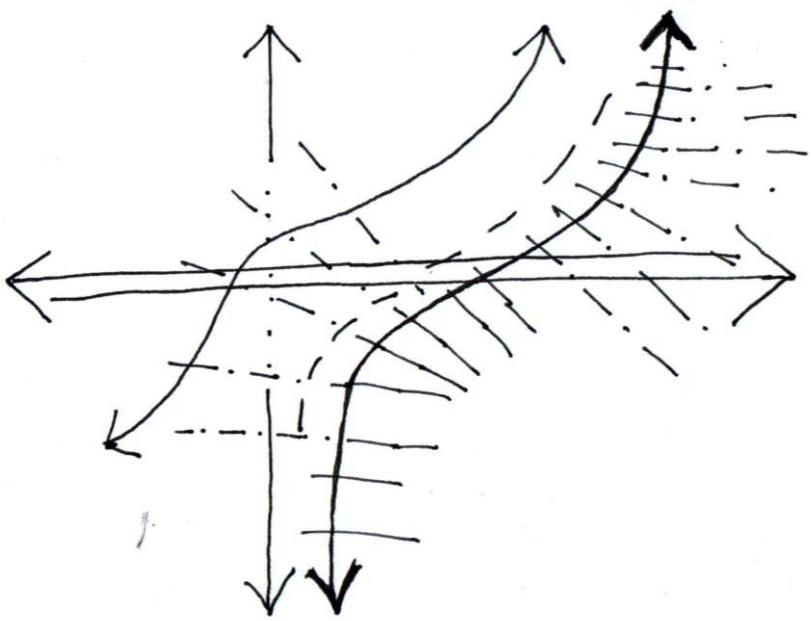
BRIDGING BOKSBURG

INFRASTRUCTURE ASSEMBLAGES FOR COMMUNITY AND ECOLOGICAL INTEGRATION AND REHABILITATION.



Department of Architecture

Discipline coordinator: Jan Hugo

Supervisors: Jan Hugo & Paul Devenish

Co-supervisor: Tariq Toffa

Faculty of Engineering, the Built Environment, and Information Technology

University of Pretoria, Pretoria, **0002, South Africa**

Name: Christopher Thompson
Supervisor: Paul Devenish and Jan Hugo
Co-supervisor: Tariq Toffa
Project location: Boksburg Bus Depot, Boksburg CBD
Building programme: Food Systems and Ecological Education
Client: Environmental Resource & Waste Management Department, Ekurhuleni Municipality.

Keywords:
Post-industrial, post-apartheid, infrastructural entanglement, ecology, right to the city, Boksburg CBD.

BRIDGING BOKSBURG
INFRASTRUCTURE ASSEMBLAGES FOR COMMUNITY AND ECOLOGICAL INTEGRATION AND REHABILITATION.

Boksburg CBD is a small town critically positioned along the Witwatersrand Reef. Since the discovery of gold within the area, from the late 19th century, Boksburg's natural landscape has experienced significant historical urban movements in close succession, each with unique and demanding informants which have prominently manipulated and hastened the delivery of its infrastructure and its subsequent disparate urban developments. From large scale mining operations of the early 1900's to specialised supporting manufacturing industries that supplemented the demands of the second world war, these large areas of functional industrial operation had scarred much of the available natural landscape, and by the mid-late 1900's, these scarred environments became strategic devices that would assert the spatial planning practices of racial control during the apartheid era. These urban development characteristics are anthropocentric and comprised of engineered rationalities, monofunctional typologies, decentralised resources and opportunities, infrastructural barriers, urban efficiencies, and human dominance. This has resulted in separated processes between the urban and natural which currently inhibits inclusive and sustainable development for both human and non-human actors of the area. This contributed to a contemporary urban fabric that is ineffective in the provision of the community's socio-economic and environmental needs. For this design project, 'urban infrastructure and inequality' is the topic of investigation into Boksburg's CBD. This region of study is reflective of past injustices, associated with environmental scarification for resource extraction through mining, rapid urban development, and the human orientated urban infrastructure and its barriers. From this background understanding the design question of "how can the interconnection of separate systems of Boksburg's post-industrial economy, education infrastructure, and nature, provide a sustainable and resilient node to rehabilitate and revitalise the marginalised community and enable a right to the city?" is derived.

The aim of this design intervention is to centralise and network with the natural, economic, educational, and transport functions of Boksburg's CBD, to provide a richer, more inclusive, sensitive, regenerative, and connected context between human and non-human actors. This is done by interpreting and recoding mono-functional, separate, and rational urban infrastructures into rhizomatic entanglements (a connected and interrelated focus of infrastructure agency bound through the design's operation that is plugged into the identified urban and natural system). An architectural intervention at the Boksburg bus depot aims to transform and repurpose the deteriorating site into a centralised hub of socio-environmental and educational exchange that sustainably activates the contemporary post-industrial and post-apartheid context and redirect the future development focusses of Boksburg. This environmental educational upliftment programme is a community based mediatory space between college students, researchers, school students and Boksburg residents which provides, for the identified user, the necessary ecological skills and knowledge to encourage efforts towards sustainable ecological and infrastructure transformations to activate Boksburg's scarred natural landscapes caused by Boksburg's mining and industrial operations. This dissemination of knowledge is achieved through courtyard typologies that are platforms for social exchange and investigation, which integrate visually accessible labs which utilise the surrounding ecological research processes and infrastructure. Through this urban intervention the users become an active participant with access to opportunities that contribute to and shape Boksburg fabric and its processes. This provides the user with the right to the city.

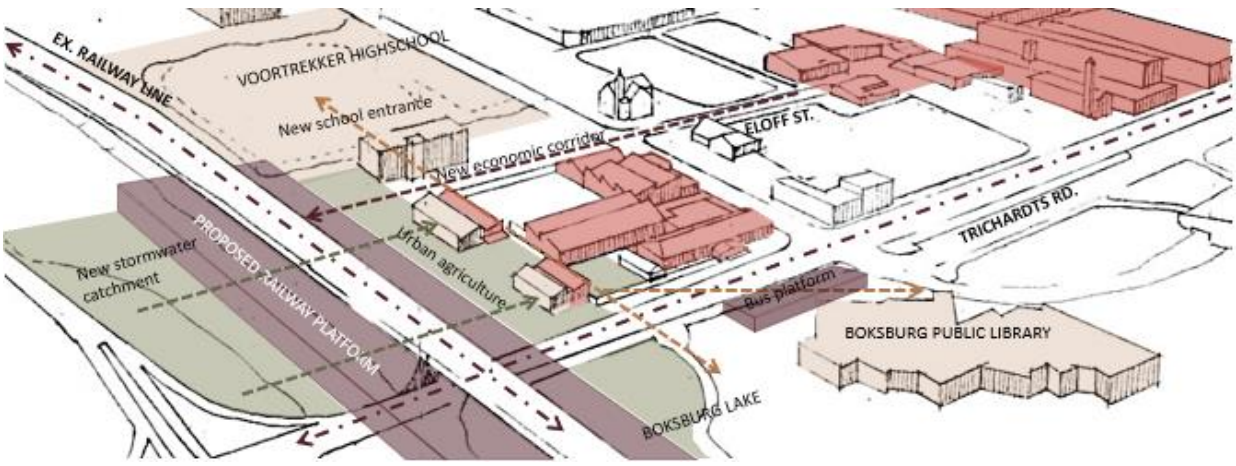


Figure 1: A parti diagram showing the integration between education, transport, economic and ecological infrastructures through Boksburg's bus depot.

1. DIT 801 RESEARCH AND DPD 801 DESIGN INEGRATION:

a. A summary of the research

The research lens investigated the inherited infrastructures from apartheid South Africa and its effect on the current user. This observation-based research analysis investigated the passenger-rail's infrastructural artefacts, processes and integrated systems that were designed with an intention of societal control that aligned with apartheid values. The embedded characteristics of many these infrastructures were that of order, segregation, monofunctionality, rationality, efficiency and anthropocentricism. Many of these railway stations and infrastructures have been incorporated into the contemporary public transport network and are undergoing processes of modernization. This research project explored what aspects of these inherited engineered infrastructures still display these apartheid principles, and how it may influence the curation of the passenger-rail stations, its operations and the urban systems they connect to, and how users of these connected infrastructures may be limited or othered. The research investigated Rissik Station (Hatfield, Pretoria) through a perspective of design thinking using Post-Humanism as a critical lens to reveal relevant station constituents for targeted modernization that would improve the contemporary user experience.

The posthuman lens framed an investigation of the station by observing the human actors and the non-human actors (the infrastructure) in equal agency (the enactment that materialises an effect) by investigating the mutual relationship between (intra-relationship) the identified actors. This analysis helped identify what should change about the current monofunctional, rational, and engineered landscape and starts to recognise methods or strategies for an inclusive, interconnected and responsive environment, considerate of both the non-human and human perspectives and their entanglements (a more-than-human context).

b. **The design narrative**

This theoretical posthumanist critique was then applied to the context of Boksburg. A place that saw anthropocentric and rapid urban development directly influenced by the colonial era and its resource extraction from the mining operations, the subsequent supporting industrial precincts, and the apartheid era which implemented city planning that followed ordered, monofunctional, rationalised and engineered systems that segregated the population and enabled control that restricted non-white racial groups from entering the CBD. Lessons from posthumanism framed the Boksburg context as anthropocentric (the human dominance over the natural landscape and its resources). In this context the dominance of the human over the non-human context (the natural environment) through the monofunctional and rationalised application of infrastructure, which supported the anthropocentric agenda, critically othered and exploited the non-human and its processes.

This broadly framed the design problem and opened an initial inquiry of a more-than-human architecture that is inclusive of both the human and non-human perspectives which could facilitate, through the manipulation of existing infrastructure and natural processes, the human and non-human entanglement where both the human and non-human actors have equal agency.

In this case, the theory 'the right to the city' is used as a practical social justice lens that critically encompasses the equality and agency between the human and non-human. The right to the city explores provision of opportunity, collaboration, reconciliation and gathering to engender a collective context of mutual exchange and interaction for both the non-human and human actor. This architecture aims to bridge Boksburg.

2. A DESIGN INQUIRY AND THE APPLICATION OF THEORY

a. A background to design inquiry

The brief of the chosen research theme of Urban Infrastructure and Inequality proposed a method to critically understand the role and influence of urban infrastructures on users within the society. Applying an assemblage theory to the study of urban infrastructure positions the infrastructure within an urban fabric, with relational value - interconnecting with different systems and informing urban processes. The location and the way in which these urban infrastructural systems network and operate significantly impact the social inclusion of an area and therefore opportunities for equality.

For this urban infrastructure and inequality theme the critical lens of post-humanism was considered. This lens studies the non-human (the living and non-living agents) and their influence over the human. This lens prioritises the in-between or the relation between the human and non-human, which decentralises the normative anthropocentric perspective of design. By applying the post-humanism lens to urban infrastructure and inequality we can understand the relational nature of infrastructure on urban processes and systems to reveal the inherent and perpetuating inequalities on society.

The design inquiry was an opportunity to research and glean the fundamental ideas and concepts that drive the posthuman perspective. The intention was to achieve a posthuman mindset, to provide a provocation that would gear and set a design and research perspective to ultimately delimit and drive the design and research responses for the year ahead.

b. What is it about?

The design inquiry was a concept representation exercise to explore and deepen the interpretation of a posthuman intention for architectural application. The aim of the design inquiry was to provide a visual and interactive display that summarises and translates key posthuman concepts into performative and reflective engagements. An abstract exchange or tangible experience of what a posthuman project might involve.

The design inquiry intended to create a user awareness for the non-human, to understand their interconnectivity and to define the exchange between the human and non-human. From this the design inquiry manifests the first critical theory with lessons of what to look for and be considerate towards when engaging with the design project. The design inquiry represented the start and informed the direction for the design project. A focus on urban infrastructures informed by their relation to the inhabitants of the area, how these inhabitants are being influenced and the potential of infrastructure to provide opportunity, inclusion, and equality to an area.

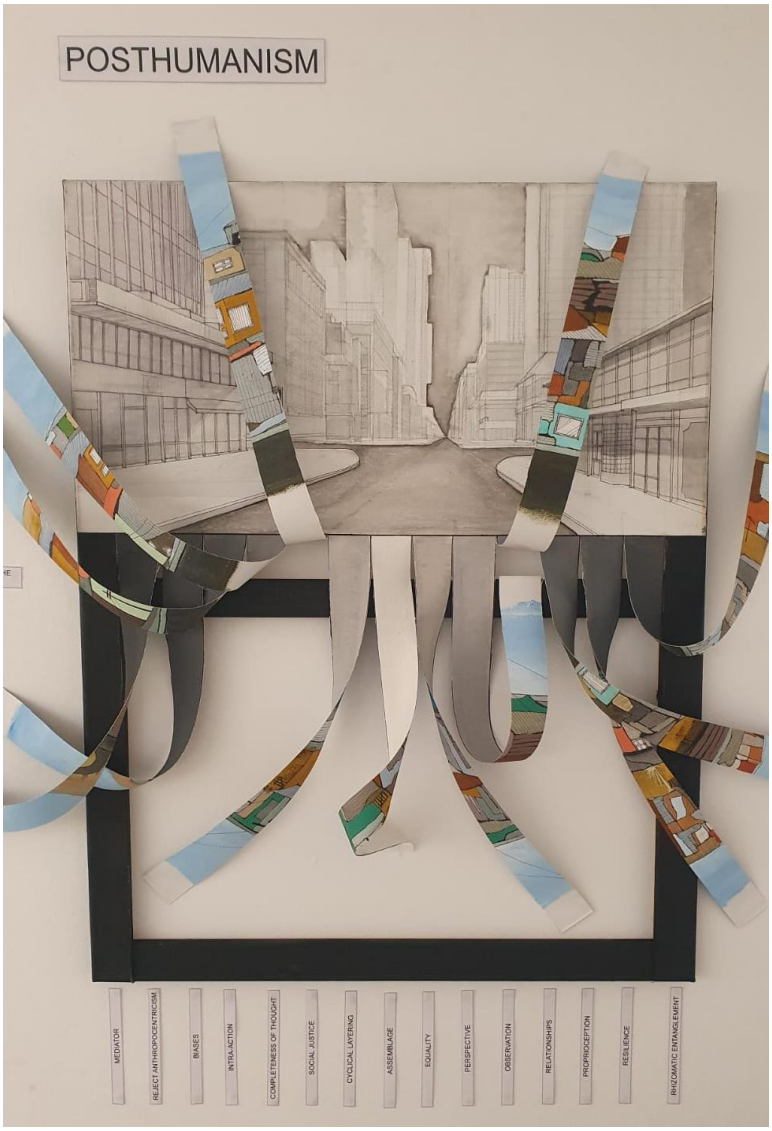


Figure 2: Image of the posthuman provocation.

c. "A Posthuman Provocation":

This object of intra-action is, for the viewer, a brief experience of my emerging understanding and accumulated knowledge of the rich and complex theory of posthumanism. Through this object, I am both reminded of posthuman core values and its foregrounding concepts, as well as demonstrating and imparting the obtained knowledge through a posthuman demonstration. This exhibit frames neither the object, nor the viewer (the subject) as important, however, it is the act of engagement – the established relational context (the more-than-human) that is prioritised between the non-human and human actors.

The object of provocation redefines the conscious spatial context of the viewer, as the viewer and canvas experience undivided intra-action. Fifteen keywords for investigation are displayed below loose strips of varying value (representational of our inherited monofunctional, static and fragmented/segregated cityscape and infrastructure), as well as an illustration of a city (to evoke individual association, memory, or bias within the user). The canvas, the viewer and the intra-action manifests the posthuman context.

With inquiry, the viewer raises individual strips to reveals glimpses into a new context, depictive of underrepresented, and marginalised voices. The viewer should acknowledge a broader city setting of perpetuating inequality that is not separate to the infrastructure of the city (the double-sided strips). The viewer must now critically engage with the canvas, serve as mediator, and weave a new composition to reveal an assemblage of holistic balance between the two contexts (as a designer should connect a context of inequality into a context of quality).

An abstracted picture complete with multiple systems, voices, and contexts are interwoven and connected and the strips, representative of infrastructure now network and knit an urban fabric of inclusivity and interconnectedness. The viewer must however critically reflect and acknowledge the new context they have created, and they must understand that everyone may have intervened with this canvas in their own way. This should make the viewer aware of their own bias in their decision making. As designers, we must be deliberate, sensitive, and critically aware of inequalities, as well as your own biases, to design for social justice.

d. The reflection:

“Architecture has the powerful responsibility of shaping society and narrating the events of its antecedents. It is therefore a crucial task to bring an authenticity to the new developing architecture that celebrates the differences, recognises the past injustices, utilises a framework that binds and unites histories, and solidifies the commonalities (a break away from elitist purity of the international style). It is the duty to form relationships that are devoid of labelling – othering- where all are represented as equal counterparts within a culturally diverse” and dynamic “system for a country to sustainably live-in unification” (Thompson, 2020). The focus needs of societies across the globe have an inherited cardinal responsibility to establish an inclusive (local) identity in this contemporary era of history.

My critical post-humanist investigation was an opportunity to holistically engage with the forementioned, to action an eco-systemic architecture that is a synchronous culmination of precedents, experience, and comprehension of accepted theory. It recognises the distinction (differences) and constitutes a sensitive harmony of individual conscious realities and the non-human actuality - a collective perspective of intra-action to fuel identity, wellbeing, community, emotional engagement, and association (meaning) and consequently sustainability. It is through this discourse – designers become aware, “attentive”, and “responsive” to personhood, culture, landscape, space, materials, natural phenomenon, and their interconnectedness (Barad, 2007:91). There is an inherent awareness of all things, no hierarchy of relationships and classification this will lead to understanding and a solution driven design.

This has informed my design by connecting the surrounding monofunctional facilities of Boksburg, that are underutilised and underappreciated into an interconnected system of value, importance, pride, and centrality of community and economy. This site aims to utilise and activate the context of Boksburg into a gathering space of recreation, fulfilment, skills training, and community involvement.

This begins to inform my design theme of right to the city and more critically skills development. This process as a designer is critically reflective of the community and user needs in synthesis, however it becomes the user’s full engagement with the space and architecture (following their interests to hone their skills and trade to either enter a different economy or improve their own business) either way strengthening the Boksburg value and quality of service to uplift the area.

3. THE WAY FORWARD:

The inherent concepts of posthumanism, revealed through the design inquiry exploration, established abstract ideologies of assemblage, interconnectivity, mediation, and equality between the human actors and non-human (urban infrastructure and nature) actors. Furthermore, the physical engagement and interaction with the design inquiry product revealed actions of stitching, overlapping, interweaving, negotiation, and exchange with a desired intention of urban furtherance and benefit. These notions prompted the design project narrative and iterative academic exploration of urban infrastructure and its processes, to investigate and reveal the implicit and explicit urban potentials, from which its appropriate assemblage provides urban social improvement and sustainability.

a. Determining the area of study:

The post-human provocation demonstrated an intra-relationship of the human and non-human actors in equal hierarchy through which the intra-actions became more-than-human rather than anthropocentric. From this critical perspective, this design project acknowledges non-human othering, human dominance and bias, and aims to address these concerns and establish an inclusive, integrated and responsive architecture that remediates the human and non-human condition into a sensitive and sustainable context.

Therefore, the following criteria was used to determine the macro context within which this architecture will situate and mediate the human and non-human:

1. The selected region must have a site that would easily be accessible in matters of familiarity, transport cost and proximity to my area of work to ensure that site visits could occur frequently and thoroughly.
2. The selected region must be urban and contextualised within existing larger urban developments and operations so that adequate and appropriate infrastructures could be utilised to establish valuable urban assemblages within larger interconnected systems.
3. The selected region must demonstrate relevant characteristics of existing urban trends and circumstances so that this project could serve as a case study for similar local contexts of concern.
4. The selected region should show existing qualities of anthropocentric development and non-human othering.
5. The selected region needs must be an area suited for rehabilitation and upliftment.

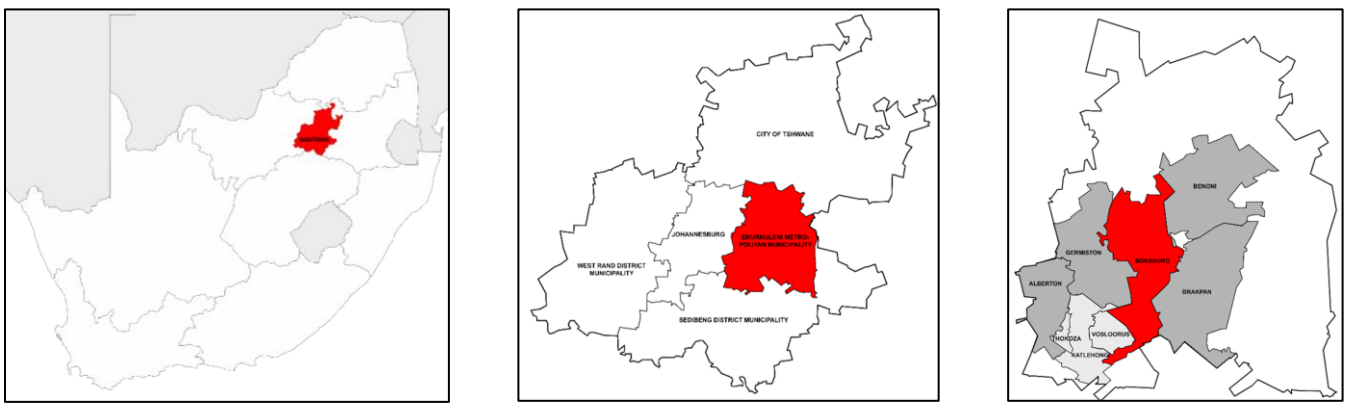


Figure 3: A diagram locating the city of Boksburg within South Africa.

4. THE MACRO ANALYSIS:

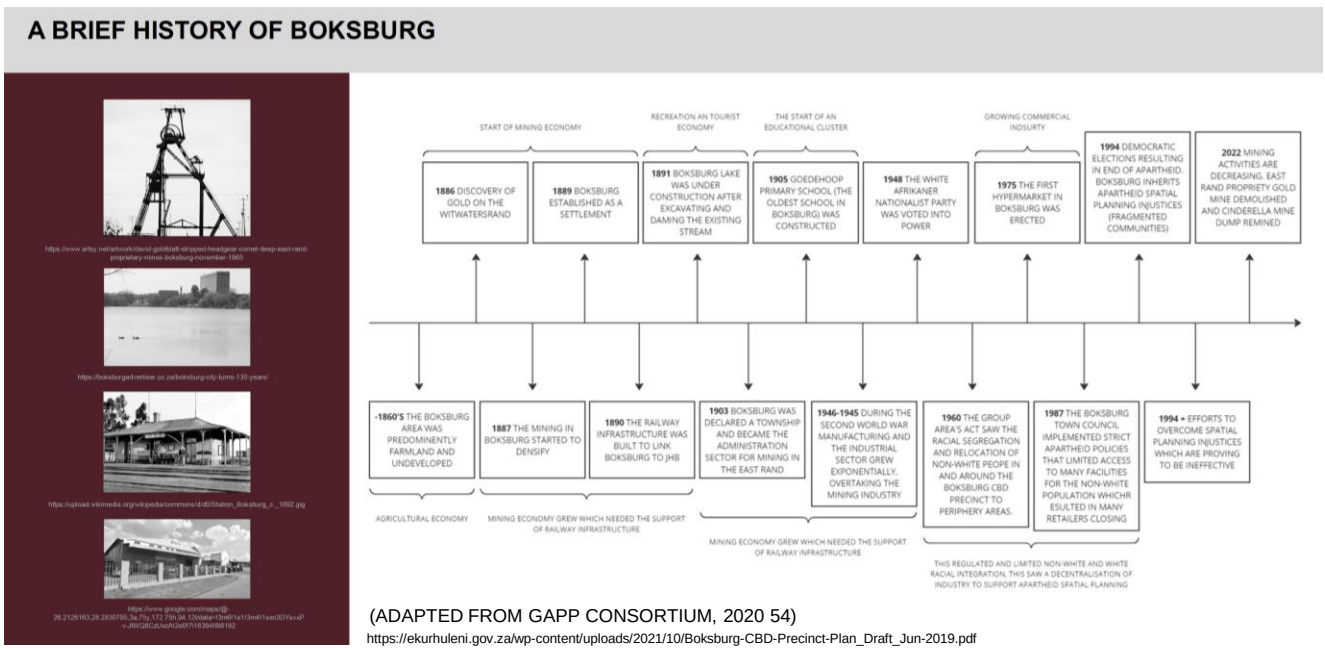
By applying this criteria, the macro analysis will be conducted in the Gauteng region with specific focus along the Witwatersrand Reef, a natural (non-human) context that is still exploited for human benefit through urban processes and development. The city of Boksburg, a mining town, was selected for its urban complexity, its relation and negative impact (through its associated disruptive urban operations) to the natural condition of the Witwatersrand Reef, as well as its infrastructural connectivity to greater established urban systems. Boksburg was also critically selected, for this design project, for its potential to serve as a case study for similar South African contexts with a post-industrial future.

a. History of Boksburg:

Succeeding the discovery of coal and gold in the area in 1887, Boksburg township (situated on the Witwatersrand), was established 8km east of Johannesburg. Boksburg served as the administrative centre of the former East Rand (now the Ekurhuleni Metropolitan Municipality), and assumed gold production, which was considered amidst the most crucial gold producing towns on the Witwatersrand (Britannica, 2017: online). This gold resource discovery-initiated South Africa's transformation into an industrially advanced and economically heterogeneous society (Ally, 1993: 2), as a result Boksburg is presently a diversified industrial and mining sector with a material, electronic, and high technology machinery manufacturing, and measuring industry (Britannica, 2017: online and Rogerson & Rogerson, 1999: 92).

Boksburg, since its formalisation into a township in 1903, has focused its densification in and around the mining sectors with residential suburbs surrounding and supporting economic establishments and its functioning. The events of the Second World War were critical occurrences that transitioned the predominant economy focus from mining and propelled Boksburg's undeveloped manufacturing sector, which resulted in a secondary industry of expeditious development (Nieftagodien, 2006: 94). However, in 1948 the new South African government and apartheid-architects, the National Party, implemented an urban racial restructuring through social engineering strategies - this restructuring was predominant in the East Rand (Nieftagodien, 2001: ii). The official gazette of spatial planning policies and legislation (such as the Group Areas Act of 1950) required East Rand local authorities to assign land beyond city peripheries to relocate non-white inhabitants residing in the newly established apartheid-towns (Nieftagodien, 2001: ii). In 1967, as part of the holistic apartheid scheme, the conservative National Party passed the Physical Planning Act 88 with the intention of accelerating industrial decentralisation. Its impact controlled the African population, and coerced industries to disperse points located in or near Bantustans to regulate and limit the flow of African work labour into city regions (Karam, 2006: 144). Relatedly, buffer zones were a regional prerequisite to establish residential areas for race groups (Nieftagodien, 2001: 111).

Buffer zones within Boksburg, established by the Boksburg council, were used as a strategy to maintain group area separation (Nieftagodien, 2001: 83). Industrial areas and the main railway line separated African locations (south of the railway line) and white residential areas (north of the railway line) (Nieftagodien, 2001: 83). This strategy was implemented to preclude an African labourer commute through designated white areas (Nieftagodien, 2001: 83). Designated areas for African relocation were Vosloorus, Katlehong and Thokoza, which forms Kathorus. These areas are low-income modern African townships, that service the Alberton (west), Germiston (north), and Boksburg (east) CBD's (Mbinza & Lewis, n.d.: 4). Reiger Park, situated west of Boksburg CBD, and south of the buffer zone (to uphold government apartheid policies), was allocated to segregate coloured citizens. Reiger Park's location was suitable, as it was still within proximity to industrial areas, which increased the blue-collar labour pool for white employers (Nieftagodien, 2001: 91). Similarly, the suburb of Actonville (established to the South of the railway line and on the east periphery of Boksburg) was assigned to Indian citizens, also separated from the white residential areas towards the north. This modernist apartheid ideal saw fragmented spatial patterns and mono-functional settlements which has entrenched inequality through racial othering and exploitation which engendered poverty for many non-white residents (Mbinza & Lewis, n.d.: 1).



(ADAPTED FROM GAPP CONSORTIUM, 2020 54)

https://ekurhuleni.gov.za/wp-content/uploads/2021/10/Boksburg-CBD-Precinct-Plan_Draft_Jun-2019.pdf

Figure 4: A timeline of events that have contributed to Boksburg's urban development.

a. History of Boksburg continued:

Many East Rand non-white residents who were forcibly removed to group areas, still had employment in the Boksburg's Industrial East region (Nieftagodien, 2001: 124). Previously most non-white citizens were within walking distance to get to their place of employment in the industrial neighbourhoods and the town centres (Nieftagodien, 2001: 124). The new township locations were substantially further than their previous regular commute, which brought about significant increase in transport fees that non-white commuters had to pay, with little subsidy provided by the local authority at the time (Nieftagodien, 2001: 124).

The Boksburg region underwent focused and rapid urban development from 1887 onward because of the growth and industrialization of gold extraction along the Witwatersrand reef (GAPP Consortium, 2020: 54). Throughout this era, Boksburg's urban fabric densified and comprised of neo-classical architecture that facilitated much of the business to support the operations of a developing mining town. Boksburg quickly developed integrated transport systems that included trams, and later busses. The railway line was also developed to carry the unrefined ore, extracted from the mines to Johannesburg. In 1939, the event of the second world war, material and manufacturing demands intensified, from which the manufacturing industry's economic contribution, and priority surpassed the contributions of the mining industry. This shift in economic focus resulted in rapid industrial development and expansion toward the periphery of Boksburg CBD (Boksburg East Industrial). By 1948, the apartheid government was voted into power which implemented spatial practices and policies that racially othered Boksburg inhabitants, as a result non-white residents were segregated to the periphery areas of Reiger Park, Actonville, and Vosloorus. Boksburg CBD became a white only area. The resulting spatial planning practices and developments to support the white resident's needs and to enforce a segregated city, Boksburg decentralised its economy, with its built environment comprising of monofunctional buildings and spaces.

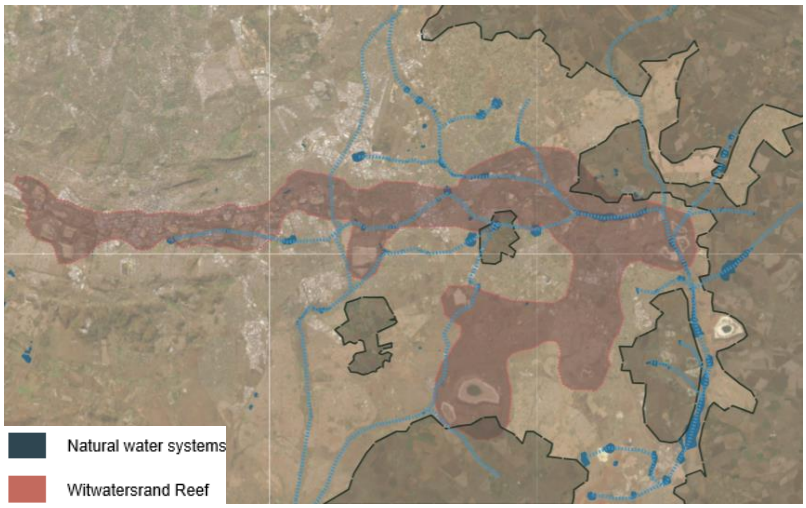


Figure 5: A regional map of the Witwatersrand Reef and the natural water systems.

b. Natural systems:
Before recent history and the discovery of gold in the area, the approximate region of Boksburg was used for agricultural during the late iron age era.

Following the events of the Great Trek, people settled within the Boksburg region in 1860 which resulted in defined and formalised areas of farmland.

This occupied region was along the Witwatersrand Reef and between a network of natural water systems.

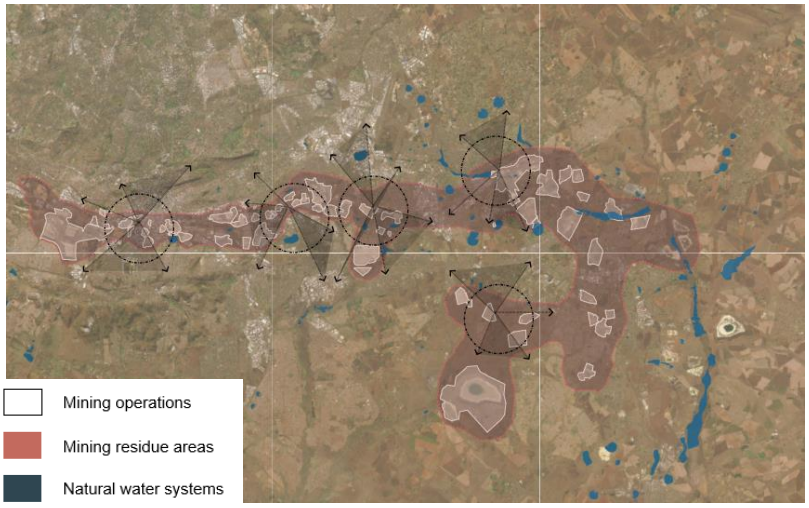


Figure 6: A regional map of the mining development across the Witwatersrand Reef.

c. Mining development:
The discovery of gold in the Boksburg area resulted in rapid industrial and infrastructural development to support mining operations along the Witwatersrand Reef.

This resulted in a large-scale ecosystemic disruptions and natural environment scarification.

From these mining developments, resulted in a rapidly growing population which required significant the urbanization of the area to support the living requirements of workforce. This contributed to the establishment of Boksburg as a mining town.

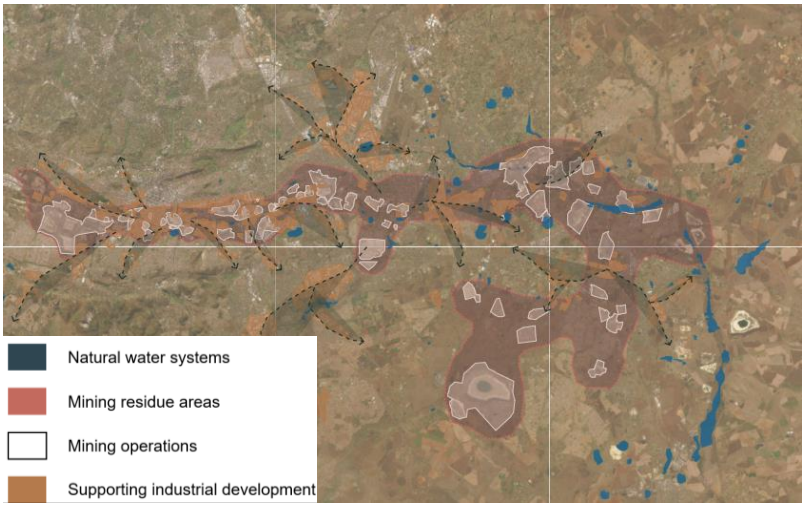


Figure 7: A regional map of the supporting industrial development around the Witwatersrand Reef.

d. Supporting industry:
At the time of the second world war, the manufacturing industry grew substantially and rapidly to support the demands of the war. This specialised industry developed outwards from the mining centers along the Witwatersrand Reef. At this time, the economic contribution of the manufacturing industry overtook the mining industry. This development continued the disruption and scarification of the natural landscape. These large industrial and mining areas would later be utilised to support racial segregation under the apartheid regime.

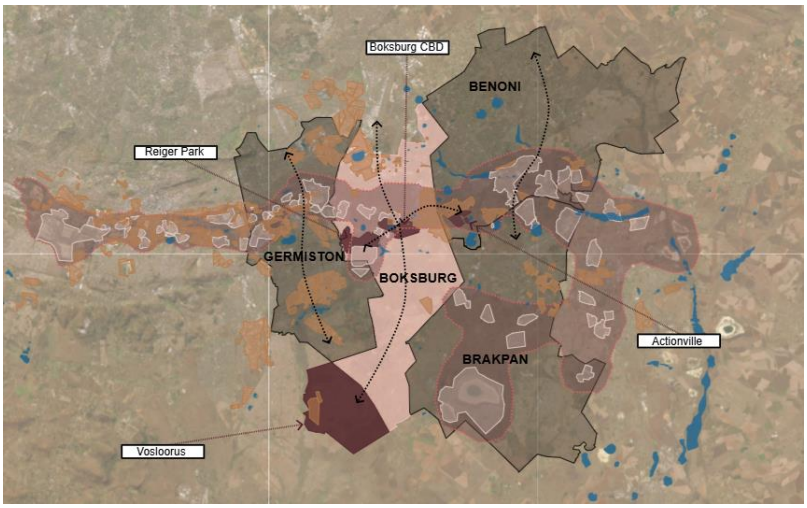


Figure 8: A regional map showing areas of segregation, within Boksburg, during apartheid.

e. Apartheid areas of segregation:
After the development of the industrial economy of the colonial era, the scarred landscapes were further exploited to support the apartheid agenda to rapidly develop and racially segregate community members of Boksburg CBD. Reiger Park (coloured people), Vosloourus (black people), and Actonville (Asian people), all separated by industrial and mining operations.

- Mining operations
- Areas of segregation
- Boksburg vertical development
- Supporting industrial development
- Natural water systems

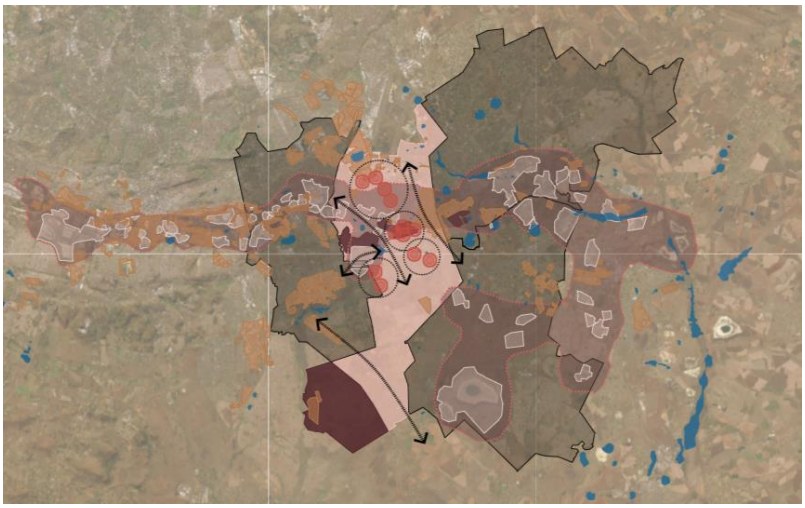


Figure 9: A regional map showing the segregated areas and their restricted access to education .

f. Access to education during apartheid:
During apartheid non-white people received limited education that taught students how to serve the government's needs, like how to work in factories (Schreiner et al., 1986: online). This limited access to education meant that these people could not access specialised industries and a wider range of economic opportunities.

- Boksburg vertical development
- Areas of segregation
- Supporting industrial development
- Mining residue areas
- Neighbouring cities
- Decentralised economic hubs

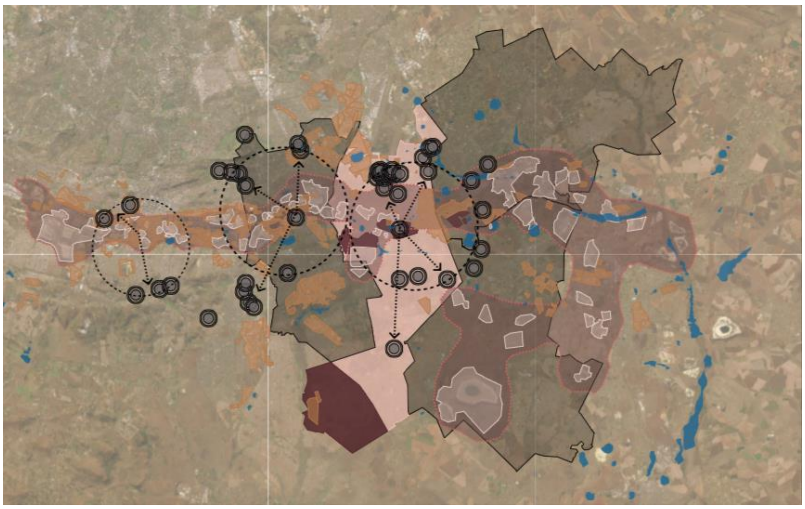


Figure 10: A regional map showing the decentralization of economic hubs around Boksburg CBD.

f. Decentralisation of economic opportunity:
To further establish racial segregation economic development was decentralised and restricting economic access and opportunities for non-white people in the area.

- Mining operations
- Natural water systems
- Boksburg vertical development
- Areas of segregation
- Supporting industrial development
- Mining residue areas
- Neighbouring cities
- Decentralised economic hubs

5. THE WAY FORWARD:

THEORETICAL FRAMEWORK: RIGHT TO THE CITY

A critical theory to "urban life, to renewed centrality, to places of encounter and exchange, to life rhythms and time uses, enabling the full and complete usage of these moments and places" (Lefebvre in Seixas, 2021: 2)

Castro Seixas, E., 2021. Urban (digital) play and right to the city: A critical perspective. Frontiers in psychology, 12, p.636111.

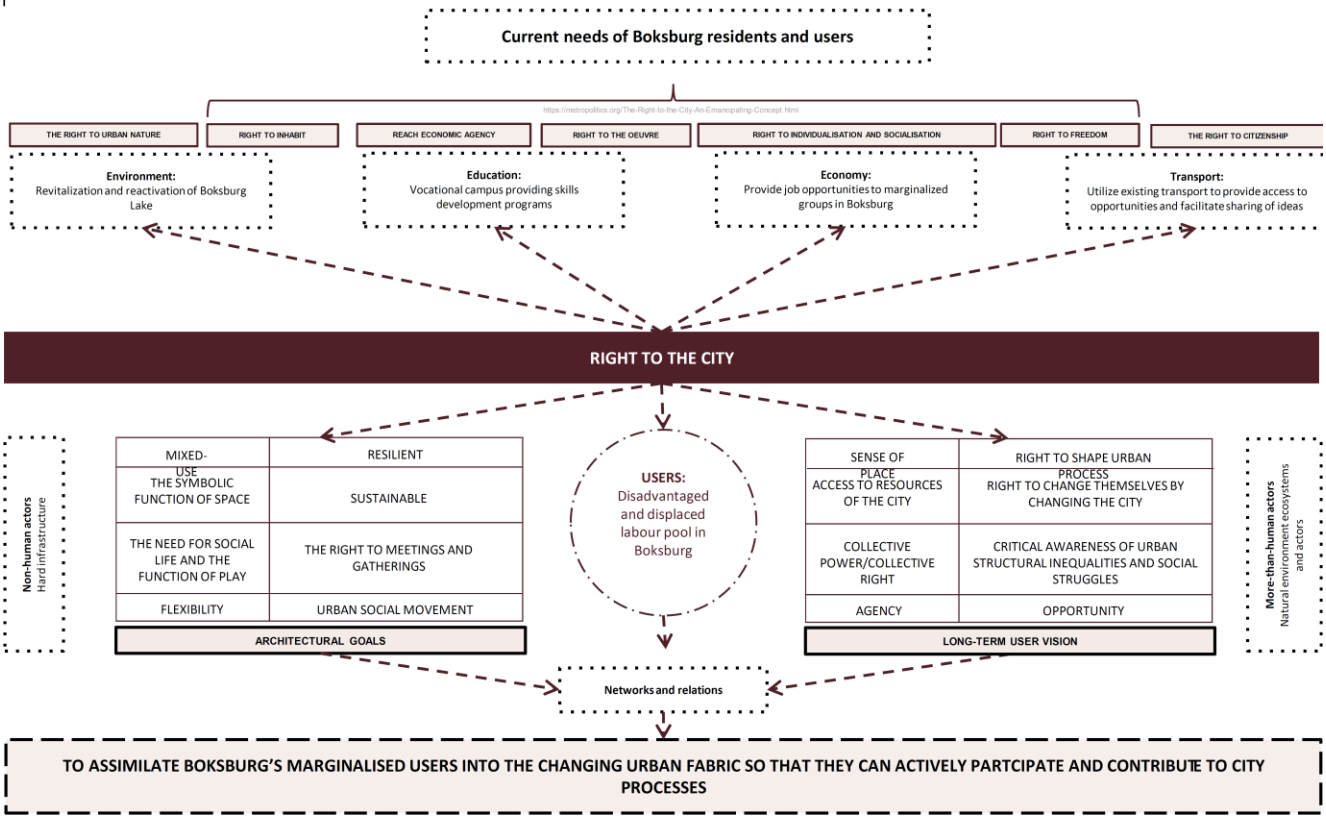


Figure 11: A diagram structuring the approach to achieve a right to the city.

a. The right to the city:

A normative approach needed to be applied to determine how to achieve a social equality for a post-apartheid, post-mining and post-industrial context. The theory, the right to the city, provides direction into how spaces should facilitate othered users and help them access the opportunities that the city provides.

The right to the city is a critical theory to "urban life, to renewed centrality, to places of encounter and exchange, to life rhythms and time uses, enabling the full and complete usage of these moments and places" (Lefebvre in Seixas, 2021: 2). The right to the city collectively considers the accessibility of its users to the built environment and critically informs the architecture, as a social space, to accommodate collaboration, and reconciliation, to promote individual, collective, and social existence through the exchange of products, ideas, feelings, and knowledge for both human and non-human actors.

The apartheid city imposed social engineering that racialised and fragmented its urban inhabitants. To achieve a unified and orderly city is not necessarily attainable or desirable. The current context, with its persistent legacy of fragmentation, can provide richer opportunities for its users (human and non-human) through design intervention, particularly for emergent networks that struggle to survive (Simone, 2005: 321). Furthermore, a right to the city should be viewed as a collective right to change the city and shape the process of urbanization (Seixas, 2021: 1). The right to the city should not be narrowed to maintenance provision within the urban setting, but to additionally cater for the selected right to engage with the city to satisfy variable aspirations (Simone, 2005: 321).

For this design project, this theoretical framework is used to provide a space that would be considerate of multiple perspectives of the non-human (natural) and human (the user), into an integrated architecture that simultaneously accommodates the education process for environmental remediation and the rehabilitative process to improve the natural context's health, quality and ultimately its accessibility.

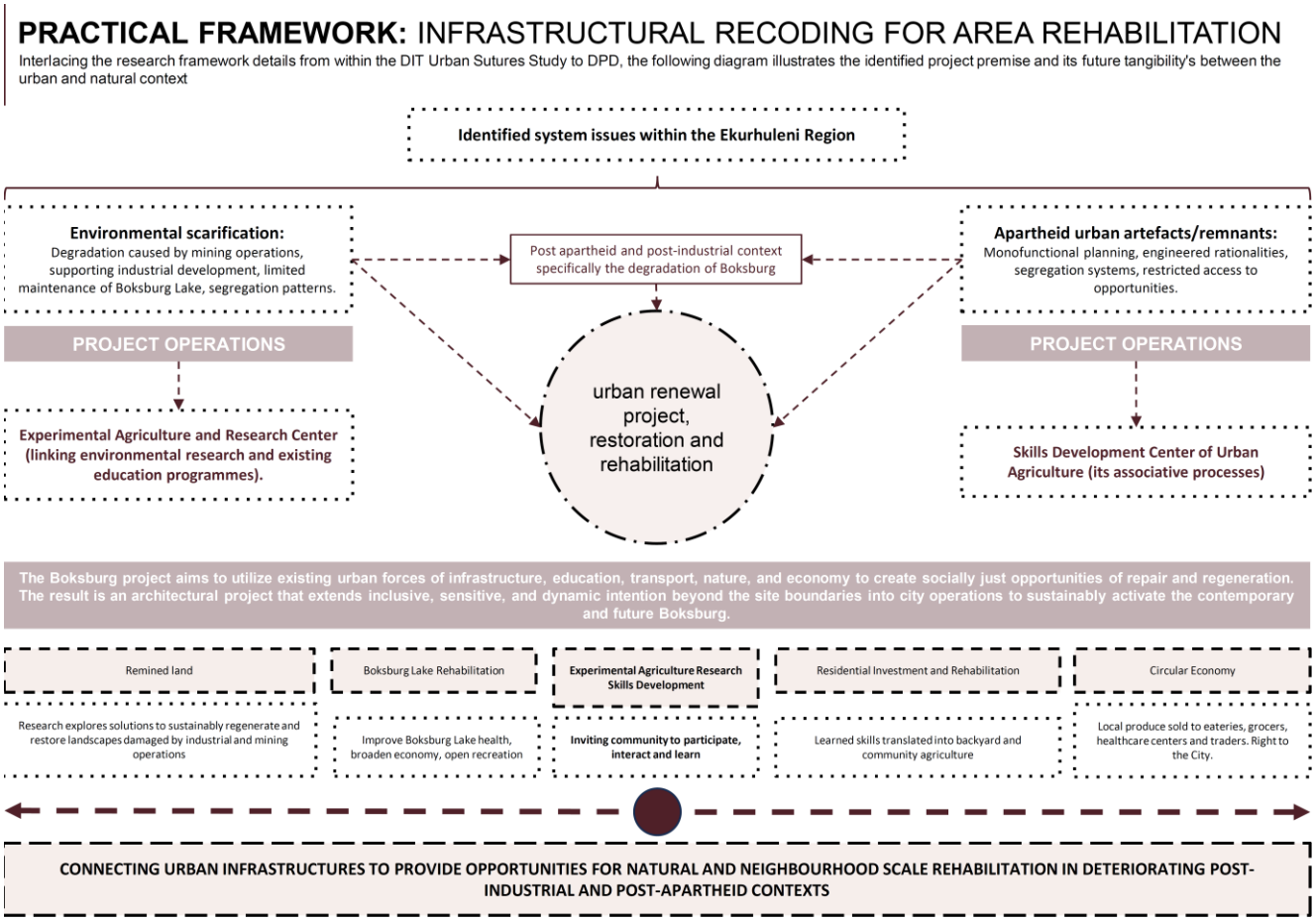


Figure 12: A diagram illustrating the practical framework and intention for the design project in Boksburg.

b. The project outline:

Lasting historical impressions of rapid urbanisation around specialised mining and manufacturing industries as well as the subsequent decentralised, monofunctional, segregated and unequal spatial policies and practices of the apartheid regime are significantly embedded in the development patterns of many established South African urban contexts which subsequently exploited and scarred the natural landscape. These urban development characteristics, premised on both human dominance and racial othering, resulted in unequal resource distribution that currently inhibits inclusive and sustainable development. In this post-apartheid South Africa, many previously white-only areas experienced de-gentrification as the previously disadvantaged non-white residents migrated closer to economic centres. However, many of these disadvantaged residents did not receive or complete a recognised education limiting their employment access into the surrounding specialised industries. Consequently, this forced them to establish informal enterprises or enter employment as unskilled labour. For this design project, ‘urban infrastructure and inequality’ is the topic of investigation into Boksburg’s CBD. This region of study is reflective of past socio and environmental injustices, associated with racial segregation, and the unequal distribution of urban infrastructure. Moreover, its past spatial planning has brought about a decentralised economy and comprises of many monofunctional facilities resulting in an urban fabric that is ineffective in the provision of the community’s socio-environmental needs. A current gap in the Boksburg CBD urban fabric is the limited opportunity for community gathering, recreational spaces in nature, and environmental programmes. In addition, educational programmes that target the mature demographic of Boksburg to acquiring the necessary skills and knowledge for environmental rehabilitation. The project aims to address the following question “how can the interconnection of separate systems of Boksburg's post-industrial economy, education infrastructure, and nature, provide a sustainable and resilient node to rehabilitate and revitalise the marginalised non-human and human community and enable a right to the city?” is derived.

The aims of this design intervention are to centralise and network with the ecological, recreational, economic and transport functions of Boksburg's CBD, to provide a richer, more meaningful, sensitive, exciting, and connected context. An architectural intervention at the Boksburg bus depot aims to relocate the bus depot and to transform and repurpose the deteriorating site into a centralised hub of ecological remediation, socio-economic and educational exchange. The project intertwines, utilises and adapts the existing infrastructures of the bus depot with the urban and existing natural processes of the surrounding landscape to provide a bridge between the scarred natural environment and the post-industrial Boksburg. This design project is a mediator between the non-human (nature) and human actors for mutual benefit and to reorientate the exploitive anthropocentric narrative of Boksburg into an inclusive and equal context. This community based, intra-active, environmental remediation and research precinct aims to promote an improved quality of environmental health and life for the non-human and human inhabitants of the Boksburg CBD precinct and to a larger extent contexts along the Witwatersrand Reef.

The architecture aims to accommodate research investigations into environmental remediation strategies by gathering samples from damaged natural landscapes, testing them, collating them into a database, mapping the data to build a model of damaged conditions and their properties, and how to best remediate them, as well as provide an opportunity to test strategies to advance research into environmental remediation. This precinct provides training for research students, community knowledge transfer and upskilling, as well as interschool, extracurricular environmental programmes. Education is hosted for the community through practical experiments, workshops, and the maintenance and care of experimental agriculture farms. In addition, the architecture aims to expose the research processes of soil, water and plant remediation. Through this urban intervention the users become an active participant with access to opportunities that contribute to and shape the Boksburg fabric and its processes (which provides the user with the right to the city). The scope of design resolution, derived from the urban interconnectivity between the relevant topics of nature, recreation, economy, and education, is focused on soil remediation, stormwater cleaning and plant diversity remediation.

c. Site Selection:

Selecting a site within Boksburg CBD became a necessary exercise to find the ideal location to insert a design intervention that exhibits the abstract principles and values of the design inquiry . Ideologies of assemblage, interconnectivity, mediation, and equality, are now directed and utilised as design drivers to stitch, connect, negotiate, and provide exchange between the identified urban systems of education, economy, nature, and industry (mining and industrial manufacturing). The aim is to address the social inequalities currently present in Boksburg CBD. These systems were mapped and became the contextual informants in choosing the site. Three areas within the Boksburg CBD precinct were identified for their position amongst economic activity, education facilities, and their proximity to natural systems. The sites were also chosen for their accessibility to existing transport networks. To determine which of the sites could meaningfully uplift the neighbourhood was explored through a mapping exercise of the contextual informants.

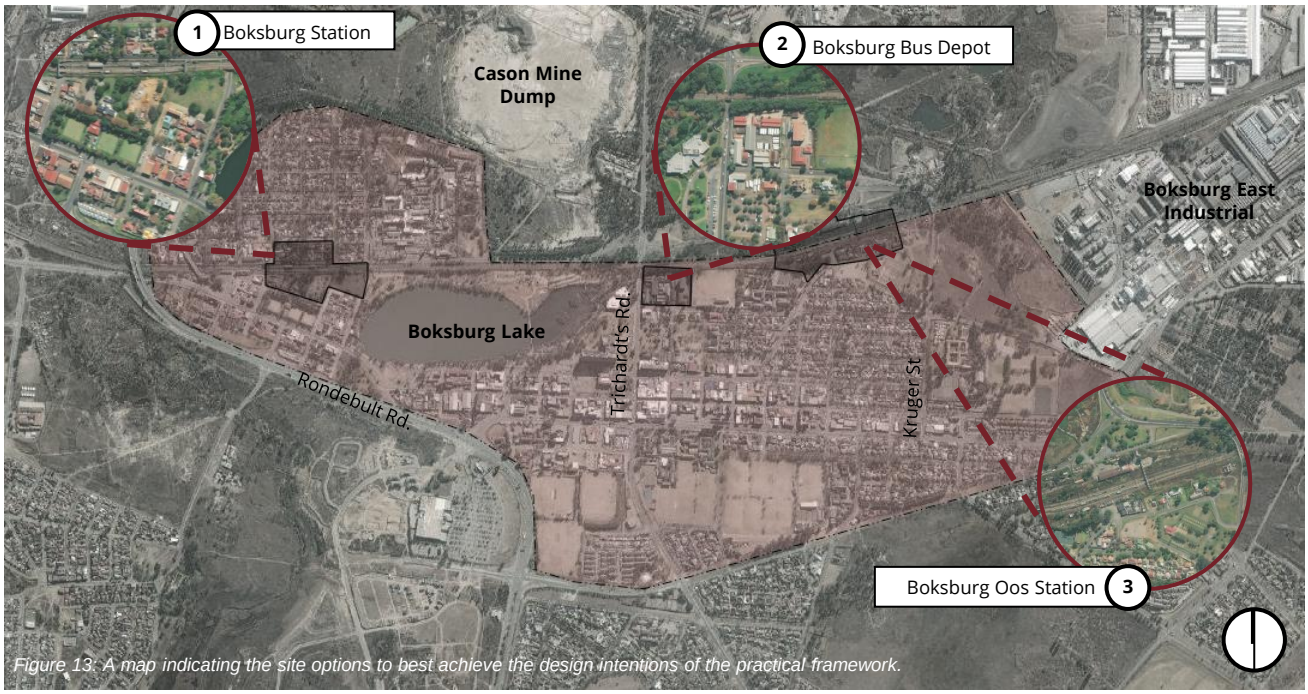


Figure 13: A map indicating the site options to best achieve the design intentions of the practical framework.

d. The user groups:

USER ANALYSIS: INHABITANTS OF THE BOKSBURG NEIGHBOURHOOD

Interpreting and recoding mono-functional, separate and rational urban infrastructures into rhizomatic entanglements (a connected and interrelated focus of infrastructure agency bound through the design's operation that is plugged into the identified urban and natural system). The user groups are therefore localised to inhabitants, dwellers, operators and consumers within these infrastructures. Emphasis is placed on community upliftment and achieving the right to the city, marginalised Boksburg residents seeking education, employment or marketable skills, as well as researchers and students that could enable knowledge transfer to occur – in addition to support research towards the sustainable natural rehabilitation in the area.

PRIMARY USER: FUTURE RESEARCHERS

Description:

Extending from the existing education infrastructures and exploiting the educational potential of the proposed university. New investment into environmental research and conservation, as well as investigating research into the associated rehabilitative processes and the necessary engineered systems to support future restoration projects.

Community Contribution:

- Research into rehabilitating land scared due to mine and industrial processes.
- Resilient and sustainable solutions to restore and rehabilitate Boksburg Lake.
- Resilient and sustainable urban backyard agricultural solutions for community members

Programmatic Needs:

- Research rooms
- Agricultural testing grounds
- Lecture spaces
- Practical spaces and labs
- Resource center
- Offices
- Presentation room

SECONDARY USER: ECONOMICALLY MARGINALISED RESIDENTS

Description:

Inhabitants who have moved into Boksburg CBD, who may not have received the required education to access the specialized industrial economy or those who have been displaced due to the diminishing mining operations in the area. Individuals who seek employment, economic opportunity, or to learn marketable skills.

Community Contribution

- Residential properties and public spaces that can support community urban agriculture.
- The maintenance and care of these spaces.
- The urban processes of planting, production, harvesting, trading and distribution of these resources into the local economy.

Programmatic Needs:

- Community garden
- Workshops
- Trade spaces (greengrocer, eateries, healthcare retail)
- Recreational space/courtyard
- Community gathering space (sharing of knowledge)
- Transport provision

TERTIARY USER: NEIGHBOURHOOD HIGHSCHOOL STUDENTS

Description:

Highschool students in the Boksburg area already support and encourage environmental, sustainable movements and are actively involved in the learning, cleaning and conservation of Boksburg Lake. This environmental support focus and the additional life science curriculum an be translated into inter-school activities on site

Community Contribution

- Schools can facilitate interschool activities and gathering.
- Initiatives of learning around natural conservation and urban agriculture can better inform the knowledge transfer for future generations.
- Support in environmental initiatives and activities

Programmatic Needs:

- Amphitheatre
- Safe circulation between schools and site
- Community gardens and projects
- Recycling station
- Labs
- Hall for interschool initiatives, exhibitions and functions

Figure 14: A diagram of the intended users that will be considered in the design project.

6. URBAN INFRASTRUCTURE INFORMANTS:

INFORMANTS: BOKSBURG INTEGRATIONS

IDENTIFYING SITE INFORMANTS:

The concept 'Bridging Boksburg', for this interactive community-based environmental upliftment research center, looks at integrating urban infrastructures of education, transport, and economy. It also looks at bridging the gap, diminishing the disparity between and provide right to the city for the human (urban Boksburg), and the non-human (natural landscape). The informants are selected for their potential within the Boksburg environment to connect the urban fabric and its operations.

CONTEXTUAL INFORMANTS: SITE AS MEDIATOR FOR CONTEXT

GREEN BELTS AND ECOLOGICAL INFRASTRUCTURE

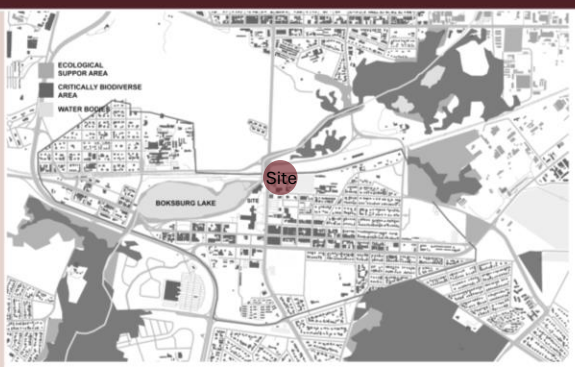


Figure 15: A map illustrating the green belts within Boksburg CBD.

The site is located adjacent to Boksburg Lake, which was a recreational attraction. The lake was closed due to crime and a lack of maintenance, but it is currently being rehabilitated. A connecting intervention to Boksburg Lake may improve the public value of Boksburg Lake. The site is located adjacent to where the stream connects to the mouth of Boksburg Lake. The site is located at the lowest point between Boksburg CBD and Boksburg North, and due to engineered surfaces and the lack of stormwater infrastructure, runoff causes flooding at Trichardt's Road, and the subsequent inoperability of this road next to the site. The location of the site potential to centralise, connect and activate the existing programmes of Boksburg.

LOCAL ECONOMY

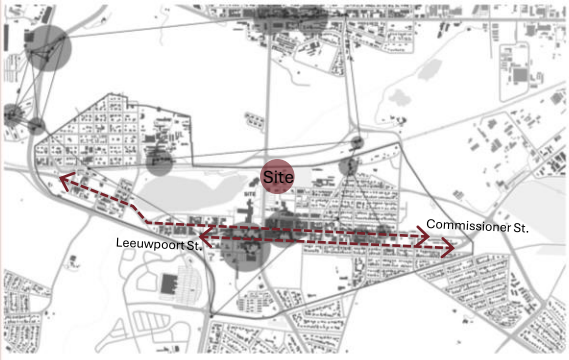


Figure 16: A map illustrating trade operations within Boksburg CBD.

Boksburg CBD's retail corridor operates along an east-west axis, with retail stores, businesses and workshops that front Leeuwpoort Street and Commissioner Street. However, retail is densified in the centre of the precinct, but little economy is developed northwards. The position of the site, and the programmes it implements could provide an opportunity to encourage development northwards to eventually connect to Boksburg North, it also further reinforces centralising economy of Boksburg CBD along Trichardts Road (the main arterial road at the centre of CBD).

MINING AND INDUSTRIAL OPERATIONS

Figure 17: A map illustrating the industrial and mining operations.

Boksburg CBD is near Cinderella Mine Dump, as well as the Boksburg East Industrial Precinct. The mine dump provides an opportunity for sustainable resource extraction and recycling. According to Boksburg's Precinct Node Plan, the mine dump has been remined and is expected to undergo land revitalisation and later economic development. Using materials sourced from this site will establish a historical identity in the project's architecture. The Boksburg East Industrial Precinct provides other opportunities to acquire locally produced materials.

EDUCATIONAL DIVERSITIES

Figure 18: A map illustrating the educational facilities in the area.

Well-established secondary education institutions are present within Boksburg CBD. These educational systems can be utilised for their resources and programmes, whilst the project site can allow for inter-school projects and to provide community interfacing opportunities. The site is central to the urban context and could utilise its position to stitch or weave the existing urban fabric to revitalise the area. The site abuts Voortrekker Highschool, Eloff Street that runs into the site connects to the main entrance of Boksburg Highschool, Voortrekker Road that runs south of the site connects to St Dominic's Catholic School for Girls and the site is across the road from Boksburg Library.

7. URBAN INTENTIONS:

a. The precinct vision

After investigating the macro scale narrative of urban development along the Witwatersrand reef, the urban framework explores urban ideas and visions that could reorientate the Boksburg CBD narrative. From the anthropocentric spatial planning practices of the colonial and apartheid era that scarred the natural landscape, this urban framework aims to stitch and repair the Boksburg context by providing opportunities for both human and non-human agency and entanglement. The urban framework developed initially from the bus depot as a campus extension of the proposed Science and Innovation University. The bus depot was selected for its position and its potential to connect to key urban and natural infrastructures (of the Boksburg Lake ecological system). The bus depot's position is located at the gateway of the CBD along Trichardt's Road where it can serve as a frontier and mediator for ecological and urban intersections. This urban framework seeks to reimagine the relationship between the city and its industrial legacy with a new considerate perspective toward nature. The proposed urban framework follows the natural ecological flows of the Boksburg Lake stream. As part of the urban framework, the design incorporates a natural detour for the Boksburg Lake stream, allowing it to bypass the site while maintaining its ecological integrity. This approach effectively addresses the challenges posed by the railway infrastructure by facilitating a more natural flow of water. Additionally, any remediation of soils and stormwater that occurs on site, can be distributed into the natural areas of the site, whereby the restored nutrients can be efficiently transported via the stream to larger ecological systems. This strategy not only enhances the environmental quality of the area but also reinforces the interconnectedness of local ecosystems.

By pedestrianising Eloff Street, the urban framework aims to create a safer circulatory system within Boksburg CBD, enhancing connectivity between established schools, the new university, Boksburg Library, and the proposed Environmental Rehabilitation Research Centre. Furthermore, the bus depot becomes a critical departure point through which the diversity of Boksburg inhabitants can access the ecological systems of Boksburg Lake and its ecological corridor. This transformation is intended to encourage inter-school and community-based collaboration and interaction for environmental conservation education, whereby the sharing of knowledge and opinions from multiple user perspectives could contribute to a right to the city and human (inhabitants) and non-human(environmental) agency, which can critically reorientate the developmental focusses of Boksburg CBD. In doing so, the framework strengthens the integration of urban spaces and inhabitants with the natural context.

In addition, the development of the lifestyle center to the northwest of the bus depot enables a northward economic development to link the economic processes of Boksburg North with that of Boksburg CBD (which currently only operates on an east west axis. This lifestyle precinct provides additional opportunities to better connect the hospital operations of health and human rehabilitation with the bus depot focused on the non-human environmental health and rehabilitation. This development also better links with the recreational potential of Boksburg Lake and the rest of the city CBD.

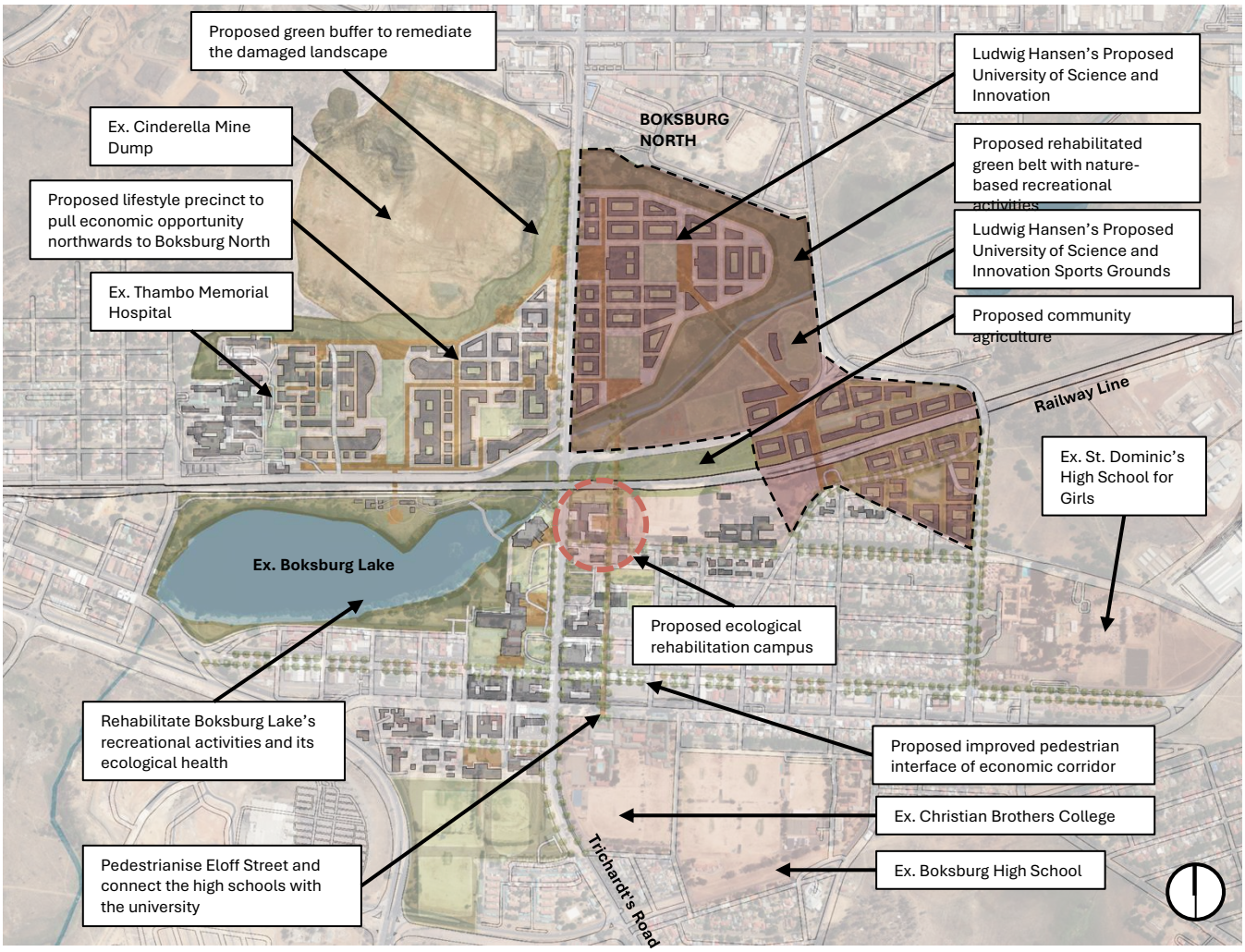


Figure 19: The proposed urban design framework for Boksburg CBD.

b. The conceptual intention going forward

CONCEPT DEVELOPMENT: BRIDGING (URBAN)

CONCEPT DEVELOPMENT:
The concept of bridging developed from the initial narrative of connecting infrastructures. Bridging starts to initiate operational and physical structures that distributes processes, circumvents infrastructural and natural barriers. Bridging also reconciles the disparate or independent, and the larger differences between identified groups are made less significant. In this case bridging ensures an integrated approach that reconciles disparate and seemingly opposing groups of Boksburg's landscapes i.e. infrastructure and nature, education and economy, the human and the non-human context.

MACRO SCALE: BRIDGING COMMUNITY, NATURE AND INFRASTRUCTURE

MESO SCALE: BRIDGING COMMUNITY, NATURE AND INFRASTRUCTURE

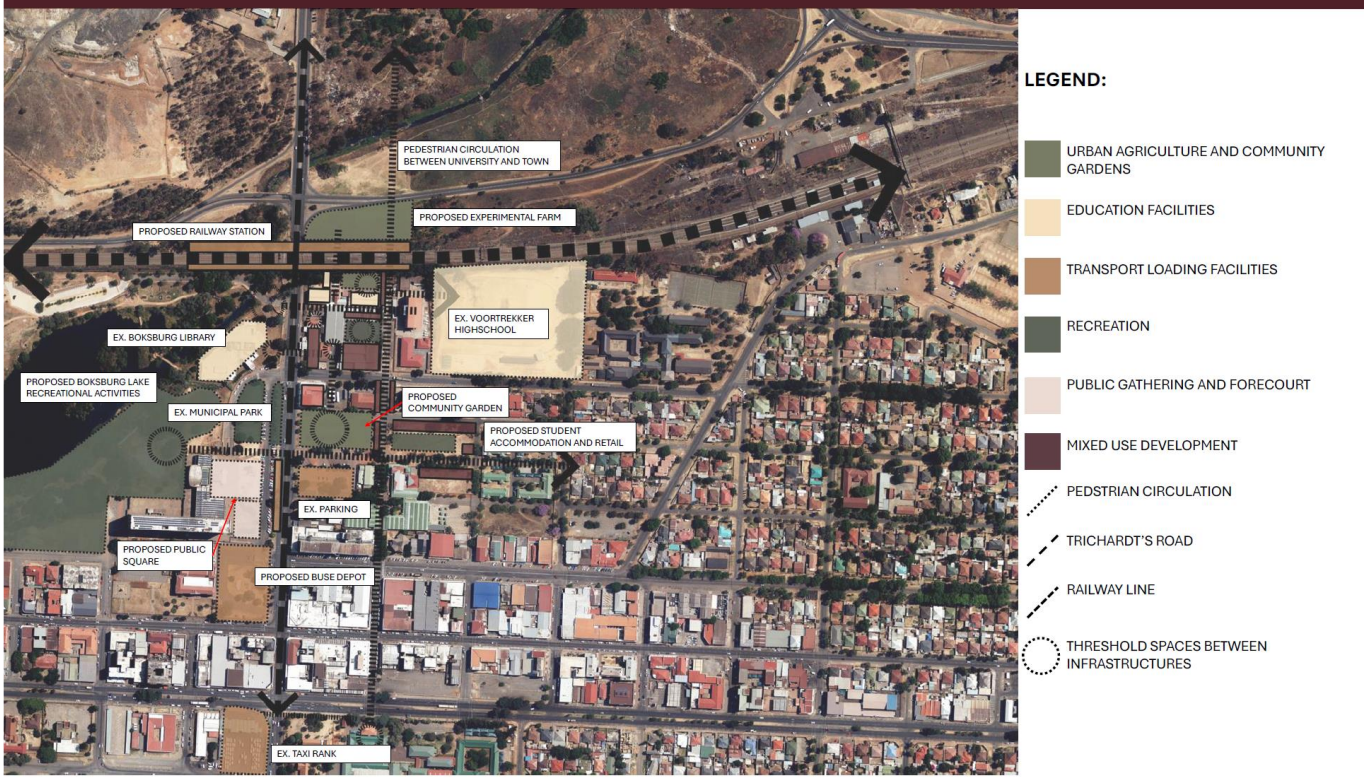


Figure 20: The proposed urban infrastructures and how they could be utilised to bridge Boksburg CBD's urban and natural processes.

c. The block vision

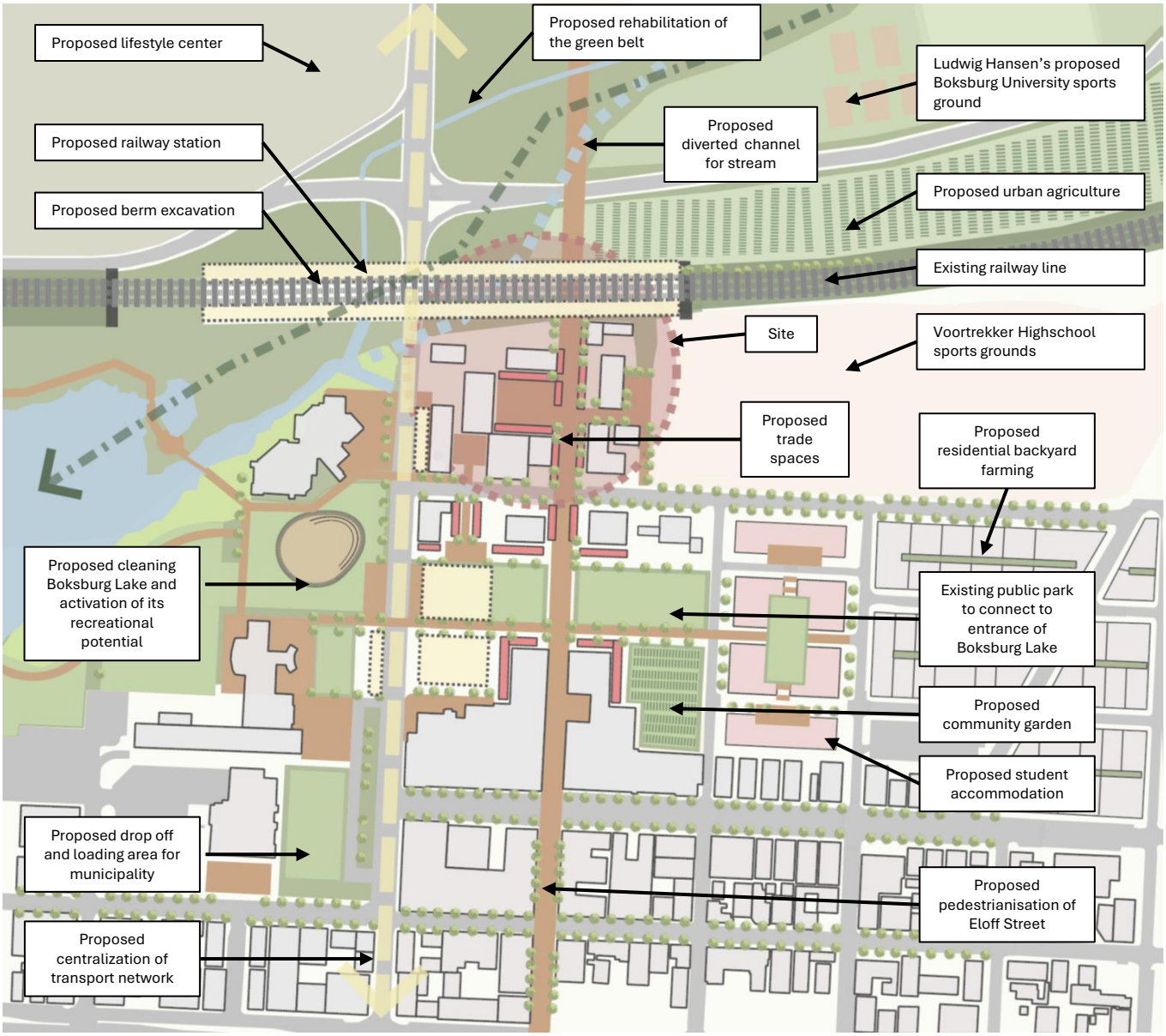


Figure 21: The proposed block vision for Boksburg CBD.

1. Ecological Connectivity and Water System Manipulation

- Railway Line and Ecological Flow: The plan identifies the railway line as an infrastructural barrier that limits ecological movement, especially between the northern habitats of Boksburg and the central precinct. By removing a significant portion of the berm, the proposal aims to facilitate better ecological connectivity, allowing natural habitats to flow more freely and integrate into the surrounding urban areas.
- Water System Reconfiguration: The manipulation of the water system to follow a more natural route ensures that the rehabilitation of natural resources can be distributed downstream via the local stream. This could potentially enhance biodiversity and improve the ecological health of the broader region, creating a more resilient urban environment.

2. Access to Boksburg Lake and Community Development

- Linking Residential and Recreational Areas: The vision promotes connecting the residential neighbourhoods with the recreational and community-gathering potential of Boksburg Lake. This could boost local tourism, economic development, and community engagement by creating a direct link between people and nature. By integrating park activities and green spaces, it makes the area more accessible and usable for residents, encouraging a more holistic engagement with the environment.

3. Transport and Connectivity Improvements

- Strengthening Trichardt's Road Transport Network: The proposal suggests reinforcing the transport routes, specifically along Trichardt's road, by adding bus and taxi stops. This would enhance mobility for residents and commuters, improving access to Boksburg's CBD and neighbouring suburbs. The addition of a new railway station along the existing line (above the project site) would help centralise transport infrastructure, boosting connectivity for people traveling within and outside the city.
- North-South Development Axis: The enhanced transport system will create a stronger north-south relationship, connecting key areas of Boksburg's urban grid, which could also support development and economic activities along this axis.

4. Pedestrianization and Community Spaces

- Eloff Street Pedestrianization: Pedestrianising Eloff street is a strategic move to prioritise foot traffic and improve safety, particularly for children and community members. This transformation of the street into a pedestrian-friendly zone could also contribute to a more active public space, promoting social interaction, accessibility, and safety.
- Environmental Education and Exchange: The site would serve as a mediatory space for nature, education, and the economy. By centralising educational facilities (such as environmental education centers), libraries, and trade spaces for community members, the vision proposes a more integrated, sustainable urban environment where citizens can learn about environmental stewardship and engage in local trade.
- Densification and Economic Development: Trade spaces and areas designated for economic activities would support the development of a more diverse local economy. The project encourages northward densification, aligning with broader trends in urban development that prioritise mixed-use spaces and active ground-floor uses to support both residential and commercial growth.

5. Integration of Nature and Community

- Nature as a Mediator: The project envisions nature not just as a backdrop but as a mediator that connects different aspects of urban life, from transportation to education to commerce. By incorporating nature-based solutions (e.g., green spaces, sustainable water management), the plan ensures that development does not come at the expense of ecological integrity.
- Sustainable Urbanism: The overall approach suggests a shift toward more sustainable urbanism that values ecological systems, community cohesion, and local economic opportunities, creating a resilient urban space that is sustainable.

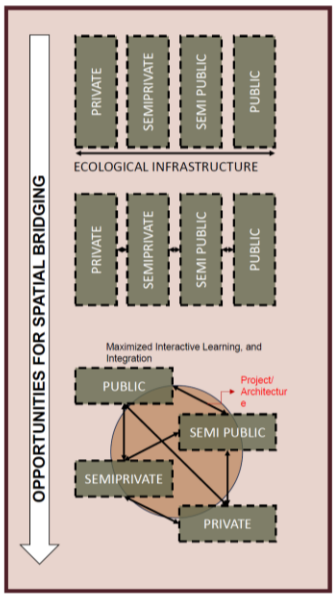
c. The conceptual development and the building programmes

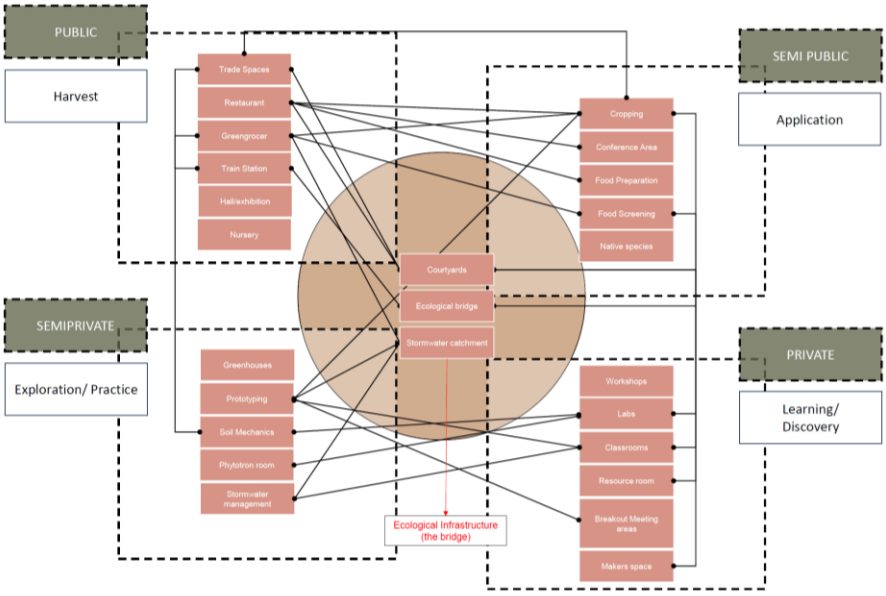
CONCEPT DEVELOPMENT: BRIDGING

SITE OPERATIONAL AND ARCHITECTURAL CONCEPT DEVELOPMENT:

The stance of bridging, as a space, becomes the negotiation and mediation between destinations. For this project bridging hosts the intra-relation and integration between human and non-human (nature), infrastructures, education phases/users, urban process, functions and post-apartheid and post-industrial focusses (the past and present). Bridging is the threshold or transitional point of sharing knowledge and skills to help provide new opportunities for interactive learning and community engagement - the transitional point in the lives of the intended user. Bridging is reflective of natural root systems (just as urban infrastructures should be), diversified unrelated systems interconnected, receptive and nurturing.

BRIDGING INTENTION: COMMUNITY, NATURE AND INFRASTRUCTURE



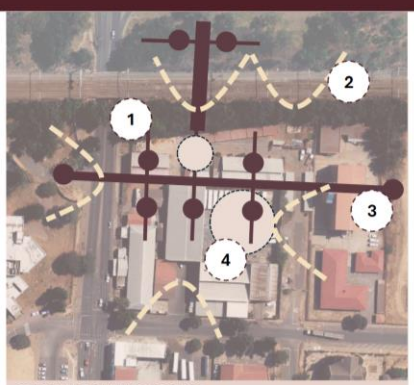


1 **Ecological Story** – Water, soil, urban agriculture and uplifting the community

2 **Ecological Application** – Ecological flows, urban infrastructure and social integration

3 **Ecological Theory** – Knowledge and skills transfer for post-industrial and post-apartheid contexts

BRIDGING INTENTION: SITE SCALE APPLICATION OF STRATEGIES



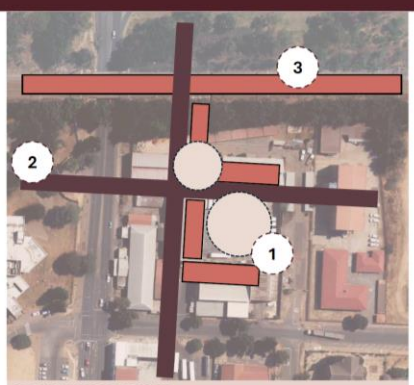


Figure 22: A poster illustrating the initial programmes and how they could be interconnected to enable the architectural programmatic bridging between human and non-human actors.

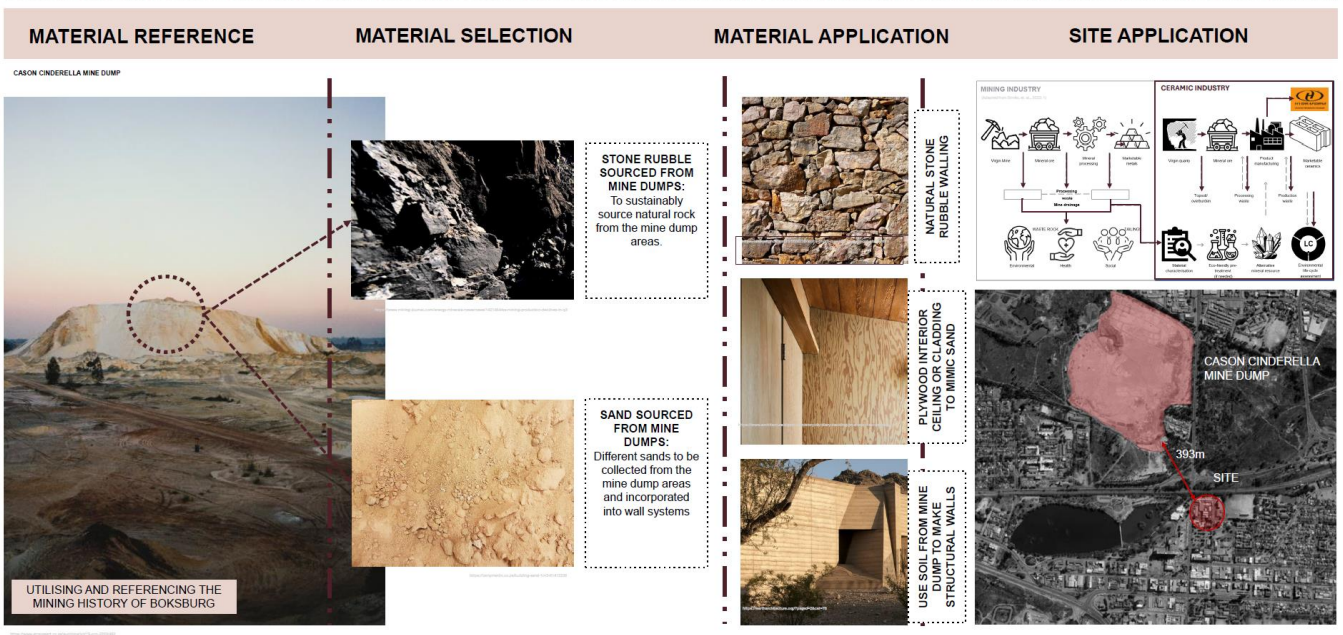
8. THE MATERIAL SELECTION:

MATERIAL CONSIDERATIONS: BRIDGING

MATERIAL SELECTION AND APPLICATION:
The material selection was derived from the possibility of sourcing local material that reflect the contemporary Boksburg industrial typology. It was also motivated by supporting local trades and industries. However, a sustainable approach to material acquisition that reflects the industrial and mining heritage of the area would be to utilise the existing industrial materials of brick and steel, however, to accompany this primary selection with usable mine waste material through adobe bricks and stone rubble to bridge the contemporary design intentions with the heritage value of the area.

SOURCING MATERIAL: MINE WASTE MATERIAL CONCEPTUAL INTENTIONS

Material concept: To remember a historically significant mining origin, whilst providing a new sustainable, inclusive and contemporary Boksburg identity through familiar raw materials (of the mines), as well as incorporating systems and architectural typologies of the site and area. This precinct project at the Boksburg Bus Depot, is an adaptive reuse project that aims to transform the existing buildings into a relevant public space to uplift the community through job creation, environmental interaction, and education.



RECYCLING MATERIALS: STRUCTURES AT BOKSBURG BUS DEPOT

Material concept: Recycling concepts for existing building material and elements which **their** first life cycle are explored to achieve a sustainable architecture. Indexes of recyclability - recycled, infracycled, reused and infra-used materials are more suitable to improve the environment during construction. This approach assists design and construction thinking toward a closed-loop material cycle. Materials gained from the disassembly process of structures at the Boksburg Bus Depot are selected and extracted to sustainably contribute to the material palette and construction for this project. (Vefago, et. al., 2013: 127)

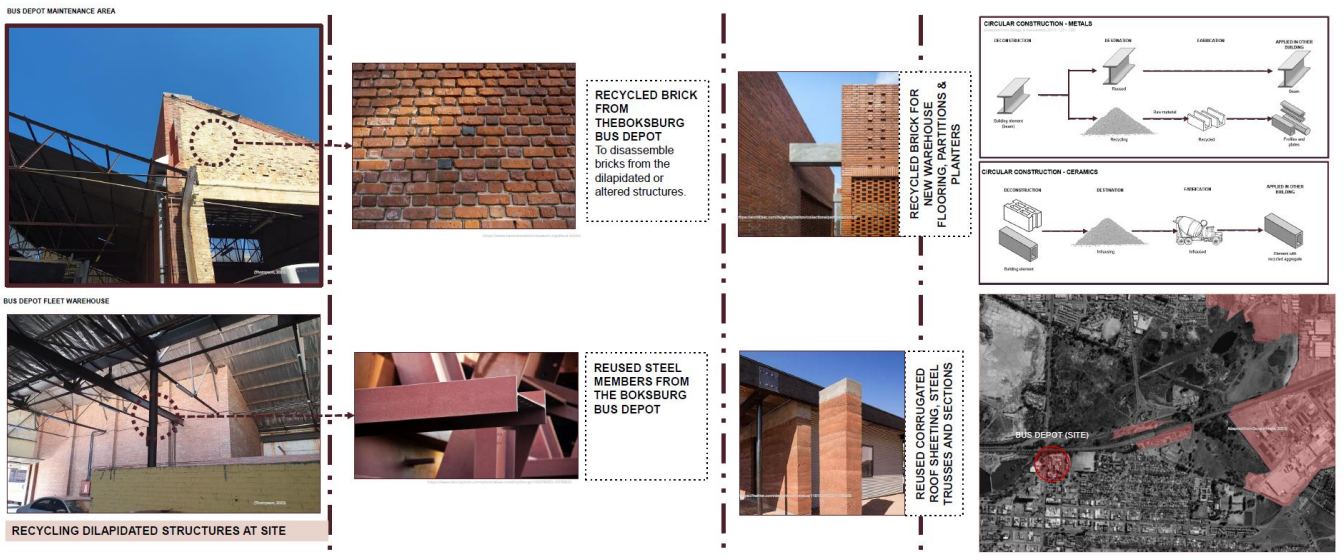


Figure 23: A poster of the materials, their influences and how they are utilised in the construction of the building.

9. THE COMMUNITY-BASED ENIVORNMENTAL REHABILITATION EDUCATION CAMPUS:

a. The contextual edge conditons

From the urban framework three prominent contextual conditions were defined, which informed the design of the edge conditions of the building and how these edges negotiate with and respond to the necessary requirements between the human and non-human actors.

1. Infrastructural condition: The Trichardt's Road edge – on the western boundary of the site is the main arterial road through Boksburg, which experiences frequent and fast traffic, and its hard infrastructure focused on the circulation of motor-vehicles over pedestrian movement. This is also the identified area to reinforce central and easy access into the city environment through public transport stops. Therefore, the western edge of the building is used for services, staff access, loading and unloading of samples, refuse and waste removal.

2. Social condition: The pedestrianisation of Eloff street creates a slow and soft infrastructural corridor that is better suited for activated public edges, community gathering and safe general access. For these reasons, the eastern edge becomes the main public entrance that accommodates community gathering and engagement through courtyards, community markets, exhibition spaces and retail stores.

3. Ecological condition: After excavating the railway line berm, the natural edge north of the site is better connected to the wider ecological systems north of the railway line, and the proposed manipulation of the man-made Boksburg Stream to run alongside the building enables the building edge to engage with some ecological infrastructures to enhance the environmental remediation processes and programmes used in the architecture. Therefore, this edge condition is an opportunity to interact with and utilise urban infrastructures to assist with the remediation process and mediate the urban and natural contexts.

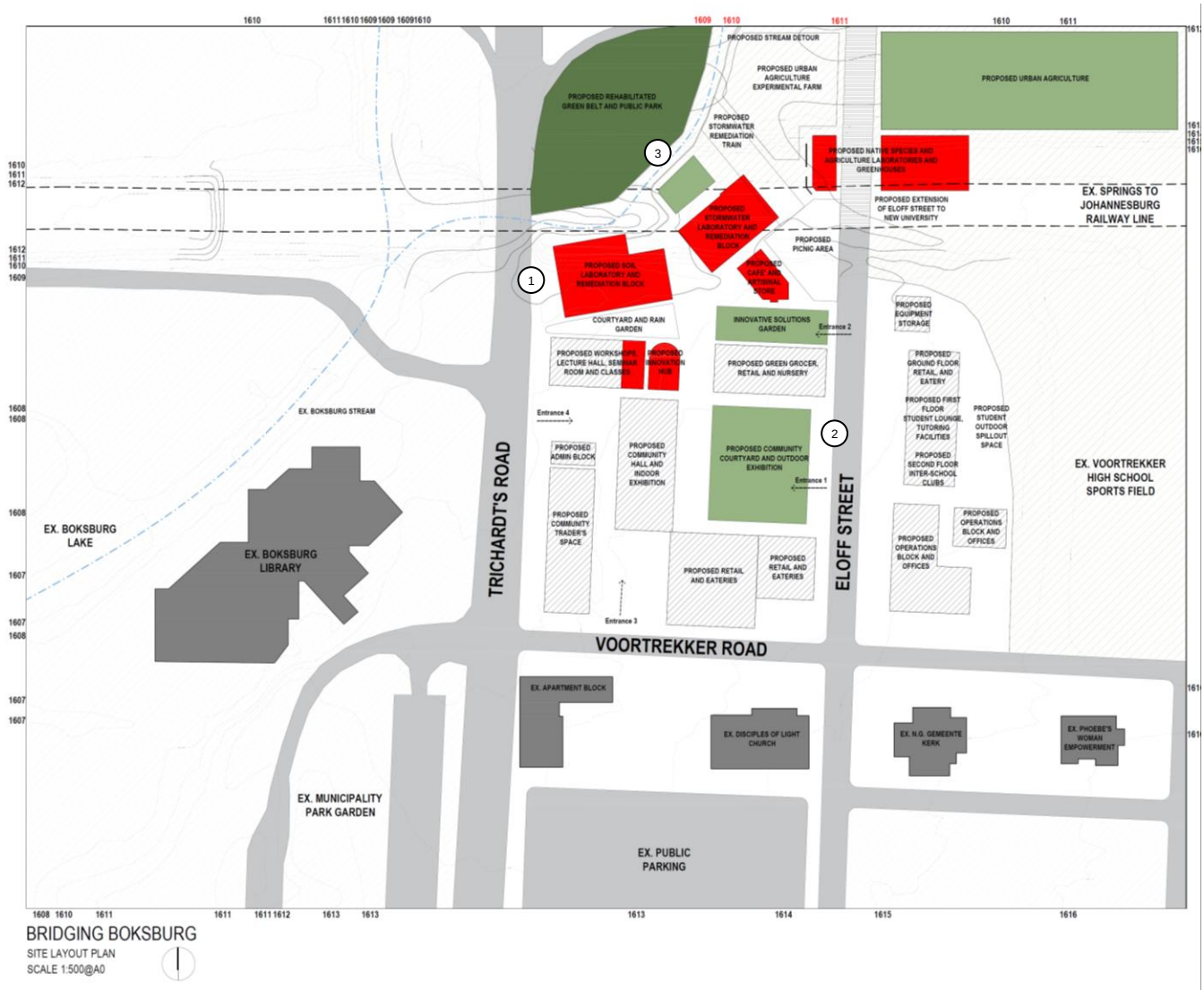


Figure 24: A site layout plan illustrating the proposed programmatic adaptions and additions to the bus depot.

b. The floor plan logic :

The building form is derived from the contours of the site and the stormwater runoff. The building also runs alongside and does not interrupt the identified ecological flows of the green belt. This enables the building to serve as a mediator or membrane to bridge the natural environment and the urban context. Toward the interior of the site the building fronts interactive green spaces that include visual and tactile examples for community-based learning to illustrate methods of soil and water remediation as well as the benefits of these remediated components have on the environment. These public spaces also serve as courtyard spaces whereby community members, researchers and school students can share their knowledge and exchange ideas.

The soil lab, intended for researches to collect soil samples from the area to document and build a thorough data base of soil conditions in the area and the strategies for damaged soil remediation. This lab is designed so that the testing, experiments, the soil cleaning and phytoremediation processes are visually accessible to the public. The remediated soil can then be deposited into the green belt using the provided pedestrian bridges to improve the soil quality and stability and to transfer the nutrients into larger ecological systems. Similarly, the stormwater lab utilises a stormwater train that is exposed to and is intended to educate the public about the processes involved to treating stormwater by exposing each phase of cleaning and improving the quality of the stormwater. At the end of this stormwater filtering train, the cleaned and nutrient filled stormwater enters Boksburg Stream where it transfer nutrients into larger ecological systems.

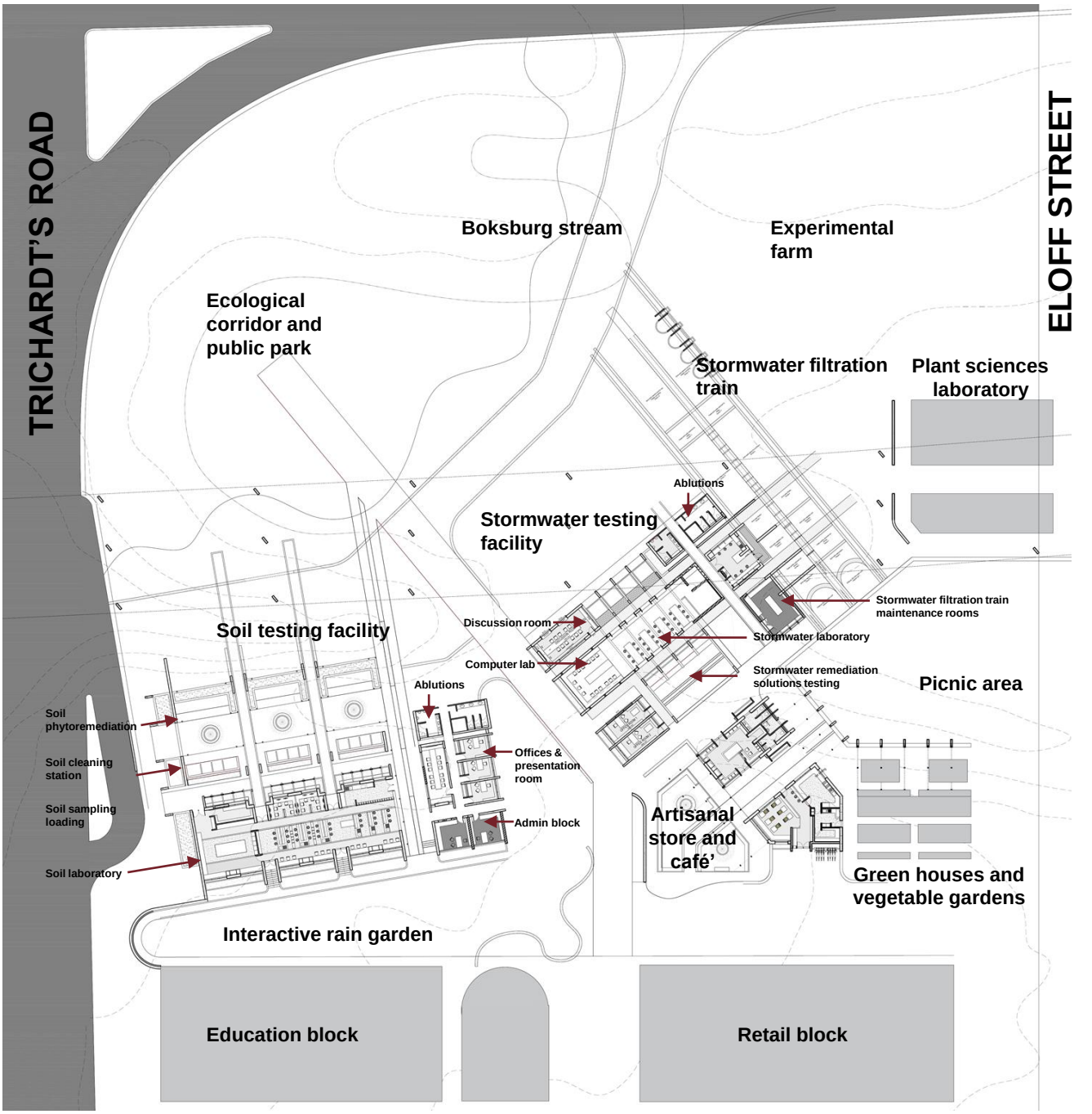


Figure 25: The ground floor plan illustrating the programmatic layout and the building form..

b. Section through the soil building

The approach to the soil building was to recess some of the building below natural ground level. From the understanding that soil is essential to host, support, and sustain plant life, the building being recessed into the ground to create a user experience that connects or roots the researcher into the context of soil. When working with and testing soil views from the lab to the natural landscape that occurs at ground level which reinforces the importance of soil and all that it supports.

The building technology also references the stereotomic qualities of soil and the lightweight qualities of flora that emerges from it. The building similarly is constructed using gabion walls as the primary load bearing structure from which the lightweight and tectonic timber structures are supported. The double pitched green roof follows the topography of the landscape and is intended to visually connect the natural landscape and pull it through and over the soil testing facility and introduce it into the urban context.

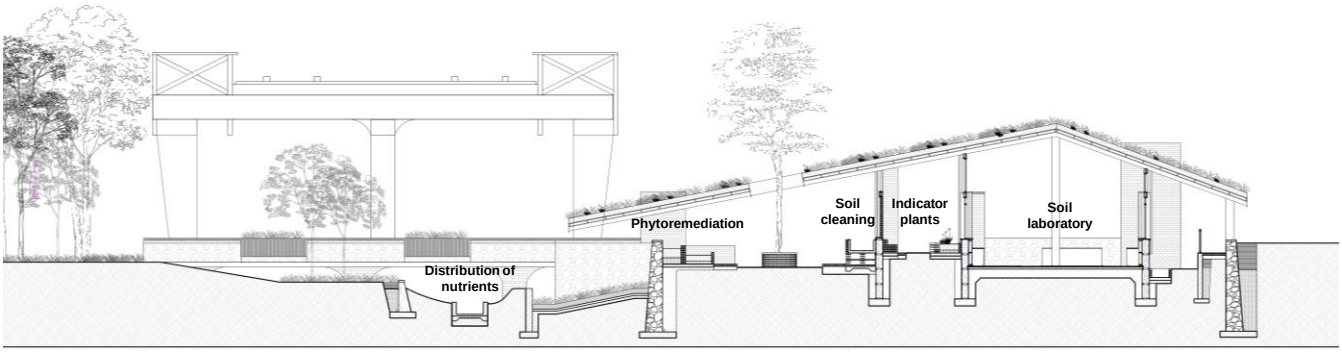


Figure 26: A section through the soil laboratory illustrating the stages of soil remediation.

c. Section through the stormwater building

The stormwater building approach aims to critically understand the systems, in logical layers, that contribute to the remediation process of stormwater that runs through the site. The building is therefore situated next to and above a stormwater filtering, cleaning and remediation train which is accessible to the public to engage with and learn about the different processes involved. This train is also intended for the researchers to experiment with and prototype different solutions for stormwater remediation. The building is elevated as to not interrupt the stormwater flows, it is also raised to contextualise of the contribution of the individual layers of stormwater remediation, the stormwater transference to the Boksburg Lake stream and the greater ecological actor's dependent on quality water as a holistic narrative.

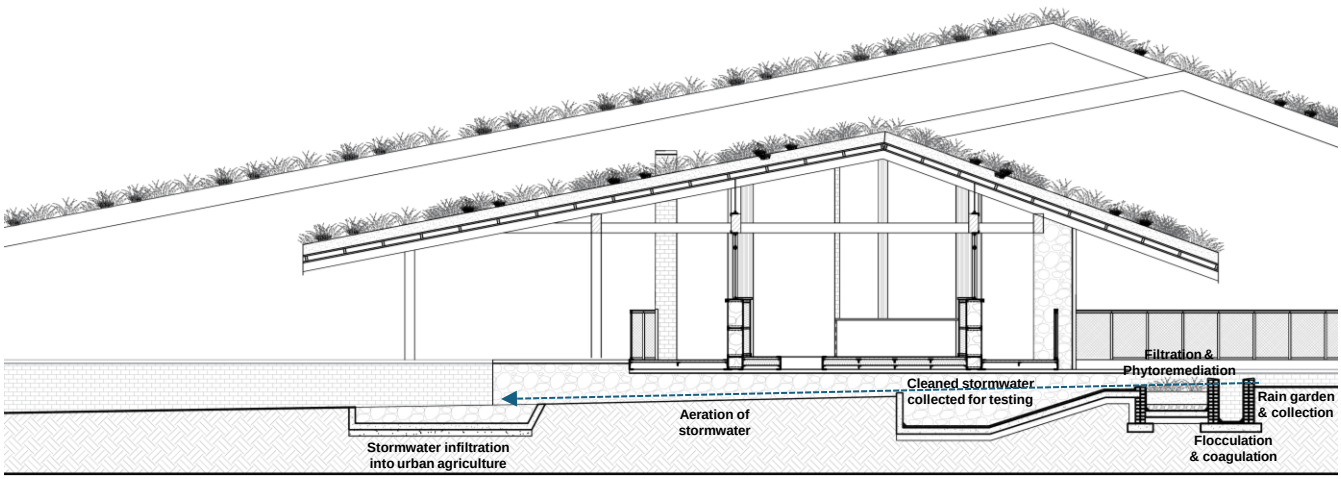


Figure 27: A section through the stormwater laboratory illustrating the stages of stormwater filtration.

10. REFLECTION:

The Bridging Boksburg project is a design exploration focused on the mining and industrial context, examining the environmental damage caused by each of these sectors. Since Boksburg CBD shares similar characteristics and issues with many other South African mining and industrial contexts along the Witwatersrand Reef, the project is a relevant study that contributes design strategies and lessons to repair these contexts. The design project, Bridging Boksburg, was an opportunity to explore and test critical theories of posthumanism and 'the right to the city' through urban and architectural considerations. The project is framed as a process of responding to degradation (both environmental and social) and moving toward healing. This project of sustainability and restorative justice, positions architecture and urban planning as a crucial mediator in both natural and urban healing. Bridging Boksburg is a restorative, community-centered intervention that aims to heal long-term environmental and social damage caused by mining practices.

Key themes that emerged and contributed to the outcome of the design project:

1. Mono-functionality and infrastructure: There should be an awareness of the inherited effects, of both industrial development and apartheid, particularly on urban planning, access to resources, and social dynamics within the region. Critically understanding both the contemporary user's needs within the context, as well as the history that informed infrastructure development, and how these infrastructures control, order, separate and integrate city processes and destinations can inform a more critically responsive, richer and desired design response through the recoding and networking of infrastructures within the urban fabric. Through this process, the contemporary user can overcome infrastructural barriers, and single-purpose urban spaces and infrastructures become diversified, adaptable, complex, independent and multi-functional contributors that are entangled within urban processes.
2. Human and non-human perspectives: Moving away from anthropocentric spatial outcomes, by prioritising and being considerate toward both the needs of the human and non-human through one architecture, enables a critically responsive, just, and inclusive design where both the human and non-human are entangled, providing both users with agency, where ecological and urban processes align. The project creates spaces for equal interaction, mutual engagement, and exchange of knowledge and skills through interactive learning opportunities between the users and nature, allowing users to contribute to and change urban processes. The project becomes the host and mediator of the human and non-human intra-relationship (the relationship between the user and nature). The project is not only about physical space but about creating environments for dynamic relationships between people, place, and the natural world, resulting in a more-than-human context.
3. Community Engagement: Through bridging opportunities, the project seeks to revitalise Boksburg—turning a place of neglect into one of opportunity and growth. It's about reinvigorating the community and environment, addressing the impacts of past industrial activities. By providing explicit and responsive opportunities for community engagement with nature, conservation and education, allows users to contribute to and change city processes, improves wellbeing for both the human and non-human actor, and provides the community with a furthered sense of identity and right to the city.

This design project bridges the human and non-human disparity, infrastructural barriers, monofunctional planning and processes, and the inherited artefacts of the apartheid industrial city into a contemporary post-industrial, post-apartheid and inclusive context. The project focuses on revitalising neglected areas like Boksburg by addressing the environmental and social impacts of mining and industrialization. Through restorative, community-centered interventions, it aims to heal the scars of the past while fostering a more inclusive, sustainable future. The goal is to create spaces that improve well-being, strengthen identity, and empower local communities to shape their environment, contributing to a more equitable future.

11. REFERENCES:

- Barad, K., 2007. Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning. *Duke University Press, pp.* 71-94.
- Britannica, The Editors of Encyclopaedia, 2017. Boksburg. *Encyclopedia Britannica*, 23 Feb. 2017, https://www.britannica.com/place/Boksburg. Accessed 14 April 2023.
- GAPP Consortium, 2020. Boksburg CBD Urban Design Precinct Plan. Ekurhuleni: *City of Ekurhuleni*, pp.11-281.
- Karam, A., in Roberts, S., 2006. The Apartheid City: Patterns of Industrial and Residential Development in Ekurhuleni. *Sustainable Manufacturing? The Case of South Africa and Ekurhuleni*, pp.141-158.
- Mbinza, Z. & Lewis, M., n.d. Economic crisis, spatial trends, and sustainable urbanisation, planning and governance. pp.1-11.
- Nieftagodien, M., 2001. The implementation of urban apartheid on the East Rand, 1948-1973: the role of local government and local resistance (Doctoral dissertation, University of the Witwatersrand).
- Nieftagodien, N., in Roberts, S., 2006. Economy and Society on the East Rand in the 20th Century. *Sustainable Manufacturing? The Case of South Africa & Ekurhuleni*, pp.93-111.
- Schreiner, B., Schreiner, F., and Schreiner, B., 1986. My Spirit Is Not Banned. Harare: *Zimbabwe Publishing House*, http://www.sahistory.org.za/pages/library-resources/online%20books/baard. Access 4 October 2024.
- Seixas, E.C., 2021. Urban (Digital) Play and Right to the City: A Critical Perspective. *Frontiers in Psychology*, *12*, p.661.
- Simão, F.V., Chambart, H., Vandemeulebroeke, L., Nielsen, P., Adrianto, L.R., Pfister, S. and Cappuyns, V., 2022. Mine waste as a sustainable resource for facing bricks. *Journal of Cleaner Production*, *368*, pp. 1-15.
- Simone, A., 2005. The right to the city. *Interventions*, *7*(3), pp.321-325.
- Vefago, L.H.M. and Avellaneda, J., 2013. Recycling concepts and the index of recyclability for building materials. *Resources, conservation and recycling*, *72*, pp.127-135.