Appendix 10- Comparative land use Assessment

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Comparative land use assessment

Applicant: Tja Naledi Beafase Investment Holdings

Farm: Subdivision 4 of Woodlands 407

Administrative District: Parys

Introduction

Tja Naledi Beafase Investment Holdings intends to operate a small sand mining operation near Vaal Eden in the Parys district of the Free State Province. This land use assessment is part of the environmental impact assessment (EIA) and environmental management programme (EMP).

As part of the overall Environmental Impact Assessment and EMP, Dorean has been tasked to submit an comparative land use in terms of the Department of Mineral Regulation regulations in this regard. (We refer to these guidelines as Regulation 50(d) 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 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.

Based on Regulation 50(d), 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, 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(d) as a requirement to analyse, we deem the net employment gain and lost as an important factor and have considered this analysis as well.

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).

- EBITDA - Earnings Before Interest, Taxes, Depreciation and Amortization

Assumptions and limitation

- We assume that the mining project being evaluated is economically viable.
- We assume that all the financial information provided to us is correct
- We assume that the agricultural land in hectares that could potentially be lost to this industry is correct (the hectares), as provided by Tja Naledi Beafase .
- 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 Tja Naledi Beafase.
- 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. Although based on scientific evidence from specialists, the ratings and weightings remain relatively subjective and must be considered as a Tja Naledi Beafase view of sustainable development factors for this project.

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 inserted based on our own macro-economic databases (using hectares as a base).

Key Findings

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 350 hectares and to be conservative, 350 ha was used), are minute in agricultural terms. The current value of the land at R8000 per hectare is R2.8 million. The mine will result in a direct investment of R4.1 million to start the project with as additional spending on operational costs in the surrounding area derived form the income generated form the project.

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

Key Results

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

Row	Ecomomic aspect	Mine	Agriculture	Estimated cost/benefit economy
1	Potential agricultural hectares displaces		-350	
2	Estimated market value for agricultural land per hectare		R 8 000.00	
3	Estimated investment by the mine	R 4 300 000.00		
4	Time value depreciation of mine land	R -2 472 401.99		
5	Net investment value	R 1 827 598.01	R -2 800 000.00	R -972 401.99
6	Lif of mine/agricultural production	10		
7	Employees per 100ha		7	
8	Employees on the mine initially	2		
9	New employees over the Life of mine	10		3
10	FTE Total jobs created/retained/lost	10	7	3
11	Discount rate	20%	8%	
12	Present value of EVA (GDP)	R 18 006 383.31	R -4 443 617.01	R 13 562 766.30
13	Total investment/Property vlaue lost	R 1 827 598.01	R -2 800 000.00	R -972 401.99
14	Total present value of EVA + Property value	R 19 833 981.31	R -7 243 617.01	R 12 590 364.30

The positive net difference, shows the EVA (thus the PV of all future EVA streams are in the millions of rand). The direct employment opportunities created are negative at 2 initially with the possibility of increasing to 10 employees.

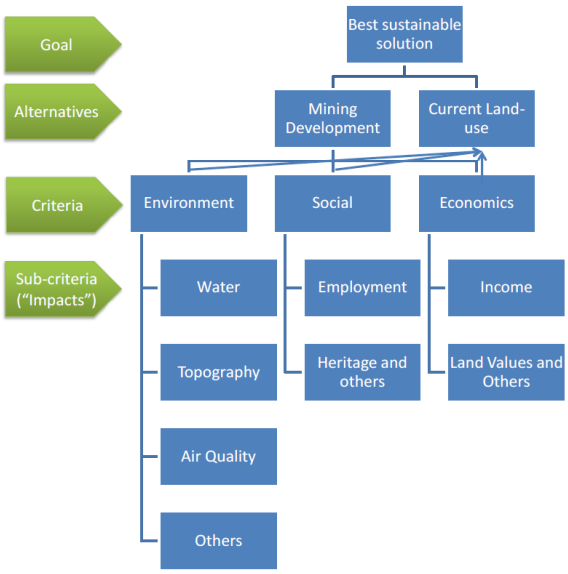
Mining Project	
i Discount Rate	The rate at which future GGP streams are discounted to the present to accommodate for risk and the inflation rate. For mining this was set at 20% due to the higher risk nature of projects and for agriculture at the risk- free rate of 8% in South Africa.
ii Economic Period (years)	The estimated life of mine for the mining project and 10 years for agriculture.
iii Impacted Agricultural Hectare	The hectares that would potentially be impacted as advised by the Company
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.
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 10 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.
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 /10 years for agriculture] * estimated jobs to be created or retained in mining. This gives a comparable life time equivalent jobs to Agriculture.

Integrated sustainable development analysis

Introduction

Regulation 50 (d) 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 1970's 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 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 in the EIA process)

Execution of the Analytical Hierarchical Process in this analysis

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

The 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 Dorean Environmental Services.

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.

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	Loss of soil resources and land capability	Medium	Low
Environmental	Los of vegetation	Medium	Medium
Environmental	Invasive vegetation encroachment	Medium	Low
Environmental	Change in topography	Low	Low
Environmental	Degrading grazing potential - Land use	Low	Low
Environmental	Uncontrolled veldt fires	Medium	Low
Environmental	Visual impact on the environment	Medium	Low
Environmental	Impacting cultural or archaeological sites	Low	Low
Economic	Positive financial impact	High	High
Environmental	Noise	Medium	Medium
Environmental	Fall out dust	Medium	Low
Environmental	Disturbance of fauna	Medium	Low
Environmental	Surface water drainage and quality	Low	Low
Environmental	Groundwater quality or quantity	Low	Low
Social	Cumulative impacts on neighbours	Low	Low

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. The results are as follows:

Table 5: SLR relative weighting of impacts

Row labels		Sum of Weighting	
Economic			**100%**
	Economic impact	100%	
Environmental			**100%**
	Loss of soil resources and land capability	10%	
	Los of vegetation	10%	
	Invasive vegetation encroachment	7%	
	Change in topography	10%	
	Degrading grazing potential - Land use	10%	
	Uncontrolled veldt fires	8%	
	Visual impact on the environment	8%	
	Impacting cultural or archaeological sites	8%	
	Noise	8%	
	Fall out dust	6%	
	Disturbance of fauna	10%	
	Surface water drainage and quality	8%	
	Groundwater quality or quantity	7%	
Social			**100%**
	Cumulative impacts on neighbours	100%	

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.

Findings

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

	A	B	C
	Row Labels	Sum of operations - BMW	Sum of operations - AMW
1	Economic	90%	90%
2	Environmental	-20%	-8%
3	Social	-10%	-10%
4	**Average**	**20%**	**24%**
5			
6			
7			
8	**Row Labels**	**Sum of operations - BMW**	**Sum of operations - AMW**
9	Economic	H	H
10	Environmental	(M-L)	(L)
11	Social	(L)	(L)
12	**Average**	**(M-L)**	**(M-L)**

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

1. Looking at cell B4, which is the total average un-weighted rating for the project and which amounts to +20 %, the development has a Medium Positive value – however, the more important rating is that of the mitigated one in cell C4. Based on this rating, 24%, 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.

Conclusion

Given this project's strong large scale socio-economic benefits, we conclude that it is acceptable. The fact that relatively little land is impacted upon and that the Tja Naledi Beafase economic footprint is going to be wider than district level also assists in making it acceptable from a sustainable development viewpoint. Hence this project is recommended from a sustainable development perspective.