

# **Cullinan Site Visit – 4 February 2016**











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# **Cullinan Site Visit Itinerary**



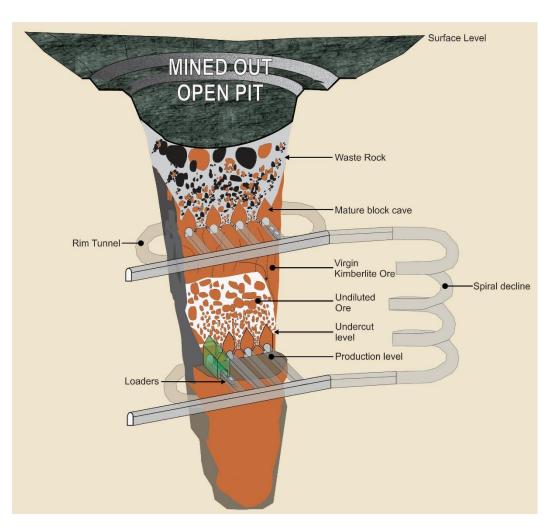
09:30	Arrive at Cullinan Diamond Mine
09:45	Overview briefing on Petra and Cullinan & safety briefing
11:00	Underground visit
13:15	New plant visit
14:10	Changehouse
14:30	Lunch with management, Q&A, diamond viewing
16:00	Mine visit ends



# **PETRA OVERVIEW**

# **Moving into Undiluted Ore / Schematic**





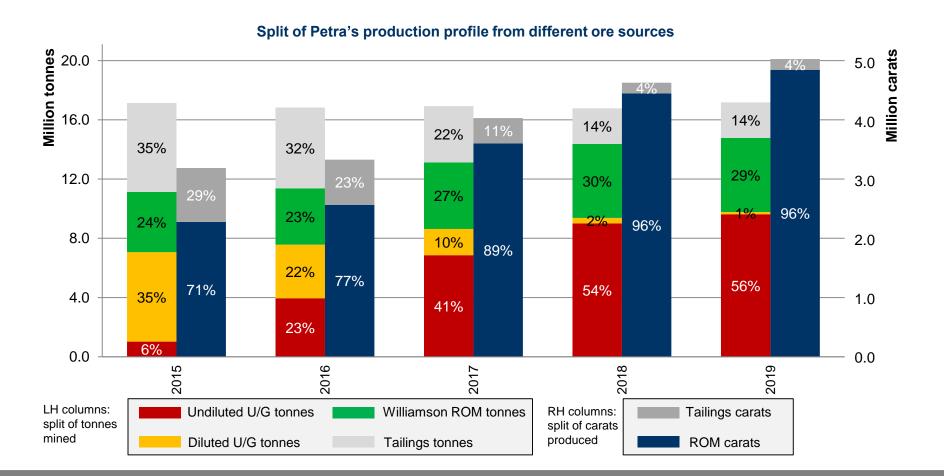
- Caving is a safe and proven mechanised mining method; provides access to higher volumes of ore than other methods
- Current underground mining taking place in diluted, mature caves nearing end of lives
- Expansion programmes to take next 'cut' by deepening and establishing new block/sub level caves in undiluted kimberlite
- Grades expected to rise significantly, increasing margin per tonne mined, especially at Finsch and Cullinan
- Will reduce wear and tear on processing systems (waste rock is harder and more abrasive than kimberlite)

# **Growth & Margin Expansion**



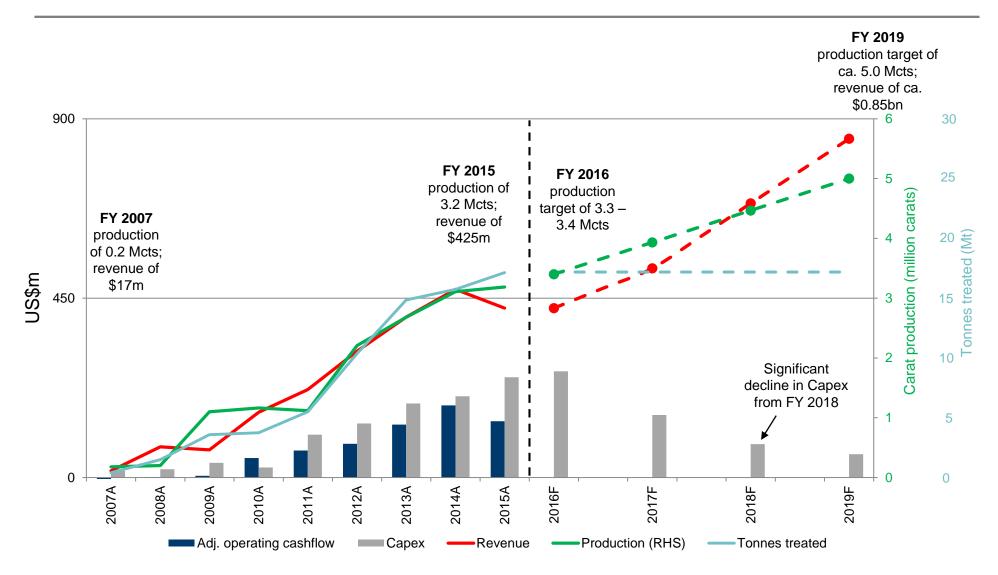
Operating margins expected to rise from ca. 36% to +50% by FY 2019

- Group tonnage throughput to remain flat, but increase in ROM grades to lead to ca. 60% growth in production
- Lower value tailings to reduce from 29% in FY 2015 to 4% of carat production by FY 2019



# **Outlook – Growth and Margin Expansion**





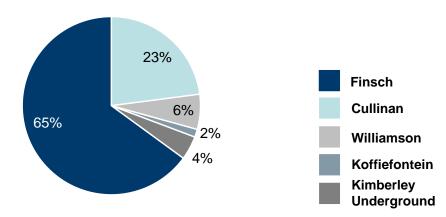
Notes: 1. All forecasts for Capex, revenue and production are management estimates. 2. Capex is in nominal terms. 3. Forecast revenue calculated using FY 2016 guided prices less 9%, flat pricing for FY 2017 (real terms), and thereafter a 4% annual real price increase.

## Petra Portfolio – FY 2015 vs FY 2019

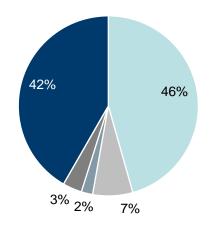


#### **Gross Production**

FY 2015 actual: 3.2 million carats

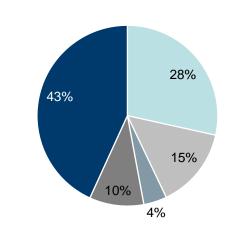


FY 2019: ca. 5 million carats<sup>1</sup>

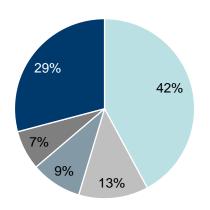


**Gross Revenue** 

FY 2015 actual: US\$425.0 million



FY 2019: ca. US\$0.85 billion1





# **CULLINAN OVERVIEW**

# Cullinan Diamond Mine ("CDM") Overview





1902

Cullinan kimberlite pipe originally discovered by Sir Thomas Cullinan 1903

Open pit mining commenced at 'Premier Mine' in 1903 - at time of WW1 14,000 employed at mine 1905

Recovery of the 3,106 carat Cullinan diamond – the world's largest gem diamond 1930

De Beers acquired controlling interest in Premier 1932

Mine closed due to depression and lack of market for luxury goods 1945

Mine reopened and pit dewatered for development of underground mine 1997

Premier (Transvaal) Diamond Company amalgamated into DBCM 2008

Mine acquired by Petra Consortium acquisition cost of R1bn – Petra had initial 37% interest 2009

Petra increased its interest to 74% by buying out Al Rajhi's interest

- Source of the Cullinan, the largest gem diamond ever recovered (3,106 carats)
- Produced a quarter of all the world's diamonds of +400 cts; 140 stones of +200 cts; 811 stones of +100 cts
- World's most important source of truly rare and highly prized blue diamonds
- One of the largest diamond resources by in-situ value 195.4 Mcts valued at \$34 billion<sup>1</sup>
- FY 2015 production of 0.7 Mcts and revenue of \$122.2 million
- C-Cut Phase 1 expansion plan to increase production to +2 Mctpa by FY 2019
- Cullinan plays a very important role in its local community and is dedicated to maintaining high ESG standards

## **Iconic Diamonds**



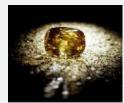
• Exceptional diamonds (+\$5 million stones) contributed on average \$21 million p.a. from FY 08 to FY 15

#### Historic Recoveries pre-Petra

#### **Recoveries by Petra**



The Cullinan
3,106 ct rough
Largest gem diamond
ever discovered
Source of the diamonds in
the British Crown Jewels
1905



The Golden Jubilee
755.5 ct rough
545.6 ct polished
The largest cut diamond in the
world
1986



The Cullinan Heritage
507.55 ct rough
104 ct polished, plus 23
auxilliary stones
Sold for \$35.3m, word record
for rough stone
2009



The Cullinan Dream
122.5 ct rough
sold \$23.5m
Petra retains 15% share in
polished
2014



The Centenary
599.1 ct rough
273.8 ct polished
Cut into a modified heartshaped design, "fit for the
turban of a Sultan or Maharaja"
1986



The Taylor Burton
240.8 ct rough
69.4 ct polished
Gifted to Elizabeth Taylor by
Richard Burton
1966



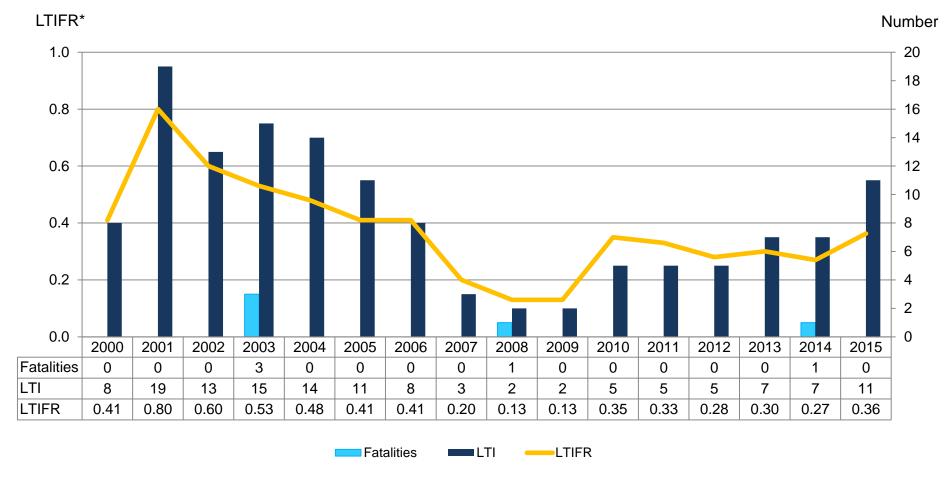
The Blue Moon of Josephine 29.6 ct rough 12.0ct polished Rough sold for \$25.5m, and polished for a record \$48.5m 2015



The Star of Josephine 26.6 ct rough, 7.0ct polished sold for \$9.5m 2009

# **Safety Performance**



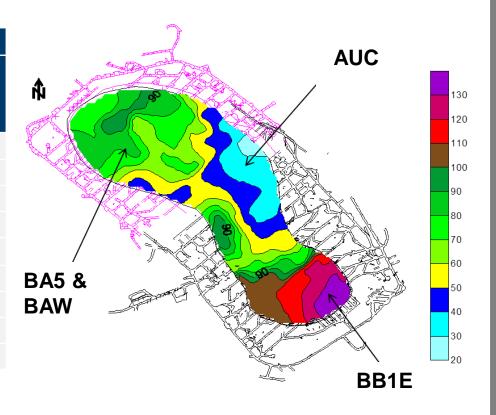


- FY 2001 FY 2006: Increase in activities and projects
- FY 2010 current: Increase in activities, employees/contractors and projects

# **Major Diamond Resource**



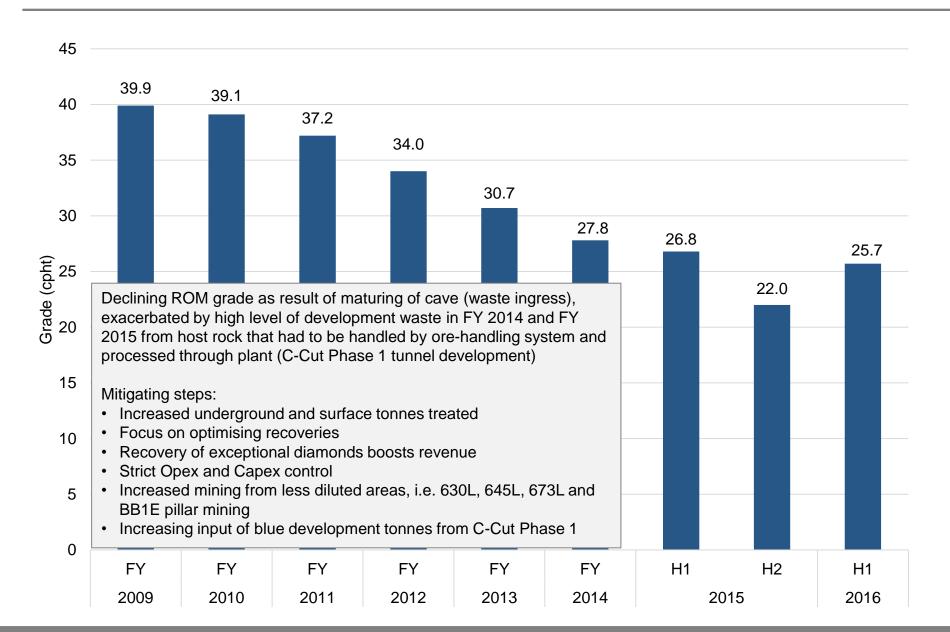
Tonnes	Gross (Jun 2015	5) Contained						
Tonnes		Contained						
Tonnes		Contained						
10111100	Grade	Diamonds						
(millions)	(cpht)	(Mcts)						
-	-	-						
48.0	47.8	22.95						
48.0	47.8	22.95						
-	-	-						
253.9	70.6	178.10						
172.0	10.0	17.33						
425.8	45.9	195.43						
	- 48.0 48.0 48.0 - 253.9 172.0	(millions) (cpht)						



- Resource bottom cut-off: 1.0mm.
- Reserve bottom cut off: 1.0mm.
- B-Cut resource tonnes and grade are based on block cave depletion modelling and include external waste.
- C-Cut Resource stated as in-situ.
- Reserve carats and grades are factorised as per the following Resource to Reserve liberation factors: "Brown" kimberlite 75.8%,
  "Grey" kimberlite 71.4%, and Hypabbysal kimberlite 71.8%.
- Changes in Reserve and Resource figures due to mining depletions, the re-estimation of Grey Kimberlite grade using new sample information in the AUC South, and new Reserves based on PCBC and Mine 2-4D scheduling on BB1E, AUC, BA5, BAW Ph1 and C-Cut Ph1; current and projected plant performance has been factored into the Reserves.

# **ROM Grade Turnaround in Progress**



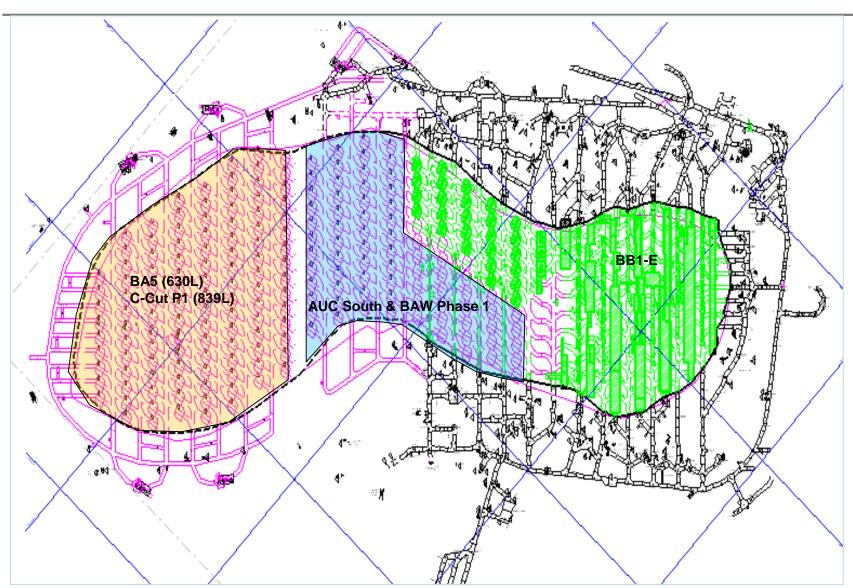




# **MINING OVERVIEW**

# **Plan View of Cullinan Mining Areas**





# **Cullinan Mine Plan – High Level**

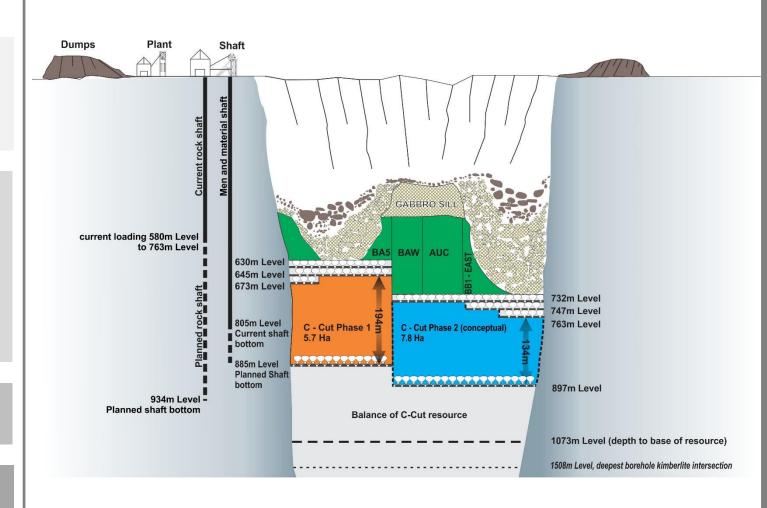


Current mining taking place in B-Cut at 732m and rehabilitation mining on 645m

C-Cut Phase 1 – new block cave being established on western side of orebody; production build up from H2 FY 2016 – 16 yr mine plan

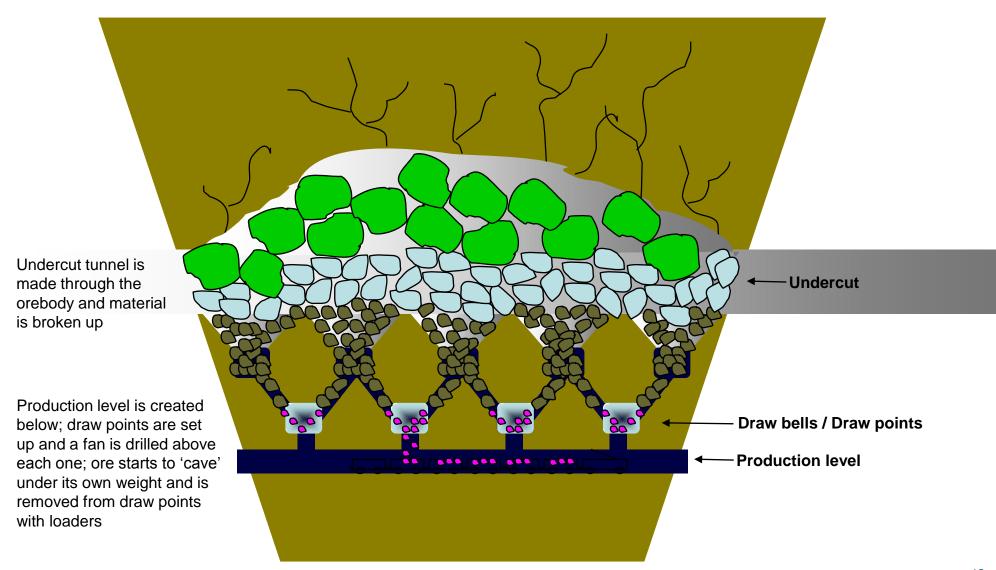
Dramatic simplification of ore-handling system

C-Cut Phase 2 – not in current mine plan



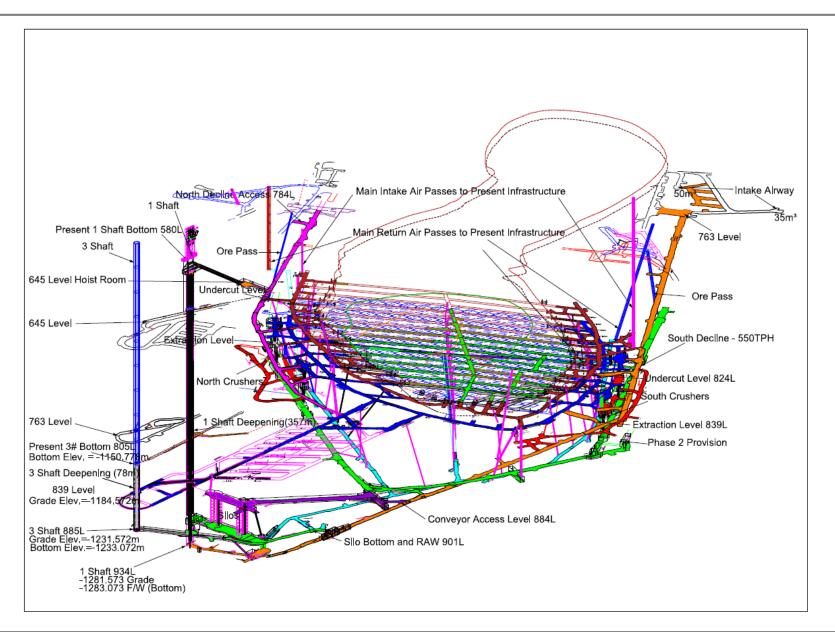
# **Block Caving Schematic**





## **C-Cut Phase 1**





# **New Plant – Significantly Reduced Footprint**



#### COMPARISON - CURRENT vs AG MILLING PLANT

	Current Plants (Main, DTP & OSP)	New AG Milling Plant
Throughput p.a.	2.8 Mt ROM 2.5 Mt Tailings	6.0Mt ROM capacity Initial feed: 4.0 Mt ROM 2.3 – 2.5 Mt Tailings
Total footprint	ca. 27 ha	ca. 4 ha

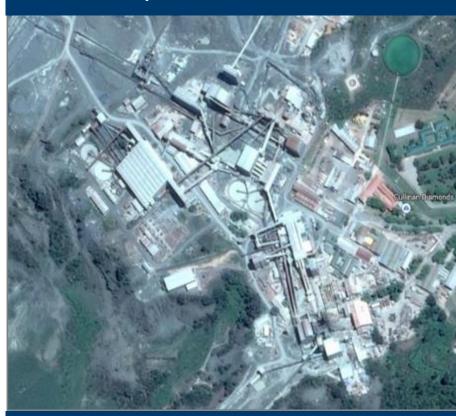
#### **MAJOR EQUIPMENT INSTALLATIONS**

Conveyors	151 belts (15 km)	22 belts (3 km)				
Conveyor transfer points	179	32				
Screens	88	22				
Pumps	121	7				
Crushers	18	4 (excl 2 mills)				
Feeders	21	14				
Substations	17	2				
Electrical motors	589	84				

#### IMPROVED ELECTRICITY EFFICIENCY

Power consumption	22.5 MW	25.0 MW					
Power consumption per tonne	4.7	4.2 (12% improvement)					

#### **Current plant commissioned in 1947**



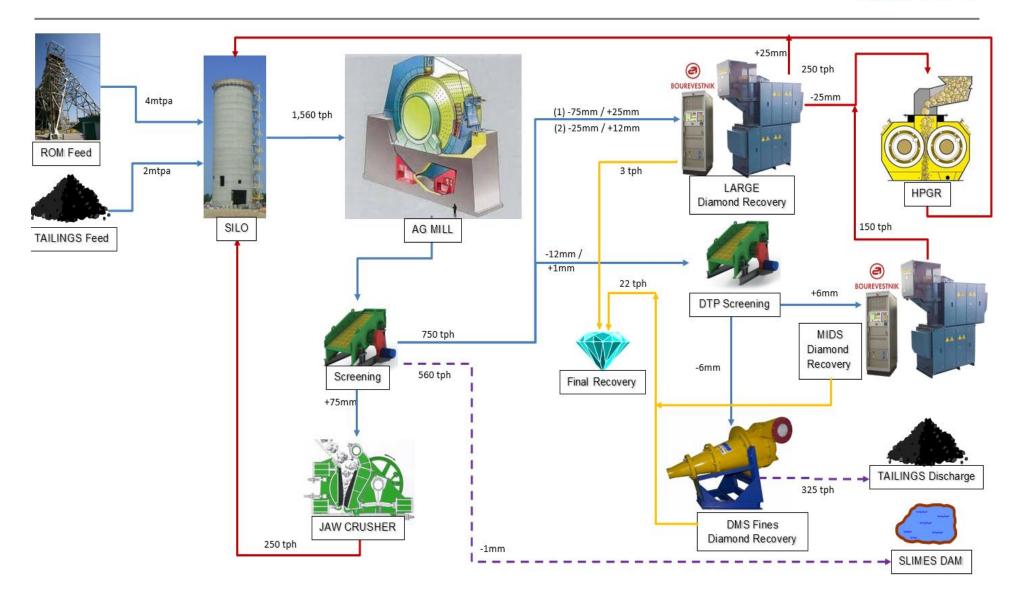
Google Earth image of current Cullinan Plant

#### **IMPROVED WATER CONSUMPTION**

Consumption	Current Plants	New AG Milling Plant
m³ per tonne	3.5	1.2 (66% improvement)

# **New Plant – Simplified Process Flow Diagram**



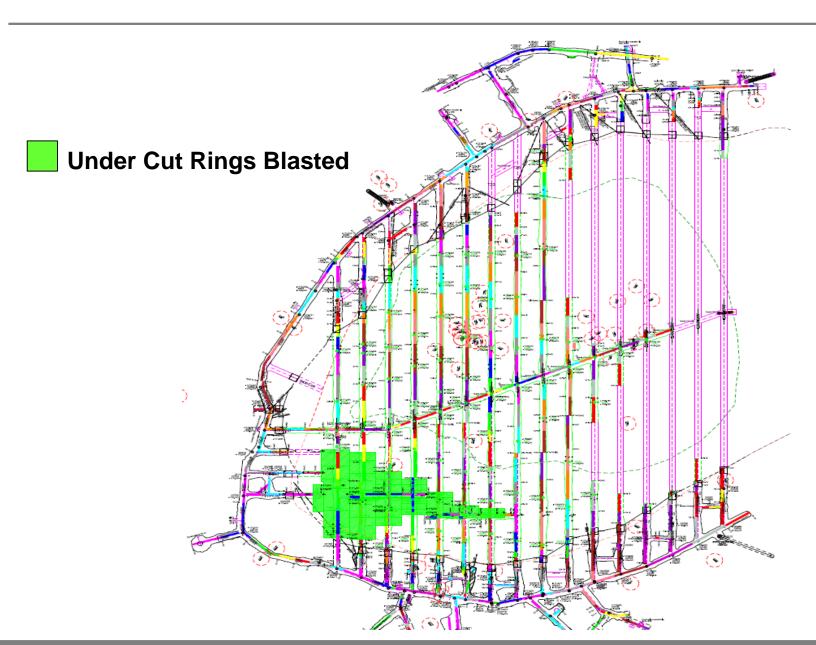




# C-CUT PHASE 1 EXPANSION PROGRAMME

# **Production Start-Up Under Cut level – 824L**





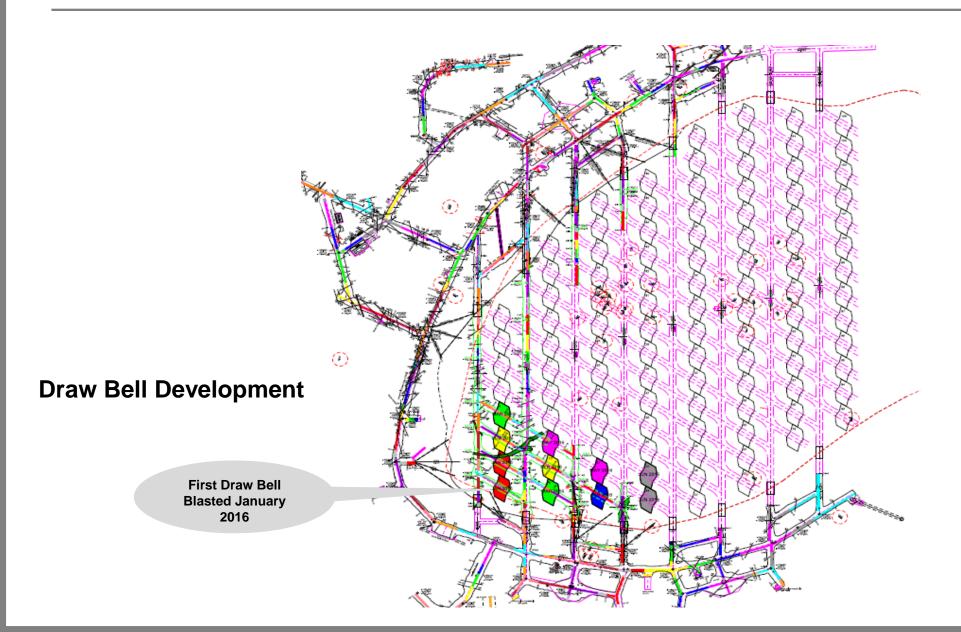
# **Undercut Development – 824L**





# **Production Start-Up – Extraction Draw Bells – 839L**





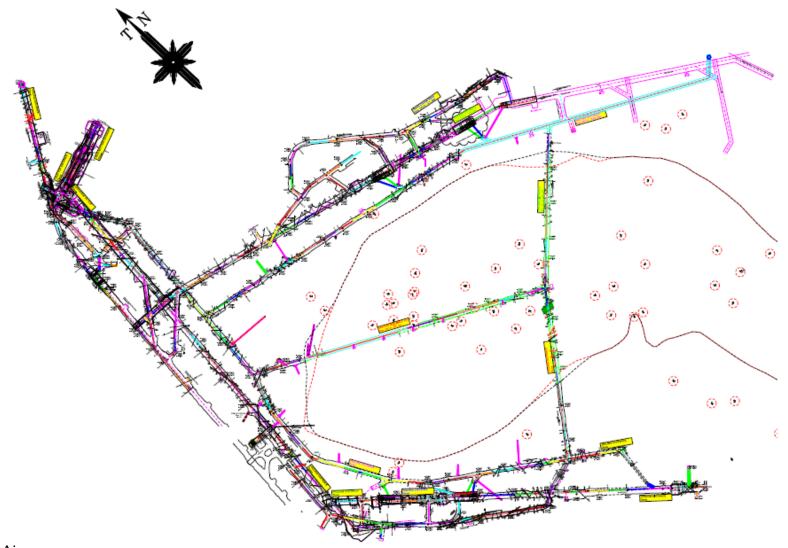
# Blue Tunnel Development – 824L/839L





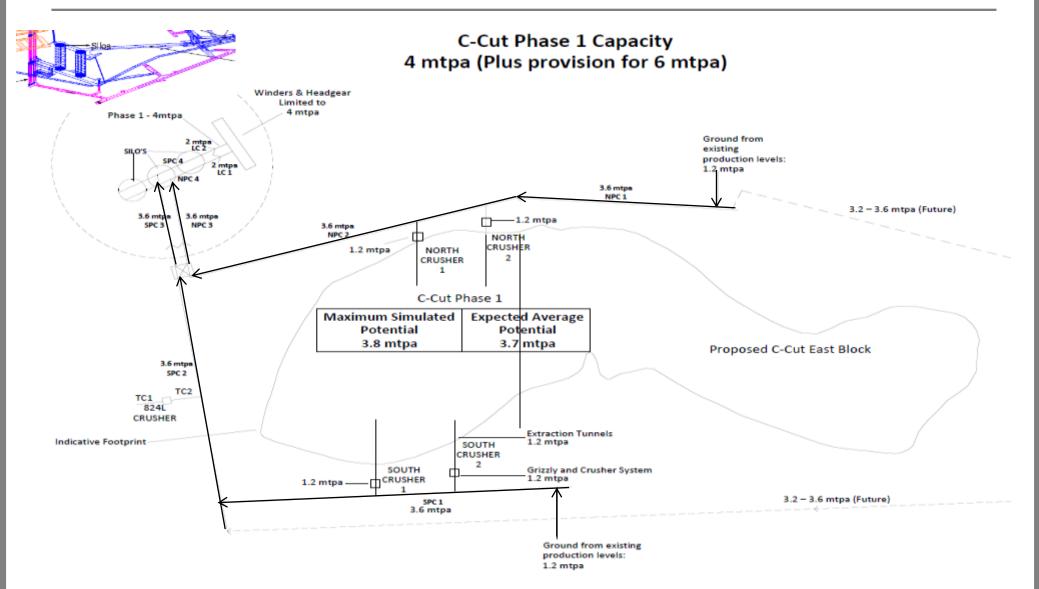
# **Production Start-Up – Conveyor and RAW\* – 895L**





# **Ore-handling Reduced from 11x to 4x**





# **Engineering infrastructure – Ground Handling 895L**





# **Engineering Infrastructure – Ground Handling Crusher and Tip**





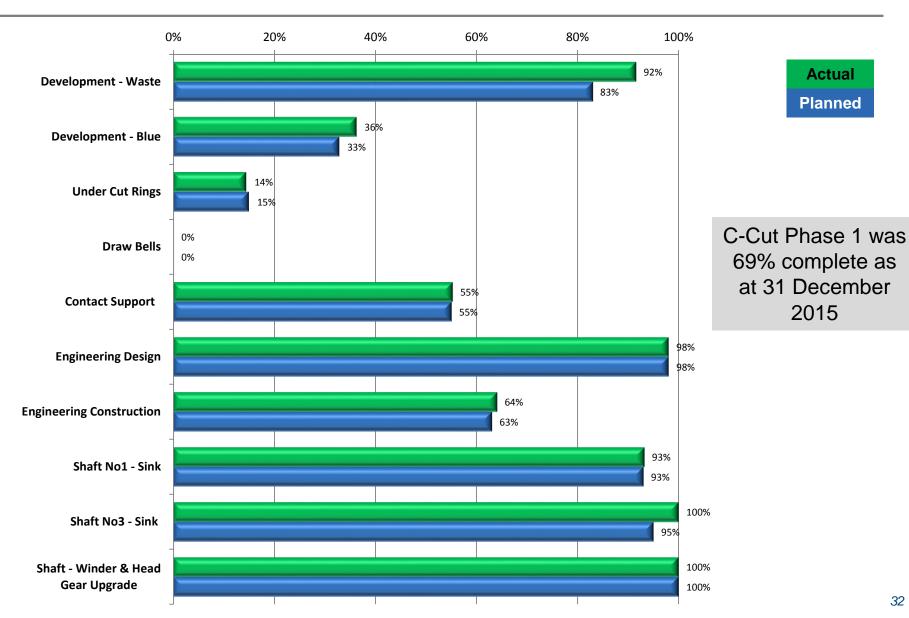
# **Cullinan – Road Ahead**



Development programme		FY FY 2011	FY	FY	FY 2015		FY 2016		FY 2017		FY 2018		FY 2019	
			2013	2014	H1	H2								
Development of Declines & Access Tunnels														
Blasting of Under Cut at 824L														
New Production levels at 839L														
Development of Shaft #1 to 943L														
Production from C-Cut Phase 1														
Development of ore-handling system at 895L														
Steady state ROM production of 4 Mtpa														
New Cullinan Plant to be operational														
Guidance on plans post FY 2019														·

# **C-Cut Phase 1 – Project Summary**



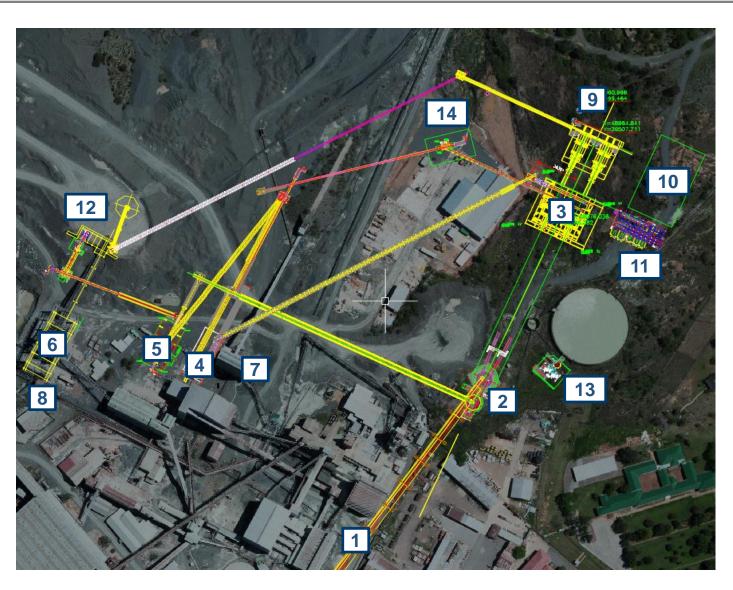




# **NEW CULLINAN MILL PLANT**

## **New Plant Aerial Overview**





- 1. ROM Feed
- ROM Silo and Return Silo
- 3. Mill Section
- 4. XRL Recovery
- 5. HPGR Crusher
- 6. DMS Plant
- 7. Final Recovery
- 8. Tailings Disposal
- 9. Slimes Disposal
- 10. New Eskom Substation
- 11. MV Substation
- 12. Re-mined Material
- 13. Pump Station
- 14. Jaw Crusher

# **Benefits of New Plant**



Strong stand-alone economics	Construction cost of ca. ZAR1.65 billion (ca. \$142.8 million)					
Strong stand-alone economics	Payback of ca. 3 years and IRR of 25%					
	<ul> <li>Top-cut of 75mm (will cater for diamonds of +3,000 carats, such as the Cullinan diamond)</li> </ul>					
'Softer' liberation protecting	<ul> <li>+25mm material only exposed to AG milling (comminution via attrition, not crushing)</li> </ul>					
large diamonds from breakage	<ul> <li>-25mm material liberated through HPGR; inter-particle crushing, thereby moving away from high impact cone crushing</li> </ul>					
	Increased liberation throughout total diamond spectrum					
Improved liberation	+1mm unliberated kimberlite particles in tailings will reduce from current 60% to post-AG mill 40%					
	-1mm slimes will increase from current 40% to post-AG mill 60%					
	6% saving in Maximum Demand costs following new 88KV take-off from Eskom					
Energy savings	Gravity-feed slimes disposal 5					
	12% increased energy efficiency per tonne					
Enhanced security	<ul> <li>New Final Recovery Sorting machines: concentrate load reduction from 50 tph (3 Mtpa) to 25 tph (6 Mtpa)</li> </ul>					
	Total hands-off final recovery					
	Improved liberation leading to reduced tonnes in circulation					
	Only -12mm material will report to DMS					
Lower opex	AG milling reducing need for step-wise crushing					
	Less reliance on labour (high level of automation) and reduction in equipment and maintenance					
	• ca. R20 to R25 / tonne opex saving					

# **Latest Processing Technology**



#### Autogenous ("AG") Milling

- Utilise inter-particle crushing in an abrasive manner compared to impact forces in traditional crushers
- Benefits are reduced diamond breakage, improved liberation and early stage reduction of ore to below the bottom cut off size of the plant, hence a resultant reduction in operating cost
- Milling of ore in diamond processes are already used with great success in Russia, Botswana and Angola
- Extensive mill simulation work conducted by international experts in the field



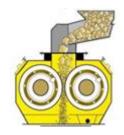
#### Bourevestnik ("BV") X-ray machines

- Increased throughput capability resulted in the replacement of the more expensive and less efficient DMS processes
- Improved algorithm results in reduced non-diamond content from BV machines to downstream process, resulting in a simplified recovery process
- BV X-ray machines are used extensively in diamond recovery processes across the world
- In-depth test work of the robustness and recovery capability was conducted and proved that these machines are of a world-class standard

## **High Pressure Grinding Rolls ("HPGR")**

Proven technology and currently utilised at CDM

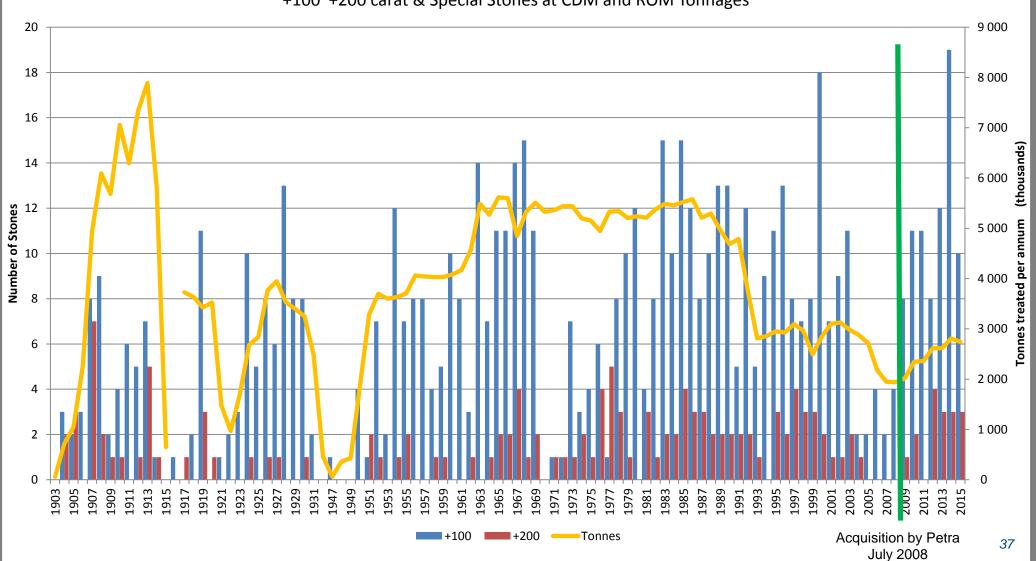




## **History of Large Diamond Recoveries**



+100 +200 carat & Special Stones at CDM and ROM Tonnages



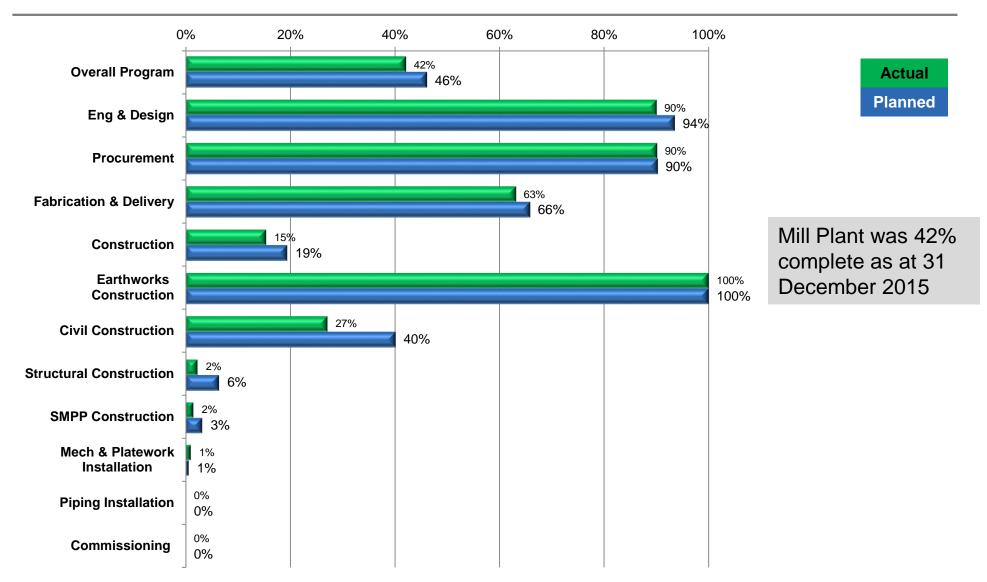
## **Plant Project Milestones**



	Q1 FY16 Jul-Sep 15	Q2 FY16 Oct-Dec 15	Q3 FY16 Jan-Mar 16	Q4 FY16 Apr-Jun 16	Q1 FY17 Jul-Sep 16	Q2 FY17 Oct-Dec 16	Q3 FY17 Jan-Mar 17	Q4 FY17 Apr-Jun 17
Contract signed: start, site prepared								
Bulk Earthworks: Completed (contractor off site)								
Civils								
SMPP (Structural, Mechanical, Plating and Piping)								
Equipment - Mills, HPGR, Screens, Jaw, BVs, Pumps, MV Switchgear								
Electrical								
Equipment C2 Commissioning								
Process C3 Commissioning								
Fully operational								

## Mill Plant – Project Summary



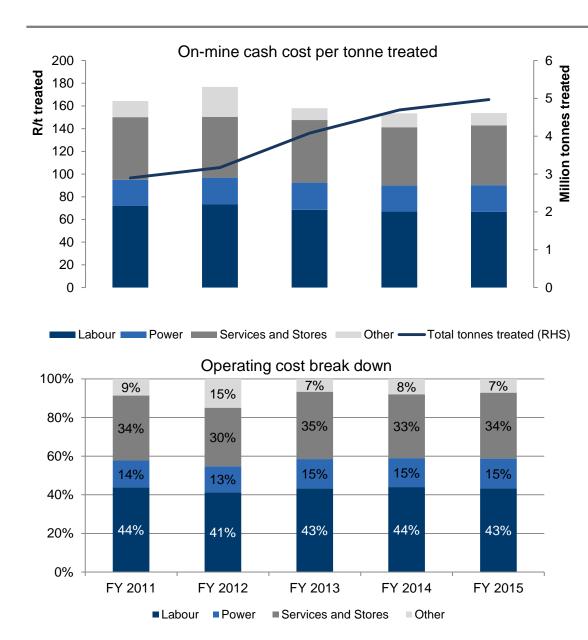




# **COSTS & CAPEX**

## **Operating Cost History and Make-up**

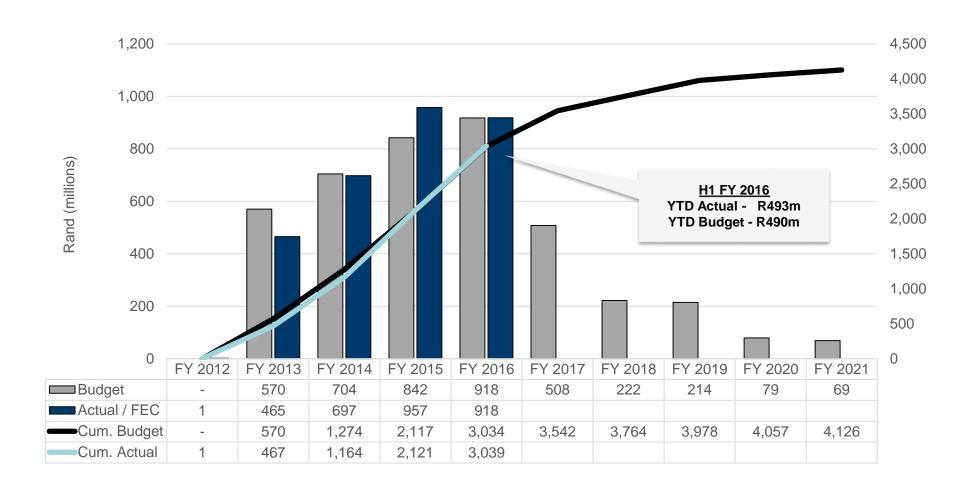




- Risk of rising electricity costs managed through efficient design of new infrastructure
- Maintenance and management of new and old infrastructure
- New designs cater for high degree of automation
- Advancement of a Group procurement strategy to yield benefits related to economies of scale

## **C-Cut Phase 1 Project: Actual Expenditure to Budget**





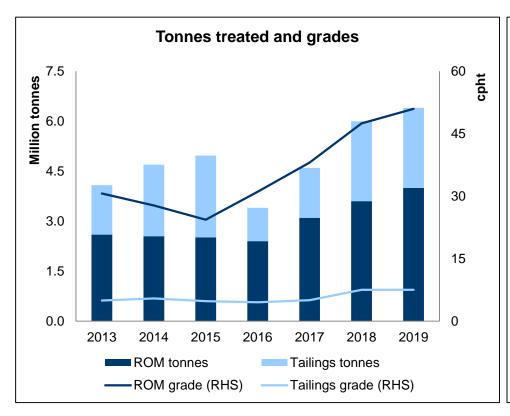


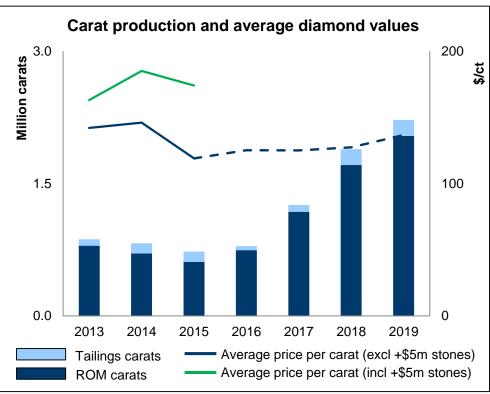
# **OUTLOOK**

#### **Cullinan – Production Plan**



• ROM tonnages to rise 60%, but ROM carat production expected to rise +200%, due to increase in grade as result of mining undiluted C-Cut tonnes





1. Forecasts for average value per carat calculated using FY 2016 guided prices less 9%, flat pricing for FY 2017 (real terms), and thereafter a 4% annual real price increase

#### **Cullinan Outlook**



- Improving grades grade to rise gradually from ca. 26 cpht to +50 cpht by FY 2019
- Improving product mix due to production from undiluted areas and higher proportion of ROM vs tailings
- Improving recoveries new plant to optimise recoveries from Cullinan
- Improving mining costs Focus on increasing efficiencies and major simplification of ore-handling system
- Very robust economics positive cashflow even at depth of downturn
- Longevity current 15 year mine plan will only exploit 21% of total major resource
- Spectacular diamonds Cullinan will continue to produce iconic diamonds

#### Putting in place a sustainable future for Cullinan and its local communities



# CORPORATE SOCIAL RESPONSIBILITY

## Safety, Health & Employee Wellbeing



- OHSAS 18001:2007 certified
- 3,755 medicals carries out during FY 2015
- Chronic disease management and awareness
- Bulk SMS system is utilised to remind employees and supervisors of health checks for chronic conditions







Annual Sports Day 2015

- Monthly chronic diseases management via Wellness clinic with permanent sister employed
  - Hypertension monitoring: 288 employees on programme
  - Diabetes: 55 employees on programme
  - HIV/Aids: 44 employees on programme
  - December is HIV/Aids month 1,017 employees tested

## **Environmental Management**



- ISO 14001 certified; next surveillance audit 15-19 February 2016
- Annual internal environmental audits carried out
- No major incidents have been reported within the last year
- Alien invasive species are continuously controlled mine wide
- Energy saving initiative: Replacement of electrical geysers with heat pumps at change house houses resulting in approximately 40-50% saving on electricity
- Cost saving initiative: Improved salvaging of reusable materials, copper stripping and auction of other materials to save costs and reduce disposed waste
- Awareness: Arbor day celebration with school children in Refilwe community to improve awareness of the value of planting trees





## **Training and Development**



- Key focus for Petra (ca. \$6.7 million on staff training and development in FY 2015 across whole Group)
- Leadership Development Programme helps Petra identify and develop future leaders within the organisation:
  - 69 employees participated in FY 2015 (36% female / 64% male)
  - 40 people graduated in FY 2015
- Adult basic education and training provided free of cost or obligation
- Portable skills training to develop alternative skills for employees (for self-employment after their mining careers) e.g. computer skills, electrical house wiring, drivers licence etc.
- Engineering Learnerships: 8 external and 9 internal
- Rock breaking Learnerships: 7
- Metallurgy Learnerships: 14





#### **Education Initiatives**



Long-term strategy to address the scarcity of technical skills in the industry

Implementation of a Maths and Science Centre at 3 local schools

 Assisting with improving Maths & Science results and increasing number of applicants for careers in mining

One book one learner project as endorsed by the Department of Education

- Initiative to enhance the Maths & Science program at schools
- Training of both teachers and learners on how to effectively use the Maths dictionary





#### Career Day 2015

- All learners in
  Grade 10 to 12
  from local schools
  were invited to
  CDM's Career Day
- All the career opportunities were exhibited in ca. 20 stalls in which all departments on the mine were represented
- Ca. 1,200 children attended the Career Day

#### **Education Initiatives continues...**



Bursary programme – bursaries awarded to 5 beneficiaries:

- 2 learners studying for Mining Engineering (1 was on Petra scholarship and 1 employee)
- 1 learner studying Electrical Engineering
- 2 Metallurgy Engineering (one learner used to be on Petra Experiential Learnership Programme)
- Vocational work provided to Petra bursars and local community learners who meet the requirements for this initiative in order to complete their workplace projects
- Scholarships: 18 learners from local schools (Grades10 -12), excelling in Maths and Science



#### **Community Projects**



Group social spend increased to ca. \$1.7 million in FY 2015 (FY 2014: \$1 million)

Community projects include:

#### **Expansion of Onverwacht Primary School**

 The mine has committed to build 4 classrooms, library and the administration block (commencing in March 2016) after re-zoning approval from the City of Tshwane was received



 Department of Basic Education had expressed a need for school sports facilities at 3 local primary schools. The mine together with the city will implement - project will commence late February 2016



#### **Employee Volunteerism**

- Employees are encourage to volunteer their time and skills at various local NGO's
- In December 2015, two mine employees heeded the call when they donated Christmas presents to needy children in the local Refilwe community

#### **Community Projects**



#### **Leshidi Place of Safety**

- Place of safety for orphaned and vulnerable children in Refilwe.
- Adopted by the Petra Foundation as a CSI flagship project for CDM
- CDM bought some groceries, bedding, toys and board games for the festive season





Matric Awards
CDM has
sponsored the
2015 Matric
Awards
ceremony for
Regions 5 & 7



## **Community Work on Mandela Day**

















## **Community Work on Mandela Day**













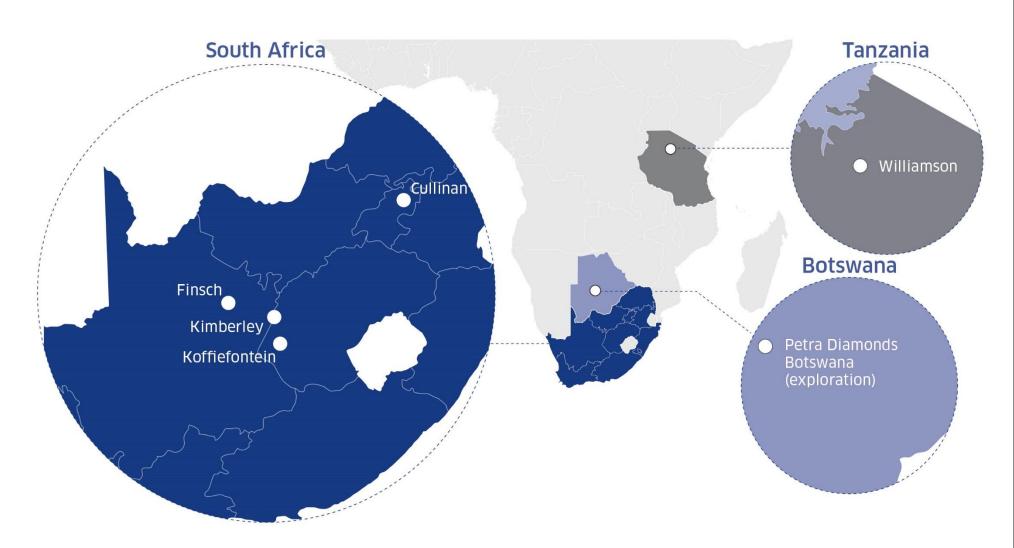




# **APPENDIX**

## Location





## **Current Trading – H1 FY 2016 Results**



	Unit	H1 FY 2016	H1 FY 2015	Variance	FY 2015
<u>Sales</u>					
Revenue	US\$m	25.0	77.7	-68%	122.2
Diamonds sold	Carats	227,759	314,957	-28%	700,896
Average price per carat	US\$	110	247 <sup>1</sup>	-56%	1 <b>7</b> 4 <sup>2</sup>
ROM Production					
Tonnes treated	Tonnes	1,180,399	1,292,895	-9%	2,513,004
Diamonds produced	Carats	303,400	333,770	-9%	611,993
Grade	Cpht	25.7	25.8	0%	24.4
<u>Tailings Production</u>					
Tonnes treated	Tonnes	397,158	1,212,368	-67%	2,458,306
Diamonds produced	Carats	18,966	57,628	-67%	117,503
Grade	Cpht	4.8	4.8	0%	4.8
<u>Total Production</u>					
Tonnes treated	Tonnes	1,577,557	2,505,263	-37%	4,971,310
Diamonds produced	Carats	322,366	391,398	-18%	729,496
Capex					
Expansion Capex	US\$m	74.2	47.0	+58%	104.8
Sustaining Capex	US\$m	4.4	3.4	+29%	8.8
Borrowing Costs Capitalised	US\$m	6.9	3.6	+92%	7.9
Total Capex	US\$m	85.5	54.0	+58%	121.5

- 1. Excluding Exceptional Diamonds, the average value was \$124 / ct; 2. excluding Exceptional Diamonds, the average value was \$119 / ct
- ROM production decreased in line with Petra strategy to focus on grade control in FY 2016 while C-Cut Phase
   1 block is initiated
- Grade continued to improve in comparison to lows reached in H2 FY 2015
- Tailings production down significantly due to decision to utilise DTP primarily to treat additional higher value ROM material

#### **Capex Overview**



- Total expansion Capex of ca. R6.5 billion (ca. US\$550 million)
- R4 billion capital spent to date (H1 FY 2016); remaining Capex of R2.5 billion (ca. US\$190 million) to FY 2019
- Capex fully funded from current debt facilities, treasury and mine cashflows
- Split of Capex guidance at Cullinan:

Financial Year		FY 2015 A	FY 2016 F	FY 2017 F	FY 2018 F	FY 2019 F
Capex						
<ul> <li>C-Cut Phase 1 and other</li> </ul>	ZARm	1,094	1,120	470	190	170
<ul> <li>Mill Plant</li> </ul>	ZARm	105	930	490	70	-
Total Expansion Capex	ZARm	1,199	2,050	960	260	170
Total Sustaining Capex	ZARm	101	90	80	80	80

Note: FY 2016 to FY 2019 capital guidance stated in real FY 2016 money terms

#### **Labour Relations Risk Mitigation**



- Labour relations at Cullinan have been stable in FY 2015 and H1 FY 2016
- No migrant labour 70% of employees come from local/provincial area to Cullinan
- Strong focus on internal communications and engagement with employee representatives
- Petra concluded 3 year wage agreement with NUM in September 2014 (10% pa)
- Itumeleng Petra Diamonds Employee Trust owns 12% of mine
  - Annual IPDET distributions commenced in December 2014



## **Power Risk Mitigation**



- Diamond mining industry is light user of power in comparison to other commodities (no smelting / refining)
- Cullinan already operating under allotted power capacity (used to run at historically higher tonnage levels)
- Eskom consults with industry pre load shedding, enabling customers to react appropriately
- Petra strategy to date to prioritise higher value underground ROM production by temporarily halting tailings production – no material impact on production
- Installation of back-up generators to keep mine running in event of Stage 1 or 2 load reduction
- Madupi Unit 6 brought 800MW into grid in 2015; next unit set for early 2017; completion in 2019 / 2020;
   Kusile to come on stream by end of 2017

Eskom Load Reduction	Impact on Petra	Frequency
Stages 1 & 2	10% load reduction within a two hour notice – Petra handles with selective use of winders/pumps	Come and go
Stage 3	20% load reduction within a two hour notice – will impact tailings production	Handful of times
Stage 4	Only essential loads will be allowed	Hasn't happened yet



## **Petra**Diamonds



#### Further enquiries:

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