Strategy4Good Partners
Technology House * Greenacres Office Park
Victory Park * Johannesburg * South Africa
Suite 90, Private Bag X7, Parkview 2122
Landline: +27 11 782 2394
Mobile: +27 82 606 0731
Fax: +27 11 782 2396
www.strategy4good.co.za

MEMORANDUM

To: Linda Munro, SLR Consulting

From: Gerrie Muller, Strategy4Good Partner

Date: 31 August 2013

Re: **Impala Shaft 18 Expansion**

Acronyms:

GGP – Gross Geographic Product

GDP – Gross Domestic Product

EVA – Economic Value Added

(These three terms are often used interchangeably and in the main means the same thing).

1 Background and objectives

Impala Platinum Limited (Impala) operates a platinum mining and processing operation near Rustenburg in the North West. The operation has an approved environmental impact assessment (EIA) and environmental management programme (EMP) report (SRK, August 1997) that has been amended numerous times to incorporate a range of expansion projects.

The main aim of the project now is to replace production from older shafts that are reaching the end of their life. This will be achieved by developing a new vertical shaft complex (No. 18 Shaft). In addition, new sewage treatment plant/s are needed to provide sewage treatment capacity in this part of the Impala converted mining rights (CMR) area and to ensure that grey water produced can be used for mining, instead of valuable potable water. The backfilling of mine residue into mine voids will assist with more effective ventilation and safer mining.

The proposed project therefore includes the establishment of a new vertical shaft complex (No. 18 Shaft) with associated infrastructure, underground mining section, residue facility, water management facilities and various support infrastructure and services, new sewage treatment plant/s and tailings plants for preparation of tailings for use as support and ventilation barriers at the No 17 and 18 Shafts.

The project area falls within the Rustenburg Local Municipality and the Bojanala Platinum District Municipality in the North West province.

As part of the overall Environmental Impact Assessment, Strategy4Good has been tasked to submit an alternative economic land-use and integrated sustainable development analysis in terms of the Department of Minerals and Resources regulations in this regard[1]. (We refer to these guidelines as "Regulation 50" in our report.)

Regulation 50 has two distinct components, the first being a straight analysis of the economic value of land between a mining project and the alternative land-use, and the second being an opinion on the sustainable development quality of the project relative to the alternative land-use. The latter requires

[1] Guideline for the Compilation of an Environmental Impact Assessment and an Environmental Management Programme to be Submitted with Applications for a Mining Right in terms of the Mineral and Petroleum Resources Development Act, 2002, (Act no. 28 of 2002) (the Act)". Regulation 50

the integration of all the social, environmental and economic impacts on a cost-benefit basis. The wording of this requirement is ambiguous and we interpret this as an assessment of the better land-use alternative for this generation without compromising the needs of the next generation.[2]

Based on Regulation 50, the first task required in terms of this analysis is to report on the agricultural property values that would potentially be lost in the continuation of the mining project. We assume the logical reason for this (not stated in Regulation 50) is that at any given time a country has capital stock with which it produces income, and a reduction of one type of asset (for example, farming land) needs to be replaced by another (in this case, mining land assets). This calculation is incorporated in the findings below.

The second task with respect to the land use valuation is the calculation of the Net Present Value of future income streams to determine which alternative land-use yields the most positive economic results for this generation. Our approach in this regard was to obtain the budgeted economic value added from the mine for the duration of its life (which is its Investments, EBITDA[3], Salaries and Wages less its mine closure costs). The opportunity cost (EVA lost) is that of the agricultural produce of impacted farms. The land use with the highest value is then rated as the better economic alternative land-use.

Although not stated in Regulation 50 as a requirement to analyse, we deem the net employment gain and lost as an important factor and have considered this analysis as well.

2 Assumptions and limitation

a) We assume that the mining project being evaluated is economically viable
b) We assume that all the financial information provided to us (in its unsigned format) is correct
c) We assume that the agricultural land in hectares that could potentially be lost to this industry is correct (the hectares), as provided by SLR

[2] The most common definition of Sustainable Development is: ‘Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
[3] Earnings before Interests, Taxes, Depreciation and Amortisation

d) This study is limited in its scope as we worked mainly with "inferred economic data", thus we limited ourselves to desktop research, telephonic interviews and relied on independent information from SLR.
e) As a limitation, it is not possible to determine all the environmental and social costs and hence we use the Environmental Impact Assessment as the basis for rated costs and benefits.
f) Although based on scientific evidence from specialists, the ratings and weightings remain relatively subjective and must be considered as an SLR view of sustainable development factors for this project.

3 Approach

The approach undertaken in this evaluation is aligned to the stipulations of Regulation 50. In this regard, we firstly compare the new mining investment with the potential loss of agricultural property values. We secondly sum the present value of the net economic value added of the mining project relative to impacted farmland yields. For employment we simply compare new mining employment with that of potentially lost employment in agriculture. Standard present value formulae are used as are found in a Microsoft Excel Spreadsheet. Values for the mining industry were obtained from the project developer and values in the agricultural industry were imputed based on our own macro-economic databases (using hectares as a base).

4 Key Findings

4.1 Materiality

In any specialist evaluation, the aspect of materiality needs to be considered**. In this study,** the actual amount of farm land potentially being displaced (less than 300 hectares and to be conservative, 800 ha was used), are minute in agricultural terms and compared to an anticipated mining investment of approximately R8 billion and job retention of just over 9 000 jobs per annum on average, a land-use alternative analysis of this nature is somewhat immaterial.

In addition to this, the agricultural areas are contiguous to core mining land that enhances the competitive advantage of the North West Province; thus, qualitatively, mining would appear to be the far better use of land in the specific mining locations of this project.

4.2 Key Results

In the tables below we show that the economic benefits of the mining project significantly outstrip that of potential losses in agriculture and that there can be no doubt about the benefits of mining for the land-use in the study area.

Table 1: Shaft 18 trade off analysis

Row #	Economic Aspects	Shaft 18	Agriculture - EcoTourism	Est cost/benefit economy
2	Potential Agricultural hectares directly displaced		(800)	
3	Precautionary approach (radius of 1 km around mine)			
4	Total Potential agricultural land lost		(800)	
5	Estimated market value for agricultural land ph (R'000)		7.0	
6	Estimated Investment by mine (2012 Rm)	8,776		
7	Time value depreciation of mine land (Rm)	(5,046)		
8	Net investment value of (Rm)	3,730	(6)	3,725
9	Life of mine / economic generation (years)	24	32	
10	Initial construction employment (FTE)	1,200		
11	Adjust for 2 years construction	75		
12	Employees per 100 hectare		(2)	
13	Add new employment/jobs retained vs opportunity losses	9,460	(16)	9,444
14	FTE Total Jobs Created / Retained / (Lost)	7,095	(16)	7,079
15	FTE Jobs Created / Retained / (Lost) inc constrc'n	7,170	(16)	7,154
16	GDP pe (in respective industries) (2011) (R'000)	434	150	
17	GDP added/lost (Rm)	4,106	(2)	4,104
18	Discount Rate	20%	12%	
19	Present Value of EVA (GDP) (Rm)	20,272	(19)	20,253
20	Total Investment/(Property Value Lost)	3,730	(6)	3,725
21	Total Present Value of EVA + Property value(Rm)	24,003	(25)	23,978

The positive net difference, (the fourth column above), shows the EVA (thus the PV of all future EVA streams are in the billions of rand). The direct employment opportunities retained/created are significantly high at just over 9 000 employees.

Table 2: Explanatory notes to approach

Mining project		
i.	Discount Rate	The rate at which future GGP streams are discounted to the present to accommodate for risk and the inflation rate. For mining this was set at 20% due to the higher risk nature of projects and for agriculture at the risk-free rate of 8% in South Africa.
ii.	Economic Period (years)	The estimated life of mine for the mining project and 40 years for agriculture. The 40 years is estimated to be the economic life of one worker.
iii.	Impacted Agricultural Hectare	The hectares that would potentially be impacted as advised by the Environmental Consultants.
iv.	Annual Estimated GDP per hectare	The GGP per hectare is based on: [[The total income to farms in the relevant area/number of farms that area]/average hectares per farm]*a GGP factor[4]
v.	PV Investment/Divestment	The present value (PV) of the mining investment compared to the potential losses in farm land values. Investment refers to mining investment and Divestment refers to potential property values lost. Property values are calculated at [the average asking price for land in the area less 15%]* number of hectares.
vi.	PV of Future GDP Contribution	Total GGP in the mining industry is calculated as the total of salaries and wages plus EBITDA, discounted at the discount rate over the life of mine. The agricultural PV of GGP is the sum of the imputed GGP per hectare, over 40 years, discounted back to today.
vii.	PV Mine closure costs	Anticipated mining closure costs. Treated as a negative to GGP as it reduces the economic value added.
viii.	Net Present Value (NPV)	Net present value is the sum of *v to vii* above.
ix.	Employment creation/retention	Number of direct jobs created/retained. The mining employment is taken from the mine plan and that of agriculture imputed based on Stats SA averages for that region.
x.	NPV after GDP multiplier	Standard multipliers for South Africa as supplied by Quantec[5].
xi.	Gross Employment after multiplier	Same as above.
xii.	Period adjusted employment	We reduced the employment numbers for mining on the following basis: we take a factor of [Life of Mine /40 years for agriculture] * estimated jobs to be created or retained in mining. This gives a comparable life time equivalent jobs to Agriculture.

[4] Derived as Agriculture EVA/Total Output as per Quantec analyses
[5] Quantec is a reputable economics data provider

5 Integrated sustainable development analysis

5.1 Introduction

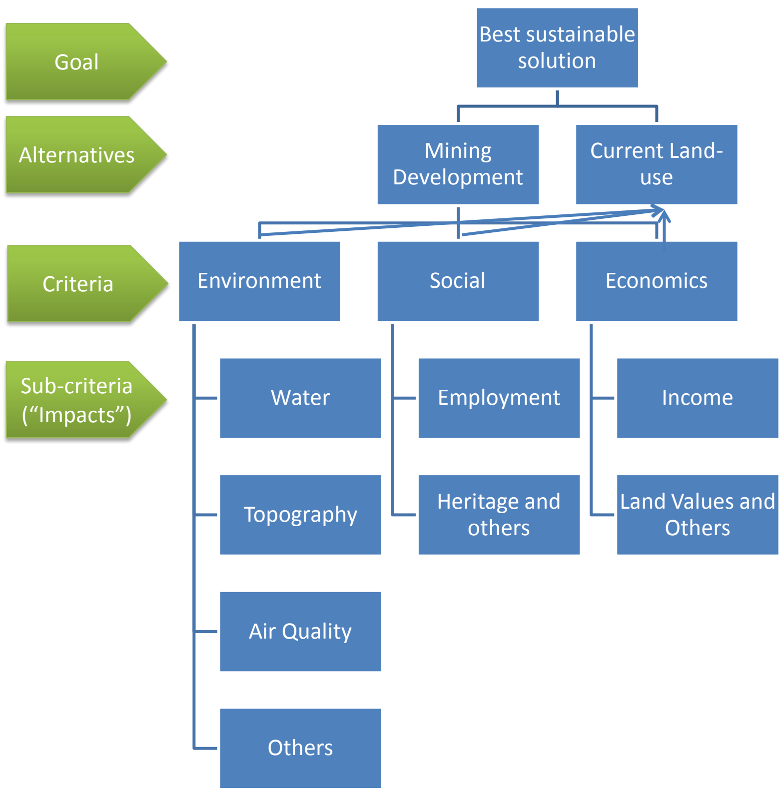
Regulation 50 (d) 9 states that all the sustainable development impacts (social, economic and environmental) need to be listed and equitably weighed up against one another to determine the best land-use for this and the next generation.

Regulation 50 (d) 9 states that a sustainable development cost-befit analysis be conducted to determine the best use of alternative land options. To this end, all the sustainable development impacts (social, economic and environmental) need to be listed and equitably weighed up against one another to determine the best land-use for this and the next generation.

In arriving at the best sustainability option of land-use, we have made use of the Analytical Hierarchical Process, which is a structured technique for organizing and analysing complex decisions. Based on mathematics and psychology, it was developed by Thomas L. Saaty in the 1970s and has been extensively studied and refined since then. It has particular application in group decision making and is used around the world in a wide variety of decision situations, in fields such as government, business, industry, healthcare, and education.

The figure below outlines this methodology.

Figure 1: AHP Decision Making Process



The first step in developing the Analytical Hierarchical Process is to define the decision-making goal. In this case, it is to decide which is the best sustainable alternative of land-use for this and the next generation. There are two alternatives to compare, that of the proposed mining project and the current land-use. The criteria used are the generally accepted sustainability categories, namely Environment, Social and Economics with each having its own sub-criteria (being the impacts as identified by SLR in the EIA process)

6 Execution of the Analytical Hierarchical Process in this analysis

The Analytical Hierarchical Process was designed and executed in the following manner:

a. The SLR socio-economic and environment impact assessment was used as a basis for the severity of risks and opportunities (costs and benefits). These impacts have been described in the main Environmental Impact Assessment document as compiled by SLR Consulting.
b. ***Only the mitigated impact significance was used as it is assumed that mitigation will take place. In this regard, the role of monitoring by the regulator is critical for the sustainable development success of this application.***
c. The impact significance was converted into numerical scales +90% for very positive, e.g. Income generation and -90% for severely negative (e.g. the physical destruction of biodiversity).

Table 3: Mitigated impact significance ratings

Category	Indicator	Before Mitigation	After Mitigation
Environmental	Physical destruction of biodiversity	(H)	(H)
Environmental	Loss of soil resources and land capability th	(H)	(L)
Environmental	Pollution of surface water resources	(H)	(L)
Environmental	Contamination of groundwater	(H)	(L)
Environmental	Negative landscape and visual impacts	(H)	(L)
Environmental	Destruction and disturbance of heritage (in	(H)	(L)
Social	Relocation of farm dwellers	(H)	(L)
Environmental	Hazardous excavations/structures/surface s	(H)	(M)
Environmental	Air pollution	(H)	(M)
Environmental	Loss of current land uses	(H)	(M)
Environmental	Blasting hazards	(H)	(M)
Environmental	Project-related road use and traffic	(H)	(M)
Social	Inward migration impact	(H)	(M)
Social	Job Retention	H	H
Environmental	General disturbance of biodiversity	(H)	(M)
Environmental	Dewatering	(L)	(L)
Environmental	Noise pollution	(L)	(L)
Environmental	Loss of soil resources and land capability th	(M)	(M)
Environmental	Alteration of drainage patterns	(M)	(M)
Economic	Economic impact	H	H

The conversion is then done on the basis outlined below.

Table 4: Conversion of impact rating to Percentage Scale

Rating	%	Direction
H	90%	Positive
H-M	66%	Positive
M-H	66%	Positive
M	50%	Positive
M-L	22%	Positive
L	10%	Positive
0	0%	Neutral
(L)	-10%	Negative
(M-L)	-22%	Negative
(M)	-50%	Negative
(H-M)	-66%	Negative
(M-H)	-66%	Negative
(H)	-90%	Negative
(FF) (Fatal Flaw)	-100%	Negative

a. Weighted averages were determined for each impact.

The relative importance of each aspect for this project was work-shopped between the SLR EIA Project Manager and Staregy4 Good. The results are as follows:

Table 5: SLR relative weighting of impacts

Row Labels	Sum of Weighting
Economic	**100%**
Economic impact	100%
Environmental	**100%**
Air pollution	7%
Alteration of drainage patterns	5%
Blasting hazards	7%
Contamination of groundwater	7%
Destruction and disturbance of heritage (including cultural) and paleontological resources	7%
Dewatering	2%
General disturbance of biodiversity	7%
Hazardous excavations/structures/surface subsidence	7%
Loss of current land uses	7%
Loss of soil resources and land capability through contamination	7%
Loss of soil resources and land capability through physical disturbance	5%
Negative landscape and visual impacts	7%
Noise pollution	2%
Physical destruction of biodiversity	7%
Pollution of surface water resources	7%
Project-related road use and traffic	7%
Social	**100%**
Inward migration impact	20%
Job Retention	60%
Relocation of farm dwellers	20%
Grand Total	**300%**

The weighted impacts were then summed by category (environment, economic and social) to determine the percentage extent - positive or negative.

In the final ranking environment, social and economics were rated as equal in importance.

7 Findings

Table 6: Un-weighted and Weighted Results (Mitigated) (UNW = un-weighted and W = Weighted)

	A	B	C
1			
2	**Row Labels**	**Sum of Operations - BMW**	**Sum of Operations - AMW**
3	Economic	90%	54%
4	Environmental	-82%	46%
5	Social	18%	-5%
6	**Average**	**9%**	**32%**
7			
8			
9			
10	**Row Labels**	**Sum of Operations - BMW**	**Sum of Operations - AMW**
11	Economic	H	M
12	Environmental	(H)	M-L
13	Social	L	(L)
14	**Grand Total**	**VL**	**M-L**

The results from the above table can be outlined as follows:

1. Looking at cell B6, which is the total un-weighted rating for the project and which amounts to +9 %, the development has a Low Positive value – however, the more important rating is that of the mitigated one in cell C6. Based on this rating, 32%, the project has a M-L positive integrated development rating.
2. This rating is sufficient to indicate that society is better off with having this development as an alternative land-use.

8 Conclusion

Given this project's strong socio-economic benefits, we conclude that it is acceptable. The fact that relatively little land is impacted upon and that the Impala footprint is well-established also assists in making it acceptable from a sustainable development viewpoint. Hence this project is recommended from a sustainable development perspective.