Preliminary Economic Assessment - Executive Summary

on

Glenover Rare Earth Project PEA

to

Glenover Phosphate (PTY) Ltd

prepared by

GBM

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Document Approval

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SECTION 1 - SUMMARY

1.1 Executive Summary

The Glenover Project area is located in the Waterberg region in the western part of the Limpopo Province of the Republic of South Africa. The project is focused on the development of the Rare Earth Oxide potential of in situ stockpiles and the below-surface resource.

Previous operations mined apatite breccia for its phosphate content and ceased in 1984. During the mining of the apatite breccia, phosphate-bearing material which did not fulfil the grade requirements of the off-take agreement was stockpiled, forming the basis for the current stockpiles.

Subsequent studies have confirmed the existence of potentially economical exploitable Total Rare Earth Oxide (“TREO”) grades in the breccia and SAMREC compliant resources have been defined. Test work has been conducted on representative breccia material to prove saleable Rare Earth Oxide (“REO”) products, predominantly cerium, lanthanum, neodymium, samarium, praseodymium and europium.

The intent of this preliminary report is to assess economic feasibility of treating run-of-mine (“ROM”) material from both the stockpiles and extension of the existing open pit mine by metallurgical processes to produce a mixed REO product. Based on the initial results a plant was designed to process 400 000 t/a ROM to produce approximately 7 400 t/a of REOs, or equivalent to 6 200 t/a of Rare Earth Elements (“REEs”),

A mining study was conducted by CSA Global South Africa (Pty) Limited (“CSA”), which initially considered 1 250 000 t/a ROM feed. During the course of this study the ROM feed was reduced to 400 000 t/a. Although this has a negative impact on project returns it is considered necessary in order to fit the project better into the perceived REEs and Phosphate (“P”) markets and to allow for more realistic reagent supply dynamics in the South African market given existing capacities. A desktop analysis of the effect of throughput change was undertaken by GBM, and it is recommended that further optimizations around the ideal plant throughput be conducted in order to determine the most attractive project economics.

Conventional drilling and blasting is proposed for both ore and waste. The beneficiation process entails baking of the whole ore in contact with sulphuric acid, removing gypsum, iron and phosphates which would be deleterious to the recovery of REEs and then selective precipitation of rare earth oxalates which are subsequently converted to oxides by calcining.

Significant upside potential is offered by recovery of phosphate products, ammonium sulphate and scandium from the waste products, however further process definition is required before inclusion of these products in the process economics can be justified.

The total initial investment capital cost estimate is USD 233 758 821 and includes a contingency of USD 33 850 006.

Based on the capital investment and operating cost estimation the Project will yield an internal rate of return ("IRR") of 34.5 % and a net present value (NPV) of USD 512 160 943 at a discount rate of 8 %.

These values have been estimated based on a 'basket price' for Glenover's REO product. This price is calculated using the weighted average of the individual REO oxide prices at the relative proportions in which they occur within the deposit and is based on a combination of forecast prices for 2015 and historic Chinese prices.

Mine planning and financial modelling has been carried out on aggregated Inferred and Indicated resources. For the purposes of the PEA, the cost of additional studies on the stockpiles to upgrade their status was considered unjustifiable. As this report could be used to raise seed funding, inferred resources will need to be upgraded to indicated or measured status, before any pre-feasibility work can be completed. However, the availability of on-surface stockpiled Run-Of-Mine material represents significant early cash-flow in the mine planning, which is an important project differentiator.

As per South African Code for the Reporting of Exploration Results, Mineral Resources and Mineral Reserves ("the SAMREC Code") guidelines on reports including Inferred resources, a cash flow model has been developed excluding the Inferred resources in order to determine the value they add to the project. This SAMREC-compliant estimations results in a LOM of 18 years, an IRR of 25.9 % and an NPV at 8 % discount of USD 374 964 468.

1.2 Introduction

GBM Minerals Engineering Consultants Limited ("GBM") has been mandated by Glenover Phosphate (Pty) Ltd ("Glenover Phosphate") to compile a Preliminary Economic Assessment ("PEA") of the in situ resource and stockpiles of Rare Earth Oxides ("REO") at the Glenover Project. The purpose of this PEA is to evaluate the preliminary economic potential of the Project by giving consideration to capital and operating costs for infrastructure, mining and mineral processing.

1.3 Reliance on Other Experts

While the main body of this report is a GBM prepared document approved by GBM qualified persons, GBM mandated CSA Global ("CSA") to undertake a review of the Mineral Resources and Exploration Targets and to undertake a PEA confidence level mine design and pit optimization and Digby Wells Environmental ("Digby Wells") to conduct a Preliminary Assessment of environmental impact.

In addition the report relies on previously prepared material relating to subject matter such as project background, geology, resource and reserve statements, mining and environmental regulations and market analyses.

1.4 Property Description and Location

The project area is located in the Waterberg region in the western part of the Limpopo Province of the Republic of South Africa. The Glenover Carbonatite Complex ("GCC") is located approximately 90 km northwest of the town of Thabazimbi in the Limpopo Province; the nearest town is Lephalale (formerly Ellisras), which is approximately 60 km away.

The mineral assets under evaluation are located on the farm Glenover 371 LQ. This includes a large open pit mine as well as various stockpiles of mined materials containing REE, phosphate and other potentially economic elements.

1.5 Accessibility, Climate, Local Resources, Infrastructure and Physiography

The site can be accessed via the tarred P16/2 provincial road, which connects to the major regional town of Lephalale.

The project falls within the Northern Arid Bushveld climatic region. This is a summer rainfall region with warm summers and moderate, dry winters. Rainfall mainly occurs between November and April with an average rainfall of approximately 345 mm/a. The average maximum temperatures occur from November to January with temperatures reaching a maximum of 33 °C. The average minimum temperatures occur during June and July with a minimum temperature of 5 °C.

Existing infrastructure in the area offers good access to services, including electricity, water, manpower, accommodation and consumables.

1.6 History

Glenover Phosphate commenced mining of apatite breccia for phosphate in 1963 and continued until 1984 under the ownership of Goldfields South Africa ("GFSA"). During the mining of the apatite breccia, phosphate-bearing material which did not fulfil the grade requirements of the prevailing off-take agreement was stockpiled, forming the basis for the current stockpiles.

Historical exploration between 1953 and 1987 comprised geophysical surveys, drilling and mapping. The majority of the historical exploration information generated concentrated on the phosphate mineralization, but certain analyses reported interesting grades of TREO in the pyroxenite and carbonatite lithologies with additional enrichment in the apatite breccias.

In 1999 Fer-Min-Ore ("FMO") purchased Glenover Mine and subsequently built and operated a Single Super Phosphate (SSP) fertilizer plant using material from a high-grade stock pile. The fertilizer plant was put on care-and-maintenance whilst the development of the GCC, including rare earths, is under review.

In September 2011 Snowden released a Competent Persons Report ("CPR") containing a resource estimate for three of the five surface stockpiles at the Glenover mine. Glenover commissioned Geo-Consult International (Pty) Ltd ("GeoConsult") to manage and evaluate the REE resource potential of the remaining material in the pit and stockpiles that were excluded from the Snowden evaluation and compile a SAMREC-compliant resource statement. Following a review of historic GFSA mine data GeoConsult planned and executed a drilling programme of 21 diamond drill holes in and around the pit area with the objective of defining the extents of the main apatite-haematite breccia body and evaluating its potential and evaluating the potential of the surrounding carbonatite and pyroxenite as a source of REE for further exploration.

1.7 Geological Setting and Mineralization

The Glenover Project is focussed on the GCC; a composite plug of pyroxenite and carbonatite intruded into sediments of the Waterberg Group. GeoConsult conducted an evaluation of the REO mineral resources for the Glenover mine according to the SAMREC code. This included the in-situ material comprising apatite breccia, and a small amount of surrounding carbonatite and pyroxenite (defined only by drill core owing to the breccia drill programme terminating in fresh rock), as well as the historical stockpiles. GBM commissioned CSA to undertake a review of GeoConsult's 2012 REO Mineral Resources for the Glenover Mine.

The GCC covers an area approximately 4.5 km by 3.5 km in size and comprises an oval pipe-like intrusion of micaceous pyroxenite cut by an irregular central pipe of dolomite carbonatite. Carbonatite veins and sheets of varying thicknesses branch out from the main pipe. The central core of the carbonatite pipe is composed of a phosphate-REE enriched apatite-hematite breccia. This breccia is interpreted to have formed through solution-collapse during leaching of the primary carbonatite by circulating near-surface acidic fluids.

The complex is hosted by shallow dipping feldspathic quartzites, grit and shale of the Waterberg Group.

The Mineral Resources have not been converted to Mineral Reserves. This conversion would be undertaken in the Pre-Feasibility phase of the Project depending on the outcome of the PEA and further exploration.

1.8 Deposit Types

This study is focussed on the phosphate and REE mineralisation in the hematite-apatite breccia in the core of GCC. Leaching of the more mobile elements in the primary carbonatite during formation of the carbonatite caused enrichment of less mobile components such as phosphate, iron and the REO.

Phosphate minerals are primary and secondary apatite as well as monazite (R- (1)). The REO are largely hosted in phosphate (apatite and monazite), carbonate (bastnaesite, synchysite) phases along with aeschynite, a REE titano-niobate.

The 2011 GeoConsult drilling campaign forms the basis of the geological model as well as the basis upon which future exploration may be undertaken. The GCC is being explored for the PEA in terms of the REO enrichment.

1.9 Exploration

GeoConsult reviewed available survey information and extensive records pertaining to GFSA phosphate mining operations to aid in a preliminary design of the apatite-breccia, carbonatite and pyroxenite model. This model assisted in the determination of the optimal sites for 2011 drilling campaign.

A density of 2.97 t/m^3 was determined for the apatite breccia, based on 300 measurements. The density for the carbonatite was measured from 204 samples resulting in a density determination of 2.89 t/m^3. The carbonatised pyroxenite was measured using a limited number of samples as 3.17 t/m^3. The fresh pyroxenite rendered a density value of 3.36 t/m^3.

1.10 Drilling

In 2011 GeoConsult undertook diamond core drilling on the apatite-breccia surrounding the open pit. All project data collection and storage has been executed in accordance with internationally accepted best practice for SAMREC/JORC/NI43-101 compliance. The borehole database for Glenover comprises 127 historical drill holes and the 21 recently drilled holes. The historical drill data was used in initial resource modelling and as a proxy check on the new drilling; only the series of drill holes drilled in 2011 were considered for estimation. The area covered by the 2011 drilling campaign is approximately 60 000 m^2.

1.11 Sample Preparation, Analyses and Security

The recording and collection of samples at Glenover was governed by the logging and sampling protocol defined in GeoConsult's CPR (2012). All samples were delivered to Genalysis Laboratory (ISO/IEC 17025 accredited) in Johannesburg for sample preparation and subsequently shipped by them to their Perth laboratory in Western Australia for analysis (Primary Laboratory). Referee samples were selected and sent to Activation Laboratories ("Actlabs", ISO/IEC 17025 accredited) in Ontario, Canada (Secondary Laboratory).

1.12 Data Verification

A rigorous QAQC programme has been implemented for the Glenover project involving the insertion of blanks, standards and duplicates into the sample sequence. Selections of referee samples were also sent to a second laboratory as a check on the primary laboratory. All QAQC sample types were inserted or selected at 5 % or one in every 20 samples for each type respectively. A total of 443 (or 17.45 %) of the total primary samples were submitted as QAQC samples (blanks, standards and duplicates). A further 149 (or 5.87 %) samples were selected for referee analysis at the secondary laboratory bringing the total proportion of QAQC samples to 23.32 % of the total number of primary samples.

No additional QAQC measures were applied by Glenover to the sampling and assay of the stockpiles.

For the test work that forms the basis of the process design, GBM has reviewed the source documents and confirmed they support the process design.

1.13 Mineral Processing and Metallurgical Testing

A mineralogy study was carried out by Xstrata Process Support ("XPS"). The study showed that rare earth elements occur in the Glenover orebody in a number of minerals. GBM has examined this test work and is satisfied that it has been carried out in a coherent manner and provides sufficient information to design a process to the level of accuracy required of a PEA.

A suite of test work was commissioned by Dorfner ANZAPLAN out of Germany to investigate a suitable processing route primarily for the economic recovery of REO. Beneficiation by physical means was first tested, the objective being to concentrate rare earth minerals for further treatment via hydrometallurgical work and to obtain a marketable apatite concentrate. In total 14.5 % of ROM by weight reported to a P concentrate containing 25 % of the P_2O_5 contained in ROM, 11 % of the TREO in ROM and 1.9 % of the ROM Fe_2O_3.

Since physical processing was demonstrated to be of limited efficiency, it was decided to investigate using ROM material as feed for hydrometallurgical extraction. Two methods of decomposition were tested, a caustic decomposition and an acid baking process.

The caustic decomposition route was found to be less effective due to high calcium extraction complicating both double salt and oxalate precipitation and also lower extraction rates of both P and REE. In contrast, the acid baking process yielded extraction rates of 80 % - 90 % for REE and > 90 % for P depending on the raw material and the reaction parameters applied. Iron extraction was also dependent on reaction conditions.

After leaching, $FePO_4$ was precipitated from the leaching liquor by adjusting the pH. The separated $FePO_4$ could be at least partially transferred to alkali phosphates by suspending it in a solution of alkali hydroxides. Further test work is required to produce a valuable P-derivative from the $FePO_4$ and no value has been attributed to the $FePO_4$ in this phase of the project.

The REE were precipitated from the leach liquor as oxalates through the addition of oxalic acid. The precipitate was calcined at temperatures >800 °C for 30 minutes to decompose the oxalates to oxides.

The selected process provides an overall REE recovery of 80 %. Optimisation test work during the PFS could lead to further increases in the recovery of REE. Some variability in the rate of REE recovery during acid decomposition has been observed. The REE recovery value used in the economic assessment originates from what is currently believed to be the most representative test of those conducted but further optimisation and variability testing is required to determine the average recovery with more confidence.

Additional opportunities to add value to the project have been identified for further investigation but have not been included in the economic assessment due to the current low level of definition. These include converting $FePO_4$ into saleable P-derivatives, recovering ammonium sulphate from solution and potential recovery of scandium. Additional test work is planned during the PFS to evaluate these additional opportunities.

The processing route which has been developed is not yet fully optimized but further work aimed at enhancing the understanding of the unit processes and optimising the process conditions and reagent consumption is planned during the PFS.

1.14 Mineral Resource Estimate

Based on the reviews undertaken by CSA on the GeoConsult Mineral Resources for the in situ mineralization, CSA is of the opinion that the quoted figures of tonnage and grade are valid and representative of the data from which they derived.

The criteria GeoConsult used in the determination of the confidence levels of Indicated and Inferred in situ Mineral Resources has taken into account the confidence in tonnage/grade computations, density, quality, value and distribution of primary data and information, confidence of the geological and mineralization models.

Data review work undertaken by CSA in terms of the modelling suggests geological, sample, survey and density data for the project to be reliable for use in resource estimation work and that no significant bias in this data exists that materially affects the quality of the resource estimates that rely on this data. Block model validations demonstrate that the block grades honour the input composite grades.

CSA undertook a review of the available information for the stockpiles and compiled the following volumes and representative grades.

Table 1-1: Mineral Resource Tabulation

Rock Type	Resource Class	Tonnage Mt	TREO + Y_2O_3 (%)	P_2O_5 (%)	Nb_2O_5 (%)	Sc_2O_3 ppm
Apatite-Haematite Breccia	Measured					
	Indicated	7.407	2.2	17.57	0.47	179.5
	Total Measured & Indicated	**7.407**	**2.2**	**17.57**	**0.47**	**179.5**
	Inferred	0.274	2.16	15.83	0.46	167.9
Carbonatite	Measured					
	Indicated	9.374	0.86	3.5	0.18	63.8
	Total Measured & Indicated	**9.374**	**0.86**	**3.5**	**0.18**	**63.8**
	Inferred	0.453	0.8	4.24	0.15	66.3
Pyroxenite	Measured					
	Indicated					
	Total Measured & Indicated					
	Inferred	8.735	0.66	5.31	0.11	71.6
Surface Stockpiles	Measured					
	Indicated					
	Total Measured & Indicated					
	Inferred	2.685	1.94	22.21	-	-
Total	Indicated	16.781	1.45	9.71	0.31	114.9
	Total Measured & Indicated	**16.781**	**1.45**	**9.71**	**0.31**	**114.9**
	Inferred	12.147	0.98	9.25	-	-
Total Resource		**28.928**	**1.24**	**9.52**	**-**	**-**

Table 1-2: Relative Proportions of the Individual REO in Different Components of the Resource

REO	Apatite Breccia (%)	Carbonatite (%)	Pyroxenite (%)
La_2O_3	16.17	16.94	15.87
CeO_2	44.62	45.77	44.78
Pr_6O_{11}	5.89	5.85	5.83
Nd_2O_3	22.49	21.87	21.87
Eu_2O_3	0.93	0.87	0.92

REO	Apatite Breccia (%)	Carbonatite (%)	Pyroxenite (%)
Dy_2O_3	0.81	0.68	0.86
Tb_4O_7	0.22	0.19	0.22
Y_2O_3	2.64	2.12	2.82
Remaining REOs	6.23	5.71	6.83
Total	100	100	100

1.15 Mineral Reserve Estimates

The following information is an estimate of minable tonnage, not a true reserve statement.

Although the surface stockpiles are classified as inferred mineral resources, they have been reclaimed at the start of the project, as directed by the client, as they present an immediate plant feed source during the waste mining required to expose ore faces in the pit. Due their relative location in the orebody, grades and classifications, only the appetite beccia has been included in the mine plan, with no consideration given to the carbonatite or pyroxenite portions of the resource. There is known REO in the surrounding pyroxenite and carbonatite and these may be considered in future as a blend component rather than simply waste.

A summary of the LOM results is included in Table 1-3.

Table 1-3: Summary of the LOM Results

Life of Mine	Tonnes
Stockpiles	
Ore mined	2 694 322
Pit	
Ore mined	7 125 462
Waste mined	14 740 640
Total tonnes mined (pit + stockpile)	24 560 424
Feed to plant	
Ore processed	9 819 784

Mine planning has been carried out on combined inferred and indicated resources. GBM has taken cognisance of the fact that this report could be used to raise seed funding and as such, potential investors need to be reminded that the mine planning includes Inferred resources. All of the inferred resources will need to be upgraded to indicated or measured status, before any pre-feasibility work can be carried out.

1.16 Mining Methods

The mining study initially considered a mining rate of 1 250 000 t/a ROM feed. A factorised analysis of a 400 000 t/a ROM feed sourced from the reclamation of historical stockpiles and from a conventional open pit mine was then carried out to provide order of magnitude tonnages and costs, based on revised processing feed requirements, processing costs and recoveries.

Conventional drilling and blasting is proposed for both ore and waste. The drilling depths proposed are 10 m with an additional 1.5 m sub-drill. The drilling patterns and blasting requirements were based on typical open cut operations in South Africa for similar rock types (found in the Western and Eastern Bushveld) and require site specific study.

Although the historic stockpiles (Stockpiles 1 – 8) are classified as inferred mineral resources, they have been planned to be mined first, as they provide the lowest cost ROM to the plant to maximise early cash flows and profitability, as directed by the client.

The mining method selected for stockpile reclaim would include pre-treating with a dozer utilising the slot dozing technique and loading into haulers using a wheel loader.

Mining costs have been provided by CSA in USD/t of ROM and have been included in the capital and operating estimate for the project.

1.17 Recovery Methods

Ore from the historical stockpiles and the open pit mine will be crushed to a nominal size of -10 mm in a three-stage crushing and screening circuit. A single stage ball mill operating in closed circuit with a hydrocyclone will reduce the crushed feed to a nominal size of 80 % passing 75 µm. Cyclone overflow will be thickened and filtered.

After filtration, the milled solids will have sulphuric acid added and the mixture will be baked in a rotary kiln. The baked material will be leached with water in agitated tanks to dissolve the components solubilised during baking, including REE. The resulting slurry will subjected to solid/liquid separation to remove insoluble matter. These solids consist mainly of gypsum and will be discarded as waste.

The filtrate from the water leach product ("leaching liquor") contains phosphoric acid, iron sulphates and rare earth sulphates. Ammonia will be added to raise the pH to approximately 3.5, causing the precipitation of iron phosphates and thorium which will be removed by filtration. To ensure quantitative precipitation of iron phosphates with minimal loss of REE, the Fe/P molar ratio is adjusted to 1 through the addition of iron sulphate prior to adding the ammonia.

Rare earth sulphates in solution are converted to oxalates by first adding sulphuric acid to the liquor after precipitation of iron phosphate and then adding oxalic acid to precipitate rare earth oxalates. The rare earth oxalates will be separated and then calcined to produce a mixed rare earth oxide product for sale.

Solution separated from the rare earth oxalates will undergo a number of processes to purify and regenerate residual oxalic acid such that it can be recycled. This will also provide opportunity to recycle REE in solution to the oxalate formation stage which increases the recovery of REE.

The first stage will raise the pH using ammonia to remove any residual iron and phosphate – this will form an iron phosphate precipitate which will be separated and combined with the $FePO_4$ produced earlier in the process.

A second raise in the pH by ammonia will precipitate rare earth hydroxides which will be re-dissolved in sulphuric acid and the rare earth sulphates formed then recycled to the oxalate formation step.

Lime will then be added to the solution which will form insoluble calcium oxalates which will be separated. The remaining solution containing ammonium sulphate and ammonia will be recycled to reduce water make-up. The solid calcium oxalate will be reacted with sulphuric acid to produce oxalic acid and solid calcium sulphate. The oxalic acid will be recycled to the rare earth oxalate formation process. The gypsum will be discarded as waste with the gypsum removed earlier in the process.

There is potential to increase the value of the project by producing marketable tripotassium phosphate or another phosphate product from the iron phosphate precipitates and ammonium sulphate from the oxalic regeneration process. Test work is planned to develop these processes and assess the commercial suitability of the products.

1.18 Project Infrastructure

The infrastructure required to support the process plant has been specified to suit the 25 year project life. Infrastructure includes the required buildings such as the mill office and administration building, warehouse, workshops, laboratory, emergency services and security. Process plant site roads and perimeter fencing have also been included. Allowance has been made for a construction camp which will also service as staff and community accommodation during operations.

Utilities including power, coal and fuel will be sourced from local providers.

A raw water supply is required for continual operation. A replenishing bore hole is in operation at the existing site and it is therefore proposed that an expansion or similar new bore field will supply the projects water requirements. The accumulation of water in the existing pit and conceptual geohydrology supports this assumption, though no specific ground water investigation has been completed for this project.

If necessary, riverbed wells or a borehole field could be developed at Matlabas River and connected to the site via an approximate 7 km pipeline, though this has not been allowed for at this stage. Potable water supply requirements are expected to increase, therefore any existing treatment facilities will need to be expanded.

1.19 Market Studies and Contracts

A market study on current rare earth demand, supply and pricing for rare earths was conducted by Dr Harmer at Galileo Resources and has been included in this report.

Current market and pricing trends have formed the basis for an estimate of the value of the contained REE in the Glenover deposit, the most meaningful being the likely value close to the anticipated time of production rather than current prices. This is the value of 1 kg of separated 99 % pure REO from the Glenover ore - essentially a 'basket price' – calculated as the weighted average of the individual REO oxide prices at the relative proportions in which they occur within the deposit.

A number of projected 2015 REO prices, along with prices adopted by other recently concluded PEA's are compared with a 3 year average in Table 1-4.

Table 1-4: Selected Price Estimations for Purified REO

Reference	Prices: 99 % pure oxide USD/kg									
	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Y
2015 projection (Roskill)[1]	27.5	12.5	100	100	-	1 100	-	1 100	900	50
2015 projection (IMCOA)[2]	26.5	25	77	80	34	625	44	605	295	56
Zandkopsdrift PEA (Frontier, March 2012)[3]	27.5	12.5	100	100	39	1 100	56	1 100	900	50
Norra Karr PEA (Tasman, May 2012)	10	5	75	75	10	500	40	975	520	20
3 year average FOB China	42	41	81	93	39	1 207	56	1 016	554	57

Notes: no value is assigned for the heavy REE from Ho-Lu; these have extreme niche applications and would not form part of a standard off-take contract;

1: mid-point values of the ranges estimated by Roskill (2011); 2: Kingsnorth, personal communication 2011 (equivalent to the Q4 2011 average prices with 25 % of the La and Ce values); 3: equivalent to the Roskill values with Sm and Gd prices from the 3 year average FOB China estimate

The approach adopted by Frontier Rare Earths in the PEA on the Zandkopsdrift Deposit has been adopted for this PEA: essentially being the mid-point values of the 2015 price ranges estimated by Roskill (2011) supplemented by the 3 year average FOB China prices for Sm and Gd (not estimated by Roskill).

Using these prices the basket price of 1 kg of 99 % rare earth oxides in the Glenover ore is USD 60.79.

1.20 Environmental Studies, Permitting and Social or Community Impact

Digby Wells was subcontracted by GBM to conduct a Preliminary Assessment of environmental matters for the proposed Glenover Project. In terms of environmental and social information available, no fatal flaws have been identified that would prevent the project to proceed into a feasibility phase. Digby Wells has provided a plan of action to progress the project in terms of legal requirements and for the submission of a full Environmental and Social Impact Assessment and Environmental Management Programmes.

Glenover currently holds a registered Prospecting Right No. LP 868 PR which was renewed recently for a period of three years. In order to exploit the phosphate and REE, Glenover will be required to apply for a Mining Right in terms of section 22 of the Mineral and Petroleum Resources Development Act, 2002 ("MPRDA"). A Mining Right will only come into effect once approval of the Environmental Management Programme is granted by the Department of Mineral Resources (DMR).

1.21 Capital and Operating Costs

1.21.1 Capital Costs

The purpose of the capital cost estimate is to provide substantiated costs which can be utilised to assess the economics of the project. The capital cost estimate has been prepared to the level of a preliminary study, with an accuracy of -40 % to +40 %, and is presented in USD.

Wherever possible, GBM has obtained supplier quotations for plant equipment. Where a quotation was not available a commercial or internal database was used to estimate the cost. If neither of the above was available GBM has estimated the cost based on experience. The total initial investment capital cost estimate is USD 233 758 821 and includes a contingency of USD 33 850 006.

Table 1-5 shows the capital cost breakdown.

Table 1-5: Project CAPEX Estimate USD (Capital Cost Breakdown)

Cost Centre	Currency	Total	Fraction
Total Capital Investment	USD	233 758 821	1.00
Fixed Capital	USD	225 849 847	0.97
100 - Direct	USD	158 182 174	0.68
200 - Indirect	USD	67 667 674	0.29
300 - Working Capital	USD	7 908 974	0.03

1.21.2 Operating Costs

This OPEX Breakdown for the processing plant is based upon a 400 000 t/a throughput and estimated yield based on test work results. The summary report for the annual operating costs can be seen in Table 1-6 and Table 21-20**Error! Reference source not found.**. The tables below outline the major areas and their associated annual costs and costs per tonne of ore.

Table 1-6: Processing OPEX Report (USD/a and USD/t Average)

Area No.	Area Name	Total (USD/t)	Total (USD/a)
000	General	9.7	3 878 387
200	Processing	313.2	125 276 240
300	Waste Management	2.2	866 614
400	Product Handling	0.3	125 704
500	Infrastructure and Utilities	2.0	810 834
600	Environmental	0.02	8 881
Total		**327.4**	**130 966 660**

Table 1-7: Mining OPEX Overheads Report (USD/a)

Area No.	Area Name	Total (USD/a)
100	Mining – Pit - Overheads	2 368 000
100	Mining – Stockpile - Overheads	2 308 000

Table 1-8: Mining OPEX Rate Report (USD)

Area No.	Area Name	Total (USD/t)
100	Mining - Ore reclaim – pit	5.53
100	Mining – Waste movement	5.53
100	Mining - Ore reclaim – stockpile	3.26

1.22 Economic Analysis

The base case financial model prepared for evaluation of project economics is a constant dollar type model which assumes the purchasing power does not change with time. This means the cost of capital, operating costs and revenue are constant through time. A scenario analysis is undertaken to assess the impact of time varying changes in the reagent consumption, REO recovery and price and CAPEX.

Based on the capital investment and operating cost estimation the Project will yield an internal rate of return (IRR) of 34.5 % and a net present value (NPV) of USD 512 160 943 at a discount rate of 8 %. A summary of the discounted cash flow for the base case can be seen in Table 1-9 below.

Table 1-9: Discounted Cash Flow Summary

Item	LOM	Unit
Total Investment Capital	419 184 263	USD
Fixed capital investment	268 675 290	USD
Sustaining capital investment	142 600 000	USD
Working capital investment	7 908 974	USD
Revenue	6 595 951 468	USD
REO production	167 170	t
REO price (inc discount)	39 457	USD/t
Total Operating Cost	3 407 111 198	USD
General and administration	94 099 375	USD
Infrastructure and utilities	42 364 494	USD
Mining	188 498 035	USD
Processing	3 057 428 845	USD
Operating Income	3 188 840 270	USD
Depreciation Claimed	242 612 232	USD
Depreciation allowance	242 612 232	USD
Depreciation carry-forward	70 806 803	USD
Working Capital Take-Out	7 908 974	USD
Taxable operating income	2 954 137 012	USD
Tax and Royalties	1 034 580 988	USD
Loss carry-forward claimed	0	USD
Royalties	288 086 979	USD
Income tax	746 494 009	USD
Loss carry-forward	0	USD
Post Tax Income	2 154 259 282	**USD**
Cash Flow	1 735 075 018	**USD**
Revenue	672	**USD/t feed**
Revenue	39.46	**USD/kg REO**

Item	LOM	Unit
Total Operating Cost	347	**USD/t feed**
Total Operating Cost	20.38	**USD/kg REO**
Annual Operating Income	325	**USD/t feed**
Annual Operating Income	19.08	**USD/kg REO**
IRR	34.5 %	
NPV (@ 8 % discount)	512 160 943	**USD**
Discount rate sensitivity		
NPV (@ 5 % discount rate)	782 562 158	USD
NPV (@ 10 % discount rate)	392 695 571	USD
NPV (@ 12 % discount rate)	304 170 346	USD
NPV (@ 15 % discount rate)	209 851 154	USD

A sensitivity analysis was conducted to estimate the magnitude of the sensitivity of the model as measured by NPV and IRR (where relevant). It was found that the project's economic performance is primarily influenced by REE pricing and recovery and that it is also strongly influenced by reagent prices (and hence by the potential production of phosphate and ammonium sulphate co-products), as these are the major contributor to the operating cost of the project.

A scenario analysis of the project excluding inferred resources, as per SAMREC guidelines; has also been conducted. The result is a LOM of 18 years, an IRR of 25.9 % and an NPV of USD 374 964 468 at a discount rate of 8 %.

1.23 Adjacent Properties

Glenover holds a registered Prospecting Right No. LP 868 PR, which expired on 30 October 2012. An application for a renewal was properly submitted in terms of the provisions of Section 18 of the Mineral and Petroleum Resources Development Act, 2002 ("MPRDA"). The renewal period was granted for three years, after which Glenover will be required to apply for a Mining Right. The Glenover prospecting right is that, by default, the existing right remains in full force and effect until such time as the extension is granted which, by law must be allowed by the DMR assuming the correct process has been followed by the applicant (Glenover). The total Glenover project area is controlled by Glenover Phosphate and all mineral resources and reserves lie within the Glenover concessions.

Consideration is given within this report to other South African carbonatite REO deposits, including Zandkopsdrift Rare Earth Project and Steenkampskraal monazite deposit.

1.24 Interpretations and Conclusions

1.24.1 Processing

Test work conducted at laboratory scale by Dorfner Anzaplan has demonstrated, at a level of confidence appropriate for a Preliminary Economic Assessment, that REE can be extracted from the Glenover ore at a recovery sufficient to warrant economic analysis.

The calculated recovery of REE is 80.0 % and it may be possible that this value could be improved through further optimisation testing. The magnitude of this improvement is not known at this stage. Further, variability in recovery across ore types has not been determined; the overall recovery may therefore differ from the value upon which this PEA is based.

The recovery of REE is based in part on theoretical understanding of the chemistry of the processes being applied which will be verified through confirmatory test work during the PFS. The project is OPEX sensitive due to high quantities of reagents consumed; changes to process basis could significantly affect project costs and viability.

1.24.2 Mineral Resource and Reserve Estimates

The total in situ Mineral Resources, as stated by GeoConsult, have an SAMREC classified Resource of 16.781 Mt of ore within Indicated with a REO grade of 1.51 % TREO and 9.462 Mt within Inferred category with a REO grade of 0.71 % TREO. The Inferred Mineral Resources stated by CSA for the stockpiles have an approximate 2.812 Mt at a grade of 2.05 % TREO.

Apatite breccia is the primary resource upon which this study is based with only the stockpiles and in situ apatite breccia components of the resource used in the economic evaluation. This portion of the resource has an estimated SAMREC Resource of 7.407 Mt of ore within Indicated with a REO grade of 2.20 % and 2.959 Mt within Inferred category with a grade of 1.96 % TREO.

Based on the estimated operating costs and predicted recoveries and revenues, the minable tonnes estimate for the project results in 9.820 Mt delivered to the plant at 2.13 % TREO.

There is known REO in the surrounding pyroxenite and carbonatite and these may be considered in future as a blend component rather than simply waste.

The criteria GeoConsult used in the determination of the confidence levels of Indicated and Inferred in situ Mineral Resources have taken into account the confidence in tonnage/grade computations, density, quality, value and distribution of primary data and information, confidence of the geological and mineralization models.

All of the inferred resources will need to be upgraded to indicated or measured status, before any pre-feasibility work can be carried out.

1.24.3 Infrastructure

Infrastructure necessary to support the mining and process operations for the life of mine of 25 years has been included.

The project site is adequately serviced by existing local roads but there may be potential for expansions of the rail line in the area. Deliveries and freight of equipment, consumables and product is currently based on the use of trucks.

The operation is projected to be a net water consumer. In order to meet the water requirements it is proposed that the existing borehole be expanded or that a similar, new bore hole field be established. If necessary it is possible that the Matlabas River could be connected to the site via an approximate 7 km pipeline, though this has not been allowed for at this stage. Potable water supply requirements are expected to increase, therefore any existing treatment facilities will need to be expanded.

A new network connection will be required to supply power to the new process plant site. This is based on the assumption that sufficient power is available in the network and that the supply authority will levy the charge for the upgrade against the tariffs on the increased consumption.

1.24.4 Financial Summary

The initial investment capital cost estimate for the required infrastructure, mining and mineral processing plant is USD 233 758 821 and includes a contingency of USD 33 850 006.

The operating costs have been estimated at USD 130 966 660 USD/a, or 327 USD/t.

The project has been evaluated using a basket price of 60.79 USD/kg of 99 % rare earth oxides in the Glenover ore, less a 35 % basket price discount applied.

Based on the capital investment and operating cost estimation the project will yield an internal rate of return (IRR) of 34.5 % and a net present value (NPV) of USD 512 160 943 at a discount rate of 8 %.

A scenario analysis of the project excluding inferred resources, as per SAMREC guidelines, has also been conducted. The result is a LOM of 18 years, an IRR of 25.9 % and an NPV at 8 % discount of USD 374 964 468.

Economic performance is highly sensitive to changes to the OPEX, with the main contributor to annual operating costs being the consumption of reagents.

1.24.5 Environmental and Social Impact

1.24.5.1 Environment and Social

In terms of environmental and social information available, no fatal flaws have been identified that would prevent the project from proceeding into a feasibility phase.

1.24.5.2 Legal

Glenover currently holds a registered Prospecting Right No. LP 868 PR. In order to exploit the phosphate and REE, Glenover will be required to apply for a Mining Right in terms of section 22 of the Mineral and Petroleum Resources Development Act, 2002 ("MPRDA"). A Mining Right will only come into effect once approval of the Environmental Management Programme is granted by the Department of Mineral Resources (DMR).

Zoning Certificates were not obtained, however it was confirmed with the Lephalale Town Planners that the relevant farms are zoned as agricultural land and therefore either a Consent Use Applications or Rezoning Application will be required from the Municipality. Such an application should be undertaken concurrently with the Mining Right Application.

All of the licences and permits set out above will need to be in place before the commencement of mining operations. The issuing of some of these licences may be the subject of delay. Although this is judged as material, it is not assessed as being a fatal flaw.

1.25 Recommendations

1.25.1 Metallurgical Test Work and Processing

Further test work should be conducted to optimise process conditions and to verify recoveries of both major products and potential value-adding products. This should include further work to confirm the optimal process conditions and verify the REE recovery achieved, including variability across ore types.

1.25.2 Mineral Resource and Reserve Estimates

Further drilling is to be conducted in the next stage of resource estimation. CSA recommends that work be undertaken to upgrade the Inferred Mineral Resources to Indicated, in particular the resource estimate for the stockpiles, for better classification prior to further studies being undertaken. Further exploration is required to more accurately understand the scope of the total resource. Environmental and hydrogeological information should be updated for the next study.

1.25.3 Mining Methods

CSA recommends that contractor mining be employed which will provide the necessary flexibility in terms of equipment requirements and shift scheduling. A detailed mining study is to be conducted for 400 000 t annual ROM feed. The identified mining areas require more detailed geotechnical/slope design studies in order to optimise the slope design from a practical and design point of view. The economics of the project should be assessed in respect of a range of ROM feeds.

1.25.4 Environment and Social Impact

Prior to the commencement of a feasibility phase, a screening assessment should be done to indicate sensitive areas to assist in future planning of mining areas and placement of surface infrastructure.

Revision of the environmental closure and liability cost should be done based on envisaged mining operations and closure objectives.

1.25.5 Legal

Rezoning Application should be undertaken concurrently with the Mining Right Application and all other main environmental authorisation requirements.

Project Planning should take into consideration the timeframes required to ensure Mining and Environmental authorisation approvals.

It is a requirement of the MPRDA that the applicant for a mining right must compile a Social and Labour Plan (the costs of which must be allowed for in the economic model of the project) and be in compliance with the principles of the Mining Charter. These requirements include the participation of a Black Economic Empowerment entity (a BEE company or HDSA individual) through a shareholding of at least 26 %. The final corporate structure for Glenover at the time of the application for a mining right must take this into account. It is recommended that future works follow, at a minimum, the Digby Wells' approach detailed in Section 20.5 for the completion of the EIA/EMP.