

AfriSam

Motivation for Migration to 22mm Concrete Stone

Road Pavement Forum 12 November 2008

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Product Technical Manager: AAG

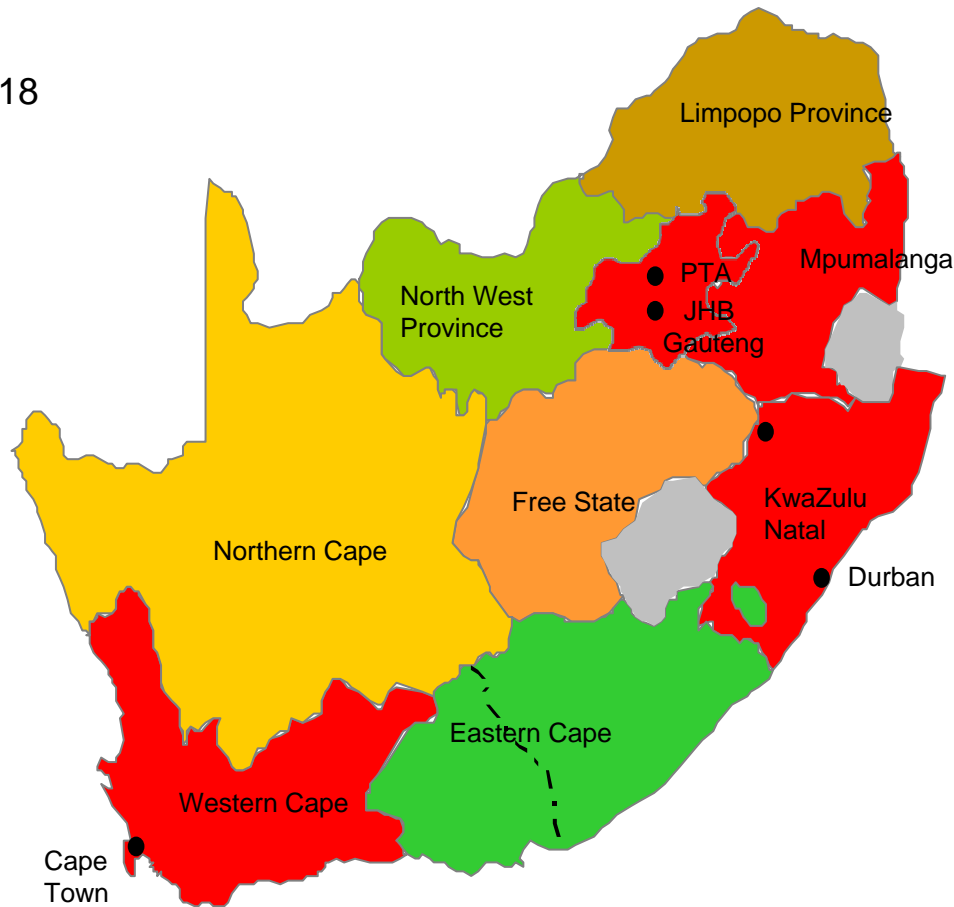
Contents

- Aggregate and Readymix Overview
- Quarrying operations
- Product plant mix
- Example of product split (Ferro)
- Product demand from major projects
- Implications in concrete
- Conclusion

Geographical location: AfriSam Aggregates

National

Operations: 18



Gauteng*

Operations: 10
(7 quarries, 3 dumps)

KwaZulu Natal

Operations: 6

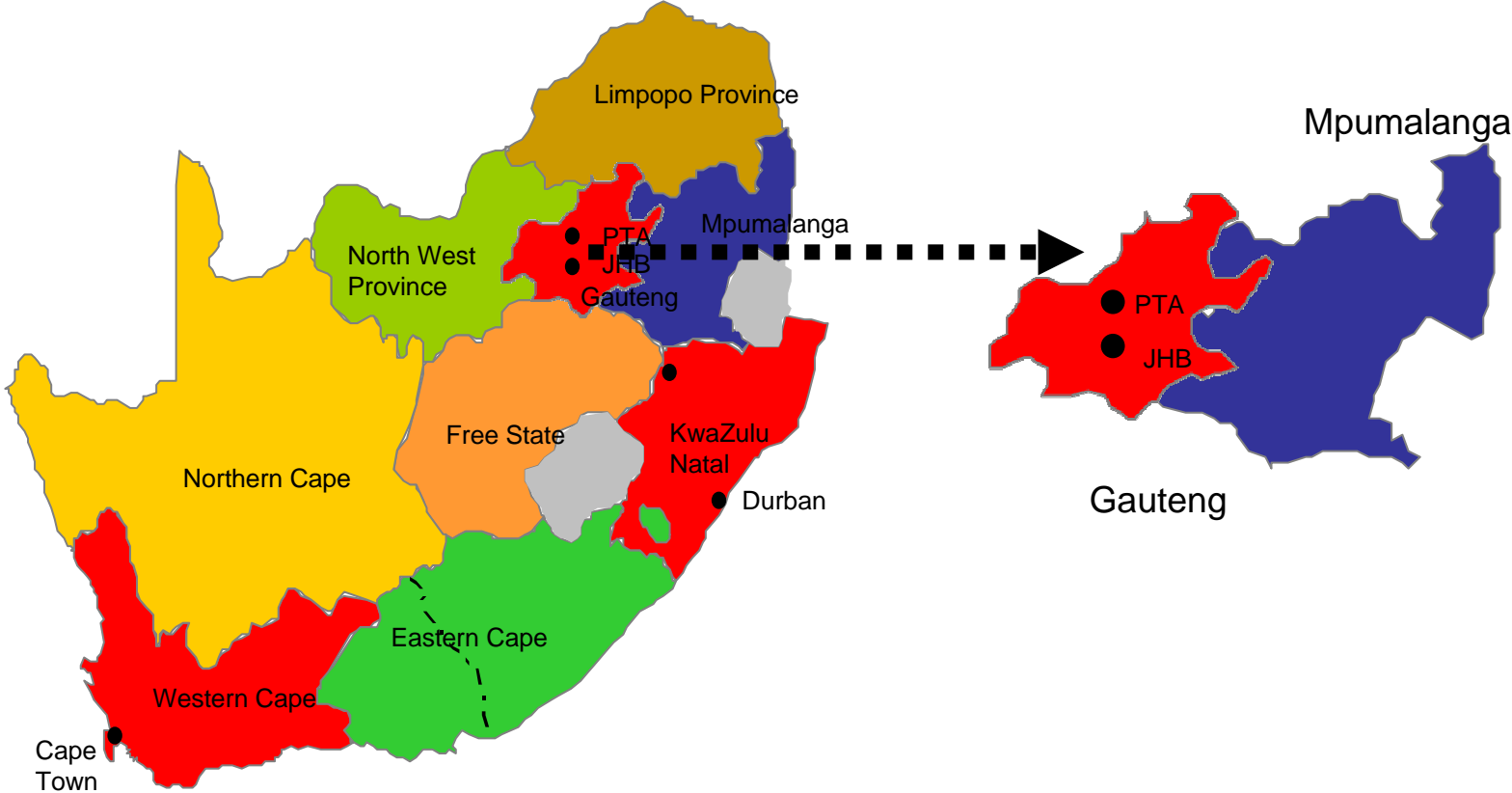
* includes Mpumalanga
PTA : Pretoria
JHB : Johannesburg

Cape

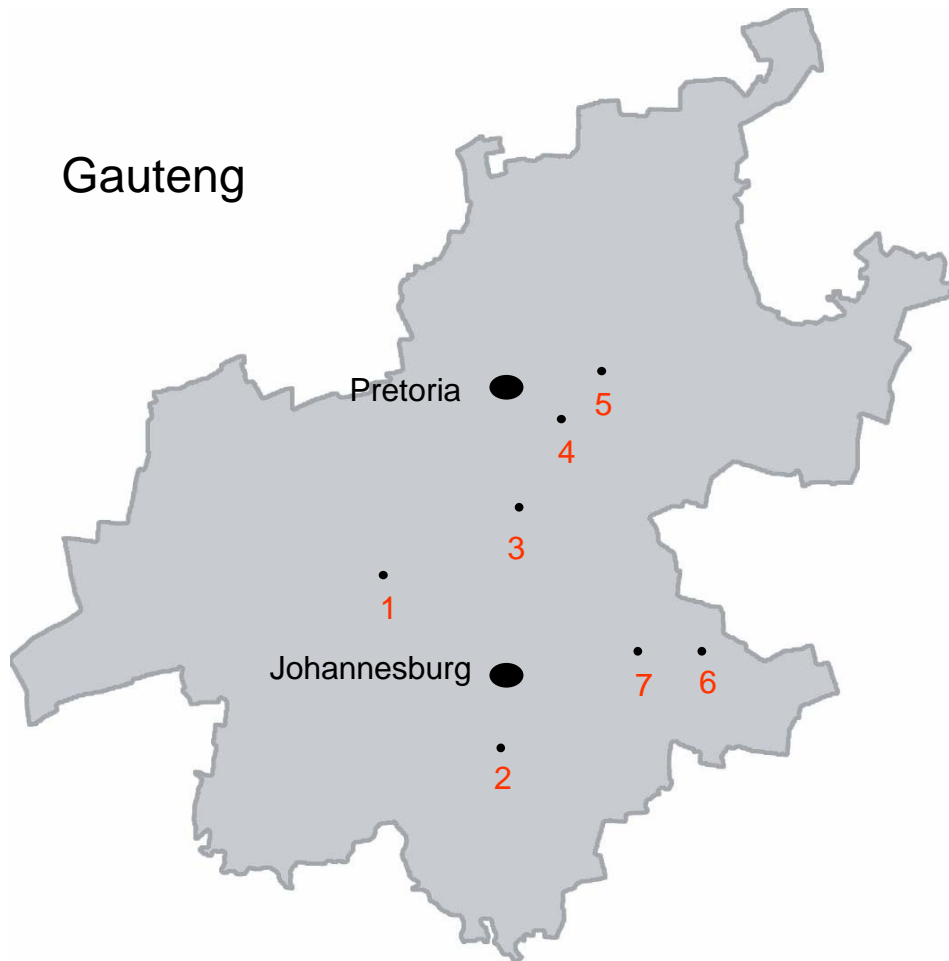
Operations: 2

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Geographical location: AfriSam Aggregate Gauteng



Gauteng and Mpumalanga operations



Mpumalanga



- 1 Roodekrans
- 2 Eikenhof
- 3 Jukskei
- 4 Olifantsfontein
- 5 Ferro
- 6 Vogels*
- 7 Rooikraal
- 8 Zeekoewater

* Dump operation, 2 smaller dump operations not shown

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AAG operations



- Eikenhof
- Ferro
- Olifantsfontein
- Jukskei
- Roodekrans
- Rooikraal
- Vogels
- Zeekoewater

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AAG Eikenhof quarry



Material properties

Andesite

- Relative density : 2.92
- ACV : 9
- Unconfined compression : 516-538 Mpa
- 10% FACT : 440-475kN

Blasting

- Burden : 3m
- Spacing : 3.6m
- Hole dia : 102mm
- Hole depth : 10.5m
- Stemming : 3m
- Powder factor : 325g/ton

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AAG operations



- Eikenhof
- **Ferro**
- Olifantsfontein
- Jukskei
- Roodekrans
- Rooikraal
- Vogels
- Zeekoewater

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AAG Ferro quarry



Material properties

Meta-quartzite

- Relative density : 2.65
- ACV : 20
- 10% FACT : 205 kN

Blasting

- Burden : 3m
- Spacing : 3m
- Hole dia : 76mm
- Hole depth : 13m
- Stemming : 3m
- Powder factor : 185g/ton

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AAG operations



- Eikenhof
- Ferro
- **Olifantsfontein**
- Jukskei
- Roodekrans
- Rooikraal
- Vogels
- Zeekoewater

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AAG Olifantsfontein quarry



Material properties

Dolomite

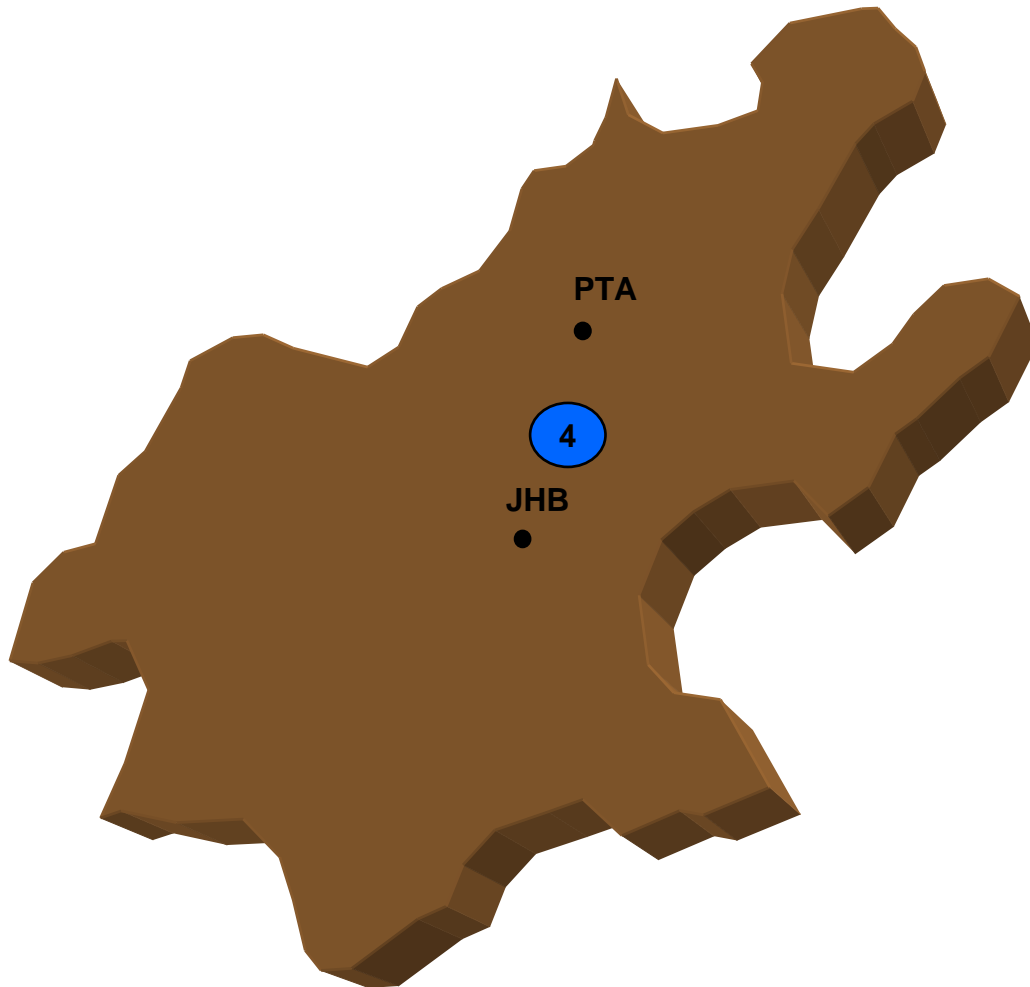
- Relative density : 2.86
- ACV : 19
- Unconfined compression : 212-396 MPa
- 10% FACT : 220-240kN

Blasting

- Burden : 3.8m
- Spacing : 4.2m
- Hole dia : 102mm
- Hole depth : 11m
- Stemming : 1.5m
- Powder factor : 210 g/ton

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AAG operations



- Eikenhof
- Ferro
- Olifantsfontein
- **Jukskei**
- Roodekrans
- Rooikraal
- Vogels
- Zeekoewater

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AAG Jukskei quarry



Material properties

Granite

- Relative density : 2.65
- ACV : 27
- Unconfined compression : 242-275 MPa
- 10% FACT : 120-190kN

Blasting

- Burden : 3 m
- Spacing : 3.5 m
- Hole dia : 102 mm
- Hole depth : 14 m
- Stemming : 1.5m
- Powder factor : 330g/ton

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AAG operations



- Eikenhof
- Ferro
- Olifantsfontein
- Jukskei
- **Roodekrans**
- Rooikraal
- Vogels
- Zeekoewater

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Roodekrans quarry



Quarry Exploration

- Decomposed Zone : River Sand
- Oxidized Zone : Crushed River Sand
- Fresh Granite : Hard Rock

AAG operations



- Eikenhof
- Ferro
- Olifantsfontein
- Jukskei
- Roodekrans
- **Rooikraal**
- Vogels
- Zeekoewater

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AAG Rooikraal quarry



Material properties

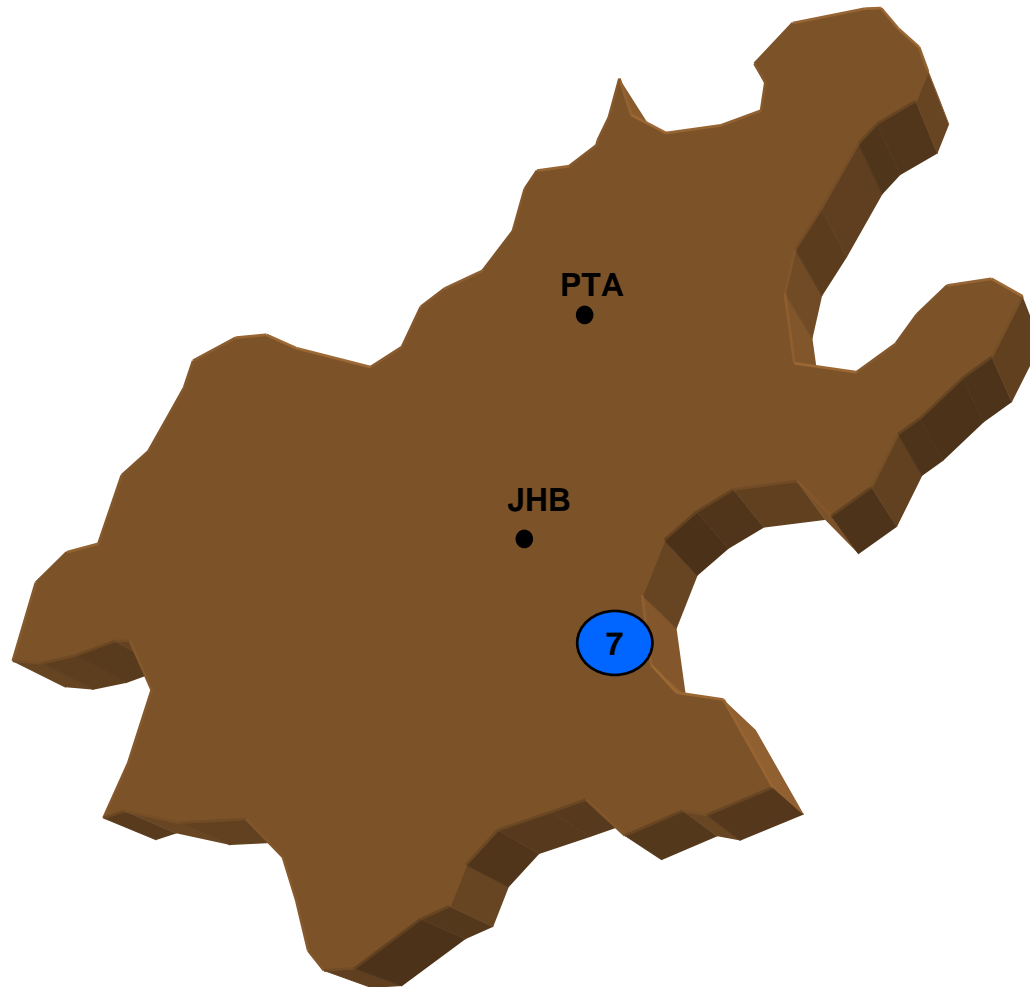
- Relative density :2.93
- ACV : 11.8
- 10% FACT : 351.9kN

Blasting

- Burden : 2.8m
- Spacing : 3m
- Hole dia : 102mm
- Hole depth : 10m
- Stemming : 1.5m
- Powder factor : 340g/ton

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AAG operations



- Eikenhof
- Ferro
- Olifantsfontein
- Jukskei
- Roodekrans
- Rooikraal
- **Vogels**
- Zeekoewater

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AAG Vogels dump



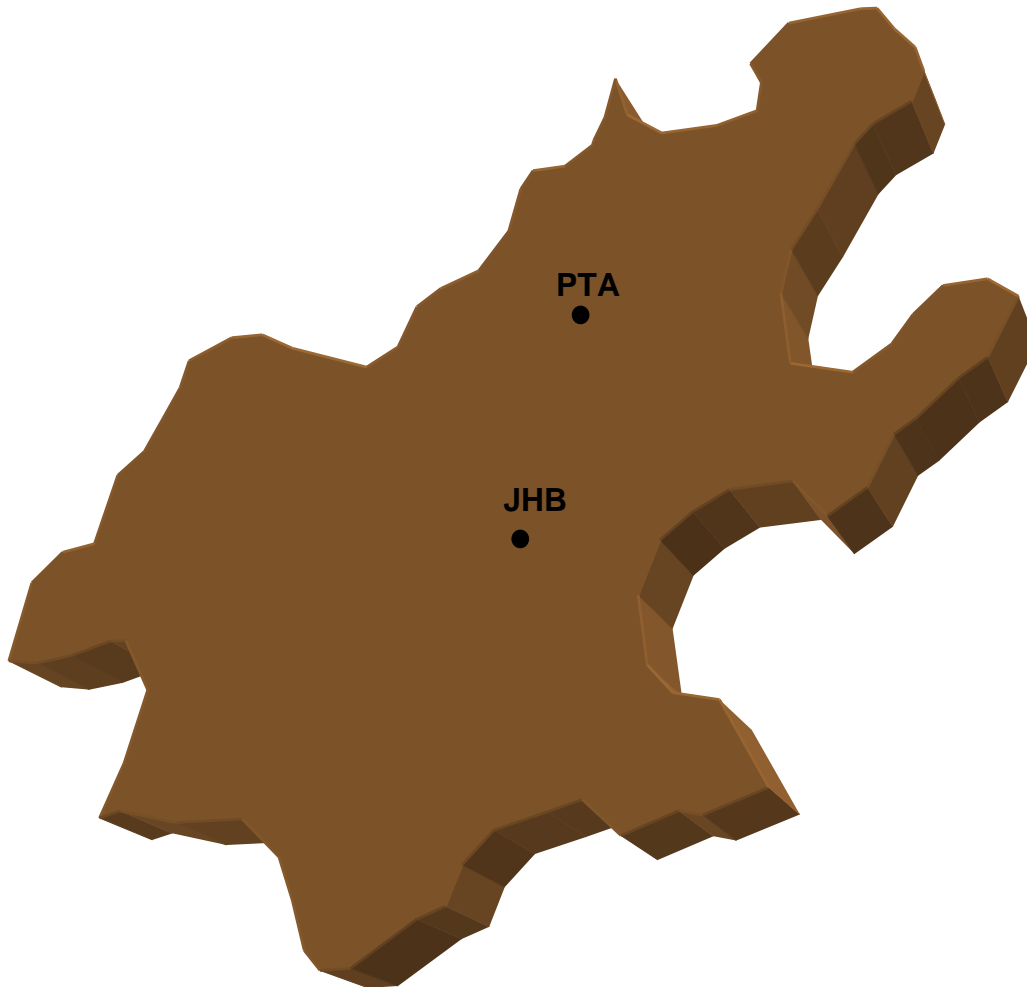
Material properties

Reef Quartzite

- Relative density : 2.74
- ACV : 15
- 10% FACT : 245 kN

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AAG operations



- Eikenhof
- Ferro
- Olifantsfontein
- Jukskei
- Roodekrans
- Rooikraal
- **7** Vogels
- Zeekoewater

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AAG Zeekoewater quarry



Material properties

Felsite

- Relative density :2.64
- ACV : 18
- Unconfined compression strength : 377-453 MPa
- 10% FACT : 230-380kN

Blasting

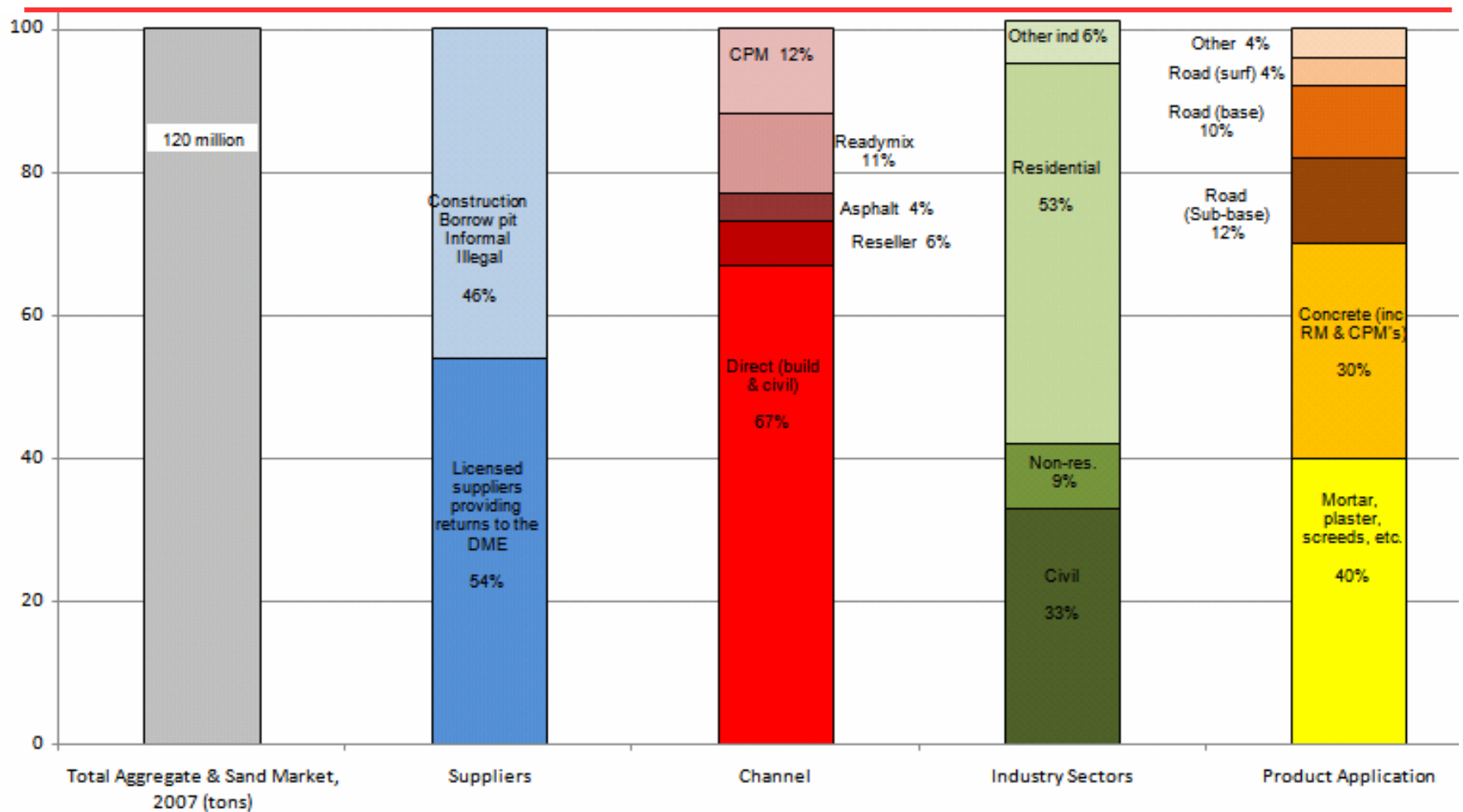
- Burden : 3m
- Spacing : 3.5m
- Hole dia : 102mm
- Powder factor : 220g/ton

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AAG – Plant/Product Mix

Product	Ferro	Olies	Jukskei	Vogels	Rooikraal	Eikenhof	Roodekrans	Zeekoewater
Concrete Stone								
37,5mm		✓	✓			✓		
22mm	✓	✓	✓	✓	✓	✓	✓	✓
13,2mm	✓	✓	✓	✓	✓	✓	✓	✓
9,5mm	✓		✓	✓	✓	✓		
6,7mm	✓	✓		✓	✓	✓		✓
Road stone								
19mm	✓				✓			
13,2mm	✓				✓			
9,5mm	✓				✓			
6,7mm	✓				✓			
Base Material								
G1	✓		✓	✓	✓		✓	✓
G5	✓		✓				✓	
Sands								
Washed				✓	✓		✓	
Unwashed		✓	✓			✓	✓	✓
Blended sand	✓							

South African Aggregate Market Map - 2007



AAG – Ferro quarry product split

TERTIARY/ROADSTONE PLANT

Capacity	345t/hour
Gross OEE	36.3%
Consented hours/month	504

Product	T/hr	% Split
22mm	64.7	18.8
13,2mm	49.1	14.2
Washed sand	8.1	2.3
Unwashed sand	76.0	22.0
19mm Roadstone	52.8	15.3
13,2mm Roadstone	26.4	7.7
9,5mm Roadstone	41.5	12.0
6,7mm Roadstone	26.4	7.7
	345.0	100.0

The logo for AfriSam, featuring the word "Afri" in red and "Sam" in grey, with a stylized 'A'.

AAG – Major projects

- GFIP
 - G1 80 000 tons
 - G5 798 000 tons
 - G6/7 600 000 tons
 - Unselected fill 100 000 tons
 - Asphalt 728 000 tons

- Gautrain
 - Ballast 438 000 tons

Implications of larger stone in concrete

- Benefits:
 - Improved dimensional stability
 - Potentially more durable
 - Reduced cement contents
 - Less shrinkage cracking
- Concerns:
 - Pumpability
 - Congested reinforcing
 - Cover issues

Conclusion

- Environmental pressures
- Limited supply of quality aggregates
- Proven successfully in coastal regions/Pioneer 22
- Support and buy in of industry organisations
- Working in conjunction with downstream customers
- SABS:1083 requires revision
- Output increased by about 10%