Llefa Lame...

[Re]imagining Soshanguve Landfill

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School of Architecture, Planning & Geomatics
Master of Landscape Architecture (2021)

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[Re]imagining Soshanguve Landfill

by
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MLBLEF001

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I further state that no part of this dissertation has already been or is currently being submitted for any such degree, diploma or other qualification.

2021

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Special thanks to:

My late mother: Meriam Dimakatso Molubi… I can write a whole book on how grateful and lucky I am to be under your guidance throughout all these years, it is sad that you did not arrive with me on this destination; but im 100% sure that "Te me" is super proud.

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Marulela wee!
Ke Marulela a ntlo tsa goswa, ge o sa rulele o tla naiwa.
Ke batho ba segwaritlhe sa bo Mokgaetji. Ke ba bo mphetoleng a marumo motse mosha molla koma.
Ke ba go tswa Tokeng gaabo Raisibe.
Se gatlhane le Makotopu Matebele o lobile. Gatlhana le Makotopu Tebele a wa lebona.
Mbagho Motsekedi a mmina Marulela.
Ba gho Magadisa we tekxomo ta se manailene.
Ba gho Ntshakga, Masela we ledlagwe.

Marulela wee!!!
Kekana

Prelude

10 July 2020

In the morning, at around 7am, me and my late mother drove towards the north of Soshanguve Block S to attend a relative's funeral, we used the M21 route known as Molefe Makinta Drive, it was previously and famously known as Lucas Mangope Highway. The road is a corridor connecting Brits town and Hammanskraal. It was during lockdown but the streets are buzzing because the route passes through many township sections of Ga-Rankuwa, Mabopane and Soshanguve. Our destination is close to another local node, a cross junction where Molefe Makinta and Soutpan road (A corridor that connects Bojanala/Moretele district and Tshwane); there's a Landfill situated on the south-eastern part of the cross road, across it on the north eastern side lies a rehabilitation centre famously known as 'Stout school' and City of Tshwane Building.

After funeral preceding's, my mom and I decided to drive by my aunt's place, her older sister, in Soshanguve Block PP2 (West of Molefe Makinta drive) which is less than five minutes drive away. At around 15H00, we left block PP2, traveling from the west towards Molefe Makinta Drive, the direction of the landfill. As we slowly come closer to the landfill, I tell my mom that we might be heading to trouble, it looked like there were protest, a cloud of dust covering the landfill, people making noise, primary school children pushing carts, adults dragging man-size bags, an estimated number of 50 people moving up and down the landfill terrain and of course car hooters from the local taxis passing by- a whole buzz. We realised when we were just about to the to the south that it is not a protest but waste pickers and waste recyclers. I could not stop thinking about that three (3) minutes experience.

26 December 2020

I left home (Ga-Rankuwa) at 11am, its a public holiday, a day after Christmas Day. I was travelling to Kromkuil (10 minuets away from Tswaing Crater in Bojanala District), my late grandparents home; I used the Molefe Makinta route. I couldn't wait to pass by the landfill because I was so interested to see what'll be happening since my last experience. I saw roughly ten to fifteen people up the mound, I felt to see people at a landfill on what most people in the community consider as a family day.

Abstract

Twenty-seven (27) years of democracy in South Africa, communities in townships formed by the apartheid government, live in dire conditions brought by the legacy of apartheid. The lack of economic opportunities and resources make South African citizens creative and innovative, communities from Pretoria north townships gather daily at municipal landfills to collect, sort valuable and recyclable waste in exchange for cash.

This study focuses on informal waste re-claimers working conditions at Soshanguve landfill and Soshanguve township communities residing in the vicinity of an active landfill that is situated within an evironment that is rich in history and heritage.

The aim of this study is to investigate the daily activities of the informal waste re-claimers; and hopes to inform innovative and functional ways to create a tolerable working environment during the operational phases of the landfill with the intention of transforming it to a sustainable public open space upon decommission. The study approach considers a pragmatic research using both qualitative and quantitative study methods to collect data through In-depth interviews, statistical observations and theoretical investigation.

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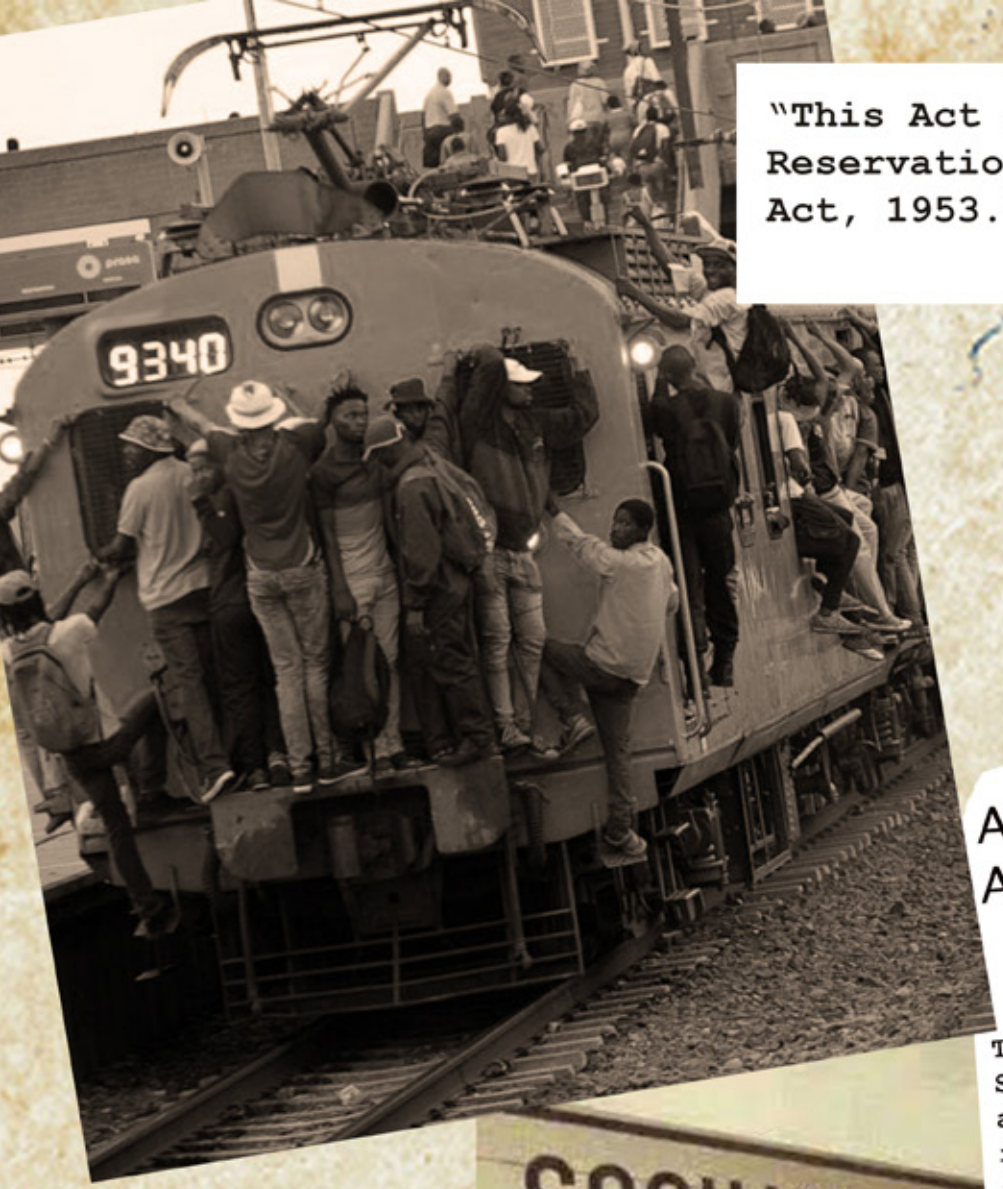
List of Figures

Chapter 1: Introduction

This chapter orchestrates the reader to the authors first-hand experience at the Soshanguve landfill and it further justifies the rationale of the groundwork on which this study is based.



"This Act shall be called the Reservation of Separate Amenities Act, 1953."

Act No. 41 0f 1950, Group Areas Act

The aim of the act was to further segregate the South African people, by creating areas divided along racial lines and thus forcefully relocating Non-White South Africans to locations outside the cities and towns. In 1974 Soshanguve township was established.

SO-SHA-NGU-VE

SOtho-SHAngani-NGUni-VEnda

1.1 Background

Section 24 of the Constitution of South Africa states that everyone has the right to an environment that is not harmful to their health and well-being; and to have the environment protected for their benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development (Government Printing Works, 2014). The legislation further provides that landfill sites should be managed to ensure compliance at all times, adequate buffer areas should be implemented in accordance with the Department of Water Affairs and Forestry (DWAF) guidelines and no public access shall be allowed (KH Landscape Architects, 2008).

Twenty-seven (27) years of democracy in South Africa, communities in townships still live in dire conditions brought by the legacy of apartheid. Social and environmental justice; and sustainable development were promised. While some progress has been slow, resulting in the growing population's need for employment, basic infrastructure and sanitation.

The inadequate administration of resources, facilities and infrastructure has led South African citizens to practice innovative living, although some of the innovations are against the law and or by-laws provided by the ruling government.

1.2 Research Problem

Communities from Pretoria north townships (Ga-Rankuwa, Mabopane and Soshanguve) gather daily at municipal landfills to collect and sort valuable and recyclable waste in exchange for cash. However, the residents of Soshanguve block S, T, PP2 and the neighbouring informal settlement "Mazambani" have been proposing to the municipality, City of Tshwane metropolitan municipality (CoT), to close down the landfill situated in the middle of these communities, because of the unbearable odour, noise, land and air pollution caused by the landfill (Ngobeni, 2019).

The landfill has been one of the income generators, in fact, some of the residents are against the closing of the landfill as it serves as an opportunity to create employment because they live off reclaiming waste at the landfill as way sustenance. According to the CoT the informal waste reclaiming is unlawful, but the fact that the informal activities of reclaiming waste are by means contributing positively to the environment cannot be ignored. The landfill's life cycle increases when waste is sorted and recycled accordingly, waste recycling reduces pollution and most importantly, the problem that the government fails to resolve, employment.

The proposed study area is situated within an environment that is rich in history and heritage, it is situated along a regional corridor that was named after a Bantustan of Bophuthatswana leader, Mr Lucas Mangope Drive (M21) presently known as Molefe Makinta Highway and soutpanspruit river, 4km away from Tswaing Meteorite Crater, and 28km away from the Amandebele-A-Moletlane Chief Authority office who currently claim that the land is rightfully theirs (Nyoka, 2018).

1.3 Research Questions

How can Soshanguve landfill become a habitable working environment during operational phase and transform to a sustainable public open space upon decommission?

I. How can informal waste sorting be formalized to improve local economy?
II. How can Soshanguve landfill transform to a heritage landscape to facilitate tourism?

1.4 Objectives

The aim of this study is to investigate the daily functioning of Soshanguve landfill and hopes to inform innovative and functional ways to:

1. create a safe working environment for informal recyclers during the evolving times of the landfill operations;
2. create livable environment for Soshanguve residents;
3. develop a heritage public open space upon decommissioning.

1.5 Methodology

Research Paradigm: This study employed a pragmatic research approach, using both qualitative and quantitative research methods to collect, analyze and interpret data.

Approach: The research design for the study involved the acquisition and analysis of secondary data through theoretical investigations and case studies in order to estab-

lish a suitable approach for landfill design. The study used desktop studies for collection of Geographical Information Systems (GIS) and Historical photographs; investigated the state of land and relevant environmental attributes at regional and site scale.

Preceding Muller and Gibbs (2011) techniques of mapping cultural landscapes and storytelling, this study employed these techniques to unravel historical monuments; understanding narratives that form place and cultural identity.

In-depth interviews with knowledgeable and experienced individuals were conducted in order to understand the daily lived experiences of Soshanguve residents.

Site observation and analysis were conducted to develop the project intervention and design.

1.6 Assumptions & Delimitations

The author acknowledges that landfills are deemed unsafe and some parts of the study area will not be accessed. Due to current Covid-19 regulations, the author could not conduct group interviews; all site visits and interactions were observed and adhered to these regulations.

The author does not promote informal waste reclaiming and sorting; however, it is the reality of the study area and this study aims to improve the lived experience of users.

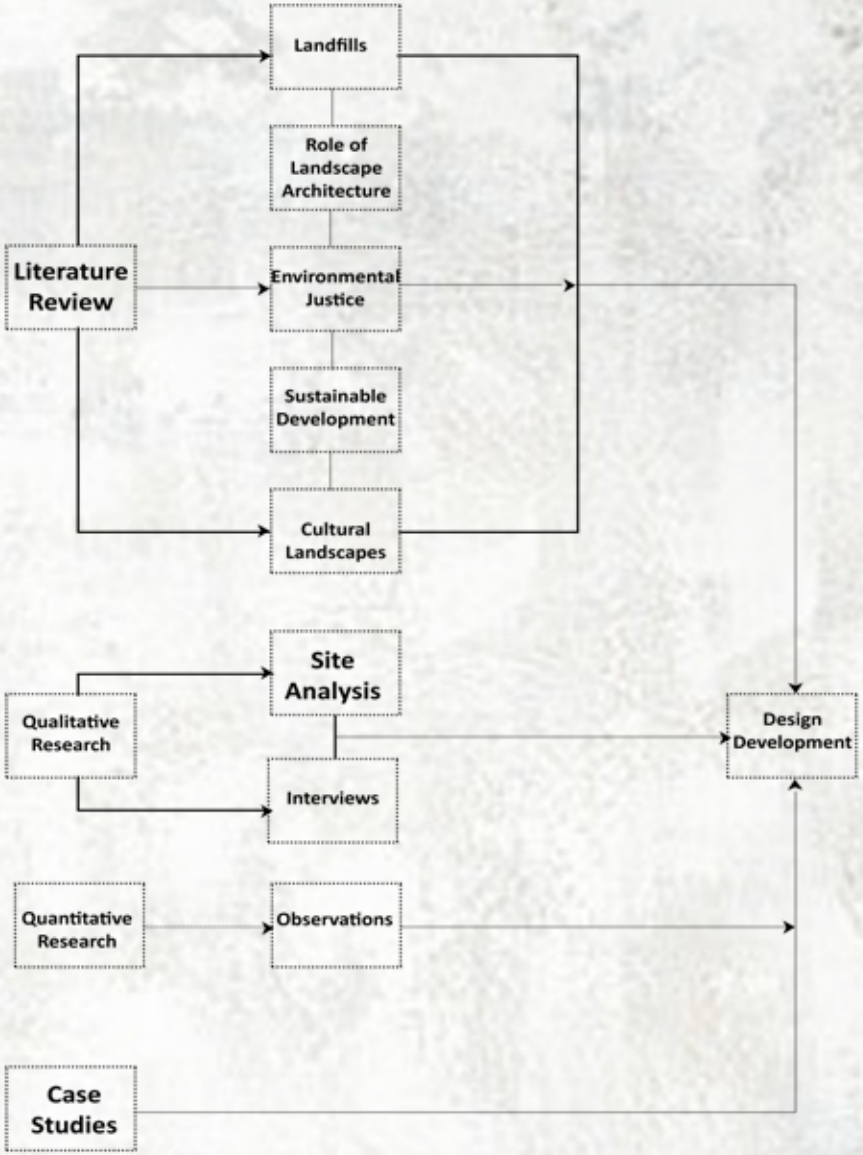


Figure 1: Methodology Diagram

Chapter 2: Archiving the Intangible

This chapter's chief focus is to document research participants narratives obtained through in-depth interviews and multiple site visits. The objective is to get insight of the lives of the waste re-claimers and understanding how the Soshanguve landfill operates.

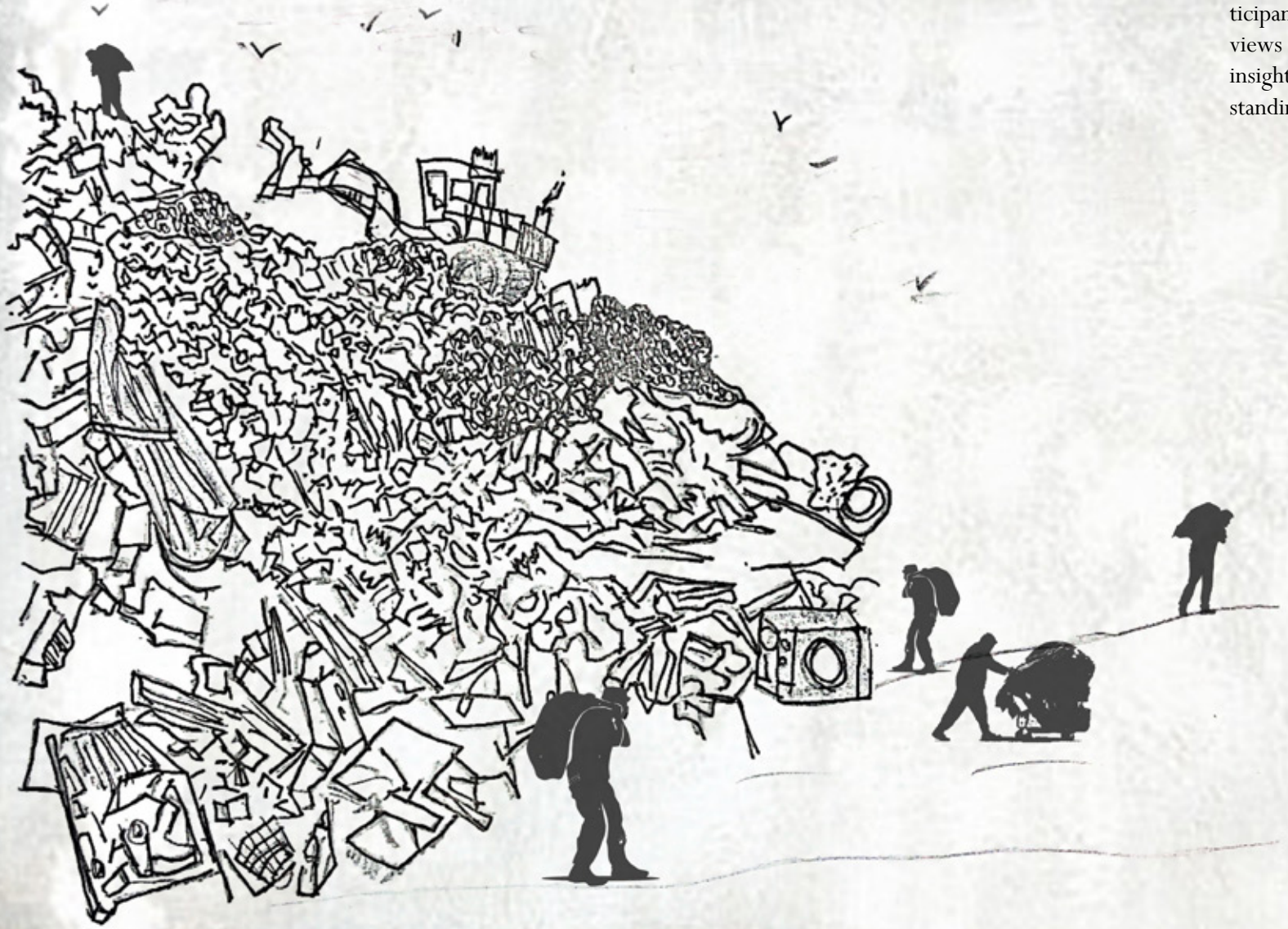


Figure 2: Mam Lizzy Narrative

Mam Lizzy (56y/o)

"I have been recycling waste for approximately thirty-three (33) years, that is how I got nominated to be the leader of our re-cycling forum. I liaise with site manager on informal basis, we do not have any formal contract with the municipality, however, I am very grateful for the patience they give us. My core responsibility is to negotiate fair prices between the waste re-claimers and waste buyers, we call them "Middlemen".

With the money I have made through recycling waste, I managed to take all my three (3) children to school, recently, the younger one got a driver's licence through the income I have made here. I stay in block KK a formal settlement; I catch a local taxi to a daily basis, it costs me R30.00 return trip."

Access/ Entrance to Site

Single Lane Ramp to access the working Face

Waste Sale

Figure 3: Shelton Narrative

Shelton (50y/o)

"I stay in Block S informal settlement. I walk to get home, I arrive here 7:30am daily and leave at 17:00 I collect white paper and green soft drink bottles. I started recycling waste on the year 2016 when I got retrenched from work; the working conditions here are similar to when I was doing construction works so I am used to this harsh blazing sun."

Site Experience

Walk on Steep Slopes for Short Movement

Rest on Waste Berms

walk on Wet & Vegetated

Tumi (32y/o)

"I stay in Block S. I carry my stock every morning, I have a friend who has a car fetches me sometimes, especial on days when I need to get more supplies. I built my stall using the tree branches from the garden refuse waste. My biggest challenge here is the security of my goods, I can't leave anything here because it will be stolen. My Stall becomes a change room for the guys as you can see their bags are here. Things that can be left here at the end of the day are work suits, my chairs & tables, but sometimes the homeless drug addicts steal them its just a risky."

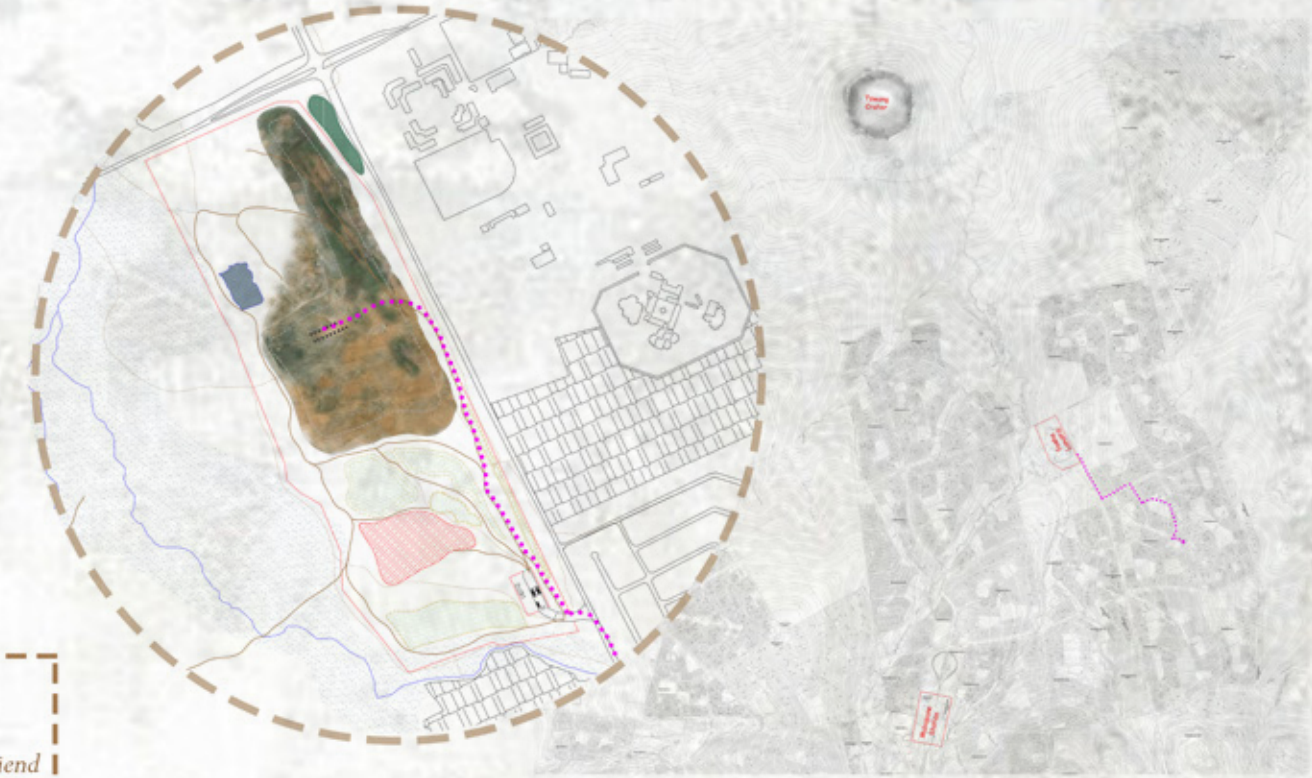


Figure 4: Tumi Narrative

Site Experience

Access/ Entrance to Site

Negotiate Path with Trucks on Single Lane

Single Lane Ramp to access the Market Place

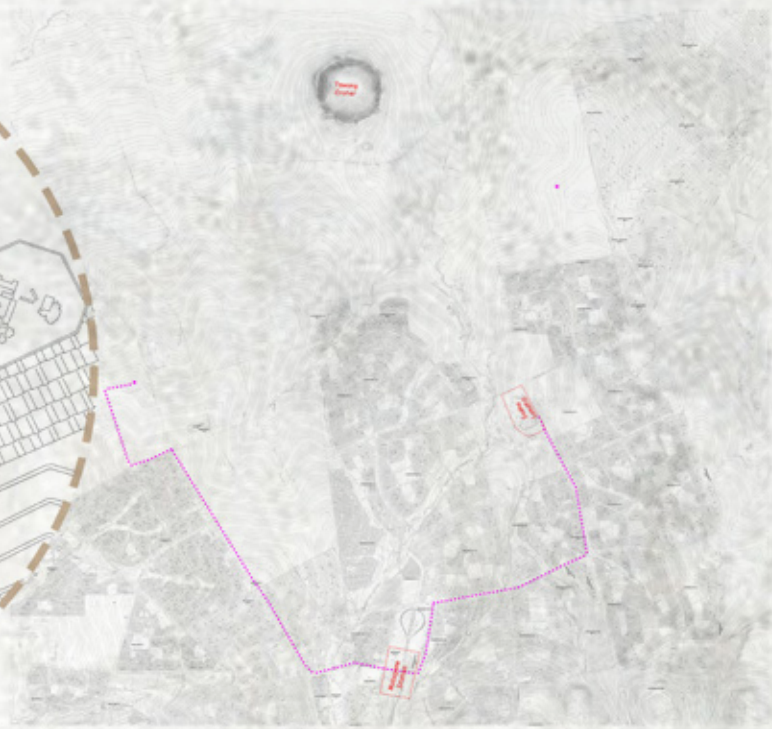


Figure 5: Lerato Narrative

Lerato (67y/o)

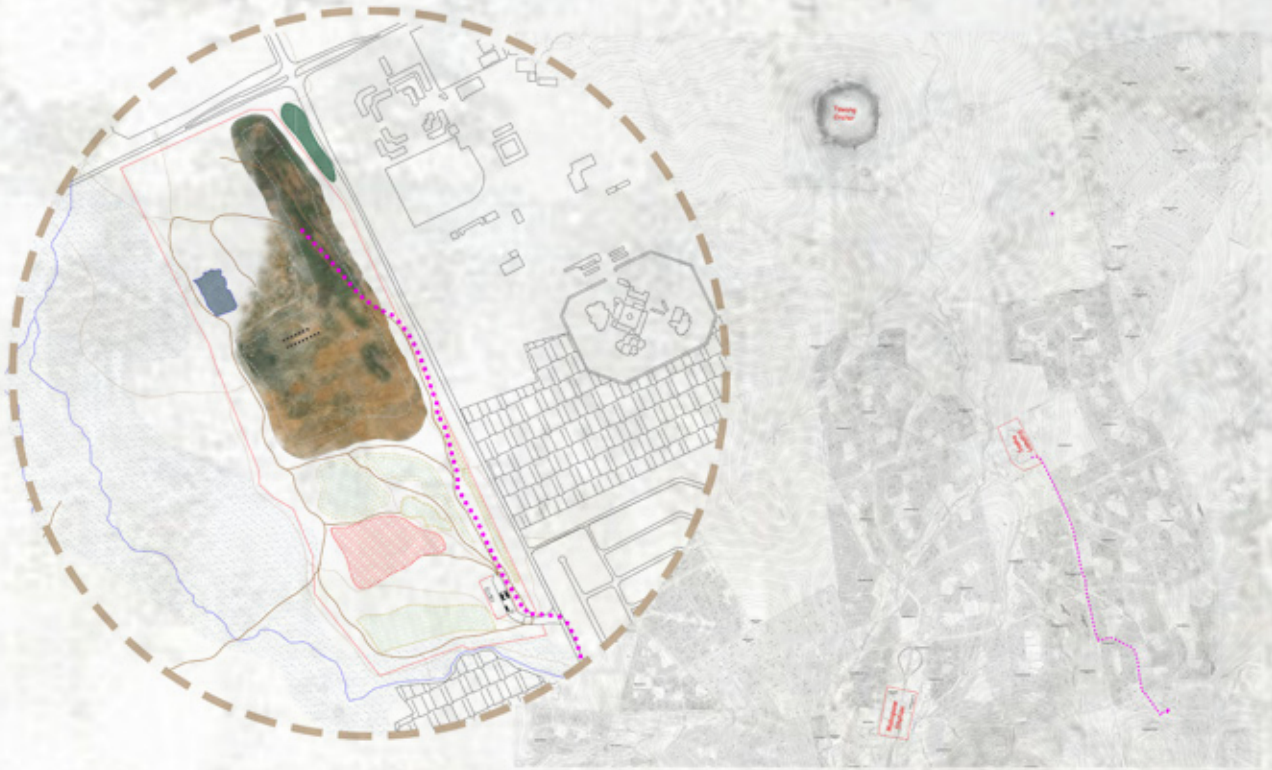
"I started sorting waste long before Lizzy, there was an active landfill in block UU and most of us started there in the late 1980's. Back in the day people used to call us silly names because they believed that only homeless people can do this job. I stay inWinterveld, I take two (2) taxis to get here i change taxis at mabopane station, so its four (4) taxis for a return trip on a daily basis, that's R60.00 on transport a day. because I stay far, I arrive at 10:00 am. I collect brown cardboard; I make R120.00 per kilogram, you see now my bag weighed four (4) kilograms. I only fill one (1) bag a day because I'm too old now."

Site Experience

Access/ Entrance to Site

Rest on Waste Berms

walk on Wet & Vegetated



Big Mama (31y/o)

"I was named "Big Mama" because of my personality and Character. I stay in Block M, I walk every day. My stall is not for commercial purposes, it's just a change room. I collect detergent and milk plastic bottles because they are most valuable to the buyers, we don't crush the bottles or squeeze them; because buyers wash them and refill contents and re-brand the packaging. Each 2 litres detergent bottle costs R1.50, milk bottle if it's not damaged costs R4.00; you see there is lots of money here? Most of the time I collect these material in my neighbourhood."

Site Experience

Access/ Entrance to Site

Single Lane Ramp to access the working Face

Waste Sale

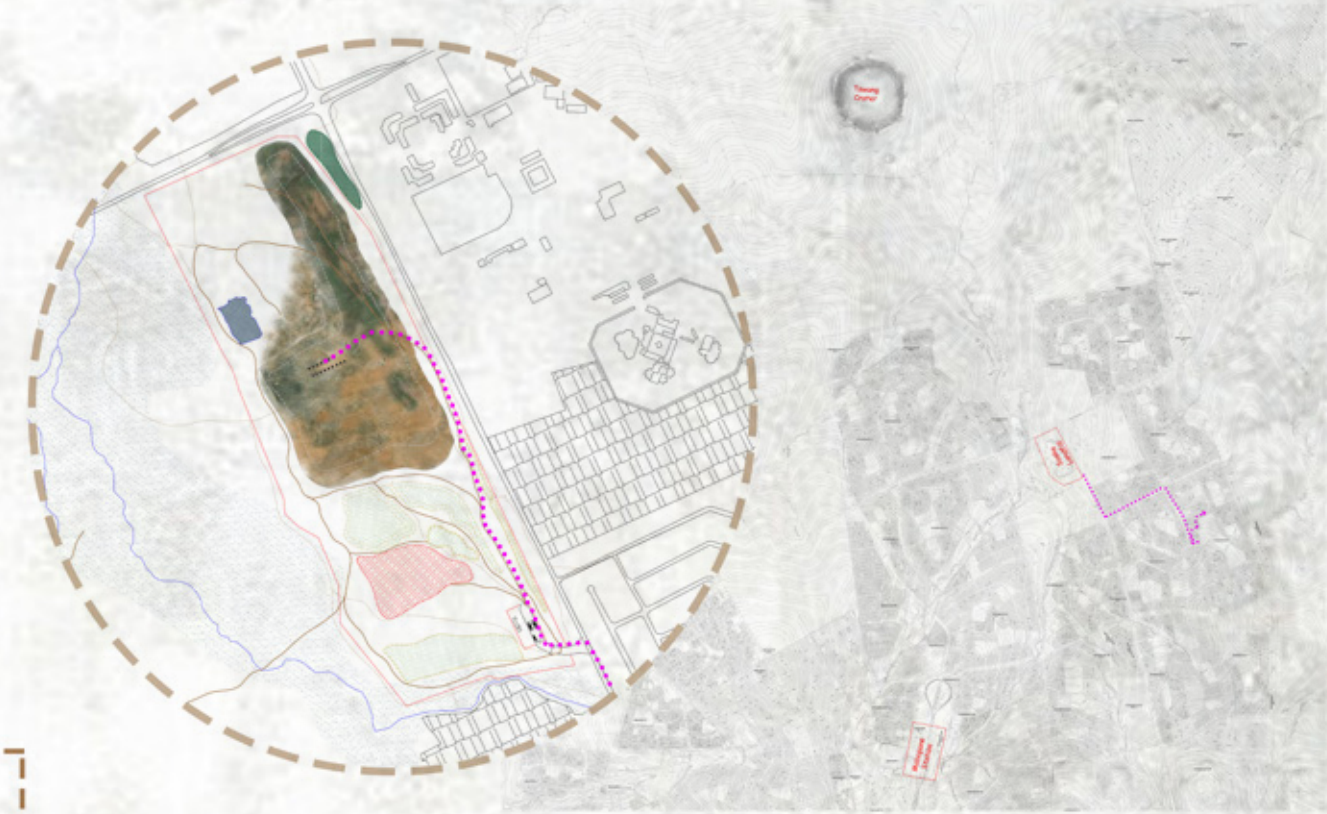


Figure 7: Rich Narrative

Rich (27y/o)

"Rich was derived from my real name, but because I love a fancy life, most people think that I got it from my fancy lifestyle. I only sell cool drinks and Cigarettes. I make enough money for survival because it's hard to get a decent job even if you went to school, I could've chosen to sell at Mabopane Station but there are many vendors there, here I don't have a lot of competition. I share this stall with other people who keep their bags and change here. I live in Block S; I store my supplies in a portable cooler box then I carry it every day. The stall is made of the recycled materials we found here, it's easy to find heavy duty plastic and tree branches around."

Site Experience

Access/ Entrance to Site

Negotiate Path with Trucks on Single Lane

Single Lane Ramp to access the Market Place

Figure 8: Jankie Narrative

Jankie (33y/o))

"I stay in Block S; I wake up early in the morning to collect waste from household bins before the municipal trucks come to collect, I use a trolley to carry the valuable material and sell at the landfill, if I do not find the middlemen I go to the private recyclers adjacent to the landfill. They call me Junkie because I used to be a drug addict, I smoked "Nyaope". Now I moved back home and I even contribute financially at home."

Site Experience

Collect off-site

Single Lane Ramp to access the Market Place

Waste Sale

Faraganye (38y/o)

"I moved to South Africa back in the year 2006 before the 2010 soccer world cup because there were lots of job opportunities in the construction industry; After the famous soccer event, the industry started slacking and unfortunately I got retrenched. Since my re-trenchment, this has been my way of living and I still manage to survive and feed my family in Zimbabwe. I walk to Tswaing on a daily basis, it's not that far from here, most women catch taxis I prefer walking because it saves money plus I can even collect some valuables along the way."

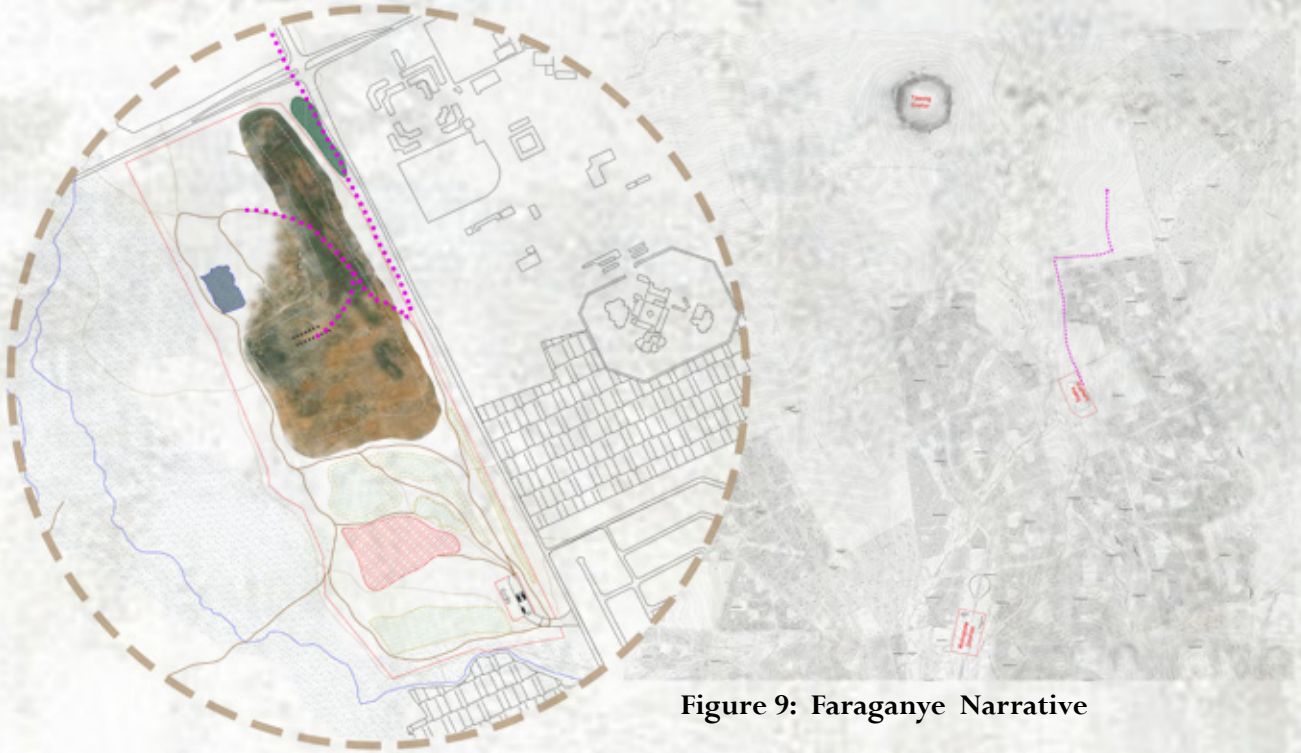


Figure 9: Faraganye Narrative

Site Experience

Walk on Steep Slopes for Short Movement

Walk on Wet & Vegetated Paths

Rest on Waste Berms

Lydia (25y/o)

"I live in Tswaing informal settlement; I came to South Africa soon after my husband immigrated to find a better job because we were suffering back in Mozambique. Most people in our neighbourhood work on the landfill, I decided to share a stall with a friend to sell warm meals."

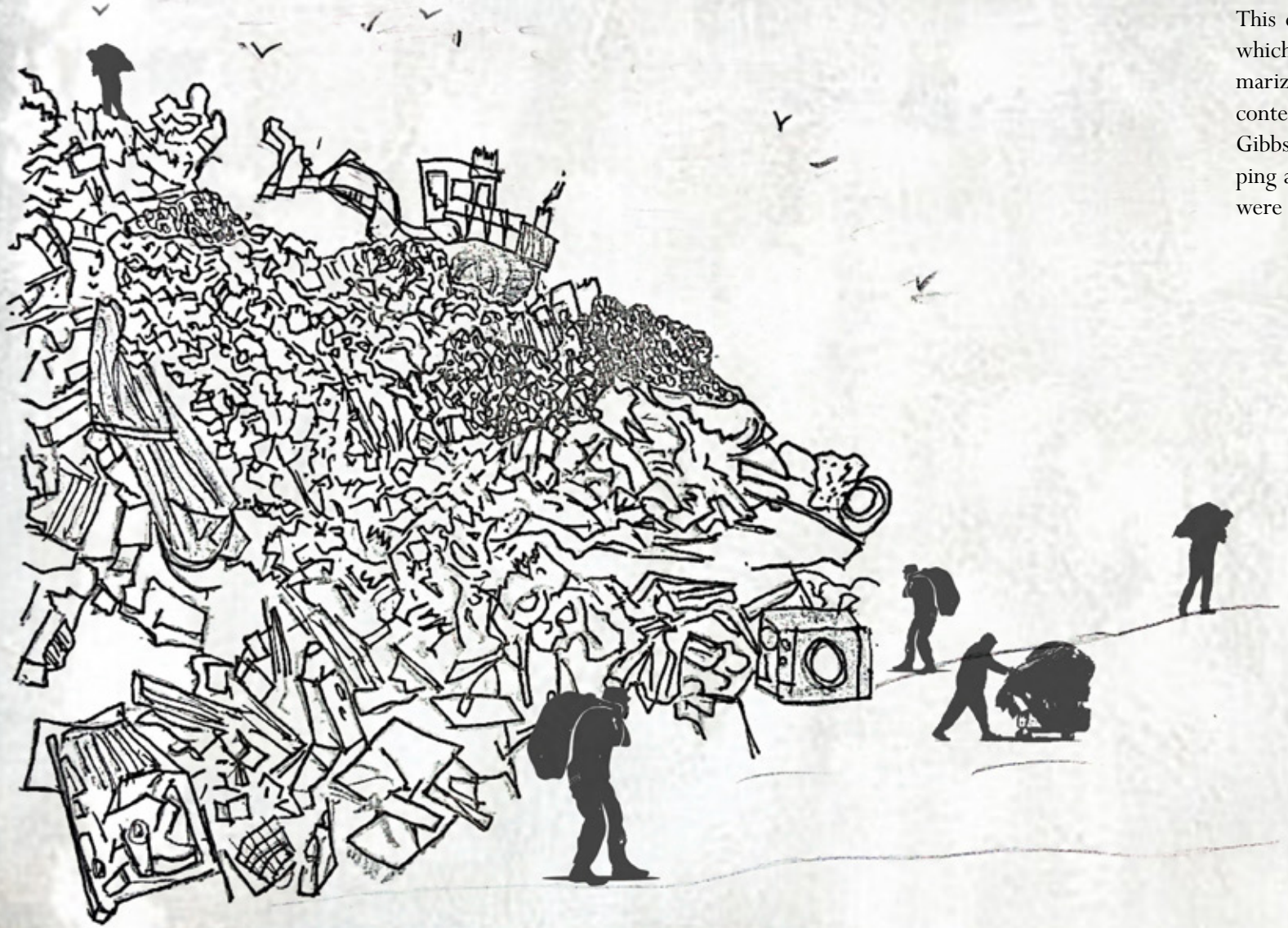
Site Experience

Access/ Entrance to Site

Use Open Fire to Prepare Meals

Carry Supplies Uphill-Downhill

Chapter 3: Context & Historical Background



This chapter orientates the reader to the footing in which Soshanguve landfill is situated, succinctly summarizes the history of Soshanguve township and its context and on the latter, analyzes the status quo. Gibbs & Muller (2011) techniques of reading, mapping and representing data, as discussed in *Chapter 1*, were adopted to depict data and findings.

Figure 11: Locality Map of Soshanguve

3.1 Locality

Soshanguve landfill is situated in the North-western region of a township called Soshanguve, North of the city of Pretoria, under the administration of the City of Tshwane Metropolitan Municipality (CTMM); in Gauteng province, South Africa.

The study area is situated within an environment that is rich in history and heritage, it is situated along a regional corridor that was named after a Bantustan of Bophuthatswana leader, Mr Lucas Mangope Drive (M21) presently known as Molefe Makinta Highway and soutpanspruit river, 1.9 kilometers (km) away from Tswaing Meteorite Crater Museum boundary, and 28km away from the Amandebele-A-Moletlane Chief Authority office. The study area is within the Tswaing/Zoutpan/Soutpan which means a "A Place of Salt".

3.2 The Historical Timeline of Soshanguve

In the year 1974, Soshanguve township was established. Soshanguve is an acronym derived from shortening Sotho, Shangaan, Nguni and Venda ethnic groups, guided by the apartheid Group Areas Act No. 41 0f 1950 under the administration of Bantustan of Bophuthatswana. South Africa was liberated in the year 1994, when the first democratic leader, the late Nelson Mandela, was inaugurated. Constitution was amended and a lot of changes were promised to the citizens of the republic yet twenty-eight (28) years later; the living conditions are worsening. *See Appendix 1* for a detailed historical timeline of Tswaing Meteorite Crater and how Soshanguve township was established.

3.3 The Underlying Context : Geology & Hydrology

Nebo Granite is the common rock type found in the study area (Reimold, 1990). Nebo Granite is part of the Bushveld Complex. The Bushveld Complex is a multi-layered rock that stretches hundreds of kilometers vertically and horizontally. According to (Reimold, et. al., 1999) research discussed early on this *chapter*, depicts that when the asteroid hit the ground, the impact caused an explosion that excavated a hundred (100) meters deep crater; and the bedrock overturned out to approximately hundreds of meters. *Figure 13* graphically represents Cross-section of the Tswaing crater geology modified after Brandt, D., (1994), Brandt & Reimold (1999), Partridge & Reimold (1990). As mentioned above, the crater is situated ap-

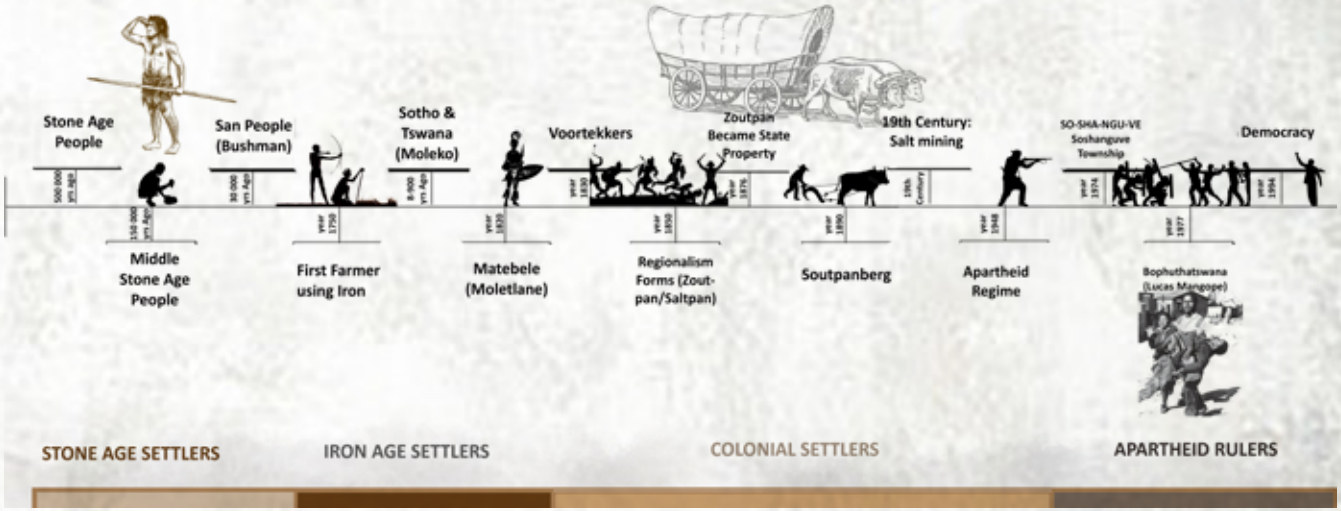


Figure 12: Historical Timeline of Soshanguve

proximately 5 kilometeres away from the study area, it can be confidently concluded that the geology underneath the crater is similar to the one underneath Soshanguve landfill.

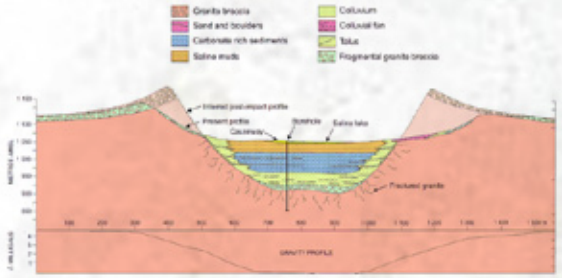


Figure 13: Cross-section of the Tswaing crater geology modified after Brandt, D., (1994), Brandt & Reimold (1999)

The Soutpanspruit river course, which was aptly named after the salt pan, is embedded three-hundred (300) meters away from the study area and also passes through the meteorite crater museum precinct. The river is one of the major rivers within the Crocodile West & Marico Catchment. The Soutpanspruit and its tributaries flow through most of the northern portion of Soshanguve,flowing in a northerly direction. According to Bolosha and Mkhonza (2018) report, Soutpanspruit river has a poor habitat integrity, therefore, does not have sufficient habit available to accommodate a diverse community of macro invertebrates due to poor storm water drainage, collapsed banks, illegal dumping and presence of alien invasive species resulted to a low to moderate stream flow. The river functions as an ecological link within the open space system, and its regarded as highly ecological sensitivity (LOSP, 2008).

3.4 The Surface Context: Status Quo

3.4.1 Topography

The study area is situated in an interposal zone between BBushvelds, Bakenveld and Springbok flats (Viljoen, 2012). From the definition of bushveld, which means an area with a low altitude, the study area is flat with low undulation. The altitude varies from 1139 meters above sea level from the Soutpanspruit river banks to 1160 meters above sea level on the highest point of decommissioned landfill mound. Currently, the highest point of landfill mound is equal to the highest of the crater rim, this is depicted on the visual assessment to follow later in this *chapter*.

3.4.2 Flora and Fauna

Herbivores such as the Sable or Roan antelope (Hippotragus sp.) and Equus capensis (a large zebra - now extinct), could have been found chewing the leaves of small Acacia trees or grazing in the tall grasses. Lions, leopards, and hyena waited for their next meal. African elephants, giraffes and the now extinct giant Wildebeest, Megalotragus priscus, rounded out the grassland megafauna (Reimold, et. al., 1999). The impacts of the shockwave caused by the asteroid as discussed early on this *chapter*, inflicted sever damage on flora and fauna in the region. (Reimold, et. al., 1999) reports that the explosive shockwave produced Gayle-force winds of speeds exceeding 100km/h within three (3) to five (5) kilometers of the impact, these strong winds destroyed grasses, flattened trees and caused injury on animals to a distance of fourteen (14) to nineteen (19) kilometer radius from the impact. *Figure 14* depicts the effects map of the Tswaing impact.

Figure 14: Tswaing Impact Map

Presently, the vegetation within the study area is influenced by the Soutpanspruit floodplain classified into different plant communities; grasses, marshes and woodlands.

3.4.3 Bio-Climatic Conditions

The study area is classified under the Temperate Eastern Plateau, with warm and wet summers; cold and dry winters. The prevailing winds blow in North-Easterly direction in summer and North-Westerly direction in winter (Viljoen, 2012).

3.4.4 Demographics

Soshanguve township is situated thirty (30) kilometers away from the Pretoria central business district. The township is comprised of an approximately (40163) human population (Stats South Africa, 2011), with a diversity of languages and cultures as already discussed early

in this *chapter*. With a diverse population groups and historical evolution, a distinction of housing typologies resulted; ranging from privately built home structures, old suburbs with apartheid "Match Box" houses built from clay bricks (Mabuya & Scholes, 2011), recently developed Reconstruction and Development Programme (RDP) houses under the democratic state governance and lastly, the abundance of informal house structures built from corrugated zinc and iron materials that encompass the Soshanguve landfill. Access to basic services, resources and housing typologies are major segregation devices within this township.

3.4.5 Open Space Systems

There are no regional open spaces (referred to as brown nodes) within the context of Soshanguve landfill, however, the Tswaing Meteorite Crater is a national reserve and it is not under the municipality's administration as depicted on *Figure 15* overleaf. The study area is highlighted in red to show its size in comparison the existing facilities within the region. According to the Local Open Space Plan Report (2008), Soshanguve community parks are accessible freely, sports facilities are linked to schools or clubs. Parks are commonly developed with play equipment, lawn and demarcated by bollards.

The report enforces that all recreational nodes linked to hills and rivers are regarded ecologically sensitive. *Figure 16* shows the local open space network of the City of Tshwane Metropolitan Municipality within the context of this study. The study area is highlighted to depict its size in relation to other recreational spots adjacent.

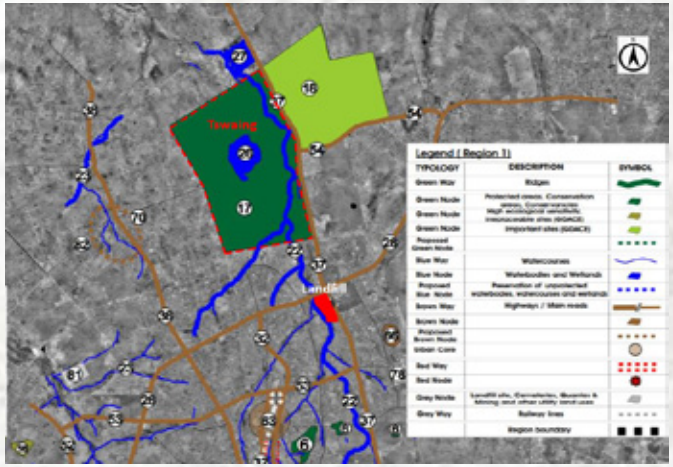


Figure 15: CTMM Regional Open Space Plan

Figure 16: Local Open Space Plan

3.5 Synthesis

Soshanguve township has wealth of history tied to it, the environment has evolved through occurrences of supernatural and government revolutionary events; and socio-economic drivers. The geology within the context of the study area influenced the Soshanguve settlement at local and regional scale dating occupation patterns from thousands of years ago.

The Soutpanspruit river and its wetland system links open spaces within and beyond the region of the City of Tshwane Metropolitan Municipality, as mentioned early on this *chapter,* open spaces linked to the wetland systems are regarded sensitive. Within the context of Soshanguve landfill, it is of utmost importance to restore and rehabilitate biodiversity as discussed on Bolosha and Mkhonza report (2018). Gowar (2016) advocates that no one appreciates living in or around a landfill site, however it is the reality of Soshanguve residents and lives of the waste recyclers who closely interacts with such intolerant environment.

Considering the local open space system analysis, it is evident that there is great potential of transforming the Soshanguve landfill into a multi-purpose sports facility upon decommission; while embracing the diverse cultures and history associated to facilitate social cohesion. This study advocates that the transformation of this landfill, should have significant economic value to sustain livelihoods currently dependent to it and continuously generate income in the future as a device to consolidate the injustices discussed early on this *chapter*. *Refer to the Synthesis diagram overleaf.*

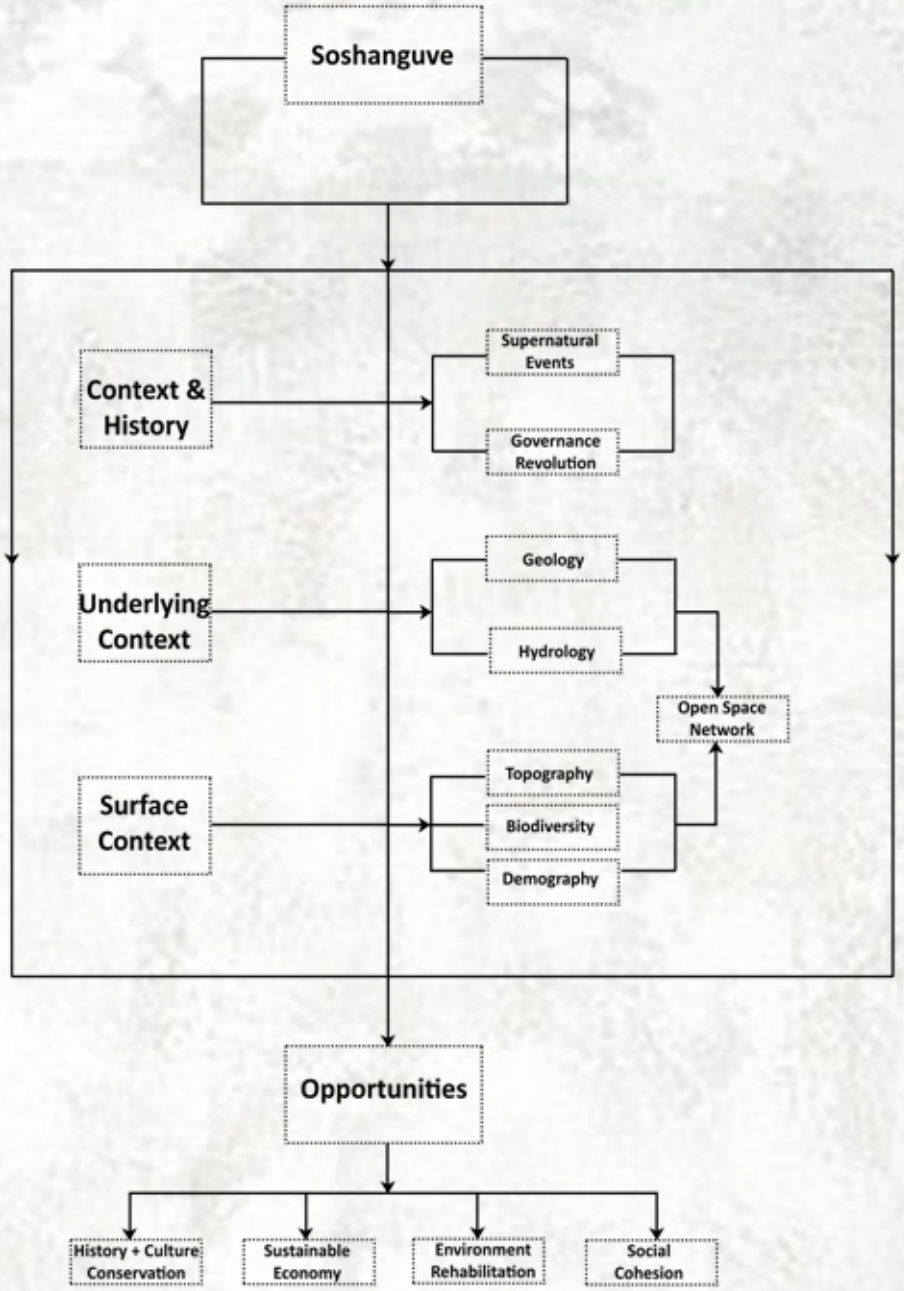
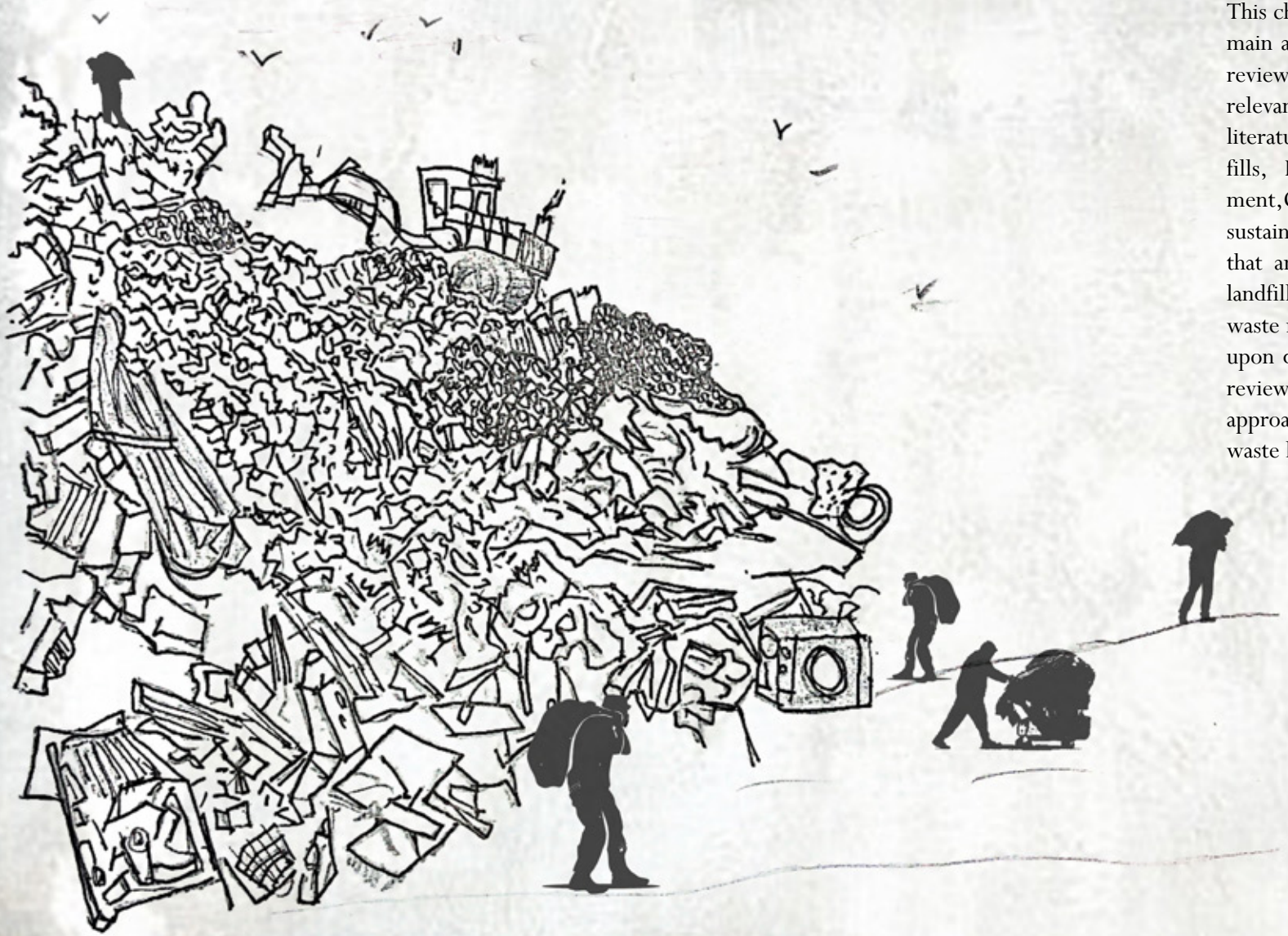


Figure 17: Context & Historical Background Synthesis Diagram

Chapter 4: Theoretical Investigation



This chapter's chief focus is on answering the research main and sub-questions as raised in *chapter 1* through reviewing the relevant literature and their combined relevance to the context of Soshanguve landfill. The literature review comprises of five (5) strands: Landfills, Environmental Justice, Sustainable Development, Cultural Landscapes. It investigates how, through sustainable landscape architectural design approaches that are able to conciliate spaces between required landfill processes while accommodating activities of waste re-claiming, a cultural landscape can be realized upon decommission. The answers from the literature review needs to be combined to establish a sensible approach that can be employed to transform an active waste landscape.

Figure 18: Theoretical Framework

4.1 Landfills

4.1.1 Definition & Legislation:

Landfills are areas where dispensable materials are sent, which are then covered underground. During this interaction, certain measures are taken to keep the waste from coming to and conceivably tainting any groundwater. In South Africa and globally, research has shown that most landfills are situated close to poor and marginalized neighbourhoods; this is alarming given the fact that there is a wide range of diseases and viruses associated with living in such environments (Njoku et. al., 2019). In South Africa, the Department of Water Affairs and Forestry (DWAF) facilitates the enforcement of waste management governed by a series of national legislative Acts (DWAF, 1998). DWAF established a reference framework for waste management that outlines the minimum standards for permitting systems of landfill sites according to guidelines outline in Section 20(1) of the Environment Conservation Act, 1989 (Act 73 of 1989).

The City of Tshwane Metropolitan Municipality (CTMM) adopted national waste management legislation to formulate a Local Open Space Plan (LOSP) that outlines the standards of Landfill site implementation as depicted in *Figure 18* overleaf. The legislation also facilitates public access to landfill sites and it firmly states that the general public is not permitted to enter the sites because they are deemed unsafe. According to LOSP, end- use plans should be compiled to provide for alternative use of land upon decommissioning such as regional sports facilities and other recreational facilities as part of environmental conservation (KHLA, 2008).

4.1.2 Operating Systems & Terminology:

Cell: A unique compartment designed and constructed to contain eligible waste at an active landfill.

Capping or Cover: Placement of geotextile or clay soil layer over compacted masses of waste to minimize percolation of runoff water into the waste; minimize odour and escaping gases such as methane.

Excavation & Stockpiling of Cover: digging out and removing of topsoil and storing for later use as cover or capping material.

Gas Management: Process designed to extract gasses at landfills through suction systems on perforated pipes in order to reduce odour and potential explosion hazards.

Leachate: Water that has percolated through the waste and possibly contains hazardous contaminants.

Waste: Discarded materials deposited in to landfills.

Screening Berms: man-made elevated strip of land designed to hide landfill operations.

Figure 20 overleaf depicts the standard anatomy, practices and systems that apply of an active landfill sites in the Southern African region.

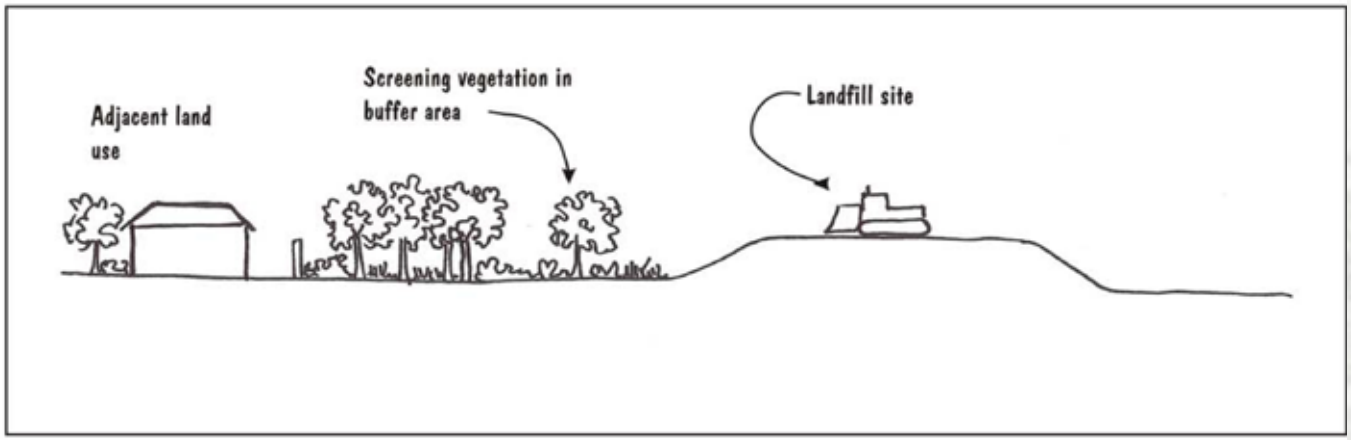


Figure 19: Landfill Standards Cross-Section According to TOSP

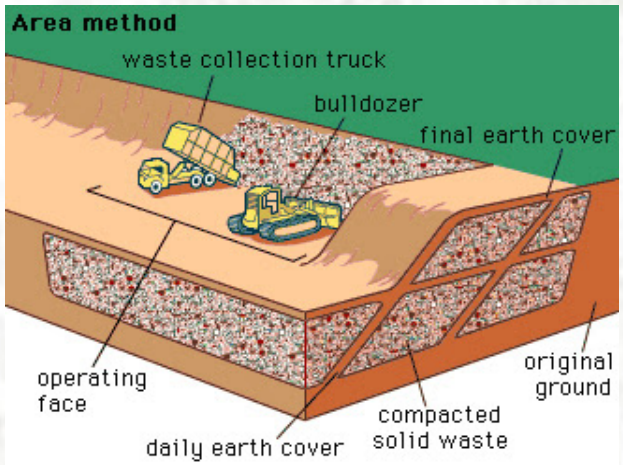


Figure 20: Typical Landfill Anatomy in Southern African Regions

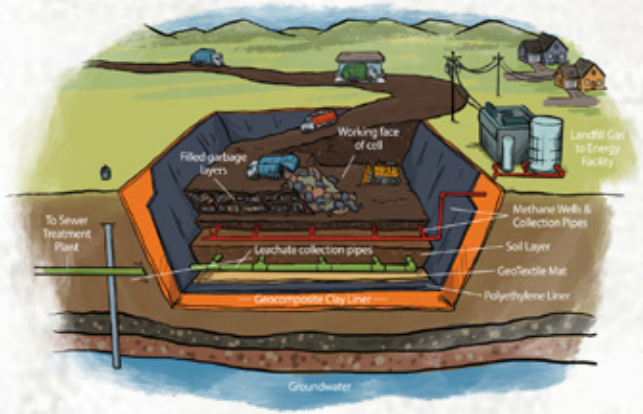


Figure 21: Typical Landfill Anatomy Arccording to International Standards

4.2 The Role of Landscape Architecture

Landscape architecture is commonly defined as the art and practice of designing the outdoor environment, especially designing parks or gardens to harmonize with buildings and roads (Oxford). According to Patterson of places of different scales that contributes to public health, safety and social welfare; in addition to these definitions, Saidi (2009) reckons that landscape architects in the Sub-Saharan should consider adopting the approach of responding to social issues as a basis of landscape architectural design. In Alan-Mozes (2009) opinion, landfills could provide landscape architects an opportunity to address issues of aesthetics, ecology, engineering and commerce.

Theory is yet to be written about designing livable waste landscapes that accommodates the co-existence of social and commercial components, especially the temporal and informal activities associated with the activity of waste reclaiming. Informal waste re-claimers working environment needs and requirements are not different from any normal workplace environment, the provision of ablution facilities, shelter, places of rest etc. Gowar (2016) associates the lives of informal waste re-claimers with those living in informal settlements, the notion of temporality and vulnerability. The working conditions of Soshanguve landfill waste re-claimers are similar to those of an active construction site, the only dissimilarity to these scenarios is that construction sites are properly planned and basic facilities are provided prior operation commence as regulated by the Occupational Health and Safety of South Africa, under section 43 of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993).

The role of landscape architecture in Soshanguve landfill is to create a livable working environment for the waste re-claimers during the operational phase of the site, adopt the skills and knowledge that the re-claimers have acquired through their experience to inform a design that will be functional upon decommissioning; and to mitigate negative environmental impacts in order to transform the site into a treasure that the residents of Soshanguve will appreciate and celebrate. Construction sites are deemed unsafe, yet practices have been established to reduce the

risks of danger, similar approach can be employed to inform liveable landfill site design.

4.3 Environmental Justice

Environmental justice is the fair treatment and meaningful involvement of all people, regardless of race, colour, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no population bears a disproportionate share of negative environmental consequences resulting from industrial, municipal, and commercial operations or from the execution of federal, state, and local laws; regulations; and policies (US Department of Energy, 2017).

The concept of environmental justice emerged from the United States where it was developed fifty years ago in opposition to practices that were identified by black communities as "environmental racism". Environmental justice is both backward and forward looking; it highlights past and present injustices that arise as a result of environment-related economic and social oppression and exclusion, while at the same time advocating means by which to address these injustices. An environmental right which state: 'Everyone has the right to an environment that is not harmful to their health or well-being'. As the foundation of constitutional environmental protection in South Africa and as part of the transformative vision of the Constitution, this right must address historical injustices and it must enable people to live in an environment that permits health and well-being and promotes sustainable development (Toxopeüs & Kotzé, 2017).

As already mentioned on the previous *chapter*, Soshanguve township was established through the apartheid planning practices and the landfill was used as a tool to enforce the injustices, however, through adaptability, skills and innovation, the Soshanguve residents and communities adjacent to the site saw an opportunity to create a living in a harsh environment that was imposed in their lives. Public access in landfills is illegal according to South African legislation, however, the activities associated with informal re-claiming of waste in Soshanguve landfill cannot be ignored because they are a result of historical poor planning, yet addressing challenges that are faced during the current democratic governance i.e. unemployment, waste management, etc. It is irrational to situate a hazardous landform in the middle of a settlement where growth and expansion was anticipated while prohibiting access and interaction between the settlers and the landscape.

4.4 Sustainable Development

Sustainable development is defined as a development that meets the needs of the current generation without compromising the ability of future generations to meets their own needs (Mensah & Casadevall, 2019). Mohieldin (2017) depicts that sustainable development, is an approach to developments which uses resources in a way that allows them (the resources) to continue to exist for others. It is argued that the relevance of sustainable development deepens with the dawn of every day because the population keeps increasing but the natural resources available for the satisfaction of human needs and wants do not (Mensah & Casadevall, 2019).

Sustainable landscape architecture creates ecological designs for the outdoor and urban environment (Bean & Yang, 2009). The design of a sustainable landscape encompasses the three pillars of sustainable development: economic well-being, social equity and environmental protections (United Cities and Local Governments, 2010) & Yang, 2009). The design of a sustainable landscape encompasses the three pillars of sustainable development: economic well-being, social equity and environmental protections (United Cities and Local Governments, 2010)

Khan (1995) as cited in Bassiago (1999) argues that relationships among economic, social and environmental sustainability, the three domains must be integrated for sustainability sake. "If a man in a given geographical area lacks a job (economic), he is likely to be poor and disenfranchised (social); if he is poor and disenfranchised, he has an incentive to engage in practices that harm ecology, for example, by cutting down trees for firewood to cook his meals and warm his home (environmental)". The landfill processes pose harm to the ecology, however, the action of waste re-claiming in Soshanguve reduces negative impacts of the site, addresses the social and economic challenges through job creation.

South Africa is a developing country, which means financial resources are limited in any given development. It is vital for this study to propose a design that will be functional and most importantly, sustainable, to ensure that all proposed interventions succeed. There is no literature that stipulates principles of developing active landfills, however, research and case studies have been conducted to establish design approaches that can lead to sustainable developments. Circular economy can help reduce waste and contribute towards sustainable development through aggressive recycling methods, where waste is recovered and

then reprocessed to manufacture new products (Tomita & Slotow, 2020).

Mira Engler (1995), landscape architect and researcher, coined the terms "Waste Parks" and "Waste Museums" which are publicly accessed and inviting parks where waste is the common factor. These parks were transformed through art, design and biotechnologies; more landscape architects adopted this trend and collaborated with teams of environmental artists, architects and engineers, to satisfy both realistic and new appreciative paradigms. Waste parks serve multi-functional purposes to achieve traditional park recreational components such as facilitating sightseeing, promote social interaction; and adhere to contemporary needs such as land remediation, environmental education, wildlife conservation and recycling purposes.

"Drosscapes" is a term coined by Alan Berger, professor of urban design at MIT, and is part of a new vocabulary and aesthetic that could be useful for the redesign and adaptive reuse of 'waste landscapes' within urbanized regions (Berger, 2006). Berger defines Drosscape as the creation of a new condition in which vast, wasted, or wasteful land surfaces are modelled in accordance with new programs or new sets of values that remove or replace real or perceived wasteful aspects of geographical spaces.

Drosscape is an urban design framework that looks at urbanized regions as the waste product of defunct economic and industrial processes. Drosscape, as a concept, implies that dross, or waste, may be "scaped", or resurfaced, and reprogrammed for adaptive reuse (Berger, 2006). Berger continues to explain that this phenomenon emerges from two primary processes. Firstly, Drosscape surfaces is a by-product of rapid urbanization and horizontal growth urban sprawl. Secondly, these spaces arise as a consequence of defunct economic and production systems.

Engler (1995) and Berger (2006) approaches to landfill transformation both considers the three pillars of sustainable and this legitimizes the adoption of their principles within the context of Soshanguve, given its socio-economic status, it can benefit from some of the design principles depicted. Engler developed eight (8) approaches that can be applied to the treatment of landfills or waste-related design projects namely: Camouflage, Restoration, Recycling, Mitigation, Sustainable, Educative, Celebrative and Integrative. The integrative approach is a sensible approach to be adopted in the context of Soshanguve landfill because it is multi-faceted, it combines the celebrative strategy with all other strategies. The integrative approach combines the principles of ecology, with the philosophy of art, scientific inflexibility with expressive metaphors.

4.5 Cultural Landscapes

Muller and Gibbs (2011) refers to cultural landscape as a 'Tapestry', which embodies layers of information that overlaps and converge; composed of natural factors (topography, climate, etc.) and including human factors such as historic land uses, destroyed and existing infrastructure and so forth. Wagner and Miskell, as quoted in Fowler (1999, p.56) advocates that cultural landscapes are an inheritance of many years of natural evolution and of many eras of human effort. O'Hare (1997) champions that cultural landscapes consist of three (3) elements namely: the natural physical environment, human effort and significant meaning to users integrated over a certain period of time. An American geographer, Carl O. Sauer (1925), developed the concept of cultural landscapes into an approach that integrates human-nature interactions that were ignored previously. This approach acknowledges intangible values and cultural expression that are not physically and instantly visible. Soshanguve landfill and the surrounding settlements around its context has a wealth of tangible and intangible diverse cultures that are not celebrated today. SAHO (2019) enforces this statement and goes on to say that the cultures, languages and heritages of South Africa are multiple, diverse, and dynamic. The waste re-claimers, are people who have settled in this township and region from many years ago. The culture of re-claiming waste is embedded within the events that shape the existing landscape. Waste landscapes as defined earlier in this *chapter*, are often made invisible and not accessible to the public eye because they deemed eyesores (Engler,1995), this notion makes it close to impossible to regard waste landscapes as heritage treasures.

Proschan (2009) advocates that intangible heritage is inevitably a "living" heritage, he continues to say that "it must continue to be actively produced, maintained, re-created and safe-guarded by communities, groups or individuals concerned, or it simply ceases to be heritage. The action of re-claiming waste has been practiced in developing countries for many years. Van Heerden (2015), a city planner, did a study in Cape Town where informal waste re-claimers locally referred to as "Skarellers", says each participant of his study had numerous and flexible identities that carried layers of narratives and meaning. The meaning and narratives behind their nicknames align with their religious, social lifestyle or simply derived from their real name as a way of protecting their real identity. Van Heerden continues to say that his study participants did

not appreciate being called "waste pickers", as a community, they identify themselves as "Skarellers". It shows that these community of waste re-claimers have claimed and own their culture and identity, this validates (Proschan, 2009) notion of living heritage, he believes that intangible heritage is embedded in human intellect, bodies also referring to communities, manifested in the past, present and the future.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) eased the way for new approaches of valuing, protecting and managing cultural landscapes (Muller & Gibbs, 2011). Three categories of classifying cultural landscape were established, table (x) depicts each category and its definition; these categories have been continuously amended over the years and all categories of heritage have been incorporated (Mitchell, Rosller & Tricaud, 2009). This study has a potential of transforming Soshanguve landfill into a cultural landscape, it aligns with the second category definition of a cultural site because it has developed continuously over a period of time. One can argue the fact that eventually the site will be decommissioned and all activities will dissipate; however, through the Engler (1995) approach mentioned early on this *chapter* and Sauer (1925) approach, a successfully transformed landfill can be anticipated.

4.6 Synthesis

Active landfills are evolving landscapes, they depict a living organism, requiring continuous systems and processes that ensure successful operations. There is intensive monitoring in landfill sites which denotes that in the context of Soshanguve landfill, activities associated with waste re-claiming can be negotiated and accommodated within the normal operations of the facility and compliance can be easily facilitated or enforced. According to South African legislation, the general public access to landfill sites is prohibited despite the fact that these landscapes that are deemed unsafe, are superimposed in their neighbourhoods. Research shows that landfills globally are situated in marginalized neighbourhoods, Engler (1995) enforces this statement, she says waste sites are found in areas that have low economic value, ecologically degraded and away from cities.

Hamdi (2010) pioneers that the role of designers is not to provide, but alternatively to enable adaptability and sustainability. He further explains that human beings have the ability to make a living out of the limited resources within the environment that they settle in. The realities of waste sites in South Africa is a contrast of those in developed countries. Waste re-claimers in Soshanguve landfill validates these statements, they make a living off a harsh environment that was intended to enforce injustice.

Table 1: Cultural Landscapes Categories

CULTURAL LANDSCAPE CATEGORY	EXTRACT FROM THE OPERATIONAL GUIDELINES FOR THE IMPLEMENTATION OF THE WORLD HERITAGE CONVENTION
i	The most easily identifiable is the clearly defined landscape designed and created intentionally by man. This embraces garden and parkland landscapes constructed for aesthetic reasons which are often (but not always) associated with religious or other monumental buildings and ensembles.
ii	The second category is the organically evolved landscape. This results from an initial social, economic, administrative, and/or religious imperative and has developed its present form by association with and in response to its natural environment. Such landscapes reflect that process of evolution in their form and component features. They fall into two sub-categories: - a relict (or fossil) landscape is one in which an evolutionary process came to an end at some time in the past, either abruptly or over a period. Its significant distinguishing features are, however, still visible in material form. - a continuing landscape is one which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time it exhibits significant material evidence of its evolution over time.
iii	the final category is the associative cultural landscape. The inclusion of such landscapes on the World Heritage List is justifiable by virtue of the powerful religious, artistic or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent.

Engler (1995) mentioned that often, stereotypes associated with landfills lead to the notion of hiding and prohibition of access to the general public because they are associated with shame. This statement highlights the realities of residents who propose that the landfill should be decommissioned as discussed in *Chapter 1*. A sustainable landscape design is one that integrates the community's economic well-being, social equity and environmental conservation. The sustainable development approach is a vital within the context of Soshanguve because it will mitigate all the injustices discussed early in this *chapter*.

Cultural landscapes are an inheritance of many years of natural evolution and of many eras of human effort (Fowler, 1999). Waste re-claimers in Soshanguve landfill have tangible and intangible heritage embedded on the landscape, through cultural landscape approach championed by Sauer (1925), coupled with strategies adopted from Engler (1995); there is a potential of a sustainable landscape that can archive and celebrate the evolution of the site. Both Engler (1995) and Sauer (1925) discussed all the innovative approaches of transforming landscapes, but none of them mentions what happens during the active operation of these landscapes, only decommissioned phases are referred to.

This study proposes that a solution to all concerns discussed in this *chapter,* is to establish a sensible design criteria and framework by adopting Engler (1995) integrative approach, combing all other strategies to negotiate the coexistence of landfill operations and a humane working environment for waste re-claimers while transforming Soshanguve landfill into a cultural landscape upon decommissioning.

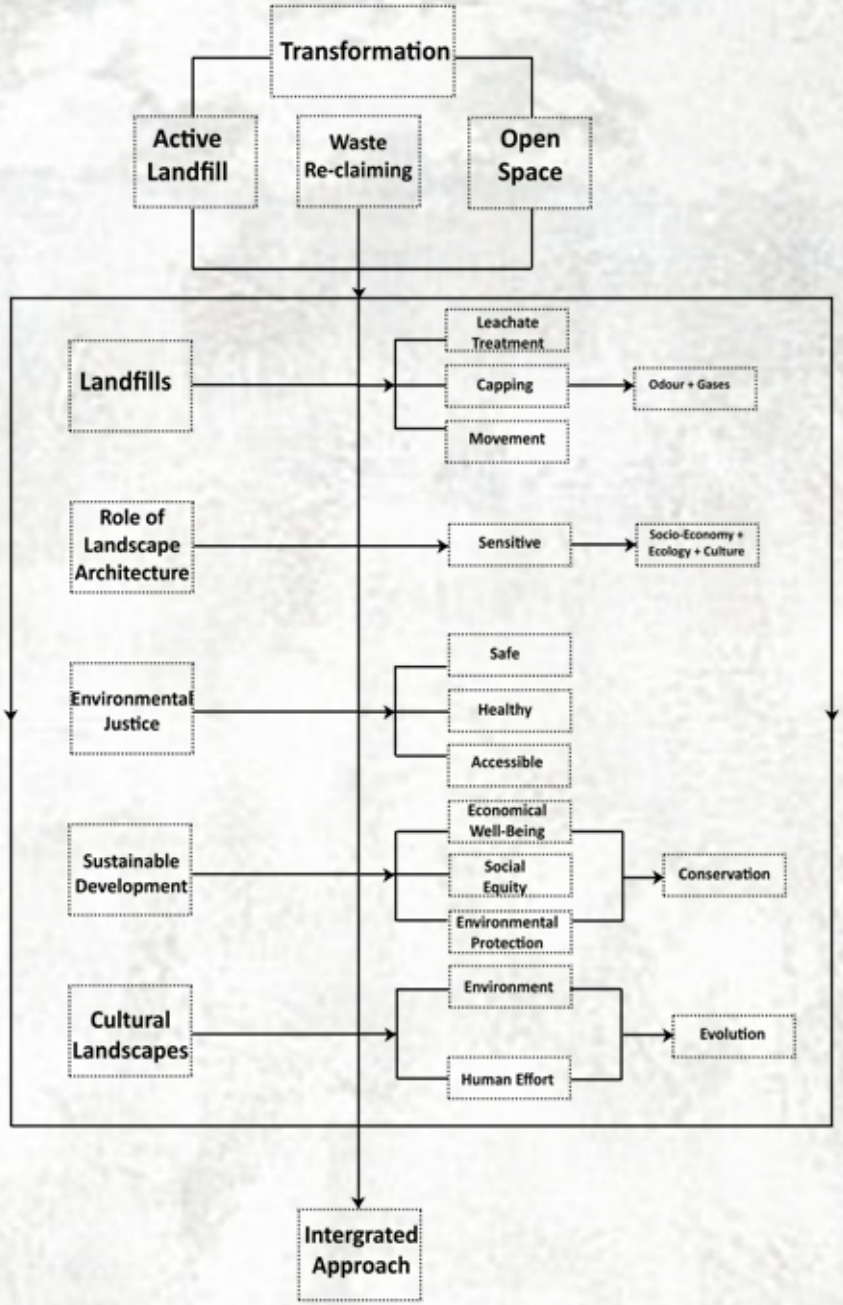
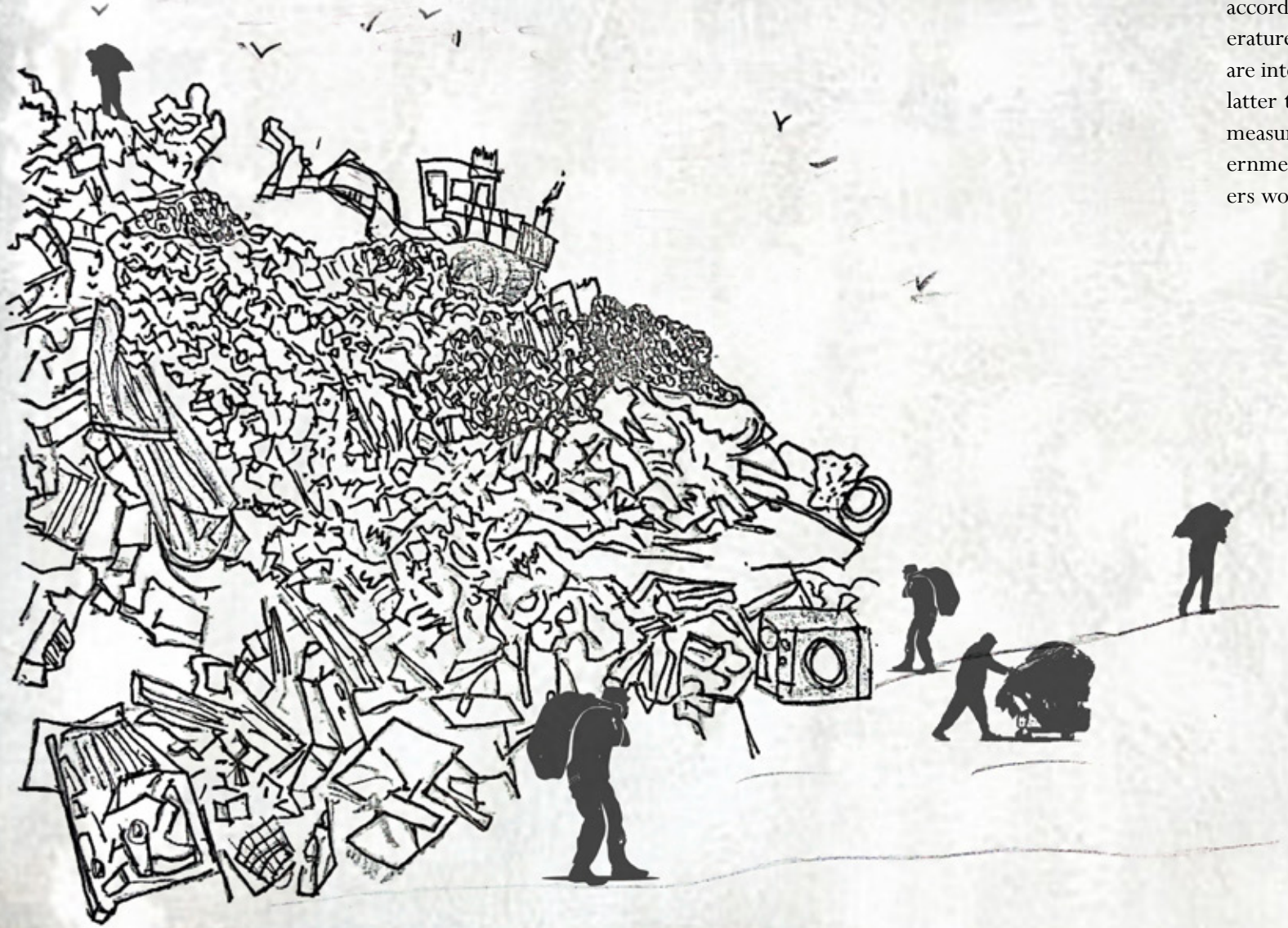


Figure 22: Theoretical Investigation Synthesis Diagram

Chapter 5: Case Studies



This chapter focuses om evaluating precedent projects according to the approach set out in the preceding literature review. The first two (2) case studies discussed are international transformed landfill projects with the latter two (2) focusing on local case studies regarding measures, guidelines and policies established by government bodies in improving informal waste reclaimers working conditions in the South Africa.

5.1 Vall d'en Joan: Graff, Spain

Designer: Battle I Roig Architects

Description: The landfill was permitted in the year 1974. Prior the restoration project, an approximately twenty-centimeter (20cm) layer of soil covered the decommissioned mounds with no specialized capping. The aim of the restoration project was to address three main aspects namely: Solving technical problems such as capping, creating a public open space and lastly, creating a new landscape. Multi-disciplinary techniques were adopted to realize this project (geology, engineering and landscape architecture).

The transformation involved technical solutions such as harvesting landfill gases and converting it to biogas, leachate treatment techniques, farming and agriculture informed by the topography, vegetation and hydrology. The decommissioned mounds were rehabilitated through a controlled succession planting approach which involves re-introducing native plant species in the landscape and allow them to manifest naturally over a certain period of time.

Critique: The environmental rehabilitation approach for this landfill transformation was successful, however, the quality of edible crops farmed on the newly transformed landfill was overlooked considering the toxicity of the soil strata and ground water quality. There is a lot of history tied to the permission and the operational phases of the landfill and there is a missed opportunity of archiving the history of this landscape through a design that reveals and celebrates the narratives embedded on this particular landscape.

Figure 23: Vall d'en Joan Restoration Project

5.2 Freshkills Park

Designer: James Conner

Description: Freshkills park is regarded as one of the largest landfills in the world and its commonly referenced as the first few transformed landfill projects. Features such as ponding areas, wetlands, existing decommissioned mounds and public participation were used as design informants. The intervention's main objective was to transform it into an ecologically healthy environment. Machinery that was used during the operational phase was incorporated on the proposed plan as part of the infrastructure or program of the transformed landscape to celebrate the history of the space.

The implementation of the framework was realized through a series of phases with a ten (10) year interval time-frame. Sports facilities, recreational spaces, trails and pathways were incorporated in the design to make the landscape multi-functional.

Critique: The intervention is multi-functional, it is evident in the integration of restoring a degraded environment, revealing the history of the site and using the size and magnitude of this landscape to as an opportunity to create a public open space. Acknowledging the size and intensity of this intervention to realize it through a phased framework is noteworthy. The notion of involving the public during the planning phase of an intervention reduces the chances of a space being neglected by users upon development completion.

Figure 24: Freshkills Park Phased Development Plans

5.3 Waste Picker Integration Guideline for South Africa

Prepared by: Department of Environment, Forestry and Fisheries (DEFF) & Department of Science and Innovation (DSI).

Description: The core objective of establishing waste pickers integration guideline is to recognize the informal activities and the important role that they play in the waste management realm. The DEFF and DSI approach to enabling and formalizing the waste reclaiming activities is

through institutionalizing and establishing integrated plan by involving all the industry stakeholders from the government and municipality level and lastly waste buyers or private reclaimers.

Figure 25: 7 Waste Pickers Intergration Diagram

Critique: The stipulated guidelines recognizes the diversity amongst waste re-claimers as individuals; gender, social and economic backgrounds etc. The proposed guidelines moved away from treating the waste recycling as a job for the marginalized individuals and refrains from treating the proposed integration plans as an act of charity.

5.4 Creating an enabling environment for the informal waste sector.

Prepared by: City of Johannesburg

Description: The policy's main objective is to empower waste recyclers through a series of interventions to improve recyclers working conditions and social programs that will ensure sustainable livelihoods. The City of Johannesburg Municipality engaged with the recyclers to get insight of their working conditions, challenges and needs required to make their jobs easy. The policy identified different categories of recyclers and attempted to address their needs accordingly; recyclers working at landfill sites, recyclers sorting waste in city streets and recyclers at source/households.

Recyclers who operate at landfill sites were provided with a formal recycling/auction center, while recyclers who operate in city streets were provided with cycles, trolleys and carts to move around and carry valuables. Waste buyers also referred to as "Middlemen" were endorsed with trucks that are able to collect and move valuable materials from landfill sites to a buy-back center. A step further to ensure sustainability to recyclers livelihoods was taken, through a skills development course in waste management; this initiative chief objective was to upskill the recyclers skills set in the waste management realm.

Critique: It is evident that the policy acknowledges and advocates for waste recycling across all categories. The people-first approach made the implementation of these interventions successful, however, the waste recyclers needs operating at landfill sites were not completely addressed. The provision of basic infrastructure was overlooked.

Figure 26: Middlemen Waste Trucks

Figure 27: Diepsloot Waste Buy Back Centre

5.5 Synthesis

- The landfill transformation case studies were successful in creating public open spaces, the first case study discussed camouflaged the historical land use as defined by Engler (1995) discussed in the preceding theoretical investigation.
- The preceding case studies regarding the enabling working environments for recyclers did not address spatial needs for a tolerable working space, one of the biggest challenge recyclers face, especially in landfills, are spatial related and in this instance, were overlooked.

Chapter 6: Artefact

This chapter is based on an abstract model built from the project's process word: "Transformation". A manifesto was extracted from parts of the artefact to gain insight about the site, possible design principles, strategies and approach.

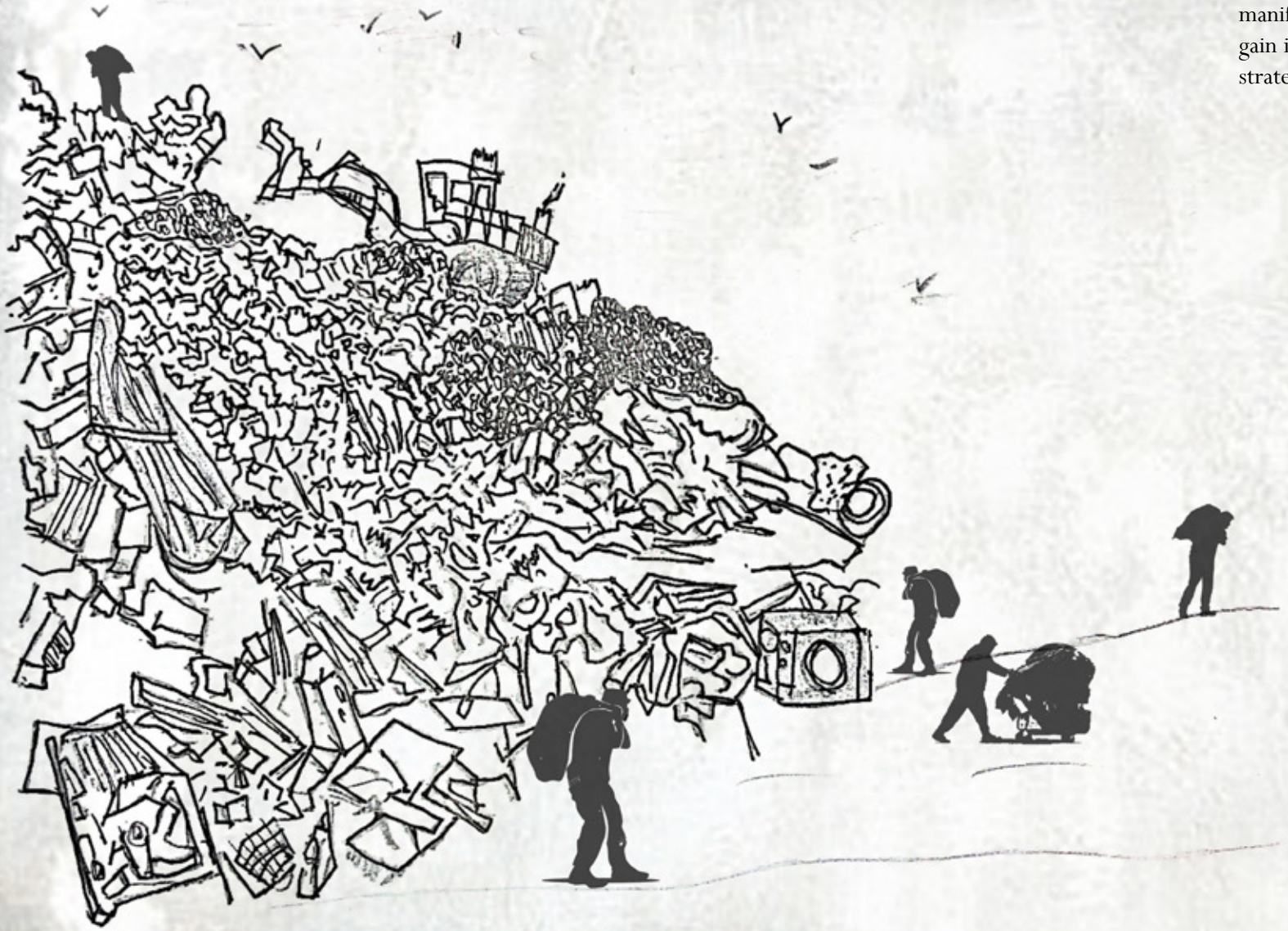


Figure 28: Abstract Transformation Model

Principle 1: Change

- ***Waste to Wages***: re-thinking of the waste management system through the process of recycling which is independent of landfills.

This project will adopt a circular economy strategy, where informal waste reclaiming is formalized and becomes part of the landfill operations. This initiative hopes to inform a new way of generating income to the marginalized communities.

- ***Llefa Lwethu (Our heritage):*** re-imagining waste landscape into a heritage site.

With wealth of heritage and history tied to the focus area, this project aims to embrace peoples cultural identity through memories, sense of place, lived experiences through a design that will reflect all the listed components

Principle 2: Revision

- ***Dump to Destination:*** re-imagining waste landscapes into a liveable environment and tourist attraction site.
- The project aims to recreate the landfill as an ecologically friendly environment with green open space functions that will remedy current site conditions; and represent proud cultural characteristics. This vision can be realized through a series of interventions:

1. Improving current waste management practices,
2. Creating green open spaces,
3. Maintenance of currently stable slopes while recovering vegetation,
4. River rehabilitation and,
5. Activate economic functions and activities.

Principle 3: Alteration

- ***Go green or Go Home***

Going Environmentally/Ecologically friendly has numerous benefits, but using locally manufactured products has more benefits as it addresses the issue of employment and reduces the amount of resources lost in introducing exotic materials that will end up in the landfill, i.e. energy loss (energy lost in transporting materials from area to the next).

This project commits to creating a clean, healthy and sustainable environment. This principle can be realised by adopting the following initiatives:

1. Incorporating renewable energy techniques,
2. Using local materials (Indigenous plants, locally manufactured products),
3. Creating awareness of eco-savvy practices.

Principle 4: Modification

- ***4-R Strategy: Re-use, Reduce, Recycle and Re-purpose.***

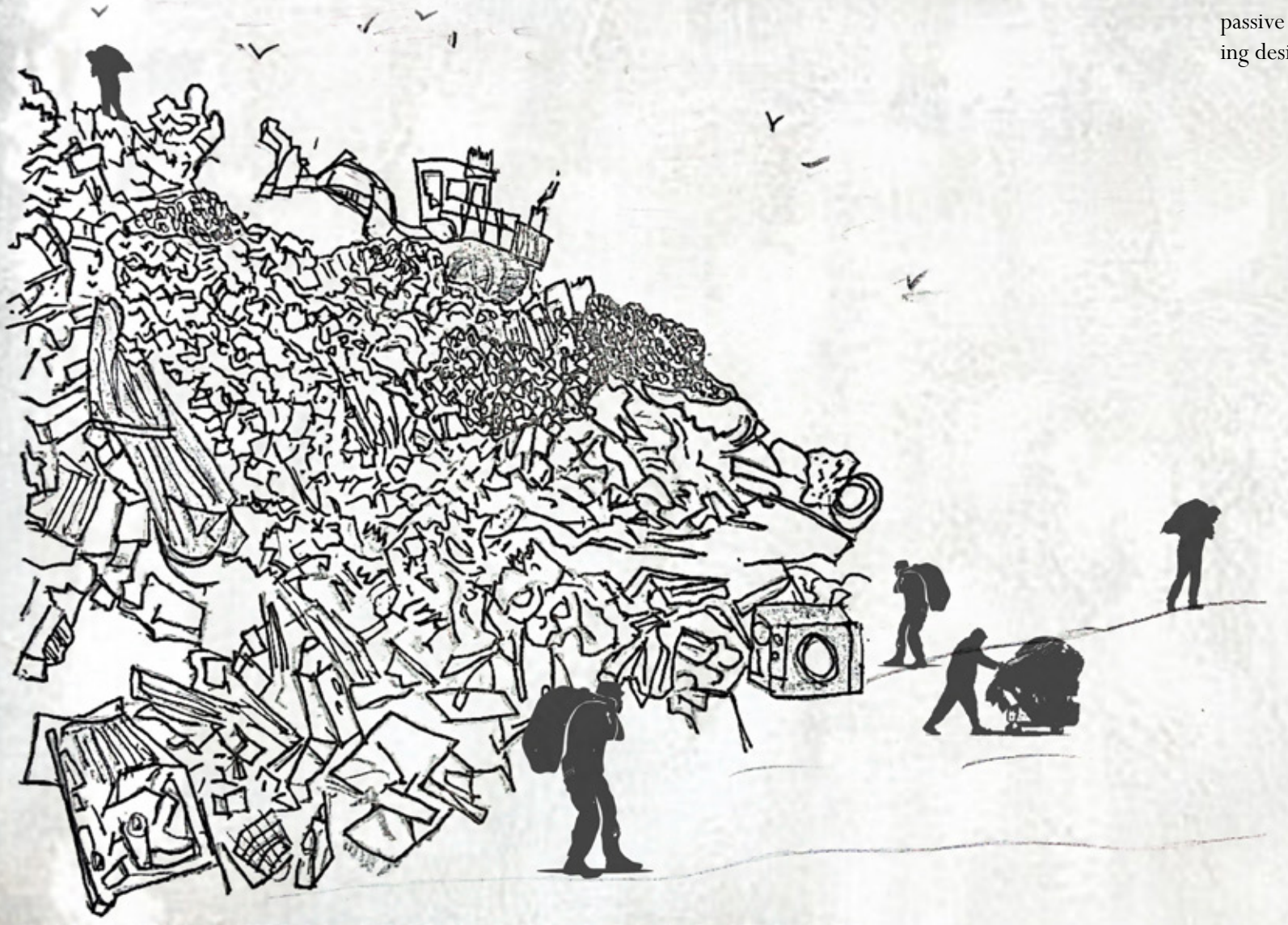
The 3-R waste management strategy has been adopted locally and internationally to conserve natural resources, landfill space and energy, but in South Africa, it has been quite challenging to successfully recycle all material that goes to waste due lack of funding to carry out the process of recycling.

This project commits to include re-purposing of materials so they can be incorporated back into the landscape through:

1. Waste to material, discarded and recuperated elements used as architectural components such as furniture, sculptures, etc.

Chapter 7: Site Analysis

The aim of this chapter is to investigate the place, movement, historical and current land use, active and passive spaces with the objective of identifying emerging design informants.



7.1 Mapping the Precinct Evolution

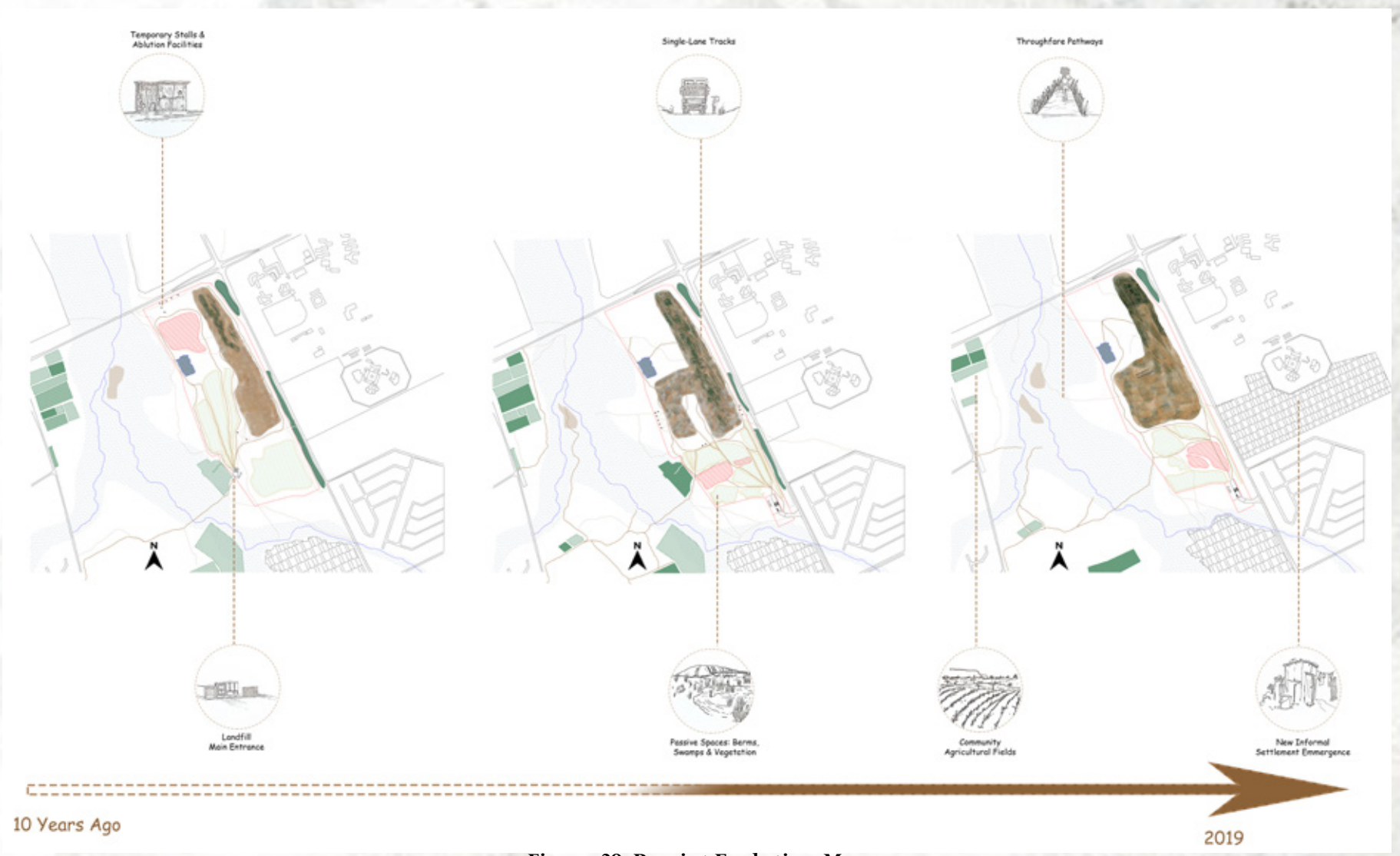


Figure 29: Precint Evolution Maps

7.2 Interroagating Place, Paths. Passive & Land use

LEGEND

1. Wetland vegetation
2. Place of Healimg and Worship
3. Mixture of Bushveld and Riparian Vegetation
4. Disturbed Vegetation
5. Ponding Area
6. Emerging Throghfares
7. Stalls & Wate Auction Market
8. Mound Access Ramp
9. Informal Taxi Stop
10. Passive Spaces
11. Admin Block
12. Main Entrance
13. Existing Trees
14. Eroded Berms
15. Community Agricultural Fields
16. Pathways
17. Informal settlement


Eroded Screening Berms & Emmerging Taxi Drop-off Zone


Ecological Recovery on Decomissioned Banks


Temporary Stalls & Ablution Facilities


New Informal Settlement Emergence


Landfill Main Entrance


Single-Lane Routes


Community Agricultural Fields


Throughfare Pathways


Place of Religious Significance


Landfill Boundary Expansion, Entrance & Settlement Growth


Passive Spaces: Berms, Swamps & Vegetation

Figure 30: The Current Soshanguve Landfill Plan

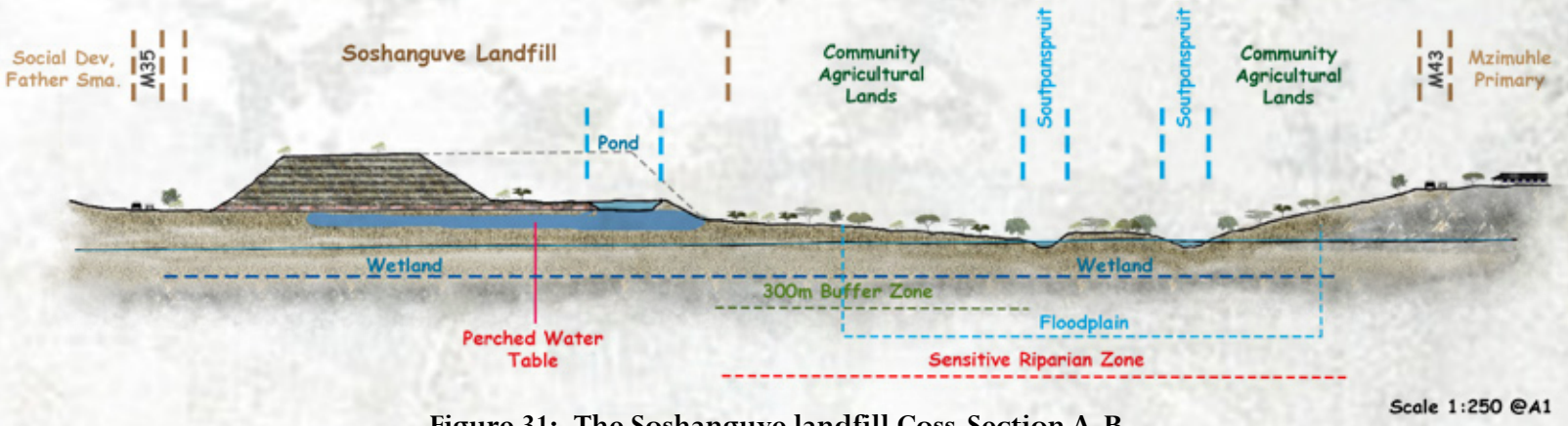


Figure 31: The Soshanguve landfill Coss-Section A-B

Figure 30 and *Figure 31* depicts the current land use of the precinct and its context. The Soshanguve landfill lies on approximately the same altitude as the Tswaing Meteorite Crater and thus creating a visual link between the two sites as depicted in *Figure 32*. This provides an opportunity to offer and create lookout points on the proposed end-use plan to promote or facilitate tourism.

This study condemns a top-down approach, the notion of adopting size-one-fits-all design approach; as such, the users adaptive responses will be the primary design informant and design principles will be derived from that. Three (3) main categories of the site users were identified during the interviews and site observations, the Recyclers, waste buyers (middlemen) and vendors who own the stalls.

The proposed framework in the following *chapter* aims to create a tolerable working environment for the active site users with the intention of using the legacy of the active phases as end-use plan design clues.

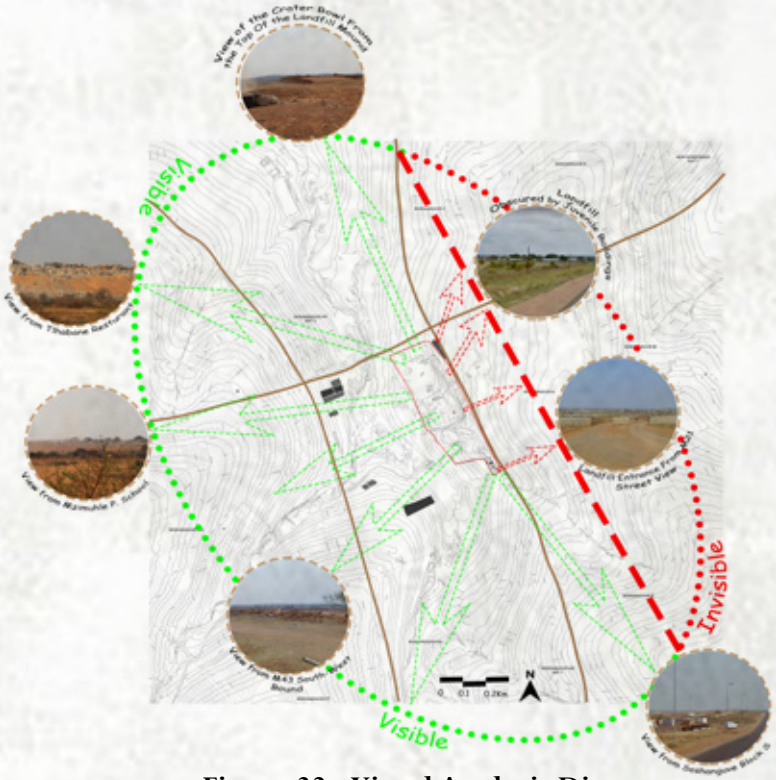


Figure 32: Visual Analysis Diagram

User Adaptive Response

Pause: Reclaimers rest on Waste Berms while waiting for their turn to pick and Sort.

Shelter: Reclaimers like Lerato Established Stalls too close to the working face to reduce movement.

Temporality: Mobile ablution facilities such as those used in construction sites were adopted for comfort.

Commerce: Lydia, Rich and other vendors erected stall on decommissoned mounds to sell cool drinks, warm meals etc. further away from the working face.

Aution: Mam Lizzy and waste buyers negotiate commercial spaces with vendors on site.

Access: Shelton and other site users established informal access points to reduce movement around site.

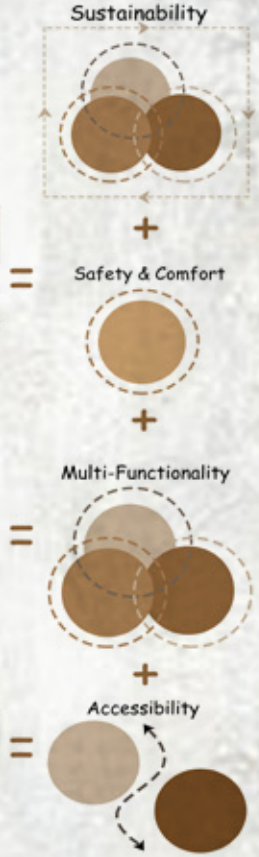
Simulating Site Activities

Exploring Design Responses & Principles

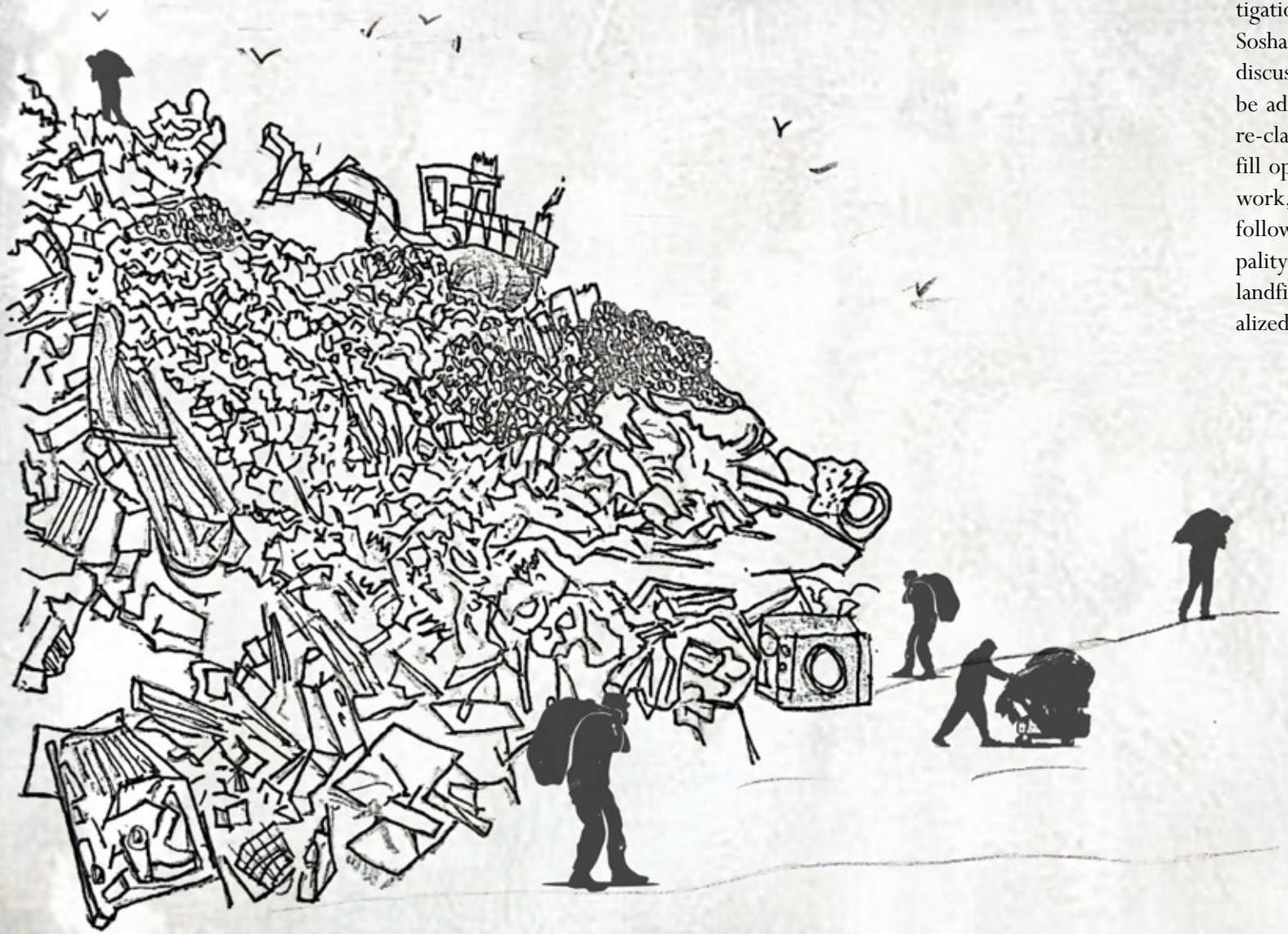
Responding to Recyclers Needs

Responding to Waste Buyers Needs

Responding to Vendors Needs



Chapter 8: Framework



This chapter's chief objective is to respond to investigations conducted in previous chapters regarding Soshanguve landfill and its context. The approaches discussed in the literature review and case studies will be adopted coupled with lived experiences of waste re-claimers and vendors while considering the landfill operation standards to establish a sensible framework, design criteria and programs. This is carried out following the City of Tshwane Metropolitan Municipality Open Space Framework (TOSF). Because the landfill is still in operation, transformation can be realized through a phased conversion.

8.1 Re-Imagining a Tolerable Working Environment

Access

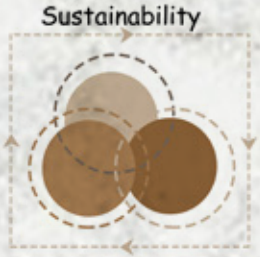
Working Conditions

Movement

Communal/Multi-Purpose Nodes

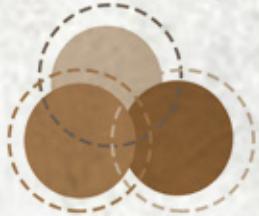
Waste Auction Spaces

Sustainability



Safety & Comfort

Multi-Functionality



Accessibility

Proposed Framework Diagram

Decommissioned Mound + Active Cell: Phase 1 (Immediate Intervention: 1st Year)

1. Develop Arrival Node
2. Gas Capping
3. Mound Stabilization
4. Develop Drainage Channels & Leachate Management Systems
5. Establish Safe & Comfortable Walkways
6. Develop Areas of Rest
7. Provide Permanent Infrastructure (Vendor Stalls & Ablution)
8. Establish Waste-To-Energy Systems
9. Nursery

Active Cell Decommissioned + Proposed cell Active: Phase 2 (3rd Year)

1. Archive Paths with Trees
2. Develop Areas of Rest Further
3. Develop Movement Routes Further
4. Align Ablution Facilities with Operations
5. Stabilize Decommissioned Mounds Further
6. Supply Vendors with Bio Electricity

Cell 2 Decommissioned: Phase 3 (5th Year)

1. Archive Paths Further
2. Stabilize Mounds Further
3. Develop End-Use Plan

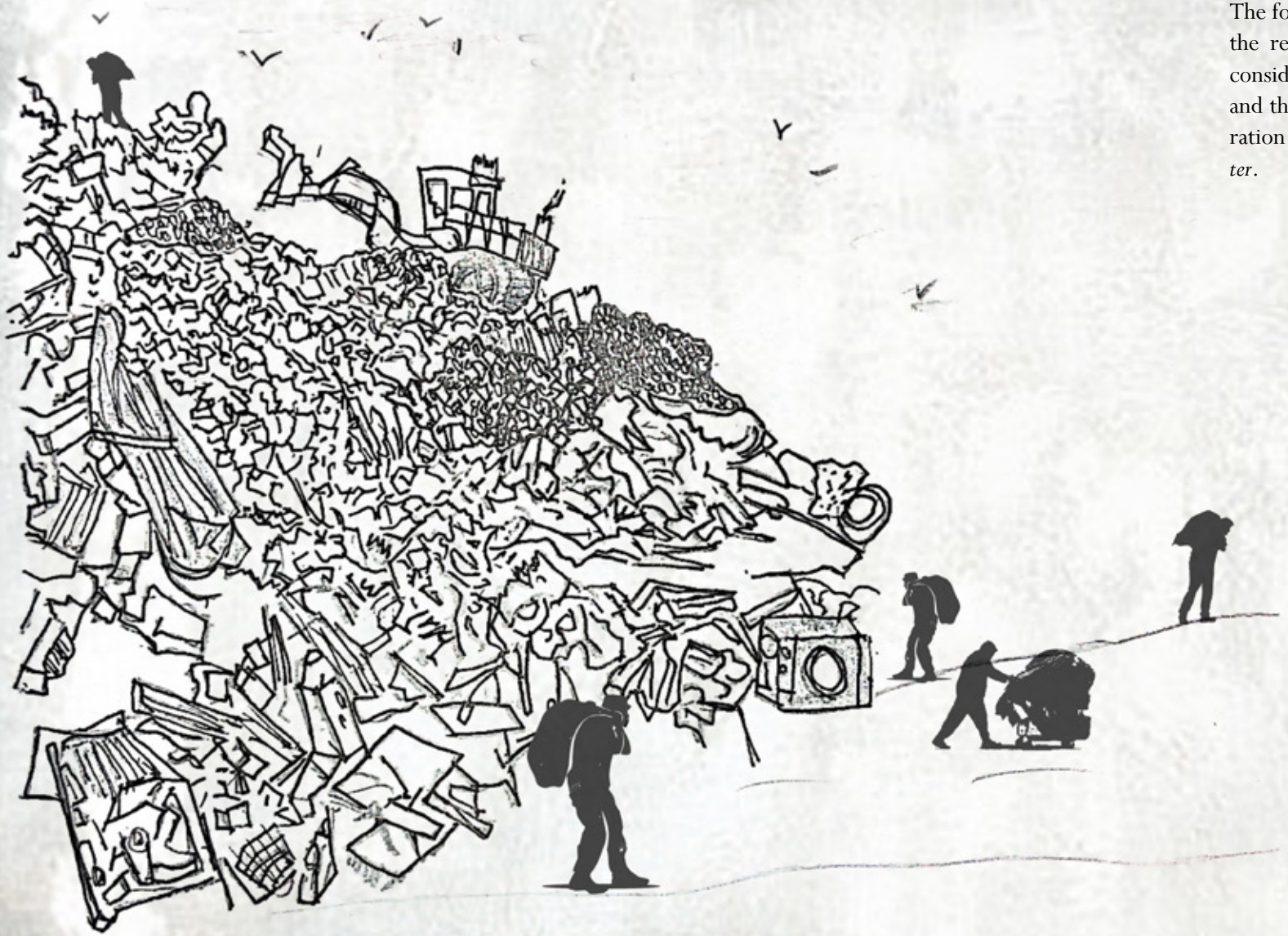
Landfill Decommission: Phase 4 (7th Year)

1. Develop an Open Public Open Space using the memory of the Landfill Operational Phases and align with the Tshwane Open Space Plan.
2. Manage Leachate & Gas Systems

Figure 33: Phased Framework Diagram

Chapter 9: Design Development

The focal point of this Chapter is to attempt to answer the research questions through design explorations; considering all the research, case studies, site analysis; and the design principles derived from the site exploration and proposed framework in the previous *Chapter*.



9.1 Model Iterations

Mound Progression

Current Phase

Phase 2

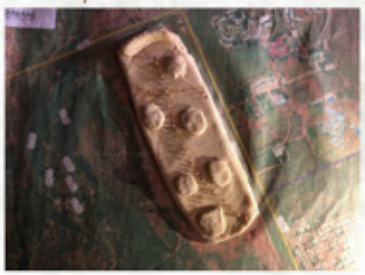
Phase 3

Archiving Movement

Interrogating User Experience

Tree Planting

Terrain Manipulation



Testing Light, glare & Wind

Abstraction

Conceptualizng Phased Conversions through Paths

Phase 1

Phase 2

Phase 3

Using Abstraction as the Design Informant

Superimposed Dough Model on Plan

Extracting Design Informants from the Manifesto

Pattern, Textures & Form

9.2 Conceptualised Phased Conversion Plans

Figure 34: Phase 1-3 Conversion Plan

This study condemns a top-down approach and the notion of adopting size-one-fits-all design approach; as such, the users adaptive responses will be the primary design informant . Three (3) main categories of the site users were identified during the site analysis, the Recyclers, waste buyers (middlemen) and vendors who own the stalls.

The model iterations on the previous page delineates the progression of the landfilling operations. The dough models further assist in portraying how the current users of the site will move in relation to the modification of the precinct. The patterns formed by the movement within the precinct informs future desire lines. The paths and textures from the dough models and the artefact inspired the form of elements that feature in the proposed end use plan discussed in the latter of this *chapter.*

Figure 30 and *Figure 31* in *Chapter 7* depicts the current land use of the precinct and its context. The precinct lies on appoximately the same altitude as the Tswaing Meteorite Crater and thus creating a visual link between the two sites as depicted in *Figure 32*. This provides an opportunity to offer and create lookout points on the proposed end-use plan to promote or facilitate tourism.

The objective of this study is to seek co-existence between active landfill operations and informal activities occurring on site such as waste recycling, economic activities, etc. moreover, this study concentrates on natural processes that are taking place especially soil erosion and decomposition.

As depicted in the previous *chapter*, gas capping and soil stabilization should be prioritized in pursuance of a healthy environment. For any of the proposed aspects to be implemented, it cannot be ignored that a landfill mound oozes harmful gases i.e. Methane which poses both health and

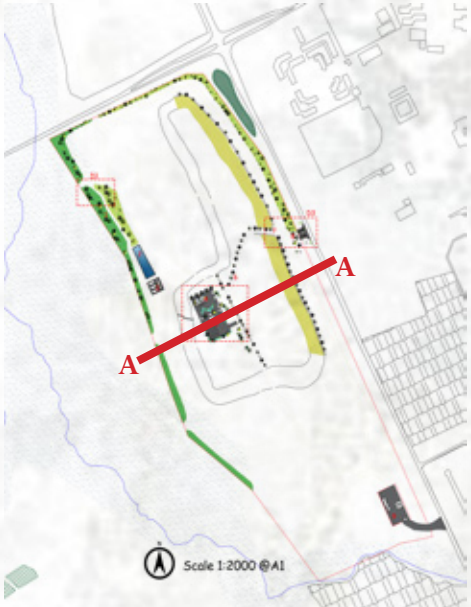


Figure 35: Phase 1 Reference Plan

environmental hazards. Crawford & Smith (1985) alludes that landfill produces gases for a period of over fifty (50) years post decommission, it is therefore vital to prioritize gas capping techniques on site. The current landfill gas capping on the decommissioned cells do not meet both local and international capping standards as discussed in (Department of Environmental Affairs, 2019), (Landfill Design Group, 2018) and (Sinnathamby et. al., 2013); consequently, the concept of phyto-capping the decommissioned landfill cells/banks to address uncontrolled harmful gases and engineering techniques i.e. the use of gabion retainer walls to stabilize the banks and/or reduce soil erosion were adopted.

In addition to harmful gases emitted by the landfill, dust and bad odour are challenges faced by the site users within the precinct and residential areas bordering the precinct. The proposed trees will trap dust and improve the air quality yet providing shade and aesthetics, however, given the current landfill capping system, which is approximately 500mm imported top soil without gas collection and drainage layers which is inadequate growth medium for tree planting. Research shows that it is probable to plant trees on landfills provided that a minimum of 1500mm of topsoil is imported without the roots damaging the existing cap layer (Foot & Moffat, 2008).

As already mentioned early in this section that the process of decomposition takes place, it means the height of the decommissioned plateau will decrease and that gradual

9.2 Phase 1 Conceptualised Cross-Section A-A

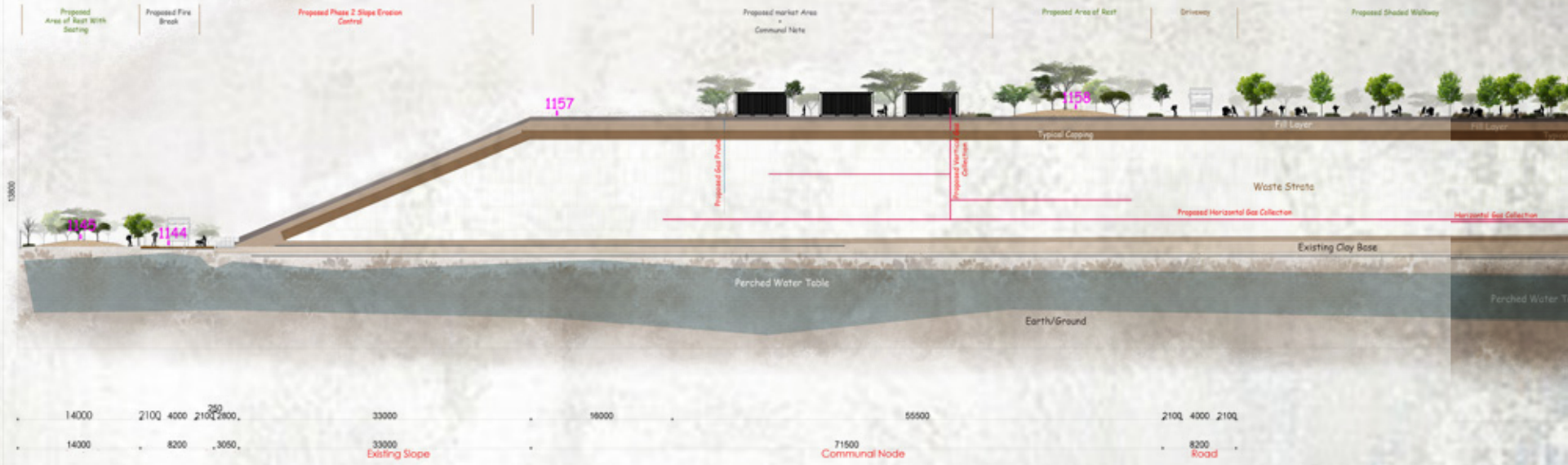


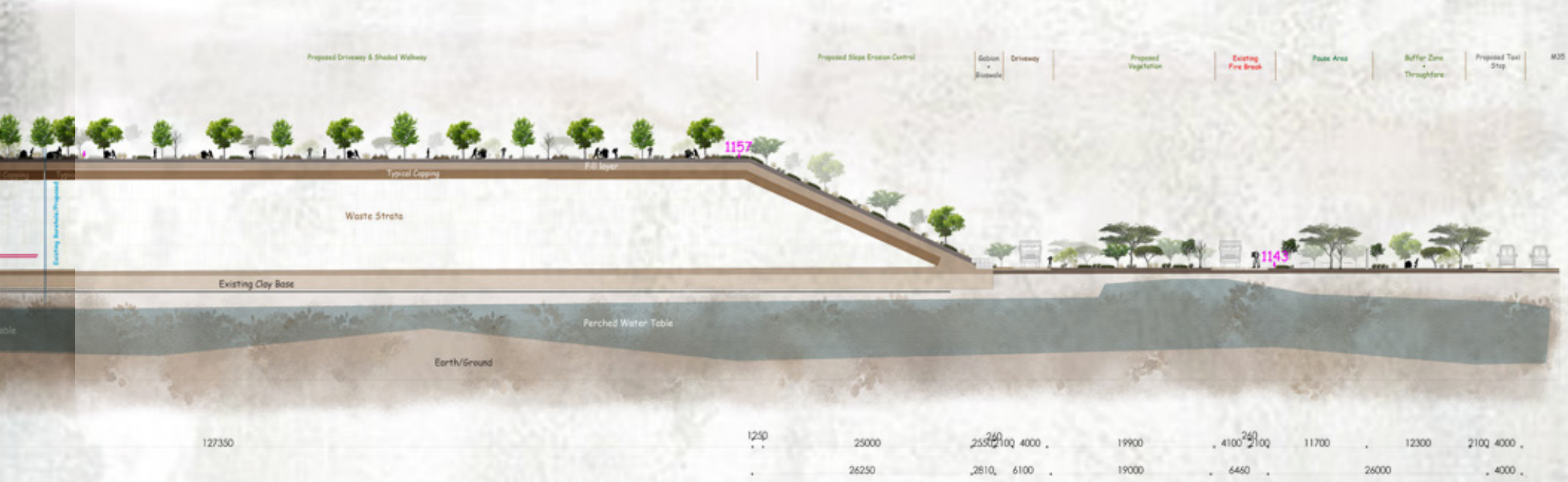
Figure 36: Phase 1 Conceptual Cross-Section

decline in height effectuate landfill mound instability. As such, it becomes challenging to propose built structures at the top of the landfill plateau as it poses safety risks and hazard in distant future. Reclaimed shipping containers and mobile vendor stalls are the most viable structures that can be introduced on the precinct because they can be moved and adjusted according to the needs of the users during the active phases of the site and they can continue to be of usage even after decommission as part of the end-use plan design inconjunction with the natural processes.

Other than active landfill cells where waste reclaimers spend most of their time collecting and sorting valuable material; the existing informal market place is where most social interactions occur. It is important to include the provision of basic aspects of a public space such as communal water points, ablution facilities, areas of pause and rest, soft landscape materials (trees and shrubs, etc.), hard landscape material (paved surfaces, seating benches, walkways, driveways, etc.) by encapsulating all these elements through design. Furthermore, a designated market place, vendor stalls, communal kitchen areas or sinks and storage facilities.

Figure 35 below depicts the overall proposed concept for immediate intervention (Phase 1) within the precinct.

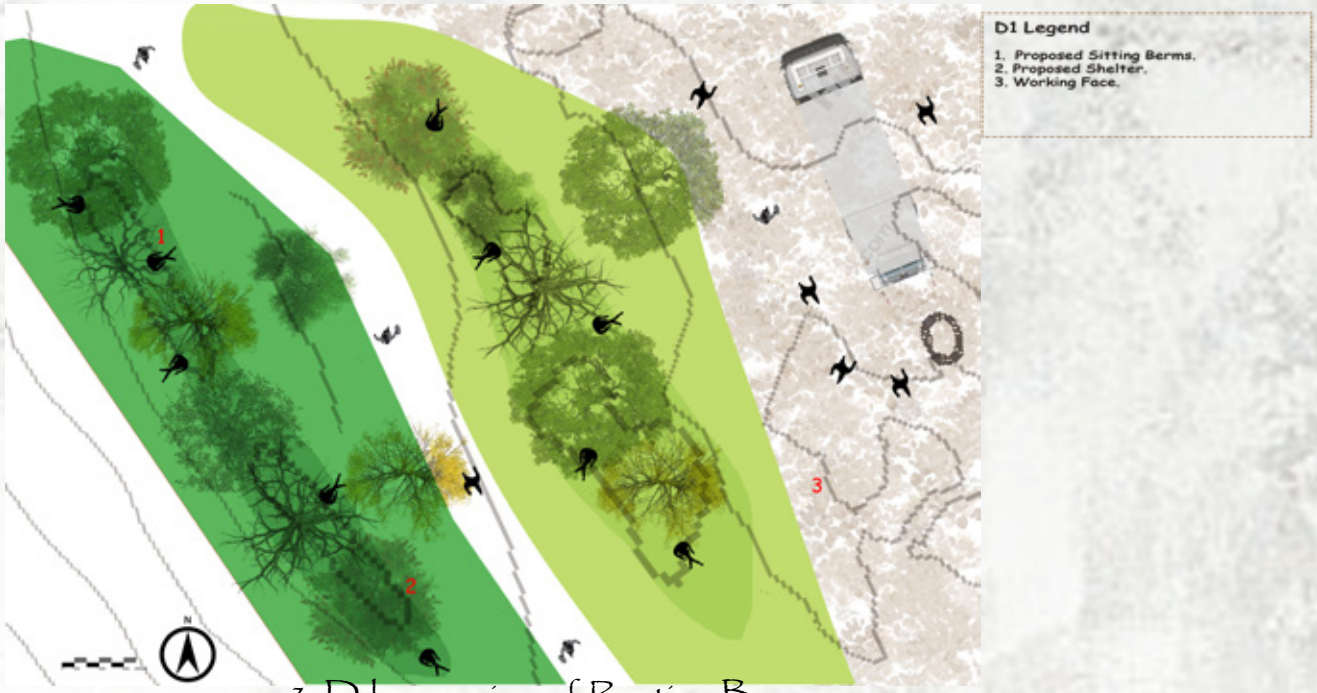
- Proposed Gas Probes, Vertical & Horizontal Gas Collection: are landfill gas monitoring systems that collects accumulated gases for management sampling or used as bio-energy. This can be beneficial for fast fod vendors who currently use open fire to prepare meals.
- Proposed Water Testing Probe: there are existing boreholes that are used to pump water to spray down the dust during landfill operation hours, these boreholes can be used as points to source and sample leachate and test water quality for compliance as the landfill progresses.
- Proposed Areas of Rest with Seating: as depicted in *Chapter 7 & 8*, Waste reclaimers spend most of their time waiting for waste trucks to tip and they rest on waste berms, *Figure 36* overleaf depicts the proposed seating berms concept.
- Proposed Fire Breaks & Buffer zones: According to DWAF (1998) and LOSF (2008), landfill sites require adequate planting to screen the precinct from bordering establishments, in the same light, fire breaks should be provided to reduce risks of undesired fires.
- Proposed Communal Node & Market Area: this node



encapsulates water points, wash area waste market araea,storage areas and ablution facilities as depicted in *figure 37* overleaf.

- Proposed Driveways & Shade Walkways: clear routes and comfortable walkways enable movement and easy access to and from important nodes within the precinct. The legacy of these pathways along with the proposed tree planting will inform the layout of elements of the end-use plan while embracing the heritage of the precinct. The proposed scented trees will improve the air quality and diffuse the bad odour.
- Proposed Slope Erosion Control: as discussed earlier on this *chapter*, it is vital to address the stabilization of the landfill mound. Soil erosion is one of the factors that accelerates weathering of the plateau, as such, introducing soil stabilization techniques i.e. phyto-capping adopting the Tswaing Crater plant strategy discussed in the next *chapter*.
- Proposed Gabion Walls & Bioswales: gabion structures are flexible and are able to adjust with the load, as such, due to lack of financial resources for the implementation of this proposal, it is sensical to use these structures because they require less maintenance less time to build. Bioswales will filter contaminated run-off before it reaches other water courses or reduces the spread of toxic sediments.
- Proposed Vegetation: the proposed vegetation will filtrate the run-off, beautify the area and enhance biodiversity.
- Proposed Thoroughfare & Taxi Stop: *figure 38* depicts the layout of the proposed taxi stop and pause area. This will enhance the user movement experience on site and improve safety upon the end-use plan because the bordering precinct communities have developed thoroughfare and broke barriers.

9.2.1 D1: Coceptual Resting Berms



3-D Impression of Resting Berms

Figure 37: Resting Berms

9.2.2 D2 Communal Node

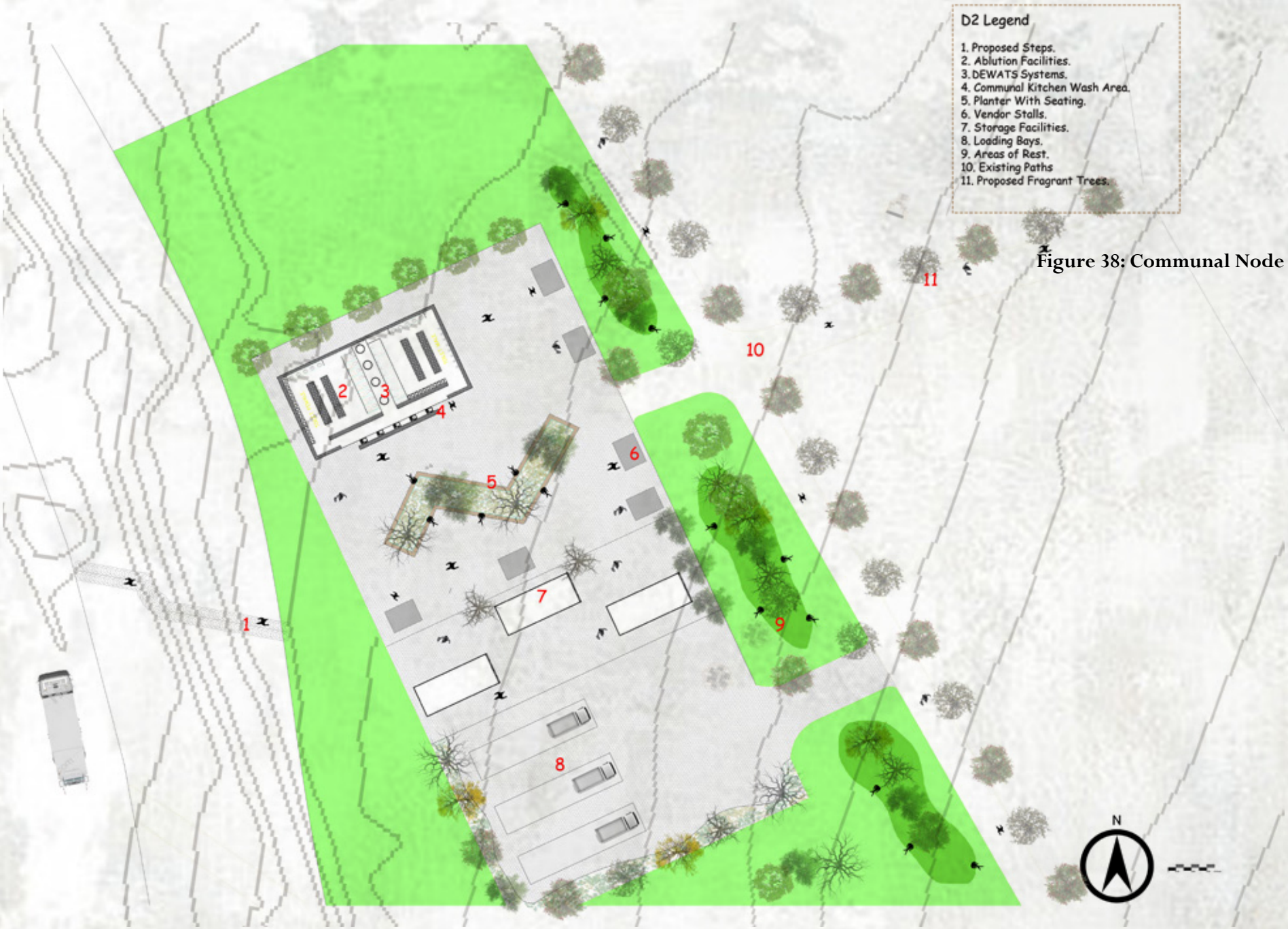


Figure 38: Communal Node

9.2.3 D3 Entry Node

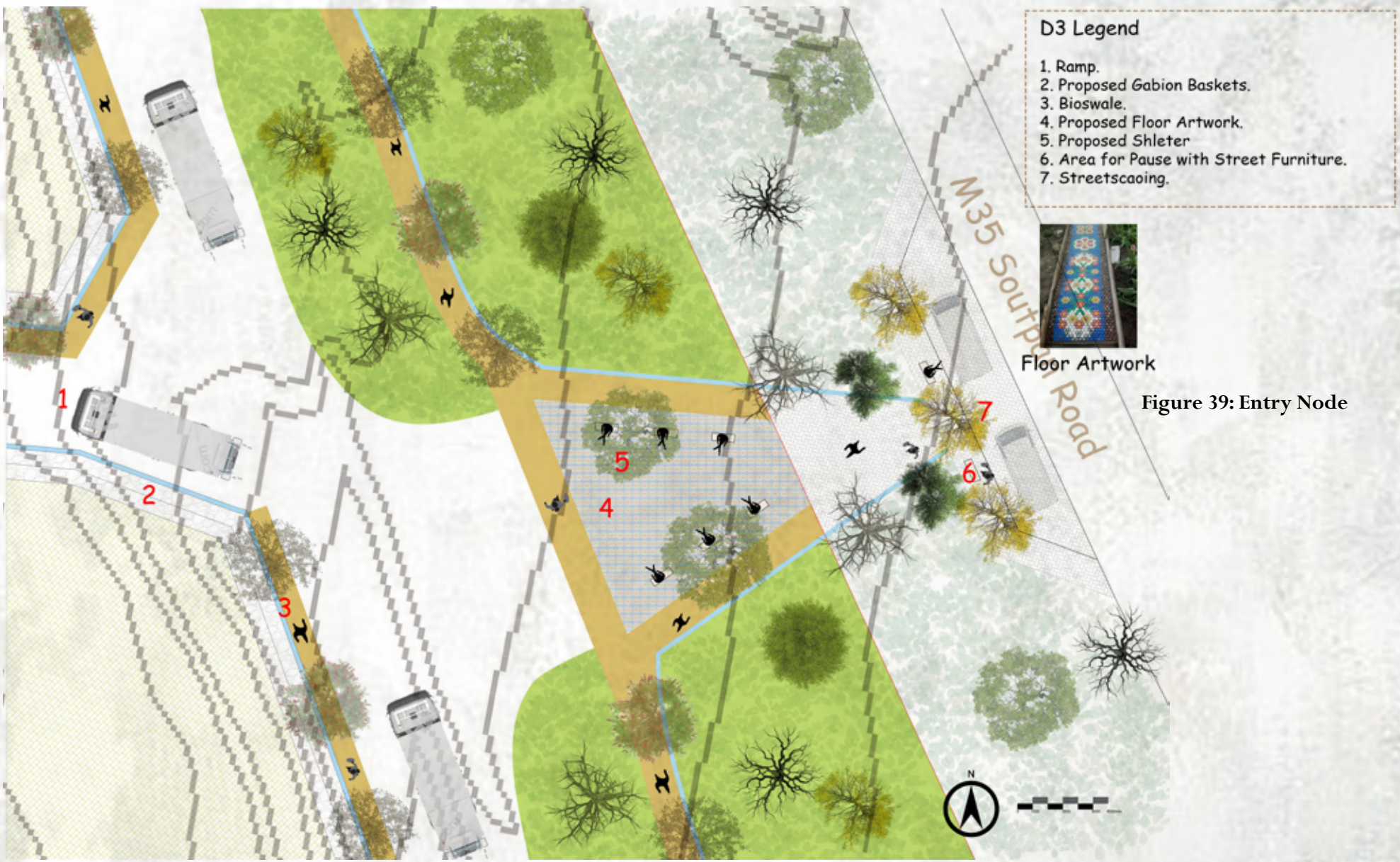


Figure 39: Entry Node

9.3 Developing the End-Use Masterplan: Llefa Lame

Llefa Lame as interpreted in the introductory chapters, simply means "my inheritance". The concept is two-fold, the Verbatim and Notional. The end-use plan is informed by the legacies of the landfilling operations, informal socio-economic activities occurring within the precinct, Historic [super] natural events and the City of Tshwane Metropolitan Municipality Open Space Framework as the overarching legislation enforcement.

9.3.1 The Verbatim Concept

The verbatim concept is carried through the literal interpretation of the phrase "Llefa Lame", referring to the inheritance of the current users of the precinct and how they have made a fortune [informal economy] throughout the years of operation; this study intends to create socio-economic activities even post-decommissioning. Moreover, the concept is expressed through the end-use program such as retaining driveways, pathways and trees.

9.3.2 The Notional Concept

The notional concept is expressed spatially by mimicking and embracing past events to stimulate the user's imagination and senses such as introducing endemic vegetation to restore the land to its natural state before disturbance and incorporating furniture that is designed from reclaimed material to celebrate the precinct heritage *refer to figure 39*. The program includes lookout points that visually connects the precinct with the Tswaing Crater, replicating what grows at the crater and creating forest illusions. Overleaf are 3-D impressions of the proposed End-Use Plan.

Figure 40: End-Use Plan

9.4 End-Use 3-D Impressions

Figure 41: Proposed Tswaing Lookout Point

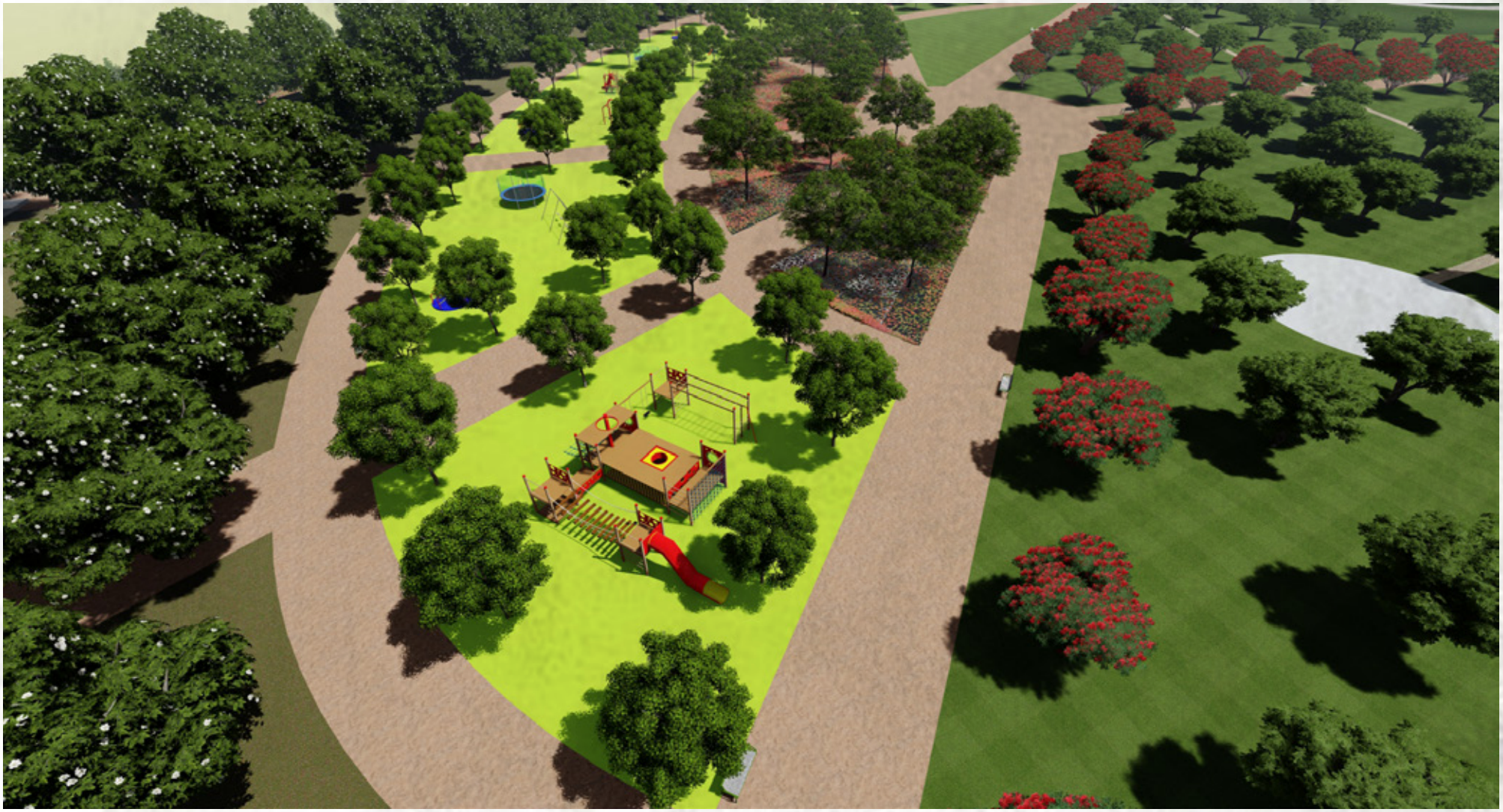


Figure 42: Proposed Children Play Park

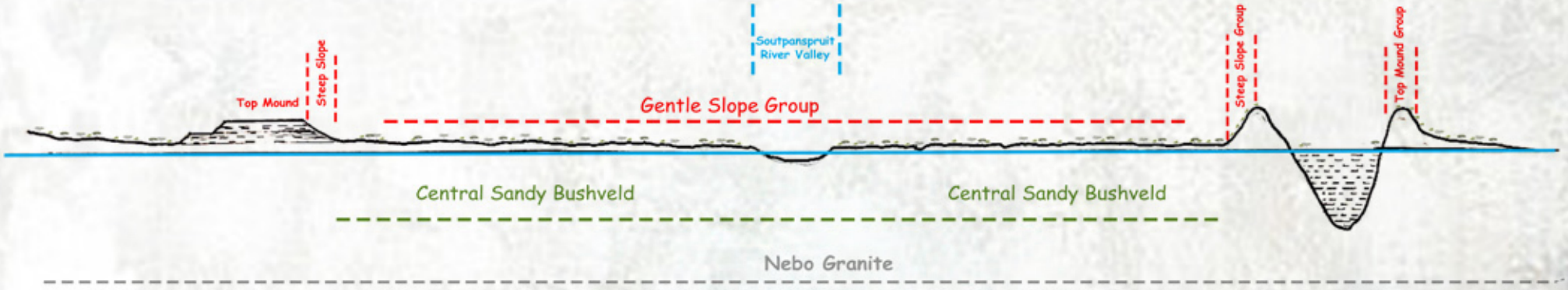
Figure 43: Vegetated & Stabilized Decommissioned Mounds

Figure 44: Users walking experience Through the Park

9.5 End-Use Planting Strategy

Soshanguve Landfill

Tswaing Meteorite Crater



9.6 End-Use Planting Strategy

Sports field Pallete

1. Berchemia zeyheri
2. Celtis africana
3. Olea europae spb. Africana
3. Combretum krausii
5. Cynodon Dactylon
6. Tulbaghia violacea
7. Peltophorum africanus

Seating Grasses Pallete

1. Heteropyxis Natalensis
2. Celtis africana
3. Olea europae spb. Africana
3. Combretum krausii
5. Trachelospermum Jasminoides
6. Tulbaghia violacea
7. Cynodon Dactylon

Heritage Garden Pallete

1. Vachellia Karoo
2. V. Xanthophloea
3.V. nilotica
4. V. tortilis
5. Berhemia zeyheri
6. Peltephorum africanus.
7. Combretum erythrophyllum.

Planting Plan Legend

- Sports Field Pallete
- Sitting Grasses Pallete
- Grasses Pallete
- Tswaing Groundcovers Pallete
- Scented Garden Pallete
- Heritage Garden Pallete

Scented Garden Pallete

1. Heteropyxis Natalensis
2. Callistemon Viminalis
3. Buddleja salvifolia
3. Confetti bush
5. Trachelospermum Jasminoides
6. Tulbaghia violacea
7. Bolusanthus speciosus

Tswaing Groundcovers Pallete

1. Ischaemum africanum
2. Setaria incrasata
3. Solanum delagoenese
4. Kalanchoe rotundifolia
5. Hirpicium bechuanese
6. Grewia flava
7. Pavonia Burchelii

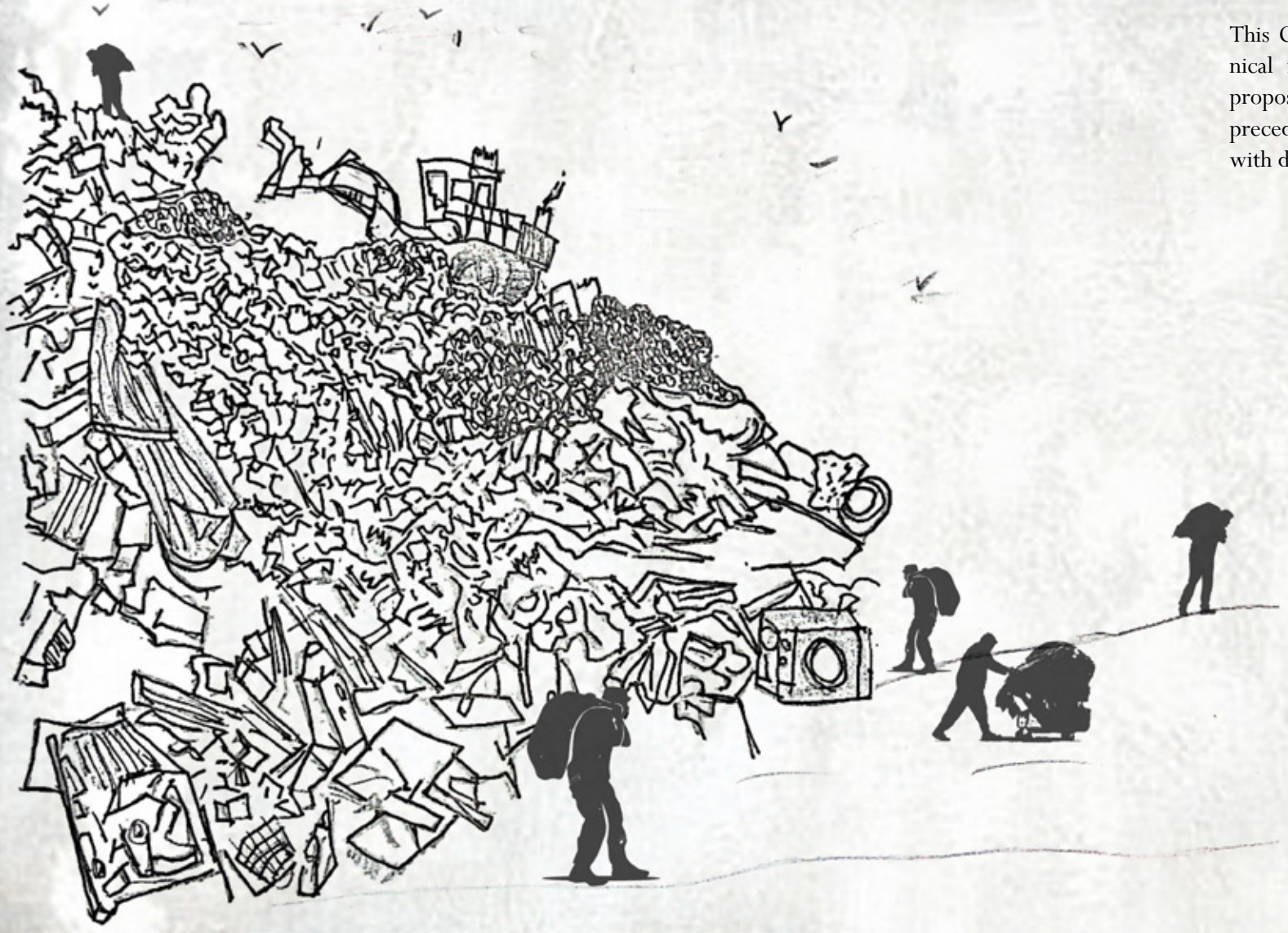
Grasses Pallete

1. Penisetum setaceum
2. Carex morrowii
3. Festuca glauca
4. Muhlenbergia rigens
5. Miscanthus Sinensis

N

Chapter 10: Design Technification

This Chapter aims to highlight and resolve the technical requirements for the implementation of the proposed framework that was briefly explored in the preceding *Chapter* and attached construction drawings with design specifications on the latter section.



Soshanguve landfill is one of the largest and longest operating Sanitary landfills not only within the region but the entire province as well. It is obvious that there is wealth of different valuable material that can be reclaimed in order to construct functional elements for the proposed project *see Figure 48* overleaf.

This study attempts to utilise these readily available material to realize the framework and design concepts discussed in *chapter* 8 and 9. The materials required to resolve the technical exploration can be divided into strategies and categories.

10.1 Water Strategies

Figure 45: Mobile Decentralized Waste Water System Concept

Water is one of the pivotal resource that is demanded by all precinct occupants irrespective of levels of consumption and handling. *Figure 31* in *Chapter 7* depicts that the water table is close too close to the ground level and there are two (2) boreholes that exist within the precinct. this serves as an opportunity to use under ground water for ablution facilities and only use freshwarter from the municipal supply for drinking and proposed kitchen facilities. Moreover, Decentralised Waste Water Treatment System (DEWATS) can integrate the fresh and waste water system trogether with the proposed leachate treatment plant and form a sustainable water cycle.

As depicted in *figure 48* overleaf, there is a lot of runoff from saturation underground and landfill operation sedimentation ponds. Chanelling surface run-off will reduce the risks of contaminated water reaching bordering watercourses and spreading toxic and harmful sediments.

10.2 Retaining & Screening Walls Strategies

Figure 46: Gabion Structures

As discussed in *Chapter 9*, gabion baskets are versatile structures with multiple benefits. They require less time to implement as compared to concrete built structures and can be cheap because there is a variety of fill material available in the market for purchasing such as rocks and reclaimed materials as depicted in *figure 45*. Incorporating reclaimed materials in the construction of gabion walls is not only artistic but also append to notional concept discussed previously.

10.3 Paving Strategies

Hard surfaces on landfills that are not properly capped for gases pose risks of unintended fires and explosions because gases accumulate and compress beneath such solid surfaces, as such, the Bosun grass block is thus a safer alternative. The grass blocks allow vegetation to establish while gases filter through; the block act as a non slip mechanism in wet seasons especially on slopes, refer to *figure 46* and *page* 61.

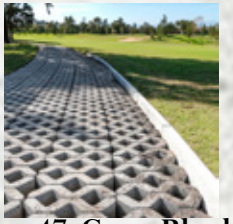


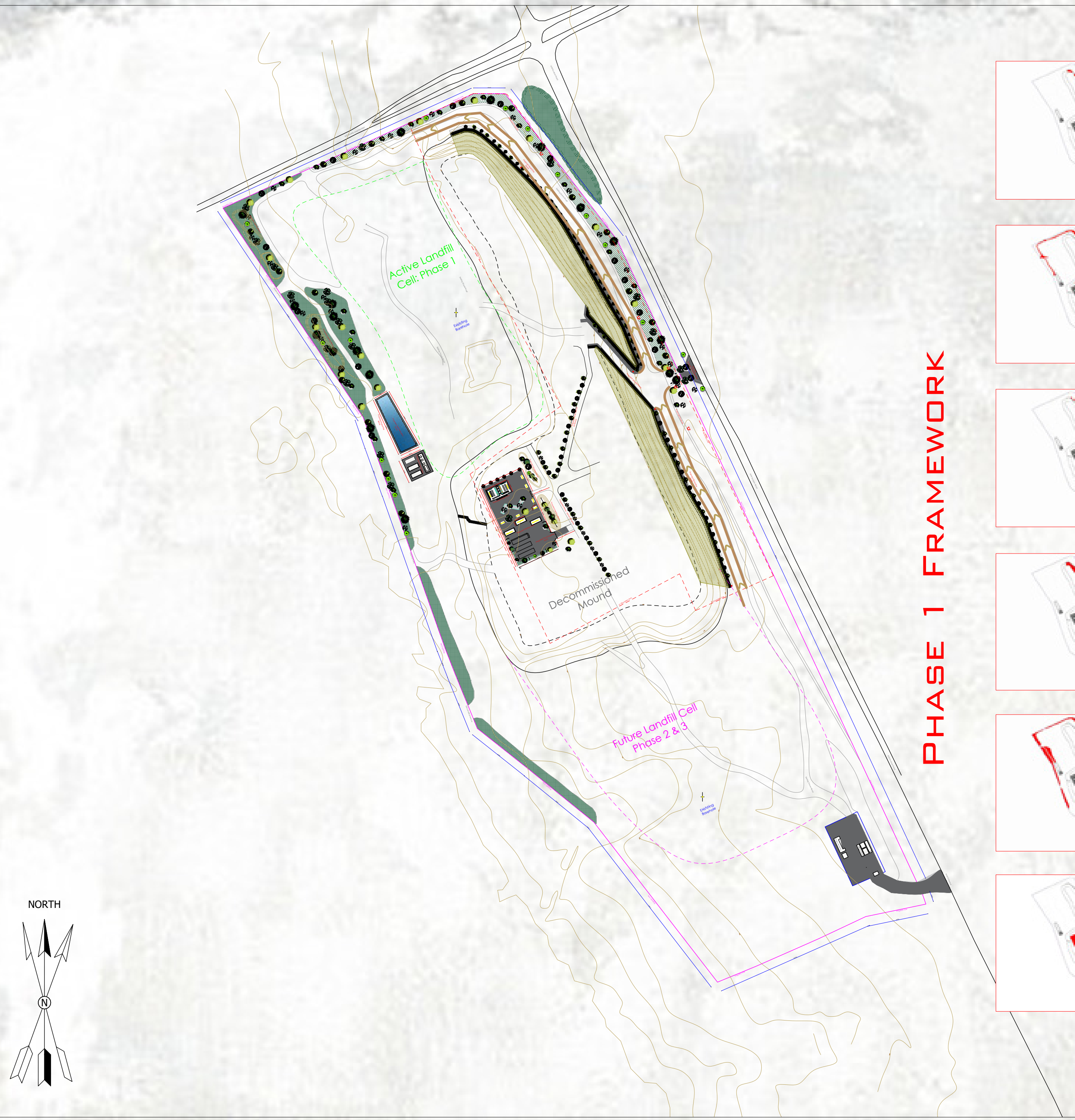
Figure 47: Grass Block Concept

10.4 Furniture & Artwork Strategies

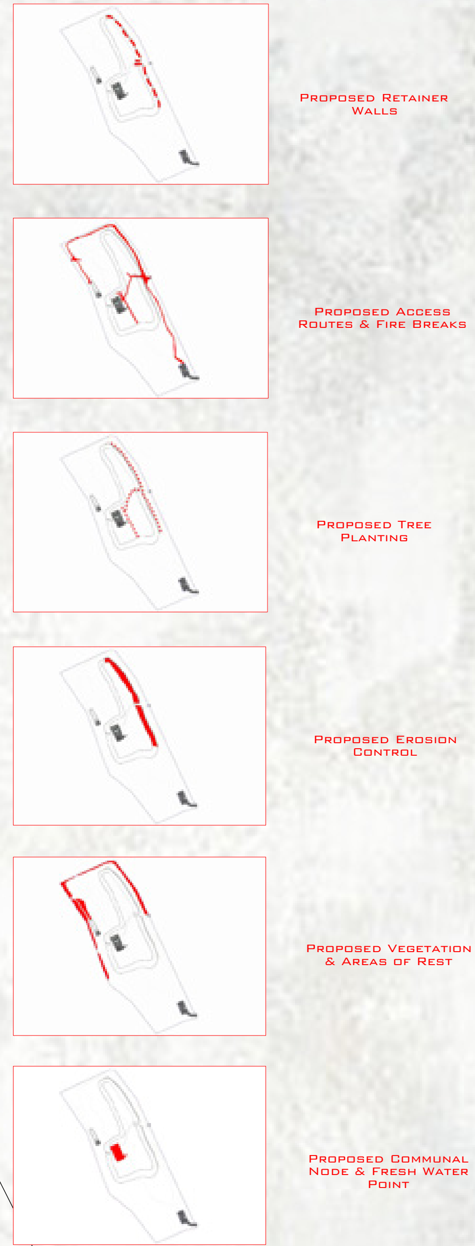
Figure 48: Furniture designed from reclaimed Material

Figure 47 depicts how reclaimed material can be re-integrated into the landscape design and other facilities within the precinct. Reclaiming can be achieved from high level as reclaiming or refurbishing shipping containers to lower level as re-using plastic bottle caps to design floor mosaics for aesthetics. This strategy can be economic provided that all the materials are avilable on site yet expensive if the reclaimed material requires transportation from source to the construction site for example, large quantities of used car tyres and shipping containers will be required for succesful implementation; depending solely on Soshanguve landfill is not sensical.

Figure 49: Site Materiality



Phase 1 Framework



General Notes

- This drawing is not to be scaled. Figured dimensions are to be used. All dimensions are in millimeters unless otherwise stated.

- All dimensions and levels must be checked on site by the Contractor before putting work in hand. Any discrepancies on the drawings are to be brought to the Landscape Architect's attention by the Contractor before putting work in hand.
- The Landscape Architects are to be notified of any variations.
- The design of this drawing is the copyright of the Landscape Architects.
- LT scale: 0.01

Legend:

- Phase 1 Construction Boundary
- Active Cell
- Property Boundary
- Existing Contour Lines
- Decommissioned Mound
- Proposed Contour Lines
- Proposed Bank Vegetation
- Proposed Shrubs & Groundcovers
- Proposed Trees
- Proposed Catch Basins & Manholes
- Proposed Culvert Head walls & Outlets
- Proposed Water Filtration Planting

Revisions

Rev.	Date	Description	By

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University of Cape Town
School of Architecture, Planning & Geomatics
Master of Landscape Architecture 2021
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For Exam Submission

Project description

Llefa Lame: [Re]imagining Soshanguve Landfill Dissertation Technology Examination

Date	Drawn by	Scale
07/11/2022	LPM SACLAP No. 333	1:2000 @A1

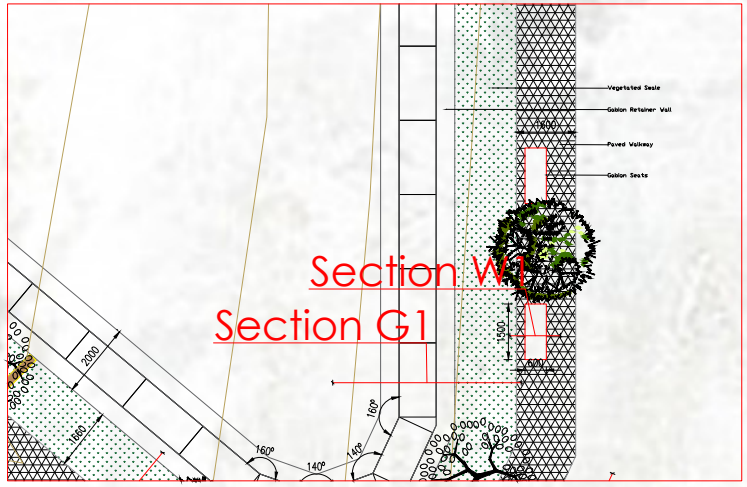
Drawing no.	Rev. no.
LSP-DTE-200	0

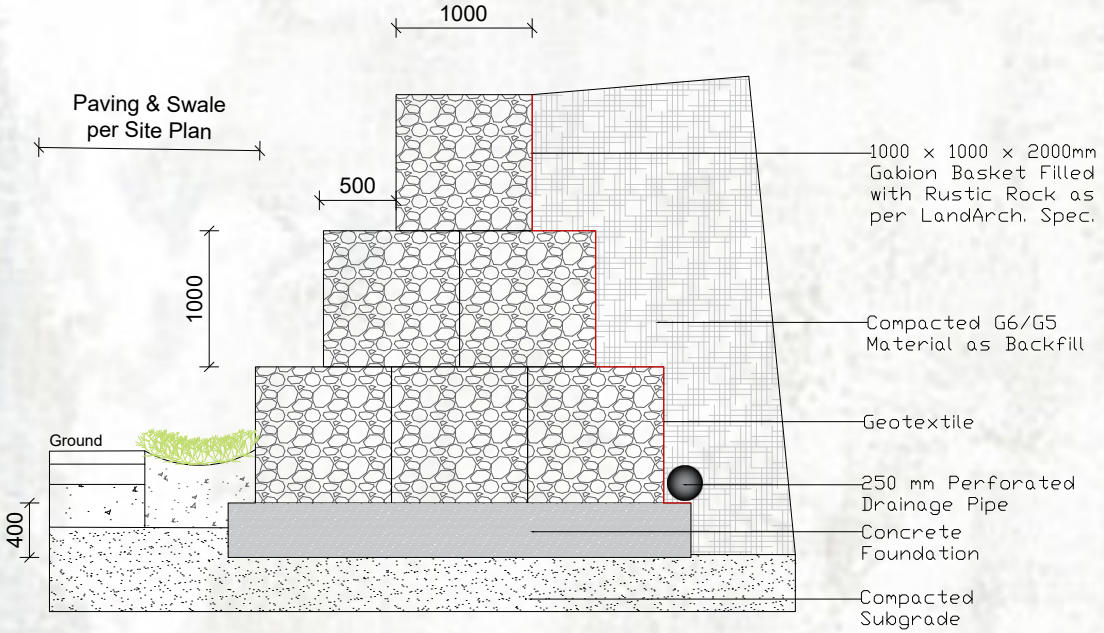
Llefa Lame: Phase 1 Site Plan

Scale: 1:2000 (A1)

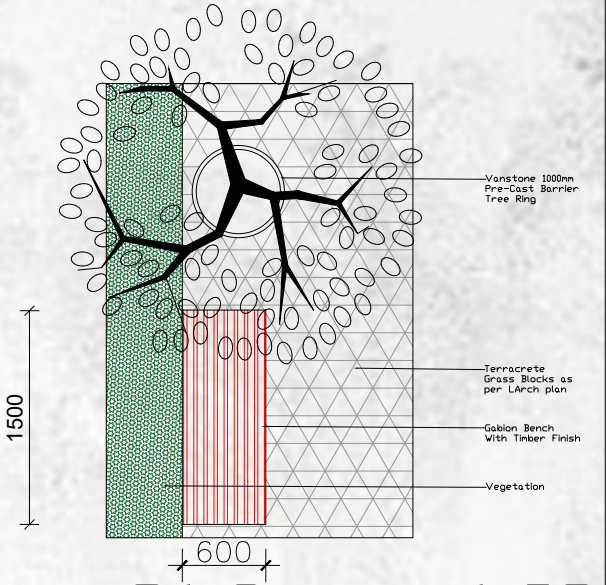
Lefentse P. Molubi University of Cape Town, Master of Landscape Architecture 2021

Detail W1: Gabion Retainer Wall 1:50

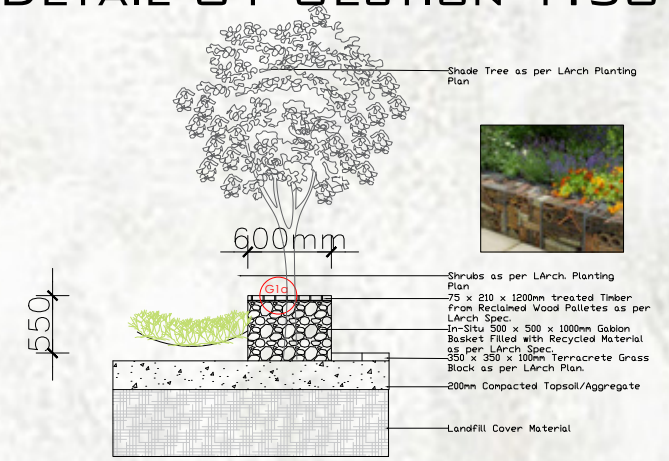




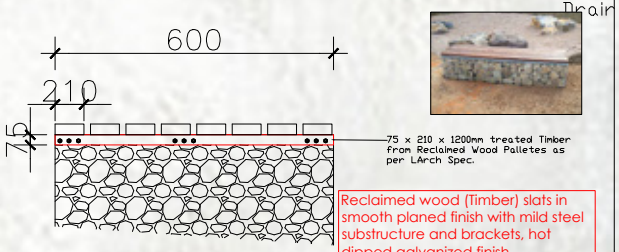
Detail G1 Plan 1:50



Detail G1 Section 1:50



Detail G1a 1:10



Reclaimed wood (Timber) slats in smooth planed finish with mild steel substructure and brackets, hot dipped galvanized finish

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Please observe health & safety lifting guidelines. A fork lift or crane will be required for off-loading and positioning of items.

Gabion Seat Specifications:

The under-seat gabion typically requires up to 450kg of fill material, although this will vary according to the material size and weight.

In case of recycled material inadequacy; - the advice of the stone supplier should be sought to ensure the appropriate amount of infill material is supplied.

Gabions Baskets to be supplied pre-clipped at the bottom and flat packed

The advice of the stone supplier should be sought to ensure the appropriate amount of infill material is supplied.

Gabions Baskets to be supplied pre-clipped at the bottom and flat packed.

Maximum height to be retained is 3 meters.

Gabion mesh basket:

- *Builders Merchant* 1m x 1m x 2m Double Twist Woven Mash (Class A Galvanized Coating)
- Tensile Strength: 350-550N/mm2
- Aperture: 60x80x2.2mm

Gabion basket fill:

Fill with *Pavement Material* 90-300mm Rustic Gabion Rocks

Geotextiles:

Geotextile to extend minimum of 300mm from back edge of gabion basket and wrapped around as required.

Backfill & Compaction:

G5/G6 recommended backfill material & soil to be compacted to 93% MOD AASHTO. Do not compact layers more than 500mm thick.

Vibrating plate: Maximum of 1000kg mass

Foundation:

400mm x 1700mm Sub Base

Services & Drainage Pipes:

Services passing through structures should be set into a sleeve, for drainage pipes a flexible joint should be provided immediately behind the structure.

Revisions

Rev.	Date	Description	By

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For Exam Submission

Project description
Llefa Lame: (Re)imagining Soshanguve Landfill
Dissertation Technology Examination

Date	Drawn by	Scale
25/10/2022	LPM SACLAP No. 333	1:50 @A1

Drawing no. LGB-DTE-100 | Rev. no. 0

Scale: 1:50 (A1)

Llefa Lame: Phase 1 Detail W1: Gabions

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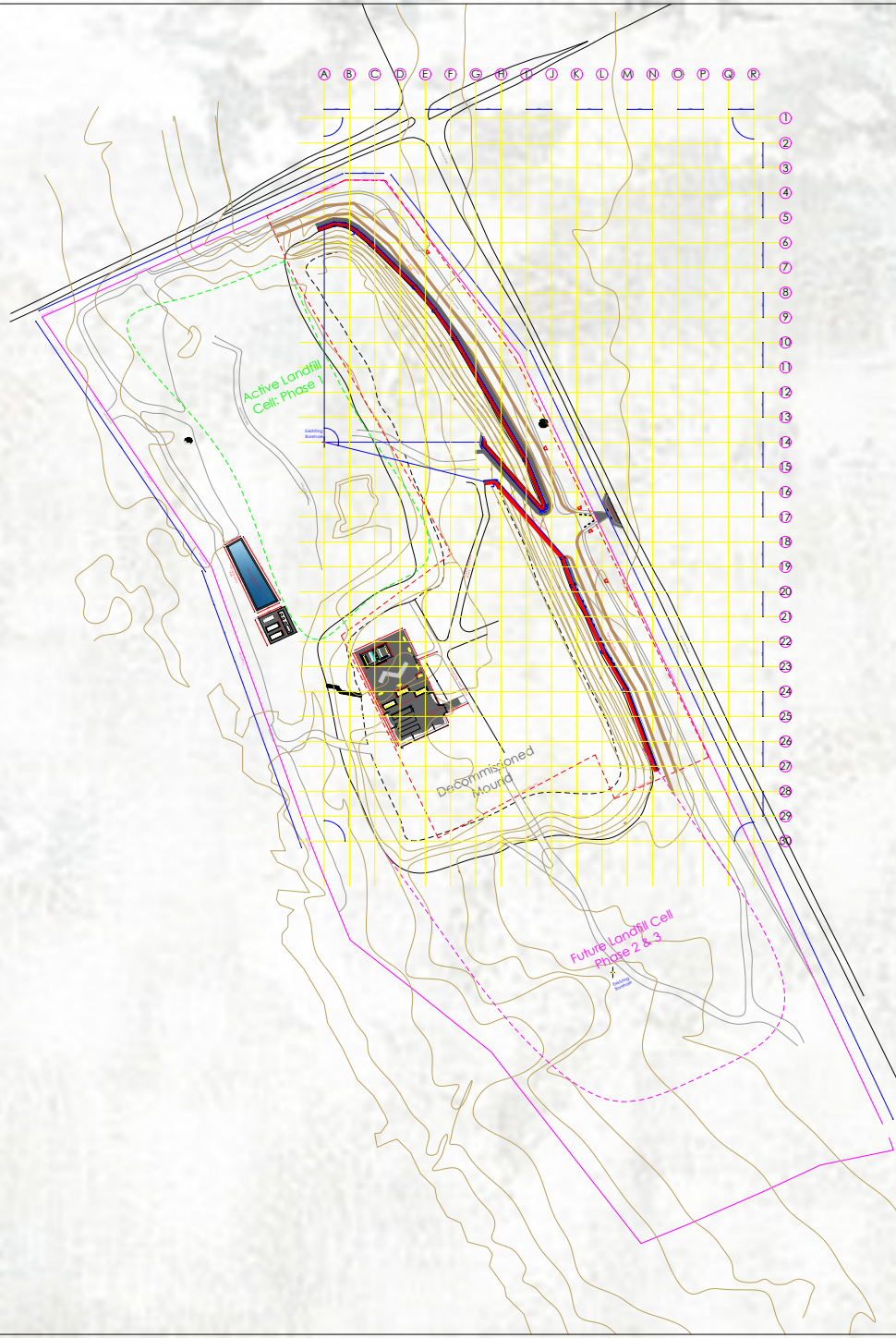

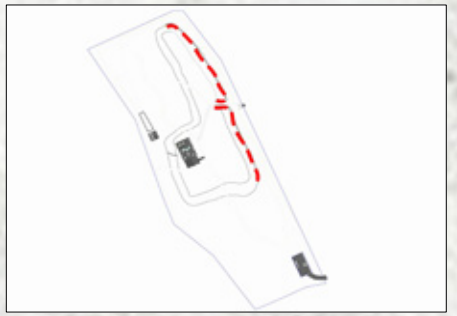

NORTH

LLEFA LAME: PHASE 1 GABION SETTING OUT PLAN

SCALE: 1:2000 (A1)

GENERAL NOTES

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- LT scale: 0.01

LEGEND:

- Phase 1 Construction Boundary
- Active Cell
- Property Boundary
- Existing Contour Lines
- Decommissioned Mound
- Proposed Contour Lines
- Proposed Bank Vegetation
- Proposed Shrubs & Groundcovers
- Proposed Trees
- Proposed Catch Basins & Manholes
- Proposed Culvert Head walls & Outlets
- Proposed Filtration Planting

REVISIONS

Rev.	Date	Description	By

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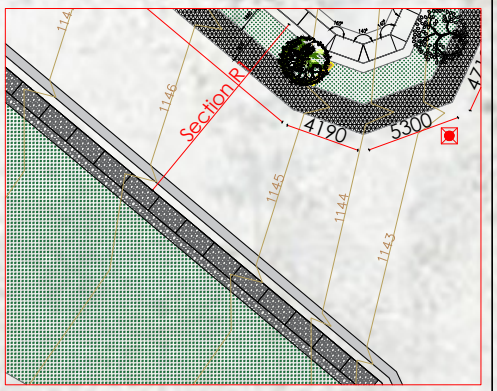
FOR EXAM SUBMISSION

PROJECT DESCRIPTION
LLEFA LAME: (RE)IMAGINING SOSHANGUVE LANDFILL
DISSERTATION TECHNOLOGY EXAMINATION

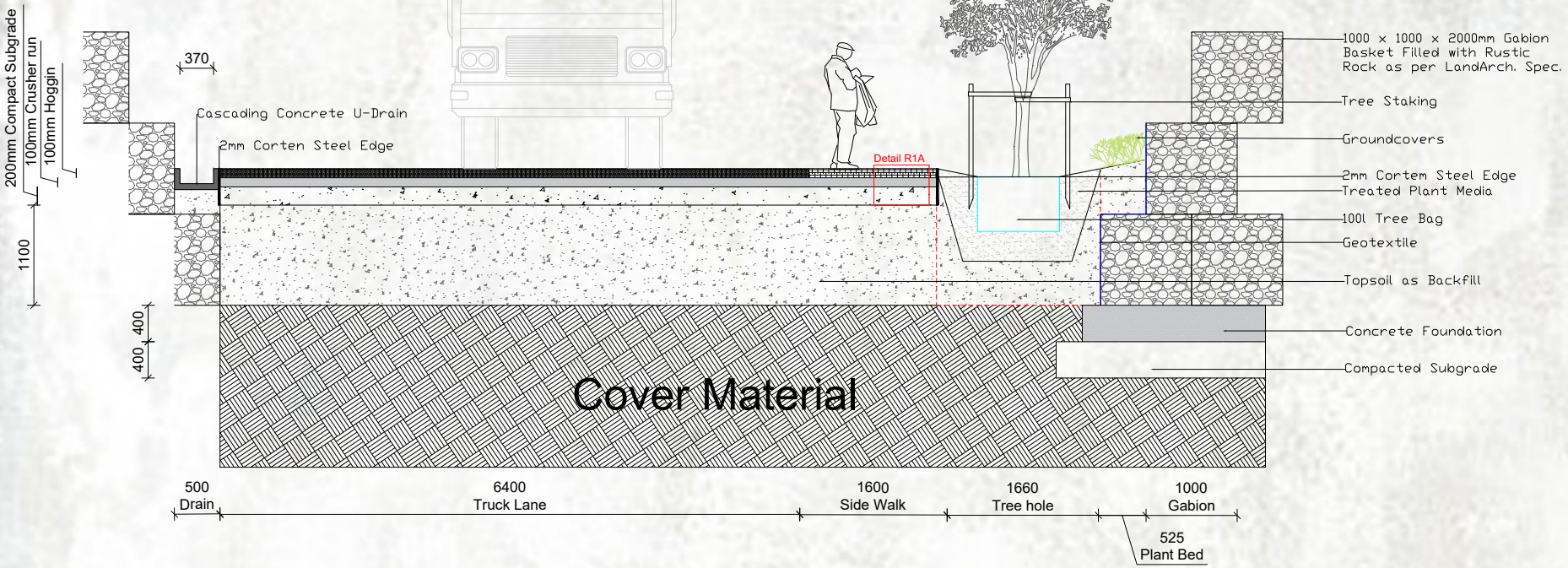
DATE	DRAWN BY	SCALE
07/11/2022	LP MOLUBI SACLAP NO. 333	1:2000 @A1

DRAWING NO. LSO-DTE-200 | REV. NO. 0

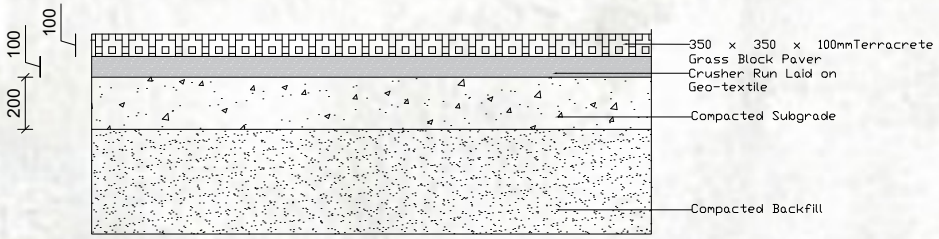
LEFENTSE P. MOLUBI University of Cape Town, Master of Landscape Architecture 2021



Detail R1: Ramp Driveway Section 1:25



Detail: R1A Paving Section 1:10



General Notes

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Specifications:

Gravel Hogging

Type: Prosurfacing Hoggin natural gravel

Size: 10mm gravel particles

Finish: Self-binding natural gravel

Layer-works: 50-100mm self-binding gravel laid on 100mm Crusher-run. Use a vibrating roller or whacker plate to level the hogging and sprinkle water for binding.

Edging: Metal edging sheets

Walkways:

Type: Terracrete Grass Block Paver

Size: 350 x 350 x 100mm

Finish: Concrete

Pattern: As per supplier specification.

Edging: Header course on concrete haunching.

Layer-works: Sand blinding layer and compacted base as per engineer and supplier specifications.

Services & Drainage Pipes:

Services passing through structures should be set into a sleeve, for drainage pipes a flexible joint should be provided immediately behind the structure.

Revisions

No.	Date	Description	By

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For Exam Submission

Project Description

Llefa Lame: [Re]imagining Soshanguve Landfill Dissertation Technology Examination

Date	Drawn by	Scale
14/11/2022	LPM SACLAP NO. 333	1:25 @A1

Drawing No. LRD-DTE-200 Rev. No. 0

Scale: 1:25 (A1)

Llefa Lame: Phase 1 Detail R1: Ramp Driveway

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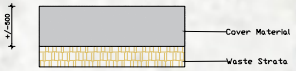
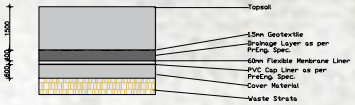
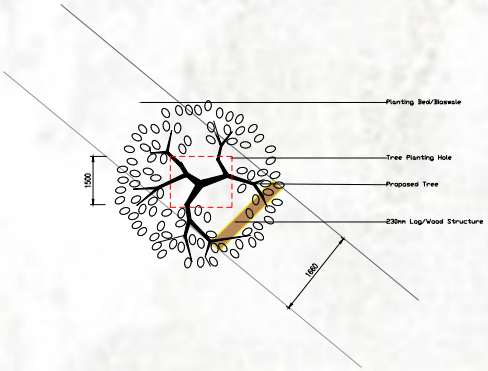
Current Capping



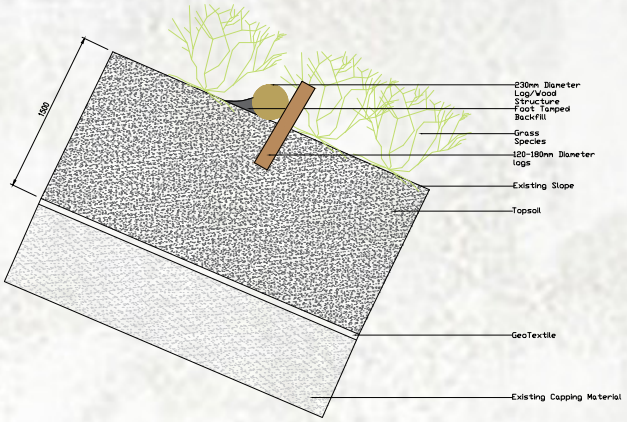
International Standard



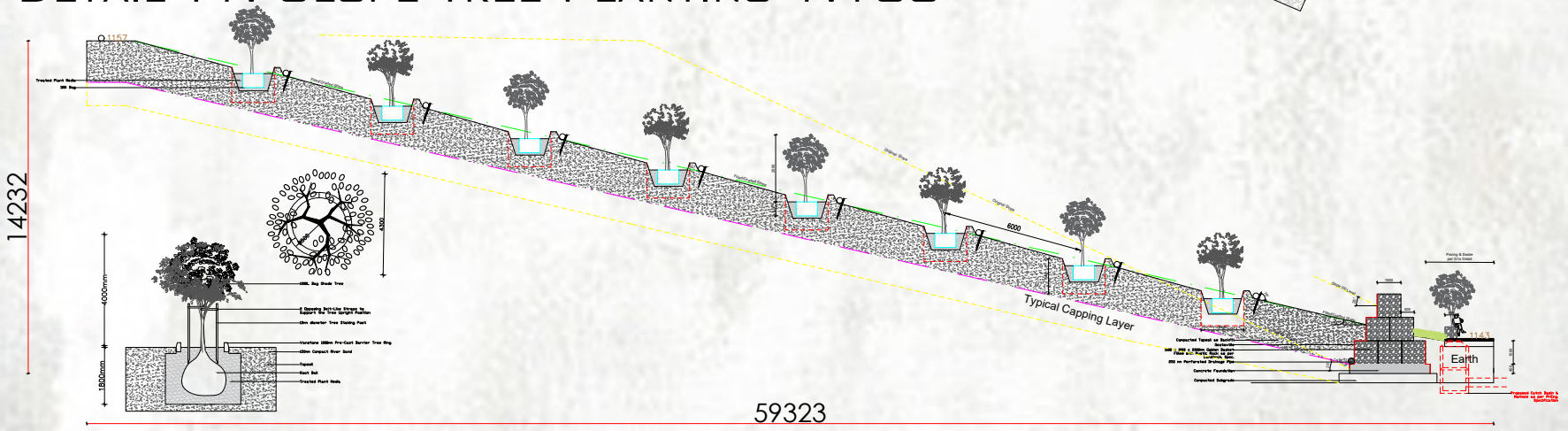
Slope Tree Planting Plan 1:50



Phytocapping 1:20



Detail T1: Slope Tree Planting 1:100



General Notes

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Specifications:

Purchase all trees at Just Trees Nursery and transport to site.

All plant material must be purchased at registered nurseries unless the species are propagated at the proposed on-site nursery.

All plants must be transported to the site in trucks with closed canopies. Plants in transit may not be exposed to wind or any other harmful elements.

All plants are to be viewed and approved by the Landscape Architect before planting.

The Landscape Architect retains the right to adjust specific species and plant sizes if plants are not available or of poor quality.

Supply all equipment and labour for planting of trees, shrubs, groundcovers and seeding.

Backfill with planting media to specification and tramp down firmly. Remove all surplus soil.

Form a pond around each tree and shrub/s and water well after planting.

Keep all plants moist.

Plant sizes and plant densities will be strictly enforced.

Trees from 50 ltr containers: 1800 - 2200 mm height after planting with stem diameter of 20-30 mm measured 300mm above soil level.

Trees from 100 ltr containers: 2500 - 3000 mm height after planting with stem diameter of 30-50 mm measured 300mm above soil level

NOTE: Contractor to meet the Landscape Architect to select all trees to be used. Colour photos of the proposed trees can also be supplied to the Landscape Architect.

Revisions

Rev.	Date	Description	By

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For Exam Submission

Project description
Llefa Lame: [Re]imagining Soshanguve Landfill Dissertation Technology Examination

Date	Drawn by	Scale
26/11/2022	LPM SACLAP No.	1:100 @A1

Drawing no. LTP-DTE-200 Rev. no. 0

62

Scale: 1:100 (A1)

Llefa Lame: Phase 1 Detail T1: Tree Planting

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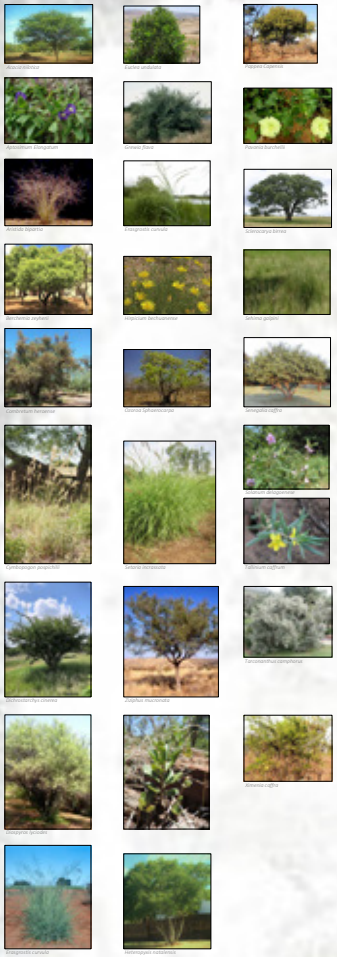
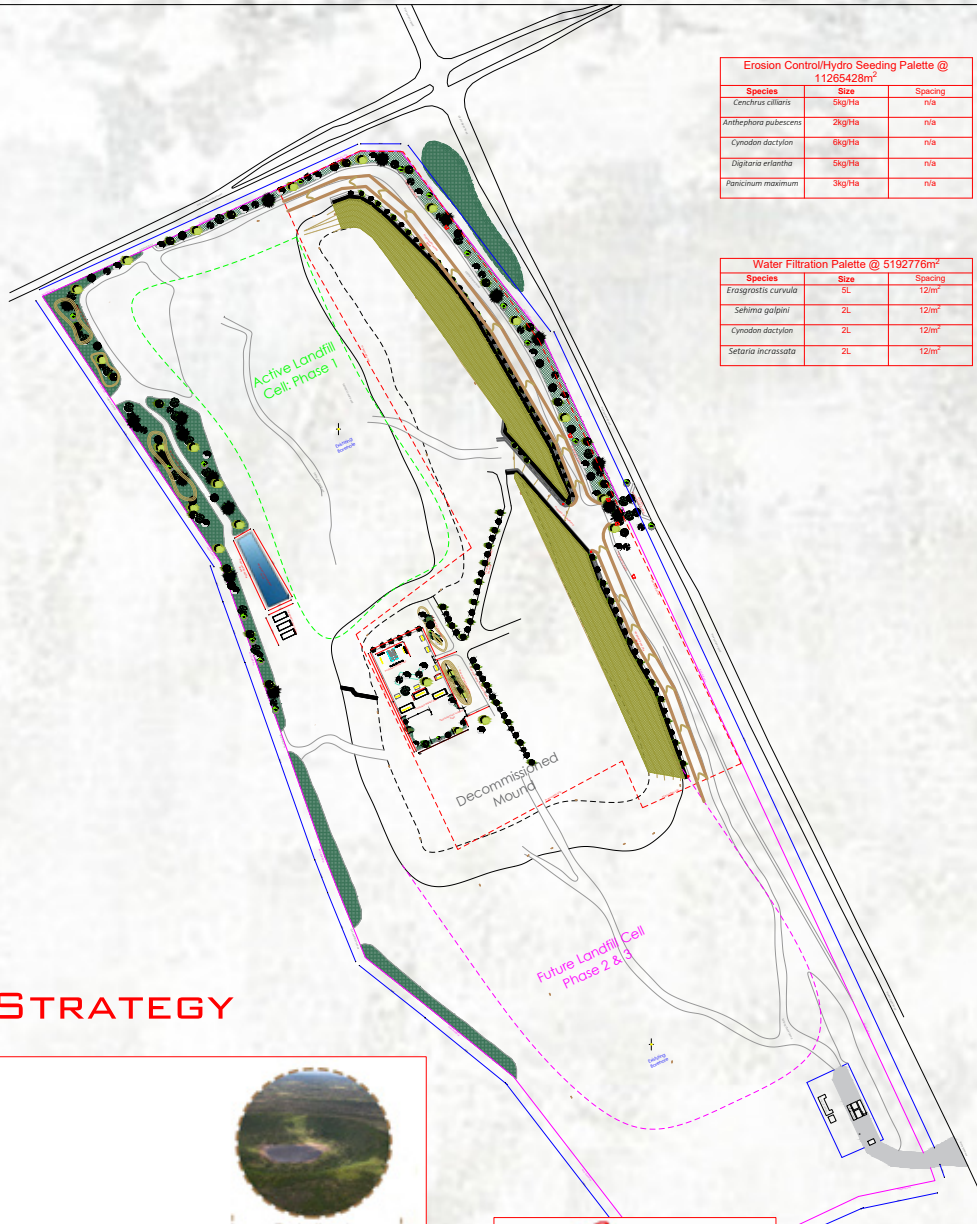




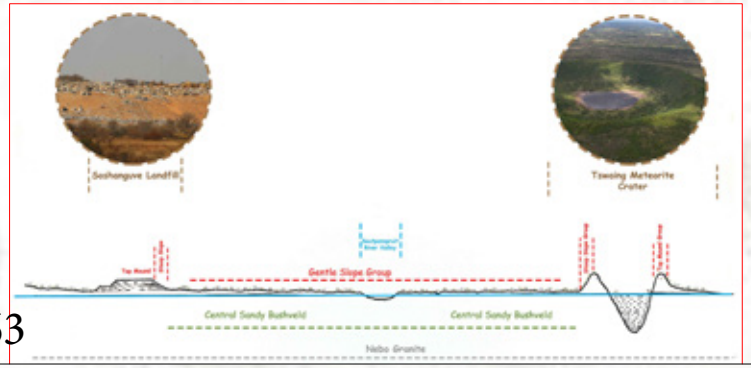
Erosion Control/Hydro Seeding Palette @ 11265428m²		
Species	**Size**	**Spacing**
Cenchrus ciliaris	5kg/Ha	n/a
Anthephora pubescens	2kg/Ha	n/a
Cynodon dactylon	6kg/Ha	n/a
Digitaria erlantha	5kg/Ha	n/a
Panicinum maximum	3kg/Ha	n/a

Water Filtration Palette @ 5192776m²		
Species	**Size**	**Spacing**
Erasgrostis curvula	5L	12/m²
Sehima galpini	2L	12/m²
Cynodon dactylon	2L	12/m²
Setaria incrassata	2L	12/m²

Shrubs, Seating Grasses & Groundcovers Palette @ 9920251m²		
Species	**Size**	**Spacing**
Ischaemum africanum	5L	4/m²
Solanum delagoense	5L	4/m²
Hirpicium bechuanese	3L	6/m²
Kalanchoe rotundifolia	2L	12/m²
Grewia flava	10L	2m
Pavonia Burchell	2L	12/m²
Penisetum setaceum	5L	4/m²
Festuca glauca	5L	4/m²
Muhlenbergia rigens	5L	4/m²
Miscanthus Sinensis	5L	4/m²
Aptosimum Elongatum	2L	12/m²
Aristida bipartia	5L	4/m²
Pavonia burchellii	2L	12/m²
Cymbopogon pospichilli	5L	4/m²
Tallinium caffrum	2L	12/m²

Shade & Scented Trees Palette		
Species	**Size**	**Spacing**
Celtis africana	50L	6m
Combretum kraussi	100L	6m
Searsia lancea	50L	6m
Olea europaea subsp. Africana	50L	6m
Heteropyxis natalensis	100L	6m
Callistemon viminalis	100L	6m
Vachellia Karoo	100L	10m
Peltephorum africanus	100L	10m
Vachellia Xanthophloea	100L	10m
Vachellia nilotica	100L	10m
V. tortilis	100L	10m
Senegalia caffra	100L	10m
Ozoroa Sphaerocarpa	50L	6m
Diospyros lycioides	50L	6m
Euclea undulata	100L	10m
Berchemia zeyherii	100L	10m
Dichrostarchys cinerea	100L	10m
Combretum heroense	100L	6m
Ziziphus mucronata	100L	10m
Senegalia caffra	50L	6m
Sclerocarya birrea	50L	6m
Pappea Capensis	50L	6m

Planting Strategy



NORTH

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- LT scale: 0.01

LEGEND:

- Phase 1 Construction Boundary
- Active Cell
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- Existing Contour Lines
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- Proposed Trees
- Proposed Catch Basins & Manholes
- Proposed Culvert Head walls & Outlets
- Proposed Water Filtration Planting

Revisions

Rev.	Date	Description	By

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For Exam Submission

Project Description
Llefa Lame: [Re]imagining Soshanguve Landfill Dissertation Technology Examination

Date	Drawn by	Scale
07/11/2022	LPP SACLAP NO. 333	1:2000 @A1

Drawing no.	Rev. no.
LPP-DTE-200	0

Scale: 1:2000 (A1)

Llefa Lame: Phase 1 Planting Plan

Lefentse P. Molubi University of Cape Town, Master of Landscape Architecture 2021

Llefa Lame: Phase 1 Communal Node Setting Out

Scale: 1:250 (A1)

General Notes
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Revisions

Rev.	Date	Description	By

Lefentse Precious Molubi
SACLAP No. 333
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For Exam Submission

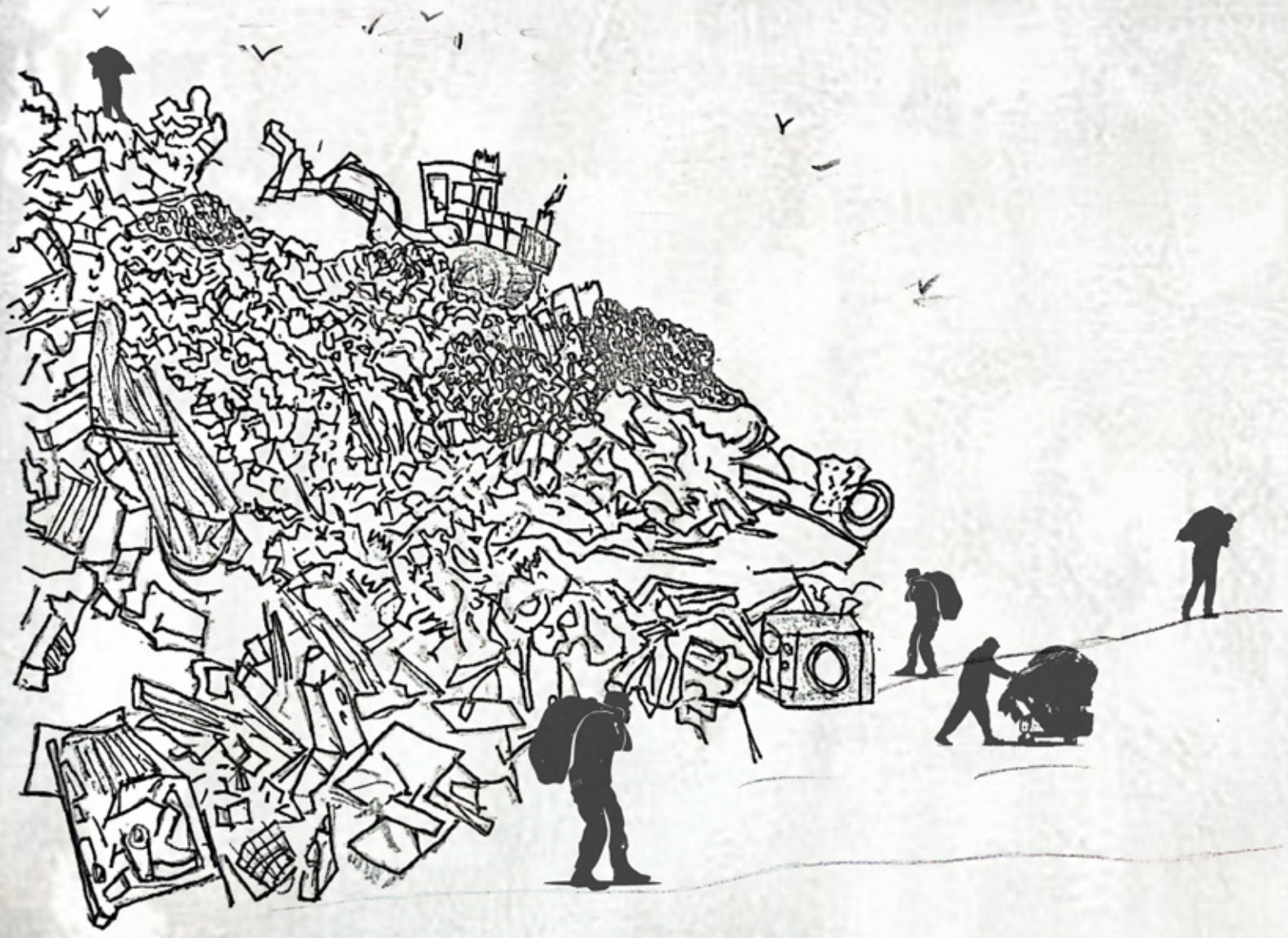
Project Description
Llefa Lame: [Re]imagining Soshanguve Landfill
Dissertation Technology Examination

Date	Drawn by	Scale
25/10/2022	LPM SACLAP No. 333	1:250 @A1

Drawing No.	Rev. No.
LCN-DTE-200	0

Lefentse P. Molubi University of Cape Town, Master of Landscape Architecture 2021

Chapter 11: Conclusions & Reflections



The aim of this dissertation was to create a tolerable working environment for the informal waste recyclers and other stakeholders at the Soshanguve landfill, with the intention of using the legacy of the operational phases of the landfill to inform an end-use plan for a heritage public space upon decommissioning.

It can be observed throughout the study that having insight and knowledge about the site users is a powerful approach as it limits the chances of the proposed intervention to be a "Ghost Space". It can be concluded that in landscape architectural design, especially in countries with developing economies, the bottom-up approach, integrative approach and the people-first approach is essential.

The study area embodies three (3) essential layers in landscape architecture, The environment, the socio-economy and lastly the cultural and historical layer. None of these layers is more important than the other, therefore, all these components should be treated as a system and not separate components to ensure successful landscape performance.

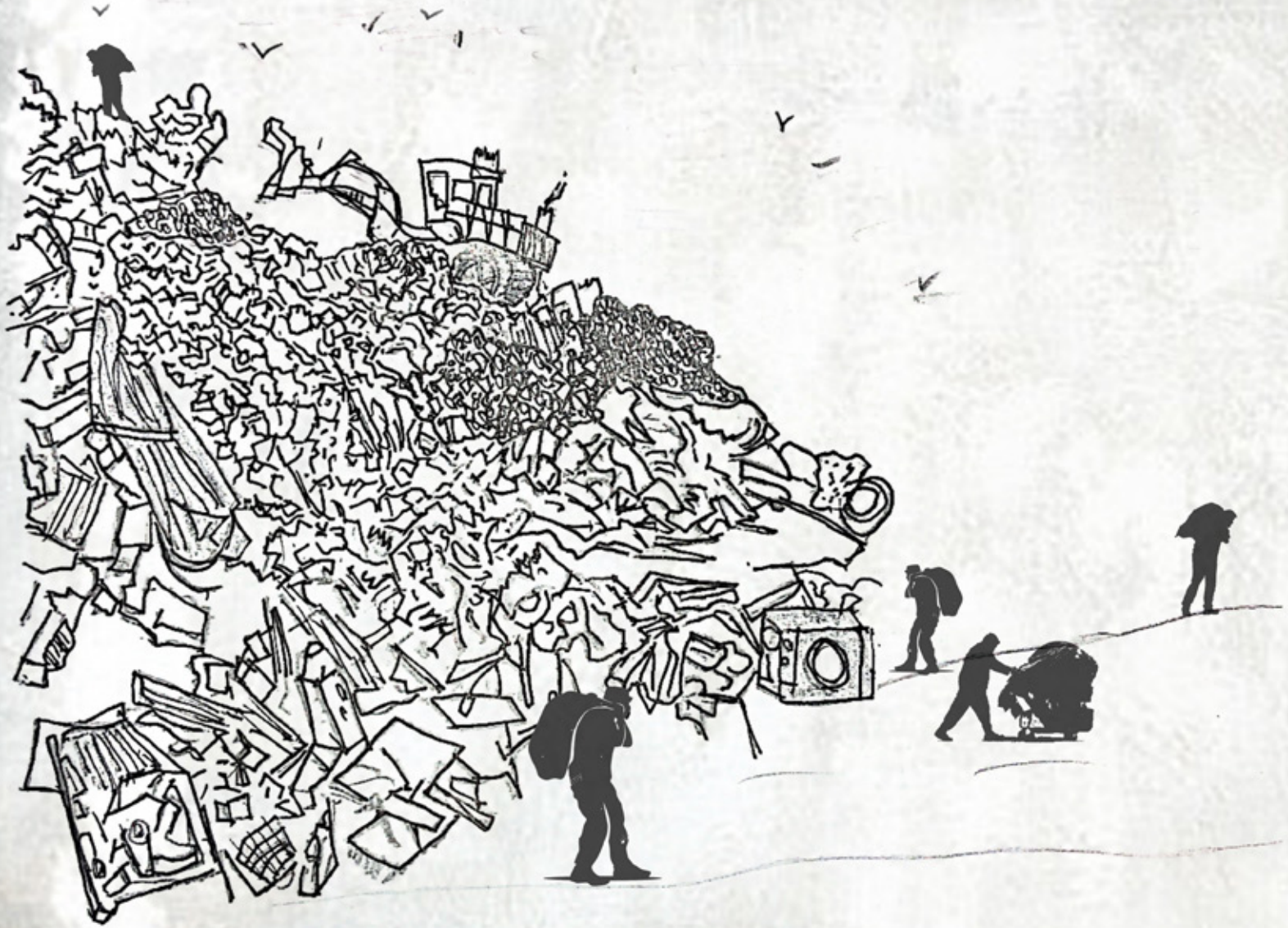
It is proven that the proposed interventions meet the set design principles: Sustainability [environment, livelihoods, culture and heritage], Safety and Comfort [tolerable working environment, promotes movement and provison of basic facilities], Multi-functionality [utility landscape, economic hub, public open space] and Accessibility [thoroughfares connects communities].

To conclude the design exploration and technical investigation, the author proposed that existing and readily available waste material should be incorporated back into the construction of the proposed design interventions. However, it is acknowledged that the scale and magnitude of this kind of project will require a lot more than the readily available materials in terms of time to collect, and an undeniable fact that most of these materials are the main source of income for the main characters of this study.

The proposed interventions can be achieved successfully if the site users realize that the main objective of these activities is to improve the lived experiences on site. Incentives can be provided to boost the morale of the workmanship and as discussed in *Chapter 5*, the joining of forces can give rise to learning opportunities and sustainable livelihoods and Soshanguve landfill can truly be an inheritance.

Llefa Lame...

Chapter 12: References



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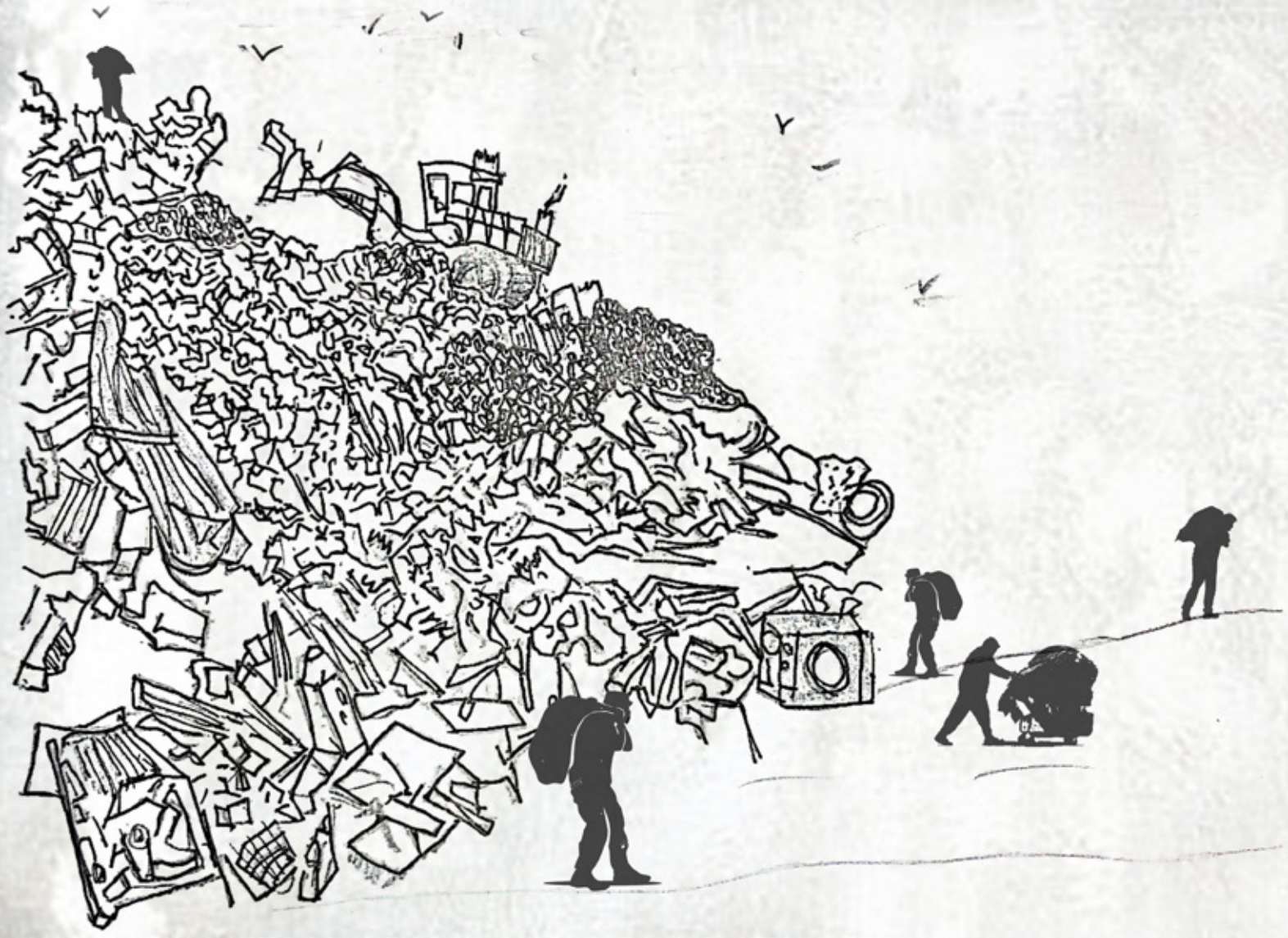
Chapter 13: Appendices



Appendix 1: Historical Timeline of Soshanguve

According to (Reimold, et. al., 1999) research, 220 000 years ago a meteorite hit the earth crust approximately 5 km away from the study area, a crater, currently known as Tswaing was formed. The researchers reckon that the impact was witnessed by early stone age people who periodically inhabited the land 500 00 years ago. Constant visits to the land only began 150 000 years ago, during the middle stone age era. A few stone artefacts were discovered at the crater which were brought by the ancestors of the Bushmen who settled on the land 30 000 to 2000 years ago.

One thousand seven hundred and fifty (1750) years ago, the first farmers to use iron implements inhabited the land. Shards from decorated clay pots were discovered at the crater floor which depicts that Sotho people or Tswana were present during the iron age era also remains of a few stone walls and broken grindstones were observed. Due to drought, famine and competition of resources; political groupings, growth of militarism and emergence of dominant kingdoms stemmed, one of these were Matebele empire.

Colonial settlers, Voortrekkers who are white farmers who relocated from the province of the Western Cape occupied the land soon after the departure of the Matebele in the early 1830's. In the 1890's the farmers divided the land into huge farms and the crater was the nucleus of that settlement pattern, and it was aptly named "Zoutpan" which means Salt pan in Dutch. The crater became the main source of natural salt for the region of Pretoria which was established in 1855 as the capital city of the Transvaal Boer Republic. The saltpan was declared state property in 1875 because of its economic value.

1948 marks the year of the beginning of Apartheid in South Africa. Despite the fact that South Africa was an already divided country, apartheid laws were introduced to reinforce constitutionally the segregation of the non-white populations of South Africa from the white minority as a means of upholding the political, economic and social supremacy of White South Africa (SAHO, 2011). In the 1955, Professor Tomlinson was appointed as a government advisor on how apartheid should be employed and he advised that the black populations should be divided and settle according to their ethnicity in homeland (SAHO, 2011). He further suggested that the state should invest in farming and setting up factories in homeland outskirts to provide adequate employment for blacks while removing them from "White towns". He failed to realize the rate at which white factories would grow and attract more black populations back in "White towns". The then ruling government refused to invest on farming in "White towns" reserves and the outcomes left many non-white people living in dire conditions at the villages and those living in the cities were continually harassed by the strict laws of separation.

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If Student	**Your Degree: e.g., MSc, PhD, etc.**	MASTER of LANDSCAPE ARCHITECTURE (MLA)
	Credit Value of Research: e.g., 60/120/180/360 etc.	120
	Name of Supervisor (if supervised):	DR. CHRISTINE PRICE
If this is a researchcontract, indicate the source of funding/sponsorship		National Dept. Public Works
Project Title		Life a Laine: Re-imagining Soshanguve Landfill

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