

City of Johannesburg Metropolitan Municipality

Spatial Development Framework Review Draft 2015/16

In collaboration with: Iyer Urban Design; UN Habitat; Urban Morphology and Complex Systems Institute and the French Development Agency

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1. Foreword

To follow.

2. Executive Summary

2.1. Existing spatial structure of Johannesburg and its shortcomings

Spatial inequality remains a defining characteristic of the settlement pattern of Johannesburg. The location and concentration of jobs does not match that of where people live. This job-housing mismatch significantly contributes to inequality in the city as- for many residents- access to economic opportunities is stifled by costly and distant commuting.

Some of the highest densities of housing, the 'townships' inherited from apartheid spatial policies, are also some of the most deprived areas in the city, located far from areas of economic opportunity. There are also two major spatial discontinuities in the city structure that are barriers to opportunity: the mining belt, which has become a symbol of north-south segregation, and the vacant tracts of undeveloped land in the north east of the city (Glen Austin/Austin View, Modderfontein and Frankenwald) that form a spatial divide between the City of Johannesburg and its neighbour, Ekurhuleni.

Post-apartheid housing delivery has arguably exacerbated apartheid spatial development patterns, by building housing in areas far from economic activity, with the availability of land being the primary logic behind their location. The private sector, through car-oriented developments (for example malls and gated residential estates and office parks) has further aggravated spatial segregation. Continuing to meet development demand in this manner not only exacerbates existing socio-economic disparities and spatial inequality in the city, but also places significant pressure on the natural environment and reduces the efficiency and increases the cost of infrastructure provision.

The Spatial Development Framework thus seeks to address five major issues in Johannesburg's spatial and social landscape:

- **spatial inequalities and the job-housing mismatch,**
- **urban sprawl and fragmentation,**
- **exclusion and disconnection emanating from buffer areas (the mining belt and Modderfontein), securitisation and gated developments, and disconnected street networks (high cul-de-sac ratios and low intersection densities),**
- **inefficient residential densities and land use diversity,**
- **increasing pressure on the natural environment and green infrastructure.**

2.2. Transformation agenda: towards a spatially just city

The SDF for Johannesburg 2040¹ is a city-wide spatial policy document identifying the main challenges and opportunities in the city, setting a spatial vision for the future city, and outlining a set of strategies that would lead to the realisation of that vision. Importantly, along with providing a spatial vision, **the SDF defines the priority transformation areas to be used in the City's capital investment prioritisation model (Johannesburg Strategic Infrastructure Platform – JSIP)**. This will ensure that infrastructure investment is directed to priority areas as defined in this SDF.

The core objective of the SDF 2040 is to **'create a spatially just world class African city'**. The SDF 2040 is premised on the notion of spatial transformation, defined through the principles of equity, justice, resilience, sustainability and urban efficiency which this SDF seeks to translate into a development policy.

The SDF is not a static master plan; it is rather a dynamic model of strategic planning that will be cyclically reviewed, adjusting the focus and direction based on city transformation that takes place on the ground.

2.3. Spatial vision: a compact polycentric city

The spatial transformation vision of the SDF 2040 seeks to create a spatially just world class African city. The vision is based on a modelling exercise testing three development scenarios, each hypothesising the growth of Johannesburg from 4.3 million to 7 million people by 2040. The first model describes a 'business-as-usual' scenario with dispersed, sprawled growth. The second describes a 'linear development' scenario where future development occurs along an expansive public transport network (corridor development) linking all marginalised areas of the city, through vast development corridors to the inner city. The third scenario is a compact polycentric model which concentrates growth in a compact urban core and around priority transformation areas and key urban and transit oriented development nodes. The compact polycentric city model performed significantly better than the other two in terms of economic, environmental and social indicators.

Therefore, the spatial vision envisaged by the SDF 2040 for Johannesburg is a compact polycentric city with a dense urban core linked by efficient public transport networks to dense, mixed use, complimentary sub-centres, situated within a protected and integrated natural environment.

The development model (Figure 1) below is an illustration of a traditional polycentric city model with a strong core, connected to sub centres with a high density urban form, and public transit, and with a logical density gradient radiating from metropolitan centres.

¹ While SPLUMA dictates that the SDF should indicate a 5 and a 10-20 year vision for the SDF, this SDF has taken a 25 year view in line with the City's GDS 2040.

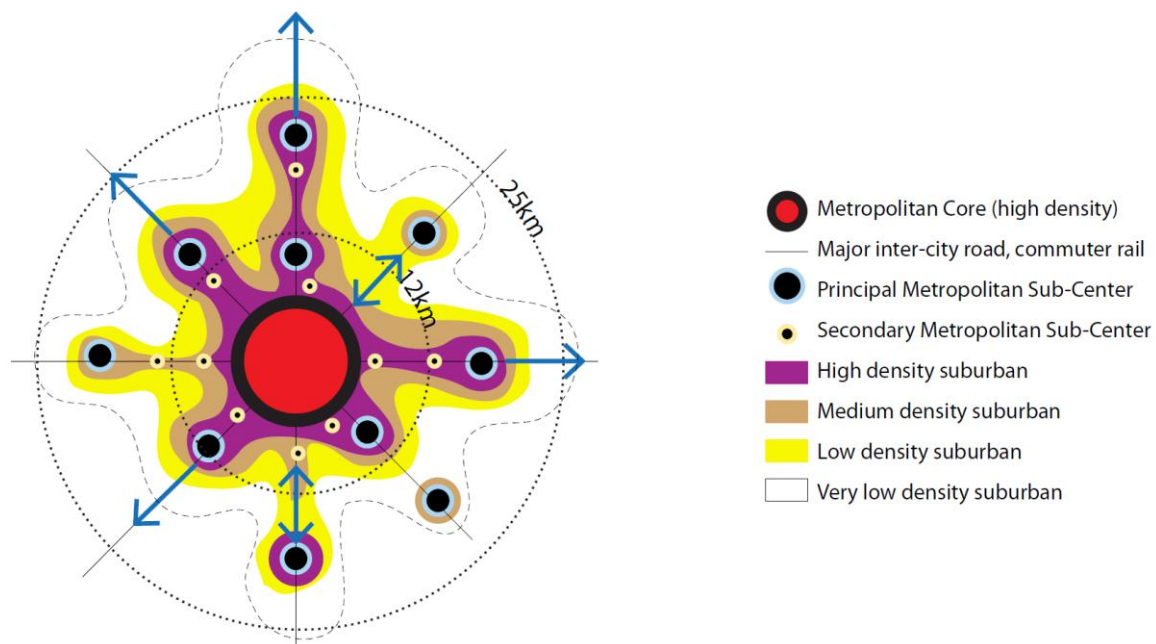


Figure 1: Traditional Polycentric City Model (Source: Urban Morphology Institute)

The City of Johannesburg presently displays the inverse of this polycentric urban model (Figure 2). This SDF thus proposes a shift to a more efficient and inclusive urban logic of compact polycentricity (Figure 3) with a focus on the inner city as the core node of Johannesburg, surrounded by mixed use nodes of various intensities connected by effective public transport and a more logical and efficient density gradient. The nodal strategy developed in this SDF presents the hierarchy of nodes to be supported around this core.

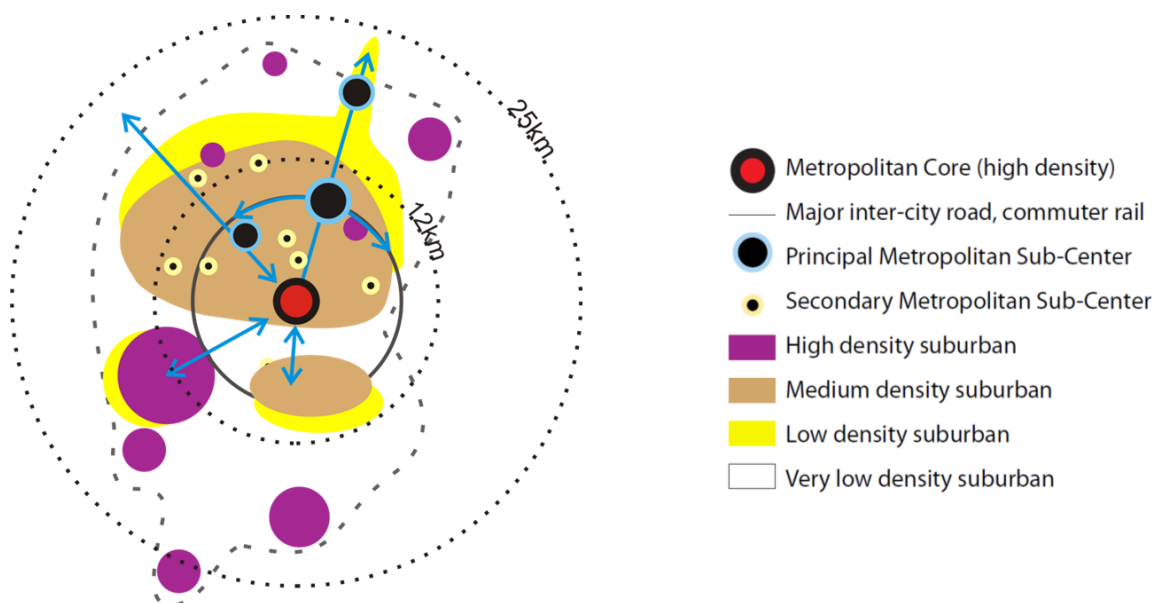


Figure 2: Johannesburg's current metropolitan structure of inverted polycentricity (UMI, 2015)

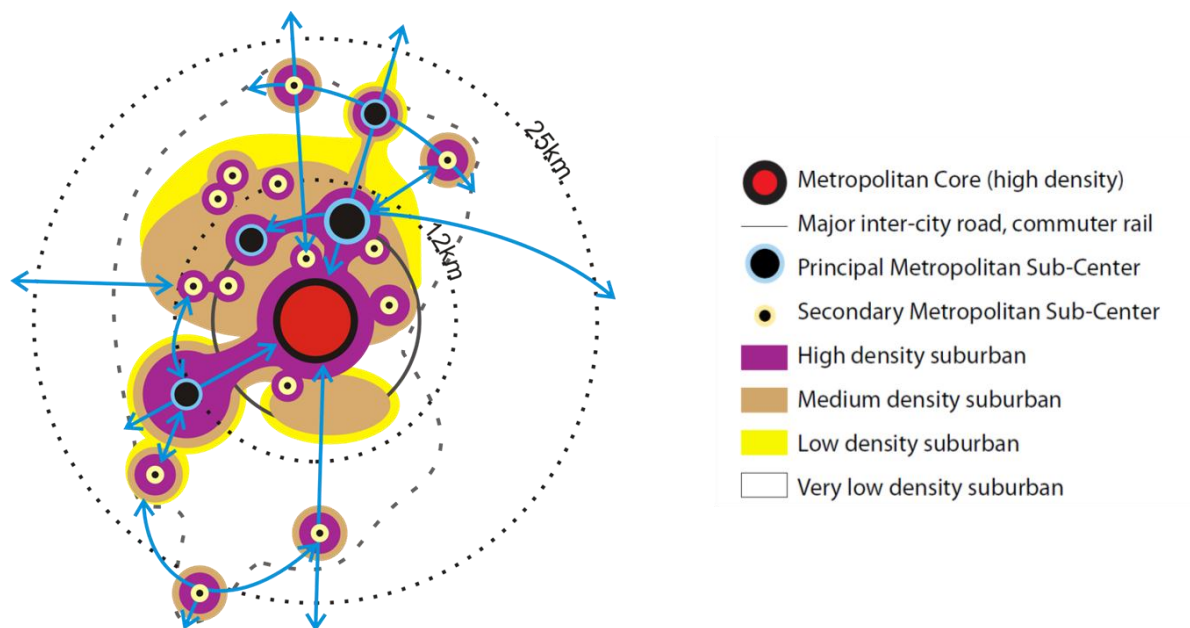


Figure 3: Johannesburg Future City Model: Compact Polycentric Urban Form

The future polycentric Johannesburg will bring jobs to residential areas and housing opportunities to job centres (rather than merely transporting people between the two). It will bridge spatial and social barriers and build a framework for a spatially just city.

To facilitate the spatial transformation needed in the city, the SDF 2040 endorses the following intertwined concepts of the new image of Johannesburg:

- **Compact city** – combining density, diversity, proximity and accessibility, reducing distances, travel times and costs, bringing jobs and social amenities to single use residential areas, reducing energy consumption and infrastructure costs
- **Inclusive city** – ensuring balanced service provision (hard and soft) and opportunities for all by diversifying land uses, promoting social mixing and bridging social, spatial and economic barriers
- **Connected city** –enhancing physical and virtual infrastructure at provincial and urban scales to re-connect the city, starting from ‘the corridors of freedom’ to street and neighbourhood-level connectivity
- **Resilient city** – building a metropolitan open space system as a protection buffer, protecting valuable green infrastructure and areas of high agricultural potential, promoting sustainable energy use, reinforcing the urban development boundary and protecting biodiversity resources
- **Generative city** – focusing investment in priority transformation areas and nodes with the potential to grow economically and create jobs while enhancing public space and promoting sustainability (social, environmental and economic)

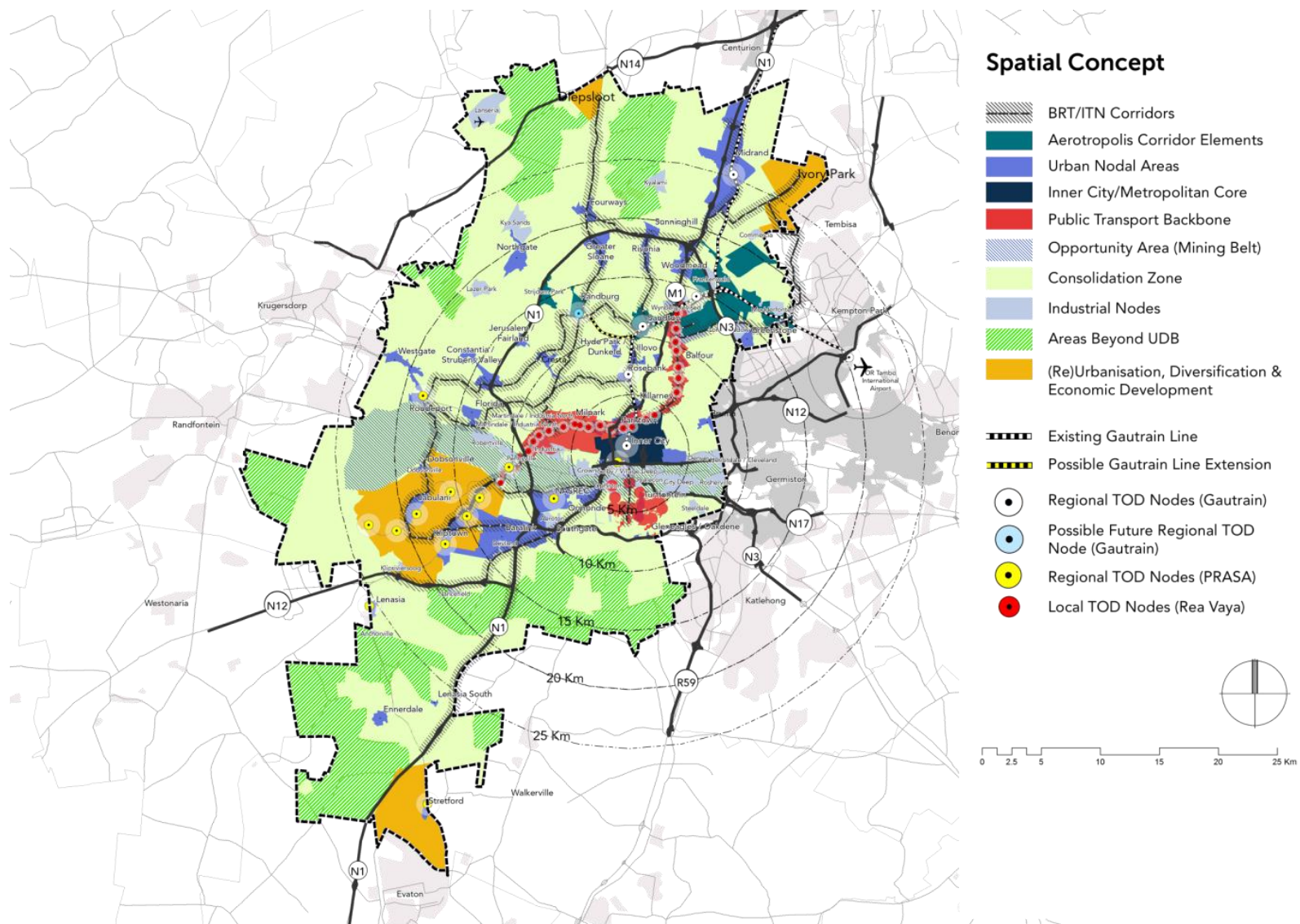


Figure 4: SDF Concept
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2.4. A spatial strategy: implementing the spatial vision

The SDF 2040 sets the guiding vision and then builds a concrete strategy for its realisation. **The spatial strategy is translated into the following steps for implementation:**

- Defining priority transformation areas and strategies for them
- Defining key focus areas outside of priority transformation areas
- A spatially directed capital investment focus
- Spatial policy regulations and guidelines
- Measuring urban performance

These strategies are discussed under the relevant headings below.

2.4.1. Priority transformation areas

A series of areas are defined where investment is prioritised, as they have the capacity to trigger positive effects on a city-wide scale. These, effectively replace the Capital Investment Priority Areas (CIPAs) as identified in the previous SDF. Complementing the polycentric nodal vision for the city, these are the selected areas (Figure 4) where capital investment should be directed:

- **Strengthening the metropolitan core** – building on the opportunities of the CBD as a dense economic core of the city and tackling issues of fragmented developments, crime, bad buildings and lack of affordable housing. The strategy suggests consolidating the inner city through a public space/street network and expanding it towards the southern industrial area through redeveloping and intensifying underperforming buildings, strategic connector streets, and developing vacant space. The inner city will also be significant in bridging north-south discontinuities.
- **Consolidating a Public Transport Backbone** – consolidating appropriate growth and development opportunities around existing and future public transport nodes, starting from the Corridors of Freedom linking Soweto to Sandton along Louis Botha Avenue and Empire-Perth, and the Turffontein area. This will also include a focus on transit oriented development nodes, including Gautrain, Rea Vaya (BRT) and PRASA stations.
- **Unlocking Soweto as a True City District** – diversifying Soweto to address its largely residential nature by developing mixed land uses (particularly economically productive ones) and social services, making use of its good street pattern and public transport network. Develop it into a series of self-sufficient mixed-use nodes as drivers of economic growth and job creation, allowing Soweto to function as a liveable city district in its own right with access to jobs and the full array of urban amenities.
- **Addressing Marginalisation through (re)urbanisation** – The areas of Diepsloot, Ivory Park and Orange Farm all have high population densities but are mostly residential and underserved. In these areas mixed land uses must be strategically included, to drive

economic development and job creation. Social services should be improved to promote mixed use areas where people can not only live, but access city amenities such as jobs, schooling, healthcare and recreation.

- **Unlocking the Mining Belt** – this spatial discontinuity presents opportunities for development and public open space that could integrate the north with the south. By identifying strategic interventions along the belt - road linkages, mixed use redevelopments, rehabilitation of degraded and damaged land – this fragmenting feature could become one of inclusion.
- **Developing an Aerotropolis Corridor** – establishing a strategic connection between the northern parts of the city (Randburg, Sandton and Alexandra) and the OR Tambo Aerotropolis; incorporating the Modderfontein and Frankenwald areas; creating a regional logic for the development of strategic land parcels utilising current development dynamics to drive growth and reduce expansion pressure on the periphery.

2.4.2. Key focus areas outside of priority transformation areas

While priority transformation areas are defined, there are other key areas of the city that are central to the vision of the SDF. These include:

- **An integrated Natural Structure** - The natural environment is an essential element in the structuring of the future city. The structure should be seen as a city asset that provides valuable ecosystem services and not merely as unused land available for development. Protecting these areas is not done for the sake of conservation alone, but to make surrounding developed parts of the city more sustainable, liveable and valuable (socially, financially and in terms of green infrastructure) to the urban structure.
- **A consolidation and restructuring zone** – This area (neither within priority transformation areas, nor outside the urban development boundary) is viewed as a focus of urban consolidation, controlled growth, urban management, addressing backlogs and structural positioning for medium to longer term growth. The policy intent in these areas would be to ensure existing and future development proposals are aligned as far as possible with the broader intent of the SDF, specifically in terms of consolidating and diversifying development around existing activity nodes, public investment, and public transport infrastructure.
- **A hierarchy of nodes** as a Focus for Growth, Consolidation, and Reinvestment – The previous SDF defined a number of metropolitan, regional, district and neighbourhood nodes as catalytic nodes. Added to these are TOD nodes. These will be supported for compact, walkable, liveable and mixed use development. Industrial nodes will be a focus of future job creation, as well as diversification.
- **Informal Settlements** - The SDF reiterates the position supported in national policy (e.g. Breaking New Ground, the National Development Plan, National Development Outcome 8 and the National Upgrading Support Programme) and City of Johannesburg Policy (e.g. SHSUP and the City's Informal Settlement Regularisation Policy) that in-situ upgrading of

informal settlements should be the first option for intervention, with relocation only applied where upgrades are not possible. When relocation is necessary, distances should be kept to a minimum (within 2 km).

- **Other Marginalised Areas** - While this SDF defines Orange Farm, Ivory Park and Diepsloot as marginalised areas of key prioritisation, there are others in the city that must not be ignored. Existing marginalised formal areas, infrastructure backlogs (hard and soft) should be met, and diversification of land use should be promoted to allow for economic development and mixed use activity.
- **Lanseria** - The Lanseria Development Framework 2020 and the Mogale City Spatial Development Framework identify the Lanseria airport node as a long term strategic development node with opportunities for commercial, business and residential development. The future development of the airport is grounded on the Lanseria airport infrastructure project with a development company established to undertake this development. This development should be mixed use with mixed income housing opportunities.

2.4.3. Capital Investment Focus

The City of Johannesburg has a key role to play in directing and promoting private investment in priority transformation areas. This will be done by investing in bulk infrastructure, services, and social infrastructure including health and education facilities in priority areas, close to public transit infrastructure. This will be done pre-emptively in the priority areas identified, to attract private development and investment. In order to maximise private investments towards realising the vision of the SDF, two mechanisms will be used. The first is a capital investment prioritisation process focussing investment in priority transformation areas and nodes (Johannesburg Strategic Infrastructure Platform – JSIP). The second is land value capture and financing mechanisms.

2.4.4. City-wide spatial policy regulations

Various spatial policy regulations are suggested as a means of supporting the spatial concept and priority transformation areas. They serve as a mainstay for priority projects, but at the same time contribute to the realisation of the spatial vision at a city-scale.

- **From Zoning to Form-Based Codes in Priority Areas** – shifting away from land use zoning that allowed single use urban areas and long travel distances, form-based coding would support the building of compact, mixed use neighbourhoods and public spaces in each of the priority areas, through physical form regulations. These should be incorporated into RSDFs and more localised spatial planning frameworks
- **Nodal Guidelines** – facilitating the development of a polycentric multi-nodal city by categorising the current city nodes with prospects for growth. Promote densification, diversification and development in these nodes. The main categories of nodes are: mixed-use/key urban nodes (under various categories), industrial nodes, Transit Oriented Development (TOD) nodes and neighbourhood nodes.
- **Reinforcing the Urban Development Boundary** – re-emphasising the Urban Development Boundary and severely limiting new development outside of it and protecting the natural

environment. Defining what development will be allowed in consolidation areas (those not outside the UDB, nor within priority transformation areas) and promoting higher density and land-use diversity within priority transformation areas and nodes.

- **Densification Regulations** – density provisions and regulations facilitating higher density development within appropriate areas, promoting mixed use developments and improved connections.
- **Inclusive and affordable housing** – ensuring the provision of affordable and social housing within all new housing developments. Low cost housing should ultimately make up 20-50% of residential floor area in all neighbourhoods².
- **The Public Environment** – placing focus on the public environment for all development (green and brownfield), the quality of public space and the interface between public and private space. Public space should make up 50% of total area at a neighbourhood level, including 15-20% public open space, and 30-45% for streets including sidewalks
- **Protected and integrated natural structure** – maximising the value (social, natural and financial) of environmentally sensitive areas by protecting the environmental services they provide (green infrastructure), using them as a public structuring layer for the built environment
- **Land Readjustment** – The SDF recommends the development of a land readjustment framework or legislation to allow neighbouring property owners to pool land for development to ensure integrated urban forms on privately owned land, with public streets and open space.

2.4.5. Development control and measuring urban performance

The implementation of the SDFs strategies and visions will be assessed using indicators on spatial development. These will also be used in assessing new development and township establishment applications. The indicators include land use mix, population and job density, the amount and quality of public space, the percentage of affordable housing, connectivity levels and access to public transit. These measures will also be used to assess current urban forms to provide direction for how they may be retrofitted for better performance going forward.

Focusing major investments in the identified transformation areas, supported by defined spatial policies and regulations, and revising the SDF's priority areas over time would ensure the gradual evolution of Johannesburg into a spatially just world class African city.

² UN Habitat. (2015). *Global Public Space Toolkit: From Global Principles to Local Policies and Practice*. Nairobi: UN Habitat.

3. Reviewing the SDF

Chapter Summary: *Spatial Development Frameworks (SDF's) are described by the Municipal Systems Act (MSA) (Act 32 of 2000) as a component of Integrated Development Planning (IDP) for municipalities. More recently, they have been mandated by the Spatial Planning and Land Use Management Act (SPLUMA) (Act 16 of 2013).*

This review of the City of Johannesburg's SDF follows a number of previous versions. The City's first SDF was approved by council in 2001, with the most recent approved SDF being the 2010/11 version. As this document is a review of the preceding SDF, it is seen as an evolving document, rather than a full overhaul. As such, the intent is to build on the strengths and successes of the previous SDF and address its limitations. This document details the spatial policies, strategies and implementation mechanisms that will carry through from previous SDFs, as well as those that have been amended or added.

3.1. The SDF as A Transformative Process

This SDF presents a vision through which spatial transformation, as defined by the principles of spatial justice, sustainability, resilience and efficiency, can be achieved. It is a planning process situated within a broader suite or package of plans as presented in Figure 5. It is influenced by and takes direction from the Integrated Development Plan (IDP) and the Growth and Development Strategy (GDS), and in turn provides direction for the formulation of more detailed spatial planning and strategic frameworks including Regional Spatial Development Frameworks (RSDFs), urban development frameworks and precinct plans. As such, the SDF should find a balance in the detail it provides for its implementation. Direction should be sufficiently detailed to give concrete guidance, yet not overly prescriptive to the point that it inhibits creativity and meaningful action.

The main objectives of the SDF Review process can be summarised as follows:

- To build on the successes and address the limitations of the previous SDF
- To provide a spatial dimension and plan to direct investment, growth and development in a manner that can deliver on the desired outcomes of the Growth and Development Strategy (GDS) 2040;
- To fulfil the legislative requirements of review, noting the requirements of the MSA and SPLUMA;
- To capture, analyse and utilise the most updated information regarding developmental trends and issues, both within the city, and in wider contexts including international, regional, national and the Gauteng City-Region;
- To collect, collate and reflect on the needs of a range of stakeholders in the City of Johannesburg and different spheres of government;
- To develop indicators to be used: to monitor the implementation of the SDF; to evaluate new development applications and to assess current form to direct future intervention.

The SDF presents a possible future whilst being cognisant of the past and present. It is important to recognise that spatial planning in itself cannot realise the full suite of requirements for city development. Hence, a realistic implementation framework is tied to this SDF, a point on which previous SDFs have been critiqued. The SDF must translate into a clear decision-making framework that is able to chart a way forward for public sector investment. This gap is addressed in this SDF through implementation strategies that combine a set of priority investment area projects with spatial policies to support them.

Equally, realising the development goals of the municipality relies on the ability of the city to create an environment that facilitates private sector confidence and investment. It is therefore critical that the SDF conveys a confident and realistic future that is attractive for private sector investment.

3.1.1. Applying this SDF in relation to regional and local spatial plans

This SDF 2040 (2015/16), once approved by council, will replace its predecessor. Development corridors and other primary development areas included in the previous SDF that are not contained in this version will fall away. The SDF is read in conjunction with Regional Spatial Development Frameworks (RSDFs) and other localised spatial policy documents including Urban Development Frameworks (UDFs) Nodal Policies and Precinct Plans (PPs) that have been approved by council.

This SDF will prompt the development of new regional and/or local spatial policy frameworks. Until such time as new regional and local policies are approved by council, this SDF should be read in conjunction with current RSDFs, PPs and UDFs.

For areas explicitly covered by this SDF including priority transformation areas (Chapter 7), proposed density regulations (Table 6 p.105) and development control indicators (section 8.4); this SDF will apply. In those areas not explicitly covered by this SDF, current RSDFs, PPs and UDFs should be applied until such time as new RSDFs, PPS or UDFs are approved by council.

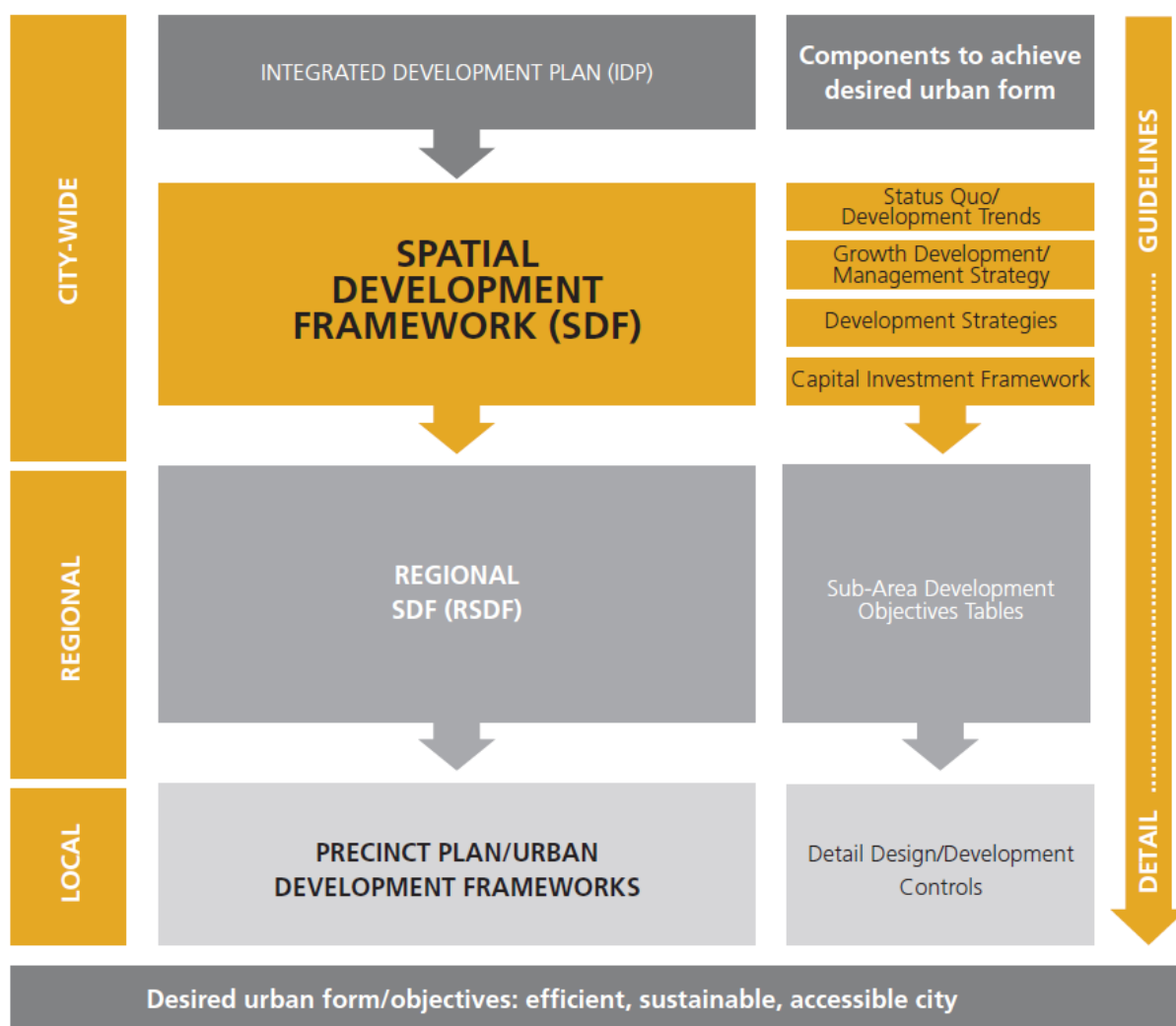


Figure 5: Hierarchy of Spatial Plans

3.1.2. SDF Review Process

The review of this SDF was structured around a number of processes. First was a series of charrette sessions with a reference group of planners, developers, bankers, environmental interest groups, provincial government departments and specialists in various development-related fields. Second was consultation with various departments within the City of Johannesburg for input and comment. Third was a public participation process in which a concept draft SDF was presented and debated and contributed to by various interest groups. Last was the SPLUMA legislated process of gazetting the draft SDF document for a period of 60 days for public comment. Comments from each process were/will be collated and added (where applicable) to the document before final council approval and publication.

3.2. Spatial Policy/Legislative Context

The SDF for Johannesburg represents the key spatial policy position for the city. It should reflect the intent and principles of broader city policy, as well as spatial policy and legislative initiatives in other spheres of government. Amongst the policies and acts reviewed are the National Development Plan

(NDP), the Spatial Planning and Land Use Management Act (SPLUMA), the Gauteng Transformation Modernisation and Reindustrialisation Strategy (TMR) and the Gauteng Spatial Development Framework (GSDF). The key city of Johannesburg policies reviewed include the Growth and Development Strategy 2040 (GDS), and the Integrated Development Plan (IDP).

3.2.1. National Development Plan

The National Development Plan 2030 provides a policy framework that looks beyond current constraints confronting the nation to the transformation imperatives that are needed to support accelerated economic growth over the next 20 to 30 years, focussing specifically on addressing poverty and reducing inequality.

The key spatial principles are outlined in Chapter 8 of the NDP, 'Sustainable Human Settlements'. They are: **spatial justice, spatial resilience, spatial sustainability, spatial efficiency and spatial quality.**

Of specific relevance to the SDF Review process are the NDP's human settlement targets, as set out in Chapter 8, which focus on transforming human settlements and the national space economy. These spatial targets include:

- upgrade all informal settlements on suitable, well located land by 2030;
- more people living closer to their places of work;
- better quality public transport; and
- more jobs in proximity to townships.

To achieve these targets the NDP advocates strong measures to prevent further development of housing in marginal locations, increased urban densities to support sustainable public transport, incentivising economic activity in and adjacent to townships; and engaging the private sector in the gap housing market.

3.2.2. Spatial Planning & Land Use Management Act (SPLUMA)

The Spatial Planning and Land Use Management Act, 2013 (SPLUMA) came into effect on 01 July 2015. It is a framework act for all spatial planning and land use management legislation in South Africa. The legislation seeks to promote consistency and uniformity in procedures and decision-making related to the spatial planning environment across the country, and across all spheres of government.

SPLUMA reinforces and unifies the NDP's vision and policies in respect of using spatial planning mechanisms to tackle poverty and inequality while creating conditions for inclusive growth by fostering a high-employment economy that delivers on social and spatial cohesion.

The five development principles, as set out in Section 7 (a) to (e) of SPLUMA are summarised as:

- **Spatial justice:** past spatial and other development imbalances must be redressed through improved access to and use of land.

- **Spatial sustainability:** spatial planning and land use management systems must promote the principles of socio-economic and environmental sustainability
- **Efficiency:** land development must optimise the use of existing resources and the accompanying infrastructure
- **Spatial resilience:** securing communities and livelihoods from spatial dimensions of socio-economic and environmental shocks through mitigation and adaptability that is accommodated by flexibility in spatial plans, policies and land use management systems.
- **Good administration:** all spheres of government must ensure an integrated approach to land use and land development and all departments must provide their sector inputs and comply with prescribed requirements during the preparation or amendment of SDFs.

3.2.3. **Gauteng Transformation Modernisation and Reindustrialisation Strategy (TMR)**

At the 2014 inaugural State of the Province Address, Gauteng Premier David Makhura tabled the Transformation Modernisation Reindustrialisation strategic roadmap to move Gauteng forward. The strategy identifies the apartheid space economy and human settlements patterns as key structural challenges.

The TMR strategy proposes 10 pillars which will ensure integrated, socially cohesive and economically inclusive development. These are: radical economic transformation, decisive spatial transformation, accelerating social transformation, transformation of the state and governance, modernisation of the economy, modernisation of the public service and the state, modernisation of human settlements and urban development, modernisation of public transport and other infrastructure, reindustrialising Gauteng as our country's economic hub, taking a lead in Africa's new industrial revolution.

The TMR strategy identifies five (5) "development corridors", with the CoJ anchoring the central development corridor; the hub of finance, services, ICT and pharmaceutical industries.

To achieve these goals, the TMR strategy supports:

- inner city regeneration efforts in the City of Johannesburg CBD
- the corridors of freedom initiative
- regeneration of Kliptown and Alexandra
- integrated human settlements development
- township economies
- the aerotropolis initiative at OR Tambo and Lanseria airports.

The TMR advocates that Gauteng municipalities adopt a city region perspective to ensure that Gauteng remains the economic and industrial hub of South Africa and the SADC region, and a "gateway to Africa".

3.2.4. Gauteng Spatial Development Framework

The Gauteng Spatial Development Framework is currently under review; however the current Gauteng SDF has the following policy directives:

- Integration of the apartheid fragments, the municipalities in the province and the municipalities in the wider Gauteng City region;
- Safe, affordable and sustainable public transport, in contrast to the focus on private mobility on which the present provincial structure is focused
- Quality of life and living, implying proximity to, or easy and affordable access to quality open space and social and cultural facilities;
- Proximity to, or easy and affordable access to quality open space and social and cultural facilities;
- Shared, sustainable and inclusive economic growth, ensuring that everyone in the province can get access to economic opportunities and contribute to, and share in the economic development of the province;
- Protection and enhancement of the natural environment, ensuring the sustainability of natural systems and the fauna and flora habitats, their connectivity and bio-diversity
- Choice, enabling individuals and communities to decide within an overarching framework what works for them, where opportunity presents itself and where to locate in the urban system without incurring inordinate premiums and;
- Creativity and innovation, ensuring that the province can adapt to change in constructive ways.

3.2.5. Growth and Development Strategy 2040

The Johannesburg GDS 2040 is an aspirational strategy that defines the type of society the city aspires to achieve by 2040. The strategy restates the City's resolve in confronting the past injustices created during apartheid, working towards a democratic, non- prejudiced and just City while simultaneously confronting present and future challenges as they emerge.

The GDS 2040 provides a set of defined strategic directions that frame the five- year IDP and other medium-term plans. In support of long-term delivery, the IDP will contain specific five-year operational activities, targets and financial budgets.

The GDS 2040 is predicated on three principles, namely: Resilience; Sustainability and Liveability.

Given the National (NDP and SPLUMA), provincial (TMR and GSDF) and local (GDS and IDP) policy principles that have been outlined, the principles of spatial justice, sustainability, resilience and efficiency have been identified as pivotal for spatial development in Johannesburg. It is crucial, therefore, that the city of Johannesburg's SDF adopt these principles for Johannesburg's spatial future.

4. Johannesburg: Global, African and regional and local context

Chapter Summary: *It is clear that cities do not exist in isolation to their surroundings. They form part of local, regional and international networks, connected through economic systems, social ties, shared environmental concerns, and the movement of goods, people and services. It is for this reason, that despite only having direct influence within certain borders, municipal planning must take cognisance of the city and how it interacts with wider contexts. At the same time a strong evidence based understanding of the city is needed to drive decision making and planning for future improvement and growth. This chapter outlines the regional context of Johannesburg, and the challenges the city faces.*

4.1. A role in Africa

Improving the capacity of Johannesburg to absorb population growth in an inclusive way is one of the key challenges. The latest data provided by the Population Division of the United Nations show that Africa is experiencing unprecedented population growth. The UN's 'World Population Prospectus' for 2015³, estimates the current population of Africa to be 1.18 billion. The African population, according to the report, is also growing at a faster rate than any other in the world, and is projected to grow as high as 2.48 billion in 2050, and 4.39 billion in 2100.

As the City of Johannesburg moved through its democratic transformation, its role in a broader African context has grown. A recent report entitled 'Cities of Opportunity'⁴ which undertook an analysis of 30 cities at the heart of the world's economy and culture, showed that Johannesburg is indeed a top-ranking city to live and do business in from a cost and ease point of view. Factors such as liveability, connectivity and innovation were also taken into account. Although mature cities such as London, New York and Singapore perform best, Johannesburg sits ahead of several emerging market cities such as Istanbul, São Paulo, Rio de Janeiro, Mumbai, Jakarta and Nairobi. At a macro level this is a very positive outlook for Johannesburg, although the report recognises that there are other essential areas in which it needs to improve for its citizens – health, safety and recognising informality (key issues for many emerging economies).

Johannesburg is a major economy in the global south, and the top performer in Africa. However this status may soon change. The economy of Lagos (Nigeria) with an annual GDP of R400billion is growing faster than Johannesburg's (R510billion) and may soon take top spot in the continent. This falls in the context of a number of other African urban centres that are also growing in regional and international prominence. While urban economies do compete with one another, the growth in African urban economies should be seen as an opportunity that Johannesburg, and indeed other cities in South Africa, can connect to for mutual benefit. This benefit is already being seen for Johannesburg and Gauteng in terms of large Johannesburg based businesses working in Africa, but

³ UN, Department of Economic and Social Affairs, Population Division, 2015. *World Population Prospects The 2015 Revision Key Findings and Advance Tables*

⁴ PWC, 2014. *Cities of Opportunity*, <http://www.pwc.com/us/en/cities-of-opportunity/>

also in terms of smaller scale trade. A recent study by the Gauteng City-Region Observatory (GCRO)⁵ interviewed some 1200 cross border informal sector traders who travel to Gauteng to buy goods to sell in their home country. Most of these traders travel to Gauteng at least once a month, and spend on average R11 679 on goods per trip as well as money on transport and accommodation. Collectively the traders interviewed (who represent only a portion of the total) spend over R160 million a year in Gauteng. This represents the economic significance of the city and its region, not only in international financial terms, but in more localised and less formal markets too.

The role of the informal economy must be acknowledged and defined. In the face of global economic downturns linked to the impacts of Climate Change globally, the informal sector has made remarkable responses in terms of the need to reduce, reuse and recycle resources with significant spin offs in terms of income creation; in contrast to the formal economy.

A sustained Johannesburg economic transition creating jobs for all population strata will hinge on achieving two important features highlighted in the UN Habitat report *The State of African Cities 2014, Re-imagining sustainable urban transitions*.

Firstly, Johannesburg's economic development must become more self-driven by further exploration of existing and new technologies for raising domestic productivity and income generation. Johannesburg must rapidly improve its social services, especially in its lower income areas, to create better working and living conditions as well as new economic opportunities for its young people who will have to carry forward the current economic momentum.

Secondly, trade and investment flows between Johannesburg, Africa and the world, will need to be further expanded. These strategic relationships must rise above mere natural resource extraction. Investments in road, rail and energy networks will be crucial in boosting Johannesburg's urban economy; unlocking areas for investments in agro-industrial and manufacturing enterprises; facilitating flows of people, commodities and services; and assuring food, water and energy security for development.

Johannesburg's thrust towards industrialisation must, however, take into account the roles that the inevitable Africa urban transition will play in structural transformations. With a large, emerging, urban consumer class in Africa, Johannesburg should actively explore and embrace more diverse growth opportunities, especially where these can be decoupled from resource exploitation and ecological degradation. This might include growing services sectors for example, to establish value chains that cut across city and national economies at all levels.

While Growing economies and urban populations in Africa pose many challenges, they provide many opportunities. It is important for Johannesburg and other South African cities to embrace the growth of African cities, and to strengthen links into the growing urban network in Africa.

⁵ Peberdy, S. (2015). *Informal sector cross border trade spending in Gauteng*. Retrieved October 6, 2015, from Gauteng City-Region Observatory: <http://bit.ly/GPtrade>

Securing Johannesburg's future as a leading African city economy will require responsiveness to this changing economic environment with a focus of building on the established strengths of the City. The key focus areas for Johannesburg as set out in the City's economic strategy will be: improving the spatial efficiency and competitiveness of the City, better exploitation of agglomeration potential in both new and existing industries and positioning of the City's businesses in global value chains⁶.

4.2. The Importance of the Gauteng City-Region

The Gauteng City-Region is the economic hub of the mining, manufacturing, tertiary and quaternary sectors of South Africa. Gauteng is the highest provincial contributor of GDP at 34% of the national total, and has the highest per capita income.

While the City of Johannesburg is South Africa's most economically developed metro, the role that the Gauteng City-Region plays in Johannesburg's economy, and vice versa, cannot be emphasised enough. Agglomeration economies function across scales, from groupings of a few people and firms, to groupings of large cities and metros. The close proximity of three neighbouring metros (Johannesburg, Tshwane and Ekurhuleni⁷) as well as significant centres of mining and industry (including Rustenburg, Vereeniging and Vanderbijlpark to name a few) in fairly close proximity, provides substantial opportunities for job intensive and inclusive economic growth. This provides potential for municipalities to be both drivers and beneficiaries of economic growth in the region that would be mutually beneficial to society, the private sector and different government authorities across spheres and political boundaries.

While Gauteng is the smallest province by land mass in South Africa, it has the highest population, making it the most densely populated. Gauteng Province is home to 23.9 percent of the nation's population, or over 12.9 million people. Although Gauteng is the most densely populated province, only 17% of its area is considered 'urbanised' or settled. So, although the population density of the entire province is low in international urban terms (672 people/km²) the density of built up areas⁸ is significantly higher at around 4 724 people/km².⁹

The prevailing spatial development pattern of the city-region is a fragmented one, and reflects the historic three-node focus of the province i.e. Pretoria, Johannesburg and Vereeniging. The City Region displays a wide range of social and economic opportunities however. Based on these, and with the implementation of sustainable development principles, the city region has the potential to develop as one of the world's significant emerging conurbations, with Johannesburg at its centre.

⁶ Economic Development Strategy for the City of Johannesburg, 2015.

⁷ These three metros are all in the top 5 in South Africa in terms of percentage contribution to South Africa's GDP (Economic Development Strategy for the City of Johannesburg Department of Economic Development, City Johannesburg. 2015)

⁸ This is based on the built up area of the province as it was in 2000

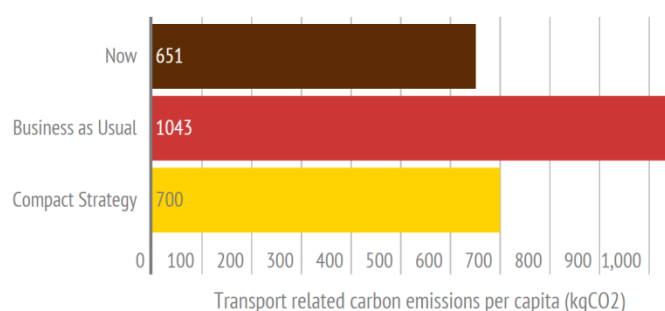
⁹ Gotz, G., Wray, C., & Mubiwa, B. (2014). The 'thin oil of urbanisation'? Spatial change in Johannesburg and the Gauteng City-Region. In P. Harrison, G. Gotz, C. Wray, & A. Todes (Eds.), *Changing Space, Changing City: Johannesburg After apartheid* (pp. 42-62). Johannesburg: Wits University Press.

4.3. Climate Change: Risks and Opportunities for Johannesburg

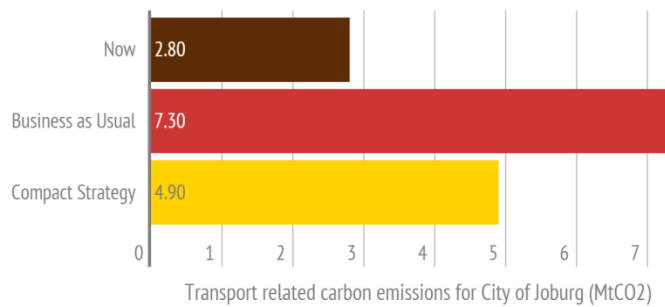
Climate change is a current inevitability and its manifestations are unpredictable. Whether it will involve gradual shifts in temperature (up or down), changes in rainfall patterns, altered groundwater salinity or changes in the frequency and/or severity of extreme weather events is yet to be confirmed.

South Africa is the only African country among the world's top 25 emitters of carbon dioxide over the past several decades.¹⁰ In 2014, the City of Johannesburg conducted its first ever city-wide carbon inventory using the Global Protocol for Community-scale Greenhouse Gas Emissions (GPC), on a 2007 baseline. Total greenhouse gas emissions were estimated at 26.5 million tons of CO₂ emissions. Carbon emissions per capita in Johannesburg are already much higher (by 20% to 50%) than best practice cities such as Paris, Tokyo or Seoul. The carbon intensity (in tCO₂e/\$GDP) of Johannesburg's economy is 4 to 6 times higher than these three cities. The share of mining and energy intensive industries in Johannesburg's economy and the country's coal intensive energy supply are partly responsible for this figure, but the transportation sectors also largely contribute to this figure, with 41,000 TJ (terajoule) consumed annually for passenger transportation, or 9.3 GJ (gigajoule) per capita. This makes Johannesburg transportation energy intensity much higher than cities in Europe (Paris, London, Berlin) or Asia (Hong Kong, Tokyo, Seoul). More serious is the growth in the private car fleet outpacing demographic growth, inducing a gradual modal switch from minibus taxis to private cars. Based on this trend, models predict an increase in energy consumption and carbon emissions of 60% per capita and 160% for the City of Johannesburg.

This massive increase in energy and carbon intensity of transportation due to the switch towards private cars can only be balanced with a very ambitious strategy resting upon both transit investment and an intensification of the urban fabric around transit infrastructures, through higher residential and job density, and denser, more mixed-use urban fabrics.



¹⁰ <http://data.worldbank.org>



Source: Urban Morphology Institute

The SDF will integrate the link between urbanisation patterns, energy intensity and carbon emission levels in the city of Johannesburg. Measuring the link between local urban intervention, such as increases of density, under different scenarios in the SDF and carbon emissions will make the City of Johannesburg a pioneering city with a clearer understanding of the impacts on emissions of integrated land use and transportation planning.

4.3.1. Climate change adaptation

Johannesburg, like all Southern African cities is extremely vulnerable to climate change impacts. Temperature increases and weather variability threaten to directly or indirectly disrupt systems critical to the survival of cities in the region. The sub-region is warming and increased droughts are possible in the future. Heat island effects and changing disease epidemiologies are key challenges for inland urban areas. Unguided urbanisation, degradation of freshwater resources, lowered levels of food security and failure of climate change adaptation strategies are among the most significant global environmental risks in African cities.

The challenge for African cities such as Johannesburg to respond to the impacts of climate change is particularly serious, due to the often precarious nature of living conditions and livelihoods that many face. For those living just outside of poverty, but still with very low incomes (the 'floating middle class', defined as those living on between US\$2 and US\$4 per day¹¹), very slight external changes can prompt a shift to poverty. These may include social, economic, political or environmental changes such as illness, increasing food or fuel prices or damage to property due to unexpected events.

Many of the floating middle class in Johannesburg live in informal settlements, informal backyard dwellings or informally occupied buildings. Informal living environments are at times located in high-risk locations (such as flood plains) and often with minimal bulk and public services, such as waste collection and management, public transport, access to potable water, sanitation, and health facilities. As such, it is clear that certain portions of the population are more at risk to the seemingly slight and gradual changes that climate change poses.

¹¹ The Deloitte Consumer Review Africa: A 21st Century view

Policy and action on climate change in South Africa is changing. The AFD¹² reports that efforts of some local leaders, like Johannesburg, “in addition to rising global awareness of climate change and increasing impacts on the poor and the rich alike, are beginning to create a political opportunity for making climate change a central development issue, linked to patterns of consumption, employment and public services. This, in turn, creates the potential for mainstreaming climate adaptation into the core mandate, planning and budget allocations of South African municipalities.”

Lessons learned from pioneering local adaptation planning programmes indicate that the integration of adaptation plans and strategies for disaster risk reduction must, as a perceived co-benefit, be geared towards achieving development priorities. Initial cost-benefit analyses show that ecosystem-based adaptation strategies and community-based and institutional responses might have advantages in enabling sustainable responses over capital intensive infrastructural solutions (Taylor, Cartwright & Sutherland, 2014).

The push for resilience in all planning is a major policy objective for the City of Johannesburg. Climate change is a significant threat to a sustainable future in the short, medium and long term. Future mitigation and adaptation efforts need to be developed to focus on the plight of vulnerable city residents, vulnerable infrastructure and vulnerable ecosystems.

The South African government’s National Climate Change Response (NCCR) White Paper¹³ was developed in 2011 and focuses on three key aspects:

- Adaptation;
- Mitigation; and
- Mainstreaming sustainable and ‘climate- resilient’ development.

The NCCR White Paper requires all government departments and state-owned enterprises to achieve “full alignment with the national climate change response” by way of reviewing their legislation, policies, strategies, governance structures and plans.

In the context of the significant role urban form plays in carbon emissions, the SDF must: build resilience within communities; promote a compact carbon efficient urban form; and preserve the natural environment that provides irreplaceable ecosystem services for the city.

4.4. A Dynamic, Changing City

From its early beginnings as a mining camp, Johannesburg has grown to become a truly global and cosmopolitan city, with strong physical, economic, and social connections to key centres across Southern Africa, Africa and the world. In transforming from a mining town to an industrial city and more recently to a centre of the tertiary economy, the City is continually extending its significance as

¹² Taylor, A., Cartwright, A., & Sutherland, C. (2014). *Institutional Pathways for Local Climate Adaptation: A Comparison of Three South African Municipalities*. Paris: Agence Française de Développement. (pp.8)

¹³ <http://bit.ly/NCCRwhitepaper>

a regional centre in Southern Africa, and an important global gateway. The city's economy is now dominated by the tertiary sector, with Trade, Transport, Finance and Community services making up 76% of the city's economic output. Importantly, the finance sector was the fastest growing from 1996 to 2013. Mining has declined to just 1% of economic output, and while manufacture still makes up 16% of the city's economic output, it has declined from 20% in 1996.¹⁴

At the same time, the city is grappling with a number of spatial and developmental issues, including a growing population, a backlog of adequate housing, high levels of poverty and unemployment, spatial and economic fragmentation, disconnection, and inequality.

These issues become increasingly challenging in the context of a unique and irreplaceable natural environment, already degraded by mining, industry and past development that is becoming increasingly threatened by current urban growth patterns.

Within this context, the city is defined by several 'tensions' that require constant mediation and balance, often between 'big' and 'small'. These include: global versus local leadership; supporting large and small/medium enterprises (formal and informal); transformative initiatives vs incremental interventions; addressing the city of the past while building the city of the future; driving change vs supporting organic informal change; retaining conventional wisdom while adapting to next generation innovation; and regional connections vs local walkability.

The spatial future of the city is difficult to predict, and is likely to be determined, to some extent, by a number of key challenges moving forward, including:

- A growing role in Africa, and specifically Sub-Saharan Africa, as trade increases and the city becomes more accessible;
- Decelerating economic growth;
- Ongoing urbanisation, high levels of poverty and increasing levels of unemployment and inequality;
- The growing impact of climate change on economic and spatial patterns;

¹⁴ Economic Development Strategy for the City of Johannesburg Department of Economic Development, City Johannesburg. 2015

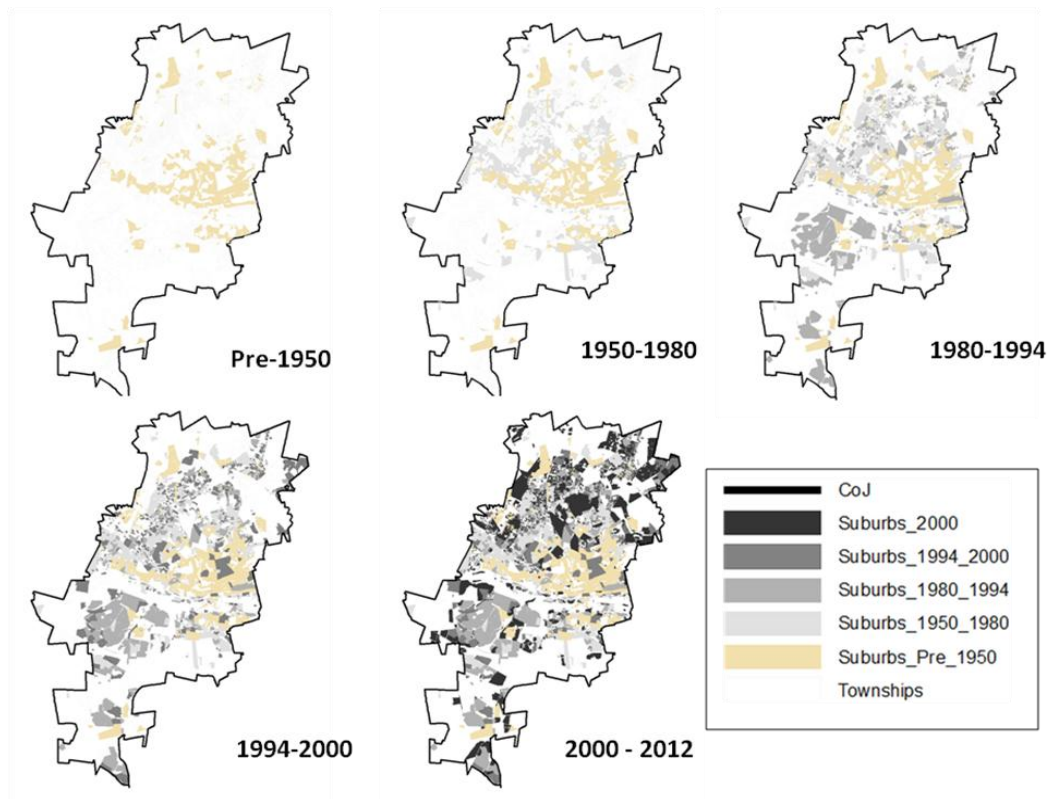


Figure 6: Spatial pattern of growth of Johannesburg, 1950 to 2012 (Source: City of Johannesburg Corporate Geo-Informatics)

5. The current city

Chapter Summary: The apartheid practices of planning and urbanisation have led to the development of a spatial structure with many shortcomings: spatial inequality (including a stark job-housing mismatch), fragmentation and spatial disconnection, urban sprawl and limiting densities, limited land-use diversity and pressure on the natural environment. The current structure and development patterns require revisiting in order to meet the future urban challenges in a sustainable manner.

5.1. Existing Spatial Structure

The spatial structure that currently defines the City of Johannesburg can be summarised in terms of the following dominant elements:

- An established inner-city core or CBD which still functions as a significant economic focus of the City. It is also anchored on the two dominant development corridors that cross the city-region;
- A series of activity nodes of varying intensities and functional characteristics that have established around the core over time;

- An east-west urban corridor system that has grown around the key rail, road, and industrial areas that supported the mining industry that formed the basis of the city's historic growth;
- A related belt of mining land and residue areas, immediately south of the east-west corridor, that is a significant development buffer between the northern and southern parts of the city;
- A spatially and economically marginalised pattern of settlement to the south-west, centred around the Soweto area and home to approximately 40% of the city's population, characterised by low to medium residential density sprawling settlement, with relatively low levels of economic activity and generally poor connectivity to the urban areas and economic opportunities to the north;
- An economically strong northern corridor, characterised by a major mobility spine supporting accessibility routes, and now a regional mass transit system (Gautrain);
- An area of mainly residential development, predominantly medium to upper income, structured around a series of nodes and radial links between the inner-city and the ring road (N1);
- An area of predominately lower income, traditional "blue collar" residential settlement south of the inner-city area, separated by the mining and industrial belt;
- A series of marginalised, predominantly low income, residential areas that have grown in areas outside of the main urban structure;
- A growing fringe of low residential density, and generally spatially exclusive, housing development on the northern fringe of the city;
- A dispersed and relatively low intensity area of settlement to the far south of the city.
- Pockets of vacant, under-utilised, well located pieces of land such as those in the Modderfontein area.

In interpreting the current city structure morphologically, Johannesburg displays a unique structure of inverted polycentricity, inherited largely from its complex history. This structure is characterised, inter-alia, by peripheral or satellite nodes larger than the main urban centre (inner city). It is also characterised by an illogical density gradient, where core economic areas are surrounded by large low to medium density residential areas. Some high density residential areas are located on the outskirts of the city, and far from job and economic opportunities. This spatial contradiction translates into a job housing mismatch and has a significant impact in terms of social exclusion, energy and carbon intensity (by increasing travel time and travel distances from jobs to housing) and economic productivity (by jeopardising agglomeration economies) with most commuter flows being directed to the city centre.

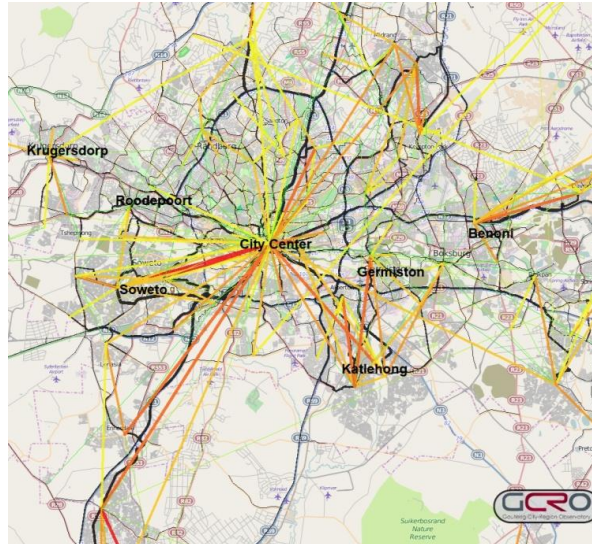


Figure 7: Commuting flows in the City of Johannesburg. Source: GCR0

5.2. Urbanisation

During apartheid, various measures were used to suppress urbanisation in South Africa, including the pass system and legislation such as the Group Areas act of 1950. This led to a pent-up demand for access to urban areas. The end of Apartheid saw a surge in urbanisation in South Africa, related to meeting pent up demand.¹⁵ Much of this growth happened in South Africa's metropolitan municipalities, including Johannesburg. Data from the United Nations however suggests that the post-apartheid 'boom' in population for the city has ended, and that while population growth will continue, it will be at much lower rates than experienced in the 1990s and early 2000s (Figure 8).

According to population data from the 1996, 2001 and 2011 censuses, Johannesburg is continuing to grow, although at a decelerating rate. From 1996 to 2001 its population grew at an average of 4.1% per annum while from 2001 to 2011 it grew on average at 3.2% per annum. The United Nations predicts a further deceleration of growth, to 2% for the period 2015 to 2020, 1.3% for 2020 to 2025 and 1% for 2025 to 2030.

¹⁵ Harrison, P., Gotz, G., Todes, A., & Wray, C. (2014). Materialities, subjectivities, and spatial transformation in Johannesburg. In P. Harrison, G. Gotz, A. Todes, & C. Wray (Eds.), *Changing Space Changing City: Johannesburg After Apartheid* (pp. 2-41). Johannesburg: Wits Press.

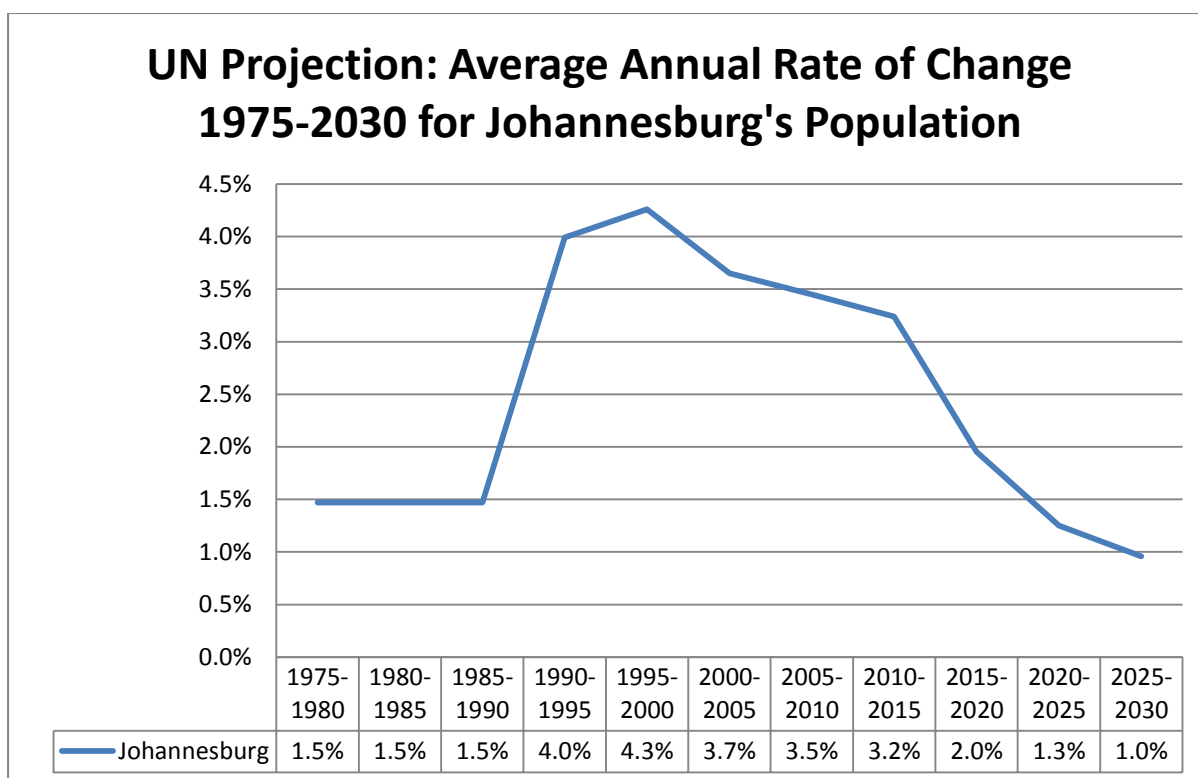


Figure 8: Population Growth Rates for Johannesburg, 1975-2030 (UN Population Division 2014¹⁶)

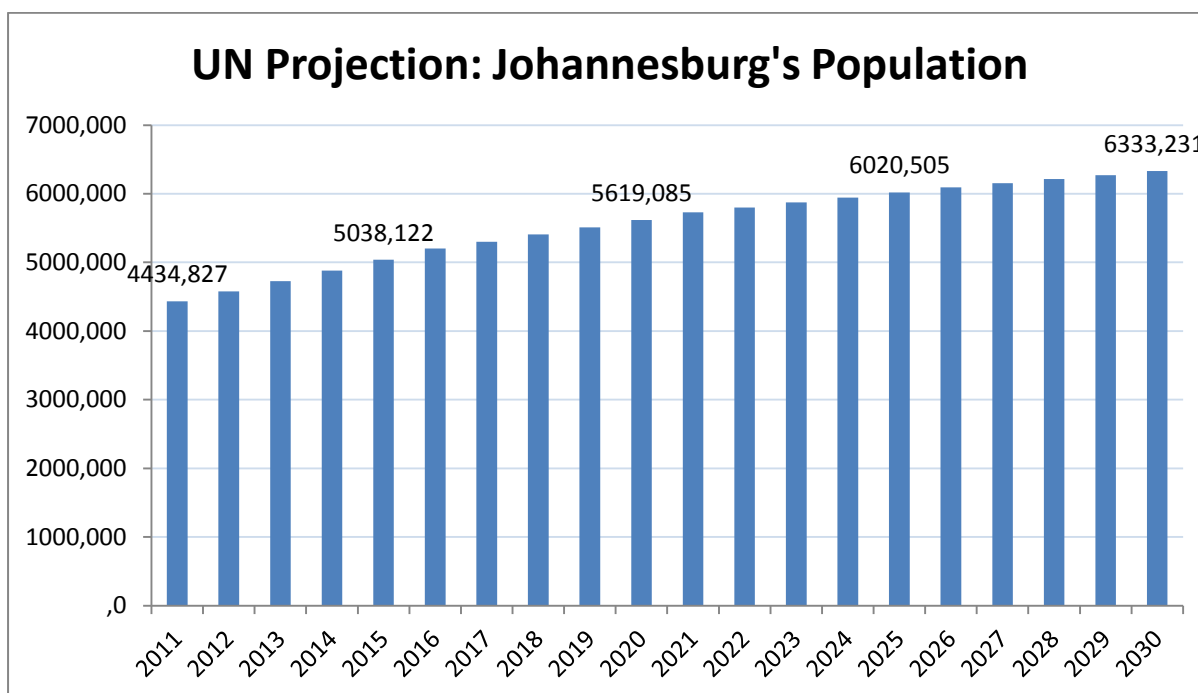


Figure 9: UN Projected Population Growth for Johannesburg using census 2011 as the starting point¹⁷

¹⁶ United Nations, Department of Economic and Social Affairs, Population Division (2014). World Urbanization Prospects: The 2014 Revision, CD-ROM Edition.

Population growth is certain, but the rate of growth is less clear. Natural growth may account for about 75% of future growth, with immigration, domestic and international, making up the rest¹⁸. There are many projections for the city of Johannesburg's population over the next 25 years. These are summarised in the City of Johannesburg Consolidated Infrastructure Plan of 2013, with the highest estimate being just under 7 million people in the year 2030. As a city, it is prudent to plan for higher rather than lower estimates. This should be done cautiously however, to prevent the over-investment in infrastructure that could exceed needs. With growth rates declining, the number used to model different growth scenarios for this SDF was 7 million people by 2040 (discussed later in the document).

From a growth management perspective, the critical challenge moving forward is threefold. The city needs to concurrently meet the backlog of those living in poverty and unsatisfactory living conditions; accommodate projected population increases; and maintain and continually adapt (for greater inclusion) those parts of the city that are performing well.

5.3. Poverty, Inequality and Unemployment

An important factor that emerges when comparing Johannesburg to other cities relates to the urban inequality that exists. Although Johannesburg enjoys higher incomes than other parts of the country, in terms of the Gini coefficient, it ranks as one of the most unequal cities in the world¹⁹. Although there is some evidence (across censuses and from surveys such as the GCRO's Quality of Life Survey) that quality of life is improving across the city region (in Johannesburg, because of successful service delivery and the introduction of grants²⁰), the fact that the wealthy have gotten richer at a faster rate than lower income groups, has driven inequality.

Johannesburg is certainly the economic centre of South Africa. The city is host "to two-thirds of all South Africa's corporate headquarters and 60 per cent of the top 100 companies"²¹. The city also contributes 17% of the country's economic output. Thus, while economic indicators suggest Johannesburg is well placed in terms of its competitiveness, inequality in the city (specifically the spatial inequality that is apparent in its structure) is a tough reality that must be addressed.

"In 2013 it is estimated that 1.5 million people or 33 percent of the population of the City of Johannesburg still live below the upper poverty line as defined by StatsSA".²² This is approximately

¹⁷ This was calculated using the Census 2011 population figure for Johannesburg Municipality, and then projected using the UN Growth Rate Predictions from Figure 9: United Nations, Department of Economic and Social Affairs, Population Division (2014). World Urbanization Prospects: The 2014 Revision, CD-ROM Edition.

¹⁸ Everett, D. (2014). Poverty and Inequality in the Gauteng City-Region. In P. Harrison, Gotz, G, Todes, A, & C. Wray (Eds.), *Changing Space, Changing City: Johannesburg after apartheid* (pp. 63-81). Johannesburg: Wits Press.

¹⁹ UN Habitat. State of the World's Cities 2010/2011 Bridging The Urban Divide

²⁰ Everett, D. (2014). Poverty and Inequality in the Gauteng City-Region. In P. Harrison, Gotz, G, Todes, A, & C. Wray (Eds.), *Changing Space, Changing City: Johannesburg after apartheid* (pp. 63-81). Johannesburg: Wits Press.

²¹ Un Habitat 2010. State of the World's Cities 2010/2011 Bridging The Urban Divide. Pp.20.

²² Economic Development Strategy for the City of Johannesburg Department of Economic Development, City Johannesburg. 2015. Pp. 6.

465,478 more people than in 2003. Despite 1996 to 2004 being characterised by rapid economic growth, the annual estimates of people living in poverty have increased consistently from 2003 to 2013, with a slight decrease observed in 2007 and 2012. The percentage of Johannesburg's residents living in poverty increased from 30% in 2003 to 33% in 2013.

The southern parts of the city have consistently reported the highest percentage of people living in poverty. This includes the areas of Ennerdale and Orange Farm, where unfavourable living conditions persist. These areas are characterised by low economic activity and long travel distances to seek employment. Many residents also do not have qualifications so seek unskilled and low paying jobs. The spatial location of these areas perpetuates poverty in them and reinforces inequality.

Parts of the northern areas of the City, such as Randburg, Sandton and Rosebank, display the lowest percentage of people living in poverty. These areas are historically better located with regard to jobs, and are better serviced.

According to recent employment data by Statistics South Africa, the South African unemployment rate is over 25%, while the city's unemployment rate is also about 25%.²³ According to the Census 2011, the City of Johannesburg youth unemployment rate decreased from 45.5% in 2001 to 31.5% in 2011. When considering all people of working age in the city, 40% are unemployed. Although this rate is lower than that of other metros, it is still high.²⁴

5.4. Housing backlog: improving the lives of informal dwellers

Significant African cities such as Johannesburg have the vast challenge of improving the lives of those living in informal dwellings and closing the gap between rich and poor. If Johannesburg is to become an inclusionary arrival city, it needs to make space for the urban poor majority through good planning initiatives such as densification, diversification and integration.

While the population is growing, there is an existing housing backlog in the city: those who are informally housed in often inadequate living conditions. Informal dwellings include informal settlements, informal backyard dwellings, and formal buildings that are informally occupied. While these areas are often well located (a reason that people have chosen to live there) they are often poorly serviced (if at all), living conditions are often inadequate, and they can pose risks to their inhabitants, from fire to flooding, illness and crime.

Due to the nature of informality, reliable statistics are difficult to achieve, however census data does provide some indication. According to the Census 2011, 17.4% of Johannesburg's households live in informal settlements or informal backyard dwellings. The census indicates that there are 125,800 households living in informal settlements, and some 124,000 households living in informal backyard homes. Importantly the number of households living in informal settlements has declined from 2001 to 2011, while households living in informal backyard dwellings have increased significantly (Table

²³ Statistics South Africa. (2015). *City of Johannesburg*. Retrieved October 15, 2015, from <http://bit.ly/statscoj>

²⁴ Economic Development Strategy for the City of Johannesburg Department of Economic Development, City Johannesburg. 2015

1). The decline in households living in informal settlements may be due to government housing and upgrading programmes, and due to a move to backyard accommodation. Regardless of this, the backlog is significant and needs to be addressed.

Table 1: Households Living in Informal Settlements and Informal Backyard Dwellings, 2001 to 2011 (Source: Census 2001 and 2011, Quantec EasyData)

Year	Informal Settlements (households)		Informal backyard dwellings (households)	
	Number	% of all CoJ Households	Number	% of all CoJ Households
2001	133,400	12.7%	78,572	7.5%
2011	125,788	8.8 %	123,977	8.6%
% change 2001 to 2011	-5.71%		57.79%	

The SDF reiterates the position supported in national policy (e.g. Breaking New Ground, the National Development Plan, National Development Outcome 8 and the National Upgrading Support Programme) and City of Johannesburg Policy (e.g. SHSUP and the City's Informal Settlement Regularisation Policy) that in-situ upgrading of informal settlements should be the first option for intervention, with relocation only applied where upgrades are not possible and where the land inhabited is unsuitable for human habitation. When relocation is necessary, distances should be kept to a minimum (within 2 km). Moving people far from where they live moves them away from the opportunities, livelihoods, relationships and amenities that prompted them to locate there in the first place.

Informal back yarding must also be addressed where it yields sub-standard living conditions. The aim here should not be to do away with back yarding. The practice of backyard rental housing provides valuable income for home owners, provides affordable shelter for the urban poor, and densifies low density urban areas. The City should see the process of back yarding as a positive one that can be adapted and improved to maintain livelihoods and provide affordable housing in the city in a way that provides an adequate standard of living, access to economic opportunity and improved quality of life for low income urban dwellers.

5.5. Shortcomings of the Current City Structure

The spatial structure of the city presents a number of significant challenges to future urban development processes, most notably:

- high levels of spatial inequality and a mismatch between jobs and housing;
- fragmentation and spatial disconnection;
- urban sprawl and limiting densities;
- limited diversity and inefficient land use patterns;
- increasing pressure on the natural environment.

Understanding these spatial shortcomings, the dynamics that drive them and the opportunities that exist for addressing them provide a basis for moving forward with a new transformative vision for the city.

5.5.1. Spatial Inequality and the Job-Housing Mismatch

Spatial inequality remains a defining characteristic of the settlement pattern of Johannesburg. When job density is matched with housing density (i.e., places of work vs residential areas) the following is revealed:

- Only 0.3 % of the metropolitan area matches a high density of jobs with a high density of population
- 3% of the metropolitan area hosts 1/3 of the jobs
- 5% of the metropolitan area hosts 1/3 of inhabitants

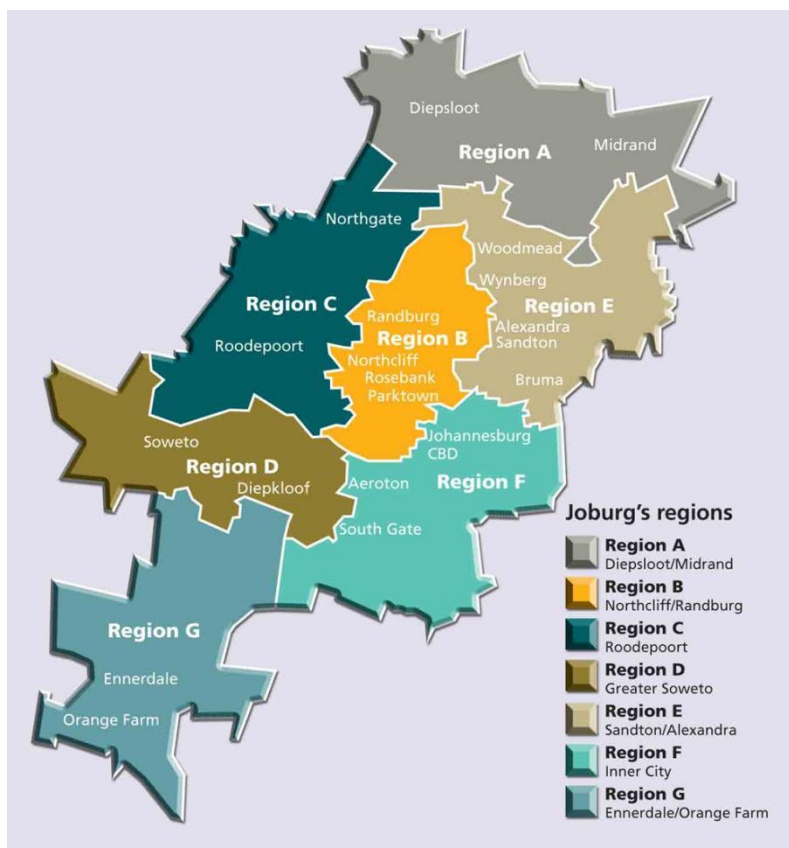


Figure 10: Administrative regions in the City of Johannesburg

There is also significant variation in the economic output across the city's regions. Regions E and F (which house Sandton and the Johannesburg CBD respectively) account for 50% of the city's

economic output. Together regions A, B and C contribute 37%, while regions D and G only contribute 13%, despite housing significant proportions of the metro's population.²⁵

This illustrates a job-housing mismatch in the city's spatial form, a significant contributor to inequality. When population densities are overlaid onto a deprivation map (Figure 11), it reveals that, generally, the highest densities are in the most deprived areas which are far from areas of economic opportunity. This spatial inequality is inherited from the apartheid planning which was based on racial and functional zoning.

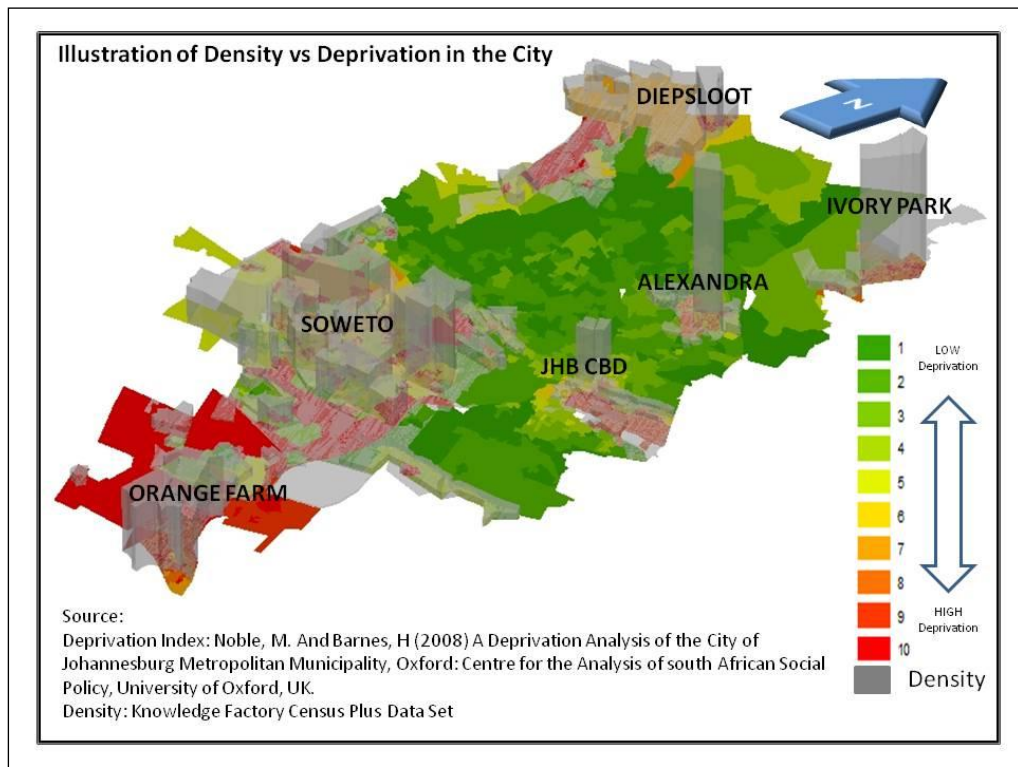


Figure 11: Deprivation (green to red) and Densities (grey columns)

²⁵ Economic Development Strategy for the City of Johannesburg 2015

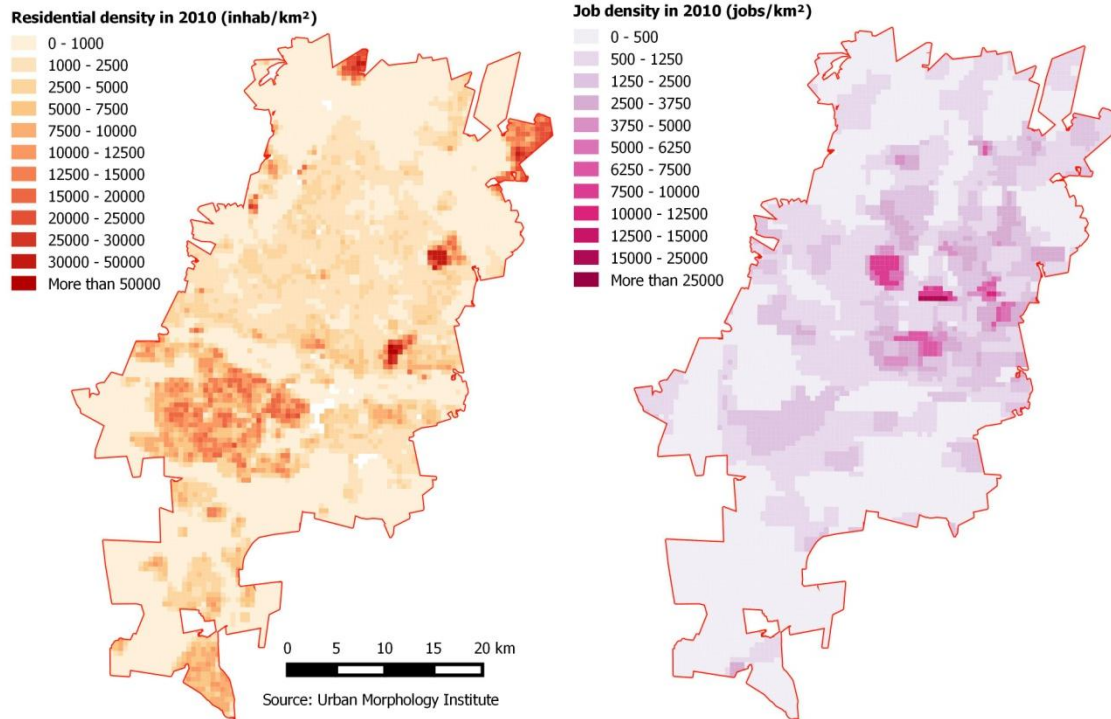


Figure 12: Population density (left) and formal job density (right) in the City of Johannesburg. Source: Urban Morphology Institute

Traditionally, housing for low income residents has been delivered in areas that are distant from main economic sectors on cheap and available land, rather than on land that is optimal for urban development. Continuing to meet housing demand in this manner not only exacerbates existing socio-economic disparities in the city, but entrenches a growing pattern of spatial inequality.

Overcoming spatial inequality in Johannesburg requires rethinking urban systems such public transport (formal and informal) and putting in place systems that create a high density of jobs matched with a high density of housing. Here, a move must be made from merely transporting people to jobs each day, to creating housing opportunities near jobs, and creating job intensive economic opportunities in high density residential areas. This must be done through matching local skills with relevant economic growth opportunities at metropolitan and regional scales.

While it is recognised that in the short term people do need to be transported to work opportunities (through efficient public transport), in the medium to long term, people should be able to work near to where they live. This is particularly important for the urban poor who are generally those who must travel farthest at great cost to places of work and to access social services such as education and healthcare.

A key concern here is to balance the supply of new housing and related social infrastructure, with the creation of new employment and related economic opportunities. This is particularly significant when one considers the anticipated socio-economic pattern of housing demand, which is predominantly in the lower income sectors of the population. The City's Sustainable Human Settlements Urbanisation Plan (SHSUP) estimates housing demand for Johannesburg up to 2030 noting that the majority (62%) of housing demand will be for low income households (earning less than R3500 income per month). If this housing delivery is to improve the socio-economic

circumstances of beneficiaries over time it must be located close to job opportunities and not on peripheral green field sites.

Future housing delivery must be considered in the context of the future spatial economy if the city is to address the job-housing mismatch that exists. A recent study undertaken by the city has shown that Johannesburg can expect positive annual growth across all sectors and regions except the Mining sector for the period 2013-2018.

It is anticipated that the finance and business sector will grow much faster than all other sectors (in terms of GDP), followed by the electricity sector, transport and trade in all regions except Region G where transport, trade construction and manufacturing sectors are expected to grow relatively faster than the electricity sector. Notable is that the least productive region in the City (Region G) is expected to have relatively much higher growth rates (GDP) than the rest of the regions. This indicates the low base it is starting from however, rather than suggesting large scale job creation.

The Col's economy is primarily dependent upon the finance and business sector, community services, trade and manufacturing. This suggests a need for economic transformation that creates opportunities in other sectors that are currently not performing well in the City.

A job density analysis shows sharp patterns of spatial concentration of formal jobs in the city:

- One third of the formal jobs are concentrated in 56 km², which represents 3% of the urban area
- One third of the formal jobs are located in 324 km², representing 21% of the urban area
- One third of the formal jobs are scattered in 1240 km², representing 75% of the urban area.

The spatial concentration of formal jobs in Johannesburg is much higher than the spatial concentration of housing. This sharp concentration of jobs is an asset for Johannesburg and will feed economic growth if it is articulated with an efficient transportation network in the short term and by increased housing opportunities in close proximity in the long term.

5.5.2. Fragmentation and Spatial Disconnection

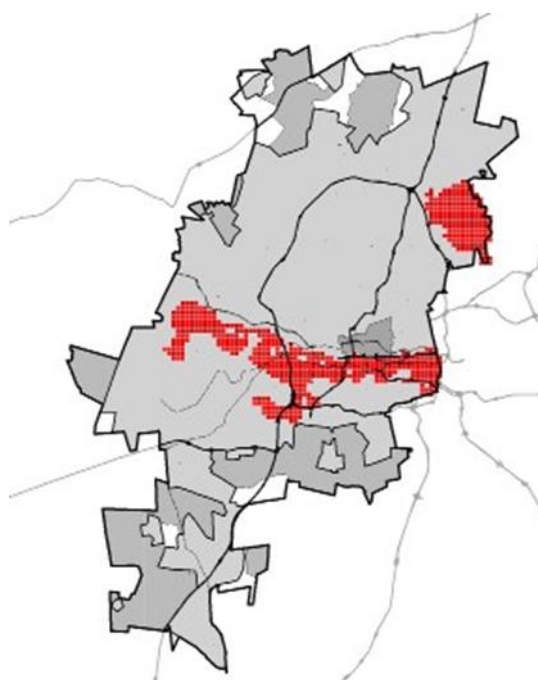


Figure 13: Key spatial Discontinuities in the Johannesburg Urban Structure

Spatially, the city of Johannesburg displays a high degree of fragmentation that is evident across all scales of development. At the City-Region and metropolitan scale, there is a broad divide between northern and southern development areas, a pattern that is evident across Gauteng.

Two key discontinuities in the urban fabric present significant development “vacuums” in the urban system. The first is the mining belt.

While the whole mining belt represents urban fragmentation in the city by dividing it north/south, the effects in the western parts of the belt are most prominent. In particular, it separates Soweto from economic centres along the western corridor between Krugersdorp (in Mogale City) and the inner-city running through Roodepoort.

The second key discontinuity lies to the north-east of the city, around the areas of Modderfontein²⁶, Frankenwald and Linbro Park. This area represents a key opportunity to create an east-west connection to Ekurhuleni and the OR Tambo Aerotropolis. For various reasons, these areas have remained undeveloped as the city has grown around them, notably along the corridor between Johannesburg and Pretoria.

At more localised levels, the issues of fragmentation and spatial disconnection are evident, very often as a result of patterns of urban development. The trend in the northern parts of the city towards ‘security estates’ has major implications in this regard, effectively sterilising large parts of the urban system and creating significant buffers to sustainable and inclusive urban form.

²⁶ Which is currently being developed.

In analysing the connectivity of the street networks in the City of Johannesburg, a mapping exercise was undertaken showing intersections per km². The main issue highlighted by this analysis is that most of the metropolitan area (93%) falls below the threshold of 100 intersections per km², an internationally recognised connectivity benchmark to support walkability.

The high level of spatial inequality in the city is reflected in the urban spatial form and in high levels of securitisation with the proliferation of strip malls and gated office parks and townhouse developments. These are characterised by controlled street patterns that have moved from the historically open grid to the clustered cul-de-sac, loop and 'lollipop' configuration contributing to fragmentation and low levels of walkability.

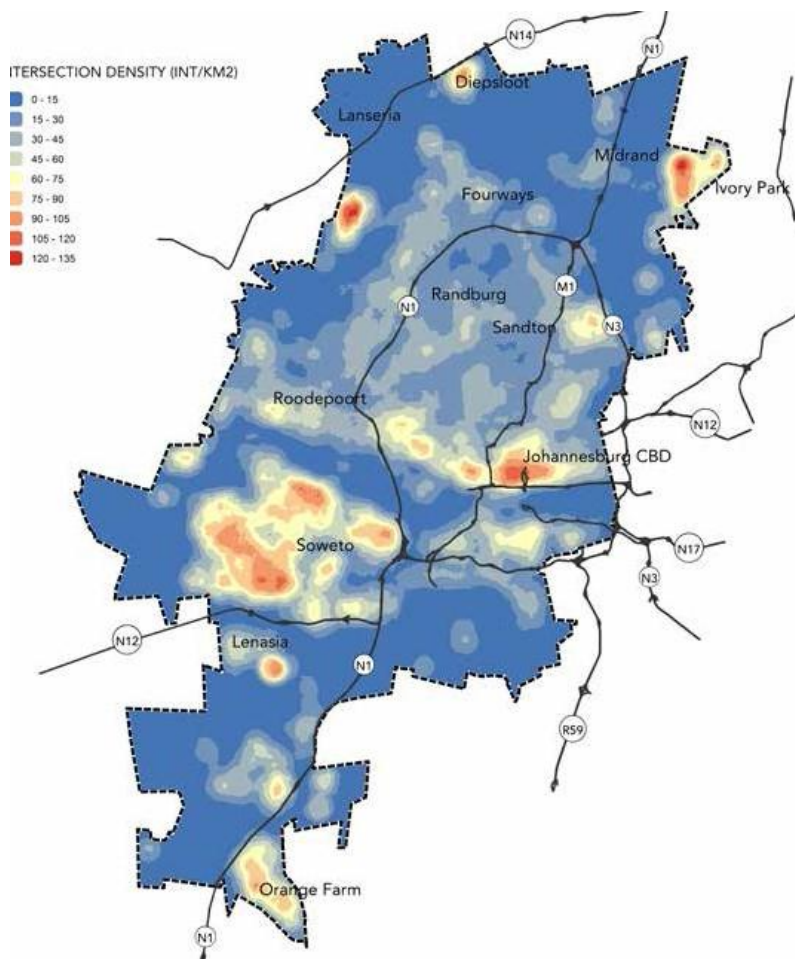


Figure 14: Intersection density across Johannesburg

5.5.3. Urban Sprawl & Limiting Densities

Urban growth in Johannesburg has not occurred in a compact manner. Despite the fact that over the last 20 years the city has become denser (with population having grown at a faster rate than the built up area footprint²⁷) the city has grown in a fairly sprawled fashion. This is due to both apartheid

²⁷ Angel, S., Parent, J., Civco, D. L., & Blei, A. M. (2010). *The Persistent Decline in Urban Densities: Global and Historical Evidence of 'Sprawl'*. Cambridge, MA: Lincoln Institute of Land Policy.

and post-apartheid planning. Apartheid planning sprawled the city by design, placing large portions of the population in peripheral 'dormitory townships', while post 1994, there has been dispersed and piecemeal growth in the city (including gated and car oriented developments and public housing developments on the periphery). As such, densities and concentrations of jobs and people have not adequately developed to support a sustainable city. There have however been successes in diversifying and densifying certain parts of the city.

A density analysis shows that one third of the population (1.45 million inhabitants) is concentrated in 5% of the urban area (87km²), with a residential density higher than 7500 inhabitants per km². This figure is to be compared with international benchmarks and best practices. Successful compact cities display a much higher density in the urban core such as Paris with 21,200 people/km² or Manhattan in New York City with 27,000 people/km².

Table 2: Variable population densities across the City of Johannesburg (Census, 2011)

AREA	POPULATION DENSITY (People/ km ²)
Hillbrow	68 400
Alexandra Ext. 47	52 900
Yeoville	19 400
Killarney	12 300
Cosmo City	4 500
Radiokop Ext. 10	3 200
Houghton Estate	1 100
Blue Hills AH	350

The City's average population density of almost 2,695 persons per km² translates into a wide range of residential patterns, both formal and informal at low and high densities. Residential densities vary from 10 du/ha in lifestyle (golf, equestrian, and country) estates to 40-70du/ha in townhouse and cluster developments. It must be noted that the built up area only makes up a portion of the entire municipal area. As such, the built up area has a population density of between 5,700 and 6,500 people per square km²⁸.

²⁸ Harrison, P., Gotz, G., Todes, A., & Wray, C. (2014). Materialities, subjectivities, and spatial transformation in Johannesburg. In P. Harrison, G. Gotz, A. Todes, & C. Wray (Eds.), *Changing Space Changing City: Johannesburg After Apartheid* (pp. 2-41). Johannesburg: Wits Press. Pp. 9.

Compared to established residential areas of the City, newer townhouse and cluster developments have significantly higher average residential density. These new developments are focused on private vehicle use however and are frequently located in single use clusters, with limited access to public transit infrastructure. As such they generally do not foster walkable neighbourhoods and have not been met with the requisite public infrastructure (e.g. public schools, clinics etc.).

Important to note is the fact that some of the highest residential densities in the city are some distance from the core, and from economic activity. Soweto, Orange Farm, Diepsloot and Ivory Park for example reflect relatively high residential densities but are all limited in their land use diversity. Erven of 250-350m² are common in these areas typically translating into densities of 40-60du/ha or 10,000 to 20,000 people per square km.

UN-Habitat proposes at least 15,000 people per km², (150 people/ha) to make optimal use of scarce land both on the city and neighbourhood scale. **It must be noted that densification on its own cannot make cities more liveable and sustainable, but that this densification should happen in conjunction with a mixing and intensification of land uses.** In this light, diversification is needed in high density residential areas, and residential densification is needed in core areas with access to economic activity and city infrastructure (including social services, public transit and bulk infrastructure).

Extensive analysis of prevailing patterns in land use change, based on different types of development applications, has been undertaken by the city, with some key trends identified:

- Subdivision of land is not necessarily related to the public transportation network and is most prevalent within the northern suburbs of the City and within the ring of freeways to the north and south of the CBD (Figure 18).
- 62% of rezoning applications for higher density development are within walking distance of nodes of the City or public transportation network.
- Residential building applications accounted for more than 96% of applications submitted and 75% of the building area approved.
- The spatial shift of more affordable units (i.e. less than R 550,000 per unit) is further from the core economic centres of the City and closer to more marginal locations.
- Market trends indicate a demand for apartment block / 'loft-living' developments in well-located areas (within and around nodes).
- High levels of sprawl in Johannesburg increase costs of services and of goods such as food. Ultimately, these culminate in higher costs to households and businesses. Compact, medium to high-density settlements are more sustainable in the use of resources as well as waste and emission profiles.

There are diverse consequences of sprawl for urban governance in Southern Africa. These include increased costs of administering electricity, waste management, water, sewage and transport services through centralised systems. Urban sprawl significantly contributes to climate change. Sprawled and fragmented urban forms have very high per capita carbon emissions and energy consumption. This relates firstly to transportation: low density and fragmentation create higher average travel distances, and thus higher per capita energy consumption. Second, there are higher energy costs in moving goods, services and waste into, around and out of the city.

Beyond energy and carbon emissions, low densities and sprawled single use settlements impact infrastructure needs per capita increases when density decreases. Comparing a compact city like Seoul or Tokyo to Johannesburg, road network investment length (and cost) per capita is multiplied by 6 and waste water network length and costs are multiplied by 3.5. At the same time, economic productivity per capita decreases as density (especially job density) declines. Models for U.S. states and European regions suggest that productivity increases by 4.5 to 5 percent when employment density is doubled²⁹.

	tCO ₂ e/cap	tCO ₂ e/\$GDP
Paris	5.2	112
Seoul	4.1	179
Tokyo	4.9	146
Johannesburg	6.2	670
Average Chinese city	10	1100

Table 1: CO₂ emissions per capita and per GDP in 6 cities

Figure 15: CO₂ emissions per capita and per GDP in 6 cities (Source: Urban Morphology Institute)

5.5.4. Limited Diversity and Inefficient Land Use Patterns

The City of Johannesburg covers 1,645 km² and is characterised by a wide range of land uses and patterns, shaped over time by myriad factors, including geology (the basis of the mining industry), politics (the segregating policies of apartheid planning), industry and more recently national, regional and international migration.

The pattern of land use in the city is dominated by residential development, accounting for almost 30% of total settlement area. Economic activity, or land use that generates jobs, accounts for only 10% of the developed area. This includes land developed for business, commercial, industrial and demarcated mining land.

²⁹ Ciccone, A., & Hall, R. (1996). *Productivity and the Density of Economic Activity*. Retrieved November 3, 2015, from Stanford University: <http://web.stanford.edu/~rehall/Productivity-AER-March-1996.pdf>

The two maps in Figure 16 below display the spatial structure of land use in Johannesburg. To map the local diversity of land use, land use diversity indexes have been calculated within a 500m x 500m grid. The higher the land use diversity index, the higher the mix of uses (commercial, residential or community use). These maps show that most of the city has a land use diversity index below 0.8, which is considered as the best practice benchmark. The separation of land uses contributes to increasing average distances travelled. Hence, separation of land uses and zoning impact on (1) climate and energy intensity, by increasing energy needs for transportation, (2) social inclusion, by making jobs and social infrastructure less accessible to low income households and (3) economic productivity, by separating companies activities from labour pools and limiting agglomeration economies³⁰. High levels of land use diversity are paramount, especially around transit stations. To reap the full benefits of public transit investment, the target for land use diversity indexes within 1km catchment areas should be set within the 0.80 - 0.90 range, which will ensure high levels of mixed use in close proximity to transit infrastructures.

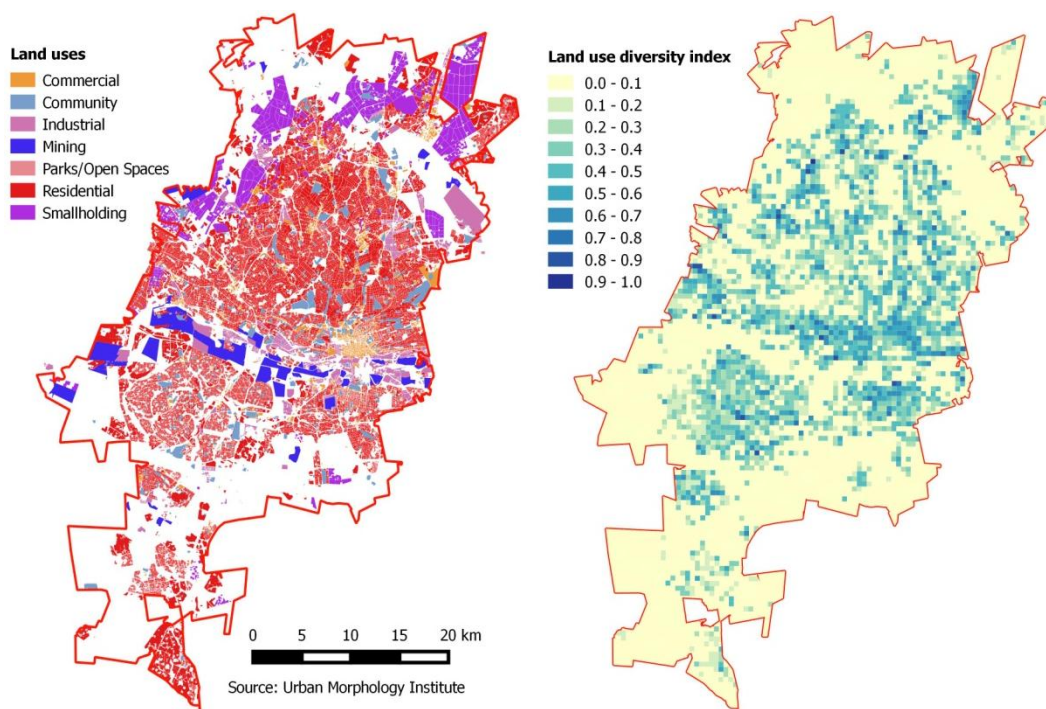


Figure 16: Land uses (left) and land use diversity index (right). Source: Urban Morphology Institute

5.5.5. Increasing pressure on the natural environment

The natural environment provides many vital and valuable (socially and financially) environmental services in the City of Johannesburg.

Ecosystem services provided by green infrastructure include:

³⁰ Ewing, R., & Cervero, R. (2010). *Travel and the Built Environment*. Journal of the American Planning Association, 76(3).

- **“provisioning services** that relate to the products derived from an ecosystem, including food, fibre and fuel, genetic resources, medicines and pharmaceuticals
- **regulating services** that involve the benefits derived from the regulation of ecosystem processes, such as air quality regulation, climate regulation, water regulation, erosion regulation, disease regulation, pest regulation and natural hazard regulation
- **cultural services** are the benefits people obtain from ecosystems such as reflection, recreation, inspiration, and aesthetic enjoyment, and include cultural diversity and educational values, and
- **supporting services** are those necessary for the production of all other ecosystem services, such as soil formation, photosynthesis, primary production, nutrient cycling and water cycling.”³¹

As such, these areas are not merely nice to have, but essential in the functioning of the city. If the services are lost, they will need to be replaced, at great cost (in terms of capital outlay and operating cost) by city authorities. A 2013 report by the GCRO for example, calculates the value of ecosystem services provided by open space in Johannesburg at between R 38,6 million and R 77 million per annum. The report also gives a current value of this open space, of between R966 million and R 1,9 billion.³²

Of the 164,499.6ha of the Johannesburg Municipality, only 54,081.7ha (32.9%) remains in a natural state (South African National Biodiversity Institute). There are a total of 10 reserves in the City covering only 993.7ha (0.6% of the municipality). This represents an inadequate level of protection for the city’s ecosystems.

³¹ Schäffler, A., Christopher, N., Bobbins, K., et al. (2013). *State of Green Infrastructure in the Gauteng City-Region*. Johannesburg: Gauteng City-Region Observatory. Pp. 126.

³² Same as above.

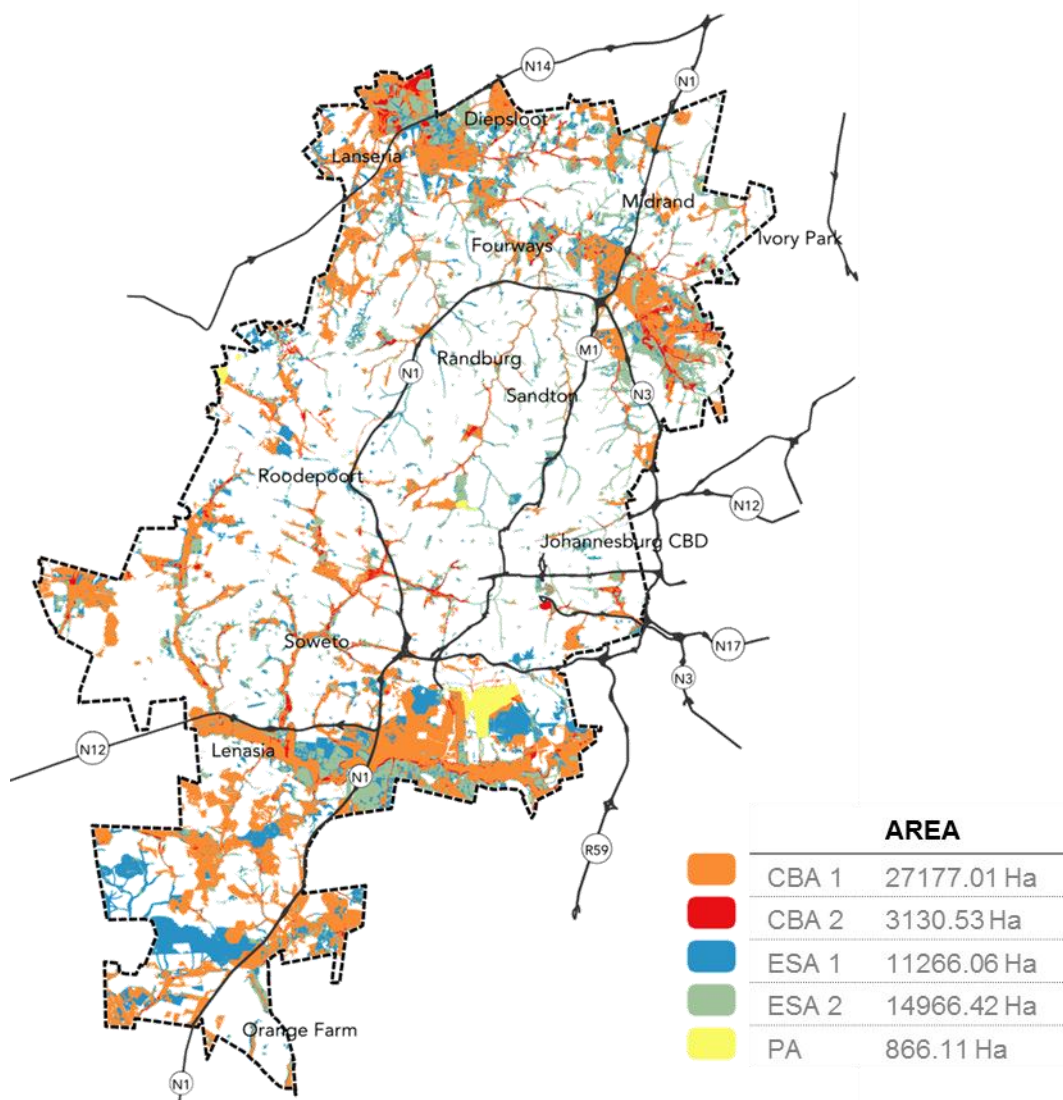


Figure 17: Critical Biodiversity Areas in the City of Johannesburg

In response to concerns about the rapid loss and fragmentation of open space resources, the loss of protective vegetation cover, the associated loss of ecosystem goods and services, and the need to respond appropriately to development pressures within the City in a sustainable way, JMOSS (Johannesburg Metropolitan Open Space System) 1 (2002) and JMOSS 2 (2004) were developed. JMOSS 1 comprised an audit of open spaces and classification of these in terms of their primary (Ecological) or secondary (Recreational/parks) value. JMOSS 2 contained policies for open space provisioning and recommendations for all forms of urban greening.

What is particularly significant for this SDF is the spatial trend that is emerging with regards to current development as reflected in the pattern of development and township establishment applications, and the spatial distribution of remaining environmental and ecological resources (Figure 18).

It is imperative the SDF ensures that current open space systems and ecological resources are considered as structuring elements and assets to guide and integrate future urban development,

rather than expendable land for development. This is critical in the context of climate change and the need for resilience in the future city.

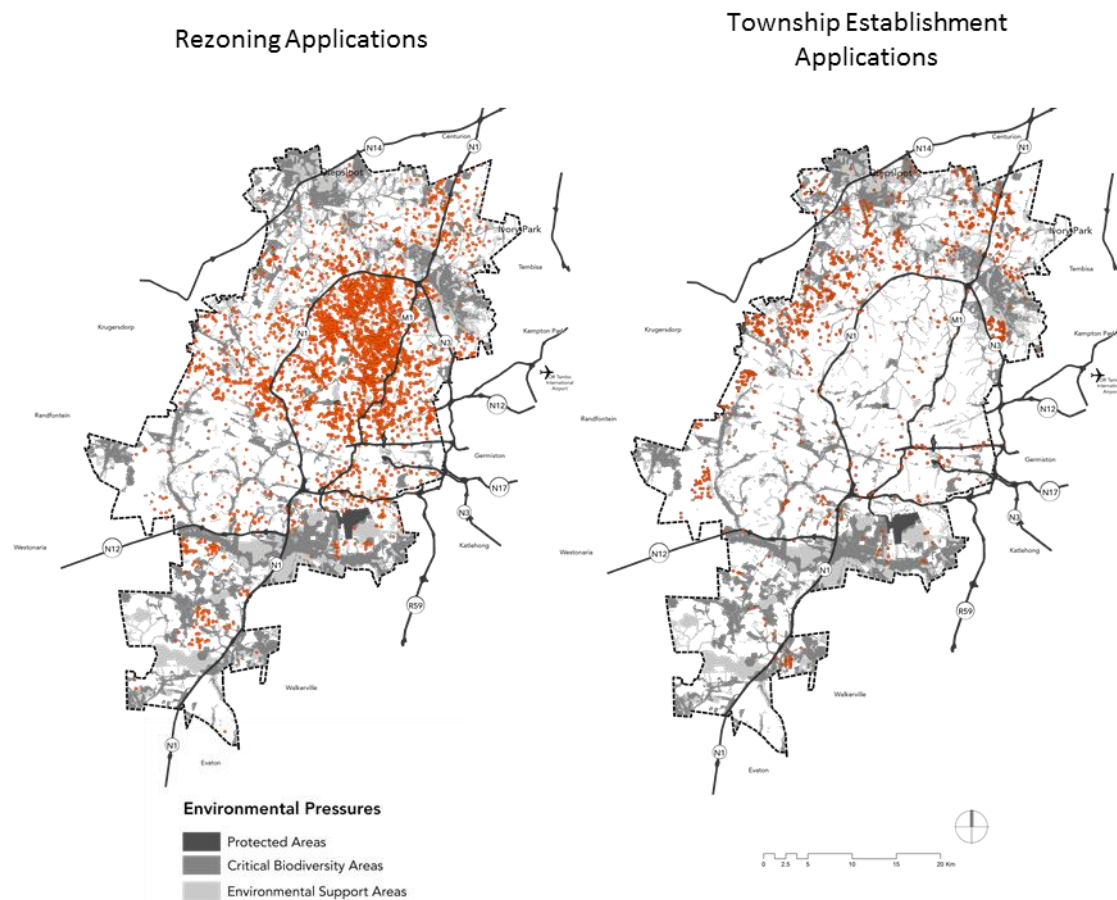


Figure 18: Critical Biodiversity areas (CBA) and development trends

5.6. Implications of the prevailing development pattern

Urbanisation is a reality to which the city's spatial policy and other city policies must respond. It is evident that the current spatial structure and development patterns in the city require revisiting if we are to meet our future urban challenge in a manner that is responsive to the identified policy principles of spatial justice, spatial resilience, spatial sustainability, spatial efficiency, spatial quality and spatial transformation. Although current policy seeks to address the challenges that face our city; the prevailing development pattern is still based on:

- sprawl and disconnection,
- a spatial mismatch between residents and jobs,
- monofunctional land uses with low diversity at the local scale,
- a finite and threatened natural structure with social and spatial fragmentation accentuating the divide between incomes and populations.

The current pattern of job dispersal within the city results in and exacerbates: socio-economic exclusion; poor mobility; high congestion; high energy and carbon intensity; high infrastructure costs and jeopardises urban productivity.

6. A Future City

Chapter Summary: For the SDF review process three alternative spatial trajectories were modelled, providing scenario analysis of each³³. Each scenario was based on the hypothetical growth of Johannesburg from 4.3 million to 7 million inhabitants by 2040. The first scenario described a 'business as usual' scenario where the city continues to sprawl and disperse, scattering population and jobs across the metropolitan area with a high level of fragmentation. The second model described a 'corridor development' scenario where future development occurred along an expansive public transport network linking peripheral marginalised areas of the city to the inner city. The third scenario is a 'compact polycentric' model with ambitious intensification (more jobs, residents and services) in focus areas with high access to transit infrastructures (such as the inner city). The compact polycentric city model performed significantly better than the other two in terms of economic, environmental and social impact indicators. Therefore the spatial vision outlined in the review of the SDF 2040 is a compact polycentric city model, opposing spatial inequality and long commuting distances, promoting a denser, diversified, spatially just city, where people have easy access to jobs and urban amenities, and the natural environment is protected. The vision of the polycentric city model is built around the principles of: compactness, inclusivity, connectivity, efficiency, resilience, sustainability and job creation.

6.1. Towards a Spatial Vision

As is evident from the preceding discussion, the City of Johannesburg faces numerous challenges moving forward, and the SDF Review process must provide a basis for dealing with the key issues confronting the city.

The **spatial transformation** of Johannesburg will require a focused shift from the apartheid legacy and spatial patterns of the past to unlock the potential of the city as a focus for a new urban future. Today's decisions and interventions will begin transforming the urban spatial and social form into a particular development direction for future decades. Real opportunities exist for embracing a new urban paradigm that is more conducive to both the present and long-term needs of Johannesburg's population.

The challenge for spatial planning and transit infrastructure will thus be to slow the shift towards private cars and balance it by reducing average travel distances and times and supporting a modal switch towards public transit.

Johannesburg now has an opportunity to seek policy and strategic directions that incorporate long-term sustainability for social, environmental and economic development that will better deliver than the existing urban paradigm has done so far.

To address these priorities the following goals for transformation are essential:

³³ A comprehensive explanation of this analysis is contained in one of the annexure papers (What do we understand about the future of Johannesburg: Scenarios and Strategies)

- From sprawl, fragmentation and inverted polycentricity to compact polycentricity
- From job-housing mismatch to matching people, jobs and skills spatially
- From mono-functional land uses to mixed use densities
- From spatial disconnection to a connected city
- From limited diversity (zoning) to mixed land use, form based codes and community development
- From inefficient land use and unsustainable land markets to synchronising public and private investment around transit stations, nodes and priority transformation areas
- From diminishing environmental resources to protecting the environment as a natural, social and economic asset
- From gated private spaces to accessible public spaces

The compact polycentric city model promoted in the Spatial Development Framework 2040 embodies all of these transformations into a single spatial vision, and is based on the intertwined concepts of the new image of Johannesburg as a compact, inclusive, connected, resilient and generative city.

6.1.1. A Compact Polycentric Urban Model

The three main scenarios (Figure 19) for the future shape of Johannesburg that were tested as possible models are:

- Business as usual (sprawl): dispersal and scattering of population and jobs across a vast metropolitan area of 1645 km² with a high level of fragmentation.
- Linear development: concentration of population and jobs along extensive transit lines, and higher concentration of jobs in the urban hyper-core after urban regeneration.
- Compact Polycentric development: clustering of population and jobs with polycentricity at two scales: compact polycentricity in a limited hyper-core, and metropolitan polycentricity with highly compact satellite 'towns' with mixed uses and highly developed social infrastructure such as jobs, education and health, linked by public transit to the regenerated urban hyper-core.

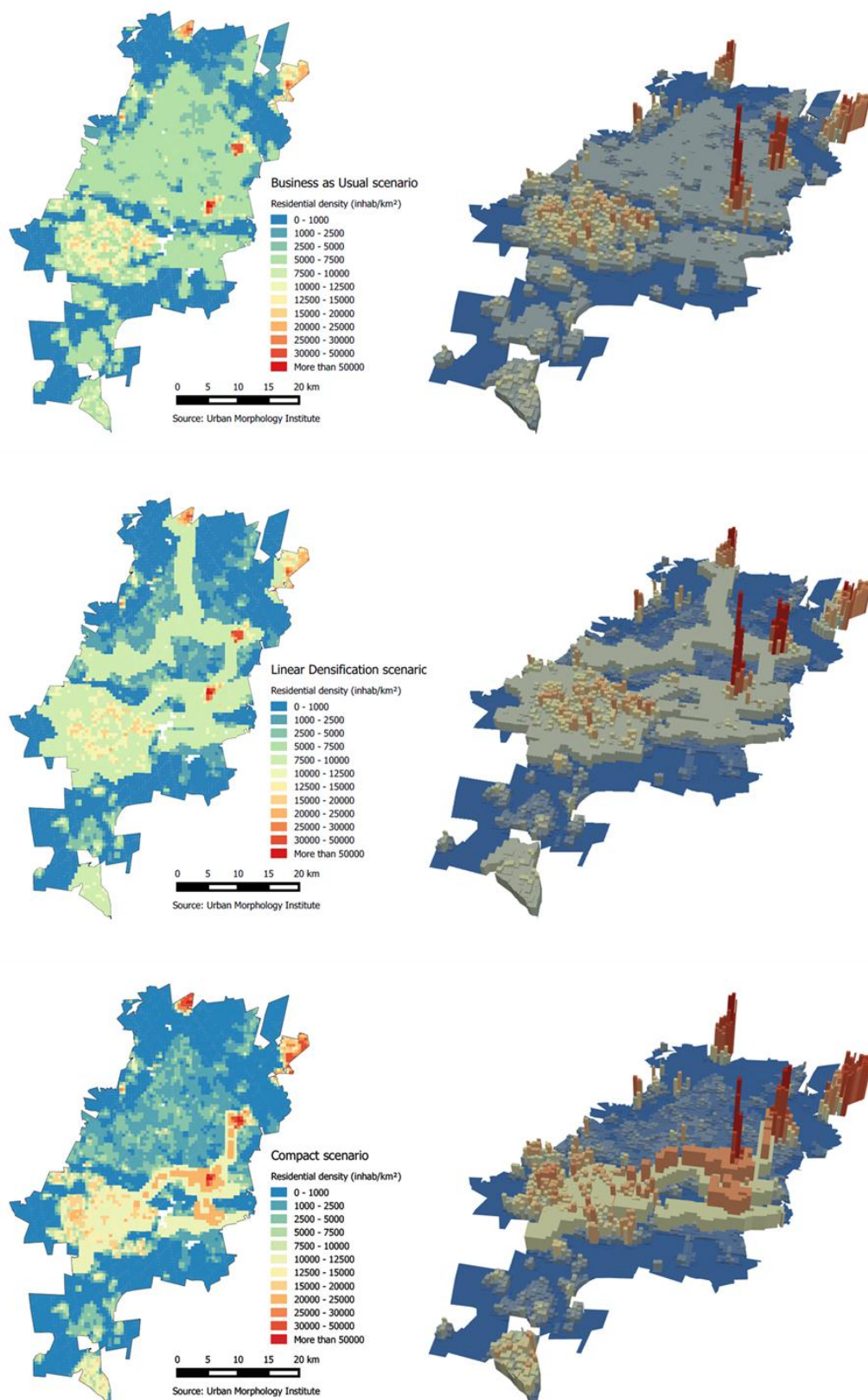


Figure 19: Modelled Scenarios: Business as Usual (top); Corridor Development (middle); Compact Polycentric (bottom) (Source: Urban Morphology Institute)

The impact of each of these scenarios on energy consumption and carbon emissions was modelled, the outcomes of which are represented in Figure 20 and Figure 21 below³⁴. It is evident from this analysis that the business as usual approach would result in significant increases in transport carbon emissions, transport energy consumption as well as travel times and travel cost per capita, compared to the other two scenarios (linear densification and the compact strategy). Further detail on the modelling and scenarios is available in an annexure report by the Urban Morphology and Complex Systems Institute.

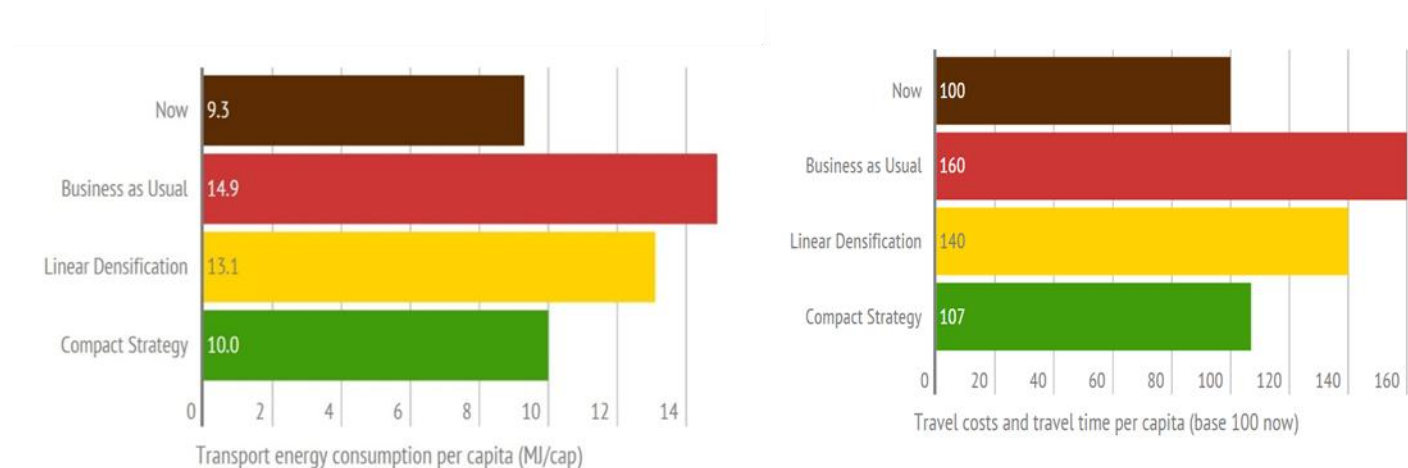


Figure 20: Transport Energy Consumption per Capita (left) and Travel costs and travel time per capita (right)

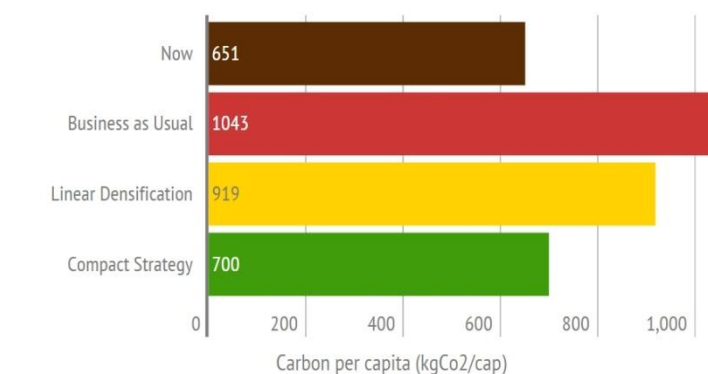


Figure 21: Carbon use per capita

³⁴ Note that the increase in energy, transport time and carbon emissions from the current scenario (black) to the compact polycentric city (green) is a result of improved incomes and quality of life being factored into the model.

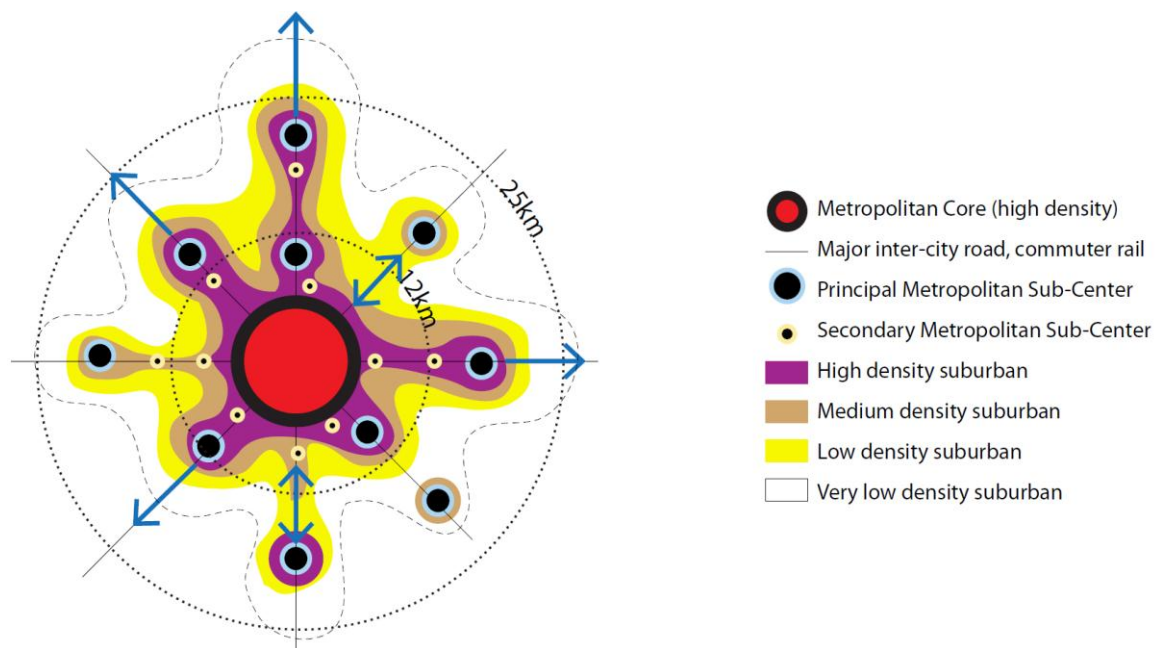


Figure 22: The Traditional Polycentric Urban Model, balancing linear development opportunities with a strong core and well-connected nodal points (UMI 2015)

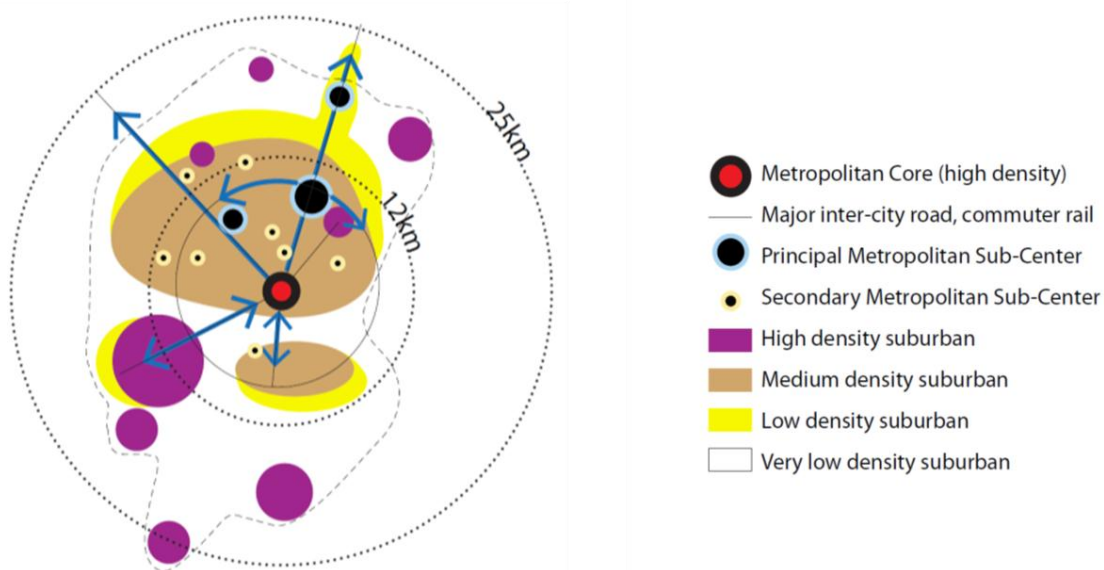


Figure 23: Johannesburg's current metropolitan structure of inverted polycentricity (UMI, 2015)

The compact polycentric city model performed significantly better than the other two in terms of economic, environmental and social impact indicators. Therefore the spatial vision outlined in the review of the SDF for Johannesburg 2040 is a Compact Polycentric Urban Model (Figure 24), opposing the Inverted Polycentricity Model (Figure 23) that Johannesburg currently represents. The Compact Polycentric Urban model opposes spatial inequality and long commuting distances, and promotes a denser, spatially just city, where people have easy access to jobs.

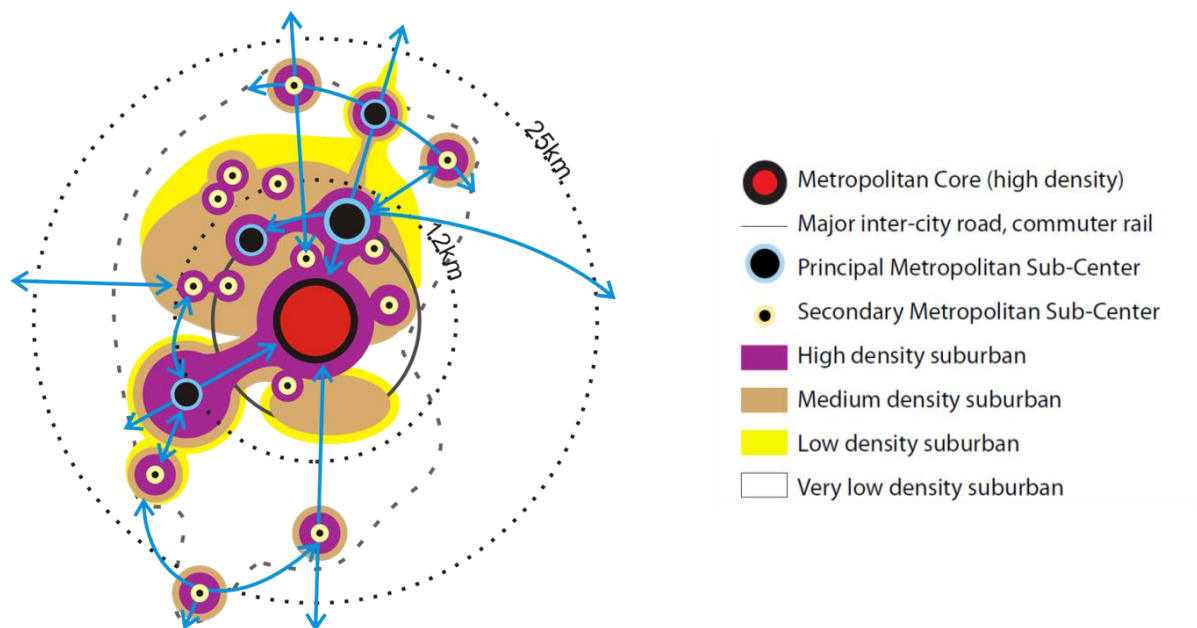


Figure 24: Johannesburg Future City Model: Compact Polycentric Urban Form

The model builds a Gauteng City-Region perspective which respects the interconnectedness of the City of Johannesburg to the surrounding local municipalities by connecting peripheral areas not only to the economic centre of Johannesburg, but to appropriate nearby economic nodes within and outside of the boundary of the City of Johannesburg. The model enables, rather than merely transporting people to jobs and social services, bringing jobs to where people are and people to where jobs are. The Polycentric Compact Urban Model directly combats both spatial inequality and inaccessibility of jobs, as well as long commuting times, traffic congestion and pollution.

6.2. Transformation Themes & Spatial Opportunities

A number of themes have been identified as goals of this SDF. These are detailed below.

6.2.1. The Compact City

The compact city strategy aims to intensify urban land use through a combination of higher residential densities and centralisation, mixed land uses, and development limits outside of a designated area³⁵.

The new polycentric compact city model builds on the urban infill and compaction emphasis of previous SDFs and promoted by the new urbanism movement. It is a model that focusses on infill and redevelopment (brown field) and opposes green-field development on the outskirts of the city. The model will combine density (in terms of housing, jobs and urban amenities), proximity, accessibility to public transit, and diversity of land uses in order to establish an urban hierarchy and logic. It is a model in which a renewed historic inner city will re-assume its role as a fundamental

³⁵ Churchman, A. (1999). Disentangling the Concept of Density. *Journal of Planning Literature*, 13(4), 389-411.

linkage for other neighbourhoods, and that will subsequently help to improve spatial, social and economic equity in Johannesburg.

Compactness reduces physical distances and travel times, bringing people closer to their jobs, public facilities and amenities, and social facilities, thus generating the urban space for interactions between citizens with different incomes and social origin. The compact city is environmentally and economically sustainable: increasing density and proximity helps to reduce energy consumption for transportation as well as improves land use management and preservation of rural land and biodiversity. The city generated through medium to high-density settlements, also reduces cost of services, public facilities and infrastructure provision, increasing economic sustainability and feasibility.

The compact city model includes the generation of new centralities in selected areas, for example creating economic centres in peripheral marginalised areas. With high transit accessibility this urban strategy will balance access to facilities, jobs and services in all neighbourhoods, concentrating city level central activities in determined strategic areas, in order to speed up spatial, economic and social renewal in the selected neighbourhoods, and increase equity between the different parts of the city.

By creating high-density, mixed use areas, cities can accommodate population growth and ensure land is used in accordance with demand without compromising the City's natural assets. UN-Habitat's residential density principle proposes at least **15,000 people/km²**, to make optimal use of scarce land both on the city and neighbourhood scale. To ensure job accessibility, a target of at least 1 job for two inhabitants (job-housing ratio equal to 0.5) should be aimed at, that is **at least 7,500 jobs/km²**.

Compact development prioritises development close to and radiating from an urban core, where the definition of high-density development is based primarily on the concentration of jobs, businesses and dwelling units. In wide metropolitan regions such as Europe mega-urban regions, compact development may apply to polycentric development, where two or more cities in a region share complementary functions and are in themselves compact cities linked by regional rail, in which case compact development strategies radiate from each urban core.

A basic principle to guide future growth and development is to view appropriate densification as the first response to meeting growth demands. There are significant vacant or underutilised land parcels in well located areas within the existing urban fabric that should be unlocked and released for development or re-development. In addition, there should be a related shift towards more sustainable typologies for urban development, particularly residential development, in well located urban areas. New residential developments, including those in the affordable and subsidised housing sectors, should move away from the detached house option, towards row and cluster mixed use urban forms including housing, offices and shops as the basic building model for urban development. Importantly, redevelopment of existing buildings to higher density is fundamental in the city of Johannesburg.

Densification of existing built-up areas does not mean that investment in new infrastructure will not be required. In fact, it means the opposite. This SDF promotes pre-emptively upgrading infrastructure in key transformative areas (defined later in the document) to promote private sector

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development and densification. In the longer term, this form of infrastructural investment will be more efficient, and cost-effective, than continually expanding infrastructural systems outwards.

Spatial opportunities

With reference to an emerging spatial concept for the city, the following key spatial opportunities exist as a basis for moving towards a more compact urban form. Densification should occur:

- around key public transport facilities (existing & future);
- as a mixed-use response within the CBD;
- around current and future mixed use & economic nodes;
- around existing social service facilities, including schools, healthcare and public open space.

6.2.2. The Inclusive City

Non-democratic planning of the past has resulted in a city where physical barriers such as industrial or mining areas separate residents depending on their income, class or ethnicity. Post democratic housing development has also perpetuated this situation through the development of subsidised housing in the outskirts of the city where cheap vacant land is available.

An inclusive Johannesburg ensures the balanced provision of services and opportunities for all. The delivery of services to different social groups and neighbourhoods, spatial integration through urban connectivity and the creation of a liveable city are rights related to Inclusivity.

Inclusivity is also achieved through a social mix, understood as the spatial integration of different social and economic groups to build a healthy and vibrant city. Inclusivity and compactness are deeply intertwined, as Inclusivity is fostered by the proximity to jobs and services, social mix, increased feasibility of service provision in dense areas, the reduction of household expenditure in transport and energy consumption, and the availability of a range of nearby housing typologies that are a result of compactness.

Johannesburg represents, for many inhabitants from the Southern African sub-region, the opportunity of a more prosperous future. As presented earlier in this document the future of Johannesburg will be strongly influenced by migration and the SDF needs to respond to this in an inclusive manner. The arrival-city is defined as the urban enclave where tight social networks provide the essential services to urban newcomers, such as affordable housing and assistance in finding entry-level jobs. The adequate planning and management of the social aspirations of newcomers is the strength that will breathe life into the city and create new integral parts of the economy of Johannesburg.

A mobile new South African middle class is emerging and adding to the total household expenditure of the city, currently estimated as more than USD 25 billion per annum.

Understanding, managing and supporting Johannesburg's social advancement ladder and planning for the median will unlock the potential of development of the city. Nevertheless, in this process, specific attention must be set to ensure that the most vulnerable groups are able to exercise their

Rights to the City. A significant percentage of the economic activity of the city will be informal in these enclaves. Understanding and creating the enabling mechanisms for support and formalisation will undoubtedly translate into a progressive shift in the city's economy. It is important to endorse informality for its positive effects and support its adaption where it yields undesirable effects.

Challenges on the social sphere for Johannesburg are the provision of housing and land tenure for deprived groups and the reinforcement of safety and security. Enhancement of safety and security inside the city will be a key component to foster integration and promote a more sustainable way of life, through safe neighbourhoods with walkable streets and developments balancing residential, offices and commercial uses.

The objectives of the social mix areas are to promote more social inclusivity and interaction and avoid exclusion, to attract a diverse array of services, and to foster multi-level employment within communities. The UN Habitat principle with regards to social mix suggests that 20%-50% residential space should be reserved for affordable housing.

Enhancing social inclusivity is a cornerstone principle of sustainable urbanism. There are many aspects to social inclusivity: at the broadest level; this deals with the notion of people centred cities, whereby citizens have equal opportunities and an active role in shaping their futures. Participation in decision-making is therefore an essential aspect of social inclusivity.

Spatial opportunities

The key spatial imperatives and opportunities that support a more inclusive city include:

- Overcome the spatial barriers that have separated people and places in the city by establishing new opportunities and development patterns;
- Connect people to people and people to jobs by providing public transit, intensifying street networks and addressing street network disconnections;
- Intensify and grow areas of greatest inclusivity
- Plan mixed-use areas instead of single use residential areas and use financial, legal and regulatory frameworks to bring opportunities and jobs to people
- Densify and diversify single use areas by: delivering mixed-use commercial, infrastructure (hard and soft) and cultural activities to residential only areas; providing housing opportunities near to economic centres and supporting commercial activity and housing in light industrial areas
- Plan affordable housing within each new development, enhancing the social mix.

6.2.3. The Connected City

Regionally, Johannesburg is the centre of the Gauteng province which is home to 12 million inhabitants, 25% of the South African population. Connectivity with the other countries that form the region and inside the province among the different districts through national and

regional corridors will foster economic development through specialisation of activities and economies of agglomeration.

Johannesburg's connectivity needs to be understood as an attractor for the sub-continental region and as a generator for the Gauteng City-Region. The city is the main sub-continental and national economic and cultural hub. **A realisation in this SDF (and a departure from the previous one), based on the compact polycentric model, is that connection or *transit* corridors do not necessarily represent *development* corridors. There are cases where development should be promoted at nodes along a transport corridor, and not along the entire length of the corridor..**

The city's connectivity model is based on the enhancement of physical and virtual infrastructures. The main strategy of physical connectivity at the provincial and urban scales, "The Corridors of Freedom" pursues the integration of all the communities, enhancing connectivity to provide access to jobs, housing and services.

"The Corridors of Freedom" are the first step in the strategy to mobilise the dynamic energy of the city, connecting important strategic nodes such as Soweto, Inner City, Alexandra and Sandton to each other.

These holistically designed economic, social and infrastructure corridors are important tools to achieve compactness and competitiveness, through an affordable and accessible mass public transit that includes both bus and passenger rail, and that provides mixed income housing, schools, offices, community facilities, cultural centres, parks, public squares, clinics and libraries.

The three steps in the implementation of the corridors are first, to link disconnected areas, second, to bring jobs to where people live and develop polycentrism. Thirdly, a mobility network connecting these new centralities must be put into place.

Connectivity strengthens the physical, social and virtual relationship between people, places and goods. At a regional level, connectivity links centres of production and consumption with the view of strengthening systems of cities and urban-rural linkages. At a city level, connectivity is closely related to mobility and the permeability of an area. At a neighbourhood level, connectivity is linked to the public realm (including street) design, walkability, ground floor and street facing activities and a network of public spaces.

Specifically, street connectivity refers to the density of connections and nodes in a street network and the directness of the links between settlements and correlates positively with increased efficiency (and multi-modality) of flows and access to jobs and services. As connectivity increases, travel distances and congestion decrease and route options and travel modes increase allowing more direct travel between destinations, creating a more accessible and resilient system. Connected street networks are internally and externally well connected. Fine grain grids represent highly connected street networks, while disconnected ones are gated enclaves and cul-de-sac and loop intensive layouts.

This principle proposes a grid and a hierarchy of streets with arterial and secondary roads that are well connected through intersections. The grid pattern allows for continuous and connected public realm and supports walkability and alternative transit modes.

The design of the city must address the layout of the street patterns, mixed use blocks and the provision of high quality and continuous public space to encourage walkability, social interaction and safety. Healthy communities are fostered by a connected city where streets and public spaces are interlinked and provide a continuum for economic and social activities to flourish. Johannesburg has space to retrofit and redesign disconnected street networks, enhance well connected ones, and design new networks to be well connected.

Importantly, streets are not merely places for cars. UN-Habitat considers the street as the most important public space where people interact on a daily basis. The street is a structural element that shapes urban form and determines the pattern of development of blocks, buildings, open spaces and landscape. Sufficient, accessible and well-designed space allocated to streets contributes to improved walkability and connectivity, which fosters economic development.

As an indicator, in developing countries land allocated to streets is low, varying between 6-12%, compared to cities in developed countries where it averages 29%. Additional 15-20% land should be allocated for other open/green public spaces.

Communication networks and ICT's are playing an increasingly important role to promote social advancement and integration. Virtual connectivity in Johannesburg enables access to information and education, fosters job creation and entrepreneurship and enhances competitiveness and social participation. It also reduces the need for physical connectivity and commuter trips.

Physical and virtual connectivity at all scales must ensure that the economic potential of the city and the region are fully utilised. In order to achieve competitiveness, it is essential to create jobs closer to the citizens, located in new centralities and/or in current mainly residential areas like Soweto, Diepsloot, Ivory Park, and Orange Farm. The renewal and revival of the (historical) inner city (CBD) as the heart of the new compact polycentric city acts as the connector, bridging the historical north-south divide.

A trans-boundary vision of regional linkages is vital to introducing sustainable economic growth in Johannesburg and developing new linkages with global markets and emerging world economic powers.

Spatial opportunities

The key spatial imperatives and opportunities that support a more connected city include:

- Focus on selected public transport corridors as one focus of a connected city, with a focus on the corridors of freedom;
- Promote transit oriented, mixed use development around public transit stations (including PRASA, Gautrain and BRT stations);
- A new mixed use development corridor that connects the key urban nodes of Randburg and Sandton with the growing opportunity around the OR Tambo Airport and associated Aerotropolis.

- Address connectivity barriers to development in the city through the redesign and refurbishment of street networks in poorly connected areas;
- Ensure future development contributes to, rather than reduces, levels of connectivity within the city;
- Promote global connectivity by drawing on the key transit corridors that connect the City to the broader regional system, namely:
 - The North-South transit Corridor between the City and Tshwane;
 - The central transport corridor that straddles the mining belt;

6.2.4. The Resilient City

The Resilient City is a common theme that runs through many of the spatial policy informants that underpin the current process. Resilience, fundamentally, is concerned with the ability of the city to withstand, and adapt to, changes over time.

A key resource in a resilient city is the natural environment. The natural environment must not be viewed as a limit to economic development, but rather a basis on which all economic activity is founded – offering minerals, fresh air, water, a sense of relief from dense urban environments and so forth. As such, it can be viewed as the ‘natural capital’ of any given area and the provider of essential and valuable (socially and economically) ecosystem services (see section 5.5.5).

Environmentally sensitive and open areas pose unique, sometimes-overlooked opportunities to development. It can create unique socio-economic, agricultural, educational and tourism based opportunities. Natural landscapes provide the opportunity to establish wider experiences of space, enhanced aesthetics, access to ecosystem services and an improved sense of place for citizens.

Resilience has become a largely used concept in the urban planning discourse internationally. Resilience spans over economic, social and environmental dimensions and has been defined by the Global forum on Urban Resilience and Adaptation as: “the capacity and ability for urban systems and communities to be able to withstand stress and, survive, adapt, and bounce back after a crisis or disaster.” Another definition from the University of the Witwatersrand and the Gauteng City-Region Observatory states: “Resilience refers to the capability of individuals, social groups, or social-ecological systems including towns and cities not only to live with changes, disturbances, adversities or disasters but also to adapt, innovate and transform into new more desirable configurations.”³⁶

The Global forum on Urban Resilience and Adaptation argues that an integrated urban framework takes into account water, energy, food security, greenhouse gas reductions and ecosystem protection among others. They further argue that building urban resilience necessitates alleviating

³⁶ Harrison, P., et al. (2014). *Urban Resilience Thinking for Municipalities*. University of the Witwatersrand & Gauteng City-Region Observatory. Retrieved October 7, 2015, from: <http://bit.ly/resiliencereport>

urban poverty. Urban resilience contributes to sustainable urban development and therefore the forum argues that Cities need to be at the forefront of resilience building.

Green open spaces, parks and gardens, secure and accessible to the public are a feature and asset of all liveable cities. It is a competitive advantage determining quality of life. A metropolitan open space system in a city is essential to a set of important functions, including improving air quality, reducing the urban heat island, providing a habitat to species (for instance birds), allowing urban agriculture, recreation and spiritual solace.

Density and compactness in a city should be complemented by a metropolitan open space system. A metropolitan open space system is a key feature in increasing Johannesburg's resilience, including taking action against climate change and mitigating extreme weather events. For this reason, open space must be protected and preserved to support the densification and infill imperatives of the city.

Johannesburg recognises its leading regional role in Climate Change Mitigation and Adaptation, as well as the potential role that the city will play as the regional centre of innovation, development and application of new technologies and solutions in the effort to curb, halt, reverse and adapt to global climate change. Energy and Resource Efficiency is an important objective here, too. Sustainable buildings are able to conserve energy and resources, keeping costs down, while at the same time providing formidable spaces for working and living.

Anticipating climate change and integrating climate change mitigation and adaptation into the SDF and urban planning practices of Johannesburg will help the city set a regional example of planning a sustainable, resilient city.

Energy and resource efficiency is a prerequisite to maintain and extend the access to basic urban services in Johannesburg at affordable levels. The way the city spatially develops will be a major determining factor for both accessibility and affordability. A broader city-region perspective is imperative, if sustainability is to be achieved.

"A sustainable, resource efficient city can be defined as a city that is significantly decoupled from resource exploitation and ecological impacts and is socio-economically and ecologically sustainable in the long term. By contrast, a low-carbon growth contributes to achieving sustainability but does not guarantee sustainability in itself."³⁷

Equally important is the latent and somewhat overarching opportunity for streets to accommodate quality open space areas. The notion of Complete Streets will indeed play a key and central role in SDF planning (albeit at the finer planning scale). The environmental co-benefits of these streets are numerous, evidenced by studies which have found that cities with these types of streets enjoy inter alia: better environmental sustainability, enhanced walkability, reduced traffic congestion, higher productivity and quality of life, and higher levels of social inclusion³⁸.

Spatial opportunities

³⁷ UNEP: Sustainable, Resource Efficient Cities – Making it Happen: <http://bit.ly/1WhhTKp>

³⁸ UN Habitat. (2015). *Streets as Public Spaces and Drivers of Urban Prosperity*. Nairobi: UN Habitat.

Key spatial interventions and priorities in this regard include:

- Protect remaining Biodiversity resources by using them as structuring elements for urbanisation, and providers of ecosystem services (including provisioning services and public open space)
- Consider JMOSS as an integrated social open space layer
- Integrate built and unbuilt open space network
- Reinforce an urban development boundary, restricting any development in disaster and hazard prone areas
- Consider the public environment, particularly streets, as a key open space contributor.
- Plan natural buffer zones in disaster prone areas, protecting from flooding and/or mining waste exposure

6.2.5. The Generative City

Cities are traditionally generators of opportunity, although their ability to generate real opportunities for a growing urban population can be constrained by an overemphasis on functional zoning and generally large scale, peripheral development.

Spatial complexity is an urban quality that is central to the future sustainability of the city. Complexity in the urban system stems from a layering of patterns of activity over time that gives character and diversity to the city. Functional zoning practices that have served to guide much of Johannesburg's growth and development have, to a large extent, stifled diversity by grouping, rather than layering, complimentary urban activities and functions. True urban complexity requires delivery agencies and departments within the city to function in a similar "layered" approach.

The city must focus investment in areas where the potential for developing and sustaining true mixed-use urban environments is greatest. In this regard, the opportunity presented by the inner-city itself, and by key urban nodes that have grown to support the core over time, must be harnessed. In addition, opportunities for new transit oriented nodal areas must be identified and promoted.

A key element of structure that can influence the generative capacity of the city is the public realm. The public realm comprises of all public space including street space. This represents an important layer of the built environment in that it provides the connections between different elements and functions of the urban environment. A well-developed public environment serves as a fundamental supporting layer to sustainable growth and development.

In the context of the city, the key contributors to the public environment include formal open spaces, parks and streets (including sidewalks and non-motorised transport space). It also includes public infrastructure such as public transit stations, clinics and libraries. The quality of the public realm has a significant impact on social interaction, identity and economic investment of an area. Importantly, the quality of the public environment acts as a support, and determines the quality of the overall system.

The legibility or imageability of a place, to a large extent, determines the success of the place, and assists in developing an understanding of the potential of a place to generate clear and memorable images. An area which is successful in achieving this will attract a number of people and economic activities in turn making the area viable. The initial impression of an area encourages the need by a user to return. Features such as architectural character, interactions between buildings and the public realm, street furniture, unique opportunities and places increase an area's imageability.

The inequalities that exist in the spatial structure of the city are equally evident in the quality of the public environment, with a clear distinction in quality of parks and open spaces in different parts of the city. Street Space is a key element of a generative urban structure, and very often becomes the focus of economic opportunity and potential.

A UN Report entitled "Streets as Public Spaces and Drivers of Urban Prosperity"³⁹, suggests that prosperous cities are those that recognise the importance and relevance of public spaces, and which have allocated sufficient land to street development. It states that where the resulting City Prosperity Index (CPI) is closer to a factor of 1, cities enjoy: higher street connectivity, good infrastructure development, provision of basic services – water, sanitation and drainage - , good environmental sustainability, walkability and reduced traffic congestion, higher productivity and quality of life and higher levels of equity and social inclusion. After studying 100 cities across the globe, it found that Johannesburg has a low to moderate score of 0.5. This grouping of cities studied includes 'contemporaries' such as Beijing, Casablanca and Sao Paolo. Johannesburg therefore needs to perform better in this area to ensure enhanced city, and individual, well-being.

What is evident is that the generative propensity of the city in the future will depend on a range of other factors, related to spatial connectivity and integration, diversity and mix of uses, and the ability of the spatial structure of the city to support a wide range of urban users and operators.

The bid-value model developed as part of the review process provides important spatial clues as to which parts of the city have more inherent development potential, based on their generative capacity. The logic of movement and centrality is important in this regard, and as the model shows that consolidating development around established urban elements such as commercial nodes and activity links provides significant potential moving forward.

Spatial opportunities

Key spatial opportunities for building a more generative urban structure in Johannesburg suggest the following:

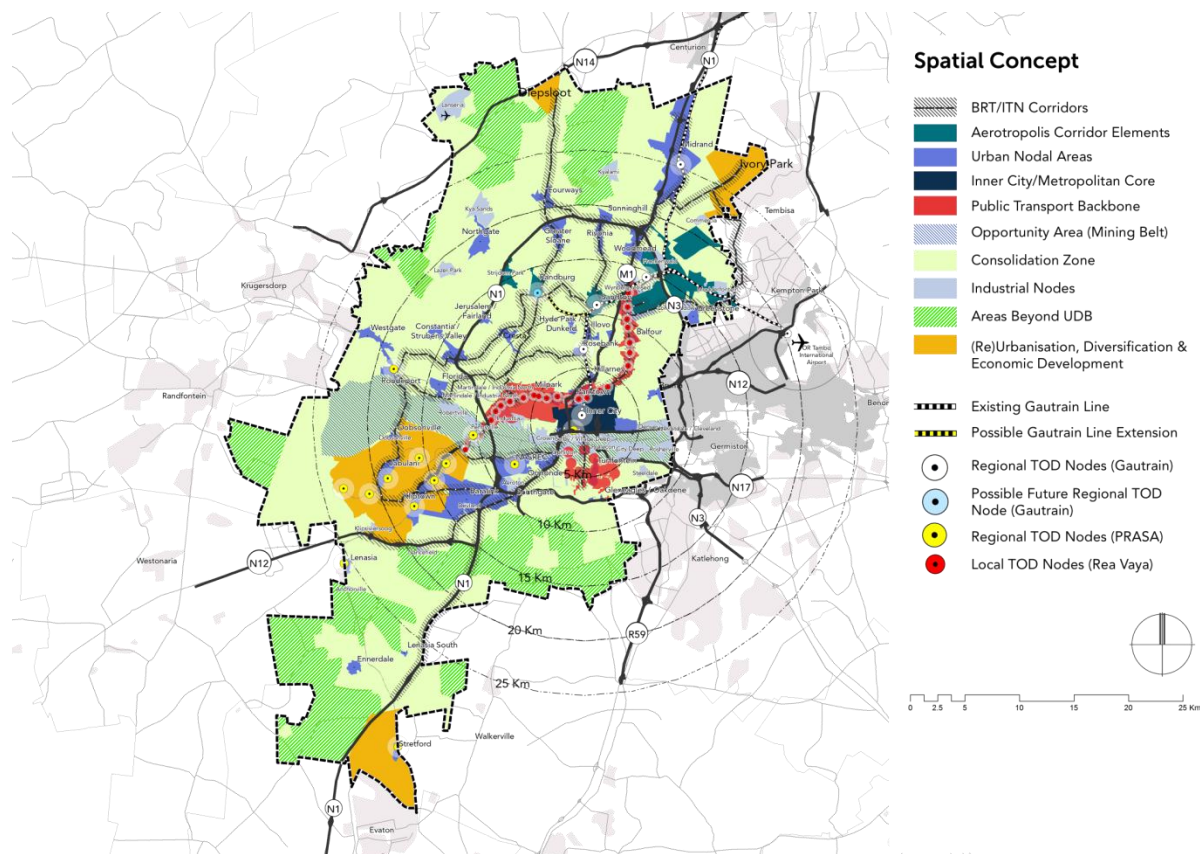
- Focus on the Inner City
- Focus on the public realm, including streets
- Diversify high density residential areas of the city, to allow them to function as urban areas in their own right

³⁹ UN Habitat. (2015). *Streets as Public Spaces and Drivers of Urban Prosperity*. Nairobi: UN Habitat.

- Diversify large commercial nodes
- Promote new transit nodes
- Consolidate & grow primary economic areas
- Promote a Generative Urban Structure through development regulations and assessment processes that prevent new developments from becoming mono-functional and disconnected “islands” in the urban system

7. Spatial Concept

Chapter summary: The spatial concept for Johannesburg 2040 builds on the spatial vision for the future city as a Compact Polycentric City. The concept entails a series of strategies and interventions in focus areas and city-wide. The spatial concept envisions Johannesburg as a hierarchy of dense mixed use priority transformation areas, corridors and nodes, that integrate the natural ecological system as a structuring layer, and that are connected by an efficient public transit system.



The analysis and transformation themes outlined in the previous chapter and the identified spatial opportunities provide a basis for deriving a conceptual spatial structure to guide development in the city over the next two decades. These areas will influence the city's capital investment priority area model as well as the consideration of development applications.

The spatial concept for Johannesburg 2040 is based on a compact polycentric structural system, strongly focused on the natural ecological system as a structuring layer; a hierarchy of priority transformation areas and dense mixed-use nodes efficiently connected by public transit infrastructure.

The spatial system defines the boundaries of growth and investment of the city through an Urban Development Boundary (UDB), anticipating future population growth and defining the limit of urban growth towards the peripheries and sensitive natural areas. It also adds a second layer, of areas neither outside the development boundary, nor within priority transformation areas or nodes which are referred to as consolidation areas. Growth and densification will be controlled and regulated in

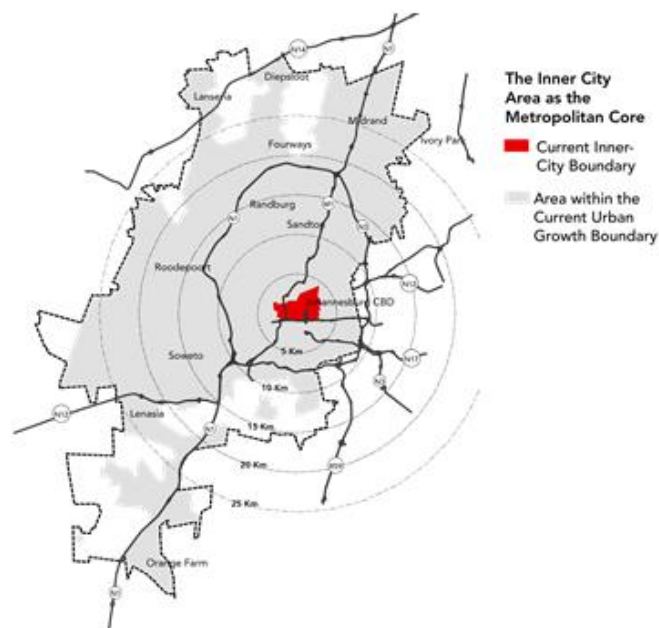
these areas particularly in peripheral areas which interface with the Urban Development Boundary (UDB).

The key elements of the spatial concept are summarised as follows:

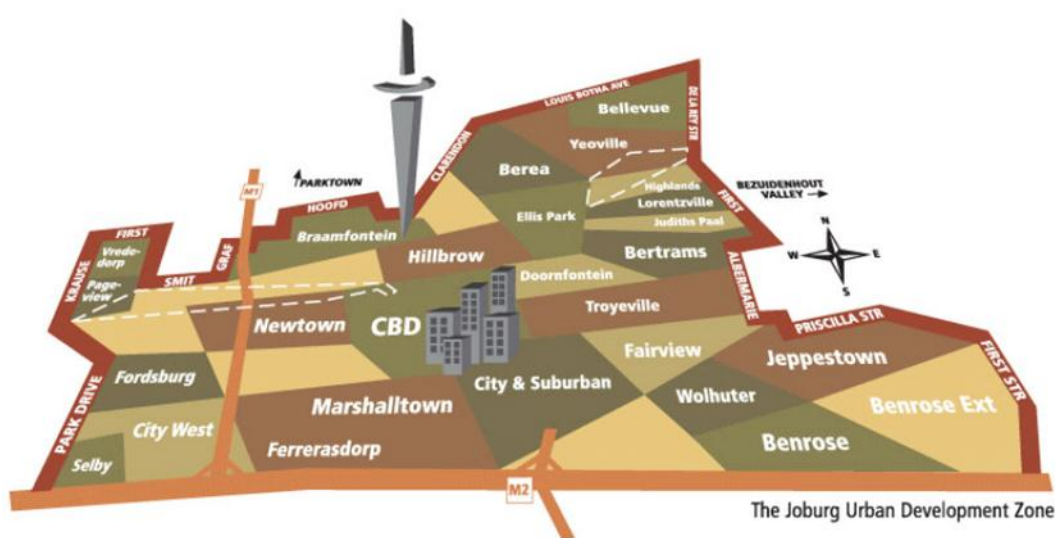
- A Strong, Accessible & Generative Urban Core
- A Hierarchy of Nodes as a Focus for Growth, Consolidation, and Reinvestment
 - Public Transport station nodes as a Focus of Growth (TOD)
- Corridors that Connect and Integrate (corridors of freedom, and the Randburg, Sandton, Aerotropolis corridor)
- Upgrading, Reinvestment and diversification in Underperforming Areas
- An Integrated Natural Structure
- Consolidating Areas of Stability (areas within the UDB, but outside the priority transformation areas)

7.1. A Strong, Accessible & Generative Urban Core

Using the opportunities of the CBD as a dense economic core of the city and tackling the issues of fragmented developments, crime, bad buildings and lack of affordable housing, the strategy suggests consolidating the inner city through a public space/street network and expanding it towards the southern industrial area through redeveloping and intensifying underperforming buildings, strategic connector streets, and developing vacant space. The inner city will also be significant in bridging north-south discontinuities.



The inner-city remains the primary activity node in the city, a role that should be protected and reinforced through future development initiatives, particularly in view of the significance of the public sector as a key employer in the city economy. Potential for reinforcing the role of the CBD as a global trading focus, with specific reference to Africa, certainly exists given the transport and freight infrastructure that is tied into this node.



There is a renewed interest in redeveloping the CBD due in part to major investments from the Municipality (through the Johannesburg Development Agency) and the national treasury tax incentive. This has led to significant growth and economic expansion in the city centre. The launch of the Inner City Charter in 2006 and more recently the Inner City Roadmap has helped to consolidate and focus investment and revitalisation efforts. It is estimated that the inner city is home to approximately 260,000 with around 800,000 commuters entering or passing through the area each day.

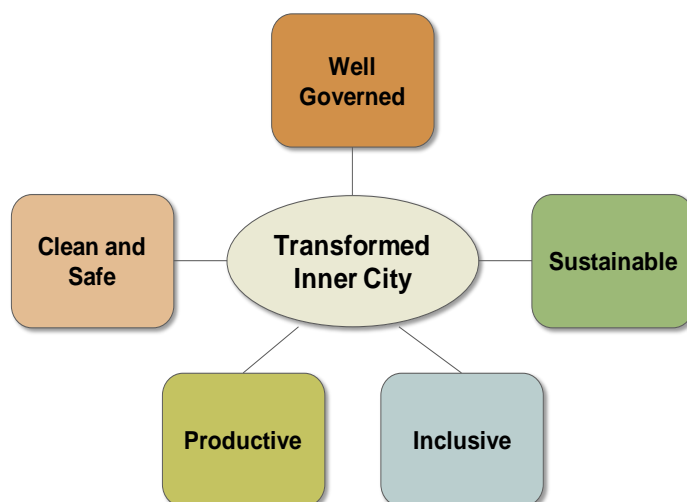
The area however has noteworthy problems: limited affordable housing, fragmented pockets of development and gentrification, 'bad buildings', pockets of poor living conditions and limited social infrastructure. Selecting it as a focal node aims to maximise on the opportunities of the area however, including: its central location in the wider municipality; the high levels of public transport accessibility and connectivity (including Park Station Precinct); a favourable street pattern and continuous public realm based on the grid; walkable layout; relatively high densities; underused vacant pockets of land; underutilised strategic nodes and established industrial activity in close proximity. The area is full of latent potential, with its numerous diverse and vibrant zones, especially the ethnic districts and the popular tourist stops.

The Inner City Roadmap is a strategic document that reflects the City of Johannesburg's statement of intent for transforming the area. It was established as a response to the urgent need to prioritise the regeneration of the inner city, recognising the central role that the inner city plays in the development of Johannesburg.

The vision for the inner city, as defined by the Inner City Transformation Roadmap is:

“A well-governed, transformed, safe, clean and sustainable inner city of Johannesburg, which offers high quality, sustainable services; supports vibrant economic activity; and provides a welcoming place for all residents, commuters, workers, traders, investors and tourists”

The roadmap defines five pillars of inner city transformation to achieve this vision:



The roadmap takes an area-based management and partnership approach to guide municipal activity in transforming the inner city. It defines a housing priority precinct (Inner City Housing Implementation Plan) for densification and regeneration which includes: the South Eastern quadrant (Eastern gateway and surrounds), Bertrams, Troyeville, New Doornfontein, Jeppestown, City and Suburban and Wolhuter. Opportunities in these areas include some usable vacant land and many underutilised and abandoned warehouse and factory spaces that can be used for brownfield housing and mixed use developments. The roadmap includes four additional focus precincts including: Hillbrow and Berea; the Railway seam; Westgate and the Core CBD. The roadmap proposes urban development frameworks or precinct plans to guide the development of each precinct.

In order to achieve its vision, the roadmap proposes a partnership approach where a wide range of stakeholders are engaged in meeting the vision for the CBD. The plan proposes delegating leaders for defined outputs, requiring relevant internal (City of Johannesburg) and external stakeholders to work together under a reinvigorated Inner City Partnership.

In support of the Inner City Roadmap, and the vision for the CBD as the core of the future compact polycentric structure of the city, the emerging strategy for strengthening the Metropolitan Core is two-fold:

a) Intensifying, diversifying and re-stitching the Inner City into a compact and safe walkable area

- Intensifying and diversifying the inner city to expand use and access to a variety of locally accessible city amenities and land uses
- Assessing, retrofitting and expanding the network of 'connecting streets' linking together the different places of public interest, as well as the residential and office developments

- Enhancing the attractiveness of the connecting streets by supporting public transport, pedestrian and bicycle movement, even demarcating streets for pedestrian-only movement. Supporting the development of ground floor commercial activities along the streets ensuring 24/7 activity and thus increased safety and security.
- Enhancing the street grid system by planning small pockets of public spaces (parks, playgrounds etc.) alongside the streets densifying the network of activities and facilities.

b) Expanding the Inner City towards the southern industrial belt area, bridging the north-south divide

The industrial belt area south of the Inner City is currently an area of predominantly low density, light industrial development and warehouses, with some pockets of commercial development. Many people working in the area commute from distant parts of the city and have access to neither housing options, nor social and leisure amenities in the working area. The newly planned BRT route towards the Southern peripheries opens up new possibilities for development along the transport corridors. At the same time, the industrial belt and the southern edge of the CBD have buildings and spaces with potential to be redeveloped.

Combined, the corridors and the spaces could be transformed into a connected system of mixed-use developments, offering affordable housing options to compliment the jobs available. At the same time it would enhance and expand the existing commercial activities in the area, attracting visitors from both the Inner City and the Southern peripheries, gradually bridging the North-South barrier.

Moreover, the development concepts promoted in the Turffontein Corridor linking the Inner City to the Southern Peripheries could be extended for the industrial strategic area as well, with a project-based (or form based codes) approach likely being more suitable than a zoning-based approach. Specific strategies that could be explored with regard to this initiative include:

- Promoting the inner city as the centre for international trade and a transportation hub,
- Expanding on existing best-practice social and low income housing developments to secure options for all income groups,
- Enhancing public transport infrastructure,
- Reducing the numbers of private vehicles entering the inner city and improving safety of movement and the public realm.

A possible scenario for urban infill and redevelopment of the area south of the inner-city could incorporate the following spatial strategies:

- Demarcating strategic 'connector' streets linking the southern and the northern area that have the potential to generate development - they follow either planned BRT routes or existing frequent routes that lead from the CBD to the industrial area and the Southern peripheries.
- Tracing potential smaller scale 'transformative areas': vacant spaces and/or land suitable for redevelopment: empty plots, municipal storage spaces, abandoned buildings or low density warehouses. By redeveloping these 'transformative areas', new mixed

neighbourhoods could be created, introducing residential, public and green spaces in the industrial area.

- Connecting the 'strategic streets' and the 'transformative areas' in a connected system of streets and public nodes. The smaller more walkable streets in the area already hold an 'urban' potential. New streets would be opened up and pockets of public spaces, green areas, commercial activities and educational facilities introduced.
- Strengthening, intensifying and diversifying the inner-city in this manner will also seek to reinforce the existing Corridor of Freedom initiative around the Turffontein area by developing the industrial belt as a strategic mixed-use partially residential area: one connecting the CBD with the southern areas, with a potential to break the south-north division.

Some legal and financial tools that are suggested to support the implementation of these strategies are:

- Provide incentives to add social housing options on empty plots or rehabilitated buildings.
- Area or neighbourhood-scale land management and land readjustment instruments for the south industrial zone
- Building permit conditions for private developers to invest in public space (e.g. 20% of land plot must be public space, or the street in front of the area must be paved and planted)
- CEPACs (Certificates for additional building potential) generating revenue for public investment from private developers

7.2. Consolidating a Public Transit Backbone

Consolidate appropriate growth and development opportunities around existing and future public transport nodes, starting with the Corridors of Freedom.

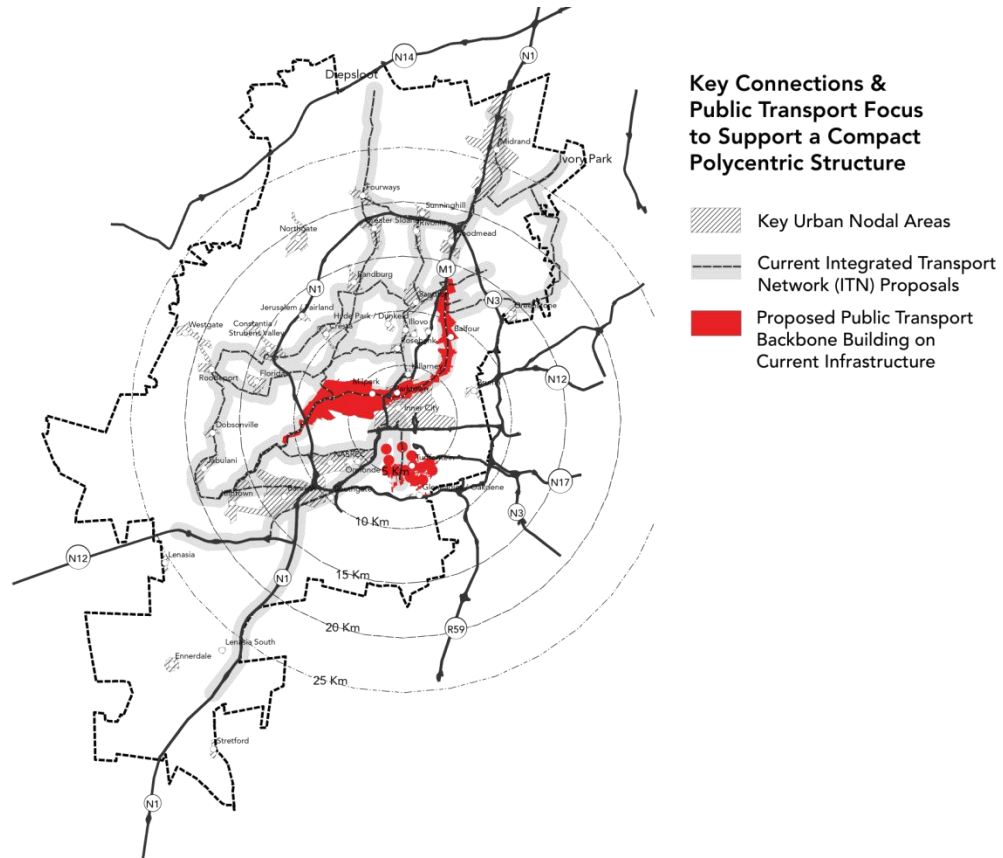


Figure 26: A public transit backbone as a key mixed use, dense development corridor

Building onto the Corridors of Freedom strategy, the selected Corridors of the SDF are locally and regionally relevant public transit routes that have the potential to generate growth and facilitate inclusive mixed-use development with increased densities, following the concept of transit-oriented-development. The emerging public transport system of Johannesburg is based on Rea Vaya (BRT) Infrastructure, the existing commuter rail network, and the Gautrain rapid rail system. It is important to note that not all *transit* corridors are *development* corridors. Some transit corridors should facilitate development at nodes (stations), while others, such as the corridors of freedom and the eastern end of the airport corridor, should promote development along their length.

At the present time, urban areas along the corridors of freedom remain significantly lower than international best practice in terms of urban intensity (residential density, job density and built density). To reap the full benefits of transit investments in terms of generalised accessibility and modal switch to public transit, it is essential to implement an ambitious strategy of intensification of the urban fabric in very close proximity to public transit.

Residential and job density analyses carried out within the Corridors of Freedom catchment areas provide valuable insights when compared to international benchmarks and best practices. Figure 27 and Figure 28 compare the share of people living and working within 500m, 1km and 2km of public

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transit in three cities (London, New York and Copenhagen) and in Johannesburg using the current/projected BRT network. In London, New York and Copenhagen one quarter of people live less than 500m from public transit and half live within 1km. In the three cities, between one third and half of all jobs are located less than 500m from public transit, two thirds less than 1km.

With the current/projected BRT scheme in Johannesburg, and taking into account current residential and job density spatial distributions, only a limited number of residents and workers will be in close proximity to transit facilities.

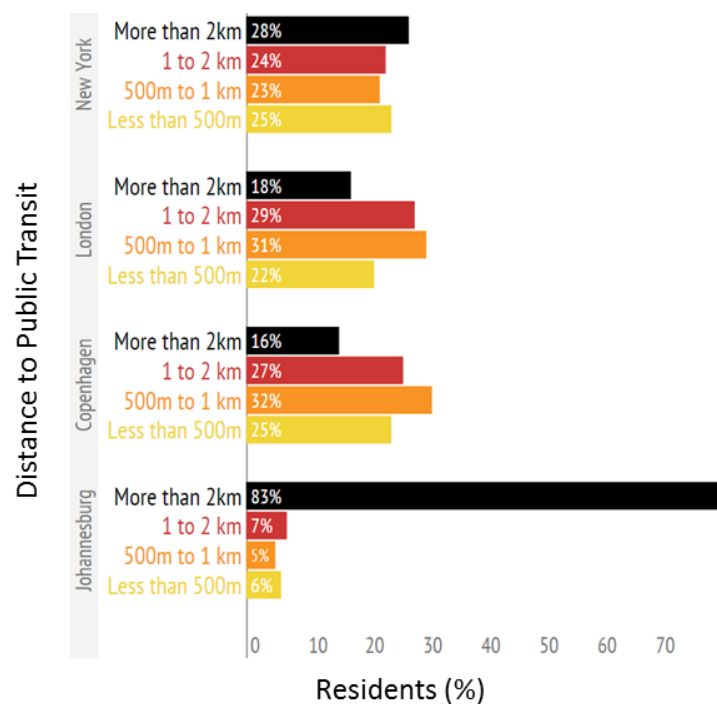


Figure 27: Respective share of residents and proximity to transit facilities in New York, Copenhagen, London and Johannesburg (with 2040 projected transit network and current residential density distributions). Source: Urban Morphology Institute

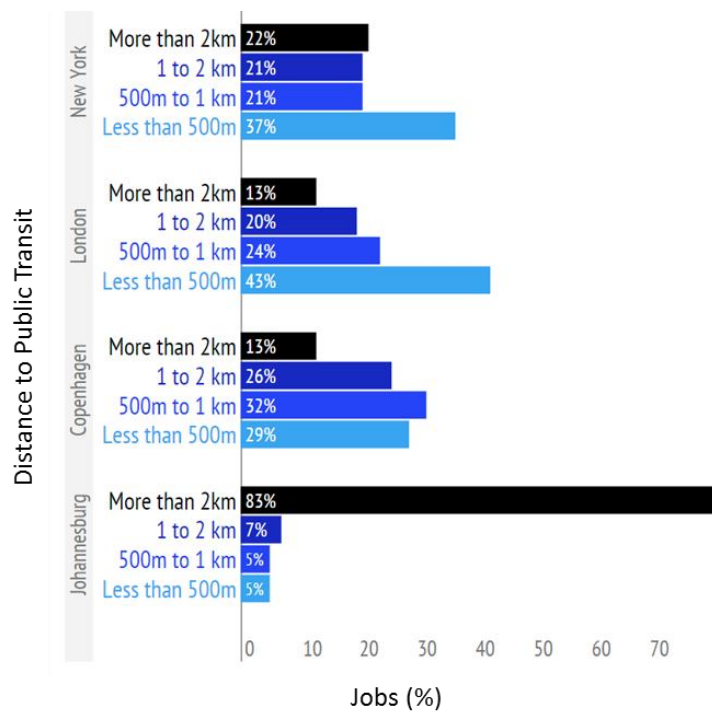


Figure 28: Respective share of jobs and proximity to transit facilities in New York, Copenhagen, London and Johannesburg (with 2040 projected transit network and current job density distributions). Source: Urban Morphology Institute

It is acknowledged that the impact of transit infrastructures on modal choices, land use and land prices decreases significantly beyond the 1km catchment area. At the same time, land use patterns tend to be highly segregated along transit corridors. For example, there is a clear separation of uses along the Empire Perth corridor, with 40% of the area dedicated to residential use, concentrated in specific pockets, with monotonous detached single housing, and 30% of the area is dedicated to businesses and commercial activities, mostly in self-contained business parks.

Education and public facilities are equally dispersed, although some concentrations do exist along the future corridor. Open spaces are also scattered and many are currently unsafe and neglected. The separation of land uses contributes to increasing average distances travelled within the corridor area. It also impacts on: energy intensity, by increasing energy needs for transportation; social inclusion by making jobs and social infrastructure less accessible to low income households; and economic productivity by separating economic activity from labour pools and jeopardising agglomeration economies.

On this basis, the focus of the initial strategy is densification, diversification and development along the existing Rea Vaya Network that underpins the Corridors of Freedom along Louis Botha Avenue and Empire Perth, linking Soweto through to Sandton, building on the work done through the spatial concept of corridors for these areas.

A densification process can be fostered either with higher building, or wider building footprint, or both combined. While increasing the building footprint along the backbone will support densification, it will also allow for the creation of a much finer grain urban fabric. The major benefit will be a higher quality public realm (characterised by human scale streets, high levels of walkability,

connectivity and continuity), supporting vibrant street life and ultimately contributing to decreasing crime levels.

A diversification of land plot sizes is essential to support a vibrant and sustainable land market and create a generative urban structure. Research undertaken has emphasised the need to plan land use in these corridors with a very fine grain. The fine grain of plot subdivisions fosters an active land market with a great potential of a future mix of uses.

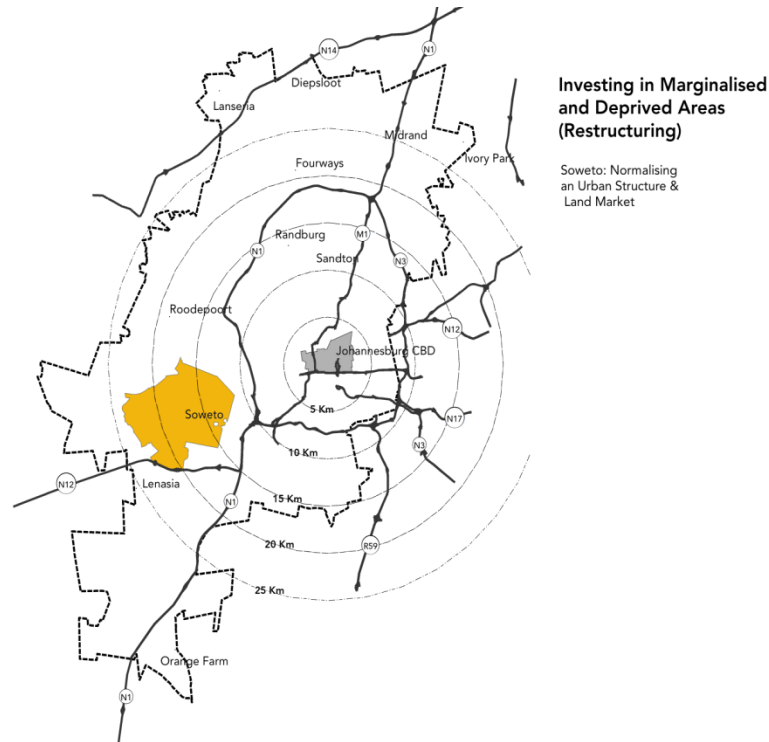
Over time, some plots will consolidate for large investors, whereas others will keep a small size and provide opportunities for medium and small investors (e.g. SMEs, housing, etc.). Building on initial investments made by the public sector, and provided the appropriate regulations and incentives are in place, the diversity of actors from the private sector will lead to a steady land use diversification.

Some legal and financial tools that are suggested in supporting the implementation of these strategies are:

- Form-based codes for the transport corridors can help regulate the street fronts, building typologies and ground floor activities, the public spaces and the private-public boundaries
- Collaborative policy with the city's Social Housing Companies to develop social housing along corridors
- Building permit conditions for private developers to invest in social housing and public space (e.g. 20% of land plot must be public space, or 20% of all housing units must be affordable or social housing)
- Density bonuses in exchange for provision for social and public infrastructure (these will be negotiated on individual applications, based on meeting the goals of this SDF, and the development control and urban performance indicators outlined in section 8.4)
- Mechanisms discouraging idle/vacant/underutilised private land through higher taxation.
- Mechanisms to share increases in land value due to public infrastructure upgrades.

7.3. Unlocking Soweto as a True City District

Diversify Soweto to address its largely residential nature by developing mixed land uses (particularly economically productive ones) and social services, making use of its good street pattern and public transport. Develop it into a series of self-sufficient mixed-use nodes as growth points for jobs within the area, allowing Soweto to function as a liveable city district with access to jobs and the full array of urban amenities.



With a population of around 1.3 million inhabitants Soweto is the size of a self-contained city (Soweto and the City of Paris – not greater Paris- are roughly the same size). However, it remains highly dependent on the wider and inner city for jobs, with many residents making long daily commutes. A product of apartheid planning, Soweto remains to function as a segregated ‘township’, that is largely residential with limited job producing economic activity. Despite the vast gains made through public investment over the past two decades, the area still faces poor housing, overcrowding, high unemployment and insufficient infrastructure. Soweto is a medium density mostly ground level development, with vast single use (residential only) areas, lacking mixed use activities and consolidated public spaces. Soweto however holds the potential to become a true city district: the low density leaves spaces for densification strategies; street networks are well connected internally with high levels of walkability; and the existing (PRASA), newly installed and planned (BRT) public transport infrastructure open possibilities for mixed use transit oriented development. A key barrier to densification, the low density of jobs, must be noted however.

The first strategic project relates to the potential to “Re-urbanise” the Soweto Area – a strategy of focused planning and infrastructure intervention within the Soweto area to begin transforming this key part of Johannesburg from an apartheid era dormitory suburb, into a mixed use, sustainable, liveable and walkable urban area. The strategy for Soweto involves:

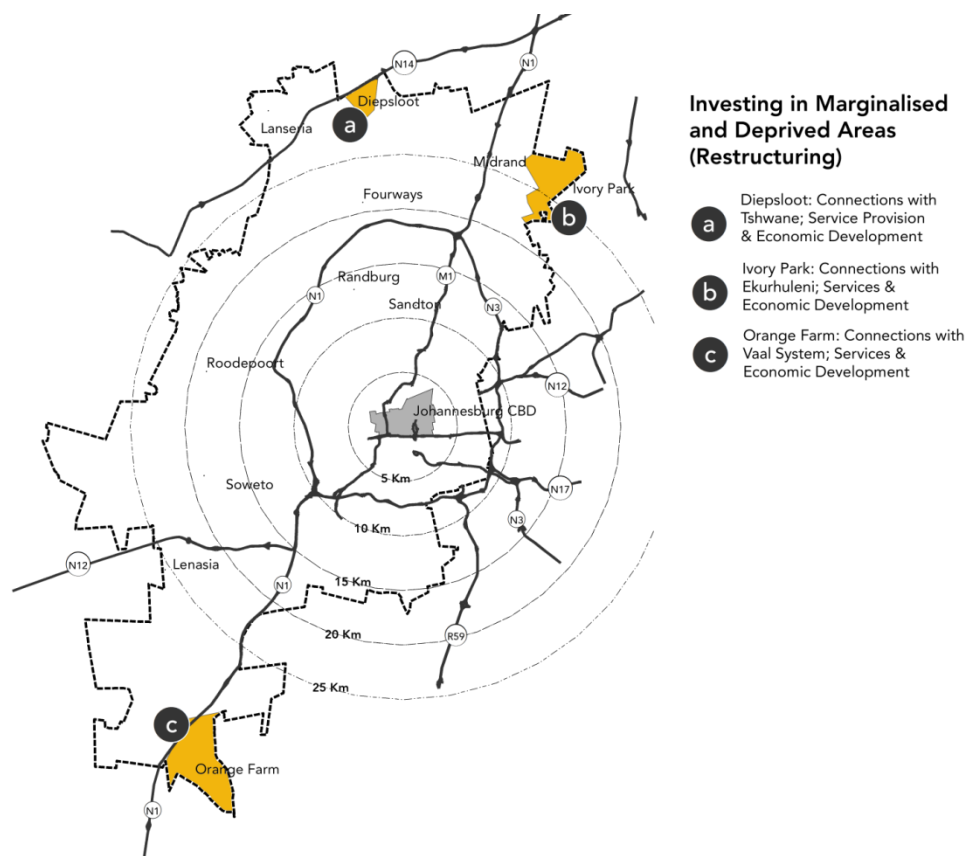
- Identifying and growing economic potential in areas of greatest accessibility and activity (identified nodes and TOD areas around PRASA and BRT stations);
- Consolidating investment in social infrastructure in strategic clusters to support the emergence of mixed-use nodes;
- Building on sustainable public transport systems and creating efficient public transport networks within these areas as a means of generating opportunity, as opposed to just outward and inward movement.
- Promote three to five story walk up residential buildings with shops and commercial activity on the ground floor that directly face the street, with parking, if included, underground or at the back (non-street side) of plots

Legal and financial tools that are suggested in supporting the implementation of these strategies are:

- Unlock the land market to stimulate owner development, acquisition, sales, and consolidation of plots.
- Accelerate development processes for development permits.
- Set-up framework for land readjustment/pooling to enable home owner driven dense mixed-use development and preventing gentrification.
- Set-up pilot projects to test the viability and desirability of TOD, plot consolidation and land readjustment projects.
- Develop an efficient land information and valuation system.

7.4. Addressing Marginalisation through (re)urbanisation

The areas of Diepsloot, Ivory Park and Orange Farm all have high population densities but are mostly residential and underserved. In these areas mixed land uses must be strategically included, to drive economic development and job growth. Social services should be improved to promote mixed use areas where people can not only live, but access city amenities such as jobs, schooling, healthcare and recreation.



The process of addressing spatial inequality in the city, particularly in Diepsloot, Ivory Park and Orange Farm (highly deprived areas in terms of the City's deprivation study) is a long term one, and central to the broader Transformative Vision underpinning the proposed SDF concept. There are certain key strategies that emerge as proposed priority interventions in this regard.

- On-going commitment to service upgrading (e.g. gravel roads upgrading),
- Improving the lives of people living in informal settlements through upgrading and infrastructure provision,
- Intensive capital investment to stimulate economic activity,
- Emphasis on social amenities which are absent or limited in terms of capacity,
- Extension of walking, cycling and public transport provision and infrastructure,

- Provision of high quality public transport and upgrading of precincts around public transport nodes such as taxi ranks, interchanges and rail and Rea Vaya BRT stations.

In addition to investment in strategic infrastructure to support longer term growth, it is imperative that the current spatial inequalities that characterise marginalised settlements and nodes within the city be addressed through the SDF. The aim is not to merely connect these areas to city amenities (including jobs and social services) but to diversify them into liveable city districts, where people can work, shop, recreate and access healthcare and education. At the same time, they should be connected by efficient public transport to the wider city.

These areas require investment in the historic shortfall in basic services and amenities and the on-going maintenance, upgrading and renewal of existing networks and components throughout the City. In terms of the vision for a future city however, it becomes imperative that this investment is generative in nature, rather than merely responsive. In this regard, there are certain strategies that are important in investing in these largely single use settlements. Investment in these cases must be seen in terms of its potential to generate future opportunity and urban “logic” in the system, as opposed to just addressing current need. In the case of marginalised settlements, investment should seek to establish a clear urban logic that can serve as a basis for future sustainable urban growth.

Due to the peripheral location of Orange Farm, Diepsloot and Ivory Park, there is a need to look at them in terms of a regional logic beyond the boundaries of the city. Preceding SDFs focussed on integrating these areas into the functional core of the city. Whilst this is important in the short term, it does not necessarily address the longer term sustainability of these settlements, or reduce the need to travel, a major financial burden on many residents. As such, the areas should be connected, in the short term, to regional economic centres nearby, and in the medium to long term, developed as mixed-use nodes in their own right.

Diepsloot, for example, is roughly 30km from the Johannesburg inner-city, yet only half that distance to the growing Centurion node in the neighbouring municipality of Tshwane. It is also more logical to connect it via public transport routes (as opposed to development corridors) to economic nodes in the north of the city, such as Midrand and Fourways. A similar dynamic exists in the settlements of Orange Farm and Ivory Park, with Orange Farm having connections through trade and employment with areas such as Ennerdale, Vereeniging, and Van der Bijl Park. Ivory Park relates strongly to Midrand and areas in Ekurhuleni, such as Thembisa (which it effectively forms part of) and the OR Tambo aerotropolis. At the same time, these peripheral nodes should be developed within their own borders, enhancing self-sufficiency and supporting economic growth and job creation.

The strategy for the peripheral nodes of the city can be summarised as:

- Diepsloot: Enhance connections to the nearest larger regional centre – the Centurion node, and provide improved services and infrastructure, economic development and growth of mixed-use nodes within the settlement. Address environmentally sensitive areas around Diepsloot in a sustainable manner and in a manner that maximises on economic and social value. Incorporate this natural environment as a structuring element in Diepsloot in a way that provides public open space for the community.

- Orange Farm: Enhance connections to the nearest larger regional centres – Ennerdale, Vereeniging and Vanderbijlpark, and provide improved services and infrastructure, economic development and growth of mixed-use nodes within the area.
- Ivory Park: Enhance connections to the nearest larger regional centres – Midrand and Ekurhuleni, and provide improved services and infrastructure, economic development and growth of mixed-use nodes

Legal and financial tools that are suggested in support of the implementation of these strategies are:

- Mechanisms to support small-scale community-driven projects and community initiatives
- Support affordable transport modes for creating linkages with regional centres (e.g. minibuses, walking and biking)
- Regularisation programs for informal dwellers to improve tenure security.
- Mechanisms increasing the provision of basic urban services through tariffs that allow for cross-subsidisation and innovative pre-paid billing technology.
- Set-up framework for land readjustment/pooling to enable opening spaces for better infrastructure, public spaces and services.

7.5. A Hierarchy of Nodes (Including TOD nodes) as a Focus for Growth, Consolidation, and Reinvestment

The previous SDF defined a number of metropolitan, regional, district and neighbourhood nodes as catalytic nodes. These will be supported for compact, walkable, liveable and mixed use development. There has been no change in classification or delineation of nodes from the previous SDF, and it is anticipated that this change will take place following the publication of the SDF through a nodal strategy and/or Regional Spatial Development Frameworks.

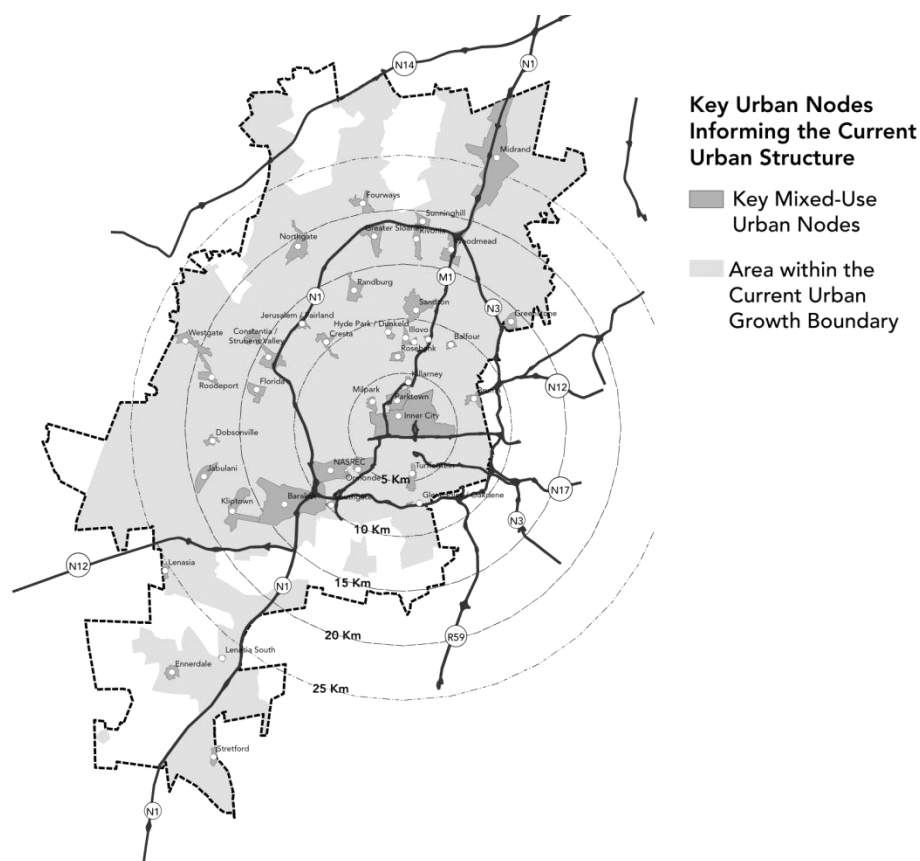


Figure 29: Key Urban Nodes

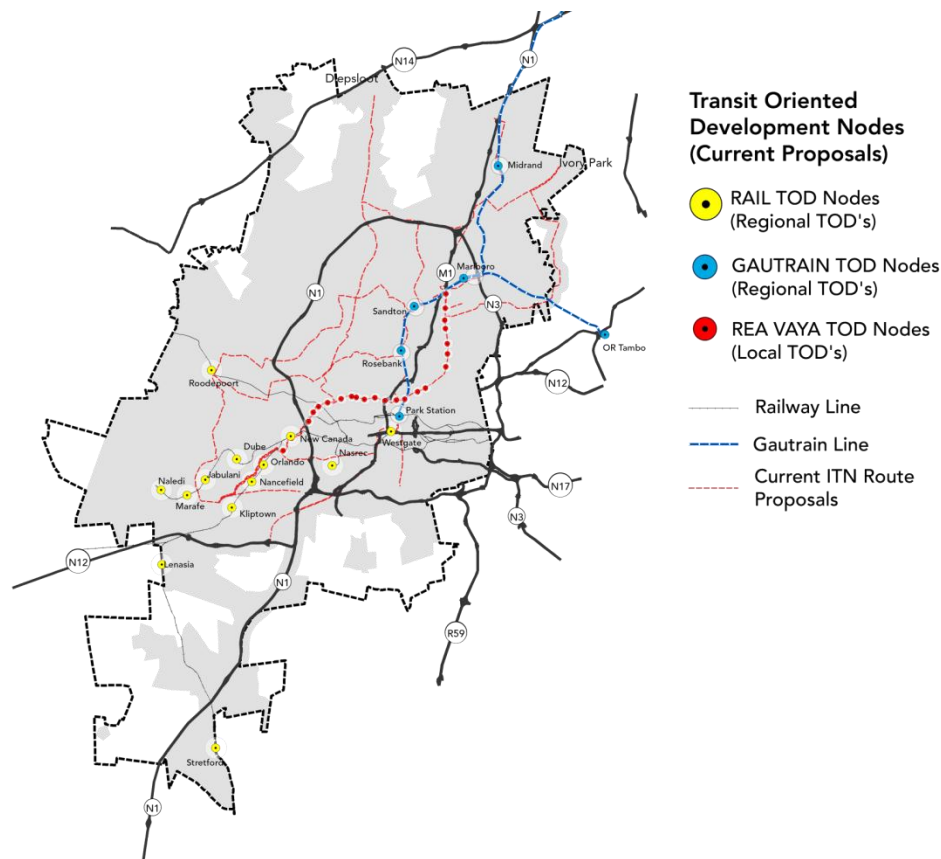


Figure 30: TOD Nodes

Over time, pockets of economic and mixed use activity have grown around the city; a structure of nodal points that exist at various intervals from the urban core. However, not all of these nodes are equal, particularly in terms of their ability and potential to support spatial transformation and facilitate generative urban growth. The nodal strategy aims to maximise the potential of the existing nodal structure, maximising the generative potential of the nodes by recognising and investing in their unique specificities. The focus on nodes will be on diversification and intensification with a strong focus on walkability and transit oriented development around public transit infrastructure, including current and future BRT, PRASA and Gautrain Stations.

7.5.1. Nodal Strategy

As described in the Spatial Concept of the SDF, a nodal strategy would seek to maximise the development and economic growth potential of the existing nodal structure of the city, by differentiating the unique characteristics and qualities of different nodes, categorising them accordingly, and offering a set of recommended interventions for each. This not only gives a policy support for the priority transformation areas, but also offers directions for gradual development of all the relevant nodes in the city. The directions are organised in tables (below) summarising the main characteristics of the nodes and guidelines for development or intervention.

The four developed and detailed categories of nodes are:

- Mixed-use / Key Urban Nodes
- Industrial Nodes

- Transit-Oriented-Development Nodes
- Neighbourhood Nodes

Mixed-Use/Key Urban Nodes

The system of mixed-use urban nodes that exists in the city provides an important basis for integrating future growth and investment. Not all nodes have the same potential in this regard, however, and the challenges confronting individual nodes are equally diverse in nature. A strategy to guide short to medium term growth within key nodal areas must thus take cognisance of these variations, whilst at the same time seeking to contribute to the longer term vision expressed through the compact polycentric urban model around which the SDF Spatial Concept is premised.

Whilst the boundaries of the key urban nodes discussed in the current Review process have been retained from previous spatial policy processes, including the most recent RSDF Processes, and have thus formed the basis for land use policy decisions up to this point, it must be noted that these boundaries are not definitive, and boundaries may be refined over time (through council resolutions) in response to emerging trends, as well as the strategic influence of the SDF Spatial Concept.

The Key Urban Nodes are divided according to a Nodal Hierarchy being: CBD (Metropolitan Core) Node, Metropolitan Node, Regional Node, District Node and Neighbourhood Node.

While the guidelines and management approach given with the Nodal Hierarchy suggest a broad framework for directing the longer term development of nodal areas within the city, specificities of different nodes should be taken into account. Therefore, a set of priority guidelines for some of the key metropolitan nodes is presented as a Priority Nodal Strategy, giving strategic basis for short to medium term intervention in nodes that are pivotal to realising the longer term vision of a Compact Polycentric City.

The distinction that is important to note here is that the Nodal Hierarchy provides a high level “placement” of these nodes relative to one another, whilst the Nodal Strategy proposed here provides more immediate direction to shorter term growth priorities with key Urban Nodes. Following are the tables outlining both the Nodal Hierarchy and the Priority Nodal Strategy:

	CBD (Metropolitan Core)	Metropolitan Node	Regional Node	District Node	Neighbourhood Node
Description	<p>The CBD is the historical origin and core of the metropolitan city.</p> <p>The CBD serves national and international communities.</p>	<p>These nodes are of metropolitan significance in terms of attracting people from areas beyond the metropolitan boundaries of the city.</p> <p>They offer a deeper selection of merchandise/economic opportunities, and draw from a larger population base.</p>	<p>These nodes are of significance within the metropolitan area. They serve specific regional areas. Equally important is that these nodes serve as economic hubs and focal points for employment opportunities.</p> <p>They satisfy the needs of a large primary and secondary catchment areas and have a wider entertainment component while supporting comparative and destination shopping.</p>	<p>Serves one or more neighbourhoods.</p> <p>Most of these nodes do not necessarily fulfil a true regional role, but rather that of a larger community node.</p> <p>The tenant mix is wider and competes on both ends against neighbourhood and regional nodes.</p>	<p>The nodes are of significance in local areas and mainly consist of retail development with an opportunity for smaller scale offices and social facilities.</p> <p>There are a considerably large number of these nodes within in the metropolitan area.</p> <p>These centres usually service the surrounding neighbourhood within a 2km range</p> <p>They fulfil a convenience and express convenience role.</p>
Dynamics / characteristics of the node	<p>Situated at the confluence of metropolitan routes and freeways, in the area of highest accessibility.</p> <p>Diversity of activities and public facilities across the range of primary, secondary & tertiary uses.</p> <p>Full range of public transport facilities.</p> <p>Established high-density residential component.</p> <p>Serves the national and international communities through transport, employment, accommodation and services.</p> <p>Due to the CBD's large footprint, there are different areas within the CBD that has distinct profiles.</p>	<p>Situated on mobility spines supported by mobility roads and have access to urban freeways</p> <p>A variety of goods, services and speciality products are offered at the node.</p> <p>Distinct profile.</p>	<p>These nodes are situated on mobility spines supported by mobility roads.</p> <p>Fulfil a variety of functions with sufficient mix of uses.</p> <p>Not necessarily a distinct profile, with nodes in tight competition against each other.</p>	<p>These nodes are predominantly located on mobility roads and / or activity streets (but not necessarily in all cases).</p> <p>Activities are of a local nature providing for convenience, daily needs and social services.</p> <p>Pedestrian activity is relatively easy.</p>	<p>Pedestrian-preferred access.</p> <p>Activities serve the immediate neighbourhood / suburb and are convenience based (not office dominated)</p>

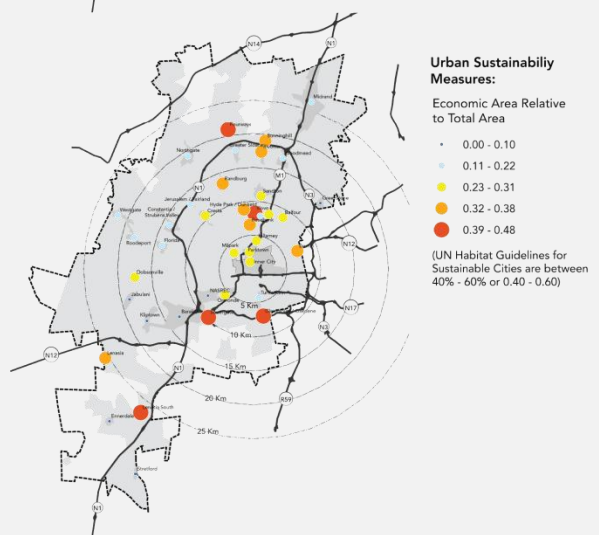
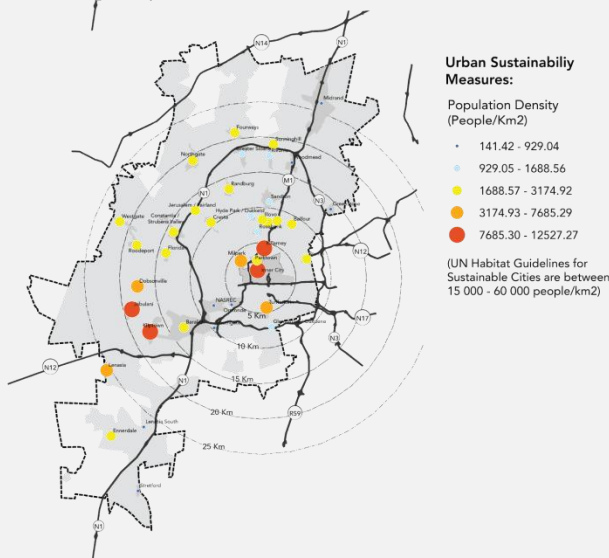
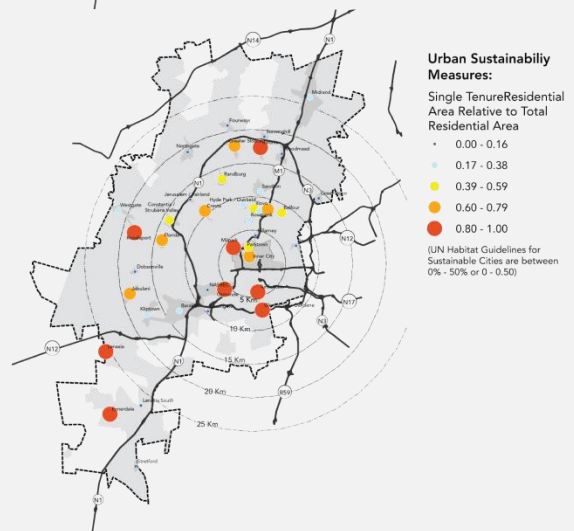
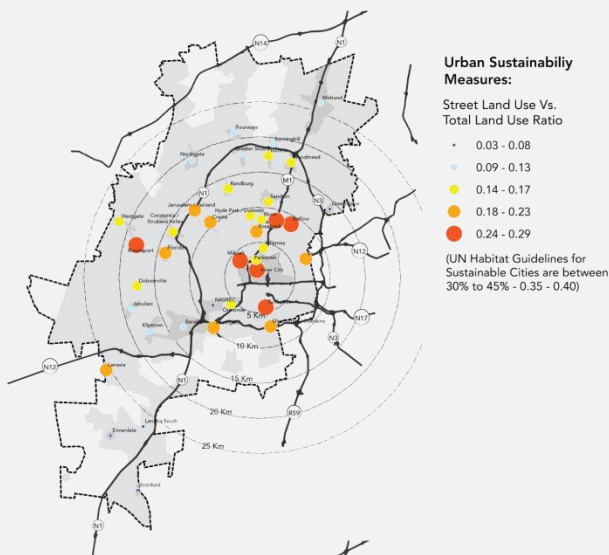
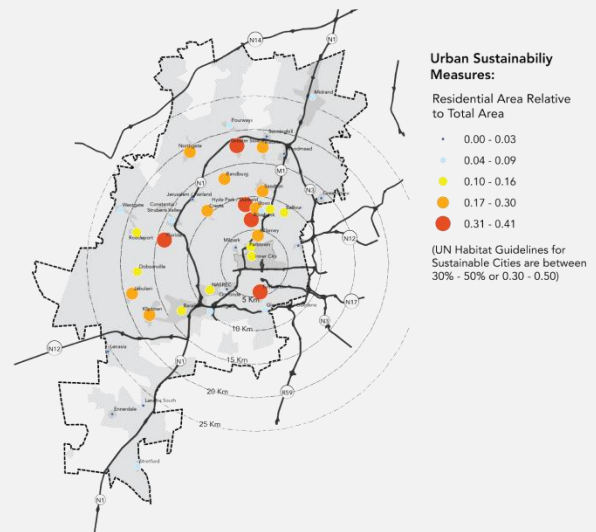
Table 3: Nodal Hierarchy

	CBD	Metropolitan Node	Regional Node	District Node	Neighbourhood Node
Development Guidelines	<p>Promote and acknowledge as the core of the city.</p> <p>Symbiotic relationship with decentralised nodes.</p> <p>Improve pedestrian linkages</p>	<p>Intensity and pedestrian-friendliness to connect the various activity precincts in spite of being a very large node.</p> <p>Provision of adequate public transport facilities</p> <p>Provision of informal trading facilities</p> <p>Provision for inclusionary business</p> <p>Provision for social facilities and metro parks</p>	<p>Intensity and pedestrian-friendliness to connect the various activity precincts and uses within smaller precincts.</p> <p>Provision of adequate public transport facilities</p> <p>Provision of informal trading facilities</p> <p>Provision for inclusionary business</p> <p>Provision for social facilities and at least a metro park</p>	<p>Intensity and pedestrian-friendliness to connect the various uses</p> <p>Provision of adequate public transport facilities</p> <p>Provision of informal trading facilities</p> <p>Provision for inclusionary business</p>	<p>Pedestrian preferred access</p> <p>Creation of active spaces</p> <p>Economic feasibility for new nodes</p> <p>Interface with surrounding environment</p> <p>Dominated by convenience use with small scale offices</p> <p>Design approach should focus on creating attractive spaces</p> <p>Provision for public transport facility where the neighbourhood node is on major transportation routes</p>
Required management approach	<p>The focus should fall on revitalisation and marketing in order to change perceptions.</p>	<p>The focus should fall on the creation of a clear profile for each metropolitan node.</p> <p>The design approach should focus on integrating various uses and different precincts visually and physically into a cohesive whole.</p>	<p>The focus should be on the monitoring and management of nodes to prevent an oversupply.</p> <p>The design approach should focus on integrating various parts of the node in one cohesive whole, as well as integrating the node within its surrounding environment through pedestrian linkages.</p>	<p>The design approach should focus on integrating these nodes within their immediate environment by providing sufficient, safe and pleasant pedestrian linkages.</p>	<p>The design approach should focus on the creation of attractive public spaces even on a very small scale.</p> <p>Leftover spaces should be avoided at all cost.</p>

Table 4: Priority Nodal Strategy

Key Urban Nodes as a Focus of Growth and Development

The City has an established hierarchy of nodes, although not all are equal in terms of their propensity to support and structure a sustainable and generative Compact Polycentric City form



Industrial/Specialist Nodes

Johannesburg has long been a centre for mining and manufacturing. Critically, a major transportation network emerged in the late 19th century to carry the City's new-found mineral wealth. The City's role as a transportation hub supported the development of industrial facilities fed by a rapidly-expanding labour supply. Within its brief history the City of Johannesburg rose to become an industrial powerhouse in Africa. More recently, the city has seen a shift to the tertiary economy.

An important goal for the City is to promote the successful development of Johannesburg's economic base in part by ensuring that industrial land is maximised for its highest and best use. Ultimately, it is in the City's interests to direct manufacturing, warehousing, or other industrial activities to the most competitive new or existing locations for such activity, so that these sectors may flourish and create jobs and income for local residents.

The City has finalised a council-endorsed study, which focuses on the following key objectives as part of an Industrial Land Study for Johannesburg: specify the industrial uses with growth potential in Johannesburg, identify competitive locations for industrial growth, examine existing industrial areas and identify the highest-end-best use for older industrial zones, recommend policies, programmes, incentives and strategies required to resolve key issues in the supply of industrial land and redevelopment of older industrial zones.

The rationale for the selection of the Industrial Nodes was following key issues and information that were looked at as part of the research and analysis component:

- **Economic Overview:** Key economic trends are summarised along with an updated analysis of industrial land supply and demand.
- **Employment Trends:** Issues covered include the location of employers' and employees' places of residence and work and others.
- **Industrial Property Market Update:** Issues covered include how land/ building supply affects rentals and the ability of smaller industries to afford to move to better building space or even established industries to expand and ultimately create more jobs.
- **Infrastructure Summary:** Support infrastructure and its impact on the growth or decline of industrial development are discussed.
- **Business Survey (questionnaire survey):** Significant input was gathered through a survey of 100 manufacturing and other industrial businesses as a sample of the Chamber of Commerce).
- **Key stakeholder issues:** Key drivers and inhibitors for industrial business and property owners were obtained from the various interactions with stakeholders.
- **Prioritisation Criteria:** criteria for the selection of priority areas for industrial development review, based on input from the demand analysis, infrastructure assessment, surveys, interviews, focus groups, and City policy framework.

Expansion of Existing Industrial Node/Zoning

Criteria	Potential Industrial Node
<ul style="list-style-type: none"> • Build-out • Sustainability • Infrastructure Capacity • Environmental Sustainability • Market Pressure/Potential • Accessibility (housing/employment) 	<ul style="list-style-type: none"> • Aeroton: Yes • Commercia / Chloorkop, Modderfontein: Yes • Linbro Park: Qualified Yes • Midrand: Yes • Kiasha Park: Yes • Kya Sand / Northlands: Qualified Yes • Anchorville / Lawley: Undetermined • Nancefield: Yes, if possible

Regeneration of Existing Industrial Node

Criteria	Potential Industrial Node
<ul style="list-style-type: none"> • Marketability • Management • Physical Crime & Grime • Location (proximity to low-income areas) 	<ul style="list-style-type: none"> • Benrose / Denver: Yes with modifications. • Selby & Booyens: Yes with modifications • City Deep: Yes with modifications • Wynberg/Marlboro South: Yes (Including Residential)

Change of Zoning Away from Industrial

Criteria	Potential Industrial Node
<ul style="list-style-type: none"> • Location & Context (impact on surrounding uses) • Marketability • Existing Plans • Infrastructure Capacity (peak periods in network) • Accessibility (access to opportunity) • Changing character/use (use not aligned with zoning) 	<ul style="list-style-type: none"> • Fordsburg: Yes / Modification • Braamfontein Werf: Yes • Klipriviersoog: Undetermined • West Turfontein / Robertsham: Qualified Yes • Lanseria Airport Area: Yes.

New Industrial Areas

Criteria	Potential Industrial Node
<ul style="list-style-type: none"> • Infrastructure (accessibility/availability of existing infrastructure): <ul style="list-style-type: none"> – Capacity – Service network • Location/Accessibility • Marketability • Environmental Sensitivity • State land ownership • Proximity to housing (“appropriate” work force for industry) • Existing Planning context (limiting industrial uses) • Target industrial sectors, integrated economic development • Cost of development 	<ul style="list-style-type: none"> • “Golden Triangle”: Conditional Yes • Bassonia / Mulbarton: Undetermined • Modderfontein: Qualified Yes • Diepsloot: No • Orange Farm: Limited • Soweto: Emdeni I.P./ Zola, Dobsonville, Dhlamini, and Chiawelo • Crown Mines / Industria West / Stormill-Robertville

Transit Oriented Development (TOD) Nodes

Through the GDS process, TOD was identified as a priority programme, with the objective to encourage the optimal development of transit hubs across the city, that provide access to affordable accommodation, transport, high quality spaces, amenities and social services.

These are nodes in the city that are specifically linked to transit facilities such as the Gautrain Stations, PRASA rail stations, BRT corridors and stations and other major public transport facilities. These nodes should ideally offer a range of mixed uses relating to the function and scale of the transit node. TOD areas have the greater potential for offering good quality of life through the creation of intense mixed-use precincts that can accommodate a range of economic opportunities within walking distance from public transport.

These nodes vary in size and function. The largest TOD nodes are anchored by Gautrain Stations such as Park, Rosebank, Sandton and the developing Midrand and Marlboro Stations. A large number of TOD precincts are anchored by PRASA rail stations. At a more localised scale, BRT stations tied to the Rea Vaya Network will contribute significantly to the achievement of TOD precincts in the City. As a matter of principle, low density, single-storey, residential developments are not acceptable within TOD nodes. Densities envisaged for these various public transport elements are reflected under the Density Guidelines.

The TOD nodes are currently being developed as part of the on-going city strategies, and the rationale of their selection is based on:

- A major public or mass transport station
- Potential for mixed-use development and densification

Neighbourhood Nodes

Neighbourhood nodes fulfil specific functions for neighbourhood residents and the functioning of neighbourhoods as a whole. Their importance is related to the provision of convenience related uses such as: social and community facilities, petrol stations with retail outlet, doctor's consulting rooms, convenience related shopping/services which may include uses such as convenience grocers, dry cleaners, butchers, local fruit and vegetable shops, laundromats, restaurants, beauty parlours and hairdressers.

In many neighbourhood nodes however, the functions that exist tend to be focussed on retail uses alone, with little diversification, particularly in terms of social and community functions. Many neighbourhood nodes have developed incrementally and in an ad-hoc manner, frequently resulting in inappropriate land uses and zonings. Consequently, managing the scale of development, land use control and law enforcement becomes problematic and limits opportunities for integration and the sustainability of these nodes and the areas in which they are located. There is an increasing acknowledgement that these nodes need to be better managed.

Moving forward, it is important that a process and guidelines be put in place that can guide a transformation from neighbourhood shopping centres to real neighbourhood nodes. Such a process/guideline would need to be premised on a number of key strategic imperatives:

- Diversifying activity away from basic retail and petrol filling stations, accommodating a wider range of uses and activities that would be appropriate to a small growing nodal area, such as higher density residential opportunities, non-retail commercial functions, and importantly, social and community functions;
- Premising future nodal expansion around public transport infrastructure and services, growing the user base of the node and extending its area of influence;
- Structuring the expansion of neighbourhood nodes around an integrated public environment that connects elements, facilitates movement for motorised and non-motorised users, and provides real opportunities for place-making.

7.6. Unlocking the Mining Belt

This spatial discontinuity presents opportunities for development that could integrate the north with the south. By identifying strategic interventions along the belt - road linkages, mixed use redevelopments, rehabilitation of degraded and damaged land – the fragmenting feature could become one of inclusion.

As outlined in the overall Spatial Concept of the SDF, the mining belt has been selected as one of the crucial development opportunities in the city. Explorations undertaken thus far in terms of outlining a future strategy for this area have identified a number of key opportunity areas along the mining belt, including its potential to integrate the areas of Soweto with the broader urban and economic opportunities around Roodepoort towards Mogale City, and its role in facilitating the southern expansion of the existing Johannesburg Inner City area.

The primary objective is to re-shape the historical mining-belt buffer (that racially and economically segregated areas such as Soweto from the north of the City) into a mixed use, vibrant growth area that bridges the historic spatial divide. Addressing the entire mining belt would require too large an investment in the short to medium term. The strategy is to identify select strategic interventions well suited to re-stitch JHB across the mining belt. In the short term, due to the sheer size of the mining belt, key catalytic projects should be implemented, that will contribute to the long term evolution of the mining belt over time. Interventions could possibly include:

- Investment in strategic road linkages and related infrastructure;
- Exploring the ecological structure of the areas as a key determinant to a future settlement pattern;
- Re-utilisation of locations subjected to or sterilised by historic and current mining practices for large-scale, mixed-use and mixed income developments;
- Consolidating current industrial activities and growing the potential for real job creation in the primary economic sector in accessible locations;
- Rehabilitation of degraded and polluted land and mitigation of acid mine drainage.
- Co-ordination with and support of mining industry / property owners will be essential to unlocking the inherent development potential.

Some legal and financial tools that are suggested support the implementation of these strategies are:

- Mechanisms to incentive ex-mining land owners or new private investors to clean and redevelop the land (tax cuts, subsidies, bonus density in other parts of town)
- A dedicated environmental restoration strategy that could attract international funds.
- Regularisation or readjustment programs for informal dwellers to improve tenure security.
- Mechanisms increasing the provision of basic urban services through tariffs that allow for cross-subsidisation and innovative pre-paid billing technology

7.7. Developing an Aerotropolis Corridor

While the city of Johannesburg has strong east-west connections following the gold reef (broadly from Krugersdorp, through the CBD to Ekurhuleni), east west connections are limited in the north of the city. This is despite the City of Johannesburg and Ekurhuleni containing strong economic and growth areas in this region. In Johannesburg, Randburg and Sandton are well established and growing, and in Ekurhuleni the aerotropolis around OR Tambo is receiving significant attention and investment, to support established areas such as Kempton Park and Edenvale. At the same time, there are a number of opportunities in strengthening links between the two Metros. There are well placed parcels of open land linking the areas, including Modderfontein, Linbro Park and Frankenswald in Johannesburg, and Dries Niemandt in Ekurhuleni, all of which are centres of developmental energy and investment. Then there is the existing Gautrain link that provides an efficient transport link across the two metros. There is also significant transit infrastructure planned in the area, including Johannesburg and Ekurhuleni BRT systems, the Corridors of Freedom, and the Great Walk pedestrian and bicycle connection between Alexandra and Sandton.

The SDF thus proposes an aerotropolis corridor, that will maximise the opportunities presented, and provide a strong urban logic in connecting Johannesburg to Ekurhuleni in the north of the city. The proposed corridor will run from Randburg, through Sandton, Alexandra, Frankenswald, Linbro Park, and Dries Niemandt to the Aerotropolis. The aim of the corridor is to create a regional logic for the development of strategic land parcels, utilising current development dynamics to drive growth and reducing expansion pressure on the peripheries.

While it is described as a corridor, this term is cautiously used. It will be a combination of a transit corridor, focussing development around current and future Gautrain and BRT stations, as well as a development corridor, made up of strategic parcels of land, rather than a continuous “worm” of development.

In the eastern part of the corridor, from Randburg to Sandton, it will be a transit corridor with development concentrated around BRT and Gautrain stations. In this light, the SDF proposes Randburg as a location for a future Gautrain station. In the eastern portion of the corridor, the SDF proposes development around BRT and Gautrain Stations, but also in strategic areas, indicated in Figure 31 below that make up the more traditional development corridor portion. While the new corridor is not a single shape, the many shapes and focus areas that comprise it, will make up the strategic link between the two metros.

The interventions and strategies leading to the development of the Aerotropolis Corridor would be the following:

- The eastern part of the corridor (Randburg to Sandton) as a transit corridor with development focused around BRT and Gautrain stations (proposing Randburg as a location for a future Gautrain station).
- Building a strategic connection between economic growth areas
- Building on the Aerotropolis Initiative
- Utilising current development dynamics to drive growth
- Reducing pressure for northward expansion of the fringe
- Developing a Public Transport Connection (The Randburg- Airport Link) ;
- Leveraging on existing and proposed infrastructure investment, including Gautrain, BRT and the corridors of freedom
- Focusing intense, mixed use, inclusive development in the strategic development areas (Frankenwald & Modderfontein)

Some legal and financial tools that are suggested support the implementation of these strategies are:

- Mechanisms to incentivise private investors to invest in the development of the large vacant lands (tax cuts, bonus densities in other parts of the city)
- Inclusionary zoning mechanisms to leverage private developers to create affordable and social housing mixed with high-income housing (demanding up to 20-30% affordable housing).

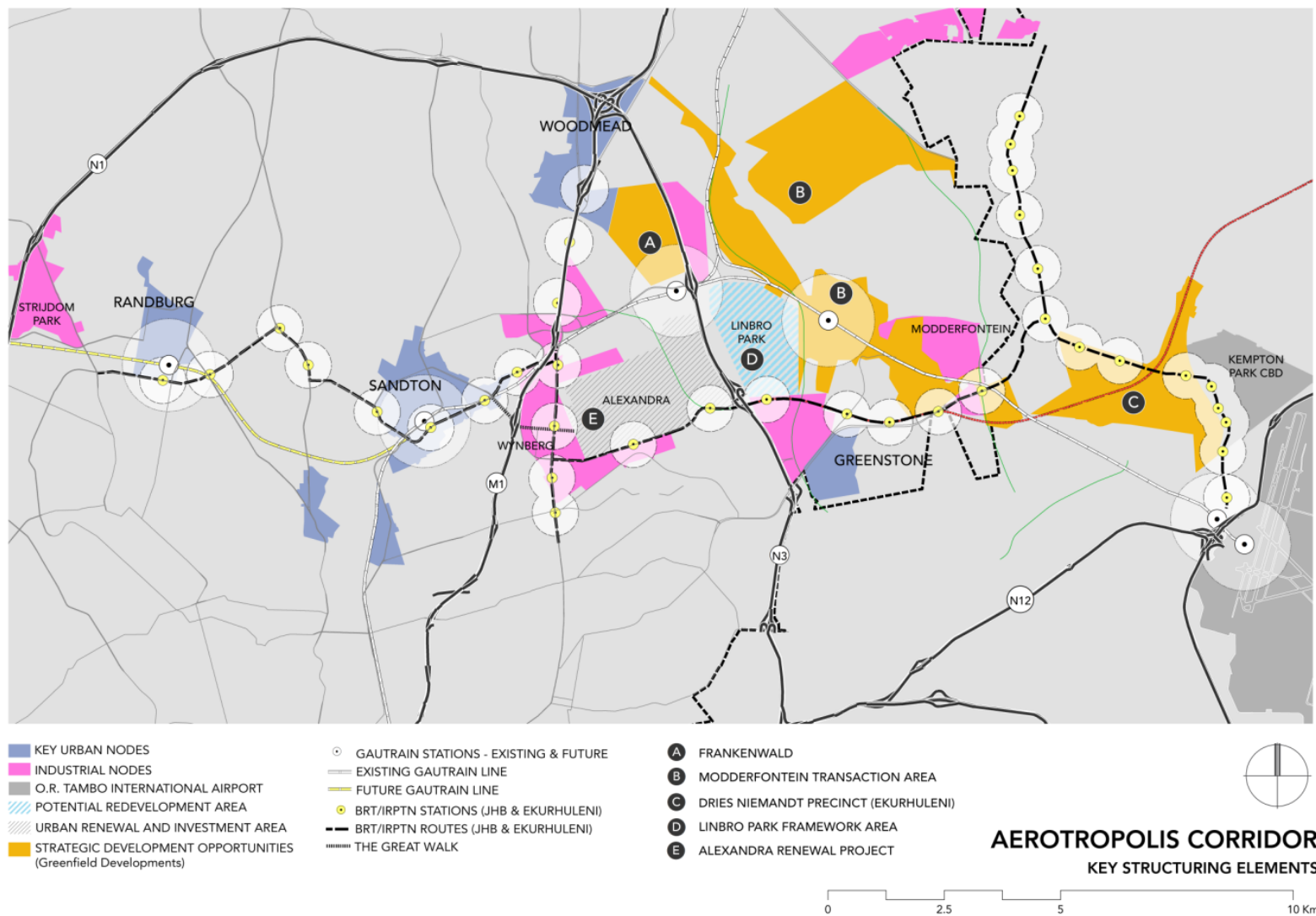


Figure 31: Proposed Aerotropolis Corridor
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7.8. Integrated Natural Structure as a provider of ecosystem services

The natural environment becomes an increasingly important element in the structuring of the future city. The critical biodiversity layer should be seen as a city asset that provides valuable infrastructure services and not merely as unused land available for development. Protecting these areas is not done for the sake of conservation alone, but to make surrounding developed parts of the city more sustainable, liveable and valuable. They should also be protected to maximise their intrinsic value in providing ecosystem services as green infrastructure, including supporting, provisioning, regulating and cultural services. Defining an ecological layer in this SDF is done towards:

- Protecting high value areas beyond existing areas of settlement;
- Integrating natural ecological systems with urban development through green corridors and the extension of urban open space network;
- Ensuring new development & redevelopment is cognisant of current environmental policy;
- Extending the role of the public environment, through streets and public spaces, in a broader, integrated, open space network.
- Maximising the value of ecosystem services

The green infrastructure of Johannesburg would encompass not only vacant open space, but several different categories of spaces, including:

smaller green patches	small community parks
	community/neighbourhood gardens
	small scale urban agriculture
larger green patches	bigger city parks
	forests
	natural reserves
	natural areas within the Mining belt
	wetlands
	swamps
	productive landscapes (agriculture, crops)
	green fields/meadows
green corridors	streets with a green path / tree line
	rivers and river banks
	pedestrian/bicycle pathways
	wildlife passages
	wider natural pathways

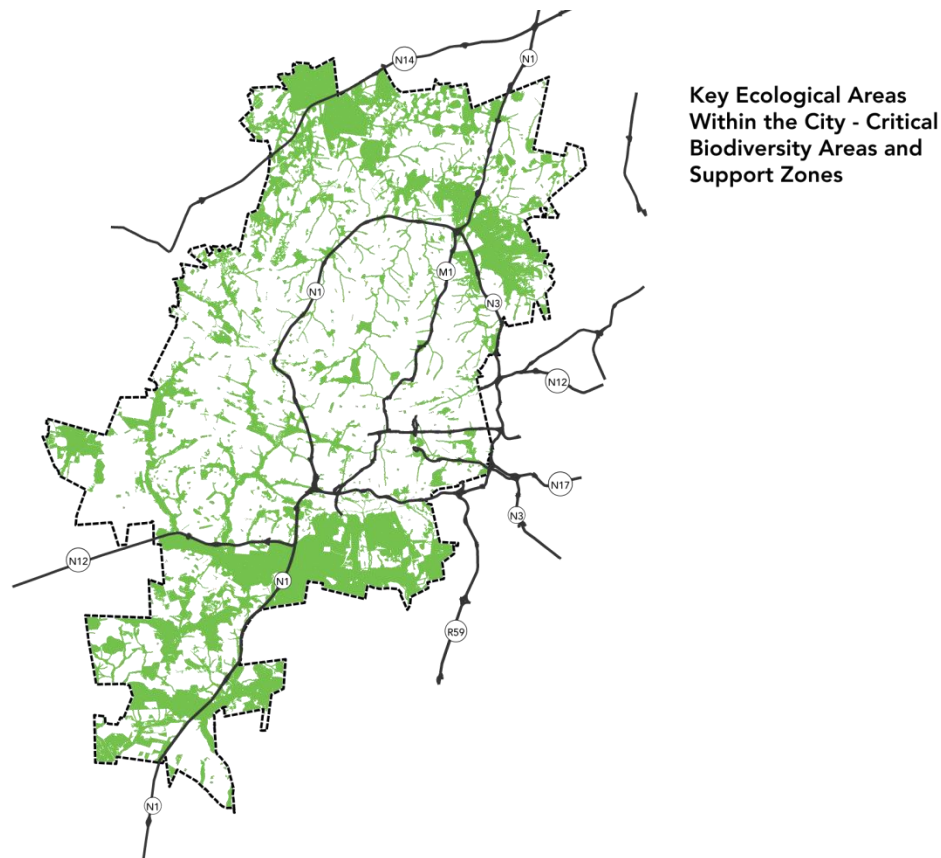
7.8.1. Development controls and supporting mechanisms in critical biodiversity areas

Critical biodiversity areas must be protected and preserved, with the value of ecosystem services they provide maximised. They should form part of the public realm, adding value and structuring elements to the urban system and provide agricultural, tourism, social and spiritual services.

- Developments within critical biodiversity areas must be limited to those that add value to the public realm, and that preserve the vital ecosystem services these areas provide.
- These areas must be considered as vital to adding value and structuring elements to the urban realm
 - The interface with the urban area must be given high priority to promote public accessibility
 - These areas are not just dead green space, but are key parts of the public realm, and must be protected as such.
 - They provide needed open space that must be preserved for a growing city
 - These areas must be considered as adding real estate value to urban developments
- All building or rezoning applications for critical biodiversity, Gauteng EMS or protected open space areas must go through the appropriate processes set out by the Environment and Infrastructure Services Department in the City of Johannesburg, the Gauteng Department of Agriculture and Rural Development and any other relevant national policy and legislation

The City should:

- Invest in and support the agricultural industry and agricultural projects as a key sector in preserving green infrastructure and maximising its value for the city, including growing the economy, creating jobs and providing food and other products
- Invest in and support tourism, social, spiritual and leisure initiatives in critical biodiversity areas to protect the areas, grow the economy, and create jobs
- Plan natural areas such as wetlands and swamps as protected natural buffers, serving as a natural 'urban development boundary' and protection from flooding and other climate-change related damages
- Within the city, plan green corridors and green patches as buffers/dividers between incompatible land use areas, such as between residential and noxious industries
- Use neighbourhood guidelines and form-based codes in order to ensure that each street is planned with a tree line, a pedestrian and bicycle pathway
- On a neighbourhood scale, support, invest and incentivise development of smaller community parks, gardens and urban agriculture



Financing green infrastructure in cities

Natural services are very similar to other utilities, in the sense that they provide tangible, valuable benefits to inhabitants and visitors of the city. However, these benefits do not always create an immediate incentive for investors, as the economic benefits do not flow back to them directly. Where such services do benefit private agents (such as in increasing real estate prices), they should contribute to the maintenance of such services as well.

A crucial step for making investing in ecological areas viable is to create a business case for investing in ecological assets, coupled with a strategy for the implementation of taxation and pricing measures to raise revenue for advancing environmental goals (e.g. tax exemptions or subsidies for private developers that invest in environmentally friendly technologies, water, energy and waste management, as well as in green spaces and neighbourhood parks; or conditions for building permission obliging investors to leave a certain percentage of their plot as a green space). The business case should be developed with a background of strong collaboration between the city's financial and environmental departments, as well as other related departments such as basic services, disaster management and transportation. This should also include priority investment from the city budget in green infrastructure, especially since the investment pays off in reduced public costs for storm water management, flooding, transport and basic services.

7.9. Key focus areas outside of priority transformation areas

A number of areas in the City of Johannesburg do not necessarily fall within the priority transformative areas mentioned above, however, form part of a city wide issues that require strategies to respond to them.

7.9.1. Consolidation or Restructuring Zones

It is recognised that many areas of the city are currently subject to fairly fixed development proposals that do not necessarily fall within the Priority Development Zone, nor outside the existing Urban Development Boundary of the City. This area is viewed as a focus of Urban Consolidation, controlled growth, urban management, addressing backlogs and structural positioning for medium to longer term growth. The policy intent in these areas would be to ensure existing and future development proposals are aligned as far as possible with the broader intent of the SDF, specifically in terms of consolidating and diversifying development around existing activity nodes, public installations, and public transport infrastructure.

In the Consolidation zone, the city will allow new developments that promote the goals and meet the requirements of the SDF, but do not require extensive bulk infrastructure upgrades. The land uses and intensities of uses within this zone must be scaled down in the peripheries of this zone i.e where this zone interfaces with the ecological resource zone.

7.9.2. Informal Settlements

See section 5.4.

7.9.3. Marginalised areas outside of priority transformation areas

While this SDF defines Orange Farm, Ivory Park and Diepsloot as marginalised areas of key prioritisation, there are others in the city that should by no means be ignored. Broadly, in existing marginalised, formal areas, infrastructure backlogs (hard and soft) should be met, and diversification of land use should be promoted to allow for economic development and mixed use activity. Alexandra is a key example, and much of the investment it will receive will be through the Alexandra Renewal Project, and it's inclusion in the key aerotropolis corridor.

7.9.4. Lanseria

The Lanseria Development Framework 2020 and the Mogale City Spatial Development Framework identify the Lanseria airport node as a long term strategic development node with opportunities for commercial, business and residential development. The future development of the airport is grounded on the Lanseria airport infrastructure project with a development company established to undertake this development.

The Lanseria node occupies some 900ha straddling the City of Johannesburg and Mogale City municipal boundary to the north west of the city. A preliminary land use budget in terms of the development frameworks estimate that the development will yield some 8,2 million m² of floor area. The node requires government support to ensure the installation of key bulk infrastructure including sewer and water, electricity, roads and public transportation. The further development of

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infrastructure around the airport, including future plans to extend the runway, lands the node to its seamless integration with SADC, and global, air, rail and road logistics networks.

The development of the Lanseria node still needs to address:

- The installation of the airport infrastructure and phasing thereof
- The alignment of the development objectives of the airport development with the spatial development objectives of the City as contained in this SDF
- Environmental compliance
 - the development is largely greenfield
 - the large tracts of critical biodiversity areas and protected reserves in close proximity
- Determination of the location and percentage of low income/affordable housing within mixed income housing developments;
- Infrastructure requirements and costs thereof; and
- The socio-economic impact of the subject development on the City of Johannesburg's space economy in particular, primarily for the City's peripheral settlements, and the Gauteng City Region in general;

The SDF broadly supports a vision to enable the development of an Aerotropolis that addresses the above-mentioned issues in the Lanseria node. It also proposes a Gautrain linkage to support the airport, and joint it to OR Tambo international Airport.

8. Implementing the Plan

Chapter Summary: *The recommended nodes and corridors for development of the Spatial Concept of the SDF 2040 are translated into several steps for implementation that are detailed in this section, namely:*

- **priority transformation areas** – *defining a hierarchy of Capital Investment Priority Areas for the city;*
- **capital investment focus** – *directing public investment into priority transformation areas and suggesting tools for realising financial and social returns on investment;*
- **spatial policy regulations** – *supporting the priority transformation projects and the city-wide spatial concept;*
- **and measuring urban performance** – *a system of measuring the urban performance of the implemented strategies.*

8.1. Priority Transformation Areas

The Spatial Concept proposed through the SDF 2040 for Johannesburg – the Polycentric Compact City structured around priority transformation areas, nodes and corridors – is a long term strategy to spatially transform the city into one that is more inclusive, connected, resilient, and generative in nature. As with any long term strategy, it is not a vision that can be implemented in a single round of investment. Instead, it is imperative that a series of key “catalytic” interventions and priority projects are identified that can be planned and implemented within the short – to medium term timeframe. It is also imperative for the City to direct and facilitate private sector development in priority areas, through creating an enabling environment.

The selected priority transformation areas are not fixed and unchangeable. Legislation requires that the proposed SDF is periodically reviewed, a process that may suggest a redirection or refocus, based on the performance of the spatial transformation that has taken place on the ground by then. The process is thus a dynamic one, rather than a static master-plan based implementation strategy.

Given the above, the following key projects – Priority Transformation Areas – are proposed as a focus for the first period of capital investment in the future city:

- Strengthening the Metropolitan Core
- Consolidating a public transport backbone
- Investing in Soweto as a true city district
- Addressing Marginalisation through (Re)-Urbanisation
- Unlocking the Mining Belt
- Developing an Aerotropolis Corridor)

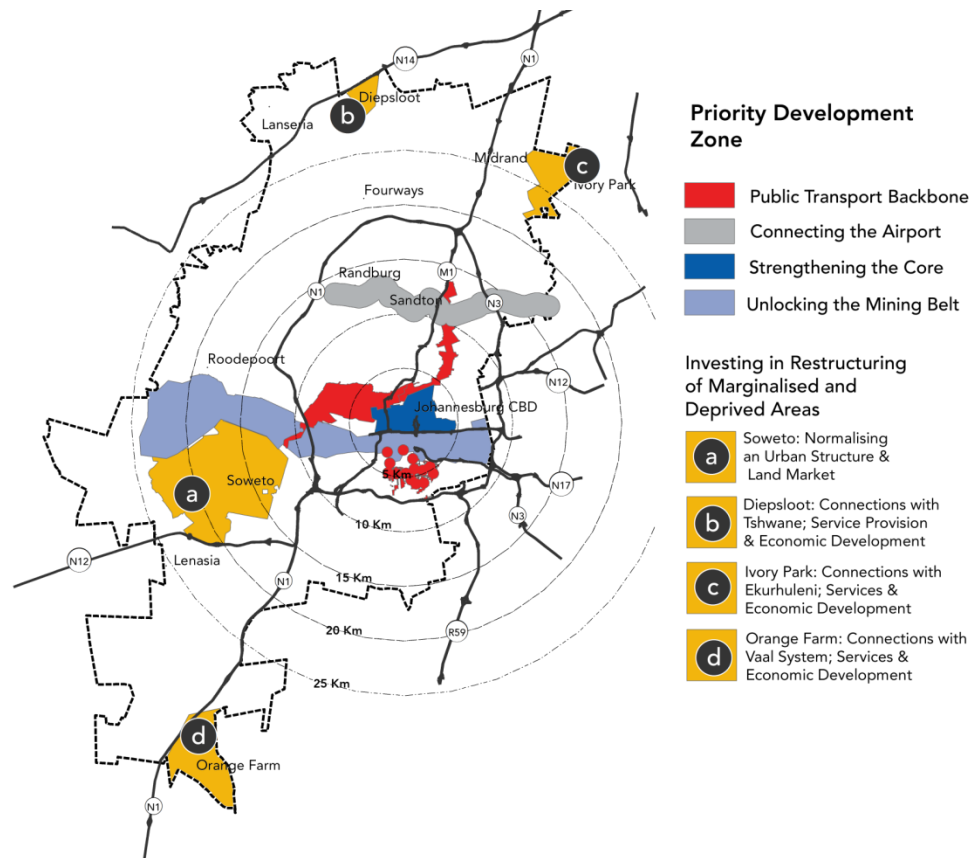


Figure 32: Priority Transformation Projects

8.2. Capital Investment Focus

The public sector has a key role to play in order to leverage on private investment, by providing the bulk infrastructure and main services; and providing a large amount of social infrastructure, including health and education facilities, in very close proximity to transit, to address the needs of people living within the transit catchment areas, but also beyond.

The analysis has highlighted significant inequities in terms of access to services such as education and health, which are skewed towards high income groups and urban areas. Good access to social infrastructure is important to the development of the Future City. It will become even more significant as the population increases. Beyond improving access to health and education, social infrastructure will at the same time catalyse land use diversification, provide jobs in close proximity to transit and leverage on private investments.

This document has proposed a set of Priority Transformation Projects as the first stage of implementing the longer term spatial vision for the City. It is imperative that these Priority Transformation Projects form the basis of a Capital Investment Framework. The provision of capital infrastructure thus becomes a key tool in implementation of the SDF Concept, and the pattern of investment must prioritise the identified spatial areas if any meaningful spatial transformation is to occur. **The main tool for implementing this is to use the priority transformation areas in the JSIP (Johannesburg Strategic Infrastructure Platform). JSIP is a tool that is in its final stages of**

development, that is used to prioritise capital infrastructure spend, and direct budget to that spend accordingly.

It is recognised that development cannot come to a complete halt outside of the Priority Development Zone, but the SDF does propose that this zone does receive the bulk of investment in new infrastructure for the foreseeable future. The table below provides an indication as to how investment spending can be prioritised with reference to the key spatial transformation areas, whilst balancing demand in areas outside of this zone.

Table 5: Capital investment Percentage in Priority Transformation areas “Blue Zone” and Consolidation areas “Orange Zone” over time

	2015 – 2020	2020-2025	2025-2030
BLUE ZONE	70%	80%	90%
ORANGE ZONE	30%	20%	10%

8.2.1. Land Value Capture

Land value capture is a mechanism to share the benefits of a land value increase that result from public investment in infrastructure and amenities (e.g. public transit infrastructure, roads, parks or bulk service upgrades) or other public action (e.g. rezoning, increasing development rights, etc.). It ensures that government authorities, private developers and the general public realise a return on public investment (through rates increases, operating revenue, land transfers etc.), and that this return can be used for maintenance of infrastructure, and re-invested into new improvement projects.

It is very important, especially in the context of the inequality present in Johannesburg, that returns on investment are not only financial, but social too. This is in line with two of the major goals of the city’s GDS, which are financial sustainability and reducing inequality. If a BRT station (or any other infrastructure) for example were to increase the rates base, but then ‘push out’ poorer citizens to make way for more wealthy ones, the financial gain would be negated by the social loss. It is therefore imperative to balance the two goals of financial and social returns on investment for the city. It would mean that new developments should have a requirement to accommodate lower income citizens of the city, and contribute to improving the public realm (see section 8.3.5)

Importantly, land value capture can be used as a tool not only to realise returns on public investment, but also as a means to finance the provision of new infrastructure; a method that the City of Johannesburg is already piloting, and one that has been successfully implemented in a number of cities worldwide (Tax Increment Financing - TIF). It is possible to model the increase in rates that infrastructure and resulting new developments will generate for the city. The infrastructure needed to support this new development can then be financed, based on the projected returns. It is important in this case, that:

- Rates increases are considered thoroughly, and in consultation with finance experts and lenders to ensure realistic predictions;
- Rates increases from the specific developments are ring fenced to service the specific infrastructure loans;
- That risk on the infrastructure loans is shared by private developers and the city, to ensure mutual commitment to realising the goals of such a project;
- And that inclusive social return (such as inclusionary housing and a percentage of public space) is set out as a requirement for this type of infrastructure funding.

According to the Urban Land Institute⁴⁰, value capture mechanisms involve a financial positive feedback loop with four components: (1) Value Creation, (2) Value Realisation, (3) Value Capture and (4) Local Value Recycling.

⁴⁰ Huxley, J. (2009). *Value Capture Finance: Making urban development pay its way*. Urban Land Institute.

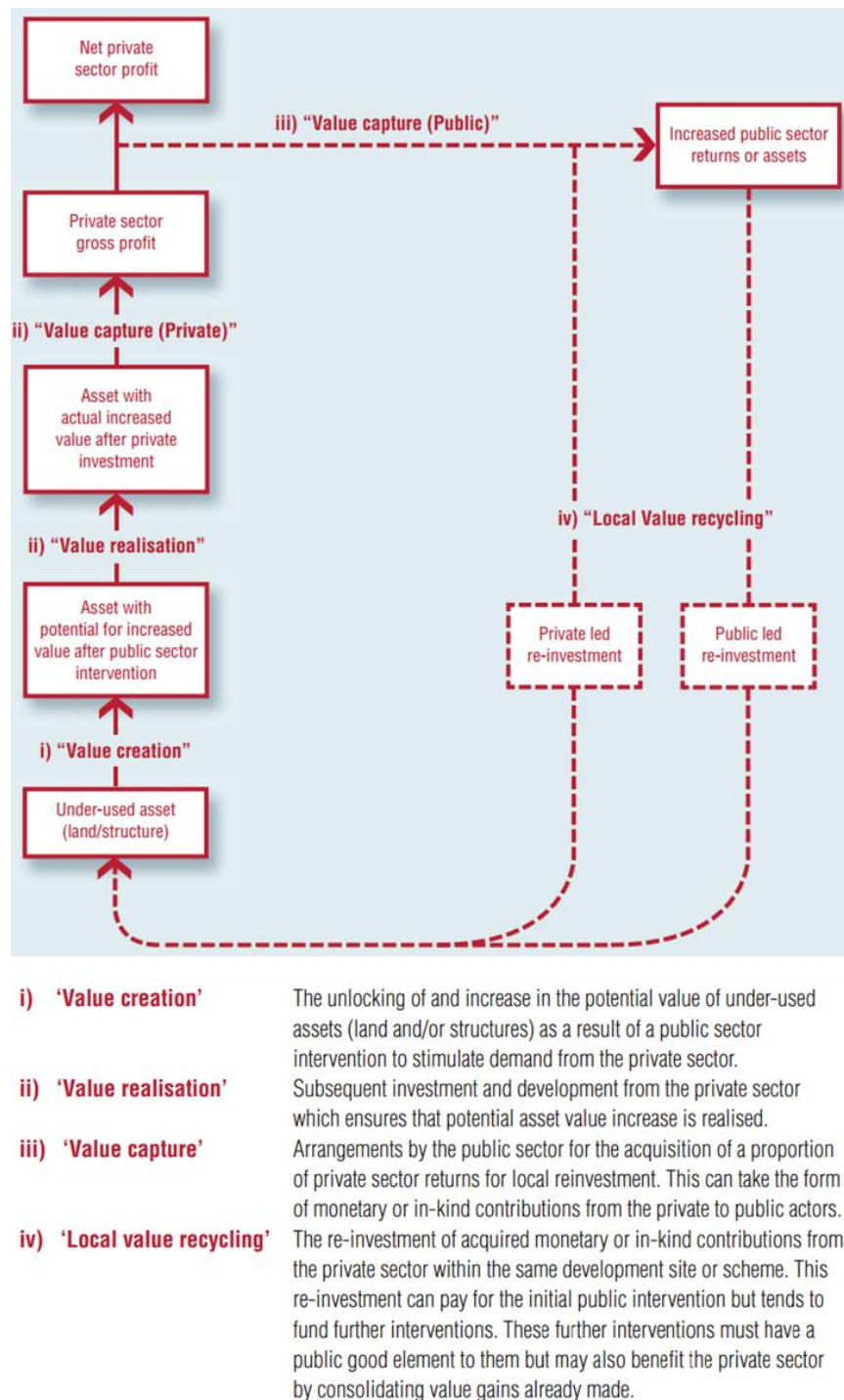


Figure 33: An idealised Value Capture Finance positive feedback loop⁴¹

⁴¹ Huxley, J. (2009). *Value Capture Finance: Making urban development pay its way*. Urban Land Institute. Pp. 7-8.

8.3. City- Wide Spatial Policy Regulations

A series of Policy Regulations are suggested in the SDF as a means of supporting the spatial concept and Priority Transformation Projects underpinning the broader transformation vision. The intention of the Policy Guidelines is to provide implementation mechanisms for meeting the vision of the SDF.

8.3.1. Re-enforcing the Urban Development Boundary

The previous Spatial Development Framework has as one of its key tools an Urban Development Boundary (UDB) to manage the expansion of the city's footprint, limit sprawl related infrastructure costs (capital and operational) and protect vulnerable ecological resources. This SDF seeks to re-emphasise the UDB. With an emphasis on compacting future growth in nodes and priority transformation areas, this SDF introduces the concept of three 'levels' of the urban development boundary. This growth management tool is elaborated as follows:

A Priority Development Zone

The Priority Development Zone (The "Blue" Zone) represents the spatial extent of the short to medium term focus of urban growth and investment promotion, as well as being the focus of future incentive packages, and the bulk of public capital investment (primarily facilitated through the Johannesburg Strategic Infrastructure Platform – JSIP) .

In the Blue zone, the city will promote densification, diversification and intensification through capital infrastructure investment, increased density allowances and other incentives.

A Consolidation and Structuring Zone

It is recognised that many areas of the city are currently subject to fairly fixed development proposals that do not necessarily fall within the Priority Development Zone, yet fall within the existing Urban Development Boundary of the City. This area is viewed as a focus of Urban Consolidation, controlled growth, urban management, addressing backlogs and structural positioning for medium to longer term growth. The policy intent in these areas would be to ensure existing and future development proposals are aligned as far as possible with the broader intent of the SDF, specifically in terms of consolidating and diversifying development around existing activity nodes, public installations, and public transport infrastructure.

In the Consolidation zone, the city will allow new developments that promote the goals and meet the requirements of the SDF, but do not require extensive bulk infrastructure upgrades. The land uses and intensities of uses within this zone must be scaled down in the peripheries of this zone i.e. where this zone interfaces with the ecological resource zone or low intensity/ecologically sensitive areas in neighbouring municipalities.

An Ecological Resource Zone

The areas falling outside of the existing Urban Development Boundary are viewed as a focus of ecological resource protection and management, food production, agricultural related investment, leisure and tourism, and green energy initiatives.

In the green zone, the city will severely limit development and infrastructure investment that is not related to the initiatives mentioned immediately above.

Critical Biodiversity Layer

In addition to the three 'zones' of development, special attention must be given to the Critical Biodiversity, Protected, and Environmental Support Areas in the city. These areas (which fall in different UDB zones) should provide structuring elements to the urban realm and should be protected to maximise the ecosystem services they provide (see section 5.5.5).

The spatial extent of each of these growth management areas is reflected below:

	ha	km ²	% of CoJ
BLUE ZONE	40283.28	402.83	24%
GREEN ZONE	32662.21	326.62	20%
ORANGE ZONE	91656.68	916.56	56%

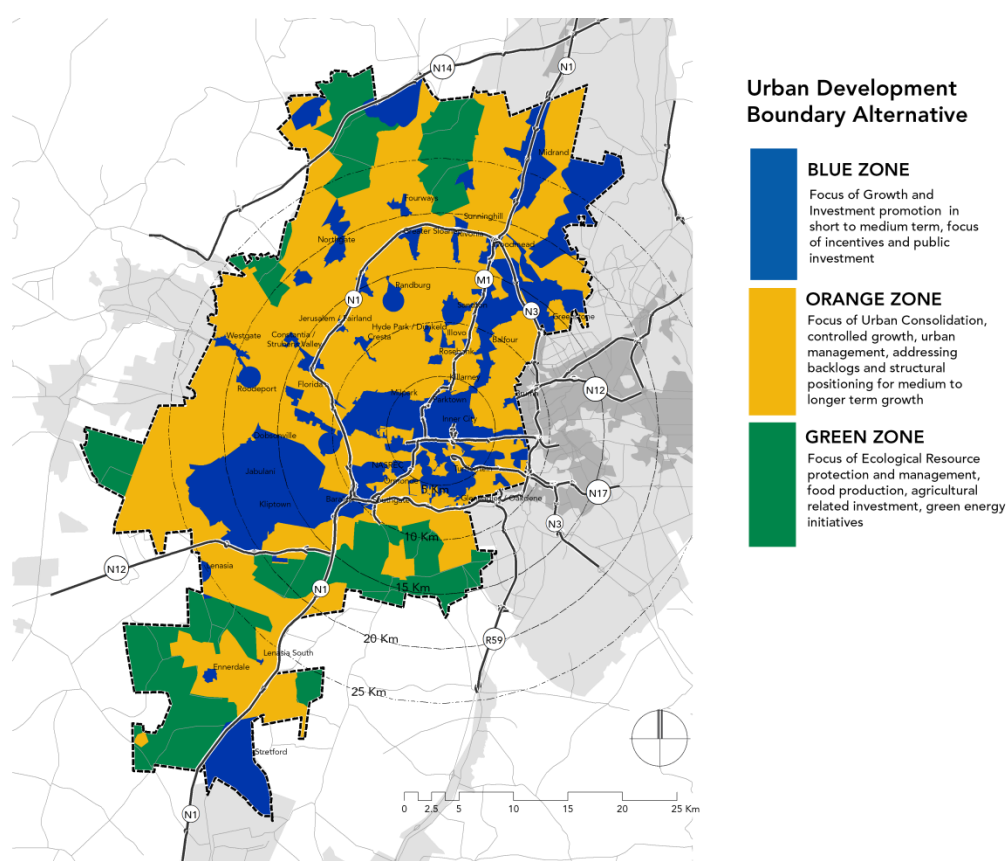


Figure 34: Urban development ‘zones’ or boundaries for Johannesburg

8.3.2. From Zoning to Form-Based Codes in Priority Areas⁴²

In meeting the vision of the SDF, a shift from traditional zoning to form based zoning, or codes, is proposed. The aim is to pilot this approach in select priority transformation areas and, if successful, roll it out to all priority areas, and possibly the entire city. The SDF does not define these codes in detail for each priority area, noting rather that they should be developed for each area in consultation with the principles laid out in this SDF, and stakeholders in each priority area.

Traditional zoning was designed to separate land uses, in response to inappropriate land use mixes, for example having high density residential areas in close proximity to heavy, high polluting industry. What it has often resulted in is the separation of land uses that complement one another, such as retail, accommodation, social services, public space and business. It has also resulted in car oriented urban form, as well as sprawl.

Zoning, which defines the use of land and the development requirements of that land (density, floor area ratio, etc.) allows for myriad combinations, that can meet the technical requirements without benefitting the character of the built environment that various stakeholders (from communities to planning authorities) would like to achieve. For example, a townhouse complex may have the correct land use, coverage and density, but not interact with the street nor contribute positively to the public realm, nor create walkability. Another example may be a mall, which, while it may meet requirements, does not necessarily interact positively with the public realm in which it finds itself. These are general examples, and not a consideration of all malls or townhouses.

The Form Based Codes Institute defines form-based codes as:

“... a land development regulation that fosters predictable built results and a high-quality public realm by using physical form (rather than separation of uses) as the organising principle for the code. A form-based code is a regulation, not a mere guideline, adopted into city, town, or county law. A form-based code offers a powerful alternative to conventional zoning regulation.”⁴³

Form based codes are thus always made for a specific context, and a smaller area – a neighbourhood or a district – and are not general guidelines for a city wide scale. A form based approach may also look at ‘retrofitting’ existing built form that does not meet the needs of the collective built environment vision, to better meet those needs.

Introducing Form-Based Codes as spatial policy on a local or regional scale in Johannesburg has the following goals:

- To define what form the built environment should take, and what land uses should be in place
- To offer design requirements (not guidelines), built into the new ‘form’ of zoning, to define the mix of uses and the required regulations including density, FAR etc.

⁴² This section is based on information from <http://formbasedcodes.org/>

⁴³ <http://formbasedcodes.org/definition>

- To deal with context-specific aspects such as interaction with the street shops and commercial activities on the ground floor), height, interaction of building facades, parking location (on street, underground, or in a manner that does not create a parking 'buffer' between the street and the building), pedestrian accessibility and contribution to shared visions for the built environment

8.3.3. Nodal Guidelines

See section 7.5.

8.3.4. Densification Regulations

Density provisions and regulations are central to realising the longer term vision of the Compact Polycentric city that forms the basis for the current SDF Spatial Concept. In this regard, it is imperative that specific regulations and targets be set that can facilitate higher density development in appropriate areas within the urban structure, and to develop infrastructural capacity that can support this growth.

The goal of the density regulations is to assist the City in curbing urban sprawl and locating a bulk of the City's residents close to urban amenities, specifically public transportation infrastructure and economic opportunities.

The strategy employs the following to achieve the above goal:

- Creating a common vision of high density, mixed use, mixed income developments within nodes and priority transformation areas.
- Increase the viability of existing and proposed public transport infrastructure and services.
- Public transport and non-motorised transport infrastructure to be aligned and invested into key priority areas.
- Appropriate urban design and TOD principles to guide development.
- Alignment of public infrastructure and social amenities with high density areas.
- To optimise the use of land and provide accommodation in close proximity to urban opportunities.
- To improve residents' quality of life by bringing them closer to urban opportunities and reduce travel times.
- To reduce pressure for the development of open spaces and environmentally sensitive areas.
- To reduce air, water and land pollution.
- Subsidised and social housing to be well integrated with uses along transport corridors.
- Infrastructure capacities will have to be assessed in terms of their ability to accommodate higher densities.
- Channel market supply into strategic densification areas.
- To promote human scale, pedestrian friendly developments.

The strategy also outlines detailed density regulations for different typologies of urban structure and parts of the city.

Table 6: Density Regulations

Target Locations/Spatial Elements		Density Regulations	
		Population Density (du = dwelling units)	Job Density (township/neighbourhood scale)
1 Key Urban Nodes	Within CBD	Minimum: 100 du/ha	Minimum 0.5 jobs per resident (1.5 jobs per du ⁴⁴)
	Within Metropolitan Nodes	Minimum: 80 du/ha	
	Within Regional Nodes	Minimum: 80 du/ha	
	Within 1000m of CBD	Minimum: 80 du/ha	
	Within 500m of a Metropolitan/Regional Node	Minimum: 60 du/ha Maximum: 100 du/ha	
	Within District nodes/Specialist nodes	Minimum: 80 du/ha	
	Within 500m of District nodes/Specialist nodes	Minimum: 60 du/ha Maximum: 100 du/ha	
2 Transit Oriented Development Nodes	Within 500m of Rea Vaya / BRT bus stations.	Minimum : 60 du/ha Maximum : 500 du/ha (Subject to provisions and guidelines emanating from approved Strategic Area Frameworks that exist)	
	Within 1000m of Gautrain stations and PRASA rail stations	Minimum: 80 du/ha Maximum: 500 du/ha (Subject to provisions and guidelines emanating from approved Strategic Area Frameworks that exist)	
3 Priority Development Areas 'Blue Zone'	Public Transport Backbone	Apply public transport density and Corridors of Freedom guidelines Minimum: 50 du/ha	
	Metropolitan Core and Key Mixed Use Zones	Apply the respective nodal density guidelines	
	Marginalised Areas/(Re) Urbanisation Focus	To be determined per proposal - an urban design/typology issue and not a density issue. It will therefore be dealt with by the development control indicators outlined in this SDF. Minimum: 50 du/ha	

⁴⁴ This is based on an average household size of three as per the Census 2011 figures for Johannesburg

4

Subdivisions and second dwelling units

All single dwelling and low density residential areas

Base density and minimum erf size to be based on configuration of existing suburb/township & average erf size in immediately neighbouring townships/suburbs.

Minimum Erf size 500m² per subdivided stand

Maximum density: 20 Du/ha

8.3.5. Inclusive and affordable Housing

As at the time of the current SDF review process, the Gauteng Provincial Government is in the process of preparing an Inclusionary Housing Policy that is envisaged to apply to housing developments within the Province as a whole. The Bill seeks to design inclusionary housing legislation that requires private developers to include number of affordable housing options in new residential developments of a certain size. The number of inclusionary units will be based on a percentage of the total number of units in a development; currently proposed at between 10 and 30%. This SDF seeks to achieve a conscious mix of income groups in areas of the city that are well located and well serviced by jobs, social services and public transport. The SDF supports a requirement for inclusionary housing. With a complex issue such as this, it is recommended that a dedicated policy be adopted for inclusionary housing, or that the Gauteng Inclusionary housing bill be implemented.

The Inclusionary Housing Policy proposed in this SDF aims to:

- contribute towards achieving a better balance of race and income groups in new residential developments
- provide accommodation opportunities for low income and lower-middle income households in well located areas that they might otherwise be excluded from;
- improve the supply of affordable housing opportunities (ownership and rental).
- mobilise the private sector to provide lasting solutions in the delivery of inclusionary housing opportunities.

The following must be clarified in by-laws and related regulations:

- Market correction mechanisms must be in place to protect beneficiaries of inclusionary housing from displacement through gentrification.
- Management of inclusionary housing must ensure that rentals and the reselling of units remains affordable. In the case of ownership, amendment scheme conditions and/or title deed restriction giving the municipality a right of first refusal on all inclusionary unit sales will help ensure this goal.
- The possibility of offsite provision/supply

- Ensuring that inclusionary housing caters for the whole spectrum of low income households, and not just the top end of the inclusionary segment for example:
 - allocate 10% of total units developed to low income households;
 - allocate 20%-30% of total units developed to low to middle income households.
- Mechanisms must be in place to ensure the timely development of the inclusionary units. The development of inclusionary units must occur concurrently with the market related units.
- The design and location of inclusionary units within new developments must be approved by council

In order to facilitate the delivery of inclusionary housing, the SDF proposes the following:

- The inclusionary housing policy should be applicable in “key transformative areas”, nodes and transit oriented development nodes
- Inclusionary housing should be coupled to an incentive programme to create a positive development environment, and to target priority areas;
- The inclusionary housing policy provides for inclusionary units to be additional to allowable residential densities, and at
- Land use and development management should give priority to development applications that include inclusionary housing through fast tracking approvals.
- Land use and development management must support smaller unit sizes to promote the provision of inclusionary housing
- Flexibility in zoning, height, footprint, parking and other design requirements should be allowed to accommodate affordable housing

8.3.6. The Public Environment

According to the Charter of Public Space⁴⁵, “public spaces are the places publicly owned or for public use, accessible and enjoyable for all for free and without profit motive”.

A well designed and responsive public environment is central to the broader intent of this SDF. In this regard, the notion of the Public Environment extends beyond the provision of parks and open spaces, including also sidewalks, streets, pedestrian connections, and spaces occupied and activated by traders and residents on a daily basis. The public environment offers a range economic, social and

⁴⁵ Biennial of Public Space. (2013). *Charter of Public Space*. Retrieved from <http://bit.ly/1iHexO8>

ecological benefits to the city (see section 5.5.5). One of the key intents of this SDF is thus to ensure adequate provision, protection, and integration of public environment resources.

In order to protect and enhance the public environment:

- Development should seek to integrate with its context by establishing connections to and from the surrounding urban system, maximising permeability through the site, and ensuring continuity of movement through the neighbourhood;
- Development should ensure positive interface conditions between new and existing developments, built and natural landscapes, and a clear transition between public, semi-public, semi-private and private realms
- Development should reinforce and enhance existing patterns of activity where appropriate, promote diversity and layering of uses, and provide opportunities for as wide a range of user groups as possible
- Development should reinforce the role of non-motorised transport, providing for safe pedestrian & cycling movement, linking to public transport systems
- Development should seek to enhance the overall public environment, reinforcing the character of an area, and creating usable and memorable public space opportunities
- Development should consider sustainable development responses, enhance protection of and access to biophysical resources, and adopt a physical response that can adapt to changes over time

A policy guideline initiative is proposed to supplement existing building and planning regulations to focus specifically on elements of the public environment with regards to new development. Some areas of concern that should be addressed include the interface between private and public development, and between built and unbuilt, the configuration of the street network, the privatisation and neglect of public space, the configuration of the public environment as well as the quality (and inequality) of public environment investment. Moreover, the erosion of public environment resources causes additional concern.

The following indicators offer precise values and possible directions that can guide previously stated efforts:

- Ensure that there is an accessible public park or recreational open space within 500 meters of every resident. (UN Urban Environmental Accords 2005, Action 10)
- By 2030, all regions achieve a tree canopy of at least 25% of land areas and meet WHO's suggested minimum of 9m² open public space per resident. (Future of Places indicator, UN-Habitat).
- Allocate at least 50% of land to streets and public space at a neighbourhood scale. (15-20% to public space, 30% to streets, including sidewalks).
- Street connectivity is between 80-120 intersections per square kilometre (UN-Habitat Global Public Space Toolkit)
- Provide at least 2.4 ha of public open space per 1000 inhabitants at a neighbourhood scale

8.3.7. Land readjustment

Land readjustment is a process that facilitates the re-distribution of land in a project area to the respective former landowners, after adjustment and consolidation of all parcels of land according to a new land use plan that both enables densification and opens space for infrastructure, services and public spaces. It is a process suggested by the SDF for implementation in the City of Johannesburg.

Land readjustment is a method that allows landowners to pool their land and develop their plots collectively. It allows landowners to use their land as main resource to improve housing, finance redevelopment, and can also be used for the redevelopment of dilapidated industrial areas. While urban renewal is often associated with expropriation and displacement, land readjustment aims to develop land while maintaining the population and creating fair and equitable benefits. The method is often used where the fragmentation of plots impedes effective development, and single landowners have insufficient capital to initiate their plot's development.

With land readjustment, a group of neighbouring landowners come together in a partnership and pool their land to jointly plan and service their adjoining plots. Part of the land can also be sold to offset development costs. The resulting costs and benefits of the project are equitably shared among public bodies, landowners and developers. During the readjustment, part of the land will often be used for infrastructure or public space. The public sector can stimulate this process by devising incentives that promote collective action.

Land readjustment involves a change in people's legal relationships in the same way that it alters their physical ones. This means that there are three fundamental considerations: (1) to provide the framework within which relationships can be changed in a clear and predictable manner that results in mutual (public and private) benefit. (2) To ensure that the framework is fair and will treat individuals and groups equitably, particularly the poor, women and the vulnerable, including private landowners and the wider citizenry of the city. (3) To provide the vehicle for the implementation of government policy on the ground. Legal mechanisms are needed to handle issues such as site selection, the level of land contributions, the amount of say that landowners and non-owners have, the land valuation mechanism, sales and transfers of land after the project has been announced, handling disputes, combatting speculation, the classification of land in the plan, the types of formal land rights to be allocated, and the financial arrangements. If the law already provides for land readjustment, it should be used as the basis for project design. If no such laws exist, it may still be possible to borrow concepts from related legislation, such as rules on planning, land acquisition, expropriation and compensation.

Land readjustment benefits landowners and communities, as well as the city, as it helps achieve a higher standard of living, better access to infrastructure, services and open public spaces at lower or no cost to the local government. It also may help create new sites for development and urban expansion. Land readjustment has been widely adopted in Asian, European and Latin American countries.

8.3.8. Process and Quality Control

In order to ensure that new developments meet the goals of this SDF, it is important that quality control is implemented not only in the application phase of developments (land use and building permission), but also in the design phase. The SDF thus proposes the strengthening of the existing Urban Design Adjudication Committee (UDAC) that will assess all new township developments, and

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developments of 1000m² floor space or more, according to the goals of this SDF, the density regulations (section 8.3.4) and development control measures (section 8.4).

8.4. Development Control and Urban Performance Measures

This SDF review draws strongly on prevailing norms and standards that define different elements of urban sustainability.

A key element of the SDF is a framework for the assessment of urban performance within the priority transformation zones, and as a means of evaluating development applications for these areas. Based on UN Habitat principles and assessment formulas, the following matrix should be used to assess development applications in priority transformation areas, and for the city to measure urban performance, so as to direct the type of growth and development needed in different areas of the city. The table should also be used to assess all new township establishments and new developments of 1000m² floor space or more.

Formula	Unit/Targets
Street Area including sidewalks (Public Realm) as a percentage of Total neighbourhood/township Area	(30 – 45%)
Population Density	(15 000 – 60 000 people/km ²)
Economic Floor Area as a percentage of Total Floor Area	(40% - 60%)
Residential Floor Area as a percentage of Total Floor Area	(30% - 50%)
Single Tenure Residential floor Area as a percentage of total Residential Floor Area	(0 – 50%)
Affordable Housing units as a percentage of total Residential units	(20 – 50%)
Single function block Area as a percentage of total neighbourhood area	(0 – 10%)
Job Density	0.5 to 1 job per resident
Access to Transit	(30% of new housing opportunities within 1km of public transit stops, 70% within 2km of public transit stops)
Street Connectivity (Intersections/km ²)	(80 – 120 Intersections/km ²)
Public open space (parks, squares, playgrounds, sports fields etc.) as a percentage of total neighbourhood area	(15 – 20%)