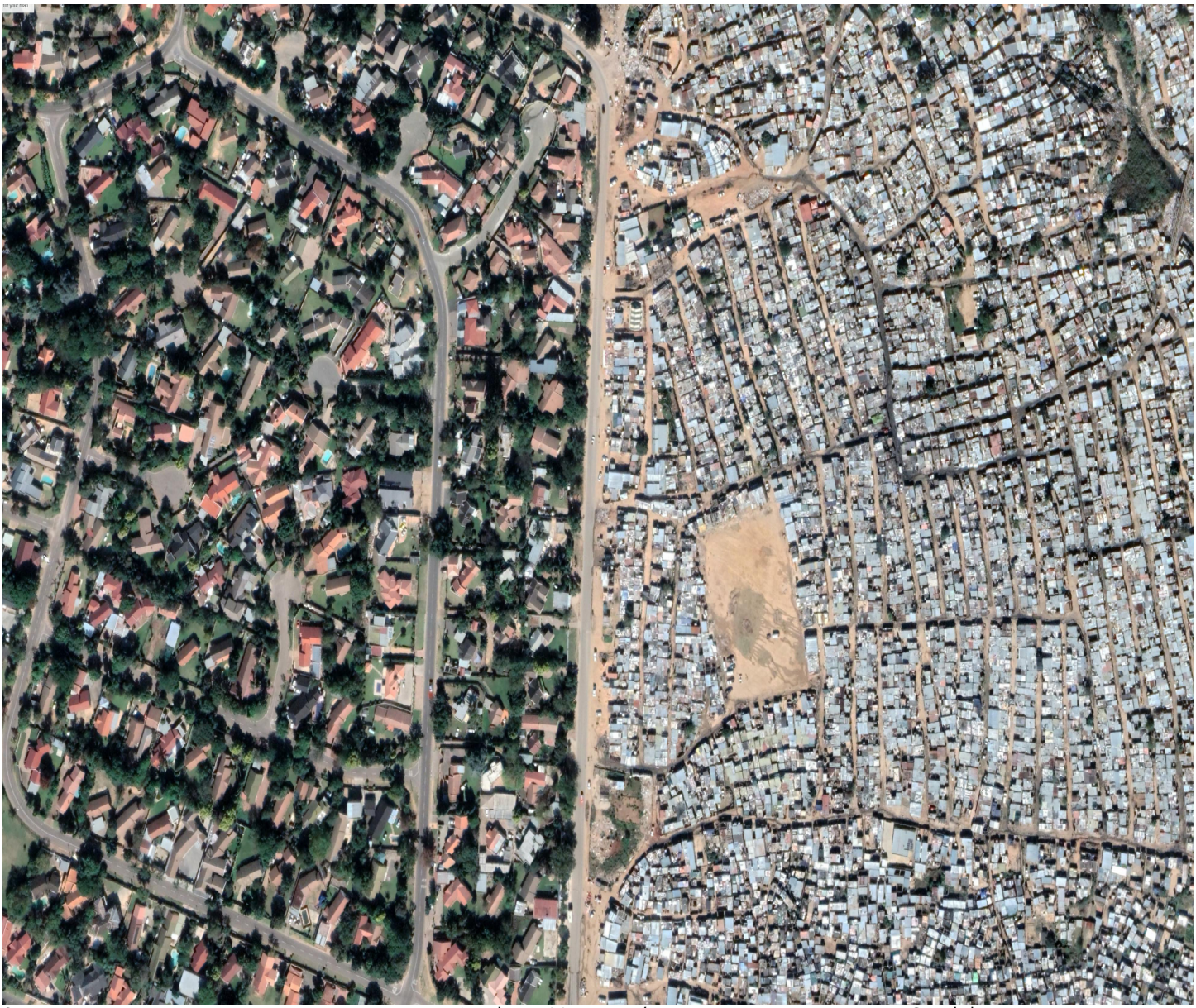
Politecnico di Torino

Masters of Science in Architecture for Sustainable Project

Master's Degree Thesis

Re-thinking Urban Informality

Kya Sands Johannesburg, South Africa



Unequal scenes - Kya Sands Johannesburg, South Africa - Image © Johnny Miller

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Academic Year 2019/2021

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Acknowledgements

We would like to begin by praising Allah, the Almighty, the Most Gracious, and the Most Merciful for His blessings bestowed upon us during our studies and in finishing this thesis.

We also want to express our gratitude to the people listed below, without the help of whom we would not have been able to finish this study or earn our master's degree. Our sincere gratitude goes out to Professors Mario Artuso and Maurizio Tiepolo from Politecnico University, whose expertise in the field guided us during our investigation.

Our family deserves the biggest appreciation for all the assistance they provided as we finished off our two years of distant study. and lastly, our friends at Residenza Olimpia, in particular Mr. Adnan Haider, who has helped us and inspired us during this research.

Last but not least, we hope that our study will be useful for future research endeavors.

Abstract

Global South's cities are undergoing fast urbanization, resulting in a demand for additional housing that governments are unable to meet.

By 2050, approximately an additional three billion people will be living in improvised housing.

Despite these projections, many top policymakers are still focused on preventing informal urbanization. It's important to recognize that in developing-world cities, informal activities dominate every element of social and economic activity. Informality has been highlighted as the key mechanism of urbanization and urban growth throughout Africa and much of emerging Asia. The phenomenon of informality as a kind of urbanism has been limited to developing countries' urbanization processes.

As a conclusion, this thesis investigates the role of the informal city in future urbanization, as well as what is required to ensure that these settlements are resilient and sustainable in the long run. The study will be based on an overall strategy that takes into account time and rapid population expansion, as well as a narrative about how this plan is implemented in the chosen neighborhood..

It highlights the challenges that are present in Kya Sands' unplanned informal settlement in Johannesburg. Since the discovery of gold, the expansion of informal township communities in Johannesburg has been poorly governed and affected by politics. The discovery of diamonds and gold resulted in significant changes in the economy and society of towns and rural areas, as well as in the urbanization process.

Moreover this research focuses on design strategies for upgrading the informal settlements in general, and Kya sands in particular.

Key words (Urban Informality, Resilient Architecture, Sustainable living, Urbanization, Global South)

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Challenge -Urban Future

Urbanization continues to have great impact on society and the environment. Since 1990, the world's population has been increasingly concentrated in metropolitan regions. It has become a trend in the global south, and it is occurring on a far larger scale than when the similar process occurred in the north. The tendency is not new, but it is persistent, as evidenced by a significant rise in number of urban residents, from 57 million in 1990-2000 to 77 million in 2010-2015. In 1990, 44 percent world's population (2.3 billion) lived in cities; In 2015, it had risen to 54 percent (4 billion). The rise in urban population has not been evenly distributed over the globe. Different regions have seen their urban populations increase faster or slower, but nearly no part of the world can claim to have experienced a decline in urbanization.

Asia has by far the greatest population of urban residents, followed by Europe, Africa, and Latin America.

In 2019, as of UN report on the Sustainable Development Goals, one out of every four urban residents in the globe lived in slum-like circumstances in 2018, i.e., informal settlements with temporary dwellings, inadequate basic amenities, and insecure tenure. Over the next few decades, southern cities are forecast to absorb the majority of the world's population expansion, with slums expected to absorb the majority of it.

Since much of the present era's urban growth is occurring in underdeveloped countries, urban sociologist Douglas Massey states,

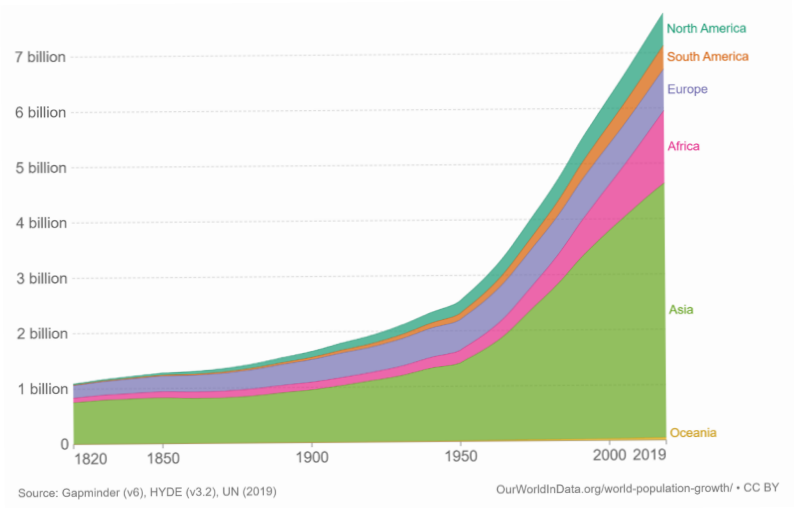

Figure 1. World population by region
Source: (UN, 2019)

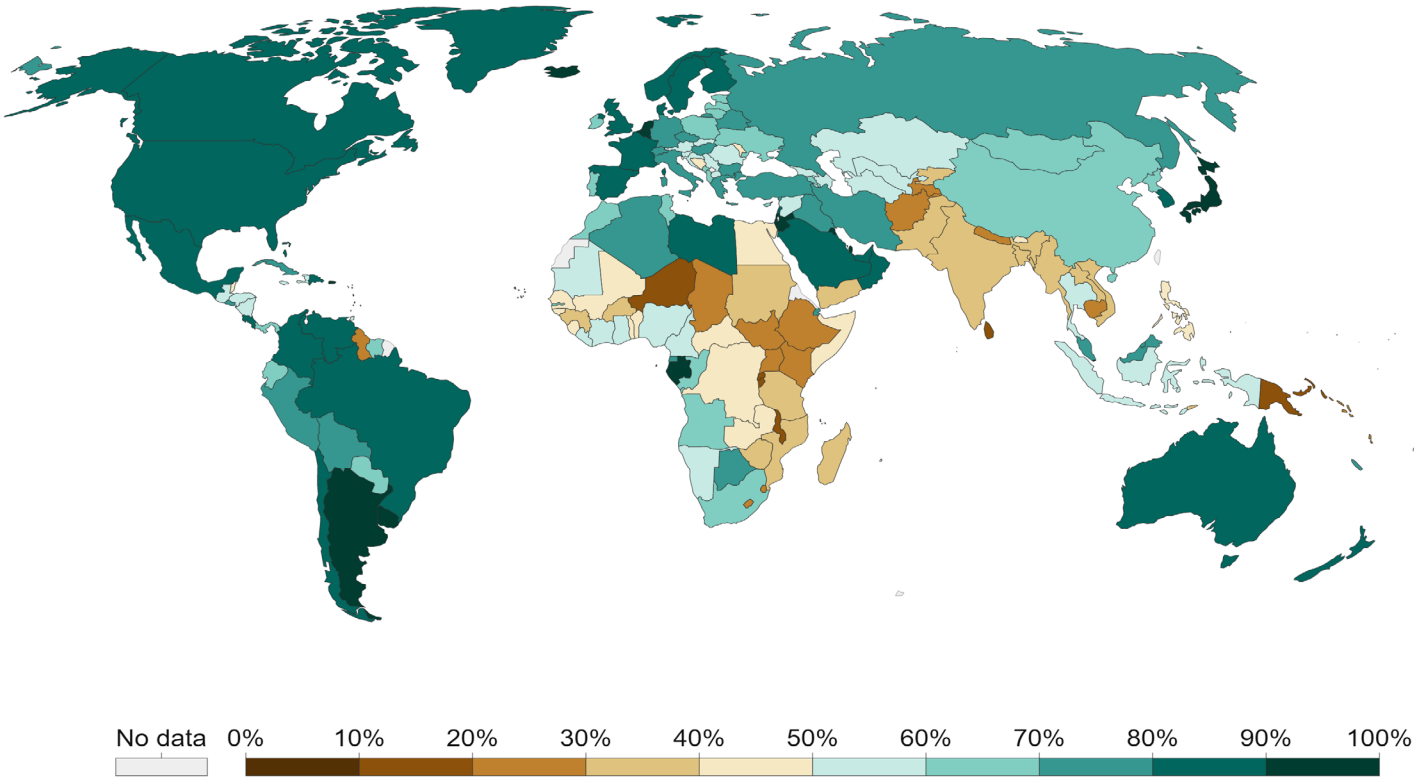

Figure 2. Share of people living in Urban areas.
Source: (UN, 2019)

"That the urban future lies neither in Chicago, nor Los Angeles, It instead lies in "third World" cities like Rio de Janeiro, Mumbai, Hong Kong. and that it is necessary to pay attention to the urban transformations of the developing world as now it is seen as a generalized mode of metropolitan urbanization." (Roy, A. 2005)

Structure of the Work

The structure of the whole thesis is divided into following four (04) major parts:

- The Research
- The Case Studies
- The Analysis
- Design Strategies and Proposal

1. The Research

The first part of the work (i.e. The Research) begins by exploring the theme of Informal Urbanization. Exploring te concepts behind historical definitions of slums and informal settlements. Additionally the Global trends about informal urbanization and what misconceptions are there regarding the same. This Part also discusses the chosen site in detail and the reasons for its selection, the statistics and demographics of the city and country in general.

2. The Case Studies

In Second phase (The Case Studies) some architectural case studies are discussed in order to draw comparison with our project. These case studies predominantly discuss incremental design approaches in informal settings.

3. The Analysis

The Third part of the work i.e. The Analysis focuses on the territorial study of Johannesburg and in particular Kya Sands where the site is located. It also looks on a meso scale at the site in order to understand the immediate context. Historical, cultural and architectural aspects of the place are studied in this section. This has helped in better planning during the proposal or the design phase.

4. Design Guidelines Strategies and Proposal

The last phase of the work (Rethinking urban informality) presents viable design strategies an solutions based on guidelines provided by United Nations for better organization of informal developments and to the challenges of Urbanization-

Final Phase presents strategies widely used & ultimately a workable design proposal.

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Part 01: The Research

Chapter 01

Introduction

1.1 DESCRIPTION

What is Urban Informality?
Architects and economists have developed a variety of criteria for urban informality. One of the first mentions was in 1963 by British architect John FC Turner, who described informal urbanization as a self-made housing solution to the urban poor's housing scarcity in emerging countries.
Urban informality is, at its most basic level, a way of producing the built environment and occupying land that deviates from established norms. It is a multifaceted process that can take many forms, including the lack of legal property rights, non-compliance with rules nd regulations, lack of policies, low-quality and limited supply of urban services, and bad environmental conditions in human settlements. These manifestations of informality can be seen in a variety of settings and can take on a variety of names and forms based on their size, location, and shape. Slums, shantytowns, illegal settlements and encampments, and favelas are only a few of the typologies connected with urban informality.

High levels of urban informality have historically been linked to rapid population growth in cities of the Global South due to rural-to-urban shift and high birth rates, financial difficulties and lack of economic opportunity, governments' inability to enforce zoning codes and plans, and limited resources to provide adequate housing to all populations. Humanitarian crises, conflict, natural catastrophes, and, more recently, climate change are all variables that contribute to informality. These factors contribute to the occupation of vacant lots and the self-construction of housing on public, communal, and private land; the unlicensed division and private sale, communal, and public land by observers; the development of irregular and/or extra-legal public housing projects; the unauthorized subdivision of previously legal plots for the construction of additional buildings outside of existing codes and plans; and the occupation of riverbanks, reservoirs, and mountaintops. Smaller-scale acts of urban informality include the construction of houses that do not follow building requirements, the violation of zoning regulations on legally owned property, and the use of property for prohibited activities.

The success of urban planning is a major factor in the prevalence of informality in cities. As a result of their well-established planning systems, urban informality in wealthy countries is limited. In contrast, due to weak planning and governance capacities, a significant and growing part of urban growth in poor countries is informal.

1.2 COMMON MISCONCEPTIONS ABOUT URBAN INFORMALITY

Misconceptions and prejudices about urban informality frequently impact not only public perception but also political viewpoints. It is commonly assumed, for example, that the lack of a legal property title indicates that a parcel of land was purchased outside of the market. The majority of the informal land, on the other hand, came via market transactions in which speculators misled buyers about the land's existing and/or prospective legal status. Throughout fact, informal land occupations, which were popular in the twentieth century across the Global South, are now rare.

Furthermore, it is frequently considered, mistakenly, that informal settlers invest little or no money in housing. However, this isn't the case. People living in informal settlements spend more money on housing than those in the formal housing market when costs are adjusted for location, lack of infrastructure and connectivity, cost of basic needs such as water, and land price, which is often as expensive as in well-established neighborhoods. Informal development, on the other hand, allows for the purchase of smaller lots than those recommended (reducing overall prices), the gradual construction of dwellings (spreading costs over several years), and the avoidance of fees associated with adhering to construction standards and legislation.

Another widely held misconception is that only the poor live in informal settlements. This is not the case, as evidenced by a number of studies. In comparison to formal communities, the socioeconomic mix of older and more consolidated inner-city slums is more diverse. Despite having the financial means to shift, residents in densely packed informal urban settlements with official occupations and legal ownership of their homes frequently reject. This is often due to the communities' attractive locations, near proximity to employment centres, and strong social networks that long-term inhabitants belong to. Informal inhabitants, like formal residents, aren't bound to their communities and frequently move in and out as their economic circumstances change or as they seek to maximize benefits in both formal and informal real estate markets. In addition, as various researchers have pointed out, when the middle and upper classes acquire valuable land in protected natural regions, they may engage in informal development, or land use planning not restricted by land use plans.

1.3 GLOBAL TRENDS

While widespread poverty is often connected with urban informality, contemporary trends suggest this is not necessarily the case.

1.3.1Urban informality and poverty in numbers

Far from being a transitory fad, urban informality is closely tied to urbanization, according to recent trends.

- Around a quarter of the world's urban population lives in informal settlements.
- In Latin America, informal settlements are growing at a faster rate than poverty rates
- In Latin America, between 50 and 75 percent of informal settlements are the result of illegal land appropriation.
- Large-scale activities associated to the United Nations' Millennium Development Goals improved living conditions in informal and low-income settlements throughout the Global South between 2000 and 2010.
- Cities in the Global South account for 90 percent of urban expansion, with

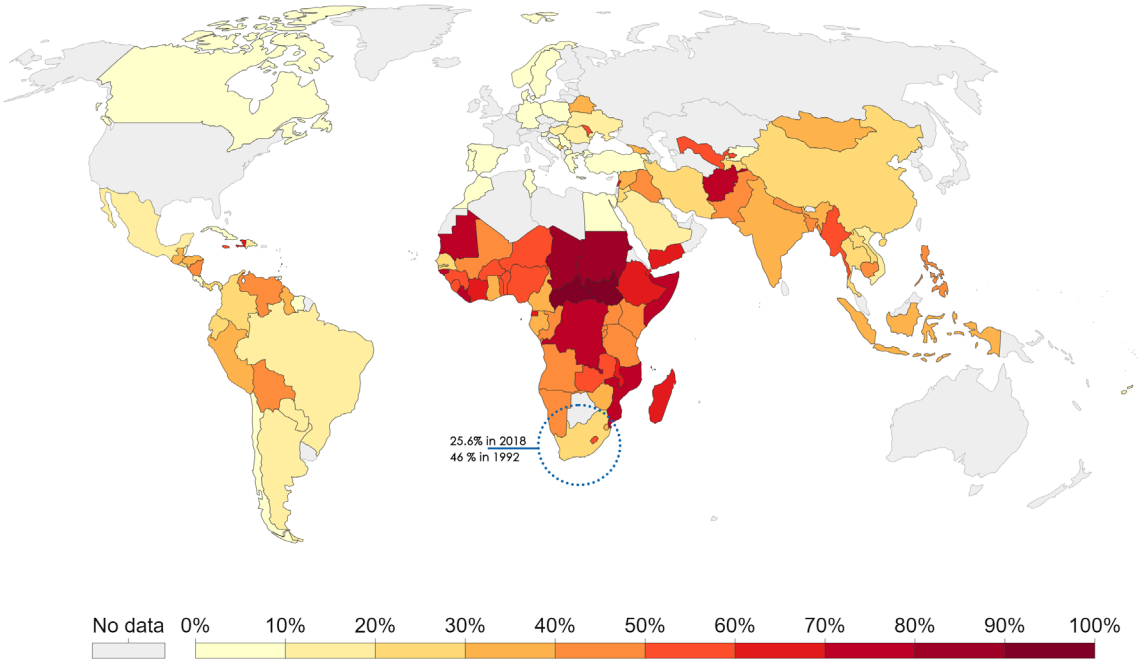


Figure 3. Share of urban population living in slums, 2018.
Source: (UN, 2019)

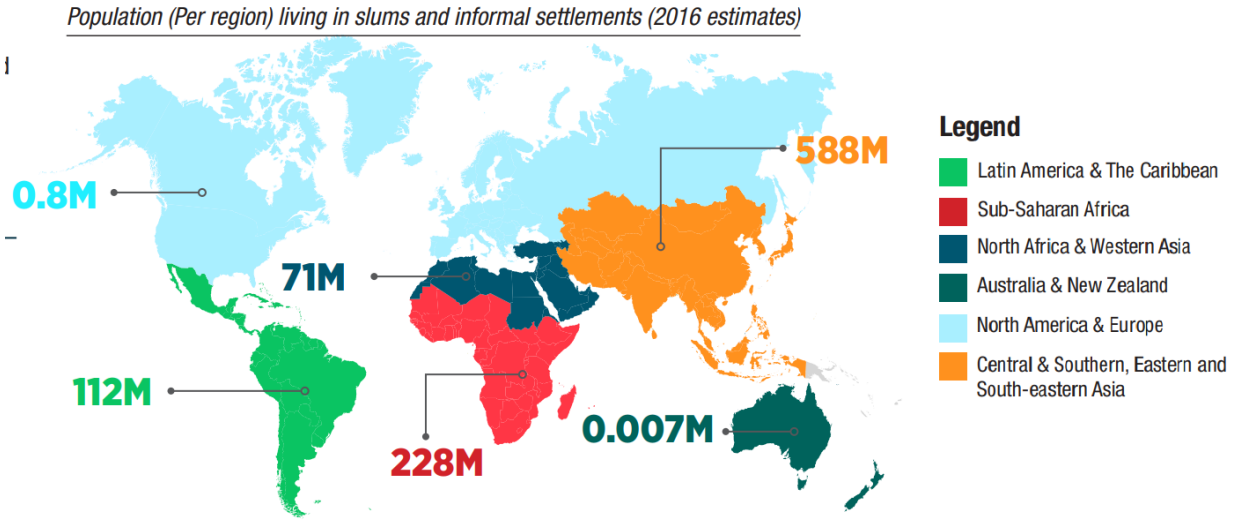


Figure 4. Population (per region) living in slums and informal settlements (2016 estimates) Source: (UN HABITAT, 2020)

their populations increasing by seventy million people each year.

- In Africa, informal settlements account for a greater portion of the urban population (61.7%).
- Squatter camps account for 30% of the population in Asia, which hosts half of the world's population.
- In Latin America and the Caribbean, where regularization policies have been in effect for decades, 24 percent of the urban population lives in squatter camps.
- Inequality is also prominent in wealthy countries' metropolitan centers. Approximately 6-7% of Europe's population is unable to afford adequate housing. Many people in the United States live in extreme poverty or slum conditions.
- Inextricably related are the rise of informality and the paucity of affordable housing for low-income people. While private real estate and housing investments for middle- and upper-income groups have expanded in recent years,

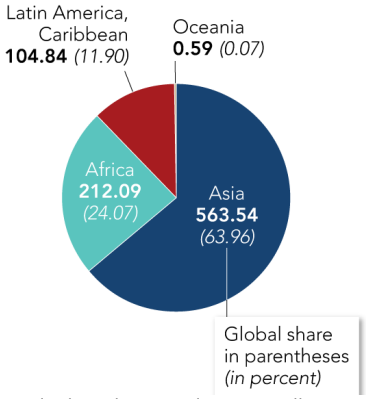


Figure 5. Regional urban slum population in millions ; Source: (UN HABITAT, 2020)

there has been little development in more affordable homes for the poor.

1.4 PROBLEMS RELATED TO URBAN INFORMALITY

While urban housing informality takes numerous forms, there are some parallels and challenges that arise from the legal and physical limits that informal settlers face. These issues can be found in the social, economic, health, environmental, and cultural realms. Despite the fact that alternative nomenclature is used to characterize informal urban development, the United Nations' definition of "slums" is utilized in this section. Although these issues are most prevalent in the Global South, they can also be found in impoverished and slum-like communities in the United States and other industrialized nations. Slum families, according to the UN Environment Programme, are those that lack at least one of the following:

• Permanent, long-term shelter that is resistant to unfavorable weather conditions.
• Enough living space, with no more than three individuals sharing a single room.
• Affordably priced access to safe water in significant quantities.
• Access to proper sanitation, such as a private or public bathroom that can accommodate a suitable number of people.
• Tenure security that avoids forcible evictions

Informal settlement residents face higher economic, social, and spatial isolation than other urban groups, and hence are unable to take advantage of crucial facilities accessible in other urban contexts. For example;

- Residents of informal settlements frequently endure physical marginalization and difficulties getting jobs due to their communities' remote locations and a lack of suitable transportation services and infrastructure.
- Health risks and other challenges result from a lack of basic utilities like water, sanitation, power, and cooking fuel. Infections are increased when people are exposed to human waste, rodents, and wastewater, for example.
- In the same way, a lack of fuel and power causes additional public health problems, such as respiratory problems caused by indoor fossil fuel combustion. This is especially true for mothers and children who spend the majority of their time inside.
- Homes in poor condition are more exposed to the elements, fires, dust, and crime.
- Because informal settlements are typically located in dangerous regions, such as along streams, on slopes, or near to industrial activity, residents are exposed to a variety of environmental threats such as floods, mudslides, fires, air, water, and ground pollution.
- Living in a slum reduces one's life expec-

tancy significantly. Around the world, 20 percent of the poorest urban population has a life expectancy of 55 years, while 40% of the wealthiest have a life expectancy of 70 years or more. Similarly, infant mortality is twice as high in the lowest 20% of the population for children aged 5 and under.

- A lack of essential public utilities has societal ramifications. For example, informal urban settlements with no streetlights or suitable recreational spaces had a greater rate of crime among young residents.
- Uneven street layouts make it more difficult to reach law enforcement and emergency personnel.
- There are also a lot of social stigmas. According to studies, having an address associated with a slum or not having an official address limits one's ability to get work and access services.
- The inability to obtain loans, accumulate wealth, pass property to offspring, and engage in other financial operations is further hampered by the lack of legal ownership.
- There are also political and financial vulnerabilities. Informal residents, for example, may be enticed to participate in fraudulent schemes in the hopes of attaining legal tenancy of their land, or they may be convinced to support politicians and social leaders in exchange for promises of tenure security and infrastructure improvements.

1.5 FACTS AND FIGURES

- More than Four billion people live in cities around the world. According to the United Nations, 2007 was the first year in which more people lived in cities than in rural regions.
- Urban population estimates differ, owing to differences over the precise definition of a 'urban area' and what it comprises.
- In urban locations around the world, little under Slum dwellers account for 1/3 of the population.
- For the majority of human history, people lived in rural areas with low population density. Urbanization is a phenomenon that has only occurred in the last few centuries.
- More than 2/3 of the world's population is expected to reside in cities by 2050.
- By 2050, it is expected that about Seven billion people will live in cities.
- As people become wealthier, they tend to shift from rural to urban areas.
- In urban locations, living standards are generally higher.
- The expanding worldwide housing problem is fueled by a number of facts:
- There are 1.6 billion people who do not have access to decent shelter.
- Currently, one out of every seven people on the earth lives in a slum.
- According to current projections, one out of every four people will be residing in a slum by 2030.
- In developing countries, one out of ev-

ery three people lives in a slum.

- Slums are home to up to Ninety percent of the urban population in some nations.

The expanding worldwide housing problem is fueled by a number of facts:

- One and over a half billion people do not have access to suitable housing.
- Currently, one in every seven people on earth lives in a slum.
- According to current projections, one out of every four people would be living in a slum by 2030.
- One out of Three urban residents live in slums in developing countries.
- In some countries, as much as Ninety percent of the urban population live in slums.

Unsafe and/or unhealthy housing is a common feature of slums.

. For example no windows, filthy floors, leaky walls and roofs

- Overcrowded homes
- Access to essential amenities such as water, sanitation, electricity, and transportation is limited or non-existent
- Homes are unstable: flimsy constructions are commonly blown away or damaged during storms and earthquakes.
- Tenure of land is unreliable (i.e., the land rights to live there).

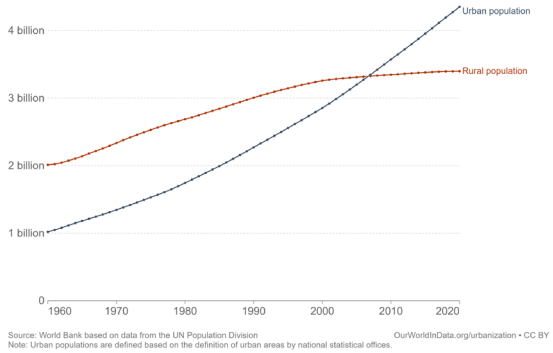


Figure 6. Share of urban population living urban and rural areas, 1960 to 2020, 2018
Source: (UN HABITAT, 2020)

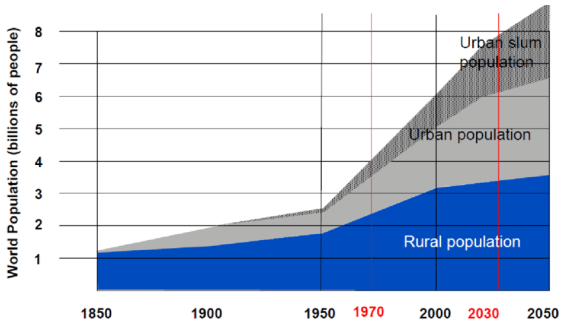
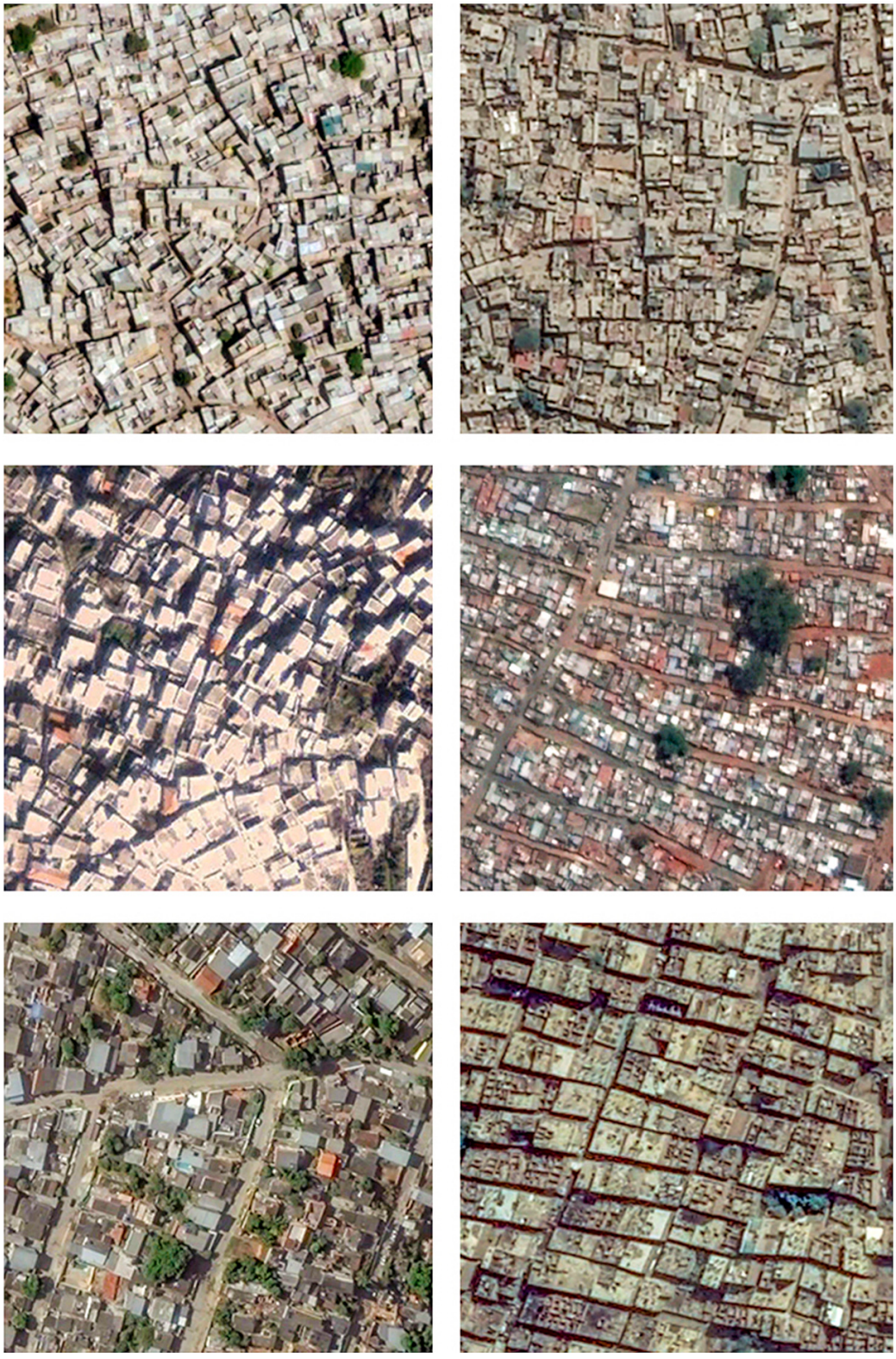


Figure 7. Rural, Urban and Urban Slum population- projected 2050
Source : Fritsche, Uwe & Eppler, Ulrike & Laaks, Sabine. (2015). Urban-Rural Linkages and Global Sustainable Land Use.

Figure 8: Informal morphologies (200 · 200 m scale) - locations include Buenos Aires, Caracas, Cairo, Jakarta, Johannesburg, Karachi, Lima, Manila, Mumbai, Nairobi, Rio de Janeiro and Skyros (Photos: Google Earth).

Source: Habitat International



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Source: Habitat International

Why Africa?

1.6 THE GROWTH OF URBAN INFORMALITY IN AFRICA

The African continent was chosen for this study because, according to Cities Alliance, "Africa's urban population is predicted to quadruple to an estimated 1.5 billion people in the next 30 years." Between now and 2050, nine countries, four of which are on the African continent, will account for over half of world population growth. Rapid urbanization is already posing significant social, environmental, and economic issues for national and local governments, as well as the general public. Due to the rapid migration of people into cities and other structural challenges, local and municipal governments frequently fall behind with their spatial planning and infrastructure construction.

Around Sixty percent of the urban population in Sub-Saharan Africa lives in informal settlements, and about Seventy five percent of basic requirements are met informally. According to predictions, the number of informal settlements will grow in the following decades. Why is the phenomena of urban informality persisting or resurfacing (if it ever faded) in Africa's urban landscape? This condition has been attributed to a number of issues in the literature, including urbanization, local planning capacity, planning ignorance, and the creation of ineffective policies.

Figure 9 : South Africa's Location and Illustrative Map
Source: By Author

Figure 10 : African urban-cities
Source. (Via Wathi)

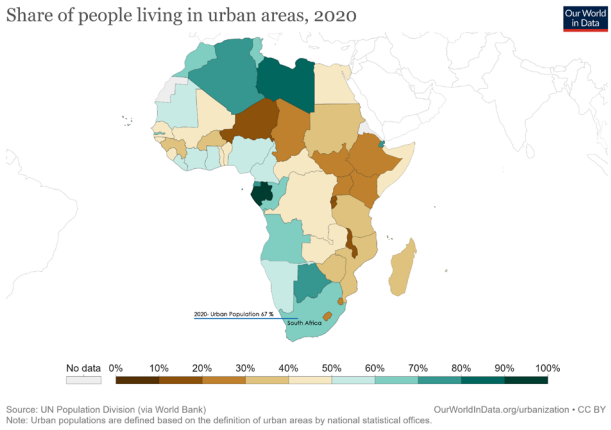


Figure 11 : Share of people living in urban Arica - 2020.
Source: UN. (Via World Bank)

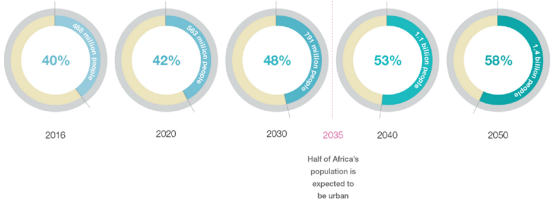


Figure 12 : Africas urban population growth 2016-2050
Source: United Nations World Urbanization Prospects, IFs version 7.22

Why South Africa?

1.7 SOUTH AFRICA AND THE HOUSING BACKLOG

By 2014, 23% of South Africa's urban population was living in shacks, which are often made of tin and other materials and are poorly constructed. It is hazardous and unpleasant to live in an informal village in South Africa. Sanitation and plumbing are frequently unavailable, as is running water and power. In addition, over the last ten years, urbanization has increased the number of South Africans who rely on informal lodging.

.

While the current housing problem has its origins, at least in part, in previous policies, the fact of more than 7million South Africans living in informal settlements must be accepted. With a housing land of nearly over a million units in urban areas, there is little choice but to accept that a significant section of people will remain informally housed for the foreseeable future. As a result, the government and the private sector must collaborate to support informal housing delivery systems, leveraging them imaginatively to meet the housing shortage. Simultaneously, informal housing must take place in a livable, safe, and healthy environment.
Both service as well as site plans and in-place upgrades will need to be widely marketed as housing strategies to achieve this. When Peter Joubert writes, he confesses his acceptance of the current harsh reality.

One of the key challenges facing South Africa for the rest of this century and into the next will be how we react to the needs of these communities. We could bulldoze the shacks in the hopes of displacing the occupants, but they will merely reappear somewhere else, more dilapidated, desperate,

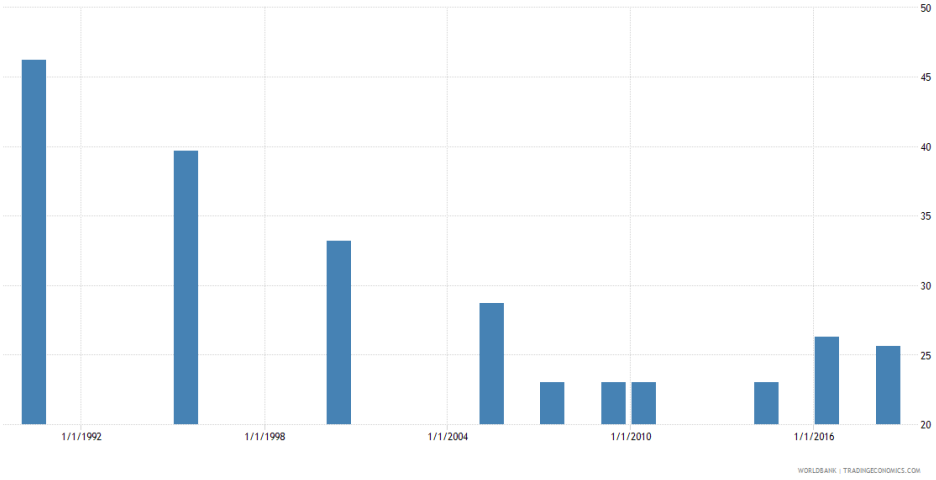


Figure 13 : Percentage of people living in slums in South Africa
Source: Based on data taken from UN Habitat.

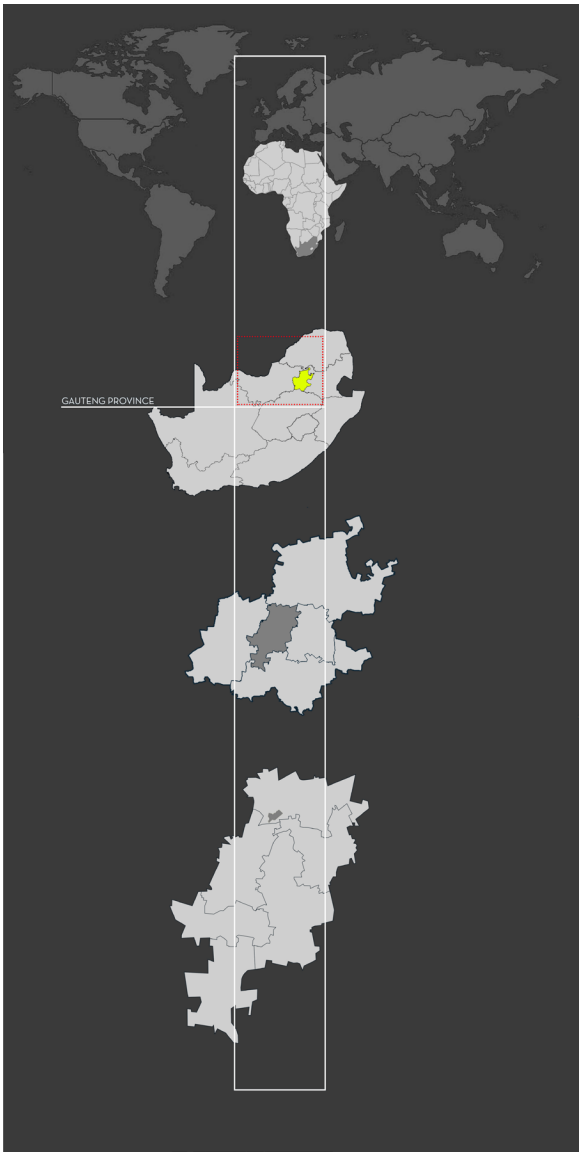


Figure 14 : Gauteng Province Location and Illustrative Map
Source: By Author

and aggressive. We could ignore them, but they will eventually become a health hazard and a financial drain on our formal cities if we do. Alternatively, we may put our resources and expertise to good use and turn this tremendous surge of human energy into a beneficial part of urban and economic development.

Informal housing, in all of its forms, is an important part of South Africa's urban landscape that can no longer be overlooked or disregarded.
The progressive South African Constitution in 1996 declared that every South African has the right to decent housing. Section 26 establishes that everyone has the right to appropriate housing. With an ever-increasing urban population, the growth of informal settlements in South Africa will necessitate collaboration between the government and non-governmental organizations to identify safer alternatives.

1.7.1 Historical Analysis

Informal settlement has appeared in many forms during the course of this century, and it is currently expanding at an unprecedented rate. The government's reaction to informal settlements has also changed over time and has been influenced by larger political goals. The following phases can be identified in broad terms:

- Before 1923: The Public Health Movement and Early Urbanization
- 1923- 39: The Native Urban Areas Act

(influx control and racial segregation)

- 1939- 48: Rapid urbanization and the proliferation of informal settlements
- 1948- 67: Apartheid, mass housing and the destruction of informal settlements
- 1967- 79: The housing crisis and the resurgence of squatter camps
- 1979- 85: Self-help housing and the gradual acceptance of black urbanization
- 1986- 90: The policy of orderly urbanization
- After 1990: Democratization and urban reconstruction

1.7.2 The Reconstruction and Development Programm

The ANC administration established the Reconstruction and Development Programme in 1994, which established a government-funded housing program for low-income individuals. As part of the program, the government built about two million brand new basic government residences between 1994 and 2005. Since the program's inception in 1994, the government has built approximately four million dwellings and distributed them to low-income families and individuals.

Figure 15. Gauteng mismanaged: Ekurhuleni, Johannesburg, and Tshwane regions
Source: Alexandra (Photo: Gallo Images / Sharon Seretlo)

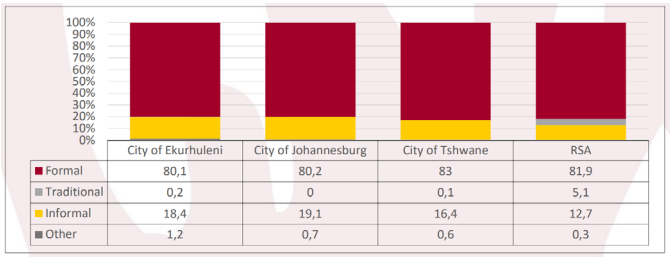
However, in recent years, progress has stalled, and the government is struggling to meet demand for RDP houses. Some parts of the country,

Long wait times for free government housing have resulted from housing backlogs. The persistence of slums in and around South Africa's cities and townships has been fostered by this issue. In South Africa, informal settlements have expanded in size and population during the last several decades.

Why Johannesburg?

1.8 JOHANNESBURG AND THE SHARE OF INFORMAL SETTLEMENTS

Johannesburg is the wealthiest and largest city in South Africa's Gauteng province. It is one of the world's top 50 cities. It is the preferred destination for workers from all across the continent because it is the continent's economic powerhouse and has a dual urban structure. All of these causes contribute to the city's rapid urbanization. Unexpected increases in urbanization, poor planning, and growth have put a significant strain on natural and economic resources in cities. Various structures and townships have been built on top of agricultural grounds, resulting in increased buildup areas. In addition to the major city, urban sprawl is spreading to the periphery. As a result, it is critical to comprehend the intricate interplay between Johannesburg, South Africa's fast increasing



	City of Ekurhuleni	City of Johannesburg	City of Tshwane	RSA
Formal	80,1	80,2	83	81,9
Traditional	0,2	0	0,1	5,1
Informal	18,4	19,1	16,4	12,7
Other	1,2	0,7	0,6	0,3

Figure 1: Percentage of households that live in formal, informal and traditional dwellings by Gauteng metropolitan area and in South Africa as a whole, 2019

Table 1 : Percentage of households living in formal and inforaml and traditional dwellings
Source. State of human rights in Gauteng REPORT 2020/2021

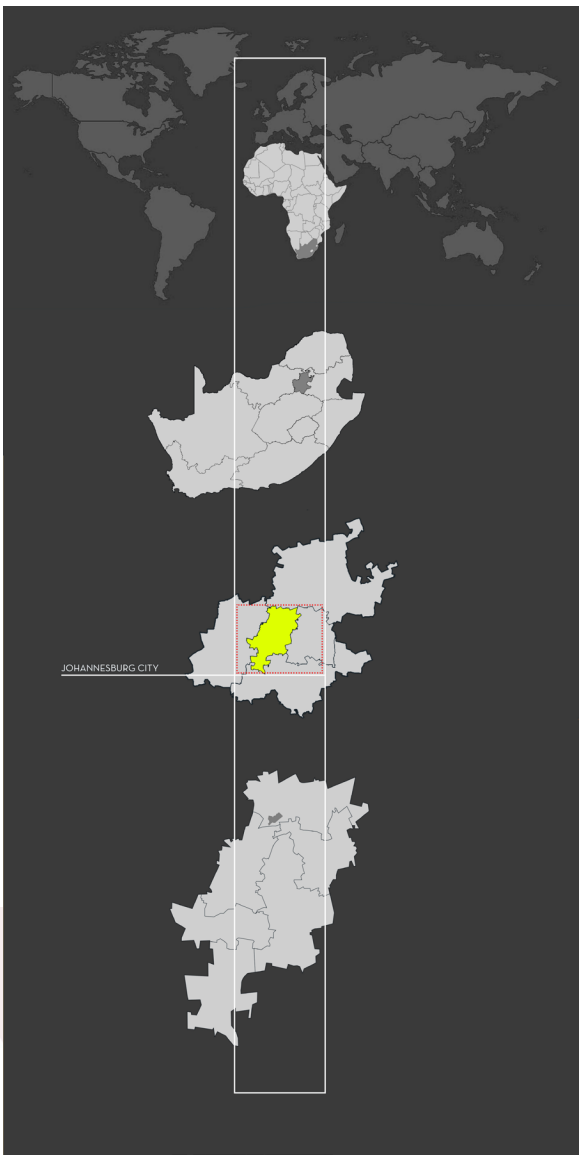


Figure 16 : Johannesburg City Location and Illustrative Map
Source: By Author

urban agglomerate and its surrounding bio-physical systems.

Moreover, many methods were used to discourage urbanization in South Africa during apartheid. As a result, there was an unmet demand for access to urban regions. South Africa experienced a rise in urbanization following the end of apartheid, owing to the need to supply pent-up demand. Much of this expansion took place in South Africa's metropolises, especially Johannesburg. Johannesburg is still growing, though at a slower pace, according to population data from the 1996, 2001, and 2011 censuses.

According to population data from the 1996, 2001 and 2011 censuses, Johannesburg is continuing to grow, although at a decelerating rate.

According to the most recent General Household Survey conducted by Statistics South Africa, 16.8% of households in South Africa's metros live in informality – in other words, in makeshift, mostly corrugated tin, or traditional dwellings, mostly clay and thatch dwellings, with limited access to water and sanitation and, in many cases, electricity in the dwelling. The percentage of households living in poverty in Gauteng's three metros is 18.4 percent in the City of Ekurhuleni, 19.1 percent in the City of Johannesburg, and 16.4 percent in the City of Tshwane. In Gauteng's metros, the percentage of families who rely on shared and communal taps to receive water is 8% in Ekurhuleni, 7% in Johannesburg, and 3% in Tshwane. The percentage of households without power in the City of Ekurhuleni is 20.2 percent, 29.2 percent in the City of Johannesburg, and 15.1 percent in the City of Tshwane.

	Ekurhuleni	Johannesburg	Tshwane
Total number of households in the municipality	1 283 162	1 925 389	1 187 664
Number of households with access to electricity	1 024 568	1 363 728	1 008 720
Number of households without access to electricity	258 594	561 661	178 944
% of households without access to electricity	**20,2%**	**29,2%**	**15,1%**
Number of households with the main source of drinking water piped (tap) water on community stand: distance less than 200m from dwelling/institution	103 581	137 852	36 404
% of households using a shared, communal tap for water	**8,1%**	**7,2%**	**3,1%**

Table 1: Gauteng metro indicators, 2019[4]

Table 2 : Number of Households and the availability of basic Services
Source. STATE OF HUMAN RIGHTS IN GAUTENG REPORT 2020/2021

Why kya Sands?

1.9 KYA SANDS

The Kya Sands informal settlement/slum is one of the 189 registered informal settlements under Johannesburg's administration. Many slums and informal dwellings in Johannesburg, like Kya Sands, lack basic services and amenities. Kya Sands is a high-density informal colony with a population of over 34,000 people (estimated). In some informal settlements, slum intervention programs for slum upgradation are not working, necessitating the introduction of new tactics and approaches, such as the supply of in-situ home upgrades to enhance living circumstances. Cities in Africa cannot expect to develop if the majority of citizens live in huge informal settlements with no hope of change beyond basic utilities.

In post-apartheid South Africa, the project-linked capital subsidy program (often known as the 'RDP housing subsidy') under the National Houses Subsidy Scheme has been used to give land, housing, and services to households in informal settlements. Because this funding method was meant for development on vacant land, it has been difficult to use to upgrading or improving living conditions in existing informal settlements without removing and redeveloping them.

By 2003, it was widely recognized as a policy gap because there was no specialized subsidy scheme in place to allow in situ upgrading of informal settlements with little

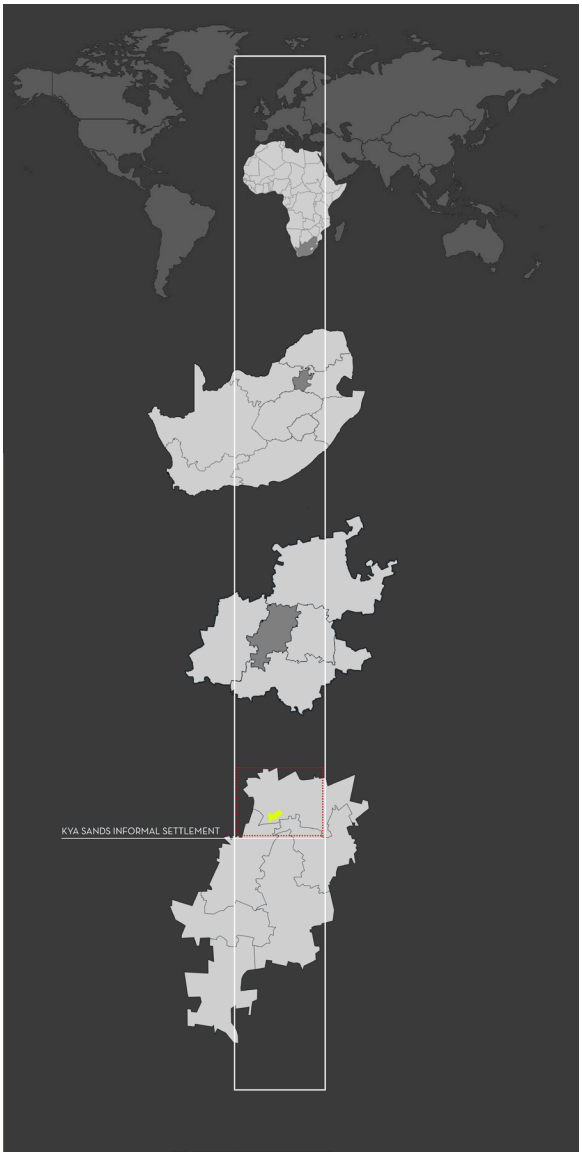


Figure 17 : Kya Sand settlement Location and Illustrative Map
Source: By Author

damage to existing residents' livelihoods (Marx 2003). As a result, the national Department of Housing included it in its 2004 Breaking New Ground Strategy (commonly known as "BNG"), which aimed to offer "more responsive systems that addressed the multidimensional needs of sustainable human settlements.

However, the Upgrading of Informal Settlements Programme was not implemented by provincial and municipal administrations. We recognize that some regions, like as the Kya Sands informal settlement, require upgrading and long-term tenure security. Furthermore, we feel that Kya Sands informal settlement should be acknowledged as a distinct type of settlement rather than being labeled as "informal settlement" as a result of incremental design and in situ upgradation.

Problem statement and Research questions

1.10 PROBLEM STATEMENT

The cities in Southern Africa have a dual urban form. This structure was inherited from colonial regimes, in which semi-urbanized areas coexisted alongside urban centers, all of which provided adequate living circumstances. Semi-urbanized communities lack basic infrastructure and utilities, and the majority of the population is low-income. Only 33% of the overall population now lives in rural areas, according to a recent report released in Johannesburg by the South African Institute of Race Relations (SAIRR). In 11 years, the number of people living in rural areas declined from 48 percent to 38 percent, while the population of urban areas expanded from 52 percent to 62 percent. Higher economic growth in metropolitan areas, as well as post-apartheid freedom of movement, were highlighted as the key precipitates of the trend by SAIRR, which attracted people looking for work.

Currently, 23% of South Africa's urban population lives in informal housing settlements or "shacks," which are typically made of tin and other low-cost materials. In South Africa, living in informal settlements is unsafe and unpleasant. According to the 2009/2010 Informal Settlement Atlas, there are 2,628 informal settlement polygons spanning 70 municipalities in the country. Informal settlements have been an important aspect of Johannesburg since its inception, dictating its evolution to some extent and frequently being displaced by formal development then reappearing elsewhere.

Kya Sands, which has existed since the late 1980s, is possibly the largest informal settlement in Johannesburg's north-west. The position of the Kya Sands settlement within the guarded landscape is a prime example of post-apartheid South Africa's urban disparity. As a result of the expanding population of Kya Sands settlement, which will face a space deficit for the next decade, and considering their social life, the community will no longer be able to keep their families on the property

Approximately 1 billion people live in slums, encampments, or informal settlements around the world. Eastern and South-Eastern Asia (370 million), Sub-Saharan Africa (238 million), and Central and Southern Asia (227 million) account for 80% of the population. By 2030, it is anticipated that 3 billion people will require suitable and affordable housing. Even in the best of circumstances, the living conditions in these squatter camps are frequently deplorable. The neighborhoods are overcrowded, and residents lack access to clean water, sanitation, and a consistent source of income.

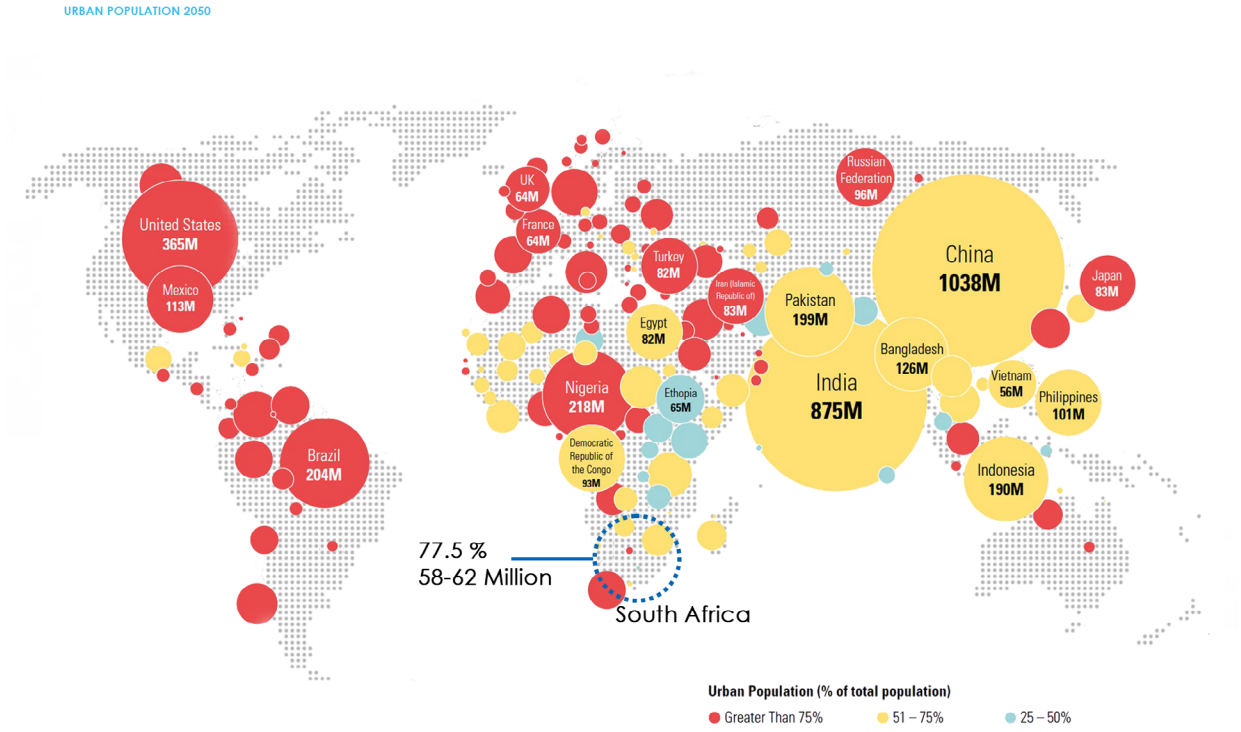


Figure 18 : Urban Population 2050.
Source: UNICEF.

Informal settlements are the world's most widespread form of urbanization, accounting for one-third of all urban areas. With the rise of urban populations comes the growth of informal settlements, slums, and poor residential districts around the world. Certain populations are disproportionately affected by living in informal settlements. Informal settlements are generally found on the outskirts of cities, with limited access to markets and resources. By 2050, Africa's 1.1 billion people will have doubled in number, with more than 80% of the growth taking place in cities, particularly slums. This urban growth has caught Africa off guard.

1.11 RESEARCH QUESTIONS FORMULATION

It is of importance that the questions formulated at the beginning of our thesis research be designed to be clear, unambiguous, and clearly structured, as this will determine both the direction and focus of our thesis. Which are.

1. What strategies can be proposed to deal the unplanned growth of Kya Sands informal settlement for its dense population?
2. What physical interventions can be made into the informal settlement of Kya Sands to improve its housing quality, urban services (water, sanitation, energy, waste management, storm-water drainage, etc.), environmental issues (health and flood risks), and connections with neighborhood and the city of Johannesburg?
3. What are the design guidelines available for upgrading Kya sands informal settlement?

1.12 OBJECTIVES OF THE PROJECT

The six parallel work streams from research questions making up the project aim at providing some strategies and guidelines for the upgrading of Kya Sands informal settlement in Johannesburg, South Africa.
Eventually the strategies and guidelines proposal of the project will develop a preliminary masterplan for Kya Sands informal settlement. The objectives of proposed strategies are.

- To improve Kya Sands informal settlement's internal and external connections.
- To provide a planned pattern for streets and set guidelines for horizontal and vertical growth.
- To enhance urban services for Kya Sands informal settlement like water supply, waste management, storm water drainage and sanitation.
- To upgrade housing quality with provision of good structure, enabling mixed use to preserve the overlapping uses of livelihood/economic and residential.
- To propose facilities such as space for community events, agricultural gardens, health, and educational services.
- To upgrade the north riding stream for better drainage and to act as green landscape for sports and leisure activi-

ties. Moreover, to provide proper waste management system for the community.

1.13 RESEARCH METHODOLOGY

The research methodology approach adopted for this project is a mixed method approach that covers both aspects of qualitative and quantitative data.

The methodology for the preparation of this thesis was conducted in 3 distinct phases.

Phase 1: Data Collection

Primarily this involves two types of data collection. i.e.

Primary Data:

Creating base maps for informal settlement of Kya Sands with surrounding neighborhoods using QGIS, cataloging its typologies i.e., Residential, Industrial, Commercial, Green spaces, water bodies etc. It also involves acquiring relevant data from Open Street Map, OpenAFRICA, iGISMap,
A random sampling technique is adopted, and 10 interview questionnaires are distributed to slum dwellers/residents of Kya Sands informal settlement with help of a private NGO- Juda Africa, which is working for Kya Sands informal settlement.

Secondary Data:

Secondary data is collected from literature and various internet sources to provide a baseline of the general perspectives about South Africa regarding urban informality, an overview of city of Johannesburg, its terri-

torial framework and mainly about Kya Sand informal settlement, its current situation, and future government plans thereof.
The analytical data is taken from relevant case studies to analyze Kya Sands future development plans.

Phase 2: Situational Analysis

This phase involves the analysis of detailed information about Kya Sands informal settlement. i.e.

a- Socio-economic analysis

This section specifically considered the socio-economic attributes of households of Kya Sands informal settlement.

b- Spatial characteristics

The spatial characteristics includes aspects such as existing land uses in Kya Sands region.

c- Infrastructure network

This section discusses the analysis of existing and planned transportation network of Kya Sands region and its all modes of public transportation (BRT, bus, taxi) in connection with its neighborhood and city of Johannesburg.

d- Environmental issues

This part includes determining environmental issues affecting residents of Kya Sands informal settlement. In particular, environmentally vulnerable areas to health risk.

Phase 3: Development Concept and Vision Statement

The vision phase includes defining objectives and strategies for the upgrading of Kya Sands informal settlement. These objectives and strategies focus on core issues of Kya Sands informal settlement like unplanned growth, poor and lack of urban services (water supply, sanitation, waste management, storm water drainage), poor housing, insufficient commercial/mixed use facilities etc.

Literature Review Part 01

Chapter 02

Theoretical Framework

2.1 URBAN INFORMALITY

In contrast to the glass and steel that earlier generations of urbanists had imagined, the cities of the future are primarily built out of unfinished brick, straw, recycled plastic, cement blocks, and discarded wood. Much of the metropolitan world of the twenty-first century dwells in squalor, surrounded by pollution, filth, and decay, instead of cities of light ascending toward heaven.

The 'informal' city, where not-quite-urban citizens live in squalor and illegitimacy, has been the focus of decades of research and policy, with 'slums' generally represented as the embodiment of the 'informal' city, where not-quite-urban residents' dwell in squalor and illegitimacy. Places ravaged by depravity, criminality, and squalor are depicted in the above quote. They are following a thread that can be found running through scholarly and policy debates on urban informal settlements, in which these areas are tacitly divorced from the concept of the city: they are perceived as elsewhere, nowhere, and other. However, in informal settlements, typical stories of everyday urban life survive alongside the cramped living circumstances. For the residents of these areas, they are home, the setting for both ordinary and exceptional happenings; nevertheless, due to the widespread use of overwhelmingly negative depictions of urban informal settlements, these 'everyday' experiences are generally ignored. In fact, notions that 'other' these neighborhoods have practical consequences and are part of residents' daily lives in the city.

Around one billion people live in urban informal settlements around the world, which are mostly developed by the locals themselves. These sites, on the other hand, are frequently discounted, unrecognized, labeled illegal, and vilified. Exclusion and 'othering' of informal settlements through geographical and social marginalization are common in cities where they flourish, as mentioned above. Despite years of research and policy activities on urban informal settlements, academic and policy discourses continue to fail to comprehend them.
Africa's urban population has doubled in the last decade and is expected to triple between 2010 and 2050, thanks to the world's highest urbanization rates. With seven megacities and a fast-growing number of minor cities, the change of this traditionally rural continent into one dominated by urbanization is obvious.

An increasing body of scholarship addressing Africa's 'urban revolution' has evolved during the last two decades. The moti-

vations, scale, pace, and nature of urban growth in Africa are substantially different from the experience and historical patterns of urbanization in the North, which is an important strand of this work that sets it apart from classic and conventional urban research and theory. African urbanisms have several characteristics, including urbanization without industrialization, high natural growth rates, and housing, employment, and basic services that are primarily generated without government interference or control. Many of the notions, models, and logics usually associated with urban growth and development – particularly connected to the function of the state, economy, and society – either do not apply or operate in very different ways, and hence must be rethought, reformed, or simply considered in their own right. The growing body of knowledge about African cities recognizes that this reality is part of a larger geographical realignment in urban studies that has occurred in recent years, with southern perspectives serving as new points of departure for theorizing the city, urban governance, development, and planning.

The need to better understand African cities in order to shape the continent's urban future is becoming increasingly recognized in policy circles, reflecting a global shift acknowledging the role cities will need to play if global development agendas like the Sustainable Development Goals and the New Urban Agenda, as well as agreements like the Paris Climate Agreement, are to be realized. The adoption of continental policies such as Agenda 2063 and national development plans with an urban orientation, as well as high-level support for these global agendas by African governments, indicate a significant watershed and a change from policies that are primarily focused on the countryside. Despite this discursive shift, there is still a disconnect between urban policies and practice. Local governments continue to lack the political, administrative, and budgetary tools and resources to appropriately plan, rule, and manage sustainable and inclusive cities and human settlements, while national governments across the continent are frequently indifferent to the concerns of urban inhabitants.

As a result, just a few African countries will fulfill global goals by 2030. A lack of data and expertise that can appropriately guide and monitor progress and execution of such plans and policies is just as obstructive as a lack of financial and technical resources. Indeed, most of the information generated in and about urban Africa does not directly address the difficulties faced by people who govern and are governed on the ground.

2.2 URBAN INFORMAL SETTLEMENTS AND MARGINALIZATION

One-third of the world's urban population lives in informal settlements, which are largely found in cities in the global South. Self-build homes, inadequate services, and low resident salaries are common characteristics of such communities, which are typically specified in academic literature. The phrase 'urban informal settlement' is difficult to define precisely because it is vulnerable to many varied interpretations in scholarly and policy debates. Furthermore, the term "informal," which generally refers to a lack of regulation, has been applied to a wide range of overlapping social sectors, including labor, trade, and infrastructure. The term 'informality' has been applied to entire societal sectors, including work, housing, infrastructure, and trade, among others. Because this is the subject of the study, the literature studied focuses mostly on urban informal settlements. Unless otherwise stated, the term 'informality' refers to human settlements, whereas 'the informal sector' refers to a broader range of informal activities.
Many scholars point out how difficult it is to use a single term to describe the many different types of low-income housing that exist throughout the global South. The favelas of Rio de Janeiro, the bustees of Calcutta, and the barriadas of Lima are examples of these types of settlements, which may be found on the outskirts and in the heart of numerous cities. High levels of urbanization, whether based on migration or other types of urban growth, and a lack of appropriate housing (and land) provision are widely accepted as contributing factors. However, factors like as ownership, land transfer and tenure, as well as infrastructural levels, influence the wide range of settlement forms. Indeed, the myriad types of informality, as well as the fact that different definitions reflect diverse philosophical views, may be at the foundation of the definitional difficulty.
Conceptually complicated and methodologically elusive,' then, are informal settlements. 'DIY housing, inadequate services, and gradual regeneration of neighborhoods through formation of local committees,' according to a fairly common academic conceptualization. Urban informal settlements as those that fall into at least two of the four categories listed below:

1) the majority of dwellings were erected by their occupants.
2) the settlement was originally unlawful or without planning authorization.
3) the settlement's infrastructure and services were originally deficient.
4) the settlement is occupied by the poor, whatever defined.

Meanwhile, UN habitat defines a slum as "a community in an urban area where more than half of the population lives in substandard housing and lacks basic amenities.
As a result, different reports highlight different aspects of urban informal communities. According to some estimates, up to 90% of

new housing in cities in the global South is built by local citizens. Others have claimed that the urban poor are the genuine architects and planners of these cities, claiming that illegal, mostly self-built dwellings continue to be the most common source of new city housing. Informal settlements, on the other hand, have been considered as a physical embodiment of urban poverty and inequality. Degrees of illegality in terms of land occupation and noncompliance with official regulations, in particular, are frequently highlighted as common factors, relating to the fact that informal settlements are typically built by their residents on marginal urban land, following invasion or illegal subdivision. This means they don't follow the rules, leading in tenure instability, whether due to a lack of legal titles or the prospect of eviction or other threats.

When groups or places are perceived as "relationally distant and relatively isolated from the "bulk" of the city and its principal activities," marginalization occurs. In the case of urban informal settlements, the impacts of marginalization, which include prejudice, poverty, and exclusion, are well-documented. Disease and death rates are greater in 'slums' than in 'non-slum' urban regions, according to UN-Habitat, along with other aspects of urban deprivation like inequality of access to services, housing, land, education, health care, and employment prospects. This comes amid rising inequality and marginalization in most major cities around the world, worsening insecurity and social unrest.

2.3 MAIN CONCEPTS ABOUT INFORMAL SETTLEMENTS

Informal settlements - are residential areas where residents lack security of land tenure or the dwellings they occupy, with modalities ranging from squatting to informal rental housing. The neighborhoods often lack, or are cut off from, basic services and city infrastructure, and the housing may not comply with current planning and building regulations and is often located in geographically and environmentally hazardous areas. Furthermore, for people of all income levels, affluent and poor, informal settlements can be a kind of real estate speculation. Slums are the poorest and most marginalized kind of informal settlements, typified by poverty and vast clusters of decaying homes, frequently in the most dangerous metropolitan areas. Slum inhabitants are continually subject to eviction, sickness, and violence, in addition to a lack of official supply of essential infrastructure and services, public space, and green places.

Socio-spatial exclusion – refers to the factors that contribute to individuals and groups being geographically marginalized as a result of where they reside and who they are. It is defined by a person's inability to access or successfully use a variety of facilities and services that increase well-being and enable them to take advantage of available possibilities. Because of their identity, which is physically expressed in urban contexts by

the presence of informal settlements, some groups and people frequently suffer disproportionate 'disadvantage.'
Environmental justice - refers to the dynamic link between poverty, ecosystem services, and pollution, in which vulnerable and impoverished urban inhabitants bear the brunt of environmental consequences disproportionately. Environmental justice attempts to prevent abuses of power in regard to natural resources, and it advocates for the poor's legal and social empowerment, as well as new approaches to sustainability, in order to ensure the quality of life of future generations.
Participatory slum upgrading – is a scientific approach aimed at addressing the urban development imbalances that slum inhabitants represent. It involves and involves all essential urban players, including all levels of government, community representatives, civil society, non-governmental organizations, academia, the private sector, and, most importantly, slum inhabitants, in the process of improving slum living standards. This multi-stakeholder platform is thought to be more likely to foster the essential relationships, governance structures, institutional frameworks, and financing choices that lead to inclusive planning and long-term outcomes. Slum dwellers, in particular, have significant knowledge, skills, and capacity to contribute to, drive, and own the upgrading process, and an inclusive approach to improving their living conditions leads to major socio-cultural shifts in the direction of a rights-based society.

2.4 FRAMING THE ISSUES OF URBAN INFORMAL SETTLEMENTS

Informal settlements, slums, and other impoverished residential areas are a worldwide phenomenon. Squatter settlements, favelas, poblaciónes, shacks, barrios bajos, bidonvilles exist in urban environments all over the world, in a variety of forms and typologies, dimensions, locations, and names (squatter settlements, favelas, poblaciónes, shacks, barrios bajos, bidonvilles). While urban informality is more prevalent in developing countries, housing informality and inadequate living circumstances exist in affluent countries as well. Informal settlements and slums are the result of a number of interconnected factors, including population growth and rural-urban migration, a lack of affordable housing for the urban poor, poor governance (particularly in the areas of policy, planning, land and urban management, resulting in land speculation and grabbing), economic vulnerability and underpaid work, discrimination and marginalization, and displacement caused by conflict, natural disasters, and climate change.
People living in informal settlements, especially slums, are more spatially, socially, and economically excluded from the benefits and possibilities of the larger urban environment than other urban dwellers. They face constant discrimination and extreme disadvantage, which includes geographical mar-

ginalization, a lack of basic services, poor governance frameworks, limited access to land and property, precarious livelihoods, and a high vulnerability to the negative effects of poor and exposed environments, climate change, and natural disasters due to the informal settlements' location. Since 2003, UN Member States have agreed to define a slum home as a group of individuals living under the same roof who do not meet one or more of the following five criteria:

1) access to improved water,
2) access to improved sanitation facilities,
3) sufficient living area – not overcrowded,
4) structural quality/durability of dwellings, and
5) security of tenure.

These '5 Deprivations' have an impact on slum inhabitants' lives and, since its agreement, have made it possible to measure and track slum demographics, however there is a considerable data gap when it comes to more generally defined informal settlements. The proportion of the urban population in developing countries living in slums has decreased from 39 percent in 2000 to 32 percent now (2010). Indeed, according to UN MDG estimates, a total of 227 million urban slum inhabitants in developing countries saw significant improvements in their living conditions between 2000 and 2010.
Slum dwellers' living conditions have also improved as a result of policy and programmatic responses by national and municipal governments, foreign development partners, and non-governmental and community-based groups. The passage of progressive and implementable urban development, affordable housing, slum upgrading, and land policies, for example, has fueled programmatic responses such as direct infrastructure provision, pro-poor financing options, and innovative partnerships for affordable housing solutions, informal settlements regularization, and slum upgrading programs. Despite these advancements, around a quarter of the world's urban population still lives in slums. Since 1990, the global population has grown by 213 million slum dwellers.

Over 90% of urban expansion takes place in developing countries, with an estimated 70 million new citizens added each year. The urban populations of the world's two poorest regions — South Asia and Sub-Saharan Africa — are predicted to quadruple in the next two decades, implying that the absolute number of informal settlement and slum dwellers in these areas will skyrocket. Over half of Africa's urban population (61.7 percent) lives in slums, and the continent's urban population is expected to grow from 400 million to 1.2 billion by 2050. Slums are home to 30% of the urban population of Asia, which has half of the world's urban population. Asia, on the other hand, was at the forefront of effective efforts to achieve MDG Target 11 Goal 7, with governments helping an estimated 172 million slum residents.
Despite a 9 percent decrease in recent years, informal settlements remain a signifi-

cant feature of urban areas in Latin America and the Caribbean, where regularization of informal housing has historically contributed to providing housing solutions. At least 24 percent of the region's urban population still lives in slums. The amount of substandard housing in the Arab world varies from country to country. In some nations, informal settlements and slum houses form isolated, marginalized areas, but in others, 67 to 94 percent of city dwellers suffer from one or more housing shortages. In several Gulf countries, for example, low-income migrant workers' housing circumstances are generally deplorable in comparison to the rest of the metropolitan population. Cities in developed regions are not immune to urban differences in their inhabitants' living standards. In Europe, for example, there has been an increase in the number of city dwellers who are unable to pay their rent, with housing costs growing especially quickly in the more prosperous metropolitan cities. This is especially true in the region's southern and eastern regions, where it is estimated that more than 6% of urban people in Western European countries live in highly precarious circumstances. Other developed regions' trends (North America, Australia, and New Zealand) indicate that considerable percentage of people live in contextually poor neighborhoods.

New slum inhabitants' ability to leave these damaged environments is still limited. For example, of the 10 million people added to Sub-Saharan Africa's urban population each year, two-thirds (7 million) reside in slums or informal settlements, with just 2 million expected to leave. There is a link between the rise of slums and informal settlements and a shortage of suitable homes and land. While private sector housing investment has remained consistent over time, it has not translated into pro-poor, affordable homes. According to some estimates, the annual affordable housing shortfall now amounts at $650 billion and is anticipated to widen.

The 'five deprivations' continue to depict the poor living conditions of slum inhabitants at the home level. For example, most slum residents still have no security of tenure and are constantly threatened with eviction, and their housing is constantly deemed highly precarious, with nearly three-quarters of them in Sub-Saharan Africa in this situation. Open sewer lines drain effluent in front of people's dwellings, and there are just one thousand public toilets to serve the whole slum population of more than 180,000 people in Kenya's major slum Kibera, in Nairobi. Slum conditions are hazardous to residents' health and make them more susceptible to infectious disease epidemics, which has a significant impact on slum dwellers' life expectancy. While the poorest twenty percent of city dwellers struggle to reach the age of 55, the wealthiest forty percent live to be well over seventy. Similarly, the under-five mortality rate among the world's lowest twenty percent of urban dwellers is more than double that of the wealthier urban quintiles.

Slums have an impact on city prosperity and long-term viability. While these areas

are recognized for providing much-needed mixed land use to cities and for having an active informal economy that, in many countries, provides the majority of jobs, these informal jobs are unskilled, low-paid, and insecure livelihood options, part of a 'subsistence economy' that allows residents to survive but not to progress sufficiently to change their living conditions or to realize the full potential contribution. Slums in urban areas have a genuine economic, environmental, and social 'cost,' which is reflected by a 'lopsided prosperity.'

2.5 INFORMAL SETTLEMENTS' ISSUES SUMMARY

- Many governments do not acknowledge the existence of slums and informal settlements, despite the fact that some do. This lack of notice and subsequent response immediately jeopardizes city-wide sustainable development and wealth, as well as resulting in forced evictions, to the disadvantage of millions of city people.
- Despite data demonstrating an inextricable link between location and the persistence of intergenerational poverty and economic inequality, informal settlements and slums continue to be spatially detached from broader urban systems and stay excluded from mainstream urban opportunities.
- Despite evidence of a relationship between land availability, cheap housing supply, and the frequency of informal settlements and slums, the global stock of affordable housing is falling. Furthermore, governments are gradually withdrawing from direct involvement in the provision of affordable housing, which has serious repercussions for the urban poor because the housing sector is vulnerable to speculative dynamics that benefit more affluent city dwellers.
- Homes finance alternatives for the urban poor have remained limited due to a lack of funding for large-scale affordable housing. Either the private sector's interests win out, or the financing arrangements fall short of housing demand. There are frequently ineffective municipal taxing structures and financial mechanisms for capturing land-value rises. Despite the essential role they play in allowing impoverished urban inhabitants to save and borrow, community-based finance options are also inadequate and distant from mainstream financial institutions.
- There is a scarcity of accurate, localized, standardized, and accessible qualitative and quantitative data on informal settlements and slums, as well as associated learning platforms. The aspects of residents' lives are often unclear to policy and planning responses because data is often ad hoc and not coupled to robust city-wide monitoring and evaluation systems. The lack of effective knowledge and capacity building platforms at the local, national, and global levels also hin-

ders effective knowledge and capacity building among urban stakeholders.

- Integrated development strategies, particularly those that combine urban planning, funding, and legal components relating to informal settlements and slums, are not prioritized at the national or local levels, and 'no forcible eviction' laws need to be institutionalized. As a result, marginalized populations continue to be disproportionately affected by policies, laws, and regulations.
- Despite being recognized as critical to sustainable housing provision and poverty eradication, efforts to enhance land management practice and adopt new notions of tenure security remain limited. Periurban areas present a unique governance problem because they frequently exist outside of traditional 'city/town' boundaries.
- The absence of government reaction to and support for livelihoods in slums and informal settlements, as well as their lack of integration into the greater urban environment, promotes long-term inequality and intergenerational disadvantage, particularly for women and youth.
- Many upgrading methods continue to import solutions from other areas without adapting processes to the local situation. As a result, they are unable to fully use local knowledge or generate city-wide/'at-scale' answers.
- Riverbanks; sandy and degraded soils, near industries and dump sites, in swamps, flood-prone zones, steep slopes — informal settlements and slums are often found in the most environmentally and geographically hazardous urban regions. Living in these locations, whose vulnerability is often exacerbated by climate change, is always life-threatening since there are no options.
- Living in an informal setting has a tremendous impact on specific groups, and their disparity is perpetuated merely by who they are, increasing their marginalization. Unskilled youth are excluded from economic and employment opportunities, people with disabilities suffer from slums' dilapidated infrastructure, and migrants, refugees, and internally displaced persons affected by conflict and economic crisis face additional levels of vulnerability and marginalization due to their slums' dilapidated infrastructure.

2.6 ARCHITECTURAL DESIGN IN THE CITIES OF THE GLOBAL SOUTH

While new and repeating "natural catastrophes" punctuate the agendas of international policy and threaten global economies, architecture for international collaboration has been the focus of intense discussion in recent years, occupying larger spaces within the disciplinary discourse. The ethical and

civic implications of such an approach are obvious, as is the respect due to individuals who work in difficult circumstances, in destitute places, and with a frequently crippling lack of resources. However, the high level of interest produced by such activities cannot be only based on ethical considerations. What emerges through close observation appears to include the architectural discipline's basic heart, its methodology, and a better understanding of the profession. In other words, the goal is not to make a structure, but to promote development, with the belief that architecture can be a tool—not the only one, nor the most important one—for improving people's living conditions. What emerges is a shift from architecture in the traditional sense, which focuses on optimizing the produced artifact for sale, to a process-based architecture that is concerned with the social, environmental, and economic ecosystems with which it seeks to interact and interfere.

It is obvious that cities will be the arena in which the Global South's future bet will be wagered. In this context, it is vital for disciplines concerned with space organization to explore what function architectural design might play and how it can help to the development of these areas. In a situation so different from the past, we must ask ourselves what forms, tools, and goals we can operate with. At the same time, this phenomenon cannot be contained inside the vanishing borders of distant countries. Major migration flows mobilize identities, cultures, people, and problems that were once foreign to us but are now startlingly close and urgent. As a result, it's critical to broaden the scope of observation and grapple with the most pressing issues in order for solutions to emerge. The necessity to handle complex, inter-scalar, and transnational processes is symptomatic of the current situation, as well as the rethinking that is occurring in the design disciplines.

2.7 TENURE SECURITY

Tenure security has become a serious concern in international development over the last decade. The United Nations Centre for Human Settlements decided to focus its operations on two areas in 1999, indicating how important it is: a global campaign on security of tenure and a global campaign on governance (Durand-Lasserve & Royston, 2002). In other recent arguments, tenure security has been mentioned as a critical component of achieving Millennium Development Goal 7. Tenure and informality debates have not received much attention in South Africa. This is in part because, since 1994, the government has pursued an ambitious and, in quantitative terms at least, mainly successful housing delivery program that includes individual ownership as a key component.

Given the scale of informal settlements and the impending Millennium Development Goals deadline, a more flexible and accommodating strategy is emerging. Part 3 of the National Housing Code in South Africa

contains the policy framework for interim approaches to tenure and, more broadly, for progressive in situ upgrading of informal settlements. However, there is a scarcity of experience with upgrading in-place informal settlements. The time lapse between earmarking a settlement for upgrading and actual project implementation (which might range from six months to 25 years) is also being acknowledged. As a result of this fact, some cities have begun to experiment with newer techniques. (Dan Smit and Gemey Abrahams, 2010)

2.8 THE INCREMENTAL TENURE APPROACH

Different government approaches, local settings, types and frequency of informal settlements, local politics, and demands from civil society organizations all influence how people respond to tenure. Despite this reality, there are two basic ways that can be identified. The first focuses on establishing legal tenure consistency based on individual ownership rights. This method is frequently difficult to apply and takes a long time. The second approach prioritizes tenure security over ownership, emphasizing that tenure security in informal settlements is based on a variety of conditions and circumstances. The second approach contends that alternative mechanisms, such as administrative recognition or local community witnessing processes, can be used to produce substantial – and frequently adequate – tenure security.

Security of tenure claims are often more reserved, but they are widely held. The following are some of the pro-ownership arguments:

• It gives legal tenure protection, which makes land investment more secure.
• It offers a foundation for the impoverished to obtain loan financing.
• It encourages previously unrecognized informal settlements to become officially recognized.
• It initiates the delivery of municipal services.
• It develops effective cadastral systems for revenue collection and, as a result, is critical to the development of long-term service delivery models.
• Because standardized and trustworthy land records enable for more controlled land purchase, sale, and mortgaging, it incorporates informal housing into financial land markets and helps equalize land prices with informal, socially dominated land markets (unit costs of land are often exorbitantly high in informal settlements).
• It gives you a lot of protection against being evicted in a hurry.

2.9 MECHANISMS FOR RECOGNIZING TENURE

Both forms of acknowledgment have perks and disadvantages. As a result, the Incremental Tenure Approach employs a hybrid of the two. Administrative recognition, in theory, may be the first step toward tenure and settlement upgrading, leading to legal recognition, which would strengthen the settlement and allow for more specific types of tenure. Administrative processes can be used even under the cover of broad settlement legal acceptance. As a result, this strategy provides for flexibility and the discovery of the ideal mix for a given neighborhood and municipality. It does not favor one type of identification over another, but rather provides channels for each, both separately and in combination, and explains the connections between them.

Figure below shows how different legal pathways can lead to legal recognition and where these fit in, in relation to administrative mechanisms within an overall upgrading process.

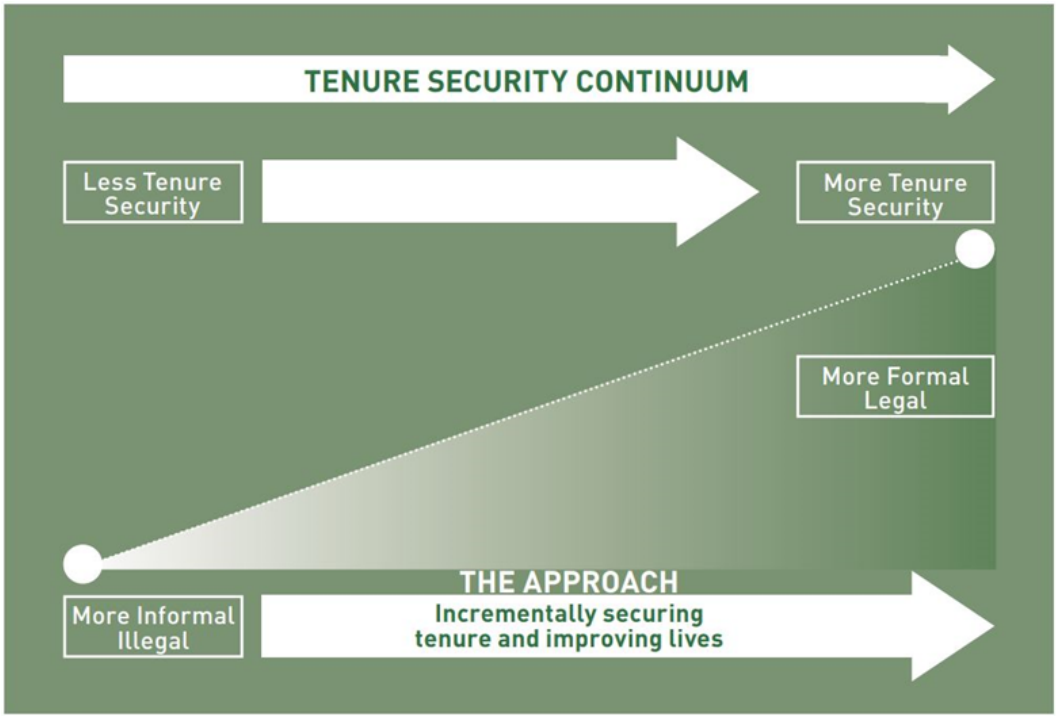


Figure 19: The tenure security continuum
Source: (Incrementally Securing Tenure, An Approach for Informal Settlement Upgrading in South Africa), by Dan Smit and Gemey Abrahams 2010

An important aspect of the overall approach is building on the notion of incremental improvements. By taking a step-by-step, incremental approach a community can move positively towards ownership if required. Incremental approaches imply gradual improvements in a range of components in any settlement. The table below depicts how several legal channels can lead to legal recognition and where they fit into an overall upgrading process in terms of administrative mechanisms.

ADMINISTRATIVE RECOGNITION	LEGAL RECOGNITION
This uses instruments that may arise from policies or administrative practices to give residents tenure security. They may not have a firm legal basis but rather derive security through commitment by authorities in the form of council resolutions or administrative systems.	This uses a legal procedure in terms of some recognised law to grant legal status to an area. It usually results in declaring the area in terms of this law (a settlement area, an area zoned for informal housing) which then permits certain other actions to take place legally.
EXAMPLES OF ADMINISTRATIVE RECOGNITION MECHANISMS: • Issuing an occupation certificate in recognition of residents permission to remain in the settlement. • Undertaking shack enumeration and linking it to a list or record. • Agreeing on a block layout with a community and introducing basic services.	**EXAMPLES OF LEGAL RECOGNITION MECHANISMS:** • City of Johannesburg's Amendment Scheme where designated areas are declared as 'Transitional Residential Settlement Areas' through the ordinance[1]. Certain legal conditions become applicable, e.g. land use conditions, basic layout plans, occupation certificates and registers. • 'Early' forms of township establishment, through for example Chapter 1 of the Less Formal Establishment Act or a simple Chapter 5 Development Facilitation Act (DFA) application, also afford legal recognition to a settlement.

Table 3. Mechanisms for recognizing tenure
Source: (Incrementally Securing Tenure, An Approach for Informal Settlement Upgrading in South Africa), by Dan Smit and Gemey Abrahams 2010

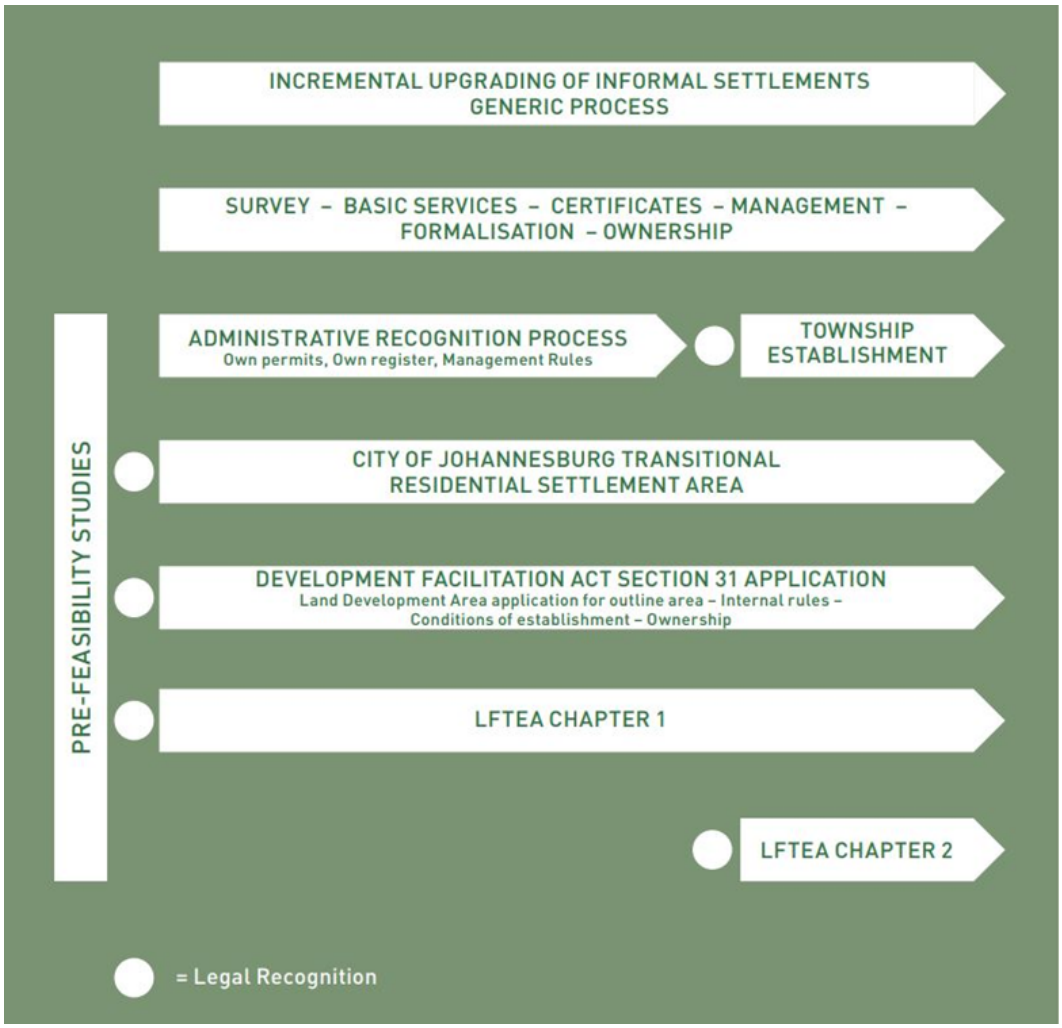


Figure 20 : Administrative and legal recognition
Source: (Incrementally Securing Tenure, An Approach for Informal Settlement Upgrading in South Africa), by Dan Smit and Gemey Abrahams 2010

Tenure mechanism	Administrative recognition	Legal recognition	Township establishment
Plot identification	Basic site plan – no individual plot boundaries, perhaps neighbourhood blocks, main roads. Based on aerial photographs and community verification	Detailed layout plan: individual plot boundaries, all roads, sites for facilities and plots identified	Approved layout plan with pegged sites which informs the General Plan that gets approved
Recording of occupants	List (database) of occupants, linked to a shack number with or without a single GPS point reference	Full register of all occupants, dependants, linked to a property description, tenant relationships, next of kin	A township register as per the Deeds Registry Act
Tenure evidence	Letter of occupation certificate/card acknowledging occupation	Simple lease with municipality/ province Simple servitude of use A municipal bill could serve as a contract	Title deed Lease Long lease
Land use management	Basic health and safety rules Can be indicated on letter of occupation	Through the Amendment Scheme (see table 3 in step 3), rezoning or DFA, rules or conditions for managing land use in the settlement.	Town Planning Scheme zoning and title deed conditions
Services provision	Basic services – communal level of services (LOS 1)	Planned, upgraded services, individual connections (LOS 2 - 3)	Highest level of services as per township establishment conditions

Table 4. Incremental improvements
Source: (Incrementally Securing Tenure, An Approach for Informal Settlement Upgrading in South Africa), by Dan Smit and Gemey Abrahams 2010

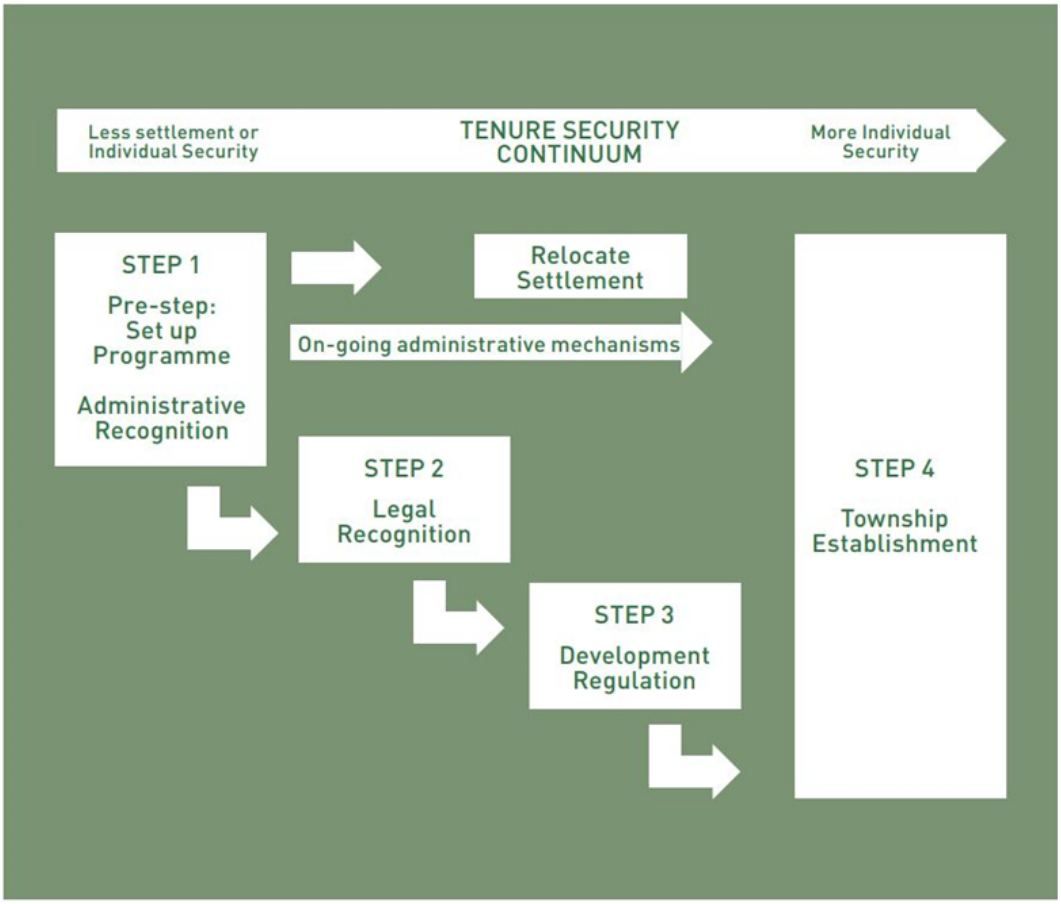
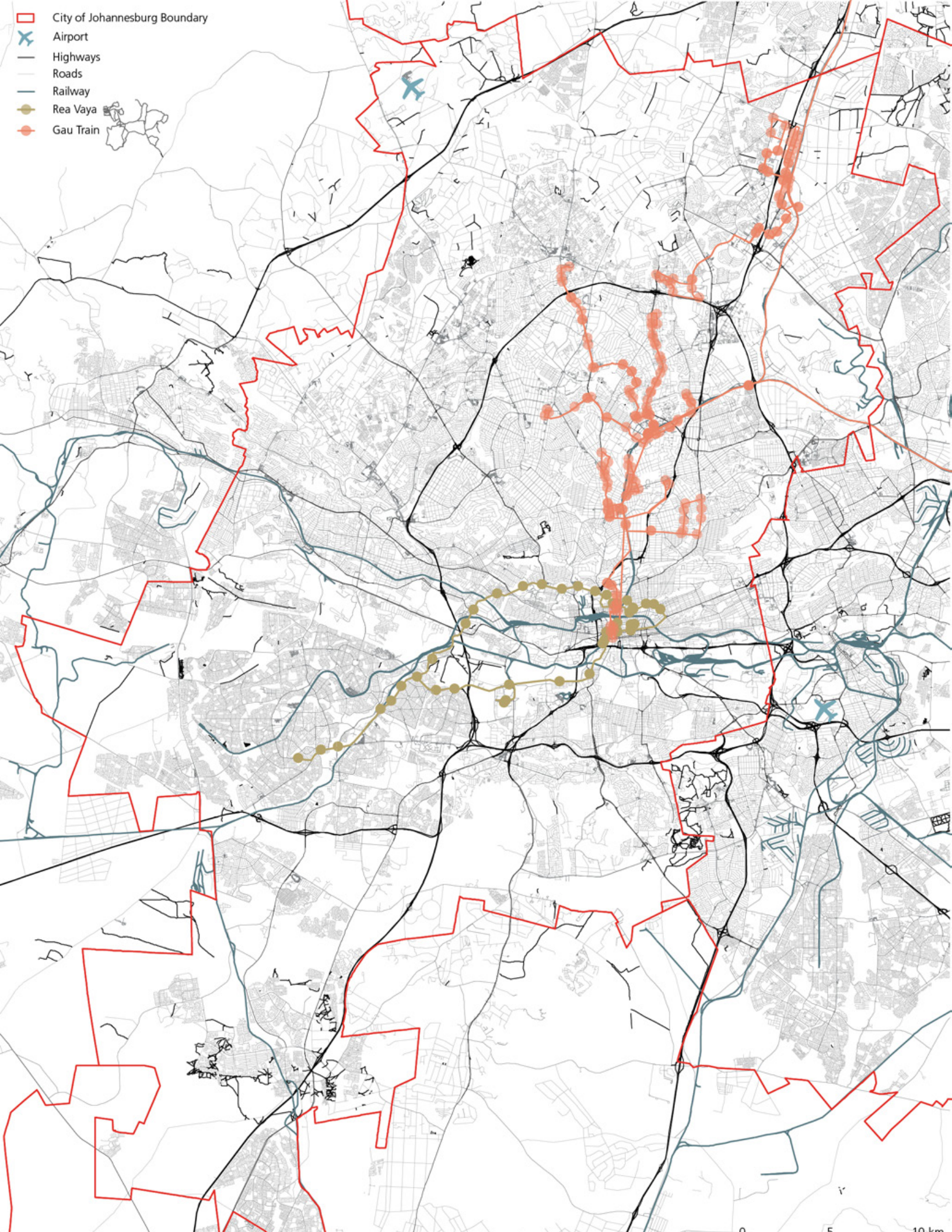


Figure 21. Schematic representation of the Incremental Tenure Approach
Source: (Incrementally Securing Tenure, An Approach for Informal Settlement Upgrading in South Africa), by Dan Smit and Gemey Abrahams 2010


City of Johannesburg Boundary
Airport
Highways
Roads
Railway
Rea Vaya
Gau Train
0
5
10 km

Literature Review Part 02

Case Studies

2.10 CHOICE OF CASE STUDIES

The Case studies chosen under are some of the best examples of social housing in modern history. These case studies are analysed to highlight the design strategies concerning upgrading of informal settlements, low cost construction, incremental appproaches, sustainability and adaptability in informal settlements.

According to the new urban agenda, decent housing is a universally acknowledged human right, a fundamental necessity, and an indicator of a living standard that is sufficient. A coveted and desirable product that is difficult to come by for the 48 percent of the world's urban population who live in underdeveloped countries.

2.10.1 Incremental housing and informality

Self-help movement opponents challenge people's ability to change their living conditions. Seabrook (1996) underlines the impossibility of switching from government-supported to entirely self-help programs, whereas Davis (2006) mentions "illusions of self-help." Similar to this, authorities frequently express their reluctance to let modifications or adjustments made by the self to houses that were erected by the government. Authorities regularly observe that permitting people to create slums (Tipple & Ameen, 1999), legalize the presence of squatters and poor urban neighborhoods (Porio et al., 2004), or recreate the squatting conditions in which they previously resided would allow them to create slums.

2.11 CASE STUDY 01

2.11.1 Quinta Monroy settlement, Chile

Quinta Monroy's Elemental design was established in the city of Iquique. An informal settlement in the city's center was to be upgraded as part of this project. By immigrants who had moved into the property in the 1960s, the settlement was established. From 50 families in the beginning to 100 families in 2003, the population grew steadily. Residents were able to grow minor crops on the 5,722 sqm property at one stage. As the number of occupants grew, the available space was reduced. The village quickly grew into a maze-like maze of self-built dwellings made of wood and improvised materials. 60 percent of the rooms lacked natural light and ventilation, making living conditions problematic. Residents lack essential utilities such as electricity, water, and sanitation, despite a few haphazard connections. The community was also vulnerable to fires, such as the one that forced twenty households to leave in 1980, and unsafe due to ongoing threats of crime and drug use, which compelled inhabitants to establish self-defense associations.

Quinta Monroy is a 93-unit housing complex divided across four courtyards with the goal of encouraging community engagement and maintaining prior neighbors' affinities. The dwelling units are modular, measuring 3x6m apiece.T here are two different sorts of homes. Three housing type units totaling 54 square meter (three modules) each are located on the ground floor, two of which have been finished and one of which is still being finished.

Figure 22: Photograph of Quinta Monroy, by Cristóbal Palma
Source : ArchDaily - Estudio Palma

Figure 23: Photograph of Quinta Monroy, by Cristóbal Palma
Source : ArchDaily- Estudio Palma

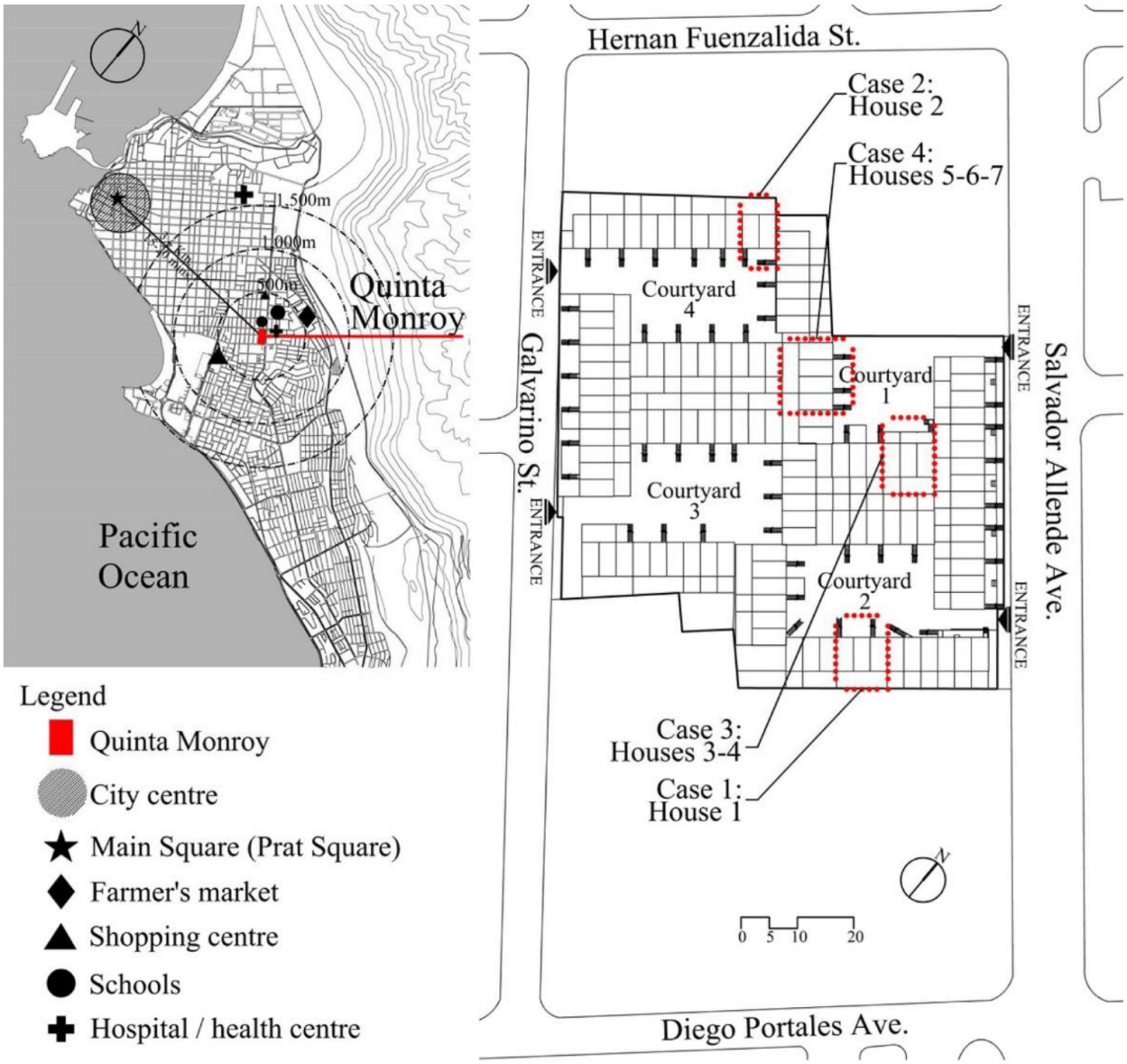


Figure 24: - Location and settlement layout of Quinta Monroy
Source : Carrasco, S., & O'Brien, D. (2021)

Elemental claims that the backyard of the lower units, which is 27 square meters, may be used up to 60 percent of the time to produce a total space of 70 square meters. Typology 2 (59 units) consists of duplex flats erected on top of typology 1 units. 1.5 units were erected upstairs on the land occupied by one type 1 unit. Two constructed modules (36 square meter) and two more modules which can be added to each duplex unit, for a total of 72 square meters, are available (Figure 40). Elemental asserted to have utilized the site to its full potential by building 2.5 homes on 54 square meters. The Quinta Monroy residences were built in stages, with the residents leading the way. The emphasis is on the kinds of resident-built house expansions, which contrasts with Elemental's approach and aspirations. This study details the settlement's situation twelve years after the homes were given to the residents.

According to Elemental, the Quinta Monroy project must overcome four significant challenges: 1- creating families in a condensed urban area; 2- incremental building without neighborhood degradation; 3. security and economic expansion; and 4. community involvement in design. By the time the dwellings were done, 2 of the 4 tasks had been accomplished. Residents were able to secure formal ownership of their in-situ built

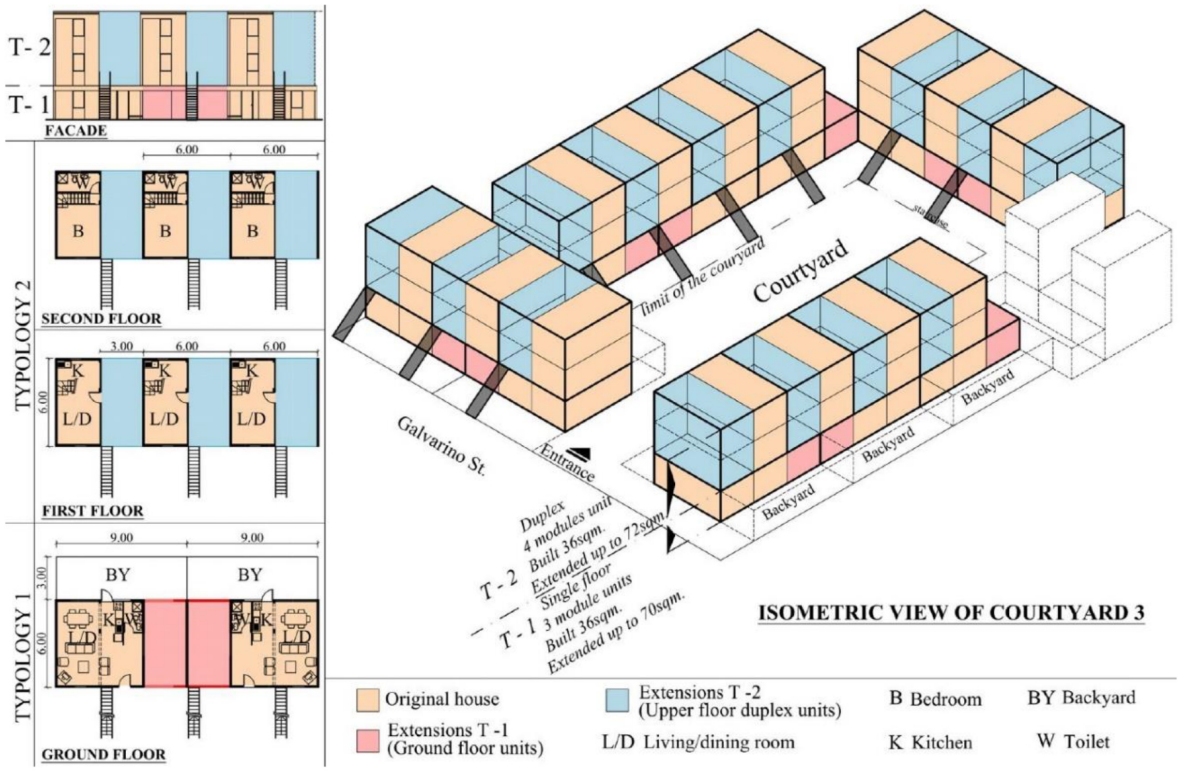


Figure 25 : Initial 'parallel housing' buildings and house typologies of Quinta Monroy
Source : Carrasco, S., & O'Brien, D. (2021)

homes without having to relocate.
Using the participatory design methods recommended by Aravena & Iacobelli, the families' input was taken into account during the design and construction processes. during the site visit, the families expressed their recognition.
Despite the unpredictability of at least half of future resident-driven development, the housing blocks and settlement will eventually distort and decay. Furthermore, it is unclear if the labor required to expand the homes would put a strain on the inhabitants' precarious economies and produce buildings that won't endanger their safety and the safety of the surrounding community. (Carrasco, S., & O'Brien, D. (2021)

Figure 26: "Figure ground" plan and image of Quinta Monroy in 2002 prior to redevelopment.
Source : Elemental's Quinta Monroy settlement by David O'Brien, Sandra Carrasco

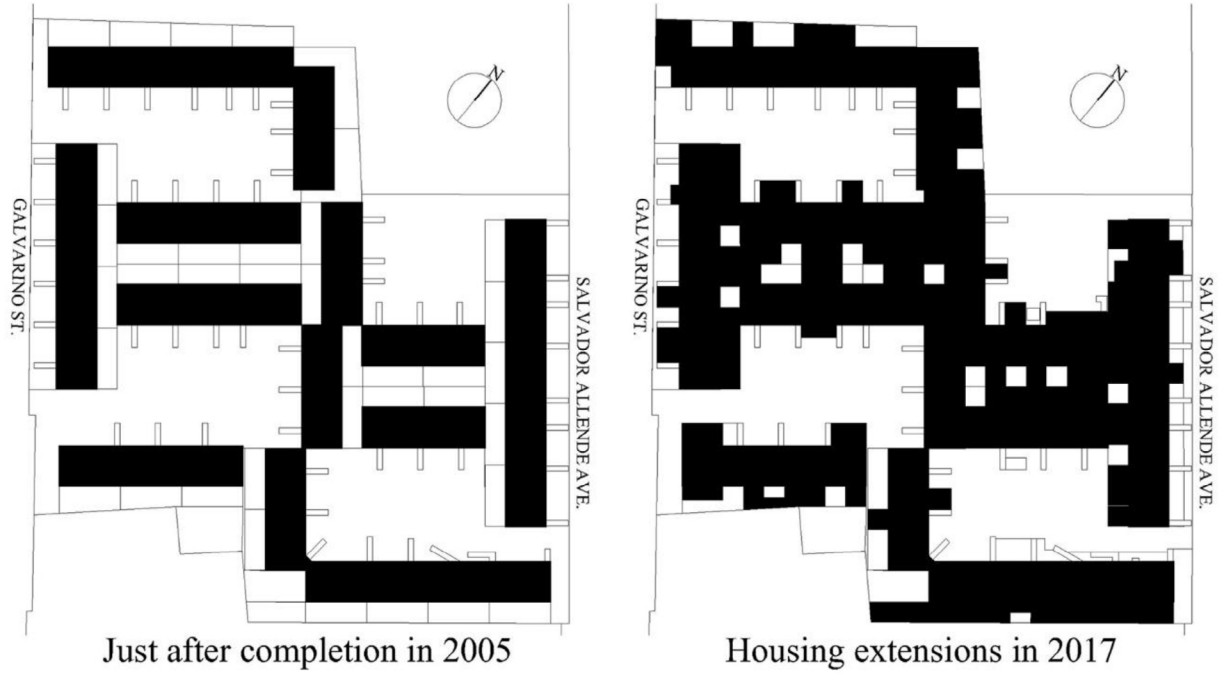


Figure 27: Changes in built and open spaces in Quinta Monroy
Source : Carrasco, S., & O'Brien, D. (2021)

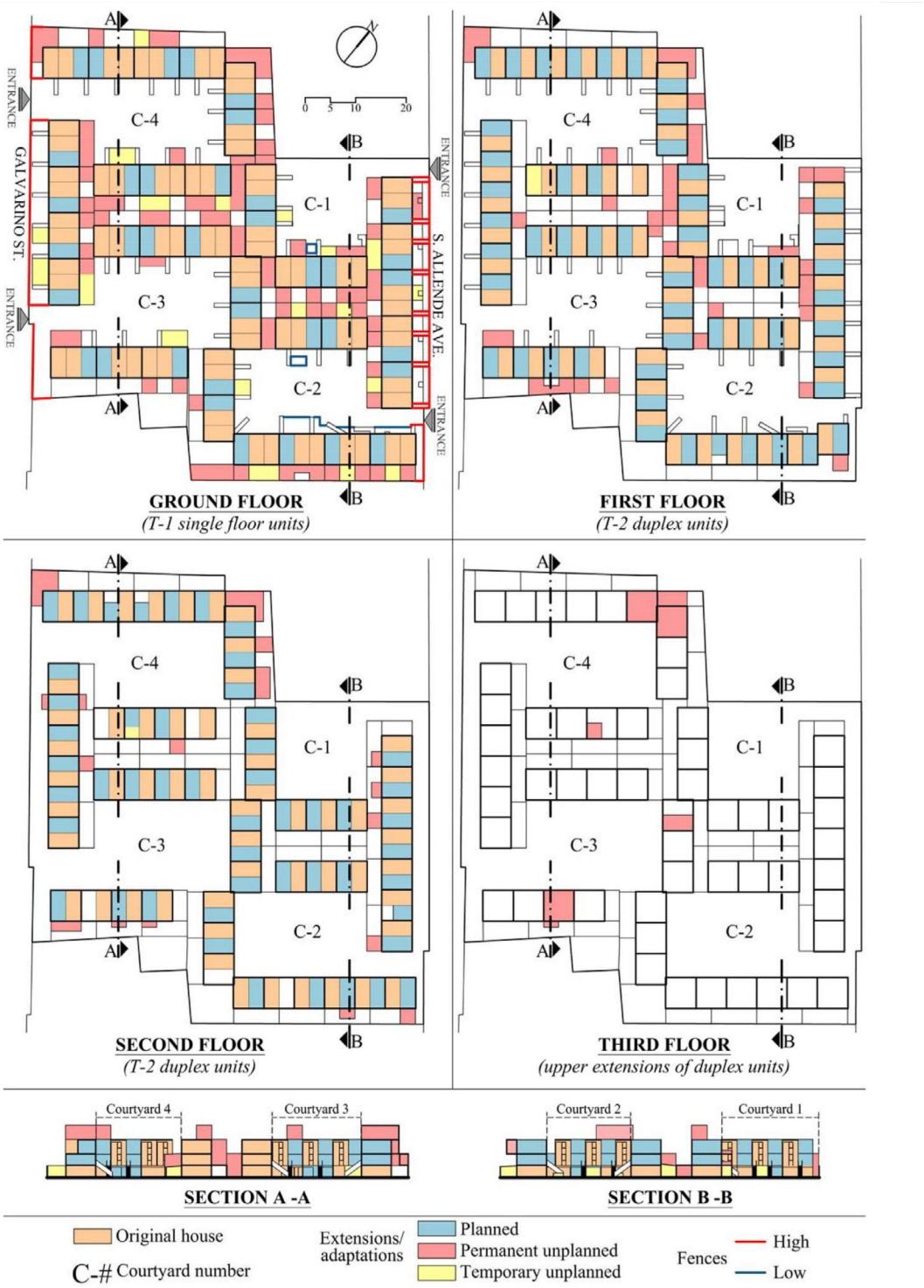


Figure 28: Types of housing extensions per story and typology
Source : Carrasco, S., & O'Brien, D. (2021)

Houses facing Salvador Allende Avenue
In 2009 in the left (Palma, C. 2009) and in 2017 in the right (Authors)

Permanent (left) and temporary (right) frontal extensions in courtyards.

Figure 29: Changes in the construction of extensions and frontal extensions in courtyards.
Source : Carrasco, S., & O'Brien, D. (2021)

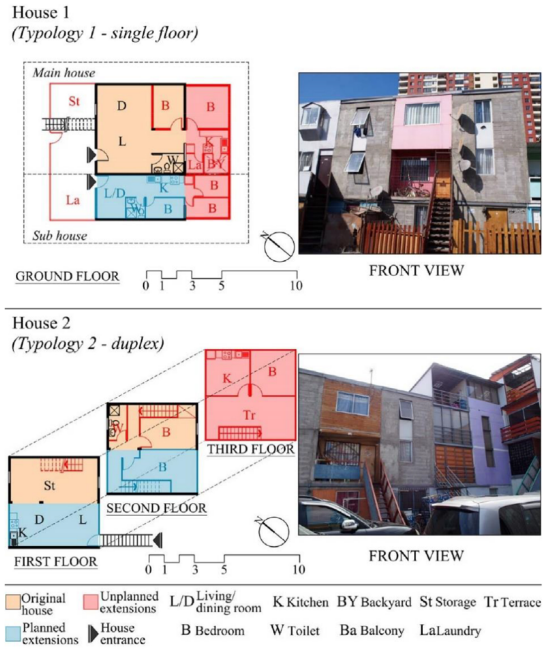


Figure 30: Isolated housing extensions.
Source : Carrasco, S., & O'Brien, D. (2021)

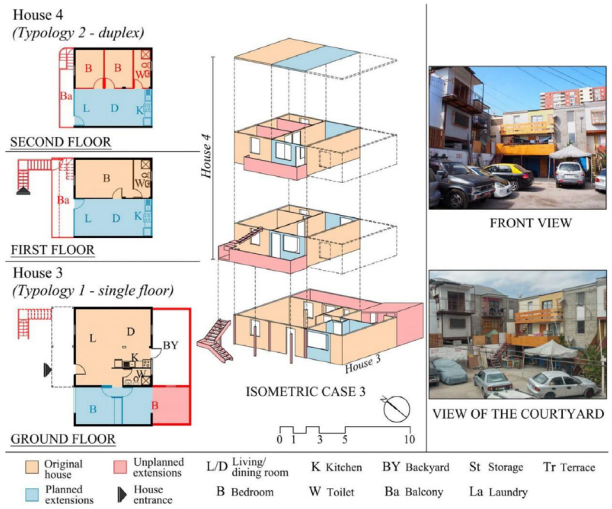


Figure 31: Coordinated housing extensions
Source : Carrasco, S., & O'Brien, D. (2021)

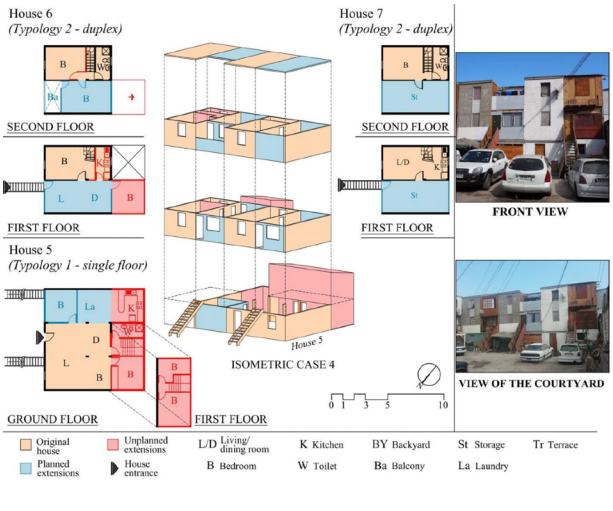


Figure 32: Multiple households coordinated extensions.
Source : Carrasco, S., & O'Brien, D. (2021)

2.12 CASE STUDY 02

2.12.1 PREVI Housing Project - 1976

PREVI was an innovative, low-cost housing project in Peru that was intended to be adaptable throughout time. The objective was to create a strategy and competition brief for housing constructions that may provide a substitute for the tremendous proliferation of informal settlements that was taking place in Lima at the time. They were tasked with creating 1500 residential units for a dilapidated area in the heart of Lima.

The Previ project illustrates a situation in which households took over abandoned projects that had been left unfinished by the state, finishing the work, and integrating the neighborhood into the metropolis.

It was for the first time that Previ Project demonstrated the transition from high-rise architecture to low rise social housing of informal neighborhoods on a human scale that were flexible and walkable. Previ celebrates the spontaneous growth of informal settlements, and gave the freedom to morph the built environment according to family's identity, size and need.

Initially, the proposal was entered for a global competition. Finding answers for the city's housing issues was the major goal.

However the project is criticized as a failure since it didn't consider community participation during its planning.
But for some the success of Previ Housing today as people are expressing desire to live in the neighborhood explains the contributions of Previ for the social architecture;

Figure 33: Urban Evolution of Previ
Source :http://www.transfer-arch.com/reference/previ-lima-1969/

Figure 34: Aerial Image of PREVI upon completion 1978
Source :http://www.transfer-arch.com/reference/previ-lima-1969/

as it has put forward some important design guides and priorities for planning and construction technology to acheive a sustainable built environment. It focused on principles such as Human scale and pedestrian friendly environment. It considers design features from vernacular architecture, Hight desnity, low rise planning with courtyards and public spaces, appropriate and improved building technologies and expandability. w

With some shortcomings the Previ experimental housing is still a success and it is a model that can be repeated and adjusted to different realities. Previ set an example for the expansion of housing units even after years of their construction.

Despite the lack of Technical knowledge and guidance, Previ has become a famous urban setting. So what were the guidelines in the initial planning and what are the takeaways from it transformation and lessons to be carried forward?

2.13 CASE STUDY 03

2.13.1 Urban-Think Tank's Project EMPOWER SHACK in Cape Town, South Africa (2016)

The Urban Think Tank (ETHZ) and the non-governmental organization Ikhayalami, along with the BT-Section (Site C) neighborhood of Khayelitsha, Cape Town, and other regional and international partners, are the driving forces behind the interdisciplinary post-apartheid housing development known as Empower Shack.

The goal of the project is to improve informal settlements through creative organizational and design models, as well as the creation, application, and assessment of four key elements: a two-story housing prototype, participatory spatial planning, integrated urban systems, and economic solutions. The four-house principal project was completed in

Figure 35 : Axonometric view of empower shack project
Source : https://architizer.com/projects/empower-shack/

December 2015 and is currently being evaluated by users.

Fire was another important component of early design ideas. In townships, where all self-built shacks are made completely of wood or from metal-clad timber frames, fire is a constant hazard. By improving emergency service accessibility to informal areas, Ikhayalami's blocking out plan was created in part to solve this problem.The architectural counterpart involved looking for the best material for flooring and walls that would be both fireproof and insulating. Last but not least, the decision was made to research two building techniques: structural insulated panels and an L-section steel frame. Both were strong for their weight, resilient to fire, simple to handle, and straightforward to put together. Due to the ease with which the components could be obtained on the South African construction market, industrial partnerships could be established for further optimization through mass manufacture and prefabrication, decreasing the technical and financial obstacles to the components.

Figure 36 : Facade view showing corrograted sheet walls
Source : https://architizer.com/projects/empower-shack/

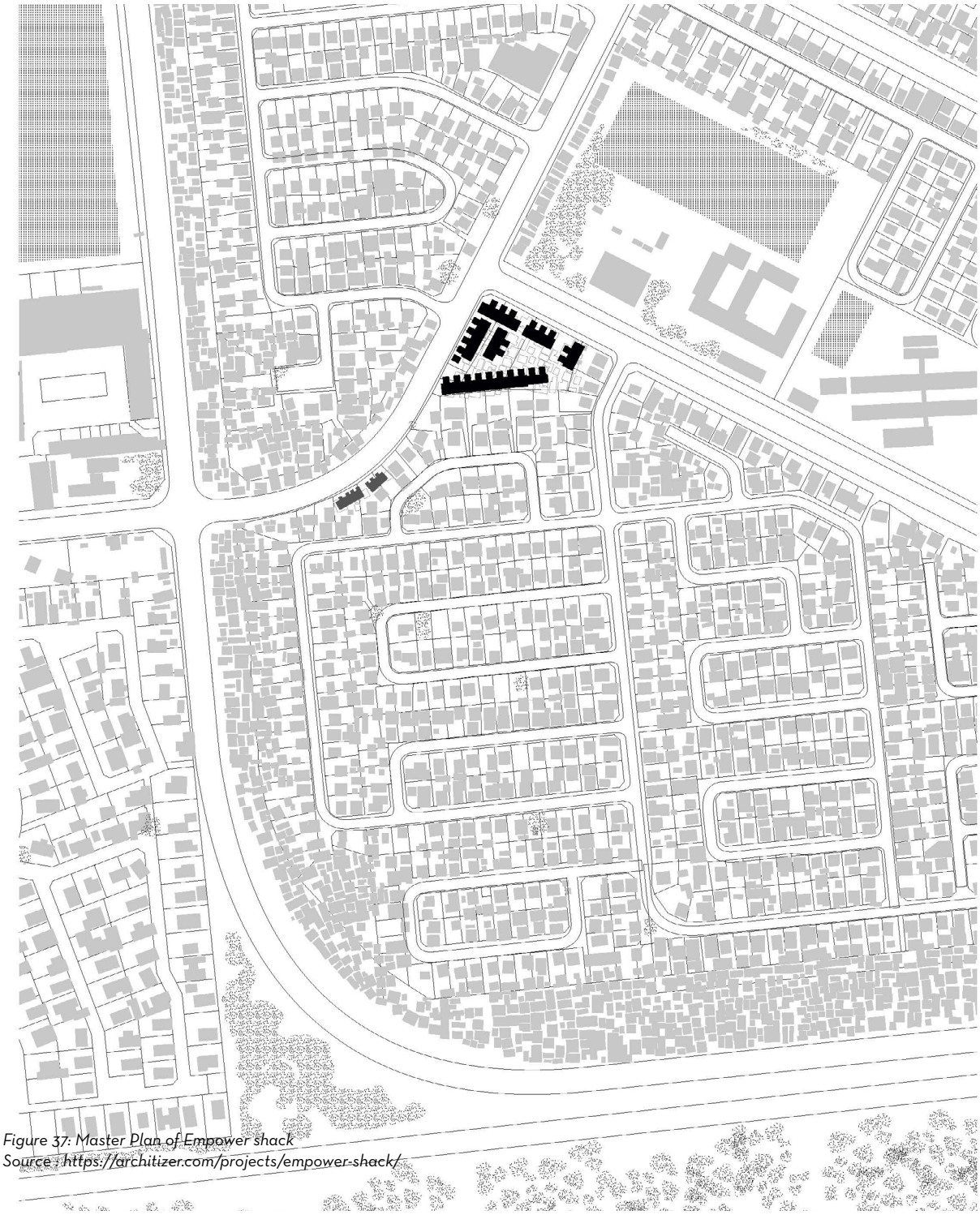


Figure 37: Master Plan of Empower shack
Source : https://architizer.com/projects/empower-shack/

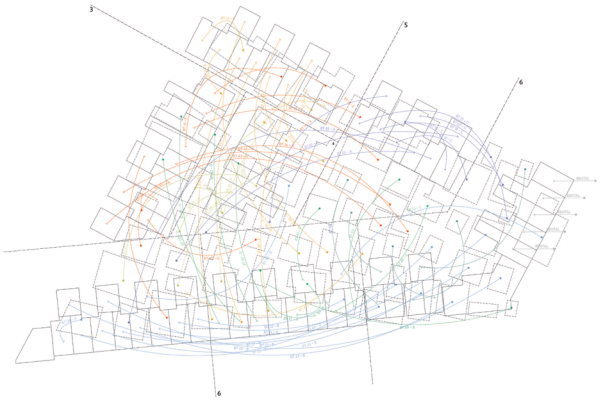


Figure 38: Preperential planning map of Empower shack
Source : https://architizer.com/projects/empower-shack/

Figure 39 : Floor Plan of Empower shack
Source : https://architizer.com/projects/empower-shack/

The Modular System

In order to keep prices down and building time efficient, the experiments were carried with 3-unit modules to create a range of housing designs. A straightforward module (4.8m x 2.4 m, 11.5 m2) served as the foundation of the home. To create a larger house, one or two "L" module expansions (2.4m x 1.6 m, 3.8 m2) but then module extension "W" (1.24m x 1.2 m, 4.8 m2) can be added.

The ability to stack the modules to build two-story shacks is a fundamental feature of this technology. There are other logistical advantages as well, the most noteworthy of which is that the system employs local workers. With a little training, indigenous laborers can construct a sturdy structure. A simple structure, likewise, can be constructed rapidly and then developed over time.

Residents can often contribute a little amount toward a house construction, but not always. They lack access to commercial finance, which would enable them to take out a loan large enough to fund the construction of the home they desire and repay the debt over time. Rather, they must improve their home in little, reasonable steps over time. The structure can be expanded when resources become available by using re-usable materials. (ETH Zürich, 2016)

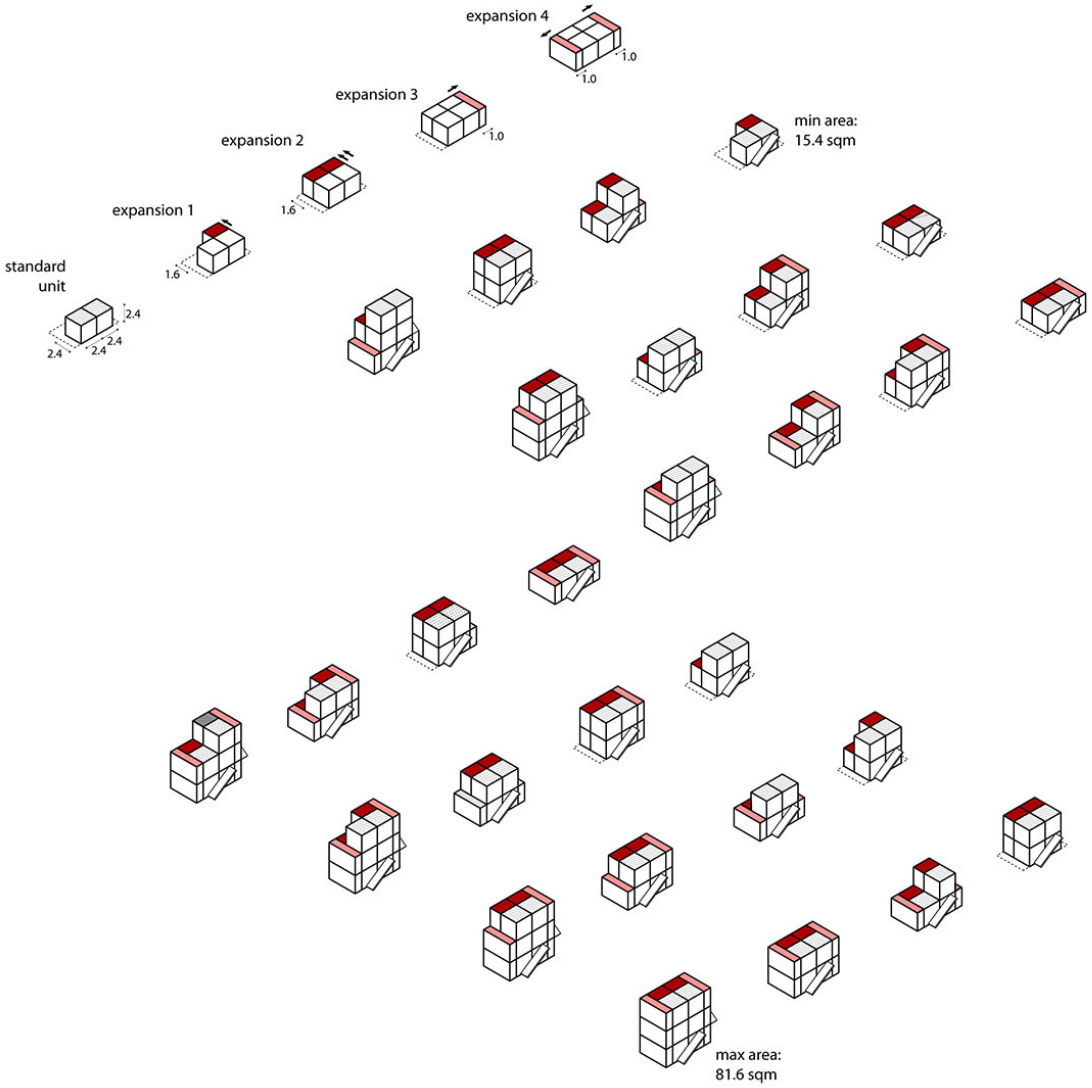


Figure 40 : Initial volume sketches show a variety of configurations depending on existing footprint and temporal need.
Source : https://architizer.com/projects/empower-shack/

Two-storey unit. 1:100

Two-storey unit. Groundfloor allows for potential commercial use. 1:100

Three-storey unit. 1:100

Figure 41 : Floor Plans
Source : https://architizer.com/projects/empower-shack/

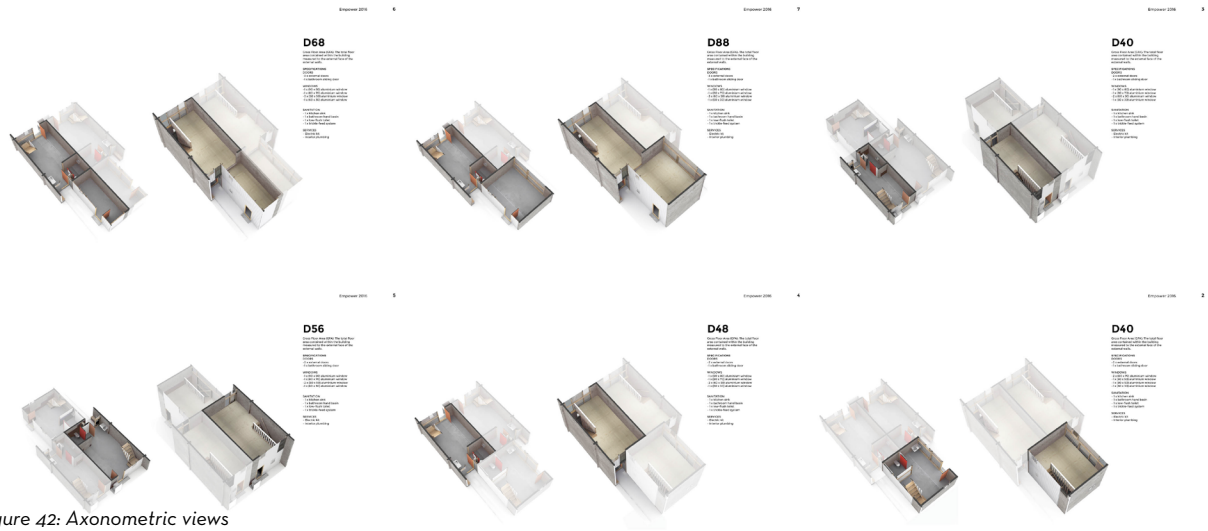


Figure 42: Axonometric views
Source : https://architizer.com/projects/empower-shack/

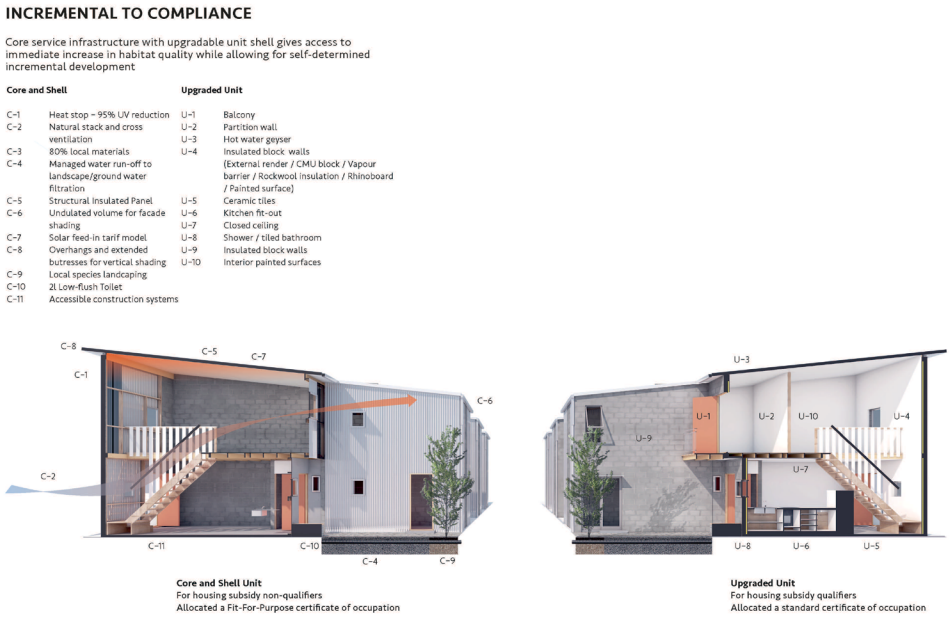


Figure 43: perspective sectional views
Source : https://architizer.com/projects/empower-shack/

Figure 44 : street view 1
Source : https://architizer.com/projects/empower-shack/

Figure 45 : street view 2
Source : https://architizer.com/projects/empower-shack/

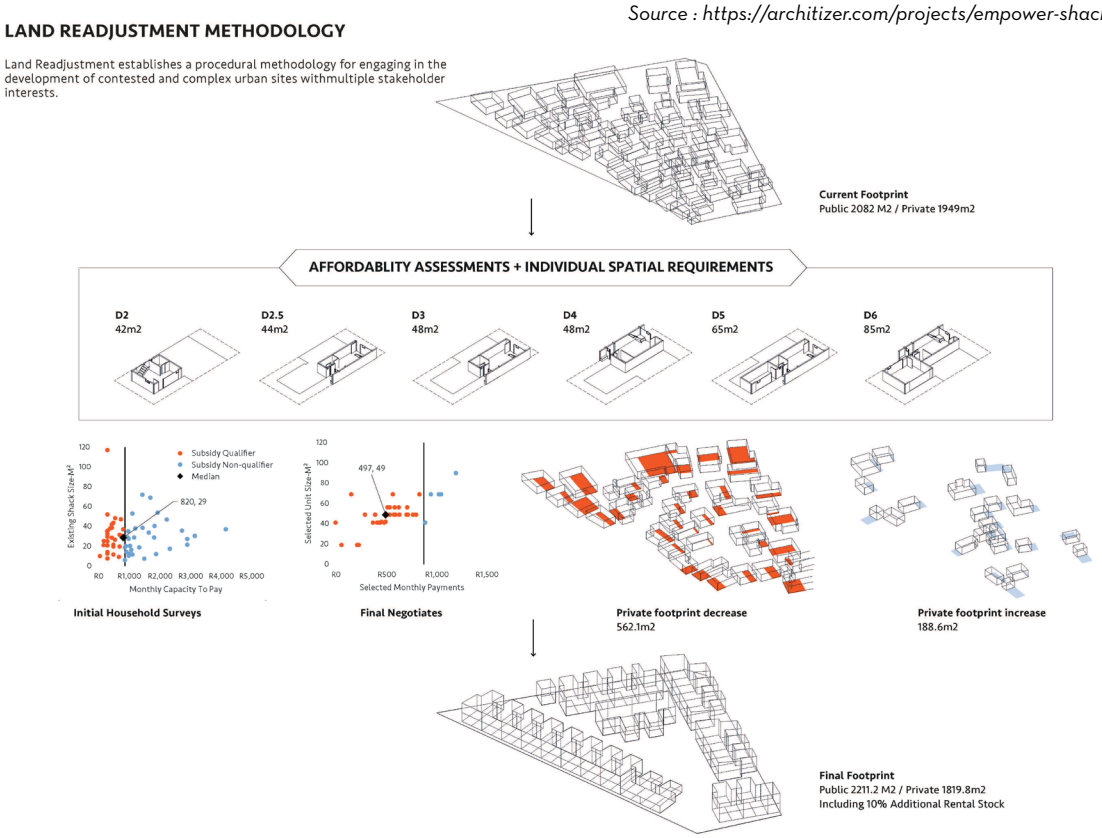


Figure 46: Covered Footprint of Empower Shack
Source : https://architizer.com/projects/empower-shack/

2.14 CASE STUDIES EVALUATION AND KEY FINDINGS

The incapacity of social housing projects to adapt to shifting conditions and family demands, as well as their typical tendency to depreciate with time, are two of the most worrying aspects of these projects. Projects that may allow community involvement in the evolution of homes and the contributions families make to change these projects are crucial to take into account while maintaining the quality of the built environment.

It was intended for Previ and Quinta Monroy to develop and grow. Their urban design allows for individual family customization of the apartments while preventing larger densities, which eventually raises the value of the area and property.
This serves as a concrete example of how rising values might work as a draw for families and future generations to stay in the same area.

2.14.1 Features adapted for the Design Proposal

1- Rollover upgrading/ Rearrangement of Shacks

2- Incremental Growth- Dynamic Habitat

3- Built Facilities should grow in value over time.

4- Use of low cost and Recycled materials

5- People and communities should be willing to contribute. It can be ensured by giving financial benefits directly to the people.

6- Community Participation and using local skills .

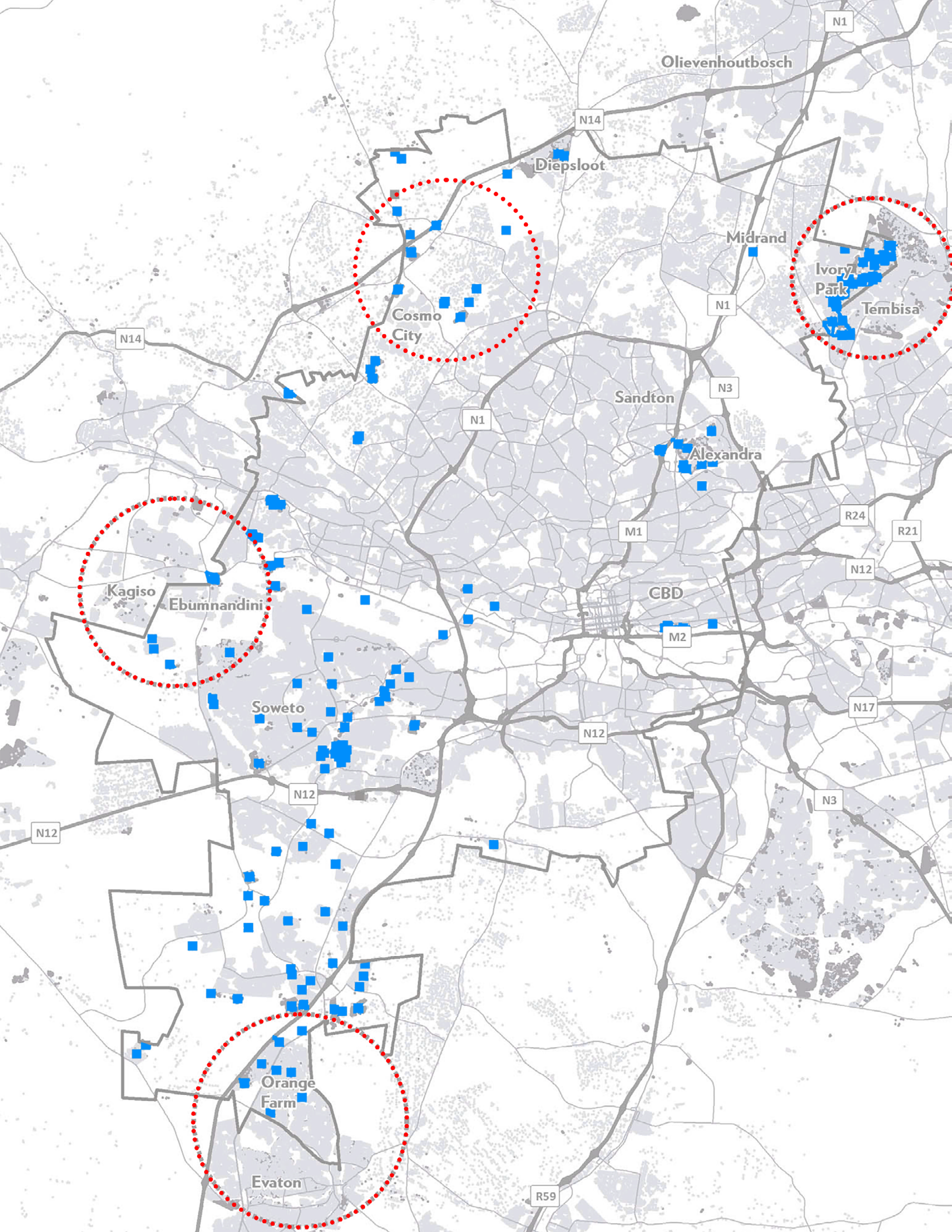
6- Building functions and programs which help in removing boundaries between different classes of society.

7- Physical and urban Infrastructure interventions should create networks. this will make stronger organization of activities and the impact will be considerable over time.

8- Open Urban Design- Promoting Growth

9- Change of Use

10- Self Managed Transformation


N1
Olievenhoutbosch
N14
Diepsloot
Midrand
Ivory Park
Tembisa
N1
Cosmo City
N14
N3
Sandton
N1
Alexandra
R24
R21
M1
N12
Kagiso
Ebumnandini
CBD
M2
N17
Soweto
N12
N12
N3
N12
Orange Farm
Evaton
R59

Part 02 -The Analysis

Chapter 03
Urban Informality in Johannesburg

Figure 47 : Location of Johannesburg in the larger Context
Source : UN- Habitat

3.1 BACKGROUND AND EVOLUTION

3.1.1 Johannesburg, city, Gauteng province, South Africa.

Johannesburg, one of the world's newest major cities, was founded in 1886 as a result of gold discovery. The Transvaal, a self-governing Afrikaner republic that eventually became one of South Africa's four provinces, was previously home to the city. Gauteng (a Sotho name meaning "Golden Place"), one of South Africa's nine provinces, now includes the metropolis.

Johannesburg's geography reflects nearly a century of racially motivated social engineering, which culminated under South Africa's racial segregation system, apartheid (meaning "apartness"), which lasted from 1948-94. With glass and steel skyscrapers and stench-filled shantytowns, internationally recognized colleges and widespread illiteracy, shining wealth and awful poverty, the result is a metropolis of remarkable contrasts.

3.2 THE CONSTRUCTION OF URBAN INFORMAL SETTLEMENTS IN JOHANNESBURG

3.2.1 General Context

Johannesburg Metropolitan Municipality is South Africa's largest and fastest-growing metropolis. It is the capital of Gauteng Province, the smallest and wealthiest province in South Africa. It is located in South Africa's eastern plateau, known as the Highveld, at an elevation of approximately 1700 meters above sea level. The city of Johannesburg covers a total area of 1,645 km2 and runs from Orange Farm in the south to Midrand in the north. Diepsloot, Ennerdale, Ivory Park, Lenasia, Orange Farm, Randburg, Roodepoort, Rosebank, Sandton, and Soweto, as well as two main urban hubs, Johannesburg and Midrand, make up the region. In the year 2000, the Metropolitan Municipality was formed by the merger of five different metropolitan local governments. In 2006, the municipality was divided into seven administrative areas.

Figure 48 : Location Map South Africa
Source: Author's Map

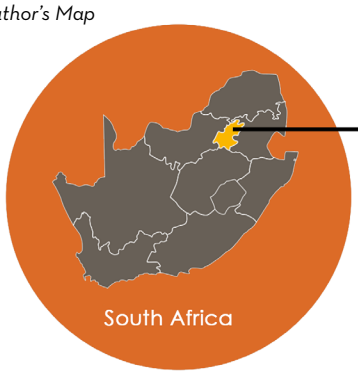


Figure 49 : Location Map Gauteng Province
Source: Author's Map

Figure 50: Map of Gauteng province and Location of Johannesburg
Source: Author's Map

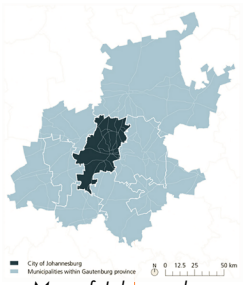


Figure 51: Map of Johannesburg
Source: Author's Map

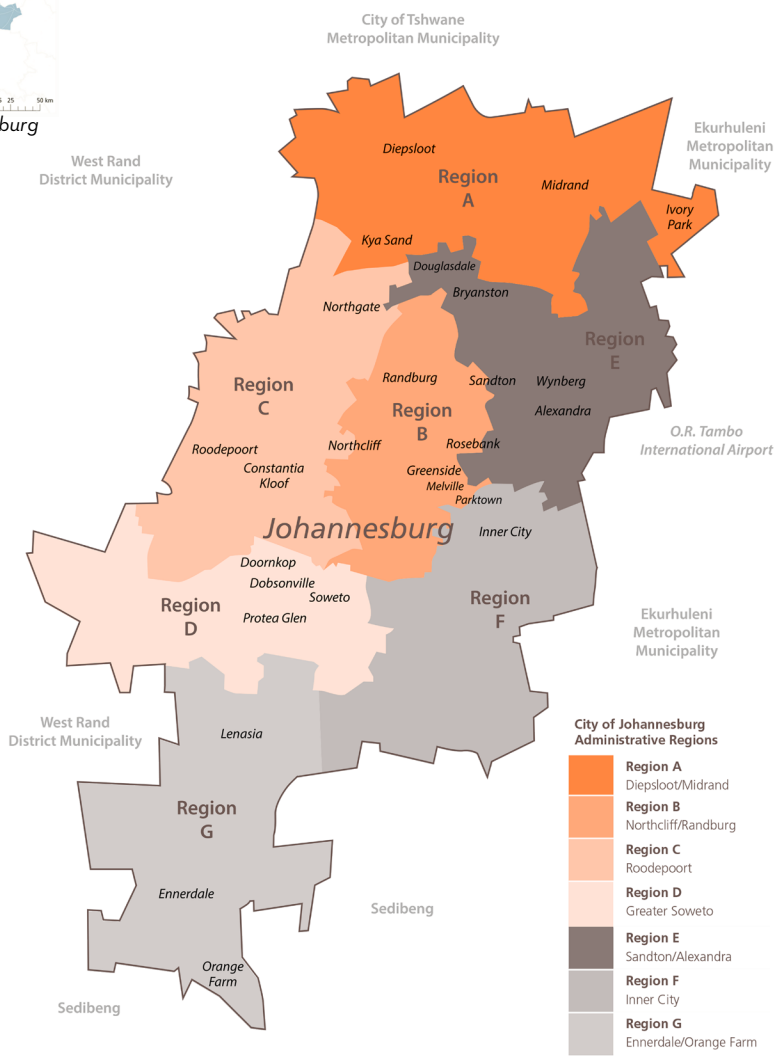


Figure 52: Map of Johannesburg, Administrative Boundaries
Source: Author's Map

3.2.2 History of Johannesburg
The early period, 1853–1930

The narrative of gold is crucial to Johannesburg's early history. A South African prospector named Pieter Jacob Marais discovered alluvial gold in the Jukskei River, north of what would become Johannesburg, in 1853. Several minor strikes followed, but the Witwatersrand Main Reef escaped prospectors until 1886, when George Harrison, an Australian prospector, came across an outcropping on a property called Langlaagte. Harrison, however, failed to see the significance of his discovery, selling his claim for £10 and setting out for the goldfields of the eastern Transvaal.

Johannesburg became the 19th century's last great boomtown as the size of the gold reserves became clear. Prospectors from as far as Australia and California joined competent Cornish and Welsh miners, who brought a strong trade-union history to South Africa. Debt and drought drove many Afrikaners from their rural homes, resulting in slums like Brickfields and Vrededorp. Blacks from all over the southern African subcontinent flocked to the city, frequently in huge groups, adding a dozen more voices to the cultural and linguistic cacophony. The majority of Blacks worked in the mines for six to nine months before returning to their rural communities. Others chose to make a permanent home in the burgeoning metropolis, working as rickshaw drivers, domestic laborers, and washermen.

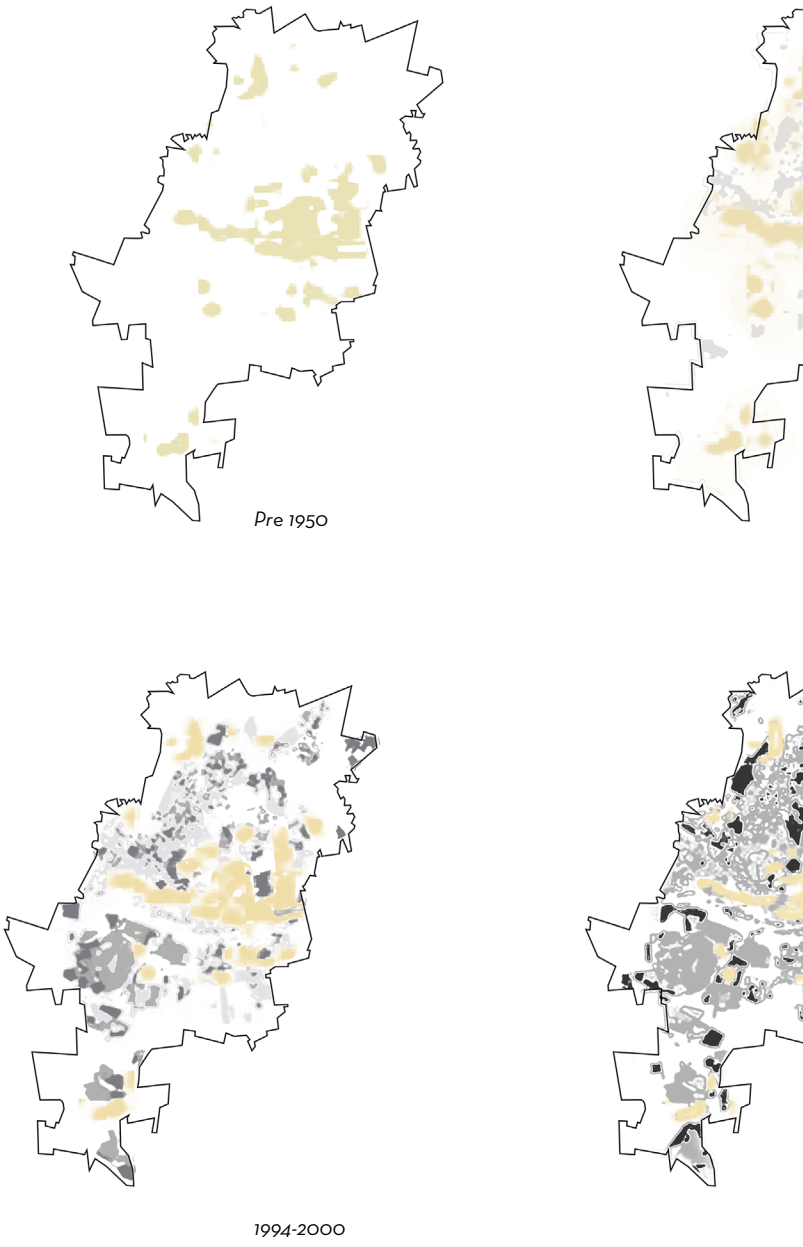
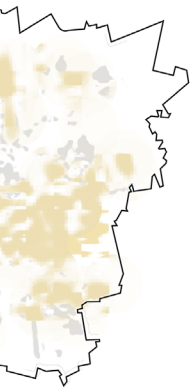
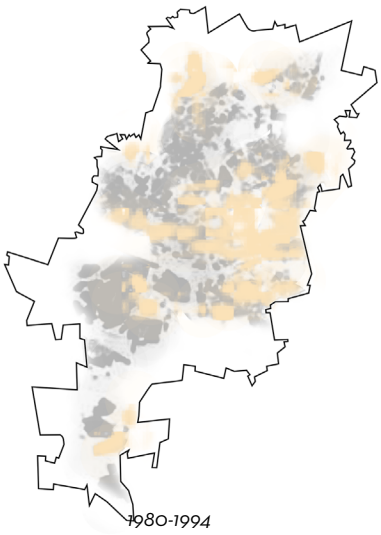


Figure 53 : Spatial pattern of growth of Johannesburg, 1950 to 2012
Source: City of Johannesburg Corporate GeoInformatics

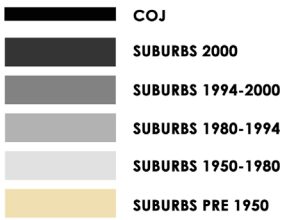


1950 -1980



1980-1994

2000-2012



3.2.3 Urban Growth Pattern

Johannesburg has grown from a little mining town to a truly global and cosmopolitan metropolis with strong physical, economic, and social linkages to major locations across Southern Africa, Africa, and the world. The city continues to develop in prominence as a regional hub in Southern Africa and a crucial global gateway as it evolves from a mining town to an industrial metropolis and, more recently, a tertiary economic hub. The tertiary sector currently contributes for 76 percent of the city's economic output, with the rest coming from Trade, Transportation, Finance, and Community Services. The financial industry increased at the fastest rate from 1996 to 2013. Simultaneously, the city has a number of spatial and developmental issues, including a growing population, a housing crisis, high levels of poverty and unemployment, geographical and economic fragmentation, disconnection, and inequality.

The city's spatial future is difficult to predict, and it will most likely be impacted to some extent in the coming years by a number of significant challenges, including:

- Africa, particularly Sub-Saharan Africa, is becoming increasingly significant as trade expands and cities become more accessible.
- The economy is slowing.
- Continued urbanization, high poverty levels, and increased unemployment

and inequality are all contributing issues.
- The growing impact of climate change on economic and spatial patterns.

3.2.4 The transformations of the 1930s and '40s

In the 1930s and 1940s, a major in-migration of Blacks from the countryside changed Johannesburg. The expanding availability of jobs in the Witwatersrand's fast-growing secondary industries, which was mostly due to deteriorating conditions in rural reserves, indicated black urbanization. The manufacturing industry in South Africa grew rapidly in the 1930s, particularly during the boom years that followed the country's removal from the gold standard in 1933. It sprang from the necessity of war and was sustained by government tariffs into the 1920s. By the early 1940s, manufacturing had overtaken both mining and agriculture in terms of contribution to the gross national product. The majority of this expansion took place in Johannesburg and ancient East Rand mining towns like Benoni, Boksburg, and Germiston, where the number of Blacks working in secondary industries quickly surpassed those working in the mines. The fact that an increasing percentage of these employees were permanent urbanized proletarians with families and children was ominous for segregationists.

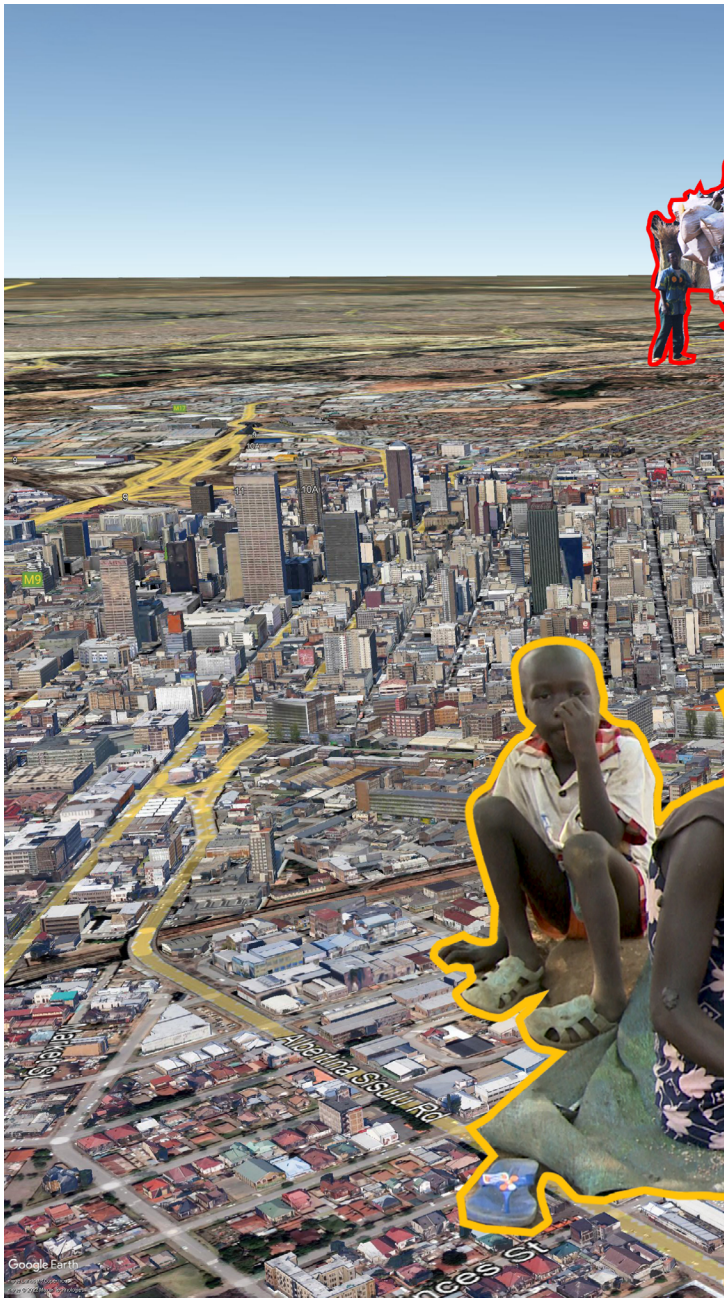


Figure 54: Migration Illustration
Source : Author's Diagram

Figure 54: Migration Illustration
Source : Author's Diagram

3.2.5 The city site - Physical and Human Geography

The Highveld is a huge grassy plateau that runs throughout the interior of South Africa. The city of Johannesburg is situated atop it. The city is located on the Witwatersrand, also known as the Rand, which is a series of low, stony ridges that serves as a watershed between the Indian and Atlantic seas. The city's elevation ranges from 1,740 to 1,810 metres. Johannesburg is devoid of water except for a few minor streams and man-made lakes. The city's location is due to the existence of a more valuable resource: gold. The city grew atop the Witwatersrand Main Reef, a subterranean stratum of gold-bearing quartz-silica conglomerate that stretches hundreds of kilometres beneath the Highveld. The Witwatersrand gold sector accounted for more than forty percent of global annual gold production at the time, despite the fact that most of the city's gold mines closed in the 1970s. The area still has rusted headgear, towering yellow-white mine dumps, and dusty Australian bluegum trees imported for underground timbering.

3.2.6 Urban Growth and Challenges

According to Department of Human Settlement's NUSP Definition of Informal settlements

An 'Informal Settlement' exists where housing has been created in an urban or peri-urban location without official approval. Informal settlements may contain a few dwellings or thousands of them and are generally characterised by inadequate infrastructure, poor access to basic services, unsuitable environments, uncontrolled and unhealthy population densities, inadequate dwellings, poor access to health and education facilities and lack of effective administration by the municipality.

Since its inception, informal settlements have been an important part of Johannesburg's growth, shaping it in various ways and periodically being displaced by formal development just to reap again somewhere.

Informal settlements in Johannesburg are clustered in an arc that runs from Ivory Park in the north-east, through Diepsloot in the north-west, and down to Orange Farm in the far south (as seen in the map below). This trend must be considered in a broader context than merely the city. On the one hand, the continuation of Johannesburg's affluent northern suburbs into the neighboring Ekurhuleni Municipality to the east means that informal settlements on the city's eastern outskirts are not there. On the other hand, the city's formal low-income housing areas are part of a much larger agglomeration of formal low-income building in three major clusters, each containing pockets of informal settlement. Orange Farm's formal development continues into Evaton, Ivory Park into Tembisa, and Ebumandini (west) towards Kagiso over the Johannesburg border. To the north, at Olievenhoutbosch, there is a large official

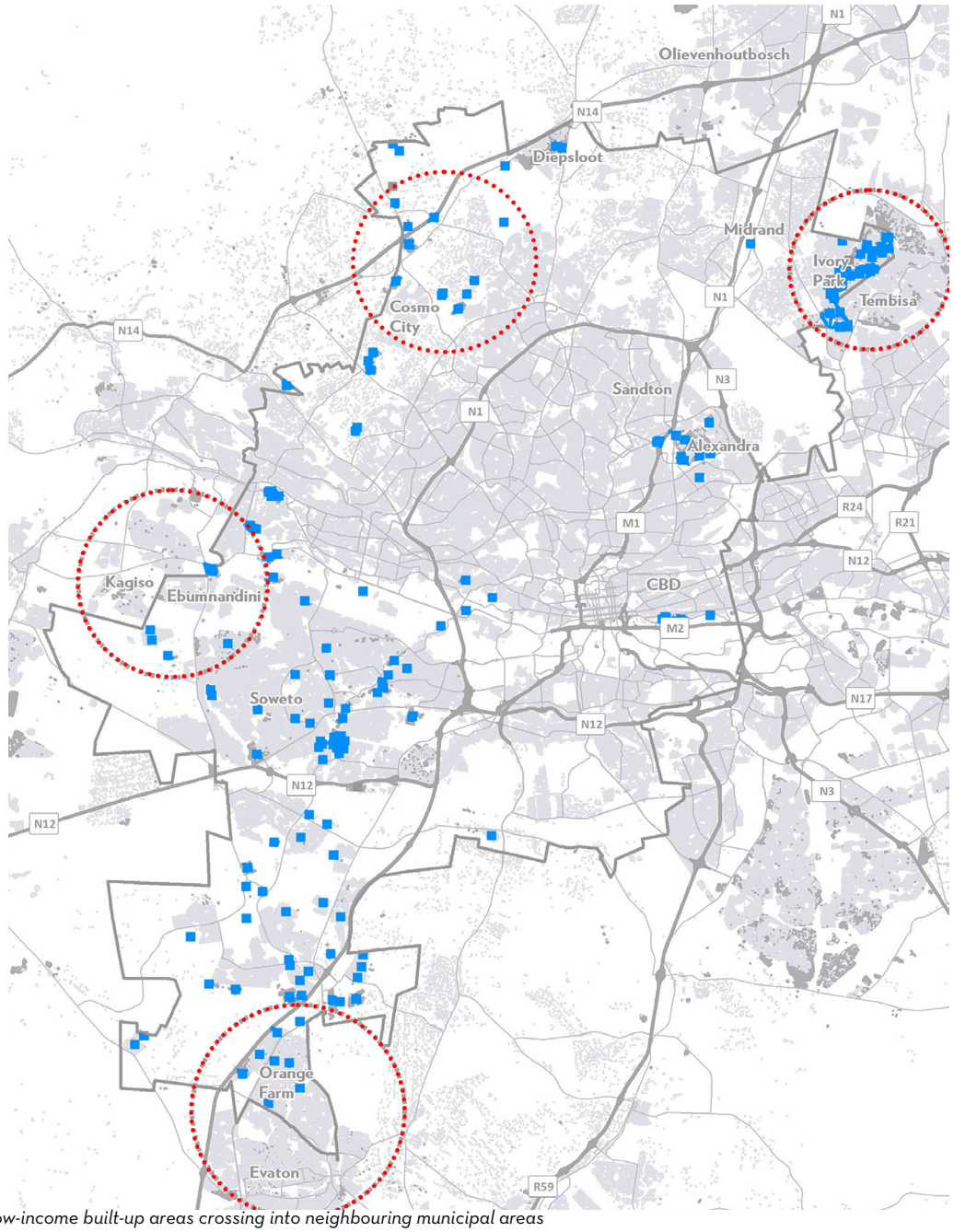


Figure 55 : Johannesburg's high-income and low-income built-up areas crossing into neighbouring municipal areas
Source : HUCHZERMEYER, MARIE, et al. "Informal Settlements." Changing Space, Changing City: Johannesburg after Apartheid - Open Access Selection, edited by PHILIP HARRISON et al., Wits University Press, 2014, pp. 154-75, https://doi.org/10.18772/22014107656.12.
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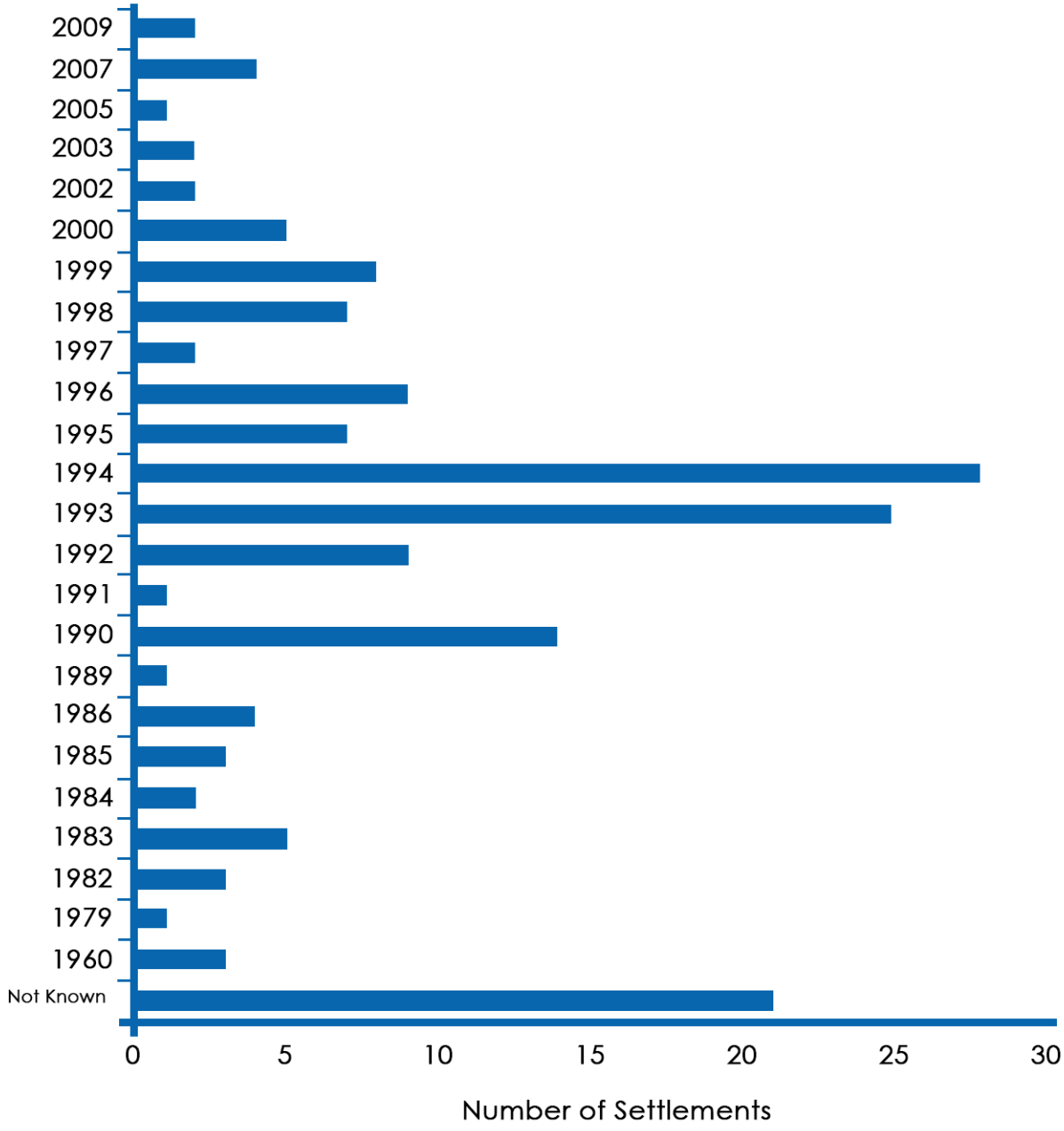


Figure 56: Informal settlement formation, Johannesburg 1960–2008
Source : HUCHZERMEYER, MARIE, et al. "Informal Settlements." Changing Space, Changing City: Johannesburg after Apartheid - Open Access Selection, edited by PHILIP HARRISON et al., Wits University Press, 2014, pp. 154–75, https://doi.org/10.18772/22014107656.12.
Recreated by Author.

low-income housing concentration just outside the municipal boundaries. The only informal settlement area within a formal housing complex that crosses the municipal line is the Chris Hani Extension 4 community, which straddles Ivory Park and Tembisa.

3.2.7 The nature of Johannesburg's informal settlements

Apart from informal communities that have sprung up on underutilized land within the urban fabric, such as Ivory Park, Johannesburg's informal settlements are surprisingly orderly. In general, informal settlements have taken the form of a grid of parallel roadways that is similar in size to official settlements. The formal framework of the city, on the other hand, cannot compare to the density of the structures. Colonies that have taken up residence in green spaces in the city's formal districts, in particular, have reached a state of desolation. Slovo is a highly inhabited informal community in Johannesburg. A 950-structure settlement in the coronation's lower middle-income segment. It was first published in 1993 and hasn't altered much in the intervening two decades. Some similar villages have been totally eliminated due to the problems that dense communities present for in situ upgrading. Between 2003 and 2004, the informal colony in Diepkloof, Soweto, was fully evacuated.

Figure 57: Map of Soweto informal settlement in Johannesburg
Source : Map Taken from Satellite view on Google earth Pro.

Figure 58: Map of Ivory Park informal settlement in Johannesburg
Source : Map Taken from Satellite view on Google earth Pro.

Figure 59: Map of Kya Sands informal settlement in Johannesburg
Source : Map Taken from Satellite view on Google earth Pro.

This town isn't even mentioned in the city data source. Over 65 percent of actual settlements had a well-organized layout, according to the settlement analysis. In comparison, 35% have a layout that is much denser and disordered. In addition, the majority of the households are moderately sized and well-organized.

Figure 60: Informal settlements removed between 2000 and 2011
Source : HUCHZERMEYER, MARIE, et al. "Informal Settlements." Changing Space, Changing City: Johannesburg after Apartheid - Open Access Selection, edited by PHILIP HARRISON et al., Wits University Press, 2014, pp. 154-75, https://doi.org/10.18772/22014107656.12.

3.2.8 Regional Trends in informal settlements change

A- Complete Removal in areas of investment interest

Only in Soweto is it possible to demolish entire settlements without supplying RDP homes in the immediate vicinity, resulting in relocation to a distant location. The only other areas where many informal communities have completely vanished are the affluent smallholding and gated development sectors of northern Johannesburg in the City's region A. The majority of these evictions and relocations were caused by rising real estate interest. In ivory park, just one settlement was relocated from a school field. The Joburg spatial regeneration strategy 2030 named Soweto as a critical site for urban spatial renewal, resulting in numerous evictions and relocations. On the other hand, Ivory Park, which is the most heavily populated informal area, has remained untouched since its creation.

Figure 61: The old Weilers Farm plan superimposed on the new formalized pattern.
Source : HUCHZERMEYER, MARIE, et al. "Informal Settlements." Changing Space, Changing City: Johannesburg after Apartheid - Open Access Selection, edited by PHILIP HARRISON et al., Wits University Press, 2014, pp. 154-75, https://doi.org/10.18772/22014107656.12.

B- Rollover upgrading

Rollover upgrade has 'formalized' several informal settlements in Johannesburg's south. A former pattern, which was usually orderly but not particularly dense, is replaced with a new plan of equivalent density. This is ironic, considering the rationale provided in Huchzermeyer's case study of two similar settlements was merely the engineer's view that the previous layout was unworkable, as well as their brief to build a conventional layout for a subsidized housing development. New highways are frequently built at the same intervals as old highways, but

Figure 62: Map of Kya Sands informal settlement in Johannesburg in 2007
Source : Map Taken from Satellite view on Google earth Pro.

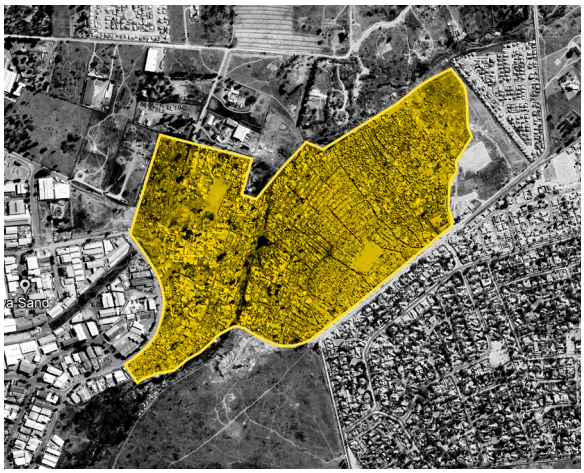


Figure 63: Map of Kya Sands informal settlement in Johannesburg in 2021
Source : Map Taken from Satellite view on Google earth Pro.

in the opposite direction. Despite the fact that these communities possessed spatial attributes that were appropriate for upgrading, the homes and their buildings were removed from the site and a new development was carried out. Nomzamo is one such case in Soweto.

C- Informal settlement expansion and new informal settlement formation

Many of the informal settlements that have arisen are on privately held land, posing a severe hurdle to the city's plan to formalize them. Kya Sands, in Johannesburg's affluent north-west, is a comparable case. It has risen rapidly since 2007. Kya Sands had around 3000 people in 2011, according to the city's database. A big industrial sector is located directly across the street from Kya Sands. It is also close to a number of rich areas, including the gated estates of Maroeladal and Jukskei Park, which are both within a 3-kilometer radius.

3.3 SOUTH AFRICAN POLICIES FOR DEVELOPMENT OF TOWNSHIPS AND INFORMAL SETTLEMENTS

3.3.1 A brief introduction into the development of Townships and informal settlements

When South Africa was formed in 1910 as a union of four provinces, the population was divided into races, but each state imposed distinct segregation and rights limits. Until the official declaration of the Apartheid state, the rights of the colored community were distributed variably from province to province. The Black Land Act of 1913 made it illegal for Black Africans to possess or rent land outside of designated reserves (7.6% of South Africa's total land area). As a result, a considerable portion of the black population was forced to abandon farming in order to find work in the city. (The first mixed-race Townships arose within cities, but they gradually moved to the outskirts as time passed.) The government permitted these settlements because they guaranteed a labor force within urban regions, but they were underdeveloped owing to a lack of investment, and they were plagued by acute poverty and uncontrolled population influx. The government invested in Townships from 1923 until the creation of the Apartheid system in 1948, recognizing the importance of the settlement in order to meet the rising need for non-white cheap labor. However, because investment could not keep up with the growing number of people migrating, informal settlements arose. Furthermore, the government established four zones for ethnical races and existentially created Townships by the "Group Areas Act No 41" in 1950. In fact, this meant that non-white residents who had remained in the city were evicted from their homes. Townships were designed according to precise plans provided by the federal government. This included not only the monotonous design, size, and material of dwellings, but also the fact that the community should be situated at a sufficient distance from white areas and buffered by industry and open spaces. Following the factories were zones for Colored, Indian, and Chinese populations, who were even isolated from black families living on the outside. Beyond the insufficient development of Townships, the influx of squatting and informal settlements grew as nonwhites were expected to work in cities but were unable or unable to commute on a daily basis from the outskirts. Although the government built three racially divided Townships, it was unable to regulate the growing number of unauthorized migrants. (Heyer & James, 2015).

3.3.2 South African policies for coping with increasing poverty and informal Settlements

When South Africa's apartheid rule fell in 1994, the country was enthusiastic about eliminating poverty and establishing equality among the country's numerous ethnic groups. However, homelessness and landlessness are on the rise. The South African National Dwelling Policy has followed the idea that the state should promote a "better living for all" by providing appropriate housing structures in planned and serviced neighborhoods for impoverished people. As a result, the South African Constitution emerged built on a strong commitment to housing as a basic human right and its provision as a government responsibility.
Even if more participatory ways have been established, this top-down delivering mindset has persisted in South Africa among housing beneficiaries as well as at various government levels.
Two housing and development programs run by the Department of Human Settlements (NDHS) are described below:
These are the following

• RDP – Reconstruction and Development Programme
• UISP – Upgrading of Informal Settlements Programme

A) Reconstruction and Development Program (RDP)

The African National Congress established the Reconstruction and Development Programme (RDP) in 1994 as a comprehensive and ambitious approach to addressing and acknowledging the interconnections between violence, unemployment, inadequate education and health care, a failing economy, and a lack of housing. 'The RDP was not set up by professionals – although many, many experts have participated in that process – but by the same people who will be part of its implementation,' Nelson Mandela said in the program's preamble in 1994. It is the result of extensive collaboration, debate, and consideration of what we require and what is feasible. 'All households must have sanitation and trash collection within two years, or offer the needy with a quality, well-located, and cheap shelter for all by the year 2003,' for example, demonstrate its ambition. These objectives were clearly not met, as the country is still struggling to provide adequate water, sanitation, and housing to its citizens 28 years later.

B) Upgrading of Informal Settlements Programme (UISP)

The Republic of South Africa's government is a signatory to the United Nations Millennium Development Goals, which aim to improve the lives of at least 100 million slum dwellers by 2020. To pursue these objectives, the NDHS formed a cooperation with

the Cities Alliance in 2006, whose members include major international governmental institutions, NGOs, and multilateral organizations such as UN-HABITAT, UNICEF, and SDI. The Cities Alliance and the World Bank Institute offered technical assistance to South Africa for the design and implementation of the National Upgrading Support Programme through 2011. The NUSP then created two practical tools, the Urban Settlement Development Grant and the Upgrading of Informal Settlements Programme. Along with the UISP, 16 pilot priority projects, including the N2 project in Cape Town, have been assigned to observe and analyze best practices and contribute to the development of a detailed upgrading strategy for the entire country.

The USDG is a pooled infrastructure grant that municipalities can apply for whenever they want to invest in an informal settlement, such as in sanitation, roads, bridges, and other infrastructure. The UISP, a holistic policy document focusing on the tenure security of informal dwellers and their recognition as citizens, health and security through infrastructure, and community empowerment through their participation in the upgrading process and addressing their broader social needs, defines this process.

3.3.3 State Intervention Policy towards Upgrading of Informal Settlements

In accordance with the Growth and Development Summit decisions, the Informal Settlement Regularization and Upgrading Steering Committee aims to eliminate informal settlements by 2014 utilizing an incremental housing approach to construct sustainable human settlements. As a result, this group provides much-needed coordination among parties. This means that informal settlements must be authorized in order for the city to meet their service needs. These communities must also be able to establish some sort of individual tenure in order to maintain the structures and other improvements they have created. The supply of services and infrastructure will be part of the informal settlement scheme.

a) Formalization

In this sense, formalization refers to the legal processes by which townships are established with formal services and residents receive formal security of tenure. This usually entails the creation of top structures.

b) Regularization

Interim efforts to acknowledge informal settlements and provide a sense of tenure security for persons are included in regularization. The following are the goals of regularization:

- To provide inhabitants in informal settlements with a level of protection that is distinct from the lengthy and inefficient township establishment processes.
- To incorporate all settlements into an acceptable regulatory environment for the sake of safety and to encourage individual and state investment.
- To acknowledge the significance of informal settlements in providing quick and affordable housing, rather than pretending they don't exist.
- Intervene to eliminate the inefficiencies that come with this informal manner of home provision.
- To establish an atmosphere that encourages state and local government investment.

c) Categorization of the 180 informal settlements

The 180 informal settlements have been divided into five intervention regions by the Committee.

Category 1: 73 Settlements for upgrading
This category includes all in-situ initiatives, the majority of which were founded under the less formal township statute. The length of time it takes to complete each settlement varies. Except for highways and storm water infrastructure, almost all communities in this category have received bulk infrastructure as well as interior services.
So far, 26 settlements have approved surveyor general diagrams, 20 settlements have submitted completed layout plan applications to Surveyor General, 19 settlements have draft layout plans, and the remaining 8 settlements are in the planning stages under the aegis of CoJ Housing.

Category 2: 16 Settlements for relocation
Due to poor geotechnical and other safety problems, the 16 villages in this category will be transferred to other places. As a result, projects in other locations cater to these settlements. These villages are being relocated to greenfield projects by CoJ Housing.

Category 3: 23 Settlements to be regularized
The Department of Development Planning and Urban Management is regularizing these settlements. Basic plans for these communities will be created, allowing infrastructure authorities to design infrastructure interventions. Each settlement in this category will get Level 1 services at first; tenure will refer to the legal occupation of temporary structures rather than ownership; and each settlement will have its own business strategy. Private landowners are now negotiating for land on which some of the villages in this category are located.

Category 4: 21 Programme Linked Settlements. The Alexandra Renewal Programme and the Kliptown Programme are linked to housing programs that would formalize homes for participants.

Category 5: 47 Settlements not assigned any Project
These villages are either on undevelopable terrain or on land that is privately owned. On 33 of the 47 settlements, more extensive studies are needed to see if they may be regularized and developed in place. (Kunene Z, 2009).

The Department of Human Settlements also developed the National Upgrading Support Program to assist in the execution of the Upgrading of Informal Settlements Program. In comparison to subsidized housing, the UISP recommends a more just intervention method. The main goal of the UISP is to "organized in situ upgrading of informal settlements rather than relocation.
According to the Constitution, relocation should only be used as a last resort in extreme situations and should be done on a voluntary and cooperative basis (ibid.). In response to UISP-related lawsuits, the Constitutional Court recommends that the feasibility of in-situ upgrading be studied in all informal settlements before displacement is considered.
On the Huruma in situ settlement upgrade in Nairobi, Adegun and Ouma indicates that in situ upgrading can be environmentally sustainable, particularly when it integrates densification, local procurement of building materials, and community-based construction processes.

3.3.4 Summary of the Housing Programs and the UISP in relation to re-blocking

The RDP, as the first democratic housing plan with top-down planning, has molded the formation of modern Townships while also causing substantial, still-unresolved issues. Even after Apartheid, families were routinely transferred to rural places, cut off from their social networks but with little job and livelihood options. Furthermore, the so-called RDP dwellings proved to be of poor quality and inadequate for the needs of low-income households. Ten years later, in 2004, these issues were recognised, resulting in the Breaking New Ground development plan, which suggested for the first time the upgrading of informal settlements rather than house development. However, because the BNG was not substantial enough, the National Housing Code was launched in 2009, along with the IDP and UISP. These are more realistic instructions for towns on how to coordinate development with local groups and individuals. The national Upgrading of Informal Settlements Programme, in particular, has a direct impact on the ways in which municipalities, communities, and supporting NGOs can participate in settlement upgrading.
In this regard, it's worth noting that the UISP stipulates that the municipality can only upgrade public-owned land. The municipality is responsible for surveying suitable land and infrastructure services throughout

Phases 1-3, but not for top structures, which implies that financing will be granted solely for services. As a result, supporting NGOs and communities must offer top structures, such as shacks in this example. It is vital to note that shacks can only be built when the municipality has given the necessary ground structures, such as water lines and electricity.

As a result, all project partners and communities are reliant on the municipality's delivery and timeliness. This must adhere to the three UISP Phases and their pre-determined time constraints; for example, Phase 2: Project Initiation is scheduled to last 8-12 months. Furthermore, a municipality must develop and amend its budget annually in accordance with the IDP (Integrated Development Plan) five-year plan. For UISP projects, this means that a municipality must request for funding for the next project phase within the financial year but must also spend its budget within this time limit for the current project phase. Otherwise, it will be sanctioned and receive less funds the following year. Phase 2 of the UISP needs a settlement's socioeconomic and demographic profile,' which in practice means towns will hire experts to conduct a community assessment. Furthermore, unlike community-supporting organizations like CORC and ISN, these consultants will frequently be assigned the role of community mobilization, in which they lack experience. This is because, as previously said, towns are required to spend project budgets and complete all project phases, and hiring a consultant is a relatively simple way to spend money for this difficult community work.

3.3.5 The PIE Act

The Prevention of Illegal Eviction and Unlawful Occupation of Land Act 19 of 1998, passed by the first democratic Parliament in 1998, superseded PISA. The PIE Act gave effect to section 26(3) of the Constitution, which states that before issuing an eviction order, a court must consider all relevant facts. It stipulated that an unlawful occupier's eviction must be "fair and equitable," taking into account a number of considerations such as the occupiers' personal circumstances and if the state could provide alternative housing.

The PIE Act was enacted to safeguard millions of South Africans living in metropolitan areas who had no common law right to the land they occupied, at least until mass housing could be built. In this way, the PIE Act aimed to flip the legal order in relation to evictions, from one that targeted illegal occupation and "land invasion" to one that aimed to prevent illegal removals.

3.3.6 Development of eviction law

The constitutional guarantee of adequate housing for all and the PIE Act's provisions stand in stark contrast to the ubiquitous realities of housing backlogs, evictions, and removals. This is one of the key reasons why the right to appropriate housing has been brought up in court so frequently. Because of the high number of litigations, the legislation relating to the right to housing, evictions, and alternative housing is always evolving and adapting as South African courts incrementally and gradually develop the right.

As this right has grown, so have the responsibilities placed on municipal governments. The ever-changing legal landscape has spawned a new set of interactions in the realms of housing and eviction law. These connections, in turn, are defined by a set of rights and responsibilities owed to distinct parties.

Municipalities, on the other hand, have been hesitant, incapable, or unwilling to carry out the commitments set down in case law. More broadly, municipalities across the country have failed to develop and implement proactive, programmatic, and consistent responses to evictions and the provision of alternative housing in eviction cases within their borders.

Instead, governments have frequently responded in an ad hoc, somewhat uncoordinated fashion, providing alternative accommodations only after being directed to do so by courts (sometimes multiple times). When towns have attempted to undertake a more coordinated response, their plans have frequently failed to effectively absorb the significant protections enshrined in jurisprudence and human rights law.

3.3.7 Housing Act and the Housing Code

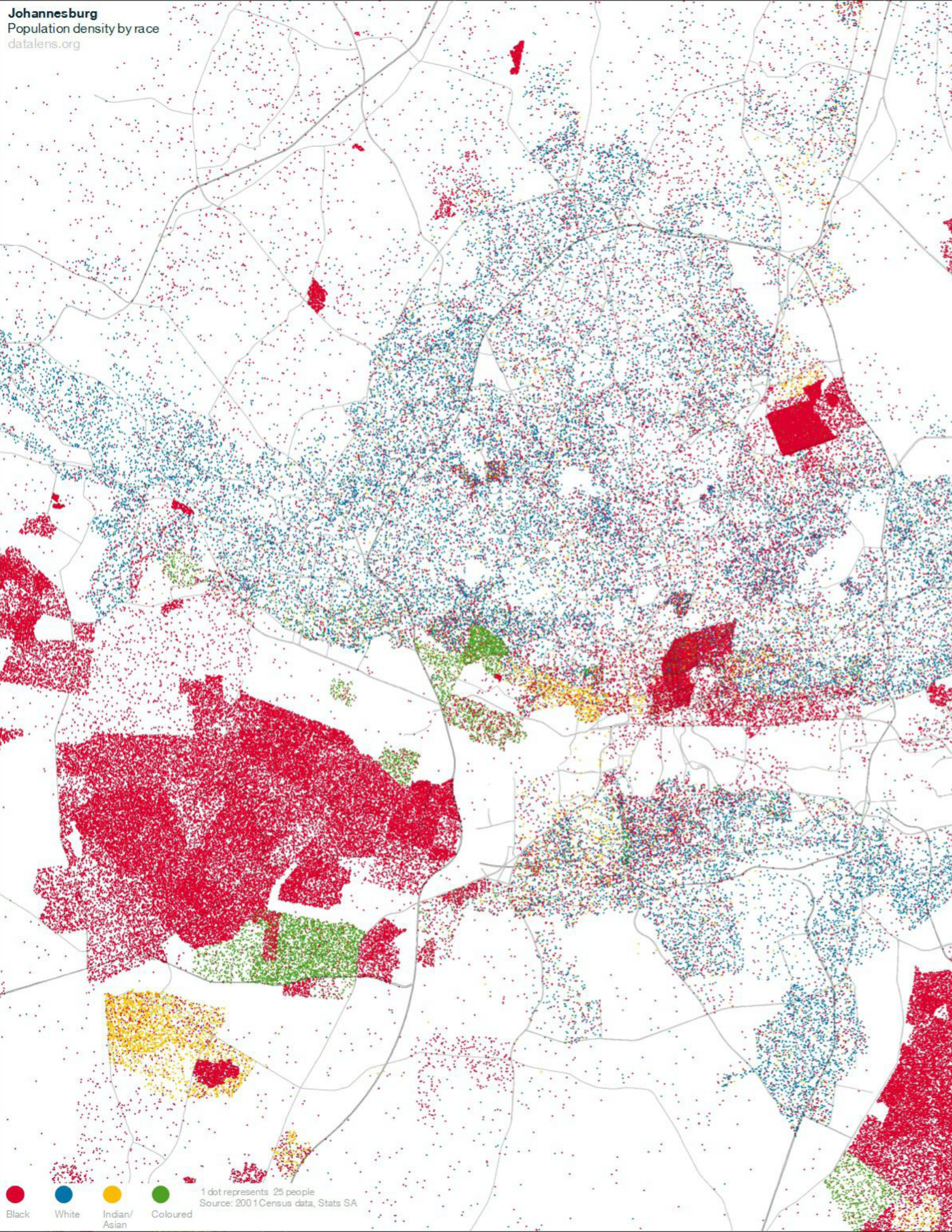
The Housing Act 107 of 1999 (the Housing Act) is the main piece of law in South Africa that deals with housing. The Act lays the groundwork for the national housing development process by establishing general principles for housing development across all levels of government, defining the roles of national, provincial, and local governments in housing development, and laying the groundwork for national housing program financing.

According to Section 2(1) of the Housing Act, all levels of government are required to prioritize the needs of the poor in housing development and to consult constructively with individuals and communities affected by housing construction. The Act also requires the state to ensure that housing developments provide as many housing and tenure options as is reasonably possible; are economically, fiscally, socially, and financially affordable and sustainable; are administered in a transparent, accountable, and equitable manner; and adhere to good

governance practices.
In addition, section 9(1)(a)(i) and (iii) of the Housing Act are significant in the context of inhabitants' rights to housing and essential services in informal settlements. The following are the provisions:

(1) Every municipality must, as part of the municipality's process of integrated development planning, take all reasonable and necessary steps within the framework of national and provincial housing legislation and policy to –
(a) ensure that –
(i) the inhabitants of its area of jurisdiction have access to adequate housing on a progressive basis; [and] …

(iii) services in respect of water, sanitation, electricity, roads, storm-water drainage and transport are provided in a manner which is economically efficient…


Johannesburg
Population density by race
datalens.org
Black
White
Indian/
Asian
Coloured
1 dot represents 25 people
Source: 2001 Census data, Stats SA

An Overview of Context

3.4 THE CITY LAYOUT

from the city's initial survey in 1886, central Johannesburg's rectangular grid layout has remained the same. Johannesburg is the commercial and financial hub of South Africa. The huge concrete structures that shadow the tiny lanes giving the sense of being in a tunnel. The city's jumbled architecture is a result of years of fast expansion and a disdain for historical preservation.

Around the turn of the 20th century, a wide diversity of architectural trends and styles emerged. Massive concrete structures with steel reinforcement, like Corner House, the corporate office of one of the biggest mining firms in South Africa, symbolized the city's new role as a British Empire outpost.

A prime example of American impact on the "skyscraper" concept is the ESKOM Building, a 21-story Art Deco tower constructed to represent New York City's vivacity in the 1930s. (The Building was destroyed in 1983, joining a lengthy list of historical sites that have vanished with the passage of time.) Any architectural individuality the city had in the decades following WWII was lost in a sea of bland high-rise blocks. More than 500 townships and suburbs make up Greater Johannesburg, which covers an area of more than 200 square miles. Each was designated for a certain "racial group" in accordance with the Group Areas Act of 1950, the cornerstone of urban segregation.

Despite the revocation of the legislation in 1991, racial segregation is still prevalent in Johannesburg.
The majority of Black Africans live in "townships," which are effectively dormitory settlements for Blacks working in the metropolis, on the outskirts of the city. Over 500,000 people live in the Alexandra township, which was cut out of the white dominant northern suburbs of Johannesburg. more than three times as many people reside in Soweto, a vast urban area ten miles to the southwest of the metropolis. The city's small mixed race population resides in townships to the west of the city, while the majority of its Indian residents—ethnic Asians including Indians, Malays, Filipinos, and Chinese—dwell in Lenasia, a special "Asian" township created in the 1950s to house Indians who had been forcibly relocated from the city center.

The kind and caliber of the accommodations vary. Tens of thousands of squatters who live without running water, power, or sanitary facilities also dwell in Soweto, which is known for its unending rows of two-room matchbox houses constructed by the municipality. Soweto also contains a few wealthy enclaves. Black migrant workers, who have historically been the core of South Africa's industrial labor force, are housed in sizable, single-gender hostels close to their workplaces or on the outskirts of Black townships. Every suburb has a different selection of white houses.

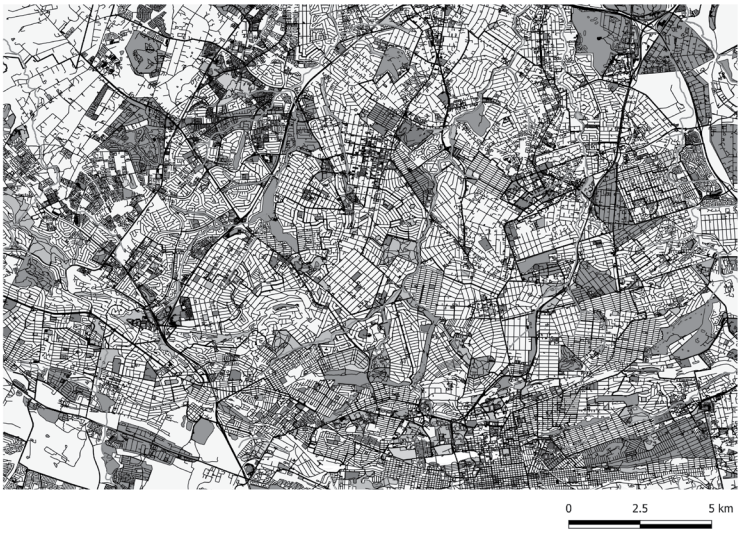


Figure 64: City Layout of Johannesburg
Source: Author's Map

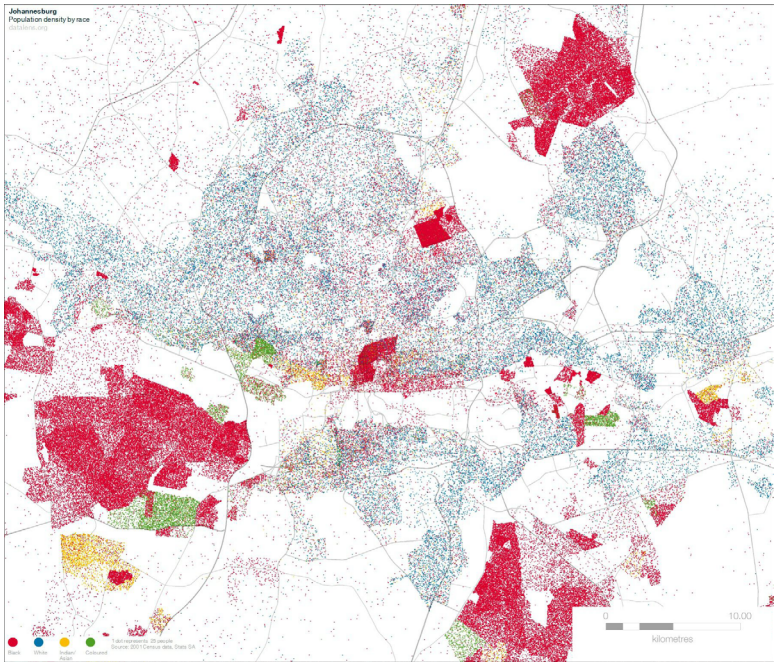


Figure 65: Population Density by Race.
Source: SAHO- South African History Online

In the city's western neighborhoods like Brixton and Melville, where modest tin-roofed bungalows and semidetached homes had housed white working class residents, middle-class whites now live there. The white poorest areas of Johannesburg, Cottesloe, Vrededorp, and Booysens Reserve, are far worse. Wealthy whites live in the north, either in one of a few brand-new suburbs or in one of the area's stunning, historic towns like Houghton and Parktown, which formerly housed South Africa's rich businessmen. Homes in the northern suburbs frequently contain swimming pools and sizable flower gardens. The bulk of them are encircled by tall fences.

3.5 SOCIAL DEVELOPMENT PROFILE

3.5.1 Key Demographics

Less than one-fifth of Johannesburg's residents are white, whereas around three-quarters of its population is black, colored, or Asian/Indian. However, these figures fall well short of portraying the city's multilingual population. In Johannesburg, people regularly speak at least a dozen different languages.

There are sizable Portuguese, Greek, Italian, Russian, Polish, and Lebanese minorities in the city, although the majority of the white population is English and Afrikaans. Every language and ethnic group in southern Africa is represented among the Black people. Christianity, practiced by both white and black people, makes up the majority of the population, with all of the world's main religions represented. Male and female respondents were evenly split in the 2016 Johannesburg Household Survey.

For every 100 women in the population in year 2018, there were 100.3 men. In comparison to the rest of South Africa, the City of Johannesburg Metropolitan Municipality has 50.06 percent more men (48.96 percent). 2.57 million girls (49.94%) and 2.58 million men made up the entire population (50.06 percent). In the 14 million-person Gauteng province, where women make up 6.95 million of the population, or 49.75 percent, this trend is prevalent.

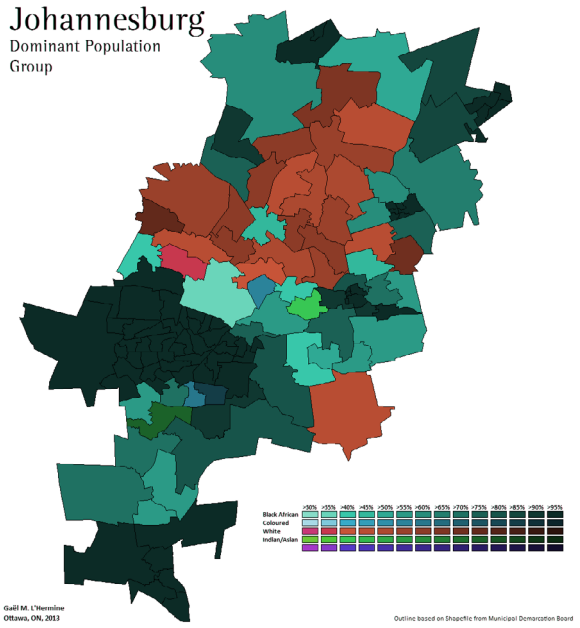


Figure 66: Johannesburg Dominant Population Groups
Data Source: https://welections.wordpress.com/guide-to-the-2014-south-african-election/race-ethnicity-and-language-in-south-africa/

The young working age group (25-44 years) accounts for about 40% of Johannesburg's population. In comparison to the rest of the country, The city has a much bigger proportion of working-age persons in the ages of 25 and 49. It's possible that this is related to the flood of young people looking for work in Johannesburg.

The young working age group (25-44 years) has the biggest population share, with over 2 million persons (or about 40% of the overall population). The population of johannesburg was 80.17 percent in 2018 were black Africans, Africans of color Whites make up 9.79 percent of the population, while colored African make up 5.27 percent and 4.76 percent Asian.

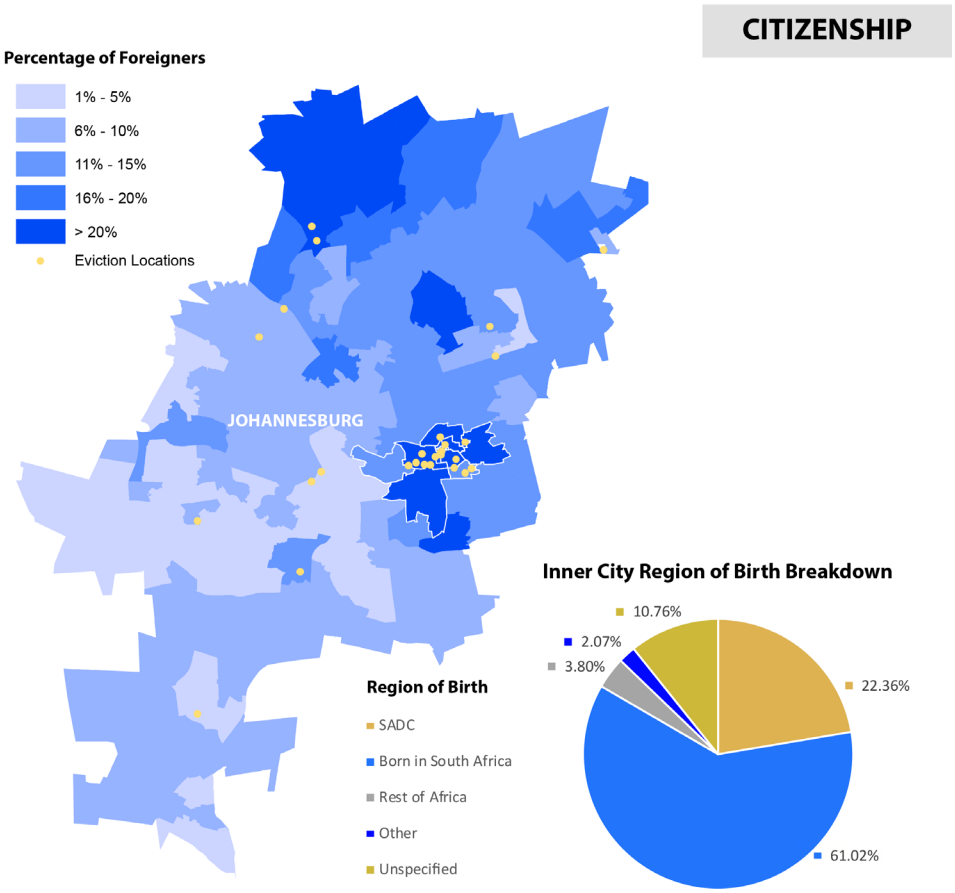


Figure 67: Johannesburg: Percentage of Foreigners
Source: Angela Li
Data Source:http://infrapolitics.c4sr.columbia.edu/studentProjects/Li/index.html

As the mayor's eviction plan points out, the inner city has a disproportionately large number of foreigners, mostly from neighboring Southern African Development Community (SADC) member countries. Although the data does not identify a percentage of undocumented immigrants, it is safe to assume that the indeterminate category contains mostly undocumented immigrants who do not want to be identified. Despite the relatively large percentage of foreigners due to both legal and illegal immigration, South Africans still account for more than half of the population of Johannesburg. As a result, it is unlikely that evictions will be limited to only undocumented immigrants if they are carried out on entire occupied buildings at once.

3.5.2 Commerce and industry

The city of Johannesburg is a financial, mining, and manufacturing hub. All of the businesses mostly mining, as well as the Chamber of Mines, which regulates the industry, are based in the city. Local manufacturers in city and the East Rand create a wide range of products, from textiles to specialist steels. To assist the mining industry, there is a sizable engineering sector. The majority of the banks, insurance firms, and building societies in the nation have their corporate headquarters there. Over 600 firms are currently listed on the Johannesburg Stock Exchange, which was established in 1887 to provide money for deep-level mining. As a result of the latter's shortcomings, a vibrant local taxi industry has emerged.

Despite the fact that Pretoria, South Africa's capital, is merely 40 miles to the north, Johannesburg houses the majority of state ministries. Many foreign countries have consulates in the city, largely to suit the needs of the area's hundreds of international firms.

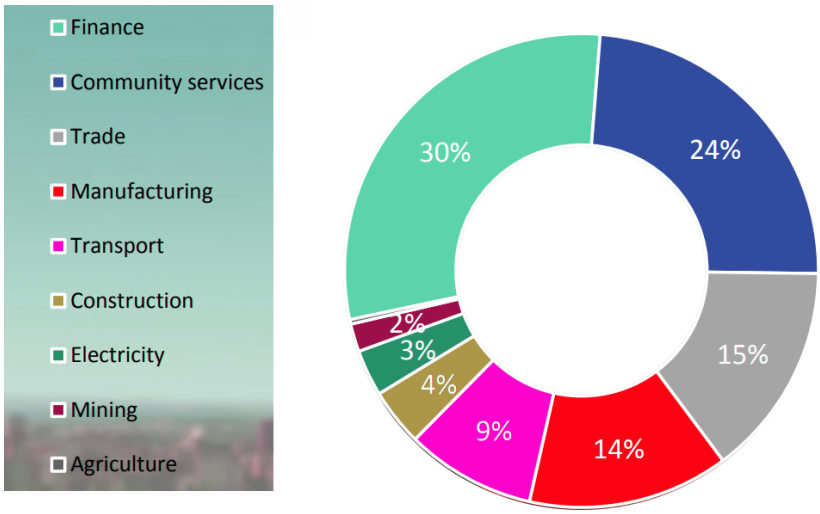
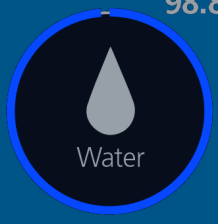
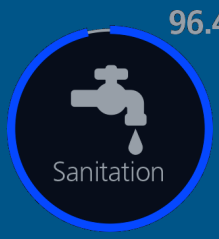


Figure 68: Johannesburg's main Eonomic Sectors
Data Source: Joburg, The State of City

Access to basic services

1.8 million households





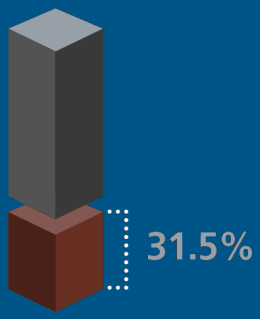
210+ informal settlements

6.30
Quality of life (QoI) index

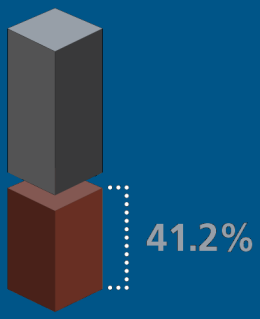
95%
Water quality Blue drop index

73pts
Customer satisfaction index

Figure 69: Johannesburg demographics
Data Source: Joburg, The State of City



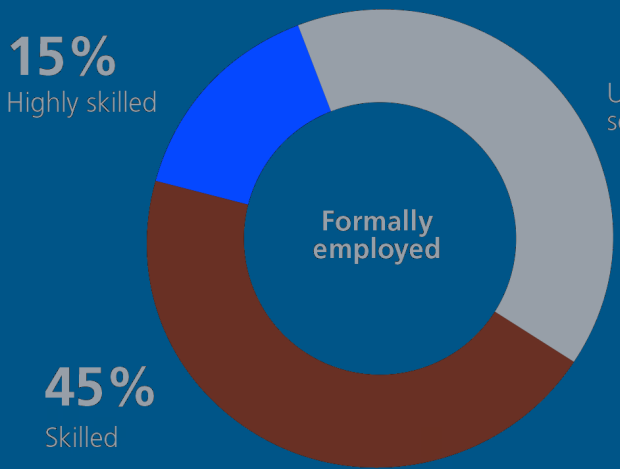
Unemployment rate



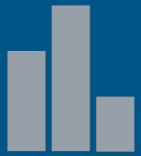
Youth unemployment rate

Poverty rate
45.22%

Human Development Index
0.725



GINI coefficient
0.628



GVA Growth (Average annual growth)
1.95%

3.5.3 Climate

Johannesburg has a pleasant climate. Summer temperatures hover about 25 degrees Celsius, while winter temperatures hover around 18 degrees Celsius, with temperatures rarely falling below freezing. The city receives about eight hours of sunlight every day in both winter and summer. The average yearly rainfall is around 28 inches (700 mm); however, the quantity varies substantially from year to year. Droughts are a typical occurrence. Summer brings almost all of the city's rain, which frequently falls in the form of magnificent late-afternoon lightning storms. Air pollution is a severe problem, particularly during the winter months, when thermal inversions prevent air from moving westward from the Indian Ocean.

3.5.4 Population

With a population of almost 5.5 million, Johannesburg is the most populated city in South Africa. The metro also asserts itself to be the financial and economic center of the nation. Nearly 10% of South Africa's population resided in the city in 2018. The pace of population growth has dropped from 3 and half percent to 2.4 percent since 2011. However, this was much bigger than the Gauteng and national standards, demonstrating that the city continues to be a magnet for inward migration. 2 246 350 people were registered to vote in the 2016 municipal elections, and 57.1 percent of those people cast ballots. Voter participation was comparable in Gauteng and South Africa.

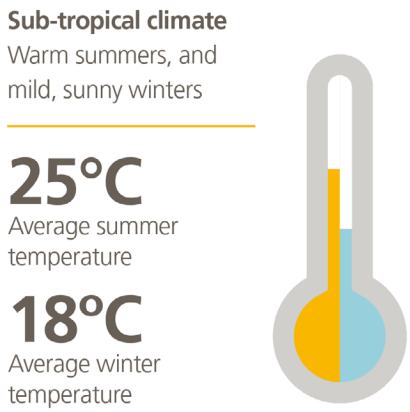


Figure 70. Weather conditions of Johannesburg
Data Source: Joburg, The State of City

Figure 71: Key information about the Johannesburg city in numbers
Data Source: Joburg, The State of City

3.5.5 Households

In 2018, there were 1.68 million people living in the City of Johannesburg Metropolitan Municipality. From 2008 to 2018, the number of families rose on average at a 3.04 percent yearly pace. The average household size in the City of Johannesburg Metropolitan Municipality is decreasing, with an annual population growth rate of 2.91 percent. In 2008, there were around 3.9 people per household on average; in 2018, there were about 3.1 individuals per family. A woman is the head of her household in around 37.7% of the households in the city. This number is somewhat more then Gauteng rate of 35.86% and close to the 90 percent national average (41.32 percent). There were 5 144 families in 2018 with a kid as the head. They make up less than 10% of the South African population overall and roughly a third of the population of Gauteng (15,241). (111,471).

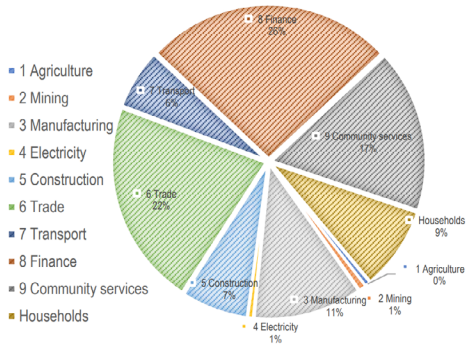


Figure 72 : E mployment composition , 2018 city of johannesburg
Source : Ibid

3.5.6 Employment /Unemployment

In Johannesburg over 52% of the economically active population is employed. They spend 77 percent of their time working in the formal economy. With 26.1 percent of all employees, the banking industry has the largest labor force. The retail and trade sector employs 22% of the workforce. Because the provincial capital is located in a city, the community services sector, which includes general government responsibilities, employs 17% of the workforce. Agriculture employs the fewest people, making up only 0.6 percent of the entire workforce. In 2008, the informal sector employed 225 000 people; today, it employs 351 000 people, accounting for 8% of the overall workforce. The majority of these jobs are in the trade industry.

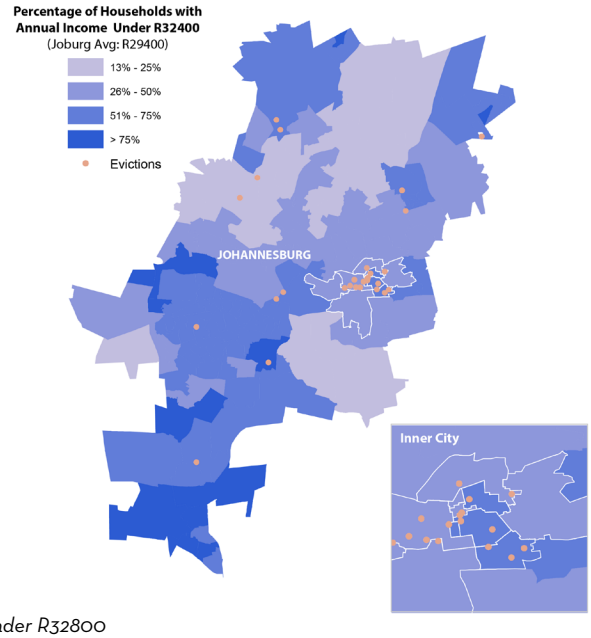


Figure 73: Johannesburg Percentage of Household Annual Income under R32800
Source: Angela Li
Data Source: http://infrapolitics.c4sr.columbia.edu/studentProjects/Li/index.html

The unemployment rate in the inner city varies from 6% to 20%, with rates as high as 20% in locations like Hillbrow and Jeppetowns. More than a quarter of a percent the annual income in the inner city is also low, which is understandable considering the high unemployment rate. The location is mostly occupied by persons who are economically disadvantaged and reside in rental homes with a limited budget.

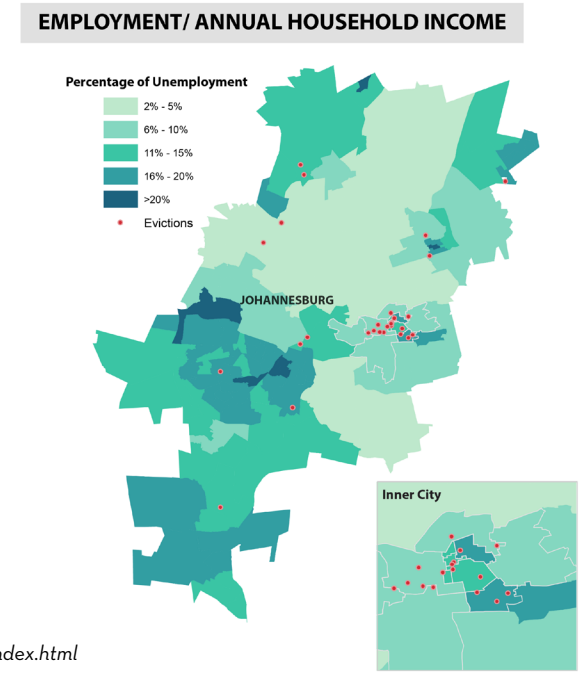


Figure 74: Johannesburg Percentage of Unemployment
Source: Angela Li
Data Source: http://infrapolitics.c4sr.columbia.edu/studentProjects/Li/index.html

In addition, the inner city has a low home-ownership rate when compared to other districts. Renters frequently occupy the kidnapped structures, paying rent to the owners who are genuinely in command of the structures. As a result, residents are evicted from places where they've lived for years under the fictitious pretext of illegal occupancy, while paying to live there legitimately.

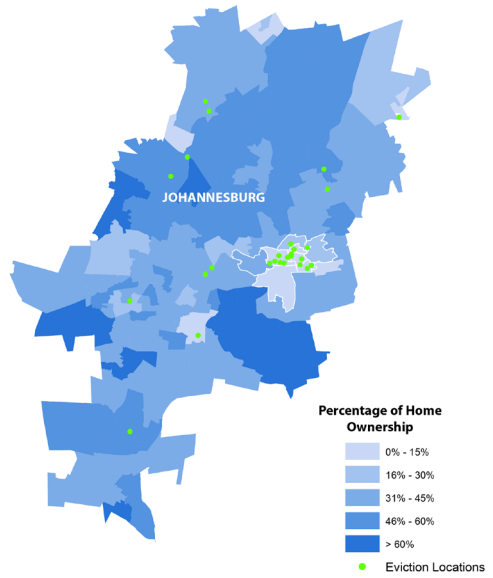


Figure 75 : Percentage of Home ownership
Source: Angela Li
Data Source: http://infrapolitics.c4sr.columbia.edu/studentProjects/Li/index.html

In terms of housing types, the proportion of informal homes in the inner city is extremely low (shacks). Outside of the city, evictions have mostly taken place in places where there are a lot of squatter communities. This is in line with the fact that evictions in the inner city have mostly taken place in hijacked buildings, whilst evictions in townships have primarily taken the form of hut clearing.

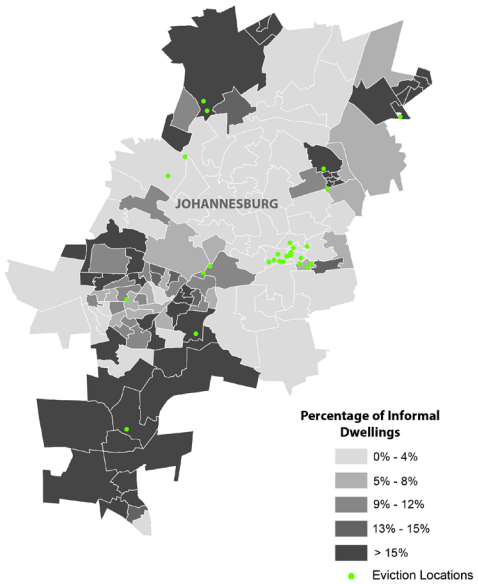


Figure 76: Percentage of Informal Dwelling
Source: Angela Li
Data Source: http://infrapolitics.c4sr.columbia.edu/studentProjects/Li/index.html

3.6 TERRITORIAL FRAMEWORK

3.6.1 Spatial Analysis

a) Existing Mobility System

For Johannesburg's mobility, the Transport Department supervises a complex network of highways and a developing public transportation system. Various corporate and public entities provide public transit in a variety of ways. One of the most pressing difficulties facing Johannesburg's administration is the integration of the numerous operators, each of whom has its own timetables, routes, and fares and does not share a common ticketing system.

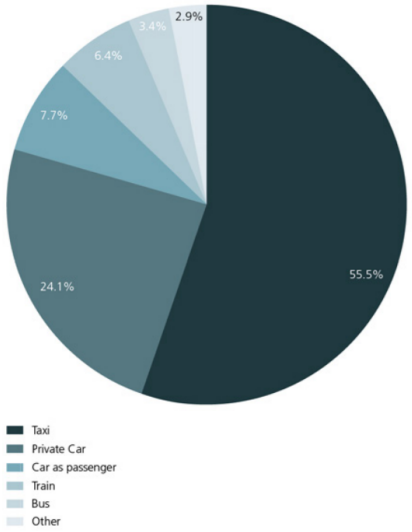


Figure 77: Transport types in the City of Johannesburg
Source: UN Habitat

b) The Road Network

Responsibilities of the road network It is divided between numerous levels of government in Johannesburg. The national government is in charge of the highways (N routes). Several provincially-owned highways are constructed and maintained by the provincial Department of Roadways and Transport in Johannesburg. The CoJ is in charge of maintaining and expanding the surviving public roadway network, which includes two freeways: the M1, which connects the city center and Sandton to the highway to Pretoria, and the M2 and M2, which run east-west somewhat above the mining belt.

c) The Rail System

The Johannesburg rail system is managed by the South African National Passenger Rail Authority (PRASA). The city's commuter rail operator is Metrorail. The rail network is east-west oriented, only covers the southern portion of Johannesburg, and does not completely mesh with existing residential and business areas. Despite the fact that OR Tambo International Airport, Midrand, and Sandton are all served by Gautrain, many important destinations within the city, such as OR Tambo International Airport, Midrand, and Sandton, are not serviced.

d) Gautrain

The province has established a rapid rail system in Joburg. This system is known as Gautrain. It was completed in 2012 and joins the river's two sides. OR Johannesburg, Tshwane, and Tshwane are all served by O.R. Tambo International Airport. Airports without a runway in the northern suburbs are served by a combination of heavy train and metro. Joburg's 80-kilometer system is served by two lines and ten stops, five of which are located within the city. To get to and from the stations, park and ride is used. & Bombela Concession Company manages the concession via a bus feeder/distribution system that services a 5km radius around each station's catchment area. The Gautrain system uses a smartcard technology that is likewise used for public transit. Passengers are transported using buses.

e) The BRT System

The Rea Vaya Bus Rapid Transit (BRT) system is the preferred mode of mass public transit for the city's busier corridors. Rea Vaya BRT Phases 1A and 1B, which featured 48 stations and 42.2 kilometers of trunk route, were built and put into service between 2009 and 2013. It connects Soweto locations, including the main academic sites, to the city center and surrounding suburbs. Phase 1C, which will extend the lines to the city's northern extremities, is nearing completion. The Rea Vaya is operated by the CoJ and accepts smartcard payments as well as automated fare collection.

f) Bus System

There is a well-developed bus system in Joburg. All regular lines are subsidized, and their operation is split between the Johannesburg City and the Gauteng Province, with no standardized timetables or tariffs. Metrobus operates a fleet of 418 buses that serve over 229 routes within the Metropolitan Municipality. The Metrobus is run by the CoJ, however it uses a different ticketing system than the Rea Vaya. The province of Gauteng has agreements with 11 additional private companies, the largest of which is Putco.

g) Mini Bus System

Despite its unofficial status, the minibus cab is surprisingly well-regulated and, to a large part, Joburg's primary mode of public transit. There are a total of 32 taxi associations, with at least 1,013 different routes under their control. Apart from the estimated 12,300 short-distance minibus taxis in Joburg, the city has a strong long-distance taxi industry, offering service to over 100 different locations, including international destinations. The radial minibus-taxi route network is centered on the Central Business District, with an average taxi route length of 17.8 kilometers. Many passengers (about

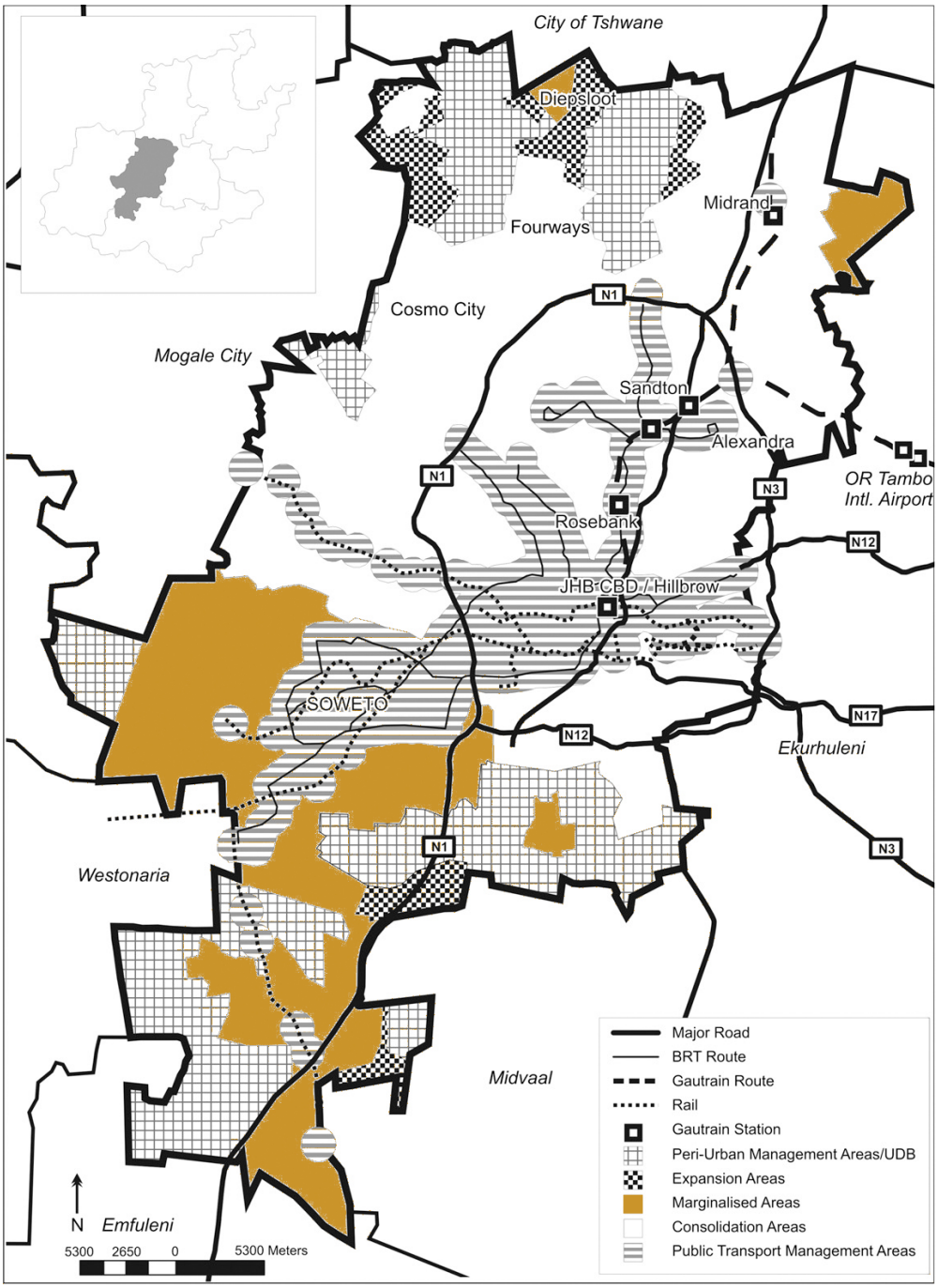


Figure 78: Spatial Organization of Johannesburg
Source: Todes, A. (2012). Urban growth and strategic spatial planning in Johannesburg, South Africa. CITIES, 29, 158-165.

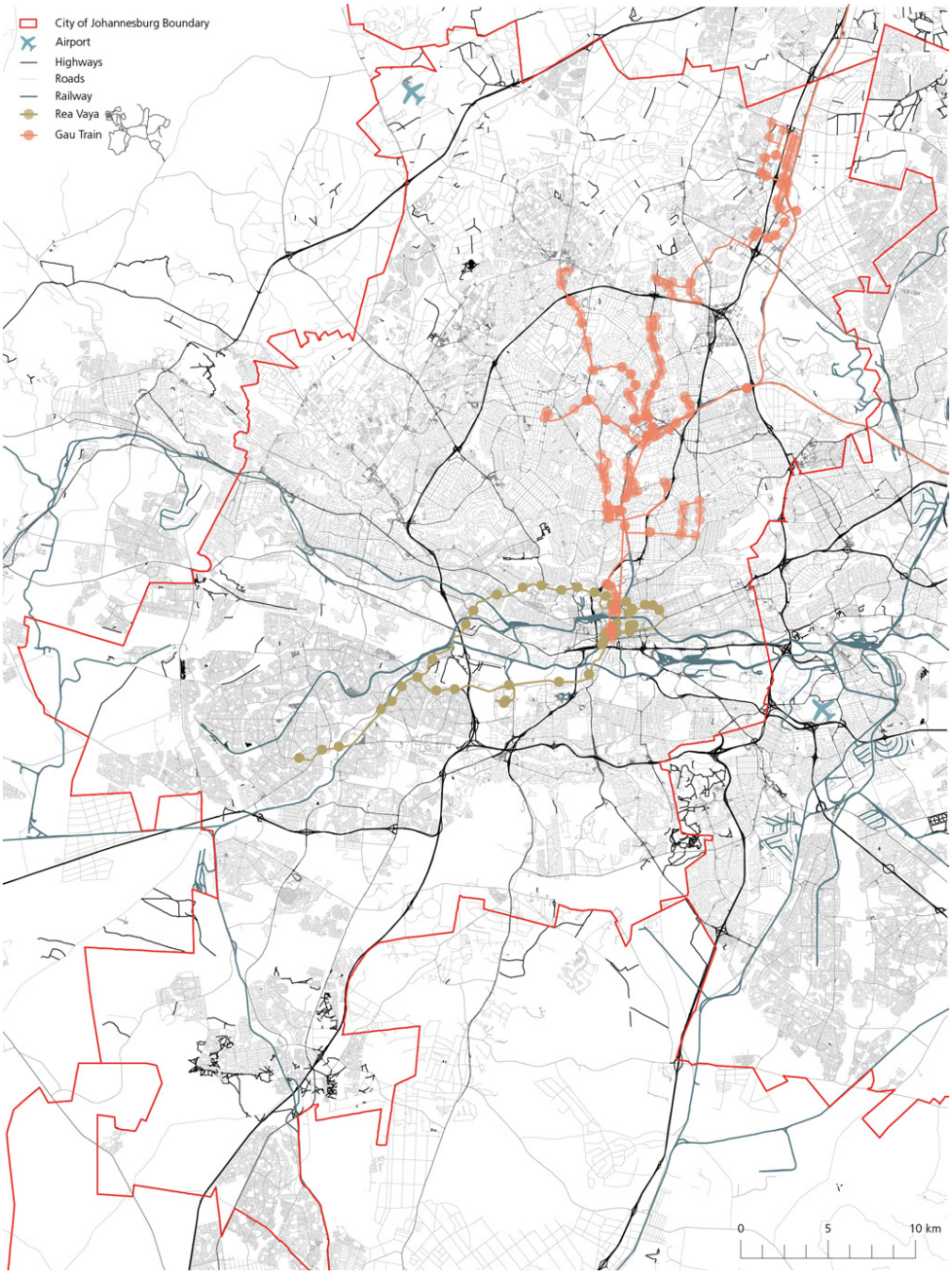


Figure 79: Strategic public transport network and flagship project routes The category of taxi mainly refers to the minibus taxis
Source : UN Habitat

65 percent) can complete their journeys in a single taxi, but 24 percent require a taxi-taxi combination, and 11 percent require transfers to trains or buses.

h) Metered Taxi System

Between 1800 and 2000 metered taxis are thought to exist in Johannesburg. Apart from the many services provided by various official large corporations, there are also numerous individual no-name cabs with "Taxi" printed on their roof lights instead of a corporate name. Approximately 44% of taxis fall under this category. Taxis that are metered are obliged by law to have a sealed meter in order to determine the fare. The Gauteng Provincial Government regulates taxi pricing, registers taxi licenses, and grades taxi services.

i) Tuk-tuk

A handful of tuk-tuk operations have been awarded operating permits in Joburg. The former ITP, on the other hand, had no laws limiting the use of these automobiles or motorcycles in public transportation, raising worries about safety, competition, and proliferation.

j) Non Motorised Transport

After vehicles and minibus taxis, walking is the third most prevalent mode of transportation in Gauteng. During morning rush hour, 34 percent of commutes in the province are made on foot (car 30.8 percent, minibus-taxi 21.9 percent), a decrease from the previous poll in 2000. 15 Walking to public transportation, such as train stations, bus stops, and taxi ranks, is also the most prevalent mode of transportation. Cycling, on the other hand, makes up only 0.3 percent of all journeys. Only about 10% of the city's walkers and cyclists prefer to walk or pedal for more than 30 minutes since they cannot afford motorized transportation.

k) Intelligent Transport System

For the past ten years, the Johannesburg Roads Agency (JRA) has used the Intelligent Transportation System (ITS) to increase the efficiency of the road network.
Remote monitoring of highways and signalized intersections with CCTV cameras, incident identification and management, and providing drivers with real-time information are just a few of the systems in place. Policy and investment objectives in the city have shifted to ITS tools to strengthen the city's public transportation network, particularly the BRT system.

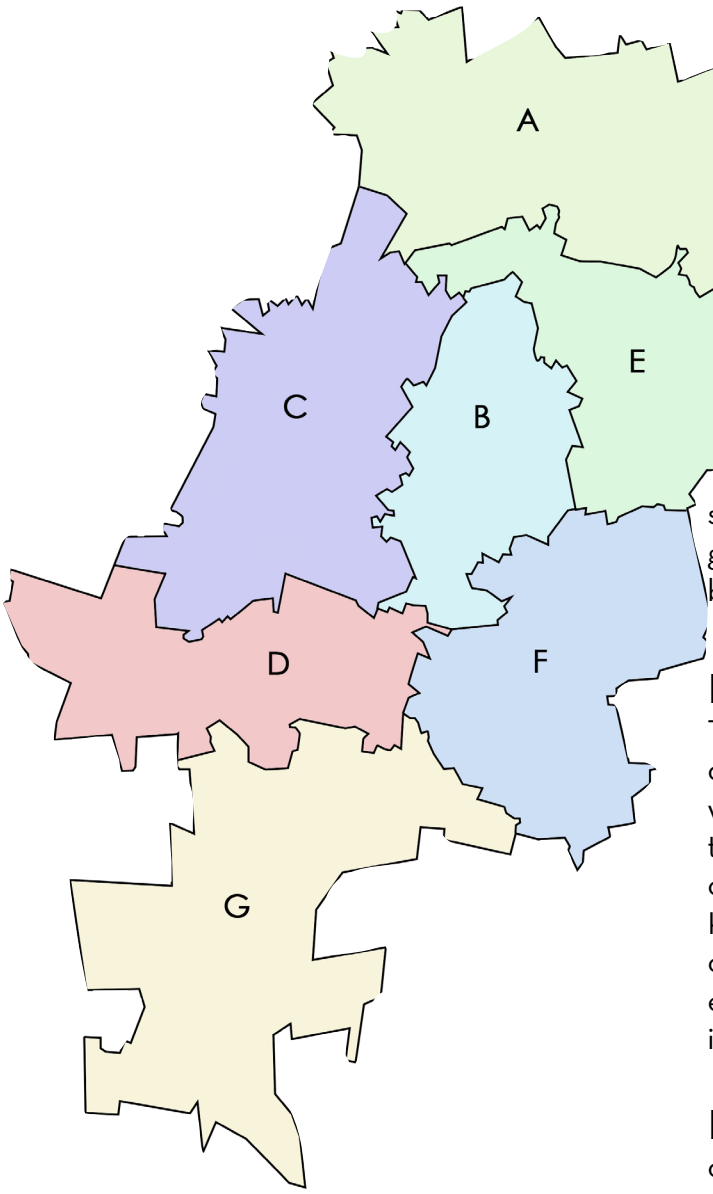


Figure 80: Regions of Johanneburg
Source : Joburg, Recreated by Author

3.6.2 Regions of Johannesburg

The city of Johannesburg is formed by 7 regions

Region A

It is the region of northern small farms, which includes Midrand, a developing residential neighborhood that connects to Tshwane, the country's capital, and is home to the telecom and warehousing sectors. For the city's distribution network, it also functions as a packaging and logistics centre. Diepslot and Ivory Park, both disadvantaged and new townships, are also in the area. In 1996, this region contributed 10 percent of City's GDP; by 2018, it had increased to 12%.

Region B

Telecommunications and financial services companies with headquarters in Region B, which used to be the developing center for the central northern commercial districts, including Parktown, Randburg, and Northcliff. Here is also where Riverlea, a former colored town, is located. This region contributed 13% of Johannesburg's economic output in 1996, a share it kept in 2018.

Region C

consists of the city of Rodepoort, Kagiso, and the Northcliff area, which served as a buffer zone between the southern sectors and the concentration of black townships. It is also known as the western industrial and

warehousing district. Also nearby is the notoriously bad-named village of Doornkop. In 1996, the area contributed 10% to Johannesburg's GDP; in 2018, that percentage increased slightly to 11%.

Region D

The majority of black townships, including South Africa's largest township, Soweto, are found in the heavily industrial Region D. Small farms and markets for livestock and agricultural products, which have traditionally been supported by manufacturing, abound in the area. With 24% of the city's population living in this area, it is the most populated area in the city, but it also has the highest unemployment rate at 43%. The region's contribution to Johannesburg's GDP was 10percent in 1996, but due to the decline of industry, it was only 8% in 2018.

Region E

is both the most economically important and the most contradictory region. On the one hand, it is the location of the "champaign north," which is supported by Sandton, the wealthiest square mile in Africa. On the other side sits Alexandra, the oldest and poorest township in South Africa. The economy of this region, which currently includes the Johannesburg Stock Exchange, is based mostly on finance, retail, and warehousing (JSE). Its contribution to the city's GDP increased from 25% in 1996 to 27% in 2018, which might account for the rise.

Region F

There are several banks headquarters and provincial government buildings in the city's Central Business Sector, which was previously very lively but is now the city's financial district.

This is where the city's Aerton warehouse and industrial hub as well as the Johannesburg Fresh Produce Market are situated. It is a key agricultural link to the surrounding city of Ekurhuleni, although a little property to the south of South Gate is steadily changing. The JSE's exit and the fall in manufacturing are the main reasons why this region's contribution fell from 27% in 1996 to 23% in 2018.

Region G

Region G, the city's southernmost district, is home to small holdings and storage facilities. This area is home to the more recent townships of Orange Farm and Lenasia as well as the previous colored townships of Eldorado Park and Ennerdale. Through this area, you may reach the Sedibeng District Municipality. With 17% of the population and yet a 28% unemployment rate, this district is the 2nd most populous in the city. The region continued to contribute 4% of the city's GDP between 1996 and 2018.

Spatial Analysis of Kya Sands

Kya Sands - Spatial Analysis

3.7 LOCATION MAP

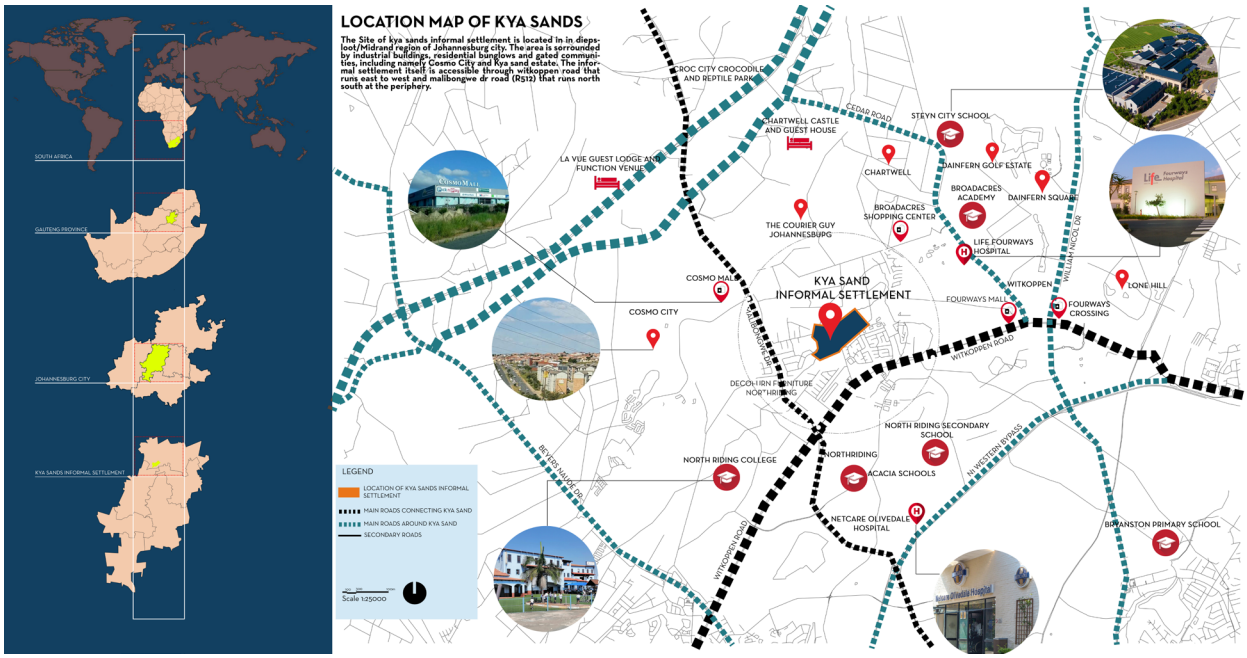


Figure 81 : Location of Kya sands in The Johannesburg
Source : Authors Diagram.

The Site of kya sands informal settlement is located in in diepsloot/Midrand region of Johannesburg city. The area is sorrounded by industrial buildings, residential bunglows and gated communities, including namely Cosmo City and Kya sand estate. The informal settlement itself is accessible through witkoppen road that runs east to west and malibongwe dr road (R512) that runs north south at the periphery.

3.8 KYA SANDS CONTEXT

Figure 82: Map of Kya Sand Informal Settlement and its context,
Source : Authors Map

Kya Sands is divided into several sections. The settlement is divided into sections A through D. These are government-defined units that are used to count and number the settlement's dwellings and toilets. Other sections include Madala Side, which is the northern portion of Pipeline, and Pipeline, which is the entirety of the village east of the river.

The settlement is bordered on both sides of the North Riding Stream by the industrial district of Kya Sand to the west, the residential neighborhood of Bloubosrand to the east, the industrial district of Hoogland to the south, and largely small holdings to the north. The neighborhood is spread across six different farm and agricultural holdings and is comprised of both privately and publicly held land.

3.9 BUILDING FUNCTIONS

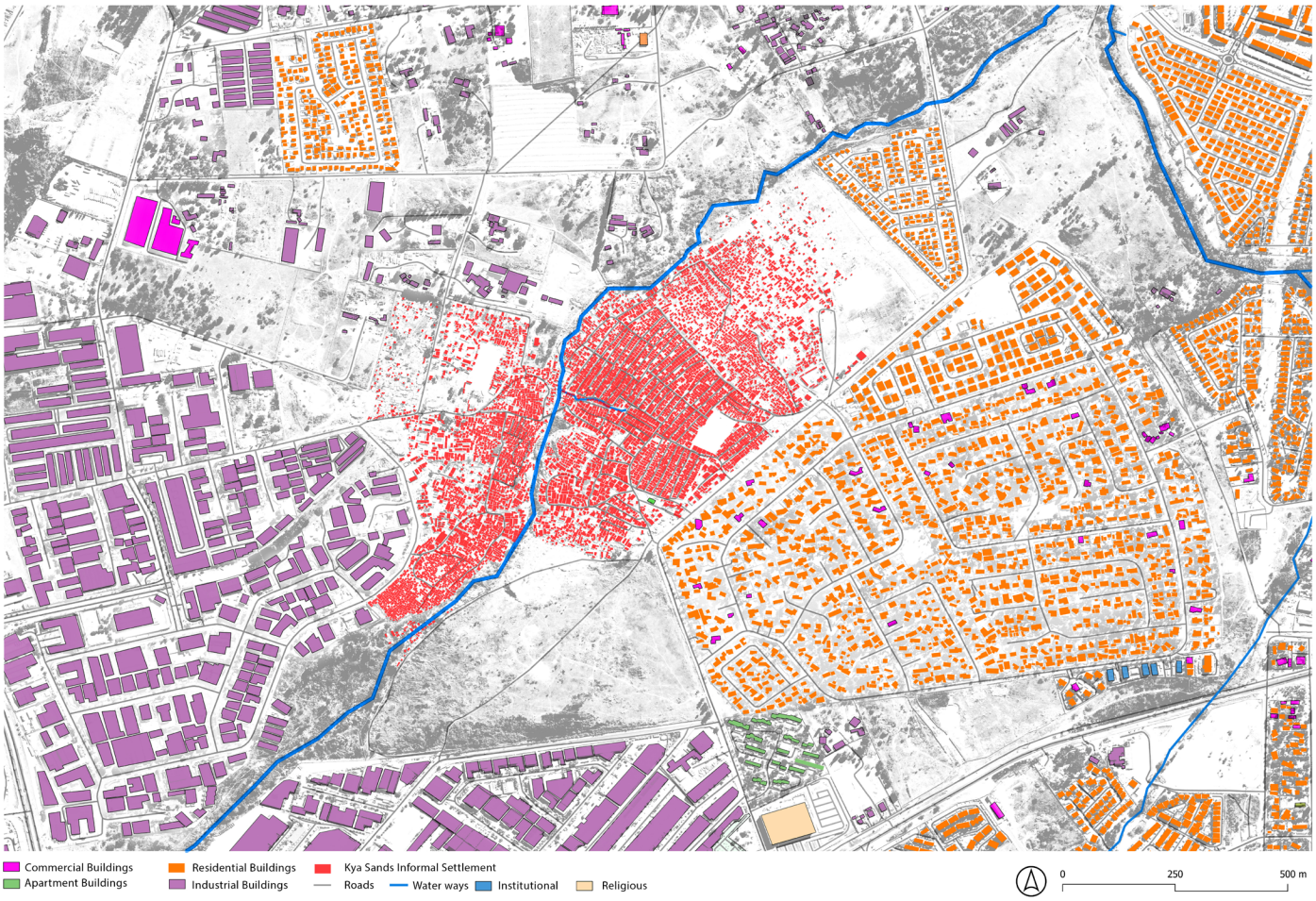


Figure 83 : Building functions in Kya sands site context, note the significant differences in the development densities
Source : Authors Map

Kya Sands informal settlement is surrounded by mostly residential area like residential neighborhood of Blou-bosrand to the east side and small portion of residential estate towards Diepsloot and Tshwane municipal areas. At the west side of Kya Sands there is Industrial area with commercial buildings to the south-west part. Cosmo residential city is located to the west side of Kya Sands informal settlement.

3.10 ACCESS ROUTES

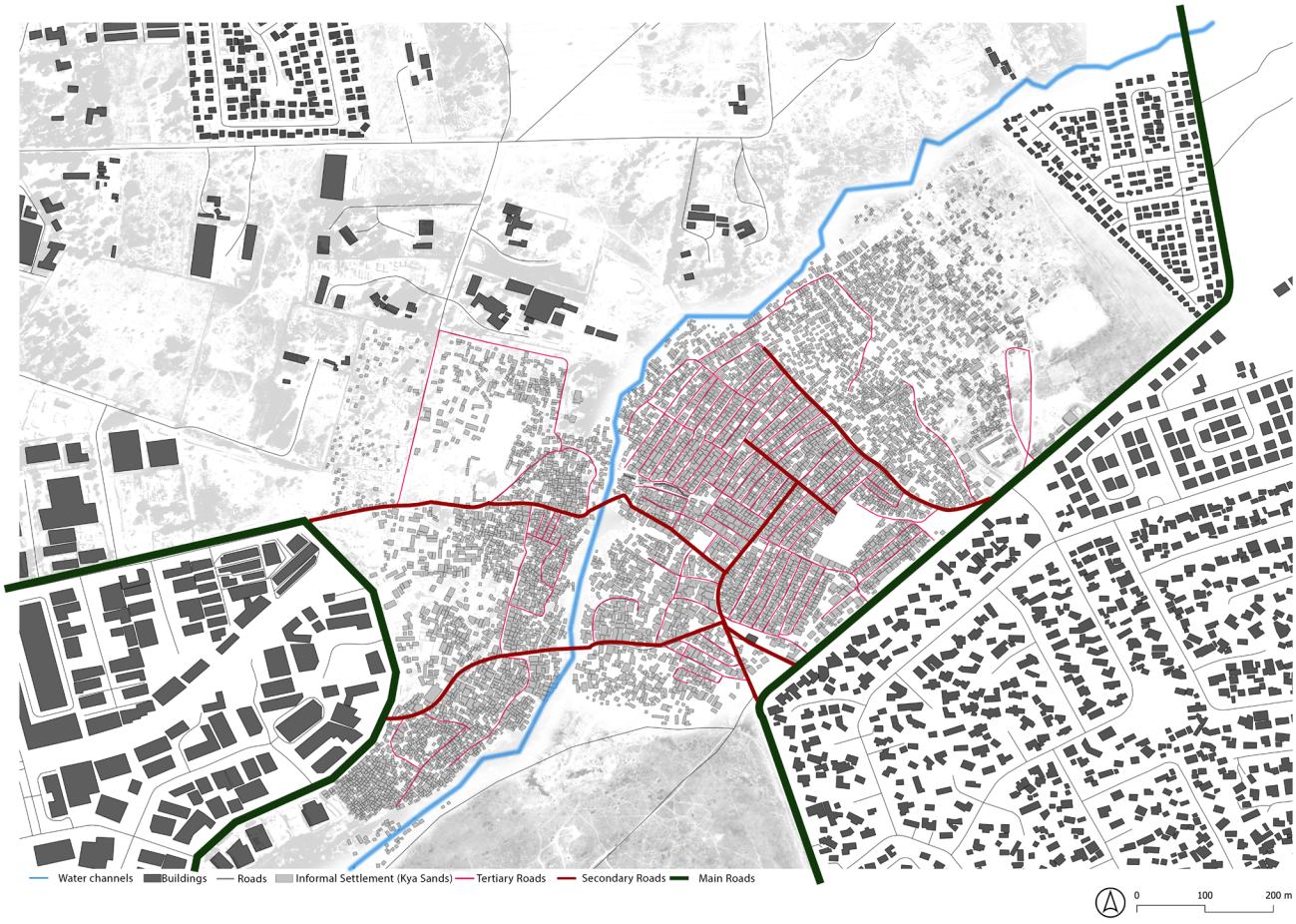


Figure 84 : Map of Kya Sand Informal Settlement and its infrastructure. Showing Major Roads, Secondary Roads and Tertiary links
Source : Authors Map

Malibongwe Drive (R512), formerly known as Hans Strijdom Drive, is a major road that runs through the industrial area of Kya Sands and its Informal settlement. It connects Kya Sands settlement with the capital city of Johannesburg. Kya Sands informal settlement is connected through Witkoppen road to Fourways- which is the fastest-developing commercial and residential hub in Sandton, north of Johannesburg, South Africa. Connection between Eastern and Western sides of Kya Sands informal settlement is existed through two pedestrian bridges which are structurally instable and need attention for reconstruction.

3.11 MACRO CONDITIONS OF SITE

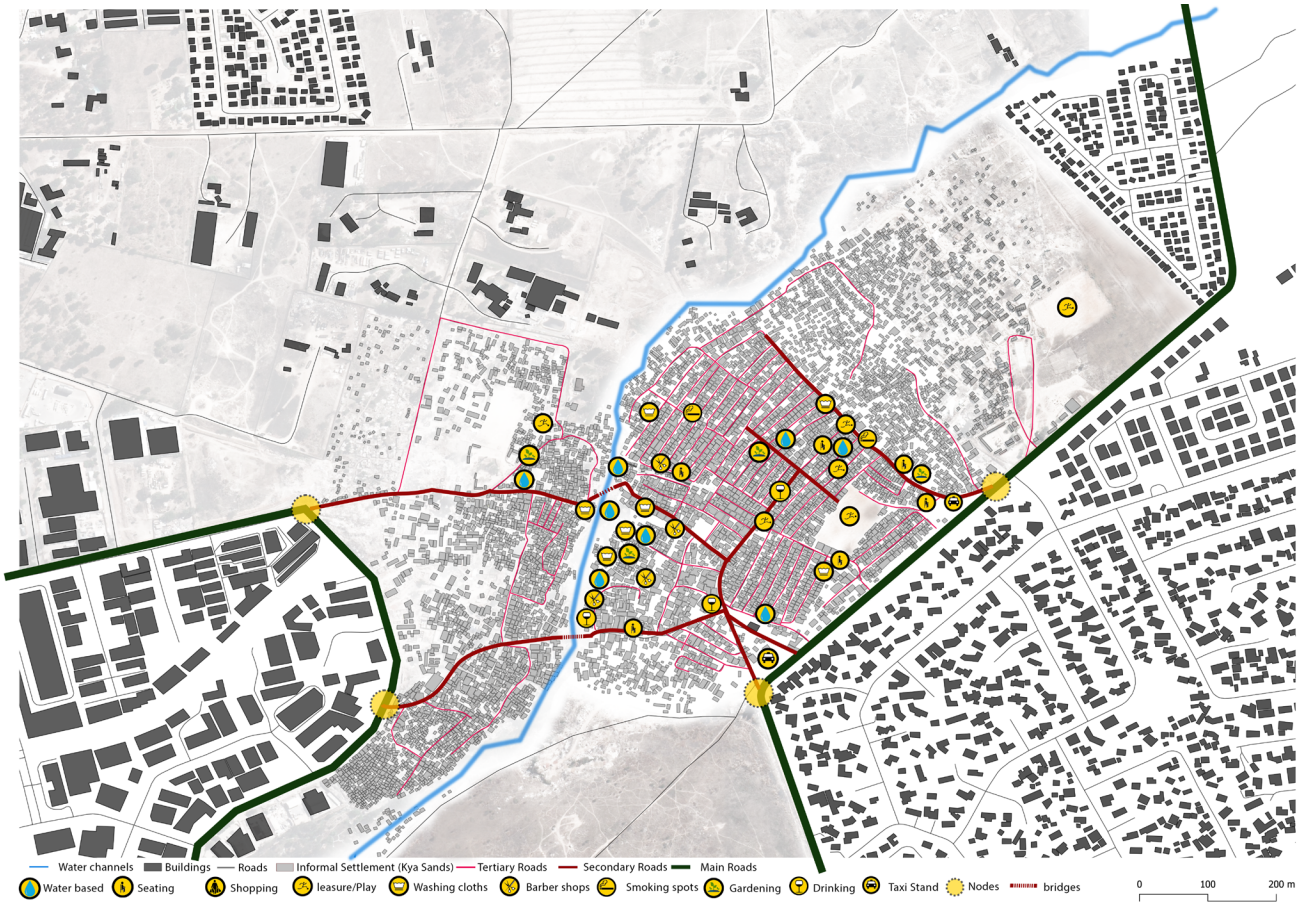


Figure 85 : Existed services in Kya Sands
Source : Authors Map. Data Source: Sustainable Urban Development and Globalization by Agostino Petrillo, Paola Bellaviti

Kya Sands informal settlement is divided into eastern and western parts by a stream flowing towards the north and it falls into the river called Klein-Jukskei. Residents of Kya sands have constructed two pedestrian bridges over it but now they are structurally not stable. A small road Riverbend Road coming out of Witkoppen Road is connecting Kya Sands slum area to the main Malibongwe Drive (R512) which further connects with Johannesburg capital city. There are few taxi stands along Uitval-Drive and lack of bus stands. Variety of Shops are present along the road while inside the slum's fabric there are informal seating areas for drinking and gossips. Some barber shops are there in the residential area. Dwellers use the stream for washing their clothes.

3.12 INCREMENTAL GROWTH

Figure 86 : Map of Kya Sand Informal Settlement and its spatial growth in 2007, 2009 and 2021.
Source : Authors Map using QGIS and Google Earth

3.13 NODES, PUBLIC SPACES AND THEIR CONNECTIVITY

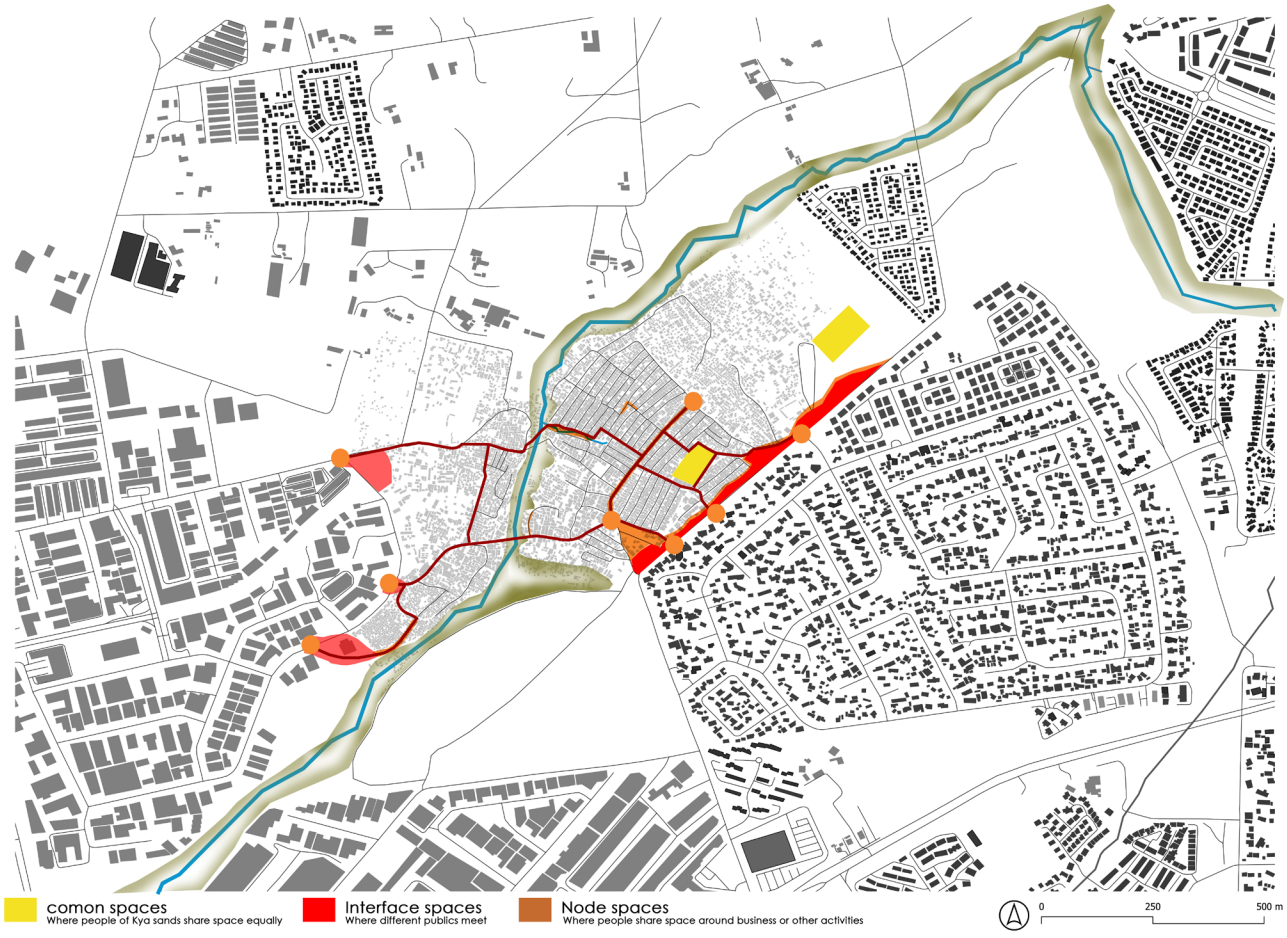
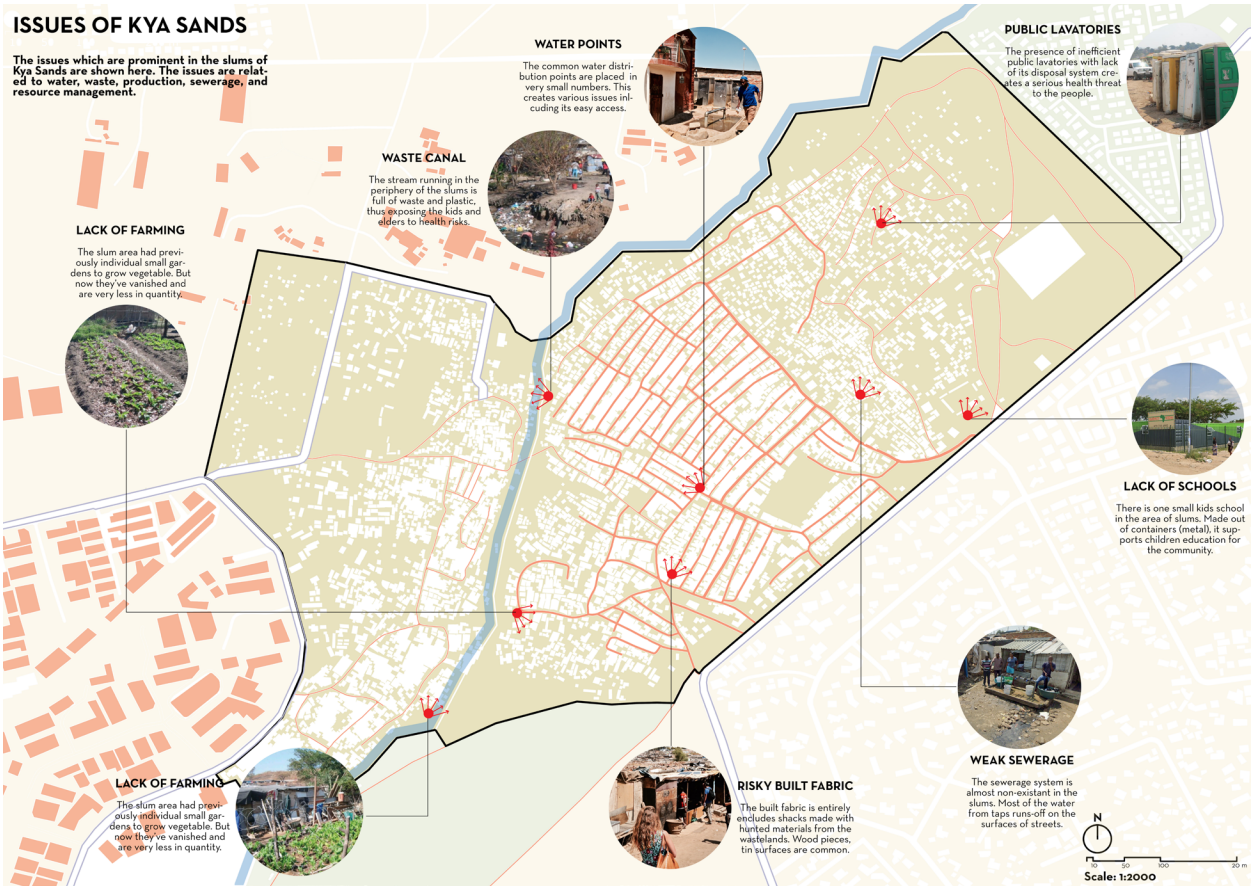


Figure 87: Nodes, Common public spaces and their connectivity
Source : Authors Map

3.14 ISSUES OF KYA SAND



The issues which are prominent in the slums of Kya sands are shown in the map above. The issues are concerned with water management, waste management, sewerage and resource management.

Figure 88: issues of kya sands informal settlement
Source : Authors Map

3.15 SPATIAL CHARACTERISTICS OF HIGH DENSITY NEIGHBORHOODS IN KYA SANDS INFORMAL SETTLEMENT

The layers below show the various characteristics of Kya Sands informal settlement, inlcuding street patterns, Building functions and typologies, Solids and voids and Flow of traffic.

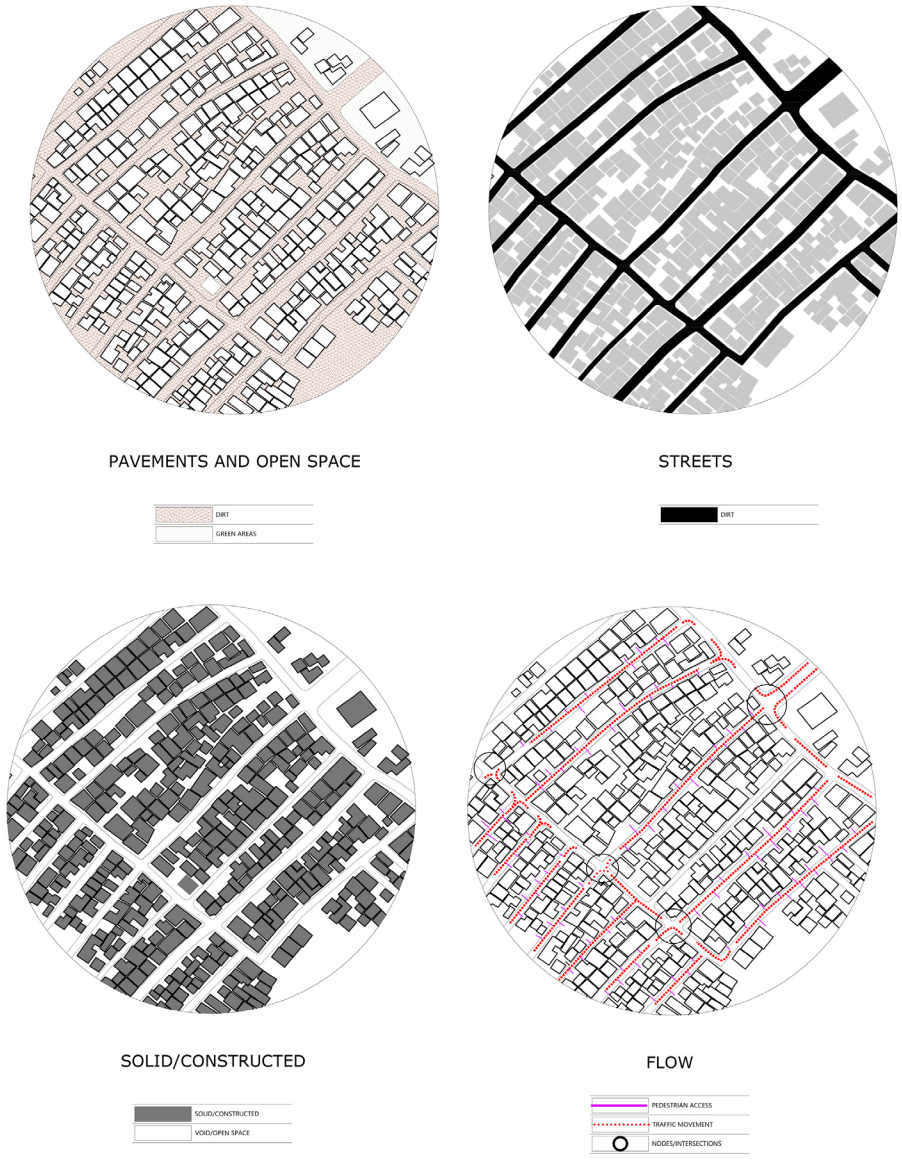


Figure 89: Spatial characteristics of High Density neighborhood in Kya Sands
Source : Authors Map

3.16 EXISTING BUILDING FUNCTIONS

Figure 90: Spatial characteristics of High Density neighborhood in Kya Sands
Source : Authors Map

Part 03: Design Guidelines and Strategies

Chapter 04
Design Guidelines and Strategies

4.1 GENERAL DESIGN GUIDELINES AND PRINCIPLES FOR UPGRADING INFORMAL SETTLEMENTS

This chapter provides an overview of planning design ideas for upgrading slum and informal settlements, based on and reinforcing UN-current Habitat's five principles for sustainable neighborhood development. It also explains why these recommendations were made, with the purpose of increasing the implementation of sustainable design frameworks in urban regions where informality is high, such as slums and other informal settlements.
The concepts are designed to guide both renovating and preventing new slums from forming. On the one hand, the standards provide a technical roadmap for systematically tackling local planning challenges in order to build a route toward long-term community planning. The guidelines can also be used as a preventative tool to assess current planning conditions in cities with informality and slums, as well as to lead special and new "at scale" urban upgrading and regeneration operations.

4.1.1 Design Policies- United Nations Millennium Development Goals

The government of South Africa a member and signatory to the United Nations for Development Goals. The primary goal of it is to improve the lives of people in the slums. The number will be around 100 million in 2020. In addition, South Africa is a part of the Vancouver Declaration. It is also parto of Istanbul Declaration. And lastly it is associated with Habitat Agenda. The primary aims of the declarations/agenda are aimed at alleviating the plight of people with housingfacilities. The upgrading of slums Programme adheres to meeting the unique development needs of such under-developed areas with extreme poverty.

The section here discusses the procedure for upgrading of informal developments/ slums. It focuses the distribution of funding to municipalities. The goal is to carry out upgradation of situation of human life in slums. The investment will help the municipality in boosting various elements:

- Tenusre Security
- Basic Services
- Amenities (social and economic)
- Empowerment (in regulating housing)

In extraordinary/extreme situations, the

program may involve removal and resettlement of individual units for upgradation.

The National Housing Programme: Upgrading of Informal Settlements was established in accordance with 'the Housing Act' of 1997. According to the housing code, the goal of settlements interventions is to transform settlements into sustainable and integrated neighborhoods where people have access to adequate municipal services and social facilities. The function of community engagement, in which people of informal settlements contribute their expertise and skills to the development of their settlements, is central to this process.

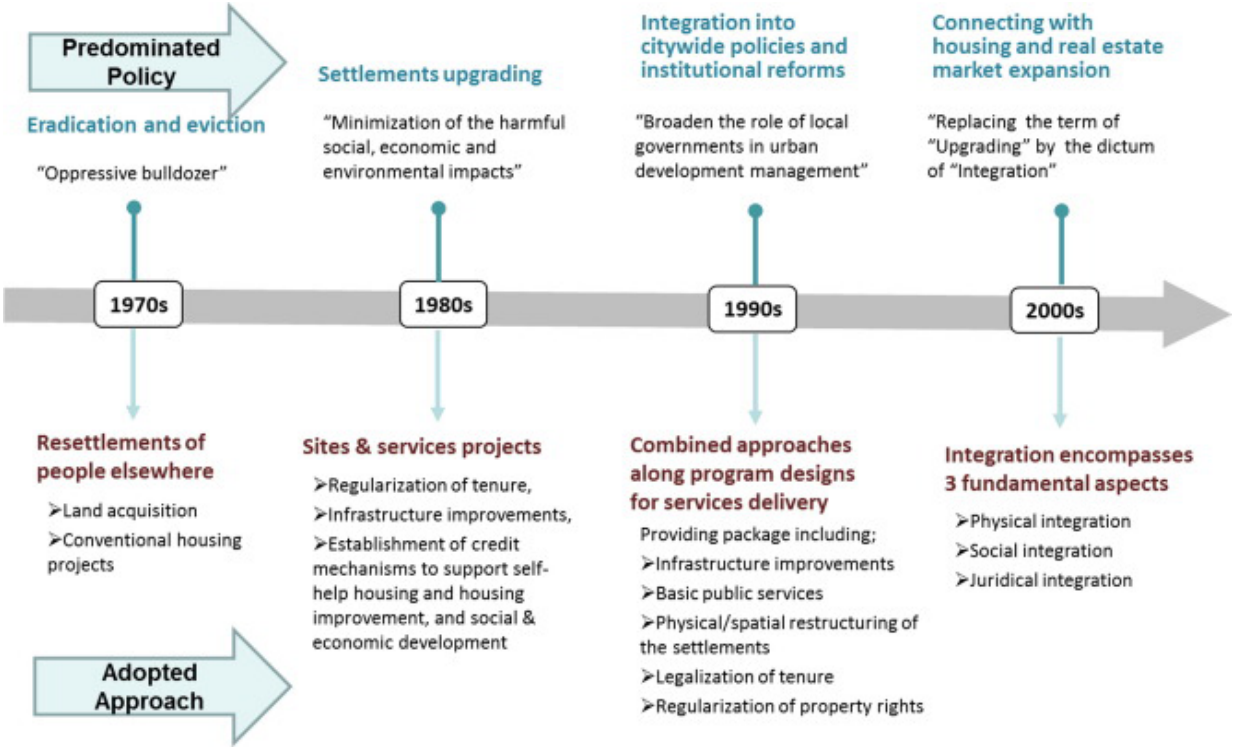


Figure 91: Evolution of informal settlements upgrading strategies
Source :Khalifa, Marwa. (2015). Evolution of informal settlements upgrading strategies in Egypt: From negligence to participatory development. Ain Shams Engineering Journal. 10. 10.1016/j.asej.2015.04.008.

4.2 UNITED NATION'S GENERAL PRINCIPLES FOR UPGRADING INFORMAL SETTLEMENTS

SDG 11 (Sustainable Development Goals) states:

"Let's make cities & settlements inclusive, healthy, safe, robust, & long-lasting."

By 2030, Target 11.1 ensures that everyone has access to appropriate, safe, and affordable living unit in addition to basic amenities.

"Safe, inexpensive, accessible, and sustainable transportation systems" is a Target 11.2 for 2030.

Improve inclusive and sustainable urbanization as well as capacity for participative, integrated, & sustainable planning and management in world by 30's of the century - Target 11.3.

The target 11.7 elaborates the provision of universal access to secure, inclusive green and public places.

4.2.1 Key themes addressed by SDG

- Affordable Living
- Services & better Infrastructure
- Sustainable transportation
- Access to public spaces
- Sustainable buildings

4.2.2 Key considerations for planning in participatory slum and informal settlement upgrading

The challenges and opportunities of urban planning in slums

The challenge of poverty, high degree of informality of slums and other entities remains substantial, with an estimated one billion slum residents living in urban centers today. It is also critical to develop a long-term solution to the 'five deprivations' of appropriate space, suitable shelter, tenure, access to drinking water & sanitation. Under the banner of human rights, international legislation (Right to Adequate Housing) serves as a reminder of responsibility to address essential quality of life.

Given that these contexts are often reflective of ongoing deep-seated governance and institutional dysfunction, weak land management, and limited planning capacity,

a key challenge for planning – both in terms of governance, spatial planning, and local area design – is how it can enable us to deal the global challenge of slums/settlements. These issues are especially concerning because the magnitude of people living in poor conditions in such settlements is growing. And the geographical and socioeconomic inequities are widening in many parts of the world.

A second major difficulty is fostering a more positive perception of slum and informal settlement residents as urban residents with rights and contributions to make. Finally, a third difficulty is determining how planning may aid in the spatial and social integration of unplanned regions, ensuring that all urban people and locales, both planned and unplanned, are linked. Slums and other informal settlements, for example, are frequently overlooked in official planning considerations since they are thought to be occupying land "illegally." This is despite the fact that low-cost housing options for poor city people are generally restricted or non-existent. Furthermore, many people have firmly held unfavorable ideas about slum and informal settlement dwellers, which makes it difficult for them to participate actively in planning and development processes.
However, it is crucial to emphasize, particularly in the context of poor countries, that in many urban situations, an informal 'version' of 'planning' is generally conducted. Local communities (particularly local leaders) and even the commercial sector employ parallel planning systems to make decisions on local design - roads and the placement of plots and buildings - based on local customs and cultural norms on land deemed available.
In summary, given that many metropolitan locations, particularly in Africa and Asia, have high levels of informality and slum and other informal settlement situations, these are all difficulties that local area planning, and design must consider.

Characteristics of slums and urban regions with high levels of informality; the following major characteristics of slums and informal settlements must be considered in planning:

- Many components (land, home design and materials, plot and street layout, building code compliance) are outside of formal planning systems and frameworks.
- There is very little certainty of tenure, although there is frequently a dynamic mix of land use agreements and claims.
- High levels of mixed land use and multi-function activities carried out by various organizations in most locations.
- Few distinctions between public and private. Spaces are multifunctional and frequently defined by activities that provide income in the informal economy. Homes and streets are frequently employed as production areas.
- Mobility spaces prioritized for walking and small carts, vending, but often not well connected with the rest of the city.

- Sometimes located on geographically hazardous land or in a climate vulnerable area.
- Limited mix of people from different socio-economic backgrounds but often a mix of shack houses tightly packed together made of unsafe and non-durable materials (ethnicity, religion, permanent or transitory citizens).
- Conditions that are frequently congested and occasionally overcrowded, as seen by small shack houses that are tightly packed together and fashioned of dangerous and non-durable materials.

According to UN-current Habitat's 5 principles for sustainable neighborhood planning, Table 5 depicts the possible contrasts between slum and informal settlement regions and formal gated communities.

Table I - Applying the recommended 5 planning principles in the slum context

Principle	Indicator	Current Range
Principle I	Street land-use	0-15%
Multifunction streets		45-65%
Principle II	Population density	80-100%
Density		0-20%
	Economic use	60-90%
Principle III		10-30%
Mixed-use built space	Residential use	10-30%
		70-100%
	Single tenure	80-100%
Principle IV		80-100%
Social Mix	Socio economic diversity	0-30%
		0-20%
	Identity Mix	50-80%
		0-20%
	Single Block function	0-10%
Principle V		90-100%
Limited land-use specilaisation	Secure tenure	0-10%
		80-100%

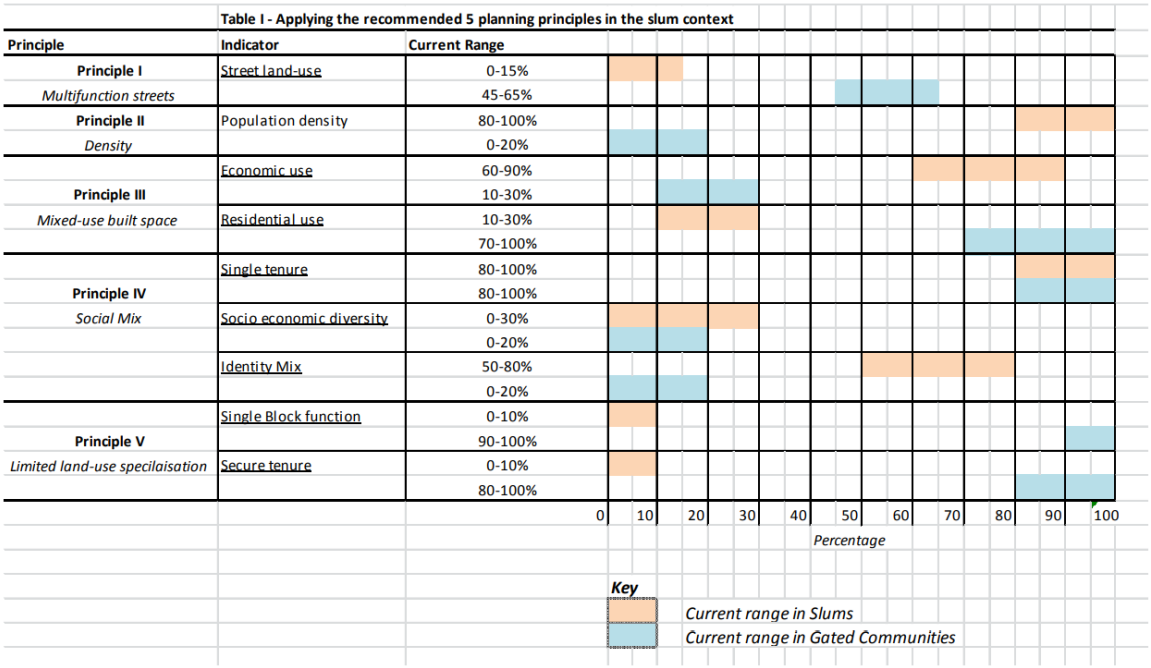


Table 5: Contrast between a slum context and a gated community within a developing country major city according to UN-Habitat's current 5 sustainable neighborhood planning principles.
Source : PARTICIPATORY SLUM UPGRADING PROGRAMME PSUP TRANSFORMING THE LIVES OF ONE BILLION SLUM DWELLERS, n.d.

4.3 GUIDELINES FROM GLOBAL FRAMEWORKS

One thing to be noted is; the proposed Participatory Slum Upgrading Programme (PSUP) neighborhood planning design recommendations respond to a variety of international frameworks that support sustainable and inclusive slum upgrading (such as the Sustainable Development Target 11.1), the current internationally agreed definition of a slum household (defined by deprivations in relation to water, sanitation, durable housing, overcrowding, and security of tenure), and Department of Housing / Urban Development in the United States of America's guidelines. The proposed PSUP recommendations take into account inputs from global debates on the best approaches to planning in developing countries, as well as the practical experience of UN-Participatory Habitat's Slum Upgrading Programme (PSUP), which operates in 35 countries and 160 cities around the world. In harnessing and enhancing the positive components of slums and other informal settlements, as well as the capabilities of those who live there, and integrating them back into the greater urban environment, planning certainly plays a vital role.

4.4 WAYS TO PROMOTE INCLUSION AND PREVENT THE CHALLENGES OF SLUMS BY URBAN DESIGN

A key goal of planning in neighborhoods with high levels of informality, as well as slums and other informal settlements, is to integrate those who live there into the broader urban context through participatory and inclusive approaches, while also assisting in the development of tangible improvements to the lives of slum dwellers through their physical living conditions.

Planning must:

- Consider larger governance frameworks such as the presence or lack of pro-poor legislation, building regulations versus enforcement practice, land management, and institutional collaboration and ability when addressing crucial practical design and context/locality challenges.
- Recognize that the distinctions between government, market systems, and the informal economy are blurred when it comes to formal and informal, legal and unlawful, formal planning codes and improvised planning outcomes.
- Recognize the value and rights of people living in slums/settlements. Slums are frequently locations that represent a diversified informal economy that runs

concurrently with - but often in lockstep with - the formal economic system. Through street vending, open kitchens, home-based workshops, and the informal transportation system, the informal economy is frequently more tightly related to local physical places, dynamics, and infrastructure than the formal economy.

- Be familiar with land management systems. In planning processes, it's also important to keep in mind the continuity of land rights by tenure security provision. Security of tenure for people living in slums is a direct result of effective interventions, but it is also a necessary fundamental component of effective planning and slum and informal settlement upgrading (providing secure tenure is more likely to promote the provision of effective basic services and mobility infrastructure).
- Adopt a flexible stance in the face of often unpredictably unpredictable planning conditions (uncertain enforcement of planning regulations, complex governance arrangements), large-scale informality, and the impact of long-standing local cultural norms, all of which are compounded by limited planning capacity.
- Involve a wide range of stakeholders, including slum and informal settlement residents, who have a right to be involved but are typically untrained in planning or unfamiliar with development processes.
- Adopt a city-wide approach to both address urgent deprivation and livelihood challenges in slum and other informal settlement contexts, as well as to begin to facilitate integration and enhance prevention capability and action. Planning is critical in these situations, but it must play a different function than it does in other industrialized countries (with a stronger governance and capacity development focus rather than a solely technical one).
- Recognize that, through the upgrading process, planning contributes to the prevention of poor settlements lacking quality conditions. It opens the door to transformation (a more favorable attitude toward slum residents and participatory planning) and, in turn, a more proactive and forward-thinking approach to urbanization. Slum and informal settlement upgrading begins to address the issues at hand by establishing the essential working partnerships for long-term urban development as well as governance arrangements to prevent future problems. It also (and more crucially) develops knowledge, capacity, and abilities in all aspects of planning so that city decision-makers may begin to plan forward.

4.5 KEY NEIGHBORHOOD PLANNING RECOMMENDATIONS FOR TRANSFORMING SLUMS INCREMENTALLY AND SUSTAINABLY

The following Participatory Slum Upgrading Program ideas for sustainable neighborhood planning design are offered in light of UN-commitment Habitat's to promote participatory, incremental, city-wide slum upgrading.

4.5.1. Planning Design Recommendation 1

More attention and emphasis should be given to the provision of multi-dimensional public/common good space for socioeconomic growth (for livelihoods, artistic expression, and social networks), utility and waste management infrastructure, and mobility.

- Strengthen the connection between roads, sidewalks, and utility infrastructure (rather than focusing just on roadways, sidewalks, and recreation places), as well as the points of connection for official and informal public transportation networks.
- Emphasize the availability of space for community/social services, as well as recreation, public gatherings, and cultural events.
- Recognize and protect these places' adaptability and multi-use potential.

9.5.2. Planning Design Recommendation 2

Recognize overcrowding in slums and other informal settlements, but also in the larger urban environment, for equitable development.

- According to recent research, the average density in large urban areas around the world is between 4,000 and 10,000 people per square kilometer (51.4 percent). In addition, 18.3 percent dwell in slightly higher-density urban regions (10,000,20,000 people per square kilometer), the majority of which are in developing-country cities. In terms of density, the most important consideration in slum and informal settlement upgrading is to reduce overcrowding and begin to promote a city-wide approach to density that ensures a more equitable distribution of the urban form that does not unfairly burden the most vulnerable or privilege certain groups based on their socioeconomic status.
- To promote equitable development, take into account the population density per km2 as well as the building coverage (say, >50%) and the FAR (say of 1.5 plus).

If used on a city-wide scale, this can help balance vertical and horizontal building dispersion.

- Encourage the construction of two-story buildings in slums and other informal settlement sites. These neighborhoods are typically inherently crowded, but they lack vertical development and are not as dense in terms of horizontal built-up space.
- Think about the relevance of developing a density range (both a minimum and a maximum) and how to apply it across the entire urban setting to achieve equity and sustainability.

4.5.3. Planning Design Recommendation 3

Recognize and protect the mixed land use that already exists in slums and other informal communities.

- Place a greater emphasis on safeguarding existing mixed land use and facilitating security of tenure in slums and informal settlements to enhance livelihood and informal sector activities. This will be made easier if principles 1 and 3 are aligned.
- Emphasize a variety of uses within the urban built environment, including residential, livelihood activities, and other economic uses, while acknowledging that the percentage of residential space in some areas may be slightly higher or lower depending on the dynamics of the area and current regulations.
- Integrate slum and informal settlement activities into the broader urban fabric by combining preservation and upgrading with methods to integrate slum and informal settlement activities into the broader urban fabric.
- Preserve and enable mixed use inside the home space, if practical and safe, i.e., preserve the overlapping uses of livelihood/economic and residential with some facility to assure a safe and not overcrowded residential component.
- Any place that is entirely residential should be avoided.

4.5.4. Planning Design Recommendation 4

Recognize and preserve the current social mix and diversity in slums

- Promote social mix in slums/settlements to foster inclusion and diversity.
- Promote availability of living units in different price ranges and tenure types accommodate different income ranges and socio-economic diversity

4.5.5. Planning Design Recommendation 5

Recognize the multiple land uses of slums

and informal settlements and the rarity of single function blocks/land-use specializations.

- The multi-dimensional activity on blocks should be understood and preserved as positive elements within slums /settlements and in terms of contributing to dynamism of the broader urban environment. This principle also contributes to Principle 3 and 4.

4.5.6. Planning Design Recommendation 6

Promote climate resilient design

- Encourage the enactment or incorporation of climate resilient features in the local planning design and housing structures.
- Facilitate the development of zoning laws, detailed planning regulations and

TABLE - DETAILED PLANNING RECOMMENDATIONS AND ACTUAL SITUATION IN SLUMS BY UN-HABITAT

RECOMMENDATION	INDICATOR	CURRENT RANGE IN PERCENT	TANGIBLE BENEFITS
P D R I	STREET AND LAND-USE RECOMMENDED RANGE	30-45%	LED /CULTURAL EXPRESSION/
MULTIFUNCTION STREETS	MOBILITY (SIDE WALKS/ROADS/STREETS)	0-10%	MOBILITY +INTER-CITY
(UNBUILT SPACE)	UTILITY (SEWAGE/STREET LIGHTS ETC)	0-5%	CONNECTIONS / SAFETY
	PUBLIC SERVICES (HOSPITALS/PARKS ETC)	0-5%	
	HIGH DENSITY / RECOMMENDED RANGE	40-70%	LED /ENERGY EFFICIENT
PLANNING DESIGN	SLUMS : VERTICAL	80-90% (BC =100% / FAR = 1)	AFFORDABILITY / SAFETY /
RECOMMENDATION II	SLUMS : HORIZONTAL	80-100% (BC =50% / FAR = 1.5)	INCREASED ACCESSIBILITY
DENSITY	INFORMAL SETTLEMENT : VERTICAL	0-15% (BC = 50% / FAR = 1)	AFFORDABILITY / SAFETY /
	INFORMAL SETTLEMENT : HORIZONTAL	80-100% (BC = 50% / FAR = 1.5)	INCREASED ACCESSIBILITY
PLANNING DESIGN	RECOMMENDED MIXED USE RANGE	55-70%	LED / SAFETY /
RECOMMENDATION III	ECONOMICAL USE / INFORMAL ECONOMY	60-90%	GENDER SENSITIVITY /
(MIXED-USE BUILT SPACE)	RESIDENTIAL USE (EXCLUSIVE)	10-30%	CONSERVES LAND
PLANNING DESIGN	SINGLE TENURE	80-100%	INCLUSIVE COMMUNITIES /
RECOMMENDATION IV	SOCIO ECONOMIC DIVERSITY	15-40%	ENCOURAGES DIVERSITY /
(SOCIAL MIX)	IDENTITY MIX	50-80%	STRENGTHEN SOCIAL NETWORK
RECOMMENDATION V	SINGLE BLOCK FUNCTION	0-10%	COMMUNITY LEVEL INVEST. IN
LIMITED LAND USE	SECURE TENURE	0-10%	HOUSING AND NEIGHBORHOOD
SPECIALIZATION			INVESTMENTS / LED
RECOMMENDATION VI			STRENGTHEN CLIMATE RESILIENCE
RESILIENT DESIGN			AND RESILIENCE PLANNING

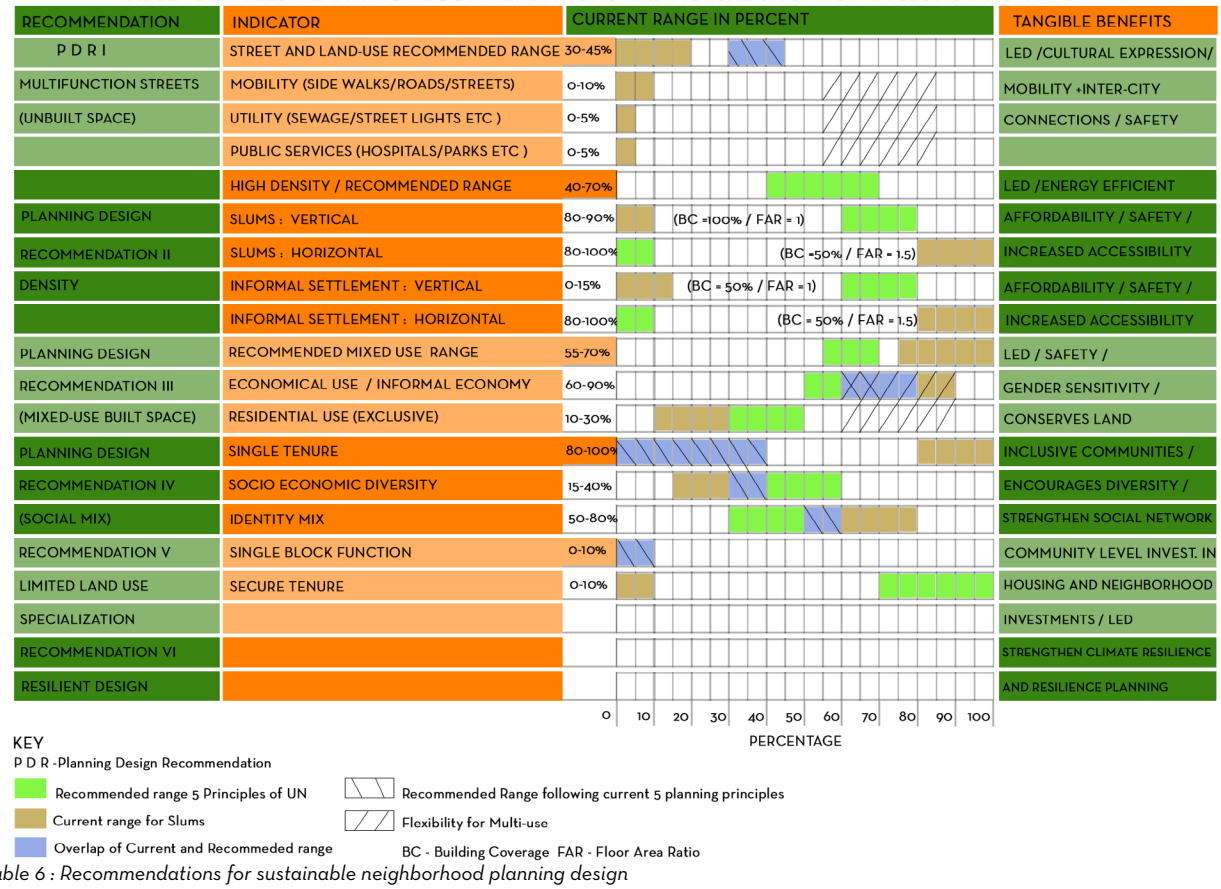


Table 6 : Recommendations for sustainable neighborhood planning design
Source :PARTICIPATORY SLUM UPGRADING PROGRAMME PSUP TRANSFORMING THE LIVES OF ONE BILLION SLUM DWELLERS, n.d.

land-use plans ensure that housing is only built in non-hazardous areas (environmentally and geographically).

Slum and other informal settlements are different from formal urban areas. While they are often considered deprived spaces and clearly lack many basic and essential infrastructure and services, they also contain elements that can be preserved and that indeed, could add a dynamic dimension.

4.6 CONCLUSION

The remainder of the urban environment has been included into the design. Slum and informal settlement residents may have a right, as well as the capacity, skills, and information that can be tapped through such citywide integration efforts. Local planning and design can go a long way toward making those linkages happen. The recommendations for upgrading projects outlined in this document are intended to assist technical practitioners as well as urban managers – particularly community leaders who are frequently on the ground in local neighborhoods making crucial design decisions. They offer suggestions for improving local amenity, physical design, and critical socio-economic and cultural objectives such as increased economic development, safety, the functional provision of basic services, and improved mobility. The rationale for the recommendations is outlined in the table on the following pages. It builds on the Participatory Slum Upgrading Program's experience and highlights some insights for each proposed recommendation, as well as statistics and numbers from developing-country cities. Column three restates the PSUP suggestion, including general and detailed criteria, and column four offer recommendations for urban planning implementation.

Table 5: Rationale behind the development of the PSUP neighborhood planning design recommendations.
The table also provides suggestions for associated implementation actions.

Observations from country level work on public space and common areas	Some examples	PSUP Implementing Recommendations for sustainable, participatory, city-wide slum upgrading and prevention and the development of a n'hood design plan	Associated Urban Planning implementation actions
Slums are often lacking in adequate space for public / common good activities. This includes space for livelihood activity, meeting space, cultural expression and recreation. It also includes adequate space for mobility and inter urban connections represented in a shortage of roads/street, sidewalk as well as space for public utilities. All these spaces and their uses require attention in planning and design. Public space often plays multiple roles in slums where public and private dimensions overlap. Depending on the time of day and day of the week, common areas are used for mobility, livelihood generation, utility functions, both individual and collective and recreation. The multi-dimensionality of public space should be understood and the positive elements – especially in relation to livelihood generation, recreation and safety - preserved. 'Public space' can be a contentious term in slums. The division between the 'public' and 'private' is often flexible compared with other urban areas and spaces are also contested and appropriated. Public space tends to be understood more in terms of its 'use value' than as a fixed entity in its own right. Land for public space is also highly contested and symptomatic of broader political interests and land management dysfunction. The governance arrangements around land must be clearly connected with planning design proposals in slums in relation to public/common space. Most slum dwellers tend to walk and don't own/use private cars. The road/street, sidewalk configuration must consider all uses– especially livelihood generation - and thus what mobility structures are appropriate and will connect to the rest of the city. Prioritizing one type over the other should be avoided. Space for utility and service infrastructure is often missing in slum environments (representing some of the key deprivations). Streets should further be understood as 'facilitators' for effective utility and service infrastructure so that a widened road network is also perhaps better accepted in slum upgrading activities. Consider an incremental approach including a lawful relocation process if necessary. 30% for streets/roads/sidewalks alone is a 'big jump' – in terms of cost, disruption, management of a process - for governments and other stakeholders in slum upgrading projects.	Nairobi: Core: 11,5 % with 7,3 km street/km² Nairobi Total: 3,8 % with 7,3 km street/km² Kibera: 3% of land allocated to streets/roads. Limited space allocated for sidewalks. Bangui overall: 6% 1 Dakar: Core: 8 0 % with 7,7km street/km² Medellin: Core: 25,2 % with 18,1 km street/km² Medellin: Total: 16,6 % with 11,9 km street/km² Sao Paulo: Core: 19,5 % with 16,1 km street/km² Sao Paulo: Total: 14,5 % with 12,0 km street/km² Lagos: Core: 14,0 % with 13,5 km street/km² Lagos: Total: 10,0 % Manila: Core: 15,2 % with 19,5 km street/km² Manila: Total: 10,0 % with 12,8 km street/km² Cairo: Core: 15,7 % with 15,7 km street/km² Cairo: Total: 11,0 % with 11,0 km street/km² Conclusion: Slum contexts, alongside other urban areas in many LDC, struggle to fulfill any public space/common area requirements and have on average 10% for roads and streets. These contexts require the promotion of all forms of public space.	**1. Provide (public/common good) multi-use space for socio-economic development (for livelihoods, cultural expression and social networks), spaces for utilities and basic infrastructure and mobility** **Broad recommendations:** Recognize that slums are often common area/public space deficient. Recognize the many different land-use activities which take place in the public /common areas of slums so a range of spaces required (streets, sidewalks, spaces for markets, stalls, etc.). Recognize that the division between public and private spaces in slum contexts is not defined and that many activities, especially those related to livelihood and economic development, depend on this flexibility and the fluidity of the common areas. Support multi-functional common areas in slums that support many different activities which are both time and day dependent. Recognize the gender dimension to public space as women fulfill both caring and family related and livelihood activities. Many slums have significant proportions of female headed households which must be accounted for in planning for public space and a certain interface with residential especially for women. Promote common space connections and links via streets, sidewalks, livelihood infrastructure (market places) to the rest of the urban environment. Such linkages are critical to improving the lives of slum dwellers. Link public/common space with a range of basic infrastructure development required in slums (consider in terms of the 5 deprivations – access to improved water, sanitation facilities) and in terms of how it is linked with other broader urban infrastructure. For example, link utility infrastructure with sidewalk/street/roads, should incorporate drainage for storm water and sanitation, water, the provision of electricity and street lightning. This which would also facilitate the discussion and decision making around street width and trunk infrastructure connections for optimal integration to the broader urban fabric. Consider the different mobility requirements of slum dwellers in the short term (less car focused, connections between main and secondary roads) as well as the long term mobility requirements for broader urban integration (capacity for range of vehicles to pass through). Security of tenure and land governance arrangements for public space must be considered and factored into all stages of planning and design processes. Specific recommendations: Promote the current principle 1 in terms of the multiple activities being undertaken in those spaces. This will highlight the importance of common good areas and utility/prosperity functions that they engender/result in. Consider revising the current 30% space designated for streets and an efficient street network - to include all common spaces. The gap between current practice in urban areas with a high incidence of slums and informality and the current principle, suggests that 30% is even a significant jump from the current practice (10%) indicated in column 2. Consider designating 20% for streets, sidewalks including provision for drainage channels (utility functions), with an emphasis on additional spaces for livelihood generation and local economic development. Consider designating 10% for recreation/ community space/services/facilities. Consider preserving an agreed % of the current access configuration to preserve existing livelihood generation activities and to preserve access to homes as appropriate. Consider a regulation that provides a common space within higher density buildings for trading and livelihood generation.	Undertake an inventory of public spaces including informal livelihoods via a participatory enumeration process. Give priority to understanding the gender dimensions and the ways that youth are engaged. Use observation techniques. Map the status of utility, infrastructure conditions and options to link slums with broader urban infrastructure. Use a participatory planning process to understand the history around space for community activities to inform planning and explore options exist for lawful relocation. Prioritize securing common spaces for the community as an entry point for slum upgrading activities. This promotes the value of socio-economic activities in slums and the 'common good' for sustainable urbanization, promotes consensus building, builds capacity in local communities and other stakeholders. Review plans to ensure how key transport networks and basic service infrastructure can be connected to slum and informal settlement contexts for city-wide integration.

Table 7. Rationale behind the development of the PSUP neighborhood planning design recommendations
Source : QG04_PSUP Planning Design Recommendations

Observations from country level work on public space and common areas	Some examples	PSUP Implementing Recommendations for sustainable, participatory, city-wide slum upgrading and prevention and the development of a n'hood design plan	Assodated Urban Planning implementation actions
Observations from country level work on density and compactness	Some examples	Implementing Recommendations for participatory, city-wide slum upgrading and prevention	Associated Urban Planning implementation actions
Many slums and informal settlements are already naturally dense environments and provide an example of the benefits of high density living for the rest of the urban context. However, some slums are also not vertically dense and this causes severe over-crowding (at the horizontal level). Furthermore, over-crowded slums are often in stark contrast to the low density in other parts of the urban environment	Nairobi: Kibera: 108,000 people/km2 Les Cayes, Haiti13: City: 7,985 people/km2 Slums: 53,288 people/km2 Antananarivo, Madagascar4 City:15,441 people/km2 Studied slum: between 33,140 – 89,252 people/km2 Dakar, Senegal5 City:29,700 – 55,530people/km2 Studied slum: between 220,246 people/km2 Conclusion: many LDC cities are already way above the recommended minimum density so this indicator becomes less relevant to them.	2. Ensure equitable and efficient multi-level density and compactness Broad recommendations: The key consideration in slum upgrading in regard to density, is to 1) reduce overcrowding and 2) promote a city-wide approach to density that ensures a more equitable distribution which doesn't fall unfairly on the most vulnerable. More discussion might be required on understanding optimal density ranges and would suggest that these must be accompanied by considerations of equity. Re-visit question of density ranges considering city-wide density distribution and latest figures on city urban density Current figure is less relevant in some slums (at least 15,000 people/km2) but both a minimum and maximum density range would be useful to develop. Review density in slums in terms of broader urban density norms. Promote equitable density across the whole urban context, considered at the city-wide scale to manage over-crowding in slums. Specific recommendations: If the density of 15,000 people per km² is agreed, include considerations of both the building coverage of >50 per cent combine with a FAR of 1.5 plus as the urban density formulation. This can help balance vertical and horizontal building distribution if applied at a city-wide scale. Promote vertical density both in terms of floor area ratio (2 plus for vertical, slum deprivation definition of overcrowding might be useful to manage unsustainable density). Promote 'building coverage' of around 60% which includes private and public space). Recognize that slums are already often using small plot sizes and are also considered overcrowded so the slum definition of overcrowding must also be discussed alongside any plot size figure. A dwelling unit figure at the neighborhood level might be useful. Consider the agreed slum deprivation definition to reduce overcrowding in slums (no more than 3 persons to share a room).	Undertake participatory enumeration to understand housing density types, household configurations (intra-household relations) and thus actual slum dweller numbers and density dimensions. Compare current slum density with city-wide densities and projected population growth to inform future planning. Collate and report figures highlighting any current density divides across the urban area city to inform planning. Map cultural norms in relation to building designs, usage of rooms, land and security of tenure to inform density discussions.

Observations from country level work on mixed land use	Some examples	Implementing Recommendations for participatory, city-wide slum upgrading and prevention	Assodated Urban Planning Implementation actions
Slums are already often very mixed in terms of land use although the spatial/physical arrangement is often not organized and might mask the range of activity being undertaken. Basic services and security of tenure are often missing in slums and provision for them almost non-existent. In many slums, residential housing exists alongside local economic development and livelihood initiatives or contains enterprises within the home space. The land-use in slums is seldom static and often changes rapidly, even depending on the time of the day. In many instances, the capacity for flexible mixed land use is an asset as it responds to people's needs, particularly in relation to livelihood generation and economic development.	Ararom, Akure, Nigeria : 28% residential, 15 6% commercial, 51 7% mixed, 5 4% public, 0% open6	3. During slum upgrading preserve existing mixed land use including the informal economy activities, and facilitate security of tenure and access to basic urban services to integrate them into the broader urban fabric. Broad recommendations: Give greater emphasis to preserving the existing mixed land use and facilitate security of tenure, to strengthen livelihood and informal economy activities. Combine this with mechanisms to integrate slums and the activities, into the broader urban fabric. Where feasible and safe, preserve and facilitate mixed use within the home space, i e preserve the overlapping uses of livelihood/economic and residential with some facility to ensure a safe and not over crowded residential component. Closely aligned with principle 1 and 3 because in slum and informal settlement contexts the division between the external/internal/public /private is often blurred and the use of space connected. The lively, productive elements should be understood and preserved. Specific recommendations: Promote multiple land use and mixed use activities within the 30 to 50 per cent built area percentage. Dissuade the development of areas into mono functional spaces. I e that there should never be 100% residential and the division between residential and economic flexible and legitimately overlapping in some circumstances.	Map formal and informal land use and compare with livelihood activity. Compare with n'hood and city-level data to understand needs for further planning. Promote building types which facilitate a mixed use with special attention towards the provision of space for small businesses close to or within the home sphere/space (in recognition of women's duel role as principle livelihood generator and involvement in care work in many slum ad informal settlement contexts).
Slums often exhibit high levels of diversity across different identity categories. Diversity in slums is not based solely on income levels. They often contain a mix of ethnic groups and tenure security types, household compilations and sizes for example (though these usually fall outside of the current legal framework). This natural diversity promotes a degree of social mix. However, cities with a high proportion of slums often reflect deep socio-economic and spatial segregation. There is also very little mixing of low cost housing in the more affluent areas to facilitate mixed areas.	In Kibera, 10 %7 and in Kiandi, 4% owns their house or shop8 Tribe mix in Nairobi's Kibera. Luo tribe (50.2%), Kisiis (15.8%), Luhyas (15 1%), Kambas (9 8%) and Kikuyus (5.7%)9 Most slums show that the majority of dwellers have very limited or no security of tenure.	4. Preserve the current social mix and diversity in slums and promote social mix in future planning projects across the broader urban context such as in urban infill. Broad recommendations: Social mix must be considered in a multi-dimensional manner – and include considerations of other types of categories beyond income status. For example, tenure types, identity and household size and compilation are also useful indicators of social mix. Preserve the positive elements of diversity and inclusivity in slums that already exist across different categories (culture, age, religion, ethnicity, disability). Understand the likelihood of female headed households as a key feature of that social mix. Promote public infrastructure and services that represent multiple identities and needs. Facilitate and promote the integration of this diversity into the broader urban context. Consider the impact of forced evictions, relocation and gentrification on social mix in any proposal (particularly in terms of skewing the socio-economic background of residents). Mix social housing with other forms of housing to avoid clear intra-neighborhood spatial segregation particularly in infill projects. Specific recommendations: Ensure a proportion of low cost housing across the whole urban context (% proportion?). Ensure the preservation of cultural heritage, both in physical forms and in-terms of local art/market activity etc and housing design type through heritage overlays and via the specification of land use rights that promote land remaining in local hands and thus the preservation of local cultural heritage.	Undertake participatory enumeration to understand various identity categories and compare these to known city-wide categories. Promote the integration of slums dwellers through livelihoods, promoting inclusive public spaces, housing mix. Translate knowledge into building codes and planning regulations.

Observations from country level work on mixed land use	Some examples	Implementing Recommendations for participatory, city-wide slum upgrading and prevention	Assodated Urban Planning implementation actions
The politics around land in urban contexts with high levels of informality pose enormous challenges to planning in slums. Land titles and security of tenure are often unclear and contested. Slums represent a gross miss-match between current formal land systems and informal land rights and security of tenure systems which often undermine the needs and rights of the poor. These needs and rights are compounded by legal systems that give no flexibility to different security of tenure models and also entrenched cultural norms around land ownership as the most viable option for security of tenure. Most slums are not accounted for in formal zoning plans or regulations or are deemed to be something else. While some slums might appear to have single block functions this is not related to a single use activity. Rather, there is more likely to be wide range of activities being undertaken in any physical block.		5. Ensure adequate blocks and preserve multiple land use. Broad recommendations: Promote and preserve adequate block sizes in slums (define adequate). Preserve multiple block functions and the current mixed land-use activity within those blocks in slums to promote livelihood generation, economic development, social and cultural activities and safety measures. Specific recommendations: Promote mixed land use zoning as per principle 3. Single function blocks should cover less than 10 per cent of any neighborhood.	Use participatory tools to understand the neighbourhood land and tenure situation such as the Social Tenure Domain Model and participatory enumerations.

Observations from country level work on mixed land use	Some examples	Implementing Recommendations for participatory, city-wide slum upgrading and prevention	Assodated Urban Planning Implementation actions
Climate change and the impact of environmental conditions have a significant impact on some slum contexts and many slum dwellers. Local planning design could help strengthen resilience to climate change through the consideration of climate impact and natural hazards in the upgrading phase and in the development of the city-wide slum upgrading strategy. Focus could be on two levels. The local environment/ neighbourhood level and improvements to the physical structure and design of the house. The neighborhood level Slum upgrading in Small Island States require particular attention to this challenge.	Small Island States in the Pacific and Caribbean (Haiti) are part of the slum upgrading programme in UN-Habitat and are utilizing local materials and designs to improve infrastructure and housing resilience.	6.Climate compatible slum upgrading and prevention Broad recommendations: Consider resilience in terms of 1) improvements to housing structures and 2) improvements to local communities and neighbourhoods. Install zoning laws & regulations and land-use plans to prevent that housing is built in exposed and hazardous areas [12] Develop relocation policies and strategies that prevent forced evictions. Use well known approaches such as the "Build Back Better" to guide upgrading. Specific recommendations: Housing design: Consider key aspects which promote climate resilience: Suitable site topography (not on steep or unstable ground) building orientation (East-West axis where main facades face North-West), position (e.g space for ventilation in tropical climates), footprint (allowing for green space, rainwater infiltration), drainage (maintaining natural drainage patterns), locally sourced materials and appropriate mix for strength (select materials for climate zone and ensure right mix for strength) shading (depending on climate - maximizing shade and light) colours (use light colours to reflect heat) natural ventilation (maximizing natural air streams), foundations and roof (ensuring sufficient depth and strength of foundation, and suitable roof for the climate)11. Promote water catchment off roofs and promote local enterprise for affordable tanks for additional water storage. Use building approaches that are more likely to promote durability in that context – such as using knee bracing to enhance the free movement of debris during a storm surge12. Neighbourhood design: Build appropriate infrastructure for resilient neighborhoods and reflecting the 5 deprivations on slums. Consider key aspects such as: adequate storm water drainage, durable electricity and fresh drinking water and durable community buildings. Explore biogas options for local waste management and dedicate site. Consider trunk infrastructure to provide for the rapid entrance/exit of emergency services and suitable drainage of storm water for example. Support installation of suitable landfill sites and the regeneration of those already in place. Consider storm walls, barriers and additional bridges in water prone and coastal areas in areas subject to landslides, built and managed through partnerships with local business, community and government. Ensure community centre or hall and other key communal infrastructure such as local market infrastructure, water points and shared toilets are given priority to robust structures that are located in a safe/dry part of the neighbourhood to double up as a possible shelter/safety point. Consider solar lighting for these community facilities. Promote the incremental process of putting electricity cables underground.	Undertake participatory processes to understand climate impact on affected communities, to learn about local building techniques and environmentally friendly available materials as well as to feedback inform any re-location strategy. Analyze local risk mitigation strategies, construction materials and design features (for both housing and other urban design). Adopt appropriate and agreed climate resilience targets in the city-wide slum upgrading strategy

4.7 DESIGN POLICIES AT URBAN LEVEL

- The following are some of the factors to consider while making more thorough decisions about upgrading any informal settlement:
- The development's characteristics, such as the proposed neighborhood's type, the expected number of residents, and specific elements that must be integrated or regulations that must be met
- The site's existing features and its immediate surroundings (built and natural environment) as established by the proposed development's physical location
- Alternatives for the development of a certain settlement that are available for consideration

1

Compact growth

Cities' periphery expansion should be managed, and compact and inclusive urban growth should be promoted, according to national urban policy.

2

Context

National urban strategies should take into account the setting as well as the unique history and growth of cities.

3

Local governance

Local governments and cities must play an active role in achieving national policy objectives.

4

Rather than relocating informal settlements after they have been formed, national urban strategies should limit displacement and prepare land and infrastructure ahead of time.

5

Through targeted housing programs, financing methods, and/or zoning incentives, encourage the creation of a diverse types of housings to meet the multiple demands of people.

6

Beyond mass housing, establish incremental housing systems that give inhabitants access to serviced land and a minimum core unit while requiring them to build and expand according to predetermined requirements.

7

Increase the rental housing supply.

8

Create a mix of demand-side and supply-side subsidies.

9

Fix the mortgage markets by focusing on low-income borrowers and expanding the primary and secondary housing financing channels.

10

Develop dense and mixed-income housing layouts near transit to reduce land acquisition costs.

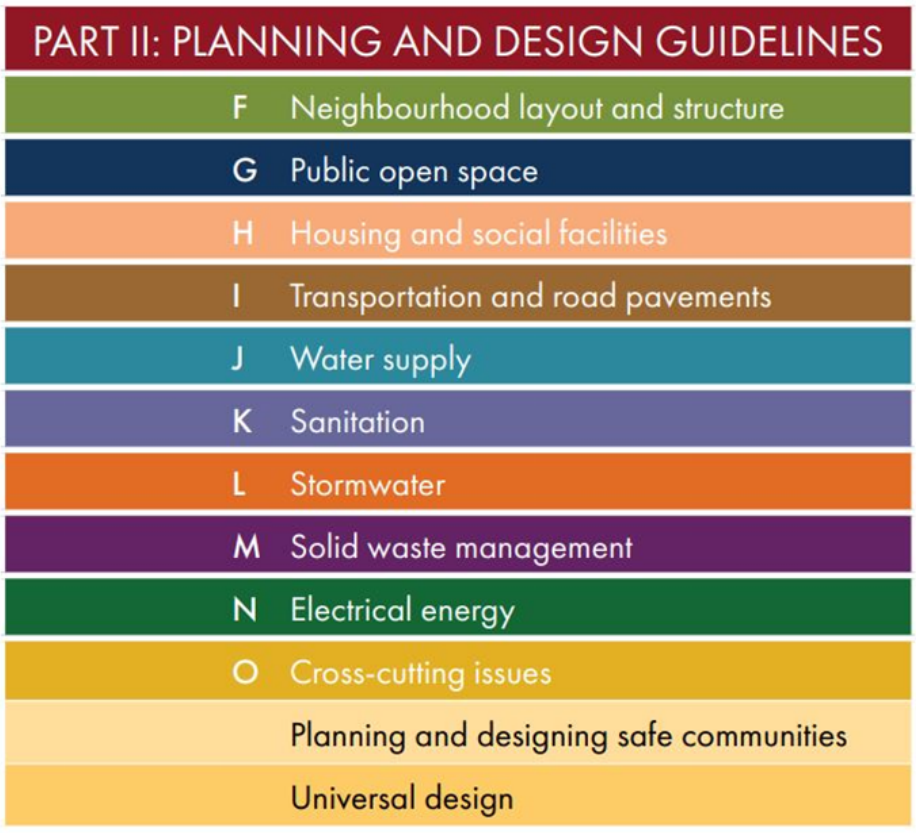


Figure 92. Tools for upgrading Slum
Source: Authors Map

Strategies and Approach

4.8 IDENTIFYING PARAMETERS FOR INTERVENTION

4.8.1 Green Infrastructure

In cities, green infrastructure and natural ecosystems is a valuable component. Their function as urban green amenity can provide benefits to residents of many socioeconomic strata in metropolitan settings. They can also have some negative and unfavorable characteristics to them. The way people interact with nature in cities is marked by informality. Informal communities are commonly found near streams, riverbanks, wetlands, steep slopes and other types of interstitial entity/space throughout developing countries. Such areas may be ecologically significant and rich in biodiversity. Informal settlers intrude on official green spaces, particularly urban parks, while carrying out diverse activities. (O. B. Adegun, 2019)

Green infrastructure has received more attention in literature on urbanization in Africa and other poor countries in general across the globe. Green infrastructure has been studied in low-income urban settings, particularly in South Africa's formally designed (but meagre income) townships. Low-income households are fully dependent on natural resources of the environment for survival and livelihood.

In South Africa, more understanding regarding green infrastructure in informal unplanned communities is required. Experts believe that global green agendas must include the informal sector, which is omnipresent in developing countries' cities. Housing and urban development in poor nations that are inclusive, sustainable, resilient, and safe, as outlined in the global Sustainable Development Goal 11, is not realizable without participation from this sector.

Slums are a significant type of shelter for impoverished citizens in Africa, and so must not be overlooked. Kya Sands is a large scale informal /unplanned town in Johannesburg, South Africa, that houses poor people and homes of low socioeconomic status. Small patches of green area can be found throughout the settlement. Kya Sands hamlet is bisected by a watercourse with wetlands. These ecological traits allow researchers to look into many areas of people's relationships with green areas and ecosystems. The research attempts to contribute to the growing body of knowledge on greening in low-income environments. It includes the types of green areas in the settlements – productive gardens, public parks and sports area.

It is crossed by stream, also known as Kya Sands Spruit. This stream, a tributary of the northerly running Klein Jukskei River. The flora and fauna of the stream, as well as the riparian corridor and domestic gardens give the settlements a natural ecological feature.

This gives researchers the chance to look into the role and possibilities of green areas in the whole area.

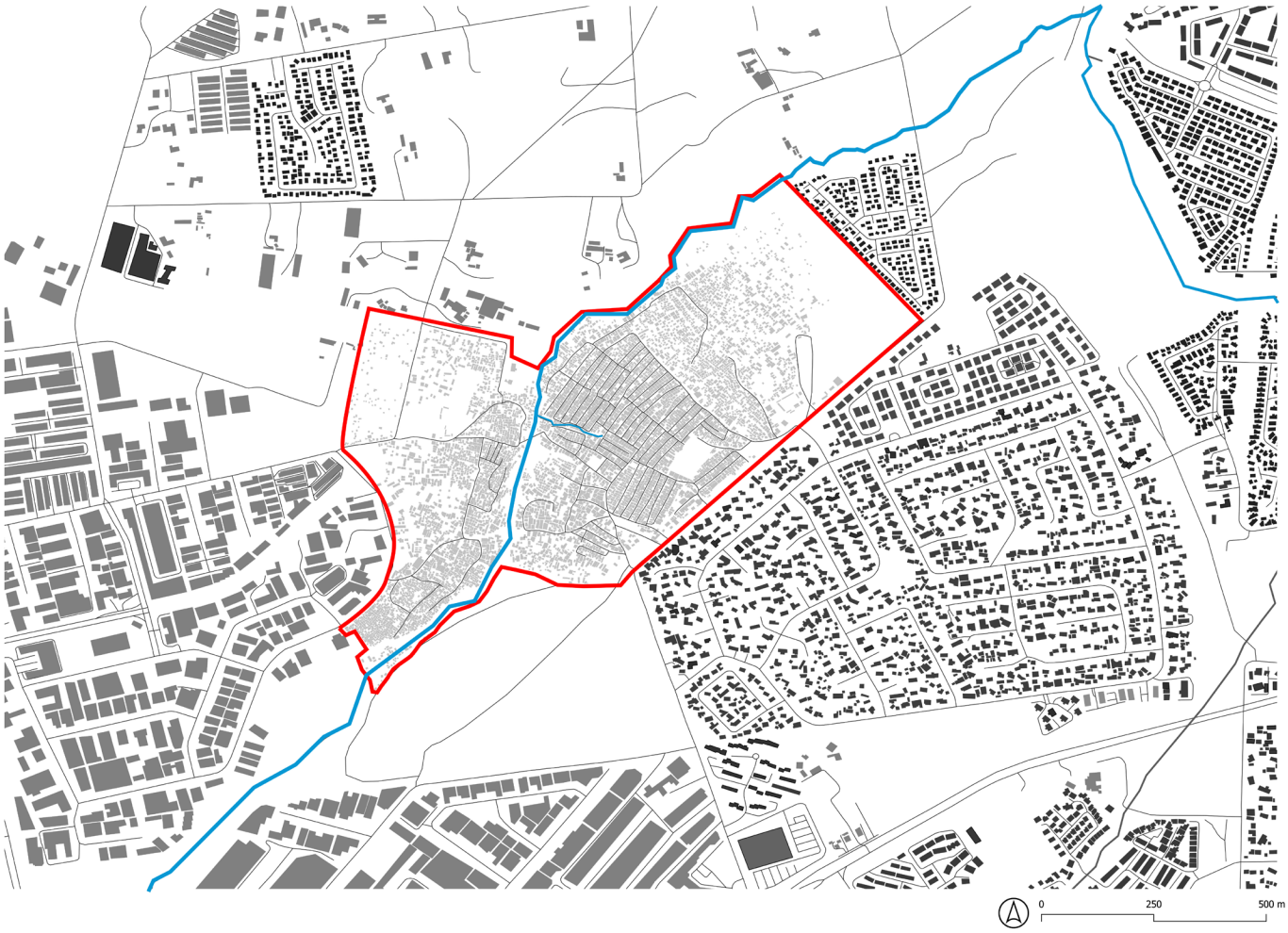


Figure 93 : Spatial Growth pattern of Kya Sands, 2007 -2021
Source : Authors Diagram.

4.8.2 Elements of green infrastructure in Kya Sands Settlement

a) Domestic Gardens

Gardens indicate vegetation and vegetated regions inside stands in this context. Plants in pots around a shack on the ground (see figure) is a good examples. Water from common taps and, on rare occasions, water from the stream is used to irrigate the gardens. There was a link between the sort of gardens included and the delineated areas. There are fewer and smaller gardens around residences without clearly defined stands. The most popular sort of garden in this setting is plants in pots next to shacks.

Domestic gardens are used for a variety of purposes. They are the ones that supply food. 'We prepare some, and some are used by individuals [with authorisation], but I don't sell,' says a person. Because not every household in the colony has a garden, gardens provide a small contribution to household food consumption. Harvests are typically tiny. Settlements gather only 1.7 kg of fresh food in a month, accounting for only 6.7% of monthly vegetable food intake. Despite this, some inhabitants are still motivated by the prospect of financial benefit. A report indicates that one resident wants to 'grow these trees, chop them up, sell them for firewood, or build with them' . While

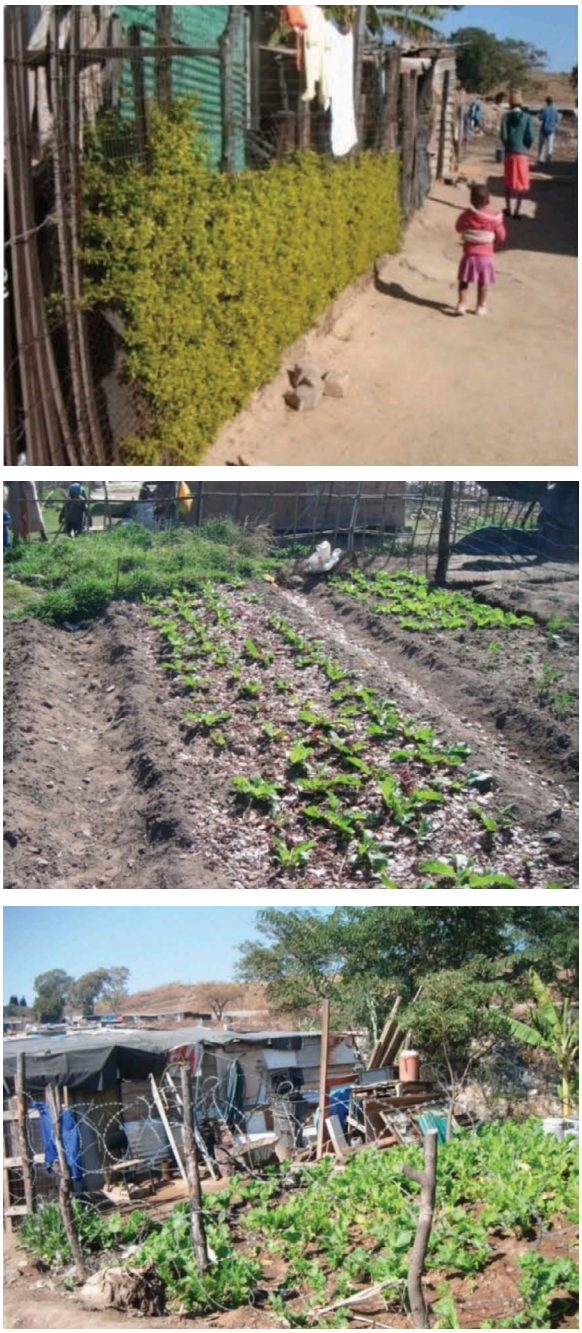


Figure 94: Some of the domestic gardens in Kya Sands Settlement. Source : Photographs taken by Olumuyiwa Bayode Adegun, May/ June 2014.

another intends to 'make vegetable gardens to create cash.' People here really like vegetables, says another person. Another answered, "If residents' tenure in the area/ neighborhood is secured, I will produce food because I have gardening knowledge. I will cultivate, trim, and sell them".

Gardening is a leisure in Kya Sands, as no one take it as as their primary occupation. The gardens add to the aesthetic appeal of the area, thereby improving psychological well-being. Some people grow plants for beautification regardless of the nature of their dwelling unit or the scale of their stands (Image 22). An individual residing in the area said that he "uses leaves of the plants for fragrance or medicine". Some of the gardens in the neighborhood are artistic, allowing for creative self-expression while also encouraging a sense of place attachment.

4.8.3 Benefits from communal gardens

In the Kya Sands community, there were two communal gardens as of late 2014. The first, Thandanani, began in 2007 under church spearheaded by a group of vulnerable residents of the site and the Msawawa villages. The 18 Kya Sands residents who founded the communal garden (16 women and 2 males) came together because they needed mutual support and transportation to clinics. The 180-square-meter garden is situated on the slums outskirts (refer Image). Members of the support group worked there from 8 a.m. until 2 p.m., planting vegetables. The garden's production was either eaten by the members or sold. There were days when only handful of people would buy. As people explored other types of the works, membership dwindled, and the garden was closed eventually.

In early 2015, the second communal garden in Kya Sands was established. It was founded by a Christian Ministry's nonprofit affiliate, functioning in the area since late 1990s. It is part of the NPO's project agricultural program to help Kya Sands inhabitants improve their socioeconomic status. Food from the garden is currently used at the NPO's weekly community kitchen, where Kya Sands' youngs are fed.

Gardening activities are primarily carried out by volunteers from various parts of Johannesburg, as they were during the time of work. People in Kya Sands who are interested in participating are also encouraged to do so.

Figure 95 : Location of communal gardens, parks, and soccer pitch in Kya Sands settlement.
Source : Authors Map

The communal gardens are fruitful, materially, and socially, and they assit to improve the settlement's quality of life and environmental quality. Regular meetings, working together, peer support, and similar goals, as shown by the Thandanani garden, may have boosted the groups at risk with hopes for a quality life. Volunteering in the green gardens enable people to benefit and socialize, which helps to build social life. The importance of gardens to social life has been reported in several local informal developments. Communal gardens can assist sociolly and ecologically especially in terms of justice and empowerment. Communal gardens in Kya Sands have been dwindling due to urbanization.

Figure 96 : The communal garden in June 2014 (left) and later in June 2015 (right)
Source : Photographs by Olumuyiwa Bayode Adegun

4.8.4 Public spaces Park' initiatives

There are no municipal parks in Kya Sands because the settlement is not formally recognized, and green areas are not considered as important services. Residents created vegetated outdoor places, henceforth referred to as 'parks,' in response to the lack of this amenity, however they lack official sense of parks. Figure 87 (derived from Olumuyiwa Bayode Adegun's 2019 report) shows the place and photos of the recognized informal/slum parks. The creation of the parks is usually spearheaded by a person or a group. The physical construction is carried out by family members, friends, and locals who are interested. Trees, bushes, flowers, sitting areas, and sports equipment created from recycled trash/waste goods such as vehicles' tires, trunks, etc. make up the core components of the parks. The 'parks' are used for social and recreational activities. On weekends, men gather there to drink and relax. And they watch soccer occasionally.

The municipal institution accountable for green areas in Johannesburg, Johannesburg City Parks and Zoo (JCPZ), does not contribute to self-constructed green areas. In March 2013, the heads of Kya Sand informed JCPZ, requesting help with the creation of green open areas.

Due to the state's approach, which creates doubt on the durability of various informal developments, non-governmental groups do not support these informal parks. Conditions related to NGOs' financing may prevent them from working in such an environment. According to a representative from Food and Trees for Africa, his organization 'doesn't perform in informal developments ... since the officials of government might easily approach and distroy everything down...' We won't be able to do plantation even if we get calls.

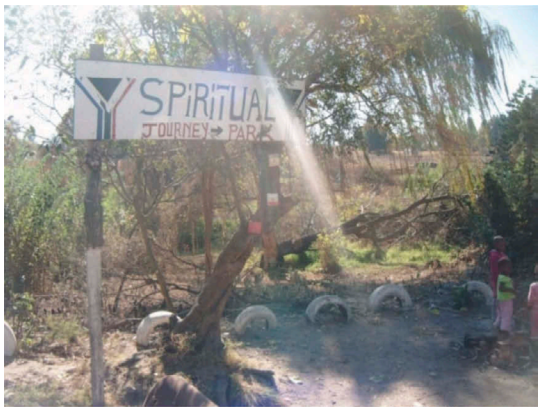


Figure 97: Informal parks in Kya Sand settlement
Source : Photographs taken by Olumuyiwa Bayode Adegun, May/ June 2014.

4.8.5 Recreational
The local soccer pitch

In the nights, there is an open space that is utilised. and during weekends, primarily for settlement football activities. Like the majority of soccer players, This open-air pitch in informal developments. There is no vegetation in space (see Image). Any Grass planting can't grow there since it's too hot. The athletes and spectators tread on it. It is a well-known recreational area. This is beneficial to social life. As a vital resource, a location that promotes community togetherness, it has not been encroached upon in the same way that the settlement grew. Various groups of people congregate freely near the pitch to watch/see and participate in athletic events.

Figure 98: Soccer game underway on the pitch in Kya Sands settlement.
Source : Photograph taken by Olumuyiwa Bayode Adegun, Sunday 25 May 2014.

4.8.6 Housing Typologies Existing Spatial Structure of Johannesburg

The settlement layout of Johannesburg is still characterized by spatial disparity. The 'townships' as a result of apartheid strategies have couple of the highest housing densities in city, but they are also couple of the most disadvantaged districts, with limited use of land diversification (mostly for living purposes), and are positioned distant from areas with capacity of economy. By developing houses in regions far from economic activity, post-apartheid housing has probably worsened apartheid spatial development, with land availability being the fundamental justification behind its location. The private sector has exacerbated spatial segregation by building vehicular developments (such as shopping malls, gated real estates, and parks). Meeting the demands, not only exacerbates existing social and economic spatial difference, but also puts significant pressure on the environment, lowers the efficiency of infrastructure provision, and enhances the cost of infrastructure provision and its maintenance.

Figure 99: Alexandra Township in context to Sandton, Johannesburg
Source : Unequal Scenes – photo by Johnny Miller

The city of Johannesburg is working hard to address the spatial divide created by apartheid-era urban design. Spatial inequality refers to the unequal distribution or access to socially valued resources and opportunities depending on geographic location or the boundaries imposed by such conditions. It is a causality of how cities and regions are planned and managed, as well as where resources and opportunities are allocated, rather than a causality of development.

Figure 100: Building typologies of Alexandra Township, Johannesburg
Source : Unequal Scenes - photo by Johnny Miller

Figure 101: Alexandra in 2016
Source : Unequal Scenes – photo by Johnny Miller

Figure 102: Alexandra in 2018
Source : Unequal Scenes – photo by Johnny Miller

4.8.7 Existing Spatial Structure of Kya Sands

In 2015, a research team of academics (from the University of the Witwatersrand (South Africa), Politecnico di Milano (Italia), and Thomas Jefferson University (USA), as well as City of Johannesburg government officials and urban planners, worked with Kya Sands residents. The aim was to examine the sociol, economic, cultural, and built environment of the Kya Sands settlements. The group looked at these informal, gradual processes, particularly in the context of housing construction, and came up with a home design methodology that tries to address the needs, preferences, and capacities of local residents.

The project's principal objectives were twofold. To begin, the group would perform onsite dweller's oriented research on the processes of incrementality regarding settlement growth. Second, they'd use their results to create a design for an in-place, incremental housing. In such circumstances, how do dwellers live? What was the process of constructing their homes? What is the process of constructing homes on the ground? What type of materials and construction methods are to be used? What type of different typologies are there? Finally, how can we as designers improve incremental process of construction that are born through increments responsive to the requirements of many users?

With this in mind, the group devised a set of organized research objectives:

- To define "incrementality" in the context of Kya Sands housing.
- To have a better understanding of the various and nuanced housing typologies seen in informal settlements.
- Investigate housing-related processes like
  - way of occupancy (owner/renter)
  - Construction team
  - Construction materials
  - Water, Sanitation, and Electrical infrastructure
  - adaptability of dwelling over time
- To create an appropriate housing form that responds to the interests,
- requirements, and capacities of residents.
- Create an in-situ system that allows people to stay in their homes while
- customizing building.

Figure 103: Kya Sands, Johannesburg
Source : Unequal Scenes - photo by Johnny Miller

4.8.8 Urban Spatial Conditions

The team looked at different spatial settings in the area around mobility networks (primary routes, secondary, and tertiary routes, vehicular and pedestrian) in partnership with local community members. The study was carried out on a variety of scales and using various mediums. On a larger scale, the researchers used Google Earth records to evaluate settlement growth, looking at patterns of formal circulation and growth direction. The group mapped living areas in the neighborhoods by hand at the district size, learning about less formal ways of scale and circulation, as well as residents' relationships to their urban atmosphere. Photo documentation and sketches led to the creation of a digital collage. (Image Below)

Figure 104: Digital collage examining Kya Sands' urban spatial contexts
Source : Sustainable Urban Development and Globalization by Agostino Petrillo, Paola Bellaviti

The researchers looked at the spatial linkages between dwellings, communal outdoor areas, and business corridors in order to better comprehend the spatial gradients between private and public spaces. On a more personal level, the team looked into users' relationships with their homes, as well as the indoor/outdoor relations that influence mundane life in the community. The group investigated privacy thresholds at the public level, learning about the complex levels of privacy that exist in dense metropolitan settings.

4.8.9 Kya Sands' Housing typologies and incremental processes of assembly

Informal developments by definition is an evolving process of incrementality, with a direct interaction of the user and the process from the ground up: Local constituents construct buildings, economies evolve, politics inform themselves, and spatial policies are enacted. Various social, political, economic, and spatial influences shape the trends of development in each informal community. The team in Kya Sands developed "incrementality" as a way of development based on local populations' possibilities and capacities.
In Kya Sands, housing incrementality is

characterized as a movement from low to highdurable constructions. A dweller may construct an elementary unit with no foundation, using hard/soft panels such as salvaged plywood, traffic signboards, billboards, plastic or fabric for walls and roofs. Over the time, the resident may collect clay bricks and structural elements for walls, as well as roofing tiles or metal sheets for roofing. The materials are stored on the site until users, friends, or local builders can construct one wall or section of wall at a time. A long-lasting construction with weather-resistant capabilities, improved security and ventilation, and adequate sewerage, water, and power may eventually emerge.

The team discovered the opposite in Kya Sands, where many individuals in northern contexts spend most of their time indoors and only venture outside as a supplement to daily living. Residents spend most of their time outside, only coming inside when absolutely required. Consquently, the transition between public vs private spaces is painstakingly handled. More public-facing homes may front elemantry and secondary circulation ways, with a minor spatial barrier at the front door, such as a well-kept stoop or a well-kept enclosed garden. Residents can relax in shade under a roof overhang or a strategic tree.

In Kya Sands, public/private borders are subtle in their materiality but powerful in their spatial language. The general public is kept at bay by a strategically placed clothesline or pile of construction debris. A one-room unit along a street edge may have no windows on the public side but may open to an internal courtyard with an open door and window in more private residences. A somewhat lengthy, compacted, and narrow corridor leading to such a courtyard could be formed by two single-room houses. Even within the open courts, the positioning of doors/windows creates privacy borders, which are maintained by individual tenants while the courtyard is shared by all. In each dwelling typologies, incrementality plays an important part in the creation of residents' homes. A variety of socio-spatial tectonics sensitive to the user have also been discovered:

• Housing type: Courtyard Residence

A short path (0.80 m) takes to a 3 m by 4 m courtyard shaded by a mango tree just off a major motor road through the community and along a pedestrian corridor. A solitary old woman lives in one of the five one-room houses that flank the courtyard. She relocated from the northern area of Venda, a 5 hour drive from Johannesburg, three years ago for proximity to her older children. Three of her four neighbors are Venda natives. She rents out her room and has never met the owner. Her nice neighbors are assisting her with the construction of a little larger (3 m * 6 m) home that also faces the courtyard. Bricks & CMU blocks were rescued from

BUILDING TYPOLOGIES

Residential

One story
Reused Scrap Material

Mixed Use

One story
Reused Scrap Material

Shop

One story
Reused Scrap Material

Courtyard Residences

One story
Reused Scrap Material

Figure 105. Various housing Typologies of Kya Sand
Source: Created by Author

Figure 106. A perspective showing housing typologies
Source: Unequal Scenes - photo by Johnny Miller

Figure 107. A comparative view of Kya sand informal settlement with the formal bungalows
Source: Unequal Scenes - photo by Johnny Miller

the trash and used to construct the foundation and masonry walls. She's putting aside money to buy corrugated metal roofs, windows, & doors. She'll be switching from a dark, windowless plywood-paneled house with a tarped plastic roof to a secure brick structure with metal roof, two windows, and a locking door. In the courtyard, there is a restroom installed by the government, and in the pedestrian passage, there is a water stand.

• Housing type: Street-Edge Living Unit

A free-standing two-bedroom flat situated on a secondary, domestic scale vehicular route. The mother, who is over the age of 20, and her child came to the community from rural area. She is a student of a local college and works at a retail store. She took over the building (made out of plywood) she had made herself and replaced the front wall with clay bricks. She has begun repairing the remaining surrounding walls, but she is awaiting additional cash and construction materials. The roof is constructed with corrugated metal and is covered with a huge plastic sheet. The tarp is a fire hazard, but it resists water, she admits. She promises us that she will not set fire to the house. The holes for the windows and doors are made of metal and are glazed. There is a toilet (installed by water) and running water inside at the back of the house.

• Housing type: Storefront Residence

A storefront living unit with 03 bedrooms in the back is located on the main vehicular road connecting the unit entrance to the landfill. The storefront is 2m deep, 4m broad room with a small cooking fire and several seating possibilities. The residence is home to a woman from Mozambique, her close friend, and her daughter. It's been suggested by neighbors that it's an unofficial she been (which she coyly denies for legal reasons). She came 10 years ago, just as the settlement was taking shape. She has relocated and built the dwellings again in the hamlet on several occasions, including after shack fires. Scrap items were used to construct the construction, which included plywood panels, lumber, plastic, and a plastic roofing tarp. There are no windows, and the doors are made up of plywood sheets with chain lock holes drilled in them. A toilet has been built by government into the structure, and a water stand can be located near the edge of the street.

• Housing type: 2-story Residence

A two-story dwelling, unlike the majority of residential typologies, is located on a narrow pedestrian route. The 50-year-old dweller works as a builder in the area and relocated to Kya Sands to be closer to his job. He was the one who built the structure. He generally employed dump-collected building materials, such as blocks, windows, and doors, as well as corrugated roofing. A water station is positioned in front of the home, and public restrooms are located next to it.

4.8.10 Services

Water, power, and sanitation are the three basic municipal services covered below. It depicts the extent to which municipal services are provided in the Western Sub-Region, as well as the bulk network that serves the Western Sub-Region. The level of service is based on Census 2001 and only displays the number of municipal service connections that exist. The capacity of the bulk municipal services network to accommodate urban expansion and densification is not shown. Determining capacity necessitates extensive engineering calculations, which are outside the scope of this study. (Luthuli Maluleke And Associates, 2008)

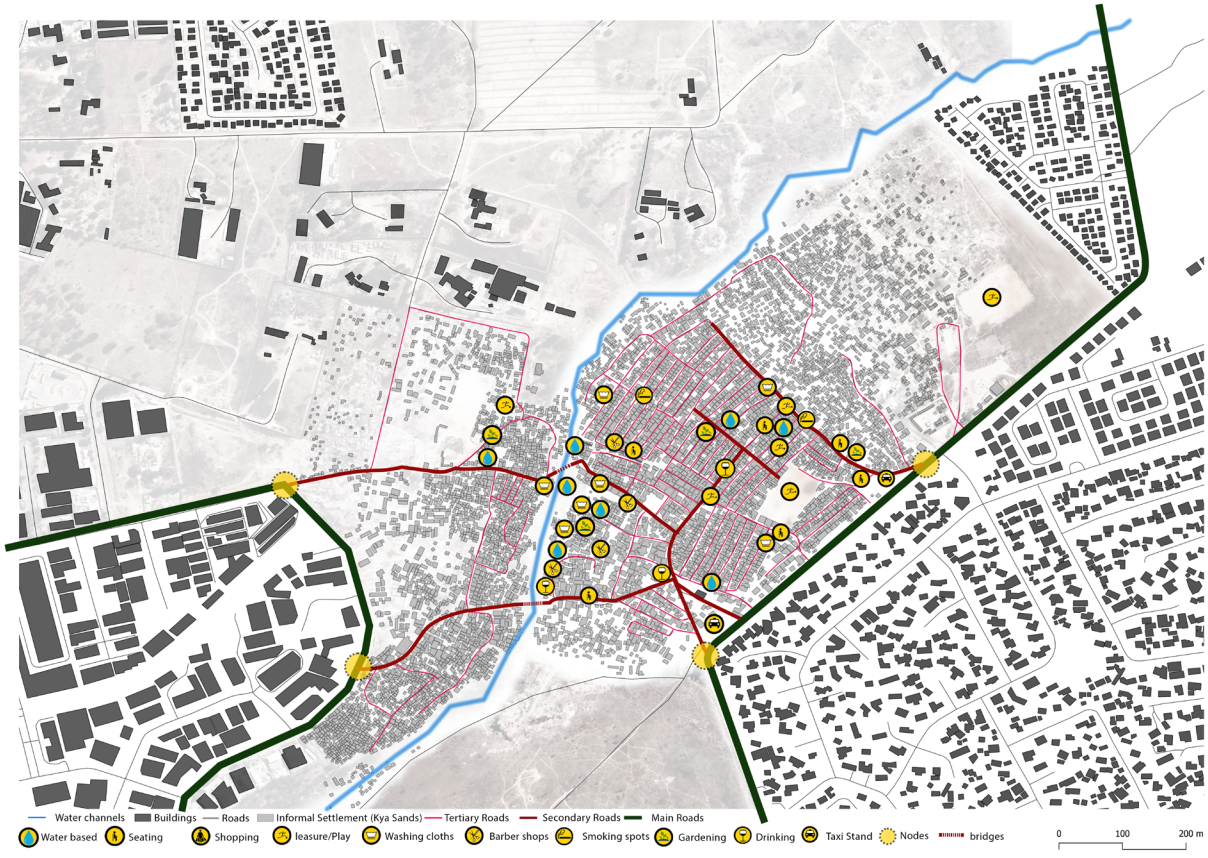


Figure 108: Existed services in Kya Sands
Source : Authors Map. Data Source: Sustainable Urban Development and Globalization by Agostino Petrillo, Paola Bellaviti

Water supply

In the city of Johannesburg, a total of 1.47 million (98.4%) houses have access to water via yard connections in formalized areas & communal standpipes within a walking distance of 200 meters in the settlements. Over time, the city has been successful in minimizing water backages. Between 2007 and 2018, the percentage of households has decreased significantly, dropping by -7.14 percent on an annual basis. (Joburg, 2019)
The majority of families in the Western Sub-Region have access to taped water, as shown in the diagram below. Many households, on the other hand, must walk rather considerable distances to access taped water. Water from dams is used by a substantial number of houses in the Western Sub-Region. Figure: Water backlog - percent of homes falling below RDP-level. Pollution in Gauteng's rivers can pose a health danger, according to IHS Markit Regional eXplorer version 1870. Currently, a Rand Water pipeline running along the N14 motorway serves the areas on Johannesburg's northern outskirts, including Diepsloot. The bulk water network servicing Bryanston and Rivonia serves the areas abutting the N1 highway (such as Kya Sand, Fourways, and Sunninghill). The bulk water networks supplying Administrative Region A are under increasing strain as a result of development pressures within the region. (Luthuli Maluleke and Associates, 2008)

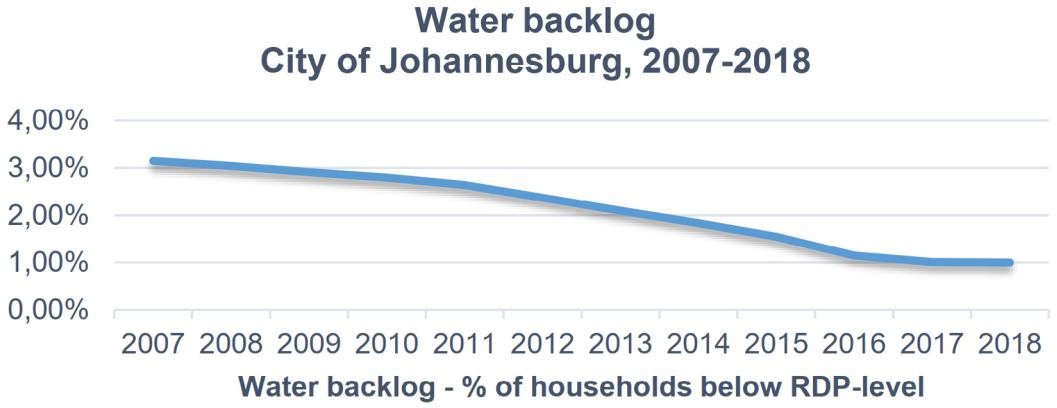


Figure 109: Water backlog - % of households below RDP-level
Source : IHS Markit Regional eXplorer version 1870.

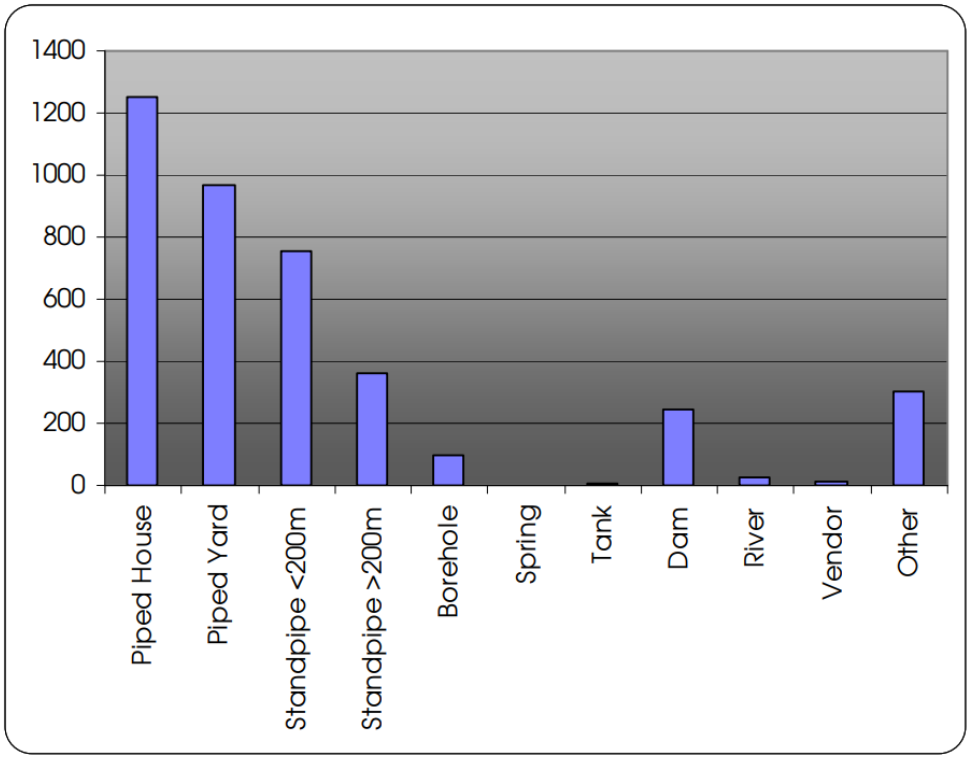


Figure 110: Region receiving water from various sources
Source : Kya Sands Development framework 2020, Census 2001.

To address the issues raised above, a regional water reservoir will be built northeast of Dainfern, supplying water to Administrative Region A. A bulk water pipeline will connect Diepsloot to this reservoir, which is now under construction.

The projected reservoir will also supply the southern areas of Administrative Region A, such as Kya Sand, Fourways, and Sunninghill. The new reservoir should alleviate existing water supply issues in Administrative Region A, and it has the capacity to deliver water to the region for many years to come. (Luthuli Maluleke and Associates, 2008)

The stream (north ride) is a source of ecosystem service provisioning. During the early years of the Kya Sands town, the stream served as a source of water. 'The river was smaller in the late 1980s; even if the water was dirty, we were still able to wash our laundary and bath ourselves with water collected there, unlike now when it is pol-

Figure 111: Piped Water supply system in Kya Sands
Source :Photo taken on September 17, 2015 by Roberto Rocco

luted,' remarked one of the earliest inhabitants. Changes in the stream's size, in terms of increased flow, are most likely the result of upstream development, which restricted options for seepage into the soil (resulting in run-off) in the area.

Some inhabitants continued to use the stream as a supplement to the common standpipe water supply at the time of my fieldwork. During shack construction, I noticed that water from the stream is utilized to make mortar & concrete, despite the fact that dirty stream water might damage the mortar and concrete. One of the dwellers spoke with used the water for irrigation. When there was no tap water, this happened. "We merely scoop some with a bucket to water a couple of our plants," he explained. However, some of the neighbors I spoke with were concerned about the quality of the stream's water, saying it was unfit for irrigating food crops.

The stream is used for laundry and other washing operations. On one of my visits to the village, I came across a group of inhabitants who were washing empty paint co-

natiners in the stream (see Image 40). Paints washed away, maybe non-biodegradable, polluting the stream. (Bayode Adegun, 2016)

Figure 112 : Residents washing recently emptied paint containers in the North Riding stream next to a dumping area
Source : Photo by Olumuyiwa Bayode Adegun, November 2014

Figure 113 : Children playing in the North Riding Stream while a resident collects water
Source : Photo by Olumuyiwa Bayode Adegun, May 2014

Sanitation supply

In the city of Johannesburg, a total of 1.36 million people (92.7 percent) have facility of sanitation via individual sewer connections to units in formalized areas and at a basic level via VIPs and ablution blocks in settlements. In last 10 years, the sanitation backlog (the number of homes without sanitary restrooms) has significantly decreased; in 2018, there were 113 899 families without access to elemantry sanitation, down to 109 065 in 2019.

The city has progressed in clearing the sanitation backlog, but there is still to be carried out. Between 2007 and 2018, the percentage of homes without sanitary toilets declined by 1.05 percent per year. (Joburg, 2019).

The present coverage of sanitation services in informal communities is 82.5 percent. The

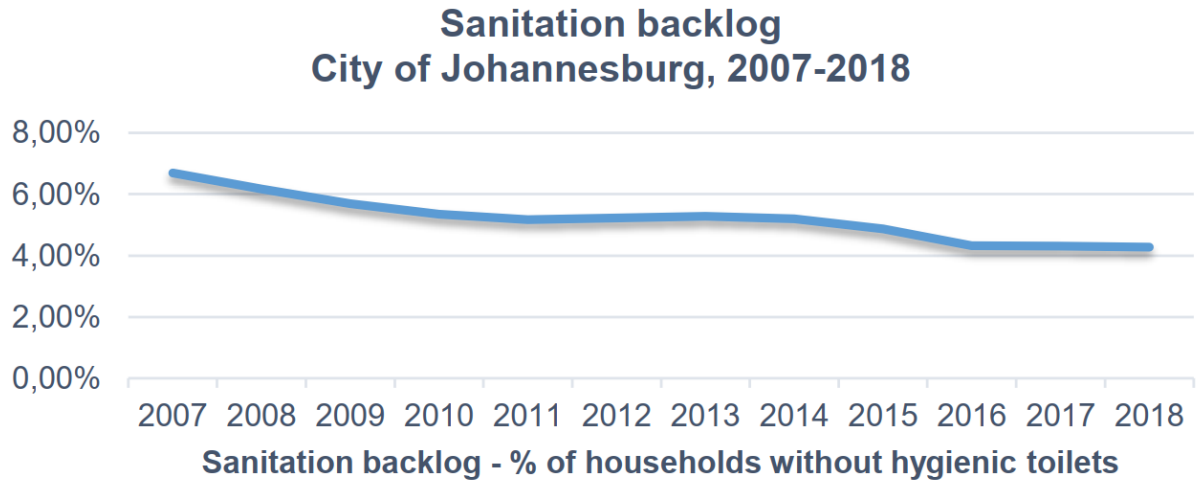


Figure 114: Sanitation backlog - % of households without hygienic toilets
Source : IHS Markit Regional eXplorer version 1870.

basic sanitation program is still being implemented by Johannesburg Water on a yearly basis. Priority is given to settlements that are serviceable but lack basic sanitation. Up until the end of the 2008/09 fiscal year, the type of sanitation provided to informal settlements was shown in the graph below.

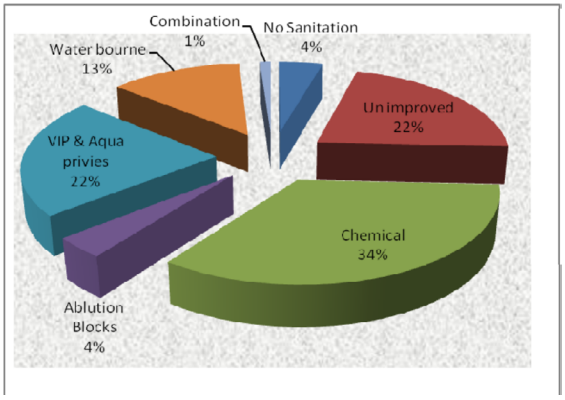


Figure 115: Sanitation services provided status, 2009
Source : Provision of sanitation in informal settlements in the city of Johannesburg, Z Kunene

Government strategy towards sanitation services to informal settlements

The provision of sanitation services to the City of Johannesburg's settlements necessitates a collaborative effort between various stakeholders, including the Housing Department of Johannesburg, the Housing Department of Gauteng Province, the City of Johannesburg Urban Management Planning, Infrastructure and Service Delivery Department, and Johannesburg Water - Institutional Social Development.

A settlement upgradation Steering committee was established by the City of Johannesburg to look the implementation of the Programme and monitor participation by players, with the goal of improving the welfare, safety, and health of the communities . The lack of a coordinated approach among the main players made it difficult to serve, prompting the formation of this group.

The Committee is chaired by the Department of Planning and Urban Management of the City of Johannesburg. Once a month, the committee meets.

In accordance with the Growth and Development Summit decisions, the Informal Settlement Regularization and Upgrading Steering Committee aims to eliminate settlements by 2014 utilizing an incremental housing method to construct sustainable settlements. As a result, this group provides coordination among parties. This means that informal settlements must be authorized in order for the city to meet service needs. These people must also be able to developsome sort of tenure in order to maintain the structures and other improvements they have created.

Flush toilets connected to a sewer network are a popular kind of sanitation supply in the

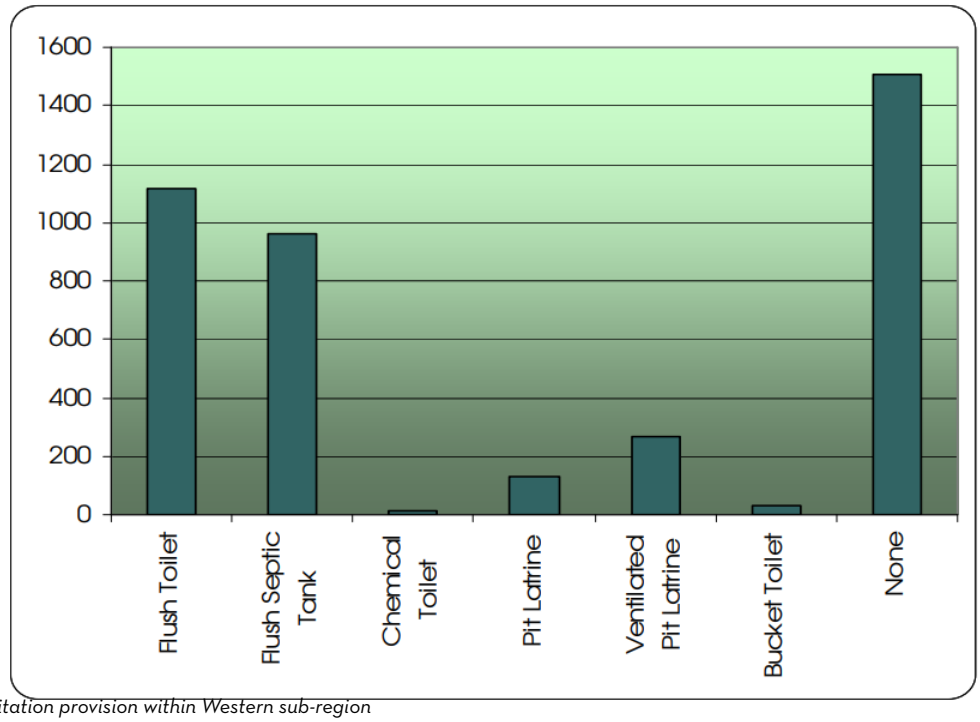


Figure 116 : Sanitation provision within Western sub-region
Source : Kya Sands Development framework 2020, Census 2001.

Western Sub-Region, as shown in the diagram above. Other sanitation systems, such as flush toilets connected to a septic tank, are also frequently used in the Western Sub-Region. These additional systems are common in the Western Sub-Region, owing to the Western Sub-rural Region's environment, and are not required to be connected to the municipal services network. The significant percentage of families without access to any type of toilet facility is concerning. This poses a major health danger, particularly if dams are also utilized to provide drinking water.

The stream is a supplement to the current sanitation system, compensating for the lack of toilets and sufficient drainage due to its position. Some inhabitants, particularly those who live nearby, use the riparian corridor for excrement and urine. These people dwelve in shacks without access to a bathroom or any other amenities. Toilet paper (or its typical counterpart, newspaper) and human waste are all thrown into the stream. In addition, grey water is discharged into the creek. 'We use it [the stream] like, as everything; as you can see, it's utilized as a waste area, a bin, and a drain,' one of the inhabitants said.

Residents of Kya Sands say the city has abandoned them and is failing to solve the issue of chemical toilets. Residents of the Kya Sand

Figure 117 : Chemical toilets in Kya Sands
Source : Photos taken on April 19, 2017, by Phathu Luvhengo

informal settlement are living in deplorable conditions as a consequence of the City of Johannesburg's poor service delivery. This is claimed to Nyauza Nongwevu, a community leader who also claims to be the presiding officer of the settlement body corporate. He protested that they had been ignored for the past three years and that they could only hope for better treatment while living in filth. With poor cleaning and drainage of chemical toilets, this problem has worsened during the last three years. Nongwevu said

that the driver of the waste-draining truck was avoiding other streets in favor of a few residents who had reportedly paid a bribe. He claimed that they were robbing them of their fundamental rights. Tidimalo Chuene, a representative for the company, claimed the chemical toilets in the community were serviced up to three times a week. She claimed that in the last three years, the number of times these toilets were serviced per week had doubled to ensure that they were cleaner. (Phathu Luvhengo, 2017)

Waste Management

The city gathers and removes garbage from 1.72 million households (92.9%) on a weekly basis. A total of 11 100 houses (0.6%) has their garbage collected less frequently than once a week by the city. Communal garbage dumps are used by 94 351 (5.1%) of houses, whereas 14 800 (0.8%) of households have their personal dump and 9 250 (0.5%) of households do not have refuse removal. Backlogs were experienced by 131 352 households (7.1 percent) (below formal once weekly collection). This rate has risen over the last ten years. (Johannesburg, 2019)
Despite serving more houses than ever before, the backlogs in waste collection continue to rise.

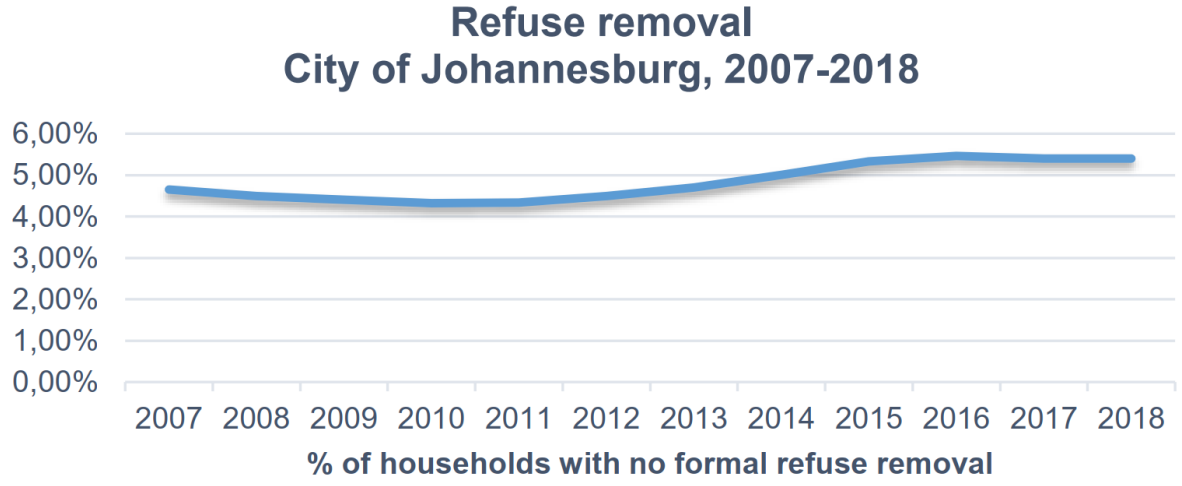


Figure 118 : % of households with no formal refuse removal
Source : IHS Markit Regional eXplorer version 1870.

Electricity

Total of 1.6 mil (92.3%) people have electricity facility for numerous purposes, while 12 806 (0.8%) people only have access to power for only lighting/illumination. Households that use solar or other energy sources are included in these statistics. However, around 133 540 families (7.7%) do not have access to electricity. Since 2007, this figure has risen at a rate of 0.45 pc per year on average. Despite the fact that the city's access to energy is reasonably good (>90%), the city has not met its 97 percent access goal. In the city, informal living units (yard shacks) and settlements (households existing on un-proclaimed property earmarked for development) continue to be the most affected by the lack of power.

The city's energy problems are more complicated than merely a matter of supply. The cost and needs of maintenance and updating of city's energy infrastructure to allow appropriate and dependable distribution are among the city's major issues, which are exacerbated by illegal connections, cable theft, and vandalism.

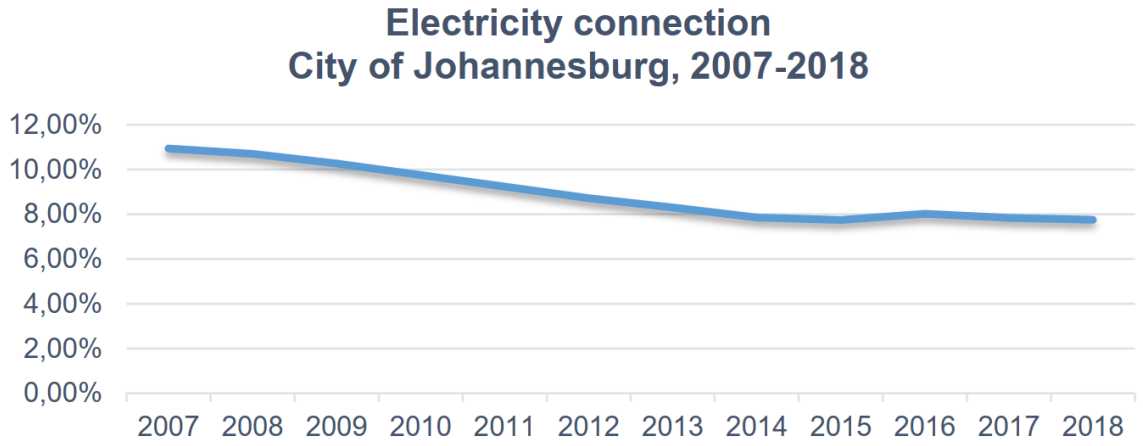


Figure 119 : % of households with no electrical connection
Source : IHS Markit Regional eXplorer version 1870.

The city is making some progress in terms of electrical connections; however, progress is slow, and the nation's energy security remains a significant concern. Between 2007 and 2018, the number of homes without access to electricity dropped.

Energy Supply

Most households in the Western Sub-Region have access to and use electricity, as shown in the diagram below. However, a large number of homes in the subregion rely on alternative energy sources such as paraffin and candles. These households' usage of alternative energy sources indicated that they either do not have access to electricity or found it too expensive to use. Due to Eskom's limited capacity to supply the national electricity grid, the ability of Eskom (a South African electricity public utility) to supply electricity to the northern reaches of Johannesburg is an issue and problem not only for the northern reaches of Johannesburg, but for Gauteng and the country as a whole. In terms of Eskom's long-term planning, It is only logical to suppose that high-growth areas, such as Johannesburg's northern reaches, will be prioritized.

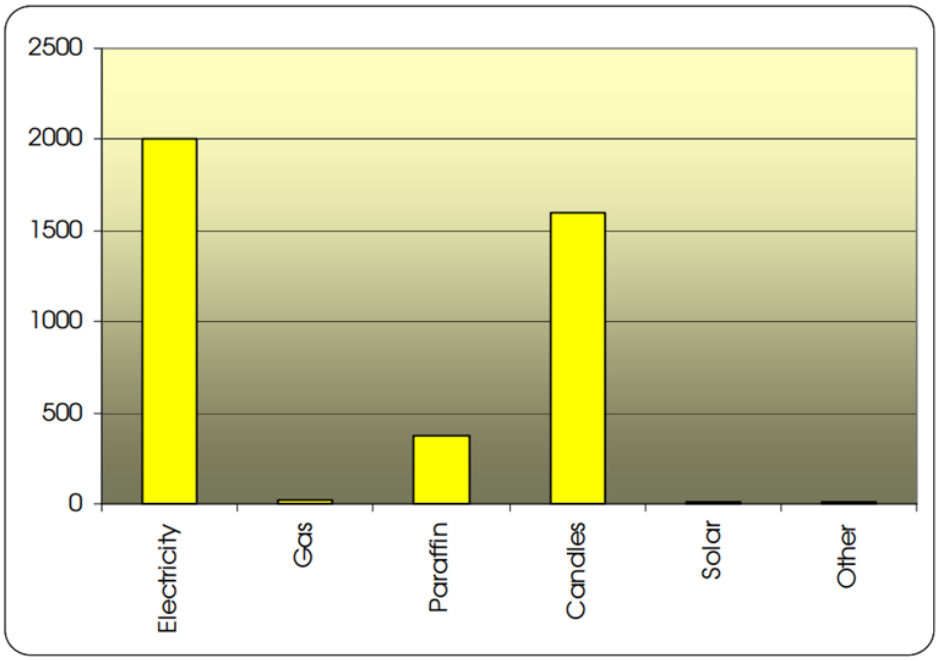


Figure 120: Energy provision within Western sub-region
Source : Kya Sands Development framework 2020, Census 2001

Incremental growth

Kya Sands is an unplanned neighborhood in Johannesburg's northwestern outskirts. The town is adjacent (on the west) to the Kya Sands industrial region and on the east by the Bloubosrand residential neighborhood. The ancient Randburg landfill site divides it from the Hoogland industrial district to the south. The town is crossed by the North Riding stream, which is part of the Juskei river watershed. The Kya Sands communi-

Figure 121 : Kya Sands Urbanism over time
Source : Authors Map

ty is spread across both public and private land. We separated Kya Sands informal colony into sub-parts to highlight the evolution of its urbanism throughout time.

Kya Sands began in 1989 as an illegal occupation by persons working as subcontractors at the Randburg Dumping Site, which is now closed. Murray's (2008:102) arguments demonstrate that this occupation may be linked to "unscrupulous landowners take benfit of the poor's condition by bringing them onto their land in exchange for a charge." One of the first settlers in Kya Sand confirmed Murray's claim, saying, "The land owner counted us before he gave us the land... We would sleep along the stream in makeshift reed shelters, and we would live like this for a year. We lived in pipes for another year after that. We built little units after that since we now had authorization.' By 2009, Kya Sands has grown to become Johannesburg's largest unplanned settlement in the north-west. According to one of the dwellers, the town began in 1990 with a population of around 169 individuals.

According to a 2007 estimate by the City of Johannesburg, about 7500 people live in 1200 units in the informal community. In 2009, a survey conducted by Professional Mobile Mapping (PMM) in 2009, there are 16238 individuals living in roughly 5325 homes (PMM, 2009). In 2015, the population of Kya Sands was estimated to be at 34,000 people.

4.9 PROJECT ELIGIBILITY

Moving towards more sustainable human settlements for the city requires a shared vision and understanding of sustainable human settlement and development. To achieve the vision of sustainability, approaches to urban development and management must incorporate integrated and fresh responses to emerging issues in the implementation of sustainable development. The common themes of economic growth, human development, and environmental conservation are commonly related with the notion of sustainable development. At all levels (local, national, regional, and global), performance and assessments are routinely made in respect to these themes. Given that the notion emphasizes the need to take awareness of the geographical and environmental, social, financial, and institutional ramifications of rapid population expansion and urbanization, it is a more rounded and full response to urbanization. Sustainable Human Settlements is more frequently connected with providing inhabitants with adequate, secure, and well-serviced housing. In South Africa, this word has been used interchangeably with sustainable housing to describe integrated housing developments, which are well-located homes in close proximity to socio-economic opportunities (such as jobs, transit networks, and social amenities and networks). However, meeting these needs and characteristics of Sustainable Human Settlements does not mean that all aspects of Sustainable Development, par-

ticularly those related to economic growth and environmental protection, are resolved.

"All people have the right to an environment that is not harmful to health or well-being; and to have the environment protected for the benefit of generations through reasonable legislative and other measures that curbpollution and ecological damage, advocate conservation, and secure ecologically sustainable progress and use of natural resources," according to the Constitution."

"Sustained rapid economic growth," "sustainable economic activities," "sustainable employment," and the measurement of success "by the level to which the lives and chances of the poorest South Africans are transformed in a sustainable method" are all mentioned in the National Spatial Development Perspective and National Development Plan (National Spatial Development Perspective, 2006; National Development Plan).

The Johannesburg 2040 Growth and Development Strategy (GDS 2040, 2011) is based on an overall vision of sustainability for the City of Johannesburg in the current approach to sustainability and sustainable development.

"In which human and economic progress do not deplete the natural ecological carrying capacity of the urban centers, regions, nations, and connected global environment in which it takes place, & do not deplete the greater capacity of all to endure".

4.10 SITE SELECTION CRITERIA

The locations indicated visually on Image below were chosen as Strategic Areas based on the Emerging Development Principles for future housing provision, as well as rules found in the City's Spatial Development Framework, Growth Management Strategy, and Growth Development Strategy. These locations should be prioritized for housing provision (high, middle, and low income) in the City during the next two decades (up to 2030), as they comply with the Emerging Development Principles outlined above. Each of the Strategic Areas was examined and evaluated in terms of conformity with a set of criteria, as shown below: (City of Johannesburg, 2012)

This collection of spatial characteristics is

seen to be essential for achieving the ideal "sustainable" shape. The findings of this assessment point to the type of action needed to establish the urban form necessary for achieving a Sustainable Human Settlement. The number and spatial extent of the Strategic Areas, as shown in Image 50, were finalized based on the results of the evaluation process.

Government Perspective of Kya Sands

On 13 MAY 2016, the Minister of Human Settlements was questioned in the National Assembly on plans to formally place people of the Kya Sands informal settlement in Johannesburg, Gauteng. If not, why not; if so, what are the key specifics of such plans, how many beneficiaries have been identified, and when will such plans be implemented? (Ministry of Human Settlements, 2016)

REPLY:

REPLY:
(a) Yes, arrangements to formally house people of the Kya Sands Informal Settlement have been put in place. Because of the density of the informal population, there is insufficient land surrounding the region to legalize the project in situ. As a result, it was suggested that the project be constructed in tandem with the Lion Park Project, which is located near the Lanseria Airport further north. The plan was for the Nietgedacht Property, where the Lion Park Project would be built, to be formalized first because the density is lower, and then some residents of Kya Sands would be shifted to the Lion Park Project. Residents of the remaining Kya Sands informal communities would be legalized on the spot. It should be highlighted that, due to the tremendous demand for housing, both projects would be developed as high-density housing, preventing incremental formalization.
(b) The project's scope was expanded to encompass all of the informal communities on Malibongwe Drive between Kya Sands and Lanseria, resulting in a total of 13 000 beneficiaries. At the Lion Park development, 8,000 beneficiaries would be housed, while 5,000 will be housed at the Kya Sands development. Beneficiaries from the informal communities of Lanseria/Freeway, Lanseria/Lion Park, Lanseria/Selina Park, Sands/iNanda Holding 57, Houtkoppen, Plot 5 Riverbed, and Malatje will be housed in the two developments.
(c) The planning process is already underway, and early indications suggest that construction will begin in the 2019/2020 fiscal year.

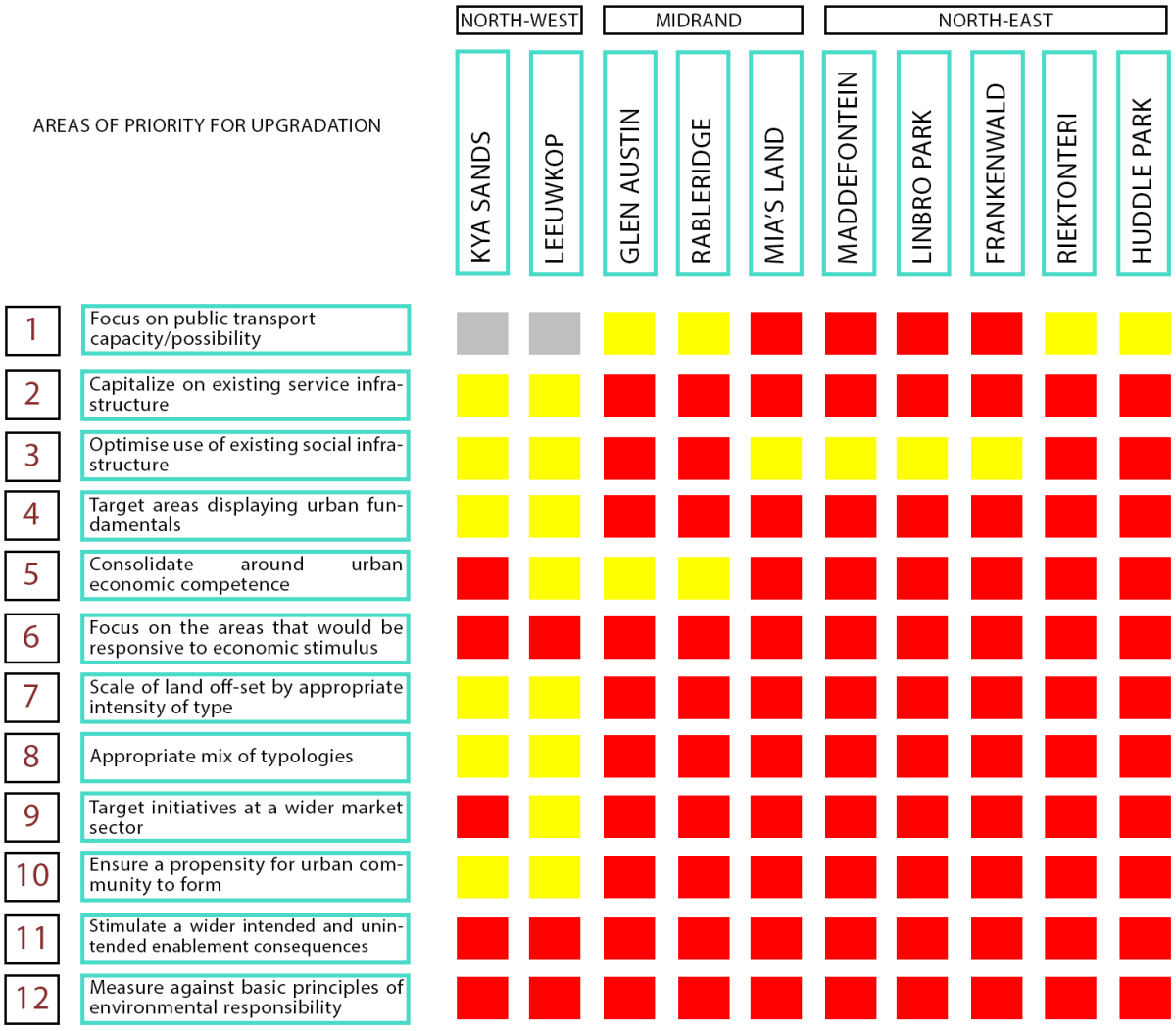


Figure 122 : Priority areas for housing provision
Source : The Sustainable Human Settlements Urbanization Plan (SHSUP) spatial proposals, chapter 7-8

4.11 SWOT ANALYSIS

S

STRENGTHS

Environmental

Access to Water
Presence of River

Social

Strong sense of community
Socio-Spatial adaptability
Location and accessibility to work and jobs
Provision of primary school services

Economic

Entrepreneurship

W

WEAKNESSES

Environmental

Scarce accessibility to public Transport
Industrial and Garbage Pollution
Limited provision of electricity and water

Social

Lack of Communication on Government level
Lack of Human Capital investement
Lack of sanitary services
Voilence and insecurity
Expolitation and Corruption
Unemployment
Lack of support for vulnerable groups

Economic

Extreme income inequality
Lack of support for Entrepreneurs

Table 8: SWOT Analysis of Kya Sands
Source : By Author

O

OPPORTUNITIES

Environmental

Promotion of Urban metabolism
Small Scale Agriculture
Environmentl upgrading and Dump recovery
Eco services
Development of Empty Land
Easy Provision of services because of Density

Social

Investment in multicultural environment
Investment in the human capital of the place

Economic

Promotion of local Entrepreneurship and Dynamism
Easy availability of Local Materials (Dump)

T

THREATS

Environmental

Uncontrolled and unplanned growth
Disease and Disaster outbreaks
Rise of Environmental and Pollution Hazads

Social

Segregation and Risk of Eviction
Potential Rise of Xenophobia
Persistence of lack of comunication between Government Levels
Conservative perspective on slum upgrading

Economic

Unemployment
Tenure insecurity

Table 9: SWOT Analysis of Kya Sands
Source : By Author

4.12 KYA SANDS ACTORS RELATIONSHIPS

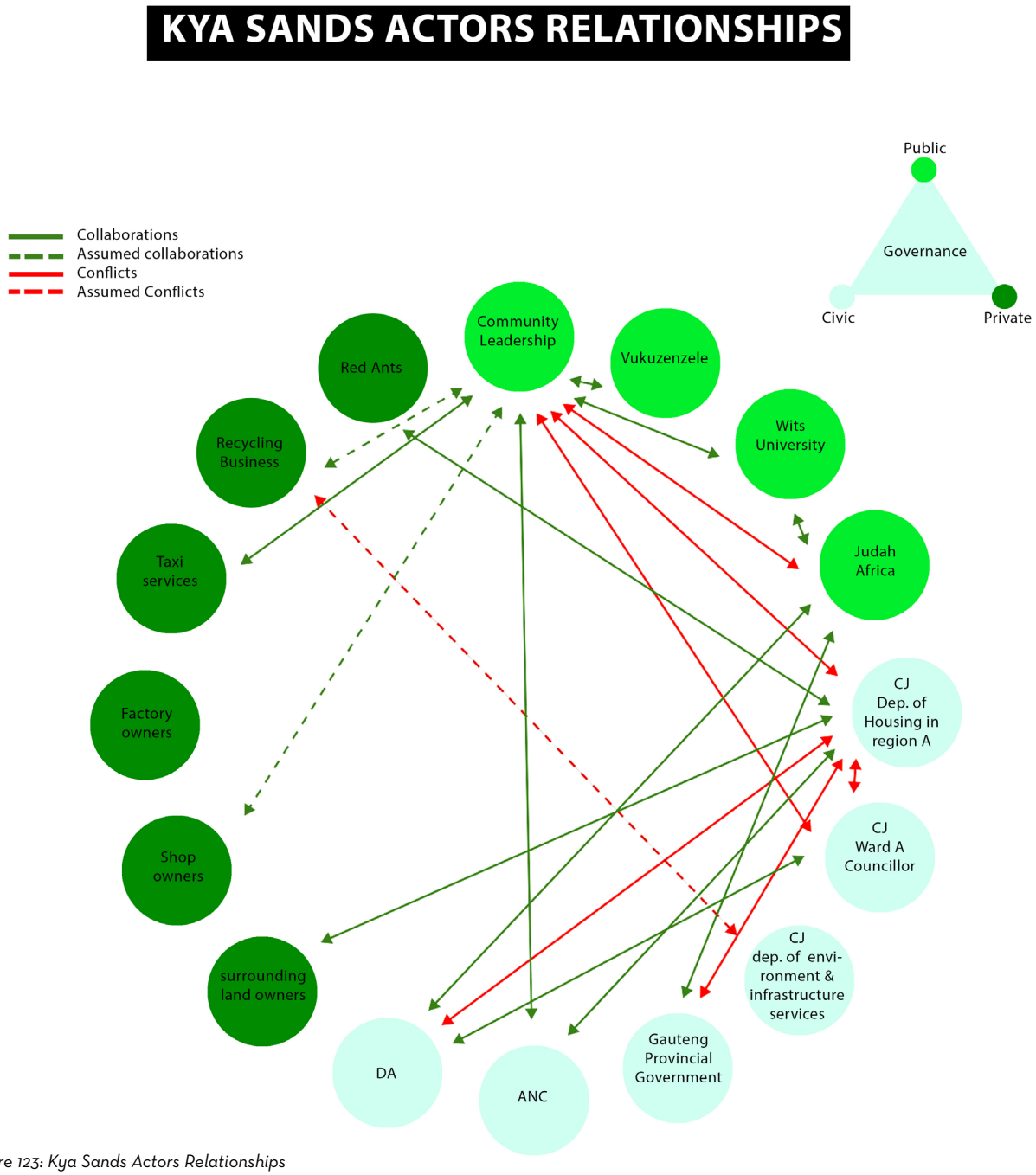


Figure 123: Kya Sands Actors Relationships
Source : Authors Map

Part 04: Design Proposal

Chapter 05
Illustrated Proposal for Kya Sands Upgrading

5.1 PROPOSED PROGRAMS FOR KYA SANDS INFORMAL SETTLEMENT UPGRADING

The Aim of proposing the interventions is to bring a positive change in the well being of the residents of Kya sand informal Settlement. Keeping in view the on ground realities and issues sorrounding such settlements.

The key findings of our analysis gave us a direction to choose certain elements from the settlement which are vital for the social sustainability in the longer run. Therefore by proposing the interventions we aim to:

- Vanished Public and Private gardens to be revived on new sites
- Improving the natural landscape and River dump site to cater the health and Flood risks
- Providing Services in the high density areas to improve the livelihood of community
- Improving the issues of accessibility within and with the outside Neighborhood through proposed street network.
- Improving the issues of accessibility (an Obstacle for water and waste management vehicles to operate) within and with the outside Neighborhood through proposed street network.
- Improving the infrastructure of the settlement including Bridges, Storm water management in the streets and public space enhancement.

Proposed Programs for Intervention

Educational
Kindergarden
Primary School
Technical Education School

Commercial Activities
Farmers Market
Grocery shops
Fruit Shops
Hardware Shop
Hair dressing Salon
Restaurant
Fancy dresses shop
Toys Shop

Services
Book shop
internet centre
photocopies shop
salon
office
health centre
Community Centre
Waste Management Centre
Recycling Plant
Water FilterPlant
Storm/Grey water management
Community Kitchen
Kya Sands Park and River Park
Bridges
New infrastructure

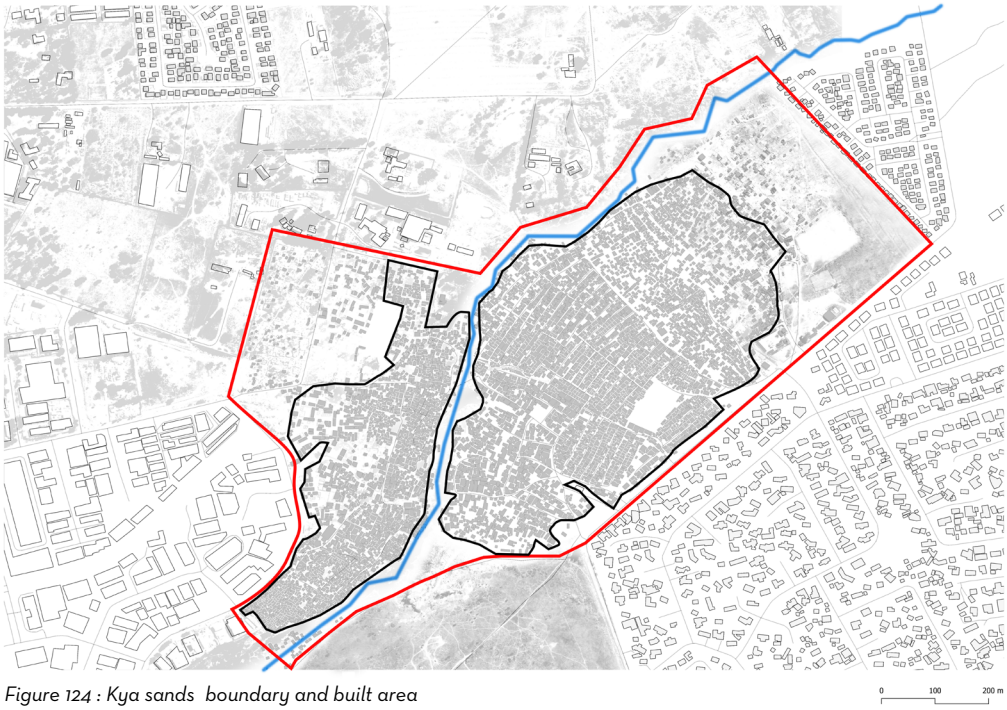


Figure 124 : Kya sands boundary and built area
Source : Authors Map

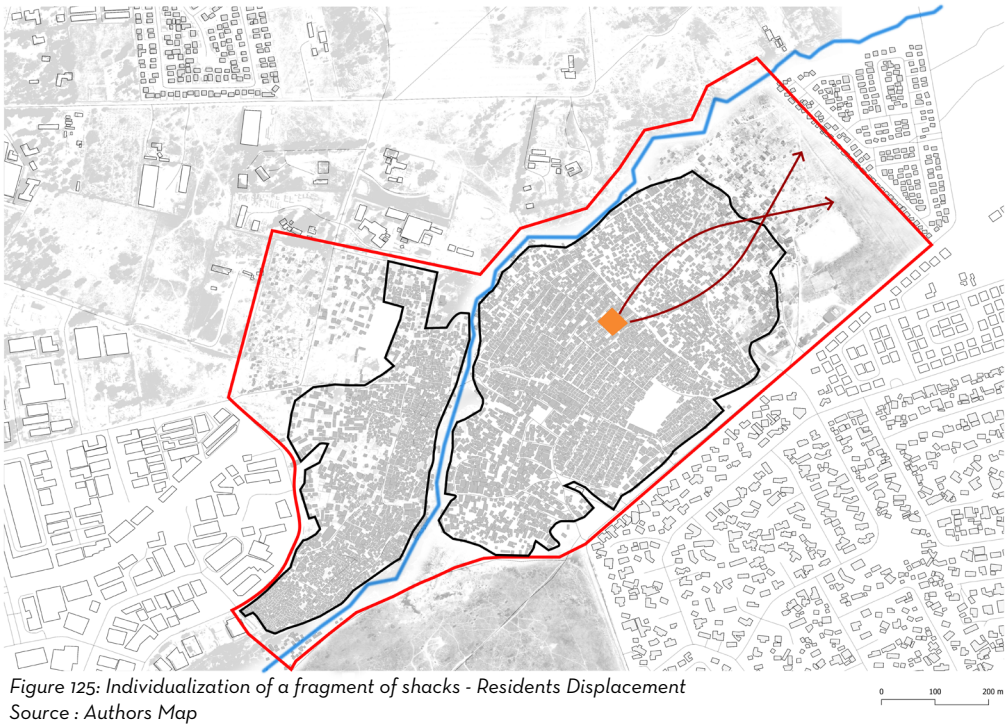


Figure 125: Individualization of a fragment of shacks - Residents Displacement
Source : Authors Map

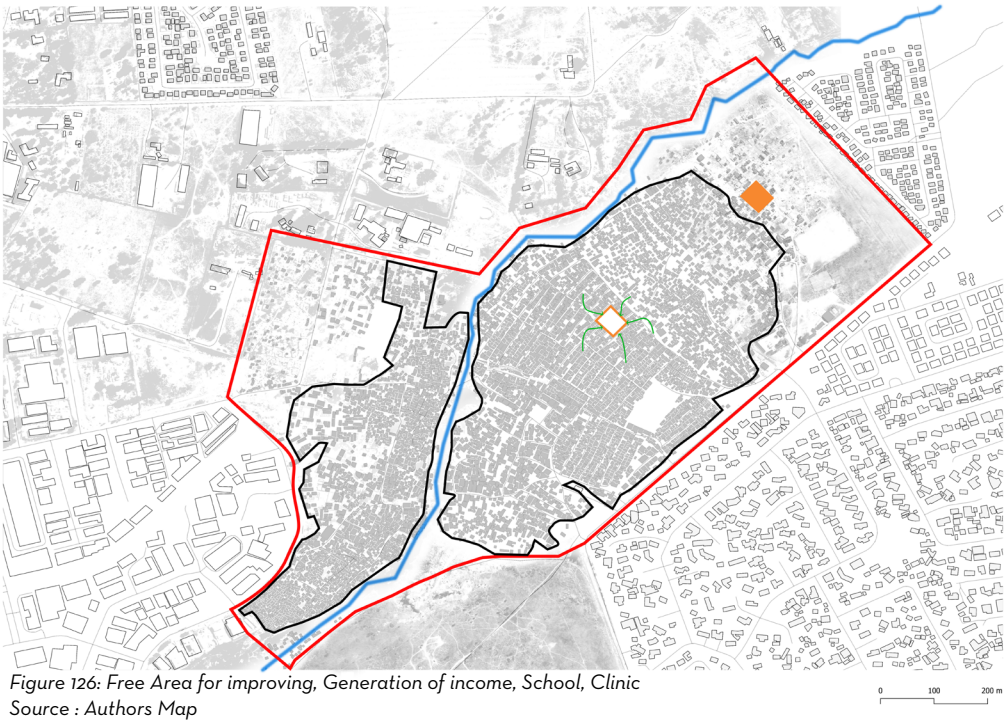


Figure 126: Free Area for improving, Generation of income, School, Clinic
Source : Authors Map

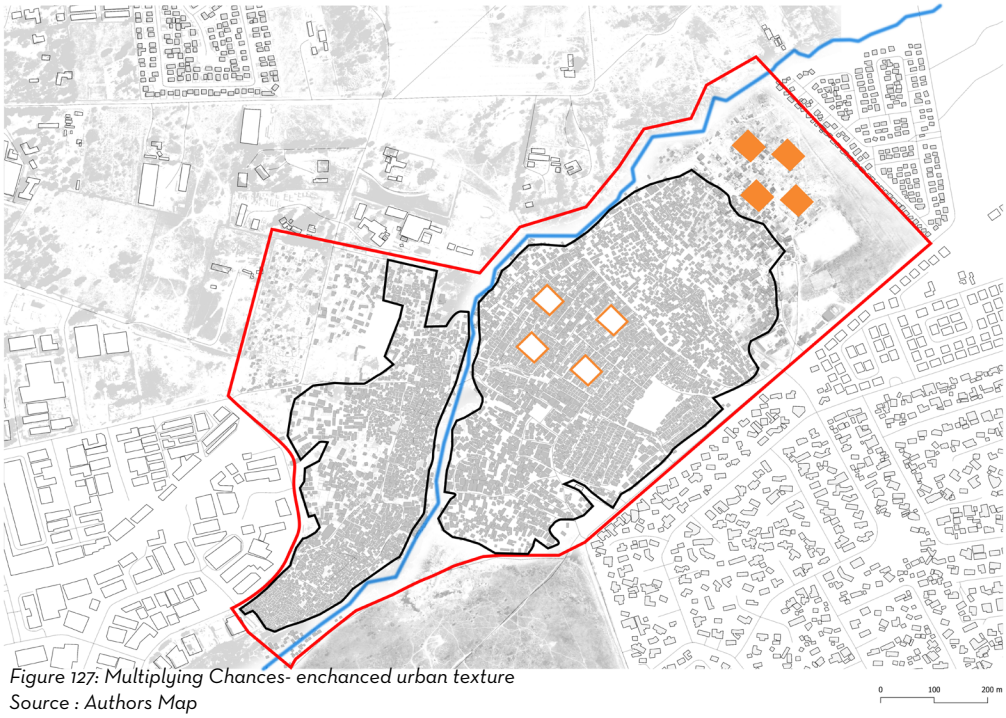


Figure 127: Multiplying Chances- enchanced urban texture
Source : Authors Map

STRATEGY FOR INCREMENTAL UPGRADING

5.2 STRATEGY FOR INCREMENTAL UPGRADING

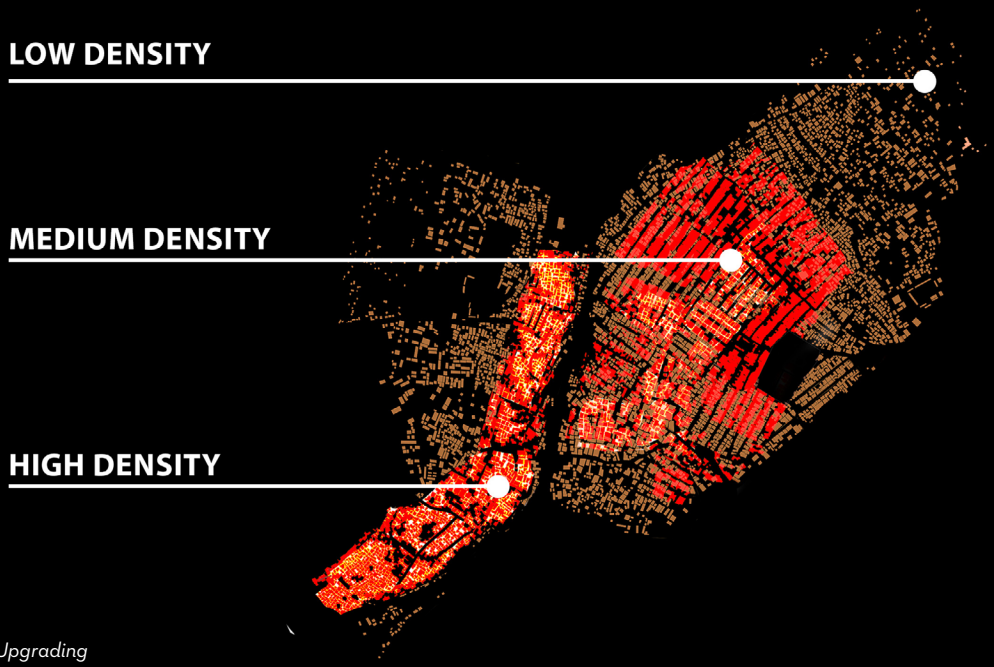


Figure 128: strategies for inremental Upgrading
Source : Authors Map

Master Planning	Incrementality - Services (Schools, Health centers, Public spaces)		
Density	High Density	Medium Density	Low Density
Builder	Self	Paid Builder	Government
Site Location	In situ/Incremental	In situ/Substitution	In situ/Green field
Function	Residential + Shop	Residential	Residential
Type	Courtyard	Linear	New Terraced Houses
Services	Transitional Strategies		Individual Service
Materiality	Transitional Strategies		Compliant Formality
Opportunity	Builder Paid		Rental

Table 10: strategies for inremental Upgrading
Source : By Author

5.3 DESIGN SCENARIOS

Government Vision

- Relocation
- Eviction of Undocumented People
- Provision of RDP Housing for South Africans

Issues with Government Vision

- What about Immigrants from other Countries?

Figure 129: Government vision for Kya Sands
Source : Authors Map

Judah Africa (NGO) Vision

A successful Flagship for a social economic development through 5 main projects:

- School
- Clinic
- Community and Multipurpose Center
- Agriculture
- Orphanage

Figure 130: Judah Africa (NPO) Vision of Kya Sands
Source : Authors Map

Bridging Vision

A Participatory approach which tries to upgrade the interventions already done in the settlement in a sustainable way in order to connect kya sands on a local and regional scale

Figure 131: Bridging Vision for Kya sands
Source : Authors Map

5.4 PARTICIPATORY DEVELOPMENT IN KYA SANDS

1- Declare Kya sands as a Transitional Residential Zone

2- Improving the Conditions of North Riding Stream to improve the environmental impacts.

3- Increasing internal and external accessibility. upgrading the bridge connection between east and west wing of Kya sands

4- Providing Multiple options for Housing for the relocated shacks as a result of water stream upgradation intervention

5- Enhancing Public and Private infrastructure by propsosing various public services and functions

6- Relabeling Kya sands identity

Figure 132: Participatory Development in Kya Sands
Source : Authors Map

5.5 DESIGN OBJECTIVES

OBJECTIVES	ACTIONS	STAKEHOLDERS	
		By Action	Main Actors
1  1- Declare Kya sands as a Transitional Residential Zone	Changing the current zoning of kya sands	City of Johannesburg (CoJ)	NPOs/NGOs (Judah Africa) CoJ Community Leadership Gauteng Provincial Government
	Developing a flagship project for the strategic spatial development of Johannesburg (Livability, sustainability and resilience)	CoJ, Gauteng Dept. of Human settlements, Community Leaders, NPO's/NGO's	
	Setting up an impartial organizing structure	Urban Community Facilitators, University, CoJ	
2  2- Improving the Conditions of North Riding Stream to improve the environmental impacts.	Reclaiming of the dump sites	Pikitup (Municipal Entity)	Pikitup (Municipal Entity) NPOs/NGOs (Judah Africa) CoJ Community Leadership National Government
	Cleaning up the river and the wetland Creating a green belt along the river within the larger water systems Providing sustainable grey water management	CoJ Dept. of Environmental Management and National Dept. of Water and Sanitation	
	Generation of blue and green economies	Mayor of CoJ Dept of Economic Development, Community Leaders, NPOs/NGOs	
3  3- Increasing internal and external accessibility, upgrading the bridge connection between east and west wing of Kya sands	Improving the quality and accessibility of streets inside the area. (Pavements, street lighting)	CoJ Road Agency and Provincial Dept. of Human Settlements	WITS University NPOs/NGOs (Judah Africa) CoJ Community Leadership National Government Gauteng Provincial Government
	Connecting the area to the sorroundings and the city through an affordable integrated and sustainable transport system	CoJ Dept. of Transportation and provincial transport departments	
	Improving connection within the area by constructing bridges to cross the river.	CoJ Environment and infrastructure Service.	
4  4- Providing Multiple options for Housing for the relocated shacks as a result of water stream upgradation intervention	Providing water and sanitation to the settlement	National Dept. of water and sanitation. Dept of Env. and Infrastructure	WITS University NPOs/NGOs (Judah Africa) CoJ Community Leadership National Government Gauteng Provincial Government
	Decreasing the density in the congested parts of the urban fabric	CoJ Development planning and urban management, Community, Stakeholders	
	Self-built upgrading of the houses (self-managed, technically supported, economically supported	Provincial Dept. of Human settlements and Community	
	Enabling the construction of single-storey housing units (mixed-use and residential typologies	Provincial Dept. of Human settlements, Community, NPOs and NGOs	
5  5- Enhancing Public and Private infrastructure by propsosing various public services and functions	Strengthening and complementing the common spaces and service networks within the settlement.	Urban Designers, Community, City Parks, Community Leaders, NPOs and NGOs	WITS University NPOs/NGOs (Judah Africa) CoJ Community Leadership National Government Gauteng Provincial Government Churches Urban Designers
	Constructing a multifunctional and attractive community center, services, facilities (sports, community Kitchen, sustainable ablution facilities, Playgrounds and cultural spaces)	Urban Designers, Community Stakeholders, Provincial Dept. Art Culture and Sports, CoJ, Comunity Leaders, NPOs/NGO's	
	Setup a system of urban agriculture initiatives and provide common gardens for the community	Provincial Agriculture Dept. , CoJ Environmental Management, Community Leaders, NPOs/NGOs	
	Creating spaces of interface between different publics of the area.	CoJ Development Agency	
	Providing high level multifunctional public facilities for the whole area (Starting with a health facility and a school)	Provincial Dept. of Education, CoJ Dept of Health, Provincial Dept. of Health, Community Leaders, NPOs/NGOs and churches	
	Establishing empowerment programs for vulnerable groups.	National Dept. of Women, Children and Disabled, Home affairs and CoJ	
6  6- Relabeling Kya sands identity	Organizing a competition to create branding identity and logo with and for the community Attach the brand and logo with a system of economic and social activites Promoting the unique social and cultural characteristics and opportunities of Kya sands	Community Leaders, NPOs/NGOs, Churches, Wits University, and City of Johannesburg (CoJ)	WITS University NPOs/NGOs (Judah Africa) CoJ Community Leadership Churches

Figure 133: Design Objectives
Source : Authors Map

5.6 INTERVENTION STRATEGIES FOR EXISTING NEIGHBORHOOD

5.6.1 Design strategy for High Density Neighborhoods

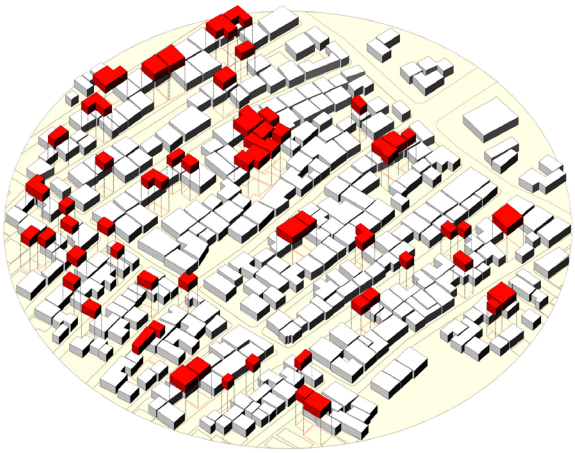


Figure 134: Upgrading Strategy for high density neighborhood in kya sands
Source : Authors Map

5.6.2 Design strategy for Medium Density Neighborhoods

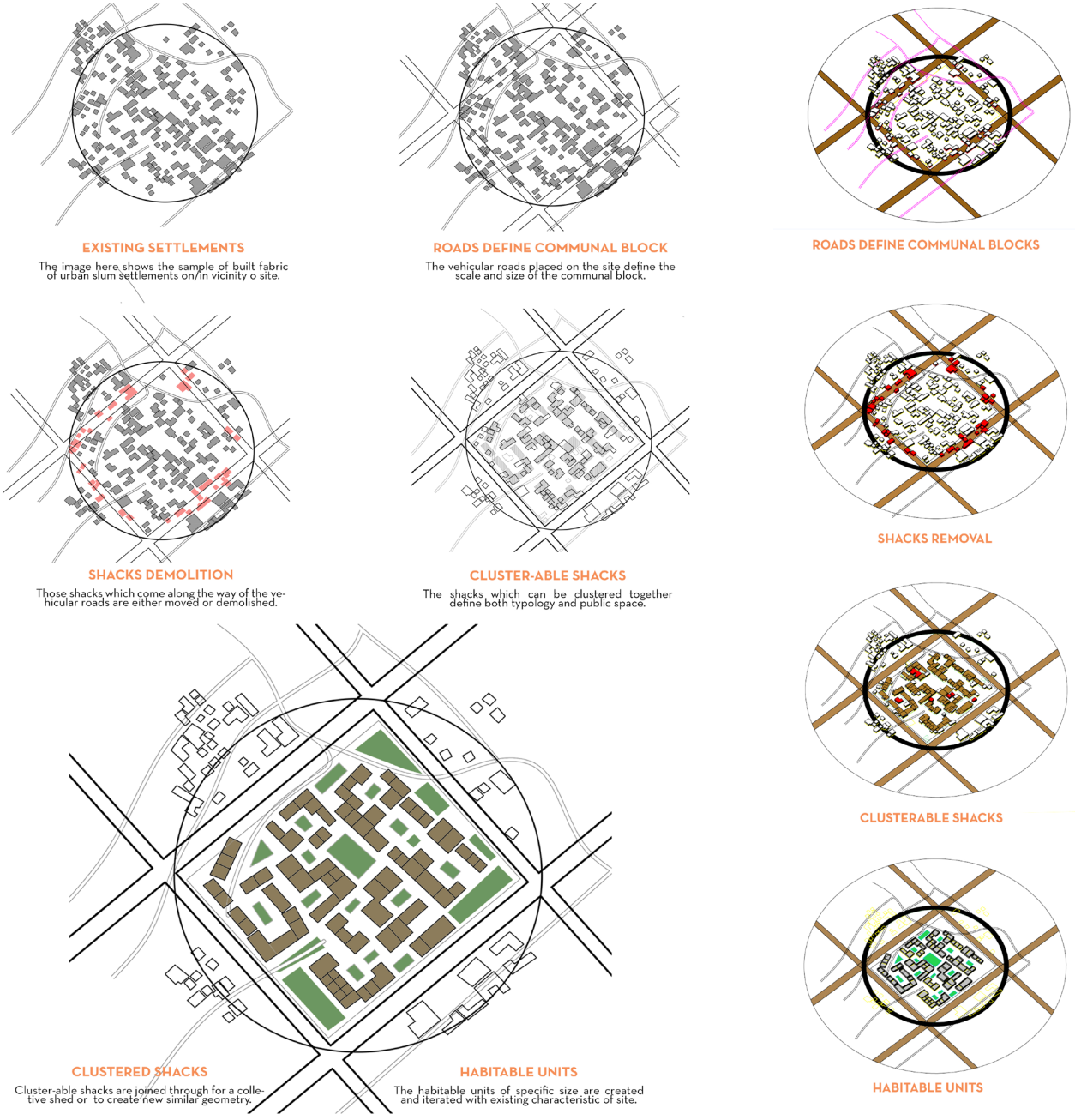


Figure 135: Upgrading strategy for Medium Density Neighborhood in Kya Sands
Source : Authors Map

5.6.3 Design strategy for Low Density Neighborhoods

Figure 136: Upgrading strategy for Low Density Neighborhood in Kya Sands / New infrastructure
Source : Authors Map

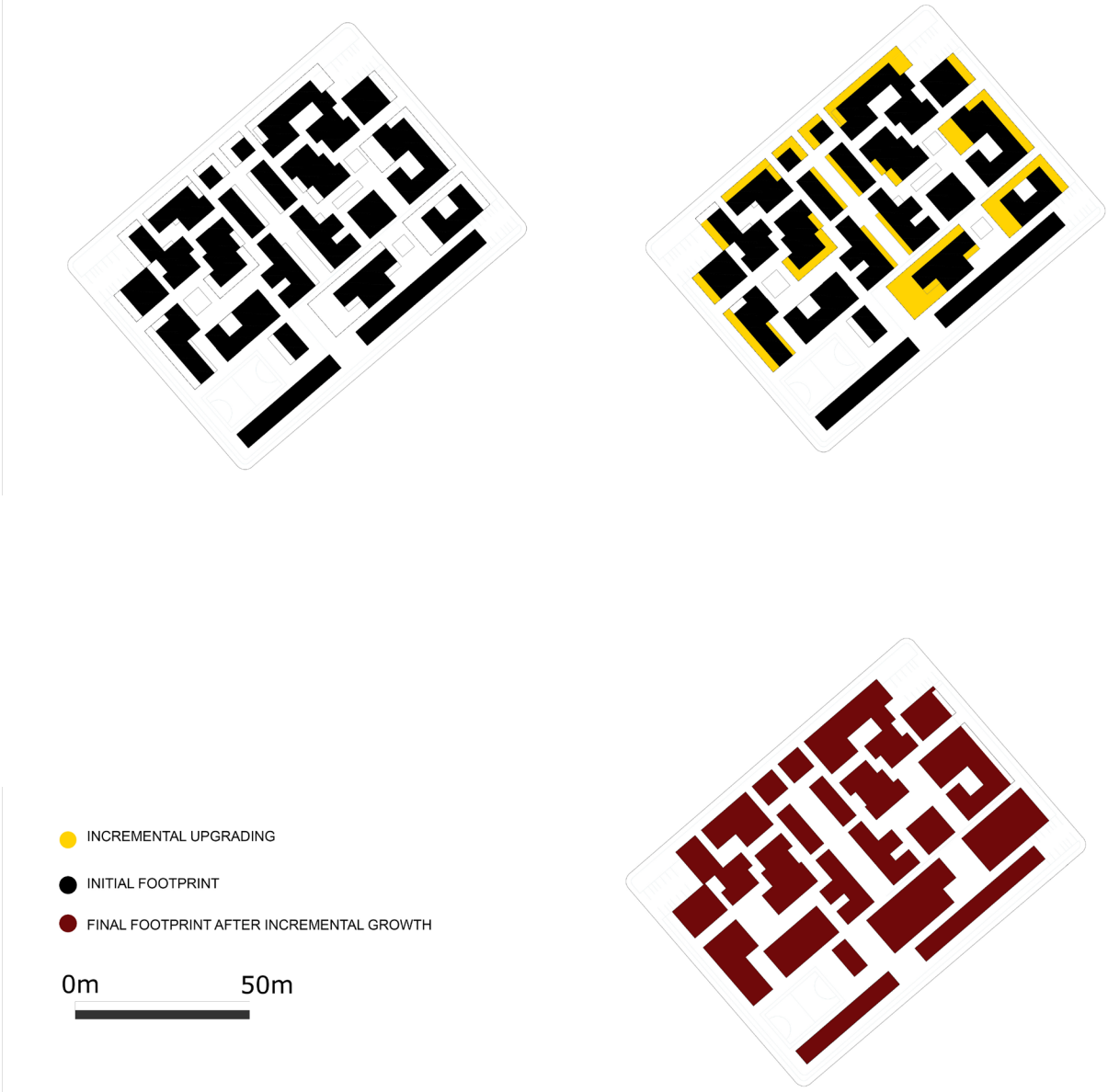


Figure 137: Cluster Compostion in Low Density Neighborhood
Source : Authors Map

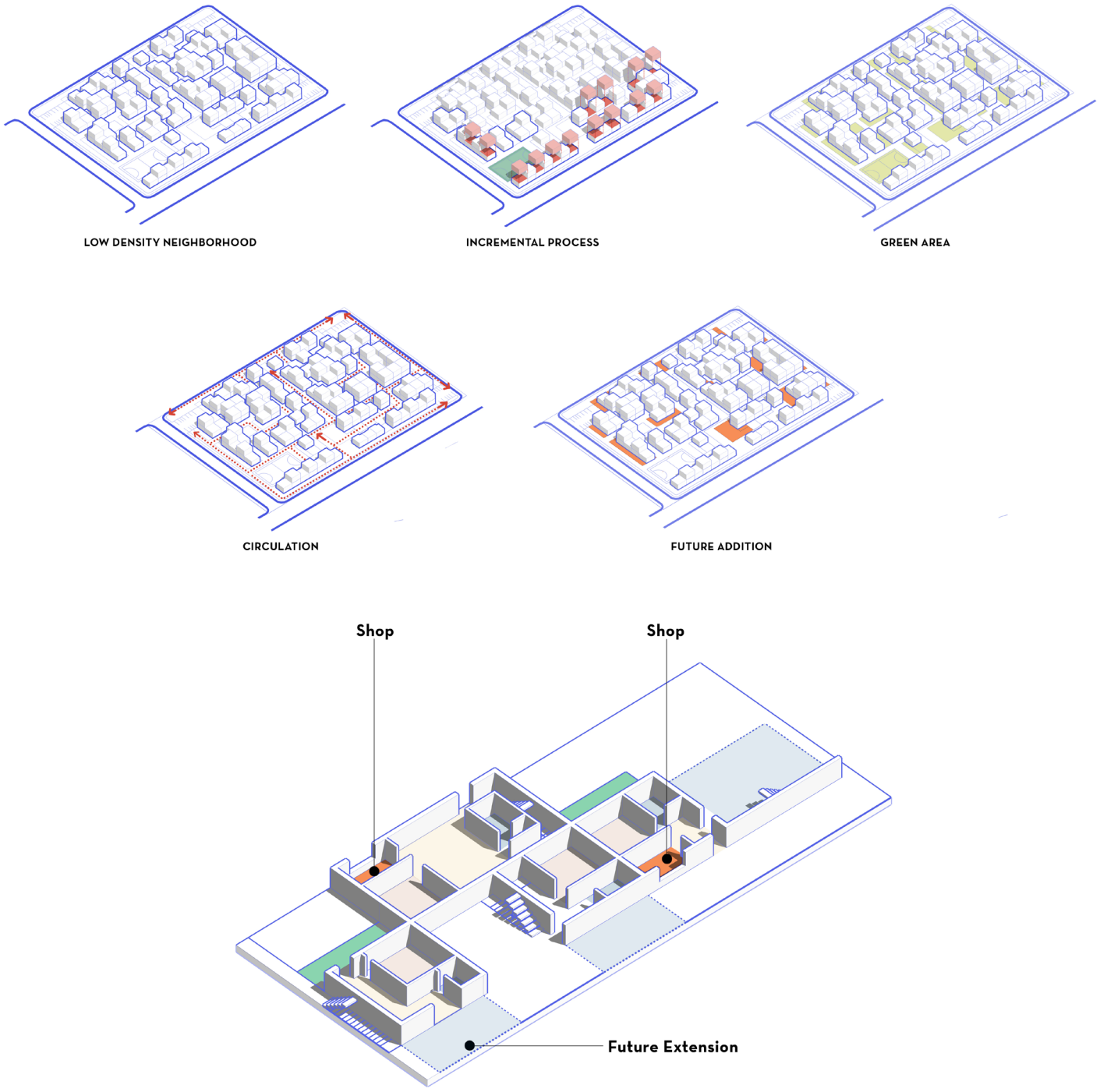


Figure 138: Cluster Details
Source : Authors Map

5.7 ILLUSTRATED GRAPHICS OF INTERVENTIONS

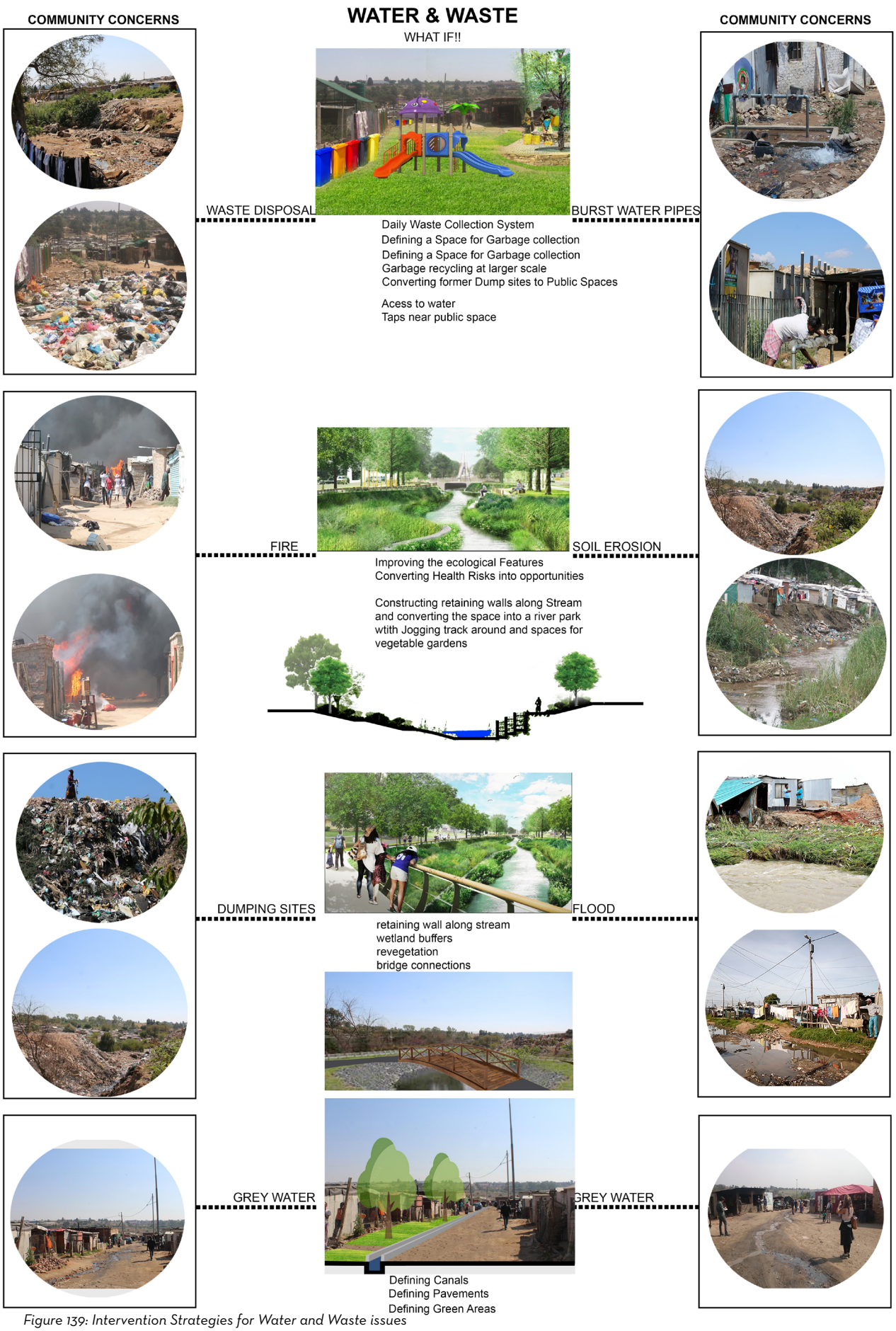


Figure 139: Intervention Strategies for Water and Waste issues
Source : By Author

5.8 ILLUSTRATED MAP OF INTERVENTIONS

TOTAL NO. OF NEW MIXED-USE RESIDENTIAL UNITS IN KYA SANDS INFORMAL SETTLEMENT	TOTAL AREA OF PROPOSED SITE FOR RELOCATION IN KYA SANDS INFORMAL SETTLEMENT	TOTAL COVERED AREA OF NEW HOUSING IN KYA SANDS INFORMAL SETTLEMENT	TOTAL COVERED AREA FOR MIXED USE IN KYA SANDS INFORMAL SETTLEMENT	TOTAL UNBUILT AREA ON PROPOSED SITE IN KYA SANDS INFORMAL SETTLEMENT	TOTAL UNBUILT A GROWTH IN KY
240/1020	**68890 sq-m out of 700136 sq-m**	**12500 sq-m**	**4900 sq-m**	**51490 sq-m**	
23.5%	**9.8%**	**18%**	**14%**	**74.7%**	

TOTAL NUMBER OF EXISTING SHACKS IN KYA SANDS INFORMAL SETTLEMENT	TOTAL NUMBER OF EXISTING COMMERCIAL/MIXED-USE SHACKS	TOTAL NUMBER OF REMOVED/RELOCATED SHACKS	TOTAL NUMBER OF CONFIGURED/ARRANGED SHACKS ON SITE	TOTAL NUMBER OF PROPOSED HOUSING UNITS ON NEW SITE
6449	**560**	**410**	**637**	**1020(TWO STOREYS)**
100%	**8.7%**	**6.4%**	**9.9%**	**15.8%**

TOTAL EXISTING AREA OF KYA SANDS INFORMAL SETTLEMENT	TOTAL COVERED/BUILT AREA OF KYA SANDS INFORMAL SETTLEMENT	TOTAL AREA OF UNBUILT SPACES IN KYA SANDS INFORMAL SETTLEMENT	TOTAL NUMBER OF PEOPLE IN KYA SANDS INFORMAL SETTLEMENT	
700136 sq-m	**457600 sq-m**	**242536 sq-m**	**34000**	
100%	**65.4%**	**34.6%**	**Number taken from last survey in 2015**	

Table 11: Statistics of Proposed Facilities and Landuse
Source : By Author

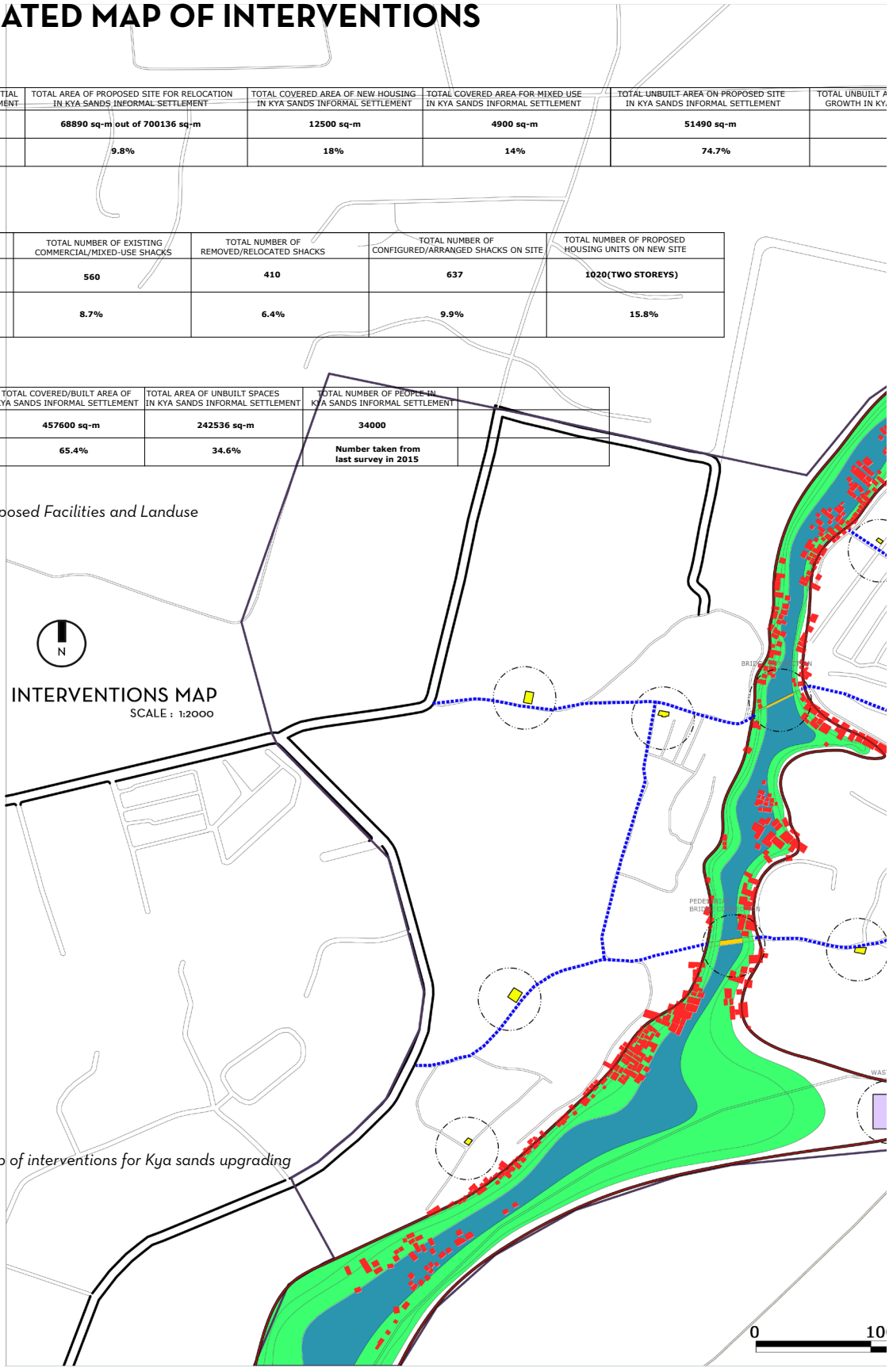
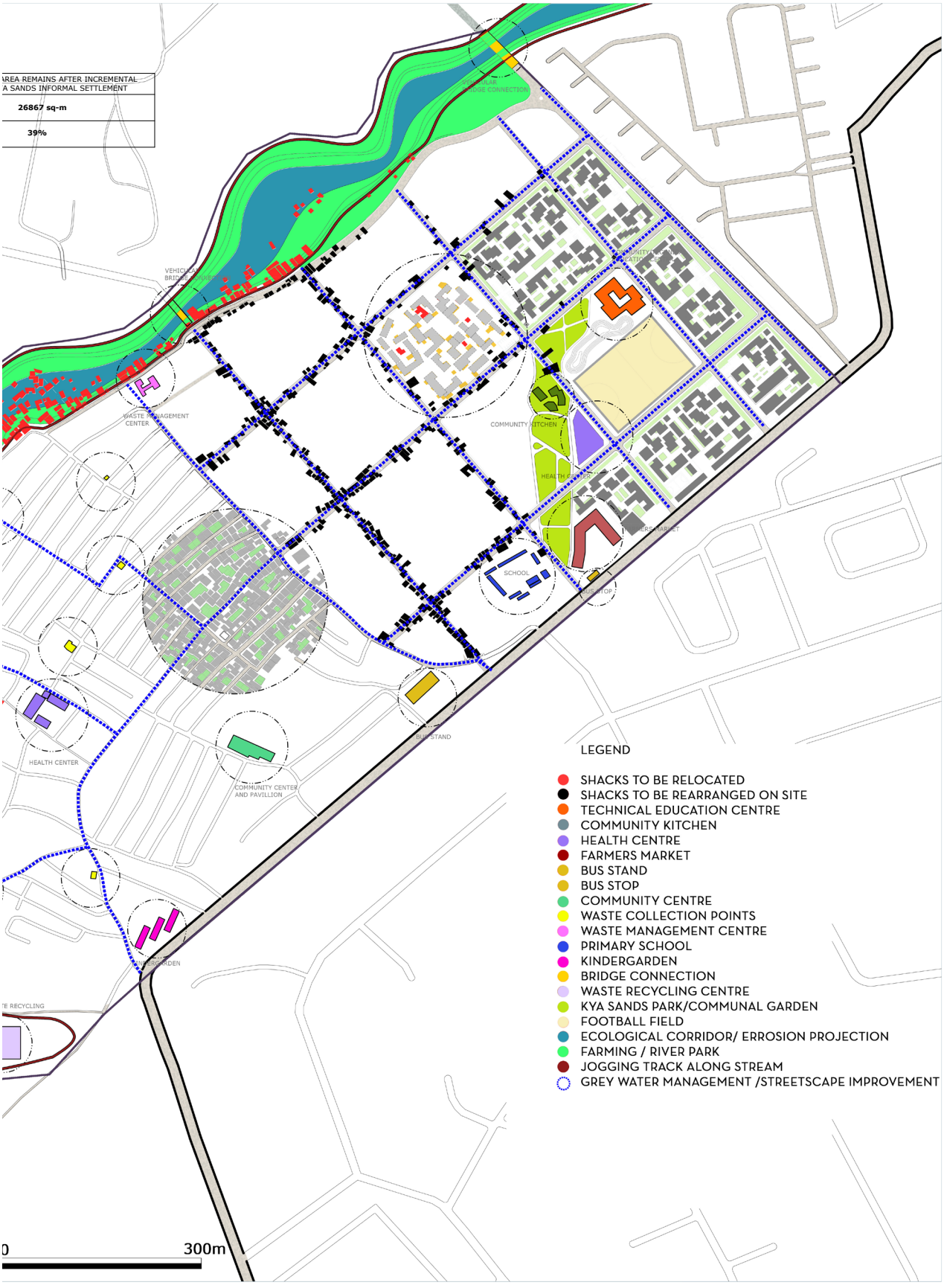


Figure 140: Illustrated Map of interventions for Kya sands upgrading
Source : Authors Map


REA REMAINS AFTER INCREMENTAL
A SANDS INFORMAL SETTLEMENT
26867 sq-m
39%
WASTE MANAGEMENT CENTER
COMMUNITY KITCHEN
SCHOOL
HEALTH CENTER
COMMUNITY CENTER AND PAVILLION
BUS STAND
LEGEND
SHACKS TO BE RELOCATED
SHACKS TO BE REARRANGED ON SITE
TECHNICAL EDUCATION CENTRE
COMMUNITY KITCHEN
HEALTH CENTRE
FARMERS MARKET
BUS STAND
BUS STOP
COMMUNITY CENTRE
WASTE COLLECTION POINTS
WASTE MANAGEMENT CENTRE
PRIMARY SCHOOL
KINDERGARDEN
BRIDGE CONNECTION
WASTE RECYCLING CENTRE
KYA SANDS PARK/COMMUNAL GARDEN
FOOTBALL FIELD
ECOLOGICAL CORRIDOR/ ERROSION PROJECTION
FARMING / RIVER PARK
JOGGING TRACK ALONG STREAM
GREY WATER MANAGEMENT /STREETSCAPE IMPROVEMENT
0
300m

5.9 MASTER PLAN

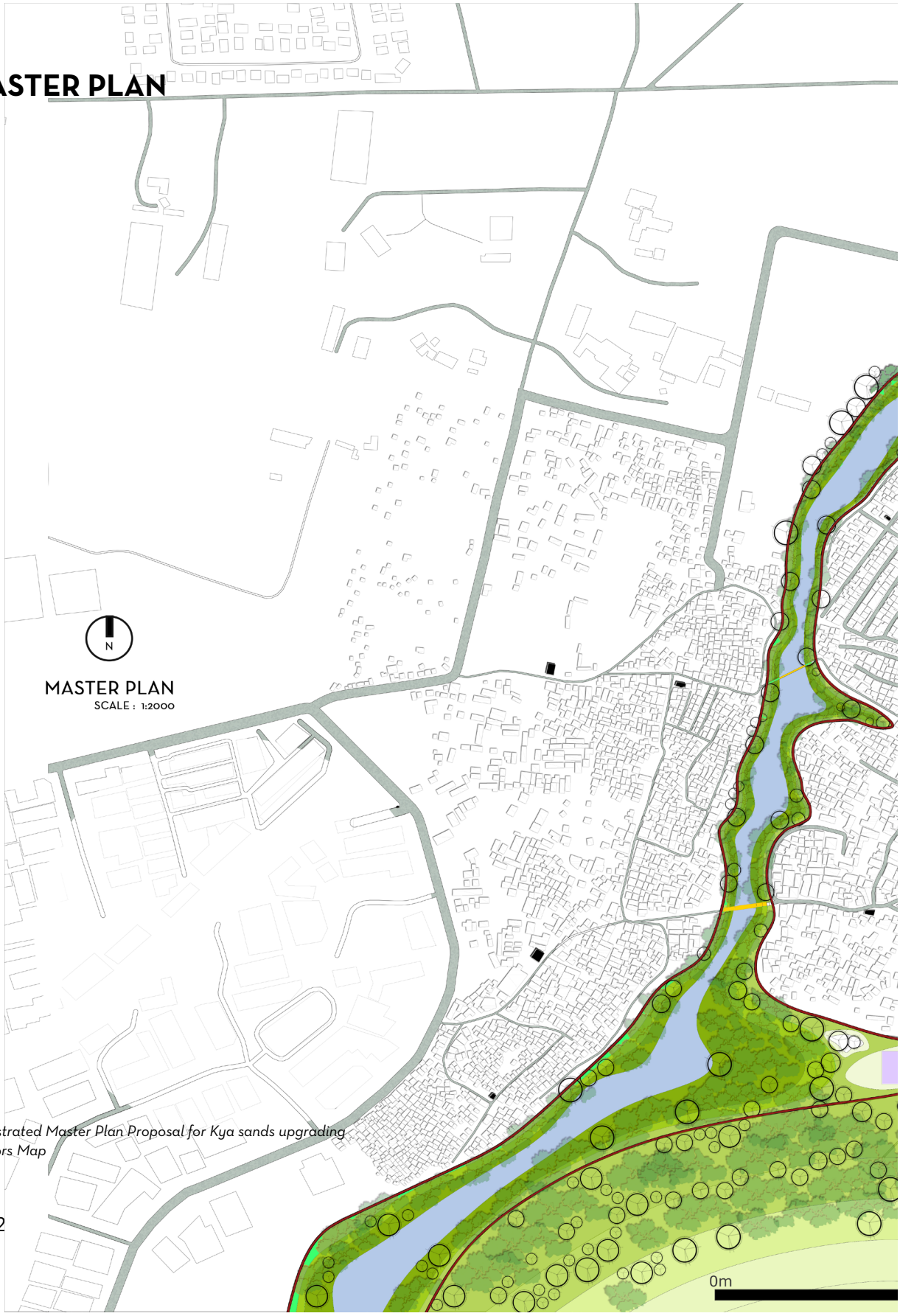
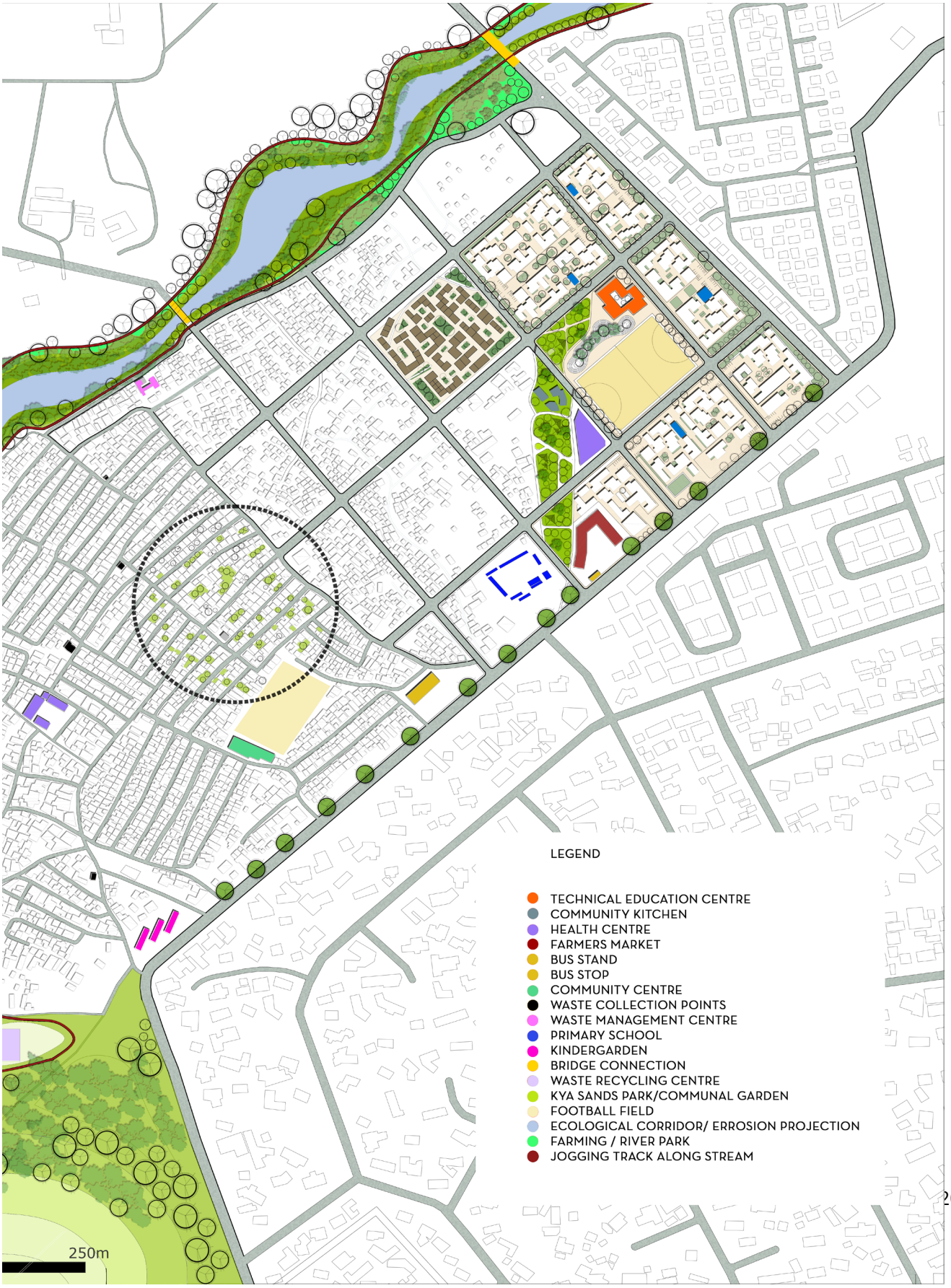


Figure 141: Illustrated Master Plan Proposal for Kya sands upgrading
Source : Authors Map


LEGEND
TECHNICAL EDUCATION CENTRE
COMMUNITY KITCHEN
HEALTH CENTRE
FARMERS MARKET
BUS STAND
BUS STOP
COMMUNITY CENTRE
WASTE COLLECTION POINTS
WASTE MANAGEMENT CENTRE
PRIMARY SCHOOL
KINDERGARDEN
BRIDGE CONNECTION
WASTE RECYCLING CENTRE
KYA SANDS PARK/COMMUNAL GARDEN
FOOTBALL FIELD
ECOLOGICAL CORRIDOR/ ERROSION PROJECTION
FARMING / RIVER PARK
JOGGING TRACK ALONG STREAM
250m

5.10 SECTION

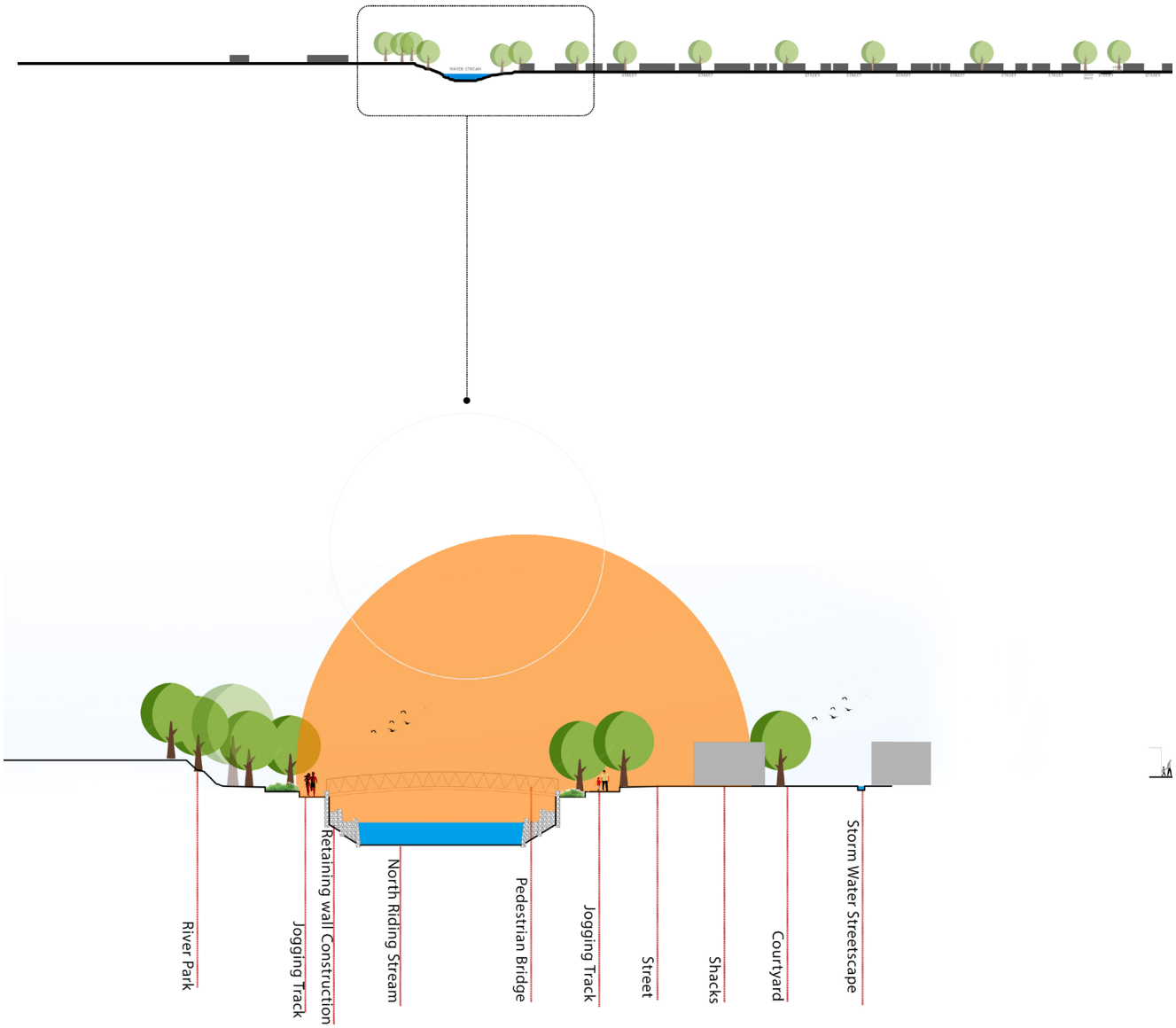
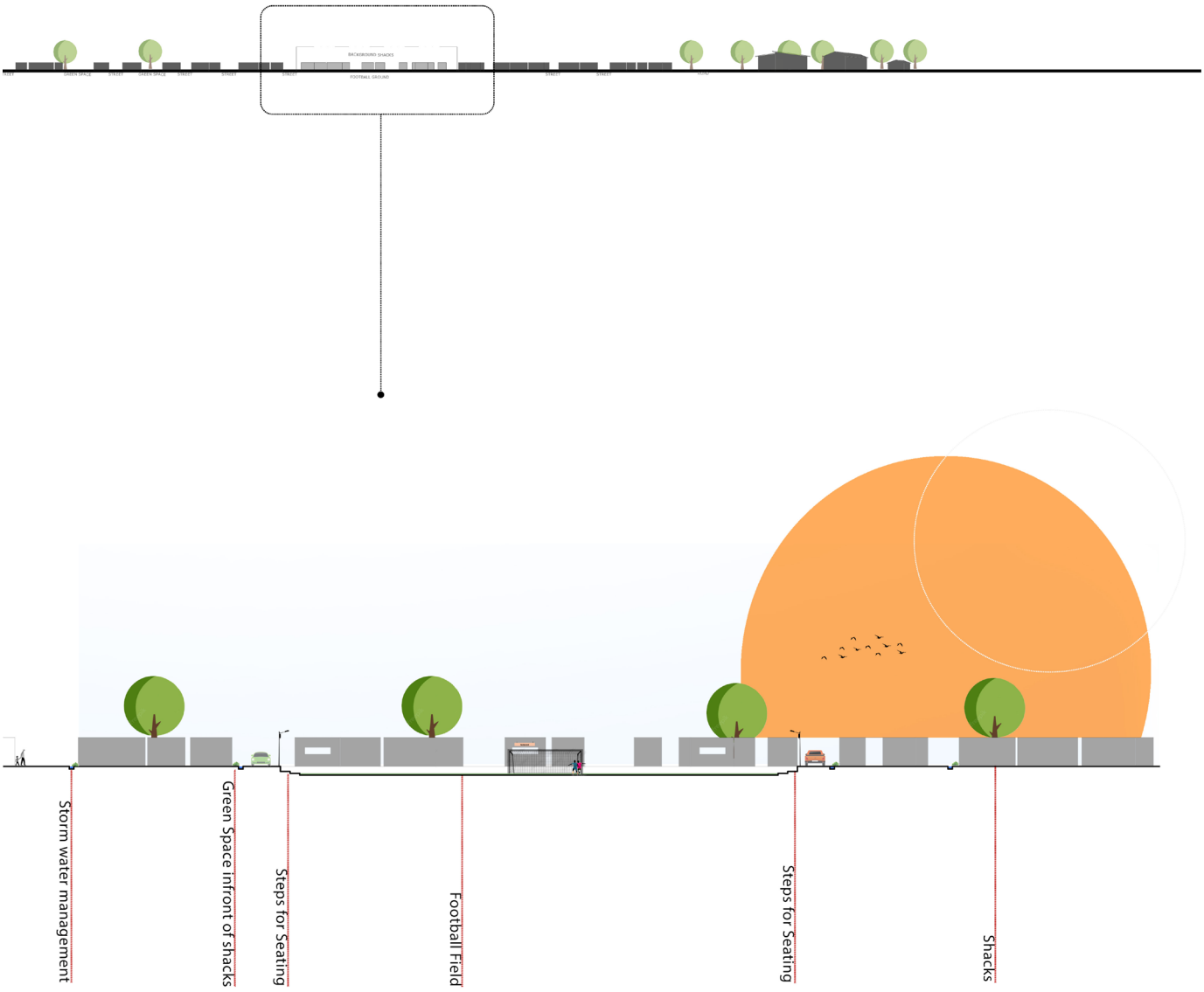


Figure 142: Illustrated Sections
Source : Authors Map


Storm water management
Green Space infront of shacks
Steps for Seating
Football Field
Steps for Seating
Shacks

5.11 MAJOR PROPOSED FACILITIES

Figure 143: Illustrate
Source : Authors Ma


EGENERATION
14 FARMING
1 COMMUNITY CENTRE/ STADIUM AND HIV/AIDS OUTREACH CENTRE
2 COMMUNITY KITCHEN
3 OPEN MARKET
4 PRIMARY SCHOOL
7 KINDERGARDEN
6 COMMUNITY CENTRE
5 BUS STAND AND WASTE RECYCLING
250m

5.12 COLLAGES OF PROPOSED INTERVENTIONS

Figure 144: Dumping Site - Before Intervention
Source : image taken from google earth

Figure 145: Dumping Site converted to a public space - After Intervention
Source : By Author

Figure 146: Storm Water situation Before Intervention
Source : image taken from google earth

Figure 147: Storm Water situation After Intervention
Source : By Author

Figure 148: River Dump site situation Before Intervention
Source : inproceedings{Adegun2016InformalSI, title={Informal settlement intervention and green infrastructure: exploring just sustainability in Kya Sands, Ruimsig and Cosmo city in Johannesburg}, author={Olumuyiwa Bayode Adegun}, year={2016}}

Figure 149: Converted River Park After Intervention
Source : By Author

Figure 150: No public space - Before Intervention
Source : image taken from google earth

Figure 151: Inserting Public Spaces -inviting neighborhood to connect- After Intervention
Source : By Author

Figure 152: Grey Water Situation - Before Intervention
Source : image taken from google earth

Figure 153: Grey water situation After Intervention - Improved Streetscape
Source : By Author

Figure 154: Bridge Cossing over North Riding Stream
Source : inproceedings{Adegun2016InformalSI, title={Informal settlement intervention and green infrastructure: exploring just sustainability in Kya Sands, Ruimsig and Cosmo city in Johannesburg}, author={Olumuyiwa Bayode Adegun}, year={2016}}

Figure 155: Ecological Upgrading, controlling soil erosion and improved connections
Source : By Author

Chapter 06
Conlcusion and Recommendations

6.1 THESIS CONCLUSION AND RECOMMENDATIONS

Sustainable upgrading of informal settlement as the objective of this thesis offered great opportunity for understanding challenges to informal settlements and provision of flexible and adaptable design strategies in those settlements. This thesis investigated the rapid urbanization happening in South Africa in general and specifically its impacts on informal settlements.

The issues related to urban informality and specifically to existing informal settlements were explored in the literature synthesis. Some adaptable and incremental design strategies and practices were highlighted in the relevant case studies. Within this theoretical framework, this thesis explored South African state and Gauteng's regional policies to upgrade informal settlements. Moreover, this thesis also covered United Nations' Planning and Design recommendations for transforming slums incrementally and sustainably.

One of the prominent problems of informal settlements was its rapid unplanned growth mostly over illegal land property which results in isolation from rest of Urban fabric and lack of urban services.

As per South African state intervention policies towards upgrading of informal settlements, priority should be given to in-situ upgrading and provision of social housing on site rather than relocating to distant locations. According to UN general policies, National urban policies should minimize displacement and proactively prepare land and infrastructure, rather than relocating informal settlements once they are built. While respecting both State and UN principles, Design strategies and some guidelines were proposed to cope with the fast-growing social housing problems along with some environmental issues in informal settlements.

Residents were vulnerable to health risks due to an existing water feature which was flowing between the two parts of the informal settlement. Being supportive to an ecological system it was transformed to be an opportunity offering landscapes for residents' various sports activities and agricultural farming. Looking at diverse urban density of our site, we proposed three strategies for high density, medium density, and for environmentally vulnerable shacks along the stream. For high density area we relocated some structurally instable shacks and shacks built in the way of planned streets and there we alternatively proposed green spaces with activities for children, a health care Centre, and Community Centre for public events. For medium density a strategy was adapted to rearrange the shacks

into patterned clusters to provide proper streets in connection with high density area. For vulnerable shacks along the stream, we proposed new housing units on empty available land to the North.

Mixed use residential units were proposed in order to improve their informal economy and incrementalism was planned horizontally and vertically for future development of the new residential model. While enabling participatory planning of the Kya Sands' community and discussing our illustrated preliminary design proposal with relevant stakeholders, we believe this project can be processed in further detailed way to get to a practical design project for Kya Sands informal settlement.

In summary, this project of sustainable upgrading of informal settlement can inspire and challenge new future developmental plans for informal settlements and it is achievable with the government subsidy, NGOs financial support and allocated UN funds for the development of informal settlements.

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