



ROAD PAVEMENTS  
FORUM

# WELCOME ONLINE

Tuesday, 16 May 2023

# PROGRAMME



Chairperson: Tom McKune

## KEYNOTE SESSION

**The SAICE Infrastructure Report Card with reference to the Road Pavement**  
Friedrich Slabbert

**Progress with N2/N3 Corridor Upgrade Projects**  
Ravi Ronny

**N2/N3 Contracts Feedback**  
Krishna Naidoo

**Introduction to ASPASA Director:** Letisha van den Berg

**N3TC Retired Engineering manager shares lessons learnt**  
Douglas Judd

MATERIALS AND LABORATORIES:  
**LTPP Results of EME placed on South Coast Road**  
Dr. Julius Komba

**SANS 1083**  
Herman Marais and Bryan Perrie

**Ensuring Quality Results from Site Laboratories**  
Barry Pearce

**TRH24 – Upgrading of Unpaved Roads**  
Gerhard Fourie

CONFERENCES AND EVENTS:  
**RMF Feedback- April 2023** : Phil Hendricks  
**PIARC – Prague 23** : Nazir Alli / Randall Cable  
**CAPSA 2023** : Mahendren Manicum  
**ConPaveStruc23**: Krishna Naidoo

**RESOLUTIONS**

# The SAICE Infrastructure Report Card with reference to the Road Pavement Conditions

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Past Chairman of the SAICE Transport Division

16 May 2023

# Content of the Presentation

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- A. Background to the SAICE Infrastructure Report Card
- B. Sources of Information
- C. South African Road Lengths
- D. Road Condition Reporting
- E. Conclusions
- F. What holds the future?

# Disclaimer

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- Best available information used and scientific assessment of all road conditions will have an impact on the information shared

# A. Background to the SAICE Infrastructure Report Card (IRC) (1/6)

- Commenced in 2006 with the release of an IRC on Infrastructure at approximate 5-year intervals
- The 2022 IRC is the fourth produced following on from the 2006, 2011 and 2017 editions
- It reflects the expert view of SAICE and its members on the current condition of a broad range of public infrastructure
- The 2022 edition covered 13 infrastructure sectors with a total of 32 sub sectors of infrastructure
- All research work was done by volunteers

# A. Background to the SAICE Infrastructure Report Card (IRC) (2/6)

- Considering roads, five (5) sub sectors are summarised:
  - National Roads
  - Paved provincial roads
  - Paved roads in metropolitan areas
  - Paved roads in other municipalities
  - Unpaved provincial and municipal roads
- This grouping was maintained in 2022, although it is believed that it should be revised for future editions
- Gravel roads in provincial, metropolitan areas and other municipalities should each be reported separately
- Proposed to report seven sub sectors for the next edition

# A. Background to the SAICE Infrastructure Report Card (IRC) (3/6)






A	B	C	D	E
WORLD-CLASS	FIT FOR THE FUTURE	SATISFACTORY FOR NOW	AT RISK OF FAILURE	UNFIT FOR PURPOSE
<p>Infrastructure is comparable to the best internationally in every respect. It is in excellent condition and well maintained, with capacity to endure pressure from unusual events.</p>	<p>Infrastructure is in good condition and properly maintained. It satisfies current demands and is sufficiently robust to deal with minor incidents.</p>	<p>Infrastructure condition is acceptable, although stressed at peak periods. It will need investment in the current Medium-Term Expenditure Framework (MTEF) period to avoid serious deficiencies.</p>	<p>Infrastructure is not coping with demand and is poorly maintained. It is likely that the public will be subjected to severe inconvenience and even danger without prompt action.</p>	<p>Infrastructure has failed or is on the verge of failure, exposing the public to health and safety hazards. Immediate action is required.</p>

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# A. Ba In

- The 20

ROADS	
<b>B</b> for national roads 	<p>Of the nation's network of approximately 750 000 km of roads, SANRAL controls 21 403 km and maintains them to a high standard. The proportion in "poor" to "very poor" condition has crept slightly above the international benchmark of 10%, mainly due to the further acquisition of provincial roads in poorer condition. Constraints on funding due to revenue shortfalls in toll operations may affect operational and maintenance requirements. Despite this, the overall change in condition of the national roads has shown an increase in "good" and "very good" sections.</p>
<b>D</b> for paved provincial roads 	<p>A slight improvement in the paved provincial network score is due in part to the shifting from "fair-good" in 2011 to "good-very good" in Gauteng. Over 90% of sections in the Western Cape are either "fair", "good" or "very good", maintaining their standard. However, the condition in other provinces remains precarious or is deteriorating. There is a risk of further deterioration due to vehicle overloading, poor maintenance and the reduction of skilled personnel in provincial departments.</p>
<b>C-</b> for paved metropolitan roads 	<p>Regarding municipal roads, data on asset management is difficult to come by, even for municipalities that might have sound practices in place for their road systems. A particular issue is the difficulty in discovering to what extent monitoring is conducted and, if it is, to what extent this is used for effective asset management. Furthermore, the data (as for so much of the infrastructure in this report) is not readily available to the public, and it is not conveniently accessible in a form that permits comparison across municipalities or against good practice standards.</p>
<b>D-</b> for other paved municipal roads 	
<b>E</b> for provincial, metropolitan and municipal gravel roads 	<p>South African gravel roads constitute 75% of the road network. There has been some improvement in the Western Cape, contrasted with extraordinary deterioration in the North West Province.</p> <p>Due to neglect, gravel roads are generally in a very unhealthy condition, with between just 2% and 12% in the "good" to "very good" condition, depending on the province. By contrast the "poor" to "very poor" condition applies to 40% to 90% of the category.</p>

# A. Background to the SAICE Infrastructure Report Card (IRC) (5/6)

- Summary of the SAICE 2021/2 Roads assessment illustrated
- Notice the snail paths
- Also, some smaller errors in the report e.g. the snail path of national roads
- The concern with this reporting is that the good and poor areas are all grouped together resulting in “not to serious situation”
- The purpose of this presentation is to show pockets of excellence or otherwise

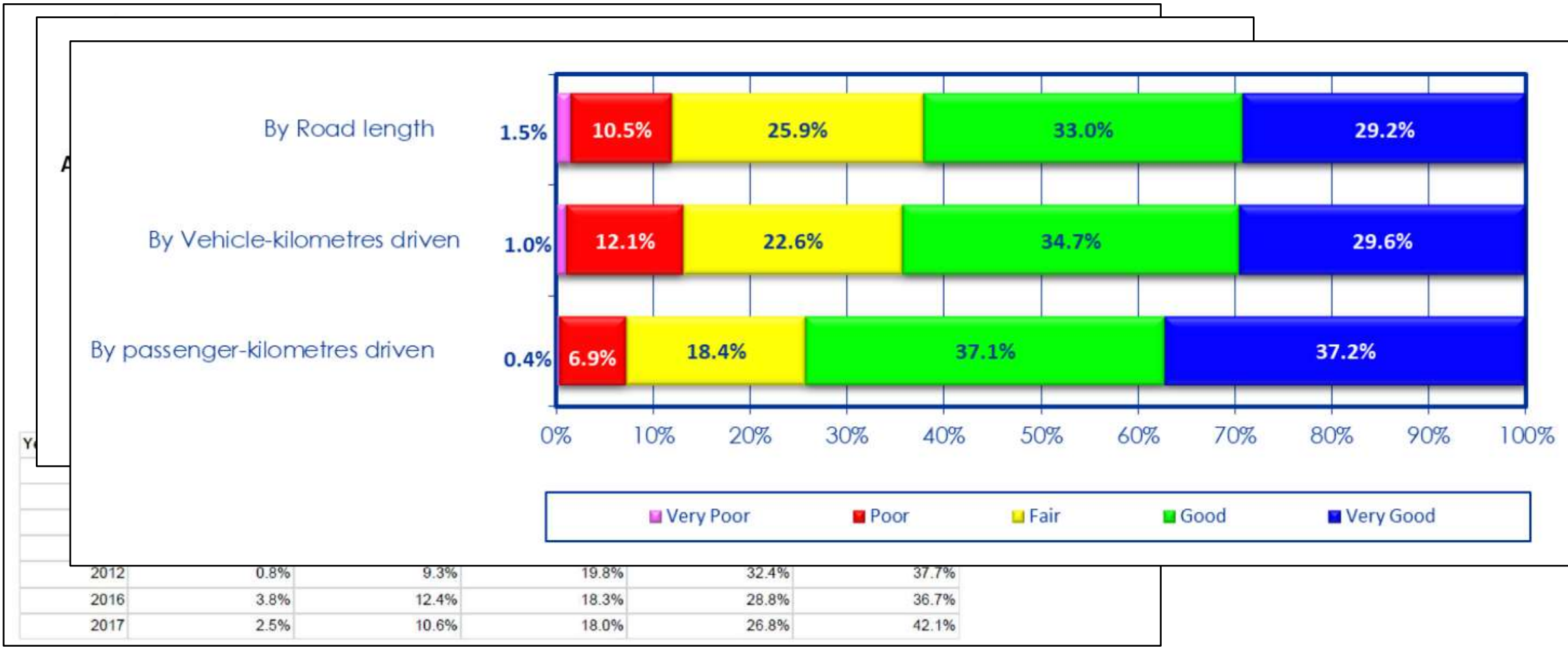


# A. Background to the SAICE Infrastructure Report Card (IRC) (6/6)

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- <https://saice.org.za/downloads/SAICE-2022-Infrastructure-Report-Card.pdf>

# B. Sources of Information: What is the requirement? (1/9)



## B. Sources of Information (2/9)

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- The sources of road condition data were required from national, provincial, metropolitan and district road agencies
- The data date considered was for condition surveys from 2018 to 2020
- Limited data for districts were obtained, despite numerous telephonic and written requests by SAICE considering the content of Division of Revenue Act stating the requirement for annual condition returns
- In the Western Cape, the district roads are the responsibility of the province, while the districts are responsible for the maintenance and those detailed reports were available but due to the non comparison with other districts, the attempt to report on district conditions were dismissed

## B. Sources of Information (3/9)

- Although it is a requirement to submit annual reports reflecting the condition of roads by all roads authorities, it was a major struggle to obtain the relevant information to compile the IRC roads sector research report
- Road lengths as reported in different reports reflect different lengths for the same authority, although these reports were compiled within the same year
- The reports shared, were inconsistently reflecting relevant information as is the requirement by Treasury has a specific requirement of what needs to be reported

## B. Sources of Information from Authorities (4/9)

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- 1 x national: SANRAL
- 9 x provinces
- 8 x metropolitan areas
- 48 x district municipalities
  
- 66 authorities with no one controlling authority
  
- Conducting condition assessment appear to be dependant on the political will and skills available in the authority...

## B. Sources of Information: National and Provincial (5/9)

- Authorities were generally reluctant to make network reports available, which is worrying and frustrating
- This was a sad finding of the research work performed
- Comprehensive Road Asset Management System (RAMS) reports were received from:
  - South African National Roads Agency SOC Limited (SANRAL) [Integrated Report 2021
  - Mpumalanga 2019 assessment report
  - Western Cape 2019 assessment report



## B. Sources of Information: Metropolitan (6/9)

- Again, authorities were generally reluctant to make network reports available, although these were promised by some
- This too was a sad finding of the research work performed
- Comprehensive Road Asset Management System (RAMS) reports or high level summary reports were received from:
  - City of Cape Town 2019 condition assessment as reported in the Comprehensive Integrated Transport Plan (CITP 2018-2023)
  - eThekweni Metropolitan Municipality (eMM) Strategic Road Maintenance Needs Report for paved roads (2018)
  - Mangaung Metropolitan Municipality (MMM) 2019 Consultant's presentation
  - Nelson Mandela Bay Metropolitan Municipality 2015 assessment for paved roads

## B. Sources of Information: Non Scientific Reports (7/9)

- Metropolitan sources either contained in a presentation of extracted from the provincial annual financial reports (some from different reports) with varying content concerning quantitative and qualitative information:
  - Buffalo City 2020/21 – Annual report
  - City of Ekurhuleni Metropolitan Municipality (EMM) 2020/21 – Annual Report only road lengths
  - JRA 2020 presentation on paved road conditions
- No information received from City of Tshwane – research relied on press releases

## B. Sources of Information: Non Scientific Reports (8/9)

- Provincial sources either contained in a presentation of extracted from the provincial annual financial reports (some up to four different reports) with varying content concerning quantitative and qualitative information:
  - Eastern Cape 2020, only total road length
  - Free State 2021, only total road length
  - Gauteng 2015, 2020/21 report using 2015 data
  - KwaZulu-Natal 2020/21 – Annual Report
  - Limpopo 2018 and 2020 summary reports – Presentation and Annual Report
  - Northern Cape 2020/21 – Annual Report and Vote 05 Report
  - North West 2020/21 – Annual Report

## B. Sources of Information: What could be used for comparison purposes? (9/9)

- The international benchmark for road network length in a “poor and very poor condition” is less than 10%
- This parameter was then used to compare and rate networks in line with the SAICE’s rating, i.e., less than 10% would then be either an A or B

# C. South African Road Lengths (1/8)

Table. An overview of the South African road network


Authority	Paved	Gravel	Total
Sanral	21 403	0	21 403
Provinces - 9	47 348	226 273	273 621
Metros - 8	51 682	14 461	66 143
Municipalities	37 691	219 223	256 914
<b>Total</b>	158 124	459 957	618 081
<b>Un-Proclaimed (Estimate)</b>		131 919	131 919
<b>Estimated Total</b>	158 124	591 876	750 000

\* rounded estimate

# C. South African Road Lengths – As reported by Department of Transport (2/8)

An overview of the South African road network

Authority	Paved	Gravel	Total
SANRAL	21 403	0	21 403
Provinces - 9	47 348	226 273	273 621
Metros -8	51 682	14 461	66 143
Municipalities	37 691	219 223	256 914
Total	158 124	459 957	618 081
<b>Unproclaimed (Estimate)</b>		131 919	131 919
Estimated Total (rounded)	158 124	591 876	750 000



# C. South African Road Lengths – As found through SAICE research – National roads (3/8)

- SANRAL: **22 253** km approximately 4% more than DoT
- As SANRAL takes over increasingly more provincial roads every year due to numerous strategic reasons – DoT and Treasury need to be aware that the increased road lengths require more resources, both financial and institutional
- SANRAL report in Business News of 9<sup>th</sup> May 2023: **‘End of the road’ for South Africa**
  - National road agency SANRAL says it has hit a *“fiscal cliff”* and can no longer expand the roads under its purview nor fully address the growing backlog of maintenance required to bring them up to standard
  - Meanwhile, the national government is marching ahead with plans to move some of the most neglected provincial roads into the SANRAL portfolio – making matters worse
  - In its Annual Performance Plan for the 2023/24 financial year, the road agency said it had reached the stage where it needs to take *“rational and prudent decisions”* regarding its road network growth, as well as review how much support it can give to other road authorities and how many roads it can incorporate from other spheres of government

# C. South African Road Lengths – SAICE research – Provincial network (4/8)

Authority	Road Length (km)		
	Surfaced	Gravel	Total
Eastern Cape	3 959	36 464	40 423
Free State	2 945	14 313	17 258
Gauteng	3 700	1 254	4 954
KwaZulu-Natal	7 994	25 769	33 763
Limpopo	6 473	13 685	20 158
Mpumalanga (inclusive of haul roads)	10 568	8 257	18 825
Northern Cape	3 591	23 573	27 164
North West	5 283	14 655	19 938
Western Cape	7 267	10 357	17 624
<b>Provincial Road Network Lengths</b>	<b>51 780</b>	<b>148 327</b>	<b>200 107</b>



# C. South African Road Lengths – SAICE research – Metropolitan network (5/8)

Authority	Road Length (km)		
	Surfaced	Gravel	Total
Buffalo City	1 682	1 637	3 319
City of Cape Town	10 257	162	10 419
City of Johannesburg	8 542	2 300	10 842
City of eThekweni	6 848	Unknown	6 848
City of Johannesburg	12 430	1 169	13 599
City of Tshwane	6 631	3 036	9 668
Ekurhuleni Metropolitan Municipality	8 224	1 658	9 882
Mangaung Municipality	1 587	2 244	3 831
Nelson Mandela Metropolitan Municipality	2 847	778	3 625
<b>Metropolitan Road Lengths</b>	<b>59 048</b>	<b>12 985</b>	<b>72 033</b>

# C. South African Road Lengths – SAICE research – District network (7/8)

Authority	Road Length (km)		
	Surfaced	Gravel	Total
District Municipalities	40 648	266 416	307 064

# C. South African Road Lengths – SAICE research – Overall network (8/8)

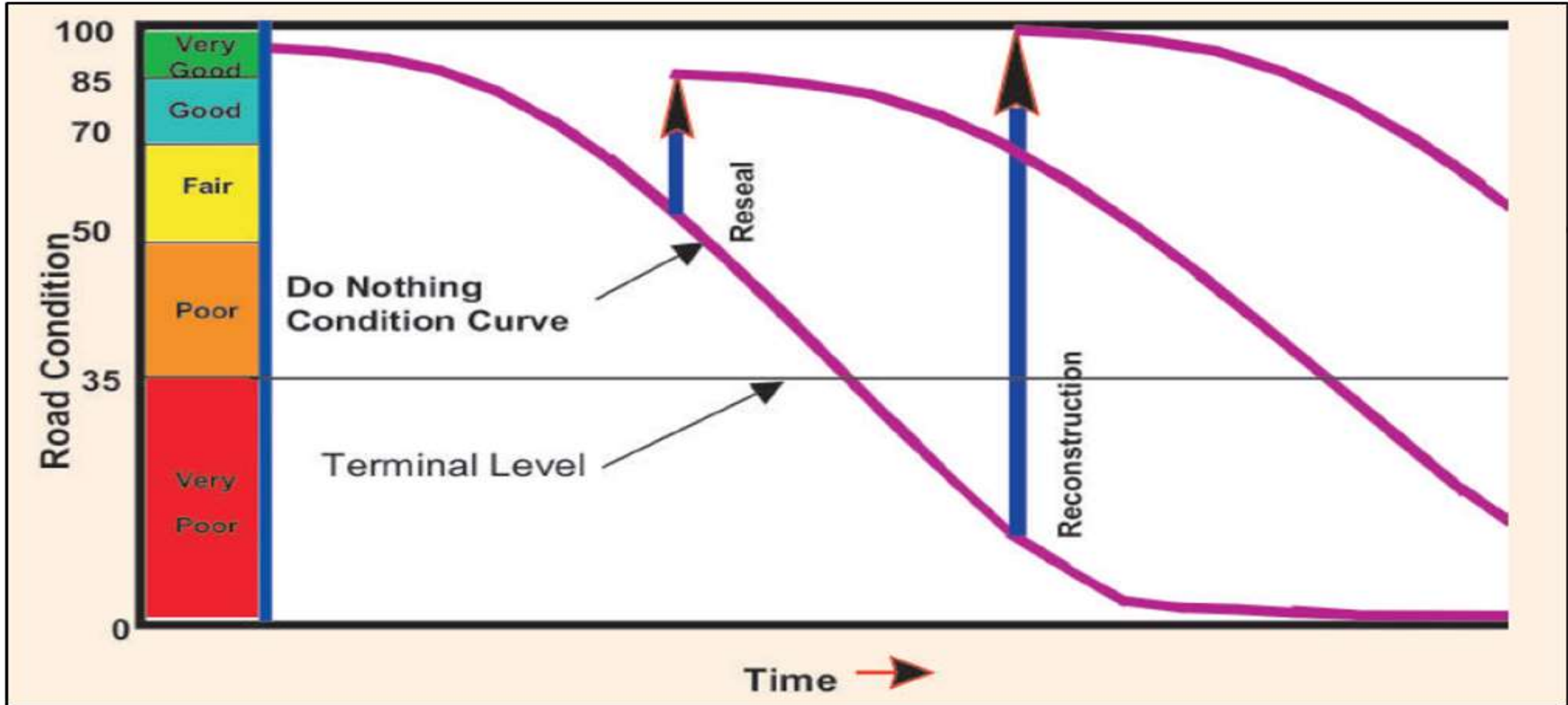
- The next table represents the road lengths as per the sources obtained and reflect nearly 10% more surfaced roads and 7% less gravel roads than DoT records
- Should the DoT record of 750 000 km be accurate, then there shall be just more than 150 000 km of unproclaimed roads
- These unproclaimed roads are providing access to social services used by

Authority	Road Length (km)		
	Surfaced	Gravel	Total
National Road Lengths	22 253	0	22 253
Provincial Road Network Lengths	51 780	148 327	200 107
Metropolitan Road Lengths	59 048	12 985	72 033
District Municipalities	40 648	266 416	307 064
<b>Total</b>	<b>173 729</b>	<b>427 728</b>	<b>601 457</b>

## D. Road Condition Reporting (1/15)

- The general state or condition of a surfaced or gravel road network is described in terms of a Visual Condition Index (VCI) and is reflected in a Road or Pavement Management System (RMS or PMS)
- The VCI of a road network is ideally quantified annually (or at least bi-annually) and if reported over time, shows the trend in road conditions
- The VCI uses a five-point scale, i.e., very good, good, fair, poor and bad (very poor) as defined in Technical Methods for Highways (TMH) 9 that is the well-established road pavement engineering methodology in South Africa

# D. Road Condition Reporting (2/15)



# D. Road Condition Reporting (3/15)

Condition Category	Index Range	Condition Category Description	Functional Category Description	Colour Code
Very Good	85 - 100	Asset is still like new and no problems are expected.	Good service levels at all times	Blue
Good	70 - 85	Asset is still in a condition that only requires routine maintenance to retain its condition.	Mostly good service levels with isolated problems occurring at certain times.	Green
Fair	50 - 70	Some clearly evident deterioration and would benefit from preventative maintenance or requires renewal of isolated areas.	Reasonable service but with intermittent poor service.	Orange
Poor	30 - 50	Asset needs significant renewal or rehabilitation to improve its structural integrity	Generally poor service levels with occasional very poor service being provided.	Red
Critical	0 - 30	Asset is in imminent danger of structural failure and requires substantial renewal or upgrading with less than 10% of EUL remaining.	Very poor service levels at most times.	Purple

# D. Road Condition Reporting – SANRAL (4/15)

- There have been small fluctuations in pavement condition over the past three years
- Compared to 2018/19, the pavement condition in 2019/20 shows a slight downward drift, with marginally lower percentages in the good and very good categories and a small increase in fair ratings

Financial Year -> Road Condition	2017/18	2018/19	2019/20	2020/21
Very Good	15,0%	14,8%	14,5%	14,22%
Good	46,7%	45,0%	43,9%	41,13%
Fair	34,8%	36,2%	35,2%	37,74%
Poor	3,4%	4,0%	6,1%	6,64%
Very Poor	0,1%	0,1%	0,3%	0,27%
<b>Combined Poor &amp; Very Poor</b>	<b>3,5%</b>	<b>4,1%</b>	<b>6,4%</b>	<b>6,97%</b>

# D. Road Condition Reporting – Provinces (5/15)

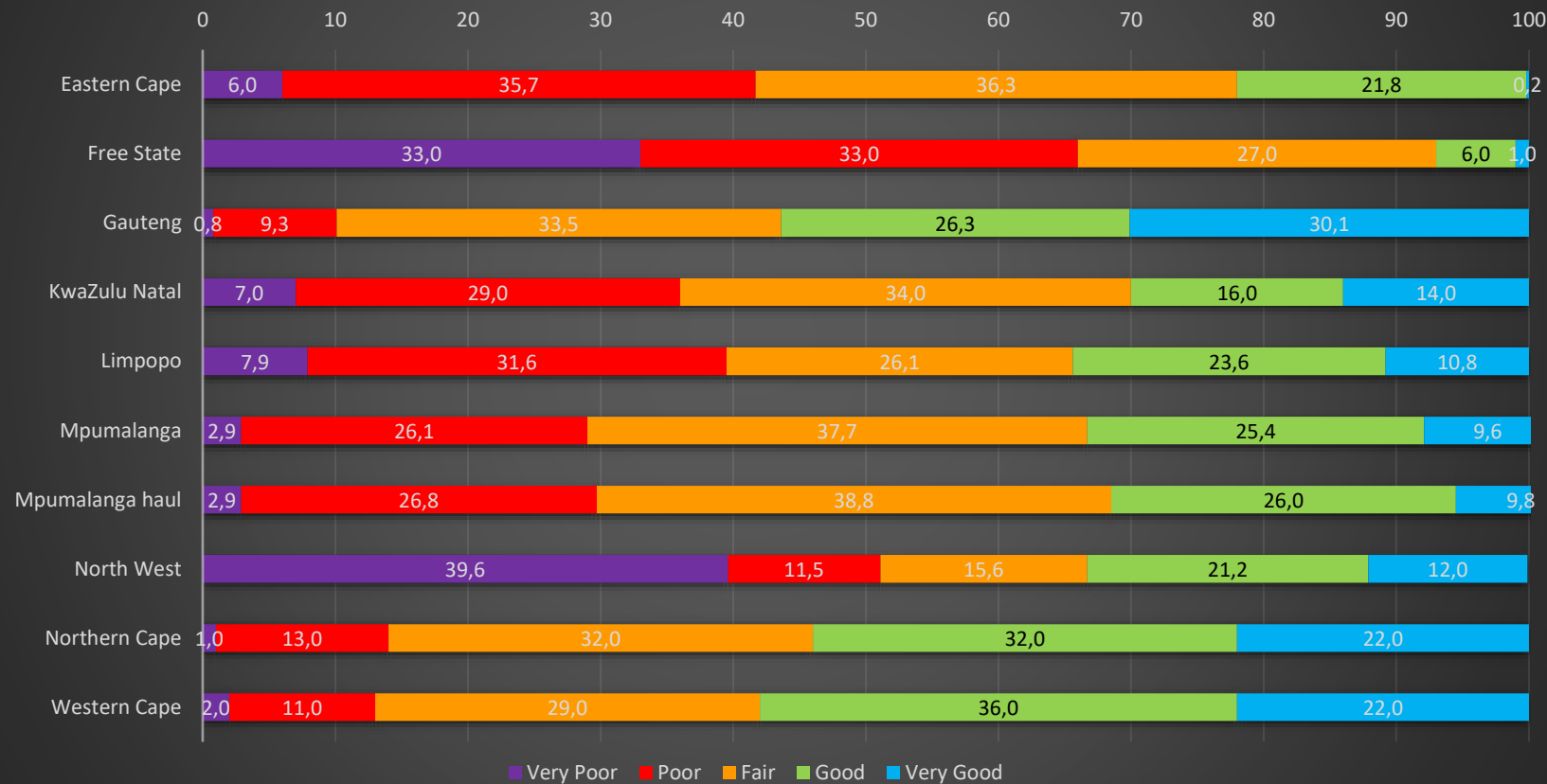
- Since appropriate information was not received from all provinces, the 2017 full data set is presented
- The share in the “*poor and very poor*” condition categories are then compared between 2017 and 2020
- This is presented for surfaced as well as gravel roads



# D. Road Condition Reporting – Provinces

## Surfaced condition report 2017 (6/15)

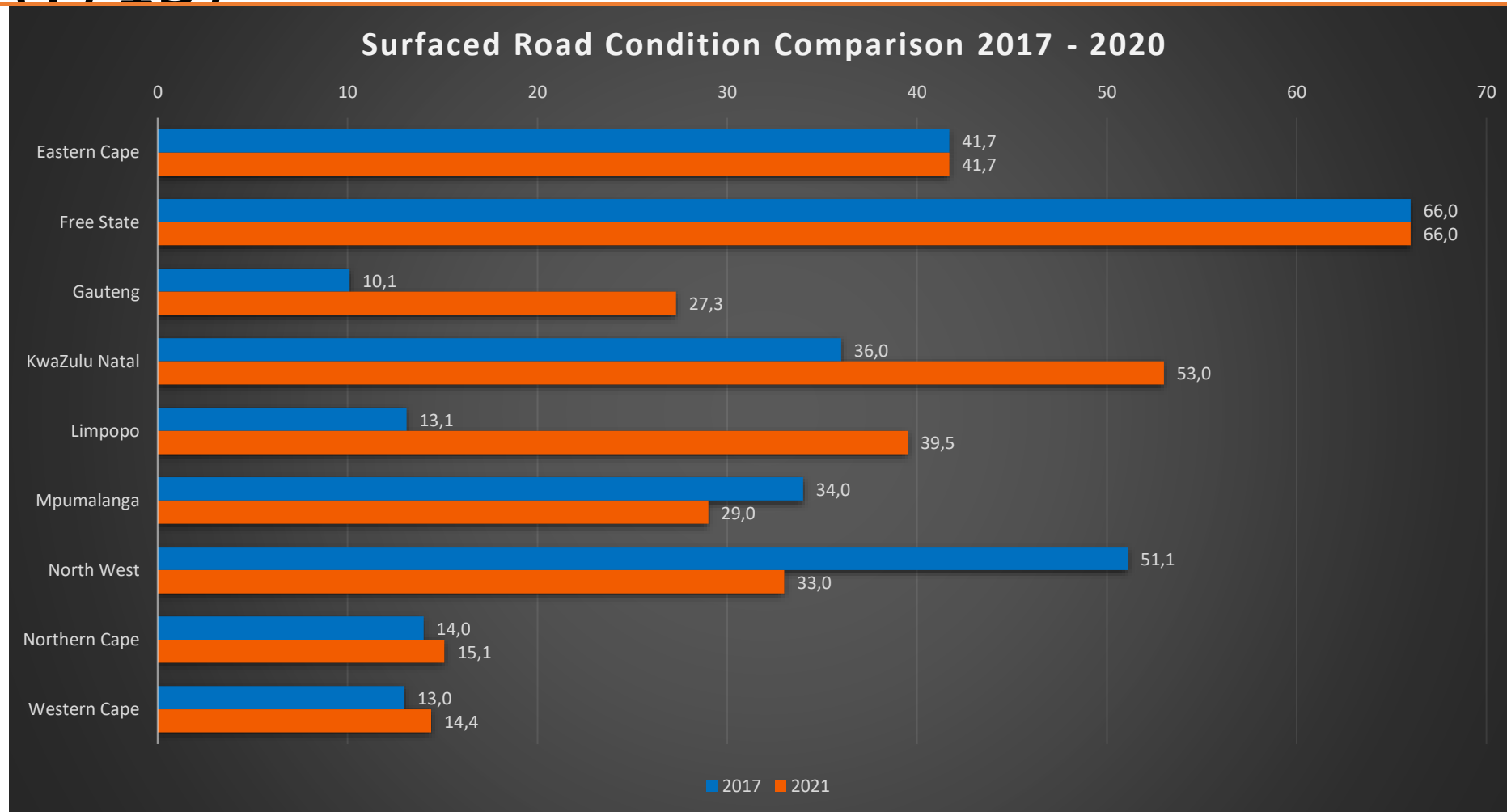
Surfaced Road Condition Index 2017 Data



# D. Road Condition Reporting – Provinces

## Surfaced condition change 2017 – 2020

(7/15)



# D. Road Condition Reporting – Provinces

## Surfaced condition change 2017 – 2020

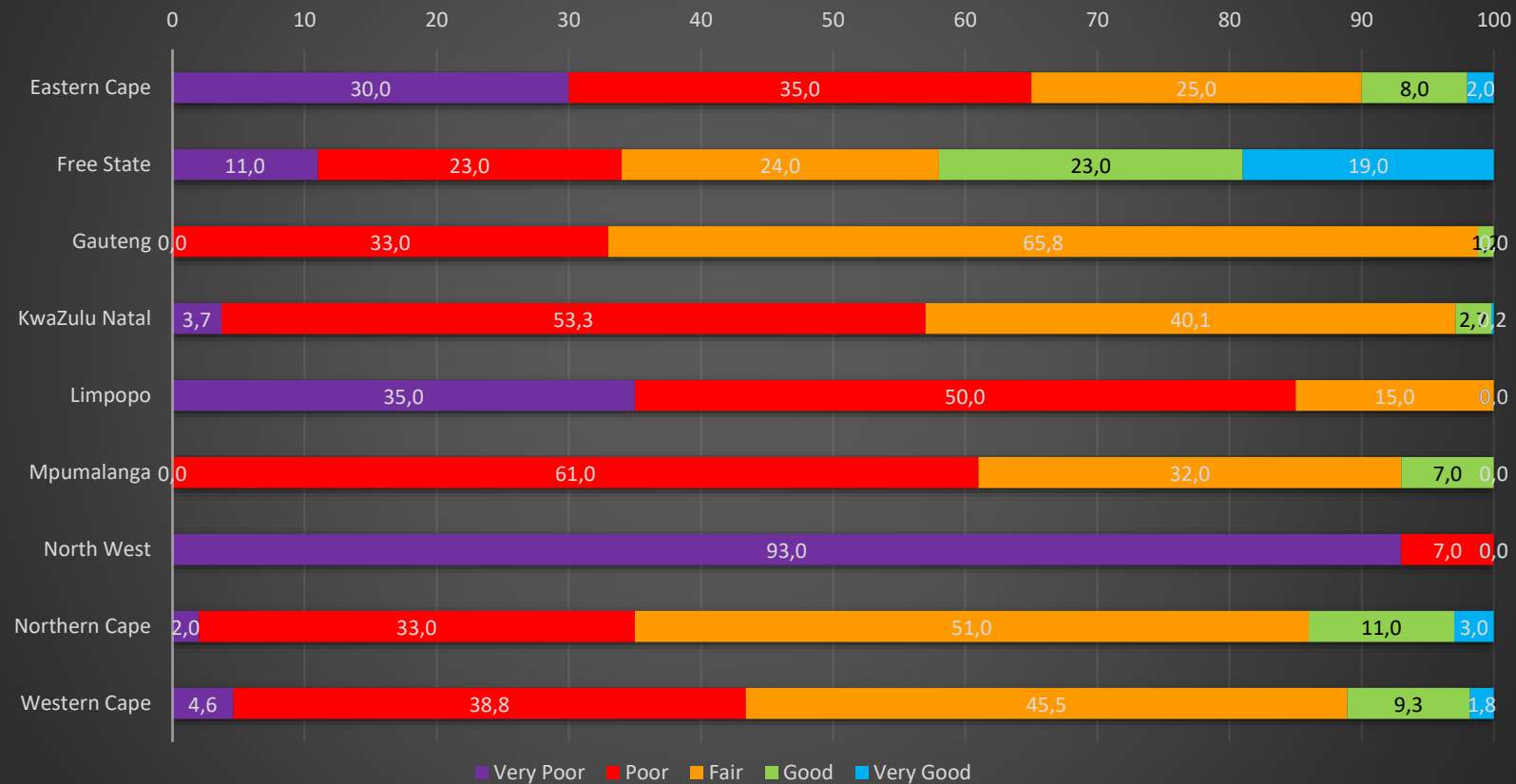
### (8/15)

- In 2017, 15 951 km of surfaced roads were in “*poor + very poor*” condition
- This length of surfaced roads in “*poor + very poor*” increased to 18 352 km in 2020, an increase of 15% over three years or nearly 5% per annum
- The back log in surfaced road rehabilitation / reconstruction across the nine provinces increased from R 239 Bn in 2017 to R 275 Bn in 2020 – conservative estimates

# D. Road Condition Reporting – Provinces

## Gravel condition report 2017 (9/15)

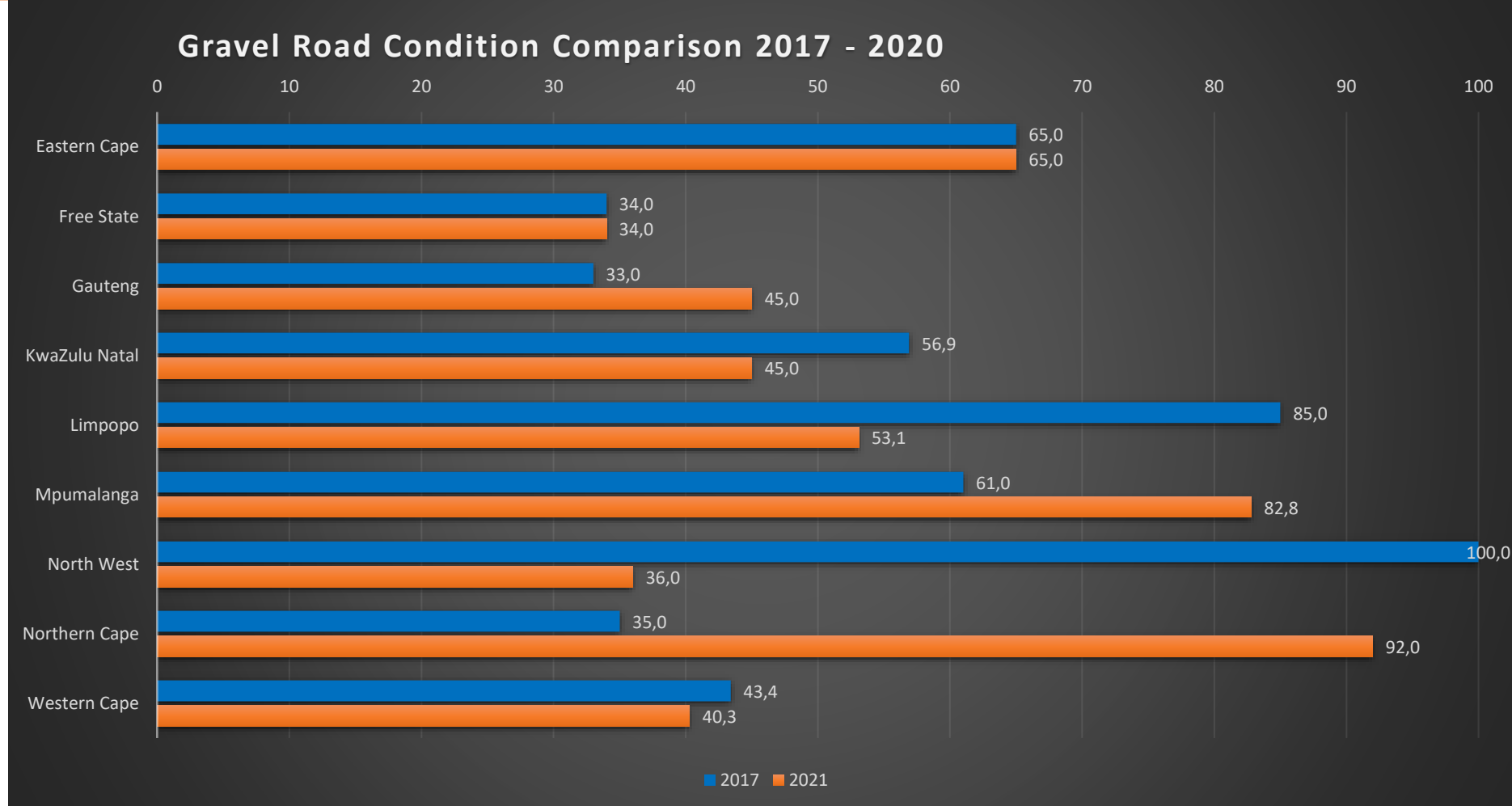
Gravel Road Condition Index 2017 Data



# D. Road Condition Reporting – Provinces

## Gravel condition change 2017 – 2020

(10/15)



# D. Road Condition Reporting – Provinces

## Gravel road condition change 2017 – 2020 (11/15)

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- In 2017, 93 457 km of gravel roads were in “*poor + very poor*” condition – 63% of the provincial network
- This length of surfaced roads in “*poor + very poor*” reduced to 80 832 km in 2020 – 55% of the provincial network
- Gravel road conditions should not be compared in this manner over such a long period due to the rapid change due to environmental factors – however, these number still show an unacceptable state of gravel roads
- The back log in gravel road reconstruction (?) across the nine provinces is estimated at R 364 Bn 2020 – conservative estimates

# D. Road Condition Reporting – Metropolitan Areas (12/15)

- In order to report some comparative numbers, only roads in “*poor*”

Metropolitan Area	Condition Reporting for Poor and Very Poor Roads 2021						
	Paved	%	km	Gravel	%	km	Total
Buffalo City	1 682	35	589	1 637	35	573	3 319
City of Cape Town	10 257	3	287	162	1	2	10 419
City of Johannesburg	8 542	13	1 145	2 300	72	1 656	10 842
City of eThekweni	6 848	10	685	Unknown			6 848
City of Johannesburg	12 430	32	3 964	1 169	72	841	13 599
City of Tshwane	6 631	90	5 968	3 036	90	2 733	9 668
Ekurhuleni Metropolitan Municipality	8 224	45	3 701	1 658	70	1 161	9 882
Mangaung Municipality	1 587	62	991	2 244	62	1 391	3 831
Nelson Mandela Metropolitan Municipality	2 847	13	370	778	13	101	3 625
<b>Metropolitan Road Lengths and conditons</b>	<b>59 048</b>	<b>30,0</b>	<b>17 699</b>	<b>12 984</b>	<b>65,1</b>	<b>8 458</b>	<b>72 033</b>

## D. Road Condition Reporting – Metropolitan Areas (13/15)

- The back log in surfaced street rehabilitation / reconstruction across the eight metros are estimated at R 265 Bn in 2020 – conservative estimates
- The back log in gravel street reconstruction across the eight metros are estimated at R 38 Bn in 2020 – conservative estimates



## D. Road rehabilitation / Reconstruction – Back log (14/15)

- The back log in surfaced street rehabilitation / reconstruction across the eight metros are estimated at R 265 Bn in 2020 – conservative estimates
- The back log in gravel street reconstruction across the eight metros are estimated at R 38 Bn in 2020 – conservative estimates

## D. Road rehabilitation / Reconstruction – Back log Provinces + Metropolitan areas (15/15)

- Values in R Bn

<b>Road Surface</b>	<b>Provincial</b>	<b>Metropolitan</b>	<b>Total</b>
<b>Surfaced</b>	R239	R265	R504
<b>Gravel</b>	R364	R38	R402
<b>Total</b>	R603	R303	R906

## E. Conclusions (1/4)

- Although many authorities were reluctant to make network reports available, the information shared reflects the dire situation that South African road users are experiencing
- There are pockets of excellence across provincial and metropolitan authorities that need to be applauded
- Road lengths in different reports from provinces and treasury differ substantially and the basis of reporting needs to be improved
- There is no singular reliable database reflecting road lengths and conditions
- The apparent limited capacity of the majority of road authorities is a great concern

## E. Conclusions (2/4)

- Non unified reporting by authorities on expenditure and road conditions is a concern
- Although there are clear guidance given on the prioritisation of road expenditure it appears that there is no uniformity how maintenance and rehabilitation schedules are set
- The economic and social value of roads need to be considered in road improvement projects
- The provincial road network is deteriorating at a rate that has a negative impact on road safety, moving of freight and the preservation of the asset

## E. Conclusions (3/4)

- The gravel road network is too extensive and the allocated budgets for the maintenance too constrained to be kept in a satisfactory condition
- The economic and social value of low-volume roads are not adequately addressed when funds are allocated for gravel roads
- A consistent methodology for prioritising road expenditure and a consistent methodology to estimate the economic significance of roads are required
- It appear as if preventative maintenance actions are not part of most provincial and metropolitan authorities' asset management planning

## E. Conclusions (4/4)

- Although not reported as part of the research, only the Western Cape province's district roads are assessed in a unified manner as the road asset is still the responsibility of the province with the district authorities required to perform maintenance in line with allocated budgets and schedules
- For the 48 DMs, other than the five DMs in the Western Cape, very limited data obtained, although treasury reported on 11<sup>th</sup> February 2022 that “35 957 kilometres of paved road network and 53 255 kilometres of unpaved road network were assessed”. These roads lengths quoted need to be compared with the road lengths reported by DoT, namely 37 691 km paved roads and 219 222 km of gravel roads

## F. What holds the future? (1/2)

- Poor road safety, logistics and conditions with limited skills within many authorities without consequence to authorities
- Institutional capacity plays a critical role in condition of roads. The importance of skills and experience in each phase of the project processes cannot be over-emphasised. Road authorities should have a large cohort of engineers capable of ensuring quality control during every step of the project cycle. This has budgetary implications for the authority. However, there are significant savings to be realised from the efficiencies this capacity brings about

## F. What holds the future? (2/2)

- The backlog of road maintenance and rehabilitation will only be reduced with a coordinated effort from all involved in asset management
- Back to basics:
  - Keep water off the road surface, keep stormwater drains clean, keep verges free of debris to allow water to flow away from the road prism
  - Do regular road condition assessments and apply the results from asset management systems
  - If authorities cannot do the small things correct, such as crack sealing, proper patching (not pothole filling) surface overlay, how will we solve problems such as...
    - reconstruction of roads
    - motivation for appropriate funding
    - Appointment of appropriate staff





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**THANK YOU FOR YOUR  
ATTENTION**