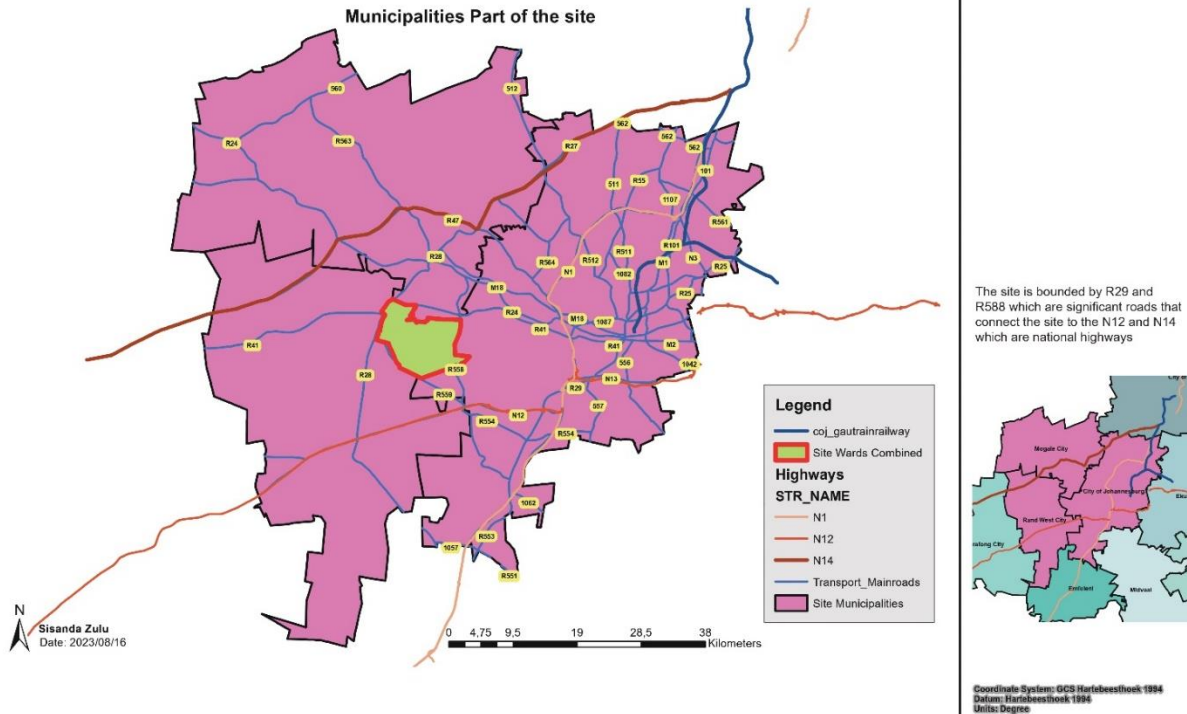


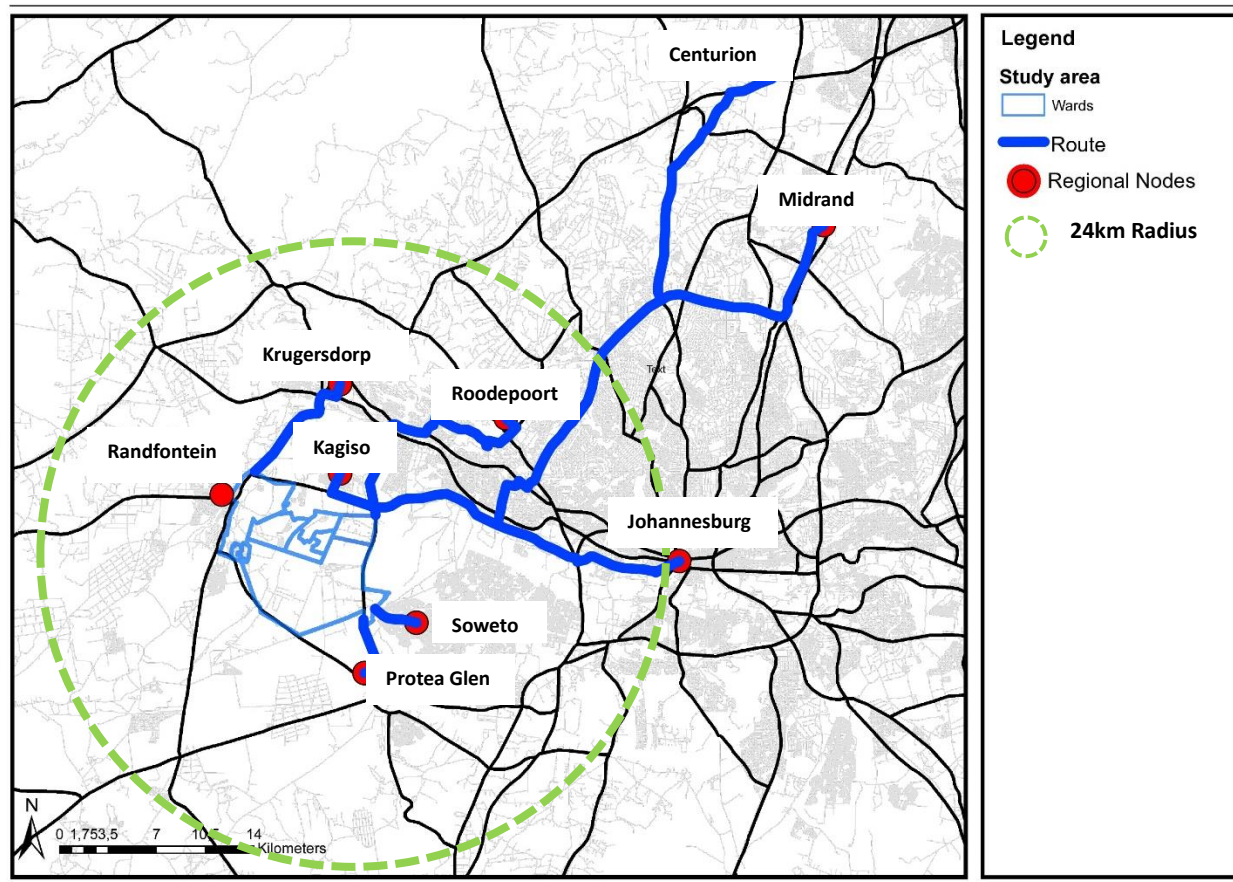
## Introduction



The main purpose of my Spatial Development Framework is to create a self-sustaining, environmentally resilient, progressive and economically prospering settlement. Given the context of our site being predominantly of mining use in the past, the impact the mines have had on the site has limited its prosperity significantly. From mine dumps that have formed mountains of sand dunes, to chemicals and other toxins mixing with natural bodies nearby, the mining has not made our site the most suitable place to live in or even conduct business in. The site is located in the Gauteng province and overlaps three municipalities namely, The City of Johannesburg (Ward 53, Ward 128), Mogale City Wards 1,2, 34,35) and Rand West City (Wards 8, 10, 20). Since these three municipalities perform differently in many respects from employment to migration, it means that even within our site we will observe different dynamics occurring at once.

The theme of human settlements and movement is pretty much concerned with where people are and where people often go. This forms the foundation for our research when trying to realise the causes of the trends and patterns of the movement and location of the people and ultimately the implications of them. In our Kagiso site, for the movement part of the theme, we must understand where people travel for economic opportunities, groceries, and other social amenities (Todes, 2011). In doing this we also had to look at the type of transportation available for the public at large, but also try and point out exactly where these modes of transportation can be accessed. Migration is also a critical factor when tracking movement trends, one of the themes' main objectives was to observe if people are moving into the area or not, and if so, look at the reasons and implications of that for the site (Kok and Cillionson, 2006). Simultaneously, while you are observing where people are going, you want to look at where they are currently which involves scrutinising human settlements.

Human settlements tie in very well with movement because if you assess the standard of living in a settlement, in correlation to the migration in the area you might find that because it is cheaper to live in Kagiso people who cannot afford much prefer the area. In trying to understand human settlements you also must be cognizant of the different types of settlement; this is significant when trying to gauge the type of people there in terms of income class or types of employment that might be prevalent in the area (Turok, 2012). However, educated/calculated guesses cannot be made from one aspect. The human settlement aspect of the theme considers the typologies that exist including the pricing of dwellings/houses on and around the site. Lastly, when human settlements are made up of different densities both from the population(density) and dwelling units(density), in correlation to this theme looks at the amenities available and their proximity to the settlements and the implication of these dynamics.



### Method and sources

Most of the statistical data like population numbers, number of households and average household income were collected for our site from StatsSA, Wazimaps and Quantec Easy Data. For some data like settlement facilities and their threshold capacity, we consulted the CSIR Guidelines for the Provision of Social Facilities in South Africa, 2015. Traffic flow and direction data on routes were acquired on Google Maps by utilizing the traffic feature which shows you at any given time how intense and how quickly is traffic flowing on routes around our site. Additional information was first-hand information gathered through interviews and conversations with different individuals around the site.

**Main Indicators:**

- **Settlement types** are a baseline indicator that describes the present situation on the site. This indicator is focused on deducing better-performing settlements by simply identifying the type it is. From this we are also able to identify areas of need, if you have an informal settlement, you are aware at an instance that there are necessities they do not have, or they are not even recognised by the local municipality as a settlement which is the case on the site.
- **Income levels and consumption** is an objective indicator that allows us to represent facts independently of personal evaluations. This indicator allows us to gauge the level of affordability in settlements, from this, you get a glimpse into factors like people spending most of their money trying to get to work rather than other needs which can be translated to the type of settlement they reside in which was the case on some parts of the site.
- **The Gini coefficient** is an indicator used to measure the distribution of wealth. As previously mentioned, our site falls under 3 different municipalities which means there will be different earning margins between the populations if employed in the different municipalities. This would prove significant when trying to decide which land uses should be placed on which part of the site.
- **Population growth rate** helps us observe which places are growing, at times this can be related to something happening in that area like an employment boom or a newfound hub of opportunities in that area. This comes with implications for our settlements because growth requires expansions of facilities for functional settlements.
- **Access** looks at a range of things including access to public transport, social facilities and economic nodes which informs the movement on the site, if there is limited access to social amenities for instance it means people must travel long distances outside of the site to access them which was the case on our site.
- **Travel time & Transit Nodes** This indicator looks at where people are going and how they are getting there, this way we are able to see why people leave the site to frequent other areas which further backs the element of access. The most common mode of public transportation is the minibus taxi, which transports people from our site to local nodes (Kagiso, Krugersdorp) and regional nodes (Johannesburg).
- **Housing Typology** The township settlements are predominantly single dwelling units and they residents utilize their own personal space to establish a primary/secondary source of income through backyard rentals, retail and selling livestock.

## ANALYSIS AND FINDINGS

### Population Data:

The population near Kagiso has experienced significant growth over the past decade. In 2011, the population stood at 146,900, with a housing backlog of 14,388. By 2023, the population had increased to 177,934, along with a housing backlog of 17,428. Projections for 2050 indicate a further increase to 273,869 people, with a housing backlog of 26,824. This rapid population growth underscores the urgent need for housing and infrastructure development in the area.

### Weighted Average

1.61%

Popn2011	Popn2023	Popn2050
146900	177934	273869

Households	2011	2023	2050
	47649	57715	88833

Average Household	2011	2023	2050
	3.0830	3.0830	3.0830

Backlog	2011	2023	2050
	14388	17428	26824

### Employment Opportunities and the Mining Industry:

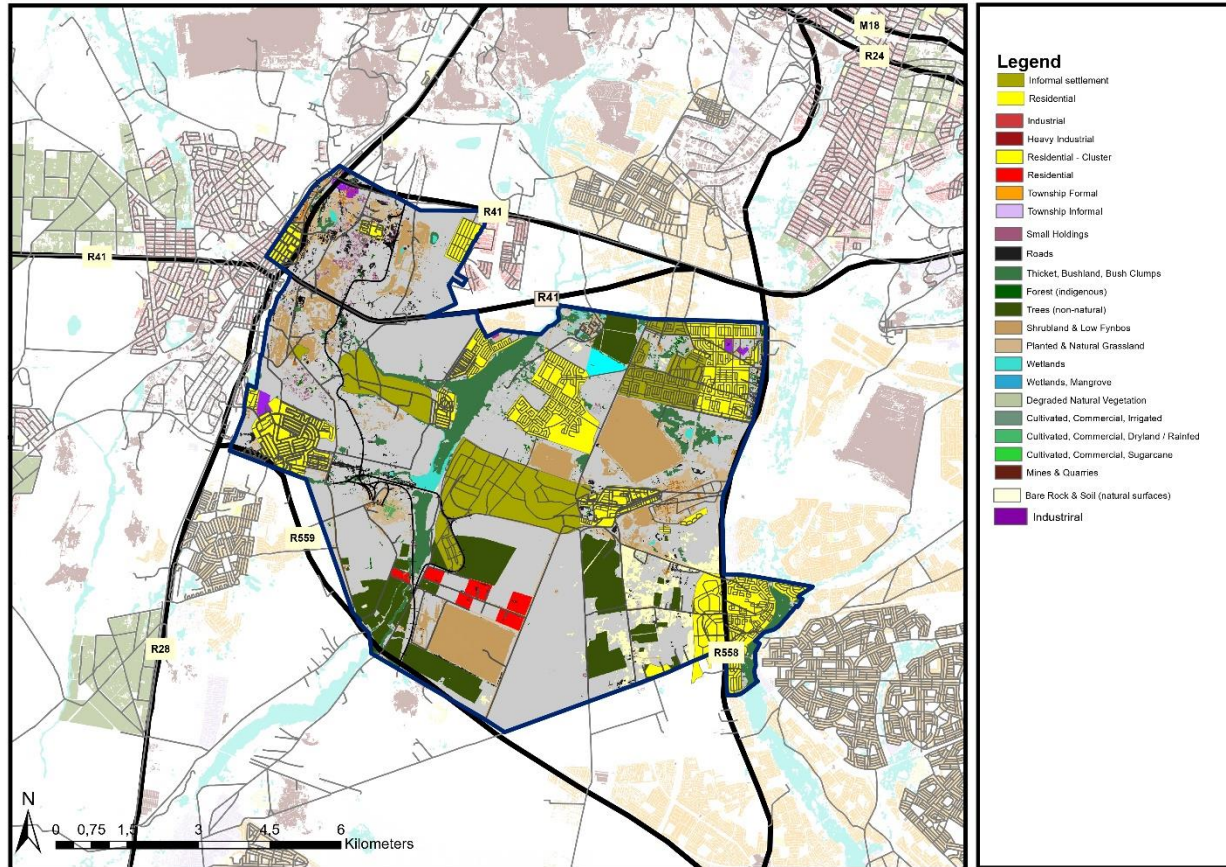
The site lacks sufficient employment opportunities, which has created a heavy reliance on neighbouring economic nodes like Randfontein, Krugersdorp and Roodepoort for goods, services, and employment. The mining industry, once a significant source of employment, has dwindled and caused environmental damage. Contaminated water and mine dump erosion are major environmental concerns. Rejuvenating the mining industry and diversifying the local economy are crucial for sustainable development.

### Informal Settlements and Service Delivery Challenges:

Informal settlements are emerging in and around the site, exacerbating service delivery issues. A settlement called 'Lockdown' emerged after 2020 when people lost their jobs due to the COVID-19 pandemic and the municipality is aware of their existence, but they are reluctant to formalize the settlement because of low population numbers. There is a critical concern over the provision of water in these informal settlements. Many residents have resorted to utilizing water from a nearby wetland due to the lack of a formal water supply.

### Settlement types and green spaces



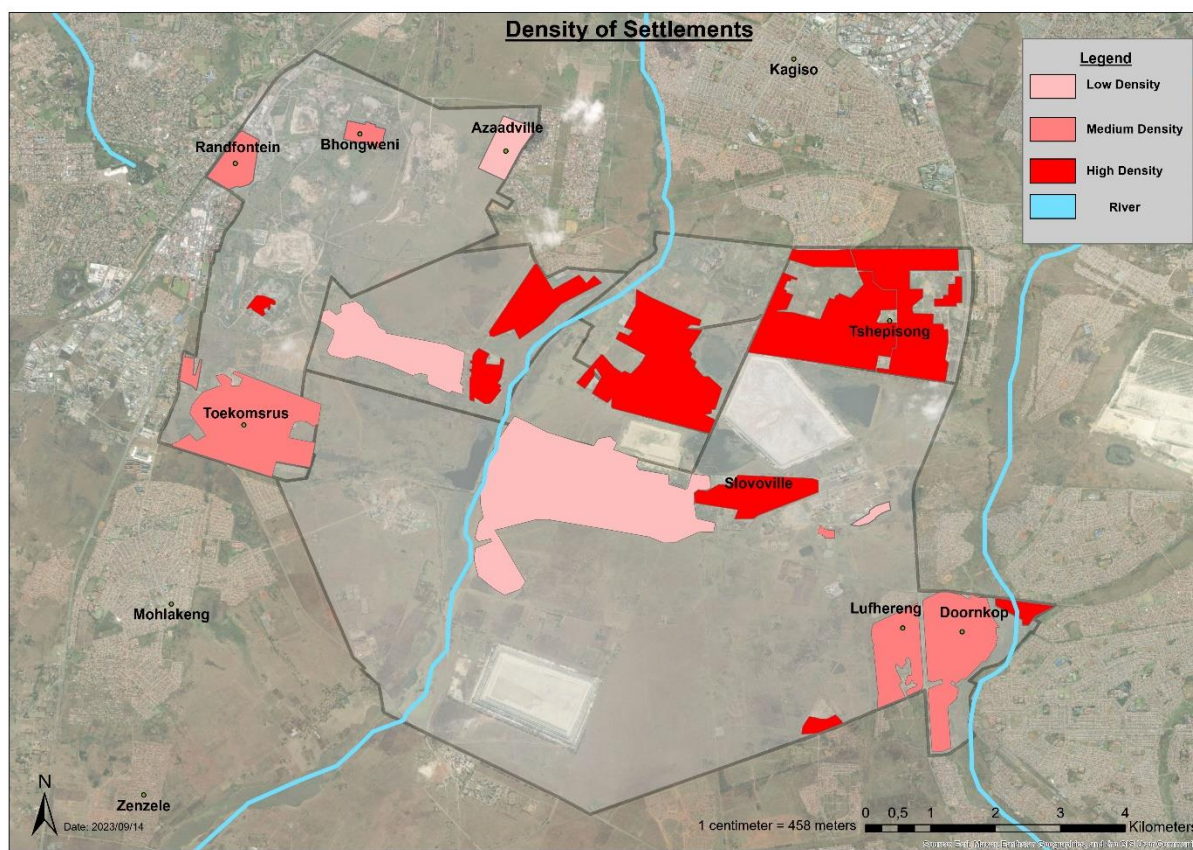


### Public Transportation Infrastructure:

The lack of a comprehensive public transportation system in some parts of the site. The absence of efficient public transportation hinders accessibility to employment centres and essential services, leading to increased individual transportation costs.

### Density Variation:

The site exhibits variations in housing density relative to the sizes of the settlements. Key settlements include Tshepisoeng, a high-density area covering 407 hectares; Toekomsrus, a low-density area spanning 223 hectares; Slovoville, a medium-density region across 80 hectares; and Lufhereng, another medium-density area covering 270 hectares. This has also shown that there is a disparity in the housing market on the site, the higher the density of the settlement the cheaper a dwelling unit is going to be and vice versa.



Low density 0 – 40units/ha

Medium density 40 – 100units/ha

High Density >100units/ha

**Key Issues/Trends****TAXIS**

Within our site, there seems to be a lack of variety in public transportation with minibus taxis being the dominant mode used. There is no taxi rank or station within the site, people rely on getting closer to busier streets that taxis frequent. From an interview we conducted with a resident employed in Krugersdorp we got a sense that if you are living in the core of the site, you are at a disadvantage, the resident explained how her company arranged transportation for her because minibus taxis were not as reliable in her location. If the site gradually increases in population numbers, public transportation might be reliable since it caters for a bigger population and guarantees profitability. As the site develops there can also be a need for different modes of transportation like buses and meter taxis.

**LAND USES**

The site is predominantly for residential use and what is easily observable even in firsthand interviews is that people must travel to places like Krugersdorp, Johannesburg, and Roodepoort for economic opportunities. There is also a trend of backyarding occurring on the site where you have people making additional sources of income by renting out backrooms in their homes. Since the site had a lot of mining activity in the past, the mine dumps left behind negatively affected the immediate site. On windy days soil particles from the mine dumps are blown away towards residential settlements, water bodies and neighbouring empty land. This limits the growth and introduction of new land uses which can unlock opportunities for the site, clearing, flattening, or adding agricultural elements on the mine dumps to reduce wind erosion for a safer and economically viable site.

**SOCIAL AMENITIES**

As it stands, the site does not have adequate amenities like clinics, sports facilities, community centres and schools (to name a few) to accommodate the existing population, their capacity is over the threshold making them unsustainable. Even though some of these amenities can be accessed in some settlements close by, there is a significant need to provide more of them if populations are expected to increase.

**ENVIRONMENTAL CONCERNS**

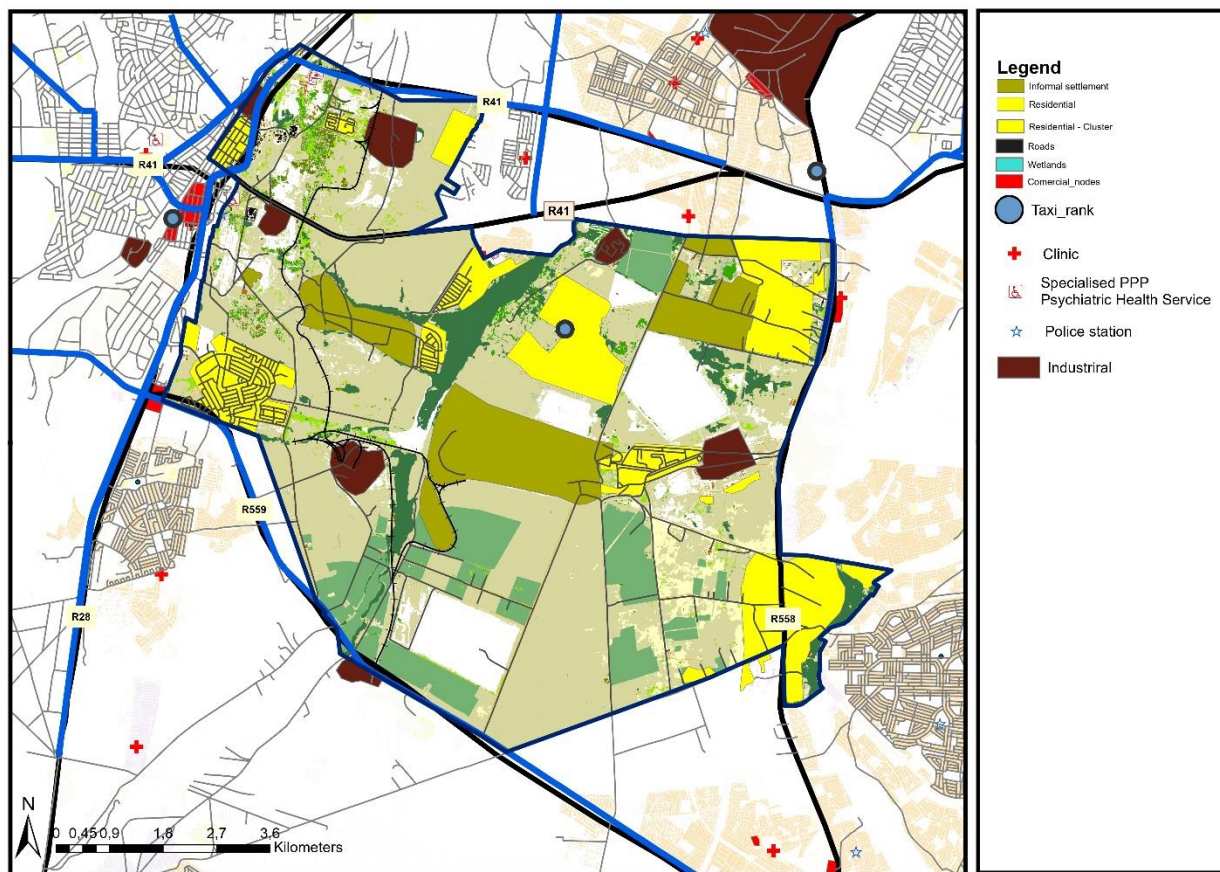
The site is also going through some landscape changes, with the existing water bodies on the site having been getting bigger and bigger over the years and starting to creep into residential spaces. This has even meant that certain families have to be relocated to other areas due to floods occurring. The mine dumps found on the site also pose a threat to the health and safety of residents.

**DISPARITIES IN PROPERTY VALUES**

It is clear that within the different settlements, there is a difference when it comes to the housing market. Toekomsrus which is a fairly new development on the West has houses worth  $\pm 3x$  those of Tshepisoong with Lufhereng and Doornkop being so what the middle ground of the market. Depending on the type of development that might dominate the site in the near future, property values will play a key role in deciding where the new development will be located on the site. This also relates to the different settlement densities you find in different settlements.



## Industries and Important Services



### Future Population and Settlement Growth

weighted average 1.61%			Households		Backlog			Percentage	For Expansion Area
Municipality	Ward		2011	2050	2011	2023	2050		
COJ	53	11370			262	317	488	1.82	484,44ha
COJ	128	15791			8400	10175	15660	58.38	
			27161	50443					
Mogale City	1	2897			1068	1294	1991	7.42	259,12ha
Mogale City	2	2641			1018	1233	1898	7.08	
Mogale City	34	4889			1605	1944	2992	11.16	
Mogale City	35	3796			941	1140	1754	6.54	
			14223	26755					
Rand West	8	2780			142	172	265	0.99	61,19ha
Rand West	10	1415			351	425	654	2.44	
Rand West	20	2070			601	728	1120	4.18	
			6265	11635					
			47649	88833	14388	17428	26824	100.00	804,75ha

### Infrastructure and Services:

The rapid increase in the number of households in these areas necessitates a significant investment in infrastructure, including roads, water supply, sanitation, healthcare facilities, and educational institutions. Limited economic activities and services are currently present on the site, which further underlines the importance of providing these essential services and necessities to accommodate the expansion.

### Land Use Planning:

Proper land use planning is essential to ensure that the expansion of settlements is well-organized, minimizing congestion and ensuring efficient land utilization. This will also involve zoning for commercial and industrial areas to encourage economic development and to bring balance to the land uses found on the site.

### Transportation:

The growth in population will increase the demand for public transportation, necessitating the development of public transit systems that promote accessibility and efficiency.

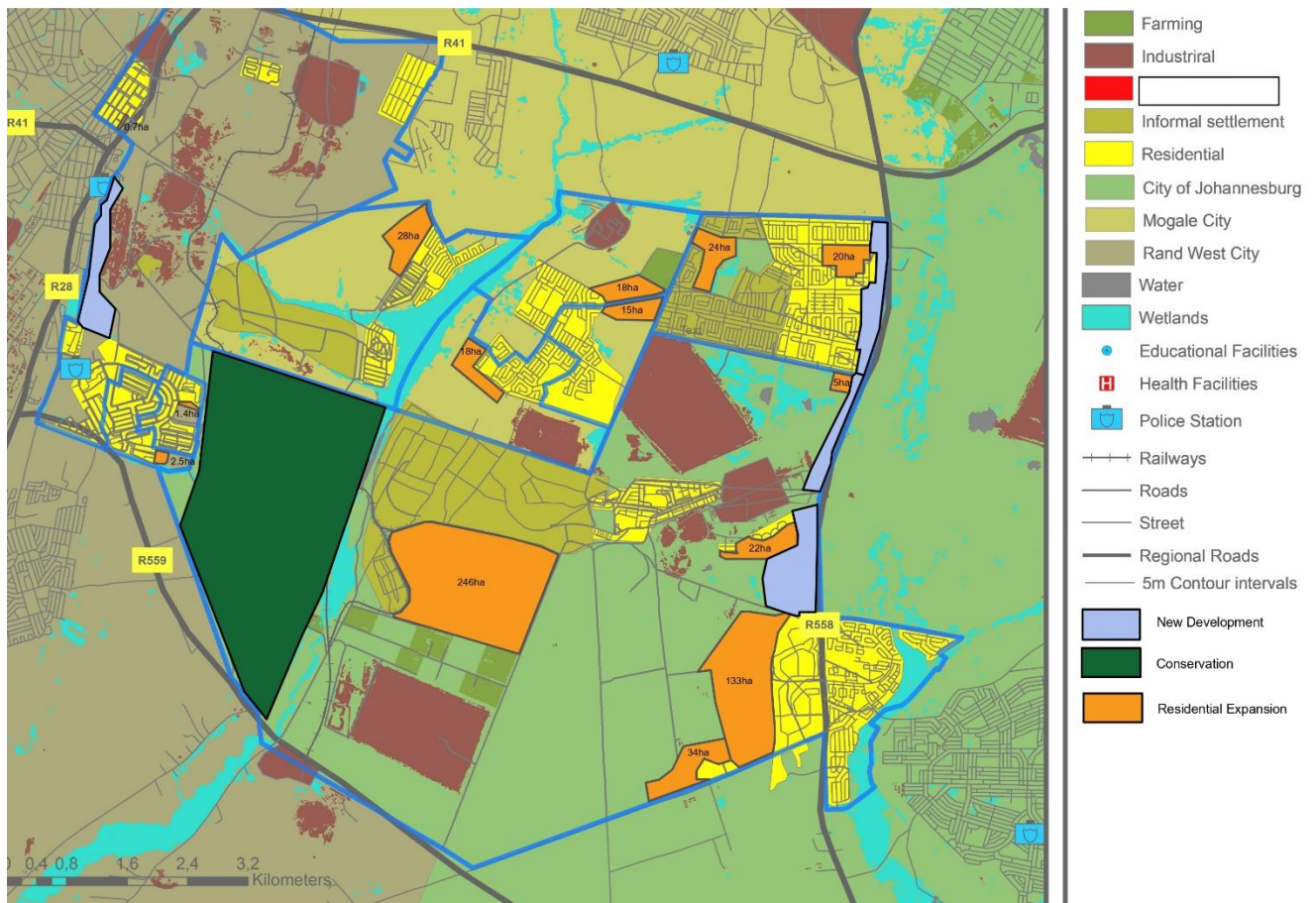
### Sustainability:

Ensure that settlement expansion is carried out sustainably, with attention to environmental considerations, such as green spaces, water conservation, and energy efficiency and accommodate for further expansion after the year 2050.

### Different expansion rates:

The site is formed by wards of different from different municipalities which means they vary in terms of opportunities and other socio-economic prospects which will directly affect the expansion of the different wards of the site. A settlement like Lufhereng can be expected to expand by 167 hectares because it is already the biggest settlement in its ward which means it is a preferred settlement. This expansion will lead to a growing population and an increased need for various amenities and services, including schools, healthcare facilities, and public spaces. A settlement like Toekomsrus can be expected to expand by 3.9ha which is way smaller when compared to settlements of the COJ, since there is also a variation in prices you can expect slower residential expansion on the western part of the site in general.

## Settlement expansion on the site



## **2050 VISION**

The main vision for the area is to create a self-sustaining, environmentally resilient, progressive and economically prospering settlement. This vision will result in a sustainable settlement as it touches on the environmental, social and economic aspects of settlements.

**Environmental rehabilitation** should be the first step taken when trying to change the spatial landscape of the site. The mine dumps are the biggest standouts that should be dealt with because they are a threat to the people and economic opportunities. This can be done by vegetating them to reduce erosion during windy weather conditions or clearing them at once if funding permits. **Settlement relocation** for certain residents living near water bodies is required due to the expansions that have been happening. There have to be clear demarcations of where the flood line starts and ends in order to try and prevent people from developing on vulnerable land.

**Economic diversification** is the next stepping stone towards the economic prosperity of the site. This can occur from more small businesses (retail/ services), industries (light industries, manufacturing) and medium enterprises setting up shop on the site. The R558 presents a great opportunity for this expansion to take place because it will provide businesses with maximum exposure while also being located near residential settlements with big populations. The R559 is also an ideal edge for economic diversification because the western is already developed with places like Randfontein having the bulk of economic activities.

**Community Development** that also contributes to a better quality of life in general must be taken into consideration, these include improving the quality and access to health facilities, educational institutions and other social developments that are a challenge to the communities at the present moment. This aspect is largely critical because you already have these well-established settlements like Tshepiso which do not have adequate social facilities to maintain them for a long time. **Informal settlement upgrading and formalization** should occur in the area, this is important to ensure that there are no parts of our site lagging behind on anything as the rest of it moves forward. Formalizing informal settlements such as 'Lockdown' and providing proper infrastructure will also improve their ease of access services seeing as how they are struggling to access necessities like water at the present moment.

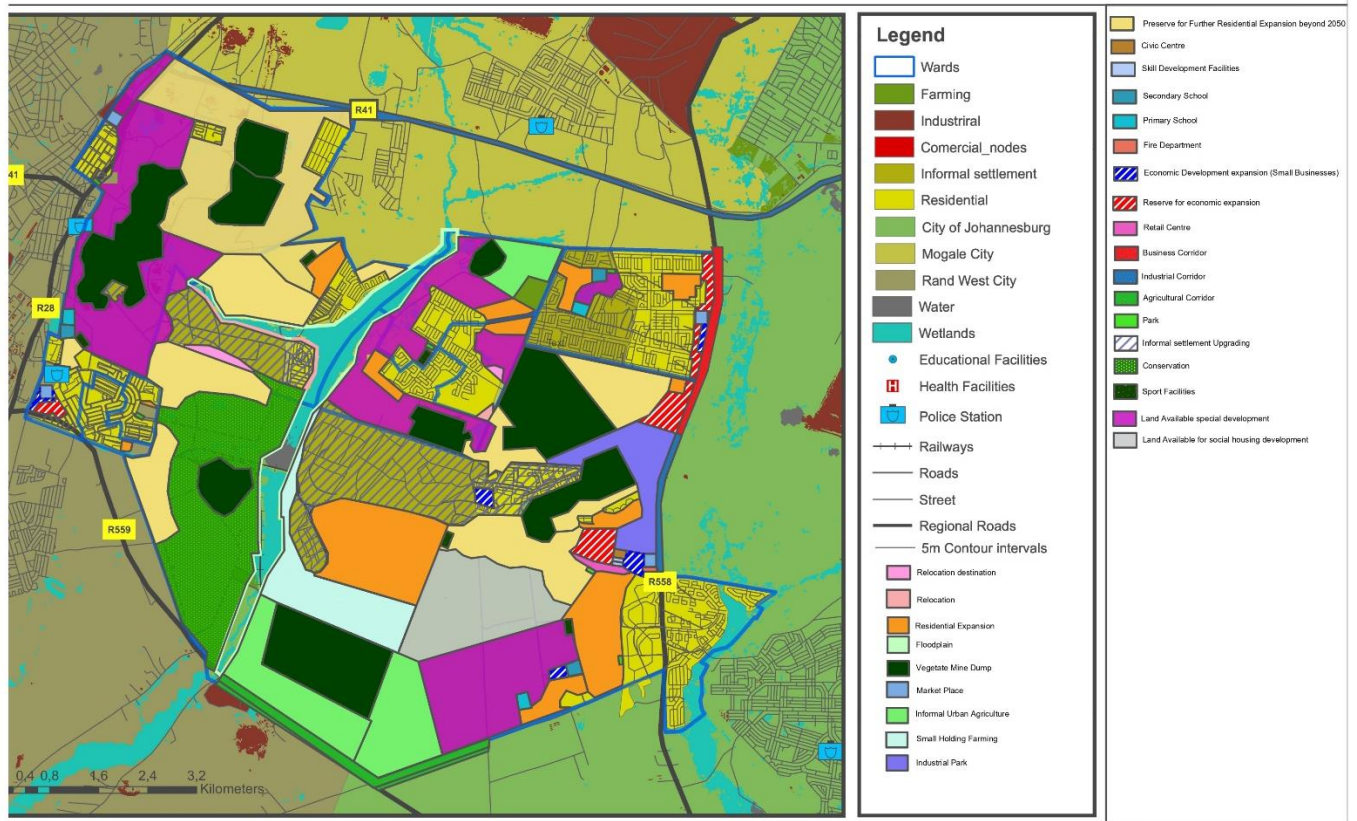
At the south of our site, there is some **Agricultural activity** (small holding) taking place which is a huge contrast to what the site was previously known for. This presents a unique opportunity to use some part of the south for different agricultural activities (poultry farming, livestock farming and crop produce resilient to the environmental conditions) which will create a lot of employment opportunities but also provide the residents of our site the luxury to purchase agricultural produce cheaply. The presence of a river and wetlands on our site makes this a viable idea. **Manufacturing** is also a viable use that can come into the site, considering the site is not too far from Chamdor Industries north of Kagiso which produces fabrics, and it is also not too far from Johannesburg and other business districts where industries prefer to locate. Factors like cheap labour for under-skilled populations would also draw all these different industries in.

To ensure that our **settlements progresses** and keeps up with the rest of the world, there have to be educational facilities that offer the skills required to survive the 4<sup>th</sup> industrial revolution. These facilities can supply a range of skills from coding, software engineering, cyber security or the field of sciences which can open a gateway towards groundbreaking discoveries. If these facilities are able to produce



individuals with these high-end skills, they can be exported to other parts of the country or even to neighbouring countries that are in desperate need of these skills. In these current times, our environments have been experiencing a lot of natural disasters and we observed time and time again that our response teams are not as effective as one might anticipate. For us to have a **resilient** site there has to be a lot of effort put into creating response facilities like fire departments and natural disaster response teams on the site to try and curve inefficiency when real-world disasters occur.

## SDF



Residential expansion naturally occurs as the population grows, urbanisation advances, and economic development flourishes. An essential approach to this expansion involves thoughtful planning and a dedicated focus on rehabilitating the environment to create sustainable settlements which is what I have attempted to do with this SDF. The mine dumps have been vegetated to reduce their impact on the development around them. There is also a clear floodplain demarcation (30m wide) around the wetland to prevent development from happening nearby which will result in some residential relocations taking place. The Southeast of the site has a conservation area (550ha) which is the greenest part of the site and can be developed into an active green space in the future.

In the south of the SDF, there is a provision of informal urban agriculture which includes grazing, kraal facilities and poultry farming, 330ha was provided for this use and is in the south because of the proximity to the wetland and the R559. Economically viable settlements are those that not only meet the immediate needs of their residents but also create long-term economic sustainability. This is the reason for the provision of space for small businesses to locate and provide additional space for the projected growth of these businesses on different parts of the site.

The provision of the civic centre (2.5ha) and the fire department facilities ensures that the people are closer to emergency response teams, and they can request or file complaints about services without having to travel long distances. The retail centre(10.2ha) is also meant to bring necessities closer to the people rather than have them travel to Kagiso or Krugersdorp to

purchase them. The provision of the industrial park(132ha) is meant to diversify the site's economy and bring about mass employment for the residents living in the nearby settlements. The location of the industrial park is also strategic because it will have full exposure and be easily accessible from the R559 which connects to the R41 which is an industrial corridor which connects to Johannesburg and other industries along the way. The skill development centres (0,4ha) are meant to provide the youth with relevant skills of our time like coding, and software engineering which can be exported to other parts of the country and other neighbouring countries.

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