© University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Awakening the Landscape:

The social and ecological revival of an idle mining site on the Johannesburg mining belt.

By Corne de Villiers

© University of Pretoria

By Corne de Villiers

Study leader: Dr. Ida Breed
Course Coordinator: Johan N. Prinsloo

This dissertation is submitted in partial fulfillment of the requirements for the degree

Masters of Landscape Architecture (Professional)

Department of Architecture, Faculty of Engineering,
Built Environment, and Information Technology,
University of Pretoria,
South Africa

October 2017

© University of Pretoria

University of Pretoria

October 2017

In accordance with Regulation 4(e) of the General Regulations (G.57) for dissertations and theses, I declare that this dissertation, which I hereby submit for the degree of Landscape 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 dissertation has already been, or is currently being, submitted for any such degree, diploma or other qualification. I further declare that this dissertation 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 the text and list of references

Corne de Villiers

Dissertation Title:
Awakening the landscape, the social and ecological revival of an idle mining site on the Johannesburg mining belt.

Site description:
A Idle post-mining site.

Address:
The corner of Booysens road, and Booysens Station road, Turffontein, Johannesburg South.

GPS Coordinates:
26°13'31.5"S 28°02'01.9"E

Client:
The City of Johannesburg, and Governmental departments such: as Johannesburg City Parks, and the Department of Higher Education.

© University of Pretoria

Contents

© University of Pretoria

© University of Pretoria

List of Figures

© University of Pretoria

© University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

© University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

© University of Pretoria

© University of Pretoria

00_Abstract

South Africa is one of the leading countries globally when it comes to mining and extracting minerals from the Landscape. Mining companies in South Africa are not satisfying their legal responsibilities by effectively "closing down" mines. Derelict mine sites occur all over the country and are not rehabilitated or reused at all. These mines leave behind a trail of idle landscapes, influencing the environmental and social structure of its context.

This dissertation investigates the role of the landscape architect in the revival of an abandoned dumping site on the Johannesburg mining belt, in the south of the city, within the proposed Corridors of Freedom Framework. It seeks ways of transforming derelict mining spaces into spaces for opportunity as proposed by the Johannesburg Spatial Development Framework and the Urban Framework for Turffontein. The two main issues caused by the derelict mining sites in Turffontein are that of unemployment and environmental pollution.

The hypothesis states that landscape design can respond to the site's socio-environmental issues through a: didactic landscape intervention that creates awareness of the unemployment and environmental pollution; and a programme that focuses on skills development, material generation and rehabilitation.

In order to test the hypothesis, research was done on key contextual and site-specific issues through on site mapping and available desktop information. Existing urban frameworks and Spatial Development Frameworks regarding the future plans of the Turffontein precinct were consulted, along with a literature review and precedent study in order to identify made use of informal interviews to solutions and opportunities at a wide range of scales. The author gather insight on the site and context related matters.
In conclusion, it is argued that a didactic landscape intervention, focussed on skills development, remediation, and material generation can address the key social and environmental issues of the Turffontein area. The design programme directly responds to the contextual needs, while the experience of the site design is educational. By respecting the genius loci of the place, didactic moments are created along a route in the landscape to create awareness with the users of the socio-environmental constraints challenges of the site and context. The aim is to allow future generations to experience and learn through the design intervention that confronts them with the immediate challenges and creates opportunity for growth and change.

© University of Pretoria

© University of Pretoria

© University of Pretoria

© University of Pretoria

01 _Chapter one
Introduction

South Africa is one of the leading countries globally when it comes to mining and extracting minerals from the Landscape. Containing more than $2.5 trillion in mineral reserves, the country is the world's largest producer of platinum, and leading producer of gold, diamonds, base metals, and coal (O'Donnell, 2011). As much as the mineral resources economically benefit the country, they also have social and environmental disadvantages. Mining companies are legally obligated by The Minerals act of 1991 (Act No. 50 of 1991) to budget for 'cleaning-up' operations that are supposed to restore, and rehabilitate the disturbed piece of land in order to officially close the mine. The Act provides statutory requirements enforcing environmental protection, the management of environmental impacts, and the rehabilitation of the affected environment of prospecting and mining in South Africa (Swart, 2003). However, in a recent report published by the World Wide Fund for Nature, they indicated that mining companies in South Africa are not satisfying their legal responsibilities (WWF,2016). Derelict mine sites are not rehabilitated or reused at all, and the hazardous areas are not fulfilling their legal obligations (Van Wyk, 2014), leaving behind a trail of idle landscapes. According to Van Wyk, (2014) these abandoned sites create negative conditions such as; sinkholes, erosion, loss of biodiversity, water pollution, and heavy metal pollution. Mine acid pollution in communal areas has resulted in physical hazards and human injury (Van Wyk, 2014). The closure of mines further impacts the economy of the country, leaving many people without work (Sieff, 2016), and a chain of derelict spaces in urban areas.

In response to current urban challenges the 2040 Spatial Development Framework (SDF) of Johannesburg mentions the proposal of the corridors of freedom. The framework mentions the mining belt as urban space with immense potential that should form part of the corridors of freedom (see figure 1). The corridors aim towards a polycentricity model, that encourages mixed use areas in the city: spaces of work, education, and play. The problem is that the Spatial Development Framework does not elaborate on potential programmes for the derelict spaces. At the moment these abandoned spaces have a vast negative contribution to the city such as: spatial sprawl; social issues; environmental pollution; health hazards; and physical segregation (City of Johannesburg: Department of Development Planning, 2017). The corridors of freedom Urban framework for the Turffontein precinct was recently completed. It proposes to create access to opportunity by reducing distance between home, work, and education. (Newtown Landscape Architects & IYER Urban Design studio, 2015).

This dissertation attempts to study the role of the landscape architect in the revival of an abandoned dumping site on the Johannesburg mining belt, in the south of the city, within the proposed corridor of freedom framework. It seeks ways of transforming derelict mining spaces into spaces for opportunity as proposed by the Johannesburg Spatial Development Framework and the Urban framework for Turffontein. The two main issues caused by the derelict mining sites in Turffontein are that of unemployment and environmental pollution.

© University of Pretoria

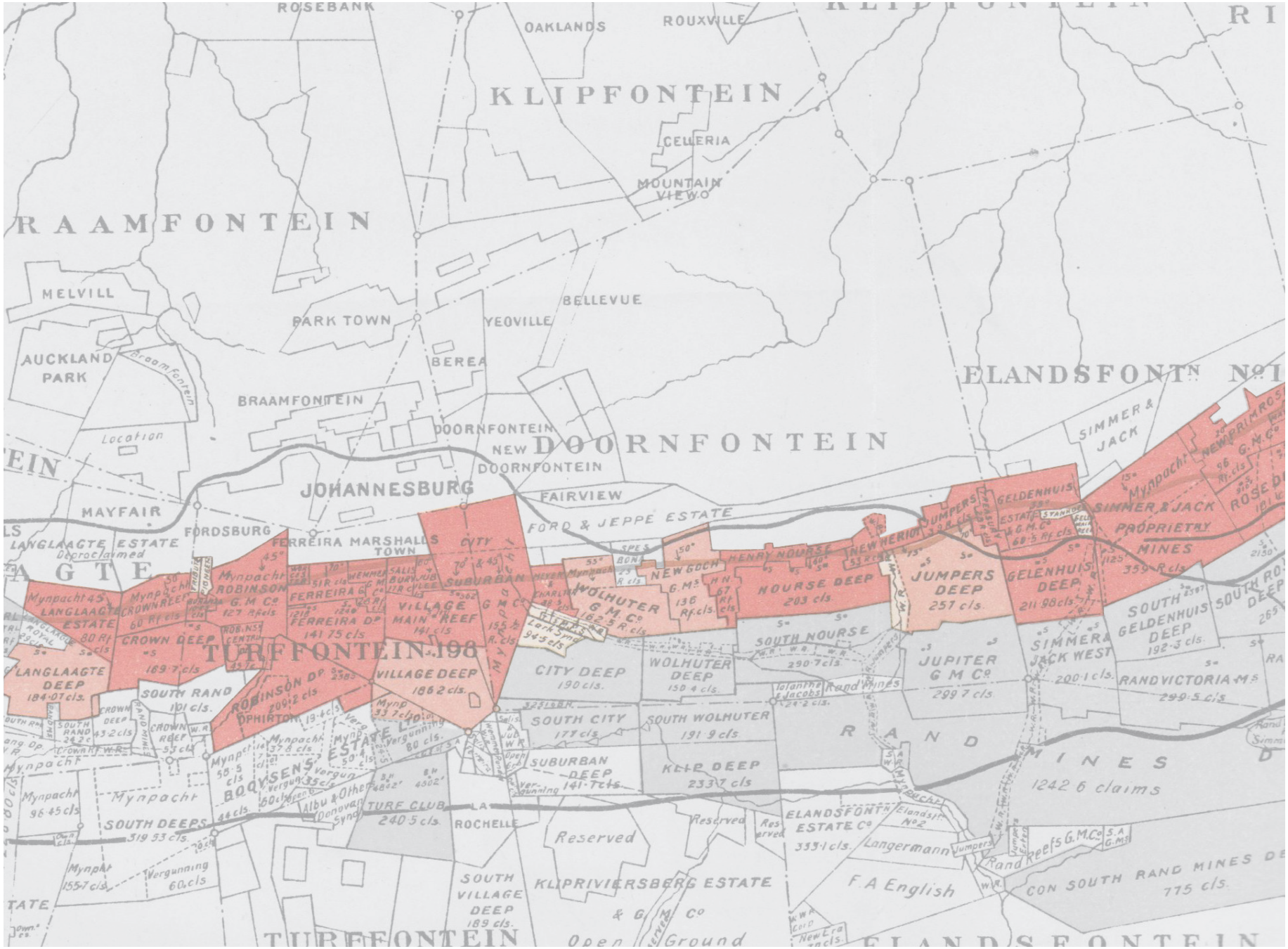


Figure 1 | The Johannesburg mining belt (Author 2017)

© University of Pretoria

01.1 Context

The discovery of diamonds in Kimberly and then the discovery of the gold reef by Harrison and Walker in 1886 in the old Transvaal, set South Africa and the Witwatersrand on the world map (KPMG South Africa, 2015). Suddenly the riches of this land presented opportunities that interested a vast number of countries from all over the world. Within decades of the findings, the South African economy grew from one based purely on agriculture and trade, into one thriving on the rich underground minerals of the newly established City of Gold, known today as Johannesburg. So it is no understatement when one says that South Africa was built on the back of the mining industry (KPMG South Africa, 2015). For more than a century, this industry has been the driving force behind our country's economy. These mines suddenly required a vast number of labourers specializing in the mining and extraction of gold minerals.

With the increase in population due to the mining industry the city of Johannesburg expanded into a mighty economic hub. Its urban development was largely determined by the mining belt running east to west (see figure 2). The urban form originally grew along the line of the mining belt, creating a strong axis from which development occurred northward. This becomes evident when we look at the Central Business District (CBD) developing just to the north of the belt and the large idle scar running adjacent to the city center, physically separating the north from the south.

Turffontein which will be the location of the investigation, is located to the immediate south of the Johannesburg CBD (see figure 3). Turffontein is bordered by the M2 to the North, M19/ Marjorie Street to the East, Kliprivier Drive/M1 to the west and N12 to the south. The northern portion of Turffotein consist of a swathe of industrial land, warehousing and storage space, and the remnants of the city's historic manufacturing hub-While industrial activity may have changed substantially in the City, the built form of these industrial areas continues to attract light industrial and warehousing functions. This industrial space is adjacent to a band of partially used mining land, mine dumps and the Robinson Landfill site. This east west mining and industrial belt roughly situated between the railway line and the M2 highway forms a barrier between the Inner city and the residential areas in the south, with Turffontein only connected to the CBD via Booysens Road, Eloff Street and Rosettenville Road (see figure 5).

01.2 Site

The administration of Johannesburg is divided into 7 regions following the creation of the post-apartheid City of Johannesburg Metropolitan Municipality in 2000. According to the spatial urban framework of Johannesburg, the Turffontein precinct forms part of region F (see figure 5) of the Johannesburg Metropolitan municipality (City of Johannesburg: Department of Development Planning, 2017). The Turffontein precinct is often associated with Johannesburg south, a residential, commercial, and industrial precinct. This region will be the focus area of the study.

© University of Pretoria

Previously the site was part of the Robinson deep gold mine. Currently the specific site is mined out and functions as a mining material dumping facility for excavated debris. Providing an opportunity for on-site materials. The site is surrounded predominantly by residential, commercial and light industrial typologies (see figure 4). The site is defined by the metro rail and Booysens station to the north-west, providing direct connections to the CBD and adjoining industrial areas. The open space to the north of Booysens station is occupied by a small informal settlement, home to a group of people seeking job opportunities in the city. City power is located to the south, and the large Robinson Deep landfill to the west. A clustering of recreational facilities situated in the centre of Turffontein, which includes sporting and recreational facilities such as Turffontein Racecourse, Rand Stadium, Wembley Stadium, Wembley Arena a popular recreational motor-sport facility, Hector Norris Cycling Velodrome and Wemmer Pan and its associated water sports including sailing, rowing and canoeing. Pioneers Park has numerous public and private sporting facilities, including rugby, football, swimming and tennis (see figure 5).

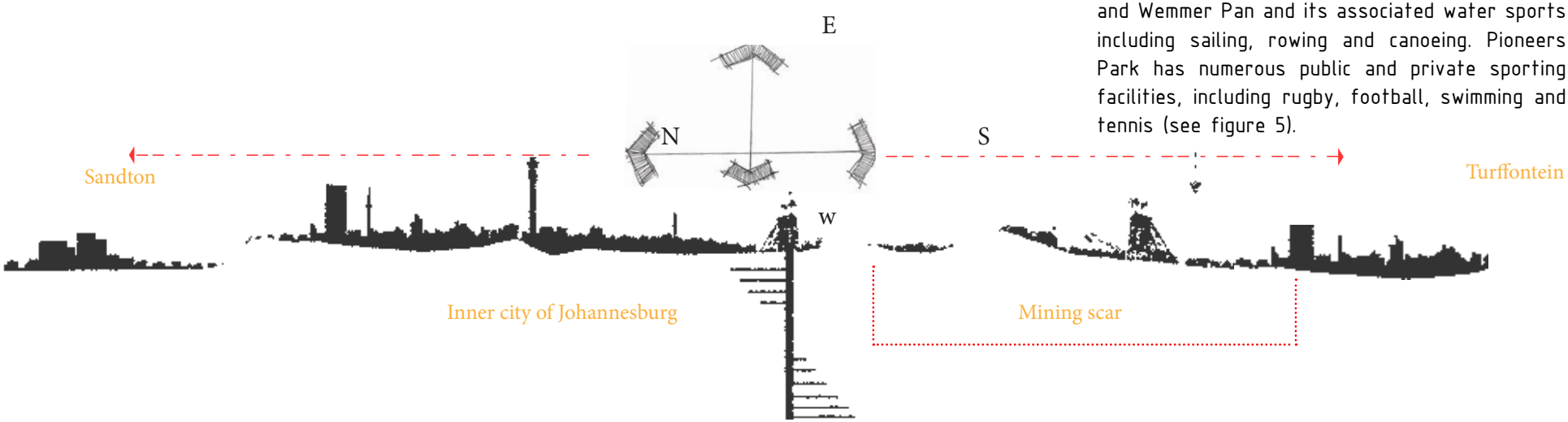


Figure 2 | Section of the Johannesburg mining belt running east-west (Author 2017)

© University of Pretoria

Figure 3 | Johannesburg South, Turffontrein and the mining belt (Author 2017)

© University of Pretoria

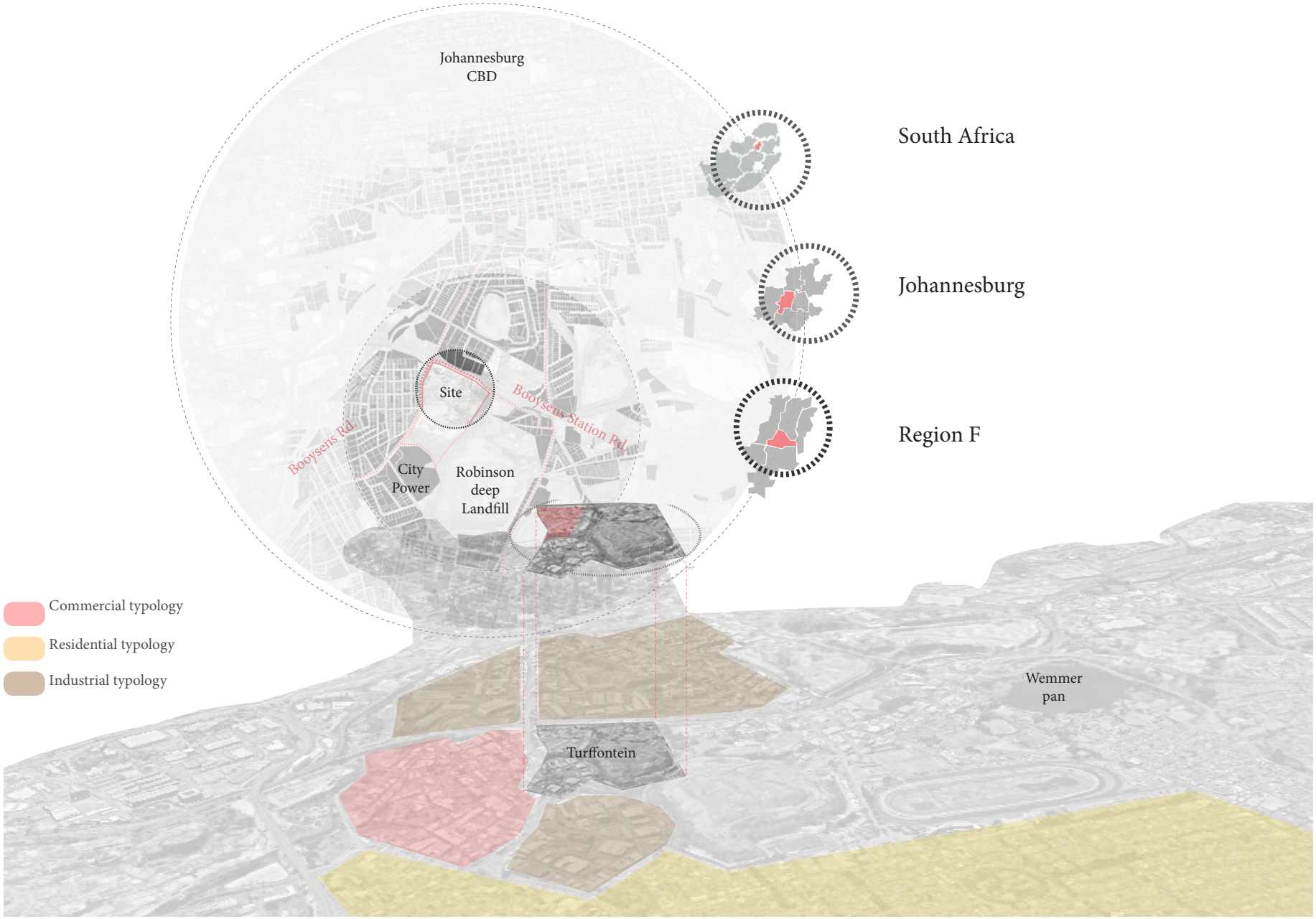


Figure 4 | Intervention location and surroundings (Author 2017)

© University of Pretoria

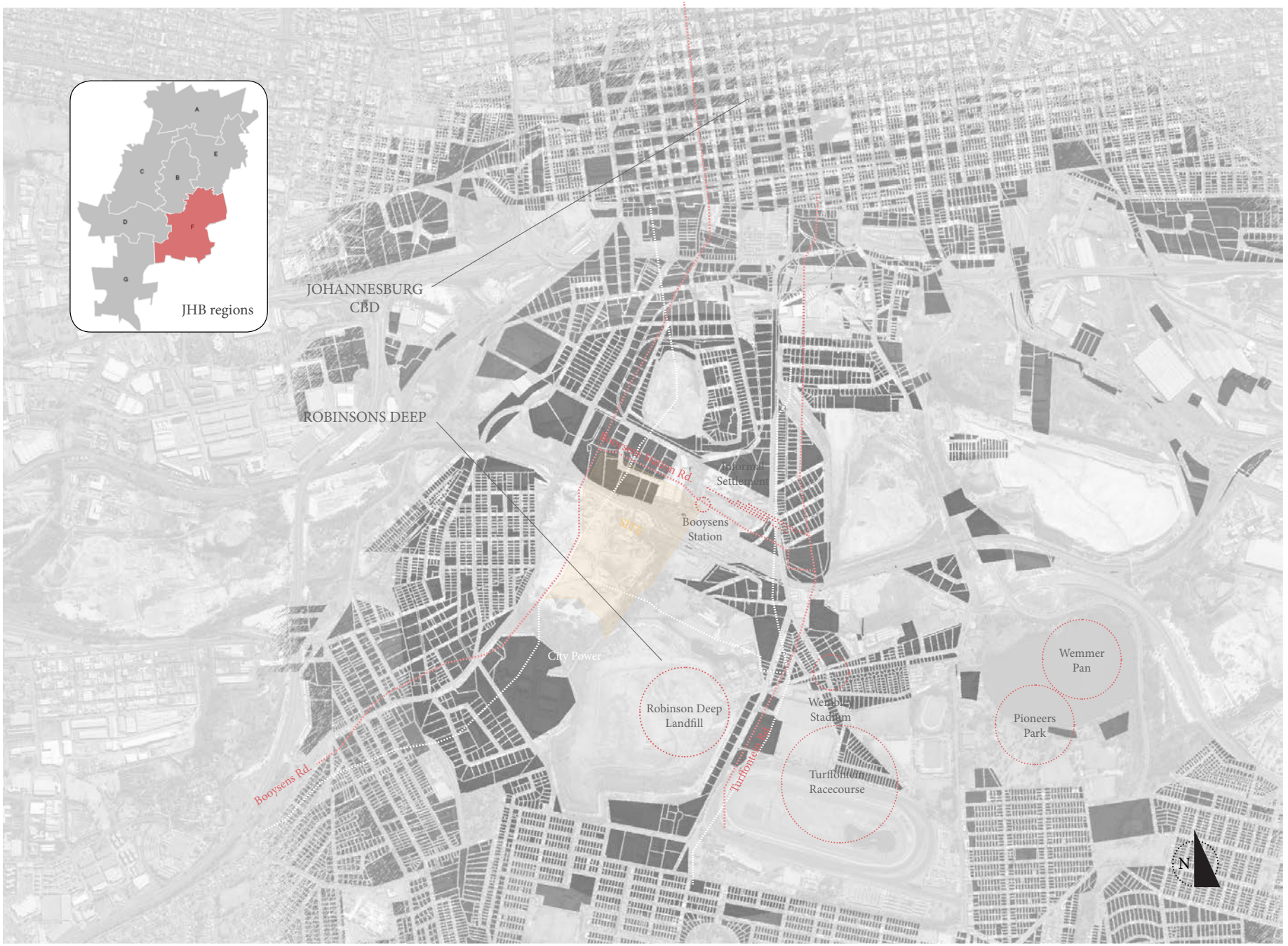


Figure 5 | Turffontrein region and site location (Author 2017)

© University of Pretoria

01.3 Research Question

How can a landscape intervention address the primary social and environmental issues of unemployment and environmental pollution on the Johannesburg mining belt?

01.4 Hypothesis

The landscape design can respond to the sites socio-environmental issues by:

a) A didactic landscape intervention that creates awareness of the unemployment and environmental pollution.

b) A programme that focuses on skills development, material generation and rehabilitation.

01.5 Sub Questions

01.5.1 What is a didactic landscape?

01.5.2 How can a didactic landscape intervention create awareness of:
a) Unemployment?
b) Environmental pollution?

01.5.3 How can a landscape intervention address unemployment through a programme of:
a) skills development?
b) material generation?

01.5.3 How can a landscape intervention address ecological pollution through a programme of remediation?

01.6_Aims & Objectives

The Aim is to identify and focus on key social and environmental issues. The primary issues manifesting in the area is unemployment, ecological pollution, and a lack of public green space. The idea is to create awareness on these issues by optimizing the concerns as design drivers in a didactic landscape intervention.

The investigation and associated interventions have the following objectives:

01.6.1 *Identify and unlock the latent potential of the Johannesburg mining belt.* (This objective aims to recognize The Turffontein framework, and develop the findings into a detail design proposal).

01.6.2 Revive and re-use the derelict sites, by *reviving the Genius Loci* of the Turffontein area and responding with didactic interventions.

01.6.3 Investigate *on-site material generation* and its potential tectonic manifestation on the landscape as expressive construction.

01.6.4 Use the potential of landscape tectonics and expressive construction in design as an *opportunity for skills development* (socio-economic health) in the precinct.

01.6.5 Ecologically analyse, revive, and remediate the worked piece of land (ecological health).

© University of Pretoria

01.7 Research Methodology

The methodological approach of the dissertation is illustrated in figure 6. It focuses on social and ecological concerns created by the post-mining industry within the Turffontein area. The intention is to identify and focus on key contextual and site-specific issues. The primary issues manifesting in the area is unemployment and ecological pollution. The idea is to create awareness of these issues in a didactic landscape intervention.

The dissertation will respond to available desktop information, such as existing urban frameworks, as well as Spatial Development Frameworks regarding the future plans of the Turffontein precinct.

The dissertation will address contextual and site-specific concerns through theoretical research and precedent study in order to identify similar problems and opportunities at a wide range of scales. It will make use of informal interviews to confirm site and context related matters.

01.8 Client and User

Johannesburg city parks is seen as the driver of the environmental component of the project, in conjunction with their environmental unit, Earthlife (NGO) and Groundwork (NPO). The social component of the project will be driven by the Department of Higher Education and Training (DHET) and the National Artisan Moderation Body (NAMB), in conjunction with Fountain of Youth (foYU) NPO and Teka Takho NPO (see figure 7). The foreseen roles of these stakeholders are described in this section.

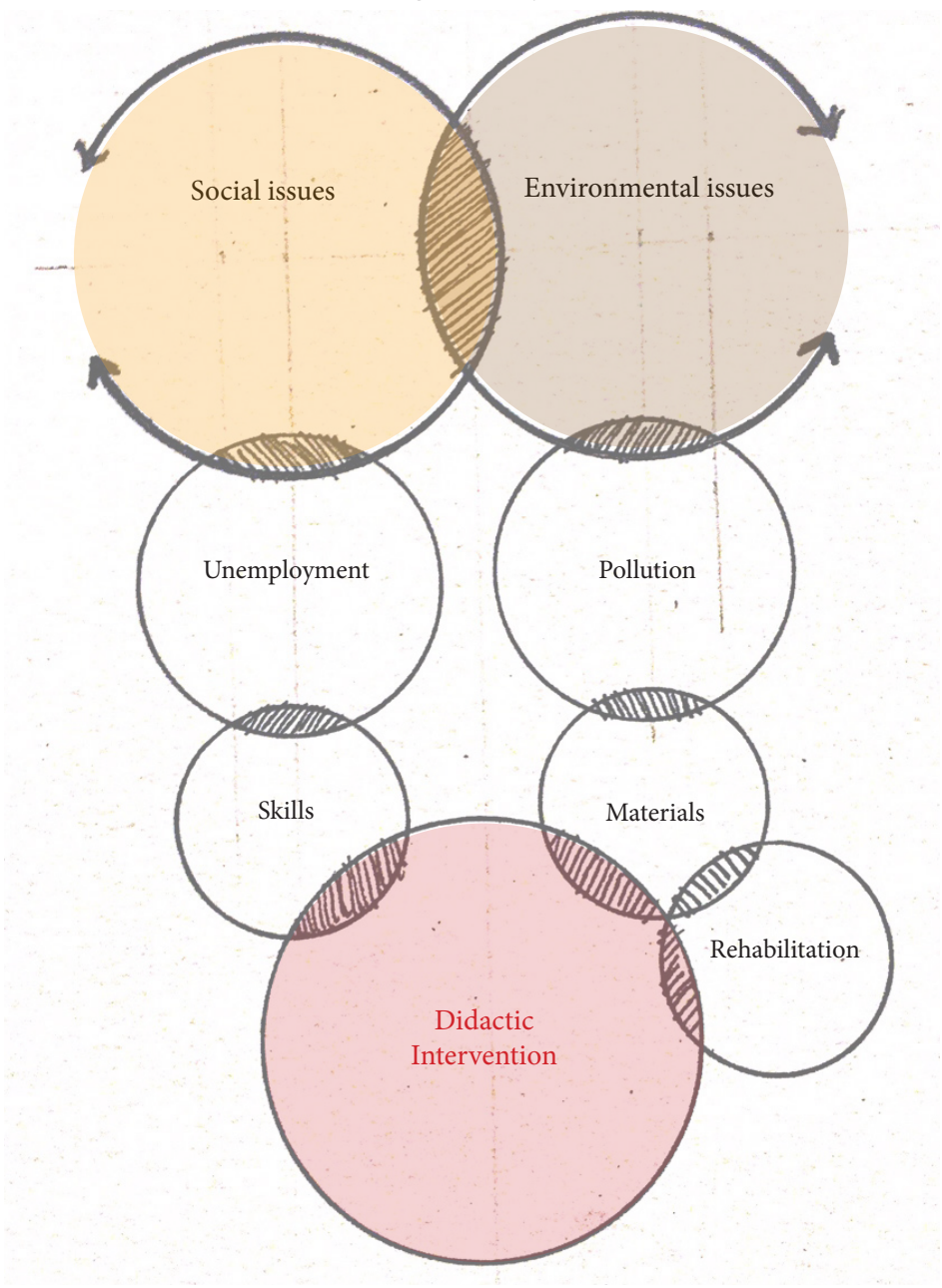


Figure 6 | Methodological approach (Author 2017)

© University of Pretoria

The 2040 Spatial Development Framework of Johannesburg mentions the idea of the corridors of freedom, and the polycentricity model, which is an urban structure that is characterized by more than one self-sufficient urban centre that are interconnected by transit links. The framework proposes the mining belt as part of the urban space, and defines the belt as idle space with immense potential that can form part of these corridors of freedom. The framework encourages innovative interventions that contribute and give back to the city (City of Johannesburg: Department of Development Planning, 2017). Johannesburg City Parks supports the framework and mentions that environmental education is of utter importance and at the top of their agenda in Johannesburg. Johannesburg City Parks have a special environmental education unit converging on environmental awareness among the residents of Johannesburg (Johannesburg City Parks and Zoo, 2013).

The Department of Higher Education and Training (DHET) launched the National Artisan Moderation Body (NAMB) in order to coordinate skills development in South Africa and thereby strengthening the country's skills base. The NAMB's main objective is to move towards implementing apprenticeship-based skills and artisan development centres in the country, and are looking for innovative intervention to strengthen their goals (Department: Higher Education & Training, 2015). The National Department of Environmental Affairs administrates Expanded Public Works Programmes (EPWP). These programmes aim to alleviate poverty and unemployment in the country. EPWP projects provide short-term and long-term work opportunities and training to unemployed and unskilled individuals (City of Johannesburg: Department of Development Planning, 2017). Teka Takho Community Development NPO in Turffontein provide services that includes; Development and Housing, Economic, Social and Community Development, and Social Development.

Fountain of Youth (foYU) is an independent non-governmental/ non-profit organization (NPO) that focuses on offering and providing social service to meet the human and social needs of vulnerable communities. Fountain of Youth's goal is to actively contribute towards a new release that supports and strengthens families in Johannesburg by eliminating all conditions eroding the family, inter alia, poverty, inequality, and unemployment. The foYU targets groups such as: Homeless (living and working on streets); poor households; the unemployed; School aged-out-school youth; and youth at risk (Fountain of Youth, 2015).

Earth-life Africa is a non-profit organization (NGO), in Johannesburg, pursuing a healthier life for all people without abusing other people or degrading their environment. They strive to encourage and support individuals, businesses and industries to reduce pollution, minimize waste and protect our natural resources (Earth-life, 2017). Earth-life Africa works in partnership with GroundWork (GW), a non-profit environmental justice service focusing on South Africa's climate and energy justice, coal usage, environmental health, and waste (groundWork, 2017).

© University of Pretoria

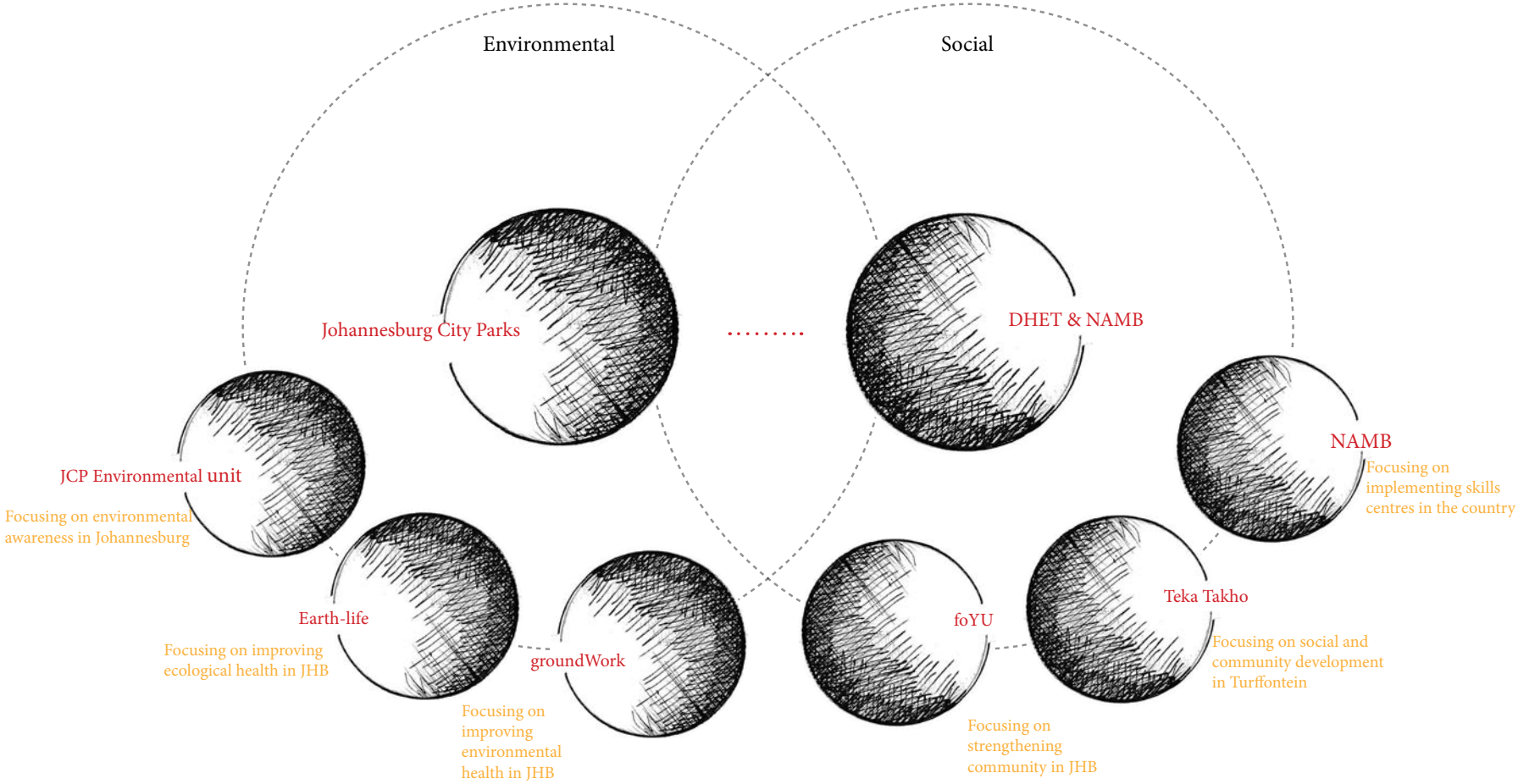


Figure 7 | Client and Organization structure (Author 2017)

© University of Pretoria

01.9 Assumptions

The dissertation will operate from the assumption that the following proposals will be implemented: the 2040 Spatial Development Framework of Johannesburg; the urban strategy for Johannesburg and the corridors of freedom; The Turffontein Urban framework and accompanying interventions; and the M70 Turffontein road extension.

Since the site is currently used as a dumping facility, and only requested to be tested for levels of radioactive activity in 2017. There is no information on this matter. The author assumes that the radiation is at an acceptable level for the intervention to commence.

The author assumes that the urban framework done by the Robinson Deep mining group will be implemented on the relevant site in three phases, and propose that this intervention be implemented in the second phase of the urban framework along with the group proposal as set out in Chapter 4.

01.10 Delineations

The site is located in Turffontien, Johannesburg . The site is defined by the Robinson deep landfill to the east; Booysens road to the west, Booysens station to the north, and city power to the South (see figure 5).

The implementation of the intervention will be located on the northern boundary of the site, defined by the new proposed Booysens station to the south, proposed light industrial workshops to the north, and mixed use typologies to the western boundary of the intervention. The eastern boundary of the intervention will be integrated with the existing functional PPC factory.

01.11 Limitations

The study was subject to a variety of limitations such as: Access to the site was limited due to the unsafe nature of the site. The site could only be investigated at specific times during the day. The site is unsafe since it is occupied by illegal miners. Information on the ecological nature, soil conditions, and radiation levels of the site was limited; no soil samples or test were available for the worked piece of land; and no environmental impact assessment has been done for the site.

© University of Pretoria

© University of Pretoria

© University of Pretoria

02_Chapter Two

Theory

This chapter focusses on four sub questions raised by the main problem and hypothesis. The intention is to systematically analyse and react to these questions. This chapter outlines the socio-environmental issues of Turffontein and considers landscape approaches and interventions that could potentially aid in the revival of the site and context. First we will look at the didactic landscape. Secondly, we will be looking at the primary social issues of the context and what kind of interventions can improve such issues. Finally, the environmental issues of the context and site, and what kind of interventions can aid in the revival of such sites is considered.

© University of Pretoria

02.1 What is a didactic landscape?

Throughout history platforms for learning have been chance affairs, a rippled reflection of the organizational culture. Usually landscape architects attempt to restore damaged or post-industrial sites to what was previously there. Attempting to restore the site to its original state and overlooking the significance of the genius loci. The didactic landscape approach is usually more explicit in its intention with the purpose to promote environmental or historical awareness. This is accomplished by presenting the issues of the context as the basis for conservation (see figure 8). Ideally, didactic landscapes are aesthetic textbooks of the processes that occurred on a site (Swaffield, 2002).

As example, the Sunken bamboo garden, at La Villette by Alexandre Chemetoff, decisively allow the significant urban structures to remain a part of the design (see figure 9), capturing the legacy of the historic processes of the place. Water mains, sewer lines, and electrical ducts still cross the site, while the newly designed retaining walls are constructed from materials generated on site. This way the genius loci is respected and allowed to evolve. Didactic thinking is a respectable response to a post-industrial site, but the success of the design ultimately depends on the honesty and skill with which the design is made and what it offers the context and its user. It is meant to be a collaborative process between features, plans for how it will be maintained, used, and learned from (Lopez, 2011). The didactic approach can be summarized as in table 1 on page 19:

Figure 8 | Didactic approach (Author 2017)

Figure 9 | Sunken bamboo garden, historic urban structures respected in the design (Lopez 2011)

Figure 10 | Sunken bamboo garden, Genius loci of the place captured in the design elements (Lopez 2011)

© University of Pretoria

Didactic approach	1. Use forms in design to inform us about the natural workings and processes of the place. 2. Instruct on the history of the place. 3. Intentions are usually shown more openly, clearly, and visually. 4. Should respect the *genius loci* of the place. 5. Interpret and explain the *genius loci* through design. 6. Use the landscape as an aesthetic textbook on natural and urban processes and history of the place.

Table 1 | Didactic approach (Swaffield 2002)

02.2 How can a didactic landscape intervention create awareness on unemployment?

" Tell me and I forget, teach me and I remember, involve me and I learn".
-Benjamin Franklin

Unemployment and the lack of skills development continues to persist as the primary social challenges within the Turrfontein region. The Johannesburg mining belt have serious consequences for the urban setting and natural environment. Some of the primary social issues in the Johannesburg area is the lack of skills training in the education system, creating a critical skills shortage in the Johannesburg sector. So much that the Department of Higher Education and Training (DHET) launched the National Artisan Moderation body (NAMB) to strengthen the country's skill base. Johannesburg City Parks acknowledges this as a primary issue and aim towards implementing apprenticeship-based skills development and educational centres in Johannesburg. These will be orchestrated by the Environmental Education Unit (Department: Higher Education & Training, 2015). The question is how can a landscape intervention support such an initiative?

In the Northern Cape of South Africa Habitat landscape architects addressed the social concerns of a local community by creating employment opportunities, developing skills, educating the community on their environment, and maximizing the socio-economic impact of the project at a local level through a series of educational landscape parks (see figure 11). The design process made use of: community participation (by sourcing unskilled local labour and educating them through on-duty skills development in the construction of the park); Local manufacturers to generate building materials; sourcing of local materials, and recycling of materials to utilize in the design and amplify the concept of re-use in the local community. They also made use of didactic approaches that educate the community

© University of Pretoria

Figure 11 | Educational park, Habitat LA showing educational playscape of the karoo formation (WLA 2016).

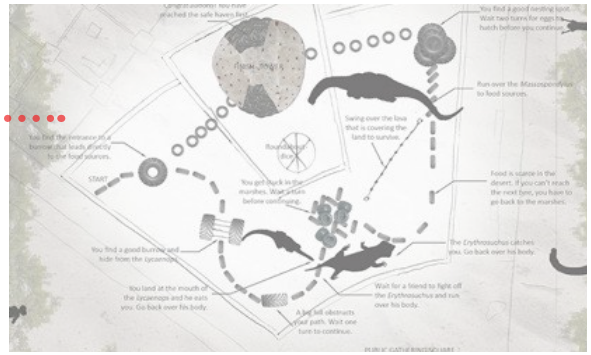


Figure 12 | Blow up of the Karoo formation explained in a interactive playground intervention (WLA 2016).

Figure 13 | Final Design of the Educational Landscape (WLA 2016).

on their environment and vegetation through playscapes and interactive interventions (see figure 12). The final design (see figure 13) is articulated along the principal movement pattern/ spine which connects place of work and stay (WLA, 2015). The aim is to create social clusters of amenities in an environment that discourages fences and pockets of isolated public facilities, and encourages multi-use interactive amenities in order to promote community participation and awareness of unemployment.

In conclusion, a project such as this can create awareness on unemployment. Community members with no skills can become a part of such an intervention, as discussed in the example above. The local community will participate in the intervention by helping to construct the park. In the process of constructing, the unemployed men and woman will get the chance to be employed and in the process, gain experience and certain skills. The project will provide didactic interventions for all ages. From skills development to educating the youth on the formation of the Karoo through a didactic playscape.

© University of Pretoria

02.3 How can a didactic landscape intervention create awareness on ecological pollution?

Idle mining sites, lack of green space, acid mine drainage, soil pollution, air pollution, and loss of biodiversity are the primary environmental challenges within the Turrfontein region (Van Wyk, 2014). Water systems are polluted, hazardous soil contaminated with heavy metals, blows over dilapidated tailings transporting contaminants into the city. The Johannesburg post-mining industry, and its waste products is the grand architect of these environmental issues. These abandoned mining sites have serious consequences for the ecology of the urban setting and its health. The question is how can a didactic landscape intervention create awareness on these environmental issues?

When reviving post-industrial land, landscape architects' primary intention is to return the site as close as possible to its original state. Softening its industrial past and neglecting its didactic potential. THUPDI and Tsinghua University successfully attempted to oppose this by responding with a very honest landscape approach in the Quarry Garden, Shanghai, China. A previous quarry was approached in an authentic way. The site offered a distinctive opportunity for an unusual place and THUPDI responded with a didactic design that gives insight into the practice of mining in China. Telling the story of its industrial past, while breathing life back into the site with eco-friendly public space. What makes this a good example of a unique didactic intervention is the design's acceptance of the site's post-industrial history (see figure 14).

The abandoned landscape on Chen Mountain was revived, embracing the legacy of the site. The site creates a dramatic experience for visitors through a space that had little to no human contact for more than 20 years. The stripped away surface vegetation, habitat fragmentation, lifeless rock surfaces, excavated soil and tunnels were used to create physical awareness of the history of the site. The bold and minimal shapes created by the pathways are reminiscent of the strokes of ancient Chinese landscape ink paintings, giving a hint of the Asian culture. The landscape remained as if little was done to it and the rough rock faces are left as it was many years ago, surrounding a deep pool of water that was left after mining ceased (see figure 15). The design aims at creating awareness on the significance of the history of the mining industry, while reviving the ecology of the site. The design result is an honest piece of landscape architecture, not shy of enhancing its industrial past. It is not trying to cover up what it is, while still considering that it needs to be ecologically safe for user interaction (Landscape Architects Network, 2010).

As a conclusion, awareness on the ecological pollution of a site can be created as in the Shanghai quarry. The site went from a mine of extraction to space that gives back to the community. This quarry was a space of no human contact for almost 20 years, to a publicly accessible site used on a daily basis. The way in which the park's industrial history or identity is captured, is what makes the site successful. The *genius loci* of the place is respected by the designer and remnants are used in poetic design to create moments in the landscape which rises questions in the user's subconscious mind.

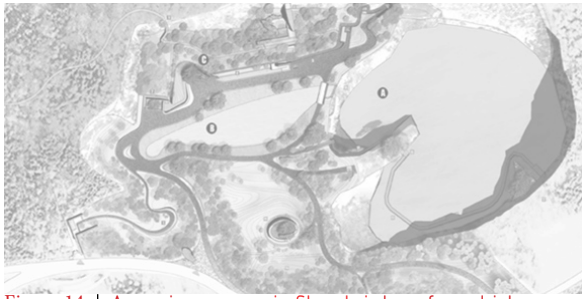


Figure 14 A previous quarry in Shanghai, transformed into a eco-friendly public park. Respecting the identy of the site. The result is a revived didactic intervention telling the story of mining in china (Landscape Architects Network, 2010).

Figure 15 The quarry garden, Shanghai. A moment in the landcsape, telling the story of the place. In this case the quarry hole converted into a large water body (Landscape Architects Network, 2010).

© University of Pretoria

02.4 How can a landscape intervention address unemployment through a programme of skills development and material generation?

> "If you think of brick, you say to brick, what do you want, brick? And brick says to you, I like an arch. And if you say to brick, look, arches are expensive, and I can use a concrete lintel over you. What do you think of that, brick? Brick says, I like an arch. And it's important, you see, that you honour the material that you use. You can only do it if you honour the brick and glorify the brick".
>
> – *Louis Kahn*

The current site is used as a dumping facility for materials and excavated mining debris. Optimizing and re-using these materials creates an opportunity for on-site generation of construction materials and skills development.

Through the ages architects were better known as master builders. Mastering the arts of design and crafting at a deeper investigative level. Understanding the act of making, strengthens the act of design. Tectonic theory is most often associated with the architectural profession. It is the art of assembly, a negotiation between the relationship of the constructive practice and theoretical ideals. Frampton (1995) defined it as the poetics of construction. Discussions on the significance of tectonics over time in the architectural profession, guided Frampton's investigation on the theory of expressive construction, influencing the way in which architects design. This Investigation or developed tectonic theory changed the focus of the architectural discipline from one based on symbolic form, to the art of spatial design; from meaning to being (Mathy, 2016). Shifting from the theories of style to physical material presence. One might ask what is the potential for landscape architecture?

Being a theorist and master on style in the technical and tectonic arts, Gottfried Semper stretched his understanding by examining the evolution of art with the intention of developing a theory based on style. Semper was convinced that the study of architectural history was crucial in the profession, in order not to mimic form, but to learn and gain a comprehensive understanding of the historical laws developed over time (Hvattum, 2004). From this stand point Semper developed his basic rules of style. In Semper's *Die Vier Elemente der Baukunste* he investigates tectonic and steriotomic construction. The assembly of lightweight linear materials and the piling of heavyweight steriotomic materials, in order to explore the relationship between material and form creation. Semper found that there is a direct relationship between material and form, and believe that when materials are assembled appropriately, form will be the result. The way in which materials are assembled, determines the space they create (Semper, 1851).

In the *Studies in Techtronic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture* Kennith Frampton revived the ideas of Semper in his tectonic theory. In a time of constant material changes and evolving construction methods, Frampton attempted to guide the arts of architectural expression using the tectonic theory. According to Frampton (1995), with the shift to contemporary times and the birth of digital design, architects became distracted by symbolic representation and were less able to create spaces embedded in constructional craft. In his investigation on the tectonic arts, Frampton mentions that architecture can only be understood through physical construction.

In the process of making, architects must have a deeply rooted understanding in the art of building, and use this knowledge to craft and construct poetically (Broughton, 2012). An architect should be able to understand the nature of the material he works with, in order to use that material to its full potential, and the nature of that material should have an influence in the way it is used in construction (Mathy, 2016). So Frampton's tectonic theory attempts to connect abstract form and space making with the ability to comprehend these ideas through practice (see figure 16).

According to Broughton (2012), although the tectonic theory had a massive influence on the architectural discipline, it remains an unknown theory to the landscape architectural profession. One can only wonder if it is a missed opportunity for the discipline of landscape architecture. However, Frampton's tectonic theory can only partially be

© University of Pretoria

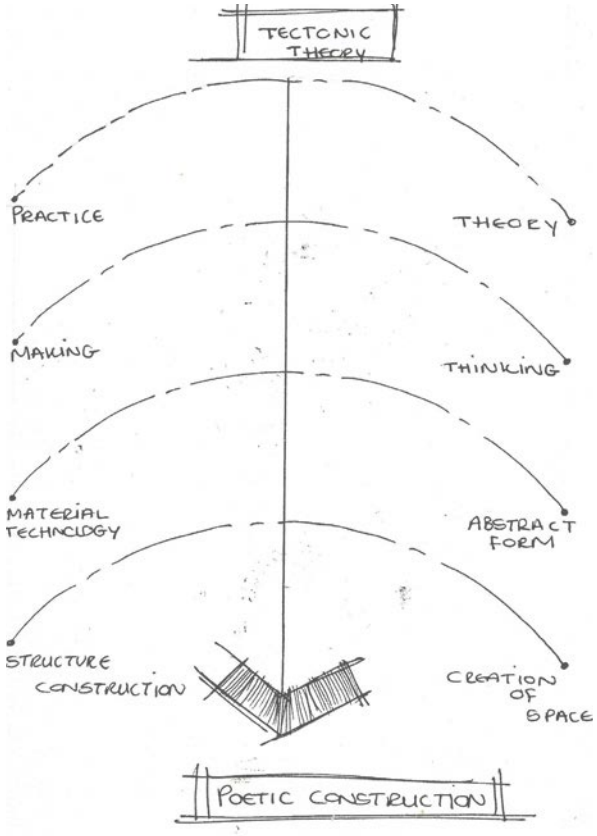


Figure 16 | Tectonic theory (Frampton 1995)

applied to the profession, because of the vast differences between landscapes and buildings. Buildings are designed to focus on challenging the natural forces acting upon them, whereas the landscape requires these same forces in order to survive (Mathy, 2016). This essential contrasting difference between landscape and building, is what creates the limitation of Frampton's theory in the discipline of landscape architecture.

The tectonic approach or expressive construction is unknown in contemporary landscape architecture, and often results in design where the full potential of materials and their relationship to one another are lacking (Mathy, 2016). According to Broughton (2012) there is no well- known tectonic theory of how landscapes should be constructed expressively and mentions that there is no channel of discourse between the relationship of construction and resultant form in landscape architecture. The lack of understanding about the tectonics of construction materials and their potential in the landscape is an untapped opportunity. Not exploring the potential of these materials may prevent the full growth of the discipline. Thus a tectonic theory focused specifically on expressive construction in landscape architecture is an important focus in this dissertation. The tectonics of the construction materials generated on site will be explored in chapter 8 in order to discover contemporary expressive construction methods, and how they will inform form and space making in the landscape. The Aim is to explore the latent potential of *in-situ* materials, and unlock how they can contribute to the space making of didactic landscapes. In short capturing the significance of these materials to revive an idle site.

In conclusion, the untapped materials, found on site creates an opportunity for exploration and innovation in the field of building materials. The author will explore ways in chapter 8 to use these materials to their full potential. A project such as this can create community participation in the building and maintenance of the landscape, and in return gain some skills and experience in the field of construction and landscaping. Thus the intervention itself can create opportunity for skills development and employment in order to maintain itself. As mentioned, the potential that the on-site materials offer, needs to be explored. If the tectonic explorations are successful, these materials will need to be generated in large quantities in order to construct the intervention. These materials will be generated on the site at the local PPC factory and skill centres. Community members will get the opportunity to participate in which case they will be employed and taught how to make or sculpt these materials. The skill centres on the site will allow for the training of these skills. This way by participating community will gain experience and skills, which can be utilized to address the issue of unemployment and site pollution in the area.

© University of Pretoria

02.5 How can a landscape intervention address ecological pollution through a programme of remediation?

Topics on the site remediation or rehabilitation techniques for the reclamation of post-industrial landscapes have been a widely known discussion under landscape architects for the last decade. Usually pollutants and hazardous materials are transported away from the site to centralized storage systems (landfills) or treatment plants. With the rise in energy costs and the protocols of discharging of materials becoming more and more strict, landscape architects turned to *in-situ* strategies to deal with these issues. The most common remediation strategies today is micro-remediation (biological remediation) via bacteria, plants, and fungus or macro-remediation such as concealment or capping (Robinson, 2007).

In the North of Sydney, a previous petroleum industry has been closed down and exposed to some of these remediation processes due to heavy soil pollution (see figure 17). This site is similar to the idle site in Turffontein due to the fact that both are polluted with heavy metals and both have a post-industrial heritage. As part of the cleaning-up process some of the large tanks and structures were removed, and a legacy of soil pollution as infrastructure remained. Rather than excavating and transporting the polluted soil to a landfill, the British Petroleum park used in-situ processes that cleansed the polluted soil and reused the industrial infrastructure. The stripped topsoil where stockpiled on site and mixed with compost and micro-organisms and after nine months, reapplied as planting medium. The design re-purposes the industrial fragments to create natural landscape and contain remaining contamination. The storm-water infrastructure was redirected to frog pond habitats which also act as a cleansing facility for the site`'s storm-water. Steel platforms float above the preserved and rehabilitated landscape allowing only for visual interaction of the rehabilitation processes (Robinson, 2007).

In conclusion, the precedent above proved that it is possible to use remediation on site and convert it to a didactic intervention. The Sydney British Petroleum park takes a polluted area and transforms it into a visual healing opportunity. The project indicates that it is not always necessary to remove pollutants from site in order to create a programme. The challenge is finding innovative ways to heal the site, and make the process visual to the user. Although the remediation process is not physically interactive, it has a visual component, educating the user on the importance of ecological health. For the Turffontein intervention the *genius loci* of the place will be respected and some areas of pollution will act as remnants to be phytoremediated. This process will be visual, educating the users and community on the importance of the environment and ecological health.

© University of Pretoria

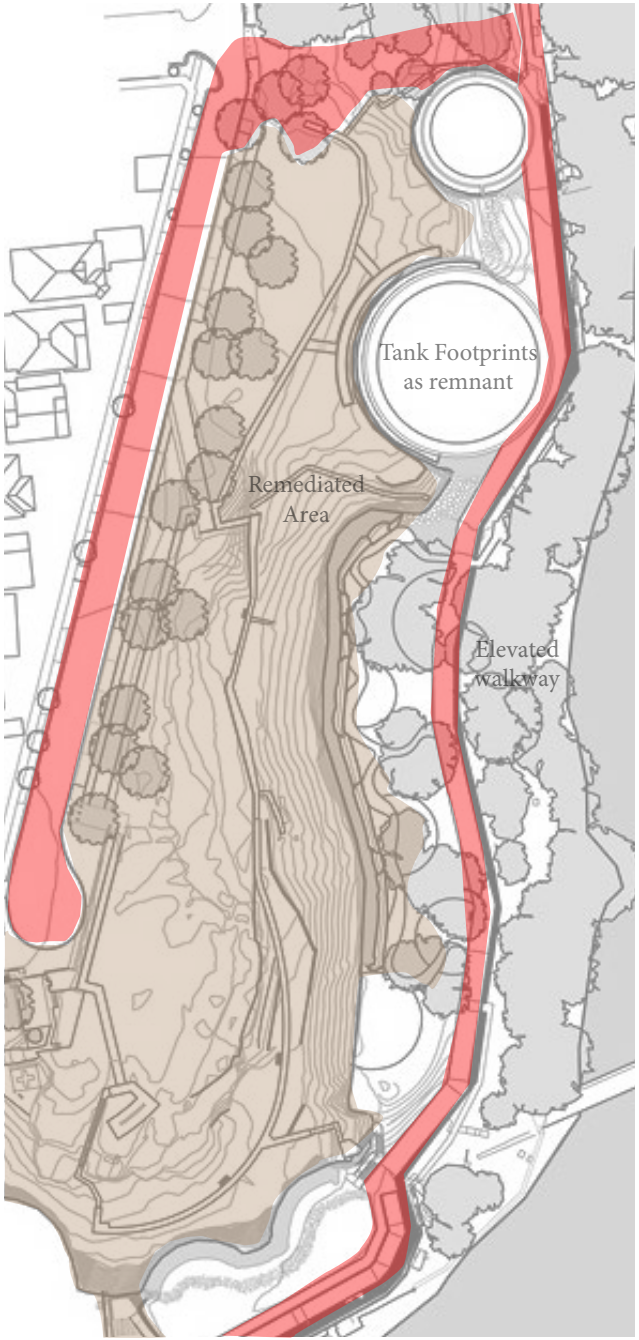


Figure 17 | British Petroleum Park, Sydney. Utilizing a contaminated site to create a programme of remediation and visual healing. (Robinson 2007).

© University of Pretoria

Chapter overview

Through the theoretical investigation the author has gathered that in order for the didactic landscape approach to address the issues of unemployment, material generation, and rehabilitation on the site it has to:

Be honest landscape design. Didactic	· The design should not shy away from its identity, which is a mine of extraction. Respecting the Genius loci. · It should evolve into an environment that educates on the workings of the place. · It should rise and optimize concerns to manipulate and generate design opportunities. · It should consist of a meandering sensory experience that informs.
Address current and future needs. Unemployment	· The design require spaces that unite and build community. · It should consist of spaces that are able to explain, communicate, conceptualize, teach, and serve. · It should consist of space for communal skills development. · The design should address the basic needs of the community and surrounding users.
Address landscape tectonics. Material	· It should consist of spaces that allow for the experimentation of landscape tectonics. · It should be able to generate materials on site. · It should consist of space that forge individual and communal skills.
Address site pollution. Remediation	· Pollution should be addressed through material generation on site. · Remediation should form part of the design, through spaces dedicated to healing the land. · The design should consist of healthy and sustainable public spaces.

Table 2 | Didactic Landscape guidelines (Author 2017)

© University of Pretoria

© University of Pretoria

© University of Pretoria

03_Chapter Three

History, Context, and Analysis

This chapter provides a quick overview of the development of Johannesburg. Secondly the urban context and Turffontein area is discussed to gain a better understanding of the context. Next, a comprehensive analysis of the specific site is presented with opportunities and constraints.

© University of Pretoria

03.1 History

Unlike most cities, the discovery of Johannesburg was not due to the discovery of water. The city of Johannesburg is mainly known as the city of gold due to its rich gold reserves. In 1806 an English explorer sir John Barrow indicated that gold may potentially be found in the Witwatersrand. In 1886 Harrison and Walker gain the prospecting rights on the farm Langlaagte and went on a search for the gold reef. Within a few months they discover payable gold on the farm Langlaagte and soon a small mining settlement was established in the Witwatersrand area. Word of the gold strike spread like wild fire and soon hundreds of people flocked here in search new opportunities (see figure 18). Within a few years Johannesburg expanded and the first suburbs were established. Booysens, Fordsburg, Langlaagte, Braamfontein, Auckland Park, Marshall's Town, Ferreira's Town, and Jeppe's Town.

Soon the name of the city changed due the influence of Johannes Meyer and Johannes Rissik. Johannesburg rapidly expanded from a small mining settlement to a powerful city. From this moment in time the Johannesburg mining industry became South Africa's economic backbone. The urban form of the city is mainly shaped along the gold reef mining belt. The city grew along this mining axis with the Central Business District (CBD) developing just to the north of the belt. Today, the city has a large idle scar, created by the mining industry running adjacent to the city centre in an east-west direction just south of the CBD. The idle scar physically segregates the north from the south of Johannesburg. This then causes for city sprawl to occur to the north, neglecting the south.

© University of Pretoria

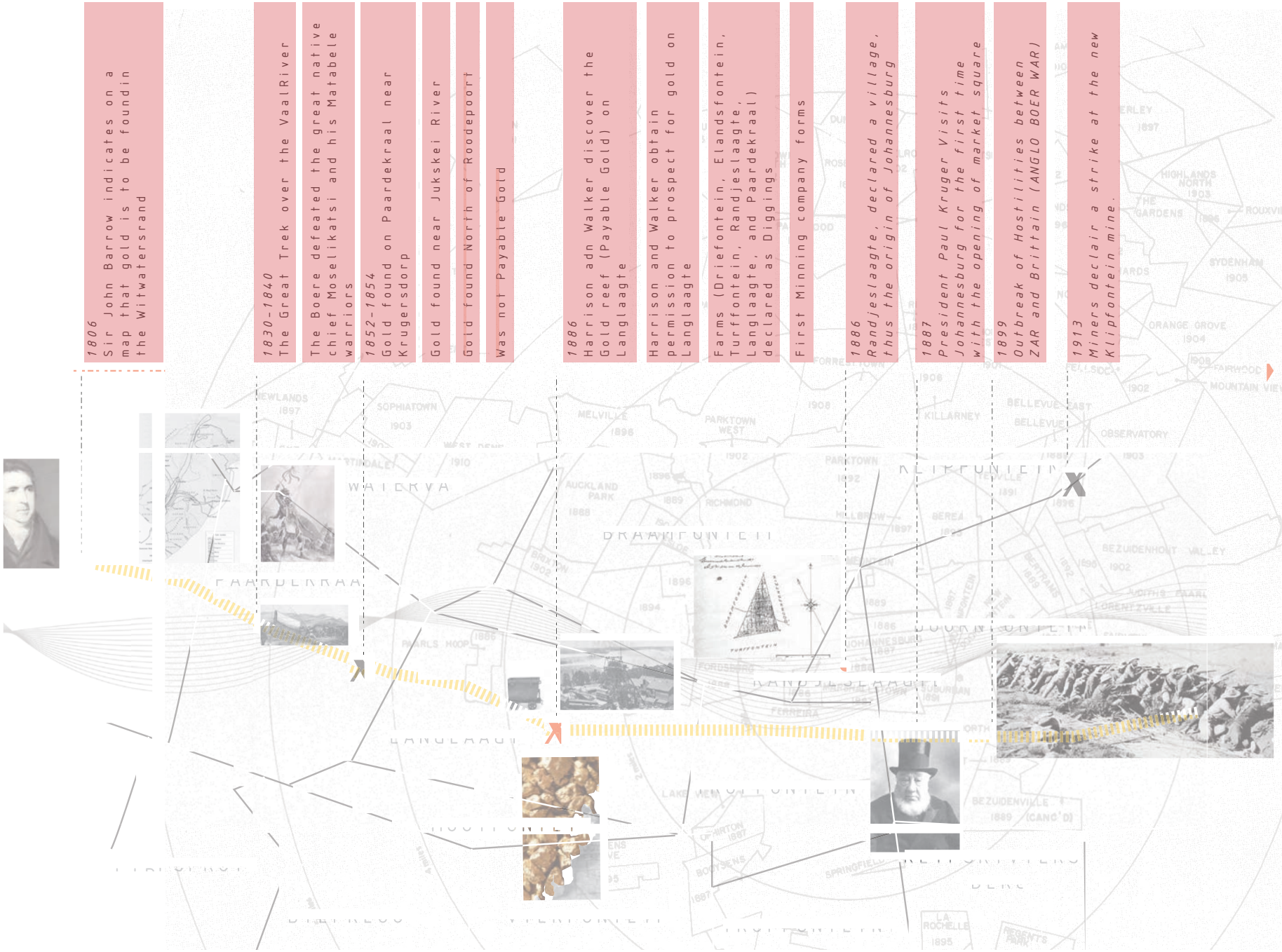
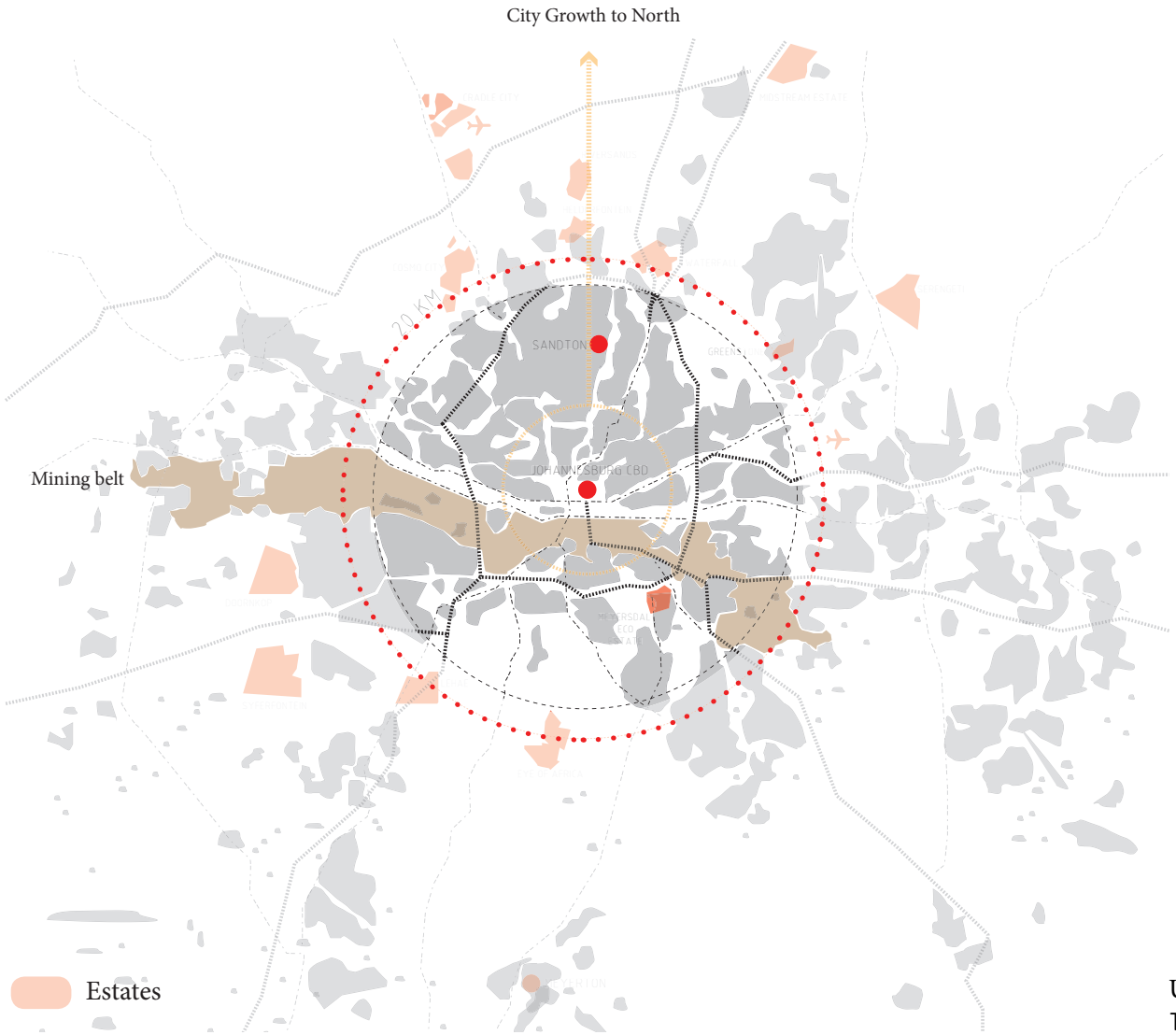


Figure 18 | Historical time line of Johannesburg (Author 2017)

© University of Pretoria

03.2 Urban Analysis



Urban Sprawl

The urban sprawl around the Johannesburg area is fragmented taking over the space of natural landscapes. Large communities and popular recreational areas fall outside a radius of 20 Km from the precinct (see figure 19).

Figure 19 | Urban sprawl of Johannesburg (Author 2017)

© University of Pretoria

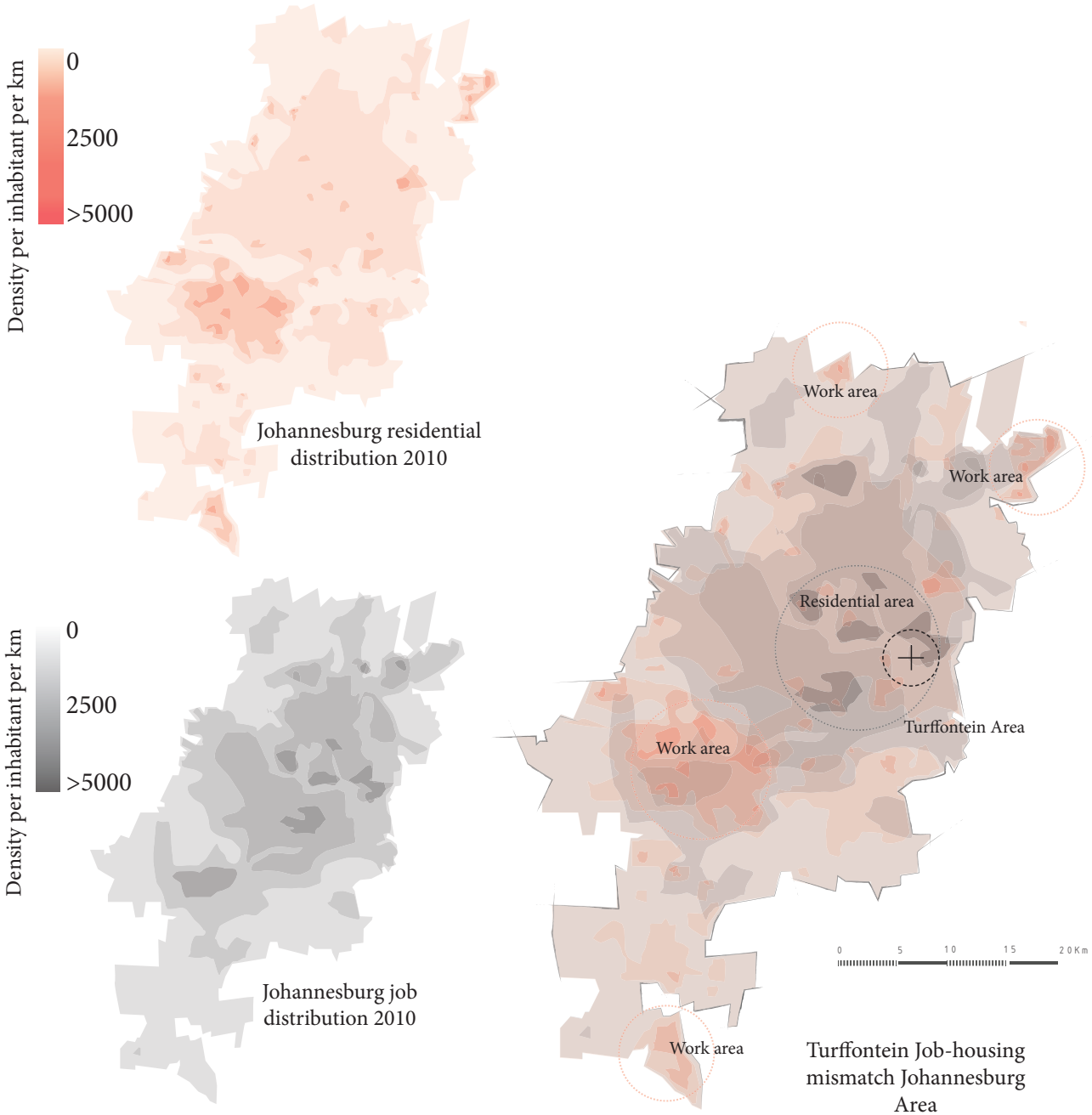


Figure 20 | Job vs residential mismatch (Author, 2017)

Job-Housing

Due to people working far away from where they live, or not possessing the skills to work in the Turffontein area. There is a clear job- housing mismatch (see figure 20).

© University of Pretoria

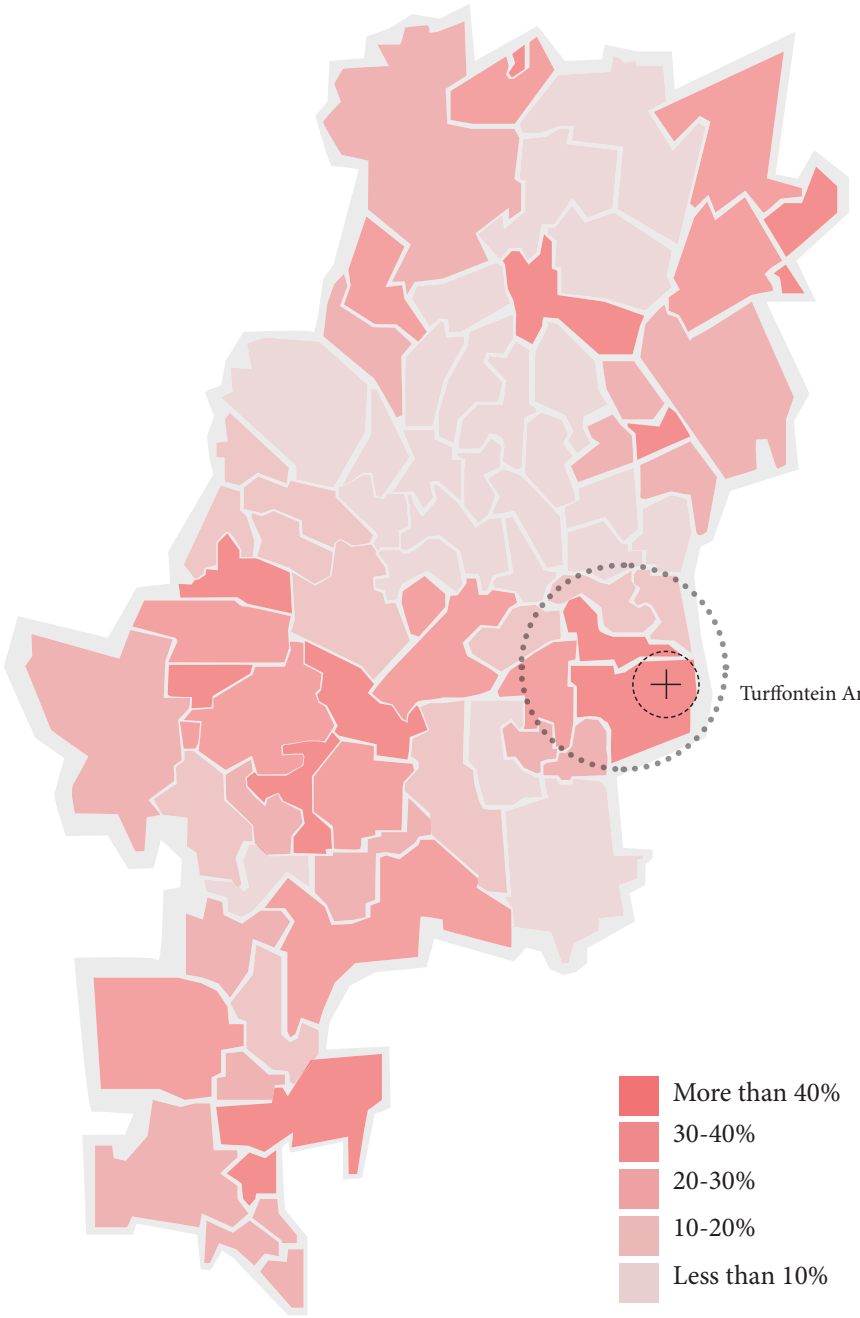
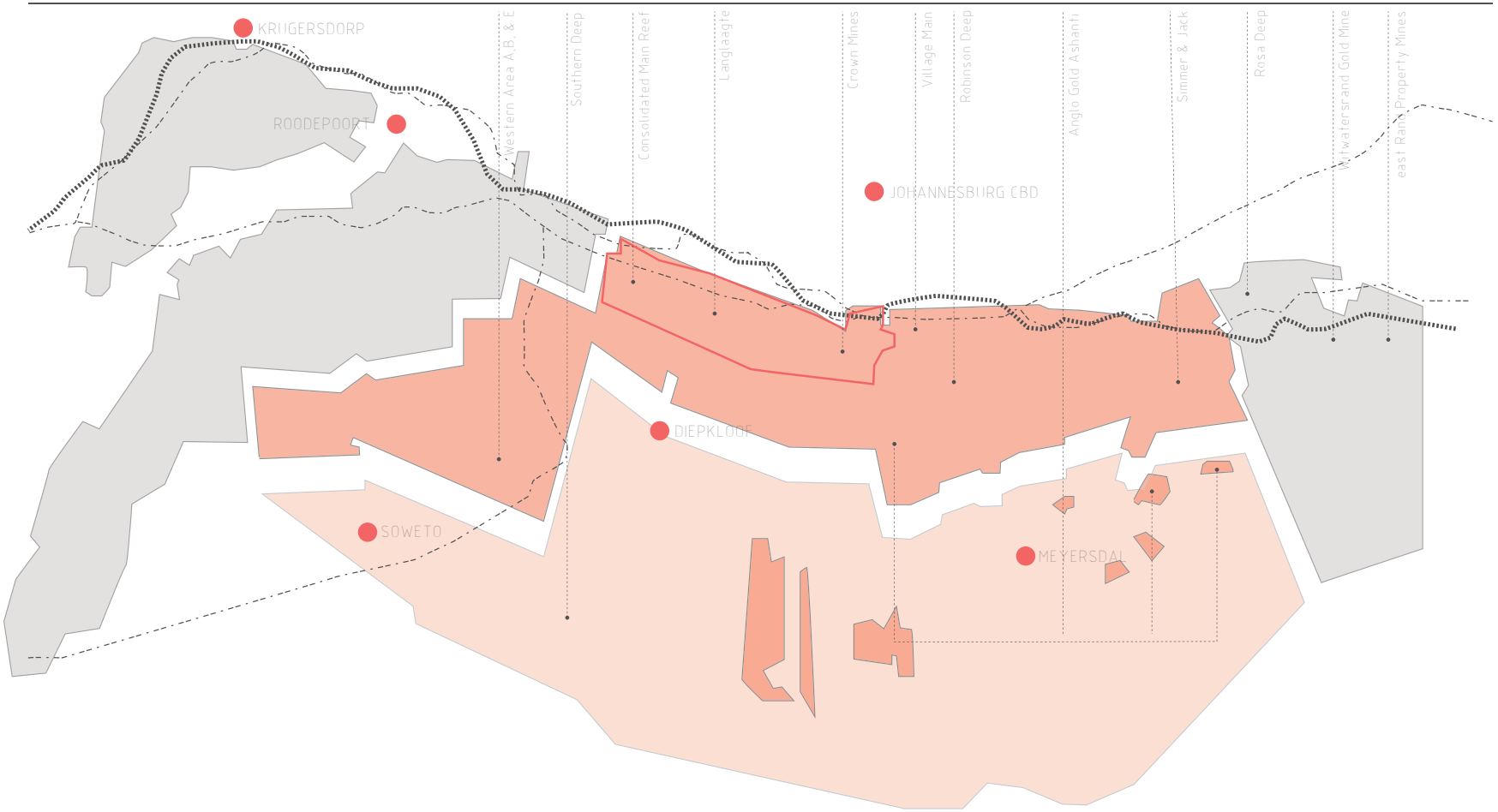


Figure 21 | Unemployment statistics of Johannesburg (Author 2017)

Unemployment

Due to the fact that local members of the community do not possess the skills to work in the industrial area, one can see that the unemployment statistics for the Johannesburg area is increasing in the Turffontein area (see figure 21).

© University of Pretoria



Mining belt

The mining belt creates increased pressure on the natural environment of the Johannesburg area. The mining belt occupies natural space with an idle hazardous scar, creating vacant areas (see figure 22).

Figure 22 | Prospecting rights in Johannesburg (Author 2017)

© University of Pretoria

Urban ecology

The City of Johannesburg holds a disproportionately high percentage of rare and threatened species and ecosystems compared both to the rest of the Gauteng Province and to South Africa as a whole (Newtown Landscape Architects & IYER Urban Design studio, 2015). This is due largely to the combination of its topographic and geological diversity resulting in a diversity of habitats (which will in turn support a diversity of species) and the high level of habitat transformation that characterizes the bio-region. The site falls within the green corridor running east-west through the city. It will be able to contribute to the urban biodiversity of the larger city scheme, by introducing green spaces as green infrastructure, that include habitats. (see figure 23).

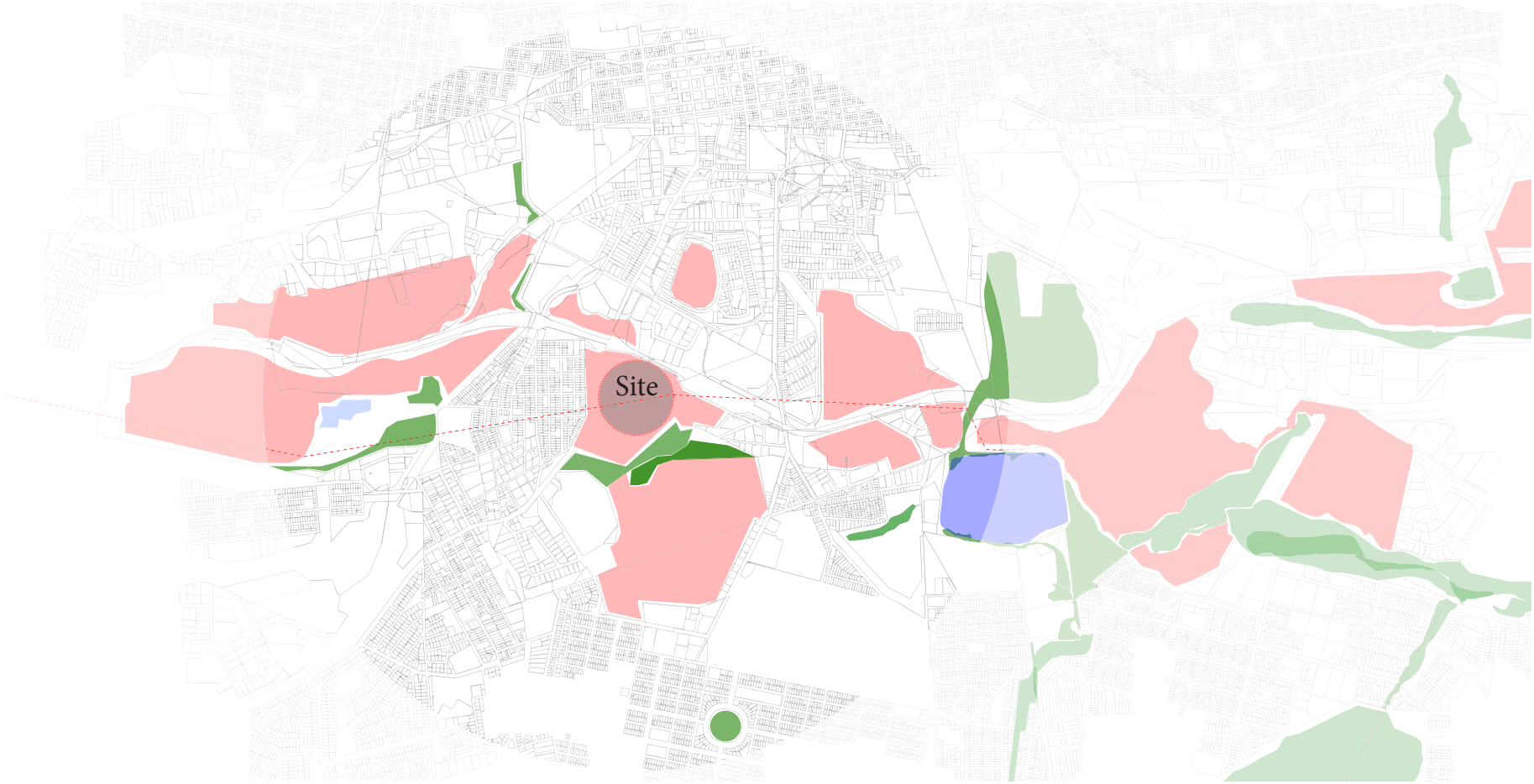


Figure 23 | Turffontein Ecological corridor (Author 2017)

© University of Pretoria

03.3 Site Analysis

Movement

The site analysis revealed that the most movement occurred on the western edge of the site, adjacent to Booysens road. This edge is used mostly by pedestrians moving in and through the commercial area heading towards the CBD. The only movement on site is by local residents from an informal settlement to the north (see figure 27), moving through the site on their way to work in the industrial area and back (see figure 24).

Access

Site Analysis revealed that access to the site is very restricted. The only vehicular entrance of the site is situated to the north and used by trucks dumping mine debris. The site is physically accessible to pedestrians from the northern and the wester edges, but very unsafe due to the site being visually very inaccessible. The eastern and southern boundaries consist of the large Robinson deep landfill and city power with no access opportunities (see figure 27).

Users

At the moment the specific site is used as a dumping facility for excavated mining debris. The site is also occupied by illegal miners, scavenging for mineral remains. The northern edge of the site is occupied by a small informal settlement, with residents looking for work opportunities. The western edge is a very commercial edge with a variety of pedestrians such as: commercial workers, vendors, and trolley pushers.

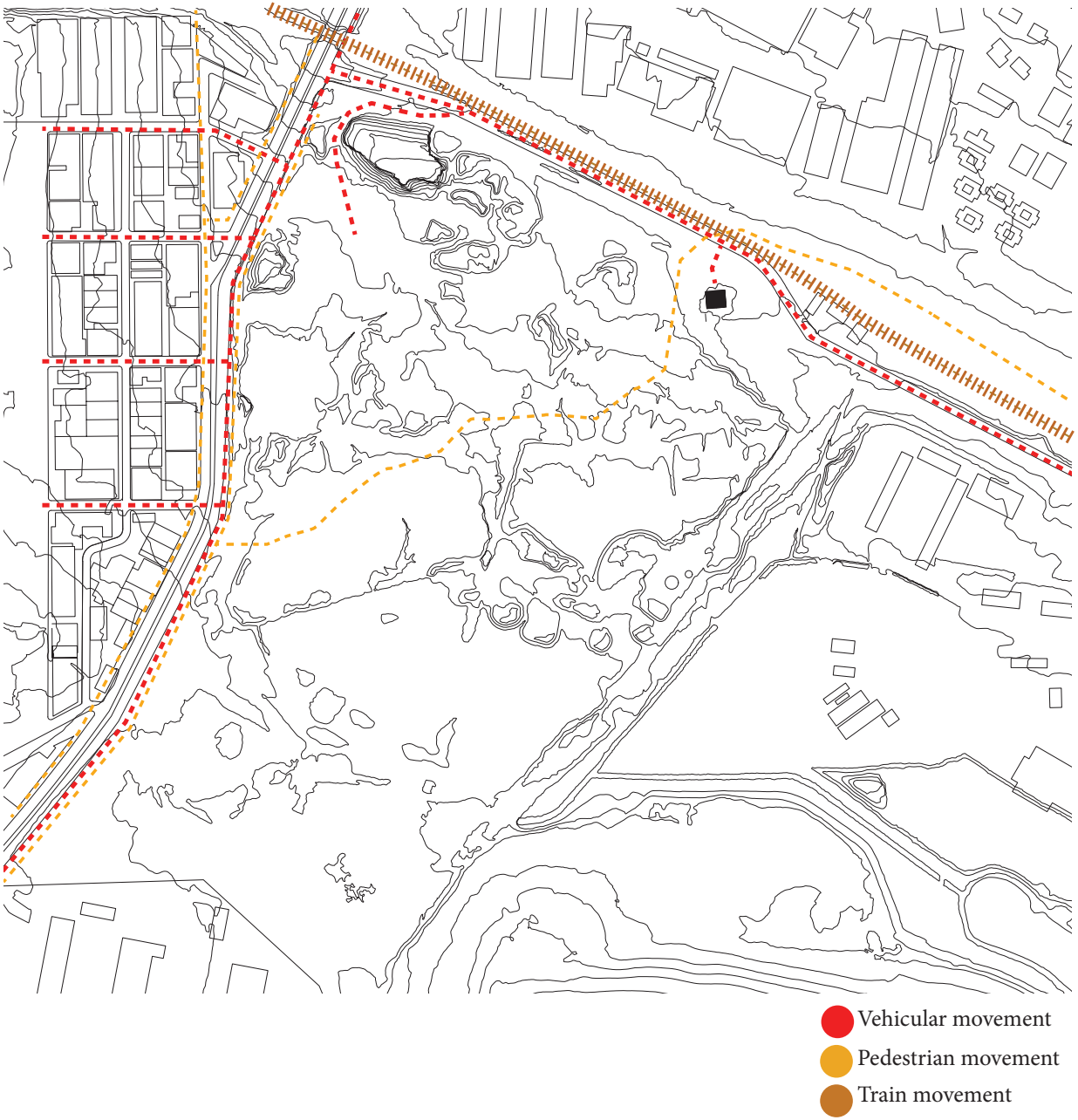


Figure 24 | Movement Analysis (Author 2017)

© University of Pretoria

Biodiversity

The eastern and southern edges of the site are subject to a variety of invasive plant species (see figure 27) while the interior and other edges of the site are subject to dumping and heavy metal pollution. Most of this will need to be remediated. Almost no natural species can be found on the site (see figure 25 and 26).

Topography

The site has a very complex topography due to it being subject to various stages of mining. The north western corner of the site has a very large mound, which seems to be an original remnant of the original topography. The rest of the site is rough, degraded, and weathered (see photographs of the site on page 41). The slope of the site seems to be gentle from the north-eastern corner to the south-western corner (see figure 28).

Figure 25 | *Cortaderia selloana (Poaceae)*, Pampas grass (Author 2017)

Figure 26 | *Eucalyptus cladocalyx*, Sugar gum (Author 2017)

© University of Pretoria

Figure 27 | Analysis (Author 2017)

© University of Pretoria

03.4 Site Photos

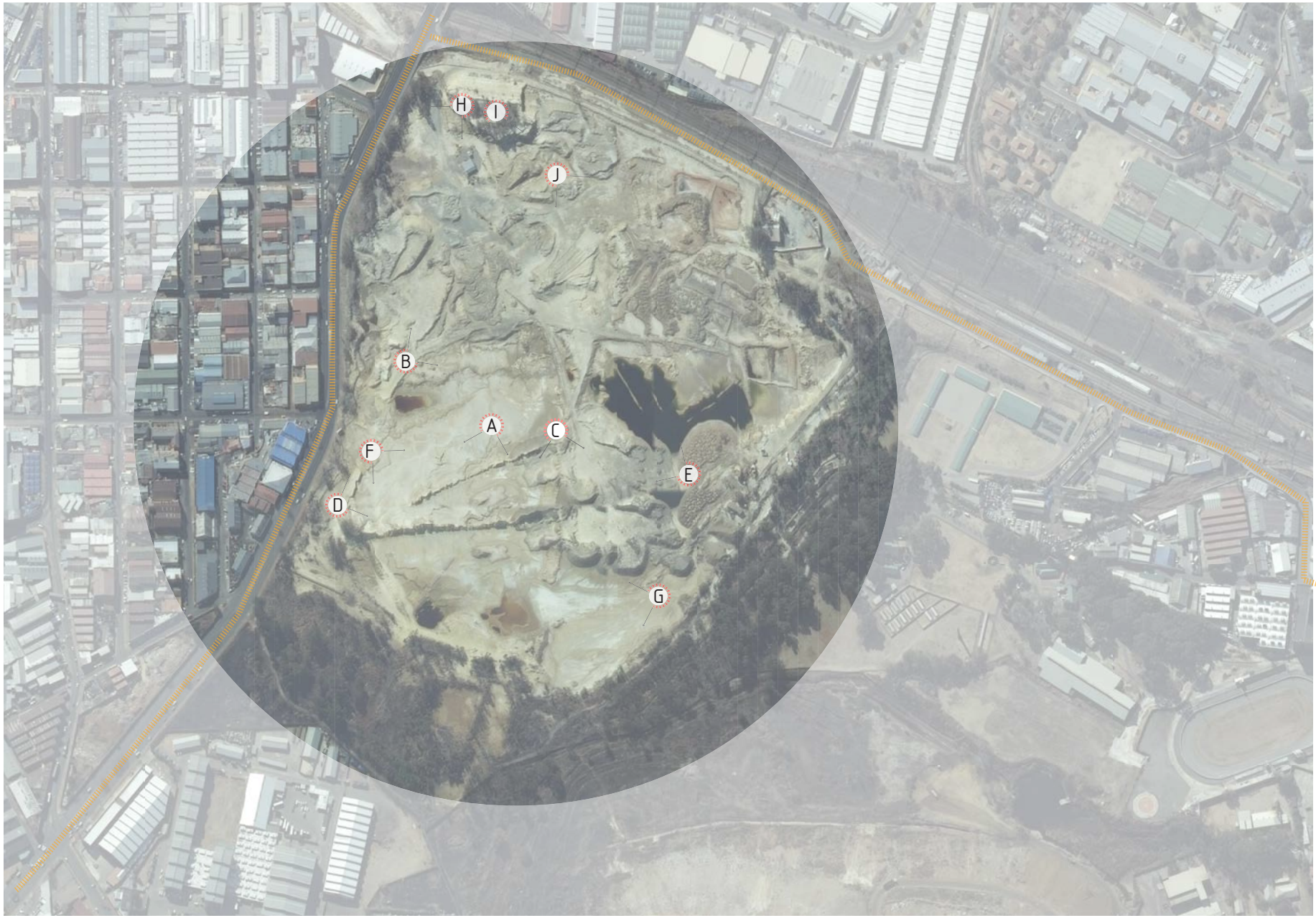


Figure 28 | Photo map of the Turffontein site (Author 2017)

© University of Pretoria


Photo A


Photo B


Photo C


Photo C

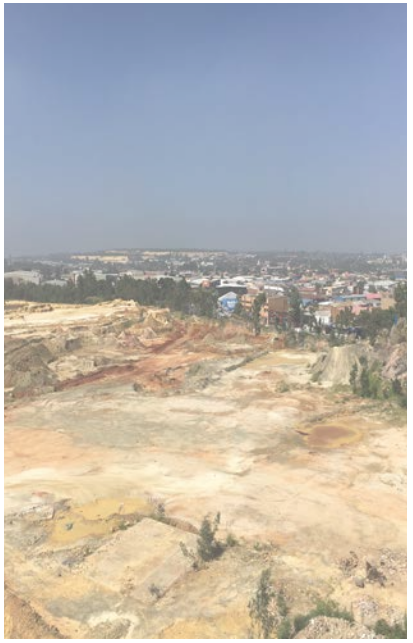


Photo H


Photo D


Photo E


Photo F

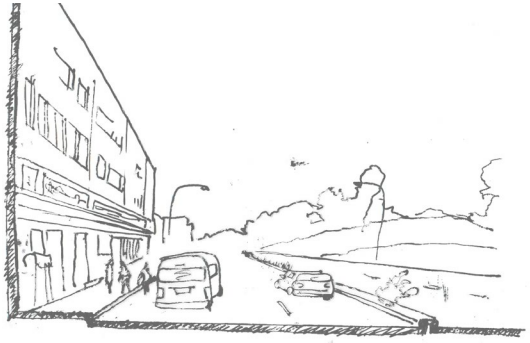

Photo G


Photo D


Photo I


Photo J

© University of Pretoria



Booysens road view

Booysens road view

Main street view

Booysens Station road view

Figure 29 | Sketches of the Turffontein site (Author 2017)

03.5 Site Strengths

1. The study area's proximity to public transport nodes is of great benefit.
2. The site is located adjacent to Booysens street which allows quick connection to the city CBD.
3. The context provides a variety of social and environmental issues which can be utilized for the greater good such as: materials which can be used in constructing the landscape.
4. The site is home to a very diverse set of users accessing the site at various times of the day .
5. The site falls within the urban biodiversity corridor of the city.

03.6 Site Weaknesses

1. The site is subject to intense pollution and alien invasive plants.
2. At the moment the specific site is disconnected from the north of Johannesburg, by the large industrial mining belt.
3. The large Robinson deep landfill to the east of the site, can be seen as a weakness, due to the smell that emanates from it at times.
4. The site as is, is quite unsafe due to illegal mining.
5. The site is very enclosed with limited access points at specific edges.
6. The context is subject to a lot of unemployed people.
7. The site is used as a dumping facility for mining debris.

03.7 Opportunities

1. The site is unplanned and ambiguous.
2. The site has unique topography which can be used in design.
3. The site can act as a gateway into the south of the city.
4. The site is connected to the CBD.
5. The site is home to a variety of users within the precinct.
6. It is in close proximity to various transit nodes.
7. The site has a very unique *genius loci*.

© University of Pretoria

© University of Pretoria

© University of Pretoria

04_Chapter Four

Urban Framework

In the development of the urban framework, various governmental and private frameworks were investigated and taken into account in order to understand and structure the site context in a holistic way.

© University of Pretoria

04.1 Previous Framework Analysis

Spatial development framework of Johannesburg 2040

The 2040 Spatial Development Framework of Johannesburg mentions the proposal of the corridors of freedom. The framework aims towards a polycentricity model, which encourages mixed use areas in the city. Spaces of work, education, and stay. The Framework pursues to create a spatially just, world class African city. Which concentrates growth in a compact urban core, around transformation, key urban and transit oriented development nodes.

The spatial vision is to create a compact polycentric city by 2040. Here the Inner City would form the strong urban core. Linked by efficient public transport to dense, mixed use (residential and commercial) sub-centers, situated within a protected and integrated natural environment. The ideal structure is a strong core, connected with high housing densities, surrounding cores and gradually lower densities further from cores (see figure 31). At the moment Johannesburg showcases the inverse of this model (see figure 30). The framework aims toward addressing the issues of: increasing pressure on the natural environment and green infrastructure; urban sprawl and fragmentation; spatial inequalities and mismatch; exclusion and disconnection emanating from high potential underused areas (the mining belt and the Modderfontein area); Securitization and gated developments, and disconnected street networks (high cull-de-sac ratios and low intersection densities); Inefficient residential densities and land use diversity.

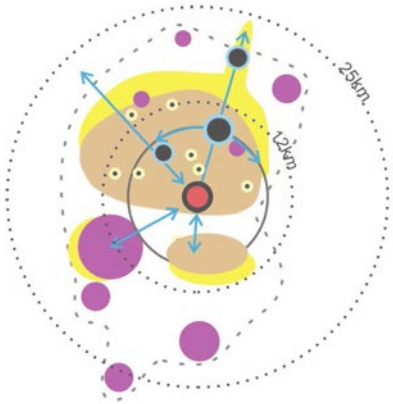


Figure 30 | Current model of Johannesburg (City of Johannesburg: Department of Development Planning 2017)

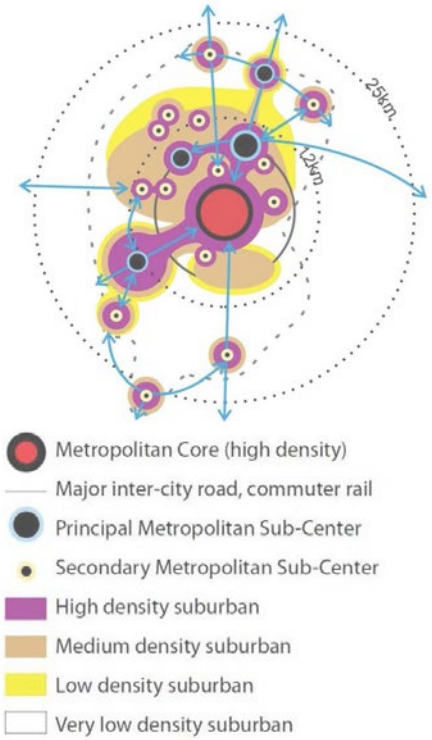


Figure 31 | Ideal model of Johannesburg (City of Johannesburg: Department of Development Planning 2017)

Recently a corridor of freedom Urban framework for the Turffontein precinct was done by Newtown Landscape Architects. The idea is to create access to opportunity by reducing distance between home, work, and education (see figure 32); creating attractive pedestrian environments (a walkable city); creating a people centered city; enhancing transit nodes with high residential development around them; promote mixed use development to create a vibrant area for live, work, and learning. (Newtown Landscape Architects & IYER Urban Design studio, 2015). The vision therefore entails becoming a quality urban environment. By providing a range of housing, economic and social options, with affordable higher residential density. Provided in mixed-use precincts, surrounding quality transit service routes and stops, supported by an integrated public (hard and soft) open space system. The resultant framework is focused around four key elements: a movement network, optimizing connectivity within the corridor, and harnessing connections with the city; a structure for the spatial economy, that identifies key nodal and mixed-use areas and integrates them into a future corridor system; an underlying structure of social infrastructure (social clusters) that can grow and intensify over time to support growth within the corridor; and an approach to guiding densification within the corridor that is appropriate to the existing structure and context, but also supports a high level public transport system.

© University of Pretoria

04.2 Group Urban Framework proposal

The idea for the urban framework is to unlock the potential of the mining belt by using the principles of the corridors of freedom to re-stitch the urban fabric. Utilizing the mining belt as a mixed-use vibrant growth area that bridges historic and spatial divide. The vision of the group is to create a lively residential, commercial, and educational mixed use node (see figure 32).

The principles proposed for the mixed-use node:

1. Proper pedestrian, bicycle, and vehicular movement.
2. A newly developed transit hub.
3. Commercial, residential, and educational mixed use areas.
4. Skill development areas.
5. Site rehabilitation.
6. Since the site is a hub of mined materials, the group proposes that these materials be used and manipulated into construction materials.
7. Heritage or memory remnants to educate the community on the identity of the site.

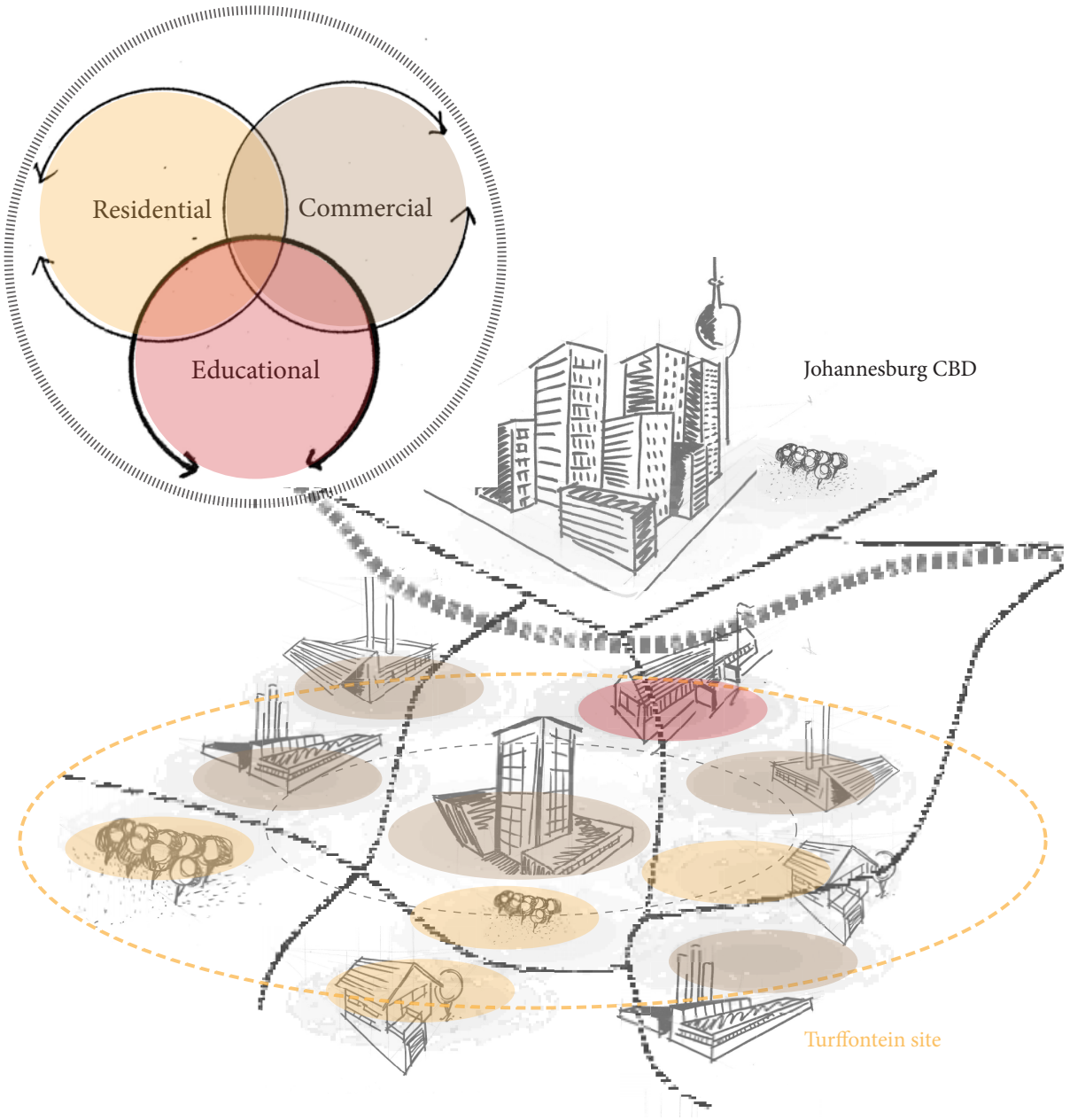


Figure 32 | Vision of the proposed mixed-use Precinct (Author 2017)

© University of Pretoria

04.3 Group Framework Plan

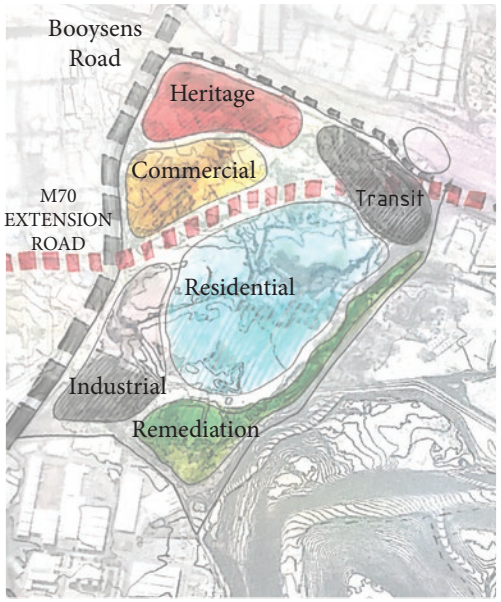


Figure 33 | Group framework zoning areas according to the polycentric model (Author, 2017)

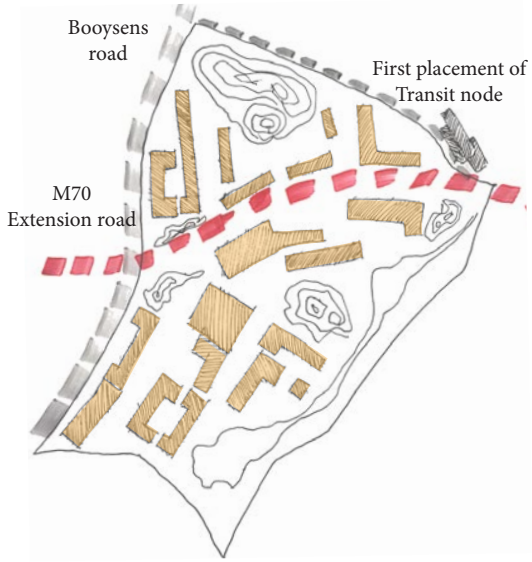


Figure 34 | Group framework building typology (Author 2017)

Figure 35 | Group framework vision showing building typologies and ecological systems (Author 2017)

© University of Pretoria

04.4 Group Framework Sections

These section of the group framework indicate the mixed-use nature of the polycentric model in the proposal.

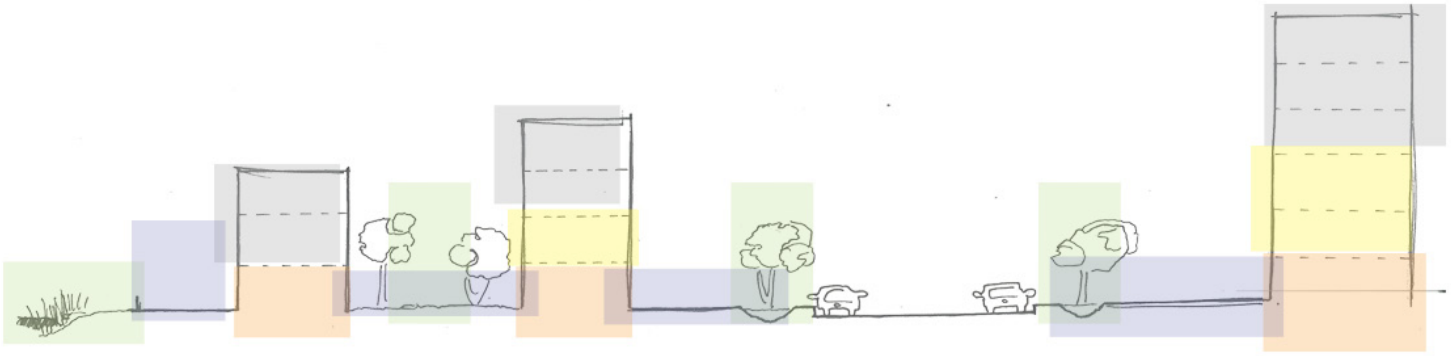


Figure 36 | Section A-A through the residential - commercial typology (Author 2017)

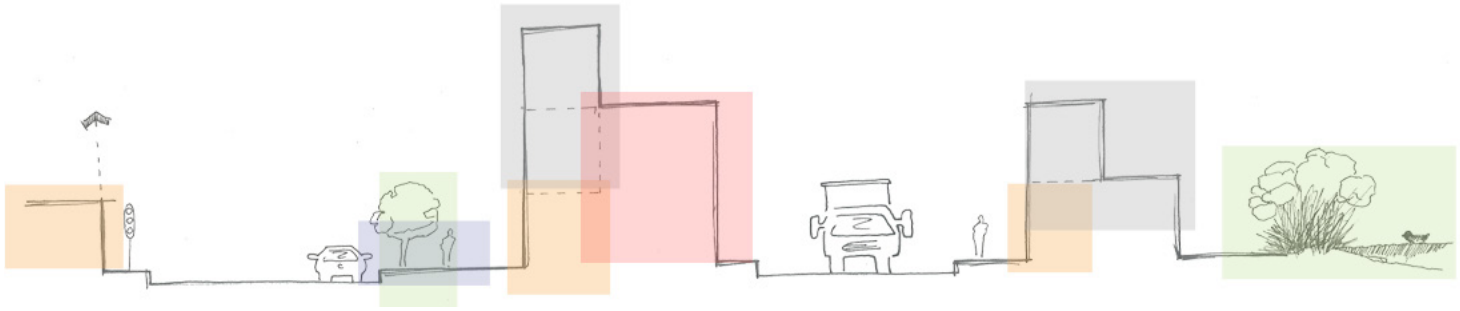


Figure 37 | Section B-B through the industrial - commercial typology (Author 2017)

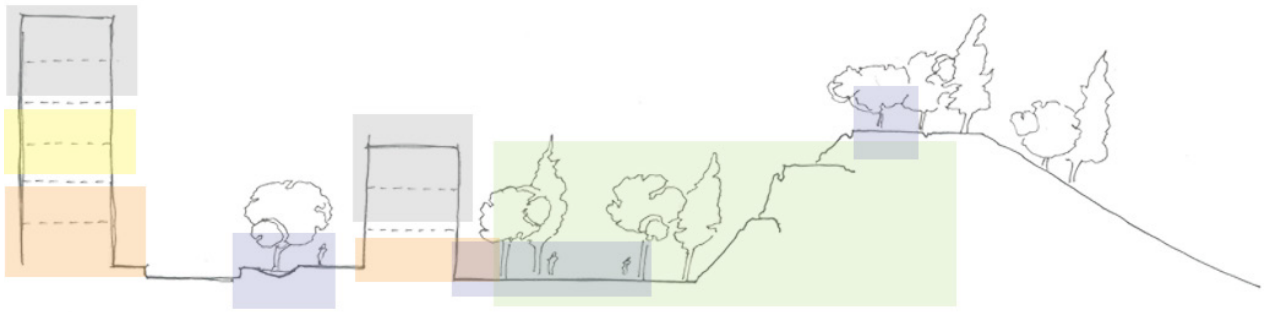


Figure 38 | Section C-C through the residential, commercial, and ecological typology (Author 2017)

© University of Pretoria

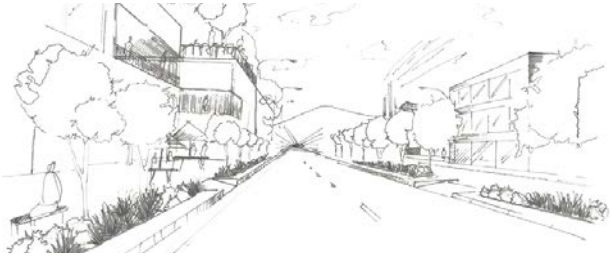


Figure 39 | Vision A M70 extension through the site (Author 2017)

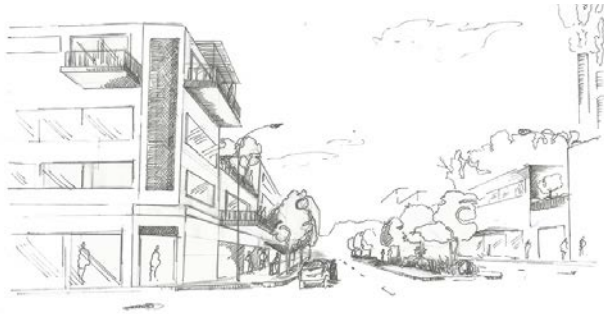


Figure 40 | Vision B Booysens road (Author 2017)

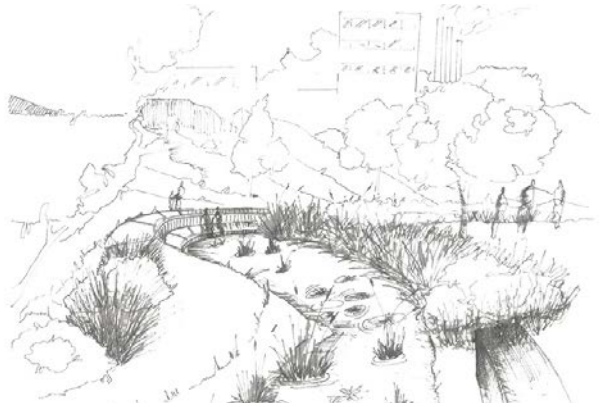


Figure 41 | Vision C ecological water (Author 2017)

Figure 42 | Vision D Transit node (Author 2017)

© University of Pretoria

Phasing

The implementation of the group vision is proposed and incorporate over a period of 35 years in three phases (see figure 43).

The first phase will consist of: material generation from the polluted site; remediation; the M70 extension; and a transit hub (see figure 44).

The second phase consists of: the erection of the newly proposed residential and commercial typologies; and the implementation of a didactic pedestrian green space for the precinct and the focus of the author (see figure 45).

Lastly, phase three will entail the functioning of the larger precinct as a unit, fulfilling the vision and creating a functional, lively residential, commercial, and educational mixed use precinct (see figure 46).

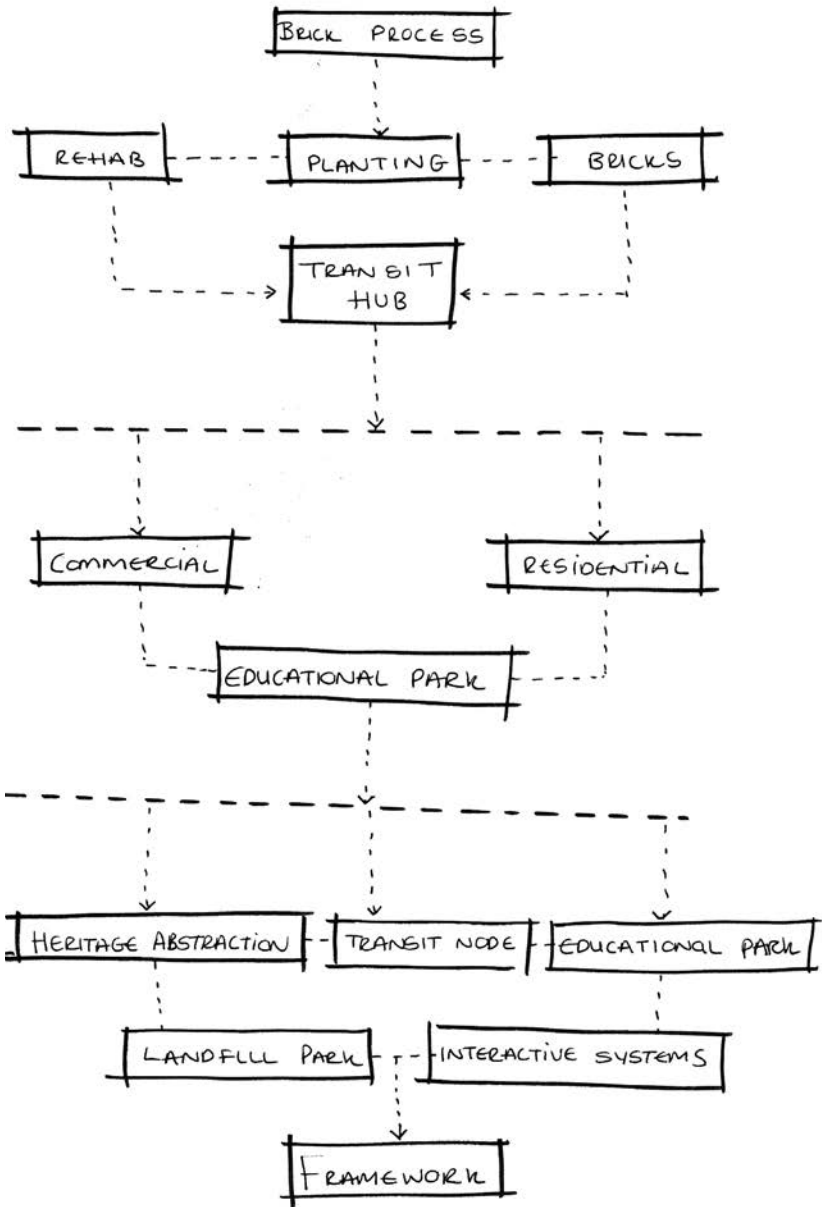


Figure 43 | Group framework Phasing (Author 2017)

© University of Pretoria

Figure 44 | Group framework Phase 1 (Author 2017)

© University of Pretoria

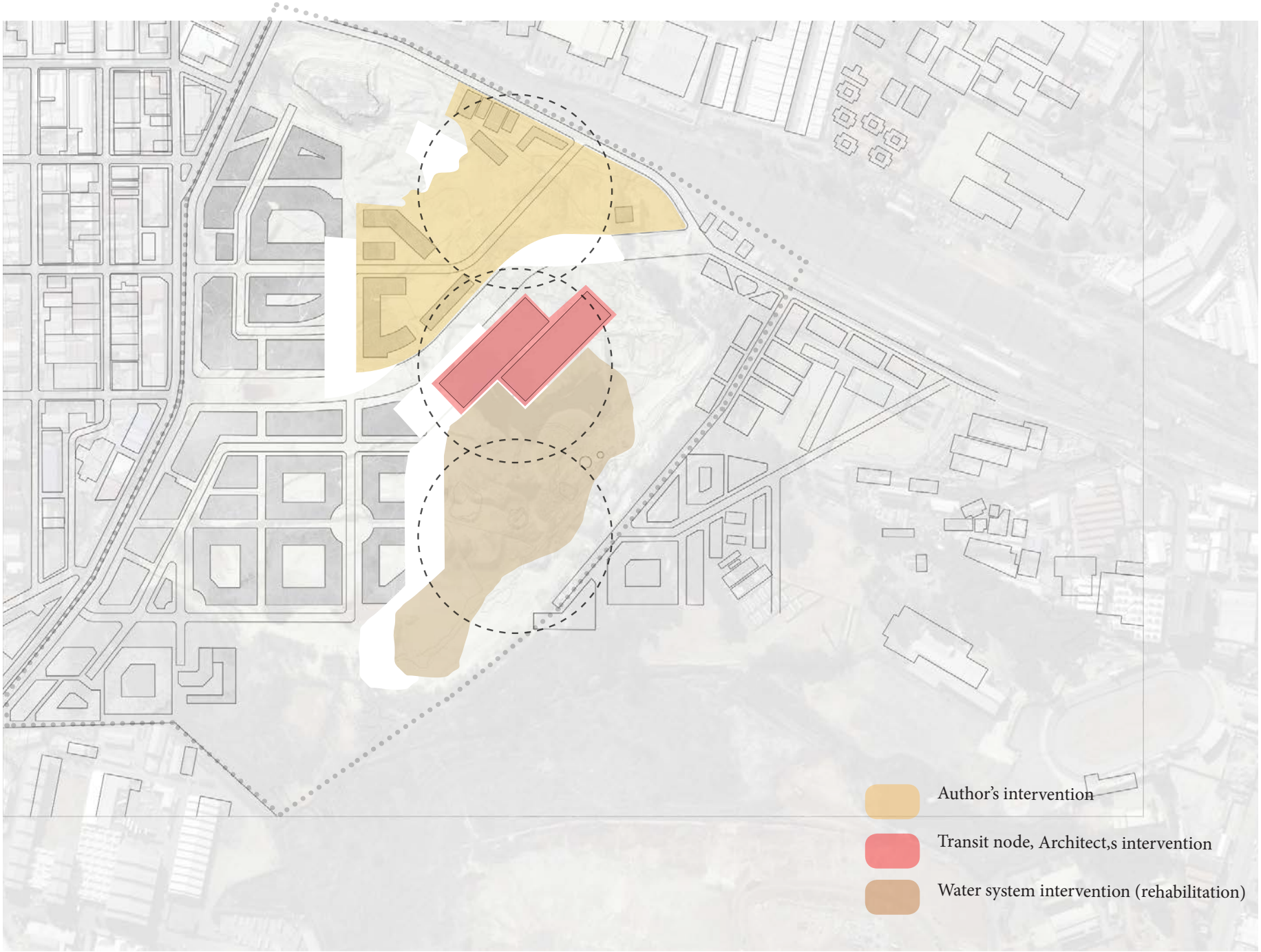


Figure 45 | Group framework Phase 2 (Author 2017)

© University of Pretoria

Figure 46 | Group framework Phase 3, complete framework (Author, 2017)

© University of Pretoria

© University of Pretoria

© University of Pretoria

05_Chapter Five

Intervention Programme

In the programme chapter, a range of factors were considered to develop a suitable programme. Factors such as: various users and their needs, key social and ecological issues and the group framework were taken into consideration in order to develop a suitable programme for the intervention.

© University of Pretoria

Daily workers

Residents in the precinct

Residents from the informal settlement

Students from the skills centres in the precinct

Figure 47 | Site users (Author 2017)

© University of Pretoria

05.1 Site Users

The site will be used by various users, such as: daily workers within the precinct; residents living in the precinct; residents from a nearby informal settlement; participants of the various skills centres in the precinct; daily users of the transit node; learners on school field trips; educational groups; vendors; and people who visit the site for any specific reason (figure 47).

Daily users of the transit node

Learners on school field trips

Vendors in the precinct

Site visitor

© University of Pretoria

05.2 Intervention programme:

In order for the intervention to be successful the landscape programme should address all of the above mentioned users' needs. For that reason, the intervention will incorporate the following:

Material generation:

According to research and theory gathered in chapter 2, the author recognized that intervention should be able to address materials and landscape tectonics. The site should be able to generate materials in order to construct the intervention (see table 2). The intervention should be able to create opportunities for the local community to participate and develop skills in various areas. For that reason, the materials sourced on-site, (from the polluted soil and excavated mine debris) will be reused by the *in-situ* PPC factory to manufacture building materials. With the help and participation of local community, the intervention will be constructed from these materials as suggested in the group framework. This intervention will continue to generate materials after the construction of the site, in order to train participating community members and equipping them with a certain skill set. These materials can be outsourced to create an economic income for the intervention (see figure 48).

Skills development

The urban development framework proposes that the vibrant mixed-use precinct incorporate some form of skills training in the framework. Throughout chapter 2, the author noticed that it is important to create space where individual and communal skills development can take place (see table 2). The contextual and site analysis gathered that this area is under pressure with high unemployment numbers. The idea is that the materials manufactured on-site will be optimized to construct the intervention. Unskilled participants from the local community will be employed and educated in the process of building. The Participants will receive on-site skills training in the field of construction. This way the local community participates in the project and receives skills training and employment in return.

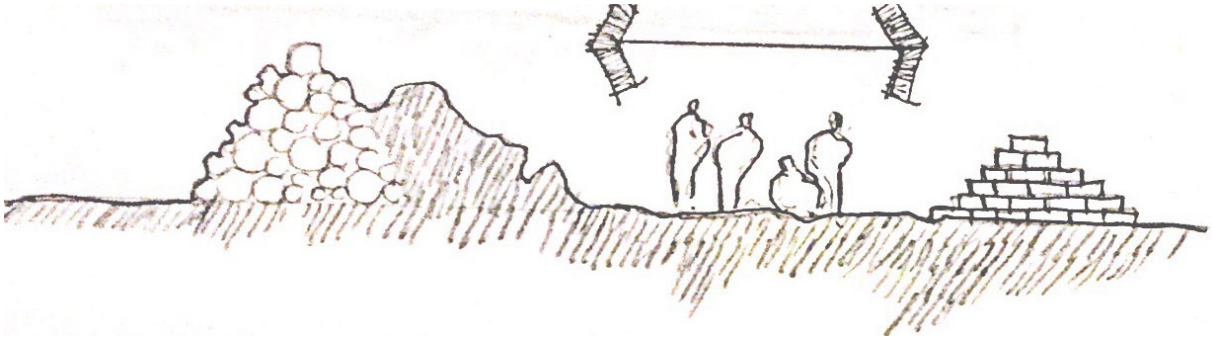


Figure 48 | Material generation (Author 2017)

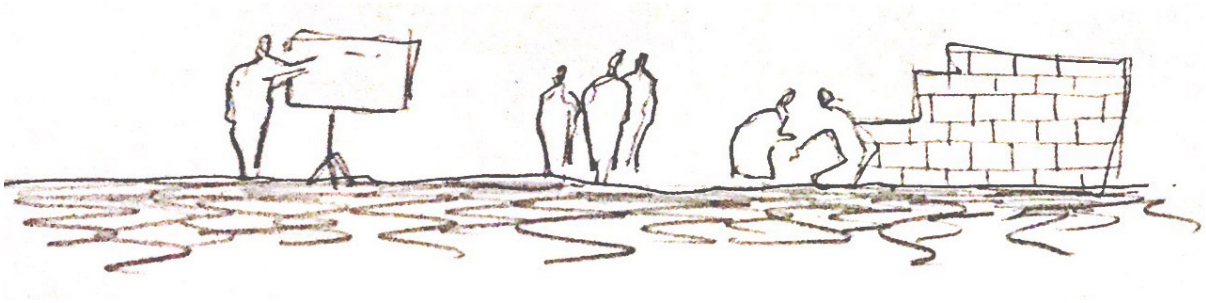


Figure 49 | Skills development (Author 2017)

© University of Pretoria

Recycling

Throughout the research and theory, the author noticed that the terrain is subject to a vast quantity of recyclable materials. The site also has a large number of trolley pushers in the area. In chapter 2, it was noted that the site needs a space that is able to explain, teach and serve in order to educate and create awareness on the issue of recycling in the Turffontein area (table 2). The author gathered that there is already a large quantity of recyclers (trolley pushers) in the area, which gathers materials in order to make a living. The idea is that the recycling facility will aid these users in the precinct, by rewarding them for recycling their materials at the facility. As for the building materials not used for material manufacturing, this will be sent to the skills centre where it will be re-used in innovative experiments (landscape tectonics or art pieces). The role of this centre is to create awareness and significance on the idea of recycling within the Turffontein area

Remediation

In the theory chapter, the author asked the question of remediation as programme. Through the research it became clear that it is possible to incorporate a programme of remediation in a didactic landscape. Chapter 3 mentions that pollution is a problem on site and should be addressed through spaces dedicated to healing the land. It is also clear that the site needs to accommodate users in a healthy public space (see table 2).The remediation area will act as a remnant of the site. A phytoremediation process (discussed in chapter 8) in the form of phytoextraction, will be implemented and maintained by the nursery on the site. The local community will be employed in the remediation process and gain experience and skills in this field of work. As in the British Petroleum park in Sydney, the site will make the remediation zone visually accessible. This space has the potential to become something else in the future when this area is remediated to a suitable level.

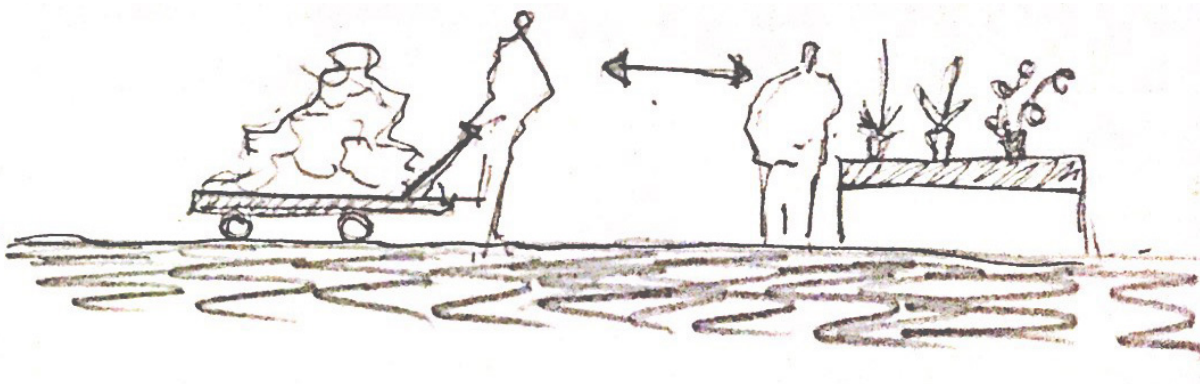


Figure 50 | Recycling proposal (Author 2017)

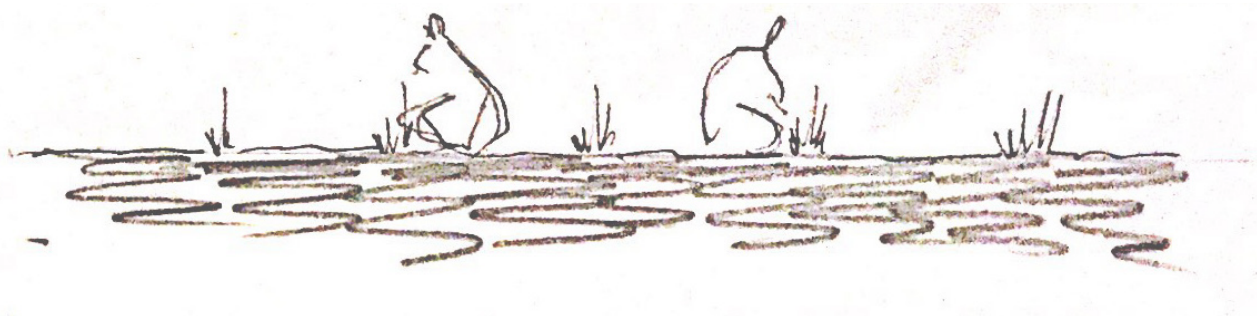


Figure 51 | Remediation proposal (Author 2017)

© University of Pretoria

Nursery

One of the largest concerns as mentioned in chapter 3, is that the site is bare and subject to few plant species. As mentioned in table 2, an intervention such as this should be able to rise and optimize concerns to manipulate design and create opportunities. The nursery is an intervention that focuses on the concern of planting on site, and will act as a green lung in the project. Its function is to act as a hub where a variety of plants from surrounding vegetation units needed in various systems across the framework, will be grown. When the plants in the remediation systems deplete they will be replaced by the plants from the nursery. This hub will distribute plants to the framework's water system; remediation system; planting system; food system; and the urban market. Local community will also gain landscaping experience and skills at this facility, in order to be employed to maintain the precinct landscapes (see figure 52).

Plant Identification

The park will attempt to incorporate interventions of plant identification, aiming towards visually educating the users on the indigenous and invasive planting in the area. Chapter 2 mentions in table 2 that such an intervention should incorporate spaces of sensory experience that informs users on the identity and *genius loci* of the site. The intention is to create a space where planting contrast each other, creating visual contrast and awareness. The user will be able to identify a difference in the spatial quality, leading to an educational experience. The planting used in these interventions will be grown on site in the nursery. The invasive planting areas will consist of category 2 species which will be maintained by the student in the nursery.

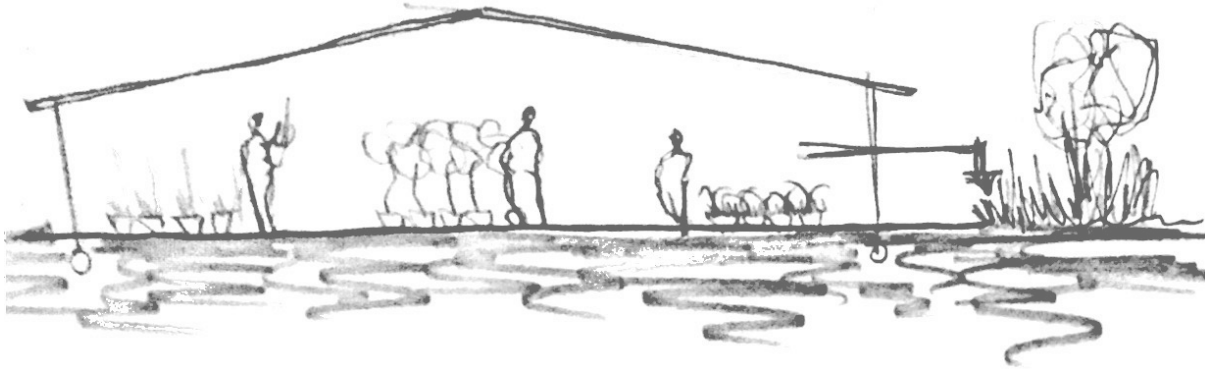


Figure 52 | Nursery proposal (Author 2017)

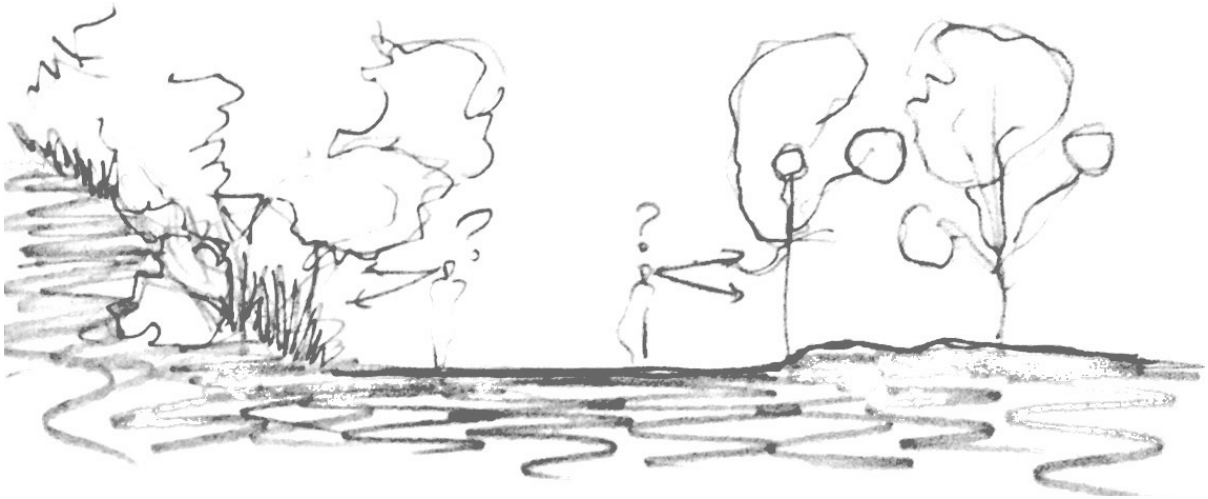


Figure 53 | Plant identification proposal (Author 2017)

© University of Pretoria

Remediation garden

Because the larger remediation area is only visually accessible to the public user, there is a remediation garden designed with the specific intention of interacting. The user can visually identify and interact with the various species used for remediation. The intervention visually educating the users as mentioned in chapter 2. The species will be planted in such a way that the grass species is planted from pioneer to climax species. This remediation planting will consist of local plants from the Soweto Highveld Grassland vegetation unit. This way the user is confronted with a historical layer from the site used to heal space (see figure 54).

Skills Platforms

As mentioned in chapter 2, the site requires space that is able to teach, communicate, conceptualize, unite, and build community. The skills platforms attempts to create a physical platform in the landscape that acts as exhibition space for community and the skills development centre. These platforms can be used by the students of the centre and community as spaces where skills can be "showed off" as art installations. It can also be optimized as examining platforms or practice platforms for the students of the centre (see figure 55).

Market

The intention of the urban market intervention is to provide a place throughout the week for communal informal trading. Throughout the chapter 2 the author found that although the precedents consisted mostly of didactic programmes, the basic needs of the everyday users must still be accommodated for (see table 2). Therefore, an urban market space with a balcony overlooking the site is proposed. Over the weekends this market space has the potential to become a large urban market that generates economic income for the site. It can possibly feed off of the surrounding interventions such as the nursery for flower markets, and will act as the economic driver that sustains the project. Here the community, interventions, activities, and centres can participate to create an intense public space. the space can also host: skills presentations; art exhibitions; school field trips; flower exhibitions; musical performances; educational trips; and cultural food markets (see figure 56).

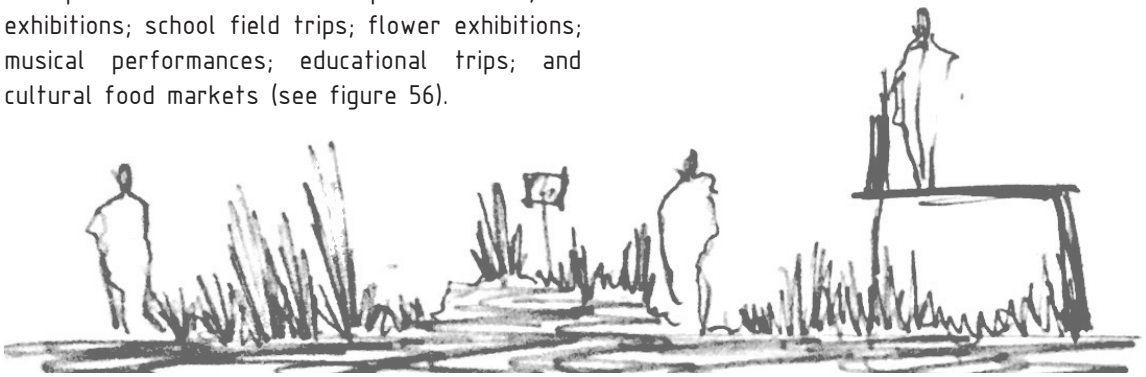


Figure 54 | Remediation garden proposal (Author 2017)

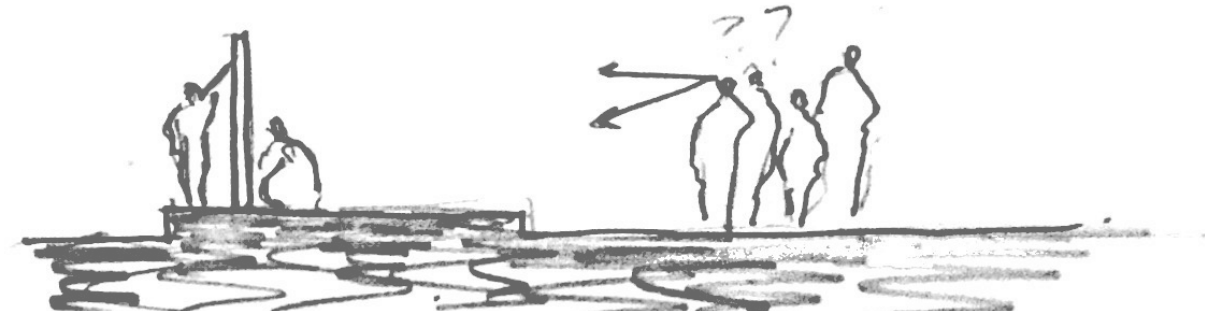


Figure 55 | Skills platforms intervention (Author 2017)

© University of Pretoria

Passive spaces

As mentioned above this park space will have a very didactic programme, but it still needs to address the everyday needs of the everyday users moving through the site. Certain moments or folly's in the landscape, act as quiet spaces, to be utilized by the everyday users. They can potentially be used by the students of the centres; children on school field trips; residents of the precinct; workers of the precinct; or the daily visitors in the area.

Performance platform

According to the theory and research in chapter 2, the intervention needs a space for communal gathering, and building community. The intention of this performance platform is to be used for: performances; plays; art; dancing; and singing. It is an expressive area for the local community. This way the users will be confronted, and educated on the diversity of cultures in the Turffontein area.

Running & Cycling Trail

Through research, the author noticed that the Turffontein area is a very active sports area. There is a need for an active recreational space in the area. This intervention will allow for a route that can be used for running and cycling around the site. The police academy to the east of the intervention is in need of a running track for their monthly fitness test, and can utilize this space for that purpose. Having regular police officers running through the site will also create a sense of security on the site.

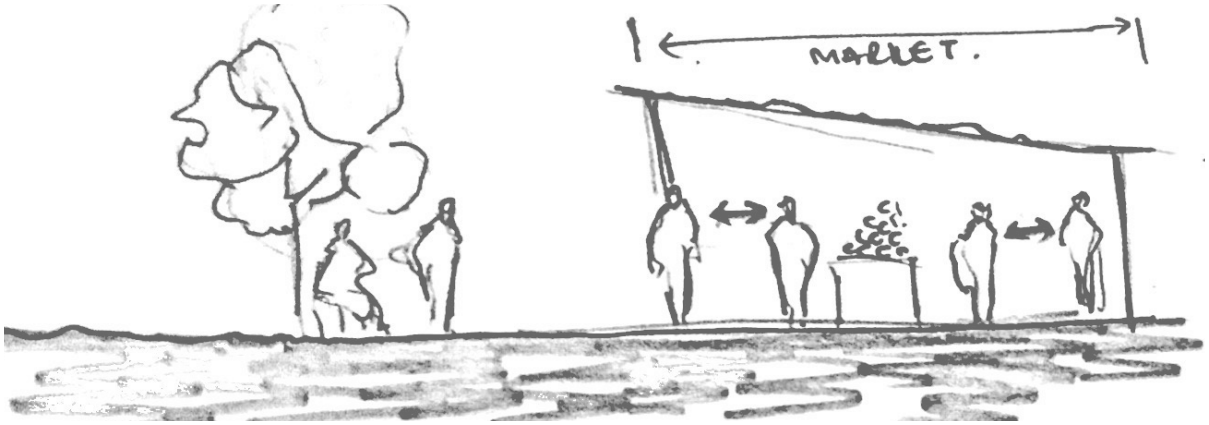


Figure 56 | Urban market proposal (Author 2017)

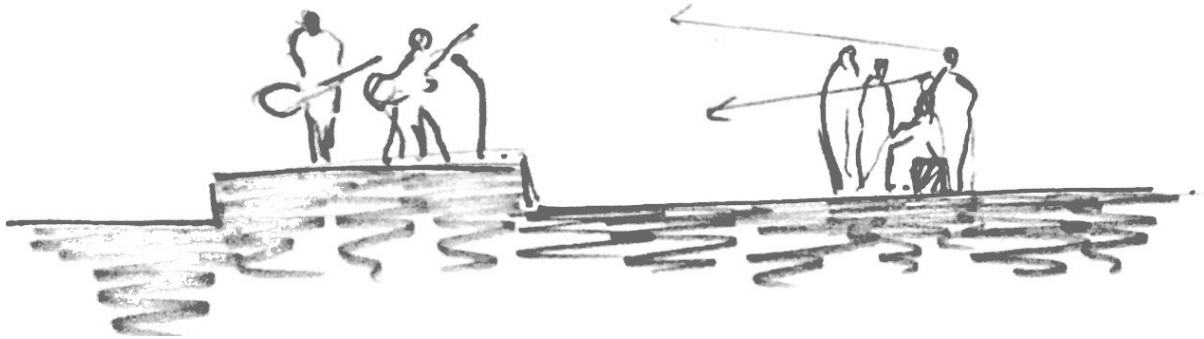


Figure 57 | performance platform proposal (Author 2017)

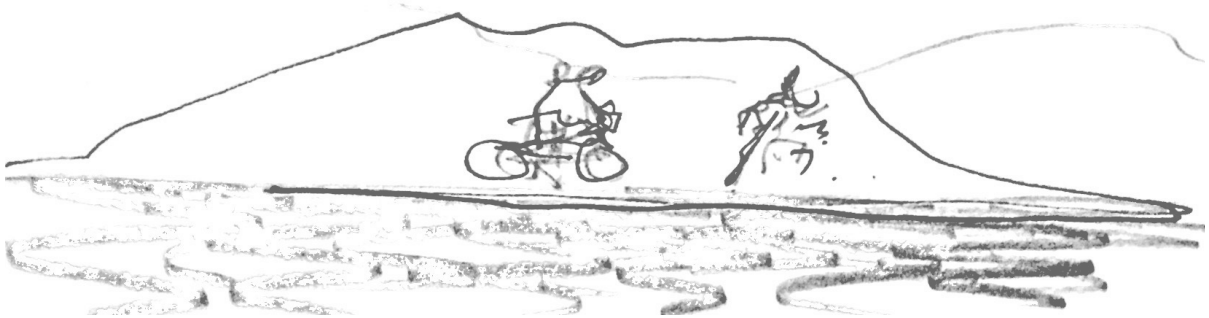


Figure 58 | Cycling and trial running proposal (Author 2017)

© University of Pretoria

Remnant Mounds

One of the most important characteristics of a didactic landscape as explained in chapter 2, is the idea of *genius loci*. The design should not shy away from its identity, which in this case is a mine of extraction. Respecting the *genius loci* of the place is crucial in a didactic landscape approach. Therefore, topography will be preserved around the site as remnants of the history of the place. These topographical remnants may pose a stability issue, and will be abstracted through a series of walls. These walls will be made from brick which is made from material gathered on site. This way the brick holds its colour, respecting the *genius loci* of the place. This will create a lasting link with the spirit of the site.

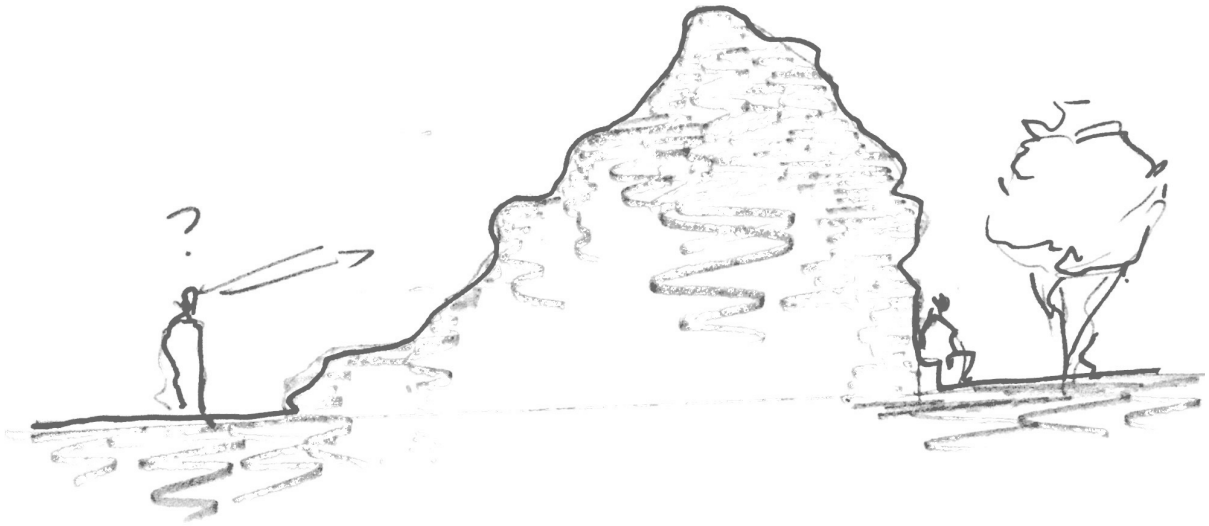


Figure 59 | Remnant proposal (Author 2017)

Communal Park

The park acts as a green space for the larger precinct. It can be used for various recreational activities; passive activities; spiritual activities; sporting activities; or just a green space to pass the time.

© University of Pretoria

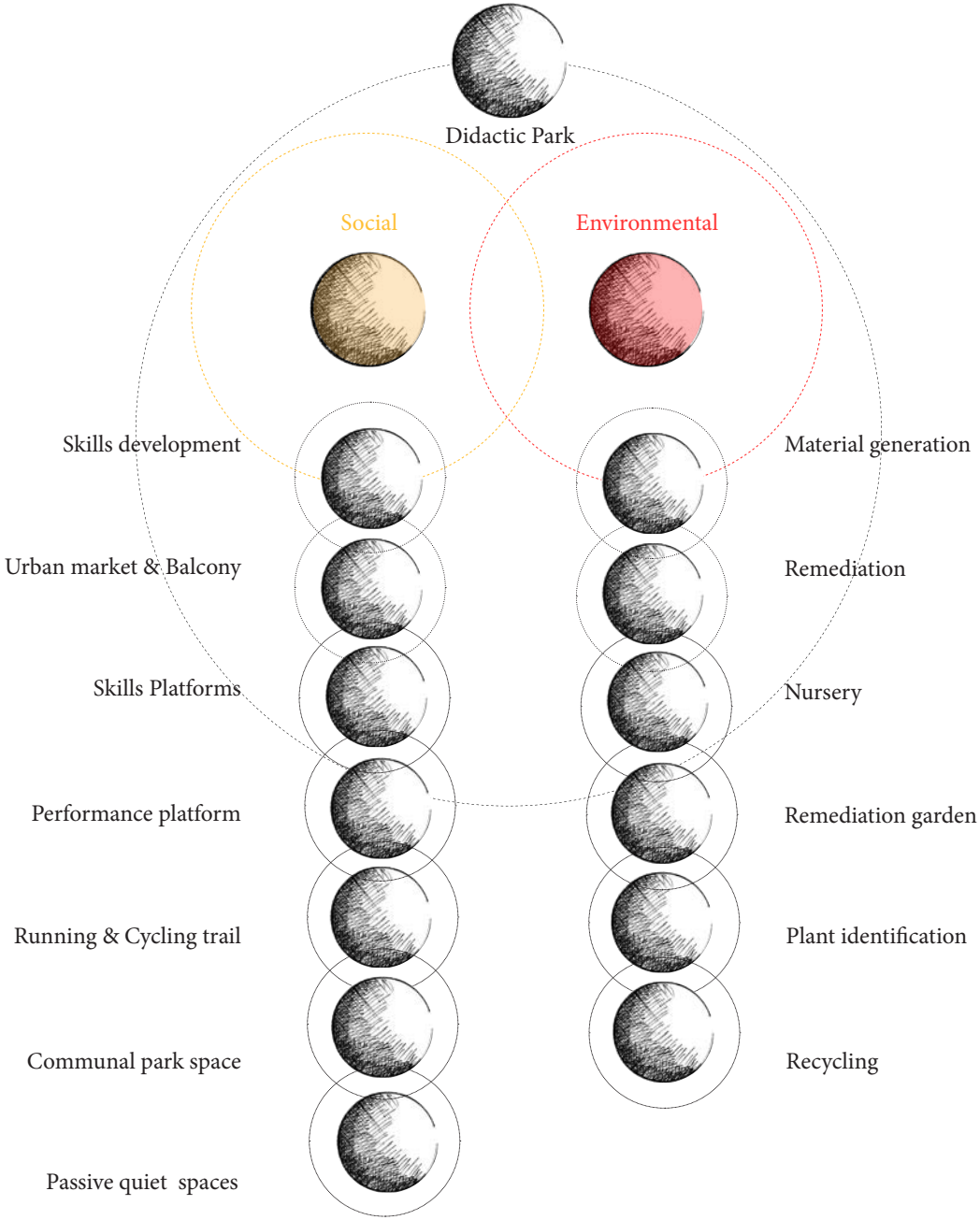


Figure 60 | Programme proposal conclusion (Author 2017)

© University of Pretoria

© University of Pretoria

© University of Pretoria

06_Chapter Six

Design Development

The master plan development chapter, is an accumulation of the theoretical foundation, conceptual approach; design development; and the continual iteration of various explorations and outcomes. The masterplan provides an overview of the functions and programmes occurring on the site in order to create a didactic landscape.

This chapter touches on the theoretical principles used, analysis, and the conceptual approach in the generation of the masterplan. As well as the various design informants that had an influence on the masterplan design.

© University of Pretoria

06.1 Conceptual Intention

The design concept guides the design from a mine of extraction to a mine of assimilation, by respecting the *genius loci* of the place along a didactic route of moments in the landscape.

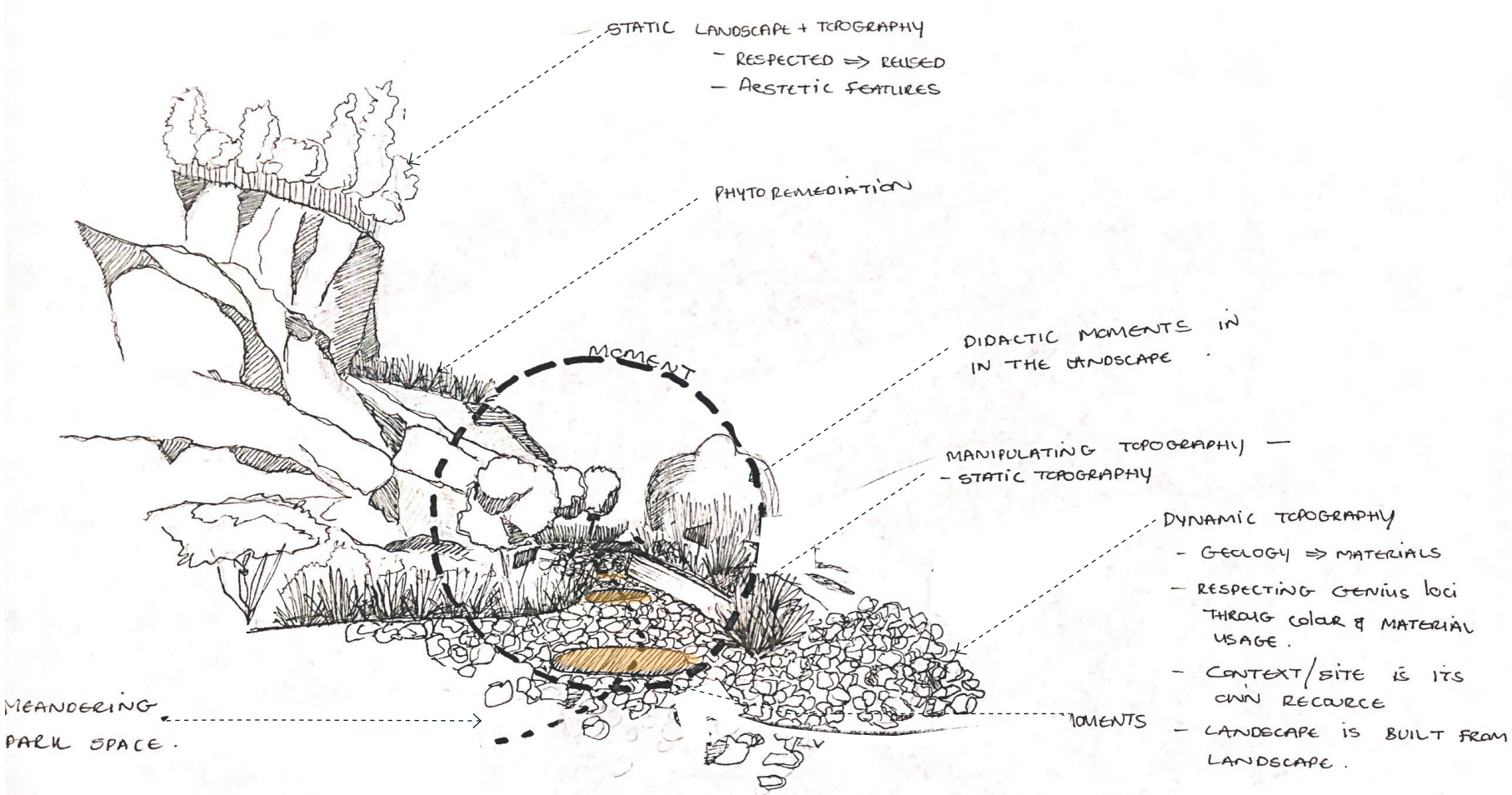


Figure 61 | Diagram indicating the intention of the concept (Author 2017)

© University of Pretoria

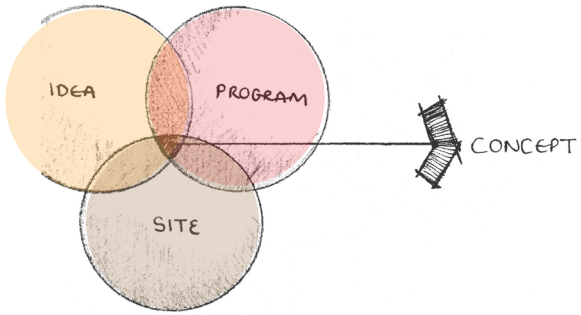


Figure 62 | Layered conceptual approach (Author 2017)

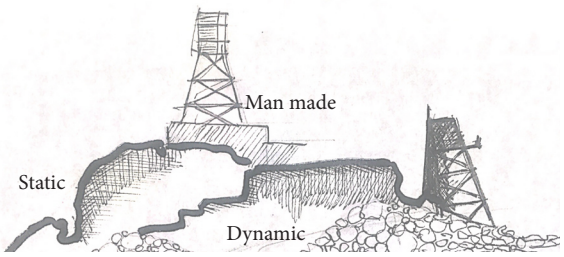


Figure 63 | Layers of Topography on the Turffontein site (Author 2017)

The conceptual approach of the design, is a layered system that weaves the site, program, and idea together and drives the design investigation (see figure 62)

Site

The rareness and beauty of the topography (static and dynamic) on this specific site is one of the drivers in the concept generation. In order to understand this beauty, one must understand the genius of this place. *Genius loci* is an ancient and tireless idea. It is a Latin term referring to the spirit that lives within a space. It was believed by the ancient Romans that, just like people, places have physical spirits dwelling within them. These entities were seen as divine spirits controlling the essence of the space (Menin, 2003).

This idea of *genius loci* became a very popular informant under architects, interior architects, and landscape architects after the 18th century. This was due to the English poet Alexander Pope's quote on the genius of place inspiring poetic thinking under designers. The quote simply stated:

> "To build, to plant, whatever you intend. To rear the Column or the Arch to bend. To swell the Terras or to sink the Grot: In all, let Nature never be forgot. Consult the Genius of the place in all. Consult the genius of the place in all; That tells the waters or to rise, or fall; Or helps the ambitious hill the heavens to scale, Or scoops in circling theatres the vale; Calls in the country, catches opening glades, Joins willing woods, and varies shades from shades, Now breaks, or now directs, the intending lines; Paints as you plant, and, as you work, designs" (Menin, 2003).

This led to one of the most agreeable design principle within the profession of landscape architecture and garden design. Valuing the genius of a place, and adjusting designs to respect it. The architect Christian Norberg-Schulz, who was also a respected phenomenologist took the concept of *genius loci* and constructed it as the foundation of his architectural phenomenology. He recognized that something holly manifests in different types of places, making a link between place, divine being and the human condition (Menin, 2003).

In this project the author understands *genius loci* as a dynamic term that evolved over centuries, referring in most cases to the spiritual, psychological, and physical experience of a place. In modern terms it could be understood as the "vibe" of a place. It is focusing on the unique qualities of a place. In the case of the Turffontein site, it is subject to a very rare type of topography. It is both static and dynamic due to the site being used as a dumping facility for mining debris. (Menin, 2003). The Author acknowledges this to be a part of the genius of the place and will attempt to enhance these qualities rather than to destroy them. This way the user can appreciate the qualities of the context (Larkham, 2003).

© University of Pretoria

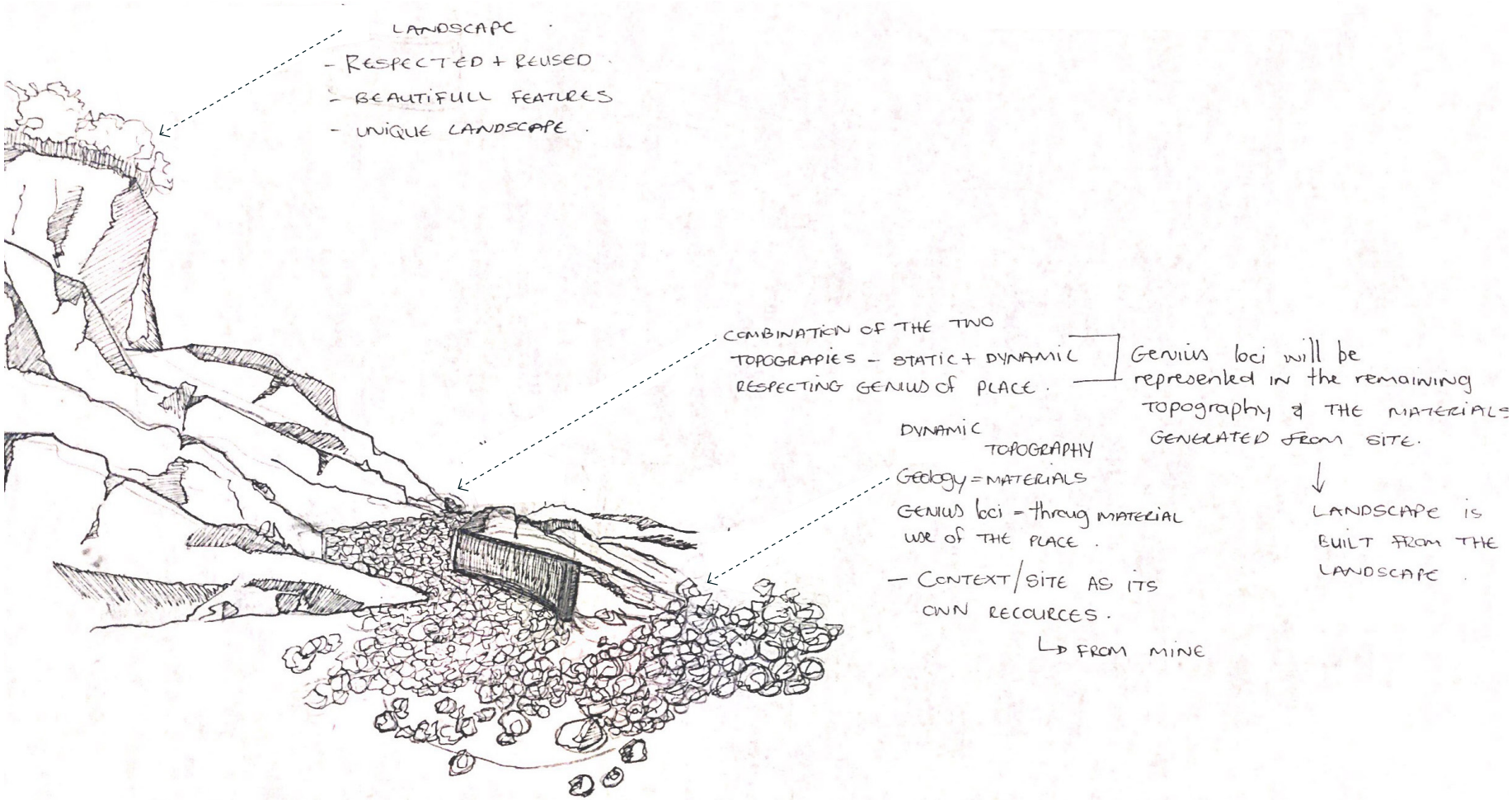


Figure 64 | Conceptual diagram of the spirit of the topography of the Turffoneitn site (Author 2017)

© University of Pretoria

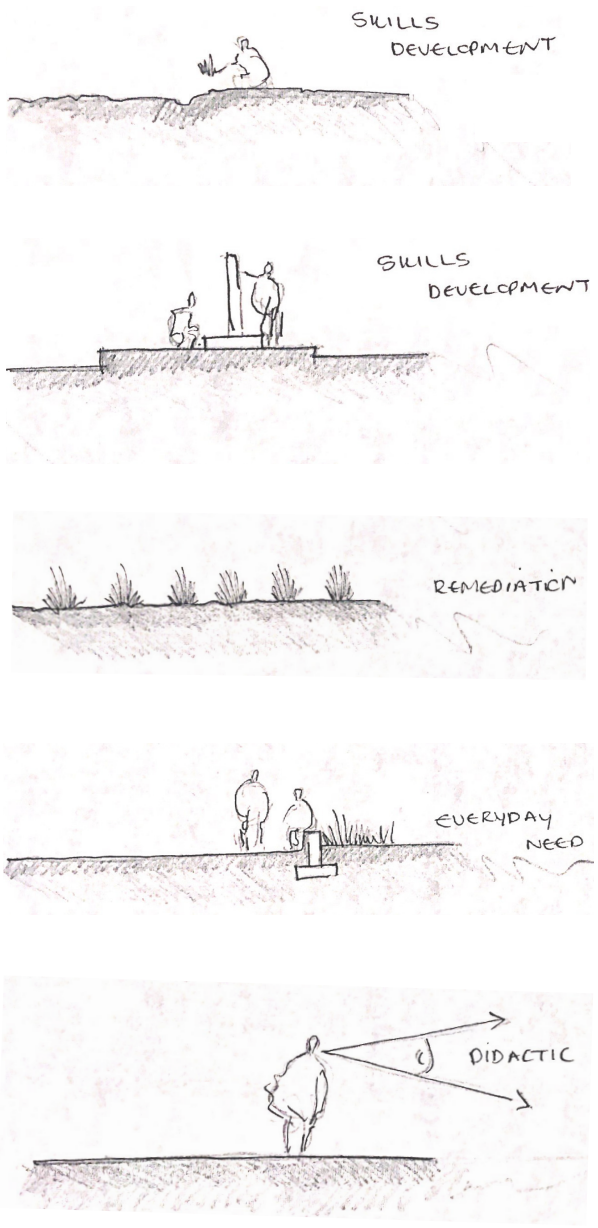


Figure 65 | Proposed Programs (Author 2017)

Program

The design should be a place that addresses the social and ecological issues of the context, such as unemployment and ecological pollution, through facilitating spaces of skills development, material generation, and remediation (see figure 65). The design should also act as a green space or park space within the larger precinct which various users can use on a daily basis. The space should be able to satisfy the general daily needs of the surrounding precinct users. The programs respect the place as a previous mine of extraction, but will enhance the programme to a mine of assimilation (input of information). Capturing these qualities rather than to destroy them. This way the user can appreciate the qualities of the context (Larkham, 2003).

Idea

The idea driving the concept is one inspired by the didactic approach (see chapter 2). The idea is to design a wondering route of didactic moments in the landscape, linking the newly developed skills centres and the transit node (see figure 66). These moments are meant to be explored in order to educate users and transfer knowledge in innovative ways on the socio-ecological environment, and the genius of the place. It is creating sensory experiences that educates or informs (see figure 67).

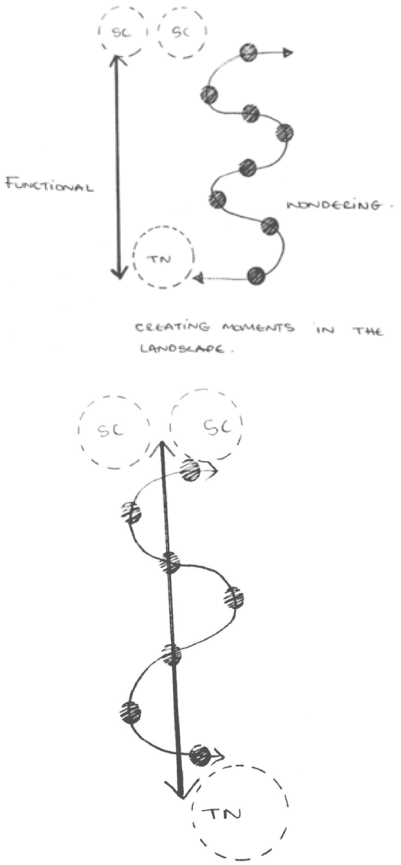


Figure 66 | Functional vs. Meandering route (Author 2017)

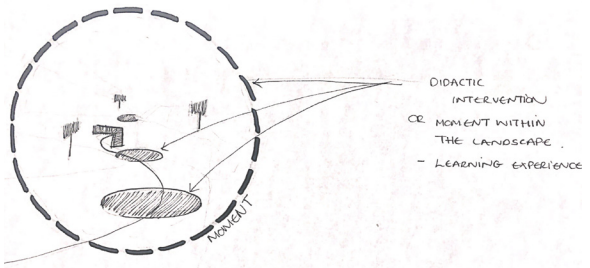


Figure 67 | Didactic moments along a meandering route (Author 2017)

© University of Pretoria

06.2 Final Concept

The intention of the project will be fulfilled by:

1. Solving the paradox of a landscape that takes a user from A to B on a daily basis, while creating a meandering route of didactic moments that can be explored on a weekly or monthly basis (see figure 68).
2. Abstracting the existing static topography of the site through a series of constructed walls created from materials generated on site. Intending to capture the genius of colour, topography, and materials on the site, while facilitating skills development (see figure 69).
3. Using the mining debris on site to generate materials and construct the landscape. Capturing the genius of the place through materiality and colour, while remediating the polluted site (see figure 70).

© University of Pretoria

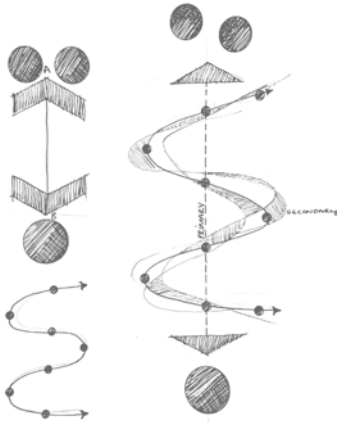


Figure 68 | Didactic moments along a meandering route (Author 2017)

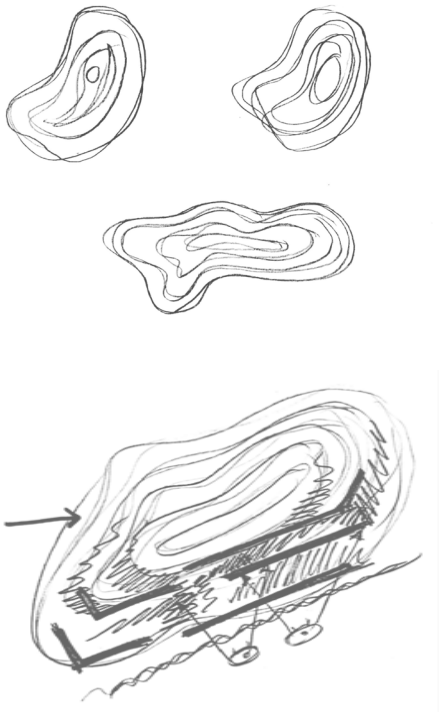


Figure 69 | Didactic moments along a meandering route (Author 2017)

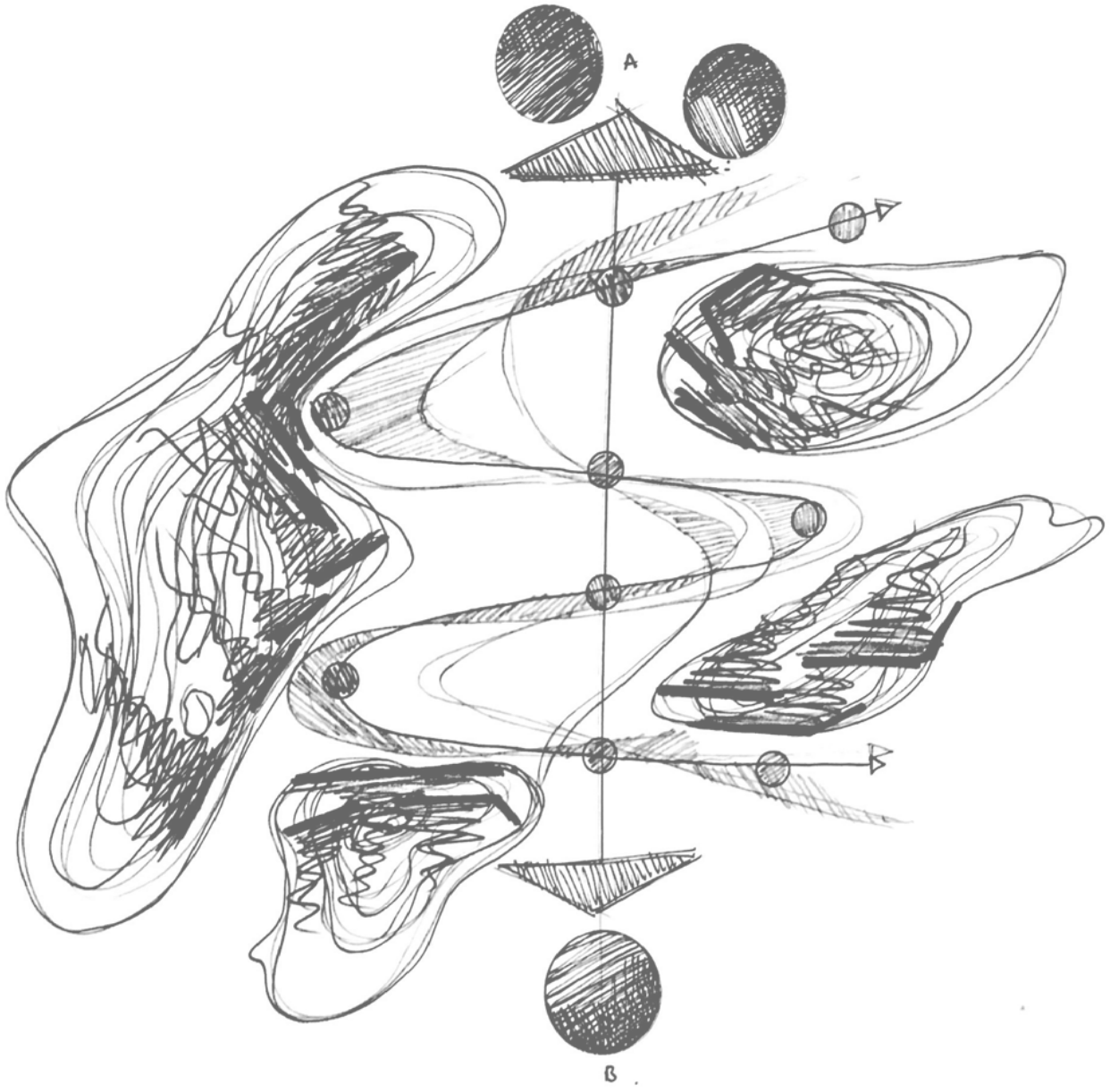


Figure 70 Final conceptual diagram (Author 2017)

© University of Pretoria

06.3 Master Plan Development

The master plan is a layered result of the theory, concept and site informants. Primarily addressing the socio-ecological issues of the context (see chapter 1) while providing for a variety of surrounding users and their needs. The result is a didactic park.

From the urban and site analysis, a few opportunities were identified that could possibly influence design. Combined with the research, theory, and the concept it can generate a master plan design for the site. The opportunities identified were:

1. The site is unplanned and ambiguous.
2. The site consists of a unique type of topography (static and dynamic) that can be utilized aesthetically and in construction, to capture the genius of the place.
3. The site is used by a diverse set of users.
4. The framework in its mixed use typology introduces even more users to the site.
5. The site is in close proximity to various transit nodes.
6. The group framework also proposes a transit node.

In order to establish where the specific intervention would be located, the author investigated various aspects of the group framework such as: important connections; hierarchy of entrances; and hierarchy of vehicular routes. The investigation indicated that a didactic intervention will be most successful to the North-Eastern part of the framework. This was due to the fact that it is close to the main connection between transit node and various skill centres (see figure 71). This specific site is also very central to main entrances of the framework, as well as close to main routes. Thus the master plan design will commence in this specific area.

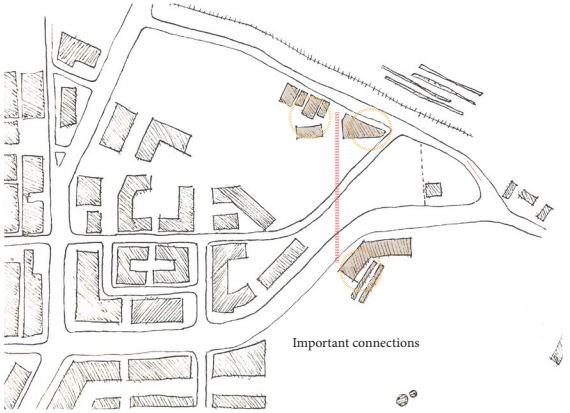


Figure 71 | Urban framework indicating important links (Author 2017)

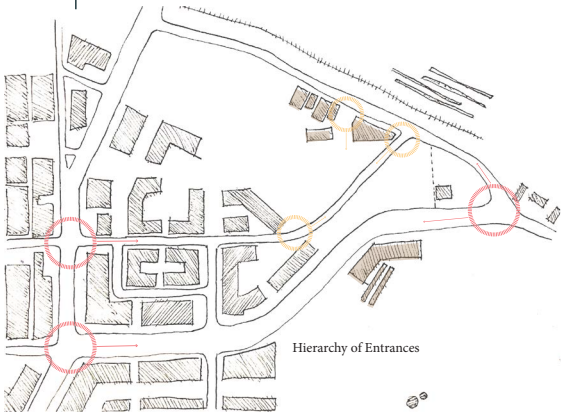


Figure 72 | Urban framework indicating Entrances (Author 2017)

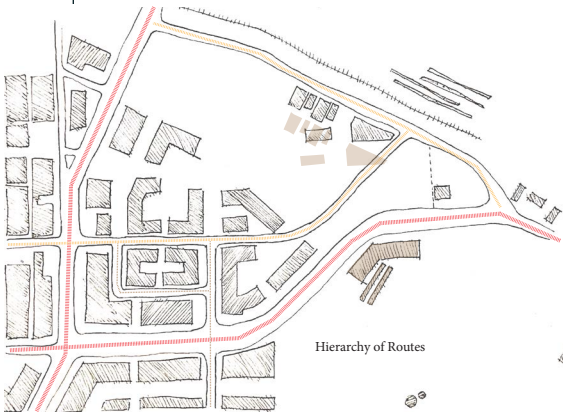


Figure 73 | Urban framework indicating routes (Author 2017)

© University of Pretoria

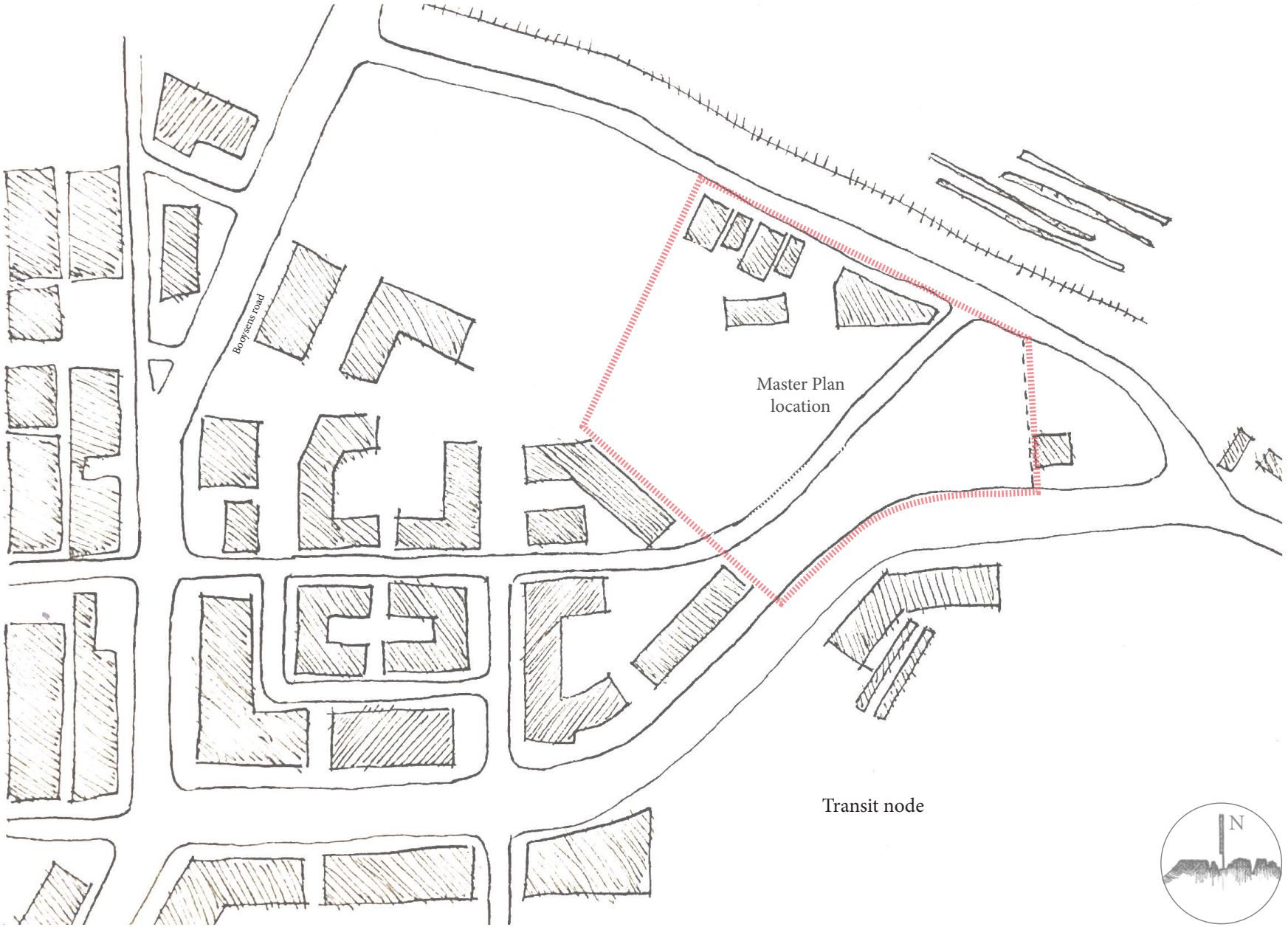


Figure74 | Urban framework indicating Master plan location (Author 2017)

© University of Pretoria

06.4 Master Plan Informants

Route Investigation

The first investigation was driven by the most important route or connection on the site. The skills centres form part of the framework, and the connection between the transit node and these centres become very important. It is a route that will be used on a daily basis. The linear link between these places will act as a functional route. The next investigation of the author was driven by the theoretical chapter, to investigate the effect of a meandering path on which didactic moments in the landscape could be articulated. The concept and theory chapter explains it as moments of sensory experience that educates or informs the user (see figure 74).

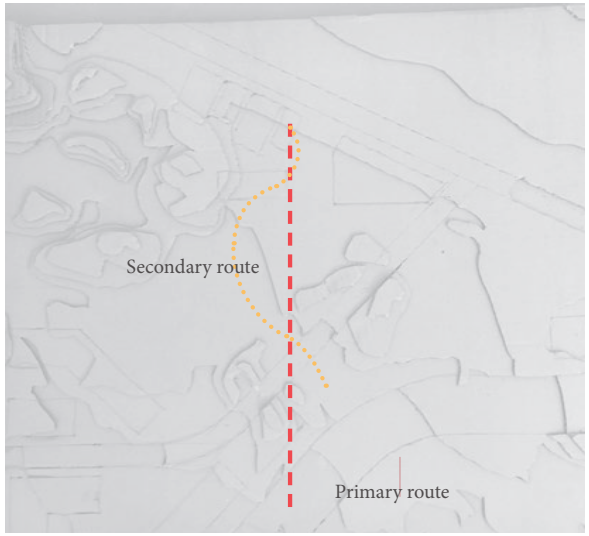


Figure 75 | Model Investigating routes (Author 2017)

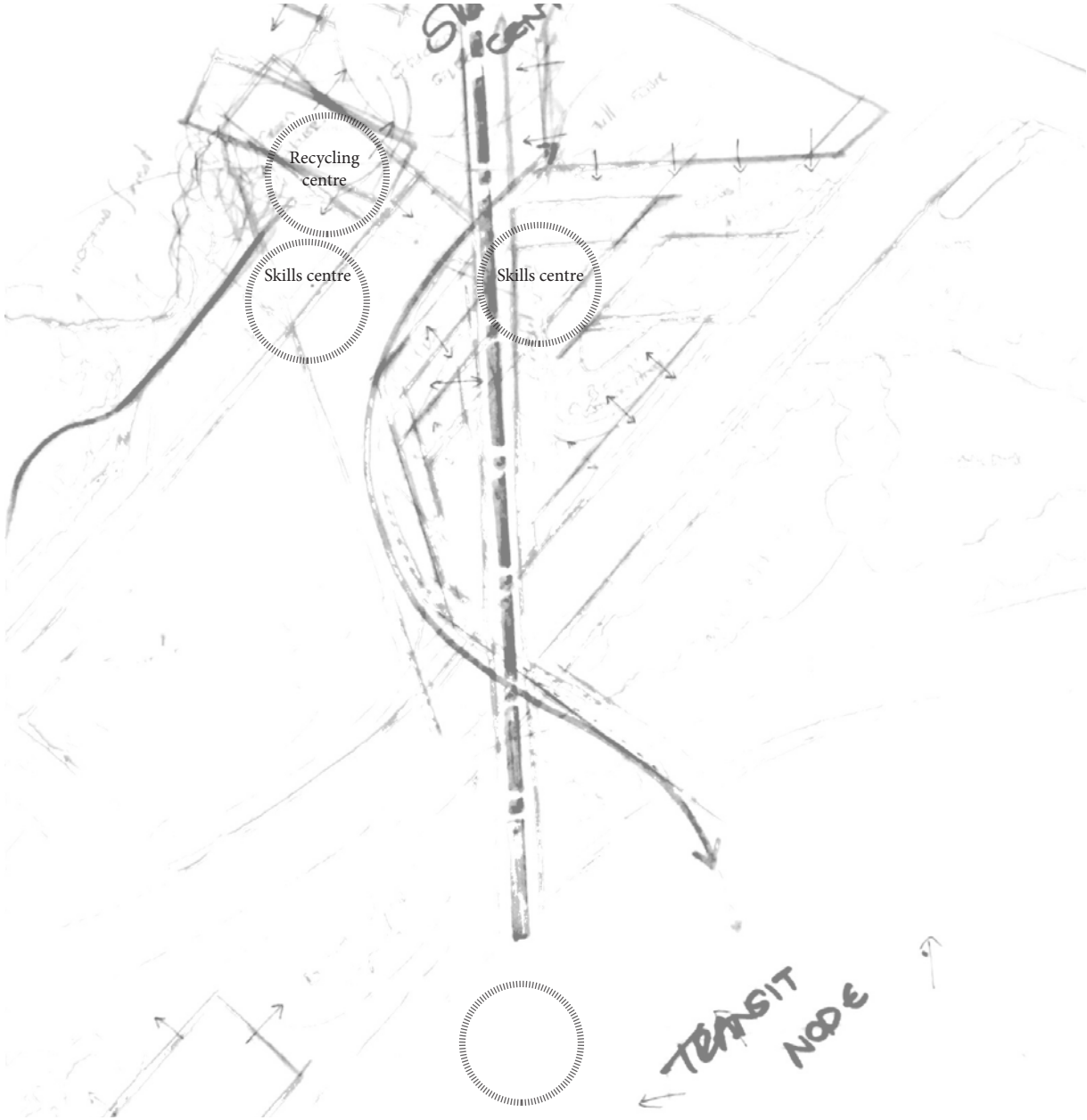


Figure 76 | Primary vs. Secondary route investigation (Author 2017)

© University of Pretoria

Topographic Investigation

The second layer of investigation focused on the topography on the site. Since it is part of the theoretical approach and the concept to respect the genius of the place, it was decided that certain topography needed to be retained and used as memory abstractions and remnants (see figure 78).

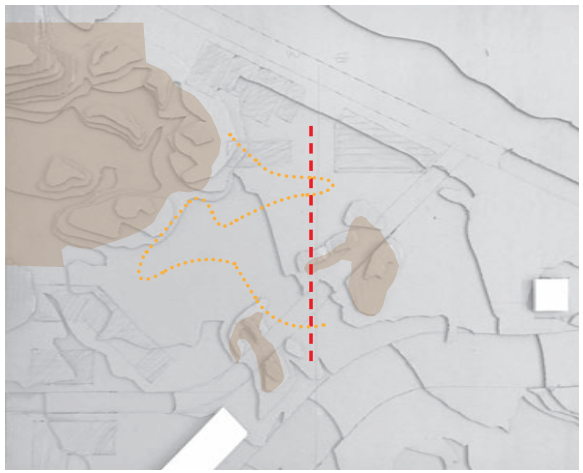


Figure 77 | Model investigating Primary vs. Secondary routes (Author 2017)

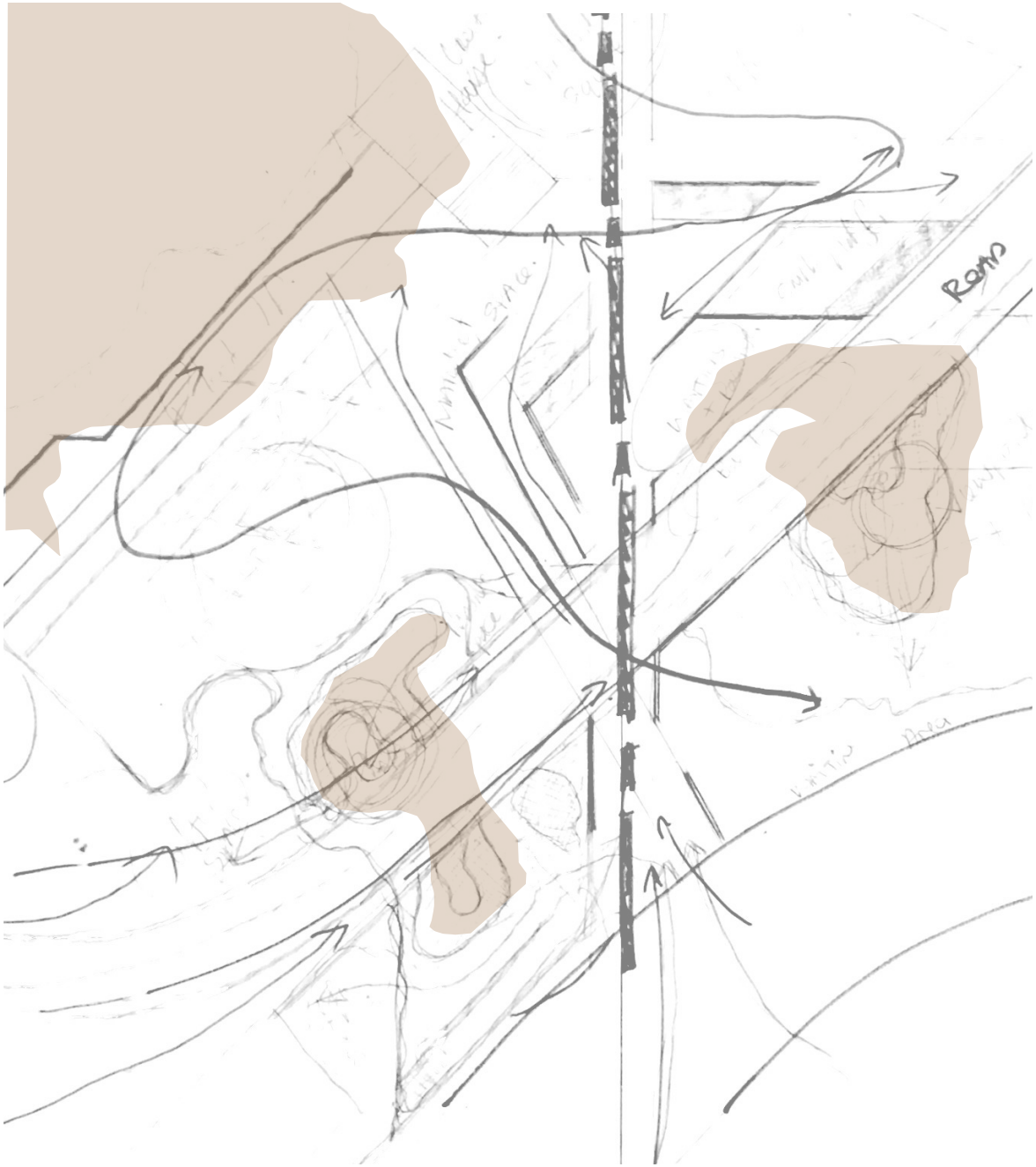


Figure 78 | Plan investigating the static topography on site (Author 2017)

© University of Pretoria

Desire lines

The third layer of investigation was identifying and superimpose the linearity of the connection between the site and the informal settlement on the previous layer to act as desire lines. These desire lines created for a very linear spatial organization ,contrasting the organic path and topography on the site (see figure 80).

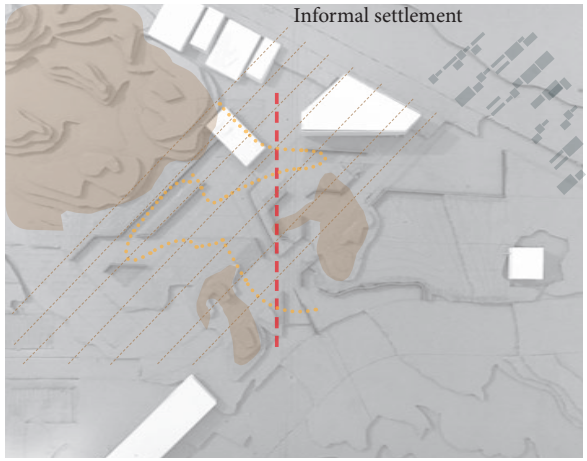


Figure 79 | Model Investigating linear grid of the settlement on site (Author 2017)

Figure 80 | Plan investigating the linearity of the desire lines (Author 2017)

© University of Pretoria

Ideally the scale of these three developments should have been similar to make comparison easier (see figure 81).

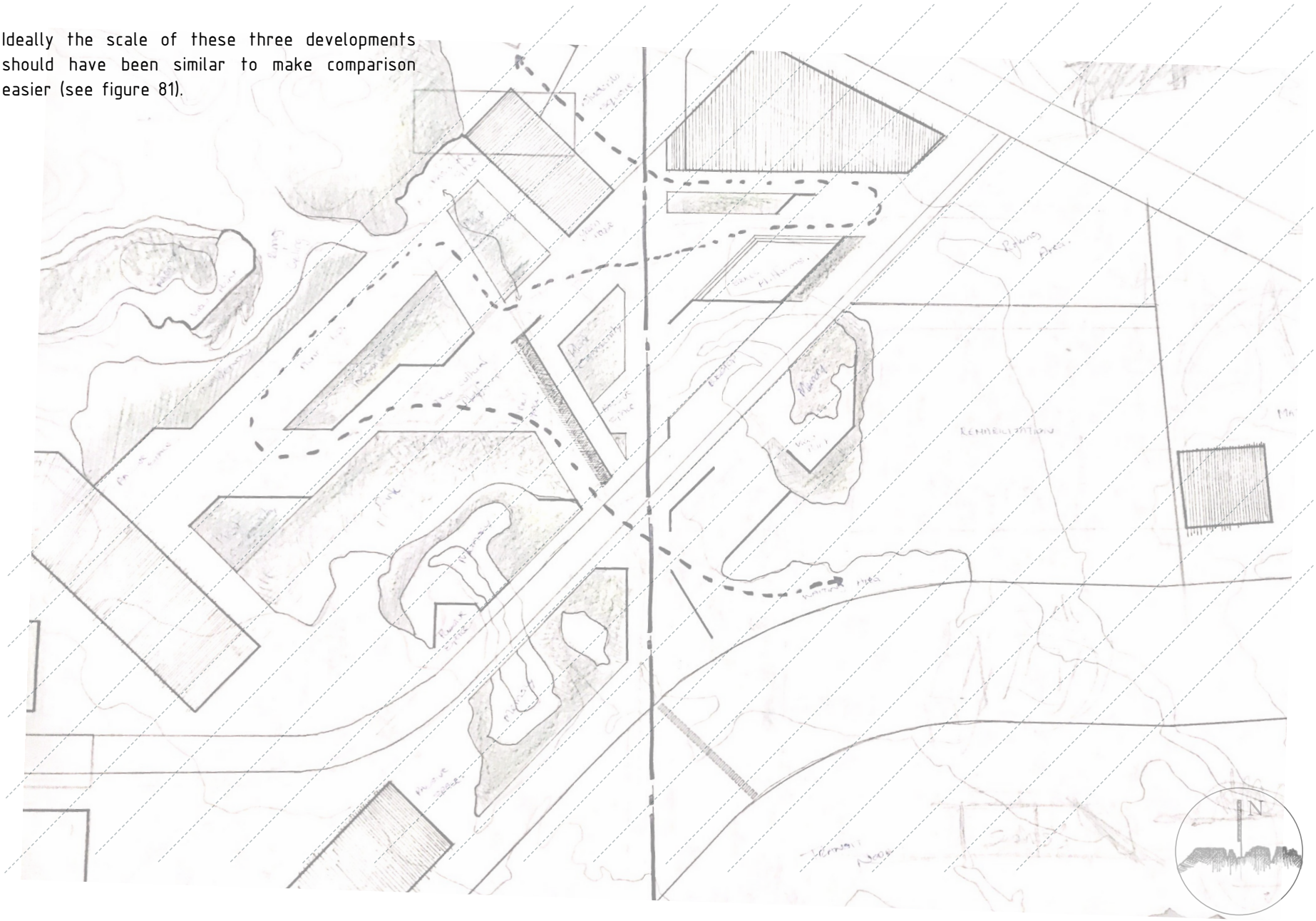


Figure 81 | Development of Master plan through iteration of desire lines (Author 2017)

© University of Pretoria

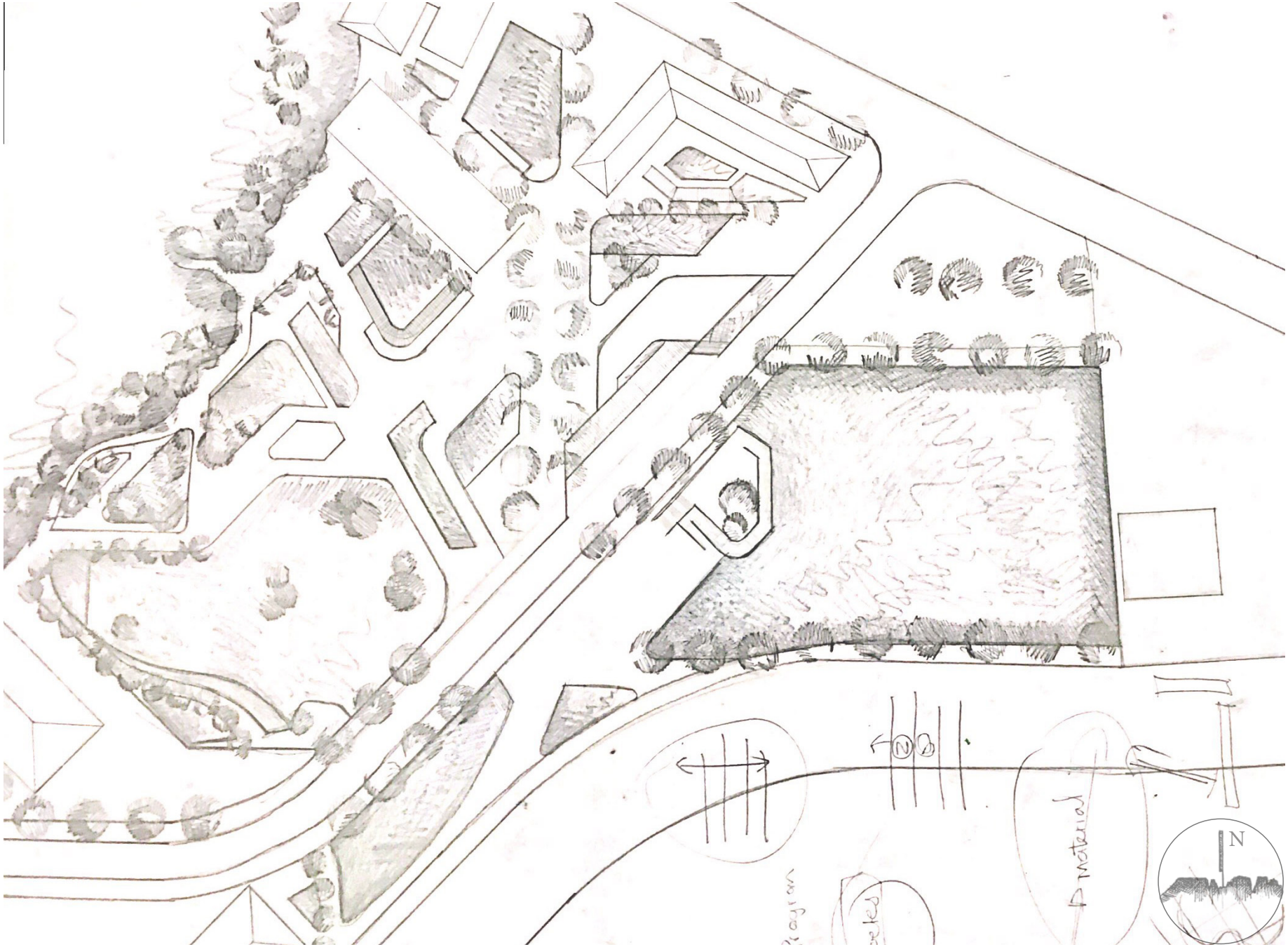


Figure 82 | Development of Master plan through iteration (Author 2017)

© University of Pretoria

Figure 83 | Final Master plan NTS (Author 2017)

© University of Pretoria

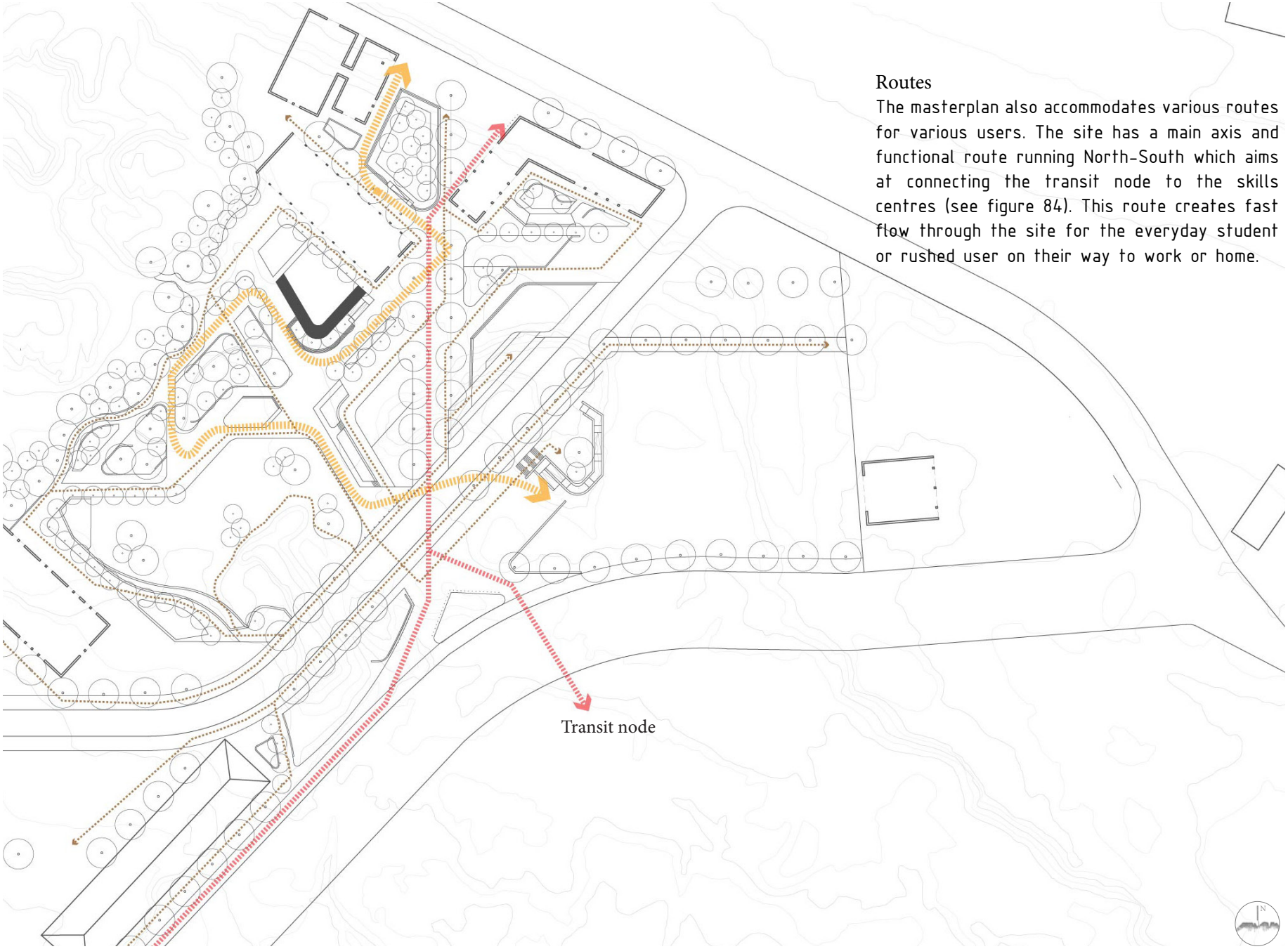
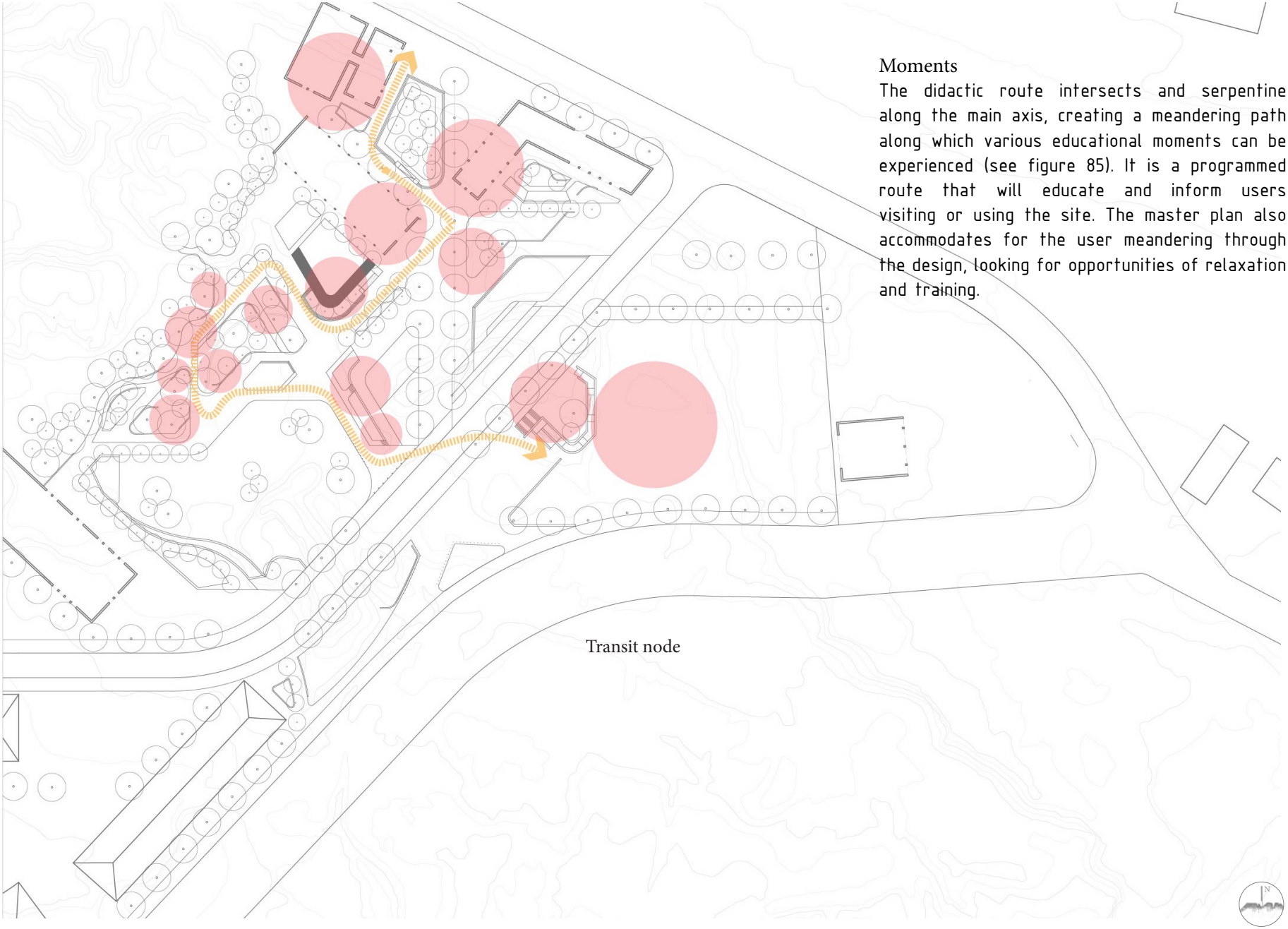


Figure 84 | Master plan circulation route organization (Author 2017)

© University of Pretoria



Moments

The didactic route intersects and serpentine along the main axis, creating a meandering path along which various educational moments can be experienced (see figure 85). It is a programmed route that will educate and inform users visiting or using the site. The master plan also accommodates for the user meandering through the design, looking for opportunities of relaxation and training.

Figure 85 | Master plan Educational moments on path (Author 2017)

© University of Pretoria

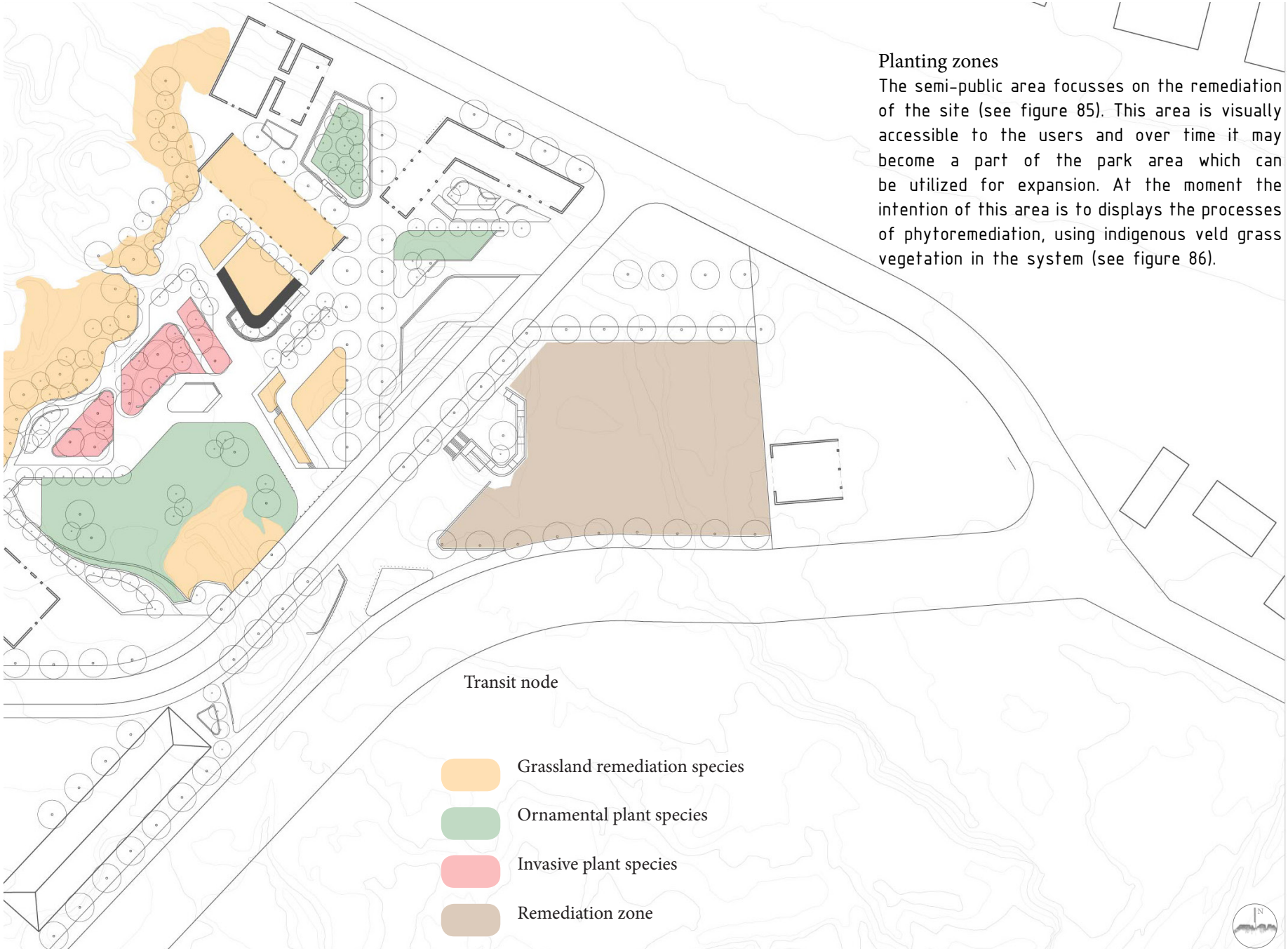


Figure 86 | Master plan organization and plant zoning (Author 2017)

© University of Pretoria

© University of Pretoria

© University of Pretoria

07 _Chapter Seven

Sketch Plan Development

The sketch plan chapter focusses on the selection and refinement of a specific area on the master plan. The intention of the sketch plan is explained as well as the design process for the specific didactic moments in the landscape. The final sketch plan is explained in detail.

As the concept mentioned, (chapter 6) the design is driven by the idea of a didactic experience with specific moments in the landscape that is able to educate and inform on the socio- ecological issues of the context. Thus the sketch plan area is chosen in order to reflect these moments as they have a strong focus on tectonic elements for further investigation in chapter 8.

© University of Pretoria

07.1 Sketch Plan

Figure 87 | Sketch plan focus area on master plan (Author 2017)

© University of Pretoria

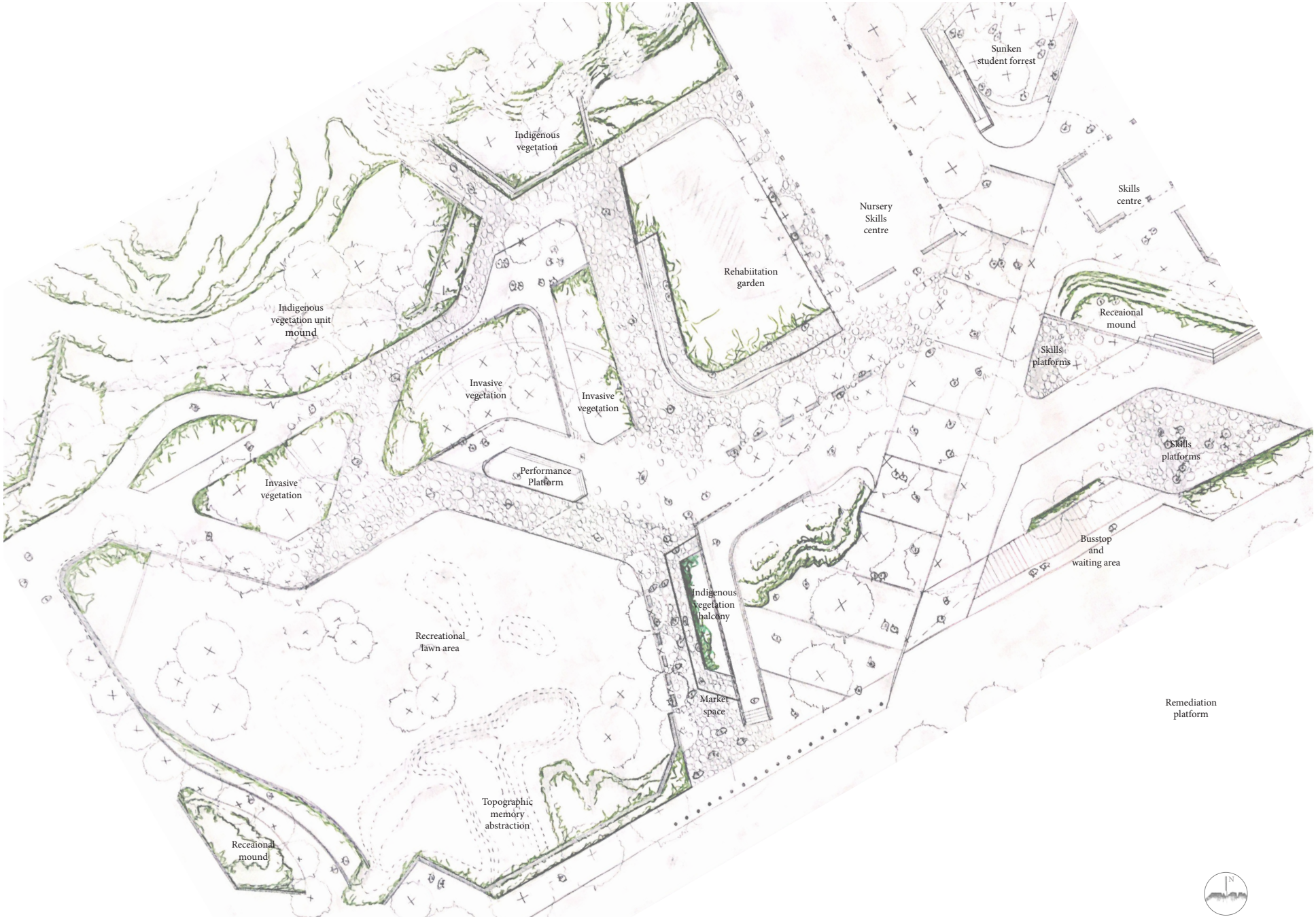


Figure 88 | Sketch plan area development (Author 2017)

© University of Pretoria

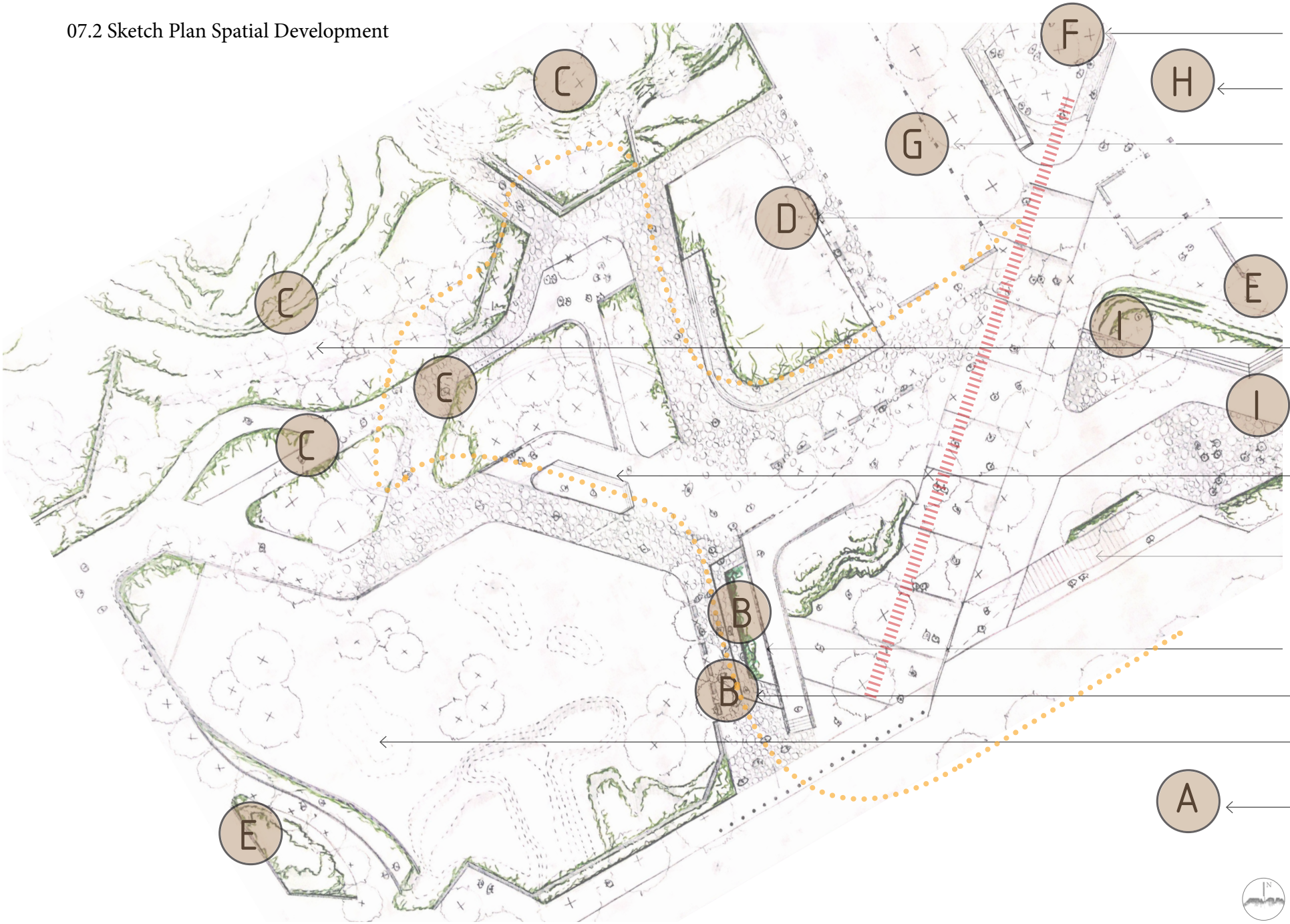


Figure 89 | Sketch plan illustrating routes on site (Author 2017)

© University of Pretoria

F Sunken Student Forrest

H Skills Centre

G Nursery Skills Centre

D Remediation garden

E Recreational green mounds

C Plant identification

I Skills Platforms

Performance Platform

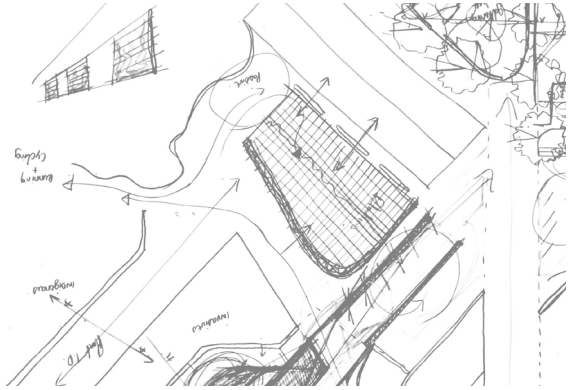
Busstop & Waiting Area

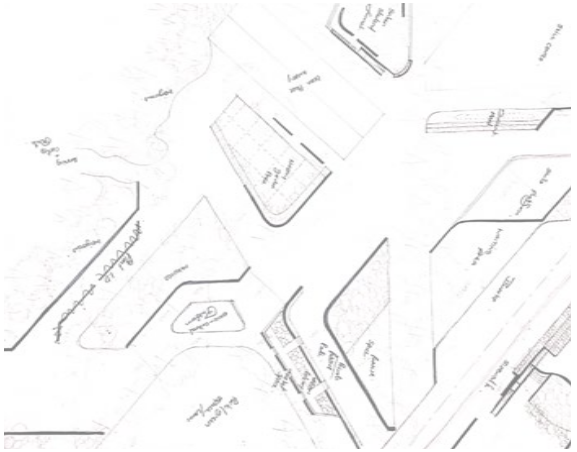
B Indigenous Shrub Balcony

B Urban Market Space

Recreational Green Area

A Remediation View Point





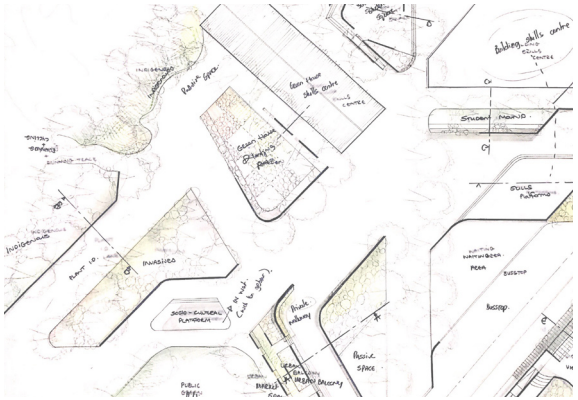


Figure 90 | Sketch plan development through iteration (Author 2017)

© University of Pretoria

A. Remediation View Point Spatial Development

As mentioned in chapter 3 the site is subject to heavy metal pollution and must be remediated. Chapter 2 showed that it is possible to incorporate a program of remediation in a didactic landscape through spaces dedicated to healing the land. The research done in chapter 2 illustrated that it is important to make these processes visually accessible. In this case the intention of the remediation view point is to create visual access for the user over the remediation zone (see figure 91). Since this zone is not physically accessible this area is designed to provide a visual experience on how the site is being healed. The elevated platform can also be used as a quiet space, used for yoga or meditation in the early morning, with the sun rising over the Robinson deep landfill (see figure 92).

© University of Pretoria

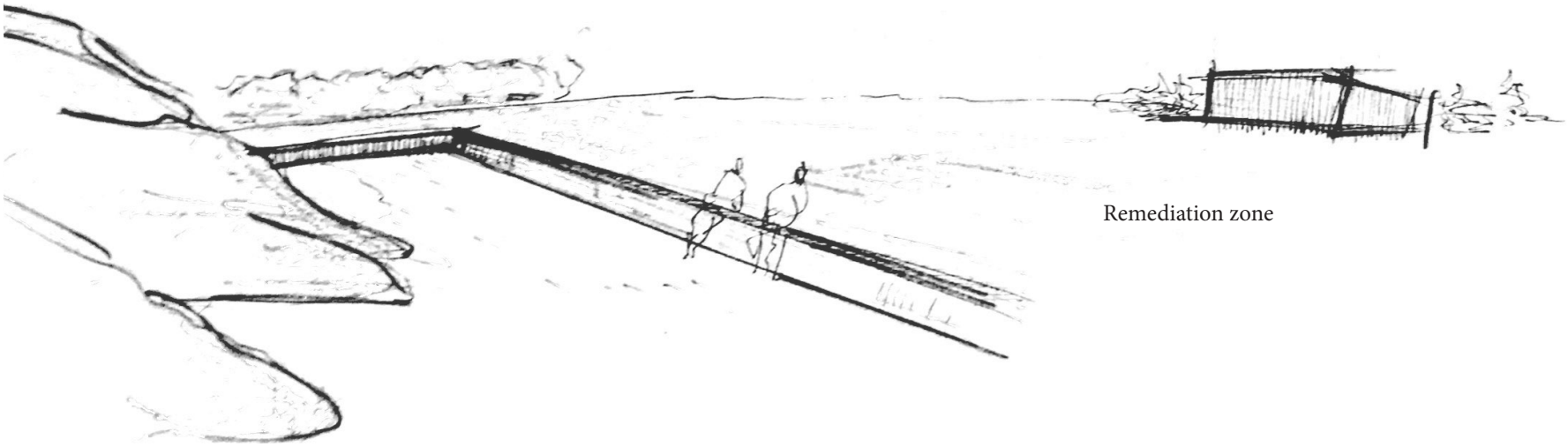


Figure 91 | Remediation view point spatial development through perspective exploration (Author 2017)

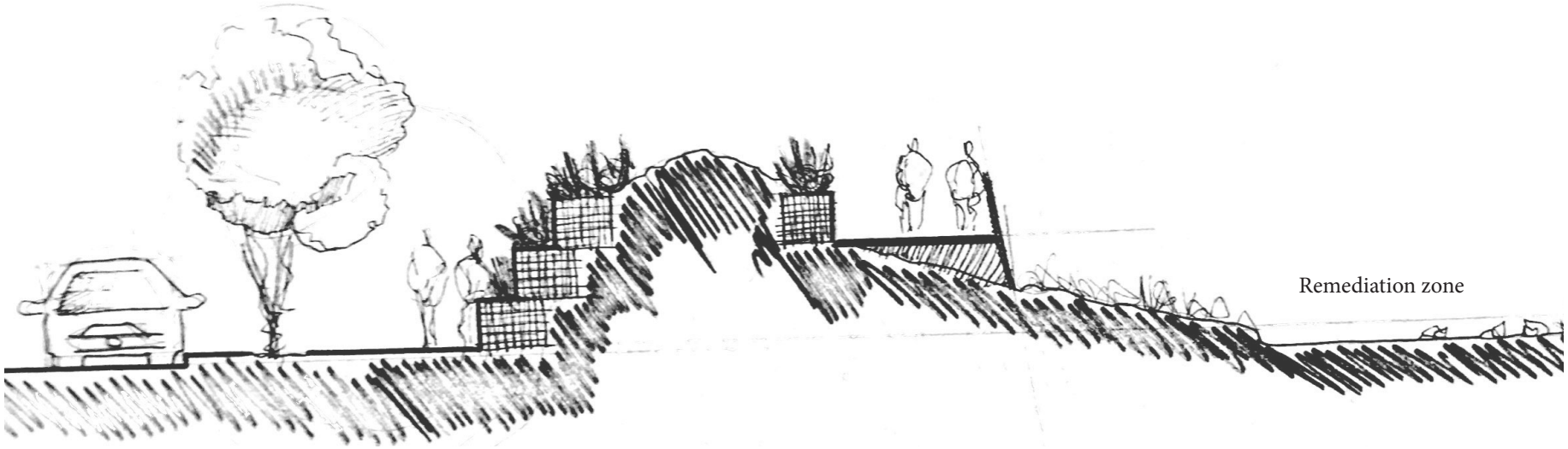


Figure 92 | Remediation view point spatial development through section iteration (Author 2017)

© University of Pretoria

B. Urban Market Space & Balcony Spatial Development

As mentioned in chapter 5, the intervention should accommodate for the daily needs of the users. Although the programme is didactic, the basic needs of the everyday users must still be accommodated for. Therefore, an urban market space with a balcony overlooking the site is proposed (see figure 93). Throughout the week this space can be used for communal informal trading. Over weekends the market space has the potential to become a large urban market that generates economic income for the site. The urban market and balcony is a multifunctional area, that provides for a vibrant area at the bottom and a quieter area at the top (see figure 95). It becomes a poetic moment in the landscape providing a view point over the site.

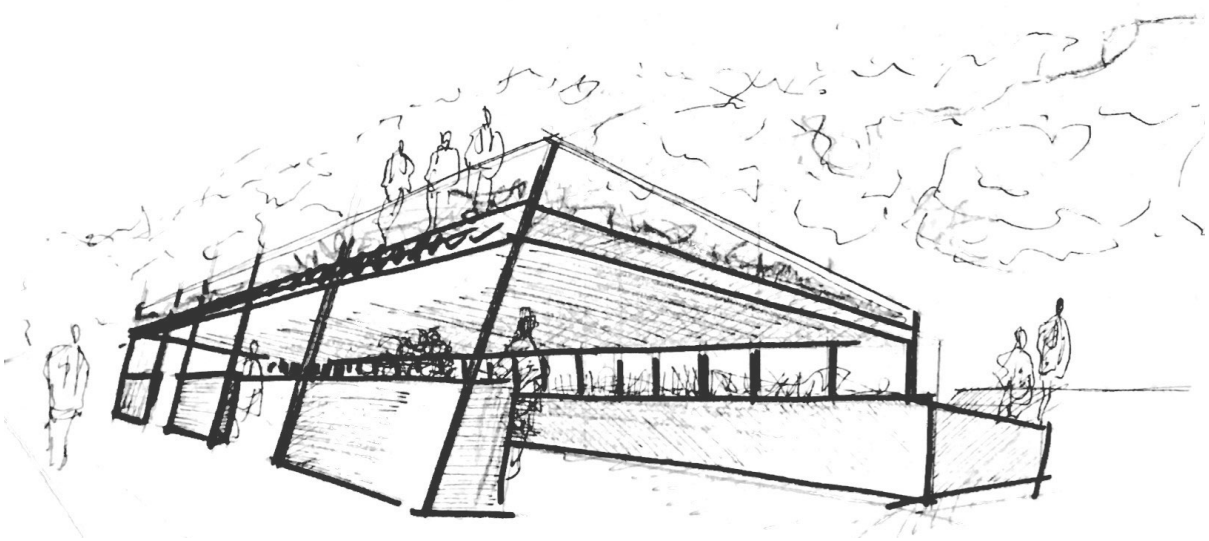


Figure 93 | Urban market and balcony vision through perspective exploration (Author 2017)

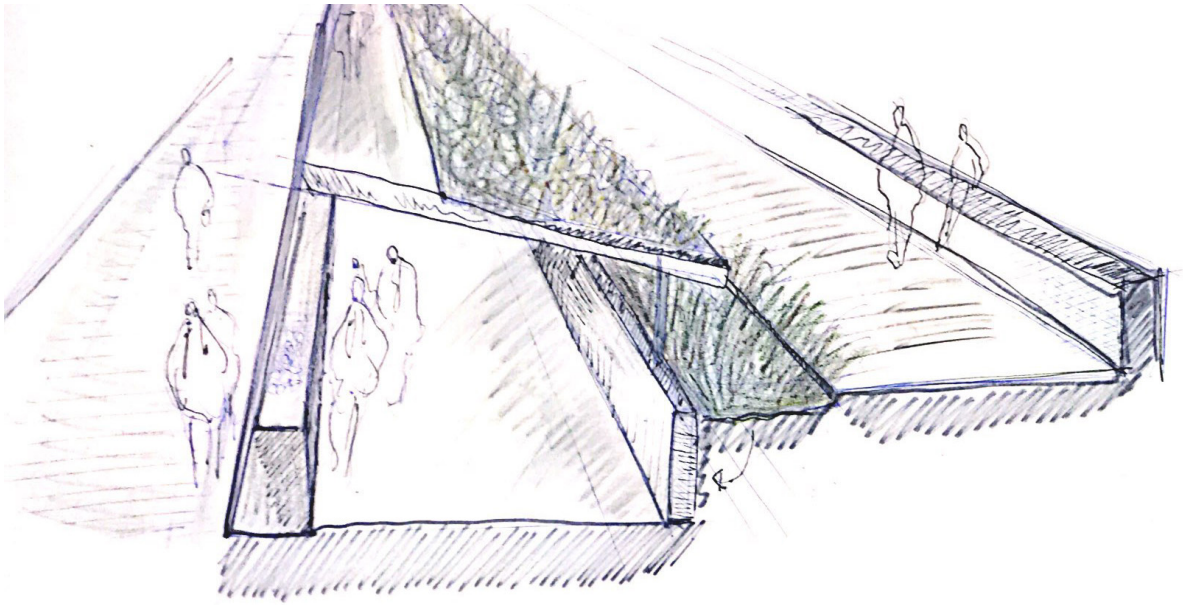


Figure 94 | Urban market and balcony spatial iteration through section perspective (Author 2017)

© University of Pretoria

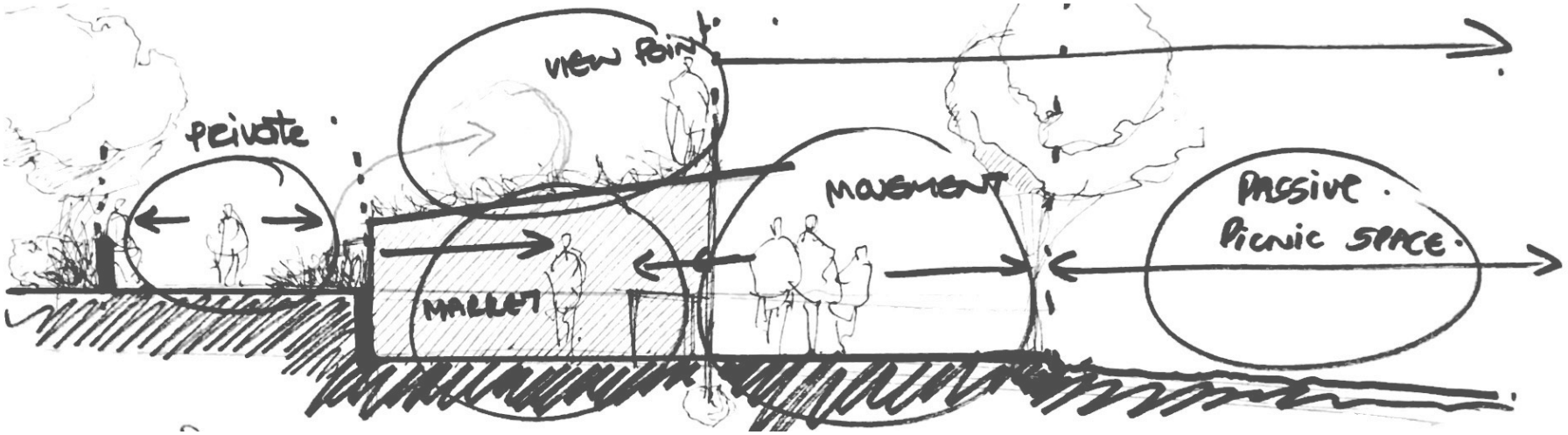


Figure 95 | Urban market and balcony spatial organization through section iteration (Author 2017)

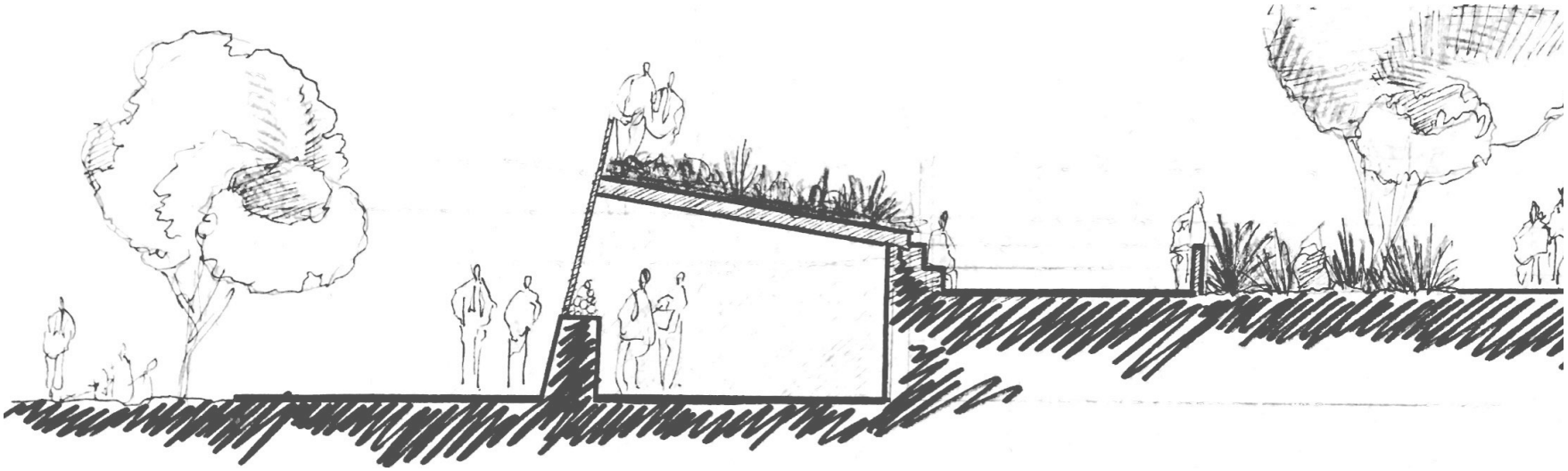


Figure 96 | Urban market and balcony functional development through section iteration (Author 2017)

© University of Pretoria

C. Invasive & Indigenous Vegetation Unit Spatial Development

Chapter 5 explains the intention of this moment, as a space creating visual contrast between planting zones, aiming towards visually educating the users on the indigenous and invasive planting in the area. The user will visually notice the contrast of planting showing two different historical layers of the site. The existing invasive planting and the indigenous recreational planting unit incorporated on the opposite edge. This area has the potential to become a strong poetic moment in the landscape (see figure 99).

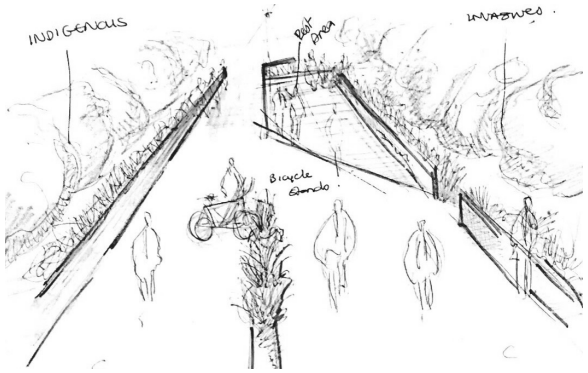


Figure 97 | Spatial development of the invasive vs. indigenous exploration (Author 2017)

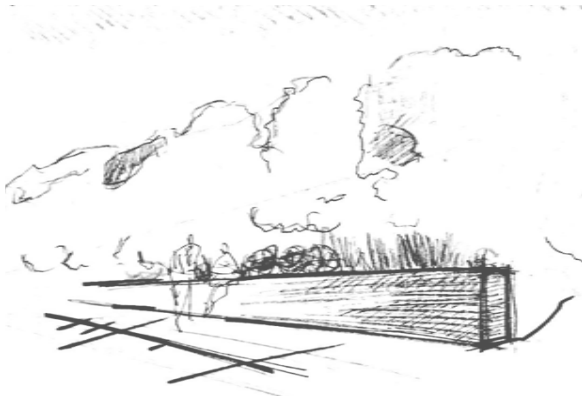


Figure 98 | Edge condition through wall exploration (Author 2017)

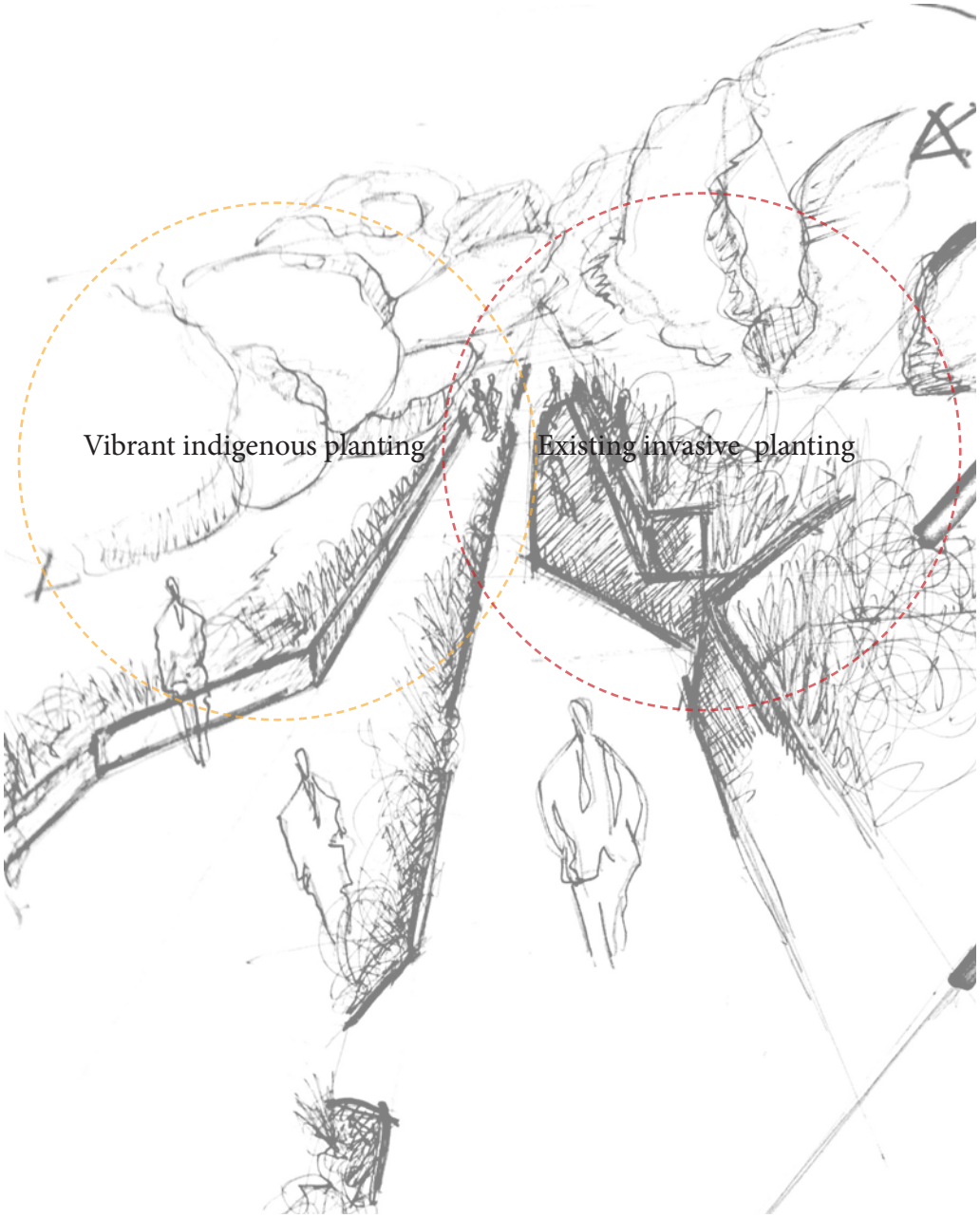


Figure 99 | Spatial development of the contrasting planting edges through perspective exploration (Author 2017)

© University of Pretoria

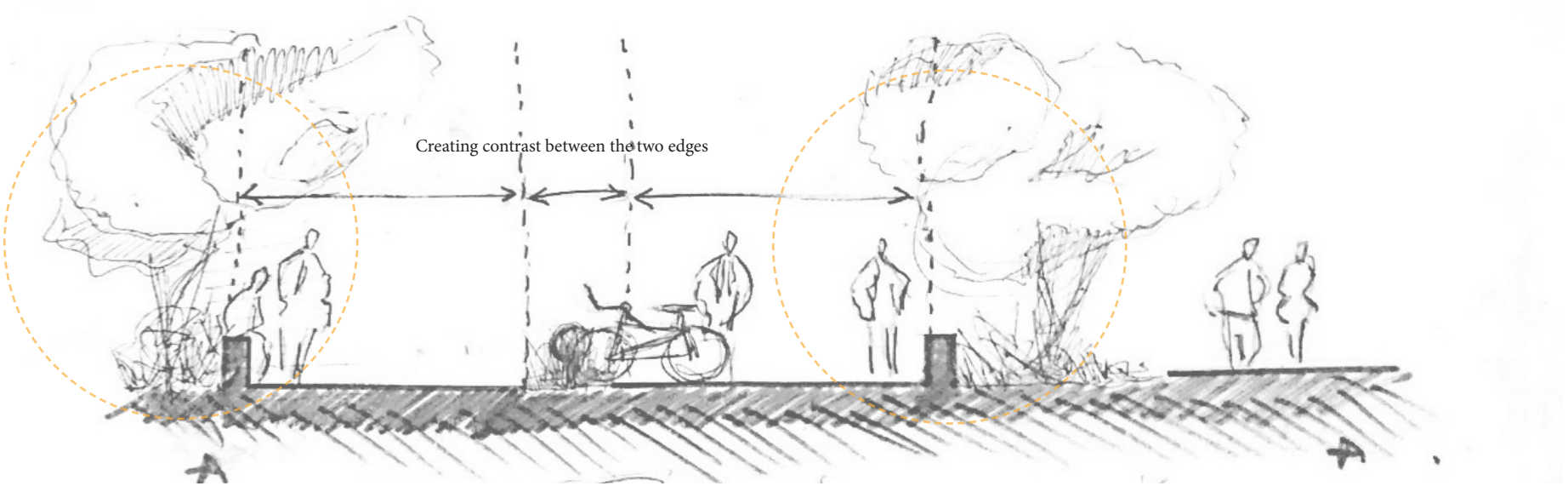


Figure 100 | Invasive vs Indigenous zone development through section iteration (Author 2017)

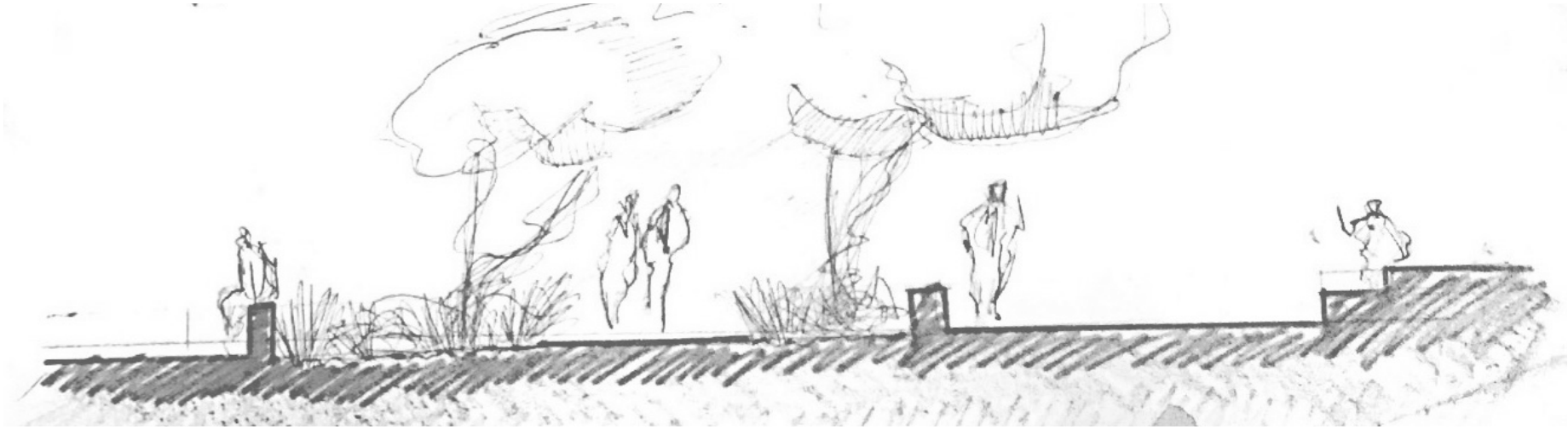


Figure 101 | Sketch plan development through section iteration (Author 2017)

© University of Pretoria

D. Remediation garden Spatial Development

As mentioned above in space A, the site will be subject to a large remediation zone. The intention of the remediation garden is to have space where the remediation planting is physically accessible and intractable. This area will consist of the planting palette which is used to remediate and heal the site. Here the user can see, smell, and feel the grass species used in remediation. From indigenous pioneer species to climax species will visually and physically accessible (see figure 102). The intention is also to plant the grasses in such a way that the difference between pioneer, sub climax and climax species are visual and educational. This way the space creates for a poetic moment in the landscape while educating users on the importance of the indigenous grasslands in the area (see figure 103).

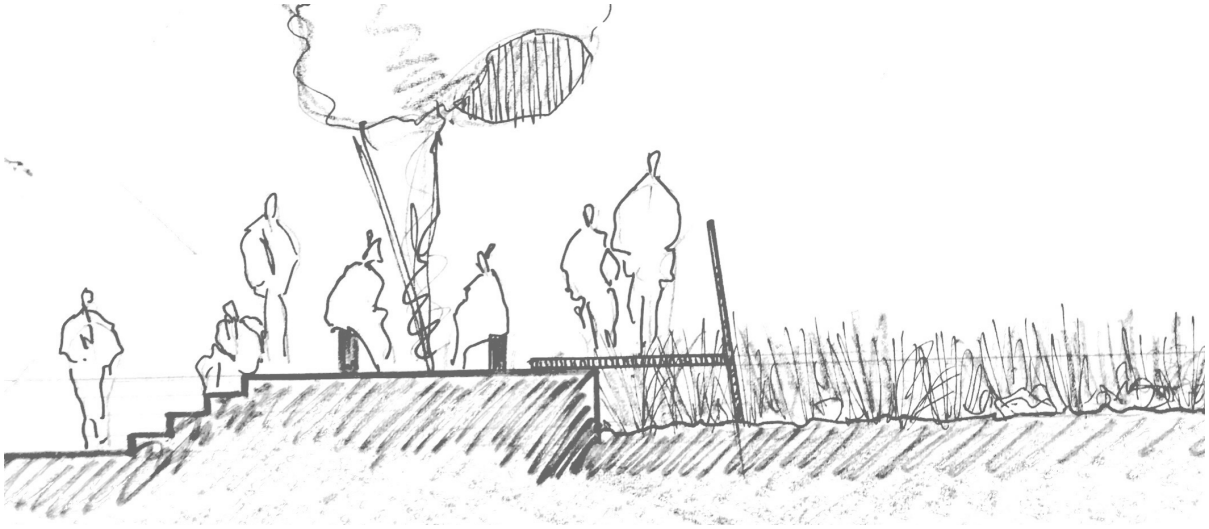


Figure 102 | Spatial intention of the remediation garden as section iteration (Author 2017)

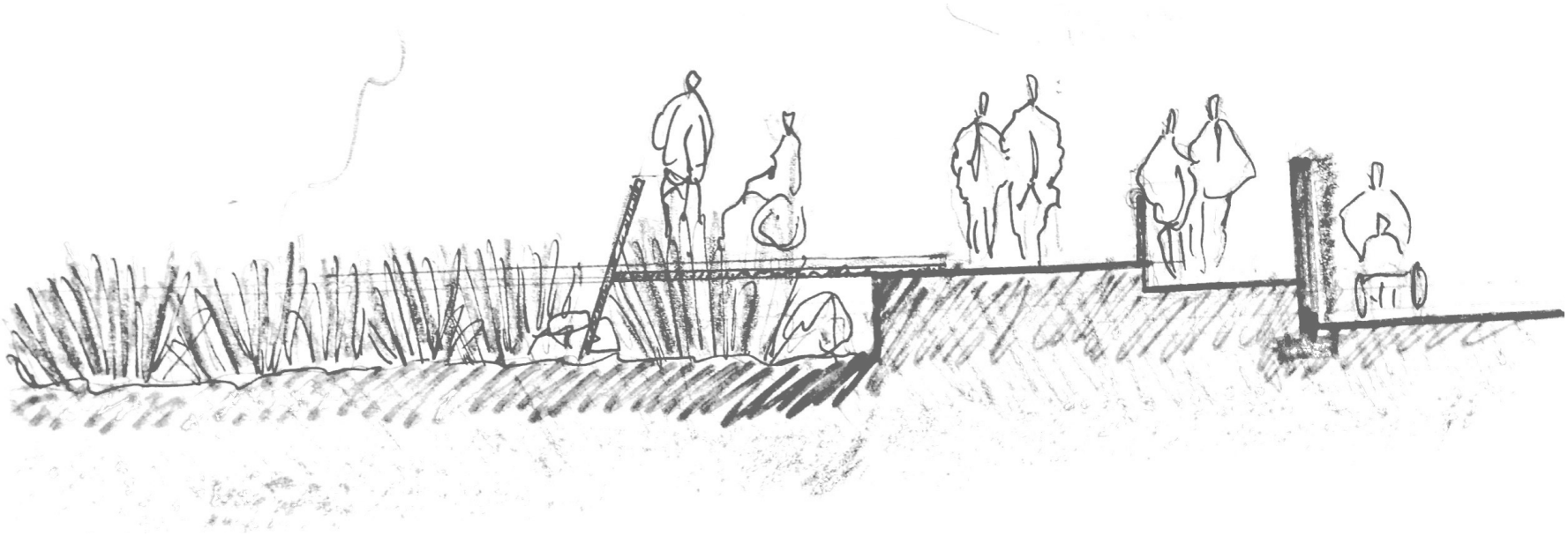


Figure 103 | Remediation garden section iteration (Author 2017)

© University of Pretoria

F. Sunken Student Forrest Spatial Development

The park act as a green space for the larger precinct. It can be used for various recreational activities, passive activities, spiritual activities, sporting activities, or just a green space to pass the time. The site also accommodates students from the various skills centres, and therefore needs space in which students can relax and pass time. Although this space is open to all users it is a sunken forest space with the intention of taking the student out of his busy daily surroundings. The sunken space transports the user from the busy activities into a quiet, dense, natural space. This sunken area also has the capability of acting as a detention facility in a rain event (see figure 105).

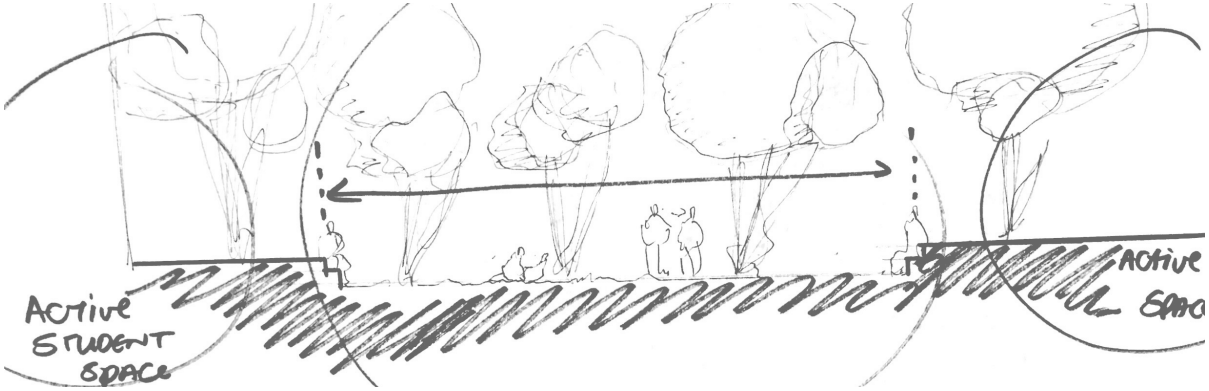


Figure 104 | Sunken student forest development through section iteration (Author 2017)

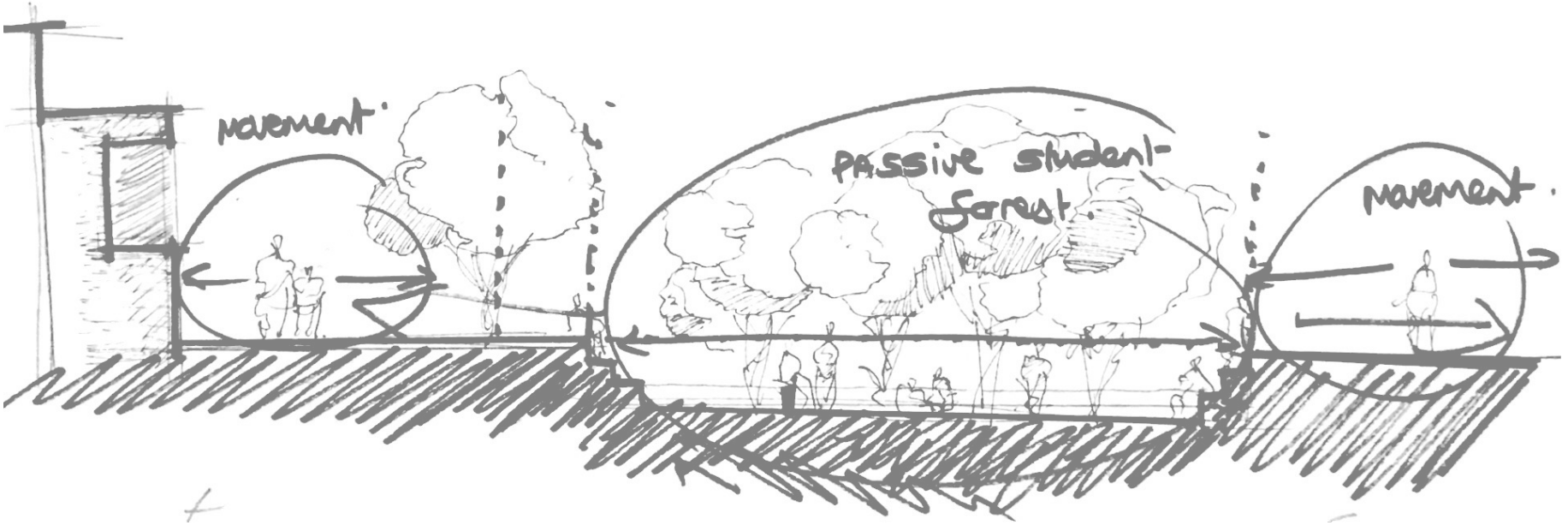


Figure 105 | Sunken student forest edge development through section iteration (Author 2017)

© University of Pretoria

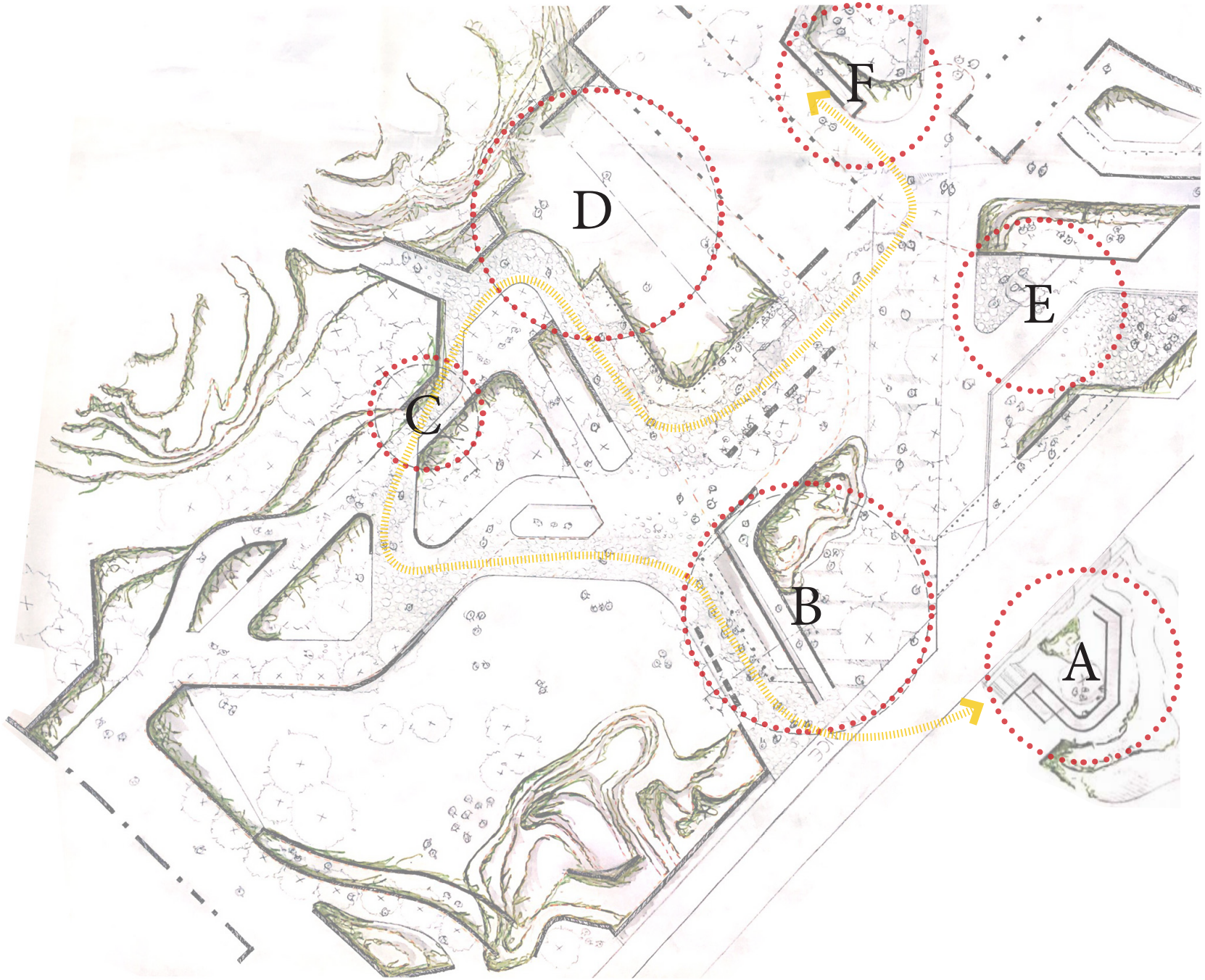


Figure 106 | Sketch plan development NTS (Author 2017)

© University of Pretoria

07.3 Sketch Plan Moments Refinement

Figure 107 | Final Sketch plan, Illustrating important moments on the didactic route NTS (Author 2017)

© University of Pretoria

Section A_A: Urban Market & Balcony

© University of Pretoria

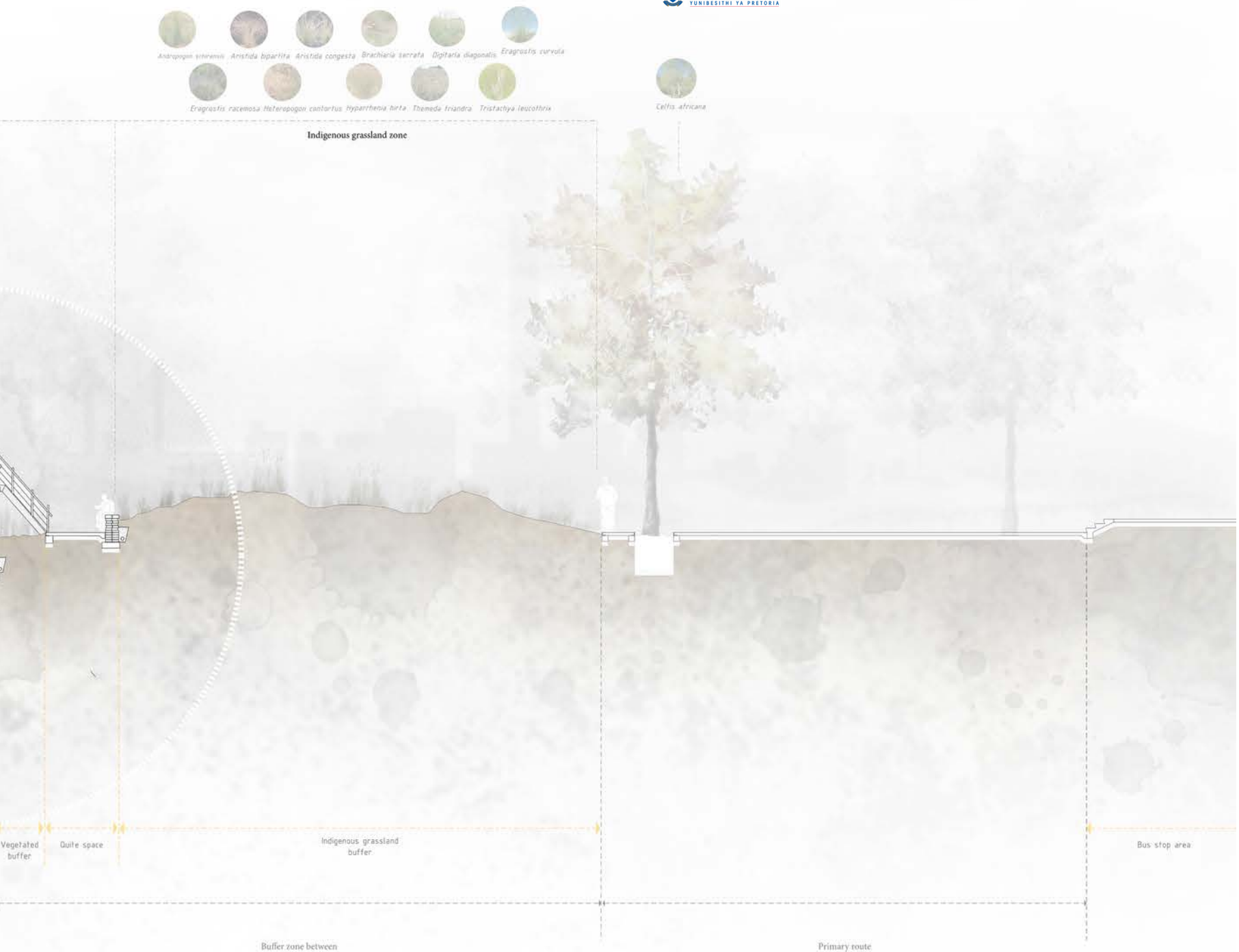
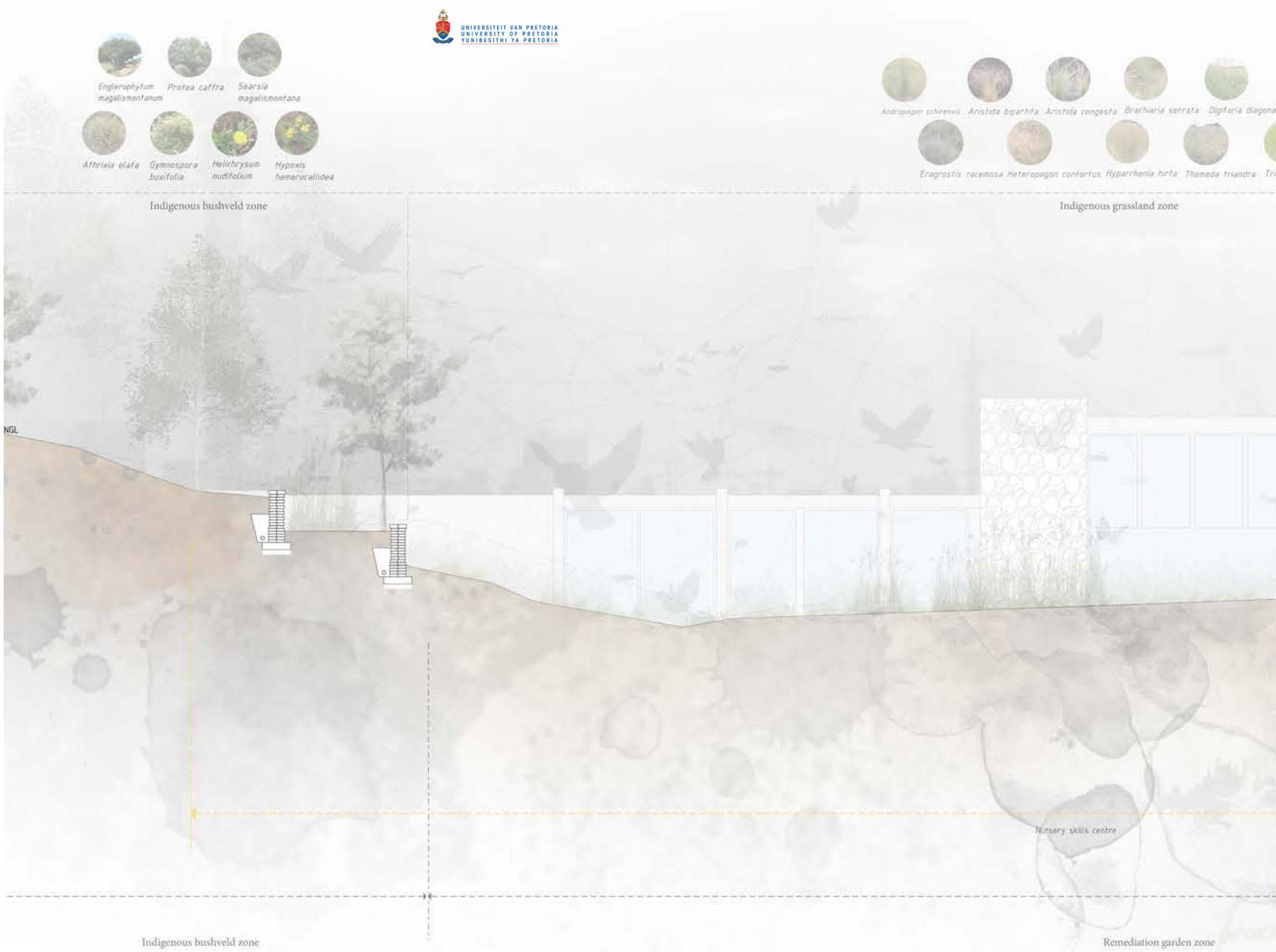


Figure 108 | Section A-A Section through topographic remnant, recreational green space, and urban market NTS (Author 2017)

© University of Pretoria



Section C_C : Remediation garden

© University of Pretoria

Figure 109 | Section C-C through remediation garden NTS (Author 2017)

© University of Pretoria

Section B_B: Plant Identification zone

© University of Pretoria

Figure 110 | Section B-B through Plant identification zone NTS (Author 2017)

© University of Pretoria

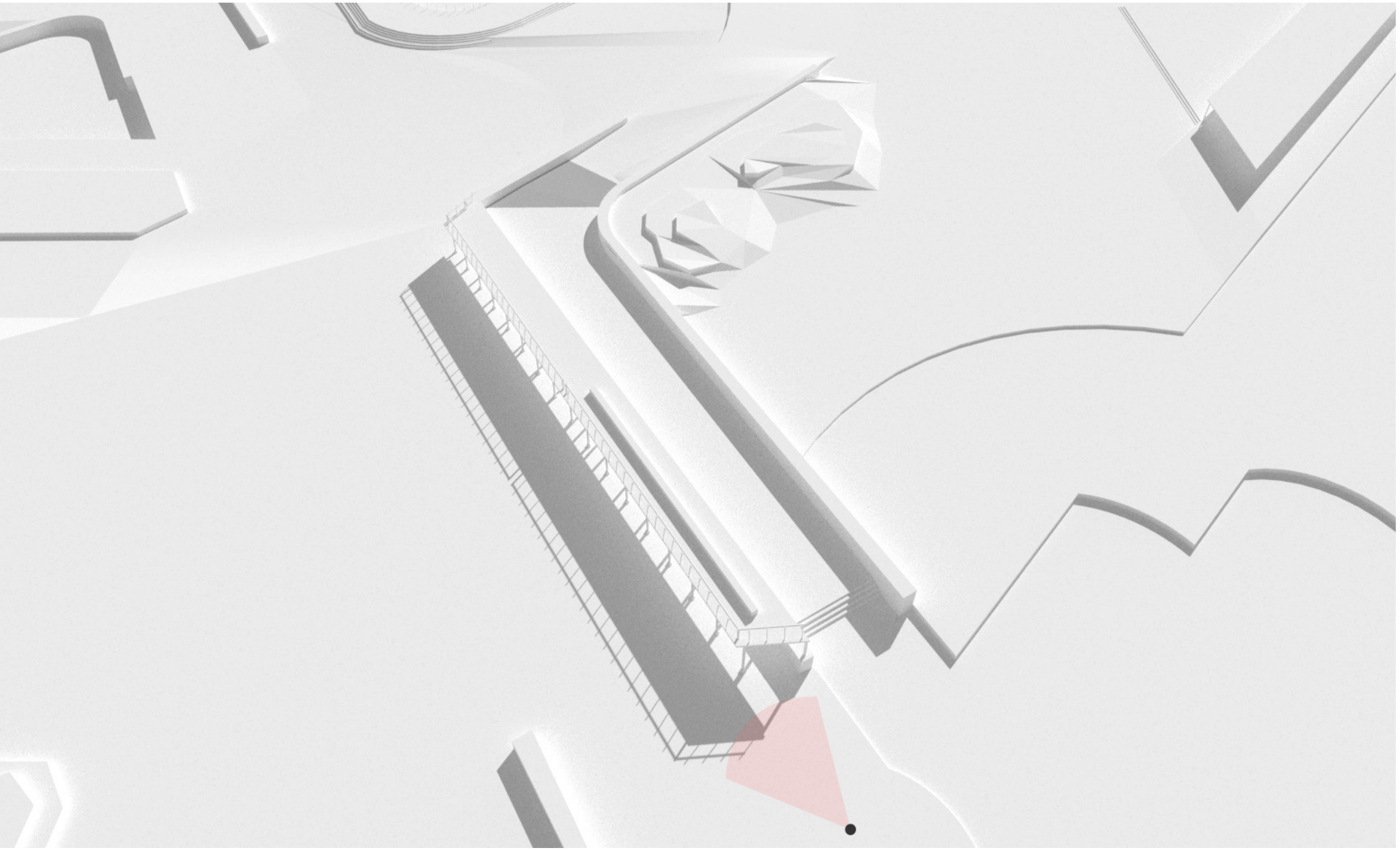


Figure 111 | Spatial model exploration of the urban market and balcony moment (Author 2017)

© University of Pretoria

Figure 112 | Perspective of the urban market and balcony moment (Author 2017)

© University of Pretoria

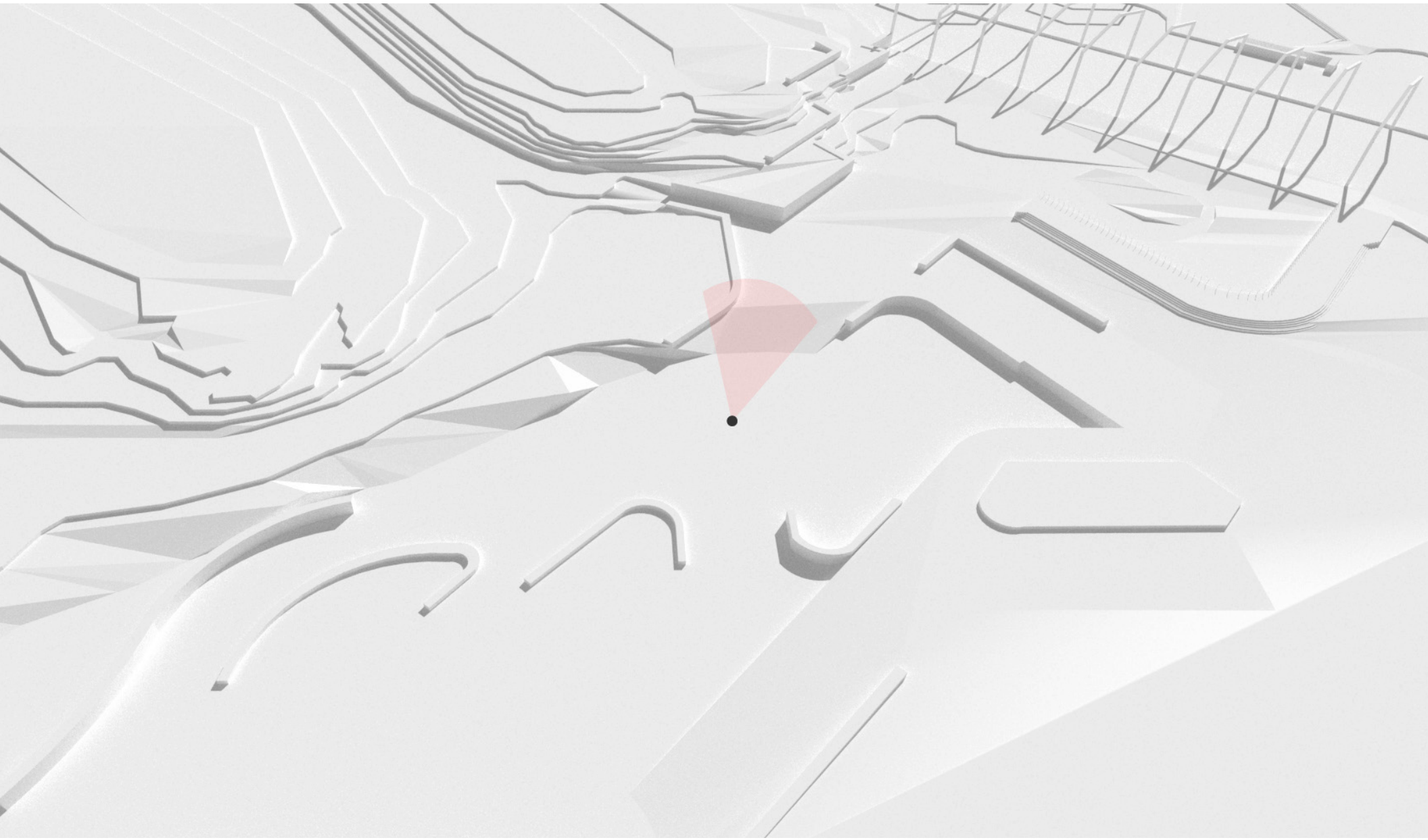


Figure 113 | Spatial model exploration of the plant identification moment (Author 2017)

© University of Pretoria

Figure 114 | Perspective of the plant identification moment (Author 2017)

© University of Pretoria

Figure 115 | Spatial model exploration of the remediation garden moment (Author 2017)

© University of Pretoria

Figure 116 | Perspective of the remediation garden moment (Author 2017)

© University of Pretoria

© University of Pretoria

08_Chapter Eight

Technical Development

This chapter focuses on the systems and detailed technification of the project. First the author develops and illustrates the water system, then planting strategy, and lastly material choices. Next the author investigates the tectonics of the *in-situ* materials used to develop the poetics of the construction in the landscape, and finally these investigations are developed as construction details.

© University of Pretoria

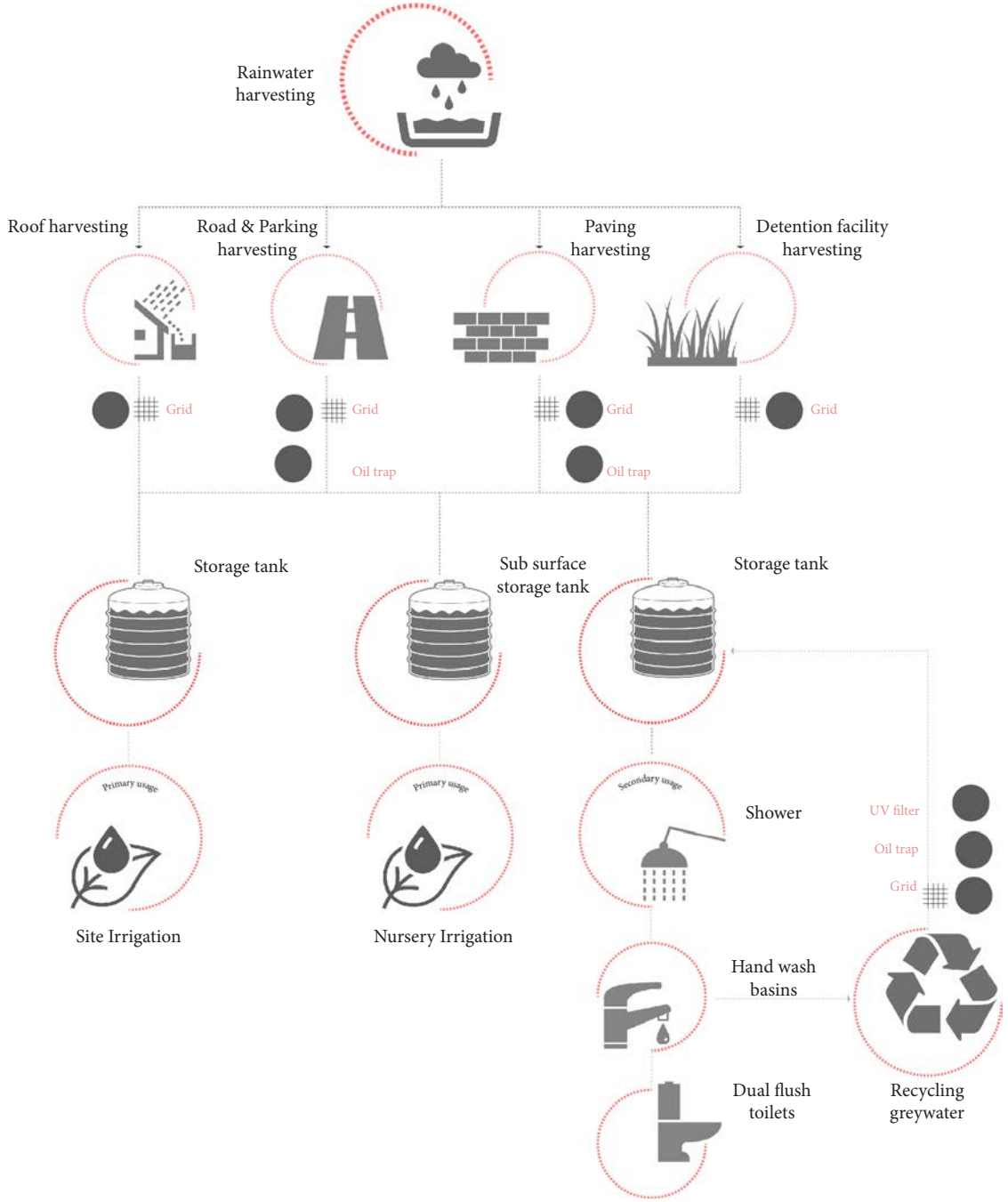


Figure 117 | Combined water strategy (Author, 2017)

08.1 Water strategy Development

The site will have a rainwater harvesting system. The larger system will be split into 3 different systems that functions separately and accommodates for different water needs on site. The primary water usage on site is to irrigate. The secondary use for water is to feed the facilities at the skills centre. The water systems will function as follow:

The first system indicated in figure 121 will be implemented at the skills centre. The rainwater harvested from this buildings 670 square meter roof area will only be used to feed the facilities within the skills centre. The harvested rain water accumulates in a 300 cubic meter tank and will typically feed the hand wash basins, showers, and toilets within the centre.

The second system indicated in figure 122 focuses on the sites nursery. Here rainwater will be harvested from the nursery's 1210 square meter roof area and accumulate in a 300 cubic meter tank. This water will purely be used for irrigation purposes within the nursery where the indigenous plants for the sites planting strategy will be grown.

The third system indicated in figure 123 focuses purely on the irrigation of the site. Rainwater will be harvested from surrounding paving, roads, and bioswale areas. Paved areas will be utilized to collect over an area of 2000 square meters. Road areas will be utilized to collect 2730 square meters, and lastly the bioswale areas will be used to collect over an area of 365 square meters. The rainwater will then accumulate in a 1000 cubic meter tank at the top of the site where it will gravity feed the irrigation system of the site.

© University of Pretoria

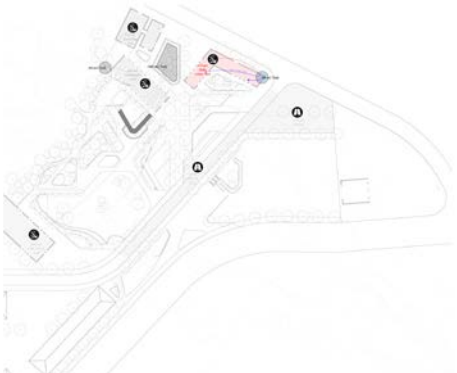


Figure 118 | Skills centre water strategy (Author 2017)

Figure 119 | Nursery water strategy (Author 2017)

Figure 120 | Site water strategy (Author 2017)

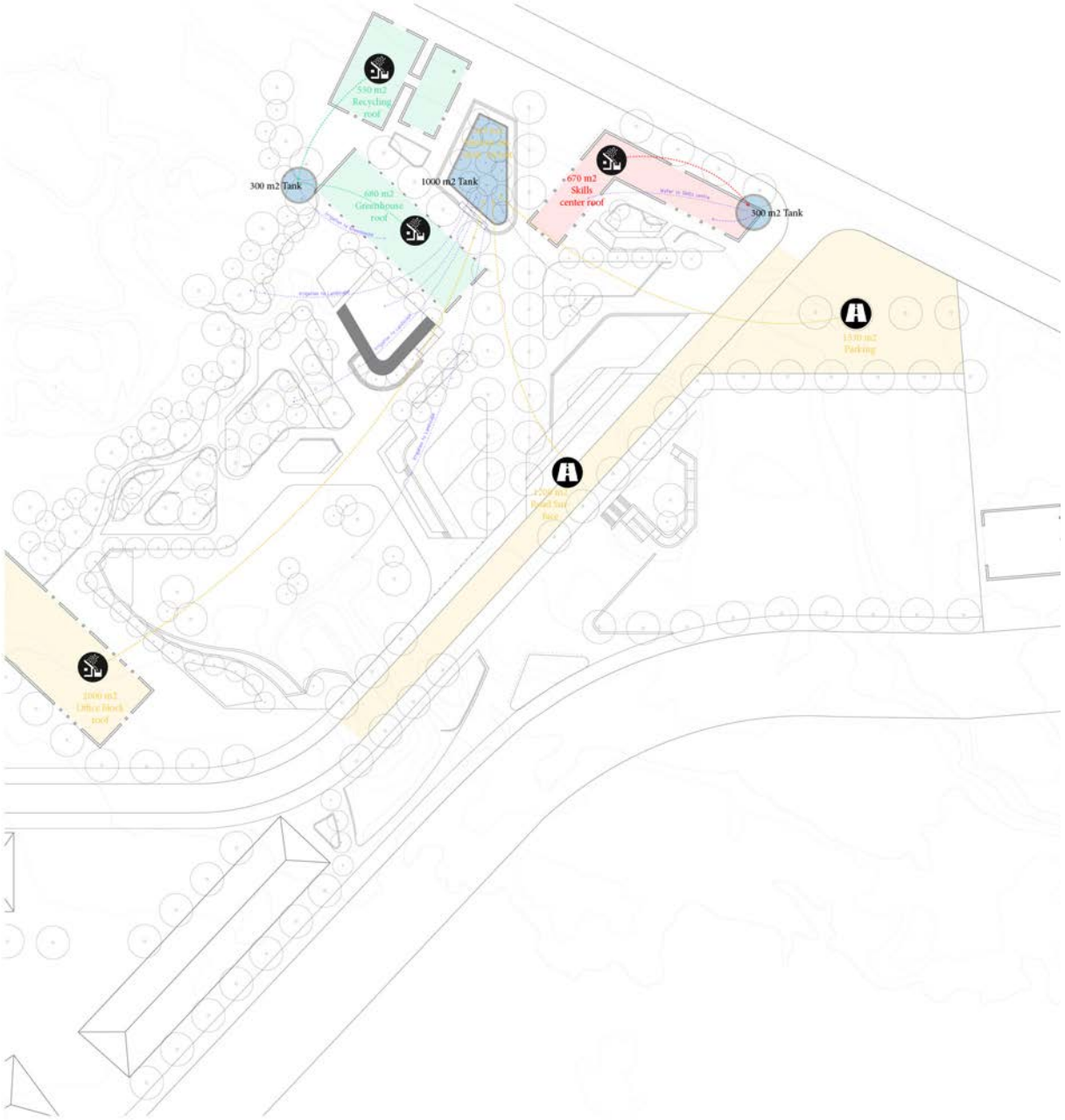


Figure 121 | Complete water strategy (Author 2017)

© University of Pretoria

08.2 Planting investigation

As mentioned in the site analysis, the City of Johannesburg holds a disproportionately high percentage of rare and threatened species and threatened ecosystem compared both to the rest of the Gauteng Province and to South Africa as a whole (Newtown Landscape Architects & IYER Urban Design studio, 2015). This is due largely to the combination of its topographic and geological diversity resulting in a diversity of habitats (which will in turn support a diversity of species) and the high level of habitat transformation that characterizes the bioregion. The site falls within the green corridor running through the city and will be able to contribute to the urban biodiversity of the larger city scheme. Site analysis also pointed out that the eastern and southern edges of the site are subject to a variety of invasive plant species while the interior and other edges of the site are subject to dumping and heavy metal pollution. Most of this will need to be remediated. The site falls between two vegetation units namely: The Soweto Highveld Grassland, and the Gold Reef Mountain Bushveld (Rutherford, 2010).

The Soweto Highveld Grassland

This area's vegetation is mostly dominated by tufted grassland species. The geology of this unit consists predominantly of shale, sandstone, and mud-stone. As a result of the geology the soil in this unit is a deep reddish soil. This unit is subject to an average rainfall of about 662mm per annum and average temperatures of 25 degrees Celsius (Rutherford, 2010).

The Gold reef mountain bushveld

This area's vegetation is dominated by woody plants. The geology predominately consists of quartzite, shale, and mud-stone. The soil of this unit is normally a shallow gravely soil. This unit is subject to an average rainfall of about 700mm per annum and average temperatures of 30 degrees Celsius (Rutherford, 2010).

Figure 122 | Vegetation units in Turffontein (Author 2017)

© University of Pretoria

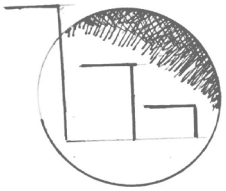
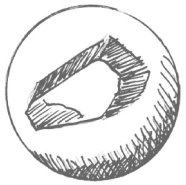
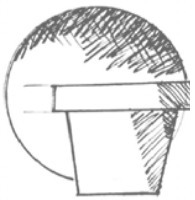
Sowet highveld grassland		Gold reef mountain bushveld
Dominated by tufted Grassland		Dominated by woody vegetation
Dominated by Shale Sandstone & Mudstone		Dominated by Shale Quartzite & Mudstone
Dominated by deep red soil		Dominated by Shallow Gravel soil
Avg. Temperatures of 25 degrees Celsius		Avg. Temperatures of 30 degrees Celsius
Avg. Rainfall of 662 P/Annum		Avg. Rainfall of 700 P/Annum

Figure 123 | Vegetation units characteristics (Author 2017)

© University of Pretoria

08.3 Soweto Highveld Grassland Planting strategy

Soweto Highveld Grassland remediation

Because of the nature of the site and the processes that formed the site over time, the site is subject to heavy metal pollution. This means that the site needs to be Phytoremediated over a certain period. The Soweto Highveld Grassland species will be investigated and the most effective species will be used as the palette to remediate the site (Rutherford, 2010).

Phytoremediation is a planting process used to remediate soils contaminated with organic and inorganic materials. It is the use of planting to efficiently cleanse contaminants from a worked piece of land. Plants are unique organisms which have the capability to absorb nutrients and contaminants from a growth matrix. The plants absorb, immobilize, or degrade the contaminates through chemical processes in its unique metabolism. The plant facilitates this process for a certain period after which it is harvested, removed, disposed of and replaced. Phytoremediation can be used to clean up metals; pesticides; solvents; explosives; crude oil; polyaromatic hydrocarbons; and landfill leachates. In this particular case the soil is polluted with heavy metals. Plants have the capability to stabilize heavy metal pollution by acting as a trap in which the metals are captured. The root systems take up the contaminants. Phytoremediation is labor and energy intensive. It is an *in-situ* remediation technology that utilizes the inherent abilities of living plants. It is also an ecologically friendly, solar-energy driven clean-up technology, based on the concept of using nature to cleanse nature (Rennenberg, 2005).

The planting will be used to capture the metals through the process of Phytoextraction which take up the metals in the soil matrix through their roots system into above-ground portions of plant (see figure 127). Plants can absorb unusually large amounts of metals and still be able to grow for a certain period. When this period has reached its life-cycle the plants are harvested or cut back and either burnt or composted to recycle the metals (see figure 128). In this case the plants will not be burnt or composted but, used in the thatching industry of site. This procedure may be repeated as many times as necessary to decrease the soil contaminants to an acceptable level.

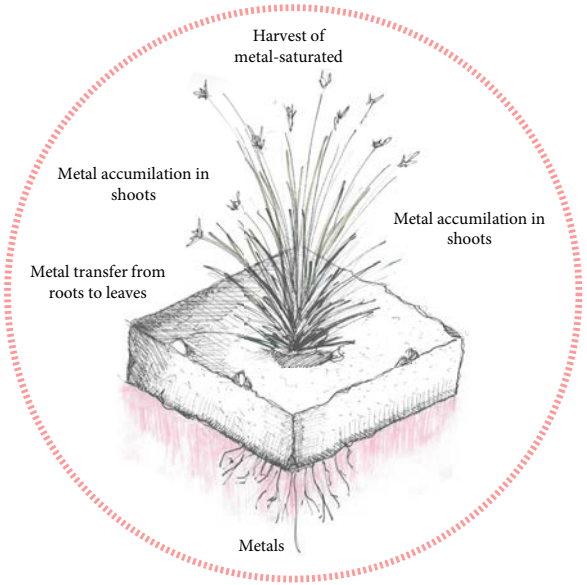


Figure 124 | Remediation system (Rennenberg 2005)

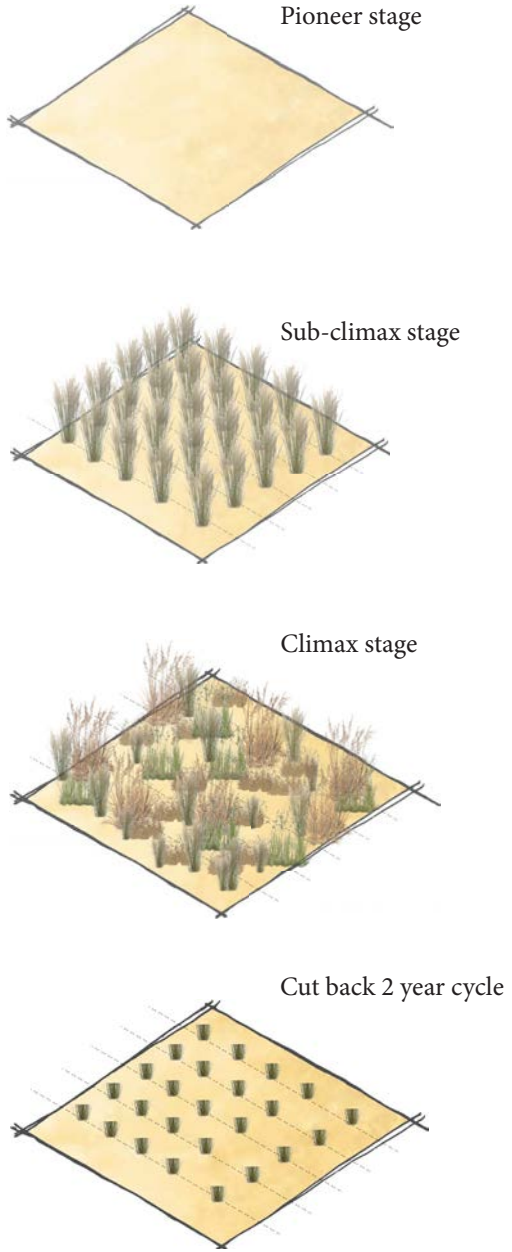


Figure 125 | Phytoextraction system (Author 2017)

© University of Pretoria

Soweto Highveld Grassland remediation planting

Dominant grasses


Eragrostis racemosa


Heteropogon contortus


Themeda triandra


Tristachya leucothrix

Other grasses


Andropogon schirensis


Digitaria diagonalis


Aristida bipartita


Eragrostis curvula


Aristida congesta


Eragrostis plana


Brachiaria serrata


Heteropogon contortus


Cynodon dactylon


Hyparrhenia hirta

Grassland shrub species


Anthospermum rigidum


Justicia anagalloides


Berkheya setifera


Lippia scaberrima


Felicia muricata

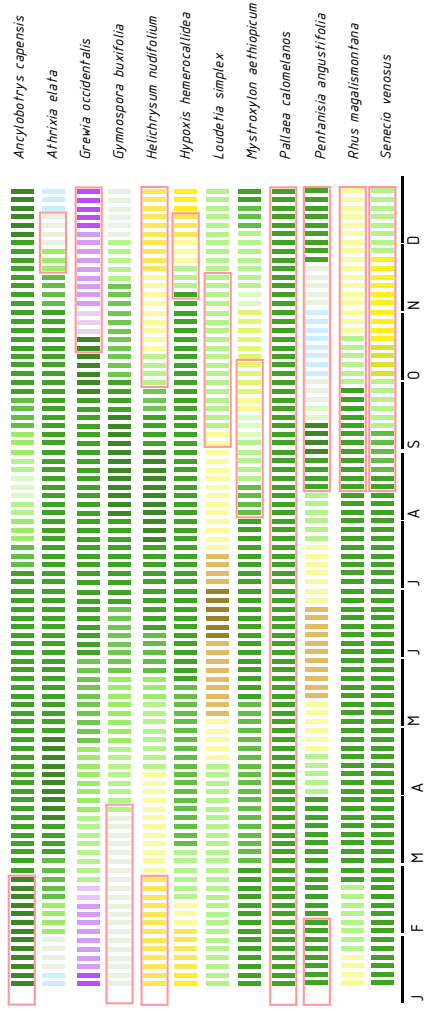

Rhynchosia totta


Garderia subintegra


Selago densiflora


Hermannia depressa


Senecio coronatus



Times of cultivation

Figure 126 | Grassland planting chart (Author 2017)

© University of Pretoria

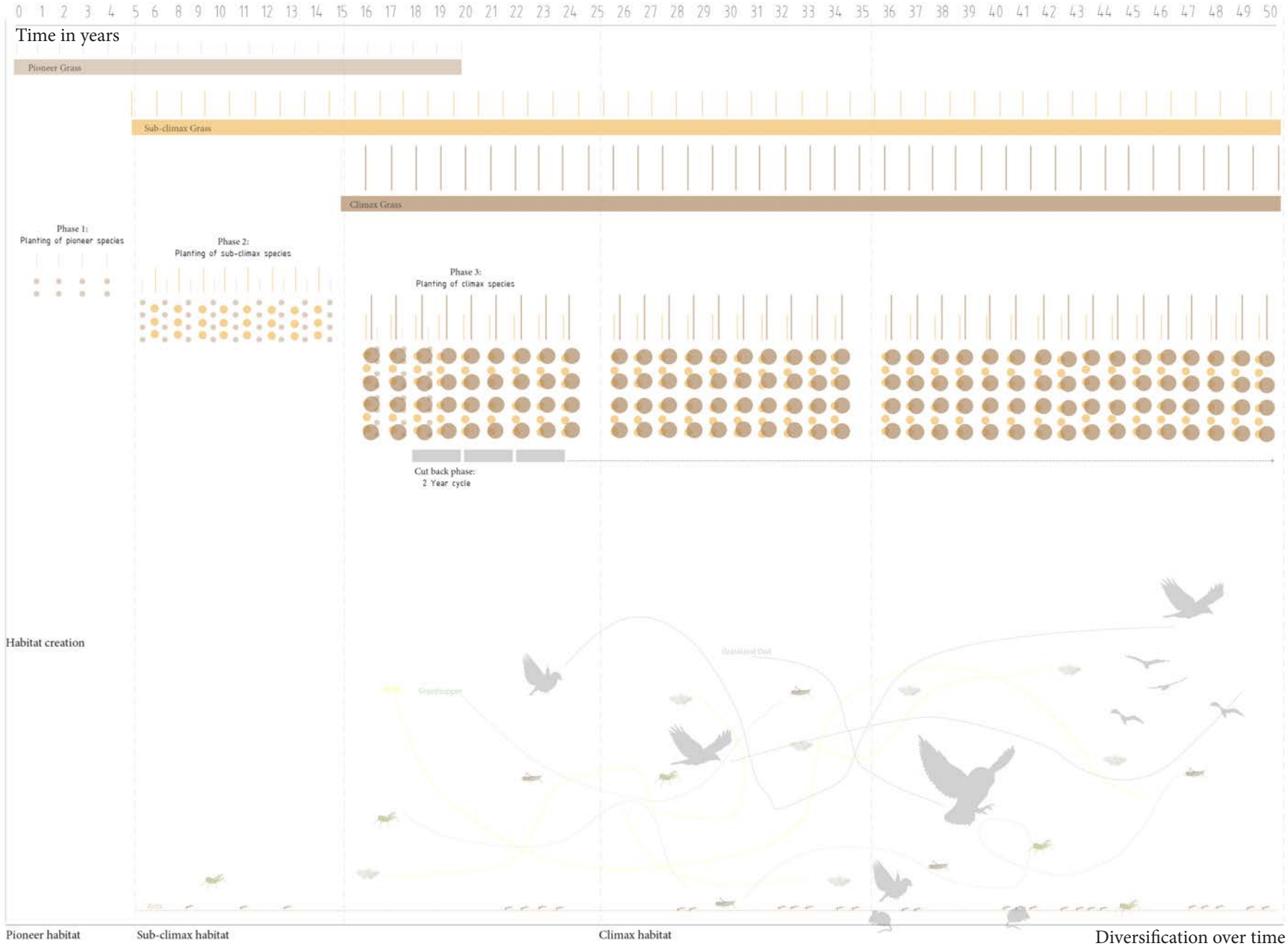


Figure 127 | Grassland Strategy, Diversification over time chart (Author 2017)

© University of Pretoria

08.4 Gold Reef Mountain Bushveld planting strategy

When the targeted areas of the site have been phytoremediated with the various types of grass species to an acceptable level, the Gold Reef Mountain Bushveld unit will be introduced to the site. The idea of this community is that planting will have various functions on site. Some of these plants will act as ornamental plants, whereas others will be used in a more natural fashion to recreate the community for didactic interventions.

The naturalized planting style will be used against natural and recreational mounds and slopes forming part of the design. This community is also established to widen the habitat biodiversity of the site, extending the ecological corridor running through the Turffontein area. The ornamental planting of the intervention planting initiated in the first phase of the planting strategy will mostly consist of these species.

Trees


Vachelea caffra


Protea caffra

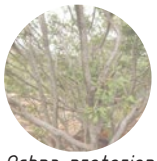

Celtis africana


Rhus leptodictya


Combretum molle


Dombeya rotundifolia


Englerophytum


Ochna pretoriensis

Shrubs


Ancylobotrys capensis


Loudetia simplex


Athrixia elata


Mystroxylon aethiopicum


Grewia occidentalis


Pallaea calomelanos


Gymnospora buxifolia

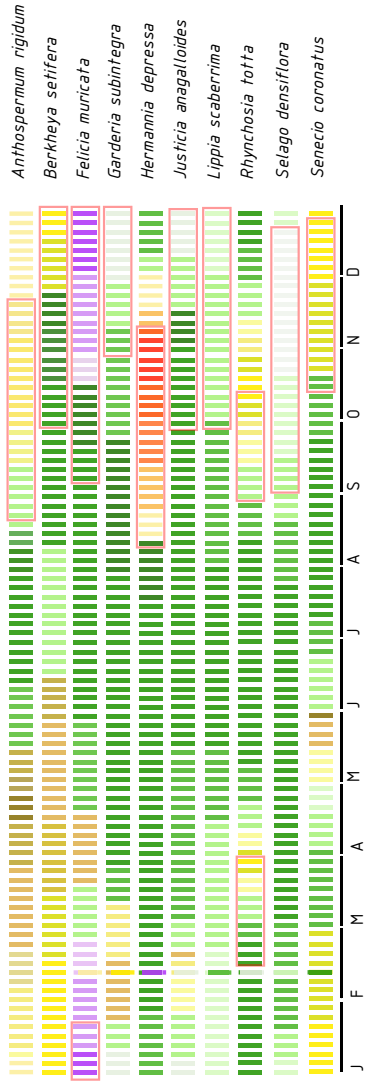

Pentanisia angustifolia


Helichrysum nudifolium


Rhus magalismontana


Hypoxis hemerocallidea


Senecio venosus



Times of cultivation

Figure 128 | Bushveld planting chart over time (Author 2017)

© University of Pretoria

Figure 129 | Bushveld Strategy, Diversification over time chart (Author 2017)

© University of Pretoria

08.6 Combined planting strategy

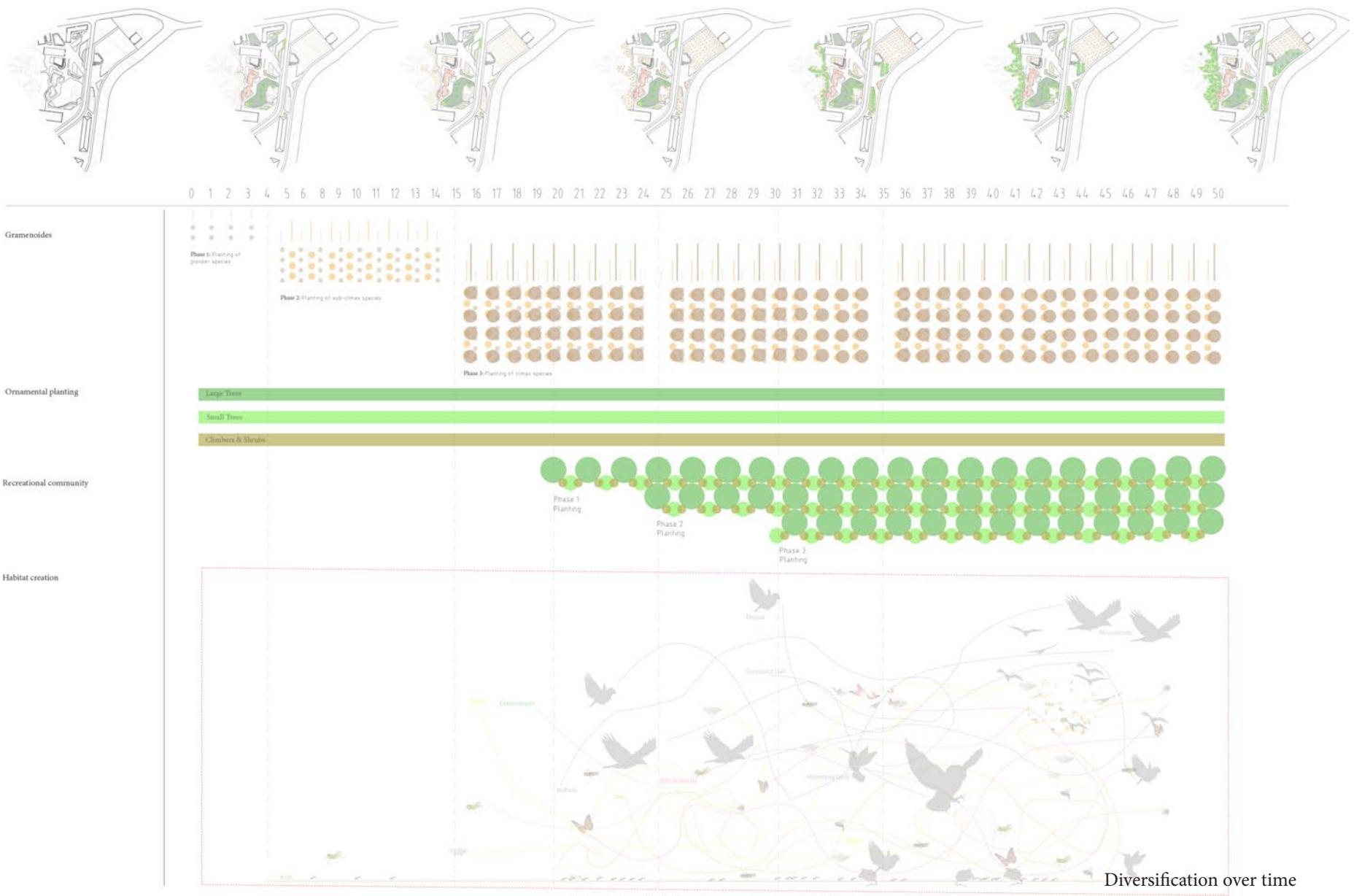


Figure 130 | Combined planting diversification over time chart (Author 2017)

© University of Pretoria

08.7 Spatial planting strategy

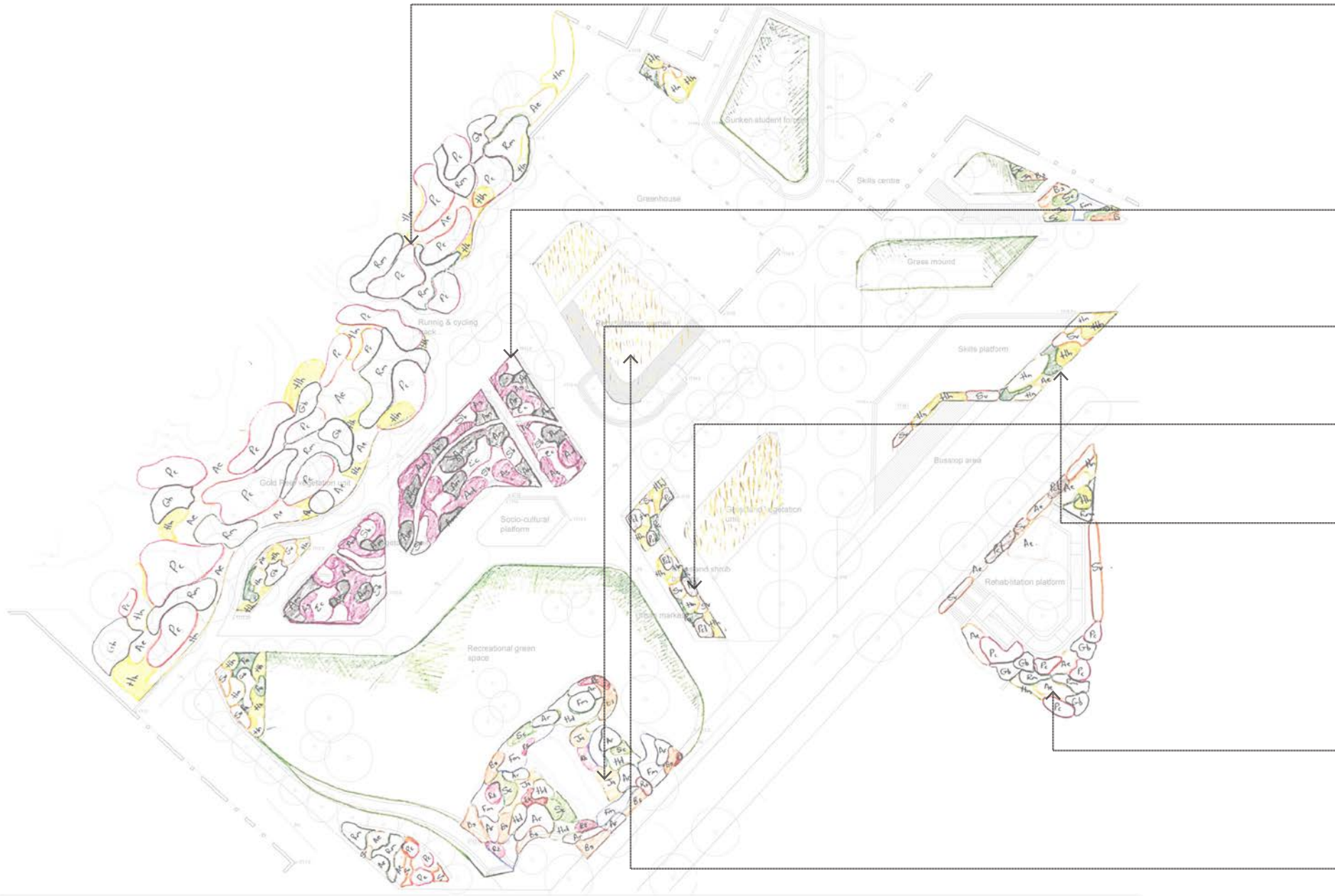
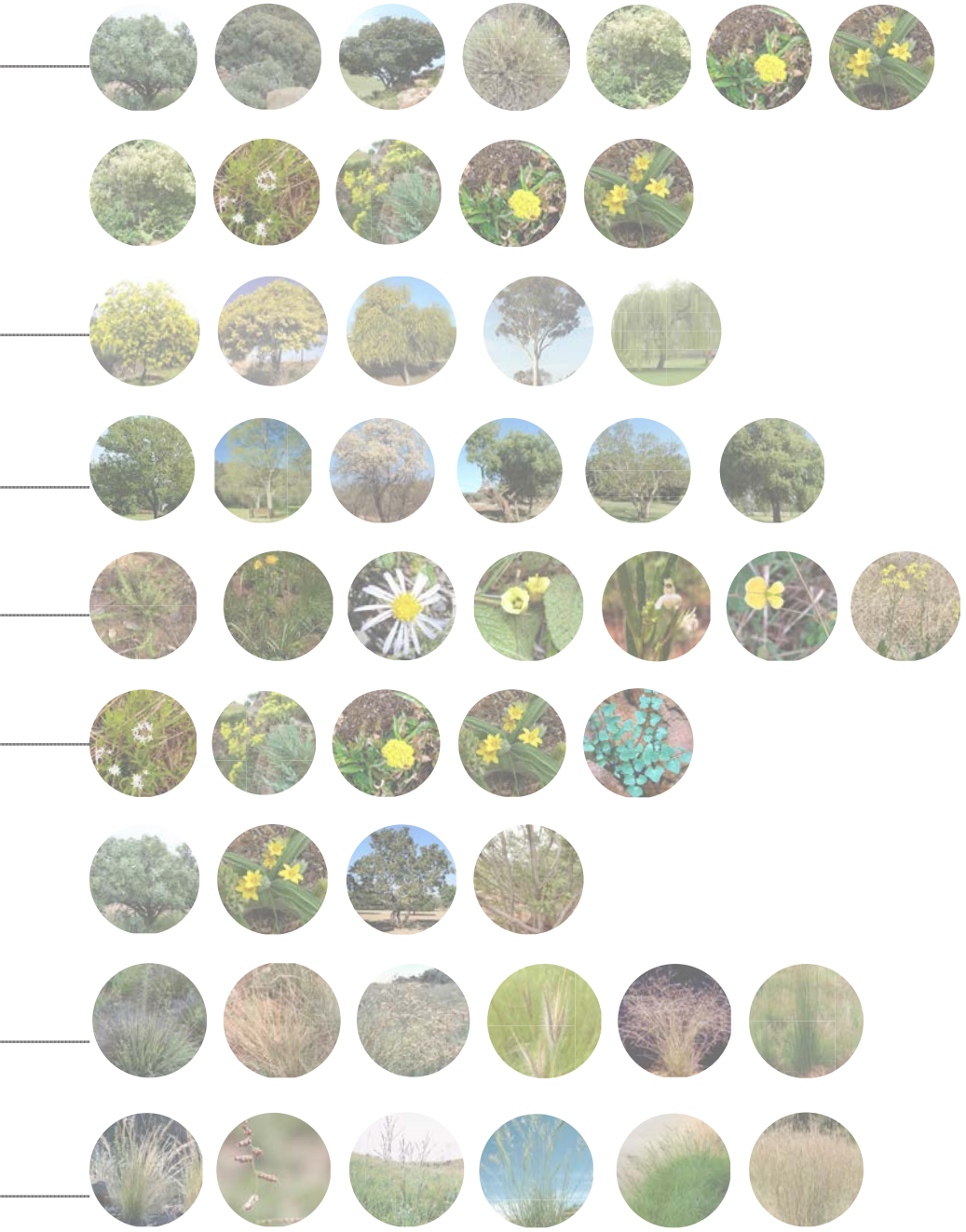
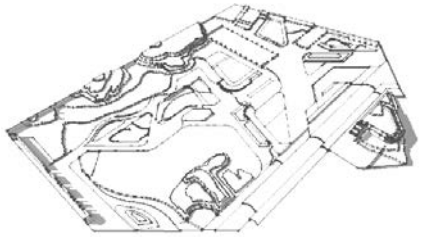


Figure 131 | Planting plan (Author 2017)

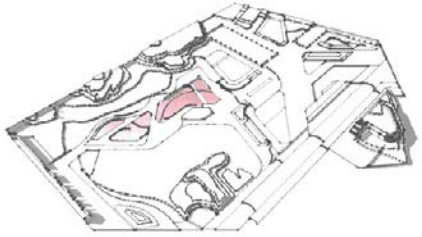
© University of Pretoria



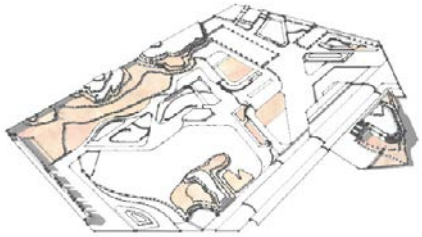


Existing Planting

Ornamental Planting



Invasive Planting



Gramenoid Planting

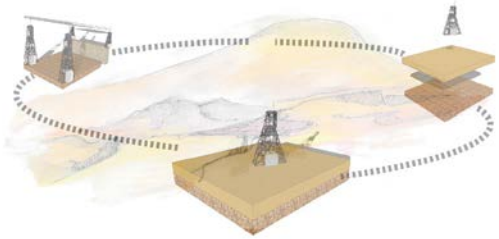
© University of Pretoria

08.8 Technical Investigation

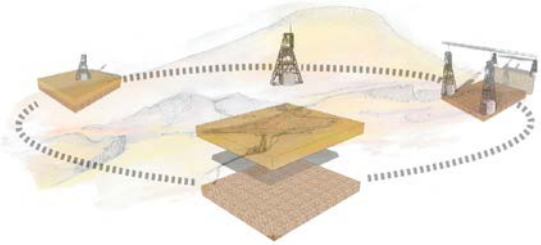
The project proposal attempts to guide the design from a mine of extraction to a mine of assimilation, by respecting the Genius of the place along a didactic route of moments in the landscape. Due to the various implications and constraints on the site, capturing the genius of the place will be difficult. The author believes by using materials from site and generating construction materials, it is possible to capture the spirit of the place with materiality. Therefore, the technical approach of the project focuses a lot on the manifestation of materials in order to capture the genius of the place.

As mentioned in chapter 2 (see table 2) a didactic landscape should not shy away from its identity. In this case, the site is a mine of extraction. By using these on site dumping debris the author optimizes a concern and sees a design opportunity for construction materials, while addressing pollution at the same time. By using these materials in the historical layers that they occur on site, the author respects the genius loci of the place. By using and manipulating these materials, the design captures the colors, textures and feel of the space.

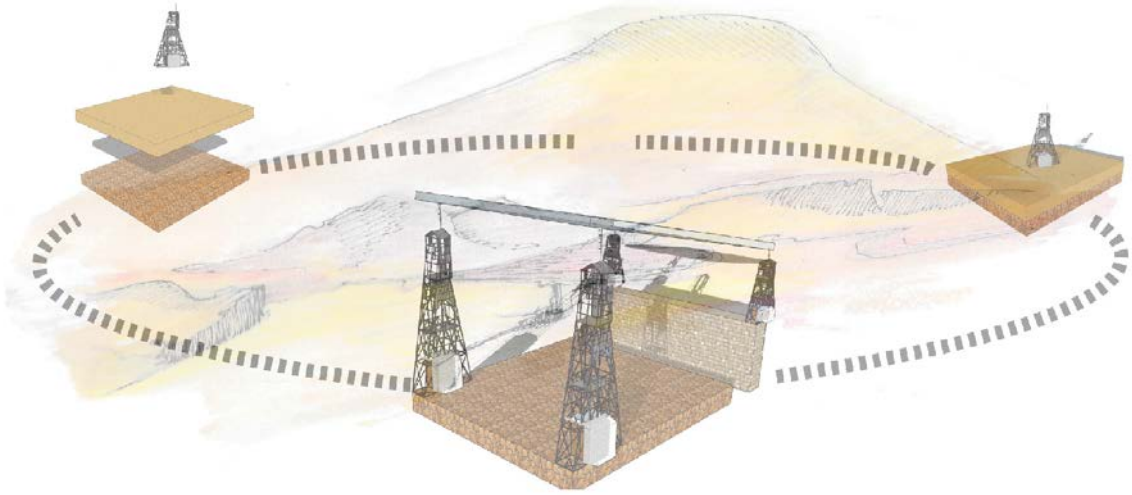
The idea is to use the elements in the manner that they occur on site. Stone forms the bottom layer. The soil on the site occurs as the middle layer, and the steel elements manifests as the top layer of infrastructure. This means that stone will be used as floor plane, soil as wall plane and steel as infrastructural plane. The site offers three types of possible materials. The yellow soil, this material will be investigated and transformed into concrete bricks made on site. These bricks and their tectonic potential will then be explored in the wall plane. Secondly the brown stone, the excavated mining debris of the site offers a diverse set of geology. Stone such as quartzite and shale are among these in large quantities. These two types of stone and their tectonic potential in the floor plane will form an investigation. Lastly the rusty red steel on site. This material consists mostly of galvanized steel pipes. The idea is to incorporate this material as structural elements throughout the design intervention.



Historical layers of the site.



Investigating the potential of the layers as construction materials.

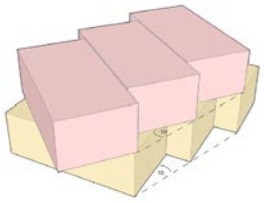


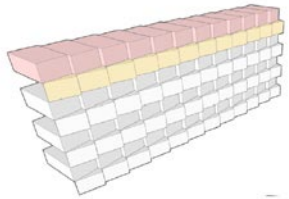
Investigating the tectonic potential of the layers on site.

Figure 132 | Approach to technification (Author 2017)

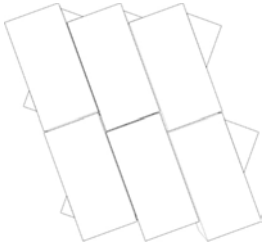
© University of Pretoria

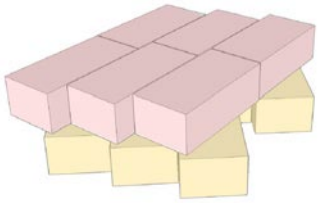
Brick pattern as straight wall

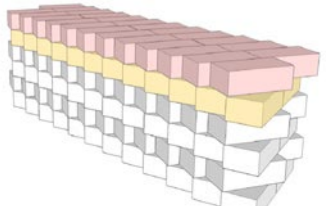




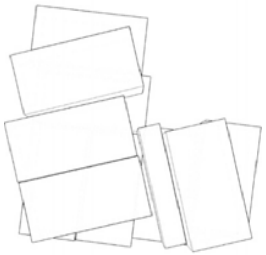
Brick pattern as double layer straight wall

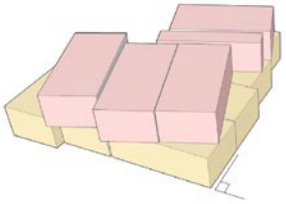


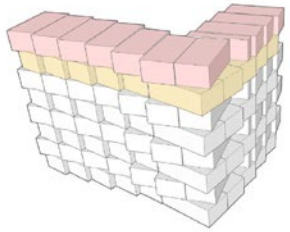




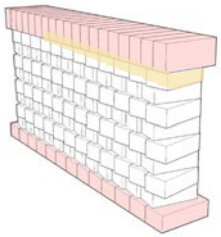
Brick pattern as perpendicular corner in wall

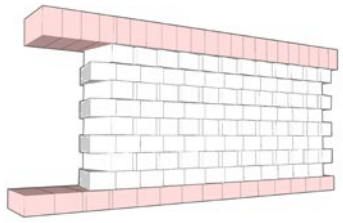






Top and Bottom edge of wall, defined with roller course





Soil as Brick Investigation

As mentioned above, the soil layer on site will be explored and manipulated to represent the wall in the landscape. The author proposes this by creating *in-situ* concrete bricks from the excavated and dumped soil on site. This way the author addresses the issue of pollution on site while creating opportunity for skills development and employment in the field of brick making. By manipulating the soil on site to form bricks, the material is rooted in the identity of the site. The tectonics of the brick is explored to construct the walls in the following way:

By shifting the first brick layer at a ten-degree angle, and the next at the same angle in the opposite direction the author created a pattern on the brick face that will be pulled through the design. The pattern and grey-yellow colour of the brick will have a visual impact on the users, creating awareness on the brick and what it represents.

Brick pattern as curved wall

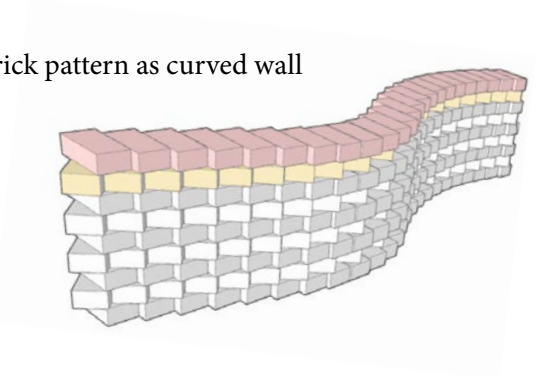


Figure 133 | Tectonic exploration of the brick in the wall (Author 2017)

© University of Pretoria

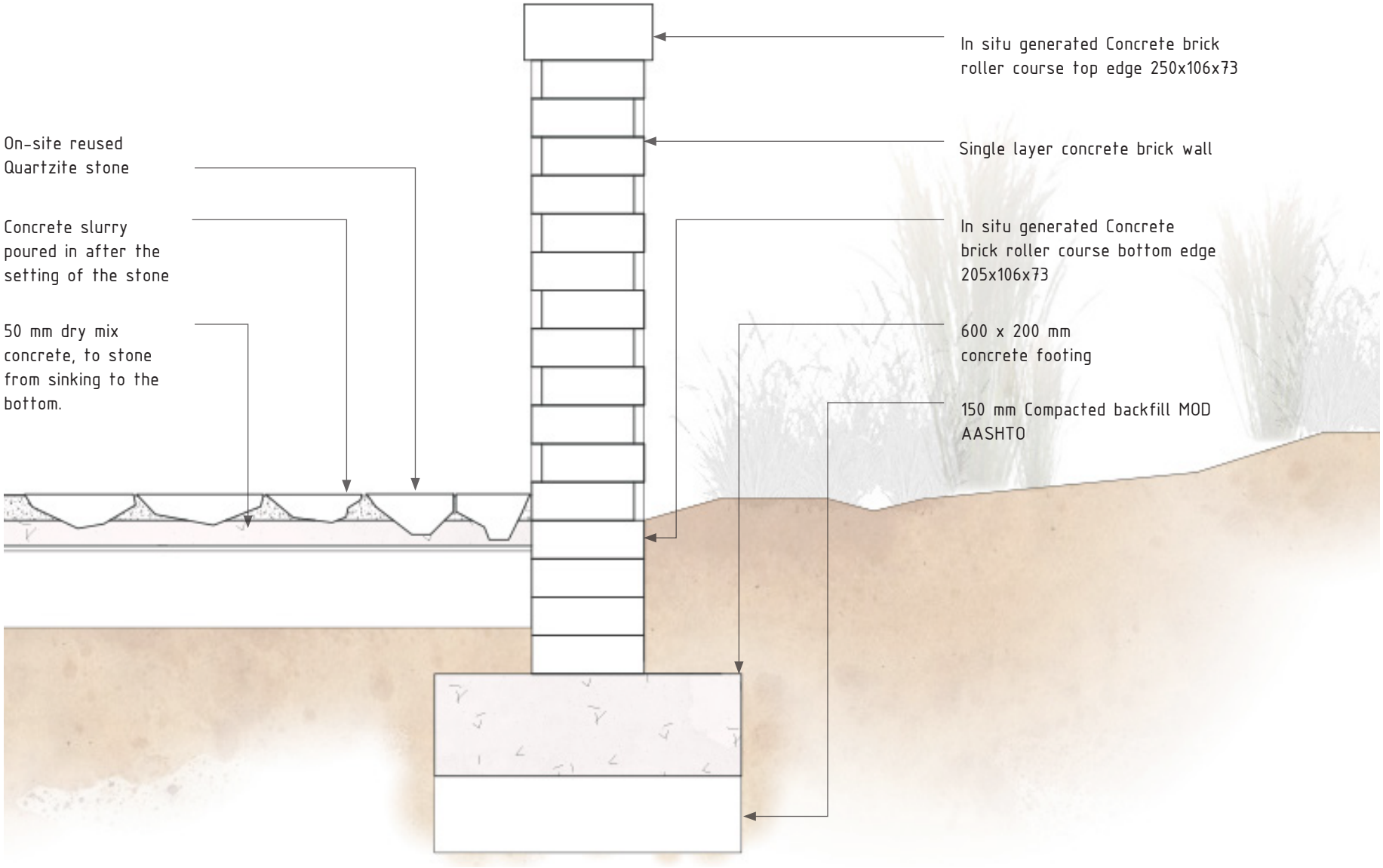


Figure 134 | Detail trough the proposed wall, NTS (Author 2017)

© University of Pretoria

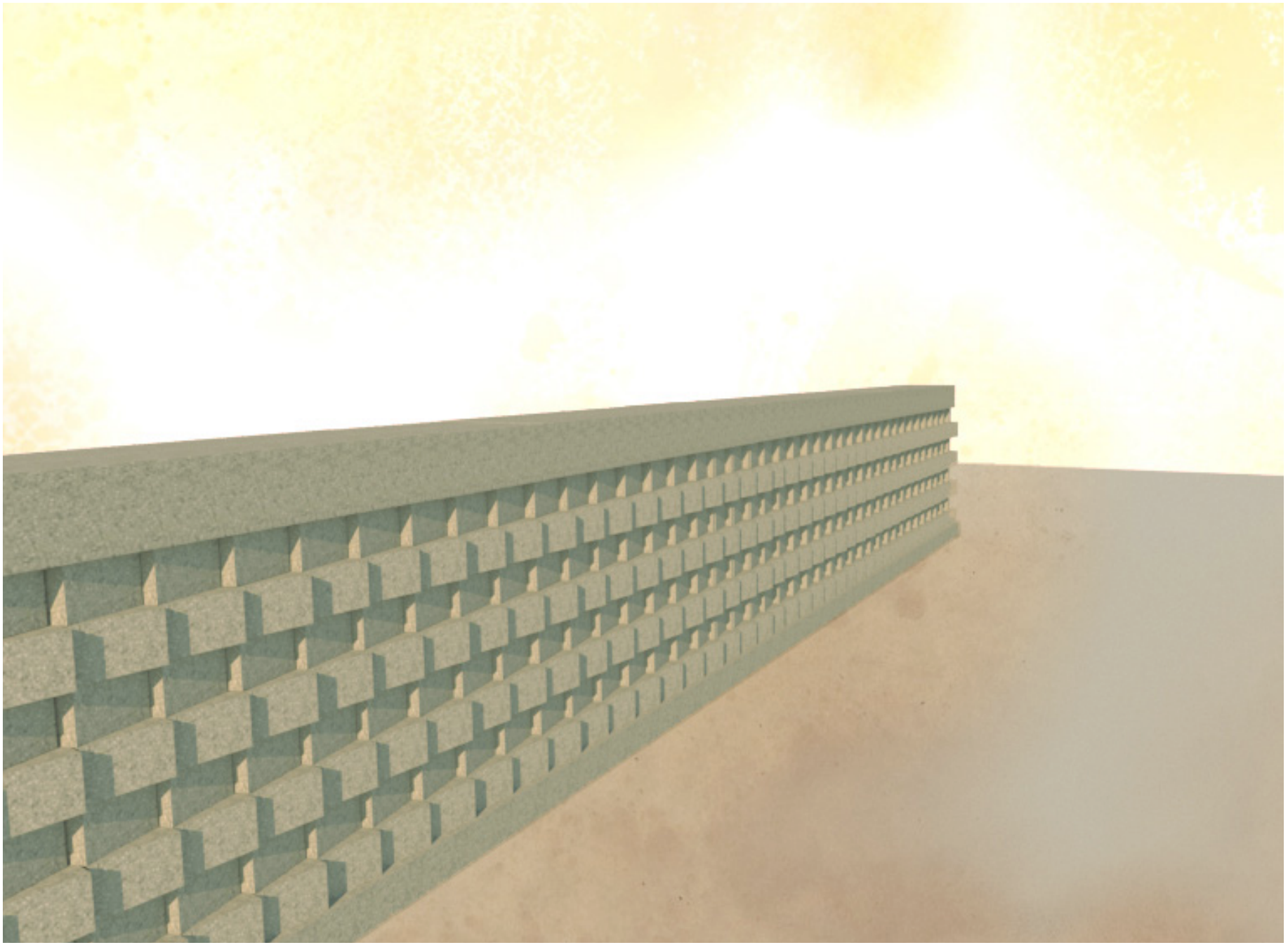


Figure 135 | Vision of the wall capturing the genius loci of the site (Author 2017)

© University of Pretoria

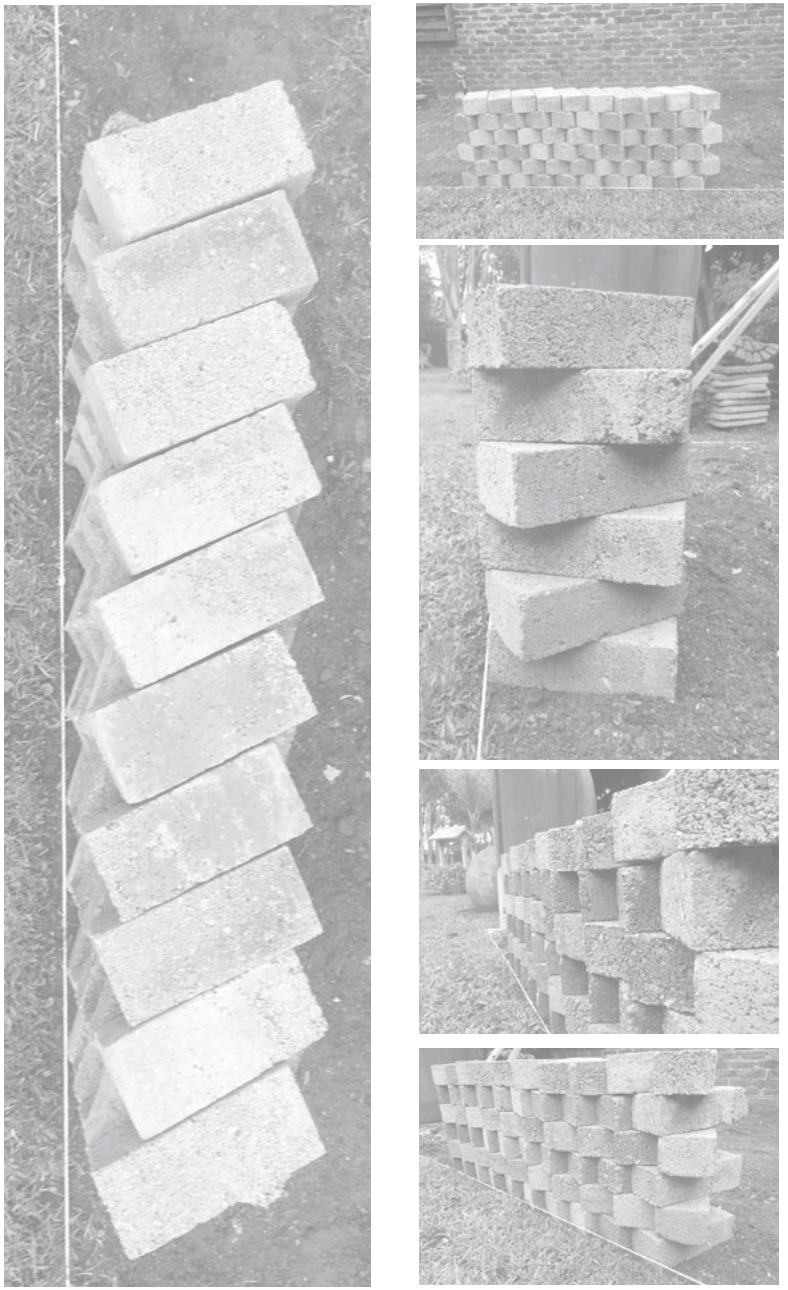


Figure 136 | Wall prototype experiment (Author 2017)

© University of Pretoria

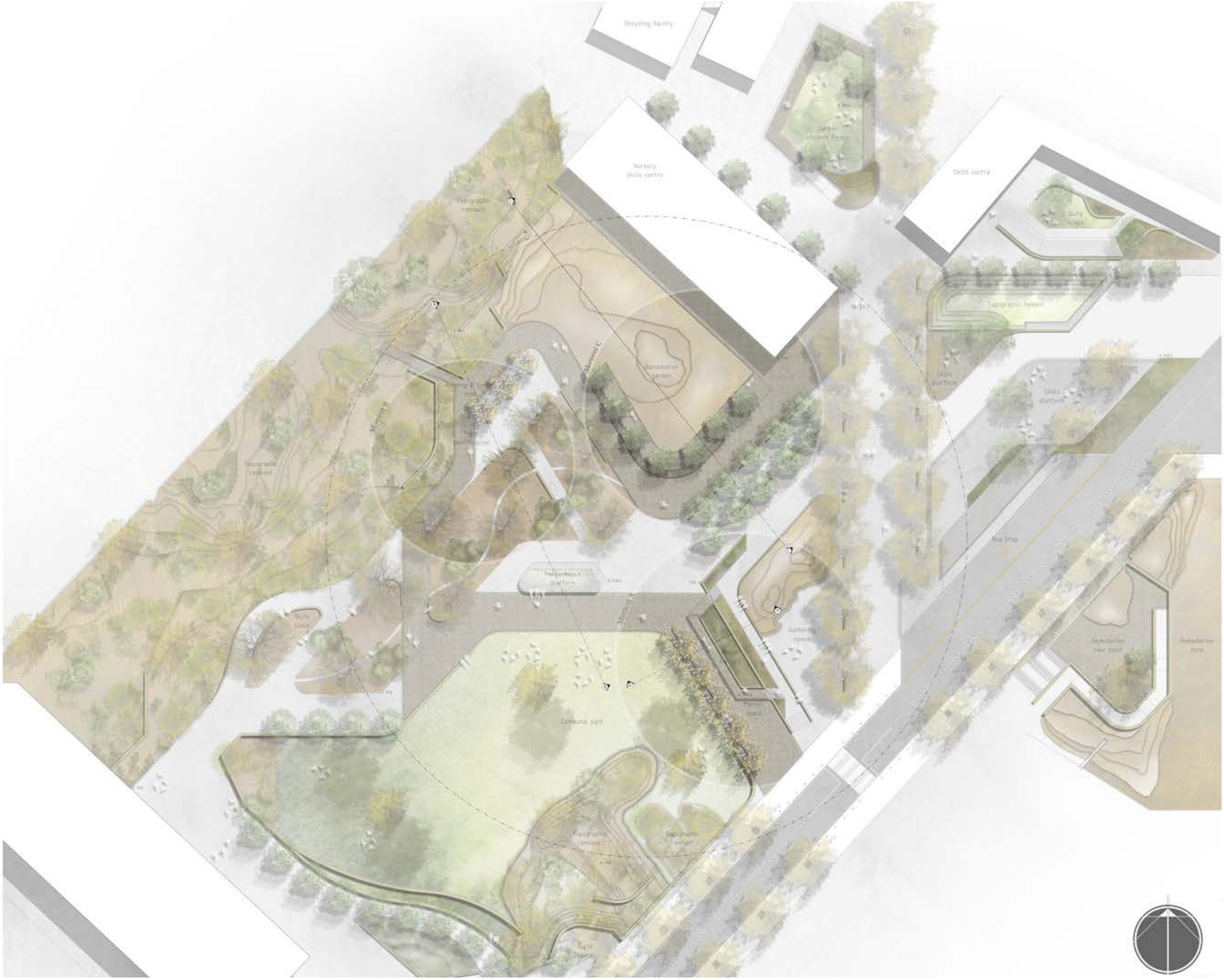


Figure 137 | Final sketch plan indicating detail sections (Author 2017)

© University of Pretoria

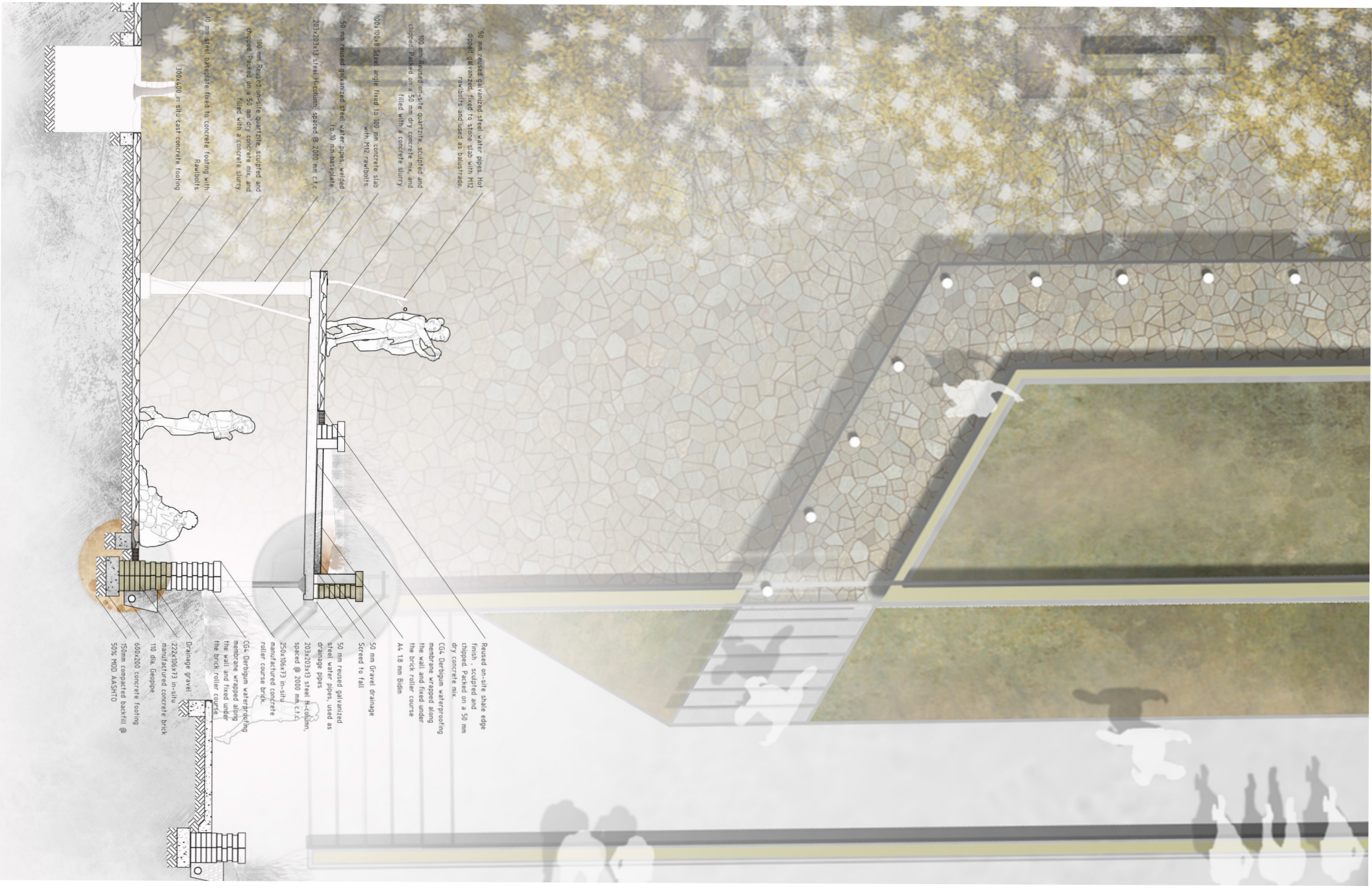


Figure 138 | Detail trough the Urban market and balcony, NTS (Author 2017)

© University of Pretoria

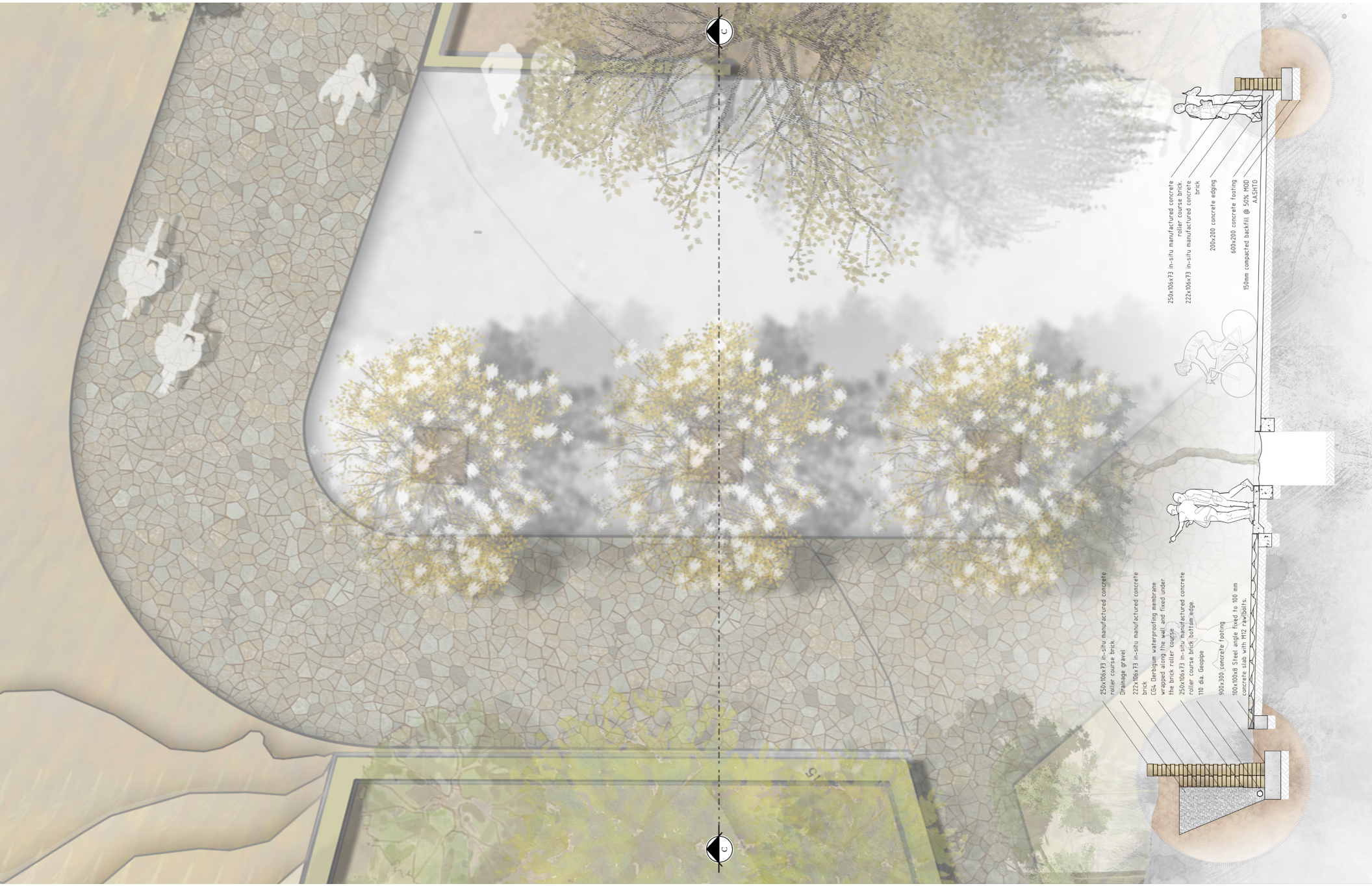


Figure 139 | Detail trough the Plant identification zone, NTS (Author 2017)

© University of Pretoria

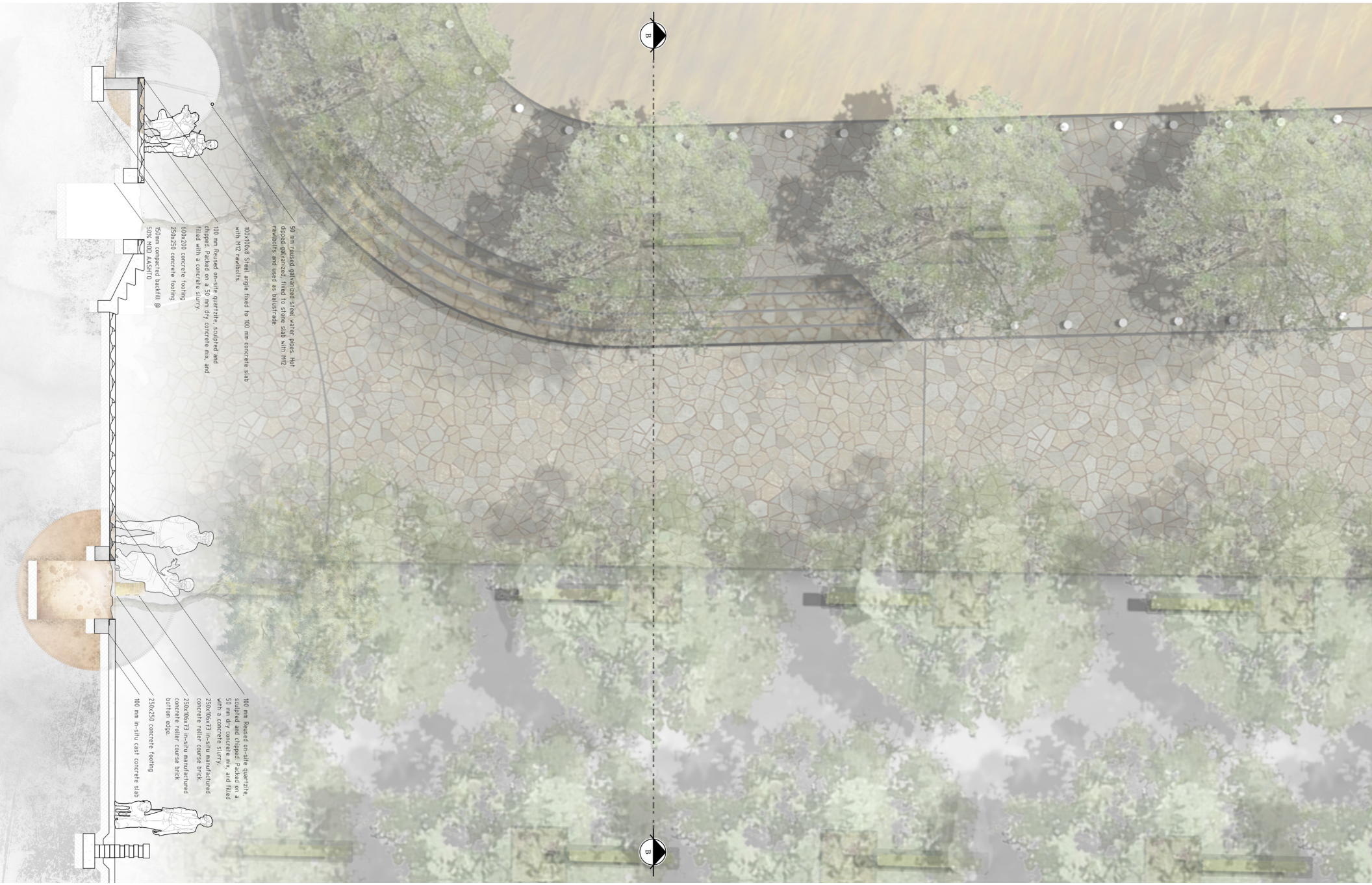


Figure 140 | Detail trough the remediation garden, NTS (Author 2017)

© University of Pretoria

© University of Pretoria

© University of Pretoria

09 _Chapter Nine
Conclusion

This dissertation set out to investigate the role of the landscape architect in the revival of an abandoned dumping site on the Johannesburg mining belt, in the south of the city, within the proposed Corridors of Freedom Framework.

It discovered ways of transforming derelict mining spaces into spaces for opportunity in Turffontein. The two main issues caused by the derelict mining sites in Turffontein were that of unemployment and environmental pollution. The landscape design responded to the these socio-environmental issues through a: didactic landscape intervention that creates awareness of the unemployment and environmental pollution; and a programme that focuses on skills development, material generation and rehabilitation.

In conclusion, it is argued that a didactic landscape intervention, focussed on skills development, remediation, and material generation can address the key social and environmental issues of the Turffontein area. The design programme directly responds to the contextual needs, while the experience of the site design is educational. By respecting the genius loci of the place, didactic moments are created along a route in the landscape to create awareness with the users of the socio-environmental constraints challenges of the site and context. The aim is to allow future generations to experience and learn through the design intervention that confronts them with the immediate challenges and creates opportunity for growth and change.

© University of Pretoria

References

Ban, S., 1983. The Landscape approach of Bernard Lassus. The journal of Garden history, 3(2), pp. 79-107.

Broughton, J., 2012. Techtonic sites: Structuring the landscape with textile derived construction techniques, Urbana, Illinois: University of Illinois.

City of Johannesburg: Department of Development Planning, 2017. Spatial Development Framework 2040, Johannesburg: City of Johannesburg Metropolitan Municipality.
conservapedia, 2014. http://www.conservapedia.com. [Online]
Available at: http://www.conservapedia.com/Evolutionism
[Accessed 04 04 2017].

Dee, c., 2001. Form and fabric in Landscape Architecture. 1 ed. London: Spon press.

Department: Higher Education & Training, 2015. www.dhetnews.co.za. [Online]
Available at: http://www.dhetnews.co.za/south-africas-skills-shortage-and-the-functions-of-namb/
[Accessed 01 05 2017].

designboom, 2013. designboom | architecture & design magazine. [Online]
Available at: http://www.designboom.com/architecture/estudi-marti-franch-tudela-culip-restoration-project-cap-de-creus-spain/
[Accessed 04 04 2017].
design, C. s. o. g., 2011. csgd.wordpress.com. [Online]
Available at: https://csgd.wordpress.com/2011/06/06/the-spirit-of-the-place/
[Accessed 28 08 2017].

dictionary, t. f., 2014. http://www.thefreedictionary.com. [Online]
Available at: http://www.thefreedictionary.com/revival
[Accessed 12 06 2017].

Earth-life, 2017. http://earthlife.org.za/. [Online]
Available at: http://earthlife.org.za/mission-and-vision-statement/
[Accessed 11 7 2017].

Fin24, 2014. www.Fin24.com. [Online]
Available at: http://www.fin24.com/economy/graduates-battle-higly-skilled-shrink-20140210
[Accessed 01 05 2017].
Fountain of Youth, 2015. http://www.ngopulse.org. [Online]
Available at: http://www.ngopulse.org/organisation/fountain-youth
[Accessed 11 7 2017].

Frampton, K., 1995. Studies in Tectonic Culture., Massachusetts: MIT.
greeninc Landscape Architects, 2016. http://www.greeninc.co.za. [Online]
Available at: http://www.greeninc.co.za/projects_2009_jcp.html
[Accessed 29 05 2017].

groundWork, 2017. http://www.groundwork.org.za/. [Online]
Available at: http://www.groundwork.org.za/
[Accessed 11 7 2017].

Historyonthene, 2014. http://www.historyonthenet.com. [Online]
Available at: http://www.historyonthenet.com/mesopotamian-artisans-and-craft-workers/
[Accessed 02 05 2017].

© University of Pretoria

Hvattum, M., 2004. Gottfried Semper and the Problem of Historicism, New York: Cambridge University Press.

Joburg GDS 2040, 2004. joburg.org.za. [Online]
Available at: https://joburg.org.za/index.php?option=com_content&task=view&id=444&Itemid=58
[Accessed 07 05 2017].

Joburg GDS 2040, 2009. joburg.org.za. [Online]
Available at: https://joburg.org.za/index.php?option=com_content&task=view&id=3371&Itemid=207
[Accessed 07 05 2017].

Johannesburg city Parks and Zoo, 2013. Jhbcityparks.com. [Online]
Available at: http://www.jhbcityparks.com/index.php/conservation-contents-95/botanical-gardens-contents-96
[Accessed 07 05 2017].

Johannesburg city parks and zoo, 2015. www.jhbcityparks.com. [Online]
Available at: http://www.jhbcityparks.com/index.php/education-centres
[Accessed 29 05 2017].

KPMG South Africa, 2015. www.sablog.kpmg.co.za. [Online]
Available at: https://www.sablog.kpmg.co.za/2013/12/role-mining-south-african-economy/
[Accessed 6 03 2017].

Landezine, 2016. www.landezine.com. [Online]
Available at: http://www.landezine.com/index.php/2016/09/museum-park-louvre-lens-by-mosbach-paysagistes/
[Accessed 8 03 2017].

Landscape Architects Network, 2010. landarchs.com. [Online]
Available at: https://landarchs.com/the-award-winning-quarry-garden-breathes-life-back-into-abandoned-site/
[Accessed 12 7 2017].

Larkham, G. J. &. P. J., 2003. Journal of urban design. Sense of Place, Authenticity and Character: A, Vol 8(1), pp. 67-81.

Latz & Partners, 2002. http://www.latzundpartner.de. [Online]
Available at: http://www.latzundpartner.de/en/projekte/postindustrielle-landschaften/landschaftspark-duisburg-nord-de/
[Accessed 04 04 2017].

Lopez, O., 2011. archdaily. [Online]
Available at: http://www.archdaily.com/168152/ad-classics-le-cylindre-sonore-bernhard-leitner
[Accessed 19 10 2017].

Mark, J., 2011. http://www.ancient.eu. [Online]
Available at: http://www.ancient.eu/crafts/
[Accessed 02 05 2017].

Mathy, M., 2016. Haute Jardin: Exploring the pre-fabrication of landscapes through the process of making. 1 ed. Pretoria: University of Pretoria.
Menin, S., 2003. Constructing Place: Mind and the Matter of Place-Making. 1 ed. London: Routledge.

Newtown Landscape Architects & IYER Urban Design studio, 2015. Wemer pan precinct, Urban Design Framework, Johannesburg: Metropolitan Centre, City of Johannesburg.

© University of Pretoria

Obniski, M., 2008. http://www.metmuseum.org. [Online]
Available at: http://www.metmuseum.org/toah/hd/acam/hd_acam.htm
[Accessed 02 02 05].

O'Donnell, C., 2011. http://www.wealthwire.com. [Online]
Available at: http://www.wealthwire.com/news/global/2372
[Accessed 13 03 2017].

Olalde, M., 2015. The Haunting Legacy of South Africa's Gold Mines, New Haven, America: Yale Environment 360.
Q-files, 2013. www.q-files.com. [Online]
Available at: https://www.q-files.com/history/ancient-egypt/craftworkers-in-ancient-egypt/
[Accessed 02 05 2017].

Rennenberg, A. P. &. H., 2005. EMBO Reports. [Online]
Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1369103/
[Accessed 15 09 2017].

Righinin, P., 2001. Thinking architecturally. 1 ed. Cape Town: University of Cape Town Press.

Robinson, L. M. &. A., 2007. Living Systems: Innovative materials & Technologies for landscape architecture. 1 ed. Berlin: Birkhauser.

Rutherford, L. M. &. M., 2010. The vegetation of South Africa, Leshoto, and Swaziland. 1 ed. Pretoria: South African NAtional Biodiversity Institute.

Sa-venues.com, 2017. http://www.sa-venues.com. [Online]
Available at: http://www.sa-venues.com/things-to-do/gauteng/rhodes-park/
[Accessed 07 05 2017].

Semper, G., 1851. Die vier Elemente der Baukunst : Beitrag zur vergleichenden Baukunde. 1 ed. Braunschweig: Vieweg und Sohn, 1851.

Semper, G., 2010. The four elements of Architecture and other wrightings. 1 ed. Campbridge: campbridge University press.

Sieff, K., 2016. South Africa's Illegal gold miners are risking all to scratch out a living.. [Online]
Available at: http//www.indipendent.co.uk/news/world/africa/south-africa's-illegal-gold-miners-forced-to-scavenge-in-abandoned-shafts-in-a-perilous-attempt-to-a6919561.html
[Accessed 6 03 2017].

South African History Online, 2017. Sahistory.org.za. [Online]
Available at: http://www.sahistory.org.za/article/great-trek-1835-1846
[Accessed 22 February 2017].

Spaces, P. f. P., 2005. www.pps.org. [Online]
Available at: https://www.pps.org/reference/tencharacteristics-2/
[Accessed 12 06 2017].

Stelli, J., 2014. http://wiredspace.wits.ac.za. [Online]
Available at: https://www.google.co.za/url?sa=t&rct=j&q=&esrc=s&source=web&cd=9&cad=rja&uact=8&ved=0ahUKEwiG_KmIhNTSAhVIC8AKHTsrCRcQFgg6MAg&url=http%3A%2F%2Fwiredspace.wits.ac.za%2Fjspui%2Fbitstream%2F10539%2F13645%2F1%2FJenna%2520Stelli%2520-%2520Abstract.pdf&usg=AFQj
[Accessed 13 03 2017].

Swaffield, S., 2002. Must landscapes mean?. In: 1, ed. Theory in landscape architecture: A Reader. Pennsylvania: University of Pennsylvania, pp. 89-101.

© University of Pretoria

Swaffield, S. R., 2002. Theory in landscape architecture: A reader. 1 ed. Philadelphia: University of Pennsylvania Press.

Swart, E., 2003. he South African legislative framework, Pretoria: The Journal of The South African Institute of Mining and Metallurgy.

Tompson, W., 2017. www.moneyweb.co.za. [Online]
Available at: https://www.moneyweb.co.za/mineweb/mining-companies-investment/gold-mining-will-be-finished-by-2033/
[Accessed 01 05 2017].

Van Wyk, D., 2014. Abandoned mines are seriously impacting communities and is contributing to child-labour. [Online]
Available at: https://www.google.co.za/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwjJiJrNtdPSAhULKsAKHQnuC4cQFggYMAA&url=http%3A%2F%2Fwww.bench-marks.org.za%2Fpress%2Fabandoned_mines_and_child_labour.pdf&usg=AFQjCNFouDFFUW6XWoAfunkoTTUbQmaGDA&sig
[Accessed 13 03 2017].

Waterhouse, J. W., 1896. Hylas and the Nymps. [Art] (Manchester City Art Gallery).

Weilacher, U., 2008. Syntax of landscape, The Landscape architecture of peter Latz and Partners. 1 ed. Berlin: Deutsche Nationalbibliothek.

WLA, 2015. worldlandscapearchitect. [Online]
Available at: http://worldlandscapearchitect.com/habitat-landscape-architects-creates-educational-parks-in-northern-cape-south-africa/#.WW3NcojfrIU
[Accessed 12 07 2017].

Your dictoinary, 2017. www.yourdictionary.com. [Online]
Available at: http://www.yourdictionary.com/reconnect
[Accessed 28 02 2017].

Available at: https://www.moneyweb.co.za/mineweb/mining-companies-investment/gold-mining-will-be-finished-by-2033/
[Accessed 01 05 2017].

Van Wyk, D., 2014. Abandoned mines are seriously impacting communities and is contributing to child-labour. [Online]
Available at: https://www.google.co.za/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwjJiJrNtdPSAhULKsAKHQnuC4cQFggYMAA&url=http%3A%2F%2Fwww.bench-marks.org.za%2Fpress%2Fabandoned_mines_and_child_labour.pdf&usg=AFQjCNFouDFFUW6XWoAfunkoTTUbQmaGDA&sig
[Accessed 13 03 2017].

Waterhouse, J. W., 1896. Hylas and the Nymps. [Art] (Manchester City Art Gallery).

Weilacher, U., 2008. Syntax of landscape, The Landscape architecture of peter Latz and Partners. 1 ed. Berlin: Deutsche Nationalbibliothek.

WLA, 2015. worldlandscapearchitect. [Online]
Available at: http://worldlandscapearchitect.com/habitat-landscape-architects-creates-educational-parks-in-northern-cape-south-africa/#.WW3NcojfrIU
[Accessed 12 07 2017].

Your dictoinary, 2017. www.yourdictionary.com. [Online]
Available at: http://www.yourdictionary.com/reconnect
[Accessed 28 02 2017].

© University of Pretoria

© University of Pretoria

Acknowledgements

12 Blessed is the man who remains steadfast under trial, for when he has stood the test he will receive the crown of life, which God has promised to those who love him.
James 1:12

To my Saviour and Heavenly Father:
Thank you for guiding my hands through this project. Thank you for strengthening me to take on the giant each day. Thank you for surrounding me with positivity, inspiration, and people that made this year more meaningful. Most of all, thank you for blessing me much more than I ever deserved.

Dr. Ida Breed:
Thank you for your patience, wisdom, knowledge, strong guidance, and loving heart. You have been a true inspiration throughout my studies, and I will forever be grateful for working under you this year. Thank you for your mentorship!

Johan N. Prinsloo:
Thank you for the hours and hours you spent with us in studio. Thank you for your endless poetic wisdom, and your passion for landscape architecture. You taught me a great deal about the deeper meaning of landscape architecture, and for that I will always be grateful.

Fourie Pieterse:
Fourie, baie dankie vir 5 jaar se rugby praatjies, ondersteuning en omgee. Jy was werklik my rolmodel en held in Boukende. Dankie vir alles wat ek onder jou kon leer. Boukunde is werklik n bietjie minder sonder jou.

Aan my familie:
Pop en Mom. Baie dankie vir die voorreg om my droom te kon na jaag. Dankie vir al die ondersteuning, omgee, hulp, en liefde. Julle is my trots en my veilige hawe. In die moeilike tye is julle altyd daar, en daarvoor sal ek julle vir altyd in my hart koester.

Zanmari Havenga:
My geskenk van God. Dankie vir al die liefde, ondersteuning, en geduld. Dankie dat "opgee" nooit n opsie vir jou was nie. Jy was my motivering en my rots. Die jaar sou werklik baie moeiliker gewees het sonder jou, en daarvoor sal ek jou virewig lief hê.

© University of Pretoria