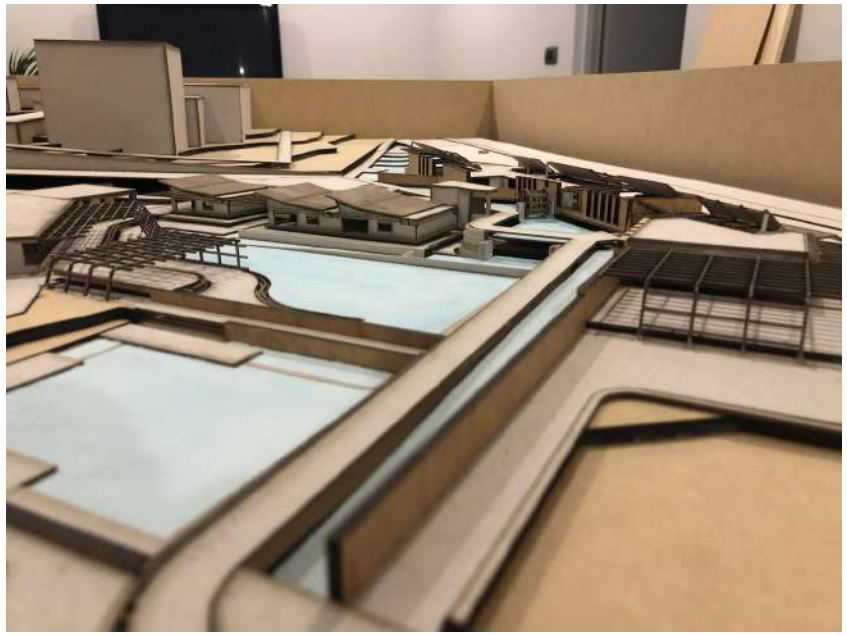


Figure 9.24: Model photos (Author, 2019)

Model photos





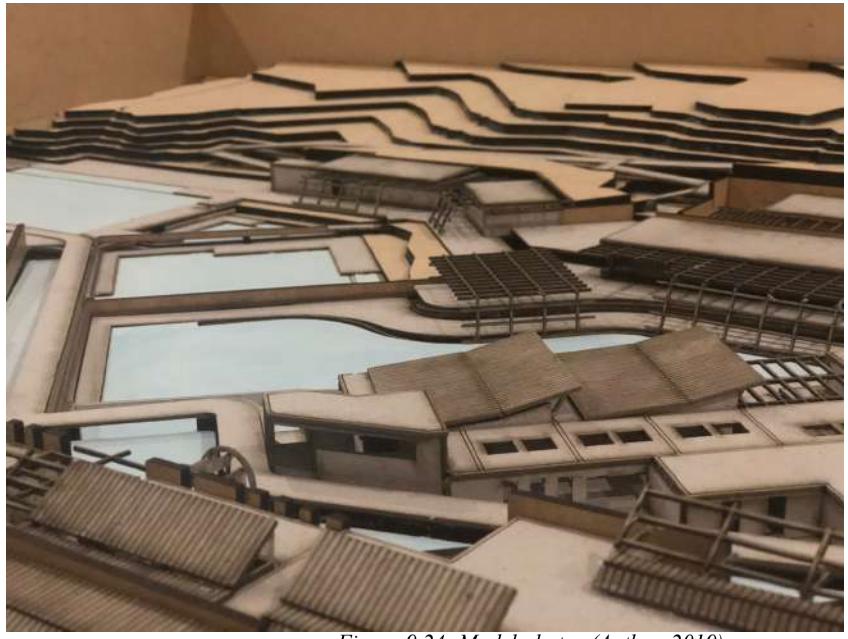
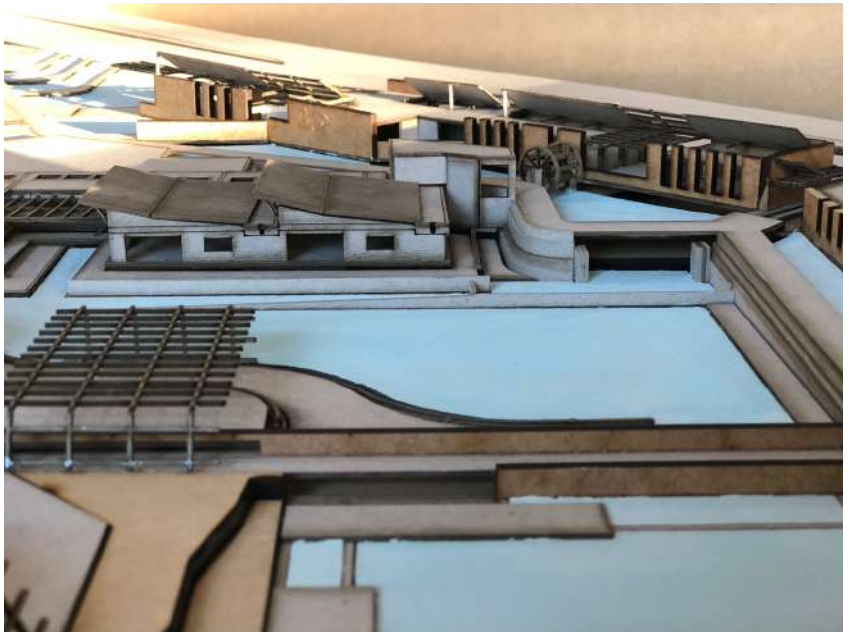


Figure 9.24: Model photos (Author, 2019)

Model photos



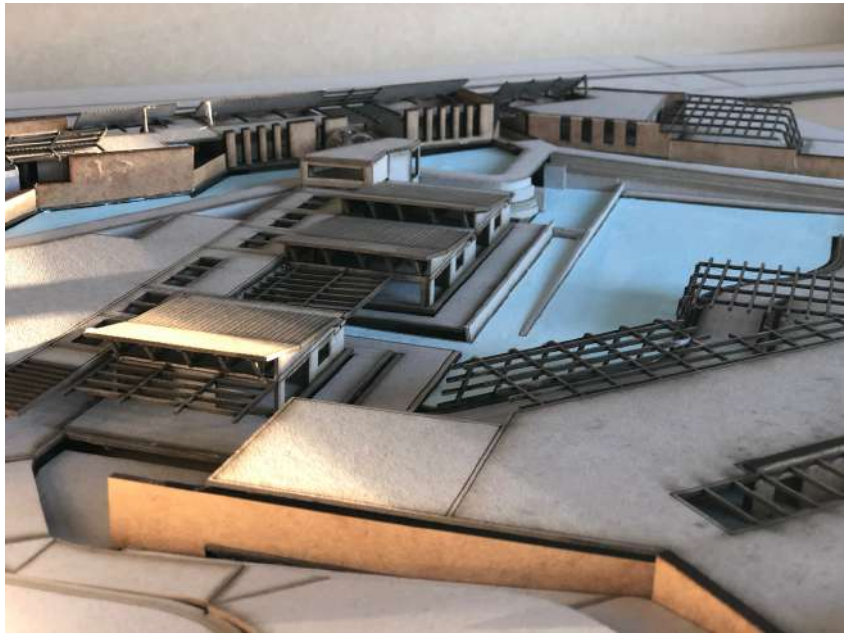
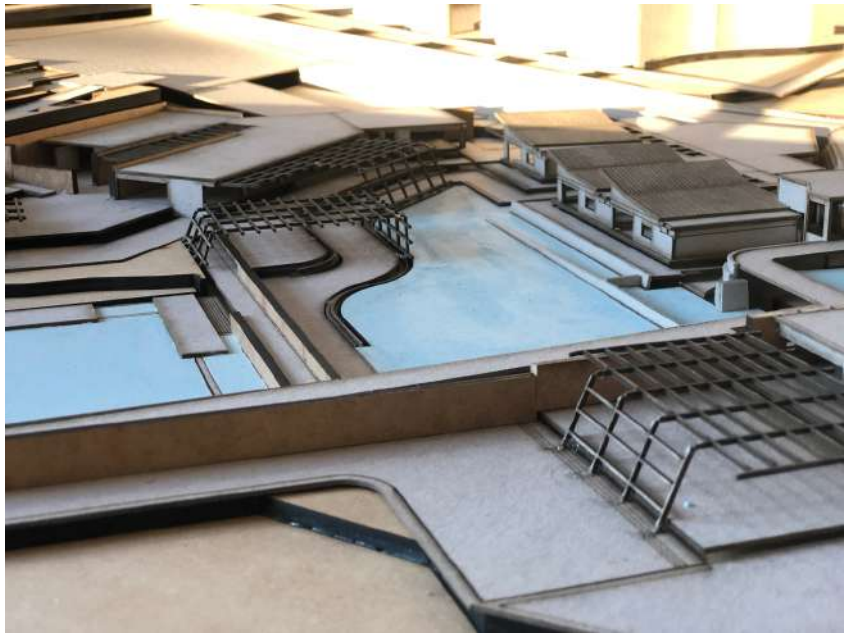
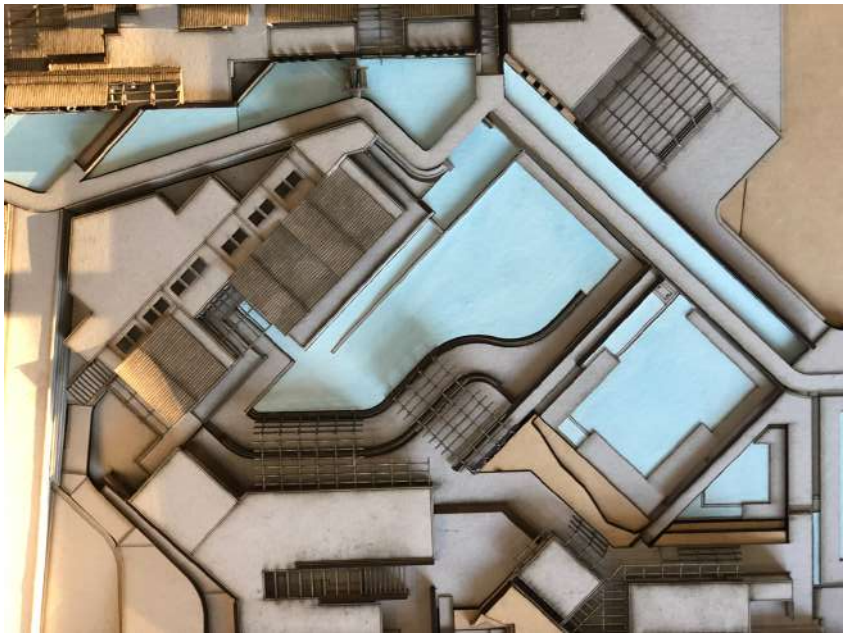


Figure 9.24: Model photos (Author, 2019)

Model photos





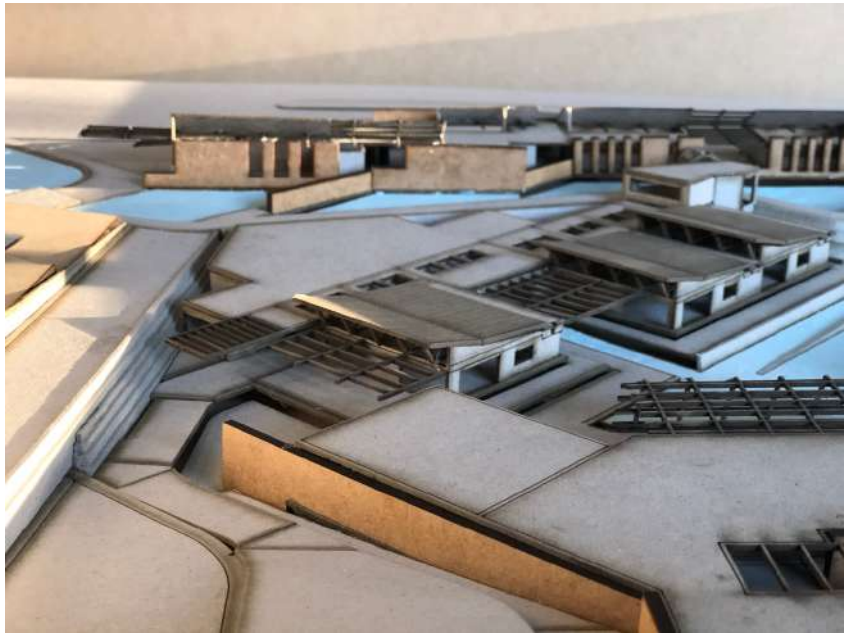


Figure 9.24: Model photos (Author, 2019)

References

Adamson, G. (2010). The Craft Reader, Berg.

Adjaye, D. (2011). African Metropolitan Architecture. United Kingdom, Thames & Hudson.

Alexis Schäffler, M. S. (2013). "Valuing green infrastructure in an urban environment under pressure — The Johannesburg case." Ecological Economics 86: 246-257.

Ba, A. H. (1976). "African Art: Where the Hand has Ears."

Botha, N. (2017). "THE STORY BEHIND THE ESTABLISHMENT AND THE NAMING OF THE TOWN OF PRETORIA AND THE DUBIOUS EXISTENCE OF A PERSON CALLED "TSHWANE"." SAJCH 31(1): 134-158.

Du Plessis, H. C. d. (2014). "Designing for Hope: Pathways to Regenerative Sustainability."

De Jong, C. D. J., Robert Cornelis; Searle, Richard; Wilburn, Kenneth E. (1987). "Pretoriana." 091.

Dippenaar, M. A. (2013). "Hydrogeological Heritage Overview: Pretoria's Fountains - Arteries of life."

Fan Shu-Yang, B. F., Raymond Cote (2004). "Principles and practice of ecological design." Environmental Reviews 12: 97-112.

Forbes, S. T. K. (1997). "Urban Nature Conservation: Landscape Management in the Urban Countryside." Frampton, K. (1990). "Rappel A L'Ordre: The case for the Tectonic." Architectural Design 60.

Grant, C. B. M. (2005). "Biodiversity and Human Health: What Role for Nature in Healthy Urban Planning?" Built Environment (1978-) 31(4).

Hart, K. V. P. (2013). "A history of South African capitalism in national and global perspective." Transformation: Critical Perspectives on Southern Africa 81/82: 55-85.

http://hiddenarchitecture.net/bellinzona-bathhouse/. Retrieved 30 August, 2019.

http://www.bronberger.co.za/index.php?option=com_content&view=article&id=3384:andries-se-waterwiel-in-die-apies-word-meintjes-se-meule&catid=50:toeka-se-dae&Itemid=76. Retrieved 28 August, 2019.

https://gulfnews.com/entertainment/arts-culture/living-spaces-that-celebrate-life-1.2246490.

https://www.archdaily.com/539870/ad-classics-olympic-archery-range-enric-miralles-and-carme-pinos/53f1ea12c07a80c384000462-ad-classics-olympic-archery-range-enric-miralles-and-carme-pinos-?next_project=no. Retrieved 29 August 2019.

https://www.sahistory.org.za/article/basotho-wars-1858-1868.

https://www.transfer-arch.com/works/il-bagno-di-bellinzona/ (2017). Retrieved 30 August, 2019.

Kaplan, R. (1989). "The Experience of Nature."

Kirsten M. Parris, M. A., Sarah A. Bekessy, Danielle Dagenais (2018). "The seven lamps of planning for biodiversity in the city." Cities 83: 44-53.

Kosoy, N. P. G. B., Klaus Bosselmann, and B. M. Anantha Duraiappah, Joan Martinez-Alier, Deborah Rogers and Robert Thomson (2012). "Pillars for a flourishing Earth: planetary boundaries, economic growth delusion and green economy." Current Opinion in Environmental Sustainability 4: 74-79.

Liebenberg, E. (2015). "A cartographical history of Pretoria."

Loos, A. (1982). "Building Materials." Speaking Into the Void: Collected Essays 1897-1900.

Matsinde, T. (2015). Contemporary Design Africa, Thames & Hudson.

Morris, W. (1888). "The Revival of Handicraft." Fortnightly review.

ORR, D. (2001). "Architecture, Ecological Design, and Human Ecology." 89th ACSA Annual Meeting.

Peres, E. A. B., Chrisna Du Plessis (2015). "Architecture for life: Exploring Regenerative and Resilience thinking " Architecture SA Jan/Feb(71).

Pfab, M. (2017). "The Gauteng Conservation Plan: Planning for Biodiversity in a rapidly urbanising province." Bothalia - African Biodiversity & Conservation.

Pye, D. (1968). The Nature and Art of Workmanship, Cambridge University Press.

Schaffler, G. G. a. A. (2015). "Conundrums in implementing a green economy in the Gauteng City-Region." Current Opinion in Environmental Sustainability 13.

SCHALKWYK, J. A. V. (1993). "'N ARGEOLOGIESE ONDERSOEK VAN DIE FONTEINEDALGEBIED, GELEë OP DIE PLAAS GROENKLOOF 358-JR, PRETORIA." National Cultural History Museum.

Steele, J. (2005). Ecological Architecture - A Critical History. United Kingdom, Thames & Hudson.

Stevens, I. (2008). "Nature and design: thoughts on sources and subjects." SAJAH 23(3): 96-111.

References

Tonder, L. v. (2008). "A CULTURAL HERITAGE MANAGEMENT PLAN FOR THE GROENKLOOF NATURE RESERVE., CITY OF TSHW ANE."

Top, A (2012). "Pretoria's fountains still the cleanest water around : water and wastewater." IMIESA 37(9).

Tschumi, B. (1987). Le Parc De La Vilette, Princeton Architecture Press.

Vollenhoven, A. C. v. (2005). "Die eerste blanke bewoner van die Pretoria-omgewing." SA Tydskrif vir Kultuurgeskiedenis.

Vyver, Y. v. d. (2015). "Situating Geography and the powers of Law, State and Church in the dynamic of Change that lead to the establishment of Pretoria." SAJAH 30(3): 151-171.

Waldheim, C. (2016). Landscape as Urbanism - A General Theory, Princeton University Press.

Wilson, E. O. (2002). "What Is Nature Worth?" The Wilson Quarterly 26: 20-39.

Yeang, K. (2006). Ecodesign - A Manual for Ecological Design, Wiley-Academy.

Yeang, K. (2009). Ecomasterplanning, John Wiley & Sons Ltd.

Yeang, K. (2017). It's not easy being green, ORO Editions.

Tshwane, C. o. (2005). "Tshwane proposed open space framework." 2.

Tshwane, C. o. (2013). "Tshwane Vision 2055."

Tshwane, C. o. (2015). "Tshwane Inner City Regeneration."

Arup (2013). "City of Tshwane Masterplan - Restoration framework."

Tshwane, C. o. (2013). "City of Tshwane Urban Renewal Project."

Addendum A
Ethics clearance

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Engineering, Built Environment and Information Technology
Fakulteit Ingenieurswese, Bou-omgewing en Inligtingtegnologie / Lefapha la Boetšenere, Tikologo ya Kago le Theknolotši ya Tshedimošo

Reference number: EBIT/E11/2019 25 April 2019

Prof A Barker, Mr JN Prinsloo & Ms C Karusseit
Department Architecture
University of Pretoria
Pretoria
0028

Dear All

FACULTY COMMITTEE FOR RESEARCH ETHICS AND INTEGRITY

Your recent application to the EBIT Research Ethics Committee refers.

Approval is granted for the application with reference number that appears above.

1. This means that the research project entitled "*Masters professional dissertation in architecture, landscape architecture and interior architecture*" has been approved as submitted. It is important to note what approval implies. This is expanded on in the points that follow.

2. This approval does not imply that the researcher, student or lecturer is relieved of any accountability in terms of the Code of Ethics for Scholarly Activities of the University of Pretoria, or the Policy and Procedures for Responsible Research of the University of Pretoria. These documents are available on the website of the EBIT Research Ethics Committee.

3. If action is taken beyond the approved application, approval is withdrawn automatically.

4. According to the regulations, any relevant problem arising from the study or research methodology as well as any amendments or changes, must be brought to the attention of the EBIT Research Ethics Office.

5. The Committee must be notified on completion of the project.

The Committee wishes you every success with the research project.

Prof JJ Hanekom
Chair: Faculty Committee for Research Ethics and Integrity
FACULTY OF ENGINEERING, BUILT ENVIRONMENT AND INFORMATION TECHNOLOGY

Addendum B

July paper

Roan de Wet

R Returning {through} the origin

A physical and cultural gateway to the Genesis of Pretoria. A critique on the lost, once integral, relationship with the natural.

Fig. 01. Above; Hand coloured picture postcard circa 1908 showing a horse tramcar crossing the Tram bridge over the Apies river en route to Sunnyside via Carol Hardijzer www.(theheritageportal.co.za)

NTRODUCTION

A long-standing problem has been that humans have removed themselves from the natural lifecycle and are therefore acting in a dominant role, allowing the anthropogenic to overshadow the ecological. The lost relationship with nature is accentuated by our railways and highways, connecting people on a large scale, but isolating and homogenizing environments on a more intimate scale. The “green” infrastructure is suppressed and seen as an afterthought. This article explores the potential for a bio-integration of infrastructures to assist in defining the space, currently in disarray, surrounding the chosen site at the Southern gateway to the city of Pretoria. This gateway is the only entrance to the city with a neigbouring nature reserve (Groenkloof) and, therefore, deemed a suitable site to facilitate an extension of the natural threshold to allow nature to penetrate from the peripheries of the city, by addressing the rigid boundaries created by grey infrastructure and envisioning ways to bio-integrate these.

The highway running through the gateway (Nelson Mandela Drive) is developed on the basis of existing city frameworks, as a celebratory route, and therefore my scheme will focus on recreation and handcraft skills development. The project I am proposing is a natural resources training facility. It serves as a critique on the lost, once integral, relationship with the natural. Manifesting as a physical and symbolic gateway to the genesis of a city. A city infrastructural rethinking, where architecture can become a green infrastructural asset to the city.

The landscape will act as a practical and moral guide to the users of the city, through its mountains, valleys and rivers. A positive, sustainable relationship and education surrounding environmental literacy will be promoted, by exposing ecological systems, specifically that of water, for what they are and could be. The existing spatial boundary between nature and urban will be re-envisioned to allow overlapping and a blur between the two, through the introduction of a series of smaller thresholds, morphing the urban with the natural. The newly invigorated

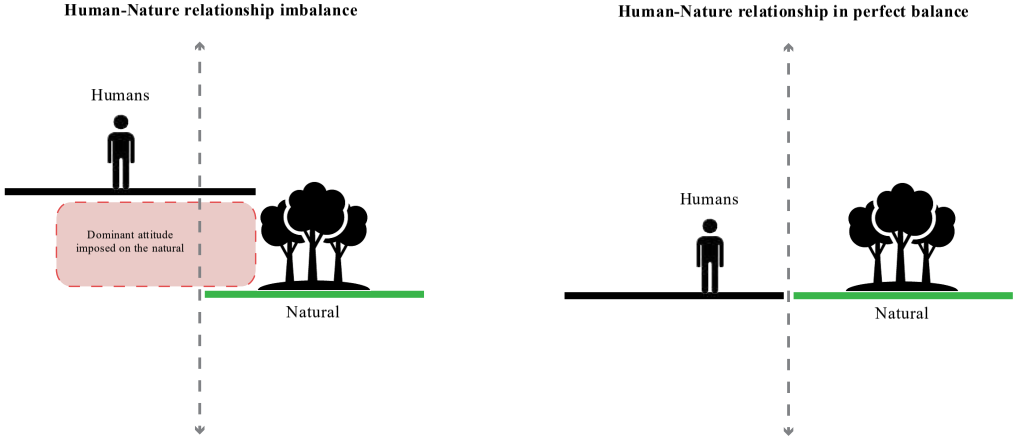
natural relationship will serve to offer a sense of identity to the city dweller. An identity found in the natural and the origins of the city.

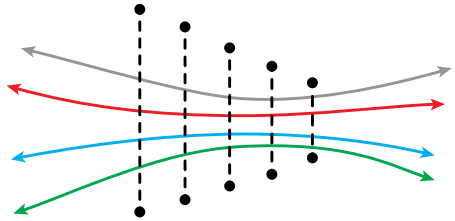
This article will offer a brief history of Pretoria's origin and highlight the integral role nature has played in its genesis. Unfortunately, the role has now largely become lost through the development of the city and the implementation of a rigid city grid system on a natural landscape. A solution will be offered on how to deal with the coming together of two different orientating grid layouts, leading to an isolated nature reserve, on the edge of Pretoria CBD, the physical and symbolic origin of the city. Green infrastructure and its role as mediatior from urban to natural will be discussed as a means to ease the transition of people living in homogenous high-density residential areas to a nature reserve.

HUMAN-NATURE RELATIONSHIP IMBALANCE

According to Kosoy (2012), the technological age has seen nature shifted into the position of largely used for the benefit of people. Any environmental problem is seen as fixable through technology.
Climate change, loss of biodiversity, desertification and the disruption of natural lifecycles are the causes of our disregard for nature and its ecosystems.
The crisis of our deteriorating natural environment has already seen the dwindling of biodiversity at nearly all geographic locations of the past century. This scenario threatens to eradicate our evolutionary inheritance and cause irreversible damage to our everyday human experience, now and for our future generations.
The responses to reduce the rate of destruction of these threats to our biodiversity and ecosystem function loss, have largely been unsuccessful. The atmosphere is struggling to absorb the large amounts of gases emitted into the air daily. The oceans are chemically changed and facing overfishing past the point of recovery. This is only a glimpse of the damage we are causing to the environment.
According to Kosoy, there has been several attempts to address the issues at hand by developing mechanisms to combat the human-driven environmental degradation. The green economy is seen as one of the potential mechanisms to value eco-system services and internalize the cost of externalities. It is defined as an economy that focusses on improving human well-being and social equity, while reducing or eradicating environmental risks and

Fig. 02. Below; Human-Nature Equilibrium (Author, 2019)
Fig. 03. Opposite Top Right; Infrastructural integration (Author, 2019)





Architecture allows the 4 infrastructures to work together in harmony

Fig. 03. Left; Infrastructural integration (Author, 2019)
Fig. 04. Opposite Top Right; Map showing the farmsteads of both Bronkhorst brothers and Andries van der Walt (van der Vyver, 2015)
Fig. 05. Opposite Bottom Right; Plan of Pretoria - Jeppe 1878 (van der Vyver, 2015)

ecological resource depletion. Therefore, the need for addressing and developing an economy that prioritizes a flourishing Earth is more evident than ever before. The illusion of unlimited growth or believing in technological miracles is showing itself to be unrealistic when confronted with our thermodynamic reality. It is our responsibility as humanity to rethink our economic goals in realistic relation to the Earth's limits (Kosoy, 2012).

LOST RELATIONSHIP WITH THE NATURAL

South Africa's (SA.'s) admittance to the BRICS (Brazil, Russia, India, China, South Africa) association has highlighted the fact that the rest of the countries in the association, see the demographic opportunity of SA as the gateway to the rest of Africa. Hart (2013) claims that SA's economy is dwarfed by size and less dynamic than those of China or Brazil. The discovery of diamonds in Kimberley in 1868 and of gold in the Rand around the same time propelled SA as a major exporter of precious minerals from the 1870s. From the 1880s onwards, for three decades, SA participated in globalisation driven by imperial rivalry and haute finance (Polanyi 1944), both orchestrated by Britain. Cecil Rhodes and the British planned to conquer the African continent from the Cape to Cairo. After the Boer war, the British placed a large part of their global and private investment into SA infrastructure. The mine owners needed stable political and economic conditions and felt that the Boer government of the Transvaal did not guarantee this. The weakness of elite farmers and a lack of industrial opportunities led to the concentration of the SA economy around mining (Hart, 2013).

SUPPRESSED GREEN INFRASTRUCTURE

Ecological design is defined by Orr (2001) as the careful meshing of human purposes with the larger patterns and flows of the natural world and the interpretation of those patterns and flows to inform our human actions. When designing ecologically, we are continually instructed by the fabric of our everyday life. Pedagogy informs our infrastructure, which in turn informs us. Ecologically designed communities become a tool to teach about land-use, landscapes and human connections, while the restoration of wildlife corridors and habitats becomes a way of engaging with animals. The main aim of ecological design then becomes a way to expand our awareness of nature and ecological competence.
The Philosopher, Bruce Wilshere (2001) writes that, "we have encased ourselves in controlled environments called building and cities. Strapped into machines, we speed from place to place whenever desired, typically, only slightly knowing any particular place and its regenerative rhythms and prospects." We have alienated ourselves from nature that formed our needs over millions of years, which means alienation from ourselves. This has led to the deprivation of one of our primal needs as organisms, namely, to engage with nature. We now find ourselves in an alienated world of our own making, separated from the cycles of nature. Ecological design aims to reconnect us, as sensuous beings, to a sensuous and living world. A world that does not need to be remade, but rather revealed.

Historically, there have been proponents of the idea of ecologically prioritised design. One such example is Ebenezer Howard and his idea of the "garden city" (1968), which would focus on the incorporation of green open spaces in the form of gardens and parks and the preserved natural landscape. Jane Jacobs in the 1960's focused on the idea of including elements of the "neighbourhood" in her planning. The community space, where multi-functional space and short travelling distances were emphasized (Shu-Yang, 2004). Ian McHarg (1967) advocated that ecological systems evident in the natural landscape should become the central core of decision making towards human involvement with land development.

THE GENESIS OF PRETORIA

According to van der Vyver, (2015), in order to understand the significant role the natural environment has played in the Genesis of Pretoria, the evolution of the area needs to be investigated. The area of Pretoria evolved from a

natural environment, to an agricultural settlement, before it was established as a town and the capital city of the country. The first remnants of human activity in the area, dates back as far as 2000BCE. Stone Age and Iron Age groups moved through and temporarily settled in the area. Activity areas, classified as workshops, were found on the embankments of the Apies river, overlooking the valley and the river in Groenkloof Nature Reserve. A Late Iron Age Moloko[1] potsherd was also found in a cave in the reserve.
In the 1600's the Southern Transvaal Ndebele tribe occupied the area. They were in all likeliness the first people to see the potential of the river valley, which later became Pretoria, as a suitable place in which to reside. In the 1820's Mzilikazi, breakaway Zulu chief who founded the Matabele tribe, arrived in the area. He slaughtered the Bakwena tribe, who had already driven the San people out of the area (van Vollenhoven, 2008). Furthermore, van der Vyver continues to explain that during the Difaqane[2], Mzilikazi built two military kraals on the banks of the Apies river. In 1836 he launched an attack on the Potgieter Trek. The Voortrekkers retaliated in 1837 and Mzilikazi fled to Limpopo. 1840 marks the period when Pretoria transformed from a natural environment to an agricultural settlement, established by Lucas and Gert Bronkhorst. Lucas built his house at the origins of the Apies River, and the Fountains were known for years as the Bronkhorst fountains. Voortrekkers initially settled on farms and not in towns. The towns however, developed around the settlements to support the farming community. These were either government sponsored or church towns (Floyd, 196; van der Vyver, 2015). Marthinus Wessel Pretorius and Piet Potgieter suggested that the Volksraad be moved to a single location in the middle of the country and deemed Elandspoort as a suitable location for establishing this new town. Pretorius then bought the farms of Prinsloo, van der Walt and Bronkhorst on the banks of the Apies River (van der Vyver, 2015). Pretorius made many attempts at establishing the new town, but farmers further down the river objected. The Volksraad hesitated to permit the establishment of a new town with its financial implications. Only after Pretorius concentrated his efforts of establishing a new town through the church, did he become successful (van

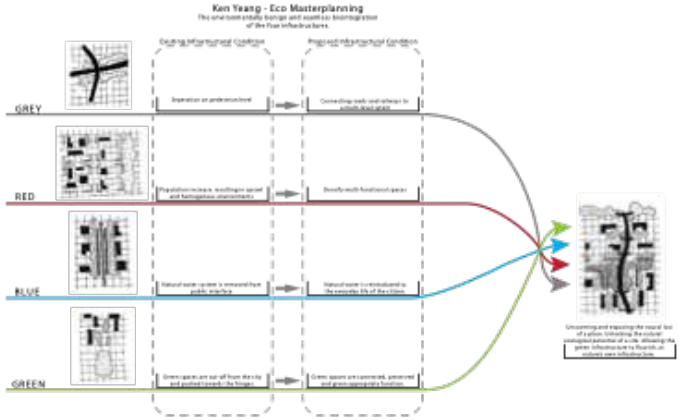


Fig. 04. Opposite Middle Left; Map showing the farmsteads of both Bronkhorst brothers and Andries van der Walt (van der Vyver, 2015)
Fig. 05. Opposite Bottom Left; Plan of Pretoria - Jeppe 1878 (van der Vyver, 2015)
Fig. 06. Left; Ken Yeang - Eco Masterplanning (Author, 2019)

der Vyver, 2015). In November 1853, Elandspoort and Koedoespoort were declared a town, known as Pretoria Philadelphia. The official date recorded is 1855, when the Volksraad gave its permission for establishing a town. The construction of a church began in 1856. The Dutch Reformed church needed a large space for "nachtmaal" meetings, attended by widely dispersed farmers. Church square was then formed.

The next series of events marks the beginning of the deterioration of the relationship between humans and the natural. In 1857 A.F. du Toit commenced the process of setting out the rigid city grid, with Church square as the starting point. Du toit used an east-west, north-south axis to lay out the first city blocks (Kraehmer, 1978; van der Vyver, 2015). The road layout followed the same orientation and did not respond to any actual requirements and lines between different points of interest in the city. The result was a grid pattern with no natural considerations and one that ignored topography. The grid pattern was even imposed on steep ridges (Kraehmer, 1978; van der Vyver, 2015). The ridges, valley and river, which were so integral to the Genesis of the city were dominated by the rigid grid layout, resulting in the natural landscape being changed forever. The basic principle for applying a grid pattern, was water. This is evident in the copying of the water system used in other Voortrekker towns and defending the grid as it had a "civilized" status attached to it. In 1860 Pretoria became the capital city and the seat of government.

At this stage of the evolution, the city began to expand rapidly and most city development decisions were made in the name of progression. This manner of thinking could be seen in the decision to channelize the Apies River, after a flood occurred in 1880. Visual connection with the river was lost in 1890, when a weir was constructed to feed water along the streets (Peres, 2015). The separation of man and nature was accentuated by the creation of a physical boundary between the city and the natural, when the NZASM railway was built in 1893. The railway was the answer for the ZAR to establish an independent link to a port in Delagoa Bay that was not occupied by the British. The ZAR saw the importance of having a relationship with the pristine natural, when president Paul Kruger proclaimed Groenkloof a protected nature reserve. This was the first nature sanctuary in South Africa (van Vollenhoven, 2005).

BIOINTEGRATION OF GREEN INFRATRUCTURE

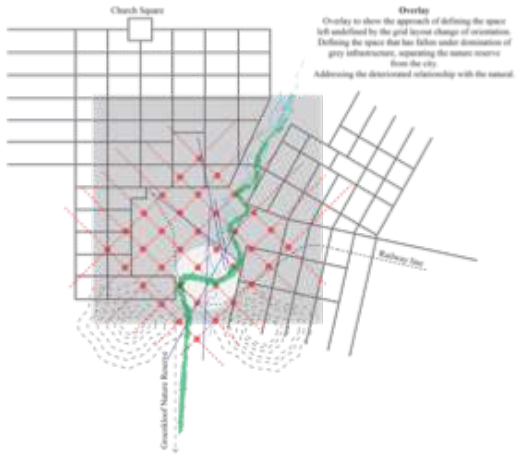
Ken Yeang (2017) compares the analogy of his architecture to a prosthesis. Prosthesis is defined as an artificial, human made device, that is connected to its organic host. The organic host in the case of a prothesis is the human body. In order for the prosthesis to function properly, a seamless, biointegration with the host is needed. Yeang defines the goal of prosthetic design as providing solutions that will enable the appropriate biointegration of the artificial with the organic. Yeang continues the analogy by defining our built environment as the prosthetic device, a synthetic, human made object, latching onto a host organism, which is the human body, or the ecosystems in which our built environment must seamlessly and benignly biointegrate. Our built environment has largely failed to biointegrate and this has led to a global environmental decline.

Furthermore, Yeang sets the challenge that we as designers are tasked to do. He states that we must strive to achieve "an environmentally seamless biointegration of our human-made, built environment as a constructed ecosystem with the naturally occurring ecosystems in a reciprocal and symbiotic relationship, as opposed to one that is estranged, inert, and parasitic."

The project focuses on uncovering and enhancing the green infrastructure of the city. A system that can be likened to a cleansing organ like a lung or a kidney, offering social and ecological support to the city.

AN URBAN MIND SHIFT

According to Waldheim (2016), Stan Allen stated, "increasingly, landscape is emerging as a model for urbanism". Architecture and urban design's inability to produce rational, satisfactory contemporary urban conditions has shone a light on landscape urbanism as



a possible solution. Architecture is no longer seen as the sole building block of urban form. Peter Rowe identified that a priority should be afforded to landscape rather than freestanding built form. One of the main statements landscape urbanism claims to make is the, "conflation, integration, and fluid exchange between environmental (natural) and infrastructural (engineered) systems.

Waldheim continues and states that, usually the landscape project is placed in the shadow of the infrastructural object, which is seen as more important than the field into which it is placed. However, the landscape is an element through which all ecological transactions must pass, it is seen as the infrastructure of the future.

Waldheim further maintained that landscape has the ability to stitch infrastructure into urban fabrics. Rethinking the relationship between ecology and infrastructure, landscape removes the emphasis from the middle scale architectural or urban work and places the emphasis instead on large-scale infrastructural diagram and the small-scale material condition.

The most intriguing aspect landscape urbanism has to offer is the complex interweaving of natural ecologies with the social, cultural and infrastructural layers of the city. This more complex urbanism is capable of providing a cultural alternative to traditional urban form, while developing an urbanism in which environmental wellbeing, social welfare and cultural aspiration morph into one.

Rem Koolhaas (1998) stated that, "architecture is no longer the primary element of urban order; increasingly landscape is the primary element of urban order."

THE URBAN PARK

Bernard Tschumi's Parc de la Vilette was chosen as an appropriate way of defining a vast ill-defined urban green space. The general aim of Tschumi's project was to develop an organizing structure that could operate independently of the functional use. A system without a centre or hierarchy, that could function without the usual relationship between program and the resulting architecture. The point grid system was thus implemented (Tschumi, 1987). Tschumi further argued that the point grid system could become a tool against functionalist approaches, showcasing that there does not have to be a cause-and-effect relationship between program and architecture. His approach marked a shift in thinking towards social and historical circumstances. A counter notion to the utopia of unity. His competition entry was one of the first in recent architectural history, to propose a new program, that of the "Urban Park". Arguing for the combination of different juxtaposed programs to offer new perspectives and attitudes to the urban dweller. The important distinction that Tschumi makes is that during the 20th century, the concept of the park has changed. It can no longer be separated from the concept of the city, the park and the city should be seen as an entity. The park can no longer be seen as an image of nature within the city. The utopian idea of the pristine, protected from the grim reality park is no longer valid. Tschumi opposed Olmsted's notion of "in the park the city is not supposed to exist", and states that "to create falls and hills hiding the highway, ignores the power of urban reality."

GREEN INFRASTRUCTURE IN A GREY WORLD

South Africa is the most urbanized sub region in Africa, with 61% of its population now residing in cities (UNHabitat, 2010; Schäffler, 2013). Although the demographic growth is slowing down, the migration from rural to urban continues unhindered. This is placing immense pressure on cities ill-equipped to handle the ever growing population (Sanyal, 2011).

The increase in infrastructural demand is often met with a response by cities in a manner to reduce resource consumption and increase resource efficiency through redesigning grey infrastructure, roads and railways, as the energy and resource supply systems (Weisz and Steinberger, 2010; Schäffler, 2013). It is evident that the green infrastructure or urban biophysical networks, with the ability to provide ecosystem services and improve the overall resilience of a city, is being overlooked (Schäffler, 2013).

Fig. 07. Opposite Top Left; Applying Bernard Tschumi's principles (Author, 2019)
Fig. 08. Below Right; Green infrastructure network (Author, 2019)

From a South African perspective, Schäffler (2013) makes the point that planning and research surrounding environmental issues is often not catered for as seemingly more pressing issues such as service delivery deficit, poverty and economic exclusion take precedent. She states that rapidly expanding cities, need to consider the important role green assets play in the broader infrastructural development strategy. This will only happen if these assets are recognized as integral parts of a city planning process and integrated in city budgeting and accounting systems (Schäffler, 2013).

Green infrastructure is defined as a "connected network of multifunctional, predominately unbuilt, space that supports both ecological and social activities and processes" (Kambites & Owen; Schäffler, 2013). All cities have green spaces, yet they are not all considered green infrastructure. Ecological and natural assets are only seen as green infrastructure when they contribute to providing social, environmental and economic functions (Landscape Institute, 2009; Schäffler, 2013).

Schäffler, (2013) maintains that green spaces need to be seen as systems, so that they can be designed and incorporated into cities as a whole. Grey infrastructure, like roads, would not be built piece by piece. Green infrastructure needs to be administered in a similar way and treated as a functioning entity. There are two aspects to consider when trying to achieve this, namely, unlocking the ecosystem services potential, and smoother transitions between different infrastructures. This will improve urban resilience in a city with constant increased of demands placed on it. Many cities often see urban green space as something nice to have and fail to see the ecological and social benefits these systems have on an environment. Resilient ecosystems are normally overlooked in African contexts, as the socio-economic issues and demands such as poverty and job creation demand funds and attention. Green corridors and infrastructures provide an important function to cities through removing air pollutants. Johannesburg is a prime example of a city combating the gold mine boom's effect on air quality by constructing an urban forest (Mcpherson et al. 1997). The green spaces also help to manage microclimates and fight the urban heat island effect (Schäffler, 2013).

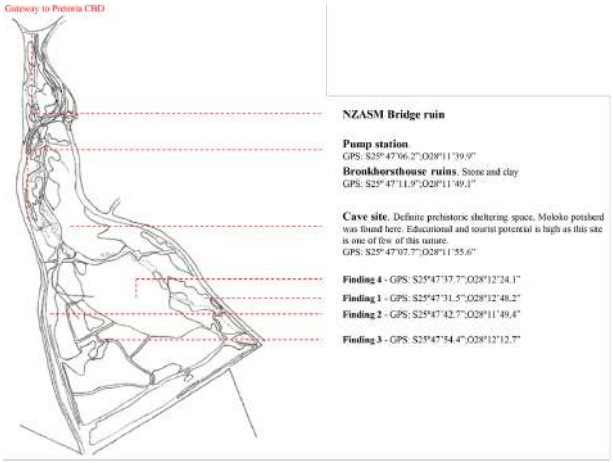


Fig. 09. Left; Groenkloof Nature Reserve (Author, 2019)

GROENKLOOF NATURE RESERVE

Data have been presented in literature by J.A Van Schalkwyk (1993) that archeologists found objects and remnants of civilizations dating back to the Stone Age, approximately 120 000 years ago, in Groenkloof Nature Reserve. The reserve holds great tourist and educational potential and should be used as an asset to the city. The reserve stretches from the fountains valley all the way to the edge of the city, where it is cut off by a fence and the railway. The isolated and overgrown nature of the reserve has lured a vagrant element and some parts are considered as dangerous.

RAILWAYS AND HIGHWAYS

The chosen site for the project at the Southern gateway to the city is seen as an appropriate location to biointegrate the previously defined four infrastructures. The site is completely dominated by grey infrastructure through highways and railways separating the city from the nature reserve and creating isolated homogenous environments. The mighty Apies River has been demoted to the category of grey infrastructure by serving mainly as a stormwater channel. The opportunity exists to lift the green and blue infrastructures and allow them to take their rightful place in the working of the city.

TRANSITION AND FLOW

The Apies river caused a shift in the grid orientation towards the south gateway to the city. By applying Bernard Tschumi's point, line and surface principles on a larger scale, the site can be treated as an urban park. The goal is to mesh together the different orientated grid geometries to allow the green infrastructure to penetrate the threshold of the city. The project site will serve as the transition between urban and natural and allow the flow of water, people and green infrastructure to occur. Groundwater is usually a hidden resource, removed from the daily lives of the urban citizen. Dippenaar (2015) states the fact that Pretoria is a great example of a city using the groundwater for urban water supply. There is however a need for creating awareness and appreciation for the fountains valley's natural springs. The deconstructing of the Apies River canal will allow the urban citizens to rekindle a relationship with the water once again and create awareness surrounding this natural asset.

CRAFTS AND NATURE

Adolf Loos (1982) ponders the question: Which has more worth? A kilogram of stone or a kilogram of gold? He states that this question would seem ridiculous. Ridiculous to the merchant, not to the artist, who sees all materials as having equal value. The artist's goal is to master the material in a way that his work becomes of value independent of the inherent value of the raw material. It is generally accepted that the world in which we live, gives precedence to quantity of work, as this is easily controlled and measured. It is evident for all to see and judge, without the need for special knowledge or skills. Therefore, the error rate is decreased significantly.

William Morris (1888) argues that for art workmanship to have value, the individual workman's hand should be visible within the piece of work. The workman should add his value to a piece of work, independent of the design of the artist who has planned the work, but not executed it.

David Pye (1968) concluded that although the goal of design is to impose order onto something, the worker performing the design task must be allowed his own spontaneity and individuality to come to the fore. This is an important element often overlooked in the valuing of workmanship. Nature showcases this example through the natural environment and through all naturally grown things, showing individuality on a basis of order and uniformity. Pye further argues that human sensibility grew from the aesthetic nature possesses, order permeated by individuality. Highly regulated workmanship was in admiration in the early days of civilization, as it was rare, and difficult to imitate. Today, that dynamic has completely reversed, and we are striving for an environment more to the like of our natural one.

Good workmanship exploits the diversity quality in its work and goes beyond the elements controlled by design. Diversity mimics in our built environment something that we have lost from our natural environment. Those small-scale deviations in a craft are often celebrated, as it shows an opposition to the regulated design template of the large-scale product (Pye, 1968).

Pye (1968) differentiates workmanship in two distinct categories, workmanship of risk and workmanship of certainty. The workmanship of risk entails the type of work that posseses a unique aesthetic quality, the type of work that is not assisted by regulated machinery that performs a task without fault. The workmanship of certainty on the other hand, is defined as work that cannot be spoilt by the operative performing the job. He is regulated by a system or machine, safeguarding the product's regulated outcome. Speed and precision are often the motive for this type of workmanship. This workmanship can do nearly everything well, apart from creating diversity. Workmanship of risk took advantage of diversity, by exploiting the inherent qualities of a natural material. Pye further states that workmanship of risk is in no way superior or a protest against the workmanship of certainty. The crafts should rather be seen as a complementary addition to our environments dominated by workmanship of certainty. The crafts being a complement to industry.

Pye (1968) argues that there are no born designers, and that people are born with or without the makings of a designer in them. This can however, only be extracted through much hard work and practice. He states that a willing individual can learn something in two minutes through experience, where an indifferent one will not learn this skill in two weeks. The value of work lies in the amount of passion poured into the craft, and not in the time spent on it.

African Art and its religious connotations to nature and the cosmos Ba (1976) states that art was not seen as a separate activity from life, in the traditional African way. Ancient Africa viewed the universe as an all-encompassing religious one, and acts of creation was seldom performed without an intention or ritual. In traditional Africa, there was no separation between the sacred and the profane. Everything was seen under the umbrella of the unity of life and, therefore, interconnected. Everything was seen as art and nothing was done for mere recreation or utilitarian purposes. They were activities with religious weight and integral to the way of living. Art, meaning the work of the hands, was defined as everything at which people worked and which could contribute to the development of the individual. This included knowledge transfer and the means and methods of putting something together. The traditional ironsmith's forge was seen as a scared space, which one could not enter or use without the specific rituals accompanying the task. The traditional African ironsmith did not arbitrarily see the craft as the making of an object, but rather the participation in the act of creation and the mystery of life. Art objects was used to translate knowledge through different means, like deciphering patterns of tapestry. The traditional African saw art as a porthole into which one can see the infinite horizon of the cosmos. Therefore, most works of art had several meanings, a religious one, an educational one and a recreational one. This is the meaning of initiation, "the profound knowledge of that which is taught through things, through appearances, and through nature itself".

Several writers expressed their differences on their views of nature and its influence on workmanship. Nature is defined by the historian Jacques Barzun (2000) as something that has no intentions, friendly or unfriendly. It does not exist as an entity. Man has constructed it from man's experiences and needs. Once seen as such a construct, it feeds him and the sight of it gives him endless joy (Stevens, 2008).

If one considers the appropriateness of nature as a source of inspiration and the relevance it holds for design and art, one does not have to look far to find the camp that responds in the negative. The modernists, in particular Adolf Loos (1998), through "Ornament is crime" and form follows function rejected the idea of nature in art and design, although in the Western world, nature was often only used as a source of ornament (Stevens, 2008).

Barzun (2000) stated that the

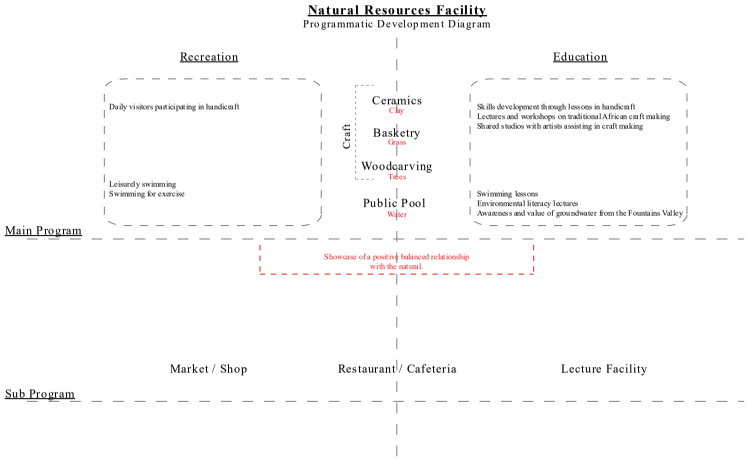
gravitation towards nature throughout Western history resounds as the Great Aboslute, with nature seen as the handiwork of God and, therefore, never wrong. This resulted in the way of living according to nature. John Ruskin saw the unique aesthetic qualities that free and rough workmanship brought (Pye in Stansky 1985). He admired the “naturalness” and the traces of the individual maker left in the art (Stevens, 2008).

According to Harvey & Press, (1991) William Morris was influenced by Ruskin’s love for the “naturalness” and thus believed in “truth to materials”. The inherent qualities of each material had to be brought out in each design. A piece of furniture should not hide the methods or process in which it was made and which materials it made use of. The nature of the material determined the “naturalness” and the limitations of the design (Stevens, 2008).

Stevens (2008) concluded that nature is an important source in the development of decorative South African arts, where the aim is to create art that is associated with Africa. She likened this to the way William Morris used nature as a symbol to signify a better, simpler life with improved social conditions. South African crafts have a similar take on this as they deal with social ideologies, such as the renaissance of crafts, cultivation of creativity in craft workers and social improvements like, job creation and poverty alleviation. This shows that although nature might have lost its link to the larger cosmos, it still serves as a symbol of ideals and aspirations.

Natural Resources facility Education through crafts is deemed an appropriate program, as the diversity element will assist in redefying a homogenous residential environment. The surrounding community will have the opportunity to learn a practical skill during the night schooling sessions. They will have access to three different streams of craft through natural materials and access to a platform to eventually sell their crafts through the market, as a means to generate an extra income. The facility will also be used as a purely recreational one during the day, where users are assisted by freelance artists sharing the studio with them. Ultimately the goal of using crafts of natural materials, is to showcase a condition of humans and nature thriving in a balanced co-dependant relationship. A facility that strengthens the bond between humans and the natural, as it was in the Genesis of Pretoria.

Fig. 10. Below Right; Programmatic Development Diagram (Author, 2019)

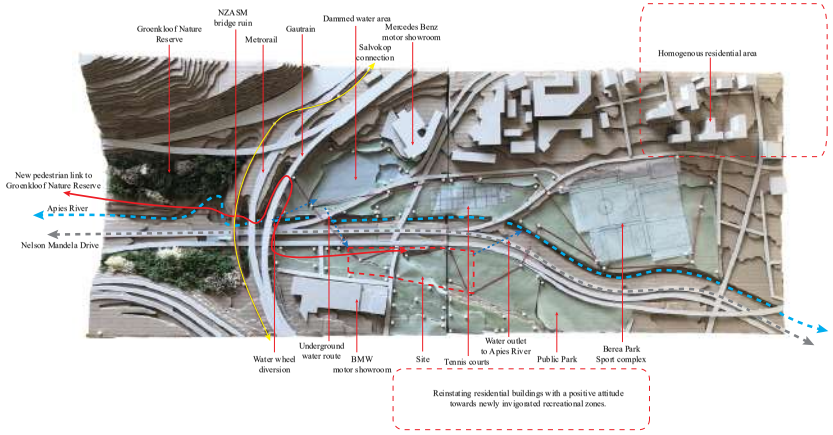


The project becomes a celebration of Pretoria’s natural water supply from the Fountains valley, through creating awareness and appreciation by deconstructing the Apies River storm water channel, to create an environment of mutual respect between nature and humans, similar to the conditions at the Genesis of Pretoria.

CONCLUSION

Architecture as a standalone solution has many limitations when it comes to ecological and infrastructural problems. The model of landscape urbanism is seen as a suitable solution to deal with the particular obstacles that the site present. In order to reset the human-nature relationship equilibrium, the green infrastructure needs to be developed from the nature reserve all the way into the city. The project hopes to make an urban contribution through the application of the point, line and surface principles on a larger scale. The system will allow the meshing of the street grid layout and the connecting of city and nature reserve. The green infrastructure will be able to flow into the city and next to Nelson Mandela drive as a result. Through creating public pool facilities through the filtering of the water from the Apies River and the introduction of a handcraft facility, the formal and functional contribution will be made. The flow and transition of people, water and green infrastructure will alleviate the current strain caused by the bottleneck of the ridges. The technological contribution will be made by the use of predominately natural materials, blurring the threshold between urban and natural.

Fig. 11. Below Right; Urban flow and transition diagram (Author, 2019)



Endnotes

1Moloko is a Late Iron Age pottery style linked to proto Sotho-Tswane people (van der Vyver, 2015). Evers (1981, 1983) chose the word Moloko to describe a cultural complex, where the Sotho/Tswana diverged across the country through a process of line segmentation or splitting of tribes. The word Moloko is derived from the old Pedi (North Sotho) word for tribe (Fredriksen, 2009).

2Difaqane, also known as Mfecane or Lifaqane in Sesotho, refers to the period of widespread chaos in Southern Africa during the period between 1815 and 1840. It is a Zulu word meaning with the meaning along the lines of “the crushing” or “scattering” see https://www.sahistory.org.za/article/basotho-wars-1858-1868

References

Adamson, G. (2010). The Craft Reader, Berg.

Alexis Schäffler, M. S. (2013). “Valuing green infrastructure in an urban environment under pressure — The Johannesburg case.” Ecological Economics 86: 246-257.

Ba, A. H. (1976). “African Art: Where the Hand has Ears.”

Dippenaar, M. A. (2013). “Hydrogeological Heritage Overview: Pretoria’s Fountains - Arteries of life.”

Keith Hart, V. P. (2013). “A history of South African capitalism in national and global perspective.”

Transformation: Critical Perspectives on Southern Africa 81/82: 55-85.

Loos, A. (1982). “Building Materials.” Speaking Into the Void: Collected Essays 1897-1900.

Morris, W. (1888). “The Revival of Handicraft.” Fortnightly review.

Nicolas Kosoy, P. G. B., Klaus Bosselmann, and B. M. Anantha Duraiappah, Joan Martinez-Alier, Deborah Rogers and Robert Thomson (2012). “Pillars for a flourishing Earth: planetary boundaries, economic growth delusion and green economy.” Current Opinion in Environmental Sustainability 4: 74-79.

ORR, D. (2001). “Architecture, Ecological Design, and Human Ecology.” 89th ACSA Annual Meeting.

Pye, D. (1968). The Nature and Art of Workmanship, Cambridge University Press.

SCHALKWYK, J. A. V. (1993). “’N ARGEOLOGIESE ONDERSOEK VAN DIE FONTEINEDALGEBIED, GELEë OP DIE PLAAS GROENKLOOF 358-JR, PRETORIA.” National Cultural History Museum.

Stevens, I. (2008). “Nature and design: thoughts on sources and subjects.” SAJAH 23(3): 96-111.

Tonder, L. v. (2008). “A CULTURAL HERITAGE MANAGEMENT PLAN FOR THE GROENKLOOF NA TURE RESERVE., CITY OF TSHW ANE.”

Tschumi, B. (1987). Le Parc De La Vilette, Princeton Architecture Press.

Vollenhoven, A. C. v. (2005). “Die eerste blanke bewoner van die Pretoria-omgewing.” SA Tydskrif vir Kultuurgeskiedenis.

Vyver, Y. v. d. (2015). “Situating Geography and the powers of Law, State and Church

in the dynamic of Change that lead to the establishment of Pretoria.” SAJAH 30(3): 151-171.

Waldheim, C. (2016). Landscape as Urbanism - A General Theory, Princeton University Press.

Yeang, K. (2017). It’s not easy being green, ORO Editions.