

THE N1 CORRIDOR CAPE TOWN: AN INTEGRATED MULTIMODAL TRANSPORT STRATEGY FOR THE CORRIDOR

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ABSTRACT

The N1 Corridor, within the Cape Town Metropolitan Area, is an extremely important transport conduit facilitating a very high level of movement of freight, passengers, commuters, tourists, business traffic and recreational traffic. The N1 Corridor connects the two largest nodes within Cape Town and is the primary access to the Port, large industrial areas and large developments such as Century City. Furthermore, significant vacant sites within the corridor, if developed, could accommodate an additional 10 000 dwelling units and 50 000 jobs.

However, the N1 Freeway currently experiences high levels of commuter peak period congestion, characterised by low vehicle operating speeds and low vehicle occupancies. The corridor catchment is poorly served by public transport services, although two commuter rail lines are accommodated within the corridor.

This integrated land use/transport study was commissioned to formulate an integrated multimodal transport strategy for the corridor, which would address:

- Creation of attractive public transport alternatives.
- Provision of the necessary levels of mobility and accessibility of people and goods.
- Provision of the necessary levels of access to the vacant strategic sites.

This paper highlights the key challenges of this project, the potential development that could be accommodated along the corridor, and the formulation of an integrated multimodal transport strategy to maximise the development potential along the corridor, while safeguarding the mobility along the corridor and the accessibility of the CBD and Port of Cape Town.

1. INTRODUCTION

The N1 corridor forms part of the pattern of radial development along the main transport routes that emanate from the central city of Cape Town, where urban settlement at the Cape was first established⁽⁵⁾. Voortrekker Road, which can be regarded as the origin of the N1 corridor, was originally a wagon route providing the central city with access to products and farming areas in the hinterland (Refer to Figure 1). In the nineteenth century this axis was reinforced by the construction of the rail line to the interior, which resulted in rapid urban development along this corridor.

After World War II, car ownership grew rapidly, requiring new road networks to cope with the increased travel demand. This led to the construction of the N1 and other major roads such as the Western Boulevard and Eastern Boulevard (& De Waal Drive) – all roads

which provided rapid access to the central city and bypassed the traditional business roads, such as Voortrekker Road and Main Road (through Southern Suburbs). At this time, the rail network was also expanded and together these transport investments provided vastly improved accessibility to the central city, resulting in a rapid growth in commercial development in the CBD, during the 1960's and 1970's.

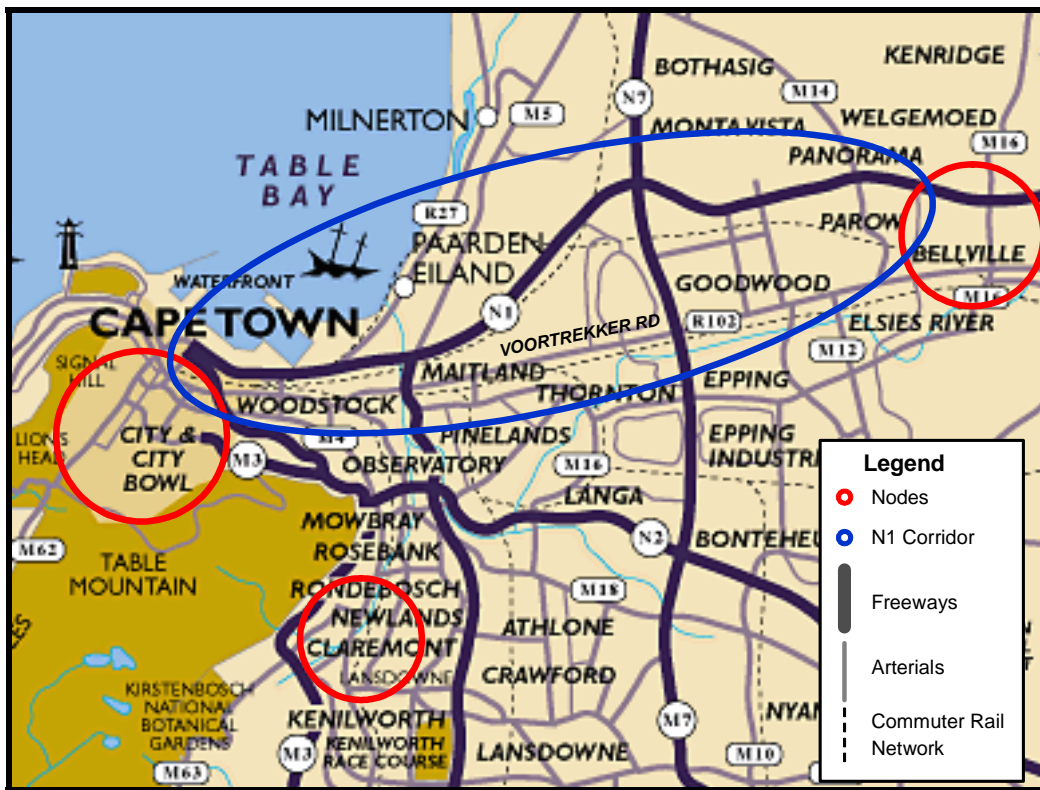


Figure 1. Locality sketch.

During the 1980's there was a general economic downturn, which was accompanied by a trend towards the decentralisation in the pattern of development in the metropolitan area, resulting in a slump in development within the CBD. Increased levels of congestion along the major access routes to the CBD, together with a shortage of parking (due to the increased use of the private car) within the CBD, are regarded as two of the main causes of the decentralisation trend. This trend continues to date, and is currently reinforced by a decline in the quality of the commuter rail service, which has exacerbated the peak period traffic congestion on the N1 Freeway and other CBD access routes. The Bellville/Tygerberg node, in particular, has become a major office and retail centre in the metropolitan area, although not outgrowing the CBD. The Bellville/Tygerberg node is now the second largest business and commercial node with the metropolitan area and is directly connected to the CBD by the N1 corridor.

More recently, large commercial development which gain access off this corridor, such as the N1 City and Century City development, stress the importance of this corridor as a generator of economic activity. The less prominent trend of business establishment in the traditional industrial areas along the N1, such as Paarden Eiland and Maitland, also indicate the value of the exposure and accessibility provided by the N1 corridor. Recent developments within the central city, such as the Victoria and Alfred Waterfront, the central City Urban Renewal Project (undertaken by the Cape Town Partnership) and the Cape Town International Convention Centre, have reaffirmed the importance of the inner city area in the economy of the metropolitan area and thus the N1 Corridor which provides access to this area.

The N1 is also the corridor which provides access to the Port of Cape Town, incorporating freight rail and road based routes. With the current interest in developing the ship repair industry to serve the possible oil and gas industry off the west coast of Africa, there is a renewed awareness of the strategic importance of the N1 Corridor at an international level, as part of the logistic chain in international trade. A gradual reduction in the accessibility of the Port of Cape Town will continue to undermine the efficiency and viability of the Port.

2. THE EXISTING TRANSPORT PROBLEM

The majority of the N1 catchment area, situated north of the N1 Freeway, is poorly served by public transport⁽⁵⁾. The existing commuter rail network and services are well developed within the area south of the N1 Freeway, whereas no commuter rail lines exist north of the N1 Freeway. Currently, there is no priority for road based public transport on the N1 Freeway and as a result, the road based public transport mode share on the N1 Freeway is less than 10% during the weekday peak periods.

The Monte Vista rail commuter service operating within the corridor, is underutilised, has low frequency of service and station precincts are generally inaccessible, unattractive and deserted (during off peak periods). Due to the low frequency of service, the commuter rail service has not been able to provide a travel time saving for current car commuters (choice users), in spite of the high level of congestion and time delays experienced by car commuters, during peak periods.

Currently, the N1 Freeway carries very high two way traffic flows, which range between 95 000 and 120 000 vehicles per day. During the commuter peak periods on weekdays, the route operates at capacity for in excess of 2 hours in the peak direction of travel (inbound during the AM peak and outbound during the PM peak). Very long queues develop on the freeway, which extend for up to 12 kilometres along the N1 Freeway, during the weekday AM peak period. Vehicles travelling in congested conditions along the N1 Freeway operate at speeds as low as 20km/hr, along various sections of the route.

The peak period accessibility by road, of the CBD and developments along N1 Corridor, is deteriorating annually as congestion increases. Peak period traffic flows are increasing at a rate of approximately 2.5 % per annum, whereas the daily flows are increasing at 3.5% and 5 % per annum, for the inbound and outbound flows respectively.

The gradual reduction in the levels of accessibility by road for extended periods of the day is having a negative impact on time sensitive loads destined for the Port, especially during peak periods. During the peak periods, the existing road space is inefficiently utilised in that 70% of the vehicles are single occupant vehicles (SOV's). This results in a very low vehicle occupancy for the N1 Freeway of approximately 1.6 people per vehicle.

The N1 Freeway serves a multiplicity of trips, with a high proportion of intermediate destinations along its length. As a result, a relatively low proportion of the trips on the freeway are long distance through trips i.e. travel between the CBD and the Bellville/Tygerberg node. During the weekday AM peak period, only 38% of trips in the peak direction are long distance through trips, while during the weekday PM peak period, the proportion is as low as 29% in the peak direction. The balance of the trips are destined for the intermediate destinations.

The preliminary investigation into the future private and public transport demand along the N1 corridor indicates that:

- The peak period private vehicle demand along the corridor (with an annual growth rate of 2.5 %) will exceed the current available capacity (3 hour peak period capacity) along the corridor within 5 to 7 years.
- It will not be possible to accommodate the future traffic generated by the continued growth of the central city, the Port and strategic sites along the corridor within an acceptable peak period at the current modal split, without significant capacity improvements to the N1 corridor.
- Additional modal shifts towards public transport will to be required to accommodate future travel demand, as the scale of improvements needed to make provision for private vehicles, may not be affordable or acceptable.
- A substantial potential demand for road-based public transport services along the corridor has been identified, particularly for the fast growing areas north of the N1 road corridor.

3. THE FUTURE LAND USE SCENARIOS

The N1 Corridor has enormous development potential, not only along its length, but also within the nodes on either end of the corridor namely the CBD (central city) and the Bellville/Tygerberg node.

Within the central city, the current booming development trend is the conversion of old office buildings into upmarket residential apartments and the provision of new upmarket apartment blocks on greenfield sites. The Victoria and Alfred Waterfront is currently 50% developed, the balance of the proposed land use being offices, retail, hotel and residential uses. Other future developments within the CBD include incorporate office and residential uses. The Cape Town Partnership would also like to encourage lower income housing within the central city area, to create diversity and to place these people close to social and economic opportunities.

In the last decade, the Bellville/Tygerberg node has been the area of most rapid commercial growth in the metropolitan area. This growth is set to continue for the foreseeable future.

The corridor, between N1 City and the CBD, is bounded by a number of strategic vacant or partially developed sites. Development frameworks exist of a number of these sites and in the case of the Century City site, development rights have already been granted and are currently being exercised. A summary of the development potential of the N1 Corridor strategic sites is indicated in Figure 2.

In summary, the potential development along the corridor (excluding the development within the nodes on either end of the corridor) is predominantly commercial and residential in nature and could translate into housing for approximately 30 000 people (10 000 dwelling units) and 50 000 jobs⁽⁵⁾.

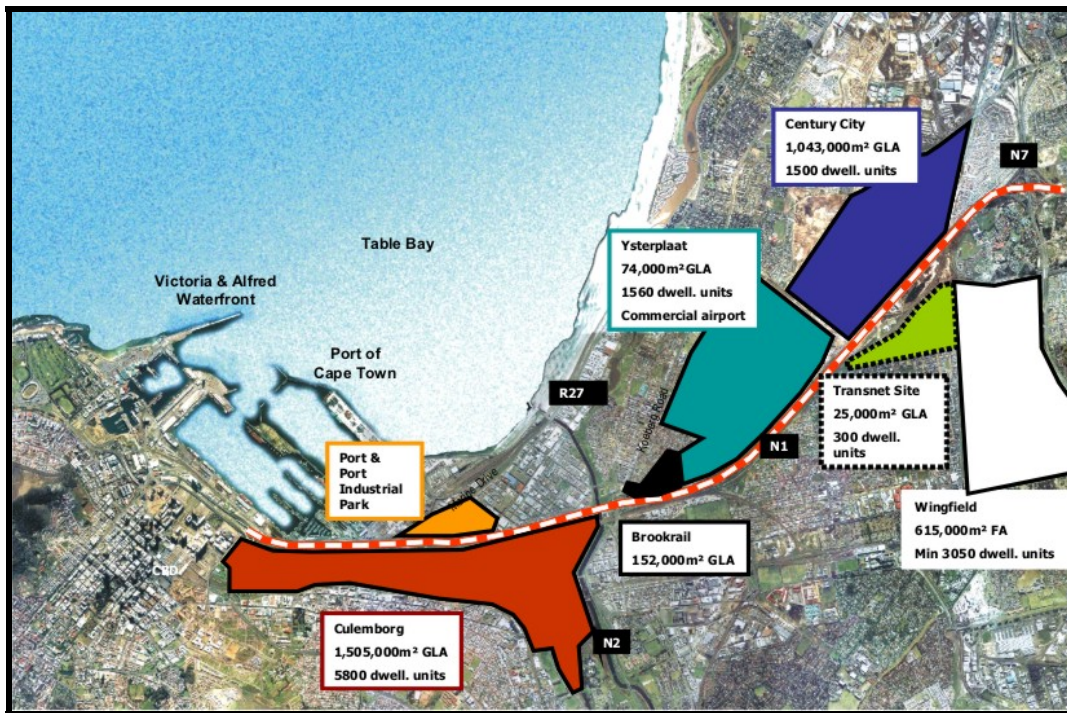


Figure 2. Summary of development potential of strategic sites.

4. THE LAND USE/TRANSPORT CHALLENGE

The N1 Corridor can be considered as a “corridor of economic opportunity” for the following reasons:

- It is a regional gateway to the metro area.
- It provides metropolitan mobility and intersects with important commuter, recreational and freight routes namely the N7, the M5 and Marine Drive (R27).
- It is strategically located metropolitan corridor linking two major nodes and a number of important sites, by both road and rail.
- It is the primary access to key areas of economic activity.
- The potential development of strategic sites within the corridor could generate 10 000 dwellings & 50 000 jobs (currently there are 120 000 jobs in CBD).
- The opportunity exists to provide the upgraded transport infrastructure to serve the corridor and unlock key sites, on a broad public-private partnership basis.

The implications of not implementing an integrated land use/transport plan for the corridor, together with a multimodal transport strategy for the corridor, are as follows:

- Mobility along the corridor and access to employment (both CBD & along the corridor) will be hindered.
- The economic competitiveness of the CDB and the Port will be eroded.
- The development of the strategic sites along the corridor will be compromised/ remain dormant , which in turn will lead to a low density city.
- The pace of decentralised development will continue.
- The desired increased public transport modal share will not be achieved.
- Regional air quality will continue to deteriorate due to increased private car usage in congested conditions.

In order for the central city to strengthen its position as the most important business, government, tourism and residential node in the metropolitan area in the foreseeable future and in order to safeguard the successful functioning of the Port of Cape Town, it is vital to ensure that the necessary transportation and other infrastructure is in place to support these developments and the much needed “employment generating development” that could take place along the corridor.

5. NATIONAL TRANSPORT POLICY AND INTERNATIONAL PRECEDENT

The Moving Ahead Transport Plan⁽¹⁾ stresses that the Provincial and National policies on transport have strongly advocated a “public transport first” approach to improving the mobility and access to employment of all citizens. A strategic investment plan has been formulated to achieve the above goal. Implications of not implementing this investment plan are given. Inherent in the investment plan, is an implementation of travel demand management (TDM) strategies i.e. strategies that maximise the people moving capacity of the transport system by increasing the occupancy of vehicles or by influencing the time of, or need to travel.

The key principles outlined in the Public Transport Component⁽²⁾ of the Moving Ahead Transport Plan are as follows:

- There should be political and institutional commitment to implementing policies that accelerate and sustain dedicated funding for a vastly improved and expanded public transport system, while restricting unsustainable growth in private car use through travel demand management measures.
- The rail system should remain the backbone of the metropolitan transport system.
- Where necessary, dedicated public transport lanes will need to be provided along movement corridors to provide priority to public transport vehicles.

National government policy on infrastructure development to support and encourage economic development has been aptly summarised by Ministers Alec Erwin and Jeff Radebe as follows:

“...even if we were to develop all of Africa’s 80 international and regional ports into paragons of efficiency and world-class standards, without a related push forward in our rail and road networks, any progress in ports would be short-lived” Minister Jeff Radebe⁽³⁾.

“Our transportation is strategic and has to be rapidly modernised and developed as an inter-modal system. A key aspect of ensuring increased investment is better investment and planning coordination with the major cities that start and end our logistics corridors.” Minister Alec Erwin⁽⁴⁾

The above policy statements indicate a drive towards infrastructure development with an emphasis on promoting fast, efficient and sustainable transport systems, in particular public and freight transport networks and services, incorporating both rail and road modes. Single occupant vehicle commuter travel will need to be kept in check through travel demand management strategies, especially where additional road capacity is provided to ensure efficient movement of business, freight, recreational and tourism traffic.

International precedent indicates that cities are looking for healthier, greener, smarter and traffic-free ways of commuting. Alternative modes to the “single occupant car” are being heavily promoted i.e. walk, cycle, carpooling and public transport. Cities are investing in alternative modes i.e. providing commuter rail, bikeways, busways, bus priority measures and transit lanes. However, it should be noted that strategic sections of urban freeways are still being planned and built to complement the integrated transport plan. Furthermore, cities are investing in education campaigns to inform commuters of “better, smarter, cleaner and cheaper” travel alternatives.

Internationally, cities have realised that additional freeway capacity is quickly consumed by latent demand for travel resulting in the reoccurrence of congestion shortly after the capacity upgrade. Certain cities have developed strategies that use congestion as an effective tool to promote alternative high occupancy modes of transport. These alternative strategies incorporate predominantly public transport alternatives and are primarily aimed at car restraint - particularly the single occupant vehicle. A fundamental principle in addressing future congestion is the provision of attractive alternative modes of transport for existing and potential future car users. Without providing an attractive alternative mode, car restraint can set off strong undesirable decentralisation forces, as commuters exchange places of work and/or residence, rather than shift to public transport.

6. AN INTEGRATED MULTIMODAL TRANSPORT STRATEGY

In order to meet the current and future transportation demands along the N1 corridor and at the nodes on either end of the corridor, the following integrated multimodal transport strategy for the corridor has been formulated⁽³⁾:

1. The provision of a range of attractive public transport options for the corridor

- The acceptance that the commuter rail network is the backbone to the public transport network and hence, the upgrading of the existing commuter rail service through investment in improvements to stations, rolling stock, quality of service, reliability and security.
- The identification and provision of managed (rapid transit) lanes and high quality bus service along the corridor to areas not served by rail.
- The provision of feeder services to both the rail and rapid transit route via integrated and seamless transfer interchanges/station precincts. Interchanges and stations would have to be equipped with secure park and ride facilities and bicycle lock up facilities.
- The promotion of transit oriented land use design at stations to ensure integration with other vibrant land uses i.e. shopping centres, hospitals, office parks, high density residential areas etc.

2. The provision of adequate mobility and accessibility to the CBD, the Port and the strategic sites

- The provision of public transport priority measures along the corridor to ensure high levels of mobility for public transport vehicles.
- The provision of high quality (rapid) public transport services to serve the corridor and its catchment area.
- The provision of lane balance to critical section of the N1 Freeway, thereby removing bottlenecks.
- The provision of capacity improvements to interchange ramps, merge and weave areas.

3. The provision of adequate access to strategic sites

- The promotion of the location of high intensity land-uses close to rail/bus stations, to minimise walking/cycling distances within the corridor.
- The upgrading of the existing interchanges and the provision of new/appropriately spaced interchanges to unlock the strategic sites.
- The identification of sections of the N1 Freeway where collector-distributor roads can facilitate desired levels of access to strategic sites, without compromising freeway mobility.

Inherent in the integrated multimodal transport strategy should be the implementation of modern land use management strategies and a broad range of travel demand management strategies. These strategies would require long term commitment from planning and transport authorities.

7. MANAGED (RAPID TRANSIT) LANES PROPOSAL

The concept of providing managed lanes adjacent to the N1 Freeway is currently being considered. A right of way has been defined along the corridor adjacent to the currently congested section of the N1 Freeway, between the CBD and Platteklouf Interchange (Refer to Figure 3). The managed lanes would have controlled access at specific points along the route and would only allow access to specific vehicles. The managed lanes would operate under free flow conditions at an operating speed of approximately 80 km/h.

The proposed use of the managed lanes is as Public Transport/High Occupancy Toll (HOT) lanes, which would allow access to the following vehicles:

- Public transport vehicles
- Toll paying high occupancy vehicles i.e. carpools & vanpools
- Toll paying low occupancy vehicles i.e. SOV's
- Emergency vehicles

An alternative proposal which is also being investigated is the use of the lanes by freight vehicles destined for the Port, together with the public transport vehicles, provided that the freight vehicles could operate above a minimum speed (not to delay public transport vehicles or disrupt the free flow conditions) and that the public transport stations are situated offline (not on the managed lane).

The benefits of the Public Transport/HOT lane proposal are:

- To provide a 30 minute travel time saving between Platteklouf Interchange & the CBD (distance of 16 km) during peak periods, when compared to travelling in the congested general traffic lanes.
- To provide a revenue stream from tolling private vehicle use in the lane, that could subsidise the public transport service along the lanes.
- The priority provided by the lanes will encourage ridesharing, thereby increasing vehicle occupancies on the corridor and promoting a public transport culture amongst commuters.
- To provide travel time benefits for public transport vehicles over private transport, thereby improving the efficiency of the corridor and improving the modal split by public transport.
- To provide a tool to manage the duration of congestion, thereby benefiting freight and business traffic.

Phase 1 of the managed lanes is between the CBD and Platteklouf interchange, while Phase 2 would extend the lanes from Platteklouf Interchange to the Durban Road interchange at the Bellville/ Tygerberg node.

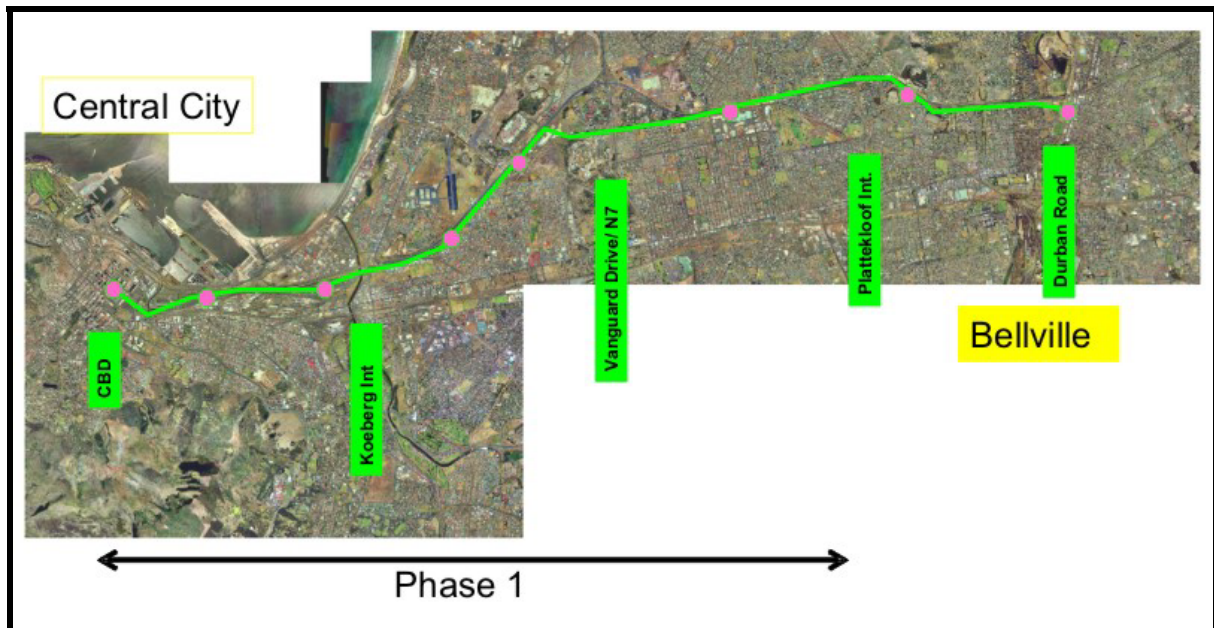


Figure 3. Conceptual alignment of managed lanes.

8. CONCLUSION

Development pressure along the N1 Corridor is growing steadily. Therefore, a conceptual plan incorporating the integrated multimodal transport strategy for the N1 Corridor is urgently required to provide a guide for the land use and transport authorities to adjudicate land use development proposals and to implement the necessary transport infrastructure projects to support these developments and to safeguard the future accessibility of the Central City and Port of Cape Town.

The integrated multimodal transport strategy for the N1 Corridor presented in this paper is in line with government policy, incorporates lessons learned from international precedent and if implemented will allow the N1 Corridor (and a significant portion of the City of Cape Town) to develop to its full potential in an environmentally sustainable manner.

9. REFERENCES

- [1] Cape Metropolitan Council, 1998, Moving Ahead: Cape Metropolitan Transport Plan: Part 1: Contextual Review
- [2] Cape Metropolitan Council, 1999, Moving Ahead: Cape Metropolitan Transport Plan: Part 2: Public Transport Strategic Component.
- [3] Department of Public Enterprises (DPE). 2004. Intermodal Africa 2004. Address by Minister Jeff Radebe to the Intermodal Africa 2004 Conference on 5 February 2004. <http://www.dpe.gov.za/dpe/home.asp?id=39>
- [4] Department of Public Enterprises (DPE). 2005a. Moving South Africa's Economy: A Public-private Partnership. Address to the 9th National Maritime Conference by Alec Erwin Minister of Public Enterprises on 17 March 2005. <http://www.dpe.gov.za/dpe/home.asp?id=330>
- [5] HHO Africa et.al, June 2003, Conceptual Planning of the N1 Corridor between the Monte Vista interchange and Cape Town: Interim Report