ITMP25
EXECUTIVE SUMMARY

REVIEW, PREPARATION AND UPDATE OF THE TWENTY-FIVE YEAR INTEGRATED TRANSPORT MASTER PLAN (ITMP25) FOR GAUTENG PROVINCE

GAUTENG
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

GAUTENG TRANSPORT AUTHORITY
ACCESS GAUTENG 2050
Connecting People, Places and Opportunities Sustainably


FINAL

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1. Introduction

GIBB was appointed by the Transport Authority for Gauteng (TAG) for the review, preparation and update of the twenty-five-year integrated transport master plan (ITMP25) for Gauteng province. The 25 Year Gauteng Integrated Transport Master Plan (2013) (GITMP25) was developed by the Gauteng Department of Roads and Transport (GDRT) in 2013. The GITMP25 for Gauteng mapped out key transport projects and plans to be rolled out over the next 25 years to year 2037. In addition to the GITMP25, a 5-Year Gauteng Transport Implementation Plan (GTIP5) was developed. The TAG and GDRT have reviewed and updated the GTIP5 and are completing the review and update of the GITMP25 for the Gauteng Province for the next 25 years, the reviewed and updated being referred to as the 25 Year Integrated Transport Master Plan (ITMP25).

The ITMP25 for Gauteng is an important strategic document which will enable the GDRT to regulate, plan and develop an efficient and well-integrated transport system that serves public interest by enhancing mobility and delivering safe, secure, and environmentally sustainable air, rail, and road-based public and private transport services. The core objective of the ITMP25 is to guide the Gauteng Province towards a world-class, sustainable transport system that supports it's economic, social, cultural, and environmental goals.

The GDRT's vision is to develop "*An integrated, sustainable infrastructure that promotes people-centred, innovative and an accessible, safe and affordable movement of people, goods and services.*" Furthermore, building on Gauteng Province's broader vision of *"A liveable, equitable, inclusive and united Gauteng City-Region"*, the TAG has developed the *Access Gauteng 2050* Vision of *"Connecting People, Places and Opportunities Sustainably"*.

The ITMP25 mission is to support these visions, and is stated below:

> *"To establish a sustainable, resilient, effective, innovative, integrated and technologically advanced transport system that enhances quality of life, supports economic growth and influences land use whilst minimising environmental impact through mode shift to connect people, places and products safely, affordably and equitably."*

Gauteng, the smallest province of South Africa' nine provinces, is situated in the north-west parts of South Africa. Although only 1.5% of the country's land area, highly urbanised Gauteng is home to more than a quarter of South Africa's population and contains the country's largest city, Johannesburg, its administrative capital, Pretoria, and other large areas such as Midrand and Vanderbijlpark (GCRO, 2021).

Gauteng is the economic powerhouse of Southern Africa, producing 35% of South Africa's GDP and is currently the 7th largest economy on the African Continent. The sectors that are the main contributors to economic growth are business, financial and real estate services. The Gauteng economy was forecasted to grow at 4.7% in 2021 after a contraction of 8.2% in 2020. There is currently a divergence between economic and population growth rates.

Gauteng's southern border is the Vaal River, which separates it from the Free State. It also borders on Northwest to the west, Limpopo to the north, and Mpumalanga to the east. Gauteng is the only landlocked province of South Africa without a foreign border.

A single Global City Region with the Gauteng Province at its core has developed with rapid urbanisation. The Global City Region includes the three Metropolitan Municipalities and two District Municipalities in the province and the Local Municipalities within their districts, together

with other municipalities in adjacent provinces. Transport moves freely across the municipal and provincial boundaries and the Gauteng urban conurbation functions as a **single functional transport area** on a daily basis.

Administratively, Gauteng contains two District Municipalities (Sedibeng and West Rand) and three Metropolitan municipalities (Tshwane Metropolitan Municipality, Johannesburg Metropolitan Municipality and Ekurhuleni Metropolitan Municipality). Emfuleni Local Municipality, Lesedi Local Municipality and Midvaal Local Municipality fall within Sedibeng District Municipality. Merafong Local Municipality, Mogale City Local Municipality and Rand West City Local Municipality fall within West Rand District Municipality.

With further growth in the Gauteng economy, the demand for the movement of people, goods and services is continuously increasing. This has resulted in an ever-increasing level and duration of traffic congestion, loss of productivity, an increase in the impact that transport has on the environment and a decrease in the quality of life of its people. As opposed to other solutions, transport challenges in the province can be addressed meaningfully by planning and implementing integrated provincial wide public transport and non-motorised transport systems to promote sustainable modes of transport.

South Africa and the Gauteng Province especially has become part of the global village. The external environment has changed significantly over the past decade, and several global forces are influencing and shaping the transport sector.

It is estimated that by 2025, 60% of the world's population will be living in urban areas (UITP). The result of this rapid urbanisation and economic development is the increased demand for the movement of people, goods and services. Similar to global trends, private vehicles are or remain the preferred mode of transport in Gauteng and this is leading to further increased traffic congestion, pollution, road traffic accidents and a greater dependency on fossil fuels. Urbanisation has also led to the inevitable emergence of 'Smart Cities' and a greater dependency on ICT solutions.

There seems little doubt that climate change is one of the most significant threats to the future of humanity. The increased demand for travel has a very significant impact on the natural environment because of pollution and increased greenhouse gas emissions, with general agreement on the transport sector's adverse contribution to this. The transport sector is responsible for 18% of all man-made greenhouse gas emissions. Considering the fact that the global private vehicle fleet is expected to treble by 2050, emissions from transport are projected to grow faster than that of any other sector. Public transport is three to four times more energy efficient per passenger than private vehicles. Promotion of public and non-motorised transport use should therefore be at the forefront of this fight against climate change. Public transport and non-motorised transport (NMT) play a major part in providing greener mobility solutions and reduction of CO_2 emissions.

It is also important to deal with the changing global weather patterns on the transport system. Building resilience and contingency measures into the system is crucial to mitigate the adverse impact of climatic incidents, such as flooding, extreme heat or cold conditions.

We are living in the Fourth Industrial Revolution (4IR). This is the first industrial revolution rooted in a new technological phenomenon, namely digitalization, rather than in the emergence of a new type of energy source. Digitalization enables the building of a new virtual world from which the physical world can be steered.

A major consequence of 4IR for the transport sector is the emergence of Disruptive Technology. The disruptions come from agile, innovative businesses using global digital platforms to oust well-established incumbents by improving the quality, speed and pricing of their services, as well as linking their services to convenient payment platforms. A major opportunity for the transport sector related to the advent of 4IR, is the availability of Big Data that can greatly contribute towards planning and the management of the transport network and associated systems.

4IR developments will also bring about both workforce challenges and opportunities. With the current employment challenges in South Africa and Gauteng, the opportunities offered by 4IR need to be exploited to create new jobs.

Increased geo-political instability and uncertainty, recently experienced as a result of the war in Ukraine has had an impact on energy costs, the cost of living and inflation. This has led to a drive for less dependence on oil and gas as primary sources of energy and an acceleration in the deployment of other and more sustainable sources. This will continue to impact but also benefit the transport sector.

The Provincial Government has adopted the Growing Gauteng Together 2030 policy to address current realities and with the aim to address alleviation of poverty and inequality, the promotion of job creation, Broad-Based Black Economic Empowerment (BBBEE), supporting township economy growth and enhancing women and youth empowerment. The approach towards the development of the transport system in Gauteng needs to support this policy.

The GDRT Departmental Growing Gauteng Together through Smart Mobility 2030 Plan was compiled in response to Growing Gauteng Together 2030. The foundation of this plan is restructured urban form, Gauteng as a freight logistics hub, data centric mobility and building strong institutions.

The National Rail Policy, 2022 has been adopted, which provides a basis for the transformation of both passenger and freight rail. Over time and with the promulgation of the proposed National Rail Act to enable the implementation of this policy, this could have a significant impact on specifically the management of passenger rail in the province.

The Gauteng Provincial Land Transport Framework (PLTF) was developed in terms of the National Land Transport Act 5 of 2009 (NLTA) and Regulations Related to the Minimum Requirements for the Preparation of Provincial Land Transport Frameworks, 2011. The ITMP25 must guide choiceful decisions and inform, support and enable the implementation of the PLTF as well as municipal strategies that have already been developed. Therefore, significant points of leverage in the existing PLTF and other provincial or municipal strategies were considered.

The themes to be addressed from a national perspective are:

- Inclusive economic growth and job creation;
- Reduce poverty and the high cost of living; and
- Develop a capable and ethical state.

The five elevated priorities for Gauteng Province are as follows:

- Economic recovery and acceleration;
- Improving townships, informal settlements, and hostels (TISH);

- Strengthen the battle against crime, corruption, vandalism, and lawlessness;
- Prioritization of health and wellness of communities; and
- Strengthen the capacity of the state to deliver services.

The themes to be addressed from a provincial perspective are:

- Township, Informal Settlement and Hostel (TISH) programme;
- Central Business District (CBD) revitalisation (such as Pretoria, Johannesburg, Roodepoort and Kempton Park);
- Links to key nodes within and outside the Province (Krugersdorp, Rustenburg and Sasolburg);
- Focusing on Special Economic Zones (SEZs), including the Lanseria node;
- Addressing the issue of taxi violence; and
- Training and capacitation within the Province and its municipalities.

2. Communication and Stakeholder Engagement

The purpose of this Executive Summary is to present an outline of the stakeholder engagement process that was followed during the review, preparation, and updating of the ITMP25. The stakeholder engagement section also provides a detailed analysis of the various stakeholders and their engagement activities.

The stakeholder engagement process involved various activities such as the development of a Stakeholder Engagement Plan, analysis of stakeholders, sharing information with interested and affected parties (I&APs) and key role-players (KRPs), and obtaining input from stakeholders. A total of 1,517 individuals representing different sectors of society were included in the stakeholder database, with 361 entities identified as key role-players. Opportunities for stakeholder engagement included KRP workshops, focus group meetings, and virtual public I&AP meetings.

The stakeholder engagement process also outlines the criteria for the identification of KRPs and the definitions of I&APs, stakeholders, KRPs, and strategic stakeholders. It further discusses the legislative and regulatory framework pertaining to stakeholder engagement, including references to the Gauteng Transport Authority Act, National Land Transport Act, Promotion of Administrative Justice Act, Constitution of the Republic of South Africa, and various other acts and regulations.

As part of the ITMP25 stakeholder engagement process, the Draft ITMP25 was made available for public review and comment. This involved notifying all I&APs and KRPs, publishing advertorials in newspapers, posting the Draft ITMP25 on the project's website and the GDRT's website, convening a workshop with KRPs to present the contents of the draft plan, and holding a virtual public I&AP meeting to present the contents for comment and input. All the comments and responses were captured in a Comments and Responses Register and used to update the plan for submission to TAG for final approval. Once approved, the Final Draft ITMP25 will be presented to the Gauteng MEC for Roads and Transport.

Overall, the section provides a detailed account of the ITMP25 stakeholder engagement process, highlighting the importance of collaboration and input from stakeholders in achieving successful project outcomes.

3. Economic and Demographic Status Quo Analysis and Scenario Planning Overview

Gauteng is South Africa's economic powerhouse, contributing over 35% to the national economy. The economy generated R1.47 trillion in gross value added (GVA) and created 4 million jobs in 2022. The province's economy is primarily driven by the services sector, which accounts for over 80% of the economy's GVA. Key industries include business services, community services, retail trade, and finance.

While Gauteng has a strong manufacturing base, it has faced challenges in recent years due to factors such as **load shedding**, **logistical constraints**, **deteriorating infrastructure** and **global economic pressures**. Despite these challenges, the province has shown resilience and continues to be a significant contributor to South Africa's economic growth.

Figure 3-1 below provides an overview of the size of the Gauteng provincial economy and the employment opportunities created by the province.

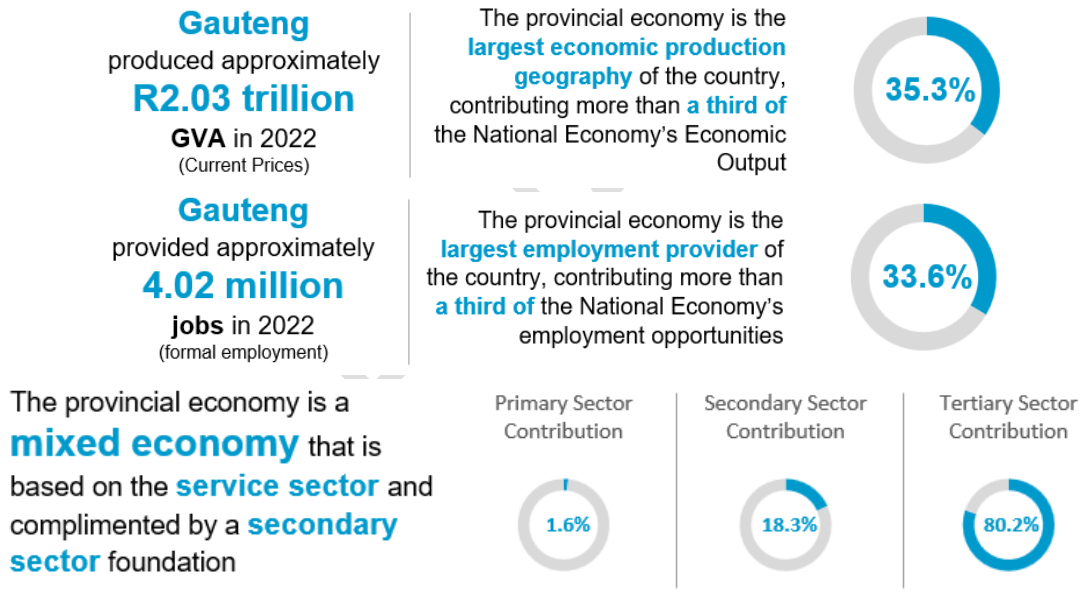


Figure 3-1: Summary of the Size and Structure of the Gauteng Provincial Economy in terms of Gross Value Added and Employment Opportunities

Demographically, Gauteng is South Africa's most populous province, accounting for nearly 25% of the country's population. The province has experienced rapid population growth, in part because of rapid in-migration to the province. Population growth has outpaced economic expansion, leading to a significant labour absorption gap which in turn creates high rates of unemployment and dependency ratios.

Key attributes of the provincial demography include:

- Gauteng is South Africa's most populous province.
- Gauteng has experienced rapid population growth partially due to high in-migration – although undocumented migrants are difficult to quantify, their presence to impact on planning and service delivery.

- Economic growth has not kept pace with population growth, leading to a continuously increasing labour absorption gap.
- Unemployment rates are high in Gauteng, contributing to low household incomes and high dependency ratios.
- Over 49% of households in Gauteng live in poverty, highlighting the economic disparities in the province.
- The Quality of Life Index in Gauteng has systematically been declining since 2017/18 due to a variety of socio-economic factors such as limited economic opportunities, declining living environments and service delivery, continuously declining accessibility and other related service delivery limitations.

Figure 3-2 provides an overview of the total number of people and households in the Gauteng province.

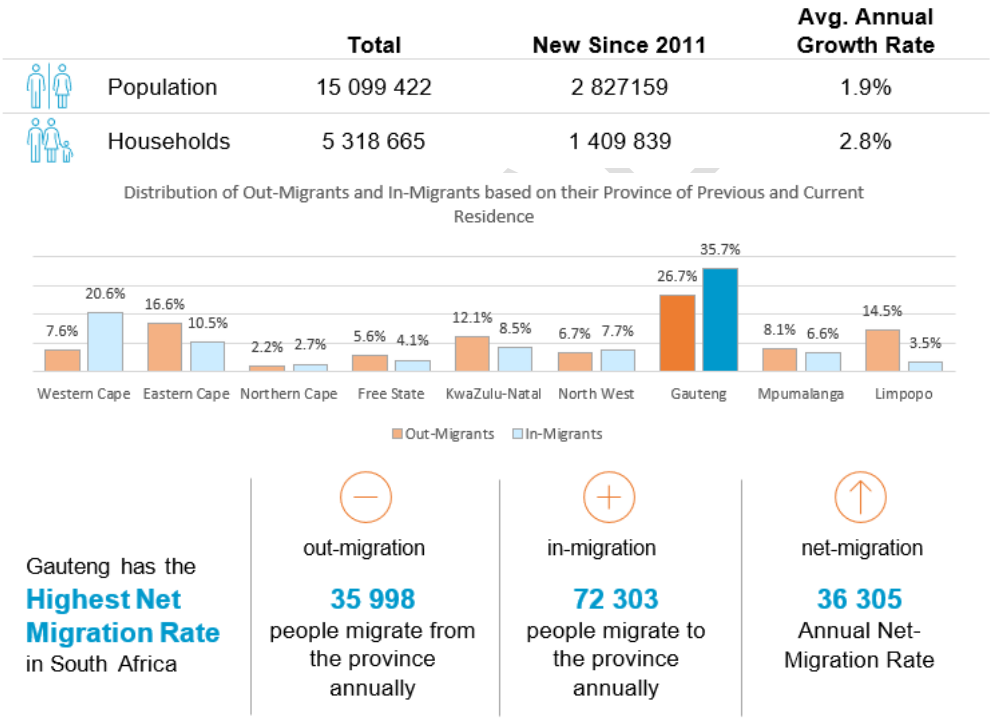


Figure 3-2: Provincial Demography Size and Migration Context
Source: DEMACON ex StatsSA, 2023

Taking into consideration the emerging growth themes of the economic status quo analysis this section outlines two comparable yet distinct scenarios (realistic and optimistic) for the economic trajectory of the Gauteng province (between 2022 and 2047).

Figure 3-3 defines the realistic and optimistic scenarios for economic growth in the Gauteng province.

Realistic Scenario	The realistic scenario is based on a trend of systematic and deepening economic growth stagnation. While the economy maintains its growth, the presence of structural macroeconomic and local economic factors is expected to persistently constrain the province's economic potential. Consequently, this will limit the economy's growth to a trajectory similar to its recent rate of expansion
Optimistic Scenario	The optimistic scenario is based on the improvement of the business environment in the province. Although structural changes to the economy allow for new industries and technologies to enter the market, basic sectors such as manufacturing continue to play an important developmental role in the provincial economy. Within this scenario, the provincial economy is anticipated to increase growth well beyond its current trajectory

Figure 3-3: Defining the Realistic and Optimistic Economic Scenarios

Figure 3-4 provides an overview of the economic scenario forecasts for the realistic and optimistic economic scenarios of the Gauteng economy.

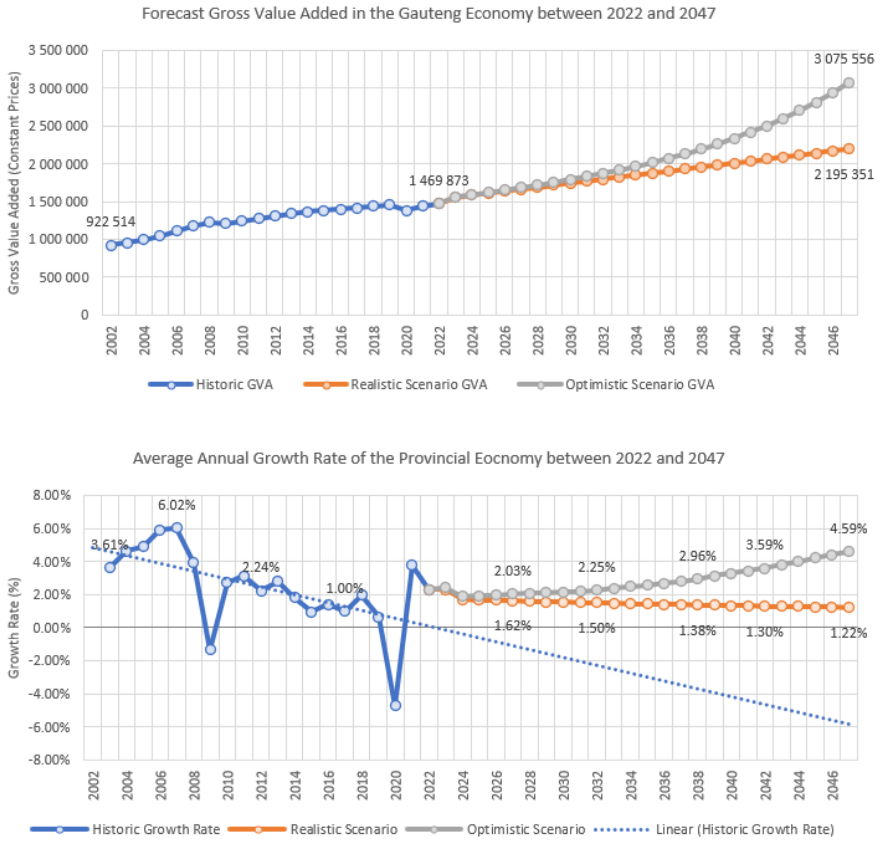


Figure 3-4: Economic Scenario Forecasts

Taking into consideration the emerging growth themes of the demographic status quo analysis this section seeks to create two comparable yet distinct scenarios (realistic and optimistic) for the demographic trajectory of the Gauteng province (between 2022 and 2047).

Figure 3-5 defines the realistic and optimistic scenarios for demographic growth in the Gauteng province.

Realistic Scenario	The realistic scenario is based on a continuation of current demographic growth trends whilst also acknowledging externalities that could influence the growth trajectory of the provincial demography. The scenario identifies that the Gauteng province will remain a net in-migration destination and that the extent of migration to the province could have knock-on effects throughout the province's demography and economy
Optimistic Scenario	The optimistic scenario considers the moderating of population growth in the province based on easing in-migration, continuous slowing of the net reproductive rate and increasing life expectancy. The moderation of population growth is partially as a result of improving economic conditions in other provincial economies, where access to employment, services and opportunities are progressive to the point where in-migration to the Gauteng province is to an extent mitigated

Figure 3-5: Defining the Realistic and Optimistic Demographic Scenarios

Figure 3.6 provides an overview of the economic scenario forecasts for the realistic and optimistic economic scenarios of the Gauteng economy.

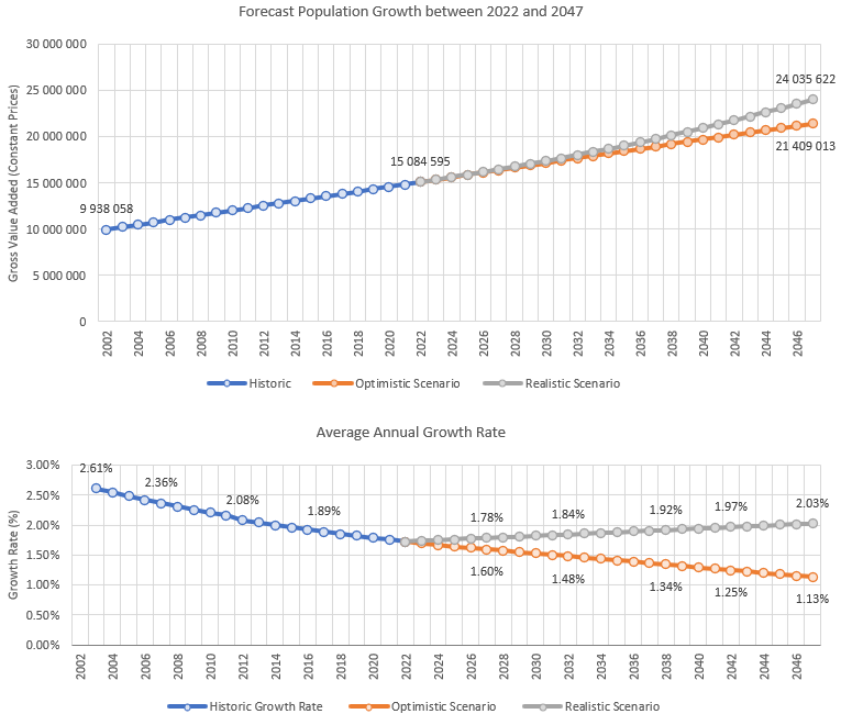


Figure 3.6: Demographic Scenario Forecasts

4. Land Use and Spatial Planning Status Quo Analysis and Future Scenarios

The Integrated Transport Master Plan (ITMP25) for Gauteng outlines a comprehensive strategy to create an integrated, efficient, and sustainable transport system that supports the province's spatial and economic goals. As South Africa's most populous and economically significant province, Gauteng faces unique challenges such as rapid urbanisation, historical

spatial inequalities, and general infrastructure constraints that are significantly centred on engineering infrastructure (e.g. bulk services such as water, electricity, wastewater, etc.) deficiencies. The ITMP25 aims to address many of these issues by promoting **coordinated and integrated land use, infrastructure and transport planning**, enhancing connectivity, and creating compact and well-connected urban environments that are conducive to economic growth and social development.

Each municipality within Gauteng has unique challenges and opportunities that are addressed through their Spatial Development Frameworks (SDF). Ekurhuleni's focus is on developing an aerotropolis around OR Tambo International Airport and leveraging its strategic location to drive economic growth and job creation. Johannesburg's strategy emphasizes addressing socio-economic disparities through densification in strategic corridors and expanding the public transport network to improve access to services and economic opportunities. Tshwane's extensive geographical spread, encompassing both urban and rural areas, requires a focus on strengthening growth nodes and expanding the BRT system to enhance transport integration. In Sedibeng and West Rand, where economic opportunities are limited and poverty levels are high, their plans and those of local municipalities under their jurisdiction, propose catalytic projects to stimulate local economies and improve connectivity to metro areas.

The spatial distribution and classification of urban nodes within Gauteng reflect a deliberately polycentric structure that reinforces the province's strategic spatial and transport planning objectives. The Metropolitan Core, comprising Johannesburg and Tshwane CBDs, anchors the regional urban system, supported by a network of Regional, Primary, Secondary, and Emerging nodes distributed along major development corridors and public transport spines. High-order nodes are concentrated along the Johannesburg–Tshwane development axis and around the Ekurhuleni aerotropolis, highlighting the historical consolidation of infrastructure and economic investment within the urban core. In contrast, the peripheral areas—particularly within Sedibeng and West Rand—are characterised by a predominance of Secondary and Emerging nodes, which underscores the legacy of spatial inequality and the need for targeted investment to redress historical imbalances. The identification of new growth points and emerging nodes in these localities represents a deliberate shift towards spatial transformation through the promotion of integrated, transit-oriented development. The various nodes and their hierarchy are visually represented in **Figure 4-1**.

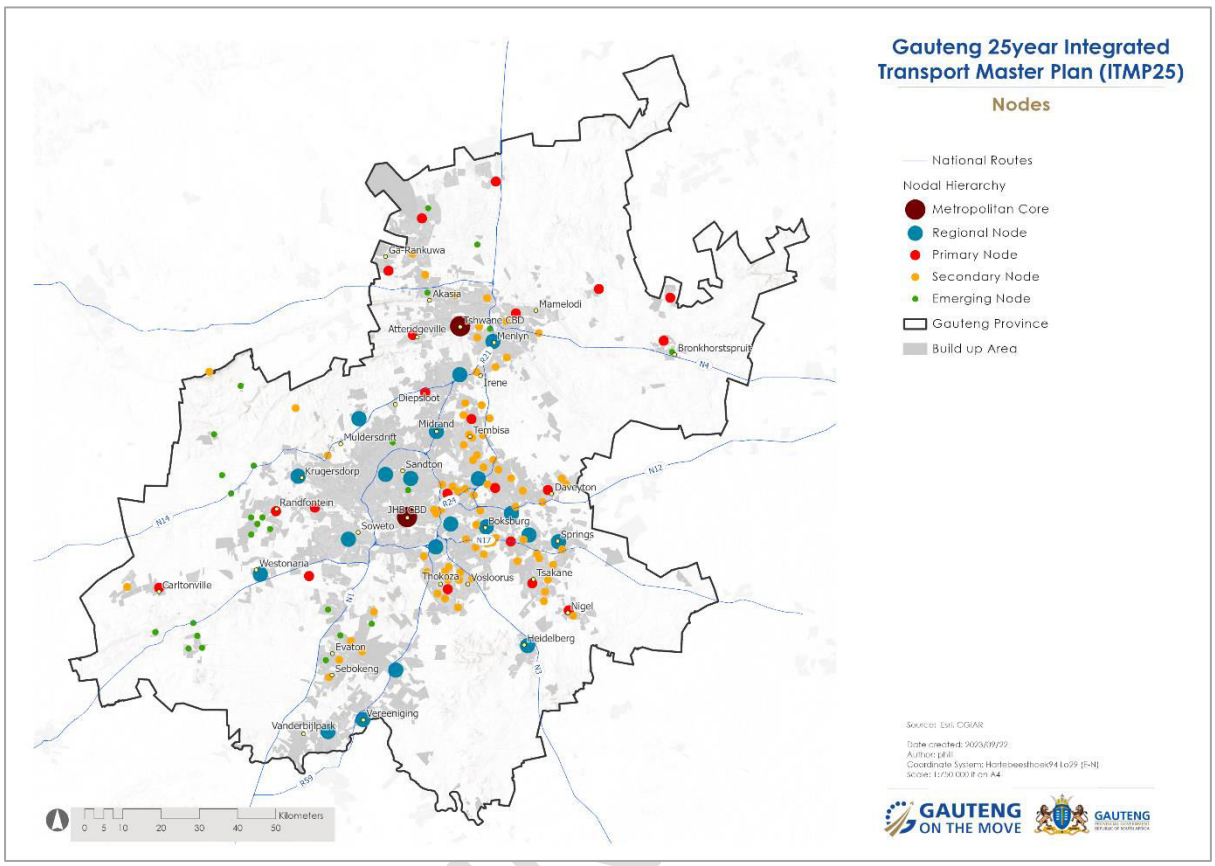


Figure 4.1: Gauteng Nodes and Anchors

Translating these SDFs growth aspirations into quantifiable land use requirements, two development scenarios were formulated for the ITMP25. They are a **realistic** or **optimistic** scenario, which are based on specific forecasted economic and demographic growth trends, to help anticipate future land use demand, and therefore, transport infrastructure needs. These scenarios direct the planning of residential, commercial and industrial land development, in an effort to ensure appropriate infrastructure capacity and delivery in line with anticipated growth. This forward-looking approach allows for proactive planning that can adapt to changing conditions and support sustainable development across the province.

The foundational difference between the realistic and optimistic land use demand forecasts is the extent to which current and future identified development opportunity areas will be utilised to support residential and/or economic growth. Under the realistic land use demand forecast, rapid demographic growth drives urban expansion and densification up to the urban edge of the province, while moderating demographic growth under the optimistic scenario concentrates urban residential development within infill development and densification priority areas. Likewise, slow economic growth under the realistic land use demand forecast clusters economic land use expansion in the core and central economic productive area of the province, while under the accelerated growth trajectory of the optimistic land use demand

forecast – economic expansion permeates the core economic centre of the province and enables decentralised economic growth.

Between 2022 and 2047, household growth in Gauteng Province is projected to vary depending on the land use demand forecast. Under the realistic forecast, an increase of 4,044,739 households, from 5,318,675 in 2022 to 9,363,415, is predicted by 2047, while the optimistic forecast projects a smaller growth of 3,021,507 households, reaching 8,340,182 by 2047.

During the same time, the cumulative additional demand for economic land uses in Gauteng Province is expected to grow significantly. Under the realistic forecast, demand will increase from 212.8 hectares in 2022 to 5 937.0 hectares by 2047, while the optimistic forecast projects a larger growth, reaching 8,649.6 hectares over the same period.

The demand for residential development is represented by the growth of population/households in Gauteng. This growth was distributed throughout Gauteng based on the areas that were identified where residential land uses could be developed (new development, future expansion areas, subsidy housing and densification) and the possible quantum of households that could be accommodated in these areas. The amount of additional land required to accommodate future residential land use demand in the Gauteng Province by 2047 differs between the realistic and optimistic land use demand forecast. Under the realistic forecast, an additional 178 896 hectares of land would be needed to accommodate 4.0 million additional households. In contrast, under the optimistic forecast, an additional 102 075 hectares of land would be needed to accommodate 3.0 million additional households.

The plan emphasizes the need for densification and infill development within existing urban areas and along key transport corridors to reduce urban sprawl, alleviate infrastructure pressure, and foster vibrant, mixed-use communities. By encouraging higher densities in strategic locations, the ITMP25 aims to improve service delivery efficiency and support more sustainable urban growth patterns. Transit-Oriented Development (TOD) is a central focus, with efforts to develop high-density, mixed-use areas around major transport nodes. This approach seeks to promote the use of public transport, reduce reliance on private cars, and stimulate economic development, thereby enhancing the quality of urban life and reducing environmental impacts.

To ensure the successful implementation of the ITMP25, the plan outlines a comprehensive framework that includes short-, medium-, and long-term actions. In the short term, regulatory changes will facilitate densification and mixed-use development, while expanding public transport services in underserved areas. Importantly, engineering infrastructure investment is critical since it is the latter that prohibits the implementation of many strategic policies in the metros that will achieve integrated land use and transportation planning, densification, plan alignment and repairing several urban disparities. The medium-term focus will be on developing new economic nodes and corridors while continuing investment in critical infrastructure projects that support balanced growth. In the long term, the plan envisions the creation of self-sustaining urban centres that are well-integrated into the broader transport

network and aligned with sustainability goals. Also, it should be accompanied by an ASI (Avoid-Shift-Improve) Framework, a value proposition analysis on engineering infrastructure investment and a provincial densification strategy along corridors.

Effective governance and strong institutional support are essential for realising the ITMP25's mission. This includes establishing a Provincial Multi-Sectoral Forum to coordinate planning efforts across different sectors and levels of government, enhancing the capacity of municipal planning departments, and ensuring that policies are aligned to support cohesive development.

To fully realise the spatial transformation mission of the ITMP25, it is essential to address the current constraints posed by bulk engineering infrastructure backlogs, which remain a key barrier to effective densification and land use integration. The plan promotes TOD and compact growth, anchored in the ASI Framework. A province-wide densification strategy, supported by targeted infrastructure investment, is proposed to ensure alignment between future land use patterns and sustainable transport objectives.

The ITMP25 aligns closely with Gauteng's key strategic frameworks, including the Gauteng Spatial Development Framework (GSDF), Gauteng Department of Economic Development's Economic Development Plan, and the Gauteng-City Region Integrated Infrastructure Master Plan (GIIMP). It advances spatial transformation through TOD, densification, and integrated land use and transport, while promoting sustainability by prioritising public and non-motorised transport. The plan supports inclusive economic growth and job creation by targeting investment in key freight corridors, public transport infrastructure, and economic nodes like OR Tambo and Lanseria. It also provides a coordinated, long-term infrastructure pipeline to guide efficient and integrated delivery across the province.

In conclusion, the ITMP25 provides a strategic roadmap for transforming Gauteng into a dynamic, inclusive, and resilient region. By addressing key challenges such as urban sprawl, infrastructure deficits, and socio-economic disparities through integrated land use and transport planning – the plan aims to support sustainable development and improve the quality of life for all residents. Achieving this will require robust governance, effective policy alignment, and active collaboration among all stakeholders to create a vibrant and sustainable future for the province.

5. Transport Demand Modelling

A critical aspect of the ITMP25 update was the application and refinement of the Gauteng Transport Model (GTM). This model played an important role in forecasting, planning, and evaluating various transport scenarios to ensure that the province remains on track to meet its long-term mobility, environmental, financial and economic objectives.

The GTM is a tour-based transport demand model constructed in PTV VISUM. The base year for the model is 2023 and the forecast year is 2048. The model focusses on the AM peak period between 06:00 and 09:00. There are 2500-3000 zones in the model that include non-motorised transport, private vehicle systems, road-based public transport systems and rail-

based public transport. While freight is considered on the road network, no freight demand is modelled.

The model encompasses three logical units: trip generation, trip distribution, and mode choice. These units are interlocked, with trip distribution and mode choice performed simultaneously. The future demand estimation was largely based on the land use, with added demand based on the aviation and freight strategy for future scenarios. In South Africa, the affordability of cars is a useful key market segmentation criterion since commuters who are captive to public transport have different travel characteristics. The study of trip distribution within the Gauteng province involved the analysis of observed trip data, focusing on vehicle movements as captured through INRIX's floating car data.

A Modified Exponential Decay Model was used to represent trip distribution within the model. Mode choice within the model is constructed in two phases. The primary mode choice model splits trips between motorized and non-motorised transport based primarily on distance for the two populations. The secondary mode choice model splits motorized trips between private and public transport. For private vehicle trips, the SBA Macro method was utilized in the trip assignment process. Public transport trips were assigned using the timetable-based dynamic assignment method. For NMT trips, a shortest path search approach was employed. Due to the complexity of the model, a robust quality assessment framework was necessary for guiding the model Calibration and Validation processes. Best practice for each procedure was used, complemented by experience-based reasonability checks.

While multiple scenarios including various projects and strategies were modelled, the major future projects for the main scenarios reported on include:

- Road network upgrades (including K-Routes): Class 1, 2 and 3 routes planned in the current ITMP25 plan.
- Additional road-based public transport services: Full Strategic Public Transport Network.
- Additional commuter rail services: Re-establishment of pre-covid metro-rail; Extension of 3 lines (Midway to Krugersdorp; Daveyton to Etwatwa; Mabopane to Hammanskraal); Gauteng Rapid Rail Integrated Network (GRRIN) Phase 1-3 and Phase 4-5.
- Low emission zones (LEZs): R100 tax in Johannesburg Central Business District (CBD), Sandton CBD, and Tshwane CBD for private vehicles only.

There were two proposed future land-use and economic scenarios as follows:

- Base +25 years realistic, and
- Base +25 years optimistic.

The realistic and optimistic scenarios represent two distinct trajectories for the future development of Gauteng province, covering the period from 2023 to 2048. These scenarios are essential for assessing how differing economic and demographic conditions may impact transport infrastructure and demand over the long term.

The comparison between realistic and optimistic scenarios highlights the balance between economic growth and population dynamics, informing strategic decision-making for future

transport investments. A large amount of data was extracted as required to provide evidence-based decision making for the ITMP25.

The key indicators of the different scenarios modelled show that the impact of not giving further focussed investment in the transport system a priority and specifically the public transport system, is expected to adversely affect the mobility levels and the impact of transport on society and the environment. Furthermore, it appears that the Pro Public Transport Scenario for both the Realistic and Optimistic land use development scenarios is the best performing scenarios. This is from the perspective of modal spilt in favour of public transport, travel time, and GHG emissions per person trip. The Pro Road investment scenario out performs the others when it comes to the average private vehicle travel speeds, which is to be expected.

However, when comparing the key indicators for all the scenarios modelled, it is clear that the most significant impact on the transport system and its efficiency is the manner in which land use development takes place over the next 25 years. If land use development is more optimal with respect to the transport system and more specifically the public transport network (TODs), there is a significant improvement. These indicate that travel is reduced, public transport usage increases (less private transport) and GHG emissions are less. Improvements on the transport system and its efficiency are further enhanced by introducing TDM measures and giving consideration to LEZs.

6. Sustainable Transport Plan

South Africa is a signatory to the Sustainable Development Goals[1] (SDGs) as set out in the 2030 Agenda for Sustainable Development which seeks to eliminate extreme poverty and reduce inequality whilst protecting the planet. The National Development Plan (NDP) is recognised as being significantly aligned with the SDGs. Transport has a role to play in the realisation of many of the SDGs with specific relevance to Goal 11 – Sustainable Cities with Transport having a particular Target Indicator 11.2 which aims that, by 2030, all citizens will have access to safe affordable, accessible, and sustainable transport systems through expanded public transport. In addition, special attention should be paid to the travel needs of those in vulnerable situations including women, children, persons with disabilities and older persons[2] to align with Goal 3.

South Africa is also a signatory to the Paris Agreement[3] which seeks to limit global warming to below 1.5^{O} Celsius above preindustrial levels requiring CO_2 emissions to be reduced by 45% by 2030 and to Net Zero by 2050. As part of this commitment SA revised its Nationally Determined Contribution[4] (NDC) in 2021 increasing upper limit emissions reduction to 510Mt and 420Mt and lower limit reductions to 398Mt and 350Mt by 2025 and 2030 respectively. With transport contributing most emissions in Gauteng at 41.4% in 2022[5] it is essential that all transport planning be premised on the basis of addressing its contribution to GHG emissions.

[1] https://sdgs.un.org/goals

[2] https://unhabitat.org/sites/default/files/2019/05/sdg_11_synthesis_report_web2_0.pdf

[3] https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

[4] https://www.gov.za/speeches/statement-virtual-cabinet-meeting-14-september-2021-20-sep-2021-0000

[5] Gauteng Greenhouse Gas Inventory and Measurement, Reporting and Verification System, Final Report, July 2024

Transport is a significant contributor to environmental impacts and reinforces unsustainable approaches if it is planned and implemented based on increasing or supporting mobility as opposed to enhancing accessibility. Despite recognising that business as usual is no longer an option as clearly described in the previous (2013) ITMP25[6], the approach to transport planning and delivery has not changed significantly and the need to change this is critical.

Key issues that sustainable transport planning has a significant role to play in addressing include:

- The current sprawling urban form of low densities and long travel distances which contribute significantly towards the inefficiency and unaffordability of transport;
- The limited integration of transport and land use and urban planning processes;
- Walking, whilst the primary mode of travel, along with cycling and public transport should form the departure point for all transport planning. However, this is not the de facto case; and
- Transport infrastructure and systems are not and have previously not been designed for Climate Change mitigation reduction measures and adaptation for impacts and resilience and current approaches may lock out required changes.

Sustainable Transport allows the basic access and development needs of individuals, companies and society to be met safely and in a manner consistent with human and ecosystem health, promotes equity within and between generations, is affordable and both effective and efficient. It thus has a key role in addressing the resilience and adaptation requirements of climate change and achieving social justice. It is also a crosscutting discipline that underpins all aspects of transport planning and delivery and supporting sustainable urban development.

Although there are extensive legislative, policy and strategic documents at international, national and provincial levels that both recognise and require sustainable transport, little impact has been achieved thus far.

Sustainable transport requires a systems-based approach incorporating the avoid (reducing the need to travel or transport goods and includes reducing urban sprawl), shift (changing the mode of travel or transport) and improve (utilising technological improvements to reduce energy use and emissions) where walking, cycling and public transport are given priority in any land use and transport planning is recognised as the necessary approach to be adopted.

Current planning approaches are primarily focussed on the Green Economy aspects of Sustainable Transport seeking a reduction on GHG emissions through alternate energy sources and technological improvements with limited focus on the reducing the need to travel and encouraging mode shift.

Thus, significant commitment and effort is required to ensure:

- Stronger integration between land use and transport planning to address urban sprawl;
- That all transport systems designs consider climate change risks and incorporate sustainable transport principles including resilience; and
- Full life cycle cost benefit analyses that include social and environmental cost are required for all transport related projects.

[6] Gauteng 25-Year Integrated Transport Master Plan: Draft 2013

Key departure points for rapidly moving away from the current unsustainable "Business as Usual" "predict and provide" to the accepted "vision and validate" approach to transport planning include immediate adoption of the Enable-Avoid-Shift-Improve[7] (EASI), Triple Access[8] and 15 Minute Cities[9] methodologies which are complementary to and reinforce each other.

The four components comprising "EASI" are:

- **Enable** – implementing a sound, effective, responsibly governed system that is adequately resourced, capacitated, informed and financed. The system is also and capable of anticipating needs, guiding action and ensuring integrated management, development, operations and maintenance of the transport system.
- **Avoid** – the reduction / removal of the need to travel based on changing accessibility and proximity through changes in urban form and work practices;
- **Shift** – utilising less carbon-intensive modes – that is, for personal mobility from private vehicles and flight to walking and cycling, public transport and shared mobility, and for freight from vehicles and aircraft to water-based freight, electrified road-rail freight, pipelines and cargo bikes for first/last-mile collections and deliveries. Less car dependent infrastructure and travel demand initiatives are considered key here; and
- **Improve -** Improving vehicle design and energy efficiency whilst also developing clean energy sources for different types of freight and passenger vehicles. The use of green hydrogen as a fuel source is considered with a caveat of the challenges facing its effective commercialisation. This is the focus of the Green Economy approaches.

Between 40% and 60% of the required GHG emissions reductions for transport can be realised through "Avoid" and "Shift" with "Improve" only contributing up to 50% of the required reductions[10].

[7] https://slocat.net/asi/

[8] https://www.tapforuncertainty.eu/

[9] https://www.c40knowledgehub.org/s/article/Why-every-city-can-benefit-from-a-15-minute-city-vision

[10] IPCC Assessment Review 6 (AR6) WG 3 (WGIII) Climate Change 2022: Mitigation of Climate Change

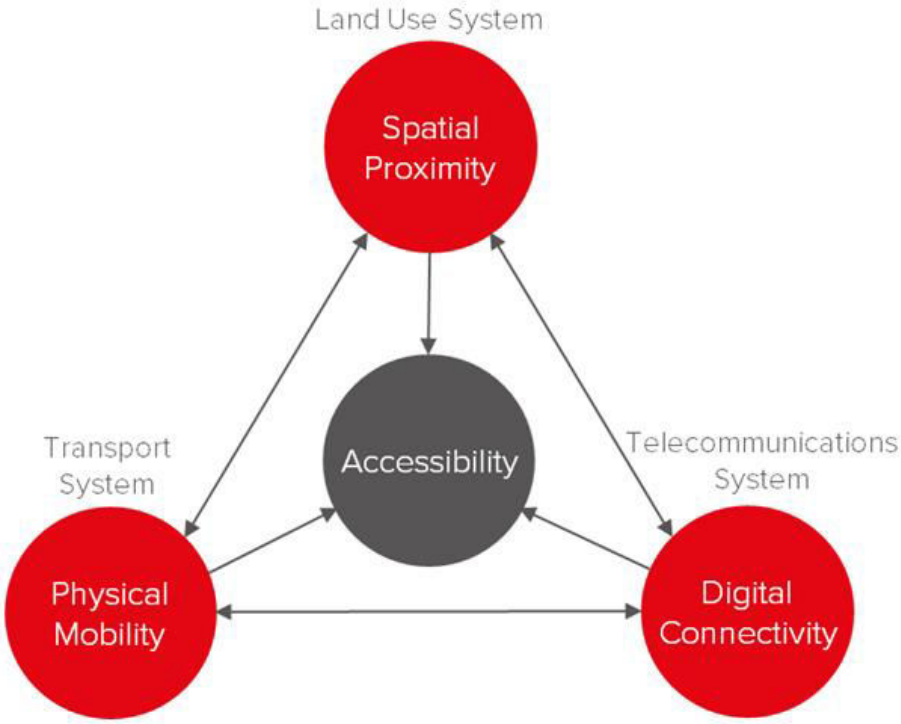


Figure 6-1: Triple Access System (adapted from Lyons et al., 2021[11])

In support of "EASI" is the Triple Access System (**Figure 6-**1) which recognises that sustainable, safe and affordable access to opportunity requires three forms of accessibility:

- Spatial proximity requires mixed-use higher density development with most opportunities accessible by walking and cycling (the 15-minute city or precinct concept);
- Digital Connectivity is the development of an effective and readily accessible digital system; and
- Physical Mobility is a transport system that is premised on sustainable transport approaches based on active mobility and public transport as the primary modes of travel.

Through adopting this approach, the following key objectives will be supported:

- Supporting the Just Transition through assisting in addressing Social and Spatial inequity;
- Supporting the Sustainable Development Goals and National Development Plan;
- Meeting the Nationally Determined Contribution GHG reduction targets – Net Zero by 2050; and
- Supporting South Africa's commitment to the Global Biodiversity Framework.

[11] Lyons, G et al. Triple Access Planning for Uncertain Futures – A Handbook for Practitioners (Summary version), March. 2024. https://uwe-repository.worktribe.com/output/11751967/

The requirement to rapidly (immediately) shift to ensuring that sustainable accessibility becomes the departure point for all transport and urban/land use planning in order to ensure that the sustainable development and NDC goals are met by 2030 and South Africa meets its international NDC and Biodiversity commitments requires that a new approach to transport planning be urgently adopted.

7. Travel Demand Management Plan

Introduction

This section outlines the key opportunities and recommendations of the Travel Demand Management (TDM) Plan, a component of the Gauteng Integrated Transport Master Plan. The TDM plan aims to promote sustainable travel patterns that align with the ITMP25 mission. TDM's value proposition lies in accommodating significant transport demand through behaviour change, alleviating the need for capacity expansion. Considering rising costs and constrained budgets, the traditional approach of "building your way out" of congestion is no longer feasible. TDM offers the potential to reduce travel demand for single-occupancy vehicles, peak-time private vehicle travel, and reliance on private cars. Its goals have expanded beyond congestion management to improving quality of life by providing accessible, affordable, and sustainable travel options. Key benefits include optimising existing systems, fewer vehicle kilometres travelled, reduced carbon emissions, cost savings, and improved safety.

Despite these benefits, TDM implementation in Gauteng has been slow due to inadequate funding, insufficient coordination among municipalities, and limited public awareness. Trends indicate a growing reliance on private vehicles and minibus taxis with a decline in sustainable transport modes. Addressing systemic gaps, such as an underdeveloped multi-modal transport system and ineffective land-use practices, is crucial for advancing TDM initiatives. Current transport projects often overlook TDM measures, focusing instead on accommodating traffic forecasts without incorporating demand management. Traffic manuals tend to perpetuate car dependency, with no requirements to address demand-side strategies in Traffic Impact Assessments (TIAs). Public awareness raising and outreach programmes to promote sustainable practices are not prioritised.

Approach

The ITMP25 mission is to establish a sustainable, integrated transport system that enhances quality of life while minimising environmental impacts. A holistic approach, guided by the Avoid-Shift-Improve (A-S-I) framework is recommended. The **"Avoid"** component aims to reduce travel demand through strategies like digital connectivity, remote work and spatial proximity. The **"Shift"** aspect encourages switching from single-occupancy vehicles to sustainable modes, e.g. public transport, walking and cycling, while the **"Improve"** element focuses on enhancing transport systems through energy efficient vehicles and technology. An **"Enable"** component supports strengthening governance and institutional frameworks, ensuring adequate funding, and building capacity within local and provincial authorities. The E-A-S-I approach is essential for shaping a successful TDM plan.

Implementation Plan

An effective TDM strategy requires addressing land-use management, access to public transport and non-motorised transport (NMT), economic and regulatory measures, and information and behaviour change strategies. The TDM strategy for Gauteng advocates

managing travel demand by addressing both supply and demand factors. The supply measures are described in complementary reports for land-use, sustainable, NMT and public transport. The TDM implementation plan focusses on behaviour change programmes to address the demand side.

Although municipalities are mostly responsible for implementing TDM measures, TAG and GDRT can play critical roles in initiating and coordinating TDM programmes. In response, the plan comprises five main components:

1. Creating an enabling environment for TDM: Provincial leadership, coordination and partnerships with stakeholders are essential for securing buy-in for TDM. Integrating TDM into governance and fostering collaboration across departments and levels of government is crucial. Advocating for dedicated funding, along with training and education, will help institutionalise TDM. Mandating the exploration of TDM initiatives before considering capacity improvements and integrating TDM measures in transport projects can further reinforce implementation.

2. Supportive Policies and Regulations: A policy reform is necessary to align transport and land-use development with TDM objectives, focusing on Traffic Impact Assessments, Parking Guidelines, Travel Plans, and Transit-Oriented Developments.

3. Information and Behaviour Change Campaigns: Raising public awareness of TDM benefits and engaging local communities and transport users is crucial for promoting behaviour change. Initial campaigns should focus on altering trip timing, route choice, and vehicle occupancy, with mode-switching measures introduced later. Outreach programmes and social marketing can encourage the adoption of sustainable transport options. Interactive events can enhance awareness and the appeal of TDM strategies.

4. Economic Measures: A successful TDM strategy combines positive (pull) incentives, such as improved public transport options and reduced fares, with negative (push) incentives, like parking or congestion charges. Economic measures, such as workplace parking levies and Low Emission Zones (LEZ), can reduce congestion and emissions in CBDs. Revenue reinvested into sustainable transport solutions will help lock in the benefits. The programme should commence with pilot projects in key areas, such as the Johannesburg and Tshwane CBDs, to help establish parameters and build community acceptance.

5. Continuous Monitoring and Evaluation: Monitoring and evaluation will track TDM strategy effectiveness, using key performance indicators. Demonstration pilots and trials are recommended to test feasibility, assess commuter experience and refine TDM programs. Following best practice, they should include clear objectives, success measures and mechanisms for measuring outcomes, including user perception studies before and after implementation. Establishing a Sustainable Development/Mobility Oversight Committee will enable ongoing evaluation of TDM progress across the province.

Resourcing the Plan

Successful TDM implementation requires adequate funding and resource allocation, including dedicated funding streams and the integration of TDM elements into public transport or infrastructure projects. A full-time TDM coordinator should be appointed to build capacity, identify and lead a team of TDM champions from various provincial departments, and drive TDM progress by implementing the TDM plan. The TDM coordinator can also establish a Gauteng TDM Working Group/Forum to encourage participation and innovation across municipalities.

In conclusion, implementing TDM in Gauteng requires a structured approach that ensures accountability, fosters collaboration among municipalities, and guides policy. Appointing a dedicated TDM coordinator is essential for securing resources and promoting effective TDM practices. Ultimately, TDM supports the ITMP25 mission for a sustainable transport system.

8. Non-Motorised Transport Plan

Within Gauteng, walking all the way comprises 27.7% of the modal share[12] of peak trips and the majority begin and end with walking. In addition, the average walking time to access the first public transport service increased from 9 minutes in 2014 to 14 minutes in 2019/20. For the same period, the time for accessing the final destination from a public transport service also increased from 8 minutes to 14 minutes. Cycling currently has a low modal share.

Whilst the stated intention in all policies and planning documents is to ensure that NMT and Universal Accessibility are given the requisite focus, in practice the situation remains that delivery of NMT systems falls significantly short and NMT is still mainly considered as an add-on with very few examples of consistent provision of NMT as an integral part of the built environment in general and the transport system in particular.

The main issues regarding the effective delivery of NMT nationally are:

- A lack of broad recognition of actual problems faced by pedestrians and cyclists. Situational assessments appear not to be available to inform NMT policy matters or development strategies;
- No dedicated NMT infrastructure funding mechanism exists as a part of sustainable transport. The recommended allocation to the development of NMT infrastructure and systems is 20% of the land transport budget allocation. (United Nations Environmental Management Programme)[13];
- No detailed NMT database to provide strategic information for transport planning purposes, such as pedestrian and bicycle volumes by major routes, NMT inventories; and
- Lack of integration of NMT and Public Transport.

The major NMT challenges at provincial and local municipal levels are:

- Lack of comprehensive provincial and city policies, strategies and implementation plans, engineering design guidelines and standards;
- A lack of personnel dedicated to and skilled in NMT and Universal Access (UA) planning and delivery;
- Limited funding for NMT infrastructure provision and lack of dedicated funding for NMT infrastructure provision;
- NMT infrastructure is mainly considered as an add-on next to a roadway for vehicles. The term ‘mobility’ is entrenched in South African transport policy and planning as strongly associated with motorised travel, whilst mobility to the majority simply means to be able to walk safely to local amenities, to school, to work, to public transport, etc.;
- Lack of integration of NMT with land use planning and public transport;
- Inadequate maintenance of existing NMT;

[12] Gauteng Province Household Travel Survey Report 2019/20

[13] https://www.unep.org/news-and-stories/press-release/urgent-investment-needed-walking-and-cycling-infrastructure-save

- Lack of NMT usage and inventory databases for planning and operational purposes; and
- The approach to NMT infrastructure and systems development remains very segregated and NMT is generally seen as separate from roads with retrofitting to provide some form of space to 'accommodate' NMT users.

Both at the national and local levels several policies, guidelines and strategies that influence or direct the approach to NMT and UA have been developed or are awaiting final approval or require updating.

The role of NMT in supporting the Just Transition and contributing to Greenhouse Gas Emissions (GHG) reductions is well recognised and key objectives are identified. Thes include promoting NMT as mode of choice; reducing excessive congestion and emissions by popularising NMT, and facilitating, co-ordinating and providing NMT infrastructure. At the municipal level various planning documents, strategies and policies include provisions for NMT infrastructure development. The key plan for Gauteng is the final draft of Gauteng Non-Motorised Transport Master Plan (May 2016) which provides a clear approach for developing NMT.

Despite the numerous policies, guidelines, plans and strategies non-motorised transport (also more recently referred to as Active Mobility) has continued to be overshadowed by car centric planning approaches. In addition, UA requires significant focus to ensure inclusion in all planning and implementation. Compounding the issues facing NMT is "spatial dislocation"[14] resulting from current and past land use planning approaches where accommodation is often low density in nature and located in areas remote from urban centres and economic opportunity.

Whilst the stated intention in all policies and planning documents is to ensure that NMT and UA are given the requisite focus, in practice the situation remains that delivery of NMT systems falls significantly short and NMT is still mainly considered as an add-on.

The development of NMT is a key element in successfully encouraging sustainable, safe, inclusive and integrated urban transport. Fundamental to pursuing this is the concept of "universal design," which in essence gives recognition to the fact "that people's mobility and accessibility are largely determined by the built environment, i.e. the design of buildings, sidewalks, paths, roads and vehicles. Design standards and practices based on the "average" person have led to the exclusion of many. Design premised on Universal Access focuses more on the community than the private motor vehicle. Thus, rather than assuming that people must accommodate the built environment, the built environment should accommodate all users as much as feasible.

As key components of any sustainable and just transport system walking and cycling should be considered as the departure point of all transport and urban planning as described in **Figure 8-1**.

[14] Growth Through Inclusion: Economic Opportunities in South Africa

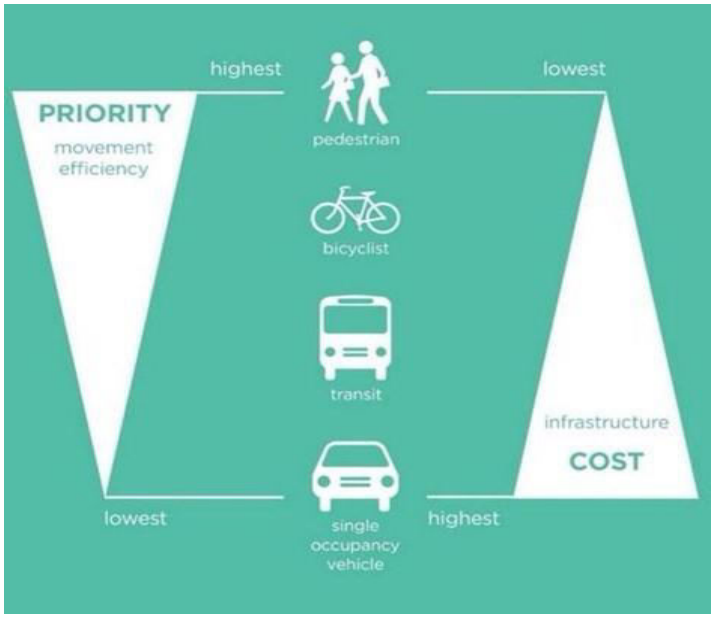


Figure 8-1: NMT prioritised in Transport Planning

This approach supports both the Enable, Avoid, Shift and Improve (EASI) and Triple Access Planning approaches that are fundamental to the development of Sustainable Transport systems and are key in the development of TDM initiatives.

A paradigm shift in the approach in road design, towards adopting the "modal hierarchy" approach to road network development is thus required. This is aimed at transforming the roads network to meet the needs of all road users. The concept implies shaping the road function according to a prioritisation scheme, where the hierarchy moves from pedestrian as the highest priority, across to bicycles, public transport and with private vehicles given the lowest priority. This ties in with the "complete streets" approach that redefines what a street is intended to do. It breaks down the traditional separation between freeways, public transport, cycling and walking, and instead focuses on the desired outcomes of a transport system that supports safe and convenient use of the roadway for everyone. This approach requires that the design guidelines which incorporate NMT (and public transport) should be rigorously applied.

As NMT remains a primary mode of travel for most residents and is fundamental to sustainable transport, cycling and walking should be included as a key departure point for all transport as well as urban and land use planning and development.

Premised on the sustainable transport goals of all having ready access to public transport, an NMT policy and strategy should be developed for Gauteng. The policy should be based on the complete streets approach and should provide guidance for all municipalities. This requires that each prepare an NMT or Active Mobility Strategy incorporating Universal Access and consider the safety and accessibility of vulnerable users as essential. Within this, walking and cycling should have distinct strategies as key modes in their own right.

Cycle corridors along routes of provincial significance should be identified and established. This will form part of the redesign of cross sections identified as part of the infrastructure and sustainable transport aspects of the PLTF.

NMT should be promoted as a preferred and accepted mode of transport within the broader sustainable transport awareness campaign.

Funding of NMT will require prioritisation and could be linked to Climate Change funding as a means of augmentation.

To achieve an effective NMT system for Gauteng the following are proposed:

- Create an adequately resourced NMT and UA section. This section is to ensure that NMT and UA are incorporated in all transport planning approaches and support the local authorities in the development and roll out of NMT Programmes;
- Develop the provincial NMT/Active Mobility policy/strategy ensuring that UA is incorporated and that safety and security are considered through the complete streets approach;
- Provide a dedicated budget for the development of NMT;
- Ensure that NMT is incorporated in the cross-section development for provincial road corridors;
- Develop routes for cycling corridors ("Cycle Highways") on roads of provincial significance. This should incorporate routes which traverse through urban areas;
- Ensure an NMT awareness-raising and safety campaign is incorporated in the sustainable transport / TDM awareness programme. As part of this campaign establish an NMT and UA working group including all key role players. The current Traffic Impact Assessment requirements must be reviewed to ensure that the overall impact of a development or project be considered and the mechanisms for mitigating these form part of the project costing and decision process. NMT, UA and Public Transport **must** be the departure point for any development or transport system upgrade; and
- Investigate and develop a bicycle distribution programme linked to the Scholar Transport Programme.

Most previous policies, strategies and plans have clearly articulated the requirement for NMT and UA as the departure point for transport planning and delivery, but they appear to be given little priority thus far. To support both a just transition and the development of a sustainable transport system NMT and UA must become the de facto departure point for all transport planning and (re)development.

9. Digitalisation Framework

In today's increasingly connected world, transportation has evolved beyond the simple movement of people and goods from one location to another. The Twenty-five Year Integrated Transport Master Plan (ITMP25) for Gauteng Province recognises that modern transport systems must create seamless connections between diverse modes of transport, services, and stakeholders. This evolution is fundamentally driven by the integration of technology and data, which form the backbone of modern transport systems.

The Digitalisation Framework for Gauteng's transport sector outlines how emerging technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), and big data can be leveraged to enhance connectivity, safety, and sustainability. This transformation extends beyond merely digitising individual components; it encompasses the broader application of digital technologies to optimise processes, improve efficiency, and create new opportunities within the transport ecosystem.

The Gauteng Digitalisation Framework is depicted in **Figure 9-1** and presents a comprehensive approach to digital transformation structured around three key elements: Intelligent Transport Systems (represents the digitisation of transport), the Data Hub (represents the storage of data and a single point of access to Mobility Data), and Digitalised Processes (represents digitalisation and various application environments). At its core lies the Data Hub, a cloud-based centralised platform housed within the Transport Management Centre (TMC), which serves as the single access point for all mobility-related data in the province.

Nine distinct Intelligent Transportation System (ITS) components form the foundation of this framework, each contributing to the province's digitised mobility footprint. These systems use technology to optimise traffic flow, improve safety, and enhance transport efficiency. The ITS components generate substantial data streams that are collected, processed, and stored within the Data Hub. Beyond ITS-related information, the Data Hub also integrates other crucial relational data, including land use information, utility data, payment systems, and infrastructure condition assessments.

The framework designates the GDRT as the custodian of the Data Hub, responsible for providing centralised oversight of data management and system integration. In this role, GDRT is also positioned to maximise opportunities for data collection and input by coordinating contributions across departments, agencies, and mobility service providers. Through this well-managed data pipeline, the system supports various applications, from business intelligence tools and dashboards to advanced data science models and optimisations. This enables both real-time operational management and long-term infrastructure planning, including predictive maintenance capabilities.

The framework positions data as the fundamental cornerstone of modern transport systems through four key components: Open Data, Data Security, Data Standards, and Data Sharing. The Open Data initiative promotes transparency and accessibility by making transport data freely available for use by the public, software developers, and other stakeholders, driving innovation in transport services and applications.

Data security forms a critical component of the framework, with the implementation of robust cybersecurity measures becoming increasingly important as transport systems become more digitised. The framework emphasises the establishment of unified data standards to ensure interoperability and seamless integration across various transport systems, while promoting effective data sharing across government agencies, transport operators, and private stakeholders.

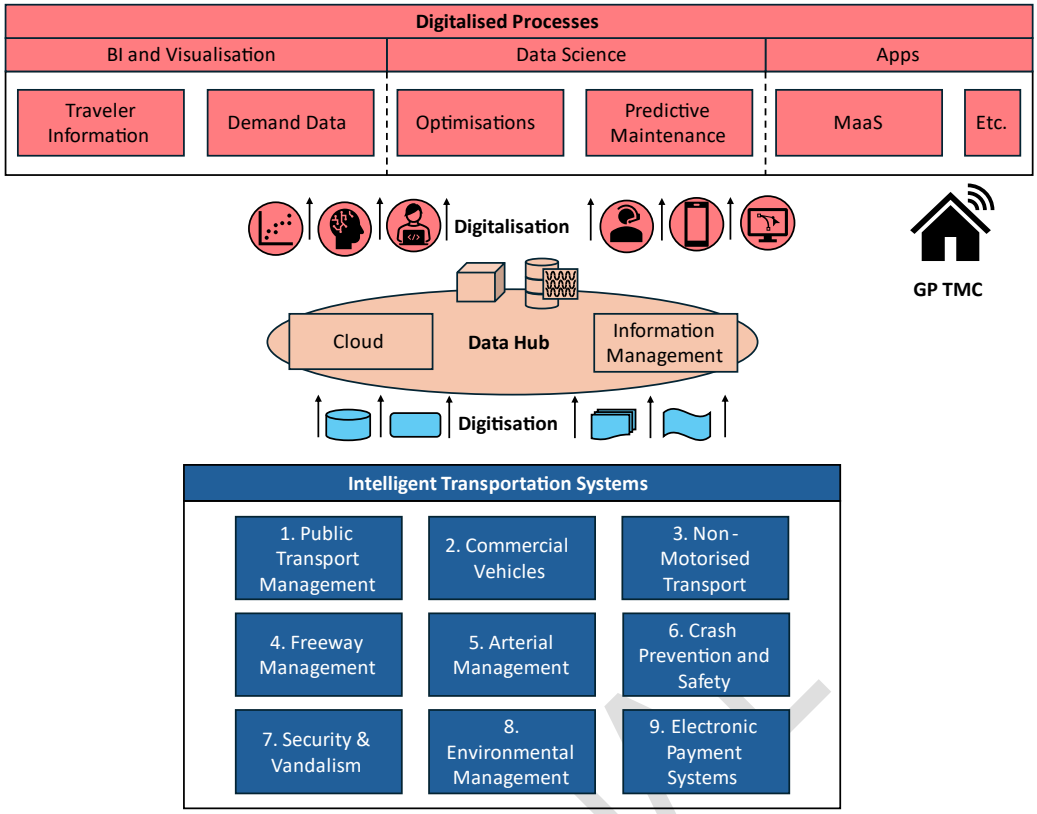


Figure 9-1: Gauteng Transport system Digitalisation Framework

The Transport Management Centre (TMC) serves as the operational heart of this digital ecosystem, facilitating three core functions: data hub operations, data visualisation, and application programming interface (API) management. As a single point of access to Mobility Data and the central repository for all transport-related data, it aggregates information from multiple sources including ITS systems, public transport feeds, traffic sensors, and weather monitoring systems. Through its data visualisation capabilities, the TMC enables stakeholders to monitor key performance indicators and make informed decisions quickly, while its API infrastructure provides secure access to transport data for external stakeholders and software developers. The key component categories considered within the TMC in the context of the Digitalisation Framework are the Data Infrastructure, Visualisation & Decision Support, Operational Systems, Human Resources and Expertise, and Physical Infrastructure.

The framework outlines several key projects grouped into four main categories: ITS, TMC, Data, and Communications. These include a clearly defined Concept of Operations for the TMC, the design and implementation of the Data Hub, a Data Strategy, the digitisation of public transport movement, creation of Advanced Public Transport Management functionality, development of traveller information platforms, implementation of Mobility as a Service (MaaS) frameworks, and a freight data warehouse.

Critical to the success of these initiatives is the development of robust ICT infrastructure through comprehensive requirements analysis, architecture design, and a Provincial Communications Backbone Plan. This infrastructure will support high-speed, reliable communication across Gauteng's transport network, connecting all components of the digital ecosystem.

The successful implementation of this framework further relies heavily on effective collaboration between key stakeholders, with the GDRT taking the lead in establishing governance structures, setting policies, as well as ensuring alignment across various provincial and municipal agencies. The framework emphasises the importance of organisational and cultural transformation, structured change management, and comprehensive capacity-building programmes.

In conclusion, the ITMP25 Digitalisation Framework presents a comprehensive approach to transforming Gauteng's transport system through digital innovation. By establishing a centralised Data Hub and integrating various ITS components, the framework creates a robust foundation for data-driven decision-making across the transport ecosystem. This enables public transport users, operators and implementing agencies to access timely, relevant information, improving service reliability, efficiency, and user experience. Through careful implementation of these initiatives, Gauteng will be well-positioned to meet the evolving transport needs of its citizens while embracing technological advancement in the transport sector.

10. Strategic Public Transport Network

Internationally, the success of a city region is in part attributed to the success and efficacy of its public transport system. **"*Show me a successful city, and I will show you a successful public transport system*"** (World Bank Representative to the UN). This can be attributed to the way in which a public transport system enhances mobility, provides access to economic opportunities, promotes social inclusion and reduces the impact of the transport system on the environment. Given the extensive nature of capital investment required to develop a public transport system, it acts as a stimulus to economic development and sustainable job creation.

The section of the ITMP25 on public transport deals with both passenger rail and road-based public transport in an integrated manner. This is done from an operating environment, modes, services, infrastructure and facilities perspective, as well as cross-cutting aspects related to public transport mobility.

The public transport offering in Gauteng is fragmented from a financial support and institutional management perspective. It is not integrated, un-coordinated operationally and in many instances does not provide the citizenry with affordable, reliable, safe, and efficient services.

According to the 2019/2020 Gauteng Household Travel Survey (GHTS), more than 28% of trips done during peak period was "walk all the way", while walk times to access public transport increased from 9 minutes to 14 minutes from 2014. It is estimated that approximately 1.15 million passenger trips are currently via public transport during the morning peak period in Gauteng. Minibus taxis catered for 82% or 950 000 of all peak period public transport trips and the higher capacity public transport modes, such as BRT, bus and commuter rail transport, for only 18% or 180 000 passengers. According to the GHTS results, respondents reported that they did not use higher capacity modes as these were either not available, infrequent or not accessible to most travellers.

Commuter rail services are provided by PRASA through a national grant and have prior to COVID-19 lost significant patronage to other public transport modes due to vandalised infrastructure and poor services. During COVID-19, PRASA suffered further setbacks when its infrastructure and facilities were further plundered. PRASA is currently engaged in a

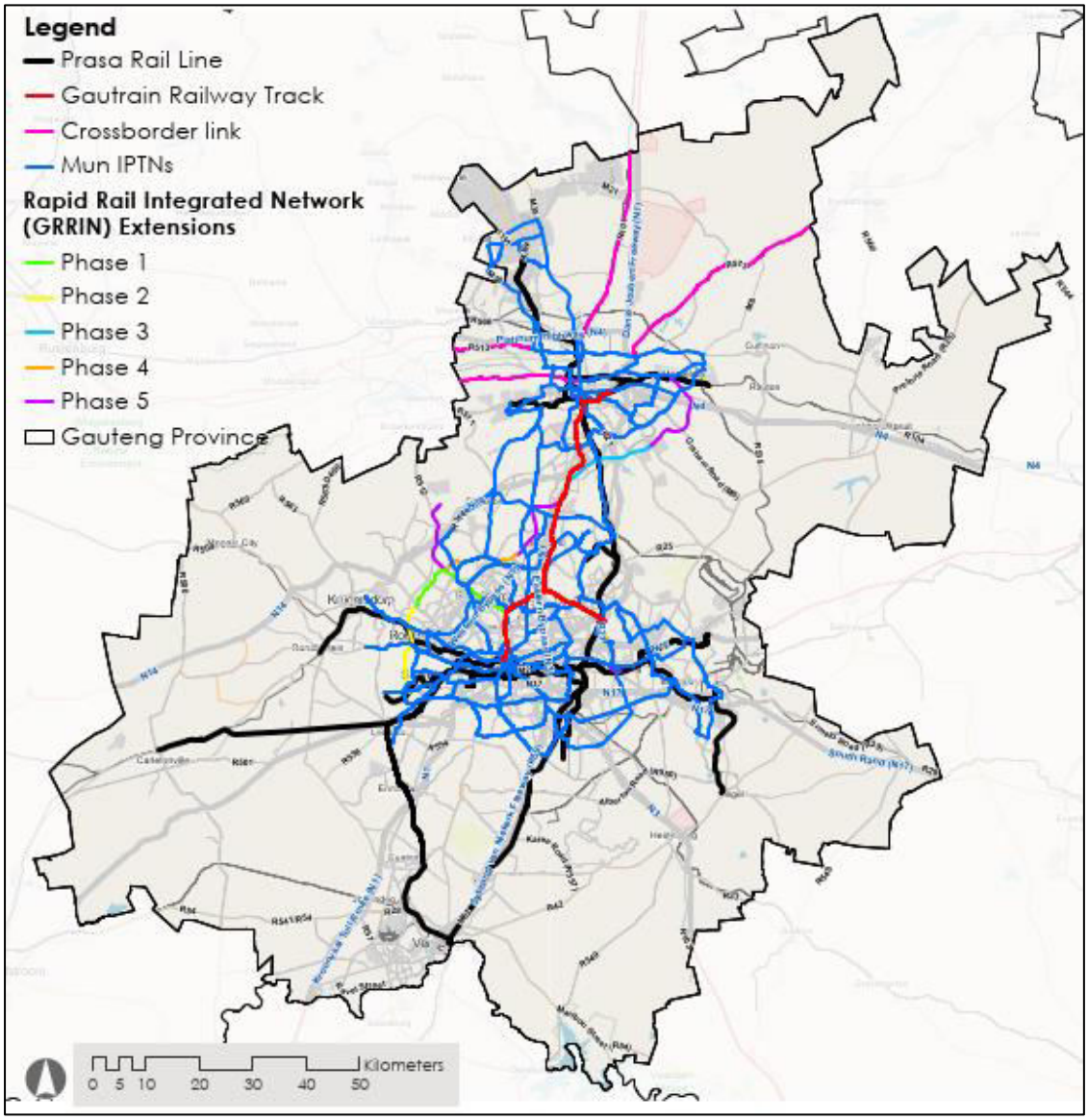
recovery and rebuild process with regards to its infrastructure and services to reclaim its ridership. Its market share currently is only approximately 4%. Regional rapid rail services between Tshwane, Johannesburg and ORTIA are offered by the Gautrain and managed by the GMA, an agency of the GDRT.

Commuter bus services are provided by private operators contracted to the GDRT, funded from the Provincial Transport Operations Grant (PTOG) and have recently been extended through 7-year negotiated contracts with the incumbent operators. The Metropolitan Municipalities in the Province are operating and further extending their BRT networks in terms of their approved Integrated Transport Plans and Strategic Public Transport Networks. Some metropolitan and local municipalities are also still operating legacy municipal bus services between mainly suburbs, CBDs and schools. The minibus taxi industry carries the bulk of public transport passengers, with a current market share in excess of 80% of public transport users. Other significant services include scholar transport, metered taxis and e-hailing. The current issues and challenges facing public transport are indicated in **Table 10-1**.

Table 10-1: Transport Issues and Challenges

Issues	Challenges
• Declining user experience • Safety and security (1LM and in-vehicle) • Affordability of services for road-based public transport users • Users "captive" to public transport and "not modes of choice" • Efficiency and lack of modal integration • Destructive competition • Services are largely peak and commuter focussed • Inadequate infrastructure and facilities • Condition of facilities and lack of effective management	• Integration of land-use and transport planning • Achieving provincial wide SPTN • Inadequate public transport funding allocation • Transformation of the institutional environment (planning and funding in silos) • Consensus on the role of modes • Rebuilding the commuter rail system • Passenger rail re-instated as the backbone of the public transport system by 2050 • Enhancing modal integration • Achieving an integrated approach towards passenger safety & security

The main objective of the public transport section of the ITMP25 is to provide a province-wide and integrated Strategic Provincial Public Transport Network (SPTN) at a conceptual level, which can serve as a framework for the further roll-out of metropolitan SPTNs and other public transport services. Existing public transport network planning of transport authorities and planning entities was used as a starting point for compiling a first cut provincial wide SPTN. These planning inputs also included the reinstatement of the existing PRASA commuter rail network and stations, which include 3 possible extensions to the PRASA network, the GRRIN Extensions Phases 1-5 and the metropolitan SPTNs. Accepted public transport network planning principles were then applied to the initial SPTN. Principles such as network continuity, network hierarchy and role of modes were applied, to identify main corridors, missing links and duplication of services. The travel demand forecast model was then used to further refine the province-wide SPTN. **Figure 10-1** shows the conceptual SPTN and the major public transport and transfer nodes are listed in **Table 10-2**. The conceptual SPTN can in future guide the planning of entities such as PRASA, the GMA and municipalities, to do more detail planning, feasibility studies and business plans.



Note: *3 proposed PRASA network extensions not included due to lack of information on detail alignments*

Figure 10-1: Conceptual Province-wide SPTN

Table 10-2: Key Nodes

No	Municipal Area	Location	25-year forecasted peak passenger volumes
1.	Johannesburg	Kliptown in Soweto	36 700
2.	Johannesburg	Park Station East	32 500
3.	Johannesburg	Johannesburg CBD	32 300
4.	Johannesburg	Sandton CBD	32 200

No	Municipal Area	Location	25-year forecasted peak passenger volumes
5.	Tshwane	Soshanguve	30 900
6.	Johannesburg	Thokoza Park in Soweto	26 500
7.	Johannesburg	Roodepoort	25 000
8.	Johannesburg	New Canada	24 700
9.	Johannesburg	Midrand	23 500
10.	Ekurhuleni	Germiston	22 800
11.	Tshwane	Temba	22 500
12.	Johannesburg	Midway in Soweto	22 000
13	Johannesburg	Diepsloot	21 000
14	Ekurhuleni	Brakpan	20 700
15.	Johannesburg	Gillview/Gleneagles area in southern Johannesburg	20 500
16.	Ekurhuleni	Boksburg	19 500
17.	Johannesburg	Nancefield/South Gate	19 200
18.	Sedibeng	Evaton/Sebokeng	19 200
19.	Ekurhuleni	Germiston CBD	18 400
20.	Johannesburg	Johannesburg Gautrain Station	17 800

By considering key indicators, provided as an output from the travel demand forecasting model, and comparing the current base-year with favourable public transport investment scenarios based on the proposed province wide SPTN, it shows improvements or at worst no deterioration. This is despite the fact that public transport passenger volumes in the peak period are expected to increase by more than 50%, from 4.1 to 6.2million. Public transport modal share will increase by approximately 5% and Green-House-Gas emissions decrease by almost 5% as well.

Gauteng is a city region with its functional transport area extending well beyond the provincial borders. PRASA operates Mainline Passenger Services (MLPS) on six routes from Johannesburg to Durban, Cape Town, Musina, Komatipoort, East London and Gqeberha. Examples of road-based services are services from Ga- Rankuwa & Brits in the Northwest Province, services from Soshanguve & Hammanskraal in Limpopo, links to Moloto in Mpumalanga and Sasolburg in the Free State. Various feasibility studies are ongoing on Provincial level in relation to potential high-speed corridors or lines. Examples are the line to Polokwane and beyond, as well as the Johannesburg-Durban high-speed passenger rail service shown in NATMAP2050. The NDoT is in the process of preparing a National Rail Master Plan and as the mandated authority, will be responsible for the implementation of any new cross-border railway lines.

The quality of public transport infrastructure and facilities has a significant impact on the efficiency of the system and the user experience. To ensure consistency across all planning, it is important for planning authorities to agree on the minimum norms and standards to be applied to station developments, types and sizes of road-based public transport infrastructure and facilities, as well as the minimum passenger amenities to be available at facilities. The GDRT can play a key role in the development of such standards and facilitating agreement amongst stakeholders.

A number of cross-cutting aspects, which apply to the broader transportation system and is key to the efficient operation of the public transport network, are important to consider for the promotion of public transport in the province. These matters include the integration of land use with public transport and transit orientated development (TOD), tying the SPTN operations into the Transport Management Centre (TMC), an integrated approach to safety and security, integrated ticketing and information (MaaS), first and last mile access to public transport stations and facilities and applying Universal Access principles.

In order to effectively enable the development of the public transport network and system, consideration must be given as to how to improve the functioning of the Provincial Regulatory Entities (PRE) and the possible establishment of Municipal Regulatory Entities (MREs). For the effective disposal of operating licence applications, consideration may have to be given to the development of a digital tool to analyse public transport demand and supply. Technology can play a facilitating role in the efficiency and effectiveness of planning, development and operation of public transport in Gauteng. The institutional capacity needs to be aligned with the roles and responsibilities allocated to the respective spheres of government and capacity building across provincial and local spheres needs to continue.

The contracting of public transport operators to provide services will increase, as the formalised system and SPTNs expand. It is proposed that the GDRT establishes a programme in collaboration with the minibus taxi industry, to assist with the professionalisation of the industry and to prepare it for participation in contracts for the provision of more formalised public transport services on SPTN links and corridors.

The provision of public transport infrastructure and services is expensive, and it can take several years from planning, design and construction to establish a new system or extend an existing one. A balanced approach that considers lifecycle costs and operational efficiency is typically sought in managing public transport systems effectively. Compared to many countries where public transport is not just a mode of force, but also a mode of choice, public transport in South Africa receives disproportionately little funding relative to its role in the economy and society (0.8% of GDP vs. the ideal 5% of GDP). The sustained funding shortages have significantly impacted more formalised public transport, the expansion thereof and government's ability to also formalise the minibus taxi industry or bring this industry into the more formalised networks of services. Fragmented planning and funding of different public transport projects and modes across the 3 spheres of government do not optimally facilitate co-ordination and integration, thereby leading to inefficiency. Funding of transport is further dealt with extensively in Section 15 of the ITMP25 Report.

It is proposed that the following public transport aspects receive priority attention in the short-term, namely:

- Feasibility investigation on the approach of the province, based on the DoT strategy for the devolution of passenger rail functions to the province;
- Assessment of the implications for the province of the National Public Transport Subsidy Policy and the implementation thereof;
- Establish a programme in collaboration with the minibus taxi industry, to assist and prepare the industry for participation in contracts for the provision of more formalised public transport services on SPTN;
- Develop norms & standards for public transport infrastructure, stations, interchanges, ranks and facilities in consultation and with municipalities;
- Develop a tool using digitised data to assist the PRE (possible future MREs) with the disposal of OL applications, linked to an online platform to deal with the disposal of OL applications;
- Conduct a feasibility analysis and develop a strategy for making public transport more Universal Access friendly, as well as a phasing approach regarding implementation;
- Implement a provincial wide integrated ticketing and fare collection system;
- Develop an integrated public transport safety and security strategy;
- Feasibility investigation on the devolution of the subsidised bus function from the Province to metropolitan municipalities, to promote integrated public transport network development as part of the rollout of IPTNs; and
- Develop a strategy to transition internal combustion engine driven road-based public transport vehicles to be propelled by more sustainable technologies.

Other public transport initiatives that should receive attention in the next 5-years are:

- Building institutional capacity at both provincial and municipal spheres of government, to effectively manage public transport and all the associated functions related thereto;
- Inclusion of all public transport planning authorities and entities in the update and refinement of one Travel Demand Forecasting Model for the province, to ensure a common and consistent basis for the further development of the SPTN;
- Facilitate the creation of a platform to make available travel information in an integrated manner to travellers (linked to MaaS);
- Ensuring that the necessary regulation of metered taxi and e-hailing services is in place and for the MEC to gazette regulations, if required to enable this; and
- Creating better synergy between the scholar transport services provided on contract by the Gauteng Department of Education (GDE) and the public transport system in the province, in general.

11. Freight Logistics Plan

Supply chains compete, not products, commodities or even transport modes. The success of supply chains depends on the extent to which the different logistics functions within the supply chain can be integrated to provide for a seamless movement of freight from origin to destination.

Freight logistics in the ITMP25 context focuses mainly on freight transport and related logistics activities. The term freight is used as a collective expression that includes raw materials, finished goods, agricultural products, consumer goods, air cargo as well as road and rail freight.

Freight transport is mainly conducted by road in Gauteng, while rail transport is used for bulk materials over long distances, such as iron ore or coal as well as containers and automotive trains. Air cargo is concentrated at the main international airports, such as OR Tambo International Airport in Kempton Park although some smaller volumes are handled at Lanseria International Airport and Wonderboom regional airport in Gauteng. There are also various pipelines for different commodities in Gauteng.

Drones are becoming important for parcel deliveries in the last mile but it is early to speak of major deployment, largely because of legislation that first has to be prepared and approved. However, drones are covered where relevant for last mile options and solutions.

Megatrends that affect the freight logistics planning environment include the 4th Industrial Revolution (4IR), climate change, sustainable transport, social impact imperative and consumer behaviour. Local trends that are important include the new focus on townships, informal settlements and hostels (TISH), change in anticipated demand for freight volumes, modal shift, corridors of freedom and special economic zones (SEZ). Separate attention is given to the trends of decarbonising trucking, freight road to rail migration and the changing landscape for rail transport.

The recent publication of a draft roadmap for freight logistics is briefly covered next and the plan continues with setting the context within which freight logistics planning is done. This includes updated legislation, policies, reports and studies, vision, principles and objectives for freight logistics, triple access planning as well as training and skills development.

The Gauteng hub strategy receives attention with recognition of possible new intermodal freight terminals at locations such as Kaalfontein, Rosslyn, Pyramid South, Sentrarand, Tshwane SEZ and Tambo Springs.

The section on the freight logistics strategy forms the core of the Freight Logistics Plan and starts with the postulation of a framework, and continues with seven themes or focus areas with freight policies and regulations addressed under each of the focus areas.

The framework for the freight logistics strategy includes the following:

1. *Freight logistics demand*, including movement or flow of freight from origins to destinations, safety and security as well as the appropriate modal split.
2. *Freight logistics network*, covering land use, freight routes, corridors of freight mobility, freight bypasses, inland intermodal terminals, logistics hubs and/or villages and nodes.
3. *Freight logistics infrastructure*, such as weighbridges, weigh-in-motion, truck stops, staging areas, charging and filling stations.

4. *Freight logistics operations*, including sustainability, new energy vehicles, better routing and scheduling, tracking and tracing, first and last mile logistics.
5. *Freight logistics legislation and control*, covering legislation, policies, self-regulation, performance-based standards and overload control.
6. *Freight logistics implementation*, including performance measuring and management, appropriate KPIs, key projects and initiatives.
7. *Freight logistics industry engagement and consultation*.

Various action plans have been suggested that include appropriate freight road to rail migration for rail-friendly freight, development of efficient corridors of freight mobility and routes for dangerous goods and abnormal loads, strengthening current and planned intermodal freight hubs, the development of truck stops, development of more sustainable freight logistics operations and last mile distribution to be made more efficient with micro hubs

The freight data warehouse needs to be revitalised as part of a multifunctional data centre for Gauteng and more focus to be placed on relevant skills development and training in freight logistics. It also includes improvement and enforcement of overload control through weigh-in-motion technology, self-regulation and performance-based standards.

A set of norms and standards should be developed to be used as key performance indicators and finally, freight logistics industry forums, vocational societies and industry associations should be engaged and consulted.

A Strategic Freight Network is proposed to connect new intermodal terminals at previously identified preferred locations, as shown in **Figure 11-1.**

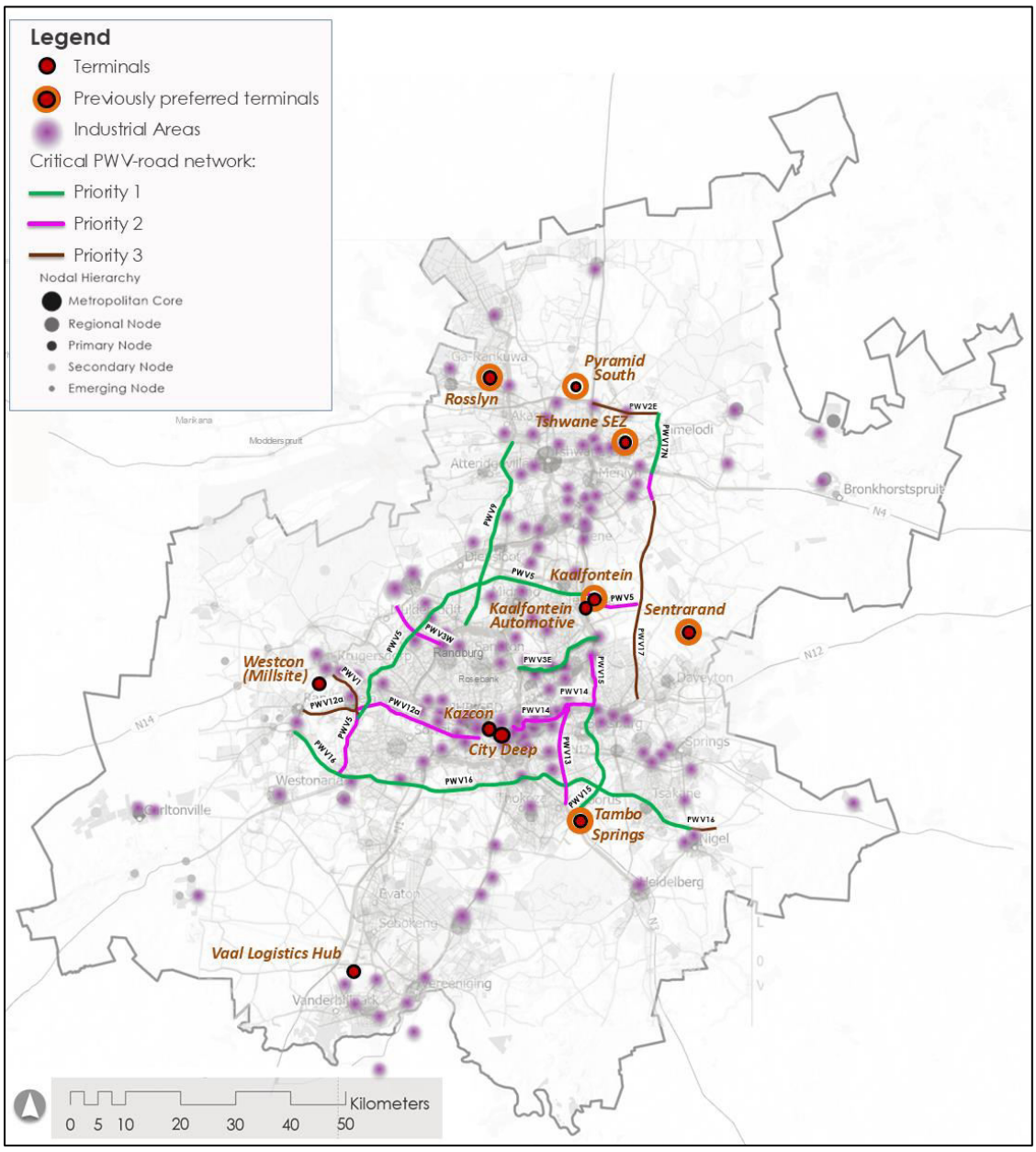


Figure 11-1: Strategic Freight Network and Terminals

12. Airports and Aviation Plan

This chapter addresses the current and future state of the region's airports, airspace, and the corresponding ground transport systems. While ITMP25 primarily focuses on land transportation, this chapter acknowledges the integral role airports play in the overall transport network, influencing road and rail infrastructure planning.

The chapter begins by outlining the importance of airports as critical nodes in Gauteng's transportation system. Aspects considered include affordability, environmental sustainability,

existing routes and traffic, and particularly their impact on the planning of road and rail access. The chapter highlights how airports influence the seamless integration of various transportation modes and emphasises the role of major airports like OR Tambo International Airport (ORTIA) and Lanseria International Airport (LIA) in shaping the region's transport landscape.

While larger airports such as ORTIA and LIA receive detailed analysis, smaller airports such as Grand Central, Rand Airport and Vereeniging Airport are briefly covered due to their limited impact on ground transport infrastructure. The chapter also covers proposed future projects, including the Vaal Aerotropolis and the expansion of Wonderboom National Airport, which hold significant implications for regional infrastructure development.

The chapter revisits the 2013 ITMP25's proposal for a third international airport in Gauteng. While current infrastructure remains sufficient, anticipated future growth could necessitate additional capacity beyond what ORTIA and LIA can provide. Gauteng Province has not yet announced the preferred location of a third international airport and should embark on a study to prepare a Provincial Airport Strategy to guide decision-making on this matter. The strategy should address key factors such as airport location, environmental impact, cost, land reservation, existing airport expansion, airspace management, and alignment with national policies. Notably, the chapter suggests prioritising the expansion of existing airports before committing to the construction of a new facility.

ORTIA, the busiest airport in South Africa, is projected to see significant passenger growth, reaching up to 43 million annual passengers by 2050. Its Master Plan outlines a series of expansions to accommodate increased demand, including an ultimate capacity of 80 million passengers through the development of a three-runway system. The Western Precinct is expected to reach full capacity by 2034, prompting development in the midfield precinct, where passenger terminals, aprons, and air cargo facilities will be established.

Key infrastructure projects at ORTIA include the phased construction of the Midfield Cargo Terminal, which will increase the airport’s cargo capacity. Additionally, the chapter highlights necessary road and rail upgrades to support this expansion. Planned road projects include extensions to the K86, K88, and K90 roads, as well as new connections via PWV 14 and N12. The GRRIN currently links with the airport and the rail network is also expected to be extended to the Midfield terminal, further integrating the airport with the region’s public transport network.

Lanseria International Airport (LIA), a privately owned airport, has also seen substantial growth in recent years, shifting from general aviation to scheduled domestic flights. The airport is projected to handle between 7.5 and 14 million annual passengers by 2050, with its capacity potentially increasing to 40 million with the implementation of the Lanseria Airport City Master Plan.

The Master Plan identifies two major development precincts: the Northern Precinct, which could accommodate 18 million passengers, and the Midfield Precinct, which would support the airport’s growth to 40 million passengers through a dual-runway system. Supporting infrastructure projects include road upgrades, such as the expansion of Ashenti Road/K31 and the construction of the PWV3 highway, which is essential for the airport’s growth.

An important consideration is the expansion of the Gauteng Rapid Rail Integrated Network into LIA as part of the 5-phase extension programme.

Wonderboom National Airport, located north of Pretoria, is planning a transition to become a more commercially viable regional airport. Key initiatives include the expansion of the primary runway and the restructuring of the airport as a company, aligning with the City of Tshwane's Integrated Development Plan. By 2050, Wonderboom is projected to handle up to 192,000 annual passengers, though the chapter cautions that these projections are optimistic.

The Vaal Aerotropolis, is a proposed large-scale development project aimed at creating a new international airport and logistics hub in Gauteng. This project is part of the Sedibeng Vaal Special Economic Zone (SEZ) and is planned to handle 7.2 million passengers and 150,000 tonnes of cargo annually. The Aerotropolis includes plans for an airport city, which will offer a range of business, hospitality, and commercial amenities to name a few. Similar to Wonderboom, the chapter cautions that these projections for Vaal Aerotropolis are optimistic when considering the historic timelines from other airports.

The chapter concludes that Gauteng's airports are critical to the province's economy and transport network and will require substantial infrastructure upgrades to support future growth. Both ORTIA and LIA have significant expansion plans that will increase their capacities, while Wonderboom and the Vaal Aerotropolis represent opportunities for regional development. The possibility of a third international airport remains a key consideration for the province, but realistic planning should focus around expanding existing facilities to meet future demand in a cost-effective and environmentally sustainable manner.

The integration of air, road, and rail transport is crucial for the province's future development, and strategic planning will be essential to ensure seamless connectivity between Gauteng's major transport nodes.

13. Road Network Plan

South Africa, and Gauteng Province, faces many developmental obstacles, including infrastructure bottlenecks, as well as economic and social challenges such as unemployment, poverty and inequality. Economic infrastructure, including the road network, is one of the key levers for economic growth. Road infrastructure has the potential to deliver a higher economic return on investment than any other single type of infrastructure. Road transportation is an important industry in the economy, yet various challenges inhibit the sector's contribution to South Africa's economic and social developmental objectives. One such challenge is the implementation of road infrastructure projects, where increased road use, low investment, and poor maintenance have led to higher transportation costs and transport bottlenecks.

The effective design, construction and maintenance of roads is crucial to a well-functioning and prosperous modern economy. Roads also play a role in meeting societal needs for connection and mobility in ever-expanding human settlements, and their construction and on-going maintenance provide opportunities to address social challenges like unemployment. With mounting concerns over climate change and air pollution, the role of roads needs to shift away from serving predominantly private vehicles and road-based freight, toward supporting more integrated mobility systems centred around walking, cycling, public transport and road-to rail diversion for rail friendly freight traffic.

Road users are reliant on a safe and efficient road network. Roads must be developed and maintained also taking into consideration the marginalisation of rural communities due to the poor state of access roads. Public transport passengers using buses and taxis are also reliant on a sound road network. Public transport services require roads to be well developed and

maintained in such a manner as to Increase the use of public transport. Freight is a major contributor to the economy and also requires an efficient transport system.

Road Authorities in South Africa have the obligation to provide a reliable, effective, efficient and integrated transport system that supports the sustainable economic and social development objectives of the country. All Road Authorities also have an obligation to plan, design, construct and maintain the road network; to protect the public investment in the road infrastructure; to ensure the continued functionality of the transportation system; and to promote the safety of traffic on the road network.

The total road network under jurisdiction of GDRT is 5 635 km in extent, of which 4 349km (77%) is surfaced. The Gauteng provincial road network includes 676 bridges and 428 major culverts.

In total, 22 billion vehicle-kilometres are travelled each year on the GDRT road network, 579 million of which are heavy vehicle-kilometres. Most traffic (99%) is carried by the surfaced road network.

The GDRT has the obligation to maintain its transport infrastructure. The Road Infrastructure Strategic Framework for South Africa (RISFSA), October 2006, provided the framework for the management of roads infrastructure. Regular visual assessments are to be carried out to determine the condition of the network which is then expressed as a Visual Condition Index (VCI). The norm set by RISFSA is that not more than 10% of the road network condition can classified as “Poor”. For the GDRT to qualify to receive funds from the Provincial Roads Maintenance Grant (PRMG), regular visual assessments must also be conducted. In 2023 visual assessments were conducted and on average the VCI was found to be 67% with 18% “poor” or worse condition. This exceeds the allowable 10%. Prior to 2023, the previous visual assessment was carried out in 2015. The VCI was then 78% with only 4% poor or worse condition. It can be concluded that the condition of the paved roads deteriorated significantly from 2015 to 2023. A further measurement used is the average Vehicle Operating Cost per kilometre (VOC). For surfaced roads this was R 9.10/km based on the 2023 assessment and R 6.89/km for 2015.

A needs analyses was conducted to determine the funding need to improve the condition of the existing roads. The funding need is only quantified for the following treatment activities which excluded allowance for general maintenance in the road reserve such as pothole repairs, grass-cutting, road shoulder repair, drainage infrastructure maintenance, etc:

- Preventive maintenance (fog spray/reseal) of surfaced roads;
- Rehabilitation of surfaced roads;
- Re-gravelling of gravel roads; and
- Upgrading of gravel roads to surfaced standards.

Following are two (2) of the scenarios investigated:

- Scenario 1 removes the backlog for reseals, rehabilitation, re-gravelling and upgrading immediately, indicating the actual budget need of the reinstatement of the road network if no constraints with regards to resources are present. The immediate need for surfaced roads is R4.155 billion and gravel roads is R1.166 billion with an additional annual allowance of R1.464 billion for surfaced and R246 million for gravel roads to maintain it to similar condition.
- Scenario 2 is a more pragmatic approach determining the funding level which improves and maintains the condition of the surfaced road network to a good condition over the next

10 years and improves the gravel thickness of the gravel road network to a moderate to plenty state over the next 10 years. The annual funding need is R1.763 billion per year for surfaced roads and R283 million per year for gravel roads.

90% of the bridges and major culverts are in a very good or good condition; 8% in a fair condition; and 2% in a poor or very poor condition.

The lack of maintenance on traffic signals was raised as a major problem. The main cause of signal outages is chronic vandalism, mainly cable theft but poles also get removed. The budget allowed for fixing and maintaining traffic signals is inadequate.

The National Department of Transport (NDoT) plays a pivotal role in ensuring road safety in South Africa. The role and responsibility of the NDoT include developing and enforcing road safety laws, setting national standards, and coordinating efforts with provinces and stakeholders. The NDoT has developed the National Road Safety Strategy 2016-2030 as a blueprint for reducing road crashes and fatalities in South Africa The Road Traffic Management Corporation (RTMC) has a key function to ensure reduction of crashes, deaths and injuries on South Africa's roads. The main objective of the unit is to contribute towards safer roads in the country through education and awareness programmes. The Gauteng's provincial safety strategy is based on the 5 Es approach, being Education; Engineering; Enforcement; Environment and Evaluation. Gauteng Province has high fatal accident rates which result in death and permanent disabilities. According to the Community Safety Committee FIS report, the province recorded 9 730 fatalities caused by 8 741 fatal crashes for the period 2018–2021, with 2 610 fatalities in 2021. This equates to an average of more than seven (7) deaths per day.

A review was conducted on GDRT design standards related to road cross sections to determine their applicability and to identify if any shortcomings existed. It was found that the design standards were still relevant and applicable except with regards to the following shortcomings that were identified:

- The accommodation of non-motorised transport facilities was inadequate; and
- The accommodation of other engineering services can be allowed in the reserve.

NDoT and SANRAL reassessed their standards too and prepared updated cross section standards for the treatment and management of non-motorised transport elements and public transport stops/lay byes. It is proposed that GDRT adopts these standards and revise their standard drawings accordingly

Gauteng Province has a planned strategic road network which was developed over time. It consists of a grid of Freeways (PWV roads) and main arterials (K-routes). There is broad consensus that it provides structure to the development of the province. The Gauteng Strategic Road Network Plan has to a large extent been taken into account in the road master planning undertaken by both SANRAL, the Metropolitan and District/Local Municipalities i.e. there is a general cohesion with regard to road planning between the three spheres of Government.

The GDRT should continuously update the existing Strategic Road Network (SRN) as a Strategic Transport Network that provides structure to the spatial development of the province. It should ensure the optimum utilisation of the land reserved for the Strategic Transport Network as integrated transport corridors, where public transport – road, rail and non-motorised transport - plays just as an important role as private cars and freight vehicles. The GDRT should develop the Class 1 (freeway) network, which forms the backbone of road-

based mobility in the province. The following PWV routes have been identified as the most important to support mobility: PWV9; PWV3, PWV5; PWV14; PWV15; PWV16; PWV17 north and N17/PWV12a.

The Priority 1, 2 and 3 PWV routes (Class 1) and Priority 1 K-routes (Class 2) have been identified and are indicated in **Figure 13-1** which are the most important to support mobility.

Finally, it should upgrade critical existing K-routes and develop new K-route links of the SRN that supports public transport routes, access routes to the freight hubs, as well as economic nodes and airports (**Table 13-1).**

Table 13-1: Freight Route Network and Airport Linkages

Category	Description	Roads
Roads supporting intermodal hubs	Roads linked to Pyramid South Hub	R101, N1, K99, K8, K4, K14
	Roads linked to Rosslyn Hub	K217, M20, K8, K4, K6, K217, PWV9
	Roads linked to Kaalfontein Hub	R25, R21, PWV5
	Roads linked to Sentrarand hub	K151, R50, R51, PWV5
	Roads linked to Tambo Springs Hub	K148/N3, R103, PWV15
Freight bypass	Linking Tambo Springs with Pomona	PWV15
	Linking the N3 with the N4	PWV17
Roads supporting international and city airports	K90N (OR Tambo)	
	K88 OR Tambo)	
	K86(OR Tambo)	
	PWV15 (Aerotropolis)	
	K29 (Lanseria)	
	N1/K170 Interchange and K176 link (Vaal Aerotropolis)	
	N1/K13 Interchange and K13 Link to R57 (Vaal Aerotropolis)	
	K97 (Wonderboom)	

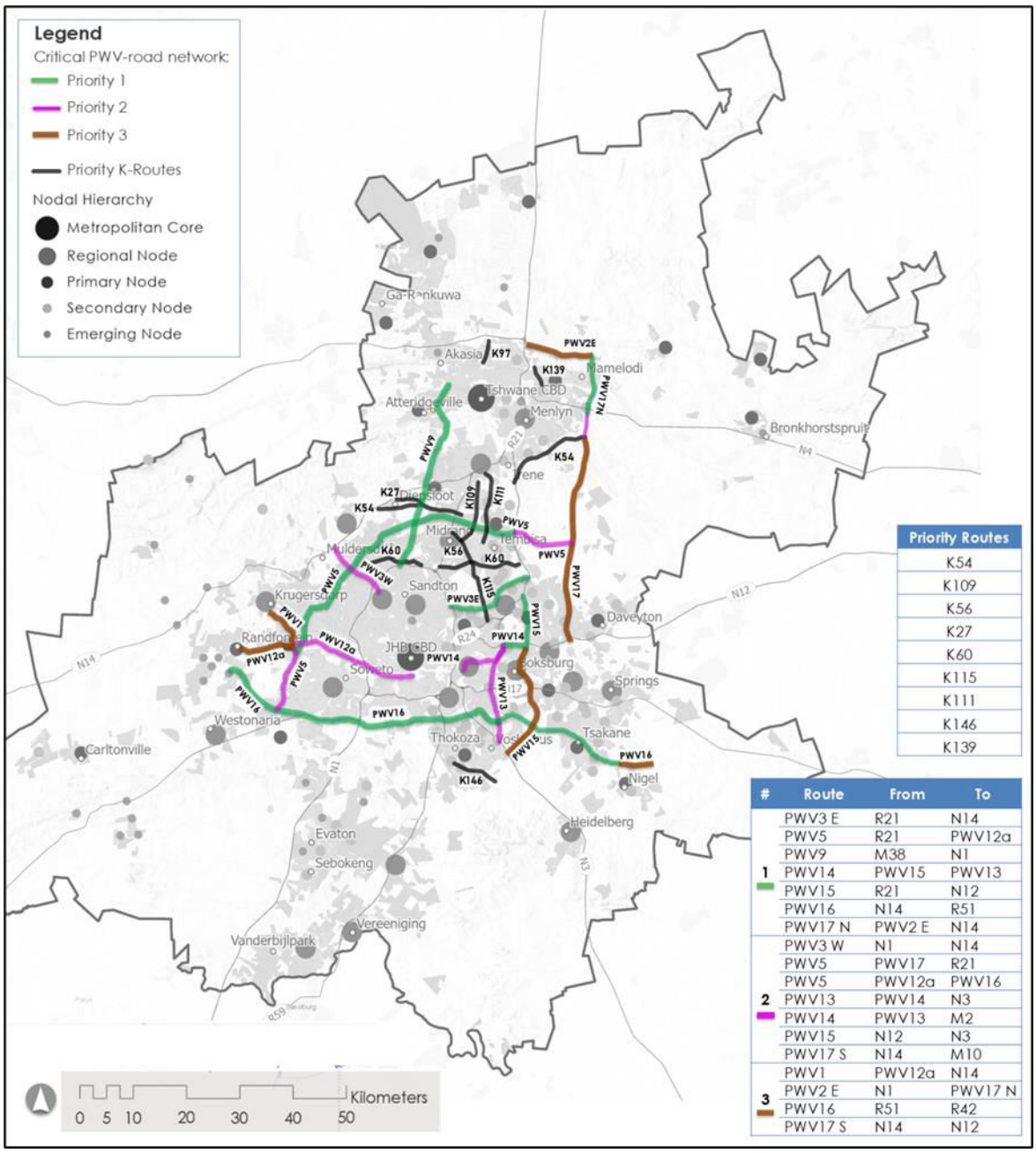


Figure 13-1 Priority 1, 2 and 3 PWV routes and Priority 1 K-routes

The following interventions are therefore proposed:

- Protect and Develop the Gauteng (Provincial) Strategic Road Network;
- Protect and Maintain Mobility, also considering Accessibility;
- Facilitate mobility continuity across municipal and provincial boundaries;
- Maintain and regularly update the Transport Demand Model developed;
- Maintain and Improve Road Design Standards to be more cost-efficient and sustainable;

- Regular updating of standard design drawings related to road cross-section based on NDoT and SANRAL guidelines;
- Ensure and apply Universal Access Design principles;
- Continue with multi-year programme for the construction of new roads and upgrade of existing roads guided by a review of the existing and planned road network;
- Expand the provision of cost-efficient transport infrastructure for non-motorised transport in support of the Shift from motorised transport over time;
- Formation of partnerships with municipalities on implementation of major arterials and other roads, especially in disadvantaged areas;
- Support Contractor Development programmes;
- Maintain Provincial Road infrastructure to the Highest Standards as required by RISFSA;
- Formation of partnerships with municipalities on the maintenance of major arterial and other roads, especially in disadvantaged areas;
- Update and Maintain Pavement Management Systems to ensure effective maintenance as per RISFSA;
- Implement more cost-efficient solutions for transport infrastructure build and maintenance to optimise usage of funds available;
- Active physical protection of road reserves from illegal invasion; and
- Support the RTMC to achieve reduction in fatalities and accidents as well as participate in the coordination and implementation of Traffic safety initiatives and programmes.

14. Governance Structures and Institutional Arrangements

The allocation of functions to the three spheres of government is governed by the Constitution, especially Schedules 4 and 5 and related sections, as well as section 11 of the National Land Transport Act, 2009 (NLTA). It is elaborated in the Policy and Legislation Review Annexure of the supplementary Governance Structures and Institutional Arrangements Report.

The national sphere of government is responsible among others for formulating national policy and strategy, national strategic transport planning and co-ordination, preparing the National Land Transport Strategic Framework (NLTSF), rail and freight transport, co-ordination between the provinces, assigning functions to other spheres of government, capacitating and monitoring provinces and municipalities in addition to co-ordinating transport between South Africa and other countries. It is also responsible for the functions listed in Schedule 4 to the Constitution concurrently with the provinces, which include public transport, road traffic regulation and vehicle licensing.

The Province is responsible among others for formulating provincial policy and strategy within the national framework, planning, co-ordination and facilitation of land transport functions in the Province, preparing the Provincial Land Transport Framework (PLTF) as well as co-ordination between and capacitation of municipalities. It is also responsible for the functions listed in Schedule 4 to the Constitution concurrently with the national sphere (public transport, the environment, road traffic regulation and vehicle licensing). It is exclusively responsible for the functions listed in Schedule 5, which include provincial roads and traffic and provincial planning.

Municipalities are responsible for the functions listed in Part B of Schedules 4 and 5 which include municipal public transport, municipal planning, municipal airports, billboards and the display of advertisements in public places as well as traffic and parking.

Chapter 3 of the Constitution provides for co-operative government. The 3 spheres of government must co-operate with one another in mutual trust and good faith inter alia by co-ordinating their actions and legislation and avoiding disputes where possible. This is also required by the Intergovernmental Relations Framework Act 13 of 2005 (IGRFA) which provides for agreements between organs of state and resolution of disputes between them.

The NLTA provides that where there are significant transport movements between municipalities, as is the case in Gauteng, they may establish an inter-municipality forum in terms of the IGRFA or a multi-jurisdictional service utility. The Transport Authority for Gauteng (TAG) has been established by the TAG Act as a co-ordinating, as well as executive, structure.

Stakeholders and key role players must be consulted in developing the ITMP25. The Promotion of Administrative Justice Act 3 of 2000 (PAJA) provides that persons whose rights may be adversely affected must be consulted when government takes administrative action, which includes transport planning, either by a notice and comment procedure or by public hearings.

The Constitution and the NLTA provide that in certain circumstances, functions that reside with the national government may be assigned to provinces or municipalities, and that functions that reside with provinces may be assigned to municipalities. The NLTA provides for assignment of certain functions and the White Paper on National Rail Policy 2022 provides that the urban passenger rail function can more effectively be performed at local level. The Rail White Paper also provides that provinces should take responsibility for regional rail. The NDoT is developing a Rail Devolution Strategy as well as a National Rail Bill and a National Rail Master Plan. The Province will investigate the possibility of taking over appropriate commuter rail functions as the Gautrain experience has shown that it is capable of exercising those functions efficiently and effectively.

The NDoT must co-ordinate between provinces on transport matters and co-ordinate between the RSA and other countries. MINMEC was established as a co-ordinating structure between the Minister and provincial MECs. The Committee of Land Transport Officials (COLTO) was established as a co-ordinating structure between the NDoT and provincial officials. There are various other national co-ordinating structures such as the Presidential Climate Commission (PCC) and the National Planning Commission (NPC).

In the Province, the MINMMEC committee has been established as a co-ordinating structure between the MEC and MMCs (members of the mayoral committees) of the municipalities, with the relevant department heads supporting it.

In the municipal sphere the South African Local Government Association (SALGA) represents local government.

The GDRT has established a Transport Technical Working Committee (TTWC) as a co-ordination structure between the Department and municipalities which has 5 technical sub-committees reporting to it. The Province must establish a Public Transport Integration Committee (PTIC), and this Committee is being re-established and revitalised.

Role players in the national sphere of government include the Minister and National Department of Transport (NDoT), the National Treasury (NT), the National Public Transport Regulator (NPTR), the SA National Roads Agency (SANRAL), the Passenger Rail Agency (PRASA), Transnet, the still to be established Transport Economic Regulator (TER), the Airports Company of SA (ACSA), the Cross-Border Road Transport Agency (CBRTA), the Border Management Authority (BMA), the Road Traffic Management Corporation (RTMC) and the Presidential Climate Commission (PCC).

Role players in the provincial sphere include the MEC and Gauteng Department of Roads and Transport (GDRT), TAG, the Gautrain Management Agency (GMA), the Gauteng Provincial Regulatory Entity (GPRE), the Gauteng Department of Education, amongst others.

In the municipal sphere there are 3 metropolitan municipalities in the Province and 2 District Municipalities, each with 3 Local Municipalities within their districts. The NLTA provides for the establishment of Intermodal Planning Committees and Local Transport Advisory Boards by municipalities. The function of regulating public transport can be assigned to municipalities, which will then become municipal regulatory entities (MREs).

Stakeholders in the private sector include minibus taxi, metered taxi and e-hailing associations, and operators of those services, bus operator associations and bus operators, commuters and the general public, organised labour and private sector databases.

15. Funding and Financial Plan

The Funding and Financial Plan assesses the current financial status of GDRT and the key stakeholders for the funding of the projects related to the development of an integrated transport system, and where there is a funding gap, proposes funding sources and solutions that can be implemented by GDRT/TAG to achieve its financial goals. The sources and solutions include the traditional sources of funding and offers a guideline for new or alternative sources that the GDRT/TAG can tap into. The sources of funding include the following:

- National and Provincial Government grants;
- Provincial Transport Operations Grant (PTOG);
- Public-Private Partnerships (PPPs);
- Revenue from transport related services;
- Contributions from development institutions like Development Bank of Southern Africa (DBSA);
- The Industrial Development Corporation (IDC);
- Debt instruments from commercial lenders; and
- Other alternative funding sources

This plan facilitates the efficient allocation of resources for transport infrastructure projects, guiding investments from both public and private sectors while emphasizing sustainability, equity, and long-term economic development, particularly given Gauteng's status as South Africa's economic hub.

The success of ITMP25 is contingent upon collaboration among Stakeholders such as GDRT, TAG, Transnet, PRASA, SANRAL, ACSA and municipalities, including City of Johannesburg, City of Tshwane, City of Ekurhuleni, West Rand District, and Sedibeng District. Each

stakeholder bears specific responsibilities for financial oversight, funding procurement, and infrastructure development to support the transport system's objectives.

The comprehensive Funding and Financial Plan ensures that transport projects are feasible, aligned with economic growth objectives, and cater to the mobility needs of all communities in Gauteng.

The government is the primary financier of transportation infrastructure, with national and provincial budget allocations providing most of the funding. Funding mechanisms include conditional grants and municipal budgets. The GDRT plays a crucial role, supported by equitable share funds and conditional grants for road infrastructure aligned with the Growing Gauteng Together 2030 (GGT2030) initiative.

Figure 15-1 shows the current flow of funding, from National Treasury down to the GDRT.

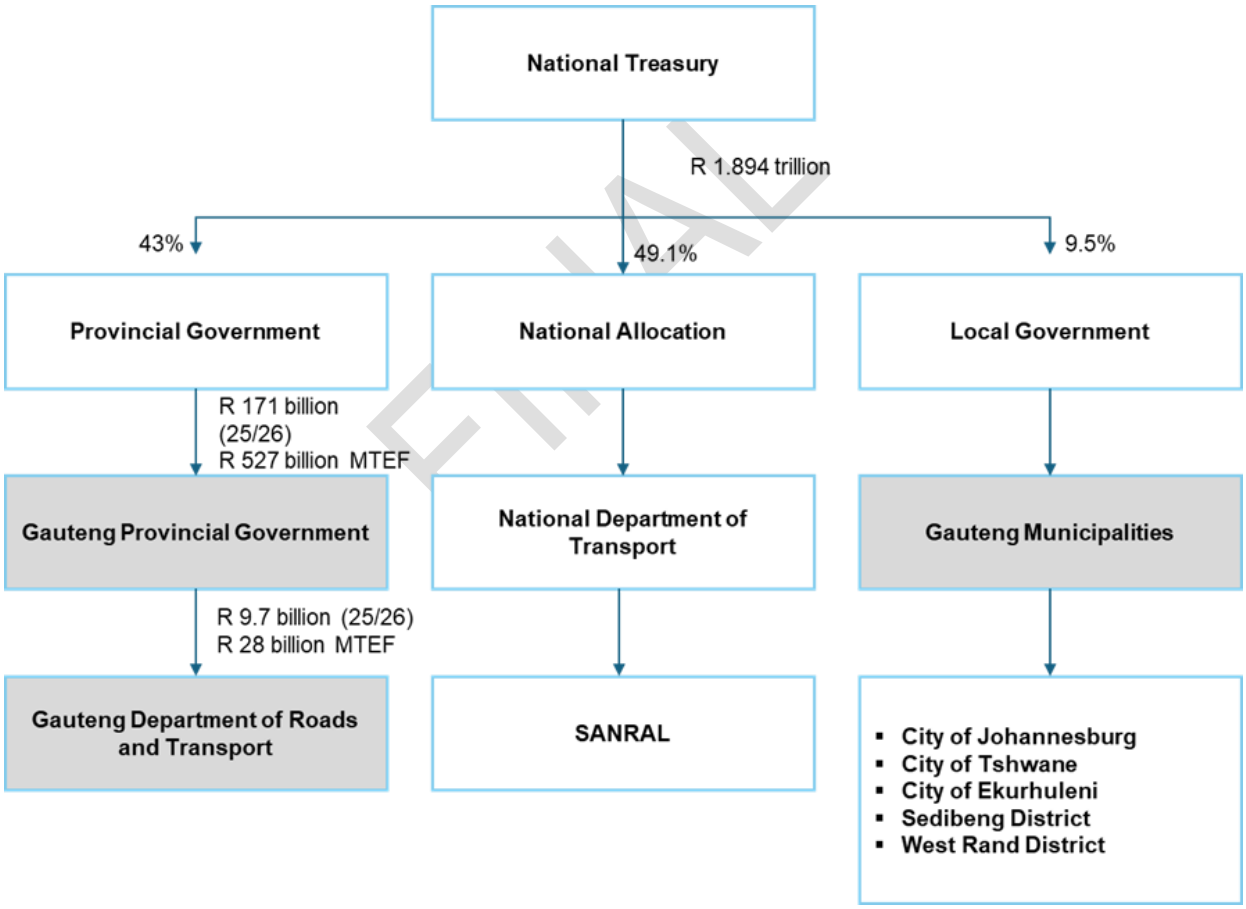


Figure 15-1: The Flow of Funds in South Africa

Gauteng Provincial Treasury

The 2025 MTEF Budget for the Gauteng Provincial Government amounted to R527.2 billion over the Medium Term. It grows at an annual average of about 2.5 per cent from R171.5 billion

in 2025/26, to R175.1 billion in 2026/27 before reaching R180.5 billion in the 2027/28 financial year. **Table 15-1** shows the budget for each financial year and the split between the equitable shares and the conditional grants.

Table 15-1: Gauteng Provincial Treasury Budget

Gauteng Allocation	25/26 (Rbn)	26/27 (Rbn)	27/28 (Rbn)	Total (Rbn)
Equitable Share	133.9	138.9	144.2	**417**
Conditional Grant	27.8	27.7	27.8	**83.3**
Other	9.8	8.5	8.5	**26.8**
Total Budget	**171.5**	**175.1**	**180.5**	**527.1**

Source: 2025 Full Budget Review, Gauteng Province Budget Speech 2025

The 2025 MTEF Budget for Gauteng is marked by compulsory baseline reductions across all provincial departments and entities due to a R6.2 billion decline in National Government transfers, driven by changes in the Provincial Equitable Share (PES) formula and efforts to manage the provincial budget deficit. The PES is set to grow at an average annual rate of about 4%, rising from R133.9 billion in 2025/26 to R144.2 billion in 2027/28. Additional PES allocations have been included to help Gauteng manage the financial impact of the public sector wage agreement. Conditional Grants remain constant over the Medium Term at about R27.8 billion for each year.

Out of the Gauteng Provincial Treasury's budget, an amount of R28 billion has been allocated to the GDRT over the Medium Term, comprising of 5% of the Province's total budget.

Gauteng Department of Roads and Transport Budget

The GDRTs budget allocation of R28 billion over the Medium Term is spread equally across the three financial years, with a budget of R9.7 billion allocated to the 2025/2026 financial year and about R9 billion for the other two years. Following through from the Gauteng Provincial Treasury, GDRT is funded through equitable shares and two conditional grants: the Provincial Road Maintenance Grant (PRMG) and the Expanded Public Works Programme Incentive Grant (EPWP).

GDRT also receives conditional grants from the National Department of Transport (NDoT) which amount to R12.1 billion over the MTEF period, with significant allocations for road infrastructure aligned with the Growing Gauteng Together 2030 (GGT2030) initiative.

GDRT is the major contributor to the Provincial Revenue Fund (PRF) and thus accounts for over half of Gauteng's own revenue collection. The revenue is primarily generated through tax receipts arising from motor vehicle registration and licencing fees. In generating this revenue, the Department is also liable for direct charges including amounts deducted from collected revenue to reimburse primary collectors/agents. Motor vehicle licencing is by far the most productive source of revenue for the Department. The total receipts from these services in 2023/204 was R5,0 billion from R4,7 billion in 2022/2023. Even though these receipts are generated by GDRT, not all of them are allocated to GDRT as they go directly to the Province.

Table 15-2 shows the summary of receipts of GDRT over the Medium Term.

Table 15-2: Summary of Receipts: Gauteng Department of Roads and Transport (GDRT)

	25/26 (Rbn)	26/27 (Rbn)	27/28 (Rbn)	Total (Rbn)
GDRT Allocation	9.7	9.15	9.15	28
Total Budget	**9.7**	**9.15**	**9.15**	**28**

Sources: Estimates of Provincial Revenue and Expenditure 2024/25, 2025 Full Budget Review, Gauteng Province Budget Seech 2025

Funding Requirements for Key Projects

According to the ITMP25 calculations, the funding requirements of the Gauteng province are approximately R86.2 billion in the Medium Term split 67% towards capital expenditure spend (Capex) and 33% towards operating expenditure (Opex). The Capex and Opex spend includes the:

- Proposed Phase 1-3 and Phases 4-5 of GRRIN;
- Completion of Municipal Bus Rapid Transport System;
- Reinstatement of the PRASA commuter rail network and services;
- Public Transport Operations Grant needs;
- Maintenance and upgrade of the current Provincial road network, also removing the maintenance backlog; and
- Provision of approximately 1250km of new PWV and K-routes.

The annual funding requirement in the Medium Term is estimated to be R27.5 billion in 25/26, R28.7 billion 26/27 and R30 billion in 27/28.

The funding requirement for the above projects and other projects of provincial significance that the Province needs to undertake has been summarised into **Figure 15-2.**

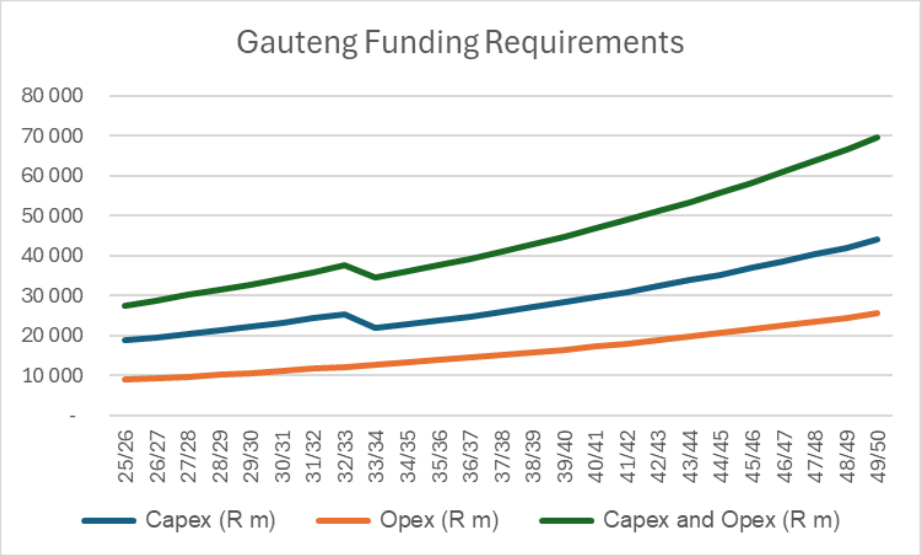


Figure 15-2: Gauteng Funding Requirements

As infrastructure financing needs grow, there is clear evidence that there is insufficient funding for all the transport infrastructure development and maintenance required as such, a persistent funding gap is likely to emerge between the necessary expenditure and available revenue (including allocations from National Treasury). **Figure 15-3** illustrates the projected progression of the funding gap over a 25-year period, when comparing revenue with capital and operational expenditure.

The funding requirements of the GDRT are approximately R48.8 billion in the Medium Term split 48% towards capital expenditure spend (Capex) and 52% towards operating expenditure (Opex). The Capex and Opex spend includes the:

- Proposed Phase 1-3 and Phases 4-5 of GRRIN,
- Public Transport Operations Grant needs;
- Maintenance and upgrade of the current Provincial road network, also removing the maintenance backlog, and
- Provision of approximately 1250km of new PWV and K-routes.

The funding disparity is driven by the fact that revenue, largely sourced from taxes, is growing at a slower pace linked to the broader economic growth than the infrastructure costs that are tied to the Consumer Price Index (CPI) inflation. Revenue growth rate is affected by the following factors:

- Pedestrian economic growth rate, e.g. currently between 1% and 1.8% in the Medium Term;
- Low growth in personal taxes, income taxes and others;
- High unemployment rate in the country;
- High debt service costs for the Government;
- Persistent spending pressures, e.g. Increasing wage bill and expenses, etc;
- Load Shedding and Energy Constraints; and
- Inflation and Interest Rate Pressures.

The cost of infrastructure is influenced by the following factors whose impact is increasing costs at a more drastic rate than revenue growth:

- Inflation in goods and services averaged 4.4% in 2024 however the SARB aims to contain inflation between 3% and 6%;
- The depreciation of the rand against major currencies has increased the cost of projects especially large infrastructure projects;
- Construction index increasing at higher than inflation rates, it recorded a growth rate of 7.8% in 2024 vs average inflation of 4.4% in the same year;
- Rising property costs including land costs; and
- The delays and inefficiencies in the implementation of projects continues to negatively affect the costs of the projects.

The widening gap over time highlights the growing financial pressure on Gauteng's transport as illustrated in the Funding Gap graph (**Figure 15-3)**. The discrepancy between the growth rates of revenue and expenditure indicates a widening Funding Gap over the twenty-five-year period unless Government takes on rigorous interventions to increase revenue and manage the implementation process.

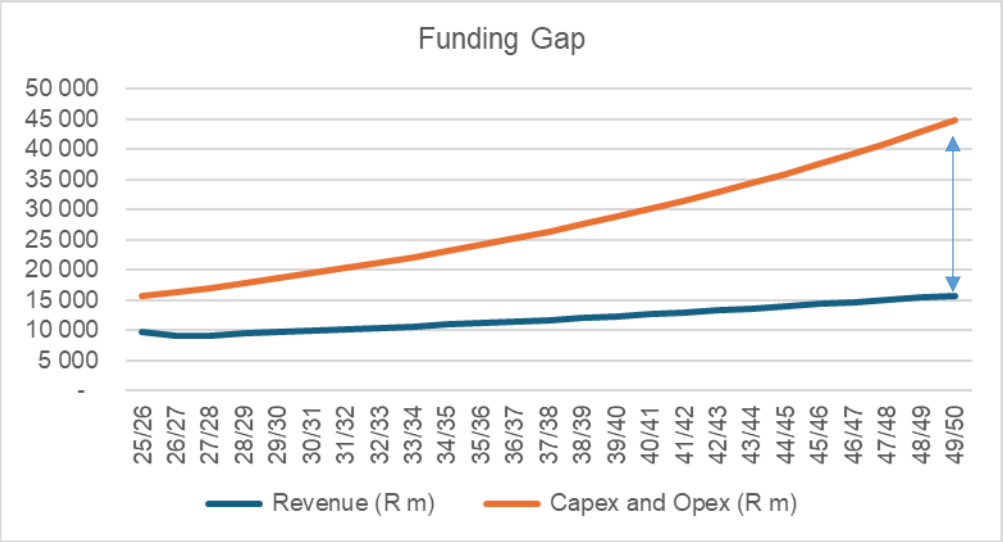


Figure 15-3:Funding Gap over the years

Transport infrastructure projects typically require significant upfront capital that exceeds the available budget in any financial year. While government can afford the costs of projects over time (as government funding alone is insufficient), the lack of upfront lump-sum funding calls for alternative financing solutions.

Benchmarking International Transport Funding Practices

As cities and regions worldwide grapple with the challenges of expanding and modernising their transport networks, the need for innovative and sustainable funding solutions has become increasingly apparent. Benchmarking international practices in transport funding

offers valuable insights into how different regions have successfully financed their transport infrastructure, enabling policymakers and planners to identify best practices and adapt them to local contexts.

International transport funding benchmarking involves the systematic comparison of funding mechanisms, financial strategies, and policy frameworks used by various countries and cities to support transport infrastructure development. By examining the successes and challenges faced by others, the Gauteng Province can better understand the potential opportunities and risks associated with different funding approaches, ensuring that its strategies are aligned with global trends and innovations.

The benchmarking exercise involved a comparative analysis of the total national budgets and transport allocations of three developed countries Germany, Switzerland, Sweden and Nigeria alongside South Africa. By evaluating how these countries prioritise transport funding within their broader fiscal frameworks, Gauteng Province can identify strategic insights to inform its own transport planning and investment decisions.

Benchmarking Analysis

Table 15-3 provides a comparative snapshot of the total national budgets and corresponding transport allocations for South Africa, Germany, Switzerland, and Sweden. This benchmarking data serves as a valuable reference point for evaluating how different countries prioritise transport spending within their broader fiscal frameworks, offering insights that can inform and enhance South Africa's own transport funding strategies.

Table 15-3: Comparative Snapshot of National Budgets

	Total Budget (USD billion)	Transport allocation (USD billion)	% of Budget allocated to Transport Spending
South Africa	141.89	3.62	2.6%
Germany	502.5	30.57	6.1%
Switzerland	92.73	11.774	12.7%
Sweden	126.76	7.71	6.1%
Nigeria	36.6	3.7	10%

South Africa's total national budget stands at USD 141.89 billion, with a transport allocation of USD 3.62 billion. This translates to approximately 2.55% of its total budget dedicated to transport a proportion that appears relatively low when compared to several developed countries and considering that developing countries should spend double the amount as developed countries. For example, Germany, with a much larger total budget of USD 502.5 billion, allocates USD 30.57 billion to transport (roughly 6.1% of its total budget), while Switzerland's transport allocation (USD 11.774 billion) represents approximately 12.7% of its total budget. Sweden, despite its moderate total budget of USD 126.76 billion, allocates USD 7.71 billion to transport about 6.1% of its total budget. Nigeria, despite having a modest overall budget compared to developed countries, allocates 10% of their budget to transport, indicating a higher relative commitment to infrastructure investment.

Relative to these countries, South Africa's allocation demonstrates relatively low percentage allocation to transport suggests an underfunding of transport infrastructure reflecting South Africa's broader fiscal constraints and the challenges of balancing transport investment with other pressing socio-economic priorities such as healthcare, education, and social services.

Moreover, while developed countries can leverage higher GDPs, more diversified tax bases, and well-established public-private partnerships to fund their transport sectors sustainably, South Africa often faces challenges in mobilising sufficient long-term financing and ensuring efficient budget execution.

Financing Options

The ITMP25 acknowledges that financing options could be:

- **Budget Allocation:** Utilise government funds, PES, and conditional grants.
- **Provincial Own Revenue:** Rely on tax revenues and fees, supplemented by municipal contributions.
- **User Pay Principle:** Fund services through user fees for rail and public transport.
- **Development Finance Institutions (DFIS):** Utilise loans from entities like DBSA, IDC, AfDB, and the World Bank for favourable terms on long-term projects.
- **Syndicated Loans:** Access large capital pools through multiple lenders for flexibility.
- **Project Finance:** Use Special Purpose Vehicles (SPVs) to fund revenue-generating projects with limited recourse financing.
- **Green Transport Fund:** Finance sustainable projects through public-private contributions and climate finance.
- **Green Climate Fund (GCF):** Access international funds for climate-resilient infrastructure.
- **Sustainability-Linked Loans & Green Bonds:** Raise significant capital for green infrastructure, focusing on sustainability and attracting green investors.
- **Bond Issuance:** Issue municipal, infrastructure, or medium-term notes (MTNs) for large projects, despite current market challenges.
- **Infrastructure Fund (IF):** Managed by ISA and DBSA, leveraging blended finance for projects aligned with the National Development Plan.
- **Provincial Transport Fund (PTF):** Proposed to pool resources from tolls, fees, and green bonds, governed for transparency and efficiency.
- **Corporate Social Responsibility (CSR) Investments:** Encourage private sector contributions to public projects.
- **Land Value Capture (LVC):** Fund infrastructure by capturing increased land values through levies and tax financing.
- **Crowdfunding:** Engage community support for specific projects.
- **Air Rights Sales & Naming Rights:** Generate revenue by selling development and naming rights.
- **Sponsorship & Development Exchanges:** Attract corporate sponsors and allow infrastructure development in exchange for land rights.
- **Carbon Credit Sales:** Fund emission-reducing projects by selling carbon credits.

16. The Seven Pillars of the Plan

The ITMP25 can be defined by the following seven (7) pillars, with funding a critical enabler for all pillars:

- **Sustainability**
  - Triple Access Planning Approach
  - Decarbonisation of Transport: EASI
  - Travel Demand Management Implementation
  - Universal Access Design Compliance
  - Non-Motorised Transport Prioritisation

- **Land Use Development and Integrated Planning**
  - Densification and Infill
  - TOD's promotion and 15 Minute Cities
  - Improvement of Bulk Engineering Services
  - Multisectoral Co-ordination and Planning

- **Digitally Enhanced Transport System**
  - MaaS Platform Development
  - Digitise Public Transport
  - Travel Information Development (incl. real-time)
  - Automatic Fare Collection (One Ticket)
  - Data Centric Decision Making

- **Strategic Public Transport**
  - Development of Provincial wide SPTN
  - Professionalisation of MBT industry
  - Passenger safety and security framework
  - Rebuild and Recovery of Commuter Rail
  - Rail as Backbone by 2050
  - Implementation of further extensions and phases of GRRIN

- **Mobility**
  - Protect Planned Transport Network and systemically implement
  - Maintain Infrastructure (including traffic signals and potholes)
  - Connectivity to Major Economic Zones and Airports
  - Facilitate mobility continuity across municipal and provincial boundaries

- **Freight Logistics**
  - Strengthening Intermodal Freight Hubs
  - Development of Freight by-pass routes and Stops
  - Promote Road to Rail for appropriate goods

- **Enablement and Effective Implementation**
  - GDRT to assign the responsibility of monitoring and implementation of the ITMP25 in the department
  - Adequate Resourcing and Institutional Support
  - Sound Governance
  - Inter Governmental relations Improvements
  - Capacity Building: Centre of Excellence
  - Establishment of a transport modelling centre

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