

**CROSS/
ROADS**
LINKING MOBILITY SOLUTIONS



IRF WORLD ROAD MEETING 2017

/ 14-17 NOVEMBER / DELHI / INDIA /

Upgrading of South Africa's National Route 3 Between Durban and Johannesburg

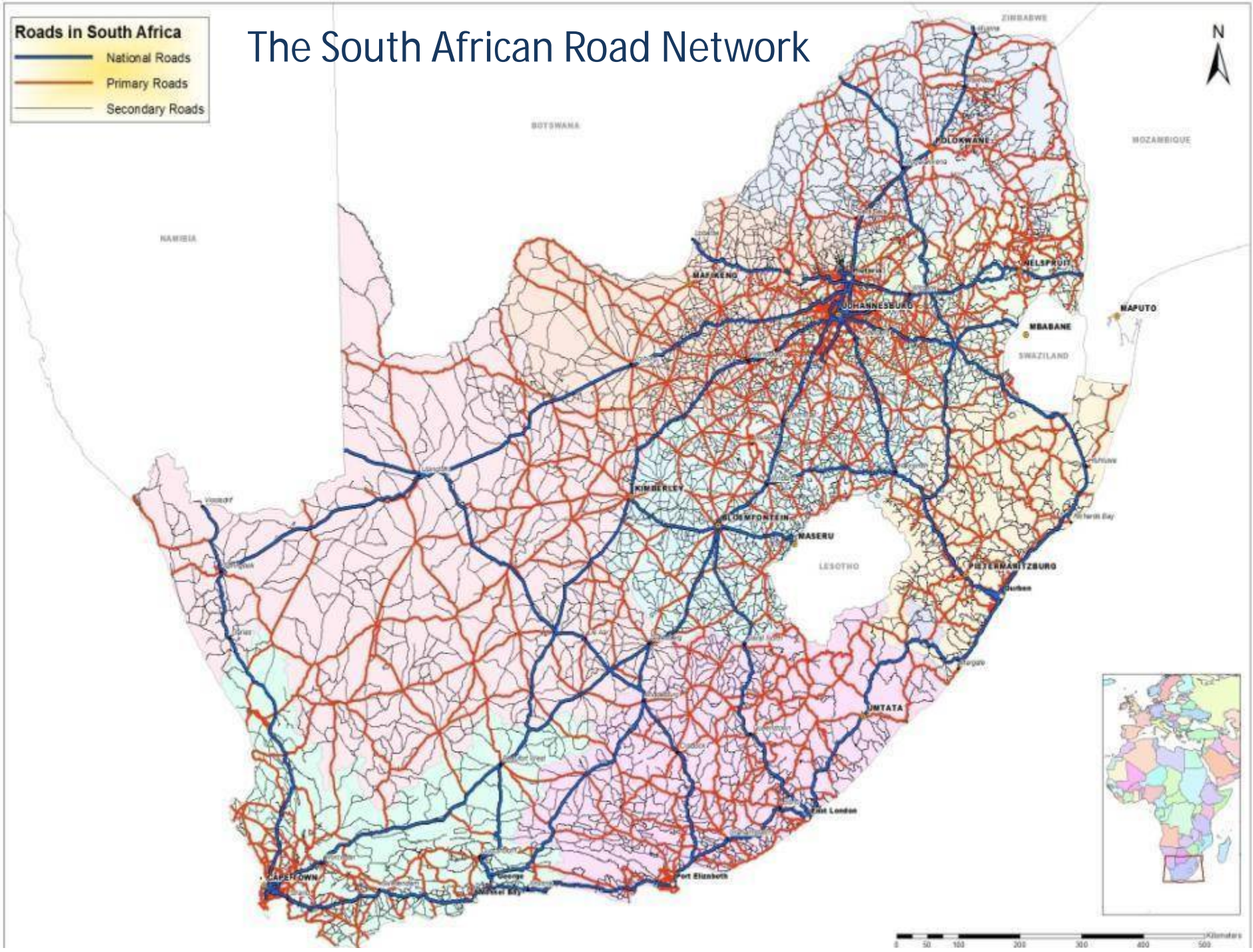


Ravi Ronny PrEng
Design and Construction Manager
SANRAL (South African National Roads
Agency Ltd)
Ronnyr@nra.co.za

Content

- The South African and National Road Network
- The National Development Plan
- Freight movement in South Africa
- Constraints on the corridor
- Planning for the N3 corridor
- Conclusions

The South African Road Network



The South African Road Network

Authority	Paved	Gravel	Total
SANRAL	21,946	0	21,946
Provinces - 9	46,805	226,273	273,078
Metros - 8	51,682	14,461	66,143
Municipalities	37,691	219,223	256,914
Total	158,124	459,957	618,081
Un-Proclaimed (Estimate)		131,919	131,919
Estimated Total	158,124	591,876	750,000

The South African Road Network

South Africa has the 10th Longest Total and 18th Longest Paved Road Network in the World

Roads Represents one of the largest public infrastructure investments in most countries

RSA Road Replacement Cost >R2 Trillion

Rank	Country	Road length (km)
	<i>World</i>	64 285 009
1	 United States	6 586 610
2	 India	4 689 842
3	 China	4 237 500
4	 Brazil	1 751 868
5	 Japan	1 210 251
6	 Canada	1 042 300
7	 Russia	982 000
8	 France	951 200
9	 Australia	823 217
10	 South Africa	750 000
11	 Spain	681 298
12	 Germany	644 480
13	 Sweden	572 900
14	 Italy	487 700
15	 Indonesia	437 759
16	 Turkey	426 906
...
34	 Dem Rep of Congo	153 497
45	 Zimbabwe	97 267
54	 Zambia	91 440
55	 Tanzania	91 049
70	 Madagascar	65 663
80	 Angola	51 429
72	 Namibia	64 189
98	 Mozambique	30 331
104	 Botswana	25 798
122	 Malawi	15 451
148	 Lesotho	7 438
161	 Swaziland	3 594
173	 Mauritius	2 066
193	 Seychelles	508
SADC Total		1 449 720

The National Development Plan

National Planning Commission identified major constraints in mapping current issues facing SA

NDP endorsed by Cabinet including National Infrastructure Plan

Cabinet decision to establish a body to integrate and coordinate the long term infrastructure build, namely the Presidential Infrastructure Coordinating Commission (PICC) with its supporting management structures

Through the PICC, Strategic Integrated Projects (SIP's) established.



The National Development Plan

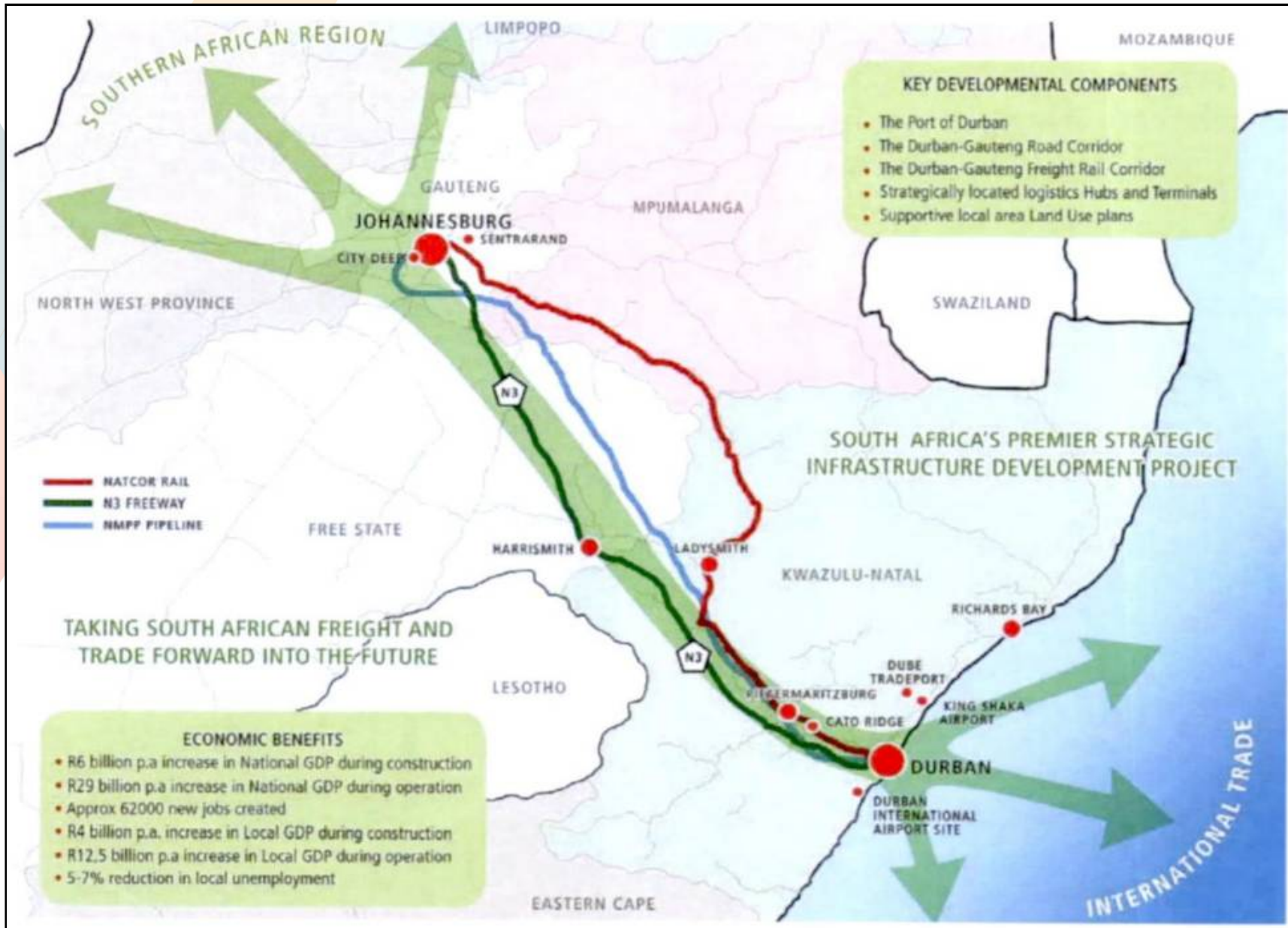
SIP 2: Durban- Free State– Gauteng Logistics and Industrial Corridor

Strengthen the logistics and transport corridor between SA's main industrial hubs; improve access to Durban's export and import facilities, raise efficiency along the corridor and integrate the Free State Industrial Strategy activities into the corridor and integrate the currently disconnected industrial and logistics activities as well as marginalised rural production centres surrounding the corridor that are currently isolated from the main logistics system.

- Economic Growth
 - Increase (4% Target, Current < 1%)
 - Reduce Logistics and Transport Costs
 - Improve Global Competiveness
 - Create Jobs
- Infrastructure Investment
 - Create Jobs
- Eliminate Bottlenecks

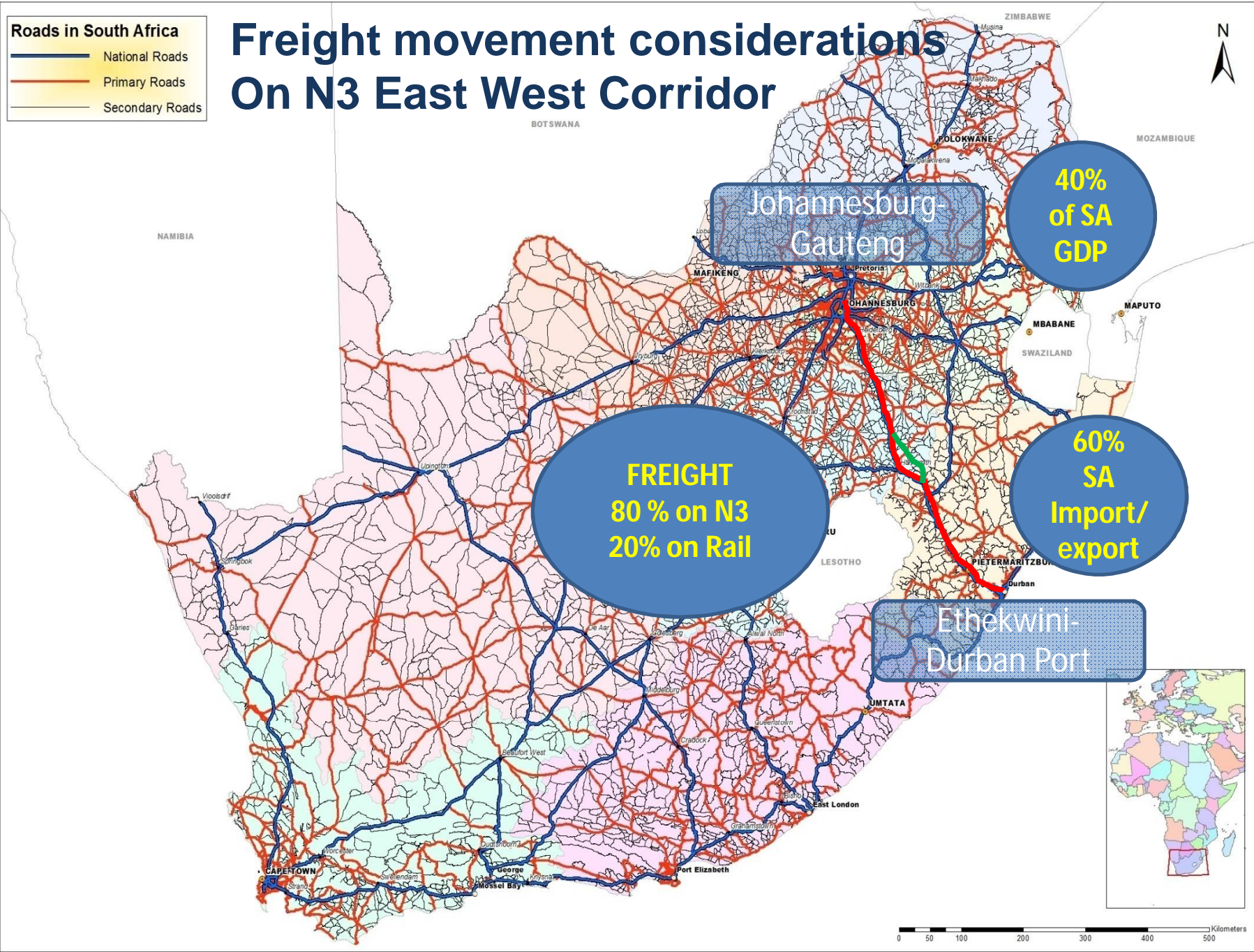


The National Development Plan – SIP2



- Roads in South Africa**
- National Roads
 - Primary Roads
 - Secondary Roads

Freight movement considerations On N3 East West Corridor



Johannesburg-Gauteng

40% of SA GDP

FREIGHT
80 % on N3
20% on Rail

60% SA Import/export

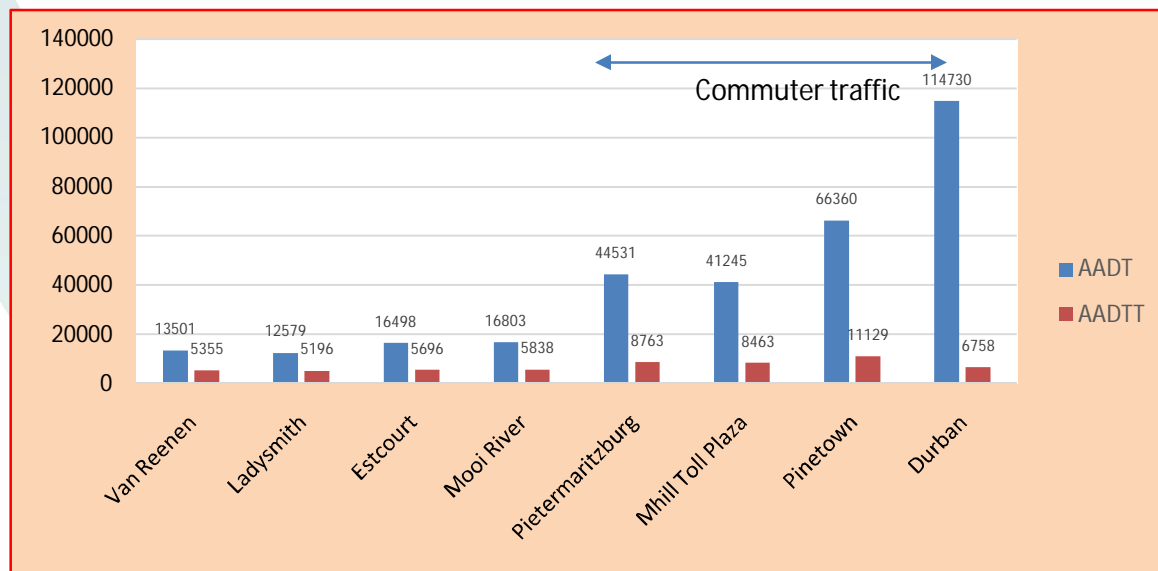
Ethekewini-Durban Port

N3 Road corridor planning



N3 Road corridor – Current Constraints – Traffic Volumes

Town	AADT	AADTT	%HV	%night
Van Reenen	13501	5355	39.7%	24.5
Ladysmith	12579	5196	41.3%	26.4
Estcourt	16498	5696	34.5%	22.4
Mooi River	16803	5838	34.7%	20.6
Pietermaritzburg	44531	8763	19.7%	12.2
Mariannahill Toll Plaza	41245	8463	20.5%	12.7
Pinetown	66360	11129	16.8%	11.4
Durban	114730	6758	5.9%	5.1



Freight Movement by Road in South Africa

NETWORK SECTION	FREIGHT COMMODITIES	ROAD TONNE (mt)
Gauteng-Durban	Containers, Steel, Cars, Coal, Manganese, Fuels, Perishables	44 (+33)
Gauteng-Cape Town	Cars, Grains, Containers, Perishables, Cement, Steel	15
Gauteng-Musina	Foods, Fuels, Vehicles, Cement, Perishables, Beverages	12
Gauteng-Tlokweng	Fuels, Cement, Containers, Vehicles, Food	6
Gauteng-Ressano	Mineral Ore, Fruit, Sugar, Timber, Cars, Paper	8
Cape Town-Namibia	Fish, Containers, Fertilisers, Cement, Machinery	4
Cape Town-Port Elizabeth	Cars, Fuels, Fruit, Perishables, Steel, Tyres	37
East London-Durban	Beverages, Foods, Fuels, Vehicles	6
Durban-Pongola	Containers, Fuel, Chemicals, Timber	7
Winburg-Harrismith	Maize, Livestock, Perishables, Steel, Containers	5.8
Gauteng-Upington	Foods, Cement, Steel, Machinery, Vehicles, Perishables	2.1
East London-Bloemfontein	Vehicles, Steel, Grains	1.2
George-Colesberg	Fuels, Grains, Perishables	1.6
Britstown-Nakop	Food, Cement, Steel, Machinery, Cars, Perishables	0.2
Gauteng-Swaziland	Beverages, Cement, Coal, Vehicles, Grains, Sugar	38
Thaba Nchu-Maseru	Containers, Fuel, Cement, Grains, Coal, Foods	3
Ermelo-Richards Bay	Coal, Steel, Timber, Chrome	0
Sishen-Saldanha	Iron Ore, Lead	0

(Source: Draft National Freight Logistics Strategy Review, March 2015)

- The N3 between KwaZulu-Natal and Gauteng is the busiest freight route in SA

Freight Movement by Road in South Africa

Year	2012	2020	2043
Road (Mta)	77	84	129
Rail (Mta)	27	84	132
Total (Mta)	104	168	261
Road %	74.0	50.0	49.4
Rail %	26.0	50.0	50.6

- Transnet's medium to long term road to rail strategy will still have substantial volumes of freight volumes on road

Current Constraints on Road Corridor



Current Constraints on Road Corridor



Current Constraints on Road Corridor

Camera 207



N3 Cam155



Camera 156



Camera 208 - Recorded



Current Constraints on Road Corridor

Camera 140 ... Exit



Camera-140



N3 Camera 139



Camera 141 ... e J/C



Current Constraints on Road Corridor

Car carrier truck overturns, scatters load of vehicles on the N3 in KZN
9 Dec 2016



The Witness

NOVEMBER 10, 2016

Townhill crash kills three

Two found at scene and third the next day, 100 metres away down bank

AMIE UMSAW

THE WITNESS reported in our special double cover the weekend after it took both those young boys to their final resting places. The 19-year-old boy, aged between 20 and 25, was identified as a member of the 25th South African Infantry and his 24th birthday was on the day of the crash.

It is believed the children were travelling from one friend's home to another in a car that was carrying a load of vehicles. The car was carrying a load of vehicles, including a car, a van and a truck. The car was carrying a load of vehicles, including a car, a van and a truck. The car was carrying a load of vehicles, including a car, a van and a truck.

CRASH AREA WELL KNOWN FOR GRUESOME VEHICLE ACCIDENTS

Townhill has a reputation for nasty vehicle accidents. Last month, two people were killed, one seriously injured when their car crashed several metres down an embankment along the N3 in Townhill. Two last month, Gray's, hospital in the same vicinity as Friday's crash, a day after a report was filed and another left seriously injured when their car crashed several metres down an embankment along the N3 in Townhill. Two last month, Gray's, hospital in the same vicinity as Friday's crash, a day after a report was filed and another left seriously injured when their car crashed several metres down an embankment along the N3 in Townhill.

OUR VIEWPOINT UPGRADE FOR 'MOST FEARED HILL' URGENT

Est 1846 The Witness KwaZulu-Natal May 16, 2016

TOWNHILLS notorious reputation is well deserved. On Friday evening three young men died when their vehicle overturned on the N3 at Townhill. Apparently, speed was a factor in the accident but often it is a combination of unroadworthiness, negligent and reckless driving, speed and drunk driving that results in catastrophic consequences on steep declines like Townhill.

Brake failure also played a role in the tragic loss of life on Hill's Hill when a truck stalled into stationary taxis and cars in use of Kwa-Zulu-Natal's worst accidents. Last month two people were killed after a petrol tanker crashed and exploded on the N3 at Townhill. A day later a man died when a truck driver apparently lost control of his vehicle on the same stretch of road.

Regular Witness letter writer Lou Corbett, a retired K11 traffic officer, recently wrote a letter to the paper and spoke of his experiences of accidents on the hill leading into New Hanover from Greytown, at Hill's Hill. Van Bensch's Pass and Townhill – describing the latter as “the most feared hill in the province because of its long descent and notoriety for heavy vehicle collisions”.

“There are too many heavy vehicles operating on our major routes putting motorists lives at stake, and when road engineers plan routes for new roads and highways, they should plan a route where steep hills are avoided, even if it does cost more to build,” he wrote.

The South African National Roads Agency (SANRAL) is working on a R25 billion project to improve the N3 between Durban and Cetara, outside Pietermaritzburg.

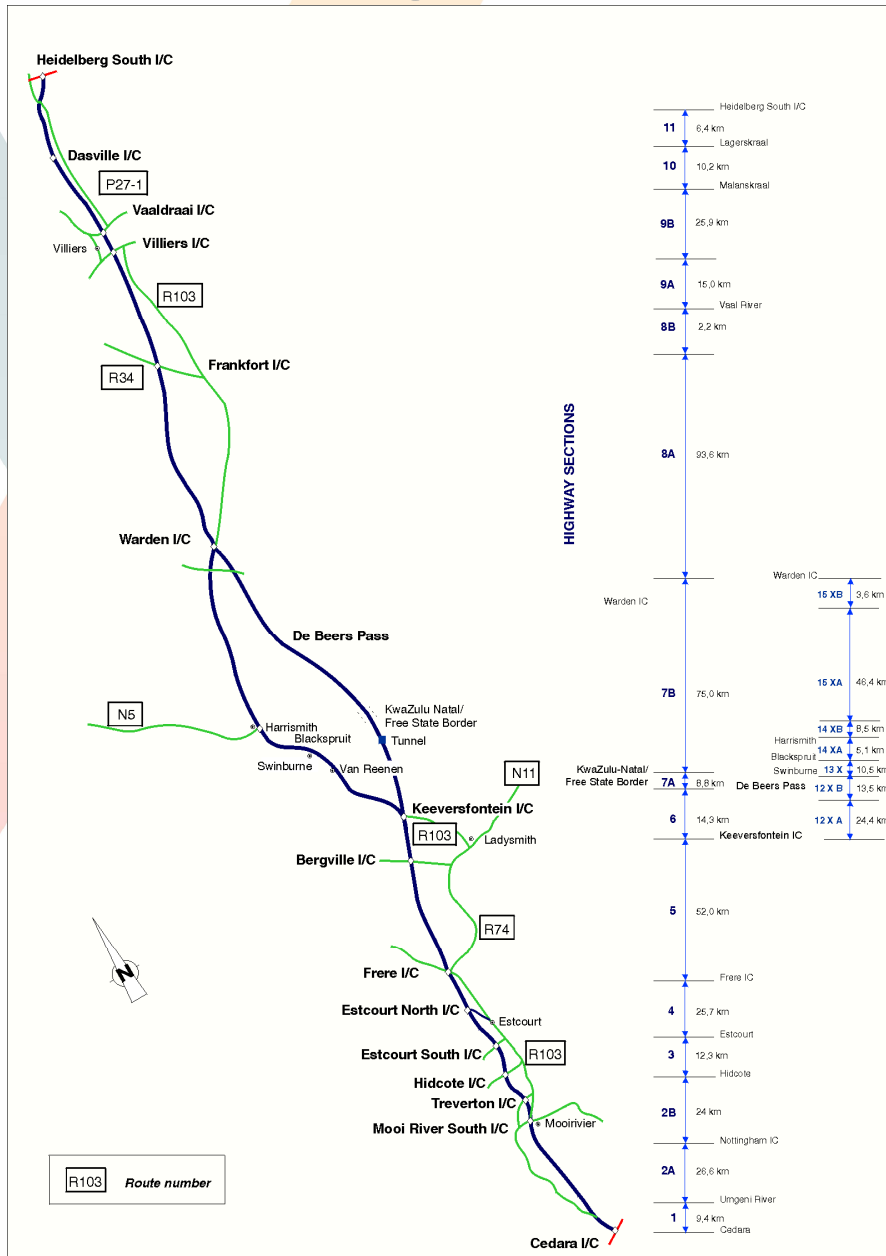
With sink holes common on Townhill, adding to the danger factor on the road, the option of building tunnels along the Townhill section of the N3 was being “explored”, Samral said.

Samral said the project was necessary because of “substantial” delay and safety concerns along the N3 between the two cities, rising volumes of freight and increased travel between the Midlands and Durban.

The R440 million upgrade of the N3 on the hill is expected to be completed in June this year.

Hopefully these upgrades on Townhill and other notorious hills in KZN will make the roads safer for the tens of thousands who travel every week. Motorists and other drivers cannot continue to risk their lives every time they use the road.

Planning of the N3 Corridor – N3 Toll Concession



- 30 Year Concession 1999 - 2029
- 415 km network on N3
- A significant portion of the Johannesburg to Durban road corridor
- 1668 lane kilometres
- Approximately R9,141 billion to be spent over next 15 years (\$634 million)

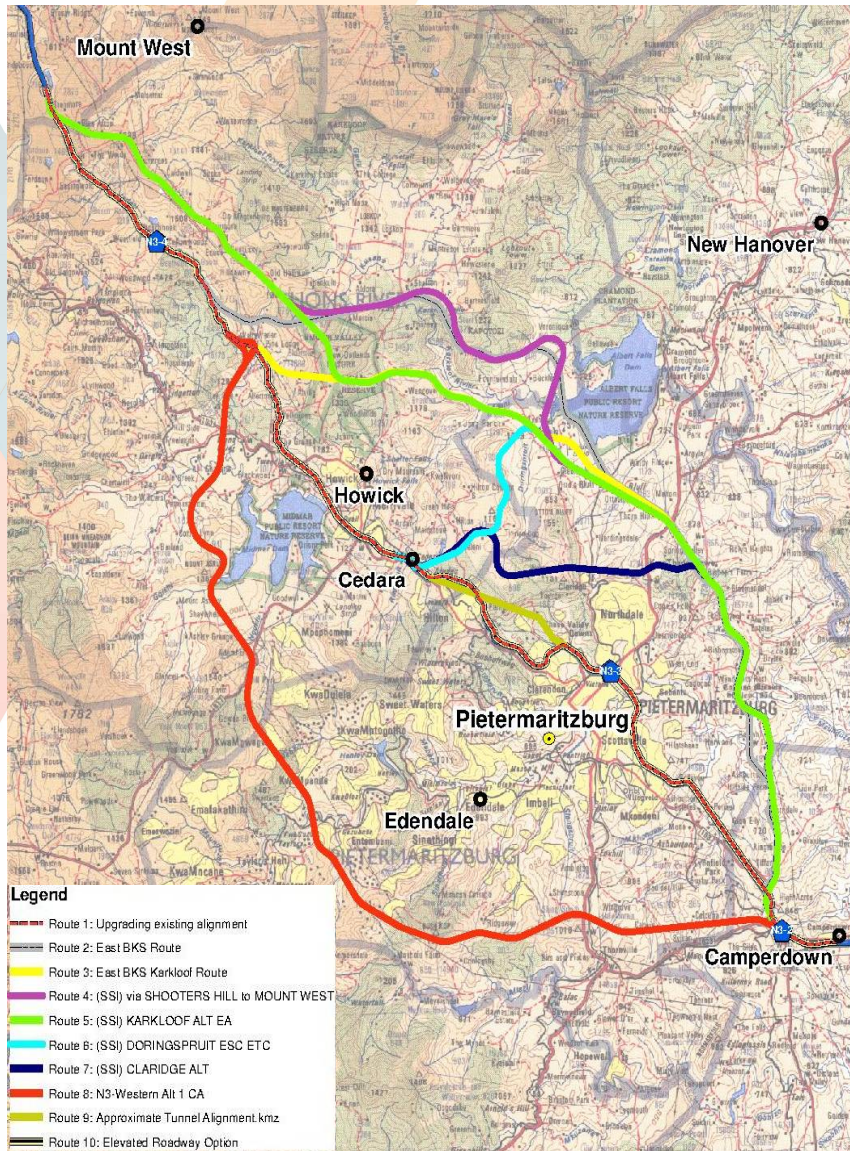
Planning of the N3 Corridor – Durban to Cedara



Planning of the N3 Corridor – Key Ridge Realignment



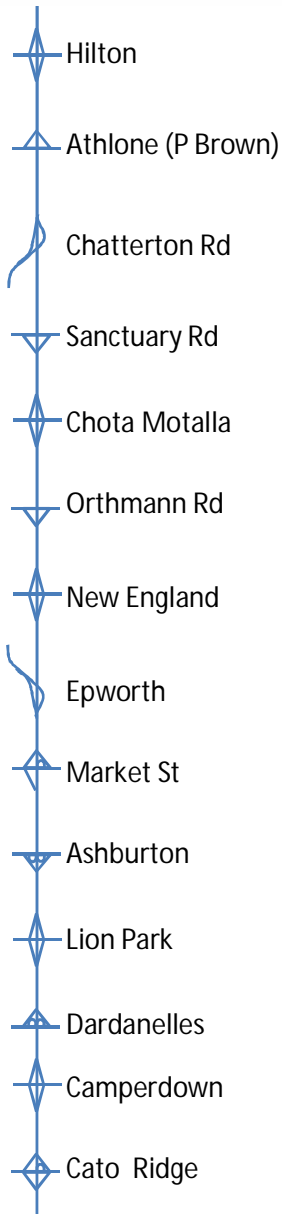
Planning of the N3 Corridor – Townhill Realignment



Route Location Study:

- Routes identified and analyzed according to:
 - Length
 - Environmental screening
 - Economic Analysis
- Routes assessed according to impact on:
 - Existing infrastructure
 - Land use

Planning of the N3 Corridor – Current Four lane Dual Section



Existing Lanes		2010			2017			2022			2027		
From Interchange	From Interchange	AADT (PCU)	Existing Lanes		AADT (PCU)	Existing Lanes		AADT (PCU)	Existing Lanes		AADT (PCU)	Existing Lanes	
			PH V/C	LOS		PH V/C	LOS		PH V/C	LOS		PH V/C	LOS
Hilton	Cedara	52 800	0.43	B	72 400	0.59	C	86 400	0.71	C	100 400	0.82	D
Athlone	Hilton	56 400	0.46	B	77 100	0.63	C	91 800	0.75	D	106 500	0.87	D
Chatterton	Athlone	46 600	0.38	B	63 100	0.52	C	74 800	0.61	C	86 600	0.71	C
Sanctuary Rd	Chatterton	32 300	0.27	A	43 600	0.36	B	51 700	0.42	B	59 700	0.49	B
Chota Motalla	Sanctuary Rd	62 200	0.38	B	80 400	0.50	C	93 300	0.57	C	106 300	0.65	C
Orthmann Rd	Chota Motalla	49 700	0.61	C	64 700	0.80	D	75 500	0.93	E	86 200	1.06	F
New England	Orthmann Rd	66 800	0.82	D	86 900	1.07	F	101 300	1.25	F	115 700	1.43	F
Epworth	New England Rd	54 400	0.67	C	72 000	0.89	D	84 600	1.04	F	97 200	1.20	F
Market St	Epworth	66 300	0.82	D	86 600	1.07	F	101 000	1.24	F	115 500	1.42	F
Ashburton	Market Rd	56 500	0.70	C	74 100	0.91	D	86 700	1.07	F	99 300	1.22	F
Lion Park	Ashburton	56 800	0.70	C	74 700	0.92	E	87 500	1.08	F	100 300	1.24	F
Dardanelles	Lynnfield Park	59 100	0.73	C	78 000	0.96	E	91 600	1.13	F	105 100	1.30	F
Camperdown	Dardanelles	55 100	0.68	C	72 400	0.90	E	84 700	1.04	F	97 000	1.20	F
Cato Ridge	Camperdown	55 300	0.68	C	71 900	0.90	E	83 800	1.03	F	95 600	1.18	F

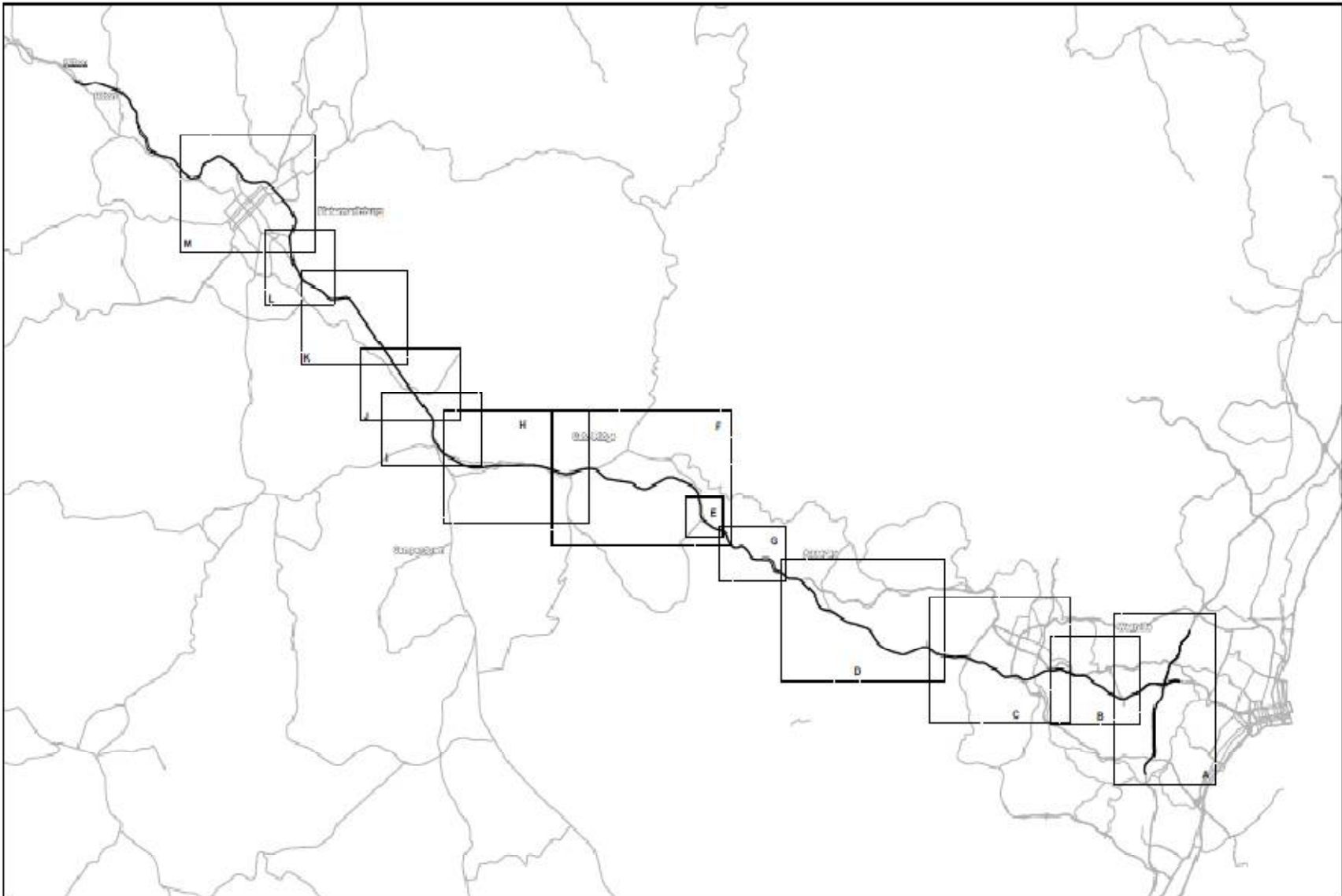
Planning of the N3 Corridor

- Considering a 35 year planning horizon up to 2047 to tie in with port upgrade plans.
- Need a phased approach – funding limitations.
- Route being assessed holistically as the Durban-Free State – Gauteng Freight Corridor together with NDoT, Transnet, provinces, and municipalities.
- Ensuring capacity meets future demands when required.
- EThekweni Municipality also considering alternative accesses into the current /new planned port

Planning of the N3 Corridor

- Addition of 2 and 3 lanes per direction resulting in a eight to ten lane freeway over a distance of 84km.
- Median consisting of a concrete barrier with drainage.
- Road surface of asphalt and/or concrete over most sections due to loading from heavy vehicles.
- Upgrading of twenty interchanges.
- Ninety five underpass/overpass bridges required to be upgraded.
- Ring road around Pietermaritzburg is being investigated.
- Key Ridge Re-alignment to reduce steep grades and straighter alignment.
- 36 -42 month construction duration on various packages.

Planning of the N3 Corridor – Work Packages

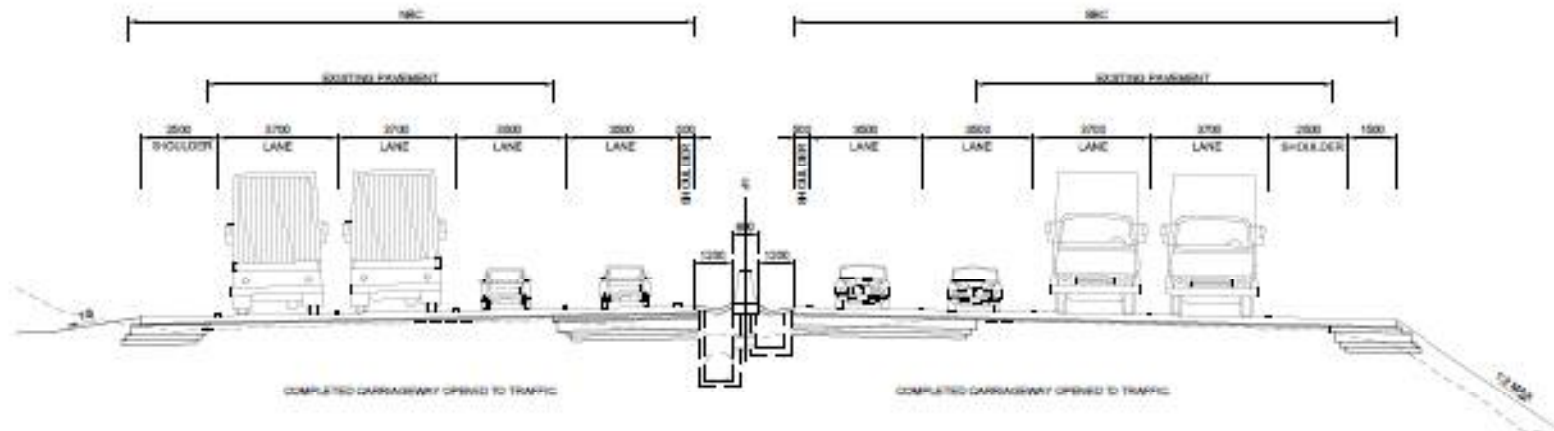
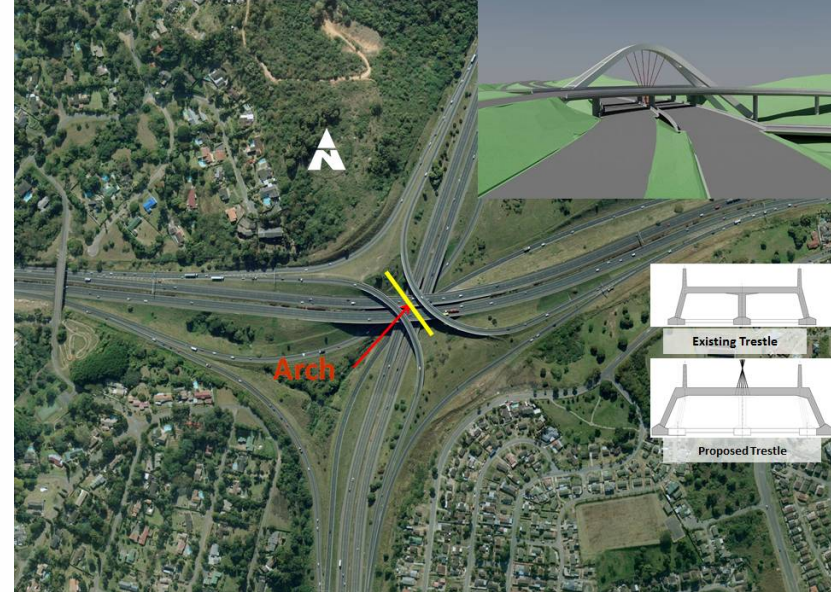
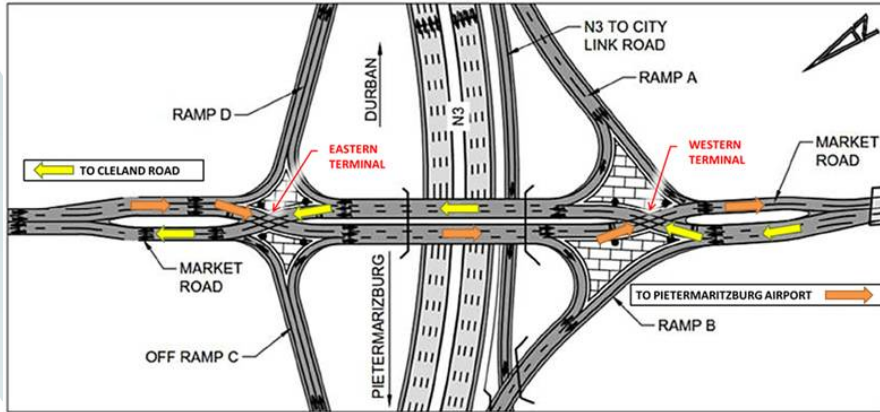


Planning of the N3 Corridor – Work Packages

PACKAGE	DESCRIPTION	LENGTH KM	NO. OF NEW BRIDGES/ WIDENINGS	I/Cs TO BE UPGRADED	DETAIL DESIGN STATUS	LAND ACQUISITION
A	EB Cloete (including portion of N2 North and N3 West)	6,3	10	1	Complete	Commenced
B	Westville Viaduct (Km11.8) to Paradise Valley (Km17.5)	5,7	13	2	90%	Commenced
C	Paradise Valley (Km17.5)-Marianhill Toll Plaza	7,5	5	3	30%	Commenced
D	Marianhill Toll Plaza (25) to Key Ridge (2.8)	11,1	9	2	55%	Commenced
E	Hammarisdale I/C upgrade (Km 9.4)	0	1	1	Construction	Commenced
F	Hammarisdale (9.1) to Cato Ridge (20.1)	11,3	3	-	35%	Commenced
G	Keyridge (Km2.8) to Hammarisdale (Km 8.1)	5,3	4	-	70%	Commenced
H	Cato Ridge (Km19.4) to Dardenelles I/C (Km26.6)	7,2	6	2	65%	Commenced
I	Dardenelles I/C (26.6) to Lynnfield Park (Km 30.6)	4	4	1	30%	Commenced
J	Lynnfield Park (Km 30.6) to Asburton I/C (Km 1.5)	5,3	4	1	40%	Commenced
K	Asburton I/C (Km 1.5) to Murray Road (Km6.1)	4,6	2	1	55%	Commenced
L	Murray Road (Km 6.1) to New England Rd I/C	2,9	9	2	25%	Commenced
M	New England Rd I/C to Twickenham Road (Km16.4)	7,5	8	4	25%	Commenced
TOTAL		79,3	78	20	47%	

- Estimated to cost approximately R23 billion (2017) – \$1,6 billion
- High level costs based on Prelim Design only

Planning of the N3 Corridor – Innovations



Planning of the N3 Corridor – Economic Analysis

- Based on the current traffic volumes, with no upgrading, cost to society R1,1 billion per annum. Due to high value of cargo transported on the N3, an accident resulting in closure will cost R340,000/hour.
- Reduction in local unemployment rates currently varying between 24% to 30%.
- The results of the cost benefit analysis is indicated in Table below.

	WITHOUT TOLLING	WITH TOLLING
Costs (Rm)	19 423	20 201
Benefits (Rm)	70 318	70 166
NPV	50 894	50 065
BCR	3.6	3.5
IRR	22.8%	22.2%

- Funding availability for the corridor upgrade is however a major risk as tolling very sensitive to both the public and politicians. Funding options to still be explored are Fuel levy (national, provincial or local), User Pay (tolling and mixed funding), Shadow tolling (borrowing from private sector and paid back through Treasury).

Planning of the N3 Corridor – Planning Work stream



Joint Project Delivery on Corridor



Conclusions

- Durban is by far South Africa's busiest port (over 40 % of imports and exports with over 80% moving along this corridor by road).
- Gauteng is South Africa's economic heartland (Over 40 % of GDP).
- Hence, the N3 highway and complimentary modes are vital for South Africa's economy and economic growth.
- Transnet need to aggressively move freight from road to rail
- Insufficient Funding for major upgrades on N3 corridor – in excess of R23 billion.
- SA National government, provinces and municipalities affected by N3 corridor need to jointly deliver project for benefit to all
- Need a good quality supplementary road network to national network in urban areas – both local and provincial roads.

Thank You

