# Current Status of Landfill Airspace in Gauteng

Institute for Waste Management of Southern Africa

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Presented by: Kobus Otto



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# Background – 2017 at Plastics SA

#### Status Quo of Landfill Airspace in Gauteng

Institute for Waste Management of Southern Africa 29 March 2017

> Presented by: Kobus Otto

2020 at Plastics SA

- *Same presenter;*
- Same venue;
- Similar presentation.

 MORE landfills closed in Gauteng – consumed additional 20 million m<sup>3</sup> of landfill airspace.

MORE Studies; MORE Plans; MORE Strategies.

Question: What was done since 2017 to <u>effectively</u> deal with Gauteng's imminent landfill airspace crisis?

# **Quantifying Waste Situation in Gauteng**

As reported in 2017:

- Gauteng's population of 11.2-million is 22.4% of SA's population.
- It generates around 33% of SA's GDP.
- It dominates the SA economy in all major sectors except agriculture, mining and quarrying.
- Estimated 40.6% of manufacturing ; 41.9% of construction; 34.8% of wholesale, retail, motor trade and accommodation; 32% of transport; and 38.8% of general government services.
- Gauteng Province by far the biggest generator of waste (including hazardous waste) in SA – roughly 33% of SA's waste generated.



### **Remaining Life of Metro Landfills**

- Remaining landfill life for CoE, CoT and CoJ landfills:
- Not all based on topographical surveys and computer modelling of airspace.
- Airspace consumption not all based on reliable weighbridge data.
- Partly based on literature studies; presented in 5-year time horizons.
- Cognisance taken of licensed footprints i.e. possibility of further cell development.
- Not considering exceedance of licensed heights and side slope gradients due to overfill.
- Not considering private landfills due to a lack of baseline information; and ongoing variations in disposal rates.
- 'Domino' effect not taken into consideration.

# **City of Ekurhuleni**

- 5 large regional landfills operated under contract: Rietfontein (GLB+) Rooikraal, Weltevreden, Platkop and Simmer & Jack (all GLB-)
- No municipal landfill towards the north of CoE.
- Estimated remaining life for Rietfontein and Simmer & Jack: 5 10 years.
- Estimated remaining life for Rooikraal, Weltevreden and Platkop: 20 years plus.
- Cover material may become determining factor.
- Some private landfills situated within / close to CoE boundaries.
- Last municipal landfill licensed and developed in CoE Rietfontein (1997)

# City of Ekurhuleni – Remaining life

	5	10	15	20
atkop landfill				
ietfontein landfill				
ooikraal landfill				
immer & Jack landfill				
eltevreden landfill				



# City of Ekurhuleni – Aerial Views



Google Earth

Imagery Date: 7/27/2019 26°17'46.65" S 28°24'52.06" E elev 0 ft eye alt 9517 ft 🚺

Platkop 2019/8/15

Rietfontein 2019/7/27

# **City of Ekurhuleni – Aerial Views**





Simmer & Jack 2019/1/12

## **City of Ekurhuleni – Aerial Views**



# **City of Tshwane**

- 1 large regional landfill; 1 medium landfill; 2 small landfills operated by municipality: Hatherley (GLB-), GaRankuwa (GMB-), Bronkhorstspruit and Sohanguve (GSB-)
- Onderstepoort recently closed.
- No municipal landfill towards the south of CoT.
- Estimated remaining life for Bronkhorstspruit, GaRankuwa and Soshanguve: 5 – 10 years.
- Estimated remaining life for Hatherley: 20 years plus.
- Cover material may become determining factor.
- Some private landfills situated within / close to CoT boundaries.
- Last municipal landfill licensed and developed in CoT Hatherley (1998)

#### City of Tshwane – Remaining life 10

	5	
Bronkhorstspruit (GSB-)	·	
GaRankuwa (GMB-)		
Hatherley (GLB-)		
<b>Onderstepoort (GMB-)</b>		
Soshanguve (GSB-)		

Soshanguve Landfill

Ga-Rankuwa Landfill

Image Landsat Nobpenicus

Conderstepoort Landfill

Pretoria

Pretoria

Google Earth,

15

20

#### "Tshwane to Develop New Landfills"

#### **Tshwane Metro to Open new landfill sites**

Pretoria East Rekord - June 19, 2019

The metro has, in the last three years, closed down the Derdepoort, Valhalla, Temba, Kwaggasrand, and Garstkloof dumping sites – resulting in a rise in illegal dumping.

The **Tshwane metro will open new landfill sites** to end dumping woes for its residents.

Spokesperson ...... said the metro has identified sites and feasibility studies would commence soon to determine their suitability as new dumpsites.

"The cost for developing a new regional landfill site will depend on the studies and the conditions for environmental authorisation," he said.

...... acknowledged that the shortage of legal dumping sites was a "challenge."

"Municipalities are, however, expected to divert more waste from landfills and consider disposal as last option."

Etc

#### **City of Tshwane – Aerial Views**

Hatharley Landfill

Google Earth

Imagery Date: 5/13/2019 25°44'14.85" S 28°24'12.62" E elev 0 ft eye alt 7602 ft Hatherley 2019/5/13

020 Maxar Technologies

Imagery Date: 7/22/2019 25°27'30.63" S 28°06'14.93" E elev 0 ft eye alt 6444 ft 📿

2020 Maxar Technologies.

Soshanguve 2019/7/22

Soshanguve Landfil

Sosha

Google Earth

#### **City of Tshwane – Aerial Views**

Ga-Rankuwa Landfill

Image © 2020 Maxar Technologies

Google Earth

laxar Technologies

Imagery Date: 7/22/2019 25°34'52.87" S 27°58'54.03" E elev 0 ft eye alt 5587 ft 🔘

GaRankuwa 2019/7/22

Pronkhorstsprutt Lendffli

**Google** Earth

magery Date: 9/18/2019 25°46'27.35" S 28°42'35.08" E elev 0 ft eye alt 3741 ft 🔘

Bronkhorstspruit 2019/9/18

### **City of Johannesburg**

- 3 large regional landfills and 1 medium landfill operated by the municipality: Goudkoppies, Marie Louise, Robinson Deep (all GLB-) and Ennerdale (GMB-).
- No municipal landfill towards the north.
- Estimated remaining life for Goudkoppies, Marie Louise, Robinson Deep and Ennerdale: 0 – 5 years.
- Cover material <u>unlikely</u> to be the determining factor.
- Some private landfills situated within / close to CoJ boundaries.
- Last municipal landfill licensed and developed in CoJ Marie Louise (1992)

# City of Johannesburg – Remaining life

	5	10	15	20
Ennerdale (GMB-)				
Goudkoppies (GLB-)				
Marie Louise (GLB-)				
Robinson Deep (GLB-)				



# City of Johannesburg – Aerial Views



# City of Johannesburg – Aerial Views



# Municipal Landfills – Current Situation



# Municipal Landfills – Situation by 2025\*



\* Current tonnage

### Municipal Landfills – 2030 to 2040\*



\* Current tonnage

## Municipal & Private\* Landfills in 2020

Soshanguve Landfill

Brits Rossiyn Landfill Multisand Landfill Conderstepoort Landfill Pretoria Conderstepoort Landfill Mooiplaats Landfill FG Landfill FG Landfill Moorkop Landfill Moorkop Landfill

Robinson Deep Landtil DGenesis Landfill Goudkopples Landfill Rootkraal Landfill Ennercele Landfill Platkop Landfill

Holfontein and Vlakfontein Class A landfills excluded

• Rietfontein, Tonk Meter Road & Bon Accord (not visible on map).

#### **Increased Transport Distances**

- Waste in future to be transported over longer distances need for *effective* waste transfer systems.
- Impact of increased transport distances:
  - Cost increases; efficiency decreases.
  - Production can be reduced by 50% (1 round vs 2 rounds).
  - Collection and transport costs significantly increased.
  - Increased pressure on remaining landfill infrastructure:
     Longer turnaround times for collection vehicles and negative impacts on environmental compliance.

#### **Increased Transport Distances**

**REL** cost per ton vs. distance to landfill - Jan. 2015 R900 R800 cost per ton R700 R600 R500 REL R400 Overall R300 R200 R100 R0 10 km 20 km 30 km 40 km 50 km 60 km 70 km 80 km 0 km Road distance from collection area to landfill

#### <u>Notes:</u>

0

The X-axis represents the one-way distance to the landfill.
The analysis was based on "synthetic" data (costs, times, etc.). The "fixed" cycle time used was 180 mins: 120-150 mins for actual

collection and 30-60 minutes turnaround time at the landfill (considered to be reasonable averages for municipal landfills.

Costs generated include truck plus crew (driver + 6 collectors).

#### Landfill Airspace in Gauteng



Sorry ..... but without sufficient landfill airspace in Gauteng everything's NOT going to be OK!!!

#### Waste Management Alternatives

- Waste diversion from landfill is preferred option.
- Various alternative treatment technologies internationally available.
- Only some treatment technologies implemented in SA were sustainable. Many failed:
  - Robinson Deep 'dirty' MRF built early '90s. Facility not viable and was shut down. Subsequently, about 10 large dirty MRF's were unsuccessful in SA.
  - CoJ and CoT separation at source projects discontinued.
  - Private / public composting facilities (e.g. Panorama), shut down.
  - Construction and Demolition Waste crushing at S&J discontinued.
  - Athlone Integrated Waste Management Facility shut down.

### **MRF** Donated to Mangaung













#### **SA Waste Industry Targets**

#### What is the South African Waste Industry Aiming at?



#### Waste Hierarchy - International

- South Africans love the waste hierarchy in different shapes and colours.
- "Apply the Waste Hierarchy and all landfill airspace shortages will vanish". <sup>(C)</sup>



# Waste Hierarchy – The SA Reality

Reality is that South Africa is in terms of *compliance with the waste hierarchy*:



#### WHO ARE WE TRYING TO FOOL?

#### **Considering Local Treatment Options**

Alternative waste treatment technologies used in SA inter alia include:

- Recycling
- Composting
- Crushing of C&D Waste.
- Waste to Energy, with various sub-options.

Two primary requirements that will determine the financial viability (and sustainability) of alternative waste treatment technologies are however mostly ignored:

- **1. Appropriate Feedstock (Quality and Volume)**
- 2. Sustainable Markets for various Offtakes

#### **Need for Sustainable Markets**

# Sustainability Prices Demand

#### Markets

With sustainable markets to drive demand for offtake and price upwards, waste industry (formal and informal) will source appropriate feedstock - WHATEVER IT TAKES.

# Recycling

Some hard facts about recycling in SA:

- High participation rates required to achieve effective recycling.
- Pikitup pilot study recorded participation rates of between 5 20%.
- Waste to be source separated for MRF's to be viable.
- Prices for recyclable material in SA *extremely* sensitive to international influences.
- SA assumed to recycle 10 15% of waste generated.
- Recycling is meant to create 1000's of jobs, but the industry is facing *serious* problems.

	Country	Percentage of Waste Recycled
1	Switzerland	52%
2	Austria	49.7%
3	Germany	48%
4	Netherlands	46%
5	Norway	40%
6	Sweden	34%
7	United States	31.5%
Source:		

http://www.aneki.com/recycling\_countries.html

### **Recycling Influences**

Reduced Markets  $\rightarrow$  Reduced Demand  $\rightarrow$  Reduced Prices  $\rightarrow$  Reduced Sustainability.

Best illustrated by impact of (i) crude oil prices, and (ii) Chinese export market for recyclables.

**Crude Oil Prices** 

 Plastics is by-product from crude oil - estimated to consume 4 % of global oil production.

 Increase in crude oil price will increase value of recyclable plastics - serving as substitute for virgin material (crude oil).

 Lower crude oil prices however reduces demand for recyclable plastics and with that, lowers recyclable plastics price and therefore viability / sustainability of plastics recycling.