

Sacred Landscapes Under Siege

“Resolving disputes over mining claims on sacred landscapes in Musina through the legal lens of a Land Court”



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M.Arch (Prof) Research Report
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Declaration

I, Mokgadi Mamabolo, enrolled as a student in the Master of Architecture (Professional) degree in the year 2025, attest that the content in this dissertation is entirely produced by me, and all external research information has been referenced accordingly in Havard Style referencing. I am fully dedicated to producing the highest standard of academic honesty and pledge to refrain from plagiarism or using any Ai generators in all phases of my research. I am aware that any violation of this declaration may result in disciplinary by the University of the Witwatersrand.

Signature : 

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Abstract

The proposed site for this dissertation is situated in Musina in the Vhembe District, close to the Limpopo River, which forms the border between South Africa and Zimbabwe. This area is well-known for its varied topography, which includes bushveld and savannah, as well as important natural and cultural landmarks like the esteemed Mapungubwe National Park. Historically, Musina has been successful in trade, farming, and mining which have served as the main pillars of the economy. The town is well-known for having an abundance of mineral resources, including copper, iron ore, and coal, which have made investments and created jobs that have greatly boosted the local economy.

The Save Mapungubwe Coalition has been having concerns about “the possible dangerous precedent set by the lack of clarity of the offset created by this agreement. The offset agreement is an important tool for ensuring that (Coal of Africa) CoAL restores all of the ecosystems that have been depleted as a result of their mining activities” (Melissa, 2014). They emphasise the danger mining operations have on archaeological sites and the ecological balance of the Vhembe Region.

This dissertation aims to unpack the historical dimensions of eco-centric architecture, particularly focusing on the nuanced relationship between indigenous African mining practices and the surrounding landscapes. It seeks to shed light on the intricate balance between culture, spirituality, heritage, and the extractive mining industry. By examining the temporality of mining and the transient nature of the miner’s experience by looking at lungs as the metaphor of the temporality of breathing. Through a critical analysis of guiding principles employed in eco-centric architecture, this dissertation aims to explore the potential significance of

what a building means in a landscape where biodiversity, culture, spirituality, heritage, and mining coexist.

This dissertation will address post-mining landscapes through land reparation and restitution, the idea of Land Reparation and Restitution in this dissertation aims to extend beyond environmental rewilding, restoration by studying the legal framework of mining in South Africa and integrating social justice, heritage, and ecological sustainability strategies. The historian Pulido states: “Not merely about returning land to those who were displaced but also about restoring the relationship between people and the land that sustains them” (Pulido, 2018).

The land court symbolizes transformation, reconciliation and justice for the environment, biodiversity, and human life. In the context of Musina, this thesis will explore ways of reparation can be conceptualised and executed given the interconnectedness histories of mining, colonization, and indigenous land use in Musina. The land Court will not only solve mining issues in Musina, but it will be advocating for land mining disputes around South Africa. It is influenced by concerns raised by the Save Mapungubwe Coalition regarding the proposed Industrial Park by the Special Economic Zone (SEZ),

South Africa’s landscapes are not only resourced but hold so much history, archaeological elements hence preserving these sacred landscape, historical mining site and indigenous knowledges are very important. Lynn Meskell explains that “Archives of cultural and spiritual heritage that reflect centuries of human-environment interaction” are important (Meskell, 2019). An area such as Musina, where we find a national archeological site, the Mapungubwe

Cultural landscape being approximately 7km from the Vele Colliery, has a coal mine is an indication a historical precedent that the coexistence of mining and scared site is not sustainable. “The Save Mapungubwe Coalition is made up of a diverse range of groups, with expertise in everything from conservation to water and even heritage resources.” (“Mapungubwe Watch - Wits University,” n.d.)

Ultimately, it aims to address questions regarding the role of the landscape in addressing the challenges left behind by coal mining and, in turn, how we can embark on the journey of healing the scars inflicted on these environments through ecologically sound restoration efforts, all while honouring the cultural heritage inherent in the site. Through the legal lens, how can we reimagine a land court that advocates for sacred landscapes, community including the mine workers’ lives?

KEYWORDS: Sacred Landscapes, Mining Disputes, Eco-centric Architecture, Land Court, Legal Frameworks, Ecological Restoration, Mining, Indigenous African Mining, Adjudication, Environmental justice, UNESCO, Landscape preservation, Spiritual heritage, Environmental conservation, Spatial Planning, Landscape sensitivity, Atmospheric violence, Disrupted Landscapes, Land Restitution, Lekgotla/khoro, Lerole,

Research Questions

1. Through the legal lens, how can we reimagine a land court that advocates for sacred landscapes, community including the mine workers' lives?
2. What are the existing legal precedents and frameworks that can be used to inform a land court to advocate for scared environments and inhabitants.
3. How can the Land Court be designed using sustainable strategies from indigenous eco-centric architecture to promote inclusive spaces for stakeholder, the indigenous community and the mine worker while considering the cultural and spiritual significance of the landscape?
4. How can architecture mediate the legal, environmental, and societal requirements in post-mining landscape or in sites that are affected by mining?

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I would like to express my true appreciation to Hilton Judin, my supervisor, for his invaluable heading and back all through the advancement of this proposal. I am as well significantly thankful to Hannah le Roux and the Tu Delft Workforce of Building and the Built Environment for the opportunity to take portion in the WEF POST LONGUE DUREE course in the Netherlands, which basically upgraded my research.

My true appreciation goes to my family and companions for their loyal reinforce and back all through this travel. Mother, thank you for all the penances you have made and the perpetual support. To my late father, thank you for ingrains in me the drive to seek after educational greatness. Too, I am thankful to SVA International for their generous financial related help, which enabled me to seek after my insightful endeavours. Your support has been instrumental and vital in finishing this breakthrough.

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REPORT PART 1



00 INTRODUCTION

Figure 1: Photograph by Chase the photographer (Mr N Mudau) during my site visit in Musina, 13 July 2024.

Introduction

The Vhembe District is a region rich in natural beauty, cultural history, and economic promise. It is situated in the northernmost part of the Limpopo Province of South Africa, it borders the districts of Capricorn and Mopani to the east and west, respectively. The district consists of the following four local municipalities, Collins Chabane, which was just formed, Thulamela, Makhado, and Musina.

This paper examines the historical aspects of eco-centric architecture in this setting, with a particular emphasis on the interaction between native African mining techniques and the surrounding environments. This study intends to emphasize the significance of sustainable practices that respect the region’s legacy while fostering ecological restoration, land restitution by looking at the cultural, spiritual, and environmental effects of mining in Vhembe.

The Vhembe District is well-known for its varied terrain, which includes savannah, bushveld, and important sites like the Mapungubwe National Park. The ruins of an old civilization, renowned for its complex social structures and trading networks, may be seen in this park, which is recognized as a UNESCO World Heritage Site. This civilization thrived from the ninth to the fourteenth century.

The Vhembe District has long served as a centre for mining and agriculture. Sustainable mining and farming were common practices among the indigenous populations in the region even before European settlers arrived. They ensured a balance between resource usage and environmental preservation through these

activities, which were strongly tied to their cultural and spiritual beliefs.

Rich mineral deposits, including as coal, iron ore, and copper, were discovered, and this led to tremendous economic growth in the area. With its ability to generate employment and draw in capital, mining rose to prominence in the community’s economy. But this also brought about cultural and environmental upheavals, especially when large-scale mining activities were built during the colonial and apartheid periods.



Figure 3: Map of South Africa. Vhembe District Municipality [WWW Document], n.d. URL <https://www.wikidata.org/wiki/Q2305610> (accessed 9.6.24).



Figure 2: The Vhembe District. Vhembe District Municipality - Map [WWW Document], n.d. URL <https://municipalities.co.za/map/129/vhembe-district-municipality> (accessed 9.6.24).

Theoritical Framework

Eco-Centric Architecture

Eco-centric Architecture emphasises ecological sustainability and creating resilience within the ecosystem by utilizing design principles that minimize ecological impacts. It challenges the traditional architectural norms by incorporating natural elements into the design.

This dissertation aims to reimagine the post-mining landscape design in Musina by using eco-centric architecture principles. Incorporating materials of minimal ecological impact, such as those that are indigenous to the area, renewable, or recycled, as a design approach for sustainable building approaches. This dissertation will investigate the application of lightweight constructions that minimize disturbance to the landscape. In addition, buildings and natural ecosystems must coexist.

Architecture needs to be designed to complement the natural biodiversity and topography to preserve the indigenous flora and fauna. Healing the damaged landscape will also be aided by the establishment of experimental phytoremediation sites, which use plants to absorb and neutralize toxins.

Janine Benyus, Biomimicry: Innovation Inspired by Nature

In the book Biomimicry: Innovation inspired by Nature, the author Janine Benyus highlights the concept of “Nature as Model” which looks at encouraging usings living organisms and natural processesas models for

human conflicts in architecture.According to his theory, during the evolution of the ecosystem, nature is able to develop and become resilient by challenging issues that can be employed to current design challenges.

As a theoretical framework “Nature as Model” has an impotance in my concept and my selected site. The design concept of “Lekgotla” will mimic the natural processes and using ecological principles to ensure that there is harmony or a balance with the indigenous landscape



Figure 4: Architecture as Collaboration Between Human and Non-Human Species | ArchDaily [WWW Document], n.d. URL <https://www.archdaily.com/994659/architecture-as-collabo-ration-between-human-and-non-human-species> (accessed 9.6.24).

Indigenous Knowledge Systems

The dissertation examines indigenous African mining techniques as a guide for sustainable land use, rehabilitation and reparation approaches. The indigenous concept of time allows for natural healing times. It will guide to the development of ecologically rehabilitating design interventions by investigating the temporality of extractive activities and the required fallow periods for land rehabilitation.

Furthermore, these practices must be integrated into the society and spirituality. Considering the land’s spiritual significance to the individuals or the affected communities, the dissertation will include places designated for ceremonies and rituals to honour these traditions. The Lekgotla will serve as a space for community meetings where disputes over land and other issues may be discussed.

Carl Sauer, The Morphology of Landscape

“Cultural Landscape” as a theory in Carl Sauer’s The Morphology of landscape book, he explains the interaction between daily human activities and the natural environment in creating a distinctive landscape. This theory views extractive industries as a crucial component of cultural landscape.

Indigenous methods demonstrate a profound understanding of how human activities both influence and are influenced by ecological processes. These methods include natural healing periods and spiritual issues. In my dissertation I aim to recognize and

restore the spiritual and cultural linkages that bind communities to their landscapes by incorporating these practices into current land restoration initiatives

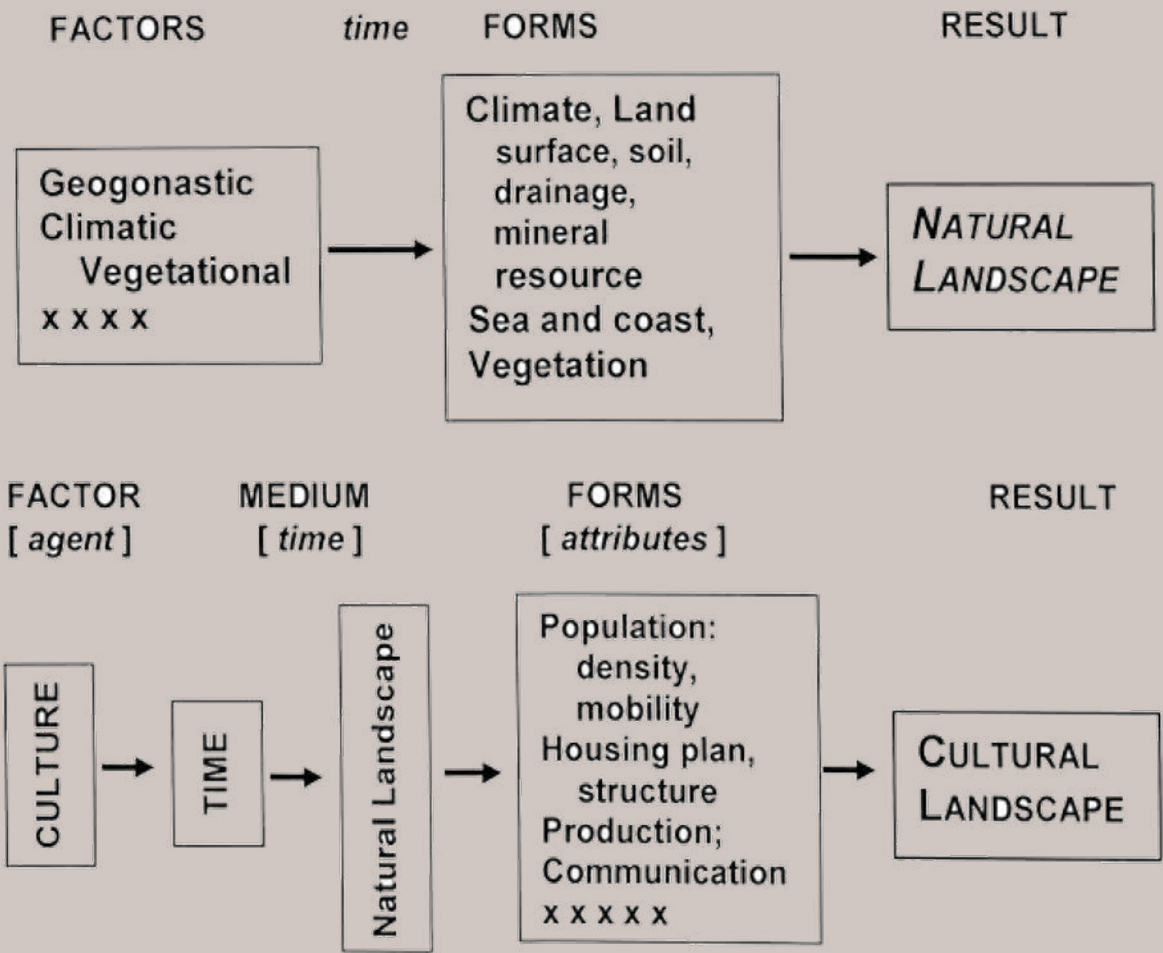


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Radical Indigenism

In *Radical Indigenism*, *Julia Watson* provides an overview of radical indigenism and emphasizes the importance of reclaiming indigenous identities, territories, and sovereignty. It suggests that land and knowledge systems be decolonized, with a focus on indigenous perspectives that are essential to social justice and the environment. She looks at “restoring Indigenous Sovereignty and Identity” as a concept in her book which focuses on empowering indigenous communities.

The principles of radical indigenism add a significant insight to my study, particularly given the framing of the debate over land reparations and land rehabilitation. Watson’s emphasis on restoring indigenous land and sovereignty provides a solid framework for advocating for land restitution in Musina. In this context of post-mining reparation initiatives, the dissertation will explore strategies that preserve and restore traditional land-use knowledge and practices. Giving land back to indigenous peoples is not the only step towards repairing the cultural and spiritual relationships to the land that mining activities have damaged.



Figure 6: Radical Indigenism principles in architecture that will be intergrated into Land Reparations and Rehabilitation Efforts in Post-Mining Landscapes. Wilson, E.-K., 2020. Book review: Lo-TEK: Design by Radical Indigenism. A Rich Life. URL <https://arichlife.com.au/book-review-lo-tek-design-by-radical-indigenism/> (accessed 9.5.24).

Temporal and Transient Landscapes

Through emphasizing the temporary states and processes that affect landscapes, the idea of temporal and transient landscapes explores how dynamic and the evolution of landscapes. Understanding the effects of mining is extremely important since it often results in temporary but severe changes to the environment.

The lung is used as a metaphor to examine the temporality of mining and how it affects ecosystems and human health. Part of the temporal assessment of mining activities involves studying the historical period of mining in Musina, including the successes and failures of mining operations and their long-term effects on the environment and public health.

Design for transience, or designing architectural and landscape interventions that recognize and accommodate the transient nature of post-mining landscapes. After all legal disputes over mining disputes have been resolved, the design seeks to investigate buildings that can be adapted or repurposed as the landscape evolves and heals.

In The Web of Life: A New Scientific Understanding of Biological systems, Fritjof Capra introduces the idea of “network dynamics,” which emphasizes the interconnected and interdependent nature of biological processes. Capra argues that networks of relationships and interactions lead to the continuous evolution of social and ecological systems as opposed to their stagnation. This theory highlights the significance of understanding the complex web of connections

required for life and how disturbances might impact the system.



Figure 7: Explores the intersection of transient landscapes and architectural solutions that adapt to environmental changes. Temporary Architecture: Innovation, Testing-Ground and Entertainment [WWW Document], 2021. . ArchDaily. URL <https://www.archdaily.com/967601/temporary-architecture-innovation-testing-ground-and-entertainment> (accessed 9.5.24).

Cai Guo-Qiang's 'The Transient Landscape' and the Terracotta Warriors at the National Gallery of Victoria | The Monthly [WWW Document], n.d. URL <https://www.themonthly.com.au/issue/2019/july/1561989600/miriam-cosic/cai-guo-qiang-s-transient-landscape-and-terracotta-warriors#mtr> (accessed 9.5.24).

The Lekgotla/Khoro-African Ruins and Homesteads

“The Lekgotla/Khoro is a traditional space for dialogue and decision-making, crucial for fostering community cohesion and justice.” Andrew Spiegel, *African Court and Informal Justice Systems* (2001).

Spiegel argues the case that formal courts and informal courts should work collaboratively to create a more inclusive and effective legal system. He emphasizes that informal systems enable a chance to settle conflicts in a way that is both socially and culturally acceptable, while formal systems are crucial for preserving laws and defending legal rights.

The Lekgotla/ Khoro, a traditional South African communal meeting place, will be redesigned as a central space of the post-mining landscape for open court spaces that is also an experiment to phytoremediation strategies.

In addition to serving as a venue for the Land Court to adjudicate mining disputes and promote environmental justice, the Lekgotla will also function as a community gathering place, host educational programs on sustainable practices. Ultimately, it will incorporate experimental phytoremediation and other restoration strategies to rehabilitate the landscape and provide a working model of sustainable design.



Figure 8: The ideas outlined in Lekgotla provide insightful guidance for modern leadership and government. Modern democratic ideals and practices are in line with the emphasis on reaching consensus, showing respect for others' experiences, and encouraging inclusive involvement. Facebook [WWW Document], n.d. URL https://web.facebook.com/photo.php?fbid=1660303674197730&id=1651840708377360&set=a.1652466464981451&_rdc=1&_rdr (accessed 9.5.24).

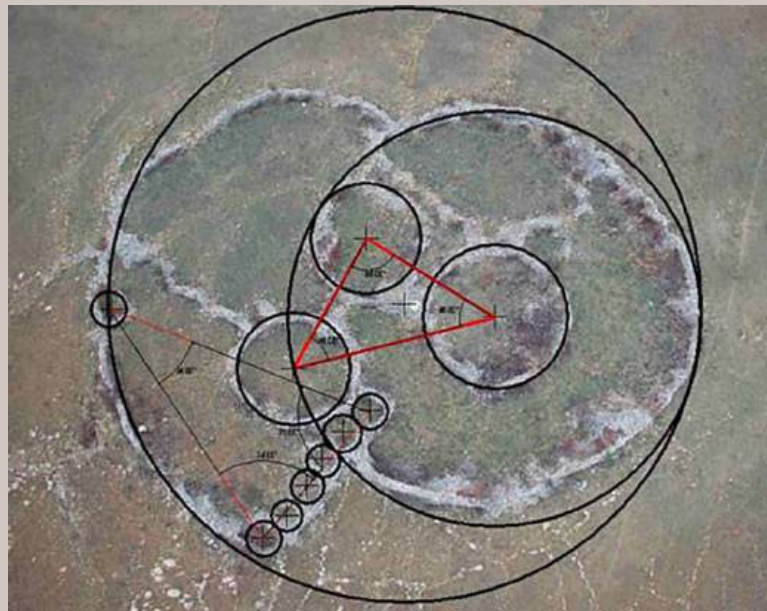


Figure 9: The circular constructions and complex patterns of the Blaauboschkraal Stone Ruins serve both practical and symbolic purposes. The circular pattern stands for concepts connected to group decision-making and dispute resolution, such as inclusion, togetherness, and the cyclical aspect of existence. utilizing the architectural ideas derived from these remains to create the lekgotla and Land Court. History, T.A., 2021. Adam's Calendar: Oldest man-made structure created by Africans 75,000 years ago. The African History. URL <https://theafricanhistory.com/2180> (accessed 9.5.24).

Part 1 - Outline

Part 1 of this dissertation will examine the different way that mining activities has affected sacred landscapes, and the existing biodiversity. It will highlight the significance of temporality as a point of view to having a broader understanding of the consequence that mining has been to the environment and human health.

The momentary character of the miners' experience will explore by drawing on the metaphor of the lungs, which constitutes the temporality of breathing due to mine toxins and the temporality of mining operations yet leaving a scar that an everlasting scar on the landscape and the body. The paper provides design strategies aiming at minimizing the negative effects of mining by employing information obtained from architectural theory.

The exposed landscape serves as a catastrophic reminder of the unresolved legal issues of toxic mining land claims, but instead of centring solely on reclamation, it encourages for a legal system that centres on restitution and reparation of land. Beyond the contrary, the dissertation investigates eco-centric methods for restoring disturbed landscapes and fostering healing.

In **Chapter 1**, we look at indigenous rights and the landscape. "This matter ultimately concerns the rights of Indigenous peoples," ruled High Court Judge Patricia Goliath. Economic benefits, she argued, "can never override the fundamental rights of First Nations Peoples." ("How Indigenous Land Rights Halted Amazon's South Africa HQ," n.d.)

Indigenous Land Rights and Mining in South Africa, this chapter reveals the relationship between mining, social justice, indigenous land rights. It will give case studies on land claims and disputes around mining, as well as strategies to legal sustainable developments and healing the landscape. Through a study of several land claim precedents, develop strategies that are inclusive to ensure indigenous people have rights and dignity.

In **Chapter 2**, the concept of 'temporality' provides us with an understanding of the impacts mining have to the landscape, through the temporal lens it allows us better to understand the temporary nature of human manipulations on the environment the interconnectedness between the previous legacies, the present and the future trajectories. The importance of implementing comprehensive strategies for mining governance that put sustainability, equality, and intergenerational justice first is highlighted by this complex understanding.

In addition, the metaphoric use of the lungs portrays the idea of breathing as representation of the cycle of life and connectivity. Mining industries provide a broad link between human society and nature, just as breathing binds a person to their surroundings. The delicate balance of interconnection can be upset by mining-induced disruptions, which, unlike the normal rhythm of breathing, can cause irreversible changes to cultural landscapes and ecosystems and the condition of the lung. The lung's damage can not be reversible unlike the earth, it is able to transform itself.

Chapter 3, Analyses Disrupted Landscapes by looking at photographer and artist, Edward Burtynsky damaged landscape and some other African landscape artists' work to understand the visible effect that mining has on the environment and the socioeconomic instability that is evident in these damaged landscapes.

The scars inflicted by mining serves as a physical reminder to the human civilization and the environment throughout their existence and post-existence. This is seen by observing the changed topographies, deforested areas, contaminated waterbodies, formation of slime dams and the relocation of native communities.

Utilize strategies of theoretical frameworks of mining interfaces, green landscape panoramas, colours of atmospheric violence to restore these damaged landscapes while considering socio-cultural and ecological elements. Explore the Case studies such as 'Old Habits Die Hard: Indigenous Land Rights and Mining in Australia' where mining disregards sacred sites and undermines the rights of the native spirituality of the community as well as deteriorates the sense of place and identity of the indigenous communities.

Chapter 4, The aim of Critical Regionalism is to mitigate the homogenizing impact of globalism by highlighting regional customs and circumstances while respecting and reflecting on the unique cultural and natural context of a place. It is consistent with the investigation of the consequences of mining on sacred sites and the consequent need for architectural interventions that consider these effects' temporal aspects.

Critical regionalism emphasizes how crucial it is to oppose prevailing philosophies and power structures.

Contrary to the extractive logic that puts immediate profit ahead of prospective social and environmental well-being is necessary to achieve this. This can help amplify forgotten voices and promote socio-political change by advocating for land restitution and reparations and by foregrounding the scars left by mining operations via their architectural interventions.

Chapter 5, Phenomenology provides a useful framework for tackling the intricate effects that mining has on communities and environments. Mining-affected areas can be healed and restored by emphasizing the lived experience of space, sensory interaction, and the creation of meaningful places. Phenomenological methods present viable avenues for facilitating sustainable development, preserving cultural heritage, and reestablishing human connection with the environment.

Chapter 6, 'Post Colonial Architecture' A crucial theoretical framework for tackling colonialism's effects on the built environment. This method, which is based on post-colonial theory, prioritizes indigenous knowledge, cultural identity, and spatial justice in order to challenge colonial power structures and decolonize architectural practice.

Post-colonial architecture facilitates the reclamation and reinvention of landscapes as sites of resistance, remembrance, and healing within the framework of land reparation and restitution.

Methodology

With a focus on eco-centric architecture, legal frameworks, and land reparation, this dissertation takes an interdisciplinary and multidisciplinary approach to investigate the interaction between indigenous African mining activities and the surrounding environments. It uses both quantitative and qualitative research methods to provide an extensive understanding of the post-mining landscape in Musina, South Africa.

The research’s design is carried out through multiple stages, each of which is carefully designed to answer certain research questions and objectives.

1. Theoretical Framework Development:

This phase of my dissertation involves reviewing relevant literature on Indigenous mining practices, eco-centric architecture, Land reparation, and legal frameworks that will play a role in my design development and final design proposal. Theories from authors such as Janine Benyus, Carl Sauer, Linda Tuhiwai and Julia Watson provide the theoretical underpinning of my dissertation. They facilitate frameworks of biomimicry, indigenous knowledge systems and dynamics system into my research.

2. Fieldwork and Case Studies:#

Fieldwork was conducted in Musina during site visits, mainly focusing it on the old Copper Mine in the Messina Fault Belt. This phase of research involves site visits, observation and taking site photographs of relevant information that is of importance to my study as part of site analysis. This will help in comparing the past state of the landscape and the current state to emphasise on the impacts of mining activities. Additionally, case

study analyze is of value to the theoretical research and design concept to draw comparisons and utilize some of the principles.

3. Qualitative Data Collection:

Online and in person interviews are conducted with different stakeholders, including the local affected community, environmental activists, Legal experts and former mine workers. This is to gather as much information as possible to understand the community that you are designing for and understanding their oral histories, narratives and understanding the importance of the potential for land reparation, different perspectives on the impacts of mining, the scientific aspects of post mining landscapes.

4. Data Analysis and Synthesis:

This phase involves collecting data from qualitative and quantitative source online and analysing using GIS mapping to understand the spatial distribution of environmental impacts and the potential intervention site.

5. Design Development and Prototyping:

Based on the information collected from the previous data collection methods, design a detailed proposal for the Musina post mining site by drawing out sustainable techniques/principles or legal laws to ensure that the design is functional, environmentally sensitive and is inclusive to the affected community.

Reclamation *Planetary Justice*

Cultural landscapes *Eco-centric Design* *Atmospheric violence*

Environmental Justice *Restitution*

Anthropocene *Green landscape panoramas*

Lekgotla *Phenomenology* *Sacred Landscapes*

De-colonization *Reparation*

Metaphor of the lungs *Transient Landscapes*

Indigenous land rights

Restoration ecology *Land Reforms*

Post Colonialism *Biodiversity* *Temporality*

Spatial justice *Phytoremediation*

Critical Regionalism

Damaged Landscapes

PART 1:
DEFINITIONS

01 INDIGENOUS LAND RIGHTS AND MINING IN SOUTH AFRICA



Figure 10: Musina’s Trade And Growth. Musina Mall, Old Copper Mine
About Musina Municipality, n.d. . Musina Local Municipality. URL <https://musina.gov.za/about-musina-municipality/> (accessed 9.4.24).

Musina

The northernmost district of South Africa’s Limpopo Province, Vhembe District, is significant historically, biologically, and culturally. The district known for its rich tapestry of cultural heritage, resilience, and economic transformation composes local municipalities, Makhado, Musina, Thulamela and Collins Chabane. The study area Musina, is close to the Zimbabwean border, has a long and illustrious mining history is influenced by the N1 road, and the proximity to Beitbridge. Discoveries made in the Vhembe District indicate to the existence of Stone Age and Iron Age civilizations during its early history.

The N1 road, a vital transportation route that passes through Musina and leads to Beitbridge, is crucial to the region’s commercial operations. The largest border crossing between South Africa and Zimbabwe, Beitbridge, is a significant point for migration and cross-border trade. Musina’s strategic significance as an industrial junction is enhanced by its proximity to an international border.

Bantu-speaking communities eventually joined the San people who had originally occupied the area. These people developed intricate communities that included iron smelting, hunting, and agriculture. The Kingdom of Mapungubwe, which existed during the 11th and 13th centuries, was one of the most prominent pre-colonial states in the area. Considered to be the earliest advanced state in southern Africa,

Mapungubwe was situated close to the confluence of the Limpopo and Shashe rivers. It was characterized by a hierarchical social structure and extensive trade

networks that extended to China and India (Huffman, 2009). “It is simply not possible to explain the evolution of social complexity in the Mapungubwe landscape without reference to the international trade.” (Huffman, 2009).

The Mapungubwe Archaeological provides a significant information on the early evolution of socio-political structures. According to Huffman (2009), the social stratification that exists in Mapungubwe where the common people live below the aristocratic class on the hill reflects the early state institutions that were formed in southern Africa which also served as centre point for trading networks of gold artifacts, ceramic and other trade commodities.

In the 19th-century, the arrival of European settlers was a major turning point for the Vhembe district. During the Great Trek, Dutch-speaking settlers known as Voortrekkers travelled north in search of new places to settle. Numerous clashes between native communities and settlers occurred during this time. The battle between the Boer settlers and the Venda people, under the leadership of King Makhado, was one of the most prominent battles. King Makhado protected his peoples’ territory and sovereignty by resisting Boer incursion.

Missionary initiatives were also established in the area during the colonial era. Missionaries served a dual purpose to promote Christianity and Western education while frequently undermining indigenous practices and ancient civilizations. Van Warmelo (1940) claims that the missionary endeavours led to a

great deal of cultural change, including the adoption of new educational and spiritual customs however, they still managed to separate the existing Venda social structure and practices.

Similar to most regions of South Africa, Vhembe District experienced extreme social and economic upheavals during the apartheid era. Forced removals and the establishment of homelands were the results of the segregation and land dispossession policies of the apartheid regime. It was incorporated into the Venda Bantustan, an autonomous region created to act as the Venda people’s homeland.

The region experienced underdevelopment and economic marginalization because of this policy. The Act specified eight national units or ‘Bantustans’ with a form of government built on the basis of the Bantu Authorities system.” While the fantasy of economic self-sufficiency for the reserves faded, the dream that the Bantustans could provide an effective alternative arena for Africans’ political and social aspirations grew ever more vivid as the ‘decade of defiance’ drew to a close. (Delius, 1996)

A new chapter began in 1994 with the end of apartheid and they implemented objectives of the post-apartheid government to advance economic growth and address past injustices. There have been initiatives to enhance the region’s healthcare, education, and infrastructure. Delius argues that these programs attempted to confront the legacy of apartheid and incorporate Vhembe into the larger South African economy.



Figure 11: Musina Boabab Trees
Musina - Google Search [WWW Document], n.d. URL https://www.google.com/search?q=Musina&oq=Musina&gs_lcrp=EgZjaHJvbWUyBggAEEUYOTIPCAEQABgKGLEdGIAEGloFMgcIAhAuGIAEMgcIAxAGIAEMg0IBBAuGK8BGM-cBGIAEMgcIBRAAGIAEMhMIBhAuGK8BGMcBGIAEGJgFGJkFMgcIBxAuGIAEMgcICBAAGIAEMgcICRAAGIAE0gEJN-jQyNmowajE1qAIsAIB&sourceid=chrome&ie=UTF-8 (accessed 9.4.24).



Figure 12: Musina Nature Reserve
About Musina Municipality, n.d. . Musina Local Municipality. URL <https://musina.gov.za/about-musina-municipality/> (accessed 9.4.24).



Figure 13: Morning Sun Nature Reserve
About Musina Municipality, n.d. . Musina Local Municipality. URL <https://musina.gov.za/about-musina-municipality/> (accessed 9.4.24).



Figure 14: Maremani Mature Resere
About Musina Municipality, n.d. . Musina Local Municipality. URL <https://musina.gov.za/about-musina-municipality/> (accessed 9.4.24).



Figure 15: Limpopo River At Bietbridge
About Musina Municipality, n.d. . Musina Local Municipality. URL <https://musina.gov.za/about-musina-municipality/> (accessed 9.4.24).



Figure 16: Mapungubwe Cultural Landscape
About Musina Municipality, n.d. . Musina Local Municipality. URL <https://musina.gov.za/about-musina-municipality/> (accessed 9.4.24).



Figure 17: Mopane Bush Lodge Wildlife
About Musina Municipality, n.d. . Musina Local Municipality. URL <https://musina.gov.za/about-musina-municipality/> (accessed 9.4.24).

Figure 18: “Musina Twon and Mine 1978, when the mine and processing plant were active. Very early view of the Messina copper mine, in 1913.” [WWW Document], n.d. . mindat.org. URL <https://www.mindat.org/photo-822263.html> (accessed 9.4.24).



Musina Road Map

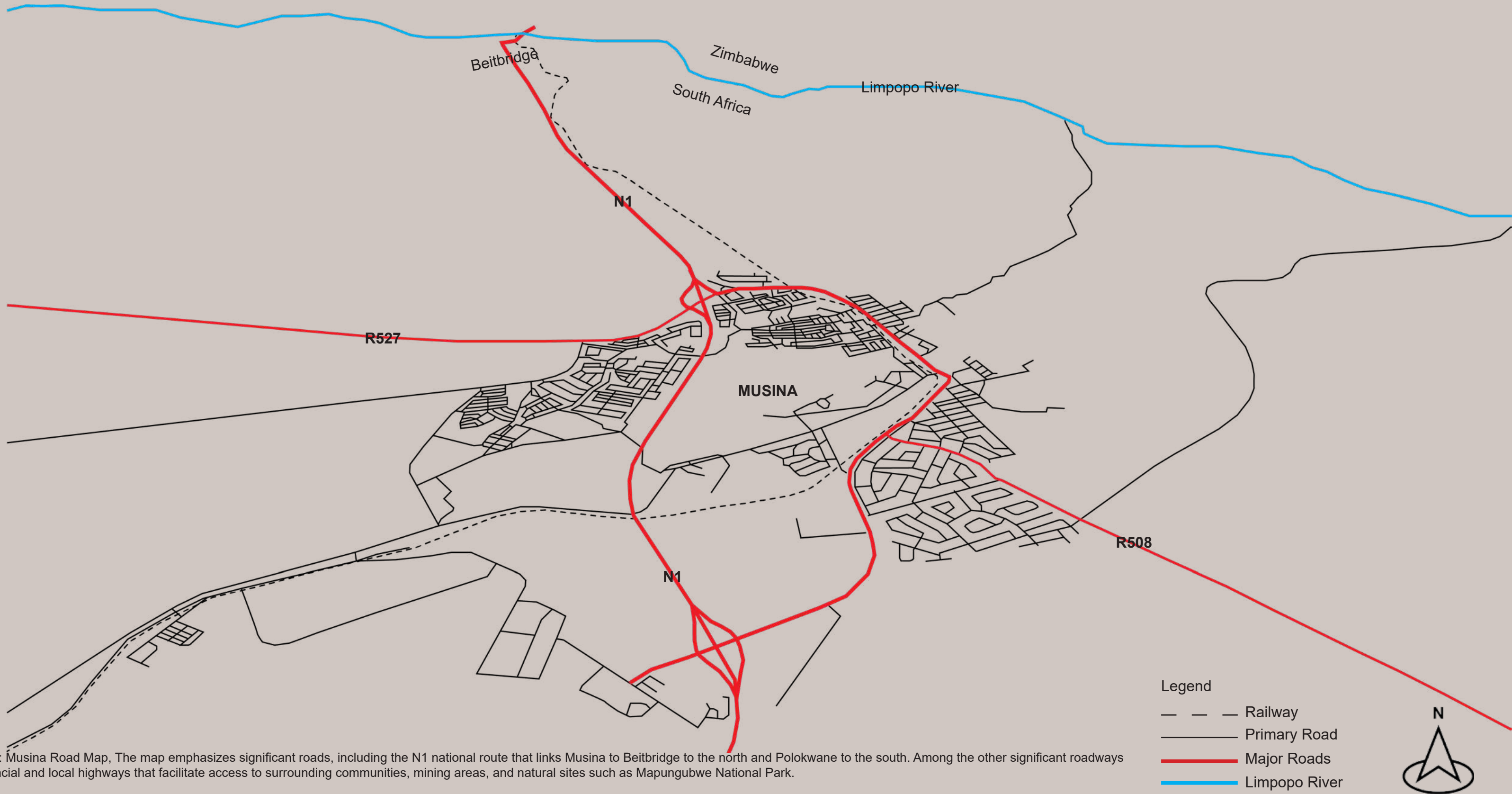


Figure 19: Musina Road Map, The map emphasizes significant roads, including the N1 national route that links Musina to Beitbridge to the north and Polokwane to the south. Among the other significant roadways are provincial and local highways that facilitate access to surrounding communities, mining areas, and natural sites such as Mapungubwe National Park.

Additionally, the road network is crucial to the region’s economic activities as it supports mining operations, tourism, and international trade. Musina’s past and present significance as an entry point for regional and global transit is evident in the layout of its infrastructure

Musina Spatial Development Map



Figure 20: Musina Spatial Development Map, The Musina Spatial Development Map emphasizes significant spatial interactions while showcasing the region’s infrastructure, economic areas, and land utilization. It emphasizes Musina’s mining areas and underscores the city’s role as a cross-border economic hub. The map illustrates the conflict between industrial expansion and environmental conservation, particularly in areas affected by mining, such as the Messina Fault Belt



Musina Green Space Map

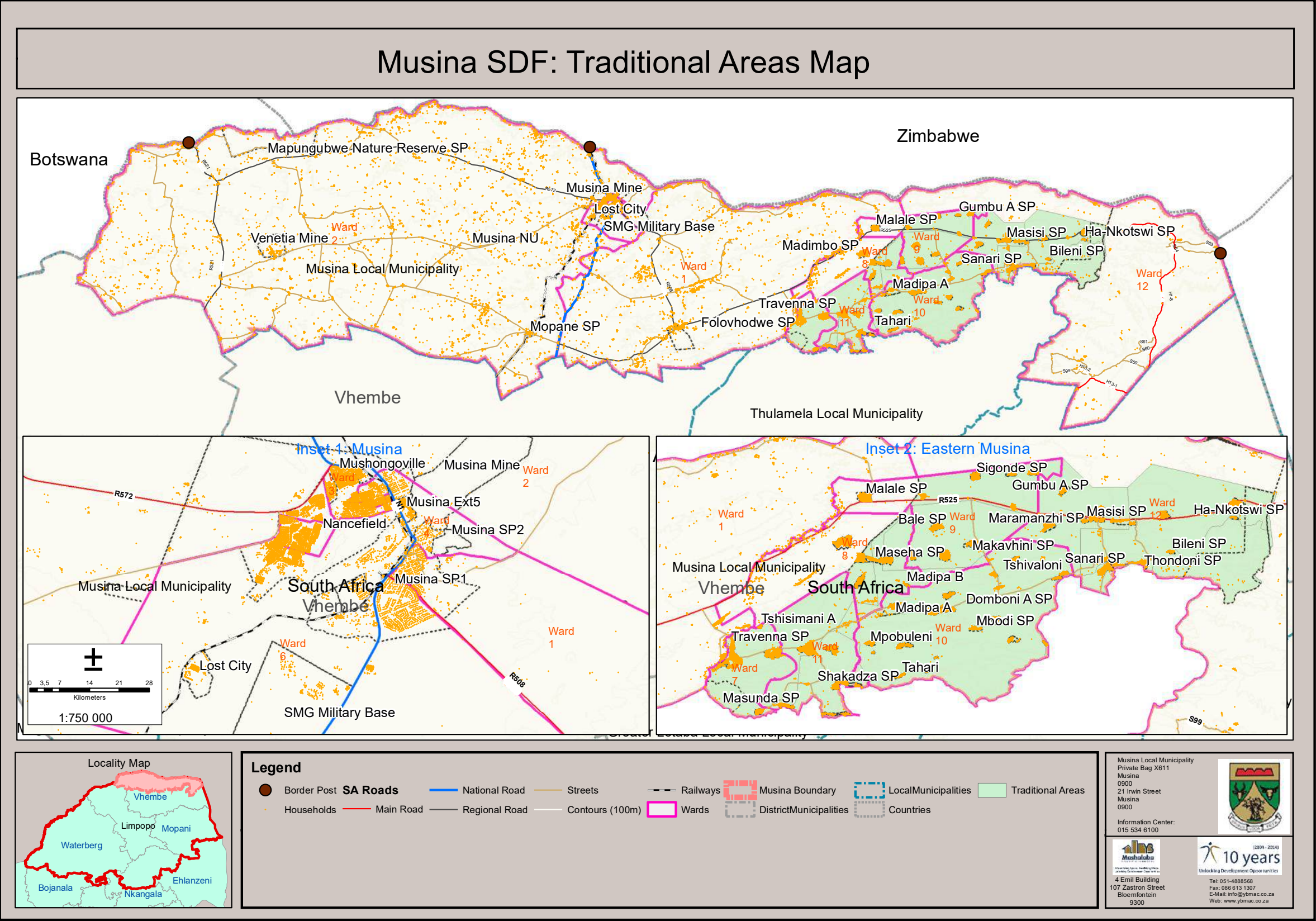
LEGEND

-  Recreational Spaces
-  Open Public Spaces
-  Buildings
-  Vegetation



Figure 21: Musina Green Space Map This map highlights key biological and environmental areas while displaying the size and position of green spaces,vegetation in Musina town. The town's parks and green areas, providing recreational options, ecological harmony. The map emphasizes significant parks, green areas, and natural environments that contribute to the conservation of biodiversity and climate resilience in the region. It also positions the town's spatial layout within the context of post-mining recovery efforts, emphasizing the importance of land restitution initiatives and sustainable urban planning.

“Stats SA (2011) and the Community Survey (2016) indicated that Musina LM comprised of 29555 households which grew to 43730 households. As illustrated above, the majority of households (29262) live in Houses or brick/concrete block structure, while 3976 households live in traditional areas and there are 3644 informal dwellings.” (“Musina Spatial Development Framework 2019.pdf,” 2024)



Map 17: Traditional Areas

Source: Limpopo SDF (2016)

Figure 22: Map showing traditional Areas in Musina. Musina Spatial Development Framework 2019.pdf, 2024. . Musina Local Municipality. URL <https://musina.gov.za/document/musina-spatial-development-framework-2019-pdf/> (accessed 9.5.24).



Figure 23: Musina Police Station. Photograph by Chase the photographer (Mr N Mudau) .



Figure 24: Old Musina Shopping Centre. Photograph by Chase the photographer (Mr N Mudau) .



Figure 25: Old Musina Shopping Centre. Photograph by Chase the photographer (Mr N Mudau) .



Figure 26: Old Musina Shopping Centre. Photograph by Chase the photographer (Mr N Mudau) .



Figure 27: Musina Hospital. Photograph by Chase the photographer (Mr N Mudau) .



Figure 28: The Venetia Diamond Mine Offices With the Musina Copper Mine shaft in the background. Photograph by Chase the photographer (Mr N Mudau) .



Figure 29: Acid Drainage along the river next to the mine. Photograph by Mokgadi Mamabolo .



Figure 30: The Railway. Photograph by Mokgadi Mamabolo .



Figure 31: Musina Hospital and the Church very close to the Copper Mine .Photograph by Mokgadi Mamabolo .



Figure 32: Street view next to the Musina Mall.Photograph by Mokgadi Mamabolo .



Figure 33: Street view next to the Musina Mall.Photograph by Mokgadi Mamabolo .



Figure 34: Street view leading to the Old Copper mine next to the Musina Hospital, Venetia Diamond Mine offices.Photograph by Mokgadi Mamabolo .



Figure 35: Musina Mall with the shaft in the background.Photograph by Mokgadi Mamabolo .



Figure 36: Street view next to the old mine house with Baobab Trees and the Shaft in the background.Photograph by Mokgadi Mamabolo .

Copper and Coal Mining

The history of mining in Musina extends back to the time when local indigenous people worked the copper mines. Southern African archaeological sites feature copper items made by the Musina people, who are recognized for their expertise in metalworking. These early mining operations established the framework for the town's subsequent development in the economy, claims Huffman (2009). The Musina people, who were proficient in metallurgy and mining when they first occupied the area, are the source of the town's name.

The discovery of substantial copper began in the early 20th century marking the beginning of Musina's modern mining history. The Musina Copper Mine was founded in 1903 and grew to be one of South Africa's biggest mining operations. Given the significance of the mine, workers from all over the nation came to Musina, creating an interesting and diversified town. Infrastructure construction such as roads, schools, railway infrastructure, and hospitals were constructed, to transform the town into a mining town.

Musina has been an important coal mining site in addition to copper. Over time, the coal resources in the area have drawn an increasing number of mining firms, strengthening the local economy. However, societal displacement and negative effects on the environment have also been brought about by coal mining. "Coal mining is by nature disturbing and destructive of the environment. Open cast mining removes large volumes of soil and rock overburden to get to the workable coal seams, and destroys regional aquifers (Munnik 2010).

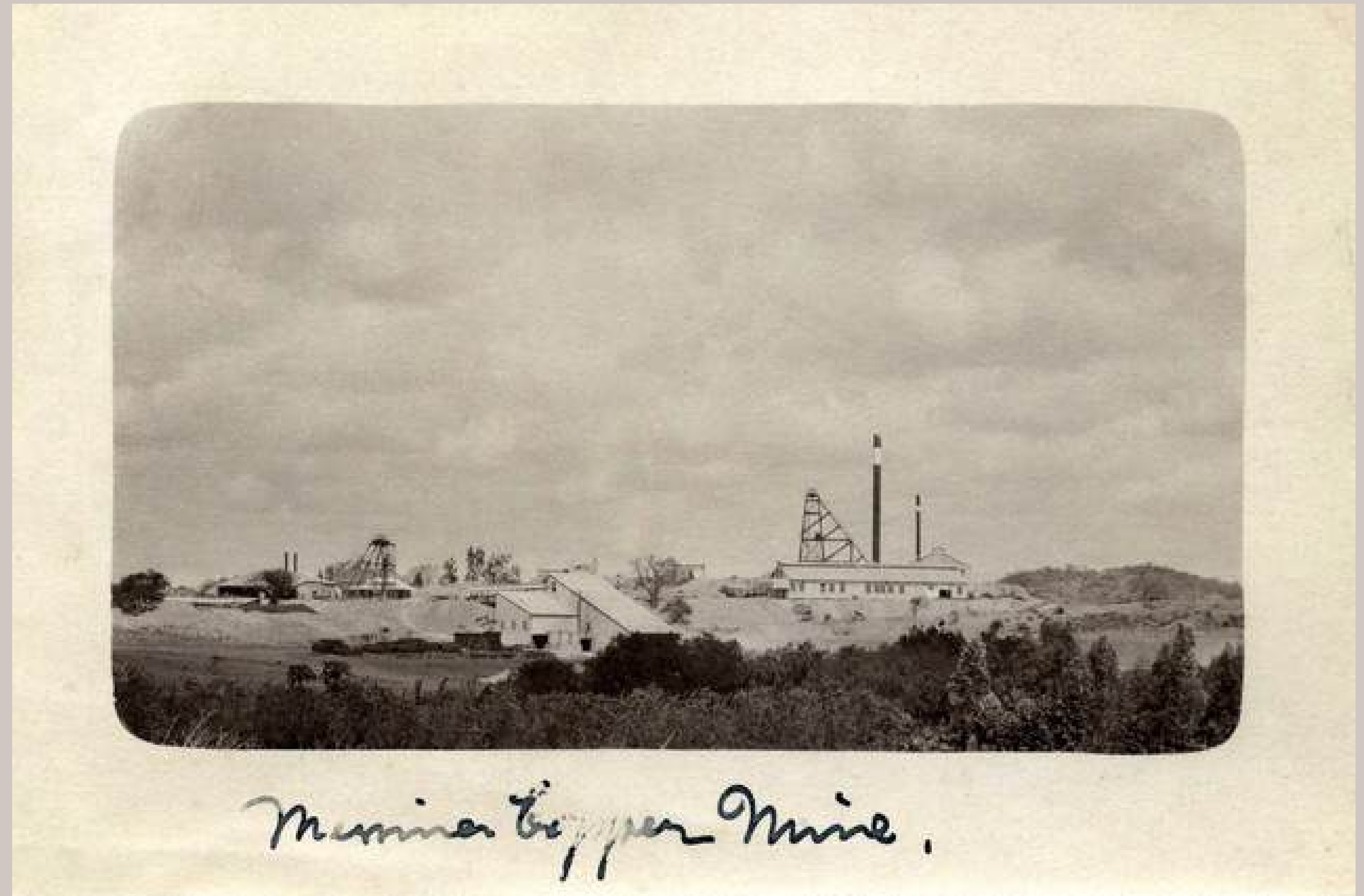
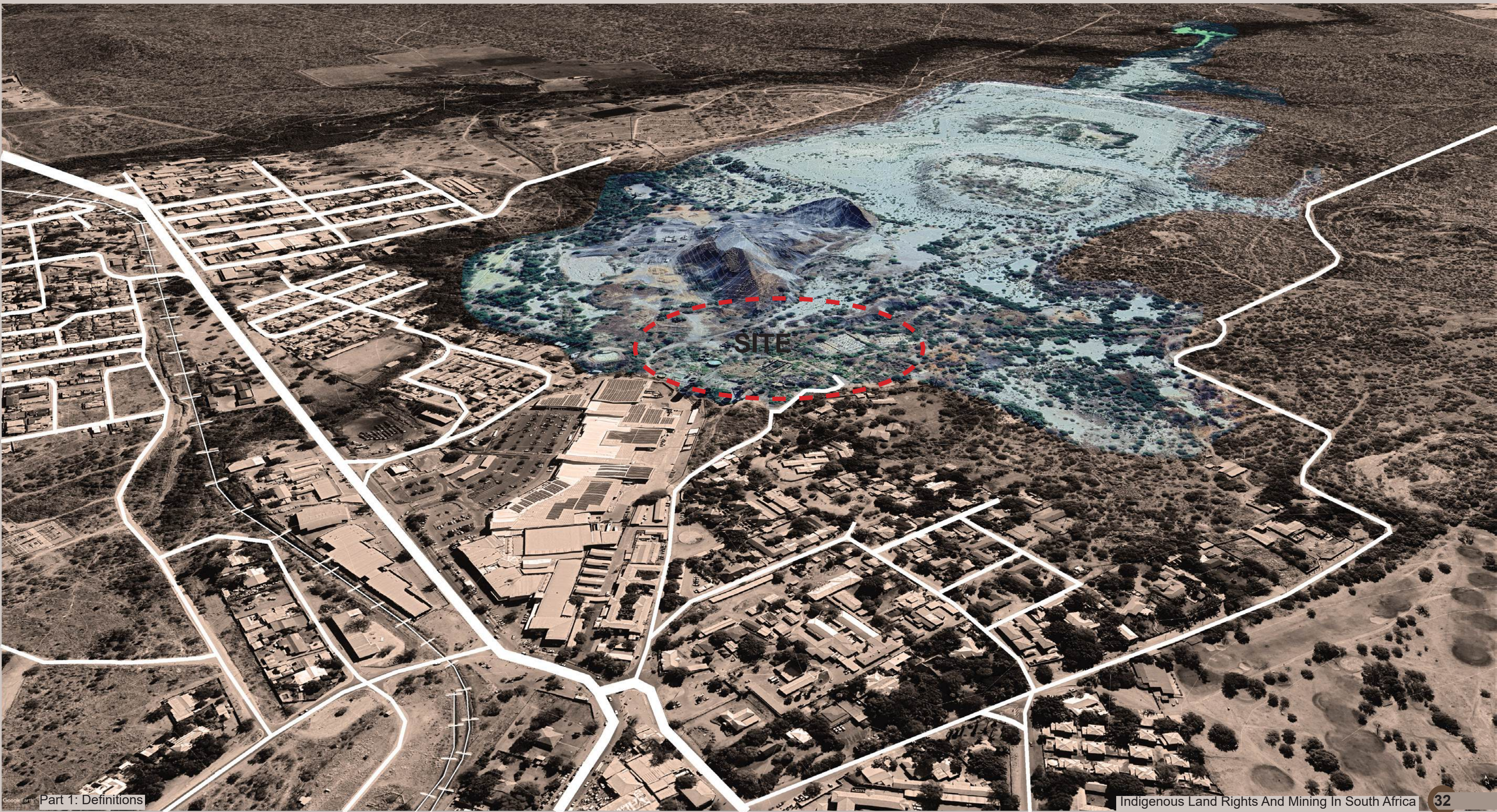
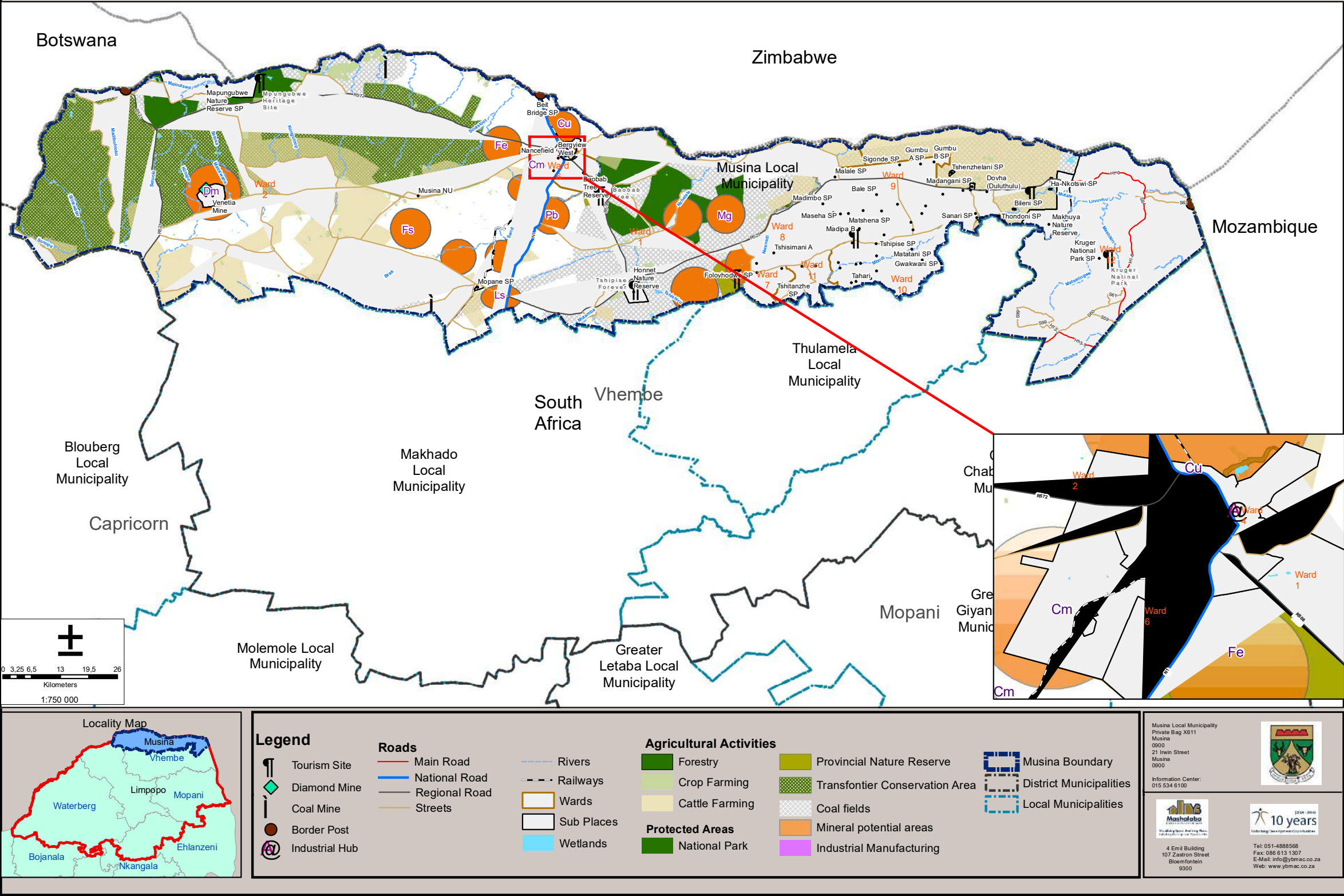


Figure 37: "The Messina Copper Mine, in 1913. Vintage real photo post card, photographer unknown. The card was sent on 30 November 1913 from Messina to Winzenheim, Alsace". Geology map of the Messina mining district. [WWW Document], n.d. . mindat.org. URL <https://www.mindat.org/photo-1047423.html> (accessed 9.4.24).

Figure 38: Site Selection within the Old Copper Mine



Musina SDF: Economic Sector



Map 15: Economic Sectors
Source: Limpopo SDF (2016)

Figure 39: Map showing the types of mineral that for potential mining in Musina. Musina Spatial Development Framework 2019.pdf, 2024. . Musina Local Municipality. URL <https://musina.gov.za/document/musina-spatial-development-framework-2019-pdf/> (accessed 9.5.24).



Musina Copper Mine Map in relation to the Land Use Zone

LEGEND

- Recreational Spaces
- Open Public Spaces
- Buildings
- Vegetation
- Slime Dam
- Mine Tailing
- Commercial zone
- Residential zone
- Water



Figure 40: Musina Copper Mine Map in relation to the Land Use Zone. This figure displays a spatial analysis of the Musina Copper Mine concerning the designated land use zones in Musina Town. The map illustrates the mine's position in the Messina Fault Belt, highlighting its proximity to key infrastructure elements such as residential areas, commercial zones, and environmentally delicate regions. It also illustrates how mining activities impact land use, city planning, and environmental conservation efforts. The combination of commercial, residential, industrial, and conservation zoning classifications illuminates the environmental and socioeconomic dynamics affecting Musina's landscape

Musina Copper Mine Map in relation to the Messina Fault belt and the geology of the mine

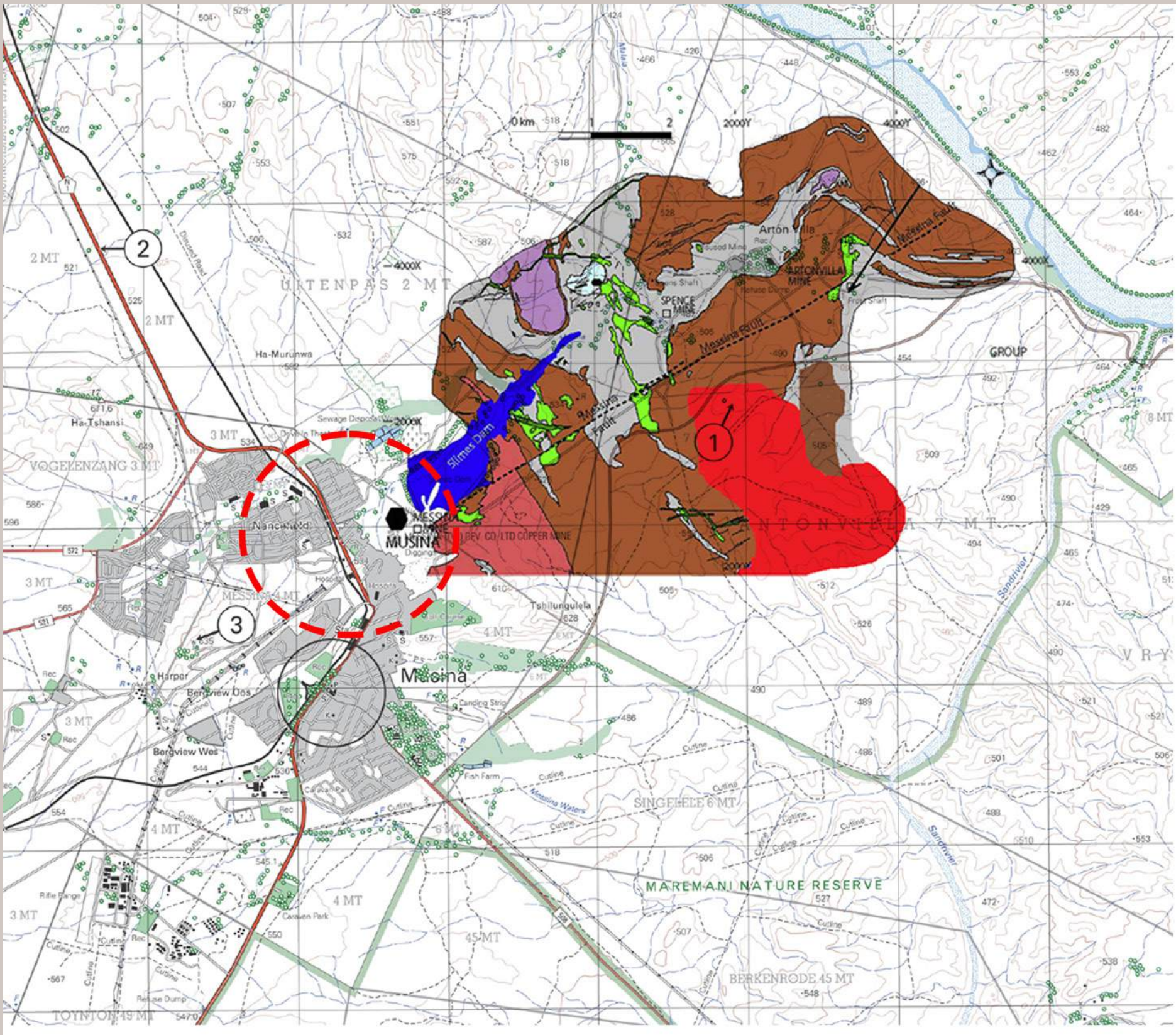


Figure 41: Musina Copper Mine Map in relation to the Messina Fault belt and the geology of the mine. This map highlights the Musina Copper Mine's position along the Messina Fault Belt while also illustrating the mine's geological framework. A significant structural feature that extends across the region and influences the mineralization of copper and associated ores is the fault zone. The map emphasizes key geological characteristics that enhance the area's rich mineral resources, including the Bushveld Igneous Complex and sedimentary layers. Understanding the tectonic and hydrothermal processes that influenced the deposit is offered by depicting the spatial relationship among the mine, fault zones, and surrounding rock formations

Chaumba, J.B., Mundalamo, H.R., Ogola, J.S., Cox, J.A., Fleisher, C.J., 2016. Petrography, sulfide mineral chemistry, and sulfur isotope evidence for a hydrothermal imprint on Musina copper deposits, Limpopo Province, South Africa: Evidence for a breccia pipe origin? *Journal of African Earth Sciences* 120, 141–159. <https://doi.org/10.1016/j.jafrearsci.2016.05.003>

Singo, N., Kramers, J., 2020. Retreatability analysis of the Musina copper mine tailings in South Africa: an exploratory study. *SN Applied Sciences* 2, 1707. <https://doi.org/10.1007/s42452-020-03447-x>

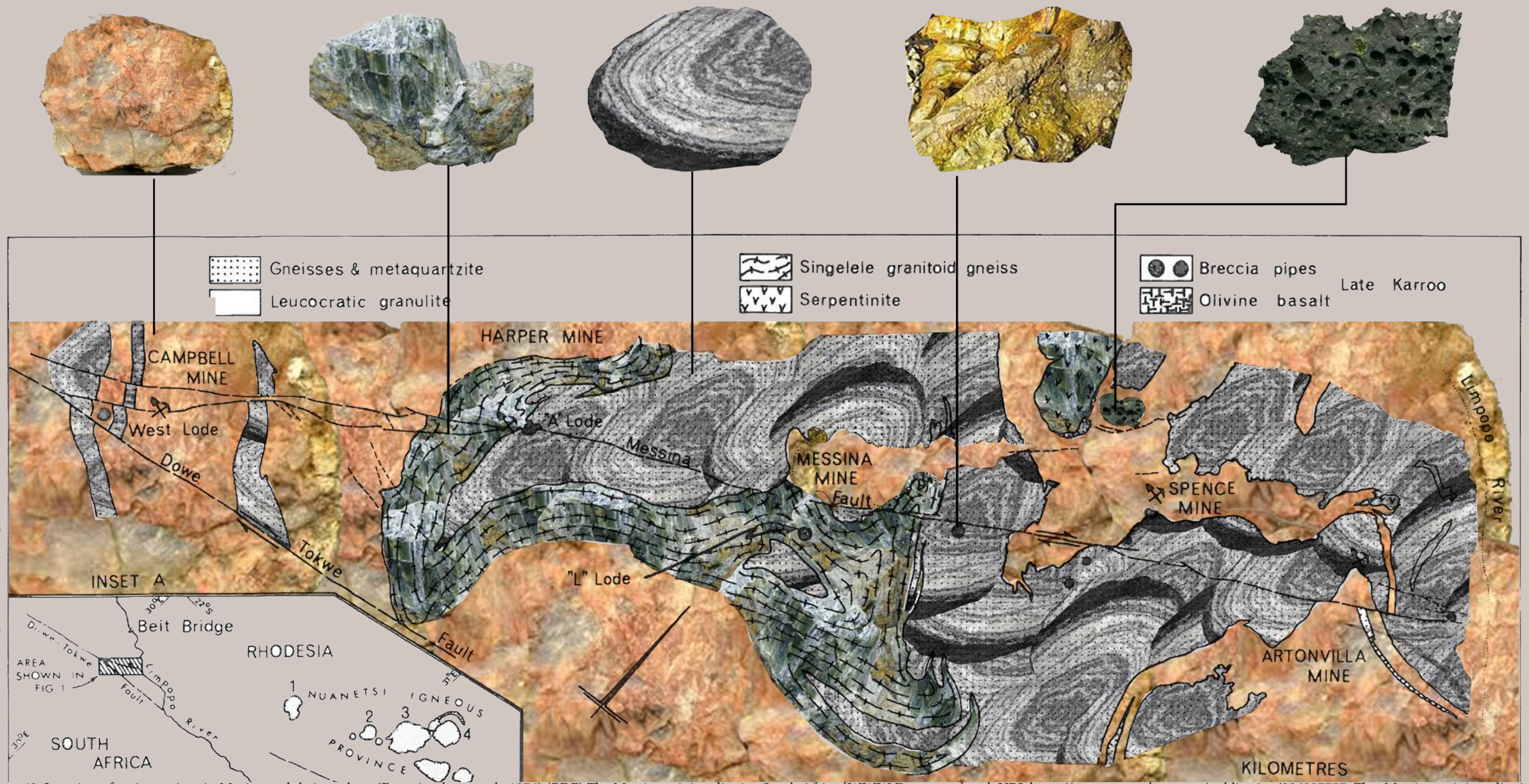
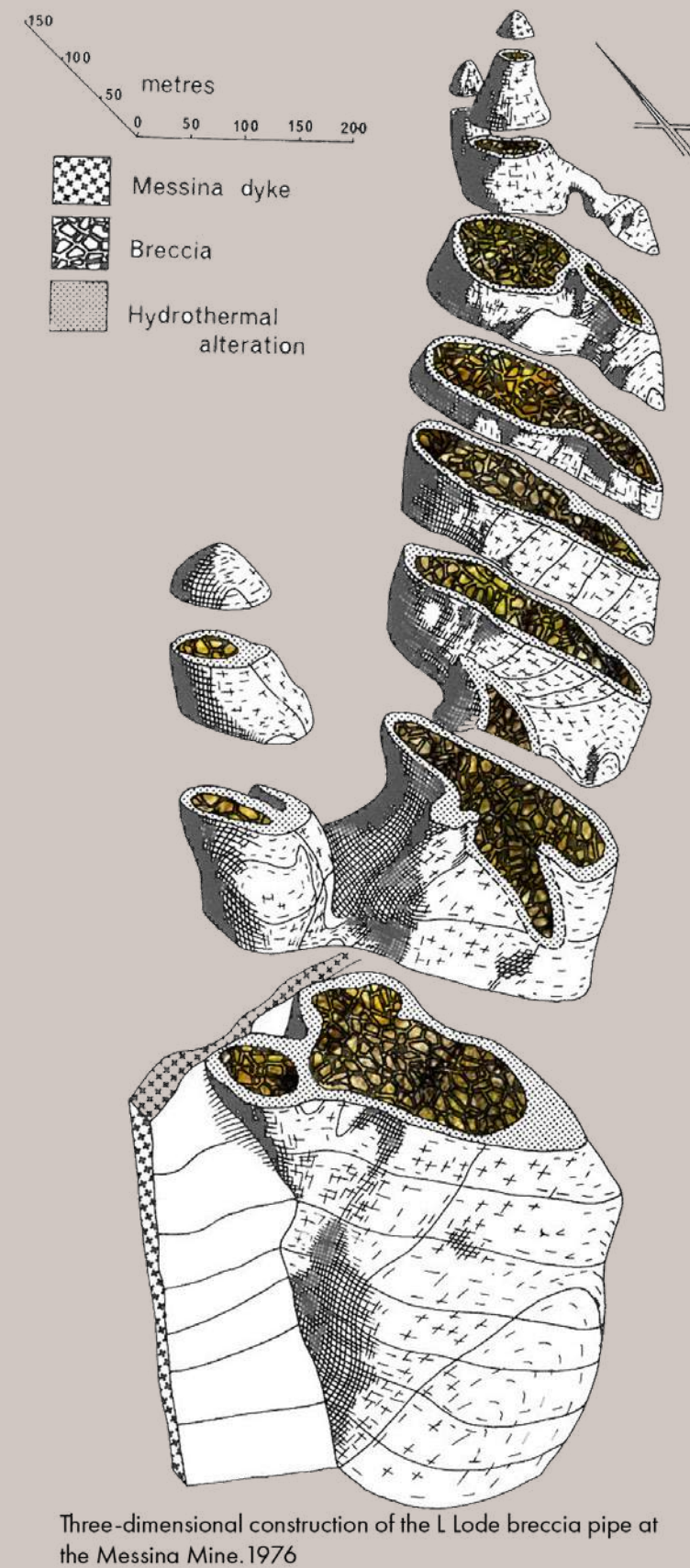
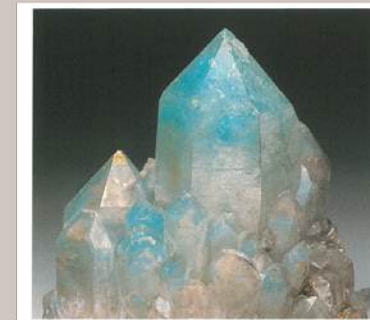


Figure 42: Location of various mines in Musina nad their geology (From Jacobsen et al., 1976) (PDF) The Messina mining district, South Africa [WWW Document], n.d. URL https://www.researchgate.net/publication/286997757_The_Messina_mining_district_South_Africa (accessed 9.6.24). This map emphasizes significant geological structures and mineral resources, indicating the positions of various mines in the Messina (Musina) mining area. The district, situated along the Messina Fault Belt, is characterized by copper, iron ore, and other mineral-rich areas. The geological structure consists of Precambrian metamorphic rocks, intrusive igneous formations with economically valuable mineral deposits, and Archaean granitoids. To shed light on the geological evolution of the area, the map additionally marks previous mining sites and their spatial connections to the regional fault systems



Three-dimensional construction of the L Lode breccia pipe at the Messina Mine. 1976



Ajoite inclusions in quartz crystals to 3.5cm in diameter, from the Messina Mine. Rob Smith Collection



Ajoite inclusions in quartz crystals to 5cm, from the Messina Mine. Rob Smith Collection



Ajoite, papagoite and eidoite inclusions in quartz 11cm tall, from Messina Mine. Rob Smith collection.



Ajoite inclusions in quartz crystals to 3cm, from the Messina Mine. Cal and Kerith Graeber specimens.



Hematite inclusion in quartz crystal, 4.4cm, from the Messina Mine. Don Olson specimen.



Cuprite and papagoite inclusions in quartz crystal, 10.4cm, from the Messina Mine (old Specimen). Cal and Kerith Graeber specimen



Ajoite inclusions in quartz crystals to 20cm, from the Messina Mine. Rob Smith specimen

Figure 43: Three dimensional construction of the L-Lode breccia pipe at the Messina Mine and the Mineralogical record (From Jacobsen et al., 1976) (PDF) The Messina mining district, South Africa [WWW Document], n.d. URL https://www.researchgate.net/publication/286997757_The_Messina_mining_district_South_Africa (accessed 9.6.24).



Figure 44: The Copper Miners Of Musina. The Copper Miners Of Musina And The Early History Of The Zoutpansberg - Auction #61 | AntiquarianAuctions.com [WWW Document], n.d. URL <https://antiquarianauctions.com/lots/the-copper-miners-of-musina-and-the-early-history-of-the-zoutpansberg> (accessed 9.4.24).

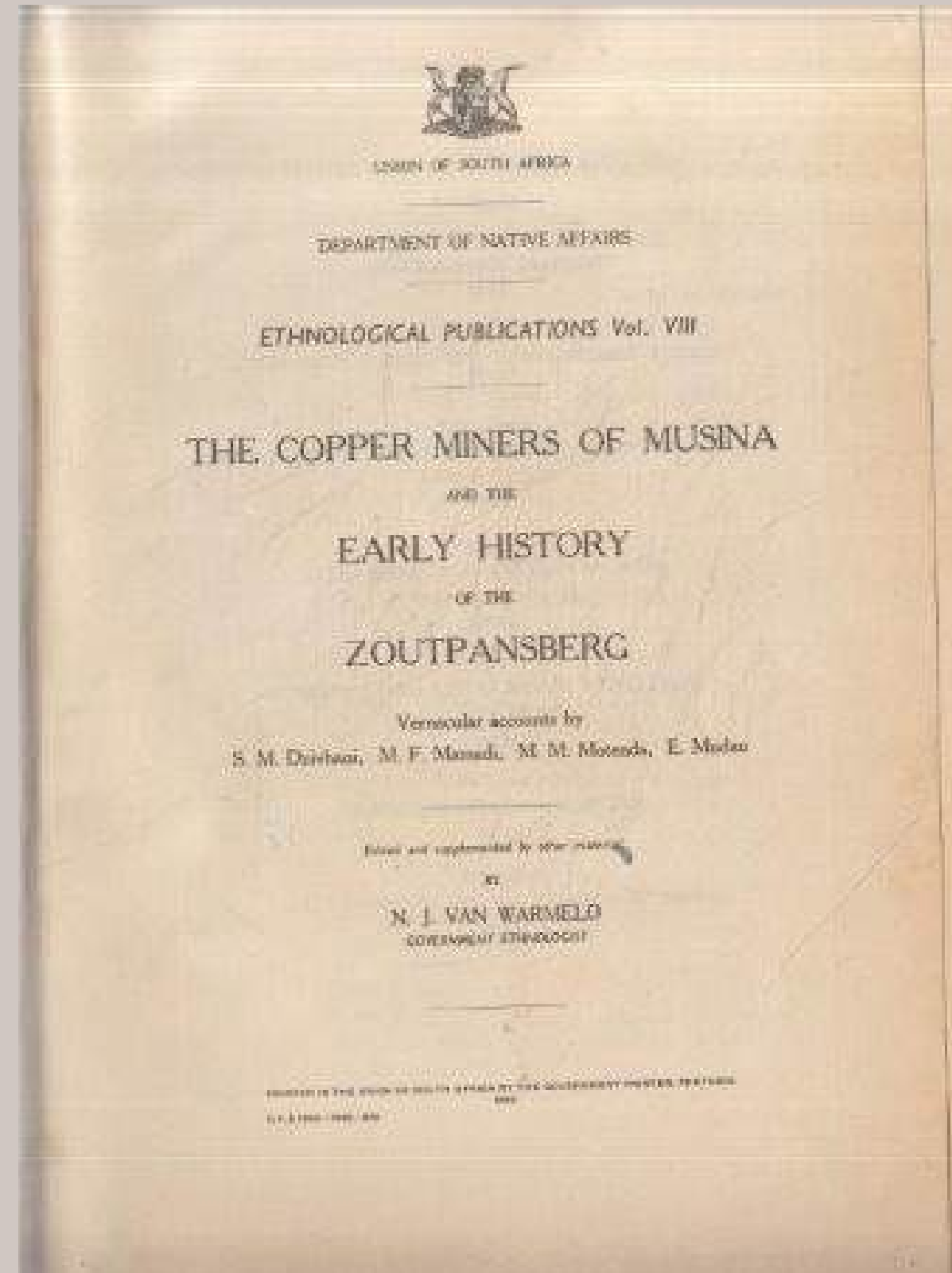
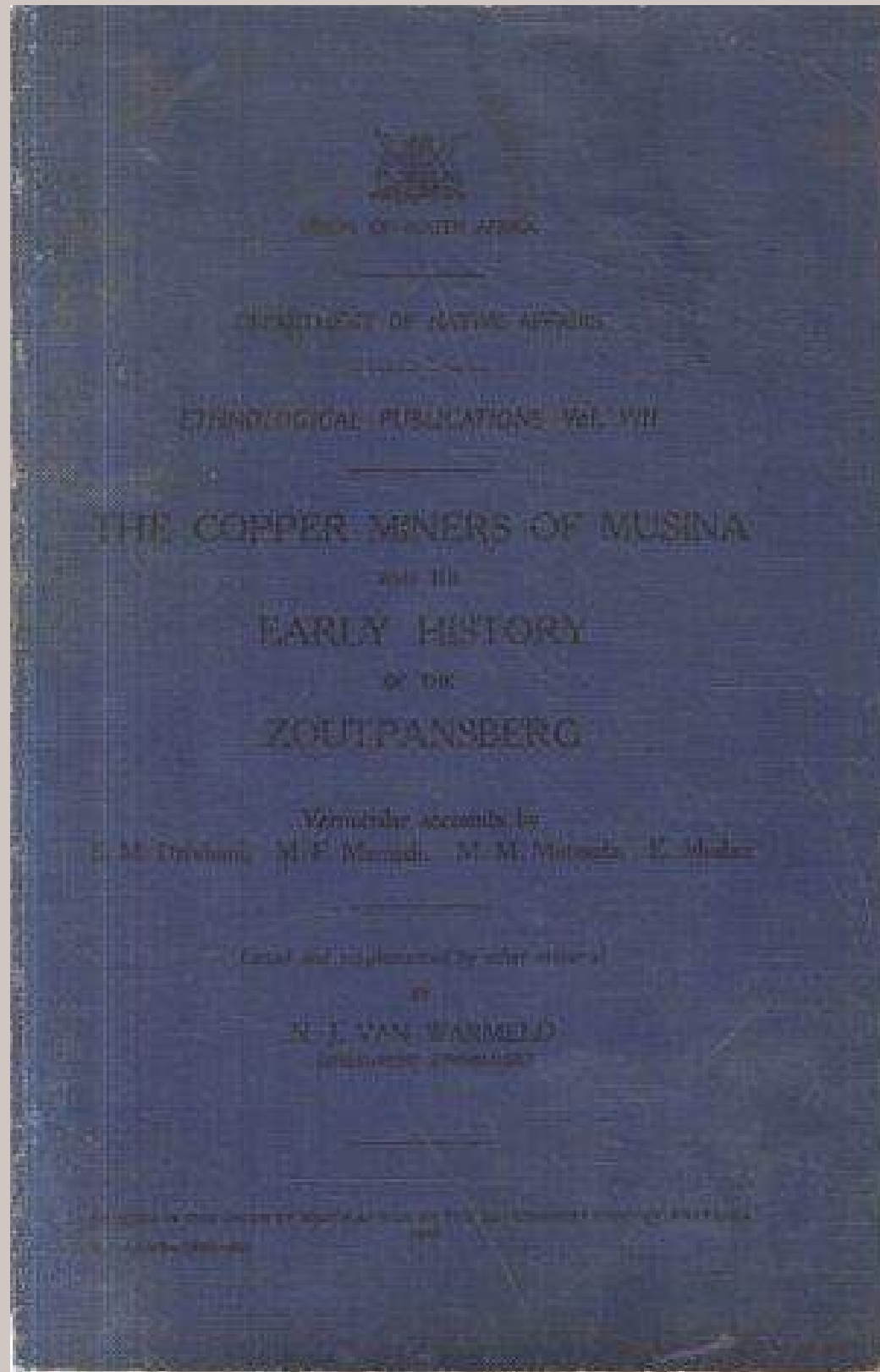


Figure 45: The Copper Miners Of Musina And the early History Of the Zoutpansberg. The Copper Miners Of Musina And The Early History Of The Zoutpansberg - Auction #61 | AntiquarianAuctions.com [WWW Document], n.d. URL <https://antiquarianauctions.com/lots/the-copper-miners-of-musina-and-the-early-history-of-the-zoutpansberg> (accessed 9.4.24).

Abandoned Mines and Buildings

Abandoned mines posed serious environmental and socioeconomic problems for several years now. These sites normally turn into sources of pollution, such as acid mine drainage, slime dams which pollutes nearby ecosystems and water sources with toxins. These mines also present a safety risk to the surrounding population’s health. There are still problems for the ecosystem and the local population because of the sluggish and inadequate rehabilitation efforts at these sites.

“The environmental harm caused by mining industry were recognized as serious issues in the world at that time, resulting in furtherance of investigation and the establishment of regulations. This suggests that the efforts toward wastewater problems from abandoned and existing mines have commenced in South Africa since then” (Matsumoto et al., 2016)

Abandoned mines have impacts on the ecosystem that extend beyond pollution. Landscape Australia published an article by Haoyang Wang (2021) that emphasizes the long-lasting damage that open-cut mining cause to the environment, which can result in habitat degradation and biodiversity loss. “It has been established that before a mine is abandoned, all water stop holes without grouting should be grouted and sealed, interconnected alleys and wells filled, and a specialized drainage system constructed to ensure that the water table is below the local elevation of the ground” (Liu et al., 2023)

Several hydrogeologists, environmental engineers, ecologists, and public health experts took it an extent

of during assessments to evaluate the impacts of post mining landscapes have on the groundwater environment.

Critical approaches to resolving the social and environmental injustices brought about by mining operations include land restitution and reparation. These tactics seek to heal the socioeconomic scars inflicted on communities in addition to rehabilitating the physical landscape. Turning abandoned mining sites into restored ecosystems and useful community areas can be greatly aided by the integration of landscape and architectural architecture techniques.

Abandoned mine sites globally are both substantial challenges and opportunities. These grounds, often neglected, are with a potential to generate the environmental threat and the environmental/sociocultural issue in the landscape. In fact, they may also turn out to be the site of creative architectural and landscape restoration initiatives that may reinvent these places and make them priceless community assets. Belgium and Germany are the countries in Eastern and Central Europe which are the first to implement new and non-traditional intervention studies into the implementing of the innovative approaches for post-industrial landscape over.

These nations have to go so far that reusing it is a way to save nature, Zollverein Coal Mine Industrial Complex in Essen, Germany is now a place to go for people who wants to see museums, art galleries, and even open spaces after for a full one-day visit. This reflects both rehabilitation and preservation to be able

to co-exist, proposing the turning of the heavily industrialized zone into a cultural centre.

During my site visit in Musina and I came across these two ladies that took me around Musina while i Interview people that stayed in the old mine houses. They stated that these building are still owned by the one of the white mine workers and they all pay rent of R1000 to him depending on the size of the rooms, though most of them are already falling down these are now homes to most residents in Musina.



Figure 46: “This mullock heap and derelict building are the tell-tale signs of an abandoned mine, a common sight in Victoria’s Central Goldfields” Australia’s abandoned mines: rehabilitated - Australian Geographic [WWW Document], n.d. URL <https://www.australiangeographic.com.au/topics/history-culture/2022/07/australias-abandoned-mines-rehabilitated/> (accessed 9.6.24).

Old Mine Houses and Existing Old Copper Mine Structures Map in relation to the town



Figure 47: Old Mine Houses and Existing Old Copper Mine Structures Map in relation to the town. This map illustrates the geographical connection between Musina Town and the leftover parts of the old copper mining infrastructure, including derelict mine houses and remaining mining facilities. The map highlights how these historical sites are linked to the broader landscape by illustrating their proximity to the town center. To contextualize the town’s historical development linked to mining operations, significant features such as the Messina Fault Belt, transportation routes, and surrounding villages are highlighted. The illustration depicts the influence of these artifacts on ongoing discussions surrounding land usage, heritage conservation, and post-mining restoration, along with their role in shaping the town’s socioeconomic structure

Old Mine Houses



Figure 48: Old Mine Houses
All photos photographed by me: Mokgadi Mamabolo during a site visit on the 12th July 2024.



Figure 49: Old Mine Houses

All photos photographed by me: Mokgadi Mamabolo during a site visit on the 12th July 2024.

It has not been a priority for Abandoned mines in Vhembe District, even Musina to be rehabilitated. They are often the main sources of pollution and physical risks due to the lack of attention to the environment over time and more urgent issues problems related to the environment and society. However, the importance of dealing with the mining mess on a wider level becomes clear.

Messina Copper Mine has closed down and, as result, its harmful influence on the environment has been made obvious. The mines have tailings and waste dumps that can bring about heavy metal pollution by the process of leaching into the groundwater and soils thus having a devastating effect on the nearby ecosystems. People and wildlife are also at risk while the open shafts and mine tunnels are present. Messina could be converted to heritage tourism although its plight as it is could attract to the park.

One of the problem-causing abandoned mines in the Vhembe District is the Zebediela Nickel Mine, which is located in the northern part of the district. The mining company left huge open pits and waste rock dumps though it mainly dealt with nickel mining. The site has acid mine drainage (AMD) that arises when sulphide minerals in the waste rock react with oxygen and water to produce sulfuric acid. The result is that the acid may carry heavy metals into the water supply and significantly cause environmental damage.

The metal mobile crusher was moved to the underground area where blasting of low-grade ore resulted in the loss of 2 million litres of water. Huge amounts of water

continued to overflow the waterway, and other types of pollution eventually spread throughout the affected areas of the villages thereby destroying the area's ecosystems. Fishes, mussels, and other species that were polluted it became impossible. T

he overflows also happen due to old bins. Coal Mines near Soutpansberg, The Vhembe District's Soutpansberg region has a history of coal mining, with a number of artisanal and small-scale mines still in operation. Many of the abandoned sites that these miners left behind are virtually forgotten and have no documentation. Due to their propensity to seriously contaminate the air and water, the coal mines in this area pose a special risk. While the trash from the mines can damage nearby water sources with heavy metals and other poisons, burning coal produces dangerous pollutants.

Important wetlands and grasslands in the Soutpansberg region are among the local habitats that are being negatively impacted by the closure of abandoned coal mines. Numerous plant and animal species, some of which are uncommon to the area, may be found in these locations. The dispersed layout of the sites and the scarcity of funding make the restoration of these mines challenging. However, there is a chance for community-led restoration projects with an emphasis on conservation areas creation, wetland restoration, and reforestation.

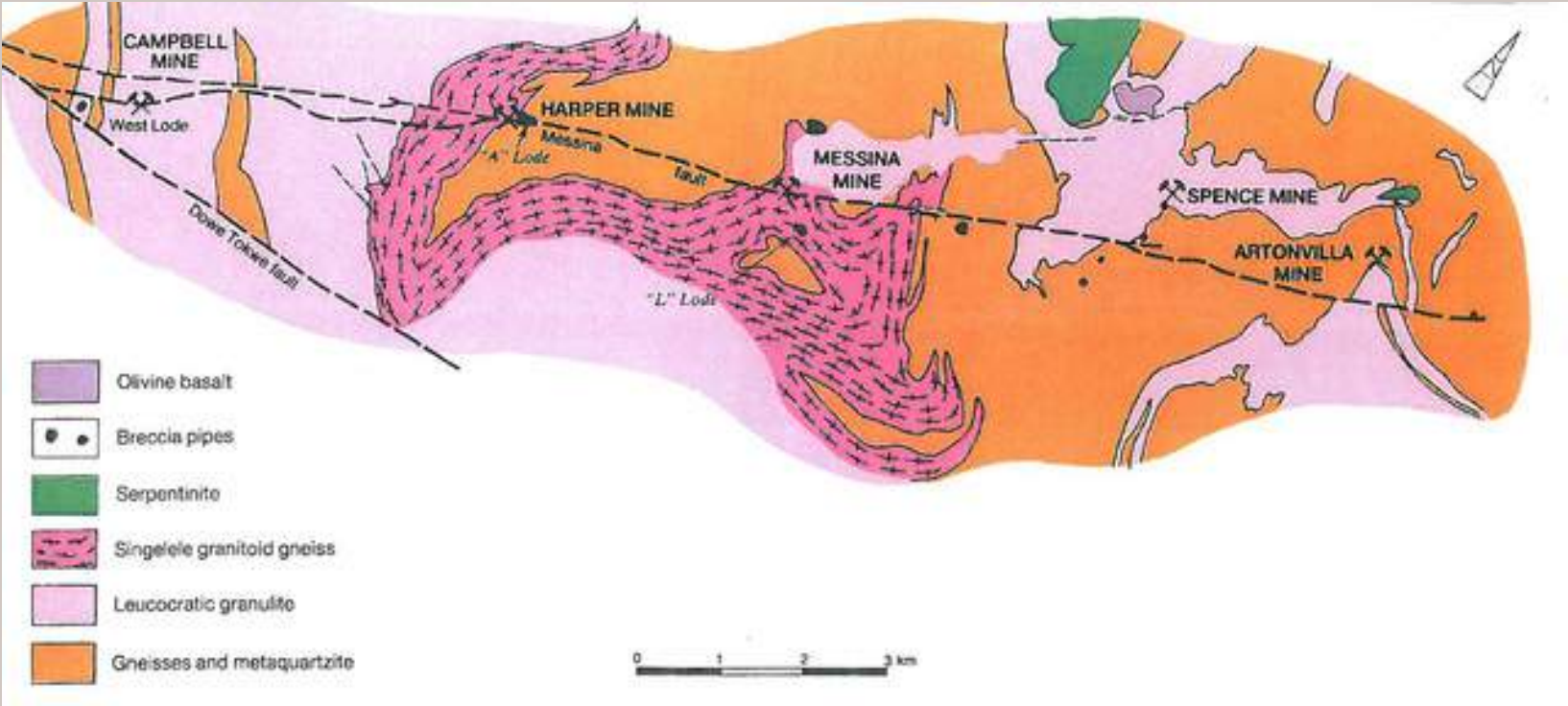


Figure 50: “The general geology of the Messina copper mining district. The location of the Campbell, Harper, Messina (No. 5 shaft), Spence and Artonvilla mines is shown. All are sited on or close to the Messina and Dowe Tokwe faults, believed to be the conduit of the copper mineralizing fluids. From Cairncross and Dixon (1995).”
Geology map of the Messina mining district. [WWW Document], n.d. . mindat.org. URL <https://www.mindat.org/photo-1047423.html> (accessed 9.4.24).

Mines in the Vhembe District in relation to Natural Reserve/Sacred Sites

Figure 51: Mines in the Vhembe District in relation to Natural Reserve/Sacred Sites. This map illustrates the relationship between natural reserves or sacred sites and mining areas in the Vhembe District, especially in Musina. It highlights the closeness of the area's mining activities, like the extraction of copper and iron ore, to sites of cultural and natural importance. These regions, such as Mapungubwe National Park, are often linked to indigenous spiritual traditions and practices. The map emphasizes the tension between protecting sacred landscapes, vital for the identity and welfare of local communities, and economic growth driven by mining. The image visually depicts Musina's efforts to find harmony between ecological and cultural conservation while using land for economic benefits





Figure 52: “Lt. Colonel J.P. Grenfell who led an exploration party in the early 1900s and who is the European credited as “discovering” the Messina copper mines although Africans had been working the deposits for many years before. Some of the Messina mine shafts were named after members of Grenfell’s party - Digby, Harper and Campbell. The picture shows Grenfell in his colonial pith helmet, Martini Henry rifle and his dog. Photo taken from a picture hanging in the Messina mine boardroom when the mine was still operating.”Harper shaft, Messina mining district [WWW Document], n.d. . mindat.org. URL <https://www.mindat.org/photo-725598.html> (accessed 9.4.24).



Figure 53: “View of some underground workings at Messina No 5 Shaft, taken shortly before the mine closed”.Harper shaft, Messina mining district [WWW Document], n.d. . mindat.org. URL <https://www.mindat.org/photo-725598.html> (accessed 9.4.24).



Figure 54: Messina Mine. Harper shaft, Messina mining district [WWW Document], n.d. . mindat.org. URL <https://www.mindat.org/photo-725598.html> (accessed 9.4.24).



Figure 55: “Harper Shaft, Messina in 1978.”Geology map of the Messina mining district. Harper shaft, Messina mining district [WWW Document], n.d. . mindat.org. URL <https://www.mindat.org/photo-725598.html> (accessed 9.4.24).



Figure 56: “The two headgear at the Messina Mine. The one in the foreground is the old No 4 shaft that operated from 1906-1918. The taller headgear in the background was the No 5 Shaft” Harper shaft, Messina mining district [WWW Document], n.d. . mindat.org. URL <https://www.mindat.org/photo-725598.html> (accessed 9.4.24).



Figure 57: “The Edith shaft at Messina mine. The cage that lowered one underground was about the size of a normal telephone booth.” Harper shaft, Messina mining district [WWW Document], n.d. . mindat.org. URL <https://www.mindat.org/photo-725598.html> (accessed 9.4.24).



Figure 58: Copper Mine, Messina, Transvaal | [ID-65942] | HiltonT | Flickr [WWW Document], n.d. URL <https://www.flickr.com/photos/hilton-t/3906632113> (accessed 9.4.24).



Figure 59: HiltonT, 1959. The Messina Copper Mine in Northern Transvaal.



Figure 60: HiltonT, 1958. Copper Mine, Messina, Transvaal.



Figure 61: Harper Shaft, Messina .Geology map of the Messina mining district. Harper shaft, Messina mining district [WWW Document], n.d. . mindat.org. URL <https://www.mindat.org/photo-725598.html> (accessed 9.4.24).

Musina Copper Mine Now



Figure 62: Remaining Ruins Musina Copper Mine
All photos photographed by me: Mokgadi Mamabolo during a site visit on the 13th July 2024.



Figure 63: Remaining Ruins Musina Copper Mine
 All photos photographed by me: Mokgadi Mamabolo during a site visit on the 13th July 2024.



Figure 64: Musina Old Copper Mine shaft
Photograph by Chase the photographer (Mr N Mudau) during my site visit in Musina, 13 July 2024.



Figure 65: Musina Old Copper Mine tailing
Photograph by Chase the photographer (Mr N Mudau) during my site visit in Musina, 13 July 2024.



Figure 66: Musina Old Copper Mine Foundations
Photograph by Chase the photographer (Mr N Mudau) during my site visit in Musina, 13 July 2024.



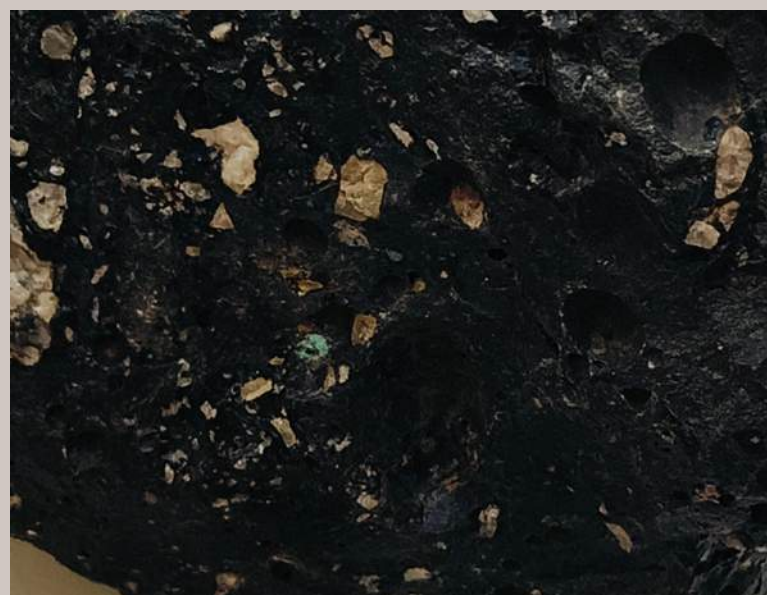


Figure 67: Rocks found on the Musina Copper Mine during a site visit. Photographs by Mokgadi Mamabolo.

Abandoned Mine Sites in South Africa

Owing to the era of mining that is notable by its extended history, South Africa can boast of several mine sites that are no longer utilized. It has been revealed that the mining activities were not always in line with environmental standards, and they also violated the human rights of the people in the surrounding areas, particularly during the apartheid period.

As a result, most of these now-derelict sites remain environmental hazards to the area and thus the uncontrolled waste sites cause health problems out of hand to the locals.”These mines are considered by many as negative legacy of post-mining operations. Although the problems of derelict mining sites are well known in almost all countries, the efforts of the mining industry, governments and the host communities towards their rehabilitation have not been very encouraging.” (Mhlongo, 2015)

The Witwatersrand gold mining area is a prominent representation of this, as it has resulted in the loss of culture, damage to the environment, and acid mine drainage. The abandoned mines, left unattended, have caused many problems in the environment, such as water pollution in the Vaal River system, and the contamination of water has occurred in the municipalities that need it for agriculture and human use.

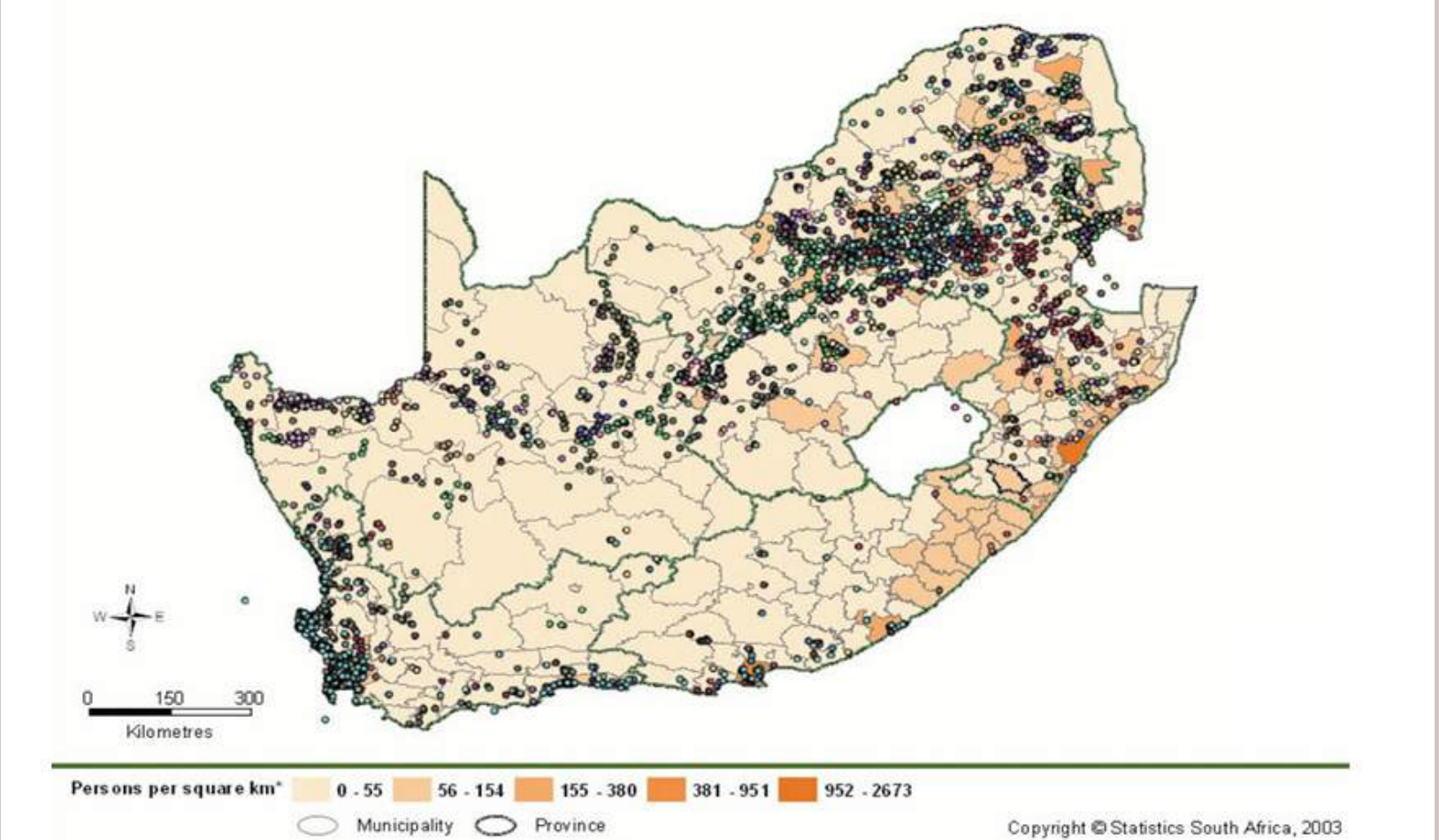


Figure 68: Abandoned mines within the vicinity of South African settlement areas (from Auditor General South Africa, 2009) Abandoned mines within the vicinity of South African settlement areas (from Auditor General South Africa, 2009 - Google Search [WWW Document], n.d. URL [https://www.google.com/search?q=Abandoned+mines+within+the+vicinity+of+South+African+settlement+areas+\(from+Auditor+General+South+Africa%2C+2009&sourceid=chrome&ie=UTF-8](https://www.google.com/search?q=Abandoned+mines+within+the+vicinity+of+South+African+settlement+areas+(from+Auditor+General+South+Africa%2C+2009&sourceid=chrome&ie=UTF-8) (accessed 9.4.24).

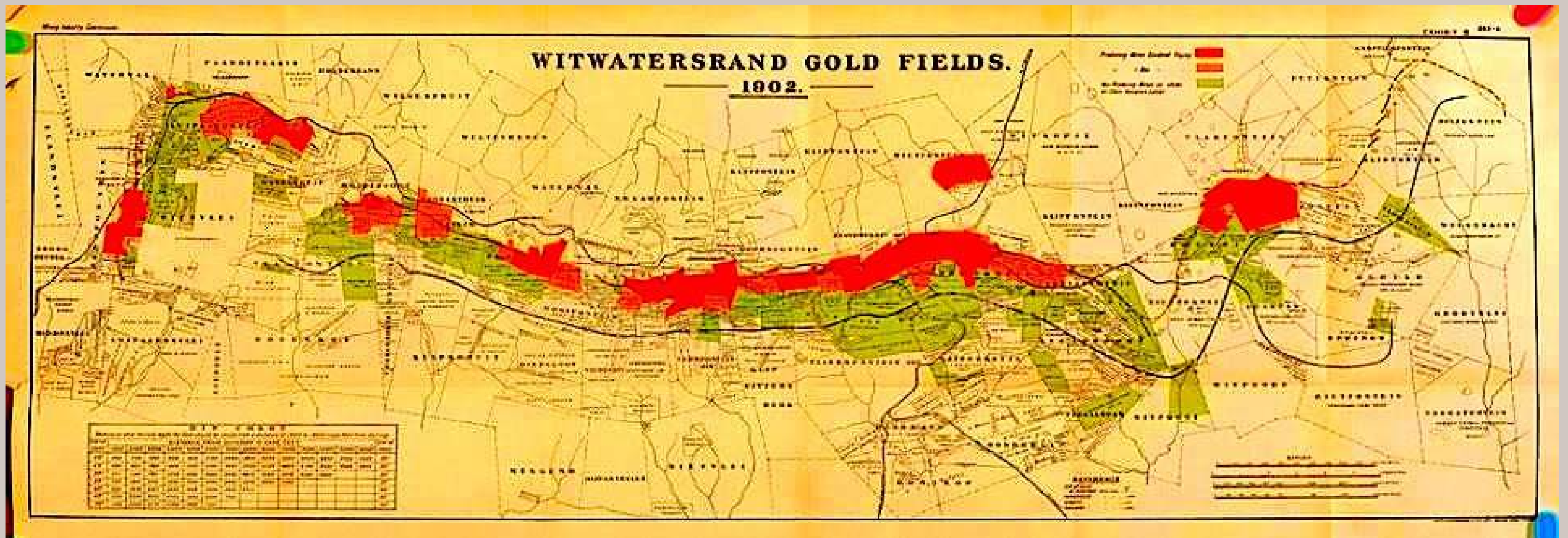


Figure 69: Witwatersrand Goldfields Map. Witwatersrand Goldfields Map via James Findlay.jpg | The Heritage Portal [WWW Document], n.d. URL <https://www.theheritageportal.co.za/files/witwatersrand-goldfields-map-james-findlay.jpg> (accessed 9.4.24).

Land Dispossession

Land expropriation was initiated by European settlers by establishing colonial farms and taking grazing lands from the indigenous peoples. To confirm the land claims of the European settlers, the colonial government passed a lot of rules which included directives and proclamations. Military operations inflicted on indigenous communities that refused compliance were very common to enforce these policies.

Rather than the abrogation of the Glen Grey Act in 1925, the British colonial government propelled land dispossession institutional in 1894 with the adoption of the Glen Grey Act. The idea was that the law would bring about the legal ownership of land among African populations by the creation of individual land titles. Unfortunately, this method was somehow deficient: it

only allowed the African people and the communities to own small pieces of property, thus, community landholding custom was limited and European settlers could easily take over the land. According to the historian William Beinart, “The Glen Grey Act was designed to break up communal landholding, creating individual titles that could be more easily alienated”

The narrative of land possession in South Africa is intricate and involves continuous conflicts for land rights, historical injustices, and legal frameworks that reach far beyond the mineral-rich territory of Musina. Musina acts as an intersection for the extraction of resources, including coal, copper, and gold.



Figure 70: SAFTU protests the Land Expropriation Bill: The South African Federation of Trade Unions (SAFTU) opposes it due to its possible effects on communities and laborers. SAFTU calls for more extensive reforms that give the needs of the poor and disadvantaged the greatest attention, claiming that the law ignores the underlying causes of inequality and land expropriation. SAFTU, n.d. SAFTU REJECTS THE LAND EXPROPRIATION BILL. URL <https://saftu.org.za/archives/5899> (accessed 9.6.24).

The implementation of colonial laws and the emergence of racially discriminatory land policies, such as the Natives Land Act of 1913, led to the uprooting of Indigenous communities from their ancestral lands and the concentration of land ownership in the hands of white settlers and mining companies. Due to mining operations that frequently ignored ecological concerns, there was considerable environmental damage as a result, including deforestation, soil erosion, and water contamination.

“The Act stipulated that Black people could live outside the reserves only if they could prove that they were in employment. Although the law was applicable to the whole of South Africa, in practice it applied only to the Transvaal and Natal.” (“The Native Land Act is passed | South African History Online,” n.d.)

Following the advent of democracy in 1994, there was optimism that land reform would tackle historical injustices. The intention behind laws such as the Restitution of Land Rights Act of 1994 and the Mineral and Petroleum Resources Development Act of 2002 was to ensure fair entry to mineral resources and redress the past problem of land loss.

The history of land ownership in South Africa has been shaped by colonialism, forced evictions, and discriminatory policies during apartheid, leading to the marginalization of Indigenous communities. Prior to European colonization, various Indigenous tribes in South Africa managed land using communal ownership practices and traditional customs. Nevertheless, the distribution of land ownership underwent a significant

change when Dutch and British settlers arrived in the 17th century.

The Natives Land Act of 1913, for example, and other colonial laws and policies limited Indigenous land ownership to designated reserves, or “Bantustans,” by establishing racially discriminatory land regulations. These measures essentially compelled Indigenous groups to relocate after being forcibly removed from their ancestral lands.

In regions such as the Vhembe District, where traditional leaders were coerced into working with colonial authorities, frequently at the expense of their own people’ land rights, the repercussions of colonialism were especially noticeable. The northern South African district of Vhembe turned into an outbreak of land possession and resistance, where indigenous communities were subjected to brutality, displacing, and economic exclusion.

” For Mawere, the loss of land not only severed the physical connection to indigenous knowledge but also disrupted social networks and cultural practices that were closely tied to the land.” (Mawere et al., 2023)

In Musina, an area famous for its mineral wealth, land disputes involve mining companies, government entities, and Indigenous groups. Lahiri-Dutt (2006) explains how the discovery of valuable mineral deposits has led to disagreements over who should have control over resource extraction and land ownership.

Indigenous groups like the Makhado and Maledu have

taken on a leading role in defending their ancestral lands and opposing mining operations, asserting their rights to their territories. “Traditional courts have emerged as invaluable foundations upon which restoration and decolonization can take place. By upholding indigenous customary laws and practices, these courts enable the reclamation of indigenous identity and self-governance, which are crucial aspects in healing the wounds inflicted by colonization.” (Mawere et al., 2023)



Figure 71: “SANNC delegation that went to England to convey African people’s objections to the 1913 Land Act, 1914. L-R: Rev W. Rubusana, T. Mapike, Rev J. Dube, S. Plaatjie and S. Msane.” The Land Act of 1913 and its alternatives, 2013. . Johan Fourie’s blog. URL <https://johanfourie.wordpress.com/2013/01/30/the-land-act-of-1913-and-its-alternatives/> (accessed 9.6.24).

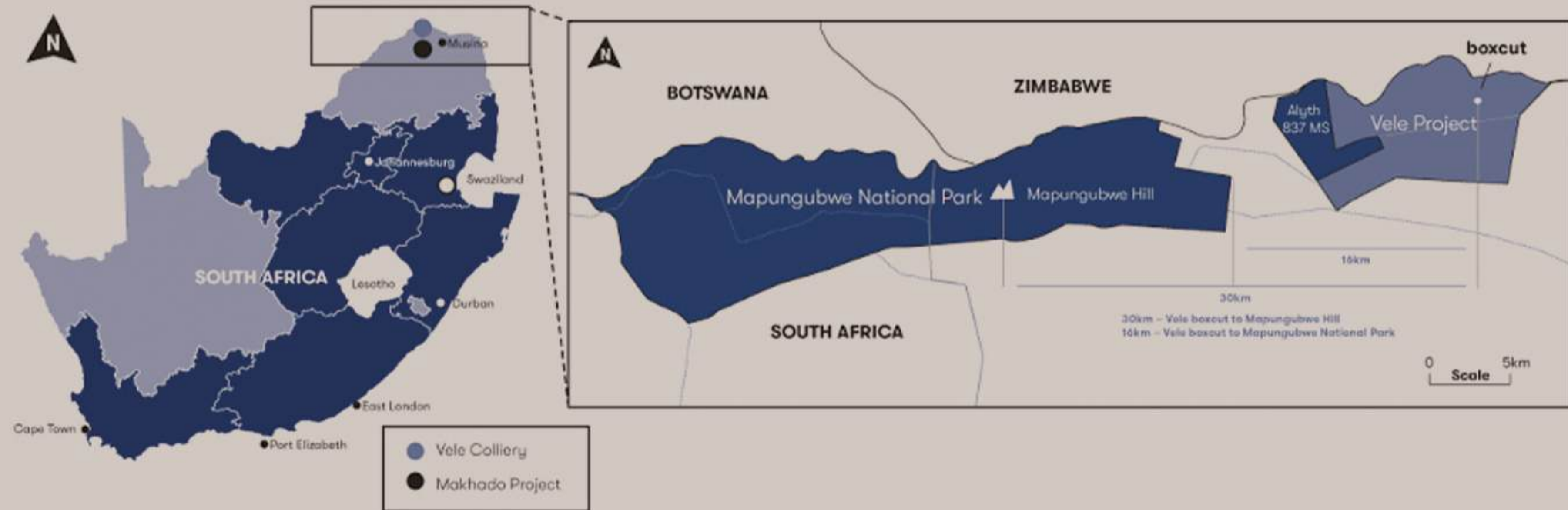


Figure 72: Map of the Vele Colliery in relation to the Mapungubwe Cultural Landscape. Vele - MCMining Limited [WWW Document], n.d. URL <https://www.mcmMining.co.za/our-business/operations/vele> (accessed 9.4.24).

Musina-Makhado SEZ Project

Located close to Musina in the Limpopo Province of South Africa, the Vele Colliery has generated a lot of controversy and discussion, especially regarding its rumoured connections to the Makhado-Musina Industrial Park. Located near Musina, the Vele Colliery coal mining project is situated close to the Mapungubwe World Heritage Site, causing conflict. Environmental activists have expressed worries that the coal mining activities could endanger the ecological and archaeological balance of the region. Protests and legal actions against the Vele Colliery have underscored

the conflict between environmental protection and economic advancement. “The conflict over the Vele Colliery underscores the need for sustainable mining practices that respect both heritage and environmental concerns,” (Crush and Tevera, 2010).

Different views on the planned Makhado-Musina Industrial Park exist, with scepticism and optimism both being expressed. Although the project offers substantial economic benefits like employment opportunities and

higher investments, it has been met with resistance from environmental activists and the local community. The primary worries centre on the environmental impact of the industrial park, especially regarding its water usage and the discharge of toxic substances. As was explained in the Report by Munnik, “The proposed industrial park could exacerbate existing environmental problems, including water scarcity and pollution.” (Munnik, 2010)

The controversies surrounding the Vele Colliery and

the anticipated mining activities near the Mapungubwe World Heritage Site serve as a perfect example of the conflict in Vhembe between heritage conservation and mining concerns. “Mapungubwe’s archaeological and natural heritage is under threat from mining activities, which could lead to irreversible damage to this important historical site.” states a 2010 Mail & Guardian report. Because of its importance as a historical and cultural monument, Mapungubwe has become a focus point for environmental and heritage activists who contend that the integrity of the site cannot be preserved by

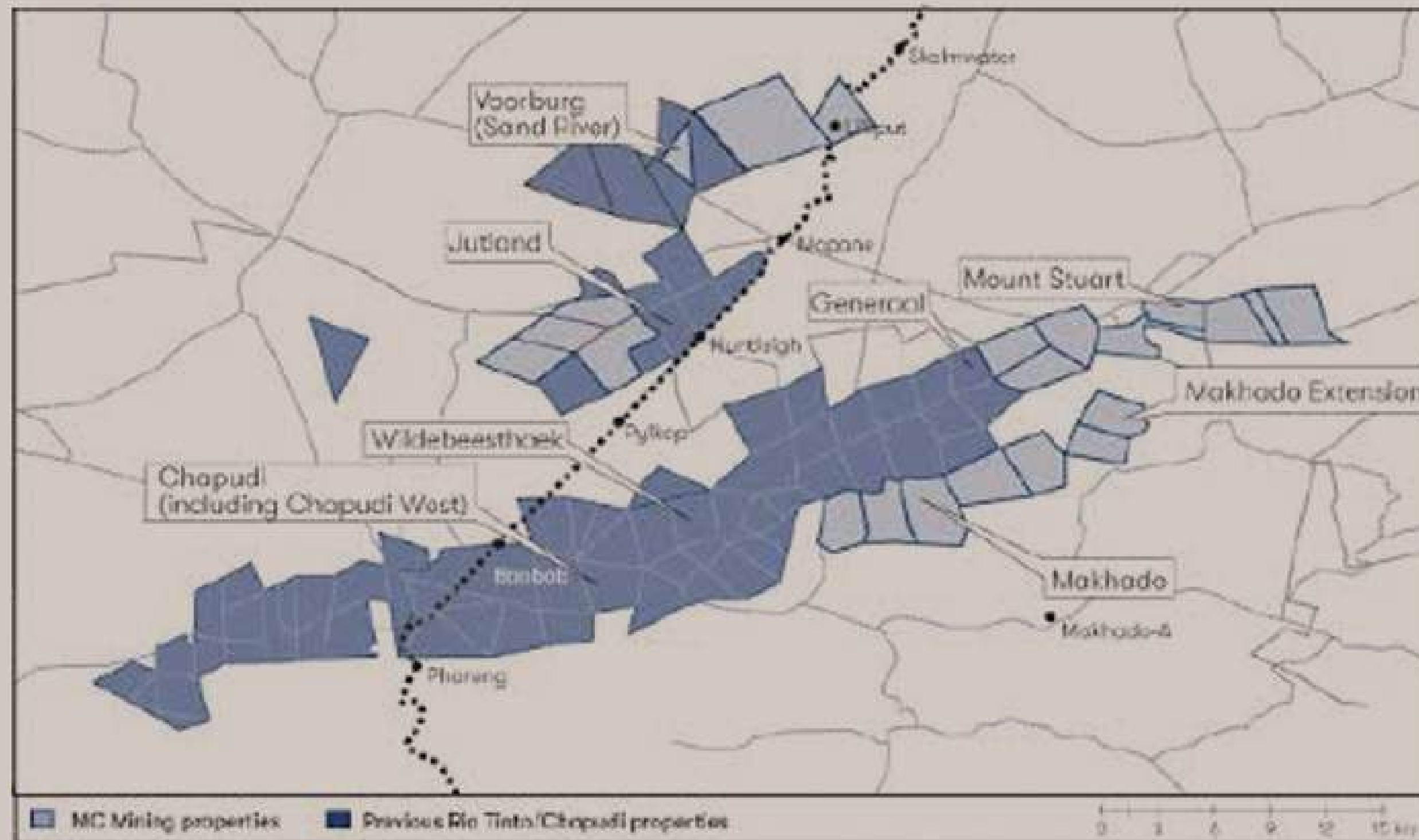


Figure 73: Greater Soutpansberg Projects by the MC Mining. GSP/MbeuYashu - MCMining Limited [WWW Document], n.d. URL <https://www.mcmining.co.za/our-business/projects/gsp-mbeu-yashu> (accessed 9.4.24).

mining activities in the area (News24, 2011). “The legal battle continues as conservation groups seek to protect the area from the adverse effects of mining.” (News24, 2011)

The intricate interaction of socio-economic, political, and racial factors in Musina led to significant changes in communities before and after apartheid. This development is closely linked to the expansion of mining operations, the creation of railroad systems, and the significance of the N1 highway that goes to Beitbridge.

The mining industry in Musina is greatly affected by its close location to Beitbridge. The N1 highway enables the movement of minerals from mines to different markets at home and abroad. This connectivity allows for smooth import and export processes, improving supply chain and logistics in the mining industry. Historians Cox and Smith explained: “The railway network from Pretoria-Piensaarsrivier-Polokwane-Musina-Beitbridge, which is 579 km-long, passes through the Municipality and it transports lime, liquid petroleum products, cement, coal and various grains” (Cox, Smith, & Welman, 2013)

The influence of the border on migration also moulds the labour dynamics within the mining sector in Musina. The arrival of workers coming to Musina’s mines from nearby countries highlights the intertwined nature of local labour markets and economies. This scenario impacts labour laws and worker rights protection, which the government and mining companies find difficult to deal with. Studies suggest that mining companies

set up separate living areas, called “hostels,” for migrant workers, especially African Americans, who experienced difficult living conditions and strict oversight. Located close to the mining areas, these dormitories represented societal power and physical separation, continuing a pattern of marginalization and oppression.

Despite focusing on accessibility and economic potential, the spatial arrangement near the N1 highway and its proximity to Beitbridge also emphasize ongoing geographical disparities. Marginalized communities are frequently placed in outskirts with restricted opportunities for jobs and necessary services. The requests from Indigenous communities for land restoration often conflict with the mining rights given by the Mineral and Petroleum Resources Development Act (MPRDA). Legal disputes often emerge between mining companies and community assertions of land ownership and usage rights. Establishing a cohesive legal framework becomes imperative to foster sustainable development by reconciling divergent interests.

“The second site is located along the N1, south of Messina, on the road to Louis Trichardt, with an area of 8,000 ha. The site borders the Musina and Makhado municipalities and is aimed at heavy industries focused on the beneficiation of rich mineral resources in the region, including an energy and metallurgical complex. The industrial area will comprise a power plant, coal methanol plant, waste gasification plant, CTL plant, coke plant, water treatment plant, synthetic bitumen area, and cotton weaving industry. The land of the

southern site is community-owned. “(Limpopo Spatial Development Framework Phase 2: Spatial Analysis Report Part C: Socio-Economic Analysis, 31 March 2023, First Draft, The Office of the Premier).

The relationship between Beitbridge and the Musina mining industry is also made more difficult due to legal and environmental issues. Issues related to social displacement, environmental damage, and the rights of local communities have been brought to the forefront by the recent growth in the mining sector. While legal regulations such as the National Environmental Management Act (NEMA) strive to achieve sustainable development and environmental justice, their enforcement is frequently inadequate, resulting in tensions between local authorities, environmental advocates, and mining companies.

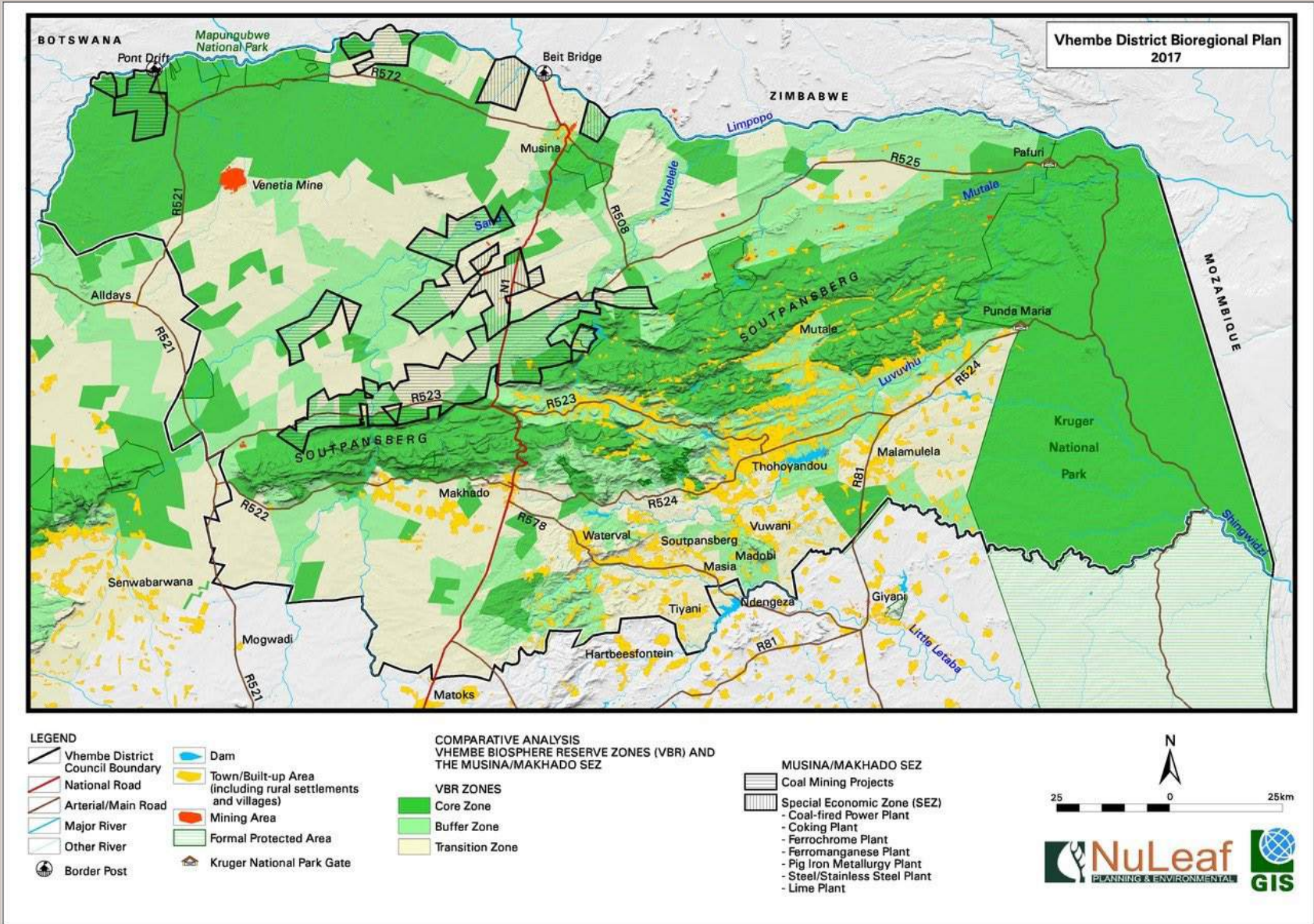
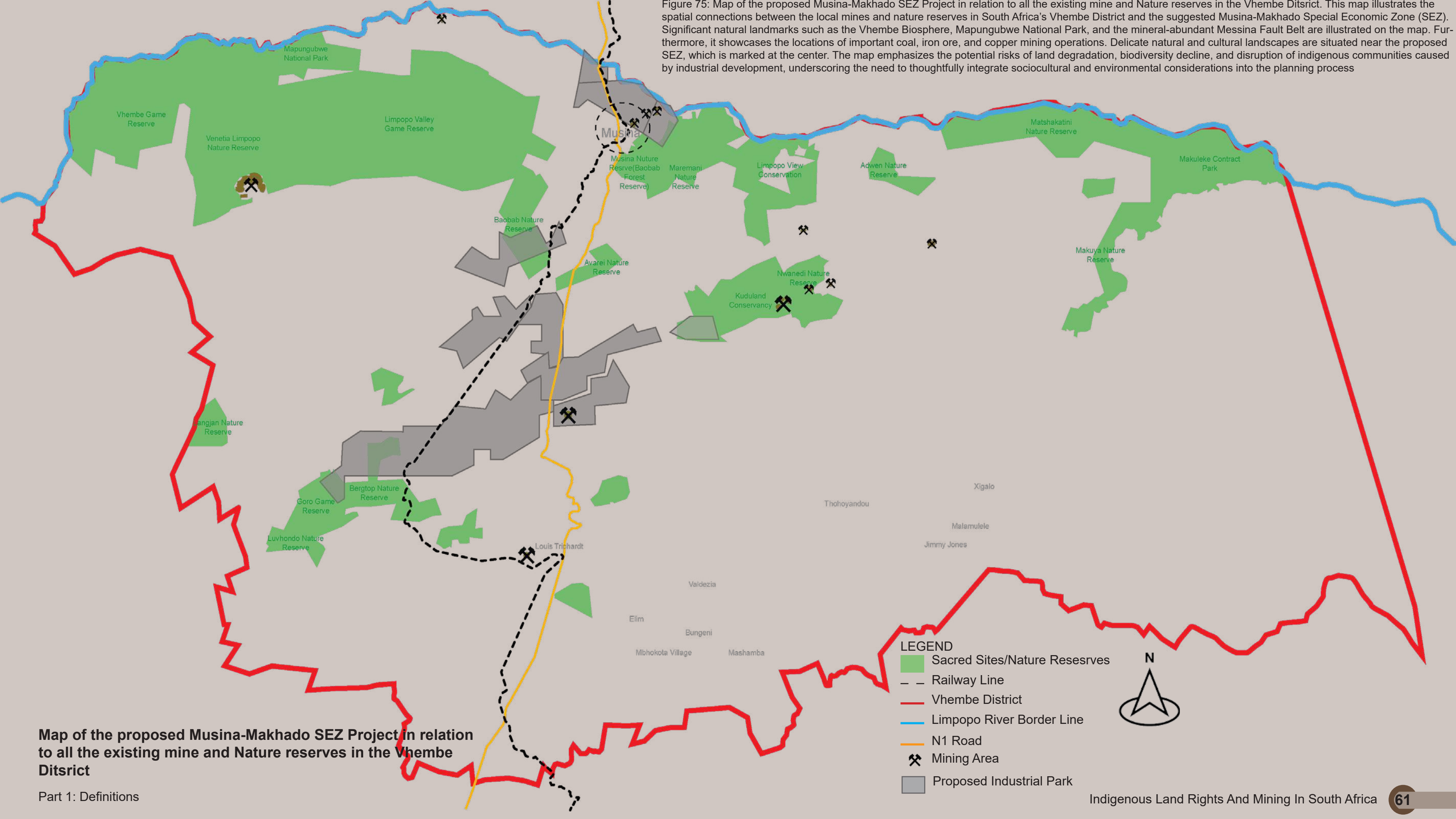


Figure 74: Vhembe District Bioregional Plan 2017
A visionary plan for landscape-scale conservation in the Vhembe and the Biodiversity Economy [WWW Document], n.d. . Living Limpopo. URL <https://livinglimpopo.org/great-vhembe> (accessed 9.4.24).

Figure 75: Map of the proposed Musina-Makhado SEZ Project in relation to all the existing mine and Nature reserves in the Vhembe District. This map illustrates the spatial connections between the local mines and nature reserves in South Africa's Vhembe District and the suggested Musina-Makhado Special Economic Zone (SEZ). Significant natural landmarks such as the Vhembe Biosphere, Mapungubwe National Park, and the mineral-abundant Messina Fault Belt are illustrated on the map. Furthermore, it showcases the locations of important coal, iron ore, and copper mining operations. Delicate natural and cultural landscapes are situated near the proposed SEZ, which is marked at the center. The map emphasizes the potential risks of land degradation, biodiversity decline, and disruption of indigenous communities caused by industrial development, underscoring the need to thoughtfully integrate sociocultural and environmental considerations into the planning process



“Africa is one continent, one people, and one nation. The notion that in order to have a nation it is necessary for there to be a common language, a common territory and common culture has failed to stand the test of time or the scrutiny of scientific definition of objective reality... The community of economic life is the major feature within a nation, and it is the economy which holds together the people living in a territory. It is on this basis that the new Africans recognise themselves as potentially one nation, whose dominion is the entire African continent” (Lawton, 2024)



Figure 76: Aerial view of South Africa's Energy and Metallurgical Special Economic Zone. Daniel, L., 2018. A look at China's big plans for Limpopo and why locals should be concerned. The South African. URL <https://www.thesouthafrican.com/news/china-south-africa-limpopo-coal-concern/> (accessed 9.5.24).



Figure 77: Effect picture of ferromanganese and ferrochrome project. Daniel, L., 2018. A look at China's big plans for Limpopo and why locals should be concerned. The South African. URL <https://www.thesouthafrican.com/news/china-south-africa-limpopo-coal-concern/> (accessed 9.5.24).



Figure 78: Rendering of the whole plant of coking, refractory and lime. Daniel, L., 2018. A look at China's big plans for Limpopo and why locals should be concerned. The South African. URL <https://www.thesouthafrican.com/news/china-south-africa-limpopo-coal-concern/> (accessed 9.5.24).



Figure 79: Power plant renderings. Daniel, L., 2018. A look at China's big plans for Limpopo and why locals should be concerned. The South African. URL <https://www.thesouthafrican.com/news/china-south-africa-limpopo-coal-concern/> (accessed 9.5.24).

“The 4 600 megawatt coal-fired power plant, known as the “Power China International Energy Project” will service: A coal washing plant (with the capacity to process 12 million tonnes per year), A coking plant, (3 million tonnes), An iron plant (3 million tonnes), A stainless steel plant (3 million tonnes), A Ferro manganese powder plant (1 million tonnes), A ferrochrome plant (3 million), A limestone plant (3 million), An apartment building, hotel, shopping mall, hospital and school will also be built.” (Daniel, 2018)

02 TEMPORALITY

Breathing: Damaged Atmospheres

The metaphor of the lung as the environment provides an effective framework for comprehending how mining operations affect the environment and public health. Environmental sustainability and ecological balance are necessary for healthy lungs to operate at their best, just as clean air and rest intervals are necessary for healthy lungs. Environmental deterioration brought on by unsustainable mining activities is mirrored in the pathology of lung disorders that arise from prolonged exposure to toxic substances.

Understanding temporalities the significance and purpose of a period essential to comprehending human activities, consider the metaphor of breathing as a powerful lens particularly those that entail the extraction of natural resources, like mining. Indigenous mining was based on a cyclical conception of time that was intertwined with social rituals, ecological cycles, and agricultural seasons. Breathing symbolizes energy, rejuvenation, and balance, and it is a continuous and repeating process.

To prevent interference with agricultural cycles, gold mining in Ghana's Ashanti region was frequently timed to align with periods when farmland is not in use. This cyclical method guaranteed that mining operations were not continuous, giving the land time to renew and recover in between extraction stages. As noted by Hilson (2002), conventional mining techniques were often incorporated into broader subsistence activities, blending resource extraction with other important community activities.

The continual exchange of carbon dioxide and oxygen

occurs during breathing, which is a rhythmic and cyclical action. The body's ability to maintain homeostasis depends on this breathing cycle. Ecological systems also function based on cyclical cycles, which are essential to preserving the health and balance of the ecosystem. This cycle of thinking is best illustrated by indigenous mining activities.

By allowing for intervals of extraction followed by rest and recuperation, these methods frequently prevented the depletion of natural resources and gave ecosystems time to recover. This is similar to how the lungs require fresh air and downtime to heal after being exposed to toxins. "Indigenous methods reflected a profound understanding of local ecosystems and the importance of allowing natural recovery periods" (Pwiti, 1997).

In Ghana's Ashanti area, for instance, traditional gold mining was incorporated into the agricultural calendar. The ground was left to recover during the wet season after mining was completed during the dry season, when there were less agricultural operations. This procedure made sure that the land would continue to be productive for future generations and that mining would not irreversibly harm the environment (Hilson, 2002).

As prolonged and intense exposure to toxic compounds can result in respiratory ailments, mining operations can also seriously degrade the environment. It is possible to think of this degradation as the environmental counterpart of respiratory conditions such as chronic obstructive pulmonary disease (COPD), silicosis, and coal workers' pneumoconiosis (CWP).

Thus, prolonged inhalation of silica dust can cause silicosis, which causes lung tissue to become inflamed and scarred. This illness is permanent and gradually reduces lung function. Parallel to this, continuous resource extraction that prevents ecological recovery fosters deforestation, soil erosion, and water contamination, all of which drastically change ecosystems and frequently cause irreversible harm.



Figure 80: A metaphor used to illustrate the negative effects of mining, in which the landscape, burdened by mining operations, is compared to the lungs, which represent the human body suffering from the toxins. The metaphor highlights how both will eventually suffer harm in comparison to the unharmed environment.

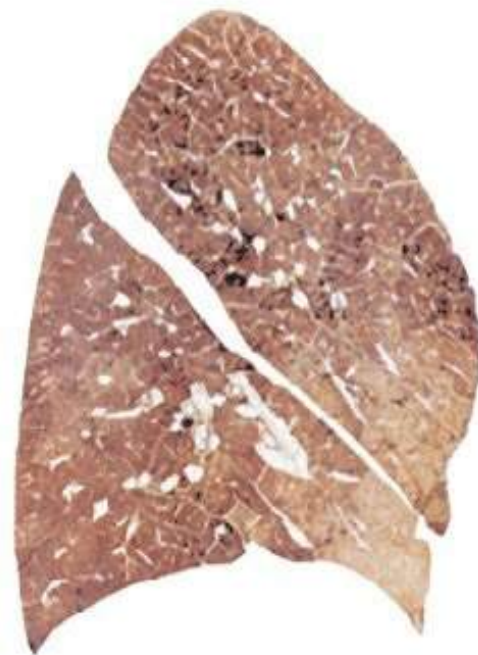
From healthy to diseased lung

In most cases of black-lung disease, small stains and hardened areas of swelling develop in the lungs as a reaction to the dust. Coal macules and nodules, small collections of dust and scarring, are distributed throughout the lung.

Healthy lung tissue



10 years in the mine



20 to 30 years in the mine



Figure 81: About Black Lung [WWW Document], n.d. . Lungs At Work. URL <https://www.lungsatworkpa.org/about-black-lung> (accessed 9.5.24).

The respiratory conditions that miners experience are a metaphor for the wider environmental effects of mining. The lung damage workers sustain from extended exposure to dust and other harmful substances represents the transient nature of their work in contrast to the ongoing harm that is done to their health. This metaphor also applies to how mining affects the ecosystem, as the short-term process of extraction causes long-term ecological destruction.

“Black Lung has been identified as the most serious occupational health threat to the nation’s mining workforce. Since the 1990’s, the National Institute of Occupational Safety and Health has compiled data which shows that the incidence of Black Lung Disease among coal miners with more than 20 years’ tenure has more than doubled, and severe cases of Black Lung have recently been identified in miners as young as 39.” (“About Black Lung,” n.d.)

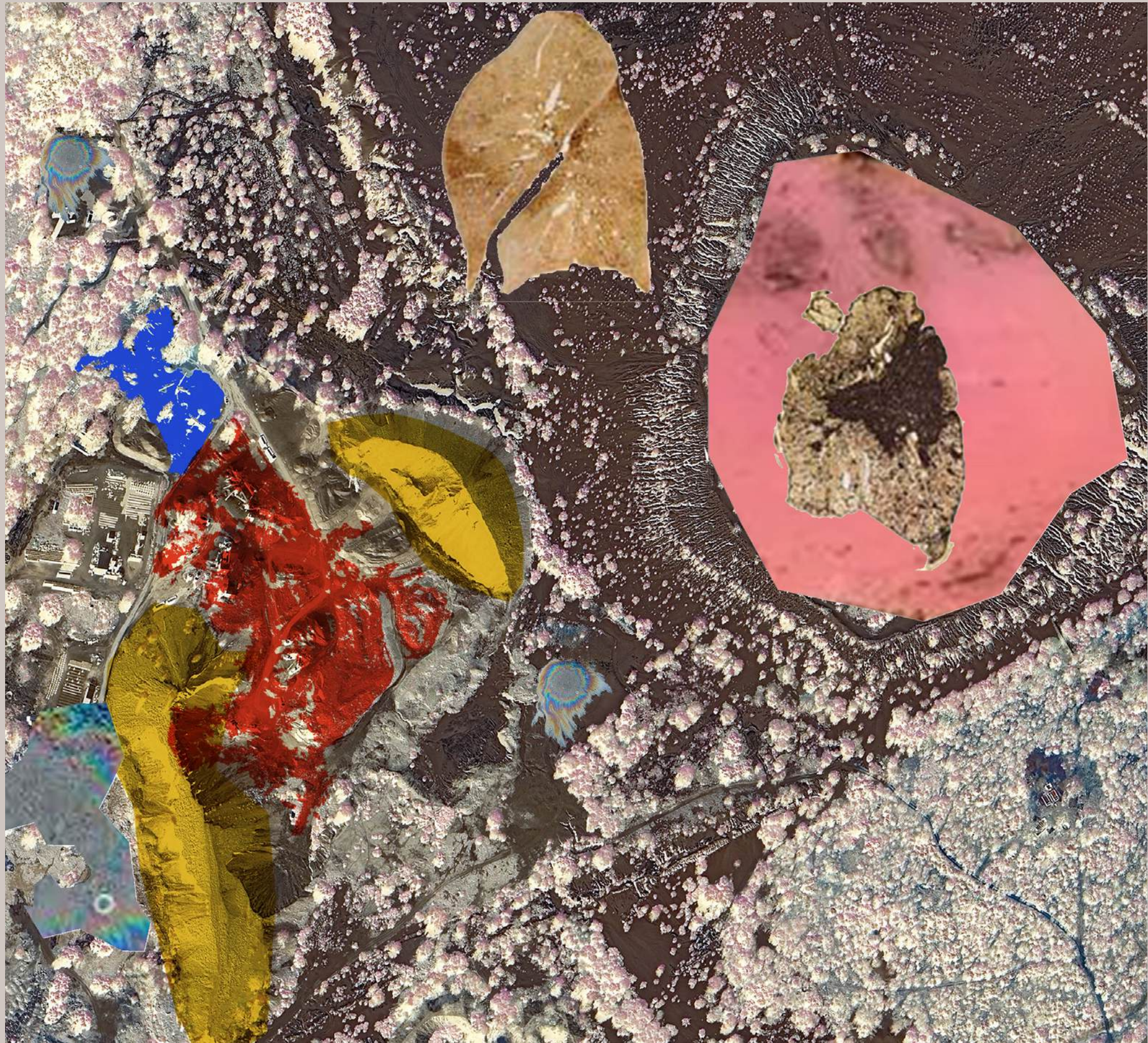


Figure 82: The metaphor of damaged mine workers' lungs and the hues of atmospheric violence in the abandoned Musina copper mine highlight the transient nature of mining activities in contrast to the long-lasting effects on the environment and human health. This analysis draws attention to the fundamental contradiction of the extractive industries: whereas mining is a transient activity, the effects it has are significant and long-lasting. Comprehending this contradiction is crucial in formulating approaches to alleviate the enduring consequences of mining and safeguard the ecology and well-being of the labor force involved in these sectors. Map from google earth and manipulated to highlight the colour of atmospheric violence

Resource Extraction

Oil development in the Niger Delta has resulted in several environmental problems, such as gas flares and oil spills. “The relentless extraction activities have led to widespread environmental degradation, fundamentally altering the landscape and ecosystem.” (Watts, 2004). The cumulative and irreversible damage observed in lung disorders brought on by extended exposure to toxic chemicals is mirrored in this degradation.

To preserve health and perform at their best, the environment and the lung both need times of rest and recuperation. This relates to the mining industry’s use of methods that support ecological balance and regeneration. Ecosystems require time for the restoration of their natural processes and biodiversity, much as healthy lungs require clean air and recuperation time after pollution exposure.

Preventing the detrimental effects of resource extraction can be accomplished by adopting sustainable mining techniques that give ecological health priority and permit rest times. These methods are similar to establishing air quality and decreasing exposure to dangerous contaminants to promote respiratory health. Implementing reclamation programs to return mined land to its natural state is one strategy for sustainable mining.

This entails repairing water systems, replenishing soil fertility, and replanting vegetation. Similar to medical treatments intended to treat lung disorders and promote respiratory health, these initiatives can aid in the healing of environmental harm and assist in the recovery of ecosystems.

The damaging nature of mining activities has led to their being called “atmospheric violence” because they considerably contribute to atmospheric pollution throughout Africa. These pollutants have a negative impact on human health and air quality. They can take many different forms, including dust, particulate matter, and hazardous gasses. Sulphur dioxide (SO2) and particle matter are released by mining operations in the Copperbelt of Zambia, for example, causing extreme air pollution. Research have indicated that these pollutants frequently have concentrations over the WHO-recommended limits, which puts the local population’s respiratory health at risk (Mutambo, 2018).

The degree of environmental deterioration is symbolized by the many colours that manifest as atmospheric aggression, which is characterized by pollution and climate change. The term “colours of atmospheric violence” refers to a spectrum of colours that characterize contaminated environments in addition to the symbolic gradations that indicate the extremes of environmental deterioration. These hues indicate the ecological catastrophes that Africa is currently experiencing visually, since the continent’s landscapes are frequently characterized by industrial pollution, deforestation, and urban sprawl.

The orange, hazy sky over industrial towns such as Lagos and Johannesburg bear witness to the severe air pollution that these regions experience. These colours signal the presence of dangerous contaminants in addition to being aesthetically pleasing. According to research conducted in 2019, Adeyemi et al. found that “the particulate matter (PM2.5) levels in Lagos

frequently exceed the World Health Organization’s recommended limits, posing serious health risks to the population”.



Figure 83: The impact of oil spills in Niger Delta causing environmental problems. Indicating the colours of atmospheric violence onto the environment. madhuri, 2023. The unclean getaway: how international oil is exiting the Niger Delta [WWW Document]. SOMO. URL <https://www.somo.nl/the-unclean-getaway-how-international-oil-is-exiting-the-niger-delta/> (accessed 9.5.24).

Temporality and Architecture

The complex relationship between indigenous land rights and mining activity in South Africa is thoroughly explored in this essay, which is placed against the backdrop of historical land possession, post-apartheid land claims, and changing legal frameworks. The systemic taking of land from indigenous populations was brought to light in the historical review, this legacy still affects modern land disputes and claims. In the aftermath of apartheid, attempts to address these past wrongs have resulted in the creation of legislative structures meant to return land to native owners. But these initiatives frequently clash with the mining sector’s objectives, calling for a careful balancing act between growth and the protection of indigenous rights.

Environmental Impact Assessments (EIAs) and mining licenses are essential tools for regulating the environmental and social implications of mining projects, and current legal frameworks and regulations aim to achieve this balance. In spite of these efforts, indigenous groups continue to be excluded from decision-making processes, which has resulted in a high number of mining lawsuits as they fight for the rights and territory they own. A vivid illustration of the continuous clashes between mining firms and indigenous landowners is the Makhado Projects .

It also explored the wider effects of mining on land ownership and indigenous rights. Although mining can be profitable, it frequently puts indigenous populations’ cultural and environmental well-being in severe jeopardy. To ensure that the opinions of indigenous people are heard and respected throughout the whole

mining project, these conflicts highlight the importance for substantial legislative protections and sincere consultation procedures.

The idea of temporality in relation to mining and its effects on African landscapes came into sharper light. Indigenous mining methods stand in sharp contrast to the fast-paced, frequently destructive nature of modern industrial mining because they are sustainable and in tune with natural cycles. It focused on how the long-term ecological and cultural rhythms of indigenous people clash with the temporality of mining activities, which are motivated by short-term economic rewards.

The contrast between the temporality of breathing and mining, which represents the life-sustaining relationship that indigenous people have with their soil, eloquently illustrates this conflict. This made the case that the unrelenting speed of mining operations breaks this link, with catastrophic consequences for the environment and society. This chronological exploration demonstrated the significance of mining methods that are not solely economical but also sustainable in terms of the environment and culture.

The gap between modern mining practices and the rights of indigenous communities can be narrowed through the use of architecture. Indigenous tribes often have a holistic view of sustainability regarding their land, and honoring these natural rhythms in architectural design can preserve cultural connections. Buildings and constructions that integrate natural cycles and traditional seasonal patterns serve as symbols of respect and appreciation for indigenous

temporal perspectives.

In architectural approaches to mining, it’s essential to prioritize sustainability and restorative justice. Lekgotla offers opportunities for community engagement and ecological rehabilitation. These structures foster sustainable environmental equilibrium for the future while tackling the pollution and deterioration caused by mining with sustainable materials and phytoremediation techniques. The design approach aligns with sustainable construction practices, enhancing their capacity to mitigate the impacts of mining and facilitate environmental restoration.

Incorporating architectural design that aligns with indigenous activities can integrate temporal rhythms. Creating environments that embody indigenous perspectives on time and nature involves incorporating elements such as natural light, ventilation, and thermal performance that align with seasonal changes. This approach not only adheres to sustainable design principles but also fosters a stronger connection between the built environment and the natural surroundings.

Promoting environmental restoration and involving the community can be achieved through architectural ideas that focus on repurposing existing mining infrastructure. Historic mining buildings can be reused for cultural or educational purposes, recognizing the impact of mining on history and providing valuable community assets. This approach helps address past injustices and encourages a sustainable future.



Figure 84: Adaptive Reuse of theTurbine Building and the redevelopment of 1913 Market Hall into a museum. "Seed Crystal" or Cathedral in the Square? Urban Industrial Adaptive Reuse in Contemporary South Africa [WWW Document], n.d. . Society of Architectural Historians. URL <https://www.sah.org/publications/sah-blog/blog-detail/sah-blog/2018/10/04/seed-crystal-or-cathedral-in-the-square-urban-industrial-adaptive-reuse-in-contemporary-south-africa> (accessed 9.7.24).

03 **DISRUPTED LANDSCAPES**

Scars: Damaged Landscapes

Many anthropogenic activities, including mining, industrialization, and agricultural development, have significantly altered the landscapes of Africa. As a result of these alterations, there is a need for novel remediation methods such phytoremediation as well as disturbed landscapes and atmospheric violence. African landscape painters, like Ghanaian Ablade Glover and Sudanese Hassan Musa, have aptly reflected the effects of human activity on the environment by capturing the hues of atmospheric violence in their works. Their paintings frequently feature themes of industrial landscapes, polluted waterways, and decaying metropolitan areas. Vibrant colours are used to evoke the emotional impact of ecological deterioration.

The breathtaking photos of industrial sites and poisonous landscapes that photographer Edward Burtynsky has taken all around the world have captured the colours of atmospheric violence. He captured the grim reality of the human cost of industrialization and resource extraction in his images of open-pit mines, oil refineries, and chemical waste dumps.

The wounds left by human exploitation, social unrest, and ecological destruction are visible on the surface of the Earth. Few human activities have had such a dramatic impact on the environment throughout human history as mining. In landscapes disturbed by mining operations, the visual consequences of environmental degradation and socioeconomic instability are strikingly apparent. Deforested areas, intoxicated rivers and streams, relocated villages, and changed topographies are all heartbreaking examples of how extractive industries affect both people and the

environment.

Like wounds on the surface of the Earth, mining scars are permanent reminders of the intricate web of relationships that exist between human civilizations and the environment. In addition to physically altering the landscape, these scars have a profound impact on the sociocultural and biological fabric of the impacted areas. The effects of mining disruption are felt for many generations and not just in the immediate area surrounding the mines. They are felt across interrelated systems.

In his revolutionary study, Gavin Hilson perceptively notes the complex effects that mining has on both communities and environments. The beginning of mining operations frequently signals the end of customary livelihoods that were based on fishing and agriculture. A cascade of ecological and social effects results from the delicate balance of ecosystems being disrupted by bulldozers tearing through formerly productive lands and poisonous effluents contaminating once pure streams. Social unrest and economic inequality are intensified when communities are uprooted and forced to leave their ancestral lands in the name of profit.



Figure 85: Scars of mining on the landscape. The scarred landscapes created by humanity’s material thirst [WWW Document], n.d. URL <https://www.bbc.com/future/article/20201117-mining-and-anthropocene-landscapes> (accessed 9.7.24).



Figure 86: An illustration depicting a landscape ravaged by mining activities, showcasing the impact of tailings dams, surface mining, and subsurface mining, along with the evident wounds and vivid hues of the destruction inflicted upon the environment.



Figure 87: An illustration depicting a landscape ravaged by mining activities, showcasing the impact of tailings dams, surface mining, and subsurface mining, along with the evident wounds and vivid hues of the destruction inflicted upon the environment.

Case Study 01: Manufactured Landscapes

Edward Burtynsky, 2006



Figure 88: A bright orange river meanders through a desolate, deep brown terrain, standing out sharply against the cold violet background. The striking, unnatural hues combine the aesthetic principles of Fauvism and abstract painting with the raw force of industrial chaos to depict the environmental fallout from metal mining. Photographs: Tailings [WWW Document], n.d. . Edward Burtynsky. URL <https://www.edwardburtynsky.com/projects/photographs/tailings> (accessed 9.6.24).

Edward Burtynsky's 2006 photo series Manufacturing Landscapes: An Artful Reflection of the Impact of Industrialization is one of the most compelling visual examinations of the effects of big businesses on societies and the earth. He presents mesmerizing images of industrial landscapes, which include mining, production, and waste treatment activities, that undoubtedly demonstrate how much human beings can change the natural world.

This paper seeks to explore the intersection of the aesthetic images of Burtynsky's photographic work and the concepts of restorative justice and post-mining landscapes, specifically analysing the powerful connection these two seemingly opposing domains elucidate.

Burtynsky's Manufactured landscapes are visually stunning and otherworldly due to his innovative and out-of-the-box panoramas of industrial structures. His photographs are often taken from the air which enhances the point of interest and objects' structure in the pictures and also highlights the volume of human interference in nature.

This particular type of images transport the viewer to a different level of technicality and volume. From this position, the obvious modification of the environment by the actions of human beings ranging from the colossal landfills of rubbish on the horizon to the immense working open-pit mines that resemble cosmic pits can be seen without any hindrances.

This is above all evident in his compilation of aerial

views which he took of manufacturing landscapes although with regard to the inclusion of human subjects he is an expert at making a human observation from a great distance that does not infringe on it alone because it is almost couple of times altered for he manages exhibiting them within industry extremities.

His portrayal of the environmental devastation caused by industry coincides with ideas on the concepts of sustainable architecture and restorative design. Images showing the scale of destruction wrought by mining and other industrial activities provide grounds on which to uphold the idea that such big wrongdoing to nature deserves attention and care so that they may be done with equity as the guiding principle. Indeed, it is not enough simply to use our emotions to move towards demining and towards industrial leg



Figure 89: The Alberta oil sands highlight the vast scale and ecological consequences of oil extraction. Photographs: Oil [WWW Document], n.d. . Edward Burtynsky. URL <https://www.edwardburtynsky.com/projects/photographs/oil> (accessed 9.6.24).



Figure 90: highlights the striking contrast between the raw extraction of natural resources and the surrounding ecosystem by showcasing the mine's deep, layered landscape. Photographs: Mines [WWW Document], n.d. . Edward Burtynsky. URL <https://www.edwardburtynsky.com/projects/photographs/mines> (accessed 9.6.24).



Figure 91: Illustrates the magnitude of human involvement, presenting the complex, stratified patterns created by extraction operations. Photographs: Mines [WWW Document], n.d. . Edward Burtynsky. URL <https://www.edwardburtynsky.com/projects/photographs/mines> (accessed 9.6.24).

Sacred Sites

Furthermore, the destruction of sacred sites affects indigenous populations deeply, threatening their spiritual well-being and destroying their sense of cultural identity. For many tribes, the land is a sacred place entwined with their collective memory, customs, and beliefs rather than just a resource to be exploited. Indigenous peoples experience trauma that is made worse by the irreversible loss of sacred landscapes, which feeds the cycle of cultural erasure and displacement.

It becomes essential to take comprehensive approaches that go beyond traditional paradigms of environmental restoration to meet the challenges of recovering damaged landscapes. Theoretical frameworks that are based on a sophisticated comprehension of mining interfaces, green landscape panoramas, and atmospheric violence’s colours provide vital insights into the intricate processes that constantly work. It is possible to adapt restoration efforts to meet the various needs and goals of impacted communities by recognizing the interaction between ecological integrity and socio-cultural values.

Indigenous peoples have a strong sense of historical connection to certain places and environments embedded in their collective memory. Ancestral customs, mythology, and daily life are all entwined with these regions. They represent a complex structure of spiritual and cultural meaning that has been developed over centuries.

Sacred places are essential to the identity and continuity of the society since they are frequently the

locations of mythical events, ceremonial ceremonies, and ancestor devotion. The disappearance of these landscapes represents a break from an important cultural and spiritual legacy in addition to physical relocation.

According to many indigenous cosmologies, the earth is a living thing with a spiritual existence and ties to the past. Mythological myths frequently describe how the world was created and how a tribe came to be, typically tying these tales to particular places of worship and geographic characteristics.

For instance, sacred landscapes are said to be the homes of ancestors and spiritual entities in several traditional African religions. Such places are disrupted when they are destroyed, which breaks the connection to spiritual activities and ancestor guidance.

Traditional beliefs and mythological stories emphasize the sacredness of certain places even more. According to Sinthumule (2023), customary taboos have always served as unauthorized protectors for forests and sacred sites. In addition to being cultural taboos, these practices also represent a profound appreciation of the land’s spiritual and ecological significance.

In addition to having mythical and ancestral importance, indigenous cultures rely heavily on sacred landscapes in their everyday lives.



Figure 92: “Natty Samuel reflects on a scared place and sacred people. Cultural tradition often has a deep-seated root in the relationship between our ancestors and their physical environment, helping to continue the human roles as custodians of nature.” (Henwood, n.d.) The Lake Fundudzi has a sacred significance to the Vneda people of Limpopo. Henwood, D., n.d. Meet the Venda – sacred people in a sacred place – Cowley News. URL <https://cowley.news/education/meet-the-venda-sacred-people-in-a-scared-place/> (accessed 9.5.24).

These environments serve as venues for customs, rituals, and social events. These customs are disturbed when these places are destroyed or deteriorated, which makes it harder for the community to carry out rituals that are crucial for social cohesiveness and cultural transmission. Thus, the destruction of holy places has repercussions that affect not just spiritual rituals but also the daily functioning of the community.

Many societies have traditionally associated mountains with spiritual importance. Mountains are venerated as holy sites where divine and ancestral presences appear in Eastern Bantu and Khoi-San cultures. According to Ògúngbilé, Ayantayo, and Labeodan (2021), the ancient cultures believed that mountains served as gates to the divine and utilized them for ceremonies and prayers.

These customs, which emphasized the mountains’ function as intermediaries between the material and spiritual worlds, were firmly embedded in their cosmological and theological systems. Sacred space practices have undergone a significant modification as seen by the conversion of mine tailings, which are commonly viewed as industrial blight, into areas of spiritual value.

Mine tailings, once a symbol of environmental destruction, are being repurposed into prayer mountains in modern-day South Africa. This metamorphosis signifies a profound change in the spiritual and cultural terrain. Communities are repurposing the barren and contaminated areas of

tailings dumps into locations for group prayer and spiritual rejuvenation. The use of mine tailings as spiritual sites reflects a profound connection between people and the environment. The blending of these mine tailings into the natural environment serves as a metaphor of resilience and transformation indicating on how the earth’s ability to heal and adapt.

Reusing mining tailings is in line with the sacred mountains’ ancient customs. As the reading highlighted, imaginative adaptations have allowed the age-old tradition of using natural features for spiritual reasons to continue in contemporary contexts. Converting mining tailings into prayer spots is a type of environmental rehabilitation that is consistent with past practices of blending sacred and natural environments.

“Mupo is anything which is not manmade: the soil, rocks, grass, air everything. These things coexist with human beings, but if we don’t have [them anymore then] we cannot live” (Barnwell et al., 2021) The Limpopo River holds great significance for the indigenous communities residing in its basin, particularly in South Africa’s Limpopo province.

Cultures such as the Venda, Shona, and Tsonga peoples have deeply integrated the river into their spiritual and cultural practices. It is not only a vital natural resource but also an integral part of their spiritual and cultural heritage. The river’s importance in rituals and ceremonies underscores its sacred status and its connection to the local identity.

Barnwell et al. (2022) explains that the Limpopo River is associated with certain customs that highlight its sacred significance. The river frequently serves as the location of rain-making ceremonies, in which community members and traditional leaders carry out customs to guarantee sufficient rainfall and agricultural productivity. These rituals emphasize the river’s vitality and its spiritual significance in preserving the harmony of the social and natural systems.

For indigenous communities, protecting the Limpopo River as a revered natural area is of utmost importance. There have been difficulties in protecting these sacred sites in the face of contemporary pressures including mining, land development, and environmental deterioration. Activities that disturb the river’s biological equilibrium and lessen its spiritual importance put its sacred status at risk.



Figure 93: Venda Traditions and customs’ relationship with the landscape.



Figure 94: The significance of mountains and Rivers in African traditions used as sacred sites for rituals, cleansing and praying. Guide, A.C., 2016. A Visit to Motoulong (Fertility Cave) [WWW Document]. Clarens News & Accommodation. URL <https://clarensnews.co.za/a-visit-to-motoulong-fertility-cave/> (accessed 9.6.24).

Indigenous Mining and Landscapes

The understanding of a landscape’s inherent value beyond its practical use is essential to any restoration project. A mining-damaged landscape is a storehouse of ecological and cultural significance as well as a blank canvas for the exploitation of resources. Therefore, restoration must involve not just the physical repair of ecosystems but also the revitalization of cultural landscapes and the empowerment of underprivileged groups of people.

Mining operations have historically been linked to important sociocultural effects, especially for indigenous groups whose identities and way of life are deeply entwined with the soil. Indigenous peoples have a close connection to their ancestral lands. For these people, the land is a precious object with spiritual and cultural importance, not just a place to obtain resources. Indigenous identities and ways of existence are directly threatened by mining activities because of the often irreparable changes they cause to the environment.

Indigenous populations, who are already oppressed and vulnerable, frequently suffer the most detrimental effects of mining while receiving little compensation. Within these communities, social conflicts and economic inequality are further entrenched by land confiscation, environmental deterioration, and the loss of traditional livelihoods.

This emphasises how crucial it is to protect cultural heritage in the face of environmental change. In the face of outside pressure, it highlights the tenacity and agency of indigenous peoples in defending their

claims to territory, self-determination, and cultural autonomy. Their work adds to larger discussions about environmental justice, indigenous rights, and sustainable development by elevating indigenous voices and viewpoints.



Figure 95: The goldminers of the Kédougou region in Senegal. It indicates the sensitive of indigenous mining to the landscape. Unearthing indigenous knowledge [WWW Document], 2020. URL <https://africasacountry.com/2024/03/unearthing-indigenous-knowledge> (accessed 9.6.24).



Figure 96: “indigenous mining is not a new phenomenon, however, the effects of natural and man-made disasters have always placed a severe burden on indigenous mining” NWU academic shares his thoughts on indigenous mining [WWW Document], n.d. . news.nwu.ac.za. URL <https://news.nwu.ac.za/nwu-academic-shares-his-thoughts-indigenous-mining> (accessed 9.6.24).

The Architecture of Sacred Landscapes, Evident Architecture and Physical Remnants

Sacred sites in these environments include sacred mountains, shrines, and ceremonial grounds that serve as central points for cosmological and spiritual rituals. These areas have been carefully constructed or altered to facilitate ceremonies honouring gods, ancestors, and nature. For example, indigenous communities incorporate locally obtained materials and long-standing building techniques in their carefully thought-out layouts to honour the environment.

Comprehending native terrains necessitates giving as much importance to intangible architectural elements. Among them are the farming methods, hunting grounds, and spiritual routes formed by long-standing cultural practices that have influenced the landscape. The environment is continuously moulded and changed by the people, as they are deeply rooted in the community’s daily practices and religious ceremonies.

Daniel G. Cooper’s concept of “spiritual geography” adds an important element to this understanding. Cooper argues that landscapes contain numerous cultural narratives and spiritual meanings, elevating them beyond mere physical environments. Cooper asserts that a landscape’s spiritual geography is shaped by the way its inhabitants perceive and interact with it, integrating conventional wisdom, legendary elements, and holy sites within the geographical space. According to Cooper (2010), this point of view highlights the significant impact of spiritual and cultural factors on the design and purpose of indigenous landscape architecture.

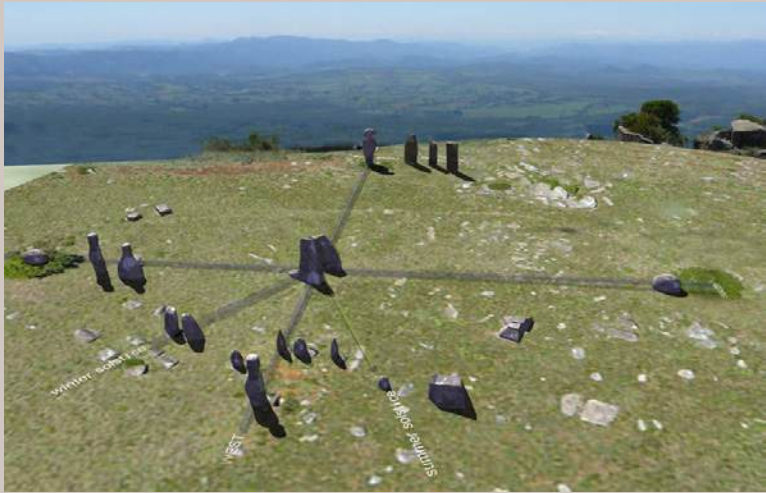


Figure 97: Blaauboschkraal stone ruins “Inzalo Yi’langa” or “Birthplace of the Sun”, where humanity was created by the gods. Sacred ceremonies were held at this site for thousands of years that ended sometime in the 1950s.” About – Stone Circle Tours, n.d. URL <https://www.stonecircle-tours.co.za/about/> (accessed 9.6.24).



Figure 99: Situated 300 km south of Harare, close to Masvingo and Lake Mutirikwi, Great Zimbabwe is a revered location and UNESCO World Heritage site. Great Zimbabwe second biggest monument in Africa [WWW Document], n.d. URL <https://anita-posch.com/great-zimbabwe> (accessed 9.6.24).



Figure 98 :Traces of the Blaauboschkraal stone ruins About – Stone Circle Tours, n.d. URL <https://www.stonecircle-tours.co.za/about/> (accessed 9.6.24).

Planetary Justice and Healing in the Anthropocene

The conversation about indigenous landscapes is further complicated by the ideas of planetary justice and “healing” in the Anthropocene era. Johnson and Sigona (2023) explore how taking into account the impacts of environmental decline on Indigenous communities could be influenced by the concept of planetary justice, which includes environmental, social, and cultural aspects. Johnson and Sigona (2023) argue that a comprehensive approach to healing in the Anthropocene must consider the interconnectedness of ecological and cultural systems, along with the importance of justice in addressing historical injustices and promoting equitable solutions.

In this context, restoring indigenous landscapes involves restoring these regions culturally and spiritually as well as physically repairing harmed environments. This dual approach aligns with the principles of planetary justice, which require a comprehensive understanding of social and environmental justice and the incorporation of indigenous perspectives and knowledge systems (Johnson & Sigona, 2022).

Therefore, the healing process becomes a way to address both the cultural displacement that Indigenous groups face and the ecological effects of development. “Planetary Justice’ (PJ) refers to social-ecological justice for humans and non-humans alike and emphasizes the multi-scalar aspects of justice for earth systems as a whole. “(Johnson and Sigona, 2022)



Figure 100: Planetary Justice: Restoring ecological balance and cultural heritage while healing the planet from the scars caused by extractive industries.

Post Mining Landscapes

The conversion of post-mining landscapes into verdant vistas is evidence of human resourcefulness and environmental responsibility. These locations, which range from earthly scars to thriving ecosystems, show the possibility of regrowth and revitalization. Landscapes that have been mined extensively frequently experience severe environmental deterioration, such as soil erosion, habitat loss, and water contamination.

However, these places can be turned into healthy ecosystems by carefully planned reclamation initiatives. “Ecological restoration in post-mining landscapes offers opportunities to enhance biodiversity, improve ecosystem services, and mitigate environmental risks.” (Alani et al.2019). Green landscape panoramas become active centres of biodiversity when they restore native vegetation, hydrological processes, and habitat corridors.

The story of South Africa’s post-mining environment’ metamorphosis is one of resiliency, adaptation, and spiritual regeneration. Natural processes and cultural initiatives can aid in the recovery of industrially damaged landscapes. A strong bond exists between humans and the environment, as evidenced by the utilization of mine dumps as spiritual sites. The manner in which that mine dumps blend with the environment is a metaphor for resilience and change, showing how the earth can heal and adapt.

Mine dumps are being reclaimed as spiritual locations, signifying resilience and change and highlighting the close relationship between humans and the natural

world. Mine dumps in Johannesburg’s Soweto neighbourhood are now revered by the locals as important spiritual places.

Today, customs and ceremonies are held amidst these imposing ruins of gold mining in the belief that these perform ceremonies on them. By emphasizing the strong cultural and spiritual ties to the land, the dumps’ physical height symbolically elevates the practitioners’ connection to the spiritual realm.

The reclamation of mining dumps in the West Rand has also taken on a spiritual dimension. These areas have been turned into memorial sites by community-led initiatives, where people come to honour those who perished because of mining operations. These locations are spaces for introspection and recovery, where the neighbourhood can grieve and find comfort together.

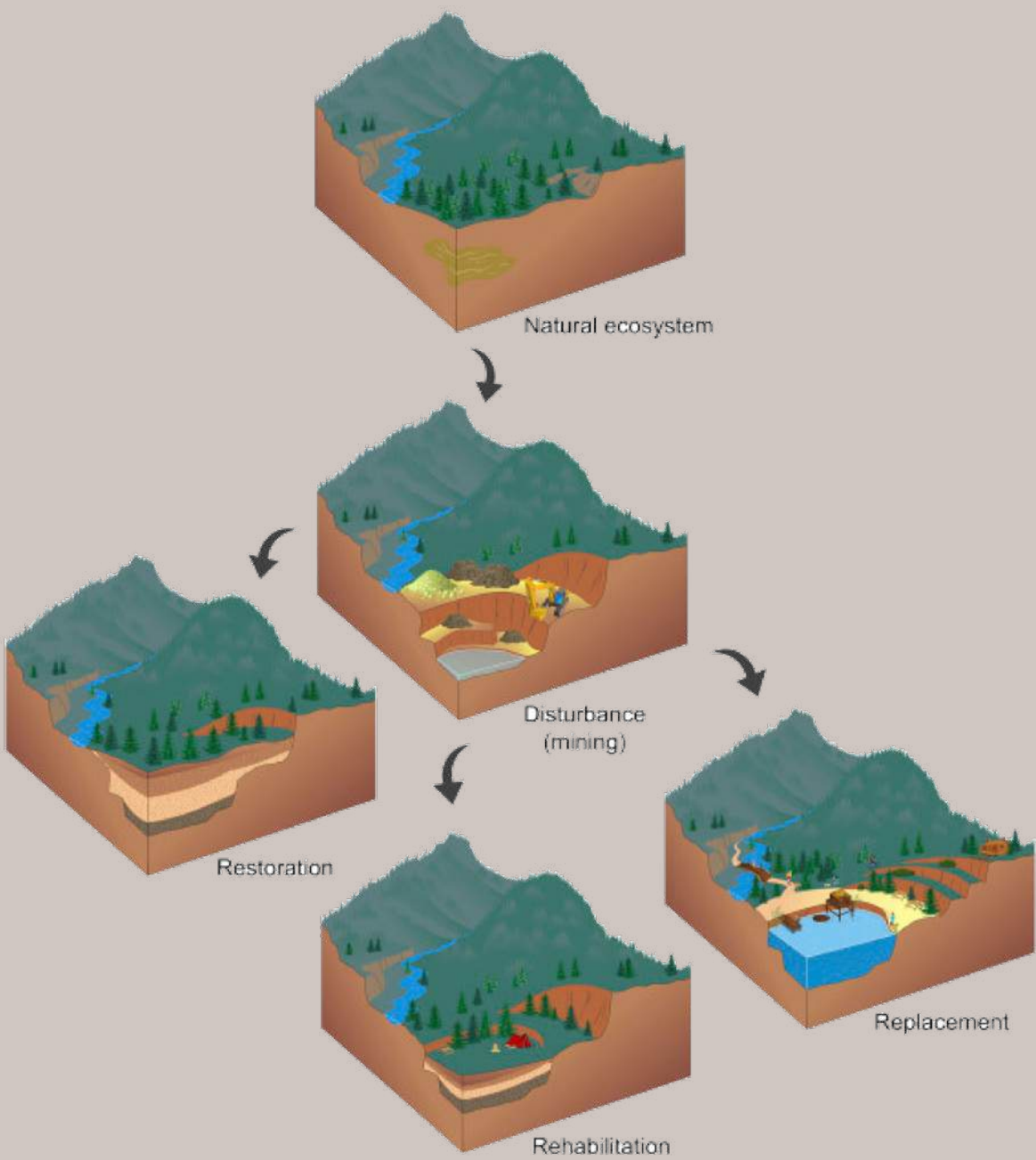


Figure 101: Post-mining landscapes and possible opportunities for rehabilitation. Favas, P.J.C., Martino, L.E., Prasad, M.N.V., 2018. Chapter 1 - Abandoned Mine Land Reclamation—Challenges and Opportunities (Holistic Approach), in: Prasad, Majeti Narasimha Vara, Favas, P.J. de C., Maiti, S.K. (Eds.), Bio-Geotechnologies for Mine Site Rehabilitation. Elsevier, pp. 3–31. <https://doi.org/10.1016/B978-0-12-812986-9.00001-4>

Green landscape views are significant for many reasons other than just the environment, they also improve the social cohesion of the local community. Biologist Soini explains that “Reclaimed post-mining landscapes provide recreational opportunities, aesthetic enjoyment, and cultural heritage preservation.” (Soini et al.2020) These sites serve as gathering places for community events, educational activities, and outdoor pursuits, which helps locals feel connected and proud of their neighbourhood.

In addition, revitalizing post-mining landscapes can raise real estate values and draw tourists, boosting regional economies and encouraging sustainable growth.

Green landscape panoramas are largely the result of technological and procedural advancements in reclamation. Improved restoration processes are made possible by these advances, which range from drone-based monitoring systems to soil stabilization techniques. Jürgen Bauhus describes these interventions: “Integration of ecological knowledge with engineering expertise is essential for achieving long-term sustainability in post-mining landscapes,” (Bauhus et al.2017).

Practitioners can ensure the viability of reclaimed areas for future generations by optimizing the ecological resilience and functional variety of these sites through the application of interdisciplinary methodologies. Although there has been progress in recovering post-mining landscapes, many obstacles still stand in the way. Stakeholders must negotiate a challenging

environment of conflicting interests and agendas, from financial limitations to regulatory obstacles.

Furthermore, there are continuous remediation issues resulting from the legacy of mining activities, such as contaminated soils and water bodies. These challenges, nevertheless, also offer chances for innovation and collaboration. The intricate issues of post-mining landscape restoration can be addressed holistically by establishing collaborations between local communities, industry players, and government organizations.



Figure 102: Limpopo River, showcasing both the region’s natural beauty and its environmental challenges. The lush riverside illustrates the clash between industrial growth and conservation, providing a clear contrast to the impact of nearby mining activities. This viewpoint effectively highlights the complex equilibrium required to maintain the river’s vital role in sustaining the surrounding ecosystems and indigenous communities. Alexandra, 2019. The Great Grey-Green-Greasy Limpopo: Great Rivers of Africa! Alexandra’s Africa. URL <https://www.alexandrasafrica.com/great-rivers-of-africa/> (accessed 9.7.24).

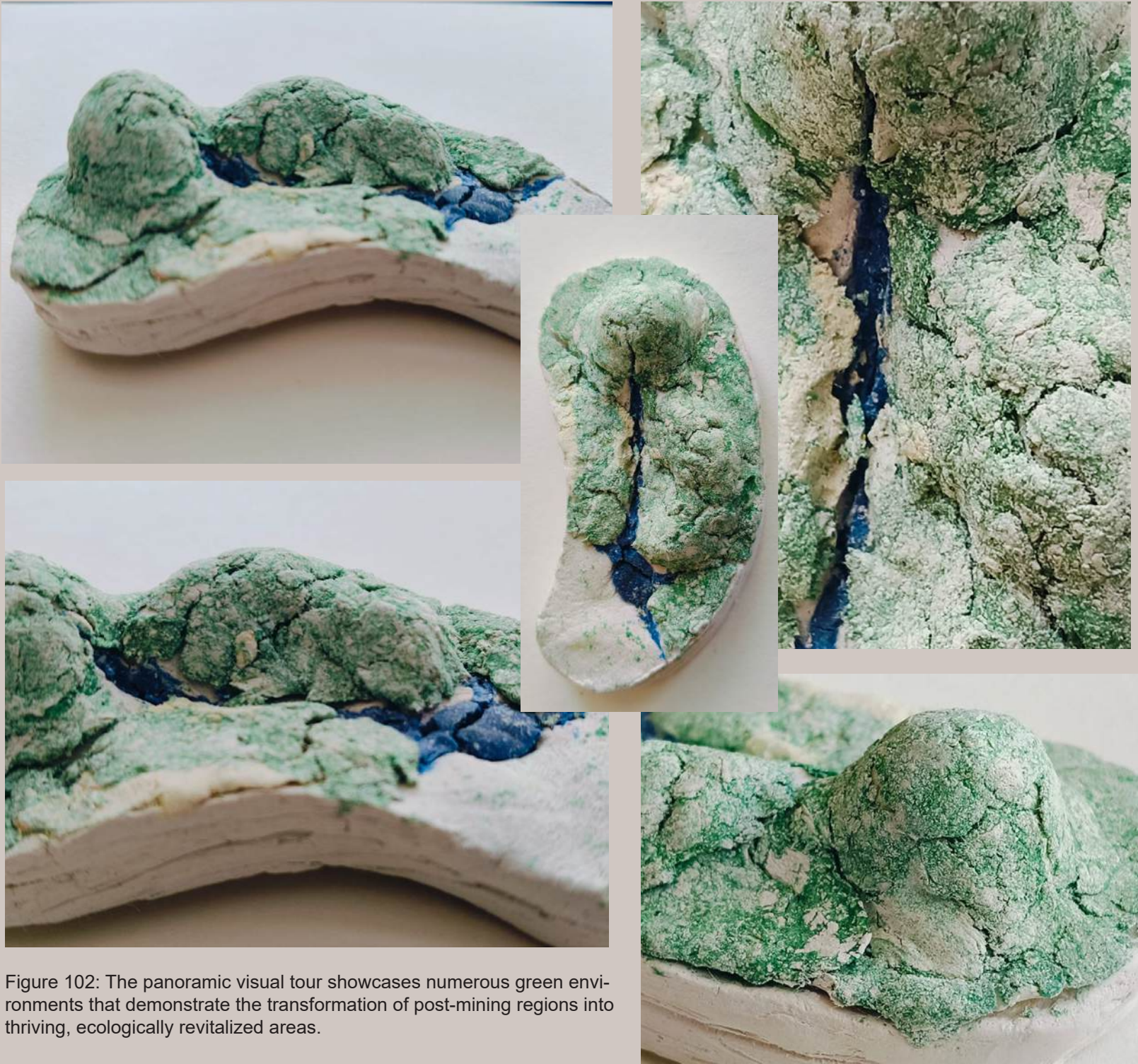


Figure 102: The panoramic visual tour showcases numerous green environments that demonstrate the transformation of post-mining regions into thriving, ecologically revitalized areas.

Case Study 02: Anthropocene: The Human Epoch

Edward Burtynsky,2006

“I have come to think of my preoccupation with the Anthropocene — the indelible marks left by humankind on the geological face of our planet — as a conceptual extension of my first and most fundamental interests as a photographer. I have always been concerned to show how we affect the Earth in a big way. To this end, I seek out and photograph large-scale systems that leave lasting marks.” (“Photographs,” n.d.)



Figure 103: Illustrates the conflict between industrial advancement and environmental deterioration, focusing on the artificial landscapes that redefine natural areas in the Anthropocene age.

The project Anthropocene: The Human Epoch, by Edward Burtynsky, significant outpouring of Burtynsky’s research into the colossal effects of humankind on our Earth by going deeper as a Study on Anthropocene. This geological period that has been a matter of argument is characterized by the significant impact of humans on the planet in other ways, such as changes in ecosystems and geology. Among its encompassing emotions and principles, the added significance this case study holds for understanding post-mining landscapes and issues related to restorative justice has moved a lot of Burtynsky’s work.

This case study consisting primarily a visual critique of the Anthropocene’s tenants challenges the viewers to examine the totality of human activity and its subsequent impact on the globe. The Burtynsky’s work elucidates the intricate relationship between the environment, society, and economy rather than placing blame on people, therefore, prompting the viewers to be reflective on their own role in forming the future of the Earth.

The areas within the series of photographs tend to instigate a sense of urgency and stewardship and, consequently, a requirement for a more profound understanding of the devastation caused by the Anthropocene. Through his pictures, he appeals to humanity for action, suggesting that it can do something about the Times that everybody lives in.

He demonstrated the consequences of resource extraction on the side of the environment, then the apparent need for an action that would be both permanent and sustainable orders of the means used in an exploitative industry such as mining. In Burtynsky’s confirmation that there is the evidence of devastating environmental consequences that have been inflicted on the planet, the call for a reflective and inclusive approach that is premised on justice arises.

Thus, these evidently include realizing the enormity of

the depicted disasters and consequently suggesting remediation that cannot only but care for the affected environment but rather the mining communities



Figure 104: An enormous tract of cleared land that was formerly rich in biodiversity has been replaced by straight lines of palm oil plants. The bleak, industrialized landscape belies the environmental cost of widespread deforestation, casting doubt on how to strike a balance in the contemporary world between ecological loss and economic gain.



Figure 105: Deforestation’s glaring, geometric scars stand out against the surrounding landscape, highlighting the terrible effects of industrial agriculture on the ecosystem.

Photographs: Anthropocene [WWW Document], n.d. . Edward Burtynsky. URL <https://www.edwardburtynsky.com/projects/photographs/anthropocene> (accessed 9.6.24).



Figure 106: An photograph of a coal train highlights the complex interplay between the natural and built surroundings, as well as the significant negative effects that coal mining has on local residents and the environment.

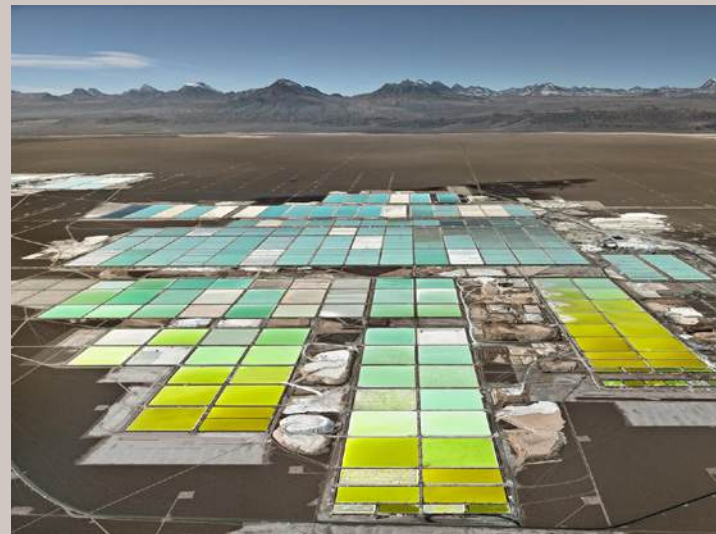


Figure 107: The extensive lithium salt flats, which are a component of the artificial landscapes created by contemporary extraction industries, emphasize the environmental consequences of mining in the Anthropocene-era.



Figure 108: An aerial photograph of the Niger Delta's oil bunkering highlights the severe effects of illicit extraction and environmental damage.



Figure 109: Showing the long-term effects of phosphorus mining on the environment as well as its ecological ramifications, the image is a chilling monument to the environmental damage brought about by extractive industries.

Photographs: Anthropocene [WWW Document], n.d. . Edward Burtynsky. URL <https://www.edwardburtynsky.com/projects/photographs/anthropocene> (accessed 9.6.24).

Economic Stakeholders

In South Africa, mining interfaces refer to the intricate network of relationships that exist between different groups of stakeholders, such as laborlabour unions, local communities, government agencies, and mining companies. In order to control the socioeconomic and environmental effects of mining activities in the nation, these interfaces are essential. Comprehending these interfaces necessitates a multifaceted methodology that considers the viewpoints and concerns of all

stakeholders involved.

“The mining sector has been historically associated with exclusionary practices and social inequalities, particularly in terms of access to land, resources, and opportunities” (Tawodzera, et al., 2019). The dynamics of mining interfaces are still shaped by this past, since communities frequently experience exclusion and marginalization from decision-making procedures.

Resource depletion and environmental degradation significantly complicate the mining interfaces in South Africa. The mining sector contributes significantly to habitat degradation, deforestation, and air and water pollution, all of which have an adverse effect on regional ecosystems and biodiversity (Chamber of Mines South Africa, 2017). For all parties involved, striking a balance between the financial advantages of mining and the requirement for environmental sustainability is a crucial task.

In South Africa, outreach to the community is still another crucial component of mining interfaces. Building trust, resolving issues, and assuring that mining projects contribute to sustainable development outcomes all depend on effective interaction with local people (Musingwini & Letsoalo, 2018). However, obstacles like inequality in power, cultural inequalities, and language difficulties frequently arise during community participation procedures.

Labour agitation and strikes in the nation’s mining industry have a long history, motivated by concerns over low pay, unfavourable working conditions, and what is believed to be worker exploitation (Fine & Rustonjee, 2016). Stability and productivity in the mining industry depend on mining corporations and labour unions developing positive working partnerships.

The necessity for cooperative methods of managing mining interfaces in South Africa has come to light more and more in recent years. This includes initiatives including community development efforts,

sustainability reporting systems, and multi-stakeholder dialogues (Munslow, 2019). The underlying tensions and conflicts that frequently define mining interfaces can be addressed with the support of these approaches by promoting greater openness, accountability, and inclusivity.

In Musina and therestoftheVhembeDistrict,community leaders and spokespeople serve as intermediaries between the local residents and external entities like mining companies and government agencies. These people have a big say in the management of the community’s needs, particularly when it comes to issues such as land rights, environmental fairness, and equal access to resources.

Chief Tshivhase of the Vhavenda people is a prominent leader in the area, who is a strong defender of the sacred locations and a promoter of the local community’s benefits from mining operations. Another important person was the late Sefako Makgatho, who helped the Marikana miners’ strike and and highlighted the exploitation of workers in the mining sector. While Makgatho was not from Musina, his activism resonates with the struggles faced by mining communities across South Africa.



Figure 110: Opening Up the Discussion on Mining Land Claims: Local Chiefs, Labor Unions, Communities, and Corporate Giants In South Africa, a Struggle for Justice, Land, and Sustainability

A Framework for Collaborative Restoration

A crucial aspect of enhancing the social and ecological sustainability of landscapes after mining is the participation of mining companies in the reclamation efforts. It's essential to make mining companies accountable for their role in rehabilitating these regions and the environmental harm they cause.

Recent research in South Africa indicates that mining companies should proactively participate in post-mining rehabilitation efforts that extend beyond mere legal obligations to include enduring ecological and socioeconomic recovery (South African Human Sciences Research Council, 2019). This may involve legally enforceable commitments to rehabilitate damaged land, including aspects of biodiversity, water resources, and soil health.

Mining companies should finance and oversee ecological restoration efforts, including reforestation, reintroduction of native species, and rehabilitation of mining waste. Ikuenobe (2021) argues that restoring the ecological and cultural dimensions of land should be included in reparative actions for communities affected by mining, and the participation of mining companies in these efforts would align with principles of ecological justice.

The social acceptance of the reclamation process can be enhanced by integrating community-led decision-making into post-mining environments. In South African mining communities, the continual engagement between local populations and mining companies is crucial for mitigating the adverse social impacts of mining activities. Establishing trust and fostering a

feeling of ownership over the reclaimed land require the development of collaborative environments for dialogue, joint design, and collective decision-making. In these spaces, local communities can voice their worries, share their traditional ecological insights, and ensure that restoration initiatives align with their financial, spiritual, and cultural needs.

Mining corporations should be encouraged to make investments in the socioeconomic rehabilitation of communities impacted by their operations in addition to environmental rehabilitation. Communities can gain long-term advantages from the development of sustainable livelihoods through investments in ecotourism, renewable energy projects, or vocational training programs .

Mining companies ought to be motivated to invest in the socioeconomic recovery of communities affected by their activities, along with environmental restoration. Communities can obtain enduring benefits from creating sustainable livelihoods by investing in ecotourism, renewable energy initiatives, or vocational training schemes.

These initiatives would allow mining firms to offer compensation that exceeds mere environmental restoration, fostering economic renewal in regions impacted by mining activities. The suggested Mining Activism/Research Centre is crucial in connecting mining companies with the communities impacted. This area acts as a platform for continuous discussion, enabling the assessment and oversight of mining companies' social and environmental duties. The Centre will promote transparency by recording the advances

in reclamation activities and ensuring corporations are responsible for fulfilling their commitments. It will also create a venue for the community to express concerns and guarantee that the company's actions correspond with the tenets of restorative justice (Watson, 2019).

A robust legislative framework is necessary to hold mining companies accountable for the lasting environmental and social impacts of their activities. The Land Court in South Africa is redefined as an entity that enforces mining companies' obligations under environmental laws while also addressing conflicts related to land restitution. Responsibilities for post-mining land reclamation must be incorporated into South Africa's environmental legislation, including the National Environmental Management Act (NEMA), ensuring that companies are legally required to aid in the rehabilitation of impacted ecosystems (Simpson, 2018).

Case Study 03: The Marikana Miners' Strike

When people think of the 2012 miners' strike in Marikana, there is a good chance that they recall this pivotal event as the one incident in South African mining history that had significant consequences. The striking police killings of thirty-four miners exposed deep-seated problems present in the mining sector such as exploitation of workers, substandard working conditions, and the absence of response mechanisms by the mining companies to the needs and entitlements of the workers.

All it took for the workers to prompt the mine management and government was for them to assert their rightful demand for wages that corresponded to their work, better working conditions, and fair treatment. Lonmin, the mining firm at the forefront of the situation, and the government were at best caught flat-footed and antagonistic (Fine & Rustomjee, 2016).

By looking at the context of the Marikana massacre, one can clearly see that in South Africa's mining sector, there is an inequality of power that remains entrenched. Workers create amazing wealth for the mining sector by working hard and producing tons of minerals, but they seem to be just observers in the process of making vital decisions for the industry.

In particular, Marikana is indicative of the lack of adequate social and economic benefits in mining communities and a situation whereby the positive outcomes of mining are not experienced equally. The voices of the miners and the residents of the impacted communities have been ignored when it comes to the distribution of wealth that is a result of mining therefore

contributing to the growing inequality within these communities.



Figure 111: Marikana massacre 12th anniversary. Leader Mgcineni 'Mambush' Noki. Khoza, A., n.d. Marikana massacre, 12 years on: Time for reflection because mineworkers are “unsung heroes of SA” [WWW Document]. News24. URL <https://www.news24.com/news24/politics/marikana-massacre-12-years-on-time-for-reflection-because-mineworkers-are-unsung-heroes-of-sa-20240816> (accessed 9.5.24).



Figure 112: Mineworkers striking near Lonmin Platinum Mines' Marikana mine at Rustenburg. Some Marikana miners say they will fight to the death [WWW Document], n.d. . TimesLIVE. URL <https://www.timeslive.co.za/news/south-africa/2012-08-18-some-marikana-miners-say-they-will-fight-to-the-death/> (accessed 9.5.24).

Case Study 04: The Save Mapungubwe Coalition

The Save Mapungubwe Coalition through which it has been actively opposing mining activities posed to the Mapungubwe Cultural Landscape which is a UNESCO World Heritage Site located in the Limpopo Province. The coalition, made up of the community-based organizations, academic institutions, and local community leaders, has been spearheaded the protection of this culturally and environmentally significant area from the encroachment of mining activities.

Mapungubwe Cultural Landscape is not just a historical site but also holds a lot of spiritual importance to the local communities, the Vhavenda people in particular. Nonetheless, the region is rich in mineral resources causing the conflict between the demand for economic development via mining and the necessity for preservation of the cultural heritage and the environment.

The Save Mapungubwe Coalition is doing an excellent job in the area and we are all aware of the importance of community engagement in the interface between mining and the source of national development. It also indicates the difficulties of the development of the economy and the protection of cultural and ecological values, more so in the regions where the communities have deep ties with the land and their spiritual background and history is largely dependent upon the land

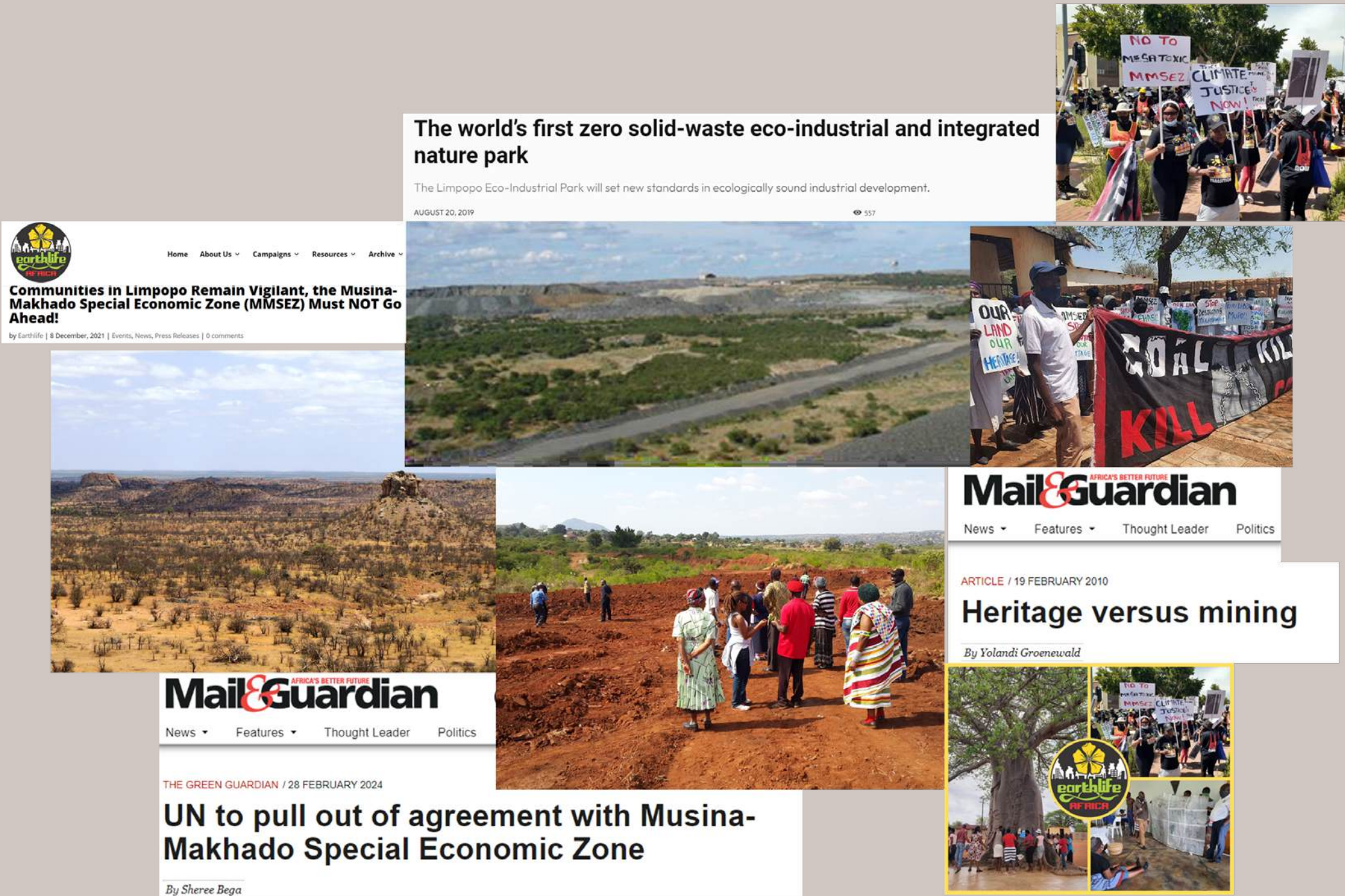


Figure 113: Collage of articles regarding the Makhado-Musina SEZ Project how the community is concerned about the environmental impacts. Heritage versus mining – The Mail & Guardian [WWW Document], n.d. URL <https://mg.co.za/article/2010-02-19-heritage-versus-mining/> (accessed 9.5.24). Omarjee, L., n.d. UN body may withdraw support from the Limpopo industrial park [WWW Document]. Business. URL https://www.news24.com/fin24/climate_future/news/un-body-may-withdraw-support-from-the-limpopo-industrial-park-20240301 (accessed 9.5.24). (Earthlife, 2021)

Mining and Environmental Justice in Limpopo

In Limpopo, the movement for environmental justice has grown because of the negative effects of mining on the local inhabitants and their ecology. There are many mining activities in the province, which are rich in South Africa's mineral wealth and occupy the largest portion there. Such mining activities have caused deforestation, water pollution, and habitat destruction. For their livelihoods, the local community members who are mostly human beings and hence need the soil for farming and they also have a great connection with the Earth's natural world.

In Limpopo, environmentally marginalized justice has made progress in their efforts to counter the negative effects of mining on the local communities and ecosystems. This province, which is rich in minerals like South Africa, has seen a lot of mining activities which have resulted in deforestation, pollution of water, and destruction of the habitats. These environmental issues have deeply affected the local communities, a vast majority of which are land-based and have strong cultural ties to the natural environment.

Mining in Limpopo has been a mixed bag, giving economic opportunities while destroying the environment and the society at the same time. Coal mining, in particular, has been the main driver of widespread deforestation, air and water pollution, and the damage of agricultural land. These losses have not only spoiled nature, but it has also put the health and life of the local people at risk." Community members interviewed for the report also complained of polluted water sources and many suggested that they and their livestock suffered serious health complications."

(Broughton, 2022)

Around the Waterberg region, the site called Energy Gateway which encompasses the enormous reserves of coal in South Africa, people have been significantly affected. The Vele Colliery, a mine operated by Coal of Africa Limited, has been subjected to legal actions from the environmental aspect, among others, climate change and the nearby Mapungubwe Cultural Landscape, a UNESCO World Heritage Site. (Green Times, 2021) , however, does report that organizations and local communities are worried about the mine's effects on climate change, air pollution, and the scarcity of water resources, which are already in short supply in the area.

In response to the environmental destruction caused by mining, residents in Limpopo have taken it upon themselves to establish environmental justice groups. An example of it is the Sekhukhune Environmental Justice Network (SEJN) that is not only active but as well as is campaigning for the rights of the communities that have been negatively affected by mining activities.

It is through their initiatives that SEJN actively contributes to the advancement of knowledge related to the environmental and health impacts of mining, and sustainable development and accountability for their actions of mining companies. (Mail & Guardian, 2021). SEJN took the lead in rallying the locals to demand that the mining firms observe strict environmental management rules and ensure that the government implements the environmental law to the letter.

Additionally, the network acts as an open forum for the members of the local society to express their concerns and engage in discussion with the investors, the government financial institutions, and NGOs. This is the people's way of resisting the greed of the powerful mining companies, which entraps them in the web of pollution and exploitation by standing up and taking control of their environment.

The study by Selo and Ngole-Jeme (2021) provides a significant contribution towards community perception of mining's environmental and social impacts in Limpopo. The research discovered that in addition to the mining community associating it as an opening for economic opportunities, it also has detrimental impacts such as land pollution, water contamination, and the relocation of communities. These effects have raised a lot of negative connotation regarding the issue which has further led to the local people not been able to trust the governing bodies and thus they feel like they do not have a say in the decision-making.

The report also deals with the issues of these perceptions for corporate social responsibility (CSR) in the mining area. The basis of the essay is that miners should not only fulfil the required legal obligations, but they must communicate with the community they reside in and address the viable interests of the people. This means crafting sustainable projects, giving appropriate compensations for environment impairment and making the local communities the gross of the economic gains derived from mining the sole beneficiaries.

The very CSR framework in the mining industry through CSR is increasingly admitted as a path to mitigate a negative impact of mining and to improve the sustainability of development. Nonetheless, practices in the financial market area often betray a deep contradiction between the philosophy of CRP and the actual implementation in the community. Many Limpopo residents are still pushed aside and have to bear the tremendous ecological and economic costs

of mining, while they are not even getting any good in return.

A more holistic and community-centred approach to CSR is what It needs not only complying with the environmental regulations but also actively engaging with communities to understand their needs and concerns. Companies should prioritize transparency and accountability in their operations and work collaboratively with local stakeholders to develop sustainable solutions that are not harmful but are a plus to the environment and the communities.

Likewise, community-held mining companies should not only ensure environmental compliance but administer environmental programs, including reforestation and conservation projects. It needs not only complying with the environmental regulations but also actively engaging with communities to understand their needs and concerns.

Companies should prioritize transparency and accountability in their operations and work collaboratively with local stakeholders to develop sustainable solutions that are not harmful but are a plus to the environment and the communities. This includes not only complying with environmental regulations but also actively engaging with communities to understand their needs and concerns. Companies should prioritize transparency and accountability in their operations and work collaborators.



Figure 114: Fight for environmental justice by the community and organisation against the enviromental harm done by mine activities.

04 **CRITICAL REGIONALISM**

Critical regionalism aims to bring balance between the regional originality and modernism as a global movement by integrating local and global concepts into architecture and planning. This approach attempts to address all the impacts brought by mining or extractive industries on the environment, society, and culture in post mining landscapes of South Africa and Africa. This chapter highlights how critical regionalism can be used to rehabilitate and reimagine post mining landscapes, and how spirituality and local customs, identity and cultural continuity and cultural cartography can be tools used in this process.

The contradiction between modern industrial objectives and indigenous landscapes has caused a clash between spirituality, traditional customs and mining activities in Africa. The growth of the industrial interventions now indicates the conflicts that arise globally. It is significant to protect and reclaim these sacred, archaeological sites through processes of post mining rehabilitation to preserve the strong and significant connection that African customs have on the environment. Africans are believers that landscapes are spiritual and are important to their identity and history.

”The acceptance of interdependence between humans and nature is very common in African communities; it shows the collective responsibility to make sure that resources are not vanishing. This proposes that environmental conservation is a collective responsibility which emerged out of the indigenous and accumulative knowledge of millions of people. They understand that the practice and value of environmental conservation is a spiritual and social responsibility and if anyone goes

against the values, person will have to face punishment from spiritual world.” (Rawat & Mishra, 2019)

A UNESCO World heritage site, the Mapungubwe cultural landscape is facing threats due to the nearby mining activity, and it is in jeopardy which affects the spiritual, historical, archaeological significance of this landscape. The reclamation and preservation processes ought to include indigenous knowledge systems and spiritual practices to ensure that the restorations are not only physical but spiritually and culturally regenerative.

The spiritual customs of indigenous African communities are deeply rooted in their interaction with the land. The landscape that surrounds Musina is a sacred site with ancestor stories woven into it, which makes it an important resource for the community. By disrupting this sacred site, mining operations threaten the preservation of cultural and spiritual heritage. One of the primary concerns of the Save Mapungubwe Coalition is the risk of causing damage to valuable historical and sacred sites in the name of economic growth.

When architects incorporate indigenous beliefs and traditions into their designs, they can effectively address the spiritual and heritage impacts of mining. Designing sustainably and preserving cultural integrity can be achieved by using local native building materials and techniques.

Understanding cultural community cartography is essential for grasping the spatial aspects of indigenous

knowledge and activities. Traditional Musina cartographies not only map physical landscapes but also cultural histories and spiritual significance. These symbolic and narrative maps, as noted in Indigenous Cartographies and Representations (2019), serve as repositories of cultural memory and identity, reflecting the close bond between communities and their environment.

The preserved and conserved cultural asset of the Richtersveld cultural and botanical landscape in South Africa highlights its historical significance and traditional land use practices. Community-based initiatives focused on environmental conservation and cultural heritage preservation have contributed to the area’s recognition. These examples showcase the application of critical regionalism as an approach to mitigating the impacts of mining on the landscape and society.

Communities participate in creating maps that reflect their experiences, values, and knowledge through participatory mapping, which empowers them by ensuring their perspectives are considered in decision-making. According to Rambaldi et al. (2006), participatory mapping can be a powerful tool for community empowerment, allowing marginalized groups to document and assert their rights and interests.

In post-mining areas, participatory mapping guides reclamation efforts, identifies sites of spiritual and historical importance, and emphasizes the cultural and environmental impacts of mining. For example, in the



Figure 115: Opposition of the homogenizing effects of globalization, Rich’s design takes inspiration from the local context, embracing the cultural and environmental distinctiveness of the Mapungubwe region in South Africa. Critical Regionalism [WWW Document], 2012. . SkyscraperCity Forum. URL <https://www.skyscrapercity.com/threads/critical-regionalism.1962991/> (accessed 9.6.24).

Niger Delta, participatory mapping has been used to document the social and environmental consequences of oil production, providing a basis for community-led restoration projects (Adekola & Mitchell, 2011). Understanding the complex connections between communities and their surroundings necessitates mapping cultural narratives and traditional land use practices, as these stories reveal how historical events, cultural traditions, and beliefs have shaped specific landscapes. By incorporating this knowledge into reclamation initiatives, restoration efforts can become more culturally sensitive and responsive to local needs.

The Indigenous San populations in South Africa have deep cultural connections to their land, which encompass valuable oral traditions and ecological knowledge. Incorporating these narratives into post-mining landscape restoration can help preserve cultural heritage and promote sustainable land use practices.

Creating environments that honour and protect the cultural identities and values of local communities is referred to as “place-making.” In post-mining contexts, this technique is essential as mining activities can disrupt community identity and unity, both physically and culturally. Place-making plays a significant role in maintaining cultural identity as it nurtures a sense of attachment to one’s environment and a feeling of belonging (Cresswell, T, 2015)

Restoring post-mining landscapes may involve reestablishing traditional land uses, establishing public and cultural spaces, and utilizing local construction

materials and architectural styles, which can help restore a sense of place and identity and enhance the social and cultural resilience of affected communities. Architectural solutions for post-mining landscapes should incorporate elements of the region’s vernacular architecture and traditional construction methods to reflect and represent the local character, promoting ecologically sustainable and culturally sensitive design while honouring the region’s rich cultural heritage.

The incorporation of traditional Venda architectural features into modern construction projects in South Africa’s Vhembe District has contributed to the preservation of local identity and cultural heritage. These features encompass the utilization of locally sourced materials and time-honoured building methods, which meet present-day requirements while upholding a sense of connection to the past (Oliver, 2003).

The passing down of knowledge between generations is crucial for the continuity of culture as it ensures the transmission of ecological knowledge and cultural customs from one generation to the next. This knowledge transfer holds particular significance in the realm of environmental rejuvenation, where traditional wisdom can inform ecological management and sustainable land utilization practices.

Elders play a crucial role in transferring ecological and cultural knowledge within numerous African tribes. Initiatives aimed at restoring post-mining landscapes should respect and consider the wisdom and expertise of the elderly to preserve their insights

for future generations. Fikret Berkes (2009) suggests that integrating traditional ecological knowledge into environmental management could enhance the resilience and sustainability of ecosystems and communities.



Figure 116: The combination of terrain, climate, light, and tectonics in architectural design is emphasized by Kenneth Frampton. This picture illustrates how modern building may blend in with the surroundings and shows how these ideas are still relevant today. Critical Regionalism for our time, 2019. . The Architectural Review. URL <https://www.architectural-review.com/essays/critical-regionalism-for-our-time> (accessed 9.6.24).

05 PHENOMENOLOGY

A phenomenological philosophical standpoint is that it takes the complex terrains after mining on which this paper tries to navigate along for an understanding of experience and consciousness towards a shared knowledge. A phenomenological reading of this dream asks us to recognize the way in which it transforms itself as an experience of landscape, foregrounding sensory immersion, attuning with South African post-mining landscapes. With that, I wish to shed light on how communities affected by mining have deep cultural and environmental ties intrinsic their everyday lives as well just in analysing these parts. We can then develop the strategies for both protecting natural systems where they are and restoring them within the built environment.

With it, we can develop natural world protective and restorative strategies within the built environment. Sight, hearing, smell-touch, and even taste play crucial roles in how we perceive the world, just as they do for the residents. These sensory worlds often undergo dramatic transformations (in some cases radically disturbing) following their abandonment and produce unique human-environment relationships in post-mining contexts.

The aesthetic horror of scarred terrain, continuous loud noises of machinery, lingering smells of chemical wastes, tactile gestures on disturbed earth compose but one element in a sensorial historic encounter at the Copper Mine Musina. Sensory mapping tools are used to record and evaluate these sensory experiences, seeking to understand how mining byproducts like dust or noise and the changed flora can influence

people’s daily living in proximity. This knowledge is crucial for designing rehabilitative strategies that optimize therapeutic sensory inputs and reduce those with potential negative effects.

The Messina Copper Mine that once resounded with the drilling, miners’ movement, and constructing noise. Today, there is silence in the air, but only the remains of the industrial structure testify to the past events, and the forest flora and soil point, mine tailings, slime dams to the events that have transpired are completely different. Insights from conversations held with former miners and local inhabitants about the effects of such phenomena on their attitude to the land critical for designing environments able to restore the area and support people in their link to their past and their identity.

Phenomenology deals with how our body moves and occupies space within the environment. Within the landscape of post-mining, embodiment is a term used to describe how people experience emotionally and physically these transformed landscapes. The embodied experience of the landscape encompasses navigating difficult terrain, exploring an abandoned mine on foot, and recalling the physical challenge. According to Edward S. Casey (1996), to be in a place is to be embedded in a series of overlapping life worlds, to be caught up in a multiplicity of memories, experiences, and meanings (Casey, E. S. (1996).



Figure 117: A post-critical ecophenomenology
Fig. 6.1 A post-critical ecophenomenology (from 'a critical ecological... [WWW Document], n.d. . ResearchGate. URL https://www.researchgate.net/figure/A-post-critical-ecophenomenology-from-a-critical-ecological-ontology-for-inquiry_fig1_314090921 (accessed 9.7.24).

Memory and embodiment go hand in hand, especially in areas where mining has historically taken place. Many individuals view the environment as a repository of individual as well as collective memories of work, struggles, and shared experiences. People’s perceptions of the future and their relationship to mine sites can be greatly impacted by the act of returning to these locations, which can bring up intense sentiments and recollections.

Atmosphere is the feelings or impression to arise from physical environment by effects caused both human and natural activities in post-mining landscape. The specific character of such post-mining space depends on the method, past and present condition of a location as well on interrelation between industrial remains and their adjacent natural environment.

For the development of strategies for post-mining landscapes, it is essential to have a deep understanding of embodied experiences. By incorporating architectural and landscape designs, spaces that acknowledge and respect these experiences can be created, offering opportunities for reflection, healing, and re-establishing a connection with the land. Strengthening the embodied connection to the landscape can be achieved through the incorporation of pathways that follow historical routes, the use of tactile materials to evoke memories, and the creation of areas that encourage physical interaction with the surroundings. These design elements ensure that interventions have a significant emotional and physical impact on the community.

In Musina, the distinctive ambiance of post-mining landscapes is shaped by a combination of human and natural influences. These areas possess a unique atmosphere that is affected by various factors, such as the sharp contrasts between the natural surroundings and industrial remnants, the changing light and weather conditions, and the presence or absence of human activity.

The landscape often bears drastic changes such as large trenches, rubbish heaps, and scarred terrain because of mining activities. These visible alterations might incite feelings of industrial decline or hopelessness. The sense of abandonment and loss is amplified by the stark disparity between the untouched beauty of the surrounding geographical area and the human-induced changes. For example, the abandoned mining sites in Musina showcase vast open pits, large mine dumps, and desolate surroundings, creating a stark visual contrast with the once vibrant and colourful bushveld that was typical of the region.

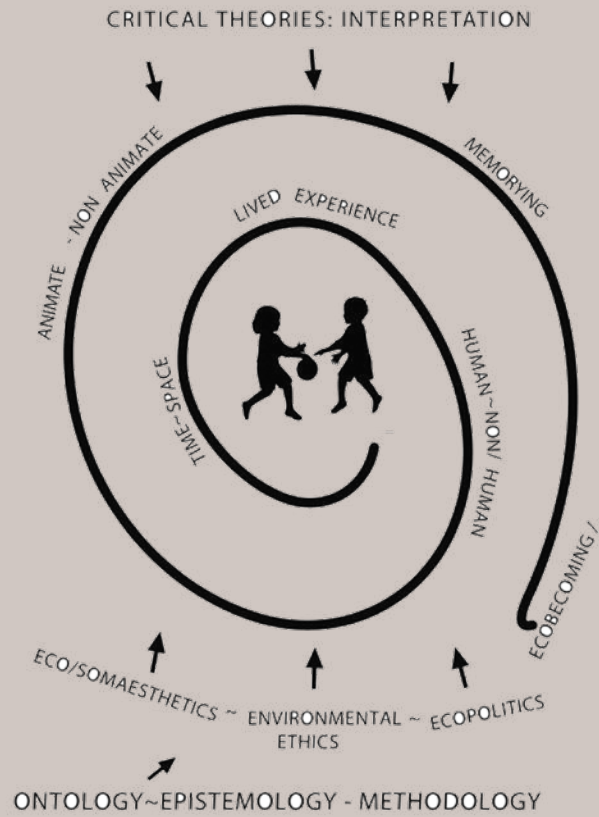


Figure 118: Post-critical ecophenomenology seeks a more respectful and integrated approach to ecological systems, going beyond critical deconstruction and emphasizing embodied, lived experience. It aims to explore people’s interactions with the environment and how they live and experience the world, promoting increased sustainability, responsibility, and knowledge of the environment.

Fig. 6.1 A post-critical ecophenomenology (from ‘a critical ecological... [WWW Document], n.d. . ResearchGate. URL https://www.researchgate.net/figure/A-post-critical-ecophenomenology-from-a-critical-ecological-ontology-for-inquiry_fig1_314090921 (accessed 9.7.24).

06 POST COLONIALISM

When it comes to landscapes after mining in South Africa, the problems of environmental damage, land dispossession, and unfair wealth distribution are linked to what happens after post-mining. To address how mining affects the environment and nearby communities is key to reclaiming these post-mining areas. Efforts to undo colonial impacts in South Africa need to take a big-picture view to deal with the lasting effects of mining. In the past, mining caused both harm to the environment and economic growth.

Mining in South Africa has caused a range of harmful effects on the environment such as contamination, deforestation and loss of biodiversity, and damage to the land. The roots of South African mining go back to colonial times when colonial powers exploited the country’s resources. These powers put their economic gains ahead of the needs of local people in their mining operations.

The history of mining in South Africa is closely linked to the impact of colonialism, significantly influencing the country’s social, economic, and environmental development. Mineral exploitation during the colonial and apartheid periods led to extensive environmental damage and the marginalization of indigenous communities.

Dealing with these historical consequences in the post-colonial era involves a multifaceted process of decolonization, aiming to establish fairness, reclaim land, and restore degraded environments. This section

delves into the convergence of post-colonialism and post-mining landscapes, examining the historical backdrop, the effects on indigenous identities and heritage, and the pursuit of social equity.

South Africa’s mining history is intertwined with its colonial and apartheid system that led to exploitation of the country’s economy and social disparities. The discovery of diamonds in Kimberley in 1867 and gold in the Witwatersrand in 1886 boosted rapid industrialization facilitated by substantial infusion of capital, which resulted into the establishment of a highly fragmented labour market.

The colonial as well as apartheid governments appropriated vast pieces of lands from indigenous societies for mining purposes most often without their consent therefore disrupting traditional land use. This exploitation was driven by the need to extract resources mainly for export to European markets with little regard for environmental consequences or inhabitants’ wellbeing. According to Bond and Dada (2007), mining has caused long-term environmental degradation such as soil degradation, water contamination and reduction in species variety on earth.

Post-mining landscape decolonization involves the handling of environmental, social or cultural impacts emanating from mining activities since the colonial period. To achieve this, it encompasses comprehensive strategies that incorporate ecological restoration, social justice and resurgence of indigenous identities

as well as cultural traditions.

Decolonizing post-mining areas necessitates environmental restoration. South Africa has witnessed numerous decades of unregulated mining resulting in toxic soils, waterways contamination and scoured landscapes in several regions. This is highlighted by Gavin Capps’ work *A Bourgeois Reform with Social Justice*. It is therefore important to adopt sustainable rehabilitation practices that are guided by ecological soundness and community involvement as indicated by Minerals Development Bill & Black Economic Empowerment in the South African Platinum Mining Industry (Capps, n.d.).

One of the methods that have been used to restore the environment is phytoremediation where plants are employed to take up and neutralize soil pollutions. This approach not only assists reclamation of land but also promotes community participation in reclamation work. Additionally, restoration of natural vegetation and rehabilitation of ecosystems can help restore biodiversity and support local livelihoods

Local people have often been transferred as a result of mining operations resulting in disruption of traditional cultural practices. The cultural heritage of many indigenous groups has also faded away due to the destruction of sacred sites, cemeteries as well as historical monuments.



Figure 119: “African men and a white Afrikaner working in the Langlaagte Deep Gold Mines during the late 19th century.” Imperialism & Mineral Wealth: 1870-1910, 2013. . South African Times. URL <https://southafricacapacity.wordpress.com/colonial/imperialism-wealth-1870-1910/> (accessed 9.7.24).



Figure 120: Gold Fields discovered the ‘West Wits Line’ to the west of Johannesburg in the 1930s, leading to the discovery of significant new gold reef extensions. South-African-Mines [WWW Document], n.d. URL <http://www.miningartifacts.org/South-African-Mines.html> (accessed 9.7.24).

Restoring and safeguarding cultural heritage should be part of the reclamation process for post-mining landscapes. This can extend to include rehabilitating sacred grounds, documenting oral traditions and reviving lost customs related to mining activities. This kind of endeavour will help reinstate the sense of attachment and unity with the land, which is important for preserving cultural identity owned by local communities.

Mining has severe economic implications with respect to wealth creation and resource distribution. Many affected communities have not been adequately compensated for their losses from mining activities, leaving them in poverty and joblessness still.

Making sure that fairness is preserved in areas after mining necessitates a comprehensive strategy for financial reparation and development. For instance, this may involve monetary compensation to the affected communities, supporting local economic initiatives, and ensuring equitable sharing of mining and restoration benefits. In addition, there is a need to address structural inequalities that have led to these exclusions, which include issues pertaining to land ownership, resource allocation as well as political participation.

Art plays a critical role in reimagining landscapes affected by mining. By having artists and cultural workers who show us other ways of seeing human-nature relations rather than prevailing stories can

generate new insights about how people relate to nature. Art can be a strong tool for decolonization and reclamation in post-mining landscapes. Artistic endeavours exploring mining history and memory can assist communities in reclaiming their cultural legacy and imagining new potentials for the land. Collaborative art projects involving the community can empower individuals to actively care for and take ownership of their surroundings through engagement in restoration and stewardship efforts.



Figure 121: Highlighting the journey of healing and restoration, where communities reclaim their cultural heritage, sacred spaces, and connection to the land after mining exploitation. Through art, memory, and stewardship, individuals break free from past scars and envision a future grounded in ecological and cultural renewal.”

Case Study 05: Out of History: Artists, Landscapes, and New ‘Practices of Self’ in Southern Africa

Nicola Brandt

Nicole conveys their perceptions of sceneries through a variety of artistic mediums. Painting, sculpture, photography, performance art, and other media may fall under this category. She focuses on the area that interacts with and reacts to social challenges, historical narratives, and cultural shifts. In addition, she delves into topics like globalization, urbanization, memory, identity, colonial legacies, post-apartheid reality, and environmental concerns. Landscapes Between Then and Now considers the historical and contemporary connections among Namibia, South Africa, and Angola.

Contemporary artists in Southern Africa are engaging post-mining landscapes, as revealed by the case study Out of History: Artists, Landscapes and New Practices of Self addressing historical and cultural legacies. Collaborations such as this are necessary to properly locate the connections between art, environmental justice and cultural reclamation.

The case study also highlights how creative endeavours can help address the legacy of mining. Their work brings an essential new perspective to degraded and mined landscapes, reminding us not only of the culture but also of important things about both natural environments altered by industrial processes.

Utilizing indigenous and local perspectives in art representation furthers social justice agendas as well as decolonization. In enriched landscapes, art projects with the values and needs of affected communities as their centre can help to empower

people while articulation a renewed cultural landscape more accommodating solutions for post-mining futures.



Figure 122: Nicole Brandt, Under a Tree of Omwandi. This installation prompts contemplation on memory, loss, and resiliency. It is made of clay pots, pictures, and sand from a location close to Uupindi. Out of History: Artists, Landscapes and New ‘Practices of Self’ in Southern Africa - ART AFRICA Magazine, 2021. URL <https://artafricamagazine.org/out-of-history-artists-landscapes-and-new-practices-of-self-in-southern-africa/> (accessed 9.7.24).



Figure 123: Shallow graves are visible in the distance, acting as melancholic symbols of the suffering and sacrifice made during the freedom war. An omwandi tree, an important symbol in the African culture and one frequently linked to spirituality and ancestral links, appears in the middle of this moving scene. Out of History: Artists, Landscapes and New ‘Practices of Self’ in Southern Africa - ART AFRICA Magazine, 2021. URL <https://artafricamagazine.org/out-of-history-artists-landscapes-and-new-practices-of-self-in-southern-africa/> (accessed 9.7.24).

Case Study 06: Bamako (The Court) (2006) - Film

Abderrahmane Sissako's singular film *Bamako* (2006) tells a story about the impact of international economic policies on Africa that is also part courtroom drama. *Bamako*, Mali. This is a make-believe court: Courtroom *Bamako*. The courtroom serves as a microcosm of global justice, since the trial is concerned with how international economic policies impact countries in Africa.

They argue that an international, potentially a World Bank or IMF, judge should weigh the evidence against them in *Bamako*. The good news for the debtor is that witnesses have appeared in court to offer their testimony on what it truly means to be cast into debt, plunged beneath poverty and exploited economically.

While the tribunal represents a centrepiece, we see what average *Bamako* residents deal with in their everyday lives as well. These are things like how their economic policies affects me, and unemployment, poverty. The contrasting scenes of the courtroom and village life highlight the disconnect between being able to make decisions from a global perspective, and local realities.

They arrange themselves in a circle, or possibly semi-circle as per tradition judges and witnesses. Such informality is at odds with the standard courtrooms, which feature levels and a judge on an elevated bench. The circular arrangement symbolizes the film's focus on building community and a commonwealth of sounds meant to be shared, much like its messages. It encourages dialogue, alongside advocating for justice that is within reach and open to all.



Figure 124: An unconventional court in Mali where the community and the judges gathered outside to resolve disputes. File: *Bamako* film.png, 2016. . Wikipedia.



Figure 125: An unconventional court in Mali where the community and the judges gathered outside to resolve disputes. *Bamako* (2006) - Abderrahmane Sissako | An absurd trial in an absurd setting takes place in Abderrahmane Sissako's "*Bamako*" (2006) as the IMF and World Bank are accused of a systematic... | By "Political film" Facebook [WWW Document], n.d. URL https://web.facebook.com/political.film/videos/bamako-2006-abderrahmane-sissako/1524243794286559/?locale=ur_PK&_rdc=1&_rdr (accessed 9.7.24).

PART 2: DESIGN APPROACH

Part 2 - Outline

Chapter 7 on, ‘Sacred Architecture’ is the study of sacred architecture theory delves into the aspects and design concepts that produce environments with profound spiritual, cultural, and affective resonance. These areas are frequently used as gathering places for group worship, introspection, and spiritual enlightenment. Sacred architecture includes any construction or landscape that aims to convey a sense of the sacred; it is not just religious buildings.

It is possible to restore not only the physical environment but also the cultural and spiritual aspects of mining-affected landscapes by integrating sacred architecture theory into the restoration process. In order to promote a sense of healing and continuity, this strategy places a strong emphasis on creating spaces that respect the history, customs, and beliefs of nearby people.

Chapter 8 is an essential framework for analysing the interactions between human activity and the environment is provided by eco-centric architecture, which centres architectural design around ecological factors. The goal of this dissertation is to examine the historical aspects of eco-centric architecture, with particular emphasis on the intricate relationships between native African methods of mining and the natural surroundings.

The strategy entails comprehending how conventional mining methods were incorporated into the regional ecology, upholding a balance between resource exploitation and environmental conservation. This theory promotes sustainable design practices that reduce the ecological footprint and enhance biodiversity

by looking at key concepts such as sustainable materials, energy efficiency, and an integration with nature.

The theoretical foundation comes from ideas in sustainable architecture and environmental history. The study will demonstrate how pre-colonial communities handled their natural resources in a sustainable and environmentally conscious manner by examining the historical background of indigenous mining. This viewpoint casts mining as a technique that may coexist with ecological and cultural preservation, challenging the negative connotations that are frequently attached to the industry.

Chapter 9, In order to rectify historical injustices and advance sustainable futures, land reform, repatriation, and ecological justice are crucial areas of concern. This chapter examines the critical role that legal systems and courts in particular play in these processes. It looks at how courts may act as forums for healing and reparation, resolving historical wrongs and laying the groundwork for upcoming obligations. It’ll also highlight on how court architecture helps these processes forward, highlighting how these kinds of places may represent sustainability and justice ideals.

It also discussion revolves around the role of architecture in rejuvenating post-mining landscapes, with a special focus on the concept of “architectural stitching.” This concept involves integrating the fragmented social, cultural, and environmental aspects resulting from mining through architectural initiatives like the Memorial Centre, Mining Activism Centre, and Land Court. These structures not only serve practical functions but also aim

to represent the scars on the land and the necessity for healing and reconciliation.

07 SACRED ARCHITECTURE

There is more to sacred architecture than meets the eye it houses elements far deeper in cultural, spiritual and human meaning beyond practicality. Upon an architectural journey that honours the sacred in a tale of built form, It weaves ritual spaces with environmental tapestries spiritual ambiance and symbolism. This chapter discusses these qualities, and how architectural architecture keeps reminiscences alive in addition to reimagining sacred spaces. This will lead us to the study of metaphorical architecture; a component analysis that suggests how ritual spaces are structured and spiritual atmospheres created, as well as considerations regarding environmental design within sacred sites.

Buildings are, as a result and essence symbolic artifacts with depths of meaning in addition to their visible forms. Symbols in architecture often reference divinities, ancestral spirits, cosmologies and natural elements giving a clear link between the physical and metaphysical. In the words of Juhani Pallasmaa, in his book *The Eyes of the Skin: Architecture is an art that reconciles us with our world by perceiving it through numerous sensory faculties* In many cases, these icons become the symbols of belonging and continuity that makes reconciliation possible.

One of the most important features to be found in African sacred architecture is the circle, a symbol at once for life and eternity, death being only one stage in decline followed by rebirth. African huts, having a circular shape that promotes equality and reflects the societies values. The use of circles in modern sacred architecture particularly reflects the continuity or unity,

as well specific elements such materials arrangement to spatial layout and total form.

Venda culture is also circled and as such circles play a major part in the design of their space, creating spaces for making homesteads or communal erecting. Inside each circle stands a small hut, traditional in shape and form of the Venda homestead. Everyone has equal access to the central space, which instils a feeling of equity and collectiveness.

And secondly, the circular design prompts social activity through shared use of storytelling spaces and other communal events like rituals or gatherings. People gather in the central courtyard to cultivate social relationships and share experiences. This structure also represents the Venda derivative ideal of ubuntu where one person is integrated with every other citizen through communal bonds into a continuous whole. In “The Sacred and the Profane” by Mircea Eliade, he said this: “Every sacred space implies a hierophant, an eruption of the sacred that results in detaching a territory from the surrounding cosmic milieu and making it qualitatively different.”

Ritual spaces (Robertson 1996) in African sacred architecture are often defined by the presence of trees, mounds or formations such as rocks and bodies of water. But how these are organized into the design allows for a healthy marriage of man and nature built. All that each natural element signifies. The lighting, acoustics and spatial configuration are all designed to improve the spiritual feel. Usually, to signal important times of the spiritual year that might receive buildings

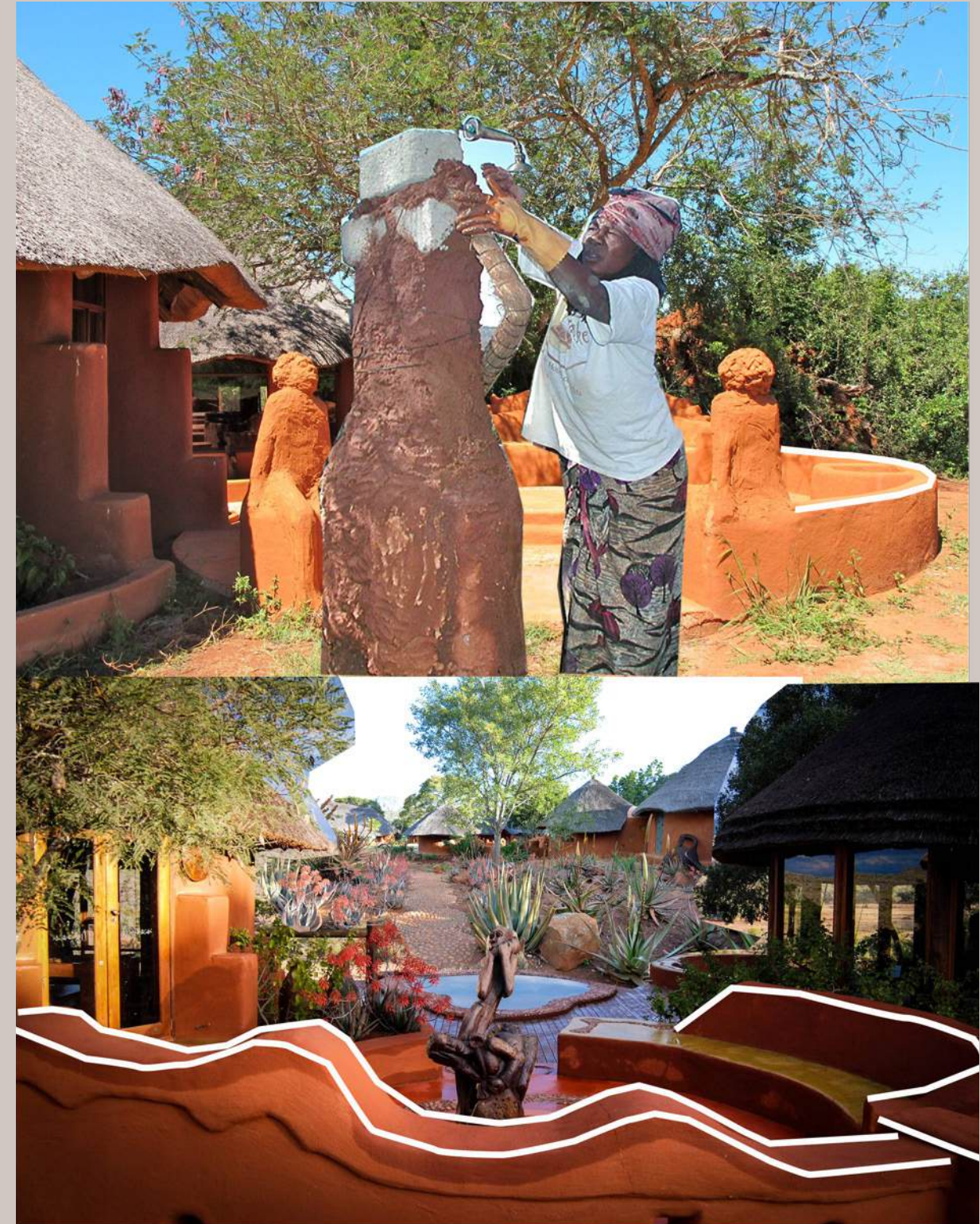


Figure 126: Leshiba Wilderness is a venda art lodge that works with artist in Limpopo to preserve the biodiversity. It is a discovered remnants of an old Venda homestead that was preserved. The use of earth and courtyard with native plant is woven into the architecture. Art and Culture, n.d. . Leshiba. URL <https://leshiba.co.za/art-and-culture/> (accessed 9.5.24).

may be correlated with astronomical bodies, creating ever changing relationships between building and universe. Creating a spiritual environment imbedded warp, particles and shape are manipulated with the light; sound or the texture to enhance awe/devotion

This complex, combined with the surrounding topography also humanly perceived and graphically represented in a series of planar abstractions defining what could be seen through or beyond the architectonic facade is called “environmental tapestry,” here taken as structuring sacred architecture.

The relationships are sacred, but they are also practical as the systems of creation that allow for places to be rooted and hence, sustained in place. It is very vital that African religious buildings take perceptual cognizance of the natural terrain. It uses local available material like thatch, clay and stone which make the buildings environment effective. Much of this material has dual advantages in addition to reducing the environmental impact produced by a consulate, it also connects its architecture with the region’s extensive cultural legacy.

The Land Court’s circular design symbolizes the importance of equality and inclusivity in the pursuit of justice. The spatial elements used in the Land Court, Mining Activism Centre, Memorial Centre, and the Lekgotla are drawn from traditional African cultures to create a strong connection with the land and its people. The use of rammed earth in the Lekgotla structure not only represents sustainability and resilience, but also signifies a deep bond with the earth.

In Venda culture, the equivalent of a “Lekgotla” is

often known as the “Khoru.” The Lekgotla or Kgotla traditionally serves as the African homestead’s version of a land court, where community members, especially elders, chiefs (referred to as “Vhamusanda”), and other leaders gather in the traditional way to discuss and resolve various issues such as land disputes, social challenges, and collective decisions. Among many African communities, particularly the Tswana, Sotho, and other Southern African groups, the Lekgotla plays a vital role in justice administration and governance.

Typical landmarks of a Lekgotla include a shaded area under large trees or a designated open space, usually located at the heart of the homestead or village. The circular seating arrangement ensures that everyone can clearly see and hear each other, emphasizing the inclusive nature of the discussions. The open-air design and use of natural materials serve to underscore the community’s deep connection with nature, linking the space to the surrounding environment.



Figure 127: Collage showing where the idea of Lekgotla/Khoru and the non-converntional court came from in the Venda people holding community under a tree and the idea of circular court that derived from the circular Venda hut.

Case Study 07: Freedom Park GAPP + Mashabane Rose Architects + MMA

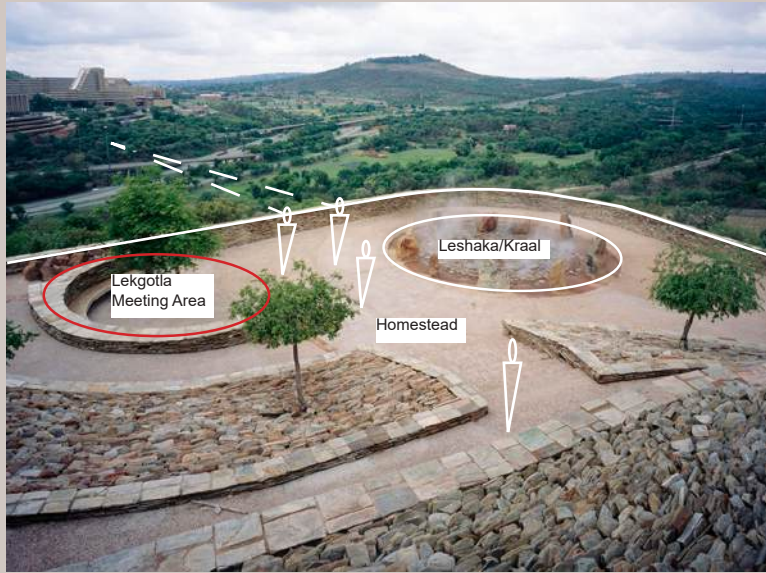


Figure 128: Influence of African homesteads to preserve indigenous cultural heritage. Freedom Park, Phase 1 / GAPP + Mashabane Rose Architects + MMA | Landscape architect, Park landscape, Landscape [WWW Document], n.d. . Pinterest. URL <https://www.pinterest.co.uk/pin/gallery-of-freedom-park-phase-1-gapp-mashabane-rose-architects-mma-9--1055109018920586878/> (accessed 9.7.24).



Figure 129: Movement on site as a way of remembering the journey of those that fought for freedom. Gallery of Freedom Park, Phase 1 / GAPP + Mashabane Rose Architects + MMA - 6 [WWW Document], n.d. . ArchDaily. URL <https://www.archdaily.com/297678/freedom-park-phase-1-gapp-mashabane-rose-architects-mma/50af86f6b3fc4b0cad00001d-freedom-park-phase-1-gapp-mashabane-rose-architects-mma-photo> (accessed 9.7.24).

Freedom Park is a symbol of healing and reconciliation, blending in perfectly with the surrounding environment with its carefully designed gardens, walkways, and views of Pretoria.

To promote harmony with the land and its history, the park's design makes use of organic materials, water features, and natural plants. Isivivane, a symbolic burial spot where visitors can honor those who died during the conflict, is located in the center of the park.

The magical steam that emerges from Isivivane's rocks begins a spiritual healing process that heightens the place's sacredness. In addition, the park has quiet spots for reflection and remembrance, like the Sanctuary, Garden of Remembrance, Wall of Names, and performance spaces.

Case Study 08: sa ____ ke lerole, (sa lerole ke ____)
Dineo Seshee Bopape



Bopape delves into the intricate webs of connections and conflicts that emerge when examining land through diverse lenses, including gender and motherhood, historical contexts and the dynamics of location, memory, and the philosophical concepts of identity and existence.

The significance of various elements including the uterus, soil, clay, charcoal, flowers, herbs, crystals, and ash, often depicted alongside imagery of hands engaged in clay manipulation. These components evoke diverse associations, spanning from the extraction of natural resources to broader themes such as the Anthropocene era and the symbolic essence of land.

Throughout her work, the notion of sovereignty emerges as a recurring motif, interwoven with discussions on identity, female embodiment, and territorial rights. Bopape conceptualizes the land as both a reservoir of collective memories and narratives, and a nurturing locus for the cycles of life and death.

Central to her inquiry is an exploration of the latent memories and intangible presences embedded within the land, and the methods by which these can be perceived or communicated. In her recent artistic endeavor, she expands upon these themes by employing soil as a conduit for transmitting sound, aimed at providing a calming influence upon the earth.

The void holes in the soil have two purposes: they are both receptacles and disruptions that disrupt continuity, memory, and surface. The land serves as a home for

the cycles of life and death as well as a storehouse for memories and historical stories.

Figure 130: Soil in its natural state interacts with ancestral memory and elemental forces in a dynamic manner. Dineo Seshee Bopape’s installation delves into themes of identity, land, and relocation through the utilization of soil, artifacts, and music. Dineo Seshee Bopape : sa ____ ke lerole, (sa lerole ke ____) [WWW Document], n.d. . Contemporary And. URL https://contemporaryand.com/exhibition/dineo-seshee-bopape-sa-____-ke-lerole-sa-lerole-ke-____/ (accessed 9.7.24). Rodgers, B., 2017. Dineo Seshee Bopape “sa____ ke lerole, (sa lerole ke____)” in Brooklyn. CFile - Contemporary Ceramic Art + Design. URL <https://cfileonline.org/exhibition-dineo-seshee-bopape-contemporary-ceramic-art-cfile/> (accessed 9.7.24).

Case Study 09: Born in the first light of the morning [Moswaro’marapo] Dineo Seshee Bopape

“Born in the first light of the morning [Moswaro’marapo]” is about awakening, rejuvenation, and fresh starts. It establishes the atmosphere for delving into topics about identity and metamorphosis. The project centers on the idea of identity and memory, examining the ways in which previous experiences and cultural history impact people individually and as groups.

Each component has a symbolic meaning and stands for a distinct facet of memory, identity, or the natural world. Crystals stand for transformation and clarity, while soil represents anchoring and a connection to the earth.

The project creates a complex web of meaning by fusing historical allusions, cultural symbolism, and personal histories. She uses interactive components in the project, like earthscapes and soundscapes, to give viewers a more immersive experience and help them better grasp the subjects being covered. As you enter the space as the viwer moving images such as “lerato laka le a phela le a phela / my love is alive, is alive, is alive (2022) and (Serithi) The rest, as they used to say, is story (2021)”



Figure 131: The dome structure, resembling a hut, is made from natural materials and brings to mind ancient dwellings and sacred spaces, symbolizing a figurative place of refuge. Dineo Seshee Bopape uses the dome to symbolize memory, shelter, and the cycle of life. Its rugged, earthy exterior holds a deep spiritual and familial connection to the land, acting as a vessel for both renewal and historical significance. The structure exudes a timeless yet outdated quality, embodying the enduring relationship between humans and nature and the resilience of indigenous heritage. Dineo Seshee Bopape: Born in the first light of the morning [moswara’marapo] - Announcements - e-flux [WWW Document], n.d. URL <https://www.e-flux.com/announcements/440323/dineo-seshee-bopapeborn-in-the-first-light-of-the-morning-moswara-marapo/> (accessed 9.7.24).

08 HISTORICAL DIMENSIONS OF ECO-CENTRIC ARCHITECTURE

With an emphasis on sustainability and conservation, eco-centric architecture aims to design buildings that blend in with their surroundings, mitigate their negative effects on the environment, and support the restoration of ecological balance.

Eco-centric architecture provides solutions to the increasing ecological issues the world experiences, particularly those brought on by mining activities. This chapter analyses the principles and development of eco-centric architecture, the importance of building in biodiverse environments, and the application of these principles to post-mining landscapes, with an emphasis on the Lekgotla design.

Eco-centric architecture, in fact, is not a new subject. It has been present in indigenous knowledge systems and traditional practices for ages. These are the systems that respect the interconnectedness of all living beings and the environment, including the indigenous ones. Accordingly, these ways were influenced by the conception of ecosystems as cyclical systems and the idea of adapting to them as well. In other words, their food, their art, their buildings came from materials that were on the land where they were.

Thus, this was achieved in harmony with the land and its resources, which was the spiritual reflection of the land in their culture. Each member of the community, parents, as well as children, was involved in making their habitats ecological.

One of the remarkable things among many indigenous architectural styles in Africa is their being eco-centric.

For a long time, these buildings and houses were made eco-centric with the help of technology. Traditional structures like the adobe houses in Mali and beehive-shaped huts of the Zulu people in South Africa, in a general context, are melters of extra land surfaces. Earth shapes could provide many benefits to a building such as helping to regulate indoor temperature, ability to collect and store water, and overall resilience.

The Industrial Revolution was a radical change from the holism-based design of the earth, as architecture was mainly concerned with mechanization, mass production, and natural resource depletion. The era also initiated the adoption of eco-technic methods which were focused on technical approaches to solving environmental problems, often disregarding the integration of ecological wholes. Still, it is the environmental movement in the sixties and seventies that came as the flame to the eco-centric principles, where sustainable architecture developed as a separate discipline.

Eco-centric design, states Louise St. Pierre in her work *Eco-centric Design: We Are Deeply Connected*, is the real key to the reconnection with the whole spectrum of life forms in the design process. She stresses that eco-centric design as sustainability should change from non-invasive to restoration and regeneration of ecosystems. This thought is parallel to those of deep ecology, which promotes a change in human behaviour that comes from a move from anthropocentric to one that has equal value for all life forms.

Besides, the shift from eco-centric to eco-technic strategies is shown in the works of Jonathan Veale in *Beyond Sustainability: Architecture for the Future*. Veale confronts the shortcomings of sustainability as a concept, stating that real eco-centric design implies a deep transformation of our relationship with the environment. He advocates for an architecture that is not only low impact but also contributes positively to the health of the planet by integrating natural processes and systems into the built environment.

Eco-centric architecture also plays a crucial role in the restoration and regeneration of post-mining landscapes. As mining activities degrade land and ecosystems, eco-centric design approaches offer a pathway to healing these scars on the earth. By integrating phytoremediation, where plants are used to remove toxins from the soil, and using sustainable materials such as rammed earth, architects can create structures that contribute to the ecological recovery of these damaged sites.

In the context of my design, the use of eco-centric principles in the design of the Lekgotla a space that serves as both a legal forum and a site for environmental restoration illustrates how architecture can be a tool for social and ecological justice. The Lekgotla design, which incorporates lightweight materials and elevates the structure to minimize ground disturbance, aligns with the eco-centric ethos of respecting and restoring the natural environment.

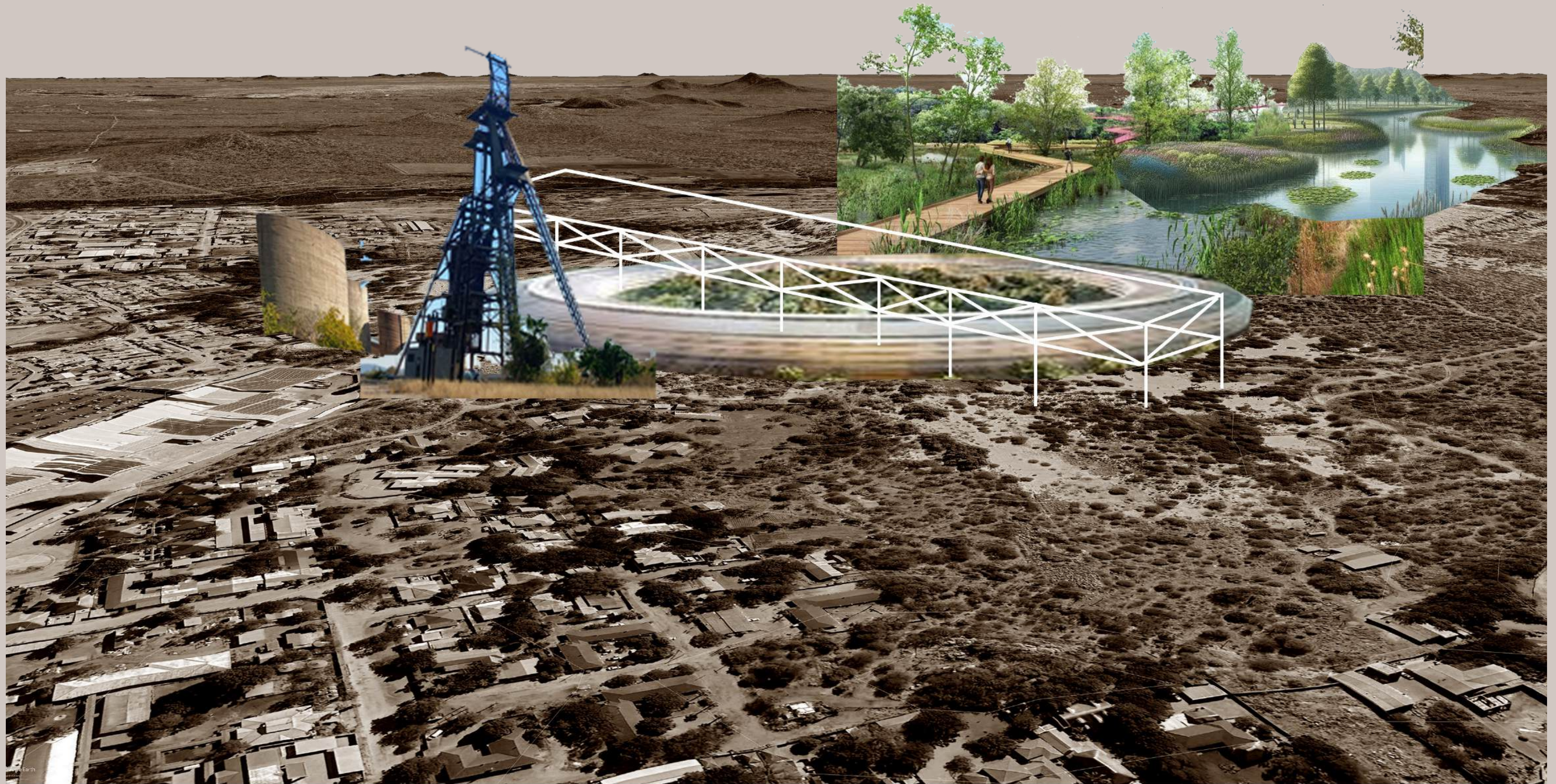


Figure 132: The collage also highlights the return to ecocentric ideas, as seen by the Lekgotla design, which is a multifunctional venue intended for both legal processes and environmental restoration in areas that have been mined. Eco-centric architecture promotes a close relationship with nature by supporting the regeneration and recovery of damaged landscapes through the use of phytoremediation and the incorporation of sustainable materials. It also shows a master plan for the future that includes artificial wetlands to retain the site's spiritual value and cleanse the neighboring river.

Understanding Phytoremediation In Post-Mining Landscapes

Phytoremediation, a verdant approach that benefits both the environment and the wallet, is the process of using plant life to remove, store and/or detoxify polluted elements from soil, water or air, etc. It is a very appealing green method for companies to undertake environmental reclamation projects that used to be mining sites.

Phytoremediation processes are among them phytoextraction method by plants that capture the contaminants in their roots and allocate them in the old leaves. Phytostabilization is one among the approaches the plants used to stabilize and immobilize the contaminants in the soil to prevent their spreading and Phytodegradation is the process where the plants metabolize the contaminants help to produce less harmful substances.

“Poplars are suitable for phytoremediation purposes due that they can remove contaminants in several ways, as for example, phytoextraction, phytostabilization and phytovolatilization. Advantageous characteristics of poplars include: quick establishment, fast growing, large biomass accumulation, extensive and deep root systems, high rates of transpiration, ease asexual propagation, exceptional growth on marginal lands, not part offood chain, long lived (25 - 30 years) and they can be harvested and then regrown.” (Guerra et al., 2011)

The main problem with the distribution of crops in regions where copper is extracted are musina, South Africa and this is why the contamination of soil and water with copper and other heavy metals poses

such a risk to the environment and human health as well. Total phytoremediation and hyperaccumulators, which are the plants that extract these types of metals from the soil to reduce the amount of metal, can be combined to restore ecological balance. In many cases, phytoremediation fails due to the unfruitful selection of plant species, high content of contaminants and poor site conditions.

“Commonly called Indian mustard, Brassica juncea, has been found having good ability to transport lead fromthe roots to the shoots. The phytoextraction coefficient for Brassica juncea studied earlier was found to be 1.7 and alsoit is observed that a lead concentration of 500 mg/l is not phytotoxic to Brassica species” (Mitra, 2017)

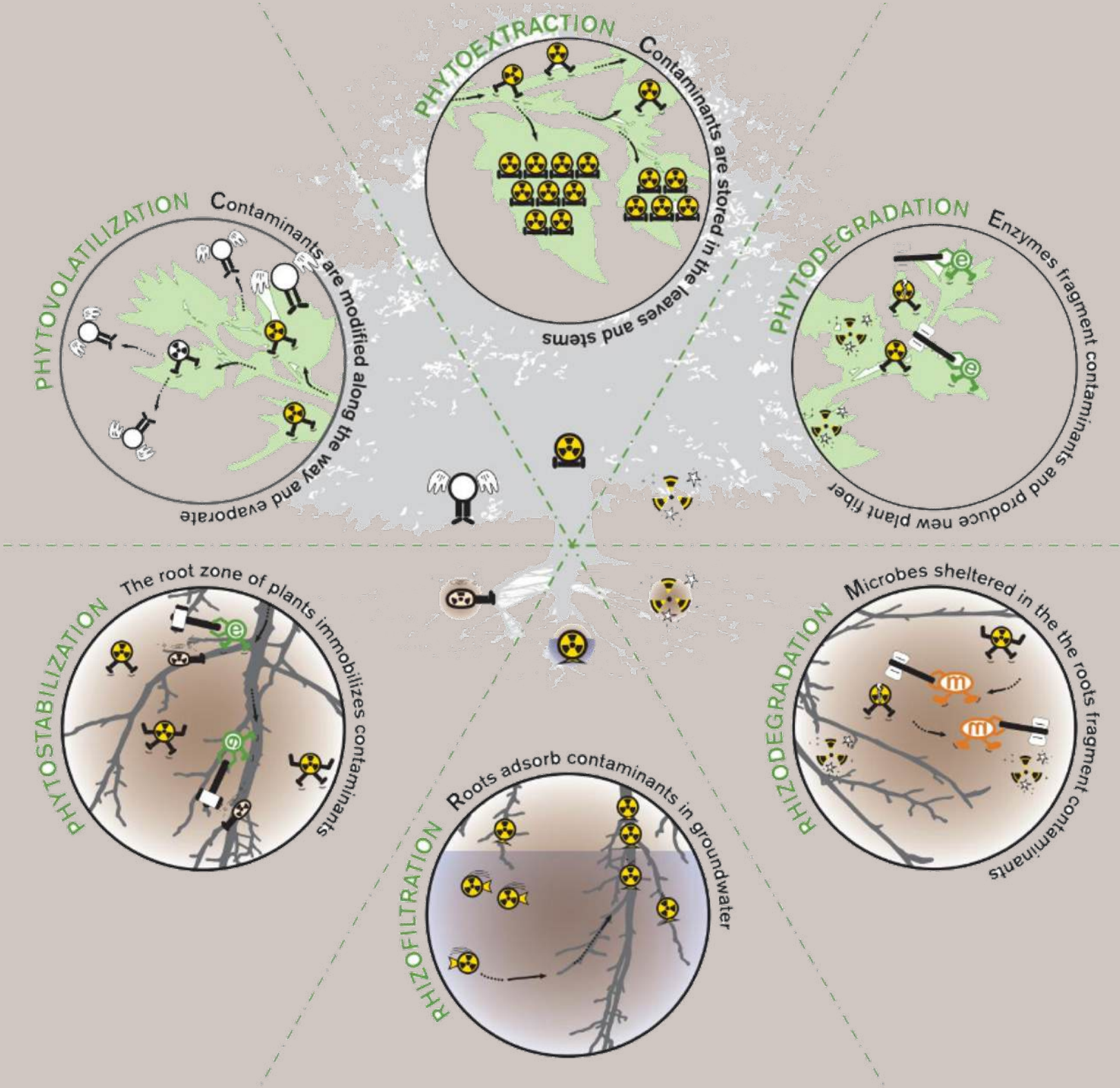


Figure 133:Types of Phytoremediation. Brownfields to Greenfields: A Field Guide to Phytoremediation by Mabelle Plasencia - Issuu [WWW Document], 2014. URL https://issuu.com/mabelleplasencia/docs/fieldguide_youarethecity (accessed 9.5.24).

Phytoremediation Strategies For Copper Contaminated Sites

Successful phytoremediation in the copper post-mining landscapes should be the first step of a planned sequence, starting from the determination of the plant species suitable for the practice. Hyperaccumulators like *Brassica juncea* (Indian mustard), *Pteris vittata* (Chinese brake fern), and some species of *Populus* which are, for example, poplar trees, are highly responsible for taking in soil heavy metals including copper. In particular, the growth of copper-laden plants on wasteland allows them to uptake copper from the soil in their root system and its re-location in shoots and leaves.

In the case of Musina, phytoremediation is being impaired largely because of the stressful climate that the place is experiencing and the decline in the quality of land. Nonetheless, these problems can be treated with the help of native plant species that have specifically adapted to the conditions in the area. For example, both *Sorghum bicolour* (sorghum) and *Helianthus annuus* (sunflower) occur naturally in semi-arid environments, with the former having been found to be accumulating considerable amounts of copper and other heavy metals from the soil.

Phytoremediation is a process that is somewhat slow and involves a period of several years, which practically means that it is the only possible way to clean the soil of contamination. On the contrary, it is also advantageous as it is a natural, passive remedy, which can be applied conjunctively with other land use activities. For instance, if the pollution rates are where they should be, the land could be reassigned for agricultural or recreational use, as was contemplated

in the study called Evaluation of Copper Tailings from the Abandoned Messina Mine for Possible Reuse in Recreational Projects in South Africa. According to the conclusion extracted from Singo and Kramers, 2020 “A correlation between Fe and Cu suggests that the Cu was deposited in the tailings as an association of chalcopyrite and pyrite. A geometallurgical study would help assess the economic feasibility of extracting Cu, with a view to reworking these tailings” (Singo and Kramers, 2020)

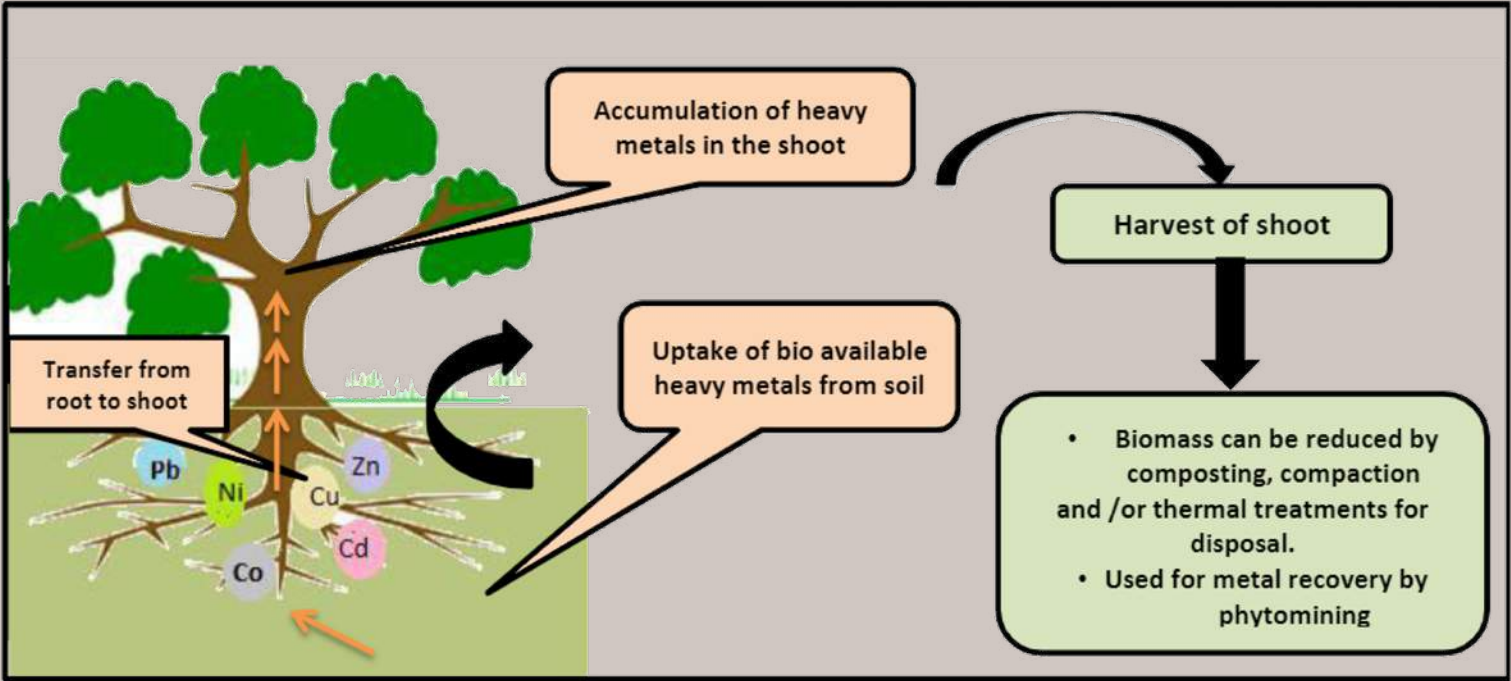


Figure 134: Phytoextraction of heavy metals by plants | Download Scientific Diagram [WWW Document], n.d. URL https://www.researchgate.net/figure/Phytoextraction-of-heavy-metals-by-plants_fig2_364331644 (accessed 9.5.24).

Indian Mustard
Brassica juncea



Cu, Pb, Cr, SE, Zn, Mn

Sunflower
Helianthus



Cu, Pb, Cr, SE, Zn, Mn, Hg,
Ni

Alpine Pennycress
Noccaea caerulescens



Cu, Zn, Cr, Cd, Pb, Ni

water hyacinth
Eichhornia crassipes



Cu, Pb, Cr, Zn, Hg,

Willow Trees
Salix



Cu, Pb, Cr, SE, Zn, Mn, Hg,
Ni

alfalfa
Medicago sativa



Cd, Pb

Wheat
Triticum



Ni, Pb

Honey Locust
Gleditsia triacanthos



Pb

Mugwort Artemisia vulgaris 	Blue Sheep Fescue Festuca ovina 	red mulberry Morus rubra 	water hyacinth Eichhornia crassipes 
Cu, Cr, Ni, Pb	Pb	Pb	Cu, Pb, Cr, Zn, Hg,

Figure 135: Showing the type of plants that could be used for phyoremediation in Copper Mine referencing all the type of contaminats that were found in the Messina Mine/ Copper mines.

REFERENCE TABLE

Common urban contaminants and their natural enemies

Contaminant	Maximum Levels in parts per million Safe To Use For	ANNUALS										PERENNIALS					TREES			
		plant seeds										plant starts					plant starts			
		native	native	native	native	native	native	native	native	native	native	native	native	native	native	native	native	native	native	native
Ag Silver	1500 ppm	38 ppm	2 ppm																	
As Arsenic	16 ppm	16 ppm	13 ppm																	
Cd Cadmium	8.3 ppm	2.5 ppm	2.5 ppm																	
Cr Chromium	400 ppm	38 ppm	30 ppm																	
Cu Copper	270 ppm	270 ppm	50 ppm																	
Hg Mercury	2.8 ppm	0.81 ppm	0.18 ppm																	
Ni Nickel	310 ppm	140 ppm	30 ppm																	
Pb Lead	1000 ppm	400 ppm	63 ppm																	
Zn Zinc	10,000 ppm	2200 ppm	109 ppm																	

DEGRADATION

EXTRACTION

STABILIZATION

VOLATILIZATION

Brassica juncea

Indian mustard

Brassica oleracea

Wild Cabbage

Cerastium arvense

Field chickweed

Helianthus annuus

Sunflower

Lupinus albus

White lupine

Medicago sativa

Alfalfa

Thlaspi caerulescens

Alpine Pennycress

Triticum aestivum

Wheat

Achillea millefolium

Yarrow

Agrostis castellana

Colonial bentgrass

Digitalis purpurea

Common Foxglove

Eichhornia crassipes

Water Hyacinth

Festuca ovina

Blue Sheep Fescue

Larrea tridentata

Creosote Bush

Solanum elaeagnifolium

Northern Starwort

Gleditsia microcarpa

Honey Locust

Ilex spp.

Holly

Salix sp.

Willow

Taxodium distichum

Bald Cypress

Figure 136: Phytoremediation Plants Reference Table. Brownfields to Greenfields: A Field Guide to Phytoremediation by Mabelle Plasencia - Issuu [WWW Document], 2014. URL https://issuu.com/mabelleplasencia/docs/fieldguide_youarethecity (accessed 9.5.24).

Potential and Challenges of Phytoremediation in Post-mining Landscapes

Phytoremediation is a promising approach for rehabilitating heavy metal-polluted post-mining environments by utilizing plant species capable of absorbing and detoxifying harmful substances from the soil. Nonetheless, several factors, such as the type and level of contamination, soil toxicity, and environmental conditions, influence its effectiveness. In post-mining areas with severe contamination, plants might struggle to completely restore the soil due to potentially very high toxicity levels (Stefanova, 2022). Moreover, phytoremediation frequently requires years or even decades to produce noticeable outcomes, which can be a disadvantage in cases where rapid ecological recovery is necessary (Subodh Kumar Maiti & Dipita Ghosh, 2020).

Issues related to the bioaccumulation of hazardous substances in the plants must also be considered, particularly if these plants are later used as construction materials or enter the food chain. Health issues may threaten both humans and wildlife due to this bioaccumulation (Stefanova, 2022). Consequently, although phytoremediation aids in lowering soil contaminants, there remains a possibility that harmful substances may accumulate in plant tissues (Stefanova, 2022).

Several strategies have been proposed to enhance the effectiveness of phytoremediation in areas affected by mining. Selecting plant species capable of withstanding and accumulating heavy metals particularly hyperaccumulators is a critical approach. Species such as *Brassica juncea* and *Helianthus annuus* can effectively absorb heavy metals like lead and cadmium (Subodh Kumar Maiti & Dipita Ghosh,

2020). Evaluating site-specific factors like soil makeup, pH levels, and regional climate conditions is essential for achieving the best plant selection. This guarantees that the most suitable species are selected for the specific region (Subodh Kumar Maiti & Dipita Ghosh, 2020).

It has been shown that microbial supplementation enhances the cleanup process alongside the choice of plants. Rhizobacteria and mycorrhizal fungi are types of helpful microorganisms that can enhance metal tolerance, encourage plant growth, and accelerate the nutrient cycle, all of which improve the efficiency of phytoremediation (Stefanova, 2022). Moreover, these bacteria assist in decomposing organic pollutants, facilitating the recovery of the environment.

Moreover, supportive techniques that can enhance phytoremediation consist of soil enhancements such as compost and biochar. These amendments can enhance soil quality by boosting nutrient availability, promoting soil structure, and reducing the likelihood of pollutant leaching. As stated by Subodh Kumar Maiti and Dipita Ghosh (2020), they may assist in the immobilization of heavy metals within the soil, thereby decreasing their bioavailability to plants. The overall effectiveness of phytoremediation efforts in areas following mining can be enhanced by applying these amendments, which can better the conditions for plant growth (Subodh Kumar Maiti & Dipita Ghosh, 2020).

Employing genetically engineered plants is yet another innovative method. To enhance the effectiveness of phytoremediation, genetically modified plants

with greater metal absorption abilities have been developed. Nonetheless, employing genetically modified organisms (GMOs) for environmental cleanup necessitates thoughtful evaluation of moral and ecological concerns, particularly in sensitive ecosystems (Subodh Kumar Maiti & Dipita Ghosh, 2020).

For phytoremediation to achieve success, it is crucial to monitor and maintain its effectiveness. To assess the success of the remediation process, ongoing evaluations of soil quality, contaminant concentrations, and plant vitality are necessary. Advanced tools such as Geographic Information Systems (GIS) and satellite imaging can facilitate the monitoring of vegetation growth and soil pollution over time (Stefanova, 2022). Assessing pollutant absorption involves analyzing heavy metal levels in soil and plant tissues, while monitoring soil stability and biodiversity recovery will help evaluate the ecosystem's health over time (Subodh Kumar Maiti & Dipita Ghosh, 2020).

In conclusion, phytoremediation offers a viable method for rehabilitating post-mining environments, although its effectiveness relies on several factors, including soil management, microbial enhancement, and the choice of plants. Despite the challenges, progress in environmental engineering and plant science technology continues to enhance the effectiveness of phytoremediation, rendering it an essential tool for rehabilitating damaged mining areas. Enhancing phytoremediation in post-mining sites necessitates a multidisciplinary approach that combines environmental engineering, microbiology, soil chemistry, and plant

science (Stefanova, 2022; Subodh Kumar Maiti & Dipita Ghosh, 2020)

Case Study 10: Post-Mining Reclamation in Belgium: The Charleroi Bouwmeester Project

Long-term interventions through ecological restoration in the Walloon region of Belgium at urban and suburban levels are illustrated by the successful project of Charleroi Bouwmeester in Belgium. In the cocktail years of industrial development in Charleroi, the functions of slag coal mining, steelworks, and bulk and fine chemicals industries were very intensive and led to important environmental effects such as poisoning of soils and waters in the area.

Furthermore, the loss of capabilities of these companies in the late 20th century had a very devastating impact on this area by making it an industrial moonscape with smelting sites, slag heaps, mined-out mines, and a chemically polluted river. While the huge industrial damage was the main challenge, the Charleroi Bouwmeester project, when it started in the beginning of the 21st century, was holistic and aimed at regaining and restoring quality of life and environment.

The project was a model of integrated urban and landscape regeneration with a mixed-use approach that united economic and environmental objectives to one another. It sought a transformation of the post-industrial zone into a lively and sustainable urban area which in turn might bring in new ventures and improve the quality of life for the community.

As a result of the redesign of the slag heaps and green spaces and the establishment of native plants there, the nearby area was rejuvenated and the pollution lowered. It wasn't just the nature side of the project that was innovative. The citizens were also the part of a process of reclaiming the land and the past of the

working class of Charleroi they are proud of.

This particular strategy of the project was tied to the adaptive reuse of the vacated industrial halls and other waste buildings that had previously paraphrased as entertainment centers, coworking spaces, food and drink spots, and learning institution. It was an initiative that created the space for greater involvement of the community and economic development in this area. A lively urban environment where the old coexists with the new was materialized through the fusion of revised architecture with the tangible relic of the industrial legacies



Figure 137: Martinet Coal Mine tailing rehabilitated and turned into a hiking trail. Photograph by Mokgadi Mamabolo



Figure 138: The reconversion of the former Martinet mining site and its slag heaps. Monceau-Roux: le site du Martinet prend son envol avec des projets concrets, comme celui de la Manufacture Urbaine [WWW Document], 2019. . sudinfo.be. URL <https://www.sudinfo.be/id101681/article/2019-02-12/monceau-roux-le-site-du-martinet-prend-son-envol-avec-des-projets-concrets-comme> (accessed 9.5.24).



Figure 139: Adaptive reuse of old industrial building into museums. Photographs by Mokgadi Mamabolo.



Figure 140: Re-think a postindustrial landscape / Dessin et Construction / Wallonie-Bruxelles Architectures / Wallonie-Bruxelles Architectures [WWW Document], n.d. URL <https://wbarchitectures.be/en/architects/Dessin-et-Construction/Re-think-a-postindustrial-landscape/554/> (accessed 9.5.24).



Figure 141: Rehabilitated Coal Mine Tailings . Photographs by Mokgadi Mamabolo.

Case Study 11: Musina Copper Mine, South Africa

In the past, the Musina Copper Mine in South Africa was an important centre of mining that is now considered a symbol of environmental damage. The long-lasting influence of mining in this sector encompasses several tailings dumps, pollution of soils, and water bodies that have been contaminated. According to Ndinannyi Kenneth Singo’s An Assessment of Heavy Metal Pollution Near an Old Copper Mine Dump in Musina, South Africa, the situation around the Musina Copper Mine is marked by the presence of copper, lead, and several other heavy metals that are above the safe levels and cause problems to the living organisms in these areas and human beings. (Singo, 2013)

Singo and Kramers, 2020 investigation emphasizes the gravity of the heavy metal contamination in the area noting that pollution goes much further away from the location of the mine dump. The spreading of these toxins certainly makes the job of the reclamation workers more difficult particularly in the cases where the region is poor in the technological resources to produce large scale effects. Indeed, it is here that phytoremediation comes up as a preferable alternative method, as it proposes a cheap, sustainable way of detoxifying the soil.” The Musina mine tailings have no detectable concentrations of Pb, Cd or As” (Singo and Kramers, 2020)

“Copper contamination of industrial waste streams is increasingly common with copper used in an array of industrial processes. Phytoremediation of copper-contaminated water with Pistia stratiotes presents a cost-effective, efficient and uncomplicated alternative for copper removal from industrial wastewater.” (Tang

et al., 2020)

Furthermore, in a different research, Retreatability Analysis of the Musina Copper Mine Tailings in South Africa: An Exploratory Study, Singo investigates the potential of using copper mine tailings in the process of reclaiming residual metals and the reduction of environmental hazards. The research argues that phytoremediation can be combined with the reclamation process, where the phytoremediation plants are used to extract the reprocessed tailings’ metals and intrinsically, decreasing the level of toxic material and accelerating the process of the rehabilitation of the landscape. “The Musina mine tailings have no detectable concentrations of Pb, Cd or As” (Singo and Kramers, 2020).....” The high concentrations of Cu are, however, a concern. While Cu is unlikely to present an important groundwater or surface (river) water contamination, its dispersion in dust in the dry season could pose a health risk to the large population living in the immediate vicinity. Ingestion of can lead to its damaging accumulation liver, brain, kidney and cornea. A retreatment of the tailings dump to extract copper would have the added advantage of mitigating this risk.” (Singo and Kramers, 2020)

“Hyperaccumulators are plants that have the ability to accumulate high concentrations of heavy metals in their aboveground portions without the adverse effects of heavy metal toxicity” (Forte and Mutiti, 2017)

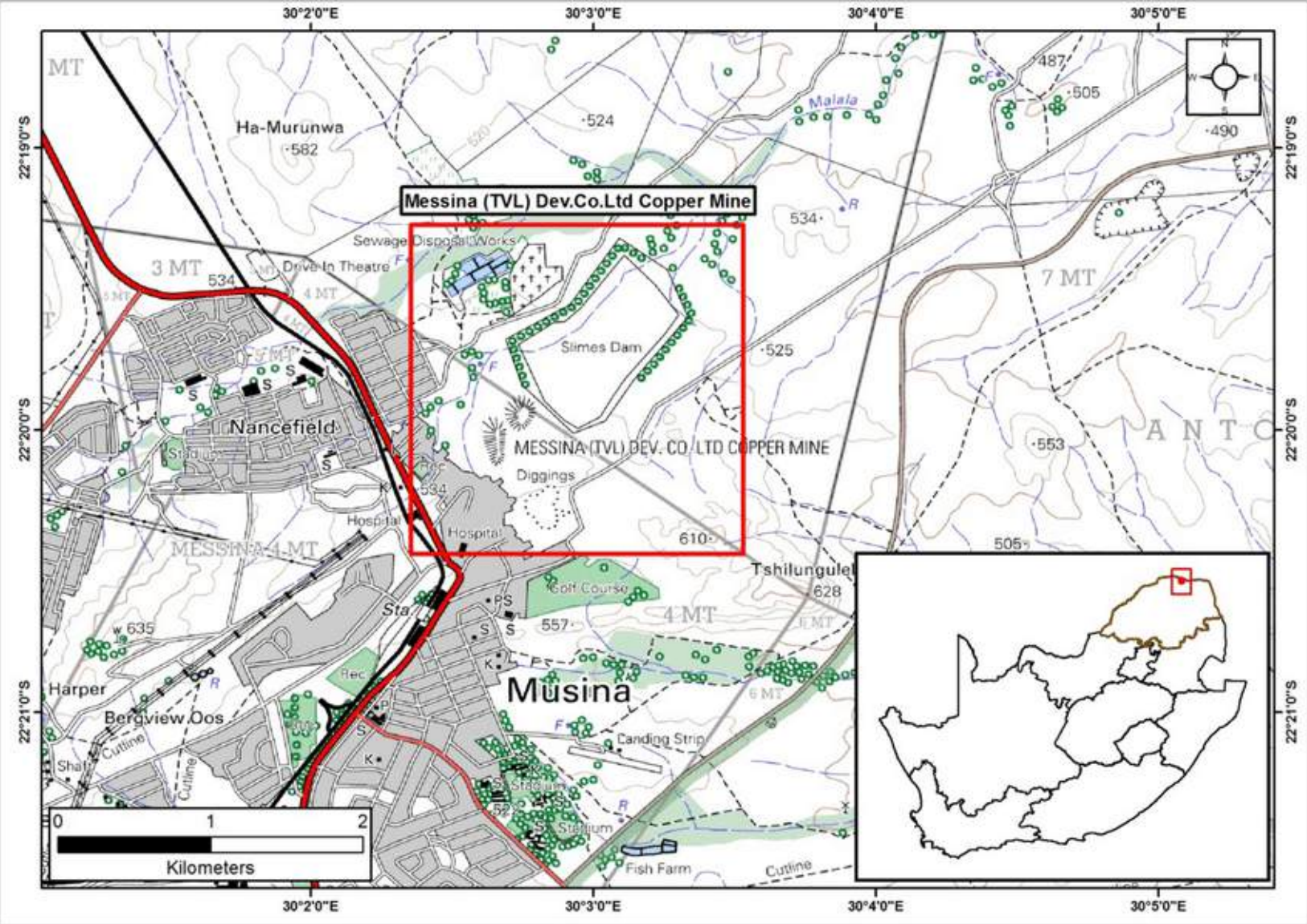


Figure 142: Locality Map of the Musina and the study area which is the old Musina Copper Mine Singo, N., Kramers, J., 2020. Retreatability analysis of the Musina copper mine tailings in South Africa: an exploratory study. SN Applied Sciences 2, 1707. <https://doi.org/10.1007/s42452-020-03447-x>

Map of the near by river next to the Messina Mine and the slime dam in relation to the community.

“The alkaline reaction of the tailings of the Musina mine means that no, or little, mobilisation of toxic and other metal ions is likely to take place. Instead, adsorption will dominate. Due to erosion, tonnes of tailings material spill from the Musina mine tailings into the nearby river and surrounding environment every year in the rainy season. Spillage samples, like the tailings themselves, have neutral to slightly alkaline pH values (7.5–8). This river is an important water source for communities living downstream [32], and it is thus important to note that this pH value signals no high level of metal contamination risk.” (Singo and Kramers, 2020)

Figure 143: Map of the near by river next to the Messina Mine and the slime dam in relation to the community.



09 LAND REPARTION/RESTITUTION

Land Reforms, Reparation

A history of dispossession, colonization, and exploitation runs deep into the South African land reform policy context, interlinked to the mining industry. The discovery of diamonds and gold in the late 19th century saw the aggressive appropriation of lands and mineral resources, the reservation of spaces for the native Africans, and the resultant economic degradation of the environment and lands within South Africa.

This chapter focuses on the analyses of the overlaps between land reform, land restitution, and environmental justice, and the operating dynamics of the mining sector within the South Africa context including an examination of existing literature and evidence-based studies. It evaluates the major issues and establish a link between land disposition and social equality, enterprise in the South African mining industry, as well as environmental sustainability, the need for restorative justice, and the important role of community participation in addressing historical sins.

The historical narrative of land in South Africa is deeply marked by the exhaust of its mineral wealth by the capitalists. The mining sector, which has been the backbone of South Africa’s economy, has also been a major cause of land dispossession. The progress of the mining activities during the colonial and apartheid eras led to the forced eviction of communities from their ancestral lands thus, they received small compensation or no compensation at all. The very first disquisition was made sure by laws such as the 1913 Natives Land Act that limited the ownership of black land, therefore, nudge the appropriation of land

in vitally important mining operations.

The quest for land reform has become highly charged against the background of the concentration of the most valuable mineral resources on the land which was traditionally owned by the indigenous. Due to the intricate land tenure, cases involving mining companies, government agencies, and local communities add to the confusion of the process. They usually end up in court battles and postponed reforms. The economic power of the mining industry further aggravates these issues as it is unfriendly in determining land reform policies and outcomes.

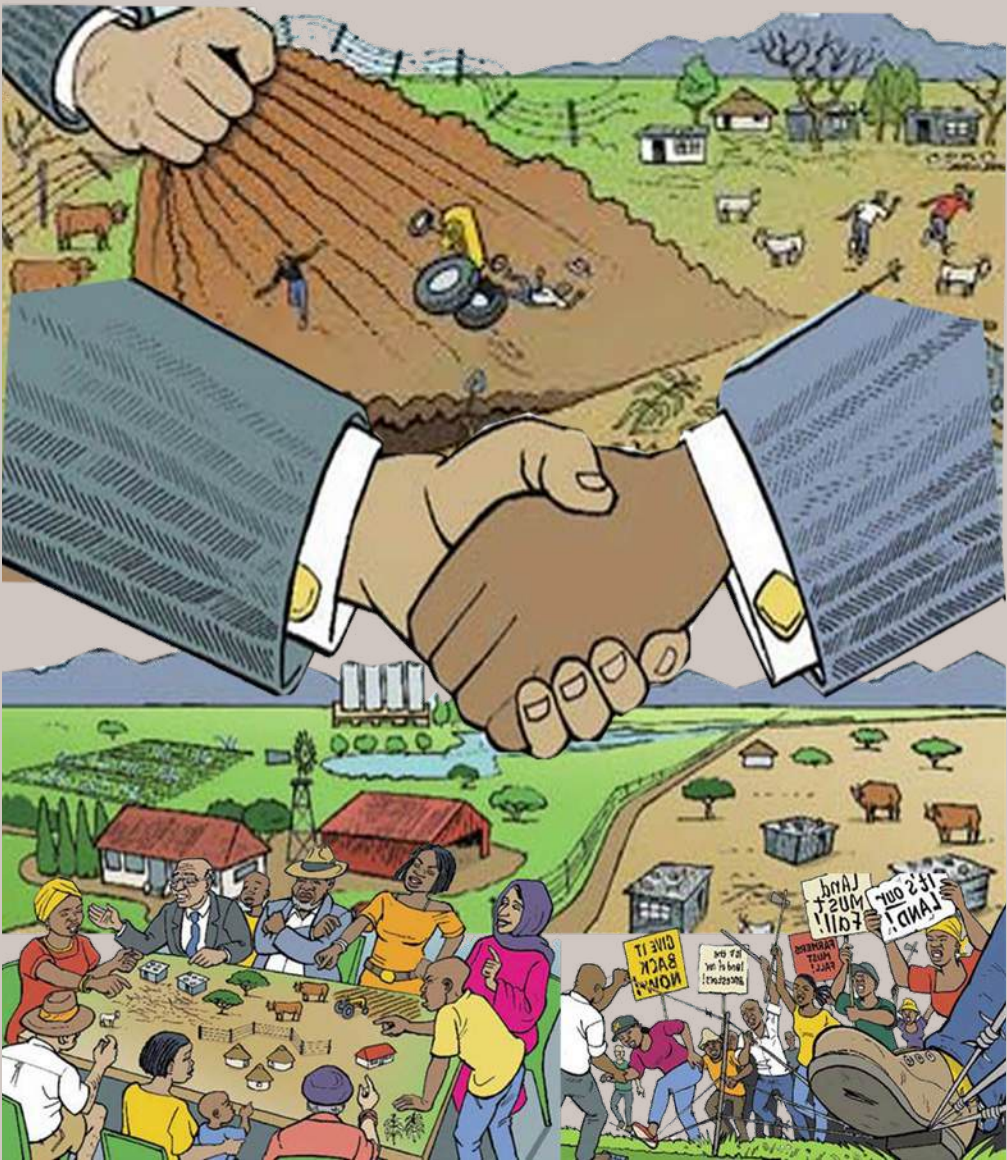


Figure 144: Images from Louise Kunz’s 2017 land reform project are combined in this collage to contrast scenes of community-driven land repair with the depressing legacy of exploitation and dispossession. It draws attention to the intricate relationship between land restitution and the mining industry, where the extraction of mineral wealth left the land and its inhabitants with lasting scars. The pictures show the continuous fight for social and environmental justice, highlighting the urgent need for laws that rectify past injustices and support ecological recovery and sustainable land usage.

Grainsa, RhinoReloaded, n.d. A fresh approach to land reform [WWW Document]. A fresh approach to land reform. URL <https://www.grainsa.co.za/a-fresh-approach-to-land-reform> (accessed 9.6.24).

Repatriation and Mining-Impacted Communities

Land reform in areas affected by mining is a field that is especially complex. It is undeniable that the return of the land to the communities that were economically displaced because of mining is not just a question of legal ownership; there are no less pressing matters that also have to do with environmental degradation and other problems that are caused by and related to mining. For the above reason, any repatriation efforts that are to be undertaken must integrate strategies for ecological restoration, guaranteeing that the repatriated land is preserved and available for sustainable livelihoods.

A number of environmental, social and economic issues have culminated in the book *Land Reform in South Africa: The Conversation That Never Took Place* which is a discourse that hardly ever happened among actors of the land reform debate in South Africa. The authors of this book put forward the bold assertion that any true repatriation for the previously colonized people of South Africa calls for a recognition of the need to rehabilitate mined lands to restore their ecological and economic worth.

The issue is key in places like the Witwatersrand, South Africa's most densely populated region, where decades of gold mining have caused various kinds of environmental degradation, including acid mine drainage and soil contamination. This lack of purposeful and high-level conversation around these issues and the land reform process in general has made land reform ineffective as many lands, which have been repatriated from the original owners, are still unfit for effective use as economic land.

The scholarly article written by Royke Lumowa et al., entitled *Promote Social Order to Achieve Social and Ecological Justice for Communities to Prevent Illegal Artisanal Small-Scale Gold Mining* investigates the complex intensifying social and ecological problems created by the illegal small-scale artisanal and small-scale gold mining practices worldwide.

The authors point out that the tackling of this problem calls for an integrated approach and many issues should be looked at in addressing the adverse effects of gold mining in the mentioned industries and society. In addition, they suggest that the restoration of mining sites that were reclaimed and rehabilitation of the mined-out zones be restored together with the implementation of measures for controlling the environment as well as the promotion of diversified economies for the communities that have been mentioned for the gold mining sector.

Given as a reference to the South African mining issues illegal mining commonly referred to as 'zama-zama's' is seen as contributing significantly to the environmental degradation in the area undermining the activities of land reform programs and the aspects of ecological justice. In this regard, there is a need for a possible solution where the mining policy and its implementation should be focused on diversifying the economy of the communities that have been mentioned above. This is the only way that the livelihoods of the people who are affected by this illegal activity can be improved while at the same time conserving the environment on which they depend for their survival.



Figure 145: The terrible reality of zama-zamas, or illegal miners, and their effects on South Africa's mining regions are depicted in this collage. It draws a contrast between the artisanal miners' valiant efforts and the frequently disastrous environmental damage they leave behind. The social and economic forces behind illegal mining are depicted in pictures of abandoned mining landscapes next to impoverished communities, and an ecological justice vision highlights the critical need for sustainable livelihoods, land rehabilitation, and diverse economies in mining-affected areas.

The Role of Courts in Advancing Land Reform, Repatriation, and Ecological Justice

The legal system is an essential factor in the resolution of land reform, repatriation, and environmental justice issues that plague mining regions across the globe. The courts are frequently called upon to intervene in issues of conflict among mining companies, the government, and the local populace especially in circumstances where land rights clash with mineral rights. The determination of the courts in such matters comes with far-reaching implications for the successful implementation of land reforms, the success of repatriation strategies, and the depth of environmental justice that can be obtained.

In Arif Rohman et al.’s Improving Ecological Justice Orientation through a Typological Approach to Illegal Mining in the Criminal Justice System the authors look at this matter. The authors state that the criminal justice system is having a role in solving the illegal mining issue. They say that a typological approach to illegal mining, which considers the social, economic, and environmental aspects of the problem, is a key element in the attainment of ecological justice. Furthermore, this approach will elicit the criminal justice system to not only cease illegal mining activities but also to rehabilitate destroyed environments and community rights.

The immense economic clout and influence of the mining sector, when combined with the cumbersome and often opaque regulations surrounding land restitution, mean that affected groups must suffer for long periods as the court cases creeping under the lengthy statutory and court proceedings. Suggestions favoured in many policies for creating specific land

courts could focus on putting these processes on the fast track and that land reform is executed fairly, transparently, and in full compliance with ecological norms.

Furthermore, the courts in this regard may be pivotal in the authority of mandating rehabilitation to the environment to rehabilitate land that is restored to citizens. In these situations, it will be crucial for the courts to put into force the regulations governing the cleaning and reclamation of land once mining and other activities by companies have taken place.

This procedure is not only Natural justice, which implies that it is not enough to simply provide the people with the land; however, that land should be of the kind that is capable of supporting life and sustained provision for the very people to whom it is returned. The social environment and the natural environment are recovered and rehabilitated because land reform is aimed at doing the right thing.



Figure 146: This collage represents collective wisdom by contrasting the formal courtrooms of the modern judicial system with the traditional African practice of settling conflicts under trees. It illustrates the crucial role that courts play in environmental justice, where the complex legal framework of statute law collides with the deeply ingrained customs of land stewardship. Traditional settings stress harmony between the people, land, and nature, underscoring the necessity for comprehensive approaches to land reform and ecological justice, even though conventional courts have the authority to order land repair.

The Role of Land Courts in the context of South Africa’s Land Reform and Environmental Justice.

While the Land Court represents a possible legal avenue, additional information is required to comprehensively grasp its function within the present legal framework, its power concerning mining disputes, and its involvement in land rehabilitation and compensation. This chapter explores the role of the Land Court in resolving mining conflicts within the broader legal and policy context of South Africa.

A crucial initial measure in addressing the complex relationship among environmental justice, mining challenges, and land reform in South Africa is the establishment of the Land Court. Because of its background involving exploitative practices and land title conflicts, the mining sector requires a legal system that can harmonize economic development with the rights of affected communities.

The Land Court Act 6 of 2023 establishes a dedicated court to adjudicate matters related to land reform, restitution, and tenure security, as stated by the Republic of South Africa (2023). The Land Court oversees disagreements stemming from competing claims to land designated for extraction, as disputes related to mining are quite common. The Mineral and Petroleum Resources Development Act (MPRDA) occasionally awards mining companies land rights by assigning the state custodianship over mineral resources (Department of Mineral Resources and Energy, 2022). Nonetheless, conflicts arise when mining activities intrude upon communities with unresolved land ownership issues or environmental worries. To resolve these conflicts and guarantee that mining operations comply with constitutional standards for fair land access and sustainable environmental practices, the

Land Court serves as a crucial forum. Several important legislative and constitutional factors shape the legal structure that oversees land and mining matters in South Africa. The Constitution (1996) (Republic of South Africa, 1996) guarantees the right to land restitution for groups affected by colonial and apartheid policies. Land claimants may pursue remedies through the Restitution of Land Rights Act 22 of 1994, often relevant in areas where mining activities are underway (Department of Rural Development and Land Reform, 2021). Nonetheless, discrepancies between mining regulations and land restitution programs result in conflicts, prompting the need for intervention by the Land Court.

The legal discussion concerning land rights and mining conflicts has been shaped further by case law. The Constitutional Court ruled in favor of regional landowners in Maledu and Others v. Itereleng Bakgatla Mineral Resources (Pty) Ltd (2018), emphasizing the necessity for mining firms to obtain proper consent before commencing activities (Constitutional Court of South Africa, 2018). The notion that those with customary land rights possess the legal authority to contest mining licenses was further confirmed in Baleni v. Minister of Mineral Resources (2019) (Centre for Environmental Rights, 2020). These decisions emphasize the need for a dedicated court, like the Land Court, to ensure compliance with legal standards and constitutional protections.

For the Land Court to manage mining matters efficiently, several measures are required. Initially, mining legislation, environmental guidelines, and community entitlements ought to be the primary subjects of specialized training courses for judges and legal

experts. This expertise enables the Court to more effectively manage the complex nature of disputes related to mining. In addition, to enhance the Court’s accessibility and capability for affected communities, additional institutional support and funding are necessary (Republic of South Africa, 2023). Additionally, the Land Court, the Department of Mineral Resources and Energy, and various civil society organizations collaborate across different agencies to enhance enforcement methods and ensure policy consistency.

Efforts to enhance public awareness are crucial for bettering access to justice. Communities are more prepared to engage with the legal system when they are given informational campaigns regarding land rights, mining regulations, and processes for resolving disputes. To fulfill its function as an impartial and accessible court, the Land Court needs to encourage transparency and participatory governance.

In South Africa’s efforts to resolve land disputes related to mining, promote land rehabilitation, and uphold environmental justice, the Land Court represents a groundbreaking legal body. The Court provides a dedicated venue for addressing conflicts arising from competing land claims and mining activities by integrating it into the existing legal framework. The Court’s function in ensuring equitable land access and sustainable growth is supported by legal precedents, regulatory structures, and alternative conflict resolution methods. Nonetheless, reforms in institutions and strategies for public involvement are essential to tackle ongoing challenges such as environmental degradation and procedural hindrances.

To establish a just and inclusive legal framework, the Land Court needs to find a balance between the economic requirements and the constitutional rights of landowners and communities.

Sustaining Community Agency : Intergrating Participatory Design and Governance in the Land Court

Particularly in circumstances where historically marginalized groups seek greater control over their land and constructed surroundings, participatory design is founded on principles of inclusiveness, collaboration, and empowerment. In South Africa, where initiatives such as housing projects and land reform efforts aim to incorporate local viewpoints, participatory design has been crucial to urban and rural development after apartheid (Huchzermeyer, 2003; Parnell & Pieterse, 2010). Nonetheless, due to superficial involvement, insufficient resources, and bureaucratic inefficiencies, execution often fails to meet policy frameworks that promote community engagement

The suggested Musina Land Court is a participatory entity that integrates indigenous justice mechanisms and community-driven governance frameworks, extending beyond Western legal customs to resolve mining disputes and land restitution issues.

In South Africa, recent efforts in participatory design have emerged in land restitution and urban development initiatives. The aim of Community-Based Natural Resource Management (CBNRM) and informal settlement enhancement has been to incorporate local governance and knowledge into spatial planning (Steenkamp & Uhr, 2000). However, sustaining participatory governance beyond the initial phases of a project remains challenging, particularly in mining-impacted communities (Parnell & Pieterse, 2010)

In the history of mining in South Africa, the interests of the state and corporations have overshadowed the well-being of the local communities. Due to extractive

industries, communities often face compelled relocation, loss of farming livelihoods, and environmental degradation. In this context, participatory design acts as a protection to restore agency to affected groups. To effectively address historical wrongs and encourage environmental responsibility, spatial planning must involve community input in the decision-making process.

Case Study 12: Booysen Magistrate Court

Co-Arch International Architects, Consultium Architects & Urban Designers



Figure 147: Booysen Magistrate court
Co-Arc's Booyens Magistrate's Court Stands Out - Quality Architecture in Johannesburg [WWW Document], n.d. URL <https://www.co-arc.com/booyens-magistrates-court/> (accessed 9.7.24).

The Booysen Magistrate Court is situated south of the Johannesburg CBD. In the 2008, the the Department of Justice recognized the necessity for a new magistrate's court in the area.

The court was conceptualized as a paradigm of innovative government infrastructure, embodying forward-thinking architectural principles. Its layout features a centralized circulation network linking multiple levels, with universal accessibility facilitated through the incorporation of both stairs and ramps, seamlessly integrated with the surrounding natural landscape.

The linear layout of the area guides individuals from the primary entrance towards the courtrooms and administrative areas, offering plenty of room for lingering or informal gatherings along the way. A focal point of the design is the expansive triple-volume atrium at its core, suffused with abundant natural light, serving as a welcoming and luminous hub for public engagement.

The architectural design incorporates a palette of durable structural and finishing materials, comprising colored walling, masonry, lightweight infill panels, and a dampened steel roof. Contrasting this solidity, glazed shopfronts allow natural light to permeate the interior. Additionally, screening elements are strategically employed to modulate natural light and enhance a sense of privacy. The integration of landscaping further enriches the environment, encompassing both public and private areas, featuring public gardens and secluded courtyard spaces.



Figure 148: Analyses ogf the courts interior spaces
studio5, 2019. Booyens Magistrate Court - Interiors | Co Arc. Co-Arc International Architects. URL <https://www.co-arc.com/booyens-magistrate-court-interior/> (accessed 9.7.24).

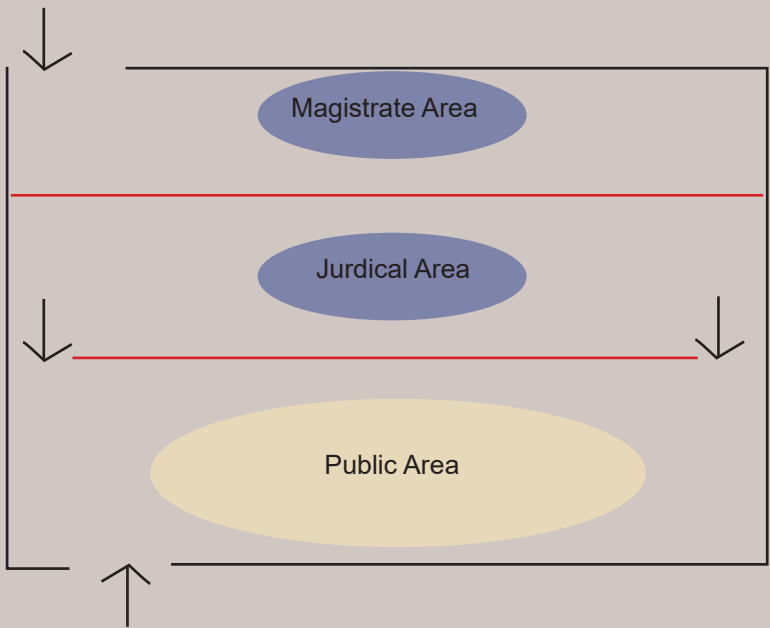
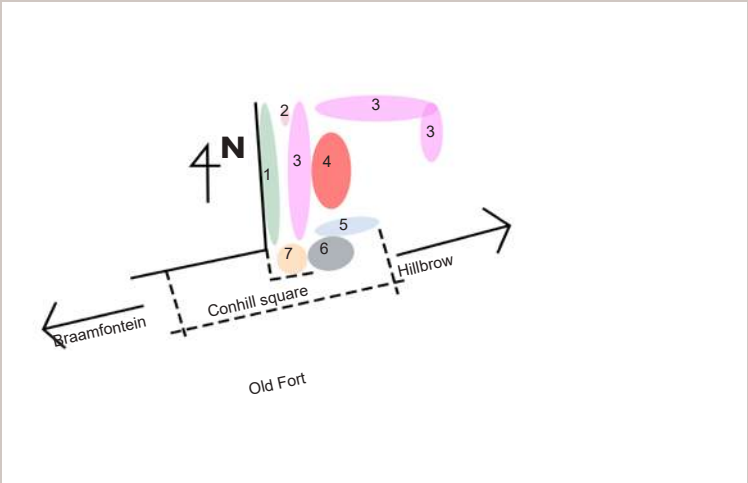


Figure 149: The court interior and an analyses of the spatial arrangements
studio5, 2019. Booyens Magistrate Court - Interiors | Co Arc. Co-Arc International Architects. URL <https://www.co-arc.com/booyens-magistrate-court-interior/> (accessed 9.7.24).

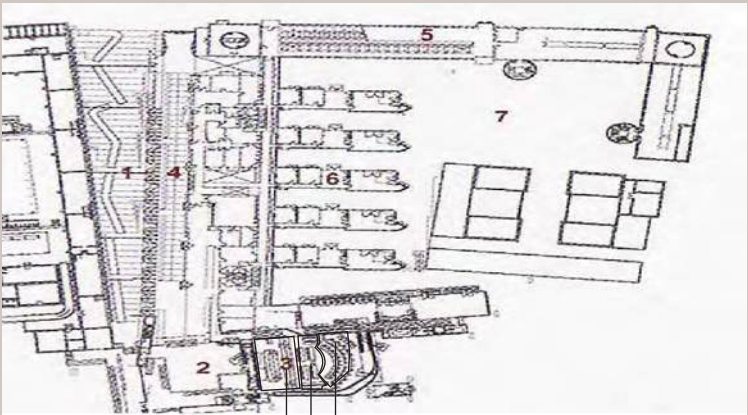
Case Study 13: The Constitutiona Hill Court
Urban Solutions Architects + Urban Designers

The aim of the was to create a public area that blended in well with its surroundings. The southern wing of the structure is centered around a public foyer and court rooms, while the northern wing is home to the library, which is partially open to the public. Both locations are very noticeable and approachable.

The western side’s interior stairs function as a gallery area in addition to providing access to the public sections. The Great African Steps, an outdoor set of stairs and walkways, surround the building’s western side. A major lobby space that is connected to the foyer makes it easier to enter the court.



- 1. Great African Stairs
- 2. Exhibition
- 3. Welsh Library
- 4. Judges Chambers
- 5. Judges Lounge
- 6. Court Chamber
- 7. Court Foyer



Public Area
Legal Representative
Magistrates Area

Figure 150: Spatial layout of the courtroom
Gumede, S., 2010. The role of architecture in the democratisation of South Africa in disadvantaged communities : a design of a civic centre for Mpumalanga Township.

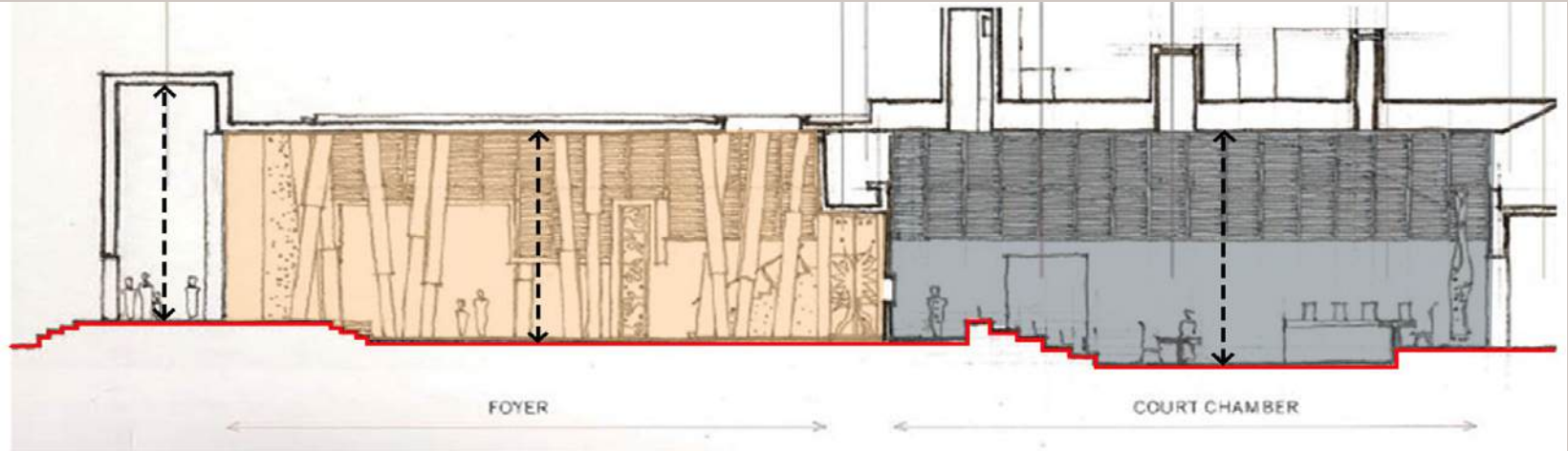


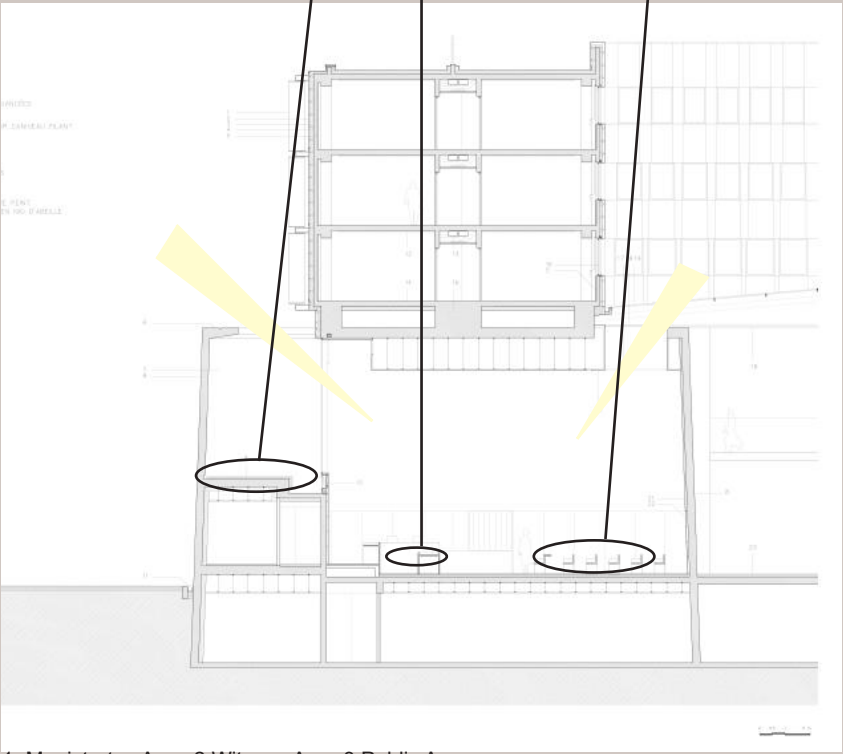
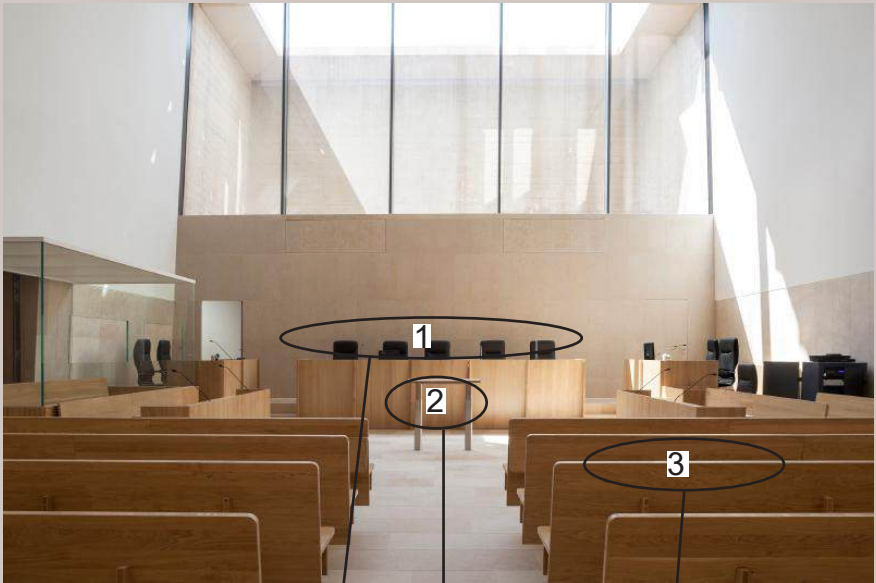
Figure 151: Analyses of the floor to ceiling height and the transparency of the facade and privacy.
PRECEDENT STUDIES Figure 5.1: Entrance area to the Court foyer (Author, 2011). 5.1 CONSTITUTIONAL COURT by omm design workshop university of pretoria Johannesburg, South Africa 2001-2004 - Google Search [WWW Document], n.d. URL https://www.google.com/search?sca_esv=8ffe4b1216883de0&q=PRECEDENT+STUDIES%0D%0AFigure+5.1:+Entrance+area+to+the+Court+foyer+(Author,+2011).%0D%0A5.1+CONSTITUTIONAL+COURT%0D%0Aby+omm+design+workshop+university+of+preto-ria%0D%0AJohannesburg,+South+Africa%0D%0A2001-2004&source=Inms&fbs=AEQNm0DPvcmG_nCbmwtBO9j6YBzM68ZanC7g-01Skprhw5JoufVCiMv-hxC44jt6JduRQysBab-bgQXjPraaWFXMvOy8K9RiSkH23PP0DUupFql8hPCq0lCgroEXVXvy2xviGvWoXPWx-DuSAr1c0rWLPDrilIXW0iMLn0xLK7g61juP3F530Paf-WJbXUSQ3CdyIpQgCg0-vWNSeMPOWcU5GTVh4j7jelig&sa=X&ved=2ahUKEw-jhwfHlZq-IAxWEQ_EDHQ8pLM8Q0pQJegQIDhAB&cshid=1725670231742992&biw=1920&bih=869&dpr=1#vhid=zephyr:0&vssid=a-tritem-https://repository.up.ac.za/bitstream/handle/2263/30276/05chapter5.pdf?sequence%3D6%26isAllowed%3Dy (accessed 9.7.24).

Case Study 14: Aix-En-Provence Courthouse

The Aix-en-Provence Courthouse stands out as a prominent exemplar of contemporary court architecture, situated within the historic confines of Aix-en-Provence, located in southern France. This architectural marvel adeptly amalgamates modernity, functionality, and a reverence for tradition, aiming to strike a harmonious balance between the authoritative aura expected of a judicial institution and the cultural ethos of its environs.

At the heart of the courthouse’s aesthetic appeal lies its carefully curated selection of materials. By juxtaposing traditional elements like stone with contemporary features such as steel and glass, the design achieves a captivating facade that exudes both solidity and transparency, thereby encapsulating the essence of its architectural narrative.

Furthermore, the interior ambiance and energy efficiency of the courthouse are intricately woven into its design ethos. Embracing the principles of biophilic design, the incorporation of ample natural light sources, including expansive windows, skylights, and strategically positioned atriums, not only enhances the spatial experience but also minimizes the building’s ecological footprint by reducing reliance on artificial lighting and ventilation systems.



1. Magistrates Area 2. Witness Area 3. Public Area

Figure 152: Highlighting the volume in the public corridor spaces and how lighliting is manipulated into the courtrooms
ATELIER MARC BARANI, Serge Demailly · Tribunal de Grande Instance [WWW Document], n.d. . Divisare. URL <https://divisare.com/projects/501253-atelier-marc-barani-serge-demailly-tribunal-de-grande-instance> (accessed 9.7.24).

Case Study 15: In Wake of Revolution Burkina Faso Parliament Building

Francis Kere

To honor the history and legacy of the location, the new parliament building is situated on place of the previous assembly building's ruin. It represents openness, responsibility, and transparency in government via architectural architecture, which aimed to achieve social fairness and democratic changes.

Open areas with large glass facades allowed for natural light and visibility are used to encourage people to interact with their legislators and the legislative process. He reduced environmental effect and increased energy efficiency by using passive cooling techniques, natural ventilation, and locally produced materials in his vernacular architecture.

He incorporated multiple green terraces along the occupiable facade. Sunshading components would support the plants and allow for air movement and cooling to achieve social laboratory.



Figure 153: Destroyed Parliament Building



Figure 154: New Proposed Parliament

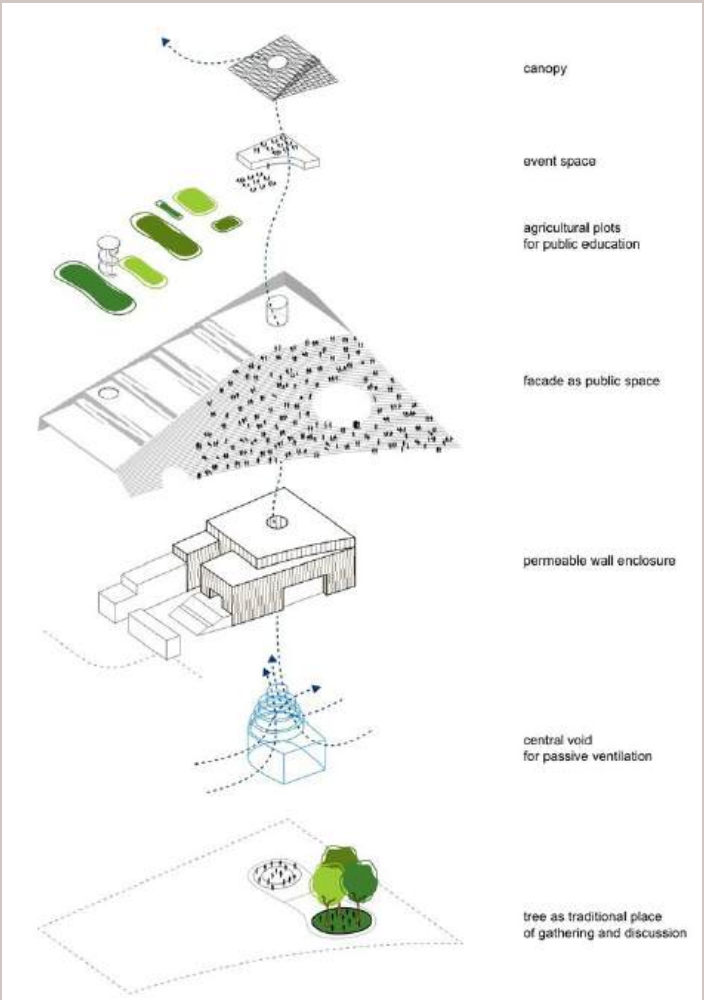
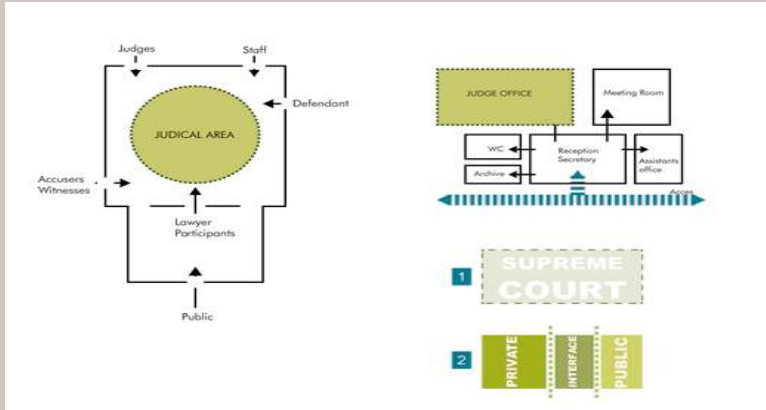


Figure 155: In Wake of Revolution, Francis Kéré Envisions a Transparent New Architecture for the Burkina Faso Parliament Building | ArchDaily [WWW Document], n.d. URL <https://www.archdaily.com/797283/in-wake-of-revolution-francis-kere-envisions-a-transparent-new-architecture-for-the-burkina-faso-parliament-building> (accessed 9.7.24).

Case Study 16: :Soupreme Court And School Of Magistrate Atelier Albania

Circulation Diagram



Spatial Arrangemnet of Program

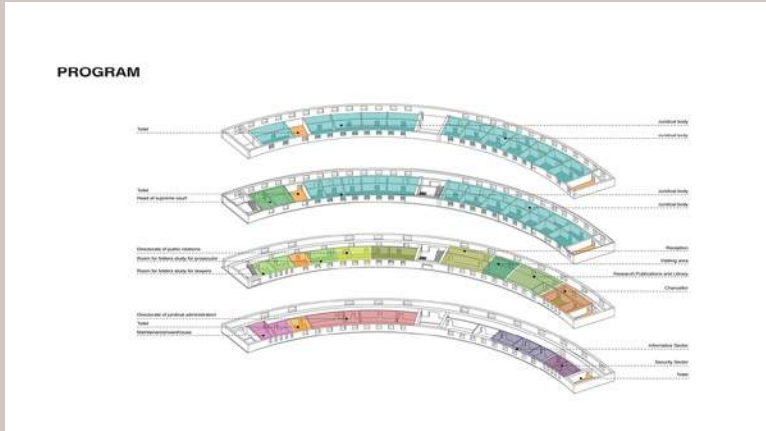


Figure 156: soupreme court and school of magistrate, n.d. .
Studioarch4. URL https://studioarch4.com/portfolio_page/soupreme-court-and-school-of-magistrate/ (accessed 9.7.24).

“Supreme Court hast to work properly between Public and semi-Public space, the itself cases and the story behind the idea of justice has to be open and clear in front of society– the border between the inside and outside has to be invisible.”

Concepts such as accessibility, openness, transparency, clearly defined organization, lighting, and diversity were part of their conceptual framework.

Different Typology studies were done To recognize the functional layouts within judicial levels which affect the layout and shape of the court. Central typologies include a central public area in the middle of the courthouse floor, with courtrooms arranged on either side and more private or limited areas surrounding it.

In linear court typologies, the courtrooms are positioned along the interior boundaries of the public space, which is elongated and located along one side of the plan.

In order to facilitate public access while maintaining the required privacy for administrative and educational activities, the design attempts to strike a balance between the separation and integration of public and private spaces.

The structure is divided into three main sections: public areas, intermediate zones that serve as courtroom interfaces, and private sections for administration, offices, and archives. Courtrooms for civil, criminal, administrative, and joint collegiate proceedings fall into one of four categories.

The ground floor is mainly used for public activities including the library, waiting areas, and reception, while the top floors house the judiciary’s offices, giving them more seclusion from the public eye.

THE PROJECT: LAND COURT, MEMORIAL AND MINING ACTIVISM CENTRE

THE BRIEF

Project Title: SACRED LANDSCAPES UNDER SIEGE

“Resolving disputes over mining claims on sacred landscapes in Musina through the legal lens of a Land Court”.

Introduction

The aim of the project is to create a multipurposed complex in Musina that includes a Memorial Centre, Mining Activism Centre, and a Land Court. The purpose of these facilities is to honour the local heritage, spirituality, biodiversity, and culture while addressing the damage that mining has caused to the sacred terrain. Through the legal lens and ecological sustainability what would a building mean in this landscape? You are to reimagine what a land court looks like in this context.

Project Objectives

- The project aims to address the healing and repair of sacred landscapes impacted by mining activity. It intends to build and establish a Land Court, Memorial Centre, and a Mining Activism Centre in Musina.
- The design will promote a sense of healing, transformation and reconciliation within the community while honouring the area’s cultural significance, heritage, and Sacredness.
- Establish a Memorial Centre that will honour the region’s indigenous peoples, customs, and historical sites while celebrating the rich cultural heritage and history of the Musina area.
- Establish a Mining Activism Centre as a focal point for activism, instruction, and action against the damaging impacts of mining on the environment, local communities, and indigenous rights.
- Establish a Land Court that will offer a forum for settling conflicts pertaining to environmental preservation, sustainable development, and land rights while integrating social justice and ecological sustainability concepts into court cases.
- Examine the legal framework and procedural intricacies of traditional courts within the context of South Africa, with a focus on understanding their historical development, jurisdictional authority, and Legal processes.

- Assess the architectural influence of mining operations on sacred terrains in Musina, considering elements such as visual appeal, cultural importance, and spatial dynamics.
- To investigate the laws pertaining to sacred landscapes and mining claims in South Africa.

Conceptual Framework

- Legal Lens: The project reimagines the role of legal institutions in addressing social and environmental issues through the Land Court, highlighting the need for fair and open legal procedures that give marginalized communities’ rights and the preservation of natural resources top priority.
- Ecological Sustainability: To reduce environmental impact and foster harmony with the surrounding landscape, the complex’s design will incorporate ecological sustainability principles through the use of green building technologies, renewable energy systems, and environmentally conscious landscaping.

Reimagining the Land Court

- The Land Court is intended to serve as a representation of equity, justice, and environmental stewardship that embodies both restorative justice ideals and community values.
- Architecturally, the Land Court embraces organic shapes, earth tones, and natural materials that blend in perfectly with the surroundings and convey a sense of grounding and earthiness.
- Incorporate transparent and open spaces to promote public engagement and discourse, thereby promoting inclusivity, accessibility, and accountability in legal proceedings.
- Incorporate new features that encourage meaningful engagement between stakeholders and support alternative dispute resolution techniques include mediation gardens, outdoor courtrooms, and community gathering spaces.

SITE SELECTION

Ownership

The proposed site for this dissertation is situated in Musina, close to the Limpopo River, which forms the border between South Africa and Zimbabwe. This area is well-known for its varied topography, which includes bushveld and savannah, as well as important natural and cultural landmarks like the esteemed Mapungubwe National Park. Historically, Musina has strived in

trade, farming, and mining which has been serving as the main pillars of the economy. The town is well-known for having an abundance of mineral resources, including copper, iron ore, and coal, which have made investments and created jobs that have greatly boosted the local economy.

The focal point of our study lies within the historical grounds of the old Musina copper mine, nestled behind the Musina Mall. The Messina Development Company sought mining rights and permits to utilize the deposit in order to develop and run the Musina copper mine. The Musina copper mine, which was established and operated as a result of this attempt, served as the backbone of the local economy for many years.

The mine was eventually closed and abandoned when the Messina Development Company ceased operations there in 1991 this was caused the occurrence of the Messina fault and the exploitation of the deposits by the Messina Development Company. Following its shutdown, the abandoned Musina copper mine has remained a silent reminder of time’s passing and a reminder of the area’s former mining grandeur. Its ruins, left untended and forgotten, are a moving reminder of how industry is cyclical and the lasting effects it has on the environment.

FEASIBILITY

Scope of Work

- To comprehend the historical, cultural, and environmental context of Musina, do site analysis and evaluation.
- Involve community leaders, legal advisors, environmental specialist, local community and mining activist, to get their opinions, comments through interviews and incorporate them into the design.
- Create schematic designs with an emphasis on architectural elements that stands for healing, reconciliation, and reverence for the sacred terrain for the buildings.
- Create detailed design drawings that adhere to the local building regulations and laws, such as floor plans, elevations, sections and 3D representations
- Designing the landscape and identifying chances to minimise environmental effects and use renewable, locally sourced, light architectural materials.
- Conducting in-depth studies and needs analyses to comprehend the needs and goals of the Musina community.
- Creating the programmatic requirements for every facility in accordance with feedback from pertinent stakeholders and specialist.

Why?

These initiatives are essential to the Musina community’s ability to confront issues relating to mining, pursue justice, and promote a more resilient and sustainable future. They offer vital tools, network support, and forums for discussion and action which contribute to the development of resiliency and solidarity in the face of challenging social, health and environmental crises.

The Land Court gives access to justice, land rights, reparations, and environmental justice cases. This is essential the local residents, mine workers for complaints about mining related issues including land conflicts. It will offer fairness and transparency ensuring that community members have voice in decisions impacting their land and resources by providing a clear and easily accessible legal process that fosters accountability in resolving current and future mining issues.

Working hand in hand, the memorial centre will foster historical remembrance, a place where people come together to remember the past and the effects that mining has had on the area and it’s people. It provides reflective spaces, introspection, remembering and healing while paying tribute to the lives lost foremost giving educational awareness through programs such as educational exhibitions, and educational programmes.

The mining activism centre will empower the community by acting as a centre for research and cooperation, and give them the tools to take part in advocacy, activism and research on mining related issues. It gives them policy influence facilitating community voices in decision-making processes regarding mining regulations and governance.

Accomodation Schedule

Description	Approx. Unit Size (sq.m)	No. of	Approx. Total Size (sq.m)
Land Court			
Courtroom	150sqm	4	600sqm
Lobby	100sqm	1	100sqm
Legal Offices	50sqm	2	100sqm
Consultation Rooms	50sqm	2	100sqm
Meeting Rooms	70sqm	2	140sqm
Administration Offices	80sqm	2	160sqm
Storerroom	10sqm	1	10sqm
Chancellor's office	40sqm	1	40sqm
Head of Court	40sqm	1	40sqm
Archive	60sqm	1	60sqm
Study Room	30sqm	2	60sqm
Reception and Info desk	30sqm	1	30sqm
Security room	10sqm	1	10sqm
Staff Tea Room	20sqm	1	20sqm
Staff Kitchenette	15sqm	1	15sqm
Staff Toilets	12sqm	1	12sqm
Cleaners Store and Sluice Room	6sqm	1	6sqm
Total			1503sqm
Memorial Centre			
Reception Area	70sqm	1	70sqm
Exhibition Hall (Inside)	200sqm	1	200sqm
Exhibition Hall (Outside)	250sqm	1	250sqm
Memorial room	100sqm	1	100sqm
Lobby Area	100sqm	1	100sqm
Storage	30sqm	1	30sqm
Reflection Room	50sqm	2	100sqm
Library	80sqm	1	80sqm
Miscellaneous Storage	20sqm	1	20sqm
Loading Area	10sqm	1	10sqm
Staff Kitchenette	10sqm	1	10sqm
Staff Toilets	12sqm	1	12sqm
Offices	15sqm	4	60sqm
Restaurant (Inside)	160sqm	1	160sqm
Restaurant (Outside)	125sqm	1	125sqm
Kitchen and Service Area	100sqm	1	100sqm
Total			1427sqm

Mining Activism Centre			
Exhibition	150sqm	1	150sqm
Information Area	70sqm	1	70sqm
Lobby Area	80sqm	1	80sqm
Activism Hub	70sqm	2	140sqm
Meeting Rooms	50sqm	2	100sqm
Workshop	80sq	2	160sqm
Auditorium	200sqm	1	200sqm
Seminar Room	40sqm	4	160sqm
Study Room	50sqm	2	100sqm
Storage	30sqm	1	30sqm
Offices	15sqm	4	60sqm
Staff Toilet	12sqm	1	12sqm
Kitchenette	15sqm	1	15sqm
Total			1117sqm
Sub Total	70%		4047sqm

Circulation	As required		
Building Service Area	As required		
Mechanical Area	As required		
Public Ablutions	As required		
Parking (100 bays) and drop-off			
Sub Total	30%		1 214sqm
Total Building Area			5261sqm

Approach to Programme

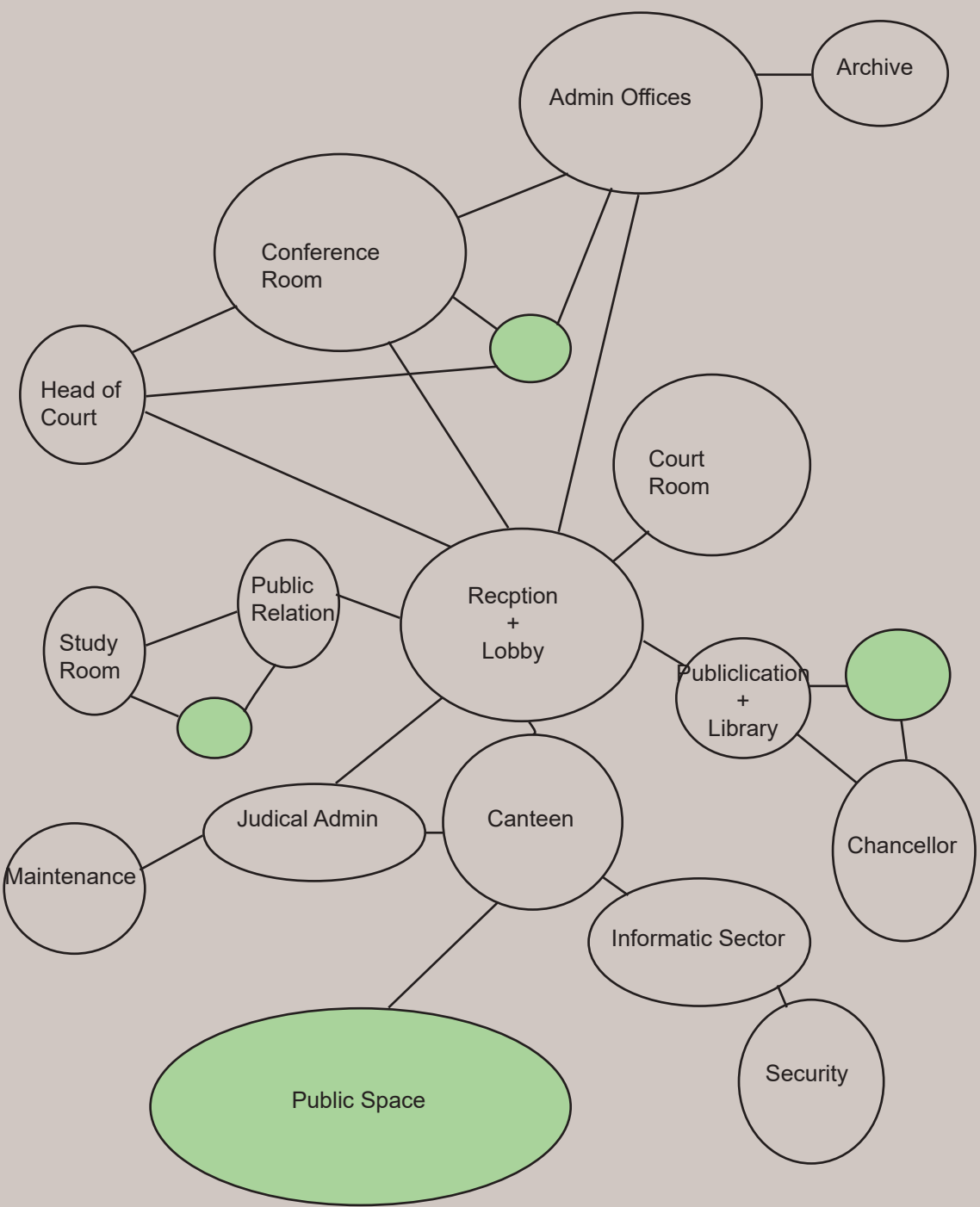
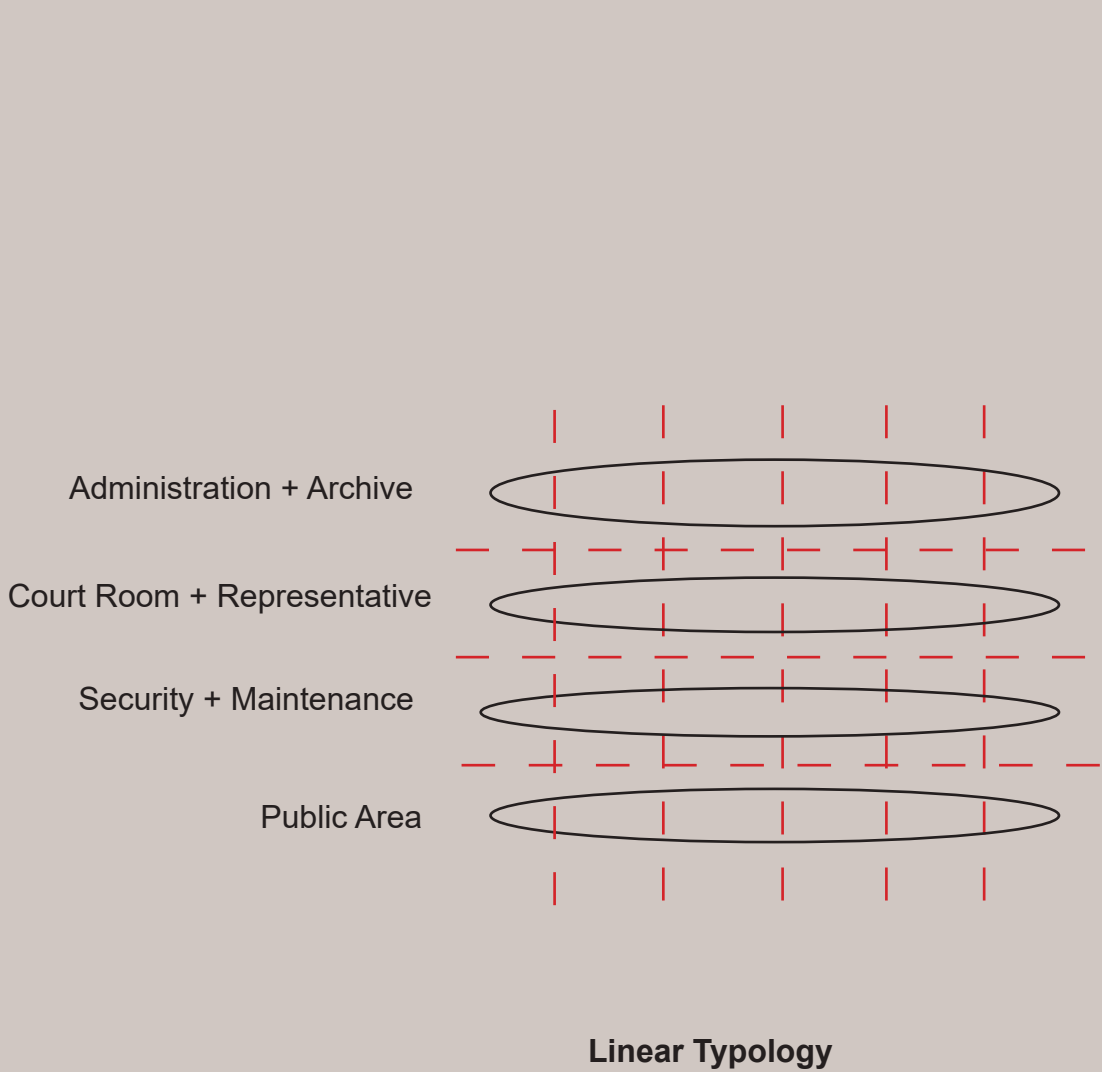


Figure 157 : Exploration of the linear typology of a court

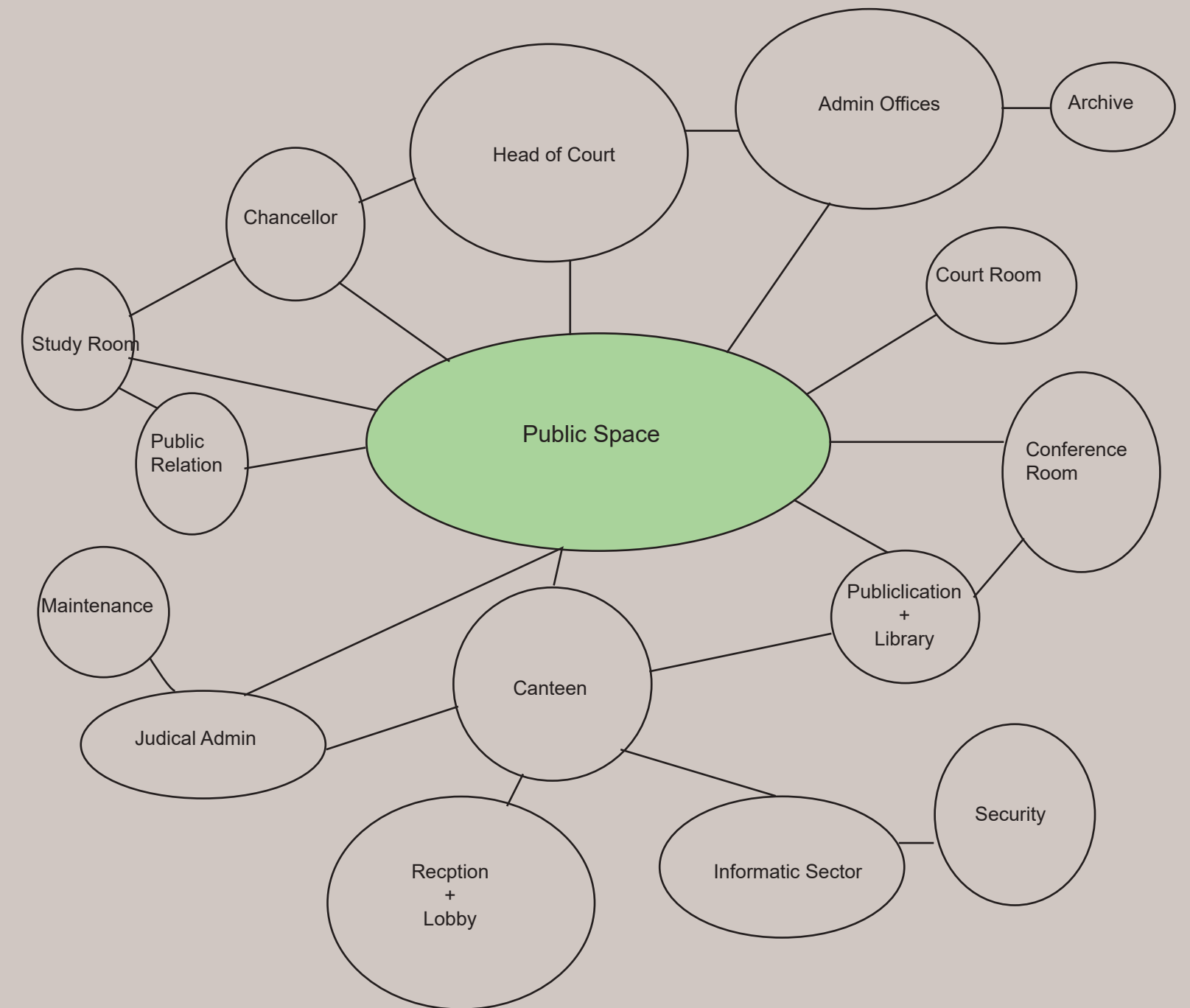
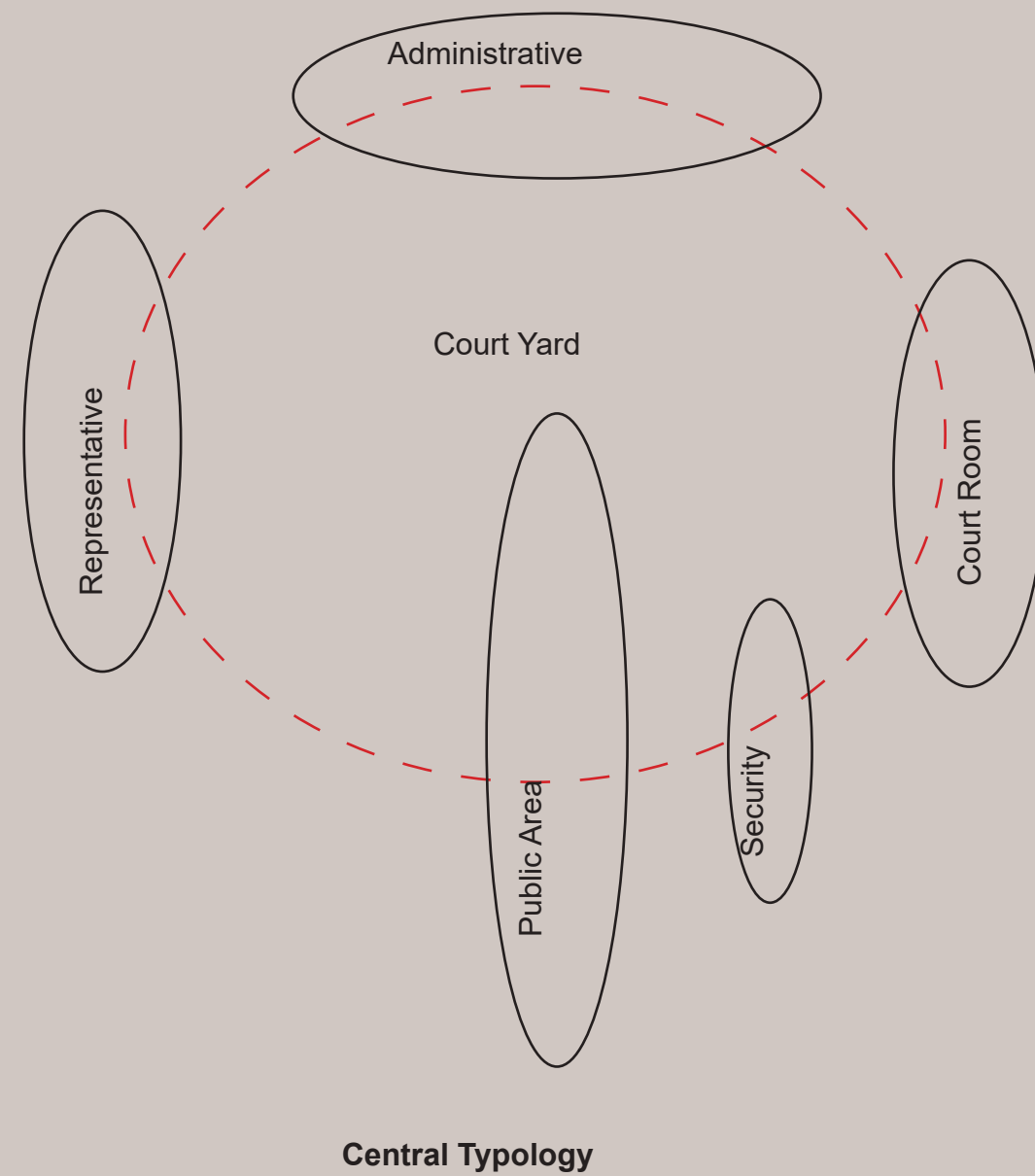


Figure 158 : Exploration of the central typology of a court

Memorial Centre			Land Court			Mining Activism Centre		
Storage 1	30sqm	Private Spaces	Juridical Aea	Courtroom 2	150sqm	Private Spaces	Information Area 1	70sqm
Library 1	80sqm			Legal Offices 2	50sqm		Storage 1	30sqm
Miscellaneous Storage 1	20sqm			Head of Court 1	40sqm		Offices 4	15sqm
Loading Area 1	10sqm			Chancellor 1	40sqm		Staff Toilet 1	12sqm
Staff Kitchenette 1	10sqm			Conference Room 2	70sqm		Kitchenette 1	15sqm
Staff Toilets 1	12sqm			Consultation Rooms 2	50sqm	Public Spaces	Exhibition 1	150sqm
Offices 4	15sqm			Meeting Rooms 2	70sqm		Lobby Area 1	80sqm
Reception Area 1	70sqm	Public Spaces	Administration	Administration Offices 2	80sqm		Activism Hub 2	70sqm
Exhibition Hall (Inside) 1	200sqm			Archive 1	60sqm		Workshop 2	80sqm
Exhibition Hall (Outside) 1	250sqm			Study Room 2	30sqm		Auditorium 1	200sqm
Memorial room 1	100sqm			Public Relation 1	20sqm		Seminar Room 4	40sqm
Lobby Area	100sqm		Security	Maintenance 1	20sqm		Study Room 2	50sqm
Restaurant (Inside) 1	160sqm			Informatic Sector 1	15sqm		WC 2 & 1 Disabled	60sqm
Restaurant (Outside) 1	125sqm		Public Aea	Security 1	10sqm			
Kitchen and Service Area 1	100sqm			Reception & Lobby 1	150sqm			
Reflection Room 2	50sqm			Canteen 1	100sqm			
WC 2 & 1 Disabled	60sqm			WC 2 & 1 Disabled	60sqm			

Architectural Stitching in Post-Mining Landscapes: Memorial Centre, Mining Activism Centre, and Land Court

Mining has a wide-ranging impact, leading to substantial harm to both the environment and communities. The devastation consists of ecological devastation, depletion of soil, and most notably, the disturbance of social and cultural bonds in communities relying on the land. When addressing mining-affected areas, the objective is to repair the damage and convert the surroundings into environments that support healing, commemorate the history, and empower communities rather than just hiding the damage.

The design of buildings can support future transformation and serve as a tribute to the things that have disappeared in an area affected by mining activities. The Memorial Center acts as a space for collective mourning and recollection. Along with paying homage to the land and individuals affected by mining, it would function as a space for contemplation where nearby communities could engage with their history, share stories, and acknowledge the lasting impact of environmental damage.

Adjacent to the Memorial Center, the Mining Activism Center plays a vital role in advocating for the rights of impacted communities. It serves as a gathering place for workers, activists, and displaced individuals to challenge corporate and official viewpoints, advocate for environmental justice, and seek reparations. The center offers resources for community organization, training in activism, and legal assistance to empower people to reclaim control over their lands and livelihoods.

Whereas the Land Court offers a legal and procedural

solution for unresolved mining disputes. The establishment of a specialized Land Court dealing with land claims, compensation, and land restoration presents a targeted approach to the complex challenges arising from mining activities.

Such a court can mediate disagreements between stakeholders, considering the interests of governments, local communities, and mining companies. It can effectively resolve conflicts in a transparent and fair manner concerning resource distribution, environmental conservation, and land ownership. The Land Court would redress past wrongs and promote peace while symbolizing accountability and restorative justice.

These architectural interventions emphasize the idea that the land should remain exposed, polluted, and untreated until mining conflicts are resolved. This concept aims to prompt communities and decision-makers to consider the human and environmental costs of mining by advocating for a period of contemplation during which the scars from mining activities are left visible.

It opposes the immediate rush to rehabilitate landscapes. The harsh beauty of devastated landscapes can provoke contemplation about industrialism, consumerism, and the vulnerability of the earth, as evidenced by Edward Burtynsky's photography of industrial wastelands, including his renowned work "Nickel Tailings" (Burtynsky, 2003). By leaving the environment exposed, the Memorial Center, Mining Activism Center, and Land Court contribute to a

broader process of education and reflection.

The polluted and exposed land becomes an interactive "guide" for visitors to directly experience the damage caused by mining and the urgent necessity for sustainable solutions. This approach aligns with the concept of post-critical ecophenomenology, which advocates for a thoughtful and physical engagement with the natural environment, particularly in landscapes that have been impacted or changed.

As stated by Brown and Toadvine (2003), ecophenomenology emphasizes the importance of forming an emotional and sensory connection with the ecological realities of the world. By preserving the natural terrain in its current state, individuals can confront the unfiltered consequences of environmental deterioration and cultivate a deeper and more meaningful bond with the land and its history.

The integration of a Memorial Center, Mining Activism Center, and Land Court provides a powerful, all encompassing strategy for reviving post-mining landscapes. These structures serve as anchor for advocacy, justice, and introspection, while the toxic, exposed land serves as a stark reminder of the lasting impact of mining activities. The design prompts a moment of contemplation, allowing communities, decision-makers, and industry leaders to confront the full extent of the damage and work towards a more fair and sustainable future by keeping the landscape untreated until all conflicts are resolved. Along with land restoration, the reclamation process seeks to address historical injustices, revive cultural heritage,

and ensure that future generations inherit a more resilient and equitable environment. These facilities will later evolve with the landscape and become part of a campus when the land is now being rehabilitated.

Land Court

Memorial Centre

Mining Activism Centre



Figure 159: The scarred post-mining environment is interwoven with justice, commemoration, and rehabilitation through the collaboration of a Memorial Center, Mining Activism Center, and Land Court. These zones symbolize the harmony between the community, history, and the land itself, serving as foundations for healing by preserving rights, honoring memory, and facilitating land reparations.



Figure 160: The scarred post-mining environment is interwoven with justice, commemoration, and rehabilitation through the collaboration of a Memorial Center, Mining Activism Center, and Land Court. These zones symbolize the harmony between the community, history, and the land itself, serving as foundations for healing by preserving rights, honoring memory, and facilitating land reparations.



Figure 161: The scarred post-mining environment is interwoven with justice, commemoration, and rehabilitation through the collaboration of a Memorial Center, Mining Activism Center, and Land Court. These zones symbolize the harmony between the community, history, and the land itself, serving as foundations for healing by preserving rights, honoring memory, and facilitating land reparations.

Bridging Legal, Environmental and Social Frameworks in Post-Mining Landscape Restoration

In South Africa and across the African continent, rehabilitating landscapes after mining is a complex process that requires a delicate equilibrium among legal, environmental, and social considerations. Historically, mining activities have led to significant social upheaval and ecological harm, particularly in regions such as South Africa's Vhembe District. In this context, deserted mines symbolize unresolved social and legal problems alongside environmental harm.

Consequently, a holistic approach that combines legal structures, environmental rehabilitation efforts, and social equity aspects is essential for restoring landscapes after mining. This essay examines the need for an interdisciplinary method to tackle these issues, drawing on the South African context as well as broader African realities.

The impact of colonialism and apartheid, which significantly affected land ownership and the rights of indigenous groups, has shaped the legal context of post-mining restitution in South Africa. The country's land reform legislation, particularly the Restitution of Land Rights Act (1994), aims to address historical injustices by restoring ancestral lands to communities that were forcibly removed from them. However, in the aftermath of mining, the legal processes for land restitution are complex, particularly regarding regions that hold sacred or ecological importance.

The role of the law in aiding both land reparations and community harmony with their land is a vital element in this restoration effort. The 1996 Constitution of South Africa highlights the importance of safeguarding cultural

heritage and ensuring environmental sustainability. Nevertheless, as noted by Watson (2017), problems such as inadequate compensation, limited community engagement, and bureaucratic delays often obstruct the execution of land restitution initiatives. Legal processes should include ecological restoration and cultural preservation alongside financial compensation in post-mining environments where the land has been significantly degraded.

In post-mining areas, environmental restoration must address more than just the visible impacts of mining. The primary objective of environmental frameworks for landscape restoration is to restore ecological balance, yet they often overlook the land's social, cultural, and spiritual dimensions. In South Africa, the National Environmental Management Act (NEMA) (1998) provides a framework for addressing environmental degradation and defines responsibilities for environmental restoration; however, it frequently fails to consider the rights and lived experiences of those affected.

In addressing this issue, scholars like Capra (1996) highlight the importance of understanding ecosystems as dynamic, interconnected systems that include not only natural elements but also social and cultural factors. Ecophenomenology offers a framework for considering the embodied interaction between individuals and their surrounding landscape. This involves leveraging traditional knowledge of natural processes and land stewardship to guide restoration initiatives following mining activities. For example, ecological restoration and traditional sustainability techniques align well with

phytoremediation approaches, which employ plants to purify the soil. In a similar way, bringing back native plants can assist affected communities in reconnecting with the land's spiritual and cultural significance while also enhancing biodiversity.

Rehabilitation of post-mining landscapes must focus on social justice, particularly considering the detrimental impacts of mining on indigenous communities in Africa. Mining activities have historically led to enduring health and social issues, displaced individuals, and disrupted customary lifestyles in South Africa. To address these societal challenges, it is essential to involve affected communities in decisions and healing processes related to restoration. To ensure that the interventions meet the needs of those most impacted, it is essential to employ participatory design methods that integrate community insights and objectives into the restoration efforts.

The concept of Lekgotla, highlights the necessity of designing areas that support social and economic empowerment as well as collective memory, cultural continuity, and communal healing. Structures like community-run centers, legal advocacy clinics, and activist spaces can help with these initiatives by giving underrepresented voices a forum to speak up for their rights and take part in the healing process.

PART 3:

DESIGN DEVELOPMENT

Part 3 - Outline

Chapter 10, This chapter examines rammed earth construction’s characteristics, applications, techniques, advantages, and disadvantages. Through an in-depth analysis of historical context, modern architecture, environmental issues, and the way it is incorporated in my designs, the goal is to present a comprehensive justification for rammed earth’s escalating importance in the contemporary architectural world. Rammed earth construction is an aged building technique that has affected the modern green design because of its ecological value and cultural importance.

10 APPROACH TO MATERIALITY

Rammed Earth as a Construction Material

Rammed earth is an ancient technique that has been used by traditional African people, especially in clay-rich areas in Africa. Following the principles of traditional African architecture that appreciate the natural surroundings, this method employs locally available materials and passive design techniques to create comfortable living spaces.

The native rammed earth construction methods illustrate simplicity and self-reliability that are their main features. A long historical period, the earth was basically compressed by wooden frames which created thick walls which had excellent insulating and thermal mass properties. These buildings were normally erected without the help of modern stabilizers, instead, they relied on the natural cohesion of the soil and the skills of the builders to ensure the structural stability.

The performance and the long-term durability of rammed earth buildings have been improved by the integration of technical developments that have been included in modern procedures. By adding cement or lime to the soil mixture, stabilized rammed earth (SRE) walls gain more strength and the weathering effects are markedly diminished. To attain higher density and consistency in the walls, the use of mechanical compaction machines is now being more frequently applied, thereby decreasing the labour intensity of the process.

However, it is far less harmful to the environment. Passive design principles in a rammed earth building are in line with the other goals of sustainable architecture, which mainly aim to reduce the negative impacts of

the environment while improving the well-being of the occupants. By decreasing the energy usage of the new projects and encouraging a more friendly relationship between the built and the natural environments, the use of rammed earth can be beneficial for ecological restoration in post-mining landscapes where the environmental damage is extremely severe.



Figure 162 : Ancient use of raw earth as a builing material. Inhabiting the earth: a new history of raw earth architecture, 2020. . The Architectural Review. URL <https://www.architectural-review.com/essays/inhabiting-the-earth-a-new-history-of-raw-earth-architecture> (accessed 9.8.24).

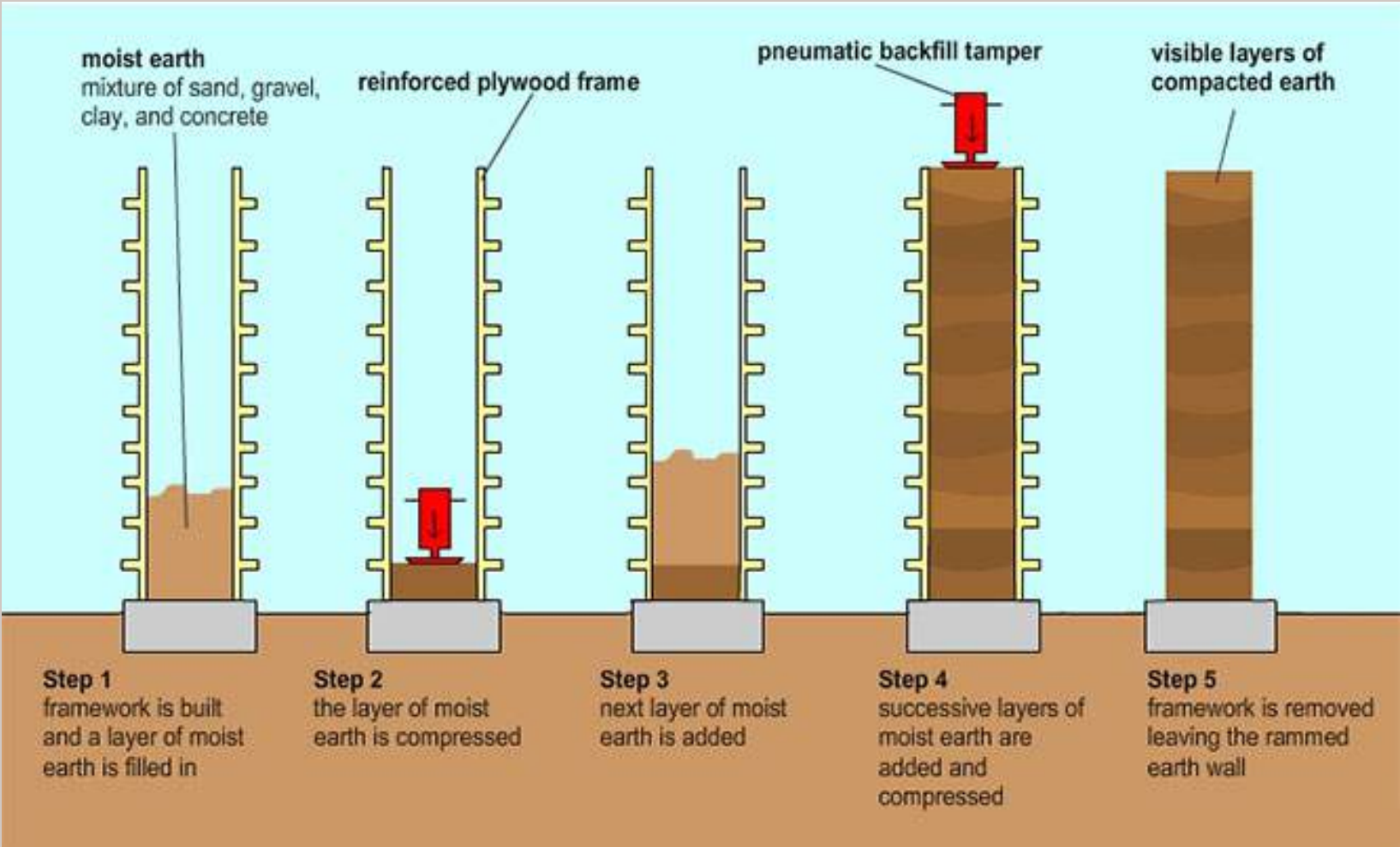


Figure 163 : Step by step construction of Rammed earth. GreenSpec: Environmental Advantages of Rammed Earth Construction [WWW Document], n.d. URL <http://www.greenspec.co.uk/building-design/rammed-earth/> (accessed 9.8.24).

Case Study 17: The Le Vau Educational Pavilion, Paris

The Le Vau Educational Pavilion is a spectacular construction that was done by the equally talented L'Atelier Senzu directed to improve education systems in a significant location of Paris, France, a locality that is already replete with historical buildings, structures, and artifacts of great attraction and magnitude.

The architects of this magnificent structure had to conquer many problems associated with the creation of an advanced educational institution that would reflect the caring commitment to the environment and follow all the latest building methods of architecture. To accomplish this goal, the architects chose rammed earth as a major building material due to its appealing aesthetic features, its energy-efficient nature, as well as the fact that it helped them put the building seamlessly into the historical and cultural surrounding in which it was situated.

This material has high thermal mass and can therefore help provide a comfortable indoor environment without any reliance on energy-consuming services and therefore allow this building to respond positively to the world's aspirations for less damaging to the global ecology-built environment.

The designers of this ground-breaking pavilion exhibit rammed earth along with materials like glass, steel, and stone to intersect the best of what the past had to offer with that of the future. These additional attributes in themselves symbolize the traditional connection between the past and the present. The rammed earth walls, though indicative of the past, provide a sense of robustness, permanence, and comfort. The whole

pavilion tightens the circle between people and place, as one learns about the environment, becomes part of the environment, and embraces the philosophy of sustainable development.

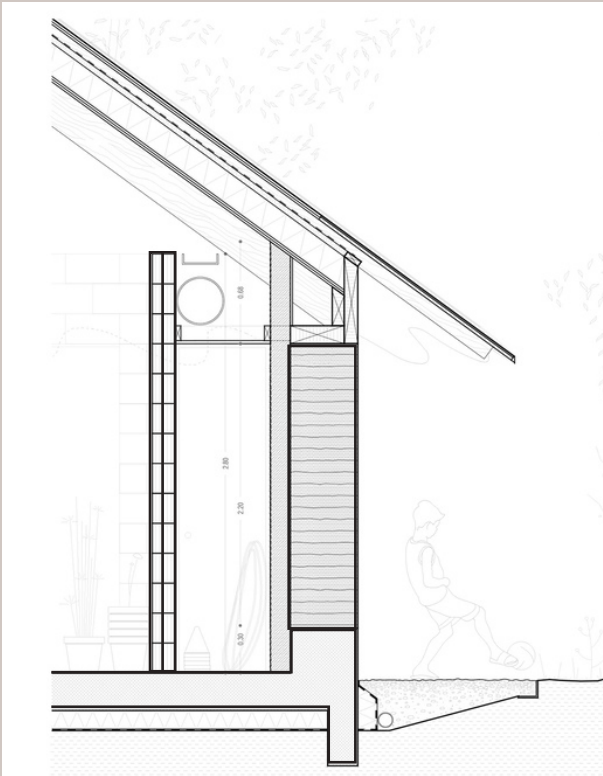
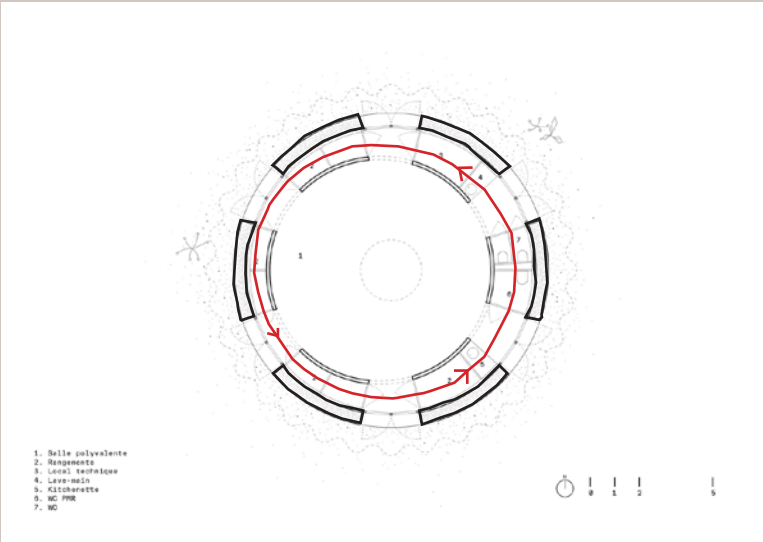


Figure 164: The use of rammed earth as an inhabitable wall. Le Vau Pavilion / L'Atelier Senzu | ArchDaily [WWW Document], n.d. URL <https://www.archdaily.com/1012029/le-vau-pavilion-latelier-senzu> (accessed 9.5.24).

Case Study 18: The Jayrán Wall, Kauh architects

The Spanish Park, created by Kauh architects together with the restoration of the Jayran Wall; this particular wall was built in the 11th century, and it signifies how architecture, and parks indeed can preserve, rehabilitate, and instil new and conservatively fresh perspectives into ancient environments.

Constructed during the Muslim Ruiz overlordship within the period of Almeria’s great expansion, the Jayran wall can be classified as one of the town’s many excellent pieces of construction that people can visit and see. The wall is a beautiful architecture that managed to be a success by putting up natural materials available in Al-Andalus’ areas of influence. As a byproduct of building walls made of compacted earth, these materials would be quite effective in the region’s Mediterranean climate not only to help in conserving heat but also to provide the structure with stability.

Wooden molds were used to pack earth in layers into extremely thick, enduring walls that would resist wearing out and damage resulting from sieges. Additional characteristics which added to the strength as well as stunning appearance of walls include such features as reinforcements at corners and stone claddings. Sadly, as is the case with many historic edifices, the Jayran wall has lost some of its parts due to the action of human beings and the effects of the natural world.

However, that’s what Kauh architects set out to achieve: instead of simply conserving an already existing material, they tried to combine the old and the new so that the past could speak somehow and

because the past was dead a new form was conjured, one that would exist in the Now and in Tomorrow’s World that all along History already knew would come. This extensive remodelling was achieved by integrating various portions of the wall bound to tar-oiled shoulders, inserting a glass case that was littered with glass shards, and, most importantly, creating a mobile learning area for tourists which is entirely new to this part of Spain.



Figure 165: Ancient wall of The Jayrán Wall and how they used rammed earth as well as how they dealt with landscaping. Rapacki, K., 2024. Field day: Parque Jardines Mediterráneos de la Hoya in Almería, Spain by KAUH Arquitectos. The Architectural Review. URL <https://www.architectural-review.com/buildings/field-day-parque-jardines-mediterraneos-de-la-hoya-in-almeria-spain-by-kauh-arquitectos> (accessed 9.5.24).

Case Study 19: Renzo Piano's Children's Hospital in Uganda

The Children's Surgical Hospital, built on the shores of Lake Victoria in Entebbe, is an impressive outcome of a collaborative effort between the renowned Renzo Piano Building Workshop and Emergency NGO. This exceptional hospital, which is comfortably designed and constructed, is part of a larger undertaking aimed at providing outstanding and free medical assistance in paediatric surgery for impoverished children in Africa.

From its initial conception through to its realization, the hospital's architectural design has paid careful attention to the natural surroundings the building is to inhabit, and the cultural context within which the building will be operated, to provide a welcoming space for both the patients and their caregivers.

Every element of the hospital has been critically analysed in its architectural design and corresponding construction, from the landscaped gardens, which create an environment where kids can play, concentrate, and reunite with their families, to the patient wards, which "don't lack soul". These inner spaces for in-patients offer enormous views to the lake and sky, allow for natural air movement and openings, and in contrast to closed hospital

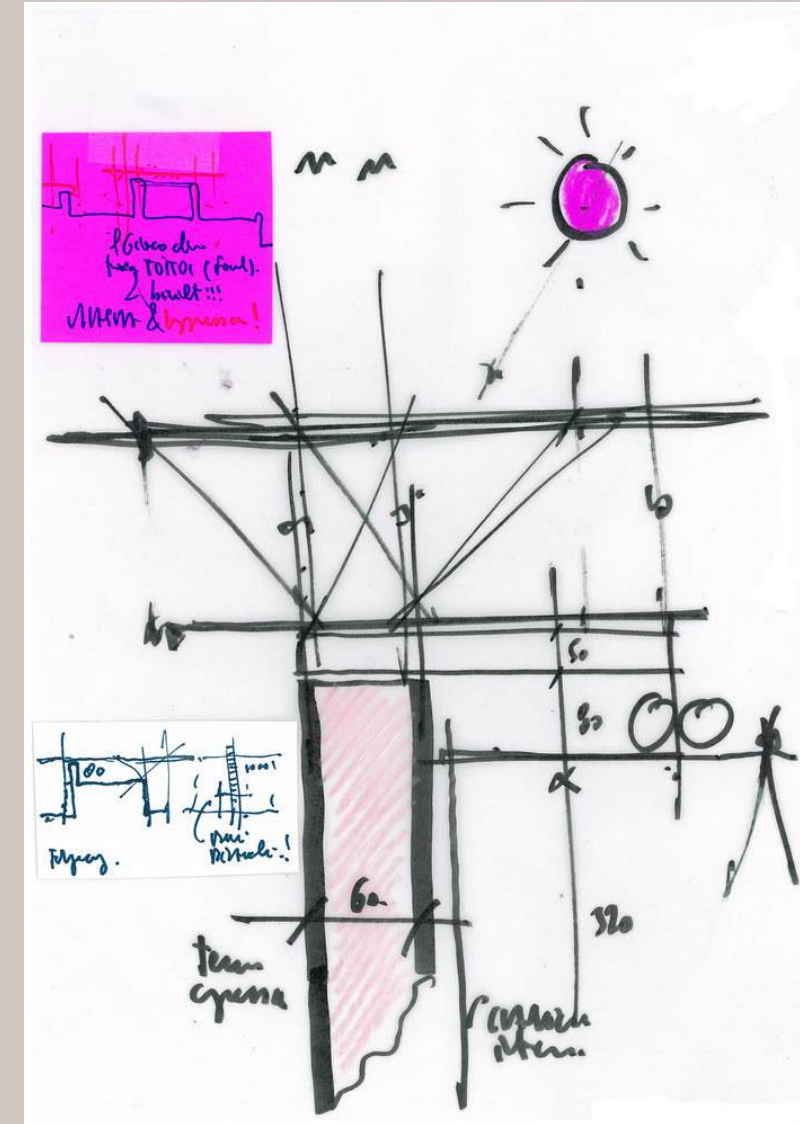


Figure 166: The use of Rammed earth in the Renzo Piano's Children's Hospital and how he used steel structure to design the double roof. Gallery of Children's Surgical Hospital / Renzo Piano Building Workshop + Studio TAMassociati - 41 [WWW Document], n.d. . ArchDaily. URL <https://www.archdaily.com/965709/childrens-surgical-hospital-renzo-piano-building-workshop-plus-studio-tamassociati/60fef77bf-91c81b268000cf-childrens-surgical-hospital-renzo-piano-building-workshop-plus-studio-tamassociati-> (accessed 9.5.24).

Use of Iron Mining Tailings in Rammed Earth

The usage of iron mining tailings in the soil mixture can fortify the compressive strength and water resistance of rammed earth as claimed by (Castillo & Kulisch, 2018), thus, it becomes a suitable for construction with rough environmental conditions. This application of waste produced within industry, such as mining tailings, to rammed earth building solves the problems of material resources and the environment.

Mining tailings that are usually discarded as waste can be utilized in diverse ways such as a stabilizing factor or a part of the soil mixture in rammed earth walls. With this, it ensures that building applications are developed sustainably and that environmental consequences from mining works are mitigated.

In the same breath, the utilization of mining tailings in rammed earth construction aligns with the circular economy’s principles of material reuse and recycling as an approach to waste mitigation and the conservation of resources. Construction materials derived from tailings provide a green alternative that reduces environmental degradation and encourages efficiency in resource use in post-mining rehabilitation, where a lot of tailings are usually deposited.

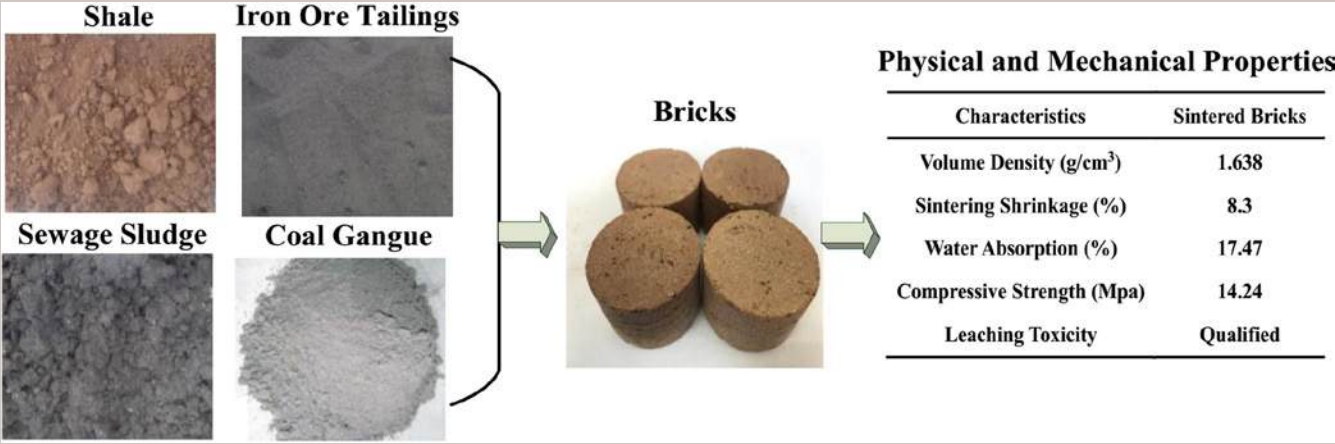


Figure 166: Using iron ore tailing to create bricks. Luo, L., Li, K., Fu, W., Liu, C., Yang, S., 2020. Preparation, characteristics and mechanisms of the composite sintered bricks produced from shale, sewage sludge, coal gangue powder and iron ore tailings. Construction and Building Materials 232, 117250. <https://doi.org/10.1016/j.conbuildmat.2019.117250>

Application in a Copper Abandoned Mine Site

Making use of copper mine tailings as a context, it further discusses innovative techniques in reconstructing lands after mining, for example, the use of earth materials such as rammed earth. Rammed earth is described by a representation of this material as the important factor in the healing of the land and development of environmentally sustainable economic systems that that integrate the traditional systems with the current environmental paradigms.

The Lekgotla is an important place where wisdom approved by the community is also available along with the latest environmental growth. Configured as a garden filled with phytoremediation plants, the lekgotla becomes a vital part of the ecological and legal rehabilitation of post-mining landscapes, in addition to being a communal meeting space.

Made by rammed earth, lekgotla’s wall symbolizes the area where community life and judicial matters intersect and interact. It is not just a physical barrier but more of a liveable structure and it intersects with the circular Land Court as well as the research centre. The massive wall acts as a space for the community to install public toilets, storage closets, and seating spots where people can prepare while gaining views as the wall is a protective shield from all the toxins coming from the post-mining landscape. The decision to postpone landscape rehabilitation until the disputes over the land are settled demonstrated the fact that legal and social injustices have to be resolved before then.

As Paul Oliver highlights that traditional building

materials like rammed earth not only represent cultural values but also serve as physical materials as well as the past and present ones, attaching people to their ecological and heritage environment. (Oliver, 2003) The open-air layout and the use of natural materials in the lekgotla is reinstating the community’s relationship with nature.

The lekgotla wall, provided that it uses earth building that is of great importance in this area, is in perfect harmony with the environment. Since the traditional method of rammed earth has been exercised over generations, it stands for a simpler and greener construction strategy, which is in favour of the environment we live in.

The use of cement or lime is required to stabilize rammed earth buildings in order to avoid the risk of soil contamination in the post-mining environment. Thus, the stability and safety of such structures are ensured. In post-mining landscapes, lime stabilization on the other hand is very crucial because it assists in neutralizing the acid content of the contaminated soils often found in the mining-affected areas. Conversely, cement stabilization that furnishes increased strength and resistance to water tape is the most appropriate way to build long-life walls in areas that are subject to erosion and severe rainfall.

Phytoremediation, which is the process of cleansing the soil of harmful materials using plants, together with rammed earth construction, is a method through which rammed earth construction can be utilized. Phytoremediation plants can be situated in rammed earth buildings, thereby, cleansing the

soil by correcting the local ecosystem. One of the ways in which excavated pollutants used in rammed earth construction can be effectively addressed is by cleaning them with some cleaner soil or stabilizers so that they can be constructed without health risks.

The Lekgotla wall is made in such a way that it can be walked on as a remembrance of all the struggles and sacrifices of the part of mine workers. By walking on the lekgotla wall, people physically turn it into a healing and reminding place where the struggles and sacrifices of the past are acknowledged and respected. The wall becomes a living monument that ties the act of walking to the metaphorical search for peace and justice.

The fact that the Land Court is being built from rammed earth and that it is located on an existing floor of the demolished mine building contributes to the actualist and metaphorical restitution of justice to the soil and, hence, the idea of land reparation is more firmly stated. This approach to post-mining landscapes stems from the belief that true healing results from reconnecting the storied broken by exploitative industries and renewing the earth. This approach is consistent with indigenous philosophies that prioritize sustainability, and community building as well as demonstrate respect for the natural world.

The Land Court and the lekgotla, through their rammed earth construction and other traditional architectural elements, are not only an example of a physical judicial and cultural framework but of a tool to revive justice and balance that was disrupted by mining in landscapes. The buildings use purpose as well as

functional spaces; they are ideas that understand the relationship between indigenous peoples and the land as being sacred, and the administration of justice as a process that must not depart from either one.



Figure 167: Lam, E.J., Zetola, V., Ramírez, Y., Montofré, Í.L., Pereira, F., 2020. Making Paving Stones from Copper Mine Tailings as Aggregates. International Journal of Environmental Research and Public Health 17, 2448. <https://doi.org/10.3390/ijerph17072448>

Challenges and Strategies of Rammed Earth in Post-Mining Environments

Rammed Earth, among its advantages are thermal mass properties, aesthetic to appeal and environmental sustainability, in a post mining landscape it offers the chance to build low impact structures that blend in seamlessly with the environment, especially one that has been contaminated by mining toxins.

Rammed earth's susceptibility to erosion and weathering is one of the biggest issues with its application in contaminated post-mining settings. The earth materials used in rammed earth building may be more susceptible to erosion in areas with frequent rainfall and a disturbed landscape from mining operations. Over time, the earth may erode due to excessive rainfall and a lack of vegetation, which could result in structural instability. By changing the earth's chemical composition, mining pollutants like heavy metals or hazardous chemicals may accelerate the deterioration process.

Furthermore, additional water infiltration into the rammed earth walls may result from the increased permeability of the soil brought on by mining's alteration of the natural environment, which could cause swelling, cracking, or disintegration (Venkatarama Reddy, 2016).

In rammed earth building, water retention can have both positive and negative effects. In hot conditions, the material's capacity to absorb and release moisture is crucial for preserving thermal comfort (Venkatarama Reddy, 2015). Water seepage, however, can become a serious problem when exposed to the high moisture levels common in post-mining areas. The hydrology of the region may be changed by mining operations,

raising the possibility of waterlogging or water seeping through the rammed earth walls.

The accumulation of moisture in the walls can promote the growth of mold, fungi, or other biological agents that can damage the material and pose additional health risks, and water seepage may result in the leaching of minerals and contaminants from the mining site, which could compromise the building's structural integrity and pose a threat to human health and the environment.

Heavy metals, acidic runoff, and toxic chemicals are just a few of the dangerous materials that frequently contaminate post-mining landscapes. The robustness of the materials used in rammed earth building may be impacted by interactions between these pollutants. For instance, rammed earth may lose its structural integrity if the soil contains acidic compounds that erode the clay content. Furthermore, toxic metals such as lead or mercury could seep into the construction material, exacerbating environmental hazards and potentially compromising the safety of building occupants.

In the same way that the choice of aggregate materials, such as sand, gravel, or crushed stone, may affect the material's resistance to the effects of contaminants, the specific composition of the material used determines how resilient rammed earth is to these contaminants. A mixture with a higher clay content may be more resistant to water infiltration, but it may also be more susceptible to chemical degradation (Venkatarama Reddy, 2015).

Applying surface treatments and coatings is one of

the best ways to increase the water resistance of rammed earth. For example, lime-based plasters have been found to give rammed earth structures a long-lasting and water-resistant finish, sealing the material to prevent excessive water absorption and shielding the surface from erosion. Bio-based coatings, like natural oils, can also be used to increase the material's resistance to water and contaminants.

Reducing the dangers of erosion and water seepage requires efficient drainage systems. Proper landscaping and drainage can assist maintain the integrity of rammed earth walls by diverting water flow away from the building. To further prevent the material from water damage, elevated building designs or raised foundations, like those suggested in the Lekgotla's design, can assist maintain the structure above wet ground.

The rammed earth mixture's robustness and durability can be increased by adding stabilizers or other additives. For instance, adding natural stabilizers like cement or lime might make the material stronger and more resistant to chemical deterioration and erosion (Venkatarama Reddy, 2016). In certain situations, adding recycled materials like mining tailings could increase the rammed earth's resilience and aid in the mining site's cleanup.

The particulars of the post-mining site must be taken into consideration while selecting materials for rammed earth building. Using locally obtained soil from uncontaminated locations, for instance, could assist guarantee the material's structural stability. The overall

longevity of the construction can also be increased by choosing aggregates that are more resilient to erosion and chemical weathering.

Balancing Exposure and Protection in Post-Mining Landscapes

In post-mining settings, exposing contaminated land is a tool for environmental justice as well as an act of pedagogical involvement. The viability of such exposure in the long run, however, is still a major worry, especially when it comes to maintaining community safety and accomplishing educational goals. This chapter looks at how post-mining landscape design might balance the needs of health and education through architectural interventions, environmental mitigation techniques, and regulatory frameworks. This chapter offers a multi-layered strategy for creating environments that both actively address the effects of mining and show its past, drawing on case studies from industrial heritage sites, ecological restoration projects, and environmental justice efforts. Complex places of memory, ecological disturbance, and sociopolitical conflict are frequently found in post-mining landscapes. When working with indigenous landscapes impacted by mining, Linda Tuhiwai Smith (2012) emphasize the need for decolonizing procedures and promote participatory approaches that incorporate traditional knowledge and healing practices. In a similar vein, Carl Sauer’s *The Morphology of Landscape* (1925) advocates site-responsive restoration methods by highlighting the interaction between natural processes and human intervention.

Additionally, in line with Janine Benyus’ (1997) *Biomimicry: Innovation Inspired by Nature*, which contends that ecological restoration ought to emulate natural processes, Julia Watson’s (2019) *Radical Indigenism* suggests that indigenous land management techniques provide sustainable models for repairing damaged landscapes. These viewpoints guide the

development of post-mining interventions that strike a balance between exposure requirements and risk-reduction tactics.

Design Strategies for Balancing Education and Health

It takes a multi-layered strategy that includes adaptive architecture, active cleanup, and restricted exposure to design post-mining landscapes that both protect public health and educate the public. Using models such as Zollverein, one important tactic is phased exposure and regulated access, in which raised walkways, designated observation platforms, and planned tourist routes reduce direct contact with contaminated soil.

Furthermore, active remediation using bio-based barriers, such as phytoremediation and bioremediation, enables microorganisms and plants to operate as living shields while absorbing toxins. This strategy, which was influenced by the Eden Project, reduces environmental risks while advancing educational objectives. Furthermore, public participation is made possible without sacrificing safety by incorporating real-time environmental monitoring equipment into the landscape, as is the case at the Tar Creek Superfund Site. By monitoring soil toxicity, water contamination, and air quality, these systems make sure that both tourists and locals are not put in unnecessary danger.

Additionally, the boundary wall of the Lekgotla will act as a barrier and include plant species that filter air, strengthening the area’s ecological and cultural

resilience. Adaptive architecture can both serve as a barrier and a sensor, providing climate-controlled observation areas while filtering airborne particles. Finally, it’s important to incorporate long-term community involvement and legal frameworks to make sure that these areas are both restorative and instructive for the impacted communities. These multi-scalar techniques can be used to protect public health and make post-mining landscapes effective learning environments.

The difficulties of revealing post-mining landscapes while maintaining public health and environmental safety have been discussed in this chapter. The suggested method promotes layered engagement tactics, active remediation, and adaptive architectural solutions by combining knowledge from theoretical frameworks and international case studies. It is important to regularly reevaluate the ratio of health to education to make sure that the welfare of impacted communities is not jeopardized by the disclosure of mining’s effects. To further improve the sustainability of such initiatives, future study should examine the integration of digital technology and regulatory frameworks.

Zollverein Coal Mine Industrial Complex (Germany)



Figure 168 :Zollverein Coal Mine Industrial Complex, Germany | World Heritage Journeys of Europe. (n.d.). Retrieved February 19, 2025, from <https://visitworldheritage.com/en/eu/zollverein-coal-mine-industrial-complex-germany/b0b631c5-ea55-4717-9141-dcf745ee052d>

While maintaining traces of its mining history, the UNESCO World Heritage site was converted into a cultural and educational environment. It prevents direct exposure to pollutants while preserving exposed industrial remains as historical landmarks. It also reduces the amount of time the general public is exposed to hazardous chemicals by using elevated walkways and dedicated viewing platforms while integrating remediation techniques to reduce long-term environmental hazards, such as controlled water filtration and soil stability.

The Eden Project (UK)



Figure 169: Gallery of Grimshaw's Eden Project North in Lancashire Receives Planning Approval—2. (n.d.). ArchDaily. Retrieved February 19, 2025, from <https://www.archdaily.com/976162/grimshaws-eden-project-north-in-lancashire-receives-planning-approval/61fa55f63e4b31c51c000041-grimshaws-eden-project-north-in-lancashire-receives-planning-approval-image>

A living laboratory for ecological education and land rehabilitation was created out of a disused clay mining pit. It shows how abandoned areas can be transformed into places for ecological restoration and education while it teaches visitors about climate change and environmental restoration through biomes that mimic various ecosystems. It restores soil health through phytoremediation methods while permitting moderate public engagement and use restricted access areas and guided tours to provide organized visitor interaction without sacrificing safety.

Learning from Global Precedents To contextualize the design approach by examining international precedents that integrate exposure and remediation while prioritizing public health.

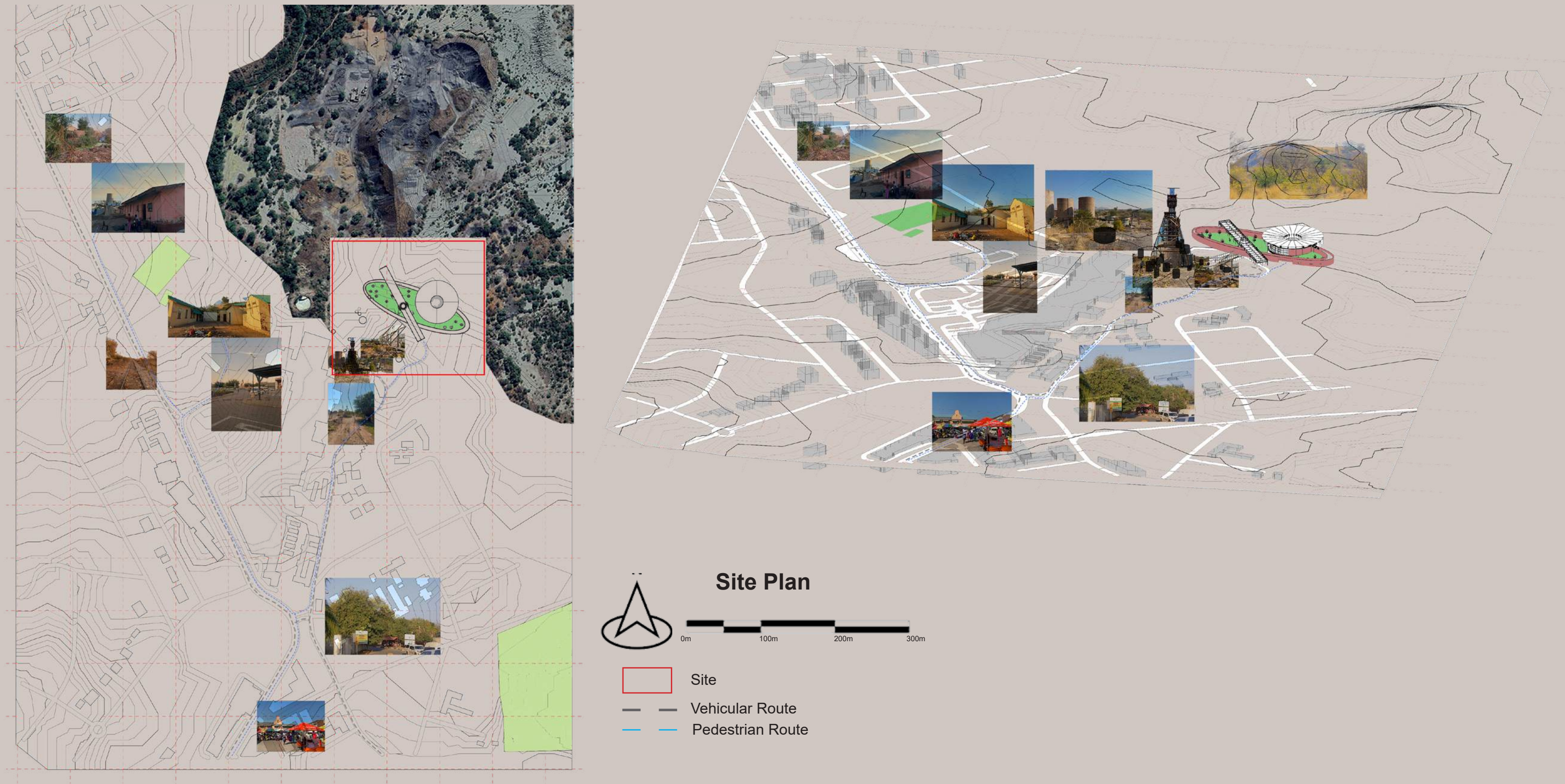


Figure 170: Site Plan

Constructed wetlands connect-
ing back to the river for filtration

Filtration Hub

Education Facility

Pond systems and phytoreme-
diation plants

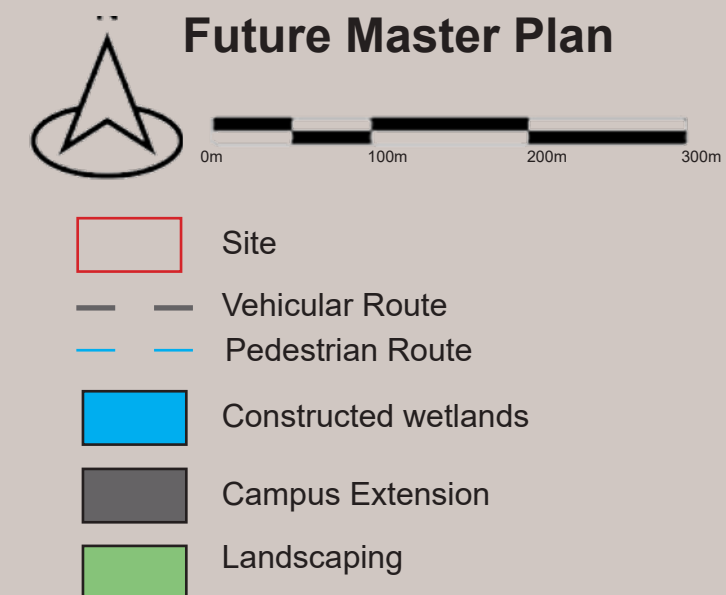
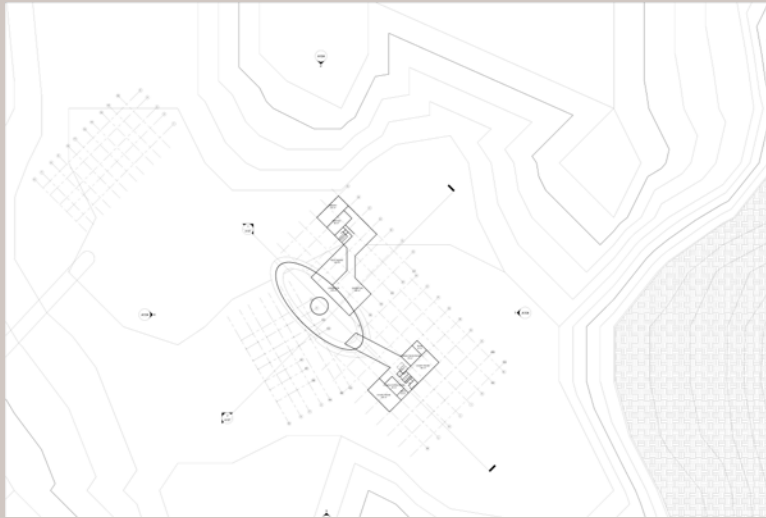
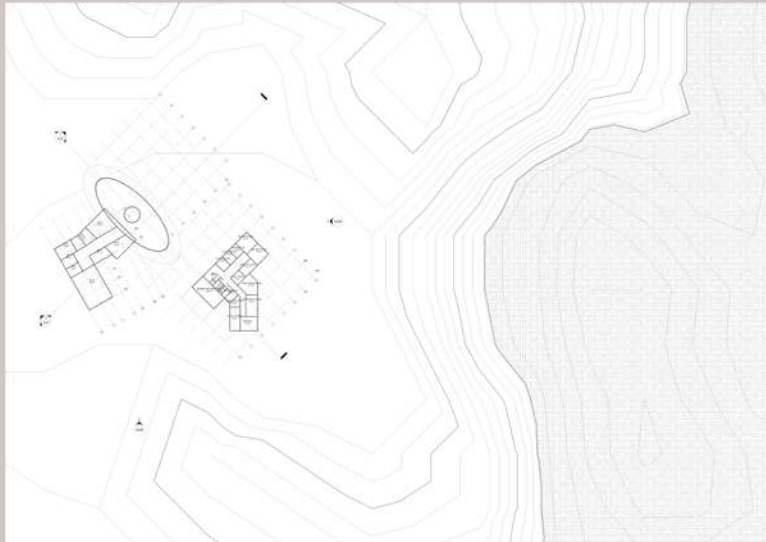


Figure 171: Future Master Plan



Ground Floor Plan



First Floor Plan



Site Plan

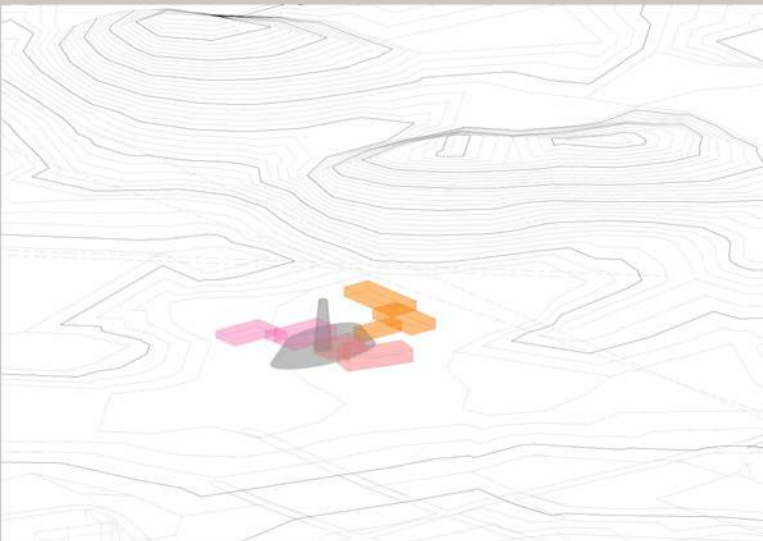
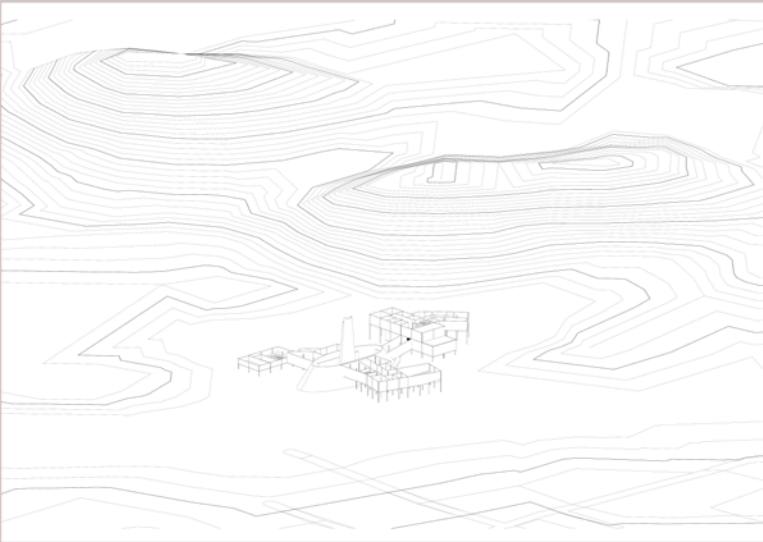
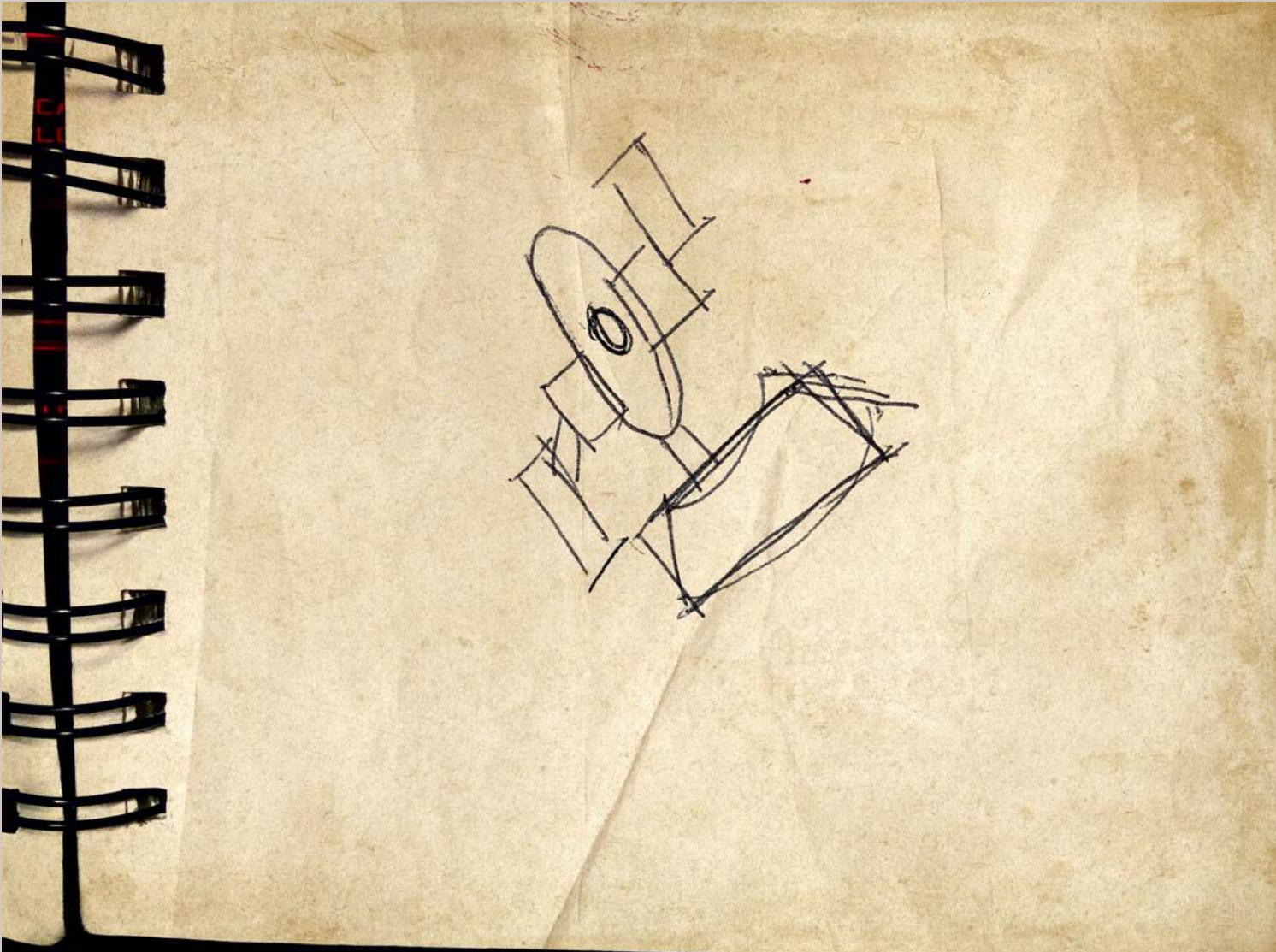


Figure 172: Crit design development sketches, plans and massings



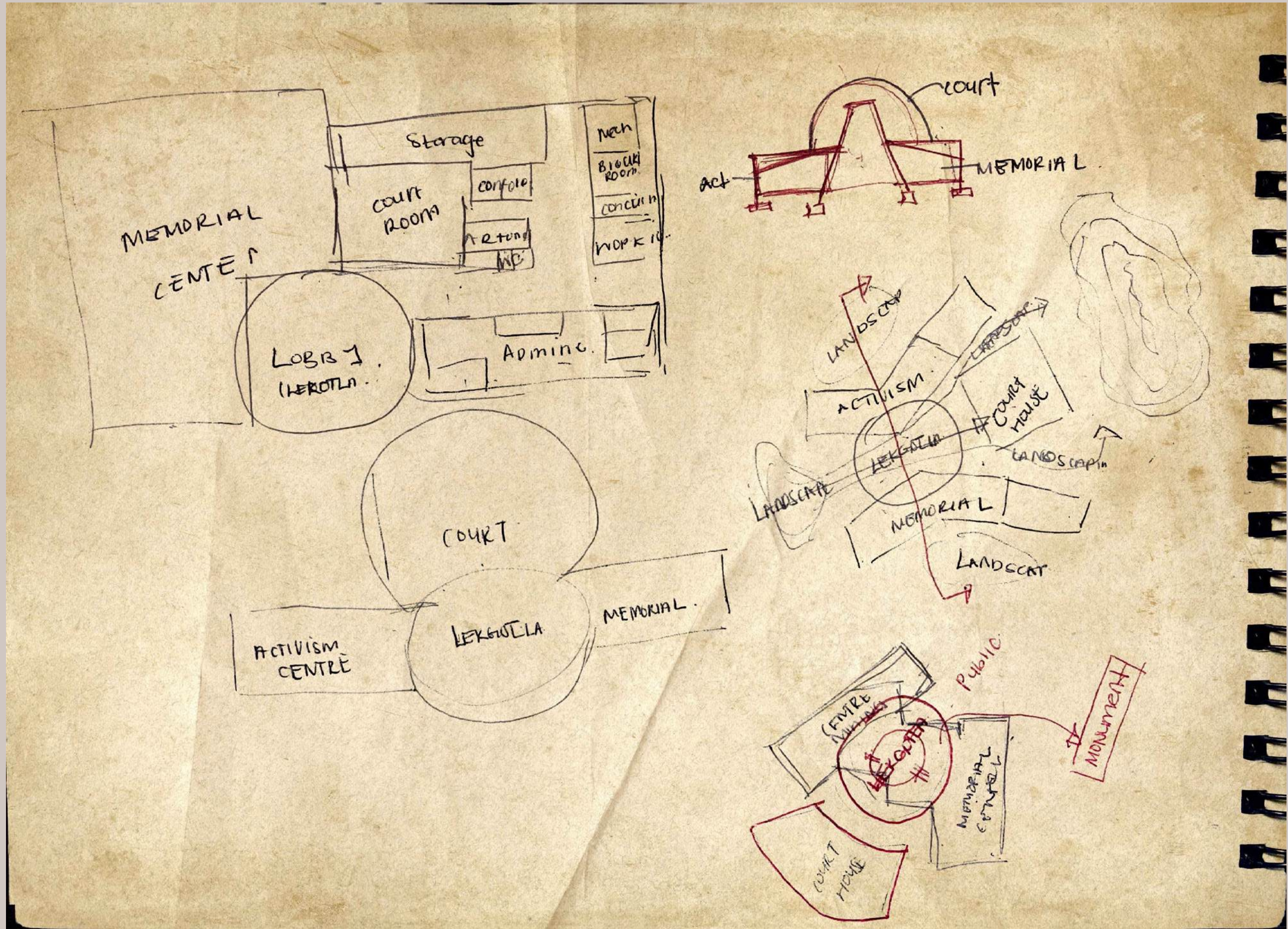


Figure 173: Design Development Sketch Explorations

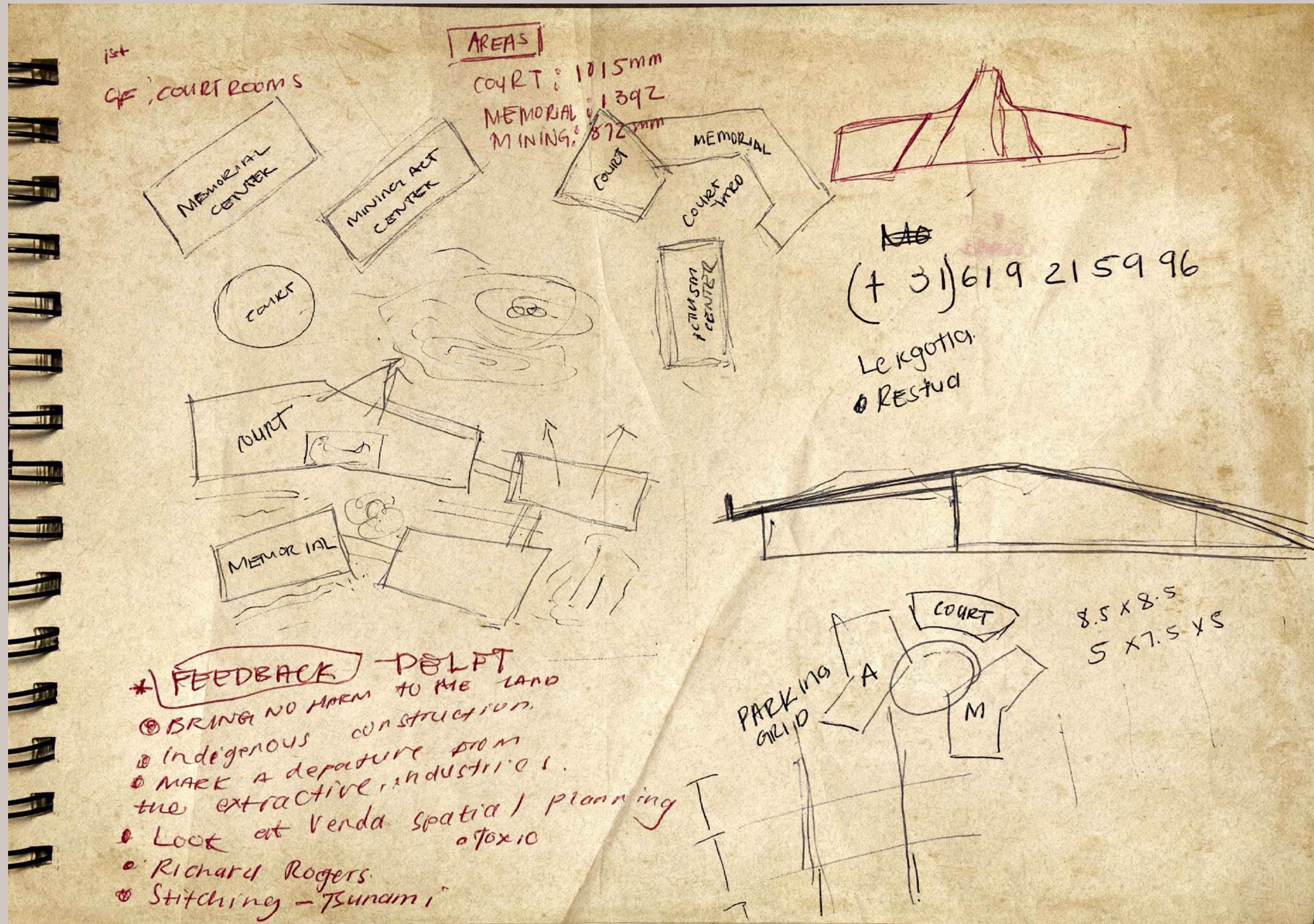


Figure 174: Design Development Sketch Explorations

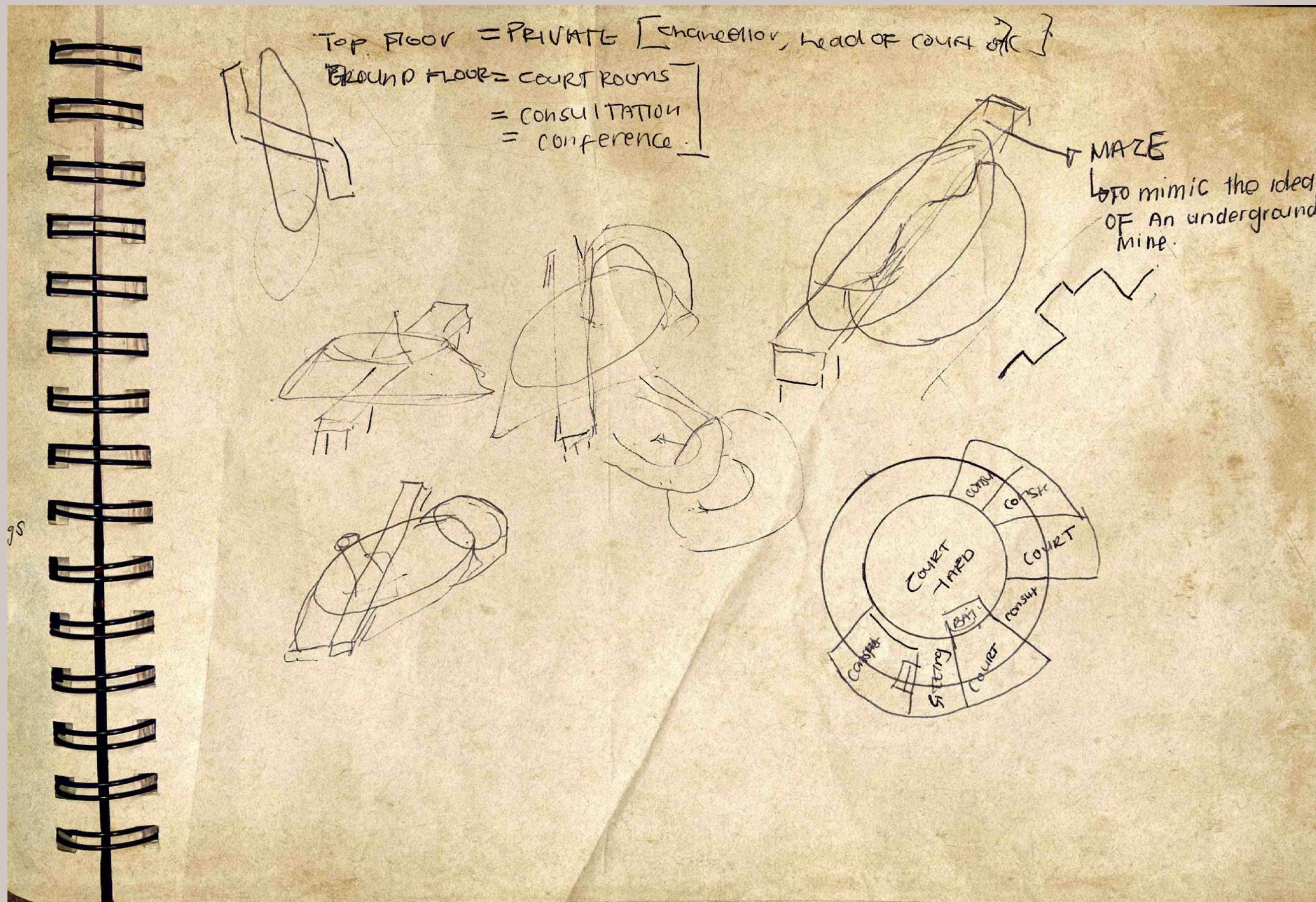


Figure 175: Design Development Sketch Explorations

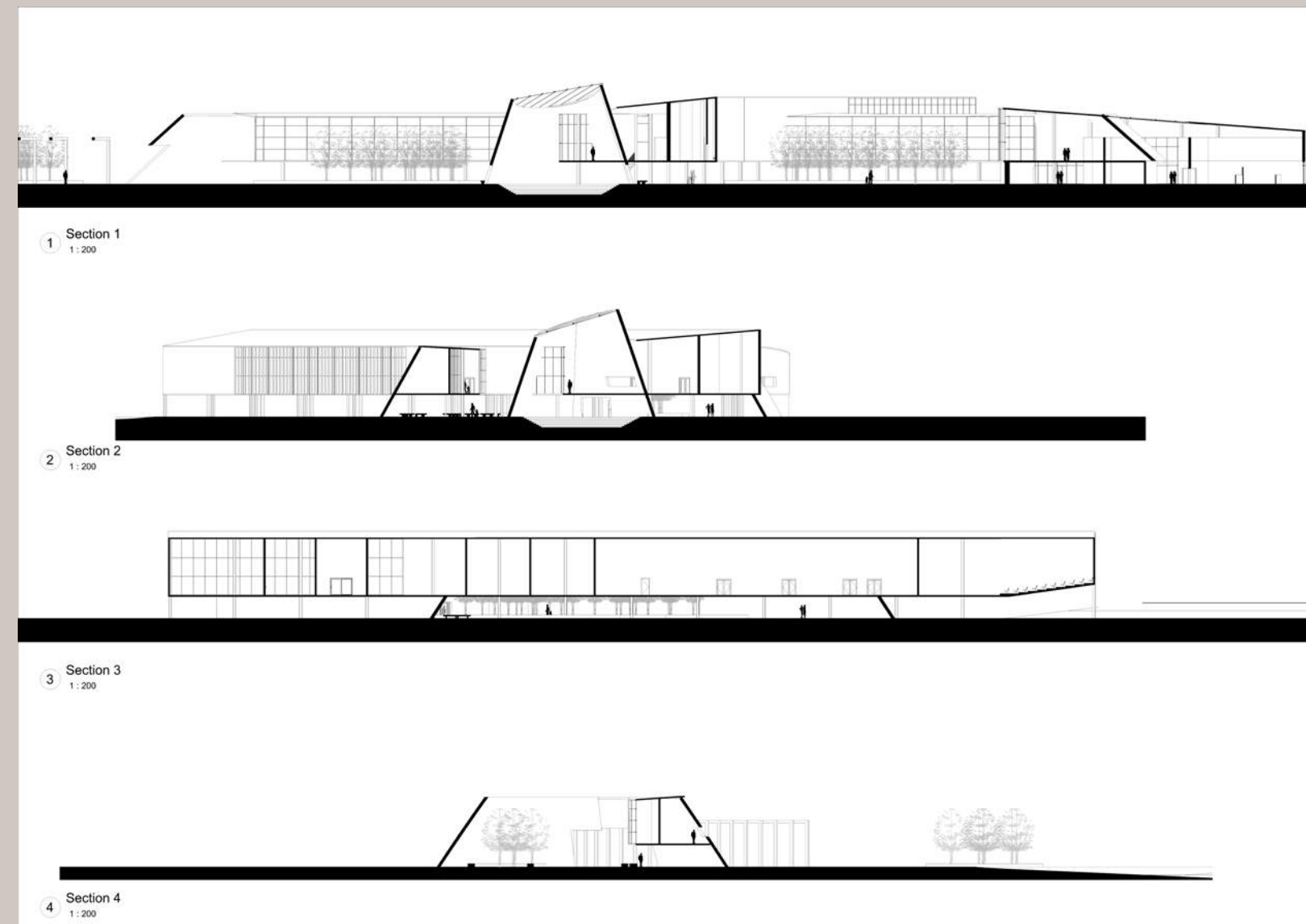
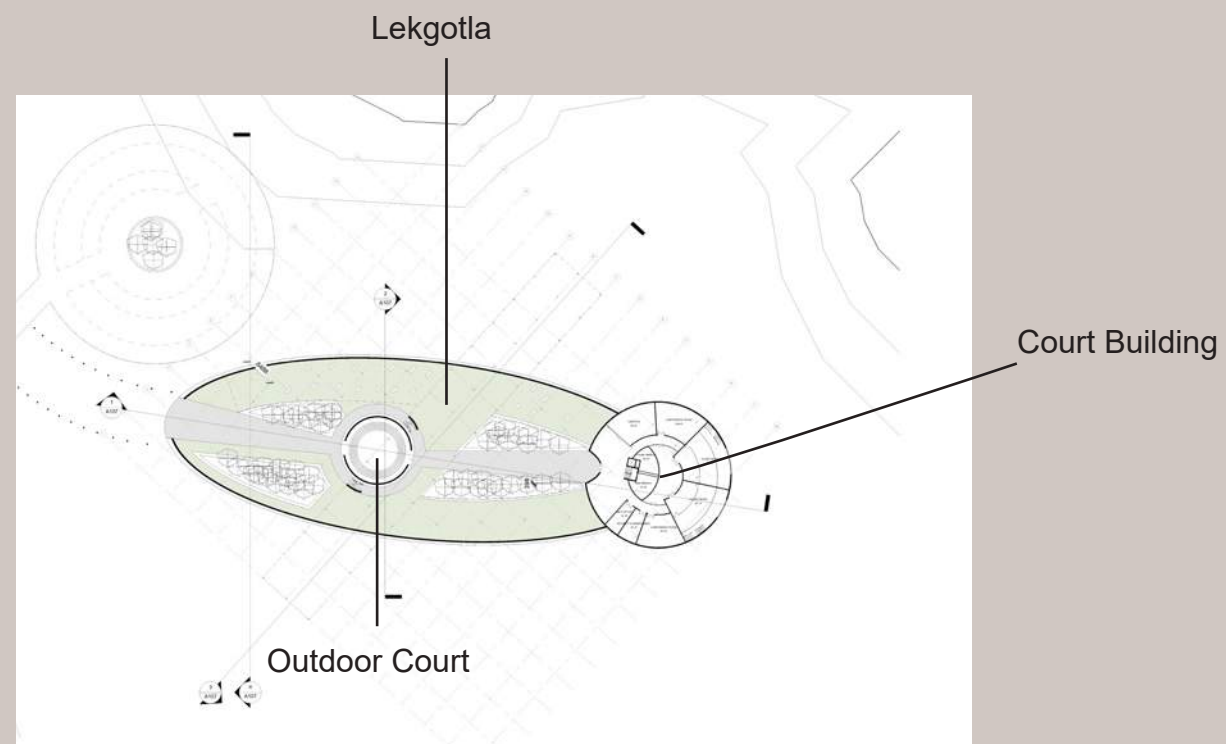


Figure 176: The original idea was to design a building with an oval, slanted rammed earth wall and raised, off-the-ground spaces, aiming for an organic shape. Initially, the plan was for the Lekgotla wall to serve as a security boundary, but as the concept developed, it transformed into a inhabitable structure. However, the slanted rammed earth wall was ultimately abandoned due to its lack of stability. The intersecting design, incorporating one lightweight structure and another heavier and more grounded, aimed to symbolize the desire to minimize harm to the earth in contrast to the destructive nature of mining. To serve this purpose, the lightweight structure was elevated off the ground. The initial notion was to create a circular court representing power and authority, while the Lekgotla was inspired by traditional, unconventional courts held outdoors under a tree in rural areas, where community disputes are resolved.

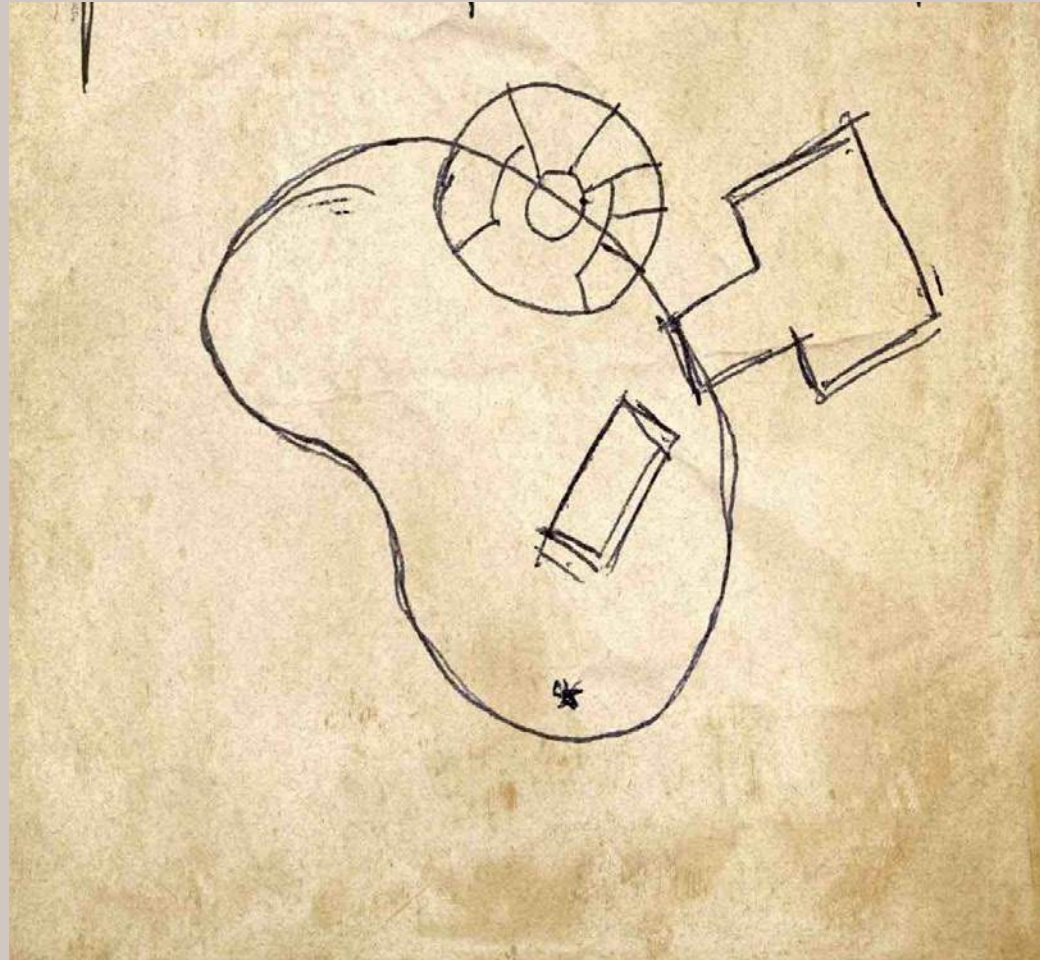


Figure 177: Design Development Sketch Exploration- including all the remaing ruins by shaping the lekgotla rammed earth wall.

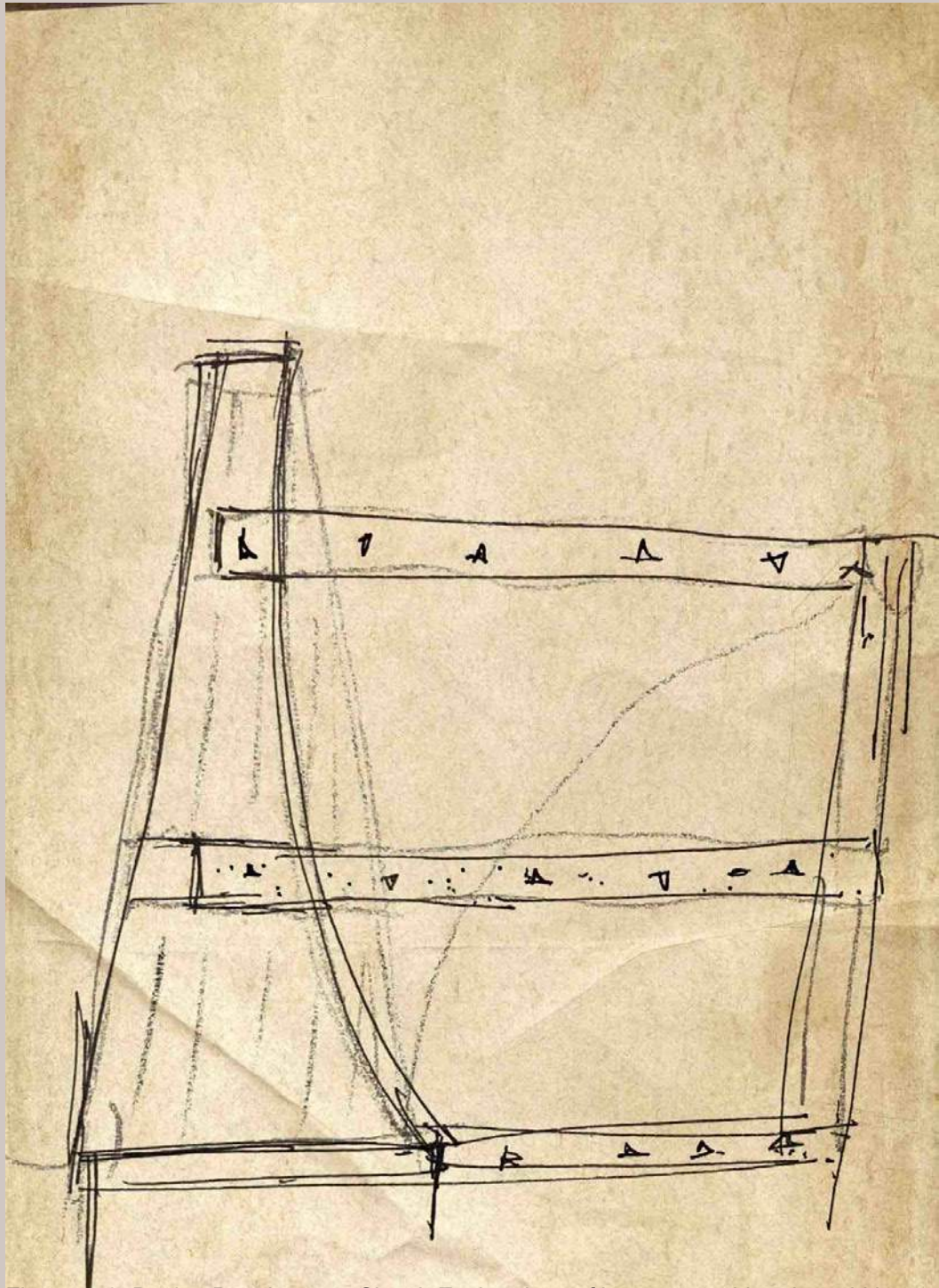


Figure 178: Design Development Sketch Explorations of how rammeddearth could be manipulated to achieve the slanted effect.

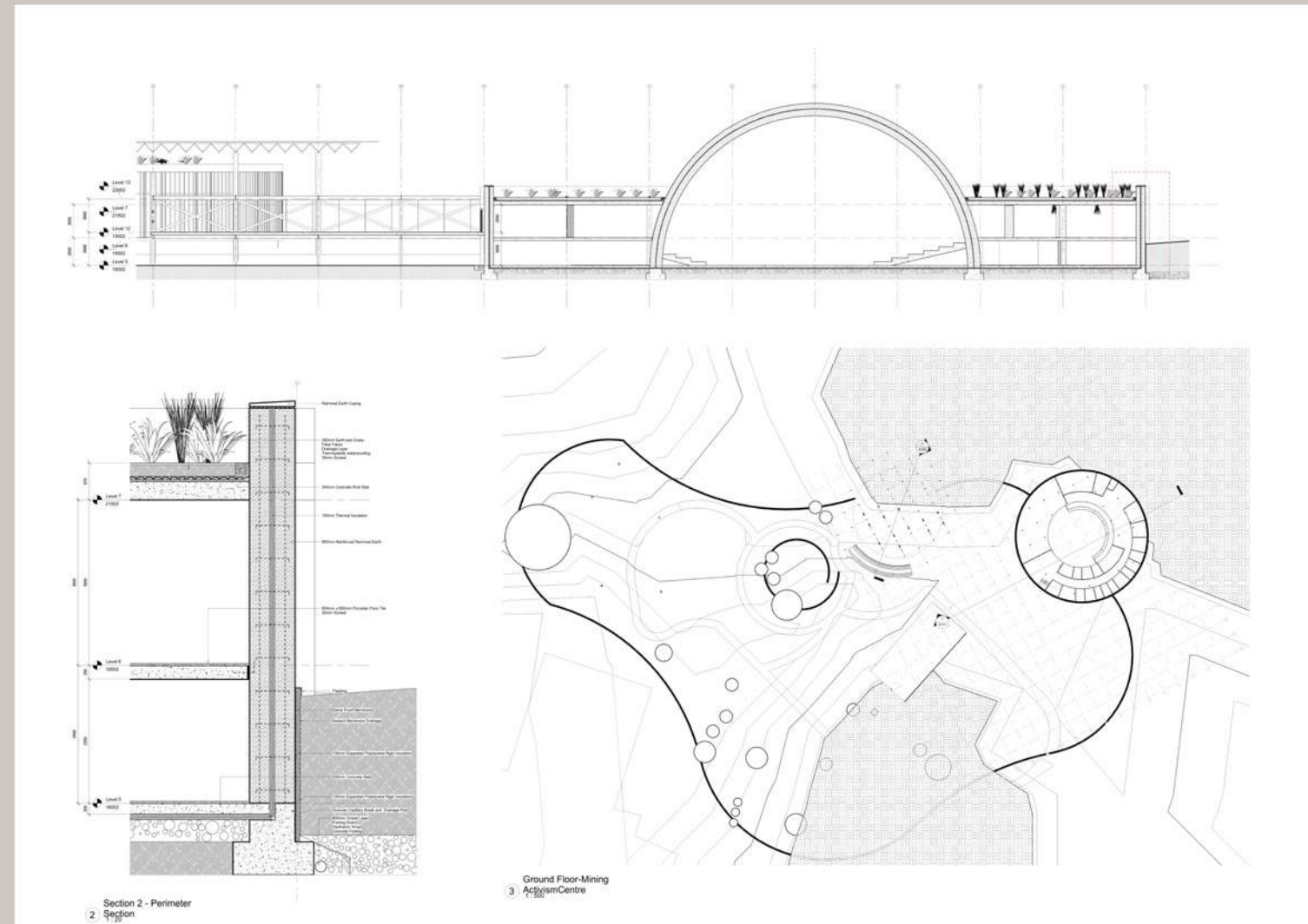
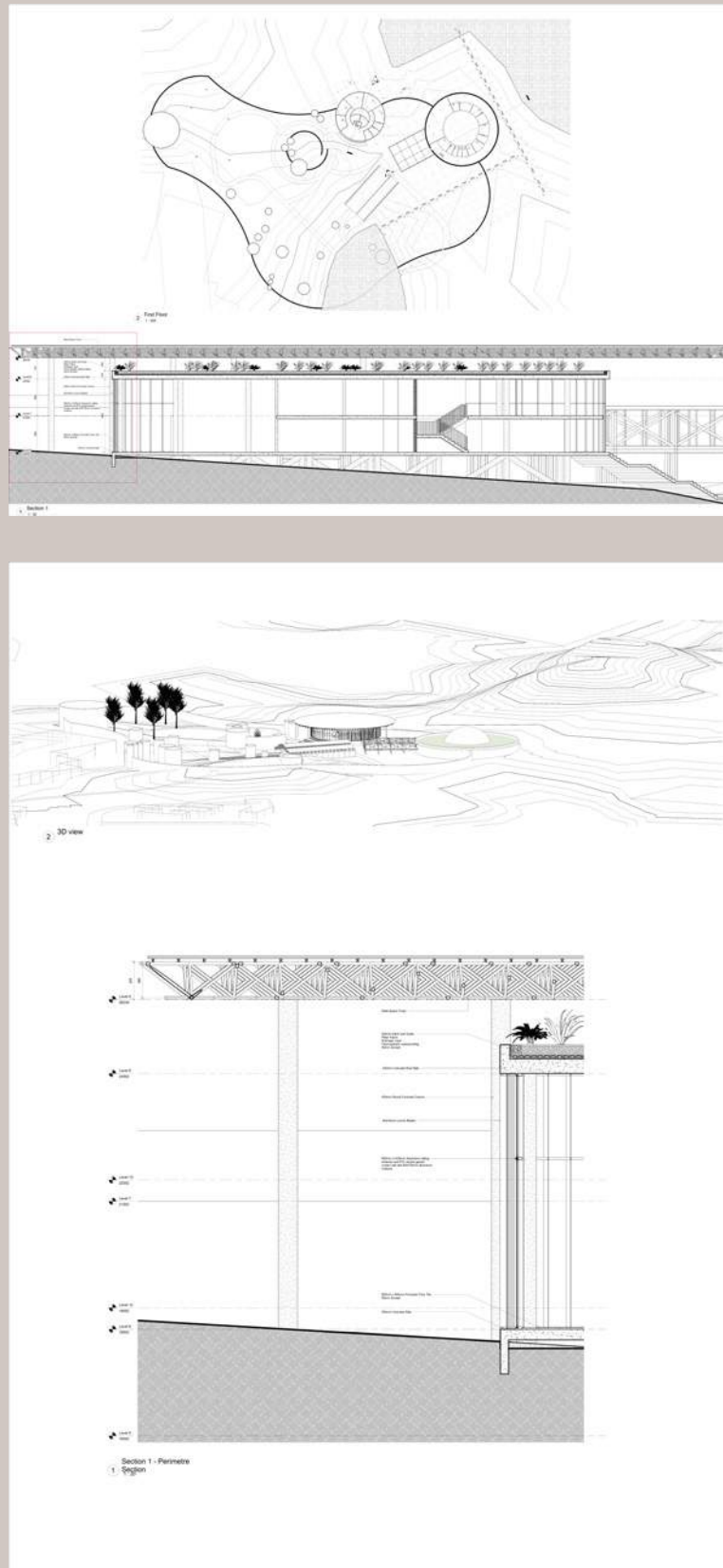


Figure 179: The main focus of the original technical plan was on utilizing rammed earth and exposed steel structures that intersect, aiming to enclose the remaining ruins and incorporate them into the phytoremediation landscape at the Lekgotla. Efforts to create dome-shaped rammed earth buildings were unsuccessful because of problems with their structural stability. Green roofs and double-roof structures were considered, but ultimately didn't align with the original plan of maintaining a toxin-free landscape, except for restoring the shielded Lekgotla area for protection from external pollutants. Some of the ideas that were investigated were improved and implemented further.

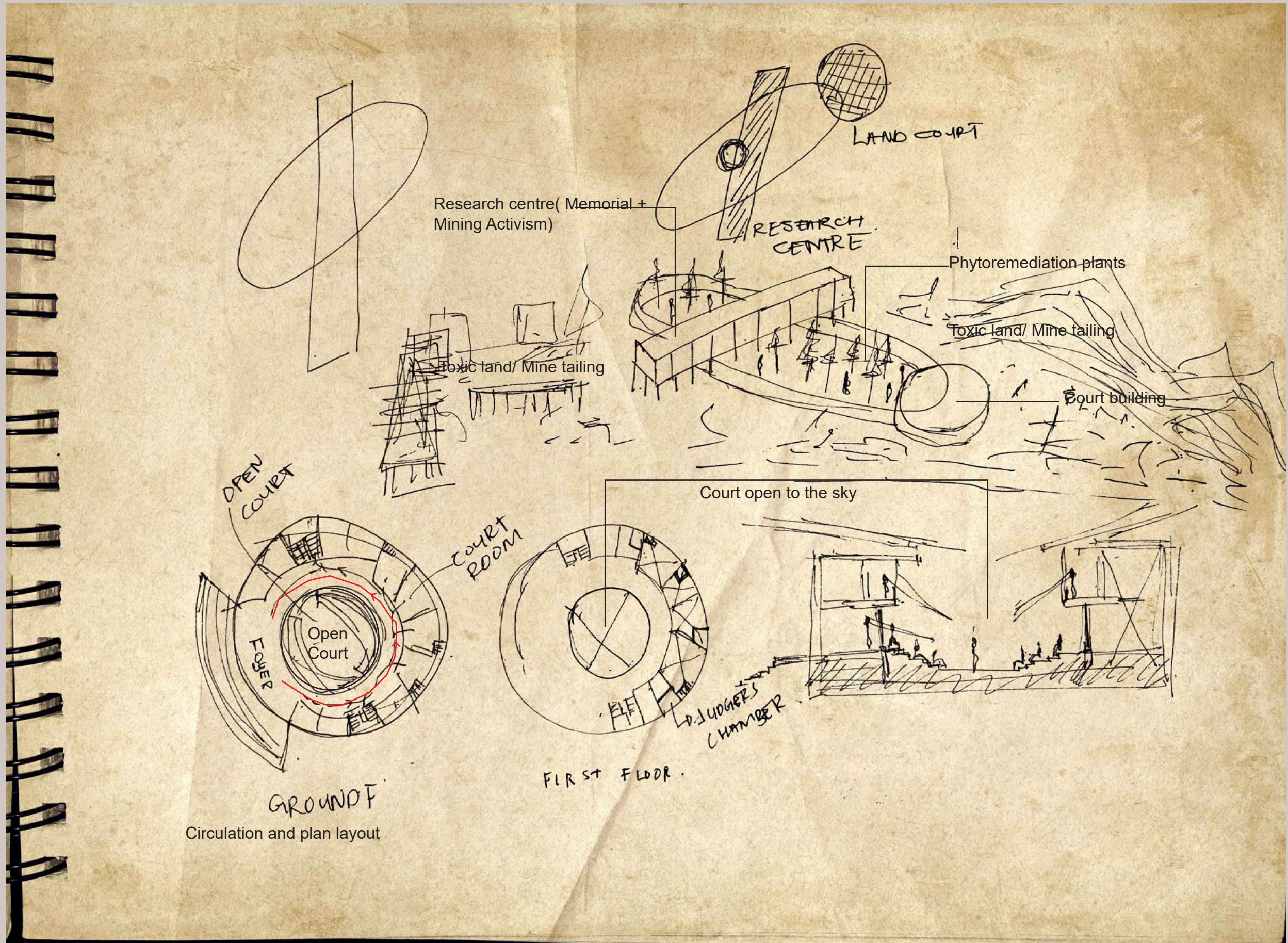


Figure 180: Design Development Sketch Explorations

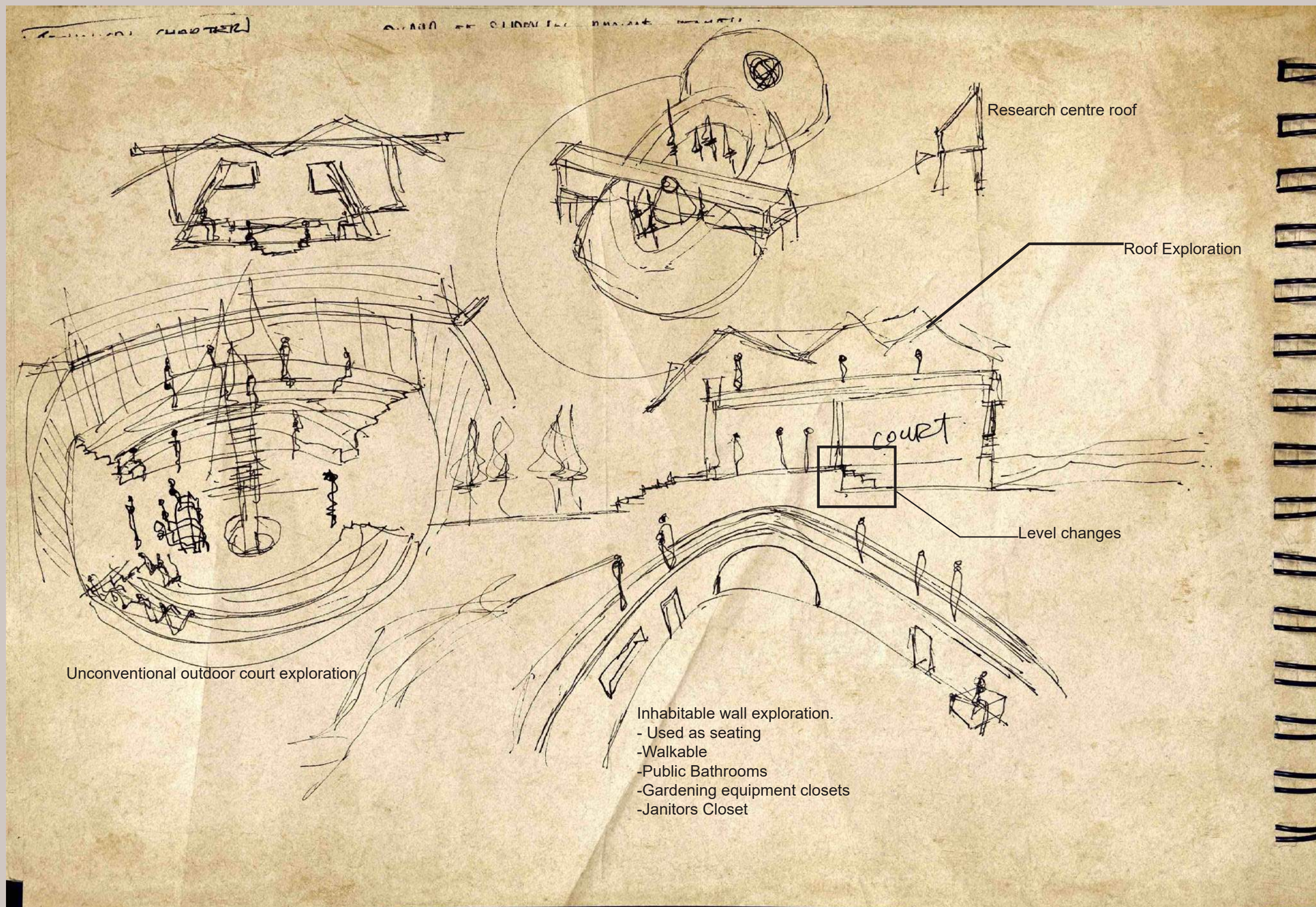


Figure 181: Design Development Sketch Explorations

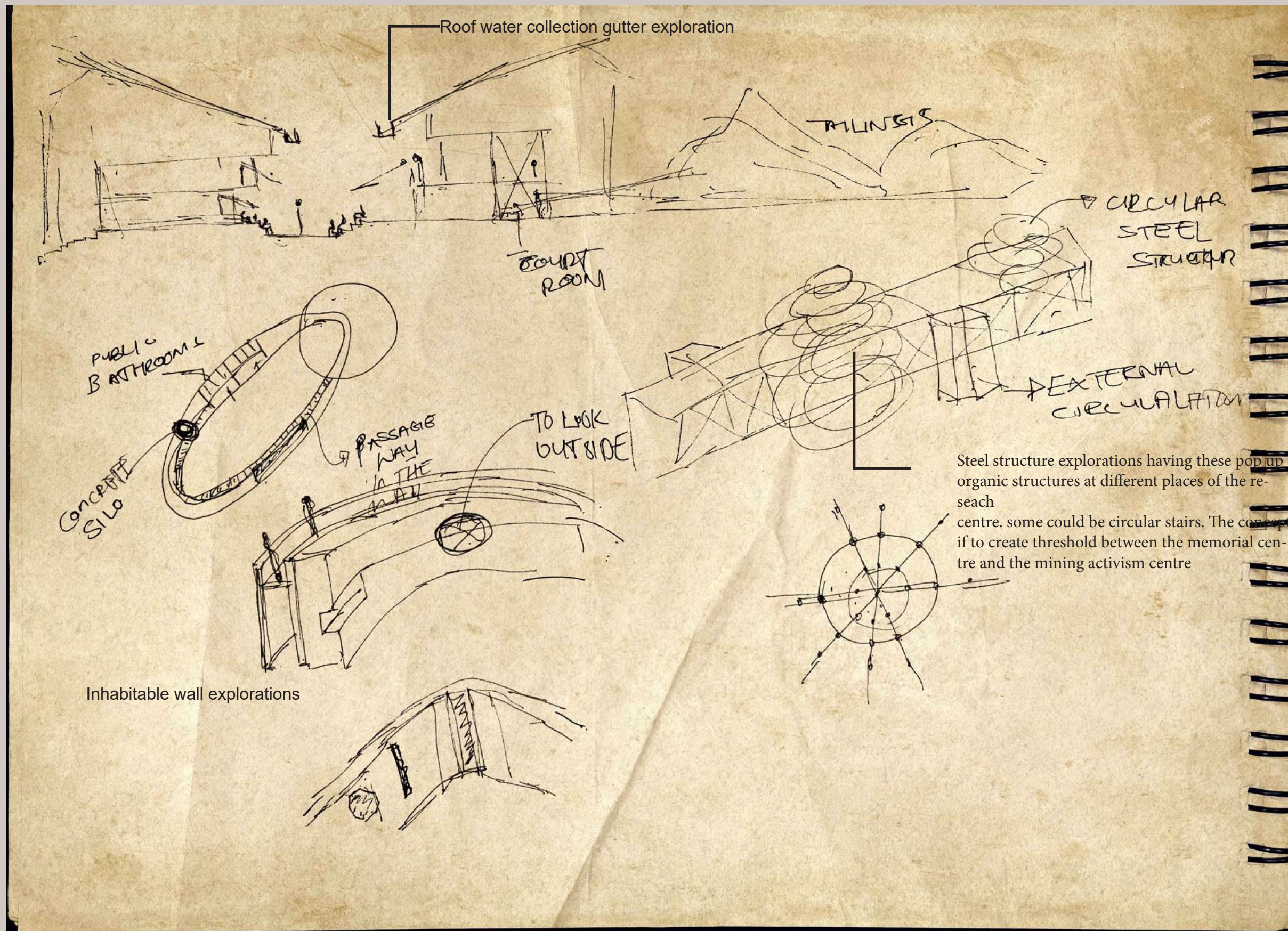


Figure 182: Design Development Sketch Explorations

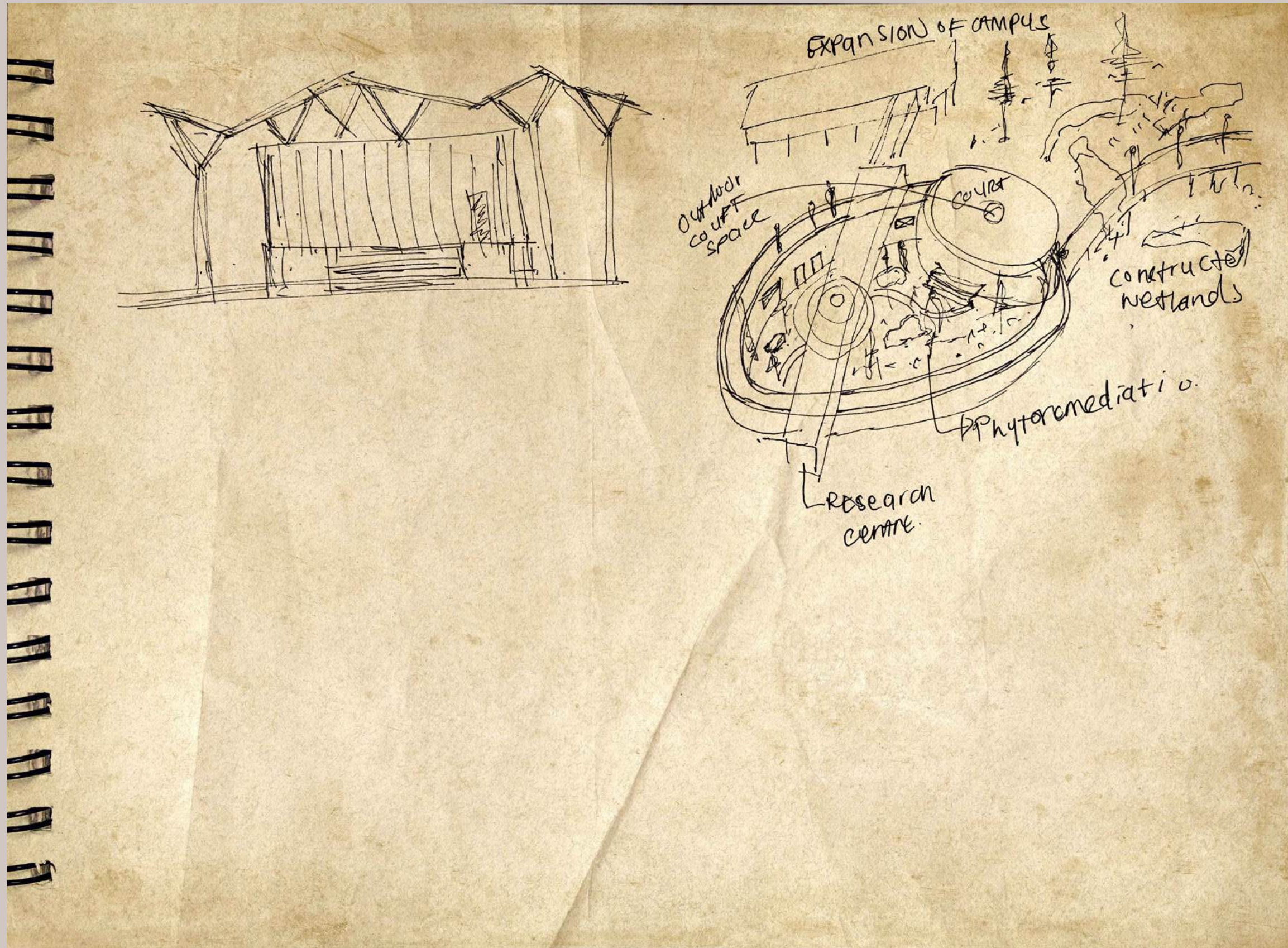


Figure 183: Design Development Sketch Explorations

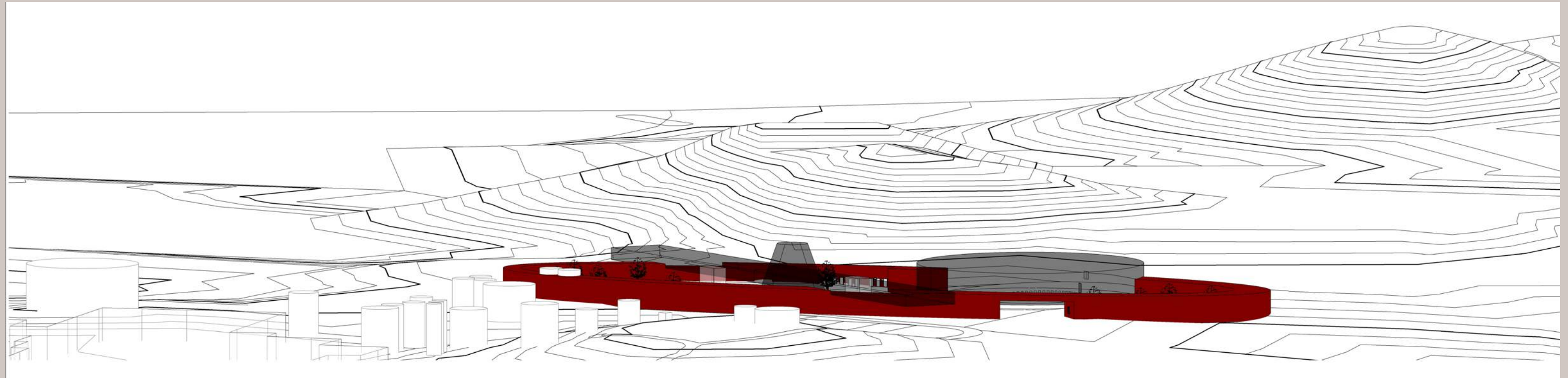


Figure 184: Design Development Massing Exploration



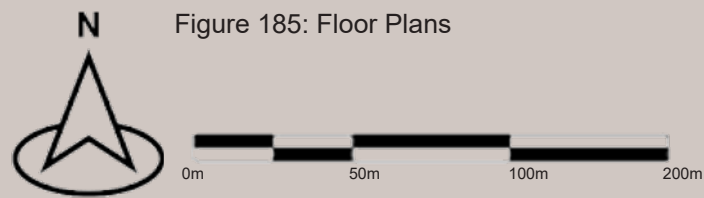
Ground Floor Plan



First Floor Plan



Second Floor Plan



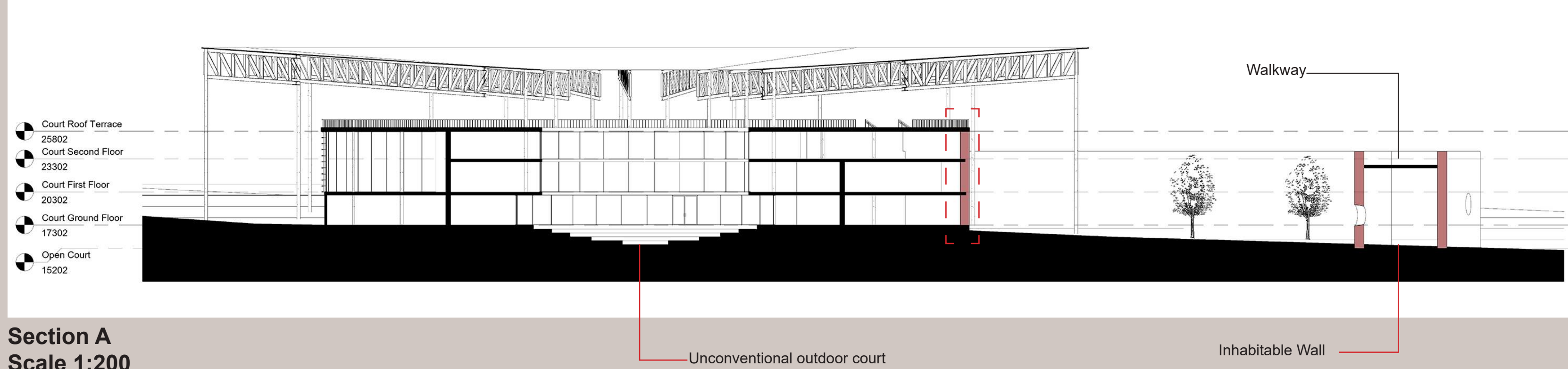
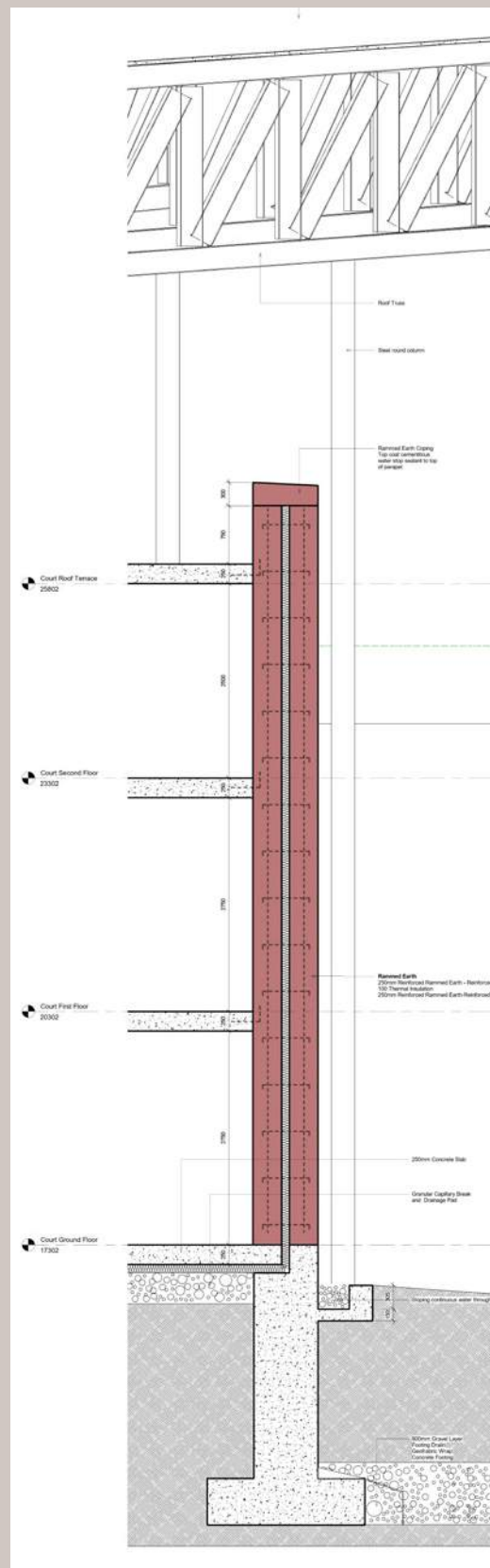


Figure 186: Sections



**Perimeter Section
Scale 1:20**

Figure 187: Perimeter Sections- Rammed earth detail.

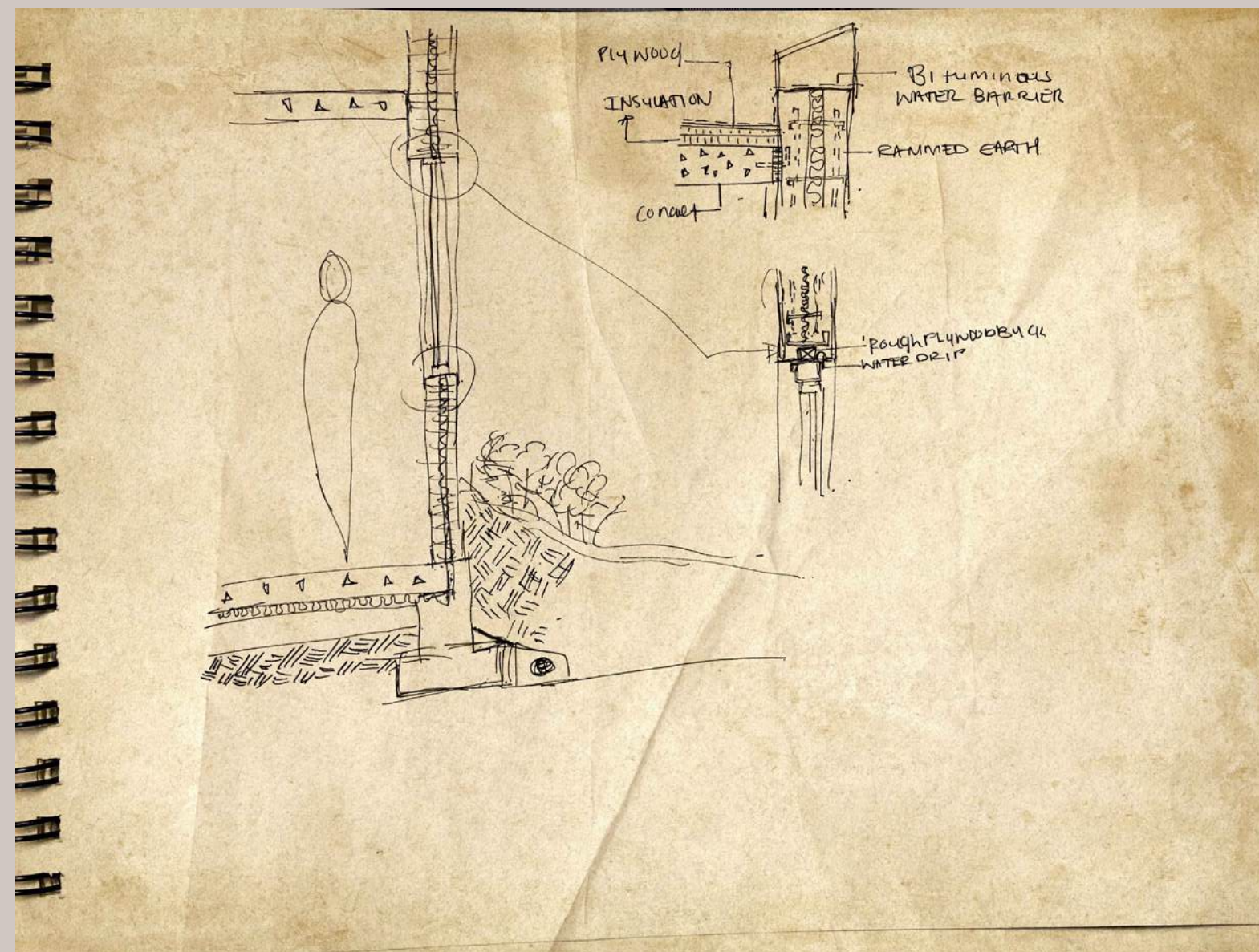
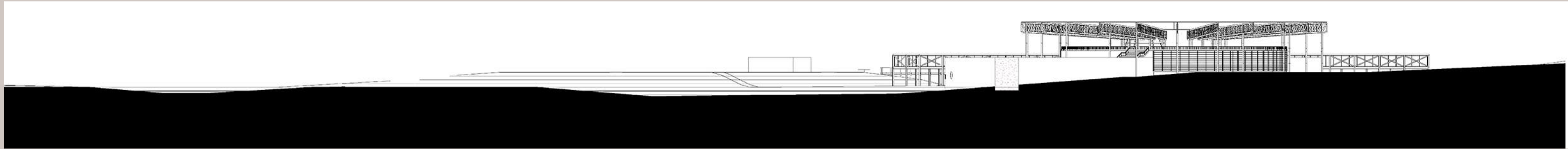
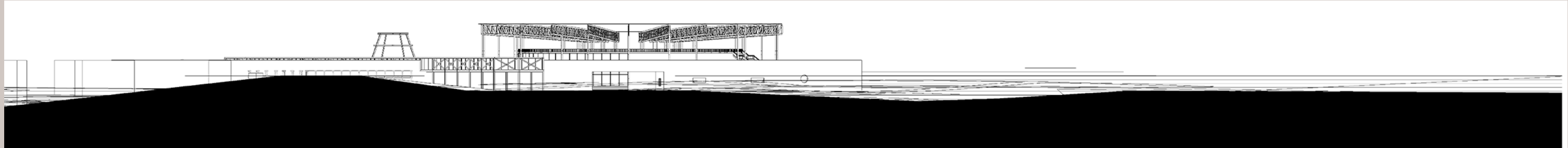


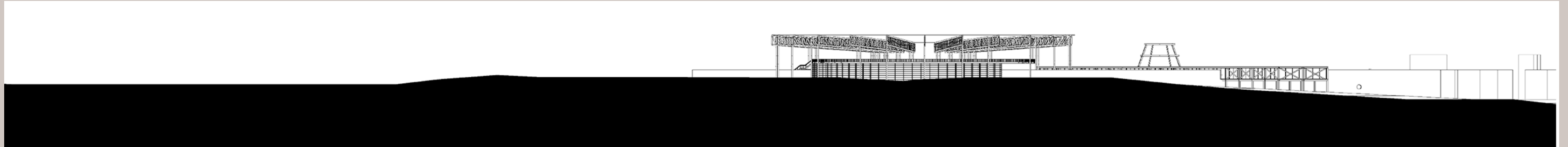
Figure 188: Rammed earth section explorations window and roof details



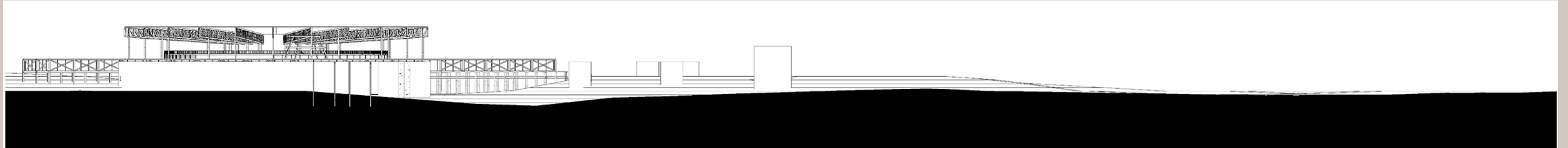
East Elevation
Scale 1:500



South Elevation
Scale 1:500

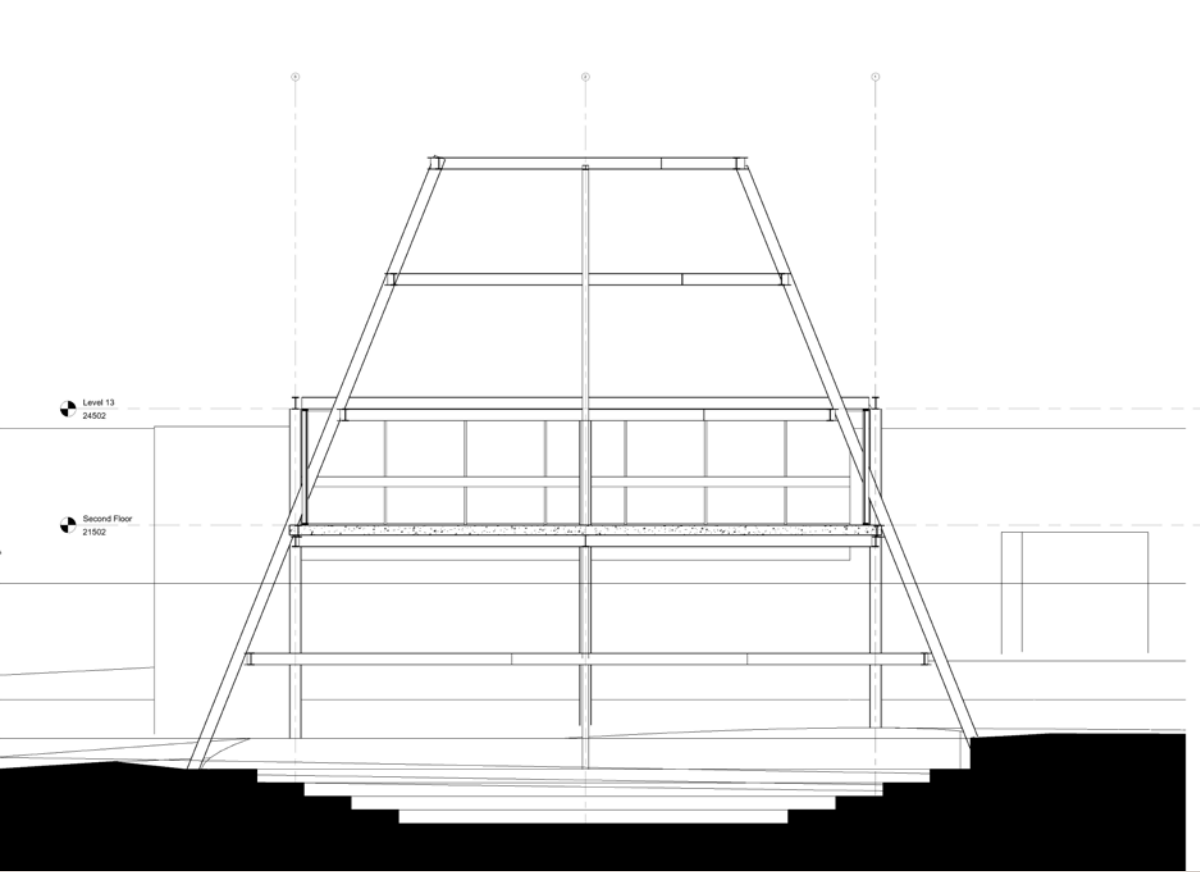


North Elevation
Scale 1:500



West Elevation
Scale 1:500

Figure 189: Elevations



Section C
Scale 1:50

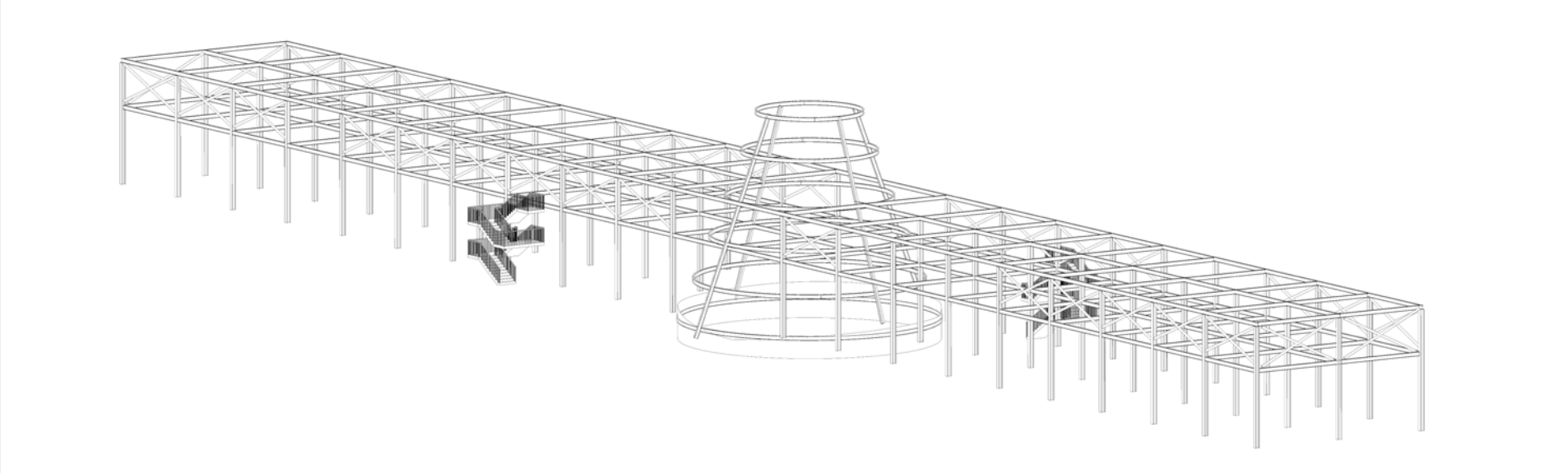


Figure 190: Steel structure details

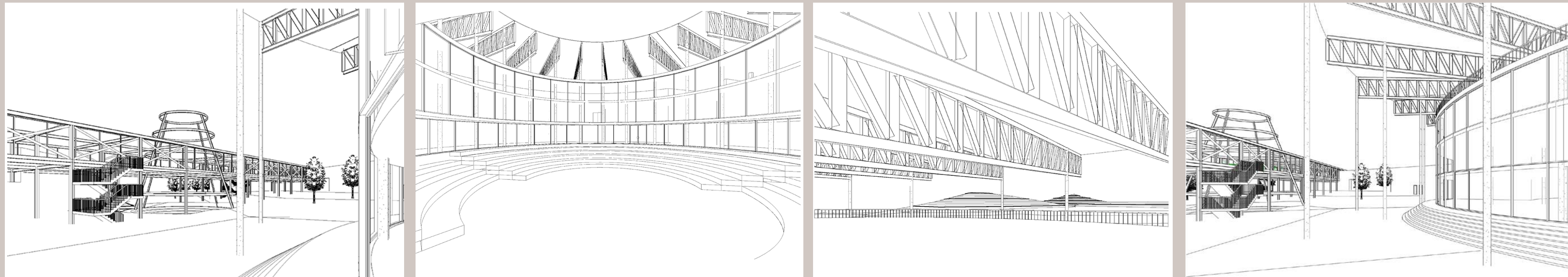


Figure 191: Perspectives

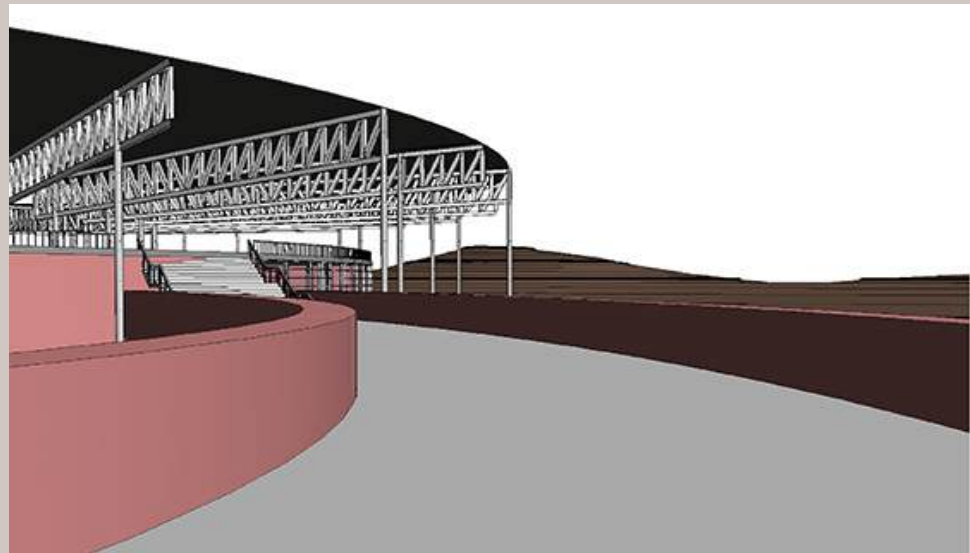
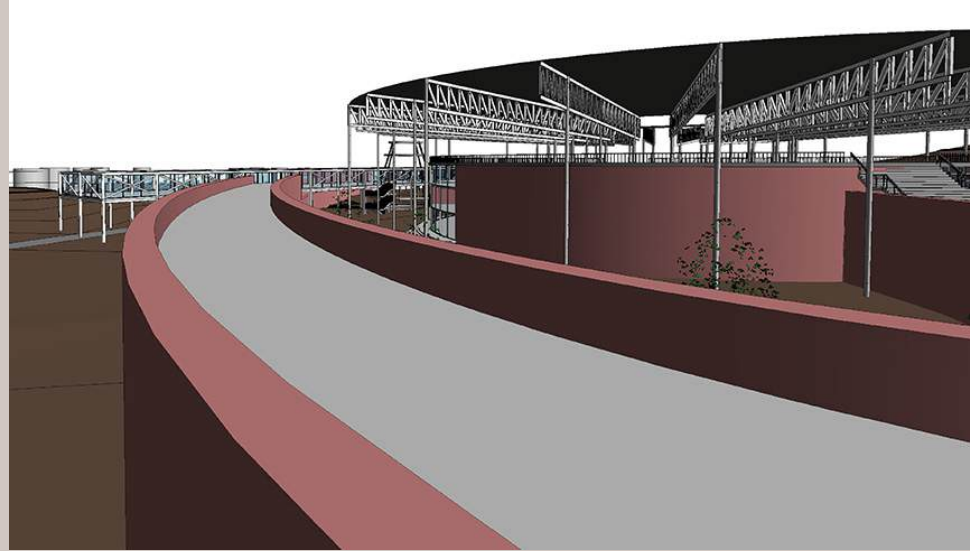
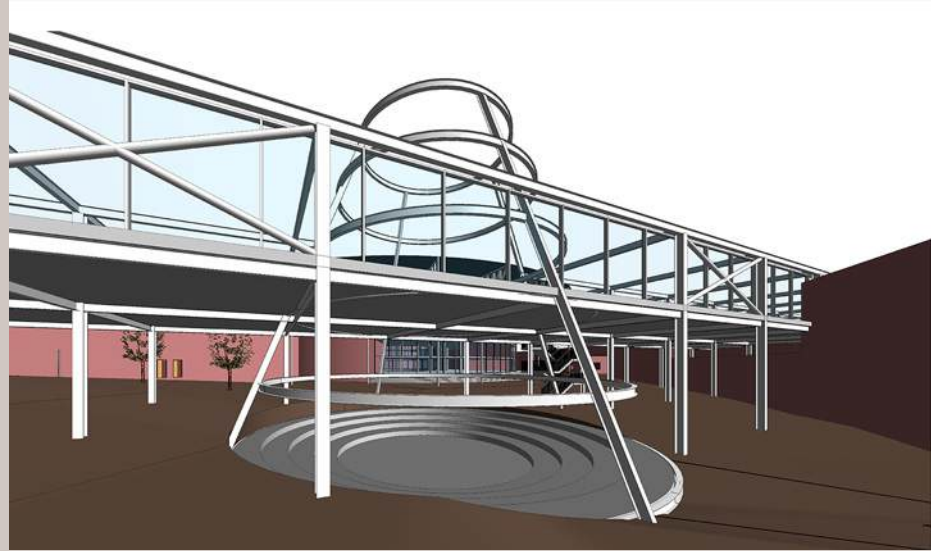


Figure 192: Perspectives

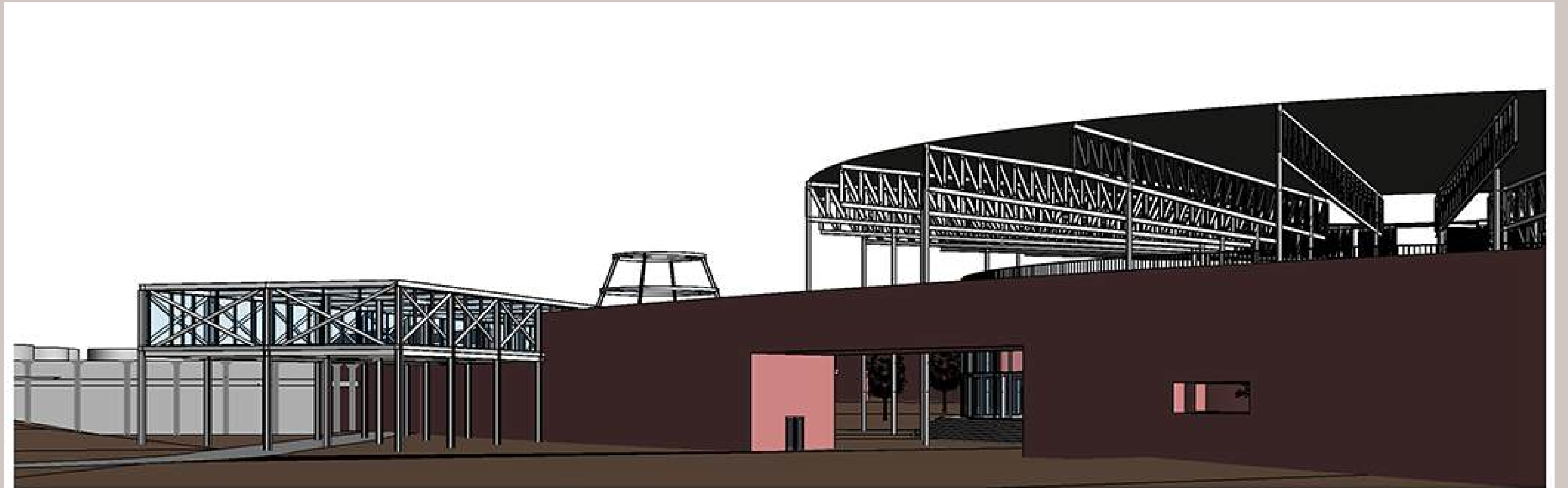
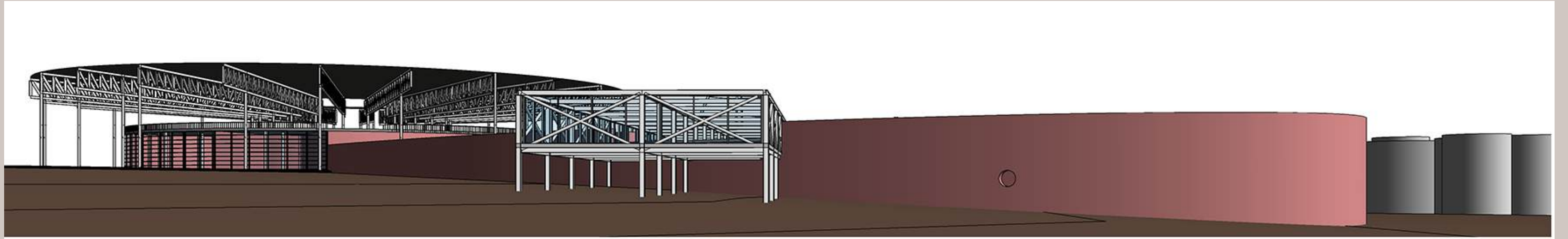


Figure 193: Perspectives

REPORT PART 2
PART 4:
DESIGN PROPOSAL

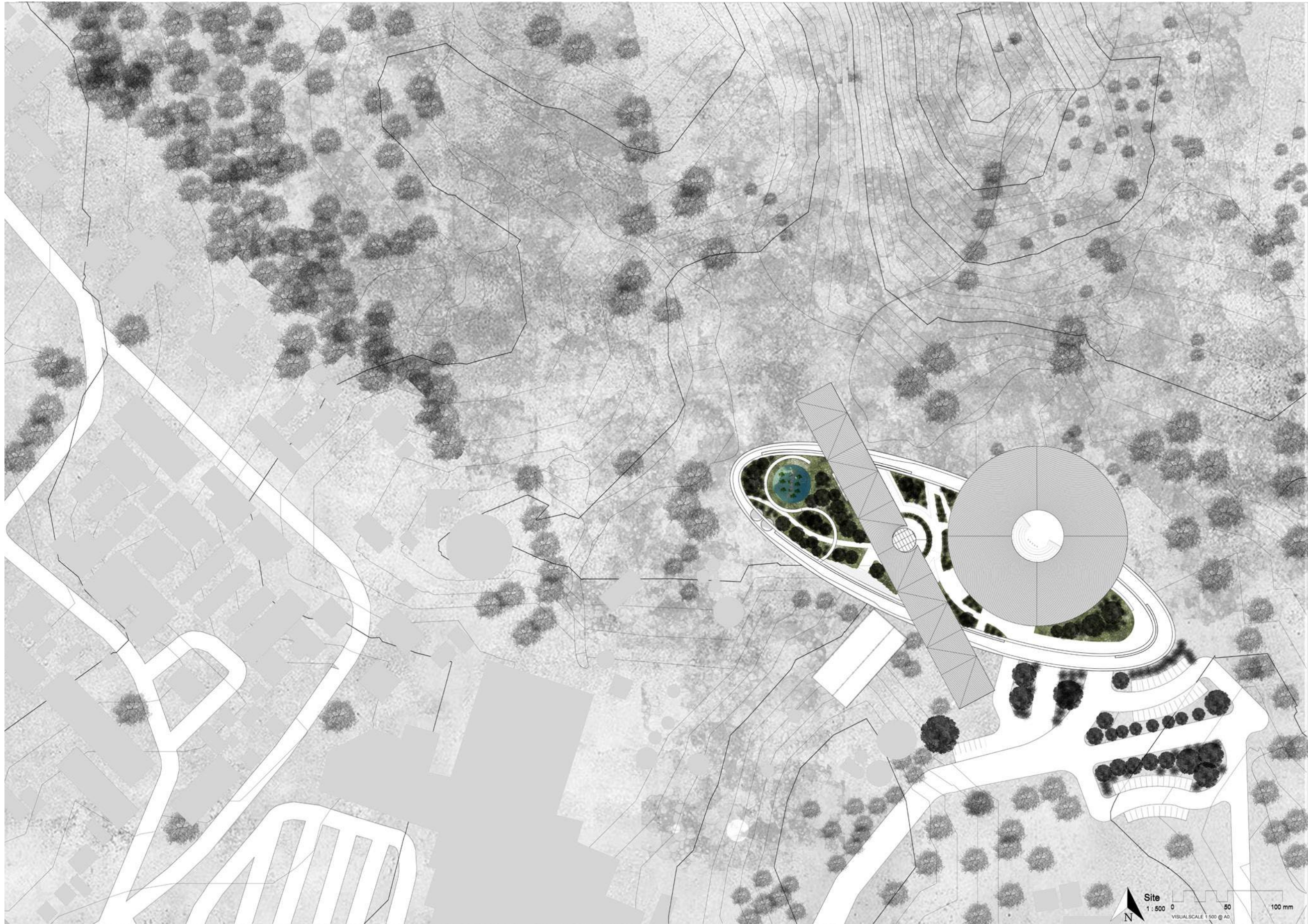


Figure 194: Site Plan

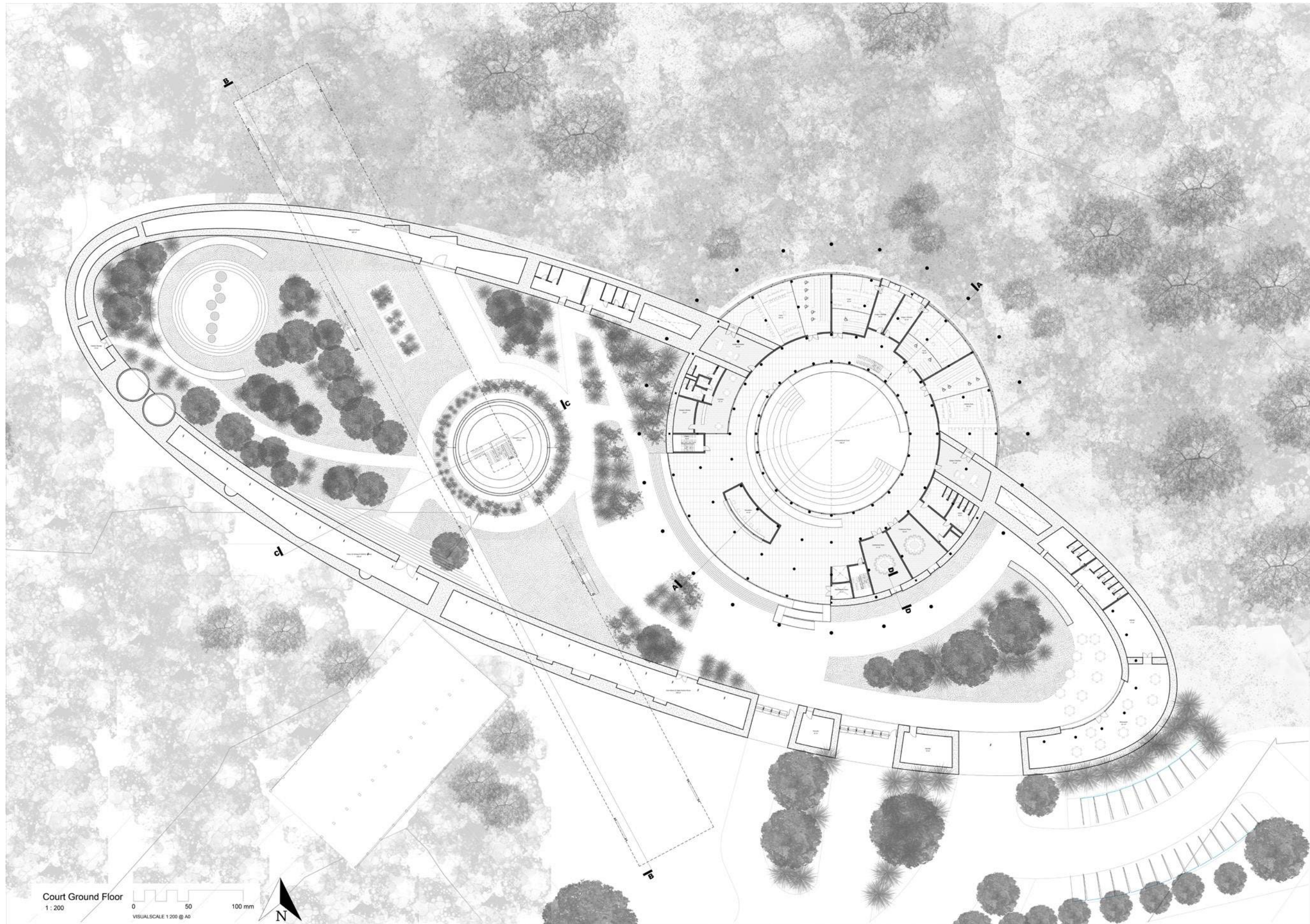


Figure 195: Ground Floor Plan

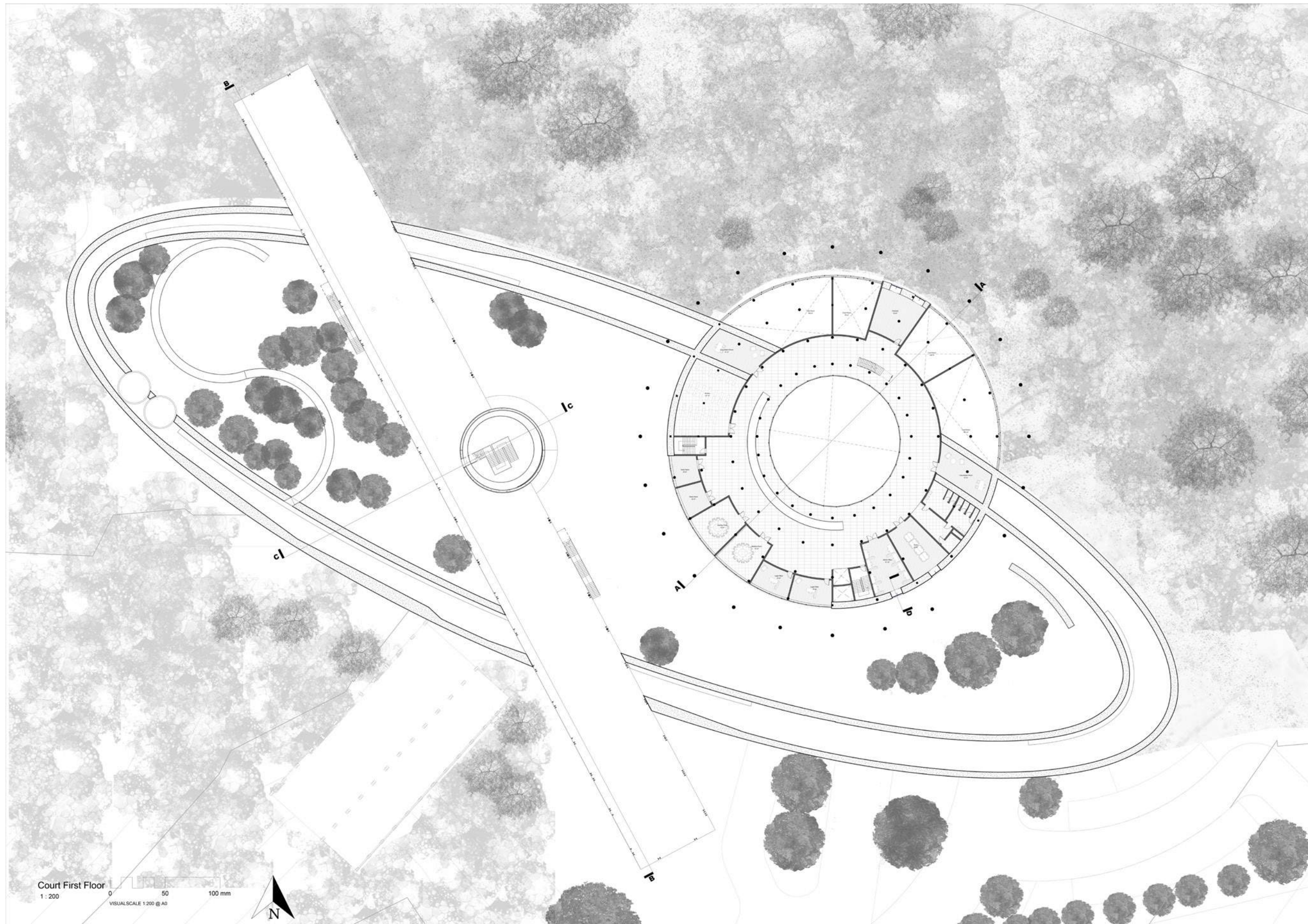


Figure 196: First Floor Plan

Figure 197: Research First Floor Plan

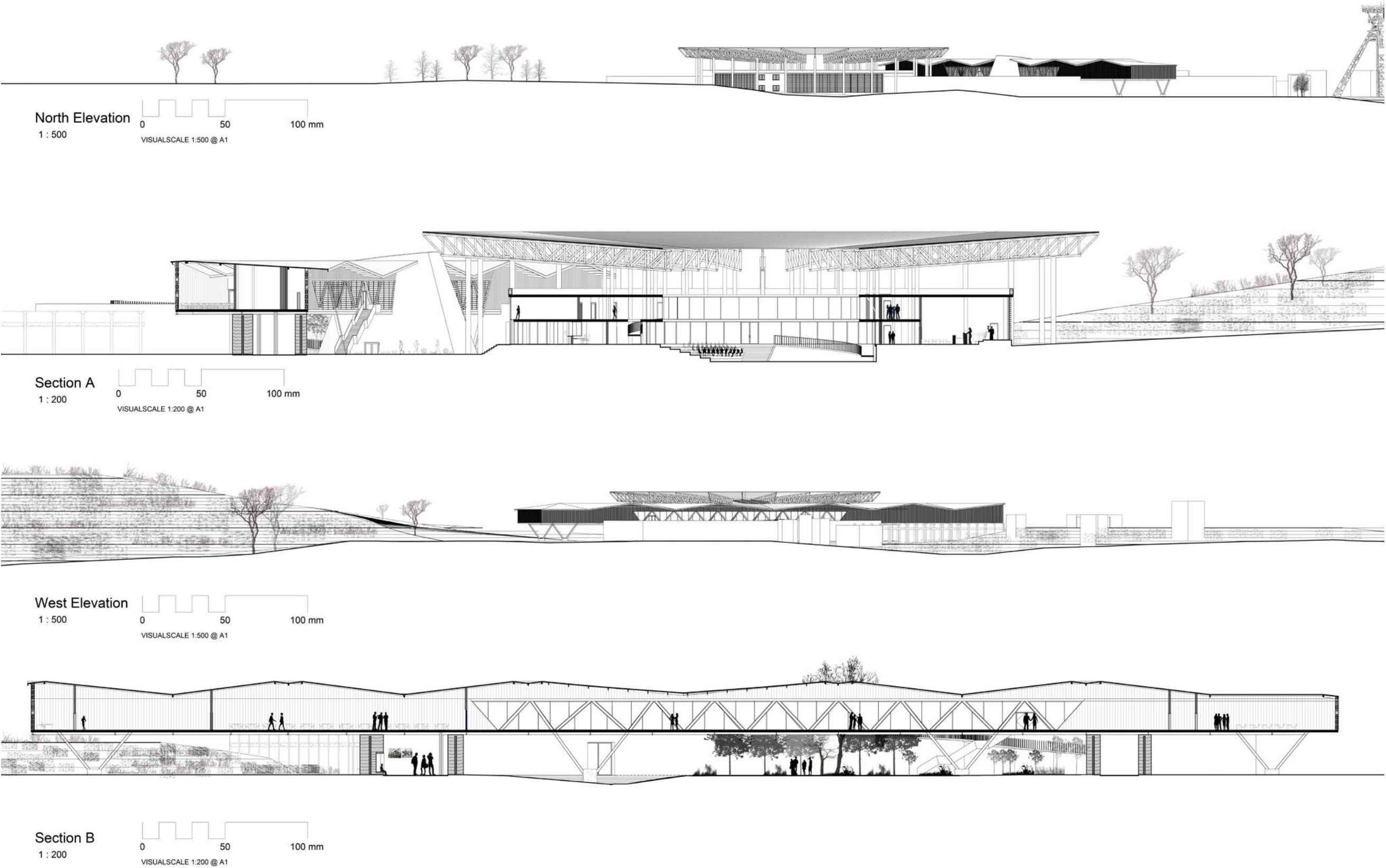


Figure 198: Section and Elevation

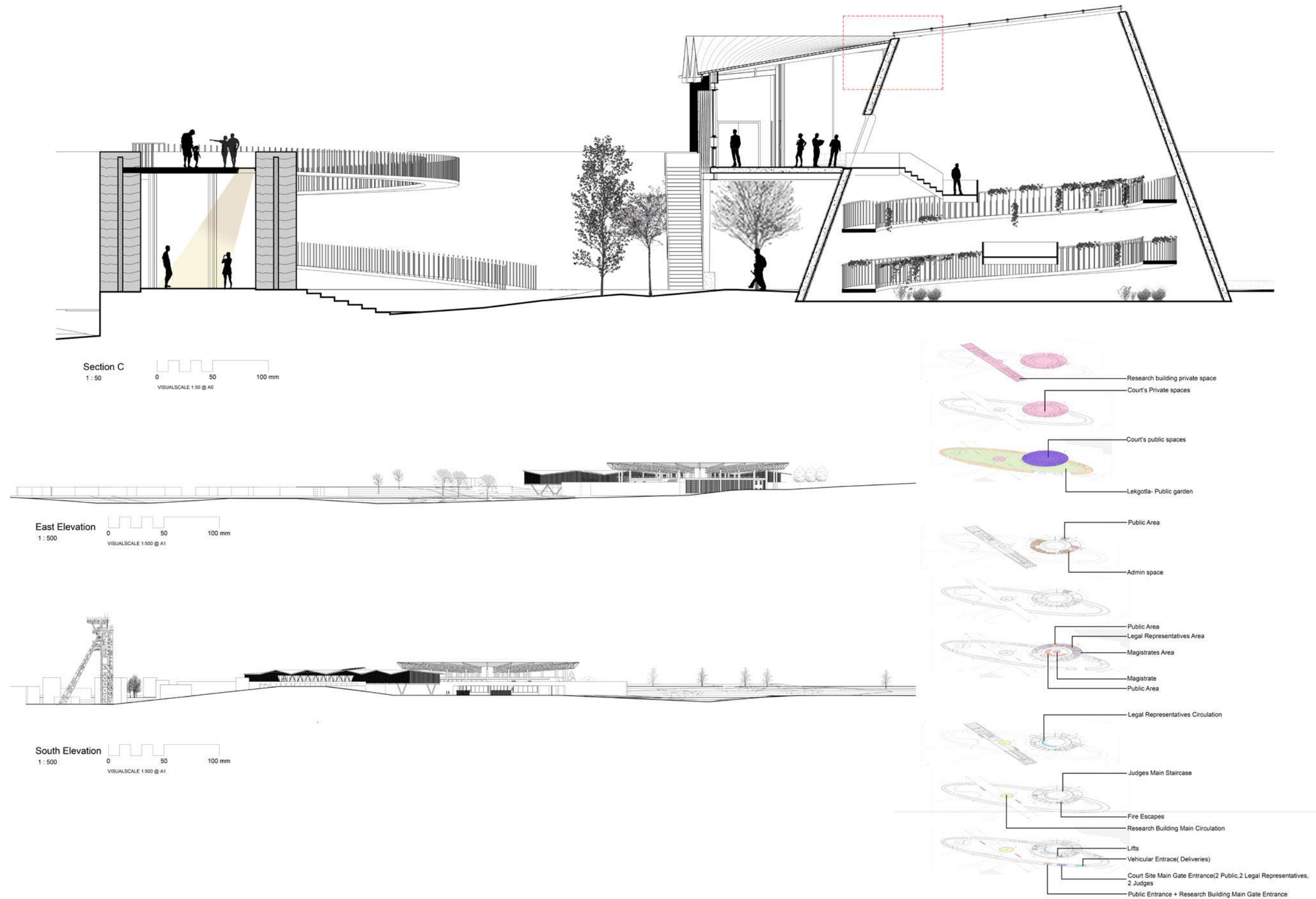


Figure 199: Elevations and Sections

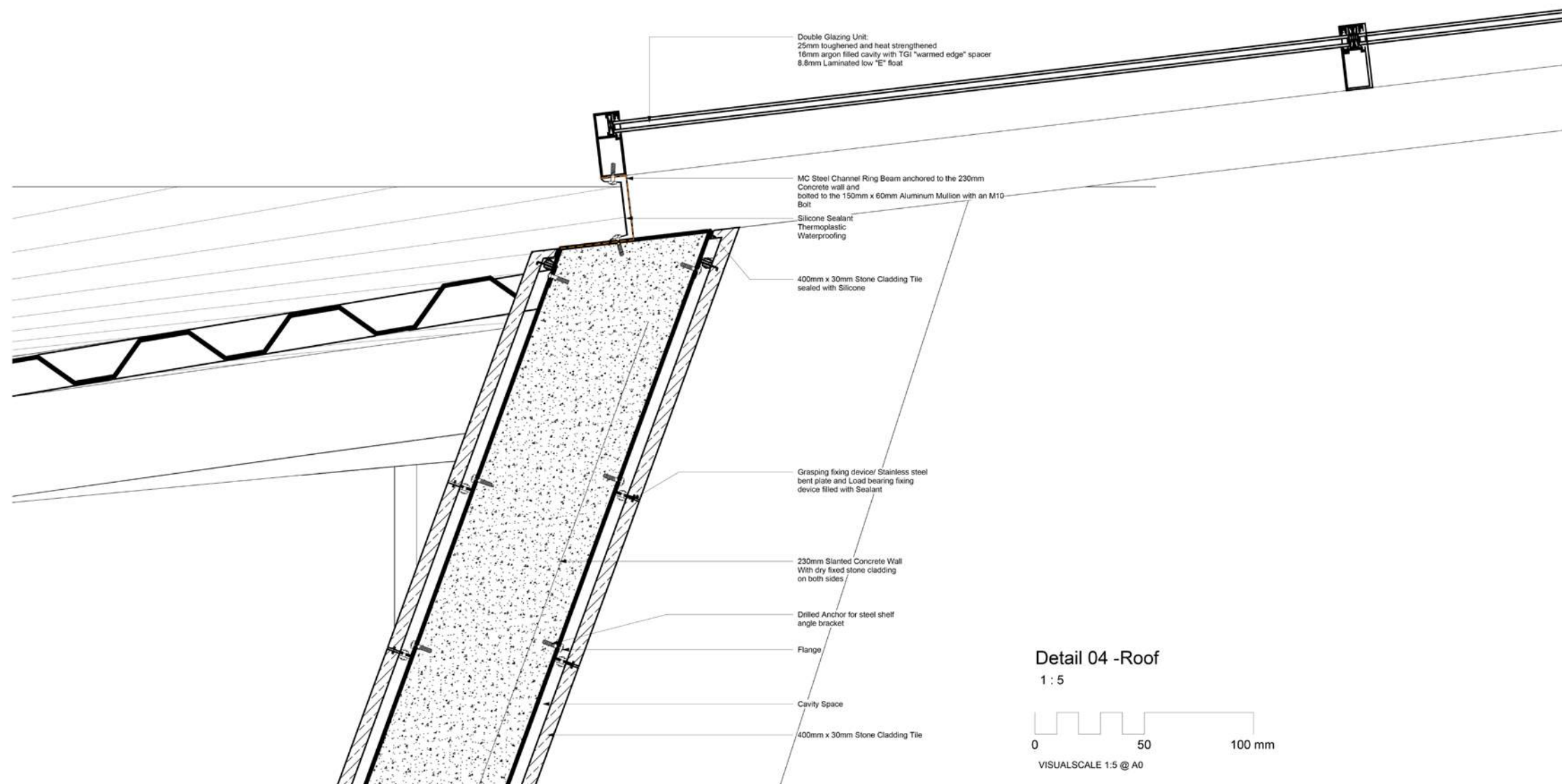


Figure 100: Detailed Section



Figure 101: Memorial Center Interior Perspective. The Memorial Center Interior Perspective illustrates a space dedicated to honoring the victims of mining, ecological harm, and cultural displacement. Natural light, post-extraction materials, and sacred items are some of the symbolic elements that enhance the reflective atmosphere of the interior. By combining social equity with ecological recovery, the region aims to provide a captivating experience that promotes environmental and cultural revitalization while allowing visitors to reflect on the impact of mining. Gentle, natural shapes, calming materials, and areas for communal meetings or personal reflection can all be viewed as fundamental architectural elements



Figure 102: Land Court Interior Perspective looking out to the Mine tailing. Rammed earth walls act as a divide between the court and adjacent mining tailings, while the Land Court's interior remains circular, minimalist, and meaningful. The arrangement of seats directed towards the mine tailings, which are presently being ecologically restored, encourages conversation and reflection in the room. As experimental plants begin to reclaim the area, the scene represents both the history of ecological harm and the potential for renewal. The region offers refuge for the earth and the soul by combining ecological, cultural, and legal equity



Figure 103: Land Court Interior Perspective. Rammed earth walls act as a divide between the court and adjacent mining tailings, while the Land Court's interior remains circular, minimalist, and meaningful. The arrangement of seats directed towards the mine tailings, which are presently being ecologically restored, encourages conversation and reflection in the room. As experimental plants begin to reclaim the area, the scene represents both the history of ecological harm and the potential for renewal. The region offers refuge for the earth and the soul by combining ecological, cultural, and legal equity



Figure 104: Research Centre/ Mining Activism Centre Interior Perspective. Focusing on environmental justice and community empowerment concerning mining, the Mining Activism Centre aims to serve as a center for advocacy and education. The adaptable, multifunctional spaces of the interior enable events, workshops, and exhibitions that highlight the social and ecological impacts of mining. The design incorporates natural light, open layouts, and materials that follow restorative and sustainable principles. Discussion, information sharing, and research areas might be vital elements, emphasizing the creation of a welcoming environment for different groups involved in environmental advocacy and land restoration. Round forms, elevated features, and visible metal elements all reinforce the concept of an environment that promotes flexibility and strength



Figure 105: Lekgotla Wall Exterior Perspective. This perspective symbolizes the link between the sacred space and the broader community through the individuals traversing the wall's summit, facilitating movement and communication while reflecting the spiritual and restorative intentions of the architectural design. Traversing the wall illustrates the integration of ceremonial practices within the built environment and establishes a connection between ecological and cultural rehabilitation efforts



Figure 106: Lekgotla Exterior Perspective. This perspective image features the Lekgotla Wall, a structural barrier designed to protect the sacred land from the contaminants of post-mining environments. Plants are cultivated for soil and water recovery in the Lekgotla, an oval-shaped area utilized for experimental phytoremediation. The boundary wall, representing safety and resilience, intersects a circular Land Court to illustrate the interplay between ecological restoration and judicial justice. This region highlights the welfare of the community and restoration of the environment by integrating sustainable design with native healing traditions.



Figure 107: Lekgotla Exterior Perspective. The establishment of an experimental phytoremediation garden in the courtyard area is shown from the exterior of the Lekgotla Wall. Incorporating native plant species recognized for their ability to absorb, decompose, or stabilize pollutants present in the post-mining environment, the garden plays a crucial role in the structure's design.



Figure 108: Lekgotla Exterior Perspective. A demonstration of the coexistence of sustainable design and environmental restoration is the Lekgotla Wall Exterior Perspective. The Lekgotla garden, a trial phytoremediation site featuring native plants selected for their ability to cleanse the air and soil affected by mining activities, is depicted in the image. Adjacent to this garden is the Mining Activism Centre, a prominent structure that serves as a hub for community engagement and activism regarding mining issues. A ramp leads to the top of the Lekgotla Wall, symbolizing both a physical ascent and the process of ecological and legal restoration, facilitating access to the site's upper regions. This picture depicts the design's layered strategy for ecological restoration, social justice, and empowering communities.



Figure 109: Khoru Unconventional Court Perspective. The Khoru Unconventional Court Perspective represents a novel, culturally significant method in the legal system that is deeply tied to indigenous traditions and wisdom. “Khoru,” originating from local or traditional languages, serves as a venue for community gatherings, conflict resolution, and justice rooted in ancestral wisdom. By integrating ecological and cultural elements into the legal framework, this perspective explores how this court functions as a sacred and restorative space for healing and reconciliation, beyond just being a legal entity. It embodies the integration of the modern legal framework with ancient, spiritually rooted methods of conflict resolution, particularly in post-mining contexts where environmental recovery, social equity, and land compensation intersect.

Post-Examination Responses

I appreciate your thoughtful comments. In my proposal, I appreciate the chance to improve my theoretical framework and strengthen the links between indigenous sustainability, post-critical ecophenomenology, and environmental justice. I outline how I am using these suggestions to my work below.

I understand how crucial it is to describe how users' emotional and sensory reactions are evoked by the land's exposure for contemplation. I am extending my explanation of the phenomenological sense of space in order to improve this, especially by referencing Pallasmaa's (2012) works, which highlight the significance of sensory perception in architectural experience. In order to make the degradation of the land a place of both transformation and recollection, I am examining how materiality, tactility, and spatial sequencing might enable an embodied connection between users and the landscape.

For me to do this, I am incorporating topophilia research (Tuan, 1977), which looks at how memories and healing are impacted by emotional ties to the land. In order to evoke a more profound, embodied experience of the land's history and ongoing restoration, I am also thinking about site-specific interventions, such as textural contrasts in walking paths, the placement of gathering areas in relation to prevailing winds, and the auditory experience of wind through exposed structures.

To better understand how circular and communal spatial interactions affect collective governance and reconciliation, I am focusing on traditional African spatial

configurations as studied by Mudimbe (1994). This is mirrored in the Lekgotla's architecture, which adheres to indigenous traditions of community-centered debate while serving as a barrier against environmental pollutants and a forum for discussion. In order to further integrate environmental restoration with cultural legacy, I am also integrating indigenous water collection methods and phytoremediation technologies into the ecological design of the project.

I'm refining how architecture encourages active engagement in legal, social, and cultural restoration in order to strengthen the design's role in justice and community empowerment. The Lekgotla is being re-examined as a dynamic, adaptable space where activists, legal professionals, and impacted communities can have ongoing conversations rather than merely as a venue for formal legal processes.

Additionally, I'm using spatial components that symbolize healing and reconciliation over time. I am suggesting material choices that observably change with weathering, like oxidized steel and untreated rammed earth walls, to represent resiliency and the passing of time, basing on Casey's (1987) analysis of the changing nature of memory. The Memorial Centre is also being planned as a dynamic archive where future generations can document, exhibit, and build upon the stories of displaced communities and legal triumphs.

I am further integrating interdisciplinary collaborations within the proposal in response to the recommendation to promote communication among architects, ac-

tivists, legal experts, and the community. I am refining the theoretical discourse on spatial justice (Foucault, 1980) to frame the Land Court as a site of advocacy, resistance, and structural change in land restitution policies, and I am investigating participatory design methodologies to ensure that the architectural interventions directly address the needs of those affected.

By implementing these improvements, my proposal aims to produce an additional and significant architectural intervention one that actively promotes ecological healing, social justice, and cultural memory in addition to acknowledging historical injustices. Both the theoretical framework and the architectural design will include these modifications, guaranteeing an interdisciplinary and comprehensive approach to post-mining landscapes.

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- Figure 101: Post-mining landscapes and possible opportunities for rehabilitation. Favas, P.J.C., Martino, L.E., Prasad, M.N.V., 2018. Chapter 1 - Abandoned Mine Land Reclamation—Challenges and Opportunities (Holistic Approach), in: Prasad, Majeti Narasimha Vara, Favas, P.J. de C., Maiti, S.K. (Eds.), Bio-Geotechnologies for Mine Site Rehabilitation. Elsevier, pp. 3–31. <https://doi.org/10.1016/B978-0-12-812986-9.00001-4>
- Figure 102: Limpopo River, showcasing both the region’s natural beauty and its environmental challenges. The lush riverside illustrates the clash between industrial growth and conservation, providing a clear contrast to the impact of nearby mining activities. This viewpoint effectively highlights the complex equilibrium required to maintain the river’s vital role in sustaining the surrounding ecosystems and indigenous communities. Alexandra, 2019. The Great Grey-Green-Greasy Limpopo: Great Rivers of Africa! Alexandra’s Africa. URL <https://www.alexandras-africa.com/great-rivers-of-africa/> (accessed 9.7.24).
- Figure 102: The panoramic visual tour showcases numerous green environments that demonstrate the transformation of post-mining regions into thriving, ecologically revitalized areas.
- Figure 103: Illustrates the conflict between industrial advancement and environmental deterioration, focusing on the artificial landscapes that redefine natural areas in the Anthropocene age. Photographs: Anthropocene [WWW Document], n.d. . Edward Burtynsky. URL <https://www.edwardburtynsky.com/projects/photographs/anthropocene> (accessed 9.6.24).
- Figure 104: An enormous tract of cleared land that was formerly rich in biodiversity has been replaced by straight lines of palm oil plants. The bleak, industrialized landscape belies the environmental cost of widespread deforestation, casting doubt on how to strike a balance in the contemporary world between ecological loss and economic gain. Photographs: Anthropocene [WWW Document], n.d. . Edward Burtynsky. URL <https://www.edwardburtynsky.com/projects/photographs/anthropocene> (accessed 9.6.24).
- Figure 105: Deforestation’s glaring, geometric scars stand out against the surrounding landscape, highlighting the terrible effects of industrial agriculture on the ecosystem. Photographs: Anthropocene [WWW Document], n.d. . Edward Burtynsky. URL <https://www.edwardburtynsky.com/projects/photographs/anthropocene> (accessed 9.6.24).
- Figure 106: An photograph of a coal train highlights the complex interplay between the natural and built surroundings, as well as the significant negative effects that coal mining has on local residents and the environment. Photographs: Anthropocene [WWW Document], n.d. . Edward Burtynsky. URL <https://www.edwardburtynsky.com/projects/photographs/anthropocene> (accessed 9.6.24).
- Figure 107: The extensive lithium salt flats, which are a component of the artificial landscapes created by contemporary extraction industries, emphasize the environmental consequences of mining in the Anthropocene-era. Photographs: Anthropocene [WWW Document], n.d. . Edward Burtynsky. URL <https://www.edwardburtynsky.com/projects/photographs/anthropocene> (accessed 9.6.24).
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- Figure 110: Opening Up the Discussion on Mining Land Claims: Local Chiefs, Labor Unions, Communities, and Corporate Giants In South Africa, a Struggle for Justice, Land, and Sustainability
- Figure 111: Marikana massacre 12th anniversary. Leader Mgcineni 'Mambush' Noki. Khoza, A., n.d. Marikana massacre, 12 years on: Time for reflection because mineworkers are "unsung heroes of SA" [WWW Document]. News24. URL <https://www.news24.com/news24/politics/marikana-massacre-12-years-on-time-for-reflection-because-mineworkers-are-unsung-heroes-of-sa-20240816> (accessed 9.5.24).
- Figure 112: Mineworkers striking near Lonmin Platinum Mines' Marikana mine at Rustenburg. Some Marikana miners say they will fight to the death [WWW Document], n.d. . TimesLIVE. URL <https://www.timeslive.co.za/news/south-africa/2012-08-18-some-marikana-miners-say-they-will-fight-to-the-death/> (accessed 9.5.24).
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- Figure 115: Opposition of the homogenizing effects of globalization, Rich's design takes inspiration from the local context, embracing the cultural and environmental distinctiveness of the Mapungubwe region in South Africa. Critical Regionalism [WWW Document], 2012. . SkyscraperCity Forum. URL <https://www.skyscrapercity.com/threads/critical-regionalism.1962991/> (accessed 9.6.24).
- Figure 116: The combination of terrain, climate, light, and tectonics in architectural design is emphasized by Kenneth Frampton. This picture illustrates how modern building may blend in with the surroundings and shows how these ideas are still relevant today. Critical Regionalism for our time, 2019. . The Architectural Review. URL <https://www.architectural-review.com/essays/critical-regionalism-for-our-time> (accessed 9.6.24).
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- Figure 118: Post-critical ecophenomenology seeks a more respectful and integrated approach to ecological systems, going beyond critical deconstruction and emphasizing embodied, lived experience. It aims to explore people's interactions with the environment and how they live and experience the world, promoting increased sustainability, responsibility, and knowledge of the environment.. Fig. 6.1 A post-critical ecophenomenology (from 'a critical ecological... [WWW Document], n.d. . ResearchGate. URL https://www.researchgate.net/figure/A-post-critical-ecophenomenology-from-a-critical-ecological-ontology-for-inquiry_fig1_314090921 (accessed 9.7.24).
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- Figure 121: Highlighting the journey of healing and restoration, where communities reclaim their cultural heritage, sacred spaces, and connection to the land after mining exploitation. Through art, memory, and stewardship, individuals break free from past scars and envision a future grounded in ecological and cultural renewal."
- Figure 122: Nicole Brandt, Under a Tree of Omwandi. This installation prompts contemplation on memory, loss, and resiliency. It is made of clay pots, pictures, and sand from a location close to Uupindi. Out of History: Artists, Landscapes and New 'Practices of Self' in Southern Africa - ART AFRICA Magazine, 2021. URL <https://artafricamagazine.org/out-of-history-artists-landscapes-and-new-practices-of-self-in-southern-africa/> (accessed 9.7.24).
- Figure 123: Shallow graves are visible in the distance, acting as melancholic symbols of the suffering and sacrifice made during the freedom war. An omwandi tree, an important symbol in the African culture and one frequently linked to spirituality and ancestral links, appears in the middle of this moving scene. Out of History: Artists, Landscapes and New 'Practices of Self' in Southern Africa - ART AFRICA Magazine, 2021. URL <https://artafricamagazine.org/out-of-history-artists-landscapes-and-new-practices-of-self-in-southern-africa/> (accessed 9.7.24).
- Figure 124: An unconventional court in Mali where the community and the judges gathered outside to resolve disputes. File: Bamako film.png, 2016. . Wikipedia.
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- Figure 126: Leshiba Wilderness is a Venda art lodge that works with artist in Limpopo to preserve the biodiversity. It is a discovered remnants of an old Venda homestead that was preserved. The use of earth and courtyard with native plant is woven into the architecture. Art and Culture, n.d. . Leshiba. URL <https://leshiba.co.za/art->

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- Figure 127: Collage showing where the idea of Lekgotla/Khoro and the non-converntional court came from in the Venda people holding community under a tree and the idea of circular court that derived from the circular Venda hut.
 - Figure 128: Influence of African homesteads to preserve indigenous cultural heritage. Freedom Park, Phase 1 / GAPP + Mashabane Rose Architects + MMA | Landscape architect, Park landscape, Landscape [WWW Document], n.d. . Pinterest. URL <https://www.pinterest.co.uk/pin/gallery-of-freedom-park-phase-1-gapp-mashabane-rose-architects-mma-9--1055109018920586878/> (accessed 9.7.24).
 - Figure 129: Movement on site as a way of remembering the journey of those that fought for freedom. Gallery of Freedom Park, Phase 1 / GAPP + Mashabane Rose Architects + MMA - 6 [WWW Document], n.d. . ArchDaily. URL <https://www.archdaily.com/297678/freedom-park-phase-1-gapp-mashabane-rose-architects-mma/50af86f-6b3fc4b0cad00001d-freedom-park-phase-1-gapp-mashabane-rose-architects-mma-photo> (accessed 9.7.24).
 - Figure 130: Soil in its natural state interacts with ancestral memory and elemental forces in a dynamic manner. Dineo Seshee Bopape's installation delves into themes of identity, land, and relocation through the utilization of soil, artifacts, and music. Dineo Seshee Bopape : sa ____ ke lerole, (sa lerole ke ____) [WWW Document], n.d. . Contemporary And. URL https://contemporaryand.com/exhibition/dineo-seshee-bopape-sa-____-ke-lerole-sa-lerole-ke-____/ (accessed 9.7.24). Rodgers, B., 2017. Dineo Seshee Bopape "sa ____ ke lerole, (sa lerole ke ____)" in Brooklyn. CFile - Contemporary Ceramic Art + Design. URL <https://cfileonline.org/exhibition-dineo-seshee-bopape-contemporary-ceramic-art-cfile/> (accessed 9.7.24).
 - Figure 131: The dome structure, resembling a hut, is made from natural materials and brings to mind ancient dwellings and sacred spaces, symbolizing a figurative place of refuge. Dineo Seshee Bopape uses the dome to symbolize memory, shelter, and the cycle of life. Its rugged, earthy exterior holds a deep spiritual and familial connection to the land, acting as a vessel for both renewal and historical significance. The structure exudes a timeless yet outdated quality, embodying the enduring relationship between humans and nature and the resilience of indigenous heritage. Dineo Seshee Bopape: Born in the first light of the morning [moswara'marapo] - Announcements - e-flux [WWW Document], n.d. URL <https://www.e-flux.com/announcements/440323/dineo-seshee-bopapeborn-in-the-first-light-of-the-morning-moswara-marapo/> (accessed 9.7.24).
 - Figure 132: The collage also highlights the return to ecocentric ideas, as seen by the Lekgotla design, which is a multifunctional venue intended for both legal processes and environmental restoration in areas that have been mined. Eco-centric architecture promotes a close relationship with nature by supporting the regeneration and recovery of damaged landscapes through the use of phytoremediation and the incorporation of sustainable materials. It also shows a master plan for the future that includes artificial wetlands to retain the site's spiritual value and cleanse the neighboring river.
 - Figure 133: Types of Phytoremediation. Brownfields to Greenfields: A Field Guide to Phytoremediation by Mabelle Plasencia - Issuu [WWW Document], 2014. URL https://issuu.com/mabelleplasencia/docs/fieldguide_youarethecity (accessed 9.5.24).
 - Figure 134: Phytoextraction of heavy metals by plants | Download Scientific Diagram [WWW Document], n.d. URL https://www.researchgate.net/figure/Phytoextraction-of-heavy-metals-by-plants_fig2_364331644 (accessed 9.5.24).
 - Figure 135: Showing the type of plants that could be used for phyoremediation in Copper Mine referencing all the type of contaminats that were found in the Messina Mine/ Copper mines.
 - Figure 136: Phytoremediation Plants Reference Table. Brownfields to Greenfields: A Field Guide to Phytoremediation by Mabelle Plasencia - Issuu [WWW Document], 2014. URL https://issuu.com/mabelleplasencia/docs/fieldguide_youarethecity (accessed 9.5.24).
 - Figure 137: Martinet Coal Mine tailing rehabilitated and turned into a hiking trail. Photograph by Mokgadi Mamabolo
 - Figure 138: The reconversion of the former Martinet mining site and its slag heaps. Monceau-Roux: le site du Martinet prend son envol avec des projets concrets, comme celui de la Manufacture Urbaine [WWW Document], 2019. . sudinfo.be. URL <https://www.sudinfo.be/id101681/article/2019-02-12/monceau-roux-le-site-du-martinet-prend-son-envol-avec-des-projets-concrets-comme> (accessed 9.5.24).
 - Figure 139: Adaptive reuse of old industrial building into museums. Photographs by Mokgadi Mamabolo.
 - Figure 140: Re-think a postindustrial landscape / Dessin et Construction / Wallonie-Bruxelles Architectures / Wallonie-Bruxelles Architectures [WWW Document], n.d. URL <https://wbarchitectures.be/en/architects/Dessin-et-Construction/Re-think-a-postindustrial-landscape/554/> (accessed 9.5.24).
 - Figure 141: Rehabilitated Coal Mine Tailings . Photographs by Mokgadi Mamabolo.
 - Figure 142: Locality Map of the Musina and the study area which is the old Musina Copper Mine Singo, N., Kramers, J., 2020. Retreatability analysis of the Musina copper mine tailings in South Africa: an exploratory study. SN Applied Sciences 2, 1707. <https://doi.org/10.1007/s42452-020-03447-x>
 - Figure 143: Map of the near by river next to the Messina Mine and the slime dam in relation to the community.
 - Figure 144: Images from Louise Kunz's 2017 land reform project are combined in this collage to contrast scenes of community-driven land repair with the depressing legacy of exploitation and dispossession. It draws attention to the intricate relationship between land restitution and the mining industry, where the extraction of mineral wealth left the land and its inhabitants with lasting scars. The pictures show the continuous fight for social and environmental justice, highlighting the urgent need for laws that rectify past injustices and support ecological recovery and sustainable land usage. Grainsa, RhinoReloaded, n.d. A fresh approach to land reform [WWW Document]. A fresh approach to land reform. URL <https://www.grainsa.co.za/a-fresh-approach-to-land-reform> (accessed 9.6.24).
 - Figure 145: The terrible reality of zama-zamas, or illegal miners, and their effects on South Africa's mining

regions are depicted in this collage. It draws a contrast between the artisanal miners' valiant efforts and the frequently disastrous environmental damage they leave behind. The social and economic forces behind illegal mining are depicted in pictures of abandoned mining landscapes next to impoverished communities, and an ecological justice vision highlights the critical need for sustainable livelihoods, land rehabilitation, and diverse economies in mining-affected areas.

- Figure 146: This collage represents collective wisdom by contrasting the formal courtrooms of the modern judicial system with the traditional African practice of settling conflicts under trees. It illustrates the crucial role that courts play in environmental justice, where the complex legal framework of statute law collides with the deeply ingrained customs of land stewardship. Traditional settings stress harmony between the people, land, and nature, underscoring the necessity for comprehensive approaches to land reform and ecological justice, even though conventional courts have the authority to order land repair.
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- Figure 151: Analyses of the floor to ceiling height and the transparency of the facade and privacy. PRECEDENT STUDIES Figure 5.1: Entrance area to the Court foyer (Author, 2011). 5.1 CONSTITUTIONAL COURT by omm design workshop university of pretoria Johannesburg, South Africa 2001-2004 - Google Search [WWW Document], n.d. URL [https://www.google.com/search?sca_esv=8ffe4b1216883de0&q=PRECEDENT+STUDIES%0D%0AFigure+5.1:+Entrance+area+to+the+Court+foyer+\(Author,+2011\).%0D%0A5.1+-CONSTITUTIONAL+COURT%0D%0Aby+omm+design+workshop+university+of+pretoria%0D%0AJohannesburg,+South+Africa%0D%0A2001-2004&source=Inms&fbs=AEQNm0DPvcmG_nCbmwtBO9j6YBz-M68ZanC7g01Skprhw5JoufVCiMv-hxC44jt6JduRQysBab-bgQXjPraaWFXMvOy8K9RISkH23PP0DUup-Fql8hPCq0ICgroEXVXvy2xviGvWoXPWxDuSAr1c0rWLPDrilIXW0iMLn0xLK7g61juP3F530Paf-WJbXUS-Q3CdylpQgCg0-vWNSeMPOWcU5GTVh4j7jelg&sa=X&ved=2ahUKEwjhwfHlZq-IAxWEQ_EDHQ8pLM8Q0pQ-JegQIDhAB&cshid=1725670231742992&biw=1920&bih=869&dpr=1#vhid=zephyr:0&vssid=atritem-https://repository.up.ac.za/bitstream/handle/2263/30276/05chapter5.pdf?sequence%3D6%26isAllowed%3Dy](https://www.google.com/search?sca_esv=8ffe4b1216883de0&q=PRECEDENT+STUDIES%0D%0AFigure+5.1:+Entrance+area+to+the+Court+foyer+(Author,+2011).%0D%0A5.1+-CONSTITUTIONAL+COURT%0D%0Aby+omm+design+workshop+university+of+pretoria%0D%0AJohannesburg,+South+Africa%0D%0A2001-2004&source=Inms&fbs=AEQNm0DPvcmG_nCbmwtBO9j6YBz-M68ZanC7g01Skprhw5JoufVCiMv-hxC44jt6JduRQysBab-bgQXjPraaWFXMvOy8K9RISkH23PP0DUup-Fql8hPCq0ICgroEXVXvy2xviGvWoXPWxDuSAr1c0rWLPDrilIXW0iMLn0xLK7g61juP3F530Paf-WJbXUS-Q3CdylpQgCg0-vWNSeMPOWcU5GTVh4j7jelg&sa=X&ved=2ahUKEwjhwfHlZq-IAxWEQ_EDHQ8pLM8Q0pQ-JegQIDhAB&cshid=1725670231742992&biw=1920&bih=869&dpr=1#vhid=zephyr:0&vssid=atritem-https://repository.up.ac.za/bitstream/handle/2263/30276/05chapter5.pdf?sequence%3D6%26isAllowed%3Dy) (ac-

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- Figure 155: In Wake of Revolution, Francis Kéré Envisions a Transparent New Architecture for the Burkina Faso Parliament Building | ArchDaily [WWW Document], n.d. URL <https://www.archdaily.com/797283/in-wake-of-revolution-francis-kere-envisions-a-transparent-new-architecture-for-the-burkina-faso-parliament-building> (accessed 9.7.24).
- Figure 156: soupreme court and school of magistrate, n.d. . Studioarch4. URL https://studioarch4.com/portfolio_page/soupreme-court-and-school-of-magistrate/ (accessed 9.7.24).
- Figure 157 : Exploration of the linear typology of a court
- Figure 158 : Exploration of the central typology of a court
- Figure 159: The scarred post-mining environment is interwoven with justice, commemoration, and rehabilitation through the collaboration of a Memorial Center, Mining Activism Center, and Land Court. These zones symbolize the harmony between the community, history, and the land itself, serving as foundations for healing by preserving rights, honoring memory, and facilitating land reparations.
- Figure 160: The scarred post-mining environment is interwoven with justice, commemoration, and rehabilitation through the collaboration of a Memorial Center, Mining Activism Center, and Land Court. These zones symbolize the harmony between the community, history, and the land itself, serving as foundations for healing by preserving rights, honoring memory, and facilitating land reparations.
- Figure 161: The scarred post-mining environment is interwoven with justice, commemoration, and rehabilitation through the collaboration of a Memorial Center, Mining Activism Center, and Land Court. These zones symbolize the harmony between the community, history, and the land itself, serving as foundations for healing by preserving rights, honoring memory, and facilitating land reparations.
- Figure 162 : Ancient use of raw earth as a builing material. Inhabiting the earth: a new history of raw earth

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- Figure 163 : Step by step construction of Rammed earth. GreenSpec: Environmental Advantages of Rammed Earth Construction [WWW Document], n.d. URL <http://www.greenspec.co.uk/building-design/rammed-earth/> (accessed 9.8.24).
 - Figure 164: The use of rammed earth as an inhabitable wall. Le Vau Pavilion / L'Atelier Senzu | ArchDaily [WWW Document], n.d. URL <https://www.archdaily.com/1012029/le-vau-pavilion-latelier-senzu> (accessed 9.5.24).
 - Figure 165: Ancient wall of The Jayrán Wall and how they used rammed earth as well as how they dealt with landscaping. Rapacki, K., 2024. Field day: Parque Jardines Mediterráneos de la Hoya in Almería, Spain by KAUH Arquitectos. The Architectural Review. URL <https://www.architectural-review.com/buildings/field-day-parque-jardines-mediterraneos-de-la-hoya-in-almeria-spain-by-kauh-arquitectos> (accessed 9.5.24).
 - Figure 166: The use of Rammed earth in the Renzo Piano's Children's Hospital and how he used steel structure to design the double roof. Gallery of Children's Surgical Hospital / Renzo Piano Building Workshop + Studio TAMassociati - 41 [WWW Document], n.d. . ArchDaily. URL <https://www.archdaily.com/965709/childrens-surgical-hospital-renzo-piano-building-workshop-plus-studio-tamassociati/60fef77bf91c81b2680000cf-childrens-surgical-hospital-renzo-piano-building-workshop-plus-studio-tamassociati-> (accessed 9.5.24).
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 - Figure 167: Lam, E.J., Zetola, V., Ramírez, Y., Montofré, Í.L., Pereira, F., 2020. Making Paving Stones from Copper Mine Tailings as Aggregates. International Journal of Environmental Research and Public Health 17, 2448. <https://doi.org/10.3390/ijerph17072448>
 - Figure 168 :Zollverein Coal Mine Industrial Complex, Germany | World Heritage Journeys of Europe. (n.d.). Retrieved February 19, 2025, from <https://visitworldheritage.com/en/eu/zollverein-coal-mine-industrial-complex-germany/b0b631c5-ea55-4717-9141-dcf745ee052d>
 - Figure 169: Gallery of Grimshaw's Eden Project North in Lancashire Receives Planning Approval—2. (n.d.). ArchDaily. Retrieved February 19, 2025, from <https://www.archdaily.com/976162/grimshaws-eden-project-north-in-lancashire-receives-planning-approval/61fa55f63e4b31c51c000041-grimshaws-eden-project-north-in-lancashire-receives-planning-approval-image>
 - Figure 170: Site Plan
 - Figure 171: Future Master Plan
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 - Figure 173: Design Development Sketch Exploration

- Figure 174: Design Development Sketch Explorations
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- Figure 176: The original idea was to design a building with an oval, slanted rammed earth wall and raised, off-the-ground spaces, aiming for an organic shape. Initially, the plan was for the Lekgotla wall to serve as a security boundary, but as the concept developed, it transformed into an inhabitable structure. However, the slanted rammed earth wall was ultimately abandoned due to its lack of stability. The intersecting design, incorporating one lightweight structure and another heavier and more grounded, aimed to symbolize the desire to minimize harm to the earth in contrast to the destructive nature of mining. To serve this purpose, the lightweight structure was elevated off the ground. The initial notion was to create a circular court representing power and authority, while the Lekgotla was inspired by traditional, unconventional courts held outdoors under a tree in rural areas, where community disputes are resolved.
- Figure 177: Design Development Sketch Exploration- including all the remaining ruins by shaping the Lekgotla rammed earth wall.
- Figure 178: Design Development Sketch Explorations of how rammed earth could be manipulated to achieve the slanted effect.
- Figure 179: The main focus of the original technical plan was on utilizing rammed earth and exposed steel structures that intersect, aiming to enclose the remaining ruins and incorporate them into the phytoremediation landscape at the Lekgotla. Efforts to create dome-shaped rammed earth buildings were unsuccessful because of problems with their structural stability. Green roofs and double-roof structures were considered, but ultimately didn't align with the original plan of maintaining a toxin-free landscape, except for restoring the shielded Lekgotla area for protection from external pollutants. Some of the ideas that were investigated were improved and implemented further.
- Figure 180: Design Development Sketch Explorations
- Figure 181: Design Development Sketch Explorations
- Figure 182: Design Development Sketch Explorations
- Figure 183: Design Development Sketch Explorations
- Figure 184: Design Development Massing Exploration
- Figure 185: Floor Plans
- Figure 186: Sections
- Figure 187: Perimeter Sections- Rammed earth detail.
- Figure 188: Rammed earth section explorations window and roof details
- Figure 189: Elevations
- Figure 190: Steel structure details
- Figure 191: Perspectives

- Figure 192: Perspectives
- Figure 193: Perspectives
- Figure 194: Site Plan
- Figure 195: Ground Floor Plan
- Figure 196: First Floor Plan
- Figure 197: Research First Floor Plan
- Figure 198: Section and Elevation
- Figure 199: Elevations and Sections
- Figure 100: Detailed Section
- Figure 101: Memorial Center Interior Perspective
- Figure 102: Land Court Interior Perspective
- Figure 103: Land Court Interior Perspective
- Figure 104: Research Centre/ Mining Activism Centre Interior Perspective
- Figure 105: Lekgotla Wall Exterior Perspective
- Figure 106: Lekgotla Exterior Perspective
- Figure 107: Lekgotla Exterior Perspective
- Figure 108: Lekgotla Exterior Perspective
- Figure 109: Khoro Unconventional Court Perspective

31 July 2024

Mamabolo Mokgadi
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TO WHOM IT MAY CONCERN

RESEARCH ETHICS APPROVAL

Sacred Landscapes Under Siege “Resolving disputes over mining claims on sacred landscapes in Musina through the legal lens of a Land Court”.

This letter serves to confirm that the Ethics application for the above titled study has been approved. The researcher has been granted clearance to proceed with the research study or project.

Protocol/clearance number is: **SOAP01/03/2024**

Yours sincerely

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