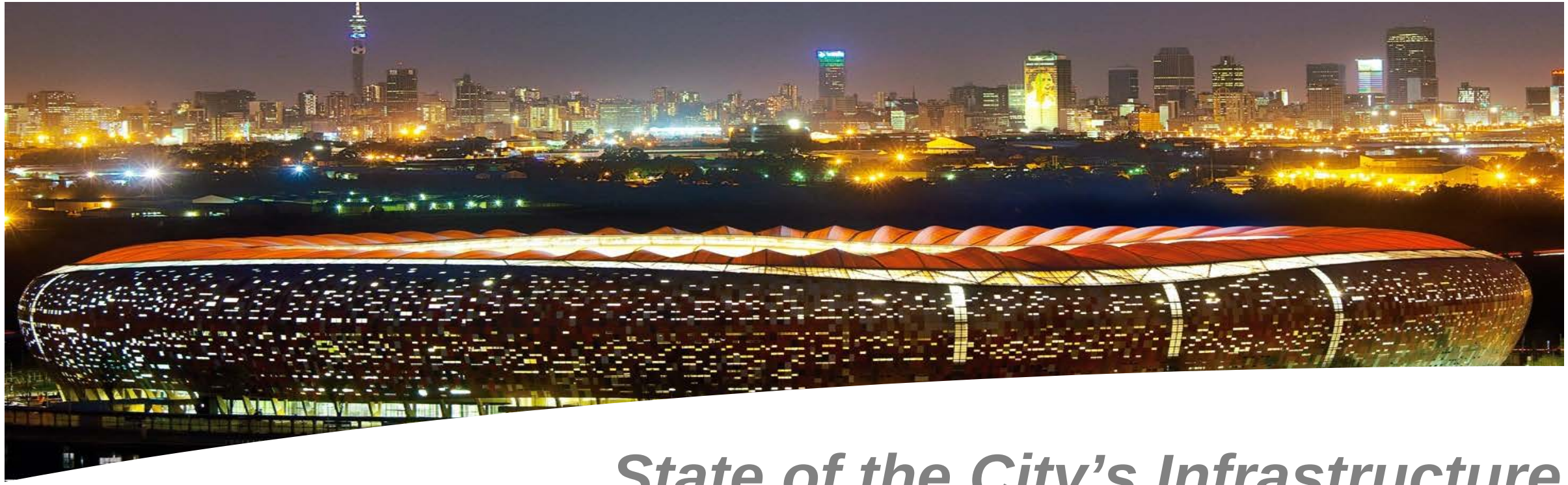
# Presentation by the Executive Mayor

## Cllr Herman Mashaba



# *State of the City's Infrastructure*

***7 November 2017***

# Introduction

***Press briefing chaired by:***

Dr Ndivhoniswani Lukhwareni (City Manager)

# *State of the City's Infrastructure*

## *Johannesburg Roads Agency*

# State of JRA Infrastructure

## State of Joburg's Road Network – 13599 km

### Current Condition of Johannesburg Roads

- 2017 Roads Condition Index undertaken city-wide shows a 25% deterioration in the condition of the road network, dropping from 89% in 2013 to 64% at present.
- In comparison to 2013 roads study, the current conditions indicate:
  - Very good and good surfaced roads have decreased from 52% to 45%, 5 581km and may require ad-hoc maintenance.
  - **Poor and very poor surfaced roads have increased from 27% to 32%**, 3 968km and require reconstruction.
  - 23% (2 852km) of surfaced roads require resurfacing. **72% of the 1168.53km of gravel roads are in a poor or very poor condition** and require reshaping and re-gravelling.

- Hilson Street - Waverley

- Albert Street - Weltevredenpark

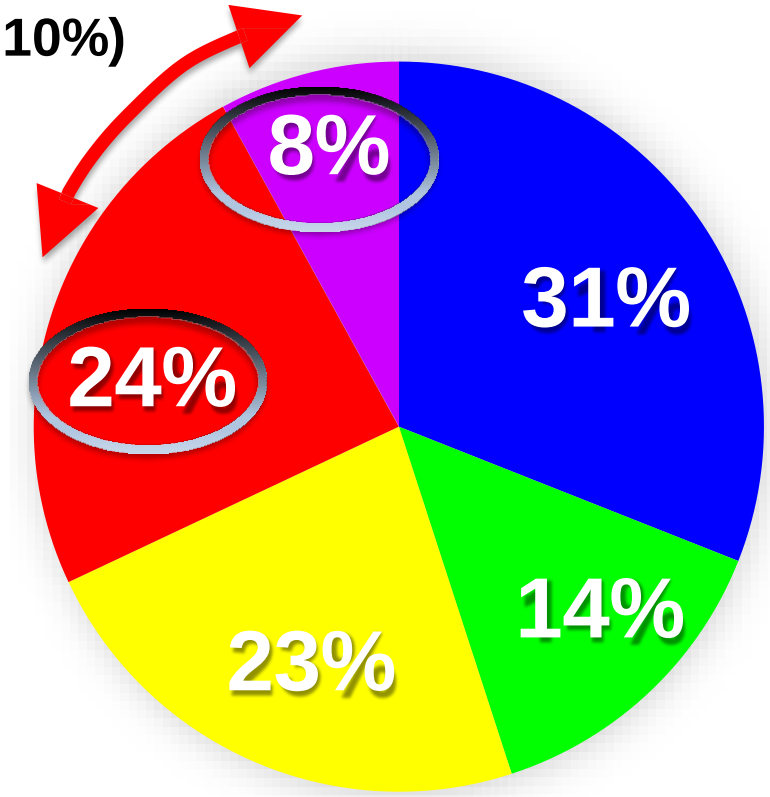
# State of JRA Infrastructure
## Condition of Surfaced Roads

| CONDITION | 2017 | 2013 | Km |
|---|---|---|---|
| VERY GOOD | 31% | 34% | 3 845 |
| GOOD | 14% | 18% | 1 736 |
| FAIR | 23% | 21% | 2 852 |
| POOR | 24% | 21% | 2 976 |
| VERY POOR | 8% | 6% | 992 |
| | | | 12 390 KM |

- **R7.1 Billion** backlog required for surfaced roads. **Only R240 million** available for resurfacing and reconstruction in current financial year.
- **R4.7 billion** required for upgrading of gravel to tar. **R295 million** is available in this current financial year.
- **Total Backlog: R 11.8 Billion**

# State of JRA Infrastructure
## Condition of Surfaced Roads

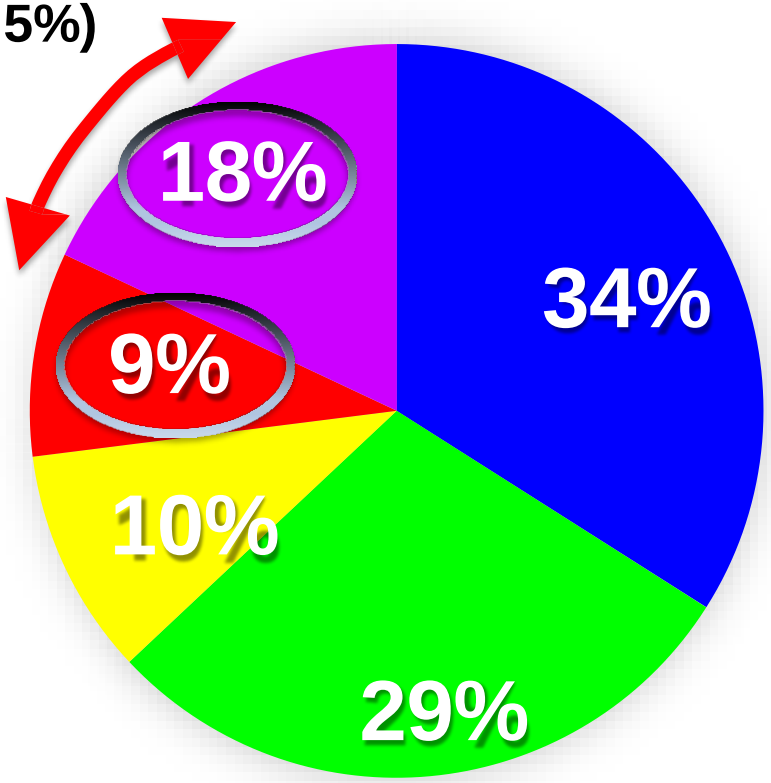
**32%**
**(Max: 10%)**




**Surface Condition**

VERY GOOD
GOOD
FAIR
POOR
VERY POOR

**27%**
**(Max: 5%)**




**Structural Condition**

# State of JRA Infrastructure
## Condition of Sidewalks, 2017

| CONDITION | 2017 | KM |
|---|---|---|
| VERY GOOD | 11 % | 1 980 |
| GOOD | 15% | 2 700 |
| FAIR | 10% | 1 800 |
| POOR | 40% | 7 200 |
| VERY POOR | 24% | 4 320 |
| | | 18 000 KM |

- Chris Hani road, Region D

- **TOTAL BACKLOG**: **R2 Billion**.
- **R0 budget available** in current financial year.

# State of JRA Infrastructure
## Condition of Bridges

| CONDITION | 2014 | NUMBER OF BRIDGES |
|---|---|---|
| VERY GOOD | 2.44% | 22 |
| GOOD | 3.33% | 30 |
| FAIR | 15.85% | 143 |
| POOR | 61.75% | 557 |
| VERY POOR | 16.63% | 150 |
| | | 902 Bridges |

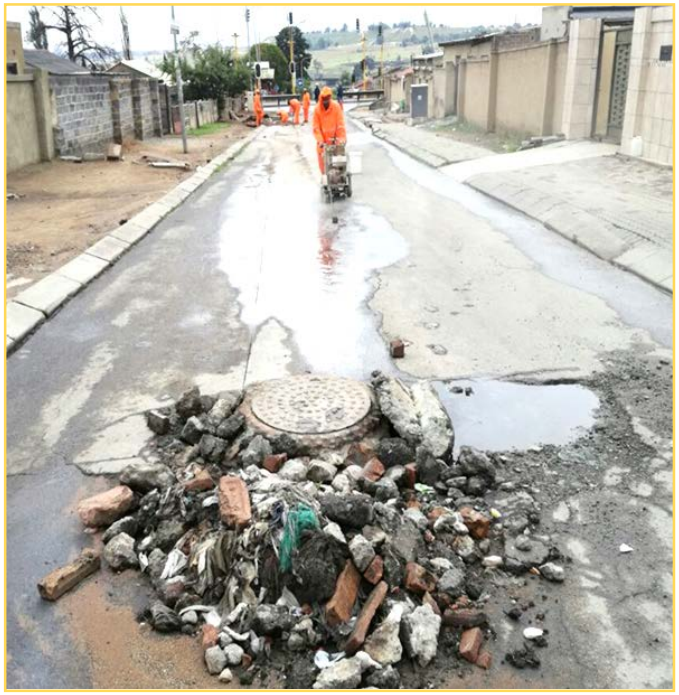
- Joe Nhlanhla Street Bridge over Jukskei River

# State of JRA Infrastructure
## Condition of Bridges

- The overall acceptable Condition Indices for bridges in a very good and good condition should be minimum 80% - currently only 5.77% of City bridges are in this acceptable condition.
- 78.38% of City bridges are in a Poor or Very Poor condition. This means the conditions of the bridges has deteriorated to an alarming state.
- Since 2013, 37 bridges have collapsed during raining seasons.
- **NB: Another round of bridge assessments has commenced.**
- **Total Backlog: R 6.5 Billion. R140 million** available in current financial year.

| Item | Group Category | Number of Bridges | Backlog Estimates |
|---|---|---|---|
| 1 | New Bridges (No Maintenance required) | 15 | 0 |
| 2 | Bridge rehabilitation and joints replacement | 554 | R2.5 Billion |
| 3 | Overtopping bridges needing upgrade | 69 | R1.7 Billion |
| 4 | Reconstruction of damaged bridges | 51 | R1.3 Billion |
| 5 | De-silting and rehabilitation | 203 | R1 Billion |
| | **TOTAL** | 902 | **R 6.5 Billion** |

# State of JRA Infrastructure
## Dams, Catchments and Storm Water



- Overflowing storm water – Ballenden Street, Orlando.

| REGION | BACKLOG |
|---|---|
| Dams (8 registered, 1 complete, 363 unregistered dams ) | R 900M structural backlog estimate excluding de-siltation.<br>R2 million available in current financial year. |
| Catchments (27 City-wide, 1 in progress - Braamfontein Spruit costing R90M) | R 2.3 Billion R8 million available in current financial year. |
| Roads Hierarchy Projects<br>(199 identified projects, five in progress incl. Widening of Ballyclare Drive, Jan Smuts Dual-carriageway, Upgrading Spencer Ave – Mainreef to Soweto highway & Metro Blvd - New East West Link from Mogale City to Northcliff ) | R 1.3 Billion for only five projects.<br><br>R8 million available in current financial year. |
| Storm water Projects | |
| Current Flooding Hotspots | R 778 Million<br>R35 million available in current financial year. |
| Master planning | R56 Billion<br>R11 million available in current financial year. |
| **TOTAL BACKLOG** | **R 61.2 Billion** |

# State of JRA Infrastructure
## Backlog Summary

| ISSUE | BACKLOG | RISK TO COMMUNITY |
|---|---|---|
| Roads | R7.1 Billion (surfaced roads)<br><br>R4.7 Billion (upgrading of gravel roads to tar) | Potholes, sinkholes, dangerous road surface, road deterioration requires more expenditure as reconstruction is more expensive than resurfacing, increase in legal claims. |
| Sidewalks | R2 Billion | Pedestrian safety |
| Bridges | R6.5 Billion | Collapse of bridges, flooding of homes and properties and danger to road users and residents. |
| Dams, Catchments & Storm water | R61.2 Billion | Collapse of dams, flooding of homes and properties and danger to road users and residents |
| | **R81.5 Billion** | **TOTAL BACKLOG over 10 years** |

# Vandalism and theft of road and related infrastructure

**COST TO THE CITY**

- 2017/18: **R 12.3 million** - Accident damage R4.4 Million annually due to Stolen road
- furniture: results in road accidents, poor visibility and as result insurance claims to CoJ

**PREVENTION MEASURES**

1. **Cable theft**
   - Reduce copper content of traffic signal cable using thinner cable
   - Use of copper cladded aluminum cable
   - Alternative construction methods, using less copper cores in cable to the poles
2. **Accident damage**
   - Traffic Engineering Analysis for locations with high record of accident damage
   - Consider geometric design changes
3. **UPS**
   - Strong, secure cabinet on the street
   - Tamper detection devices
4. **Road Furniture** (Grids, man-hole covers, steel channel posts, road
   - signage, guardrails, traffic signal poles)
   - Use of alternative materials with no scrap value
   - Infrastructure protection unit working with JMPD

# State of JRA Infrastructure
## The Road Ahead

Funding is required to maintain and improve the conditions of roads and related infrastructure.

# *State of the City's Infrastructure*

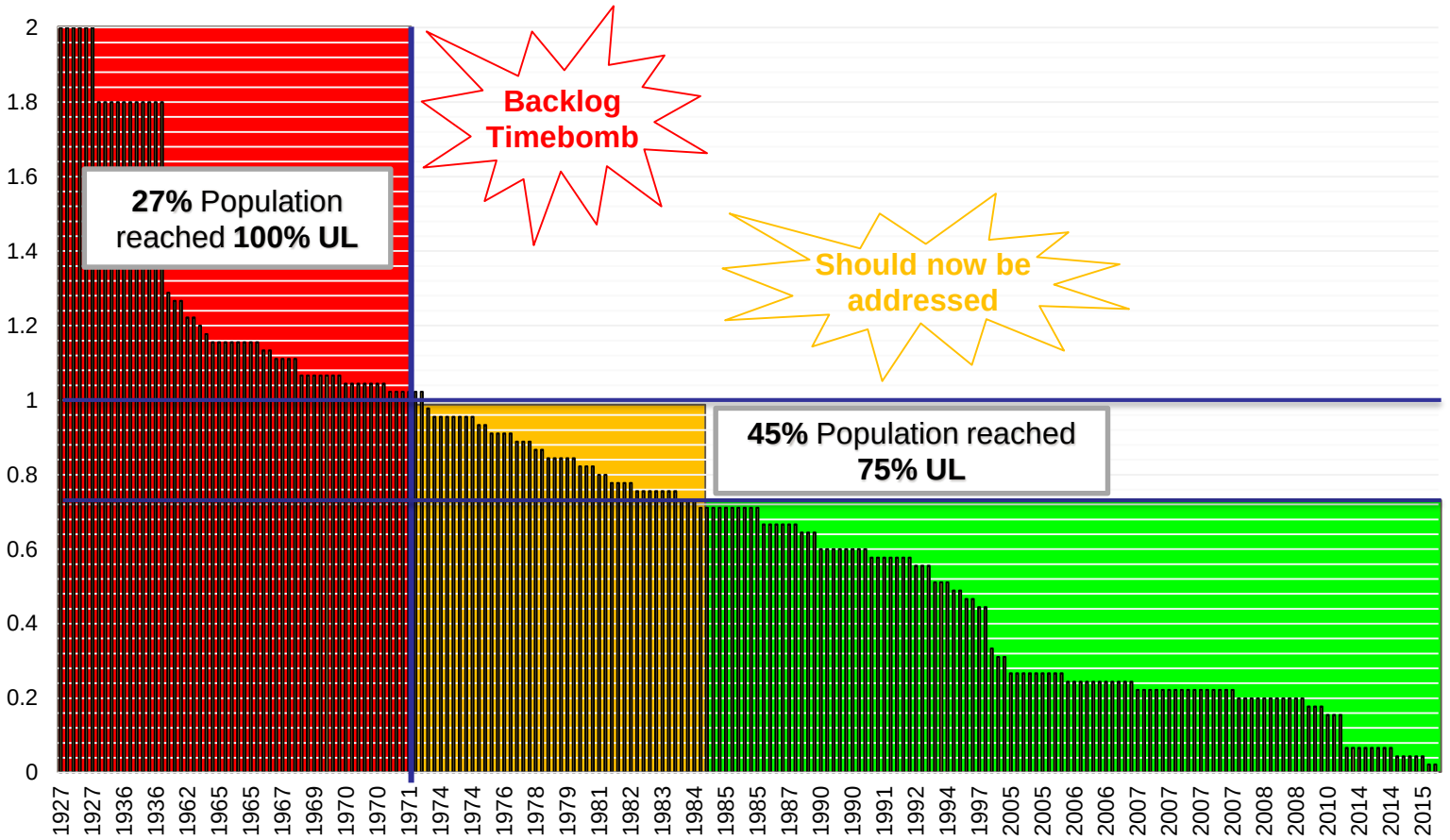
## *City Power*

# Challenges facing City Power

- **Ageing Network Infrastructure**
  - Replacement parts difficult to source
  - Difficult to operate the obsolete circuit breakers still in operation (oldest installed in 1929)
- **Theft & Vandalism**
  - Scrap value of copper makes it attractive to thieves
  - Installed copper underground is in excess of 17,000km (thus cannot be replaced overnight)
- **Backlog in Asset Renewal**
  - Consistent shortfall between requirement and actual available capital budget
  - Critical nodes supplied by the most vulnerable substations e.g. Cleveland Substation
- **Bulk Tariff Trajectory**
  - Eskom tariff trajectory going north
  - Huge adverse impact on industry and residential

# State of City Power Infrastructure
## Transformer Network

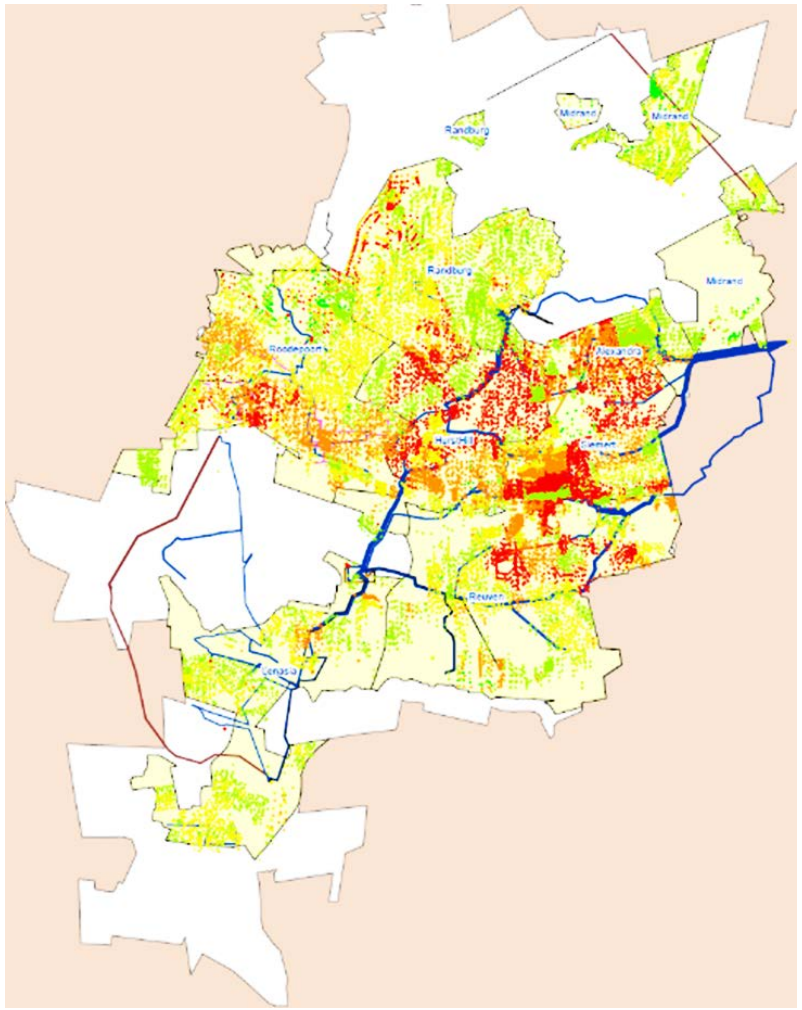
**Bulk Transformer Age Distribution**
**(% Theoretical (45Yrs) Useful Life)**




- **Total** power transformer fleet = **300 transformers**
- **High risk** transformers supplying the most critical nodes – **Inner City, Cleveland, John Ware & Roodepoort**

# State of City Power Infrastructure
## Electricity Network

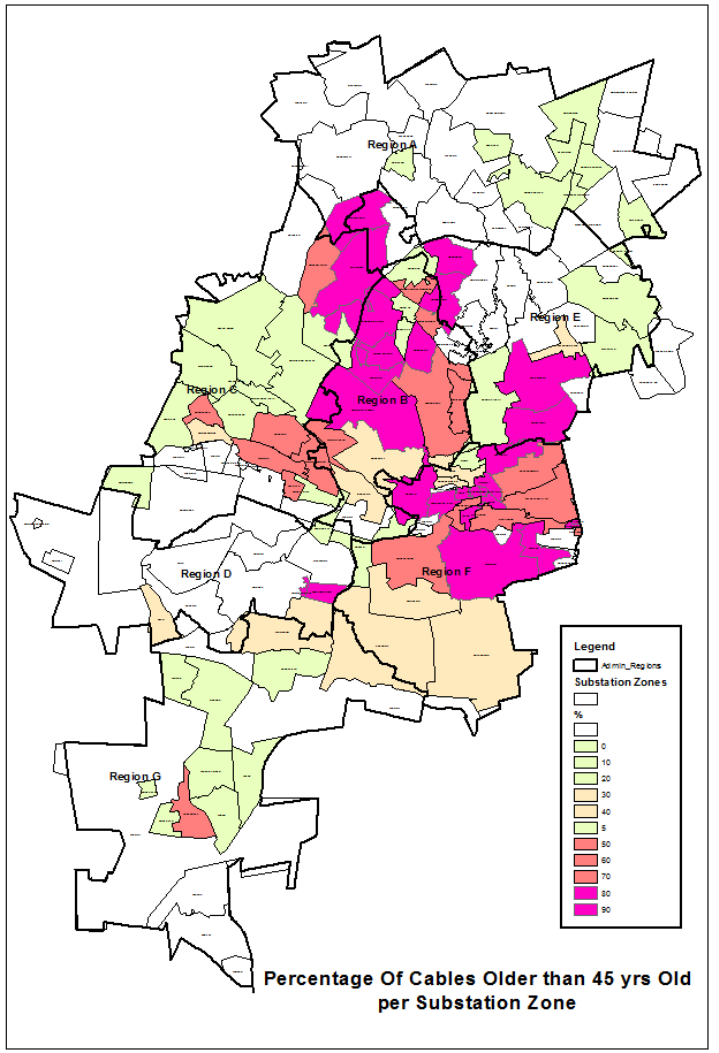
- **Red dots** represent assets that have **exceeded useful life** or are within 5%
  - **High Risk Areas:** Inner City, Roodepoort, Reuven and Hursthill areas. Roosevelt Park substation is a case in point – also Cleveland substation
- **Green dots** represent new assets
  - Electrical network in the South – **Lenasia** – is relatively ne**new assets**w.
  - **Midrand** is supplied from a reliable network which also benefited from 2010 World Cup efforts
  - **Randburg** area is also serviced by a relative new network.



# State of City Power Infrastructure
## Medium Voltage Underground Cables

- **Bright colours show the worst performing underground cables** due to age-related failures – in addition to the scourge of theft
- **Problematic areas** – Inner City, Roosevelt, Parkhurst, Roodepoort and parts of Reuven

| Area | Total Length (km) | U/G Older 45yrs (km) | Costs to Replace (R'million) |
|---|---|---|---|
| Alexandra | 383.34 | 154 | 154 |
| Hursthill | 859.99 | 172 | 172 |
| Lenasia | 548.24 | 55 | 55 |
| Midrand | 414.67 | - | - |
| Randburg | 1 214.50 | 486 | 486 |
| Reuven | 1 097.27 | 439 | 439 |
| Roodeport | 971.21 | 292 | 292 |
| Siemert | 820.09 | 657 | 657 |
| Total | 6 309.30 | 2 255 | R2 255 |

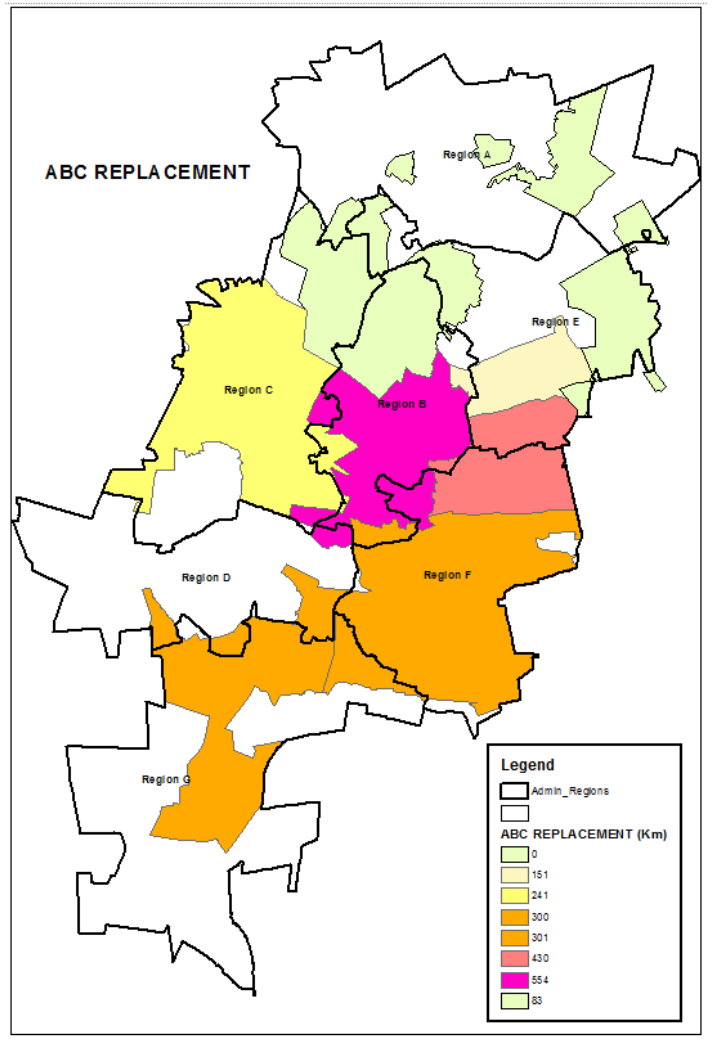


# State of City Power Infrastructure

## Low voltage overhead copper conductor

- **Currently being converted to aerial bundle conductor (ABC)**

| Area | Number of Streets | Actual Distance (m) | Cost to Replace (R' Million) |
|---|---|---|---|
| Alexandra | 29 | 26,400 | 26 |
| Hursthill | 60 | 39,700 | 39 |
| Lenasia | 62 | 34,400 | 33 |
| Midrand | 2 | 800 | 1 |
| Randburg | 71 | 54,000 | 52 |
| Reuven | 28 | 21,600 | 21 |
| Roodepoort | 28 | 12,900 | 13 |
| Siemert | 36 | 24,300 | 22 |
| **Total** | **316** | **213,700** | **R207** |



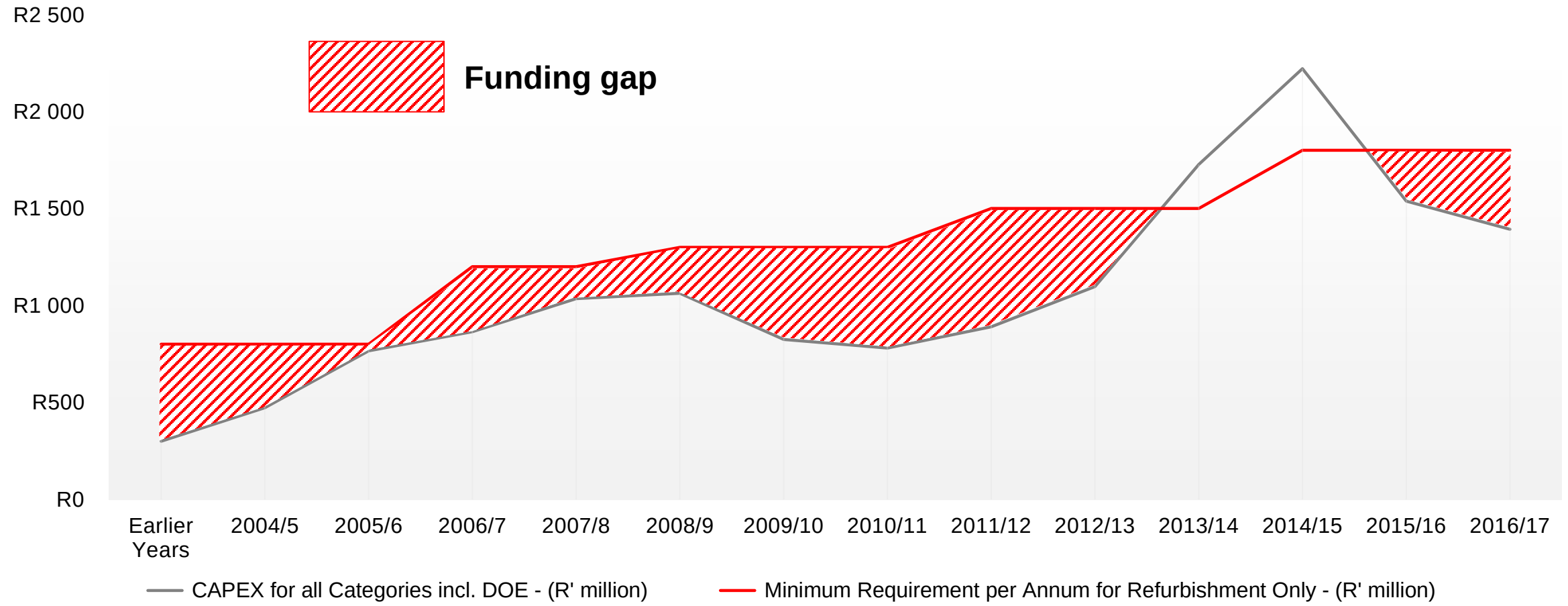
# State of City Power Infrastructure
## Historical Capital Expenditure

- **Capex Investment vs Minimum Requirement**

| Timeline | CAPEX for all Categories incl. DOE (R' million) | Minimum Requirement per Annum for Refurbishment (R' million) | Shortfall (R' million) | Remarks |
|---|---|---|---|---|
| Earlier Years | R300 | R800 | R500 | Coincides with the period when Regional Electricity Distributors or "REDs" were being considered |
| 2004/5 | R473 | R800 | R327 | |
| 2005/6 | R766 | R800 | R34 | |
| 2006/7 | R865 | R1 200 | R335 | |
| 2007/8 | R1 035 | R1 200 | R165 | Build Programme to support 2010 FIFA World Cup |
| 2008/9 | R1 063 | R1 300 | R237 | |
| 2009/10 | R825 | R1 300 | R475 | |
| 2010/11 | R780 | R1 300 | R520 | |
| 2011/12 | R890 | R1 500 | R610 | |
| 2012/13 | R1 097 | R1 500 | R403 | |
| 2013/14 | R1 727 | R1 500 | -R227 | City Power initiated rebuild of 16 new substations |
| 2014/15 | R2 221 | R1 800 | -R421 | |
| 2015/16 | R1 538 | R1 800 | R262 | |
| 2016/17 | R1 393 | R1 800 | R407 | |
| **TOTAL** | **R14 973** | **R18 600** | **R3 627** | |

# State of City Power Infrastructure
## Historical Capital Expenditure

- **Capex Investment vs Minimum Requirement**



# State of City Power Infrastructure
## Funding Requirement

- **Total requirement** from this point to 2021/22 Financial Year = **R19.8 billion**
- Indicative budget is at **R8.3 billion** over the same period.

| **MTREF BUDGET** | | | | | |
|---|---|---|---|---|---|
| Programme | Total 2017 / 2018 | Total 2018 / 2019 | Total 2019 / 2020 | Total 2020 / 2021 | Total 2021 / 2022 |
| City Power | R 1 328 | R 1 297 | R 1 144 | R 2 910 | R 1 602 |
| Reticulation: Refurbishment | R 0 | R 0 | R 0 | R 0 | R 0 |
| Total (MTREF): | R 1 328 | R 1 297 | R 1 144 | R 2 910 | R 1 602 |
| | | | | | |
| **NOT PROVISIONED FOR** | | | | | |
| Programme | Total 2017 / 2018 | Total 2018 / 2019 | Total 2019 / 2020 | Total 2020 / 2021 | Total 2021 / 2022 |
| Bulk: New | R 1 074 | R 1 632 | R 950 | R 1 197 | R 444 |
| Bulk: Refurbishment | R 0 | R 54 | R 167 | R 56 | R 56 |
| City Power | R 20 | R 20 | R 10 | R 1 793 | R 556 |
| Other | R 7 | R 0 | R 5 | R 0 | R 0 |
| Reticulation: New | R 0 | R 293 | R 416 | R 544 | R 413 |
| Reticulation: Refurbishment | R 1 571 | R 1 481 | R 518 | R 485 | R 466 |
| Secondary Plant: New | R 167 | R 156 | R 123 | R 113 | R 98 |
| Total Shortfall: | R 2 840 | R 3 635 | R 2 188 | R 4 187 | R 2 033 |
| TOTAL (Requested): | R 4 167 | R 4 932 | R 3 332 | R 7 097 | R 3 634 |

# State of City Power Infrastructure
## Funding Requirement

| Financial Year | Project Name | Number of Dwellings | Amount |
|---|---|---|---|
| **2017/18** | Kliptown Ext 11 | 200 | R6 000 000 |
| **2017/18** | Alexandra Normalisation | 1,000 | R20 000 000 |
| **2017/18** | Electrification of Slovo Park | 1,600 | R50 000 000 |
| **2017/18** | Bulk Infrastructure for Elias Motsoaledi | N/A | R 10 413 000 |
| **2017/18** | Electrification of Meriting | 500 | R16 500 000 |
| **TOTALS** | **5** | **3,300** | **R 102 913 000** |

| Financial Year | Project Name | Number of Dwellings | Amount |
|---|---|---|---|
| **2018/19** | Elias Motsoaledi phase 5 | 200 | R20 000 000 |
| **2018/19** | Electrification of Slovo Park | 700 | R24 350 000 |
| **2018/19** | Roseveldt switching Station | N/A | R20 000 000 |
| **2018/19** | Lawley Extension 4 | 250 | R10 200 000 |
| **2018/19** | Princess Plot 16, 19 & 48 | 1,534 | R50 622 000 |
| **2018/19** | Rabie Ridge | 400 | R13 200 000 |
| **2018/19** | Ennerdale | 250 | R6 800 000 |
| **2018/19** | Solplaatjies | 350 | R11 550 000 |
| **TOTALS** | **8** | **3,684** | **R156 722 000** |

| Financial Year | Project Name | Number of Stands | Amount |
|---|---|---|---|
| **2019/20** | Elias Motsoaledi | 450 | R14 850 000 |
| **2019/20** | Leratong | 600 | R19 800 000 |
| **2019/20** | Groblerspark | 3,500 | R115 500 000 |
| **2019/20** | Thembelihle | 500 | R16 500 000 |
| **2019/20** | Lehae | 1,000 | R32 00 000 |
| **2019/20** | Alexandra Normalisation | 700 | R24 300 000 |
| **TOTALS** | **6** | **6,750** | **R222 950 000** |

- Total of **R481 million required** to electrify formal and informal settlements over the medium term
  - Minimum requirement
  - 19 informal settlements
  - 13,734 units

# State of City Power Infrastructure

## Theft and vandalism of electrical infrastructure

**Cost to City:**

- **R76 million** spent on security measures for 2016/17 financial year
- 2000 theft and vandalism incidents
- Future projected cost of **R161 million**

**Mitigation:**

- Increase manpower and deployment
- Improve security monitoring and control systems

# State of City Power Infrastructure
## Visuals

**Low Voltage Overhead Network**

- In this installation, a bare copper conductor has been replaced with covered conductor. However, those black insulators that look like Telkom lines, are the cause of major outages after heavy rain or wind – Hursthill, Victory Park & even Bryanston

**Roosevelt Park Substation**

- Substation built more than 70 years ago. Catastrophic transformer failure experienced in 2016.
- Repairs being done after transformer failed that kept residents without power for 4 days

# State of City Power Infrastructure
## Visuals

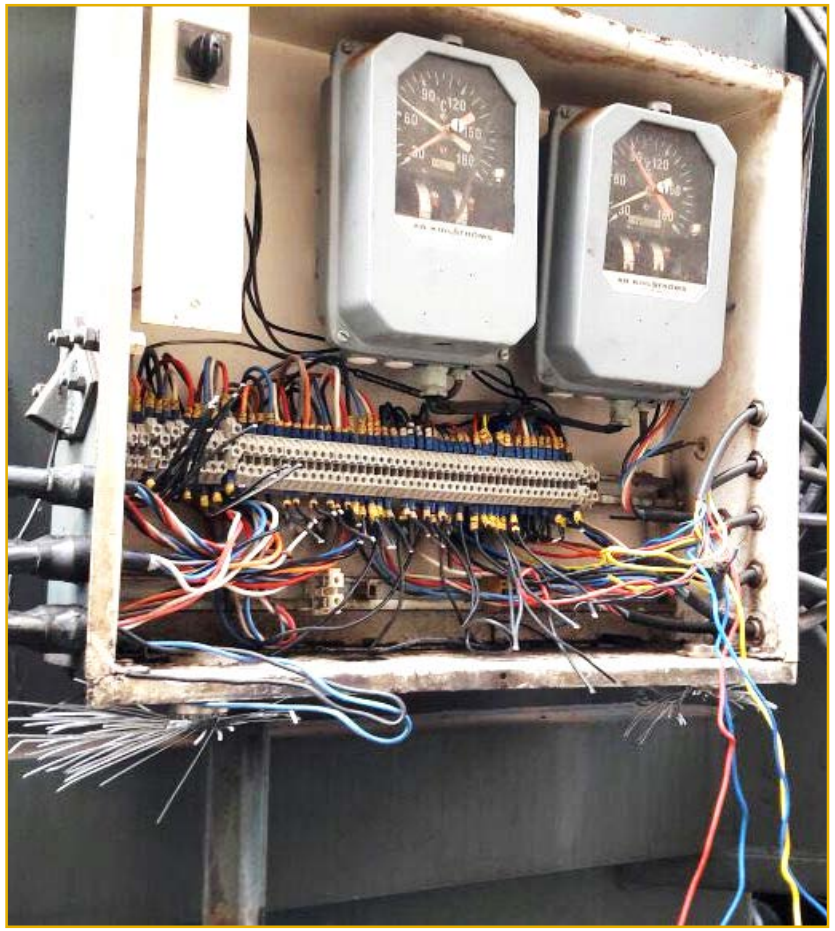


**Cleveland Substation**

- Substation currently being refurbished (approx. R180 million investment). Substation is about 80 years old.
- Supplies industry e.g. PPC Cement, Haggie Rand, Scaw Metals

**Van Beek Substation**

- Old switchgear that is difficult and unsafe to operate; spares also not available.
- High risk equipment while supplying key industry nodes



- **Control plant wiring after being vandalised**

# State of City Power Infrastructure
## The Road Ahead

- **Evaluating alternative funding models to source funding for:**
  - High risk substations
  - Informal settlements
  - Ageing underground cables
- **Assessing the legislative landscape on introduction of:**
  - IPPs (Independent Power Producers)
  - Private investors in renewable energy options
  - Private investors in mainstream energy assets e.g. substations
- **To contain the network situation:**
  - Intensifying our maintenance efforts
  - Monitoring all high risk equipment
  - Assessing quick power restoration options such as mobile substations

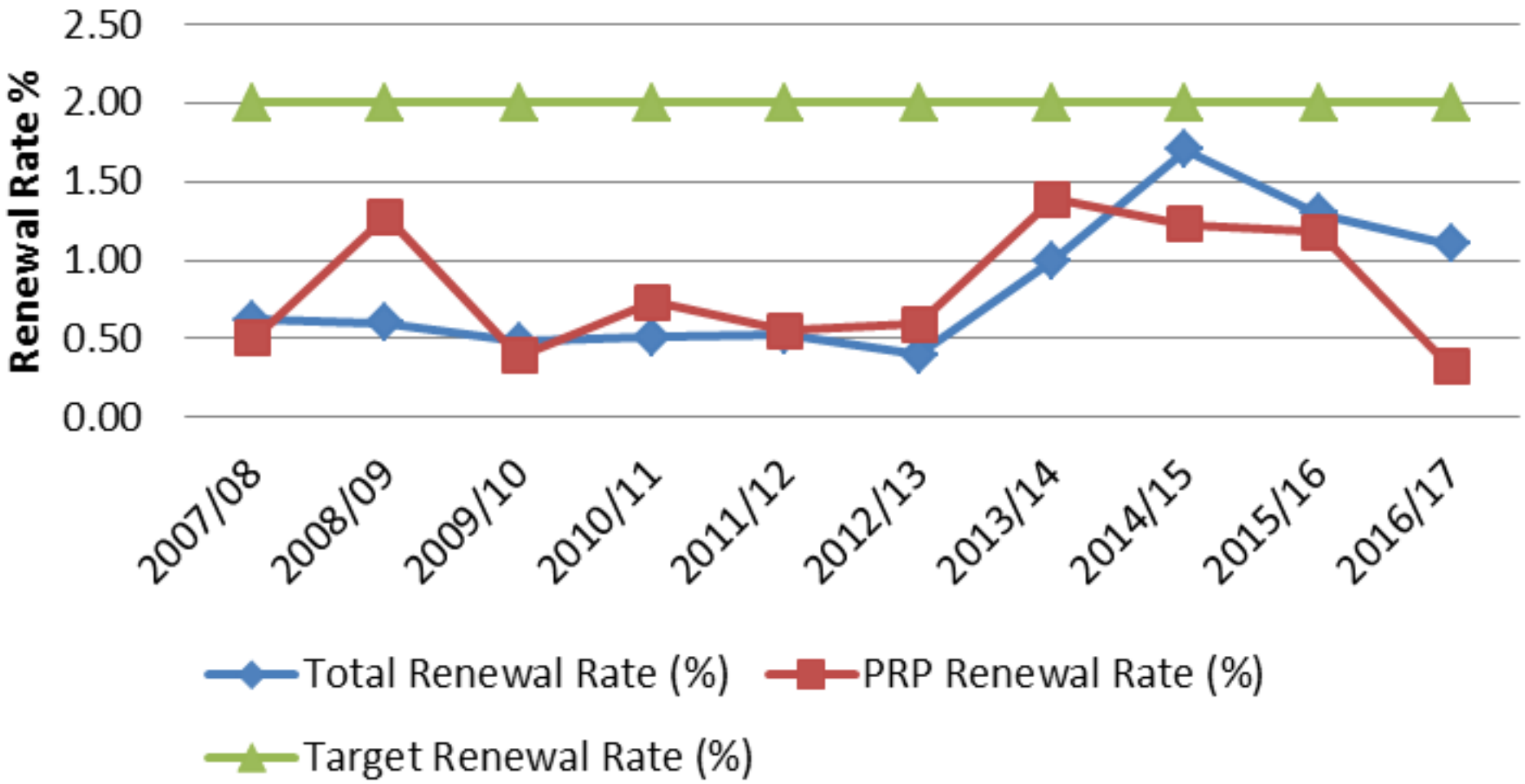
# *State of the City's Infrastructure*

## *Joburg Water*

# Challenges facing Joburg Water

- JW has total Infrastructure Assets with Current Replacement Cost (CRC) of **R 55 billion**.
- Extent of water and sewer infrastructure:
  - Water Networks - 12 066 km
  - Sewer Networks - 11 576 km
  - Water & Sewer Pump station- 78
  - Reservoirs & Water Towers- 125 with combined capacity of 1 898 Ml
  - Wastewater Treatment Works- 6 with combined treatment capacity of 1 068 Ml/ day
- **Asset Management Plans dictate a Renewal Rate of 2% p.a.**
  - **Current expenditure pattern** indicate an average **renewal rate of 1.1%** has been achieved with current funding allocations.
  - This is a **shortfall** of an average of **0.9%**

# Challenges facing Joburg Water
## Infrastructure Renewal Rate



# Challenges facing Joburg Water

- **JW has an infrastructure renewal backlog of approximately R5.8 billion as a result of underfunding.**
  - **25% of asset base** has Remaining Useful Life of **less than 10 years**.
  - **Critical Assets** that require replacement/renewal – **R12.65 billion** (Over next ten year period).
  - This equate to requirement of R1.265 billion per annum over the next 10 years for capital replacement/renewal which is currently a barrier due to funding allocation/availability.
  - Additionally R0.5 billion would be required annually to deal with infrastructure upgrade and expansion backlog.

# Challenges facing Joburg Water

**Water and Sewer Backlogs**

- Water main Replacement : R861 million
- Sewer Replacement : R1.9 billion
- Water and Sewer Capacity Upgrading backlog: R2.8 billion

- **Total Networks Backlog: R5.6 billion**

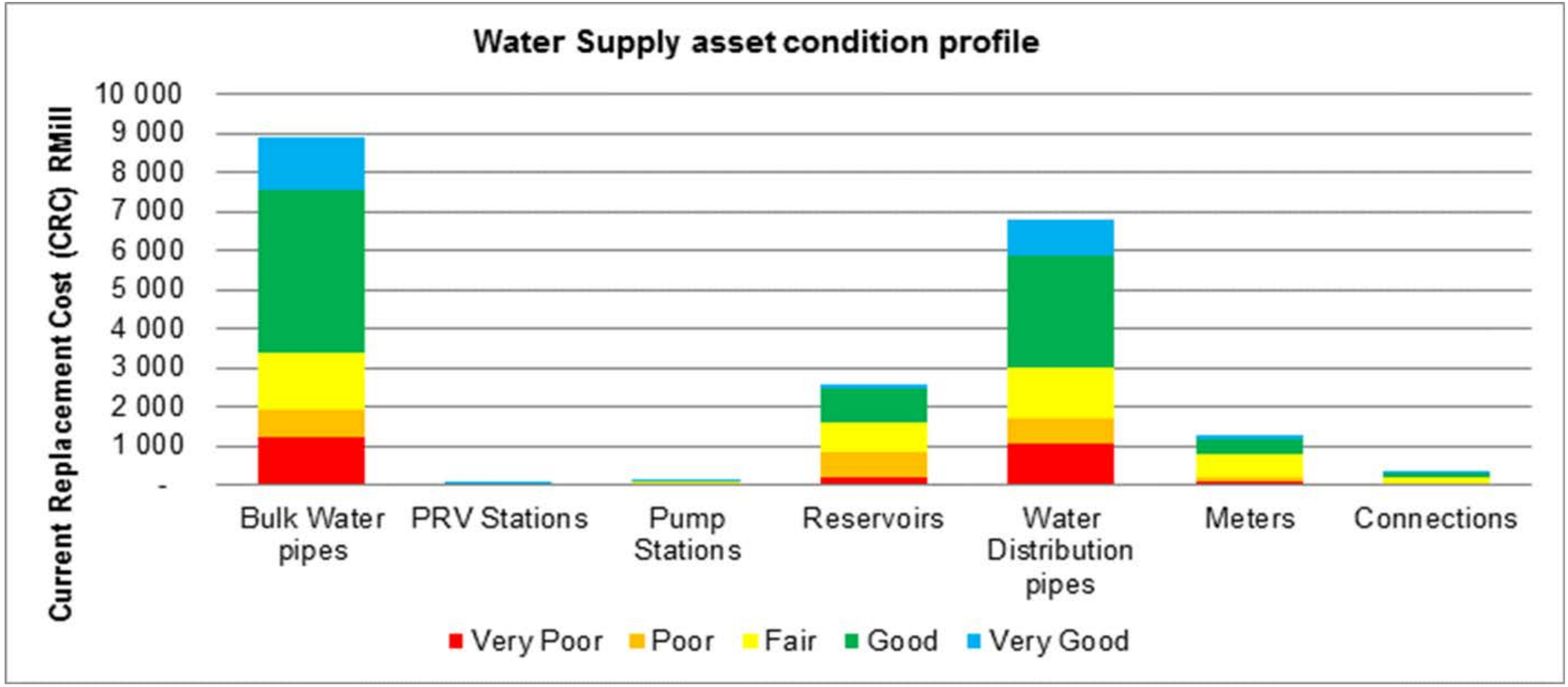
**Wastewater Treatment Works Backlogs**

- Backlog for wastewater treatment works plant and equipment replacement **R238 million**

- **Total Infrastructure Backlog: R5.8 Billion**

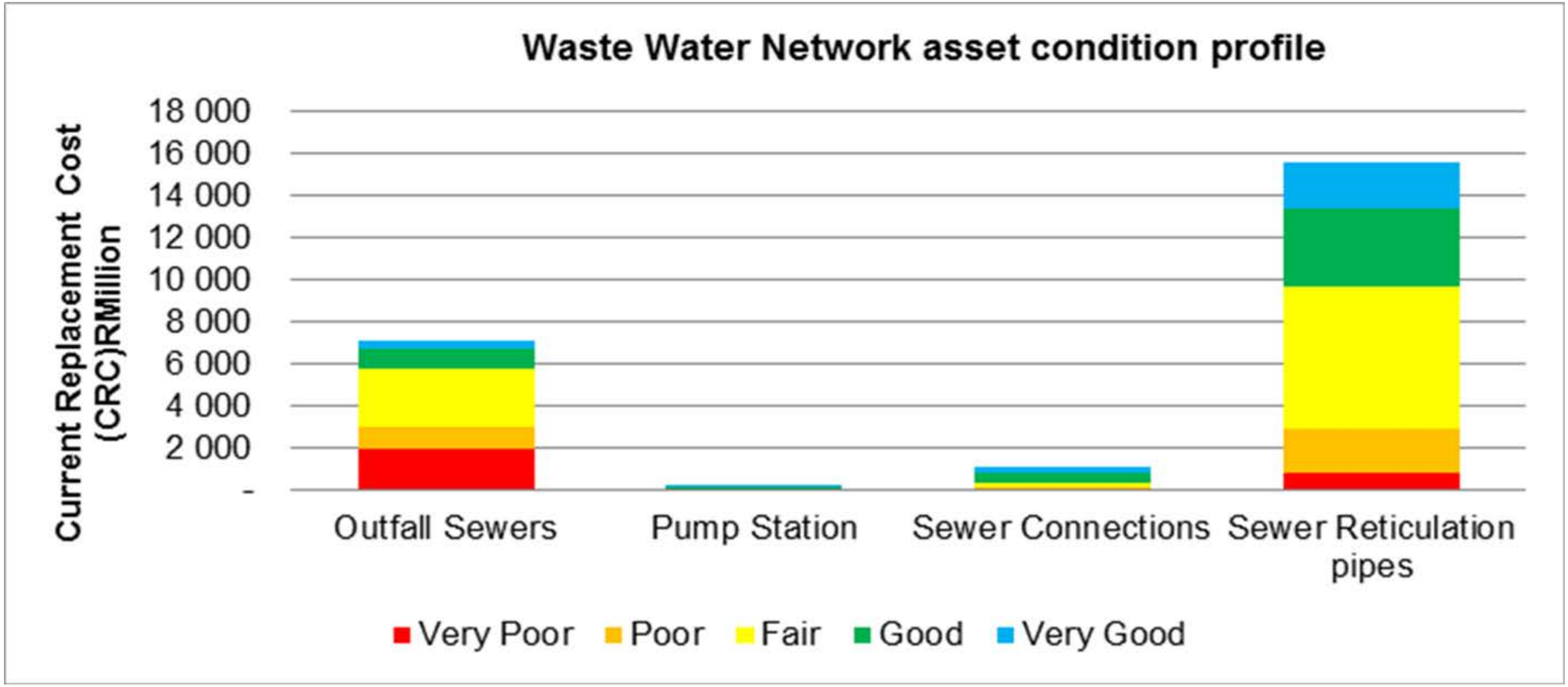
# State of Joburg Water Infrastructure

## Water Supply Asset Condition



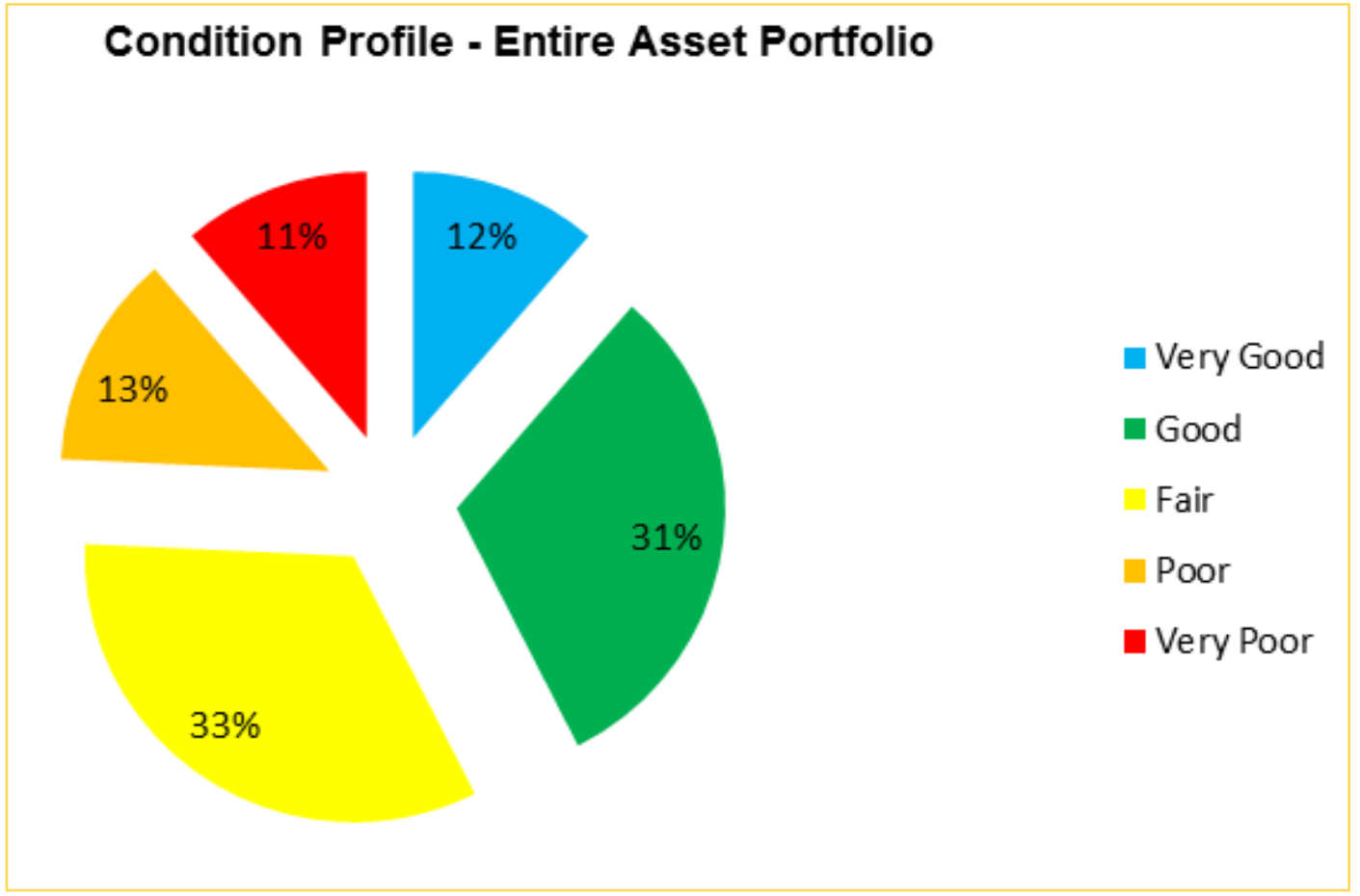
# State of Joburg Water Infrastructure

## Waste Water Network Asset Condition



# State of Joburg Water Infrastructure
## Total Asset Portfolio Condition

- Sewer blockage - Fourways, July 2017



# State of Joburg Water Infrastructure

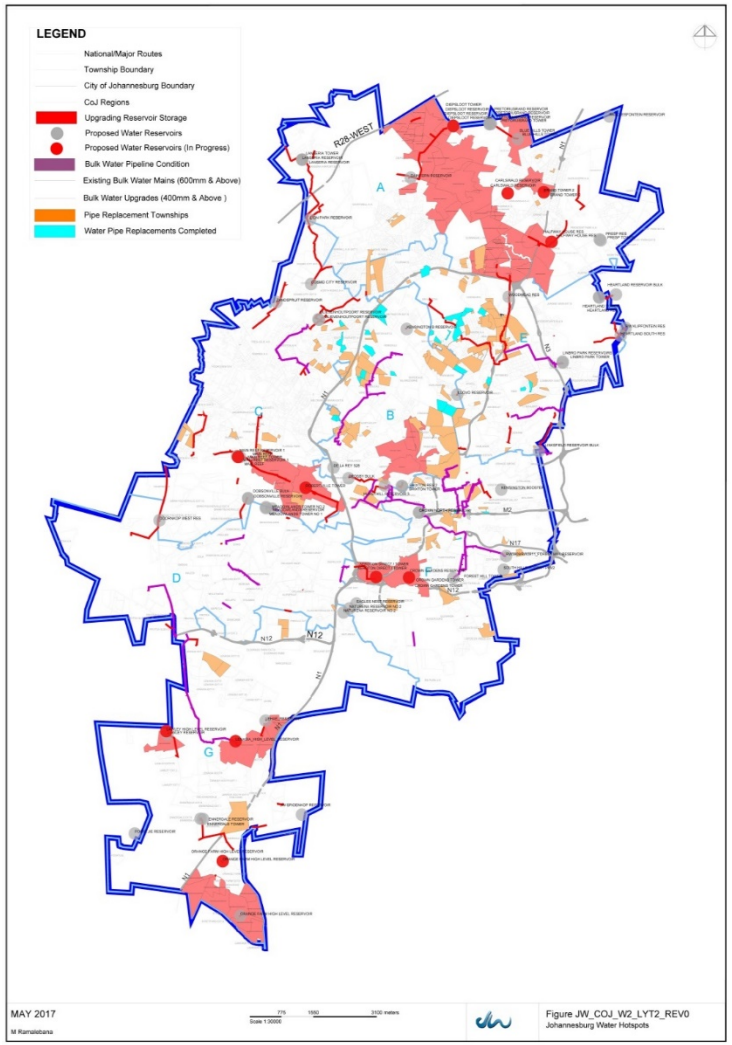
## Minimum Water Infrastructure Upgrading and Renewal

### Funding Requirements

- Water pipes renewals **require R415 million** per annum to replace 241 km annually
- Reservoirs rehabilitation **require R120 million** per year
- Water pump stations renewals **require R8 million** per year
- Water Upgrading and extensions **require R431 million** per year

**Total Water Upgrading and Renewal requirement R974 million**

- The outcome of the water networks infrastructure renewal/replacement and upgrade would be reduced bursts, improved response times and improved water supply



# State of Joburg Water Infrastructure

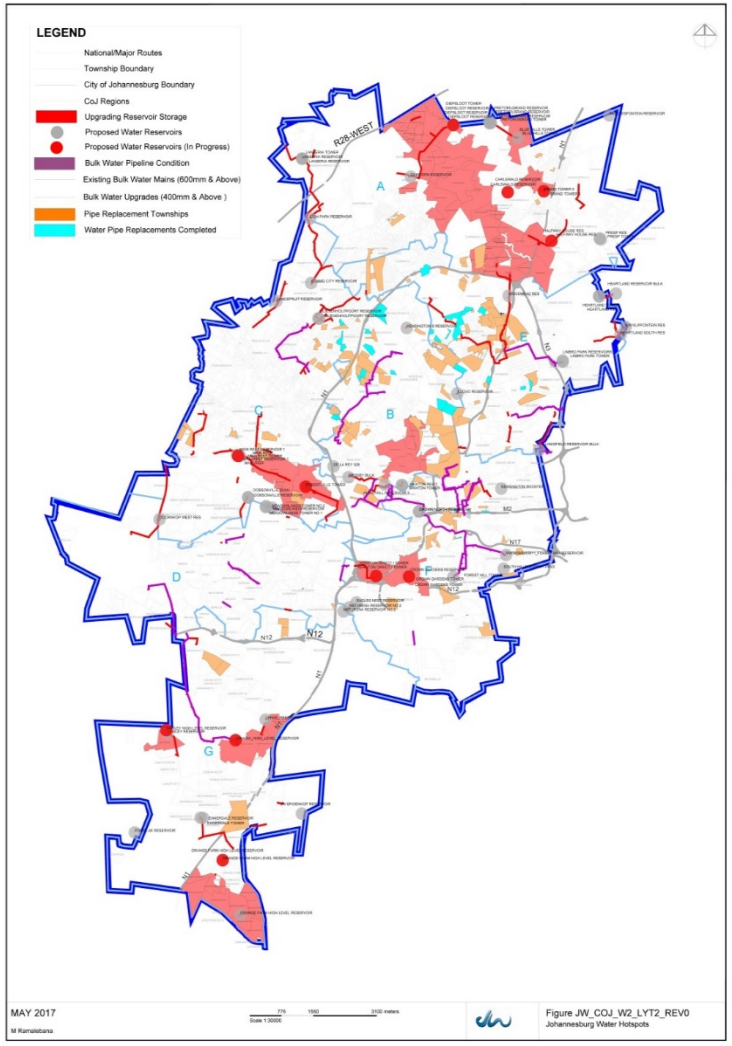
## Minimum Sewer Infrastructure Upgrading and Renewal

### Funding Requirements

- Sewer pipe renewals **require R435 million** per annum to replace 231 km annually
- Sewer pump stations **renewals R4 million** per year
- Wastewater Treatment Works **renewal R280 million** per year
- Sewer upgrading and extensions **require R102 million** per year

**Total Sewer Upgrading and Renewal requirement R 821 million per year**

- The outcomes of the wastewater infrastructure renewal/replacement and upgrade are reduced sewer blockages, improved response time, reduction in sewer spills at wastewater treatment works and improved effluent/sludge quality

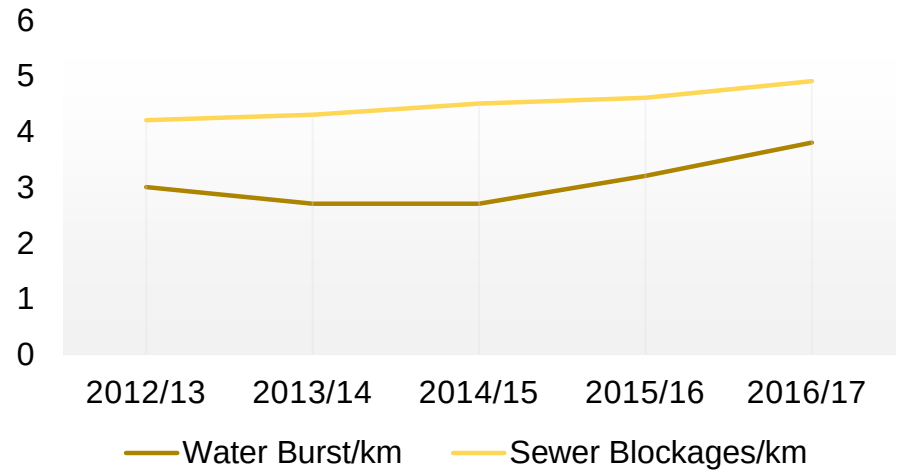


# State of Joburg Water Infrastructure

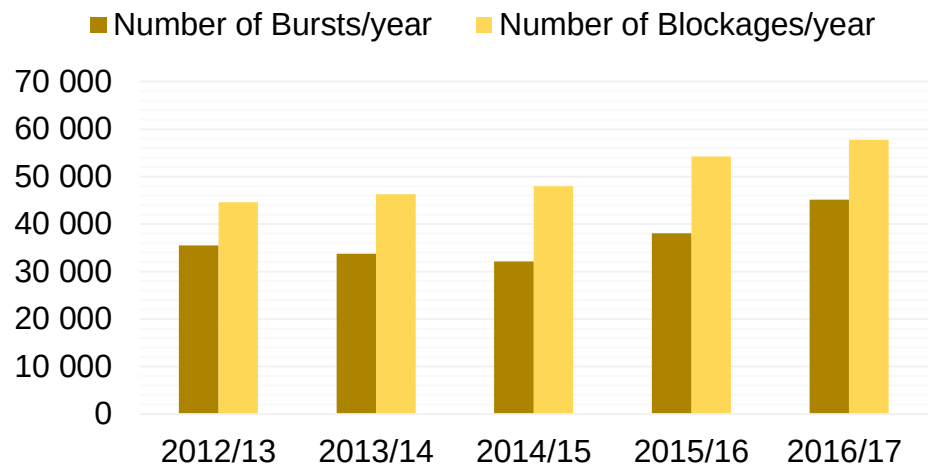
## Number of pipe bursts & sewer blockages per year

| Year | Water Burst/km | Number of Bursts/year | Sewer Blockages/km | Number of Blockages/year |
|---|---|---|---|---|
| **2012/13** | 3.0 | 35 539 | 4.2 | 44 613 |
| **2013/14** | 2.7 | 33 779 | 4.3 | 46 280 |
| **2014/15** | 2.7 | 32 131 | 4.5 | 47 981 |
| **2015/16** | 3.2 | 38 058 | 4.6 | 54 269 |
| **2016/17** | 3.8 | 45 177 | 4.9 | 57 769 |

Bursts and Blockages per kilometre




Bursts and Blockages per year



# State of Joburg Water Infrastructure
## Infrastructure theft and vandalism

- **Theft of brass water meters** is increasing at an alarming rate.
  - During the 2016/17 financial year **4,004 brass meters were stolen.**
- **JW is working closely with community policing forums** for increased policing visibility which assist with curbing the theft of meters.
- JW also **changed its specifications from brass to plastic meters**.
- Theft of electricity cables, especially on the power supply to the wastewater treatment works is also a challenge and leads to spills.
- JW is currently working closely with City Power to ensure all our wastewater treatment works are provided with additional power supply sources.

# State of Joburg Water Infrastructure
## The Road Ahead

**Short-term Interventions**

- Operationally, the following will be done to mitigate challenges with infrastructure failures:
  - City considering establishment of first line response teams to assist in reducing time of water wastage when bursts do occur.
  - Improved Pressure Management which includes preventative maintenance on all Pressure Reducing Valves (PRV) and extending smart controlled PRV installations.
  - Implement a preventative maintenance programme on all 300mm diameter valves and greater.
  - Improve sewer preventative maintenance from covering 1000km/annum with hydro jetting to a further 1000km/annum with depot based cleaning via manual sweeping of sewer lines.
  - Implement a workforce optimization programme which will include, central dispatching of teams, electronic job cards, route planning and improved customer feedback.

- *Burst pipe - Weltevreden Park, November 2017*

# State of Joburg Water Infrastructure
## The Road Ahead

**Medium-term Interventions**

- Increased capacity at wastewater treatment works – Expand Northern Works (50Ml/day) and New Lanseria Works (50 Ml/ day)
- Construct 9 new reservoirs and towers which will serve a total of 163 800 household equivalent (Blue Hills-1.8 Ml, Woodmead-20 Ml, Halfway House-20 Ml, Lawley HL-10Ml, Doornkop West-50 Ml etc.)
- Capital budget to be allocated more on renewal and replacement of infrastructure.
- Replacement of 633km of water pipes and 456km of sewer pipes.

- Burst pipe - Oakdene, August 2017

- Burst Pipe - Inner City, July 2017

# Concluding Remarks

## Investment Required Over Next 10 Years

- Joburg Roads Agency **R81.5 Billion**
- City Power **R17 Billion**
- Joburg Water **R12.65 Billion**
- **TOTAL:** **R111.15 Billion**

# Questions and Comments