
An Investigation into the Application of the Aerotropolis Strategy to the Cape Town International Airport from a Global South Urban Planning Perspective.

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ABSTRACT

The Aerotropolis is one of many airport led urban development concepts that challenge the way city's have been traditionally planned and managed. Airports have evolved from military bases to decentralised and privatised Airport Cities and regionally linked Aerotropoli (Freestone & Baker, 2011). Although Africa has 12% of the global population it only represents 1% of global air freight and passenger volumes (The World Bank, 2009). As South Africa is considered the gateway into Africa, the national led Oliver Reginald Tambo International Airport in Gauteng and the King Shaka International Airport in Ethekeweni Durban have recently pursued regional airport approaches. There is substantial scope to apply airport-urban theories to the Cape Town International Airport, which is situated 20km from a sea port, sees the second highest passenger count in South Africa and is set for 11.5 billion Rand in upgrades in the next 5 years (ACSA, 2014; Lundy, 2013). However, the decision to pursue a regional airport urban approach for the CTIA must be orientated toward the South African context of post-apartheid restructuring and social transformation. This is because the question simultaneously raised is how to stimulate development in the historically segregated South East Metro, with the economic potential of the decentralised and adjacently located CTIA being largely overlooked.

The dissertation provides a twenty (20) year regional Spatial Development Framework for the CTIA. Interviews are held with 10 key actors in fields related to airport, urban and business related planning. The literature and findings of the dissertation reveal that firstly, the AeroScape and Airea are more appropriate for conceptualising the retrofitting of an existing airport while the Aerotropolis is best suited as a business model and not a physical form. Secondly, the aviation linked sectors in Cape Town are connected to the City's unexploited comparative advantages in labour absorptive industries such as agro-processing, manufacturing and textiles which can be brought to the doorstep of the CTIA and South East Metro. Lastly, the functionality of these industries provides further opportunity to develop a sustainable closed loop metabolism between the CTIA, Phillipi East Industrial Node and Phillipi Horticultural Area.

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ACRONYMS AND ABBREVIATIONS

ATNS	- Air Traffic Navigation Services
CBO	- Community Based Organisation
CMOSS	- Cape Metropolitan Open Space System
KSIA	- King Shaka International Airport
COCT	- City of Cape Town
CTIA	- Cape Town International Airport
DAG	- Development Action Group
ECI	- Economic Intelligence Consortium
EIA	- Environmental Impact Assessment
FBO	- Faith Based Organisation
GTP	- Greater Tygerberg Partnership
ICAO	- International Civil Aviation Organisation
ITN	- Integrated Transport Plan
IPTNP	- Integrated Public Transport Network Plan
LED	- Local Economic Development
LUPA	- Land Use Planning Act
MAP	- Mean Annual Passengers
MSDF	- Metropolitan Spatial Development Framework
MPBL	- Municipal Planning By Law
NADP	- National Airports Development Plan
NEMA	- National Environmental Management Act
NGO	- Non Governmental Organisation
NISUP	- National Informal Settlement Upgrading Programme
NLTF	- National Land Transport Framework
NSDP	- National Spatial Development Plan
ORTIA	- Oliver Reginald Tambo International Airport
PEDI	- Philippi Economic Development Initiative
PRASA	- Passenger Rail Agency of South Africa
WCPSDF	- Western Cape Provincial Spatial Development Framework
SAA	- South African Airways
SACAA	- South African civil Aviation Authority
SAHF	- South African House Fund
SANDF	- South African National Defence Force
SANEC	- South African Netherlands Chamber of Commerce
SADC	- South African Development Community
SPLUMA	- Spatial Planning and Land Use Management Act
SPUD	- Spatial Planning and Urban Design
TIA	-Traffic Impact Assessment
TOD	-Transit Orientated Development
VPUU	- Violence Prevention through Urban upgrading
WCEDP	- Western Cape economic Development Partnership

CHAPTER 1: CONTEXT

1.1 BACKGROUND TO THE STUDY

Airports are undoubtedly the political and economic trade tools of the 21st century because aviation and the novelty of transporting people and their goods and cultures from one destination to the next has increasingly becoming a core component of the globalised world we live in. Air transportation is a critical factor in maintaining the trade of highly demanded goods, moving people to tourism destinations and major sports events in addition to sustaining distant dependent political, social and family ties (Stevens, 2012). As more than thirty percent of world trade travels by air, a technically networked trend has had a visa versa shaping on organisational structures and how cities are connected in the global sense (Graham & Marvan 2001; Kasarda, 2013). Airports have transformed into the multifunctional transport and commercial hubs we know today as global international airport cities (Kasarda, 2010). The contemporary reality of the airport is a decentralised manifestation of globalisation catering to kinetic elites in the form of shopping malls, hotels and business centres as well as time efficient logistic industries, manufacturing and warehouses (Kasarda, 2009). Whether planned for or not, and regardless of climate change, this pattern of growth and clustering is expected to continue as countless predictions indicate that between 2015 and 2030, worldwide commercial air passenger traffic will increase from 4.9 billion to 13.3 billion and global air cargo traffic will triple (Kasarda & Lindsay, 2011).

For the last 15 years, the 'Aerotropolis' has been a highly publicised regional economic planning concept advocated for by Professor John Kasarda, the head of the Centre for Air Commerce at the University of North Carolina. His counterpart and loyalist is Greg Lindsay, an economic journalist who together with Kasarda have published the 2011 famous book entitled 'The Aerotropolis: The Way We'll Live Next'. The two authors have seamlessly and successfully trotted around the globe advertising the concept as a business venture to keen airport authorities, politicians and businessman.

"Cities rise-and-fall, usurping ones and are eventually replaced by the next great ones. This pattern has been defined throughout history by trade routes and transportations"

(Kasarda & Lindsay, 2011:1)

Kasarda (2013) understands that for thousands of year's port cities have developed along rivers and canals and close to oceans. In the 18th century the introduction of steam engines and railroads structured and connected the growth of small and major towns. In the 19th and 20th century, roads and highways were developed for the motor-vehicle and low-density suburban sprawl ensued. In the 21st century, Kasarda (2010) views airports as the fifth wave of transit orientated development shaping their surrounding metropolitans in a similar fashion of clustering.

As depicted in Figure 1.1, the idealised description of an Aerotropolis is a sub-regional economy where the Airport City is the anchoring economic hub associated with a concentrically expanding mix of clustered uses such as warehousing, commercial real estate, office complexes, residential housing as well as time efficient logistics, distribution centres, manufacturing and industries along radial activity corridors (Kasarda & Lindsay, 2011).

Kasarda (2010) understands that traditionally, airport surroundings have organically formed along nearby arteries but often with disjointed and mismanaged land uses. Schlaak (2010) argues that despite the potentials of becoming integrated development hubs in metropolitan regions, poor cooperation amongst planners, public institutions, airport authorities and private investors has resulted in faceless airports and sprawling along corridors.

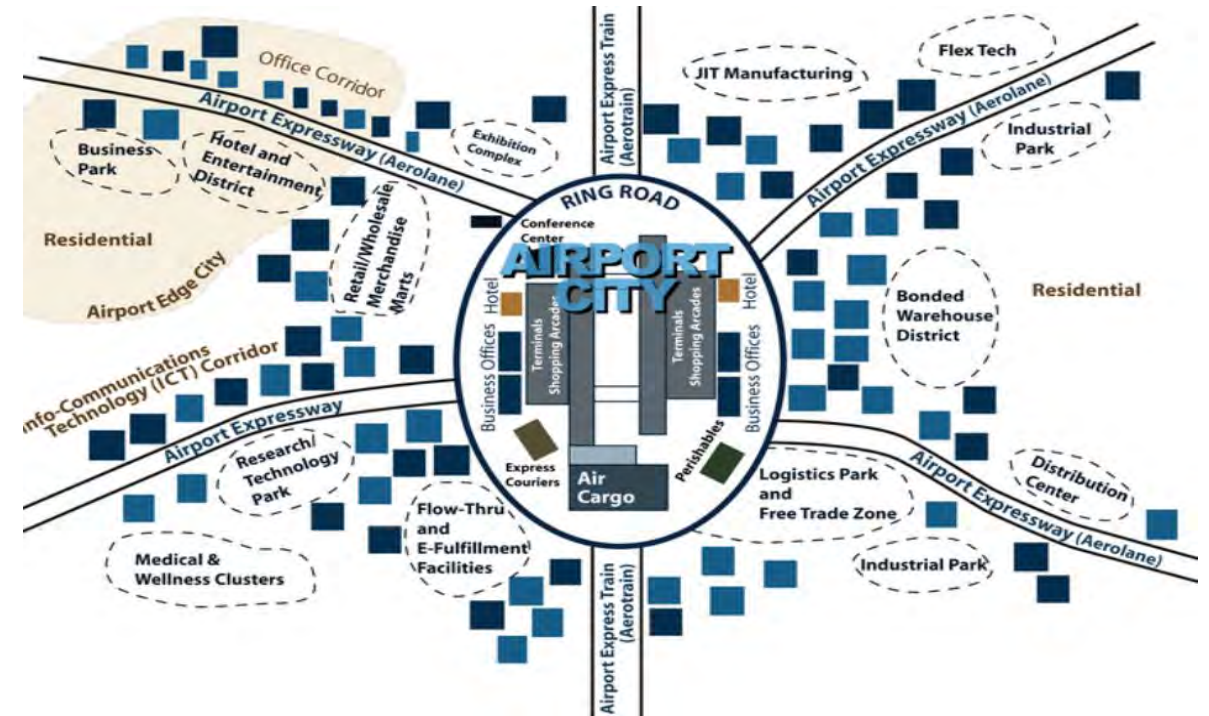


Figure 1.1 Aerotropolis Concept (Source: Kasarda, 2014)

In the regional economic sense, this haphazard growth ought to be strategically planned for in order to derive the maximum economic benefits (Kasarda, 2010). The 'Aerotropolis' is therefore broader than a single land use framework, since Kasarda (2010) maintains that it has no boundary and is not a project but rather a long term business strategy where the basic value proposition is to bolster comparative advantages through connectivity and speed. Emphasis is placed on integrated regional public private partnerships and shared visions of understanding the role of the airport outside of administrative and political boundaries (Kasarda & Lindsay, 2011). This process supposedly has the ability to leverage private sector investment, initiative new forms of networked governance and provide as a catalytic multiplier of economic growth to the airport region (Kasarda, 2010).

The concept was initially embraced in the US before emerging in Europe and more so in rapidly emerging countries of the Gulf and Asia Pacific. According to Kasarda (2010) there are 38 operational and developing aerotropolis in North America, 20 in Europe and 14 in the Asia Pacific.

Kasarda (2013) recognises that Africa has seven Airport Cities and developing 'Aerotropoli', four in Nigeria and one in Egypt at Cairo International Airport (CIA). Two are in South Africa, where in the past five years both Ekurhuleni's Oliver Tambo International Airport (ORTIA) and Ethekweni's King Shaka International Airport (KSIA) have aligned their Metropolitan Spatial Development Frameworks with the Aerotropolis concept. It was originally understood by Guy Lundy (2012), a top South African futurist, that there is scope to apply the Aerotropolis to Cape Town International Airport (CTIA) which is located within 20 minutes from the Cape Town harbour and CBD, and must be considered an economic advantage as greater trade is taking place with countries in the South and East (Lundy, 2013). CTIA is the second largest airport in South Africa with 8.9 million mean annual passengers and air cargo volumes of 30 000-40 000 tons per annum (ACSA, 2014).

In 2013, a philosophical shift occurred when both ACSA and the City of Cape Town confirmed the intention for CTIA to become an Aerotropolis, further acknowledging that public private partnerships are crucial (Lundy, 2013). In October 2014, ACSA released a tender to determine the feasibility of applying the concept to the CTIA. Thereafter in 2015, AECOM consultants were awarded the pre-feasibility tender while the Western Cape Economic Development Partnership (EDP) are currently tasked by the City of Cape Town's Department of Trade and Investment (DTI) group with determining a prerequisite for partnering and formulating an Aerotropolis steering committee. Efforts are therefore gradually being made to strategically harness the potential of the CTIA as both an Airport City and a sub-regional economy.

1.2 PROBLEM STATEMENT

If the CTIA is to develop as an Airport City and regional Aerotropolis it must be understood in the post-apartheid context of social transformation. To date the CTIA has only been able to function like a South African gated community. The CTIA shares the majority of its direct surroundings with areas such as Delft, Belhar, Philippi East, Khayelitsha, Mitchells Plain and Gugulethu which are historically associated with segregation, a lack of skills and basic services,

informal settlements, land invasions, service delivery strikes, unemployment and continual crime. Inhabitants are significantly constrained in terms of accessing the economy and hence the majority of informal activity occurs within these parts. The South East Metro is the least economically developed area in the city and has been largely un-attractable to private sector investment for such reasons. Locked into a repetitive cycle of urban policies and regulations that guide municipal management, the result is an ever increasing mass of undervalued land and the undermining of longer term location needs (Gordon, 2008). This poses both a threat to the economic viability of the Airport City and Aerotropolis as a business venture which could manifest as an exemplified pro-growth and territorial trend or as an opportunity, that if strategically well planned, could become a sustainably integrative solution.

A plethora of literature documents the growth of airports as highly politicised events bringing to the fore arguments of sustainability in line with the paradox of local liveability and the need to connect to global economic markets via aviation (Freestone & Baker, 2011). The application of the Aerotropolis to the CTIA therefore represents the very coal face of the dual challenge to balance the demand for Cape Town as a globally competitive city while at the

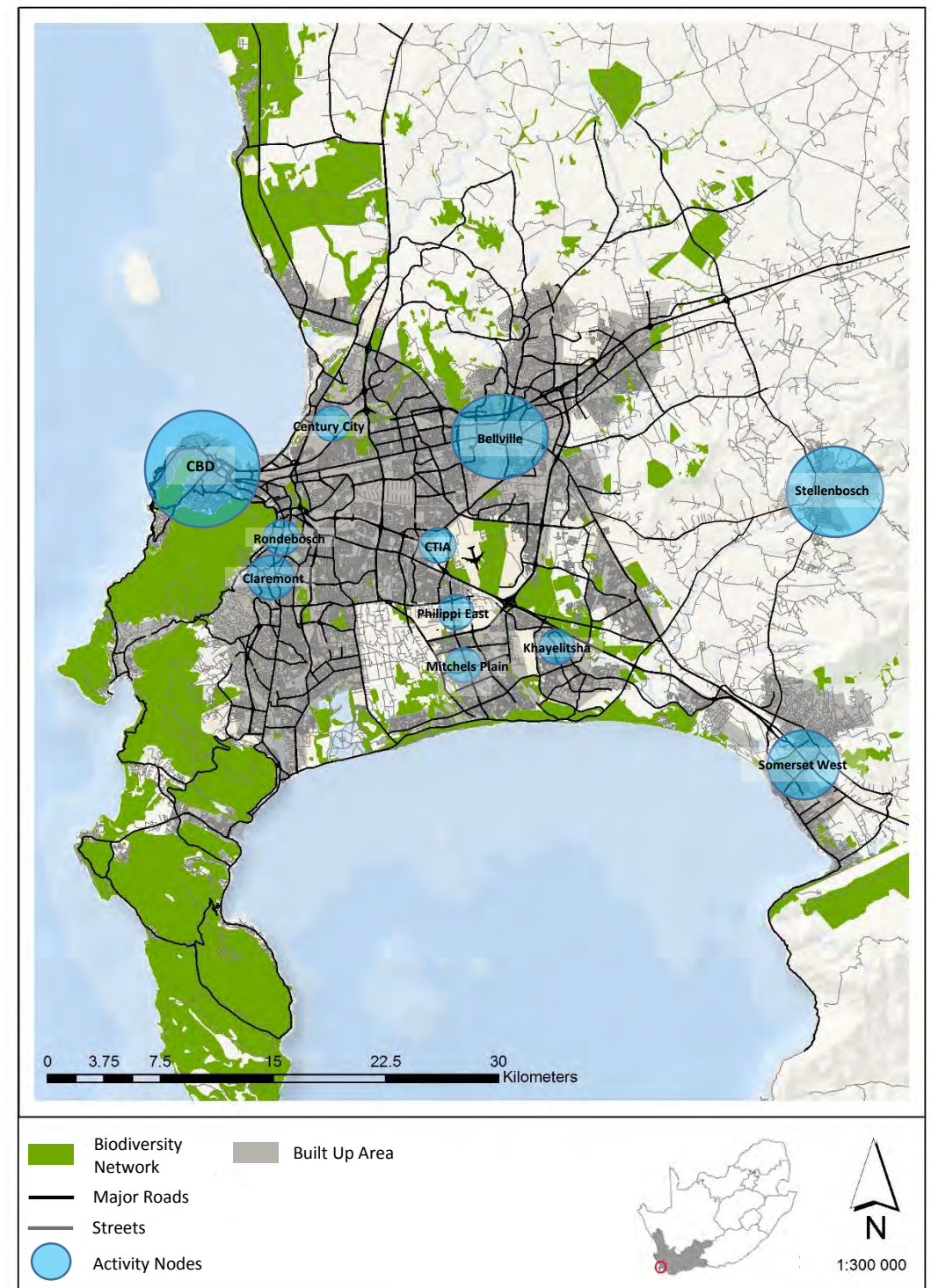


Figure 1.2 Cape Metropolitan Area (Data sourced from: UCT Library, 2015)

same time supplying basic services to marginalised groups on the peripheries. At the regional scale, the Aerotropolis concept has challenged the way in which spatial planners have traditionally perceived the functioning of an airport (Freestone & Baker, 2011). Although caught up in silo's, politics, ownership, management and fiscal

budget restraints, airport master planning is critiqued for being employed in a top down blue print manner, failing to have any redistributive effects on surrounding communities (Kwakkel, Walker & Marchau, 2010; Freestone & Baker, 2011). At the other end of the spectrum airports are not adequately recognised as potential growth nodes in broader regional economic and spatial planning frameworks (Stevens, 2012).

In hindsight of the fact that there are a diversity of concepts used to describe airport urban forms, there exists no consensus on what constitutes an Aerotropolis because there is no fully matured version or fixed blue-print (Petzer, 2012). Airports also consist of a diverse range of actors implying that they are the realised outcome of multiple rationalities of different bargaining power (Peneda, Reis & Macário, 2011). Freestone & Baker (2011) describe the Aerotropolis model as a new type of incremental mega development process that requires closer inspection by urban planners in particular. Freestone (2009) argues that urban planning ought to have a pivotal role in balancing the pro-growth orientated aviation industry perspective with that of broader urban concerns of socio-ecological and economic sustainability.

It is critical to note that the 'Aerotropolis' is critiqued for its westernised focus and modernist ideals, promoting sprawl by segregating functions, over concentrating expensive infrastructure with the assumption of increased growth in addition to being subject to an array of broader volatile market forces, peak oil, emission trading schemes and climate change (Freestone & Baker, 2011). Health epidemics, terrorism, natural disasters and immigration controls are also on the list of scepticism. Equally important is the idea of setting, where urban theorists concerned with a perspective from the global south have emphasised a comprehension of context specific values rather than simply mimicking theories formulated in the developed world (Harrison, Todes & Watson, 2008). These issues include conflicting rationalities, diverse ethnicity, weak authoritarian states as well as the growing role of informality in land markets, transport and micro-traded goods. :

This leaves the Aerotropolis concept to be largely open to qualitative interpretation, especially in Africa where rapid in-migration and urbanisation is on the agenda for the coming decades. It is within this context that the following central questions arise

1. What is the most sustainably integrated airport urban form for the future CTIA?

2. Recognising the airport as an economic driver for the immediate South East Metro, how can existing spatial and economic frameworks be aligned with airport-urban theories in a manner that is orientated toward post-apartheid restructuring and spatial transformation?

The challenges that Cape Town faces are still particularly vast. The role of networked governance implied by the Aerotropolis challenges the fact that integrated planning in South Africa is caught up in government bureaucracy, regime changes, neoliberal pro-growth agenda's as well as incoherent spatial planning and land use management systems which hinder the opportunity of pro-poor and long term sustainable partnerships, aligned visions and targeted budgets (Harrison, Todes & Watson, 2008).

1.3 PHILOSOPHICAL UNDERPINNING OF THE STUDY

Sandercock (1998) argues that planning is 'pluralistic' for being inherently an integrative discipline synthesising intricacies from the built environment. Healey (2003) adds that planning practice is strongly political and underlain by multiple values and expressions of power. Planners are therefore bound to navigating the complexities of the urban realm by reflectively adapting an array of theoretical groundings and best practice precedence to continuously dynamic contexts which further impact upon the gained individual experience and the shaping of ethical judgements (Healey, 2003). This progression is influenced by an individual or 'collectively shared perception' of what a just and equitable city should entail (Healey, 2002). As a master's student in City and Regional Planning at the University of Cape Town my ethical foundation is based on an understanding of socio-ecological and economic sustainability. This is a transdisciplinarity mode of intellect where interdependencies between social, economic and ecologic aspects are more

holistically considered (Max-Neeff, 2005). Embedded within this theoretical grounding my standpoint toward the following dissertation is that if the Aerotropolis poses both a social, economic and environmental threat to the immediate hinterland and a significant economic opportunity, the normative position would be to attempt to balance these outcomes in a mutually beneficial manner. In this regard, if the CTIA Aerotropolis is a pro-growth orientated exercise without innovative bottom up regional collaboration toward a shared vision, the CTIA will continue to exist as a socially and technically gated urban form, failing to harness the best possible opportunities and value for surrounding communities.

1.4 LIMITATIONS OF THE STUDY

Applying different airport urban concepts to an airport haphazardly woven into the urban fabric requires shared visions, extensive public participation, economic and business feasibility as well as value chain analysis to determine the market demand and investment potential, before re-configuring land uses in a manner conducive to attracting private sector development near or related to the CTIA. The nature of this task is particularly complex requiring a multidisciplinary team of experts and therefore being unachievable by a single researcher.

Further limitations to the study are time and the accessibility of spatial data and technically related documentation which was restricted either for businesses or financial purposes. A lack of quality data sets for land ownership and value were further problematic.

1.5 SCOPE AND STRUCTURE OF THE STUDY

The dissertation puts forward a twenty (20) year strategic SDF based on principles derived from lessons gained from different airport urban planning concepts and the ideas and input acquired from specialists in fields related to airport, business and urban planning. The intervention of the SDF is based on identifying different socio-ecological and economic spinoffs during the different phases of the CTIA's adoption of the Aerotropolis and Airport City processes. The ultimate goal of the dissertation is not to deliver a fixed

directive plan but rather to contribute ideas and possibilities from a sustainable global south urban planning perspective. The overall structure of the dissertation is outlined in Figure 1.3 across.

Chapter 2 provides an in depth literature review of the historical evolution of airport growth and a comparison and critique of different airport urban forms in relation to spatial planning paradigms. Specific attention is given to Professor John Kasarda's Aerotropolis concept and principles which are further unpacked in terms of ecological, socio-economic and infrastructural sustainability.

Chapter 3 provides a provides a brief introduction to the African Aviation freight market before elaborating on airport urban precedents in global north, south and south east cities.

Chapter 4 comprehends international airports in the South African landscape. The aim is to understand the role of ACSA and national, provincial and local government in the Aerotropolis and Airport City processes. The Chapter outlines critical legislature, governance and financing patterns as well trends in aeronautical and non-aeronautical income. This is further related to the tools used by the National Spatial Development Plan (NSDP) and the opportunities around transit orientated value capture.

Chapter 5 describes the methodology used to guide the researcher in formulating a regional Spatial Development Framework for the CTIA.

Chapter 6 sets out the legislative grounding to the analysis section and the overall Strategic Development Framework (SDF).

Chapter 7 investigates the functioning of the CTIA from a 25 km and 5 km radial influence. The analysis includes three different layers: The Biophysical, Infrastructure and Economic environments. These are mutually reinforcing and progression in each must run concurrently.

Chapter 8 investigates the 5km influence of the CTIA in terms of land use, connectivity and catalytic infrastructure proposals. The chapter concludes with the opportunities and constraints pertaining to both the 25 km and 5km regions.

Chapter 9 provides the strategic framework and phasing for the 5km Airport City region. Focus is directed toward the role of public private partnerships and identifying innovative ways to harness a mutually beneficial environment for the CTIA and surrounds. Thereafter, the findings of the study and strategy are concluded along with indications of fields required for further potential research.

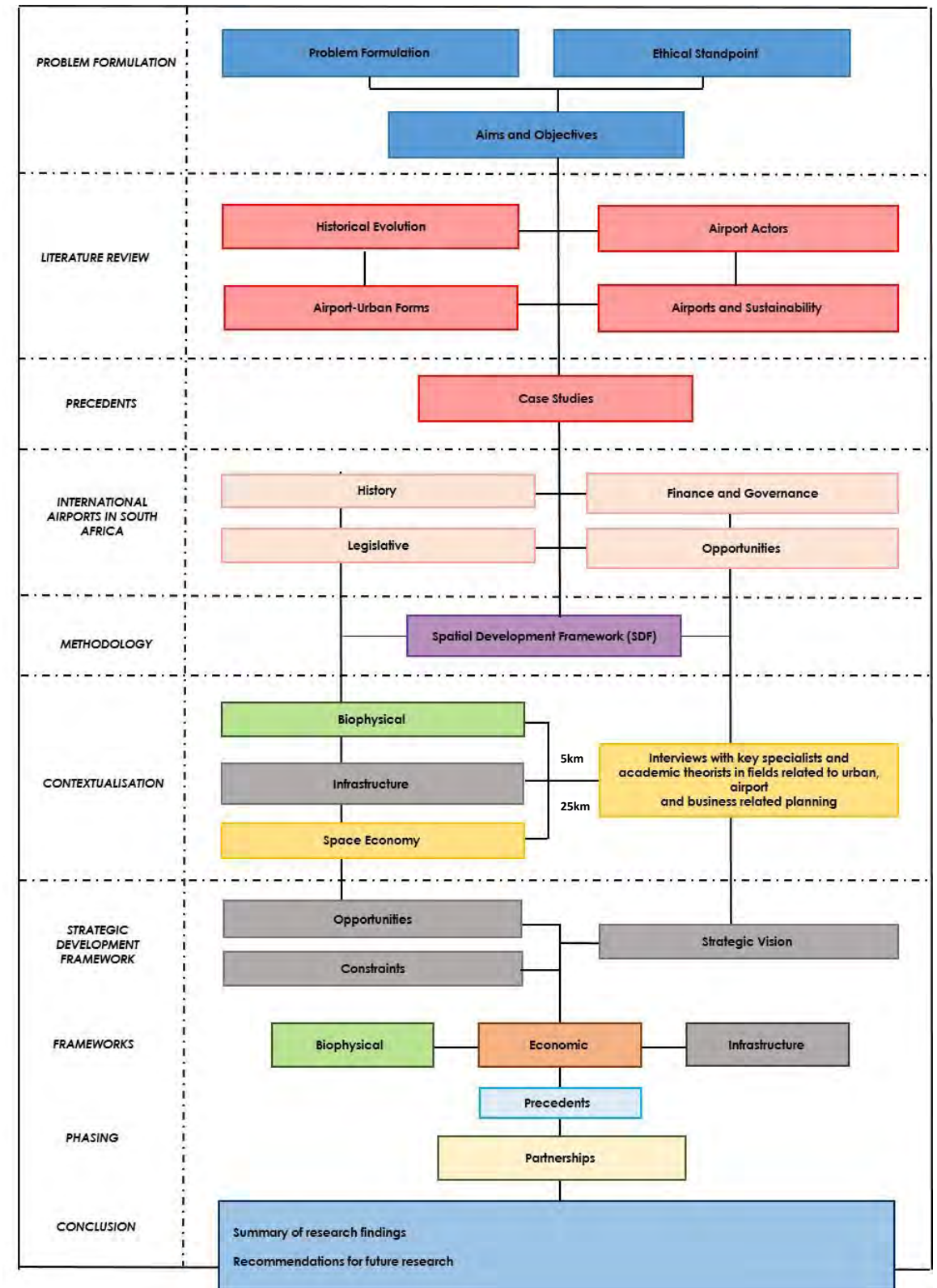


Figure 1.3 Structure of the Dissertation (Source: Author, 2015)

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

The literature review comprehends the background to airport development in relation to the central question proposed in Chapter 1. The task requires an understanding of the historical, governance, financial and spatial evolution of airports into Airport cities and Aerotropoli. Most importantly is the need for an integrated perspective of airports in relation to 21st Century demand for cities to ecologically and socio-technically retrofit themselves in line with global sustainability goals (UN Habitat, 2011).

2.2 HISTORICAL EVOLUTION OF GLOBAL AIRPORT GROWTH

Airports are physical gateways and transfer devices that have a visa versa shaping on the making of world class cities and global networked structures (Graham & Marvin, 2001). Major trends underpinning airport growth in the Global North and South East regions over the past century are the amalgamation of militarisation, privatisation and liberalisation of trade, environmental concern, globalisation, commercialisation, digitisation and time efficient competition (Freestone, 2009; Kasarda, 2010; McNeil, 2014).

In the 1920's airports were conceived by city planners as micro components of the urban transport network and as places of strategic military defence associated with highly bureaucratic leaderships (McNeil, 2014). Thereafter, the World War II period was accompanied with the development of military air bases and advances in aircrafts and aerospace industries (Peneda, 2010). In the 1960's the liberalisation of global trade unlocked the world to new economies as commercialisation, privatisation and globalisation ensued (Kasarda, 2001). The Post World War 2 era saw the democratization of aviation in the USA and Europe, who commissioned the development of new airports on metropolitan edges in order to replace older militaristic facilities (Freestone, 2009). To reduce responsibility and pressure on state funds, airport ownership was stereotypically transferred to civil aviation authorities and private sector investors who increasingly leased land for airport development (Stevens, 2012).

From financial perspectives, airports traditionally gained profit through aeronautical revenue on the 'airside' of the airport by charging airlines for flight control, parking and runway fees as well as baggage handling (Stevens, 2012). Non-aeronautical revenue originated through charging for car parking as well retail floor space to line and anchor tenants at terminals on the 'landside' (Kasarda and Lindsay 2012). In order to maximise and diversify income streams and to reduce the risk and sole reliance on aeronautical revenue, the creation of airport real estate enterprises and the leasing out of land to large scale property holding companies became a significant means of raising non-aeronautical revenue (Peneda, Reis & Macário, 2011).

Conway (1993) recognises airports in parallel with the edge city phenomenon where consumer focus was emphasised at terminals with duty free shopping related activities. This trend slowly diversified to include hotels, conference centres and shopping malls with restaurants, branded boutiques and retail facilities (Kasarda, 2009). Airports essentially became business hubs of social and financial transactions between suppliers, clients and producers. Enhanced face to face interaction of knowledge and reduction of last mile to global supply chains was key to this trend (Kasarda, 2010).

Depicted in Figure 2.1 is a systematic illustration of the interrelated airport expansion process from the 1970's onward as described by (Peneda, Reis & Macário, 2011). Comprehending the networked character of the airport in the global regional sense, significant trends were the development of the hub and spoke network, low cost passenger carriers and the forming of alliances between global airline companies (Peneda, Reis & Macário, 2011). Airline passenger and cargo flows became a central indicator of a city's global connectivity and competitiveness (Bilotkach 2015). Simultaneously, the marketing of airports by airport companies climbed sharply with each aspiring to reach a so called 'Global Airport City' status (Kasarda & Lindsay, 2011).

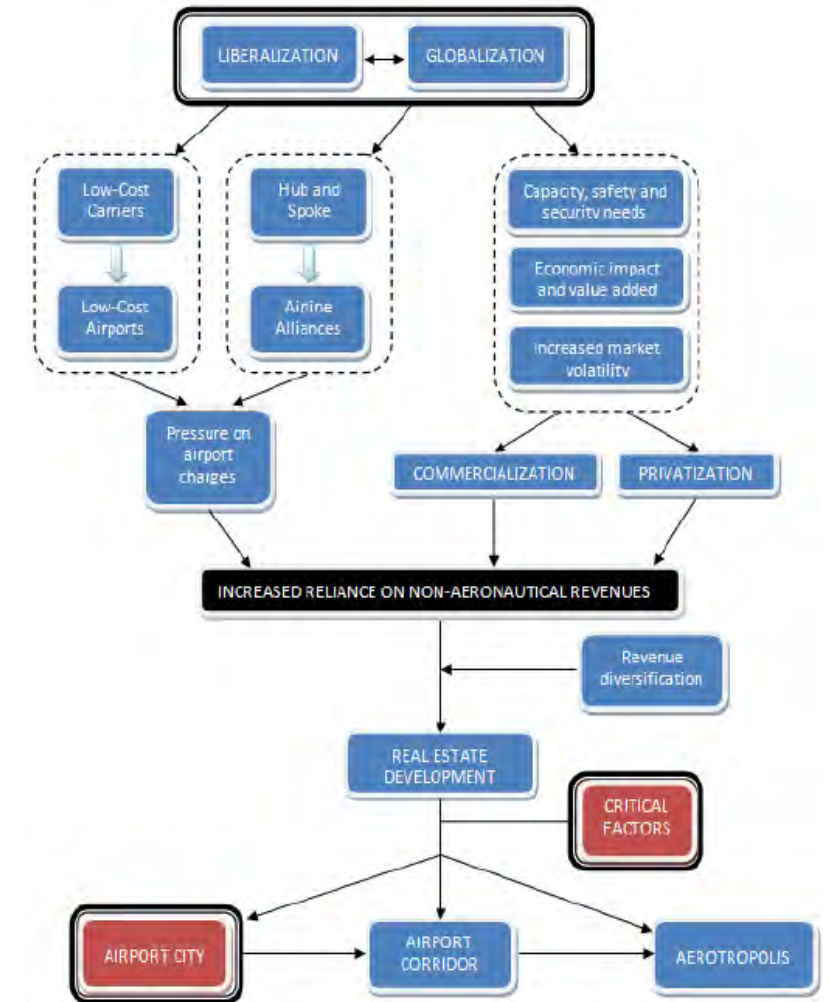


Figure 2.1 Trends in Global Airport Development (Peneda, Reis & Macário, 2011:3)

From the 1980's onward the Airport City found its real foothold in the ideals of privatisation and consumerism as a result of neo-liberal agendas (Freestone, 2009). Consistent with technological advancement, Freestone (2009) argues that the introduction of the Boeing 707 to transport larger volumes of passengers and air freight attracted the demand for clustering of industrial, warehousing and business park developments.

The hub and spoke model distinguished airports according to their locational advantage, economic status and population size (Peneda, Reis & Macário, 2011). Larger airports became central international...

...nodes in the broader global network of aviation routes and smaller domestic airports were connected to these (Peneda, Reis & Macário, 2011). Stevens (2012:45) differentiates these as “international gateway airports, national hub airports, regional airports, tourist generator airports, tourist receiver airports, and transit and interline airports”. Functionality is therefore a significant factor affecting the outcome of airport urban forms. In the regional sense the connectivity between seaports, railway, roads, and airports required regional scale planning (Kasarda, 2001).

Inspired by Castells' (1996) network city, splintering urbanism is described by Graham & Marvin (2002) who emphasise the idea that infrastructure and society are socio-technically connected and that social, capital and knowledge flows are more strongly related to international economies than local ones. In this regard, as airports become increasingly complex, a specialisation of infrastructure and logistics has dissociated them from their hinterlands (Graham & Marvin, 2002). Along with the class of the user group, the authors argue that airports have become premium networked spaces and non conformist places of hyper modernity. Simultaneously, the global environmental movement sprouted widespread contestation toward additional runways and the resultant noise, displacement, waste and carbon emissions (Freestone, 2009). This emphasised the paradox between the demand to connect globally and the impact on local liveability (Freestone & Baker, 2011).

Overall, airports should not be observed in isolation of their metropolitan surroundings because these phenomena have leveraged them as emerging cities with local liveability concerns (Stevens, 2012). The underlying trend is the ability to balance trade offs between the airport and the hinterland which depends on the nature and degree of coordination amongst the actors involved in the process.

2.3 AIRPORT DEVELOPMENT THEMES AND ACTORS

Zietsman (2013) identifies five main themes informing airport development. These include socio-economic, spatial and urban planning, transportation

improvement, environmental preservation and financial viability. The interrelationship between the themes is what gives rise to the relationship between the airport territorial boundary and the immediate hinterland. The socio-economic aspect relates to employment potential while financial success for airport owners is a demand-driven exercise, highly dependent on the timely installation of airport infrastructure in line with off-setting airline tariffs to increasingly accommodate the volume of passengers, airlines and freight transporters who use the facility (Zietsman, 2013).

Studies are conducted to forecast the necessary infrastructure and the associated political and institutional arrangements for airport expansion, which in turn spur the need for appropriate regional transport improvement and spatial and urban planning (Zietsman, 2013). The sub sequential, environmental aspects are concerned with air emissions, noise, pollution, waste, water consumption and electricity which are proportional to passenger and cargo throughput as well as the land required for airport development (Zietsman, 2013).

Perceiving airports in relation to their regional surroundings, Stevens (2012) uses an integrative model which is subdivided as infrastructure, governance, land use as well as economic and sustainable development (See Figure 2.2).

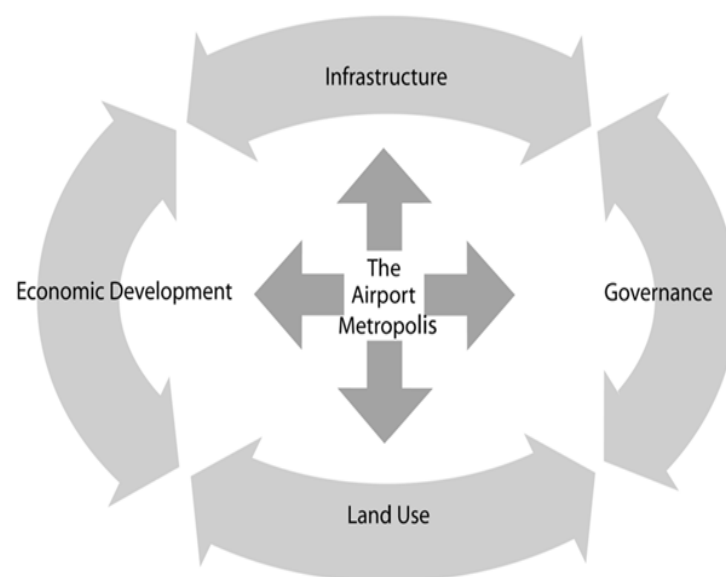


Figure 2.2 Airport Interface Model (Source: Stevens, 2012: 46)

The interdependence between airline connectivity, the desire for non-aeronautical revenue and the demand for airport and regional infrastructure is what attracts businesses to the airport, while the institutional, cultural and social environment affects market performance in terms of perceptions toward administrative efficiency, health, well-being and safety (Stevens, 2012). Airports demand large quantities of funding from national, provincial and local government and since all goods must be brought to the airport by some means, the overall road and transport infrastructure is critical as it connects and allows the inter-modality of the airport (Stevens, 2012). Correlated with transport is the regional land use and increased value component which requires a collaborative integration of airport authorities, government, private landowners and community. The success of airports is therefore negatively impacted upon by political infighting and a lack of coordination amongst stakeholders (Stevens, 2006). This can also be triggered by legislative and policy frameworks which filter airport and metropolitan planning authorities into concentrated silos, when in fact the space in which the two operate are interdependent and have a particular social and economic impact (Stevens, 2012). What is required is a form of hybrid governance with shared decision making and strategic planning amongst a vast range of actors (Appold & Kasarda, 2013).

Peneda, Reis & Macário (2011) provide a framework for the main stakeholders involved in airport related planning, further describing the potential conflicting relationship between them. These include politicians, airport operators, users and non-users in addition to developers and investors (See Figure 2.3 on following page). According to Kasarda (2013) the primary issue underpinning airport expansion is the ability to manage trade-offs and settle disputes between in the most holistically viable manner.

The primary task of the airport operator is based on attracting airlines and providing sufficient infrastructure for the supply and demand of air travel and cargo. The airport operator is influenced by politicians in the form of trade agreements, legislation, regulation and various incentives and directives (Peneda, Reis & Macário, 2011). An airport's ability to serve as a tool for economic spin-offs to

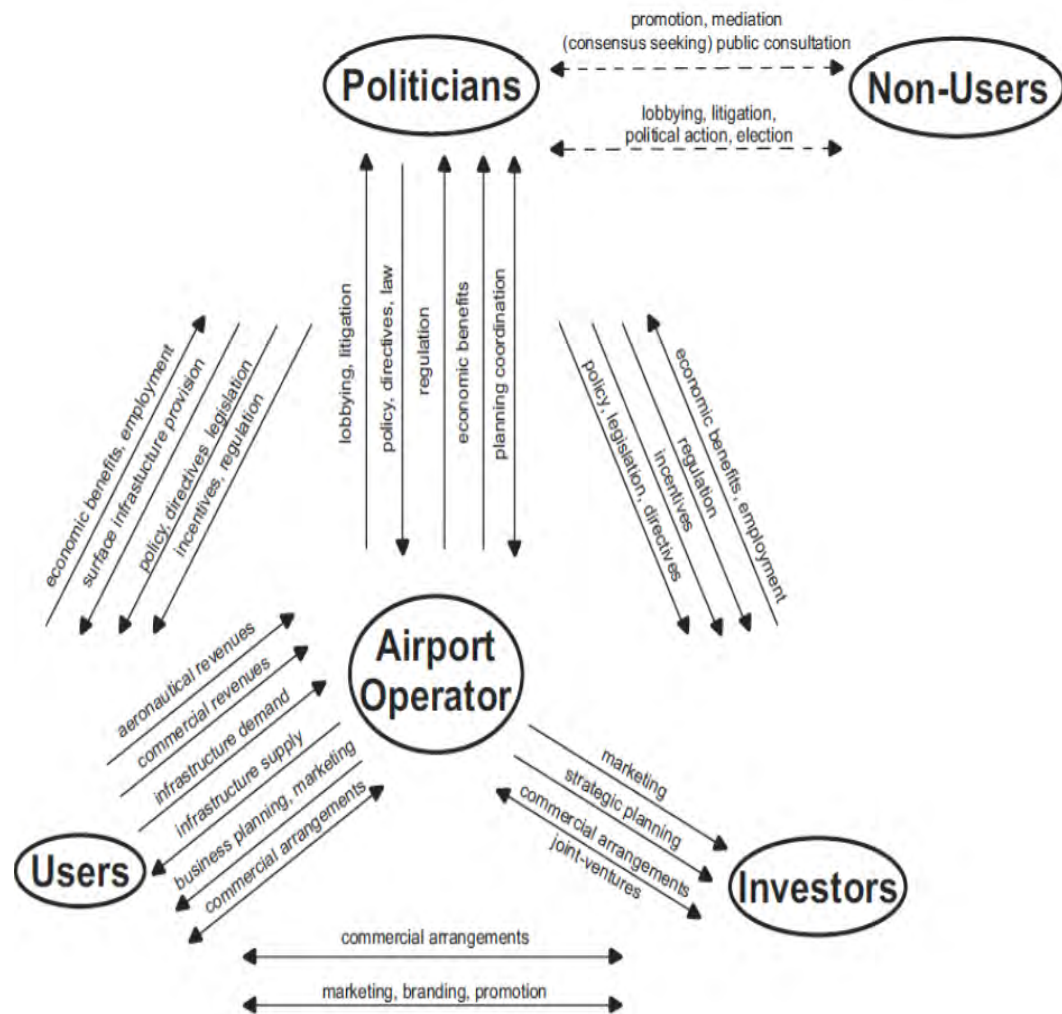


Figure 2.3 Airport Development Stakeholders (Source: Peneda, Reis & Macário, 2011:6)

tourism, manufacturing and industry is what maximises the political interest (Peneda, Reis & Macário, 2011). Airports are therefore national entities and must be understood from a national policy level (Zietsman 2013). The user stakeholder group is diverse and exhibits several complex relationships between passengers, transport and infrastructure authorities, businesses and workforce (Peneda, Reis & Macário, 2011). Airport support functions consist of activities like aircraft maintenance, flight kitchens as well as freight services, customs and foreign trade (Kasarda, 2010). Time sensitive activities include logistics, warehousing, perishable goods handling and e-commerce facilities. Specialist logistics companies are also found as important role players controlling the flow of goods assembly and distribution (Kasarda & Lindsay, 2011). Cargo handling and freight forwarding companies keep a close relation with airlines in order to arrange cargo space for goods to fly in aircrafts.

The non-user groups consists of those who deal with the negative externalities of airport growth such as local communities, surrounding landowners, environmental activists, NGO's and anti-noise groups (Peneda, Reis & Macário, 2011). Depending on the collective power of these groups, they have the ability to impact on investors through public contestation toward runway development and industry and business related growth (Stevens 2012). The mitigation of externalities is therefore the crux of airport planning which in turn sets up the resultant airport urban form (Kasarda, 2010).

2.4 AIRPORT URBAN FORMS

The literature reveals that there are a variety of urban related concepts associated with the overarching discourse of urban regional and airport centred planning. These occur at different scales from the micro-terminal up to the macro metropolitan level. The most widely discussed are the 'Airport City', 'Airport Corridor' and the 'Aerotropolis' (Peneda, Reis & Macário, 2011). Depicted in Figure 2.4 is an illustration of the different airport urban forms. Along with other terms such as the 'Aviopolis', 'Decoplex' and 'Airfront' these have also become synonymously ill-defined buzz words, often used by economists, politicians and airport operators as market and business slogans to coin and initiate the process of airport expansion (Stevens, 2006). Freestone & Baker (2011) argue that scholarly planning literature has neglected the impact and potentials of airports on metropolitan urban forms. Both airport master plans and literature on airports has been a technically documented process by transportation engineers and economists without an adaptive regional frame of reference (Kwakkel, Walker & Marchau, 2010).

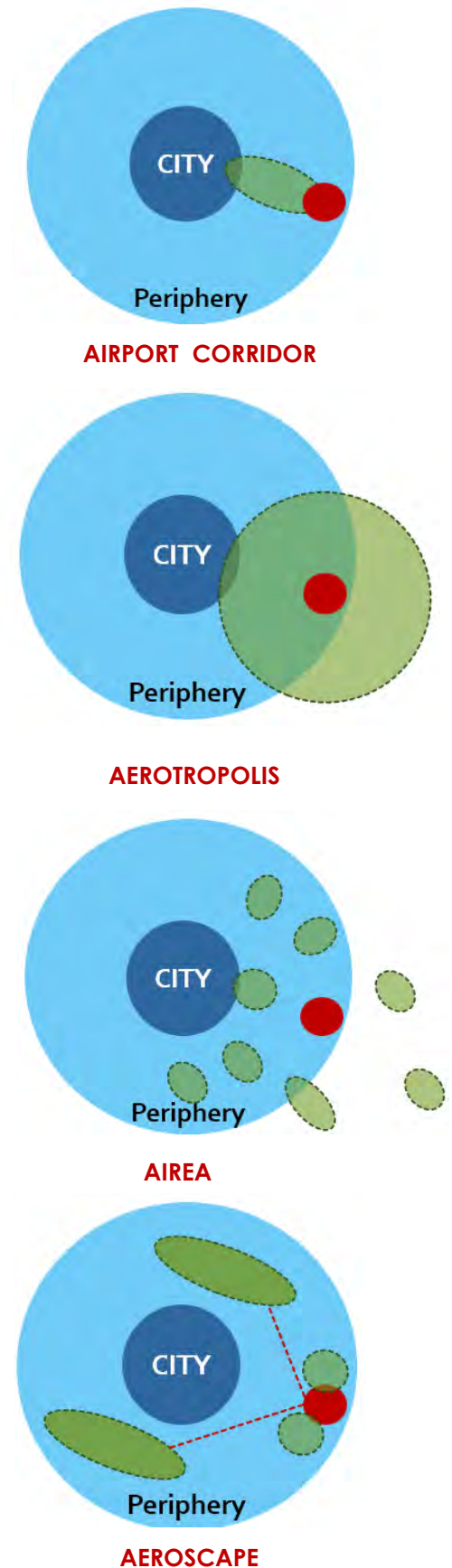


Figure 2.4 Airport urban Forms (Source: Baker (2011) in Petzer (2012:34)

Given that airports may portray various aspects of each configuration and rather than simply relying on the Aerotropolis concept, planners have been cognisant to match and apply their strengths and principles (Petzer, 2012). In this regard, the 'Airea' and the 'AeroScape' are increasingly acknowledged in contemporary literature as post-modern forms of planning because retrofitting an existing airport into an Aerotropolis must be seen in the relational sense to different economic archipelagos dispersed within the urban fabric (Schlaak, 2010).

2.4.1 The Airport City

Freestone (2009) points out that the entwinement of airports and cities is based on the infamous architecture of Le Corbusier's 1920's skyscraper city with aerodromes mantled upon rooftops. The idea was based on the assumption that cities with speed will be highly sought after in the future global economy (Freestone, 2009). During the 1970's, McKinley Conway resurrected the airport city phenomena in the USA (Peneda, Reis & Macário, 2011). The author viewed the airport runway as the main street with all the similar components found in a traditional small town such as industrial facilities, hotels, business centres and waste water treatment works. From a spatial perspective Conway (1993) understood that the airport consists of three concentric zones (See Figure 2.5). These include a core red zone for aircraft operations ranging between 2000-4000 hectares; a blue zone for industrial development, office parks and hotels ranging between 4000-8000 hectares; and lastly, a green zone or green belt which may include other uses.

The Airport City is described by Guller & Guller (2003) as a planned integration of the airport and real estate development. The core city is what integrates aeronautical and non-aeronautical incomes which are highly interdependent (Guller & Guller 2003). The overall process is described by Freestone and Baker (2011) as being determined by air connectivity commercial driven development, as well as the degree of public input and decision making between various actors.

Finavia (2004) synonymously makes use of the term 'Aviopolis' as a means of describing the marketing and strategic re-organisation of the airport as a mixed

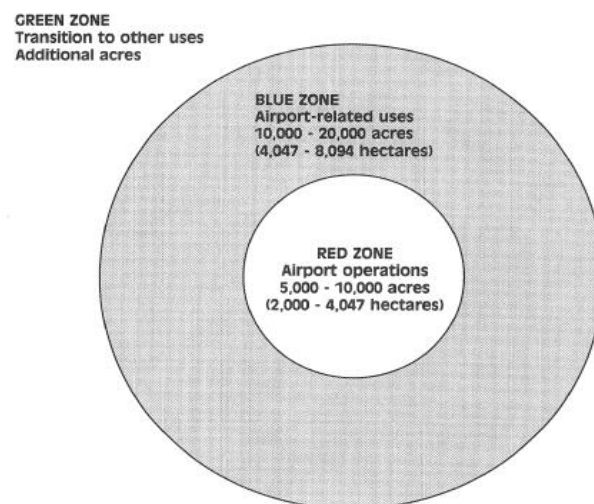


Figure 2.5 The Airport City Model (Source: Conway, 1993: 47 in Baker, 2012)

used commercial, residential and industrial hub, while Blanton (2004) uses the term 'Airfront' to highlight the role of planners in shaping and organising the airport in terms of regional and local linkages. The latter author emphasises a scenario based approach to leverage airports as economic hubs and better connect them to regional land use, infrastructure and transportation planning.

Peneda, Reis & Macário (2011) indicate that the pathway towards achieving Airport City growth is often met with difficulty and failures. The authors conducted several personal interviews with key specialists, finally identifying four key critical factors for the successful emergence of an Airport City. These include the accessibility and connectivity to airport surroundings, the economic potential of surrounding areas, the commercial approach taken by airport operators and the overall context of sustainability (Peneda, Reis & Macário, 2011).

2.4.2 The Airport Corridor

The airport corridor is articulated by Schaafsma, one of Amsterdam's senior airport planners who emphasises the link between the Schipol Airport and the CBD as a special economic zone of integrated infrastructure like road, rail and densified property development (Petzer 2012). The concept is most prominently applied to cities where CBD's are closer to airport regions (Peneda, Reis & Macário, 2011).

According to Petzer (2012), Schaafsma believes the airport corridor has become a place for business parks and regional headquarters, with the dominant sectors including insurance, banking and finance. The most prominent airport corridors have occurred under clearly defined governance structures such as Schiphol Airport and Charles de Gaulle International Airport (Peneda, Reis & Macário, 2011). Moreover, in conjunction with high speed railway projects, airport corridor approaches have been adopted in Kuala Lumpur, Zurich, Dubai, Hong Kong and Singapore who have devoted time and capital intensive infrastructure, subsidies and different forms of marketing to the idea (Stevens, 2012).

2.4.3 The Aerotropolis

The Aerotropolis concept is dominantly influenced by Professor John Kasarda's prior publications and research on logistics, economic development as well as airport employment growth and aviation networks. At the precinct scale, the Aerotropolis includes the Airport City by advocating for large scale developments around future and existing airports. The regional idea of an Aerotropolis can stretch from 25 to 60 kilometres from the airport core (Kasarda & Lindsay, 2011). The Aerotropolis is therefore emphasised as a business and logistics based model (Freestone & Baker 2011). The competitive advantage is gained by making an efficient process in both the cargo and logistics environment with different distribution channels feeding in (Kasarda, 2001). The competitiveness of the airport is determined by the degree of connectivity and speed that takes place (Kasarda, 2010).

According to Peneda, Reis & Macário (2011) the Aerotropolis represents a coordination of infrastructure, land use, marketing and spatial planning outside of the airports, hence the Aerotropolis extends beyond the fence to acknowledge that there may exist a variety of political units that regulate surrounding land uses and whose decisions ultimately impacts on time and cost efficiency of the airport function (Kasarda, 2010). The Aerotropolis includes operational elements such as the people and businesses who work at or live near the airport in addition to those who live elsewhere but are dependent on use of the airport for access to.

suppliers, business clients or customers. Kasarda & Appold (2014) proposes ten (10) macro level planning principles for an Aerotropolis:

1. "Airports not only provide financial return but should be understood as public goods associated with long term multi-stakeholder partnership;
2. Airport cities should be aware of competing industries in the area but also attempt to strengthen and enhance linkages to these;
3. Alignment of key stakeholders is crucial to the Aerotropolis vision;
4. Government and airline decisions can strongly impact investment in these locations;
5. Market condition assessment is crucial to determine and leverage market demand;
6. Location and minimising time cost accessibility to key nodes;
7. Building on economies of scale by constructing development pathways for short term investment returns and continued infrastructure improvements;
8. Aerotropolis residential communities housing airport area workers and frequent air travellers;
9. Aerotropolis development and "smart" urban growth can and should go hand-in-hand;
10. The ultimate success of the Aerotropolis rests on the aviation-enabled advantages and integrating airport planning, urban planning, and business site planning";

The principles proposed above are primarily related to a form of aviation dependent integrated regional planning where public private partnerships and cross sector collaboration are key for coordinating the overall process. According to Kasarda & Appold (2014) the major theoretical field applicable to the Aerotropolis is sustainable integrated airport planning, which is subdivided as urban theory, aviation related development and business and site planning (See Figure 2.6).



Figure 2.6 Integrated Aerotropolis Planning (Kasarda & Appold, 2014 :45)

The Aerotropolis implies that the airport operator is not the main role-player but rather a crucial stakeholder within a networked public private platform. The business planning component is primarily concerned with adding additional non-stop routes, land site selection and demand as well as marketing and attracting local and global companies to locate themselves at the airport (Kasarda & Appold, 2014). This is affected by the interrelation between air services, labour force, location in the metropolitan and market conditions (Kasarda & Appold, 2014). The urban planning component pertains to coordination between airport companies, private sector and governments who seek to orchestrate fiscal budgets for transportation, land use and community design (Kasarda & Lindsay, 2011)). This is typically achieved through the formation of steering committees and public private partnerships where the central trend is a recoupling of airport master plans, land use plans and regional economic frameworks.

Schiphol International Airport in Amsterdam is cited by Kasarda (2010) as the industry leader of the Aerotropolis concept, with strategic responses toward connectivity also seen by cities like Hong Kong, New Songdo, Dubai, Chicago, Memphis, Paris, Singapore, Bangkok, Shanghai and Osaka who have economically understood the airport as an engine of growth able to bolster comparative and competitive advantages in trade and logistics (Kasarda, 2010).

The goods typically moved by these countries include hi-tech products, manufacturing parts for iPads, computers, mobile smart phones and other technological devices which come from well skilled work bases (Kasarda, 2010).

2.4.4 The Airea

The 'Airea' is a phenomenon described by Professor Johanna from the Centre for Metropolitan Studies in Berlin. Schlaak (2010) incorporates some aspects of the Aerotropolis but employs a broader metropolitan rather than airport centric perspective (See Figure 2.7). Schlaak (2010) argues that multiple stakeholder rationalities have resulted in a lack of integrated planning, faceless airports and sprawl along corridors.

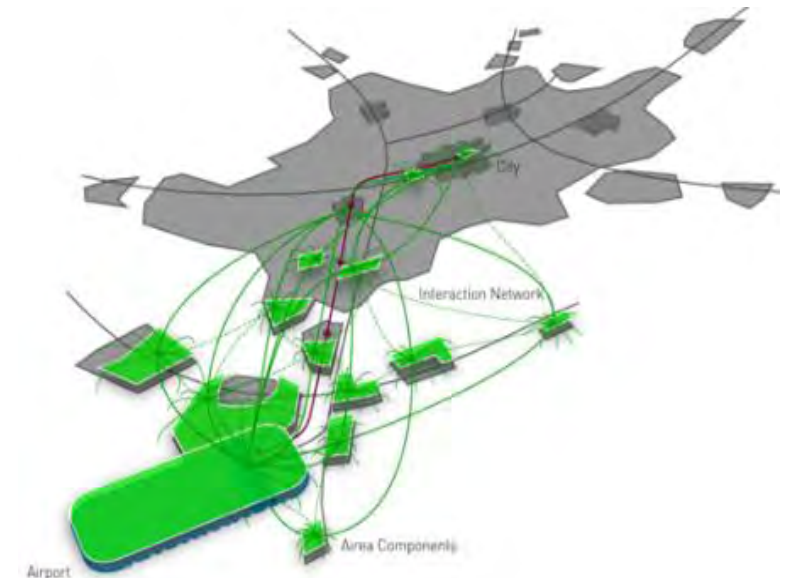


Figure 2.7 The Airea and Relational Spaces (Source: Baker, 2012)

The Airea is seen as existing within the urban fabric and connecting to a heterogeneously configured array of industrial and business islands which are either directly or indirectly related to the airport as well as each other (Baker, 2012). The Airea focusses not only on the central surroundings but the fragmented areas that have key connections to the airport (Petzer, 2012). The Airea is therefore centred on an iterative and comprehensive coordination of transportational demand and land use input from various participatory planning workshops which attract partnership and foreign investment (Schlaak, 2010).

2.4.5 The AeroScape

Kraffszyk (2012) advocates for the AeroScape approach which is based on the Airea but goes further to give expression to the time cost reality of distances between the geographically dispersed economic clusters in relation to aviation networks. According to Petzer (2012) there is no hierarchy to this spatial order and enhancing linkages and strengthening constellations between these is important. The faster the flow of goods and services between them the greater the economic benefit.

The key lesson regarding terminology is that retrofitting an existing airport should be clearly distinguished as an 'AeroScape' or 'Airea' that rekindles connections to the fragmented industrial islands of the city through collaborative intersectoral partnerships, innovative policy mechanisms and meticulous transport, community and land use planning. The Aerotropolis as a physical urban model is exacerbated, applicable only to greenfield sites or the logistical functioning of an existing airport and is insufficient for the global south, hence a clearer understanding of the different airport urban forms in relation to urban planning paradigms is necessary.

2.5 AIRPORTS AND URBAN PLANNING PARADIGMS

Airport urban concepts are primarily based on Transit Orientated Development (TOD) layouts as is depicted in Figure 2.8). The terminology is around how the main arterial is the airport runway, the terminal as a gateway and the functional core, with a walkable urban square that contains commercial outlets, leisure facilities, hotels, shopping malls, retail complexes and mixed use housing. The difference is simply the intermodal complexity and connectivity of the interchange which has access to global, regional and local markets (Stevens, 2012). According to Rhen & Huston (2015:95), the success of TOD in relation to sustainable urban regeneration is around "partnership engagement (informally or in a joint venture), site simplicity, place distinctiveness or sufficient enhancement funding, transport integration, speculative constraints and authentic local community discourse". Baker (2012) depicts each of the airport centred forms in relation to the degree of reference made to different urban planning paradigms (See Figure 2.9 across).

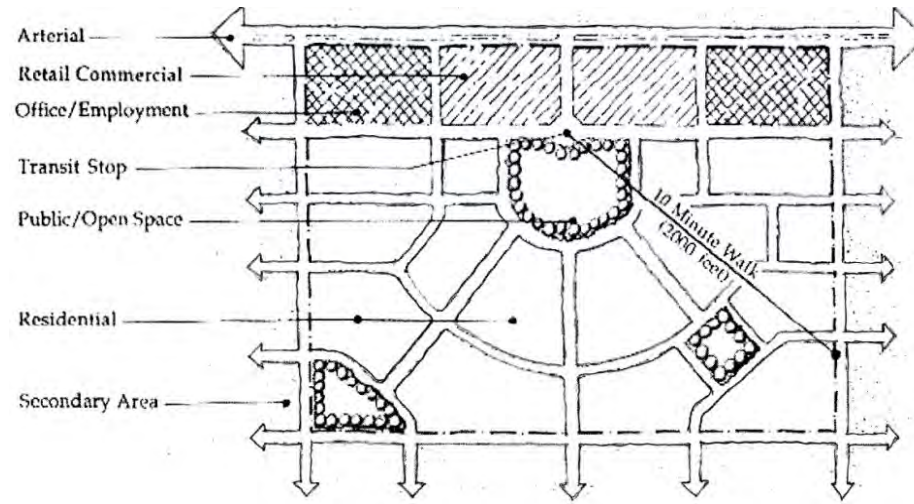


Figure 2.8 TOD and Neighbourhood Layout (Source: Katz 1994 in Wilkinson, 2006:224)

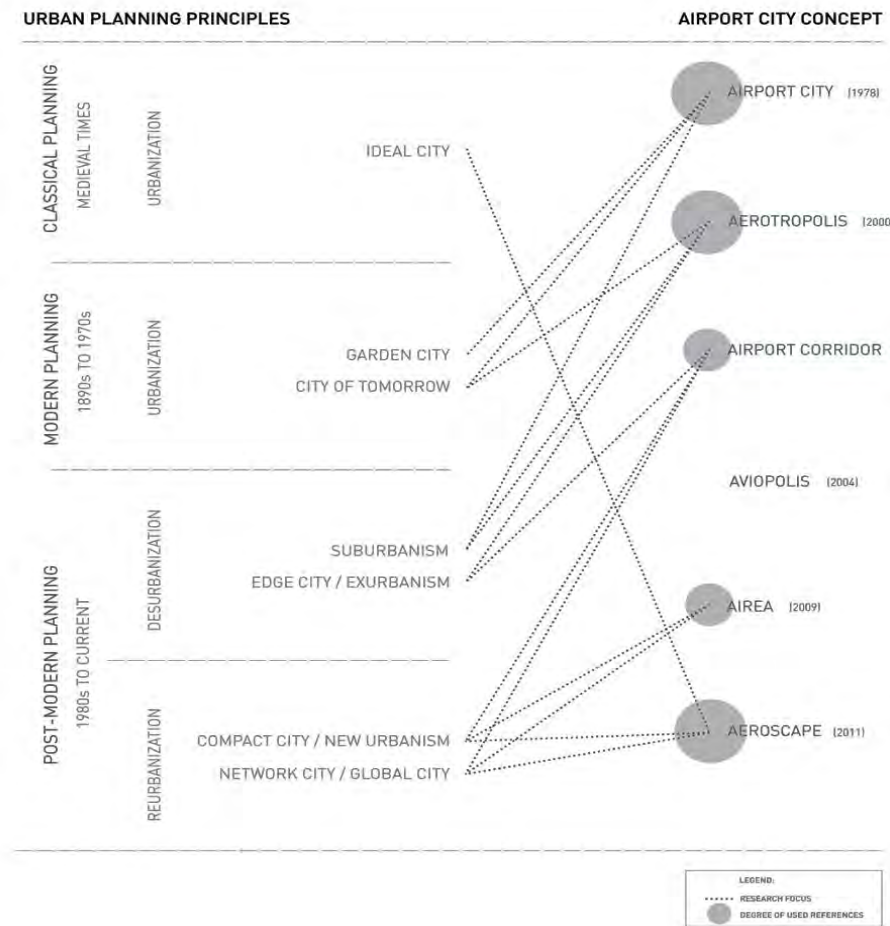


Figure 2.9 Airport urban forms in relation to planning paradigms (Source: Baker, 2012)

Both the AeroScape and Airea are embedded in post-modern planning discourses such as the compact city, new urbanism and networked city approaches while the Aerotropolis, Airport City and Airport corridor are top down targeted approaches advocating for idealised and inorganic structures typical of the modern era (Baker, 2012). Such approaches have long been dismissed by urban planners who instead argue for regional collaboration and partnership in terms of relational spaces (Graham & Marvin, 2001).

Baker (2012) argues that Kasarda's urban planning ideas are modernistic, utopian and largely undeveloped due to his economic background. Baker (2012) compares the Aerotropolis to the exacerbated idealised edge city which safely serves only its internal inhabitants and excludes all those around. The fact that the Aerotropolis model deliberately segregates functions in terms of offices, hotels, medical facilities and industrial parks also highlights Kasarda's model as a form of competition rather than compact and mixed used sustainable urban living (Baker 2012). At the same time Kasarda & Appold (2014) loosely acknowledges that smart growth principles should be adopted. Conversely, using the terminology 'Aerotropolis' could be inappropriate and can evoke the idea of mega development which in turn spurs community opposition and political wariness. At the same time though, the Aerotropolis should not be overlooked in terms of the regional operational and logistical planning required by an airport (Baker, 2012).

The Airea and AeroScape are better embedded in a compact city approach which is generally underlain with attempts to contain extensive land consumption within metropolitan urban edges, to create high density mixed uses around transit nodes and to increase public transport (Baker, 2012). Smart growth is simply a term used interchangeably with compact cities but places greater emphasis on reducing private vehicle usage for better modes of public transport.

The Airea and AeroScape are congruent with the paradigm of New Urbanism, which is a school of thought developed by planners and architects that criticise uncontrolled suburban sprawl and call for a return to citizen participation in the process of planning, with designs that focus on the importance of the neighbourhood and its integration of public and private spaces (CNU, 2015). New Urbanism sprouted from Jacobs (1961) idea of the value of public space and mixed used neighbourhoods. Other influential ideas were Alexander's (1977) emphasis on the importance of sectoral relationships in urban and environmental planning, Lynch's (1981) accessibility and diversity and Hayden (1984) who advocated for the necessity of cohesion between private and public spaces. The arguments made by these authors are well embodied in the paradigm of splintering urbanism and the long term demand for sustainability.

2.6 AIRPORTS AND SUSTAINABILITY

Airports are both global economic opportunities and sites of significant social and environmental impact (Freestone & Baker, 2011). It is therefore worthy to understand the Aerotropolis counter arguments in relation to the critiques aimed at the broader scheme of sustainability.

2.6.1 Environmental paradox

From an environmental perspective, one could argue that airports as the fifth wave of transit orientated development mirror our historical demand for highways and motor vehicles in the sense of a more intensive fossil fuelled and suburbanised economy. Aviation is said to contribute between 2-3% of global carbon emissions and without technological advancement will reach 4-5% around 2050 (Stevens, 2006). Environmentalists have viewed airports as sites of air pollution, noise, polluted run-off, sprawl and poor health, which in many case has resulted in flight restrictions, night curfews and delays in airport development (Freestone, 2009). On the other hand air travel contributes substantially to global gross domestic product and serious considerations have to be made regarding restrictions and how the economy would fare without airports (Kasarda & Lindsay, 2011). Freestone (2009) argues that airports are inherently

unsustainable and that eco-efficiency and sustainability are two different things, where focus is on mitigation at the expense of growth.

In response to the scepticism on carbon trading and the increasing cost of air travel, Kasarda & Appold (2014) argue that statistics on cargo and passenger volumes continue to rise regardless of economic downturns and cyclical dips like the 2008 financial crisis. The authors maintain that even with the introduction of other forms of transport like light rail and bus rapid transit systems, aviation has not declined as a result of the demand for increased market and social dependency across national borders.

Freestone & Baker (2011) argue that focus should be placed on better utilisation of existing facilities rather than the expansion and development of new greenfield airports. However, existing airport expansion is equally problematic as is evident in the addition of a third runway at London's Heathrow's airport, which is currently being met with fierce contestation by groups like the Royal Town Planning institute, the Greater London Council as well as environmentalists and communities (Freestone & Baker, 2011). The overall result is that regional planning and local development frameworks are becoming better entwined with airport master plans as different negotiated outcomes play out.

2.6.2 Socio-economic impact

The relation between air traffic and direct and indirect employment has received much attention. Biltokach (2015) understands that airport and local authorities seek to attract passengers by strengthening existing links or adding new destinations and routes. Biltokach's (2015) study on the relation between airport services and economic impact in the USA suggests that attracting more non-stop long haul flights impacts the most on local employment in the region. The authors findings show that within 6km of the airport, development can occur 2-5 times faster than elsewhere and that a 10% increase in the number of non-stop flights to new destinations leads to a 0.13% increase in direct and indirect employment. Freestone

(2009) asserts that Schiphol International Airport's total multiplier was 2 meaning that one job at the airport lead to one job indirectly related and another directly induced.

Sceptics argue that the Airport City is a pro-growth orientated display of privatisation and the renting out of public land to large scale industries without having any redistributive effects on lower income social groups (Freestone & Baker, 2011). In this regard Freestone (2009) conceives the Aerotropolis as a means of capturing profit from the aviation freight market which is based on the growth of large integrated operators such as DHL and FedEx. This is known as freight centred airport development which typically involves tapping into better logistical supply chain economies through air cargo. Freestone (2009) asserts that there are five issues related to this. Firstly, warehouses as well as industrial and distribution centres are not always good indicators of growth because they are becoming increasingly automated to ensure speed. Secondly, there exists a build and growth will occur type of idealism. Thirdly, the catering nature of airlines inhibits a rational decision to respond to markets and not airports. Fourth, freight moves by various modes and greater cognisance is needed regarding the relationship between airport, harbour and road and rail facilities. Lastly, the issue of operating times where time sensitive industries may be constrained by flight path noise and environmental impact restrictions (Freestone, 2009). Others argue that there exists a significant need to both enhance and reduce dependence on distant suppliers by localising continental supply chains in emerging market economies in order to become more self-sufficient (Silvestre, 2015).

Appold & Kasarda (2012) debate that the Airport City can be rectified through sufficient place making in the immediate and surrounding public realm with the use of the City Improvement (CID) model which pools rates and taxes for landscaping and security. The authors make reference to Taoyuan International Airport in Taiwan who have provided bulk infrastructure to surrounding municipalities to compensate for noise. Appold & Kasarda (2012) argue that public outreach efforts are crucial to breaking perceptions and improving community relations.

Kasarda & Lindsay (2011) argue that it is often forgotten that airports contribute significantly to smaller forms of employment such as taxi drivers, security guards, hotel and restaurant staff, building workers, cleaners, landscapers and gardeners. On the air cargo side this includes truck drivers, signallers and baggage loaders. In addition, the connectivity offered by the airport creates spin-off employment opportunities in tourism, business, manufacturing and industry (Kasarda, 2010). Appold and Kasarda (2009) do however recognise that greater research is required to understand airports and employment growth in terms of lower income groups.

2.6.3 Infrastructural Sustainability

"Infrastructure provides the foundation for our socio-economic systems. It affects economic competitiveness, social inclusiveness, quality of life and environmental health. Its influences can be direct and indirect, immediate and long term."

(UN Habitat, 2011:18)

The greater the quality and long term sustainability of a city's infrastructure the better its economic competitiveness, ecological resilience and general public well-being (UN Habitat, 2011). Fulmer (2009) understands that hard infrastructure refers to the function providing physical assets like transport, energy, water management, communications systems and solid waste networks. Soft infrastructure is characterised by operational dimensions and dynamic relational linkages to forms of governance, economies and social and cultural systems (Fulmer 2009). A hierarchy exists within this web where some forms of infrastructure like airports are more complex, critical and pricier than others and if disrupted, degraded or damaged can cause severe problems for the functioning of society (Graham & Marvin, 2001).

Airports take central stage in the concentration and complexity of post-modern neo-liberal infrastructure in the backdrop of what Swilling (2010) argues is the dichotomy of decoupling growth and resources.

Although the general rule of thumb is that retrofitting to sustainable infrastructure is expensive but cheaper in the long term, this is a significantly tall order for developing states as opposed to first world nations who, through greater financial leverage, often have more capable forms of infrastructure and governance systems (The World Bank, 2012).

Sustainable infrastructure is essentially based on mimicking nature in new forms of socio-technical and physical infrastructure or retrofitting and enhancing existing assets (UN Habitat, 2011). In this regard, urban metabolism models are used as analytical tools to inform the design of closed loop systems by identifying complex interactions between social, technical, economic and environmental relations at micro and macro scales (Kennedy, Cuddihy & Engel-Yan, 2007). A further aspect of aviation linked development is the study of industrial ecology which focuses on material flow from industry, source (Ehrenfeld, 2007). Focus in the global south is therefore directed toward enabling governance and institutionally coordinated planning around issues like climate change, population growth, constrained finances and regime changes in politics, culture and economics (Hodson, 2012).

2.7 CONCLUSION

The majority of literature on airport centred development is confined to academics of the global north whereas much of the literature in the global south is a technically documented process and underdeveloped from an urban planning perspective. The predominant gap in the literature is the westernised assumption of what can be applied and is possible in the global south because, if not strategically planned, supplanting the Aerotropolis as a physical urban model into a context of informality can lead to an exemplified form of fragmented and unsustainable space, which could arise as an additional form of conflict with the Airport City and its surroundings.

The functionality of each airport is historically and economically context specific with a dynamically negotiated outcome between multiples parties. Implied here is the demand for a greater understanding of how the different airport urban forms have played out in the Global North, South and South East cities.

The key message gained from the literature is that airports are powerful political trade tools with the ability to supply jobs, generate revenue and redistribute value to their national economies. Airports are global gateway devices that connected different market economies. Airport expansion is a lengthy processes where development can result in ongoing delays from conflicting institutional and political structures and the inability of governments to collaborate with airport authorities, regional partners and surrounding communities. As the functionality of an airport becomes highly complex, their volatility toward global markets, environmental impact and natural disasters increases.

Overall, the literature points toward a recoupling of airport master plans and urban planning frameworks to create a mutually supportive environment for the hinterland. The no-go alternative is not a viable option over better planning, coordinating and managing an existing airport as a regional economic catalyst. One of the underlying trends is the need for synergistically orchestrating business, transport, housing and bulk infrastructure in relation to airport development and realistically forecasted passenger and cargo growth.

CHAPTER 3: PRECEDENTS

3.1 INTRODUCTION

The following chapter provides precedents to be compared to the central question proposed by the study in addition to the pragmatic issue of splintering urbanism that emerged from the literature review.. The precedents include:

- Schiphol International Airport (SIA), Holland;
- Atlanta Hartsfield International Airport (AHIA), USA;
- Hong Kong International Airport (HKIA), China;
- Dubai World Central (DWC), United Arab Emirates;
- Tancredo Neves International Airport (TNIA), Brazil;
- King Shaka International Airport (KSIA), South Africa
- and Oliver Reginald Tambo International Airport (ORTIA), South Africa.

The precedents are elected in alignment with what Kasarda & Lindsay (2011) understands as aspiring to be or currently developing 'Aerotropoli' in the Global North, South and South East regions of the globe. The criteria for these are firstly, a qualitative and quantitative assessment by Kasarda himself based on aviation and industry related linkages. Secondly, a demonstrated commitment toward an Aerotropolis or Airport City by forming a steering committee and formulating strategic development initiatives. Thirdly, government support through tax incentives, legislation and other measures and lastly, the degree of media coverage toward adopting the concept. Kasarda (2013) acknowledges that these statuses may change over time. Given the need for contextual location, a brief understanding of the African Aviation freight market is provided.

3.2 AFRICAN AVIATION FREIGHT MARKET

As depicted in Figure 3.1 above, Africa's air transport industry is currently dwarfed compared to the global industry but has an expected growth rate of 5.7% a year (The World Bank, 2009). Although Africa has 12% of the global population it only represents 1% of global air freight (The World Bank, 2009). One of the key issues is that intra-African trade flows are



Figure 3.1 World Aviation Trade Routes (Source: Kasarda, 2014)

particularly low because African countries trade more with the developed world such as Europe, USA and ASIA rather than amongst themselves (The World Bank, 2009). The north and south east are able to leverage their trading abilities and supply goods at far cheaper rates than what can be supplied locally on the African continent. The question revolves around what components of the value chain can African countries provide? Perishable goods like cut flowers and sea food, manufactured goods, precious metals, jewellery, clothing, textiles and electronics (semi-conductors, consumer electronics, precision equipment, wires and cabling) are currently the most rapidly growing forms of air freight exported by African countries (The World Bank, 2009).

African international airport landside rentals and commercial space is only a small portion of overall revenue as compared to the global north who are able to stabilise their financial operations through non-aeronautical revenue (The World Bank, 2009). Kasarda & Lindsay (2011) point out that non aeronautical services in the Global North account for more than half of global airport revenue streams. The authors argue that significant scope remains in African countries with emerging aviation based economies and rapidly urbanising populations. At the same time, Kasarda & Lindsay (2011) acknowledge that not all cities will realistically be able compete given the context specific institutional frameworks and trade agreements between different markets.

In terms of regional economic integration and institutional collaboration and in response to aviation linked market based diversification, a strategic think tank has emerged called the African Airport Evolution Forum that concentrates on regional trade and cross border collaboration between the Southern African Development Community (SADC) and the Netherlands, Belgium and Luxemburg (SANEC, 2013). The aim is to attract global firms and build world class African airports, where South Africa in particular is seen as the economic and institutional gateway into Africa (SANEC, 2013).

3.3 SCHIPHOL INTERNATIONAL AIRPORT (SIA), HOLLAND

SIA is located southwest of Amsterdam and is well connected to the Rotterdam port and CBD. According to Kasarda & Lindsay (2011), SIA is jointly managed by the provincial and local government because it is situated in the municipality of Haarlemmermeer, a different district to its legal administrative power in the North Holland province. Stevens (2012). refers to this as a split government regulatory body that deals with negotiating land use decisions, noise and environmental impact.

SIA sees South Africa's population or 55 million passengers annually, has five runways, moves 1.5 million tons of cargo, has over 500 businesses (300 publicly listed) and creates over 62 000 jobs (Kasarda, 2009). Although the Amsterdam metropolitan consisted of 2.3 million inhabitants in 2011, SIA is particularly large because the...

...Netherlands is well located to supply European markets, is a world leading trader of highly mechanized agricultural export and is essentially one of the a top tourism destinations on the globe (Kasarda & Lindsay 2011).

The SIA precinct boasts the headquarters of ING banks, ABN Amro, Heineken and Royal Dutch Shell (Kasarda, 2013). SIA has hotels, conference facilities, a library, a Dutch master art gallery, shopping and entertainment centres as well as a sophisticated logistics park (See Figure 3.2 and 3.3).



Figure 3.2 Schiphol Airport (Source: KCAP, 2013)



Figure 3.3 Schiphol Airport Aerial View (Source: Guiz & Buijs, 2014)

The Zuidas district is a business park located 6 minutes east of the SIA terminal and is currently experiencing higher growth rates than the Rotterdam City due to the connectivity offered by the SIA (Kasarda & Appold, 2014).

Makhloufi & Kaal (2011) highlight that in the early 1900's rather than commissioning a new airport, collective arrangements were made to redevelop the existing military airfield into a municipal airport. As SIA grew larger the degree of responsibility was converted to national interest. Makhloufi & Kaal (2011) argue that the early success was due to cooperation between key directors and even though each had separate ambitions, effective coalitions were made. Hence, the growth of Schiphol's Airport City ultimately set up the regional Aerotropolis going forward.

From a property perspective, the Schiphol Group began diversifying their non-aeronautical revenue as early as the 1930's, which also became part of their corporate vision and marketing strategy (Guiz & Buijs, 2014). However, in the 1980's the growing environmental awareness was a particular concern for the Dutch public who increasingly contested the growth of SIA (Guiz & Buijs, 2014). Given that the Dutch are first and foremost traders, the national concern was based on the ability to grow the economy. This prompted SIA to adopt a coordinated approach to create a real estate subsidiary called the Schiphol Group to develop commercial property and to partner with outside the fence communities and stakeholders (Kasarda, 2009). In 1987 the Schiphol Area Development Company (SADC) was formed and consisted of the North Holland Province, the community of Haarlemmermeer, the community of Amsterdam and the Schiphol Group (Van den Brink pers.com, 2015).

The result of regional collaboration and sectoral alignment was a better coupling of the airport precinct and hinterland concerns, where emphasis was placed on airport authorities having to re-invest more into the public realm in addition to better engaging in public relations (Guiz & Buijs, 2014). After extensive landscaping and architectural development was done, SIA was advertised and developed as a

public space where people could engage in social activities even though they were not partaking in aviation (Freestone & Baker, 2011). The idea of treating the airport as a brand attempted to break perceptions focussed only on safe and security.

The Schiphol group have taken this initiative further by strategically acquiring land within the airport corridor. Specific policies by the Dutch government have also ensured support to aviation linked economic clusters like logistics, aerospace and agriculture (Van den Brink pers.com, 2015). Moreover, due to the efficiency and collaboration of the Dutch Government toward integrated public transport, the intermodal split of the Schiphol Airport is 45%, which is also partially due to an increase in parking tariffs and a reduction in the number of available parking bay.

Kwakkel, Walker & Marchau, (2010) argue that the reason why SIA expanded was primarily due to extensive privatisation and neoliberal trade agreements during the 1990's. The authors argue that Schiphol's industry is now under threat as a major European hub because its major airline carrier wants to move more than half its operations to Charles de Gaulle airport in France. Moreover, SIA is experiencing increased delays as a result of climate induced gale force coastal winds (Kwakkel, Walker & Marchau, 2010).

3.4 ATLANTA HARTSFIELD INTERNATIONAL AIRPORT (AHIA), USA

AHIA employees roughly 70 000 people, sees over 80 million passengers annually and is predominantly a domestic passenger transfer hub in the south east of the United States (Kasarda, 2010) (See Figure 3.3). In 2011 the Atlanta Aerotropolis Alliance steering committee was created to provide a platform for collaboration with local government, businesses and communities (ARC, 2014). The aim was to employ strategic spatial planning and design guidelines, provide regulatory assistance and to enhance building relationships with landowners, small businesses and surrounding communities (ARC, 2014).

The initial process began with gathering economic and demographic data in addition to reviewing the existing airport master plan and related policies (ARC, 2014). A multidisciplinary consultative team of transport engineers and spatial planners were subsequently brought on board (ARC, 2014). The Atlanta Aerotropolis alliance meet on a bi-monthly basis to discuss the future growth of the airport and have made significant strides through the use of a Community Improvement District (CID) model which pool rates and taxes toward airport landscaping and security (ARC, 2014).



Figure 3.4 Aerial view of AHIA (Source: Hawk, Construction 2008)

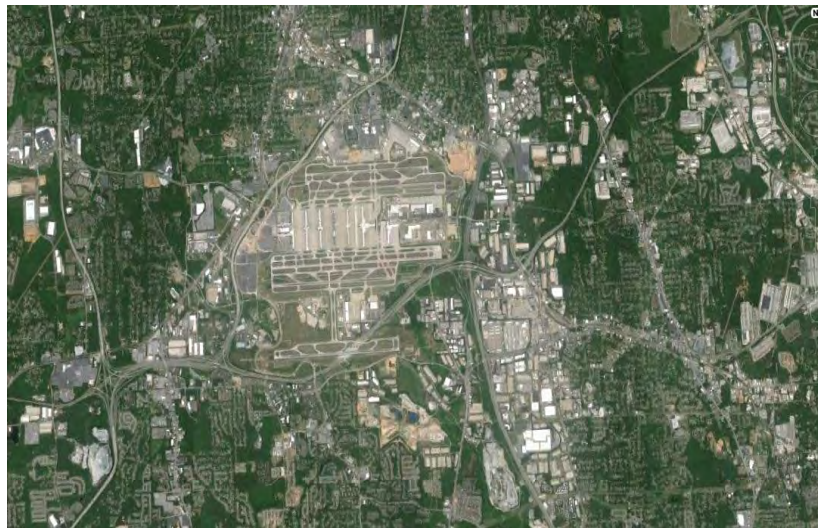


Figure 3.5 Aerial view of AHIA (Source: Google Earth, 2015)

Freestone & Baker (2011) argue that although AHIA is rated one of the world's busiest airports its hinterland represents quite the opposite (See Figure 3.4). The authors assert that industrial expansion around the airport has been significantly constrained due to urban sprawl, the unavailability of land, the failure to prepare for bulk, airport noise problems, continual blight in surrounding communities and the unattractiveness of the area to private developers.

3.5 HONG KONG INTERNATIONAL AIRPORT (HKIA), CHINA

China represent more than a third of the developing world's global air cargo traffic and are planning over a 100 new airports by the end of 2025 (Kasarda & Lindsay, 2011). The HKIA is known as a global city hub around the world seeing 62 million passengers and 4 million tons of cargo a year. HKIA is located on the small man-made island of Chep Lap Kok in the Pearl River Delta with direct connections to the port of Hong Kong via bridge and high speed rail (See Figure 3.6 and 3.7).



Figure 3.6 Hong Kong International Airport (Source: Air Cargo, 2014)

Both the development of the HKIA and the clustering of international organisations has leveraged the city's ability to trade in the global economy. Kasarda (2009) points out that such growth is directly influenced by China's world leading and rapidly growing industrial performance and the large pool of labour supply provided by the Pearl River Delta (Kasarda, 2010).



Figure 3.7 Aerial View of Hong Kong International Airport (Source: Google Earth, 2015)

McNeil (2014) conversely, argues that significant capital investment was made with an over reliance on the performance of the local economy and how this would fare in times of slowed growth. McNeil (2014) understands that there are two economic and political trends underpinning expansion of the HKIA. Firstly, in the 1980's the previous Kai Tak airport was operated and located on land leased to the British Government (McNeil, 2014). As the land lease came to its expiry and the airport became over capacitated, the Chinese government sought to achieve global competitiveness in trade by loosening ties with colonial states and developing a new greenfield airport (McNeil, 2014). The HKIA was completed in 1998 and has attracted global firms such as Cathay Pacific, HSBC, Standard Chartered Bank and the Hsin Chong Construction group (McNeil, 2014).

3.6 DUBAI WORLD CENTRAL (DWC), UNITED ARAB EMIRATES

Dubai is the primary Middle Eastern intermodal transport hub and is well located to serve European, Asian and African markets. Coupled with the 1972 OPEC crisis, Dubai has the fortune of owning the very resource that fuels global production networks. Over the next two decades Dubai is expecting an exponential growth rate in passenger and volumes (Dubai Airports, 2015). With full capacity reached at the existing Dubai International Airport (DIA) in 2010, the 32 billion dollar Dubai World Central (DWC) Aerotropolis is currently

under construction 40 km outside of the city and 6 kilometres from the Jebel Ali Port and free trade zone (Kasarda, 2010) (See Figure 3.8, 3.9 and 3.10). DWC is managed by Dubai Aviation City Corporation (DACC) and is anchored on the Al Maktoum International Airport (AMIA), which is linked to the DIA by high speed rail. AMIA began trading cargo in 2010 and later opened its doors to passengers in 2013 (Dubai Airports, 2015).



Figure 3.8 Aerial View of Dubai World Central (Source: Google Earth, 2015)



Figure 3.9 Aerial view of AMIA and Surroundings (Source: Kamikaze Emirates, 2014)

According to Freestone (2009) the DWC takes the Aerotropolis concept to the extremity of the demand for global trade and connectivity. The DWC master plan is double the size of HKIA at 140 km² and by full completion will be the largest airport in the world with a mean annual capacity of 220 million passengers and 12 million annual tons of cargo (Kasarda, 2010).



Figure 3.10 Dubai World Central (Source: GGICO Properties, 2015)

DWC will boast skyscraper office towers, logistics industries, hotels, mega-malls, a golf course and housing for over 900 000 on site workers (Dubai Airports, 2015). These are divided as six different clustered zones associated with commercial, residential, recreational and aviation (Dubai Airports, 2015).

DWC is expected to take over as the central economic hub of the UAE in the next two decades (Dubai Airports, 2015). In 2014, all freight forwarding companies were moved to the AMIA and although it currently operates on one runway, the DWC master plan expects an additional four which will be able to accommodate over 100 A380 airbuses at a time (Dubai Airports, 2015). To enhance and catalyse business and for speed and convenience, the United Arab Emirates airline company is naturally set to relocate from DIA to the headquarters of DWC (Dubai Airports, 2015). Realisation of this project is only proportional to the growth in the future global economy, in hindsight of peak oil production.

3.7 TANCREDO NEVES INTERNATIONAL AIRPORT (TNIA), BRAZIL

The TNIA is located in Belo Horizonte, Brazil's sixth largest city with a population of 2.5 million inhabitants. The TNIA was developed in 1986 with a passenger handling capacity of 20 million passengers and cargo facilities able to hold up to 150 000 tons (Kasarda, 2007). It is situated 30km from the Belo Horizonte City at a major cross-road for Brazil's North South and East West rail networks (Kasarda, 2007) (See Figure 3.11 and 3.12).



Figure 3.11 Belo Horizonte International (Source: Felipe, 2015)



Figure 3.12 Aerial view of Tancredo Neves International (Source: Google Earth, 2015)

By 1999 the anticipated growth did not occur and the TNIA only saw 400 000 passengers (Kasarda, 2007). The airport was considered a massive infrastructural failure because most of the required industries were located on the opposite side of the Belo Horizonte metropolitan area. Moreover, the majority of the

industries preferred to use the Rio and Sau Paulo Airports. Recognising these issues the Secretariat of Economic Development in partnership with the Brazilian airport operator Infraero and various other government bodies responded to the challenge (Kasarda, 2007).

Primary focus and investment went toward increasing accessibility such as reducing traffic congestion along major arteries and connecting the airport with a passenger rail express (Kasarda, 2007). The airport operator also forced over 30% of its flights at the Pamphula airport to be moved to the TNIA.. The connection between the Belo Horizonte city and the TNIA is now a boulevard of high technology and agri-processing zones (Kasarda, 2007). In 2006 the TNIA saw 3.7 million passengers and in 2014 was upgraded for the Brazilian 2014 FIFA world Cup.

3.8 KING SHAKA INTERNATIONAL AIRPORT (KSIA), SOUTH AFRICA

Durban is well located to serve as a port for the landlocked Gauteng region and is home to the majority of the ANC National Government supporter base. KSIA is a greenfield airport development located 30 kilometres north of the Durban CBD, 40 minutes from South Africa's busiest seaport and 95 minutes southward from the Richards Bay Port (See Figure 3.11 and 3.12). KSIA is a core component of the Durban-Free State-Gauteng logistics corridor which is a Strategic Infrastructure Project (SIP) of the National Government (ACSA, 2010). The regional economic aim of the project is to leverage logistical efficiency through a seamless integration of sea, air, road and rail (DTPC, 2014).

KSIA was opened a month before the 2010 FIFA World Cup. The airport currently has two runways with an hourly capacity of 24 flights, which in 2014 managed to see a total passenger throughput of 4.5 million passengers and a further 13 800 tons of cargo (ACSA, 2014). KSIA is now closely located to growing middle and higher income classes on the northern fringe of Durban such as Umhlanga and Ballito. KSIA replaced the more centrally located Durban International Airport (DIA), which was sold to Transnet for 1.8 billion Rand, who subsequently leased the land to TATA motors, in effect reinforcing the agglomeration of industrial land use around the Durban Port (ACSA, 2014).

KSIA was first conceived during the 1970's and initial bulk infrastructure was implemented (ACSA, 2010). However, due to post-apartheid sanctioning development was not revived until the 1990's (ACSA, 2010). Thereafter, a tender war saw two of the large bidders go to court and Environmental Impact Assessments further delayed the process (ACSA, 2010).



Figure 3.13 KSIA Aerial View (Source: Forest, 2010)

When KSIA was initially build it focussed on air route development and services (DTPC, 2014). The spatial planning and land use master plans as well as environment and conservation studies were conducted both at a regional and territorial level. Emphasis was placed on surface transport connectivity, logistics and additional bulk infrastructure (including ICT) in addition to knowledge management and place marketing (DTPC, 2014).

Walkable from the KSIA terminal is the 12 hectare Dube City which is one of the first planned green airport cities in Africa (ACSA, 2014). The Dube City urban design framework employed dense mixed used living and additional space for public transport, walkability and indigenous landscaping (Dube time, 2010). As non-motorised and public transport services become increasingly connected to the airport the number of parking bays will decline, allowing additional development to occur (Nicks pers.com, 2015). The Dube City has a hotel (The La Mercy), conference and business centres as well as a sophisticated IT platform (DTPC, 2014).



Figure 3.14 KSIA Spatial Development Plan (Source: DTPC, 2014)

The Dube Trade Zone is based on 60 year master plan which is owned and run by the Dube Trade Port Corporation (DTPC) (DTPC, 2014). The trade zones are accompanied by ICT infrastructure, state of the art manufacturing and warehousing and a 16 hectare integrated agricultural export zone complete with packaging companies and climate controlled hydroponic vegetable and flower grow houses fitted with solar panels (DTPC, 2014) (See Figure 3.13). Treated waste water from two sewage works supply additional water to the grow houses (DTPC, 2014). Sustainable farming methods and innovative rainwater harvesting systems are also used in the process.

The DTPC's regional objectives were to attract high value agri-businesses and add diverse value chain linkages that could be connected to the aviation freight market (DTPC, 2014). In terms of corporate social responsibility the DTPC has sought to include lower income groups in waste minimisation and food growing strategies in addition to alien vegetation and land rehabilitation programmes (DTPC, 2014)). Further CSR initiatives include providing green infrastructure like rain water harvesting tanks to underprivileged schools in addition to green education strategies (DTPC, 2014).



Figure 3.15 Climate Controlled Grow Houses (Source: DTPC, 2014)

KSIA held the World Routes Conference in 2015 as a marketing approach to gaining additional international flight routes which are also linked to the broader export, tourism and economic development strategies of the region (ACSA, 2014). This initiative has subsequently seen the addition of Qatar Airways and Air Mauritius with further prospects of Lusaka and Harare (ACSA, 2014). With Durban set to hold the Commonwealth Games in 2022, the KSIA is bound to see a wave of passengers in the future (DTPC, 2014).

3.9 OLIVER REGINALD TAMBO INTERNATIONAL AIRPORT (ORTIA), SOUTH AFRICA

With 12.2 million inhabitants, the Gauteng Region is the main economic and national headquarters of the country with ORTIA being the primary airport in South Africa's and Africa's hub and spoke network (ACSA, 2014). ORTIA is located in the district of Ekurhuleni/Johannesburg, is directly linked to the Gautrain Railway project and is home to the country's carrier airline South African Airways (SAA) (O'Toole, 2011).

ORTIA is the busiest airport in Africa, seeing 19 million mean annual passengers (half of South Africa's arrivals), 800 000 -1.2 million tons of cargo per annum and four daily scheduled A380 Airbus flights by British Airways, Lufthansa and Air Emirates (ACSA, 2014) (See Figure 3.13 and 3.14). ORTIA generates employment for over 50 000 people and is home to more than 100 large scale companies like Engen and PEPSI as well as hotels and conference centres like InterContinental and Garden Court (O'Toole 2011).

From a regional economic perspective OR Tambo is reinforced by the agglomeration of some of Gauteng's strongest industrial areas like Germiston, Kempton Park and Boksburg (See Figure 3.16 and 3.17).



Figure 3.16 OR Tambo Airport City (Source: Thousand Wonders, 2015)



Figure 3.17 OR Tambo Airport City Central (Source: Google Earth, 2015)

ORTIA is set to become a fully functional Aerotropolis by 2025 after the Ekurhuleni Municipality had enough budget to contract the expertise of Professor Kasarda himself. The project is ongoing and depends on continued interest from the Gauteng City Region, National Government, ACSA, the Department of Transport, Department of Trade and Industry as well as the Public Enterprises Company (O'Toole 2011).

Schoonraad (2010) elaborates that the Spatial Development Framework for the Ekurhuleni region will be amended and aligned with OR Tambo being one of the highest order rather than sub metropolitan nodes. In terms of process, Petzer (2012) highlights that 'Metroplan' identified different airport urban forms further opting for the Aerotropolis, Airport Corridor, Airea and Aeroscape. Due to future trade agreements, Metroplan sought to understand how the concept is being applied in other BRICS countries (Petzer, 2012).

The global Aurecon Company are tasked with overseeing the technical aspect of the Aerotropolis for Ekurhuleni. According to Aurecon (2014) this required a collaborative and multidisciplinary team of urban, transport, logistics, business and financial planners where the initial process involved understanding the characteristics of the economic clusters most suited to the concept (Aurecon, 2014). In terms of land use analysis, Metropolitan asked the following key questions. Petzer (2012:34) identifies these as:

- "Where are the multinational companies located?"
- What are the freight and cargo related land uses?
- Where do airport workers live?
- Where are the closely located mixed used activity nodes and corridors?"

In terms of logistics, focus was placed on comprehending upstream and down-stream supply chains where acknowledgement was made for the accommodation of small medium enterprises (Aurecon, 2014). This required significant quantities of data on demographics, economics, land use as well as air and surface transportation (Aurecon, 2014). The economic clusters typically included niche industries such as high-tech and time dependent freight forwarding companies (Petzer, 2012) (See Figure 3.14 on the following page).

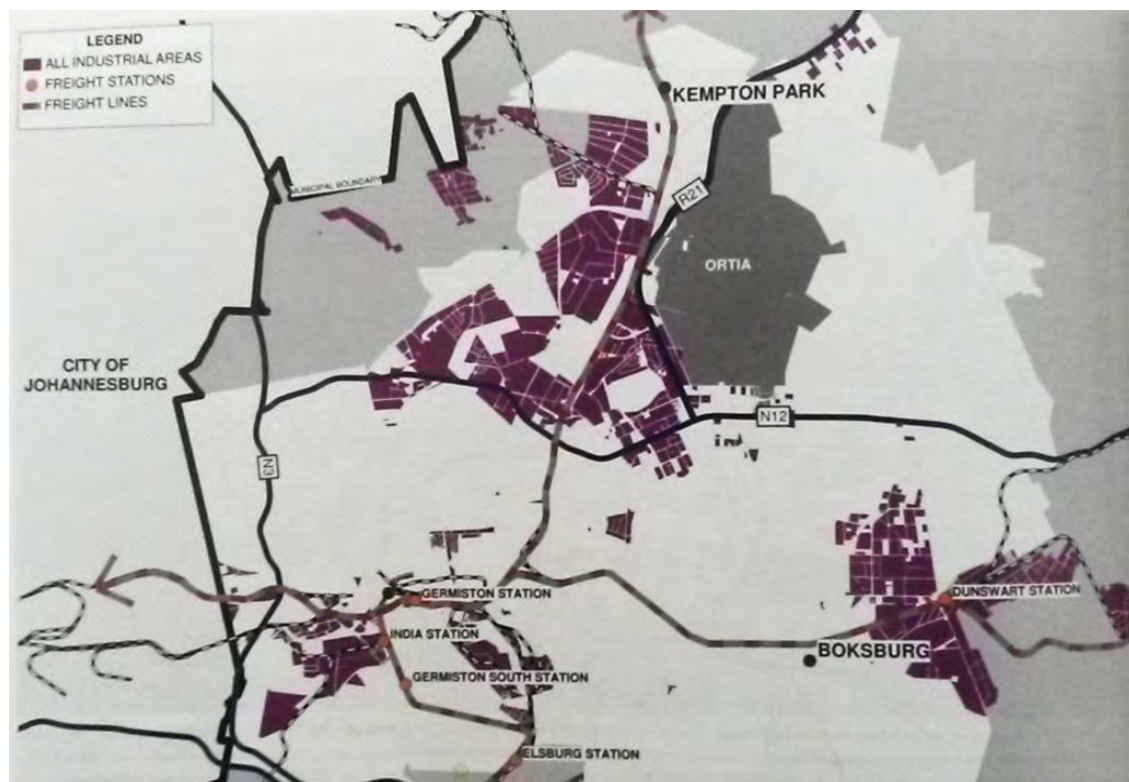


Figure 3.18 Industrial and Freight Linkages to OR Tambo (Source: Petzer, 2012:34)

According to Petzer (2012:35) the footprint of the Ekurhuleni Aerotropolis will include “the airport administrative boundary, the corridors leading to the airport, a 5 to 10 minute travelling buffer for all modes of transport, mixed used activity nodes in close proximity or linked by the Gautrain, the residential neighbourhoods accommodating airport employees, land availability for industry, inland ports, other airports and tourism attractions”.

Regarding accessibility, investment is currently filtered into upgrading the surrounding road and rail network in addition to strategic marketing and place making interventions being made at major intersections and gateways (Petzer, 2012). The OR Tambo square is to be upgraded with a business convention centre, fine dining, retail outlets and a museum with aviation related themes. ACSA have strategically acquired 240ha of private property along Atlas Road for additional commercial development with roughly 10ha designated as a free trade zone (ACSA, 2010). In terms of attracting global companies, the use of a 99 year lease with a reduction in initial capital costs has been an aspect of success for ACSA's non-aeronautical revenue (Weyer pers.com, 2015).

An additional 250 directional signs were installed to improve navigation for airport passenger and freight users (Petzer, 2012). The regional partnering platform identifies spin offs between stakeholders and configures means to track that these agreements lead to the investment or branding that needs to be employed (Aurecon, 2013).

3.10 CONCLUSION

The lessons gained from the precedents indicate that the success of an airport in the regional sense is due to the degree of political interest to pursue airport development; the ability to attract new direct flights for additional cargo space; an airports geographic position as a global passenger and cargo hub; the local institutional environment; an airports proximity and connection to rail facilities and a sea port; the scale and size of the metropolitan economy; the airports territorial location in relation to its surroundings; the market demand and availability of land as well as the level of cooperation and collaboration between airlines and multiple spheres of government, private sector and communities. A simple comparison with the Global North, South and Southeast cities reveals how the market and economic realities are vastly different, most particular the great north south divide.

Realising that the 21st century is a trade race against time, China, India and Middle Eastern countries have ensured that airports are the primary infrastructural investments to compete with, specifically so that cities are set to be built around them. The aggressive scale at which these airports are developed leverages their competitive and comparative advantage in the future aviation freight market (Kasarda & Lindsay, 2011).

Cities in the Global South on the other hand have only recently begun installing the necessary infrastructure to compete with. The resultant demand for increased passenger flows by mega-events such as the FIFA world cup ultimately directed budgets and ensured regional collaboration amongst airport authorities and government at the time.

Greenfield airports are determinant on capacity being reached at existing airports and like any other new developments these are easier to implement as there are less noise restrictions and contestation from communities. Moreover, green field airports evoke displaced economic activity if demand forecasts fail to match infrastructural investment. From a sustainability perspective, as environmental concerns and technologies improve over time, a significant shift is evident in the design of international airports toward sustainable closed loop infrastructural systems.

Strategically acquiring and leasing land in addition to establishing CID's is a noteworthy means of kick-starting inside the fence non-aeronautical revenues to attract businesses and other functions. What is essentially a significant gap in the literature is the need to identify value added benefits outside the fence to surrounding communities in addition to formulating national policy mechanisms that ensure sustainability of manufacturers, exporters and importers in aviation linked industries. In conclusion, the case studies and literature point to the need for a greater understanding of the local context of international airports in South Africa.

CHAPTER 4: INTERNATIONAL AIRPORTS IN THE SOUTH AFRICAN LANDSCAPE

4.1 INTRODUCTION

The following chapter conceptualises the historical evolution of airports in South Africa, along with their legislation, ownership and operational structures. The aim of the chapter is to gain greater insight into the role of ACSA and national, provincial and local government in adopting various airport urban concepts. This is investigated from the paradigm of splintering urbanism, ACSA's Aerotropolis strategy and the outlook and tools of the current South African National Spatial Development Plan (NSDP). The chapter provides a discussion on the opportunities for linking the informal economy to airport expansion through Area Based Management (ABM), value capture around transit nodes and linking to local economic development platforms. The chapter goes further to critique the bureaucratic flaws around public private partnership and social inclusivity.

4.2 INTERNATIONAL AIRPORTS IN SOUTH AFRICA

South Africa has 9 international airports and over a 100 smaller airfields, 11% of which are located in the Western Cape (Zietsman, 2013) (See Figure 4.1). The South African aviation industry sees "240 000 tonnes of cargo handled by 52 500 scheduled flights with sixty-six routes to 77 airports, in 51 different countries" (SACAA, 2011:12). In 2013, the South African aviation industry contributed 2.1% to GDP with over 227 000 jobs (Zietsman 2013). Equally reliant on aviation, is the South African tourism industry with a direct contribution of 2.7% to total GDP and an international tourism spend of 94.2 billion Rand (Statistics South Africa, 2015).

During the almost century long apartheid regime, airports in South Africa were owned and managed by the government and named after politicians such as Jan Smuts (Johannesburg), Louis Botha (Durban) and D.F. Malan (Cape Town). Between 1960 and 1990, the demand for airport and industrial expansion was significantly restricted through sanctions imposed by Europe and the USA (ACSA, 2007).



Figure 4.1 ACSA Airports in South Africa (Source: ACSA, 2007:11)

Only in the 1990's did South African international airports begin performing as potential trade tools of the 21st century, because operational focus in last twenty years of economic transition has been around fulfilling the apartheid infrastructural gap through aeronautical revenues more so than non-aeronautical (ACSA, 2007).

In 1993, with the move to deregulate, privatise and reduce state responsibility, the National Government enacted the Airports Company Act (No. 44 of 1993) which saw nine airports handed over to the Airport Company South Africa (ACSA, 2014). In 1994, sanctions were lifted after Independence was won by the African National Congress (ANC) and the number of foreign airlines serving South Africa tripled (ACSA 2014). The post-apartheid saw airports liberally named after their cities such as Johannesburg, Durban and Cape Town International Airports.

The hub and spoke model dictated that emphasis would be on maximising OR Tambo, where Cape Town is a main tourism feeder route. In association with bi-lateral trade agreements, the SAA national carrier followed a model of profitable routes with former colonial ties as a way of cross subsidising expensive domestic travel (The World Bank, 2009). The signing of

the Yamoussoukro Declaration in 1999 was considered "a landmark initiative to develop the [African] aviation industry through the removal of barriers by promoting the liberalisation air trade" (The World Bank, 2009). With the growing demand for goods, inter-model trade between African air and sea ports became crucial to logistical cost efficiency and economic output (The World Bank, 2009).

For the first four years of democracy, the post-apartheid National Government had over 90% shares in the ACSA but, with the need to reduce shareholder risk, a 20% stake was sold to the Airporti De Roma Company in 1998 at a value of 4 billion Rand which was later sold in 2006 to the Public Investment Corporation (PIC) (ACSA, 2014). At the same time ACSA won a tender to manage Chatrapati Shivaji International Airport in Mumbai India with a 10% equity share (ACSA, 2014). This marks the point at which ACSA set its sight on diversifying aeronautical revenues by investing expertise into the global market. Recent success is due to the extensive capital expenditure by the DOT's public transport infrastructure grant for the FIFA world cup which subsequently meant that in 2014 ACSA saw the highest ever return on revenue (ACSA, 2014).

4.3 OPERATIONAL STRUCTURE AND REVENUE STREAMS OF ACSA

ACSA's ability to forecast traffic volumes allows for the timely financing of infrastructural capacity for runways, terminals and parking. Any revenue gained from the commercial base is diverted toward infrastructure to offset tariffs for airlines. This can become increasingly difficult if there is less non-aeronautical revenue to support the existing operational structure, hence the capital used to fund portions of airport infrastructure becomes debt driven through money acquired from various bonds and Foreign Direct Investment (FDI), which can also be at risk from the local volatility of electricity shortages and water prices (ACSA, 2014).

Continual adaptation and diversification of ACSA's operational and funding structures ensures that they are one of South Africa's most profitable State Owned Enterprise generating a progressive 1.7 billion Rand after tax in 2014 (ACSA, 2014).

ACSA's total aeronautical revenue for all airports in 2014 was 4.6 billion Rand while total non-aeronautical revenue was 2.6 billion Rand. OR Tambo contributed the highest while CTIA ranked second (ACSA, 2014). ACSA's non-aeronautical revenues are expected to increase by 13.3% a year, where the main revenue streams are property, retail and advertising. The demand for land near South African international airports and the subsequent increase in non-aeronautical revenue is further reflected in ACSA's establishment of the PropCo commercial property subsidiary and the Airports Development Company (ADC) who manage land and property. The largest firms leasing land from ACSA are Bidvest Holding Limited and Airports Logistics Property Holding, who in 2013 spent R15 million rand in rentals at OR Tambo and CTIA alone (ACSA, 2014). As a result of a large dependence on private vehicle usage, South African airports have some of the highest number of parking bays in relation to every million airline passengers (ACSA TIA, 2014).

4.4 ACSA STAKEHOLDERS

Strengthening stakeholder engagement and management processes is highlighted by ACSA (2014) as the foremost requirement for running airports as an integrated business. Figure 4.2 represents the authorities and stakeholders that ACSA must adhere to and engage with in order to ensure the financial sustainability of South African airports. The value creation is the input of employees and suppliers (connected to labour laws and trade unions) and the output being the ability to coordinate airlines, retailers and distributors. ACSA contributes to communities through its Corporate Social Responsibility (CSR) initiatives, while runway and airport development participatory processes are outsourced to the Environmental Impact Assessment (EIA) consultancies.

Depicted in Figure 4.3 is the degree of stakeholder influence on ACSA's operations. National, provincial and local government as well as airport authorities, passengers and fuel suppliers are shareholders who have the greatest influence on the operational sustainability of ACSA. Although NGO's have the least dependence and influence on ACSA, employees and trade unions with collective bargaining power have a direct role in how the industry functions.

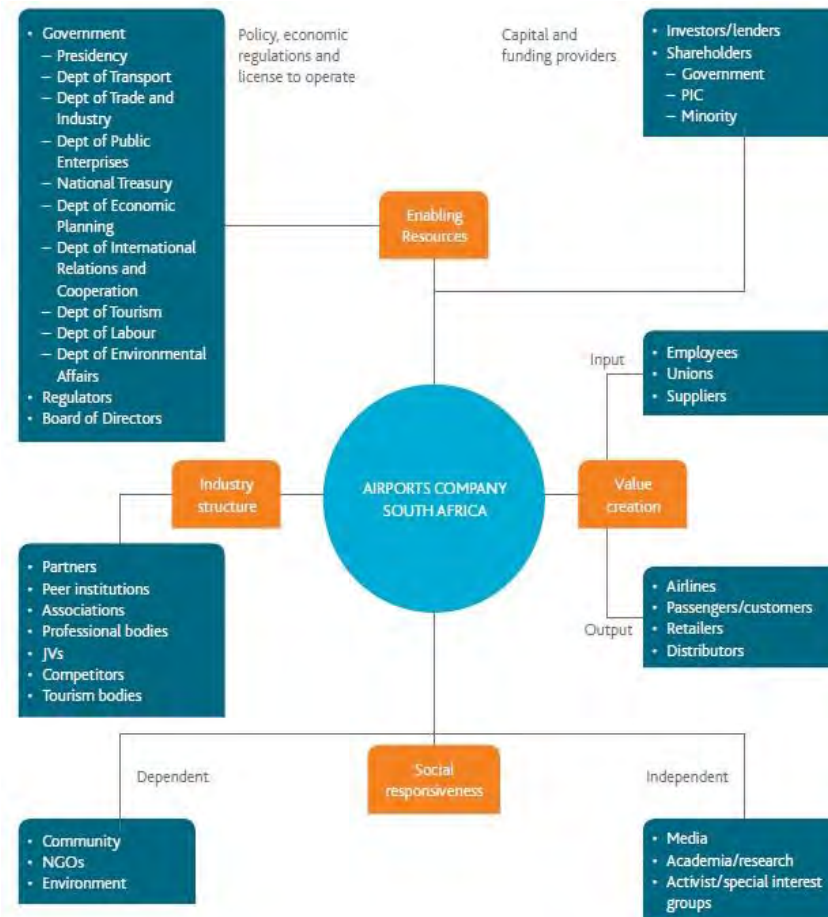


Figure 4.2 ACSA Stakeholder Management (Source: ACSA, 2014: 78))

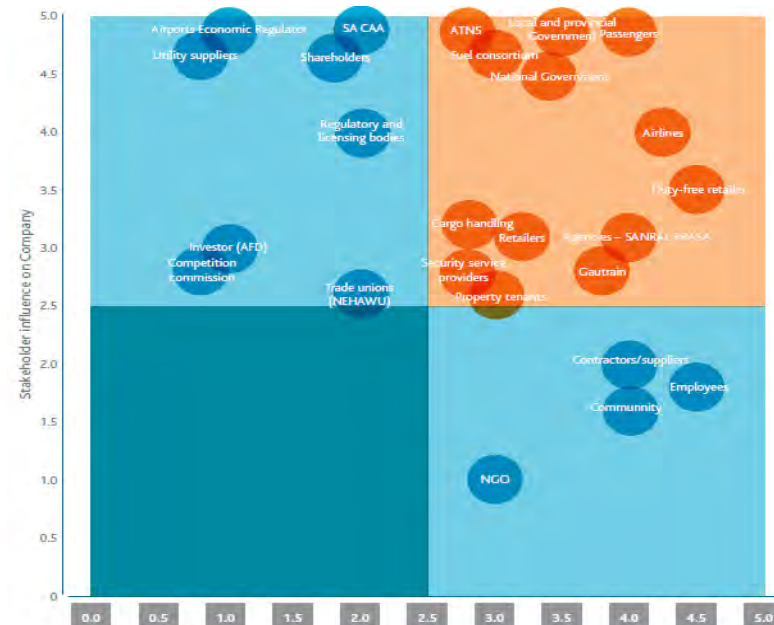


Figure 4.3 ACSA Stakeholder Dependencies (Source: ACSA, 2014:63)

This is not to say that ACSA views NGO's and communities as less important to their operation, in fact socio economic development is indicated by Zietsman's (2013) multi-actor study as one of the key indicators of ACSA's airport development strategy. What this does however highlight is that overtime the complexity of ACSA's business model has been steered toward greater cooperation amongst National Government and strategic capital intensive shareholders who have a greater influence on the operational turnover of the company. Thus, much of the focus and strategic coordination of airports in South Africa has been on global connectivity and inside the fence airport infrastructure development arising from twenty years of well demanded investment.

4.5 ACSA AEROTROPOLIS STRATEGY

Only within the last 5 years has ACSA understand the economic role of South African international airports outside of their immediate precincts and as a forms of transit orientated development. This is resembled in the draft NADP and evident in the progressive strides made at ORTIA and the regionally planned KSIA, all of which ultimately encouraged ACSA to initiate the process in Cape Town.

The Airport City concept has influenced ACSA's strategic thinking around its existing operational structure, the diversification of revenue and the enhancement of non-aeronautical revenue in particular. ACSA's financial focus is around the managing and developing the Airport City, while regional airport urban concepts require the effective formulation of national policy initiatives and regional steering committees that are able to identify and enhance key backward and forward linkages to aviation linked industries in the hinterland. Depicted in Figure 4.4 on the following page are the key informants of the South African Aerotropolis strategy as provided in a recent presentation by ACSA's chief operating officer Tebogo Mekgoe.

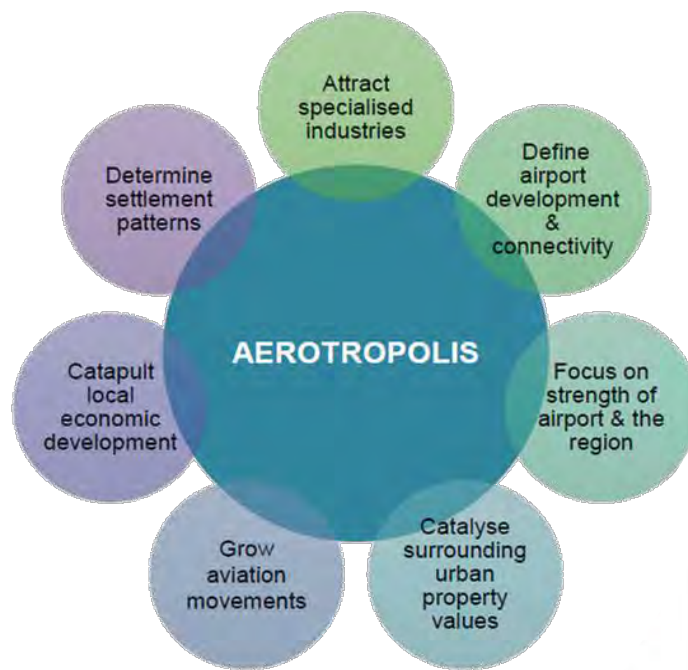


Figure 4.4 ACSA Aerotropolis Strategy (Source: Mekgoe, 2015)

Mekgoe's (2015) South African Aerotropolis informants represent a shift outside of the airport boundary toward regional collaboration and inclusivity in airport planning and linking to broader economic platforms. Although context specific, the pointers not mentioned in the Chapter 2 literature review and Chapter 3 case studies are catapulting local economic development and urban property values in addition to determining local settlement patterns. Equally missing from the diagram is the central idea of long term socio-economic and ecological sustainability. As Freestone (2009) understands, the Aerotropolis is a mega-process and must be understood in the sustainable and contextual sense of where an airport is located.

4.6 THE 2015 NATIONAL AIRPORTS DEVELOPMENT PLAN (NADP)

After almost a decade of review, the 2015 National Airport Development Plan (NADP) has been drafted by the National Department of Transport. According to the DOT (2012:73) an NADP is required to "guide all present and future airport developments and to ensure integration of airports into the transport network". The strategic objectives of the 2015 NADP are described in Figure 4.5 across (Republic of South Africa, 2015).

- "Airport development should not be considered in isolation, but be integrated into all national, provincial and municipal economic and spatial development initiatives. At the same time, airport development should also meet the social needs and objectives of local communities;
- At national level, the planning and integration of airports into the broader transport network from the point of view of modal integration, as well as in the context of the total air transport system, should be co-ordinated with the other spheres of government;
- Airport development and planning should also be incorporated into the planning initiatives of the appropriate sphere of government as an airport may influence provincial and municipal socio-economic development. Aviation knows no borders;
- The socio-economic "value" of an airport in relation to the total system, as well as from a more localised point of view, is another consideration when making decisions about seamless transport systems, private investment and the designation of additional, or the reduction of the number of, international airports or the allocation of public funding;
- Airport development should be planned holistically in accordance with a structured National Airports Development Plan, which would support national, provincial and local community objectives. Such development should complement the airport system, and in some cases may even allow for competition within the system, to the benefit of the user."

Figure 4.5 NADP Strategic Objectives (Source: Republic of South Africa, 2015)

Although the 2015 NADP specifically emphasises the socio-economic sustainability of airports with reference to meeting local needs, airport master planning is still a territorial phenomenon where outside the fence responsibility is shifted to the relevant provincial and local authority to synergise bulk, housing and transport infrastructure in line with airport expansion (McNeil, 2014). Contrasts between airports and their surroundings clearly differ according to context and setting which is coupled with the demand for communicative partnering.

4.7 AIRPORT CITIES IN THE SOUTH AFRICAN URBAN LANDMARKET

"The fragmented and polynuclear geographies of many contemporary cities can mean that the social and technological worlds of the powerful and the marginalised are rarely far apart in terms of geographical distance".

(Graham & Marvin 2001: 389)

From the perspective of splintering urbanism and rarely added to the list by gated community authors are South African Airport Cities are some of the most extreme forms of globally connected and locally disjointed enclaves in the world. During the apartheid era, white populations lived in core economic hubs while the oppressive legislative framework forced other race groups into satellite towns and homelands (Pillay, Tomlinson & Du Toit, 2006). The odd military airfield and international airport was probably perceived as an upper hand of the oppressor and today, as a globally gentrifying form of white flight.

With an unemployment rate of 26% in 2014, it is safe to assume from a business and leisure perspective that a third of South African citizens have never boarded an aeroplane in their lives.

The South African urban landscape is divided according to class and is expressed as a pattern of low density sprawl, rural in-migration and the shift of economic activities to larger urban centres (Nel & Rogerson 2007). South African international airports are embedded in a competitive demand and resultant supply of space, which the private sector has significant power over. Coupled with historical land dispossession, market distortions and state failures the reality is a dual economy where lower income groups face unequal and exploitative urban property markets (Napier, 2007).

Exacerbated by densification policies, increased building prices and the notion of competitive bidding, government acquisition of land for social housing is fixated on the city outskirts (Pillay, Tomlinson & Du Toit, 2006). The short term response by low income groups has been the occupation of vacant land (often well-located to accessible transport nodes where exchanges and transfers take place outside of formal markets (Napier, 2007). These processes have become socially accepted as fair but not legally and formally recognised by the state. The 2030 National Spatial Development Plan (NSDP) is of key importance to further unpacking the response to the trends underlying the South African urban fabric.

4.8 THE SOUTH AFRICAN NATIONAL SPATIAL DEVELOPMENT PLAN 2030 (NSDP)

The foundation of the 2030 National Spatial Development Plan is to eradicate inequality and poverty and provide jobs and skills. Transit Orientated Development (TOD) is one of the primary tools of the NSDP's aim of bringing about spatial restructuring in the post-apartheid context. The method in which the NSDP has sought to rectify this issue must be understood from the fact that political emphasis is placed on reduced governmental intervention into markets as a means for facilitating economic growth (Tomlinson, 2003). Local and national government experience incentives and pressures to relax their economies to focus state investment on infrastructure to support the private sector in achieving goals of economic growth (Shatkin, 2008). Urban governance has shifted toward entrepreneurialism in the pursuit of efficiency and competitiveness, and decentralisation

has meant more responsibility for local governments to create public private partnerships in order to better partake in the economy (Carion, 2015). This is because the Municipal Systems Act (2000) emphasised 'developmental local government' which meant sub-state participatory engagement, leadership, local dialogue, community governance and the decentralisation of power to local government and communities (Nel & Rogerson 2007). Private sector interest groups therefore have a disproportionate say in what kinds of infrastructure will be prioritised and where (Shatkin, 2008). The result is that supply led energies are focused on providing bulk infrastructure to private sector and basic service delivery to lower income areas rather than fostering micro-scale markets and innovative settlement integration (Nel & Rogerson 2007).

4.8.1 Linking the Targeting and Safety Net Approach

The NSDP's use of IDZ's and Special Economic Zones around airports ports and other areas of economic activity is a spatial means of creating jobs and targeting investment through reduced tax incentives (Tomlinson, 2003). The tools are based on the idea that inward investment from the state or private sector will only be effective where the potential and competitive advantages of each area are known or exploited (Rogerson, 2011).

From a regional economic perspective, Madell (2012) highlights key theoretical shifts that have occurred in the global north over the past century. These went from locational and central place theory (growth poles) to comparative advantage theory (attracting industries and manufacturing) to competitive advantage theory (footloose hi-tech industries) toward collaborative advantage theory with a focus on community, human resource development and sustainability. The underlying focus went from moving jobs to people in certain regions towards attracting people to jobs via industries and technologically advanced clusters. In the global south, this trend has been exacerbated along a class level between those with the skills to partake in these sectors and those without (Tomlinson, 2003).

The economic safety net to the spatial targeting approach is Local Economic Development (LED), which has become a key component of local municipal Integrated Development Plans (IDP). Nel and Rogerson (2011) view LED as a pro-poor poverty alleviating intervention broadly associated with issues like social inclusion, local control, use of local resources and locally determined interventions designed to create employment opportunities, promote development and respond to global markets.

Some municipalities, regardless of being positioned in economic hubs or near IDZ and SEZ enclaves, are often unable to secure funding for their proposed LED, transport and housing projects because preference is given to those occurring within targeted areas (Tomlinson, 2003). Moreover, the NSDP's focus on transit orientated nodes and corridors typically fails to link to the local socio-economic context (Bickford & Behrens, 2011). A further issue is that local municipalities often lack the necessary guidance, resources and management capacities conducive to attracting partnerships and investment from private sector firms. In many cases, they are confronted with weak civil societies and insufficient tax bases therefore relying heavily on NGO's to manage processes and attract private sector (Tomlinson, 2003).

Considering the Aerotropolis from the perspective of social transformation in South Africa, the underlying gap between the targeted IDZ and SEZ and the LED safety net is the need for coupling innovative inside and outside the fence partnerships between existing and emerging platforms in order to allow the fiscal and socio-technical trickle down to the local economy. However, highly demand driven airport city expansion and value capture possibilities depend on successful and democratic local project interaction which require significant time and resources (Appold & Kasarda, 2012). The reality is that both the principle and practice of empowering participation is often flawed in environmental and IDP processes which fail to link to regional innovation networks (Davids, Theron & Maphunye, 2009).

Thus, nurturing and formulating innovative and collaborative networked partnerships with private sector, communities and NGO's has proven particularly difficult.

The Aerotropolis requires effort by outside the fence entities, where local resources should be focussed toward gathering data on migration, value chains and backward and forward linkages to local businesses and NGO's. These can inform municipal LED decisions and aid in the discovery of catalytic local multipliers of existing resources and programmes that could potentially link to regional innovation networks such as the Aerotropolis partnering platform (Madell, 2011).

4.9 AREA BASED MANAGEMENT

Area Based Management (ABM) can be used in relation to airport urban surroundings. ABM is a form of integrated planning that enables greater interaction between communities, municipalities and private sector. ABM includes interdisciplinary forms of place specific planning like neighbourhood renewal and housing projects in addition to targeted socio-economic upliftment programmes. (Cameron, Odendaal & Todes, 2004). These seek to surpass the pure physical realms of development by identifying sustainable socio-economic spin offs within their plans. According to Pieterse (2010), bringing communities together around how they regard their neighbourhood in terms of problems, resources and opportunities is the only way to effectively link local level plans to those at district level, provincial and national level.

Healey (2002) argues that a key question is how does one enhance a space to compete with international markets through unique linkages to spatial qualities? The author reiterates that bureaucracies are not congruent with identifying policy linkages to place specific identities and fostering long term relationships. These questions raise the issue of complexity and scale, creating cross sector collaborative partnerships and acting upon new theories, practices and technologies that can help to improve local government performance and grass level engagement in regional airport related planning.

A critique of ABM is that autonomous agencies are faced with bureaucratic issues of funding, which through curbing corruption subsequently made it increasingly difficult for NGO's and agencies alike to receive finance released from central bodies (Cameron, Odendaal and Todes, 2004)

4.10 OPPORTUNITIES FOR VALUE CAPTURE

There are numerous ways in which state and civil society have attempted to reduce barriers to the formal market. Focus is typically around re-coupling the formal and informal sectors through incrementally enhancing policy, institutions, and tenure, bringing urban actors together around common goals, disseminating and making available market information and extracting value and accordingly redistributing it (Napier, 2007).

“Economically, transit access spurs demand for new development, enhancing the marketability of transit-oriented locations. This enhanced market value is particularly powerful in low-income communities and areas that otherwise lack market access.”

(ADEC, 2010:2)

This implies a large emphasis on the role of local government in being able to carry out these functions. In this regard, state interventions should be able to understand the complexities of the current informal and formal system well enough not to distort existing markets (Napier, 2007). Although there is no formal value capture policy in South Africa, a number of cross-subsidisation techniques are emerging, which could potentially be used by regional airport urban development processes.

4.10.1 Betterment Taxes

Investment in transport infrastructure has a direct influence on surrounding land values due to the opportunity created through increased accessibility. Locating near transport nodes and well accessible hubs is a factor considered by both large scale private

companies and small scale informal traders (ADEC, 2010). Brown-Luthango, Makanga & Smit (2013) argue for a means of value capture through state investment in transport infrastructure where the residual private land values can be captured through tax increment financing to be cross subsidised to special project programmes and public infrastructure elsewhere.

The constraints pertaining to this approach is that the informal sector is not properly conceived in terms of T.O.D let alone the fact that airports have only recently been recognised as such in South Africa hence the exacerbated notion of splintering urbanism. The assumption made is that if poorer income groups are located near a transport interchange their land values will increase. However, this may not be the case if surrounding areas are characterised with a lack of formal landownership and tenure which is a significant gap in the Airport City process. Given that banks have been reluctant to provide loans to marginalised groups on the basis of higher risk and non-payment of services, attempts at entering the formal land market and acquiring tenure are restricted to RDP housing schemes regard (Brown-Luthango, Makanga & Smit, 2013).

4.10.2 City/Business Improvement Districts

City Improvement Districts (CID) are associated with areas of clustered economic activity where landowner taxes and levies are pooled and re-invested in the public realm. In South Africa, investment is typically focussed toward enhancing security and infrastructure improvements like landscaping and signing which benefit only land owners (ADEC, 2010). Establishing a CID in lower income communities is problematic given the weak tax base from which to work. Combining emerging CID's with well-established ones is a significant gap in the South African Airport City phenomena which can be used to offset improvement in designated areas of the public realm.

4.10.3 Incentivised and inclusionary zoning

Incentivised zoning is used as means of offering developers additional density and floor space on the basis of contributing to the public realm in the form of housing, park and recreational facilities (ADEC, 2010).

In most cases the increased floor space and attraction by logistical industries near airports is a particular opportunity not to forego.

Inclusionary zoning policies are a way of ensuring that developers provide a certain ratio or percentage of affordable units (ADEC, 2010). Such policies should be responsive to market conditions and the need for public amenities in the local area (ADEC, 2010). The demand for this is evident in the South African context where the emerging GAP housing market (persons earning R 3000 – R7000 a month) are unable to secure home loans (higher risk non-payment of services) and fail to qualify for R 3000 threshold for state subsidised housing (ADEC, 2010). Airport development can therefore enhance the value of GAP housing property values which can be particularly marketable in the future.

4.10.4 Land Banking and Leaseholds

Land banking can be a mechanism used by government to purchase and secure land near transit interchanges (Brown-Luthango, Makanga & Smit, 2013). Land banking by private sector can equally be a negative aspect for airport expansion. However, from a public sector perspective, municipal agencies gain revenue through increased land value and through leasing land to the commercial and industrial sector. In this regard tax increment financing tools can be used to land value increase to offsetting municipal loans or contributing toward service delivery, education and housing. Local governments need to be proactive by appealing to national government to allow the testing of value capture and cross subsidisation around designated transport nodes, which further aligns with their mandates of creating a pro-poor enabling environment (ADEC, 2010).

4.11 CONCLUSION

ACSA's shift from inside the fence infrastructural focus has geared South Africa three main economic international airports for both global connectivity and outside the fence partnership with surroundings. For ACSA, the diversification of non-aeronautical revenues are an untapped resource which are currently being exploited where land is available. The philosophical shift toward the formulation of airport

steering committees implies a hybrid form of network governance dependent on the alignment of National, Provincial and Local government mandates in areas of economic, transport and housing development.

Accelerated economic development is vital to increase jobs and incomes in a more competitive international environment. However, regional airport urban development concepts flesh out the paradoxes in the state system in terms of the developmental aspirations at a national policy level versus the neoliberal market orientated implementation at a local level. Much of this is due to nebulous ill-defined terms that we fail to properly understand with regards to post-apartheid transformation, which for some is about the economic trickle-down effect whereas for others it is about local integration and having mixed income groups. Externalities are undoubtedly a reality of airport expansion but a philosophical shift must be made toward asking how different airport urban concepts in the South African context can evoke pro-poor trade-ups rather than trade-offs.

By understanding the Aerotropolis and Airport City concepts from a fiscal and institutional level in South Africa, it becomes clear that the challenges government needs to overcome involve addressing, aligning and enabling policy required for fundamental change and rectifying the non-coherent division of accountability between the three spheres of government. What is required is an integrative structural reform toward a more local autonomous system in order to maintain a close relationship with the public and private sector. At the local municipal level there is a need for greater innovation, capacity building, integration, measuring of alternative indicators and cooperation between LED stakeholders and departments.

CHAPTER 5: METHODOLOGY AND TECHNIQUE OF RESEARCH

5.1 INTRODUCTION

The methodology is informed by the lessons and gaps in literature review presented in Chapter 2, the secondary case studies in Chapter 3 and the background to the African and South African context in Chapter 4. Hereafter, the dissertation focus is how the different airport urban development techniques and lessons can be applied to the CTIA whereby the City of Cape Town becomes the main units of analysis.

The historical and emerging spatial and economic platforms linking the CTIA to the regional idea of an AeroScape, Airea and Airport Corridor have always existed but nowhere is there a consolidated strategic spatial vision attributed to the lessons gained from different airport urban forms and the associated need for region wide partnership.

5.2 SETTING THE SCENE

Cape Town is South Africa's oldest city and trading post, strategically situated on the southern coastal tip of Africa in the Western Cape, which is governed by the opposition political party, the Democratic Alliance. Cape Town is home to 65% of the Western Cape's population and is ranked the second most competitive metropolitan in Africa, contributing 71% to total provincial economic activity and 12% to the national economy (CoCT, 2014).

The Cape Town Metropolitan is host to the primary airport and harbour of the province. The functional efficiency of the logistical road and rail connections between these hubs and the Saldanha port (150km northward) is critical for national, provincial and local economic growth. Hence the City must "support the rationalisation, upgrade and development of port systems, airports and freight movement" (Cape Town SDF: 27). Exploiting this locational advantage is seen as one of the crucial factors for unlocking trade into the African market and creating additional employment in the Western Cape. The majority of CTIA's aviation linked exports are perishables like fresh cut flowers and fruit, while clothes and spare automotive parts contribute the highest portion of imported goods (ACSA TIA, 2013).

The CTIA airport was developed in 1954, to replace the older militaristic Wingfield Aerodrome situated near the CBD and Century City – ironically Cape Town's First Edge City - and to be strategically located within the greater functional region along the N2 primary arterial which has access to the CBD, port and southern suburbs as well Stellenbosch, Paarl, Sommerset West, George and Port Elizabeth (See Figure 5.1 and 5.2)



Figure 5.1 Cape Town DF Malan Airport 1954 (Source: Cape Town Tourism, 2009)



Figure 5.2 Aerial Image of CTIA in 2015 (Source: Google Earth, 2015)

The largest upgrades to the CTIA occurred prior to the 2010 FIFA World Cup. This included add-ons to the international terminal, the development of a multi-storey parking, a green star hotel (Cape Verde) and a

MyCiti Bus interchange connecting to the CBD (ACSA, 2014). Prior to this, the N2 Gateway Housing project became a notorious 'beautification' of the airport corridor approach by national and provincial government. The project saw the removal and relocation of informal settlements to the east of the CTIA boundary, with additional housing upgrades to Joe Slovo and Langa (Urban Africa, 2015).

The capital expenditure budget for the CTIA (one of ACSA's highest portions) between 2015 and 2025 is 11.5 billion Rand where 5.5 billion will be for new capacity and 6 billion for maintenance and refurbishment (ACSA, 2014). This includes plans to realign the existing runway, add a second primary runway, upgrade existing domestic and international terminals and to connect the CTIA to Bellville and the Cape Town CBD via passenger rail (ACSA, 2014, Fataar pers.com 2015). The final development will allow a mean annual capacity of 40 million passengers (Zietsman, 2013) (See Figure 5.3).



Figure 5.3 CTIA Master Plan (Source: NACO Consultants, 2007 in Zietsman, 2013:24)

As the economy becomes increasingly connected to international markets, the CTIA will have to become more aware of surrounding land-side support systems such as bulk infrastructure, transport and housing (Zietsman, 2013). Important to reiterate is that airport master plans are not fixed, but instead strategically adaptive processes of multiple input and continually reviewed information (Kwakkel, Walker & Marchau, 2010).

The decision to pursue a regional network approach requires that airport master plans and district, provincial and national frameworks are more synergistic and collaborative in process (Kwakkel, Walker & Marchau, 2010).

5.3 THE CAPE TOWN REGIONAL AIRPORT TRANSITION

The regional partnering platform and steering committee for the CTIA is yet to be fully developed. The current strategic role-players are ACSA, Western Cape Provincial Government, the City of Cape Town (CoCT) and Wesgro who are in the initial phases of communication around partnering, terminology, feasibility and process.

The pre-conceptual phase of the SDF requires that a range of actors be identified as key stakeholders, technical team and potential partnering groups, who are sequenced into different but integrated layers of representation. A synchronised undertaking is needed by the stakeholders depicted in Figure 5.4. Although formulating a coordinated venture among all these participants is a particularly tall order in the South African context, research on the Aerotropolis concept has been conducted by the National Treasury given the application at ORTIA and KSIA.

The Aerotropolis is essentially a broader economic growth strategy undertaken by ACSA, National, Provincial and Local Government who have regulatory authority and capital budgets for public services and bulk.

infrastructure which are all catalytic to incentivising business development on and around ACSA owned land.

The Western Cape Economic Development Partnership (WCEDP) are a neutral platform that seek to improve the performance of Cape Town's regional economic development system by creating innovative partnering networks that harness the power of both markets and planning.

ACSA are not the main driver of the process but are instead key actors toward marketing and enhancing the Airport City precinct more attractable to liveability, walkability and local business connectivity. From a financial perspective, roughly 80% of ACSA's focus includes attracting additional direct flights and supplying infrastructure to sustain the forecasted volumes of passenger and cargo throughput at ORTIA and KSIA.

Wesgro are the City of Cape Town's trade promotion agency and marketing platform for partnering and attracting foreign and domestic investment to the region. In terms of value chain partnerships, the central concern for the Department of Economic Development and Tourism (DEDAT) and the Economic Intelligence Consortium (EIC) is to track market trends and provide robust data in order strengthen existing and future aviation freight and passenger market linkages to the local economy.

The value proposition for all stakeholders involved should be a fast-tracking and better fulfilment of existing mandates, along with the long term benefits of networked governance and economic perpetuity to the national and local region.

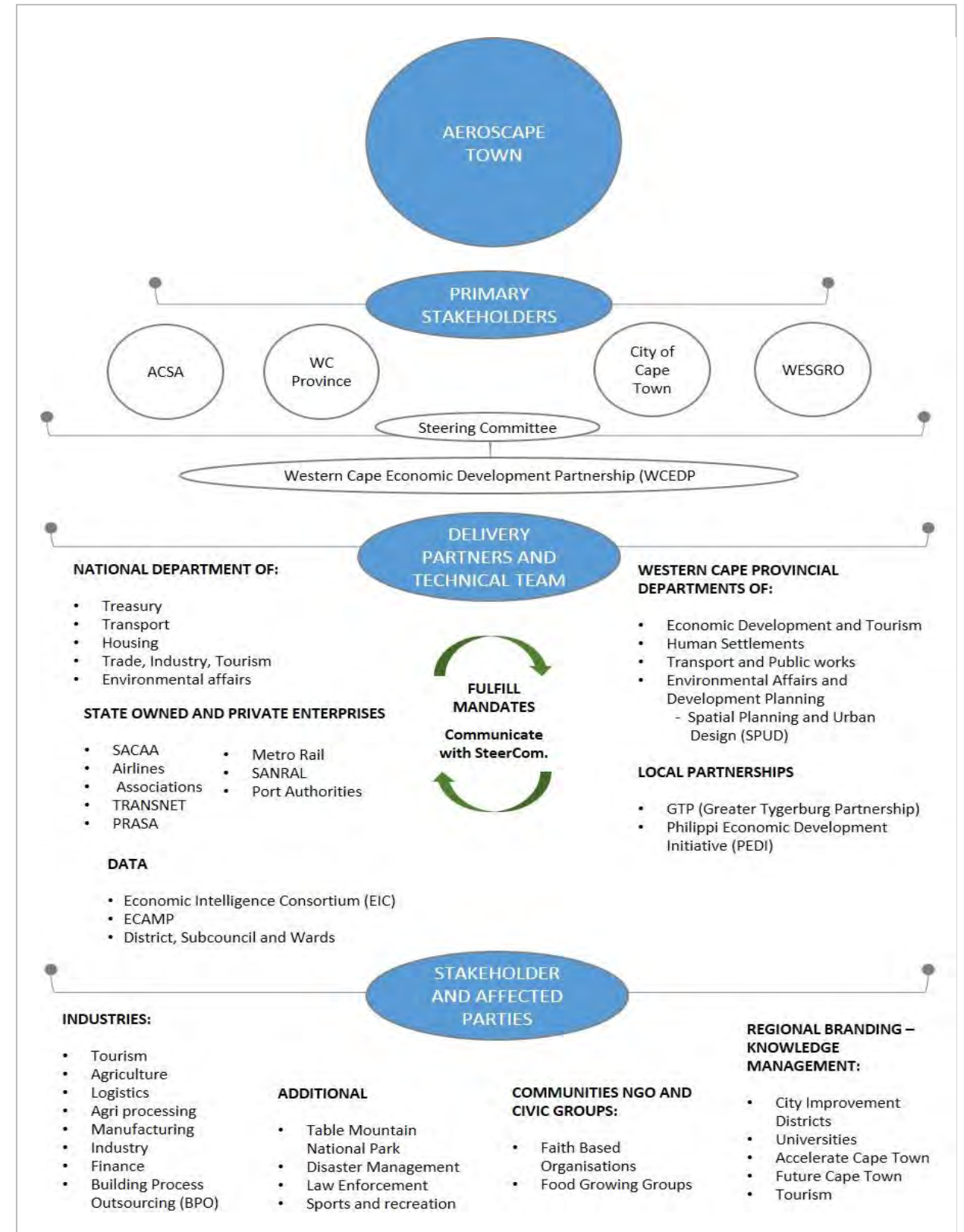


Figure 5.4 Strategic Role Players and Stakeholders (Source: Author, 2015)

5.4 QUALITATIVE DATA AND SPATIAL TOOLS

Friedman (1987) emphasises that planning is a profession that converts knowledge into action through strategic communication between multiple actors. The methodology of the dissertation is based on the epistemology of interpretivism as it includes the researcher in the building of knowledge. This is further embedded in constructivism as the theory, input and data gained is still dependent on the view of the researcher (Du Plooy Cilliers, Davis & Bezuidenhout, 2014).

The learning component of the dissertation not only emerges as a documented case study of the CTIA, but transgresses to the point of testing qualitative ideas and lessons with the use of a strategic Spatial Development Framework (SDF), which is further supported by the input of key actors involved in and related to the current 'Cape Town Aerotropolis' process.

To aid the researcher in formulating a conceptual SDF for the CTIA, semi-structured interviews were conducted with key specialists and academic theorists in field's related to urban, airport and business related planning, which in effect are Kasarda & Appold's (2014) key informant categories of the Aerotropolis process. Annexure A denotes the specialist respondents interviewed during the periods of June and September 2015. Semi-structured personal interviews and telephonic phone-calls to key participants was used as a qualitative and conversationally iterative means of gaining insight into the application of the Aerotropolis concept to the CTIA. Ten of the respondents were personally interviewed, with 6 pre-identified and four contacted through referral from original participants. All information obtained in connection with the respondents is duly referenced and disclosed only with their permission after signing a participation form developed in accordance with the UCT's ethical research requirements (See Annexure 1).

The interviews made use of open-ended questions allowing the researcher a degree of flexibility toward probing the central question (Du Plooy Cilliers, Davis and Bezuidenhout 2014). Interviews typically began with terminology around the Aerotropolis and regional airport urban forms such as the AeroScape and Airea. Discussions tended to be discourse related to airport functional elements like connections between air, ground and sea transportation as well economic, business and marketing strategies.

Thereafter, the researcher directed participants towards the CTIA's immediate surroundings and the notion of a long term socio-economic and sustainably integrated Airport City and regional airport partnership. The gaps in the literature informed the following secondary questions which were not fixed per se but rather guiding pillars of the process.

- **What are the potential catalytic nodal, corridor, port and rail projects linked to the CTIA?**
- **What partnerships can yield short term investment returns and improved infrastructure for surrounding communities?**
- **How can the CTIA regional partnership link to NGO's and small medium micro enterprises?**
- **How could the CTIA's Airport City create a closed loop metabolism?**

The secondary questions above could be research based dissertations in their own right. Nevertheless, the questions are in line with the central question proposed and the regional partnership for CTIA has only recently begun. Findings from the interviews are therefore used as a means of answering the central and secondary research questions which subsequently become theoretical planning and design inputs for the SDF.

5.5 SPATIAL DEVELOPMENT FRAMEWORK

"Spatial Planning is inherently integrative and strategic taking into account a wide range of factors and concerns and addresses the uniquely spatial aspects of those concerns. The purpose of the spatial development framework is to give direction and guide decision-making and action over a multi-year period aimed at the creation of integrated and habitable cities, towns and residential areas"

City of Cape Town (2012)

The title given to the SDF is the 'Green-AerosCape Town' which, together with the 'Airea' concept, is justified in the literature view as the most applicable airport urban form used to vision the regional approach, networked structure and sustainable retrofitting of an existing airport.

It is vital to distinguish that OR Tambo is the main economic airport in South Africa as part of the hub and spoke network, hence the SDF is essentially about tailoring the niche role of Cape Town and its location within that picture. In this regard, the title leverages the marketing and business component of the Aerotropolis concept, but simultaneously differentiates the CTIA from ORTIA and KSIA, further adding to the idea of Cape Town as a green tourism destination and knowledge growing economy.

A contextual model is formulated to aid the researcher in determining various opportunities and constraints. In this regard, Pieterse 2011) argues for versions of sustainability that seek interdependence or stabilising and destabilising effects between various components of the socio-ecological, economic and institutional system.

The proposed networked analysis of the AerosCape Town is based on a 25km buffer, which is essentially anchored on a 5 km radial influence of the Cape Town Airport City (See Figure 5.6 and 5.7). The 25km buffer is not fixed but occurs at a regional Cape metropolitan scale, which is further unpacked with a mutually reinforcing cross sectoral analysis of the biophysical environment, infrastructure and space economy. The 25 km buffer acknowledges the CTIA as a potential future economic hub centrally linking the CBD, Bellville, Somerset West, South East Metro as well as hinterlands like the Paarl and Stellenbosch.

The 5km radial influence of the Airport City fleshes out the immediate issues in the surrounding public realm which need to become short term catalytic projects for attracting businesses and creating greater settlement integration and connectivity the immediate surrounds.

The intervention of the SDF identifies key potential backward and forward linkages to the local economy as well as priority areas and associated agencies for future infrastructure investment, conservation, economic support and partnership creation.

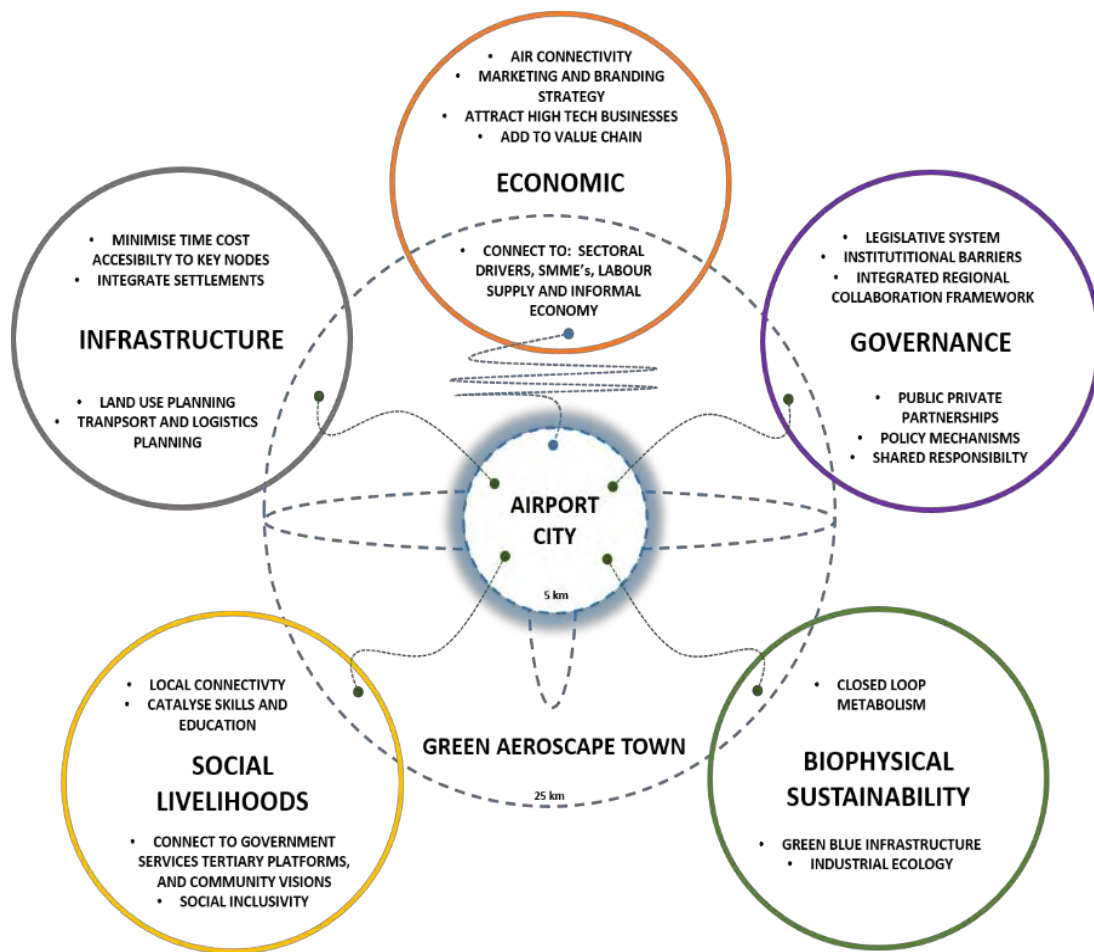


Figure 5.5 Regional AerosCape Town and Airport City Anchor (Source: Author, 2015)

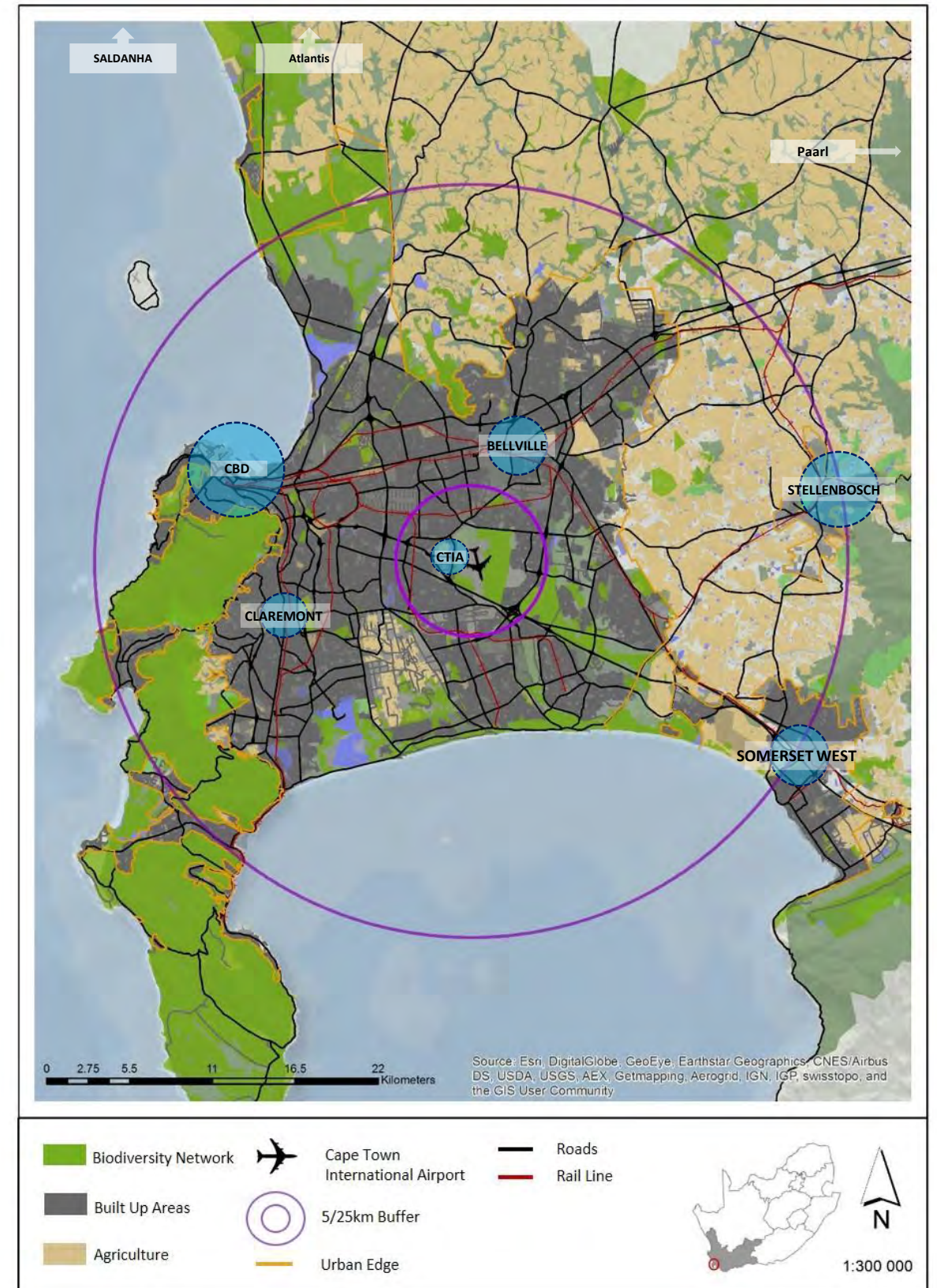


Figure 5.6 CTIA 5-20km Buffer Analysis (Source: Author, 2015)

CHAPTER 6: LEGISLATION AND PLANNING FRAMEWORKS

6.1 INTRODUCTION

Chapter six sets out the relative national, provincial and local spatial, economic and legislative frameworks and their associated values and principles pertaining to the CTIA and Cape Metropolitan.

6.2. WESTERN CAPE PROVINCIAL SDF VALUES AND PRINCIPLES

The Western Cape Provincial SDF (PSDF) sets out the overarching vision toward addressing post-apartheid spatial inequalities and transforming the province in line with the direction of the NSDP and the longer term OneCape 2040 goals (Seen Figure 6.1), which the Western Cape Infrastructure Framework, Provincial Land Transport Framework and Green Economic Strategy are all aligned.

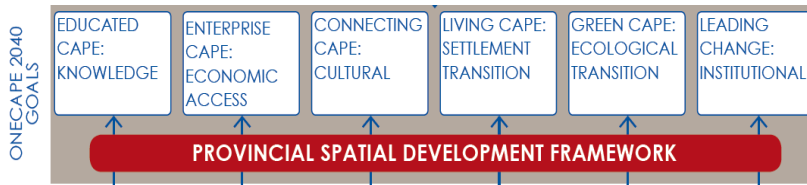


Figure 6.1 ONE CAPE 2040 Goals (Source: Western Cape PSDF, 2013: 9)

The overall vision for the Western Cape is of “a highly-skilled, innovation driven, resource efficient, connected, high opportunity and collaborative society” (Western Cape PSDF, 2013:14). The terminology attached to these goals is based on the principles advocated for by the NSDP which are spatial justice; sustainability and resilience; spatial efficiency; accessibility and liveability (Western Cape PSDF 2013). Together these are grouped into managing resources and risk, bolstering the space economy and creating integrated and sustainable human settlements. This can only be achieved through effective transitions in each of the sectors depicted in Table 6.1 above. Affiliated with these goals is the 2012-2017 Cape Town IDP, which has five main themes revolving around opportunity, safety, care, inclusivity and institutional efficiency.

Table 6.1 PSDF Transition Goals (Source: Western Cape PSDF, 2013: 9)

TRANSITION	FROM:	TO:
SETTLEMENT TRANSITION (LIVING CAPE)	Unhealthy, low access, often alienated, low opportunity neighbourhoods	Healthy, accessible, liveable, multi-opportunity communities
ECONOMIC ACCESS TRANSITION (WORKING CAPE)	Factor and efficiency-driven economy with high barriers to entry and low productivity and entrepreneurship	Innovation-driven economy with low barriers to entry, high productivity and entrepreneurship
ECOLOGICAL TRANSITION (GREEN CAPE)	Unsustainable, carbon-intensive resource use	Sustainable, low-carbon resource use
CULTURAL TRANSITION (CONNECTING CAPE)	Barriers to local and global connectivity (language, identity, distance, parochial attitudes)	High level of local connectivity and global market fluency
KNOWLEDGE TRANSITION (EDUCATING CAPE)	Unequal variable quality education plus limited innovation capacity	High-quality education for all plus high innovation capacity
INSTITUTIONAL TRANSITION (LEADING CAPE)	Defensive, adversarial structures	Open, collaborative systems

One of the de facto transitions required for the collaboration component of the AerosCape Town and Airport City is the removal of political and institutional barriers that exemplify sectoral interests and disallow the progression of transport and housing settlements in synergy with airport growth. This holds true for the ecological, cultural, and knowledge transition stages of the economy, especially where education and skills upliftment is a primary investment.

6.3 SPATIAL PLANNING LEGISLATION

In order to be competitive, fast tracking investment in catalytic quick win proposals is a way of setting up the longer term AerosCape Town vision (Allemeir pers.com, 2015). This essentially requires a reduction of red tape barriers and a spatial alignment of the CTIA master plan and provincial and local investment programmes in transport, housing, health and education.

Conversely, South African post-apartheid legislature has been fragmented and contradictory, resulting in sectoral conflicts and a significant gap between high level spatial planning and land use planning (Harrison, Todes & Watson, 2008).

The National Spatial Planning and Land Use Management Act (SPLUMA) (Act 16 of 2013) has sought to rationalise the fragmentation between the responsibilities of all three spheres of government (See Figure 6.2). Importantly arising from this act is that local municipalities have the power to execute land use decisions within their area of jurisdiction. This subsequently allows the formulation of municipal tribunals, steering committees and land use commissions between airport and city authorities in order to reconfigure a form of compatibility with the CTIA.

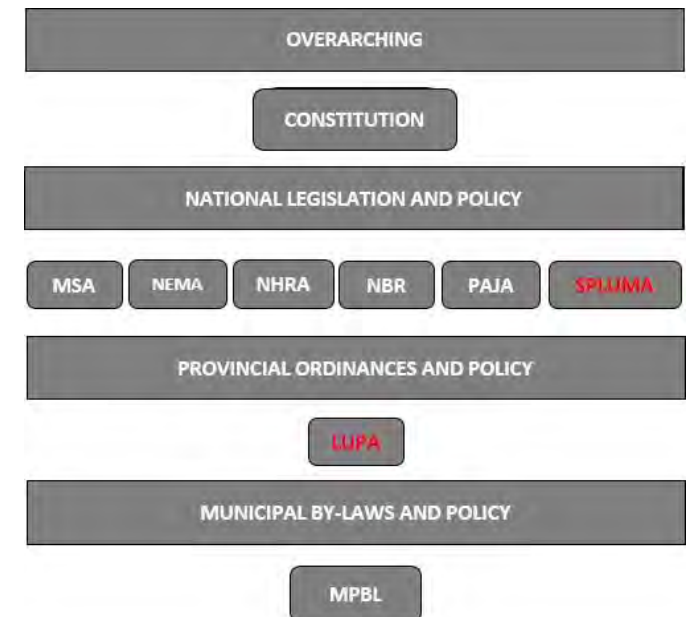


Figure 6.2 Legislative Structure (Source: Adapted from Western cape PSDF 2013)

The amalgamation of Cape Town's 24 municipalities under one zoning scheme and the introduction of the Western Cape Land Use Planning Act 2014 (LUPA) are important legislative trends. LUPA enhances consolidation and collaboration amongst provincial and municipal planning, and gives further effect to the use of restrictive overlay zones pertaining to heritage and environment (Western Cape PSDF, 2013). These restrictions can also become an efficient way of linking the principles in the AerosCape Town SDF to surrounding local municipal Integrated Development Plans.

6.4 THE NATIONAL AND PROVINCIAL LAND TRANSPORT FRAMEWORKS

The spatial logic to achieving the PSDF's transition requirements is based on the National and Provincial Land Transport Frameworks which are transit orientated frameworks of the NSDP. The terminology includes capitalising on comparative strengths, consolidating and connecting nodal areas, clustering economic activity along transport routes and connecting biodiversity corridors, freight logistics and public and non-motorised transport systems (Western Cape PSDF, 2013). These are key components to unlocking access to the urban structure in which the CTIA is embedded in.

The PLTF acknowledges the role of CTIA in the metropolitan highlighting that with increased population growth and economic activity, all forms of movement within and between the Cape metropolitan and surrounding regions will be enhanced. All roads and rail facilities leading to the CTIA at national and provincial level will therefore require additional infrastructural capacity (WC PSDF, 2013).

6.5 THE 2012 CAPE TOWN METROPOLITAN SPATIAL DEVELOPMENT FRAMEWORK (MSDF)

The formulation of the Cape Town MSDF is a function of the Municipal Systems Act (Act 32 of 2000) and is linked to different sector departments, providing specific guidelines, policies and supporting legislation in respect of land use management (CoCT, 2012). The MSDF emphasises the need to enhance the economic competitiveness of the economy where the strategic avenues of investment are infrastructure capacity to unlock access to the economy and to create skills and grow the knowledge capital of the population (CoCT, 2012). The MSDF is based on the PSDF and NSDP, by making use of a multi-accessibility grid to ensure land use intensification along corridors and densification at key nodes (CoCT, 2012).

The MSDF does not describe the CTIA as a long term gravitational feed in, able to take on more roles with the immediate surrounds (Mammon pers.com, 2015). Rather, the MSDF targets the airport as a sub-regional logistics and industrial node, concerned primarily with the intermodality of the precinct rather than the liveability.

In the case that CTIA reaches full capacity or the MAS threshold of 12 million air passengers, the MSDF sets land aside for a second airport northward of the metropolitan. However, building a new airport could simply displace economic activity and would be unfeasible if capacity is not reached at the existing airport (Mammon pers.com, 2015).

6.6 THE TYGERBERG DISTRICT SPATIAL DEVELOPMENT PLAN (SDP)

The Cape Metropolitan consists of eight districts, each of which has its own Spatial Development Plan (SDP) and Environmental Management Framework (EMF) to guide the direction of economic, social, biophysical and land use aspects within the respective districts. The CTIA is located in the lower half of the Tygerberg district. The relevant SDP sets out the noise contours pertaining to the existing CTIA runway where residential development may only occur within the 70 decibel (dBA) contours and lower (CoCT, 2009) (See Figure 6.4). The Tygerberg SDP specifically states that:

"The CTIA precinct, in addition to aviation operations, is a focal point for logistics, freight, distribution and light industrial activities among others, which benefit from the locational advantage and critical massing of businesses around the airport."

(CoCT, 2009: 35)

The Tygerberg SDP recognises the interdependency of the CTIA in terms of business and employment potential for low income groups, further advocating for enhanced physical linkages south of the N2, to the Philippi East Industrial node and greater housing opportunities to informal settlements (CoCT, 2009).

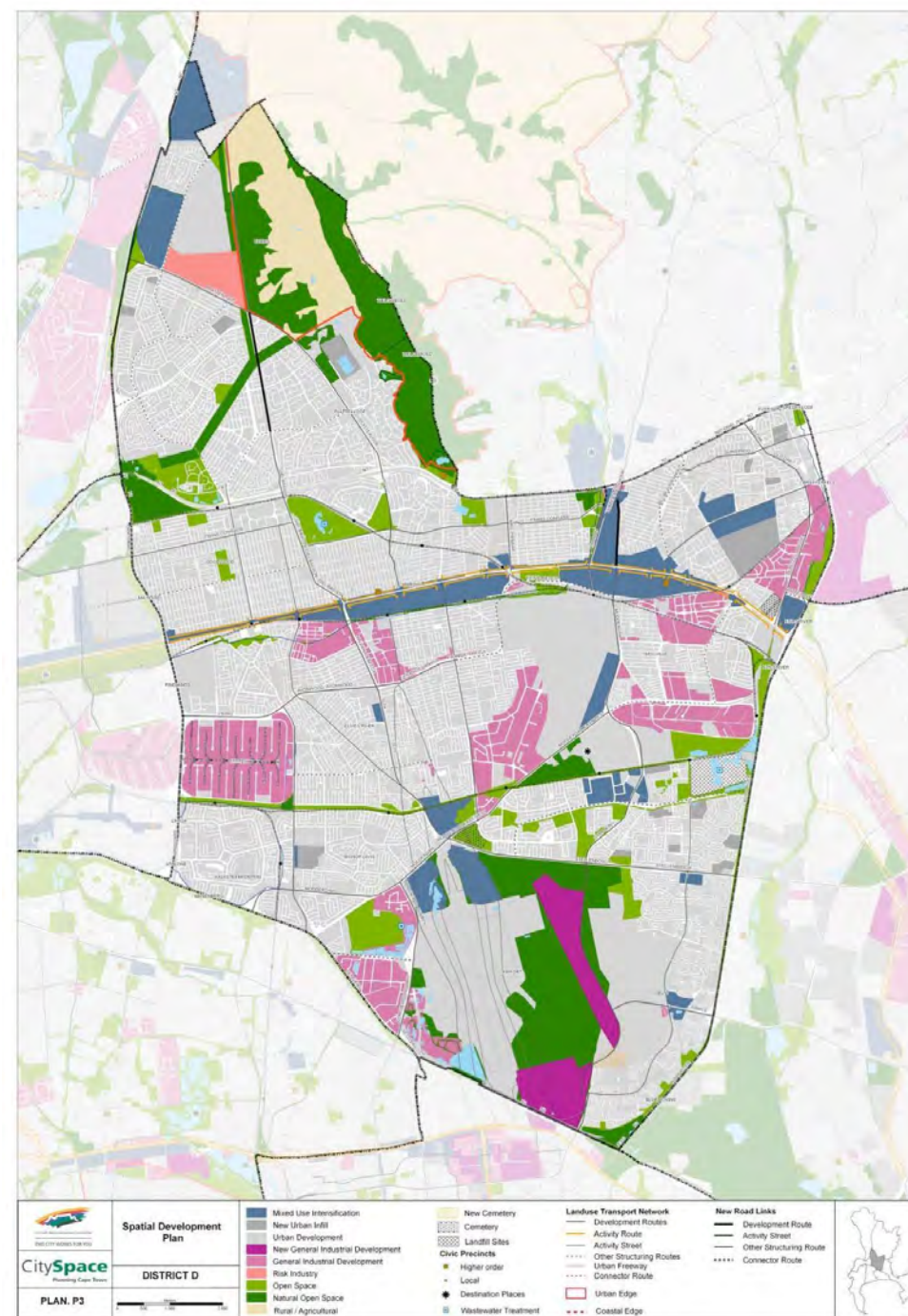


Figure 6.3 Tygerberg Spatial Development Plan (Source: CoCT, 2009:18)

6.7 ENVIRONMENTAL LEGISLATION

The principles of sustainable development are firmly embedded in the Constitution. The National Environmental Management Act (2010) is applicable to all airport and transport as well housing and settlement developments, all of which require environmental assessment and authorisation. Additional environmental acts include:

- National Water Act 36 of 1998 (NWA);
- National Heritage Resources Act 25 of 1999 (NHRA);
- National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA);
- National Environmental Management: Air Quality Act 39 of 2004 (NEMAQA);
- and Environmental Conservation Act 73 of 1989 (ECA): Noise Control Regulations.

In order to be competitive and provide jobs, red tape barriers to should be reduced in a democratic and environmentally sustainably manner.

6.8 HOUSING AND INFORMAL SETTLEMENT LEGISLATION

The Housing Act 107 of 1997 sets the housing principles across all spheres of government. The Act details how local and provincial spheres gain access to the South African Housing Fund (SAHF). The Social Housing Act is further applicable in terms of the Social Housing Regulatory Authority (SHRA) who accredit and provide rental cooperative housing options for low to medium income groups.

The City's Integrated Human Settlements Strategy employs the New Informal Settlement Upgrading Programme (NISUP) which allows for re-blocking of dwellings and security of tenure during the incremental upgrading process. This further includes opportunities for rental housing and serviced plots if alternative land is found.

The Prevention of Illegal Eviction from Unlawful Occupation of Land Act (1998) ensures that land must be designated for relocation in the case that a national or provincial organ of state declares that eviction is necessary.

6.9 AIRPORTS AND AIRSPACE LEGISLATION

Airports and airspace legislation and policies must conform to the National Constitution of 1996. Civil aviation is a national function in consultation with provincial governments where national interest in the planning and location of airports pertains to safety aspects, while provincial interests relate to the impact of airports on other provincial functions (SACAA, 2013).

With the enactment of the Civil Aviation Act in 1998, the South African Civil Aviation Authority became an agency of the National Department of Transport (DOT). SACAA's strategic plan is aligned with ensuring civil aviation safety and security, which the International Civil Aviation Organisation (ICAO) audits according to Standards and Recommendation Practices (SACAA, 2013). The authority also ensures the regulation of policies related to the safety of goods coming into and out of the airport by industries, passengers and workers.

The Air Traffic and Navigation Services Company Ltd (ATNS) is responsible for the management and provision of air traffic and navigation services.

CHAPTER 7: AEROSCAPE TOWN ANALYSIS

7.1 INTRODUCTION

Chapter seven investigates the 25km regional networked influence of the AeroScape Town. The contextual model set out in the methodology is used to knead out the multi-faceted opportunities and constraints pertaining to the CTIA in relation to the Cape Metropolitan region.

7.1.1 Population and Migration

The Cape Metropolitan sub-region consists of the category A Cape Town Municipality (24 subcouncils) and category B Stellenbosch and Drakenstein municipalities. Together they have a combined population of 4.2 million people (Stellenbosch 75 000 and Paarl 130 000). As shown in Figures 7.1 & 7.2, Cape Town's population is estimated to be a total of 3 860 589 people (CoCT, 2014).

Between 1996 and 2011, the population grew by 45.9% and is expected to reach 4.2 million by 2022 and 4.6 million by 2032 (CoCT, 2014). The population increase is largely attributed to natural population growth and in-migration. Although the Coloured population is the largest number of persons in the metropole (42% in 2011), Black Africans are the fastest growing group. Migrant influxes are predominantly from the Eastern Cape who make up 35% of new arrivals into Cape Town (CoCT, 2014).

7.1.2 Households

Between 2001 and 2011 the number of households increased by 63.6% to reach a total of 1 068 572 (CoCT, 2014). The largest increase was seen by the Black African Race group in informal dwellings in the south east metro (See Figure 6.7 and 6.8). The disparity is evident the fact that 50% of households earn less than R12 800 per month while 30% earn less than R1 600 per month.

Residential growth is divided into three submarkets, the private sector, government subsidised housing and the informal sector. The private sector delivers 8000 – 15000 dwelling units per annum depending on the market potential, infrastructural capacity, safety and overall business and regulatory environment (CoCT, 2012).

The City delivers 6500-7000 subsidised units per annum, predominantly to the peripheries, but this is not enough to keep up with population growth and in migration let alone the existing 380 000 unit housing backlog (CoCT, 2014). Alternative methods for compact community orientated housing are therefore required in the future.

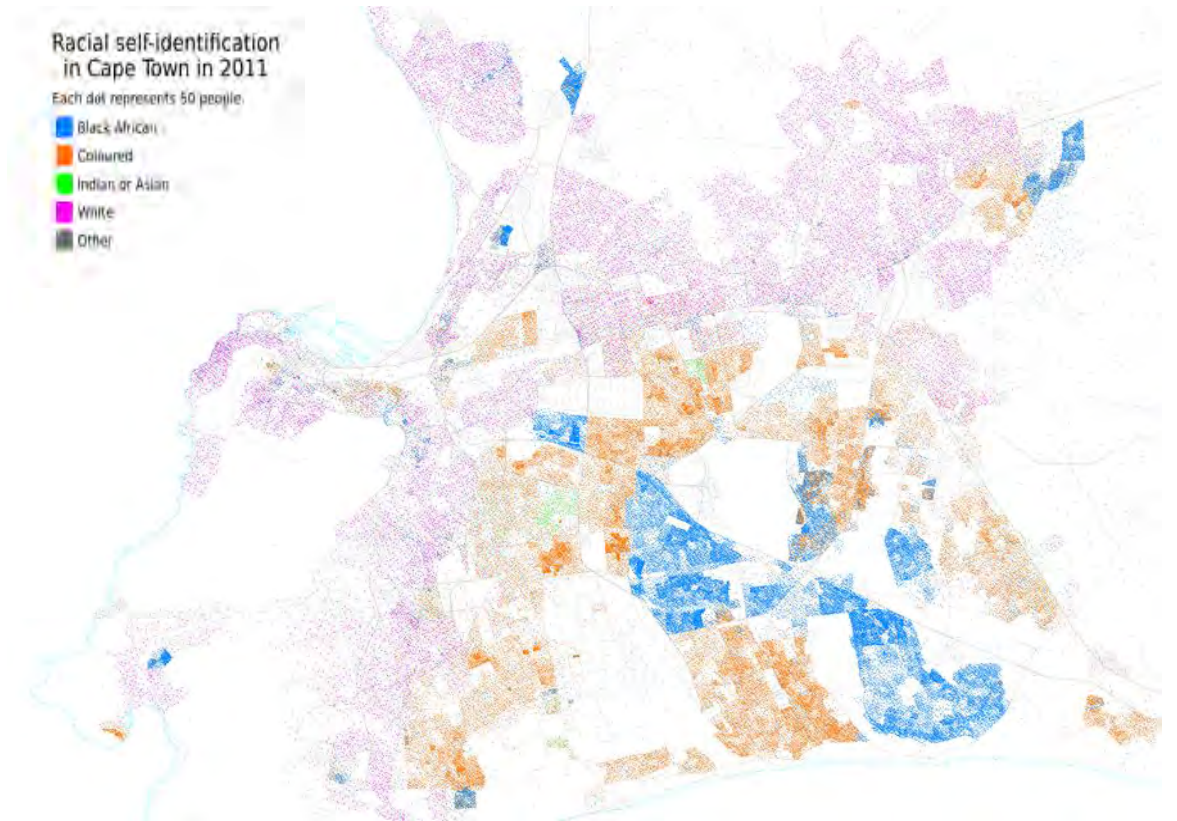


Figure 7.2 Spatial Location according to Race (Frith, 2011)

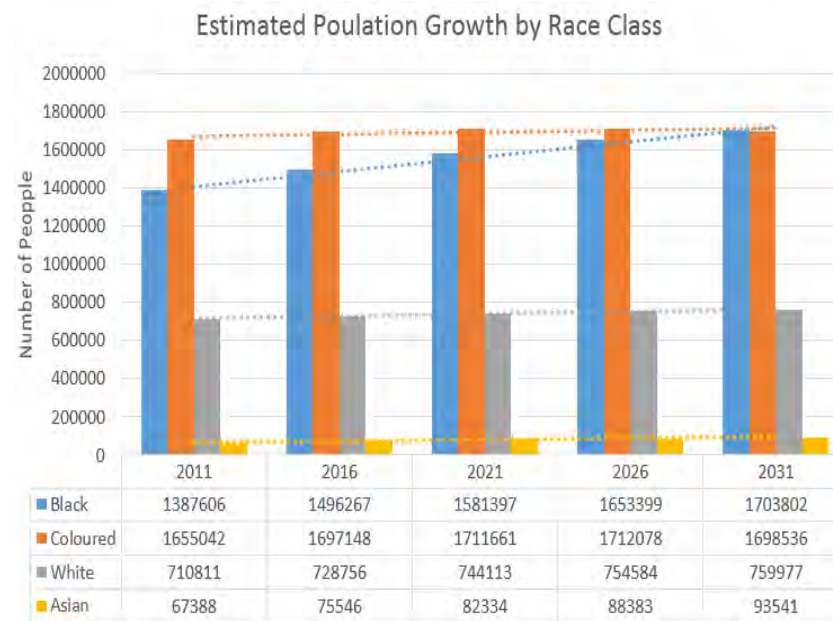


Figure 7.1 Population Growth Estimate by Race (Source: Adapted from CoCT, 2014)

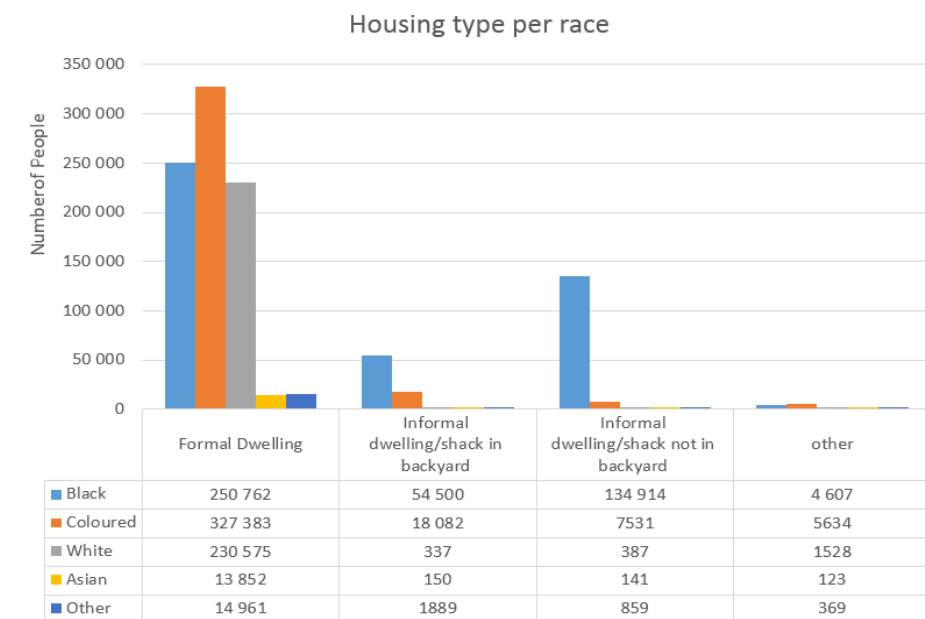


Figure 7.3 Housing Type according to Race (Source: Adapted from CoCT, 2014)

The largest informal settlements are located in former black local authority areas such as Khayelitsha and Philippi, adjacently located to the CTIA (Coct, 2014). The number of informal settlements and backyard dwellings is therefore set to rise. The repercussions of increased urbanisation and population growth will impact on the city's housing stock and bulk infrastructure like electricity, roads, sewers and storm water drains which have not forecasted for migrant influxes.

7.1.3 Age, Education and Employment

The age profile of Cape Town illustrates a disproportionate increase in the number of persons aged to 20-30 years of age. This is predominantly an unskilled youth bulge in search of employment and housing. With decreasing fertility rates, longer life expectancies and higher mortality rates the population is set to mature which will place further pressure on the demand for healthcare and social services in the future (See Figure 7.4).

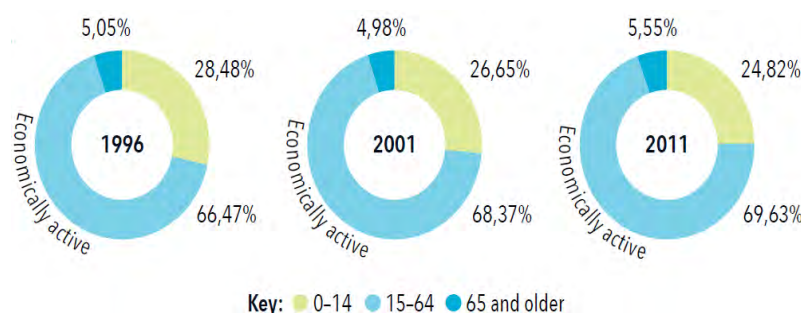


Figure 7.4 Population Age and Economic Activity (Source: CoCT, 2014:59)

In 2011, those termed economically active (15-65 years) constituted 69.7% of the population, of which 49.7 were effectively absorbed into the economy (CoCT, 2014). Between 2001 and 2011 the number persons completing secondary education (Grade 12) increased from 25.4% to 30.2% while those with tertiary and higher education amounted to 16.2% of the population (CoCT, 2014).

7.1.4 Labour Market

The CoCT (2014) highlights that GDP is not a measure of employment opportunities and how benefits are distributed. In 2011 the employment work force

amounted to 1.5 million persons at a growth rate of 2.4% per annum as opposed the City's 3.7% GDP. The result is that Cape Town's labour force grew in exceedance of the employment rate. However, labour employment saw significant growth between 2013 and 2014 (CoCT, 2014).

7.1.5 Inequality and Informality

Cape Town's gini coefficient is lower than the national average but still increased from 0.57 in 2007 to 0.67 in 2012 (CoCT, 2014). The majority of inactive and discouraged work sectors are located near the CTIA, with informal economy consisting of 9-11% of those employed in Cape Town (CoCT, 2014). Regardless of scale, informal and formal sectors are mutually dependent and "informality is not a separate sector from the formal, [and] is instead a series of transactions that connect different economies and spaces to one another" (Roy, 2005:148).

7.1.6 Health and Crime

Cape Town's HIV prevalence rate was 5.2% in 2013 which is significantly lower than the national average at 9% (CoCT, 2014). Although the overall number of primary healthcare institutions has increased, marginalised areas are still characterised by high incidences of drug and alcohol abuse, gang affiliation and health related issues like pneumonia and tuberculosis. Crime incidences in Cape Town are higher than the national average, which invariably effects foreign direct investment and tourism (CoCT, 2014).

7.1.7 Access to services

The overall level of servicing has improved between 2001 and 2011 with the average water, electricity and sanitation levels at 95%, although these are still a major issue in informal settlements. Over 50% of households do not have access to the internet but 93% have cell phones (CoCT, 2014).

7.1.8 Food security

There is a significant correlation between exporting of agricultural product versus food security and poverty. Food security according to race in 2005 was estimated at 80% Asian, 90% white and 47% Black

African (CoCT, 2014). Food prices are impacted by climate, fuel prices and volatile recessionary periods. Local food growing initiatives, farm to local markets and public private partnerships are a key platforms for growth (CoCT, 2014).

7.2 SPATIAL DISTRIBUTION OF ECONOMIC ACTIVITY IN THE METROPOLE

The spatial configuration of persons in the Cape metropole is divided by class, where economic standardisation and centralisation have resulted in multi-centric pockets of distorted space (Turok, 2001). Much of the activity is more nodal across the city with higher order institutions as well as finance, insurance, wholesale and retail sectors are concentrated in well serviced and established clusters such as the CBD, Southern Suburbs, Durbanville and Bellville (CoCT, 2014). Over 25% of economic activity is concentrated in the CBD (finance, business and insurance sectors), with more than 45% stretching along the Voortrekker Corridor. The private sector growth trend is further northward toward the urban edge and away from the South East metro.

Turok (2001) depicts the mismatch between job opportunities and population as well as the discrepancy between private sector investment and government subsidised housing projects, which are largely agglomerated within a 5 km radius of the CTIA (See Figures 7.5 and 7.6 on the following page). From a business perspective, a negative feedback mechanism is the obsolescence and poor maintenance of current public housing stock and unsanitary and unsafe neighbourhoods which constrains subsidies and deters private sector investment.

Concurrently occurring in the surrounding areas of the CTIA is an increasing demand for the fast-tracking of national, provincial and local investment programmes in bulk infrastructure, public transportation, affordable mixed use housing, skills and employment opportunities (Turok, 2001). The efficacy of achieving such in synergy with the regional airport urban planning models has been overlooked by many authorities who have failed to truly understand the future regional economic role of the CTIA, which is further undermined by the issue of attracting private sector investment to the surrounding area.

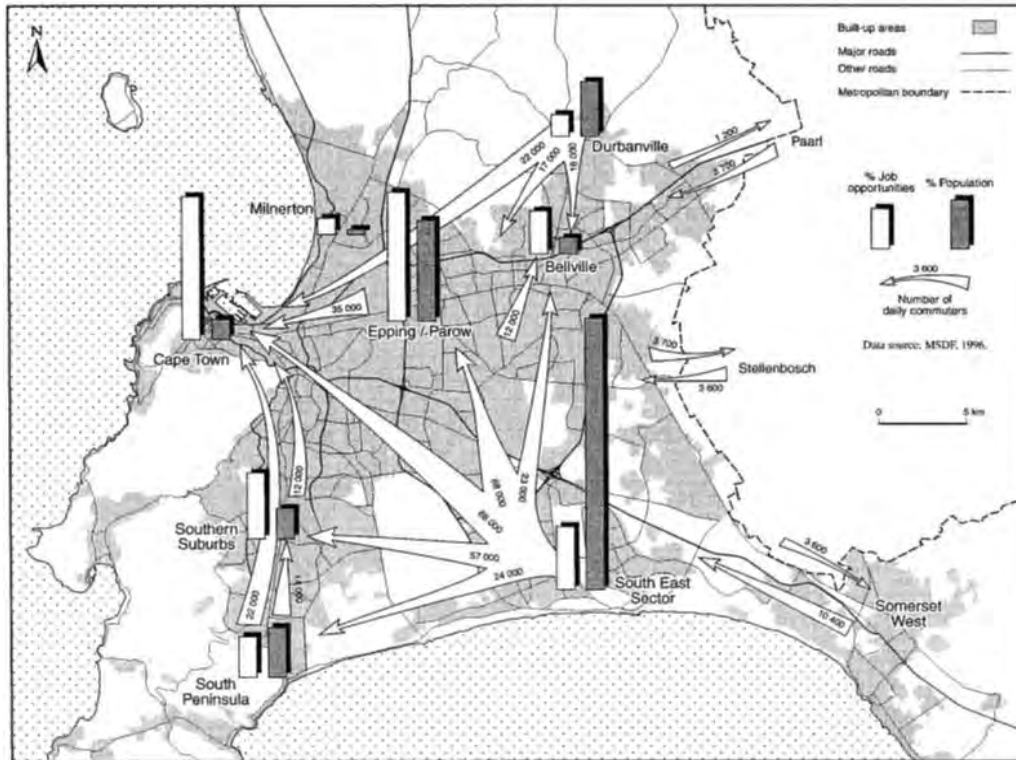


Figure 7.5 Job opportunities in relation to Population (Turok, 2001:2353)

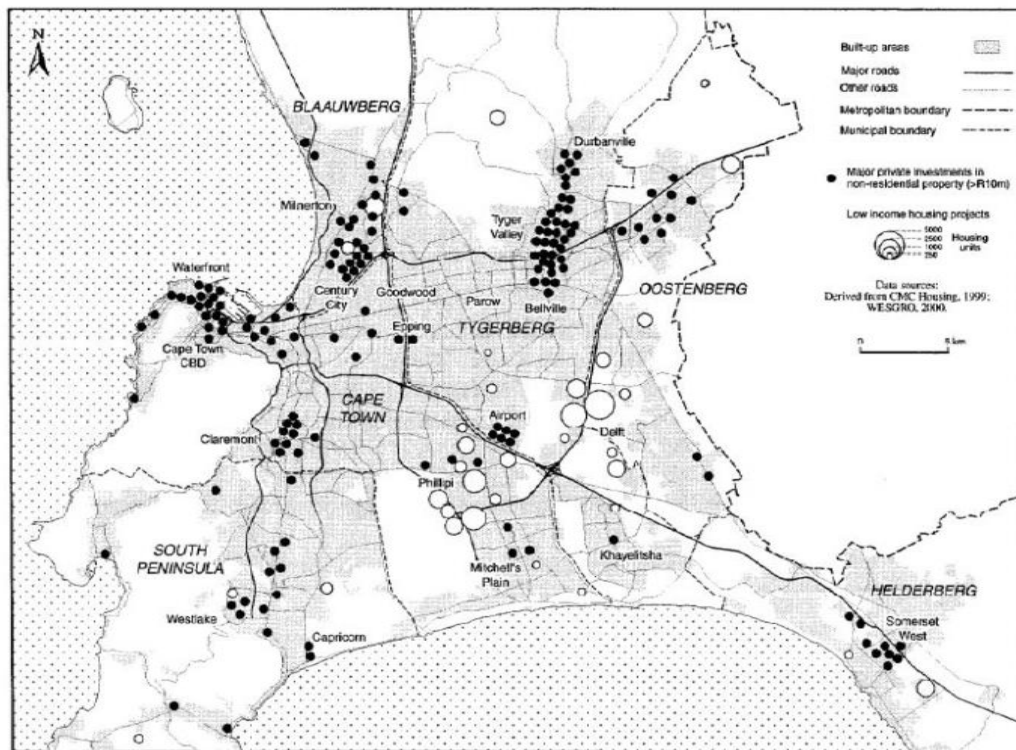


Figure 7.6 Private sector Investment and Government Subsidied Housing (Turok, 2001: 2353)

7.3 REGIONAL AEROSCAPE TOWN MOBILITY

Depicted in Figure 7.7 is a representation of how sea, ground and air connectivity could be visually recognised. The air component relates to the existing and potential air routes and the movement of international and domestic passengers. The ground component pertains to regional connectivity of the hard and soft infrastructural systems which allow passengers, employees and freight to move between sea, road and rail. Ground to air transfer for passengers is facilitated by the airport terminals, check in bays and baggage handlers while cargo freight is brought in by trucks and facilitated by air cargo handlers (Kasarda, 2001).

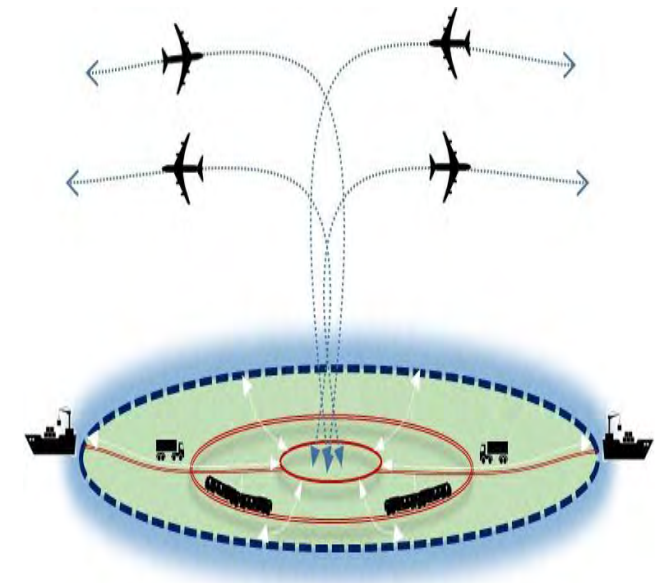


Figure 7.7 Ground to Air Movement Network (Source: Author, 2015)

7.3.1 Air Connectivity

Feasibility studies must take cognisance of existing and future aviation linked markets, because if there are no air connections there is no value proposition for the AeroCape Town regional collaboration model (Van den Brink pers.com, 2015).

The CTIA constitutes 19% of international arrivals into South Africa and is served by 20 airlines which connect to markets such as Europe, Germany, USA, China and Namibia (Wesgro, 2015). Figure 7.8 depicts the number of arrivals for each of these markets, where Europe is the most dominant.

Passenger arrivals from China are expected to grow 15% annually, with 16% from the USA, 13% from Germany and 11% from the UK (Wesgro, 2015). Due to the 2007/08 financial crisis, air travel into Cape Town declined by 7.3% and only in late 2011 did air travel statistics match pre-recessionary figures (ACSA TIA, 2013).

International Arrivals

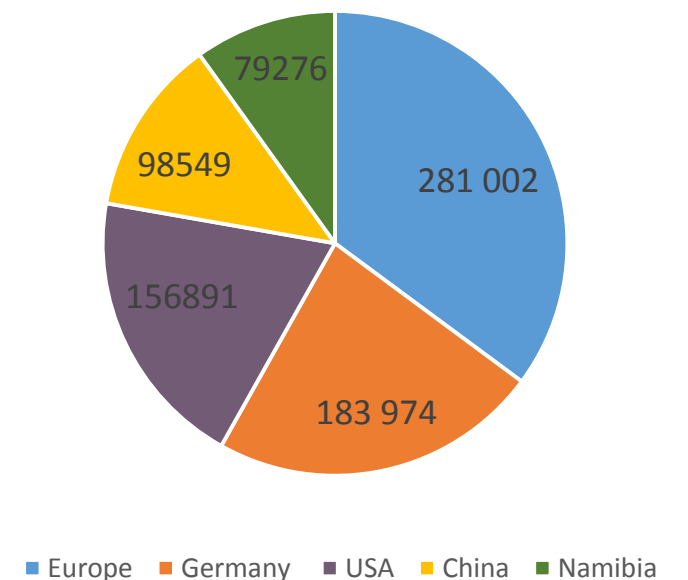


Figure 7.8 Top International Passenger Markets (Adapted from Wesgro, 2015)

Significant growth occurred between 2009 and 2014, where the dominant portion of arrivals were domestically, from Johannesburg, Durban and Port Elizabeth (See Figure 7.9). The Cape Town/Johannesburg route is ACSA's most profitable and the tenth busiest in the world (ACSA, 2014).

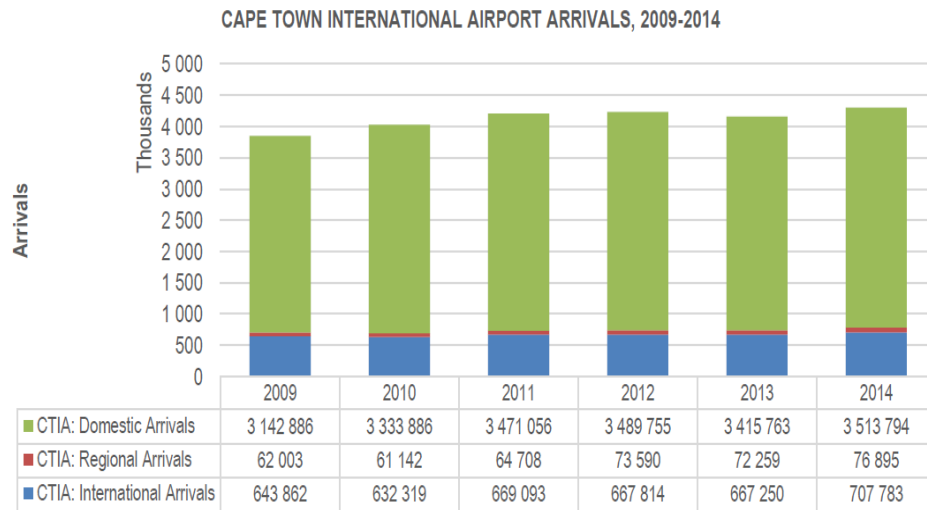


Figure 7.9 Population Age and Economic Activity
(Source: Wesgro, 2015)



Figure 7.10 CTIA International Air Connections (Source: WEHC, 2012)

From an aviation perspective, Cape Town is to some extent geographically disadvantaged given that the travel distances are relatively further south of the African continent (See Figure 7.10). Further problematic is the fact that international arrivals at OR Tambo constitute over half of all arrivals into South Africa, hence the low number of international connections to Cape Town reduces the ability to become more globally connected (CoCT, 2014). Over time flights from South America, USA and London to Cape Town have been redirected to OR Tambo.

ACSA's airlift route strategy in partnership with Wesgro and the provincial government's Department of Economic Development and Tourism (DEDAT) is vital for achieving global air connectivity (Van den Brink pers.com, 2015). The CoCT needs to be strategic about anticipating new flights and what can be offered and taken from these markets (Weyer pers.com, 2015).

Alternative solutions should be questioned such as how Cape Town can act as a stopover destination for long haul flights between South America and the East, in addition to attracting new direct routes from the USA, EU and ASIA (Lundy, 2013). The types of goods that can go to these markets can possibly be linked to growth and labour absorptive employment in the metropolitan region (Allemeir pers.com, 2015).

From a logistical perspective, increased connections to the USA or East may not be about attracting international passengers or sending a finished product but perhaps a different component of the value chain which could be assembled in Cape Town (Mammon pers.com, 2015). The airlift route strategy should therefore be linked to private sector (WesGro) and public sector (Local and Provincial Government) who are able to lobby with National Government for investment.

Each new direct flight is linked to the required basic infrastructure and servicing like electricity and transport connectivity. Hence, the City may need to reduce regulatory difficulties such as the time needed to set up distribution centres, warehouses and factories related to the AerosCape Town. In that time, companies may decide to go elsewhere given the availability of the market (Allemeir pers.com, 2015).

7.3.2 Sea Connectivity

The Cape Town port is owned by Transnet and is the second busiest in the country (CoCT, 2013). In 2011, the port saw 18 000 passengers on 19 passenger cruise ships. Due to the transport connections between the Saldanha port, Cape Town harbour and CTIA the need for integration between National Port authorities and ACSA is crucial (CoCT, 2013).

The bulk commodities exported by the seaport include agricultural product, iron, steel petroleum, chemicals and oil (CoCT, 2013). Significant investment is underway for connecting the historical CBD and foreshore and a dedicated passenger ship terminal (CoCT, 2013).

The port of Saldanha is designated as an IDZ and while the total cargo handled at Cape Town's port amounts to 2.9 million tons, the Saldanha port sees 50.2 million tons of which 60% is exported (CoCT, 2013). The 12 MAS threshold for a new airport is located on grounds closer to the Saldanha growth pole.

7.3.3 Ground connectivity

The 2013 Traffic Impact Assessment (TIA) for the CTIA identifies eight strategic traffic corridors connecting the CTIA to the Cape Town harbour and sub-metropolitan regions. The corridors are depicted in Figure 7.11 and are connected to each of the following areas:

- **Corridor 1:** Cape Town CBD, V&A Waterfront, Sea Point, Camps Bay;
- **Corridor 2:** Milnerton, Blouberg Strand, West Coast;
- **Corridor 3:** Wynberg, Claremont, Constantia, Muizenberg;
- **Corridor 4:** Durbanville, Bellville, Goodwood, Parow;
- **Corridor 5:** Mitchells Plain, Gugulethu;
- **Corridor 6:** Khayelitsha;
- **Corridor 7:** Kuilsriver, Paarl, N1 interior
- and **Corridor 8:** Somerset West, Stellenbosch, Southern Coast.

As the use of the 8 corridors has remained relatively constant over the past 5 years (ACSA TIA 2013), it becomes necessary to understand how the spatial pattern of movement to and from the CTIA is linked to the historical growth of Cape Town's urban form.

In the late 1800's Cape Town expanded via rail road in a radiating fashion from the port and CBD, along the Main road corridor toward the Simons Town harbour and adjacent the N1 and N2 primary arterial toward Paarl, Stellenbosch and Sommerset West. Today, the resultant road and rail network extending from the CBD is incongruent with low density sprawl, in-migration, privatisation and fragmented legislative and land use patterns which together with previous apartheid laws have reduced abilities to provide cost-effective public transportation and mixed use settlement initiatives (Dewar, 2011). The primary accessibility issues are the north south and east west linkages (Watson, 2002).

Due to the mismatch of where people live and work, there is a daily bottleneck of traffic congestion toward the CBD. Together with a lack of public transport culture and road based freight movement, the radial form inadvertently decreases economic productivity and increases carbon emissions. Added to these issues is a lack of mutually reinforcing modes of transport and continual competition amongst them (Watson, 2002).

The transportation sector is largely reliant on petrol and diesel, with 69% using private vehicles while the majority of lower income groups use taxis, busses and railway (Dewar, 2011). Under investment by state owned entities like Transnet and PRASA has led to inefficiency, unsafe

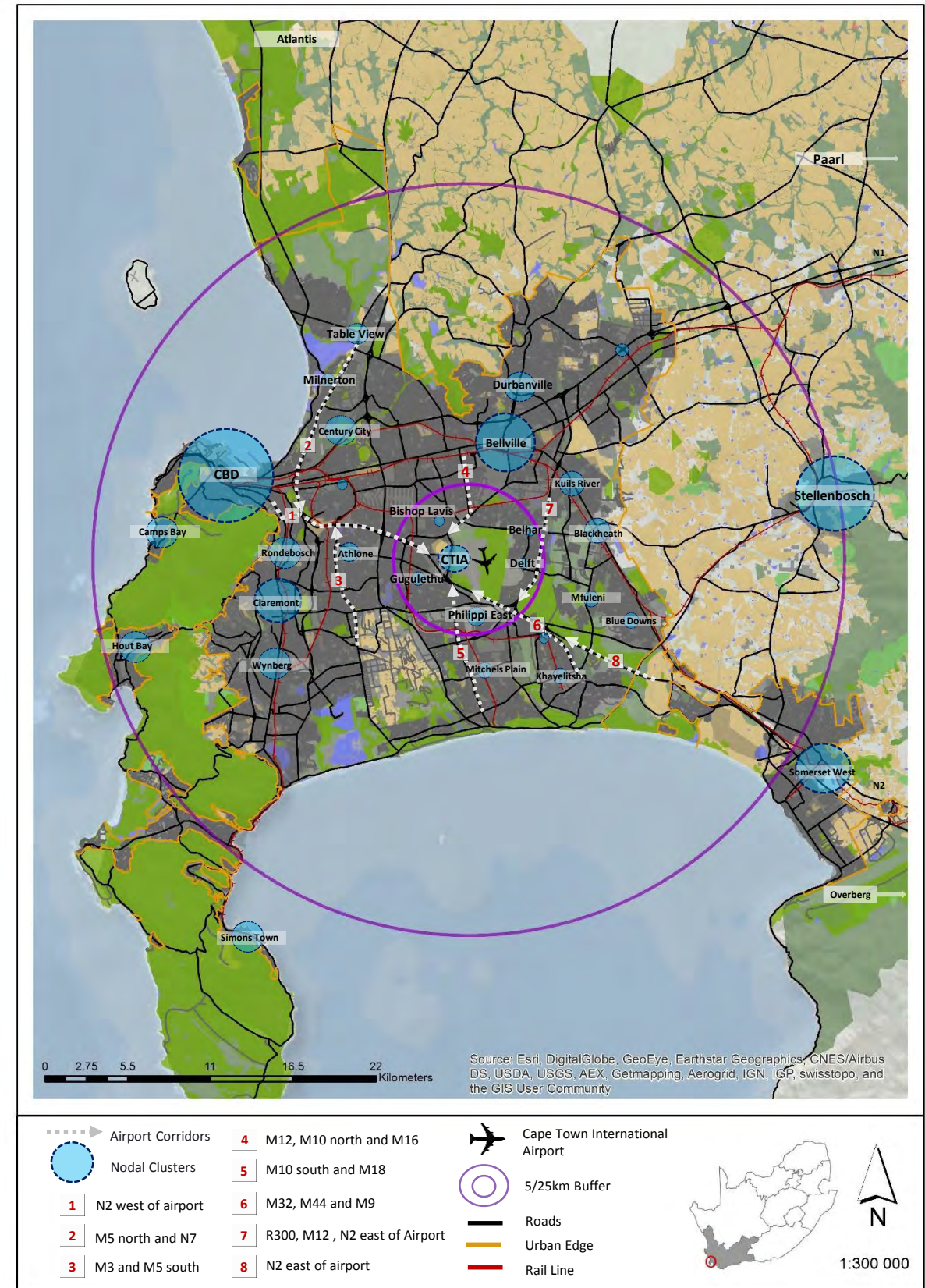


Figure 7.11 Corridors leading to and from the CTIA (Data sourced from: ACSA TIA, 2013)

conditions, enhanced road based freight movement and a decline in overall ridership, which the informal taxi economy has organically responded to. Although budgets are constrained, Cape Town is the only city in South Africa with a relatively well functioning Integrated Public Transport Network Plan (IPTNP) which has adaptively sought to address these issues through the MyCiti Bus Rapid Transit System and other forms of non-motorised transport infrastructure.

The railway system is considered the backbone and most viable option for the Cape Metropolitan to induce a modal shift away from private vehicle usage and freight based congestion (CoCT, 2013). This is acknowledged by the National and provincial land transport frameworks in addition to the provincial and metropolitans SDF's.

7.3.4 CTIA Employee Mobility

The CTIA Traffic Impact Assessment provides data on the origin 2013 and destination as well as the mode of travel used by airport employees and passengers. The trends are indicative of where employees reside and where domestic and international passengers visit. After a representative sample size of 7.5%, it was calculated that of CTIA's 4300 employees, 35% live in Mitchells Plain and Gugulethu, 10% in Khayelitsha, 23% in Durbanville, Bellville and Parow and 20% in Kuils River (ACSA TIA, 2013) (See Figure 7.12 above).

Employees living in Khayelitsha, Mitchels Plain an Gugulethu are predominantly lower skilled workers employed in industry, freight and logistics, check in bays, cleaners, security, baggage handling and landscaping, while those in Durbanville, Bellville and Kuils River are more skilled employees in administration and other processes (ACSA TIA 2013). Figure 7.13 depicts the corridors used by employees.

7.3.5 CTIA Passengers Mobility

The passenger origin and destination survey reveals the opposite to employee movement (See Figure 7.14) Depicted in Figure 7.15 are the corridors used by international and domestic passengers which reinforce the above mentioned trends. A large discrepancy exists between where international travellers visit in relation to where employees live.

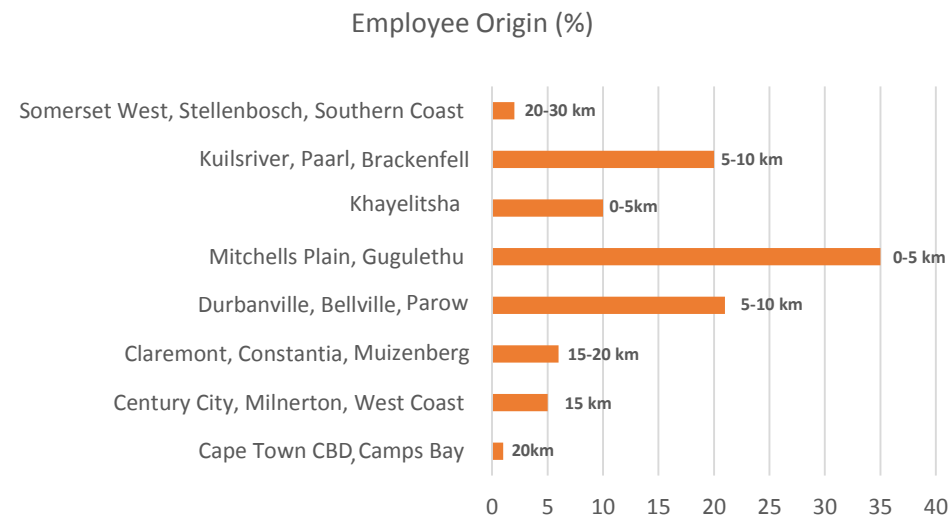


Figure 7.12 Origin of CTIA Employees in 2012 (Data sourced from: ACSA TIA, 2013)

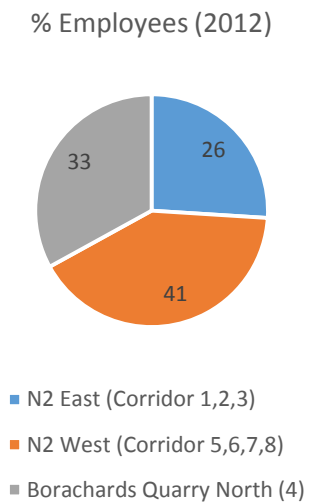


Figure 7.13 Corridors used by CTIA Employees in 2012 (Data sourced from: ACSA TIA, 2013)

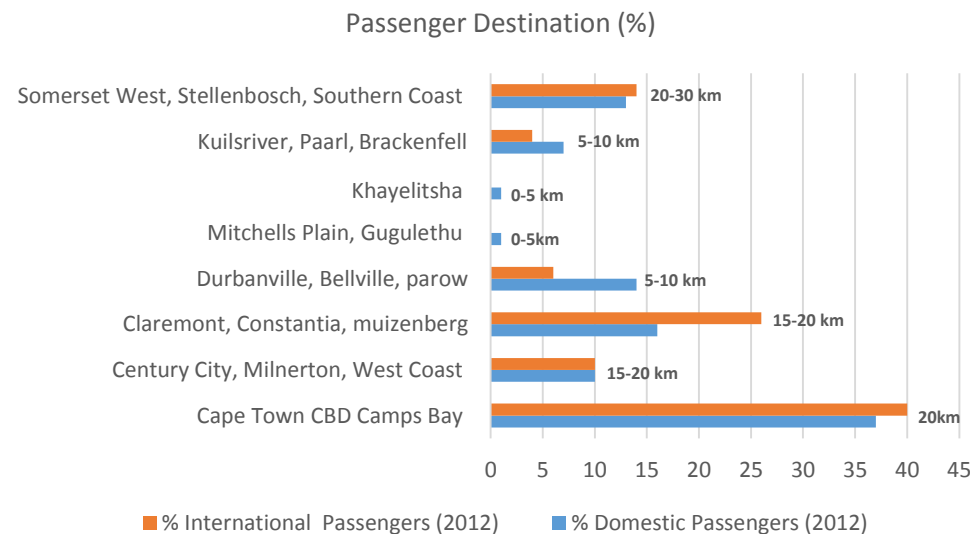


Figure 7.14 Destination of Passengers in 2012 (Data sourced from: ACSA TIA, 2013)



Figure 7.15 Corridors used by CTIA Passengers in 2012 (Data sourced from: ACSA TIA, 2013))

The starkest contrast is seen by Mitchels Plain a Khayelitsha. Cape Town CBD, Camps Bay and Claremont are the highest places of international passenger attraction while Durbanville, Bellville and Parow are tied to domestic passengers who are linked to emerging middle classes along the northern fringes of the metropole. The concentration of financial and insurance services are situated in the CBD and Century City who boast tourism interests like the V&A Waterfront and Table Mountain as well as world class hotels and bed and breakfasts. (See Figure 7.16 on following page for location bed night prices of hotels).

Stellenbosch and Paarl are also high on the list in terms of viticulture, financial services and tertiary education

Figure 7.17 represents the modal split of employees. A primary trend is an increasing reliance on private vehicle usage and the growing taxi economy which is also spurred by the fact that the CTIA is not connected by rail. Over 28% of employees use taxi's to

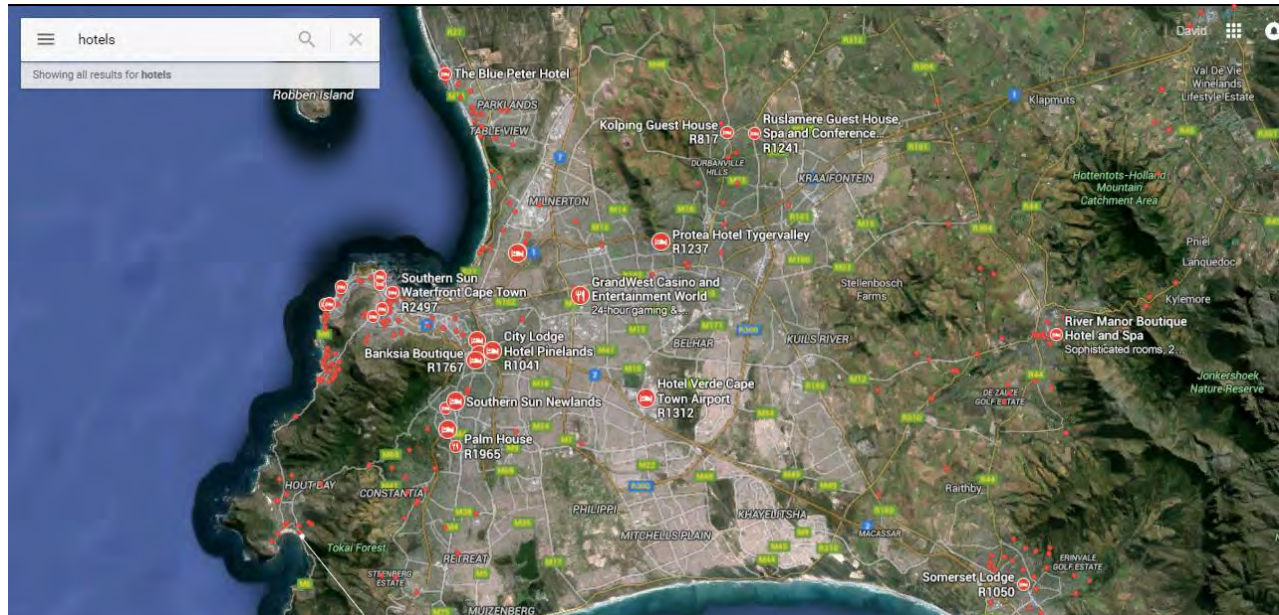


Figure 7.16 Hotel and Bed Night Prices in the Cape Functional Region (Source: Google Maps, 2015)

Employee Transport

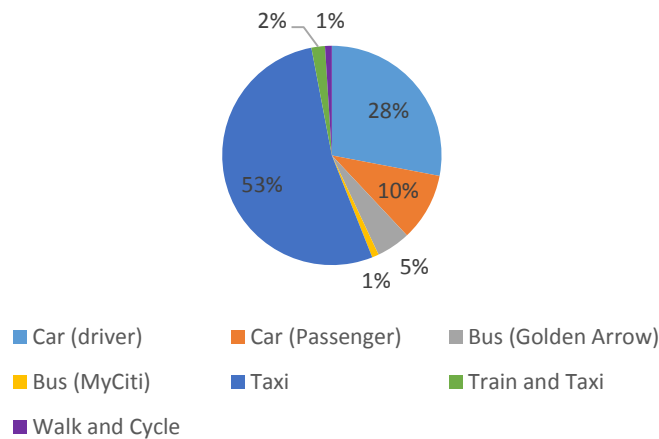


Figure 7.17 Modal Split of Employees in 2012 (Data sourced from: ACSA TIA, 2013)

Passenger Transport

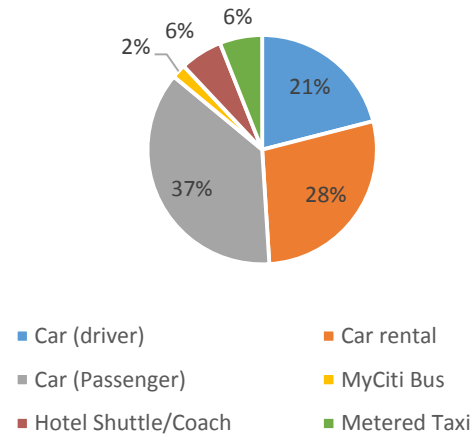


Figure 7.18 Modal Split of Passengers in 2012 (Data sourced from: ACSA TIA, 2013)

7.3.6 Forecasted Growth

The ACSA TIA (2013) forecasts employee and air passenger growth for five year intervals up until 2032 (See Table 7.1). The CTIA is expected to see an additional 2.5 million air passengers per annum, with the total number of airport related employment is expected to increase by 220 jobs a year finally reaching almost 10 000 employees by 2032.

travel to and from the CTIA, while 53% use private vehicles. The level of passenger and employee use of the MyCiti bus by both employees and passengers only amounts to 3%, hence better integration of modal options is a key issue going forward (See Figure 7.18).

Table 7.1 CTIA Passenger and Employee Growth (Data sourced from: ACSA TIA, 2013)

	2012	2017	2022	2027	2032
Million Air Passengers (MAP)	8.6	10	12	14.5	17
Airport Employees	4800	5712	6776	8064	9576

The table does not reflect the indirect employment which could be attributed to tourism, manufacturing and agriculture. Given that Khayelitsha, Mitchels Plain and Gugulethu constitute 45% of the employee base, roughly 5000 employees will be sourced from these areas in the future. Based on a dependency ratio of 3 family members per worker, this would imply that 15 000 people in Khayelitsha, Mitchels Plain and Gugulethu will be supported by the CTIA by 2032. The micro-economic impact of the CTIA alone therefore constitutes one of the largest and most concentrated sources of employment in the South East Metro

7.3.7 Industrial and Logistics Supply Chain

Ground to air supply chain networks are reliable on time sensitive distance between producers, handlers and airlines (Kasarda, 2001). The CTIA is served by 7 air cargo handlers on the landside and at Airport Industria. Freight and logistics companies are located in industrial and manufacturing areas along the N1 primary arterial (See Figure 7.19 below). Freight is moved to and from the CTIA on a daily basis, with fresh fish coming in from as far as Port Elizabeth and Namibia, while fruit and flowers come from Darling, Boland and the Overberg region (ACSA TIA, 2013).

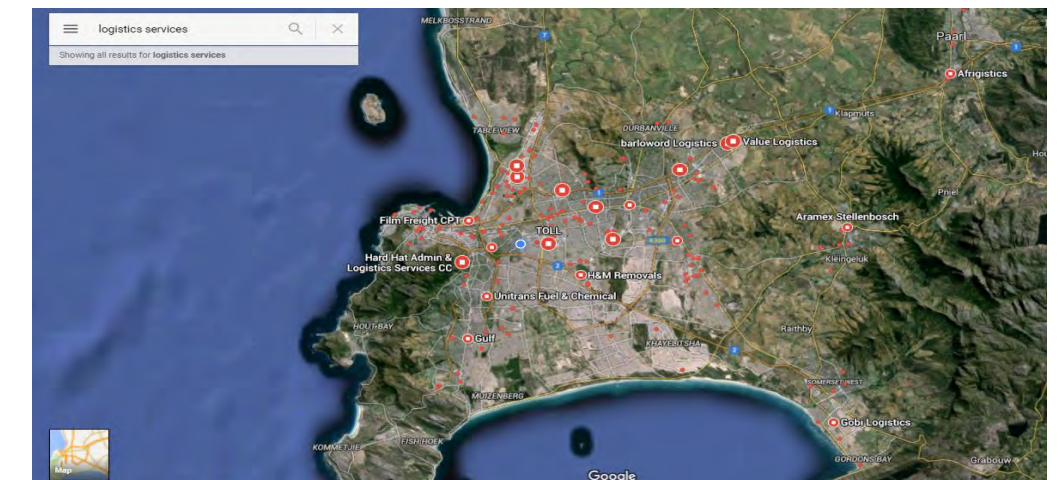


Figure 7.19 Logistics Industries in the Cape Functional Region (Source: Google Maps, 2015)

Due to domestic market connections the N1 sees more than five times the amount of freight in a year than that handled at the Cape Town seaport (CoCT, 2013). The CoCT's Integrated Transport Plan (ITN) (2013:32) identifies the main industrial freight centres in Cape Town which include: "Atlantis (± 587 ha), Montagu & Killarney Gardens (± 478 ha), Paarden Eiland (± 99 ha), Cape Town Seaport (± 240 ha), Epping 1&2 (± 445 ha), Airport Industrial (± 191 ha), Somerset West (± 1198 ha)". Depicted in Figure 7.20 are the industrial growth clusters within the Cape metropolitan (Rabie pers.com, 2015).

The thickness of the lines infers the dependence between the different networked clusters, while the circle represents their size, agglomeration and proximity to each other which weaken over distance and time (Rabie pers.com 2015). A lack of industrial connection is seen in the Southeast metro with the majority of logistical activity reinforcing the existing spatial clustering along the Voortrekker and N1 corridors.

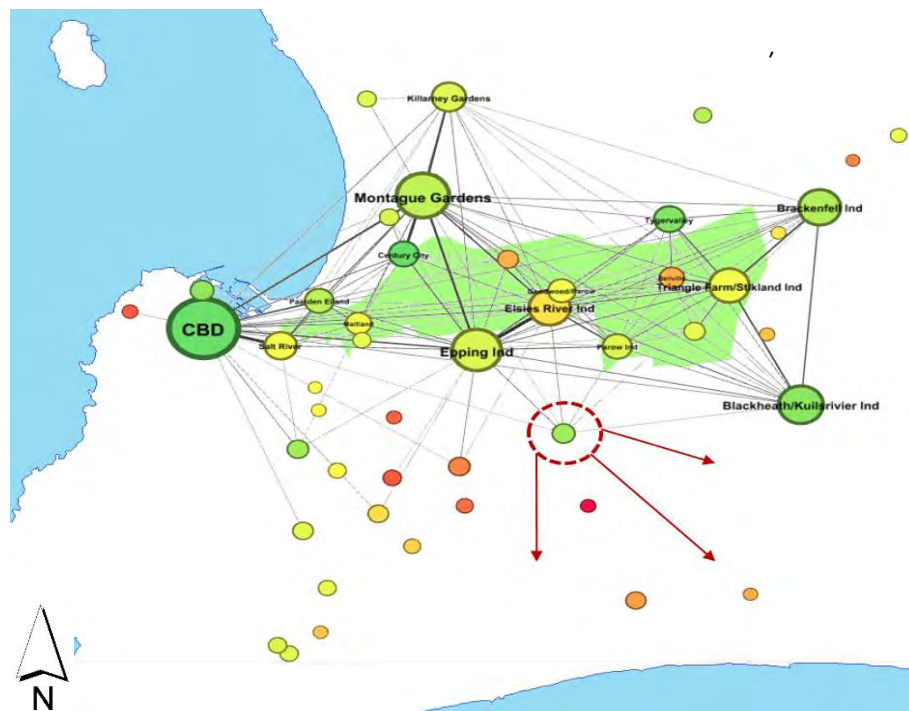


Figure 7.20 Industrial Growth Cluster in relation to the CTIA (Source: ECAMP, 2014)

Figure 7.21 across illustrates the existing airport induced freight connections to the industries in the metropole. Joubert (2015) has conducted a quantitative freight analysis for the City of Cape Town. The study provides data on the coordinates for the origin and destination of commercial freight vehicles in Cape Town during the year of 2014. For the purposes of spatially depicting the logistical and supply chain from an import/export perspective the data is applied to a subset of the CTIA landside and the Airport Industria as the origin destination and vice versa (Rabie pers.com, 2015).

Depicted in Figure 7.22 on the following page is a logistical flow analysis of the CTIA's ground to air network. The red lines represent the ground movement connections to industry and business, while the blue lines are connected to air cargo handlers, airlines, the existing quantity of cargo tonnage and the expected growth in the next 5 years.

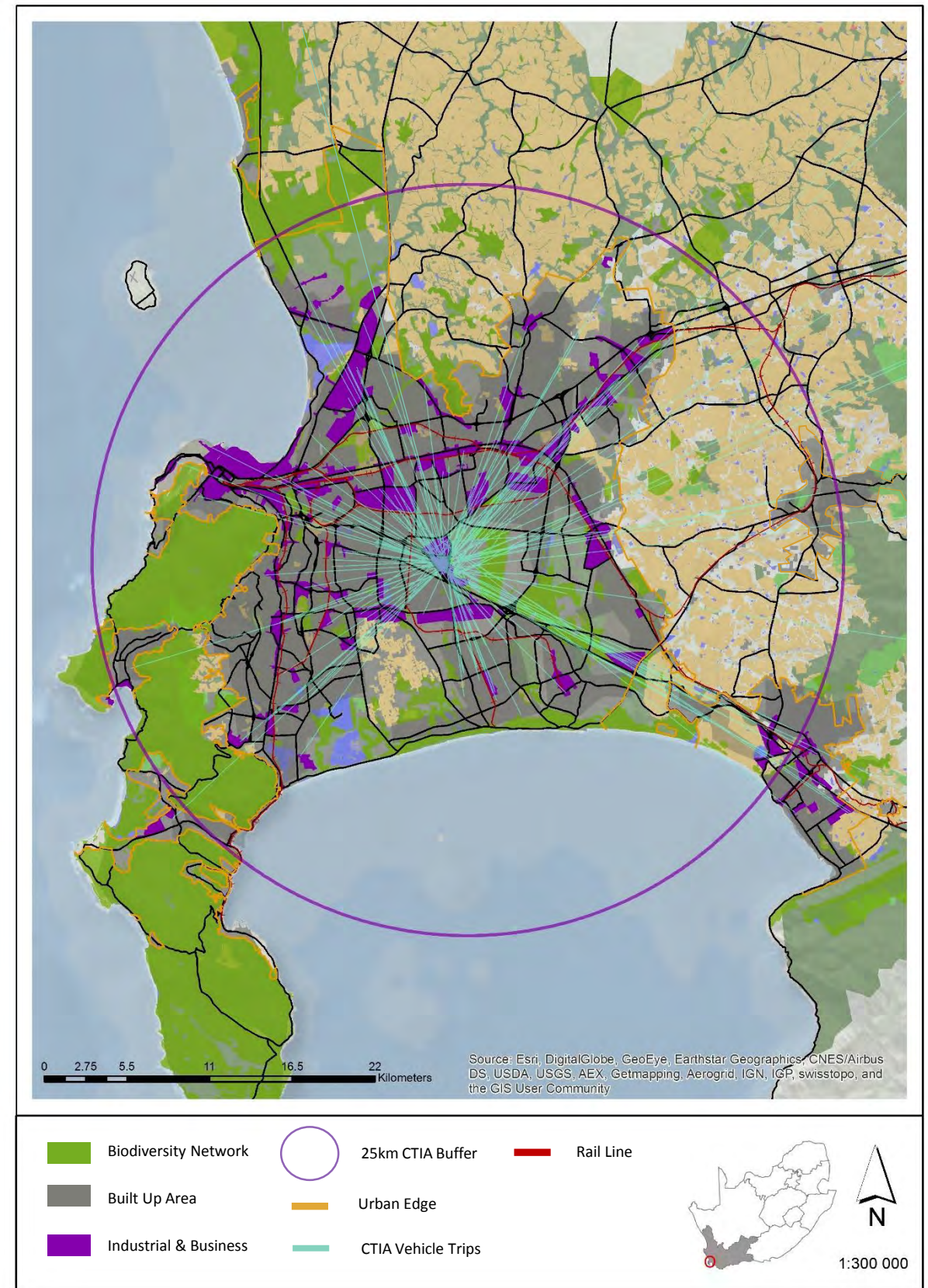


Figure 7.21 Airport Induced Ground Supply Chain (Data sourced from: Joubert, 2015)

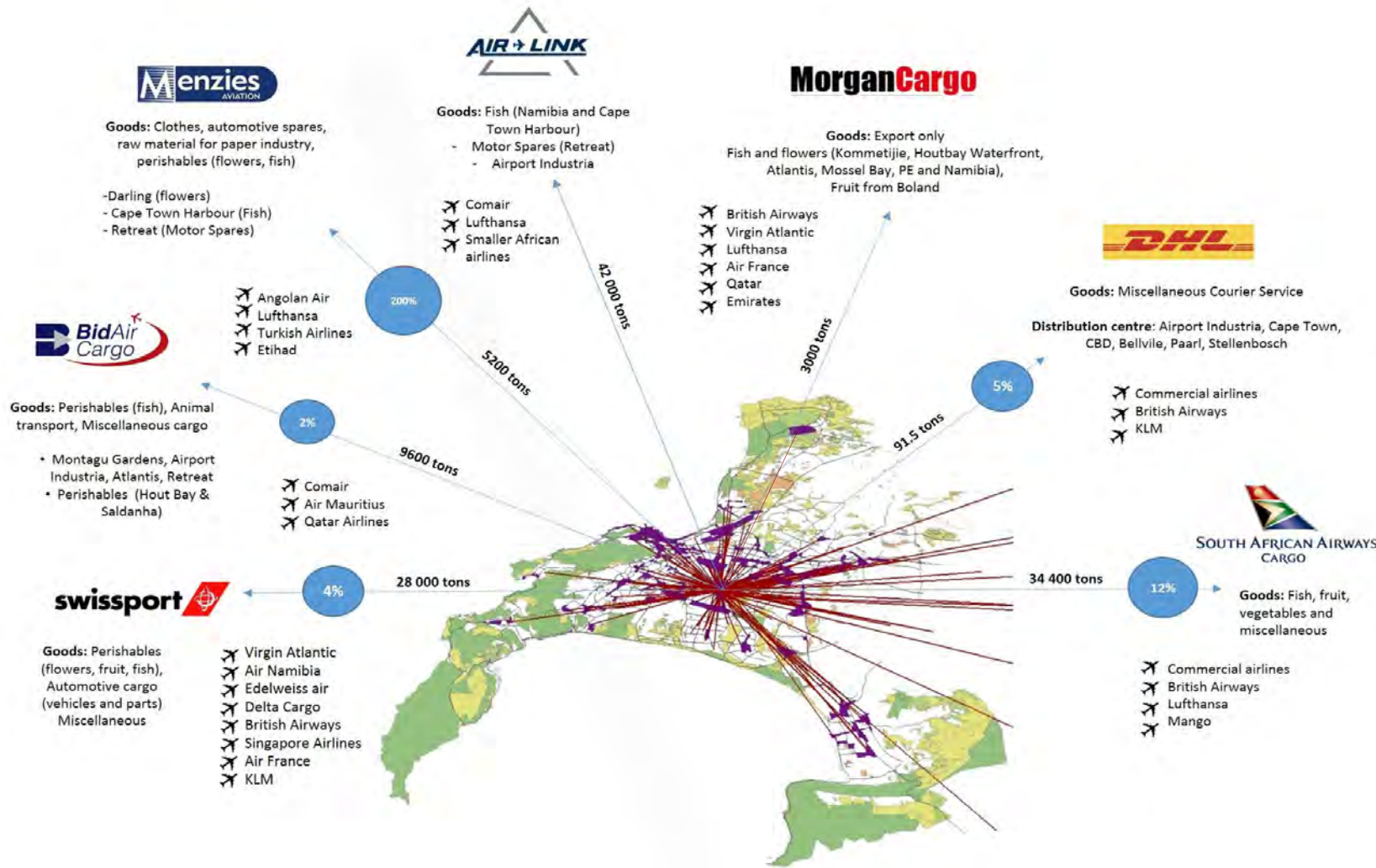


Figure 7.22 Cape Town Air and Ground Supply Chain (Data sourced from: ACSA TIA, 2013; Joubert, 2015)

Air cargo handling companies at CTIA are predominantly business branches of those based at OR Tambo (ACSA, 2014). Airlink, SAA Cargo and Swiss Port handle the majority of goods to and from the CTIA, with an overall average growth rate of 5.4% per annum (ACSA TIA, 2013). Menzies Air Cargo handlers is expecting to double in the next 5 years. When additional airlines are added to the above model, surplus goods can be linked to the connecting markets (Van den Brink pers.com, 2015). In this regard, Lufthansa and Edelweiss Airlines have indicated a 30% growth in the next 5 years (ACSA TIA, 2013).

Figure 7.23 and 7.24 across illustrates the commercial and industrial potential of the Cape Metropolitan in relation to the agglomeration of government subsidised housing around the CTIA. This is an important

consideration to make in terms of potential regionally connected airport urban employees (Kasarda & Lindsay, 2011). Commercial potential radiates from the CBD and Century City northward while industrial potential reflects the opposite trend. Between 2005 and 2012 more than a third of additional industrial space was added to Airport Industria, Black heath and Brackenfell (CoCT, 2014). Although, well located industries have indicated substantial growth they are equally shedding jobs due to mechanization (CoCT, 2014).

Stricter environmental standards and rising costs have resulted in industries seeking affordable land on the eastern peripheries of the city such as Blackheath, Brakenfell and Atlantis. Central to this trend are the site left behind which could be used for low income housing closer to well established economic clusters (Bouton, Lindsay, & Woetzel, 2012).

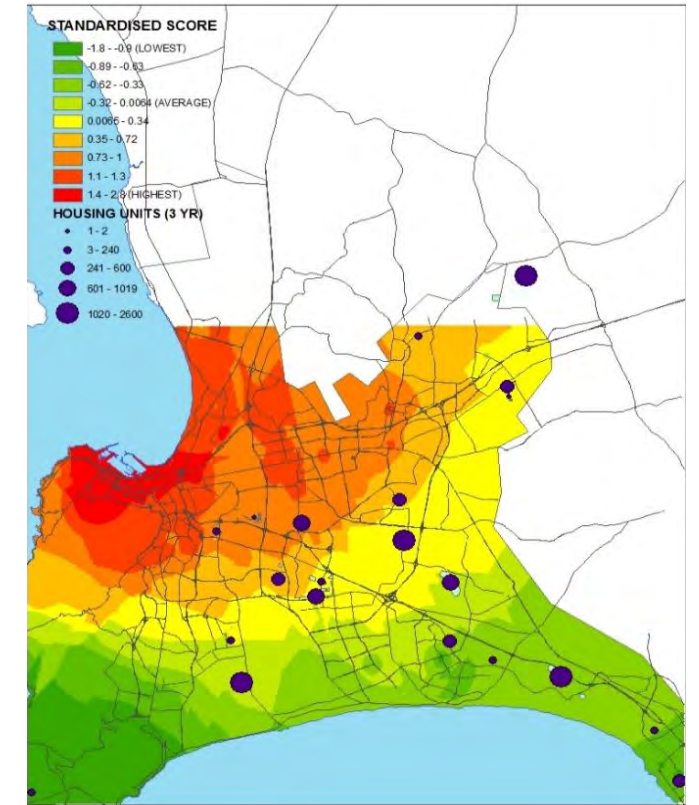


Figure 7.23 Commercial Potential (Source ECAMP, 2014)

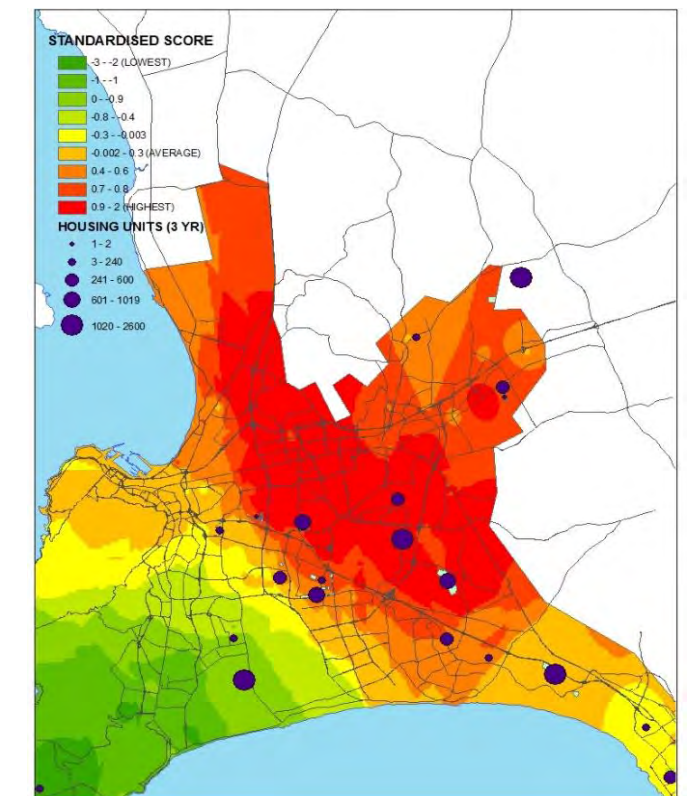


Figure 7.24 Industrial Potential (Source ECAMP, 2014)

7.4 BIOPHYSICAL ENVIRONMENT

Located in the Cape Floral Kingdom, the Western Cape is considered one of the most biologically diverse places in the world (CoCT, 2014). The inhabitants of the province and the flow of passengers and goods through the CTIA are all dependent on the socio-ecological services offered by the region's hydrological and natural environment whether for tourism, sport, health and well-being or for exporting goods. With the growing demand for tourism and fast paced low weight consumer goods, serious consideration of existing and future environmental trends is needed going forward, especially since Cape Town faces a number of challenges around water depletion, biodiversity loss, resource pollution and climate change (CoCT, 2014).

7.4.1 Land Consumption

The mountainous topography and pristine vegetation leverages the agricultural and tourism industry but current patterns of urban sprawl have impacted on the quality of this environment (CoCT, 2012). Constraints to development include the 16km Koeberg Nuclear Power Station buffer, the CTIA 65 decibel noise contours, the one in 100 year flood plain corridors, the extensive biodiversity network, the existing and potential agricultural lands, mountainous topographies, coastal setback lines and fire prone regions. There are also constraints pertaining to the mountains and what is achievable by flight paths (CoCT, 2012). Land available for housing is therefore limited and the demands are particularly high. If Cape Town continues with the current rate of land consumption (650 h/a per annum), it would consume the majority of the land suitable for urban development within the next 50 to 60 years (CoCT, 2012) (See Figure 7.25).

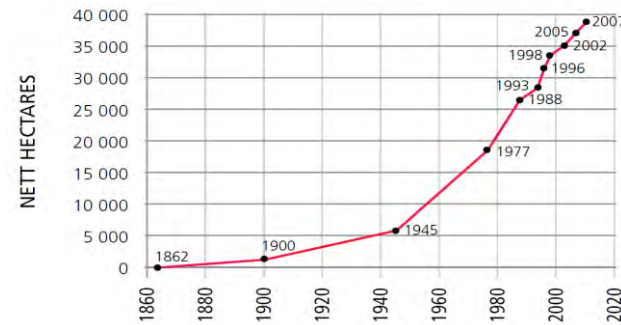


Figure 7.25 Cape Town Urban Land Consumption (Source: CoCT, 2012:22)

Compaction and densification has been on the cards of many agendas but growth is still expected to continue northward. According to Burton (2000) sprawl is determined by the rivalry between developers and the availability of agricultural land on the outskirts. This causes developers to compete with municipalities to shift the urban edge to accommodate their profit motivated needs.

7.4.2 Biodiversity

Cape Town boasts 52% of South Africa's critically endangered plants species and is considered a global hotspot for biodiversity (See Figure 7.26). Although the number of formally protected areas has increased over the past decade, 64.8% of Cape Town's biodiversity coverage has been lost due to urban sprawl and agriculture, particularly in the lower portions of the Cape Flats catchment area where the CTIA is located (SANBI 2014). The most significant of these is an 85% loss in Cape Flats Sand Fynbos and 91% of Swartland Shale Fynbos (CoCT, 2014).

7.4.3 Metropolitan Open Space Structuring System

Cape Town's supports a variety of wetlands and rivers draining toward the sea, Cape low lying area and underlying cape aquifer.

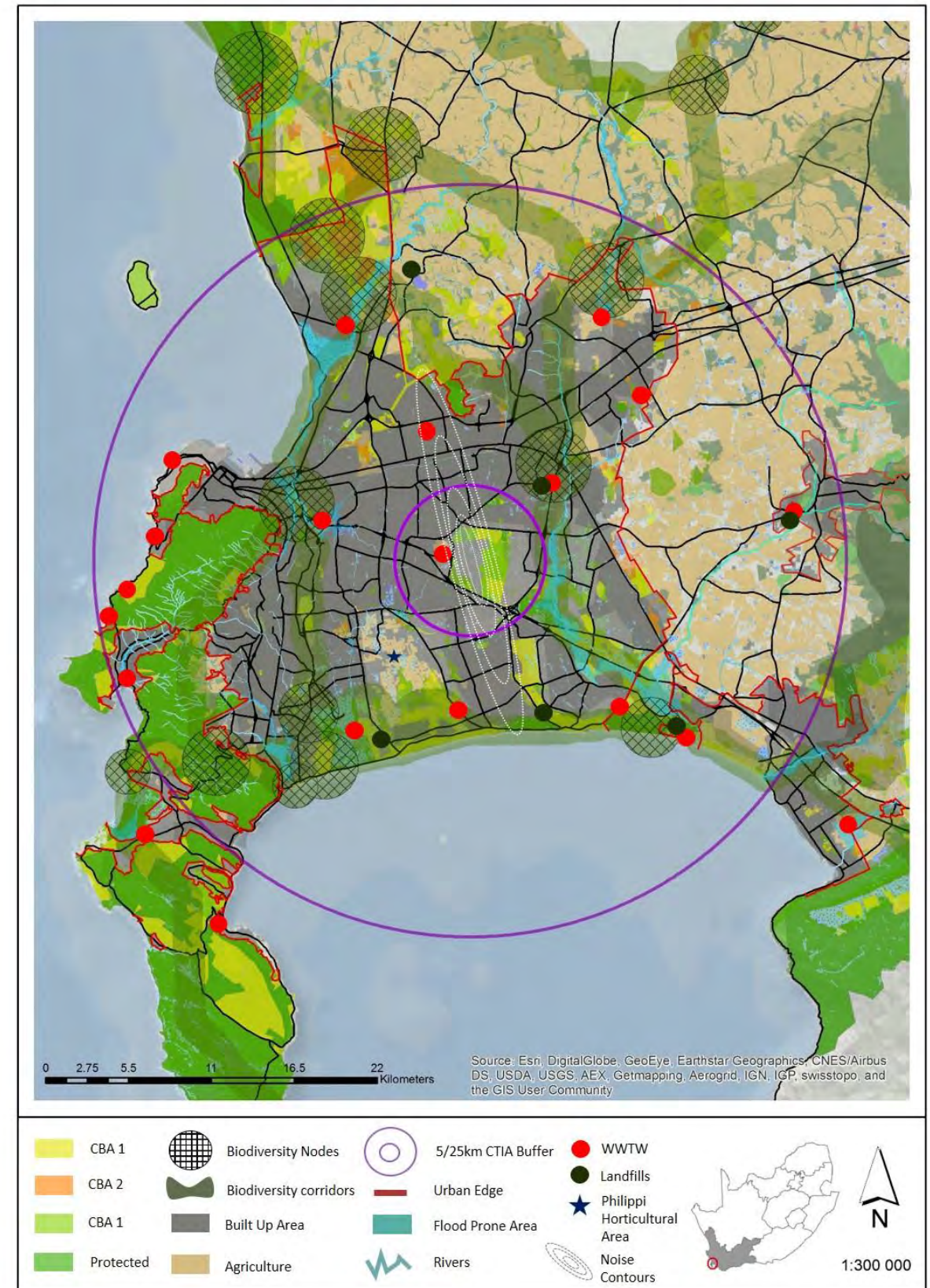


Figure 7.26 Biodiversity Network (Data sourced from: UCT Library, 2015)

The Cape Town Metropolitan Open Space System (CMOSS) includes protected wetlands, forest and mountain reserves, river corridors, sports fields, parks, servitudes and road reserves. These amalgamate as biodiversity corridors which should essentially be connected to allow the transfer of fauna and flora and provide additional ecological functions such as reducing the urban heat island, enhancing water, noise and wind filtration and providing cultural and recreational opportunities (Tzoulas, 2007).

Limited municipal budgets, urban sprawl and extensive farming practices have prejudiced the ability to maintain well-connected green open space corridors to support the socio-ecological functions of a compact urban form. Moreover, while the inhabitants of many developed countries enjoy the health benefits of accessible, well maintained and linked networks of quality open space, in Cape Town, where quality open spaces do exist, these are still divided according to socio-economic class (Willemse, 2010).

7.4.4 Rivers and Water supply

The City of Cape Town has 15 rivers and six catchment dams, the largest being Theewaterskloof and Bergwater dams (SANBI, 2014). The main operating expenditure for Western Cape municipalities is their bulk electricity and water purchases and constraints to expanding the value chain are specifically linked to water. The problem is that current rates of urban growth and agriculture have impacted on the quality and capacity of these sources and the future challenge is to provide water to an increasing population and agricultural base (CoCT 2014). With water infrastructure in need of upgrading the cape aquifer has become a future source of interest which could supply approximately "55 litres a day per person for the 500 000-odd people living in informal settlements" (ARG, 2007:5).

7.4.5 Agricultural Assets

The Western Cape is well known for its agricultural assets such as the Cape Winelands District and Breede River Basin. While the majority of farming areas are further north of the city, the Philippi Horticultural Area is located 7km from the CTIA and 15km from the CBD (See Figure 7.25). The PHA employees between 2500-3100 people on a seasonal basis, with workers being provided a daily food stipends (Battersby-Lennard &

Haysom, 2012). The PHA is reliant on the cape aquifer and provides over a 100 000 tons of fruit and vegetables to local markets at a production value of 150 million Rand in 2008 (Battersby-Lennard & Haysom, 2012). The PHA has been under threat from land invasions and a number of development proposals.

7.4.6 Landfill Constraints

Cape Town has 5 waste disposal sites which are slowly reaching capacity. Roughly 30% of waste is diverted to landfills through the City's Waste Minimisation Programme and private sector initiatives (CoCT, 2014). Existing waste sharing platforms include Integrated Waste Exchange (IWEX) and the Western Cape Industrial Symbiosis Programme (WISP) (CoCT, 2014). A significant gap though is a shortage of largescale biomass and permaculture initiatives (Battersby-Lennard & Haysom, 2012).

7.4.7 Energy

The sustainable use of energy is linked to the PSDF's vision for a transition to low carbon society. Cape Town's accounted for 7% of the national energy and although energy is predominantly supplied by the Koeberg Nuclear Power station and the Palmiet Pumped storage scheme, the city is still reliant on coal fired power from the national grid (CoCT, 2014). The transport, commercial and residential sectors account for the highest portion of Cape Town's energy use

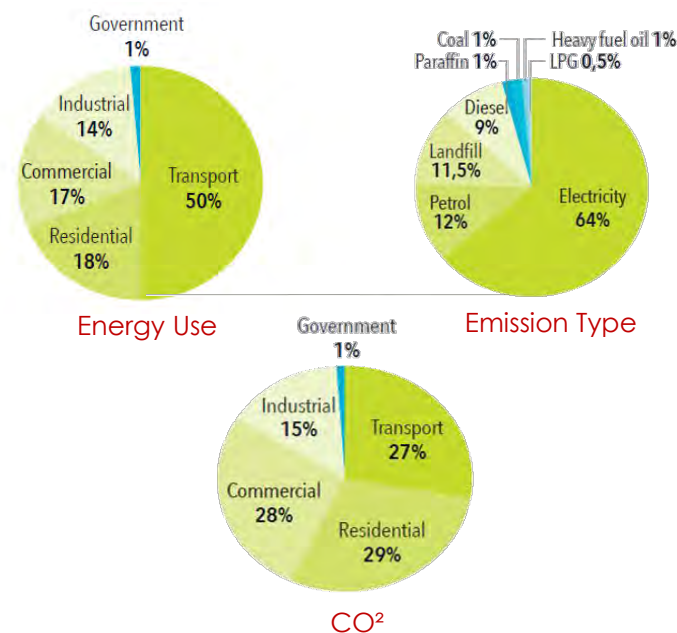


Figure 7.27 Energy Usage (Source: CoCT 2014)

and carbon emissions (See Figure 7.27). In the long term, fuel and energy prices will continue to rise therefore have repercussions for road based freight and private vehicular movement (CoCT, 2013). Electricity tariff hikes and load shedding by Eskom have a further impact on the financial sustainability of the CTIA. The opportunity for public transport, waste to energy transfer and renewable sources like solar and wind power are in high demand but land is particularly constrained.

7.4.8 Waste Water

Cape Town has 20 waste water treatment plants, many of which are reaching full capacity (CoCT, 2012). The CTIA relies on the adjacently located Borchers Quarry Waste Water Treatment Work (ACSA, 2010). The City's Wastewater and Industrial Effluent Bylaw (2006) ensures sufficient removal into the sewer system by industrial and private sector. Treated waste water is typically used by nearby industries and watering of golf courses (CoCT, 2014).

7.4.9 Climate Change and Resource Use

The Western Cape is situated in a semi-arid region with a Mediterranean climate, experiencing hot dry summers and cool wet winters (Midgely, 2005). Increasing temperatures and sea level rise is expected to affect coastal areas and low lying cape flats areas by salinity intrusion and soil erosion. Over time, the Western Cape will experience fewer rainy days but more intensive rainfall (Midgely, 2005). Flood peak thresholds are estimated to rise therefore having significant consequences for close proximity human settlements, especially informal ones (De Waal, 2012).

The Western Cape fynbos and renosterveld shrublands are both fire prone and fire adaptive and as rainfall could be significantly reduced so will overall humidity and moisture content in soil and vegetation (Midgely, 2008). Sporadic flooding and frequent droughts can put a further strain on the semi-arid region which could spill over into the agriculture sector and severely harm food and livelihood security and the ability to export fresh produce surplus to the aviation freight market. Moreover, if the natural resource base and tourism cycles change or if carbon taxes become popular, the goods that Cape Town offers may fail to be competitive.

7.5 INFRASTRUCTURAL INFORMANTS

Concurrently providing better educational facilities to deprived areas and enhancing skills development in response to aviation linked market based diversification is a key concern. Yet much of these issues are still pivotal on accessibility and location which mean that bulk infrastructure like road and rail must be upgraded in order to have a catalytic effect on job creation. Once this vision has been achieved and infrastructure has progressively been developed, focus can be shifted toward creating higher rates of economic growth through various means of diversification into new markets both locally and internationally.

A number of budgeted proposals have been made to upgrade different components of the metropolitan road and rail system, which positively impacts on the ease of mobility to and from the CTIA. Figure 7.28 provides a spatial illustration of the proposals in relation to the CTIA. The future proposals also include PRASA's railway modernisation programme, the Saldanha Port IDZ and ICT infrastructural developments.

7.5.1 Wetton Lansdowne Corridor

Attempts have been made here to link middle class suburbs (Wynburg/Claremont Node in the west) with poorer township areas in the southeast metro. The vision was a 15 km activity corridor and public transport route made up of dense mixed-use development and the establishment of a new activity node in Philippi East (Cameron, Odendaal & Todes, 2004). This is yet to be fully achieved but investment is still prioritised.

7.5.2 Borchers Quarry Extension

Airport Approach road and Borchers Quarry see high quantities of freight movement due to the adjacently located Airport Industria. In the next year New Eisleben Road south of the N1 will be extended over the N2 into Borchers Quarry road with a new interchange which could come in the form of a collector distributor on both sides of the N2 (PEDI 2014). The proposal will allow greater north south movement and will be associated with the upgrade and widening of the N2 between Borchers Quarry and the R300.

7.5.3 Airport Ring Road

The airport ring road is linked to the external road network includes Borchers Quarry Road, Modderdam Road, Stellenbosch Arterial, Symphony Way, Airport Approach and Michigan drive (ACSA TIA, 2013). Kasarda & Appold (2014) emphasise the value of having an airport ring road due to the logistical time and cost efficiency of an airport. A further consideration is the turning point movements and upgrading of key traffic intersections along the ring road.

7.5.4 R300 Corridor Extension

The R300 is a higher order feeder route that links the N1 in the north to the N2 in the South. The R300 is used by 20% of the CTIA's airport employees. In order to ease traffic congestion along the city's north south corridors expansion of the arterial is expected to take place but only if the urban edge is moved further north. The probable time frame of completion is in the next 10 years (ACSA TIA, 2013). The extension of the R300 will also link southern suburbs via the Philippi Horticultural Area to the northern suburbs.

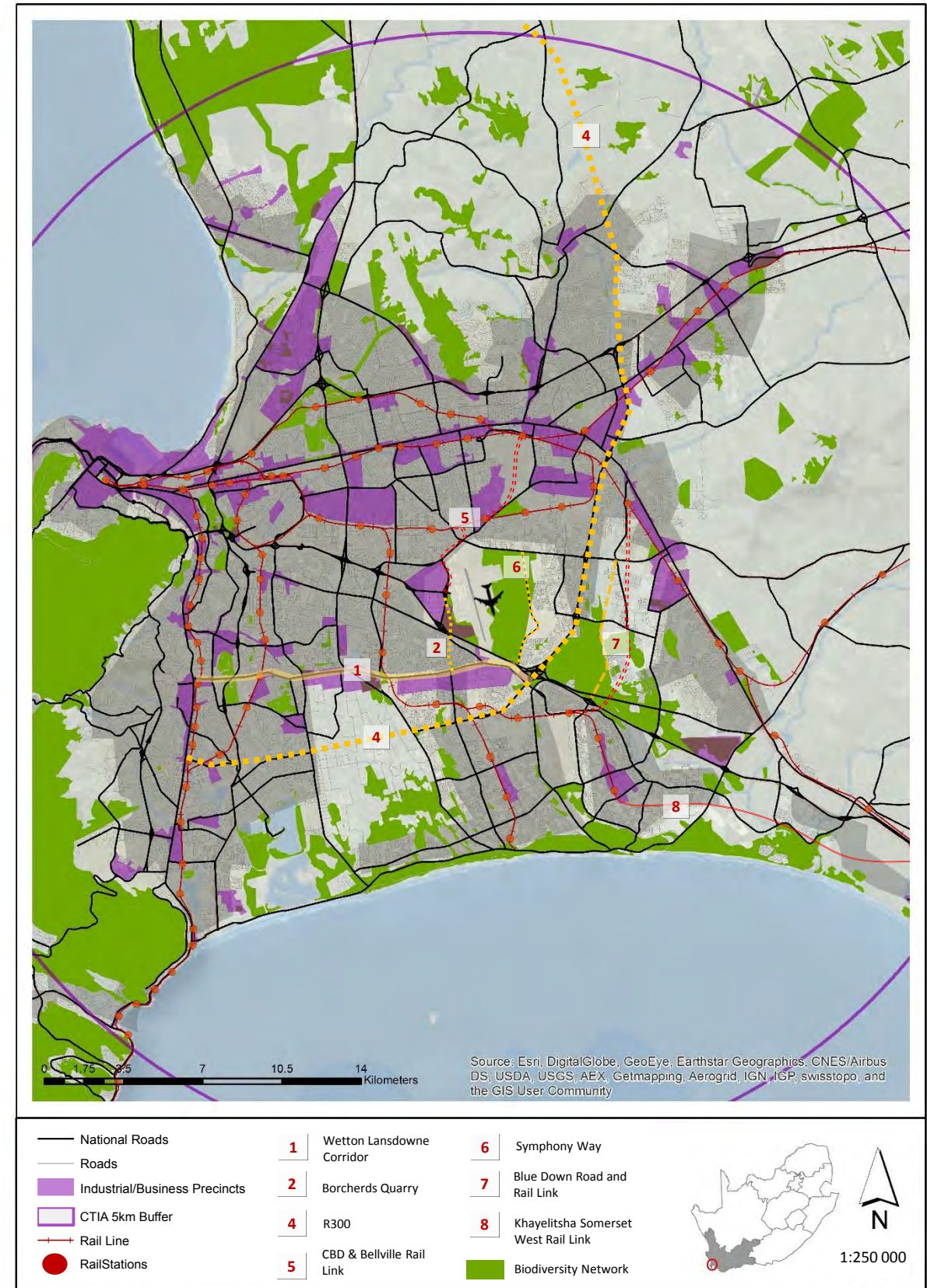


Figure 7.28 Future Infrastructure Proposals (Data sourced from UCT Library, 2015)

7.5.5 Bellville and CBD Rail Link

An additional 4km rail connecting CTIA to the existing Bellville Rail, Bus and taxi interchange 6km to the north. The proposal does not conflict with existing MyCiti bus connections to the CBD and will connect existing clustered institutions such as Cape Peninsula University of Technology (CPUT), the University of the Western Cape and Bellville Campuses to the Bellville Interchange at the Voortrekker Corridor (Lewis, 2015).

The project is headed by PRASA and the CoCT, where the ideal outcome is better integration of economic zones between the north and south-east metro. The R34.8 billion Transnet procurement programme also includes planned upgrades of the Bellville shunting yard and railway which will ease the flow logistics in the region (WC Treasury, 2013). The industrial area of Parrow can be further linked in to the CTIA in terms of maintenance and cargo (Van den Brink pers.com, 2015)

7.5.6 Symphony Way Corridor

The Symphony Way corridor has access to the Stellenbosch arterial in the north but not the N2 in the south as it crosses over and connects to the Klipfontein Corridor's (ACSA TIA, 2013). Symphony Way is a single carriage way that is soon reaching capacity and will be upgraded to a dual carriage way within the next 5 years. The corridor is earmarked as a future north south development corridor adjacent to the community of Delft which has significant portions of land available for provincial social housing (ACSA TIA, 2013).

7.5.7 Blue Downs Road and Rail Link

The Blue Downs rail link will be 17km of additional track from Nolongile Station in the South East Metro until the Kuils River Station (Fataar pers.com, 2015). The project is expected to be build and complete within the next 5 years with the connection allowing greater access between Khayelitsha, Blue Downs, Mfuleni and the growing Blackheath industrial area.

7.5.8 Khayelitsha/Somerset West Rail Link

Proposals have been made by PRASA and Metrorail to link the Paardevlei station in Somerset West to Khayelitsha. The connection will allow greater access for persons in the south East metro working in the industrial and manufacturing sectors located in Somerset West (Fataar, 2012).

7.5.9 My Citi BRT

The MyCiti Bus system specifically seeks to address years of underinvestment in the south east metro. The network is to be expanded with a total of 16 routes, of which 7 will converge 4 major trunk routes south of the CTIA at Philippi East (Smit, 2011). In terms of upgrading, the Philippi Joe Gcwabi interchange be linked to Kuils River and Black Heath via the Nolongile intermodal station (CoCT, 2013).

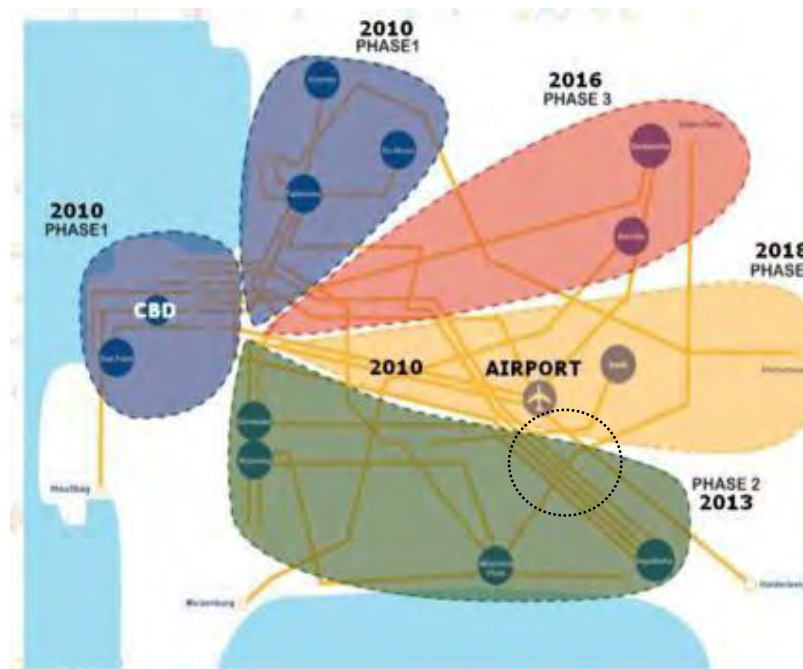


Figure 7.29 MyCiti Bus Roll Out (Source: Smit, 2011)

Although, the goal for the MyCiti bus system is to reduce bus fares and increase ridership, the efficacy of the system is still largely on realised in the CBD and northern corridor toward century city (See Figure 7.29).

7.5.10 PRASA Rail Modernisation

PRASA's modernisation project includes "signalisation upgrade, track improvements, new rolling stock and station upgrades" (CoCT, 2013:227). The overall upgrade and modernisation programmes requires engagement by CoCT, PRASA, the DoT and National Treasury in order to implement infrastructure priorities (CoCT 2013). No new rail connections to the CTIA should be undertaken unless the existing rail system is improved for daily commuters (ACSA TIA, 2013).

7.5.11 ICT Broadband Infrastructure

Transport and internet bandwidth connectivity are identified as key economic and infrastructure capacity constraints in Cape Town (WC Treasury 2013). Cape Town is considered the digital gateway into Africa with recent partnerships between Wesgro, Price Waterhouse Coopers (PWC) and the City of Cape Town who provide online collaboration platforms, advertising and marketing for small scale start-ups (Accelerate Cape Town 2015). There have been recent proposals for fibre optic cabling and upgrading of high speed broadband which will be a further attraction to the private sector and, if efficient enough, can provide free access to low income areas.

7.8 ECONOMIC INFORMANTS

Cape Town's economic growth is faster and more resilient than the national economy, which between 2006 and 2012 showed a yearly average growth rate of 2.8% as compared to 3.3% (CoCT, 2014). Stellenbosch and Paarl are considered to have the highest economic growth potentials in the Western Cape (WC Treasury 2013). External factors affecting the regional economy are volatile fluctuations in exchange prices and demand for foreign investment, tourism and agricultural product.

7.8.1 Foreign Direct Investment, Inflation and Volatility of the Rand

Foreign Direct Investment (FDI) impacts on the demand for airport expansion, particularly when investment is located in Cape Town, where the result is a value added output and the increase of labour opportunities and goods that could be linked to the aviation freight market (Nicks pers.com, 2015).

The foreign investment sectors in Cape Town are ICT, finance and insurance, tourism and hotels as well as alternative energy like oil and gas (OECD, 2013). Figure 7.30 illustrates the Foreign Direct Investment into South Africa as compared to other BRICS economies. Added to the graph is the average expected growth and FDI over the next 5 years for each of the BRICS economies. Wesgro (2015) identifies some of the largest current investments into Cape Town:

- Fluidra Spanish Company (R93 million Industry, Machinery (Tools))
- GAC Group in UAE (R179 million logistics, marine and shipping)

In conjunction with FDI, the weakening or strengthening of the Rand effects the functioning of the airport in a number of ways. For instance if the Rand weakens and inflation rises the net effect is increased international tourist arrivals and exports, and decreased domestic departures and imports (CoCT, 2014).

7.8.2 Sectoral Drivers Linked to Aviation

A location quotient is used to determine whether a certain region has a comparative advantage (>1) in a certain sector compared to the rest of the country (CoCT, 2014).

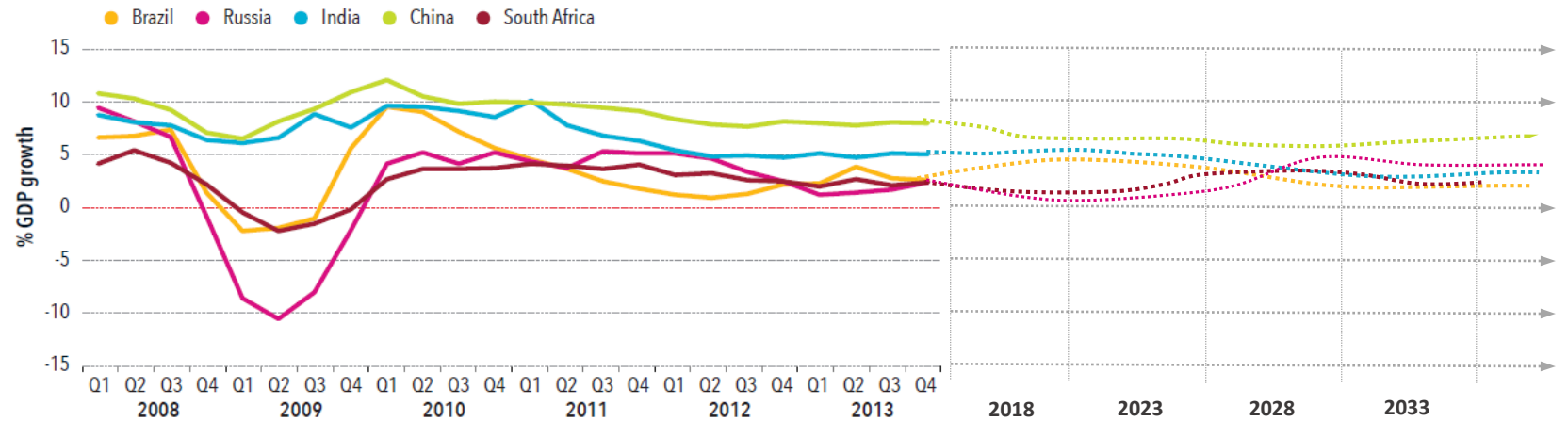


Figure 7.30 Foreign Direct Investment in BRICS Economies (Source: CoCT, 2014: 104)

However, this does not mean that the advantage is necessarily being exploited (CoCT, 2014). Depicted in Table 7.2 below are the comparative advantages for each of the Western Cape Districts, where agriculture, agro-processing, building process outsourcing (BPO) and tourism are the most prominent aviation linked sectors (WC PSDF, 2013). The Cape Metropolitan does not have a comparative advantage in agro-processing given the reliance on agricultural based economies of surrounding districts.

The sectoral drivers of Cape Town's economic activity are the primary sector (agriculture and mining) and the dominantly growing tertiary sector (business and financial services), which in 2012 contributed the highest (36.1%) to the city's total Gross Value Added (GVA). Cape Town's comparatively advantaged

Table 7.2 Comparative Advantages of the Western Cape Districts (WC PSDF, 2013)

Cape Metro	Cape Winelands	Eden
Textiles, clothing & leather	Agriculture & processing	Agriculture & processing
Tourism	Tourism	Tourism
Finance, BPO, ICT	Building & construction	Building & construction
'Knowledge sector'	Communications & ICT	Timber & furniture
Timber & furniture		
West Coast	Overberg	Central Karoo
Agriculture & processing	Agriculture & processing	Agriculture & processing
Tourism	Tourism	Tourism
Building & construction	Building & construction	Building & construction
	Timber & furniture	Electrical machinery
		Finance & insurance

industries are "fishing, clothing and textile, wood product manufacturing, electronics, furniture, hospitality, finance and business services" (CoCT, 2014: 20) (See Figure 7.31 below).

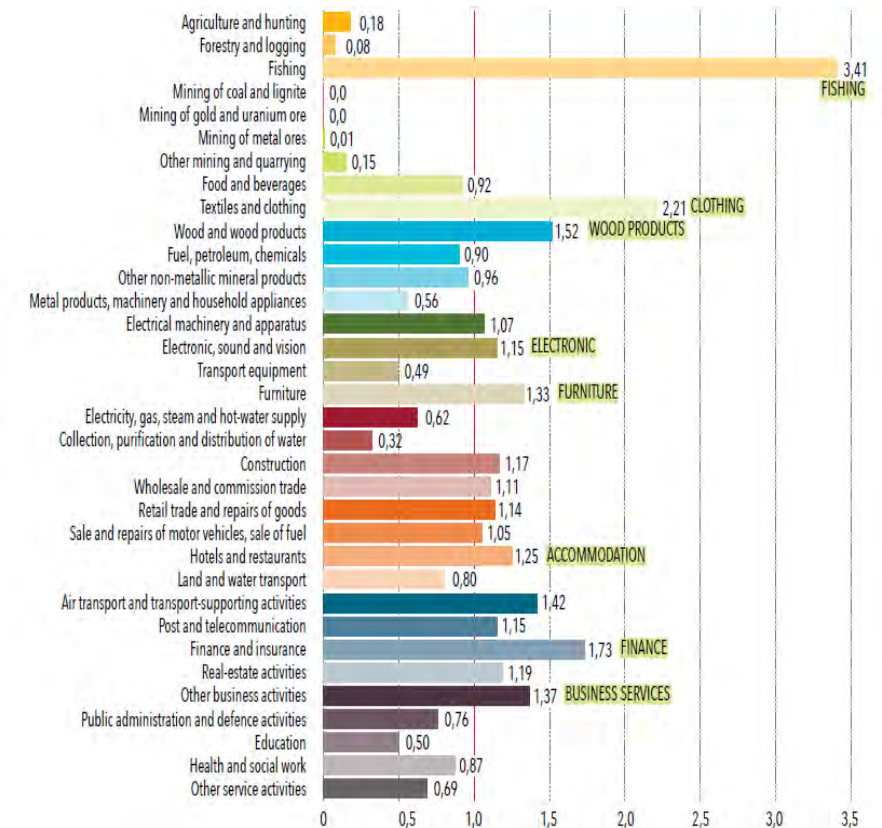


Figure 7.31 Location Quotients for Cape Town (Source: CoCT, 2014: 104)

The economic dynamics of the city say otherwise, since between 1996 and 2012, the percentage share of GDP by the primary sector declined from 26% to 22.3% while the tertiary sector increased from 73.1% to 77.7% by 2012 (CoCT, 2014) (See Figure 7.32). The decline in manufacturing is associated with Cape Town's shift toward a more serviced based economy which has been exacerbated by the pace of globalisation.

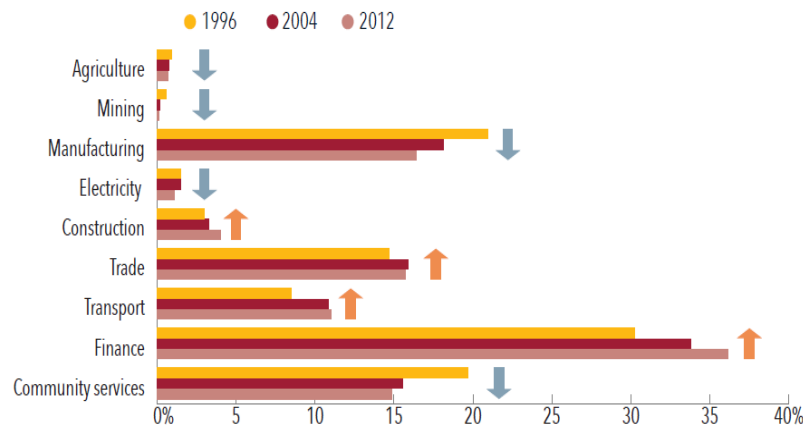


Figure 7.32 Location Quotient of Cape Town Industries (Source: CoCT, 2014: 104)

Unlike the industrialised phases that the developed world has emerged from, Cape Town has shifted away from low skilled labour intensive primary sectors like agriculture, manufacturing toward high skilled jobs in the tertiary sector such as finance and business services as well as transport and logistics. This shift is arguably one of the greatest drivers of inequality in the developing world today, bringing to light the debate whether it is worth Cape Town skipping the mature industrialised phases of a society (CoCT, 2014), especially given the demand for low skilled labour absorptive opportunities that could be linked to the growing African aviation freight market.

In terms of potential value chain partnerships the central concern is around linkages to industries, farms and local markets and asking what could be located near the airport and linked to the aviation freight market (Allemeir pers.com, 2015). The barriers to entry from a job employment perspective are only partially spatially and non-spatial impediments are the matching of skills demand (Rabie pers.com, 2015). The AerosCape Town should be about how increased

capacity in aviation linked sectors can stimulate trade connections like textiles and agro-processing which are low skilled and labour absorptive (Allemeir pers.com, 2015).

In the South African context the AerosCape Town should not be viewed as a simple setting up of business and employing low paid labour but rather about setting up small scale entrepreneurs (Mammon pers.com, 2015). The question then is what types of skills can be stimulated now that could be connected to the new market destinations attained by direct long haul flights in the future? A number of opportunities exist in various aviation export and import linked sectors and are described below.

7.8.3 Tourism and Film Industry

The Cape Town tourism industry contributes 17 billion Rand in GVA, accounting for more than 200 000 jobs, with the sector expected to increase by 5%, to R28 billion in 2019 (Accelerate Cape Town, 2015). According to Edelheim & Lexow (2004: 56) the image of how Cape Town "is projected to the potential tourist, depends on how the tourist handles the information". In this regard, Donaldson & Ferreira (2009) argue that safety and security, biodiversity and institutional efficiency are the most important factors affecting consumer reasoning for entering the Cape Town tourism market.

The fashion and film industry is considerably reliant on the use of the CTIA which is was further leveraged when Cape Town was branded the design capital of 2014. Filming locations in Cape Town are some of the most pristine and affordable in the world, with the Cape Town film studios located roughly 10 km east of the CTIA.

7.8.4 Agriculture and Agro-Processing

Agriculture is seasonal and initiates strong backward linkages to manufacturing, agro-processing, packaging, fertilisers, and machinery and wine tourism industries. The agro-processing industry in the Western Cape accounts for 80 000 jobs and is expected to increase by 126% by 2019 to reach a total of 26 billion Rand in GVA (Accelerate Cape Town, 2015).

The project Khulisa growth strategy headed by the Western Cape ministers of finance, economic opportunities, transport and Environmental Affairs has identified agro-processing as one of the key investments for job creation in the province and is (Accelerate Cape Town, 2015)

The PHA and browns farm along the Wetton Lansdowne corridor is a significant supply chain that could be going into the CTIA (Swana pers.com, 2015). The PHA employs 2350 – 3760 people and has roughly 3000ha of which only 1000ha is effectively being farmed (Battersby-Lennard & Haysom, 2012). This is the missing supply chain involving agro-processing and agri-jobs which could ultimately create a surplus to become part of the aviation freight market (Swana pers.com, 2015). Over 100 000 tons of produce come out of the PHA annually and is brought domestically (Battersby-Lennard & Haysom, 2012). This can double and triple if medium technology agricultural practices are used (Swana pers.com, 2015). Although there is no earmarked IDZ below the N1, the potential initiative for this to be applied to the Philippi Economic Development Node is similar to Dube Trade Port's Agri-zone.

There is significant demand to serve an international base through the Halaal industry which can provide food on airlines locally and globally (Mammon pers.com 2015). A 1 billion Rand agro-processing and Halaal Park has been proposed in the next two years with demand and trade agreements emerging between the Middle East, North Africa and sub Saharan Africa who house a large majority of the world's Muslim population (eProp, 2015; Mammon pers.com, 2015). The development is expected to create 5000 jobs in the next 5 years and is a strategic partnership between the Provincial Government and the Western Cape Fine Foods Initiative (eProp, 2015).

According to Accelerate Cape Town (2015) "there are two sites under consideration, namely the Cape Town International Airport and a site in the Cape Winelands. The park will be a fully Halaal zone and will be a cluster of manufacturing and service firms in the Halaal industry [which] will present significant opportunities for private sector investment." The initiative also embodies gender given the large portion of women employed in the Halaal industry (Mammon pers.com, 2015).

In terms of competition, it is important to note that King Shaka International Airport has recently pursued a similar initiative that should be recognised (Weyer pers.com, 2015).

7.8.5 Manufacturing Industry

The aviation linked manufacturing sectors include clothing & textiles, leather & footwear and micro-electronics. Recent work from DTI indicates that the textile industry shows a re-emergence in the informal economy while the formal StatsSA data shows that the industry is in decline (Allemeir pers.com, 2015). Central to this trend are labour regulations and environmental restriction which force industries to decentralise and contract out to those acting informally. These numbers are not captured in formal statistics and could well be linked to the aviation freight market. Cut-make and trim in Woodstock and Salt River are also linked to the CTIA for exporting of textiles (Mammon pers.com, 2015).

Dr. Strive Masiyiwa (2015), Zimbabwe's richest man and global philanthropist, highlights an important trend emerging in Africa, where women in Angola and Ghana are increasingly using air travel as a resourceful way of trading agricultural goods, textiles and other consumables to places around the globe. Masiyiwa (2015) points out that policy makers have failed to recognise how successful these entrepreneurs have become and should therefore be provided market training and financial support to help grow and operationalise their businesses.

7.8. Fishing Industry

Fishing industries in the Western Cape are based at the Cape Town seaport and along the West Coast at Saldanha and St Helena's Bay (Sauer et al, 2003). The majority of fish is exported to European countries and imported from Namibia. The catch includes hake, rock lobster, abalone, anchovies, sardines and tuna (Sauer et al, 2003). Fishing villages along the West Coast are shedding jobs as industries move to other fish stocks (Sauer et al, 2003).

7.8.8 University Aerospace Industry

The South African National Defence Force (SANDF) along with the Stellenbosch and Cape Peninsula University of Technology (CPUT) are equipped with tools, knowledge, expertise and potential graduates who build aircraft and parts (Kraemer-Mbula, 2008). An Aerospace cluster of skills training and technology is yet to be fully established at these nodes.

7.9 CONCLUSION

The mismatch between labour force and job availability along with an unskilled youth bulge, a radial road network, the lack of rail capacity, private vehicle usage and freight based movement are key concerns for the metropolitan structure surrounding the CTIA. The CTIA's position as a central gravitational feed-in able to deter private sector sprawl is therefore a significant point to consider, especially in terms of the long term efficiency of the physical urban structure and the achievements of ecological and social transformation goals.

The shedding of low income jobs and the shift toward financing, business and insurance requires that government intervene alongside private sector in order to stimulate sectors such as agro-processing, textiles and manufacturing which are low skilled labour absorptive and linked to the aviation freight market. Importantly distinguished though is that the shipping cargo industry outweighs the quantity of that sent by air and that linkages to the domestic market economy are stronger than international ones, although intra-African ones could be stronger.

In terms of the immediate CTIA and hinterland, partnership agreements are required to innovatively integrate settlements patterns in synergy with airport growth in addition to harnessing linkages to the local economy and tapping into the well located labour supply. The application of the Aerospace and Aerea concepts could therefore be exploited through both the existing employee base of the airport and the possibility of low skilled workers to be absorbed by the indirect employment opportunities in the CTIA 5km region.

CHAPTER 8: AEROSCAPE TOWN CITY

8.1 INTRODUCTION

Chapter 8 investigates the 5 km functionality of the CTIA as an airport city anchor to the regional AerosCape Town. The chapter concludes with opportunities and constraints for both the 25km and 5km regions. As reiterated from the literature review the success of an Airport City depends on the connectivity to the airport surroundings, the economic potential of surrounding areas, the commercial approach taken by airport operators and the overall context of sustainability (Peneda, Reis & Macário, 2011). According to the central question proposed by the dissertation, the focus is predominantly around how the Airport City can better connect to the South East Metro both physically and socio-technically.

8.2 DEMOGRAPHICS

The 5km buffer includes Subcouncils 5, 6, 11, 13, 14, 15 (See Figure 8.1). In 2011, the subcouncils had a combined population

of **969 180** persons, a third of the entire metropolitan population (See Figure 8.2). Subcouncil 5 includes Bishop Lavis to the west of the CTIA and Delft to the East. Between 2001 and 2011 Subcouncil 5 had a population count of **248 065** persons at a growth rate of 63%. Subcouncil 5 includes the CTIA and adjacent Airport Industria which are primarily industrial and logistics with no residential inhabitants.

Subcouncil 4 and 6 to the north include Bellville, Parow and Goodwood with the highest average income, rate of employment and proportion of persons completing matric and tertiary education.

Subcouncil 11, 13 and 14 south of the CTIA include Gugulethu, Nyanga, Philippi East, Lower Cross Roads and Browns farm with a combined population of **403 852** persons and 155 111 households (60% formal and 40% informal). Together, the subcouncils have an average employment of 65%, with 70% earning less than R 3200 a month.

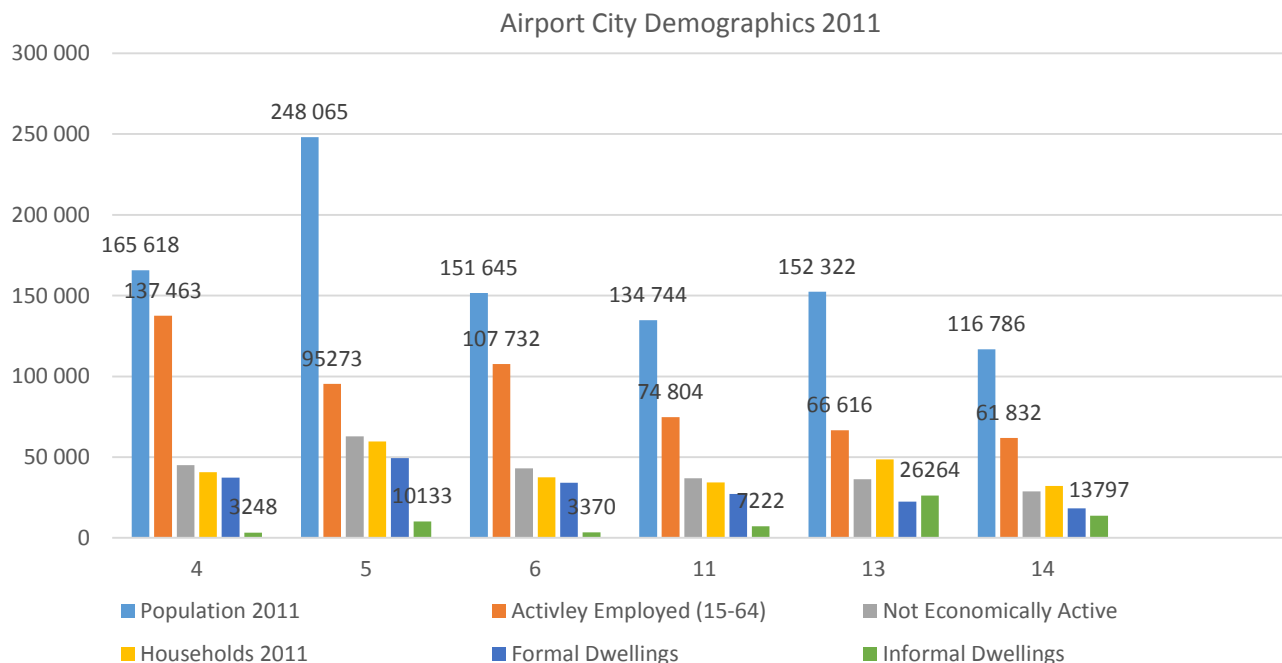


Figure 8.2 Demographics for 5km Airport City Influence (Data sourced from: Census Statistics 2011)

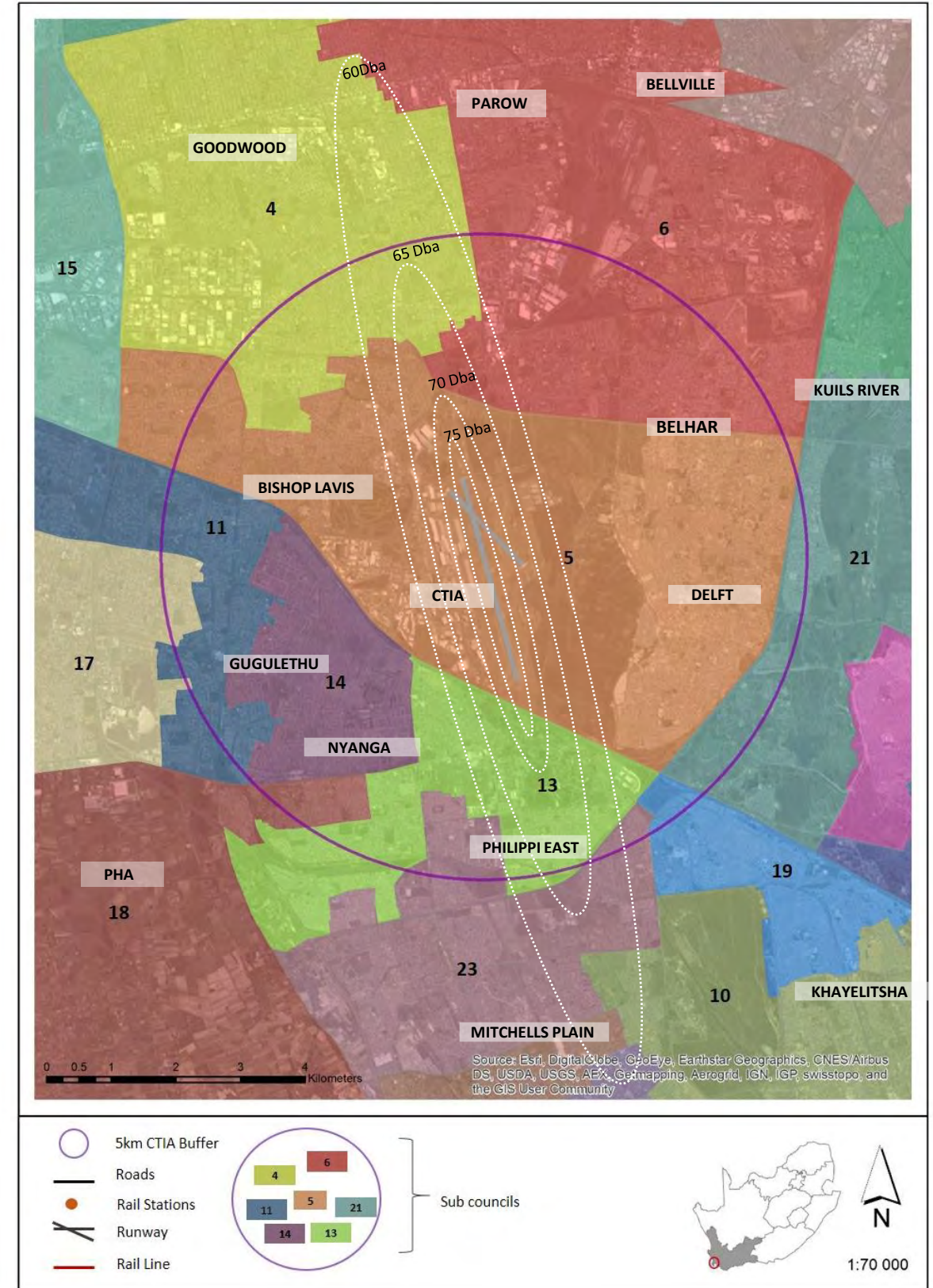


Figure 8.1 Subcouncil Profile for 5km Airport City (Data sourced from: UCT Library, 2015)

8.3 ACCESSIBILITY

The road network concerns both the CTIA and 5km radius. As described in the regional AerosCape Town analysis, there are a number of catalytic road and rail infrastructure proposals connected to the CTIA (See Figure 8.3 across). These include:

- Borchers Quarry;
- Symphony Way;
- Nolongile Station and rail upgrade;
- R300;
- Stock Road Widening;
- Klipfontein Road Widening;
- Bellville/CBD Rail Link;
- and Blue Down Link.

Public Transport upgrades include BRT extensions along Symphony way and to the South East Metro (Smit, 2011). These are accompanied with PRASA's rail way, fleet and station modernisation and programmes.

The CTIA internal road network has access from Airport Approach Road connecting to the N2 and Borchers Quarry via Modderdam Road (See Figure 8.4 below). The internal network is primarily a logistical turn style exercise for arriving and departing passengers and freight. As a result of congestion near the CTIA, Airport Approach Road will be widened to a 6 lane dual carriage way with further upgrades to the N2 (ACSA TIA, 2013).

To enhance the mobility of logistical freight to and from the airport, a modal shift to public transport and railway is required (CoCT, 2013). The MyCiti Bus Lane could be relocated to a dedicated route adjacent the N2, therefore easing congestion during peak hours (ACSA TIA, 2013). Thus, the ability of national, provincial and local enterprises to successfully fulfil mandates in synergy with airport growth ultimately impacts on the outcome of the future AerosCape Town City.



Figure 8.4 CTIA Internal Road Network (Source: Cape Executive Parking, n.d)

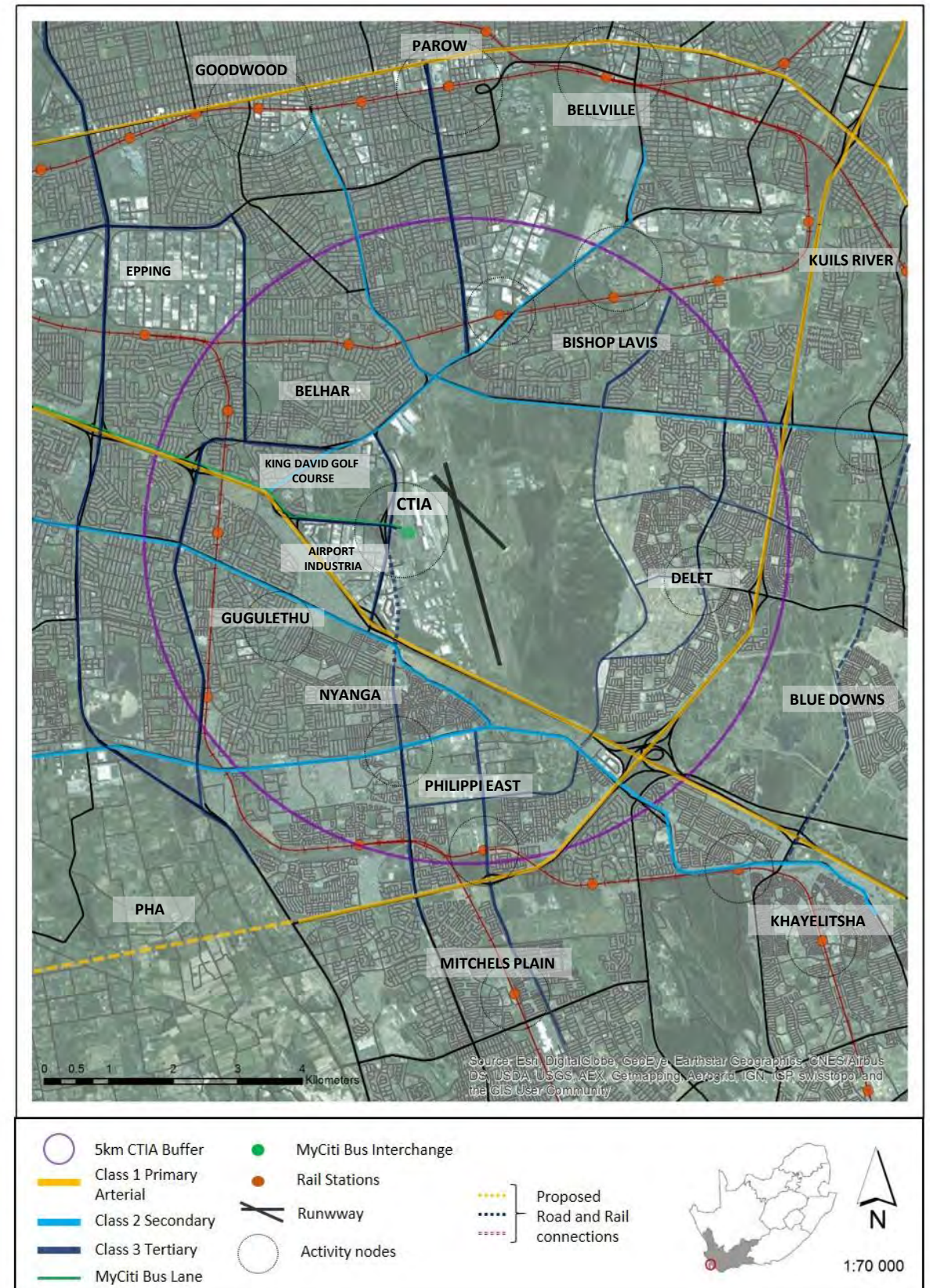


Figure 8.3 Road and Rail linkage in a 5km Buffer (Data sourced from: UCT Library, 2015)

8.4 LEGIBILITY

At a macro scale Lynch's (1981) accessibility indicators include nodes, landmarks and edges which provide a hierarchy of public and private spaces. Figure 8.5 across illustrates the prominent nodes, public services and land marks in the CTIA km buffer.

8.4.1 Nodes and Public Services

Nodal areas of activity in and around the 5km radius are Airport Industria, the CTIA, Bellville, Parow, Cape Peninsula University of Technology (CPUT), University of the Western Cape (UWC), Goodwood, Black Heath, Kuils River Delft, Philippi East, Nyanga and Gugulethu. The 5km radius includes 24 clinics, 115 schools (primary and secondary), 8 police stations, 14 libraries, 8 rail way stations, 1 government hospitals and 11 shopping centres.

Facilities inside the CTIA boundary include domestic and passenger terminals, drop off and pick up zones, parking bays, hotels such as the Hotel Verde and River Lodge as well as business, logistics and distribution parks (See Figure 8.8)

8.4.2 Edges

Edges describe the contrast between public and private space (Lynch, 1981). The N2 highway acts as a physical barrier between the Greater Tygerberg District in the North and the Cape Flats District in the South and East while the Airport approach road and Borchers Quarry are threshold gateway (See Figure 8.6; 8.7; 8.8 and 8.9). The primary concern for passengers and Airport Authorities at the CTIA is safety and security, hence the surrounding CTIA is largely gated with insufficient walkability other than between the immediate terminal, BRT interchange and parking bays.

8.4.3 Landmarks

Landmarks such as the airport control tower, terminal buildings, airport Approach Road, advertising billboards and informal housing clusters all act as place markers for guiding the direction and experience of passing passengers.

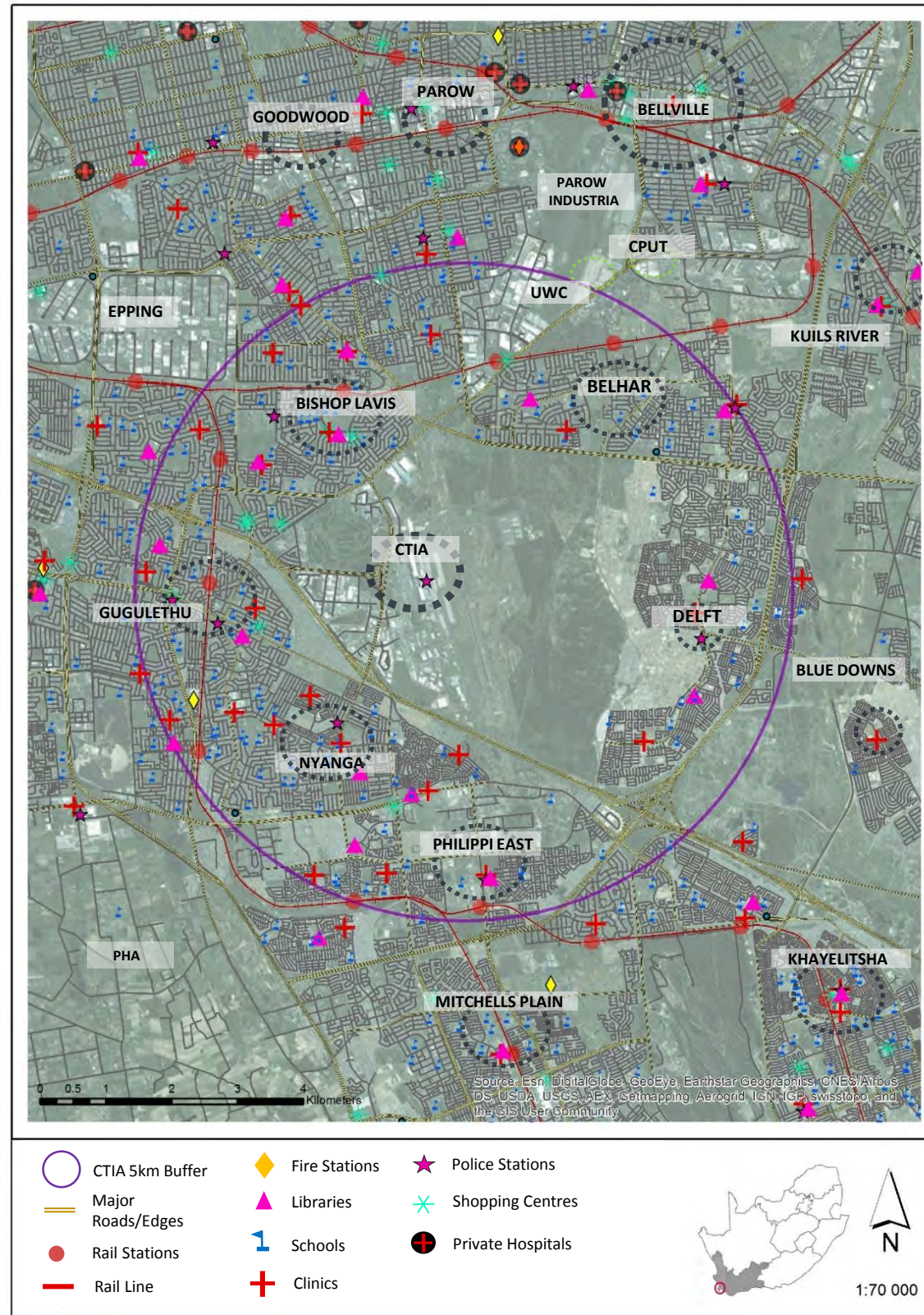


Figure 8.5 Legibility of the CTIA and Surrounds in a 5km Buffer (Data sourced from: UCT Library, 2015)



Figure 8.6 Cape Verde Hotel (Source: South African Hotels, 2011)



Figure 8.7 Airport Approach Road over N2 facing South East (Source: Google Street View, 2015)



Figure 8.8 Airport Approach Road toward Table Mountain (Source: Google Street View, 2015)



Figure 8.9 Airport Approach Road toward CTIA (Source: Google Street View, 2015)

8.5 EXISTING ZONING AND LAND USE

The 5km Airport City region has emerged as an organic form of disjointed land uses and the issue of boundary is clearly an issue (See Figure 8.10). The 5km radial coverage amounts to 7854 ha of land. The percentage for each use is depicted in Figure 8.11 below.

Land Use Coverage in 5km radius

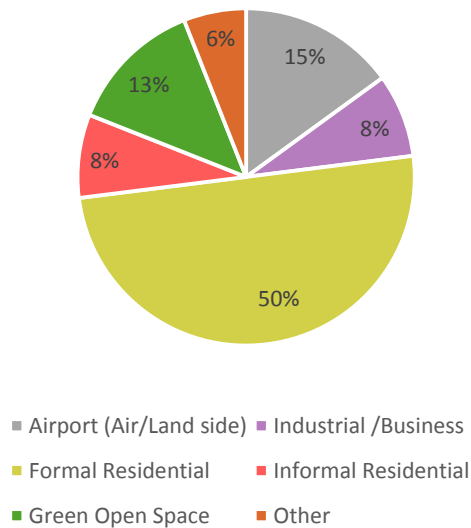


Figure 8.11 Road and Rail linkage in 5km Buffer (Data sourced from: UCT Library, 2015)

The clustering of incompatible land uses around the CTIA impacts on the ability of freight movement due to the high level of residential and private vehicle usage. Arising from the transport connectivity offered by the CTIA, informal settlements such as Barcelona, Kanana and Europe to the south west of Airport Industria and Browns Farm, Freedom Farm and Malawi Camp to the North and South East have sprouted over the past two decades. The former areas are notoriously known for service delivery protests on the N2. This has subsequently spurred

partnerships between Sanral, the CoCT and the department Transport and Public Works who are tasked with improving safety and security with visibly manned police vehicles and CCTV technology (Western Cape Government, 2015).

The informal land market is dominated by movement (footfall), socially networked relationships and a variety of well-established informal institutions (CBO's and NGO's), which like the formal sector are subject to local regional and international economic forces (Napier, 2007).

Key decision making criteria for accessing land and housing include the need for security of tenure, physical safety, servicing, location and affordability which adjust according to one's livelihood (Smit 2008). These needs are rarely filled at once and trade-offs between them are common.

Entering the formal land market and acquiring tenure are restricted to RDP housing subsidy schemes (Pillay, Tomlinson & Du Toit, 2008). These are prohibited to eight years of ownership subject to formal rates and taxes and then further unaffordable transaction costs.

Illegal selling or renting out of RDP houses has been a preferred short term effective mode of livelihood income. It is not uncommon to find that beneficiaries of RDP houses have illegally sold their place, moved to an informal settlement closer to work opportunities and either lived in or rented out a backyard shack instead (Napier, 2007). Tendencies such as these have not only perpetuated the issue of securing formal tenure but have exacerbated dwelling densities and exposure to hazardous locations such as wetlands, flight paths and non-residential zones.

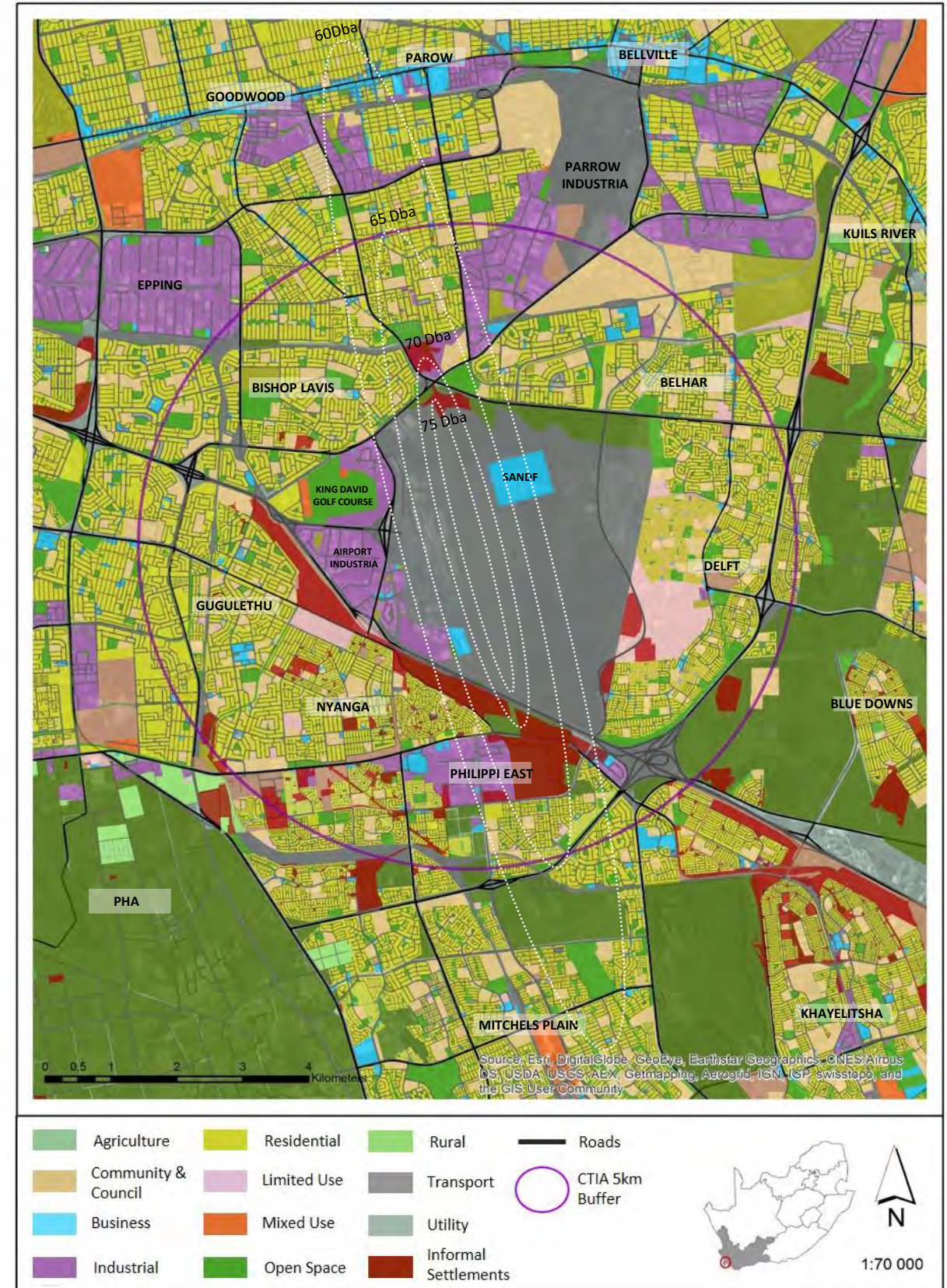


Figure 8.10 Metropolitan Land Use in relation to 5km radius around the CTIA (Data sourced from: UCT Library, 2015)

8.6 BIOPHYSICAL ENVIRONMENT

If undesignated for land use, green open space in the 5km buffer consists of 18.5% of total land coverage (See Figure 8.12). Connectivity and maintenance of macro and micro-ecological corridors is key to meeting environmental standards.

8.6.1 Vegetation

The CTIA is located on some of the last remaining core biodiversity remnants in the regional Kuils River Corridor. With the demand for global connectivity, airport expansion is expected to continue, albeit environmental mitigation will occur. Due to extensive development, polluted urban run-off and outflow from waste water treatment works, the Kuils River riparian and ecological corridor as well as the area between Delft and the CTIA are heavily infested with alien vegetation (SRK, 2013).

8.6.2 Geology and soils

The 5km radius forms part of the greater Cape Flats lower lying area and aquifer. The bedrock is generally Quaternary sediments and Malmesbury Shale with high grade silica sand deposits (SRK, 2013). To the south east, the CTIA is located on a portion of the Cape Aquifer with the water table 1.5 meters below ground level (SRK, 2013).

8.6.3 Noise

Peak hour air craft movement are in the early morning between 6-8 am and in the evenings (SRK, 2013). In Cape Town, development within the 70 Dba contour has been relatively flexible due to historical demand for residential housing in the area. Noise restrictions impact on community contestation toward aircraft movement (SRK, 2013). If no other land options are available, the design

of housing needs to be compatible with the environment and with aircraft related noise. In terms of commercial development the use of green building technologies and smart design has helped avert these issues.

8.6.4 Landscape Character

The CTIA acts as a green backdrop and distinctive edge for the CBD. Similarly, the PHA acts as a rural urban edge to the CTIA while the Kuils River is a significant green belt.

Below the N2, the Philippi Area is a distinctive cultural landscape which was originally home to Khoi San inhabitants and the Dutch agriculture in the early 19th century (PEDI, 2014). Thereafter, the Group Areas Act was established with more than half of the available farming area targeted for persons of non colour (PEDI, 2015).

8.6.5 CTIA Waste

Waste from the CTIA is proportional to passenger throughput in addition to industrial output (Zietsman, 2013). ACSA's waste recycling reduces 1228 tons per annum from landfill (ACSA, 2014).

8.6.6 CTIA Energy and Water Usage

Between 2011 and 2014 the quantity of water consumed by the CTIA increased by 40 000 kilo litres to reach 413 966 (ACSA, 2014). The amount of water used is equivalent to 165 Olympic swimming pools a year. If passenger count is expected to double this will amount to 330 Olympic swimming pools a year.

In 2014 the CTIA consumed 94 597 litres of fuel as compared to King Shaka at 184 944. This is because the CTIA replaced 60% of its vehicle fleet while KSIA's fleet increased (ACSA, 2014).



Figure 8.12 Green Open Space System in relation to 5km radius around the CTIA (Data sourced from: UCT Library, 2015).

8.7 CAPE TOWN INTERNATIONAL AIRPORT MASTER PLAN

The CTIA master plan was developed in 2001 by the Netherlands' Airport Consultants (NACO) in association with South African engineering consultants (SRK 2013). The Airport Master plan deals with the short and long term strategic intents which are reviewed every 5 years (Mamon pers.com, 2015). The master plan is divided as the urban design, transport, water, electricity and land use frameworks which are linked to ACSA's governance structures which ensure that the businesses of tenants and investors are linked to the airport functioning (Mamon pers.com 2015). ACSA have the ability to turn away potential investors if they are unable to indicate that they need relative proximity to the airport. The master plan does not include the adjacent Airport Industria or King David Golf Course on the western border.

8.7.1 CTIA Land Use Plan

The 2013 CTIA Land Use Plan is depicted in Figure 8.13 across. The CTIA is split as the landside and airside on a total land coverage of 975ha of ACSA owned land (CoCT, 2013).

- Precinct 1 (2.2.5ha) is earmarked for commercial development with proposals for a hotel and conference centre at the terminal building. This could form the gateway to the Airport City but not necessarily the AerosCape Town (ACSA, 2010).
- Precinct 2 is 24ha of land used for Aviation related logistics and is a base for South African Airways (ACSA, 2010).
- Precinct 3 (17ha) is the northern logistics node which houses Pick n Pay and DHL who have access via Bahrain Drive and Modderdam Road (ACSA TIA, 2014). In the last decade the Northern Logistics node has grown from 5000 to 35 000m² in floor space (Mammon 2015, pers.com). Current issues are insufficient land and bulk, especially truck turnaround facilities and access from Bahrain drive (ACSA TIA, 2013).
- Precinct 4 (14ha of ACSA owned land) is earmarked as a future IDZ which Pick n Pay has showed interest in (Mammon pers.com, 2015). The area is zoned for industrial and warehousing with approximately 79 000m² of gross lettable area (GLA) (ACSA, 2010).
- Precinct 5 consists of 63ha of land potentially zoned for park and ride facilities. However, if public transport offsets the need for parking, the land could be alternatively zoned to agriculture in the short term (Weyer pers.com, 2015).
- Precinct 6 was owned by provincial government but strategically acquired from ACSA without bulk services (Mammon pers.com, 2015). The precinct will be zoned as commercial office development.
- Precinct 7 to the north includes 79.2 hectares of consolidated conservation area alongside industrial land (Mamon pers.com, 2015).
- Precinct 8 includes 51.1 hectares of commercial development in the 65 DbA noise contour. The site has been acquired by ACSA from the National Housing Board, SANRAL and the City of Cape Town (SRK 2013). The site has 281 273 m³ of GFA (Mammon pers.com 2015). There are also alternatives for mixed use housing (2 to 3 storey walk ups) where the industrial area acts as a buffer to the noise issues.

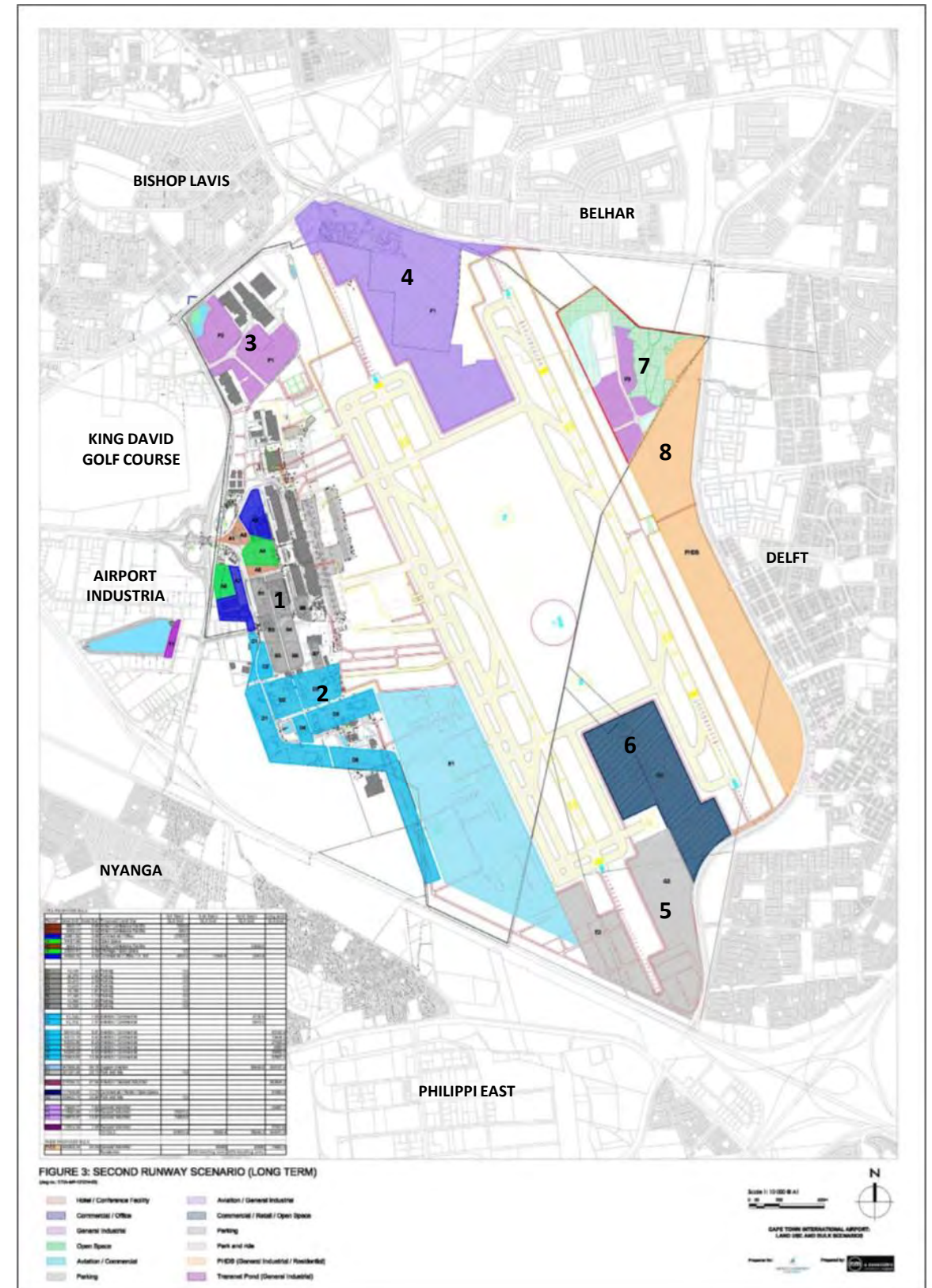


Figure 8.13 CTIA 2013 Land Use Development Plan (Source ACSA TIA, 2013: 39)

8.7.2 Runway Re-alignment

The existing runway is to be decommissioned to give rise to an additional 3.5km long runway at 11.5 degrees to the south east (SRK, 2013). The existing runway allows 30 aircraft movements per hour while the new one will allow for 44 per hour (SRK, 2013). The project will begin in early 2016 and is expected to be complete by 2019 (SRK, 2013) (See Figure 8.14; 8.15 and 8.16)

The alignment will reduce existing noise contours but shift them to other residential areas, although the overall noise impact will to the number of residential areas will be less (SRK, 2013). Aircraft noise can impact on the value of housing while runway development creates dust emissions and inconveniences for aircraft landing, surrounding health and in the case of the CTIA, the displacement of informal settlements.

The realignment will require that Freedom Farm, Blikkiesdorp and Malawi Camp informal settlements are relocated as long as there is alternative land for housing, most likely in Delft on the north eastern boundaries of the CTIA (Isaacs, 2015). The reason is that they are living without services, on land inappropriate for residential purposes and in the existing and future flight path.

The City of Cape Town has signed a memorandum of agreement with ACSA understanding that they will take on the external risks posed by the project (Isaacs, 2015). The relocation of communities can be problematic if the housing department does not fulfil their mandates on time.

Contestation toward the runway alignment from communities is currently observed in recent media reports. The primary concern is noted as community engagement in the Environmental Impact Assessment processes (Isaacs, 2015). A further issue is with outsourcing standardised EIA public consultation and advertising procedures. Hence, future infrastructure should not take place without locally focused engagement, which could result in additional delays.

8.8 AIRPORT INDUSTRIAL

Depicted in Figure 8.17 is Airport industrial, which is one of Cape Town's oldest CID's in operation since 2004 (AirportCID, 2014). Annexure 2a illustrates ECAMP's locational constraints for Airport Industria.

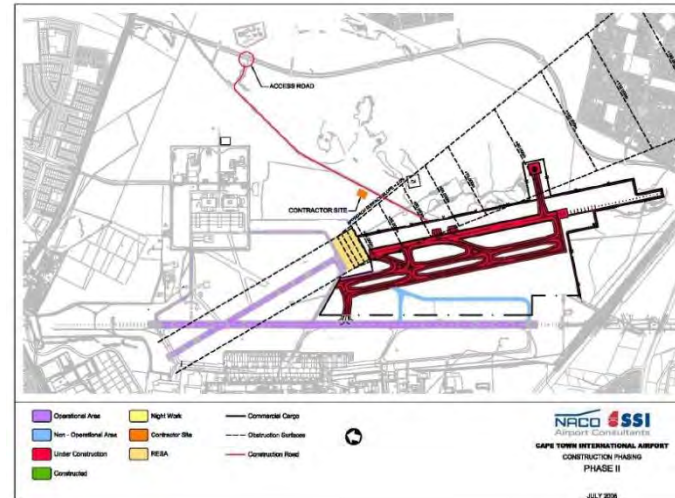


Figure 8.14 Runway Construction Phase 2 (Source: NACO-SSI, 2008)

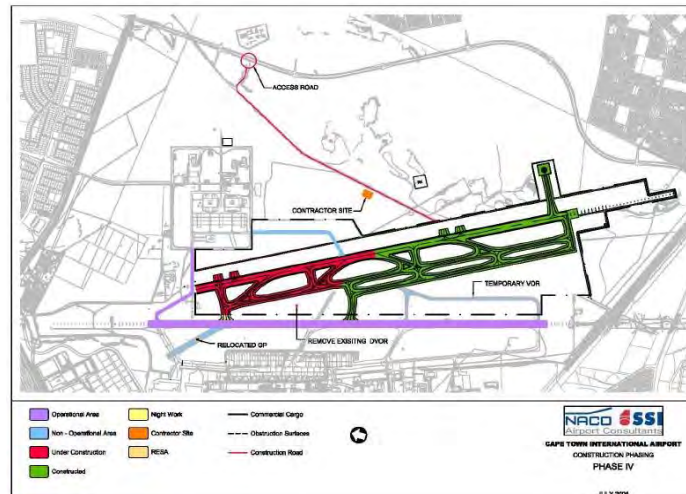


Figure 8.15 Runway Construction Phase 4 (Source: NACO-SSI, 2008)

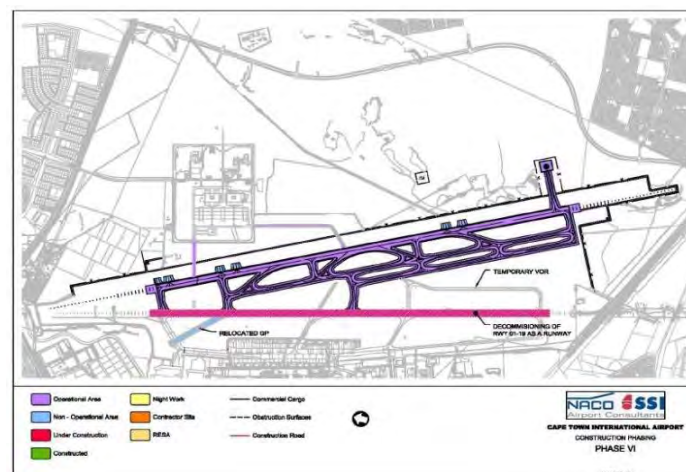


Figure 8.16 Runway Construction Phase 6 (Source: NACO-SSI, 2008)

Airport Industria is reaching consolidation phases due to affordability, lack of vacant as well as the infrastructural constraints (CoCT, 2014). Although, future intensification of the precinct will require additional upgrades there is still significant demand. This is justified by the establishment of a not for profit Section 21 Company to aid in the supply of basic services (Airportcid.co.za 2014). Longyuan Eng. SA Ltd are a multinational energy company that have recently established their company at Airport Industria (Wesgro 2015).

A site not part of the CID and adjacent to the Airport Industria and Borchers Quarry Road in the south east has been developed in the last five years as Airport City. The site is zoned as industrial and warehousing and is divided into seven different phases (3 of them complete) with a total 120 000 m² of GLA (ACSA TIA, 2013).

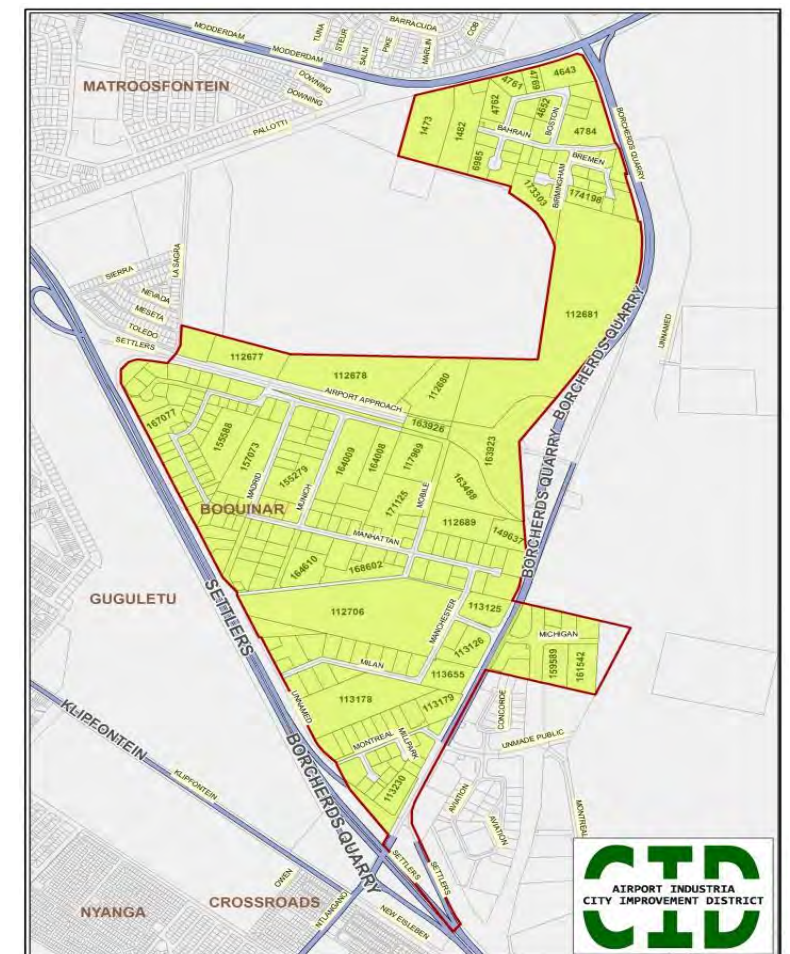


Figure 8.17 Airport Industria CID (Source: AirportCID, 2014).

8.9 EUROPE BARCELONA AND KANANA

The idea of splintering urbanism is highly embodied in the growth of ironically named informal settlements like Europe, Barcelona and Kanana alongside the specialisation of Airport Industria north of the N2 (See Figure 8.18; 8.19; 8.20 and 8.21 across). The settlements are part of the larger Gugulethu and Nyanga areas.

Between 1956 and 1987 the 72ha triangulated site below the N2 and Airport Industria was used by the City as an unlined solid landfill for household, commercial and industrial waste (ARG, 2007). The City's land use plans zone the site as limited use to be transformed into structuring open space after rehabilitation of the landfill has occurred. The informal settlements were to become part of the N2 gateway housing project but no alternative land has been found since.

Although a primary health concern for residents of the Europe community is combustible methane, there are no signs of relocating due to the proximity of value offered by the site. Regardless of conditions, inhabitants and community members have for past 20 years established strong social connections. COURC SDI are the NGO that manage and aid processes for the community.

Over time access to Airport Industria has been provided to the site via passenger bridge over the N2 (See Figure 8.22). The bridge also provides access to the Nyanga regional office Department of Home Affairs located in Airport Industria. The wetland alongside the N2 serves as a dangerous informal soccer pitch and training ground. The vacant stretch of land below the site is the Gugulethu graveyard, which the Lotus River runs adjacent and is set for major upgrades (ARG, 2007).

Possibilities of developing the area include re-blocking, incrementally rehabilitating and capping the land fill, transforming the waste to compost and providing mixed used affordable housing along with industry, manufacturing, policing and sport fields (ARG, 2007). At the time, ARG (2007) estimated rehabilitation, bulk and housing would amount to R 569 400 000. Similarly, the land value is almost equivalent to the cost of construction. Such a development could significantly revamp livelihoods in addition to altering the perceptions of by-passers and private sector businesses.

For these communities, the Borchersds quarry interchange is the largest quick win opportunity for north south accessibility (See Figure 8.23). Future site specific design should therefore gear local land owners and enhance informal trading and safety at this junction.



Figure 8.18 Aerial View of Gugulethu and Airport Industria in 1953 (Source: Google Earth, 2015)



Figure 8.19 Aerial View of Gugulethu and Airport Industria in 1988 (Source: Google Earth, 2015)



Figure 8.20 Aerial View of Gugulethu and Airport Industria 2002 (Source: Google Earth, 2015)

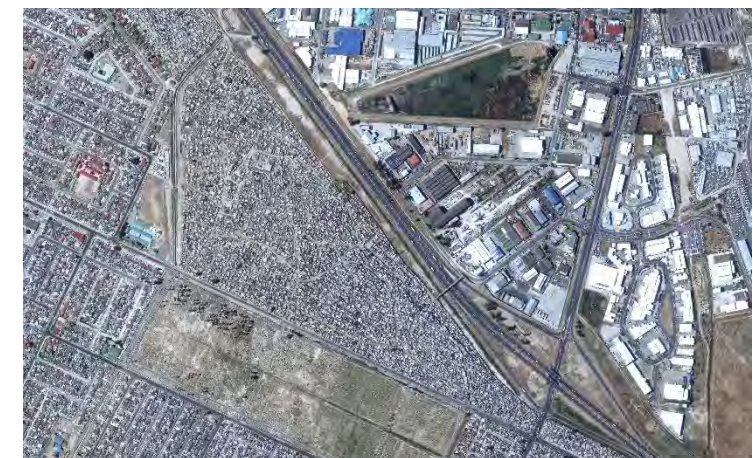


Figure 8.21 Aerial View of Gugulethu and Airport Industria 2012 (Source: Google Earth, 2015)



Figure 8.22 Aerial view of Gugulethu and N2 in 2014 (Source: Smith, 2014)



Figure 8.23 Aerial view of Borchersds Quarry Alignment (Source: PEDI, 2015:5)

8.10 KING DAVID GOLF COURSE

Passengers entering or exiting the Airport are typically unaware that there is a golf course located adjacent the CTIA (See Figure 8.24 below). This is due to emphasis placed predominantly on industrial freight and passenger mobility rather than local connectivity. In terms of diversifying aeronautical uses, King David Golf Course is a co-related land use that presents opportunity for ACSA to buy the range, rezone a portion of the land and put up a tower like block structure as an sub-anchoring building to the Airport City (Allemeir pers.com, 2015; Fataar pers.com, 2015).



Figure 8.24 King David Golf Course (Source: Google Earth, 2015)

ACSA could lease the land for 40 years at a fare market value price with an escalation at the 40 year period (Mamon pers.com, 2015). A strategically located mixed use anchor building can have also the possibility to stimulate the attraction and location of the airport city (Fataar pers.com, 2015).

8.11 PHILIPPI EAST INDUSTRIAL NODE

The Philippi East Industrial area falls under Subcouncil 13 and is a mayoral node located directly south of the CTIA (See Figure 8.25 across). For years the site has been on the cards of national, provincial and local government as the

Eastern fourth connecting industrial node via the Wetton Lansdowne Corridor (COCT, 2012). The area is one the closest private land holdings with significant vacant and zoned as industrial south of the airport (PEDI, 2015). The site has access from major transport routes such the N2, R300, Lansdowne Road and Klipfontein Road and is served by two metropolitan stations and is in close proximity to a labour supply. With visible construction Philippi is swiftly moving into the opportunity zone for growth (See Annexure 2b for ECAMP profile). Issues of infrastructure capacity, road access and perceived safety and crime have been the major downfall for private investment.

8.11.1 Philippi Economic Development Initiative (PEDI)

The Philippi Economic Development Initiative are an NGO now headed by Thomas Swana and funded by a straight grant from the City of Cape Town's Department of Trade and Industry. According to Swana pers.com (2015), Philippi East is some of the most strategic market real estate in the Western Cape because of the international knock on effect from the CTIA.

PEDI (2014) have conducted a business retention and expansion survey for PEDI by interviewing 50 of the 76 existing businesses in the area about their future plans and problems. The core industries are warehousing, light and conventional industrial in addition to urban agriculture, agri-processing, waste recycling and construction (See Figure 8.26 Across).

Over 80% of the business anticipate expansion over the next two years and are relatively optimistic about remaining and doing business in the area. The largest constraint to businesses is the shortage of skilled employees, crime and the availability of finance (PEDI, 2014). PEDI will be setting up a CID for the area within the next year which will include visible policing, cleaning and greening of the area (Swana pers.com,

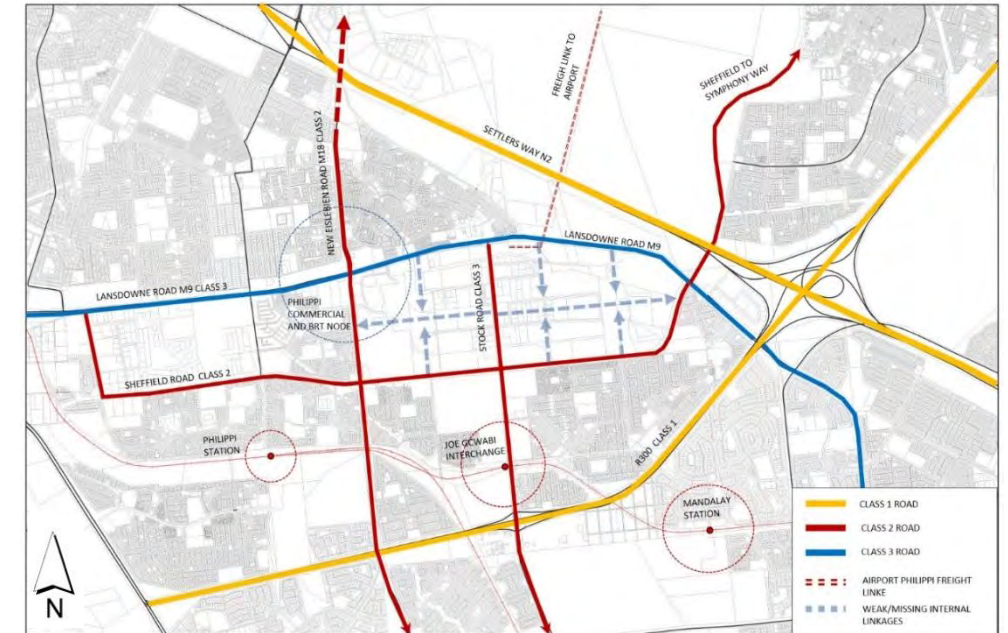


Figure 8.25 Road and Rail connections to Philippi (Data sourced from: UCT Library)

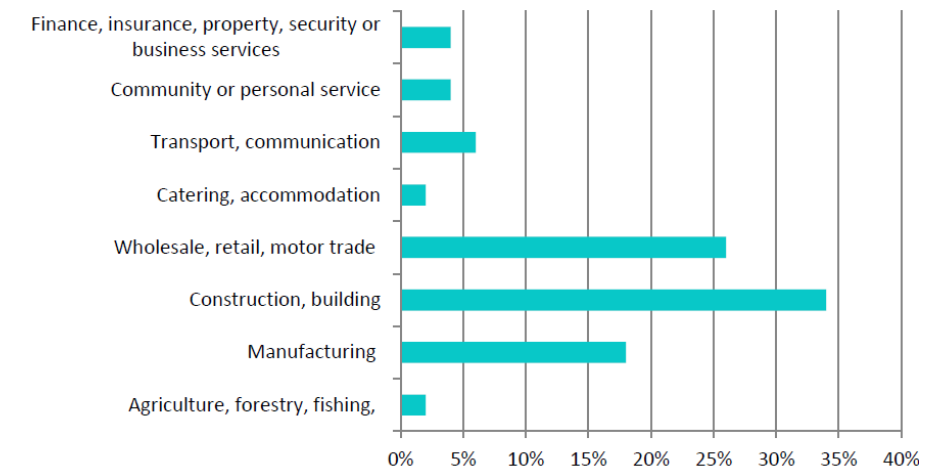


Figure 8.26 Contribution of Core Industries in Phillipi (Source: PEDI, 2014)

2015). In this regard, there are potential opportunities to combine the Airport Industria and PEDI CID in order pool resources on both sides of the N2 highway (Swana pers.com, 2015). Moreover, if PEDI gain additional public funding through the DTI the money can be used to drive skills programmes. The CID can be linked to the National government Community Worker Programme which has database of 100 000 people in the country of which 10 000 are in the Western Cape (Swana pers.com, 2015). This creates a funnel from National Government where additional workers can be employed by the CID for repaving, planting trees and reporting criminal activity.

8.11.2 Development Programmes in Philippi East

PEDI have begun to form a closed loop metabolism through their Fresh Produce Market and urban agricultural academy on Stock Road (PEDI, 2014). The academy turns Pick n Pay's waste into organic compost to grow food and worms for fish. The closed loop system occurs when the organic compost is exited to the PHA and comes back as product to be sold in the domestic market, and if there is surplus, the aviation freight market (Swana pers.com, 2015).

The corner of New Eisleben and Landsowne road is designated for a MyCiti bus station and 21 000 m² super regional shopping mall currently being constructed at (PEDI, 2014). Opposite this junction is the old cement factory which has been converted into the Philippi Village and Business Hub. The 6000 square meter retail, business and entertainment village is part of the 2014 World Design Capital project (See Figure 8.27 below). Reconstruction includes the addition of a state of the art public library, small business rental container, street services and business centre facilities. The village also an aquaculture fish farm. The area is modernising at a rapid rate with investment from a number of property holding companies that acknowledge the knock on effect of the CTIA.



Figure 8.27 Philippi Village and Business Hub (Source: SA Property News, 2014)

8.11.3 Marikana Land Invasion

Between July and August 2014 a large scale land invasion took place at the Philippi East Industria Node (See Figure 8.28, 8.29, 8.30 and 8.31). The site was named the Marikana Informal settlement which began as a mass land banking opportunity. An informal group illegally sold off sites to a large majority of informal dwellers from lower Crossroads, Khayelitsha and Philippi East and abroad. The unaffordability of backyard rent is noted as a primary reason.

Acknowledging the regional Aerotropolis concept, the occupied land was initially secured by Water Street Property Group who obtained a court interdiction against the erection of informal structures in August 2014 (Saunderson 2014). The SAPS and City Law enforcement agencies removed 150 dwellings on the 11th of August 2014 but contestation occurred and informal settlers have since returned.

Emphasis has been placed on relocation where Cape Chamber will have to play an important role to act in conflict resolution between those who are behind the invasion, property owners, the City, SAPS, and PEDI. Realistically speaking, a total eviction of all squatters is possible but the anarchy associated with this process is problematic. If untouched the area could simply become formal or informal housing, and the industrial portion will change over time into cash & carry, factory shops, and other retail activities which are incompatible with the potential perpetuity effects of the region.

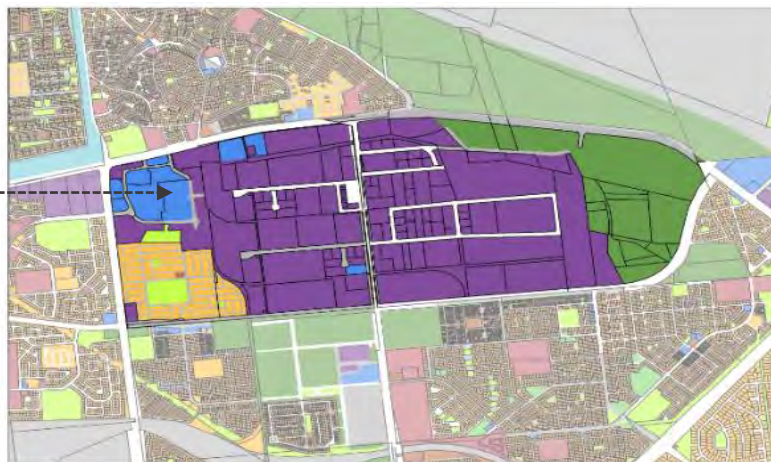


Figure 8.28 Philippi Land Use (Source: Author, 2015)



Figure 8.30 Aerial Image of Philippi in August 2014 (Source: Google Earth, 2015)



Figure 8.29 Aerial Image of Philippi in July 2014 (Source: Google Earth, 2015)



Figure 8.31 Aerial Image of Philippi September 2014 (Source: Smith, 2014)

8.12 OPPORTUNITIES AND CONSTRAINTS

Both the AerosCape Town and Airport City require a synthesis of the key opportunities and constraints which are aligned with the primary and secondary questions of the dissertation in addition to the themes of the AerosCape Town Model set out in the methodology.

8.12.1 AerosCape Town Opportunities

Table 8.1 represents the opportunities for the AerosCape Town. The infrastructural component must be considered at the macro scale in terms of the public and private governance structures that inform the logistical efficiency between agricultural bases, ports, inland ports, the railway system as well as activity nodes and corridors. Spatial planning in the City of Cape Town should continue as is, although greater emphasis ought be given to the CTIA node as a future gravitational feed in able to take on more intensified land uses for liveability and global connectivity.

The biophysical opportunities component is around sustainably retrofitting existing infrastructure both physically and socio-technically. This includes integrated waste sharing agreements between industries, manufactures and business parks.

The social livelihoods strategy concerns ACSA's CSR and public outreach efforts. These extends to the regional branding and marketing strategies of CoCT, ACSA and Wesgro which can be linked to tertiary institutions such as the CPUT, UWC and the University of Cape Town UCT,

The economic and governance component revolves around networked partnerships coupled with aligned visions and synergised government sector mandates. In terms of global connectivity this involves attracting additional long haul flights and linking new markets to untapped comparative advantages in key labour absorptive sectors such as agri-processing which could be brought to the door step of the CTIA. It also implies additional tourist flows and opportunities for foreign direct investment in companies located near the CTIA.

At the national level, the alignment of sector specific policies is a significant aspect that will have to evolve over time with the AerosCape Town strategy. This could ultimately change according to future political

Table 8.1 AerosCape Town Opportunities

OPPORTUNITIES FOR THE REGIONAL AEROSCAPE TOWN (25 KM)	
BIOPHYSICAL SUSTAINABILITY	<ul style="list-style-type: none"> • Retrofitting buildings and settlements with blue green infrastructure • Agri-processing and green skills • Alternative energies, food and rain water-harvesting systems • Integrated Waste Management • Eco-industries • Bioethanol for fuel in public transport • Tapping into the Cape Aquifer
INFRASTRUCTURE	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>PORTS</p> <ul style="list-style-type: none"> • Cape Town Harbour • Saldanha Port IDZ • Atlantis IDZ • Port Elizabeth (Coega IDZ) <p>INLAND PORTS</p> <ul style="list-style-type: none"> • Paarl • Parrow Shunt Yard <p>ACTIVITY NODES</p> <ul style="list-style-type: none"> • V&A Waterfront • CBD • CTICC • Claremont • Bellville development • Philippi East • Stellenbosch • Paarl • Somerset West </div> <div style="width: 45%;"> <p>AIRPORT ACTIVITY CORRIDORS</p> <ul style="list-style-type: none"> • Enhanced signage at key points of logistical flow • Themed public art along corridors • Upgrading of key intersections • Expressways and improved highway interchanges • R300 upgrade • Linkages to the wine industry easier to access <p>BRT PHASES</p> <ul style="list-style-type: none"> • Full roll-out of MyCiti Bus <p>RAIL STATIONS AND LINKAGES</p> <ul style="list-style-type: none"> • Modal shift to rail • Rail link to Bellville • Parrow Shunt yard for maintenance of cargo and rolling stock • Khayelitsha Somerset West Link • Blue Downs Link • PRASA station upgrade programme </div> </div>
SOCIAL LIVELIHOODS	<ul style="list-style-type: none"> • Enhance public outreach and branding of AerosCape Town Strategy • Connect to community visions and tertiary institutions • Include local livelihoods in AerosCape Town strategy
ECONOMIC AND GOVERNANCE	<ul style="list-style-type: none"> • Regional branding and marketing strategy • Airlift Route Strategy • Medium to high technology agriculture techniques • Upskill toward aviation linked sectors such as agri-processing textiles, manufacturing and fishing • Halaal industry connected to North Africa, Middle East and Sub-Saharan Africa • Strategic Infrastructure Project and Free Trade Zone at PEDI and PHA • Formulation of sector specific policies by National Government

8.12.2 Airport City Opportunities and Constraints

The Airport City includes ACSA owned land and the 5km influence which is connected to land use and district plans. Table 8.2 represents the opportunities of the CTIA in relation to the 5 km Airport City radius. The primary factors include the demand for land, housing, industry, commercial and real estate as well as airport, road and rail infrastructure.

The biophysical sustainability aspects concerns the by-product exchange between the PHA, PEDI as well as CTIA and Airport Industria. The use if green technologies and waste sharing initiatives is a further potential.

The infrastructural aspects indicates the agglomeration of city like services and infrastructure that ensure the local liveability between the CTIA and hinterland.

This extends to the economic governance component where opportunities exist for ACSA to increase non-aeronautical revenues, secure strategically well located land, attract foreign direct investment and cross-subsidise the value added on both sides of the N2 highway.

In terms of land and housing opportunities are limited to relocking, incrementally upgrading informal settlements and providing social housing and security of tenure. The housing process should not only include people in the building of their own homes but link to potential skills platform.

The opportunities map for the AerosCape Town and Airport City are depicted in Figure 3.33 and 3.44 on the following page. The Airport City opportunities map includes public services, vacant land as well as existing business and industrial land uses. Thereafter, Table 8.3 and Figure 8.34 highlight the constraints pertaining to the 5km Airport City region. These incudes biodiversity areas, future noise contours and informal settlements.

Table 8.2 Airport City (5km) Opportunities

OPPORTUNITIES FOR THE AIRPORT CITY (5KM)	
BIOPHYSICAL SUSTAINABILITY	<ul style="list-style-type: none"> • Feasibility study for material flow analysis with Philippi Horticulture Area (Goods and by-product exchange) – • Borchers Quarry WWTW - Waste to energy transfer and hydroponics • Upgrading of Lotus River • Alien vegetation removal programmes • Solar panelling • Rain water harvesting
INFRASTRUCTURE	<p>5KM RADIUS</p> <ul style="list-style-type: none"> • Borchers Quarry Re-alignment • Stock Road and Klipfontein widening project • MyCiti Bus roll out • Philippi Airport Corridor Mall • Philippi Village <p>WITHIN CTIA BOUNDARY</p> <ul style="list-style-type: none"> • Runway re-alignment • Upgrade of international and domestic terminals • Enhanced walkability to Hotel Verde and King David Golf Course • Business trade centre • Rail Station • Exhibition facilities • Museum • Formal/Informal trading market (locally grown and crafted goods)
SOCIAL LIVELIHOODS	<ul style="list-style-type: none"> • ACSA public events, community days and enhanced outreach efforts (Enhanced CSR) • Alternative methods of public advertising for EIAs – connect to existing social facilities • Funding for a public participation unit • Green education initiatives by ACSA, Airport Industria and businesses • Enhanced safety and security initiatives along N2
LAND AND HOUSING	<ul style="list-style-type: none"> • Strategic land acquisition of King David Golf Course by ACSA PropCo • Alternative land and housing for Marikana Informal Settlement • Re-blocking and informal settlement upgrade at Europe, Barcelona and Kanana • Providing tenure • Encouraging private sector involvement in housing delivery • Infill development (Mixed use affordable housing)
ECONOMIC AND GOVERNANCE	<ul style="list-style-type: none"> • Attract airlines and global companies • Supply chain finance • Combine and cross subsidise CID's • Area based urban renewal programmes at CID's • Value capture at new transit nodes • Philippi East moving into ECAMP opportunity growth zone

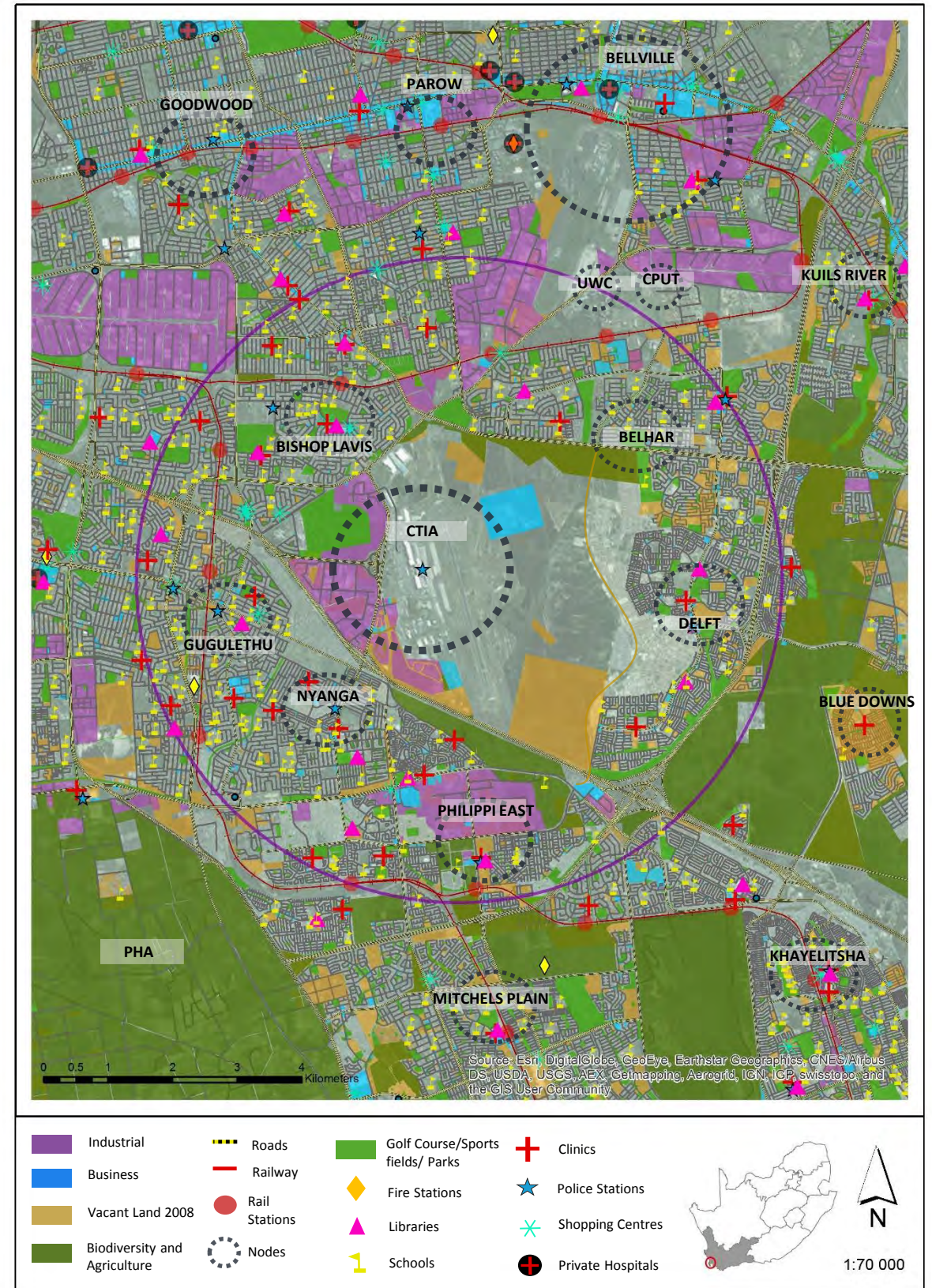
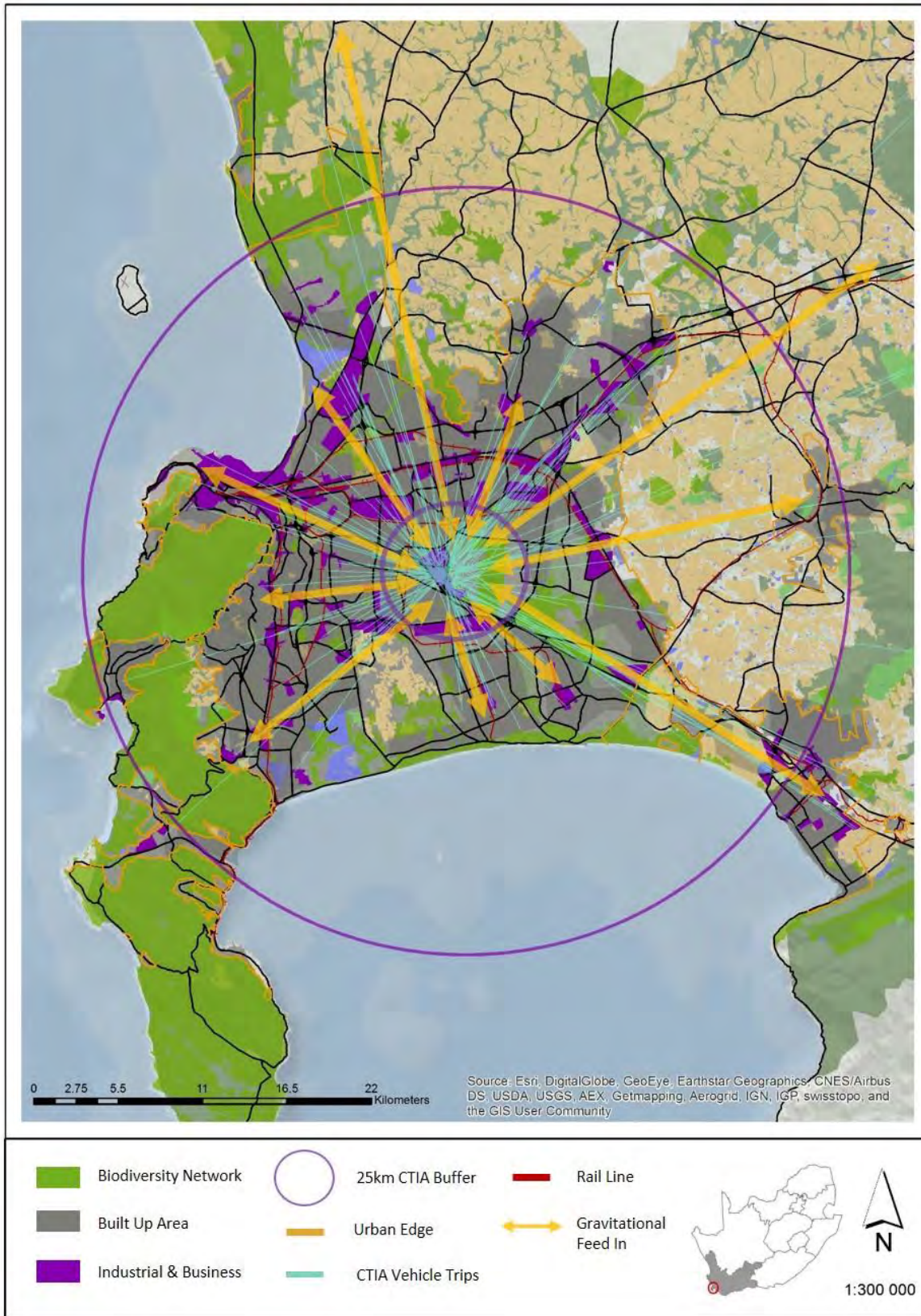


Figure 8.32 AerosCape Town Opportunities (Data sourced from: UCT Library, 2015)

Figure 8.33 Airport City Opportunities (Data sourced from: UCT Library, 2015)

Table 8.3 AerosCape Town and Airport City Constraints

CONSTRAINTS 5km and 25km	
BIOPHYSICAL SUSTAINABILITY	<ul style="list-style-type: none"> • Climate Change • Weather delays • Water shortages • Increased air emissions • Pressure for housing on agricultural land • Pollution of Cape Aquifer • Polluted water discharge • Land fill constraints • Declining resource base • Illegal Dumping
INFRASTRUCTURE	<ul style="list-style-type: none"> • Poorly serviced settlements • Consolidation of Airport Industria • Degrading bulk infrastructure in surrounding areas • Poor road capacity and signage • Lack of road access south of N2 • Traffic congestion during peak hours
SOCIAL LIVELIHOODS	<ul style="list-style-type: none"> • Contestation toward airport development • Displacement • Crime and safety • No accountable public participation unit • Education sector not focussed on skills required for the economy • Strikes along N2 • Low incomes • Gangsterism
LAND AND HOUSING	<ul style="list-style-type: none"> • In-migration • Population growth • Poor security of tenure • Lack of vacant land for social housing • Incompatible land uses related to aircraft noise • Inability to secure land from invasion • Housing and service delivery backlog
ECONOMIC AND GOVERNANVCE	<ul style="list-style-type: none"> • FDI, volatility of the Rand and inflation • Political changes and staff turnover • Corruption • Misalignment of sectoral strategies • Reliance on declining export market base • Commercial and retail sector dominated by conservatism • Competition form Port Elizabeth Harbour and Coega IDZ • Competition from KSIA Halaal Industry • High unemployment rate • Skills gap • Mechanization and decrease in demand for low skilled labour • Poor funding for LED projects • High dependency on social grants • No agriculture input subsidies • Seasonality of employment

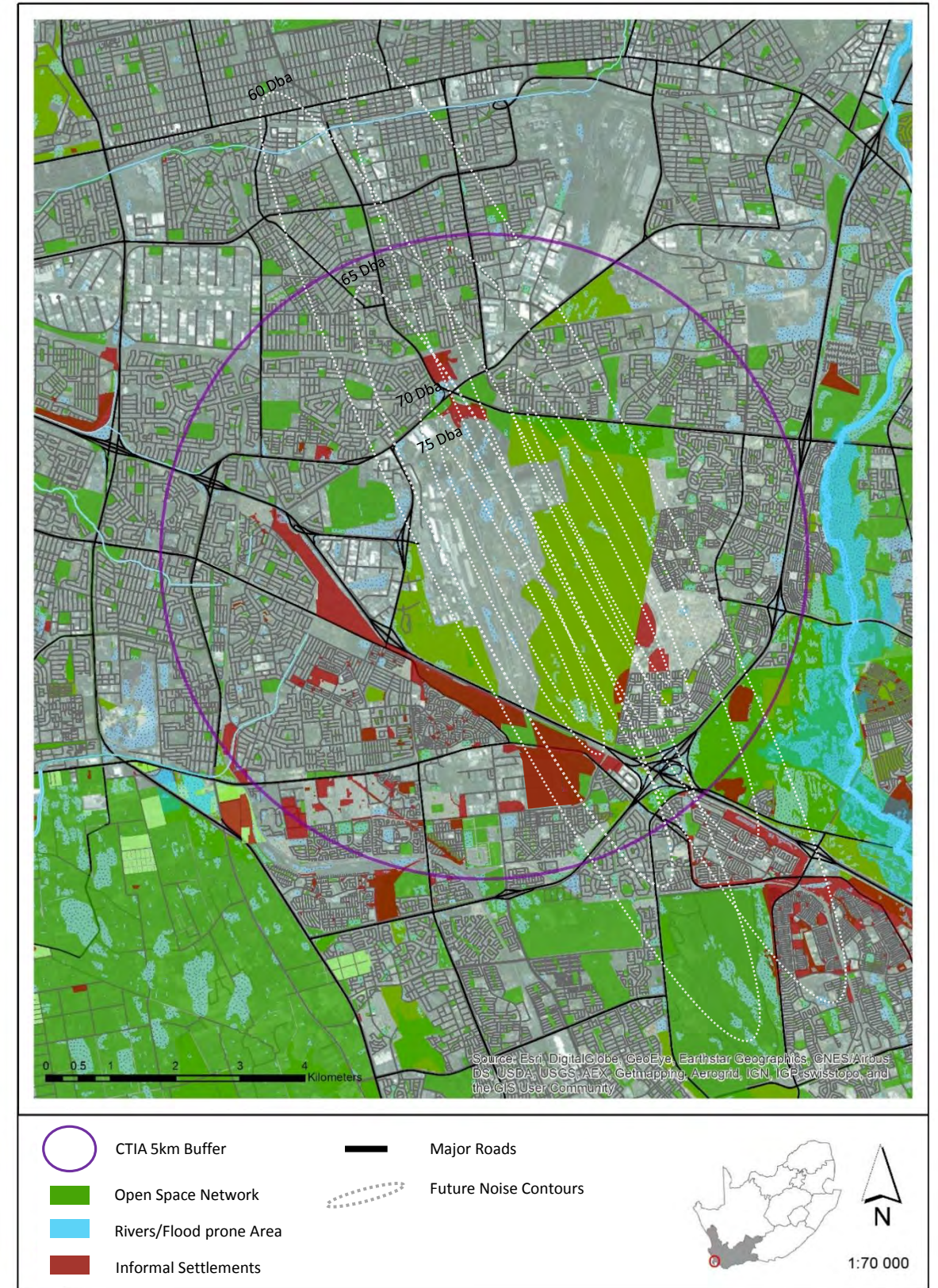


Figure 8.34 Airport City Constraints (Data sourced from: UCT Library, 2015)

8.13 CONCLUSION

The socio-technical and physical detachment between the decentralised but 'centralised' CTIA and its immediate hinterland is essentially embedded in South Africa's historical evolution. The use of a regional level approach to analyse the CTIA reflects the paradox between state imperatives for global connectivity and the post apartheid struggle for local liveability. Both public and private spatial and economic frameworks as well as informal systems are latching onto the CTIA as a form of transit orientated development. However, the synergy between these initiatives toward a consolidated AerosCape Town Vision is yet to be achieved. The opportunities and constraints drawn from the analysis section justifies such an approach if Cape Town is to leverage the economic potential of the CTIA and surrounds. Rather than physical infrastructure alone, the success of the AerosCape Town will come down to collaboration and settlement integration at the Airport City level.

CHAPTER 9: STRATEGIC FRAMEWORK AND IMPLEMENTATION

9.1 INTRODUCTION

Chapter nine presents the strategic framework, phasing and conclusion of the AerosCape Town SDF. The strategic framework is essentially informed by the opportunities and constraints synthesis coupled with the primary and secondary findings of the dissertation. Due to the central question of the dissertation, focus is directed toward the 5km radial influence of the CTIA. The chapter sets out, in table format, actions and objectives for the biophysical, economic and infrastructure environments. Each sector indicates the various actors and programmes concerned with achieving the objectives of the AerosCape Town strategy. As some actions require further elaboration, ordered referrals are made to precedents in each particular sector.

9.2 STRATEGIC PLAN

The 2035 goal for the 5km Airport City region is a place of settlement, cultural, knowledge and economic transition where social, technical and material flow are better synergised within a centrally emerging sub-regional economy of the future (See Figure 9.1). The vision sees the CTIA to its full potential with two primary runways serving 17 MAP by 2032 and 18 MAP by 2035. By this time the CTIA will directly employ 10 000 people, half of which are located in the South East Metro. The total population of Cape Town will amount to 4.8 million inhabitants, 1.5 million of which will live in a 5km radius of the airport. The rail way system will connect the CTIA to the CBD and Bellville, along with the overall metropolitan undergoing a 40% modal shift to public transport.

Access to Phillippi East will be unlocked by the Borchers Quarry Road project and a direct road and rail freight link. which if fully developed can provide "R8.1 billion sustainable feed into the fiscus from VAT, PAYE and company taxes annually with 62 000 jobs created over an 8 year period" (DEMACON, 2015:22). Combining the direct employment of the CTIA, the Phillippi Horticultural Area, existing the Cape Metropolitan tourism and potential Phillippi East Industrial amounts to 270 000 jobs.

Airport Industria will have innovative bulk infrastructure and communications technology while King David Golf course will be strategically acquired by ACSA, linked to Airport Approach Road and leased for office and commercial use. The combination and cross subsidisation of CID models between ACSA, Airport Industria and PEDI will pool resources on both sides of the N2 highway. Value will be added by private sector investment with the possible addition of a 1 billion Rand Halaal Park and strategic anchor building at the re-aligned Borchers Quarry Road. The southern boundary of CTIA will have solar grow houses similar to those at KSIA, while the eastern boundary will accommodate commercial, industrial and residential housing.

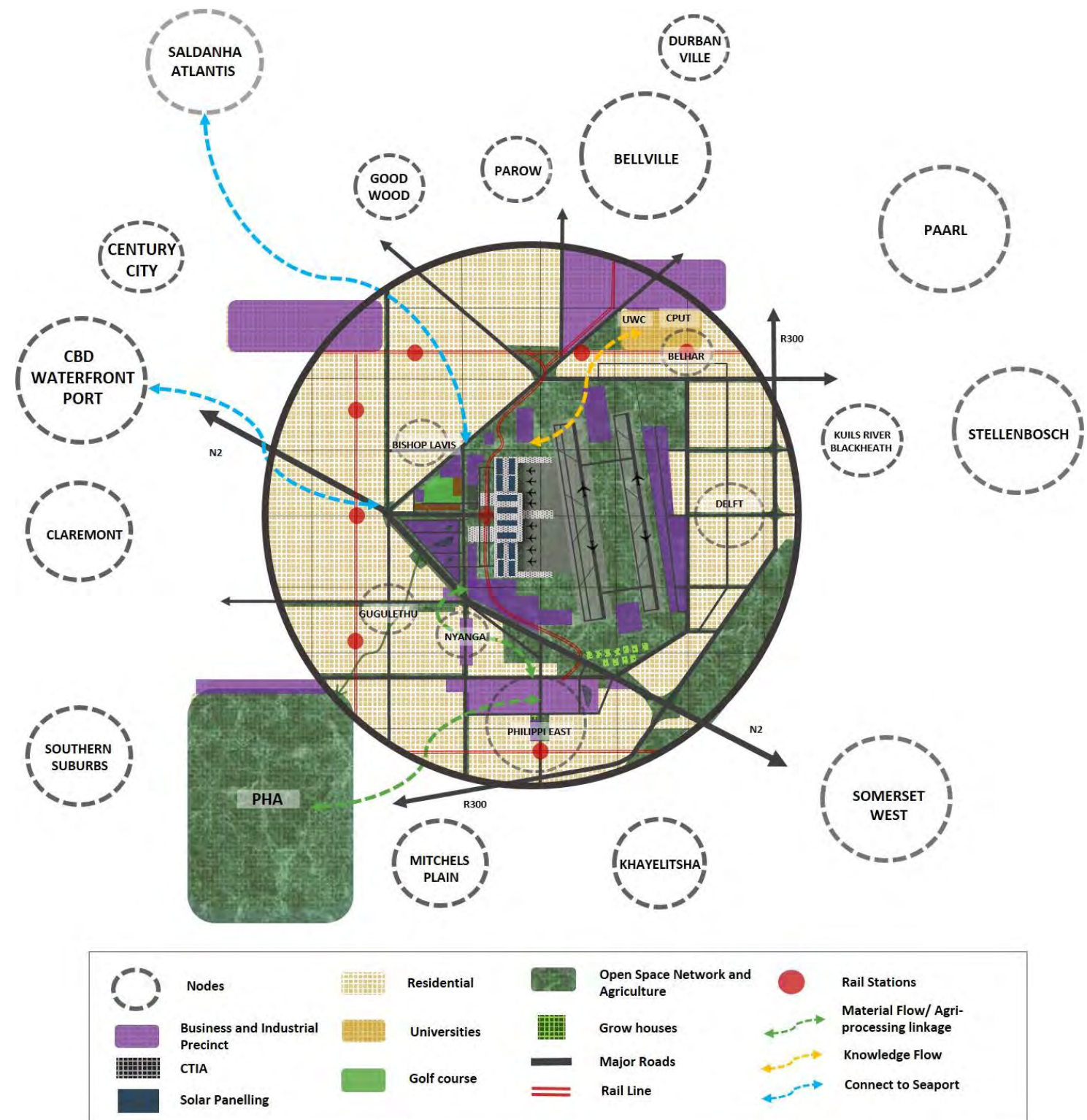


Figure 9.1 AerosCape Town 2035 Strategic Plan (Source: Author, 2015)

PEDI will act as an urban agricultural hub and processor of waste between the CTIA and the PHA, with the entire Philippi East region becoming a fully established sub metropolitan node. Informal settlements like Barcelona, Europe and Kanana will be incrementally upgraded with mixed used social housing. The underlying landfill will be rehabilitated and transformed to compost via PEDI. Alternative land and housing for a large portion of the Marikana informal settlement will be found.

The ideal for the AerosCape Town and Airport City is proportional to the number of passengers and direct international flights and the ability to link the to comparatively advantaged sectors. The process hinges on 20 years of institutional collaboration and continued interest from state owned enterprises, provincial and local government in addition to ACSA, private sector and communities.

9.3 VALUES AND PRINCIPLES

The 2035 Green AerosCape Town vision is accompanied by a set of values and principles. Although a primary concern is the intermodality and logistical efficiency of the CTIA, Jabareen (2006) argues that cities should be compact, dense and diverse, socially integrated with eco-system services, easily walkable and provide a variety of public transport opportunities to eliminate the desire to use private vehicles.

Facilities that could be housed at and around the CTIA include a golf course; a rail station; agro-processing parks; organic grow houses; an art gallery and museum; a shopping mall; food, local art and craft markets; fine dining restaurants; banks; cinemas; spas, provincial housing offices as well as trade, education, medical, skills and technology centres.

9.3.1 Densification

Segregated facilities are problematic for the CoCT's Densification strategy. The intensification and provision of mixed land uses within exiting precincts is a key principle under the live, work, pray play and eat phenomenon (Dewar, 2011). Densification is the most viable option for reducing urban sprawl, optimising the use of land, protecting the environment, providing

better public transport systems and enhancing place making and closely integrated communities (Dewar 2011). Densities should increase toward major nodes and access routes. Residential housing within 100 meters of activity nodes should range from 50-250 du/ha, while medium residential densities within 1 km of a major transport route should be 50du/ha (See Figure 9.2). This should be accompanied by articulated densities for efficient transportation and land integration.

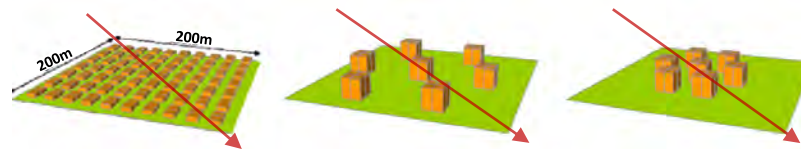


Figure 9.2 Corridor and Nodal Cluster Approach (Source: Suzuki, Cervero & Luchi, 2013)

Each node must have a place specific identity and be linked to the green open space system with sufficient capacity for BRT and non motorised transport. The clustering of public social facilities, like schools, police stations, traffic offices, parks and recreational facilities will allow for further business agglomeration potential.

9.3.2 Accessibility and Affordability

All income groups should have access to affordable basic housing and sanitation services (including wireless internet) and public transport facilities. Focus is on upgrading the MyCiti bus system and rail way with standardised travel fares. The system should essentially be safe and time efficient.

9.3.3 Education and Governmental Services

Introducing governmental services such as housing agencies, education facilities and skills training centres to the CTIA and Airport industria is a key factor for local liveability. In this regard, existing education platforms and NGO initiatives (both formal and informal) should be leveraged rather than duplicated.

9.3.4 Incentives and Inclusion

The idea of global connectivity must not overshadow the first and foremost need for local liveability. The negative outcome is a pro-growth orientated

premium networked space with a stark contrast from surroundings. If displacement and relocation of informal settlements is a definitive for the future expansion of the CTIA, the process must provide full compensation and additional incentives like housing, skills training and market creation. Continued expansion of the CTIA must not be driven by only external scientific expertise but internally by local communities as well.

9.3.5 Green Urbanism and Agro-Processing

If Cape Town is to provide more jobs through industries, efforts must also made to reduce waste volumes and harness sustainable energy and water management practices. The AerosCape Town SDF specifically adopts the precedent of eco industrial ecology, integrated waste recycling and closed loop metabolism strategies between airport, industry, businesses and hinterland.

9.3.6 Coordination, Collaboration and pro-poor empowerment

A well-coordinated and particularly long term process of collaborative partnerships between ACSA, government, private sector, communities and NGO's is required. The AerosCape Town partnering platform ought to link the functioning of the Airport City to small scale entrepreneurs and LED initiatives in the hinterland, especially if they can add value to the socio-economic and environmental sustainability of the CTIA. Although this may reinforce the complexity of networked collaboration, it will ultimately create more meaningful inclusion and potentially less contestation from communities in the future. Emphasis is placed on mutual learning, collaboration and shared visions of a sustainably equitable Airport City region.

9.3.7 Safety and Security

Enhanced funding toward safety and policy within communities and along the N2 is required. The housing and public realm should be built in a manner that's offsets potential for violent incidents. This includes active street frontages and lighting in addition to community watches and visible security personnel employed by CID establishments.

9.4 LANDSCAPE AND NATURAL RESOURCE FRAMEWORK

The landscape and natural resources framework gives direction to the CTIA master plan within the metropolitan biodiversity network. Table 9.1 on the following page correlates with Figure 9.3 across. The primary objectives for the biophysical framework are to:

- Reduce waste to landfill
- Retrofit to green Infrastructure
- Conserve and rehabilitate natural systems
- Exploit historical and cultural features of importance

The Metropolitan Open Space System (MOSS) is the building block of the economic and infrastructure frameworks objective. The MOSS should be strategically linked with equitable amenities and opportunities for parks and recreation at key precincts (See Figure 9.4 below). All biodiversity historical areas of significance should be safeguarded in a way that leverages the city's tourism image, liveability and socio-cultural status.

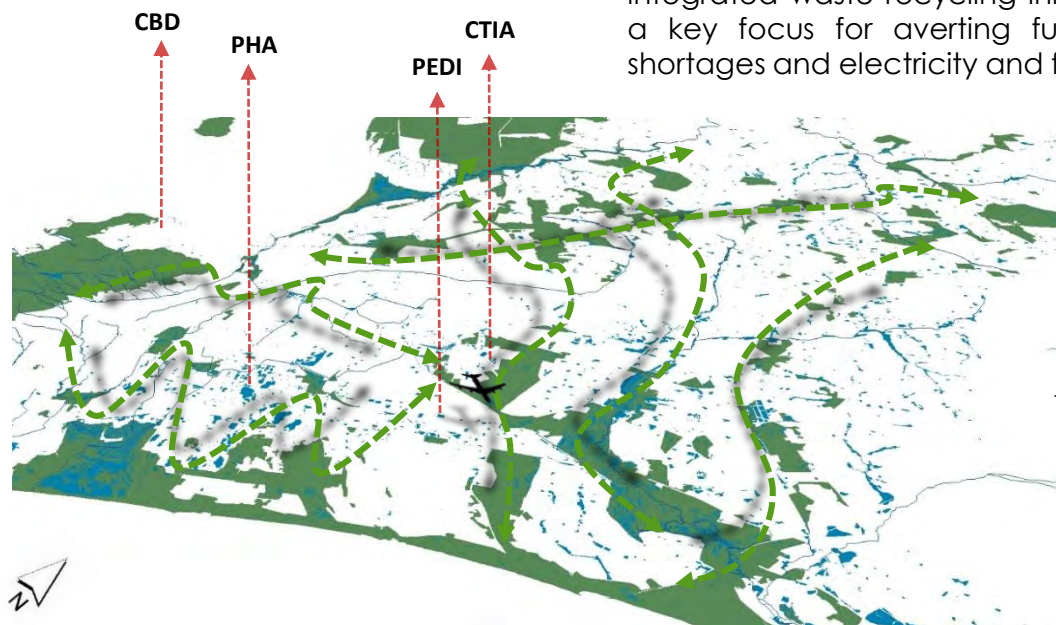


Figure 9.4 Cape Metropolitan Open Space System (Source: Author, 2015)

All development, including airport expansion, is subject to environmental off-sets which ensure developers leave a portion of land undeveloped for biodiversity and social reasons. In terms of noise, airport authorities and the CoCT need to ensure compatibility of land use and social housing.

The relationship between climate change, agricultural output and export via sea, road and air is an important point to consider for all plans going forward. The increased concentration of transport, housing and aircrafts implies additional carbon emissions and waste output as well as resource use and general land cover within the 5km region. A material flow analysis and online data base is needed for air quality as well as water and waste conservation and demand strategies. Socially this requires public outreach efforts and ongoing engagement with well established communities.

Investing in green infrastructure such as solar, rainwater harvesting and integrated waste recycling initiatives are a key focus for averting future water shortages and electricity and fuel hikes.

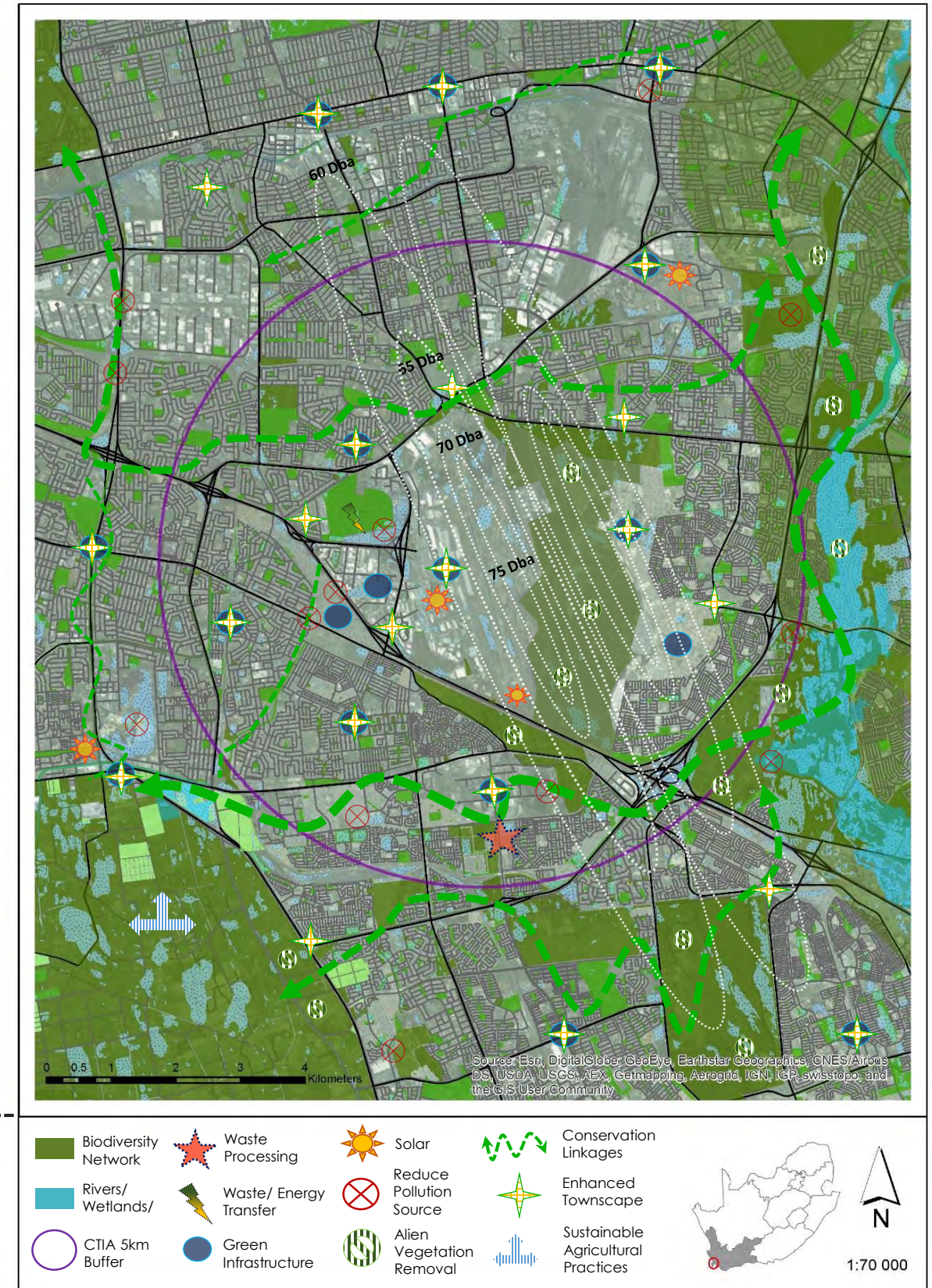











Figure 9.3 Map of Landscape and Natural Resource Framework (Data sourced from: UCT Library, 2015)

Table 9.1 Landscape and Natural Resources Management Framework

OBJECTIVES	ACTION	❖ KEY	STRATEGIES, PROGRAMMES & ACTORS
REDUCE WASTE TO LANDFILL	<ul style="list-style-type: none"> ❖ PEDI to act as processor of waste between CTIA and PHA (See precedent 1, 2 and 3) <ul style="list-style-type: none"> - City of Cape Town to amend existing waste recycling programmes with Philippi East and Horticultural Area - PHA linked to municipal waste minimisation - Feasibility for CTIA waste diversion strategy to PEDI - Integrated waste recycling between industries, manufacturing, CTIA and informal sector - Waste in return for transport and food coupons - Feasibility for material flow analysis between local source and market sink 		<ul style="list-style-type: none"> • NEMA principles • ACSA • PEDI • Airport Industria • AGRISA • SANBI • City of Cape Town • DEADP • DWAF • Industries • Communities • Universities • Outsourced Consultants
CONSERVE AND REHABILITATE NATURAL SYSTEMS	<ul style="list-style-type: none"> ❖ Ensure point sources of pollution are reduced <ul style="list-style-type: none"> - Europe Barcelona and Kanana landfill to be rehabilitated ❖ Alien vegetation removal programmes ❖ Consolidation of fragmented natural remnants <ul style="list-style-type: none"> - Ensure Core Biodiversity Areas (CBA), buffers and transitions zones are protected and maintained - Funding to specialist studies - Encourage conservation linkages both formal and informal ❖ Sustainable agricultural farming practices 	   	<ul style="list-style-type: none"> • DEADP • CAPE Nature (Stewardship programme) • City Parks • Universities • SANBI • DWAF - Working for Water programme • Cape Action for People and the Environment • Land care projects • Communities • AGRISA • Department of Rural Development and Land Reform
GREEN INFRASTRUCTURE	<ul style="list-style-type: none"> ❖ Waste to energy transfer on site from Borchers Quarry WWTW to King David golf Course and Airport Industria ❖ Water wise settlement making <ul style="list-style-type: none"> - Retrofitting to Sustainable Urban Drainage Systems (See precedent 4) - Cheaper alternatives for expanding sanitation systems - Rain water harvesting - Metering and block tariff schemes - Water Conservation and demand management ❖ Solar panelling at CTIA and strategic sites (See precedent 6) 	  	<ul style="list-style-type: none"> • ACSA • Airport Industria • Green Building Council • DEADP • Department of Transport and Public Works • City of Cape Town • DWAF • Outsourced Consultants
EXPLOIT HISTORICAL AND CULTURAL FEATURES OF IMPORTANCE	<ul style="list-style-type: none"> ❖ Ensure protection of heritage resources and enhanced townscapes <ul style="list-style-type: none"> - Protect landscapes of high significance - Retain rural urban landscape qualities and compact settlements 		<ul style="list-style-type: none"> • NHRA • DEADP • Heritage Overlay zones • Table Mountain National Park • Wine Industry • Tourism and site specific attractions

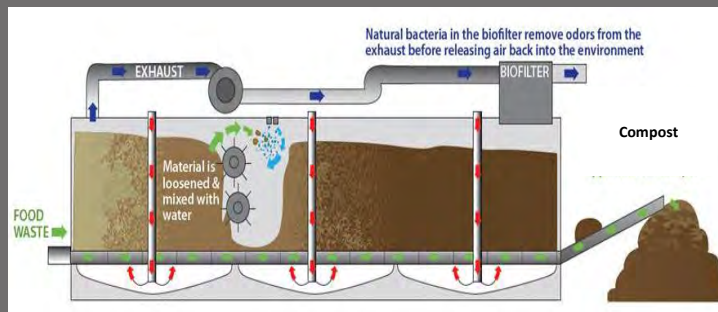
1 WASTE 2 FOOD

PEDI have begun the Waste 2 Food organic recycling project alongside their existing Fresh Produce Market. The project converts Pick n Pay's organic waste into compost through worm hammocks. The water used in the process is drained and used as worm tea for vegetable growing (PEDI, 2015).



Worm Hammocks (Source: SEED, 2015)

Recent initiatives will see the addition of a R 9 million in-vessel composter rapidly. The system rapidly converts organic waste to compost with the added ability of neutralising harmful pathogens. Over 10 tonnes of waste can be converted into compost each week (PEDI, 2015).



In-vessel Composter Source: Ohio University, 2015)

San Francisco Airport has one of the largest composting programmes in USA due to the strong agricultural ties to the hinterland. Nearly 80% of the airport and associated industry's solid waste is sent to composting sites to be sold in farmlands (SFO, 2010).

2 PLASTIC TO OIL AND DIESEL

Plastoil are private company adjacent Stock Road that convert waste plastics to recyclable fuel using a depolymerisation process (PEDI, 2014). According to Swana (2015 pers.com 2015) the company is looking to include waste to energy through incineration and innovation emission technology that harnesses the heat emitted for electricity elsewhere.

3 AGRI-PROTEIN

Coupled with the Waste 2 Food programme and the Plastoil company is the Agri Protein company. Organic waste is fed to flies that brood fly lava which can be processed into protein briquettes for live stock feed.

4 SUSTAINABLE URBAN DRAINAGE SYSTEMS (SUDS)

Green infrastructure in the form of open space provides as a natural flooding defence and recreational spin off. The city of Curitiba boasts approximately 50 square meters of open space per person (Welle, 2009). The city council boldly preserving all low lying river basins and purchasing land at critical sites. This could not have been possible without their approach to mixed use high density buildings as well. The contemporary reality is that Curitiba now houses a giant natural storm water system with over 150 km's of natural trails within the city (Welle, 2009).



Curitiba Open Space System (Source: Welle, 2009)

5 BOTTLES TO BRICKS

The Waste 2 Food programme has begun the bottles to bricks process. Two litre plastic bottles are collected from various recycling sources and then tightly filled with sand to be used as bricks in low cost housing. The technique originally began in India as a way of reducing internal heat instead of using corrugated iron (Hart, 2013).



Bottled Bricks (Source: Hart, 2013)

6 COCHIN INTERNATIONAL AIRPORT SOLAR PROJECT, INDIA

In early 2015, Cochin International Airport in India became the worlds first airport to install a 45 hectare 12 million watt solar plant complete with 46 150 solar panels (Cochin Airport, 2015). The plant supplies energy to both the Cochin Airport and the immediate grid. The terminal buildings have also been retrofitted with solar panelling. The plant has completely neutralised the airports dependence on the energy grid and no problems are experienced with regards to light reflection and air craft landing (Cochin Airport, 2015).



Solar Panels at Cochin Airport (Source: Cochin Airport, 2015)

9.5 ECONOMIC DEVELOPMENT FRAMEWORK

In line with the central question of the dissertation, the economic framework entwines the global connectivity offered by the CTIA with the local liveability and untapped economic potential of the hinterland. Table 9.2 on the following page correlates with Figure 9.5 across and Figure 9.6 below. The economic framework includes the following objectives:

- Air Route Development and Services
- Support Aviation Clustered Industries
- Pro-poor City Improvement Districts
- Knowledge Management and Place Marketing
- Strategic Land Acquisition

The primary concern is to attract new flights, stimulate local economic growth and support aviation clustered industries. In terms of export product, agro-processing is linked to a well located labour force with substantial availability of water and unfarmed land from the Cape Aquifer and PHA.

The knowledge management and place marketing aspect is related to the regional branding of the city (Kasarda & Lindsay, 2011).

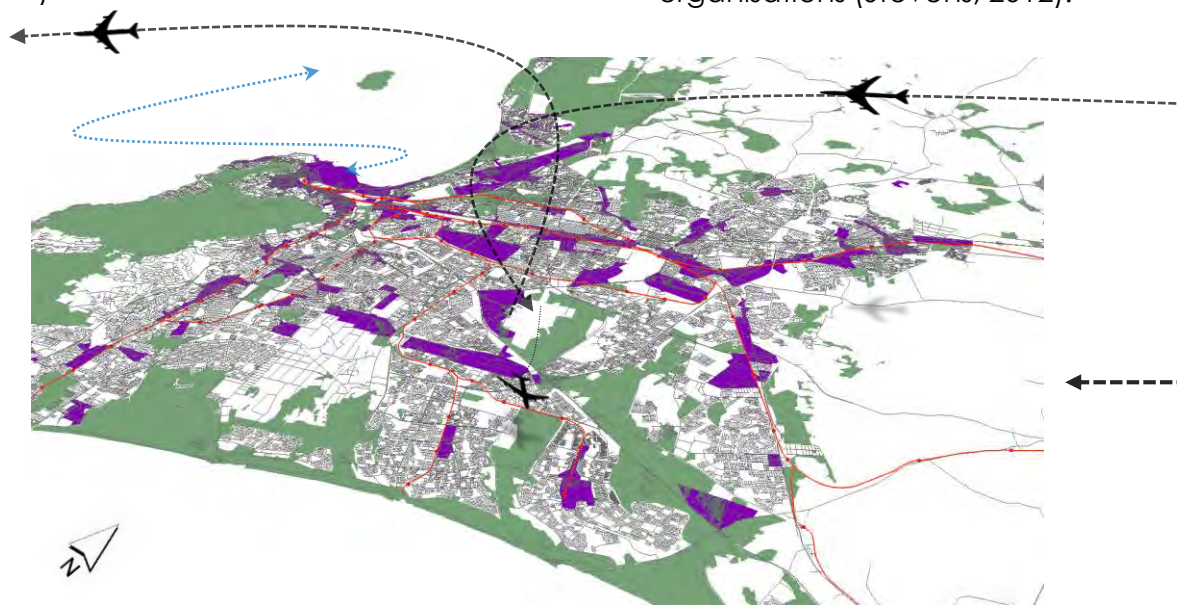


Figure 9.6 Economic Landscape (Source: Author 2015)

In this regard, focus is not only on attracting investment to the 5km region but on communities, education and training in response to the changing needs of the sector. Online platforms should be amalgamated to include local data capturing to be used for trend analysis by platforms such as ECAMP.

In terms of sustainability, the overall vision for the Philippi East Industrial Node in relation to the CTIA is based on industrial ecology principles. Combining CID models between ACSA, Airport Industria and PEDI is a sufficient long term goal that can also be pursued. This will enhance safety, cleaning and greening on both sides of the N2, which can be followed by global and local private investment and cross subsidising the value added to service delivery.

Strategic land acquisition by ACSA not only provides opportunities for additional non-aeronautical revenue but is a way of securing compatible land uses within future flight paths (Stevens, 2012). This requires setting up land use commissions between airport authorities, private land owners, state owned entities and communities organisations (Stevens, 2012).

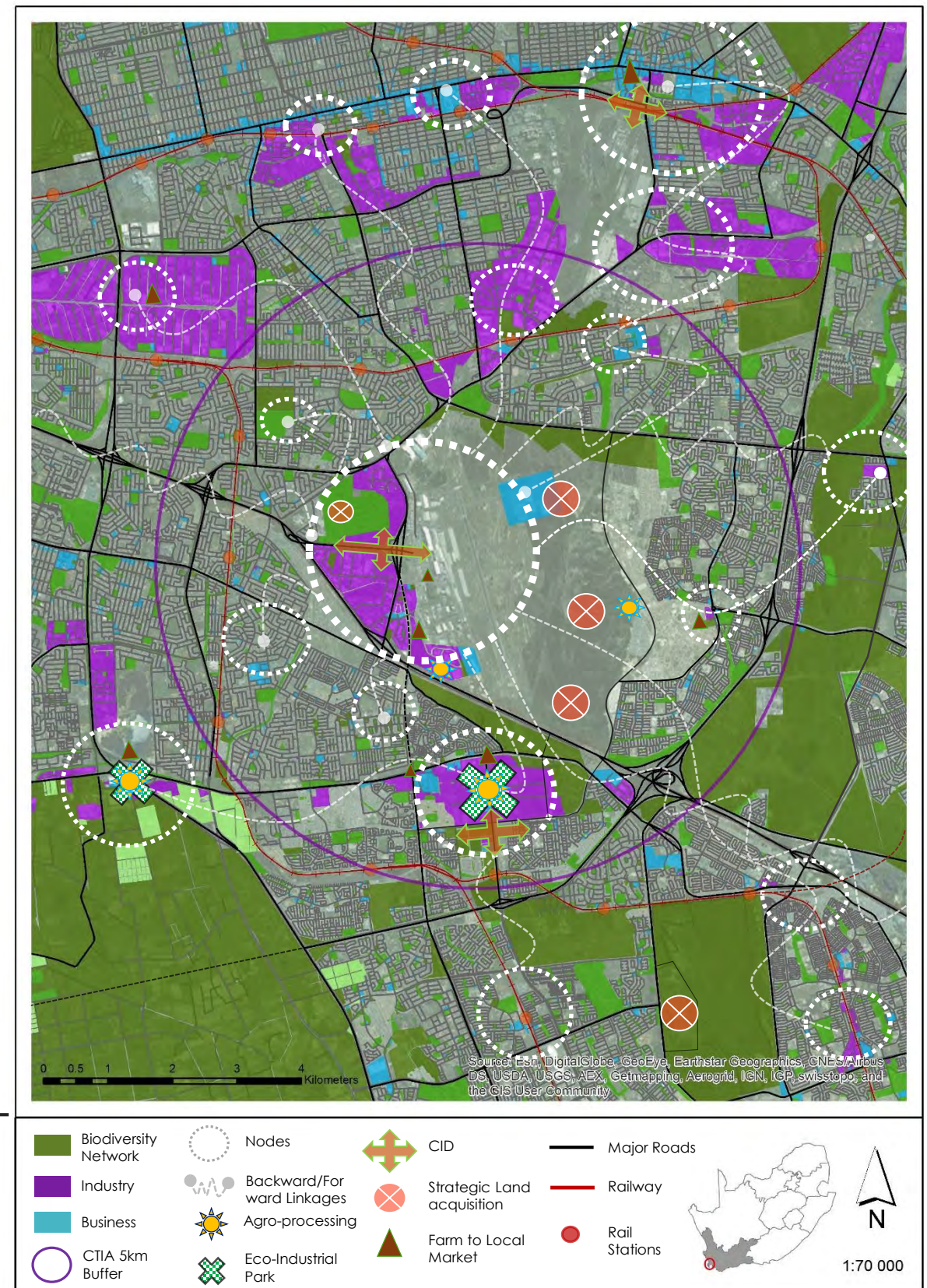










Figure 9.5 Map of Economic Development Framework (Data sourced from: UCT Library, 2015)

Table 9.2 Economic Development Framework

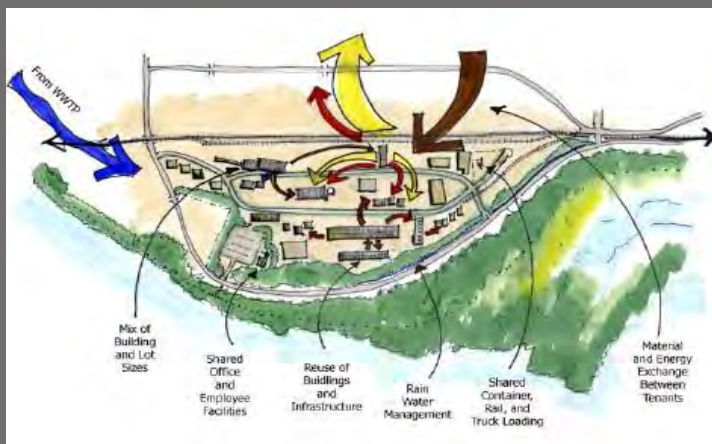
OBJECTIVES	ACTION	❖ KEY	STRATEGIES, PROGRAMMES & ACTORS
AIR ROUTE DEVELOPMENT AND SERVICES	<ul style="list-style-type: none"> ❖ Airlift route strategy <ul style="list-style-type: none"> - Enhance connections to South America, Middle East and North and Sub-Saharan Africa countries - Sustain existing routes and markets - Leverage transport and industrial assets 		<ul style="list-style-type: none"> • ACSA • Wesgro • CoCT • DEDAT • Provincial Government • Airline Associations
SUPPORT AVIATION CLUSTERED INDUSTRIES	<ul style="list-style-type: none"> ❖ Value and supply chain management <ul style="list-style-type: none"> - Attract global income streams and fast track SMME growth - Secure supply chain finance - Cost effectively aggregate agricultural export product (Link to informal goods) - Support informal trading collectives - Link export goods to available cargo space on import return flights ❖ Agro processing – Link PHA to medium to high agriculture technology <ul style="list-style-type: none"> - Light industrial at PHA and PEDI - Halaal Park and Farmers market at Borchers Quarry - Management between PHA, PEDI industries and CTIA ❖ Philippi East to become an Eco Industrial Park (See precedent 1) <ul style="list-style-type: none"> - Unlock niche market opportunities - Aquaponics, Algae bioreactors and biogas digesters (See precedents 2 & 3) - Enhance skills training and expanded works programmes through NGO's ❖ Social investment strategies focussed on securing food security and connecting to local food markets <ul style="list-style-type: none"> - Local cuisine, arts and crafts sold at CTIA bus and train station (See Precedent 4) 	   	<ul style="list-style-type: none"> • ACSA • Airline Associations • DEDAT • WC Department of Agriculture • Dutch Urban Agricultural companies • Dutch Consulate Office • PEDII • PHA Farmers Associations • WC Rural Planning and Management Guidelines • WC Department of Agriculture • Abalimi Bezakaya local food growing operation in Nyanga • DTI • SMME Support Programme • Planning & Economic Development • Private sector • Communities • Development Action Group (DAG)
PRO-POOR CITY IMPROVEMENT DISTRICTS	<ul style="list-style-type: none"> ❖ Philippi East Industrial Node to convert to CID <ul style="list-style-type: none"> - PEDI to convert to private entity to drive skills programmes - Enhanced funding to PEDI from DTI - PEDI to connect to National Community Work Programme (CWP) - Airport Industria, ACSA and PEDI CID to combine and pool value added investment - Enhanced financing to Section 21 entity at Airport Industria 		<ul style="list-style-type: none"> • Department of Trade and Industry • PEDI • ACSA • Airport Industria • Wesgro • CoCT • Communities
STRATEGIC LAND ACQUISITION	<ul style="list-style-type: none"> ❖ Secure land in future aircraft noise contours <ul style="list-style-type: none"> - Rezone aircraft compatible noise uses such as urban agriculture, green building and transport (See precedent 5) - Acquire King David Golf Course and lease to private sector (See precedent 6) - Ensure buy in from communities and universities 		<ul style="list-style-type: none"> • ACSA • CoCT • Provincial Government • Communities • Private sector
KNOWLEDGE MANAGEMENT AND PLACE MARKETING	<ul style="list-style-type: none"> ❖ Regional Branding Strategy <ul style="list-style-type: none"> - Gain support for AerosCape Town strategy - Develop world class terminal facilities (See precedent 7) - Connect to UCT, UWC, CPUT and Stellenbosch Universities - Attract Multi-national and private sector Investment - Connect to international marketing - Political Support 		<ul style="list-style-type: none"> • Wesgro • ECI • ECAMP • DEDAT • Corporate Image • Accelerate Cape Town • Universities • CoCT • Provincial Government

1 PHILIPPI ECO INDUSTRIAL AND BUSINESS PARK

The vision for the Philippi East Industrial node is based on industrial ecology principles with strong connection to the immediate farmlands. Eco Industrial Parks (EIP's) must be understood through efficiency by both business collectiveness and physical form. EIPs harness collective waste sharing and physical closed loop systems which are an effective way of achieving zero waste and emissions targets (Cote & Rosenthal, 2012).

EIP's enhance market attraction and economic competitiveness, which in the case of agri-processing can provide food security and employment opportunities (Cote & Rosenthal, 2012). In terms of the provision of innovative housing and services to the population in the immediate area, planning for EIP's must be fed to relevant planning departments (Cote & Rosenthal, 2012).

For ACSA and businesses the benefits include decreased production costs from material exchange and energy efficiency, waste recycling and the negation of environmental regulatory measures. For government the benefits include reduced demand for resources and capacity of waste going to landfills and waste water treatment works. For society the benefits include employment as well as a cleaner, greener and safer environment conducive to education and employment growth.



Eco-Industrial Park (Source: Cooper, 2010)



Philippi East Vision (Source: Garetto in PEDI, 2015)

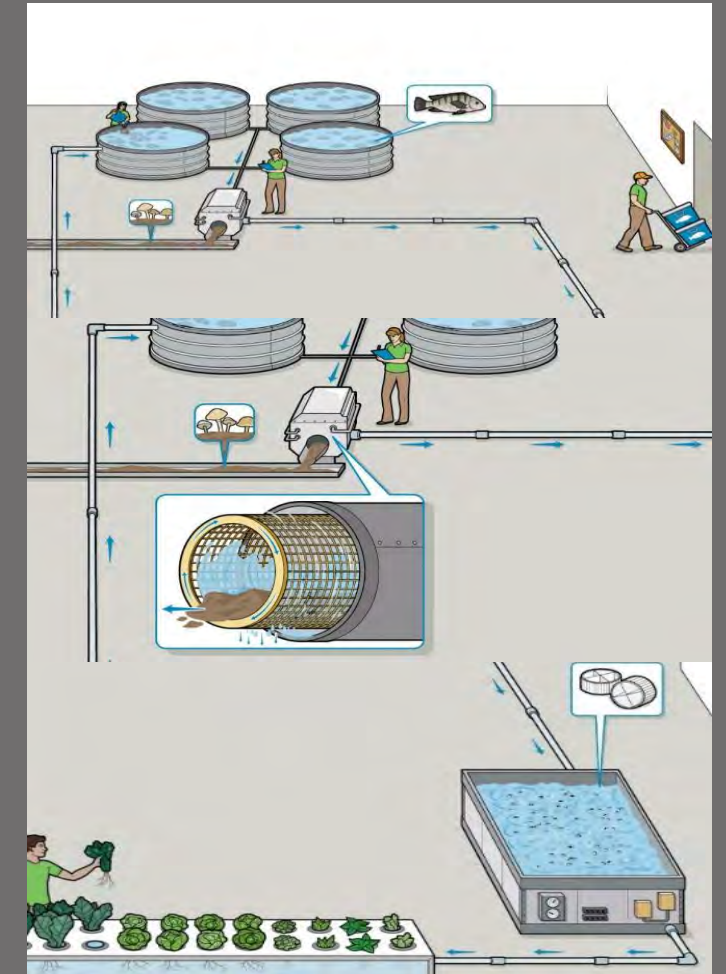


Philippi East Eco-industrial Node (Source: Author, 2014)

2 AQUAPONICS

Urban Organics in the USA has perfected a new model of aquaponic food production (Strickland, 2015). The site is roughly four tennis courts in size and combines fish farming with hydroponic vegetable cultivation. The process only uses 2% of water that a conventionally sized farm would have used (Strickland, 2015). Urban Organic sells the produce to local restaurants and grocery stores.

- Tilapia in fish tank
- Waste to screen filter (composting and organic fertiliser can be sold or used)
- Water flows into bio filter turning ammonia into nitrates
- Plants use and oxygenate water which is filtered back to fish ponds



Aquaponics (Source: Strickland, 2015)



Grow Houses alongside airport runway (Source: Argent, 2015)

3 ALGAE BIOREACTORS

There is potential for private sector to grow and harvest algae for the extraction of bio-fuel which can be sold to the MyCiti and Golden Arrow bus system in Cape Town. The by-product from Algae bioreactors creates a protein rich form of animal fodder which can be sold within the market (Nanavolataics, 2014). The biofuel can also be used to supply energy to the grid (Nanavolataics, 2014).



Algae Bioreactor (Source: Nanavolataics, 2014)

4 INFORMAL TRADING COLLECTIVES

Wawrick junction is a rail taxi and bus interchange in Durban that sees half a million commuters a day with over 6000 informal traders who collectively buy and sell goods (Neudorf, 2012). Products like herbal medicines, food, spices and clothes is directly reflective of the diverse demands offered by the South African informal market.



Warwick Interchange, Durban (Source: Neudorf, 2012)

5 URBAN AGRICULTURE PLAN, SAO PAULO

The Sao Paulo city council found that 36% of municipal land was vacant. They further identified sites that were least likely to be impacted by climate change. They annually gave these away for free to ex-farm workers on condition that they be given the skills to farm a significant portion of the land for the community and themselves (Pike, 2012).



Urban Agriculture (Source: Pike, 2012)

6 HONG KONG INTERNATIONAL AIRPORT GOLF COURSE

HKIA is home to the SkyCity nine eagles golf course which is equipped with a hotel, cinema, club house, night lighting and pristine man made wetlands, landscaping and walkable trails. Due to the extensive number of passenger the golf course does not require private membership sign up (Nine Eagles, 2007).



Nine Eagles golf Course Hong Kong (Source: Nine Eagles, 2007)

7 CHANGI AIRPORT IN SINGAPORE

The Changi Airport is one of the worlds leading airports for commercial and passenger satisfaction. The Changi Airport terminal building architecturally designed with vertical gardens and indigenous landscaping.



Changi Airport Terminal (Exploratorium, 2015)



Outside the Changi Airport terminal and scheduled to be complete in 2018 is the Exploratorium, a 134 000m² glass dome and indoor grow room with trails, a public square, retail and dining outlets as well a centred waterfall that provides natural cooling (Exploratorium, 2015). The dome will also have direct access to light passenger rail.



Changi Future Airport Terminal (Source: Exploratorium, 2015)

9.6 INFRASTRUCTURE DEVELOPMENT FRAMEWORK

By 2035 the Cape metropolitan will undergo a mega convergence of road, rail and air connectivity as the CTIA becomes a gravitational feed in with 18 MAP and more than 1.5 million inhabitants in a 5km radius. The infrastructure framework is focused on the physical and socio-technical relationships between the CTIA and hinterland. Table 9.3 correlates with Figure 9.7 across and Figure 9.8 below. Objectives for the infrastructure framework include:

- Safe Mobility and Enhanced Logistical Access
- Housing and Settlement
- Integrated Communications Technologies (ICT)
- Safety and Security
- Public Outreach and Participation

Logistical focus is around enhanced mobility, access, signage and signal timing to ports, nodes and corridors. A modal shift to public bus and rail way system will ease private vehicle usage and congestion.

Access to the Philippi East Industrial Node from Borchers Quarry is the most significant short term (2 year) infrastructural proposal for the Philippi East area, along with the N2 and stock road widening projects. The DEMACON market study points out that road access to Philippi will unlock over R 700 million in property rates and taxes which could be used to ease service delivery. Over 67 hectares of social facilities is required to sustain future population demand (DEMACON, 2014). Incremental informal settlement upgrading and access to services such as housing and transport requires continual investment from the City. This can be offset by value capture and inclusionary zoning policies in private sector housing.

The ICT component involves information dissemination through Wi-Fi and broadband to key activity nodes. The idea is to create online collaboration platforms for local safety initiatives, data collection and identification of local catalytic multipliers for job creation. Safety and security efforts require enhanced investment which can be offset through policing, public outreach programmes and urban renewal projects within CID establishments.

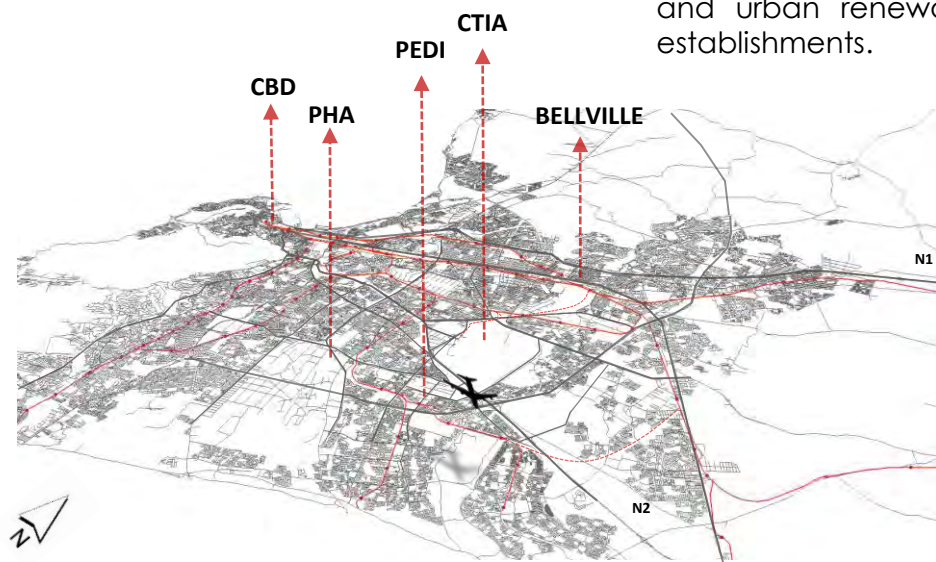


Figure 9.8 Infrastructural Landscape (Source: Author, 2015)

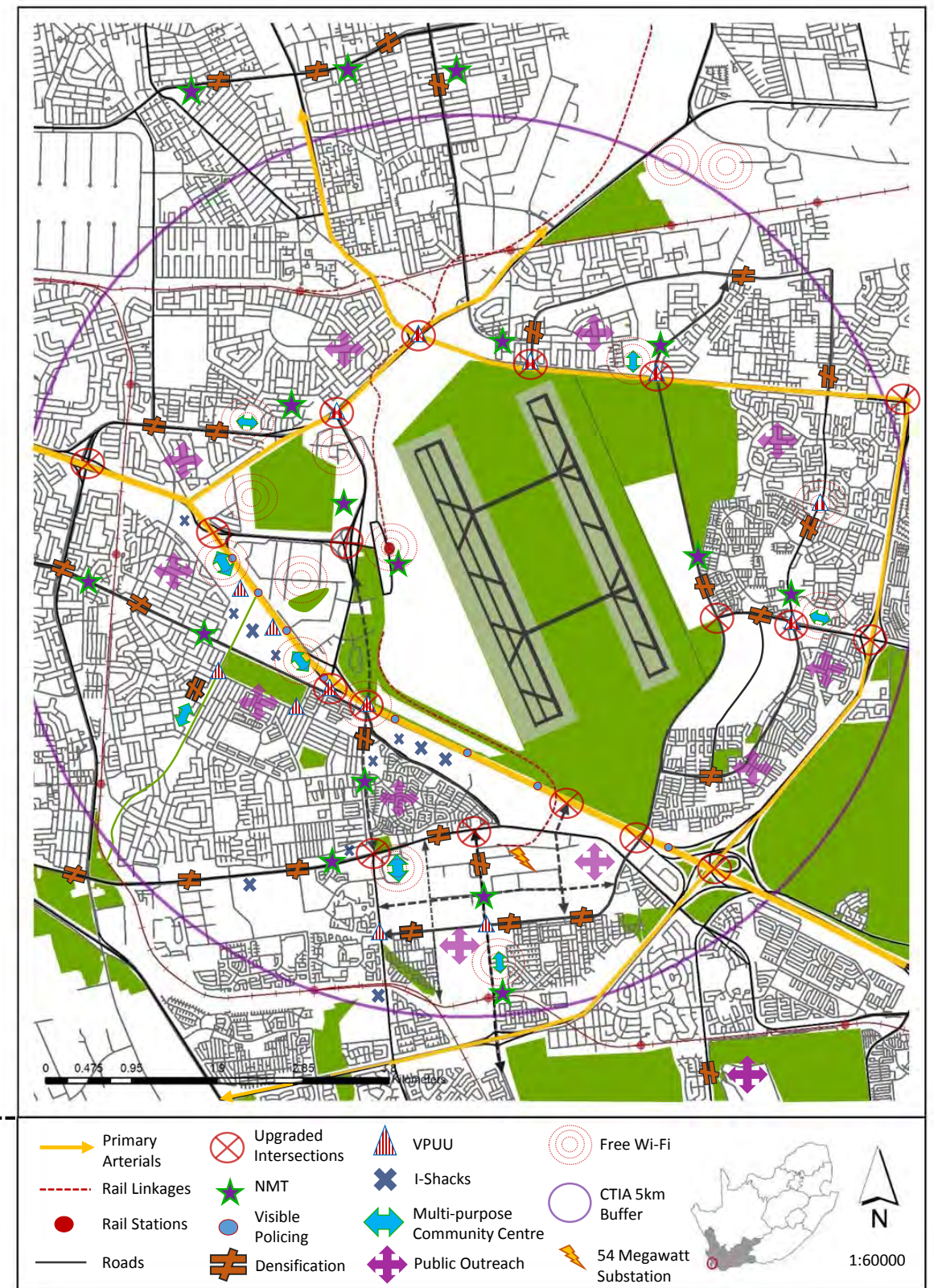














Figure 9.7 Map of Infrastructure Development Framework (Data sourced from: UCT Library, 2015)

Table 9.3 Infrastructure Development Framework

OBJECTIVES	ACTION	❖ KEY	STRATEGIES, PROGRAMMES & ACTORS
SAFE MOBILITY AND ENHANCED LOGISTICAL ACCESS	<ul style="list-style-type: none"> ❖ Coordinate land use and transport connectivity <ul style="list-style-type: none"> - Set up land use commissions - Cargo, terminal and runway development ❖ Transport Connectivity <ul style="list-style-type: none"> - Upgrade rail lines, fleet and stations - Optimise traffic signal timing - Road access linkages - Enhance value capture ❖ Upgrade key intersections <ul style="list-style-type: none"> - Signage, themed art and branding at keys points of logistical flow ❖ Non Motorised transport at CTIA and activity nodes ❖ Enhanced policing along N1 <ul style="list-style-type: none"> - Visible policing from CID's 	    	<ul style="list-style-type: none"> • ACSA • PRASA Metro Rail + National Station Upgrade programme • TRANSNET • SANRAL • WC Department of Transport and Public Works • Greater Tygerburg Partnership • Taxi Associations • Private Developers • National, Provincial and Local Government • Integrated Transport Plan • ACSA • SANRAL • CoCT • NGO's, CBO's, FBO's
HOUSING AND SETTLEMENT	<ul style="list-style-type: none"> ❖ Densification, integration and mixed land uses <ul style="list-style-type: none"> - Compact housing and community projects (50-250du/ha) (See precedent 1) - Infill development - Site and serviced plots - Insitu upgrading ❖ I-Shacks (See precedent 2) ❖ Violence Prevention through Urban Upgrading VPUU (See precedent 3) ❖ Multipurpose community centres (See precedent 4) 	   	<ul style="list-style-type: none"> • National Housing Grant • Settlement Land Acquisition Grant Programme (SLAG) • Peoples Housing Process • Informal Settlement Strategy (2014) • Department of Health and Education • National Land Reform programme • District SDP's • Ward councillors • Private real estate developers • DAG
INTEGRATED COMMUNICATIONS TECHNOLOGIES (ICT)	<ul style="list-style-type: none"> ❖ ACSA and City of Cape Town online collaborative sharing platform <ul style="list-style-type: none"> - Link to regional branding strategy - Libraries with access to internet i.e Philippi Village - Place marketing and identification of local catalytic multipliers - Extension to user friendly cell phone apps and labour brokers - Wi-Fi hotspots for surrounding areas ❖ Eskom to develop 54 megawatt substation in Philippi 	 	<ul style="list-style-type: none"> • ACSA • Wesgro • CoCT • DTI • ECAMP • ECI • PEDI • Subcouncils • Private Sector • Industries • Eskom
PUBLIC OUTREACH AND PARTICPATION	<ul style="list-style-type: none"> ❖ Funding for a public participation unit <ul style="list-style-type: none"> - Connect to local community programmes - Leverage alternative methods of advertising for Environmental Impact Assessment - Community and family events at CTIA 		<ul style="list-style-type: none"> • ACSA • Property owners • CoCT • Provincial Government • NGO, CBO's and FBO's • DAG • Private Developers • Universities

1 ELEMENTAL HOUSING PROJECT CHILE

The Elemental team and doing think tank in Chile focused on designing and implementing incremental and affordable low cost urban housing projects in well located areas (Elemental, 2007). Elemental operated as part of the program launched by Chile's Ministry of Housing and Urbanism in 2001, which targeted the poorest sectors of the community. The program, consists of a state subsidy and a savings fund for with which the land and the house can be paid for. The higher cost of the land is shared by a large number of families. The applicants opted for typologies that were 30-50 du/ha per gross and 50% of the housing structure was to be built by the residents themselves. Bathrooms, kitchens and staircase were provided by Elemental as residents were unable to these luxuries (Elemental, 2007).



Quintino Monray Housing (Source: Elemental, 2007)



Quintino Monray Housing (Source: Elemental, 2007)

2 THE I-SHACK PROJECT

The iShack Project is a modular dwelling unit provided solar electricity on a pay-for-use basis to residents of the Enkanini informal settlement in Stellenbosch. The clients pay a monthly fee for the service which provides lighting, television, cell-phone charging and additional energy for radios and televisions (I-Shack, 2014). The initiative is funded funding the South African Government's Green Fund.



I-Shacks (Source: I-Shack, 2014)

3 VIOLENCE PREVENTION THROUGH URBAN UPGRADE (VPUU)

VPUU is an active programme in the South East Metro run by the City of Cape Town. Safety principles such as street frontages, lighting and active safe boxes are used to enhance visibility and reduce opportunities for criminal activity to occur. Designs are also focussed on public facilities such as schools, libraries and soccer fields



Active Safe Boxes and Low Cost Community facilities (Source: VPUU, 2012)



Europe/Barcelona design (Source: Author, 2014)

4 FAVELLA'S MUTI PURPOSE COMMUNITY CENTRE

The Favellas in Sao Paulo is known as Brazil's most dense and lowest income area which was once agricultural land before being informally occupied (Urban Green File, 2012). In the Favellas, the Paraisopolis informal settlement is home to a 100 000 inhabitants with population densities of 700 persons per hectare (Urban Greenfile, 2012). A green multipurpose centre is currently underway as part of Sao Paulo City's youth education and development programme. The centre has a library, a hall, skills facilities and an outside space for music and arts. The building includes green technologies such as rain water harvesting tanks, solar energy panels and a grey water recycling system. The building is designed to allow natural lighting and to minimise energy use (Urban Green File, 2012).



Paraisopolis Multi-purpose centre (Source: Urban Greenfile, 2012)

9.7 PHASING AND IMPLEMENTATION

The AerosCape Town SDF is a 20 year indicative and strategically consolidated vision of the regional physical and socio-technical process. It is not a fixed reality due to the limitations associated with airport led development in addition to the dynamics of the steering committee and the negotiated outcomes made by the potential public private partnerships. Zietsman (2013:193) specifically highlights that “key decisions have to be made throughout different stages of the decision-making process [and] importantly, the decisions made during the process effect the decision outcome at the end”. It is therefore important to reiterate that the AerosCape Town is not a means to an end but rather a long term process of integrated regional collaboration and hence the need for a consolidated cross-sectoral vision.

9.7.1 Non-Spatial Process

Prior to conceptualising the spatial sector it is important to determine both the value chain that links the local and regional the value proposition for stakeholders and. In this regard, securing supply chain financing and enhancing linkages to comparatively advantaged aviation linked sectors such as agro-processing is a key opportunity. Primary focus should be to aggregate niche market products and agricultural export from both private sector, SMME's and informal trading collectives and link these to available cargo space on import return flights. This can be enhanced by with the benefits of online collaboration platforms which can connect to NGO's, expanded works programmes, labour brokers and alternative participatory processes.

The Area and AeroScape concepts understand the CTIA in relation to existing aviation industries and future regional and metropolitan infrastructure projects around ports, activity nodes and corridors. These are affiliated with different management authorities and public sector financing departments like transport, housing and public works. ACSA are effectively on a par footing to housing and transport departments.

The Airport City is the missing component where stakeholders come together to fulfil mandates in accordance with the common value proposition. In many cases alignment and expertise does exist but it is yet to harmonise through conversation, time and willingness to engage. Rather than physical infrastructure alone, the strategic framework for the CTIA is more dependent on soft infrastructural aspects like collaboration, participation and willingness to engage.

In terms of collaboration, different layers of partnership essentially need to occur. The steering committee will separate stakeholder groups as influential drivers of the process such as ACSA, Provincial Government, CoCT and Wesgro. The second level are the technical group who ensure competency of infrastructure. The last level are potential stakeholder groups such as PEDI, NGO's and communities. The overall process needs to move forward so that each layer and mandate is synergised (Allemeir pers.com, 2015).

In order to create unique value added partnerships, the steering committee needs to engage with key decision makers within each of the identified stakeholder groups. The idea is to enhance conversations amongst sectoral role players and to create quick win partnerships that can be sustained over a long period of time. Associated with this is the regional branding strategy which can be used to attract global financing firms, enhance SMME growth and bolster public and private sector interest.

Although much of the process will occur purely by market force, the CoCT needs to be strategic about what can be exported by new flight connections and market destinations. National, provincial and local government will therefore have to align and reduce regulatory difficulties to fast tract investment and economic growth.

9.7.2 Spatial Process

Once airport, road, rail and port infrastructure is planned and begins to be developed conversations and partnerships will emerge. The

Green AerosCape Town strategy is therefore both a micro and macro scale coordination of dozens of environmental, economic, social and infrastructural processes and their associated role-players. Each project must not be seen in a vacuum but rather aligned with the overall ethics and principles proposed.

In order to bring together the biophysical, economic and infrastructure frameworks, a grid and super block system is applied to the 5km Airport City radius (See Figure 9.9). The grid system consists of 1.5km by 1.5 km super blocks.

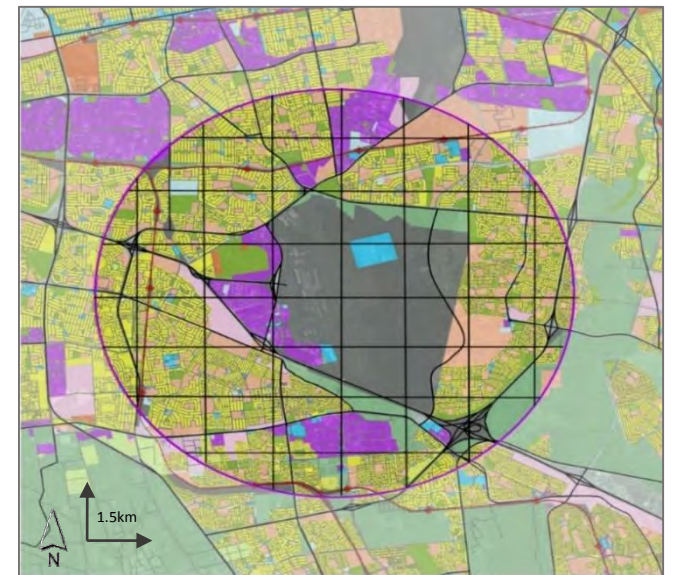


Figure 9.9 Superblock and Grid System (Source: Author, 2015)

Each of the superblocks must be associated with the principles and values of the SDF. Initial focus is around finding short and long term land uses on existing vacant land, providing bulk infrastructure and investing into the public realm. As the Airport City is a long term process, land should be compatibly zoned, ring-fenced from invasion and secured for appropriate development. In the context of rapid urbanisation, a combination of participatory process is required such as re-blocking and incremental upgrading of informal settlements. Table 9.4 on the following page spatially describes the coordinated transport and land use and process between 2015 and 2035.

Table 9.4 Transport and Land Use Phasing of 5km Airport City region over 20 years (Source: Author, 2015)

	2015-2020	2020-2025	2025-2030	2030-2035	
TRANSPORT	<p>8.5 - 9.5 MAP</p>	<p>10 - 13 MAP</p>	<p>13 - 15 MAP</p>	<p>15 - 17 MAP</p>	<ul style="list-style-type: none"> Rail Stations Major Roads Road and Runway connections Rail Line Rail Connections Activity Nodes CTIA 5km Buffer
	<ul style="list-style-type: none"> Airport Runway N2 widening Borchers Quarry Klipfontein Road widening Stock Road widening Symphony Way widening BRT IRT 	<ul style="list-style-type: none"> PRASA modernisation programme Railway connection to Bellville and CBD CTIA runway complete Rail access to Philippi East Industrial Node Airport Approach Road Widening Nolungile Station and Rail Project 	<ul style="list-style-type: none"> Direct road access to Philippi East Industrial Node via N2 Passenger model shift to rail transport Second runway planned R300 widening Stellenbosch Arterial widening 	<ul style="list-style-type: none"> CTIA a fully established metropolitan node 40% modal shift to public transport in metropolitan and 60% at CTIA Full MyCiti Bus Roll out and IRT Second runway complete Rail access to Philippi East 	<p>1.5 million inhabitants in a 5km radius</p> <p>18 MAP</p> <p>800 000 tons of cargo per annum (import + export)</p> <p>= Existing OR Tambo Cargo Volumes</p>
	<ul style="list-style-type: none"> Mixed-use housing for displaced Phasing of Europe, Barcelona and Kanana + Rehabilitation of Landfill Alternative Land for Marikana Informal Settlement PEDI, Airport Industria and ACSA CID's to merge Secure noise compatible land 	<ul style="list-style-type: none"> Acquisition of King David Golf Course Airport terminal upgrades complete Eastern boundary zoned for industrial, retail and commercial Upgrading of Lotus River Secure vacant land for agriculture 	<ul style="list-style-type: none"> Direct Access to Philippi East industrial Node via N2 Passenger model shift to rail transport Second runway planned R300 widening Stellenbosch Arterial widening 	<ul style="list-style-type: none"> CTIA 100% energy efficient Closed loop system with PEDI and PHA Zero Waste Fully integrated settlement patterns Commercial and industrial development complete 	
LAND USE					<ul style="list-style-type: none"> Business and Industrial CTIA Solar Panelling Residential Universities King David Golf-course Organic Grow houses Rail Stations Major Roads Rail Line Informal Settlements

9.8 CONCLUSION AND RECOMMENDATIONS FOR FUTURE RESEARCH

Airports are national entities linked both to the global market economy and to the manner in which a particular region seeks to reflect itself to the outside world. From a logistical perspective airports have become political infrastructure tools strategically used to leverage abilities to compete in the global trade race for connectivity and time and cost efficiency. Airport functionalities differ according to location, market type, geographic location and population size which is associated with labour, education and skills. Airport Cities in the developed world are underpinned by a century of liberalisation, privatisation and globalisation of trade. Conversely, South African International Airports such as ORTIA, KSIA and CTIA have only had 21 of years of liberation and inside the fence infrastructural investment.

In the South African context, a conundrum that gives rise to the paradigm of splintering urbanism is the relationship between the impact on local liveability and the fast paced demand for global connectivity because airports are associated with much larger perpetuity effects to the national economy. As airport territories demand additional non-aeronautical revenue to offset airline tariffs, the need for coupling of airport master plans and regional economic and spatial frameworks increases through legislative prerequisites for engagement. A transition toward a regional airport approach requires a process of shared learning and strong commitment on behalf of local, provincial and national government departments in association with ACSA, private sector, NGO's and communities. Central to this trend is long term coordination of investment, participation and management between key stakeholders.

In line with the central question of the dissertation, the most sustainably integrated airport urban form used to describe the incremental retrofitting of the CTIA is the AeroScape and Airea while the Aerotropolis should best be harnessed for its business planning strategies rather than urban physicality.

Recognising the CTIA as an economic driver for the South East Metro it is clear that existing spatial and economic frameworks can be aligned with the Airport City concept in a manner that is orientated toward post-apartheid restructuring and spatial transformation. Opportunities include area based management programmes, value capture, cross subsidising CID's, enhancing and leveraging infrastructural access, linking low skilled labour absorptive opportunities to agro-processing, securing supply chain finance, aggregating export product (both formal and informal) in addition to enhancing participatory processes and identifying local catalytic multipliers through online collaboration platforms.

Although the majority of node, port and targeted industrial projects are situated within a 25-50km radius of the CTIA, a substantial agglomeration of corridor, road and rail projects are planned and budgeted for within the 5km Airport City region, which by 2035 is expected to have a future population of 1.5 million inhabitants. Ventures that can yield short term investment returns and improved infrastructure for surrounding communities are those linked to provincial, city and private sector role players, SMME's and NGO's like PEDI. The positive outcome of a shared regional airport transition is essentially a restructured local economy along with the benefits of region wide partnership. Applying airport urban concepts to the CTIA from a perspective of the global south not only offers employment potential but simultaneously enhances the opportunity to create a closed loop metabolism through waste reduction and re-use methods associated with agro-processing.

Fields required for further research are related to a variety of discourse such as transport, land use, logistics and supply chain analysis, airport, urban and economic planning, marketing and business management, property studies,, urban design, architecture, and industrial ecology. From a biophysical perspective, financing for a material flow analysis of the networked structure of the CTIA and hinterland is further recommended.

The overall process also hinges on reliable data to be used and acted upon by different public and private partnerships. In the context of the CTIA, focus should not only be directed toward supplying services, coupling formal and informal land markets and cross subsidising added valued added on both sides of the N2, but toward questioning what components of the value chain be added by labour absorptive skills that can be created now and connected to aviation linked markets in the future. This ought to be coupled with an understanding of the micro economic impact of the CTIA in conjunction with the logistical functioning between sea, air, road, rail and activity nodes.

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ANNEXURE 1

PARTICIPANT	ASSOCIATION
Mammon, N.	NM & Associates/Vision Plan (CTIA Urban Planning Consultants)
Allemeier, J.	Western Cape Economic Development Partnership (WCEDP) (Aerotropolis partnering platform)
Weyer, M.	AECOM-SA (Cape Town Aerotropolis Feasibility Study)
* Respondent A	ACSA CTIA Infrastructural Manager
* Respondent B	ACSA CTIA Stakeholder Relations
Van den Brink, P.	South African Netherlands Chamber of Commerce (13 years - Schiphol Area Development Company SADC)
Nicks, S.	Head of CnDV Africa (King Shaka – Dube City Urban Design Framework)
Swana, T.	Head of Philippi Economic Development Initiative (PEDI)
Rabie, C.	City of Cape Town Spatial Planning Department (ECAMP site developer)
Fataar, R.	Future Cape Town

* Respondent sheets not included



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Email: Janine.Meyer@uct.ac.za Tel: 27 21 6502359

You are kindly requested to participate in a research project conducted by Mr. DMS Hanly from the Department of City and Regional Planning at the University of Cape Town. I am doing my research on the application of the 'aerotropolis' concept to the Cape Town International Airport (CTIA). You were selected as a possible participant in this Masters Dissertation because of your possible knowledge/expertise regarding the future development of the CTIA. My supervisor is Dr N. Odendaal: Nancy.odendaal@uct.ac.za or 082 537 8699.

PURPOSE OF THE MASTER DISSERTATION

The dissertation proposes a 20 year Strategic Development Framework applying various airport driven urban strategies and sustainability principles to the CTIA. The study is spatially qualitative making further use of ideas as design inputs from a broad range of actors in fields related to airport planning, business site planning and urban planning.

CONFIDENTIALITY

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Yes I give permission for you to use my name / designation / words in your dissertation

No I do not give permission for you to use my name / designation / words in your dissertation

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Signature of student

NISA MAMMON (NM & ASSOCIATES)

Name and Association



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Signature of student

Judi Altemeyer, EDP
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Paul van der Buijk
 Name and Association
 SAUEC - South African Netherlands Chamber
 13 years SADC - SADC Area Development Company



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THOMAS L. SWANA
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 CEO PHILIPPI ECONOMIC DEV INITIATIVE (PEDI)



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Signature

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Signature of student

City of Cape Town,

Name and Association

CLAUDE RABIE



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Signature

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Signature of student

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RASHIQ FATTAH, FUTURE CAPE TOWN

Name and Association

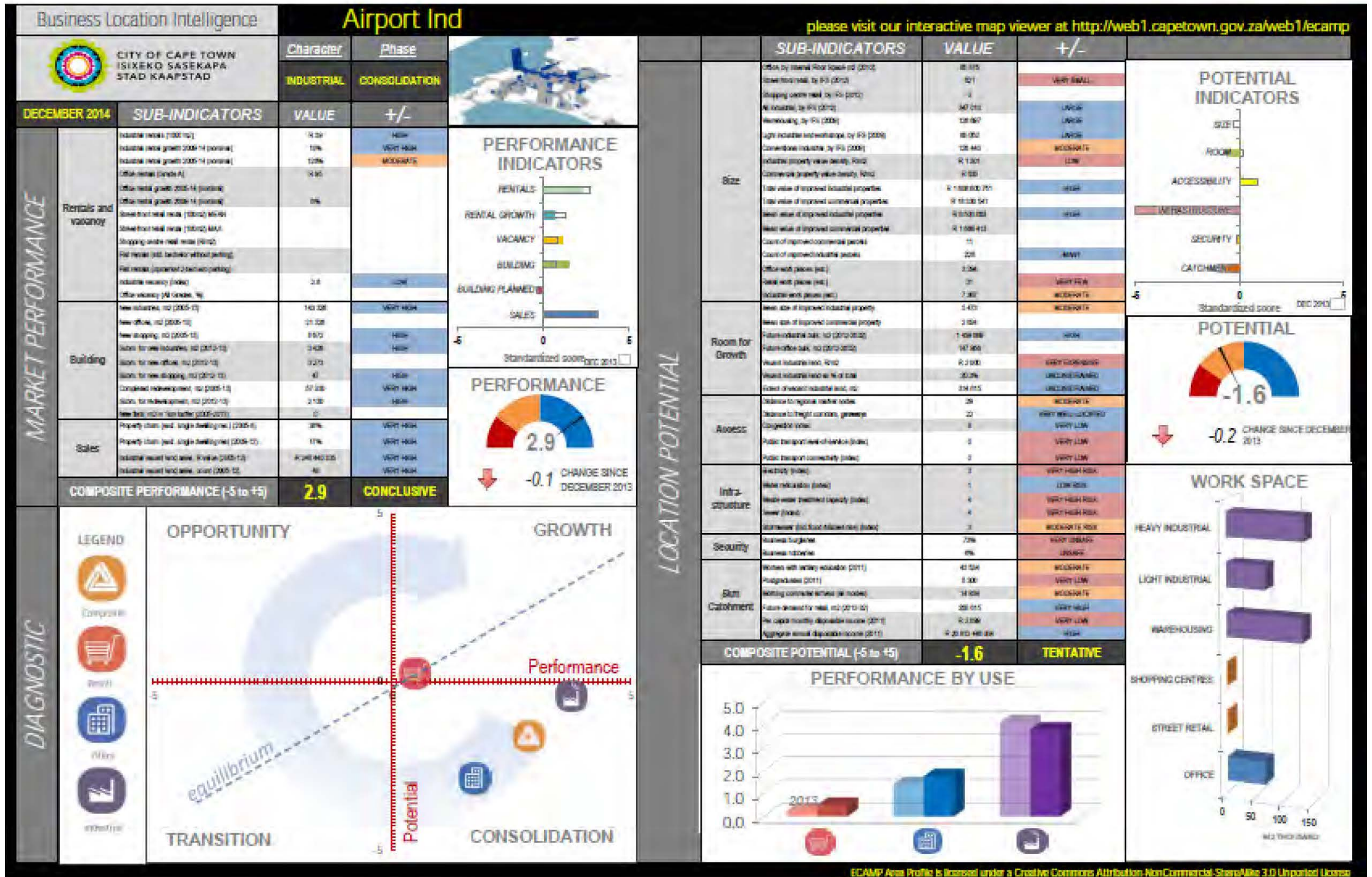


Figure 2a Airport Industria Market Performance and Location Potential (Source: ECAMP, 2014).

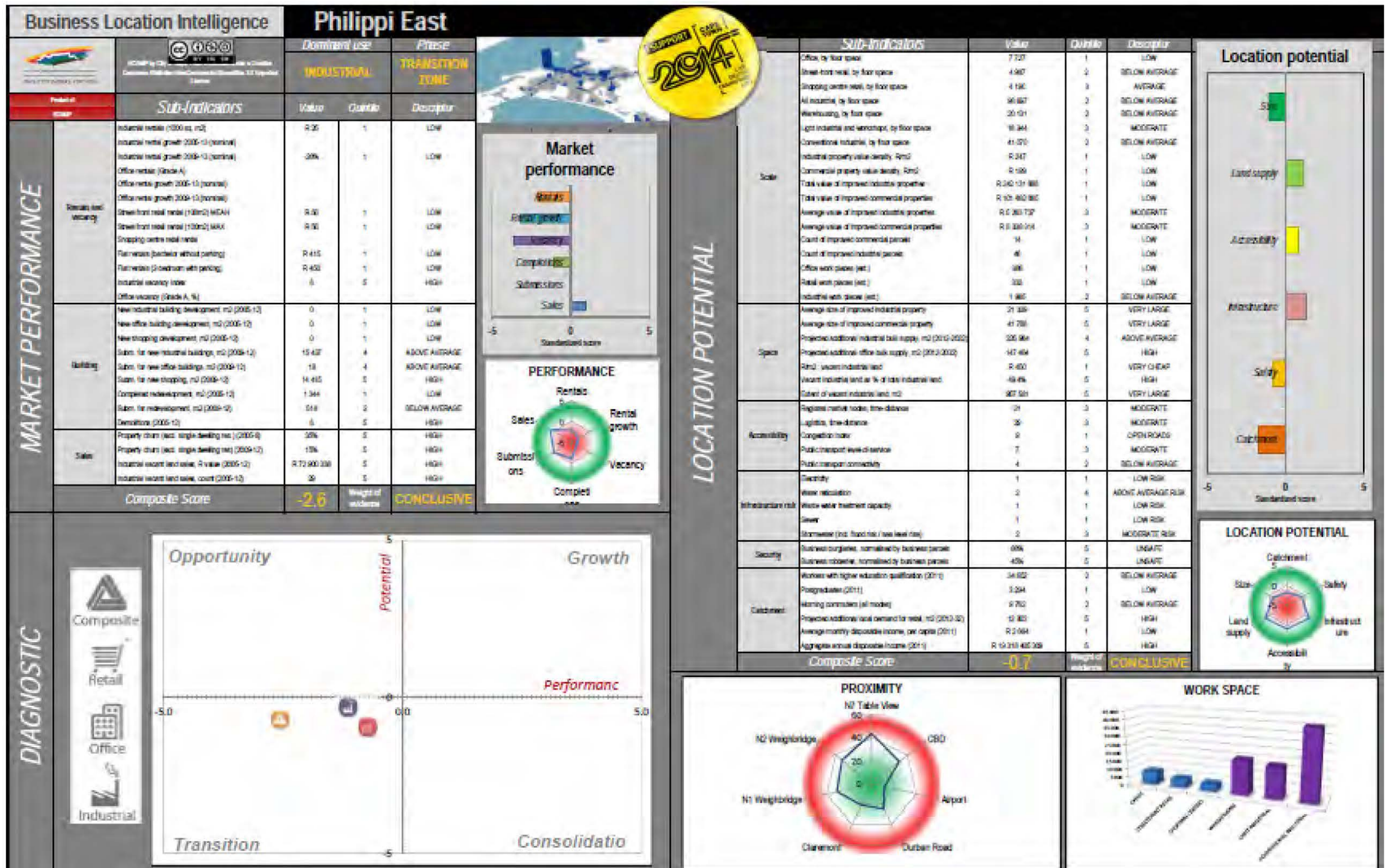


Figure 2b Philippi East Market Performance and Location Potential (Source: ECAMP, 2014).