

GREATER LANSERIA MASTER PLAN

DRAFT



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Acronyms and Abbreviations

BNG	Breaking New Ground Policy
CBD	Central Business District
CoJ	City of Johannesburg
CoT	City of Tshwane
DBSA	Development Bank of Southern Africa
DPLG	Department of Provincial and Local Government
GPEMP	Gauteng Provincial Environmental Management Framework
GCR	Gauteng City Region
GEGDS	Gauteng Employment Growth Development Strategy
GLMP	Greater Lanseria Master Plan
GP	Gauteng Province
GSDF	Gauteng Spatial Development Framework
GSRN	Gauteng Strategic Road Network
LSDF	Local-based Spatial Development Frameworks
LIA	Lanseria International Airport
LRSDP	Lanseria Regional Spatial Development Policy, 2017
LG	Local government
NSDF	National Spatial Development Framework
ORTIA	OR Tambo International Airport
PHSHDAs	Priority Human Settlements and Housing Development Areas
PWV	Pretoria Witwatersrand and Vereeniging urban region
RISFSA	Road Infrastructure Strategic Framework for South Africa
RSDF	Region-based Spatial Development Framework
SDF	Spatial Development Framework
SPLUMA	Spatial Planning and Land Use Management Act
SLOAP	Space Left Over After Planning
TRAM	Transformation, Re-industrialisation and Modernisation
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USAZ	Urban Structure Assignment Zone
WRC	Water Resource Centre
WWTW	Waste Water Treatment Works

SECTION 1 | INTRODUCTION

1.1 Overview

1.1.1 Preparation of a Master Plan for the Greater Lanseria Growth Node

The creation of a new 'Smart City' within the Greater Lanseria Growth Node emanates from a joint initiative of the Presidency, the Office of the Gauteng Premier, the City of Tshwane, the City of Johannesburg and Mogale City. The DBSA and the adjacent North West Province municipality of Madibeng are also represented. The State President introduced the initiative in his State of the Nation address in February this year (2020) and the Office of the Premier has led extensive studies and engagements in putting the planning of the smart city in place. The Lanseria Regional Spatial Development Policy (LRSDP) of 2017 is a founding reference for this planning.

It is anticipated that the Master Plan will be in place by the end of 2020 and this document, the draft master plan now presented is the fourth deliverable in the planning process, which has taken into comments from the comprehensive stakeholder engagement process held in October. A further round of stakeholder engagement will then lead to a finalised Greater Lanseria Master Plan (GLMP) in the early part of December 2020.

The underpinnings of the GLMP is the existing Lanseria Regional Spatial Development Policy (LRSDP) (2017), which is intended to guide local planning with the emphasis on the cross-border context of development linkages.

1.1.2 The making of the Lanseria Smart City

The brief for the preparation of the Greater Lanseria Master Plan is extremely explicit in its vision that this is to be **a truly post-apartheid city based on best practice in terms of urban sustainability and the principles underpinning the 'Smart City'**: it is to be a publicly-led planning initiative that welcomes and enables the involvement of a broad range of stakeholders, including local communities, community interest groups, NGOs, the business community and developers. It is to be inclusive of the broadly defined South African socio-economic spectrum and must stimulate a vibrant, mixed urban economy.

All this is encapsulated in the acronym TRAM – Transformation, Re-industrialisation and Modernisation.

The Master Plan is also to guide the way towards innovative ways of approaching economic drivers for the area, social and cultural amenity, support and urban infrastructure. In so doing, it is imperative that the initiative

is led by creating urban prospect not only for future residents and users of this city but also, in the short term, to integrate the many marginalised low-income communities that already occur within or on the fringes of this growth zone.

As a pioneering development initiative, it is the intention that this planning approach and its results should be replicable and point the way for similar initiatives country-wide.

A 'smart city' is not merely a digitally and ICT-advanced conceptualisation of a modern city: there are several dimensions on which it is based and principles that underpin it as a truly sustainable approach to city building, not least being the need for social, economic and cultural inclusivity. A city deeply divided along economic, ethnic, cultural and exclusionary lines cannot be sustainable and there are key elements to an appropriate planning and delivery approach that guide the planning approach as set out in this master planning exercise.

1.1.3 The compact, complex city

A fundamental of sustainability is that people should have, as far as possible, little need to commute and any commuting should, by default, be by non-motorised means (walking or cycling) or, where necessary, by public transport. In planning terms, this means the new city needs to be 'walkable' and its horizontal extents for any activity zone within it, be this for purposes of getting to work, shopping, schools, etc., should be governed by the 5 minute/400m and 10 minute/800m walking isochrones. Effectively, the lateral extent of an activity zone within this new city should be roughly 1600m, meaning a 10 minute walk in any direction from its epicentre.

This implies too that not only should an activity zone be **compact in its spatial extent**, it must also be **complex in its mix of urban uses**: rather than spatially separated land use zoning (where, for example, residential areas are simplistically separated from other areas of a city), people live, work, pray and play within a mixed-use activity zone where employment, residence, commercial opportunity and access to shopping, services and amenities are all found in close proximity. Where certain opportunities are not available within one activity zone, it should be possible to use safe, reliable and affordable public transport to access such opportunity further afield.

In addition, this complexity extends to not only the 'horizontal integration' of land uses (i.e. one use next to another) but also, and ideally, 'vertical integration' as well (one use on top of another, as typically occurs with retail at ground level, a number of office levels above this and residential apartments, penthouses and hotels above these in turn).

1.1.4 Urban intensification as a basis for sustainability

Apart from the walkability of the city model of compact complexity, and the reduced need for commuting (and, hence, reduced reliance on public and, more importantly, private mobility in the form of cars), **living at higher residential densities within patterns of more intense urbanity** make it possible to achieve far higher levels of efficiency in terms of infrastructural services and public transport systems. It also increases the evenness and efficacy with which social services and amenities are provided.

1.1.5 Urban complexity for dealing with complex socio-economic integration

The sustainable city model relies heavily on the complex, organic organization of city life to deal with urban integration. In an urban structure of complex compactness, it is less possible (or indeed necessary) to define 'difference' or 'otherness' and the city's patterns of social organization become less spatially distinct or overt: in many respects, **the city looks to its own naturally-occurring systems of embracing diversity** rather than relying on planning having to misdirect itself with the 'social engineering' of spatial separation and division.

1.1.6 Residential integration within a complex urban profile

Housing policies targeting the delivery of lower-income housing as an integral part of urban development, rather than as a distinctly separate activity delivered in the absence of urban prospect (i.e. the possibilities of being able to access urban opportunities and advancement of skill levels through proximity) both enhance the delivery process, make infrastructural, transport and social servicing more cost-effective and reduce the social stigma and stratification of such housing. It also allows for far more open-ended opportunities for the private and non-governmental sectors to participate in these markets as a less differentiated aspect of the housing market as a whole.

It becomes possible, for example, even within areas of fairly affluent levels of housing development, to introduce 'inclusionary' housing (a certain percent, nominally 15 or 20%, of all units to be earmarked for subsidised occupants). Similarly, amongst a wider area of apartment buildings, whether vertically integrated or not, it is possible to place social housing apartment complexes without these being moved to the periphery of the urban system. Public housing apartment blocks, too, can be implemented in these de-massified ways so that the competition for housing space closer to areas of prime location is factored into the planning process at a policy level.

The design of apartment blocks is, in policy and design guideline terms, also moved from the 'conspicuous consumption' approach that makes the

extent and type of each apartment obvious. Rather than an 'egg-crate' approach that singles out each unit, more complex design codes seek to accentuate the 'address' of the complex as a whole and make it less clear who exactly owns, or has right of tenure, to which particular unit.

In effect, in urban complexity, it becomes easier to **de-stigmatize socio-economic profile in housing delivery** and spawn a culture of inclusion as opposed to exclusivity.

1.1.7 The public environment as the armature of public life and inclusion

City building has tended become an exclusive domain for private developers who 'ring fence' off areas, whether literally or symbolically, to create enclaves of exclusivity within which semi-private environments are owned, delivered and managed on the basis of excluding 'LSMs who don't fit the desired profile'. Planning has, to a large extent, abrogated its leadership role that sees the definition of a well-designed, well-managed, secure public environment as an essential aspect of how a greater, inclusionary commonwealth of the city is engendered.

It is also necessary to understand the public environment not merely as streets, urban spaces and parks: this 'capital web' (Crane, 1966) of the city extends to all the 'key installations' (public buildings, schools, universities, hospitals, fire stations, places of worship, etc.) and the 'strategic connections' between them. It is to this 'capital web' which developers and the market as a whole respond in what Crane refers to as the 'city of a thousand designers'.

The design of the inclusionary city starts with the importance of the public environment and the manner in which a 'responsive architecture' both defines and assists with the natural surveillance and safety of that environment: the tenets of 'safe city design' apply and a people-first, rather than a car-first mentality leads the design process. Only 17% of South Africans own cars and the design approach needs to redress the imbalance between space, resource and exclusivity that attends the focus on private-mobility planning. Highly permeable, safe and convenient pedestrian and cycle systems need to be augmented with a comprehensive, integrated street system defined less by class of traffic function and more by networked connectivity that is future-proofed as urban mobility rapidly reinvents itself.

1.1.8 Environmental planning as a basis for the healthy city

Far too often, open space planning is driven more by the 'SLOAP' principle (Space Left over after Planning) than by the definition, as a fundamental underlay to the entire urban system, of an ecologically sound network of biodiversity, habitat and connectivity. This is a system that drives the layout

and shaping of our cities and looks to maximize the social value of the public environment.

As a system of reserved, positive space around which the city will evolve and grow, it is also a meaningful way of reserving land that, over time, will be required for public amenities as demand grows.

On this basis, **open space is a fundamental of urban structuring**: it is a crucial element in how it is designed, the many purposes it must serve and, very importantly, the maintenance and management required on an ongoing basis.

1.1.9 Holistic thinking and moving beyond business as usual

An important aspect of the city economy is its infrastructural investment, not simply in how it is funded and delivered but also the inclusion of myriad up-stream and down-stream aspects of its economic chain. Much of the contemporary thinking regarding urban sustainability recognises this as well as the more obvious aspects of energy-efficiency and the striving for carbon-neutral systems.

It has become increasingly clear that the silo approach to infrastructural planning, delivery and maintenance of service and movement infrastructure that has characterised engineering over the years prevents us from making important shifts in approach. Many systems are now outmoded and in fact at odds with sustainability and yet, without thinking about these and related aspects collectively, or holistically, we fail to make critical connections in paradigms that take us beyond the present limitations of our thinking. **The Lanseria Smart City presents us with an extraordinary opportunity to think through in this holistic way and open up avenues of profound opportunity into a sustainable future.** One must clearly avoid the errors of moving too far ahead along untested lines but there is more than enough in place that requires us to at least achieve a move to 'best practice' rather than persisting with the flawed thinking embedded in 'business as usual'. **Done carefully, it should indeed be possible to keep future thinking open-ended enough as we move to 'leading edge' approaches that embrace very exciting, rapidly-evolving innovation.**

1.1.10 The inclusionary economy as a spatial layout principle

It is not enough to simply rely on well-intentioned policy statements and 'some ill-defined principles of economic osmosis' to achieve meaningful overlap and participation in the complex profile of South African urban economies: these economies have very important spatial implications. It is therefore necessary, at all levels of the spatial planning and urban design of the new city, to **look for economically generative 'latch-on' nesting opportunities and a space-economy in the urban fabric that engenders this.**

As with the holistic thinking noted above, it is necessary to see the design of the public environment as one of the most important generators and platforms for spawning economic cross-over. Inevitably, this again means embracing complexity and inclusion rather than simplistic models of separation and 'specialisation' as has been the case, for example, for so many years, the regional shopping centre. Experience now shows how well-designed shopping centres, suitably 'cracked-open' can become very powerful and rapid-result catalysts of more complex economic patterns; left as introverted 'islands of privilege' they spawn very little latch-on over many decades. How the energies of one investment into the urban system are harnessed through careful urban design to spawn other opportunities is a vital aspect of the layout and enablement of activity zones, be this at the city-scale of, for example, a new fresh produce market, an airport or a freight and logistics hub, or the more localised scale of an open air market and transit centre allied to a vibrant retail centre.

1.1.11 Agriculture as an integral part of the urban economy

The Greater Lanseria Region is not necessarily well-endowed with rich soils and agricultural potential yet it has several characteristics that make higher-intensity agriculture and aquaculture important. This in turn relates to the value of agri-processing in a strategic city-region hub embedded in the fringe of the Gauteng City Region as one of Africa's great Mega Cities'.

Strategic linkages in this regard, and connections into North West Province place responsibility on this project to **actively engender agriculture as an integral part of a new city economy** and ensure that this is a new, well-directed sector that integrates a broad socio-economic spectrum. This means ensuring, too, that education, training and support are embedded in the spatial framework for this essentially urban enterprise.

1.1.12 Incrementalism as a responsible approach to urban development

Much of the 'front-end loading' from a cost point of view in a new city development lies in the provision of bulk services and early reticulation of services to various parts of the nascent city. Historically, and again in a context of less holism as a paradigm, projections of an "ultimate future" have tended to lead this process: this 'ultimate' is then pared back into a phased approach to this pre-determined future.

City growth through history shows that **incrementalism** is in fact the more appropriate way to think of city development and, used thoughtfully, is a more valid way of thinking about future development. In effect, one plans rather for thresholds and manages the risk around these thresholds, knowing that one has various options in dealing with these. This is considered to be a more appropriate approach to the Smart City not only in managing front-

end costings (and not necessarily making long-term investments at present-day values to cover future demand) but also in dealing with fast-moving innovations on an open-ended basis.

Particular mention also needs to be made regarding the provision of social infrastructure: just as city-building initiatives need to be led by economic drivers that provide urban prospect for existing marginalised communities and future city inhabitants, it is essential that communities have early access to social enablement, notably in the health and education sectors. It is not enough to simply make provision for a requisite number of sites in this regard (and often simply creating vast amounts of socially-fallow land in the process): one has to embed a delivery process of certain key installations that have to lead prior to housing programmes that deliver significant new populations into an area. Whilst incremental delivery of service delivery must be paced according to residential demand (i.e. not only must there be a site available as well as a school building, for example, there also have to be desks, chairs, books and, most importantly, teaching staff in place), it is essential that early-warning systems be put in place to ensure timely 'just-in-time' delivery of comprehensively built, stocked, staffed and managed facilities.

1.1.13 The 'Smart City' as an enabler of managing new thought paradigms

In many respects ***the 'smart city' is thus a product of thinking across many dimensions of city-building holistically***: it is not simply a city operating off a comprehensively-enabled ICT platform, as important as this indeed is. Much of what is being spoken of here, in taking us to new paradigms and approaches to city building, are able now to be undertaken with confidence precisely because of ICT enablement. The levels of modelling, demand assessment and management to support the just-in-time delivery modalities noted here are possible because of this burgeoning capacity.

Starting with modelling and planning, now possible through ICT advances which assist in breaking the mould of the outmoded predictive, largely 'social-engineering-based' approaches: it is then possible, with modern planning paradigms, to extend this ICT competence across the entire new city in both spatial and physical terms to provide the cyber underpinnings of this future city.

1.1.14 Getting to a post-apartheid city

In effect, what has been set out above fundamentally defines what is meant by 'post-apartheid' planning: it is not simply some platitude or 'deemed ideal'; it is the preparedness to boldly confront the issues that have become embedded in planning thought and that hold us back from real transformation. By being particularly mindful of and guided by, and being

true to, the principles above, we in effect eradicate apartheid planning thought from our approaches to making life-enhancing environments for all the city region's citizenry.

1.2 Study area

The study area is based on the LRSDP study area as this assists this plan to be built on the existing policy prepared to date, which is based on a 25-minute drive time from the Lanseria International Airport (LIA).

The total GLMP study area is 53,311 ha (City of Johannesburg 42%, Mogale City 38% and City of Tshwane 20%). An **Inner Focus Zone** (28,663 ha in extent) has been identified, which is predominantly undeveloped. This is where the proposed urban structure and development framework concept is focussed. A primary focus zone has been identified, near the N14 Malibongwe interchange, driven around the LIA as a catalyst

The study area is vast in extent. Figure 2: The study area in comparison to Johannesburg CBD, Manhattan, London and Paris, where the area between LIA and the N14 can accommodate London, Manhattan, Paris, and Johannesburg CBD.

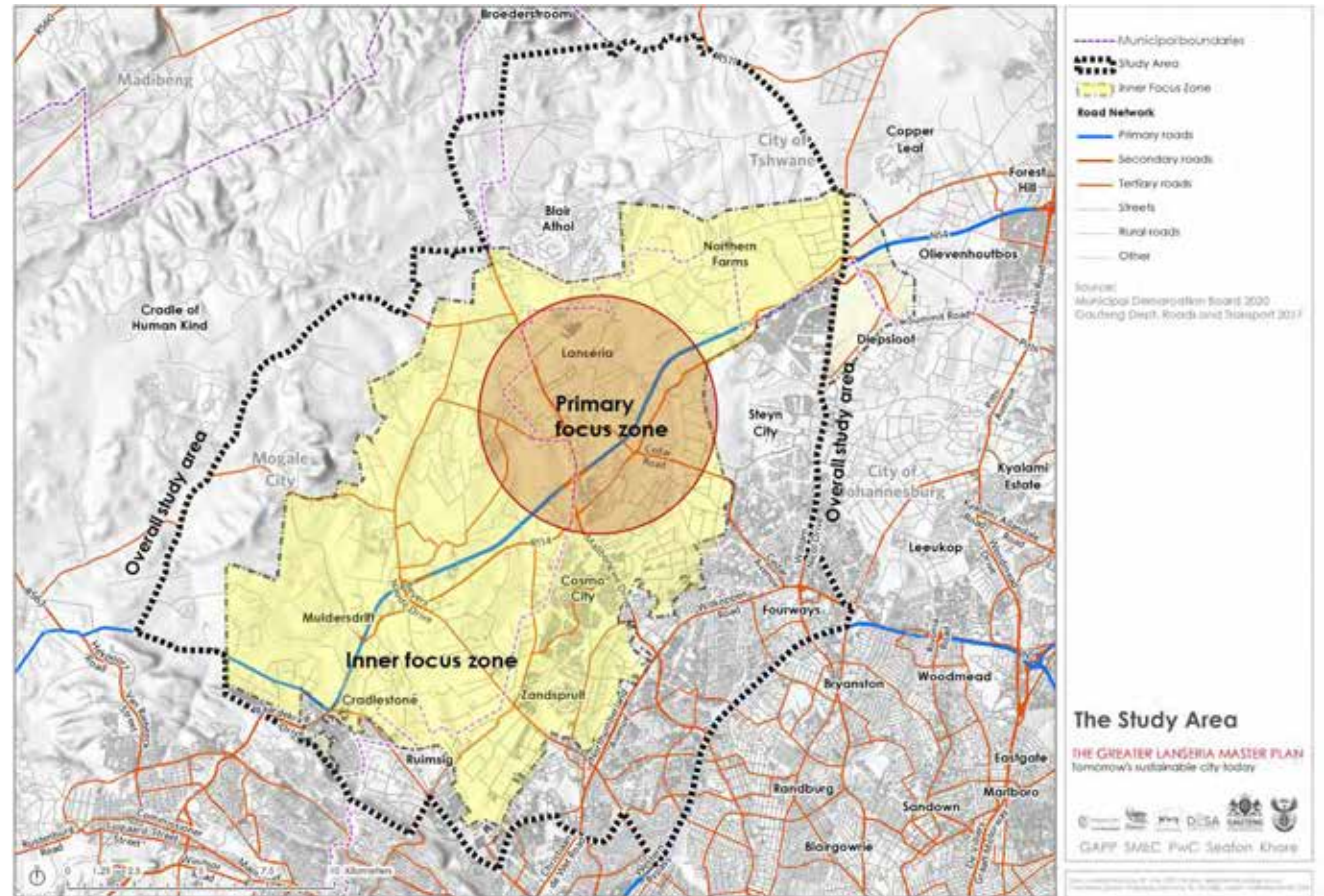


Figure 1: The GLMP Study Area, including the primary and inner focus zones



Figure 2: The study area in comparison to Johannesburg CBD, Manhattan, London and Paris

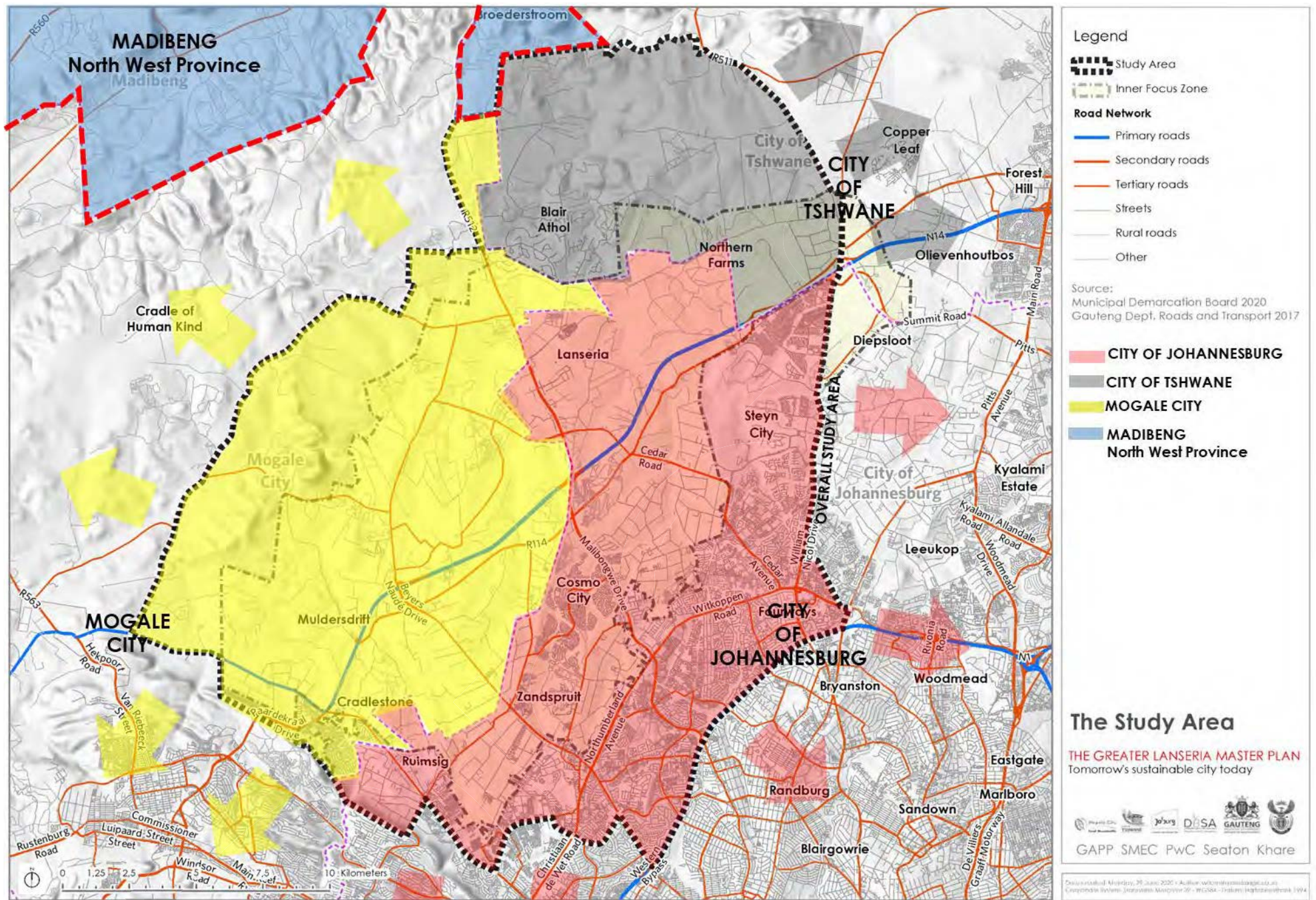


Figure 3: The study area located in split municipal jurisdictional boundaries

1.3 The composition of the report

The report is set out as follows:

Section 1 | Background and overview gives an overview of the GLMP and the structure of the report.

Section 2 | The status quo and contextual overview identifies the fundamental issues the Greater Lanseria study area faces. This includes additional input that has occurred since the LRSDP (2017) was prepared, and further detailed input where required to guide the GLMP. This section reviews the LRSDP and looks at the regional context and the local context including: movement and circulation, open space and natural environment, the Cradle of Humankind World Heritage Site, agricultural potential, land use and activity patterns, socioeconomic profile, development constraints and additional policies since the LRSDP was prepared. A thorough contextual understanding is supported with the following section on the position papers, in preparation of the conceptual development framework.

Section 3 | Greater Lanseria as a concept reviews fundamental urban sustainability development principles for the region. A regional development concept is proposed with consideration for the status quo, position papers and the foundational work of the Gauteng Spatial Development Framework in 2010. The approach is explained further through diagrams with the fundamental motive of stitching gated and marginalised communities into the urban system, as well as the establishment the new Lanseria Urban Growth Node that is driven by current market demand initiatives.

Section 4 | Position papers underpinning the GLMP includes the broad range of sector inputs. The position papers take on the many key dimensions of what underpins the GLMP, and are themselves included as the basis for discussion, refinement, and adaptation. This section of the report gives an overview of the position papers that are included as an annexure to this document.

Section 5 | Modelling elements of the GLMP whereby the intention is for the GLMP to be a GIS-based planning tool / model that is accessible on the internet. This tool will inform and guide development.

The GIS-based planning tool/model is comprised of five models: **Model 1: The urban profile model** is the status quo of the GLMP. This includes a range of information, for example, natural resources, existing infrastructure, geotechnical issues, planning and cadastral information, and policies. **Model 2: The morphological model** presents the current and possible future structuring elements. **Model 3: The Connectivity Model** evaluates how well networked land is by both rail and road, it also assesses the impact of possible new linkages. **Model 4: the Bid-Rent Model** gives the measure of the land's potential, taking into consideration the visibility, access to infrastructure, natural constraints, policy directives, and so on. **Model 5: The**

Virtual Room model is a 3-dimensional view, a visual aid to understand a possible future for a specific area within the GLMP.

Section 6 | Outcomes of application: from concept to composite includes a detailed exploration into the thinking for holistic utilities as a driver to the economic base of the Lanseria region, as well as the economic capital web, movement and circulation, open space and potential activities, that is intended to guide the infrastructure framework.

Section 7 | A framework for the implementation

Section 8 | Institutional Arrangements

Section 9 | Key Planning Issues and Associated Recommendations

Section 10 | Concluding Remarks

Section 11 | References

Annexures includes the **comprehensive status quo report**, completed **position papers** discussed in Section 3, **specialist study reports** on status quo issues and the integrated approach to the masterplan and **stakeholder engagement** reports. These include input on the following:

- Public engagement
- Water;
- Sanitation;
- Electricity;
- Solid waste;
- Transport;
- Information and Communication Technology (ICT);
- Economic infrastructure;
- Health;
- Education;
- Other social infrastructure;
- Agriculture;
- Environment and heritage;
- Institution arrangements.

SECTION 2 | CONTEXTUAL OVERVIEW AND STATUS QUO

This section gives an overview of the contextual overview and status quo, which builds on the Lanseria Regional Spatial Development Policy (LRSDP, 2017) findings. It has also been informed by a number of stakeholders, with continual confirmation from our interdisciplinary team. The findings from this section have guided the approach to the GLMP. This section is near the end of the main report, as it was the view that the GLMP should be easy to read and the plans and strategies remain upfront, should one want a better understanding at the existing issues, one can review this section for further guidance.

2.1 The Lanseria Regional Spatial Development Policy

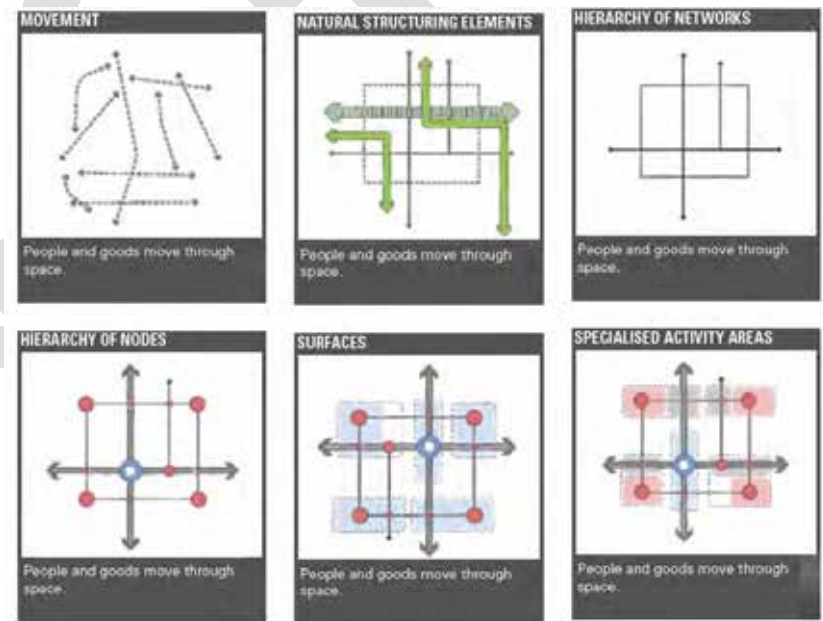
2.1.1 Principles and goals relating to the Lanseria region

The aim of the LRSDP is to establish a shared vision in order to facilitate a direction for future development. Four overarching principles, along with eight associated goals are proposed in the LRSDP. These principles form the criteria for the success of this initiative, as demonstrated in the following table:

Principles	Goals	Description
1 Community: create strong cohesive communities for residents of the area to reach their full potential.	<ul style="list-style-type: none"> Strong cohesive communities 	Current housing patterns are fragmented and isolated from employment opportunities. Housing should be provided on land that is close to major centres with a focus on strong linkages to employment areas.
2 Concentration: Create a well-defined spatial structure that connects people and places and strengthens the region in order to facilitate economic growth and opportunities.	<ul style="list-style-type: none"> Polycentric region linked to economic centres 	Planning efforts that concentrate development and create a clear hierarchy will maximise planning efficiency, reduce sprawl and increase open space reserves.
	<ul style="list-style-type: none"> Facilitate strategic economic development 	Locations should be area specific and range from large scale developments to small rural service centres.
	<ul style="list-style-type: none"> Sustainable rural development 	Rural development and resource based industries should be encouraged.
3 Connection: strengthen connections to ensure integration into the larger Gauteng City Region and to ensure sustainable investment.	<ul style="list-style-type: none"> Strengthen connections to larger GCR 	Networks should support spatial development focus areas and encourage land use and transportation integration.
	<ul style="list-style-type: none"> Investment that supports city growth 	Strategic areas should be identified for development, using a phased approach, in order to focus capital investment in engineering services infrastructure.
4 Conservation: leverage the unique environmental and tourism assets of the region	<ul style="list-style-type: none"> Preserve important natural assets 	Allow for a continuous ecological and open space system.
	<ul style="list-style-type: none"> Celebrate the region's uniqueness 	Agricultural and tourism activities should be supported and enhanced with strong linkages to these areas.

2.1.2 The development concept approach

The spatial development concept is based on a system of interrelated spatial elements which together make up the desired spatial development form for the municipal area. These spatial elements are made up of nodes, networks, and surfaces. The spatial development concept follows a focused and strategic approach in identifying development opportunities.



Development Concept - LRSDP, 2017

A principles-driven and precedent-based spatial model for the positioning of the Lanseria region in the larger Gauteng City Region is the main aim of the concept. By having this model, planners and developers can adapt its embodied precepts to varied conditions around the region.



Development Concept - LRSDP, 2017, Fig 73

2.1.3 Implementation context

The implementation section is an overview of the spatial and structural implications of expected future growth, whereby the following is discussed: growth dimensions, the capital investment and operating impact of the policy framework, the need for public and private sector investment, institutional considerations and service delivery options looking at cooperative governance and cross border integration, vehicles for service delivery, and arrangements and options for municipal service partnerships.

2.1.4 The capital investment and operating impact of the policy framework

This section of the LRSDP report discusses the need for capital investment as a function of expected growth in the planning area. Projecting growth with any confidence in a fluid and dynamic environment is very difficult. Unpredictable interventions and economic growth cycles further complicate this. The focus in long-term planning is often on capital investment requirements, although operating and maintenance costs accumulate as capital investments are made. The first table alongside shows the incremental capital investment costs, for both the public and private sector. It is important to note that the infrastructure costs, where the focus normally is, is only a small percentage of the total development. The second table shows the expected or required investment between the public and private sectors.

2.1.5 Institutional considerations and service delivery options

Private sector investment is important, however, the public sector must be able to play a role in driving the development vision. Giving effect to the cross-border integration will need full cooperation between municipalities and eventually provincial governments. It might also imply compromises in local development aims and shifts in priorities where and when needed.

Population increment	Buildings	Infrastructure					Total	Program total
		Water	Sanitation	Electricity	Roads & stormwater	Refuse		
Total (R'000)	2 775 936 169	2 321 293	1 624 660	5 943 231	3 019 299	248 401	13 156 884	2 789 093 052
Residential Types	2 754 879 602	2 269 709	1 600 982	5 766 142	2 944 401	14 642	12 595 875	2 767 475 477
Single residential (low income)	2 198 273	319 261	287 097	1 033 808	512 380	2 625	2 155 170	4 353 443
Single residential (medium income)	11 699 640	212 397	190 999	687 769	340 875	1 746	1 433 786	13 133 426
Single residential (high income)	33 327 113	185 371	166 597	600 256	384 066	1 524	1 337 813	34 664 926
Medium density (low income)	148 590 000	218 594	196 572	707 836	350 821	1 797	1 475 620	150 065 620
Medium density (medium income)	313 149 375	255 222	145 383	523 509	259 464	1 329	1 184 907	314 334 282
Medium density (high income)	900 956 160	531 919	302 818	1 091 069	540 760	2 771	2 469 337	903 425 497
High density (low income)	315 491 667	163 974	93 405	336 344	166 700	854	761 277	316 252 944
High density (medium income)	604 209 375	255 183	145 361	523 430	258 424	1 329	1 184 727	605 394 102
High density (high income)	425 258 000	127 789	72 750	262 120	129 913	666	593 238	425 851 238
Business	906 000	4 238	1 835	7 727	2 590	24 533	40 921	946 921
Industrial & commercial	4 033 721	12 720	3 306	41 483	28 597	117 804	203 909	4 237 630
Public spaces: recreation	623 990	5 478	3 119	19 011	9 269	49 002	85 879	709 870
Community facilities: municipal	6 359 576	7 795	2 868	14 013	10 010	16 683	51 368	6 410 944
Community facilities: other	9 133 280	21 354	12 551	94 856	24 432	25 738	178 930	9 312 210

Capital Expenditure over the programme period (R'000) - LRSDP, 2017, Table 34

Land uses	Buildings (R'000)			Total Infrastructure cost (R'000)		
	Private sector	Public sector	Total capital cost	Private sector	Public sector	Total capital cost
Totals	2 296 301 947	479 634 222	2 775 936 169	8 535 021	4 615 971	13 150 991
Residential Types	2 288 599 663	466 279 939	2 754 879 602	8 203 807	4 392 068	12 595 875
Single residential (low income)		2 198 273	2 198 273		2 155 170	2 155 170
Single residential (medium income)	11 699 640		11 699 640	1 433 786		1 433 786
Single residential (high income)	33 327 113		33 327 113	1 337 813		1 337 813
Medium density (low income)		148 590 000	148 590 000		1 475 620	1 475 620
Medium density (medium income)	313 149 375		313 149 375	1 184 907		1 184 907
Medium density (high income)	900 956 160		900 956 160	2 469 337		2 469 337
High density (low income)		315 491 667	315 491 667		761 277	761 277
High density (medium income)	604 209 375		604 209 375	1 184 727		1 184 727
High density (high income)	425 258 000		425 258 000	593 238		593 238
Industrial & commercial	4 033 721		4 033 721	203 909		203 909
Public spaces: recreation	1 508	622 482	623 990	223	85 657	85 879
Community facilities: municipal		6 359 576	6 359 576		51 368	51 368
Community facilities: other	2 761 055	6 372 225	9 133 280	86 160	86 878	173 038

Total operating expenditure at the end of the programme period (R'000/month) - LRSDP, 2017, Table 3

2.2 Greater Lanseria Master Plan Status Quo

2.2.1 Regional context

Gauteng as a province in terms of population profile and economic dominance, is an urban region, strongly patterned about the regional development corridors that pass through it. Far from being simply an origin/destination point, as an activity system Gauteng is better thought of as a hub with spokes (or development axes) that radiate to distant regional, national and continental places of economic importance. For example, the north-south intra-continental axis from Zimbabwe, through Polokwane and Gauteng to Cape Town via Bloemfontein (the N1 Corridor) fundamentally influences the economic vigour of the urban activity corridor that has, and continues to consolidate along the axis through Pretoria, Midrand, Johannesburg and Vanderbijlpark.

The Greater Lanseria emerging node is located on the N14 Highway, linking to Krugersdorp and Ventersdop, through to Tshwane. This corridor is seen as a far less mature route than other corridors within the region. With additional investment into the Greater Lanseria Growth node will further enhance this corridor.

It is important to note that the most powerful/economically robust development axes that define much of the Gauteng city-region's morphology are those making the most direct linkage to centres of particular importance. Economic stimulus in certain parts of adjacent provinces may not only be good for those provinces but for Gauteng as well. Equally, it is a tangible way in which Gauteng can extend its relative wealth and economic influence into adjacent declining regions.

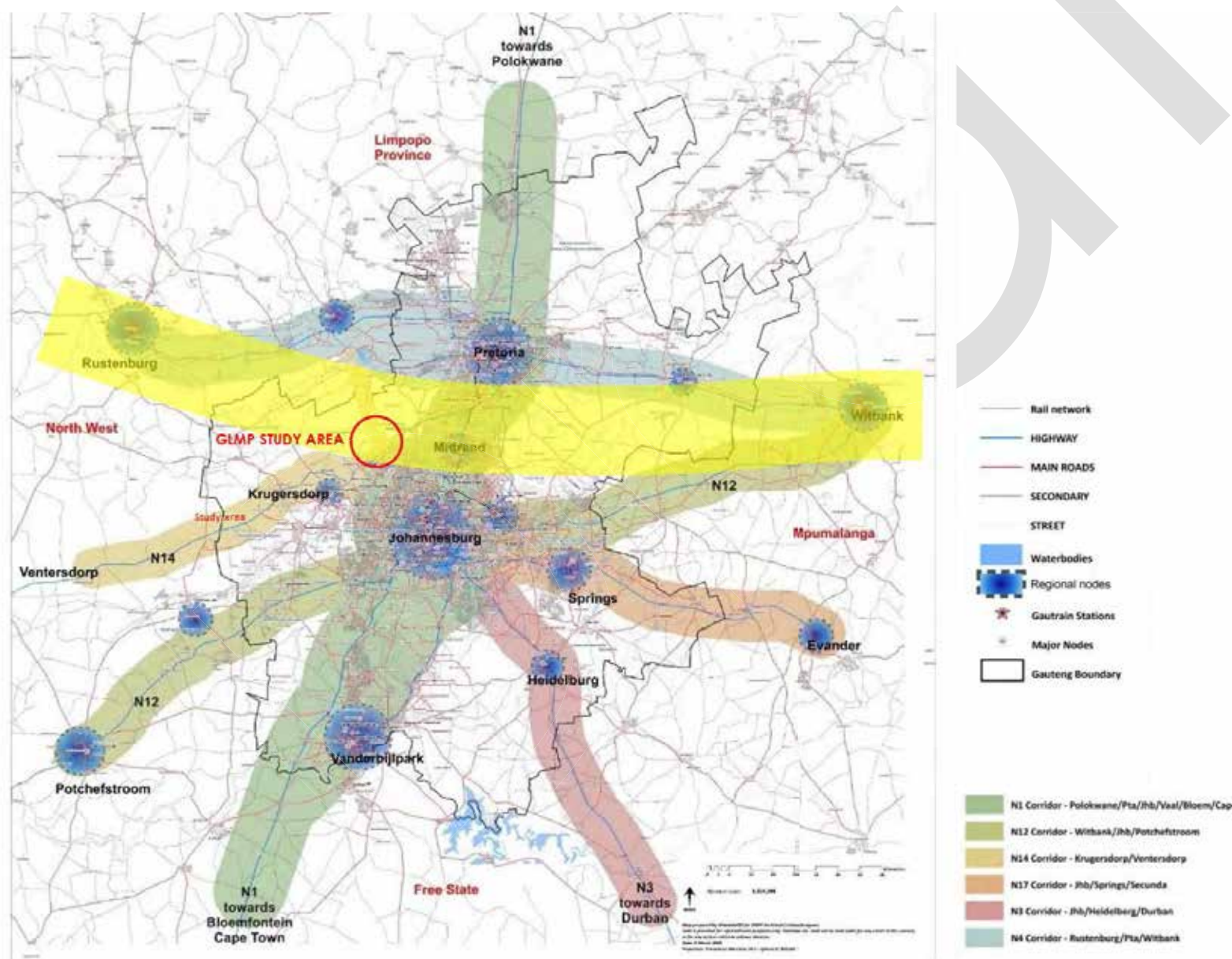


Figure 4: Greater Lanseria Growth Node in context of regional nodes and corridors

2.2.2 Movement and circulation

Movement and circulation on regional level.

A strategic transport network with the introduction of an outer radial movement network of road, passenger and freight rail in order to consolidate development in the GCR into a compact complex urban pattern was identified as part of the GSDF 2011, with input from Transnet, Prasa and the roads agencies at the time (Figure 6: Infrastructure investment promoting a compact, complex urban structure). This radial network of transport was based on international best practice of urban patterning.

A very extensive rail network (freight and passenger) already exists within the GCR. However, there is a lack of rail serving the western parts of the GCR. The opportunity of extending a mass transit network to Lanseria and a completed rail loop, where a large section of this is now located in the GLMP. This link to Lanseria is now being planned through the Gautrain Rapid Rail network (Figure 5).

The GLMP, creates the opportunity to enhance the regional movement network for the GCR.

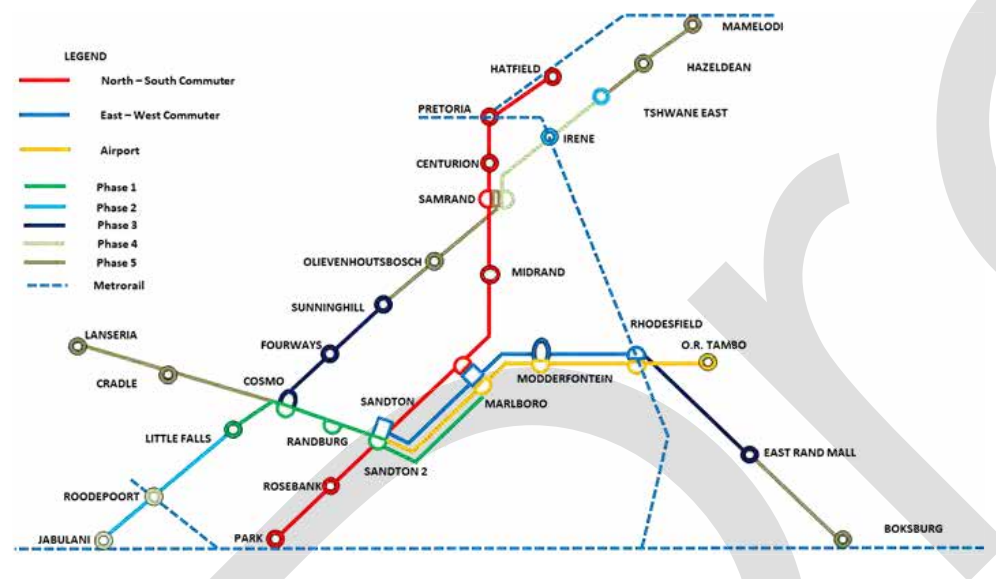


Figure 5: Schematic of Gautrain Feasibility Extensions (GMA, 2020)

Movement and circulation within the GLMP

The existing transport system in the Greater Lanseria Area comprises the following modes:

- Air Travel;
- Road Based Travel:
 - Private Vehicles;
 - Buses;
 - Minibus Taxis;

- Road Based Freight;

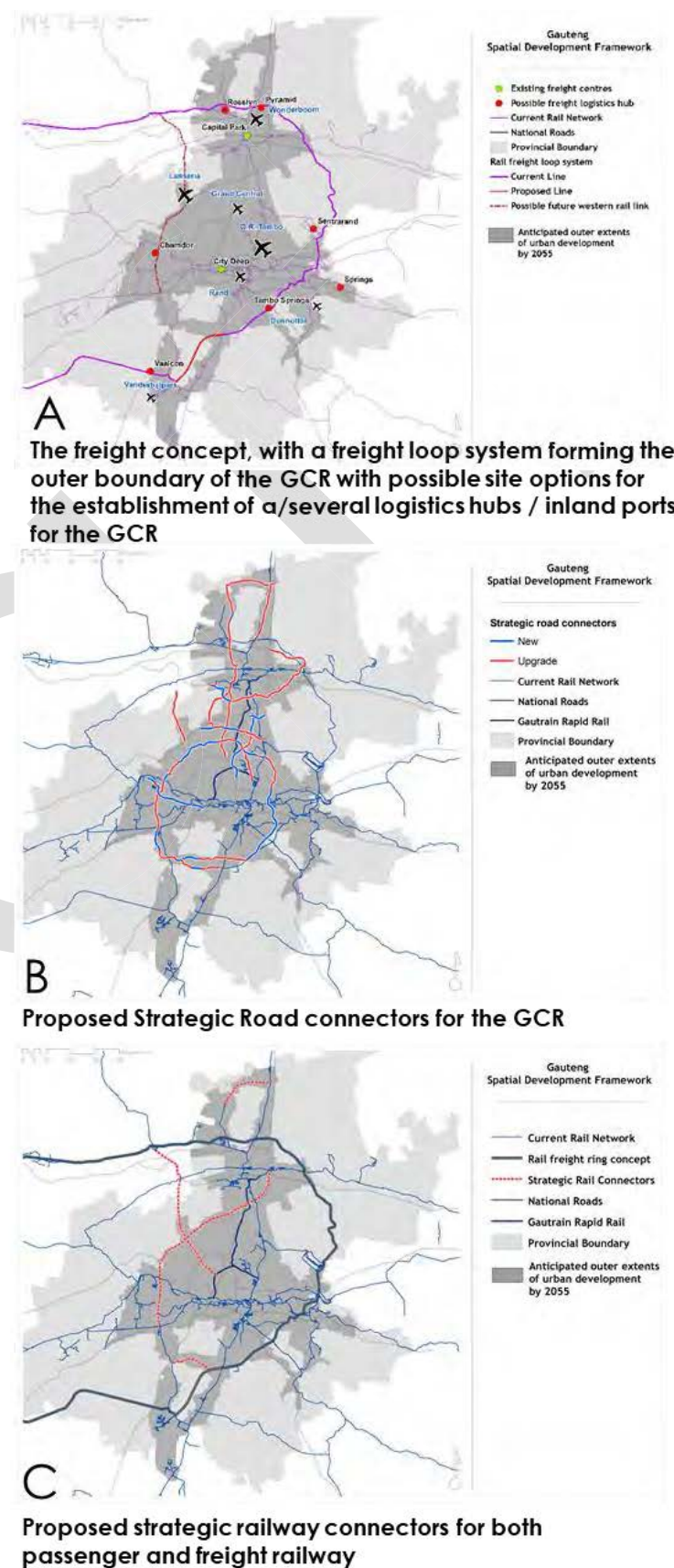


Figure 6: Infrastructure investment promoting a compact, complex urban structure

LIA

The Lanseria International Airport (LIA) is the second busiest airport in Gauteng. The existing capacity of LIA is 2.4-2.5 million passengers per annum and has reached full capacity. It mainly services flights to and from Joburg – Durban – Cape Town. At the moment the demand for travel to George is low. Service providers include SAFAIR, Kulula and Mango.

A masterplan for the LIA is currently underway to expand increased demand for capacity to accommodate an additional 1.5million passengers per annum. The LIA Master Plan includes the consideration of:

- Expanding the length of the runway to potentially 4.5km (south west) or potentially introducing a new runway for expansion of servicing regional routes;
- Introducing a dedicated freight facility;
- Expansion of the fuel depot;
- Hotel potential

Freight

Air freight and road freight currently support the Greater Lanseria Area. Air freight is limited with potential to expand this opportunity with the introduction of up and downstream synergies.

Road Based Public Transport Network

The Public Transport System in Lanseria consists of the following road passenger modes:

- Bus;
- Minibus Taxi.

Minibus taxis and buses support transport in the developed residential areas (Diepsloot, Honeydew, Zandspruit) by providing links to economic opportunities in Johannesburg - however, as additional developments are established, local transport facilities and systems will be required to connect new local developments.

The Johannesburg integrated bus and rapid transit plans for Gauteng extend to Diepsloot but not the further outlying Lanseria Area. The Lanseria area is currently proposed to be supported by rapid rail. These roads based public transport network plans will need to be reconsidered for further expansion and development in the study area.

Non-Motorised Transport Network

The study area has not been extensively developed, as a result a pedestrian network is very limited at present. Pedestrian sidewalks are not typically

provided along higher order roads (as shown in Figure 8) to discourage people from walking along high-speed vehicular routes for safety reasons - however, many residents in this area particularly from the existing developments of Zandspruit, Cosmo City and Diepsloot are not able to afford alternative means of transport and walk alongside these roadways. Pedestrian walkways along some major links has been established, such as between Zandspruit and Honeydew along the R512 (Figure 8). These often captive, non-motorised transport users, need to be accommodated in the short term by providing necessary infrastructure to improve safety and accessibility. In the long term, spatial planning reform has the potential to provide economic opportunity near places of work and thereby reduce long distance pedestrian travel.



Figure 7: Pedestrians along Malibongwe Drive (Source: Google Street View, 2019)



Figure 8: Pedestrian Walkway along the M5 between Zandspruit and Honeydew (Source: Google Street View, 2017)

Dedicated cycle lanes have been provided around the Cradle of Humankind, this is shown in Figure 9. However, these routes are predominantly focused on recreational use rather than urban mobility.

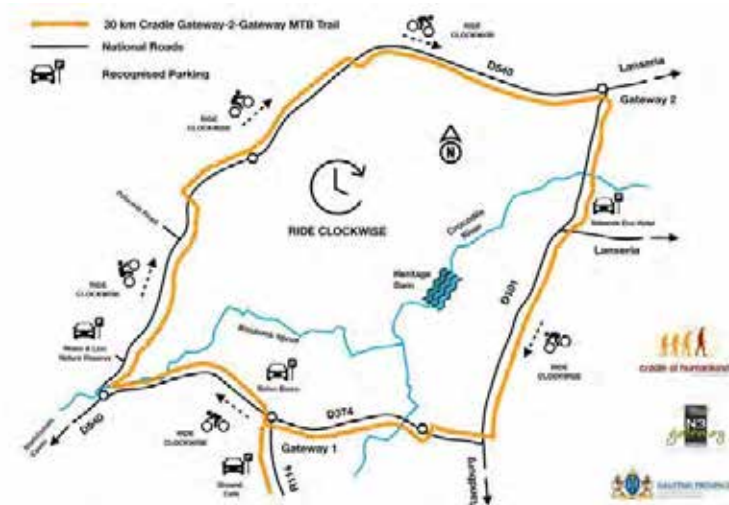


Figure 9: Cradle of Humankind Recreational Dedicated Cycle Lanes

Existing higher order roads include:

- N14, Class 1: Principal Arterial
- N1, Class 1: Principal Arterial
- R512: Malibongwe Drive, Class 2: Major Arterial
- M5: Beyers Naude Drive, Class 2: Major Arterial
- R511 William Nicol Drive, Class 2: Major Arterial
- R114, Class 2: Major Arterial

More recently established suburbs namely Fourways, Northridge, Lonehill Cosmo City, Woodmead, have very little road networking capacity, as most roads turn back on themselves, or become culs-de-sacs, with very little supporting road

networks to the main road, which forces traffic onto main roads (William Nicol, Cedar, Malibongwe Roads). This road system limits flexibility, prevents ease of access between major nodes, impacts on pedestrian movement and results in strain and traffic gridlock on existing main roads.

There is potential for additional regional and local east-west and north-west road connections that tie back into the urban system, which could alleviate train on the existing road network. The Class 2 routes give limited local access which prevents walkability and local economic access.

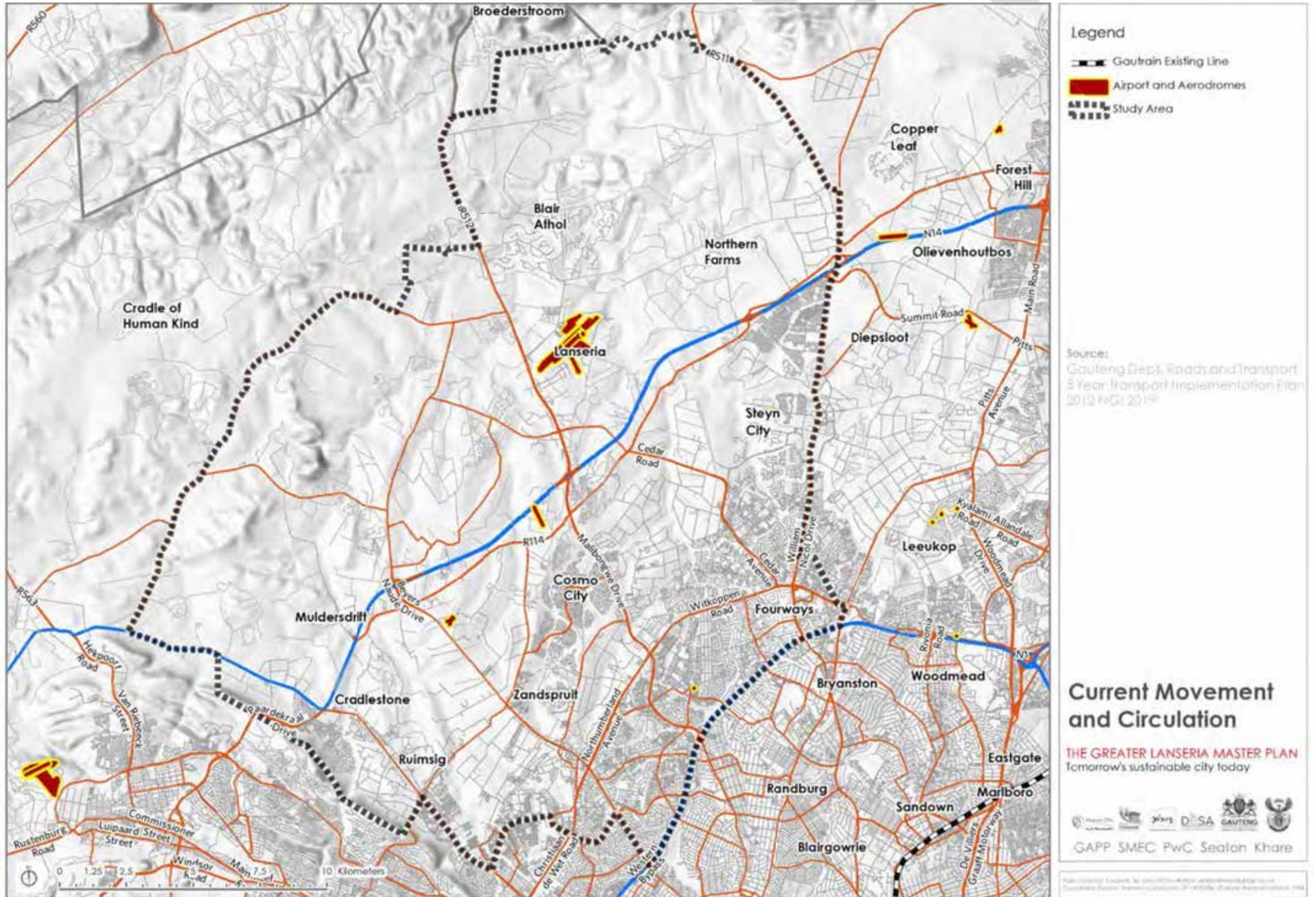


Figure 10: Existing movement and circulation within the study area

Planned transport routes includes:

- Expansion of the airport runway to 4.5km
- Gautrain extension (map shows indicative Gautrain alignment to LIA)
- GSRN proposals include:
 - PWV 3, 5 and 8
 - K31, K44, K52, K54, K56, K72, K133, K215
- A potential freight link that would form the an outer freight loop

Gauteng Department of Roads and Transport's (GPDRT) projects currently underway in /close proximity to the study area

- K33 (D1027) at Construction stage.
- K31 from peter road to R114 at procurement for Construction stage.
- P39/1 (R114) in Construction
- K72/N14 Interchange Hendrick Potgieter its considered for upgrade,
- project is at relocation of illegal settlement stage. It could be ready for construction in 2022.

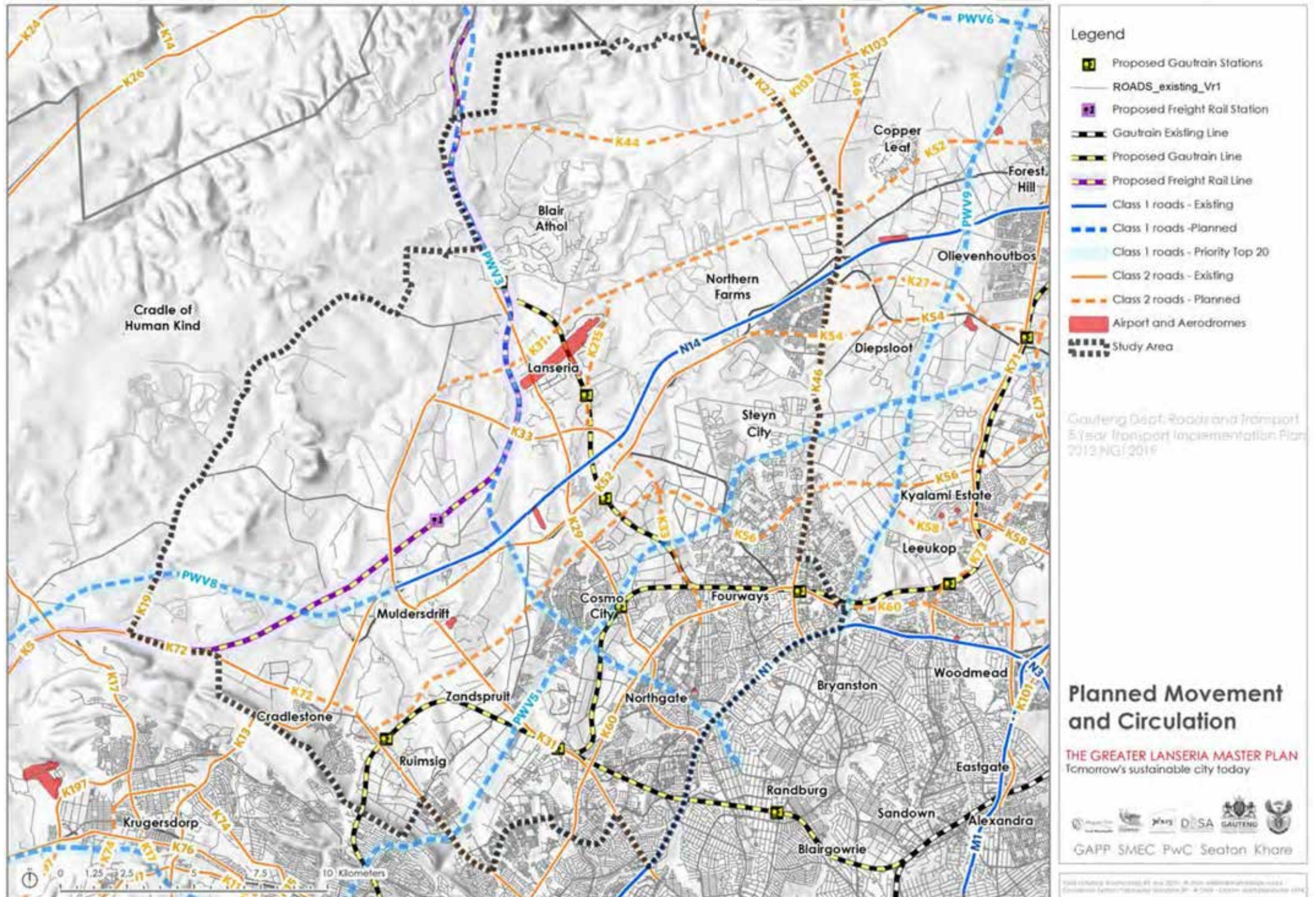


Figure 11: Existing and planned movement and circulation within the study area

2.2.3 Open space and natural environment

This section highlights the key aspects on the open space and biodiversity. For more information on Environmental refer to Annexure B, Environmental and Heritage Status Quo.

In recent times, “environmental sustainability”, “climate change” and “climate resilience” have been demonstrated to be critical elements impacting on the future of mankind’s health and safety, security and survival. Long term and historic loss and destruction of our natural environment has illuminated the importance of protecting and conserving what remains of our natural heritage into the new century, before all is lost. However, the importance of the integration of both the man-made and the natural environment in 21st century cities is now universally recognised, rather than simply protecting and alienating natural areas. The numerous and diverse benefits of this integration of the natural environment into the man-made built environment have been increasingly evident and prevalent in contributing to meeting goals of our communities, socially, ecologically, financially, and geographically. As awareness and education have increased around the value of nature in cities, it is now common and good planning to continue to ensure that the interrelationship between nature and the built environment is pursued into the future.

Environmental systems, processes and open areas and spaces must become part of the overall planning of any new sustainable city in the form of usable and functional spaces, which contribute to positive and proactive land uses

within the urban framework. The goal of including the environment in sustainable urban planning is to make it an equal partner in overall land use planning. The role and value of natural environmental systems is vitally important, as they are renewable resources and, if adequately protected, managed and properly utilised, will provide benefits to communities and cities in perpetuity.

The Greater Lanseria Master Plan (GLMP) area is vast and very diverse with a mix of existing development and urban typologies, as well as immensely sensitive ecologically and conservation areas. The nature of this diversity means that the area is managed and controlled by a suite of environmental legislation, policies and guidelines, governed and implemented by different Competent Authorities. This can and does cause conflict, overlap and perhaps controversy and needs to be addressed holistically. As such, the way forward for integrated environmental and spatial urban planning must be to incorporate all natural, green and conservation spaces as functional urban spaces for, amongst others, recreation, non-motorized transport and sustainable stormwater management and in such a way, recognise the natural environment as the link between all other land uses.

Due to its immense diversity on all levels (social, economic and environmental), the Greater Lanseria Master Plan study area provides incredible opportunity to achieve this and create a true 21st century, connected, innovative and sustainable city, integrating all services and providing for functional green spaces.

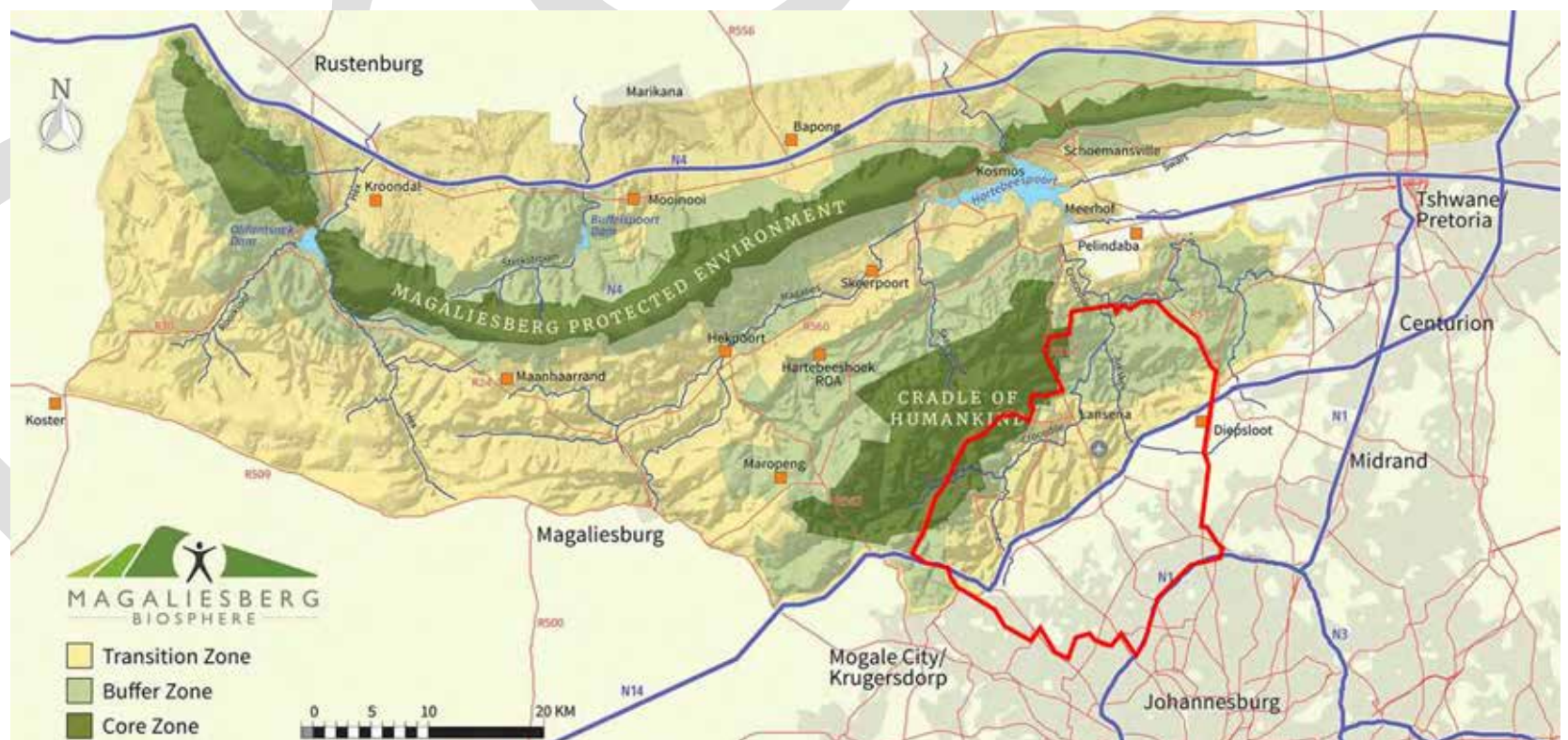


Figure 12: Site in context of the expansive Magaliesberg Biosphere

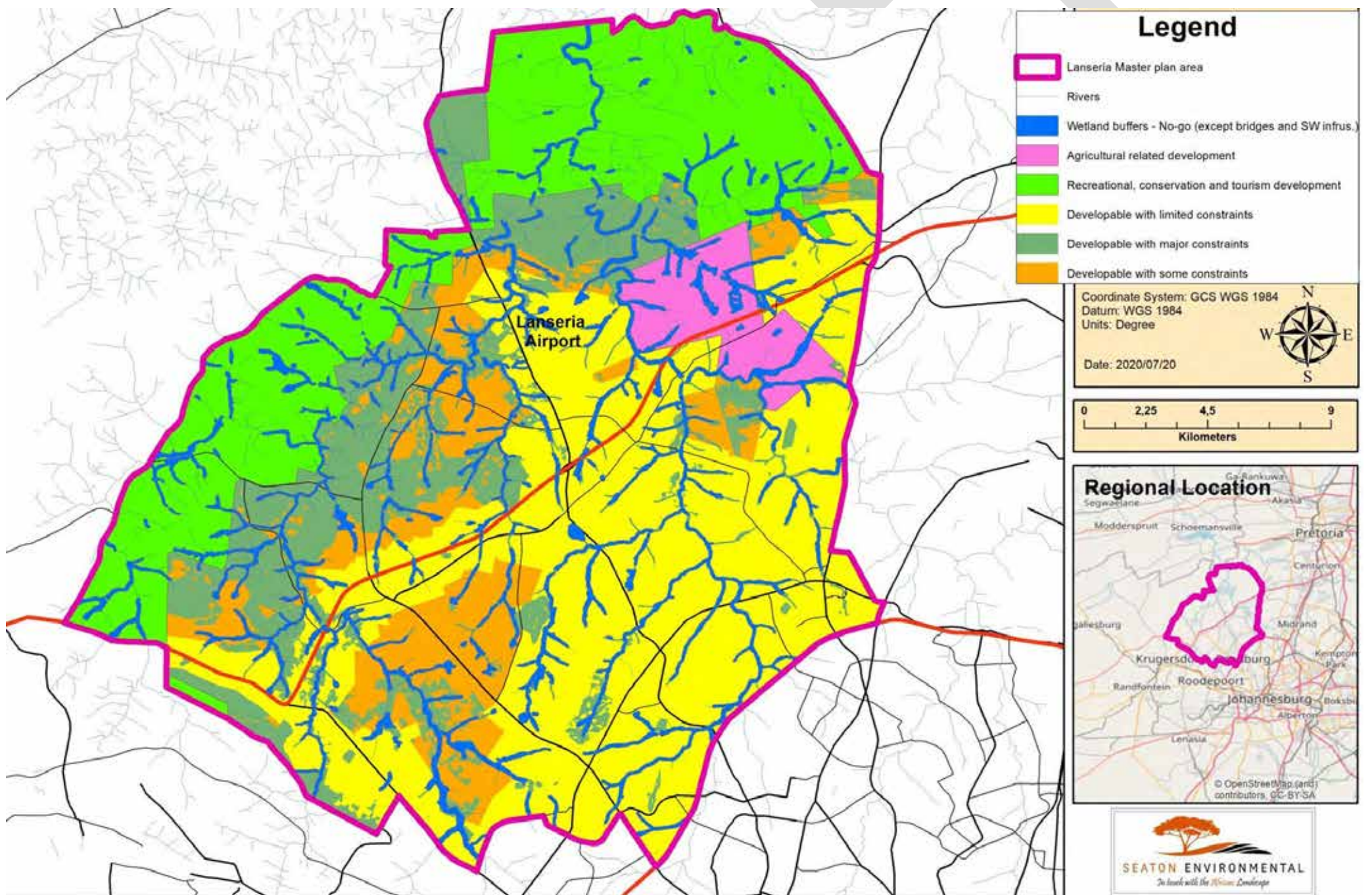


Figure 13: Environmental developable land determined through assessing environmental constraints

The **Gauteng Provincial Environmental Management Framework (GPEMF)**, 2014 has been used as the primary tool for mapping of developable land areas as identified in Figure 13. Figure 15 identifies the environmental constraints, the world heritage site, watercourses and associated 30 and 50m buffers, rocky ridges, protected and conservation areas and sensitive areas identified in the EMF, which has guided the outcomes in Figure 13.

Findings show that the primary land for development (that has the fewest environmental constraints) is concentrated to the south-east of the N14, along the N14 and around Lanseria Airport.

The GLMP study area is large and environmentally diverse, and a detailed assessment is not possible at this scale and site specific assessments and groundwork analysis must be undertaken to determine the exact constraints identified in these figures, and whether an EIA would be required.

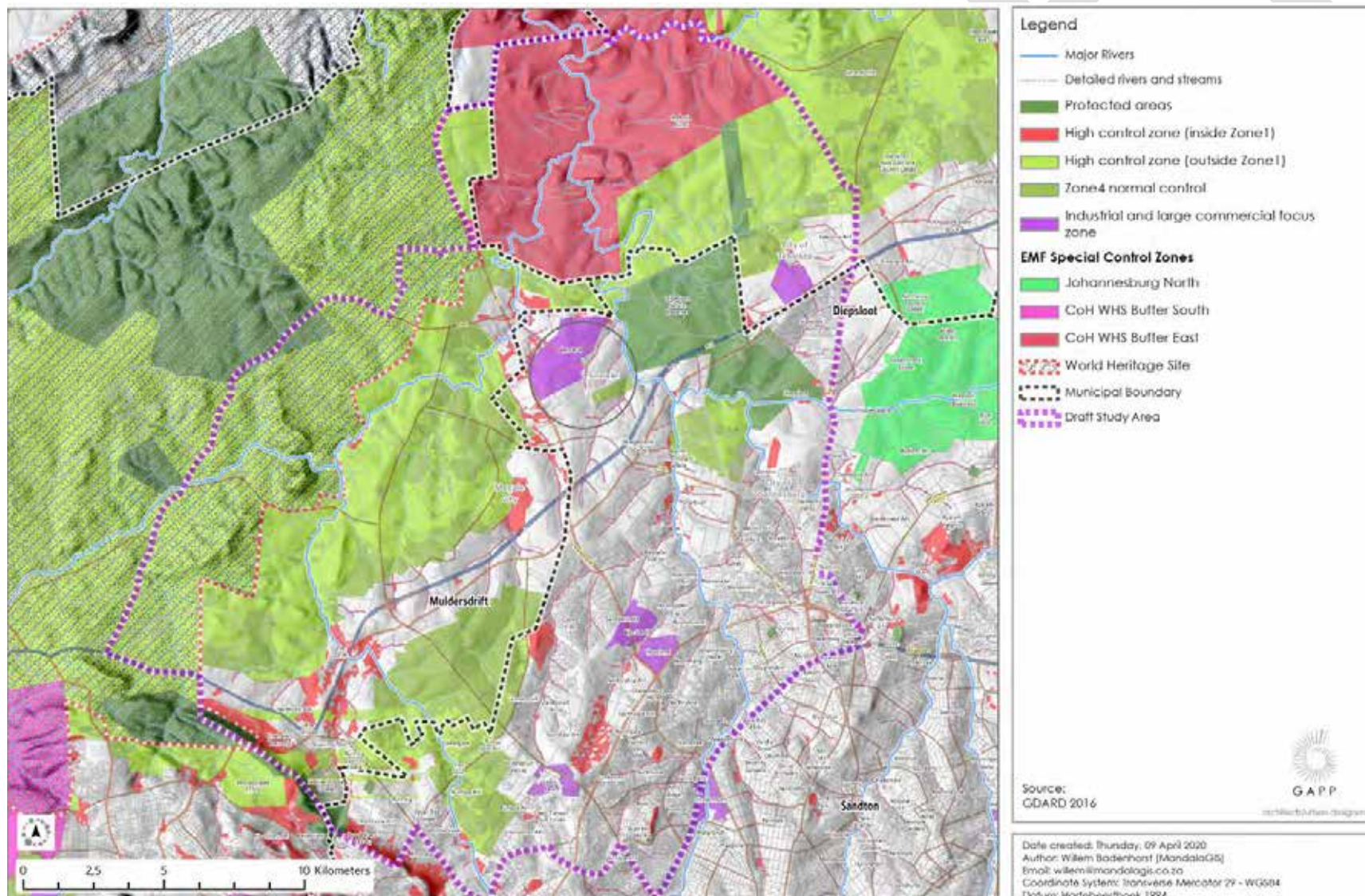


Figure 14: Gauteng Provincial Environmental Management Framework (GPEMF)

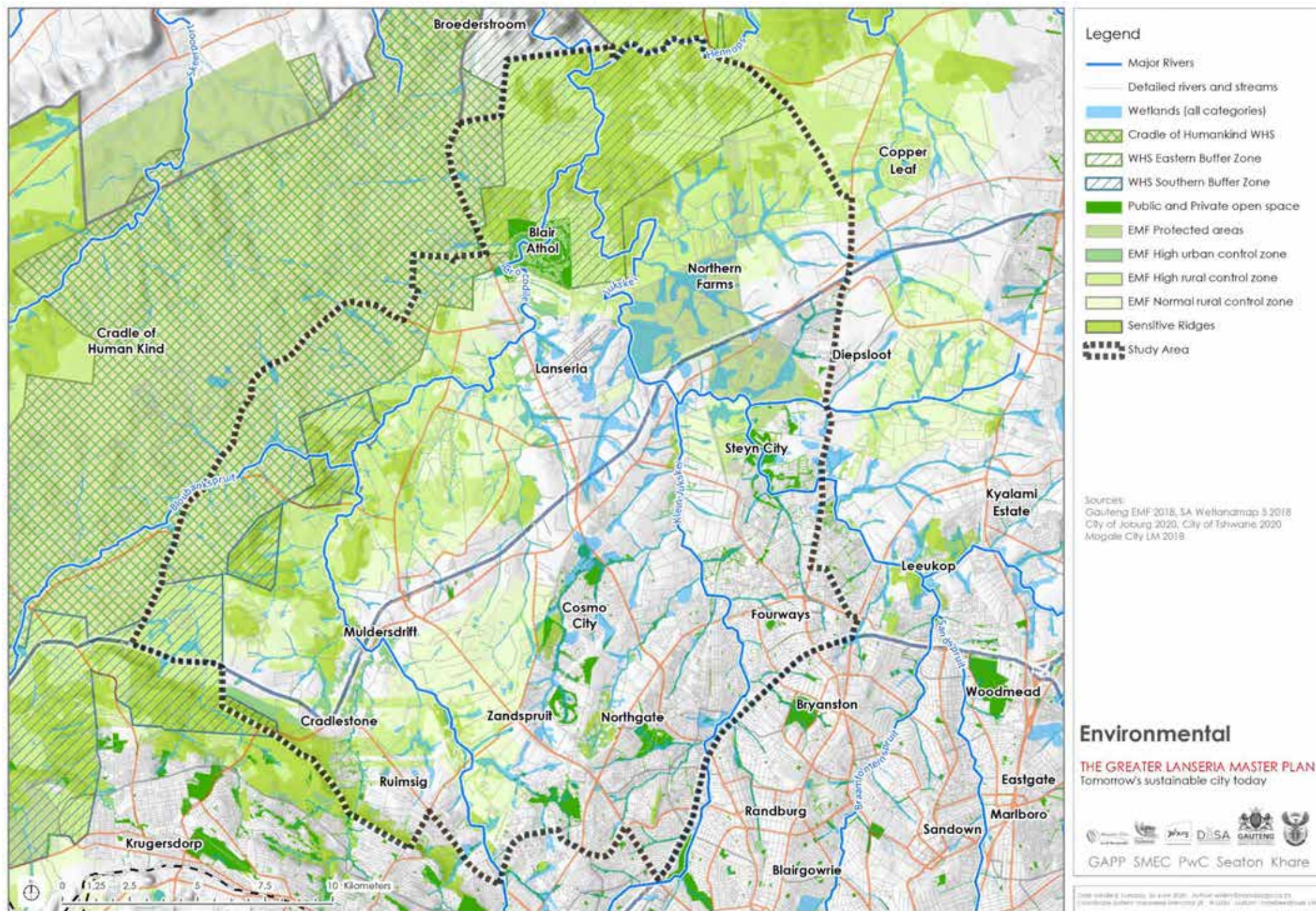


Figure 15: Environmental constraint

The **Crocodile River Reserve** was proclaimed as nature reserve in perpetuity on the 2nd October 2019 formed by two clusters of properties declared as nature reserve and one formed by properties with the protected environment status. These are proclaimed in terms of the National Environment Management: Protected Areas Act (NEM:PAA) and their management is supplemented by agreements between landowners, the

Gauteng Department of Agriculture and Rural Development (GDARD) and its MEC in order to protect biodiversity in the long term.

The vision is to expand the sites into a contiguous nature reserve over time, as noted in Figure 17

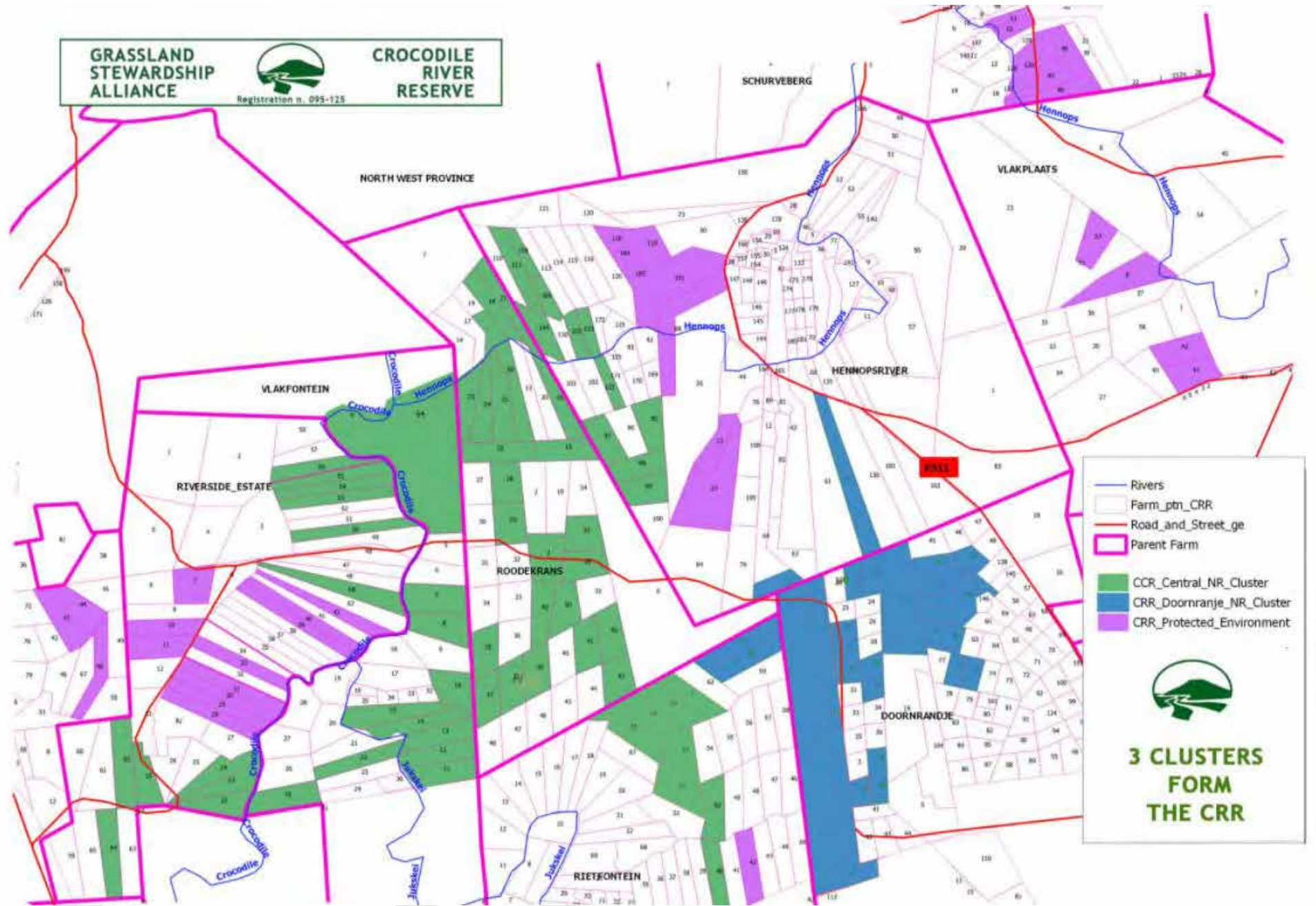


Figure 16: The Crocodile River Reserve

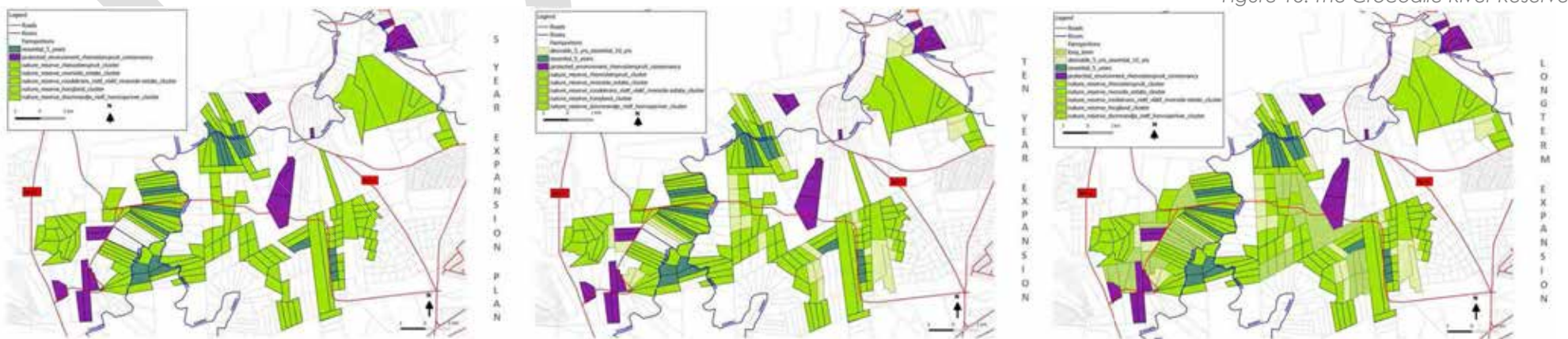


Figure 17: The Crocodile River Reserve Long term vision

2.2.4 Development Constraints

Buffers

Type	Buffer description
Wetlands	Buffer of 32m according to C-Plan and EMF data (refer to Figure 18)
Ridges	Class 1 and 2 ridges are the very sensitive areas, and they fall into the "no development areas"

Type	Buffer description
Sewage treatment works	Best case buffer of 500m and worst case buffer of 800m must be maintained for Sewage treatment works as per paragraphs 6.2.4 and 7.1. (Driefontein & Muldersdrift)
Mine Dumps	Best case buffer of 100m and worst case buffer of 0m must be maintained for Mine Dumps (rock dumps or stockpiles) as per paragraphs 6.2.6 and 7.1.
Landfill sites	Class A is 2000m Class B is 1000m (where Class B accepts hazardous waste, the buffer is 2000m) Class C is 400m Class D is 200m
Category 1 industries	Best case buffer of 750m and worst case buffer of 1500m must be maintained in Category 1 industries, such as Sasol, Arcelor Mittal, Eskom power stations etc. as per paragraph 6.2.1.
Category 2 industries	Best case buffer of 250m and worst case buffer of 500m must be maintained in Category 2 industries, such as container depot in City Deep, panel beater workshops, tanneries etc. as per paragraphs 6.2.2 and 7.1.
Category 3 industries	Best case buffer of 50m and worst case buffer of 100m must be maintained in Category 3 industries, such as warehousing and distribution operations as per paragraphs 6.2.3 and 7.1.

Source: The Gauteng Pollution Buffer Zones Guideline, March 2017.

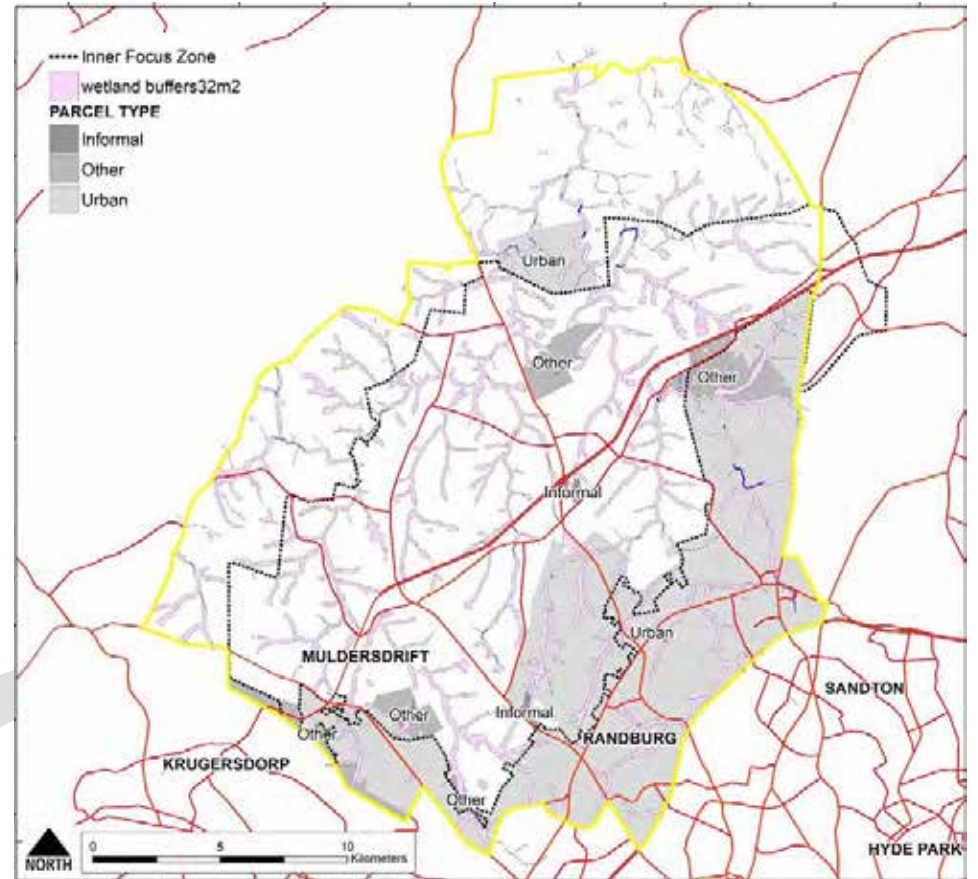


Figure 18: Wetlands and 32m wetland buffer

Legislation and guidelines used by the Department of Agriculture

There is pressure on land for urban development, yet there is also a policy and regulatory framework for the agricultural sector that needs to co-exist with spatial development frameworks at provincial and municipal level. Act 70 of 1970 and other legislation and guidelines are used by the Department of Agriculture.

Subdivision of Agricultural Land Act Section 70 of Act 1970

Areas that were previously included (before 2000) into existing township areas and schemes are exempt from the jurisdiction of Act 70 of 70. The study area is predominantly comprised by farms that formed part of the Peri Urban Areas Town Planning Scheme and therefore were not taken up into town areas prior to 2000.

Jurisdiction of DAFF

Furthermore certain farms are designated to be under the Jurisdiction of Department of Agriculture, Forestry and Fisheries (DAFF), and some of them

are not. In terms of the Act, a map indicating which properties fall under this jurisdiction was meant to be prepared in 2007, however this has not occurred.

Water use licence

Refer to the figure below.

Any farm/property located within 500m of the wetland would require a Water use license.

It is understood that these applications could delay development significantly and in cases prevent development of, potentially, very strategic landholdings. Further exploration of possibly expediting these processes should be explored, in areas that could valuably contribute to the urban system.

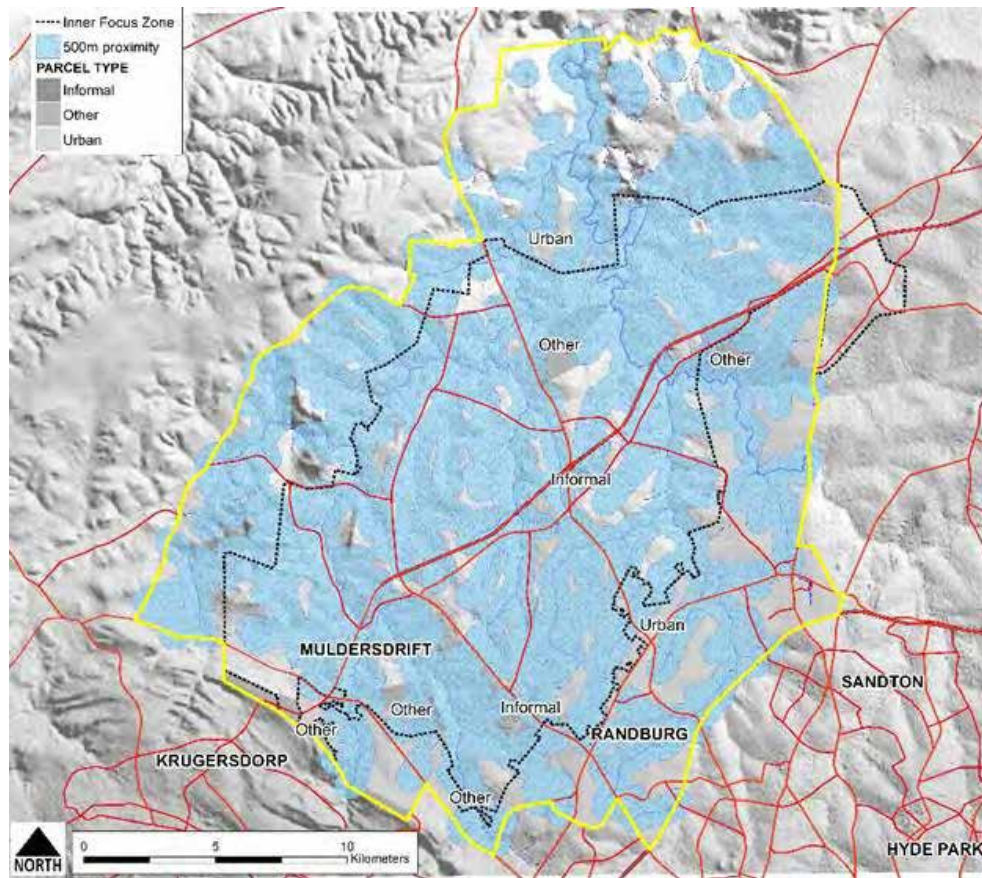


Figure 19: Farms located within 500m are subject to WULA

The LIA noise contours and height restrictions

The existing operations and proposed airport developments of LIA have an impact on the future development of the surrounding areas with regard to:

- Noise generation: the impact of noise generation levels and allowable land-use activities according to the South African Bureau of Standards (SABS) Code of Practice 10103 (2008);
- Development height: limitations on the heights of developments are specified by civil aviation regulations.

Impact of Noise Levels

The noise level that is anticipated to affect a particular area will define the nature of the land use that may suitably occur there. In general, the SABS code establishes the following:

- Land falling into a 70 dB(A) zone is not suitable for development;
- Land falling into a 65–70 dB(A) zone is suited to commercial and industrial land-use activities. Should existing residential areas become part of a 65–70 dB(A) zone due to airport expansion, the area should be earmarked for redevelopment that is less sensitive to noise, encompassing commercial and industrial activities;
- Aviation legislation specifies land-use activities that are permissible within a particular noise level. It is stated by the World Health Organisation that residential development should not be allowed within the 55-60 decibel zone. This guideline was established in 1999.

Height Development Limitations

- Height limitations are subject to approval by the Civil Aviation Authority (CAA) and the Airports Company South Africa. In general terms, development may not be higher than 50m, measured from the runway threshold.

The South African Civil Aviation Authority specifies that “no buildings or objects higher than 45 meters above the mean level of the landing area, or, in the case of a water aerodrome or heliport, the normal level of the water, must without the approval of the Director be erected within a distance of 8 kilometres measured from the nearest point on the boundary of an aerodrome or heliport” (CAA Guidance Document, Development Around Aerodromes).

2.2.5 Cradle of Humankind World Heritage site

It is imperative to find a planning equilibrium between advancement of urban areas or zones and the protection of sensitive or critical areas, be it environmental or cultural.

A shift is required in higher order planning to sustainably plan for spatial proposals in areas where the needs of those areas are constantly in conflict. Therefore a new way of thinking and planning accordingly is crucial in ultimately achieving a balance between these areas of opportunity.

COHWHS as a Planning Region

UNESCO's notice of 2007 proclaiming the Cradle of Humankind as a World Heritage Site, has resulted in concerted efforts to manage the area in order to comply with the requirements as set out by the World Heritage Convention.

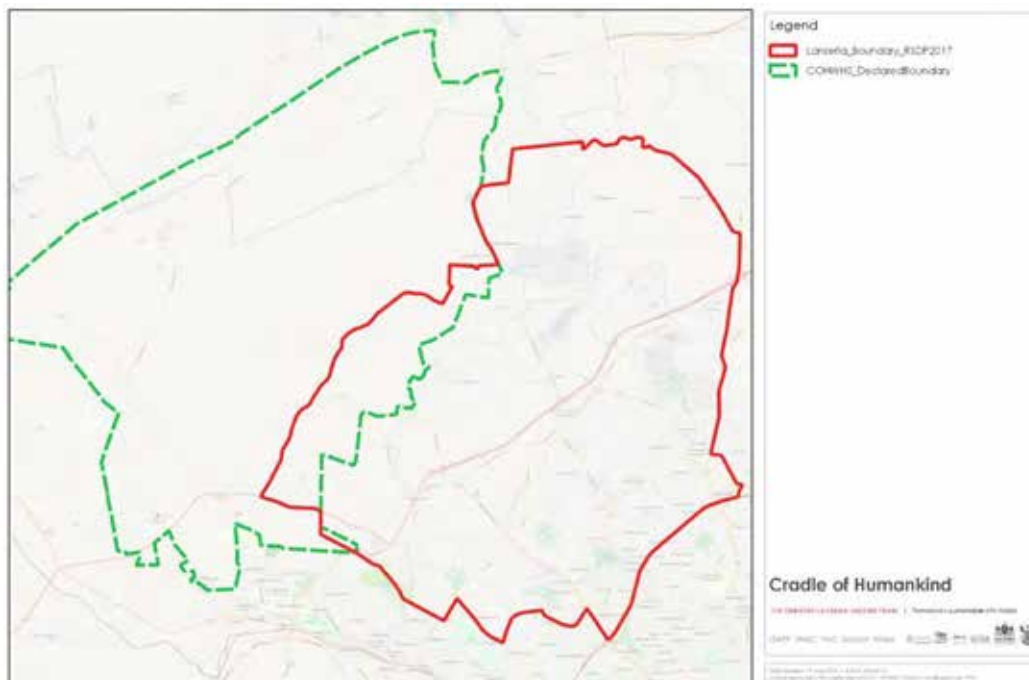


Figure 20: Cradle of Humankind delineation in context of the study area.

The very first iteration of this effort to manage the vast area was in terms of the 1999 Land Use Master Plan which proposed 6 zonation areas. However, the status of this Master Plan was drawn into question and no real authority was being exercised, and as a result land use applications would most often than not be approved without consulting the Management Authority or the document itself.

In order to guide and facilitate harmonisation between different decision-making activities by these authorities, the COHWHS Management Authority, the GDARD, West Rand District Municipality (WRDM), and Mogale City Local

Municipality (MCLM) commissioned the development of a GPEMF specifically for the COHWHS.

The GPEMF tool provided the Management Authority with an opportunity to review the previous IECMP and Master Plans and development guidance. The EMF process focused attention on addressing challenges and operational requirements relevant to the management of a cultural WHS. The protection and management of the dolomite fossil bearing component of the WHS received priority attention including the elements of Outstanding Universal Value.

The GPEMF is structured such that the Management Authority, Department of Environmental Affairs, provincial and local authorities and other users of the tool can apply it to regulatory decisions in effect at the time.

Findings and Outcomes

The spatial relationship between the Cradle of Humankind either proclaimed boundary, or new proposed core and buffer areas in relation to the Lanseria Study area presents an opportunity to constructively engage with the role players in order to align the boundary to the benefit of all parties.

Although much of the boundary as mentioned above for the Cradle of Humankind falls outside the study area, it would still be in the interest of all to propose certain land uses and zoning areas that would create a so-called buffer or soft uses between the new proposed Lanseria Developments and the Core areas of the Cradle of Humankind.

These proposals should harness their unique features, complimentary in land use, and draw on previous experiences in and around the area in order to create a logical progression from Urban to Peri-Urban, to Rural and outwards to the protected areas as set out.

It is therefore recommended that constructive stakeholder engagement is necessary to navigate the uncertainty, both spatially and environmentally that exists within the area, and the surrounding and immediate areas.

Refer to position Paper 03 in Annexure A for more detail on this.

2.2.6 Agricultural land use and farming potential

The purpose of the study is to provide a spatial perspective of agriculture to the compilation of the Spatial Development Framework of the Greater Lanseria Area. The study will focus on the present farming activities and indicate possible patterns to the major farming enterprise groupings and relate these to the natural resources that affect agricultural potential.

The present land uses were delineated from satellite images from Google and of Microsoft dated 2019 and 2020 (Figure 21). This is the most recent data available. Land uses were captured as point data and with the land size under each activity, measured and added as an attribute.

Land under natural veld and old lands are assumed to be vacant or used for animal grazing and are not specifically indicated in the analysis below. Livestock numbers can, therefore, not be estimated.

The major activities identified are the following:

Table 1: Existing agricultural land uses (expressed in hectares)

Land use	Water source				TOTAL
	Boreholes	Rainfall	Rivers	Sewer	
Cultivated lands		710.87			710.87
Fish	3.25		9.55		12.8
Horticulture	30.85		27.08		57.93
Irrigated	150.89		524.78	825.05	1 500.72
Poultry	76.96		18.68		95.64
Lands in towns		120.64			120.64
Tunnels	142.67		45.89		188.56
TOTAL	404.62	831.51	625.98	825.05	2 687.16

Because the farming activities vary for different land parcels, the interpretation of the farming activities should be done with the parcel type taken into consideration. Farms were subdivided into ever increasing smaller units, and, especially along the urban periphery, into units that may no longer be sustainable for commercial scale farming. Many of the smallholdings are now used primarily for residential purposes and not for commercial farming – there may be some livestock or subsistence level vegetable or crop production, but the scale is such that it usually only supplements food security or contributes to family income.

To enable analysis along these lines, a distinction was made for the following general land parcel types:

- 1) Commercial farming;
- 2) Small commercial farms;

- 3) Smallholdings, and
- 4) Urban areas (including informal settlements).

The spatial location of the different land parcel groups are indicated in Figure 21: Agricultural potential within the study area.

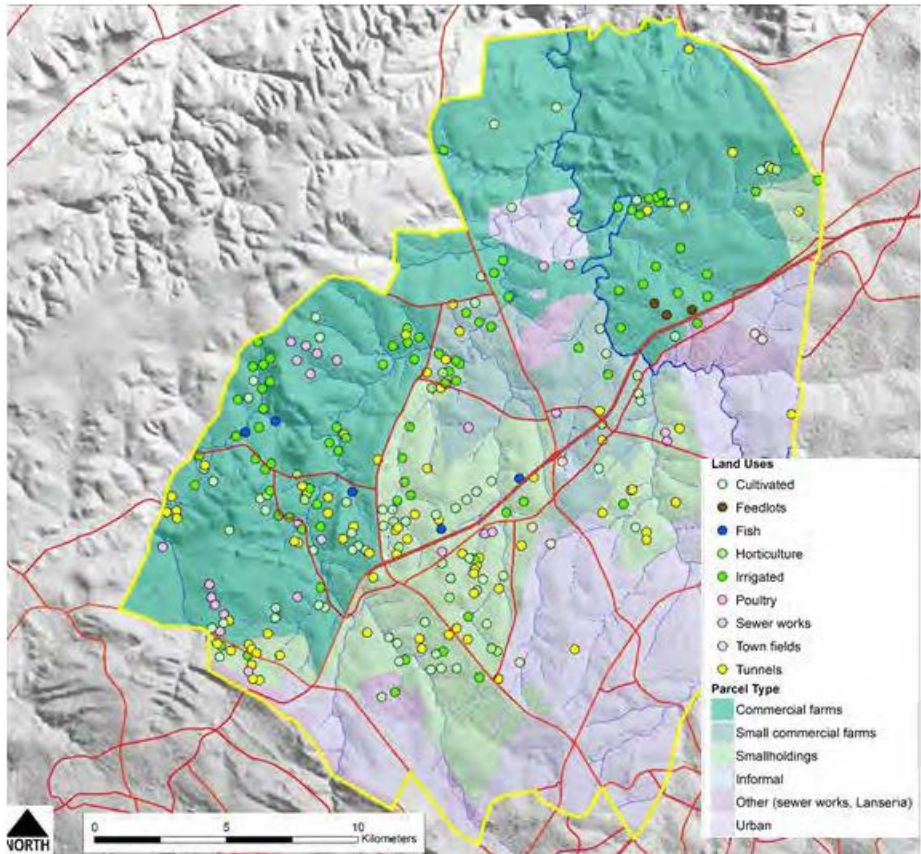
Table 2: Land use distribution between land parcel groups (in hectares)

Land use	Commercial farms	Small commercial	Smallholdings	Urban	TOTAL
Fish	9.55		3.25		12.8
Horticulture	13.65	11.94	31.93	0.41	57.93
Irrigated land	1 232.1	165.99	95.02		1 493.11
Poultry	56.49	24.6	14.55		95.64
Town fields				120.64	120.64
Tunnels	65.47	21.05	86.36	15.68	188.56
TOTAL	1377.26	223.58	231.11	136.73	1 968.68

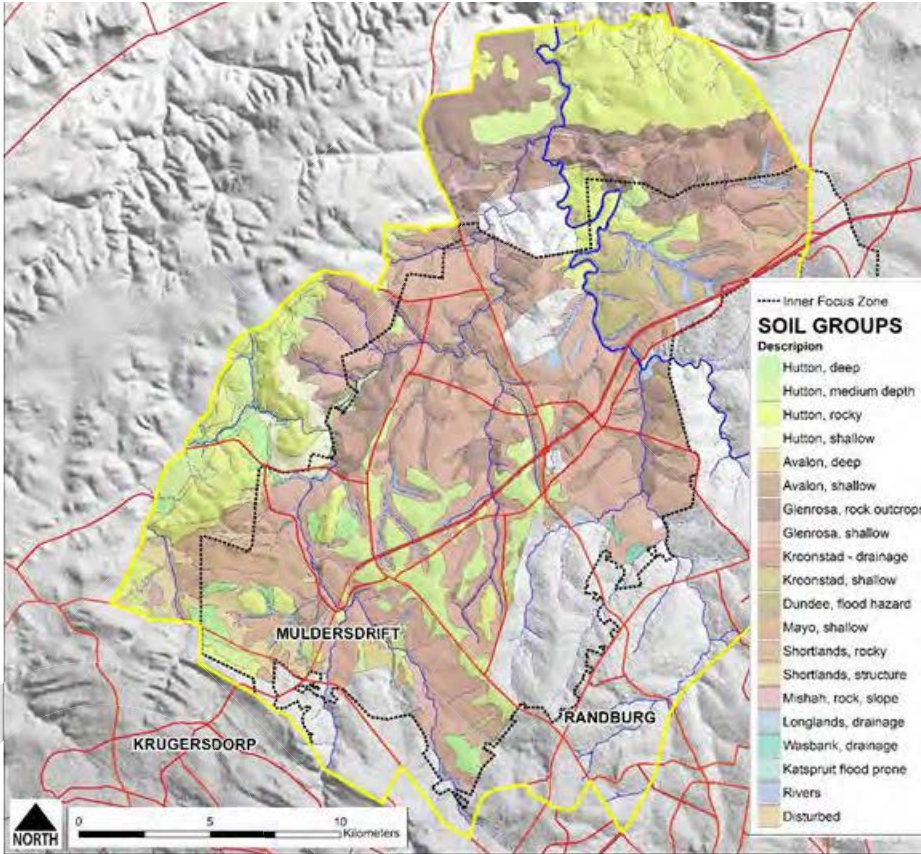
The agricultural potential of land is determined by soil properties, topography, water availability and climate.

- Soil for the majority of the study area derived from weathering of the Halfway House granite. The soils are usually shallow and gravelly on the higher land units. Downslope the soils are colluvial but often with strongly developed structure, which tends to retard infiltration of rainwater. In general the land use potential is low and the soil not arable. The northern portion is comprised from dolomite and chert, which is naturally more fertile but can be shallow and rocky.
- Groundwater potential is generally poor on the granites, with an average borehole yield of less than 2 litres per second. This is insufficient for commercial irrigated crop production. However, there are many farmers that have developed hydroponic farms from groundwater.
- Surface water from runoff or discharge from the sewerage processing plants is the major water source for irrigated farming. Most of the farmers are located along the Jukskei, Klein Jukskei and Crocodile rivers. This is also where the potential for further development is highest.

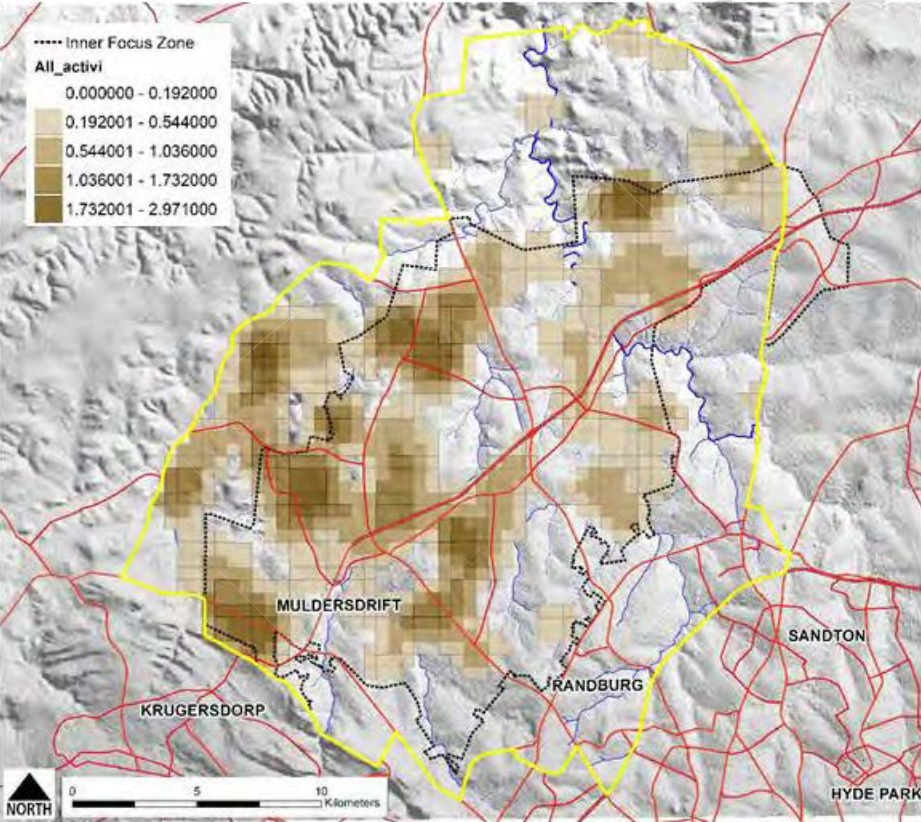
More detail on the soil and water potential can be found in the Annexure on Agricultural potential.



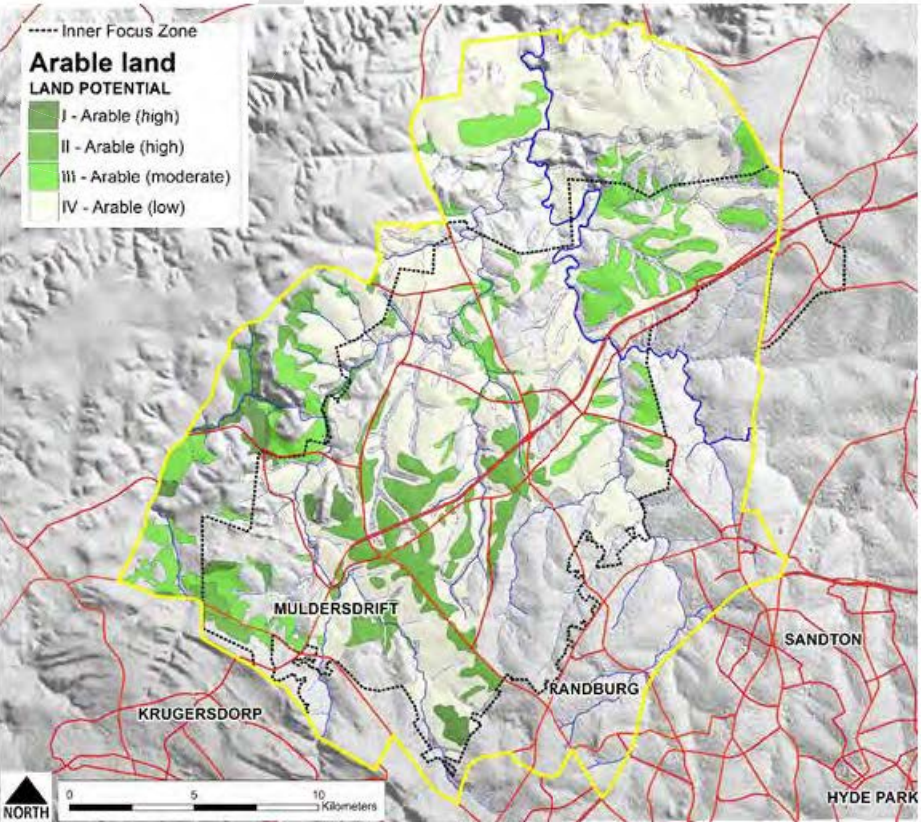
Agricultural land uses



Soil potential



Agricultural land uses heat map



Agricultural potential subject to soil, water, slope, climate

Figure 21: Agricultural potential within the study area

2.2.7 Land use and activity pattern

Development has occurred from major economic activities in the urban core outwards toward the outer reaches of the GCR. Development has also been established along existing transport networks and near economic activities. This can be seen by activity being established along main routes including William Nicol, Witkoppen, Cedar Road, Malibongwe, Beyers Naude, Hendrik Potgieter, the N1; creating opportunities to expand the Fourways, Northgate, Cradle Stone, Kya Sands nodes. LIA has also become attractive and one is seeing development impetus and pressure for development around this area.

Residential development has included cluster homes, townhouses, and lifestyle estates. Marginalised communities Cosmo City, Diepsloot, and Zandspruit have been established within the area. A number of informal settlements also exist. These residential developments have further exacerbated the socio-economic segregation that exists in much of the GCR.

Development pressure exists in potentially one of the fastest growing parts of the GCR but has generally occurred on an ad hoc basis, with very little direction resulting in car-based environments, with densities that are too low to support public transport, with undesirable public environments that cannot be navigated by a pedestrian.

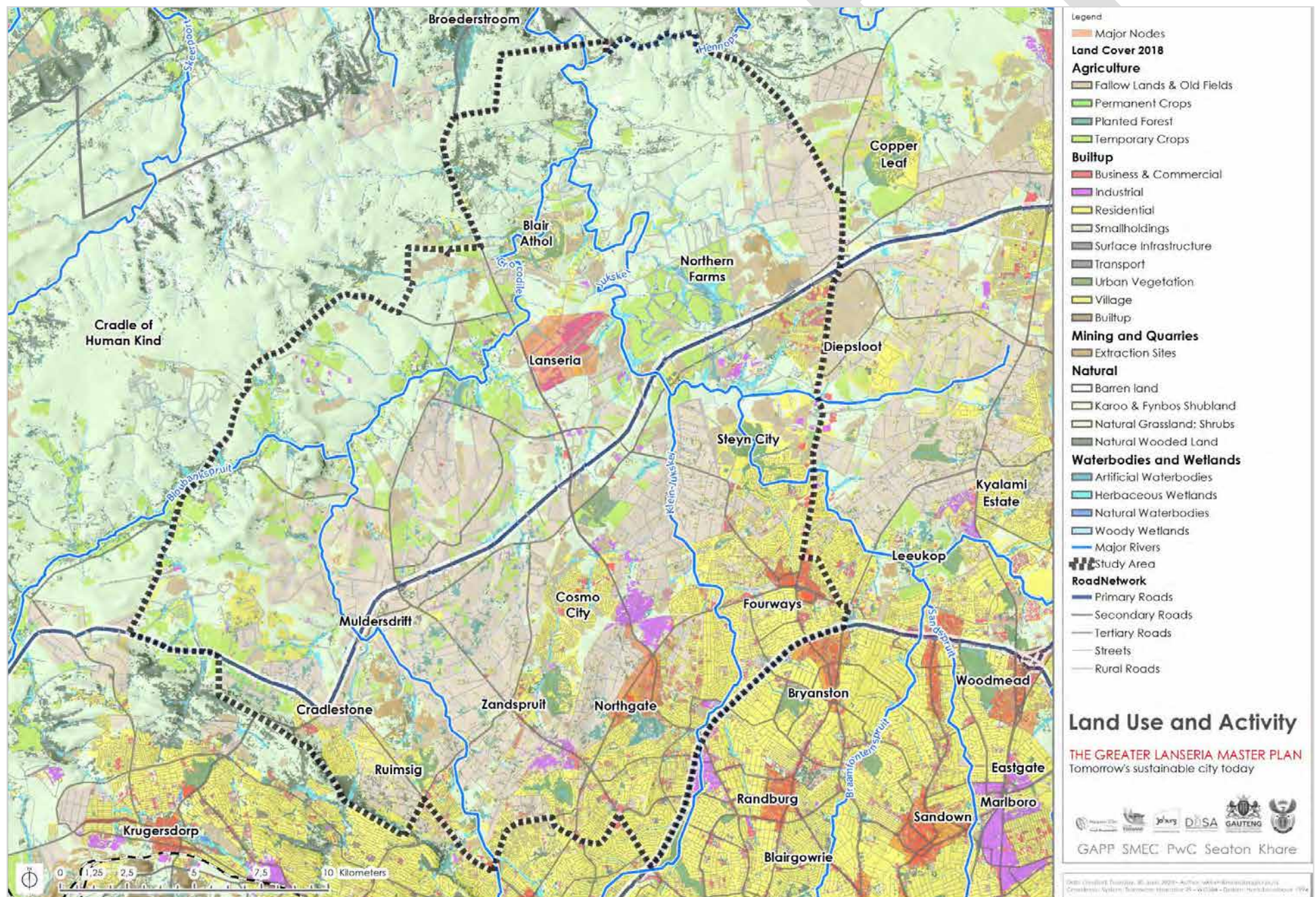


Figure 22: Existing Land use and activity pattern

2.2.8 Development proposals human settlements

A number of human settlements initiatives are underway, as seen on the following table. The residential densities seem low, and with the number of human settlements initiatives in the area, it shows the need for providing job opportunities.

There is very little public owned land within the study area, which prevents government from directing growth through land ownership. The limited availability of public owned land requires a view on the approach to gaining access to land for providing infrastructure, social facilities and public amenities.

A number of corporate clusters exist and is still in the process of being mapped.

Table 3: Development proposals, major landowners group landholdings

	AREA (HA)	RES UNITS	BUSINESS	INDUSTRIAL	PLANNING STATUS
HUMAN SETTLEMENT PROJECTS PLANNING /UNDERWAY (SOURCE CORRIDOR PROFILING, 2017) REFER TO FIGURE 23: HUMAN SETTLEMENTS INITIATIVES LOCATED NEAR THE N14 WITHIN THE GLMP STUDY AREA					
DIEPSLOOT EAST / TANGANANI EXT 14	408	11 418 Approx. 30 gross du/ha	Yes (local node)	Not proposed	
DIEPSLOOT RIVERSIDE VIEW EXT 28	251	11 406 Approx. gross 45du/ha	Yes (local node)	Not proposed	
LION PARK / COSMO CITY X17	176	10 324 Approx. gross 58du/ha	Yes (local node)	Not proposed	Township application recently extended
COSMO CITY PHASE 1 (EXTENSION)	Unknown	12 500	Yes (local node)	Not proposed	
MALIBONGWE RIDGE	120	5 514	Yes (local node)	Not proposed	
RIVERSIDE VIEW		11 406			
ZANDSPRUIT		10 000			
		61 152			
PUBLIC LANDHOLDINGS					
REFER TO FIGURE 24: STATE OWNED LAND, IDENTIFYING THE NORTHERN FARMS AS A MAJOR MUNICIPAL OWNED LANDHOLDING					
THE NORTHERN FARMS		./-1700ha			



Figure 23: Human settlements initiatives located near the N14 within the GLMP study area

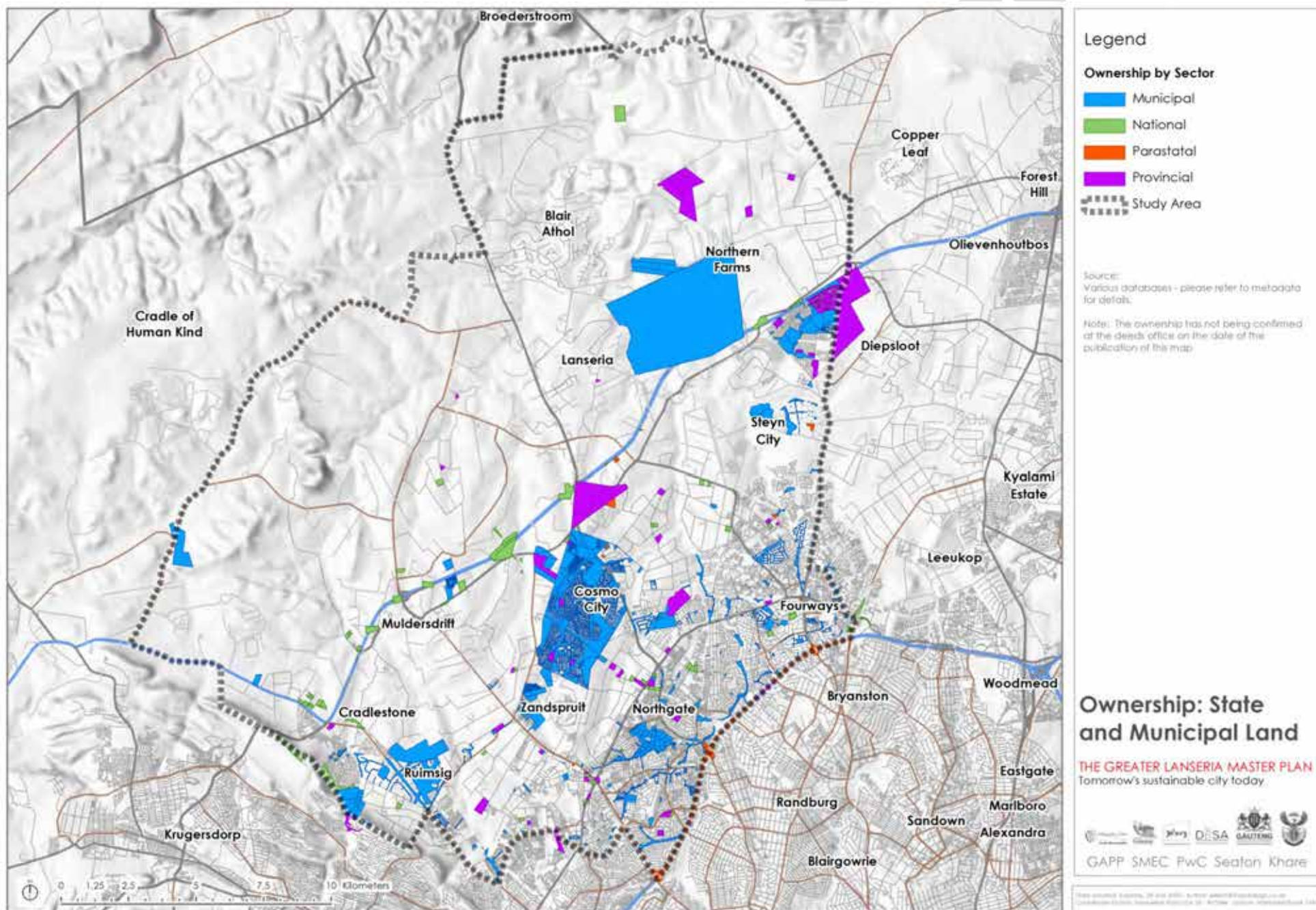


Figure 24: State owned land, identifying the Northern Farms as a major municipal owned landholding

Priority Human Settlements and Housing Areas (PHSHDAs)

136 Priority Human Settlements and Housing Areas have recently been identified in May 2020. The intent is to achieve the objectives of SPLUMA, the National Development Plan (NDP), the National Spatial Development Framework, and the Integrated Urban Development Framework creating: spatial justice, spatial efficiency, connectivity, economic and social infrastructure, access to adequate accommodation, and provision of quality housing options.

The PHDHDAs create a tool for funding, planning and development of mixed land uses and socio-economic profiles within these areas. This aims to redress

social, economic and spatial injustices through the provision of situ informal settlement upgrades and housing for people in distressed mining communities.

Large areas along the N14 and north of the Lanseria International Airport (LIA) have been identified as PHSHDAs within the study area. It is important that the PHSHDAs support the principles of the Lanseria Master Plan to achieve a compact and complex urban structure.

Urban development boundaries, the LIA noise contours and WWTW buffer has an impact on the PHSHDA areas.

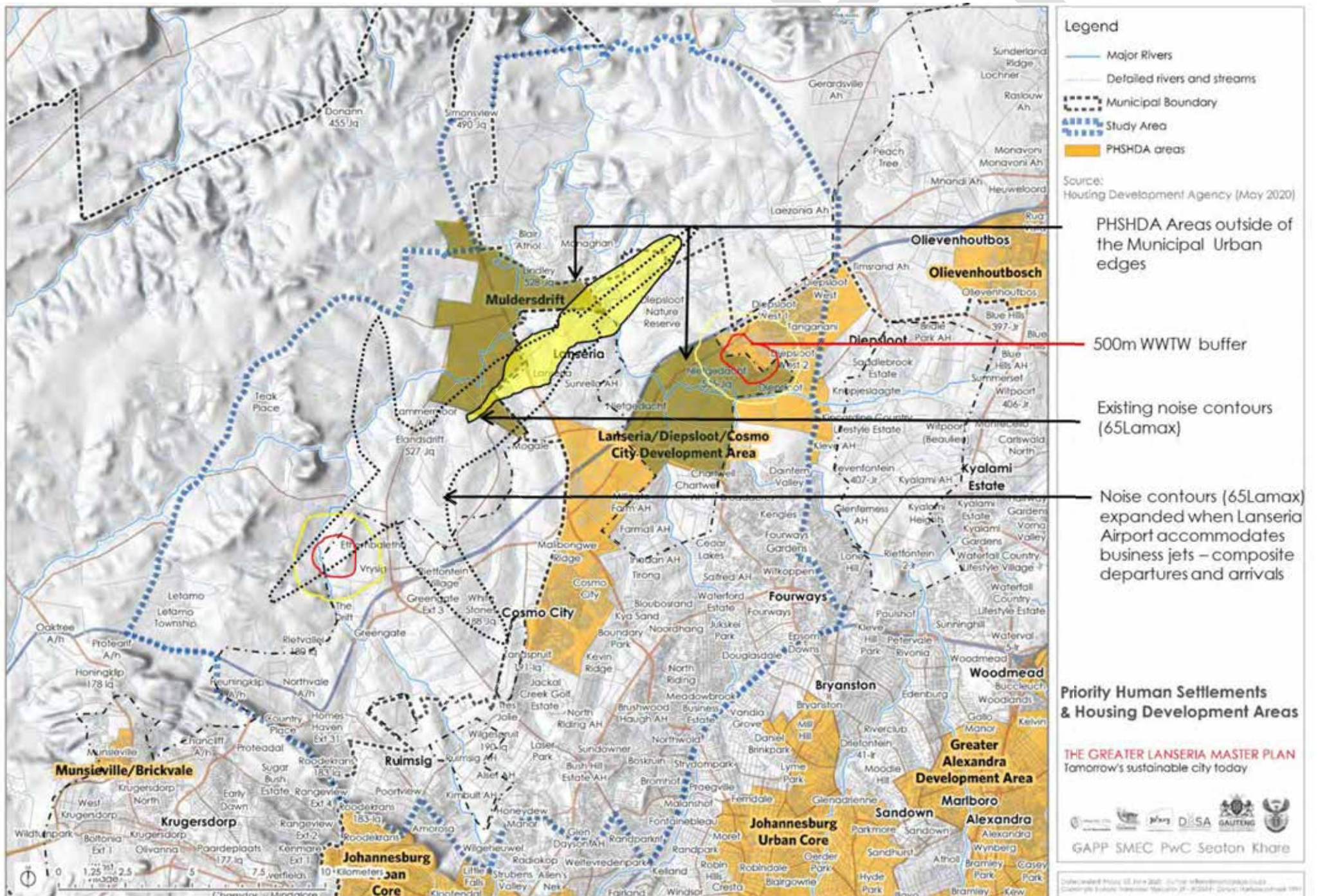


Figure 25: PHSHDAs located in the study area

2.2.9 Private development initiatives and township applications

Township applications and development underway

A number of township applications are underway in the primary focus area, for land uses such as mixed use, industrial, residential and commercial (refer to **Error! Reference source not found.**). There are also township applications occurring in Mogale City.

The Lanseria Trust One, owns large landholdings north and south of the LIA, which includes the Lanseria Corporate Estate, which hosts a number of corporate warehouses, and approximately 40% developed and directly south of the LIA.

Lion Park Extensions (3 Towers development) has lapsed and will require a new township application, delaying the development. Lanseria business gateway north of the airport seems to be in early stages of proposals.

Steyn City, currently underway, 700ha in extent, accommodating 11000 residential units, including a golf course, 260ha landscaped parkland, schools, offices, shopping, and hospital, with a smart city central to the development, predominantly privatised.

Ownership of landholdings in the primary focus zone area

There are signs of land banking as landowners are beginning to amalgamate neighbouring landholdings (Figure 28). Over and above the township applications, there are a number of plans proposed for some of these landholdings, which includes hotels, convention centres, lifestyle estates, residential developments, leisure, churches, and social facilities etc.

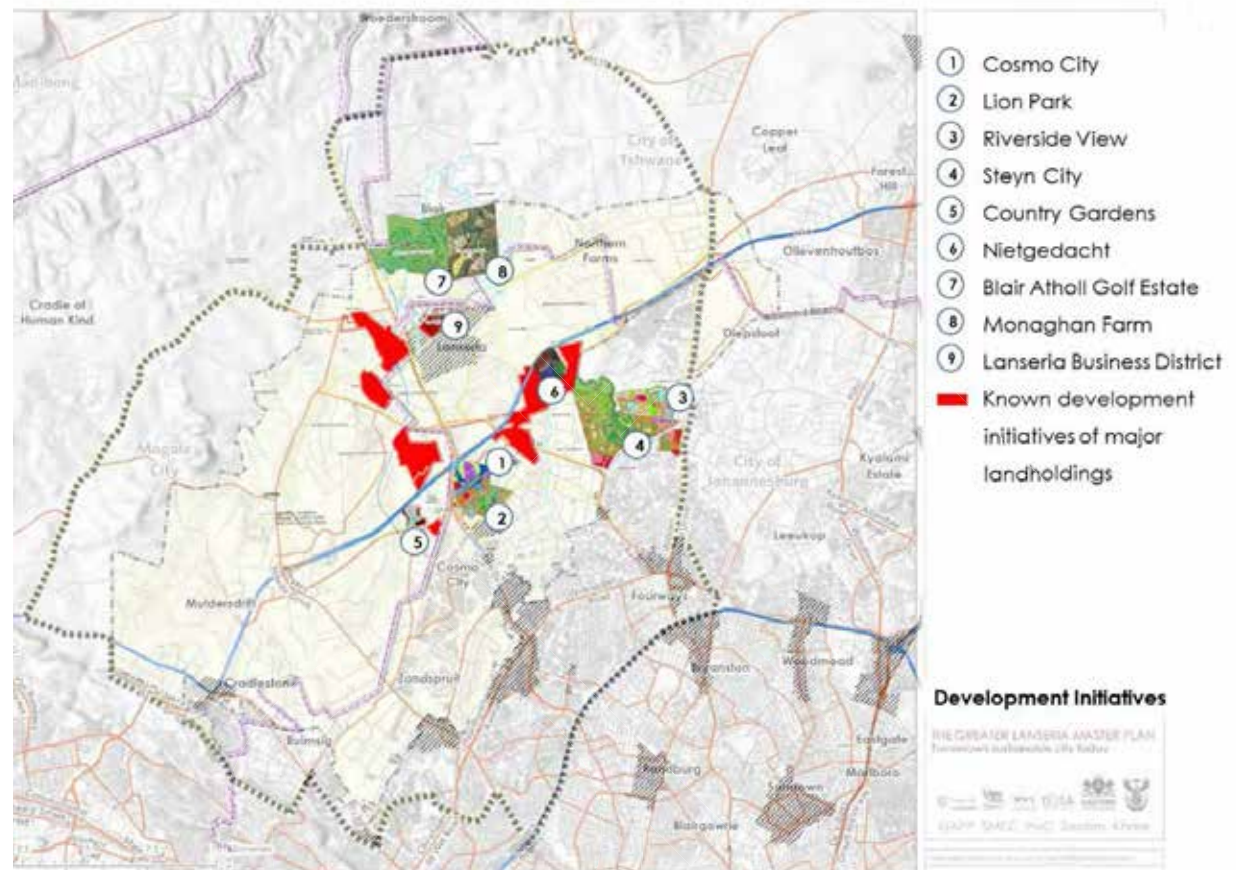


Figure 26: Private development initiatives and township applications

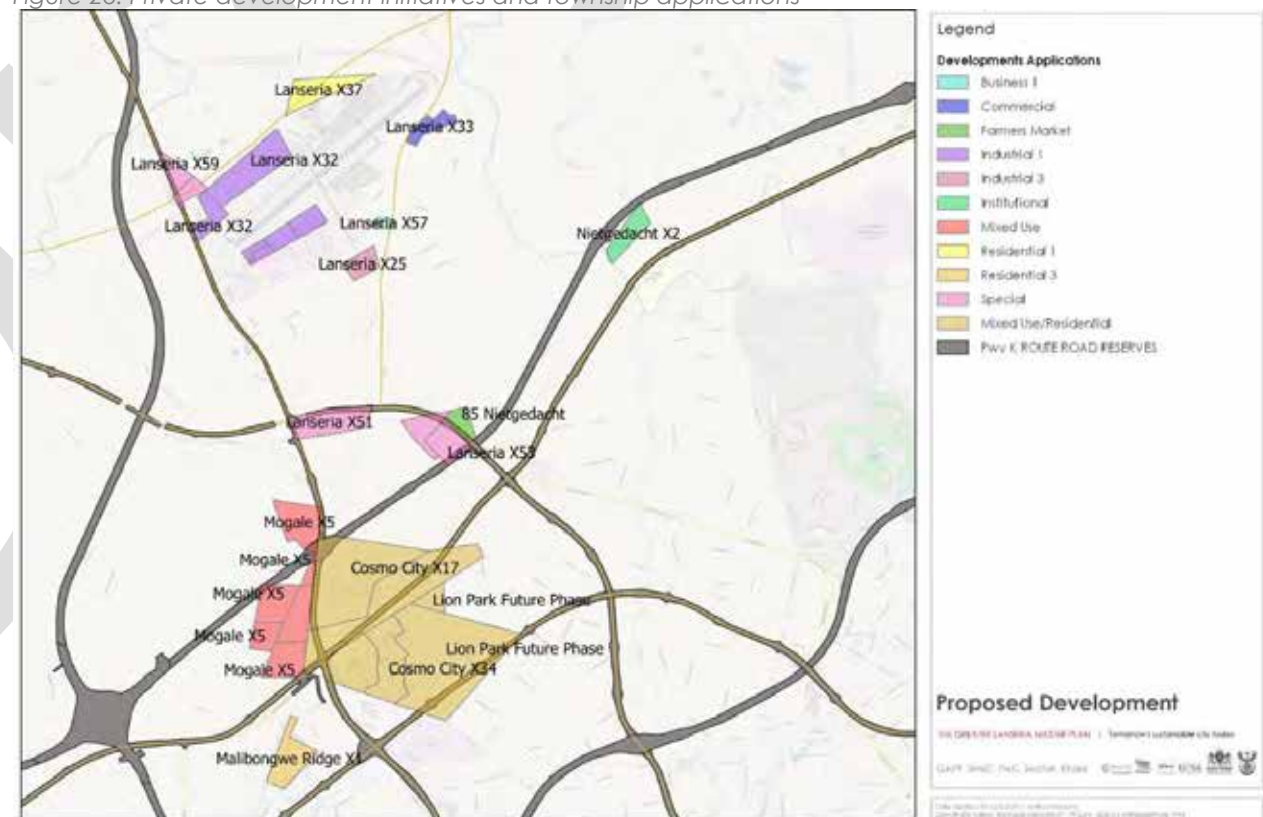


Figure 27: Private and public development initiatives and township applications

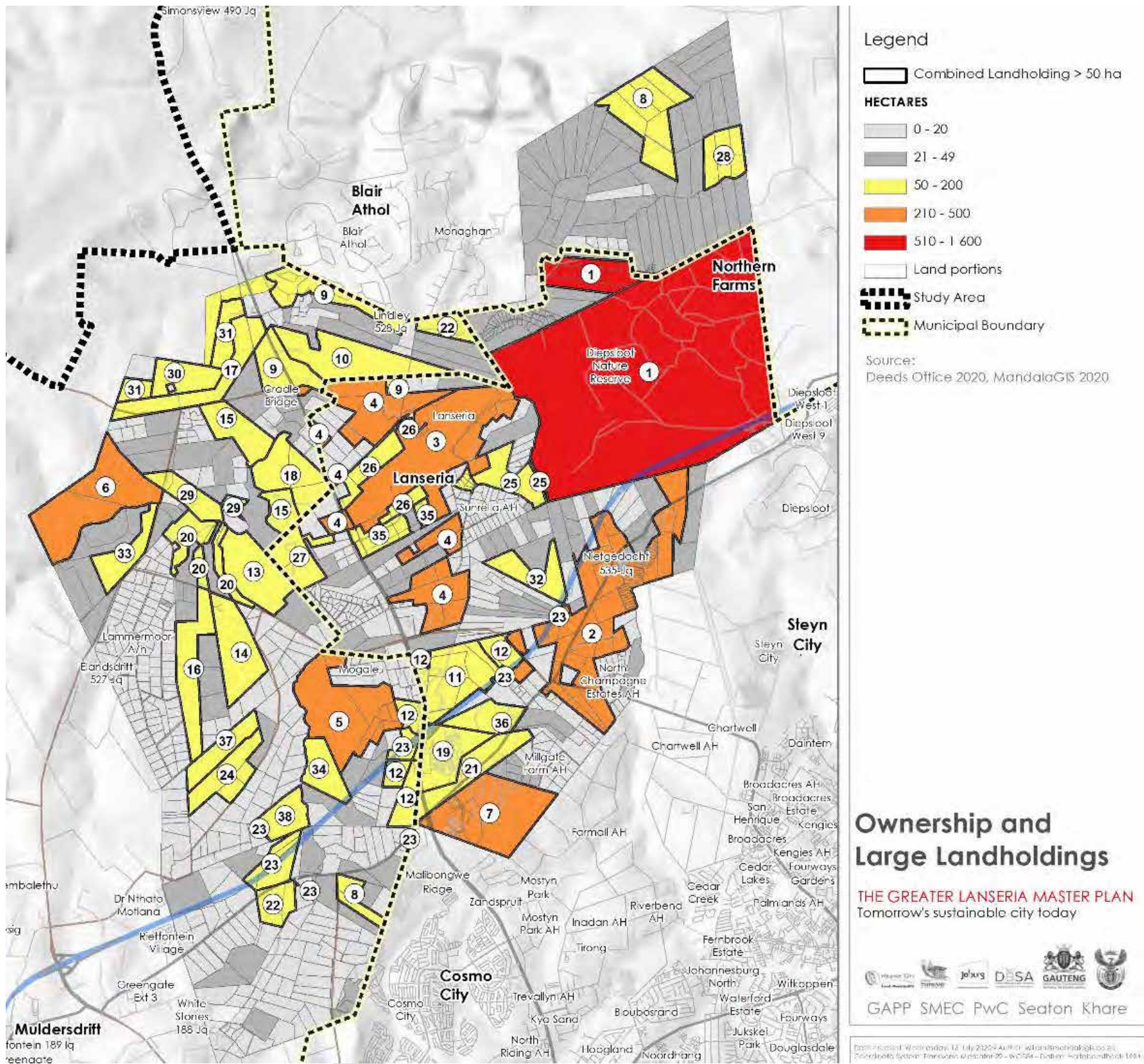


Figure 28: Ownership of large property owners and landholdings in the focus of area of the GLMP (Each number represents a single property owner but names are excluded for confidentiality purposes)

Lanseria Economic Development Initiative: Draft Spatial Economic Development

Report compiled by: Lanseria Airport Development Company and City of Johannesburg, May 2013.

The Conceptual Development Plan includes a series of structuring elements:

- Expansion of the Airport
 - The airport expansion will have an influence on existing regional road planning. As far as the provincial road network is concerned, the alignments of the following roads are severely impacted upon and should thus be taken into consideration: K29 (R512), PWV 3, K33, and K215.
- N14 Development Corridor
 - Land-use shall allow for a range of business, commercial and light industrial land use.
- Activity Corridor with a series of Development Nodes
 - The realignment of the PWV 3 in a southerly direction in order to create space for the expansion of the airport.
- Primary Freight Movement Corridor

- A link road is proposed to facilitate connectivity between the Cargo Terminal as well as the activity corridor to be developed adjacent to the PWV 3 and the K31 provincial road framing the development area in the west.
- Primary Passenger Movement Corridor
 - A link road is proposed that will connect the new passenger terminal with a new connecting road between the K31 and the N14 freeway to the north of the airport.
- Residential Development
 - The band of land holdings to the south of the N14 has been identified as a residential development area where existing developments such as Cosmo City can be linked to the Diepsloot and Olievenhoutbosch residential areas.
- Low-density Residential Development
 - Considered for areas further to the north supported and interspersed by subservient and supporting mixed use development.
- Open Space

The open space system will thread itself through the entire development with more than 40% of the land, forming part of the study area, shall remain zoned as open space.



Figure 29: Spatial Development Concept Plan indicating the expansion of the airport and the realignment of the PWV 3

2.2.10 Social and community facilities access

As recorded in the LRSDP (2017), there are five public health facilities and four private health facilities within the study area. Four SAPS stations cover the area. There are seventeen primary schools, five secondary schools and three combined schools. The current public social infrastructure delivery system is anti-urban and patchy, characterised with gaping, underutilised or completely unused sites set aside for development. Public social facilities cannot be maintained on a cost effective basis. This has resulted in the

private sector providing educational and health sites, resulting in exclusion to people who cannot afford access to private facilities. A combined strategy, from both public and private industries, should focus on building complexity through sharing, clustering and overlapping. Attention should also be paid to the rate of provision and the reduction of site sizes significantly in order to avoid underutilisation. These considerations will give the foundation upon which a rethinking will give way to propositions that address the backlog of delivery whilst paying homage to urban values that promote density and accessibility at community level in the Gauteng region.

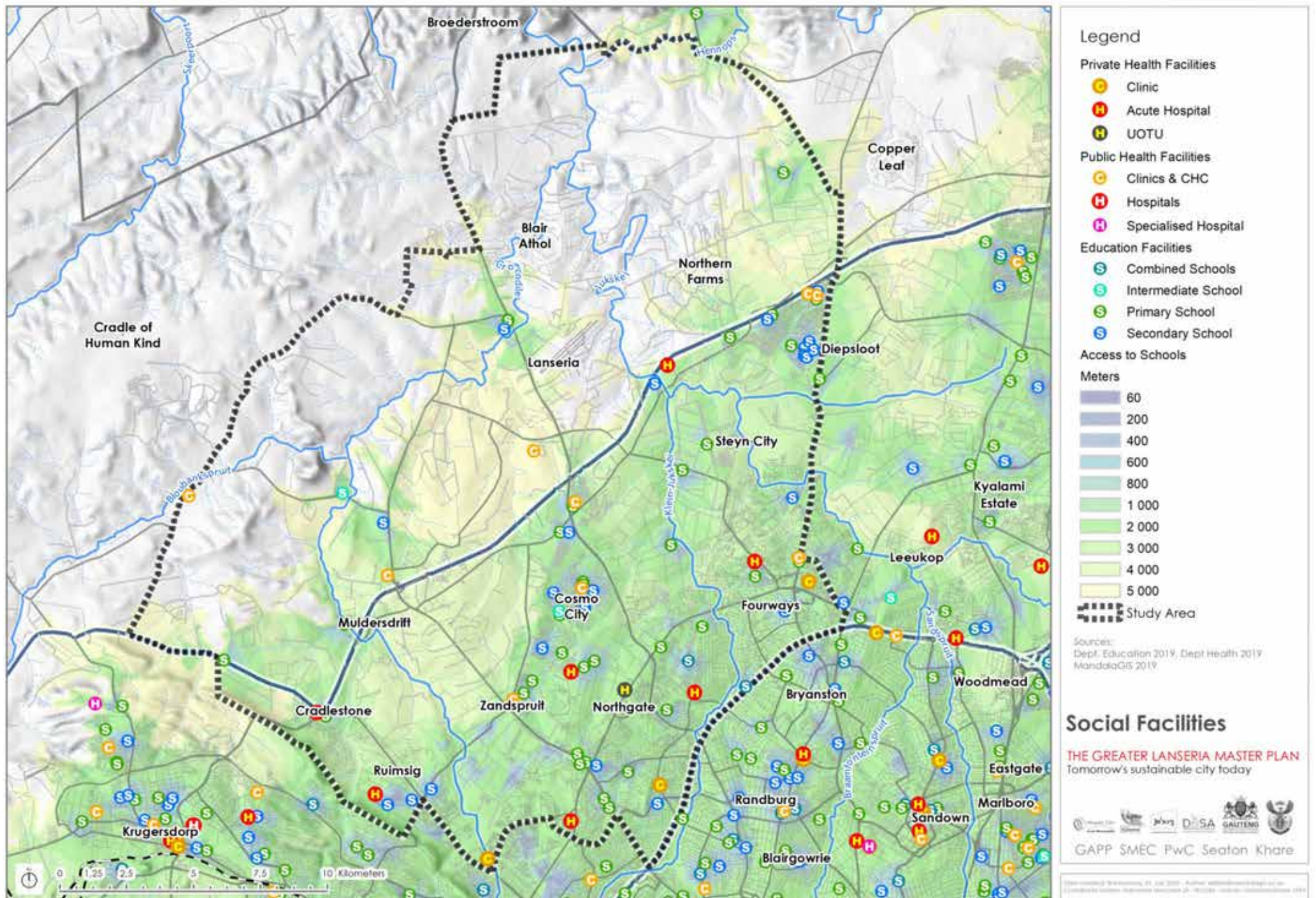


Figure 30: Access to social facilities

2.2.11 Economic access

Lanseria is isolated from major economic activities, as can be seen in the figure below describing economic access and proximity to jobs. There is some agriculture activity in the immediate vicinity of LIA. Industrial activity exists at Honeydew, Lazer Park, Kya Sands and Cosmo Business Park, although this is negligible for economic access of local residents. Housing has been delivered in a segregated approach of gated communities, enclaves of affordable housing, resulting in mono-use, minimum complexity, and housing densities that don't support public transport within the Greater

Lanseria study area. The mono-use of homogenous neighbourhoods results in negative consequences to individuals who have to commute far distances, and spend high proportions of income on public transport to access work opportunities. There is a need to stitch existing communities together into an integrated and mixed use urban profile through integrated street networks that access local economies and use the existing assets such as the Cradle, LIA, the N14 and agricultural opportunities, to create job opportunities for existing communities and accommodate the anticipated growth in this area.

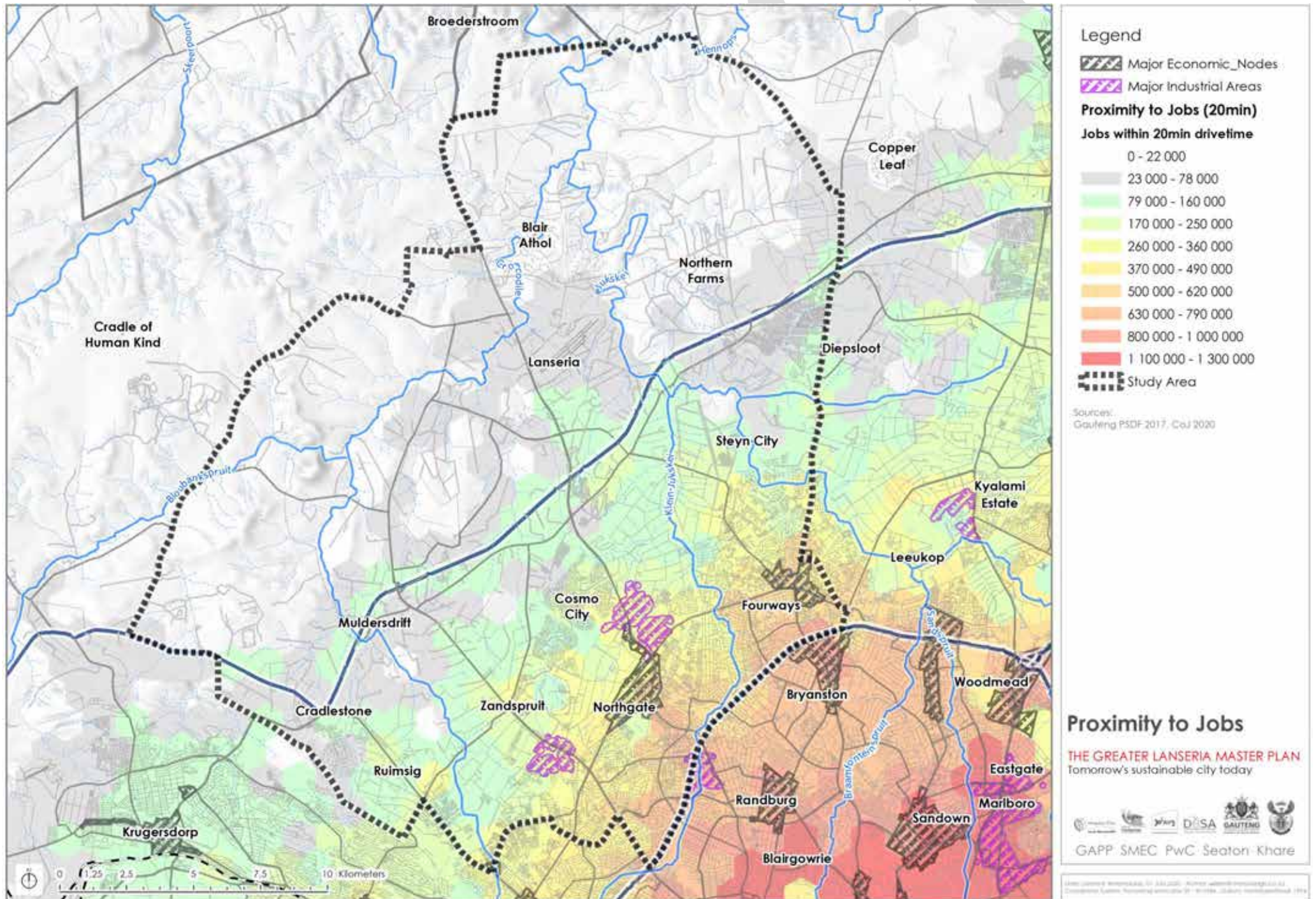


Figure 31: Economic access

2.2.12 Infrastructure

A huge challenge that we face in SA isn't the provision of infrastructure but rather the maintenance thereof, which is generally poorly managed and may lead to adverse effects to the environment and people's health. Isolated planning with a limited view on integrated infrastructure has affected long term sustainability.

Human beings require infrastructure to support their needs. The demand for energy, mobility, water, sanitation, housing, places of work, places of prayer and play are mostly developed in isolation to address a particular need or solve a singular problem.

The demand on infrastructure and resources will further be driven by the rate of urbanisation and population growth rate as indicated in. Figure 32 and Figure 33 below.

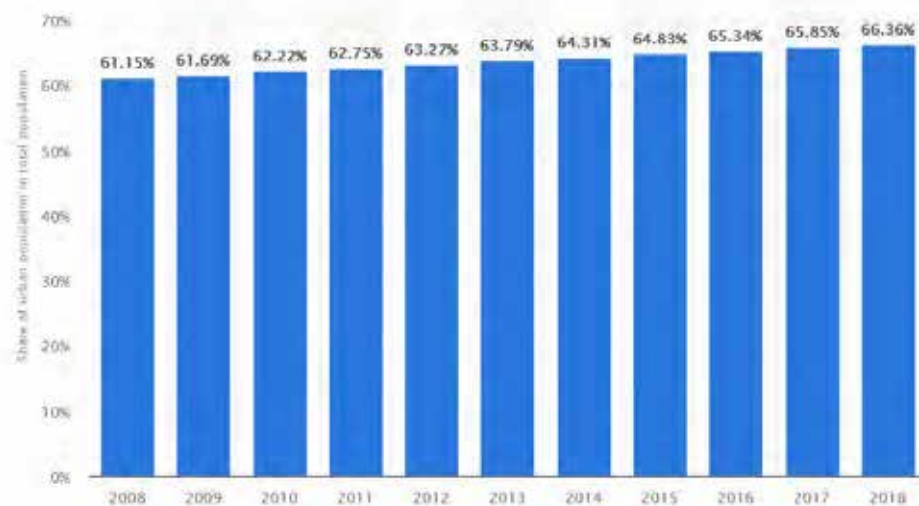


Figure 32: Share of urban population in SA compared with total population (Source: Statista 2020)

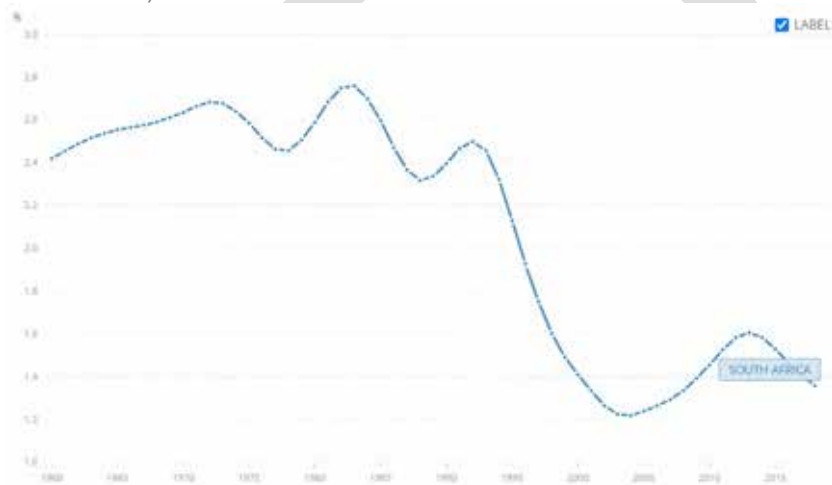


Figure 33: South African Growth Rate % (Source: The World Bank)

Taking the average urbanisation rate from 2008 to 2018 of 0.521%, the portion of South Africa's population staying currently (2020) in urban environments is 67.39%.

The South African population growth rate started to decline in early 1980 as demonstrated in Figure 33. The growth rate in 2018 was 1.358% and seems to be on a slight downward trend. Using the average decline, expected growth rate for 2020 is 1.258%

Adding the urbanisation and the expected growth rate, the estimated population growth in South African city regions is currently 1.78%.

The estimated population for the City of Joburg area for 2020 is 5.783 million. This means that the city must provide for approximately 103 000 additional residents per year.

A holistic systems approach will be required to address the current backlog as well as the future growth requirements. We have the opportunity with the GLMP to create this urban environment where people will want to live, play, work and pray.

The first step towards an infrastructure and transportation master plan is to fully understand the current situation, particularly recognising the needs of communities to determine infrastructure requirements and capacity constraints. This will allow for the prioritisation of municipal service provision for the future situation. Planning visions, strategies and frameworks should be guided by the status quo scenario. This exercise involves research and interaction with the key role-players in the infrastructure space to collect data which will build up the status quo model. The master plan should be seen as a road map that will take the services from their current state to their desired, long-term state by means of a phased approach.

This Infrastructure and Transportation Status Quo Report provides an overview of the current situation in the Lanseria area, with a needs assessment to estimate future service demands and localities for the required infrastructure. The infrastructure components discussed in this report are as follows:

- Water;
- Sanitation;
- Stormwater;
- Solid Waste;
- Electricity;
- ICT;
- Transportation.

Sustainable Infrastructure

This integrated/holistic systems approach needs to be applied at planning stage to create an urban environment where people will want to live, play,

work and pray. The question is then, how is sustainability ensured and what does sustainability mean in this context? This may be answered by another question: Will the planning framework address the future integrated needs of the people? Planners can only endeavour to anticipate these needs to the best of their ability with the test of time being the ultimate proof of their success.

Water

Access to affordable, reliable, safe and high-quality drinking water is a fundamental human right, it therefore plays a major role in the success of a functioning city at a city master planning level. There is extensive South African legislation that denies any development without available water supply.

Rand Water is responsible for the primary bulk water supply in the Lanseria area. It is then the responsibility of the relevant municipality (Joburg Water, CoT & Mogale City LM) to distribute and bill for the water that is consumed by the customers.

The Department of Water's mandate is to be the custodian of water resources in the country, borehole monitoring, issue WUL's, monitoring and compliance, ensuring enforcement (regulator and support).

The information the team currently has at hand shows that water infrastructure is largely limited to the developed areas to the south of the N14 Highway. The only significant exceptions are the bulk pipeline serving Blair Atholl Estate north of Lanseria Airport and the bulk pipeline serving the airport itself. Any development north of the existing development footprint will require additional infrastructure.

Meetings have been scheduled with the supply authorities to obtain further information on the existing and planned infrastructure around the Lanseria area. Refer to the Integrated Infrastructure Report.

Sanitation

The provision of adequate sanitation systems in conjunction with the safe supply of water, is essential for social and economic development and the overall health of a city. Sanitation systems are also very difficult and costly to retrofit into urban environments if space has not been allocated for this infrastructure in the land use planning and the identification of servitudes. It is therefore critical that land is allocated for infrastructure in the land use plans and that the city by-laws make provision for servitudes and right-of-ways that enable the implementation of sanitation infrastructure.

The information the team currently has at hand shows the following:

- The Driefontein Waste Water Treatment Works (WWTW) are located in the western part of the project area;
- The Sandton / Alexandra Works (Northern Works) are located near the eastern boundary of the project area. Information received regarding this infrastructure indicates that there is a hydraulic capacity of 446 Ml/day, but this is running close to capacity;
- There are small works (oxidation ponds) near Pelindaba, these will not be considered as they are small and the technology used in these Works is outdated.

A new proposal for a Lanseria WWTW to service Johannesburg and one at Lindley site to serve Mogale City.

Effluent discharge is regulated with guidelines, but the sporadic increase of package plants is discouraged as it poses a pollution threat. It's a huge challenge for the Department to handle compliance and monitoring.

Many of the septic tanks and package plants in the Mogale Area are substandard and are not desirable for opening up development;

The coinciding area in Tshwane is constrained by the natural environmental constraints, dolomites, and existing reserve area (as well as many portions of land in Mogale) limiting the need server development east.

Rand Water has together with Joburg Water, are looking at sustainable approaches to water and have identified a water reclamation plant at the Northern Waste Water Treatment Works that will take the treated effluent to industrial-grade water, and over time to potable water. A perception change is required for people to understand that "reused" water is safe for many applications. Johannesburg Water has identified potential off-takers, thus Rand Water will reclaim the effluent for Johannesburg Water to retail to its industrial customers. Rand Water is considering a 60 Ml/day plant in the vicinity of the Johannesburg Water Northern Works Waste Water Treatment Works (WWTW). The Reclamation Plant would be developed in three modular units of 20 Ml/day each. The Northern works wastewater treatment plant treats about 430 Ml/day, so there are good prospects of increasing the reclaim plant in the future should there be demand for industrial grade water.

In 1997 the then Greater Johannesburg Metropolitan Council appointed Ndodana, Becker & Associates cc (NBA) in association with Sludge Consult to investigate options for an outfall sewer or pump station and rising main from the Northern Wastewater Treatment Works (WwTW) area to the Lanseria area for the planned new Lanseria WwTW. A report titled "Sewer Pump Station and Rising Main for the Lanseria Area" was completed in 1998 by NBA which identified four possible site locations for the Lanseria WWTW, called W1 to W4, with associated outfall sewer or pumping main. The conclusion of the report proposed that two sites, W2 and W4, are possible sites to be used, and

noted further that W2 is favoured due to Environmental aspects and W4 due to financial aspects.

Stormwater

The adequate provision and maintenance of stormwater within a city is critical to reduce property damage, erosion, flooding, pollution and many other environmental and health and safety issues associated with storm events.

Information on existing infrastructure within the study area was not available for review and inclusion in this report. Perusal of information within the public domain such as spatial development frameworks (SDFs) also did not provide enough context on the capacity and extent of existing stormwater infrastructure within the study area.

Solid Waste

Solid waste management is one of the most challenging issues faced by developing countries due to large solid waste quantities. This causes its management to be a worldwide challenge. Efficient collection and disposal of solid waste is critical to protect the environment as well as the health of the population.

CoJ, Mogale City and CoT have multiple landfill sites, many of which, are reaching their designed capacities. There is a huge drive towards reducing waste-to-landfill, and this being done by implementing Alternative Waste Treatment Technologies (AWTT).

Electricity

The energy sector, and thus the power sector, is systemically and intrinsically linked to almost all sectors of the economy such as transport, housing, manufacturing, agri-processing, mining and ICT services. This linkage to all economic sectors makes the power sector pivotal to the growth and welfare of the economy and critically important to the urbanisation theme. Electricity is an essential driver of modern technology and socio-economic development. Its use is required at low levels for devices such as lights and mobile phones, as well as at high levels for industrial processing activities that contribute to economic value-added products and job creation.

Bulk electricity supply in the study area is provided by ESKOM, primarily at 88kV and 400kV high voltage. In terms of legislation, the municipal entities (City of Joburg, City of Tshwane, and Mogale City) involved remain entitled to invoke first right to service consumers within the respective municipal areas, including service utility formation or agency agreement. Electricity

distribution to consumers within the study area is handled by all four entities, with the Core Area primarily served by ESKOM Distribution.

The establishment of the Ithuba 88kV Substation, comprising new substation and overhead lines, near the Lanseria Airport is the most recent project embarked on by ESKOM Distribution to address load growth in the vicinity of the Core Area. In addition, the Demeter 88kV Substation is planned for implementation in the south of the study area, close to Beyers Naude off-ramp from the N14 highway.

ICT

ICT infrastructure acts as a nerve centre to orchestrate all the different interactions between the elements of a development. ICT is an essential ingredient because it “glues” together all the component parts of a smart sustainable development. ICT also acts as a “great equalizer” – human-to-human, human-to-machine and machine-to-machine – to connect a variety of everyday services, such as water and power utilities, to public infrastructure.

The infrastructure team has been in contact with the Metro Trading Company (MTC), an arm of COJ that is responsible for installation and maintenance of the City's ICT Infrastructure. Spatial information has been received that speaks to the existing infrastructure, the capacity of which still needs to be confirmed.

2.2.13 Policies and plans that guide the GLMP

The GLMP, is premised on the existing policies and plans in place, which include:

- SPLUMA (2013)
- The Integrated Urban Development Framework (IUDF), 2014
- 2030-National Development Plan (NDP), 2012
- National Spatial Development Framework, 2019
- State of the Nations Address (SONA), 2019, 6th Administration, President Cyril Ramaphosa introduces The Seven priorities to focus on for the next 5 years
- Growing Gauteng Together (GGT2030), 6th Administration
- Gauteng Spatial Development Framework 2030 (GSDF), 2016
- Gauteng 25 year Integrated Transport Master Plan (ITMP25), 2015
- Gauteng Integrated Infrastructure Master Plan (GCR IIMP 2030)
- Outer Radial Corridor Proposal- Development and Building of Post-Apartheid Cities: Legacy Projects & Mega Projects, 2015
- Municipal Spatial Development Frameworks (SDFs) – CoJ, Tshwane and Mogale City;

- National Environmental Management Act (Act 107 of 1998)
- National Water Act (Act 36 of 1998)
- National Heritage Resources Act (Act 25 of 1999)
- National Environmental Management: Biodiversity Act (Act No 10 of 2004)
- National Environmental Management: Air Quality Act (Act No. 39 of 2004)
- National Environmental Management: Protected Areas Act (Act No 57 of 2003)
- Lanseria Regional Spatial Development Policy
- Lanseria Integrated Open Space Plan
- Cradle of Humankind Integrated Management Plan
- Tshwane Region 4 Biodiversity Plan
- City of Johannesburg Regional Spatial Development Framework 2040
- Gauteng Provincial Environmental Management Framework 2014
- Environmental Impact Assessment Regulations, 2014
- GDARD Ridges Policy
- GDARD Pollution Buffer Guideline

Legal and policy requirements that guide the environmental and heritage approach to the GLMP and is elaborated on in Annexure B Environmental and Heritage Status Quo, includes:

- The South African Constitution (Act 108 of 1996)

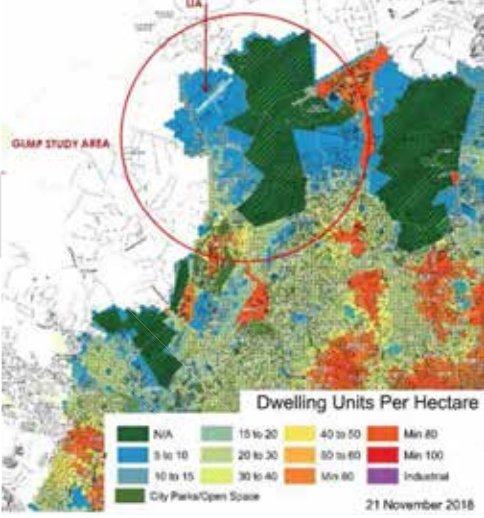
The key policies and plans have been unpacked in the table below, elaboration on each of the policies that guides the specific policy position and sector inputs, can be found in the Annexures to this document:

Urban Structuring Approach	Vision /Goal	Principles/ Strategies	GLMP implications
SPLUMA	Aim is to address the fragmented urban pattern caused by apartheid planning, guiding all spheres of spatial planning.	Principles include <ol style="list-style-type: none"> 1. "spatial justice – addressing marginalisation caused by apartheid planning 2. spatial sustainability 3. efficiency, 4. spatial resilience 5. good administration." <ul style="list-style-type: none"> • Distinguishes between spatial planning and land use management, and establishes a link between the two • Mandates the preparation of "Spatial Development Frameworks" (SDFs) by all three spheres of government, including the "National Spatial Development Framework" • Land development procedures as a uniform approach • The inclusion of the SDF in the integrated development plan • Strengthened intergovernmental support through enforcement, compliance and monitoring processes 	SPLUMA stipulates that provincial government is responsible for implementation of cross-municipal planning. The Greater Lanseria Growth Node is located across three municipal boundaries, and Gauteng Province should direct future planning of the area.
IUDF	Vision of "liveable, safe, resource-efficient cities and towns that are socially integrated, economically inclusive and globally competitive, and where residents actively participate in urban life" (IUDF).	Builds on 2030-NDP, Seeks to address spatial transformation – forge new spatial forms in settlement, transport, social and economic areas (IUDF, 2014:23) <ul style="list-style-type: none"> • 'Integrated transport and mobility • Integrated sustainable human settlements • Integrated infrastructure planning • Inclusive economic development • Efficient land governance and management • Empowered active communities 	

Urban Structuring Approach	Vision /Goal	Principles/ Strategies	GLMP implications
2030-NDP	<ul style="list-style-type: none"> Redressing apartheid spatial logic and space economy, Overcoming the inequities, isolation, fragmentation and costly and disruptive travel distances brought about by colonialism and apartheid. 	<ul style="list-style-type: none"> Effective urban governance' SACN, 2015, 17 <p>Six pillars</p> <ul style="list-style-type: none"> "Uniting all South Africans around a common programme to achieve prosperity and equity Promoting active citizenry to strengthen development, democracy and accountability Bringing about faster economic growth, higher investment and greater labour absorption Focusing on the key capabilities of people and the state Building a capable and developmental state Encouraging strong leadership throughout society to work together to solve problems" 	
NSDF,	<ul style="list-style-type: none"> 'rural-urban interdependency, urban resilience urban safety.' 	<p>'Four strategic goals</p> <ol style="list-style-type: none"> spatial integration, inclusion and access growth governance <p>"nine policy levers" to achieve these goals:</p> <ol style="list-style-type: none"> Integrated urban planning and management; Integrated and sustainable human settlements; Integrated urban infrastructure; Efficient land governance and management; Inclusive economic development; Empowered active communities; Effective urban governance; and Sustainable finances. <p>Sub-Frames:</p> <ol style="list-style-type: none"> Inter-Regional Connectivity (transport) National System of Nodes and Corridors National Resource Economy Regions National Movement and Connectivity Infrastructure System National Ecological Infrastructure and Natural Resource System <p>Acton Areas:</p> <ol style="list-style-type: none"> National Transformation Corridors Central Innovation Belt National Resource Risk Areas National Urban Regions Arid-Innovation Region' 	<p>'Growth of the Gauteng Urban Region, identifies the following principles</p> <ul style="list-style-type: none"> Consolidate urbanisation in compact, productive, sustainable, inclusive and well-governed urban core regions. Utilise innovation, enterprise development and job creation opportunities in (1) agro-eco-industries, (2) tertiary and service sectors, (3) tourism, (4) knowledge-creation, and (5) cultural and entertainment industries. Diversifying the economy and supporting its transition to the secondary and tertiary sectors Creating transformed, well-functioning Settlements' (pg 143)' <p>Development pressure is occurring near the LIA and surrounds; there is a number of marginalised settlements in the area. The above-mentioned principles would thus apply to the GLMP.</p>
SONA 2019, Address in the sixth Parliament on 20 June 2019		<ol style="list-style-type: none"> 'Economic transformation and job creation; Education, skills and health; Consolidating the social wage through reliable and quality basic services; Spatial integration, human settlements and local government; Social cohesion and safe communities; A capable, ethical and developmental state; and A better Africa and World.' 	<p>These views, especially points 1, 4 and 5 would apply to the GLMP.</p>
GGT2030	<p>'A seamlessly integrated, socially cohesive, sustainable and economically inclusive Gauteng City Region (GCR). A place of opportunities, supported by a growing economy, smart, innovation-driven and sustainable industries,</p>	<p>'Contributing to and taking the lead on the President's initiatives of economic recovery, investment, industrialisation, youth employment and the township economy – while also focusing on sectors of the economy with high employment potential.</p> <ol style="list-style-type: none"> Economic growth and job creation Education, skills development and health Integrated human settlements and land release Safety social cohesion and food security A capable, ethical and developmental state Towards a better Africa and better world 	<p>Support of Lanseria City Development Mega housing settlements namely Vaal River City and Lanseria City.</p>

Urban Structuring Approach	Vision /Goal	Principles/ Strategies	GLMP implications
	an accountable, responsive, transparent and clean government, and a healthy, active citizenry.'	7. Sustainable development for future generation.' Identifies a focus and initiatives within each municipality.	
GSDF 2030	'The GSDF 2030 identifies six spatial development principles:' 1. Liveability 2. Concentration 3. Connectivity 4. Conservation 5. Diversity 6. Viability	Four spatial development strategies are to be followed: <ul style="list-style-type: none"> • Capitalising on proximity • Managing new settlement development • Building an economic network • Creating a viable and productive hinterland Ten high-level interventions: <ol style="list-style-type: none"> 1. Intensification of nodes, public transport routes and stations 2. Nodal strengthening, maintenance and enhancement 3. Spatial integration and township regeneration 4. Municipal urban growth management 5. Expansion and integration of municipal BRT networks 6. Enhancement of major road and rail networks 7. Multi-pronged sustained support to outlying settlements 8. Strengthened and enhanced agricultural production and agro-processing 9. Active environmental management and eco-system protection 10. Improved and optimised provincial tourism opportunities' Implementation progress in 2020: 'Although strides have been made in the implementation of GSDF 2030 to respond appropriately in municipal spaces, more still needs to be done to achieve alignment of plans and programmes, both in terms of provincial and municipal SDFs as described below per programmatic response: <ul style="list-style-type: none"> • Development of Sector Spatial Prioritisation Tool for Infrastructure Delivery linked to sector standards, access, supply and demand • Review of the Project Initiation Report template to incorporate strategic spatial and statutory planning considerations • Formulation of Regional Spatial Development Policies and Frameworks (RSDPs/ RSDFs) • Assessment of Municipal Spatial Development Frameworks (MSDFs) • Hosting the Gauteng Planning Forum (GPF)' The GSDF 2030 will be furthered implemented by way of dedicated emphasis on: <ul style="list-style-type: none"> • Coordination, integration and alignment of planning and budgeting within the province to promote spatially informed joint planning between provincial sector departments and municipalities to ensure SPLUMA (and DORA) compliance • Capacity building and improving spatial intelligence in relation to infrastructure delivery in Departments such as Human Settlements, Education, Health and Infrastructure Development to optimise service delivery efficiencies that supports spatial transformation 	A Regional Node 'Provincial Area of Focus' is identified for the Lanseria Airport. This demonstrates the political will for integrated economic development and spatial restructuring at Lanseria, which includes the addition of a future Gautrain station, BRT lines and the PWV5 as a road, freight and public transport route. Refer to Figure 36. A Lanseria Regional Spatial Development Policy (RSDP) was prepared in 2016/17 after the GSDF 2030 was done.
GPEMF		The five EMZs are: <ol style="list-style-type: none"> 1. Zone 1: Urban development zone 2. Zone 2: High control zone (within the urban development zone) 3. Zone 3: High control zone (outside the urban development zone) 4. Zone 4: Normal control zone 5. Zone 5: Industrial and large commercial focus zone 	As the GLMP study area is large and diverse, the area has all 5 zones present. Figure 14: Gauteng Provincial Environmental Management Framework (GPEMF) shows the zones in relation to the GLMP study area.
ITMP25	"An integrated and efficient transport system in Gauteng that promotes sustainable economic	<ul style="list-style-type: none"> • 'Priority public transport corridors • Strategic modal transfer nodes and interchanges • • Freight routes and logistics centres • • Rail as the backbone of an integrated public transport system • 	The PWV 5 is identified as a key connection. Very limited public transport in the form of bus and rail is proposed. Refer to Figure 35.

Urban Structuring Approach	Vision /Goal	Principles/ Strategies	GLMP implications
	growth, skills development and job creation, fosters quality of life, socially includes all communities and preserves the environment."	<ul style="list-style-type: none"> Protection of future priority corridors, future road networks, passenger and freight rail networks, and airports. <ol style="list-style-type: none"> Land Use Development <ul style="list-style-type: none"> Subsidised housing provision within urban core areas Land use densification in support of public transport Strategic Public Transport Network <ul style="list-style-type: none"> Mainstreaming non-motorised transport (NMT) Reinforcing passenger rail network as the backbone of the system Extending the integrated rapid and road-based public transport networks Freight Transport <ul style="list-style-type: none"> Strengthening freight hubs Road Transport <ul style="list-style-type: none"> Travel demand management Continued provincial wide mobility.' 	
Gauteng City Region Integrated Infrastructure Master Plan (GCR IIMP) 2030.		<p>Overarching, inter-governmental, inter-sectoral master plan aimed at realising the NDP 2030 and TMR:</p> <ol style="list-style-type: none"> A globally competitive city region; Collaborative planning and development across the GCR; Clear policy direction to residents, stakeholders and investors; Long-term sustainability through efficient use of resources; Identification and support of new technologies, delivery models and financing alternatives; and Strategic prioritisation of critical infrastructure investments and developments.' 	According to the GCR IIMP, the West Rand District Municipality will create new industries, new economic nodes and a new city will be anchored around the Lanseria Airport and the Maropeng World Heritage Site.
LRSDP		Refer to SECTION 2 CONTEXTUAL OVERVIEW AND STATUS QUO The Lanseria Regional Spatial Development Policy & SECTION 5 MODEL 2: Urban morphological model	Refer to Figure 54.
Outer Radial Corridor Proposal, 2017		Proposes the establishment of an outer radial corridor (Error! Reference source not found.Figure 52). This forms the north-western corridor of Gauteng in an arc along the N14 from Mogale City CBD (Krugersdorp) via a series of nodes, including Lanseria, the Malibongwe / N14 interchange and Diepsloot, and onward toward Centurion. Proposals include the establishment of a development lattice utilising the proposed provincial road network and new links, together with the existing major and local route networks. This work outlines sets the basis to achieve the development of the N14 Lanseria corridor.	This corridor is located within the study area, which is planned to integrate previously marginalised communities and new human settlements initiatives.
CoJ SDF	'create a spatially just city' A City that is compact, inclusive, connected, resilient and generative	<ul style="list-style-type: none"> 'Integrated open space network and biodiversity Transformative zones Strengthening Johannesburg CBD TOD / Corridors of freedom Enhancing Soweto, Randburg-ORTIA development corridor Unlocking the mining belt Consolidation zone Transformed spatial economy Reinforcing the Development boundary' 	LIA is identified as an industrial node with urban development around it. A large portion of the GLMP falls outside the CoJ urban development boundary. Refer to .
CoJ Policy Nodal		<ul style="list-style-type: none"> Creating distinctive, attractive environments with a strong sense of place and local ownership; Land use intensification and densification that provides additional opportunities for intensity development, but that are designed to activate the street and increase the number and diversity of users; Creation of a range of housing opportunities and choices to address a wide spectrum of housing needs and achieve socio-economic integration; Land use and transportation integration, by strengthening and directing development around transit amenities and in so doing increase public transport ridership; 	This policy identifies the study area as having limited development potential, such as peri-urban and sub-urban, which supports low intensity (5-10du/ha) predominantly residential uses.

Urban Structuring Approach	Vision /Goal	Principles/ Strategies	GLMP implications
		<ul style="list-style-type: none"> • Creating pedestrian friendly environments by providing a high-quality streetscape that create a comfortable environment for pedestrians; and • Promoting alternative modes of transportation to the private vehicle, e.g. walking and cycling. • The focus areas of the guidelines and form-based codes are: Precinct, Neighbourhood and Street Character & Identity (Collective & stakeholder participation development approach, streetscape design, heritage and architecture, views and vistas, scaling, public amenity and safety). • Accessibility and Permeability • Land Use Intensification (Mixing) • Height and Scale • Defensible Space and Spatial Hierarchy • All rescinded by the Nodal Review Policy, as stated: <i>"This Nodal Review will rescind all sub area tables in the RSDFs, and RSDFs should be used for information only (including heritage/environmental information where relevant). Guidelines in the SDF 2040 and this nodal review will override sub-area tables in the RSDFs"</i>. 	
Mogale City			<ul style="list-style-type: none"> • The SDF Identifies the N14 for development potential, linking Krugersdorp CBD north past Lanseria. • Most of the area is identified for ecotourism. • Hendrik Potgieter/K38 is identified as a tourism corridor • A precinct framework has been defined along the N14 for urban consolidation
Madibeng SDF	<p>The SDF ought to:</p> <ul style="list-style-type: none"> • Provide a mandate of the desired spatial patterns in the municipality and give direction to private investors; • Address spatial reconstruction of the municipality; and <p>Give strategic guidance in terms the nature of development and spatial location of such development</p>	<ol style="list-style-type: none"> 1. Development of Urban Areas Brits and Hartbeespoort Dam Area 2. Reinforcement of Rural Service Centres 3. Tourism and Conservation: Hartebeespoort, Kosmos, Skeerpoort, Hartbeespoort Dam, Pienaars Dam, Damdoryn, Magaliesberg Biosphere, Nature Reserves, Conservation Areas, Heritage Sites 4. Agricultural Development Northern and Western portions of municipal area (Functional Zone 3 and Functional Zone 4) 5. Transport Linkages Road Infrastructure, Rail Infrastructure, Beestekraal 6. Townships Lethlabile, Hebron, Moinooi, Bapong - reinforcement as a growth point 7. Corridor Development Brits/Roslyn, Mabopane/Centurion, N4 National Road, R512 Regional Road, R511 Regional Road 8. Mining Areas Marikana, Sunway Village, Wonderkop, Rankotea, Bosfontein Facilitate the Enforcement of Environmental Management Frameworks 	<ul style="list-style-type: none"> • Agricultural development west of Hartbeespoort Dam. • Tourism and Conservation of Hartebeespoort Dam Area. • Development of Urban Areas Brits and Hartbeespoort Dam Area. <p>These interventions share an influence on the attraction of Lanseria.</p>
City of Tshwane Spatial Development Framework 2012 and Urban Development Boundary		<p>The Tshwane SDF development principles aim to:</p> <ul style="list-style-type: none"> • Establish higher density urban development, • A greater mixing of compatible land uses and, • Focused concentration of high-density residential land uses and intensification of non-residential land uses in nodes, around transit stations (such as the Gautrain, BRT, Rail and other formalised intermodal transport facilities). <p>The areas directly adjacent to the Lanseria development area in Region 4 are described as a biodiversity zone that contains sensitive protected areas. These areas are important in terms of nature conservation and must be maintained to ensure biodiversity integrity and its rural character per</p>	<p>The study area is located outside of any identified nodes in terms of the approved 2012 MSDF and the draft 2020 MSDF. The area also falls outside the urban edge therefore compaction, densification and high intensity development is currently not supported.</p>

Urban Structuring Approach	Vision /Goal	Principles/ Strategies	GLMP implications
		<p>the RSDF and the C-Plan. Additionally, the Cradle of Humankind World Heritage Site “buffer zone” falls within the sensitive protected area. Uses permitted in the sensitive areas include low-density housing (1 unit per 10 ha) that comprise of low development footprints (5%) and no development permitted on certain ridges and conservation areas. The RSDF proposes :</p> <ul style="list-style-type: none"> • Sensitive protected areas restrict prevent development in the areas adjacent to Lanseria airport, Northern Farm and immediately north of Diepsloot. • The Tshwane urban development boundary is demarcated by the R511 / M26. • Mixed-use development adjacent to Diepsloot to the north east. Areas marked for future urban development north-east of Diepsloot. • Urban development prohibited immediately north of Diepsloot. Retention of small-holdings and <p>The RSDF limits urban development west of the R511 / M26. It does propose limited mixed business development support in relation to the eastward expansion of Diepsloot. The possibility of establishing a mixed-use node around the Diepsloot interchange is not considered. Sensitive protected areas prevent development in relation to the Lanseria airport node.</p>	
City of Tshwane Regopma; Spatial Development Framework 2018		<p>The Region 4, RSDF identifies the area immediately north of Lanseria as environmentally sensitive areas in line with Tshwane's Bioregional Plan. In addition to the environmental layer, another layer with regards to what kind of development may be considered and under what circumstances is the Management Zone layer. The Management Zones are areas not considered suitable for urban development as they are not well located in terms of the larger urban structure and areas of opportunity and/or are characterized by environmental sensitivities as indicated by the C-Plan and Tshwane Open Space Framework. From the context of metropolitan area these zones are important and needs to be protected.</p> <p>Blair Athol Residential Estate development was approved as a low impact residential estate that meets the requirements of developments within Management Zones. The MSDF 2020 draft does not depart from the environmental layers of the Bioregional Plan 2018 or the Management Zones of the RSDF 2018. These have been retained.</p>	<p>The section within the Tshwane RSDF is located in an environmentally sensitive area and rural development such as low density eco and equestrian estates can be supported, provided that the required engineering services are available to support the development.</p> <p>Uses to be supported, in principle, within the management zone would be Lodges, Wedding Venues, mini storage, place of refreshment; children party venues and ancillary uses. The availability of services and the ease of access to major roads will play an important role in the evaluation of these uses.</p> <p>Uses serving the rural population and surrounding urban areas should be concentrated in Community Service Centres as indicated on Region 4 Rural Component Plan. Locations at the intersections of major roads will be supported.</p>

VISION, SPATIAL LOGIC AND SPATIAL LEVERS

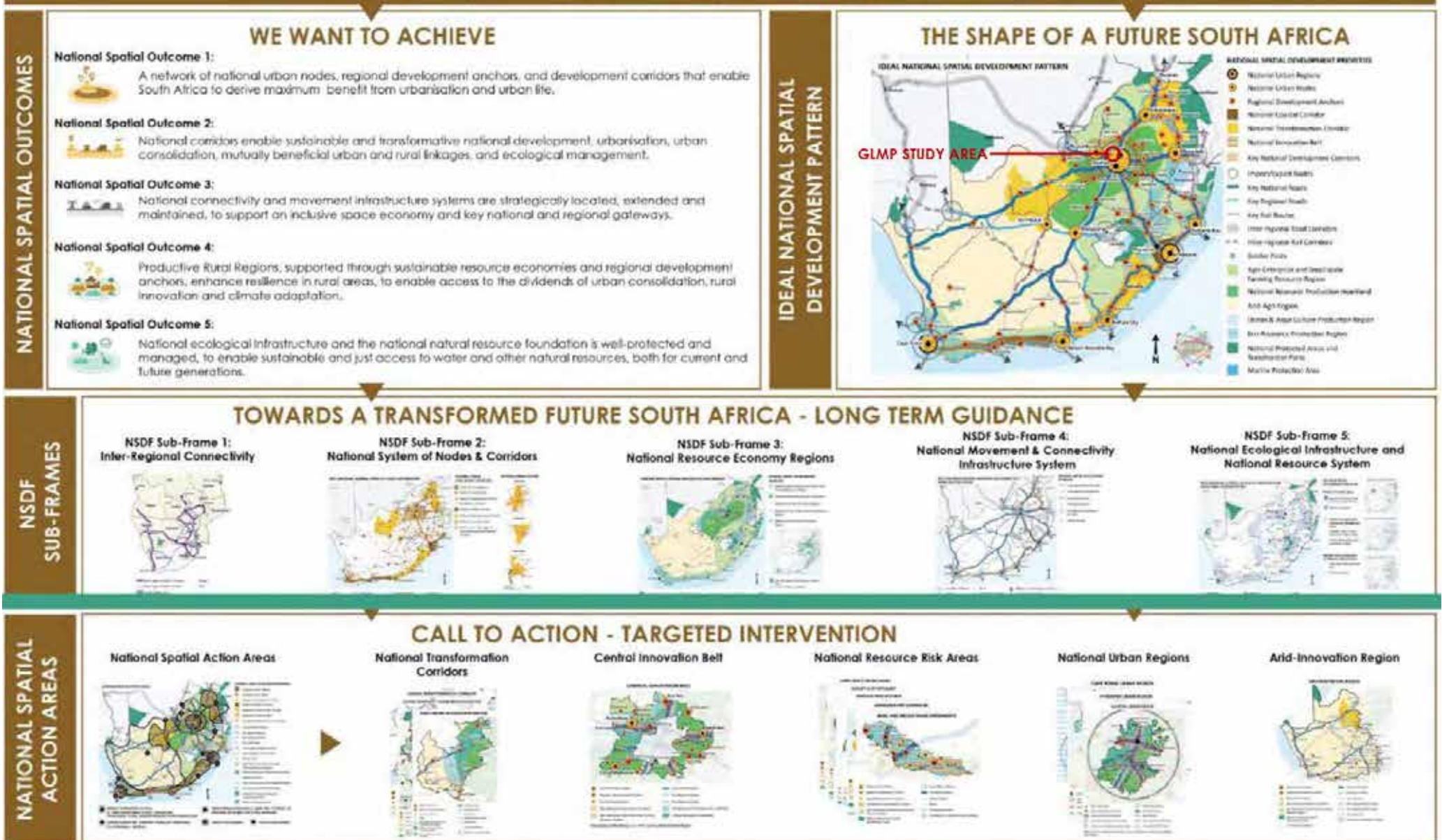
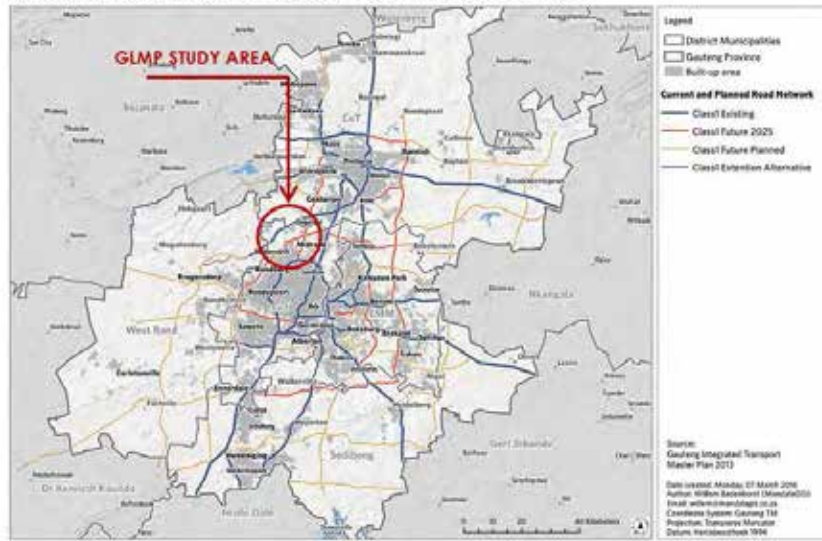
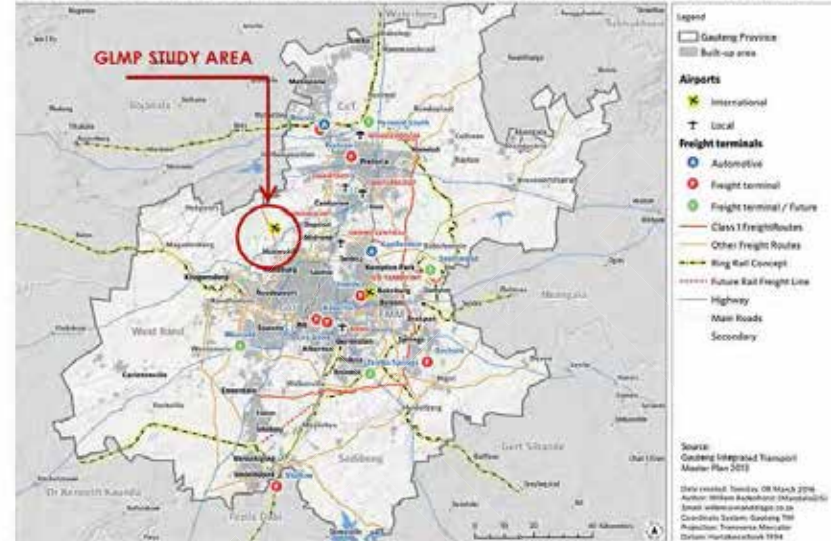


Figure 34: NSDF

Gauteng SDF 2030: Integrated Transport Master Plan 2013 - Class1 Roads



Gauteng SDF 2030: Integrated Transport Master Plan 2013 - Freight Transport Network and Airports



Gauteng SDF 2030: Integrated Transport Master Plan 2013 - Rail and Bus Passenger Network

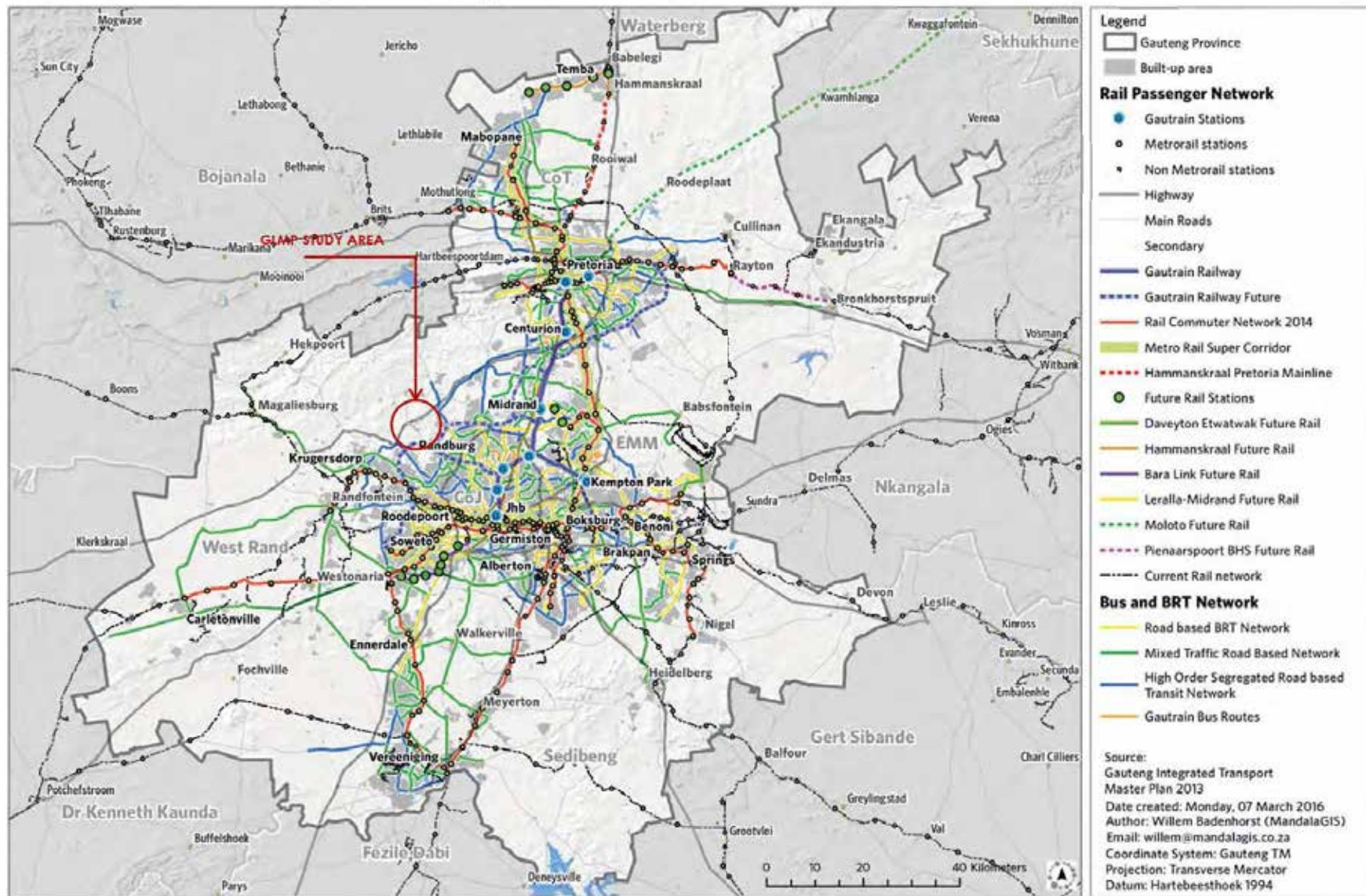


Figure 35: Gauteng Integrated Transport Masterplan – Public Transport, Road and freight proposals

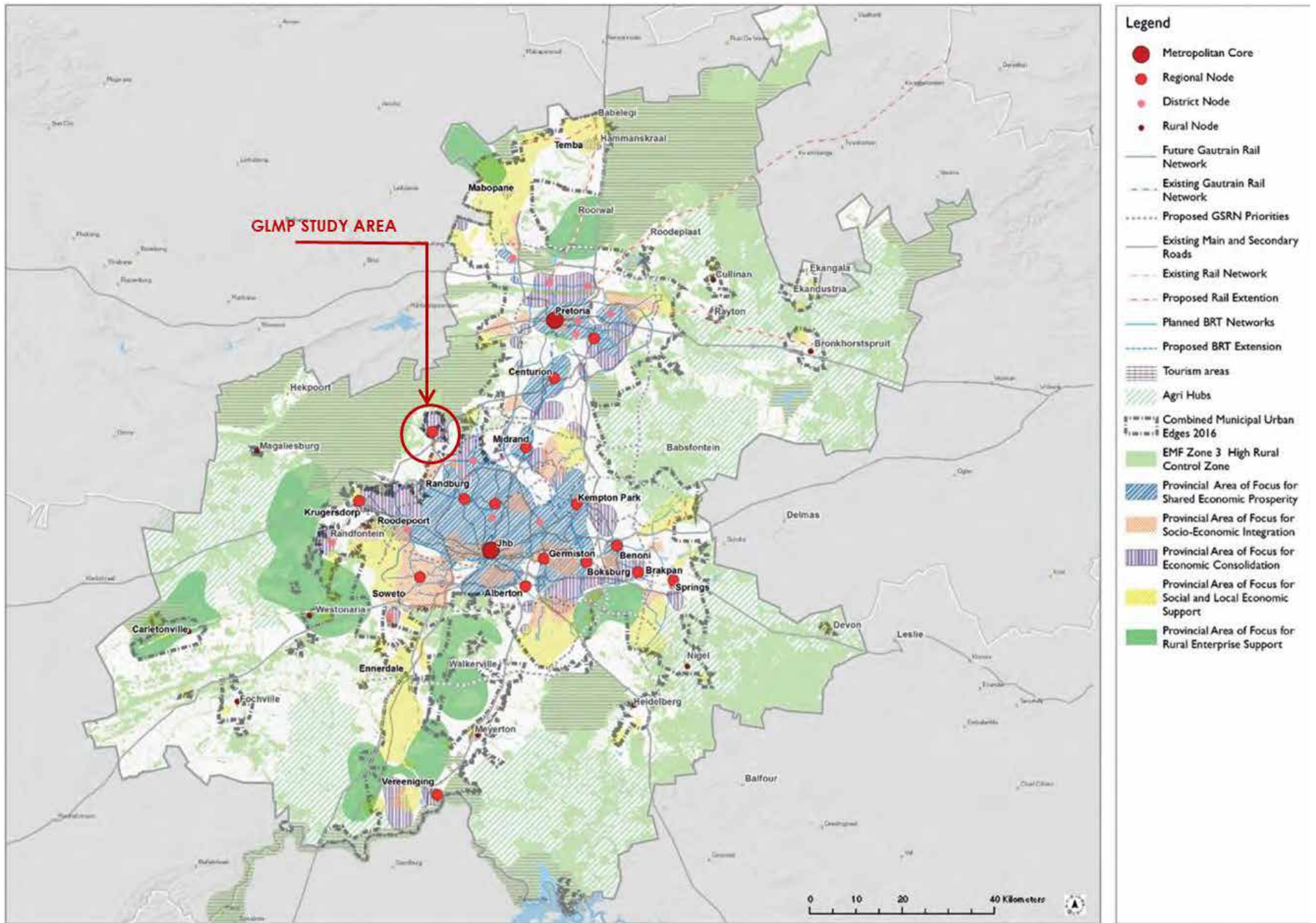


Figure 36: Gauteng SDF 2030: Spatial Development Framework and Provincial Area of focus (source: page xiii)

Madibeng SDF Legend, 2018

Tshwane SDF Legend, 2018

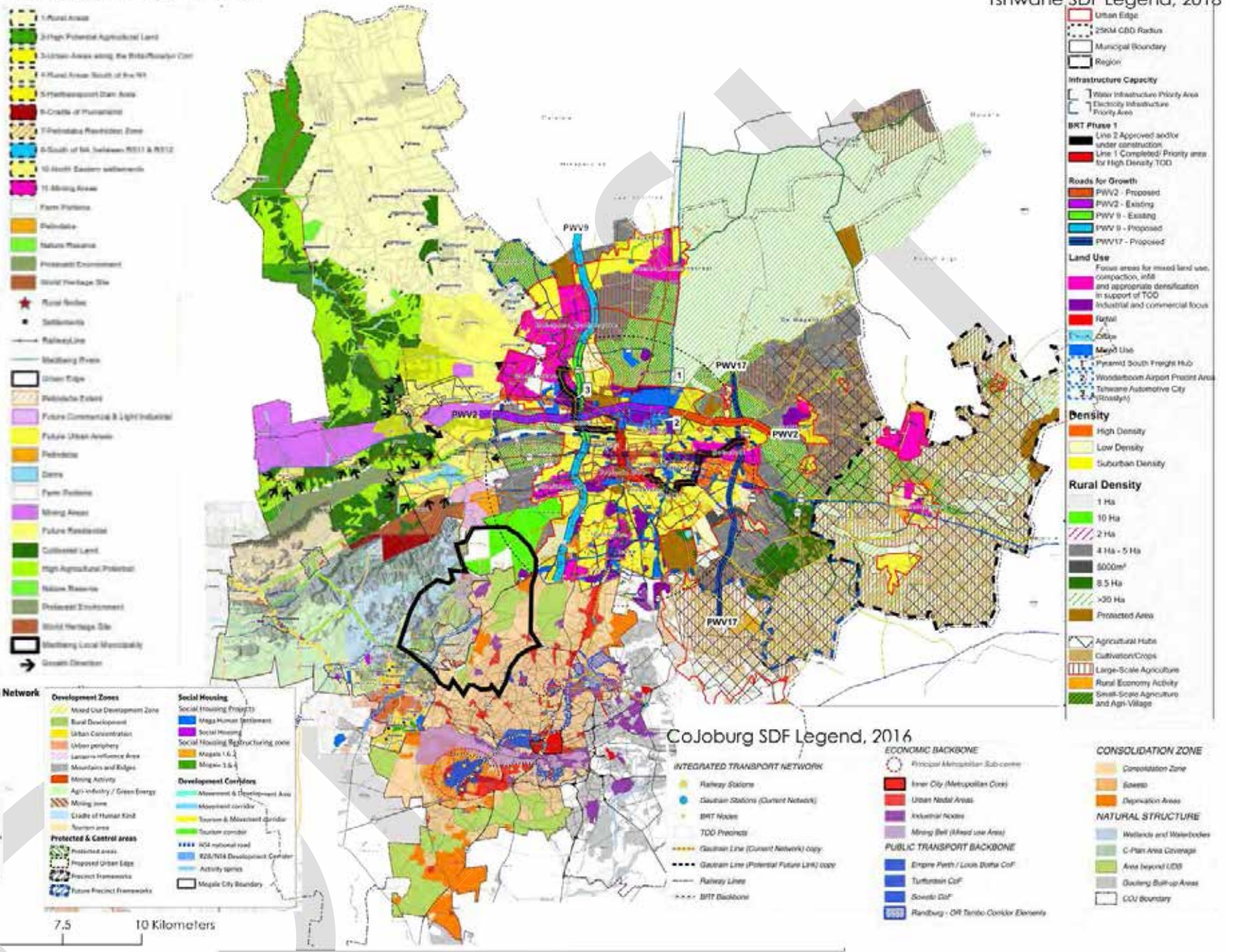


Figure 37: Collated Municipal SDFs for Mogale City (2018), Tshwane (2018), CoJ (2016) and Madibeng (2018)

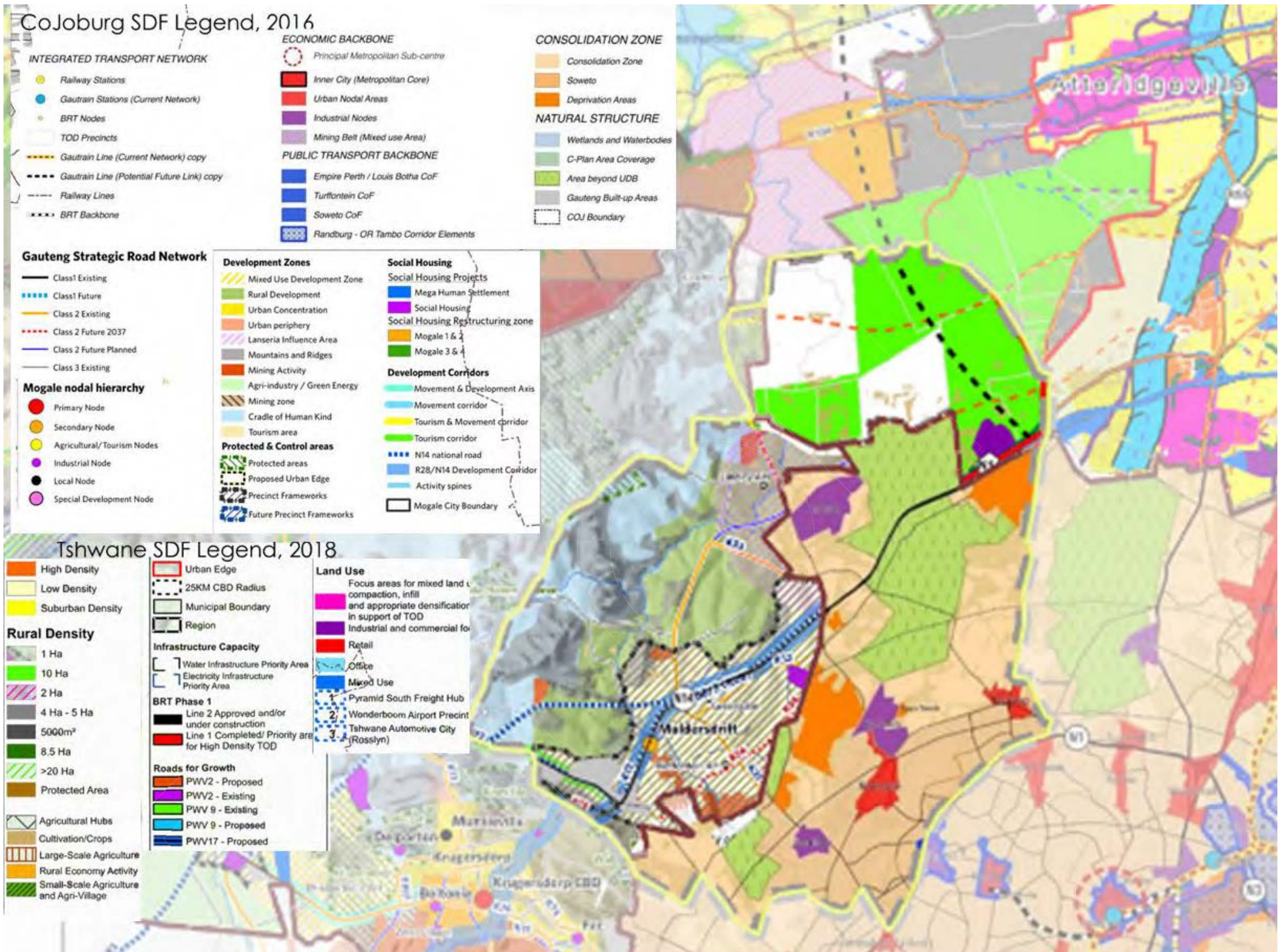


Figure 38: Collated Municipal SDFs for Mogale City (2018), Tshwane (2018), CoJ (2016) and Madibeng (2018) focusing on the study area

2.2.14 Municipal urban development boundaries (UDB)

The municipal urban development boundaries of CoJ, Tshwane and Mogale are delineated in the **Error! Reference source not found..** The UDBs are defined in order to limit urban sprawl and create an ecological resource for the protection of biological diversity, food production, tourism, leisure and recreation. Development and infrastructure investment is not supported in areas located outside the UDB unless they comply with the municipalities' intentions of biological diversity and leisure and tourism.

The CoJ UDB limits consolidation of development along the N14, and prevents east-west connections between existing developments of Diepsloot, Cosmo City, Steyn City and Kyalami. The interface of Mogale's and CoJ's UDBs results in gaps between development and should be reviewed.



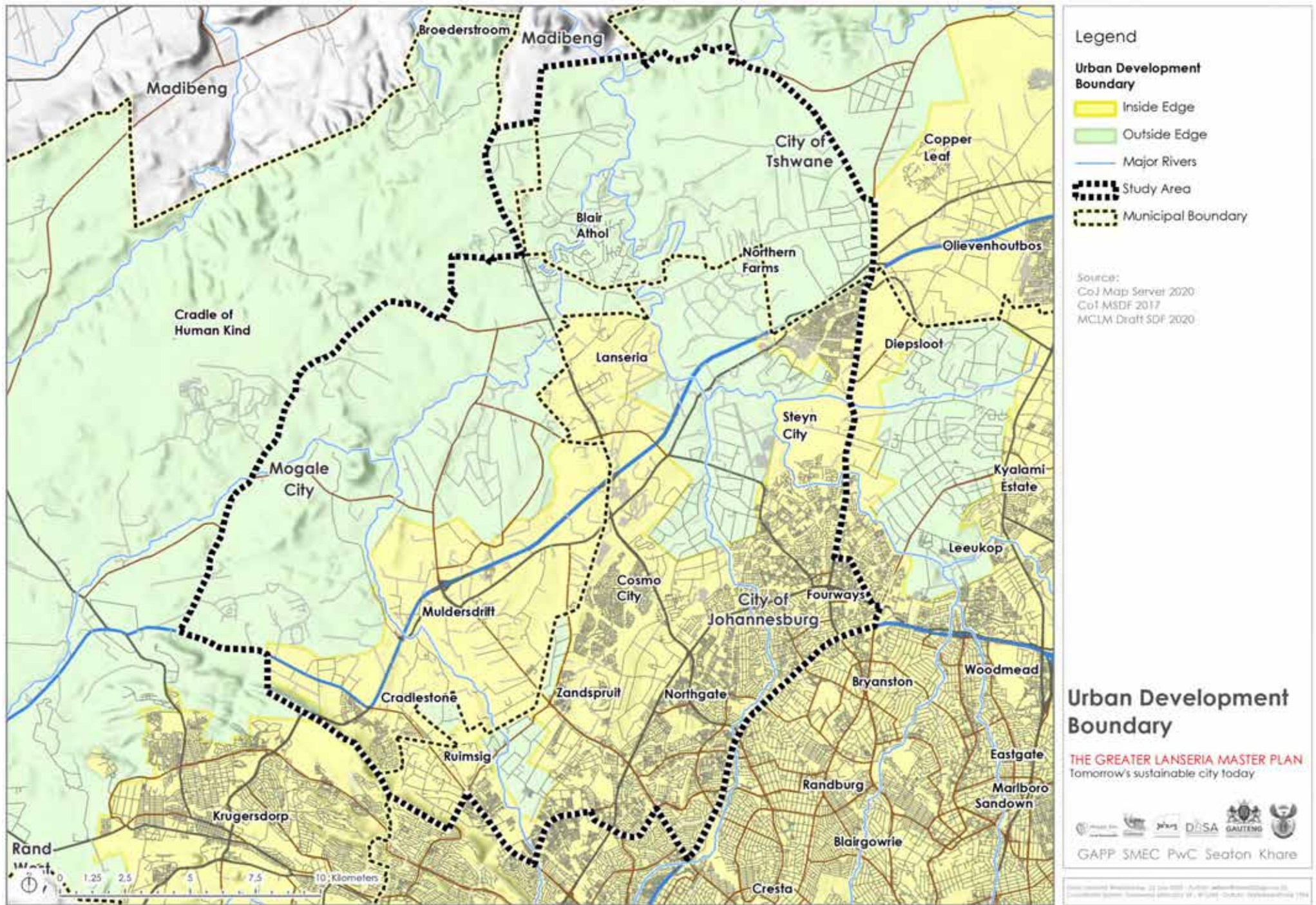


Figure 39: Municipal Urban development boundaries

2.3 Summary of findings from the context and status quo

	CONSTRAINTS	OPPORTUNITIES
MOVEMENT AND CIRCULATION	<p>There is limited road infrastructure in the wider study area, with limited local road network and regional east-west and north-west connections that tie back into the urban system.</p> <p>The Class 2 routes give limited local access which prevents walkability, local economic access. These are very costly to build.</p> <p>New K-routes and PWV routes are proposed in the study area, but are not planned any time soon, sterilising land and development for years to come.</p> <p>There is no rail network, both for passengers and freight.</p>	<p>Maximising the existing infrastructure spend of the N14, R114 and mobility routes.</p> <p>Potential to reconsider the approach to the road network to enhance economic potential and walkability.</p> <p>Opportunities for a grid of regional and local connections to elicit future nodal development and activity corridors.</p> <p>Scope for Transit Oriented Development (TOD) around major transit nodes.</p> <p>The LIA has an opportunity for an expanded freight facility.</p> <p>Gautrain linking to Lanseria will create opportunity.</p>
OPEN SPACE NETWORK AND GEOTECH	<p>Extensive waterbodies and buffers may prevent the consolidation of development in strategic areas, preventing connections and buildings from being consolidated</p>	<p>Extensive environmental areas, agricultural activities, wetlands and most importantly the Cradle is an asset that can serve as a regional opportunity for economic, tourist, recreational and conservation.</p> <p>Most soils in the area have favourable properties for development.</p>
LAND USE AND ACTIVITY	<p>Existing development has occurred on an ad hoc basis, with very little direction resulting in car-based environments, with densities that are too low to support public transport, such as Fourways, Douglasdale, and Broadacres.</p> <p>Priority Human Settlements and Gated housing development areas are located in the study area which may limit integrated housing development.</p>	<p>Potential to guide and transform the study area into a compact, complex urban form.</p>
GREATER LANSERIA REGIONAL POLICY	<p>Land use proposals and guidelines are at a high level and not always practically implemented by municipalities and developers.</p>	<p>There is scope for more diversified nodal development and land use.</p> <p>Potential to refine the road and transport network.</p>
SPATIAL POLICIES	<p>A number of policies national, provincial and municipal, guide the underpinnings of sustainable urban development</p> <p>Municipal plans, with their own urban edges and plans are not always integrated don't identify Lanseria Growth Node</p>	<p>Potential to incorporate policy into a local plan</p> <p>Potential for collaboration with municipalities to work together to achieve the spatial transformation.</p>
DEVELOPMENT PROPOSALS ECONOMIC POTENTIAL	<p>Development pressure exists without leadership. This could occur at very low densities resulting in sprawl</p>	<p>There is pressure for development and potential for guiding development appropriately.</p>

<p>INFRASTRUCTURE</p>	<p>There is limited infrastructure and funding for infrastructure which can limit the development approach. The WWTW key to unlocking development</p> <p>The cross-border issues makes delivery of infrastructure challenging.</p>	<p>Potential for alternative approaches to infrastructure delivery with green infrastructure opportunities.</p>
<p>DEVELOPMENT CONSTRAINTS AND OPPORTUNITIES</p>	<p>Permanent and long term development constraints (wetlands, mine dumps, slimes dams and gold reefs) are major physical barriers.</p> <p>Thus development potential is reduced and goals of integration between the north and south are compromised.</p> <p>WULAs, Section 70 of 1970, EIAs all delay the approval process for development.</p>	<p>Vacant land holdings are an opportunity for new development.</p> <p>Opportunities for a grid of regional and local connections to elicit future nodal development and activity corridors.</p> <p>The environment assets offer an opportunity for conservation and recreational opportunities.</p>

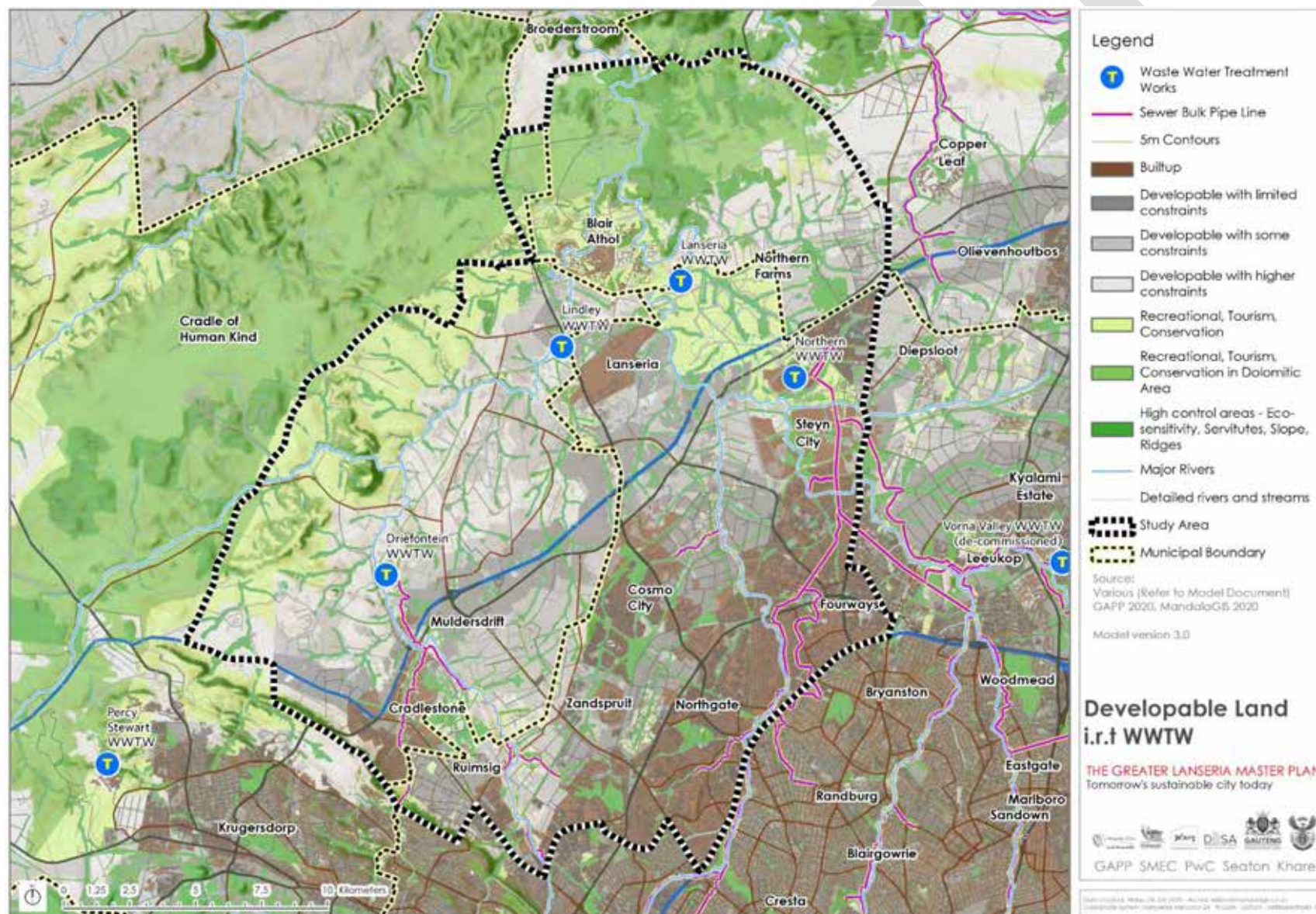


Figure 40: Development opportunities and constraints with the WWTW / Waste Water Resource Centres

SECTION 3 | GREATER LANSERIA AS A CONCEPT

Urban sustainability as the basis for transformation, re-industrialisation and modernisation (TRAM),

This includes, and builds on the 4 Cs defining the LRSDP of building Community, Concentration, Connections and Conservation:

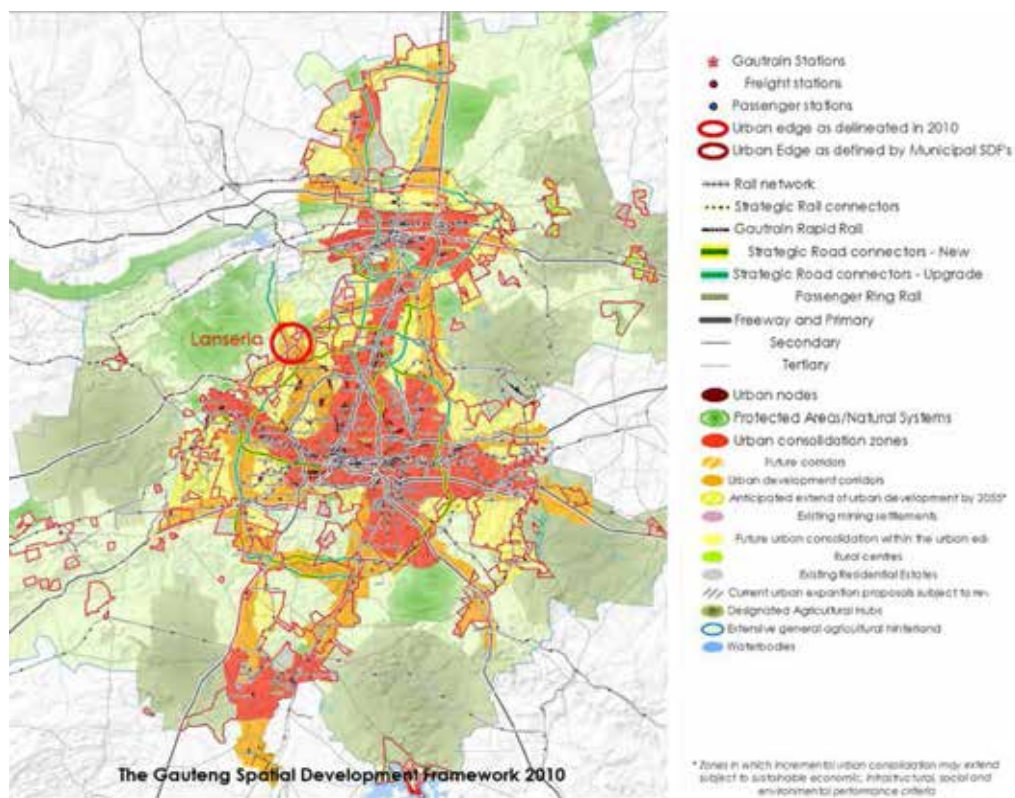
- Compact in extent (with emphasis on walking distances)
- Complex in activity pattern (mixed-use, intense, dense)
- Structured on social integration (spatially inclusive and democratic)
- Growth of local economies (integration of dual logic economies)
- Public transport based (Mass transport and feeder systems)
- Reducing the need to commute (NMT as a default movement system)
- Incorporation of ecology and bio-diversity
- Energy efficiency (through spatial pattern/ waste-to-energy production)
- Smart cities and smart infrastructure
- Next generation logistics hubs
- Appropriate service infrastructure
- Urban agriculture (as an integral part of the urban economy)

Regional development concept:

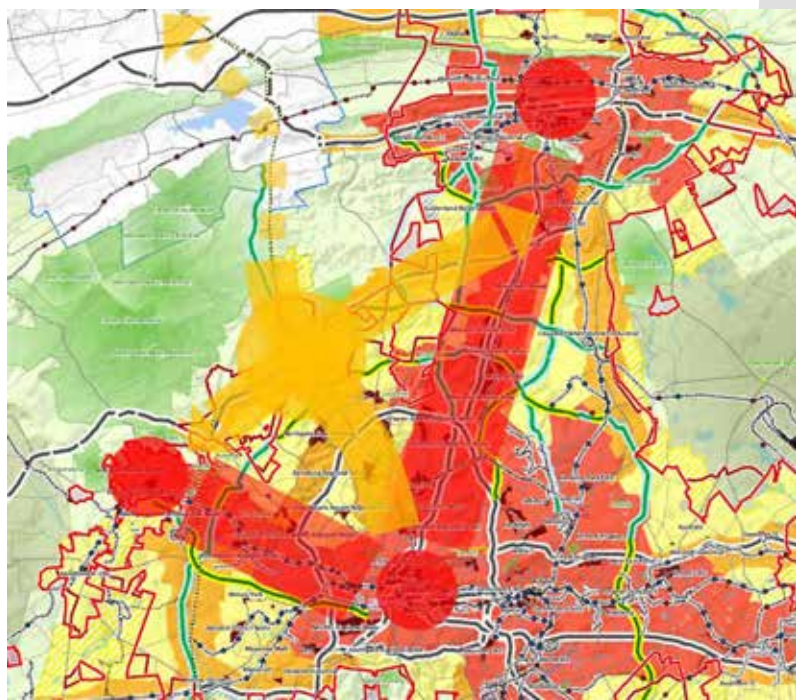
- This project is to represent, in all respects, a truly 'post-apartheid' spatial intervention in the GCR;
- It is to be an exemplar, clearly showcasing the transformation, re-industrialisation and modernization (TRAM) of this portion of the GCR;
- It will be a publicly-led initiative that will embrace and direct the market and be defined through the public dimensions of the inclusive, democratic city;
- It will embrace change and move beyond the limits of 'business-as-usual' in all respects;
 - through its inclusivity across a broad socio-economic profile;
 - through its active stimulation of a dual-logic economy;
 - through the direction of market related development responses to greater societal objectives;
 - through its exploration of new paradigms of urban thinking, sustainability and innovation embodied in all dimensions of the 'Smart City';
 - through its re-thinking of utility provision and innovative funding models;
 - Through its re-thinking of institutional models of urban development and management.

The intentions of the GSDF 2010 were always clear, as demonstrated in the following figures:

1. It is indeed necessary to consolidate urban development within the marginalised periphery of the GCR as a whole by ensuring that it becomes a naturally-occurring, integral part of a wider urban structure;
2. To this end, a radial corridor on Johannesburg's western edge was seen as a consolidation element based on road infrastructure that exists, or is planned, together with selective amendments and additions to this road thinking;
3. This radial corridor thinking is in fact developed in more detail in the Central Corridor project of 2017;
4. In relation to the Greater Lanseria area, this radial corridor has always been indicated, in GSDF 2010 thinking, along the N14 highway and selective parallel route enhancement and support needed to achieve a truly viable 'urban corridor';
5. Similarly, an enhanced activity spine predicated on Malibongwe Drive was highlighted as an important north-western consolidation route generally linking the Johannesburg city centre, Sandton, Randburg, Fourways and Broadacres out to Hartebeestpoort Dam (and Brits, Rustenburg and Botswana beyond) via Lanseria Airport;
6. The motivation, in this sub-region of the greater GCR, for these two elements of intensification and consolidation was specifically to redress the continued marginalised sprawl that is in evidence (and continues to grow) in and around the Cosmo City/Diepsloot fringe;
7. It was precisely for this reason that the wider Lanseria Airport area was ear-marked as a potential nodal project that should be prioritised as a basis for intervening in this portion of the GCR marginalised fringe and creating more urban prospect for these marginalised communities.



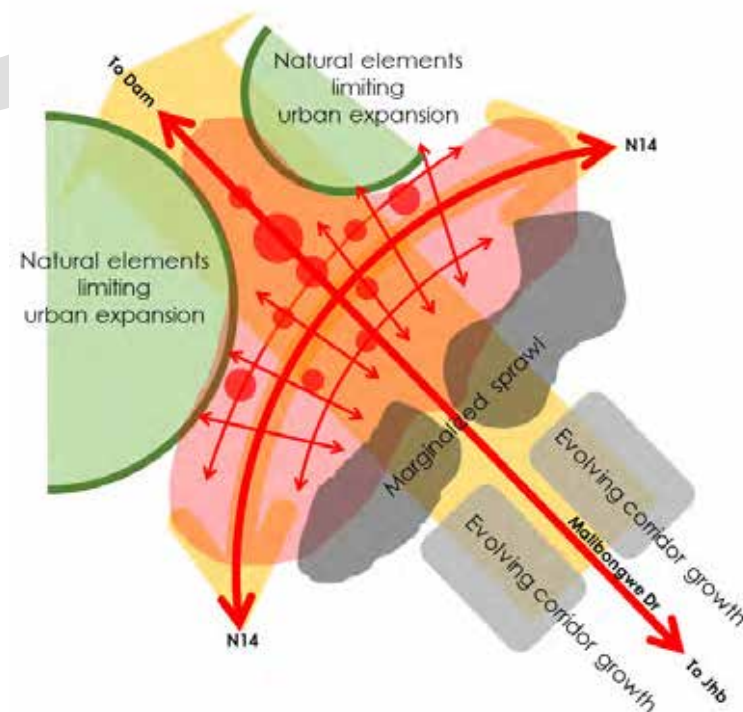
The GSDF of 2010 showing the Lanseria area at the crossing of two elements of urban consolidation: the Radial Corridor defined along the N14 and the Activity Spine focused outward from the JHB CBD to Hartebeestpoort Dam via Lanseria Airport



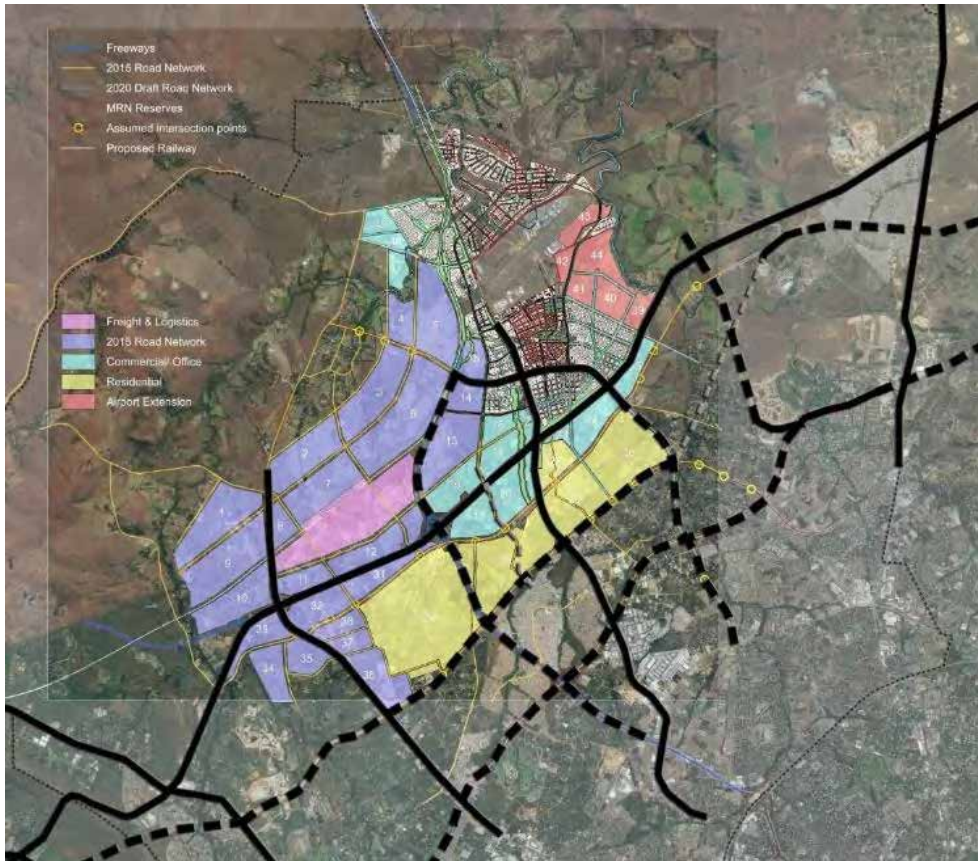
Zooming in on the north-western sector of Johannesburg within the intentions of the GSDF 2010

The approach to stitching gated and marginalised communities into the city region via an adequate level of street network.

The existing development energy is along Malibongwe Drive, where a number of existing residential enclaves and marginalised communities exist, located in Cosmo City, Zandspruit, North Riding. There is a need to integrate and stitch these settlements into the urban fabric through primary and local road connections. Roads are the life-blood of cities, as they carry economies. It is important that activity spines of Malibongwe Drive, William Nicol Drive and Beyers Naude Drive are established to support the N14 development corridor. Investment into these direct road connections remain a priority, as the roads come from somewhere important (such as an economic node) and go to somewhere important (such as another economic or industrial node). It is fundamental that the existing approach to the road network needs to be reconsidered from a stringent road hierarchy of limited access, to a more integrated approach of a fine grained grid pattern road network, where streets become the life blood of the city. According to UN-Habitat standards, average block sizes of 111mx111m are promoted, and this is an important network to strive towards. Thus a series of interconnected roads with an increased number of intersections become important for marginalised communities to integrate into the urban system, improving access to economic prospect.



An urban development framework stitching marginalised sprawl into a growth node of consolidation and urban prospect.



Stitching marginalised and gated communities through activity spines, the N14 urban development corridor and a local road network.

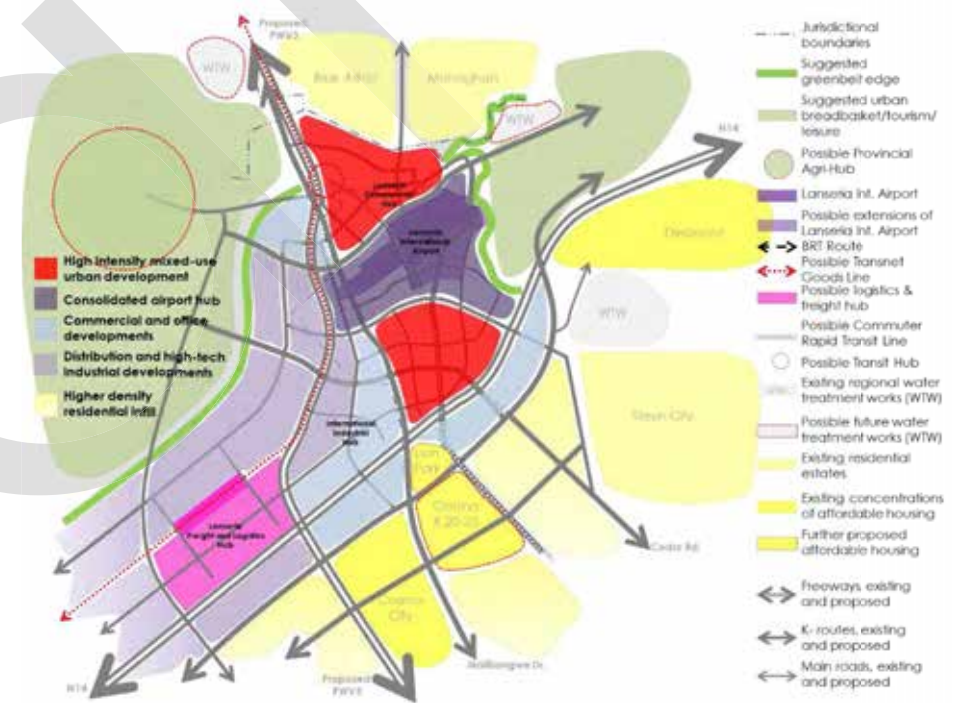
The primary focus area at the intersection of Malibongwe Drive activity spine and the N14 development corridor

There is a focus to enhance the infrastructure investment along the N14 highway to become an urban development corridor encompassing industry and logistics alongside the Lanseria International Airport. This has the opportunity to enable economic opportunities and bring households close to job opportunities.

The GLMP proposed areas of focus are informed by the current interest by private development initiatives and property market interest, particularly around the Lanseria Airport logistics and industrial hub, as well as the GSDF 2030 and the LRSDP done in 2017.

The proposed primary zone of focus forges linkages with the existing urban system and provides access into and connectivity in the underdeveloped areas of the target area. It links with Cosmo City, enabling residential extension and supporting socio-economic activities in a compact and mixed-use manner. Importantly it builds on the initiatives that are driving the Lanseria Airport node and focuses on the establishment of the Malibongwe major arterial activity spine and the realisation of the new Lanseria Urban Growth Node.

The land area extent of the proposed primary zone of focus is approximately 5,722 ha. It's able to accommodate the current LRSDP (2017) estimated demands until 2037. The proposed primary zone of focus is congruent with public development policy and private initiatives within the GLMP area, enabling a compact and complex urban system, at an intensity that supports mass transit and an efficient urban form.



The proposed new Lanseria Urban Growth node, which is an agglomeration of primary nodes, including the New Town Centre / CBD, a mixed use activity node, and nodes with a focus on residential development, business and warehousing development, as well as appropriate light industrial and commercial support development.

SECTION 4 | POSITION PAPERS UNDERPINNING THE GLMP

Introduction

The policy positions and perspectives taken on the many key dimensions of what underpins the GLMP are themselves included as the basis for discussion, refinement, and adaptation. It is also intended that other policy position papers can be added to these appendices through time.

This section of the report gives an overview of the position papers that are included as Annexure A of this document.

The need for a paradigm shift

Existing paradigms of planning and engineering, or 'business-as-usual' (BAU), are exacerbating environmental degradation by failing to lead to sustainable cities. Taken separately, it's clear how each silo-ed discipline developed its particular paradigm and why it tends to remain within this increasingly 'straight-jacketed' thinking. Taken collectively, however, it is clear that these old paradigms, which may well have been sensible at some point, have not only taken us as far as we can go - they're actually leading us up an 'urban cul-de-sac':

- We power our cities and transport on fossil fuel technology with its attendant carbon footprint;
- We use water at a rate, world-wide (not simply in dryer climates), that cannot be sustained and is failing;
- We dispose of human waste in increasingly expensive and water-wasteful ways and with increasingly negative environmental impacts downstream;
- We dispose of domestic and other waste using landfill technology that cannot be sustained either from an environmental nor land availability point of view;
- Uncontrolled waste now impacts at the core of the planetary system, the oceans;
- We sprawl our city-systems into increasingly dispersed, simplistic entities characterized by dependence on private mobility and exclusionary zoning;
- We fail to promote the spatial democracy of cities that engender both the social and economic inclusion of their citizenry;
- We fail to understand agriculture as an inherent part of the urban economy and a critical component of food security.

The position papers are underpinned by the United Nations 2030 17, goals sustainable development, considering an integrated approach to how this will be achieved the in the GLMP.



Figure 41: 17 goals of sustainable development (source: <https://sdgs.un.org/goals>)

The 'Shades of Green' approach

The following diagram gives an overview of how it is intended to move urban sustainability beyond existing paradigms of planning, engineering and urbanization to increasingly appropriate levels of sustainability and innovation. As technology in the sustainability field matures, it is the intention to move the project beyond 'leading edge' approaches into what now may be regarded somewhat as 'bleeding edge' (which we avoid at present) but will become more 'mainstream' going forward.

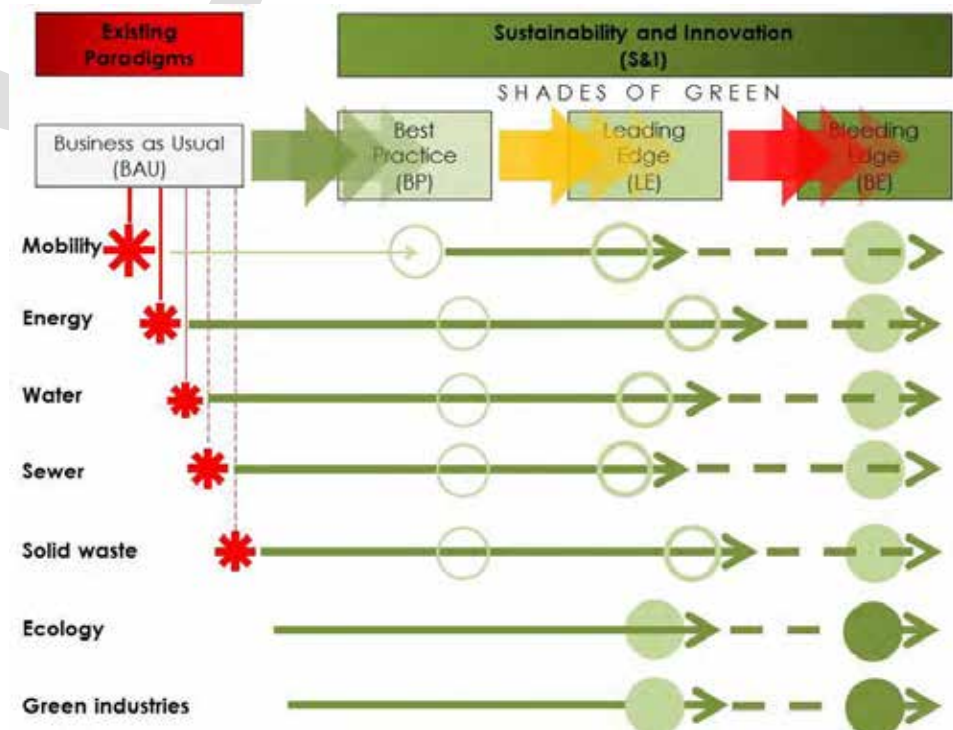


Figure 42: Shades of Green approach

4.1 01: The city rationale for a growth node in the greater Lanseria region

Refer to back to SECTION 3 | GREATER LANSERIA AS A CONCEPT

4.2 02: Integration of marginalised and gated communities into a transformed city-region structure and the influence of housing policy in this regard

Housing has been delivered in a segregated approach of gated communities and enclaves of affordable housing, resulting in mono-use neighbourhoods, minimum complexity, and housing densities that don't support public transport and walking within the Greater Lanseria Study Area.

Despite this, pressure for development in this area is occurring, and within this hinterland of agricultural holdings, housing has been delivered on an ad hoc basis. There has been little or no consideration for social, economic and physical infrastructure, in the form of road networks, public transport, or walkable environments. The lack of directive planning has resulted in an unsustainable urban system, whereby significant diseconomies are being exacerbated. In referring to the figure below, housing delivery has occurred in the form of gated, lifestyle developments, enclaves of subsidised housing, flats and walk-ups, at very low density.

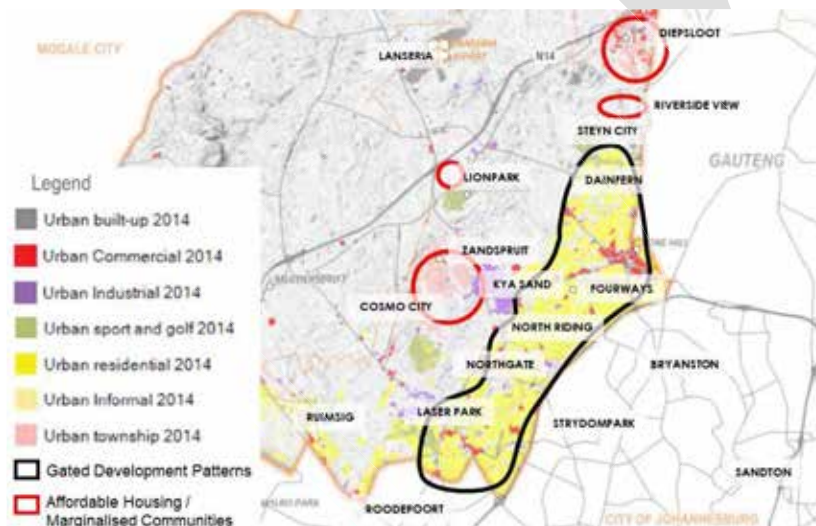


Figure 43: Location of gated developments and marginalised communities within the Lanseria Region (Source: Lanseria RSDP, 2017, recreated)

It is imperative to think differently about housing provision, for both private and public developments. Is there a way to stitch communities together into an integrated and mixed use urban profile?

The approach to integrating gated and marginalised communities into a transformed city-region structure, involves four key urban development principles to guide future housing developments within the Lanseria region.

It is important to stitch gated and marginalised communities into the city region via an adequate level of street grid road network

The approach to the road network needs to be reconsidered from the existing stringent road hierarchy of limited access, to a more integrated approach of a fine grained grid pattern road network, where streets become the life blood of the city.

The figure that follows identifies how cul-de-sacs of existing settlements within the Lanseria Region can be 'stitched' to future development through a series of grid pattern road networks. According to UN-Habitat standards, average block sizes of 111m x 111m are promoted, and this is an important network to strive towards.



Figure 44: Cul-de-sacs of existing settlements are stitched to proposed development through local road networks.

Secondly, to create higher density and higher intensity housing that responds to the street edge, which is premised on walkability as the driver for safe and inclusive neighbourhoods.

This will provide opportunity for improving the public environment, the quality of the street life and enable local economies to naturally respond, as demonstrated in the figures following.

Thirdly, the importance of providing housing as an integral part of the vertically mixed use located in the urban core and urban structuring elements (nodes, activity spines, corridors), with the appropriate housing typologies that address this

The benefits of high density, integrated development, include the following:

- Appropriate densities that are well designed, such that the UN-Habitat promotes densities of 150p/ha or 15000people/km² at 2.8 people per household, and a dwelling unit density of 53 dwelling units/ ha.
- The importance of mixed use zoning regulations, to include blending business, commercial, institutional and industrial uses, result in increased density and compact developments with the overall contribution to a sense of place and community.
- Performance criteria in terms of the morphological structures of nodes, activity spines, corridors etc. such as densities in Urban Structure range: 50 – 150 du/ha (net); Densities in Urban Zones: 80 du/ha (net).



Figure 45: High density, vertical integration of housing

Lastly, the delivery of housing to include a variegated market that encompasses a broad socio-economic profile

Fundamentally, there is a need to move away from an engineering-driven, mass-housing mind-set and think of housing in more complex ways as an urban activity. The Johannesburg SDF 2040 took a bold step to call for inclusionary housing, which resulted in the Johannesburg Inclusionary Housing Framework of 2019. The promotion for a variegated market

coincides with the GLMP. It is encouraging, that housing continues to be delivered in a variegated model, thus promoting:

- Social cohesion in order to avoid gated communities and the corresponding effects of segregation.
- A legal framework that stimulates long-term investment and new options to housing financing to expand on affordable housing, whereby banks can be better supported to support low-income households, incentives for provision of rental housing, credit mechanisms to own homes i.e. credit options, policies to reduce property speculation.

4.3 03: Delineation of the Cradle of Humankind World Heritage site and the constraints and opportunities associated with this

Cradle of Humankind World Heritage site

It is imperative to find a planning equilibrium between advancement of urban areas or zones and the protection of sensitive or critical areas, be it environmental or cultural.

A shift is required in higher order planning to sustainably plan for spatial proposals in areas where the needs of those areas are constantly in conflict. Therefore a new way of thinking and planning accordingly is crucial in ultimately achieving a balance between these areas of opportunity.

COHWHS as a Planning Region

UNESCO's notice of 2007 proclaiming the Cradle of Humankind as a World Heritage Site, has resulted in concerted efforts to manage the area in order to comply with the requirements as set out by the World Heritage Convention.

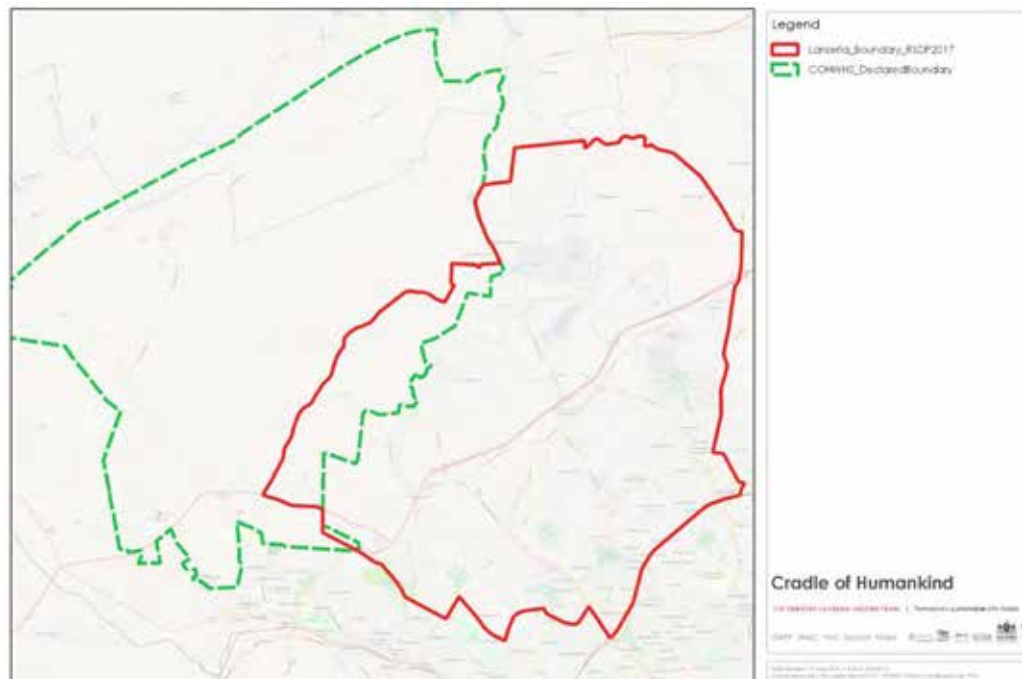


Figure 46: Cradle of Humankind delineation in context of the study area.

The very first iteration of this effort to manage the vast area was in terms of the 1999 Land Use Master Plan which proposed 6 zonation areas. However, the status of this Master Plan was drawn into question and no real authority was being exercised, and as a result land use applications would most often than not be approved without consulting the Management Authority or the document itself.

In order to guide and facilitate harmonisation between different decision-making activities by these authorities, the COHWHS Management Authority, the GDARD, West Rand District Municipality (WRDM), and Mogale City Local Municipality (MCLM) commissioned the development of a GPEMF specifically for the COHWHS.

The GPEMF tool provided the Management Authority with an opportunity to review the previous IECMP and Master Plans and development guidance. The EMF process focused attention on addressing challenges and operational requirements relevant to the management of a cultural WHS. The protection and management of the dolomite fossil bearing component of the WHS received priority attention including the elements of Outstanding Universal Value.

The GPEMF is structured such that the Management Authority, Department of Environmental Affairs, provincial and local authorities and other users of the tool can apply it to regulatory decisions in effect at the time.

Findings and Outcomes

The spatial relationship between the Cradle of Humankind either proclaimed boundary, or new proposed core and buffer areas in relation to the Lanseria

Study area presents an opportunity to constructively engage with the role players in order to align the boundary to the benefit of all parties.

Although much of the boundary as mentioned above for the Cradle of Humankind falls outside the study area, it would still be in the interest of all to propose certain land uses and zoning areas that would create a so-called buffer or soft uses between the new proposed Lanseria Developments and the Core areas of the Cradle of Humankind.

These proposals should harness their unique features, complimentary in land use, and draw on previous experiences in and around the area in order to create a logical progression from Urban to Peri-Urban, to Rural and outwards to the protected areas as set out.

It is therefore recommended that constructive stakeholder engagement is necessary to navigate the uncertainty, both spatially and environmentally that exists within the area, and the surrounding and immediate areas.

Refer to position Paper 03 in Annexure A for more detail on this.

4.4 04: Environmental and heritage performance and informants guiding integrated urban planning

Key Question: How to conceptualise and develop an environmentally sustainable city from the ground up?

1. Evaluate the current environmental legislation;
2. Plan, using environmentally sustainable urban planning factors (5 key factors that make a city environmentally sustainable and "green");
3. Implement the UN Sustainable Development Goals.

4.5 05: The agricultural potential of the greater Lanseria area, its potential as an intensive agri-hub and a driver for the growth node

The agricultural sector plays an important role in food security and job creation. Urban agriculture is an integral part of the urban economy (rather than simply 'agriculture' being some remote rural pursuit) and **recognising the importance and food security**, whereby the GCR is likely to grow to in the order of 30 million people over the next 30-40 years. Agriculture is an important building block in the economy of Gauteng; it is one of the sectors that could make a meaningful contribution to job creation, economic growth and improving the livelihoods of poor urban and peri-urban communities in the province. **Agriculture has the potential to grow due to the proximity of large urbanised markets and value could be added to locally produced products** for local and potentially large export markets. **Processing locally produced products** could add a lot of value especially if products

could be exported. **The proximity to Lanseria Airport could offer future export opportunities.** PPPs would be essential to maximise agricultural opportunities in the province.

In general terms the agricultural land of the Lanseria Masterplan region is currently being used for extensive grazing, with some arable land under dryland-cropping and others under irrigation. There is also evidence of intensive farming activities taking place in the area. The topography of the area neither lends itself to large-scale production of field crops (maize, soybeans, etc.), nor is it expected that the soil types and conditions be conducive to high yields in production. There are however some areas under irrigation such as the Northern Farms and arable fields adjacent to natural water resources.

The following mix of agricultural-related activities are foreseen in future within the area: traditional farming, intensive livestock and vegetable production, hydroponic production of vegetables, aquaculture, mushroom production, free-range chickens, ducks and geese, the production of natural insecticides, moringa, fenugreek and curry spices. Other activities comprise beekeeping, protea species that are indigenous to this area, specialised agricultural services like soil, water and tissue laboratories, drone photography and farm mapping services, horse-stables for rent, farm inputs (co-operative shops), sale of animal feeds and hay, etc. Additionally, there is a range of agriculture-related services including agri-tourism, adventure tourism, camping, picnicking, biking, 4X4 driving, etc. These activities could also be combined with weddings and other functions.

There are diverse opportunities associated to agriculture. A farming / living model worth considering is the agri-village model. In South Africa the agri-village concept has been promoted in by government at both national and provincial level. The government has been promoting the concept to support and promote subsistence and smallholder farmers.

A second model for consideration is farm villages and agricultural estates. The Crossways Farm Village case study provides an example of an independent 'rural new town' offering its residents a different way of life. The model is based on a concept of luxury living within the concept and 'flavour of a farm environment'. This is a step further from the golf-course housing estates that have developed during the last 20 to 30 years in SA. Similar property developments have been built by the **van der Bijl family** on the historical farm in Irene, South of Pretoria. **Original farming activities, have diversified into an additional offering** including a hotel, spa, restaurant and conference facilities and a housing estate named Irene Farm Village. The dairy farm operational and developed. **This demonstrates the diverse opportunities associated to agriculture.**

An industry-level SWOT analyses of the whole agricultural sector taking cognisance of input suppliers, farmers, agro-processors and other related service providers. A lot of the information shared here were obtained from interviews with managing directors and key staff from well-known

agribusinesses operational in SA. The SWOT analysis has been summarised in the following table:

Strengths	Weaknesses
<ul style="list-style-type: none"> - Capacitated producers and organisations - A strong agribusiness fraternity - Off-season production - Climatic diversity - Well-developed infrastructure - Geographic location to markets - Strong Private sector - Net exporter of agriculture products 	<ul style="list-style-type: none"> - Exposure to climatic conditions - High input costs and capital investments - Constrained cash flows - Volatile commodity prices - Constraint global competitiveness and low profitability - Lack of access to finance - Low use of technology and competitiveness - Value chain gaps
Opportunities	Threats
<ul style="list-style-type: none"> - Health Local market demand - Agro-processing - International & regional Export opportunities - Transformation - Agricultural finance - Service industries 	<ul style="list-style-type: none"> - Policy and regulatory environment - Security of land tenure - On-farm violence and theft - Technical assistance – extension services - Lack of research capacity - Poor producer prices and high input costs - Climatic conditions - Access to finance - Access to markets - Cheap imported products

4.6 06: Tourism and Leisure as an Economic Driver in the Greater Lanseria Area and its Wider Regional Linkages and Possibilities

Tourism and Hospitality as a core economic function is an essential tool for socio-economic development, prosperity and well-being of a region. Before the Covid-19 pandemic, tourism was one of the fastest growing sectors of the world economy.

Promotion of the Tourism and Hospitality industry can unlock several opportunities for economic development. Tourists stimulate an economy by spending in a wide range of sectors, including accommodation, food, transport, clothing, and many other goods and services, thereby boosting trade and stimulating capital investment. From a sociological perspective, tourism empowers women, the youth and marginalized people, amongst others. It supports the development of new businesses, enables the creation of employment opportunities, and provides an added incentive for community revitalisation. In addition, it aids in protecting a region's unique heritage and cultural norms, cultural heritage, and environmental assets.

Category	Opportunity
Tourism Source Markets	<ul style="list-style-type: none"> • Attract business and MICE tourists • Events tourism • Develop a tourist culture within the Visiting Friends and Relatives (VFR) tourist market • Potential to develop domestic tourism markets in social activities (relating to VFR, weddings, funerals and other VFR celebrations); visiting nature attractions; shopping; entertainment, events, etc.
Tourism Precincts	<ul style="list-style-type: none"> • Interlink with township tourism precincts, for instance the Sharpeville Precinct, Soweto Precinct, and Diepsloot. • Link with tourism precincts and product developments in nearby municipalities • Link into and support the development of the Vredefort Dome, relating to Potchefstroom and Parys
Events	<ul style="list-style-type: none"> • Development of conferencing and exhibition facilities • Events focused on the emerging African market
Attractions	<ul style="list-style-type: none"> • Linkages with the Magaliesberg Biosphere and the Cradle of Humankind • Develop and integrate with the N12 corridor, Soweto Tourism and tourism relating to Joburg CBD • Development and integration of tourism relating to the UNESCO Vredefort Dome • Embrace heritage and cultural attraction development relating to anti-apartheid struggle and the Anglo-Boer War • Nature-based attraction development • Health and wellness industry development • Adventure-based tourism • Township tourism

The economic and social footprint of tourism is large. It places the sector in a unique position to contribute to economic development, social upliftment, heritage preservation and environmental sustainability. It promotes solidarity and fosters cohesion, while offering numerous development opportunities in an interconnected web of economic activities. Even though the current COVID-19 pandemic has had a major impact on tourism, it does offer an opportunity to reflect and reassess how travel and tourism should grow in the future. If managed responsibly, tourism can offer livelihoods and create opportunities for many residing in the Lanseria growth node.

4.7 07: The principles of mobility and connectivity in the context of urban re-structuring and transformation

General consensus within the transport industry is that more people using non-motorised transport is critical to the sustainability of an area. High walkability results in lower environmental impacts, lower transport costs and improved public health. Because of this, it is critical to ensure complex land-uses that promote short distance work-home trips with well-developed non-motorised transport infrastructure within the Greater Lanseria Area.

The prioritisation of regional road capacity in relation to the walkability of the area will need to be determined through discussion with relevant stakeholders both within and without the study area.

Integrating regional public transport planning within the area will be critical to ensuring regional connectors do not affect the walkability and access of the Lanseria area. This will need to be achieved by ensuring adequate means for users to safely and comfortably cross high speed transit networks while attempting to limit capacity reductions to regional connectors.

4.8 08: Re-thinking the provision of social facilities and infrastructure and new paradigms of delivery

Creating a truly post-apartheid city requires shifting the thinking behind the framework for spatial design. The city is an emblem of the disparities, inequality and hindrances of access to infrastructure and participation in the economy. The Master Plan for Greater Lanseria is a gateway to the deliverance of the region from the grips of spatial segregation, and offers opportunities for a sustainable and truly transformed future. Efficient infrastructure delivery is the foundation of economically healthy cities; through improved planning and delivery systems, productivity is improved and access of opportunities is enhanced for the building of stronger neighbourhoods.

The current social infrastructure delivery system is anti-urban and patchy, characterised with gaping, under-utilised or completely unused sites set aside for development. To combat this, strategy should focus on building complexity through sharing, clustering and overlapping. Attention should also be paid to the rate of provision and the reduction of site sizes significantly in order to avoid under-utilisation. These considerations will give us a foundation upon which a rethinking will give way to propositions that address the backlog of delivery whilst paying homage to urban values that promote density and accessibility at community level in the Gauteng region. For this segment of the project, the status quo of education, health and other social facilities planning is analysed to highlight concerns and strategies are investigated to improve processes. The approach to the provision of social infrastructure needs to be reviewed and in the case of the Greater Lanseria region, as with most South African communities; the core issue is not delivery in itself more than it is how delivery is managed. Typically, provision is made for facilities but is not based on when and on what basis they are to be delivered, and by whom. The sites are provided for facilities but the utilisation of them is minimal, leaving many underutilised or unused indefinitely. The maintenance, equipping and staffing of facilities is also a concern, as communities that rely on school provision are unable to afford the maintenance and facilities, and schools in wealthier areas are often privatised or heavily subsidised by the parents of the learners, resulting in inequalities in education. Through creating complex urban profiles and

compaction, inequitable environments are rehabilitated and the quality and accessibility in the community of Greater Lanseria is improved – this is the aim.

4.9 09: The 4th Industrial Revolution (4IR), 5-G, re-industrialization, the green and blue economies, and post-Covid-19 indicators and informants

COVID-19 is an urban phenomenon, leading some to question humanity's conglomeration in cities. The World Wide Fund (WWF) is calling for cities to **embrace a post-COVID green economic recovery to build back better, including cities that are greener, more equitable, resource-efficient and circular**; and cities centred on people, not cars, with renewable energy, resilient food systems, safe housing and reliable access to clean water and sanitation. **The fourth industrial revolution represents a fundamental change in the way we live, work and relate to one another.** It is a new chapter in human development, enabled by extraordinary technology advances. **Although, it is about more than just technology-driven change; the real opportunity is to look beyond technology,** and find ways to give the greatest number of people the ability to positively impact their families, organisations and communities.

Existing paradigms of planning and engineering in South Africa are unsustainable whereby 'business-as-usual' (BAU) practices exacerbate environmental degradation. With a population of 57 million, population growth rate of 1.43% and an unemployment rate of 35% in 2020, we fail to service the built environment and employment demands of the existing and an increasing population. There is a need for a paradigm shift.

The GLMP provides an opportunity to re-think the building of a city in a revolutionary way that is inclusive to people living in it. There are multiple opportunities that come out of the fourth industrial revolution 5-G, re-industrialization, the green and blue economies, and post-Covid-19 indicators and informants **that intersect with sustainable innovation and city building.** This paper discusses four ways this could be achieved:

Firstly, how can the Lanseria smart, sustainable and safe city embrace the 'green urban agenda' whereby the city's utilities & economy is thought through holistically? This includes the revolutionary case studies of waste-to-energy, ICT and education infrastructure, waterless or de-emphasised water-borne sanitation and treatment, water harvesting and ground-water re-injection, district cooling and heating and "green re-industrialisation," making moving beyond 'business-as-usual' a fundamental imperative. Thought through in this way, **service infrastructure** and utility provision becomes so much more than a sunk cost to be recouped if possible: it **becomes the very underpinnings of a new economic base for the sub-region and its re-industrialization.**

Secondly, how can the Lanseria smart, sustainable and safe city embrace urban agriculture an inherent part of the urban economy and a critical

component of food security? Agriculture is an important building block in the economy of Gauteng; it is one of the sectors that could make a meaningful contribution to job creation, economic growth and improving the livelihoods of poor urban and peri-urban communities in the province.

Lastly, how can the Lanseria smart, sustainable and safe city embrace the 4th industrial revolution of AI and big data in an inclusionary, holistic, and upskilling manner? Research clearly demonstrates the correlation of land value, economic performance and ICT infrastructure. A fundamental aspect of this project must be how to understand its catalytic value and roll it out as a driver of development and consolidation. The fourth industrial revolution provides the opportunity to access information, having consequential benefits for education and employment. This democratises access to business and education for multiple people who have not necessarily had a formal and conventional education. This provides prospects to enable and upskill the many unemployed people in South Africa, thus opening up opportunities to the job market. The real opportunity is to look beyond technology, and find ways to give the greatest number of people the ability to positively impact their families, organisations and communities.

4.10 10: The urban structuring approach underpinning the Greater Lanseria Master plan (GLMP)

The Urban Structuring Paradigm

The urban structuring approach is rooted in the paradigm that urban morphology informs urban development strategy (both urban design and urban planning) and that in turn urban planning and design directs urban morphology. Their consideration as an interrelated whole informs a sustainable urban development approach. It has been argued in research that the lack of integration between urban design and urban planning with urban morphology has contributed to urban places being sub-optimal and even dysfunctional. Conversely, better integration of these two disciplines can inform the creation of better urban design and planning; and ultimately improved urban places.

The field of urban morphology is about identifying, recognising and understanding the pattern of the urban environment and its collections of buildings and spaces. The technical definition is an analytical activity, the study of the existing urban form or urban fabric. It covers a wide area of qualitative and quantitative techniques in spatial research and analysis. It includes inferring about and interpretation of type; and understanding and evaluating form-function relationships. The major morphological analysis approaches include spatial analytical, configuration assessment, typological and geographic-historical. Urban morphology is practiced by built environment professionals, but also includes geographers and spatial

analysts with a scientific background but no spatial planning or design training.

In contrast urban design and urban planning are about the deliberate creation of the urban environment, specifying the pattern and form, with its associated building and space ensembles. The disciplines focus on the invention of types and interventions that use type. They deliberately express and forge to create the urban environment.

The analysis of the urban environment through a morphological assessment focusing on urban sustainability, yielded development principles and guidelines for physical urban form, spaces and buildings, that direct the development of a sustainable urban system. By incorporating the morphological assessment outcomes, through the urban structuring approach into the urban design and urban planning, a more sustainable urban form and place is achieved.

The Urban Structuring Approach and its Morphological Elements

The Urban Structuring Approach, as outlined in Figure 47 assigns the establishment of a diversity of urban structuring elements, comprising several morphological types, to establish a sustainable physical urban form. It encompasses the pattern or arrangement of development areas, blocks and land parcels, the public space areas, the movement systems and streets, the buildings and built form, the parks and recreation areas, the open space network, the natural environment and landscape, and the associated services infrastructure, including social infrastructure.

By assigning the urban structuring elements, the approach integrates urban activities (with the various urban elements and systems that make up the composite of activity), connectivity and urban movement (with a focus on mass public transport, NMT and walkability). The resultant urban form is the spatial manifestation of the complex interaction of the urban processes and systems, and the human activities within it.

The urban structuring elements include the following morphological types:

- Urban consolidation zone,
- Urban corridor,
- Various types of nodes,
- Various types of activity spines,
- The high street,
- Districts (extensive or delimited),
- Natural systems (ecosystems and open space), and
- Urban voids (or discontinuities in the urban system).

These urban structure elements occur at different urban scales within the urban system, ranging from:

- Local and / or Precinct

- Neighbourhood and / or Suburb
- Town (District)
- Metropolitan (City)
- Region

The way in which the urban structuring elements are designated are informed by:

- The urban sustainability principles underpinning the project approach.
- The best practice outlined in the position papers.
- The modelling of the morphological types, establishing quantitative parameters. A performance measure is obtained from the typical characteristics of each of the elements, based on a quantitative, and in part also a qualitative, assessment in terms of floor area (bulk) and associated land use areas, land use mix in terms of diversity of activity, linkages and accessibility for various modes of transport (including pedestrian distances & walkability), typical building typologies associated with the element type (coverage, height, frontage, depth, envelope), dwelling and population density, open space (public squares, parks and recreation) and landscape areas, and requirements with regard to public transport, social and Figure 48: The Urban Morphological Types combine to form the Urban Structure (and its networks and systems) community facilities, natural environment and ecology, and utility infrastructure requirements.
- Applicable existing urban development policy.
- Sector assessments including natural environment, ecology and heritage; transportation and mass transit; logistics; utility infrastructure services; agriculture and social facilities infrastructure.

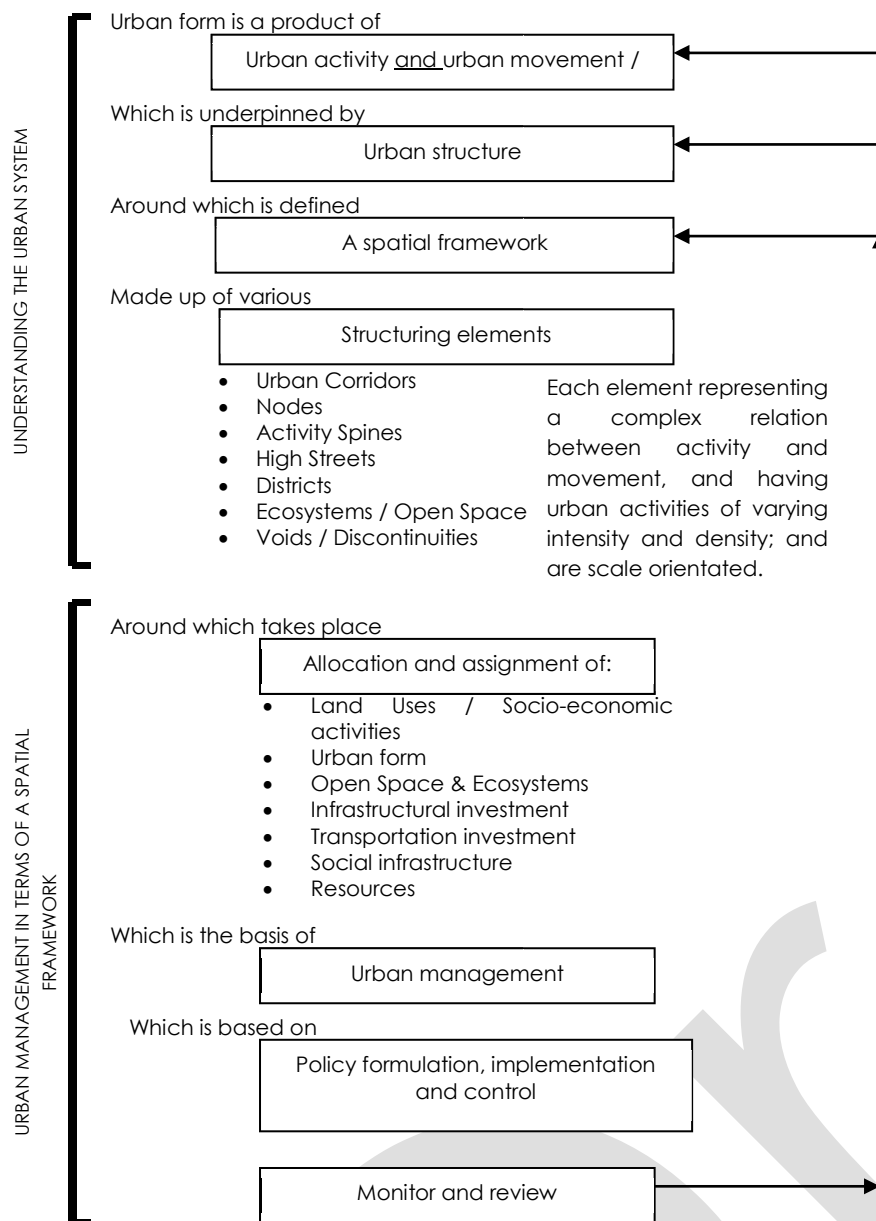


Figure 47: The Urban Structuring Approach

Based on a comparison of the existing performance to that of the required or desired performance in terms of overall policy and strategy to develop a sustainable urban system, an allocation and assignment is undertaken of: land use activities (socio-economic); open space, ecosystems and environmental performance; population densities; required service utility infrastructure; social infrastructure and facilities; transportation investment and urban policy.

The above in turn informs urban management strategies and imperatives. These direct development implementation, development control and policy formulation. This is then monitored and reviewed.

The urban structuring approach forms the basis to reconfiguring the existing urban development pattern, and forging a new one, into a more compact, complex, connected and sustainable urban system

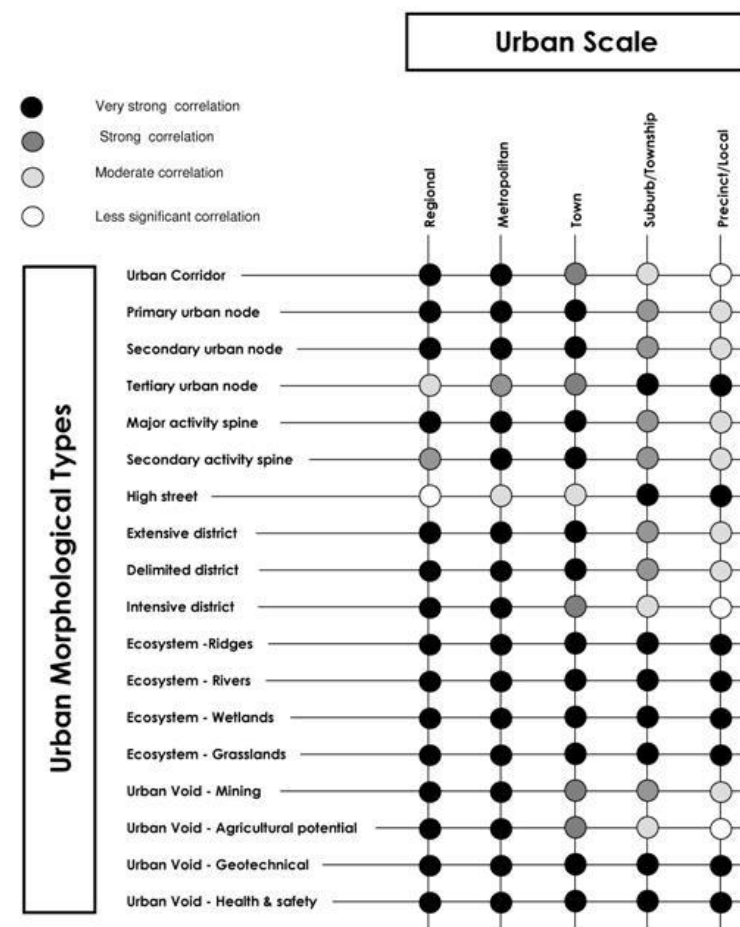


Figure 48: The Urban Morphological Types combine to form the Urban Structure (and its networks and systems)

Urban Development Policy Congruence

An assessment of existing government urban policy included the following:

- National Integrated Urban Development Framework (IUDF): A New Deal for South African Cities and Towns (April 2016)
- Spatial Planning and Land Use Management Act (SPLUMA; 2013)
- Gauteng Spatial Development Framework (GSDF) 2030 (2016)
- City of Johannesburg Spatial Development Framework 2040 (CoJ SDF 2040) and Urban Development Boundary
- City of Johannesburg Nodal Review Policy
- Mogale City Spatial Development Framework and Urban Development Boundary
- City of Tshwane Spatial Development Framework and Urban Development Boundary
- City of Tshwane Region 4 Regional Spatial Development Framework
- Gauteng City Region Integrated Infrastructure Master Plan

The Urban Structuring Approach builds on and enables the application of government urban policy, as outlined in the comparison table (**Table 4**):

Table 4: Urban Policy incorporates Urban Structuring Elements

Urban Structuring Approach	IUDF	SPLUMA	GSDF 2030	Municipal SDF's / RSDF's	CoJ Nodal Policy	LRSD P
1) Activity : Mixed Use, Compact, Dense, Connected	✓	✓	✓	✓	✓	✓
2) Mobility : Mass Public Transit, Walkability, Non-motorised Transport	✓	✓	✓	✓	✓	✓
3) Corridor Development	-	-	✓ (not in GLMP area)	✓	-	✓
4) Nodal Development	✓ (TOD's)	-	✓ (not in GLMP area)	✓	✓	✓
5) Activity Spines	✓ (mass transit corridors)	-	✓ (BRT mass transit corridors)	✓	-	✓
6) Remaining Elements	-	-	-	-	✓ (similarities)	-

In very broad terms urban policy is congruent with the urban structuring approach. The policies promote the application of urban structuring elements and associated typologies. These include promotion of:

- Development corridors and nodes.
- Transit Oriented Development (TOD), and mass transit activity spines.
- A compact, connected and coordinated urban system.
- Diversifying and densifying settlements.
- Intensification of nodes, public transport routes and stations.
- Nodal strengthening, maintenance and enhancement.
- Expanding and integrating public transport and including BRT's
- Prioritising densification along existing BRT routes
- Enabling strategic emerging nodal developments in townships, to build the polycentric provincial network
- Enabling higher density land developments and housing typologies in nodes, with the aim of creating integrated, accessible, permeable, mixed-use and high-intensity environments
- Combining density, diversity, proximity and accessibility, reducing distances, travel times and costs, bringing jobs and social amenities to single use, marginalised residential areas, reducing energy consumption and infrastructure costs
- Enhancing public transit and ICT infrastructure at provincial and urban scales to re-connect the city, starting from 'the Corridors of Freedom' to street and neighbourhood-level connectivity

- Developing nodes, TOD's into compact, walkable, liveable, mixed use and mixed income areas.
- Land use intensification (mixing), land use mix guidelines and residential densification.

Overall the Urban Structuring Approach also reinforces and applies the Sustainable Cities SDG No.11 and the urban development guidelines from the Urban Agenda UN Habitat III. Briefly these include higher densities, walkability, mass public transport, application of a street grid (18 km of street length per km²), mixed land uses and social mix, and limited land use specialisation.

Application of this can be found in MODEL 2: Urban morphological model

4.11 11: Sustainability and innovation as a basis for new paradigms for service infrastructure, transport and incremental roll-out

Refer to SECTION 6 | OUTCOMES OF APPLICATION: FROM CONCEPT TO COMPOSITE

4.12 12: Institutional models for directing the greater Lanseria Growth Node

The institutional arrangements are still being understood and discussed in detail with a number of stakeholders and may require legal input to determine the most appropriate approach to funding, implementing and administering the plan. Some early considerations include

4.13 13: Putting the greater Lanseria growth node onto a 'public conversation' platform

There is no legislated process for the preparation of a Master Plan as it is neither an SDF nor an IDP, the stakeholder engagement process has been designed to meet the requirements and milestones of the planning process for the preparation of the Greater Lanseria Master Plan (GLMP). The process must provide the input required to deliver a properly informed report and afford the public a reasonable opportunity to participate within the

restrictions imposed by the Covid-19 epidemic and also be legally defensible.

Public participation is enshrined in the Constitution which states that municipalities must “encourage the involvement of communities and community organisations in matters of local government” and that “people’s needs must be responded to, and the public must be encouraged to participate in policy-making”.

Much policy and legislation relating to public participation and spatial planning has been introduced since 1994. The White Paper on Transforming Public Service Delivery, 1997 and the White Paper on Local Government, 1998 make consultation a key element of service delivery and development. The Municipal Structures Act, 1998 requires ward councillors to establish ward committees with the mandate to facilitate participation in the development processes of municipalities and municipalities to develop mechanisms to consult with communities and community organisations and annually review the needs of communities. The Municipal Systems Act, 2000 and associated regulations require local government to encourage and create conditions for the local community to participate in the affairs of the municipality and consult the public in the development of an IDP. They also set out the mechanisms, processes and procedures for such participation.

The Spatial Planning and Land Use Management Act, 2013 (SPLUMA) states that spatial development frameworks should provide clear and accessible information to the public and private sector and provide direction for investment purposes, and where necessary, incorporate the outcomes of substantial public engagement. It also emphasises the importance of cooperative governance across the three spheres of government. Of significance to the GLMP, Part D of Chapter 4 deals with the preparation and content of a Regional Spatial Development Framework (RSDF) and states that the Minister, after consultation with the Premier and the Municipal Council responsible for a geographic area, may by notice in the Gazette publish a RSDF to guide spatial planning, land development and land use management in any region of the Republic. The Minister may also declare any geographic area of the Republic to be a region for the purpose of this section when necessary to give effect to national land use policies or priorities in any specific geographic area of the Republic in addition to the SDF applicable to such area. While no regulations have been promulgated for SPLUMA the Department of Rural Development and Land Reform (DRDLR) did produce Guidelines for the Development of Provincial, Regional and Municipal Spatial Development Frameworks and Precinct Plans.

The guidelines serve to clarify the roles and responsibilities of the different spheres of government in preparing SDFs at provincial, regional, municipal and local scales and provide a standard structure for the timeframes, preparation process and elements for each scale of SDF. National Treasury BEPP Team supported this and made comment stating SDFs need to connect with all stakeholders investing and planning within the municipal space and establish the spatial platform for integration and collaboration across spheres

and departments to ensure that municipalities incorporate the plans and projects of all spheres of government in their SDFs, thus reinforcing the principles of Chapter 3 of the Constitution, the Intergovernmental Relations Framework Act, 2005 and Chapter 2 of SPLUMA.

The Integrated Urban Development Framework, 2016 (IUDF) Implementation Plan highlights the urgency for a highly coordinated, systematic and collaborative approach by the various levels of government, the private sector and civil society, as well as an understanding of the respective roles and responsibilities needed to achieve the common vision of spatial transformation. The IUDF also notes that: “No governmental infrastructure or service provision planning should occur outside the statutory national/regional/provincial/municipal SDFs and IDPs”. Hence it is of particular importance to ensure legal adherence with SPLUMA to ensure appropriate incorporation in respective SDFs (at various scales) and municipal IDPs (and probably also District Development Model “One Plans” to ensue)

The municipal land use planning by-laws of the affected municipalities all set out the process to be followed in the preparation of a Municipal SDF and include a 60-day public comment period for the review of the draft SDF as required by SPLUMA.

The Promotion of Administrative Justice Act (PAJA) gives effect to the right to administrative action that is lawful, reasonable and procedurally fair. An SDF does not confer or take away land use rights and only guides and informs decisions relating to land development. A proposal in an SDF is therefore not a decision and is thus not an administrative action that is protected in terms of the Constitution.

In the judgement of the Supreme Court of Appeal case concerning South African Property Owners Association v The Council of The City of Johannesburg Metropolitan Municipality in 2012, adequate public participation was described as a prescribed process to be followed, properly advising, consulting and considering the views of the local community, the entitlement to be notified timeously and to be provided with all relevant information, as well as a reasonable opportunity to respond. The judgement also ruled that 30 days was a reasonable period to allow the public to provide comment.

In view of the above it is important to consider the context of the study area and the preparation of the GLMP together with the relevant policy and legislation. Where an area does not fall within one municipal or provincial area, SPLUMA and its guidelines outline the circumstances whereby the Minister may designate a region for planning purposes where it is necessary to give effect to national land use policies or priorities in any specific geographic area. The GLMP focuses on an area for the development of a wider growth node centred on a new post-apartheid smart city in Lanseria as announced in the 2020 State of the Nation Address and is therefore a national land use priority. The area straddles the municipal boundaries of three local municipalities and one district municipality within Gauteng and is,

in the future, expected to extend across the North West provincial boundary into Madibeng Municipality which forms part of the Bojanala Platinum District Municipality. The GLMP will therefore contain key elements of what could become, once completed and adopted, a Regional Spatial Development Framework for the Greater Lanseria region.

The GLMP will also contain key elements for the three Municipal SDFs of the affected municipalities and their IDPs. It should be noted that upon completion of the GLMP it will be necessary for the Municipal SDFs for the City of Johannesburg, City of Tshwane and Mogale City to be amended to reflect the spatial planning in the GLMP. As outlined above, another way of achieving this would be for the Minister of Rural Development and Land Reform to declare the Greater Lanseria area as a region and publish an RSDF for the Greater Lanseria region to guide spatial planning, land development and land use management in the area. The RSDF for the Greater Lanseria region could also cover the extended area in Madibeng Municipality and provide an instrument for linking the long term planning for this area of Madibeng to the planning for the Greater Lanseria development node centred on the Lanseria Smart City. An RSDF that provides a common spatial plan and represents the key spatial policy position for the region can also strengthen the role of the SPV to be established for the Greater Lanseria region.

Whether the Minister publishes an RSDF for the Greater Lanseria region or the three municipalities amend their own SDFs, public participation will be required in each of these processes in terms of SPLUMA and the Municipal Systems Act. The public will therefore have a further chance to comment on the planning for the area. In a similar manner the content of the GLMP will contain elements that will require the amendment of the IDPs in the three municipalities, which will also require public participation and thus the public will again have the opportunity to comment on the proposals in the GLMP.

The proposed stakeholder engagement process for the GLMP has therefore been designed to provide the required input from key stakeholders at key stages in the planning process. It allows for a 30-day comment period for the general public to comment on the draft GLMP which provides a reasonable opportunity to participate. Once accepted by the client the GLMP will then be incorporated into the SDFs of the affected municipalities or the Minister will declare the Greater Lanseria area a region and publish an RSDF for the region. The IDPs in the three municipalities will also have to be amended. Further public participation will therefore take place on the proposals in the GLMP.

The public participation process for the GLMP is shown in the figure below.

GREATER LANSERIA MASTER PLAN – KEY STAKEHOLDER ENGAGEMENT AND PUBLIC PARTICIPATION PROCESS

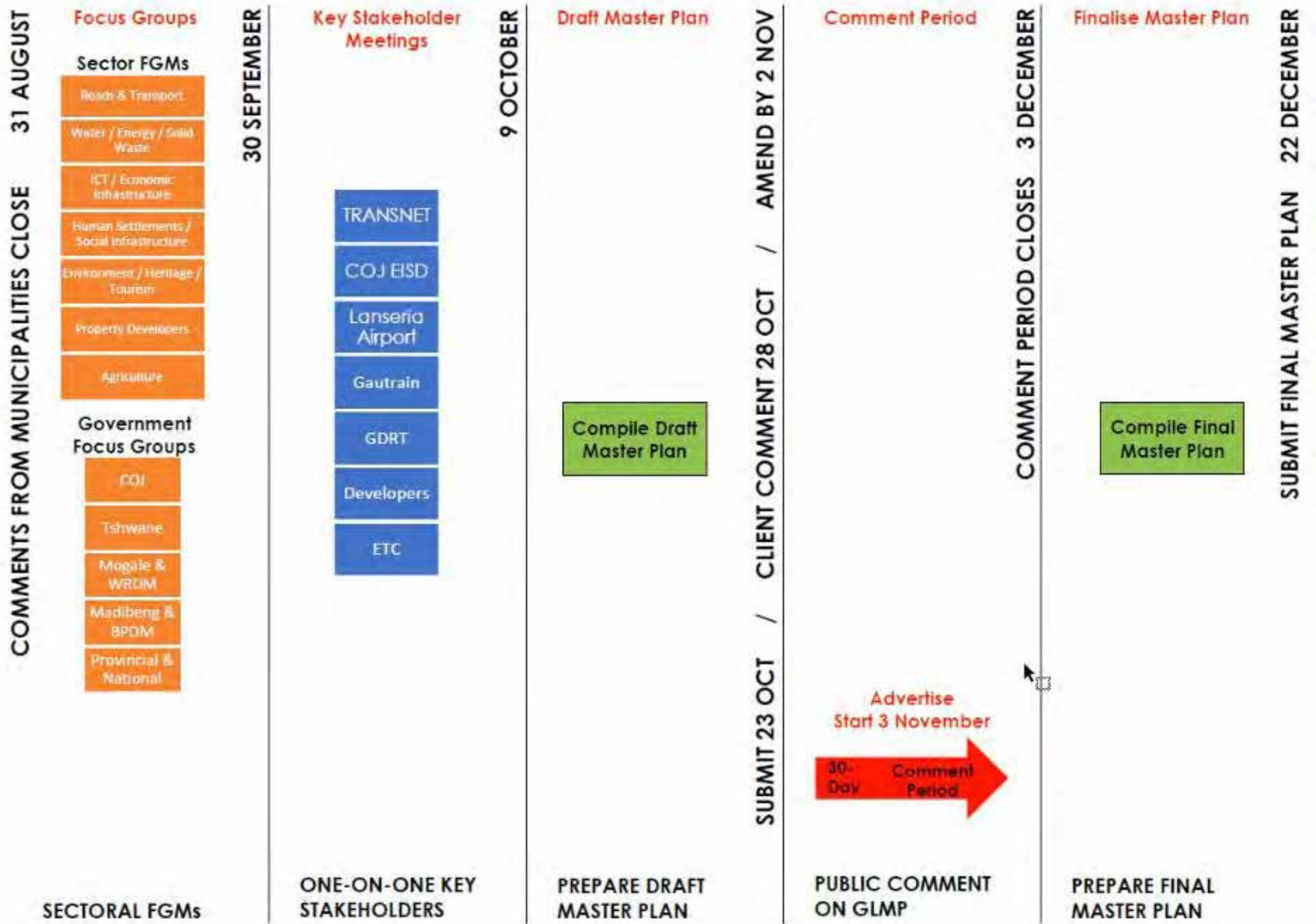


Figure 49: Greater Lanseria Master Plan public participation process

SECTION 5 | MODELLING ELEMENTS OF THE GREATER LANSERIA MASTER PLAN

At the core of the approach to preparing the Greater Lanseria Master Plan, and bearing in mind the need to fundamentally transform the present urban structure of the GLMP study area, is the belief that morphology, or spatial shape, form, extent and pattern of city processes, is a primary focus of urban management. How the morphology of an urban system is understood, how one intervenes in it, and how it is shaped and adapted is fundamental to crafting an urban structure that is effective, efficient, robust, flexible and, above all inclusionary and equitable. **Appropriate urban structure is thus the heart of urban sustainability.**

In the form presented, the Greater Lanseria Master Plan is supported by five models:

- (1) An urban profile model, (2) an urban morphology model, (3) a connectivity model, (4) a bid-rent model and (5) a virtual model room.

5.1 MODEL 1: Urban profile model

An urban profile model sets out to provide users with an in-depth understanding of the urban system in any number of ways. The GIS has a multitude of layers of information in which are embedded existing data, policies, strategies, directives and encouragements. It is possible to view/explore these at will, whether at the scale of the entire province or by specific areas or sectors. The study area has been divided into a 10m by 10m grid, or *cells* (a very fine level of spatial resolution, given the overall extent of the province), and it is possible to 'drill-down' into any one, or groups, of these cells and gain a full appreciation of the associated urban profile and the implications of the GSDF for that particular point.

This includes the consolidated overview of the RSDP status quo as well as the additional input that was established in Section 1.

5.2 MODEL 2: Urban morphological model

An urban morphological model focuses on the spatial and structural underpinnings of the urban system. Morphologically, urban systems can be described in terms of elements of an urban development (zones of urban consolidation, urban development corridors, urban nodes, activity spines, districts, zones of urban discontinuity, etc.). Each urban morphological type **performs** in a particular way and carries an **urban potential** that suggests what one might expect in urban achievement terms and how one might

make decisions around further **allocation of public transport**, service and social infrastructure investments. The focus of the urban morphological type for this project is the **anticipated nodal development** that responds to infrastructural interventions (i.e. roads and public transport). The extent of this approach is elaborated on in Position Paper 13

The Urban Structure of the GLMP Region

The existing physical structure of the GLMP region consists of two components (**Figure 50**). The first component is the existing "non-urban" or peri-urban and rural, which is a significant portion of the study area. The prevalent land uses within this area is an extensive natural environment, with a network of river systems, grasslands and protected areas such as the Cradle of Humankind and nature reserves. Within this are also agricultural production areas. The peri-urban element consists of significant areas of smallholdings.

The second component is the existing urban structure of the study area consisting of all the built-up elements:

- The existing urban area dominated by suburban residential development, from Diepsloot in the north-east, arranged south-ward along the R511 (William Nicol extension) through Dainfern to the Fourways Node, and then in a south-westerly arch along Witkoppen through Maroeladal, Bloubastrand, Northgate, Honeydew and to Strubens Valley. From there along Hendrik Potgieter to Ruimsig and Featherbrooke Estate / Pinehaven. This forms part of the zone of north-eastern residential development of the City of Johannesburg.
- The Cosmo City residential area extends over a large area, wedged between Malibongwe and Beyers Naude drives, and is physically disconnected from the existing urban area, buffered by surrounding smallholdings.

The built-up area includes a number of nodes and activity spines:

- **Nodes:** Diepsloot West, Diepsloot North (at N14 interchange), Diepsloot Central, R511 (Steyn City portion), Fourways, Northgate, Honeydew, Strubens Valley and Pinehaven / Cradlestone.
- **Industrial Nodes:** Lanseria Airport, Kya Sand, Lazer Park (adjacent to Honeydew). The Lanseria Airport is a major regional air transport and logistics hub, including industrial and business support developments surrounding it.
- The **activity spines** include the R511 (William Nicol drive extension); Malibongwe Drive, Beyers Naude Drive and Hendrik Potgieter Drive.

- The R511 activity spine is the most developed from Fourways north to Diepsloot. Most new developments along this activity spine are between Dainfern northward to Diesploot and areas traversing Diepsloot.
- The Malibongwe Drive activity spine is most intensely developed from Northriding north-westwards along Malibongwe through the Kya Sand industrial node and through to Cosmo City. From there it has intermittent development along its length for approximately 8km until it reaches the Lanseria Airport road.
- The Beyers Naude Drive (M5) activity spine is well established with mixed use and business activities from the N1 through Silver Birch, Randpark Ridge and up to the Honeydew node with its Lazer Park industrial hub. From there onwards its main function is a major regional mobility route, with small-holdings, tourism, accommodation and outdoor recreation activities along its length. From the N14 crossing it forms a major access route to the

agriculture hinterland and access to the Cradle of Humankind and related tourism activities.

- The Hendrik Potgieter activity spine portion through the study area is well developed from Strubens Valley through to Ruimsig. From there onwards development comprises suburban residential with intermittent retail development along the route. At the intersection with the N14 an emerging mixed activity node is being formed, with the casino and a retail shopping centre. From there onwards the developments along the route include small farming operations, tourist accommodation, smallholdings and residential developments.

The existing urban structure within the study area forms the basis of and the clues to directing the future development of the GLMP area. The opportunities and possibilities are explored in the following section.

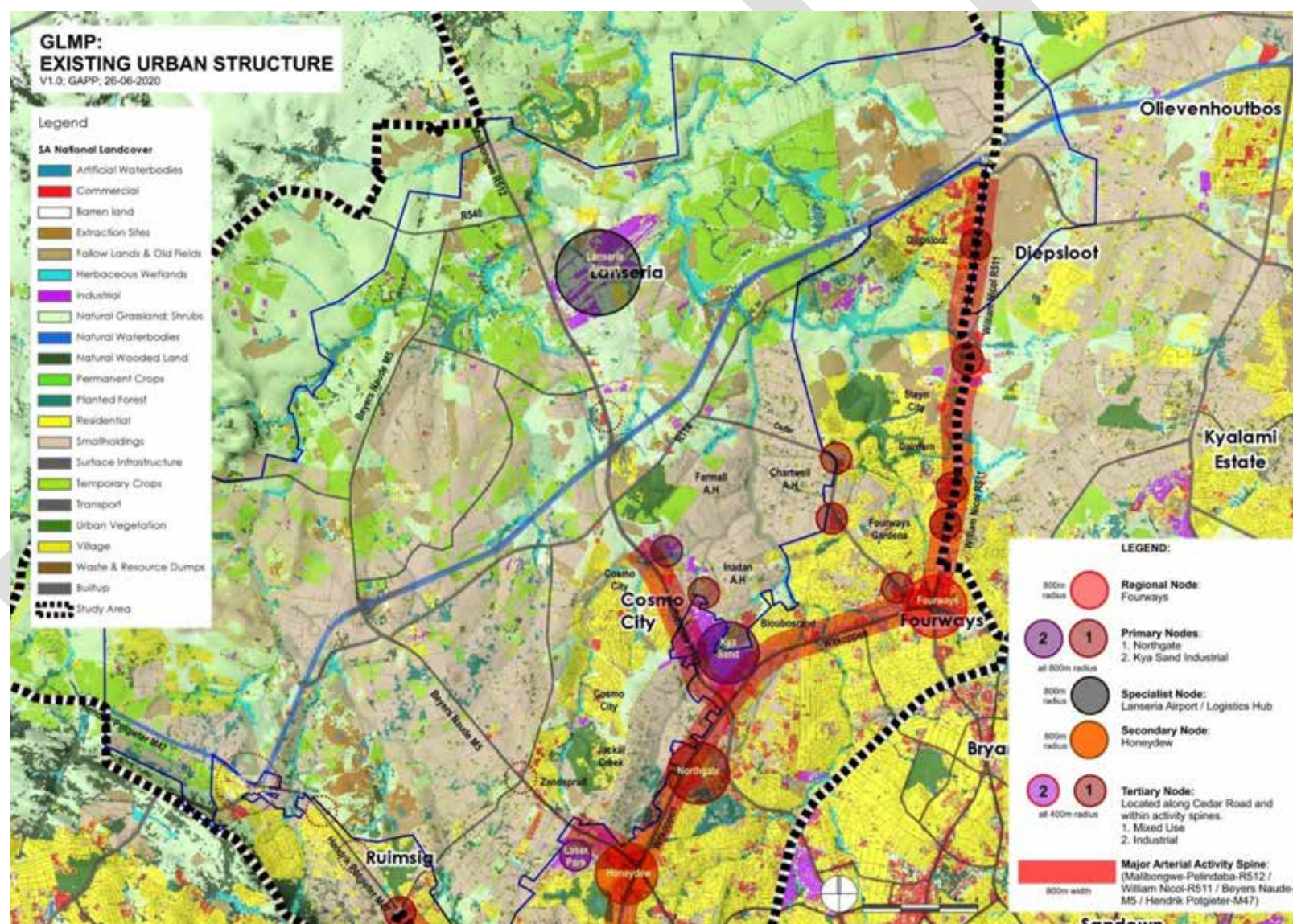


Figure 50: GLMP Existing Urban Structure

The GLMP Urban Structure Development Concept

The Urban Structuring Approach, through the assignment of the various morphological elements, proposes the establishment of a consolidated urban system that is connected, complex and compact (intense activity mix and dense configuration).

5.2.1 Overview of Informants

At the **status quo assessment stage**, an urban structuring development concept has been prepared, to give an outline of the urban development possibility for the GLMP region. This is informed by:

- The application of urban structuring elements that consist of one or a number of the following morphological types in Position Paper 13:
 - The **urban corridor**: which consists of a number of various morphological elements, and combined form the corridor.
 - A **hierarchy of nodes**: A major growth node (an agglomeration of major nodes); regional node; primary node; secondary node; tertiary node and specialist node.
 - A **hierarchy of activity spines**: Major arterial activity spine; urban arterial activity spine; main road activity spine; and specialist activity spine.
 - **Districts** (extensive or delimited),
 - **Natural systems** (ecosystems and open space), and
 - **Urban voids** (or discontinuities in the urban system).

The refinement of the concept into a more detailed spatial development plan, identifies neighbourhood nodes and local high streets.

- The allocation of the urban structuring elements as informed by the regional development lattice (**Figure 51**) that underpins the proposed urban development. This development lattice consists of the existing movement network (road hierarchy), as well as network proposals and proposed extensions and connections.
- The emerging development direction, as informed by the existing urban structure identifies key development axes and development concentrations:
 - **Development axes**: Continuing the development along the activity spines of the R511 (William Nicol & extension), Malibongwe Drive and Extension (Pelindaba Road).
 - **Emerging nodes**: Consolidating the Lanseria Airport node; the Diepsloot node, an emerging nodal clustering around the Malibongwe / N14 interchange, and the Pinehaven / Casino emerging node.

- Keeping the urban structure development within the identified developable land limits of the study area; which reduces the future development to an Inner Focus Zone.
- The influence of spatial development policy work over the last period:
 - The **outer radial corridor** proposal (Figure 52), as prepared in the work for the Gauteng Province- Development and Building of Post-Apartheid Cities: Legacy Projects & Mega Projects (Central Corridor) undertaken by the SMEC Consortium.
 - The spatial development principles of the Gauteng SDF 2011 to achieve the development of a sustainable urban system. The proposals for the area as informed by the Gauteng Spatial Development Framework 2030 (**Figure 53**) areas of focus within the GLMP study area.
 - More specifically the Lanseria Regional Spatial Development Policy (LRSDP, 2017) with its proposed nodal and corridor policy framework (**Figure 55**).

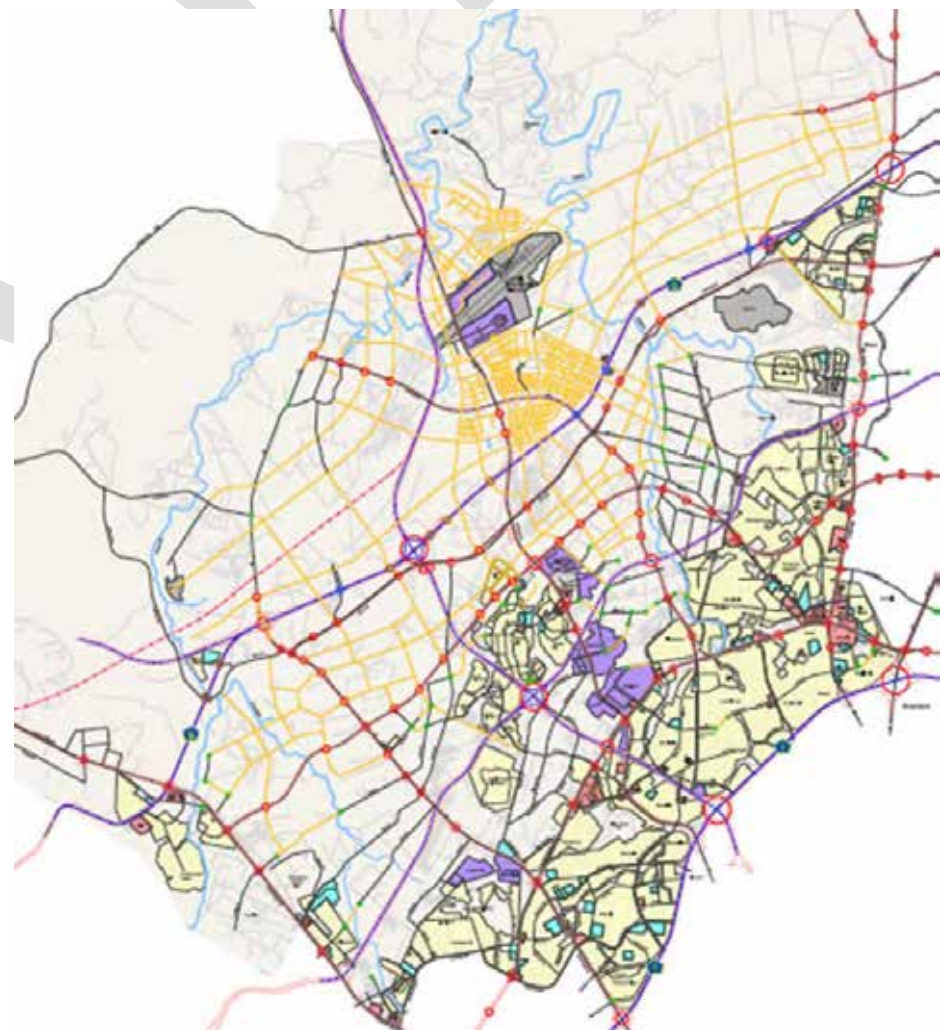
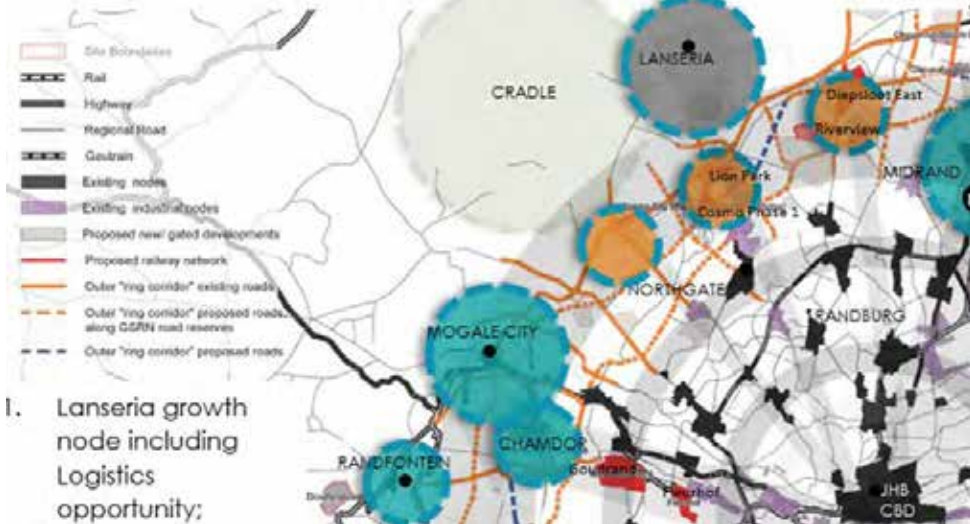


Figure 51: The GLMP Regional Development Lattice

RECOMMENDATIONS – URBAN CORRIDOR WITH FOCUSED ECONOMIC INTERVENTIONS



1. Lanseria growth node including Logistics opportunity;

Figure 52: Outer Radial Corridor – Lanseria

81: NODAL POLICY FRAMEWORK NORTH WEST

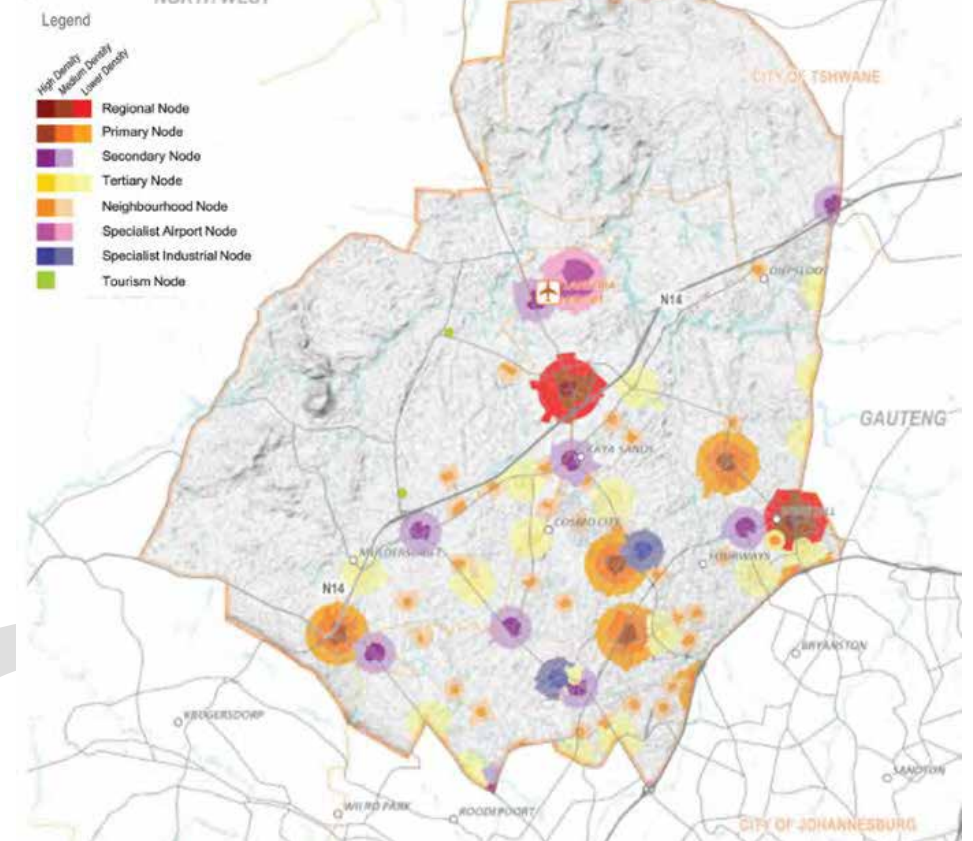


Figure 54: LRSDP Nodal Policy Framework 2017

5: GAUTENG SPATIAL DEVELOPMENT FRAMEWORK 2030

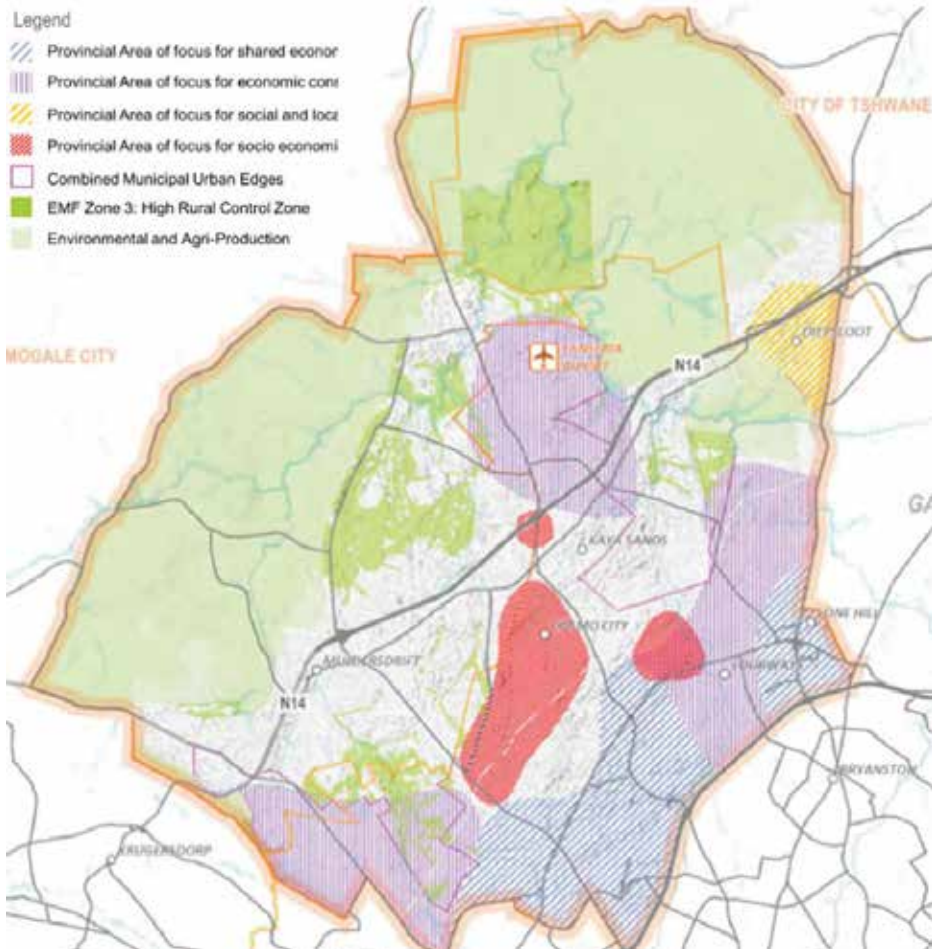


Figure 53: Provincial Focus Areas GSDF 2030

82: CORRIDOR POLICY FRAMEWORK NORTH WEST

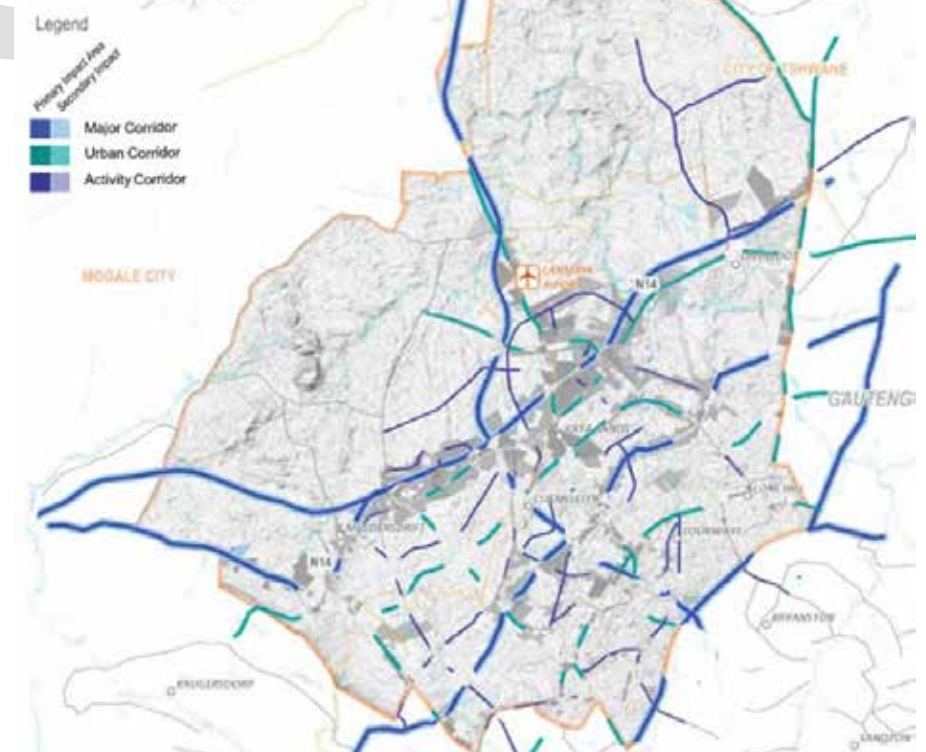


Figure 55: LRSDP Corridor Policy Framework 2017

5.2.2 Assigning the Urban Structure, forming the Development Concept

The proposed GLMP Urban Structure Development Concept, in Figure 56, forges the establishment of the N14 Development Corridor in an arc through the GLMP from the Pinehaven /Casino node, along the N14 freeway via Lanseria through to Diepsloot. It is formed by a series of nodes along its length, located on a development lattice, with the N14 freeway as a central mobility route, and two parallel mixed use urban arterial activity spines (existing and proposed) on both sides of the freeway. These are intersected by cross routes and the radial activity spines formed along the routes of Malibongwe, the R511 (William Nicol extension), Beyers Naude and Hendrik Potgieter. Combined they establish the cross rungs in the lattice.

The four major arterial activity spines are extended along their routes, with nodes at major junctions, such as at the N14; Lanseria airport node and others. Various types of nodes form part of the activity spine and reinforce the band of mixed-use development.

A network of main road activity spines refines the urban lattice. They traverse the urban districts and form linkages with the existing neighbourhoods and urban areas. In this way Cosmo City is linked with the existing urban environment, in all directions. These forge new connections and reinforce existing ones, forming continuous linkages that link all areas, new and existing. They open isolated small-holdings and introverted residential areas, laying the foundations to form a connected urban system, with links to the major nodes and urban centres.

A diverse hierarchy of urban nodes is established. The Lanseria Urban Growth Node, consisting of an integrated nodal cluster: A regional node with supporting primary nodes. The regional node is the new town centre / CBD. The primary nodes within the cluster include mixed use, residential, business and warehousing, and industrial.

The Lanseria Airport and Logistics Hub is a specialist node, forming the northern anchor of Malibongwe major arterial activity spine.

A series of secondary nodes are located along the N14 corridor, including Pinehaven/Casino, the Beyers Naude and Malibongwe intersections, and Diepsloot.

Several tertiary nodes are located along and at the intersections of activity spines and main road activity spines. The mixed-use tertiary nodes serve the local areas and districts. Several tertiary services nodes have also been identified. These are located along the specialist activity spines, serving the agricultural, tourism and nature reserve hinterland.

The specialist activity spines are of a lower intensity of development and form the interface with the agricultural, tourism and nature reserve hinterland. Activities along these spines include small farming operations, horticulture,

nurseries, intensive farming, tourism accommodation and services activities that support the agricultural and tourism / outdoor leisure economy.

5.2.3 Realising the urban system potential

The proposed GLMP Urban Structuring Development Concept outlines the possible extent of the urban development potential within the study area. The approach extends the existing urban system and consolidates it along the N14 corridor and the Lanseria Urban Growth Node, and around the Lanseria Airport node.

The inherent potential to accommodate growth and development is significant. The following aspects are highlighted:

- The total GLMP study area is 53,311 ha; of which the Inner Focus Zone is 28,663 ha (53.7%); or 286, 63 km².
- The urban structure development concept places 15,162 ha (52.9%) of the Inner Focus Zone under development. The remainder of the area falls under existing and proposed Freeways and Roads (14%); natural environment (16.4%); agricultural lands and tourism (13.3%); interspersed with existing developments (3.4%).
- The LRSDP (2017) estimated in its future growth modelling to 2037 that:
 - With current growth trends an additional 488,720 people should be accommodated in the study area.
 - This will require a total of 8,584 hectares and 77,831 stands to accommodate both residential and other uses.
 - For residential uses 182,909 consumer units are required while other uses such as business, commercial, industrial and community facilities will require an additional 2,223 consumer units.
 - In terms of roads provision 1,490 hectare should be provided, based on the estimates, accounting for 17, 4% of all new development area.
(Source: LRSDP, 2017)
- Whilst the LRSDP has a time horizon of 2037; the GLMP Urban Structuring Development Concept considers the growth and development of the study area as a continuing and incremental process that is not limited by a time horizon. Urban systems continuously evolve, change and adapt as they respond to the physical and socio-economic forces that are exerted upon them. Hence the approach is to achieve a morphologically driven mixed use, compact and complex urban environment, that is able to grow incrementally and change and adapt as circumstance requires. In this regard it is also understood that people are located within the urban system where the urban system supports and sustains them. Thus the investment in and location of urban development, with its engineering and services infrastructure, directs the location people and activities. This enables them to utilise the urban opportunity that such development brings. The Urban

Structuring Approach therefore directs the allocation of resources and where and how people are to be accommodated within the urban system.

- In this regard, the GLMP Urban Structuring Concept can certainly accommodate the LRSDP population growth and land area requirements, as outlined in Figure 57. The GLMP proposed areas of focus are informed by:
 - The current interest by private development initiatives and property market interest, particularly around the LIA logistics and industrial hub. There has been steady development growth in the areas around LIA over the last 30 years, albeit at a moderate to slow pace. The airport itself has runway capacity extension plans, to ramp up activities.
 - The GSDF 2030 areas of focus include various zones. It proposes economic consolidation around LIA and southward along Malibongwe drive to the N14 interchange. Economic consolidation in the small-holding areas abutting the existing residential suburban development on the south east and southern areas of the GLMP study area. A particular focus is socio-economic development for Cosmo City, Zandspruit, Bloubostrand and the area around the Malibongwe / N14 interchange.
 - The LRSDP (2017) proposes the short- and medium-term growth management zone in a broad north south mixed use and residential development band, including regional nodal development with commercial development. The western side of this area is Malibongwe Drive as a consolidated and extended activity spine, and the eastern boundary is formed by the Crocodile River. The northern end of this development zone is the Lanseria Airport and the southern end is Cosmo City / Kya Sand / Bloubostrand.

The proposed GLMP Urban Structuring Development Concept primary zone of focus is:

- The development of the Malibongwe Drive major arterial activity spine from Kya Sand and Cosmo City northward to its culmination at the Lanseria Airport node.
- The Malibongwe activity spine includes a series of primary nodes, such as those around the N14 interchange, which specifically link with Cosmo City, as well as a number of tertiary nodes. The activity spine serves the Lanseria Airport specialist node (also a primary node) and the new Lanseria Urban Growth Node.
- The Lanseria Airport specialist growth node and surrounding areas to the northern boundary of the GLMP study area. The airport is a key air transport, logistics and business hub.
- The proposed new Lanseria Urban Growth node, which is an agglomeration of primary nodes, including the New Town Centre / CBD, a mixed use activity node, and nodes with a focus on residential

development, business and warehousing development, as well as appropriate light industrial and commercial support development.

- The extensive underdeveloped areas from the existing north-western Johannesburg residential suburbs, Bloubostrand and Kya Sand up to the N14 and the river in the north. The area includes the agricultural holdings of Chartwell, Farmall and Inadan.

The proposed primary zone of focus forges linkages with the existing urban system and provides access into and connectivity in the underdeveloped areas of the target area. It links with Cosmo City, enabling residential extension and supporting socio-economic activities in a compact and mixed use manner. Importantly it builds on the initiatives that are driving the Lanseria Airport node and focuses on the establishment of the Malibongwe major arterial activity spine and the realisation of the new Lanseria Urban Growth Node.

The land area extent of the proposed primary zone of focus is approximately 5,722 ha. It is able to accommodate the current LRSDP (2017) estimated demands until 2037. The proposed primary zone of focus is congruent with public development policy and private initiatives within the GLMP area, enabling a compact and complex urban system, at an intensity that supports mass transit and an efficient urban form.

The Inner Focus Zone area is 28,663 ha; of which the proposed urban structure and GLMP concept places 52.9% (15,162 ha) under development (Development Area). Note that the Freeways & Roads exclude the local roads. The Natural Environment is the total estimate; i.e. includes the rivers and systems in the various urban zones and in the urban structure.

The estimated land use budget summary for the Development Area:

* ESTIMATED TOTALS:					
INNER FOCUS ZONE AREA (ha)	Freeways & Roads	Natural Environ.	Agric / Tourism	Existing Developm.	Development Area
28 663.00	4 016	4 695	3 814	976	15 162
100.0%	14.0%	16.4%	13.3%	3.4%	52.9%

Table 5: Urban Structuring Element

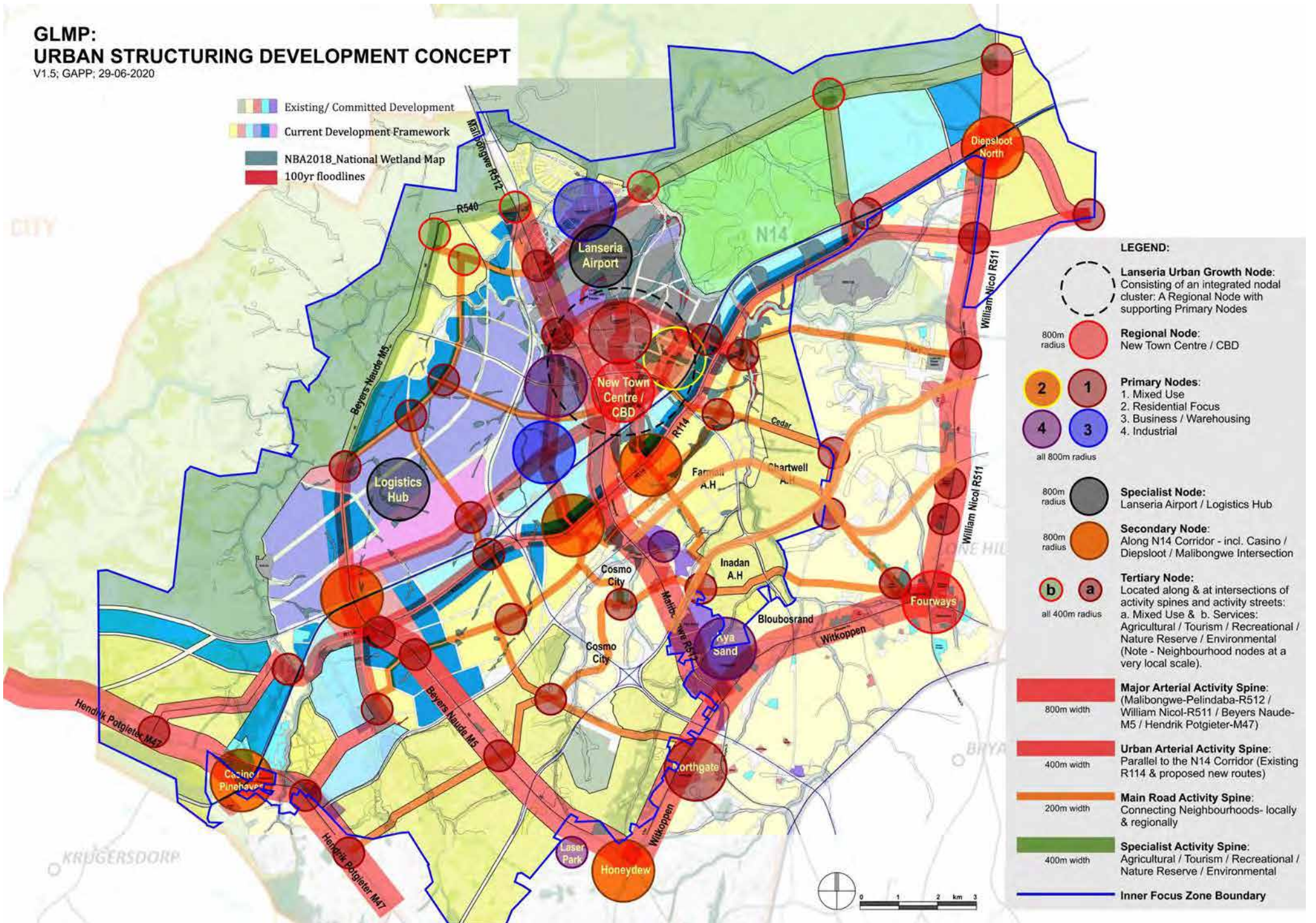


Figure 56: GLMP Urban Structuring Development Concept

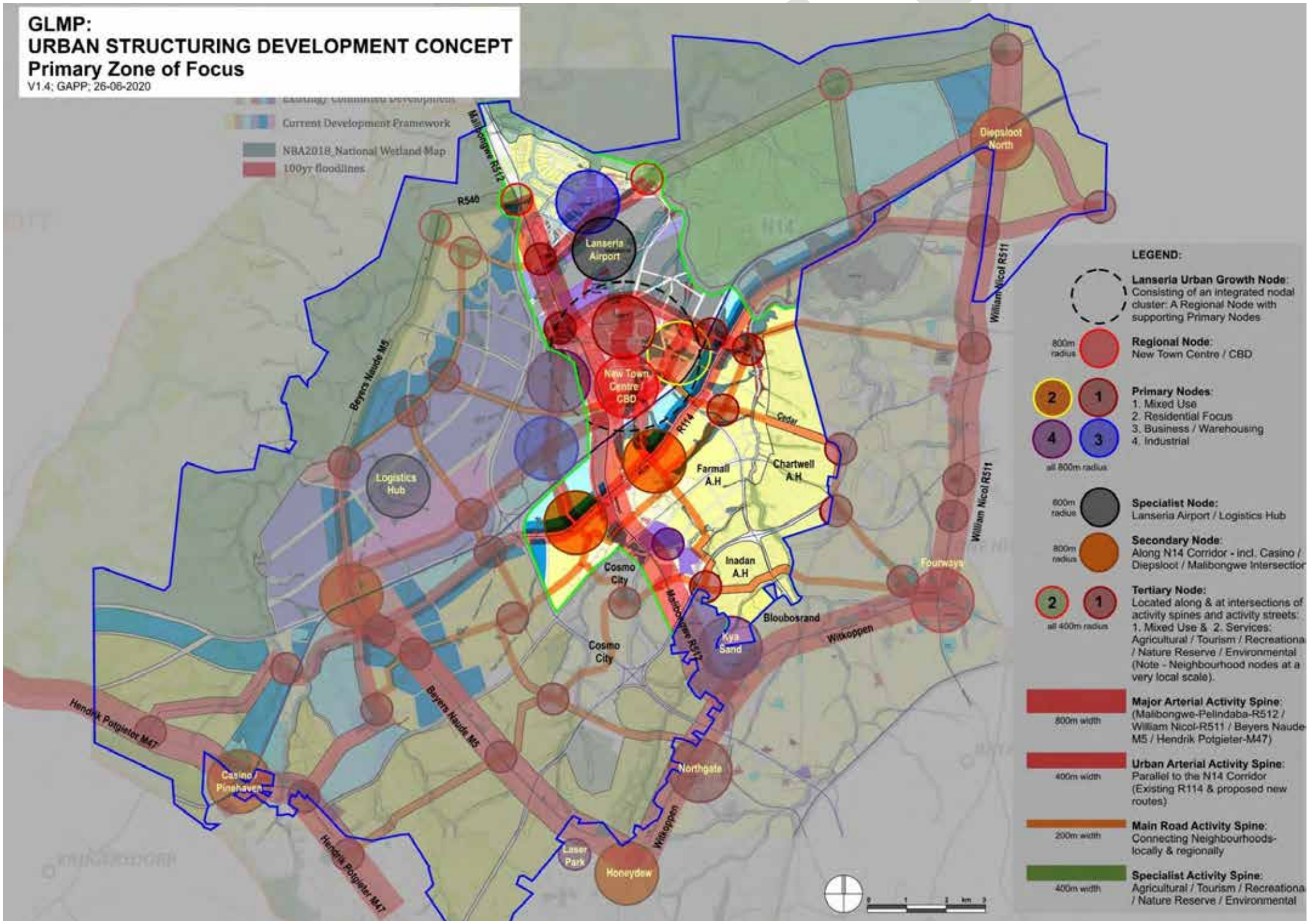


Figure 57: GLMP Urban Structuring Development Concept- Primary Focus Zone

5.3 MODEL 3: The connectivity model

The connectivity model is indicative of the degree of spatial integration (or lack thereof) of the GCR as a whole, such that one can discern those parts or elements of the GCR that are well integrated (and therefore, presumably, showing relatively high levels of urban achievement) and those parts that are relatively disconnected (and therefore, in many instances, likely to be showing high levels of marginalisation from the urban system).

At one level, the connectivity model is a tool for searching the urban system for diagnostic clues to the effectiveness or otherwise of the urban structure.

More importantly, however, it is a tool for examining the likely effects of additional infrastructure aimed at increasing the urban integration of an area. For example, an area such as Soweto, despite its very large population, is poorly connected to the wider urban system for historical reasons and much of Soweto's future achievement as an important sector of the GCR (and Johannesburg more particularly) relies substantially on improving its spatial integration with the wider system. The connectivity model assists therefore (a) in detecting the lack of connection and (b) testing what infrastructural improvements in this regard would be most effective...

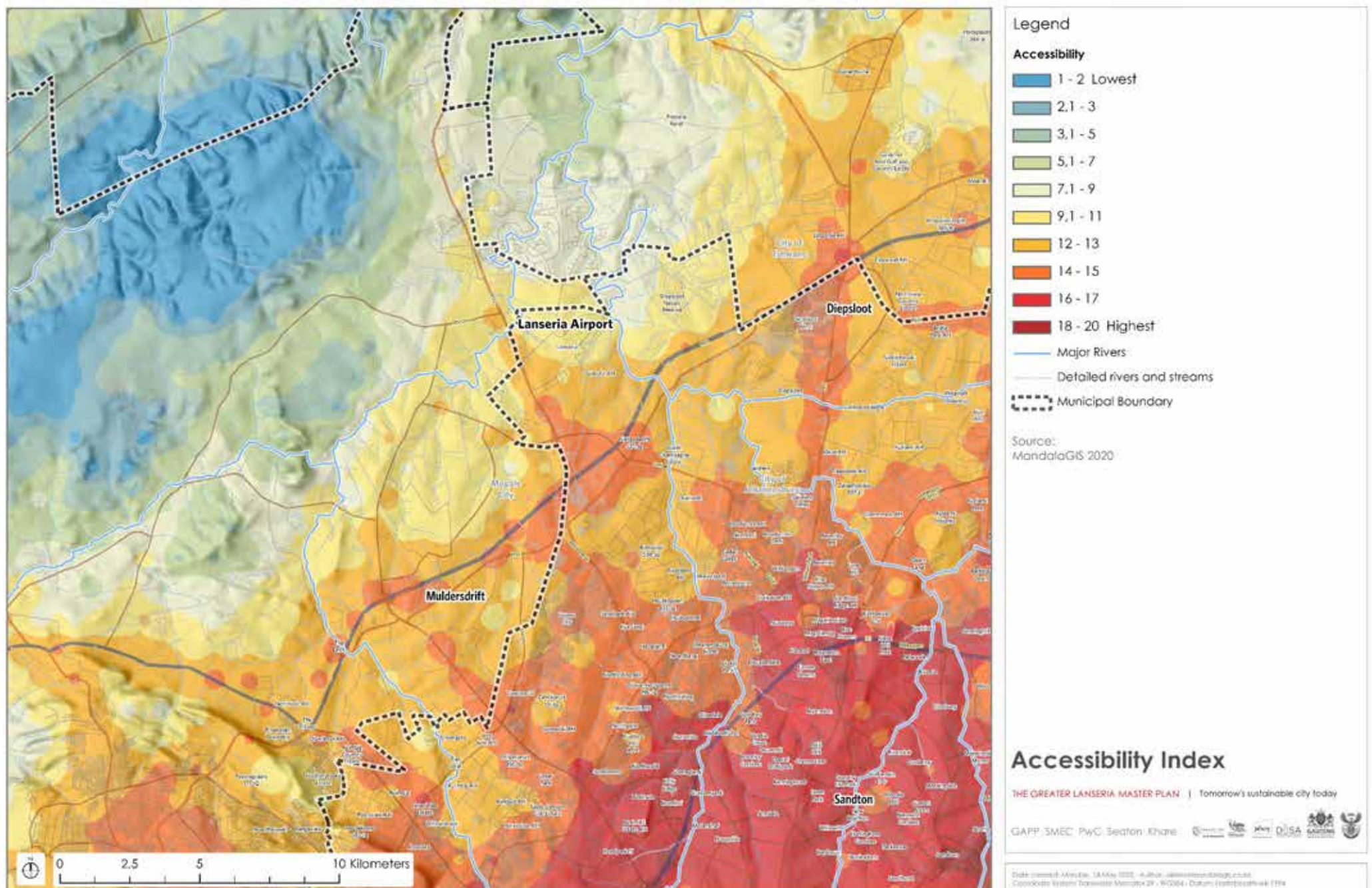


Figure 58: Connectivity model showing the level of accessibility

The principle behind the Connectivity Model is that spatial elements (Linear movement elements in this case) can be broken down into components, analysed as networks of choices, and represented as maps and graphs that describe the relative connectivity and integration of those spaces and graphs. Whilst there are a number of analysis methods of a street network, such as Integration, Choice and Depth Distance; the main concern with the current exercise is the measure of Integration and Depth:

Integration measures how many turns one has to make from a street segment to reach all other street segments in the network, using shortest paths. The first intersecting segment requires only one turn, the second, and two turns and so on. The street segments that require the least amount of turns to reach all other streets are called 'most integrated' and are usually represented with hotter colours, such as red or yellow.

Depth in the context of the Connectivity Model, is a process that measures the linear distance from the centre point of each street segment to the centre points of all the other segments. If every segment is successively chosen as a starting point, then a graph of accumulative final values is achieved. The streets with lowest Depth Distance values are said to be nearest to all the other streets.

The results of this Connectivity Model will provide spatial representations of areas that are well integrated, and thus more accessible, and areas that are more segregated, with lower levels of accessibility. The Connectivity Model which will be processed with a number of different structural iterations, against the GCR performance as a whole.

5.4 MODEL 4: The bid-rent model

The **bid-rent model** has been developed to describe an indicative urban potential of any given point within the study area expressed, notionally, in 'bid-rent' terms.¹ It is a model derived to indicate relative *urban development value* rather than an indicative land value and should be regarded in these terms only.

Effectively, the urban potential of any given point is indicated relative to its existing position in the urban structure, its urban fundamentals (such as visibility and access), and the nature of the infrastructural investments in that area.

This simply gives an indication of what might be expected, in urban performance terms, of an area in the existing circumstances. It is then possible to test, in 'if-then' terms, what the result may be of various

interventions into that area, say, in the form of a new highway interchange, or a new station or road link

One is thus able, for example to identify those areas that may not be achieving their urban potential at present, postulate why this may be, and test whether any particular programme of intervention would assist it in achieving more. Similarly, by cross-referencing with the connectivity model, one may identify areas of dislocation and test the efficacy, indicatively with the bid-rent model, of various spatial interventions to rectify this.

The diagram (Figure 62) reflects the result of the bid-rent model. The cooler coloured areas (greens and blues) in the model represent those areas with relatively low bid-value, and correlate primarily with environmentally sensitive areas.

5.4.1 The Bid-rent Model Criteria and principles

The following criteria were developed and discussed in detail with the professional team including disciplines, including Planners, Transport Engineers, and Environmentalists, etc.

The criteria used to understand the Bid-rent potential included the following, each of the criteria was weighted by the specialist, with a number between 0-5, with the following consideration. This criteria has been applied to each parcel of land, on a very small scale 10mx10m grid.

Weighting:

0 = No /weak for development

1 = very weak

2 = weak

3 = Fair

4=Favourable

5 =Very Favourable

¹ Bid-rent theory is used in urban economics to model urban activity patterns, and intensities of activity, according to the land value potential of a place as informed by how much a certain use would bid for a piece of land relative to the prices other land uses would bid. Thus, at an epi-centre of very high land value within a given spatial extent (notionally referred to as the Peak Land Value Intersection (PLVI) of any particular district), retail may typically bid extremely high

at and over a very short distance from this epi-centre; office uses may bid less but over a wider area from the epi-centre; residential, in turn, may bid less but over a much wider distance; and industrial, for its part, may bid least and be placed, by the property values, furthest away from the epi-centre. The resultant value-gradient from these graphs represents what is referred to as the 'bid-rent curve' of a particular point or district

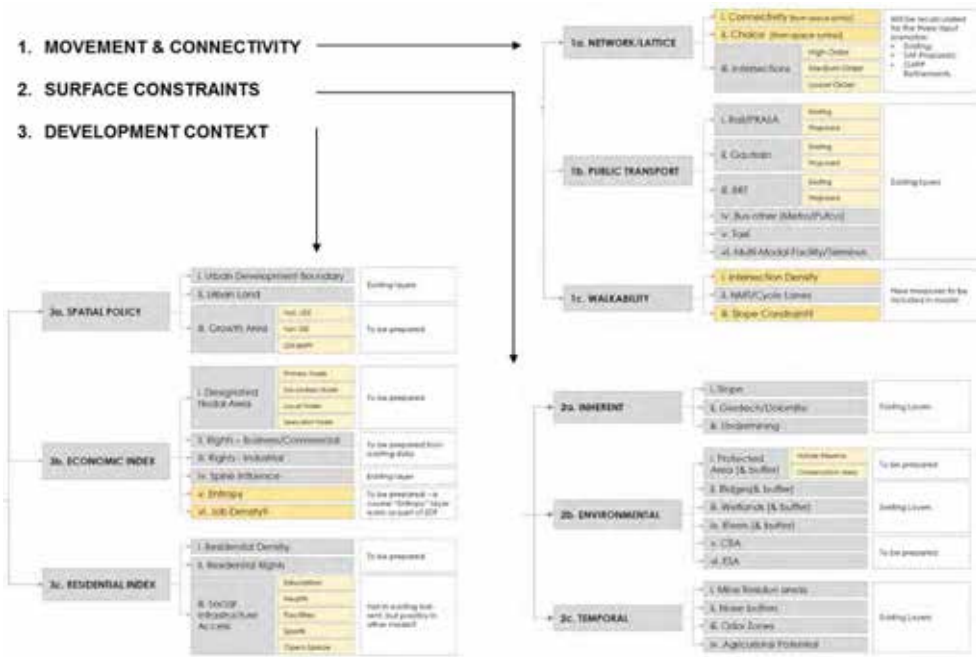


Figure 59: Bid-rent model approach

The Bid-rent Model has been applied to the existing situation, and it will also be used to test further scenarios identified as part of the Lanseria master plan.

Using the above weightings to create the Bid-rent Model, this resulted in values between 1-20, where 1-5 is low, 6-10 low-medium (lighter colours - greys and whites), 11-15 medium - high, and 16-20 high- very high (warmer colours, reds oranges and yellows).

Thus, 1-5 has a low development potential, with relatively low bid-value, primarily correlate to environmental sensitive areas, which would be areas such as undermining, ridges, poorly located in context of other economic opportunities and development, limited or no road and public transport network. Whereas, 16-20, the warmer colours, show areas with relatively high bid-value, and tend to correlate with areas of the urban system that are fundamentally well structured and enabling.

Whilst the connectivity and bid-rent models are not interconnected at this stage, they are both concerned with understanding a common issue: The Social Logic of Space, i.e.: how to understand the interrelationships between different spaces, the factors that define these interrelationships, and the way in which to operate within these interrelationships.

The connectivity model provides a means of exploring the “metric” properties of a spatial structure, whilst the bid-value model explores a wider range of “topological” relationships.

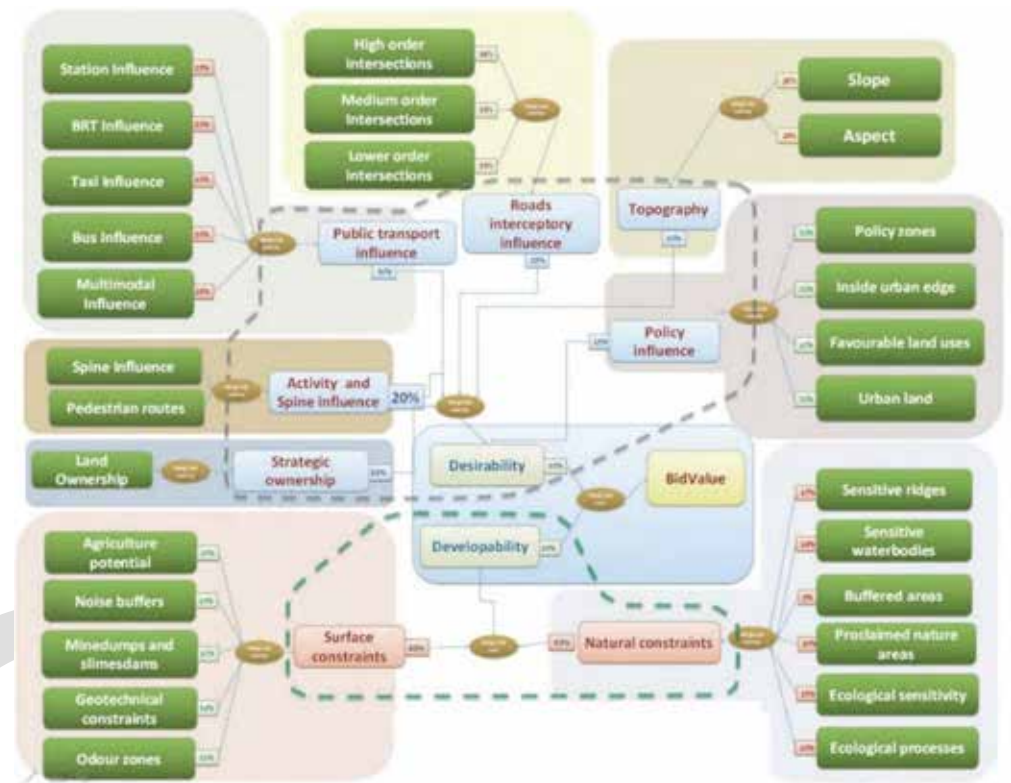


Figure 60: The underpinnings of the Bid-rent model approach

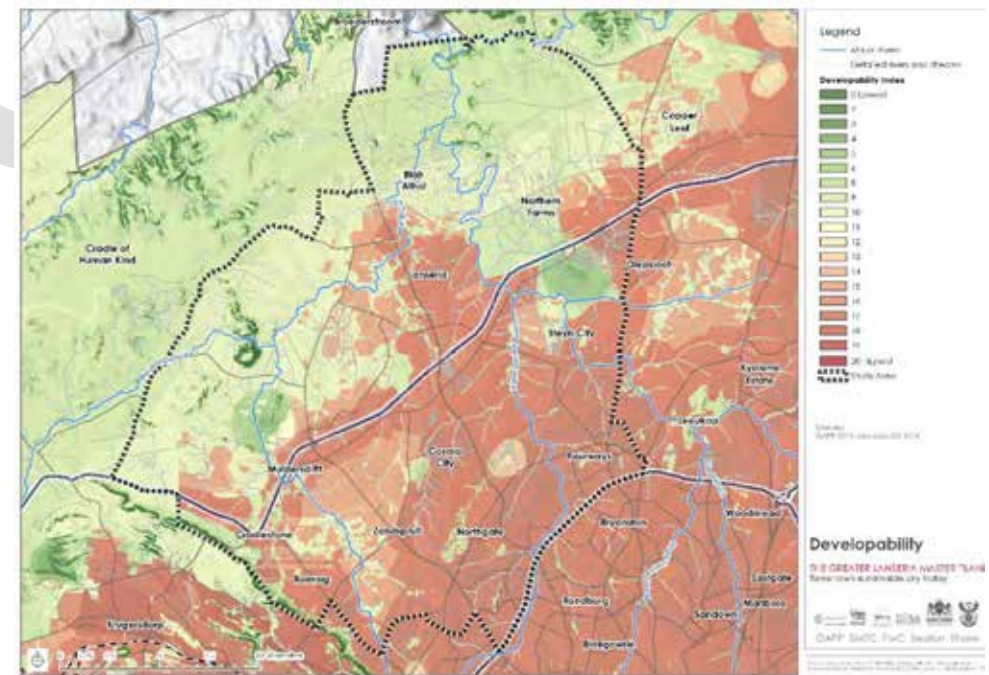


Figure 61: Developability index that informs the bid-rent model

The developability index shows the vast environmental constraint driven by the Cradle, the wetlands and riparian zones, ridges, and sensitive areas.

The results from the bid-rent model tested against the status quo, shows the development potential along the R114, the main route parallel to the N14,

and the Lanseria International Airport. The bid-rent results show limited potential in comparison to areas such as Randburg, Sandton, Fourways. This is a product of the limited infrastructure investment of and integrated road network, limited interchanges from the N14, and public transport within the study area.

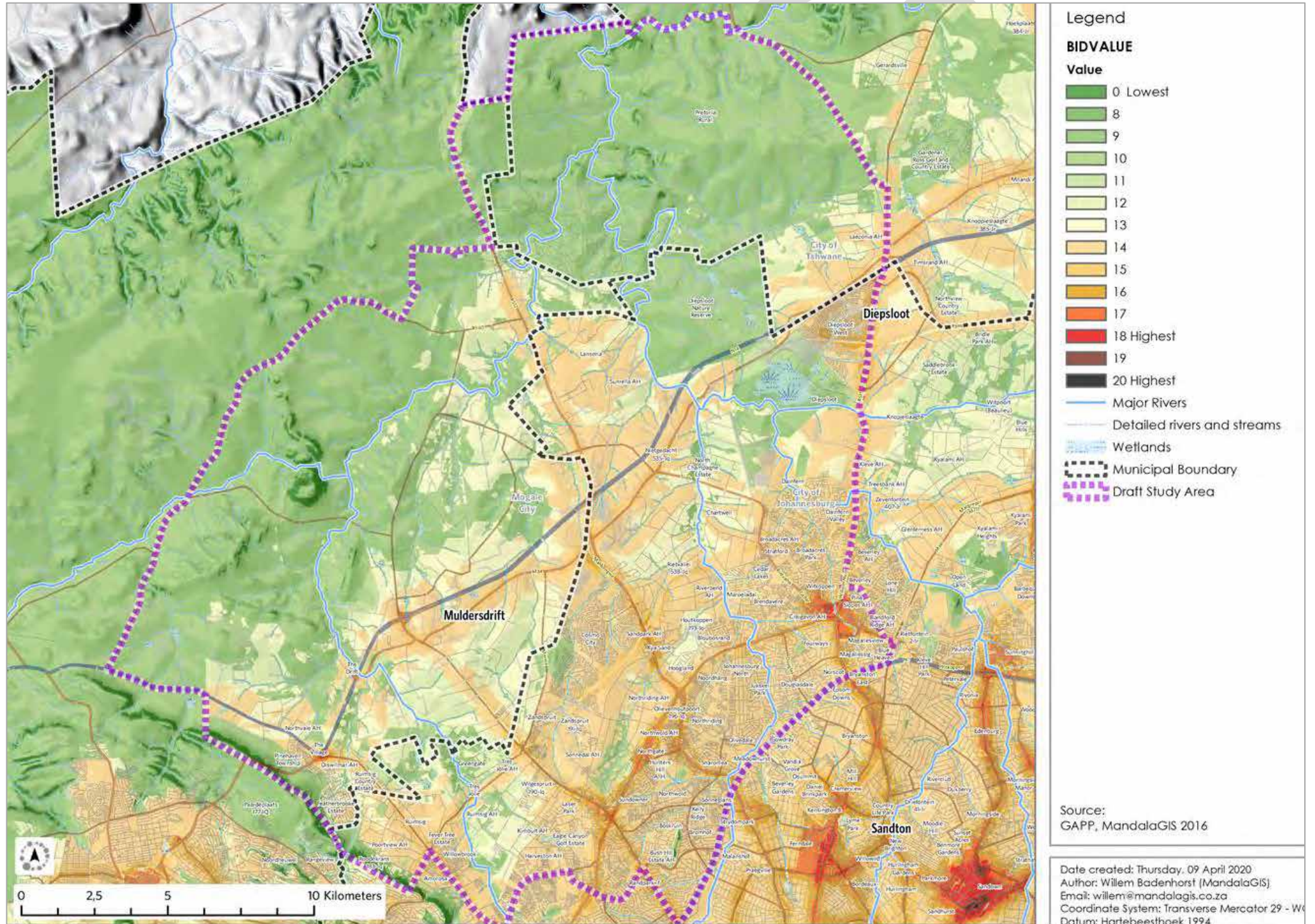


Figure 62: Bid-rent model outcome from the Status Quo

5.5 MODEL 5: The virtual model room

A **virtual model room** has been established to display various portions of the GLMP as an indication of how these areas may appear, in block-modelling terms, as a result of the various policies, infrastructure and performance criteria applied to that area. The intention is for the GLMP to be placed on a virtual platform, in which an icon indicates that there is an indicative, illustrative view of the nature of the urban environment intended. By clicking on this icon, one is able to join the virtual model room and view, in three-dimensional form, an area of similar type and to move around this model and zoom in on it at will. In this way, one is able to deal with visualising an urban future as a result of the interventions, policy directives, guidance and encouragement inherent in the GSDF (refer to Figure 63 and Figure 64)



Figure 63: Virtual model room: showing the potential of the Lanseria Growth Node



Figure 64: Virtual model room: showing the potential of the Lanseria Growth Node view from the N14

5.6 Additional models that would guide the GLMP

The 5 models will become a significant guiding tool for the master plan and it has been noted that additional models namely (a) an infrastructure model, (b) sustainability indexing model and (c) a land use-economic potential model will add value. The establishment of these models will enhance decision making of this project and any project within the Gauteng City Region. These models will be explored to some degree in this process and may also become a part of the guiding tool for GLMP.

SECTION 6 | OUTCOMES OF APPLICATION: FROM CONCEPT TO COMPOSITE

6.1 The sustainability and innovation agenda

A FUNDAMENTAL ASPECT OF THE GREATER LANSERIA SMART CITY

Understanding what a 'Smart city' means, what it spans and who it serves

In his article "Make Smart Cities for All" (the Star 14 October 2020), Professor Tshilidzi Marwala, vice-chancellor and principal of the University of Johannesburg, begins by noting: "In Singapore, there are automated meter readers and drones to detect infectious diseases, autonomous cars, assistive robots in health care; and one can travel with ease through the city's train and bus system with contactless payments ...Singapore has been declared the smartest city in the world, according to a survey published by Swiss business school IMD".

Clearly, in all of this, and in the over 1000 smart city projects around the world, there is much to envy, much to learn from and much to be grateful for given that so much of that pioneering work has charted the course for the future of so many of our cities.

However, he notes, "In a country with stark inequalities such as South Africa, the adoption of smart technologies has to be inclusive. We must remain wary of leaving vast segments of our population behind. The goal is not to create deeper inequity, but to ensure that a blueprint speaks to our challenges and posits the necessary solutions. There is scope for smart cities in South Africa, but we have to get the how and why right. After all, the real test will be whether citizens feel the benefits."

Similarly, Tsakani Manyike of the DBSA, in feedback from its collaboration with the World Bank on Smart Cities, cautions: "In the context of where South Africa finds itself in the smart city maturity level, ... (it) help(s) to define what is meant by a smart city to dispel the misconception that it is just a **tech-heavy** city".

The brief driving the planning and design of the Greater Lanseria Master Plan (which has, appropriately, come to be referred to as the "Lanseria Smart City"), the emphasis is on a publicly-led process that enables and directs the private sector of developers through its publicly-driven investments in infrastructure, the public environment and, where appropriate, public key installations and institutions. In this, it looks to be the first true post-apartheid city planning initiative and to be according to the "TRAM" principles: it is to be **Transformative** in the way city structure is re-thought to achieve true social and economic inclusion across the full spectrum of South Africa's socio-economic profile; it must be concerned with the **Re-industrialization** of the

city economy, both in terms of understanding this in the light of the 4th Industrial Revolution and its 'blue and green' economies as well as arresting decline in the Gauteng City Regions (GCR) industrial base to the south-west, west and north-west of the GCR; it must be **Adaptive** to change and resilient in the face of future uncertainties; and it must point the way in **Modernizing** the GCR as a whole in order to make it more internationally competitive.

In city terms, this means having to "make sense of the nonsense left by apartheid's spatial legacy", something which most have agreed on for years in the re-formation of the GCR but which few have had the political courage to grasp in terms of the real need for transformative thinking in city structure. In parallel with this drive for social and economic inclusion comes the need for urban sustainability as a benchmark of international best-practice as well as the compelling need for cities to be "Smart". As noted in the opening paragraphs of this section, we unfortunately tend to regard Smart Cities as being simply bolting tech-heavy cyber/digital systems onto city systems that, in South African terms, are simply and fundamentally not fit for purpose and which themselves need to be re-thought in truly 'smart-ways'; similarly, we too often leap to the idea that both 'sustainability' and 'smart' are inherently based on a 'Green City' paradigm.

Both views are, of course, absolutely necessary in the understanding of the inclusionary, sustainable and smart city: the fundamental underpinnings of this are, however, far more complex and multi-dimensional, particularly in the South African condition.

The fundamentals of the Inclusionary, Sustainable, Smart City

Post-apartheid cities, in order to be sustainable across a broad spectrum of criticalities, need to be:

- Structured on social and economic integration (spatially inclusive and democratic in terms of access to learning, opportunity, economic prospect, city-citizenry and being conscientious about avoiding those things which preclude, exclude and divide)
- Promoting the growth of local economies (within the wider ambit of growing competitive city economies, both regionally and internationally, consciously promoting the integration of dual logic economies such that many complex layers of economy form and co-exist and are encouraged to do so)
- Compact in extent (with emphasis on convenient walking distances – the 5 minute/400m and 10 minute/800m walk being the basic ergonomic of urban design – and safe, convenient cycling and cycle systems)
- Complex in activity pattern (mixed-use, intense, dense: i.e. one needs to be able to live, work, pray and play all within a local, walkable, socially relevant context)

- Focused on reducing the need to commute (non-motorised transport or NMT – walking/cycling – needs to be the default movement system)
- Public transport based (Mass transport and feeder systems with a clear understanding that private-mobility, car-based thinking is limited and that certain systems, such as the taxi industry can only one of many wider, integrated systems and which will, as for all other fossil fuel dependencies, themselves undergo systematic conversion)
- Fundamentally structured on principles of ecology and bio-diversity (without which any talk of sustainability and smartness is a *non sequitur*)
- Energy efficiency (through spatial patterns; waste-to-energy production; and the myriad facets of this diverse topic)
- Smart systems, technology and infrastructure (where knowledge and information management finds its real capacity by virtue of the kind of city paradigm we've adopted)
- Based on how we allow for next-generation logistics hubs (noting worldwide trends towards several major peripheral nodes servicing the distribution of consumer goods into city regions and the export of these out – essentially, the reason for cities and escalating urbanisation – based, generally, on the maxim of long-haul by rail/short-haul by road)
- Concerned with more appropriate service and social infrastructure delivery based on integrated, inter-disciplinary paradigms (recognising the need to break the mould of how we've done things for centuries, the limits to which we've now clearly been brought and the way we now approach and manage delivery)
- Urban agriculture as an integral part of the urban economy (rather than simply 'agriculture' being some remote rural pursuit and recognising the importance and food security of being a breadbasket, across all forms of market gardening and intensive agri- and aqua-culture at all scales, on the edge of a GCR that is likely to grow to in the order of 30 million people over the next 30-40 years)

What you won't see in the Lanseria Smart City

On the basis of all this, there will be no fantastical portrayals of other 'world cities' (other than reference, where applicable, to the relevant principles of the urban agendas that underpin them. There will be no 'eye-candy' of glitzy, soaring towers of chrome and glass architectural expression (much as this may be encouraged, where appropriate, as a consequence of having got more fundamental issues as noted above right). There will be no reference gimmickry around localized aspects of energy capture, efficiency

or generation or isolated examples of low-carbon footprint movement systems that pretend to mitigate the fundamentally damaging impacts of cities that are otherwise structurally inappropriate in how they are configured or operate. There will be no comparison with cities globally that may well be getting many things right other than to identify and learn from the principles that underpin them, the associated thought processes implicit in them, the city management and will that enables them, and which resonate contextually with the more fundamental aspects of socio-economic exclusion and spatial dislocation that need to be addressed in the apartheid spatial legacy.

What the Lanseria Smart City will be

The Lanseria Smart City will recognize that much of the population of this future city already exists in Diepsloot, Cosmo City, Lion Park, Zevenfontein, Zandspruit, Porcupine Park and Joe Slovo and will consciously make special connectivity and inclusion of these into the new city and its prospects. It will promote a city spatial order that encompasses a very wide variety of housing types, densities and housing rental/ownership models that are not segmented, stigmatized or marginalized in a design logic of safe, convenient walkability and cycling that is based on people-first thinking rather than private car mobility. It will be consciously based on a variety of public transport systems where, if walking or cycling is not convenient as a default, there is access to safe, dignified, convenient, affordable public transport whether for short or long haul. It will be a city driven around the economic drivers that create urban prospect for those who have in effect been marginalized on the periphery of an urban system and excluded both by cost and lack of transportation from accessing those parts of the system that do offer prospect. It will be a city that sees to the simultaneous social facilities (health, education, culture, leisure and sport, dignified public environments and places of assembly, both socially and around locally-derived economic opportunity). It will, of course, recognize the dignity of higher density urban living not simply as some kind of necessity but a real advantage as opposed to township and suburban sprawl. It will be a city mindful of human scale, both vertically and horizontally, with active urban edges at sidewalk level reminding us that streets are primarily places where society happens, people meet and culture cross. It will be a place where people can choose to live an urban lifestyle of compact complexity where moving from various domains of privacy in a carefully designed public environment does not present residents with a binary 'share everything or risk social isolation and alienation' type of choice. It will be a city where, regardless of social or economic 'status', one has standing, lives and works in a city designed around public manners, lack of 'otherness', inclusion and the chance to really believe one is a part of a city-commonwealth.

It will, in essence, be a city of "normality" and in the South African condition where we are so inured against recognizing abnormality on a systemic and day-to-day basis, normality has become possibly one of the greatest

aspirational wants and needs of an urban environment. What then is its “smartness”? It's a South African city in which people may find normality, urban prospect and dignity in a place that subscribes to the fundamental international tenets of inclusion, sustainability and smart, life-enhancing smartness for all.

The need to break through the barriers imposed by existing paradigms in how we design and deliver cities

As mentioned in the Section: Position Papers.

Existing paradigms of planning and engineering, or 'business-as-usual' (BAU), are exacerbating environmental degradation by failing to lead to sustainable cities. Taken separately, it's clear how each silo-ed discipline developed its particular paradigm and why it tends to remain within this increasingly 'straight-jacketed' thinking. Taken collectively, however, it is clear that these old paradigms, which may well have been sensible at some point, have not only taken us as far as we can go - they're actually leading us up an 'urban cul-de-sac':

- We power our cities and transport on fossil fuel technology with its attendant carbon footprint;
- We use water at a rate, world-wide (not simply in dryer climates), that cannot be sustained and is failing;
- We dispose of human waste in increasingly expensive and water-wasteful ways and with increasingly negative environmental impacts downstream;
- We dispose of domestic and other waste using landfill technology that cannot be sustained either from an environmental nor land availability point of view;
- Uncontrolled waste now impacts at the core of the planetary system, the oceans;
- We sprawl our city-systems into increasingly dispersed, simplistic entities characterized by dependence on private mobility and exclusionary zoning;
- We fail to promote the spatial democracy of cities that engender both the social and economic inclusion of their citizenry;
- We fail to understand agriculture as an inherent part of the urban economy and a critical component of food security.

The Lanseria Smart city must be seen as a pioneer in urban sustainability

Against this backdrop, the Lanseria Smart City initiative represents a significant opportunity in leading an urban sustainability agenda and pushing the boundaries of planning beyond simply 'business as usual'. This new smart city on the outer north-western periphery of the GCR aims to create a new economic base for this sub-region and much of this economic base is to be predicated on the 'urban sustainability agenda'. It is an area characterized by affluent urban settlement surrounded by sprawled, formal and, in many cases, informal fringe settlement. Although the formal

settlements have services and, to a degree, amenities, there are generally low levels of skills and extremely high unemployment. The Lanseria Smart City initiative could, over time, provide for a permanent residential population in this wider consolidated growth node of in the order of 3.5 million people and spanning a wide socio-economic profile. With its focus on attracting new economic drivers into the wider node, the mixed-use, complex land use profile of the project would, in addition, be likely to swell this daily concentration of economic activity by a further 150 000 people or more.

The 'Shades of Green' approach

As mentioned in the Section: Position Papers.

The following diagram gives an overview of how it is intended to move urban sustainability beyond existing paradigms of planning, engineering and urbanization to increasingly appropriate levels of sustainability and innovation. As technology in the sustainability field matures, it is the intention to move the project beyond 'leading edge' approaches into what now may be regarded somewhat as 'bleeding edge' (which we avoid at present) but will become more 'mainstream' going forward. Many of the early approaches that may now be considered 'bleeding edge' are less so because of being 'off-the-wall' thinking and more because of them being ahead of their time, systematically hard to introduce at this time, needing to move through present economic or policy barriers to entry, etc. In many of these cases there is little doubt that change will happen and possibly even fairly soon and there is an obligation on the planning team not to have shut any of these things out by virtue of short-term exigencies.

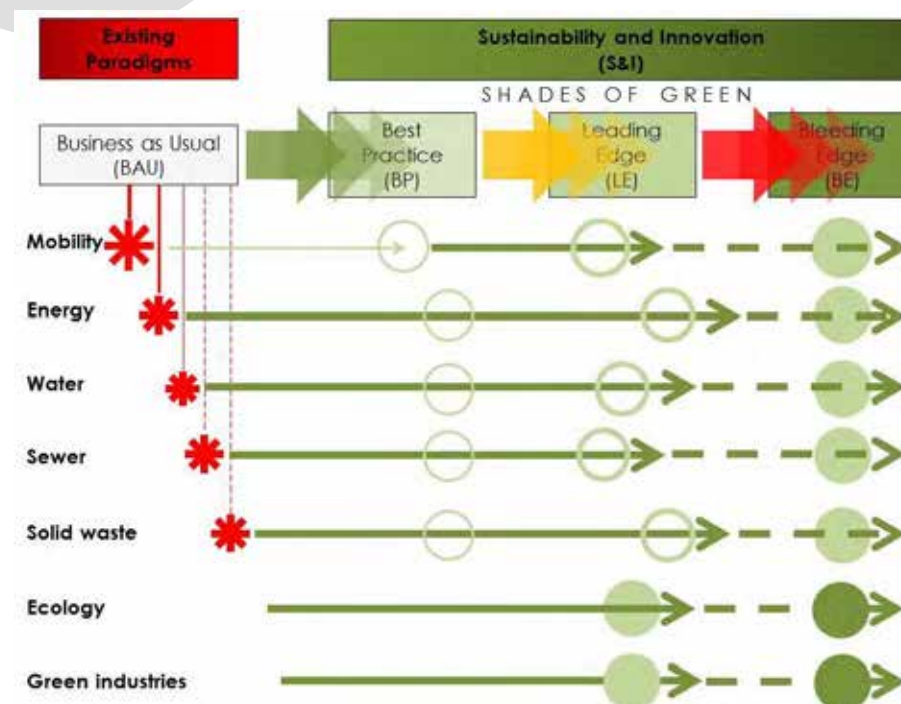


Figure 65: The Shades of Green Approach

Elements included in an open-ended approach to service infrastructure provision

In following the urban sustainability agenda as set out here, an **interdisciplinary** (as opposed to simply a multi-disciplinary) planning approach proposes a group of new utilities (and potentially one, single overarching utility) to undertake:

- Waste-to-energy using pyrolysis and, with the various solid waste departments or agencies, moving away from landfill waste technology;
- Establishing a regional waste-sorting and recycling industry in the greater node, receiving region-wide waste both from the immediate, existing hinterland which is, at present, only served by very far-flung landfill sites and, going forward, potentially via a rail system in the longer term, from waste depots that could be focused on rail further afield;
- Biogas production from the vast, existing Northern Outfall Sewer Works within the planning area;
- Harvesting biogas and compost from waste plant material, again, from the immediate, existing hinterland;
- Harvesting biogas from the proposed sewer treatment package plants that will deal with sewer treatment on-site rather in the initial stages of early development;
- Making provision for, if not already contemplated, capture of biogas at the proposed and soon to be developed JW Lanseria Water Resource Centre as a significant replacement of electrical energy into the future;
- Distributing power within the area at scale using an electrical smart-grid robust enough to both distribute and collect energy at any point and interfacing this grid with the many points of energy generation, regardless of the energy source or generation technology contemplated;
- Instituting district cooling as a utility;
- Harvesting fertiliser value from waste treatment;
- Making provision for, if not already contemplated, additional water treatment and polishing at JW Lanseria Water Resource Centre as a significant harvesting opportunity with RWB into the future;
- Moving incrementally towards increasingly waterless/less-water-based sewer systems (including the introduction of urine diversion (UD) technology at scale);
- Harvesting water at scale and replenishment of the ground-water system. SUDS will be implemented in the ample green spaces placed on either side of the rivers. These areas will act as multipurpose recreational areas with bio swales and rain gardens forming an integral part of the stormwater system.
- Augmenting energy production with water-pumping systems (noting that using Hartebeestpoort dam in this regard does not seem a sensible option) but certainly exploring the possibilities increased head-of-water of expanded above-ground water reservoirs;

- Instituting a variety of green industries (recycling, as mentioned; nursery production, seed husbandry and training; fly farming, based on food waste collected from the wider region; transportation of waste and waste-related product and by-product; urban agriculture and aquaculture);
- By choosing to develop in this nascent smart city, a developer may already qualify for 40 of the points required for a 4-Star Green Rating from the Green Building Council of South Africa and this could possibly be regarded as a mandatory entry level: 5- and 6-Star ratings could then be incentivized beyond this basic level since, going forward, it would reduce the longer term need for further infrastructure;
- With the substantial inclusion of photo-voltaic panels in the architecture of buildings and on land-banked parcels, the smart grid is should be capable of receiving this energy back into the system at any point.
- etc.

Getting from where we are now to this new sustainable future

The focus of the planning exercise now in hand is rolling out a broadly-defined programme of infrastructural investment into the wider Lanseria growth node over the next 5, 10 and 15 year time horizons. There is also the very clear injunction to promote immediate economic activity in the area and to assist this (a) through a joint planning initiative across several municipalities; (b) getting planning in place that streamlines development applications; and (c) allowing early starts, pending wider bulk servicing issues, in the form of, for example, well-defined sewer treatment package plants that evolve into a wider, sustainable system.

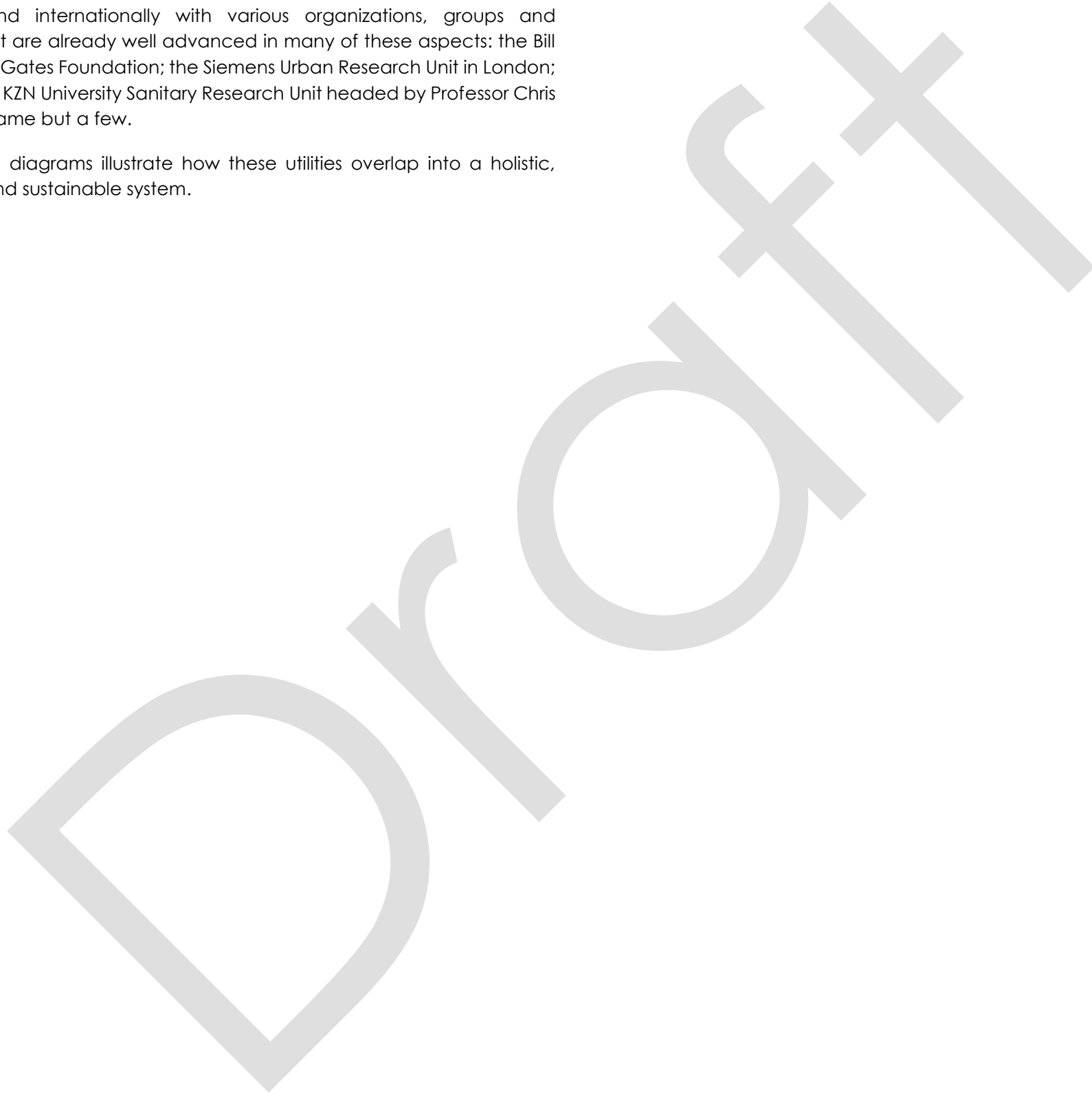
As far as possible, even within this relatively short-term 5 to 10 year horizon, it must be a planning imperative that nothing undertaken in the immediate term, even though, on the face of it may seem a BAU approach, should be regarded as entrenching BAU but rather a short-term expediency in getting initial start-ups in place. Instead, everything must be planned on a basis of 'change management' and how we move, even whilst undertaking early starts, to supplanting (or, at least, augmenting) conventional BAU thinking, virtually across the entire infrastructural board.

To this end, it is a fundamental recommendation of this planning initiative that a specific task team be appointed and funded, on the basis of the Greater Lanseria Master Plan, to undertake further detailed investigations and final planning based on the "shades of Green" approach noted earlier. In this regard, it is felt that the CSIR as a whole is possibly best placed to host this further initiative together with a properly constituted interdisciplinary urban team of professionals. In this regard, too, it is noted that the CSIR, which would be in a position to establish a series of approaches, experimentation, testing and evaluation on an unprecedented scale (and in a search for replicable approaches nation- and world-wide) would be obliged to

configure themselves as a fully integrated, interdisciplinary urban research group rather than an existing organisation of specialist units of excellence.

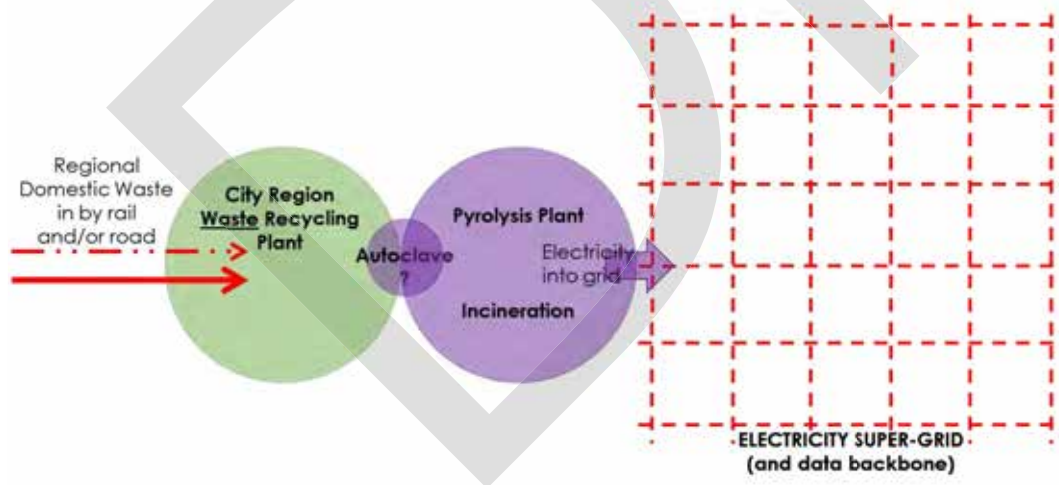
On this basis, such a team would not only be able to, but obliged to, interact nationally and internationally with various organizations, groups and agencies that are already well advanced in many of these aspects: the Bill and Melinda Gates Foundation; the Siemens Urban Research Unit in London; the CWR; the KZN University Sanitary Research Unit headed by Professor Chris Buckley, to name but a few.

The following diagrams illustrate how these utilities overlap into a holistic, integrated and sustainable system.



ENERGY

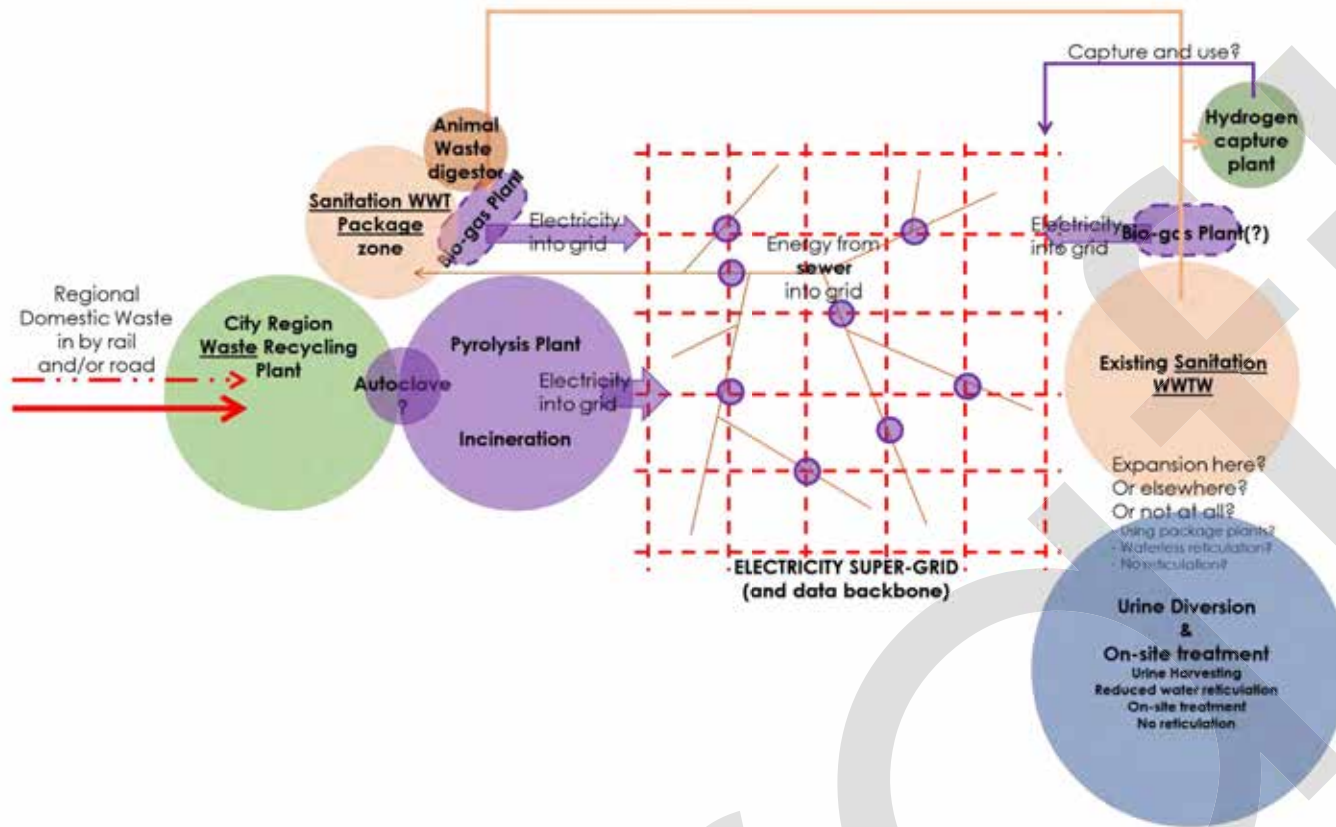
- Distributing power within the area at scale using an electrical smart-grid, robust enough to both distribute and collect energy at any point and interfacing this grid with the many points of energy generation. Electricity is the backbone of the system, and it becomes fundamental to collect energy back into the system. It is essential to future proof Greater Lanseria against the reliance on external agencies, such as Eskom and City Power;
- The electricity grid incidentally provides the data backbone;
- Instituting district cooling as a utility;
- Augmenting energy production with water-pumping systems (noting that using Hartebeestpoort dam in this regard does not seem a sensible option) but certainly exploring the possibilities increased head-of-water of expanded above-ground water reservoirs.



WASTE

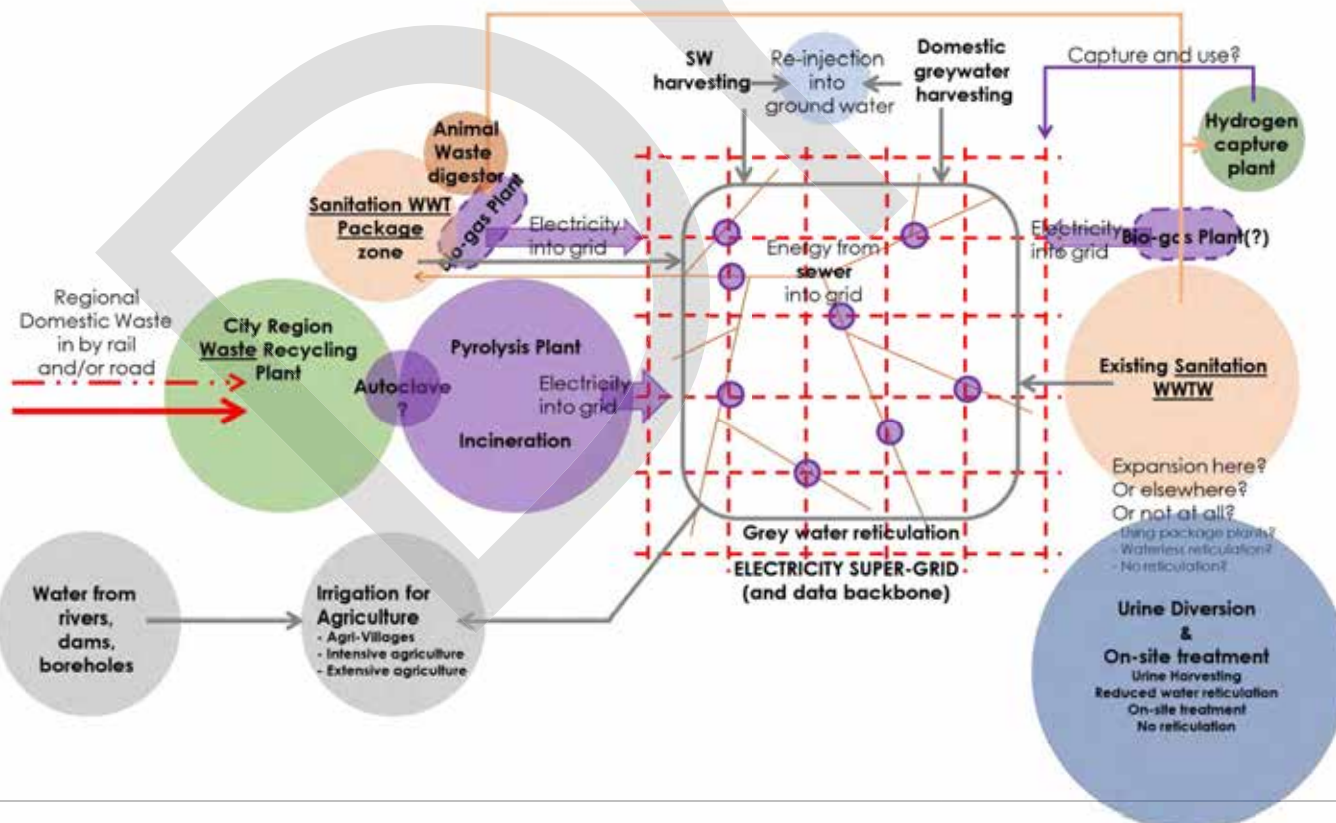
- Waste-to-energy using Pyrolysis with the various solid waste departments or agencies, moving away from landfill waste technology;
- Establishing a regional waste-sorting and recycling industry in the greater node, receiving region-wide waste both from the immediate, existing hinterland which is, at present, only served by very far-flung landfill sites and, going forward, potentially via a rail system in the longer term, from waste depots that could be focused on rail further afield.

SANITATION



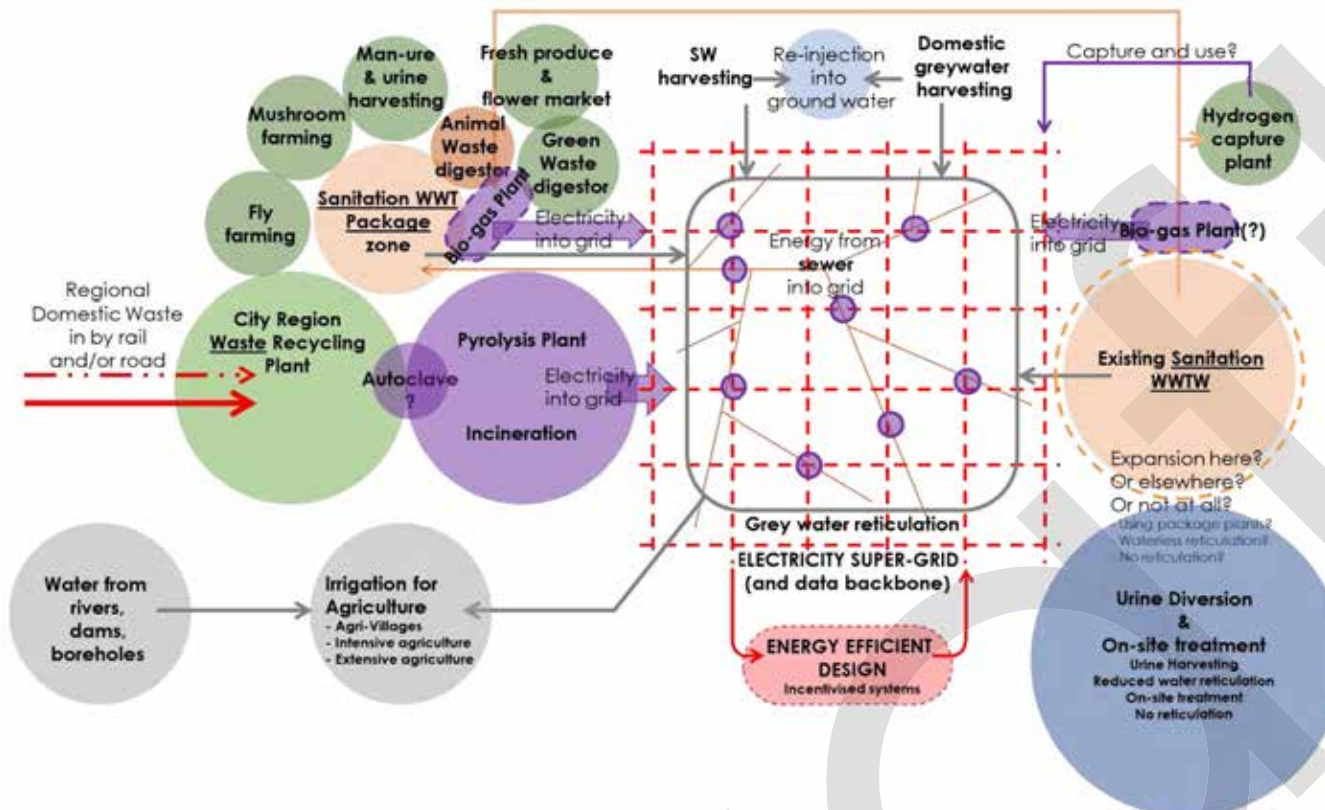
- Biogas production from the vast, existing Northern Outfall Sewer Works within the planning area;
- Harvesting biogas from the proposed sewer treatment package plants that will deal with sewer treatment on-site rather in the initial stages of early development;
- Making provision for, if not already contemplated, capture of biogas at the proposed and soon to be developed JW Lanseria Water Resource Centre as a significant replacement of electrical energy into the future;
- Harvesting fertiliser value from waste treatment;
- Moving incrementally towards increasingly waterless/less-water-based sewer systems (including the introduction of urine diversion (UD) technology at scale);

WATER HARVESTING



- Instituting district cooling as a utility;
- Making provision for, if not already contemplated, additional water treatment and polishing at JW Lanseria Water Resource Centre as a significant harvesting opportunity with Rand Water Board into the future;
- Harvesting water at scale and replenishment of the ground-water system;

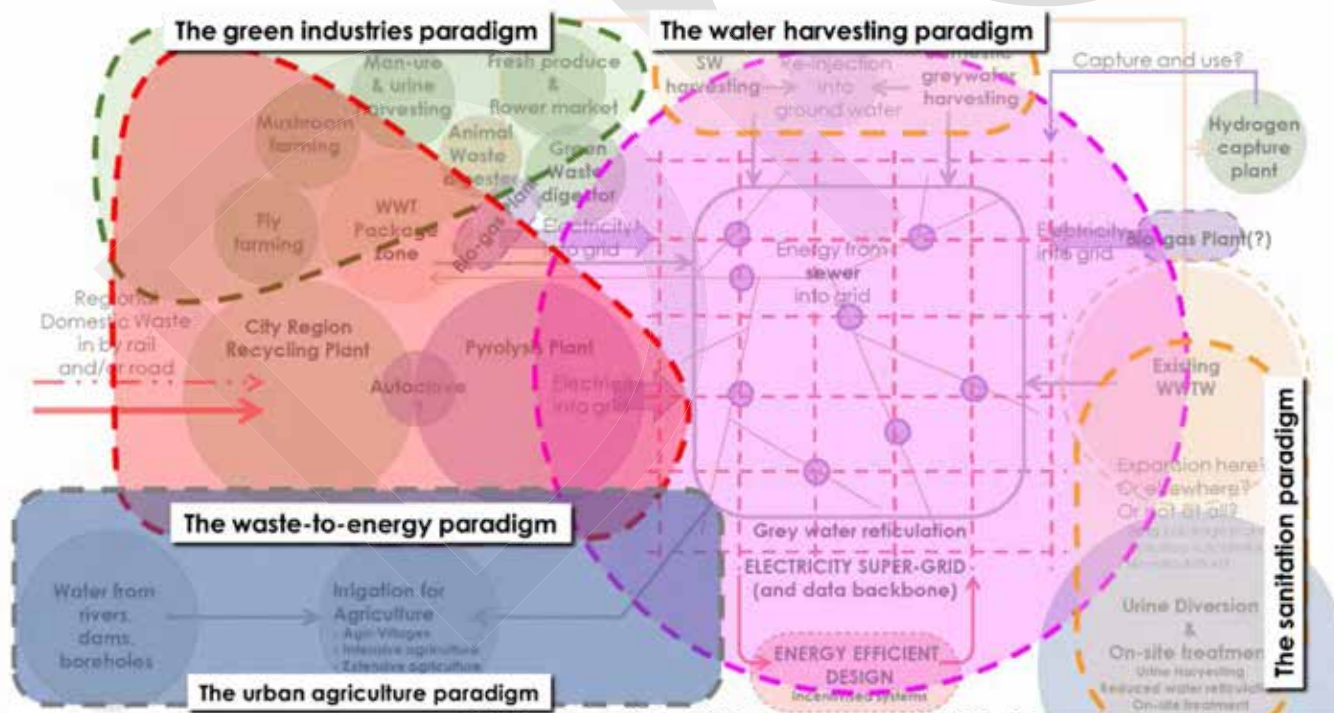
GREEN INDUSTRIES & THE URBAN AGRICULTURE PARADIGM



- Instituting a variety of green industries (recycling, as mentioned; nursery production, seed husbandry and training; fly farming, based on food waste collected from the wider region; transportation of waste and waste-related product and by-product; urban agriculture and aquaculture);
- By choosing to develop in this nascent smart city, a developer may already qualify for 40 of the points required for a 4-Star Green Rating from the Green Building Council of South Africa and this could possibly be regarded as a mandatory entry level: 5- and 6-Star ratings could then be incentivized beyond this basic level since, going forward, it would reduce the longer term need for further infrastructure;

RE-THINKING THE CITY'S UTILITIES & ECONOMY HOLISTICALLY

As with all bulk services, water infrastructure and electrical infrastructure cannot and must not be considered in isolation. Similarly, waste disposal is not in itself an isolated item for consideration, we are obliged to think of waste-to-energy (and the many up-stream and down-stream multipliers associated with this). We are on the cusp of profound paradigm changes to sanitation, for example, that can be rolled out at scale in ways very different from conventional, extremely expensive systems (both in terms of infrastructural, wasteful and high-dependency on water as a scarce resource); we shouldn't be continuing on the present trajectories. There is a need to review an integrated approach to utilities provision. Service infrastructure and utility provision becomes the very underpinnings of a new economic base for the sub-region and its re-industrialization.



6.1.1 Integrated infrastructure and transportation plan

Refer to: Annexure B.2 for more information.

6.1.2 Integrated Sustainable Infrastructure

The concept of integrated sustainable infrastructure has been described by Arka Pandit; Hyunju Jeong; John C. Crittenden; Ming Xu in a paper titled: “**An infrastructure ecology approach for urban infrastructure sustainability and resiliency**” as follows:

“The concept of ecology can be extended to the urban infrastructure as well **when the infrastructure components are not analysed individually but as an interlinked system**, which then can be termed as ‘**infrastructure ecology**’. Urban infrastructure can be envisioned as an integrated network of four major infrastructure components, which are the **water infrastructure, the energy infrastructure, the transportation infrastructure and the land-use pattern** or the urban form. Two of the more prominent interactions are between **water and energy** and that between **energy and transportation**, but these inter-relations extend beyond the water-energy nexus to all individual infrastructure components. A system level integrative approach reveals many options which might be more sustainable but not apparent when approached on an individual basis. **A holistic system level approach is required to attain sustainability as a comprehension of these interrelations lead to better design and assessment of the urban infrastructure system.**”

This integrated/holistic system approach needs to be applied at the planning stage to create an urban environment where people will want to live, play, work and pray. The question is then, how is sustainability ensured and what does sustainability mean in this context? This may be answered by another question: Will the planning GLMP address the future integrated needs of the people? Planners can only endeavour to anticipate these needs to the best of their ability with the test of time being the ultimate proof of their success.

The interrelationship of urban infrastructure components is indicated graphically Figure 66. This means that water, energy, mobility, and land use are interconnected and that neither component can be planned or implemented in isolation.

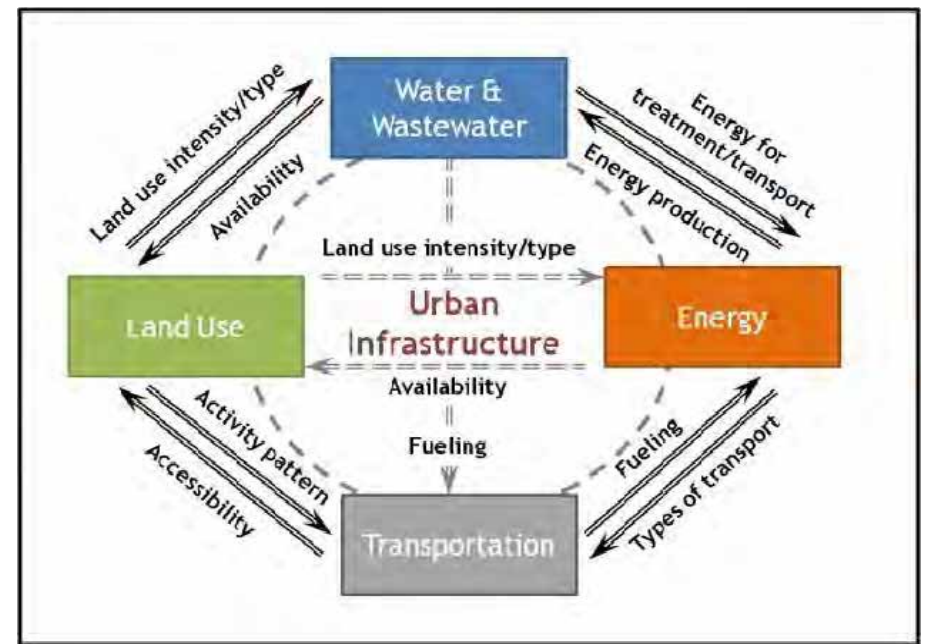


Figure 66: Interrelation of urban infrastructure components

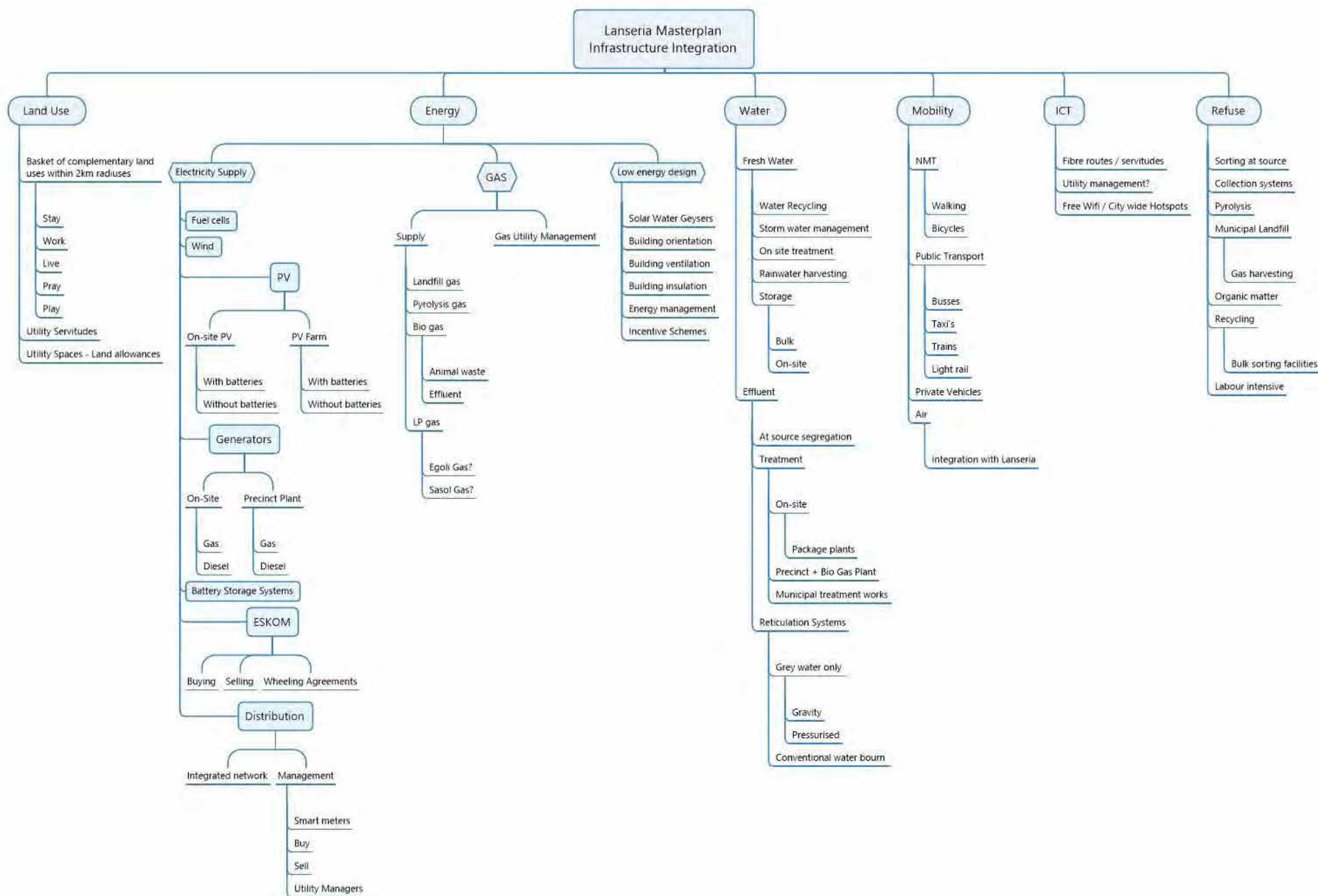


Figure 67: Integrated Infrastructure Planning Map

Documentation of Key Issues

6.1.3 Water

Access to affordable, reliable, safe and high-quality drinking water is a fundamental human right, it therefore plays a major role in the success of a functioning city at a city master planning level. There is extensive South African legislation that denies any development without available water supply.

Rand water (RW) is currently (2020) doing a groundwater study on the aquifers to determine if they can augment the potable water systems. The study has just started and the results will show the water volumes available, the water quality and treatment technologies that will be required.

The funding model for the study area is key as some infrastructure will have to be funded and maintained. But self-reliant options (boreholes) would diminish the revenue base. It's important to find a balance. Need some kind of cost-recovery fee. New utility approach in order to keep the economy going.

Planning Recommendations

- The Average Annual Daily Demand of water for the development is 62 ML/day.
- The team does not have the essential information detailing the extent and capacity of the existing water infrastructure.
- The infrastructure gap (if any) that is required for the development to be feasible will be determined once the information described above is made available.
- There are several operational quarries in the area which will eventually need to be rehabilitated, these could be earmarked for water storage in future. The phasing out of the quarries is important for planning purposes;
- The geohydrology in the area is important, especially on the granites that characterise much of the study area, resulting in groundwater table is very high. There are a number of shallow interflow water pathways, with a number of steep wetlands (subsurface). In many cases we disrupt the interflow zones where water is moving through the landscape, in the very shallow layers where you may be building a foundation or a tank etc. A Hydropedology study for specific areas should be undertaken for the study area that would require such a study over and above the wetland delineation. Water balance can be planned carefully based on this, areas for recharge and

abstracting, and measuring the impact. Hydropedology is sensitivity to entire water system on surface and below ground, ensuring sustainability of upstream and downstream catchments, interflow zones, and chemistry of water. A hydropedology report on Kyalami area has been done and could serve as an approach to Lanseria study area.

6.1.4 Sanitation

The provision of adequate sanitation systems in conjunction with the safe supply of water, is essential for social and economic development and the overall health of a city. Sanitation systems are also very difficult and costly to retrofit into urban environments if space has not been allocated for this infrastructure in the land use planning and the identification of servitudes. It is therefore critical that land is allocated for infrastructure in the land use plans and that the city by-laws make provision for servitudes and right-of-ways that enable the implementation sanitation infrastructure. The use of gravity for conveyance is a fundamental principle of the GLMP to avoid the energy costs associated with the pumping of wastewater and the associated environmental implications of the failure of a pumping system resulting in a spill.

Wastewater treatment works (WWTW) are often perceived to be the end of the cycle in which wastewater is treated to an acceptable standard for disposal into a certain system (often a river). The underpinning of the approach to sewerage is to move away from viewing Water Treatment Works (WWTW) and to view it as a Water Resource Centre (WRC), and when new sustainable technology comes into place to ultimately move away from waterborne sewage, all together.

4 Treatment Plant Proposals Options have been evaluated in this study (costs to be weighed up):

- Lindley (WUL not with DWS yet);
- New Lanseria JW Plant (Mogale sewer to be pumped to CoJ);
- Lindley + New JW Plant (natural gravity drainage);
- New Regional Plant at the confluence;

It was found that the proposed Lanseria WRC is a good location, and will be able to capture most of the demand in the first 15 years of development. Lindley WRC is much further down the line. A confluence position north of the study area was looked at to pick up both Lindley and the proposed JW plant's catchments (approx. 7km north of JW plant) which was explored for a regional plant. However a regional plant has:

- Minimal benefit going beyond confluence
- There are points of diminishing return <100ML sewerage / day due to energy demands,
- Return on investment >100ML sewerage / day

Package plants are a contentious phenomenon in the city, potentially because if implemented the “wrong way round”. Package plants are usually built for small developments, with little support on large developments as management is a problem. Done at scale with proper management systems in place with appropriate technologies

It is not advised in Lanseria for every small developer to have their own package plant, with no coherent plan, common technology, or overall management. Institutional and organisational sides are as important as the concept.

The LIA has an on-site waste water treatment plant that services the airport as well an adjacent property. With the current upgrades at the airport, the plant is reaching its capacity and by mid-next year the upgrades to the plant will commence. This is a short-term need and the airport cannot wait for / depend on the proposals that will be made as a result of the master plan. The treated water from the plant is used for irrigation purposes within the airport facility.

In order to service the sanitation requirements for the entire development, a total of 325 Ml/d of treatment capacity will need to be provided. The results of the gap analysis show that there are no deficits in the municipal plans vs. what is required to serve the development in future. The proposals seem to be adequate, it is recommended that the current plans are implemented.

The following figure outlines the broad sewer supply areas for the GLMP.

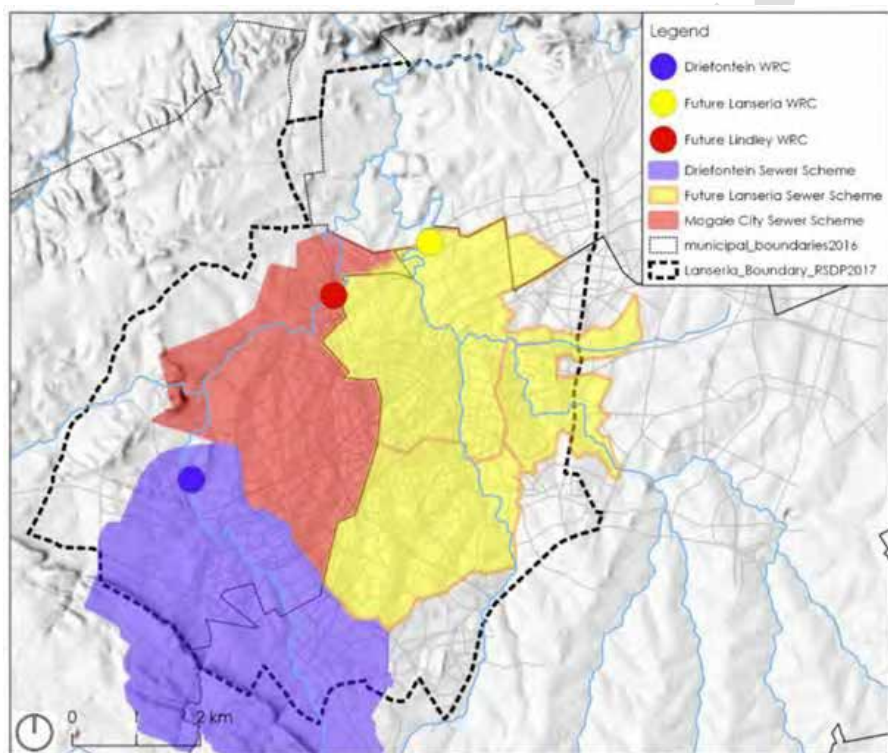


Figure 68: Proposed waste water plan

Planning Recommendations

- The proposed Lanseria WRC is required urgently and the proposed Lindley WRC is not required urgently but is crucial to unlocking development in the area. The combining of these plants into a regional plant was considered, however, due to various regions, it is strongly recommended that the Lanseria WRC be constructed immediately.
- The new Johannesburg Lanseria WRC will not service new development in the short term, as this will take between 5-7 years to be implemented and in the interim it is recommended that package plants be put in place to unlock development, with the view to connect to the more conventional on the grid systems in the future, or more sustainable approaches to sewer.
- In the interim, the package plants (can use the water for irrigation) will be permitted on condition that they comply with the following requirements:
 - The development has catalytic properties (i.e. logistics, vertically integrated mixed use, nonconventional retail mall, located within the urban core) etc. To be reviewed by relevant planning authority or design review panel;
 - The package plant meets the standards of council (properly specified) so that they can be managed appropriately;
 - Can be integrated into a more conventional system in the future with the potential new WWRCs, pumping into conventional system should be avoided, and natural flows should be followed;
 - A management plan with guarantees must be included, should the package plant not be managed appropriately, the municipality or government agency can manage this.
 - Approaches to decreasing the use of the wastewater explored (i.e. waterless toilets, ability to separate at source, potential of reusing (fertilisers etc.)) as part of the implementation and management plan of the package plant;
 - They must not in any way affect the ground water, surface and contamination (proliferation is the problem)

Moving to the shades of green approach

- **As stated by Professor Buckley, the key problems identified include**
 - Don't want Stranded Assets
 - Toilet flushing can contribute up to 35 % of domestic water use
 - Sludge management is approximately 50% of WWTW costs
 - Nutrient removal contributes over 50% of the footprint of a WWTW
 - Sustainability concepts such as circular economies
 - Social issues: employment; hunger; health

- Potential Solution of a Urine separation at source, flush with less than 2.5 L/person/day:
 - Send biodegradable waste to sewer
 - Remove nutrients at source
 - Limit treatment to anaerobic digestion
 - Produce energy 9 w/person
 - Treat decentralized
 - Reuse water and nutrients locally

6.1.5 Stormwater

The adequate provision and maintenance of stormwater within a city is critical to reduce property damage, erosion, flooding, pollution and many other environmental and health and safety issues associated with storm events.

The GLMP Study area falls within the A2 catchment, which forms part of the Crocodile (west) and Marico catchment, located in the northern part of Gauteng. The study area drains from the south west in the Jukskei and Klein Jukskei Rivers, from the south east. The rivers then join and the Crocodile River continues north towards the Hartbeespoort Dam.

From visual inspection of the built-up areas that fall within the study area it has been noted that existing stormwater infrastructure is in place in many of the areas. However, most of the development planned as part of this study is located on undeveloped land where no stormwater infrastructure is in place. The new stormwater system is assumed to be completely separate from the existing infrastructure and no upgrades will be proposed.

PCSWMM models for the pre- and post-development situations for both the 1 in 5 and 1 in 50-year return periods were created. The pre- and post-development flows for the 1 in 50-year floods are 31.12 GI and 34.31 GI respectively.

Based on the post development model, with a 5-year return period, a number of Class 100D pipes have been proposed and sized. Estimated pipe sizes vary from 450 mm diameter to 1950 mm diameter. The total length of proposed pipe is 151 km.

As all three of the Metropolitan Municipalities in this area have requirements in place for on-site attenuation, it is assumed that on-site attenuation will be practiced throughout the development. In addition to the on-site attenuation practices, provision has been made for five (5) regional attenuation facilities throughout the development, totalling 600ML. These facilities have been placed in areas where green spaces have been planned in the land use.

Although SUDS have not been specifically designed or placed in this study, allowance has been made in the land use for such systems to be placed in

road reserves as well as along the in the green spaces provided. It is suggested that bio-retention swales and rain gardens are used. With the planned publication of the City of Johannesburg Stormwater Design Manual it is anticipated that there will also be on site SUDS systems implemented within the development.

Due to the sensitivity of ecosystems in rivers and wetlands, it is anticipated that measures will need to be put in place to mitigate the effects of increased volumes of water entering the river systems. These are likely to be weirs used to decrease velocity within the rivers, or similar energy reducing structures.

Rainwater harvesting has been investigated as an option for water-sensitive urban design. To see if this is a feasible option for the GLMP, a check was done to ascertain whether the rainwater collected from the building roof areas could be reused to flush toilets. The requirement would be for 2.2 ML/h to be available for toilet flushing purposes. It is possible to supply enough water for toilet flushing, but it would require using 12% of the development area for tanks. There is a need to undertake a cost benefit analysis to determine if implementing rainwater harvesting will be beneficial and also to determine the most cost-efficient tank size.

6.1.6 Solid Waste

Solid waste management is one of the most challenging issues faced by developing countries due to large solid waste quantities, this causes its management to be a worldwide challenge. Efficient collection and disposal of solid waste is critical to protect the environment as well as the health of the population.

From a status quo perspective, more than 80% of municipal solid waste removal is done by a local authority at least once a week for all three municipalities in the study area. There are currently nine operational and nine decommissioned landfills within the three municipalities, with the addition of two private landfills being run by The Waste Group, a private service provider. The Luipaardsvlei and Marie Louise landfill sites (closest to the study area) are reaching capacity. The next nearest viable options are Robinson Deep, Goudkoppies and the Mooiplaats (private) landfills. Reduction of waste to landfill is an ongoing activity for CoJ.

There is a drive towards reducing waste-to-landfill, in 2018/19, CoJ diverted 15.7% of solid waste from its landfills. **Some Alternative Waste Treatment Technologies projects have been initiated for example a waste-to-energy plant and bio digester plants at the Robinson Deep landfill.**

The waste generation statistics for Pikitup's Randburg Depot have been used as a basis for the generation calculations for the study area. This is assumed to be representative of the land use of the proposed Greater Lanseria Master

Plan. Once the full area is developed the waste generated is estimated to be 860 t/day or 313 879 t/year (excluding waste reduction initiatives).

Three transfer stations have been proposed for the study area, to receive waste, sort it and divert as much waste from the landfill sites as possible. These have been strategically placed based on a set of criteria with particular attention to the Lanseria airport and surrounding airfields. One of the transfer stations has been location at the closed Kya Sands landfill site, in line with Pikitup's plans.

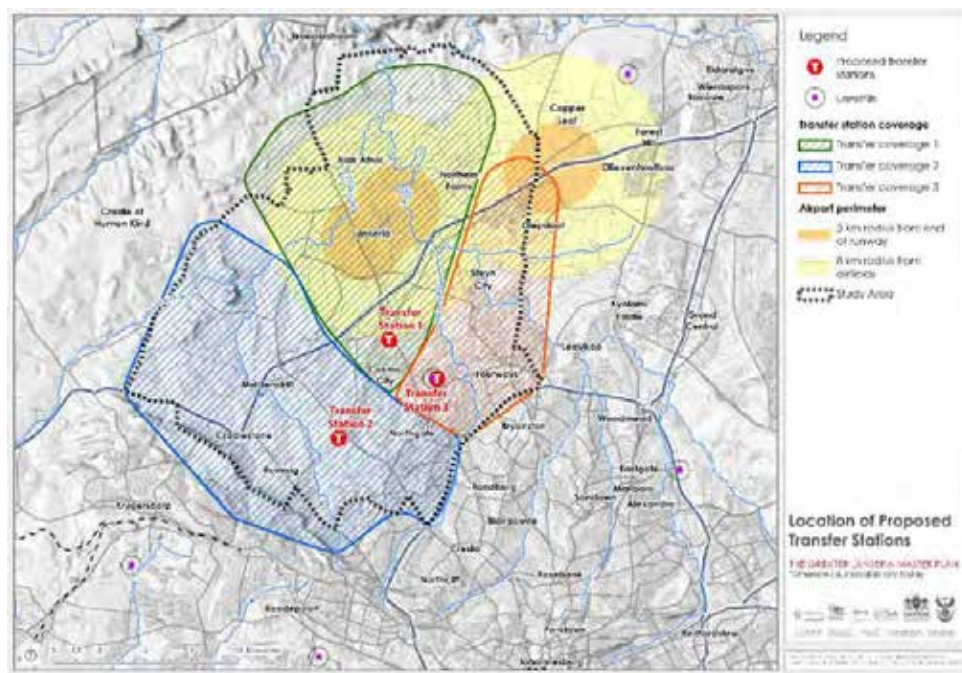


Figure 69: Proposed Transfer Stations

An assessment has been done of various waste-to-energy (W-t-E) technology possibilities for the development. The limiting criteria for the selection of a viable W-t-E option can be reduced to suitable waste quantities, experience, cost and environmental impact risk. Suitable waste quantities are only available for **Anaerobic Digestion (AD) and capturing of landfill gas to ensure an economically sound operation.** These options are also the cheaper alternatives, and capacity building and skill experience can be achieved in the South African environment. Although pyrolysis and gasification appear to be the leading environmental solution to MSW management, the lack of experience with MSW, previously failed pilot projects in the South African environment, insufficient suitable feedstock and a high cost of waste per input result in the option being highly unfavourable.

The remaining waste after W-t-E initiatives will require disposal at a sanitary landfill. Assuming that an additional 15% of waste (35% total) is diverted before landfill after the development of the primary focus zone the development of the Greater Lanseria area is expected to initially reduce the waste-to-landfill tonnage through recycling and W-t-E initiatives, however, after the development of all the focus zones, the waste-to-landfill is approximated to increase to an additional 83 866 t/year from the 2018/19

figure, bringing the total MSW generation waste-to-landfill to 213 438 t/year and requiring 1.07 ha/year of landfill space. Once the phasing of the development has been done, the team will have a better indication of the landfill space requirements and there may be a need for a new landfill to form part of the future regional solid waste plans.

Planning Recommendations

Much of the study area is underlain with Granite, which is not favourable for a landfill site. There may be a site in Mogale City which would prove suitable for an integrated facility: geotechnically, it sits on shale, is bounded on two sides by slimes dams and gold mining operations, is well removed from residential developments and is serviced by rail.



Figure 70: Potential position of a Landfill Site and Pyrolysis plant in the longer term

6.1.7 Electricity

The energy sector, and thus the power sector, is systemically and intrinsically linked to almost all sectors of the economy such as transport, housing, manufacturing, agri-processing, mining and ICT services. This linkage to all economic sectors makes the power sector pivotal to the growth and welfare of the economy and critically important to the urbanisation theme. Electricity is an essential driver of modern technology and socio-economic development. Its use is required at low levels for devices such as lights and mobile phones, as well as at high levels for industrial processing activities that contribute to economic value-added products and job creation.

Bulk electricity supply in the study area is provided by ESKOM, primarily at 88kV and 400kV high voltage. In terms of legislation, the municipal entities involved remain entitled to invoke first right to service consumers within the respective municipal areas, including service utility formation or agency agreement. Electricity distribution to consumers within the study area is handled by all four entities, with the Core Area primarily served by ESKOM Distribution.

The establishment of the Ithuba 88kV Substation, comprising new substation and overhead lines, near the Lanseria Airport is the most recent project embarked on by Eskom Distribution to address load growth in the vicinity of the Core Area. In addition, the Demeter 88kV Substation is planned for implementation in the south of the study area, close to Beyers Naude off-ramp from the N14 highway.

A grid-only solution consists of: power being generated at a remote facility, transmitted across the high voltage grid operated by Eskom, and distributed to customer premises by a local utility (being Eskom Distribution and/or municipal utility), with voltage transformation at substations at various levels of and distributed across the network. A basic understanding of the South African electricity supply landscape in terms of pertinent regulations and policy is provided, to enable further consideration of viable electricity sources as alternative to the grid solution. Alternative and contributory solutions include demand side management, distributed renewable energy generation, and energy storage systems.

The reduced implementation costs of distributed energy generation, advancement in decentralised solutions and the adaptation of business models are improving the viability of alternative energy solutions, when compared to conventional centralised grid solutions that are subject to upstream capacity constraints, increasing tariffs and a generally pressurised business model of the national and municipal utilities.

The distributed energy generation concepts provide municipal utilities (and system operators) with the opportunity to control local energy infrastructure plans, which may include distributed generation, storage systems, smart distribution grids and mini-grids. DEG can lead to a reduced dependence on the national utility (Eskom) and initiate changes in the municipal energy business model which in turn may improve financial sustainability.

Further engagement with the CSIR:

- Consensus that centralising power generation, transmission and distribution is limiting to the prosumer wanting to connect power back into the grid;
- Discussion on prosumer model for microgrids, and the potentials for bi-directional imbedded distribution in the electrical infrastructure;
- Potential for district cooling and heating through a thermal network exists;

Planning Recommendations

- The first order Electrical Demand Estimate for the development is 979MVA.
- Supply-Side Led Electricity Solution

- It is a fundamental recommendation of this planning initiative that a specific task team be appointed and funded, on the basis of the Greater Lanseria Master Plan, to undertake further detailed investigations and final planning based on the “shades of Green” approach noted earlier (*Section 6.1: The sustainability and innovation agenda*). In this regard, it is felt that the CSIR (from the discussions) as a whole is possibly best placed to host this further initiative together with a properly constituted interdisciplinary urban team of professionals. In this regard, too, it is noted that the CSIR, would be in a position to establish a series of approaches, experimentation, testing and evaluation on an unprecedented scale (and in a search for replicable approaches nation- and world-wide) would be able to as a fully integrated, interdisciplinary urban research group rather than an existing organisation of specialist units of excellence. On this basis, such a team would not only be able to, but be obliged to, interact nationally and internationally with various organizations, groups and agencies that are already well advanced in many of these aspects: the Bill and Melinda Gates Foundation; the Siemens Urban Research Unit in London; the CWR; the KZN University Sanitary Research Unit headed by Professor Chris Buckley, to name but a few.

6.1.8 ICT

ICT infrastructure acts as a nerve centre to orchestrate all the different interactions between the elements of a development. ICT is an essential ingredient because it “glues” together all the component parts of a smart sustainable development. ICT also acts as a “great equalizer” – human-to-human, human-to-machine and machine-to-machine – to connect a variety of everyday services, such as water and power utilities, to public infrastructure.

Preliminary investigations have shown that fibre infrastructure in the GLMP study area should be upgraded. The infrastructure team is awaiting information for fibre infrastructure (if any) from City of Tshwane (COT) and Mogale City Local Municipality (MCLM). The information may change the picture in terms of footprint and capacity when it is received.

The initiative of the GLMP is of strategic importance to the State, it therefore cannot only be left to the private sector alone. While having different role players in terms of the private and public sectors on board, the appropriate risk sharing strategies will need to be sorted out to make the venture equitable. **A Special Purpose Vehicle (SPV) should be considered to ascertain if this approach is the most effective way to implement and finance the required infrastructure.** This does not only speak to ICT, but rather to all engineering infrastructure.

The equipment (such as ducting) will be costed into the road infrastructure, and a site has been identified a data centre that has a special purchase vehicle set-up and institutional authority. for routes and equipment

Most importantly ensuring that there is flexibility in the contract with the service provider, to avoid being locked into the approach but also a holistic approach to implementation of fibre and 5G

6.2 Development framework thinking as a precursor to master planning

In the South African context, with lower levels of certainty, a relatively small market and a stop-start economy, planning is often more appropriately thought of in 'development framework' terms as opposed to the notion of 'master plans'. Within this context, planning tends to be less programmatic and 'product-like' and rather more like a 'mental construct' in terms of which a plan emerges in a more flexible way.

In the case of preparing the Greater Lanseria Master Plan therefore, it is the intention to follow the less-categorical development framework planning approach in arriving at an iterative planning result that has gone through a series of stakeholder engagement processes. As this planning process firms up, the framework distils into a more firmed-up 'plan'.

At the scale of planning contemplated for Greater Lanseria, it is essential that five layers of planning be overlaid to achieve a robust development framework: an underlying **open-space network** that provides an ecologically-driven basis of biodiversity and habitat; a network of movement aimed less as a road hierarchical configuration and more at **connectivity**; a **public transport** system that both connects the nascent city to a wider hinterland and provides a basis for inner city commuting; a lattice of **service infrastructure** that is both supportive of a compact and energy-efficient form and which in turn makes servicing effective; a pattern of activities that reinforces **complexity of land use** in which the separation of uses is less important than the promotion of mixed-use environments in which people can live, work, pray and play with less reliance on private car-mobility and commuting, a place where non-motorised movement (walking and cycling) is the default.

On the basis of these five overlays, city development then moves to an organized spatial economy led by proximity, accessibility and bid-rents dynamics. That is, with these basic underpinnings of enablement, the 'city' (the market, developers, development agencies and policy guidelines) is able, in many respects, and in fairly free-forming, organic ways, to assemble itself. Within this framework, the *management of urban development processes* (rather than 'development control') becomes more concerned with the making of well-crafted public environments and design guidelines that generate vibrant urban economies rather than the 'regulation' of development.

Similarly, urban framework thinking concerns itself less with detailed land-use controls and localised codes and more with urban structuring principles of nature, topography, accessibility and the elements around which community and social fabric can form: the 'key installations' and the 'strategic connections' between these that combine to form what Dave

Crane referred to as the 'Capital Web' of the city. With this in place, the city is 'assembled', effectively by the agents Crane refers to as the 'City of a Thousand Designers'.

6.3 Movement and circulation

Introduction

A well-developed transport network and transport system is critical to support the socio-economic development of the area through optimising accessibility to and mobility in, the region.

The investment in non-motorised transport infrastructure is a priority as it promotes transport sustainability and efficiency ahead of less affordable and less sustainable modes of transport. A long history of prioritising private cars over pedestrians and cyclists locally and globally has created a private vehicle bias and a reform in thinking by planners and authorities needs to take place to ensure that development is guided by sustainable principles that have long term economic benefit to the area, region and country as a whole.

Areas with existing agricultural holdings, that are experiencing development pressure like Poortview AH, Ruimsig, Northriding AH, Chartwell, should have very clear policy directives to accommodate for the change (should it be permitted), and ensure that the road network is carefully considered and integrated into the existing and proposed road network to form the grid patterned road network, which enhances flexibility in the road system, and accommodates for pedestrian movement and supports the main road network.

The GLMP, has introduced a grid pattern road network, of mixed functionality as this is flexible and resilient enough to accommodate change. The GLMP detail is designed around 5 and 10-minute walking isochrones.

The freight opportunities and public transport by rail, road and LIA have also been incorporated in this transport plan for the GLMP.

6.3.1 Road network

The road network is a significant enabler of economic development. It must become integrated, with harmony between access and mobility to enhance the development that it unlocks.

A number of roads have been introduced to form the grid-pattern road network throughout the study area, and it builds on the road network identified in the LRSDP.

The GLMP thus assigns a number of urban morphological types to the road network to ensure that appropriate development occurs along these roads. Different levels of land use intensification can occur along such road typologies and different characters occur along its length with a variegated

land use and density. The framework, where possible, introduces parallel and side streets to assist with road access management, and where potential exists the municipalities and landowners should pursue these opportunities, to enhance the activities along these roads. The urban morphological types include:

Activity Spine- Is a linear mixed-use element of urban structure containing an intense concentration of facilities such as retail, office, entertainment, work, service, commercial and industrial, community facilities and residential development, which are all focused along a major transportation route. It is the focal point of an urban corridor or can be a separate element. The spine is traffic orientated (seam), accessed through public and private transport. It carries various modes of traffic which give direct access to a range of high intensity land uses. Pedestrian movement in between passing trade characterises the nature of the activity, supported by a strong residential component. A multi-ownership pattern predominates.

Just as urban nodes, activity spines are hierarchical in nature, depending on their scale and intensity. Typically they comprise a major activity spine and a secondary activity spine at the regional / metropolitan and district scales respectively.

Specialist activity spines, which are more mono-use in nature, also occur within urban systems. For example an industrial spine which comprises predominantly industrial and service related land-use activities. The physical structure is characterised by fast-moving traffic at the centre (usually a freeway or metropolitan access route), with industrial / service uses on either side. The road at the centre is a barrier; and separate local service roads provide access along the spine. The visual exposure along the freeway / metropolitan access route provides address value and regional access to the wider urban system. A multi-ownership pattern predominates.

A **major arterial activity spine** is structured around a regional movement route. The land-use activities are retail, commercial and business within low-rise commercial and business parks type of developments, surrounded by extensive open air parking areas. Access off the major route is limited, with significant distances between intersection spacing's (at least 600m as per typical K-routes). Accordingly property areas are very large with associated coarse grained ("big box") developments, two to three storeys in height, such as typical value mart developments and wholesale retail outlets. Given the nature of the developments there is no spatial or even physical connection across the movement route, and developments tend to function

more in isolation, requiring that people travel by vehicle between developments

An **urban arterial activity spine** is structured around a major metropolitan movement route. Direct access of the route is frequent, with frequent intersection spacing's that are informed by the adjacent street network. In some instances a service road runs in parallel to the main street, allowing for increased intersections spacing's. Given the good accessibility, land use activities that make up this activity spine are mixed use retail, commercial and business, with residential apartments above. The developments are fine-grained, with typical city block sizes that allow for developments up to five storeys in parts; but for most they are up to three storeys in height. Given the nature of the developments, there is a strong spatial connection / interaction between the developments, where people cross the street between developments. Sidewalks are user friendly with short distances between developments – if not directly adjacent and / or internally connected – allowing for convenience shopping and supporting high street style activity. Medium density residential neighbourhoods adjoin the mixed use activities on either side of the activity spine, forming the additional supporting residential component to residential apartments within the mixed use developments. This reinforces the public transport systems.

A **main road activity spine** is a smaller scale activity spine, structured around a main street and can form a component part of an urban arterial activity spine. Its urban characteristics are much the same as with the urban arterial activity spine, excepting that it is quite short in its length, and developments may be more concentrate and intense.

At the suburban / precinct and local / neighbourhood scale the activity spine comprises a **high street**. It is typically characterised by mixed-use development, with residential apartments above retail and commercial activities. At the neighbourhood scale it is a pedestrian dominant activity strip along a local street, with slow-moving traffic and serviced by public transport. The main traffic bypasses the area. Because of the pedestrian focus the maximum length of a high street is the equivalent of a 10 minute walk (800m length). The mixed use activity comprises specialised trade, such as restaurants, as well as convenience stores / facilities (corner shop, pharmacy) for the surrounding residential area. At the suburban scale the mixed use is structured around a major traffic route with supporting public transport facilities.

Table 6: Road classification and Morphological response (refer to Figure 75: Movement and Circulation introducing an expanded system of public transport routes)

GLMP Morphological type	GLMP Intent	Roads identified existing	Proposed	Road classification CoTO RAM	LRSDP, 2017
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Freeway	Based on regional movement route. Land-use activities are retail, commercial and access limited to interchanges. Urban freeway, allowing for review of intersection spacing near intensive activity patterns nodes, activity spines etc.	N14	PWV5 and PWV 9 – longer term	Class 1 & 2	Major corridor
Major arterial activity spine	Allowing for access at main intersection where nodes form. Promotion of Public transport along it in the form of buses (BRT) and light rail. Supporting parallel access roads and cross road connections where possible	William Nicol Malibongwe Drive Beyers Naude Drive Hendrik Potgieter R114	K56 - proposed K33 – proposed PWV 5 PWV 9 shorter term	Class 2 & 3	Urban Corridor
Urban arterial activity spine	Major metropolitan movement route improved access. Mixed use retail, commercial and business, with residential apartments above			Class 3 and 4a	Activity corridor (although generally Class 3, would enhance economic if these became class 4B)
Main road activity spine	Smaller scale activity spine, structured around a main street. Developments may be more concentrate and intense.			Class 4b	Activity corridor (although generally Class 3, would enhance economic if these became class 4B)
High street	Residential apartments above retail and commercial activities Pedestrian dominant			Class 5a	
Commercial Street / Urban collector	Local roads in town centres, and neighbourhoods with improved access and pedestrian orientated			Class 5a	
NMT / pedestrian orientated streets	Linkages that support access to social and public amenities, often located along wetlands, within the town centre and nodes. The focus being on walking as the default mode of transport. Gated communities and lifestyle estates are not supported and if they occur pedestrian access and movement must be a priority			Class 5b & 6	

6.3.2 Road and NMT Interventions

1. Review of Cedar Road north across the N14, to Malibongwe with increased access to promote the urban core;
2. Building of the PWV3 as a regional road (not the full highway) to link to the PWV1/Pampoenshoek that has recently been opened, will improve linkage between Madibeng, Johannesburg and Tshwane; the section between Pelindaba and the PWV 1(9km) could be prioritised in the shorter term.
3. Potential realignment / classification of K-routes:
 - a. A number of wetlands exist west of the Malibongwe Dr, where the extend K31 is located, it is thus suggesting reviewing the position of this key east-west route to Tshwane
 - b. Declassify the K215 (south from Lanseria Airport) to an urban collector and supported with additional rights.
4. Detailing of grid road network to promote the UN-habitat standards (+/- 111mx111m intersections), with supporting pedestrian orientated streets;
5. Feasibility of the planned interchange:
 - a. R552 (Cedar) and the N14;
 - b. additional interchange at the Petroport on the N14 to improve access to the proposed town centre;
 - c. Feasibility of an additional intersections to improve access to the town centre;
6. Changes to alignment:
 - a. K31 – between Malibongwe, to avoid the wetlands

b. K215 (south from Lanseria Airport) this should be cancelled and additional links around the airport should be made.

c. Review of the K44 to be deproclaimed as a road through the Crocodile River Reserve

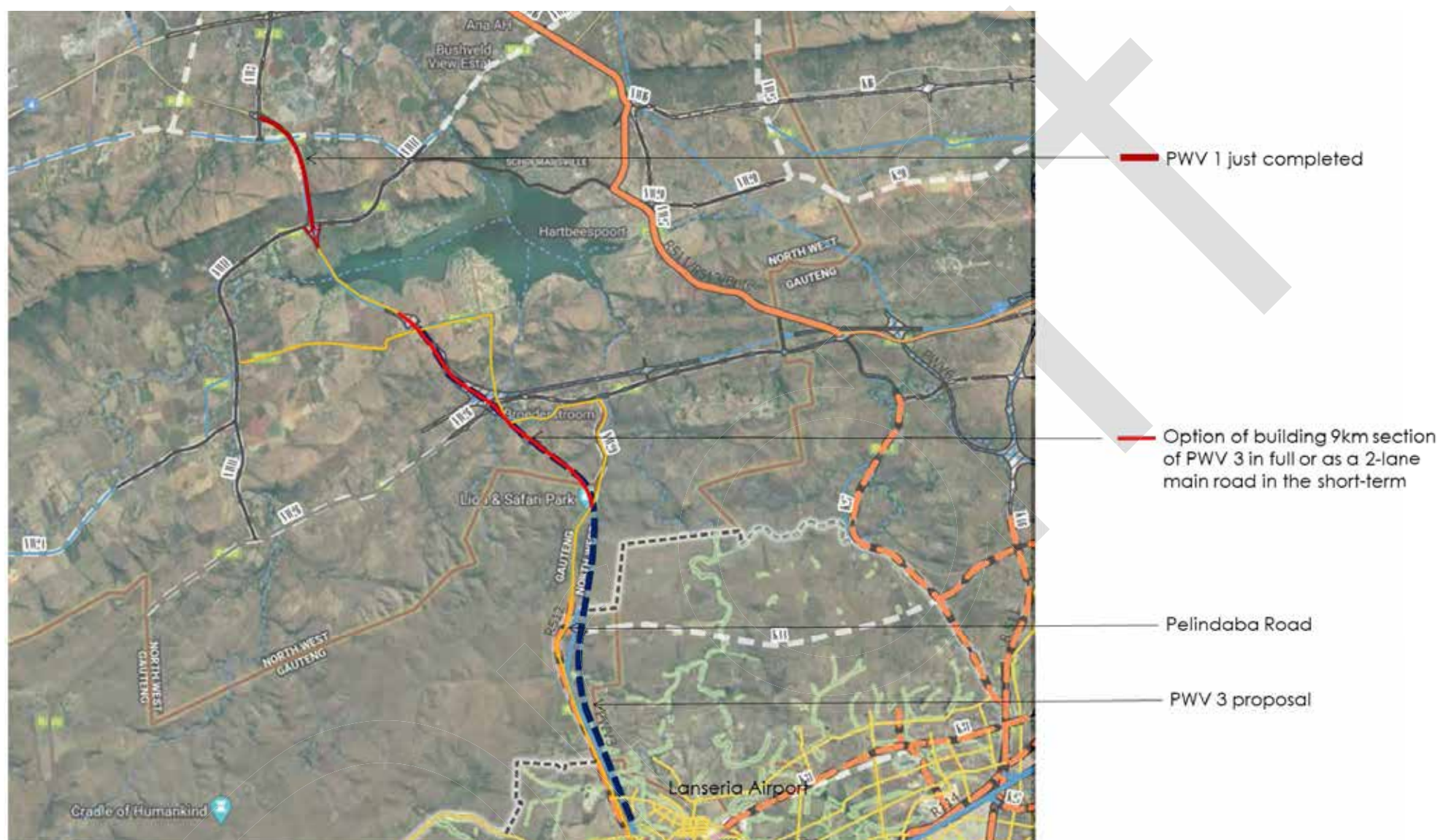


Figure 71: Potential of building a portion of the PWV3 along Pelindaba Road to create direct linkages between Gauteng and the North West Province

6.3.3 Freight and Logistics

Transnet are focusing on maintaining existing infrastructure and hubs, and don't foresee expanding their freight railway network in the near future. International best practice shows the importance of freight rail, and a freight loop on the borders of the built up areas of the GCR will have a potential of streamlining the freight and logistics opportunity. There is thus value in reserving a line to accommodate for this future strategy, with the potential of a logistics hub on the western lobe of the study area (Figure 72).

A more integrated transport model would be required to achieve the broad principles of vertically integrated mixed use, high streets, accommodating a broad socio-economic profile. Thus, incremental, shared (freight and passenger on shared lines) and with 'smart' (technologies and strategies to monitor, review, and streamline the different modes of transport) approach to roads and transport impact is important to achieve the greater vision for the GLMP.

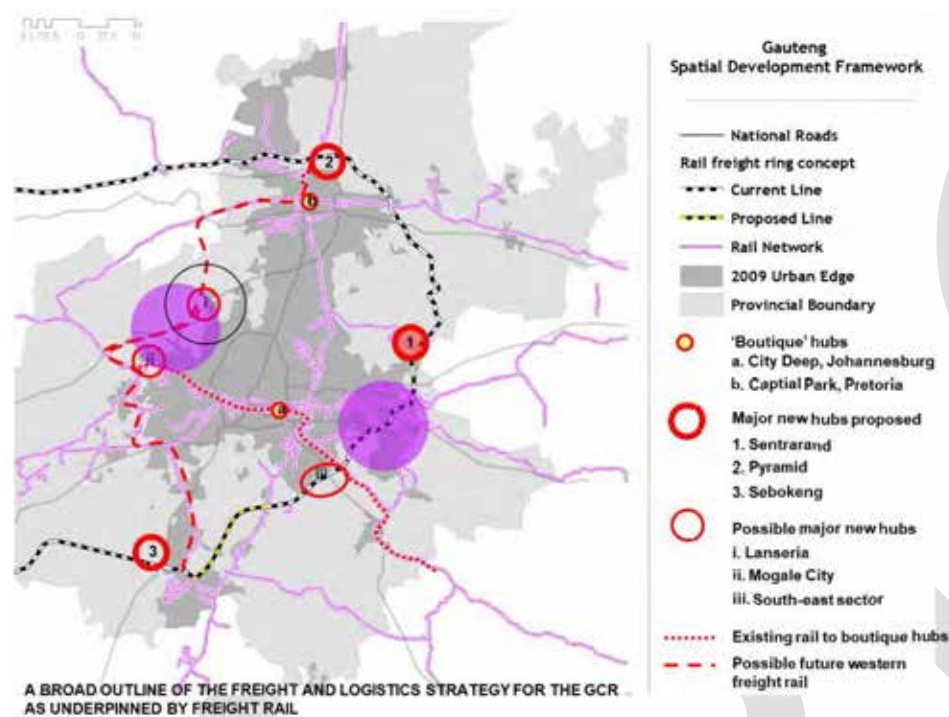


Figure 72: The potential of a freight loop with a new industrial lobe near LIA

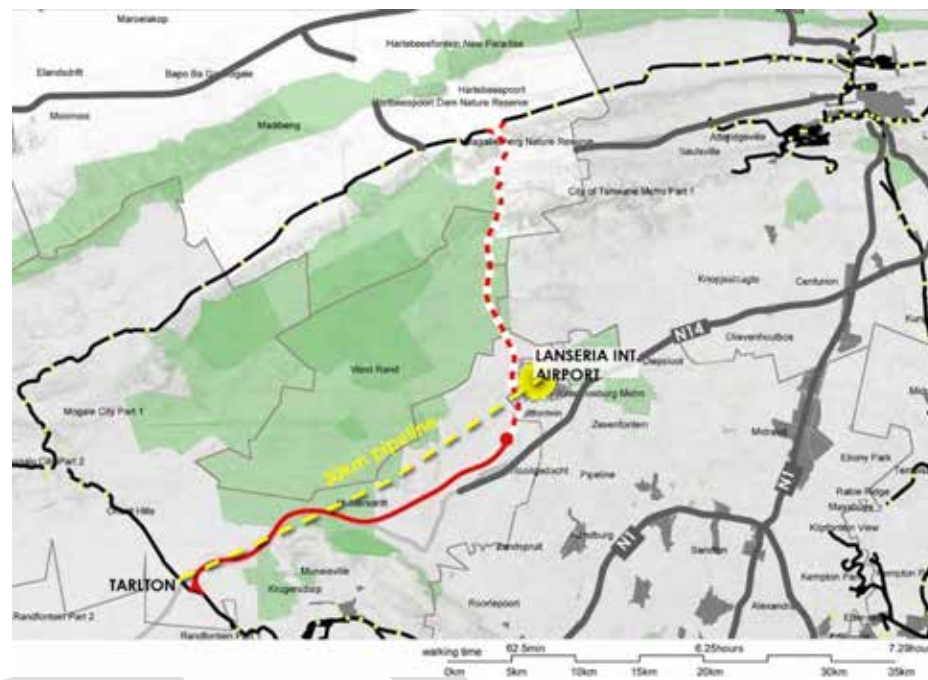


Figure 73: A proposed freight link to Lanseria, Completing the freight loop to Tshwane is constrained by topography through the Magaliesburg. Pipeline transport could also be explored to pump fuel from the existing Tarlton pipeline to the LIA would add value

6.3.4 Freight and Logistics interventions

Reserving a rail route for a future freight rail link from the existing rail station at Tarlton, to link to a proposed logistics hub near the Lanseria, is fundamental to achieving best practice sustainable principles.

6.3.5 Public transport

Public transport will become the backbone to the GLMP, prioritising the Gautrain and promotion of bus routes, passenger rail, and light rail, where possible.

Existing plans for Gautrain include extending the rail to Little Falls with planned stations Randburg, to Little Falls, and connecting to Lanseria will further consolidate the development initiatives identified in the GLMP.

In reference to a seminar held by CNBC: *Gautrain: How Gauteng plans to develop Smart Mobility & Smart Cities*, important points came through that direct frame the public transport plan. Speakers included Tshepo Kgobe (Gautrain Management Authority), Mathetha Mokonyama (CSIR), and Kevin Pillay (Siemens Smart Mobility). These points include:

- GMA defines smart mobility to be premised on: interconnection, freight and logistics opportunities, data centric transport and building strong institutions;
- GMA plans for a smart mobility centre / transport management centre in Gauteng;
- Platform API to centralise data providing a strong telecommunications backbone;
- Integrated ticketing (account based ticketing) i.e. using ones bank card seamlessly across modes;
- Green mobility (electric buses powered by solar) – capacity for 300km/day – charge at night;
- The need for democratising technology;
- Upgrading infrastructure (sensors and fibre into roads) – building the backbone;
- There is a window of opportunity to leapfrog into a smart mobility which will have physical, modal and technological contributions;
- The first 'Gauteng on the Move' application didn't include all modes in real time.
- The second version of the app to launch in 6 months – real time transport mapping (sensors in taxis)
- Minibus taxis provide last mile transport – contract taxi industry into Gautrain – already happening in Marlboro and Centurion;
- To think about Smart Mobility and Smart Finance innovatively. In Nairobi the transport industry have SACCO's (Savings and Credit Cooperative Societies) They play important role in socioeconomic development of members and communities in general as SACCOS enable easy access to financial services to people, encourage savings, create employment opportunities, support directly community development effort like helping community access to social services, stimulate growth of business. Functions like Stokvels. A key component is that the community require buy in. Social capital.
- Funding needs to be spent efficient and derive a return
- Current legislation and standards mutes' innovation. Performance based standards too prescriptive – there needs to be innovation in

standards. Other countries moving ahead with leading edge and best practise – combustion vehicles will be overhauled by 2025. International funding agencies will not invest in SA, if we don't keep up with best practise such as electric mobility. These standards become a pre-requisite for funding.

6.3.6 Public Transport Interventions

Refer to Figure 75: Movement and Circulation introducing an expanded system of public transport routes.

1. Introduction of an integrated public transport network, including, high occupancy vehicle lanes such as bus rapid transit and taxi prioritised lanes, light railway routes, bus routes, taxi routes, to integrate the public transport system;
2. Building the Gautrain to connect to LIA and the urban core;
3. Enhanced cycling routes, connecting the cradle and the urban core;
4. Co-ordination with the GMA and the transport management centre;
5. Public transport infrastructure to include the smart mobility hardware such as fibre and sensors;
6. Plans for green mobility infrastructure (electric vehicles) and the associated green infrastructure;
7. Intelligent funding mechanisms that encompasses the social capital;
8. Encouraging standards and legislation that fosters innovation.

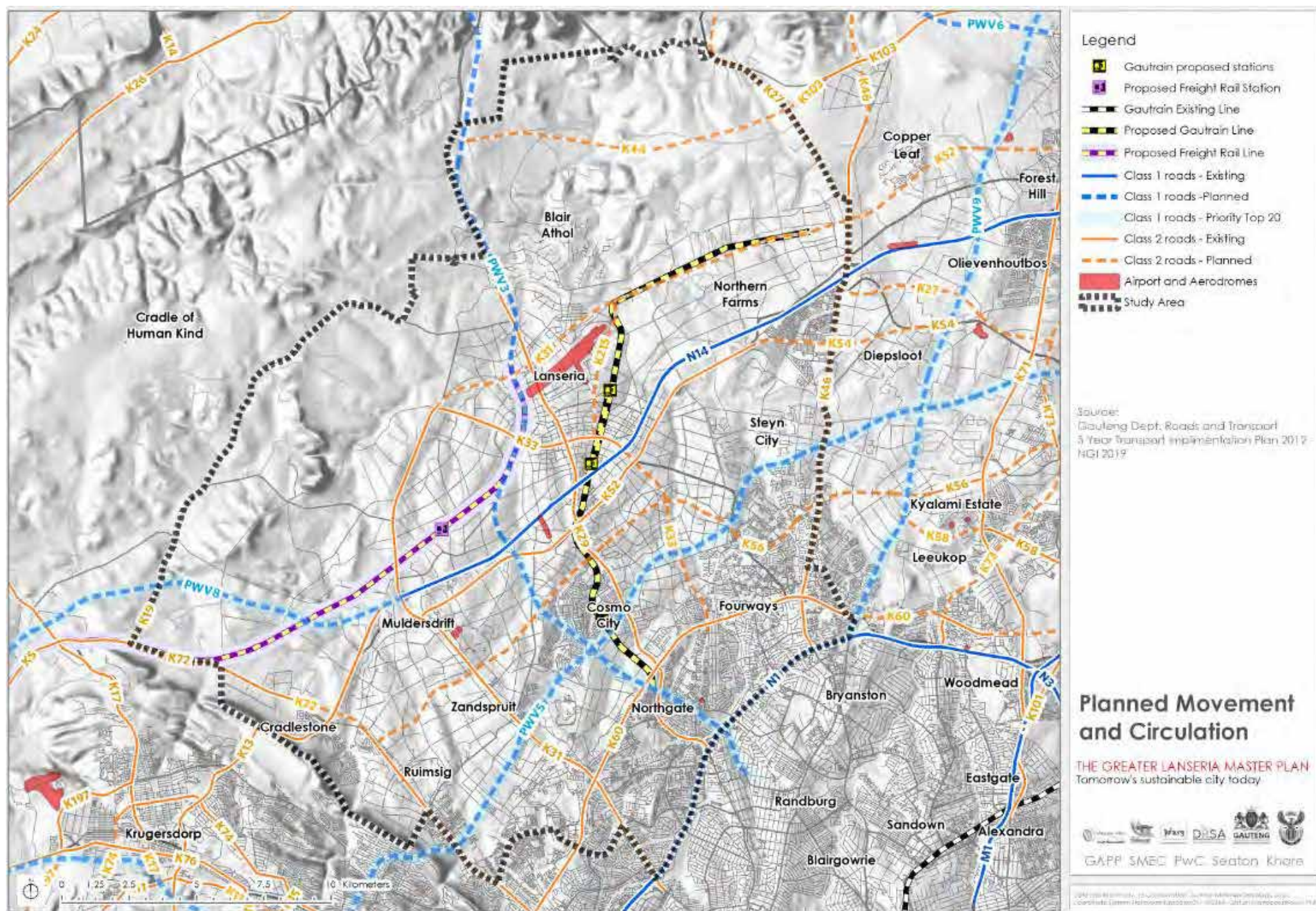


Figure 74: Movement and Circulation introducing a potential freight link, public transport through the indicative link to LIA and an integrated grid-pattern road network

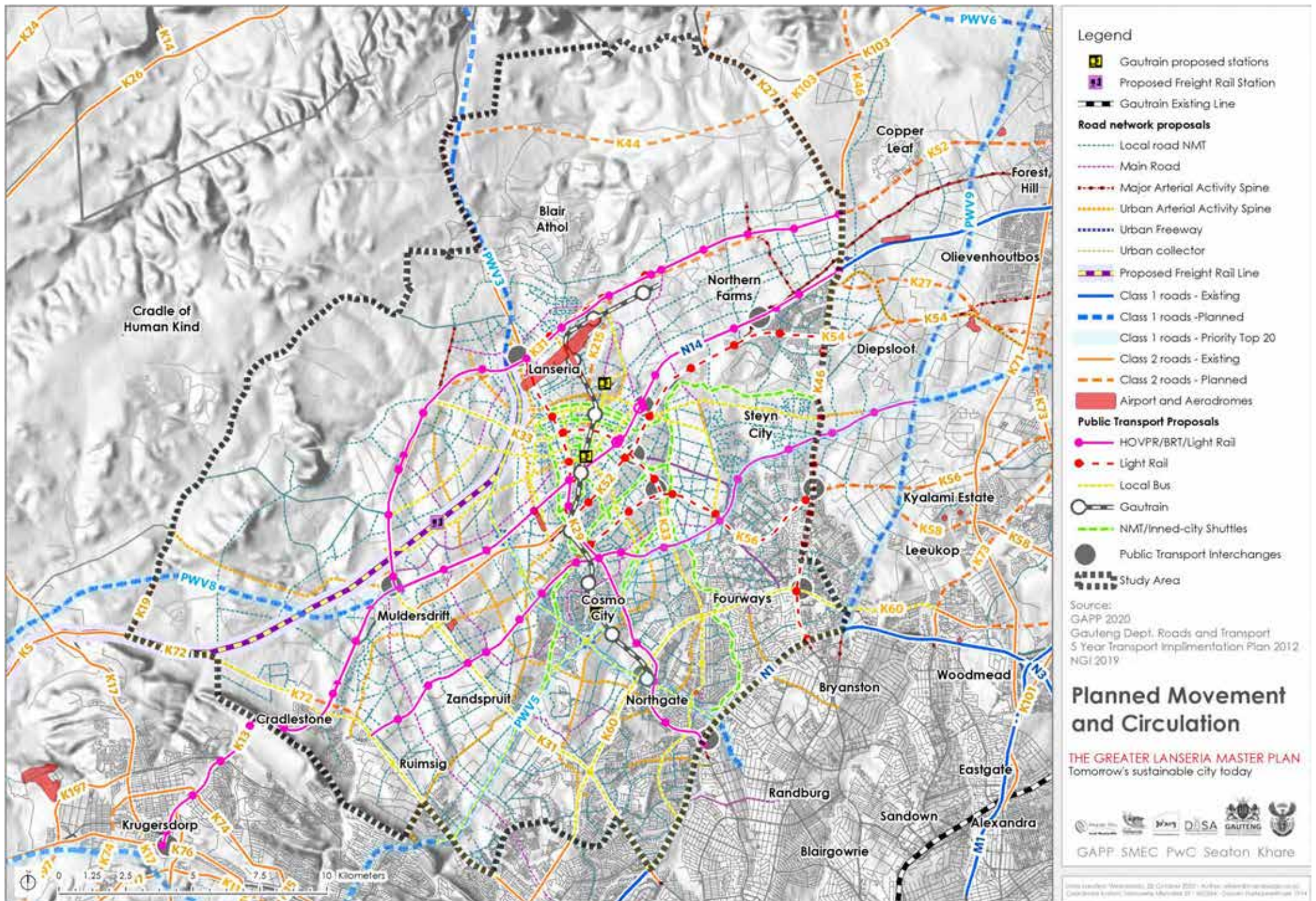


Figure 75: Movement and Circulation introducing an expanded system of public transport routes

6.4 The open space network

The open space is determined by a number of environmental factors such as the Cradle as a heritage site, the Crocodile River Reserve, the expansive wetland system, critical biodiversity areas and sensitive ridges. The opportunity lies in protecting these very special features. There is also potential identify areas of agricultural significance and enhance opportunities around high-value low-bulk intensive agriculture, which could include areas near the Northern Farms, and a specified areas in a transition zone.

A scattering of estates with golf courses exist within the study area, and together with the wetlands, a series of interconnected open spaces can be created. This could form part of an expansive recreational opportunity for neighbouring communities, similar to the Braamfontein Spruit, which has become a an open space network that serves as regional recreational facility to all city dwellers, accommodating walking, trail running, birding, and cycling. The spruit links suburbs, nodes and larger public parks into an integrated network. There is an opportunity to create an integrated open space links for public amenity within future areas of urban consolidation / areas with growth potential (Refer to 6.5 Areas of urban consolidation and the urban development boundary). There is also an opportunity to link the Braamfontein Spruit to the Crocodile River and beyond, to the Cradle.

The expansive open space system in the form of the Cradle of Human Kind, The Crocodile River Reserve, wetlands, ridges on the borders of the study area, create an opportunity for consolidated biodiversity. Strategic areas where the social, economic, and/ the need to achieve a compact, complex urban structure far outweighs the environmental value, and a biodiversity offset is permitted (such as areas close to the LIA, within the new urban core, along the N14 corridor etc.). These areas will need to be carefully considered with relevant environmental authorities, and where necessary further specialist studies will be required to ensure that the approach doesn't negatively impact the ecological system in place.

6.4.1 Open Space Interventions and recommendations

- If any sites are required for environmental offset, it is recommended that the Crocodile River Reserve host these offsets. A management approach, with the facilitation of the Crocodile River Reserve, would be required as part of the offset;
- Formalise a recreational link along the waterbody from Braamfontein Spruit to the Crocodile River and beyond, to the Cradle, linking to the Cradle Cycle loop;
- Northern farms formalised as an agrihub, nature reserve and regional recreation facility;
- Define areas for urban consolidation where biodiversity areas would be permitted.

- Review of the K44 traversing the Crocodile River Reserve, to deproclaim it across the Crocodile Reserve, so that it covers most of Tshwane but terminates at Copper leaf.

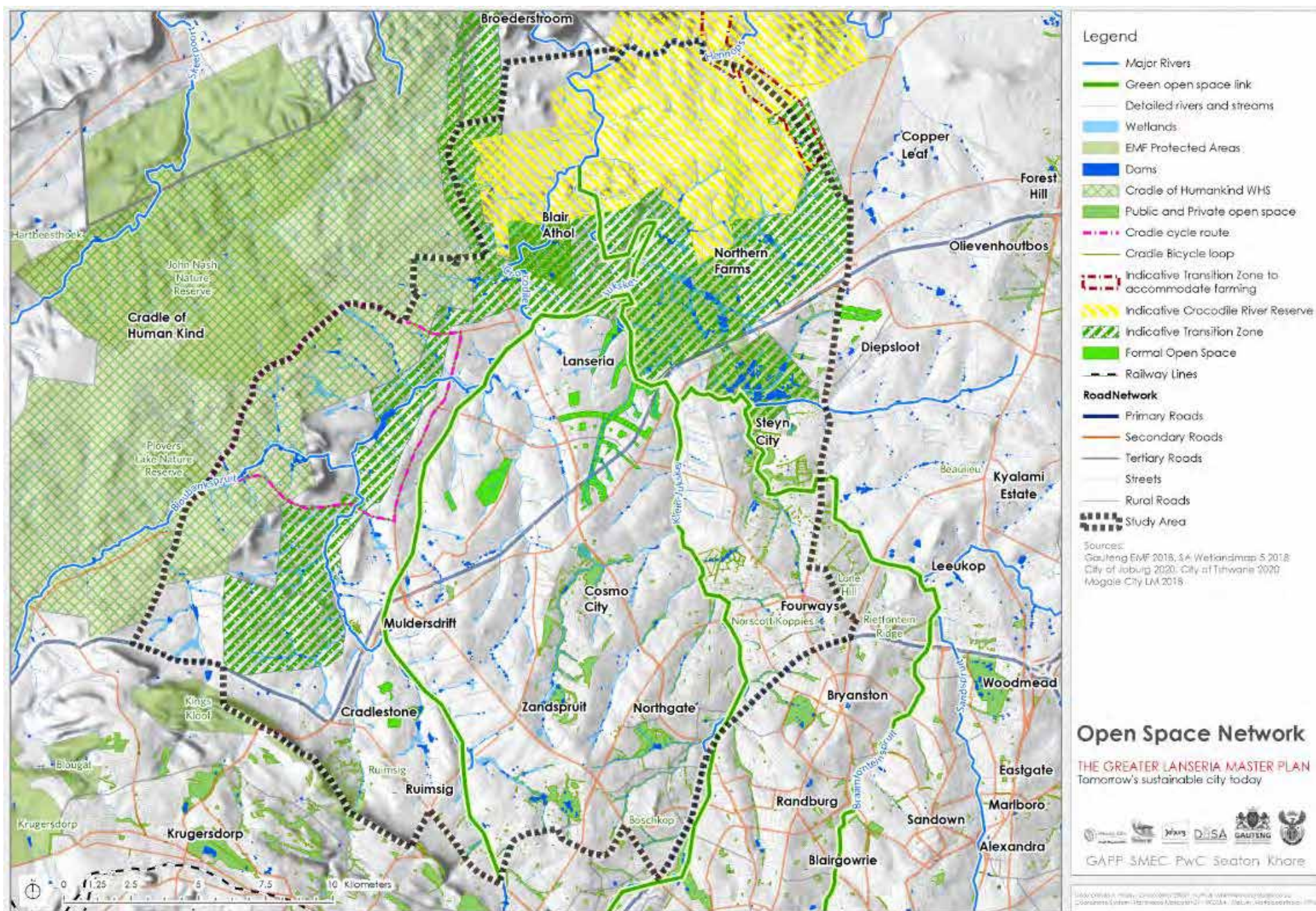


Figure 76: Open Space Network

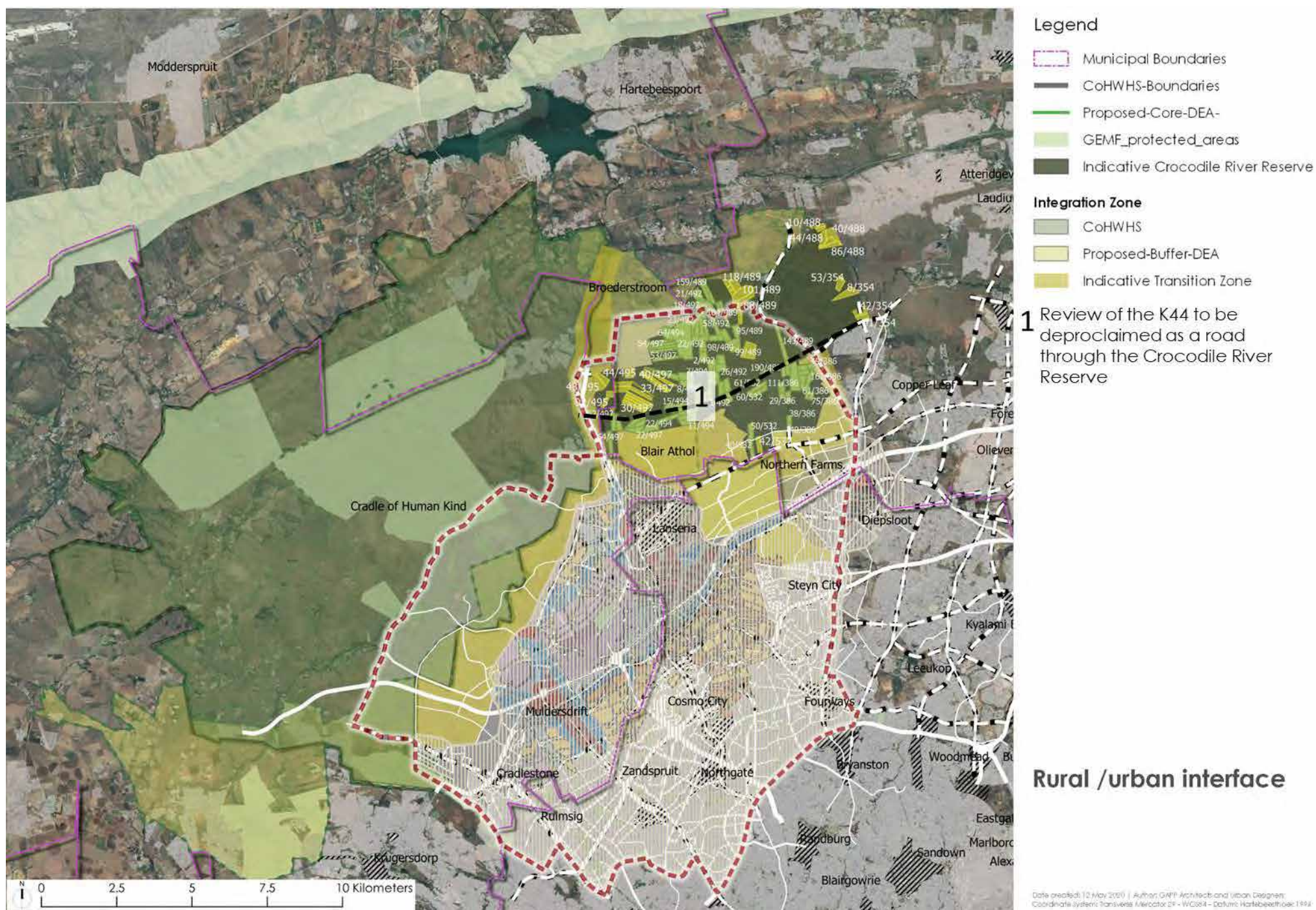


Figure 77: Rural / urban interface

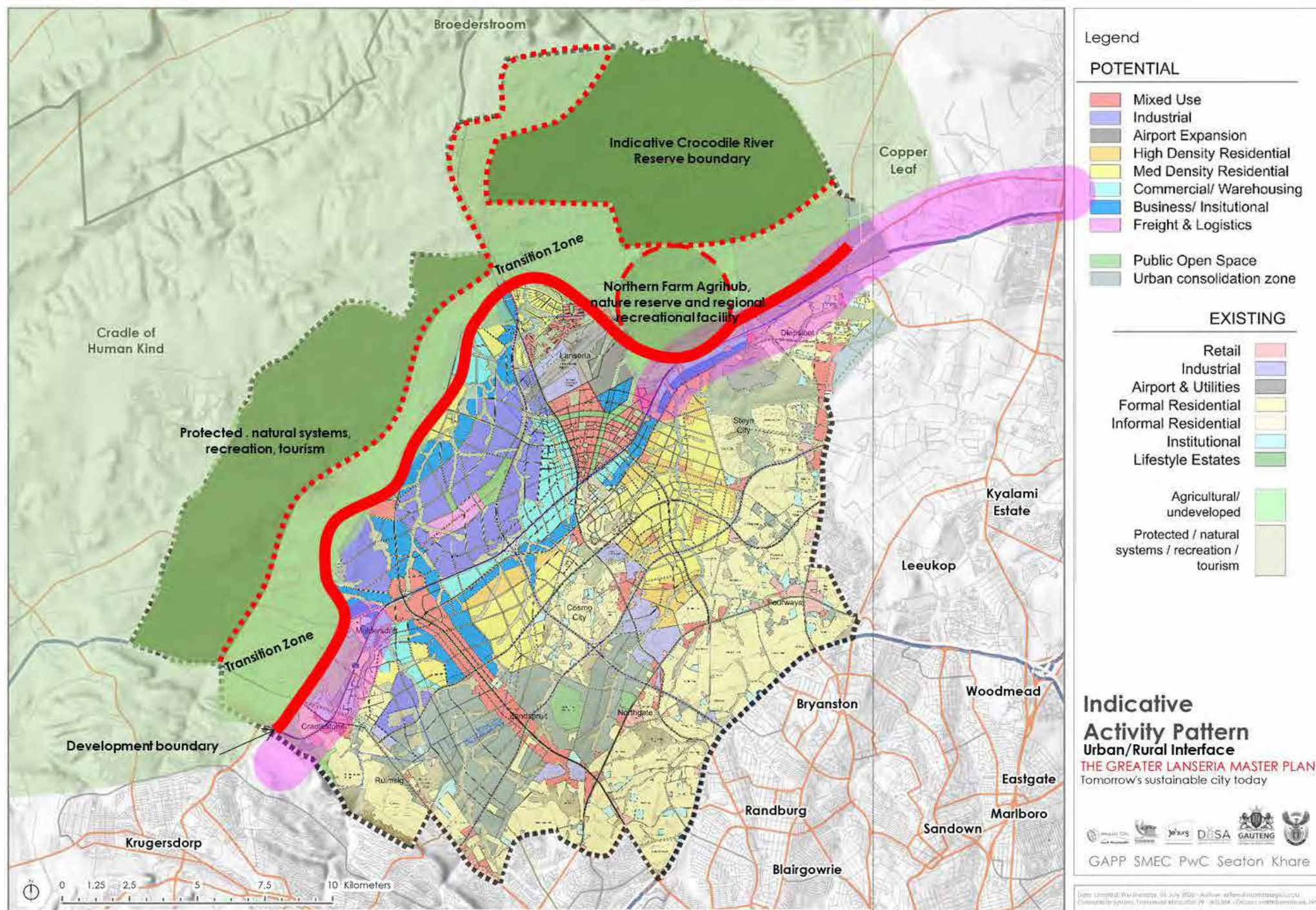


Figure 78: Rural/ urban interface

The guidelines from Tshwane SDF have been utilised to guide the sensitive areas outside the defined urban consolidation area, for the purposes of guiding the Crocodile River Reserve and the Indicative Transition Zone

Indicative Crocodile River Reserve - Management Area (refer to

Definition	<p>Areas not identified for 'future urban development'; often characterised by cultivation and very low densities (rural living), with environmental sensitivities forming part of larger ecological biospheres.</p> <p>Minimum engineering services and infrastructure for the applicable densities and land uses must be available.</p> <p>Urban development will not be permitted.</p>
Intent	<p>Conservation a priority, dwelling units to form along roads, allowing for large portions of land to remain conservation. Sharing of property boundaries are supported with limited fencing supported.</p>
Proposed Land/Open Space Typologies	<p>Range of uses on merit related to conservation, tourism, recreation, arts and crafts, home industries, multipurpose service centre.</p>
Division	<p>'Estate' townships establishment is not permitted, special conditions and environmental considerations, would be required to motivate for this.</p> <p>Divisions only on special merit; e.g. where a division is motivated because of a road, river or servitude physically severing the land.</p>
Density	<p>1 dwelling units per hectare. No second dwellings.</p>
Environmental considerations	<p>Environmental Management Framework (EMF) - still to be completed- must be adhered to.</p> <p>EIA Scoping report required on Important, Irreplaceable sites, ridges and watercourses.</p> <p>Only 5% ecological footprint on class 2 ridges and no intervention with class 1 ridges.</p> <p>Principle of "cluster and space" – 10% development footprint with 90% conservation footprint.</p>
Special conditions	<ol style="list-style-type: none"> 1. 'Cluster and Space' principle shall apply in the management areas. 2. EMF should inform the lay-out. 3. Conditions under which authorization in terms of the Environmental Conservation Act (Act 73 of 1989) must be monitored and strictly adhered to. 4. Conditions to be set for design, character and overall relationship with the environment. 5. The provision of infrastructure/ services shall be to the satisfaction of all regulating authorities, without any obligations of these parties to render services in any form whatsoever. 6. Environmental considerations.

Indicative Transition Zone / Future Urban Development Area

Definition	<p>Area has been identified as suitable for urban development in the medium to long term. However, to remain for recreation, hospitality, urban agriculture, and agricultural villages</p> <p>This area is identified based on need (development pressure, logic of area to expand), availability of services/ infrastructure, environmental sensitivities and geological conditions.</p>
Intent	Local Spatial Development Frameworks (SDFs) must be compiled to guide development, including densities, community facilities, employment and business areas, as well as infrastructure provision.
Proposed Land/Open Space Typologies	As defined in terms of the Local SDFs for an urban environment.
Division	<p>Township establishment with appropriate densities/ land uses in line with the local SDFs.</p> <p>Divisions only on special merit; e.g. where a division is motivated because of a road, river or servitude physically severing the land. Piped water must be available for division less than 5 ha.</p> <p>Divisions of more than 10 portions will require a township application.</p>
Density	Township establishment: Density as determined in terms of the local SDF's. Densities must be in line with the principles of the approved Compaction and Densification Strategy, May 2005.
Environmental considerations	<p>Environmental Management Framework (EMF) - still to be completed- must be adhered to.</p> <p>Environmental sensitivities – refer to the Tshwane Open Space Framework (TOSF) – should inform layout.</p> <p>EIA Scoping report required on Important and Irreplaceable sites and ridges.</p>
Special conditions	<p>The development should be evaluated within the requirements/guidelines set by the Local SDFs, specifically addressing:</p> <ol style="list-style-type: none"> 1. The availability of bulk engineering services – water, sewerage, roads, stormwater and electricity. 2. "Leap-frogging" is strongly discouraged. 3. The building of sustainable communities by means of sufficient job opportunities, community services such as schools, medical and recreational facilities. 4. Division of productive agricultural areas with agricultural potential shall only be permitted under special circumstances and with well-prepared motivations/ business plans. 5. The formulation of aesthetics and urban design guidelines, providing for a diversity of housing typologies and land-uses. 6. Environmental considerations. 7. Provision of sustainable economic opportunities within these areas.

6.5 Areas of urban consolidation and the urban development boundary

An area of urban consolidation (Figure 80) has been identified for the GLMP. The principles of development within this area is for future development to be compact and complex in nature. An indicative open space, road and transport and activity pattern has been determined for these areas to guide development for the next 50- 60 years, which have been tested to understand the implications on infrastructure both physical and social in the shorter and longer term.

The *urban consolidation area*, can be defined as the extent of urban development. It represents areas associated with a mix of land use activities, in various forms and levels of concentration, and includes the industrial districts, a mix of lower order urban elements, such as multiple nodes and activity spines. The activity spines form connections and linkages between existing and proposed corridors, as do the movement routes and infrastructure systems, forming a complex urban development lattice. It realises a complex interweave of district and neighbourhood nodal, activity spine and high street activities. It will include a well-developed road network, which supports commercial and logistics transport, and also accommodates mass public transport systems in the form of rail, bus and mini-bus taxi. The mixed activities and road and services infrastructure systems are interspersed with local and neighbourhood areas, from single use residential (and lower density), to historic, to medium and higher density residential neighbourhoods, interspersed with social and cultural facilities.

Development within the GLMP study area, that is outside the GLMP urban consolidation area is identified as land outside the urban development boundary, and will be seen as predominantly rural and agricultural in nature. These areas will be subject to the UDBs identified in the municipal SDFs. No gated and lifestyle villages will be permitted in these areas. A focus on infrastructure which will enhance tourism, leisure and economies generated by agriculture should be identified by the relevant municipalities as well as the GLMP.

Landholdings within Mogale, Tshwane and City of Joburg that have been defined as being outside the municipalities UDB are now considered as urban consolidation and to be incorporated into the UDB, and would have all kinds of implications on existing municipal policies and plans.

In order for development to occur in the GLMP urban consolidation, especially landholdings that were outside the municipalities' urban development boundary, the following would need to be in place:

- Careful consideration of environmental (Critical Biodiversity, and Environmental support areas) carefully mapped, conserved and incorporated into the development as a structuring element to the urban fabric;

- Infrastructure be planned for and will become available;
- Minimum performance criteria (i.e. no gated communities, floor areas, densities, sustainability index), will be applied to these areas
- A road and transport, open space, and activity pattern has been planned at a framework, and will further require detailed review by the relevant municipality to promote development in this area;

It is thus recommended that careful consideration of environmental constraints be adhered to, as well as opportunities for development in this urban consolidation area. The GLMP gives a clear infrastructure investment approach to accommodate for development of these areas.

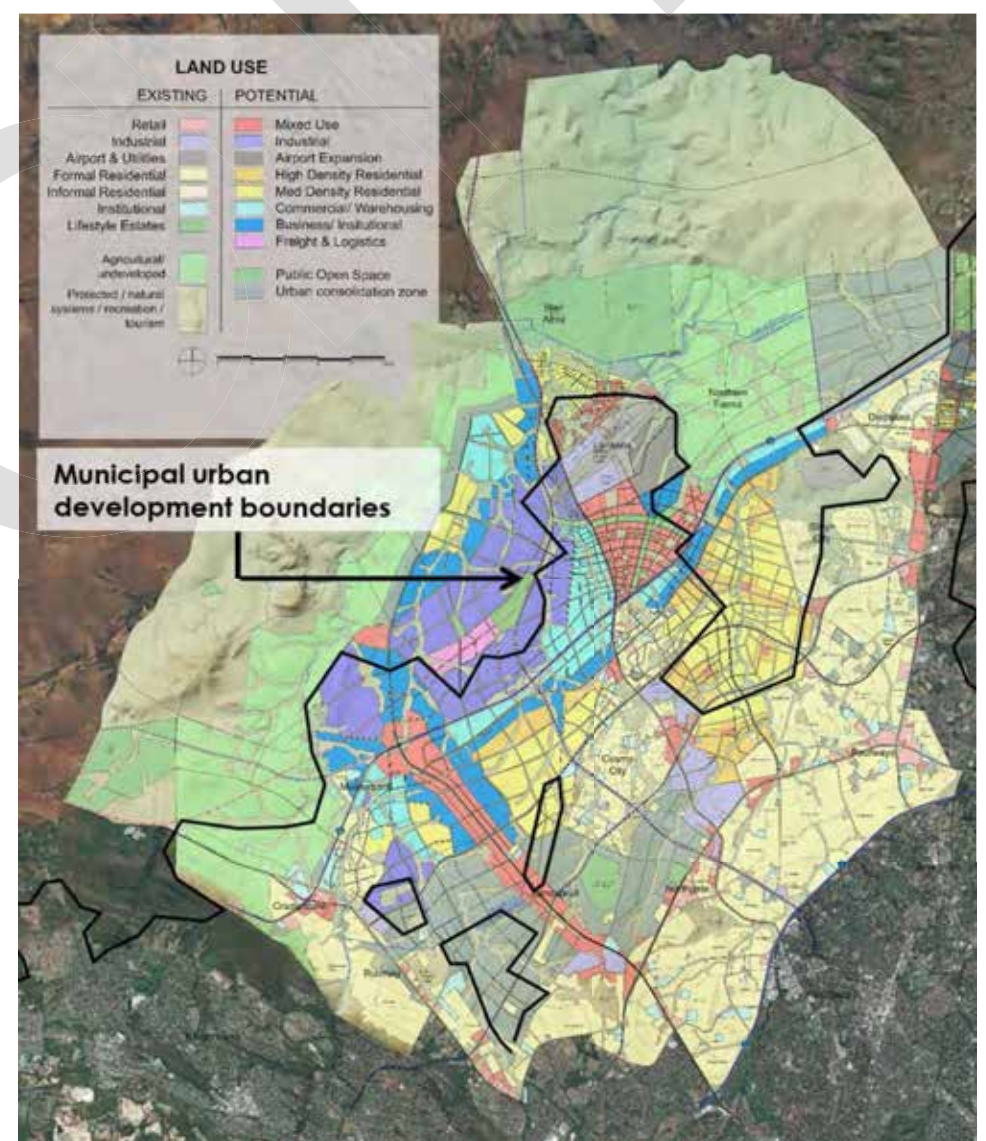


Figure 79: Municipal urban development boundaries in context of the GLMP indicative activity pattern

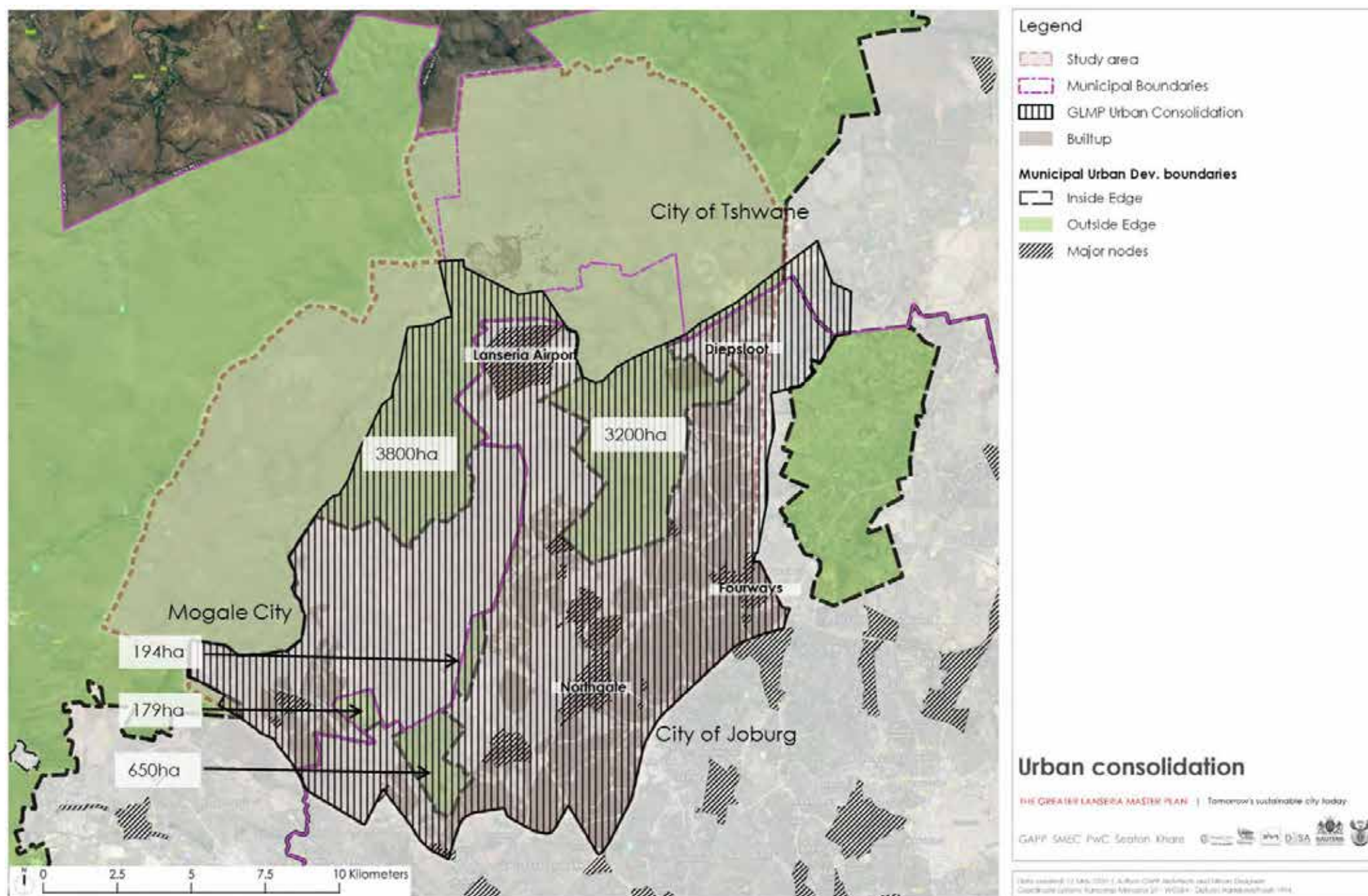


Figure 80: Urban consolidation within the GLMP study area

6.6 Legislation and guidelines used by the Department of Agriculture

There is pressure on land for urban development, yet there is also a policy and regulatory framework for the agricultural sector that needs to co-exist with spatial development frameworks at provincial and municipal level. Act 70 of 1970 and other legislation and guidelines are used by the Department of Agriculture.

6.6.1 Subdivision of Agricultural Land Act Section 70 of Act 1970

Areas that were previously included (before 2000) into existing township areas and schemes are exempt from the jurisdiction of Act 70 of 1970. The study area is predominantly comprised by farms that formed part of the Peri Urban Areas Town Planning Scheme and therefore were not taken up into town areas prior to 2000.

6.6.2 Jurisdiction of DAFF

Furthermore certain farms are designated to be under the Jurisdiction of Department of Agriculture, Forestry and Fisheries (DAFF), and some of them are not. In terms of the Act, a map indicating which properties fall under this jurisdiction was meant to be prepared in 2007, however this has not occurred.

6.6.3 Water use licence

Refer to the figure below.

Any farm/property located within 500m of the wetland would require a Water use license.

It is understood that these applications could delay development significantly and in cases prevent development of, potentially, very strategic landholdings. Further exploration of possibly expediting these processes should be explored, in areas that could valuably contribute to the urban system.

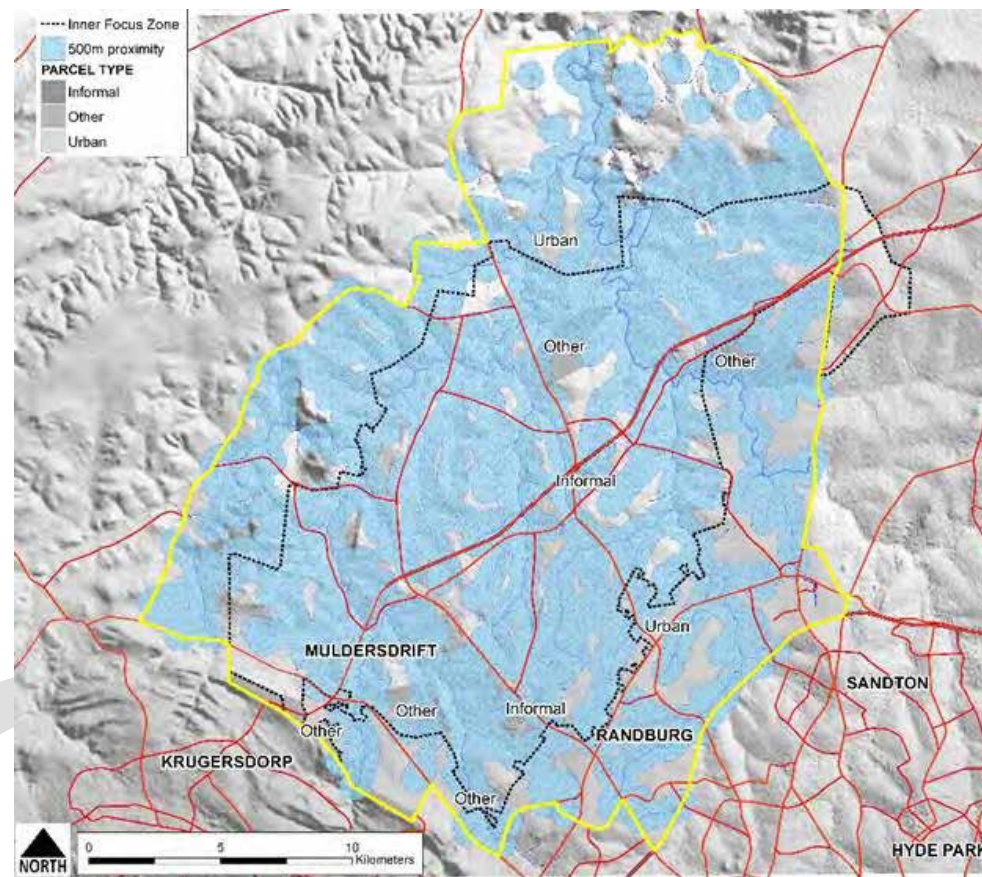


Figure 81: Farms located within 500m are subject to WULA

6.6.4 Legislation interventions and recommendations

In order to fast track development, it is suggested that the GEMF include the GLMP zone of urban consolidation. This will ensure the limitations of Act 70 of 70 are surpassed. Through fast tracking development, it remains a responsibility for development to protect and enhance the biodiversity of the area.

Furthermore looking at the WULA in a holistic way within the zone of urban consolidation.

6.7 Draft Development Framework that underpins the GLMP

The infrastructure investment concerning roads, open space, and engineering services will unlock development in this area. The figure alongside identifies areas with development potential, showing a vast area that can be developed (8555ha). These areas must be directed appropriately to avoid sprawl, and ensure that compact, complex development pattern occurs. The plan thus takes a 30 year horizon, and intends on managing development into the future, through a phasing approach and use of performance criteria (requiring a minimum floor area, dwelling unit densities) when landholders choose to apply for development rights as defined in the morphological model.

The GLMP accommodates an urban core of vertically integrated mixed use, south of LIA, intensive activity along the main mobility routes and the N14 road into a consolidated corridor, the area of focus. A potential logistics hub could further be found to have synergy with LIA, which can be located west of the airport, which would be supported by the potential loop ring freight rail link. Areas of consolidation have also been identified. A vast area of the study area has been identified as protected.

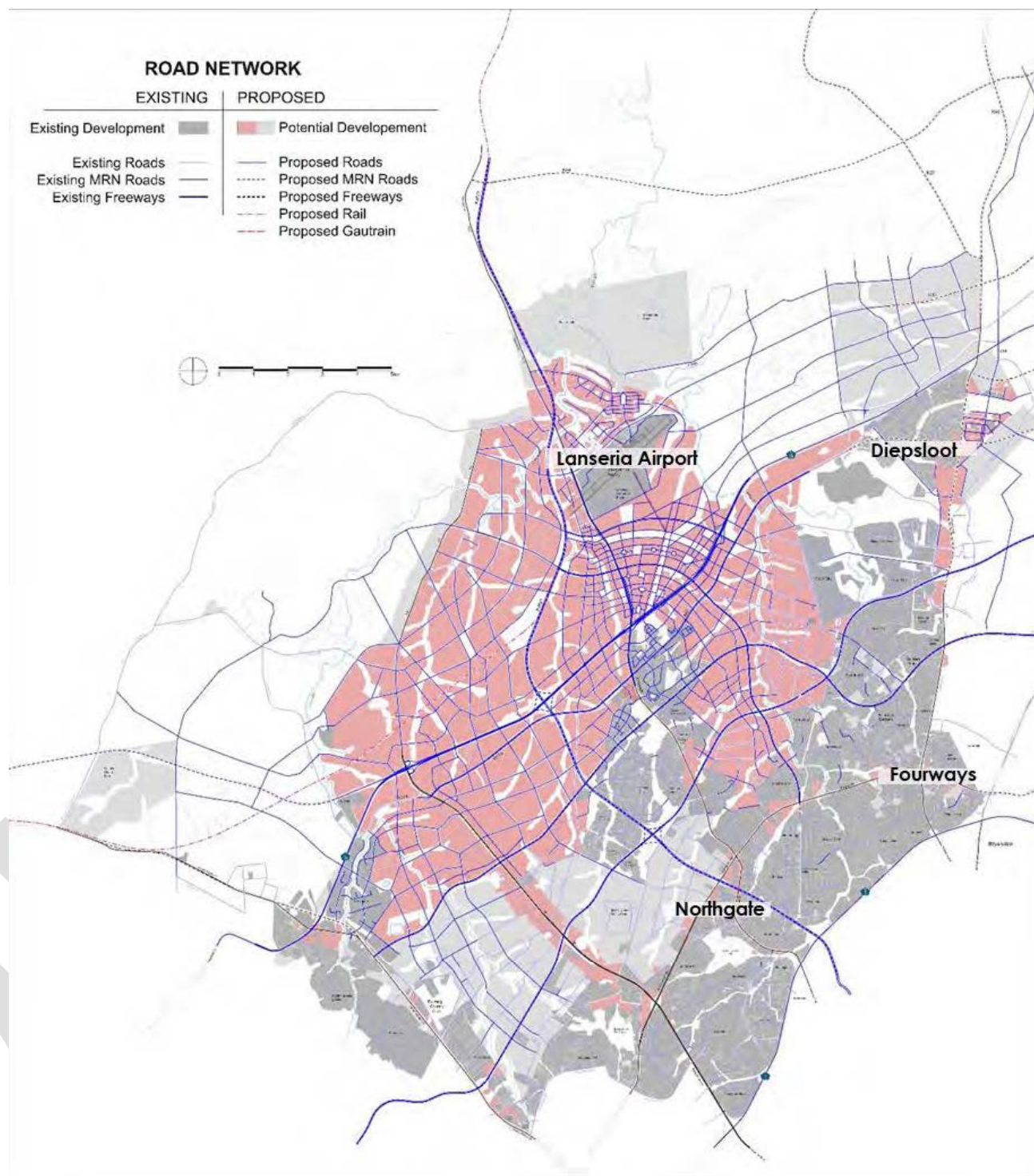


Figure 83: Plan identifying areas of existing development and areas with development potential

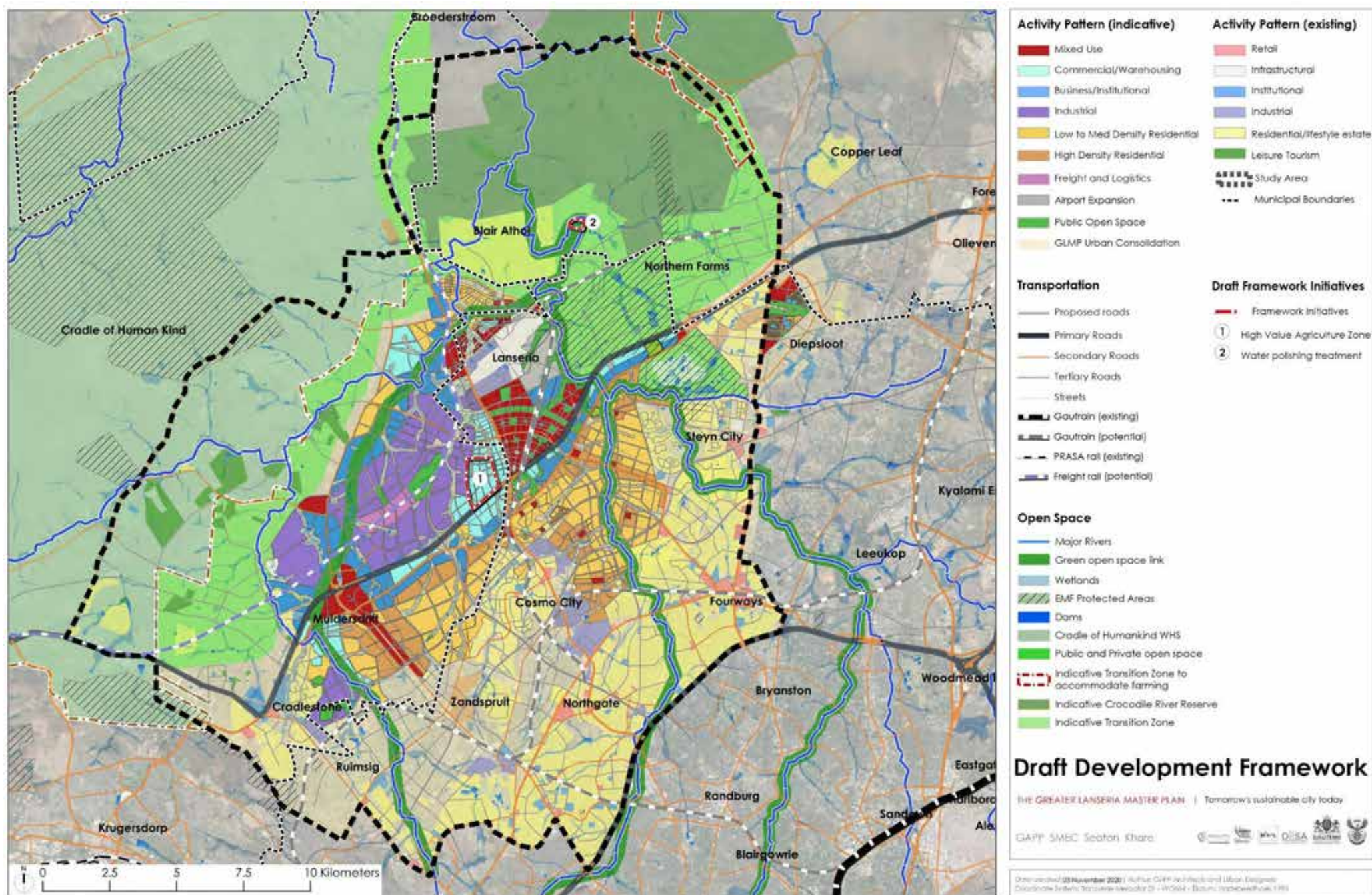


Figure 84: Draft Development Framework that underpins the GLMP

6.7.1 Unified planning and implementation across properties

With smart city thinking and in trying to establish a firm economic base for growth, one often thinks of special economic zones or related incentivized economic areas. In formulating the development framework as basis for the GLMP there has indeed been talk of various SEZ's, one being an area being designated for specialized crops and essence extraction processes related to those crops. Other stakeholders in the process have suggested a far more broadly defined SEZ encapsulating the smart city and its environs. This is an aspect still under detailed legal, economic and spatial planning review and is an item for further elaboration in planning.

Application with council – In compiling the indicative activity pattern that underpins the greater Lanseria master plan, where possible, included current rights that have been approved or townships that are in process of application with the various municipalities. There are instances where additional information has been provided by stakeholders by way of elaborating their present township applications. To the extent that these elaborations are sometimes at odds with the applications that have actually been lodged, the application as lodged has been used for guideline purposes.

Similarly, whereas **many individual township applications may have been made in the absence of a wider planning context**, additional linkages as informed by the GLMP initiative have been **included by way of better integration of individual applications into a wider planning whole**.

It is inevitable, in compiling an overall masterplan across a broad range of existing landholdings of various sizes and configurations that many landowners understandably would be seeking to achieve what might be referred to as **'highest and best planning use' for their land**. For example, one may anticipate many different landowners pushing to secure a major regional facility such as a shopping centre on their specific landholding, **without regard, necessarily, for the 'urban fundamentals'** for such a use from a spatial planning point of view. The master planning exercise has adopted an approach of positioning what is regarded as the **prime position for a compact, complex, mixed use, high intensity urban core, supported by expanded zones of urban activity** that would occur adjacent to and within the areas of influence of such an urban core.

It has also arisen in the master planning exercise that certain large scale development initiatives that are already in the pipeline exist in areas that may well be impacted by the existing operations of Lanseria International Airport and, indeed, by future additions, the airport's operations. Where stakeholders have indicated such intentions the master planning team has, in all instances, brought these potential noise impacts to the attention of the relevant developers, noting that these issues would have to be taken into account in proceeding with the application and taking the necessary

mitigation measures. In this regard, it must be noted that the master planning team is still in discussions with the **Lanseria Airport Company** to establish the airports strategic requirements into the future and how these may best be integrated with the design of an adjacent smart city. At time of reporting these issues have not yet been finalized and remain a key aspect for planning review particularly given (a) the spatial planning ramifications associated with this (b) the potential noise and height impacts

Input by various stakeholders to the master planning process often notes the potential development of nodes, for example, at the intersection of provincial K-routes whether existing or simply reserved in terms of the Gauteng Strategic Road Network (GSRN). Where relevant the master planning team has taken this thinking on board noting that, although **the crossing of two important mobility routes certainly indicates urban development potential**, the detailed configuration of local access to these opportunities by virtue of road planning **policy may often mean that a node is better contemplated as being in one particular quadrant of such an intersection or that very specific localized support access roads may be used to achieve meaningful integration of all four quadrants**. If, in addition, a public transit route is to be embedded in whatever manner within one or many of the GSRN routes (whether High capacity lanes, dedicated bus lanes, or even light rail,) these nodes then may well also have the impact of acting as **important transport orientated hubs**. As far as possible and within these parameters as noted the planning team has taken on input from various stakeholders.

6.1 Urban Structuring Assignment Zones

The GLMP study area is divided into “Urban Structure Assignment Zones (USAZ)” (Figure 86) which guides the spatial modelling. An USAZ is defined as segments of the urban environment that can comprise a combination of urban structuring elements: activity spine(s), node(s) and ecosystems, with lower-density residential support (predominantly mono-use type interstitial zones); neighbourhood facilities (i.e. school, shops and businesses). In many instances they are neighbourhood orientated, with access to public transportation and focused around pedestrian movement and related activity. They are also orientated with regard to the movement system, its hierarchy and connectivity, as well as existing and proposed nodes, as these inform the type of urban structure elements that exist and are likely to develop within the zone. The USAZ also recognise those elements that are non-urban in nature and are defined as districts, natural systems and urban voids.

The USAZ forms the most suitable area in terms of which land use activities (use type and area), socio-economic descriptors (household size, household

income, employment) and key density descriptors (residential dwelling units, residential floor area, and dwelling types), are allocated. The USAZ forms the primary “unit” in terms of which the urban structure allocation model was developed. All socio-economic, land use and density data is either combined or disaggregated and re-allocated within each USAZ.

The extent and boundary of each USAZ is defined by groupings of urban structuring elements (nodes, activity spines, corridors), natural elements and urban voids (ridges, and man-made elements such as freeways, infrastructure networks and even very specific land conditions, such as quarries, WWTW, nature areas, conservation areas and natural habitat /ecosystems and expansive areas such as rural development areas). Corridors comprise a number of USAZ. Other natural boundaries such as watersheds are also an influencing factor. Changes in land use within the urban system also form the boundary to an USAZ.

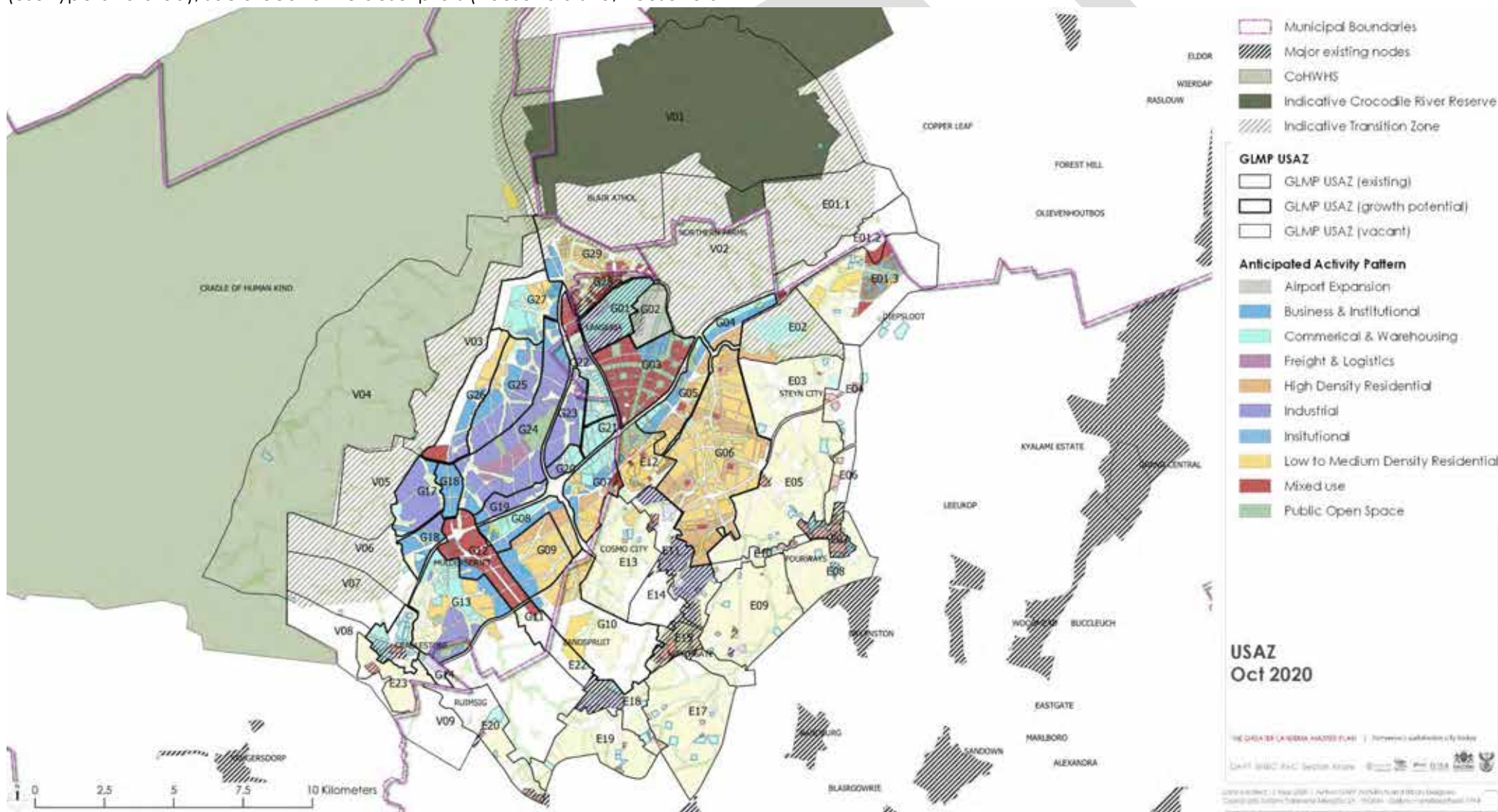


Figure 85: Urban Structuring assignment zones for the GLMP

6.2 Indicative Schedule of Rights

Schedule of rights have been determined per USAZ zone. As each zone is adapted and refined, the schedule of rights will be adapted.

The numbers yielded in the study thus far, indicate that there are indeed very substantial areas of land, notwithstanding the vast amount of land in the wider study area that is either not developable or deemed to be inappropriate for urban development, that are available for urban development. In fact, it appears that there is more developable land available than was recognised in the LRSDP.

Furthermore, the 500 000 or so population projected by 2036 in the area can, according to these early indications, be accommodated relatively easily on the land available and could, it seems, yield a significantly higher carrying capacity.

In reporting these types of preliminary numbers, however, there are always inherent dangers and it is important to put them in perspective:

- Firstly, the calculations on issues influencing the amount of developable land available are preliminary and more detailed and refined analysis may yet see a change, either up or down, in this regard;
- Secondly, the carrying capacity of the land identified has been modelled on density and urban intensity assumptions that still have to be refined further and taking note of the influence of anticipated markets, socio-economic profiles, housing preferences, etc., again, leading to a change in these numbers;
- Thirdly, it is still to be tested what inherent thresholds or limits there may be in infrastructural bulk and service reticulation and whether such population numbers can indeed be accommodated;
- Fourthly, it is yet to be established to what extent various economic drivers can be attracted to this area and hence the capabilities of this area to support the populations indicated thus far;
- Fifthly, and similarly, the ability to not only identify sites for social services (notably health and education) but to deliver these as buildings, equipped and staffed, on a basis commensurate with the settlement of people in this area has yet to be determined adequately and this, too, may limit the extent to which the population figures indicated can be accommodated.

In addition, there is the danger of these preliminary figures being interpreted in ways that drive a development approach by various agencies that may be at odds with the sustainable approach being sought.

For example, an indication of more land than originally being thought to be available should not, in and of itself, suggest that a far greater population should be channelled into this region: this would, for example, still need to be

assessed relative to the rate at which an expanded urban economy may be stimulated in this area. To simply load additional people into new housing initiatives in the area because land is available is contrary to the founding principles and development intentions of growing the node, from a population point of view, in balance with the economic prospects that can be enabled.

Equally, the possibility that say 800 000 people may be accommodated at far lower densities across more land would be counter to the intentions to reduce sprawl and develop in patterns of more efficiently serviced areas of concentration in a less land-intensive way.

Should these preliminary numbers prove to be relatively accurate after more detailed investigation, the principles of sustainability would still apply:

1. Housing initiatives should only be rolled out in strict accordance with the generation of a local economy that can support such housing with jobs and economic opportunity;
2. The patterns of development and housing typologies should still favour concentrated development along urban activity spines and within nodes that can be sustainably serviced with infrastructure, non-motorised transport and public transport;
3. Housing provision has to be strictly balanced with the ability to roll out properly enabled health, education and other social facilities necessary to support community life and cultural advancement; and
4. Any land surplus to requirements in adhering to this approach is to be 'land banked' pending take-up according to these principles and possibly used, in the interim, for productive purposes such as allotment farming or market gardening or other 'green industries' capable of being moved on to alternative sites as land for urban development is taken up on the basis set out here.

6.3 Nodal Development

Based on the Figure 56: GLMP Urban Structuring Development Concept, the existing and anticipated nodes would be as follows Figure 87, the larger

nodes would be identified as primary and specialist nodes, whereas the smaller circles secondary and tertiary nodes. The development corridor along the N14 becomes key to structuring appropriate densities and floor areas to this.

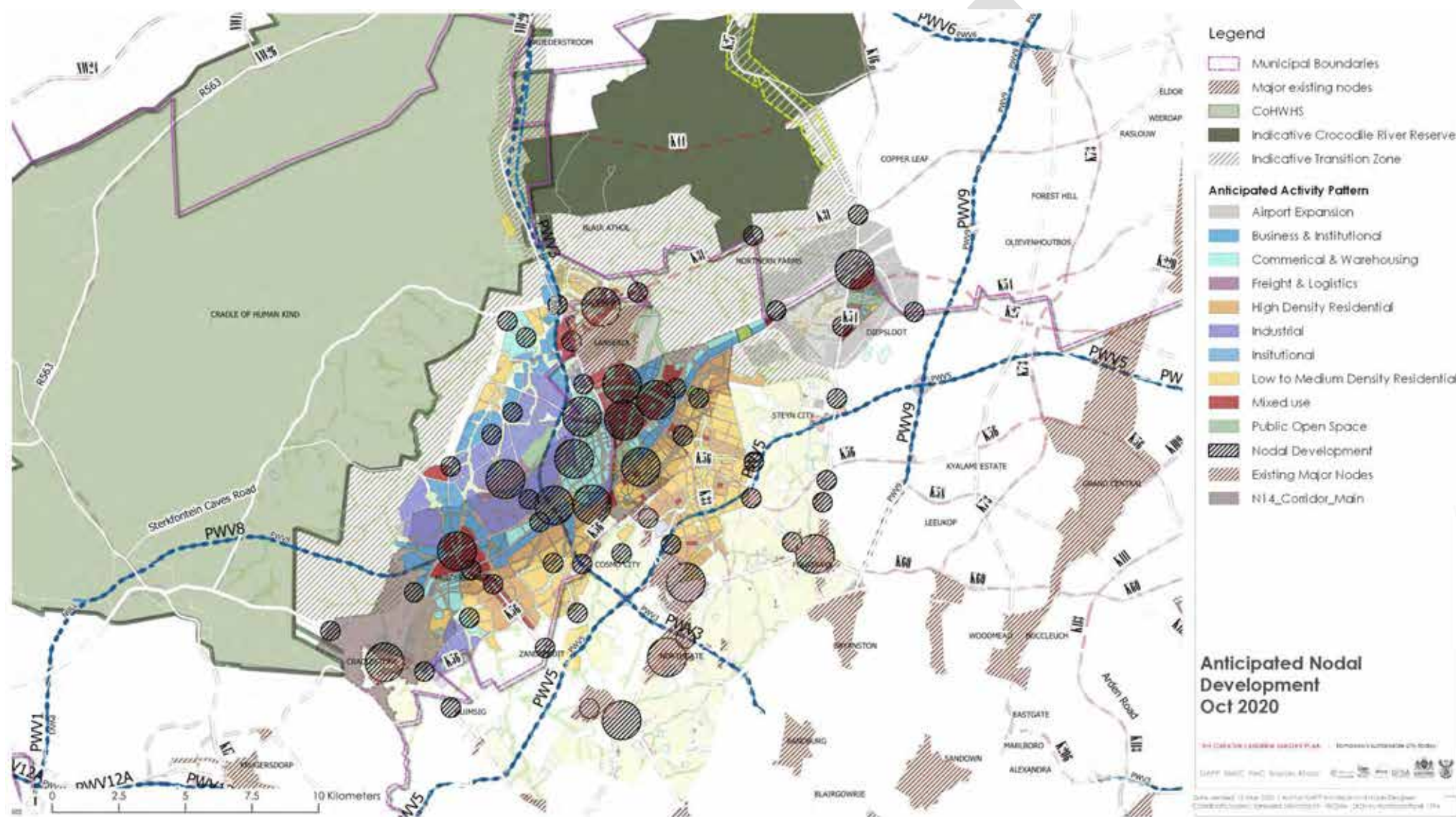


Figure 87: Nodal Development - Subject to refinement after the public comment period

6.4 Areas of focus

The extensive size of the Inner Focus Zone of the study area, which forms focus of the overall GLMP spatial development strategy, required that it is divided into more manageable areas of focus. These comprise two categories, the first encompasses a *Focus Zone*, and the second encompasses a *Precinct Planning Zone*. The *Focus Zone* forms a higher development priority, for which more detailed spatial development planning and urban design is undertaken, including the scheduling of rights, land use activities, development parameters, development and design guidelines, and the identification and placement of the envisaged capital web (public infrastructure, public facilities and the linkages between them). The *Precinct Planning Zone* provides an overview of the development strategy as informed by the GLMP for that particular area, and is earmarked for further detailed urban planning and urban design, which due to existing uncertainties, cannot be planned to the desired level of detail at the present moment.

The informants for the identification and the definition of the *Focus Zones*, which were already outlined in Section 5, include:

- The expansion and development plans of Lanseria International Airport, and the associated business park development
- The current interest by private development initiatives and property market interests, particularly around the LIA logistics and industrial hub. There has been steady development growth in the areas around LIA over the last 30 years, albeit at a moderate to slow pace.
- The GSDF 2030 areas of focus: Economic consolidation around LIA and southward along Malibongwe drive to the N14 interchange. Economic consolidation in the small-holding areas abutting the existing residential suburban development on the south east and southern areas of the GLMP study area. A particular focus is socio-economic development for Cosmo City, Zandspruit, Bloubastrand and the area around the Malibongwe / N14 interchange.
- The nodal framework and the corridor framework of the LRSDP (2017).
- The identified intervention areas of the local municipalities.

The outcome of the above yielded 6 areas of focus:

1. **Lanseria Urban Growth Node** (Focus Zone 1): This encompasses an agglomeration of primary nodes, including the proposed New Town Centre, a mixed use activity node, and nodes with a focus on residential development, business and warehousing development, as well as appropriate light industrial and commercial support development. It includes the Lanseria Airport specialist node and surrounding areas to the northern boundary of the GLMP study area. The airport is a key air transport, logistics and business hub. The development of the Malibongwe Drive major arterial activity spine from its interchange with the N14. Developments along the N14 to form the wider development corridor.

2. **Chartwell Residential** (Focus Zone 2): A district earmarked for a diversity of residential development structured around local neighbourhood nodes. It is envisaged that social housing and other forms of government housing initiatives will be included in the residential composition. This residential district forms linkages back
3. **Beyers Naude Activity Spine / N14 Mixed Use Node** (Focus Zone 3): Capitalising on the development opportunity for mixed use activities along Beyers Naude, forming a major arterial activity spine. The establishment of a major mixed-use node round the interchange is also included.
4. **Tourism and Leisure Belt** (Focus Zone 4): This forms the interface with the Cradle of Human Kind World Heritage Site.
5. **Cradle Stone Node** (Focus Zone 5): Establishment of a mixed-use node, building on the current initiatives that Mogale City is promoting.
6. **Northern Farms** (Focus Zone 6): A major agricultural development initiative, as well as a nature reserve and regional recreational facility

It must be noted that these are areas with significant landholdings available for development, and one must not preclude the existing development potential for urban consolidation of existing landholdings based on the urban structure, within existing nodes and along activity spines (Malibongwe, William Nicol, Beyers Naude, Witkoppen / Northumberland and Hendrik Potgieter).

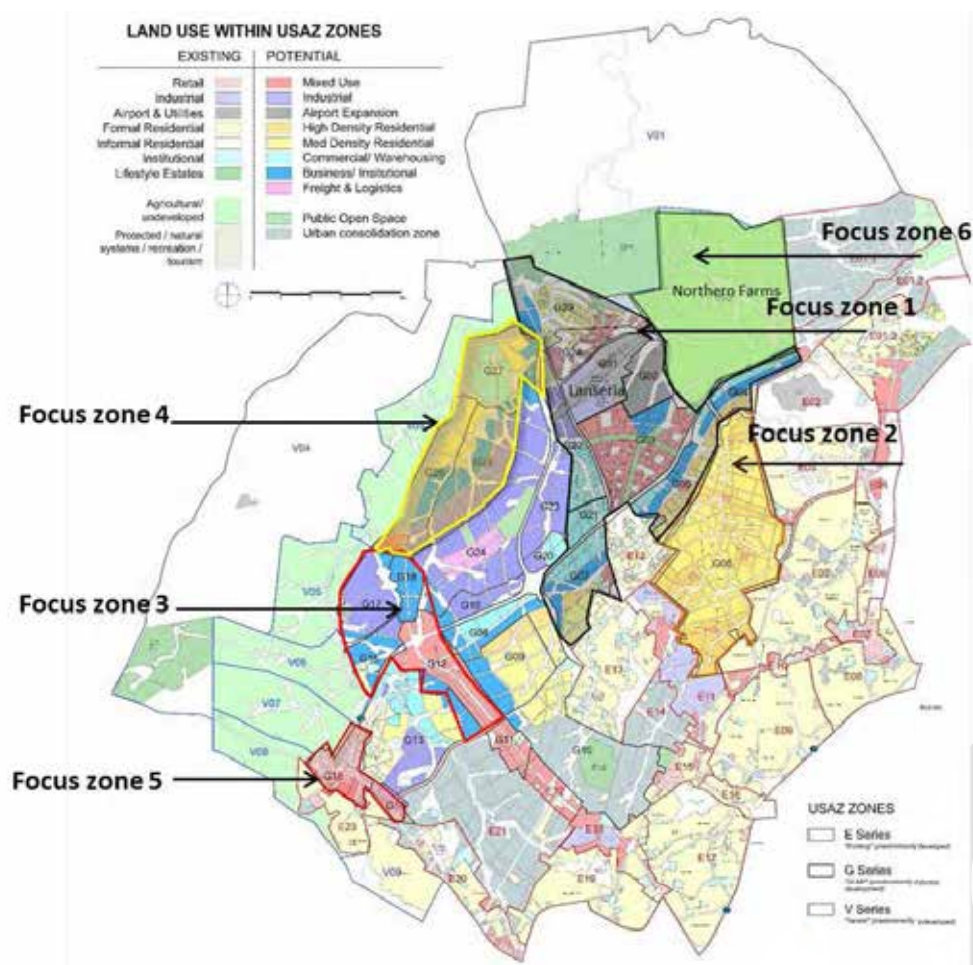


Figure 88: Areas of focus within the GLMP

6.4.1 Focus area 1 Lanseria growth node

As discussed in the previous section, the concept. The focus of development is on development infill and increased density and mixed land use along the activity spines, consolidation within the N14 corridor with an identified area for an urban core, which will become a town centre in its own right based on sustainable principles and green infrastructure, with the LIA driving it.

The primary focus area, Focus area 1, comprises:

- The Lanseria International Airport and its expansion possibilities to accommodate additional passengers per annum;
- an urban core;
- commercial freight and logistics;
- Potential urban consolidation

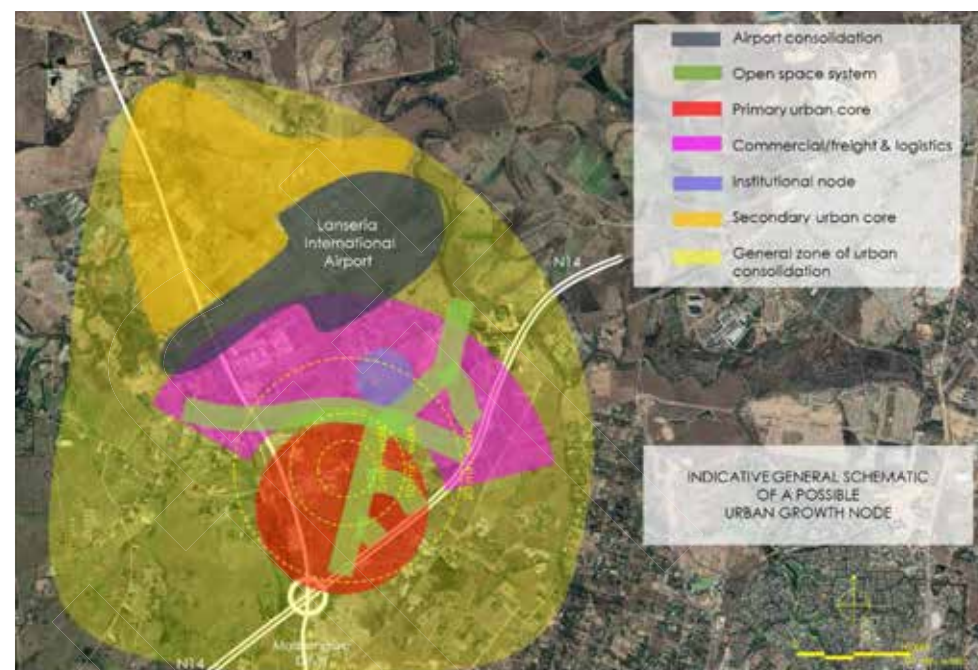


Figure 89: Development concept for the primary focus area

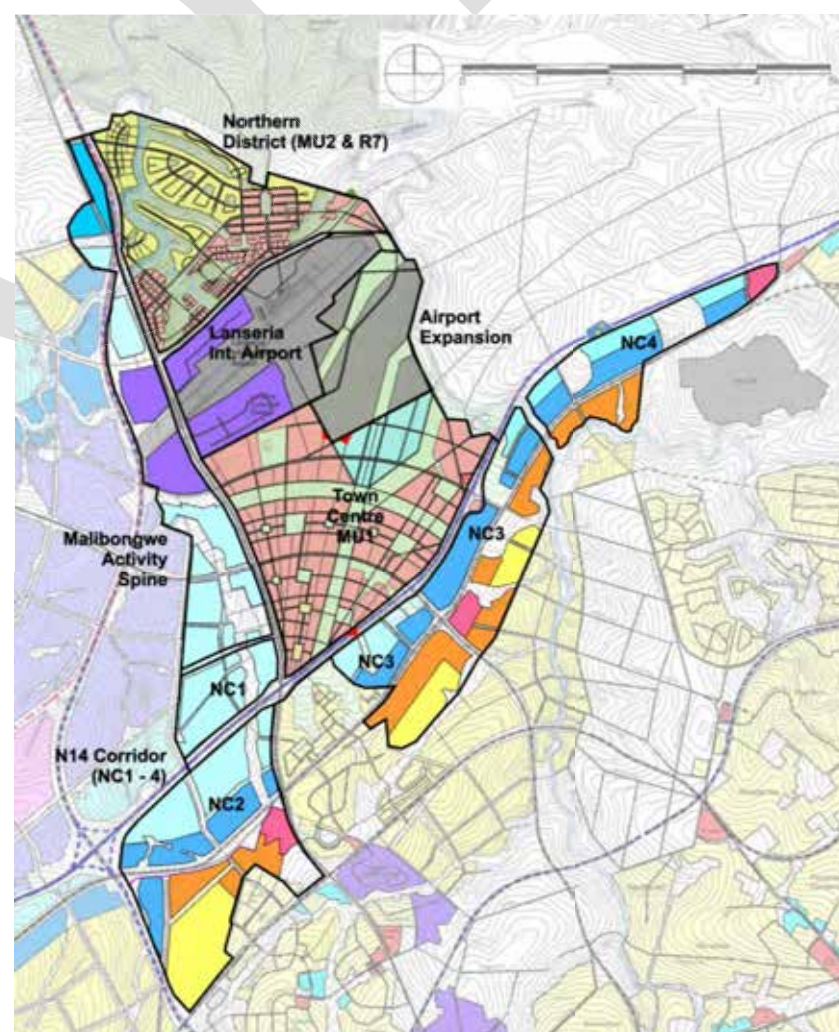
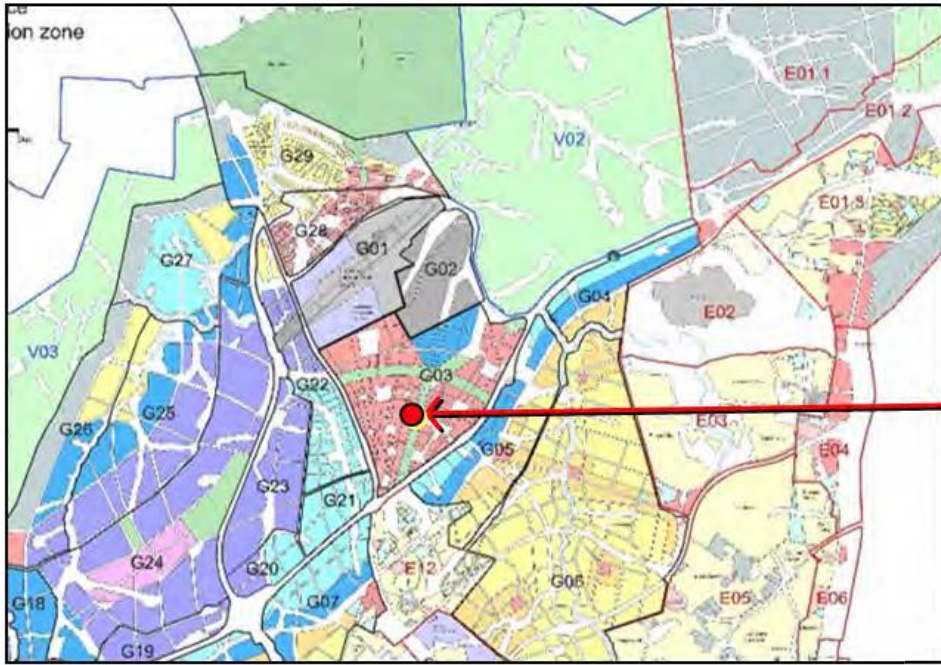


Figure 90: Anticipated activity pattern of the Lanseria Growth Node



USAZ Location within GLMP Development Area
Development Yield Outcomes

NEW TOWN CENTRE- USAZ ZONE G03 - REGIONAL NODE			LAND AREA TYPES (ha)									TOTAL
	METRIC RANGE		Street Area	Agriculture / Tourism	Mixed Use	Commercial / Warehousing	Business / Institutional	Industrial	Logistics / Freight	Airport Use / Expansion	Residential	Public Open Space & Social Facilities
LAND AREA												
Development Area %:	55%											
Development Area Extent:	ha											
Street Area %:	25%											
Street Area Extent:	ha											
Open Space Area %:	15%											
Open Space Area Extent:	ha											
Public Facilities Area %:	5%											
Public Facilities Area Extent:	ha											
RESIDENTIAL DEVELOPMENT												
Total no. of Residential Units:	No.											
Gross Residential Unit Density du/ha:	85											
Nett Higher Residential Unit Density du/ha:	155											
Nett Medium Residential Unit Density du/ha:	90											
Nett Lower Residential Unit Density du/ha:	60											
Residential Floor Area - average unit size m ² :	75											
FLOOR AREA (incl. residential)												
Floor Area:	m ²											
Nett FAR:	4.0-6.0											
Gross (Average) FAR:	2.25											
POPULATION												
Population Number @ Col p/ha:	3.8											
Gross Population Density p/ha:	150-250											

Figure 91: Establishment of Targeted Development Threshold for the USAZ zones and areas within the Zones of focus

1. PROPOSED LAND USES- TYPES AND AREAS

LANSERIA GROWTH NODE: FOCUS ZONE 1	USAZ	LAND AREA TYPES (ha)		GLMP PROPOSED LAND USE AREA (ha)											URBAN STRUCTURE ELEMENT TYPE													
		TOTAL LAND AREA	Natural Environment	Existing Developments	Available Development Area	Street Area	Agriculture / Tourism	Mixed Use	Commercial / Warehousing	Business / Institutional	Industrial	Logistics / Freight	Airport Use / Expansion	Residential	Public Open Space & Social Facilities	Regional Node	Primary Node	Secondary Node	Specialist Node	Corridor	Major Activity Spine	Urban Activity Spine	Main Activity Spine	District				
Lanseria International Airport	G01																											
Airport Expansion	G02																											
New Town Centre	G03																											
	G04																											
N14 Corridor	G05																											
	G07																											
	G21																											
Maitlberg Activity Spine	G22																											
Northern District - Business Park	G28																											
Northern District - Residential	G29																											

USAZ forms part of a Regional Node

Development Parameters for a Regional Node

TYPICAL DEVELOPMENT PARAMETERS: URBAN STRUCTURE ELEMENTS

		Node						Corridor			Activity Spine		District
		Regional	Primary	Secondary	(Average)	Major	Urban	Main				Factors vary	
Land Area	ha	314	201	50								depending	
Development Land Area	%	55%	55%	55%	50%							on type of	
Development Land Area	ha	173	111	28								District	
Open Space Land Area	%	15%	15%	15%	20%								
Open Space Land Area	ha	47	30	8									
Public Facilities Land Area	%	5%	5%	5%	10%								
Public Facilities Land Area	ha	16	10	3									
Street Area	%	25%	25%	25%	20%								
Green Area	ha	79	50	13									
Development Parameters													
Gross FAR	factor	2.25	1.75	1.25	0.40	0.70	1.05	0.90					
Nett FAR	factor	4.0 - 6.0	2.5 - 4.0	2.0	range	1.0	1.50	1.40					
Floor Area	m ²	7,071,429	3,520,000	628,571	range	range	range						
Residential Units	units	26,714	15,086	1,500 - 2,500	range	range	range						
Gross Residential Unit Density	du/ha	85	75	50	30	60	90	80					
Nett Residential Unit Density	du/ha					86	129	130					
Population	persons	85,486	48,274	8,000	range	range	range	range					
Nett Res Population Density	persons/ha												
Gross Res Population Density	persons/ha	272	240	159	96	192	288	256					

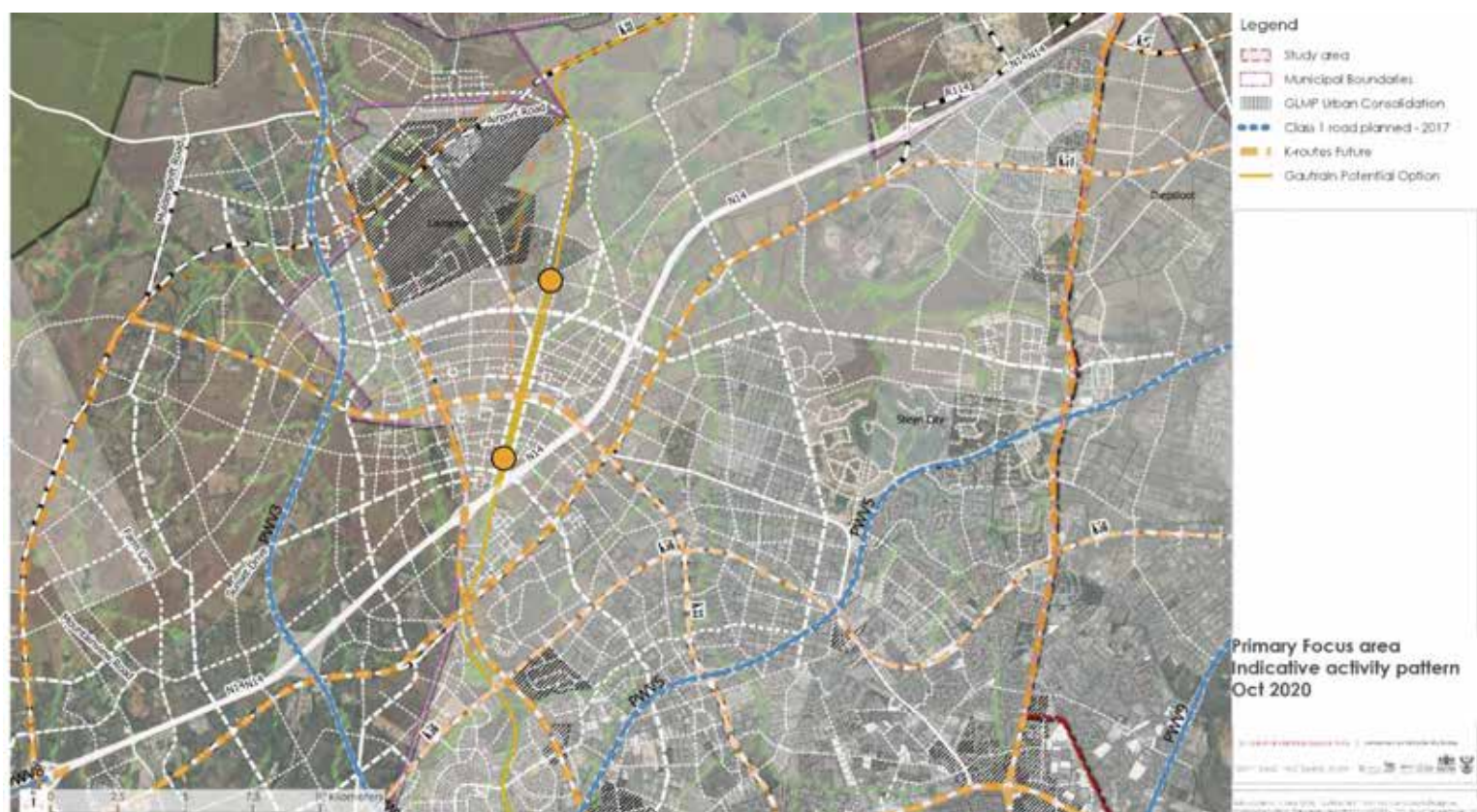


Figure 92: Indicative road network of the primary focus area

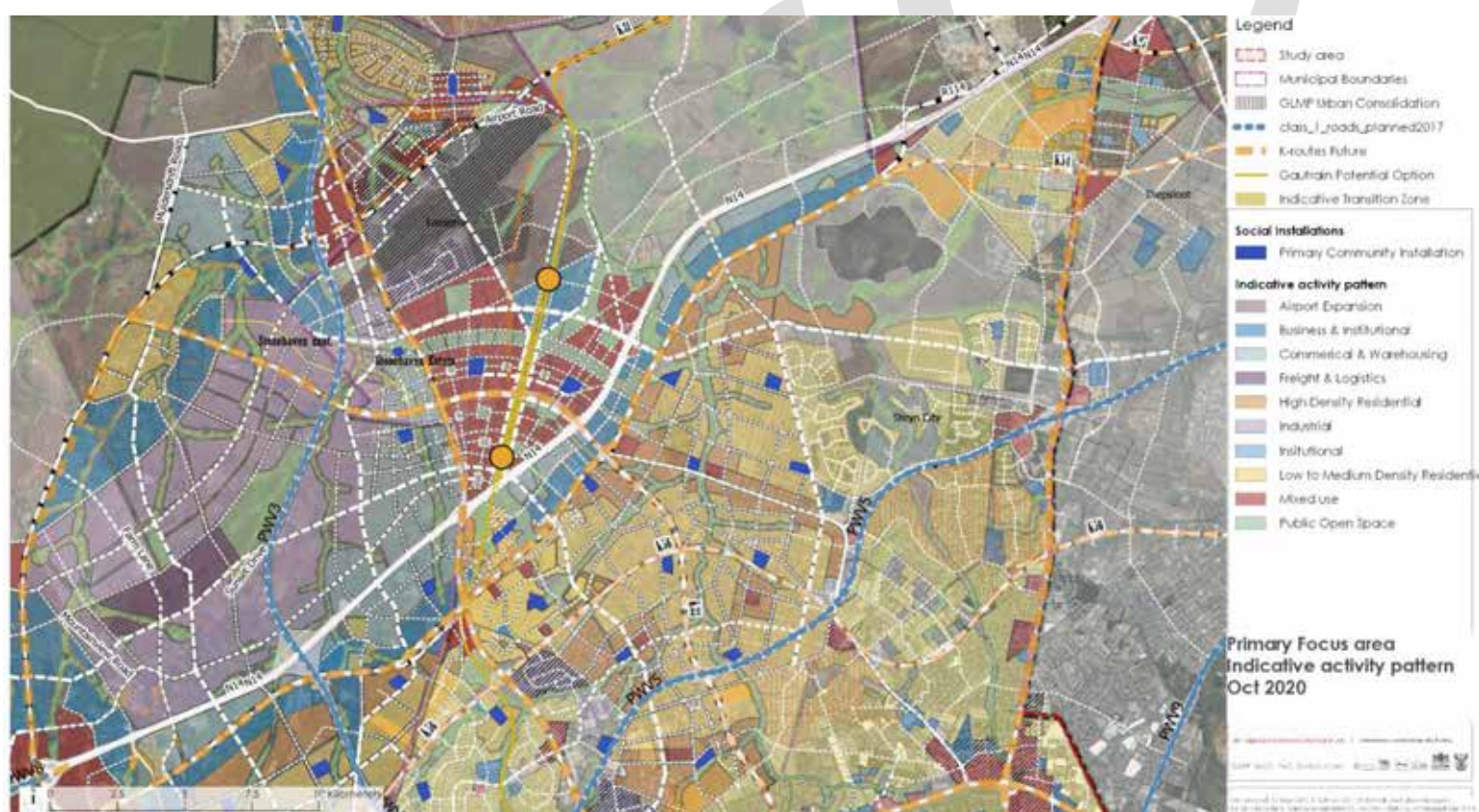


Figure 93: Indicative activity pattern of the primary focus area

6.4.2 The Lanseria international Airport (LIA)

The LIA accommodates 3.5million passengers per annum, with a vision to accommodate 18-20million passengers, the medium term and additional passengers in the longer term, which would include accommodating business jets and Boeing 737s, requiring a longer runway. The LIA is exploring different options of expansion, which could include the extension of the existing runway from 3km to 4/4.5km or potentially adding an additional runway. These options would have implications on:

- Development potential, as a second runway would take an expansive portion of land sterilising development until the second runway would be built (20-30 years);
- Malibongwe Drive, as a through road;
- The approach to public transport such as the Gautrain;
- The types of land uses and development as the landholding due to noise and height constraints on land located within the flight paths.

It is important to safeguard the LIA's strategic future position and thus GLMP allows for a number of options for the LIA's expansion. A compact approach, however, to extending the LIA is promoted. The GLMP favours the expansion option of a single runway that can extend to 4km across Malibongwe Drive, supporting bridging over Malibongwe Drive, as a smaller airport footprint wouldn't sterilise large tracts of land in the future. This option would accommodate 18-20million passengers per annum. If the LIA expands with a second runway the GLMP favours the runways being closer together with the new terminal buildings facing onto the new town centre, so that as indicated in Figure 95.

Further engagement with LIA is still to be undertaken to ensure that the strategic options don't limit the future expansion of the LIA and two runways may be required for future expansion.

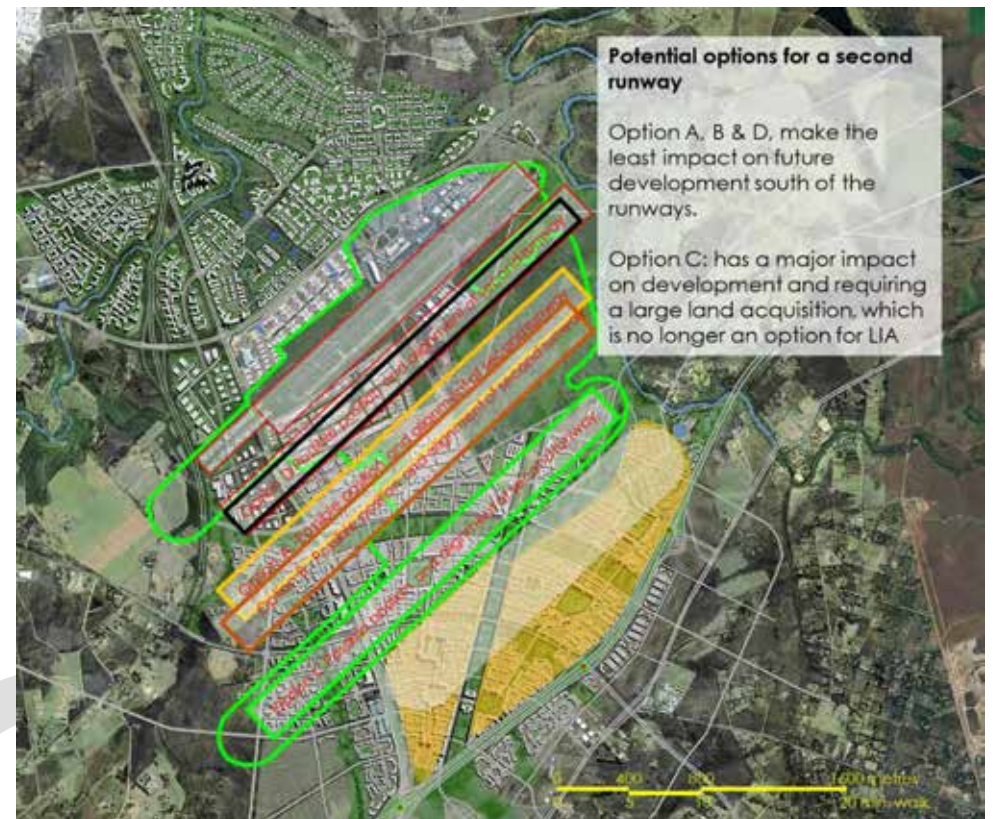


Figure 94: Options being explored for expanding the airport with a second runway

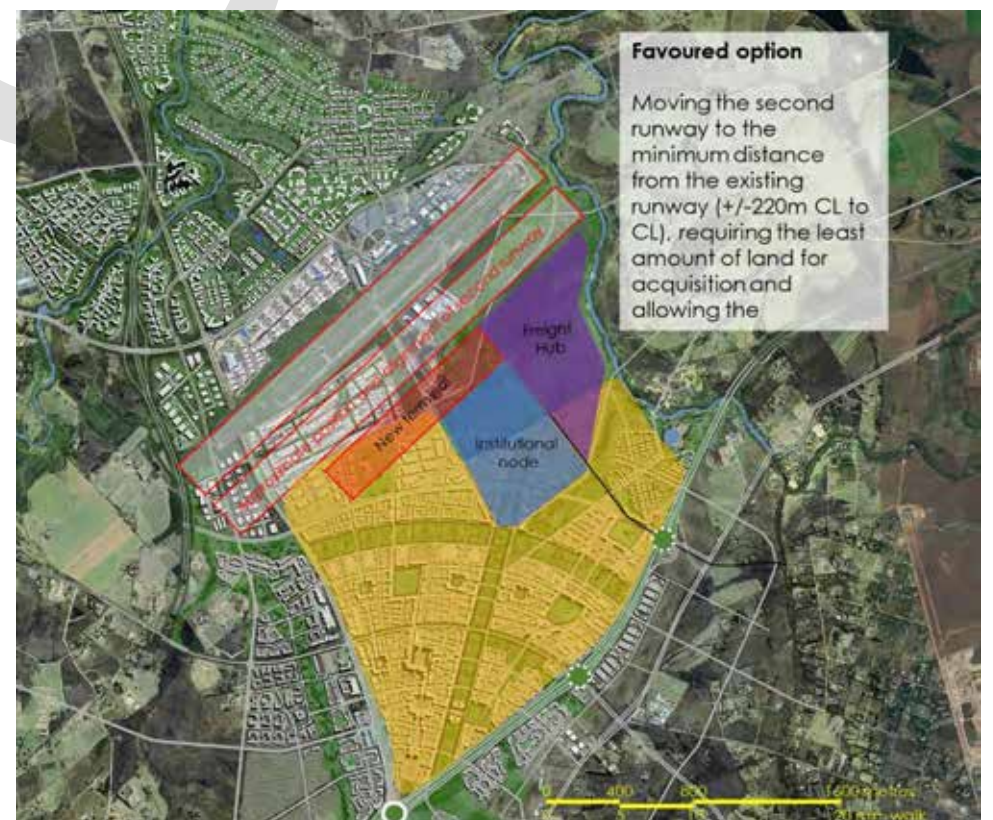


Figure 95: A second runway is viable at this point, and would have less implications on the on the existing landholdings

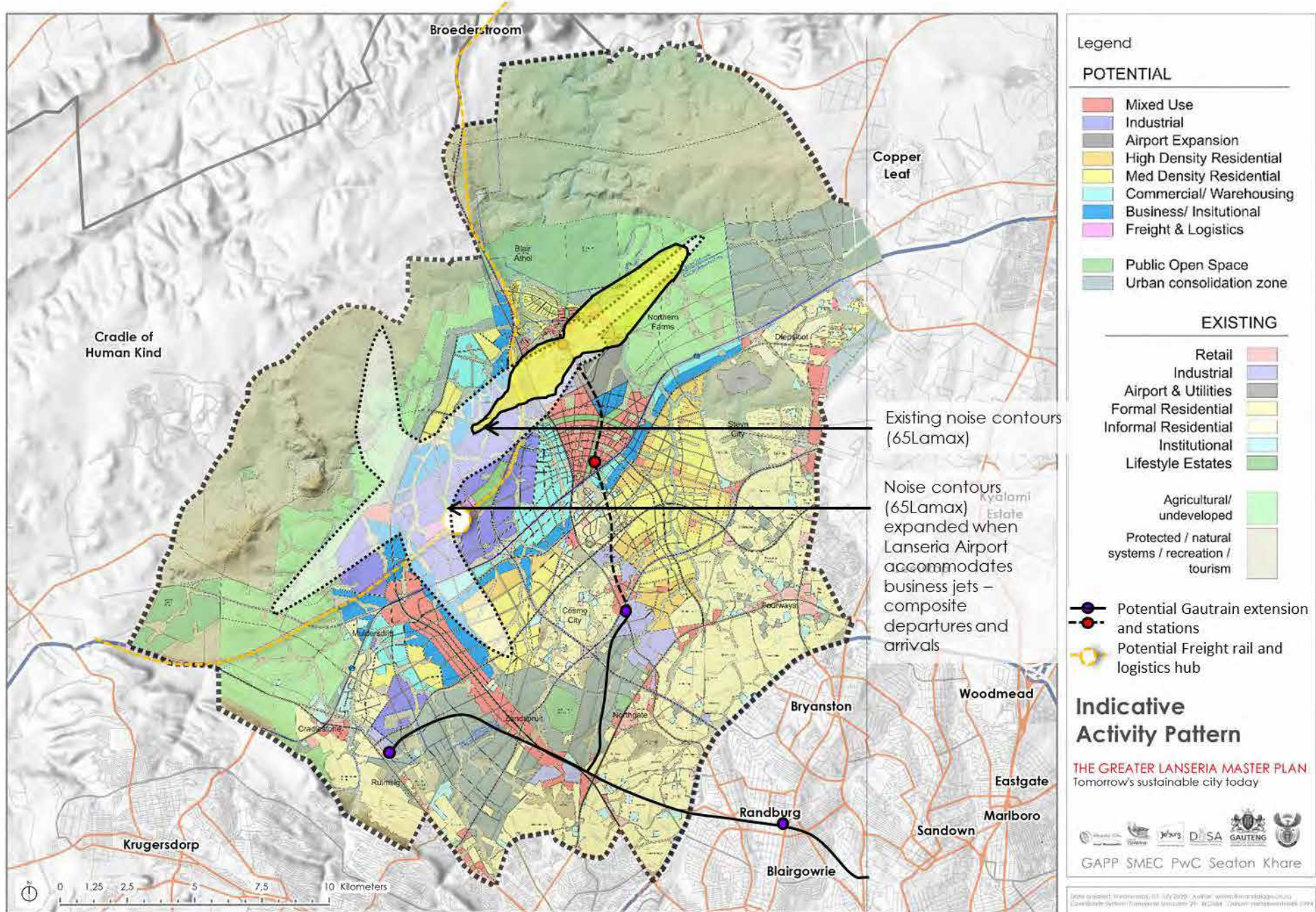


Figure 96: LIA noise impact of 65 decibels, with SANS guidelines preventing residential being established within this area.

6.4.3 The primary urban core / town centre

The primary core, is premised on international examples of town centres Abuja, New Delhi, Islamabad, Chandigarh, and Washington DC. This is where the TRAM principles will become a possibility.

The primary urban core, on which the smart sustainable city will developed. This will become a place where you can live, work, play and pray. The

default mode of transport will be walking, and should you have to travel, public transport would be the next option and only then the car.

The development will include:

- The primary core comprising the Core (intensive mixed use), frame (secondary mixed use), and 'outer core' (tertiary mixed use less intensive, residential and more automotive uses);

- A grid-road pattern road network that improves access and is enabling;
- The existing intersection distances along the N14 and Malibongwe are extensive, between 700-900m. In order to accommodate for access into the core, and road access management in the form of additional interchanges, subways / bridges / service lanes would be required to enhance it;
- A powerful shaft of space through the core will be introduced, forming the armature accommodating for cycling, pedestrian ways and becomes the seam that connects biodiversity green linkage, which will extend beyond the urban core into the neighbouring developments;
- The Gautrain, is promoted, and will also be able to run along this shaft of open space, which will serve the neighbouring businesses and apartments
- A series of non-motorised primary and secondary routes will form a tartan grid between the road network;
- Infrastructure used will be on green principles, the reuse of water, exploring waste-to-energy opportunities, transformed approaches to waterborne sewerage which include a non-reticulated service such as urine diversion, and sustainable generation of electricity, through a smart grid approach;
- Potential will exist for a great African market, social and institutional installations, and other facilities that can become economic catalysts for the area.



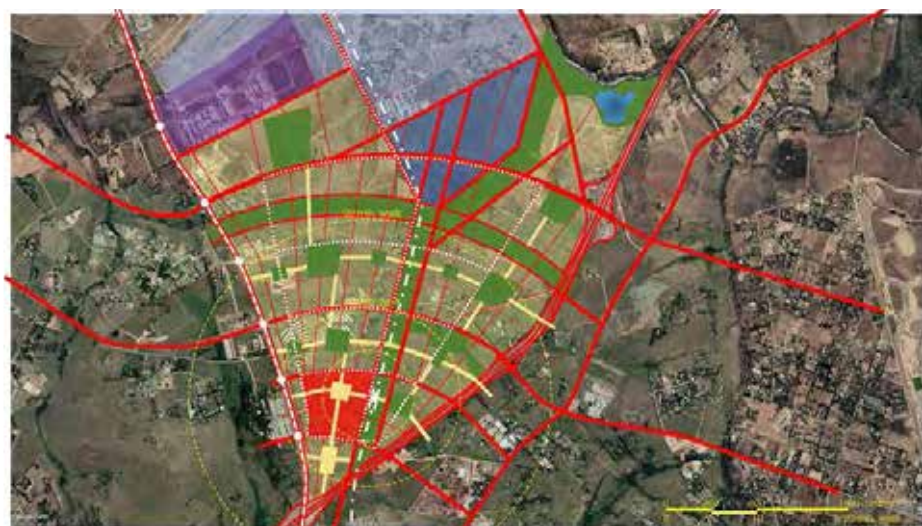
Figure 97: Development concept



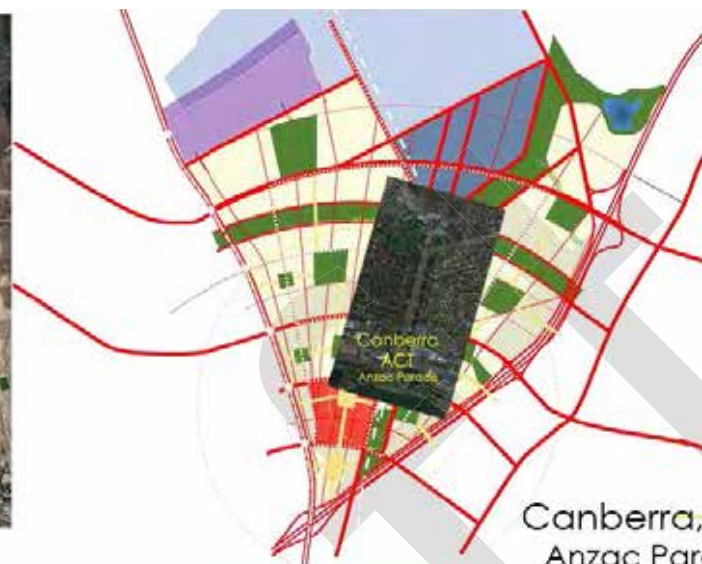
Figure 98: Road networks of the Lanseria Urban Core / Town centre



Figure 99: Vision of the new town centre



Lanseria New Town Centre



Canberra, ACT
Anzac Parade



Abuja, Nigeria



Chandigarh, India



New Delhi, India



Washington DC, National Mall

Figure 100: International examples of high quality town centres, that serve a civic function, are walkable, beautifully in landscape and building form, which becomes a high-quality space to house the arts, culture, working, learning, praying, and living

6.5 Social facilities and public amenities

It seems that a re-think to the provision of social facilities is required and thus the approach to social facilities and public amenities should become a model case for exploration

Province and the Council need to make significant in-roads into standards that are more appropriate and sustainable:

- the rate of provision (i.e. the number of facilities per 1000 pop. or no. of dwellings) could be more carefully researched and become more realistic (some standards have in fact become more restrictive than previous standards)
- site sizes could be reduced significantly and present a more pragmatic understanding of context

Some of the most profound changes could be found in the principles of:

- clustering
- sharing
- overlapping

In spite of previous reviews from time to time, space-planning standards for facility provision,

- still carry the shortcomings of standards as opposed to guidelines
- still focus on rate and size of *site provision* (as opposed to the facility itself) still require provision of land in advance of need in a context where take-up is entirely at odds with the amount of land reserved for facilities
- still result in the sterilization of great tracts of land anticipating development but being negative in the meantime

It is recommended that a model based on a set of alternative propositions and as a basis of debate, the following set of propositions:

- ***regard rates of provision and associated site areas as guidelines only***
- prepare a flexible approach that is based on these guides ***but establish, instead, performance criteria for the project we absolutely accept the principles of clustering, sharing and overlapping***
- ***de-link the open space/sports facilities component from the provision of school sites and regard this component solely as a community-based facility***
- reserve sites for future schools on the basis of using these sites until such time as they are required (a) simply through long-leases or (b) using them for other facilities (e.g. mini-factories or warehousing) until they are required as schools we only impose limited constraints on the

form of a facility (e.g. the number of floors on which it is realized or the configuration of site utilization) - particularly in the case of schools – and focus more on performance criteria and case-to-case merit we institute a system of early-warning need and mobilization of resources for delivery we provide sites on the basis that they are committed only on a just-in-time basis and when need can be assessed relative to delivery capacity

- ***we institute a facilities review panel*** that coordinates and derives synergy from the delivery of facilities such that wider objectives have to be met in the provision of a facility than simply the narrow objectives of that particular facility

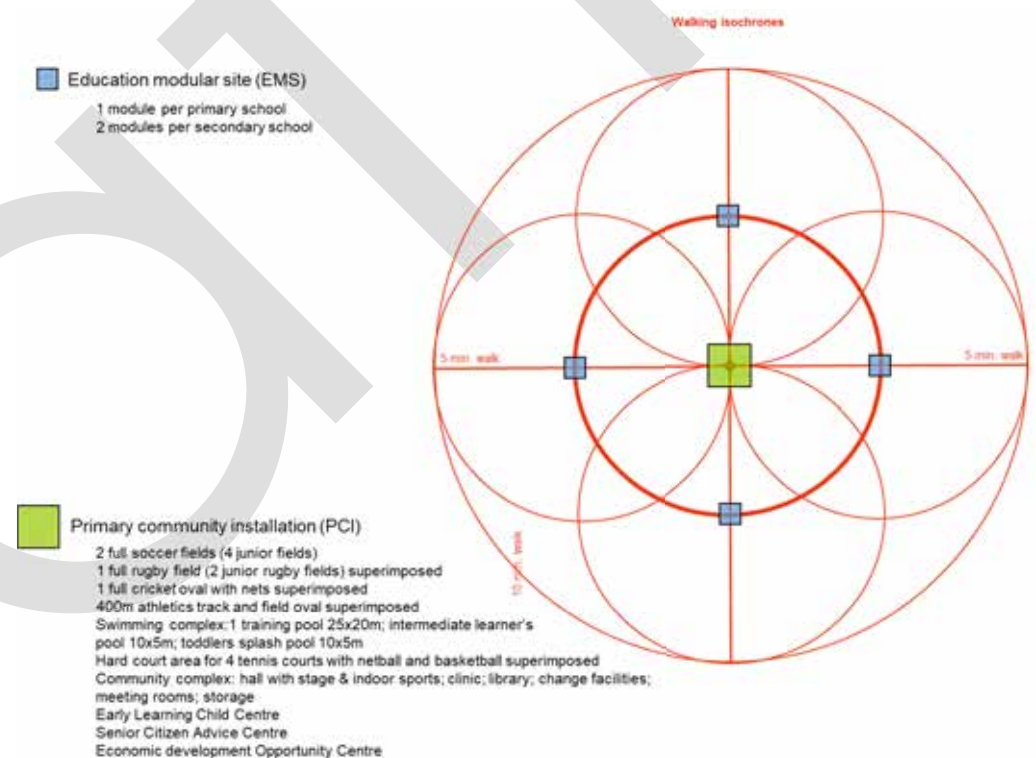


Figure 101: A typical Primary Community Installation and Education Modular Site in 5 (400m) and 10-minute (800m) walking isochrones. Resulting in a 20-minute walk between any PCI

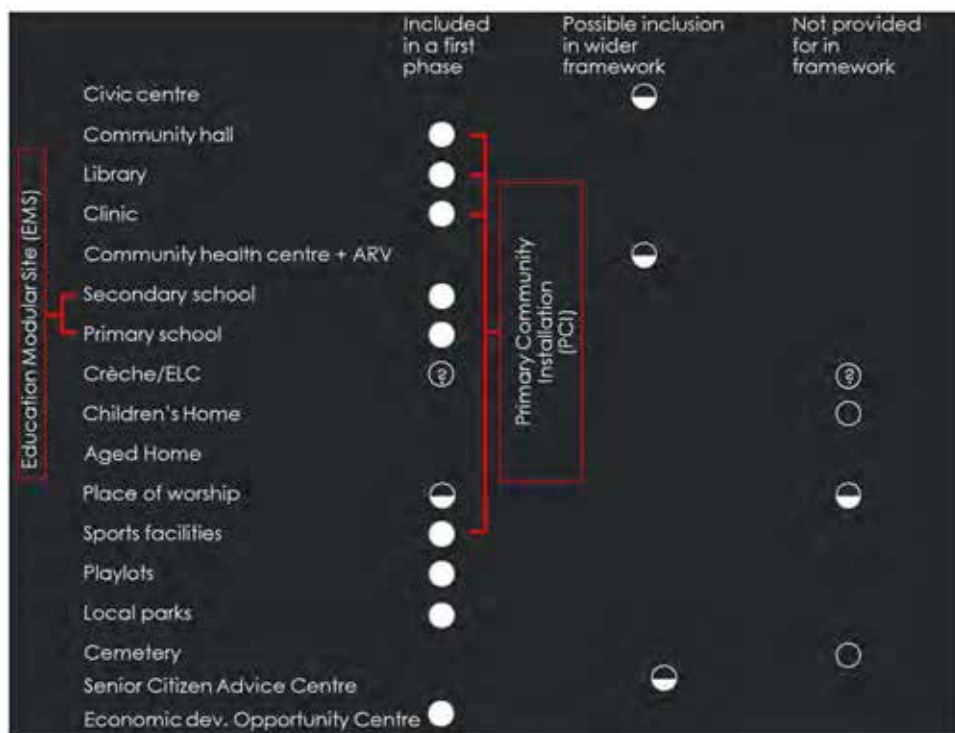


Figure 102: facilities provided in a typical Primary Community Installation

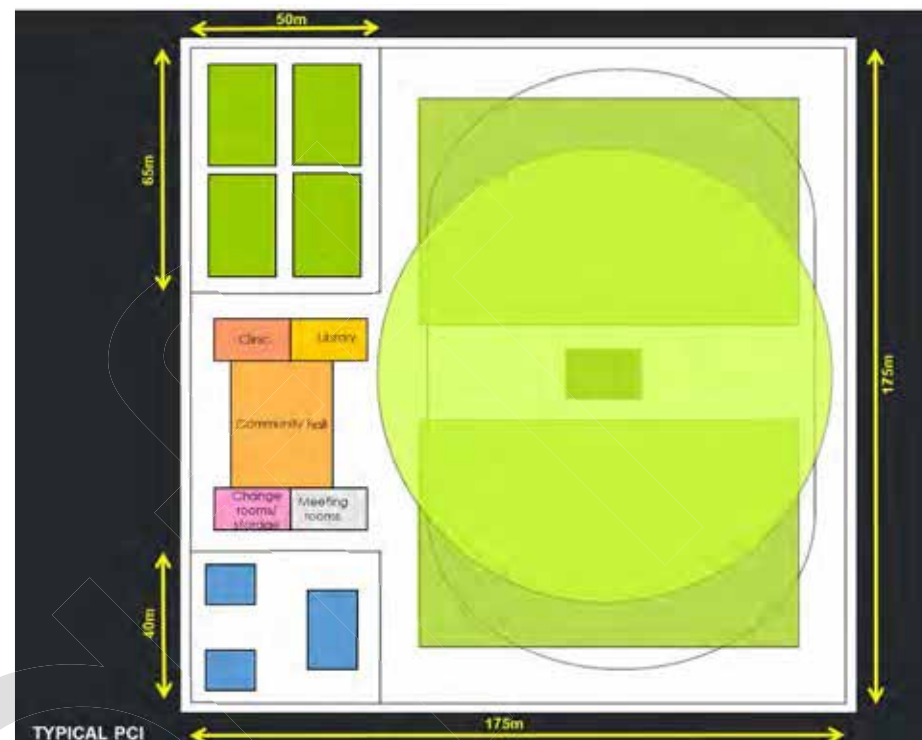


Figure 104: A typical Primary Community Installation model including classrooms and a quadrangle

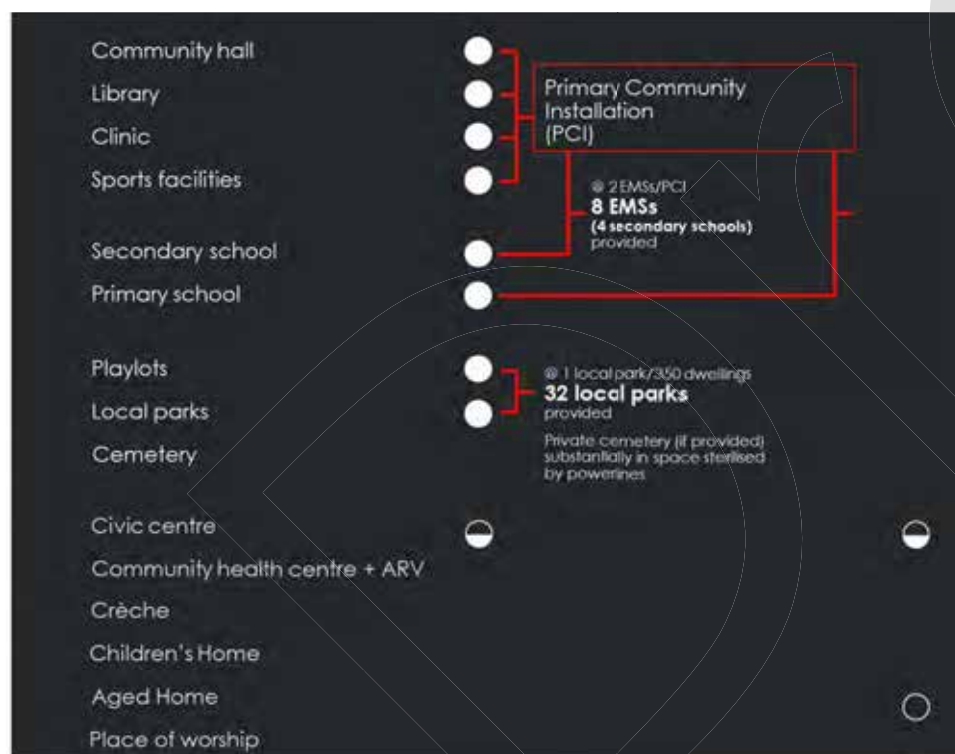


Figure 103: facilities that link to a typical Primary Community Installation

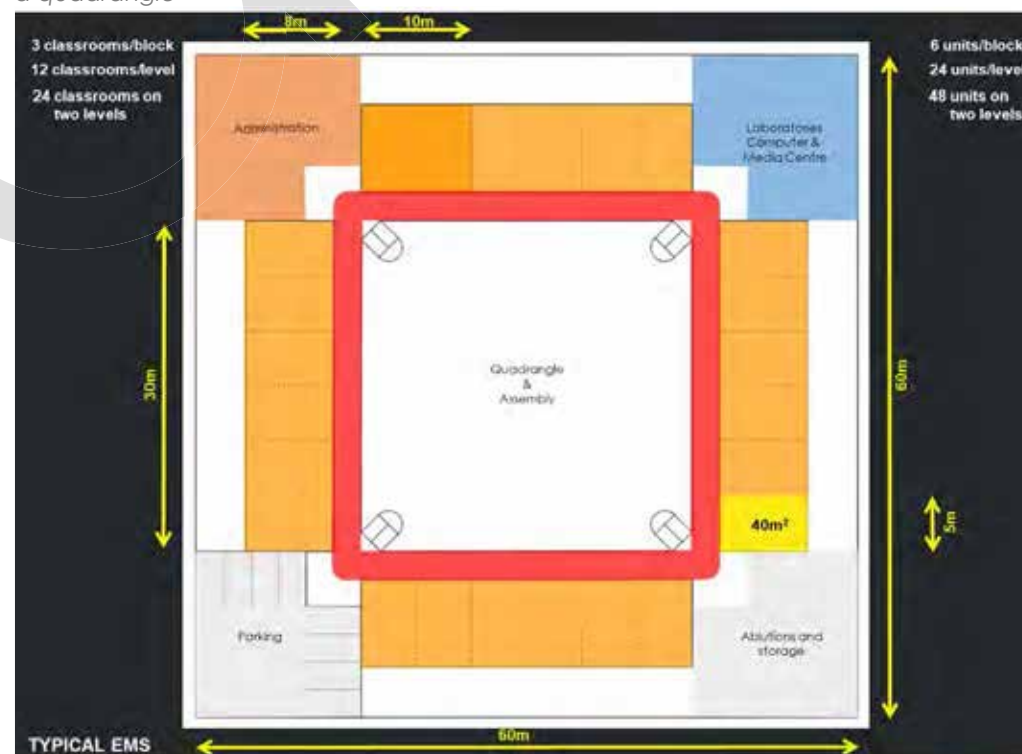


Figure 105: A typical education modular site model including classrooms and a quadrangle

Based on 20 000 dwelling units

School provision as per Provincial guidelines:

50 primary schools 2.5ha/school (with sports facilities)	125ha
25 secondary schools 4ha/school (with sports facilities)	100ha
	225ha

Suggested reduction:

8 primary schools	1.4ha adj. to SF	9.4ha
	1.5ha 1 – 1.3 from SF	12ha
4 secondary schools	1.7ha	6.8ha
	2.2ha	8.8ha
		±21ha
Plus area allocated for PCIs	8 PCIs @ 4ha each	32ha
TOTAL		53ha

The importance of the very extensive and permeable open space system underlying the development framework is also emphasised: it is the backbone of the 'green trellis' around which a high density, complex urban pattern is developed

- it provides not only for the re-instatement and preservation of a ground water regime and wetland habitat, but also a bio-diversity of habitat with migration corridors, etc.
- it provides for a linear format of open space that can incorporate pedestrian, cycle and bridal paths that will give both use and natural surveillance to the open space system and integrate a fundamental non-motorised movement system into the evolving urban fabric
- it is a 'space-reserve' for additional space that may be required in future without robbing the integrity/intensity/complexity of the adjacent urban fabric (provided that it is used for open space purposes only, whether active or passive, and that suitable ground-engineering principles are applied to retain the functionality of the ground-water regime)

- it is seen as a strategic *urban* resource that makes high-density, sustainable urban living a qualitative experience by providing an integral foil to urban pressure

A fundamental precept, therefore, is that the wetlands should not be regarded as serving the narrow, ecologically defined functions of wetland alone but a much wider, responsibly managed set of functions related to the environmental quality of urban residential living as a whole.

These considerations will give us a foundation upon where a rethinking will give way to propositions that address the backlog of delivery whilst paying homage to urban values that promote density and accessibility at community level in the Gauteng region. To truly represent a post-apartheid city, this GLMP project should illustrate ways of imagining that not only consider transformation, but use it as a mechanism for change in order to be accessible to the most marginalised groups of people in the city region. A truly post-apartheid city should aim to reach the excluded by being reachable to the excluded, and when looking specifically at social infrastructure delivery; this will be a re-envisioning of current standards to promote access and choices for all.

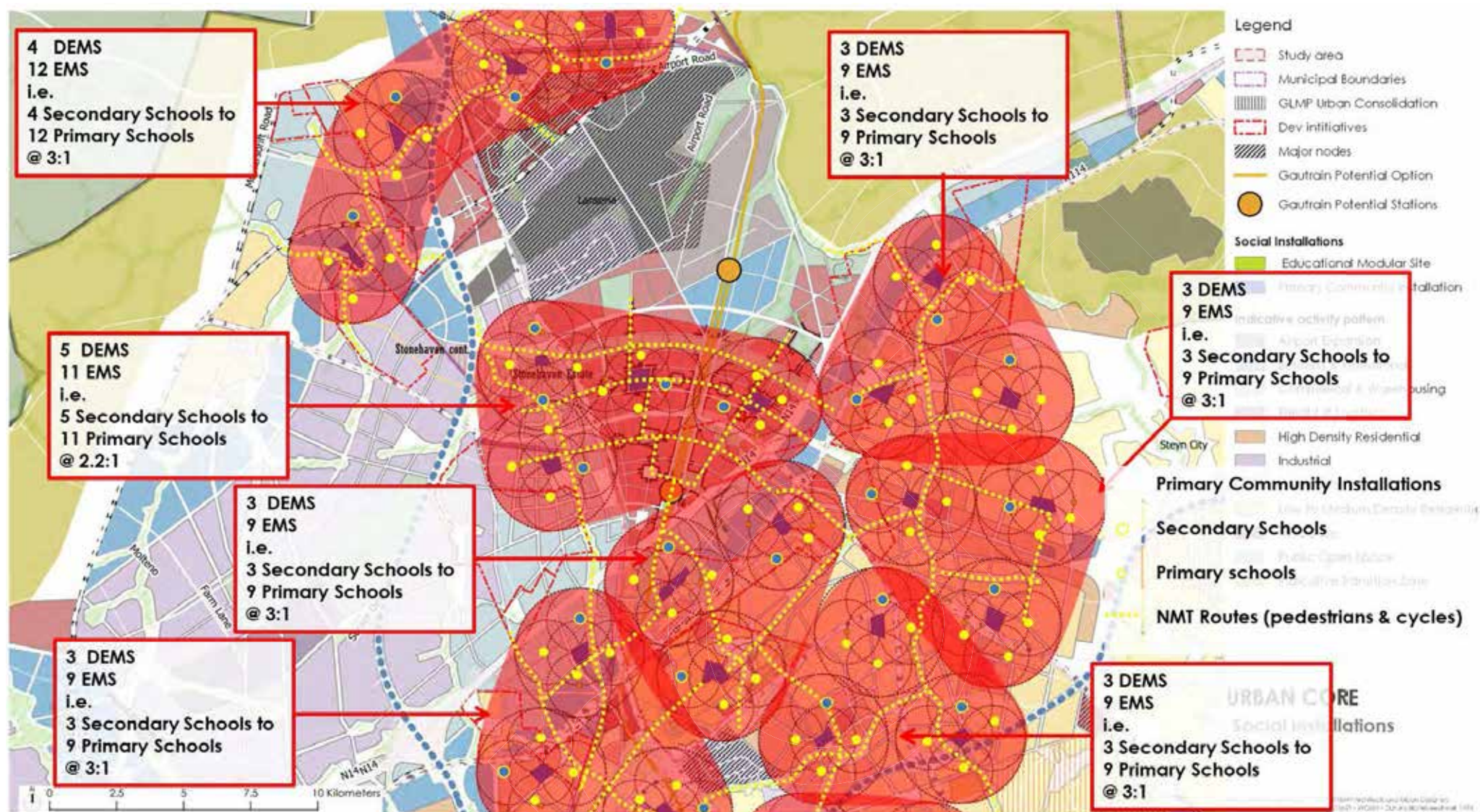


Figure 106: Pedestrian network between schools and community sites

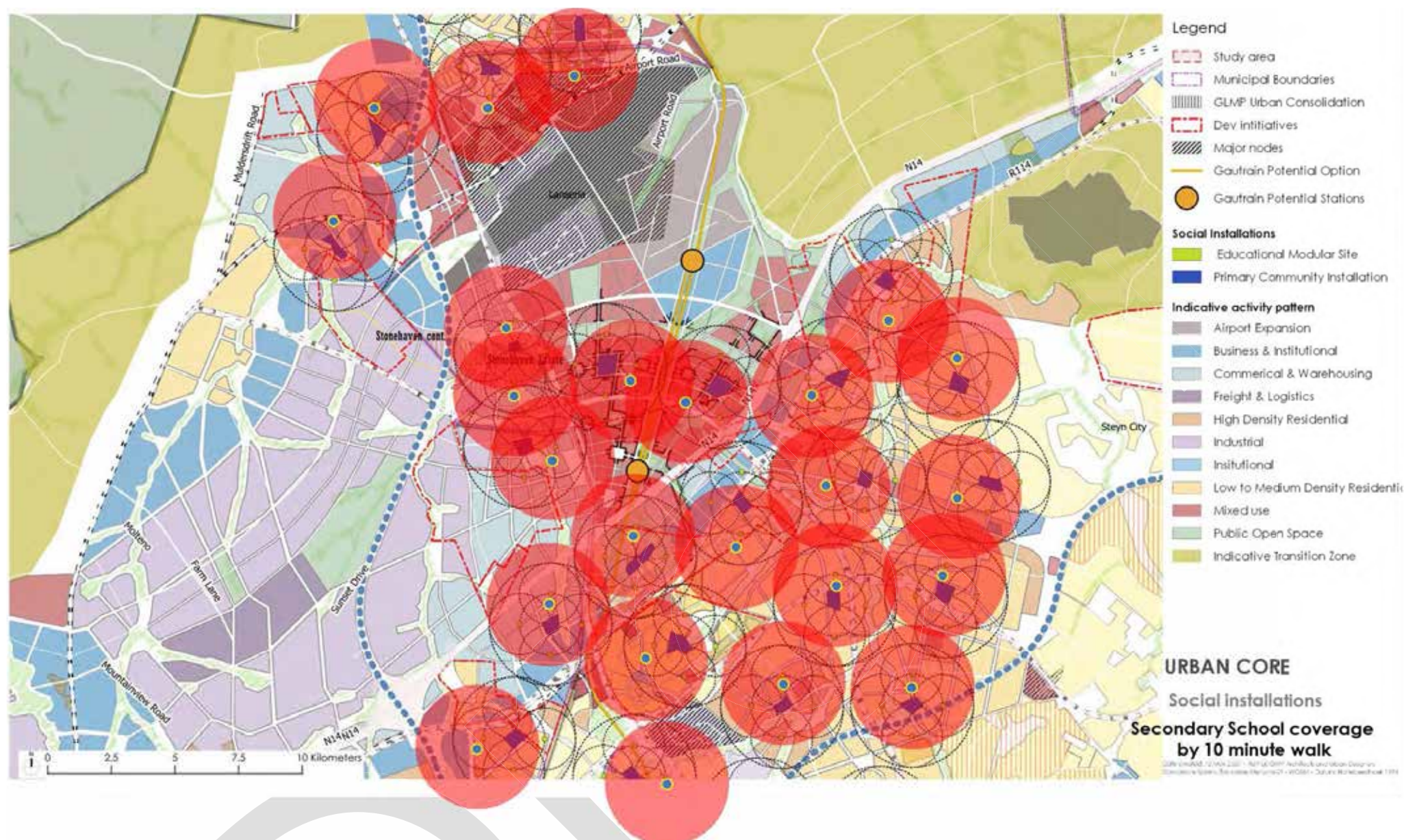


Figure 107: Secondary school coverage by 10 minute walk

6.5.1 Social facilities and public amenities provided for in the urban core

1. Regional Hospital limiting the footprint size through the approach to parking in structure, and building form, with an interface with the open existing wetland and open space network. – Allowing for 7.5ha, which is the same size as the Vosloorus hospital
2. 3 community Health sites (local clinics included in a PCI)
3. Regional Fresh Produce Site
4. Regional Flower market Site
5. Regional Abattoir
6. An Economic Development Campus (possibly a Business Development Centre or research facility)

7. Economic Development Opportunity Centers
8. Primary Community Installation (PCI's) at 4ha which include:
 - Early Learning Centre (ELC)
 - Senior Citizen Advice and Rec Centre (SCARC)
9. 2.5ha for a secondary school (Double Education Module Site - DEMS)
10. 1.5ha for a primary school (Education Module Site – EMS)

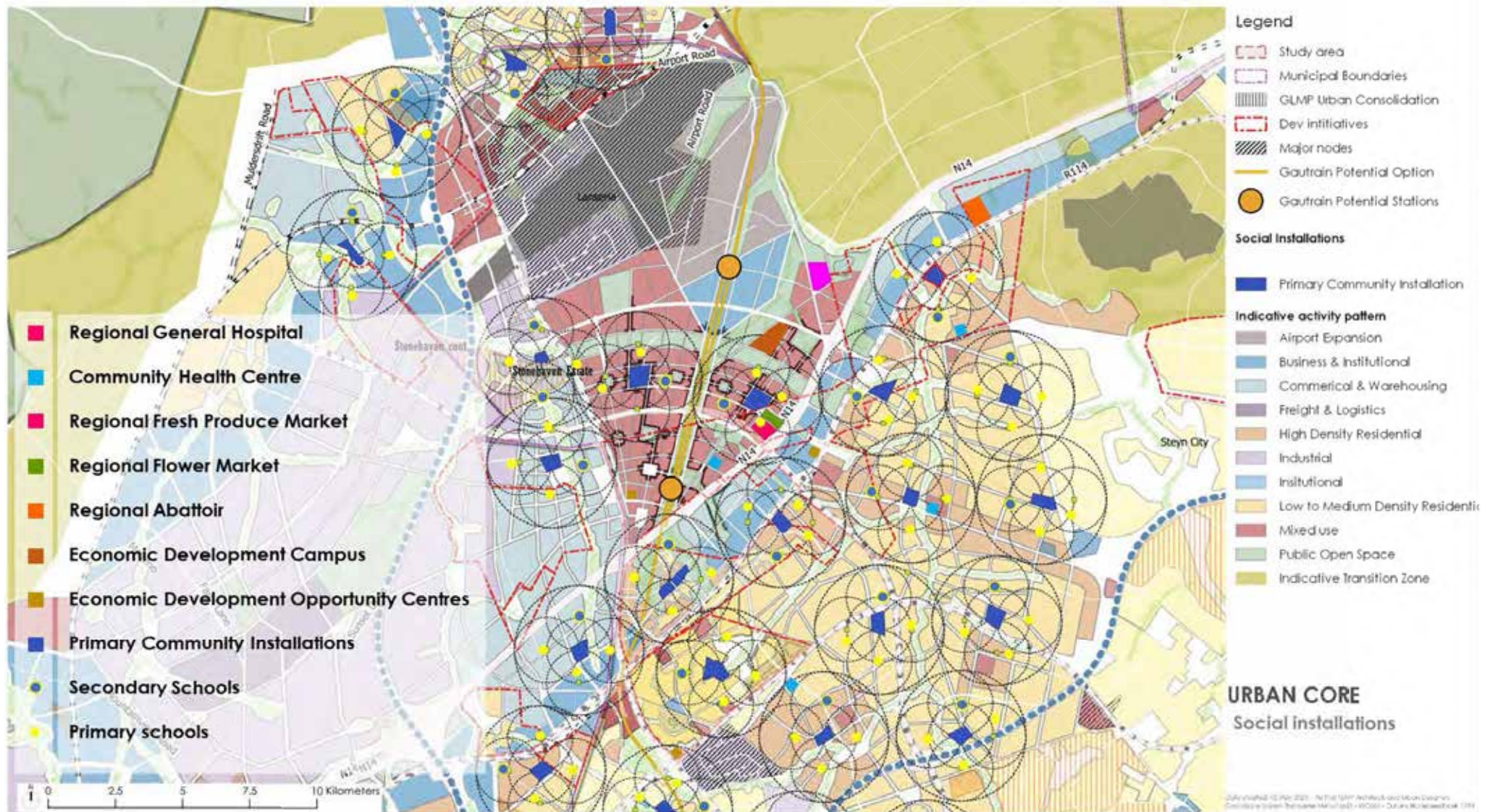


Figure 108: Introduction of PCIs, EMS's and additional facilities into the GLMP

6.6 Economic opportunities underpinning the framework

A number of opportunities have been identified in the GLMP, which are still being investigated:

1. The LIA is core to the economic value of the GLMP. There are a number of opportunities that form around this, which includes:
 - An air freight component and hub, served by the existing and anticipated, agricultural, high value low bulk cargo, located in the regions of Madibeng, Mogale, and Johannesburg;
 - Ancillary services with cargo and travel such as hot offices, locker delivery services based on the Amazon model, pop up shops and events spaces;
 - The expansion of the LIA runway from 3.2km to 4km to accommodate for 18-20million passengers, which becomes a destination that lends itself to the introduction of the hotels, conferencing facilities and the like.
2. The urban core and expanded growth node, becoming an new mixed-use development built on smart, sustainable principles, offering a social and economic value including:
 - Enablement of the blue and green economies, through sustainable infrastructure in the core;
 - A new regional shopping centre, as a catalyst with compact complex building form that is built into a town centre;
 - A node established around the Gautrain, in the longer term;
 - The enablement of a 24hour city as opposed to a 9-5 city, and the value capture;
 - The introduction of key installations of:
 - a new regional hospital, with
 - an economic development campus, with a business incubation facility ,
 - The potential of hosting the Pan African Parliament, with the ancillary industries that tack onto them into the institutional node;
3. The potential for clustering of agricultural areas, supported by a fresh produce market, and ancillary services.
4. Development being unlocked as part of an N14 corridor initiative.
5. The infill development with opportunities along the activity spines, enabling a broad socio-economic profile to occur along it.
6. The importance of reindustrialising the western parts of the GCRO, with the decline in mining and the need for economic prospect with exploration of a freight rail with a next generation logistics hub, creating a lobe over and above the industrial powerhouse located in Ekurhuleni (refer to Figure 72: The potential of a freight loop with a new industrial lobe near LIA)
7. The enablement of the blue and green economies for the study area and region creating opportunities to host research and development in sustainable infrastructure on a whole and the GLMP becoming flagship

project attracting international interest. The expansion of industries, fly farming, Morag, Berka silk, acacia creating glue, geese / ducks for high quality clothing and accessories, recycling, and sustainable energy.

6.6.1 Agriculture

The agricultural sector plays an important role in food security and job creation. In general terms the agricultural land of the Lanseria Masterplan region is currently being used for extensive grazing, with some arable land under dryland-cropping and others under irrigation. Many of the plots are not used for any farming purposes because they are just too small. There is also evidence of intensive farming activities taking place in the area. The topography of the area neither lends itself to large-scale production of field crops (maize, soybeans, etc.), nor is it expected that the soil types and conditions be conducive to high yields in production. There are however some areas under irrigation such as the Northern Farms and arable fields adjacent to natural water resources. Most of the agricultural outputs in the area comprise intensive animal and crop production comprising broiler and egg production, greenhouse-crop production, hydroponics and aquaculture. Most of these intensive production approaches do not depend on the soil properties of the area because the plant mediums (i.e. soils, vermiculite, peat moss, perlite, etc.) for greenhouses are usually 'imported' into the production area and producers rarely use the soils of the premises where greenhouses are erected.

The following mix of agricultural-related activities are foreseen in future within the area: traditional farming, intensive livestock and vegetable production, hydroponic production of vegetables, aquaculture, mushroom production, free-range chickens, ducks and geese, the production of natural insecticides, moringa, fenugreek and curry spices. Other activities comprise beekeeping, protea species that are indigenous to this area, specialised agricultural services like soil, water and tissue laboratories, drone photography and farm mapping services, horse-stables for rent, farm inputs (co-operative shops), sale of animal feeds and hay, etc. Additionally, there is a range of agriculture-related services including agri-tourism, adventure tourism, camping, picnicking, biking, 4X4 driving, etc. These activities could also be combined with weddings and other functions.

Agri-villages as a concept is neither a new idea nor is South Africa pioneering this concept. The agri-village concept has been promoted locally by government at both national and provincial level to support and create opportunities for subsistence and smallholder farmers. The implementation of this concept has limited successes. Some success has been achieved when projects were private sector led, with the involvement of NGOs and the support of government. Communities were assisted with institutional arrangements; creation of organisational structures and the ownership and utilisation of land were clearly spelled out.

Another model for consideration is farm villages and agricultural estates. The Crossways Farm Village case study provides an example of an independent 'rural new town' offering its residents a different way of life. The model is based on a concept of luxury living within the concept and 'flavour of a farm environment'. This is a step further from the golf-course housing estates that have developed during the last 20 to 30 years in SA. Similar property developments have been built by the van der Bijl family on the historical farm in Irene, South of Pretoria. They have developed a hotel, spa, restaurant and conference facilities, but kept the dairy farm operational and developed a housing estate named Irene Farm Village. Field crops and animal grazing are planted amongst the housing development areas to create an integrated approach to rural living and farming activities.

Agriculture is an important building block in the economy of Gauteng; it is one of the sectors that could make a meaningful contribution to job creation, economic growth and improving the livelihoods of poor urban and peri-urban communities in the province. The primary agriculture subsector has the potential to grow due to the proximity of large urbanised markets and value could be added to locally produced products for local and potentially large export markets. Agriculture comprises also agro-processing of locally produced products could add a lot of value especially if products could be exported. The proximity to Lanseria Airport could offer future export opportunities. PPPs would be essential to maximise agricultural opportunities in the province.

6.6.2 Agriculture interventions and recommendations

- The government should in collaboration with civil society organisations (CSOs), NGOs, farmers' organisations, local communities and private sector actors develop a strategy for agricultural development.
- The Presidency should ensure that government at all levels collaborate – at national, provincial and local government levels collaborate – including the three metropolitan municipalities, provincial investment agencies and national government organisations like the CSIR.
- Government should create a conducive environment by providing public goods such as transport and other infrastructure to entice private sector investment in primary agriculture, agro-processing, value addition activities and supporting services.
- Government could make state-owned and other land available for local urban and peri-urban communities to engage in intensive farming programmes and ensure that land is utilised exclusively for agricultural production and not for housing.
- Support should be provided by either government or private sector agribusinesses to create the necessary institutional frameworks to ensure the successful implementation of these projects – e.g. the creation of formalised structures (cooperatives, associations, private companies, etc.).

- It is advisable that inclusive implementation models be developed where private sector should be involved in co-investing while also taking up ownership with local communities to ensure short-term profitability and long-term sustainability.
- It is proposed that government support such initiatives through grants for capital equipment and infrastructure (greenhouses, irrigation systems, etc.) while private sector actors take the lead in the implementation of such projects.
- Identify specific areas of land with agricultural potential (i.e. arable land, availability of irrigation water, conducive topography, etc.) where agricultural villages (non-fertile) can be established.
- Finding patterns through the existing groupings of agriculture and clustering of agricultural holdings into specific agricultural zones namely horticulture, greenhouses ('tunnels'), irrigation land, etc.
- The government could encourage investments into high-value agricultural products for local and regional (Southern Africa) cross-border and international export markets such as the production of intensive livestock production (e.g. grass-fed beef, free-range chickens, ducks and geese), intensive vegetable production (fresh vegetables for restaurants, fresh herbs, mushrooms, etc.), hydroponic production of vegetables, aquaculture (tilapia has great potential for export), medicinal plants (moringa), other edible crops (fenugreek and curry spices), fruit (nectarines, apricots, pecan nuts, hazel nuts, etc.), floriculture (specifically protea species like *Leucospermum cordifolium*) and beekeeping activities.
- Develop a strategy to attract investments into agriculture and agro-processing activities to create outputs with a high value, low bulk and a demand from international export markets through the LIA e.g.
- One such strategy could be to create an agriculture processing and industrial park where products could be processed, packed for exports and shipped for international markets.
- Another could be developing a fresh produce market that provides an off-take opportunity for local agri-villages but also for vegetables and fruits from the irrigation schemes in the North-West Province such as Brits, Hekpoort, Magaliesberg and as far as Rustenburg.
- Encourage specialised agricultural services like soil, water and tissue laboratories, drone photography and farm mapping services, horse-stables for rent, farm inputs (co-operative shops), sale of animal feeds and hay, etc. There are a range of agriculture-related services that could be offered of which one is agri-tourism, adventure tourism, camping, picnicking, biking, 4X4 driving, etc. These activities could also be combined with weddings and other functions.

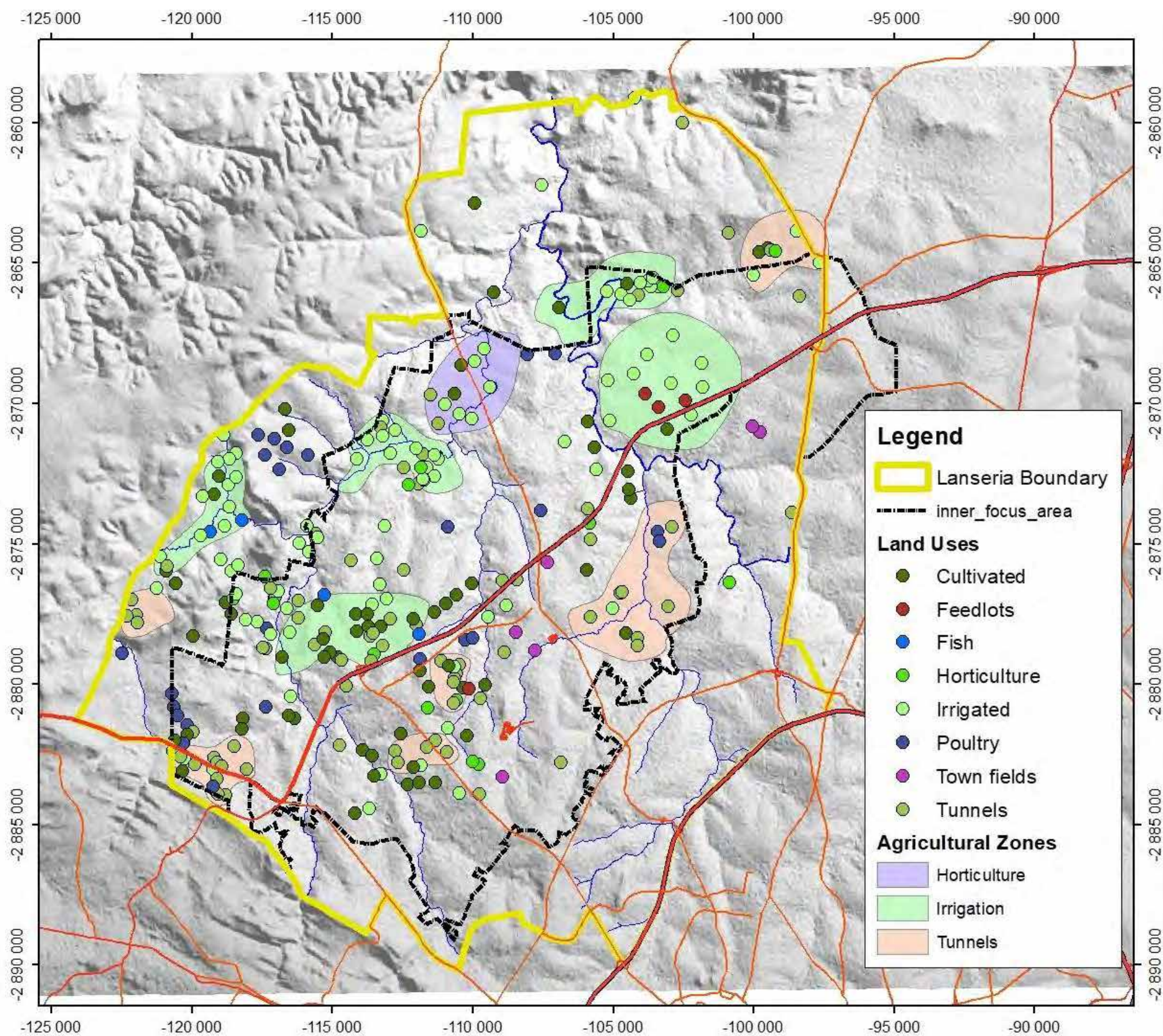


Figure 109: Potential clustering of agricultural activities with consideration of supporting agricultural services, such as agricultural villages, coops, skills development etc.

6.6.3 Hospitality and Leisure

- Travel and tourism are one of the **main engines of growth** in the **African economy**.
- The economic and social footprint of **tourism is large**.
- In 2018, South Africa received 10.4million international tourists trips, injecting R273.2billion (National Department of Tourism, 2020).
- It places the Tourism and Leisure sector in a **unique position** to contribute to:
 - economic development
 - social upliftment
 - heritage preservation
- environmental sustainability
- Offers numerous development opportunities in an interconnected web of economic activities
- **Covid-19 has had a major impact** on international and local tourism
- The general economic impact of Covid-19 worldwide is unprecedented and has negatively affected the tourism industry (impact is yet to be measured).
- We have seen an **increase** in people (domestic market) using **open spaces for exercising and socializing**, making the Magaliesberg biosphere even more attractive.

Category	Opportunity
Tourism Source Markets	<ul style="list-style-type: none"> • Attract business and MICE (Meetings, Incentives, Conferences, and Exhibition) tourists • Events tourist • Develop a tourist culture within the Visiting Friends and Relatives (VFR) tourist market • Potential to develop domestic tourism markets in social activities (relating to VFR, weddings, funerals and other VFR celebrations); visiting nature attractions; shopping; entertainment, events, etc.
Tourism Precincts	<ul style="list-style-type: none"> • Interlink with township tourism precincts, for instance the Sharpeville Precinct, Soweto Precinct, Carletonville and Westonaria tourism townships • Link with tourism precinct and product developments in nearby municipalities • Link into and support the development of the Vredefort Dome, relating to Potchefstroom and Parys • The Lanseria International Airport forming a growth node, with the linkages to Cradle
Events	<ul style="list-style-type: none"> • Development of a Conferencing and exhibition facilities • Events focused on the emerging African market
Attractions	<ul style="list-style-type: none"> • Linkages with the Magaliesberg Biosphere - Hartbeespoort, the Cradle of Humankind, • Develop and integrate with existing Gauteng heritage, i.e. the N12 corridor, Soweto Tourism and tourism relating to Joburg CBD • Development and integration of tourism relating to the Vredefort Dome UNESCO • Embrace heritage and cultural attraction development relating to the Apartheid struggle and the Anglo-Boer War • Nature-based attraction development • Health and wellness industry development • Adventure-based tourism (cycling (road and off-road), 4x4, off-road motor biking) • Township tourism

- Promote the Cradle of Humankind and Lanseria as a Region with Districts within the Region.
- Promote the Regions online presence including:
 - Region based website and social media (Facebook, twitter, Instagram);
 - Online maps and route guides;
 - Social media advertising;
 - Promotions.
- Built-form building code and language:
 - Branding;
 - Signage;
 - Gateways.
- Smart tourism (still to be explored):
 1. Through technology, including IoT, big data analytics, AI, advanced technology capable of proving real-time solutions to different tourism challenges;
 2. Elements of Smart Cities that includes e-trade and e-business,
 3. New ICT enabled products, services and business models where smart communities and digital entrepreneurship are supported by these activities.

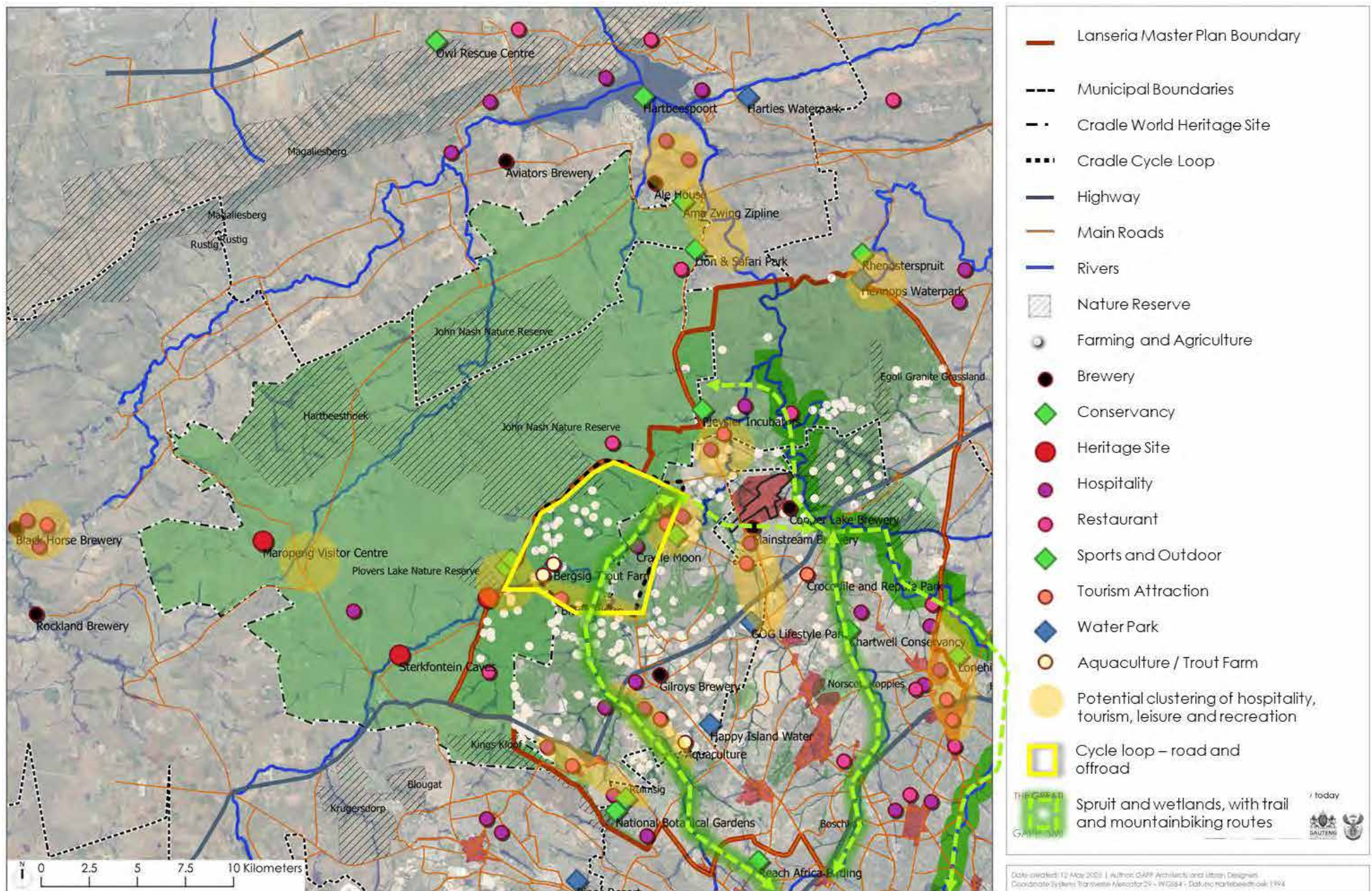


Figure 110: An approach to tourism and hospitality integrated with farming and agriculture

SECTION 7 | A FRAMEWORK FOR THE IMPLEMENTATION

This section of the report is still in planning progress and will be reviewed with further stakeholder engagement.

The following aspects covered in this section includes:

- (1) the intermediate and short term horizon;
- (2) policy support for a number of initiatives
- (3) urban structuring initiatives (these initiatives have been identified specifically to elicit change in the urban structure and are not seen as supplanting the many other developmental initiatives required in the region);
- (4) setting up a 'blog' site to ensure public participation and providing a platform for urban debate and achieving the smart sustainable city on a practical level ;
- (5) putting an Urban Review Panel in place. This is the basis for the implementation of the Greater Lanseria Master Plan.

7.1 Intermediate to short term horizon

A fundamental impediment to meaningful development in and around the Lanseria area over the past 15 years or so has been a lack of capacity in the City of Johannesburg's Northern Waste Water Treatment Works (NWWTW) and the need for an entirely new facility for the region. The NWWTW was commissioned in 1962 and has catered for the very rapid growth, mostly in the form of extensive medium density residential development, of Johannesburg's north-western sector over the past 50 years. As early as 1998 the CoJ began researching an alternative facility and this has culminated in the recently approved (August 2020) Lanseria Water Resource facility situated on the northern edge of the CoJ's Northern Farm. One anticipates that the 50MI/day first phase of this facility, once funding has been secured, could be in place within the next 5 years.

As an additional study undertaken as part of the Master Planning exercise, the efficacy of this facility has been reviewed together with a possible similar future facility in the Lindley area of Mogale City on the Crocodile River system. Mogale City too has been limited in its capacity to service additional growth in its northern areas from a sanitation point of view and the proposed Lanseria facility, which is on the Jukskei River system, does not cater for this. The question has arisen that possible thought should be given to a single, super-regional facility to serve the whole region beyond simply one or other local authority at a point further north and closer to the confluence of the two river systems.

This additional study is reported in detail elsewhere but suffice it to say, from the point of view of the Greater Lanseria Master Planning team, the following:

1. The Lanseria facility appears to be by far the most practical option given its ability to be on-line with the next 5 years;
2. There does not appear to be any major advantage in starting now with a completely new exercise for a super-regional facility as an alternative (which would likely set planning back by a further 10 to 12 years) noting that: (a) there is no suitable site nearer the confluence other than one which has extreme geological and topographical challenges and would, in all likelihood, be far too costly to develop; (b) such a facility does not capture any meaningful additional capacity for development in the process; and (c) a combined facility of the capacity envisaged shows declining returns on agglomeration of scale per MI treated;
3. In addition, there is environmental advice that several smaller facilities, rather than single, super-sized treatment facilities, are of lower ecological impact and that, over time, the paralleling of a system of smaller facilities is more easily managed and provides for greater 'national key point' security going forward;
4. It is believed that an additional facility at Lindley could be delayed well into the future (15 to 20 years) through judicious, properly guaranteed and managed use of a package plant strategy and, in the meantime, making use of and amortizing the Lanseria facility whilst allowing Mogale City to progress with new development in the immediate to medium term;
5. If there is to be a more detailed cost-benefit analysis undertaken on the above issues (beyond operational treatment costs and including life-cycle costing as well) this should be limited to a period not exceeding a few months so as not to hold back unduly the funding and implementation of the Lanseria facility which is, as it is understood, apart from funding arrangements, 'shovel-ready';
6. Indeed, it is recommended, in the interests of expediting the Lanseria Smart City Initiative, that the funding of Phase 1 of the Lanseria facility be regarded as one of the key elements of funding in order to unlock pent-up development potential for the greater area.

Regardless of the way forward in this regard (and noting that the issue is only tangentially linked to the Smart City initiative over the immediate and short terms), it is, in any event, necessary to progress planning and implementation in the immediate term (at least the next 5 years) on the basis of a judicious, properly guaranteed and managed package plant strategy. There is simply no other way to progress short-term development. The concerns in this regard in terms of environmental and quality threats from a poorly specified and managed system are of particular importance and there can be no

question of: (a) a random proliferation of these temporary facilities in a disorganized, haphazardly managed manner; and (b) seeing this (certainly in the case of development in the 'Lanseria Catchment') as an approach that endures much beyond the immediate 5-year timeframe. The intention is, beyond this immediate timeframe, to link into the new outfall that traverses the Lanseria catchment *en route* to Phase 1 of the new facility.

Similarly, there is, in seeking to delay the need for a further Lindley facility for as long as possible, a commitment to a properly specified, guaranteed and managed system both in the immediate, short- and medium-terms. Releasing early development opportunity, both in the northern reaches of Mogale City and in the environs of Lanseria, requires commitment to these systems and noting that it brings with it an important further opportunity in terms of smart city thinking: notwithstanding that we are, at present, on the cusp of a new paradigm in dealing with urban sanitation requirements, it is incumbent on us to point a new way to sustainable sanitation servicing and treatment at scale. The details of this paradigm are dealt with in more detail elsewhere but it is an approach that will see less wasteful use of water as a resource; it will require less extensive reticulation; it will rely less on concentrated points of treatment; it will significantly reduce downstream environmental impacts post treatment.

As with the 'Shades of Green' transitional thinking set out in the Sustainability and Innovation chapter, the approach of using suitable package plants as a stop-gap in the case of the Lanseria catchment and as a measure to delay

the need for a further facility at Lindley in the longer term allows us to become an active part of this important paradigm shift. Whilst it is an avowed aim to enable development with immediate effect, it equally remains an avowed aim to become less dependent on any of the future water treatment centre options noted above: the planned Lanseria facility is clearly driven by much bigger regional pressures experienced by CoJ and is not dependent on this new city initiative and it remains a planning ambition to make use reliance on it unnecessary going forward; in the case of Lindley, which is much more sensitive to pressures emanating from this new city, it is a stated planning ambition to make such a facility necessary in future. In essence, the Lanseria Smart City aims to move away, in a focused, responsible and incremental way, from reliance on centralized sewer treatment plants.

In general, within this new paradigm, there is to be a systematic move away from all 'business-as-usual' ways of providing urban utilities: this would include domestic waste disposal as a basis of waste-to-energy and all other allied means of independent power production when and where appropriate and applicable and as dealt with elsewhere. In looking to the next 5 year horizon, however, the fundamentals of phasing are structured around compact delivery of focused infrastructural investment as dictated by short-term sanitation needs.

On this basis, the following diagram sets out the strategic implementation over the immediate- to short-terms:

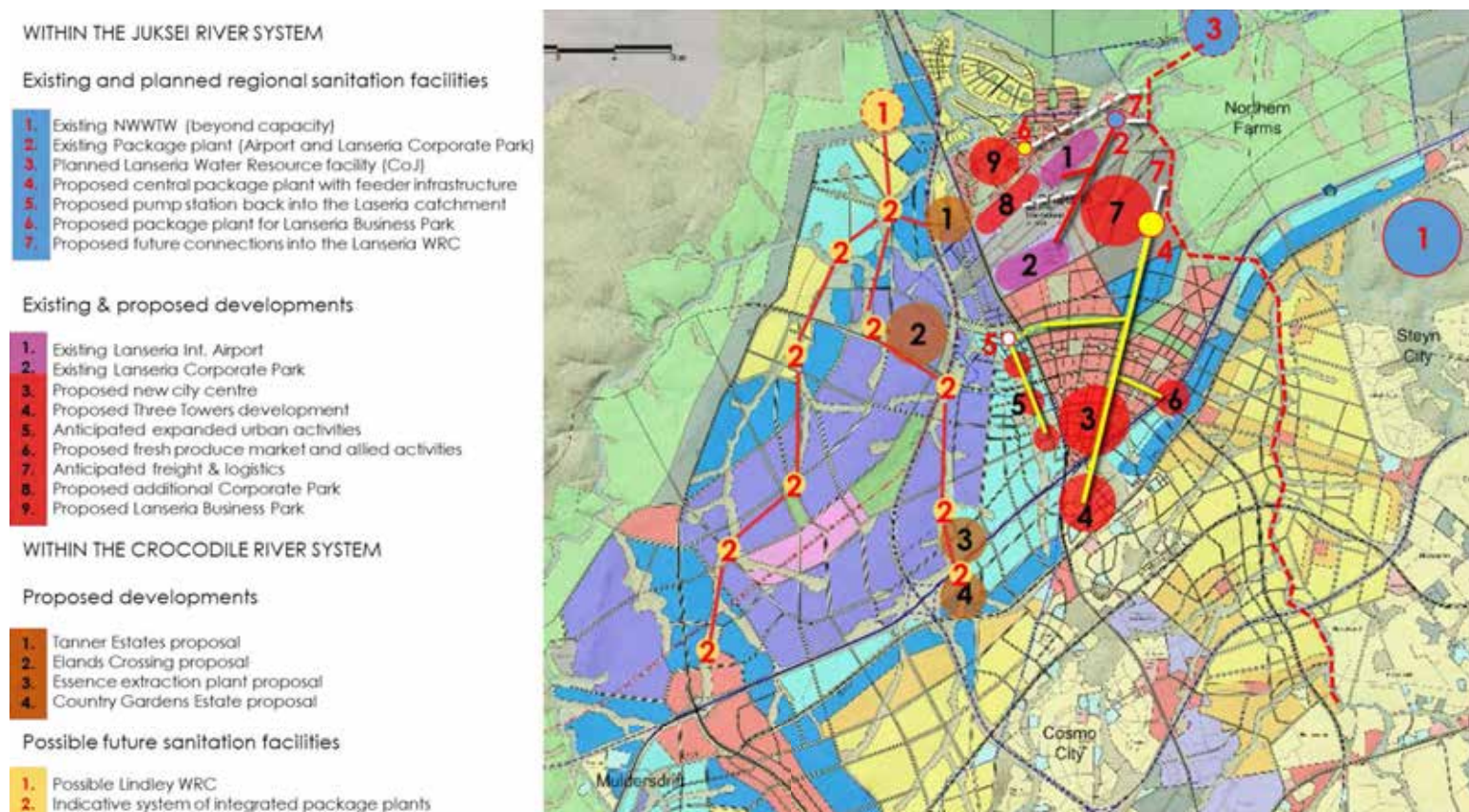


Figure 111: Phasing approach

In respect of policy support for intensified development, the areas targeted are as follows:

1. Support of the LIA, through assisting with
 - a. Improved infrastructure and access
 - b. The support of the expanding the LIA to allow for 20 000 million passengers, which require the extension of the existing runway from 3.2km to 4km across Malibongwe Road. This would require closure of the runway during this period, and a temporary solution would be required.
 - c. Support for a logistics strategy as part of the LIA that can enhance the local (light manufacturing, niche market agriculture) and regional economy.

In respect of publicly-driven infrastructure investment development, the areas targeted are as follows:

2. Roads and transport
 - Upgrade of **Malibongwe Dr.** to include public transport with buses and BRT.
 - The introduction of **Gautrain** to Lanseria Airport, in the short-term, the alignment becomes important to expropriate
 - Feasibility of an **additional interchange** at the Petroport **on the N14** to improve access to the proposed town centre
 - Building the **K31** (single carriageway, **two lanes** in the shorter-term) from Malibongwe to William Nicol, this in enhances Tshwane to the LIA International Airport
 - Design and build 9km of the **PWV3** (single carriageway, **two lanes** in the shorter-term) north extending to Pampoensnek interchange
 - Design and Build the **K56** (single carriageway, two lanes in the shorter-term) extending from Malibongwe Dr to William Nicol
 - A study to reserve the alignment for the completion of the freight loop
 - Building of the K31 as an activity spine to link to the existing R114,
 - Preparation of design guidelines (development code) for Focus Zone 1, with the focus on the town centre. This should be implemented through the introduction of a design review panel and a management association.
 - Sustainability working group... in many ways, sanitation, water, energy, - CSIR. Demonstration becomes important as part of the CSIR, functional building infrastructure to test and move it into an implementable – a leading project in the world.

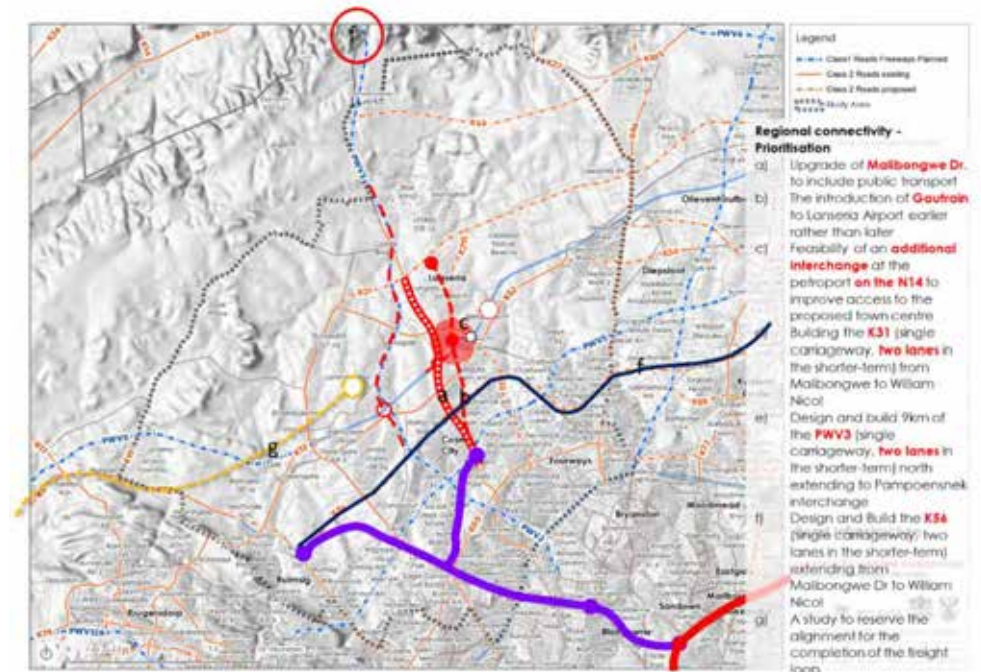


Figure 112: Transport initiatives

Further items to be explored, include:

- a. Transportation plan to determine the roads reserves to create and integrated road, public transport, and NMT, where pedestrians are the default mode of transport;
- b. Engaging further with the relevant authorities on the approach to social facilities and services;
- c. Setting up a management association and design review panel to guide development in the study area;
- d. Identification of key areas of focus with the preparation of design guidelines (development code), such as Focus Zone 1, with the focus on the town centre. This should be implemented through the introduction of a design review panel and a management association –title deed;
- e. An application to the Department of Agriculture, Forestry and Fisheries for designation as the area identified as urban consolidation, having exemption from compliance with Act 70 of 1970, and rather be subject to the GEMF in order to have agricultural land released for other urban development uses: Act 70 of 1970 in areas that favour urban consolidation have held up planning applications, preventing the favoured rates base and urban development in strategic areas. This application would assist in being able to meet development time-lines that could be reported in SONA or SOPA terms. It will also, we understand, require buy-in from GDARD and the various constituent municipalities and intersects well with the notion of a RSDF (which would allow for special development rights and fast-tracked procedures to be written in);
- f. Making use of the review procedure now underway by GDARD of its Gauteng Environmental Management

Framework (the GEMF published last year) which would allow the Master Plan exemption from environmental and EIA requirements and hence greatly speeding up development application processes. The first meeting of this Provincial review was this past September and there is to be a follow up meeting on 26 January 2021. A fully-documented proposal in place for that meeting to have the Greater Lanseria Region formally included within the ambit of the GEMF would assist with development;

- g. Reviewing various approaches to 'land-banking' into a workshopping process possibly with various land-owners and, potentially, the Banking Association of South Africa (BASA): this may be taken into various institutional explorations involving, amongst other things, community trusts;
- h. A GLMP website, with blog-site, to be established to allow stakeholders access to the constituent elements of the GLMP. This will be an interactive tool that gives users the opportunity to access the Geographic Information Systems modelling that underpins the GLMP as well as debate and engage other stakeholders via the GLMP blog on issues pertaining to spatial planning in the GLMP and smart, sustainable principles. The GLMP is expected to be launched in 2020.

The GLMP has been prepared to keep options open for green, sustainable infrastructure such as waste-to-energy, micro-hydro power (turbines in water power), pyrolysis etc. Setting up a management company with an **information management unit**, with the ultimate goal of driving the implementation of leading edge sustainable engineering services, in renewables in electricity, transportation, heating and cooling is necessary to and the creation of a realistic, long-term plan that can oversee utilities is important to achieving the smart, sustainable city. The functions of this information management unit would also include continual measure and review of infrastructure, to hold information on all utilities, being able to test the capacity of sewer systems, real time monitoring for measuring traffic, energy consumption, water quality etc. Continually measuring the success of the implementation of sustainable infrastructure, and giving recommendations on sustainable infrastructure.. In the absence of this, setting up a sustainability working group, in achieving sustainable and implementable approaches to, sanitation, water, energy, which could be hosted by the CSIR.

SECTION 8 | INSTITUTIONAL ARRANGEMENTS

This is preliminary thinking on the institutional arrangements and purely a work-in progress. The institutional arrangements are still being understood and discussed in detail with a number of stakeholders and may require legal input to determine the most appropriate approach to funding, implementing and administering the plan. Some early considerations include

8.1 Harmonising the GLMP through a development planning municipal planning support programme

The GLMP has set out purposefully to provide clear leadership in spatial planning for the municipal authorities by City of Tshwane, City of Joburg,

Madibeng, Mogale City and affected agencies making up the administration of the GLMP study boundary at local levels. It is essential that provincial intentions carry through to these levels and it is therefore necessary (a) to gain this local legislative support for the GLMP and (b) see that municipal SDFs are consistent with it. The approach could be to declare the area as Regional Spatial Development Framework and / or to create more localised area plans (precinct plans) with affected municipality guiding specific interventions. The intent would be that the GLMP becomes the overarching framework for the municipal SDFs.

Furthermore an SPV will be setup to unlock the bulk services and a number of other issues that have come up such as planning. It then needs to be supported by more structural arrangements to achieve the vision and enable implementation.

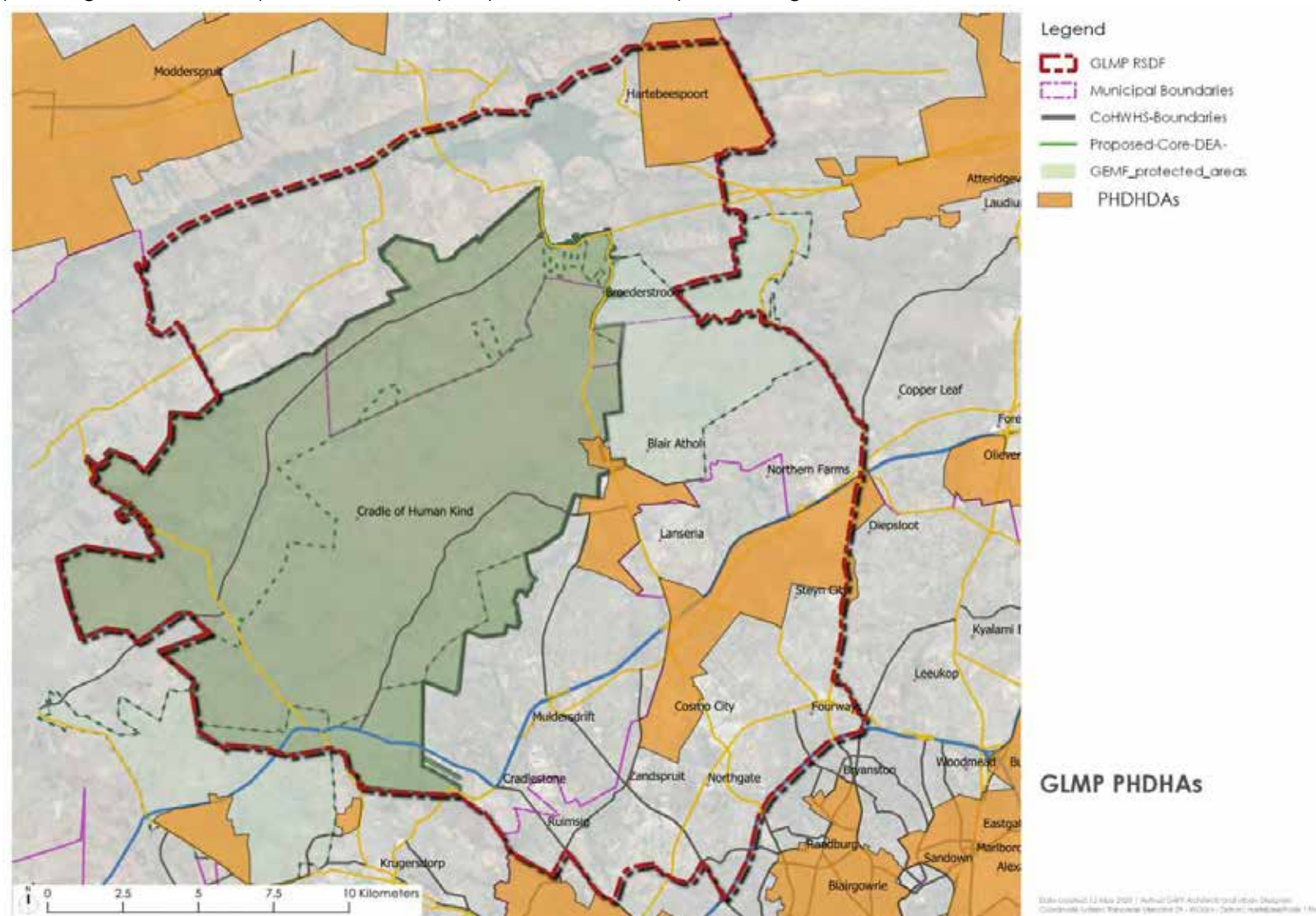


Figure 113: Potential RSD boundary (red) incorporating a section of Madibeng and the Cradle of Human Kind, with consideration of the PHDHDAs

Madibeng SDF Legend, 2018

Tshwane SDF Legend, 2018

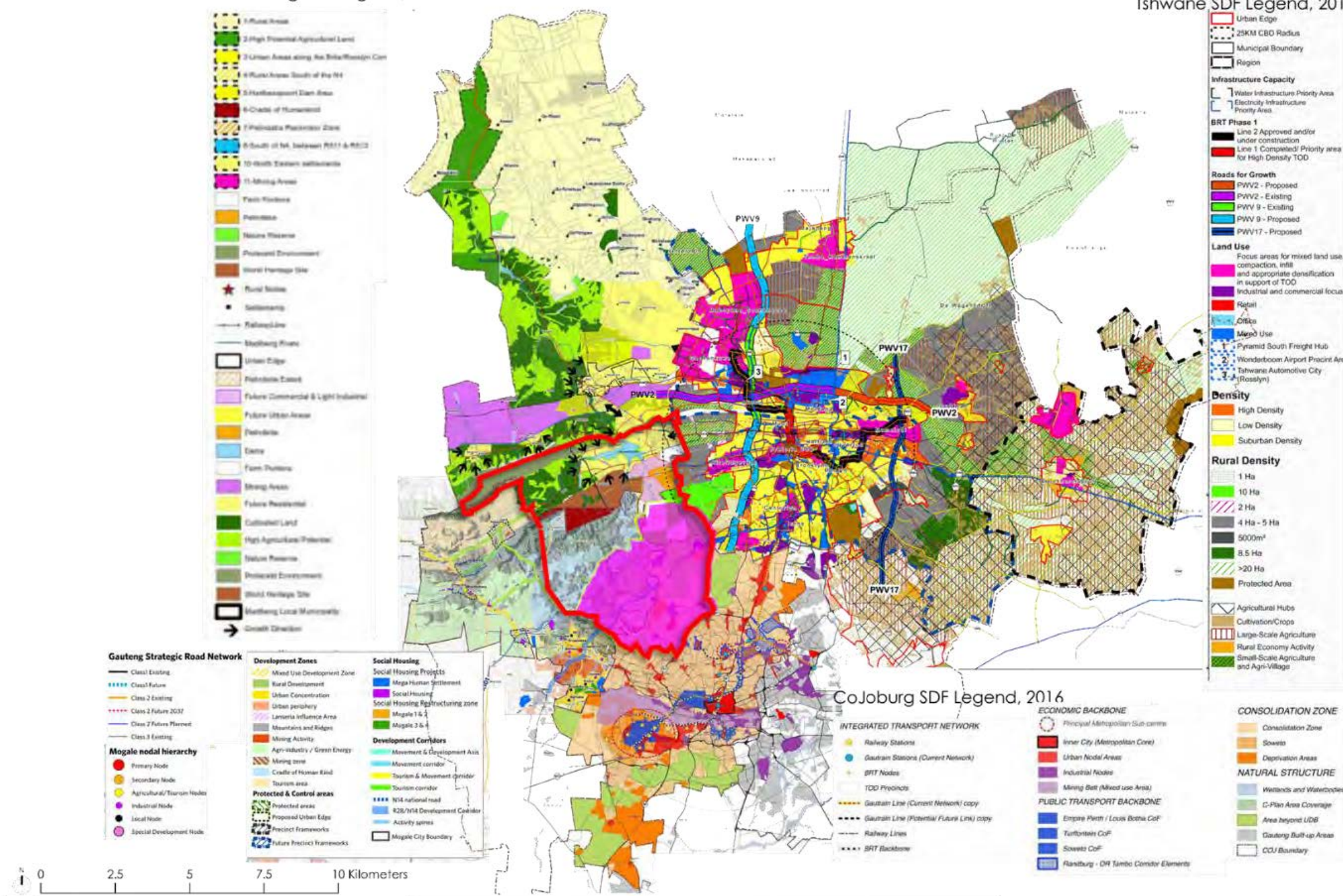


Figure 114: Collated Municipal Spatial Development Framework Plans with the potential of an RSDf boundary (red) incorporating a section of Madibeng that includes their main developed areas around Haartebeespoort Dam, agricultural areas and sensitive areas

8.2 Approach to the procedural framework

In terms of the Institutional issues, it becomes important to:

- Enable the planning and implementation of a new city initiative
- To proceed with the on-going management of the new city's functioning
- Consider an approach to how the new city is administered
- Consider how the new rates-base viewed and how do the various jurisdiction-holders participate
- Determine the approach to the designation of a planning area work
- Understand how one deals with potential rampant property speculation
- Consider the approach to assembling landholdings and an SPV/institution hold any in its own rights
- The approach to investment options into infrastructure
- Understand the thinking extent to utilities provision
- Consider the approach to utilities such as social infrastructure, health and education
- The approach to utilities, whether one or one or many and their role of planning/management/administrative SPV
- Ensure that the SPV direct the market and development
- Above all, the most appropriate legislative enablement mechanism

There are a variety of models that suggest themselves:

1. The potential of a new local authority jurisdiction
2. A mechanism for cross-jurisdictional local authority co-operation
3. Province taking an over-arching authority and lead

4. New DevCo structures like the V&A Waterfront
5. Setting up a series of Lot Owners' Management Associations
6. The Garden Cities movement – historically and more recently?
7. Setting up a new Company Towns – abroad and locally
8. The New Town Development Corporations of post-WW2 Britain

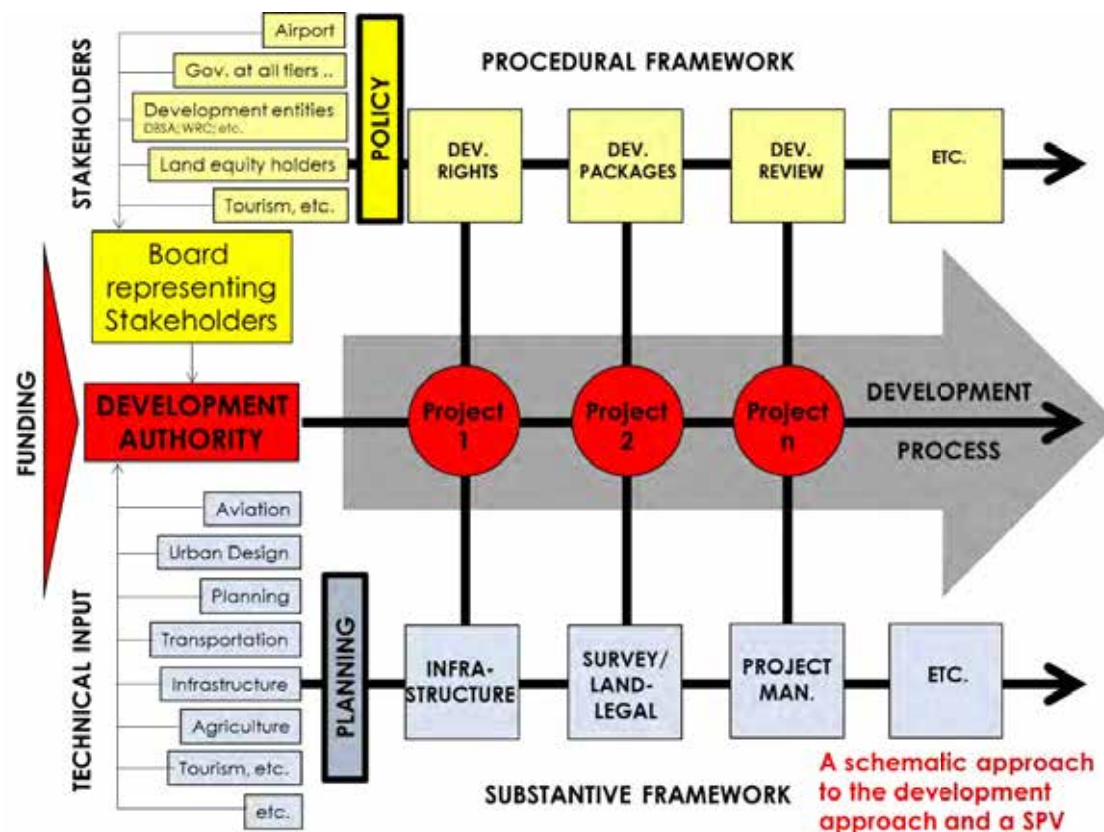


Figure 115: Structures of implementing projects as part the GLMP

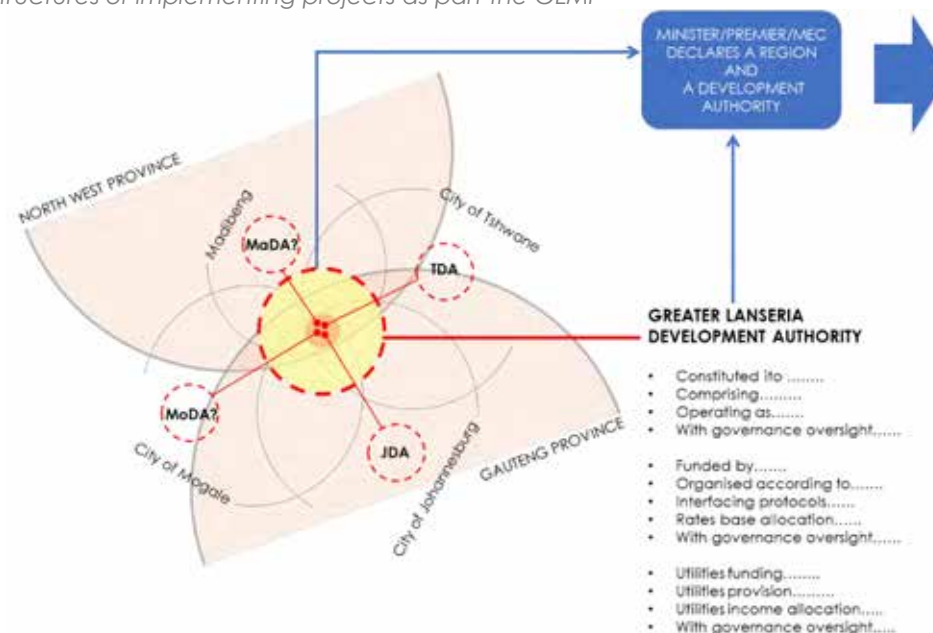


Figure 116: The potential of an overarching development or shared municipal agencies to implement the GLMP

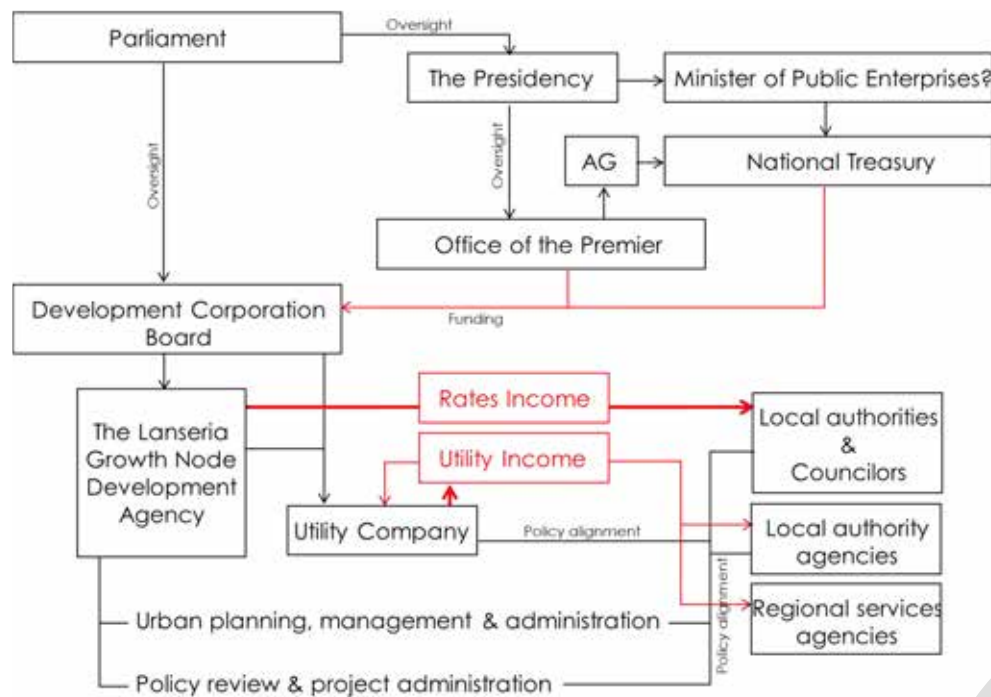
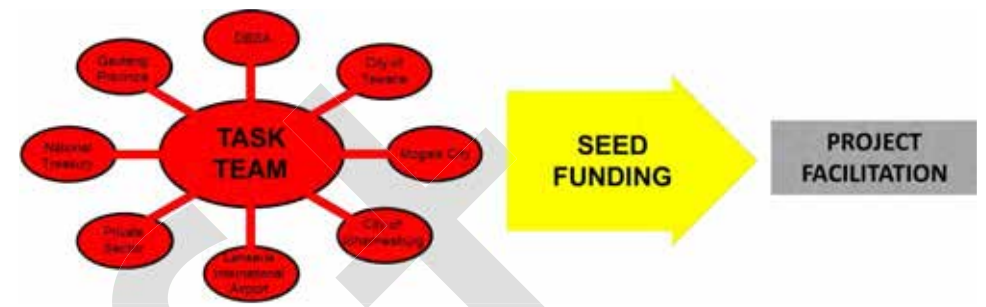


Figure 117: Institutional and funding possibilities



Figure 118: Institutional and funding possibilities

8.3 Setting up an SPV



The financial architecture includes a Special Purpose Vehicle, whereby the Development Bank of Southern Africa (DBSA) funds the bulk infrastructure. Municipalities use a cash flow coupon and Tax Increment Financing, to borrow against the future return.

The responsibilities of the SPV include:

- Prioritising infrastructural investment;
- Funding of utilities
- Management of Income flows
- Sharing the GLMP vision
- Directing Urban growth, with municipal support
 - Achieving form based codes, with the support of a design review panel is achieved in the masterplans direction.
 - Setting up of a design review panel
- Reviewing various approaches to 'land-banking' into a workshopping process possibly with various land-owners and, potentially, the Banking Association of South Africa (BASA): this may be taken into various institutional explorations involving, amongst other things, community trusts;

SECTION 9 | KEY PLANNING ISSUES AND ASSOCIATED RECOMMENDATIONS

This section represents a synthesis of much of this document's concerns. As key issues, they are assimilated in the overall Greater Lanseria Master Plan (GLMP) as set out in the preceding sections where they are collectively interwoven with their graphic content and detailed argument lines into the overall planning exercise. This section is, in effect, a 'quick reference' outlining key issues addressed in planning, the planning outcome adopted in each case and a set of recommendations associated with each.

The preparation of the GLMP is a complex process involving planning for a multi-jurisdictional subregion of the Gauteng City Region (the GCR, expected to grow into one of the MegaCities of Africa with a population in the order of 30 million over the next 30 to 40 years). Within this subregional plan is embedded the planning of the so called Lanseria Smart City as a much more compact urban consolidation zone within the subregion.

The overall planning is, within the confines of time and Covid -19 constraints, fairly comprehensive and is documented in the preceding sections of this report. Embedded within it, however, are distinct planning issues, each worthy of discussion in its own right and from which certain recommendations follow. Although inextricably linked in broader planning terms, this section unpacks some of these key issues and presents both a synopsis of each issue and the planning views taken in relation to that issue. Using the GLMP as an overall planning platform, recommendations pertaining to each of these issues are then set out as fundamental steps in moving forward, both separately in terms of each issue, and severally, as underlying elements of the overall GLMP.

1. In respect of a region-wide greening strategy

It is recognized that the Greater Lanseria Study area, effectively from the N14 Highway and the Lanseria International Airport north-westwards towards the Daspoort, Timeball and Magalies series of the greater Magaliesberg Mountain Range, forms a vital prelude and transitional zone between the consolidating Gauteng City Region (GCR) and the all-important Magaliesberg Biosphere.

This understanding fundamentally sets a parameter governing the preparation of the Greater Lanseria Master Plan (GLMP): the majority of the designated GLMP will be retained, in terms of area and usage, in a manner that: (a) limits indiscriminate urban sprawl; (b) circumscribes a clear and inviolate urban development cordon; (c) is subject to a set of landuse and development policies that give effect to a transitional zone to the greater Magaliesberg Biosphere; and (d) understands the intrinsic value of the environmental, ecological, heritage, tourism, leisure, recreational and agricultural constraints on urban development.

It is also a founding principle of the planning approach for the GLMP that any dolomitic areas within the Greater Lanseria area be omitted from consideration for development other than that which is commensurate and consistent with the development constraints note in the preceding paragraph.

In effect, it is what has been referred to by the planning team as The Great Green Yoke that spans in unwarranted urban development: it is a parameter accepted with the explicit understanding that these elements are as much, if not more, importantly embedded in and form the basis of the economic make-up of this Smart City initiative. Without this 'green backdrop', there is no Smart City.

It is recommended as follows:

- 1.1 That the portion of the Cradle of Humankind World Heritage Site (CHWHS) extending into the Greater Lanseria Study Area be explicitly designated as such as part of the GLMP and made subject to all policies and management of the Cradle of Human Kind;
- 1.2 That the management agents of the Cradle of Humankind be included in the formulation of a detailed set of policies governing that portion of the Greater Lanseria area spanned by the CHWHS;
- 1.3 That the Crocodile River Reserve (CRR) be explicitly designated as an integral part of the GLMP and as an essential adjunct of the Smart City's planning and realization (the more detailed aspects included in the recommendations relating to the CRR below refer);
- 1.4 That the limits to urban expansion as set out in the polices relating to an urban development cordon, an urban consolidation zone,

a rural transitional zone and the reserved designations noted in this section be accepted as fundamental to the planning of the Lanseria Smart City;

- 1.5 That a specialized team be assembled to formulate a more detailed integrated ecological, conservation, heritage, agricultural, recreation, leisure and tourism plan and associated business strategy for the areas noted in this section;
- 1.6 That the curators/management agents of the Magaliesberg Biosphere be requested to assist in assembling and leading this specialist team.

2. In respect of embedding the status of the Crocodile River Nature Reserve

The erstwhile Renosterspruit Reserve has been proclaimed as the Crocodile River Reserve (the CRR) and was registered in the Conservation Registry in February 2020. It takes up the majority of that northern portion of the Greater Lanseria Study Area falling under the jurisdiction of the City of Tshwane and spreads further eastwards into Tshwane's western extents beyond the boundaries this Study Area.

Certain sites have been declared a nature reserve and protected areas proclaimed in terms of the National Environment Management: Protected Areas Act (NEM:PAA) and their management is supplemented by agreements between landowners, the Gauteng Department of Agriculture and Rural Development (GDARD) and its MEC in order to protect biodiversity in the long term. It is controlled by a Not for Profit Company that has, over the years assembled a series of landholdings into various clusters, the longer-term intention being to consolidate all these by incorporating the interstitial properties not yet under the Nature Reserve's control. It is the planning intention, as far as the preparation of the GLMP is concerned, to embed the relevant portion of the CRR within the planning provisions of the GLMP as a vital environmental asset. It is further the intention to edge it, where relevant and appropriate, with suitable buffers through a rural transition zone that keeps urban encroachment into this zone at bay in perpetuity. Although the GLMP extents do not reach across the easternmost portions of the CRR, as a planning tool it is the intention of the GLMP to recommend, as far as possible, the longer-term consolidation of the CRR into a single spatial entity beyond the borders of the Greater Lanseria area.

As an environmental asset, both in its own right and as an integral part now of the GLMP, its future value is immense: the area already serves as what may be considered an "environmental off-set facility" whereby a developer in some other part of the greater region may need to off-set the removal of, for example, Egoli Grasslands; such a developer could then, through liaison with the CRR, identify a required off-set area of Egoli Grassland within the CRR and contribute it as part of the CRR's consolidation plan. On this same basis, should off-sets be required in the course of developments within the GLMP as a whole, it is the intention that these be directed to the CRR for further consideration.

Apart from the CRR being unequivocally embedded in the GLMP as an expanding, consolidating environmental asset, suitably protected from urban expansion by a rural transition zone, two wider planning issues have been identified as threats to its quality: the first is the quality of the water in river systems upstream of the CRR threatened by a lack of or poor controls on urban development as well as, potentially, compromised quality of discharge from waste water treatment works; the second is the reservation of the future east-west K44, a road link within the Gauteng Strategic Road Network (GSRN).

In respect of the first of these identified threats, it is legally enforceable that any discharge from a treatment works has to be of a minimum quality

standard and to whatever extent there are management and monitoring systems in place, whether from the Crocodile or Jukskei River systems that the CRR may not be party to, the CRR needs to be included. It is also likely that, with the new Lanseria Water Resource Centre, pressures on the overburdened existing facility are likely to ease, making the management of water quality more regular. In broader terms regarding the quality of river water, all local authorities are required to ensure adequate measures are taken to deal with river pollution and, again, the CRR must be party to, in some form, the monitoring of these aspects.

In respect of the proposed K44 route, the GLMP planning team has taken very little issue with any of the GSRN provisions within the Greater Lanseria study area other than to draw attention to environmental areas that may require deviations or particular sensitivity of detailed alignment. In this instance, however, it is believed that this portion of the proposed K44, traversing through and cutting the Conservancy into two distinct halves, has very little planning merit or priority: it is a link that, if omitted, could be satisfied by alternative, existing facilities and its apparent low priority suggests it should not be permitted to threaten the longer-term value of an important environmental asset.

It is recommended as follows:

- 2.1 That the Crocodile River Reserve (CRR) be embedded as an essential aspect of the GLMP and suitably buffered from urban encroachment by a formalized zone of rural transition as set out in the GLMP;
- 2.2 That the CRR be signaled out as one of the key environmental assets of the wider region with special status within the Gauteng Environmental Management Framework (GEMF);
- 2.3 That the CRR be formally be recognized within the GEMF as a designated off-set zone for developments occurring within the GLMP;
- 2.4 That the CRR become part of a wider monitoring apparatus in respect of water quality within the wider system of rivers moving through the Greater Lanseria area and into the CRR;
- 2.5 That the portion of the proposed K44 aligned through the CRR be reviewed in the GSRN planning with a view to its omission.

3. In respect of Lanseria International Airport

Lanseria International Airport is a privately owned and operated facility and is by far the most important economic component of the Smart City's foreseeable future. It is thus vital that its strategic importance and ambitions be accommodated in planning.

Into the short- to medium- term, it is a possibility that the Airport would wish to extend its present 3km long runway to 4km in order to increase its capacity and the size and range of aircraft that can be accommodated. This cannot be achieved other than by extending in a south-westerly direction across Malibongwe Drive. The threshold of the present runway is substantially higher than Malibongwe Drive and would thus entail bridging the runway over the road rather than dropping the road into a subway under the runway.

This runway extension option is accommodated in the GLMP land use allocations and circulation proposals.

A more difficult future option to accommodate in planning terms is the possibility of a second runway at some future date, possibly 30 to 60 years hence. Ideally, and remembering that the Airport does not own land for such an expansion, the Airport would prefer a second runway off-set by 1.4km from centre-line to centre-line in order for these to operate simultaneously, effectively as two entirely independent runways. The space between these would then be used as a mid-field terminal and cargo handling area. This approach would, however, impinge heavily on the area seen as the new city centre and would be subject to long term uncertainty pending the outcome of future thinking.

In discussion, and noting that all these ideas regarding the interface between the airport and the new city are still on-going and in need of finality on as flexible a basis as possible, the Airport has indicated that a second runway could be accommodated as an off-set of 240m centre-line to centre-line in a way that does not afford independence to the runways but that the loss of capacity associated with this may be acceptable. This would obviously sterilize less adjacent city-land and could, conceivably be used for commercial and airport related uses until such time as it may be required in the longer-term. There are obvious difficulties in the associated land dealings but discussions remain on-going in this regard.

This option would greatly assist in finding a strong city/airport synergy (bearing in mind that it is not the intention to pursue an "aerotropolis model" but rather a city-airport model much like the London City Airport at the heart of London. It must be noted that, as configured at present, Lanseria Airport has its terminal building on the northern side of the runway and taxi aprons and thus, to all intents and purposes, faces 'north' and away from the new city centre (in effect, in this way, the airport would 'turn its back on the future city').

Again, in preliminary discussions, the possibility of a future terminal complex, preferably sooner rather than later, being sited to the southern edge of the airport's property holding would present a 'south-facing' significant interface

with the city centre and the synergies to be derived from this are remarkable. It could drive several early development responses such as international convention facilities, trade centres and hotels (possibly even the siting of the Pan-African Parliament that failed to be accommodated in Midrand). There would, of course, also be synergies of shared aspects such as an Airport Gautrain station in this northern edge of the new city (in addition to the one proposed at the core of the city centre), shared parking facilities and car rental amenities.

On this basis, the existing terminal building could, in future, be designated as a terminal for chartered flight purposes.

Lanseria International Airport has repeatedly requested that ways be sought to deliver aviation fuel requirements to the airport in ways other than road. In this regard, the preference for rail connectivity has been noted. Pipeline delivery, possibly from Tarrton Refineries some 30km distant has been discussed but found to be too expensive from the Airport's point of view. The planning team is very keen to achieve this rail connection as well but difficulties in this regard with Transnet are noted: in this regard, the section dealing with goods rail connection into the GLMP refers.

Of particular significance is the potential of a substantial cargo and freight-and-logistic hub being created, possibly immediately, at the airport and operating into Africa as a major distribution hub operating off an air-platform. This is of particular value as a catalyst and the planning team welcomes it and has been at lengths to see that it can be accommodated.

It is recommended as follows:

- 3.1 That focused, on-going discussions with Lanseria International Airport continue as a matter of planning urgency to find the highest degree of synergy possible in the form of a city-airport model (as opposed to an aerotropolis model);
- 3.2 That all public policy positions be drawn up to facilitate this synergy;
- 3.3 That more detailed investigation by a specialist team be appointed to undertake an alignment exercise and a pre-feasibility on such a connection, preferably sooner rather than later into the core of the GLMP activity pattern;
- 3.4 That all policy, planning and infrastructural support be afforded the Airport in setting up and realizing its air-based freight and logistics proposals.

4. In respect of a rail-based freight and logistics hub

For a number of years, Transnet planning had envisaged an additional freight line around the western edge of the Gauteng City Region (GCR) that would complete the loop semi-formed by the present line around the north, east and west sides of the GCR. This loop would, with additional rail freight hubs at Chamdor and Lanseria, provide the GCR with a ring of 'inland ports' operating on the basis of long-haul freight into and out of the GCR by rail and short-haul internal distribution within the GCR by road.

The routing of the western loop, from Lanseria's point of view (and bearing in mind the extreme topography dividing Mogale City's central station from Lanseria to the north), would possibly comprise a spur taken from the existing Krugersdorp/Magaliesberg line near the refineries at Tarlton and find its way north roughly parallel to the N14 Highway. Getting to Lanseria on this basis and establishing a potential freight and logistics hub operating off a rail platform is, on the face of it, feasible.

Although Lanseria Airport have expressed a desire for the delivery of aviation and associated fuels by rail rather than by road (a 30 km pipeline from Tarlton apparently being uneconomical), indications are that there is no particular synergy, generally, to be found between combining a freight and logistics hub operating off both an air and rail platform. The intention of a freight rail line to the general Lanseria area was more to service a rail hub which need not have anything to do with the Airport: indeed, rather than clutter movement in and around the airport with rail lines and goods yards, there is merit in keeping the two freight entities distinct from a spatial point of view and the two issues should not be conflated.

The issue of progressing a rail line north of Lanseria to complete the loop, potentially linking onto the now defunct Hekpoort line, poses extreme topographical challenges that would likely require extensive tunneling.

In recent discussion with Transnet's new senior management, it emerges that Transnet no longer sees merit in further investment in freight rail in this vicinity and that it will not be committing to such planning in terms of the GLMP.

Notwithstanding this view, the GLMP planning team believes it would be irresponsible not to provide a new smart city initiative with a freight rail base, if only for possible private-sector investment at some future date. Not only is this a sensible long-term provision for a city that will endure for centuries but it is more particularly a necessary infrastructural investment to re-industrialise the West and North-west Rand which is flagging in the light of contraction in mining. Stimulating a reindustrialized economy here is a requirement of the brief and a necessary regional counter-balance that has seen the industrial sector concentrated primarily on the East Rand. Preliminary indications have been tabled in general discussions regarding potential industrial re-investment in the Greater Lanseria area although much of this, at this stage, is anecdotal.

The issue of passenger rail is a separate matter and is considered elsewhere as such.

For these reasons, a freight rail and hub have been allowed for in the GLMP and it is to be hoped that investment, in one way or another, finds impetus sooner rather than later. As a 25km spur from the Tarlton area it would link directly into the main east-west rail spine on which Transnet operates in any event (on lines shared with PRASA) in accessing its City Deep and Kazerne facilities.

It is recommended as follows:

- 4.1 That a freight line and a freight and logistics hub operating of a rail platform be regarded as a fundamental component of the GLMP;
- 4.2 That a detailed study be undertaken to determine the most appropriate route from the Tarlton line to the area west of Lanseria Airport;
- 4.3 That a pre-feasibility study and be business case (including the possibilities of private-sector investment) be prepared, in conjunction with a broad re-industrialisation strategy, to determine the most appropriate timing and phasing of such a line and facility;
- 4.4 That a further preliminary study considers the methods and merits of potentially extending this line further northwards within a wider GCR logic;
- 4.5 That further discussions with Transnet be kept open with a view to reappraising an overall freight rail strategy for this region into the future.

5. In respect of a Smart City development strategy

The greenfield site designated for the new city centre in terms of the GLMP is the triangular portion at the interchange between Malibongwe Drive (R512) and the N14 Highway bounded by Malibongwe Drive to the west, the N14 to the south-east and 6th Road/R552 to the north. It is largely undeveloped and is in the order of 180ha in extent (by comparison, the Umhlanga Ridge New Town Centre north of eThekweni around the Gateway super-regional shopping centre being about 150ha).

The city centre is to be a compact, complex, high-intensity node characterized by vertical, as well as horizontal integration of retailing, offices, apartments, hotels and leisure and civic amenities. The Public environment is to be the armature of the city's development and a 'responsive' architecture is required, meaning, building need to face outwards onto, and interact with the public environment as a fundamental requirement of security through natural surveillance or 'eyes-on-the-street'. Sidewalks are to be lined with active edges (shopping, offices, outward-facing apartments) and sidewalk life will be encouraged. Urban spaces, squares, markets, lanes and parks will be abundant, landscaped, maintained and safe. Pedestrian links and cycle ways will promote the intentions of the walkable city.

In effect, the city (as is the case of the Umhlanga Ridge Town Centre) will be publicly designed around the twin precepts David Crane enunciated as the core of urban design: The "Captial Web" (the public dimensions of the city, its infrastructure, key installations and design directives) and the "City of a Thousand Designers" (the myriad development responses made by individual investors, developers and their professional teams).

The city is not to be an assembly of private, gated developments but rather assembled according to the principles of perimeter-block development: generally four, six and eight storey buildings stretched around the outer perimeter of the street block looking both out onto the street and inward onto the internal courtyard so defined. These interior courtyards will be more personal and semi-private to those people inhabiting the block and are to form inner parking lots, gardens and play-lots.

Access to the city centre will rely heavily on the N14 Highway and detailed planning of a series of closely-spaced interchanges (much the same as the section of the N1 east of Tshwane including Garsfontein, Lynwood and Atterbury Roads) will allow this Highway asset to be maximized. Radial links from the N14 across to Malibongwe Drive will provide the fundamental super-road order in which more locally-defined 'complete-streets' are enabled.

Whereas it is common that sites of this sort are well placed as super-regional shopping centres (and this site is no exception), it is essential that such a use be fully understood and designed so as to provide a catalyst for wider urban development responses. This cannot be achieved with the typical model of an introverted shopping mall with blank outer walled edges standing within a sea of surface parking: it is critical that the centre be made to act as a catalyst by 'cracking it open' and making it form active edges to the

surrounding urban blocks. In effect, the inherent energy within shopping centres needs to be externalized so as to emit this energy to the benefit of surrounding development opportunities.

In addition, in externalizing the shopping centre to embrace the public environment of the city, very literal ways in which other, more local economies are promoted and encouraged to form so that the shopping centre cannot simply become a 'private, exclusive club' where, metaphorically speaking, the 'membership fee' is the price of owning a car. Engaging principles of transit-oriented-design around inter-modal transport facilities, market-places, nuanced niche-market economic latch-on development are all aspects that need to be accepted in promoting a socially and economically integrated city.

One of the outstanding characteristics of this new city is its ability to develop urban complexity by virtue of its potential synergy with the Airport: this is not an 'aerotropolis' model but rather a model that seeks interfacing the airport terminal southwards towards the city centre so that development tension is set up between the two and city grows towards this 'public face' of the airport, spawning trade, conferencing, exhibition, hotel and institutional opportunities.

As an aspect to be considered throughout the urban consolidation zone set out in the GLMP, where the underlying granites typically leave relatively shallow soils with limited soak-away capabilities (and groundwater flows in sheets at the shallow bedrock interface, surfacing unpredictably and erratically, often creating severe localized groundwater issues), it is important that hydrogeological studies be undertaken in all city centre developments. The set-out of the form and shape of the city-centre's plan-form anticipates mitigating such impacts through what might be construed as 'cut-offs' that can intercept, collect, contain and redirect groundwater flows into positive aspects of the city centres, parkland, landscaping and passive water runoff management.

It is recommended as follows:

- 5.1 That the siting of the new city centre as set out in the GLMP be endorsed;
- 5.2 That the schematic planning and design of the new city centre be adopted as the core principles and guidelines for the more detailed urban design of the city;
- 5.3 That the development and design principles and catalytic drivers as set out above be adopted as a basis for the city centre's detailed design, implementation and management;
- 5.4 That the principles of social and economic integration as set out above be adopted as a basis for the city centre's establishment and growth;
- 5.5 That an overall hydrogeological survey of the overall city centre site be required as a basis for undertaking detailed urban design of the city centre and parameters for the development of individual sites within it.

6. In respect of economic drivers for the Smart City

At present, the main economic drivers within the Greater Lanseria area are Lanseria Airport; a widespread but uncoordinated agricultural sector; a tourism and leisure industry based on the Cradle of Humankind, MICE (meetings, incentives, conventions and exhibitions or events) with small-scale conferencing and wedding venues being common; and mining/quarrying operations. At an overall level, it is recognized, in planning, that the ecological, environmental, pastoral and scenic qualities of the region (particularly in the context of the wider Magaliesberg Biosphere, is a fundamental basis of the area's economy.

Embedding strategic success factors, from the Airport's point of view, into the GLMP has been a planning priority as well as setting out a coherent spatial order as a basis: (a) on which the conservancy/heritage/tourism/leisure industries can be coordinated, marketed and expanded; and (b) on which agriculture can be coordinated and consolidated as a conscious economic strategy for the region. An Agri-tech hub has been proposed for Northern Farm in this regard.

It is envisaged that these economies, suitably enabled, will provide the all-important hinterland support for the Smart City initiative. In the process, it is seen as an important planning basis for making the smart city attractive to developers, businesses, smart industries and adding to the quality of life that attracts skills to the area in making it globally competitive.

Quarrying activities, based on the geotechnical profile of the region, are a double-edged sword given the economy they produce whilst recognizing the very tight control required to make these compatible with urban consolidation and environmental compatibility. A concerted programme, both for their coordinated enablement, control and rehabilitation into productive future elements in the landscape, is an essential strategic Smart City requirement.

Given that so much of the impetus for the smart city initiative in this location is the need to establish 'urban prospect' for the many semi-marginalised communities already settled here on what is now the urban periphery through extensive housing programmes, every planning effort going forward has to be mindful of how to add economic drivers to the area. In this regard, institutional investments, such as regional health and educational facilities, not only provide much-needed amenities to an area lacking these, and not only aspects of urban lifestyle that are attractive for competitive skills and enterprises: they form important economies in their own right, and have important up-stream and down-stream economic multipliers in allied and indirect economies in job-creation, industry, housing and urban services. For this reason, a regional hospital has been allowed for in the provision of facilities, together with district health centres (with local clinics embedded at the local area scale) as well as a knowledge campus.

Within the profile of a clean Smart City based on a powerful platform of digital infrastructure, together with the Airport integral with it, international

trade, convention and exhibition facilities will also be an essential component of the city's economy and an institutional node has been earmarked as a conscious link between the new city centre and the Airport. Within this, it is also possible that important State faculties, research centres and, potentially, the Pan African Parliament may be sited here.

Although likely to be provided by the private sector, there has also, in the same vein, been provision made for a regional fresh produce market and a regional flower market. Although a regional abattoir has been allowed for, it is believed that the wider national profile for such facilities is not net in this region but it may become a smaller, more niche-market facility for organically produced products.

Airport cargo and freight is a distinct competitive edge for this nascent city-economy and this has been factored into the interface planning of the new city centre and the Airport as an important facet. Similarly, in promoting a goods rail connection into the region, it is the intention to provide for a new generation freight and logistics hub that will drive a re-industrialisation and modernization programme for the western half of the GCR. An extensive area generally compromised for other forms of urban development within flight paths has been allowed for such uses to the south-west of the Airport.

These initiatives may be, with further research, supported where necessary by targeted SEZs and, from a planning point of view, the broad-scale movement system set out in the GLMP represents a distorted grid-system that can accommodate these being designated as required. It is not the intention to simply designate an overarching SEZ for the area since very specific requirements and limitations apply: rather, the intention is to facilitate these on an as-needed basis as opportunities arise. These might include, for example, a high-tech clean manufacturing park; an area for the production of specialist crops with specific market advantage; an extractive plant for essences that need to be delivered into international markets on a dedicated basis.

It is recommended as follows:

- 6.1 That the general configuration of the GLMP as configured as a spatial basis for the development of a vigorous new urban economy be adopted;
- 6.2 That a specialist economic research team be appointed as a specific programme allied to the GLMP initiative to identify, drive and implement a comprehensive business plan spanning all sectors noted above;
- 6.3 That specific specialist units be set up within this overarching economic research team, each focused on the specific sectors identified.

7. In respect of an integrated transportation strategy

Planning for convenient, safe and affordable public transport is a defining feature of a sustainable, smart city. Whilst reducing the need for commuting by means of a mixed-use high-density city where walking and cycling are a default, any need for movement beyond these limits must be based on an integrated public transport system. Movement in and out of the city as it grows and, in many respects, with transport patterns reversing as a new regional economy takes hold, must also be understood and enabled in terms of public transport. In effect, although immediate and short-term exigencies (noting the absence of public transport in this sector of the GCR and the sole movement infrastructure being car-based) will no doubt require reliance on private mobility, the intention going forward is to reduce this reliance to a more balanced profile of transportation.

In the short-term, it is likely that the improvement of road accessibility to the Airport will be the upgrade of Malibongwe Drive and the intention is that this upgrade must include provision for high-occupancy vehicle priority lanes (HOVPL) which would accommodate, amongst others, buses and taxis. Sooner rather than later, it is hoped that this could become a Rea Vaya route as the first formalized transit system into the area.

Discussions have been held with both PRASA and the Gautrain Management Agency (GMA) and it appears that the planned extensions of the Gautrain system into the Greater Lanseria area offer the earliest prospect of commuter rail connectivity to the Airport. This airport link is a priority for the Airport sooner rather than later since it would provide direct passenger access with OR Tambo International Airport and allow the two to act in synergy across the GCR.

Phase 1 of the Gautrain extensions is likely to deliver service into the southern portion of the Greater Lanseria area within the next 4 to 5 years as far as Little Falls and Cosmo City, having come from Sandton via Randburg. The extension of this system to the Airport is only seen as a Phase 5 extension, although the GMA notes that, if ridership warrants it sooner, it would be prepared to bring this Phase forward.

From the GLMP planning team's point of view, the early delivery of the Gautrain line to the Airport would not only strengthen the strategic position of the Airport in the Smart City, it would greatly stimulate the city's early start-up, growth and consolidation. Noting the city-building capacity of a Gautrain facility (the existing portions of the system already having indicated this very strongly in reshaping and consolidating urban structure) it is the view of the planning team that, as a Provincial agency, the GMA should be urged to promote the Lanseria Airport link and a station *en route* at the core of the new city centre.

In an informal forum of sharing planning ideas in the broader planning area, the GMA and others have been promoting the early roll-out of light-rail systems as linked support to other city-region wide systems such as Gautrain. Fourways, Steyn City and Diepsloot have been mooted as an early start

aligned on William Nicol Drive and a number of other K-routes that could, potentially, be used so as to create a looped system that would focus on the new city. Given the informality of the proposals, as well as the need for this thinking to be integrated with the approaches of all local authority agencies, the planning team has simply incorporated this thinking/indicative alignment into the GLMP.

At the overall level, it is the intention to create a strongly overlapping, integrated system of pedestrian, cycle, shuttle, taxi, bus, BRT, light-rail and city-wide passenger rail facilities. This latter issue of passenger rail obviously requires that on-going planning liaison with PRASA be maintained such that a system other than Gautrain is incorporated into the Smart city initiative.

It is recommended as follows:

- 7.1 That the early delivery of HOVPLs be built into upgrading proposals for Malibongwe Drive as a priority;
- 7.2 That the GMA be urged to play a 'city-building' role in the creation of the Lanseria Smart City and bring forward its scheduled roll-out as a catalyst for the city's development;
- 7.3 That discussions regarding integrated local transportation approaches be formalized and extended to include the transport planning of the various local authorities;
- 7.4 That a specialist team of urbanists and transportation planners be set up to take forward the transportation intentions embedded in the GLMP.

8. In respect of an overall Sustainability and Innovation agenda

As noted in the Sustainability and Innovation section, the Lanseria Smart City is an opportunity to innovate, pioneer and re-evaluate many approaches to urban development that are proving less appropriate as we go into the future. This applies to the way we make cities economically, socially and culturally inclusive as well how we reticulate them with services in a sustainable manner and deliver social amenities.

Whilst the pressure on making early starts with development initiatives means that certain immediate-term exigencies dictate some standard approaches, the 'Shades of Green' paradigm shifts set out in that section point to the need for a commitment that the Greater Lanseria Master Plan (GLMP) as now framed will be carried through in an implementation programme that is based on the urban sustainability agenda as opposed to simply becoming entrenched, again, in a narrowly-defined business-as-usual mind-set.

The areas of focus regarding the urban sustainability agenda are as set out in the relevant section: it now remains to ensure that implementational, institutional and organizational aspects are put in place to allow this very important component of holistic, interdisciplinary thinking to carry through. The focus of the project to date, putting a spatial arrangement in place together with the infrastructural requirements to underpin it over the next 5, 10 and 15 years, means that much of these bigger ideas and approaches have perforce to find their way as a priority into the fundamentals of how this future city unfolds, is organized and is managed.

It is recommended as follows:

- 8.1 That a specific task team be appointed and funded, on the basis of the Greater Lanseria Master Plan, to undertake further detailed investigations and final planning based on the "Shades of Green" approach;
- 8.2 That the CSIR as an institution be approached to host this further initiative together with a properly constituted interdisciplinary urban team of professionals;
- 8.3 That the CSIR establish a series of approaches, experimentation parameters, testing and evaluation protocols at scale and configure its multiplicity of units as a fully integrated, interdisciplinary urban research group rather than simply a grouping of specialist units of excellence;
- 8.4 That such a team be obliged to interact, nationally and internationally, with various organizations, groups and agencies that are already well advanced in many of these aspects.

9. In respect of a regional sanitation strategy

Noting the detailed study findings of the various options relating to new Water Resource Centres (WRCs), the planning team was requested to undertake, the following is highlighted:

- It is inappropriate to talk of 'Waste Water Treatment Works' in sanitation terms and facilities in this regard are more appropriately thought of and referred to as Water Resource Centres;
- Rand Water Board (RWB), together with the Water Research Council, is encouraged to participate in and direct coordinated regional water harvesting associated with WRCs and to explore the opportunities, where possible and/or appropriate, of re-purposing worked-out or semi-worked-out quarries in the wider area as storage facilities in an associated harvesting and treatment strategy;
- Although one or more regional WRCs are likely to occur within the Greater Lanseria Area in future (and that portions of, or all sanitation requirements of urban development associated with the GLMP may indeed drain to these in future) these facilities are occasioned by regional thinking beyond the needs of the GLMP itself;
- Indeed, it remains a planning ambition of the GLMP to stay abreast of nascent/new technology that promises to move away from undue dependence on water-based sewer reticulation and large scale treatment works and to align itself, going forward, with more localized, less water-dependent/more water-conscious technologies;
- To this end, sanitation package plants are not regarded merely as an interim measure to get development moving (with a view simply for connection into a future regional facility): it presents a holding position that potentially allows the Smart City to avail itself of the profound innovations that are anticipated in this aspect of urban utility;
- Resorting to interim package plants (and any interim pumping stations that may be occasioned) must come with a commitment to the robust specification, guarantee, management and monitoring of such plants and clear contingency arrangements in the event of threatened lapses in this regard;
- The proposed Lanseria WRC is the sole option for dealing with massive regional sanitation pressures in the next 5 year horizon and a future Lindley or super-regional facility elsewhere near the river confluence would, realistically, be unlikely to be put in place in less than the next 12 to 15 years;
- Roughly 60% of the costs associated with running sewerage treatment plants, regardless of size, lies in electricity consumption and it seems to be axiomatic that, given the ready opportunity to harvest bio-gas from effluent treatment to reduce electricity consumption, that this should be an explicit component of the design of a new facility.

It is recommended as follows:

- 9.1 That the general strategy set out above be followed for the longer-term approach to less-water reliant sanitation be adopted as the Lanseria Smart City sanitation strategy;
- 9.2 That a specialist team be assembled to formulate a more detailed strategy in this regard, drawing on the various centres of expertise both locally and internationally;
- 9.3 That Phase 1 of the Lanseria WRC be regarded as the first aspect of regional bulk service delivery to be funded in terms of the Lanseria Smart City utility SPV;
- 9.4 That, should the harvesting of bio-gas not be an explicit component of the design of the new Lanseria facility (whether simply as an important by-product and/or as a means of reducing dependence on electricity in running the facility), this must be an express requirement in proceeding with funding for the scheme;
- 9.5 That any further economic assessment of regional sanitation possibilities be confined to a period of no more than a few months and without impacting on the critical path of implementing Phase 1 of the Lanseria WRC.

10. In respect of a future landfill, re-cycling and waste-to-energy complex

Energy efficiency, district cooling and energy production are vital components of an integrated sustainability programme and covers a vast array of strategies, most of which are not mutually exclusive. Noting the limited facilities in the Greater Lanseria area from a landfill and domestic waste disposal point of view, special attention is, however, brought to bear on the issue of waste-to-energy.

In terms of the business-as-usual approach to domestic waste being dealt with by means of landfill technology (and noting the short-term requirements for the Lanseria Smart City), it seems sensible to create a position whereby a short- to medium-term landfill facility might allow for the early harvesting of bio-gas on one hand, whilst opening the possibility of a longer-term regional recycling facility and an allied waste-to-energy pyrolysis plant.

As it stands, it is likely that domestic waste generated in this new city initiative would have to be transported to the very distant Robertsham landfill site in Johannesburg's Southern Suburbs. Given the distance implied and the fact that Robertsham itself is limited in terms of long-term capacity, there may be merit in opening up a smaller short-term landfill site either within or near the Greater Lanseria area.

Since most of the area itself is largely underlain by granite, this is not suitable for landfill purposes. This also applies to the many quarry sites in the area which would not be suitable from a geotechnical and ground-water point of view. To the south of the study area, immediately south of the Krugersdorp Reserve and Lion Park and the municipal boundary of Mogale City, lies a site that may prove suitable for an integrated facility: geotechnically, it sits on shale, is bounded on two sides by slimes dams and gold mining operations, is well removed from residential developments and is serviced by rail.

Typically, for ease of landfill operations, the current approach is to spread each day's waste thinly over a large area and capped at the end of each day's fill. This approach, however, means that significant quantities of bio-gas can only be harvested after many years of tipping (the so-called 'low-but-slow' approach from a biogas digestion point of view). With the landfill site now suggested, the idea would be to fill on a 'steep-but-deep' basis which, whilst more difficult in landfill operation terms, nevertheless yields significant amounts of biogas much quicker.

In effect, however, the intention is to use landfill for a relatively short time (or as an augmented longer term operation) with a view to moving, as technology improves to a pyrolysis waste-to-energy approach (where waste burned at very high temperatures of in the order of 850°C is used for heat-based electrical generation).

There are problems with pyrolysis in South Africa since we do not recycle at source and this reduces the calorific value of our waste. If, however, we were to establish a properly conceived recycling plant, this would assist in job creation in a new, allied industry, capture valuable resources which

otherwise goes to waste and achieve waste with the appropriate calorific value (autoclave technology can also augment this process).

The rail access potential of the site identified is thus also of long-term significance since, going forward, it could be possible for substantial domestic waste from the wider GCR to be brought in from several municipalities by rail. Municipalities could, in future, potentially deliver domestic waste to localized transfer depots at rail-heads which would in turn then feed the recycling facility as well as the waste-to-energy plant.

It is recommended as follows:

- 10.1 That a more detailed appraisal of the identified site be carried out with a view to establishing a regional landfill, recycling and waste-to-energy facility;
- 10.2 That a detailed study be undertaken on the pre-feasibility of such a facility;
- 10.3 That this aspect of future waste disposal and energy production be kept open as a distinct strategy;
- 10.4 That a specialized team be appointed to research and undertake this stream of future work.

11. In respect of a possible Utilities SPV as well as an Urban Management SPV

One of the underlying principles of the GLMP is that it is to set out the spatial form and extent that guides bulk and reticulated infrastructure to the Lanseria Smart City initiative. Within this spatial context and short-term bulk services strategy, an SPV is to be explored and set up together with the DBSA together with funding arrangements.

It seems that, in the ambit of a Smart City initiative, much of the potential lies in and has to be realized in Smart city management. It then possibly suggests that an overarching SPV, working within and coordinating according to the directives and structures of the various local authority structures and agencies could provide: (a) dedicated urban management; (b) dedicated planning implementation and administration; and (c) encompass an overall Smart City utility entity.

It is recommended as follows:

- 11.1 That the institutional models for utility provision and urban management be explored;
- 11.2 That a detailed institutional model be developed together with the various levels of government and particularly the four municipal entities associated with the GLMP.

12. In respect of a housing strategy for the Smart City

Noting that a significant portion of the Greater Lanseria area has already been used to deliver extensive tracts of lower-income, detached housing, it is the intention of the GLMP to re-direct thinking around housing delivery going forward with the Lanseria Smart City initiative.

Although extensive tracts of the study area are promulgated as Priority Housing Development Areas (PHDAS), notably along the N14 highway corridor (in and around Diepsloot, Lion Park and Cosmo City) and the area north and west of Lanseria Airport (referred to as Muldersdrift in the PHDAS), it is felt, from a planning point of view: (a) that the continued consolidation of housing in a specific band of socio-economic profile serves to 'type-cast' the wider area; (b) exacerbates the present marginalization of communities settled here without economic prospects being readily available; and (c) under-achieves, in terms of the GLMP thinking, in consolidating an urban corridor structured along the N14 as an important component of economic infrastructure.

In respect of that area identified as the Muldersdrift PHDAS, the GLMP planning team is of the view that no lower-income delivery should go into this area other than as fragmented, higher density parcels once, or with, further commercial development consolidating as part of the Airport's existing operations. Any horizontally extensive delivery resembling lower-density, detached housing must be avoided here in preventing what, under those circumstances, would simply constitute further urban sprawl. This would be the antithesis of what the GLMP is setting out to achieve.

It has been indicated that the GLMP can add in the order of 15 000ha of additional urban land into the GCR system and that roughly 850 000 additional units may ensue in the longer-term (notionally, at 3 to 4 people per unit, adding a residential population of 3 to 4 million). The planning team has been at pains to point out, however, that this should not be construed as *carte blanche* to load the area with additional lower-income housing delivery without requisite urban structure and economic fundamentals being put in place first.

It is instructive that private sector lower-income housing initiatives such as Porcupine Park and planning in the Three Towers precinct indicate the efficacy and desirability of higher density models and, within the right urban structure and embedded within a mixed-use context, these densities can and should be considerably higher.

It has also been noted in discussions that ownership subsidy systems are unlikely to be sustainable over the extent of housing delivery contemplated in this area and that far more attention needs to be directed to higher density, well-placed rental stock delivered through various models, including social housing and the private sector.

These approaches, too, in the view of the GLMP planning team, need to be dispersed into the general fabric of the future city in smaller elements rather

than as expansive project areas that run the risk of being stigmatised by market sector. Inclusionary housing is clearly an issue to be embraced and it is believed that, undertaken with due care, it is an approach that can and must be an important component of the city.

An inherent component of the GLMP has been to create an urban structure where housing is a naturally occurring aspect of a range of compatible urban uses that make for compact, complex, walkable cities in which reliance on commuting is greatly reduced. This also promotes the view that, in this ensuing complexity, far more diverse market approaches are possible in less spatially distinct sectors. Whilst, in the longer term, there may well be infill residential opportunities at various densities and across a variety of socio-economic profiles, this should be as a consequence of first having put the necessary fundamentals of urban structuring and economy in place and consolidating around these fundamentals.

In these terms, it is a specific recommendation of the GLMP planning team that 'gated community' development models be discouraged and that no further 'leap-frog' gated estate developments into the rural transition, agricultural or conservancy zones be permitted. There should be no question of repeating what the team regards as a flawed suburban model such as typifies developments north-west of the Fourways node where every gated enclave is, in effect, a cul-de-sac off a main road. In a future of normality where high-security boundaries (the present 'neo-medievalism') become less pronounced, it remains impossible for these developments to become part of an expanded local road network and the suburban system has no future resilience in terms of urban change and adaptability.

It is recommended as follows:

- 12.1 That the model of lower-income housing delivery in the GLMP be focused on smaller scale, de-massified, higher-density projects aimed at rental stock and integrated into the urban structure of mixed-use, higher-intensity urban nodes;
- 12.2 That the provision of housing in the GLMP area be mannered, over the next 20 years as a minimum, by a wider urban development agenda predicated on urban structure and economy that ensures housing follows broader principles of urbanism and the creation of urban economies that can support housing;
- 12.3 That any housing delivery projects subscribe to the facilities provision requirements set out in the GLMP;
- 12.4 That inclusionary housing be fragmented into a complex urban model rather than be seen as stand-alone, segmented projects;
- 12.5 That 'gated' housing developments within compact, complex development nodes, beyond the scale of the city block, be discouraged;
- 12.6 That gated villages and estates within the wider urban consolidation zone of the GLMP be discouraged and, where

appropriate on particular merit, a design performance measure of planning for future integration into a wider local road network must be demonstrated;

- 12.7 That further gated residential estates not be permitted into the rural transition, agricultural or conservancy zones indicated in the GLMP;
- 12.8 That low-impact residential developments within the rural transition zones of the GLMP be confined to the immediate urban interface areas and consolidated so as to maintain the majority of the zone as agricultural, open space and/or of rural character.

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13. In respect of a social facilities strategy

The section dealing with the provision of social facilities and amenities has noted a variety of short-comings in the way these aspects are normally approached. As with aspects of sustainability, the Lanseria Smart City initiative provides the planning team not only with an opportunity, but a responsibility to think these matters through afresh.

The distribution of facilities, most notably primary and secondary schools, is patterned around the placement of what the planning team has termed Primary Community Installations (PCIs). These are combined community facilities including a hall, library, clinic, early learning centre, senior citizen centre and a variety of active recreation amenities. This distribution gives an excellent service to communities based on 5 minute (400m) and 10 minute (800m) walking isochrones. It is the intention that the sports components within the PCIs serve the schools by day and part of the weekends and the surrounding communities in the afternoons, evenings and weekends. This provides schools with better facilities than most can afford and reduces the size of the school sites required.

The majority of these sites are set out adjacent to non-motorised transport (NMT) comprising walking and cycle ways. It is a planning intention that many of the schools could be built ahead of need by communities and leased as mini-factories, production spaces, offices or commercial hubs: when needed as schools, and once teachers, books and desks are in place, these installations may then be re-purposed as schools according to demand. This has the dual effect of making use of sites in advance of them being needed (and so prevent the dangerous effects of land being sterilized and lying socially fallow) and yet having the buildings available for re-purposing when a school is required and ready to be fitted out and put into service on a 'just-in-time' basis.

Many of the regional facilities provided for have, apart from their self-evident primary purpose, the additional role of creating economic spin-off: not only, for example, is a regional hospital required in this sector of the GCR, it is also a facility that creates many up-stream and down-stream economic linkages; how they are placed and interfaced with surrounding uses that can readily respond to these economic stimuli is an important aspect of on-going urban management. The same applies to economic opportunity centres and campuses, as is also so for large regional installations such as a fresh produce market, a flower markets or an abattoir.

Clearly the placement of facilities, from a spatial point of view, in a manner that enables clustering, sharing and stimulation of local economies is only a very small part of the equation; much depends on the institutional arrangements and, more importantly, the cooperation between institutions. It is axiomatic that every facility has to achieve the specific, narrowly-defined objectives for which a facility is provided: however, it is crucial that the potential synergy and sharing of facilities achieves many other services and community and economic objectives that go beyond these primary objectives.

It is recommended as follows:

- 13.1 That one of the Smart City institutions set up be a Special Purpose Vehicle (SPV) with the focus of planning, coordination and implementation of all facilities, both local and regional;
- 13.2 That this SPV acts as the early-warning agency regarding need and readiness for a facility and coordinates with the relevant local, provincial or national agencies in calling attention to need, making the relevant sites available and analysing what other facilities might best 'nest' with such a facility;
- 13.3 That this SPV has the task of setting up local schools and communities with scheduling and management capacity for the sharing of facilities.

14. In respect of the agricultural underpinnings of the wider area

An extensive aspect of the GLMP's planning focus has been on recognizing and understanding the Greater Lanseria area's agricultural potential and this is documented extensively in various sections.

Although not a naturally-occurring agricultural resource of note (the extensive underlying granites resulting in shallow, relatively poor top soils) and water is not in abundance, there are, nevertheless, several factors which make it an important component of the GLMP:

- as a region it forms part of a much wider hinterland of the Magaliesberg that can be regarded as a 'bread-basket' directly on the edge of an urban GCR market that is already at over 12½ million people and likely to grow rapidly to 30 million, making it not only an important economic market opportunity but vital in terms of a wider food-security strategy;
- although not plentiful, water from rivers and, to a lesser extent, boreholes is available and this has to be taken in context, too, of the treated effluent water (in excess of 10 million litres per day) that is available and can be harvested and utilised far more productively than at present;
- various forms of agriculture, such as orchards and specialist crops, do indeed operate in the area already and, with enablement and coordination, could be drawn into a more focused production strategy;
- placed as it is so close to market opportunity, agriculture in the 'normal' sense (extensive cropping, grazing, etc.) is, in any event, an inappropriate paradigm and far more intensive approaches, like hydroponics and tunnel farming, make soil quality less of a productive issue;
- sited as it is as the gateway into Gauteng from the extensively fertile areas of Rustenburg and Brits, there is potential for agri-processing that must be explored;
- the Northern Farm, operating as an integral part of the Northern Waste Water Treatment Works and recipient of the 10 million l/day noted above, is a particularly noteworthy asset for future agricultural production (including aquaculture) and is embedded in the GLMP as a key future installation as an agri-tech hub.

It is recommended as follows:

- 14.1 That the importance of agriculture (and aquaculture) in all its forms and as embedded in the GLMP be noted as an essential component of the Lanseria Smart City initiative and the Greater Lanseria area which supports it;
- 14.2 That this agricultural component be recognized as an essential part of the GLMP's economy and strategic trajectory;
- 14.3 That a specialist unit be established to build on the research and explorations undertaken thus far with a view to formulating a

comprehensive agricultural strategy with associated programmes;

- 14.4 That Northern Farm (identified as a key issue in its own right and dealt with separately in this section) be recognized as a key planning intervention as part of the GLMP as an agri-tech hub as an integral part of the strategy noted above;
- 14.5 That this agricultural component of the GLMP be brought into the overall Provincial agricultural strategy and that, with CoJ, the Northern Farm be pioneered as a flag-ship project for Gauteng.

15. In respect of Northern Farm

Northern Farm, being close on 1000ha in extent, is under the control of Johannesburg Water and serves the vital function of receiving semi-treated water (in the order of 10 million litres per day) from the Northern Waste Water Treatment Works directly upstream of Northern Farm on the south side of the N14 Highway. Its function is, through extensive farming and a complex system of dams, ponds and irrigation, to bring this semi-treated water to a rigorous standard before being discharged into the Jukskei River further downstream.

A by-product of the canals, streams, dams and ponds, together with the meandering, incised Jukskei River that defines its western edge, is a rich habitat for a wide variety of birdlife, a natural resource for which it is renowned and which led to its designation as the Diepsloot Nature Reserve. A not-for-profit organisation (NPO) curates this Reserve and, apart from birding, also runs a wide variety of regional recreational pursuits on the farm including mountain biking, trail running, walks, dog-sledding and horse riding. More importantly, it runs community outreach programmes for the youth of Diepsloot in leadership, conservation and life-skills.

The NPO originally operated on a short-term lease but now merely works on a month-to-month basis. Apart from managing the environmental asset, it is reported that it has, through income derived from the recreational pursuits, reduced the CoJ annual cost of running Northern Farm from the order of R10 million from 10 years ago to about R3 million at present.

The farming operation on the land, by contrast, is not run on a particularly strong basis, with the incumbent farmer also operating on a month-to-month basis. The extensive irrigation infrastructure is dilapidated and requires extensive re-instatement.

In terms of the proposals of the Greater Lanseria Master Plan, Northern Farm is seen as both an essential environmental asset and a particularly important 'agri-hub' in the make-up of the smart, sustainable ethos guiding planning for the wider area. It must, of course, continue to play its vital primary role as a downstream 'water polishing' facility for the WWTW and must be made to work even harder as a water resource asset. This would include undertaking farming at a far more substantial level, both in terms of agriculture and aquaculture, re-instating and extending the water and irrigation systems required, establishing a technology and processing centre for training and education, investing in intensive farming methods and limited livestock breeding and organic production. Most importantly, a portion of the farm must be seen, as an integral part of the overall farm's programmes and management, as a market-gardening allotment resource for the nearby residents of Diepsloot. A small, appropriately configured residential 'estate' component may also be associated with the facility in order to complement its financial underpinnings.

Integral with this reinstatement of farming at scale would be the inclusion of the birding, recreational and community out-reach programmes associated with the farm's status as a nature reserve.

Various road proposals impinge on the integrity of the landholding, notably the proposed K31 road reserve running along the farm's northern boundary. This route would augment the existing road on the property's eastern edge. Whilst the remainder of the farm should be kept free of through roads, the K31 is an important future regional route and will, in any event, be required for access to the CoJ's proposed new Lanseria Water Resource Centre. It is felt, from a planning point of view that, with due care and sensitive detailed road alignment and design, this K31 route should be retained.

In order to achieve this, the Farm needs to be made the subject of a longer, properly defined and administered lease agreement and have its status as a vital aspect of the Greater Lanseria Master Plan entrenched.

It is recommended as follows:

- 15.1 That Johannesburg Water, in detailed consultation with the GLMP team, formulate a cogent 'Agri-Hub' and Nature Reserve plan for Northern Farm;
- 15.2 That a detailed tender be formulated and called-for in terms of this plan;
- 15.3 That the lease term be sufficiently lengthy to accommodate the extent of investment indicated by the plan (preferably a 30 year lease but a minimum of 9 years and 11 months and renewable on an on-going basis).

16. In respect of a mining/quarrying strategy

Quarrying is an important economic component of the Greater Lanseria area and is run with due regard to safety, nuisance and licensing requirements. Making sure that these are fully complied with is essential as development of a consolidated urban area gains traction around the Smart City initiative.

More importantly, it is essential that strict adherence with rehabilitation plans take place and that all licensed mining operations are made to comply with these requirements on being worked out.

It has been established that the basic geotechnical conditions in which the majority of the quarries take place are not satisfactory for subsequent landfill operations for domestic or other waste. There has, however, been some encouragement for worked out quarries in the area being allied to a more concerted programme of water-harvesting at scale.

In this regard, discussion with the Rand Water Board (RWB) indicates that it is partnering with Water Resource Centres (treatment works) in a drive to harvest far more water from sanitation treatment. Water scarcity to service city needs is not a problem confined to arid and semi-arid areas: it is a world-wide problem given the sheer scale of urbanization into the future.

To the extent that it may be necessary/possible to use worked-out quarries as reservoirs and allied permanent or temporary storage facilities, there may be value in working with quarry owners nearing the rehabilitation stage to shape these into more naturally occurring elements in the landscape, possibly even, in areas, linked into wider open space systems. Suitably lined, these might become a valuable harvesting resource and achieve a 'lake-district' ethic for the wider area rather than bear the enduring scars of quarrying.

It is recommended as follows:

- 16.1 That a specialist study be commissioned, with suitably qualified geotechnical, hydrological, urban and landscape expertise, to undertake a basis assessment of the manner in which the rehabilitation of worked-out quarries in the area should best be handled having particular regard for the precepts of the Smart City initiative;
- 16.2 That this study be extended, with RWB and Johannesburg Water, to cover the merit, feasibility and economics of converting these disused quarries into suitably shaped and designed reservoirs as part of a major water harvesting initiative.

17. In respect of embedding the GLMP as part of Municipal and Regional planning

The issue arises of how to take the planning proposals of the GLMP through into the appropriate levels of planning structures. Several options suggest themselves:

- Those aspects of the GLMP associated in turn with each of the four municipalities be used to inform the input required for the mandatory review undertaken of each Municipal Spatial Development Framework (SDF) with a view to these respective municipalities each taking on board that portion of the GLMP applicable to that municipality; or
- Those aspects of the GLMP associated with each of the 4 municipalities be embedded as a precinct plan prepared for the relevant portion of each municipality as a local planning extension of the wider GLMP exercise; or
- Moving to a wider planning initiative that would entail the designation of a defined area as a Regional Spatial Development Framework (RSDF) in which a cross-province planning initiative would transpose the GLMP as a RSDF to guide planning across this region.

The three approaches noted above need not be mutually exclusive and the simplest interim measure may well be to use the municipal SDF review process to get the respective portions of the GLMP embedded in the four municipal SDFs:

- As far as the GLMP planning team is aware, the review processes for both the City of Johannesburg and Mogale City are underway and this option can be exercised virtually as an immediate process.
- As far as is known, the Tshwane review is complete and will not come round again for 3 years but, as far as the GLMP proposals are concerned, there is nothing that is counter the existing Tshwane SDF apart from the possible omission of portion of the K44 through the Crocodile River Reserve which is, in any event, a Provincial Planning matter and need not wait for the next review period.
- It is not known at this stage when the next Madibeng SDF review is due but there is nothing in the GLMP that is at odds with the SDF of that Municipality in any event.

It would seem that this route of aligning with the SDF review process of each municipality would be the most direct and simplest option initially: it is doubtful whether the precinct planning route would be as effective but closer analysis in this regard is necessary.

On balance, however, it would appear that the most comprehensive approach would be to go the RSDF route since this would:

- provide a more significant overlap with planning in North West Province (and the all-important alignment with the Magaliesberg Biosphere);
- create an overarching regional plan around which municipal planning could be easily harmonized;

- it is a planning tool in terms of which special procedures and approaches may be defined so as to expedite planning processes and applications.

Two further aspects of policy harmonization at a regional scale would be:

- to apply to the Department of Agriculture to have the GLMP area (with the relevant Provincial and Municipal authorisations) exempted from the requirements of The Agricultural Land Act 70 of 1970 so as to streamline application processes;
- to have the GLMP integrated into the Gauteng Environmental Management Framework (GEMF) using the current GEMF review process and getting onto the agenda of the next meeting scheduled for 26 January 2021.

It is recommended as follows:

- 17.1 That the GLMP be incorporated in the Municipal SDF review processes;
- 17.2 That the GLMP, in parallel with the SDF review processes, embarks on a RSDF process;
- 17.3 That the GLMP be exempted from the provisions of Act 70 of 1970 as set out above;
- 17.4 That the GLMP be integrated into the GEMF as set out above.

18. In respect of a land banking arrangement

There have, over many years, been concerted land assembly drives in and around the Lanseria area and there are several large-scale land holdings in excess of 50ha, with some approaching 400 to 500ha. Some of these are no doubt in some way related to earlier big privately-driven city initiatives reaching back as long ago as about 2005.

The net result that many of these assemblies are scattered over a wide area and are not necessarily conducive to the sensible consolidation of a compact, complex, mixed-use Smart City. In addition, as demand for urban development ramps up on the back of the Greater Lanseria Master Plan, it is to be anticipated that many landholders will be looking to gain 'highest-and-best' planning purpose on their specific landholdings irrespective of whether these have the best 'urban fundamentals' for such purposes.

Sites for shopping centres are a typical case in point: landowners may often try for such a use even if it is not, in market terms, in the 'right' place nor adequately supported by existing or proposed infrastructure. Many distortions of the market often follow: (a) there may be too many; (b) they are likely to be scattered randomly and perpetuate private car mobility; (c) very often the growing market ends up being poorly served since no one goes ahead with a well-placed centre for fear of being intercepted by another; or (d) the market is saturated as it grows with scattered, inefficient centres without ever developing the concomitant critical mass.

The future city centre for the Lanseria Smart City initiative has been sited on the basis of what constitutes the most accessible epi-centre of what is judged to be the consolidated urban zone and having a 'greenfield' profile for development. It also is best located in balancing each of the constituent elements in the wider area and is capable of being serviced sustainably and being connected with public transport across a broad area. With this in mind, it is inevitable that many of the elements of a mixed-use, complex, intense and dense new city centre needed to create critical urban mass could have their collective energies dissipated by landowners in other locations compete for the same planning rights.

Rather than have this happen, it is suggested that a better arrangement would be some form of land-banking arrangement where the holdings of many owners could be brought together such that all could share in the value uplift of various uses in their optimal positions respectively.

This may, as an arrangement, grow to carry other possibilities such as associated trusts that would be able to bring existing and future community groupings into the value-profile created by the Smart City initiative.

It is recommended as follows:

- 18.1 That some form of land-banking arrangement be explored as an institutional extension of the GLMP;

- 18.2 That the potential of such an arrangement to extend into community trust arrangements also be explored.

SECTION 10 | CONCLUSION

The GLMP, sets about to achieve a true post-apartheid city based on the "TRAM" principles: a **T**ransformative city structure for true social and economic inclusion; **R**e-industrialization of the city economy; **A**daptive and resilient to change; **M**odernizing to be more internationally competitive. Lanseria will become a modern South African city in which people find normality, urban prospect and dignity in a place that subscribes to the fundamental principles of inclusion, sustainability and life-enhancing smartness for all. It will create significant economic opportunity, building on the influence of Lanseria International Airport, in the vicinity of marginalised communities like Diepsloot and Cosmo City on this north-western periphery of the Gauteng City Region and provide a basis for sustainable urban consolidation in this area.

The GLMP is based on sustainable, green, urban principles of:

- Compact and complex in extent (with emphasis on convenient walking distances - the 5 minute/400m and 10 minute/800m walk being the basic ergonomic of urban design - and safe, convenient cycling and cycle systems)
- Complex in activity pattern (mixed-use, intense, dense: i.e. one needs to be able to live, work, pray and play all within a local, walkable, socially relevant context)
- Structured on social integration (spatially inclusive and democratic)
- Residential integration within a complex urban profile
- The public environment as the armature of public life and inclusion
- Growth of local economies (integration of dual logic economies)
- Public transport based (Mass transport and feeder systems)
- Focused on reducing the need to commute (non-motorised transport or NMT - walking/cycling - needs to be the default movement system)
- Fundamentally structured on principles of ecology and bio-diversity (without which any talk of sustainability and smartness is a non sequitur)
- Energy efficiency (through spatial pattern/ waste-to-energy production /green buildings)
- Energy efficiency through green buildings
- Appropriate service infrastructure. As with all bulk services, water infrastructure and electrical infrastructure cannot and must not be considered in isolation; we shouldn't be continuing on the present trajectories. Holistic service infrastructure and utility provision, which conserve our previous resources of water and the natural environment, becomes the very underpinnings of a new economic base for the sub-region and its re-industrialization.
- Based on how we allow for next-generation logistics hubs (noting worldwide trends towards several major peripheral nodes servicing

the distribution of consumer goods into city regions and the export of these out - essentially, the reason for cities and escalating urbanisation - based, generally, on the maxim of long-haul by rail/short-haul by road)

- More appropriate service and social infrastructure delivery based on integrated, inter-disciplinary paradigms (recognising the need to break the mould of how we've done things for centuries, the limits to which we've now clearly been brought and the way we now approach and manage delivery)
- Urban agriculture as an integral part of the urban economy (rather than simply 'agriculture' being some remote rural pursuit and recognising the importance and food security of being a breadbasket, across all forms of market gardening and intensive agri- and aqua-culture at all scales, on the edge of a GCR that is likely to grow to in the order of 30 million people over the next 30-40 years).

A series of policy positions have been prepared, which have taken on the many key dimensions of what underpins the GLMP, and are included as the basis for discussion, refinement, and adaptation. It is also intended that other policy position papers can be added to these appendices through time.

The GLMP is underpinned by 5 models (1) An urban profile model, (2) an urban morphology model, (3) a connectivity model, (4) a bid-rent model and (5) a virtual model room. At the core of the approach to preparing the Greater Lanseria Master Plan, and bearing in mind the need to fundamentally transform the present urban structure of the GLMP study area, as well as, direct growth in a compact and complex development form, to prevent sprawl, is the belief that morphology, or spatial shape, form, extent and pattern of city processes, is a primary focus of urban management. The morphology of an urban system and the approach to interventions in shaping and adapting it is fundamental to crafting an urban structure that is effective, efficient, robust, flexible and, above all inclusionary and equitable. An appropriate urban structure is thus the heart of urban sustainability.

An implementation approach has been undertaken on an Intermediate to short term horizon. A fundamental impediment to meaningful development in and around the Lanseria area over the past 15 years or so has been a lack of capacity in the City of Johannesburg's Northern Waste Water Treatment Works (NWWTW) and the need for an entirely new facility for the region, which takes cognizance of this. There are also a number of initiatives that have been identified that require policy support to enable the true opportunity of the GLMP and very clear publicly-driven infrastructure investment development initiatives. This section is still being refined.

A synthesis of much of this document's concerns is discussed as key issues that are assimilated in the overall Greater Lanseria Master Plan (GLMP) as set out in the planning issues and associated recommendations.

In order to give the GLMP more impetus at the appropriate levels of planning structures, a number of options are being explored which includes:

- Those aspects of the GLMP associated in turn with each of the four municipalities, be used to inform the input required for the mandatory review undertaken of each Municipal Spatial Development Framework (SDF) with a view to these respective municipalities each taking on board that portion of the GLMP applicable to that municipality; or
- Those aspects of the GLMP associated with each of the 4 municipalities be embedded as a precinct plan prepared for the relevant portion of each municipality as a local planning extension of the wider GLMP exercise; or
- Moving to a wider planning initiative that would entail the designation of a defined area as a Regional Spatial Development

Framework (RSDF) in which a cross-province planning initiative would transpose the GLMP as a RSDF to guide planning across this region.

Moving forward, a Special Purpose Vehicle (SPV) will be established and development contributions, tax incremental finance and a portion of grant funding will be used to raise the necessary debt to construct the required bulk infrastructure for water, sanitation, electricity, roads and other essential infrastructure. The revenue streams from service payments over the following 15 to 20 years will then be used to finance the debt repayment. The SPV will also play a coordinating role at a regional level to ensure the successful implementation of the smart city over the next 20 years.

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3 November 2020

Dear Sir / Madam

RE: DRAFT GREATER LANSERIA MASTER PLAN AVAILABLE FOR PUBLIC COMMENT

The Greater Lanseria Master Plan is the first stage in the development of the new post-apartheid Smart City in Lanseria announced by President Ramaphosa in his 2020 State of the Nation Address and a draft of the master plan is now available for public comment.

A Smart City in the South African context must use innovative technologies to provide smarter and more sustainable services to create a new normality that will change the apartheid spatial architecture and provide social and economic opportunity for all South Africans.

In his article "Make Smart Cities for All" in the Star on 14 October 2020, Professor Tshilidzi Marwala, vice-chancellor and principal of the University of Johannesburg, remarks: "In a country with stark inequalities such as South Africa, the adoption of smart technologies has to be inclusive. We must remain wary of leaving vast segments of our population behind. The goal is not to create deeper inequity, but to ensure that a blueprint speaks to our challenges and posits the necessary solutions".

Similarly, Tsakani Manyike of the DBSA, in feedback from the DBSA's collaboration with the World Bank on Smart Cities, cautions: "In the context of where South Africa finds itself in the smart city maturity level, ...we must dispel the misconception that (a Smart City) is just a *tech-heavy city*".

The Lanseria Smart City will not be a new, glitzy Dubai or Singapore but a true post-apartheid city based on the "TRAM" principles: a Transformative city structure for true social and economic inclusion; **Re**-industrialization of the city economy; **A**daptive and resilient to change; **M**odernizing to be more internationally competitive. Lanseria will

become a modern South African city in which people find normality, urban prospect and dignity in a place that subscribes to the fundamental principles of inclusion, sustainability and life-enhancing smartness for all. It will create significant economic opportunity, building on the influence of Lanseria International Airport, in the vicinity of marginalised communities like Diepsloot and Cosmo City on this north-western periphery of the Gauteng City Region and provide a basis for sustainable urban consolidation in this area.

The Gauteng City Region will grow from 12.5 million to 30 million people over the next 30 years and will become a mega-city like São Paulo, Mexico City, Jakarta and Mumbai. Lanseria is one of the places that can absorb a lot of that growth in a structured way and although the private sector has been wanting to develop in the Lanseria area for the past 20 years, there has been no development because the area sits on the edge of four different municipalities – City of Johannesburg, Mogale City, City of Tshwane and Madibeng - and is not a priority for any of them. As a result, the required bulk infrastructure to enable development has never been built and government has therefore proposed a new approach to infrastructure financing to unlock development in the area.

A Special Purpose Vehicle (SPV) will be established to raise the necessary debt to construct the required bulk infrastructure for water, sanitation, electricity, roads and other essential infrastructure. The revenue streams from service payments over the following 15 to 20 years will then be used to finance the debt repayment. The SPV will also play a coordinating role at a regional level to ensure the successful implementation of the smart city over the next 20 years.

The Gauteng Provincial Government appointed a professional team led by GAPP Architects and Urban Designers (GAPP) to draft a master plan for the Greater Lanseria area. The objective of the Greater Lanseria Master Plan is to determine the bulk infrastructure requirements to ensure the realisation of the smart city at the core of the wider development node. The master plan looks at transport, water, sanitation, stormwater management, electricity, solid waste, information and communication technologies, health, education, social and economic infrastructure, agriculture, environmental and heritage aspects and will also propose governance and institutional arrangements for the area. It covers the infrastructure programmes and projects of several stakeholders within the Gauteng City Region, including the National Government, State Owned Enterprises, the Gauteng Provincial Government and its agencies, municipal governments and entities and the private sector.

The approach to the master plan was focused, firstly, on understanding what planning submissions have been made to the municipalities by property developers and what submissions were planned but not submitted due to the lack of bulk infrastructure by developers with land in the area and, secondly, on consolidating all the detailed technical planning work within the growth node completed by various parties to date

including property developers with applications pending in the area, the four municipalities with jurisdiction in the area, Gauteng Provincial Government as the regional planning authority and provincial and national agencies with transport and other urban infrastructure mandates. This information has provided an understanding of the development potential in the area and what bulk infrastructure is required based on the timeframes for developments to be implemented over the next 15 to 20 years. The master plan will produce a list of priority projects and associated timeframes and create a single planning regime for the entire greater Lanseria region.

The Draft Greater Lanseria Master Plan has now been completed and is being made available for public comment during a 30-day comment period commencing on Wednesday 4 November and ending at close of business on Friday 4 December 2020.

The draft master plan can be viewed online or downloaded from the following website: <https://www.gov.za/documents/public-comment> or the following link <https://drive.google.com/drive/folders/1pOeIH34neXSp089qOXUqi6HlxkjbgQKO?usp=sharing>

Videos of detailed presentations on different aspects of the draft master plan are available on YouTube at the following link:

<https://www.youtube.com/channel/UCNEgK5wtf1hBDyH4mApf4tA/>

A Facebook page and Twitter account have also been set up for the master plan as follows: <https://www.facebook.com/lanseriasmartcity> and @LanseriaSCity

Written comments on the draft master plan can be sent to the following email address: nomim@nma.org.za until the close of the comment period. For further information on the draft master plan please contact Nomi Muthialu or Julian Drew of the GAPP professional team at 011 209 2698.

Yours sincerely



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