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Amended NATIONAL INSTRUMENT 43-101 Independent Technical Report Mineral Reserves Estimate and Pre-Feasibility Study on the Buckreef Gold Mine Project, Tanzania, East Africa

for
Tanzanian Royalty Exploration Corporation (TRX)

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DATE AND SIGNATURES

This Report titled "Amended Independent Technical Mining Reserve Estimate Pre-Feasibility Study on the Buckreef Gold Mine Project, Tanzania, East Africa" prepared for Tanzanian Royalty Exploration Corporation has an effective date of 26th June 2018, and has been prepared and signed on 26th June 2018 by the following authors, as shown in the Appendices:

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Table of Contents

List of Tables

LIST OF FIGURES

1. EXECUTIVE SUMMARY

1.1 Introduction

The pre-feasibility study of the Buckreef Gold Mine Project discussed in this Independent Technical Report (ITR) has been prepared by Virimai Projects (Virimai) at the request of Tanzam2000, a subsidiary to Tanzanian Royalty Exploration Corporation (TRX) as a replacement to the ITR report that was initially prepared and compiled by MaSS Resources with an effective date of April 27, 2017. On publication of MaSS' report entitled "Updated Independent Technical Mining Reserve Estimate and Economic Feasibility Study on the Buckreef Gold Mine Project, Tanzania, East Africa", the Ontario Securities Commission (OSC) conducted a routine review of the report's contents and raised some queries that necessitated a review of the original report compiled by MaSS. Virimai Projects was then commissioned by Tanzam2000, to carry out an in-depth review of the original report by MaSS with the objective of amending and recompiling the ITR in compliance with Canadian National Instrument 43-101 "Standards of Disclosure for Mineral Projects" (NI43-101).

When TRX engaged Virimai Projects to review and respond to the comments raised by the OSC in relation to the MaSS report it was essential to start from the last published resource model and reconcile it to the present. Since no further exploration or infill drilling had been carried out since the January 2014 NI43-101 published mineral resources by Venmyn-Deloitte, these were the "current" mineral resource to be used in subsequent studies.

In undertaking its review, Virimai Projects identified an immediate problem regarding the files that were used by MaSS. Virimai Projects determined that Venmyn Deloitte had provided TRX with all the files it had generated during the resource estimation process including working files, instead of providing one final file only. MaSS made an error and used a test block model instead of the final block model. The details of this error by MaSS are fully explained in Section 14.2 of this report.

The main aim of this amended prefeasibility study is to provide a technical and economic review of the potential mining operations based on the Buckreef Gold Mineral Resource and other project definition activities such as metallurgical test work. This replacement ITR report, as titled, has been compiled by Virimai Projects to respond to the issues raised by the OSC. This Independent Technical Report (ITR) now replaces and supersedes the previous ITR published by MaSS Resources and it has an effective date of June 26, 2018.

1.2 Purpose of this Report

This report is an independent mine design and costing Pre-Feasibility Study on the Buckreef Gold Mine Project located in the Lake Victoria Goldfields, Geita District, in North Central Tanzania. This report is compliant with the Canadian National Instrument 43-101 'Standards of Disclosure for Mineral Projects'.

The intention of this report is to serve as an update NI43-101 compliant Mining and Economic Analysis Pre-feasibility Study on the Buckreef Gold Mine Project that takes into account a number of refinements, optimizations and alternatives that will form the basis for TRX to move to Feasibility Study and development of the Buckreef Gold Project as an open pit mine, which can be brought rapidly into production to benefit from the current favourable gold market conditions.

The Mineral Resources and pit-design optimized Mineral Reserves have been stated in compliance with NI43-101. No Exploration Targets or Inferred Mineral Resources have been used in the compilation of the Optimized Mineral Reserves stated in this study. Virimai Projects has taken full responsibility for the Buckreef Project Mineral Resources as previously published under two NI43-101 compliant technical reports by Venmyn Deloitte of South Africa and already in the public domain.

The supervising qualified person for this report, Mr. Wenceslaus Kutekwatekwa, deems this summary a true reflection of the content of the full report with the effective date of June 26, 2018.

1.3 Project Location

The Buckreef Project area is located in East Africa, in north-central Tanzania, approximately 45km south-west of the town of Geita, ~110km south-west of the Mwanza city. Mwanza city is serviced by regional and domestic air flights. In addition, a tarred road (B163) from Mwanza to Geita provides access and service delivery to the project area. A functional aerodrome constructed at the mine site also provides direct connections suitable for light aircraft from Mwanza or Dar Es Salaam, the capital city.

Within the project area, access to the various prospects is via an all-weather dirt road from Katoro to the mine-site. Several poorly maintained local tracks and paths suitable for 2-wheel drive vehicles are used in the dry season and 4-wheel drive vehicles in the wet season.

For reference, the Buckreef Deposit in the central part of the Buckreef Project area is located at 03^{o} 5′ 27.69″ S, 032^{o} 1′ 20.65″ E (Arc 1960 UTM Zone 36M 391,367.93mE 9,658,326.9mN). The Buckreef Project comprises five gold deposits all located within a single Special Mining License, SML04/1992.

1.4 Mineral Tenure

The Buckreef Gold Project is a gold exploration project which was originally held by IAMGOLD prior to July 2009. The "Agreement to Redevelop the Buckreef Gold Mine (ARBGM) between IAMGOLD and the Ministry for Energy and Minerals included at that point, a single Special Mining License and 12 Prospecting Licenses covering 98.19km2. In July 2010, IAMGOLD applied to surrender all licenses relating to the ARBGM, effective 25 October 2009, and the Commissioner for Minerals withdrew all license applications relating to the ARBGM.

In 2010, TRX among others, was invited by STAMICO on behalf of the Ministry of Energy and Minerals, to tender for the opportunity to negotiate a joint venture agreement with respect to the

Buckreef Project. TRX was awarded the tender, as confirmed in a letter from the Director General of STAMICO dated 16 December 2010. In October 2011, TRX signed a joint venture agreement with STAMICO with regards to the Buckreef Project. TRX holds a 55% interest in the Buckreef Project, with STAMICO holding the remaining 45%.

In terms of the agreement, TRX will manage the Buckreef Project and is responsible for providing mine development financing. If positive feasibility is achieved, TRX expects that the project will be financed through debt or a combination of debt and equity. Net profits will be divided in accordance with the parties' ownership interests after payment of all project expenses including debt service.

The current Mineral Resources for the Buckreef Gold project are declared over Special Mining License block SML04/1992 to which the JV agreement company Buckreef Gold Company Limited hold the rights as part of the second renewal of the special mining license, valid to 16th June 2027. Virimai Projects Pvt Ltd, through MaSS Resources Pvt Ltd has reviewed the licence documentation as issued by the Ministry of Energy and Minerals of Tanzania and is satisfied that these are in order. The Buckreef special mining license (SML04/92) as renewed covers a total area of 16.04km^2.

1.4.1 Permits and Permitting Process

Basis for Mineral Title

The state owns title to all mineral resources in The Republic of Tanzania. All permits conferring rights to explore and extract mineral resources are granted by the Minister of Energy and Minerals, ("MEM") in conjunction with the recently enacted Minerals Sector Mining Commission under the Tanzania 2010 Mining Act with revisions in enacted in 2017 by the 5th Parliament of Tanzania. The Mining Act serves as the legal framework governing mining in the Tanzania.

Exploration Permits (Rights and Obligation)

The Ministry of Energy and Minerals (MEM) is responsible for guiding the development of the mining industry in Tanzania through the Mineral Division. The Tanzanian Mining Act, 2010, the Explosives Act, 1963, and the Mining (Mineral Rights) Regulations, 2010, regulate the law relating to prospecting and exploiting minerals, including granting, renewals, royalties, fees and other charges.

Mineral property and control over minerals is vested in The United Republic of Tanzania. Only companies incorporated in Tanzania may hold mineral rights in Tanzania; however, exploration and mining is open to foreign concerns who can enter into joint venture agreements with locally registered Tanzanian companies and/or individuals granted mineral rights by the government.

Royalties are charged on gross value which for precious metals is 6% and district council where a gold mine is located is entitled to collect a 0.3% on the revenues from gold production as service levy. An additional export levy fee of 1%, payable to the government was enacted in early 2018. There is mandatory minimum 16% equity participation by the State when a project achieves mine development stage. Joint ventures with local companies are encouraged at both exploration and mine production stage with especially consideration on service provision with first preference being given to local indigenous companies.

Mineral rights under the Mining Act include Prospecting Licenses (PL), Special Mining Licenses (SML), Mining Licenses (ML), Processing Licenses, Smelting Licenses and Refining Licenses. The prospecting license is granted for an initial period of 4 years and subject to two renewal periods as an extension of tenure. On 1st renewal, if the license area is greater than 20km^2 then 50% must be relinquished and the license is then valid for a further 3 years. Upon second renewal, if the license is greater than 20sq km then 50% must be relinquished and the license is then valid for a further 2 years. Mining Licenses are granted for an initial period of 10 years for medium scale mining operations with a capital investment between US$100,000 and US$100 million and are renewable. An Environmental Certificate issued by the National Environment Management Council (NEMC) is a perquisite to the grant of a Mining License.

Special Mining Licenses (SML) are granted for large scale mining operations with a capital investment of more than US$100 million and are valid for the estimated mine life determined in the Feasibility Study (FS). Prior to the new regulations gazetted in March 2018, holders of special mining licenses may enter into a Mining Development Agreement (MDA) with the Government which is subject to review every five years and at the renewal of the mineral right. This has since been cancelled.

Now a recently established 6-man Mining Commission working with the Minister of Mines and both reporting to the Parliament will discuss and oversee that the Tanzanian government realizes maximum benefit from the project as well as guarantee fiscal stability for a long-term mining project, cover environmental matters which are project specific and not covered by the Mining Regulations, requirements for the procurement of goods and services available in Tanzania and the employment and training of citizens of Tanzania and the terms of State participation in long-term mining projects.

1.5 Geology and History of Exploration

1.5.1 Regional Geology

The Lake Victoria Goldfield was discovered in 1894 and significant exploitation began in the 1930s at the Geita Gold Mine. By 1940 Tanzania was producing 4.5 t/y of gold. Post 1990, a new phase of modern exploration and companies with a focus on Archaean exploration in the Lake Victoria Goldfields developed after significant gold discoveries in the Lake Victoria region.

The historic Buckreef Gold Mine was an underground mine developed within the BRMA and operated by the Tanzanian State during the late 1980s. IAMGOLD Tanzania (IAMGOLD) held the rights to the Buckreef Project prior to July 2009 and in 2010 TRX entered a joint venture with Stamico with respect to the project. The project comprises prospecting licenses 33.2km^2 in extent and a special mining license of 16.04km^2. Within the prospecting licenses, there are 53 primary mining licenses registered to local Tanzanians as small-scale artisanal gold operations.

The Buckreef Project area covers the eastern portion of the east-west trending Rwamagaza Greenstone Belt (RWGB) which is one of several Archaean supra-crustal belts lying within the Tanzanian Craton of East Africa.

1.5.2 Local Geology

Little outcrop is present on the Buckreef project licence portfolio properties limiting the amount of bedrock mapping that may be and/or has been conducted. The central part of the Buckreef license portfolio is underlain by lower Nyanzian mafic volcanics (basalts) and rock of dioritic to gabbroic texture. Within the basalts are interflow tuffaceous to argillaceous sediments and intruding quartz feldspar porphyries.

The predominant rock type on the Buckreef property is a generatively deformed mafic-felsic sequence, which ranges in composition from Mg rich to Fe-rich mafic rocks to the north. At Buckreef, drilling has indicated the presence of thin interflows of predominantly pelitic and cherty sediments. Varieties of porphyritic textured felsic intrusions have also been documented.

1.5.3 Mineralization

The historical Buckreef underground gold mine was developed on an ENE-WSW trending, 5-30 m wide, brittle-ductile fault zone developed within relatively undeformed mafic volcanics. The fault zone contains early developed pervasive iron carbonate alteration which has undergone later brittle fracturing and brecciation with recementation by multiple events of grey to white quartz veining. Finely disseminated pyrite occurs in a halo surrounding the zones of quartz veining. The degree of quartz veining is directly related to the tenor of gold mineralization. Deep drilling has led to the definition of higher grade shoots plunging steeply to the north. Several narrow, more discontinuous sub parallel zones of similar alteration and mineralization have been defined both to the west and to the east of the main fault zone.

Gold mineralization at Buckreef is non-refractory in both fresh and oxide material and is associated with small amounts of fine grained pyrite within the grey quartz veining. Detailed logging of drillcore reveals a prominent deepening of the oxidation profile above portions of both the main and north zones.

Gold mineralization is primarily localized in ENE-WSW and E-W trending brittle-ductile shear zones within relatively deformed mafic volcanics. Alteration within the shear zones is characterized by a silica carbonate- pyrite assemblage with the shear fabric being well preserved. Gold mineralization is associated with the alteration halos as well as grey quartz zones with the quartz occurring as thin veins, stringers and boudins generally parallel to the shear fabric.

1.6 Database

Virimai Projects utilized and independently interrogated and reviewed four of the Venymn resource models (Table 1.1) for the Buckreef, Eastern Porphyry, Bingwa and Tembo deposits used in the original published 2012 PEA and the subsequent 2014 Mineral Resource Update Technical reports.

Table 1.1: Block Models Provided

Item	Ore Body	Datamine Model	Model Type	Comment	Final Model Used Opt
1	Buckreef main	mod_br-mixed nospot	Krigged	Only mineralisation	bm_mod_run3
2	Eastern Porphyry	mod_ep_mixed	Krigged	Only mineralisation	ep_mod_run3
3	Bingwa	mod_bw_supercap	Krigged	Only mineralisation	bw_mod_run3
4	Tembo	mod_tb_mixed	Krigged	Only mineralisation	tb_mod_run3

As per published reports, "the Mineral Resources were estimated using Multiple Indicator Kriging (MIK) techniques in GS3 software produced by Hellman and Schofield. The model estimates resources into panels, which approximate the drill hole sample spacing throughout the majority of the study area. The Mineral Resource estimates within each panel were classified according to the distribution of sampling in the kriging neighbourhood and took into account the uncertainty in the estimates related to the proximity and distribution of the informing composites".

1.7 Mineral Resources

Virimai Projects carried out site verification of the data used in the estimation of resources that included

a. Ground truthing of the drill hole collars
b. Geology and lithology verification through core and pulp inspection, compared to the geological logs

c. Validation of the database assays compared to the assay certificates

This was carried out largely on randomly selected drill holes. Only a few holes were selected on the basis of the high grades intersected. Virimai Projects concluded that the data integrity had been preserved throughout the chain of custody and, therefore, that the results could be used in resource estimation and subsequent business use.

No further drilling has been carried out since the publication of estimated Mineral Resources by Venmyn Deloitte in 2014. Virimai Projects carried out a review of the four resource models (Buckreef Main, Eastern Porphyry, Tembo and Bingwa) used in the published estimates and found that the grade estimates were robust. For this reason, Virimai Projects accepted and adopted the resource models for use in the current pre-feasibility study. However, Virimai Projects re-stated the Mineral Resources for two of the resource areas as follows

a) Virimai Projects declared about 10,000 t less Inferred Mineral resources as a result of surface correction

b) About 85,0000 t spread across the categories were removed for the declared Mineral Resources at Bingwa as a result of being located away from the main mineralised zone either located under overburden exceeding 40 m or existing as discrete non-contiguous bodies. The 85,000 tonnes remains in the Mineral Inventory outside the open-pitable mineral resource from current projections.

Table 1.2. 2014 Published Estimated Mineral Resources Published verified by Virimai Projects in 2018

Prospect	MEASURED			INDICATED			INFERRED			**MEASURED + INDICATED**		
	Tonnes	Grade	In Situ Content	Tonnes	Grade	In Situ Content	Tonnes	Grade	In Situ Content	**Tonnes**	**Grade**	**In Situ Content**
	(Mt)	Au (g/t)	Au (Oz)	(Mt)	Au (g/t)	Au (Oz)	(Mt)	Au (g/t)	Au (Oz)	**(Mt)**	**Au (g/t)**	**Au (Oz)**
Buckreef	8.90	1.72	491,526	13.10	1.41	594,452	7.53	1.33	322,900	**22.00**	**1.54**	**1,085,978**
Eastern Porphyry	0.09	1.20	3,366	1.02	1.17	38,354	1.24	1.39	55,476	**1.10**	**1.18**	**41,721**
Tembo	0.02	0.99	531	0.19	1.77	10,518	0.27	1.93	16,521	**0.20**	**1.70**	**11,048**
Bingwa	0.91	2.83	82,386	0.57	1.38	25,274	0.31	1.29	12,922	**1.48**	**2.27**	**107,660**
Total	**9.91**	**1.81**	**577,810**	**14.87**	**1.40**	**668,598**	**9.35**	**1.36**	**407,819**	24.78	1.56	1,246,408

Table1.3. Restated Estimated Mineral Resources for the 2018 Prefeasibility Study

Prospect	MEASURED			INDICATED			INFERRED			**MEASURED + INDICATED**		
	Tonnes	Grade	In Situ Content	Tonnes	Grade	In Situ Content	Tonnes	Grade	In Situ Content	**Tonnes**	**Grade**	**In Situ Content**
	(Mt)	Au (g/t)	Au (Oz)	(Mt)	Au (g/t)	Au (Oz)	(Mt)	Au (g/t)	Au (Oz)	**(Mt)**	**Au (g/t)**	**Au (Oz)**
Buckreef	8.90	1.72	491,368	13.09	1.41	594,097	7.52	1.33	322,819	**21.99**	**1.54**	**1,085,465**
Eastern Porphyry	0.09	1.20	3,366	1.02	1.17	38,339	1.24	1.39	55,380	**1.10**	**1.18**	**41,705**
Tembo	0.02	0.99	531	0.19	1.77	10,518	0.27	1.92	16,461	**0.20**	**1.70**	**11,048**
Bingwa	0.90	2.84	82,145	0.49	1.48	23,331	0.22	1.49	10,541	**1.39**	**2.36**	**105,477**
Total	**9.90**	**1.81**	**577,411**	**14.79**	**1.40**	**666,285**	**9.25**	**1.36**	**405,201**	**24.69**	**1.57**	**1,243,696**

Virimai Projects recommended that some 29 holes totaling 4,463 m be drilled to upgrade the Inferred Mineral Resources within the reserve shell. There is also a component of extending the mineral resources where the drill holes go beyond the reserve shell. In the process some Indicated Mineral Resources are likely to be upgraded to Measured Mineral Resources. The actual metres to be drilled will be determined at the appropriate time in line with the compelling objectives of the Feasibility Study.

1.8 Mine Design and Mineral Reserves

From the published 2014 Venymn Deloitte NI-43-101 compliant Mineral Resource estimate technical report, Virimai Projects essentially overhauled and improved on the original overall mining philosophy have produced a NI-43-101 compliant Mineral Reserve estimate for Buckreef Gold Project based on the original resource block models, achievable mining shapes, mining recovery, mining dilution and open-pit pre-production development cost considerations.

The Buckreef Project Mineral Reserve estimate is based on a gold cut-off grade of 0.37grams per tonne) which has been calculated from the following parameters:

a) Gold Price (pit shell): US$ 1,300 per oz
b) Mining Cost: US$19.00 per ton of ore
c) Process Cost: US$10.24 per ton of ore
d) Labour Cost: US$1.98 per ton of ore
e) Recovery: 92.3% for oxides
f) Recovery 85.0% for sulphides

The Mineral Reserve estimate for the Project is tabulated in Table 1.4.

Table 1.4: Buckreef Project Pit-Design Optimized Mineral & ROMPAD stockpile Reserves as at 26 June 2018

Pits Design Reserves Summary		COG: Oxide & Trans = 0.38, Fresh = 0.41 Virimai 26th June 2018 Pit Design Reserves Summary			
Prospect	**Reserves**	**Tonnes**	**Grade**	**In Situ Gold Content**	
Name	**Category**	**(Mt)**	**Au (g/t)**	**Kg**	**oz**
Buckreef	Proven	8,174,415	1.64	13,374.06	429,985.66
	Probable	8,174,147	1.40	11,435.72	367,666.58
	Waste	**160,217,840**			
Total (Proven + Probable)		**16,348,562**	**1.52**	24,809.78	797,652.24
Eastern Porphyry	Proven	79,385	1.17	93	2,982
	Probable	976,281	1.03	1,003	32,242
	Waste	9,823,917	0.02		
Total (Proven + Probable)		**1,055,666**	**1.04**	1,096	35,224
Tembo	Proven	-	-	-	-
	Probable	70,183	2	165	5,312
	Waste	1,354,468	-		
Total (Proven + Probable)		**70,183**	**2.35**	**111**	**3,582**
Bingwa	Proven	1,098,383	2.39	2,366	76,074
	Probable	510,154	1.30	377	12,108
	Waste	10,311,734			
Total (Proven + Probable)		**1,608,536**	**2.04**	**2,743**	**88,182**
Grand Total	**Proven**	**9,352,183**	**1.72**	**16,092**	**517,358**
	Probable	**9,730,764**	**1.36**	**13,265**	**426,492**
	Proven +Probable	**19,082,947**	**1.54**	**16,749**	**943,851**

Source: Virimai Projects 2018

(1) Mineral Resource is inclusive of Mineral Reserve shapes, mining recovery, mining dilution and open-pit preproduction development costs. Mineral Reserve estimate includes dilution.

(2) Mineral Reserve was estimated using NI43-101F compliant Standards on Mineral Resources and Reserves, Definitions.

(3Ccontained metal may differ due to rounding.

The reserve statement for the Buckreef Gold Project is as summarised in table 1.5

Table 1.5: Buckreef Mineral Reserve Statement as at 26 June 2018

		Tonnes	**Grade**	**In Situ Gold Content**	
		(Mt)	**Au (g/t)**	**Kg**	**oz**
Buckreef Project	**Proven -Stockpile**	**119,726**	**1.86**	**223**	**7,160**
	Proven	**9,352,183**	**1.72**	**16,092**	**517,358**
	Probable	**9,730,764**	**1.36**	**13,265**	**426,492**
	Mineral Reserves	**19,202,673**	**1.54**	**29,580**	**951,010**

1) Mineral Resource is inclusive of Mineral Reserve shapes, mining recovery, mining dilution and open-pit preproduction development costs. Mineral Reserve estimate includes dilution.

(2) Mineral Reserve was estimated using NI43-101F compliant Standards on Mineral Resources and Reserves, Definitions.

(3Ccontained metal may differ due to rounding.

Reserves were calculated from pit design. Full Grade Ore cut-off grade (FGO) calculations rely on inputs from this study and other sections of the Buckreef Prefeasibility study. Reserves were based on a gold price of $1300/oz for pit design, and cut-off grade 0.38g/t. Inferred Mineral Resources are considered geologically speculative and are not used in project economics, nor are they considered for mining plans. The study is only restricted to open pit mining at this stage with no detailed consideration of underground mine planning that is envisaged at the end of the pit life.

1.9 Mine Development and Operations

Buckreef project has been planned as an open pit truck and excavator operation. This is the best mining method for the deposit due to the geometry of ore bodies and near surface material. Trucks and loaders allows for reasonably good selectivity and cost benefits.

Equipment selected to haul waste and ore materials includes seventeen 40tonnes trucks, and four backhoe excavators through the life of mine (LoM) along with additional support and ancillary equipment. Virimai Projects produced a mining schedule using parameters for the selected mining equipment.

A single optimal mining sequence has been evaluated and considered for the life of mine (LOM) production schedule described in this report and this assumes that a processing plant will be established close to the Buckreef Pit and will treat ore from the Buckreef, Bingwa, Eastern Porphyry and Tembo deposits until depletion.

The optimal mining schedule is based on optimized pit shells for each of the deposit. The pit designs generated mineral reserves which come up to a total of 19.2Mt grading at 1.54g/t excluding the current existing ROMPAD stockpile of 119,726t @ 1.86g/t.

A production schedule has been developed based on the following constraints:

- Target ore production during commercial production to be 1,497,000 tonnes per year;
- Minimization of pre-strip quantities;
- Oxides material in all pits to be treated first;
- Initial process plant feed scheduled at 60tph (Yr1-2 with upgrades to 120tph (Yr3) and 180tph (Yr4 onwards)

A summary of the mining schedule is shown in Appendix and extend to the end of the life of the four open pits in year 16.

Table 1.6: Buckreef Project Projected Mining Schedule

Description	Units	YEARS																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
Total																		
Tonnes of Oxide Ore	kt	274	256	80	110	39	31	159	65	321	118	16	1	41	-	-	-	1510
AUMI of Oxide Ore	g/t	2.04	1.53	1.13	0.89	0.7	1.22	1.02	2.08	1.98	3.92	0.74	0.79	2.11	-	-	-	1.78
Tonnes of Oxide Waste	kt	2,713	1,443	2,087	598	191	1551	2086	2140	1978	3323	918	82	1046	-	-	-	20155
Tonnes of Oxide Ore & Waste	g/t	2,988	1,699	2,166	707	230	1581	2245	2205	2299	3440	935	83	1086	-	-	-	21665
Tonnes of Trans. Ore	kt	92	192	150	93	93	91	40	21	82	341	256	52	17	-	-	-	1520
AUMI of Trans. Ore	g/t	2.18	2.86	1.63	0.87	1.01	1.01	1.57	1.04	1.05	3.1	1.29	0.91	2.72	-	-	-	1.92
Tonnes of Trans. Waste	kt	1,296	1,097	2,134	1,410	733	1,525	1,930	1,277	1,629	2,700	2,878	1,368	368	-	-	-	20,346
Tonnes of Trans. Ore & Waste	g/t	1,388	1,289	2,284	1,504	825	1,616	1,970	1,298	1,711	3,041	3,134	1,420	385	-	-	-	21,866
Tonnes of Hard Ore	kt	43	187	346	555	1247	1522	1269	1263	1060	1122	1092	1440	1497	1386	1110	915	16053
AUMI of Hard Ore	g/t	1.37	2.14	1.73	1.49	1.63	1.48	1.29	1.86	1.57	1.26	1.31	1.22	1.29	1.65	1.41	1.7	1.48
Tonnes of Hard Waste	kt	508	1,766	4,055	6,824	7,781	6,839	7,985	9,294	14,640	12,160	14,550	15,490	12,149	12,888	13,176	1,102	141,207
Tonnes of Hard Ore & Waste	kt	551	1,953	4,401	7,379	9,028	8,361	9,254	10,557	15,700	13,283	15,641	16,930	13,645	14,274	14,286	2,017	157,260
Oxide, Trans and Hard Ore	**kt**	**409**	**635**	**575**	**758**	**1378**	**1644**	**1469**	**1349**	**1462**	**1581**	**1364**	**1493**	**1555**	**1386**	**1110**	**915**	**19083**
Ore grade	kt	2.00	2.11	1.62	1.33	1.56	1.45	1.27	1.85	1.63	1.85	1.30	1.21	1.32	1.65	1.41	1.70	1.54
Waste Mined	kt	**4,518**	**4,306**	**8,276**	**8,833**	**8,705**	**9,914**	**12,000**	**12,712**	**18,248**	**18,183**	**18,346**	**16,940**	**13,562**	**12,888**	**13,176**	**1,102**	**181,708**
Ore & Waste	**kt**	**4,927**	**4,941**	**8,851**	**9,590**	**10,083**	**11,558**	**13,469**	**14,060**	**19,710**	**19,764**	**19,710**	**18,432**	**15,117**	**14,274**	**14,286**	**2,017**	**200,791**
SR (w/o)		**11.04**	**6.79**	**14.38**	**11.66**	**6.32**	**6.03**	**8.17**	**9.42**	**12.48**	**11.5**	**13.45**	**11.35**	**8.72**	**9.3**	**11.87**	**1.2**	**9.52**

1.10 Mineral Process and Metallurgical Testing

The process plant treatment philosophy is that all material above the cut-off grade is treated as ore to be processed through the plant. The ore processing circuit comprises crushing, grinding and gravity and concentration, followed by Carbon-in-Leach (CIL) processing on the gravity circuit. The process plant will operate on a 24-hour per day 7-day per week schedule. General arrangement of the ROM pad, crushing and processing facilities is shown in Appendix 32.2.

The process design for the Buckreef Project is based on extensive metallurgical test-work. Results from the work have established that high gold recoveries can be achieved with a conventional process of comminution (using the latest EDS system as a replacement for the conventional ball & roller mill circuit), gravity concentrate, flotation and leaching circuit.

The mine is estimated to produce sufficient ore to maintain an initial process plant feed scheduled at 60tph (Yr1-Yr2) with upgrades to 120tph (Yr3) and 180tph (Yr4 onwards). Targeted ore production during commercial production is 1,497,000 tonnes per year LOM.

Overall recoveries from the flotation and cyanide leach circuits are expected to be 92% and 85% for primary oxide and sulphide ores respectively.

Past and current processing analyses have shown no evidence of any deleterious elements such as arsenic, mercury, or antimony that would otherwise affect gold recovery in the leach circuit, however, copper in the leach circuit solution may occasionally be encountered.

1.11 Capital and Operating Cost Estimates

1.11.1 Capital Costs

The capital cost estimate for the Buckreef project includes all earthmoving equipment required for the mining of ore and waste, supply and commissioning of processing plant, construction of the tailings storage facility, and other support infrastructure to support a 1.5Mtpa gold operation. The capital estimates presented in the study include for the supply installation and commissioning of the defined production asset. Capital costs for the project will be phased as production facilities are ramped up over a period of say three years. Estimate capital costs for the Buckreef Project are put at US$76,5 million including projected sustaining capital costs over the life of the project. The capital costs estimates are summarised in Table 1.7. The project sustaining costs are estimated to USD22.95 million over the life of the project.

Table 1.7: Buckreef Project Life of Mine Estimate Capital Costs

Item	Description	Amount
1	Mining Equipment (Fleet)	20,629,924
2	Processing Plant	40,277,625
3	Human Resources & Community	4,665,000
4	HSE	175,000
5	Finance + IT	774,913
6	Contingency 15%	9,978,369
7	Total	76,500,831

In addition, the cost of mine closure and remediation is estimated to be $4.5 million (per the existing accepted Closure Plan). These estimates have an accuracy of ±15% with a base date as of the effective date of this Technical Report.

In addition to the initial capital outlay a total of US$4.5 million has been estimated as the mine closure costs estimate. This sum is projected to be spent in the last year of production for the removal of mining and processing equipment and demolition of unwanted infrastructure. The general philosophy of the closure plan is to have progressive rehabilitation during the operation of the mine with some of the costs catered for in the operation of the mine. The pit excavations will be designed with a future use as water storage facilities for irrigation or fishing project.

1.11.2 Operating Costs

The operating costs estimates have been estimated on the basis of inclusion of all recurring costs for labour, service contractors, mine operation maintenance parts and supplies, consumables supplies, freight transport etc to operate the facilities as described in the update study. Operating costs is defined as any recurring expenditure which can be expensed in the tax year in which it is incurred.

The average operating cost estimate for the project operation over the LOM is summarized in Table 1.8 which is calculated based on the cost per ton of ore mined and processed at the Project.

Table 1.8: Buckreef Project Life of Mine Estimate Capital Costs

Item	Description	Unit	Rate $/t
1	Mining Drilling and Blasting Waste	$/t	0.62
2	Mining Drilling and Blasting Ore	$/t	0.76
3	Load and Haul Ore	$/t	1.13
4	Load and Haul waste	$/t	1.03
5	Overhaul rate	$/t/km	0.08
6	Mine Rehabilitation (Pits & Dumps)	$/t	0.03
7	Processing Cost (per Tonne Milled)	$/t	10.24
8	Unit Cost G&A	$/t	1.98
9	Power Supply	$/t	1.29

1.12 Project Economics

The results of the Buckreef Project's economic analysis based on mining the identified open-pit Mineral Reserve, indicate a positive after-tax Net Present Value (NPV) of $130.96 million at a discount rate of 5% and an Internal Rate of Return (IRR) of 74% as summarized in Table 1.9.

Table 1.9: Results of the After-tax Financial Analysis of the Buckreef Gold Project

Item	Description	Units	Amount
1	**Mining Profile**		
1.1	Mineral Reserves (Prove +Probable)	Mt	19.202
1.3	In situ Grade	g/t	1.54
1.4	Waste in Pit Shell	Mt	181
1.5	Mine Dilution	%	5
2.4	Stripping Ratio in Area 1	waste/ore	9.54
2	**Processing**		
2.1	Annual Ore Milling	Mtpa	1.497
2.1.1	Year 1-2	Mtpa	0.486
2.1.2.	Year 3-4	Mtpa	0.972
2.1.3	Year 4-16	Mtpa	1.497
2.2	Life of Mine in Years	Years	16
2.3	**Gold Production**		
2.3.1	Average Gold Production per year	(oz)	51,000
2.3.2	Total Gold Production (LoM)	(oz)	822,000
3	**Capital Expenditure**		
3.1	Start-up Capital Plant etc	USD$ M	76.50
3.2	Sustaining capital costs	USD$ M	22.95
3.3	Closure Costs (in Opex)	USD$M	4.50
4	**Financial Modelling Result**		
4.1	Average LoM Cash Costs	USD$/oz	735
4.2	After Tax NPV @ 5% pa	USD$M	130.96
4.3	After Tax IRR	%	74

1.13 Conclusions

This update study indicates that the Buckreef Gold Project based on the estimated Proven and Probable Mineral Reserves (Open Pit quantities) of 19.0MT grading at 1.5g/t can support a 1.497Mtpa mine for a period of 16years. The ore material will be mined from the four open pits and then sent for processing at a plant located at Buckreef designed to achieve gold recovery of 92.3% and 85.0% for the oxides and sulphides material respectively over the life of the project. Over the estimated life of the mine of 16 years approximately 822koz of gold is expected to be produced.

Based on owner mining philosophy the project initial capital outlay for the earthmoving equipment and processing equipment and related infrastructure it was estimated that the project will require US$76,5 million capital outlay with sustaining costs of $22.95 million over the life of the project. The life of mine average cash operating cost is estimated at US$735/oz Au.

The after-tax Project NPV is estimated to be $130.96 M at a rate of 5% per annum and an internal rate of return of 74%. The simple payback period of the Project is estimated at 4years.

Based on the information availed to Virimai Projects and the degree of exploration work carried out at Buckreef as of the effective date of this Report it is Virimai Projects' opinion that Buckreef has mineral reserves sufficient to support an open pit operation processing 1.5Mt of ore over the period of say 16 years

Virimai Projects' conclusion, based on the work performed and presented herein is that the Buckreef Gold Project is likely to be both economically and technically feasible. Virimai Projects has reviewed the underlying assumptions to the geologic, resource, reserve and economic models and is satisfied with their suitability for use.

1.14 Recommendations

The following recommendations are made considering the results of the prefeasibility study and the project risk identified. Virimai Projects recommends progression to the next level of study that includes further drilling and other studies aimed at completing the characterisation of the Buckreef Project in preparation of detailed engineering design. The work program suggested includes for the following:

- Additional drilling to upgrade the inferred resource to indicated or measured.
- Pilot processing plant
- Continued analysis for owner mining and contract mining.
- Continuation of geotechnical investigation to optimize on the pit slopes
- Continuation of hydro geological studies to feed into the pit slope studies.

2. INTRODUCTION

Buckreef Gold Project ("Buckreef") is an advanced exploration gold project which comprise of four gold deposits namely Buckreef, Eastern Porphyry, Tembo and Bwinga all within 4km of each other. Buckreef deposit is the major deposit of the area. The gold project is located in the Geita District in Tanzania East Africa. Tanzanian Royalty Exploration Corporation (TRX) a Canadian Listed company won 55% interest in the Buckreef Project with the other remaining 45% held by State Mining Corporation of Tanzania (Stamico) in 2010.

The Updated Independent Technical Mining Reserve Estimate and Economic Pre-Feasibility Study of the Buckreef discussed in this Technical Report have been prepared by Virimai Projects at the request of TRX. The study was prepared and compiled by Virimai Projects of Harare Zimbabwe and other specialised consultants fully defined in this report. This Technical report was prepared in accordance with the guidelines set out in the National Instruments 43 -101 Standards of Disclosure for Mineral Projects (NI43 -101). The main intent of this study is to provide a technical and economic review of the potential mining operations based on Buckreef's most recent mineral resource estimate and other project definition activities such as metallurgical test work. The mineral resources used in the study are based on the Preliminary Economic Assessment (PEA) and the 2014 Technical Mineral Resource Update Report (ITR) both compiled and published by Venmyn Deloitte. The Amended Pre-Feasibility study is based on the development of an open pit mining operation feeding a processing plant to recover gold mineralisation. The processing will have a daily capacity at steady state of 1.5Mt per year. All monetary units used in this study are in USD Dollars unless otherwise specified.

2.1 Scope of Study

The following Technical Report ("the Update Report") presents the results of the amended pre-feasibility study for the development of the Buckreef Gold Project in Geita District in Tanzania East Africa. In 2017 TRX commissioned a Virimai Projects engineering consultancy and other specialist metallurgical consultancy companies to carry out the study. This study was prepared at the request of Mr Jeffrey Duval president of TRX. TRX is a Canadian publicly traded company listed on the Toronto Stock Exchange (TSX) under the trading symbol TRX with its head office situated at:

Tanzanian Royalty Exploration Corporation
82 Richmond Street West
Suite 208
Toronto ON
Canada N5C 1P1

This report titled **"**Amended NI43-101 Independent Technical Mineral Reserve Estimate and Pre-Feasibility Study on the Buckreef Gold Mine Project, Tanzania, East Africa**"** was prepared by two

Qualified Persons namely; Frank Crundwell and Wenceslaus Kutekwatekwa, following the guidelines of the NI43-101. Frank Crundwell was responsible for Item 13 (“Mineral Processing and Metallurgical Testing”) and Item17 (“Recovery methods”), while Wenceslaus Kutekwatekwa was the supervising QP responsible all sections of this Technical Report.

2.2 Effective Dates and Declaration

This Technical Report titled “Amended Independent Technical Mining Reserves Estimate and Economic Pre-feasibility Study on the Buckreef Gold Mine Project, Tanzania, East Africa” is considered effective as on the 26th June 2018. Virimai Projects’ opinion contained herein is based on information collected by Virimai Projects and TRX throughout the course of their investigations, which in turn reflects various technical and economic conditions at the time of writing. Given the nature of the mining business, these conditions can change significantly over relatively short periods of time. Consequently, actual results may be significantly more or less favourable.

This Report may include technical information which requires subsequent calculations to derive subtotals, totals and weighted averages. Such calculations inherently involve some degree of rounding and, consequently, introduce some margin of error. Where this occurs, Virimai Projects does not consider it to be material.

2.3 Terms of Reference

This report titled, “Amended NATIONAL INSTRUMENT 43-101 Independent Technical Mining Reserve Estimate and Pre-Feasibility Study on the Buckreef Gold Mine Project, Tanzania, East Africa” (the “Technical Report”) was prepared to provide Tanzam2000 Pvt. Limited (Tanzam) Company with an independent Canadian National Instrument 43-101 “Standards of Disclosure for Mineral Projects” (NI43-101) Pit-design optimized Mining Reserve Estimate and Economic Valuation Technical Report as an upgrade of the results of the 2012 Preliminary Economic Assessment (PEA) and the 2014 Technical Mineral Resource Update Report (ITR) both compiled and published by Venmyn Deloitte.

Tanzam2000 is a Tanzanian-based 100% wholly owned subsidiary of TSX listed Tanzanian Royalty Exploration Corporation (TRX), a gold exploration company that co-owns and operates Buckreef Gold Mine Re-Development Project in Central Tanzania, East Africa.

Venmyn Deloitte (Pty) Limited “Venymn Deloitte” was previously contracted by TRX and completed a Preliminary Economic Assessment (PEA) on Buckreef Gold Mine Re-development Project (Buckreef Project of the Project) in Tanzania in 2012. The results of the PEA were reported in a NI43-101 Independent Technical Report (ITR) (VIP 21 August 2012).

Further to this, Venmyn Deloitte was again commissioned by Tanzam2000, a subsidiary to Tanzanian Royalty Exploration Corporation, to produce a second independent NI43-101 compliant report titled

"Independent Technical Memorandum on the Mineral Resource Estimate for Tanzanian Royalty Exploration Corporation's Buckreef Project in Tanzania" subsequently published as ITR V119R of 30th April 2014. Newly identified mineralization was identified in various deposit extensions were evaluated and led to an increase the Mineral Resource base of the Buckreef Project. Both reports are posted on SEDAR.

In October 2016, TRX, through its subsidiary, Tanzam2000, commissioned MaSS Resources Limited of Tanzania, to produce an internal and independent optimized mine plan using proven methods that provide production surety. The study was therefore expected to effectively encompass the following aspects:

- Estimation of mineral reserves
- Mining method analysis and selection
- Development and production scheduling with specialized mining software
- Optimization of production rate and sequencing
- Estimation of equipment and manpower requirements
- Mining logistics and infrastructure design
- Capital and operating cost estimation
- Benchmarking against current operations
- Financial analysis modeling &
- Identification of opportunities, risks and risk mitigation.

The subsequent report was published on SEDAR on May 4, 2017. On publication of the report, by MaSS, entitled "Updated Independent Technical Mining Reserve Estimate and Economic Feasibility Study on the Buckreef Gold Mine Project, Tanzania, East Africa", the Ontario Securities Commission (OSC) conducted a routine review of the MaSS report's contents and raised some queries that necessitated a review of the original report compiled by MaSS. Virimai Projects, from Zimbabwe, was then commissioned by Tanzam2000, to carry out an in-depth review of the original report by MaSS with the objective of amending and recompiling the ITR in compliance with NI43-101. Virimai Projects' Consulting Director, Wenceslaus Kutekwatekwa (FSAIMM) is the Qualified Persons (QP) under the terms specified under of NI43-101.

The purpose of this Technical Report is to deliver a pit optimized Mineral Reserve estimate and projected mineral economics and financial analysis for the proposed open-pit gold mining and ore processing operations at Buckreef. The effective date for this Technical Report is June 26, 2018.

In addition to site visits, Virimai Projects held multiple discussions with technical personnel from the Company regarding all pertinent aspects of the project and carried out a review of available literature and historical documented reports and results on the property.

The reader is referred to those data sources, which are outlined in the References section of this report, for further detail. TRX's goal for this study is to maximize the underlying value of the mineral resource by employing the correct project concepts, in alignment with its corporate goals and development strategies.

The Buckreef Gold Mine Project is comprised of Buckreef Special Mining License Area (SML04/1992) which currently encompasses four (4) gold deposits namely, the Buckreef Prospect, the Eastern Porphyry Prospect, the Bingwa Prospect and the Tembo Prospect (Figure 4.1). This ITR was prepared by MaSS Resources Limited at the request of Peter Tererai Zizhou, General Manager (Operations) for Buckreef Gold Company Limited and amended by Virimai Projects.

The purpose of the Technical Report is to provide independent Mineral Resource and Mineral Reserve estimates of the gold mineralization present at the Project, in conformance with the Standards required by NI 43-101 and Form 43-101F1 as at June 26, 2018.

2.4 Sources of Information

This Technical Report is based in part on various internal company reports, maps, published reports and public information as fully listed in Section 27 "References" of this report. Sections from reports authored by other specialist consultants who have been directly quoted or summarised in this report are indicated in Section 2.1 of this report. It should be noted that the authors of this report have made use of selected portions from material contained in the following NI43 101 Compliant Technical Report "Update National Instrument 43-101, Independent Technical Report on the Buckreef Project in Tanzania for Tanzanian Royalty Exploration Corporation" dated 24th February 2014 by Venmyn Deloitte. This report is publicly available on SEDAR (www.sedar.com)

This Study has been completed using the previously mentioned Technical Report as well as available information contained in, but not limited to, the following reports, documents and discussions:

- Technical discussions with Buckreef personnel
- Personal inspection of the Buckreef Gold Project property
- RSG Global, - Metallurgical Test-work Review and Recommendations for the Buckreef Project, July 2004;
- Metallurgical Project Consultants Pty Limited, - Phase 2 Metallurgical Test-work Summary, February 2007;
- Historic exploration information from previous holders of the exploration rights, IAMGOLD Corporation (IAMGOLD), which surrendered the rights and exploration information to the Tanzanian government in 2009. The historic information is in the possession of TRX by virtue of the joint venture with Stamico;
- In-house exploration results from surveys undertaken by IAMGOLD in the course of its tenure;
- Published Venmyn independent specialist studies commissioned by TRX for the 2012 PEA and

- Published Venmyn independent technical Sound Mining (SMS), Buckreef Gold Project Mining Study, - Preliminary Economic Assessment, January 2012;
- Venmyn Independent Projects (Pty) Limited, - National Instrument 43-101 Preliminary Economic Assessment of Tanzania Royalty Exploration Corporation's Buckreef Gold Mine, Re-development Project in Tanzania, May 31st, 2012;
- ENATA LTD, - Environmental Impact Assessment for Gold Mining Project at Mnekezi Village in Geita District, Geita Region, Tanzania; February 2014;
- Venmyn Deloitte, - Update National Instrument 43-101, Independent Technical Report on the Buckreef Project in Tanzania for Tanzanian Royalty Exploration Corporation; February 24th, 2014
- Internal Buckreef unpublished reports received from Buckreef staff and additional information from the public domain

Virimai Projects are of the opinion that the basic assumptions contained in the information above are factual and accurate and that the interpretations are reasonable. Virimai Projects has relied on the data and has no reason to believe that any material facts have been withheld. Virimai Projects also has no reason to doubt the reliability of the information used to evaluate the mineral resource presented herein.

2.5 Site Visit

Virimai Projects representatives conducted a week-long site visit to Buckreef from the 13th April 2018 to 21st April 2018. Virimai Projects team comprised Messrs Arimon Ngilazi a geologist, Wenceslaus Kutekwatekwa, Wonder Mutematsaka and Clarence Ndunguru, all mining engineers. The purpose of the visit was to provide the project team members with a general overview of the Buckreef Gold Project property and review the current development milestones and planning that had taken place. Buckreef staff was at hand to provide a tour of the four properties of Buckreef Gold Project and give a background of the historical, geological setting of the gold project. During this period the team reviewed the core storage facilities and also had a chance to review the geological data.

2.6 Acknowledgement

Virimai Projects would like to extend their gratitude and acknowledge the support provided by Buckreef staff during their visit to the project. The project team greatly benefited from the collaboration and input from Mr Peter Zizhou the General Manager of Tazam2000 and his staff. Further the team had two meetings with consultant team members from MaSS Resources of Mwanza who were involved in compiling some of the internal reports of Tanzam2000. The contributions of these team members are gratefully acknowledged.

3. RELIANCE ON OTHER EXPERTS

3.1 Report Responsibility and Qualified Persons

Virimai Projects prepared this Technical Report using the reports and documents noted in Section 27 Reference of this report. Virimai Projects has not performed an independent verification of the land title and tenure as summarised in Section 4 of this report. Virimai Projects did not verify the legality of any underlying agreements that may exist concerning the permits or other agreements between third parties but has relied upon the undertaking made by TRX. Any of the opinions expressed in this study are given in good faith and in the belief that such statements or opinion are not also and misleading at the date of this Report. Virimai Projects is not aware of any known litigation potentially affecting the Buckreef Gold Project.

The estimates are based on a certain number of drill holes and samples, and on assumptions and parameters currently available as stated in this report. The level of confidence in the estimates depend upon a number of uncertainties. These uncertainties include but are not limited to: future changes in gold price and/or production costs, differences in size, grade and recovery rates from those expected, and changes in project parameters. In addition, there is no assurance that the project implementation will be carried out in the stated time frame.

4. PROPERTY DESCRIPTION AND LOCATION

The Buckreef Gold Project is a description of four gold prospects which are namely Buckreef, Eastern Porphyry Tembo and Bingwa located in the Mnekezi Village in Geita District in north-central Tanzania. The project area is located 40km south west of the town of Geita, which in turn is approximately 110km south-west of the second largest city Mwanza (Figure 4.1).

The area is fully located by the following Geographical co-ordinates:

- Latitude 03° 5′ 27.69″ S Longitude 032o 1′ 20.65″ E (ARC 1960 UTM Zone 36m: Latitude 391,367.93mE; Longitude 9,658,326.9mN)

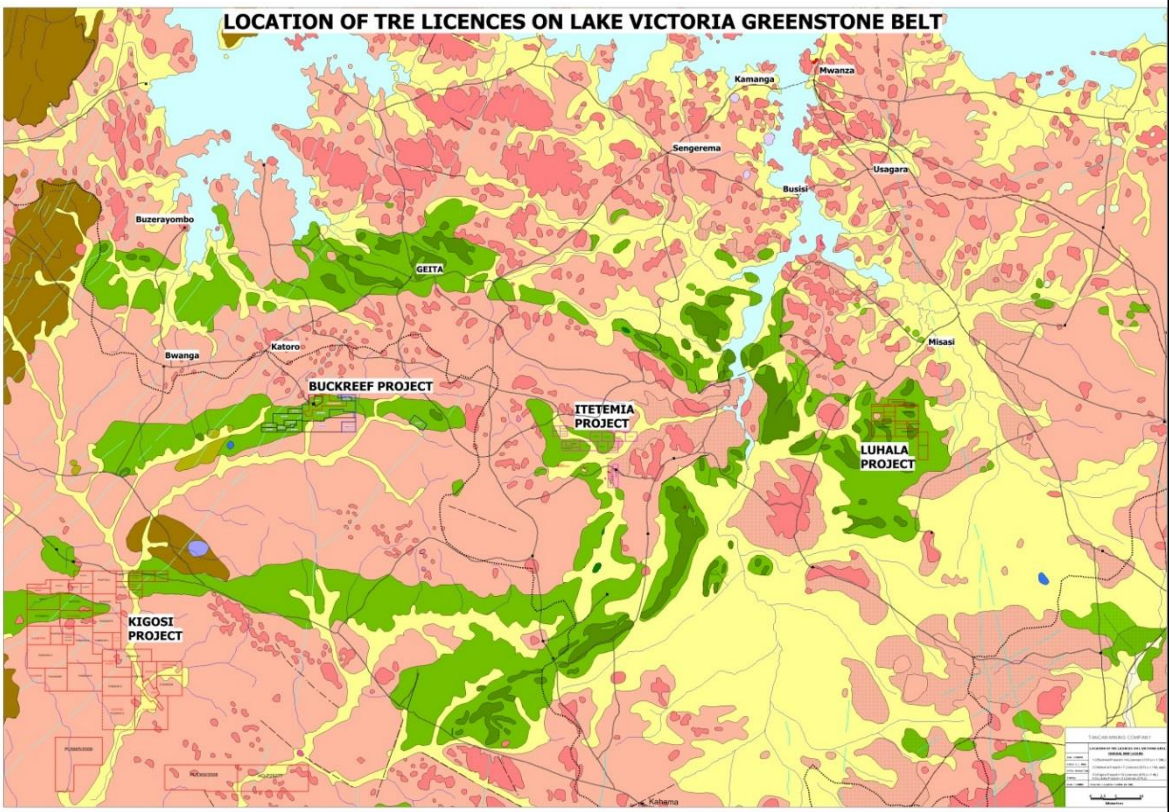


Figure 4.1: Location of the Buckreef Gold Project, Gieta District Tanzania

4.1 Mineral Tenure

The Buckreef Gold Project is a gold exploration project comprises, a single Special Mining License covering an area of 16.04km2 and 12 Prospecting Licenses covering 98.19km2 (Figure 4.2).

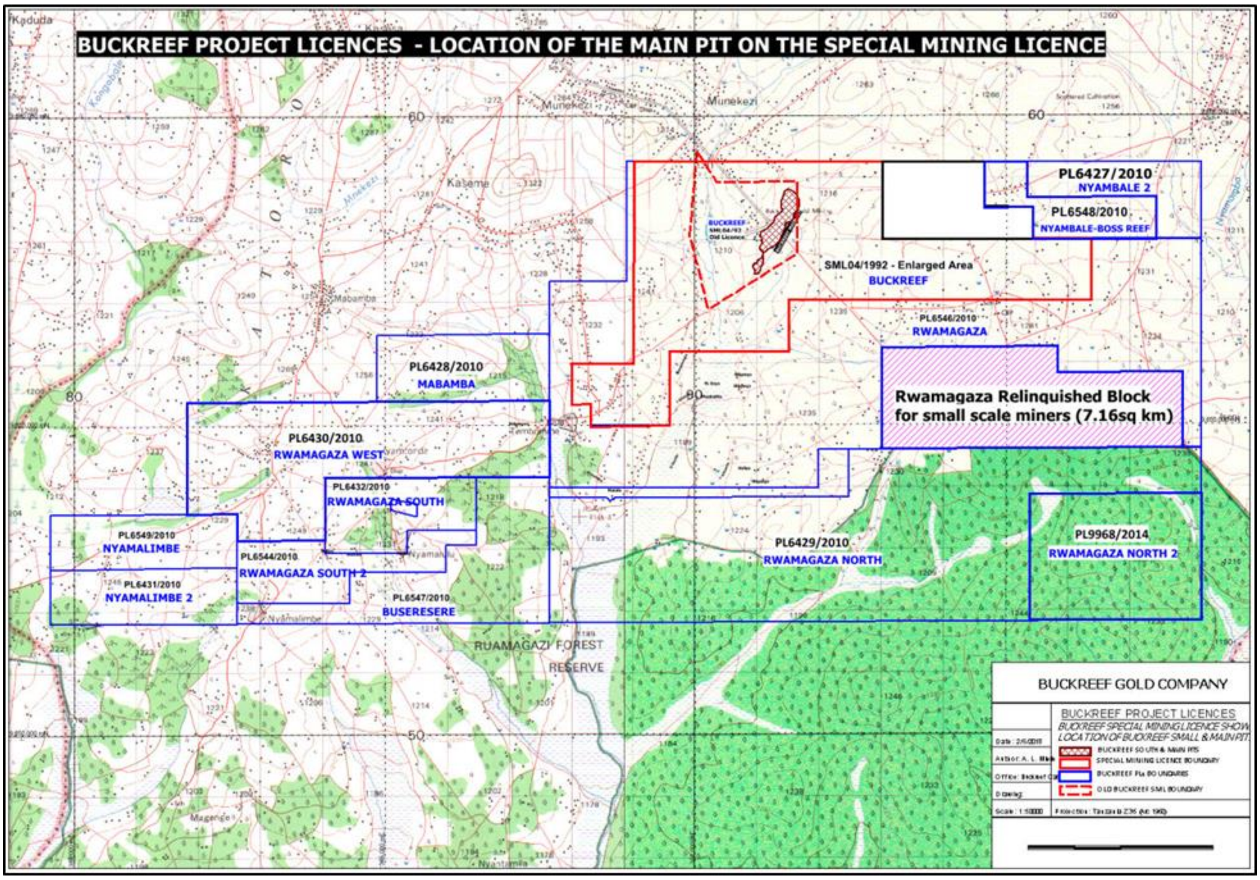


Figure 4.2: Buckreef Gold Project, TRX License Holdings, Geita District, Tanzania

The current Mineral Resources and Mineral Reserves for the Buckreef Gold project are declared over Special Mining License block SML04/1992.

In March 2017, the Buckreef gold special mining license (SML04/92) which covers an area of 16.04km^2, was successfully renewed for a further 10 years to 16th June 2027. The licenses are operated by Buckreef Gold Company Limited, the Tanzam2000 (a subsidiary company of Tanzanian Royalty Exploration).

4.2 Mining Rights in Tanzania

4.2.1 Basis for Mineral Title

The state owns title to all mineral resources in The Republic of Tanzania. All permits conferring rights to explore and extract mineral resources are granted by the Minister of Energy and Minerals, ("MEM") in terms of the Tanzania 2010 Mining Act. The Mining Act serves as the legal framework governing mining in the Tanzania.

4.2.2 Exploration Permits (Rights and Obligation)

The Ministry of Energy and Minerals (MEM) is responsible for guiding the development of the mining industry in Tanzania through the Mineral Division. The Tanzanian Mining Act, 2010, the Explosives

Act, 1963, and the Mining (Mineral Rights) Regulations, 2010, regulate the law relating to prospecting and exploiting minerals, including granting, renewals, royalties, fees and other charges.
Mineral property and control over minerals is vested in The United Republic of Tanzania. Only companies incorporated in Tanzania may hold mineral rights in Tanzania; however, exploration and mining is open to foreign concerns. Royalties are charged on gross value which for precious metals is 6% and district council where a gold mine is located is entitled to collect a 0.3% on the revenues from gold production as service levy. There is no mandatory participation by the State although joint ventures with local companies are encouraged

Mineral rights under the Mining Act include Prospecting Licenses (PL), Retention Licenses (RL), Special Mining Licenses (SML), Mining Licenses (ML), Processing Licenses, Smelting Licenses and Refining Licenses. The prospecting license is granted for an initial period of 4 years. Upon 1st renewal, if the area is greater than 20 sq. km then 50% must be relinquished and the license is then valid for a further 3 years. Upon second renewal, if the license is greater than 20sq km then 50% must be relinquished and the license is then valid for a further 2 years. Mining Licenses are granted for an initial period of 10 years for medium scale mining operations with a capital investment between US$100,000 and US$100 million and are renewable. An Environmental Certificate issued by the National Environment Management Council (NEMC) is a prerequisite to the granting of a Mining License.

Special Mining Licenses (SML) are granted for large scale mining operations with a capital investment of more than US$100 million and are valid for the estimated mine life determined in the Feasibility Study (FS). Holders of special mining licenses may enter into a Mining Development Agreement (MDA) with the Government which is subject to review every five years and at the renewal of the mineral right.

MDAs can guarantee fiscal stability for a long-term mining project, cover environmental matters which are project specific and not covered by the Mining Regulations, requirements for the procurement of goods and services available in Tanzania and the employment and training of citizens of Tanzania and the terms of State participation in long-term mining projects.

4.2.3 Project Mining Permits

The Buckreef Project comprises four gold deposits, namely Buckreef (North, Main & South), Bingwa, Eastern Porphyry and Tembo all located within a single Special Mining License, SML04/1992 (Figure 4.2). Geographical co-ordinates for each respective deposit are:

- Buckreef North: Latitude 03° 5′ 27.69″ S Longitude 032o 1′ 20.65″ E (ARC 1960 UTM Zone 36m: Latitude 391,367.93mE; Longitude 9,658,326.9mN)

- Buckreef Main: Latitude 03° 5′ 27.69″ S Longitude 032o 1′ 20.65″ E (ARC 1960 UTM Zone 36m: Latitude 391,367.93mE; Longitude 9,658,326.9mN)
- Buckreef South: Latitude 03° 5′ 27.69″ S Longitude 032o 1′ 20.65″ E (ARC 1960 UTM Zone 36m: Latitude 391,367.93mE; Longitude 9,658,326.9mN)
- Bingwa: Latitude 03° 5′ 27.69″ S Longitude 032o 1′ 20.65″ E (ARC 1960 UTM Zone 36m: Latitude 391,367.93mE; Longitude 9,658,326.9mN)
- Eastern Porphyry: Latitude 03° 5′ 27.69″ S Longitude 032o 1′ 20.65″ E (ARC 1960 UTM Zone 36m: Latitude 391,367.93mE; Longitude 9,658,326.9mN) &
- Tembo: Latitude 03° 5′ 27.69″ S Longitude 032o 1′ 20.65″ E (ARC 1960 UTM Zone 36m: Latitude 391,367.93mE; Longitude 9,658,326.9mN).

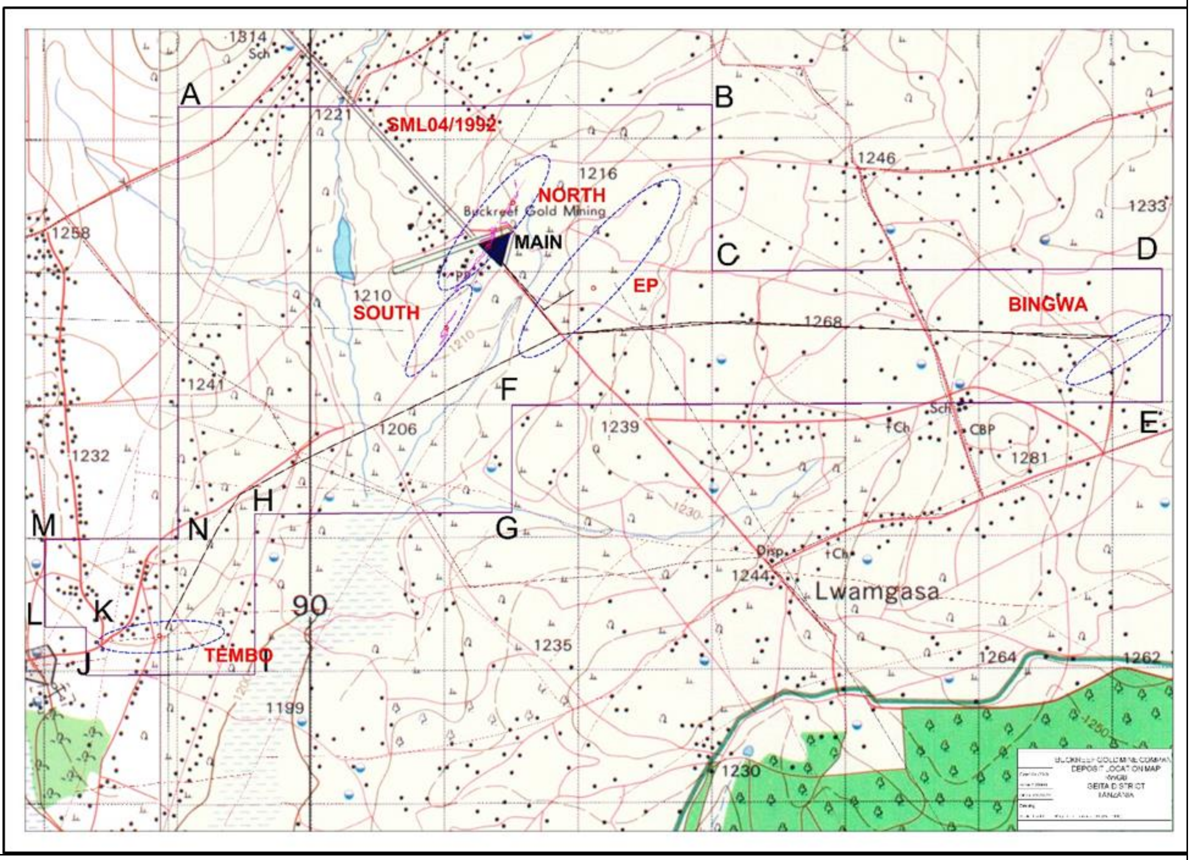


Figure 4.2 Buckreef Project: Deposit Locality within Special Mining License Boundaries, Geita District

The boundaries of the mining lease (SML04/1992) have been surveyed, whereas the boundaries of other, un-surveyed prospecting licenses are sourced from the Tanzanian Ministry of Energy and Minerals license maps.

4.2.4 Underlying Agreements

The Buckreef Gold Project is a gold exploration project which was originally held by IAMGOLD prior to July 2009. The "Agreement to Redevelop the Buckreef Gold Mine (ARBGM) between IAMGOLD and the Ministry for Energy and Minerals included at that point, a single Special Mining License and 12 Prospecting Licenses covering 98.19km2.

In July 2010, IAMGOLD applied to surrender all licenses relating to the ARBGM, effective 25 October 2009, and the Commissioner for Minerals withdrew all license applications relating to the ARBGM. In 2010, TRX was invited by STAMICO on behalf of the Ministry of Energy and Minerals, to tender for the opportunity to negotiate a joint venture agreement with respect to the Buckreef Gold Project.

TRX was awarded the tender, as confirmed in a letter from the Director General of STAMICO dated 16 December 2010. In October 2011, TANZAM2000, a 100% owned subsidiary of TRX signed a joint venture agreement with STAMICO with regards to the Buckreef Gold Project. Through this JV agreement, a Tanzanian registered JV company, Buckreef Gold Company Limited, was formed with an equity holding of 55% Tanzam2000 and 45% STAMICO. In terms of the agreement, TRX through its subsidiary, Tanzam2000 will manage the Buckreef Project and is responsible for providing exploration and mine development financing. TRX expects that the project to be financed through debt or a combination of debt and equity. Net profits will be divided in accordance with the parties' ownership interests after payment of all project expenses including debt service.

4.2.5 Environmental Considerations

TRX initiated an environmental study of the Buckreef project area in 2012 by commissioning ENATA to undertake a preliminary socio- environmental study. As a result of the socio-environmental studies that were undertaken during the period 2004 to 2014 Buckreef was issued with an EIA certificate in terms of the Environmental Management Act No 20 of 2004 in May 2014 which is valid for the life of the mining project. The EIA certificate was issued with four main conditions which included the following:

1) Installation of deep and shallow groundwater monitoring borehole around the waste rock dumps and the tailings storage facilities.
2) Installation of wall monitoring systems for the tailings dam facility to check for any likely movement of the walls.
3) Maintain a data base of the current and previous data on air, dust and noise levels in the Buckreef area.
4) Install water quality monitoring systems for the Nyamazovu River and Dam.
5) Carry out annual environmental audits of the mining area for submission to the EMA.

5. ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 Accessibility

The Buckreef Project is situated in the Geita district, approximately 110km southwest of Mwanza. The hinterland northwest of Dar es Salaam is connected by a poorly maintained bitumen road, unreliable train service and several daily commercial flights. Mwanza is the nearest major population centre to the project, approximately 60km northeast of Buckreef, and is the second largest city in Tanzania with a population of one million people.

Access to the project area is via ferry from Mwanza across Smith’s Sound, then via sealed road through the township of Geita. Alternative access is via sealed road through Shinyanga and Kahama, and subsequently via gravel road north to Bulyanhulu and then west to Nyarugusu.

The project can also be accessed by scheduled light aircraft flights (Coastal Air Services) from Mwanza to the airstrips located at Bulyanhulu or Geita Gold Mines, or more directly by charter to the bush airstrips located at Buckreef Mine or Nyarugusu Village. Access to the project area can be hampered in the rainy season

The project site itself lies 15 km south-east of Katoro Township on a series of unpaved roads. Within the project area, access is via local tracks and paths which are suitable for two-wheel drive vehicles in the dry season and four-wheel drive vehicles in the wet season.

5.2 Climate, physiography, local resources & infrastructure

5.2.1 Climate

In the project area, the wet season is overcast, the dry season is partly cloudy, and it is warm year-round. Over the course of the year, the temperature typically varies from 13°C to 30°C and is rarely below 11°C or above 32°C (Figure 5.1).

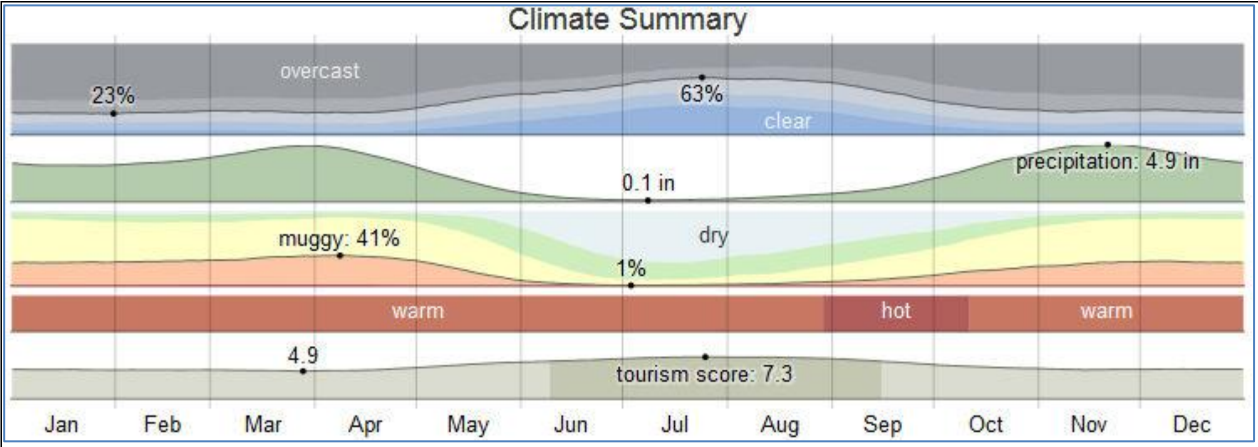


Figure 5.1 Buckreef Project, Summary of Average Climatic Conditions, Geita district; Tanzania

The project experiences a temperate climate, with sub-humid moderate temperatures all year round. The mean annual rainfall is 1,264 millimetres (mm) (Veiga, 2004) and the Geita District has a bi-modal summer rainfall distribution, with two main rainy seasons: one from November to December and the other from February to May.

The period from June to August is usually dry. The rain occurs as localized storms rather than in a generalized downpour and runoff from the upland ridge and hardpan ferricrete areas on BRMA is very high (Figure 5.2). The run-off generates rapid response stream-flow and sheet-flow. The water table varies markedly from season to season which can influence drilling conditions. Consequently, the dry season, occurring between May and September is preferable for drilling programs and field operations. During the wet seasons, access is limited across black cotton soils. River drainages are impassable in the wet season without suitable bridge construction.

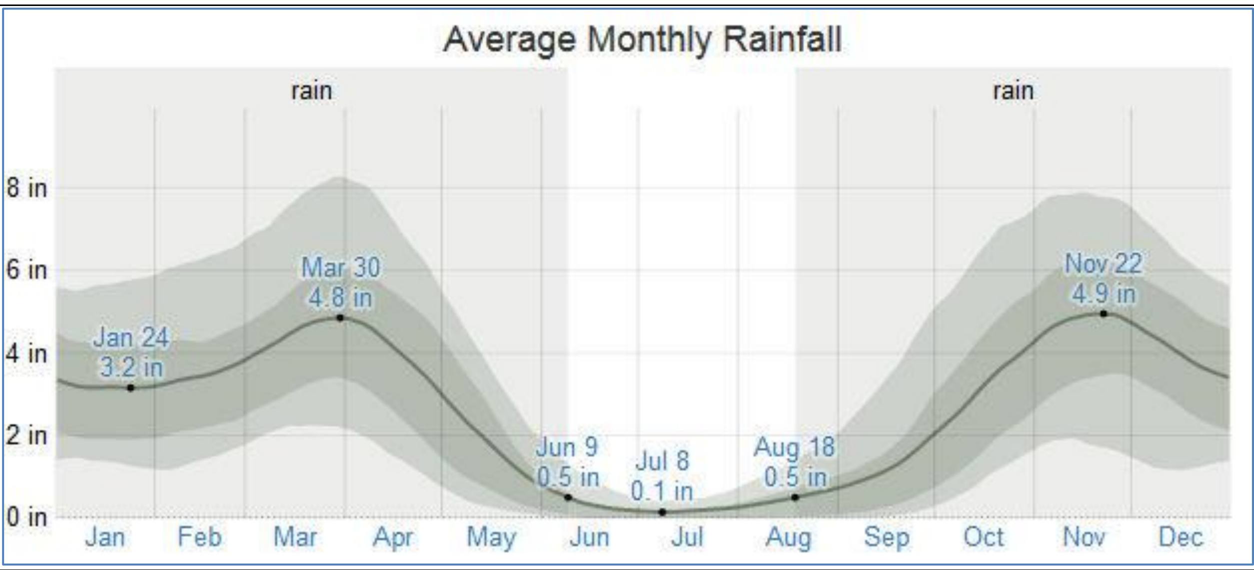


Figure 5.2 Buckreef Project, Summary of Average Annual Rainfall Patterns, Geita district; Tanzania

The annual minimum and maximum temperatures for Geita range between 14°C and 30°C. September is the warmest month with an average temperature of 29.2°C at noon, while July is coldest with an average temperature of 14.6°C at night (Figure 5.3). The area has no distinct temperature seasons and the temperature is relatively constant during the year. July is on average the month with most sunshine (Henning, 2011). The proposed project area is regarded as humid and the climate is classified as a tropical savannah (winter dry season), with a subtropical moist forest bio-zone (Henning, 2011).

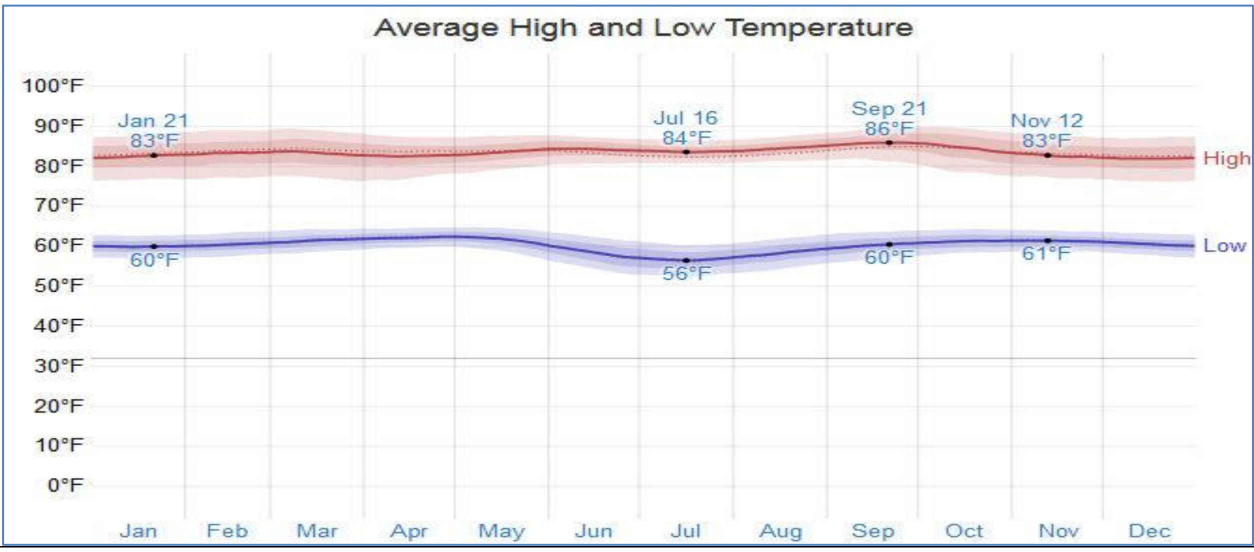


Figure 5.3 Buckreef Project, Summary of Average Annual Temperature conditions, Geita district; Tanzania

The climate in the Buckreef Project area is a major determinant of the geographical distribution of plant species and vegetation types. Local conditions of temperature, light, humidity and moisture vary greatly and the project design must accommodate this local climate variation to ensure that erosion is avoided, sensitive species or habitats are not destroyed, and material stockpiles are not damaged by meteorological events.

5.2.2 Physiography

The average attitude of the Geita district ranges between 1,300 to 1,100 meters above sea level (m.a.s.l). The Geita district is characterized by hilly topography in the north, west and parts of the south west, with a gentle slope towards the south and southeast (Figure 5.4).

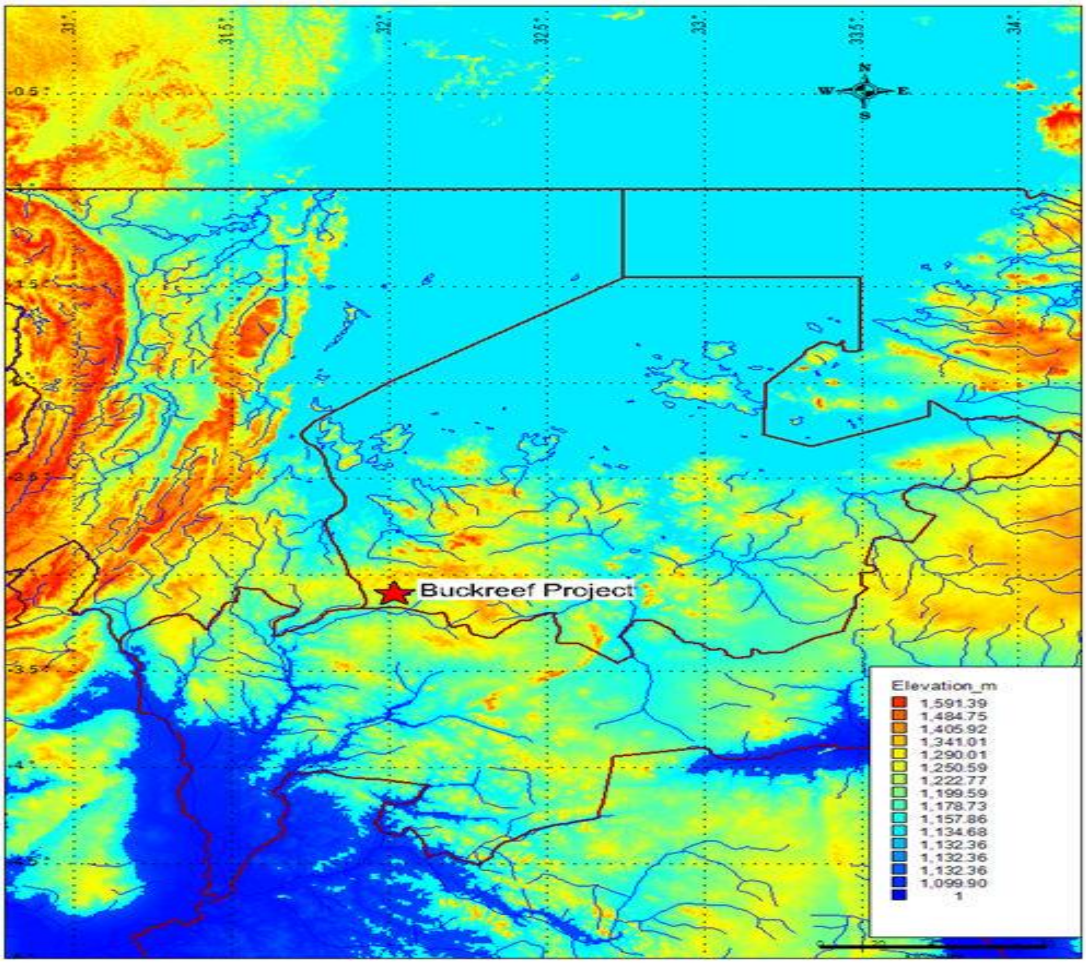


Figure 5.4 Buckreef Project: Physiographic Map of North western districts of Tanzania

There are pediments that are gently sloping towards the drainage depressions which are vulnerable to erosion, particularly where vegetation cover has been removed through cultivation, mining or overgrazing.

The Buckreef Project is dominated by very subdued terrain. Low rolling plateaus are cut by incised rivers on north, south and west sides. Major features are long ridges capped by hard iron-rich laterite ("cuirasse"). Where indigenous vegetation has not been cleared is dominated by miombo woodland.

There is one dam and one borehole at the Buckreef site at present. Water is in relatively enough supply for the current requirement and will need to be upgraded to meet mine requirement. The current supply is enough for drilling purposes, domestic use at the camp etc.

5.3 Local Resources

Geita town is an established mining community, located 45km northeast of the Buckreef Project, with a fluctuating population of approximately 2,500 people. The town was established to service AngloGold's Geita Gold Mine that has been in existence since the early 1930s.

Mining supplies, equipment, and services and a skilled mining and mineral exploration workforce are readily available in Mwanza and the mining communities in the Lake Victoria gold belt (LVG) that has a long history of mining, which helps to attract employees and contractors from throughout Africa.

The project area is densely populated with individual and/or agglomerations of dwellings related to transient artisanal gold mining activities and pastoral farming. Local small pastoral villages are poor sources of logistical support though communication in the area is provided by a modern cell phone network, which has coverage in virtually all sectors of the LVG (Figure 5.5).

5.4 Infrastructure

Buckreef is 12km from the emerging town of Katoro and 5km from Rwamgasa, aslo an emerging town both essentially based on small-scale mining and farming activities. General area infrastructure includes provincial roads, a 110kV transformer sub-station from the Tanzania Electricity Supply Company (TANESCO) grid power to Buckreef Mine, Tanzania Telecom land line and modern cellular phone coverage by several providers including Vodacom, Airtel, Halotel and Tigo.

The surface rights and area covered by the Special Mining License are sufficient for future mining operations including processing plant, open pit development, waste rock sites, tailings storage facilities and office and housing needs. The process plant will be constructed and licensed to operate at up to 180t per hour. The Company will construct sufficient accommodation on-site for all personnel and provides cafeteria services for employees housed in the Project's current onsite camp accommodation.

Geita town is the main full service community with available housing, hospital, police, fire department, potable water system, restaurants and stores. Geita town, located ~45km to the NE is linked to the emerging Katoro township by a wide tarred road and a dirt all-weather road links Katoro and Rwamagaza hamlets passing right through the Buckreef project area. Police posts are established at Katoro, Rwamagaza and Buckreef and manned by the Tanzanian Police personnel for security as well. The Buckreef Mine site is also serviced by a 1,000m gravel airstrip to provide emergency medical evacuation.

The Buckreef Mine infrastructure currently includes a defunct vertical shaft, open-pit and waste rock dump at the pilot South Pit, borehole for domestic water sources, pumps and waterlines, 110kV power sub-station, defunct heap leach pads, 10tph Carbon-in Column process plant, 200tph crusher unit with scrubbers plus mine buildings including offices and residential houses for workers. TANESCO provides electrical power to site via a single transmission line. Power and water availability are adequate for current requirements and will be upgraded to meet future mining requirements.

Fuel will be trucked in from the town of Mwanza and the district is well serviced by access roads to various operating large and medium scale mines in the district. The infrastructure surrounding the Buckreef Project area is generally poor and unpaved roads are poorly maintained rendering access during the rainy season difficult but passable.

A site drawing of the Buckreef project access road and services is shown in Figure 5.5.

Figure 5.5 Ortho-Photograph of the historical Buckreef Gold Mine Infrastructure, Looking North

In order to comply with regulations pertaining to the 500m-blast safety zone for open pit mining, some of these facilities (used during exploration and pilot mining activities), will be moved and/or demolished during planned Buckreef mining operation.

The Buckreef mine planned mining activities, facilities and infrastructure are to be located within the Special Mining Lease SML04/92 and the key components of the Project are expected to include, but not be limited to open pit mines; waste rock dumps; a central ore stockpile; a central crushing plant and mill feed storage area; a central ore milling and processing plant; water management facilities; tailings storage facility (TSF); power supply and associated infrastructure; explosives storage area; mine operation buildings; service water supply and associated infrastructure; sewage treatment; mine-site roads and parking areas; hazardous materials storage and housing ad office facilities. Detailed descriptions of these facilities are provided in Chapter 18 below.

Details for all project components will be provided in a certified closure plan to be developed following completion of the feasibility level engineering.

6. HISTORY

The Lake Victoria Goldfield was discovered in 1894 by German explorers and significant exploitation began in the 1930s at the Geita Gold Mine. Several small gold mines exploiting near surface reefs, operated throughout the Rwamagaza Greenstone Belt, particularly near the village of Rwamagaza. By 1940, Tanzania was producing 4.5tpa of gold (Au).

Gold bearing quartz veins were reported from the current Buckreef Mine area in 1945 and reports from the 1950s attest to ongoing production at several localities near Rwamagaza, including the Buckreef area. The extent of the small-scale local and colonial mining activities is evident from the numerous pits and adits covering the entire Buckreef tenement, however no production figures are available.

The Buckreef Mine was an underground mine exploited in the name of the Buckreef Gold Mining Company owned by the Tanzanian State Mining Company (STAMICO) in 1972. A brief summary of the more significant exploration and mining activities covering the Buckreef project area is discussed below.

6.1 Previous Exploration Work

6.1.1 State Mining Corporation (STAMICO) ERA (1960-1990)

Following some artisanal mining activities in the 1960s, a United Nations Development funded 13-hole core drilling program for the government owned Tanzania Mineral Resources Department and this defined 107m long by 8m wide mineralized zone down to a depth of 122m. In 1968, the parastatal, Tanzania Mineral Resources department conducted another 13-hole core drilling program whose results were not made public.

The first attempt at underground development was undertaken by Williamson Diamonds Ltd in 1970, when the Buckreef Main shaft was sunk to 75m and lateral developments were done at 30m and 60m depths respectively based on a ore reserve estimate of 106,000t @ 8.7g/t. The mining results failed to meet expectations and no production records were availed and the mine closed down and the projected reverted back to the Tanzania Mineral Resources department.

In 1972, the Tanzanian government approved an investment decision on the project that resulted in the formation of the state-owned Buckreef Gold Mining Company (BGMC) as owner of the project. During the period 1973-1977, BGMC drilled a further 3 diamond core holes while undertaking further lateral underground developments. From 1978 to 1981, the Swedish International Development Agency (SIDA) financed construction of a carbon-in-pulp (CIP) process plant and other mine infrastructure facilities. From 1982 to 1988, underground mining was resumed on unspecified ore reserve figures.

However, gold production again failed to meet expectations and only achieved 25-40% of target forecast reportedly due to a 65% discrepancy between Mine laboratory and International Laboratory assays according to a consultant investigation report. Underground mined was ceased and the workings flooded in 1990 with a total reported ore extraction estimated as 100,000t @ 3-4g/t.

6.1.2 Comprehensive Exploration ERA (1992-2010)

From 1992 to 1994, East Africa Mines Ltd. entered into an exploration agreement with the Tanzania Mineral Resources Department, now renamed STAMICO and commenced regional and project scale reverse air blast (RAB), reverse circulation (RC) and diamond core (DC) drilling centered on the Buckreef main shear structure. The results of their exploration program culminated in the signing of the first Buckreef Redevelopment Agreement ("BRDA") with Stamico.

In 1996, Spinifex Gold, an Australian registered junior exploration company acquired East Africa Mines Ltd and took over responsibility on the BRDA. In 2003, Spinifex Gold was acquired by Gallery Gold, another Australian registered mining and exploration company. In 2006, Gallery Gold was subsequently acquired by IAMGOLD, a Canadian registered mining and exploration company who then entered into the second BRDA with STAMICO.

IAMGOLD undertook a US$12 million a 4-year exploration program that included regional airborne geophysical surveys, project scale soil surveys and trenching, 65,000m of exploration and reconnaissance drilling and 70,000m of resource definition, metallurgical and hydrogeological drilling. This program resulted in the first Pre-Feasibility report published on the Buckreef project in 2009. The report indicated a historic (non NI 43-101 compliant) Mineral Resource on three major deposits as 9.9Mt @2.7g/t Au (Buckreef North, Main & South), 0.506Mt @3.87g/t Au (Bingwa) and 0.477Mt @2.9g/t Au (Tembo).

In early 2010, IAMGOLD then surrendered the project back to STAMICO as part of a corporate decision to relocate and concentrate on projects in Mali.

6.1.3 Post 2010 ERA

In October 2010, Tanzanian Royalty Exploration Corporation (TRX) signed a Memorandum of Understanding (MOU) with STAMICO and commenced negotiating a Joint Venture (JV) on the Buckreef Re-Development Agreement. TANZAM200, a 100% owned subsidiary of TRX signed a substantive joint venture agreement with STAMICO with regards to the Buckreef Project.

Through this JV agreement, a Tanzanian registered JV company, Buckreef Gold Company Limited, was formed with an equity holding of 55% Tanzam2000 and 45% STAMICO. TRX thus acquired a 55% interest in and operatorship of the project.

6.2 Historical Mineral Resource Estimates

In 2011, Hellman and Schofield (Pty) Ltd, an independent consultant previously engaged by IAMGOLD, was retained by TRX to undertake Mineral Resource estimation for the Buckreef Project. The Mineral Resource estimates, independently interrogated and reviewed by Venmyn Deloitte (Pty) Limited, were subsequently reported and published on SEDAR in the June 2011 as an NI43-101 compliant Independent Technical Report (ITR D1030-Venymn) as part of a due diligence study of the Buckreef project for TRX soon after acquisition of the Project.

In 2012, Venmyn Deloitte (Pty) Limited then completed a Preliminary Economic Assessment of the Buckreef project for TRX and the results of the PEA were reported in a Canadian National Instrument 43-101 (NI 43-101) Independent Technical Report (ITR) (VIP 21 August 2012). The PEA was based on the previously published Mineral Resource estimate at a 0.5g/t Au cut-off grade, as presented in the table below:-

Table 6.1 Mineral Resource Estimate for the BRMA (NI 43-101 Compliant – Dec 2011**)**

DEPOSIT	MEASURED			INDICATED			INFERRED			MEASURED & INDICATED		
	Tonnes (Mt)	Au Grade (g/t)	Cont,d Au (Moz)	Tonnes (Mt)	Au Grade (g/t)	Cont,d Au (Moz)	Tonnes (Mt)	Au Grade (g/t)	Cont,d Au (Moz)	Tonnes (Mt)	Au Grade (g/t)	Cont,d Au (Moz)
Buckreef	5.18	2.05	0.34	3.71	1.86	0.22	7.16	1.89	0.44	8.88	1.97	0.56
Bingwa							1.12	2.40	0.90			
Tembo							0.73	2.18	0.05			
TOTAL	5.17	2.05	0.34	3.71	1.86	0.22	9.00	1.98	0.57	8.88	1.97	0.56

Source: Hellman and Schofield 2007, 2011, Venmyn 2011
Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability
Mineral Resources inclusive of Mineral Reserves (although no Mineral Resources are reported for the PEA)
Estimates over variable widths to 3m to 40m
Bulk Density ranges 2.0g/cm3 to 2.8g/cm3
Inconsistencies in totals are due to rounding down
55% attributable to TRX
Cut-off grade 0.5g/t Au

6.2.1 Existing Resource Estimates

During the period 2013 to 2014, Venmyn was again commissioned by Tanzam2000, a subsidiary to Tanzanian Royalty Exploration Corporation, to produce a second independent NI43-101 compliant report titled “Independent Technical Memorandum on the Mineral Resource Estimate for Tanzanian Royalty Exploration Corporation’s Buckreef Project in Tanzania” subsequently published as ITR V119R of 30th April 2014. This incorporated newly identified mineralization identified in various deposit extensions and also from additional resource drilling conducted by TRX on the project. This led to an increase the published Mineral Resource estimate of the Buckreef Project at a 0.5g/t Au cut-off grade, as presented in the table below:-

Table 6.2 Buckreef Project NI43-101 Compliant Mineral Resource Estimate (0.50g/t cut-off-grade – Venymn April 2014)

	Measured			Indicated			Inferred		
Prospect	Tonnes	Grade	Contained Gold	Tonnes	Grade	Contained Gold	Tonnes	Grade	Contained Gold
	Mt	g/t	oz	Mt	g/t	oz	Mt	g/t	oz

Buckreef	8.902	1.72	491,529	13.1	1.41	594,456	7.528	1.33	322,902
Eastern Porphyry	0.087	1.20	3,366	1.016	1.17	38,355	1.239	1.39	55,476
Tembo	0.017	0.99	531	0.185	1.77	10,518	0.267	1.93	16,521
Bingwa	0.906	2.83	82,387	0.569	1.38	25,274	0.312	1.29	12,922
Total	**9.912**	**1.81**	**577,813**	**14.87**	**1.40**	**668,603**	**9.346**	**1.36**	**407,821**

Source: Venmyn Deloitte 2013, CAE Mining 2013 and TRX 2013
Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability
Mineral Resources reported inclusive of Mineral Reserves (although no Mineral Reserves are reported)
Cut-off Grade 0.5g/t Au
Estimates over variable widths to 1m to 40m
Specific Gravity ranges 2.0 to 2.8
Inconsistencies in totals are due to rounding
55% attributable to TRX

As no further or recent exploration work has been undertaken at the Buckreef project, Virimai Project resolved to independently check and verify the Mineral Resource estimates and information from Table 6.2 above that was taken from a report completed under NI 43-101 standards and amended and filed on the System for Electronic Document Analysis and Retrieval, "SEDAR", (www.sedar.com), on April 30, 2014. The authors of the Buckreef Resource Independent Technical Report (ITR V119R), produced for TRX, were Qualified Persons F. Harper (*Pri.Sci. Nat.; MGSSA*) and S. Lambert (*MSAIMM, MGASA, MSAIP*).

7. GEOLOGICAL SETTING AND MINERALIZATION

7.1 Regional Geology

The Buckreef Project is situated within the LVG of northern Tanzania which consists of a number of east-west trending, linear, Archaean greenstone belts. The LVG is the third largest gold producing region of Africa, surpassed only by the Witwatersrand Basin in South Africa and the Tarkwa region of Ghana. Numerous gold occurrences have been identified in the LVG and new discoveries continue to be made. Since 1998, when the first mine, Golden Pride was commissioned, four additional large scale mines namely, Geita, Bulyanhulu, North Mara, and Tulawaka have come into commercial production. Geita and Bulyhanulu are considered world-class deposits, together representing in excess of 35Moz of gold resources.

The Sukumaland Greenstone belt is one of eight Achaean greenstone belts that occur within the Lake Victoria Goldfield of northern Tanzania. The stratigraphy of Lake Victoria Goldfield (LVG) can be divided into three major groups; the Lower Nyanzian, Upper Nyanzian and Kavirondian. The Sukumaland Greenstone Belt has an outer arc (Upper Nyanzian) and inner arc (Lower Nyanzian) stratigraphy cored by granitic rocks. The Rwamagaza greenstone Belt which forms the inner arc of Sukumaland Greenstone Belt (Figure 7.1) comprises dominantly mafic volcanic stratigraphy with minor felsic feldspar porphyry and quartz-feldspar porphyritic, flow-banded rhyolite all. Ultramafic rocks occur in isolated locations in the area to the west of the Busolwa-Buziba prospects.

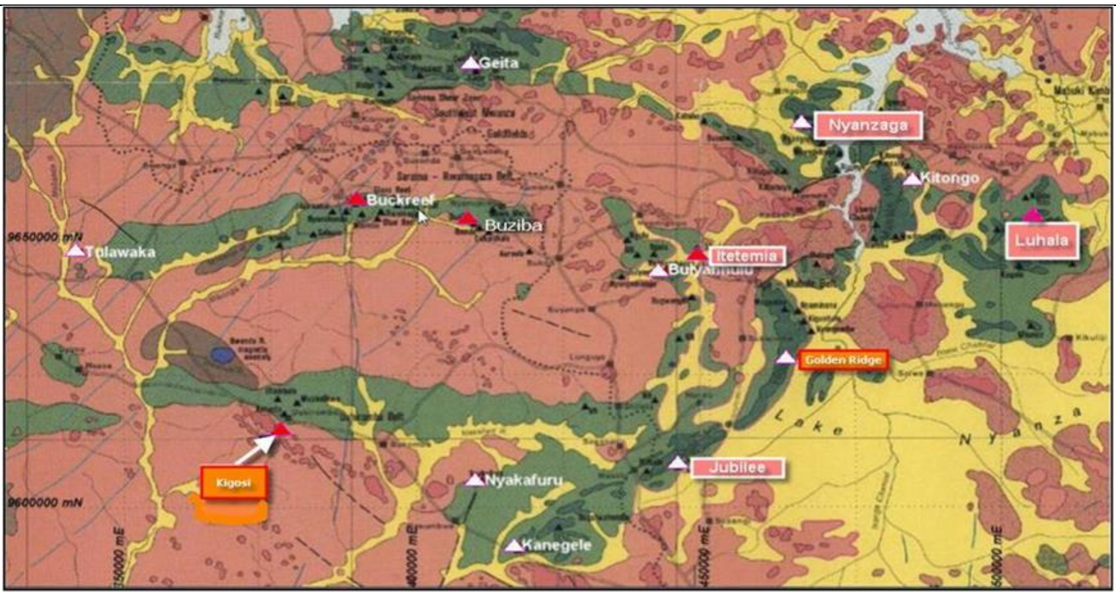


Figure 7.1 Regional Geology Map, Buckreef Gold Project, Lake Victoria Greenstone Belt, Tanzania

The top of the Lower and upper Nyanzian system is overlain by Kavirondian age rocks. Apart from occurrences in North Mara, Nikonga and BulangaMurwa, the Kavirondian is not widely distributed in the LVG. The Kavirondian rocks are generally coarse clastic molasses that include polymictic conglomerate, gritstones, quartzites, shales and siltstones, metatuffs and intermediate to acidic volcanics and while no clear tectonic setting has been put forward for these rocks, it is speculated that they were deposited in small pull apart basins.

The regional metamorphic grade of the Nyanzian is largely low grade, greenschist facies though areas of amphibolite facies are recorded, for example at Msasa and Tulawaka Mine. Local contact metamorphism caused by granite intrusions is also developed, but in general higher grade metamorphic complexes are rare.

The greenstone belts are set in a terrain of syntectonic granite, granite gneisses, late kinematic granites and associated felsic intrusives. There is a general lack of detailed regional mapping and standardization of lithological names in the LVG and consequently there is no officially recognized division of this terrain. Quennel (1960) has proposed a fivefold classification for the intrusions (G1 – G5), however subsequent authors, notably Barth (1990) and the UNDP (1986b) adopted a simpler two-fold classification dividing the intrusions into synorogenic and late kinematic cycles.

The synorogenic cycle (G1, G2 and G3 granites) is comprised of migmatites, foliated and porphyroblastic granites, biotite – hornblende granite, tronhjenite, granodiorite, tonalite, adamelite, monzanite and quartz diorite. These lithologies include all those formed by interaction with the greenstone belts and the theoretical pre Nyanzian age granitoid basement. It is probable that some of these early units are synvolcanic intrusives that fed the felsic volcanism of the Nyanzian greenstones.

The late kinematic granites (G4 and G5) are probably post Nyanzian age and possibly post Kavirondian age intrusive events. Typically, these intrusive include biotite granites, porphyritic biotite granites, microgranite, feldspar porphyries and felsophyric dykes and where mixing with the greenstone belt lithologiesoccurs the rocks become locally gneissose in texture and granodioritic in chemistry. These late intrusions often appear circular and there is evidence of slight banding suggesting a diapiric origin. However, some are less regular in shape and in the Nzega, Geita and eastern Iramba Sekenke Greenstone belt appear to have an alignment along the 110^0 and 070^0 or have contacts affected by these directions.

Numerous dolerite, gabbro and ultramafic bodies have been intruded in to the Lake Victoria Goldfields. Possibly the most significant phase is related to a system of north south, west southwest trending magnetic dolerite dykes. While they rarely crop out they are often identifiable from magnetic surveys. The trends of the north south dykes maybe divided into two sub sets, 350^0 and 010^0 (Halls et al, 1984). The 350^0 subset is largely confined to the Tanzanian craton area and where they intersect the Proterozoic age Ubendian or Usagaran belts they are highly altered hence have an age pre 2100Ma. In contrast the 010^0 subset is largely unaltered and is observed cross cutting the Lower Proterozoic Ubendian belt indicating an age younger than this orogenic event. Barth does not differentiate between the two sets and believes them both to be of Karroo age.

The regional structure is poorly understood and the correlation of specific structures from one greenstone belt to another is difficult.

Two phases of folding are generally recognized in the Nyanzian System (Barth, 1990). The first phase generated symmetric, east west trending, isoclinal folds. It is likely that this was coincident with tectonic stacking and thickening i.e. thrusting. Following this early phase, a second phase of cross folds with axial planes striking approximately 100^0 - 120^0 developed. These are coincident with major dextral lineaments that cross cut the LVG area (Figure 7.2).

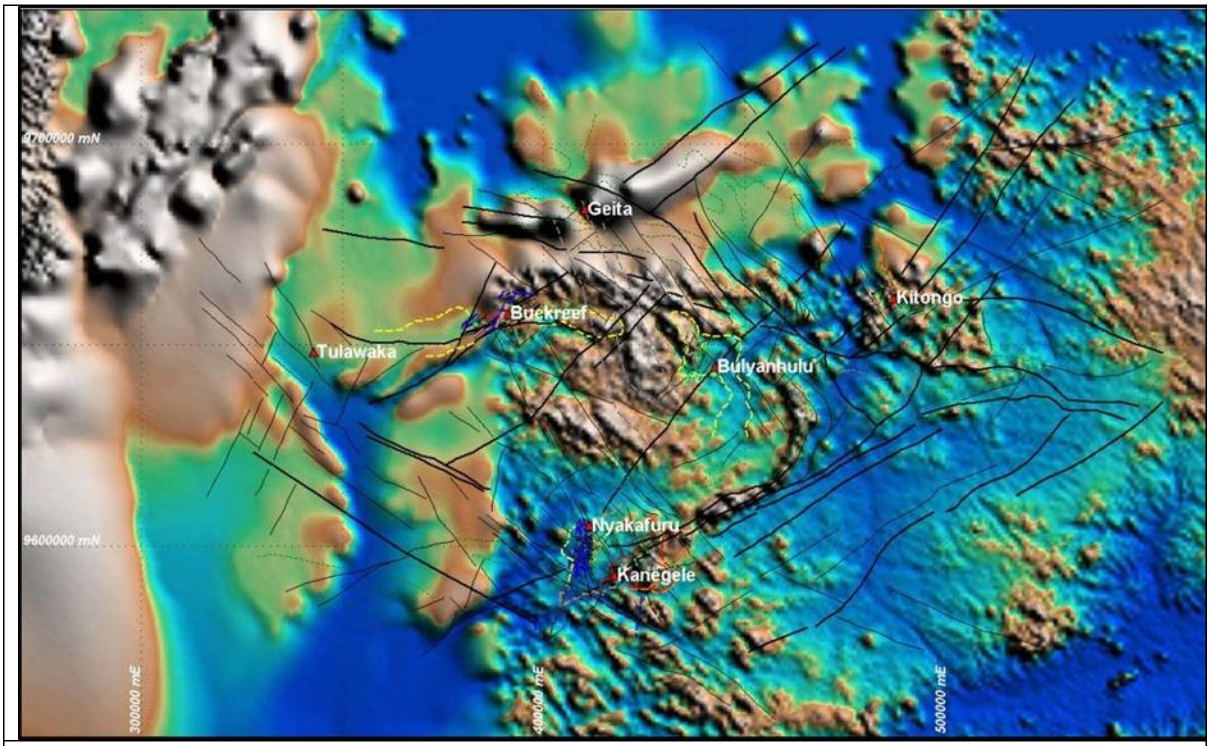


Figure 7.2 Regional Structural Setting, Buckreef Project, Rwamagaza Greenstone Belt, Geita District, Tanzania

A key factor in the localization of gold mineralization seems to be where this second phase and/or regional lineaments cross cut the primary east – west phase.

The Lake Victoria Goldfield is the third largest gold producing region of Africa, surpassed only by the Witwatersrand Basin in South Africa and the Tarkwa region of Ghana. Numerous gold occurrences have been identified in the LVG, and new discoveries continue to be made. Since 1998, when the first mine, Golden Pride was commissioned, four additional large-scale mines namely, Geita, Bulyanhulu, North Mara, and Tulawaka have come into production. Geita and Bulyanhulu Mines are considered world-class deposits, together representing more than 60Moz of gold resources.

The Lake Victoria Goldfield has geological and structural similarities to major gold districts in the Canadian Shield (Val d´Or, Kirkland Lake) and the Yilgarn Craton in Western Australia (Kalgoorlie, Laverton, Leonora, Kambalda and Southern Cross). Gold mineralization within the Lake Victoria Goldfield occurs in number of styles including: -

- quartz veins within minor brittle lineaments, most commonly worked on a small-scale by artisanal workers, due to their limited extent and erratic gold distribution (such as at Bulangamirwa workings in the Nzega Greenstone Belt);
- mineralization within major ductile shear zones;
- mineralization associated with replacement of iron formation and ferruginous sediments; and
- felsic (porphyry) hosted mineralization, such as within the Rwamagaza Greenstone Belt.

Nutt (2003) also notes that approximately 19% of known gold occurrences in the LVG are associated with or hosted in part, by felsic intrusives (excluding granitoids) and significantly at least four of the larger gold deposits have known diorite or quartz and/or feldspar porphyry's in close association i.e.:

- Geita Group (diorites and felsics),
- Bulyanhulu (quartz porphyry),
- Golden Pride (quartz porphyry or rhyolite bodies) and
- Mobrama deposit – North Mara Group (siliceous felsic rock, protolith: quartz porphyry).

Regardless of the geological environment, it is accepted that structural control on the emplacement of the mineralization is critical. The following structural features have proven to be important foci of gold mineralization: -

- Structural lineaments trending at 120º;
- Flexures and splays to the 120º trend (such as at Golden Pride);
- Structural lineaments at 70º (such as at Golden Ridge); and
- Granite-greenstone contacts (such as at the Ushirombo and Rwamagaza Greenstone belts).

7.2 Property Geology

Buckreef Gold Company Limited's Buckreef Project is in the regionally east-west trending Rwamagaza greenstone belt. This belt is considered a segment of the larger Sukumaland greenstone belt and is one of the larger greenstone belts in northern Tanzania.

Substantial areas of the Buckreef Project are covered by lateritic units, dominantly gravels, mbuga soil and cuirasse. Cuirasse forms some highly indurated upper facies of the lateritic regolith. Several lateritization events have resulted in weathering to depths of up to 40m. The limited bedrock exposure has hampered the development of detailed geologic models for the region.

Hill (2006) reported on a geological investigation of the Buckreef Project area for IamGold Ltd. In this PowerPoint presentation, Hill (2006) described the geology of the Buckreef Project as consisting of a tightly folded sequence of lower mafic, upper mafic-ultramafic sequence. The Lower mafic unit appears to be more deformed than upper mafic unit. The two units are separated by magnetic ultramafic flow at unconformity boundary. The mafic –ultramafic units are sandwiched between older granite to the south and young late granite to the north. The margins of granite intrusions have higher magnetic signature suggesting contact metamorphisms (Figure 7.3).

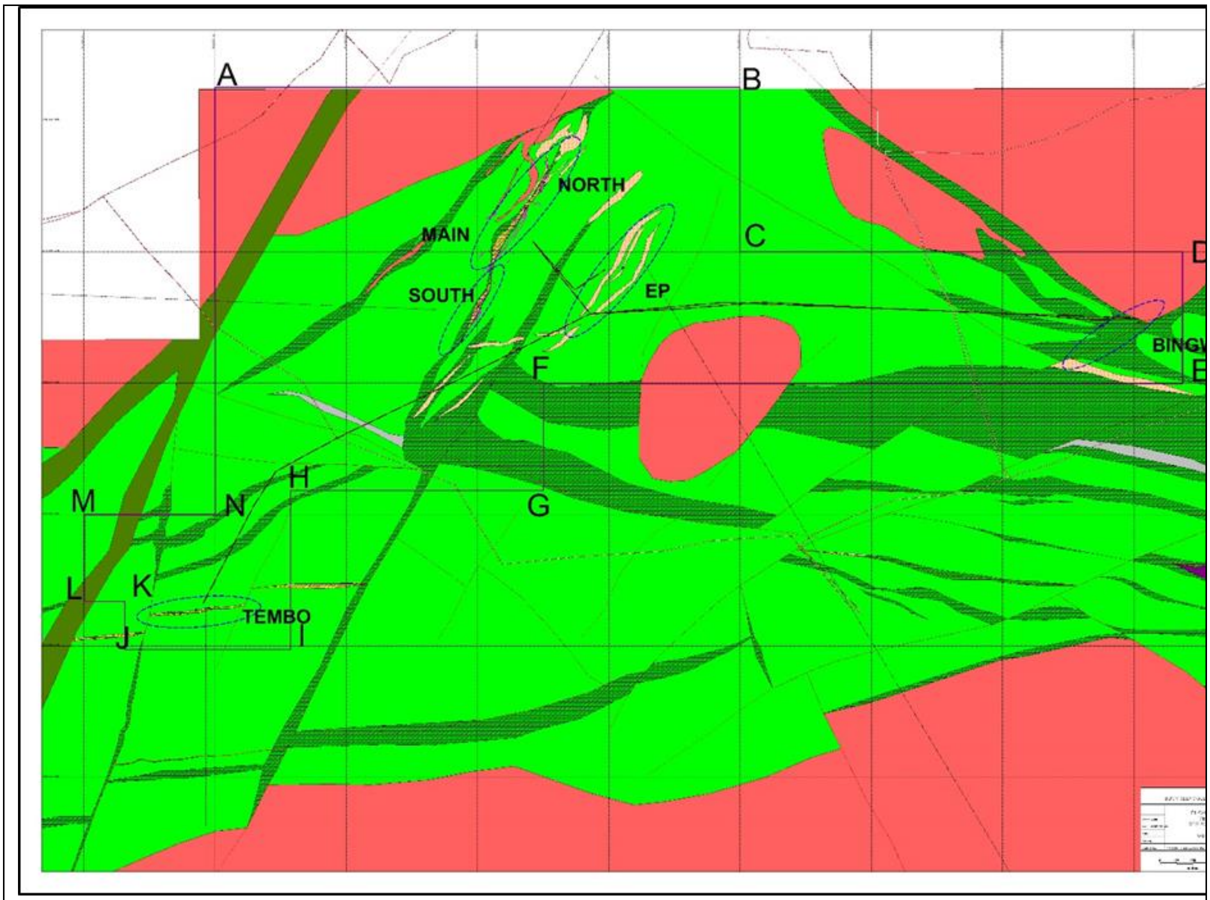


Figure 7.3 Local Geological Setting, Buckreef Project, Rwamgasa Greenstone Belt, Geita District, Tanzania

The belt is bisected by an East – West trending lineament, that is interpreted as a first-order, crustal scale, sinistral shear zone namely as the Rwamagaza Shear Zone (RSZ). The Rwamagaza greenstone sequences have been affected by at least two deformation events. The deformation D1 forms a weak E - W trending foliation and massive "buck" quartz veins that are weakly prospective for gold mineralization. D2 corresponds to the main phase of deformation and resulted in the progressive development of NE trending shear zones, and a pervasive NE foliation. N to NNE trending dextral shear faults formed during D2 and are associated with stock-work quartz veins and significant gold mineralization.

Several published data considered that regional gold deposition is tightly constrained to the pre-Lamprophyre intrusion (2697 ±10 Ma) and pre-Kuria volcanic rocks (approx. 2660Ma).

7.3 Deposit Geology

Buckreef Gold Company Limited has defined four mineral deposits on the Buckreef Property. As estimated in this technical report, from largest to smallest based on ounces of gold, these include the Buckreef mineralized corridor, Bingwa, Eastern Porphyry and Tembo Deposits. The following descriptions are summarized from Venmyn 2012.

7.3.1 Buckreef Deposit

The Buckreef Prospect is a shear zone hosted gold deposit within a sequence of mafic basalts and dolerites, near basement granite. The defunct Buckreef Mine is located on a clearly defined, east-northeast/west-southwest trending, 5m-30m wide and 8km long, brittle-ductile shear zone within relatively un-deformed mafic volcanics. Based on preserved slickensides, the dominant displacement vector across the shear zone was sinistral, however the bulk of the ductile fabric is post mineralization. Gold mineralization is associated with intense brecciation and quartz, carbonate, sericite pyrite alteration in at least two phases and is controlled within the regional shear by a fault zone with a 10m true width, drilled continuously for over 1.5km strike length (Figure 7.3).

A late stage veining event characterized by white, buck quartz veins, is evident in the main zone and is barren of gold mineralization, but is the only visible sign of the structure in outcrop.

The gold mineralization at Buckreef Prospect is non-refractory in both fresh and oxide material. Deep drill-holes indicate that high grade mineralized zones plunge steeply to the north. Several narrow, more discontinuous sub-parallel zones of similar alteration and mineralization have been defined both to the west and to the east of the main fault zone.

Detailed logging of drill-hole core reveals a prominent deepening of the oxidation profile above portions of both the Main and North Zones. The base of the oxidation zone occurs between 15m and 40m, with an average depth of 30m, and the overburden consists of both black cotton soils and lateritised duricrusts with an average depth of ±3m-4m, to a maximum of 20m.

7.3.2 Bingwa Deposit

The Bingwa Prospect is located at the northern margin of the RGB, adjacent to a sheared contact with a granitic intrusive and is approximately 4km east of the Buckreef deposit (Figure 7.4) Gold mineralization has been identified in a drilling program over a strike length of 350m and up to 100m below surface, with the main zone of mineralization occurring over a strike length of 150m. Gold mineralization at Bingwa is associated with quartz veining in strongly foliated and altered greenstone in a shear zone adjacent to the granitoid contact. The shear zone strikes northeast and dips steeply to the northwest. The main zone of mineralization is associated with the junction of a northwest striking, shallowly north dipping fault and the northeast striking shear zone.

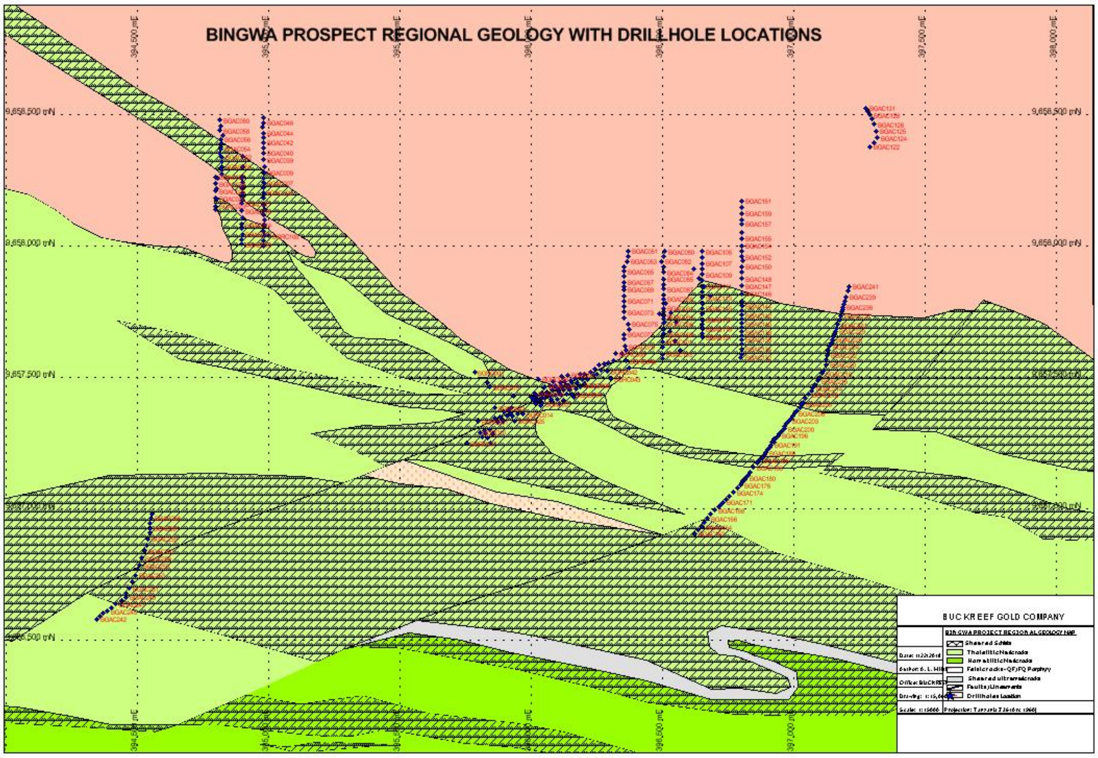


Figure 7.4 Local Geological Setting, Bingwa Deposit, Geita District, Tanzania

Source: TRX 2013

Deformation, alteration and gold mineralization appear to be limited to rheological contacts, between basalt and the early quartz veins and along the margin of the granite. The difficulty in constructing continuous grade envelopes may be due to limited continuity of the early quartz vein array, and/or the possibility that the veins are folded, transposed and boudinaged within shear zones.

Most the mineralization defined to date occurs within the oxide zone, which extends to 40m-60m below surface. The entire deposit is overlain by 5m to 8m of overburden and transported alluvial. Much of the Bingwa Prospect gold mineralization in the weathered profile occurs in lower saprolite, below the redox boundary.

There is negligible upper saprolite below the overburden cover. Given that there is typically limited chemical dispersion of gold in lower mafic saprolite, this may be one of the reasons for poor lateral grade continuity at the Bingwa Prospect. However, recent work at the Bingwa Prospect indicates that mineralization is hosted within the north-northwest to south-southeast trending structures at the intersection with the major northeast-southwest shear zone. The intersection between these structures is considered to play an important role in controlling high grade zones

7.3.3 Eastern Porphyry Deposit

The Eastern Porphyry deposit is located 0.8km east of the Buckreef main deposit and consists of weakly to moderately sheared felsic porphyry and younger fresh feldspar quartz porphyry dykes up to 30m wide within a mafic sequence dominated by medium grained dolerite.

The Eastern Porphyry structures occur within sheared basaltic lavas and medium grained dolerite intrusive of the northeast-southwest trending Nyamazama River lineament. The elongated intrusion attains a maximum thickness of 280m, but thins and disperses to the northeast and southwest into a series of relatively narrow quartz-feldspar-porphyry dykes (Figure 7.5).

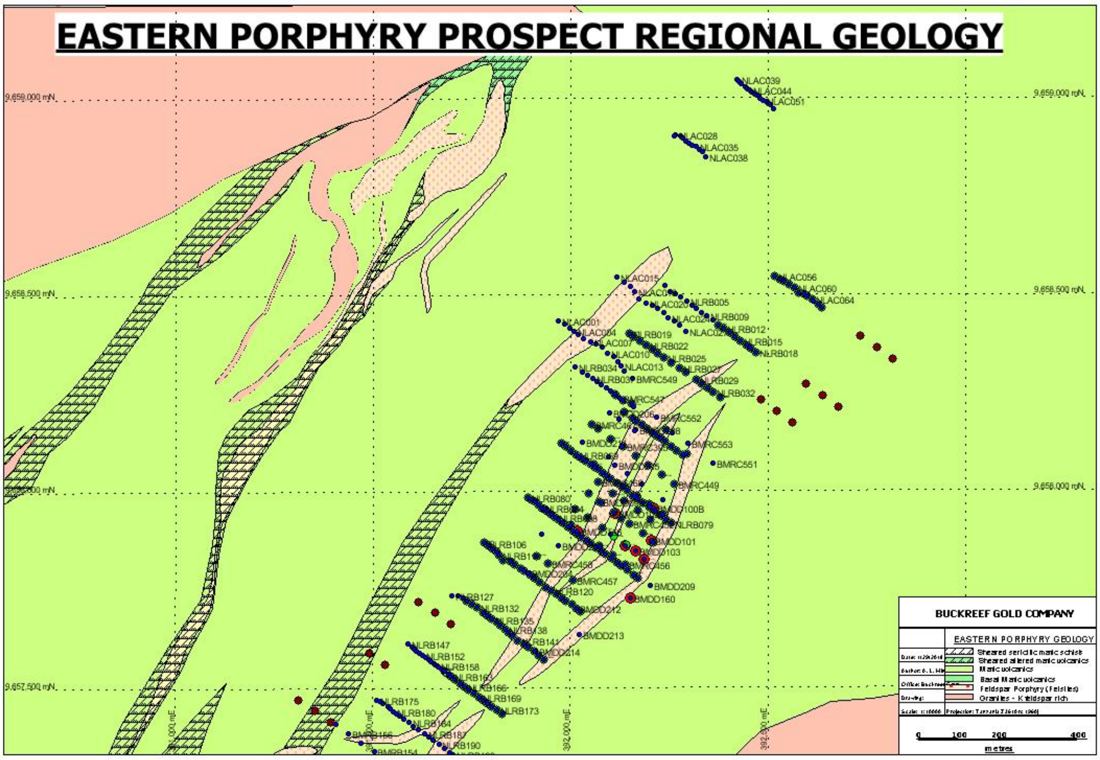


Figure 7.5 Local Geological Setting, Eastern Porpyhry Deposit, Geita District, Tanzania

Source: TRX 2013

The Eastern Porphyry mineralization is associated with silicified and weakly pyritised shears, quartz veins and veinlets, and within quartz-feldspar porphyry. Quartz veining within the felsic unit may contain pyrite with or without low grade mineralization. However, zones of shearing within the dolerite up to 7m in width are associated with silica-carbonate-pyrite alteration. The mineralization has a total strike length of approximately 1,500m. The main intrusion is coincident with a circular magnetic anomaly in the area with a diameter of 350m (Barrett, 2000). In places the quartz-feldspar-porphyry is magnetite bearing, readily deflecting a hand magnet.

The gold mineralization occurs in a similar lithological and structural setting as at Buckreef Prospect, but the intensive carbonate-silica-pyrite alteration typical of the Buckreef deposit is lacking or poorly developed. The fact that mineralization on the Nyamazama River lineament is less well developed than at Buckreef may be due to less dilation of the northeast-southwest shear compared to that of Buckreef Prospect or the presence of the porphyry intrusion which inhibited fluid flow and was less chemically reactive than the basalt.

7.3.4 Tembo Deposit

The Tembo deposit locates approximately 3km southwest of Buckreef Mine, adjacent to the main Rwamagaza Shear Zone. The mineralized zones at Tembo are confined to the east – west trending shears within met-basaltic volcanic package. Alteration in the mineralized zones consists of silica-carbonate-pyrite with well-preserved shear fabric (Figure 7.6).

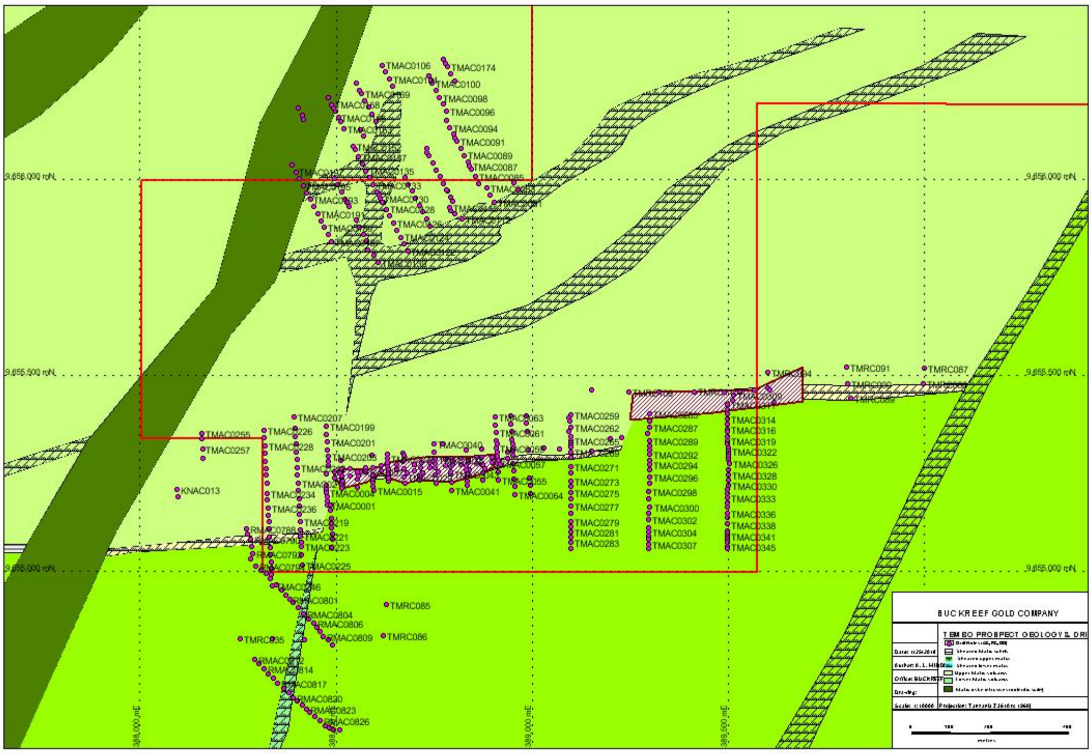


Figure 7.6 Local Geological Setting, Tembo Deposit, Geita District, Tanzania

Source: TRX 2013

Gold mineralization is associated with grey quartz thin veins, stringers and boudins parallel to the shear fabric. At Tembo deposit, the transported and residual soil cover is 7m to 9m deep, below which, completely altered and sheared mafic material occurs to a depth of 50m. Most of the oxidised zone has been exploited by artisanal mining.

7.3.5 Mineralization

Gold mineralization on the Buckreef property is universally controlled by shear-related veining and alteration, developed in three dominant geological environments: meta-basaltic volcanic-hosted, intrusive-hosted and contacts. The meta-basaltic volcanic-hosted deposits Buckreef and Tembo, tend to consist of networks of anastomosing and steeply-dipping shear zones, exhibiting multiple, superimposed, phases of veining, alteration and deformation. The intrusive-hosted deposit, Eastern

Porphyry, also exhibits multiple phases of veining, alteration and deformation, but tend to develop weak alteration and broader shear zones.

Bingwa and Eastern Porphyry are associated with intrusive contacts. This could be attributed to thermal aureole effect; however, it may also be controlled by competence contrasts and its effect on structural dilation during deformation and the consequent enhancement of permeability at these sites.

Gold is strongly associated with silica-carbonate alteration and veining. Sulphide minerals associated with mineralization consist predominantly of pyrite and minor chalcopyrite. Gold grains up to 60 microns in size have been reported in both low and high grade zones. Visible gold is known from all deposits but is not common. High amount of gold is found as inclusion in pyrite as well as fracture-filling in pyrite and chalcopyrite. Gangue minerals of interest include clay, feldspar, quartz, dolomite, and hematite and goethite in the oxide and transition material.

8. DEPOSIT TYPES

The Lake Victoria Goldfield hosts numerous small-scale and five large-scale orogenic gold deposits. Term ‘orogenic gold deposit’ is broad in scope and encompasses meso-thermal gold deposits, shear-hosted, lode-gold and metamorphic gold deposits. Orogenic gold is a distinctive class of mineral deposit that has been the source for much of world Au production.

The ores are widely recognized in both Phanerozoic mobile belts and older cratonic blocks. Orogenic gold deposits have formed over more than 3 billion years of Earth’s history, episodically during the Middle Archaean to younger Precambrian, and continuously throughout the Phanerozoic.

Typically, orogenic gold deposits are formed in regionally metamorphosed terranes, during compressional or transpressional tectonic processes at continental plates margins, in accretionary or collisional orogenic events. In both tectonic regimes, hydrated marine sedimentary sequences are added to continental margins. Subduction related thermal events then drive extensive hydrothermal fluid systems through the hydrated accretionary sequences, which results in the emplacement of gold bearing quartz veins from depths of 15km to 20km to surface (Groves 1997).

The mineralization is commonly post the deformation of the host rock but is syn-orogenic with respect to the on-going deep crustal, subduction related thermal processes (Groves 1997). In addition, mineralization has been theorized to be associated with short-lived pulses of metamorphic fluids that are released by the rapid devolatilisation of a rock column undergoing burial in a convergent orogen.

The goldfield deposits are hosted by sedimentary units intercalated with volcanics and all are associated with quartz veining. The largest deposit at Geita is hosted by ferruginous chert-pelite units. The Rwamagaza Greenstone Belt hosts numerous small-scale gold deposits exploited by small-scale miners, as well as the Tulawaka Mine that has produced more than 1 Moz at the western limit of the RGB, 56km to the west of the Buckreef Mine.

All the deposits currently being exploited by artisanal miners in the Buckreef Project area consist of narrow discontinuous quartz veins within meta-basalts, shear zones, contact zones with felsic intrusives and metamorphic foliation.

Each of the four prospects, whilst generally formed under conditions described above, are unique in the mechanisms which concentrated the mineralization. The exploration programs undertaken have been specifically designed considering the unique set of local structural, lithologic and regional tectonic conditions which created potentially favorable sites for mineralization concentration.

9. EXPLORATION

The Buckreef project has been the subject of numerous exploration programmes carried out by several companies over more fifty years. As summarized in section 6 of this report the project was originally defined by a 1966 United Nations exploration programme following up artisanal workings. The deposit was subsequently explored by the Tanzanian Mineral Resources Division and developed into a small underground mine by Buckreef Gold Mining Company a wholly owned subsidiary of the State Mining Corporation (Stamico). The mine closed down in 1990 due to low gold prices and lack of working capital resulting in inability to purchase fuel and maintain plant ending in the flooding of the mine.

Table 9.1 Summary of Buckreef Project, Historical Exploration Work, Geita District, Tanzania

DATE	EXPLORATION UNDERTAKEN
1999-2000	EAGM signed an earn-in agreement with Ashanti AngloGold to explore Buckreef Project which was terminated late 2000. 16,324m of drilling in 67 drill holes, 18 of which were RC and 49 drill holes diamond (15,363m)
2001 -2003	Spinifex Gold, operating for EAM, ran the project with very limited exploration work based on the follow up recommendations from the final exploration report by Ashanti AngloGold. 610 RC drill holes (49,000m) with 6 diamond drill holes. IP geophysical survey over Buckreef
2004 -2005	Following the merger between Spinifex Gold and Gallery Gold in 2003 significant exploration work was concluded on the project and new resources established on the Buckreef Mining licence. Resources were improved at Tembo and Bingwa prospects. Geophysics and geochemical soil surveys completed with additional RAB, RC and diamond drilling.
2006 - 2009	Following the merger between Gallery Gold and IAMGOLD Corporation of Canada in March 2006 EAM changed names to IAMGOLD Tanzania Ltd. Under IAMGOLDT, Buckreef Project was completed up to commencement of pre-feasibility studies before the company decided to close all its exploration activities in Tanzania in 2009 and in so doing decided to surrender back to the government all its exploration portfolio under the Buckreef Re development Agreement. 2,949 drill holes were drilled for 142,302m including 2,160 aircore, 745 RC and 44diamond drill holes. Regional soil and termite mound reconnaissance sampling programme. Regional mapping
2010 - 2012	In March 2010 the government of Tanzania granted afresh all the surrendered licences to Stamico, including the existed applications under IAMGOLDT.

Source: Venmyn Deloitte 2012.

9.1 Buckreef Gold Project

A Section in Chapter 6 briefly summarized the exploration history on the Buckreef Project starting from 1960 soon after the area was designated as a potential strategic deposit by the Tanzanian government following an incursion by local artisanal gold miners. Table 9.1 below summarizes the major exploration work conducted over the decades by the various companies that have been involved with the Buckreef project over the last 50+ years.

As reported in the published NI43-101 reported mention in Chapter 6 above, Tanzanian Royalty Exploration Corporation, through its 100% owned subsidiary, Tanzam200 commenced mainly further resource drilling and exploration work covering the five main prospects that make up the Buckreef project in 2012. Most of the exploration work at the Project was completed previously during the IAMGOLD ownership as reported in the SEDAR posted reports.

As cited in the published Venymn Independent Technical Reports, regional and detailed exploration by IAMGOLD identified the four major gold prospects as Buckreef (Main, North & South), Bingwa, Tembo and Eastern Porphyry. IAMGOLD then conducted further resource drilling on the Buckreef (Main & North), Bingwa and Tembo prospects. Exploration criteria for the five prospects were essentially based on the normal Archean gold deposit formation criteria listed below:

- Presence of gold
- Favourable structure (shear zones and breccia zones)
- Significant quartz vein material
- Hydrothermal alteration minerals and assemblages
- Proximity to unconformities and disconformities; and
- Proximity to oxidation/reduction boundaries of regional scale

For detailed descriptions and in-depth discussion of the exploration work, some of whose results are briefly summarized below, the reader is referred to Venymn Independent Projects Preliminary Economic Assessment Technical Report (ITR) completed under NI 43101 standards and amended and filed on the System for Electronic Document Analysis and Retrieval, “SEDAR”, (www.sedar.com), on August 12, 2012.

The authors of the Buckreef PEA Independent Technical Report (ITR VIP21), produced for TRX, were Qualified Persons F. Harper (Pri.Sci. Nat.; MGSSA) and A.N. Clay (Pri. Sci. Nat; MSAIMM, FGSSA, FAusIMM). Brief discussions on some of the significant exploration work done are summarized below.

9.1 Geophysical Survey

Because of the limited bedrock exposure in the Buckreef Project area, numerous geophysical surveys have been conducted at the site in the quest for additional ore. These efforts are summarized in report by Venmyn Deloitte 2014. Geophysical surveys conducted include ground gravity and dipole-dipole IP/resistivity.

9.1.1 Surveys

Spectral Geophysics (Botswana) was contracted during April 2008 to complete ground gravity surveys over 5km2 and the data was interpreted by Southern Geoscience Consultants (SGC) in Australia. The final results were compiled into a 1:20,000 scale geological interpretation delineating twenty-one targets and the Rwamagaza Shear Zone. Gravity surveys proved effective for the location of large first order structures and in 2008 the airborne magnetic data was interpreted into an image atlas for future target definition.

9.1.2 Induced Polarisation Surveys

During 2007, 14 IP survey blocks were completed over the project area by Spectral Geophysics and processed by SGC Australia. The results of these surveys highlighted altered fault/shears zone structures and in conjunction with magnetics can be used for targeting prospective strike extensions of existing ore bodies.

9.1.3 Geochemistry Surveys

Several historical soil and rock chip sampling programs were completed over the Buckreef Project area on a grid of 100m x 100m, with closer spaced grids (80m x 40m) over historical target areas and targets with a high density of lineaments and interpreted mineralized structures. A total of 2,028 rock chip samples, 29,546 soil samples and 481 termite mound samples were taken during the period 1992-2009.

Transported laterite, combined with Mbuga soils which cover 60% of the area, hamper geochemical sampling and interpretation and IAMGOLD completed termite mound sampling over the problematic areas. To date the termite sample density is too low for identification of meaningful anomalies. The results of the soil geochemistry results are consistent with the known structures in the area. The largest soils anomalies occur are over the main deposits at Buckreef Prospect.

On surface, favourable structures are identified utilizing the 2006 airborne magnetometer survey covering the Rwamagaza greenstone belt. Due to lack of outcrop exposure, very limited ground geological mapping was employed to identify fabrics, offsets and abrupt changes in rock types that indicate structure. Rather detailed geological core logging was used to extrapolate the structural fabrics and hydrothermal assemblages typical for each prospect.

10. DRILLING

As summarized in the various SEDAR posted Technical Reports by Venymn, the majority of the exploration and resource drilling at Buckreef's four major prospects namely Buckreef, Bingwa, Tembo and Eastern Porphyry was done previously by IAMGOLD.

TANZAM2000 then conducted further resource drilling on the Buckreef (Main, South & North), Bingwa, Tembo and Eastern Porphyry prospects based on recommendations from the 2012 Preliminary Economic Assessment report by Venymn. Many surface targets meeting some or all of the relevant criteria remain to be tested by drilling.

10.1 Buckreef Prospect

Surface exploration and resource definition drilling completed, by previous owners, along the NW-SE control lines are shown in Figure 10.1. The Buckreef resource has been drilled on local grid east-west oriented drill traverses at mostly 20meter intervals along the strike of the gold mineralization above 1100mRL (surface approximately 1225mRL). Below 1000mRL to the base of drill coverage (approximately 700mRL) the deposit has been variably intersected on 100m intervals south of 2600mN and 40-50m intervals north of 2600mN.

Many drill holes are angled steep (~60º) towards grid east or west normal to the strike of the gold mineralization. On many sections the drill holes targeting the near surface gold mineralization are spaced at 10mcentres providing approximate 20m spaced vertical intercept on the gold mineralization.

The RC resource delineation drill spacing was completed on a 40m to 20m x 20m spacing at Buckreef. On sections targeting the near surface gold mineralization, the drill-holes were spaced at 10m centres providing approximate 20m spaced vertical intercepts on the gold mineralization.

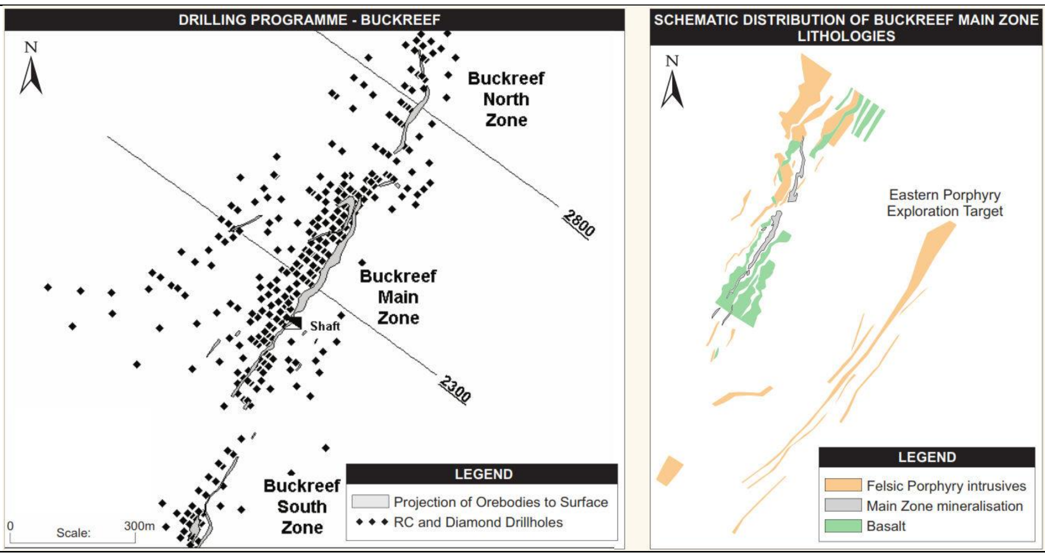


Figure 10.1 Location of Historical RC/DD exploration and Resource drill-holes, Buckreef Deposit, Geita District, Tanzania

Source: Venmyn Deloitte 2012;

Between 2013 and 2014, the TANZAM2000 completed additional resource definition drilling mainly targeting the Buckreef South and North deposits in addition to the mandatory twinning preliminary due-diligence diamond core holes on selected portions of the Buckreef main deposit as part of recommendations from Venymn reports.

At Buckreef Prospect, the North and Main Zone mineralization occurs in a shear zone with a true width of 10m, dipping steeply to the west. As a precaution to minimize interference and sampling by artisanal miners, the RC 1m samples were collected daily and transported to a central sample store where they were sampled and bagged.

The 2012 core drilling program was aimed at defining mineralization between 150m and 250m depths at the Buckreef Main deposit. The results identified a wide zone of mineralization, as exemplified by two drill-holes which intersected a mineralized zone 26m wide with a grade of 4.5g/t Au at 215m depth and a zone, 19m wide with a grade of 10.58g/t Au at 155m depth.

The same 2012 drilling program also confirmed that the high-grade mineralization extends northwards beyond the previous identified Buckreef North Zone mineralized zone and two significant drill-hole intercepts included a 46m wide mineralized zone with a grade of 2.31g/t Au at a depth of 28m and a 14m wide zone with a grade of 1.75g/t Au at a depth 206m.

The diamond drilling core recovery was an average of 93% (Venmyn Deloitte, 2014). Most of the diamond drill-holes commenced with a tricone roller bit where near surface sampling was not required, followed by HQ diameter, which was reduced to NQ/NQ2 when fresh rock was encountered. Ten HQ core holes were drilled at Buckreef to twin anomalous RC and diamond drill-holes as part of a QA/QC program on historical assay practice and grade continuity. PQ metallurgical samples were collected at Buckreef Prospect.

The main objective for this work was to advance Mineral Resources from Inferred to Measured and Indicated categories and to increase the Mineral Reserve.

10.2 Bingwa Prospect

Bingwa lies at the northern margin of the RGB adjacent to a sheared contact with a granitic intrusive and approximately 4km east of Buckreef. Surface exploration and resource definition drilling completed, by previous owners, along the NW-SE control lines are shown in Figure 10.2. An additional 1,500m of RC and 180m of diamond core drilling was completed on the prospect in the period 2012 to 2013 by the company.

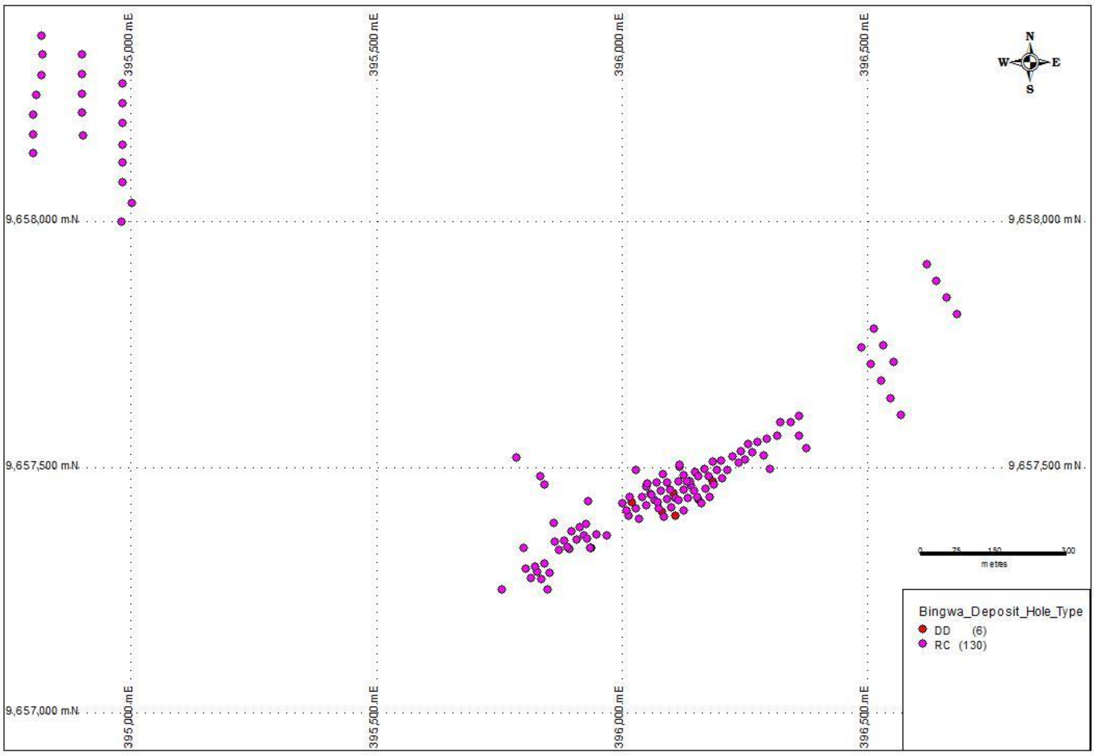


Figure 10.2 Location of Historical RC/DD exploration and Resource drill-holes, Bingwa Deposit, Geita District, Tanzania

Source: TRX 2013

The RC drilling tested the southwest strike and potential down-dip extension of the main Bingwa deposit while the core drilling is to accommodate additional metallurgical and specific gravity analytical test-work. The drilling confirmed gold mineralization over a strike length of 350m and up to 100m below surface with the main zone of mineralisation occurring over a strike length of 150m. The majority of the mineralization defined to date lies in the oxide zone, which extends to 40 to 60m below surface.

The results of this drilling program were used to advance Mineral Resources from Inferred to Measured and Indicated categories and to increase the Mineral Reserve.

10.3 Eastern Porphyry Prospect

Historical exploration work by IAMGOLD identified the Eastern Porphyry as target with potential to host a significant resource that could be added into the Buckreef Project Resource inventory.

Venymn (2012) noted that the historical wide-spaced RC drilling conducted on the Eastern Porphyry Prospect, located on the strike extension of an ENE-WSW trending, 5-30m wide, brittle-ductile fault zone, defined the presence of finely disseminated pyrite and quartz veining slivers of persistent but discontinuous sub parallel zones of quartz porphyry units hosted in the main fault zone over a 300m strike length of continuous gold mineralization associated with quartz veins emplaced in sheared felsic porphyry and dolerite.

An additional 10,814m of RC and diamond core drilling was completed on the prospect in the period 2012 to 2013 by the company. The combined historical and additional surface exploration and resource definition drilling along the NW-SE control lines are shown in Figure 10.3.

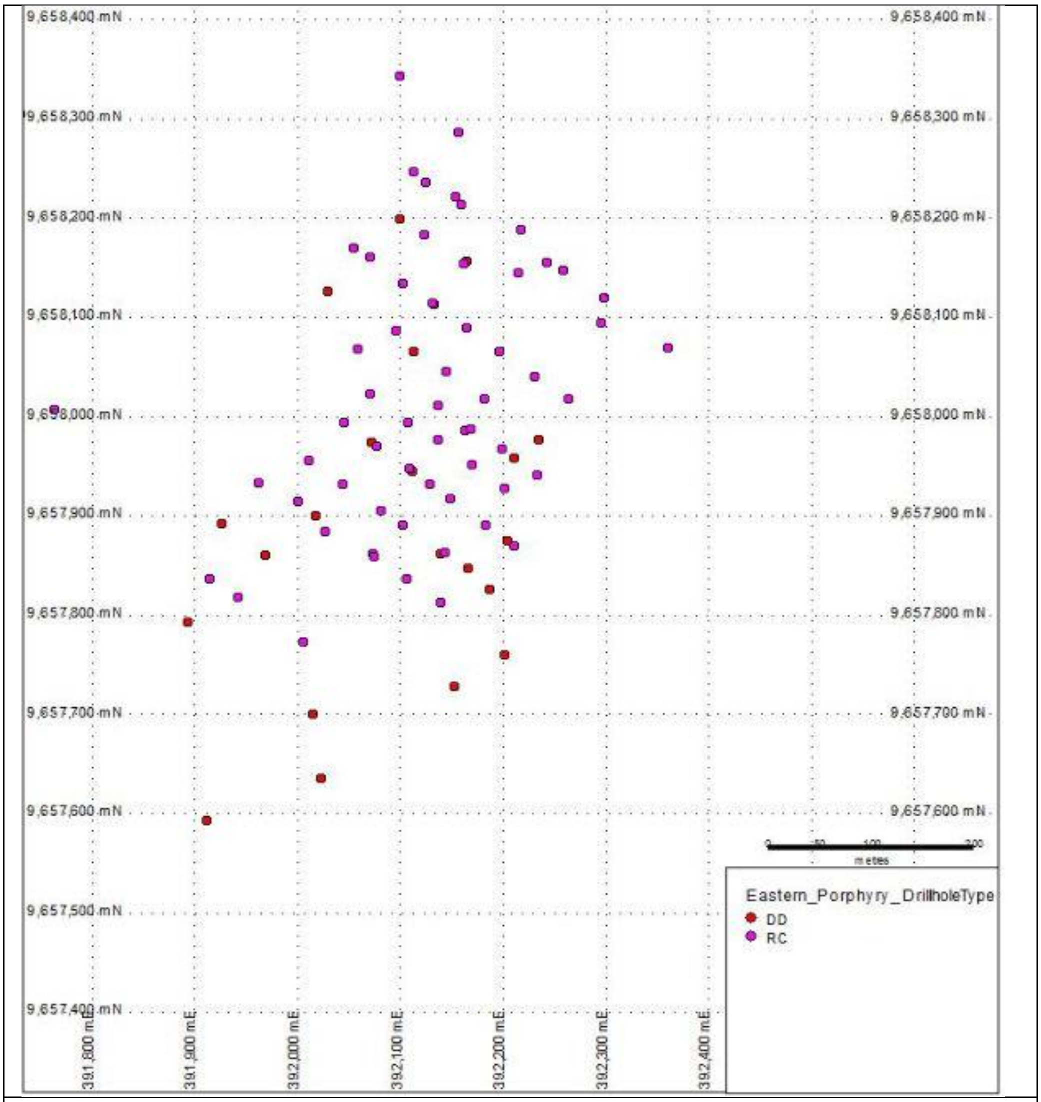


Figure 10.3 Location of Historical RC/DD exploration and Resource drill-holes, Eastern Porphyry Deposit, Geita District, Tanzania

Source: TRX 2012;

10.4 Tembo Prospect

Venymn (2012) noted that the historical RC drilling conducted on the Tembo Prospect, defined gold mineralization within grey quartz stringers, veinlets and boudins (tension zones) all tightly constrained by a 3-5m wide ENE-WSW trending brittle-ductile shear zone hosted in basaltic volcanic units. Historical drilling by IAMGOLD covered a 200m strike length.

Tanzam2000 conducted additional RC and diamond core drilling for metallurgical and specific gravity tests to upgrade the deposit resource from inferred to measured + indicated category. The drilling will also test strike continuity of mineralization to the east (Figure 10.4).

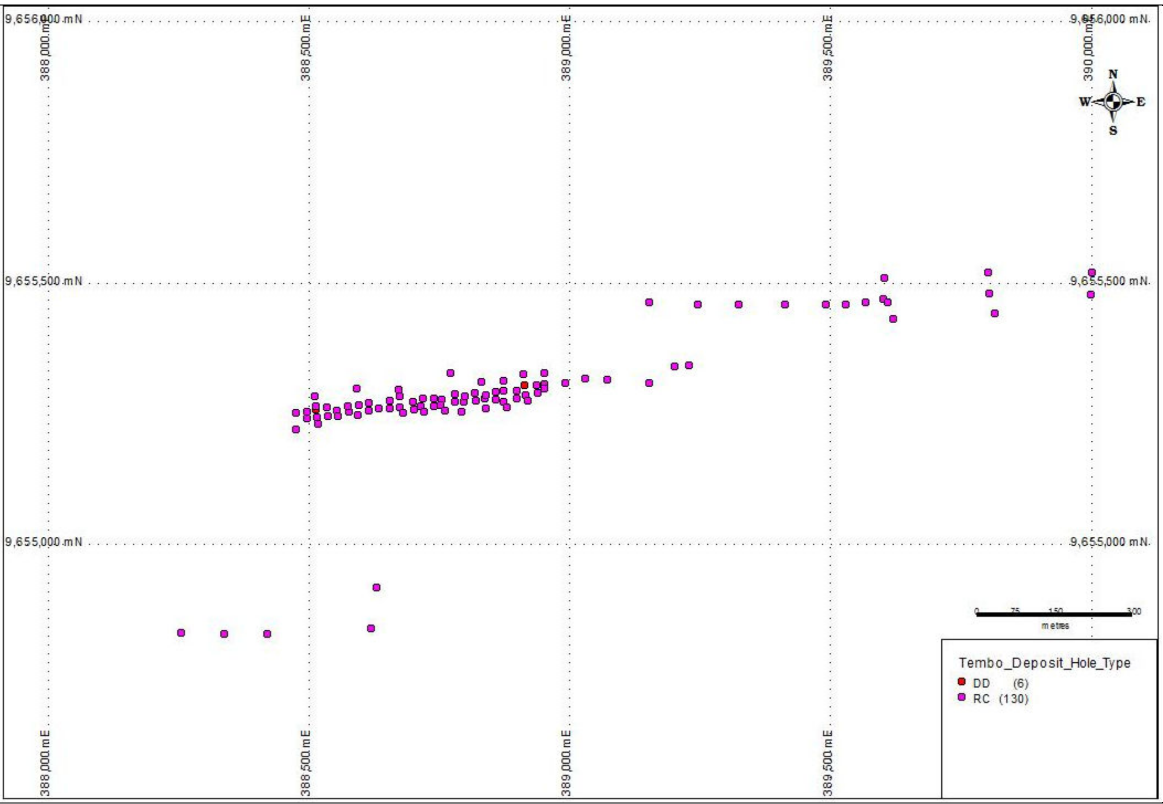


Figure 10.4 Location of Historical RC/DD exploration and Resource drill-holes, Tembo Deposit, Geita District, Tanzania

Source: TRX 2013

The results of this drilling program were used to advance Mineral Resources from Inferred to Measured and Indicated categories and to increase the Mineral Reserve.

11.SAMPLE PREPARATION, ANALYSES AND SECURITY

This section of the report briefly summarizes the sampling methods, sample preparation, assay analysis, and security procedures for surface reverse circulation and diamond drill core sampling as reported and published by Venymn. For detailed descriptions and in-depth discussion of this topic, again the reader is referred to Venymn Independent Projects Technical Reports ITR-VIP21, ITR-VI199R and ITR-VMD1598 completed under NI 43101 standards and amended and filed on the System for Electronic Document Analysis and Retrieval, “SEDAR”, (www.sedar.com).

In brief, the procedures for both RC chips and core samples were developed and documented by the previous operator IAMGOLD and were largely adopted by TANZAM2000 to maintain continuity and congruity. Any changes made by TANZAM2000 were duly noted within the Independent Technical reports mentioned above.

11.1 Core Sampling Methods

Diamond core drilling at the Project was conducted by contractors under the supervision of a qualified geologist. The drill core was then placed in labelled metal trays and depth marker blocks inserted by drilling contractor personnel prior to the removal of the core from the drill site by the project geologist. Upon arrival at the secure core logging facility, the core boxes were sequentially placed in a core rack and the spatial information on each box of core is checked for accuracy and consistency. Prior to any sampling, the drill core was digitally photographed by a geological technician under the supervision of a geologist.

Exploration geologists then logged the core and recorded observations first in a manual log sheet and then subsequently uploaded into a master drill log database. Sample selection were then based such geological considerations as presence of mineralization, favourable structure, presence of alteration halos and quartz veining. The samples were then marked and measured for sampling and identified with one part of a three-part assay tag placed at the end of the sample interval.

Venymn Deloitte noted that the potentially mineralized portion of the drill-core was split in half using a core splitter. One half of the split core was then taken as a sample that was immediately placed in a sample bag by the geologist and identified with an assay tag, whose duplicate copy was kept in the sample book, and the sample number is recorded on the log-sheet prior to entry into the master database. Additional samples on either side of the presumed mineralized section were also collected to close off mineralization as is standard practice.

The split core was then returned to the relevant core-tray and subsequently stored at the Project core-shed where these authors took the opportunity to re-look at some of the logging and sampling as part of Virimai Projects' due diligence prior to compilation of this report.

Blind standards were routinely inserted into the sample sequence prior to delivery to the assay laboratory. Blanks (also routinely inserted every 50 samples and after all noted visible gold) consist of either intervals of un-mineralized core which are identified and flagged prior to shipment to the assay lab or were sourced from a commercial laboratory and inserted into the sample stream prior to shipment.

Sealed sample bags were then transported to the assay laboratory in a timely manner. Upon arrival at the assay lab, samples are received by laboratory personnel and transferred to the laboratory's chain of custody procedures and protocols. Historical exploration companies including IAMGOLD and TANZAM2000 kept a chain of custody as well which was updated throughout the process.

11.2 RC/RAB Sampling Methods

The RC/RAB drilling sampling methodology comprised collection through a cyclone at 1m intervals into large plastic bags. An exploration geologist logged the drill-chips on site as each meter sample was riffle split on site, weighed and moisture content recorded for every meter drilled.

RC holes were stopped if persistent wet samples were encountered. Most RC samples collected since 1992 were homogenized and reduced to 2kg to 3kg on site by passing reduced samples at least 4 times through a single tier Jones riffler, which is demonstrated to be a more representative sample than that produced by stacked three tier splitters. In later years, the entire length of RC and RAB drill-holes was collected as 1m samples with individual RC samples for assaying taken as 3m composites. During composite sampling, the individual 1m riffle split reduced samples were collected in the field and retained for future analysis if warranted.

As with the core samples, unique Sample ID ticket books with corresponding tear off sample tickets were printed and used to record sample details and assay samples.

Both drill core and RC pulp samples were submitted to various ISO accredited laboratories who in turn utilized comprehensive in-house QA/QC measures from sample preparation to instrumental finish and reporting of the results. Equipment was cleaned between batches and crushing and pulverizing was monitored by sieve testing. Routine laboratory Quality Control sampling (pulp duplicates and pulp repeats) was also completed on pulps retained at the laboratory. This provided an indication of any sample preparation/sub-sampling/sample digest and assay error at the primary laboratory.

Both Hellman & Schofield and Venymn Independent Projects subsequently conducted a very intensive and detailed statistical assessment of the QA/QC Data for project area. They both concluded that the historic and recent QA/QC data available provided assurance that the data is not flawed by sampling or assaying bias. Further to that, they also considered the QA/QC performance to be good and the data suitable for incorporation in the published Mineral Resource estimates done in 2007, 2012 and 2014.

12. DATA VERIFICATION

This section of the report summarizes the results of Virimai Projects' due diligence for the data verification for the Buckreef Gold Project.

12.1 Drill Data Review

Mr. Peter T. Zizhou, the General Manager for the Buckreef gold project provided Virimai Projects with the complete drill-hole database used by and geological resource models generated there from by Venymn Deloitte in the compilation of Independent Projects Technical Reports ITR-VIP21, ITR-VI199R and ITR-VMD1598 completed under NI 43-101 standards and amended and filed on the System for Electronic Document Analysis and Retrieval, "SEDAR", (www.sedar.com).

The drill hole database and resource models were supplied as Datamine Studio 3 files with the drill hole files consisting of collar, down-hole survey and interval tables. The resource models were as 3D Datamine Studio 3 wireframe files encompassing discrete mineral zones identified by a zone number in the file name. Block models of the grade estimates were also supplied for these zones.

Surface Digital Terrain Models (DTMs) were supplied for each area and this also included the DTMs at (1) the interface of the oxide and intermediate material and (2) the interface of the intermediate and fresh material.

Virimai Projects then reviewed the data and models to verify the findings as previously reported and published by Venymn Independent Projects. Messrs Wenceslaus Kutekwatekwa, Wonder Mutematsaka and Arimon Ngilazi then visited the site from the 17th to the 19th April 2018 in the company of Mr. Peter T. Zizhou. A further two days, 21st and 22nd April 2018 were spent reviewing the data with MaSS Resources, as the immediate past consultants on the Buckreef project.

12.2 Collar Location Checks

Virimai Projects' team carried out field checks of pre-selected borehole collars on the Buckreef, Eastern Porphyry and Tembo anomalies from the 18th to the 19th of April 2018. The recorded co-ordinates of 20 collars were entered into a hand-held GPS and used to track to the positions in the field. Some of the collars at Buckreef anomaly have since been destroyed during pre-stripping but even so, some evidence was available through residual cement works. Using this method collar location for the surface diamond drill holes are considered to be reliable.

Preserved collar position of BMDD138

Figure 12.1: Ground truthing of hole collars

12.3 Drill hole and Assays Checks

Virimai Projects randomly selected several diamond and RC drill holes, and deliberately selected portions of holes with intersections of mineralization were selected by the Virimai Project team and the Buckreef project personnel and availed the core trays and pulp for inspection and verification logging in the core-shed.

12.4 Geology Checks

Several randomly chosen manual log-sheets for drill-core availed at site were first manually logged to acquaint the Virimai Projects team with the geological units as described in the log-sheets. A comparison with the lithology database then revealed congruency as previously established by Venymn Deloitte. The diamond core drill-hole lengths and lithologic coding for the core drill-holes is thus considered to be reliable.

12.5 Core Assay Checks

During the 18th to May 19th 2018 site visit, Virimai Projects carried out geology and assay checks as a single exercise. Pre-selected holes were laid out by Buckreef staff for verification logging to validate geology, depth of intersections and mineralisation. Comparison was made with the database entries and Virimai Projects found the geological and assay data to be representative of the observed geology and mineralisation.

No assay check samples were collected for this report. Virimai Projects conducted verification of the randomly chosen drill holes to check assay entries against the assay certificates. The assay certificates were obtained in both digital and manual formats directly from the assay laboratories. Virimai Projects’ finding was that the assay database was considered to be reliable.

On the basis of the verified collar, geology and assay data, Virimai Projects deems the data fit for use in resource modelling, grade estimation and subsequent business use.

Figure 12.2: Core and RC pulp logging verification

13.MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Introduction

Chemical analysis, mineralogy, comminution, gravity separation and cyanidation tests have been completed that support the process design criteria for the proposed metallurgical operations. The results of these tests are summarised in this section.

13.2 Previous test work

The following reports of work on the Buckreef deposits have been issued and reviewed:

- Metallurgical Testwork on Buckreef Samples – Geita Gold Mining Ltd, 15th September 2001;
- Scoping and Diagnostic Testwork on Tanzania Samples for Gallery Gold Ltd – IML (Pty) Ltd, September 2003;
- Phase 2 Metallurgical Testwork Summary – IAMGOLD, MPC Project 6011, February 2007
- Metallurgical Test Programme: IAMGOLD, SGS Southdale, 9 March 2009
- Heap leach Amenability Test work - SGS Southdale Metmin Report No 13/527, 16 April 2014

The relevant sections of each of these reports is summarised in order in the sections that follow.

13.3 Metallurgical Testwork on Buckreef Samples – Geita Gold Mining Ltd

Three samples from three drill holes were prepared. For each drill, a composite sample was prepared from 53 sub-samples taken at one-metre intervals along the drill core. The results for these three holes is summarised in Table 13.1.

Table 13.1. Key results from Gieta Gold test work.

		Sample		
	Units	BMRCD 185	BMRCD 191	BMRCD 204
Head grade	g/t	11.7	4.9	2.7
Recovery (direct cyanidation)	%	84	86	77
Recovery (CIL)	%	91	91	77
Cyanide consumption	kg/t	1.0	0.72	1.09
Lime consumption	kg/t	1.17	0.50	0.87

Key observations from this work were the following:

- the gold is leached rapidly, with 80% dissolved within the first two hours;
- the gold is liberated with grinding,
- diagnostic leaching and analysis indicated that the residual gold is refractory, associated with pyrite.

- Arsenic is present at about 22 g/t.

13.4 Scoping and diagnostic test work – Gallery Gold

Leaching tests, diagnostic leaching tests, and mineralogy were conducted by Independent Metallurgical Laboratory (IML), based in Perth, Australia. The leaching results are summarised in the Table 13.2.

Table 13.2. Key results from Gallery Gold test work.

		Sample	
	Units	BMDD023	BMDD222
Head grade	g/t	3.16	6.05
Recovery (direct cyanidation)	%	71.6	87.0
Cyanide consumption	kg/t	0.83	0.58
Lime consumption	kg/t	1.31	1.47

13.5 Phase 2 Metallurgical test work – IAMGOLD

IML performed further test work for IAMGOLD, with MPC acting as consultants. The results of this test work that are relevant to the current project plan are discussed in the sections that follow.

13.5.1 Grinding test work

The bond rod mill and ball mill work indices (BRWI and BBWI, respectively) are given in Table 13.3.

Table 13.3. Milling characteristics.

Item	Unit	Oxide			Primary	
		Buckreef Main Clay	Buckreef Main Rock	Buckreef Main 92	Buckreef Main	Buckreef North
BRWI	kWh/t	10.6	11.4	19.5	21.2	24.3
BBWI	kWh/t	9.9	12.9	22.3	17.5	17.2
Ai		0.014	0.154	0.586	0.424	0.042
Classification		Soft	Soft to moderate	Hard	Moderately hard	Moderately hard

13.5.2 Process selection test work

Process selection test work was undertaken to determine the relative advantages of whole ore leaching, gravity/leaching or gravity/flotation/fine grinding/leaching.

The results of this test work suggested that a gravity/leaching circuit was best suited to this orebody. The comparison of the different options is shown in Table 13.4. The test work indicated that in order to get high recoveries of gold, the flotation tailings must be leached. The consumptions of cyanide and lime were significantly higher in the flotation/fine grinding option.

Table 13.4. Recoveries for different processing options.

Recovery from Process	Unit	Buckreef Main Oxide	Buckreef North Primary	Buckreef Main Primary
Whole Ore Leaching	%	92.7	88.6	85.3
Gravity/Leaching	%	95.5	92.9	92.4
Gravity/Flotation/Leaching	%		81.3	80.2
Gravity/Flotation/Tailings leaching	%		92.1	94.5

The report recommended that the recoveries for the gravity and leaching sections that should be used in the project evaluation are those shown in Table 13.5.

Table 13.5. Recommended recovery assumptions for project evaluation.

Item	Unit	Buckreef Main Oxide	Buckreef North Primary	Buckreef Main Primary
Gravity recovery	%	30	37	41
Leaching recovery	%	65	55	51
Total recovery	%	95	92	92

13.6 Heap leaching test work

The process selection test work conducted summarised in Table 13.4 did not consider heap leaching as a possible option. Consequently, SGS was contracted to performed these tests. The first set of tests were "simulated heap tests' using a bottle roll technique, and the second set were column tests at various column heights. These tests are discussed in the following sections.

13.6.1 Simulated heap tests – SGS 2009

Simulated heap leaching tests were conducted using a bottle roll technique. The 7-day simulated heap leaching tests indicated that the extractions varied between 50.2% and 88.9%. The cyanide consumptions varied between 1.08 kg/t and 3.11 kg/t.

13.6.2 Heap leaching amenability test work – SGS 2016

The recommended height of the heap was determined by pressure percolation tests. The results indicated that the heights are 4.0, 8.2 and 16.5 m for the oxide, transition and primary orebodies, respectively.

Column tests conducted using 4.0 m columns yields leaching extractions of 67.7%, 51.0% and 52.4% for the oxide, transition and primary orebodies, respectively.

13.6.3 Conclusions concerning heap leaching

The heap leaching results were not sufficiently promising compared with those achieved using a gravity recovery and leaching process to justify this process option.

13.7 Conclusions from the test work initiated prior to this study

The process selection test work indicated that the optimal process is a combination of gravity concentration with leaching of the gravity tails. This is the process route that has been proposed in the current study.

13.8 Documentation

Apart from the historical test work that has been summarized in the previous section, test work has been undertaken to specifically support the metallurgical design of the plant for the project. This section is a summary of that supporting documentation. The relevant documents are the following:

(i) REPORT NO 15/059 r1, prepared by Juan van der Merwe of MMSA, dated 11 January 2016; and,

(ii) Project 6011, prepared by Peter Banovich of Metallurgical Project Consultants Pty Ltd, dated February 2011.

These documents are attached as Appendix 13.1 and 13.2, respectively, to this chapter.

13.9 Metallurgical test work.

13.9.1 Purpose of the test work

The process selection work conducted by MPC on behalf of IAMGOLD (attached as Appendix 13.2 to this chapter) indicated that the optimal process for this material is a gravity circuit followed by leaching of the gravity tails. The test work conducted in this study is aimed to specifically provided confirmatory information for design purposes. As a result, the test work does not simulate the process, because that was done and reported in Appendix 13.2. Instead, the test work was intended to determine the design parameters, which are discussed in the sections that follow.

13.9.2 Sample origin

A sample of 3.9 t of material was shipped to Emisha Mining Innovations. This sample consisted of the following two bulk samples:

(i) a composite sample of 2 t of material from Buckreef South and Buckreef Main oxide/transition ore, and

(ii) a composite sample of 1.9 t of material from Buckreef Main sulphide ore.

These samples are referred to here as “oxide” and “sulphide”, respectively. The oxide ore is more weathered, as can be seen in Figure 13.1, while the sulphide ore is more competent, as can be seen in Figure 13.2.

Figure13.1. Oxide ore before milling and after a single pass of milling in the multi-shaft EDS mill. (Source: Emisha Mining Innovations)

Figure13.2. Sulphide ore before milling and after a single pass of milling in the multi-shaft EDS mill.

(Source: Emisha Mining Innovations)

13.10 Grade and deportment

13.10.1 Head grade

The head grade of the oxide and sulphide ores is given in Table 13.6. The oxide ore is lower in grade than the sulphide ore, and possibly displays greater variability.

Table 13.6. Head analysis for gold

(Source: MMSA Report No 15/059 r1)

	Gold analysis, g/t			
Sample	**Replicate 1**	**Replicate 2**	**Replicate 3**	**Average**
Oxide ore	1.76	2.12	1.91	1.93
Sulphide ore	4.73	4.51	4.55	4.60

13.10.2 Gold deportment in the milled material

The deportment of gold by size fraction in the milled product was determined. The results of this analysis are shown in Figures 13.3 and 13.4 for the oxide and sulphide ores, respectively.

The results for the oxide ore indicate that the grade of gold is slightly lower in the fine fractions. Because of the large mass of fine material in the oxide ore, this fraction accounts for most of the gold. These results indicate that there is no justification for discarding a particular size fraction.

The results for the sulphide ore indicate that the grade of gold is relatively evenly distributed with size fraction. A similar conclusion to that reached for the oxide ore is applicable, that is, that these results indicate that there is no justification for discarding a particular size fraction.

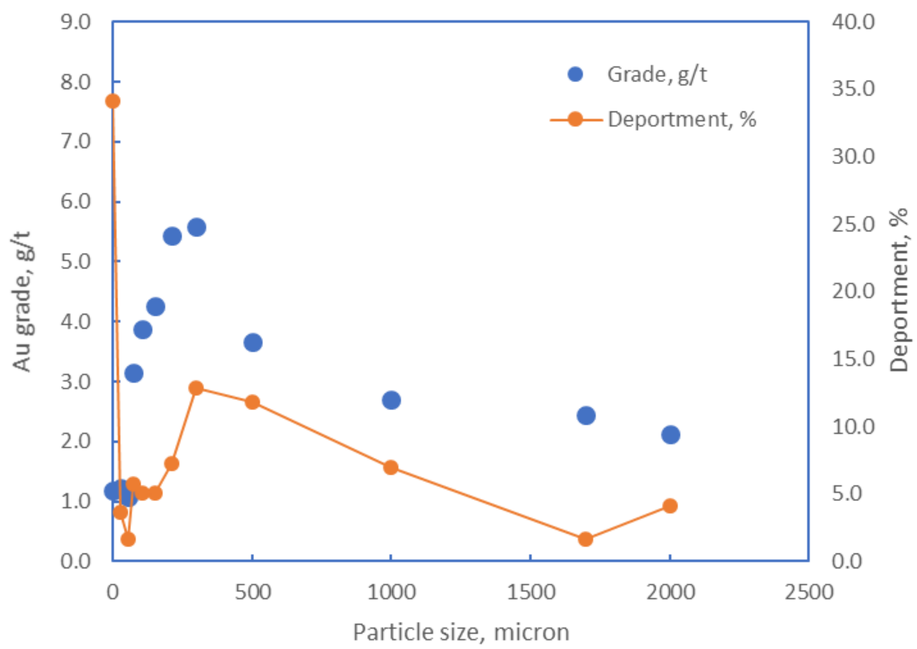


Figure 13.3. Gold grade and deportment by size fraction for the oxide ore, indicating that the gold deportment is higher in the fine fraction, bearing in mind that there is a high fines content of this ore. (Source: MMSA Report No 15/059 r1)

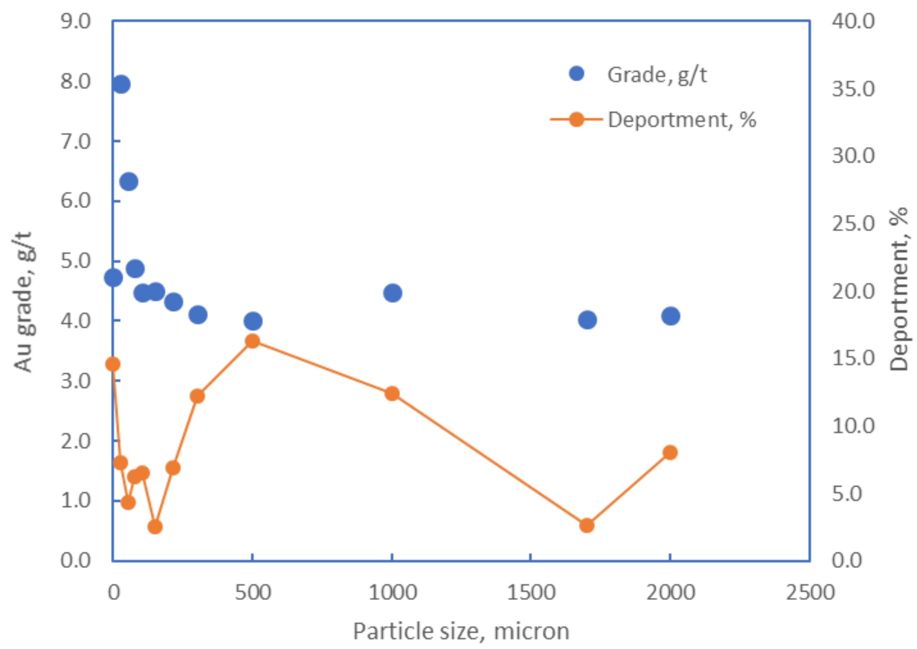


Figure 13.4. Gold grade and deportment by size fraction for the sulphide ore, indicating that the gold is not concentrated in any one size fraction. (Source: MMSA Report No 15/059 r1)

13.11 Milling

13.11.1 Bond milling index

The bond mill indices for the different ore type is given in Table 13.7. The oxide ore is soft, while the sulphide ore is moderately hard.

Table 13.7 Bond mill indices for oxide and sulphide ore materials.

(Source: Phase 2 Metallurgical Test work Summary Project 6011)

Domain	Description	BRWI kWh/t	BBWI kWh/t	AI	Classification
Oxide					
	Buckreef Main Clay	10.6	9.9	0.014	Soft
	Buckreef Main Rock	11.4	12.9	0.154	Medium
	Buckreef Main 92	19.5	22.3	0.586	Hard
	Busolwa Oxide	9.1	8.9	0.052	Soft
	Busolwa Quartz	12.8	19.0	0.335	Soft
	Buziba Oxide	11.1	9.2	0.103	Soft
Sulphide					
	Buckreef Main	21.2	17.5	0.424	Moderately hard
	Buckreef North	24.3	17.2	0.042	Moderately hard
	Busolwa	19.1	15.1	0.131	Moderately hard
	Buziba	23.2	17.6	0.339	Moderately hard

13.11.2 Pilot milling

Both the oxide and sulphide bulk samples were milled in a demonstration-scale multi-shaft EDS mill. This is a unique mill, which is designed to maximize the number of particle-particle impact events to achieve milling. The mill does not require media (balls, rods or ceramics). As a consequence, the weight of mill and the associated infrastructure requirements are substantially reduced. The principle of the EDS multi-shaft mill is shown in Figure 13.5.

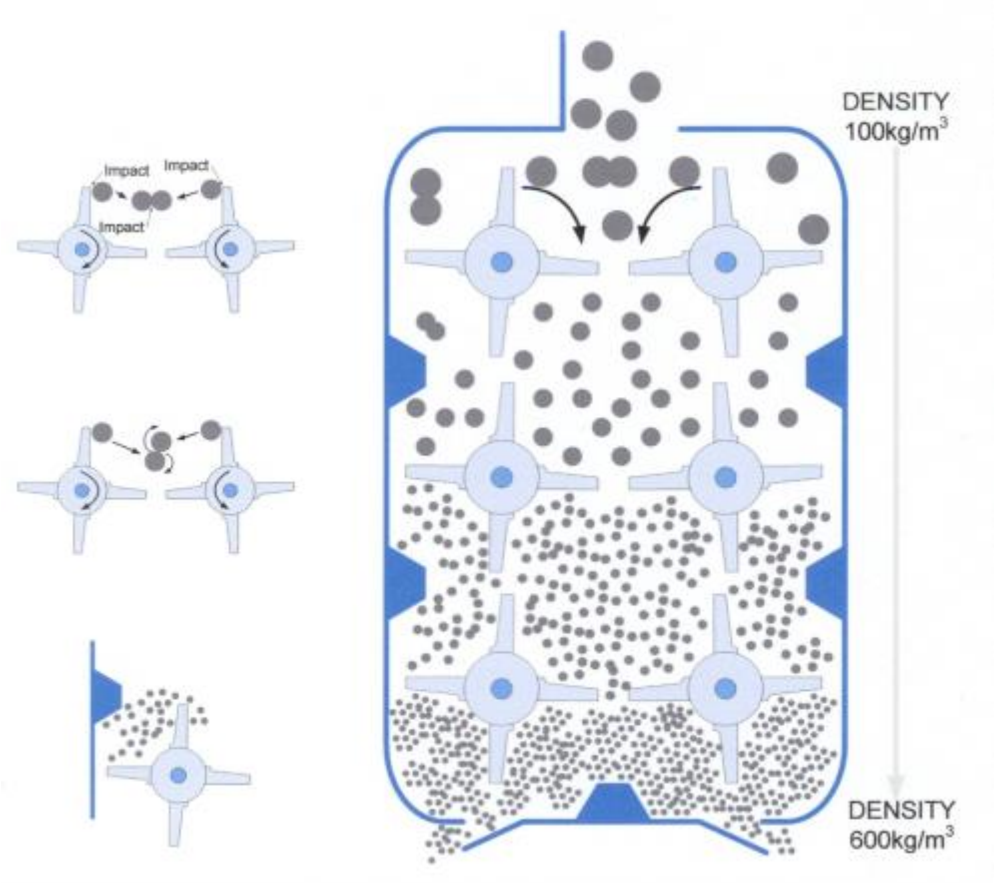


Figure 13.5. Principle of the EDS multi-shaft mill.

The material before and after the milling is shown in Figures 13.1 and 13.2 for the oxide and sulphide ores, respectively. These photographs indicate the effectiveness of a single pass through the EDS multi-shaft mill.

The particle-size distribution for the oxide material after a single milling stage is given in Figure 13.6, and that for the sulphide material is shown in Figure 13.7. These results indicate that the oxide material has a d_{50} of less than 25 µm, while that of the sulphide ore is about 250 µm. This is a direct consequence of the differences in the intrinsic hardness and the feed distribution of the two materials.

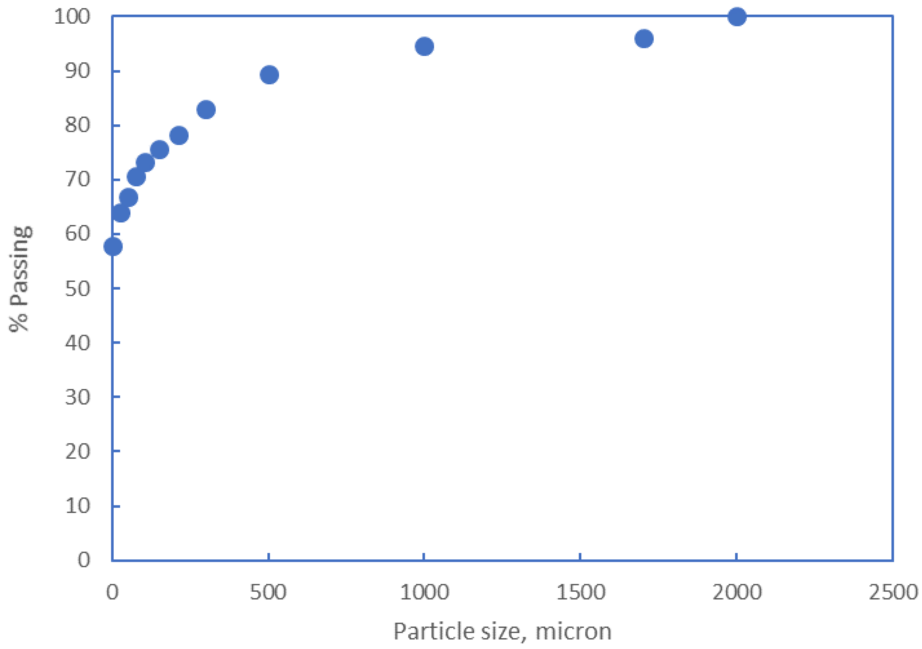


Figure 13.6. Particle-size distribution of the milled (product) oxide ore. (Source: MMSA Report No 15/059 r1)

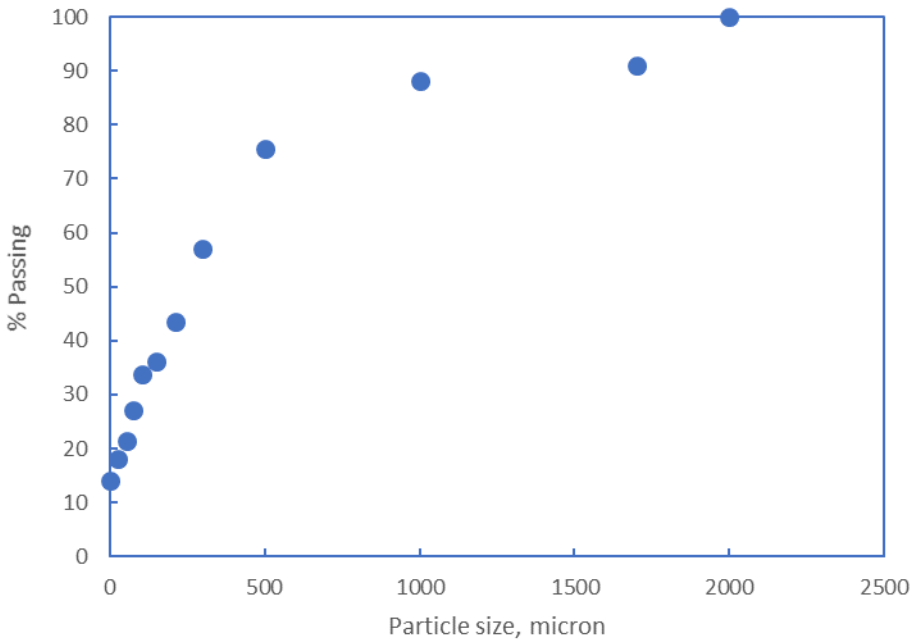


Figure 13.7. Particle-size distribution of the milled (product) sulphide ore. (Source: MMSA Report No 15/059 r1)

13.12 Gravity concentration

Gravity concentration test work was undertaken using a laboratory-scale Falcon L40 concentrator. These tests were conducted as sequential separations with inter-stage grinding. The grinding stages were as received, 50% less than 75 µm and 70% less than 75 µm.

The results of these tests are shown in Figures 13.8 and 13.9 for the oxide ore and the sulphide ore, respectively.

The gravity concentration tests for the oxide ore indicates that more than 50% of the gold can be concentrated in about 4% of the mass with a grade of about 25 g/t.

The gravity concentration tests for the sulphide ore indicates that about 20% of the gold can be concentrated in about 4% of the mass with a grade of about 25 g/t.

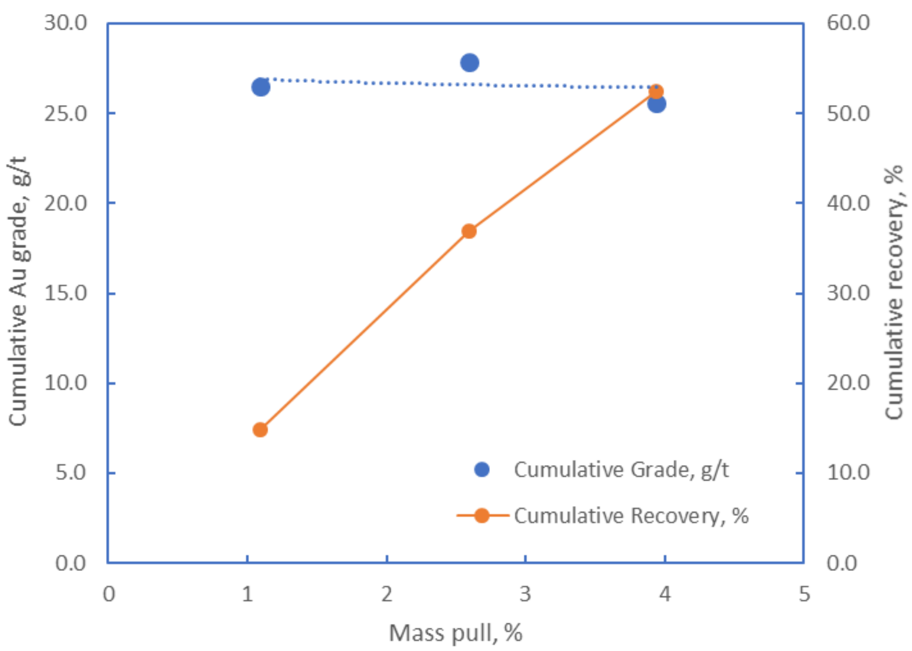


Figure 13.8. Grade and recovery curves against mass pull for the oxide ore using the Falcon L40 concentrator. (Source: MMSA Report No 15/059 r1)

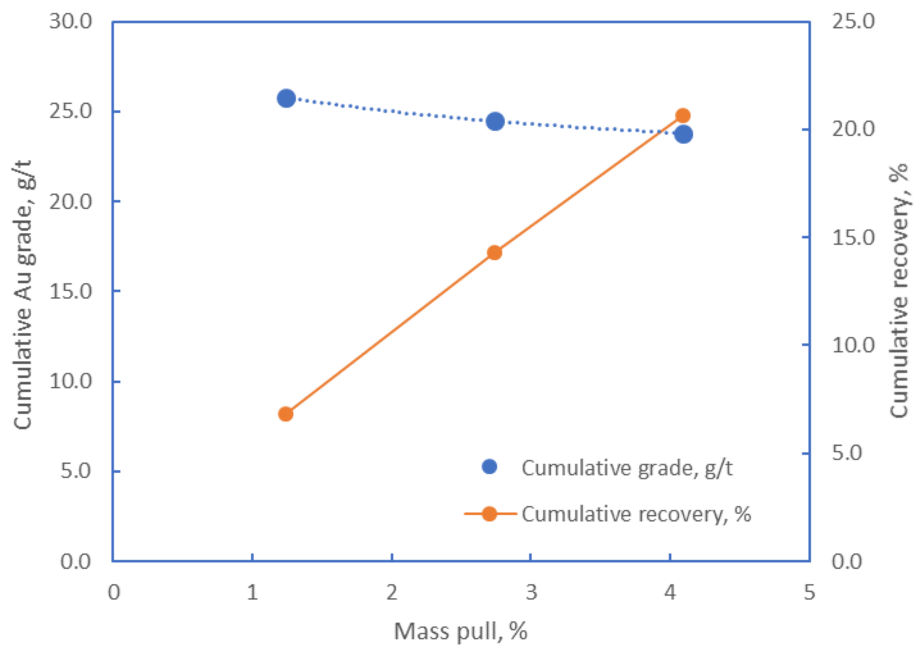


Figure 13.9. Grade and recovery curves against mass pull for the sulphide ore using the Falcon L40 concentrator. (Source: MMSA Report No 15/059 r1)

13.13 Cyanidation

Samples of the as-received ores were ground to a p_{80} of 75 µm and tested with and without the addition of carbon. The results of these tests for the oxide ore and the sulphide ore are shown in Table 13.8. The other conditions of these cyanidation tests are as follows: pH 10.5; NaCN 5 kg/t; cyanidation time 48 h. The cyanide and lime additions are excessive, and the expected cyanide and lime consumptions are closer to those determined in previous test work. See section 2 of this chapter.)

These results indicate that a leach efficiency of 93.8% can be achieved with the addition of carbon for the oxide ore, and 85.4% for the sulphide ore. These results suggest that a carbon-in-leach circuit will be beneficial in the processing of these ores.

Table 13.8. Cyanidation results for the oxide and sulphide ores.

(Source: MMSA Report No 15/059 r1)

Domain	Carbon addition, g/L	NaCN addition, kg/t	CaO addition, kg/t	Leach efficiency, %
Oxide				
	0	5	1.3	82.4
	20	5	1.3	93.8
Sulphide				
	0	5	0.6	79.8
	20	5	0.6	85.4

The MMSA test work summarised in Table 13.8 did not establish the residual concentrations of cyanide and lime after leaching, which means that an accurate estimate of the cyanide and lime consumptions cannot be determined from this test work. Previous work has established the cyanide and lime consumption, and these results are summarised in Table 13.9.

Report Name	Ore Type	Source	Milled Particle size (Microns)	Lime Consumption (kg/t)	NaCN Consumption (kg/t)	Recovery (%)
MPC IAMGOLD Phase 2 Met Testwork Summary Project 6011 Feb 2007	Buckreef Main oxide	Gravity tailings	80% - 106	3.84	1.14	*L=62.3 *G+L=96.9
	Buckreef North Primary	Gravity tailings	80% - 106	1.05	0.59	*L=56.7 *G+L=94.4
	Buckreef Main Primary	Gravity tailings	80% - 106	0.36	0.36	*L=55.9 *G+L=93.9
	Busolwa Main Oxide	Gravity tailings	80% - 106	3.05	1.58	*L=37.2 *G+L=98.0
	Busolwa Main Primary	Gravity tailings	80% - 75	0.78	0.55	*L=53.8 *G+L=98.9
	Buziba Oxide	Gravity tailings	80% - 106	3.19	1.07	*L=43.3 *G+L=97.9
	Buziba Primary	Gravity tailings	80% - 75	0.74	0.34	*L=54.0 *G+L=97.6
MMSA 15/059r1 Report Jan 2016	Sulphides (48 hours)	Ore	As Received	0.6	4.98	71.7
	Oxides (48 hours)	Ore	As Received	1.3	4.98	62.7
	Sulphides No Carbon	Ore	80% - 75	0.6	*5	79.8
	Sulphides with Carbon	Ore	80% - 75	0.6	*5	85.4
	Oxides No Carbon	Ore	80% - 75	1.3	*5	82.4
	Oxides with Carbon	Ore	80% - 75	1.3	*5	93.8
	Sulphides (24 hours)	Ore	As Received	0.6	4.98	70.0
	Oxides (24 hours)	Ore	As Received	1.3	4.98	61.1

*L = Leaching

*G+L = Combined recovery for gravity concentration and cyanidation of gravity tailings

*5 = Cyanide added at the beginning of the testwork and residual cyanide after the testwork was not provided

13.14 Conclusions

Process selection: The test work conducted by MPC and SGS has shown that more than 90% of the gold can be recovered by a combination of gravity concentration and leaching of the tails. The MMSA test work established that 93% of the gold from the oxide ore can be recovered without gravity concentration by carbon-in-pulp leaching. The work established that 85% of the gold from the sulphide can be recovered in a similar manner.

Gold deportment: There does not appear to be a concentration of gold with size fraction.

Gold head grade: The gold head grade for the metallurgical tests varied between 1.5 and 6 g/t Au. For the bulk samples supplied that were milled using the EDS mill, the oxide head grade was about 1.9 g/t and the sulphide head grade was 4.6 g/t.

Milling: The bond mill index for the oxide ore is in the range of 9-12 kWh/t, while that for the sulphide ore is in the range of 19 to 24 kWh/t.

Gravity concentration: The gravity concentration test work confirmed that 50% of the gold can be recovered from the oxide ore, and 20% of the gold from the sulphide ore. The mass pulls in both cases is about 4%.

Leaching: The cyanidation test work confirmed that the gold recovery in the presence of activated carbon for the oxide ore was about 93% and for the sulphide ore was about 85%, without gravity concentration at a grind size of 80% less than 75 µm. The expected cyanide consumption is 1.1 kg/t, and the expected lime consumption is 1.5 kg/t.

13.15 Recommendations

The test work has established the basic process parameters. There is no data on settling and thickening test work, and no data on the tailings storage facility. These aspects should be addressed.

It is recommended that the following test work is conducted:

- A process simulation run of the EDS mill in recirculation mode using a screen size of 100 micron, followed by bulk gravity concentration and bulk leaching of the tailings;
- Site water characterization;
- Settling and thickening test work;
- Tailings characterization;
- Variability test work.

14. MINERAL RESOURCE ESTIMATE

14.1 Introduction

CIM's Definition Standards for Mineral Resources and Mineral Reserves (May 2014) defines a mineral resource as a "concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge."

Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. There is no guarantee that all or any part of the Mineral Resource will be converted into Mineral Reserve. Confidence in the estimate of Inferred Mineral Resources is insufficient to allow the meaningful application of technical and economic parameters or to enable an evaluation of economic viability worthy of public disclosure.

All Mineral Resource estimation review and due diligence work reported in this section was carried out or reviewed by Virimai Projects. This Mineral Resource estimate is based on information and data supplied by Tanzam2000 Limited. On further review, the block models supplied for the four Mineral Resource areas (Buckreef Main, Eastern Porphyry, Tembo and Bingwa), the Buckreef Main and Tembo block models were contentious because Venmyn Deloitte had handed over five different block models for each of these two areas. Furthermore, the supposedly final block models were materially different from the published Mineral Resources in terms of classification for Buckreef Main and both tonnage and classification in the case of Tembo.

14.2 Mineral Resource Estimation Models

Virimai Projects was availed with a Mineral Resource grade models based on the resource models supplied generated by Venmyn Deloitte. The Mineral Resource estimate was informed by both the diamond drilling and reverse circulation drilling results using only samples confined within the Mineral Resource wireframes constructed by CAE Mining in Datamine™ Studio 3 (version 3.21.7164). For the hard boundary grade estimation, Venmyn Deloitte applied the Ordinary Kriging (OK) method in Datamine™ Studio 3 (version 3.20.5321).

The resource models availed for the four deposits considered in this report are listed in Table 14.1. On the 9th of May 2018, Virimai Projects' Arimon Ngilazi and TRX's Peter Zizhou visit to Venmyn Deloitte's offices in Johannesburg to seek clarity on the Buckreef Main and Tembo block models which Venmyn Deloitte had handed to TRX. Furthermore, the supposedly final block models were materially different from the published Mineral Resources in terms of classification for Buckreef Main, and both tonnage and classification in the case of Tembo. Venmyn Deloitte officially identified the correct models on the 10th of May 2018, which Virimai Projects had managed to independently identify during the review. Virimai Projects considered this to be the official handover from which further studies were then conducted. The other block models are deemed to be working models which had been inadvertently handed over.

The resource models availed for the four deposits considered in this report are listed in Table 13.1.

Table 13.1 Buckreef Project Resource models, Geita District, Tanzania

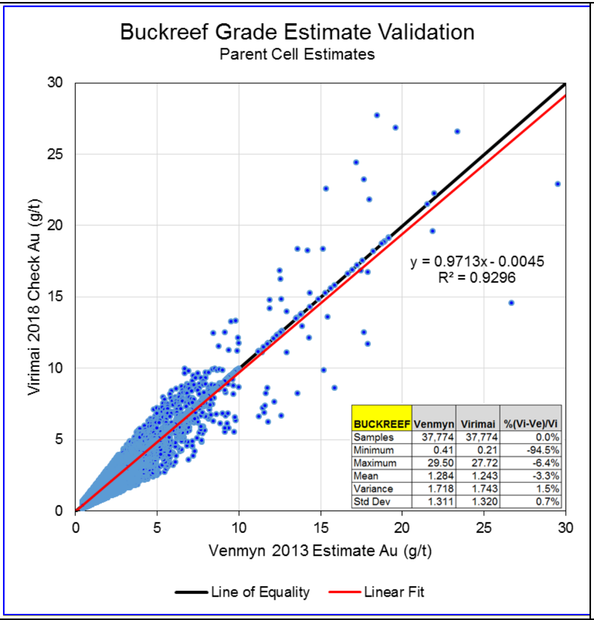
Mineralisation Area		Block Model	Model Type	Comment
1	Buckreef Main	mod_br_uncapped	OrdinaryKriging	Resource only
2	Eastern Porphyry	mod_ep_mixed	OrdinaryKriging	Resource only
3	Tembo	mod_tb_mixed	OrdinaryKriging	Resource only
4	Bingwa	mod_bw_supercap	OrdinaryKriging	Resource only

The block models reflect the general dimensions of the drilling grid that covers each prospect and consist of separate zones with fields for estimated grade, rock code, density and classification among other attributes.

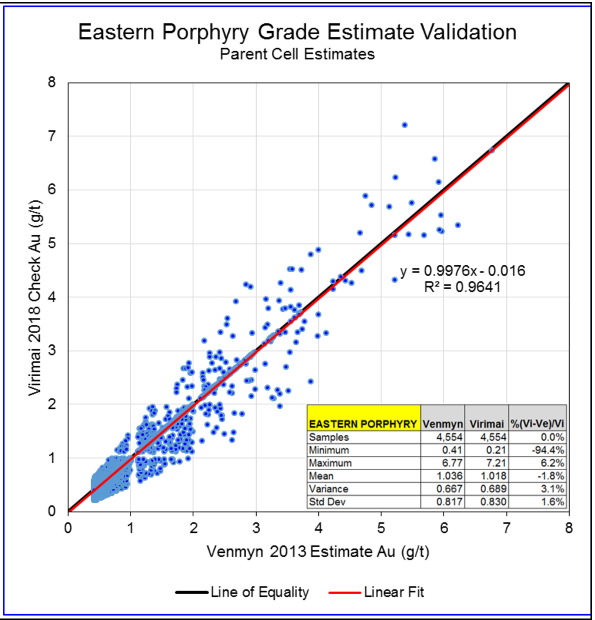
14.3 Mineral Resource Estimation Checks

Virimai Projects carried out inverse distance squared estimate out as a high-level check of the global and local (block by block) of the Venmyn Deloitte ordinary kriging estimates. The comparison is shown in Figure 14.1. Although the estimates are spread around the line of equality, the high-level check validates the robustness of the Venmyn Deloitte estimates.

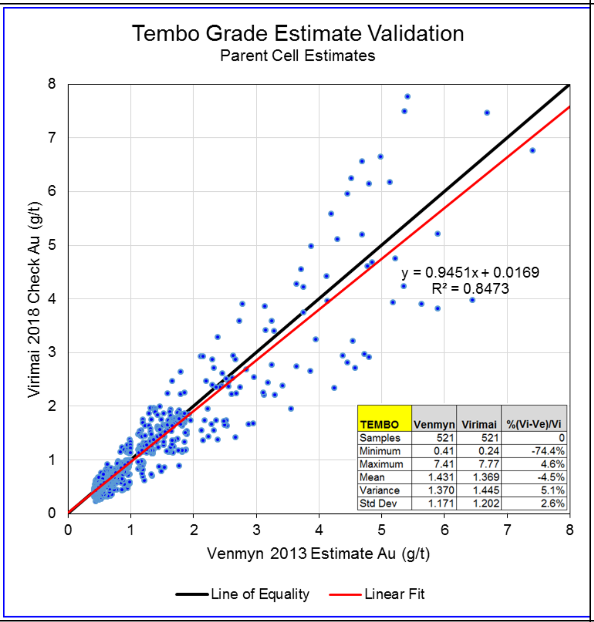
Virimai Projects also validated the block models using swathe analysis where the average of length weighted sample grades within a 100 m wide corridor for Buckreef and 50 m for the other prospects were compared to block model grades within the same swathe. This was done in order to verify that the block models correctly reflected the average of the sample grades within the same swathe (Figure 14.2). The results generally show the same trend as the sample grades and the expected smoothening effect of the ordinary kriging process with very high/low sample grades being moderated by the low/high sample grades in the neighbourhood.



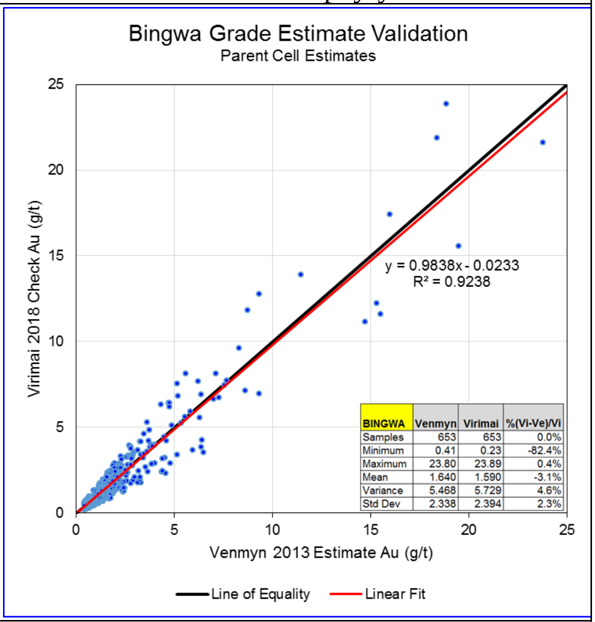
Buckreef



Eastern Porphyry

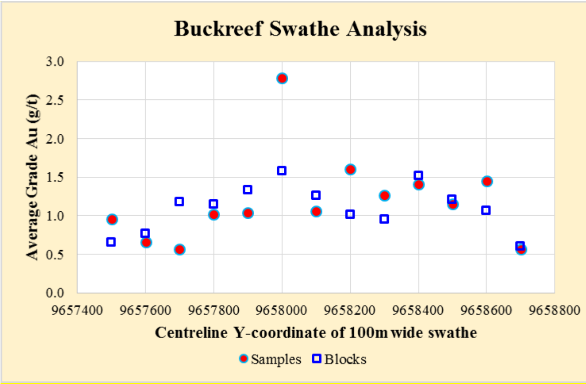


Tembo

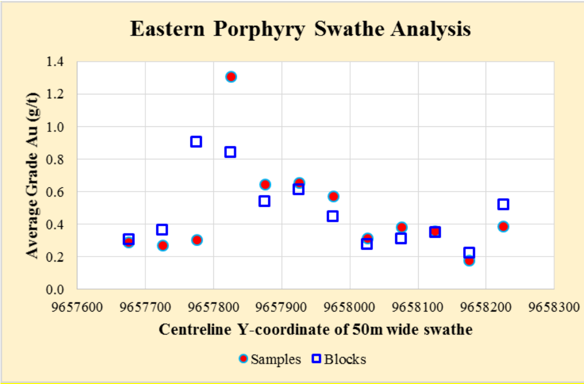


Bingwa

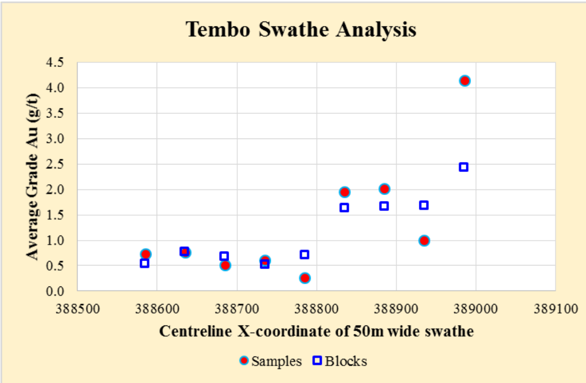
Figure 14.1: Virimai Projects block grade checks



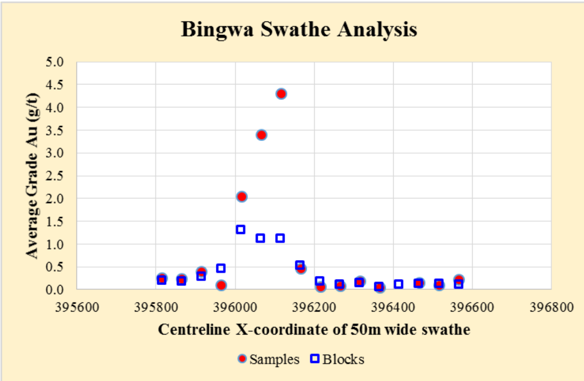
Buckreef



Eastern Porphyry



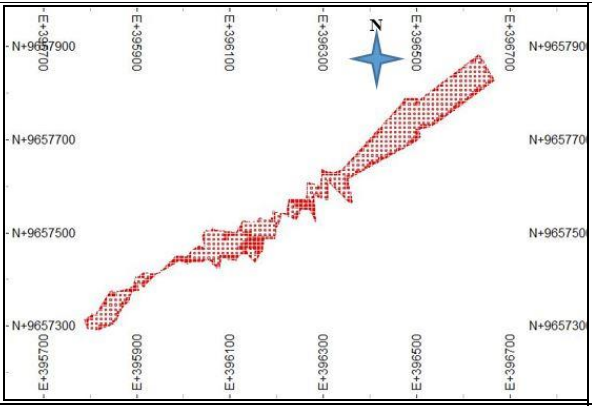
Tembo



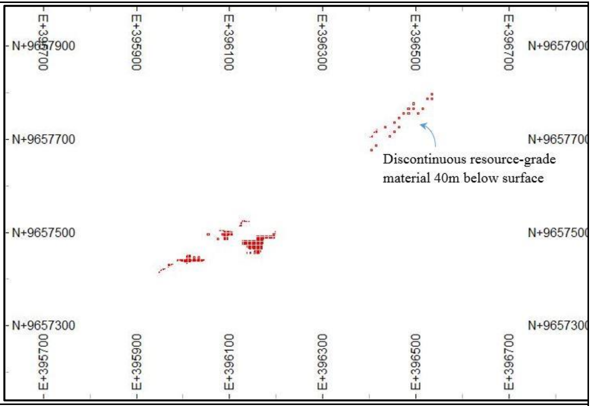
Bingwa

Figure 14.2: Virimai Projects average sample grade compared to average estimated block grade checks

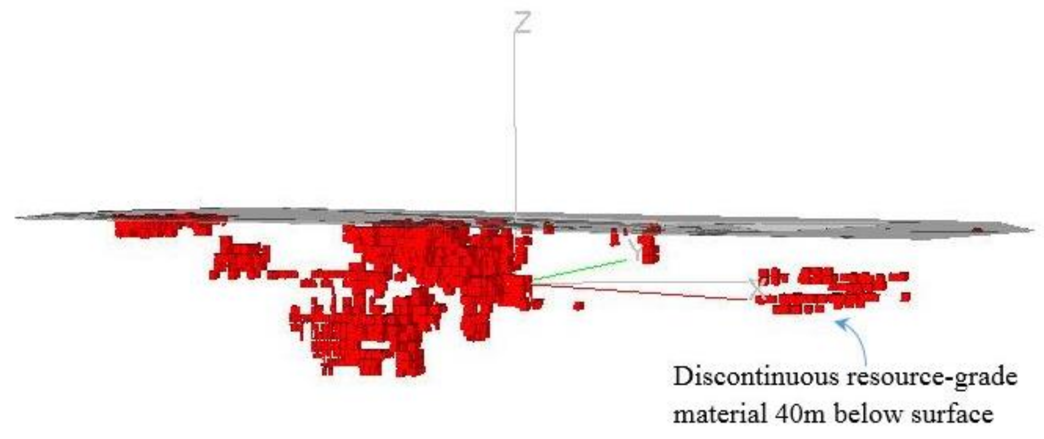
It is pertinent to note that the Bingwa average grades drop below 0.50 g/t from the easting X+396200 (Figure 14.2). The model checks showed that in the north-eastern half of the strike, continuity is poor and resource grades only start at about 40 m below surface (Figure 14.3). The exclusion of this portion is reflected in the difference of the mineable resources declared by Virimai Projects in Table 14.1.



Plan view of resource model



Plan view of resource model at 0.50 g/t cut-off



3D perspective view facing north-west at 0.50 g/t cut off

Figure 14.3: Bingwa model grade distribution checks

Given the checks carried out as outlined, Virimai Projects accepted and adopted the Venmyn Deloitte resource and grade models as being acceptable for further use in mining and economic studies.

The NI-43101 compliant Mineral Resource estimate as revised by Virimai Projects is shown Table 14.2.

Table 14.2: Buckreef Project May 2018 Mineral Resource Estimate at 0.50g/t cut-off grade

Prospect	Measured			Indicated			Inferred			Total Measured + Indicated		
	Tonnes (Mt)	Grade Au (g/t)	Content Au (Oz)	Tonnes (Mt)	Grade Au (g/t)	Content Au (Oz)	Tonnes (Mt)	Grade Au (g/t)	Content Au (Oz)	Tonnes (Mt)	Grade Au (g/t)	Content Au (Oz)
Buckreef	8.90	1.72	491,368	13.09	1.41	594,097	7.52	1.33	322,819	**21.99**	**1.54**	**1,085,465**
Eastern Porphyry	0.09	1.20	3,366	1.02	1.17	38,339	1.24	1.39	55,380	**1.10**	**1.18**	**41,705**
Tembo	0.02	0.99	531	0.19	1.77	10,518	0.27	1.92	16,461	**0.20**	**1.70**	**11,048**
Bingwa	0.90	2.84	82,145	0.49	1.48	23,331	0.22	1.49	10,541	**1.39**	**2.36**	**105,477**
Total	**9.90**	**1.81**	**577,411**	**14.79**	**1.40**	**666,285**	**9.25**	**1.36**	**405,201**	**24.69**	**1.57**	**1,243,696**

Table 14.3 summarises the differences in the 2014 and 2018 Mineral Resource estimates due to the validation process by Virimai Projects on the geological models supplied by Venymn Deloitte.

Table 14.3: Buckreef Project Comparative Mineral Resource

		Virimai May 2018 @ 0.50g/t Au cut-off				Venmyn Jan 2014 @ 0.50 g/t Au cut-off				Virimai - Venmyn	
Prospect Name	Resource Category	Tonnes (Mt)	Grade Au (g/t)	In Situ Gold Content		Tonnes (Mt)	Grade Au (g/t)	In Situ Gold Content		Virimai Projects	
				kg	oz			kg	oz	Tonnes	Content
Buckreef	Measured	8.90	1.72	15,283	491,368	8.90	1.72	15,288	491,526	0.0%	0.0%
	Indicated	13.09	1.41	18,479	594,097	13.10	1.41	18,490	594,452	-0.1%	-0.1%
	Inferred	7.52	1.33	10,041	322,819	7.53	1.33	10,043	322,900	0.0%	0.0%
Total Measured + Indicated		**21.99**	**1.54**	**33,762**	**1,085,465**	**22.00**	**1.54**	**33,778**	**1,085,978**	**0.0%**	**0.0%**
Eastern Porphyry	Measured	0.09	1.20	105	3,366	0.09	1.20	105	3,366	0.0%	0.0%
	Indicated	1.02	1.17	1,192	38,339	1.02	1.17	1,193	38,354	0.0%	0.0%
	Inferred	1.24	1.39	1,723	55,380	1.24	1.39	1,725	55,476	-0.1%	-0.2%
Total Measured + Indicated		**1.10**	**1.18**	**1,297**	**41,705**	**1.10**	**1.18**	**1,298**	**41,721**	**0.0%**	**0.0%**
Tembo	Measured	0.02	0.99	17	531	0.02	0.99	17	531	0.0%	0.0%
	Indicated	0.19	1.77	327	10,518	0.19	1.77	327	10,518	0.0%	0.0%
	Inferred	0.27	1.92	512	16,461	0.27	1.93	514	16,521	-0.2%	-0.4%
Total Measured + Indicated		**0.20**	**1.70**	**344**	**11,048**	**0.20**	**1.70**	**344**	**11,048**	**0.0%**	**0.0%**
Bingwa	Measured	0.90	2.84	2,555	82,145	0.91	2.83	2,563	82,386	-0.9%	-0.3%
	Indicated	0.49	1.48	726	23,331	0.57	1.38	786	25,274	-15.8%	-8.3%
	Inferred	0.22	1.49	328	10,541	0.31	1.29	402	12,922	-42.3%	-22.6%
Total Measured + Indicated		**1.39**	**2.36**	**3,281**	**105,477**	**1.48**	**2.27**	**3,349**	**107,660**	**-6.1%**	**-2.1%**
Grand Total	**Measured**	**9.90**	**1.81**	**17,960**	**577,411**	**9.91**	**1.81**	**17,972**	**577,810**	-0.1%	-0.1%
	Indicated	**14.79**	**1.40**	**20,724**	**666,285**	**14.87**	**1.40**	**20,796**	**668,598**	-0.6%	-0.3%
	Inferred	**9.25**	**1.36**	**12,603**	**405,201**	**9.35**	**1.36**	**12,685**	**407,819**	-1.1%	-0.6%
Measured + Indicated		**24.69**	**1.57**	**38,684**	**1,243,696**	**24.78**	**1.56**	**38,768**	**1,246,408**	**-0.4%**	**-0.2%**

Note:

1. Virimai Projects "lost" some 10,730t from re-modelling of surface DTM by extending it constrain blocks projecting above surface.

2. Virimai Projects restated Bingwa Resources to exclude the North-eastern portion which has deep seated, discontinuous resource grade pockets

Given that the valid reasons outlined above, Virimai Projects has modified the Mineral Resource estimates for classification into Measured, Indicated and Inferred categories and thus takes full responsibility for the updated Mineral Resource and considers the data to be reliable.

14.4 Mineral Resources and Conclusions

There is a fair amount of Inferred Mineral Resources from surface to about 200 m below surface the envisaged open-pit mining depth. In order to upgrade only the mineable resources, Virimai Projects recommends that some infill drilling be carried out prior to the feasibility study primarily in order to upgrade the Inferred Mineral Resources within the reserve shell. During that process, it is expected that some Indicated Mineral Resources will be upgraded to Measured Mineral Resources. There are 29 recommended holes totalling 4,463 m laid out as shown in Figure 14.4.

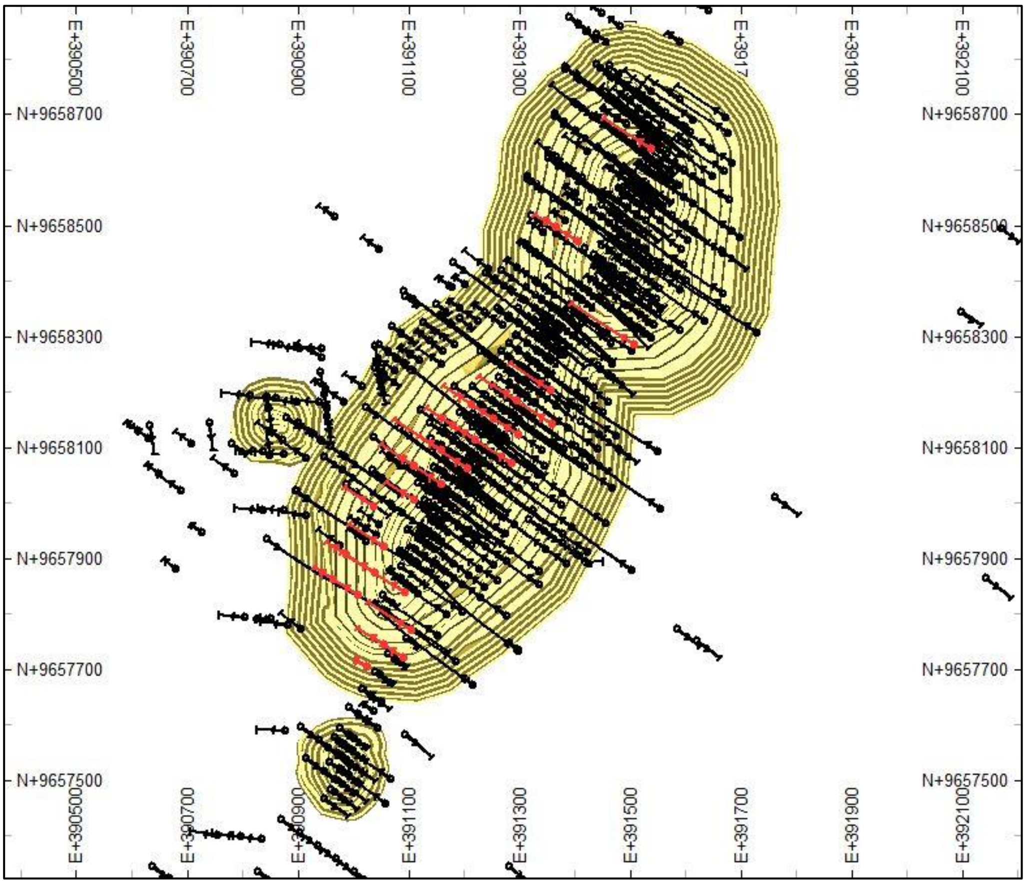
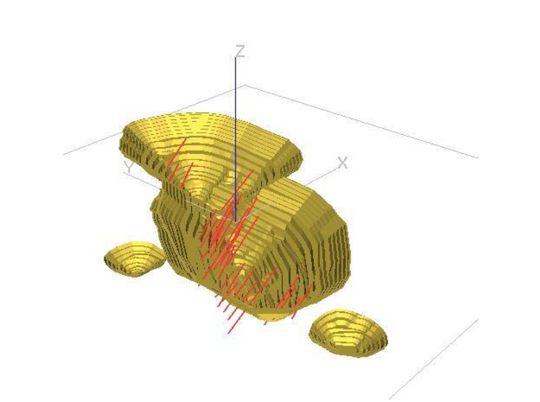
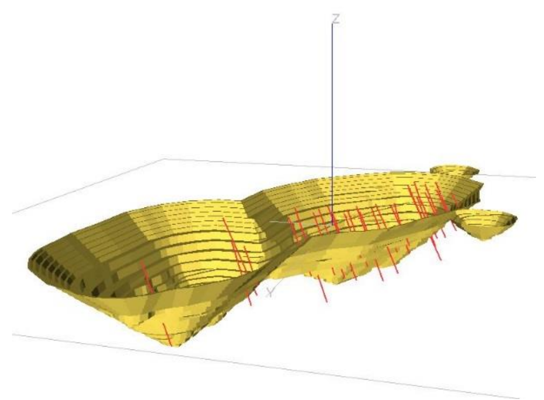


Figure 14.4: Plan view of infill (red) and existing (black) drill holes in red superimposed on the resource shell

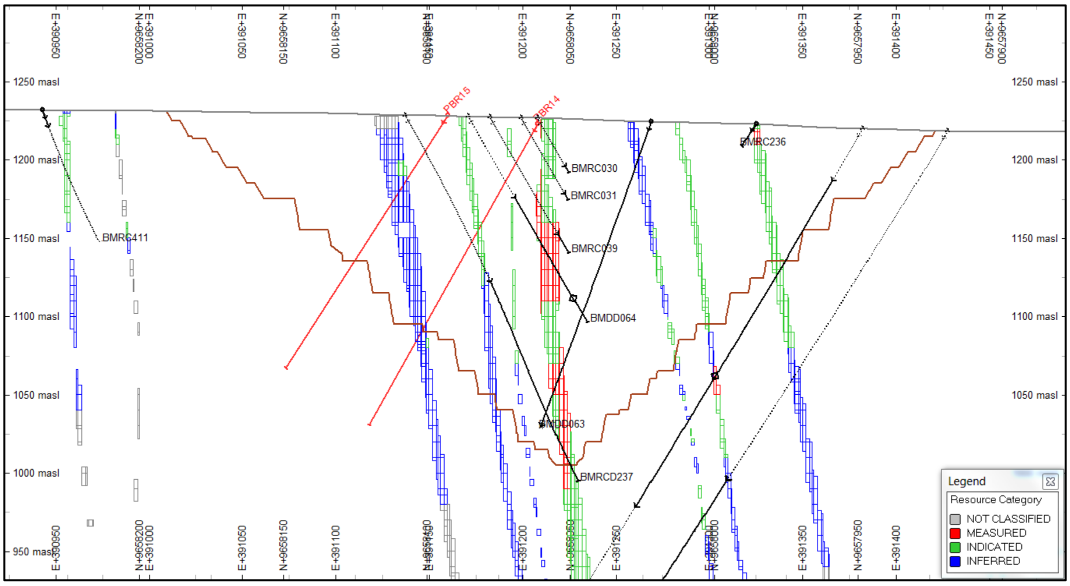
As shown in Figure 14.5, the planned holes do not necessarily terminate at the pit shell boundaries as there is an exploration component for extension beyond the pit limits as currently optimised. Therefore, there is scope to optimise the drilling programme at the execution stage to suit the compelling objectives of the feasibility study.



Perspective view of planned holes facing NE



Perspective view of planned holes facing SSE



Cross section view of classifed blocks, planned (red) and existing (black) drill holes facing NE

Figure 14.5: Different views of the planned drill holes showing pit outline

The estimated cost of the infill drilling to be carried out in two months are summarised in Table 14.4 based on the proposed hole parameters in Table 14.5. The drilling is expected to start in July 2018.

Table 14.4: Buckreef Project: Resource Upgrade Drilling Proposal Budget

Item	Month 1	Month 2	Totals
Drilling Costs-Contractor (RC Drilling)	$162,000	$239,670	$401,670
Contractors –Mobilisation and Demobilisation	$10,000	$0	$10,000
Consumables Sample bags	$1,350	$1,997	$3,347
Consumables Packaging	$90	$133	$223
Consumables QAQC Standards (4 CRMs)	$450	$666	$1,116
Consumables Ticket books	$288	$426	$714
Sample delivery (Truck/fuel/Accommodation)	$300	$300	$600
Assay/analysis	$28,350	$41,942	$70,292
Contingency (5%)	$10,141	$14,257	$24,398
Totals	**$212,969**	**$299,391**	**$512,361**

Table 14.5: Buckreef Main proposed infill drill holes

BHID	XCOLLAR	YCOLLAR	ZCOLLAR	DIP	AZIMUTH	DEPTH (m)
PBR01	391539	9658636	1224	55	303	186
PBR02	391407	9658469	1227	65	303	151
PBR03	391367	9658495	1229	60	303	93
PBR04	391509	9658283	1227	50	303	222
PBR05	391359	9658202	1218	55	303	168
PBR06	391297	9658182	1229	60	303	269
PBR07	391362	9658141	1228	60	303	173
PBR08	391255	9658150	1226	60	303	203
PBR09	391215	9658177	1229	60	303	164
PBR10	391300	9658121	1224	60	303	220
PBR11	391182	9658138	1228	60	303	122
PBR12	391222	9658112	1225	60	303	164
PBR13	391288	9658069	1219	60	303	115
PBR14	391208	9658061	1223	60	303	220
PBR15	391160	9658093	1228	55	303	192
PBR16	391161	9658033	1225	55	303	150
PBR17	391111	9658065	1230	55	303	122
PBR18	391112	9658005	1222	65	303	147
PBR19	391038	9657993	1231	55	303	115
PBR20	391058	9657920	1223	60	303	153
PBR21	391095	9657837	1226	55	303	237
PBR22	391041	9657872	1228	55	303	173
PBR23	390990	9657905	1227	55	303	147
PBR24	391108	9657769	1225	55	303	82
PBR25	390966	9657861	1228	65	303	111
PBR26	391011	9657832	1227	55	303	137
PBR27	391057	9657742	1225	60	303	112
PBR28	391094	9657718	1224	50	303	67
PBR29	391027	9657702	1223	60	303	48
Total metres proposed						**4,463**

15. MINERAL RESERVE ESTIMATE

15.1 Introduction

This section describes the Mineral Reserves estimation process completed by Virimai Projects in June 2018. By definition a Mineral Reserve is the economically mineable part of a Measured or Indicated Mineral Resource demonstrated by at least a Preliminary Feasibility Study. The Study must include adequate information on mining, processing, metallurgical, economic and other relevant factors that demonstrate, at the time of reporting, that economic extraction can be justified. The Mineral Reserve takes into account diluting material that will be mined in conjunction with the economic mineralized rock and delivered to the processing plant also takes into account the likely unrecoverable material that will be either left in the ground or will be associated with disposed waste rock.

Further, the Mineral Reserves are classified as only **Proven** and/or **Probable** in accordance with the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) classification of NI 43-101 Resource and Reserve definitions, and the Companion Policy 43-101CP.

In the calculation of reserves the most important step is to ascertain the portion of mineral resource that can be mined economically. Various parameters are put together and used as inputs for the purpose of carrying out criteria-based computations, in the process of defining economic limits of the orebody. In case of surface mining, these computations are done through a process known as Pit Optimization which is performed by using a well-known Lerch's-Grossman algorithm. The algorithm is implemented in various mine planning software applications such as Geovia Whittle, NPV Scheduler and many others. Given the right input parameters such as geological block model grades, rock classification, mining and processing costs, metal recoveries, geo-technical parameters and the metal price, the software generates a series of nested pit shells. For the purposes of pit optimization, costs are grouped into five key categories as mining, processing, selling, rehabilitation/reclamation and general/administration costs.

From optimization results, final pit shell is selected usually on the basis that it in general maximizes undiscounted or discounted cash flow at the given economic parameters and the applied physical constraints; however, it can also be selected by considering other factors such as the maximum quantity of metal product being able to realistically produce without adversely affecting the overall economic outcome of the project.

Once the optimal pit shell is selected, it is necessary to carry out designs for the purpose of putting into consideration various practical aspects such as access ramps, benched pit walls, geotechnical berms, minimum mining widths and pit phasing. Using the created pit designs, mineral reserves are calculated within those designs to determine tonnage and grade only of the **indicated** and **measured** part of the mineral resources, which are respectively converted to **probable** and **proven** mineral reserves. An economic cut-off grade is usually applied in the calculation to discriminate ore and waste that fall within the designed pit. Mined rock material of grade below cut-off grade would not be profitable if processed basing on the prevailing economic and technological conditions; these materials together with completely barren rock are reported as waste. Reserves estimates presented in this report followed this process and include four deposits that are Buckreef, Eastern Porphyry, Bingwa and Tembo. These deposits contain gold mineralization starting from near the ground surface with generally continued spatial distribution in a manner that is suitable for surface mining particularly open pit mining method.

15.2 Open Pit Mining

Considering that all the four deposits somehow start from or near the ground surface, Open Pit mining method was a logical choice made by Virimai Projects in completing reserves preparation.

Open pit mining involves cutting vertical or subvertical faces in the ground with reasonable step-ins technically known as benches. Access between benches to the lowest one, is via inclined ramps wrapping around the wall of the pit. Ramps are developed progressively as the pit continues to develop downward. Open pit design follows as closely as possible the selected pit shell in order to stay within expected economic limits. Design also follows geotechnical recommendations in order to ensure long term stability of the mine and reduced risks wall failures .

15.3 Resource Block Model

Virimai Projects used resources models discussed in chapter 14 of this report for completing mine planning. The model contains among many others important attributes including gold grade field, rock type coding, ore zones coding, mineral resources classification field etc.

15.4 Open Pit Optimization

Pit optimisations were done using Lerch-Grossman algorithm available in Whittle software. The geological block models were imported into the software considering no depletion of any mined surfaces. The input parameters used in running pit optimisations are shown in Tables below.

Table 15.1: Key Economic Parameters

Parameters	Value	Units
Long Term Gold Price - Reserves	1,300	$/Oz
Long Term Gold Price - Resources	1,600	$/Oz
Gov. Royalties	6.00	%
Export Fee	1.00	%
Other Applicable Fees (Local Service Levy)	0.30	%
Discount Rate	8.00	%
Other Selling Costs (Smelting, Insurance, Security etc)	4.40	$/Oz
Exchange Rate	2,250	TZS/USD
Fuel/Diesel Price	1.20	$/L

Table 15.2: Main Operating Constraints

Parameters	Value	Units
Maximum Mining Limit	14.00	Mtpa
Processing Limit	1.45	Mtpa
Ore Dilution (External)	5.00	%
Ore Loss	5.00	%
Call factor	100.00	%

For running optimizations geotechnical parameters are an integral part and must be understood and applied correctly. Since optimization shells do not include access ramps and/or geotechnical berms, it is vital that sufficient allowance is made to account for these berms and possible geotechnical stability step offs.

Table 15.3: Geotechnical Parameters

Inter-ramp Slope Angle	**Weathered/Soft**	**Transitional**	**Fresh Rock**
For Pit Design (Degrees)	**29**	**46**	**52**
For Optimization (Degrees)	**28**	**44**	**47**
Flattening for Ramps (Degrees)	**-1**	**-2**	**-5**

It is noted that the hard rock part has been penalized with higher IRA flattening in order to account for ramps wrapping around the pit walls several times. Geotechnical berms are also taken into consideration.

Table 15.4: Processing Parameters

Processing	**Units**	**Oxide**	**Trans**	**Hard**
Recoveries	%	92.33%	92.33%	85.50%
Processing Cost	($/t)	10.09	10.09	10.24
Rehabilitation Cost	($/t)	0.03	0.03	0.03
G&A Costs	($/t)	1.98	1.98	1.98
Total Ore Cost	($/t)	12.10	12.10	12.25

The following is a summary of the outcome of pit optimization for the four deposits.

- There are in total 4 possible push-backs for Buckreef Pit.
- Bingwa is a single pushback to the final limits
- Eastern Porphyry is also a single pushback to the final limits
- Tembo is mined to the ultimate pit limits in one single phase also.

Optimizations were carried out based on $1300/Oz gold price where by nested pit shells were create using a range of revenue factors between 0.3 and 2 at $20 increments for each deposit.

Analysis for each of the pits was completed resulting in cashflow summaries and charts showing various metrics including discounted and undiscounted cashflow useful for decision making in shell selection.

Guided by the corporate policy where by the company intends to maximize gold production at the best possible economic value, pitshells selected were not necessarily of highest undiscounted cash flow as shown in the charts for each deposit. Selected pits strike a balance between best pit value and gold ounces produce to also maximize mine life which give optionality for developing other potential targets within the area.

15.4.1 Buckreef Pit

Due to its relatively larger size, Buckreef pit was split into a total of four phases; as a result, its overall value improved significantly by differing waste stripping and improves cash flow in the early years of its life.

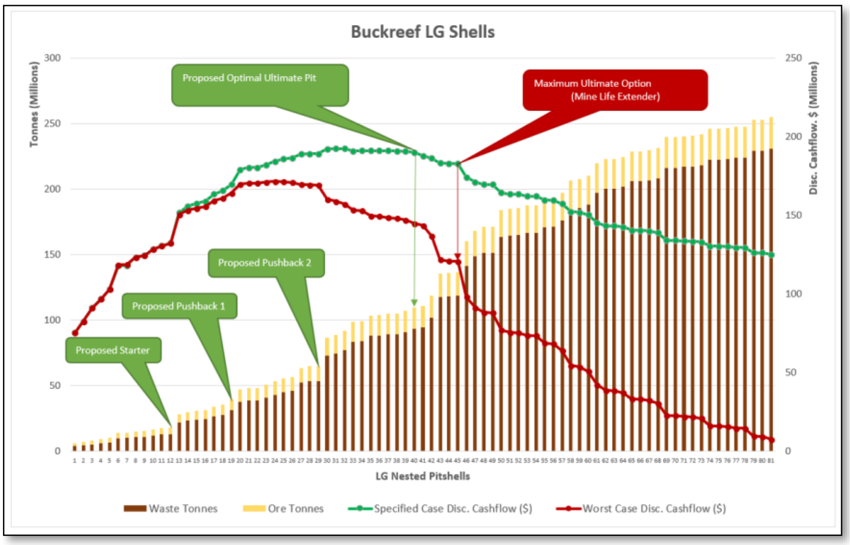


Figure 15-1: Pit by Pit Graph for Buckreef Pit

Buckreef has been determined to be mineable in 4 phases; which by doing so would allow for deferment of waste stripping hence improve cashflow in the earlier years. Pit shell number 12 was selected to be Phase One or the starter pit, Pit shell number 19 Phase Two, pit shell 29 phase three and the final pit shell was 49. By looking at pit by pit graphs, usually at step changes represent significant pits shell size change hence suitable for picking pit phases.

Isometric view of the selected pit shells with ore blocks as presented below, depict that Buckreef pits is generally high stripping pit due to its subvertical orebody.

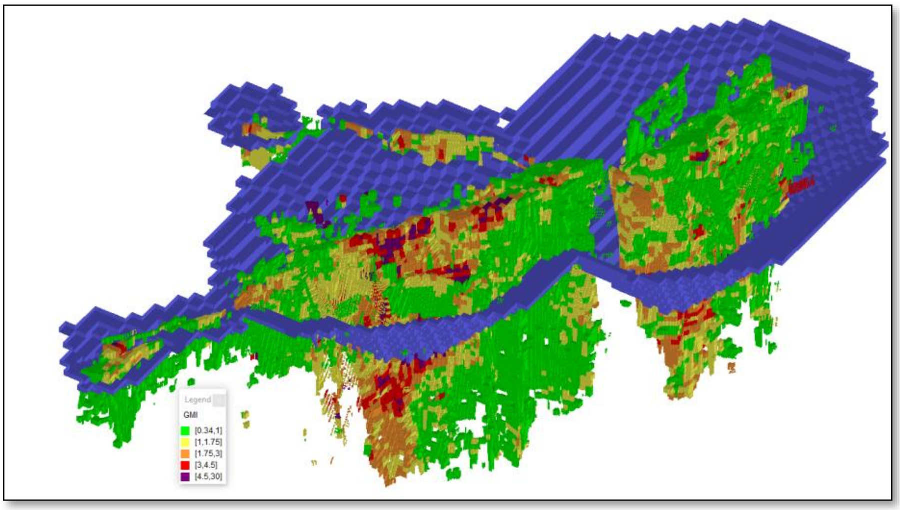


Figure 15-2: Buckreef Selected Ultimate Pit

15.4.2 Bingwa Pit

Bingwa is the second in size on tonnage basis, it however is not large enough to warrant phasing. And is also a short life pit which as a result phasing would not bear any beneficial outcome. Therefore, only the ultimate pit was selected.

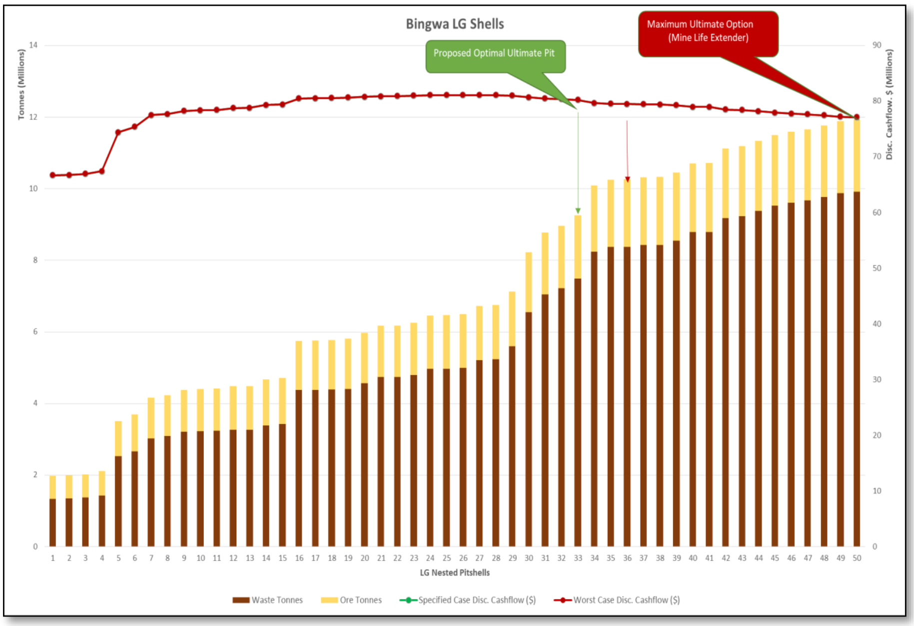


Figure 15-3: Pit by Pit graph for Bingwa

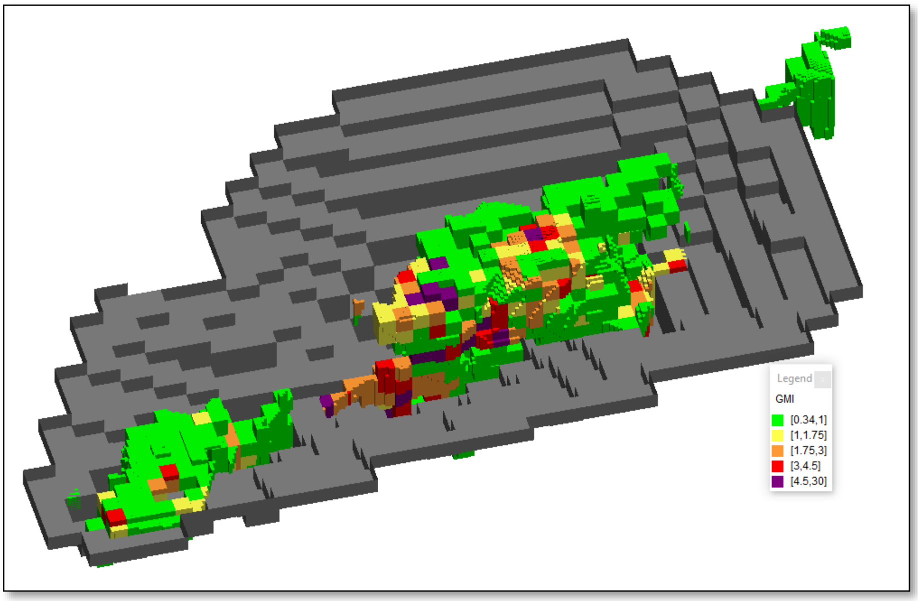


Figure 15-4: Bingwa Selected Ultimate Pit

15.4.3 Eastern Porphyry Pit

Eastern Porphyry is a small pit just next to the main Buckreef pit, similar to Bingwa it is a small satellite pit that cannot be practically phased. Ultimate pit shells was selected to be shell number 38

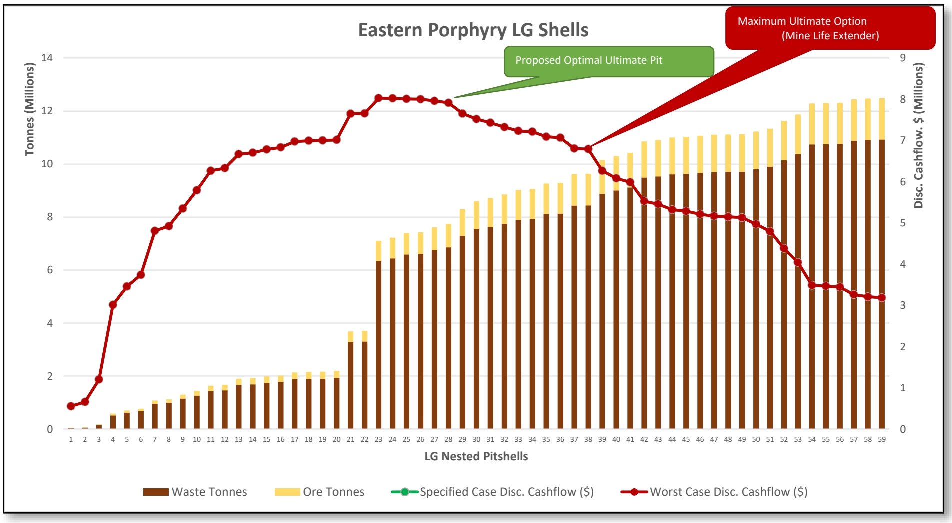


Figure 15-5: Pit by Pit graph for Eastern Porphyry

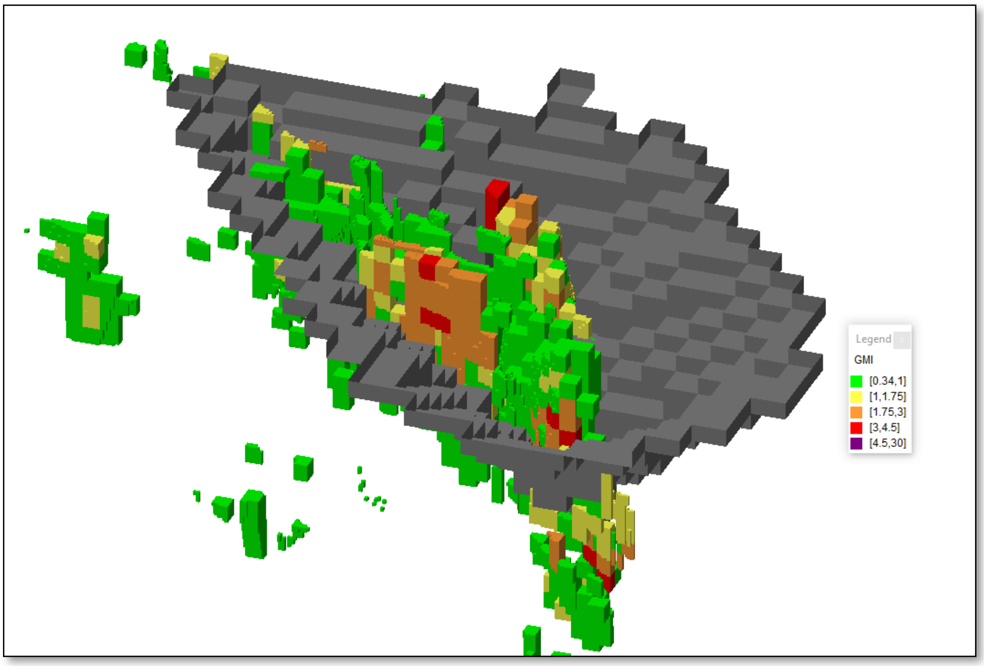


Figure 15-6: Eastern Porphyry Pit Selected Ultimate Pit

15.4.4 Tembo Pit

Tembo is the smallest of all the four deposits and follows the same trend as other satellite pits being too small for any possible phasing. Ultimate selected shell is number 13.

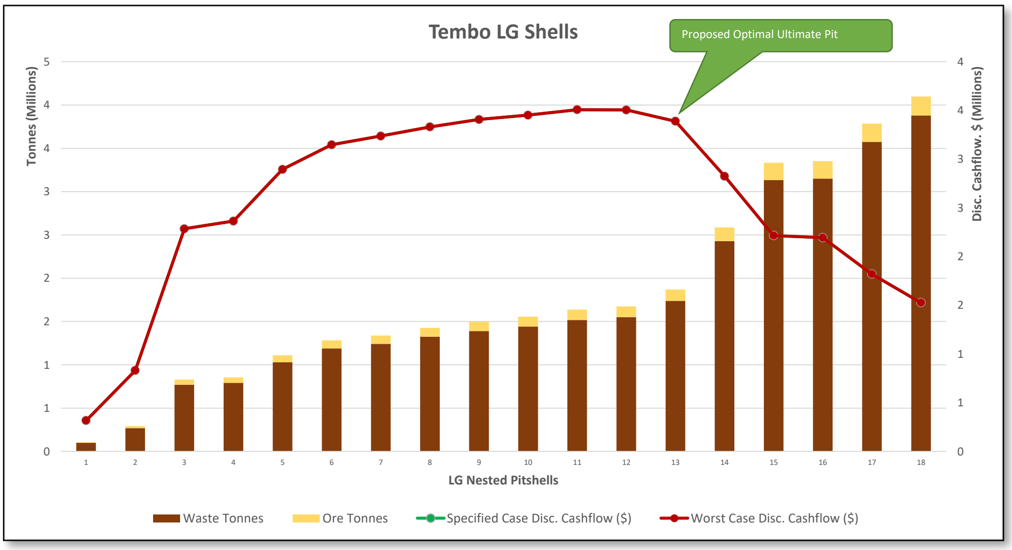


Figure 15-7: Pit by Pit graph for Tembo

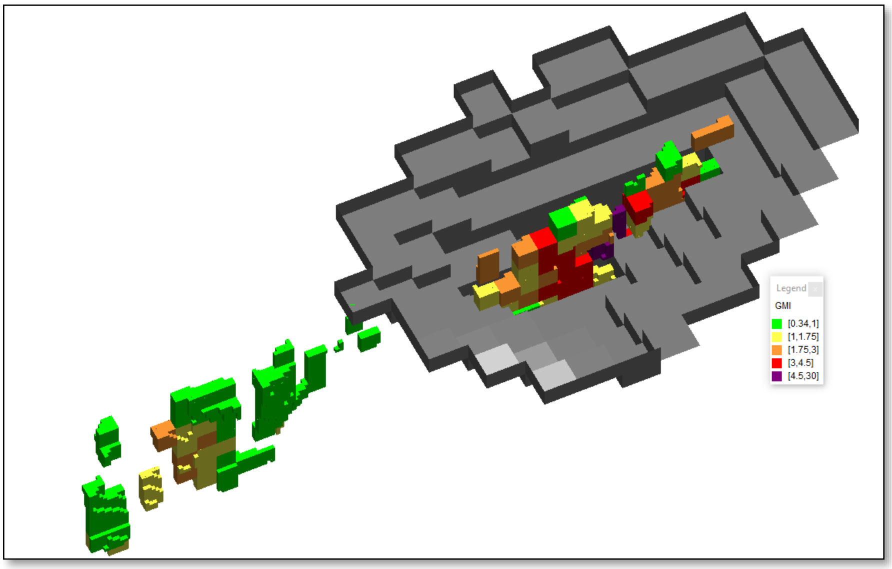


Figure 15-8: Tembo Pit Selected Ultimate Pit

15.5 Detailed Mine Design

Open pit mine designs followed the selected economic limits represented by the selected pit shells. Considering that, the deposits are made up of weathered/soft, Transitional and fresh rocks which differ in competency, the design parameters differed based on rock type. Detailed geotechnical study is yet to be completed which may optimize these parameters. However, present assumptions are quite reasonable and are within the limits of parameters applied by mines around the Buckreef project with similar rock characteristics. Pit design parameters used for design of all the four pits are summarised in Table 15-6

Table 15-6 Mine Design Parameters

Design Criteria	Weathered/Soft	Transitional	Fresh Rock
Bench Height (m)	5	10	10
Berm Width (m)	6	8	6
Batter Angle (Degrees)	60	80	80
Ramp Width (m)	10	10	10
Stack Height (m)	40	40	40
Stack Berm Width (m)	10	10	10
Inter-ramp Slope Angle (Degrees)	29	46	52

Additionally, waste rock dumps were designed taking into account the final footprint after rehabilitation shaping for rehabilitation purposes. A summary of waste rock dump design parameters are as follows:

-

- Lift Height 15m
- Ramp Width 10m
- Ramp Gradient 10%
- Tipping Angle 32 degrees
- Final Angle of Rehab 18 degrees

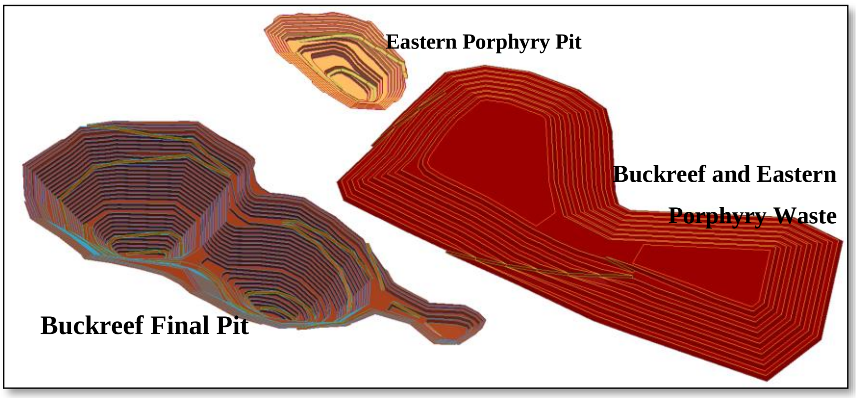


Figure 15-8: Buckreef and Eastern Porphyry Pit and Waste Dump

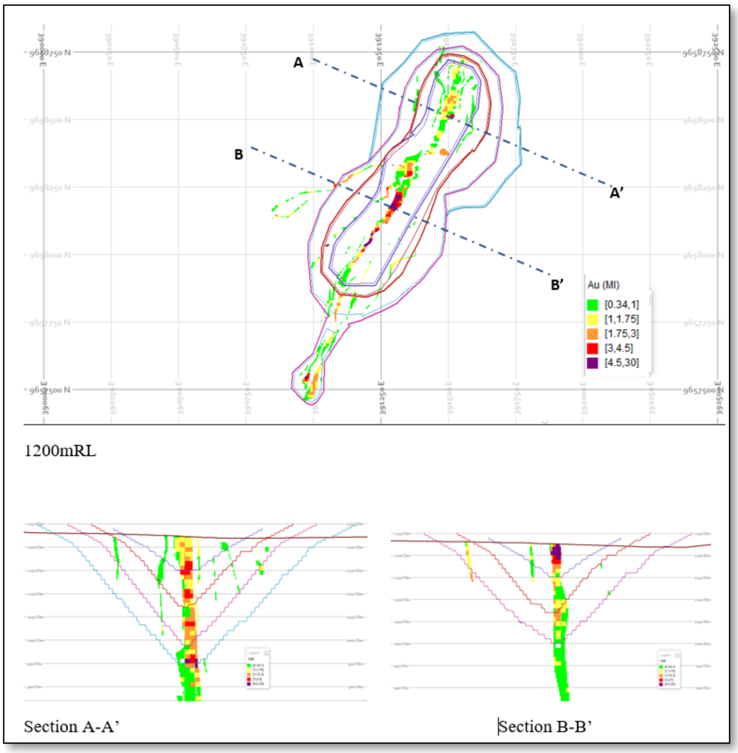


Figure 15-9: Buckreef Pit Design Plan and Sections

15.6 In-Pit Dilution and Mining Recovery

Dilution is the term used to describe the grade drop of mined ore in relation to the originally computed insitu grade due to addition of lower grade material or completely barren material. Technically there are two types of dilution, these are **internal** and **external** dilution.

Internal dilution is usually a result of averaging material grade to include waste lenses that may be within the ore zone. This is taken care off during resource modelling and so the estimated grade has already accounted for internal dilution. Of particular concern for mine planning purpose is external dilution which is taken into account in order to a consider practical limitations of mining the ore without mixing it with lower grade or barren material. In real life it is not practically possible to completely avoid the mixing consequently the ore grade is diluted due to mining practices. For this project, no extensive mining has taken place hence estimation of dilution is based on experience from other deposits of similar characteristics. It is further expected that responsible mining will be practiced in order to minimize ore dilution. For the purpose of this study it was therefore assumed that 5% will be the applicable dilution.

On the other hand, ore loss is a result of poor recovery from especially ore body contacts where by part of the ore is left in the ground or the split in waste and ore boundaries is not precise enough as a result portion of the ore is sent to the waste rock disposal areas. This is also an outcome of mining practices. With application of leading practices, it can be controlled and reduced. An ore loss of 5% was also considered.

15.7 Cut-Off Grade Criteria

In order to determine ore and waste within the pit designs, fixed cut-off grades by rock type were computed based on break-even analysis. In this analysis, all materials with grades equal or above the prescribed cut-off were classified as ore, whereas the rest with grades lower than the cut-off were considered as waste.

The breakeven calculation formula is used is as follows: -

$$\text{Cut} - \text{Off} = \frac{(\text{Processing Cost} - \text{Rehabilitation Costs})}{(\text{Gold Price x Recovery})}$$

Where

- Cut-Off is expressed in grams per tonne (g/t)
- Processing cost is in dollars per tonne of ore processed ($/t)
- Rehabilitation cost is in dollars per tonne of mined ($/t)
- Gold price in dollars per gram recovered ($/gm)
- And recovery in percentage or fraction of contained gold in the ore fed to the process.

15.8 Open Pit Material Inventory

After completing all the steps in preparation as described in this section for computation of reserves pit design and cut off grades were used to calculate reserves for each deposit. The obtained Cut off grade was used to classify ore and waste but also resource class Indicated and Measured were used to convert ore tonnes in those categories into Probable and Proven reserves respectively.

Table 15.7 Open Pit Reserves Summary

Pits Design Reserves Summary Round 3		COG: Oxide & Trans = 0.34, Fresh = 0.37 Virimai June 2018 Pit Design Reserves Summary			
Prospect Name	**Reserves Category**	**Tonnes (Mt)**	**Grade Au (g/t)**	**In Situ Gold Content Kg**	**oz**
Buckreef	Proven	8,174,415	1.64	13,374	429,986
	Probable	8,174,147	1.40	11,436	367,667
	Total (Proven + Probable)	**16,348,562**	**1.52**	**24,810**	**797,652**
Eastern Porphyry	Proven	79,385	1.17	93	2,982
	Probable	976,281	1.03	1,003	32,242
	Total (Proven + Probable)	**1,055,666**	**1.04**	**1,096**	**35,224**
Tembo	Proven	-	-	-	-
	Probable	70,183	2.35	165	5,312
	Total (Proven + Probable)	**70,183**	**2.35**	**165**	**5,312**
Bingwa	Proven	1,098,383	2.39	2,625	84,390
	Probable	510,154	1.30	662	21,271
	Total (Proven + Probable)	**1,608,536**	**2.04**	**3,286**	**105,661**
Grand Total	**Proven -Stockpile**	**119,726**	**1.86**	**223**	**7,160**
	Proven	**9,352,183**	**1.72**	**16,092**	**517,358**
	Probable	**9,730,764**	**1.36**	**13,265**	**426,492**
Total Ore	**(Proven + Probable)**	**19,202,673**	**1.54**	**29,580**	**951,009**

16. MINING METHOD

16.1 Introduction

In this update study it has been assumed that only open pit mining methods will be used for the resource extraction and any resource falling below the pit will be subject of future studies. The mining methods and production capacity have been tailored to match the milling throughput of 0.5Mtpa in year 1 ramping up in year 2 to 1.0Mtpa and then to 1,5Mtpa when in full production in year 4 of project start up. The open pit operations will deliver mined ore to the primary crusher for sizing and delivery into the processing plant.

The project consists of four deposits that are Buckreef, Eastern Porphyry, Tembo and Bingwa. These are near to the surface and are suitable for open pit mining method. The deposits consist of weathered zones/soft, transition and fresh zones. Selection of mining method is usually dictated by among other aspects the nature of the orebody which ultimately dictates the economics. For near surface orebodies, usually the first choice is to look for possibility to mine by surface method. Deep seated orebodies are commonly considered for underground mining. At Buckreef project all the deposits are near surface, consequently Open Pit mining method was chosen as the highest-ranked option for consideration. Validation of this selection was verified by running pit optimization to see if the larger portion of the orebody would be mineable economically by means of open pit.

16.2 Open Pit Mining Method

Open pit mining is a method of extracting ore from the ground by mean of excavating a series of vertical or subvertical faces while leaving wide horizontal ledges to make what is commonly know is mining benches. Mining will involve conventional drilling, blasting load and haul of both waste and ore using Articulated Dump Trucks (ADT) and Excavators R966 Liebherr. This will be a owner mining meaning the owner will acquire the mining fleet an operate using own crew to carry out mining activities.

In order to appropriately schedule waste stripping in a manner that improves project economics, Buckreef main pit will be mined by a series of four pushback staring with a small cut and increasing in size by step of each pushback to the final pit.

Figure 16-1. Key Mining Equipment

16.3 Open Pit and Stockpiles Geotechnical Designs

Long term mine stability is a critical component in consideration during design, especially when a pit has to operate for several years. Therefore, as mining continues, the walls must be able to hold in place while going through changes in seasons and excavation continue to the bottom. The pit wall will be subjected to various forces including vibrations due to blasting, wetting due to rains, gravitational forces due to changing shape of the ground also possible seismic activities. In order to achieve the intended wall stability, detailed geotechnical study is required that will identify key rockmass characterizations and establish design parameters for suitable mining without rock failures.

For purpose of pre-feasibility study, a preliminary rockmass characterization was carried out using existing core samples taken from drilling around the site. Rock core sample as shown in figure 16-2, appear to be good based on what can be seen as superior Rock Quality Designation (**RQD**) Index.

Using this information preliminary recommendations for stability design were completed and have been used in the current pit designs.

Figure 16-2: Buckreef Rock Core Sample (Source Geology of the Rwamagaza Greenstone Belt and Au prospects therein. Andrew Tunks & Jamie Rogers September 2006)

16.4 Open Pit Mine Planning

16.4.1 Open Pit Mine Production Schedule

Open pit mine production schedule was developed for each of the pit by Virimai Projects for the operation of the Buckreef Gold Project. The schedule is summarised in Table 16.4.

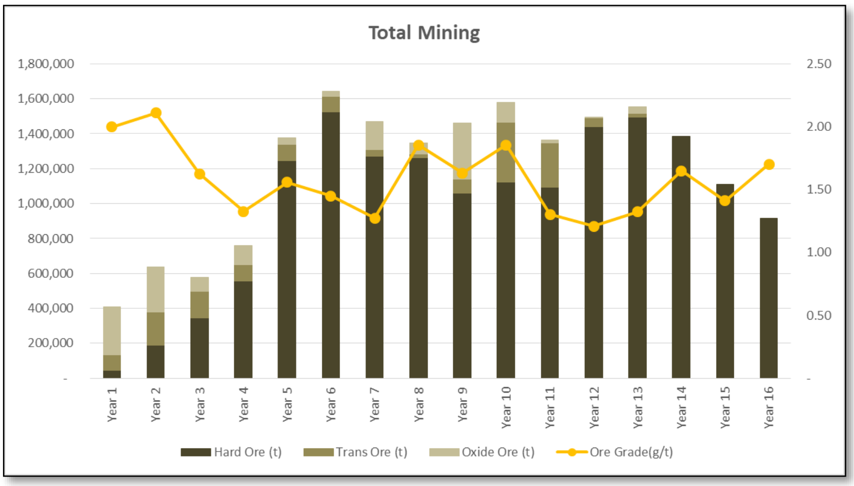


Figure 16-1 Mining Annual Summary

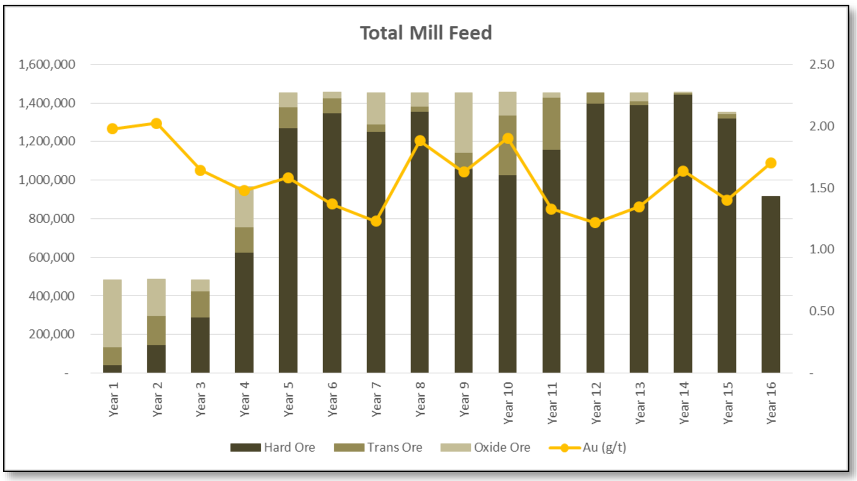


Figure 16-2 Mill Feed Annual Summary

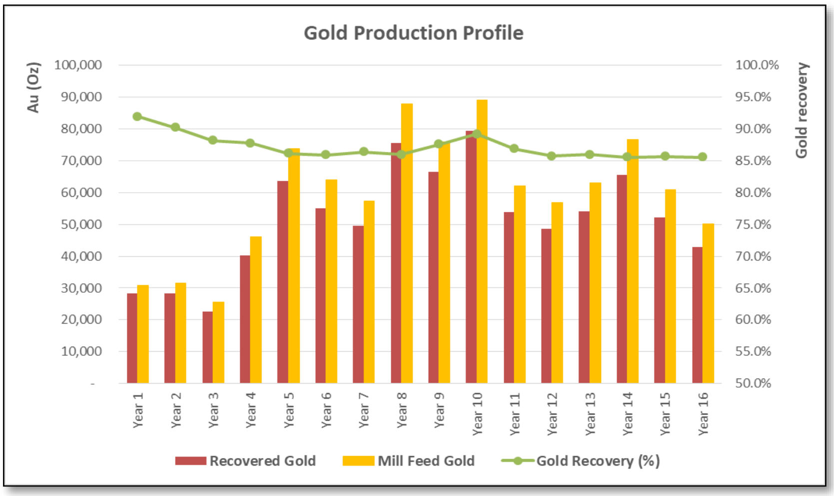


Figure 16-3 Gold Production Annual Profile

Table 16.4 Summary of Scheduled Milled Tonnages and Waste Tonnages (Refer –Appendix 32.3)

YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
Total																	
Tonnes of Oxide Ore	274	256	80	110	39	31	159	65	321	118	16	1	41	-	-	-	**1,510**
AUMI of Oxide Ore	2.04	1.53	1.13	0.89	0.70	1.22	1.02	2.08	1.98	3.92	0.74	0.79	2.11	-	-	-	**1.78**
Tonnes of Oxide Waste	2,713	1,443	2,087	598	191	1,551	2,086	2,140	1,978	3,323	918	82	1,046	-	-	-	**20,155**
Tonnes of Oxide Ore & Waste	2,988	1,699	2,166	707	230	1,581	2,245	2,205	2,299	3,440	935	83	1,086	-	-	-	**21,665**
Tonnes of Trans. Ore	92	192	150	93	93	91	40	21	82	341	256	52	17	-	-	-	**1,520**
AUMI of Trans. Ore	2.18	2.86	1.63	0.87	1.01	1.01	1.57	1.04	1.05	3.10	1.29	0.91	2.72	-	-	-	**1.92**
Tonnes of Trans. Waste	1,296	1,097	2,134	1,410	733	1,525	1,930	1,277	1,629	2,700	2,878	1,368	368	-	-	-	**20,346**
Tonnes of Trans. Ore & Waste	1,388	1,289	2,284	1,504	825	1,616	1,970	1,298	1,711	3,041	3,134	1,420	385	-	-	-	**21,866**
Tonnes of Hard Ore	43	187	346	555	1,247	1,522	1,269	1,263	1,060	1,122	1,092	1,440	1,497	1,386	1,110	915	**16,053**
AUMI of Hard Ore	1.37	2.14	1.73	1.49	1.63	1.48	1.29	1.86	1.57	1.26	1.31	1.22	1.29	1.65	1.41	1.70	**1.48**
Tonnes of Hard Waste	508	1,766	4,055	6,824	7,781	6,839	7,985	9,294	14,640	12,160	14,550	15,490	12,149	12,888	13,176	1,102	**141,207**
Tonnes of Hard Ore & Waste	551	1,953	4,401	7,379	9,028	8,361	9,254	10,557	15,700	13,283	15,641	16,930	13,645	14,274	14,286	2,017	**157,260**
Tonnes of Oxide, Trans and Hard Ore	**409**	**635**	**575**	**758**	**1,378**	**1,644**	**1,469**	**1,349**	**1,462**	**1,581**	**1,364**	**1,493**	**1,555**	**1,386**	**1,110**	**915**	**19,083**
AUMI of of Oxide, Trans and Hard Ore	2.00	2.11	1.62	1.33	1.56	1.45	1.27	1.85	1.63	1.85	1.30	1.21	1.32	1.65	1.41	1.70	**1.54**
Tonnes of of Oxide, Trans and Hard Waste	**4,518**	**4,306**	**8,276**	**8,833**	**8,705**	**9,914**	**12,000**	**12,712**	**18,248**	**18,183**	**18,346**	**16,940**	**13,562**	**12,888**	**13,176**	**1,102**	**181,708**
Tonnes of of Oxide, Trans and Hard Ore & Waste	**4,927**	**4,941**	**8,851**	**9,590**	**10,083**	**11,558**	**13,469**	**14,060**	**19,710**	**19,764**	**19,710**	**18,432**	**15,117**	**14,274**	**14,286**	**2,017**	**200,791**
SR (w/o)	**11.04**	**6.79**	**14.38**	**11.66**	**6.32**	**6.03**	**8.17**	**9.42**	**12.48**	**11.50**	**13.45**	**11.35**	**8.72**	**9.30**	**11.87**	**1.20**	**9.52**

The production schedule was developed with the aim of delivering the highest ore grades to the mill as early as possible in order to maximize the near term cash flow of the project and maximize the net present value. This was guided by mining the Buckreef pit in four phases in a value sequence per the price sensitivity of the pits and phases from the pit optimization exercise.

Production of ore and waste will begin in the first year of operation at the Buckreef open pit. The mining schedule is based upon all proven and probable reserves located within pits defined using only measured and indicated resources.

Virimai Projects adopted a value based (cash-generation capacity) pit ranking as well as proximity to process plant and ease of mine development approach to come up with an optimal production schedule. This strategy should be revisited and reviewed annually in the development of the next life of mine business plan considering available information and evolving business climate.

To assist the sequencing, cash cost per recovered ounce for each cutback or pit was calculated and ranked from lowest to highest. To maximize the return on investment, pits with the lowest cash cost (or in other words highest cash margins) are sequenced first. Other considerations were:

- Percentage of oxidation,
- Plant capacity,
- Satellite Haulage capacity, and
- Bench turnover rate.

Table 16.5 Summary of Scheduled Tonnages by Pit Tonnages

		Buckreef	**Bingwa**	**Eastern Porphyry**	**Tembo**
Waste	t	160,217,803	10,311,730	9,823,912	1,424,651
Ore	t	16,348,562	1,608,536	1,055,666	70,183
Grade	g/t	1.52	2.04	1.04	2.35
Ounce Mined	g/t	797,664.77	105,660.16	35,223.36	5,312.10
Stripping Ratio	t:t	9.80	6.41	9.31	20.30
Distance to Plant	km	1.2	5	1.3	3
Ranking		1	2	3	4

Based on the total in pit reserves available the open pit mine life is estimated at 16 years using the production rate of 0.5Mtpa for the first year 1.0Mtpa for year 2-3 and then 1.497Mtpa from the fourth year to end of mine life.

Major considerations for the mining schedule included:

- The bench by bench mining approach is considered for this type of ore body. The ore body is vertical so ore body selectivity is limited in almost all the pits. This approach brings more benefits in the middle of the life of mine.

- Mining production operations commence at and continue at the Buckreef Main Pit for the first four (4) years, the focus will be treating the oxide material at the process plant in that period. The production rate is gradually increased from ~300,000tpa to ~480,000tpa by end of 4th year.
- Year-0 includes pit pre-development including waste stripping, haul road and infrastructure construction with the process plant mainly processing ROMPAD material already on-hand for commissioning.
- In Year-4 production rate is ramped up to ~1.497Mtpa from the Buckreef main pit while in Year-4, production from the Bingwa pit will commence with production rates set around ~120,000tpa during its first years of operation. Production from Bingwa will be mostly be saprolite material while sulphide ores will commence being mined at the main Buckreef pit.
- In Year-10 production from the Eastern Porphyry pit will commence with production rates set around ~20,000-87,000tpa.
- In Year -10, the Tembo pit also comes online with overall mine production rates approximating 20ktpa to 25ktpa until LOM in Year-11. This is a small pit with a life of one year.

The production schedule applies a stockpiling strategy in order to elevate the feed grade to the mill early on. Saprolite and fresh rock ores are divided into low grade, medium grade and high grade categories with high and medium grades being prioritized in the mill feed. Low grade saprolite and rock ores are stockpiled separately until required to “fill the mill” when insufficient high grade and medium grade are being mined.

The Buckreef main pit remains the backbone of the mine over current LOM. The pit has ore of higher tonnages. Therefore, it is of strategic importance that the ore supply from this pit flows constantly. The Bingwa project is mostly oxide and it contains a larger amount of low grade as well. Enough time is given to this pit to allow grade control to take place. The grade control will turn this project into a pit of higher value because its ore body is thick and consistence as compared to the rest of the pits.

The ore treatment philosophy is that all material above the cut off is treated first. The grade control is potentially very important to increase the confidence of the ore body and increase the tonnage. It is very important to note that marginal material is separately stockpiled for treatment at the end of life after all pit mining has stopped, i.e. under reduced cost structure. The full detailed of mining and plant schedule is as indicated in Appendix 32.4

16.4.2 Material Management

During mining operations ore from the various pits will be tipped direct into the grizzlies of the three modular plants or will be stockpiled on the feed stockpile or on low grade stockpile for material with grades below cut-off. Both the RoM ore and the low grade stockpiles will be placed close to the primary crusher to reduce the re-handling costs. The low grade stockpile will be depleted after the pits have been depleted. It must however be noted that in this study all material below cut off grade has been considered as waste.

16.4.3 Waste Dump Design

The waste rock piles have been designed according to the waste requirements of each of the pit and are located around the periphery of the pits to minimize the haulage distance. The material properties assumptions used for the design of the waste rock piles are an in-situ waste rock density of 2.75t/m^3 and a swell factor of 35%. The waste dumps are located and sized to fit entirely within Buckreef's mining claims or leasing area and are kept at an adequate distance from all major water basins.

Each of the waste dumps for the four pits are estimated to hold waste volumes as summarised in table 16.5.

Table 16.5 Summary of Waste Dump Volumes at each of the Pits

Area	Waste (t)	Waste dumps Volumes Mm^3
Buckreef	160,217,803	96.52
Bingwa	10,311,730	6.21
Eastern Porphyry	9,823,912	5.92
Tembo	1,354,467	0.82
Totals	181,707,912	109.46

The dumps will be built in 5 m lifts, with 15 m bench heights. Dumping has been sequenced in phases to allow for shorter hauls during earlier years of operation.

16.4.4 In-Pit Dumping

The Buckreef pit is a elongated pit of about 1.5km in total length as the pit gets to the lower depth in order to reduce the cycle times for waste haulage and maintain the quantity of dump trucks at reasonable levels an in-pit dumping regime is considered. These in pit dumps will be located to the south of the pit and to the north. These in-pit dumps will only be considered after further drilling to sterilise the zones below those currently defined by the current drilling in the south and north of Buckreef.

16.5 Operating Time Assumptions

The operating regimes for the Buckreef Gold Project have been set in two categories as follow:

- Primary Plant operating times
- Open Pit Mining operating times.

The two have been separated in order to take into account the extra scheduled hours typically associated with mining operation such as blasting times, inspection and refuelling of earthmoving equipment and shift change.

The plant is planned to operate on 3 -8hour shifts per day, 7 days per week while the mining operations are planned on 2 -10 hour shifts per day, 7 days per week. The 2 hour in between shifts is allowed for blasting, inspection and refuelling of earthmoving equipment.

16.6 Mine Equipment and Operations

Selection and sizing of mining fleet was done by computational simulations using Talpac fleet management software. Ancillary equipment also included in the list of machines require for the operation.

The full schedule of mining equipment employed to meet its current requirements is given below.

Item	Machine Type	Model	Make	Units
1	ADT	B40E	Bell	17
2	Excavator	R966	Liebherr	3
3	Dozer	PR754	Liebherr	3
4	Wheel Dozer	PR755	Liebherr	1
5	Grader	770G	Bell	1
6	ADT Water Bowser	B30E - 27,000L	Bell	1
7	ADT Fuel Bowser	B25E - 23,000L	Bell	1
8	Drilling Rig			3

The loading equipment are backhoe hydraulic excavators equipped with 4.5m^3 bucket capacity and these will be supported by a fleet of articulated dump trucks with 40tonne payload capacity which is a good match for the 4m^3 bucket excavator. The truck fleet will start with 6 in year 1 and will increase to 17no in year 4 when the mine reaches steady production. The support equipment such as dozer and grader tend to follow the increase in the profile of the prime earthmovers.

An analysis was performed to evaluate and determine the optimum size and configuration of the truck and excavator fleet. Various sizes, brands of haul trucks, excavators, and drill rigs were evaluated. Given the close availability and relatively lack of power in the area diesel powered equipment were chosen as the most cost effective for the project. Due to the changing production requirements of the mine over the period varying numbers of key production equipment will be required. The annual requirements of the trucks, loaders/excavator and drill rigs for the project in order to meet the plant production requirements and be able to expose the same amount of ore material are summarised in Table 16.3. In addition to the key equipment auxiliary equipment such as tracked dozers for pit cleaning, rubber tyred dozers for stockpile management graders for haul roads etc will be required.

16.6.1 Drilling Requirement

The initial drill requirements would consist of two diesel-powered hydraulic percussion track drill rigs capable of drilling 110mm diameter blast holes. A 2.5m x 3.0m pattern has been selected for fresh rock ore material and a 3.70m x 4.00m pattern for fresh waste material.

16.6.2 Blasting

Overall explosive consumption was based on using a 70% ANFO and 30% emulsion mix product. Some blasting parameters may be seen in Table 16.6. Where possible drill hole liners will be used in wet holes to maximise the use of ANFO however in the study it has been assumed that mixture of ANFO/Emulsion will be the predominate explosive material. The selected explosive supplier is to erect a plant and storage facility on site. All Blasting operations will be carried out under the supervision of the mine blasting foreman, the supplier will be contracted to supply, deliver, and load explosives into the blast holes. The estimate explosive powder factor (PF) in waste has been estimated at 0.75kg/bcm (0.3kg/t) in waste material and 1.2kg/bcm (0.4kg/t) in ore material.

16.7 Mine Personnel Requirements

In view of the mining philosophy adopted by the mine of owner mining a full schedule of personnel required to maintain the pits producing at the required rate to feed the plant will include earthmoving operative and support technical support. The mine personnel requirement will cater for the operation and repair of the mining equipment, supervision, grade control and technical services. Summarised in Appendix 16.6 is the full schedule of mine staff required to support the operation of the Buckreef Gold Project.

17. RECOVERY METHODS

17.1 Introduction

The design of the processing facilities is described in this section. The test work conducted indicated that both the oxide (and transition) ore and the sulphide ore is amenable to conventional gold recovery techniques, namely, crushing, milling, gravity concentration and cyanidation. The proposed process is outlined in this section, starting with the overall design criteria, and finishing with the process description.

17.2 Appendices to this chapter

The individual process flow diagrams are given in Appendix 32.2 and the list of mechanical items is given in Appendix 32.3.

17.3 Documentation

This section is a summary of the design documentation that has been prepared for the project. The relevant documents are the following:

(i) 1707 Process description

(ii) 170220 Process Control Philosophy

(iii) 170220 Process Design Package

(iv) 1701_PD Piping and instrumentation diagrams (17) for each process section.

17.4 Description of the ore

17.4.1 Ore types

The Buckreef ore deposits consist of the four ore bodies, namely, Buckreef, Bingwa, Eastern Porphyry and Tembo.

The ore body consists of oxide material that overlies sulphide material, with a transition zone in between these two ore types. The oxide ore is weathered, has a clay consistency, and can be classified as a ‘saprolite’. Ore from the transition zone will, for the purposes of this design section, be included with oxide ore.

The depth of the oxidised layer varies between about 18 and 33 m. The sulphide ore is hard-rock, composed predominantly of quartzite.

The deportment of gold in both the oxide and sulphide ore types is ‘free-milling’, in the sense that it is amenable to gravity concentration and cyanidation with high recoveries.

17.4.2 Head grade

The design head grade for the ore is given in Table 17.1.

Table 17.1 Design head grade for oxide and sulphide ores

(Source: MMSA Report No 15/059 r1)

Sample	Gold analysis, g/t
Oxide ore	3.25
Sulphide ore	3.16

17.5 Processing strategy

The mining plan calls for the stripping of overburden, and the mining of the oxidised ore. Feed to the plant and hence production of gold will be ramped up over a period of time. To enable this, the plant will be built in modules, each with a capacity of 60 t/h. In the first two years, feed material will be fed to one module, consisting of crushing, milling, carbon-in-leach, elution, doré production and tailings detoxification. Each module has been designed to accommodate both oxide and sulphide materials.

In the third year, the fed rate will increase to 120 t/h, and the type of material will change to predominantly sulphide. A second processing module will be added to accommodate this increased production rate. This second processing module will be a replica of the first, that is, it will consist of crushing, milling, carbon-in-leach, elution, dore production and tailings detoxification.

In the fourth year, a third module will be added, raising the capacity of the processing facilities to 180 t/hr. As with the second module, this will be a replica, consisting of an entire production train.

17.6 Overall Design Criteria

The overall process criteria are given in Table 17.2. The process is design to treat 60 t/hr of oxide ore in years 1 to 2 of the mining and beneficiation plant development. In total, the processing of the oxide will take a year and quarter. In year 3, a second module will increase the production to 120 t/hr, treating sulphide ore. The front end will be modified in this phase to accommodate the sulphide ore. A third module will be installed in year 5 to increase production to 180 t/hr. The process is designed to produce 78000 oz of gold per annum, bearing in mind that the lower throughput in the first four years.

Table 17.2 Overall design criteria

Criteria	Units	Year 1-2	Years 3	Years 4 on
Dry feed rate (design)	t/h	60	120	180
Feed rate (nominal)	tpa	483 552	967 104	1 450 656
Overall availability	%	97	97	97
Recovery	%	86	94	94
Gold Production	oz pa	27 700	51 621	80 678

17.7 Mass balance

A mass balance has been prepared, and the mass flows expected through each price of equipment in the process are presented with the equipment list in Appendix 13.1.

17.8 Process Description and Design Criteria

The process consists of scrubbing, crushing, milling, gravity concentration, carbon-in-leach, elution and regeneration, and electrowinning and smelting. A model of the gold processing is shown in Figure 17.1, and a block flow diagram of the process is shown in Figure 17.2.

Each of the process sections will be described in further detail. The individual process flow diagrams are given in Appendix 13.1 and the list of mechanical items is given in Appendix 13.2.

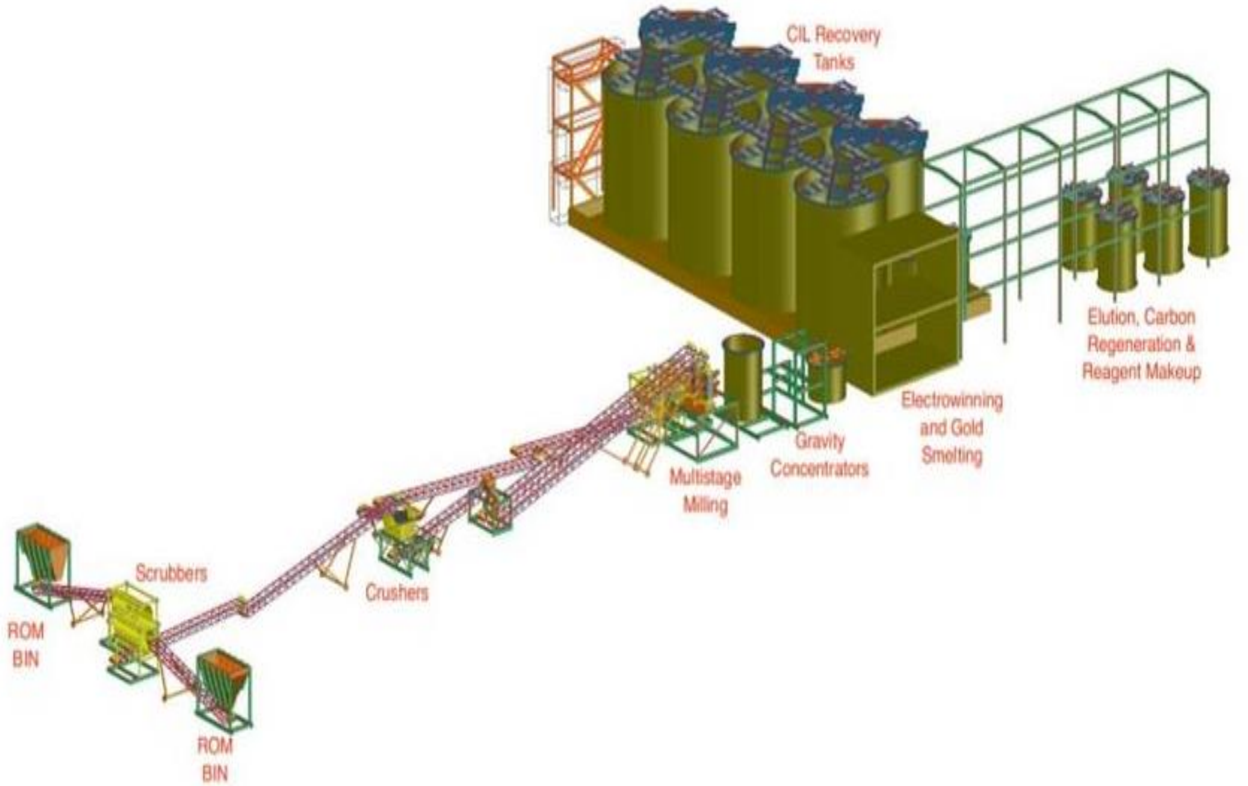


Figure 17.1. Model of the gold processing plant.

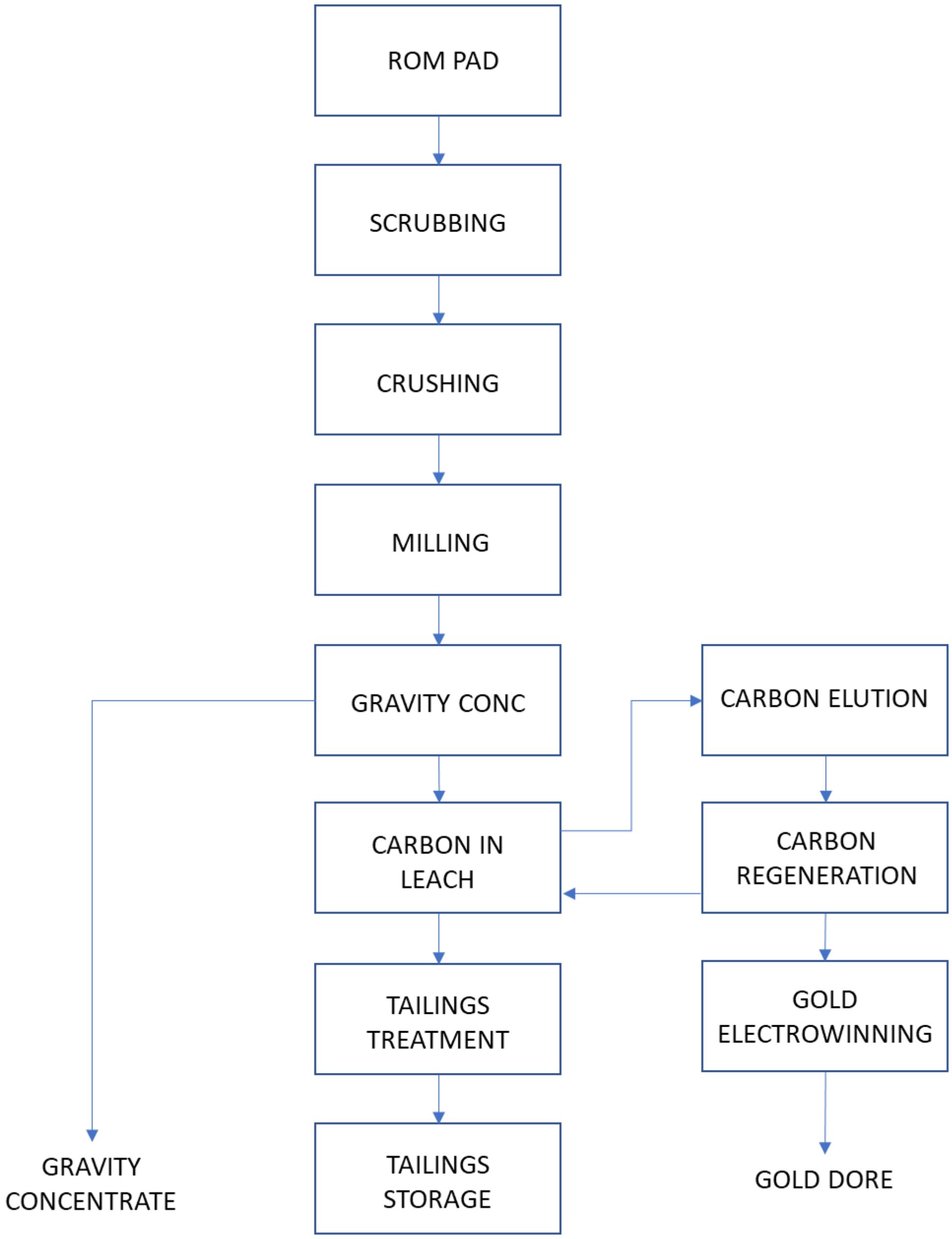


Figure 17.2. Block flow diagram of the process.

17.1.1 Ore receipt and scrubbing

The ore is stockpiled on a run-of-mine (ROM) pad and then fed to the ROM bin. The ore is conveyed from the ROM bin to a Rotaspiral. An electromagnet is used to remove tramp iron from the conveyor belt.

The oxide material is screened at 1 mm and scrubbed with water in the Rotaspiral. The minus 1 mm fraction and the water used in scrubbing drains to the underflow sump, from where it is pumped to the milling section. Water addition is controlled so that the specific gravity of the underflow is 1.3. The plus 1 mm fraction, which is now scrubbed of clay-type material, is discharged onto a conveyor and transported to the crushing section.

The design criteria for the Rotaspiral scrubbing unit are given in Table 17.3.

Table 17.3 Design criteria for the scrubber/screen.

Criteria	Units	Value
Dry feed rate per unit	t/h	30
Screen size	µm	1000
Oversize	-	40%

17.8.1 Crushing and milling

The material is conveyed to the jaw crushers. The discharge from the crushers is collected in a crusher bin, from where it is conveyed to the milling plant. Tramp iron is removed from the conveyor using an electromagnet.

The design criteria for the crusher are given in Table 17.4. The close-side setting of the crusher is 40 mm in order to create a feed of the optimal size to the EDS mill.

Table 17.4 Design criteria for the jaw crusher.

Criteria	Units	Value
Plant availability		65%
Effective operating hours	hr/y	5694
Effective operating hours	hr/d	16
Dry solids feed rate per unit	t/hr	92
Feed top size	Mm	200

The crushed ore is combined with the oversize material from the mill on the feed conveyor to the mill. The feed from the conveyor is split in a two-way splitter chute, which discharge directly into the EDS multi-shaft mills. Each of the mills discharges directly into the feed chute of a Rotaspiral. The Rotaspirals are fitted with a sizing screen of 100 µm (90 x 400 µm). The oversize from the Rotaspiral is discharged onto a conveyor that feeds it back onto the mill feed conveyor as a recirculating load. Thus, the mill product will be 100% passing 100 microns.

The undersize forms the product from the milling sections and is pumped at a specific gravity of about 1.4 to the gravity concentrators.

The design criteria for the EDS mill are given in Table 17.5.

Table 17.5 Design criteria for the EDS mill and classification circuit.

Criteria	Units	Value	
		Oxide ore	Sulphide ore
Bond work index	kWh/t	22	12
Classification screen	microns	100	100

For the treatment of the oxide ore, about 50% of ore will report to the undersize in the scrubber and will not be fed to the crushing and milling section. Consequently, the production through the mill will only be 50% of capacity.

The design of the mill anticipates that 20% of the material fed to the mill will be oversize on a single pass. Thus, the re-circulating load to the mill will be 120%.

17.8.2 Gravity concentration

The underflow from the Rotaspirals is pumped to the gravity feed tank. Two Knelson concentrators are configured in series. Concentrate from the two gravity concentrators collected in a sump, and then fed to a Deister concentrating table. The concentrate is collected and bagged.

The tailings from the gravity circuit are pumped to the thickening plant.

The design criteria for the gravity concentrators are given in Table 17.6.

Table 17.6 Design criteria for gravity concentrators.

Criteria	Units	Value
Configuration		2 units in series
Mass recovery – Unit 1		2.8%
Mass recovery – Unit 2		1.4%
Gold recovery – Unit 1		34.6%
Gold recovery – Unit 2		8.7%

The design criteria for the shaking table are given in Table 17.7.

Table 17.7 Design criteria for the shaking table.

Criteria	Units	Value
Type		Deister No 6
Gold recovery		75%
Gold grade	g/t	300

17.8.3 Thickening plant

The tailings from the gravity concentration plant are pumped to a dewatering cyclone. The cyclone underflow is fed to a pre-leach thickener, where the slurry stream is thickened.

The overflow from the cyclone and the thickener are pumped to the settling pond. The underflow from the thickener is pumped to the leaching (carbon-in-leach plant).

The design criteria for the dewatering cyclone are given in Table 17.8.

Table 17.8 Design criteria for the dewatering cyclone.

Criteria	Units	Value
Underflow percentage solids		43%

The design criteria for the thickener are given in Table 17.9.

Table 17.9 Design criteria for the thickener.

Criteria	Units	Value
Underflow density	kg/m^3	1480
Underflow percent solids	w/w	50%

17.8.4 Carbon-in-leach plant

The thickened slurry is pumped to a pre-conditioning tank, where the pH is adjusted to a value greater than 10 by the addition of lime. The slurry flows by gravity from the pre-conditioning tank into the first of the carbon-in-leach (CIL) tanks.

The preconditioned slurry flows by gravity into the first of the 6 CIL tanks. The residence time of the slurry in each tank is 4 h. A solution of NaCN is pumped into the first tank. The slurry flows by gravity through from the first tank to the sixth tank. A screen with an aperture of 630 µm on each tank allows the slurry to pass while withholding the carbon.

Carbon is pumped from the regeneration circuit to the regenerated-carbon screen (sieve-bend), and into the sixth CIL tank. Each tank has a Kemix pump cell agitator for the transfer of carbon counter-current to the flow of slurry. Loaded carbon from the first CIL tank is pumped to the carbon acid wash area.

The design criteria for the carbon-in-leach section are given in Table 17.10.

Table 17.10 Design criteria for the carbon-in-leach section.

Criteria	Units	Value
Slurry feed rate	m^3/h	81
Pre-oxidation residence time	h	3.5
CIL residence time	h	21
Leach efficiency		91%
NaCN consumption	kg/t	1.4
CaO consumption	kg/t	4.0
Carbon loading	g/t	800
Carbon residence time per stage	h	24
Carbon flowrate	t/h	0.17
Carbon concentration	g/L (slurry)	14.42
Carbon pumping		16.7%
Soluble gold recovery		90%

17.8.5 Carbon Acid wash and Elution

Loaded carbon from the CIL circuit is pumped to the loaded carbon screen, where the ore solids are screened from the ore solids. The underflow from the screen is pumped back to the first tank of the CIL. The carbon from the loaded carbon screen is collected in the loaded carbon tank, slurried with water and pumped the acid wash column. The carbon is collected in the column, and the water is drained from the carbon.

A solution of dilute hydrochloric acid is pumped from the acid wash tank into the acid wash column and drained to the acid wash tank. The purpose of the acid wash is to remove impurities like Ca from the carbon. The carbon is then washed in water and transferred to the elution column.

The carbon is loaded into the elution column. The method of elution is of the Zadra type. Gold is eluted from the carbon using a dilute caustic soda/sodium cyanide eluent solution at an elevated temperature and pressure. The eluent is pumped through a series of heat exchangers to elevate the temperature to 135°C using a combination of the exiting eluent and boiler steam.

The eluent from the elution column is pumped from the elution column through a heat exchanger, which cools the solution to 35°C, to the electrowinning cells. Spent electrolyte from the electrowinning cells is returned to the eluent tank. Recycling continues until the gold in solution is depleted to a sufficiently low level.

The design criteria for tails screening is given in Table 17.11.

Table 17.11 Design criteria for the tails screening.

Criteria	Units	Value
Screen aperture	µm	500

The design criteria for carbon elution is given in Table 17.12.

Table 17.12 Design criteria for carbon elution.

Criteria	Units	Value
Elution frequency per day		1
Carbon mass per elution	t	4.08
Eluant volume	BV	4
Eluted carbon grade	g/t	50
NaOH concentration		2.5%
NaCN concentration		3.0%

17.8.6 Carbon regeneration

Carbon from the elution column is transferred to a dewatering screw, and then thermally regenerated at 700°C. Regenerated carbon is discharged into a quench tank, where it is mixed with process water, and pumped to the elution circuit.

17.8.7 Tailings treatment

The slurry from CIL is pumped to the tailings treatment plant, where it passes over a screen for the collection of carbon that might pass through the final tank screen. Any carbon collected on this screen is transferred to the elution section. The underflow from the screen is pumped to the cyanide detoxification section.

The cyanide detoxification section consists of a single tank into which the slurry is pumped. A solution containing ferrous sulphate is added to complex the free cyanide and a dilute solution of HCl is added to lower the pH. The slurry is pumped from this tank to the existing tailings dams.

The design criteria for the tailings detoxification are given in Table 17.13.

Table 17.13 Design criteria for tailings detoxification.

Criteria	Units	Value
$FeSO_4$ consumption	kg/kg NaCN	1.6
HCl consumptions	m^3/h	0.1

17.8.8 Reagents

The reagents to the process are NaCN, NaOH, CaO, $FeSO_4$, and HCl.

The cyanide required in operation is made up by mixing solid NaCN supplied in bulk reagent in a make-up tank with process water. The cyanide solution is pumped into a holding tank and then pumped into with a ring main to the CIL and carbon elution areas.

Caustic soda is made up by mixing solid NaOH bulk supplied in reagent bags in with process water. This solution of caustic soda is pumped to the elution area.

Lime is required for neutralisation. It is made up by mixing CaO supplied in bulk reagent bags with process water. The resulting lime slurry is pumped into a holding tank and pumped from there to a ring main that supplies the CIL area.

Ferrous sulphate used for cyanide detoxification. A solution of ferrous sulphate is made up by mixing solid ferrous sulphate supplied bulk reagent bags with process water. The ferrous sulphate solution is pumped into a ring main to tailings treatment area.

Concentrated hydrochloric acid, supplied in from the isotainer, is pumped into a tank where it is diluted with process water. The dilute acid is pumped in a ring main that supplies the elution and tailings treatment areas.

17.8.9 Utilities

Water is used as potable water, process water, cooling water and carbon transfer water in the elution section. Separate supply systems are provided for each of these uses.

17.9 Equipment

17.9.1 General equipment selection

The equipment and its design capacity is listed in Appendix13. 2. This equipment list has bene costed to construct a capital cost estimate.

17.9.2 EDS Mill

The process has been designed using tried and tested equipment, except for the EDS multishift mill.

Attention should be drawn to the selection of the EDS multishaft mill. This mill is of a vertical mill consisting of several horizontal shafts at various levels. The shafts drive internal fingers or flingers that accelerate the particles. The particles break due to impact with the rotating flingers, with the wall, or with the mill liners attached to the body.

The mill is shown in Figure 17. 3, and a view of the internal rotating flingers is shown in Figure 17.4. The mill has been tested both industrially and academically. The mill offers positive benefits in terms of plant footprint, high reduction ratio, and high throughput. Powell et al. (2016) concluded that their "study proved the mills' ability to continuously sustain operation and product size for two different ore types under various configurations".

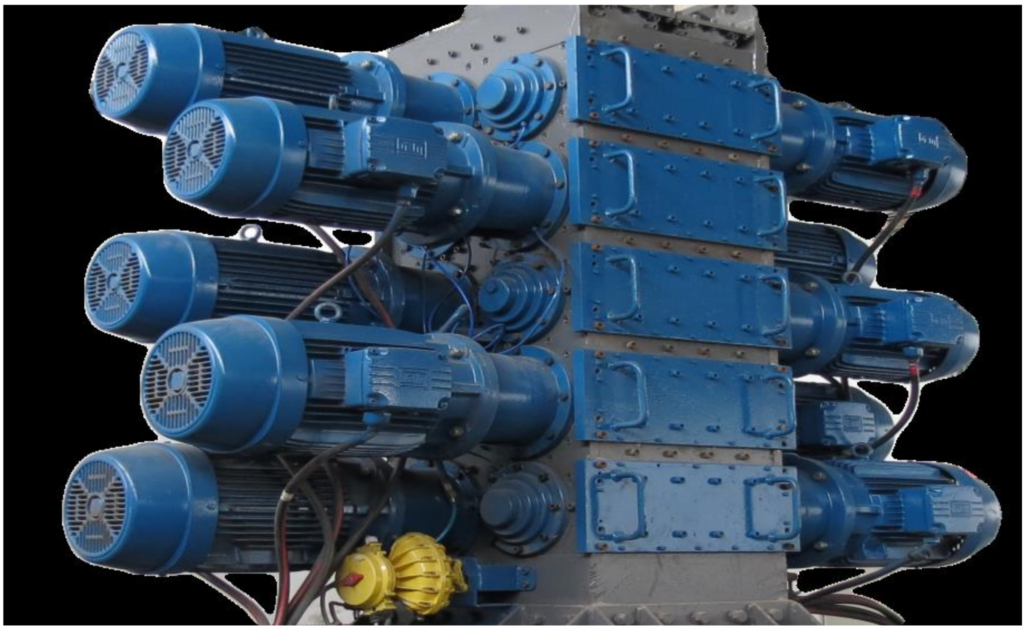


Figure 17.3. The EDS multishift mill (Source: Jeff Wain, EDS).

Figure 17.4. A view of the internals of the EDS multishift mill seen from the feed chute. (Source: Jeff Wain, EDS).

The industrial applications of the EDS mill are listed in Table 17.14.

Table 17.14 Industrial applications of the EDS mill.

Criteria	Units	Value				
Operation Site		Kalgold	WCM Mooi Nooi	De Hoek	Rayton	Marble hall
Owner		Harmony	Samancor	PPC	Randquip	Afrimat
Material		Gold ore	Chrome ore	Limestone	Kimberlite ore	Limestone
Start date		~Apr 2013	~Nov 2014	~Dec 2014	~Jan 2017	~Sept 2016
Date ended		~Oct 2013	~Apr 2015	~June 2015	~July 2017	~Nov 2016
Feed rate	t/h	20 – 100	65	80	80	120
Feed size F_{80}	mm	26	18	28	15	12
Product size P_{80}	mm	1-5	2-3	2-3.5	1	2-3
Power consumption	kWh/t	5	1.5 to 2	3-4	<2	<2
Availability		Unknown	85%	91	88%	6
Maintenance cost	R/t	Unknown	45	20	20	

17.10 Power consumption

The installed power is calculated from the installed equipment. The installed power for the oxide circuit is 1215 kW, and for the sulphide ore is 1428 kW.

17.11 Summary and Conclusions

A prefeasibility level design (class 3, -15%/+20%) has been prepared for the Buckreef project. The status of the following items for this design is summarised in Table 17.15.

Table 17.15 Status of Buckreef design.

Item	Requirement for Class III estimate	Current Status
Plant capacity	fixed	defined
Process selection	optimised	defined
Test work	finalised	Defined – items that may be considered are listed in Chapter 13.
Design basis	final	defined
Process flowsheets	detailed	completed
Process design criteria	detailed	completed
Mass balances	optimised	completed
Process equipment	completed list/sizied	completed
Specifications	Major equipment only	completed
Layout	optimised	completed
GA drawings	Full outlines	completed

18. PROJECT INFRASTRUCTURE

18.1 Introduction

Some of the current camp infrastructure is within the 500m blast exclusion safety zone of the Buckreef main pit and relocation plan is place for these infrastructures before commencement of mining. The affected infrastructures include the existing small processing plant which is within the 500m distance from the crest of the pit.

In support of the Buckreef Gold Project the processing plant and the administration offices and other services will be centrally located at the Buckreef Pit area. Over the life of the Buckreef Gold Project all the ores from satellite deposits of the Buckreef Area will be transported to the central plant for processing. The chapter outlines in detail the infrastructure and services required to support the gold production at Buckreef.

18.2 Service Roads Facilities

18.2.1 Primary Access Road

The primary access road to the project from Katoro on the highway from Mwanza exists but it is in poor condition to allow for navigation of trucks with supplies to the mine from the main supply centre in Mwanza. The Katoro to Rwamagaza Road which passes through the mine area is a provincial road which the local authority is planning to upgrade to a standard all weather gravel road. A capital provision has been made to allow for the expeditious execution of the works by the mine to allow for early logistical supply of equipment and materials for the project. The road width will be increased. Existing road surface will be resurfaced with hard transitional material from the pits. A road diversion is planned for the public transport system to by-pass the planned Buckreef mine lease area passing just north of the operations soon after passing the Nyamazovu river crossing. Further the road which goes through mine claim area will be diverted away from the mine site a total distance of 5.5km.

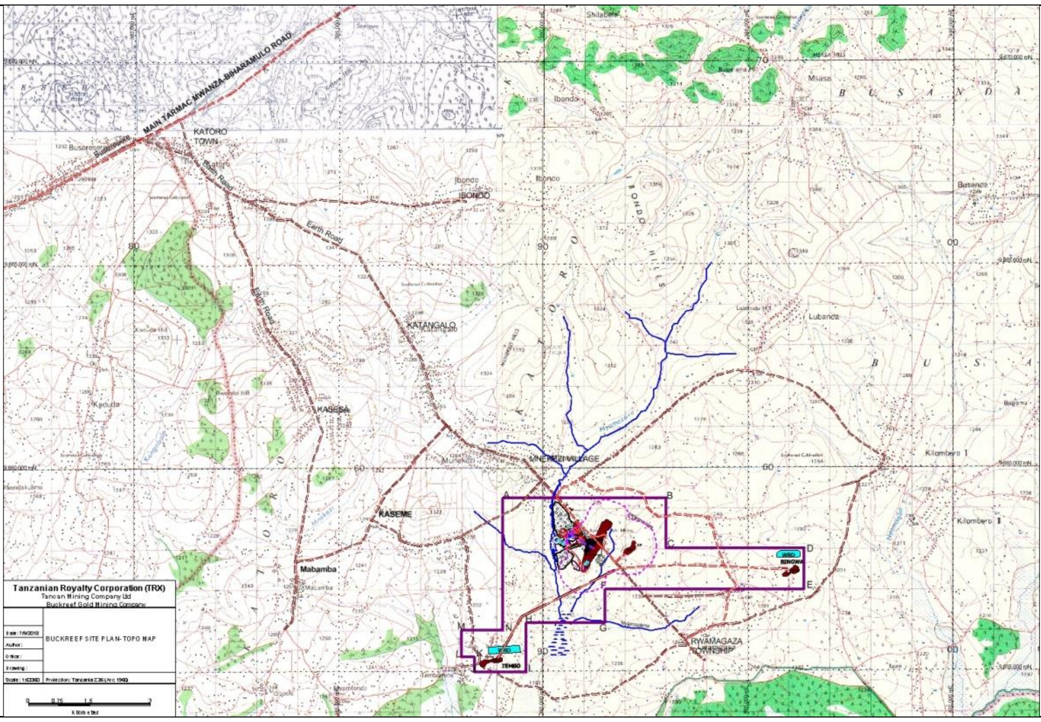


Figure 18.1 Buckreef Site Plan Showing the Main Highway from Mwanza

18.2.2 On-Site Roads and Haul Roads

Project site roads include haul roads suitable for use by mining trucks and onsite service roads for use by smaller vehicles. The site roads are for use by authorized mine personnel and equipment, with access controlled by an automated gate management security system. IT has been assumed that most of the road construction material will come from the transitional hard material from the current Buckreef Pit.

18.2.3 Airstrip

The existing airstrip passes through the northeast end of the Buckreef Main pit and will thus be moved in totality to the north as marked in Figure 18.31. The airstrip will provide for personnel access, transportation of sensitive equipment and materials, and medical emergencies. The new facility will consist of a runway, hangar and storage for emergency and firefighting materials.

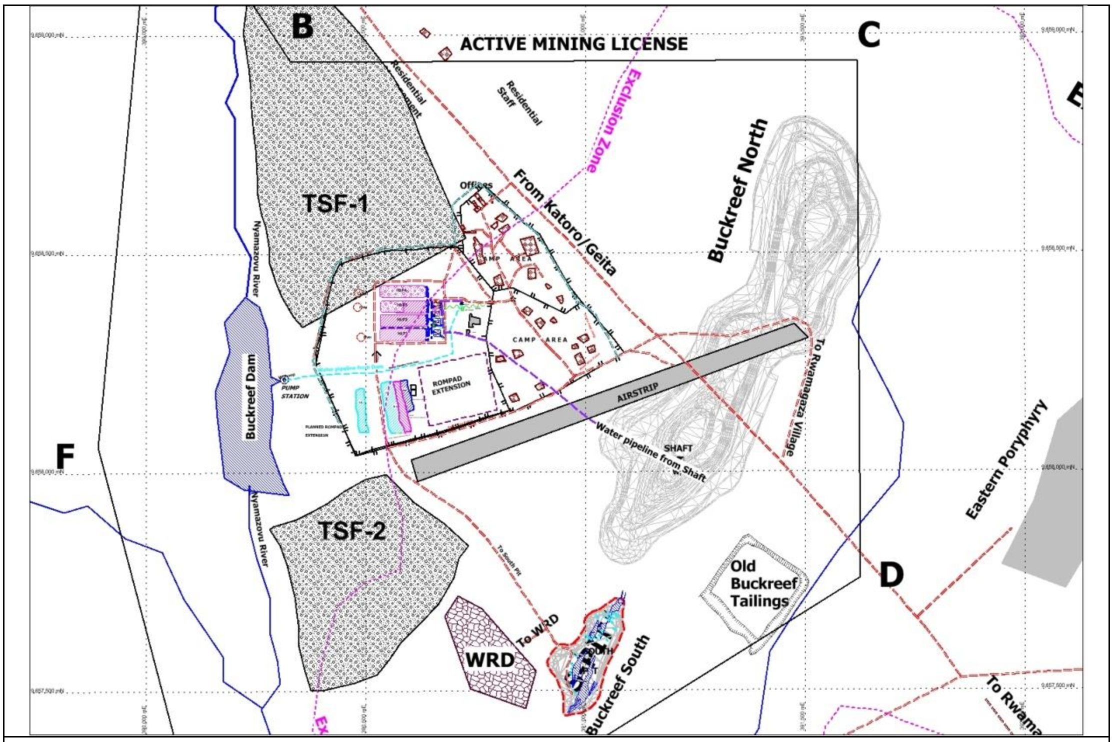


Figure 18.2 Buckreef Current Infrastructure Layout Plan

The runway will be 1,500 m long x 30 m wide with 90 m runway end safety areas at each end. The elevation of the airstrip and related access road will be above the flooding level for continuous serviceability during flood seasons. Dust suppressants will be used on the runway as required to reduce dust emissions during periods of little or no precipitation.

Incoming and outgoing flights will be scheduled for daylight hours only in accordance with the Tanzanian aviation regulations. Temporary lighting will be employed along the airstrip in the event of night time medical emergencies.

18.3 On-Building Infrastructure

The site entails a series of open pits, waste rock stockpiles, a process facility with associated laboratory and maintenance facilities; maintenance buildings for mobile mining equipment. Facilities and structures include a warehouse, offices, change house facilities for employees employed from the nearby villages, chemical storage facilities, explosives storage magazines, power generating station, fuel storage tanks, and lay down areas, and a permanent accommodation complex.

The open pit areas will be protected from potential flooding by way of construction of drainage ditches and embankments as needed at each respective site. Detailed descriptions of the critical infrastructure components are summarized in the following sections:

18.3.1 Main Administration Block & Workshop facilities

The operations and maintenance building is planned as a single story pre-engineered, steel-framed structure with a spread footing foundation. Profiled metal deck roof cladding and open facades with concrete block walls set back 1.5 m to form covered walkways will be included. The building provides offices for administrative and technical staff, including management, training, accounting, safety, and security. It will also include staff support facilities such as a conference room, print room, and lunch room.

The open pit mine operations building, electrical room, and a compressor room will be constructed adjacent to the maintenance shop. Both buildings will be pre-engineered with spread footing foundations. The mine operations area, approximately 1,200 m^2 in size, will house the following: mine operation staff office, maintenance staff office, and heavy equipment/high-rack storage warehouse on the ground floor, low-rack storage warehouse on the mezzanine floor, first aid room, lunch room, locker room and toilets.

The equipment maintenance workshop is designed to repair and maintain the open pit mine fleet and other mobile equipment. It will consist of four bays for heavy mobile equipment repairs and maintenance, two bays with two lifting hoists dedicated for heavy vehicle maintenance, two bays allocated for a machine shop, tire servicing, and other major repairs. A light vehicle maintenance building will be located adjacent to the operations and maintenance building.

A 50-tonne bridge crane will be provided for two bays and storage area. A separate truck wash station, equipped with a washing system with a water/oil separator for heavy mining equipment, will be installed outdoors.

18.3.2 Fuel Storage facilities

The fuel storage facilities will be located close to the main haulage road to the plant and outside the blasting radius of the pits. The tank farm will have storage facilities for diesel mining vehicles and the generator sets for the mine. It is planned that the farm tank will have enough capacity for a week's supply to cater for supply emergencies shortfall. The tank farm is estimated to have a capacity of 400,000lt of diesel on site. Negotiations are in place where one of the major fuel supply company in Mwanza is allowed to set up a depot on site for the supply of fuels to the mine. The company will set up its own facilities on the mine and then TRX will pay for diesel drawn on daily on monthly basis.

18.3.3 Main Camp

The permanent accommodation complex is planned to been constructed on a 10-ha elevated site northwest of the mine complex. The accommodation complex incorporates the following dormitory styles:

- Type A dormitories are private, single-occupancy rooms;
- Type B facilities are semi-private and have single-occupancy rooms with two rooms sharing one shower and toilet room and
- Type C dormitories are double-occupancy rooms with a central shower and toilet facility shared by 30 rooms.

The accommodation complex also includes the following facilities:

- Kitchen, dining hall;
- Recreation, exercise, and entertainment facility
- Soccer field;
- Infirmary equipped with trauma treatment facilities as well as life support equipment.

The Clinic centre will comprise a waiting/reception area, doctor's office, treatment room/theatre, two bed wards, washroom facilities, electrical/janitorial room, storage room and ambulance parking; and Emergency power plant. Power for the accommodation facilities will be provided through overhead lines from the central site generating station. An emergency generating station will provide power for essential services.

18.3.4 Explosives Magazine

The explosives magazine will be constructed of reinforced concrete to capacity to be determined by the explosive supplier and its structure will be in conformance with Tanzanian law. Discussions are underway with AEL Tanzania for setting up an emulsion and ANFO mixing plants on the mine to cater for all blasting material supply for the project.

18.4 Power Plant and Distribution

The electrical power supply for the project has been assumed to be based on grid power supply and diesel power supply systems. Current the mine is connected to the national grid system through a 132kV line that connects Katoro and Rwamagaza. In order to improve on the general plant availability, the Buckreef Gold Project will rely on these two main sources of power. This philosophy is borne out from the need to minimise down time due to power outages on processing facilities due to the general intermittent power supply on the national grid.

18.4.1 Diesel Generator Plant

The proposed diesel power plant for the Buckreef will consists of five gensets of 1.5MW each and these will be arranged on an N+1 operational philosophy. The five gensets will have a combined installed generating capacity of 7.5MW to cater for the total installed power requirement for the Buckreef process plant estimated at 7.5MW. The gensets that are planned to be installed will be dedicated to supply power to the following three areas:

- Crushing/Milling/CIL area – for crusher, EDS mill, process plant agitators and thickener mechanism;
- Metallurgical laboratory/Plant/Security Offices &
- Electrowinning/Smelter area.

A combination of overhead structures and buried conduit and cable are planned to be designed during detailed engineering for the five core areas where power will be supplied as summarized above.

18.4.2 Main Substation

The incoming TANESCO power lines will terminate on the dead end structures within the existing main substation. The main substation will be upgraded to meet the needs of the project upgrade. The main transformers will feed power to an outdoor switchgear unit located inside a prefab building within the substation area close to the office administration buildings. Existing overhead supply lines to the process plant site will be maintained and distributed through substations located at the process plant, crusher installation, coarse ore stockpile, and engineering workshop.

18.4.3 On-Site Power Lines

Power transmission from the main substation to the process plant substation and electrical control room is planned to be by overhead power lines. The power to the administration, warehouse and camp areas is planned to be by buried conduit and cable from process plant substation.

The electrical loads outside the process building area are planned to be supplied power by overhead power line using wooden poles and structures to the following areas:

- Coarse ore storage area;
- Primary crushing area;
- Engineering workshop;
- Tailing are reclaiming pumps; and
- Fresh water supply pumps.

The existing TANESCO power transmission line from Katoro to Rwamagaza follows the public road network and feeds the existing 110kV Buckreef Mine substation. TANESCO has been approached to upgrade the sub-station to cater for additional power requirements of the project. The planned work by TANESCO is as follows:

- Upgrade existing sub-station from 110kV to 500kV. Power will be supplied from TANESCO's upgraded 44 kV line via overhead lines to the administration buildings and housing facilities as well as the engineering workshop.
- Included in the work by TANESCO is removal of existing power line to re-route it away from the proposed Buckreef open pit area and follow the road diversion.

18.5 Process Water Supply

Processing water for the Buckreef Project will be sourced from the nearby Nyamazovu dam located to the north of the process plant. To add to the water drawn from the dam process water will be augmented with water pumped from the old workings of the underground Buckreef. Considerable use of the recycling systems will be used in the plant and the mine for effective use of water. As the mine is upgraded progressive upgrading of the dam will be made during the life of the project.

18.6 Fresh Water Supply and Distribution

A single water-borehole is currently used as the main camp potable and fire suppression water supply for building services such as dining facilities, showers and toilets. An in-line chlorine metering system will disinfect the water supply. In addition, existing water wells will be complimented by additional drill-wells drilled into the underlying bedrock, enhancement of the collection of surface water from creeks and rain water harvesting systems.

18.7 Sewage Collection and Disposal

A new sewage treatment process facility will be constructed downhill of the main camp site to complement existing sewage collection and storage facilities in use. Buried sewer pipes collect sewage from the site to the treatment process facility. The treatment process facility consists of two independent containerized treatment lagoon systems working independently and providing redundancy if one unit must be shut down for maintenance.

The proposed system is capable of treating 10,000 litres of wastewater per day. Treated effluent will be released to the Nyamazovu River via a local tributary.

18.8 Site Security

A high-level security fence will be constructed to encompass the main Buckreef operations including the camp site, process facility and open pits. The principal site entry point on the access road from the planned road detour to by-pass the Buckreef project site will be provided with a lighted security gate and vehicle access barrier. A masonry block gatehouse building will provide sanitary facilities, communications equipment and search facilities including metal detection.

A weighbridge will be located adjacent to the gatehouse building to enable incoming and outgoing vehicle load monitoring. The site entrance will be monitored by closed circuit television (CCTV) from the operations and maintenance building. CCTV monitoring will be provided at the process facility, gold room and main offices.

18.9 Communication and IT Systems

Point-to-point satellite communication will be the main communication system between the mine and the outside world. The system includes voice/data/video/fax, internet, and VPN services, including bi-directional links between the mine site and head office either in Mwanza or Dar es Salaam. VHF/UHF radio communication will be available within a 10 km radius from the process facility.

The IT system will be based at the operations and maintenance building and connected throughout the site by a fiber optic network. The connection between IT devices and end-users will provide high-throughput, secure, reliable and redundant service for data and voice. The network system will be connected to protocol independent multicasts (PIMS) and business networks through routers with firewalls and will provide remote access as required. The system will have security and encryption to prevent unauthorized access.

Satellite TV for entertainment, cellular communication, and FM radio will be provided.

18.10 Tailings Management

18.10.1 Tailings Management

The means of tailings deposition and storage is a key element for the operability and long-term closure of the Buckreef Gold Project. The TSF site was selected close to the plant area and the mine for tailings pumping. The area has been assessed to have good topographic containment and is suitable for enclosure of tailings material. The TSF covers an area of about 113ha and provides adequate storage capacity for the approximately 26.8Mm^3 of tailings anticipated to be produced over the life of the Buckreef mine based on an average deposition dry density of tailings of 1.4t/m^3. A number of sites were assessed for their suitability as TSF on the basis of the following criteria:

- Distance from the proposed open pits and centralized process plant location.
- Site's volumetric storage capacity;
- Tailings Dam's (TD) wall volume;
- TD footprint area; and
- Potential use of local gradient to expedite pumping from process plant location

As a result of the site investigation two site were identified as indicated in figure 18.4

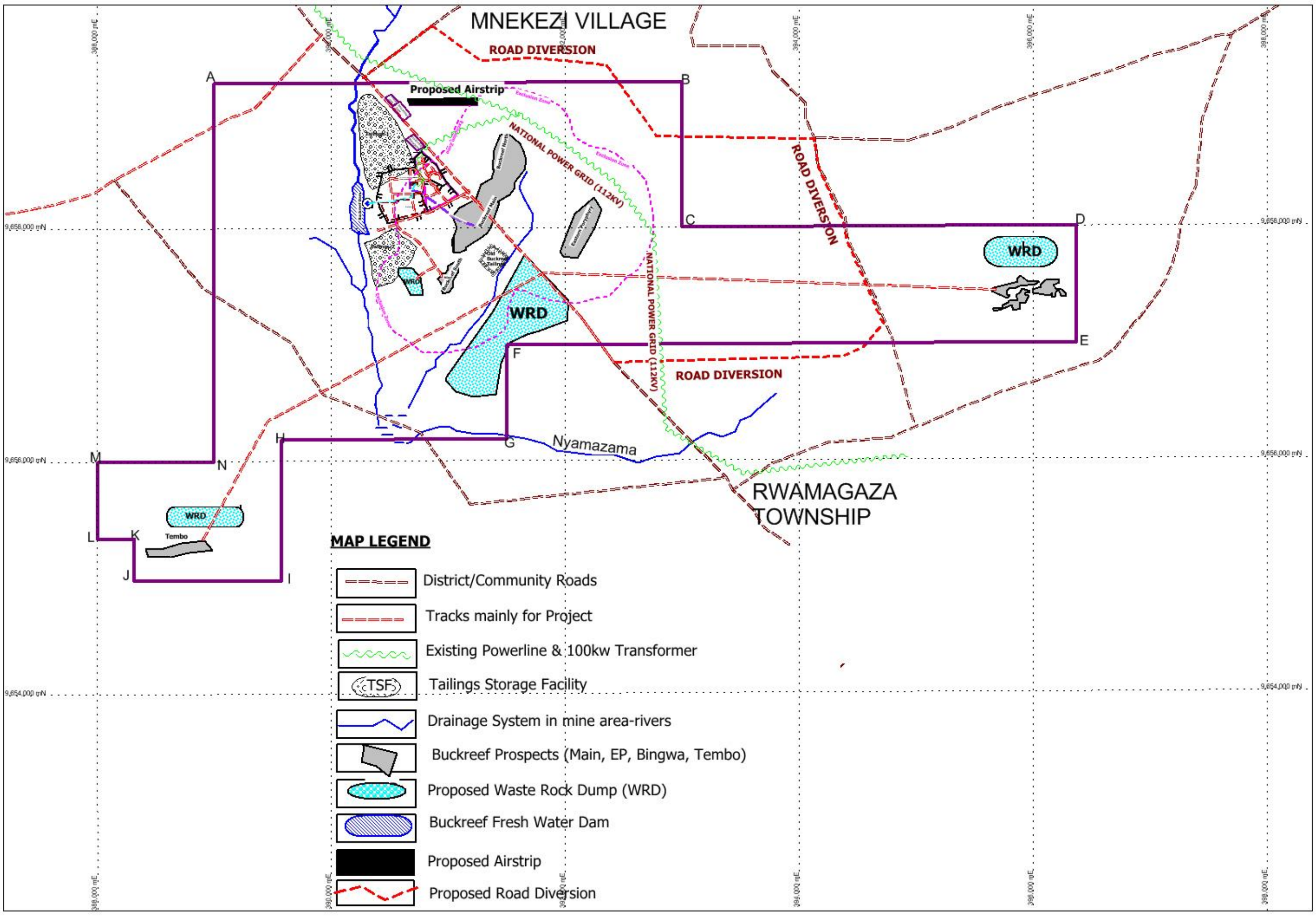


Figure 18.3: Buckreef Project Location of the Proposed Siting of Works, TSF1 And TSF2

The overall philosophy which will be guiding the design of the TSF, will include, but not be limited to, the following:

- Economical Stage 1 development;
- Efficient use of area and construction materials;
- Maximum efficiency of tailings storage;
- Maximum water recovery; and
- Minimum environmental impacts (location relative to streams, dams)

An overview of TSF design has carried out by Epoch is provided in the following sections.

18.10.2 Tailings Deposition Plan

The dam shall comprise of the following:

- A compacted earth embankment wall made of compacted excess overburden from the open pit which will help in the reduction of the construction costs.
- A curtain drain which will be situated in the Wall
- Solution trench that is situated at the base of the downstream face of the embankment wall

- Slurry(tailings) delivery and deposition pipeline and
- A floating barge with submersible pump and floating access walkway

The TSF will be constructed in a downstream manner in two phases. This is aimed at reducing the capital costs of the TSF. The first phase shall be the constructed prior to the commissioning of the processing plant and the second phase shall be constructed during the operational phase of the gold project. The tailings will be deposited by means of the slurry delivery line around the perimeter of the TSF and return water will be pumped back to the plant by means of submersible pump that will be housed on a floating barge.

18.10.3 Dam Design

The proposed layout of the TSF is illustrated in Figure 18.3 and the typical sections of the TSF are illustrated in Figure18.3. The TSF comprise of the following:

18.10.4 Tailing embankment for tailing storage

Storm water Dam SWD for capturing excess storm water runoff from the tailings dam in the event of a 1:200-year storm event

Associated secondary infrastructure to include (access roads storm water diversion structures etc).

Table 18.1 Summary of Tailing Dam Design Parameters

Item	Parameter	Unit	Value
1	TSF Wall Slopes		
1.1	Outside slope		1V:3H
1.2	Inside Slopes		1V:2.5H
2	TSF Wall Volume		
2.1	Phase 1	m3	72,671
2.2	Phase 2	m3	172,161
2.3	Phase 3	m3	406,300
3	TSF Wall height		
3.1	Datum		1,225
3.2	Crest Elevation -Phase 1	m.am.s.l	1,232
3.3	Crest Elevation -Phase 2	m.am.s.l	1,238
3.4	Crest Elevation -Phase 3	m.am.s.l	1,245
3.5	Height -Phase 1	m	7.0
3.6	Height -Phase 2	m	12.5
3.7	Height -Phase 3	m	20.0
4	Total		
5	Miscellaneous		
6	Freeboard		1.5
7	Deposition area	ha	113

18.10.5 The Storm Water Dam

The storm water will comprise of the following:

- Compacted earth embankment wall constructed from borrow material (suitable for dams)
- Curtain drain situated in the wall
- Floating barge equipped with a submersible pump and floating access walkway
- Emergency spillway.

Table 18.2 Summary of Storm Water Storage Dam Design Parameters

Item	Parameter	Unit	Value
1	SWD Wall Slopes		
1.1	Outside slope		1V:3H
1.2	Inside Slopes		1V:2.5H
2	SWD Wall Volume		
2.1	Wall Volume	m^3	14,284
2.2	Wall Height	m	
2.3	Datum		1,220
2.4	Crest Elevation	m.a.m.s.l	1,223
2.5	Height -above Datum	m	2.5
4	Storage Capacity	m^3	250,000.
5	Miscellaneous		
6	Freeboard		1
7	Deposition area	ha	25

The general layout of the TSF and the SWD is illustrated in figure 18.4.

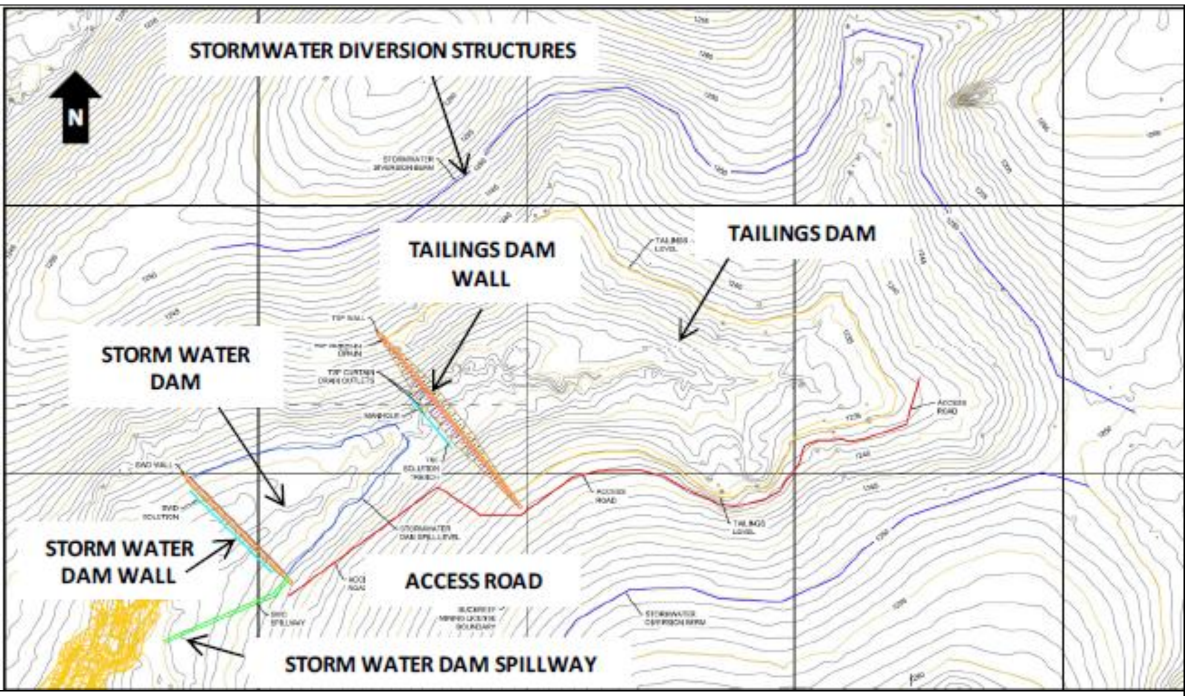


Figure 18.4 General Layout of the TSF & Storm water Dam Facility

Two options for the construction of the TSF one with bottom lining and the other without lining was presented to TRX and tests were still to be conducted if the tailings contain Arsenic and whether they are acid generating the main reason for lining to protect the ground from these elements. Indications from preliminary test were that the material is not acid generating and Arsenic.

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19. MARKET STUDIES AND CONTRACTS

19.1 Market Studies

Neither Virimai Projects nor TRX has conducted a market study in relation to the gold market which will be produced by Buckreef Gold Project. Gold is a freely traded commodity on the world market for which there is a ready and steady demand from buyers worldwide.

19.2 Contracts

There are no refining agreements or sales contracts currently in place that are relevant to this update Technical Report.

20. ENVIRONMENTAL AND SOCIAL IMPACT STUDIES PERMITTING AND SOCIAL AND COMMUNITY IMPACT

20.1 General Approach

TRX is committed to excellence in the management of health, safety environment and sustainability in the conduct of its operations. The company's objectives are as follows:

- Ensure the health and safety of its employees, contractors and visitors in the workplace.
- Responsible management of the impact that its mineral exploration and development operation may have on the environment and the community.
- Demonstrate its commitment to having sustainable development in the communities in which it is operating.

20.2 Environmental Studies

Several environmental and environmental management plan studies have been performed on the project area. The environmental Scoping Studies for the project was conducted by URS from Australia in collaboration with MTL Consulting a local company. A Social Impact Assessment (SIA) was undertaken by Social Sustainability Services Ltd of Australia and the University of Dar es Salaam in 2006.

The environmental and socio-economic baseline for the project is documented in the Environmental and Social Impact Assessment (ESIA) performed by Enata Ltd 2014. This document was submitted to the NATIONAL ENVIRONMENT MANAGEMENT COUNCIL (NEMC). This report was approved by NEMC and an EIA certificate was awarded on 19th May 2014. The Enata Ltd ESIA was subsequently updated by Sphere Envirotech & Engineering Ltd, to reflect changes which were implemented from 19th May 2014 after the issuance of the Environmental Impact Assessment Certificate in compliance with Section 92 (1) of the Environmental Management Act No.20 of 2004 and the proposed future changes following mining operations changes.

The approved ESIA for the Buckreef Project covers areas which encompass the Buckreef Main, South and North, Eastern Porphyry, Tembo and Bingwa deposits.

20.3 Community and Government Communications

Tanzam200 is an active member of the local community in Geita and Mwanza area and is in constant contact with the local and government leadership about developments on the Buckreef. The local leadership and the government leadership have been engaged in the planning activities for the project. This has been done through meetings with members of the local communities and ministry of mines

20.4 Overview

The Buckreef Project is primarily an undeveloped exploration project, although the project area includes the defunct Buckreef Mine area that was exploited by STAMICO until the mine closed in 1994. The historic mine site will ultimately form part of the future operation developed within the Buckreef Prospect. A couple of years of environmental baseline investigation have been completed on the project in support of the Buckreef Gold Project.

A summary of existing environment is provided herein and the intent of this summary is to give the reader a familiarization local setting of the area where the gold project is located. Further details of the baseline reports herein referred to are given in the referenced Environmental Assessment Reports.

20.4.1 Climate, Air Quality and Sound

The Buckreef Project is in the northwest region of Tanzania. The area has a moderately warm tropical climate with minimal variation through the year. Daily temperatures vary between 22oC and 30oC with a mean annual daily temperature of 25oC.

The region gets an average of 900 mm – 1200 mm of rainfall per annum. There are two distinct rainy seasons; the long rains or Masika from March to May and the short rains or Vuli from late September to December. The rainy seasons are characterized by short storm events, which lead to highly localized variations in rainfall. Storm events are often interspersed with relatively long dry spells. Between the two rainy seasons, is a long dry spell, occurring from June to August, which makes the area drought prone? During hot and rain season the humidity ranges between 35% and 60% respectively.

Evaporation remains relatively high throughout the year although daily evaporation rates decrease during the rainy seasons because of increased cloud cover. Average daily evaporation throughout the year varies between 4.5 and 7.2 mm/day (1,642.5 mm/yr.).

20.4.2 Physiography, Soils and Geology

The project area topography consists of gently rolling hills at an elevation of 1200 to 1250 above sea level (amsl), with flat alluvium deposits and black cotton soil filled valleys. The average elevation difference is 50m on profiles north-south and east-west over 5km. This equates to an average elevation slope of 0.01m per km or 1%.

Most of the soils in the area are iron-rich due to the widespread presence of “cuirasse” or hard laterite on the property. In river valleys and drainages saturated, clay-rich soils known as Mbuga can be found but account for only a small proportion of all soils present.

In general, soils in the project area which have not been exposed to artisanal mining activities show no pollution in the form of mercury, cyanide, or heavy metals while soils located where artisanal mining has been conducted are often found to possess contaminant levels higher than established guidelines.

A study was conducted on the stream water and sediment quality as well as on the groundwater quality in 2009 (Sphere, 2016). In terms of geochemistry the stream water and sediment quality concluded that:

- Arsenic and Cr were above probable effects levels in stream sediments,
- Sediment quality showed no enrichment in metals;
- Mercury in sediment samples were below guideline values; and
- Natural elevation of F, NO3, Al, Cr, Cu and Pb were above Canadian guidelines for aquatic life.

20.4.3 Surface Water and Sediment

Surface water is scarce in the Project area but wetlands are developed in drainage channels. The main surface water flow in the project area is a dammed Nyamazovu River, a small stream to the west of the BRMA, which was used historically as a fresh water supply for the Buckreef process plant. Another important drainage channel is that of the Nyamazama stream, which forms a confluence with the Nyikonga approximately 12km to the southeast of Buckreef mine. Due to the low topographic relief of the area the river is extremely shallow, typically no more than 1-2 m in depth, but may reach a width of 50 m during the height of flow each year.

Considering the proximity of the rivers course within the Project area, Plans including the treating and recycling water from storm water storage have been considered. This is to save the wastage of water and ensure the surface run-off are directed and kept away from the operation consequently reducing chances of the interference to the mining activities as well as the stability of the Pit walls. A storm water management plan will be implemented for the Mine Project area to ensure that water resources are protected from pollution and that run-off is managed in accordance with the applicable environmental legal requirements. Storm water will be a valuable water resource and can be effectively used to decrease water use from water sources and thus potentially decrease costs.

20.5 Groundwater Quality

Tests from the drill-holes show that ground water level depth is shallow at an average of 6.34meters below ground level (6.34mbgl). This suggests that only shallow structures and perhaps the unconfined aquifers were intersected. Nevertheless, assessment will focus on understanding the impact of excavating the open pit and abstracting groundwater on the hydro geological regime. The three pits (Buckreef, Bingwa and Eastern Porphyry) and the ROM Pad may be affected by the ground water from the two main rivers (Nyamazama and Nyamazovu). It is therefore important to make a frequent follow up on the soil behavior and its contribution to the charge of the ground water.

20.6 Biological Environment

20.6.1 Vegetation

There are several vegetation zones in the project area. Their presence is strongly related to proximity to water and human activities. Barren land, shrub-steppe, grassland, and forest zones all occur naturally and generally correspond to the increasing presence of water.

The project area is still covered with categories of natural vegetation types with diversity of life forms including trees, shrubs, herbs, climbers, grasses, sedges and reeds. The most common vegetation in the project area is Acacia polyacantha woodland and Miombo woodland. Human activities in the form of agriculture, pastoralism, artisanal mining, and settlements areas to generate firewood have had a distinct impact on the vegetation in the project area.

Pastoralism is practiced widely with cattle, sheep, and goats foraging in the woods and plain areas as they are able, however, the quality of feed is poor. The potential for damage to an already fragile ecosystem from overgrazing is high.

20.6.2 Wildlife

The area like most of the savannah areas is a very good habitat for several species of animals and birds. DikDik (Madoquaswaynei), lesser kudu (Strepsicerosimberbis) and greater kudu (Strepsicerosstrepsiceros) can all be found in the project area. It also includes the reedbuck, bushbuck, orb, hyena, serval cat, jackal, Nile crocodiles, short snouted crocodiles, baboons etc. Bird species include the shoebill (Balaenicepsrex). Other species are wattled crane (Bugeranuscarunculatus), ducks, geese, guinea fowls, bastards, plovers, vultures, Spur winged goose (Plectroptermsgumbensis).

20.6.3 Human Environment

The Buckreef Project lies entirely within the Geita District in Geita region. The area is by large undeveloped tracts of land, poor infrastructure, and a largely rural population. There are three villages immediate to project area. The villages are Mnekezi located at the northwest and Kaseme at the west end of the project. Rwamagaza village which is the center for artisanal miners is located around five kilometers southeast of Buckreef mine.

The political environment in the country is stable with a growing influence of opposition parties in a country traditionally run on single party basis for decades. The parliamentary and presidential elections were held in October 2015. Generally, the elections were peacefully and successfully held in the country.

Currently there is no incident reported regarding the trespassing or intruding into the mine area.

The mine drilled a bore hole of water as one the community engagement project and the project has been handled over to the Mnekezi village authority.

The social license to operate will be greatly enhanced judging by the current response from different stakeholders that include villagers and their leaders, interfaith organizations, local and regional government and the government leaders at a national level.

20.6.4 Population

Most of the residents in the project area belong to the Sukuma tribe. Rwamagaza village has many ethnic groups than Mnekezi. Apart from Sukuma tribe other tribes available in Rwamagaza are Waha, Wasumbwa, Wachaga, Wakurya, Wajaluo and Wazinza whereas in Mnekezi village Wasumbwa and Wazinza make minor population. The local language spoken in the project area is Sukuma.

In 2012, the total population of Mnekezi village was approximately 1820. The largest village is Rwamagaza with a population of 3,202. These are the immediately villages which will be impacted by the proposed Buckreef mine.

It is notable that among the residents of the project area, 75% are under the age of 35 and more than 50% have an age less than 20. There are slightly more women than men. This demographic is amplified in the dry season when lack of rain makes it impossible to farm and young men of working age engage themselves in artisanal gold mining activities.

20.6.5 Health

The most prevalent disease in the project area is malaria. Over 50% of all sickness treated in the region is malaria. HIV/AIDS is not only the threat to the health of the region’s population but also to the economic and social well-being of the people. Available statistics shows that the rate of HIV & AIDS infections in the region has been decreased from 8.2% to 4.5% in December 2011. The leading group due to infections is the youth group age aging between 15-24 years. Geita district had the highest number of reported AIDS cases accounting to 40.8% of all reported cases in the region. Nyang’hwale district had 872 cases equivalent to 4.1%.

Mnekezi has a dispensary staffed by four nurses and one doctor which serves residents of the project area. At Rwamagaza village there is a dispensary with one doctor and four nurses as well.

20.6.6 Farming

Agriculture is by far the most prevalent form of employment in the project area. More than 77% of the labor force is engaged in subsistence farming. Crops most commonly grown are maize, paddy, cassava, beans, groundnuts, sorghum and sweet potatoes while the major cash crops are cotton and tobacco. Where sufficient water is available, rice and vegetables are also grown (in mbuga soil); both for personal consumption and as cash crops. Issues affecting the successes of farming in the project area include poor soil, and lack of equipment.

20.6.7 Livestock

Livestock is the second most important economic activity in Geita Region. The climate of the region also favors growth of improved dairy breed particularly promotion of dairy cattle through cross breeding. The livestock kept in the region are cattle, goats, sheep, donkeys, pigs, chicken and ducks. Overgrazing is a common occurrence. Lack of pasture and veterinarians, and poor knowledge of sound livestock management practices all present challenges to cattle keepers.

20.6.8 Commerce

Trade and commerce are an important activity. Rwamagaza market is held twice in a week, Tuesday and Friday. There are small shops, a crop and second-hand clothes market in Rwamagaza-CCM. For the surrounding villages, this is really a town with its several bars, eating places (migahawa) and guest houses. The centre is always full of people engaged in trading.

Katoro Township in the north is a big business centre providing manufactured goods as well as produce from local farmers.

20.6.9 Gold Mining

Gold mining is a popular and well-organized activity regionally. Artisanal mining is an important and growing source of income in the project area. Miners are of two types: residents and migrants. Residents are local people, mostly women and children, who work local deposits by hand during the dry season when agriculture is limited or not possible. Migrants may be individuals who drift through the area hoping to find a likely spot to work or more often, bands of workers, organized, and financed by gold buyers.

Artisanal mining practices have already been hampered by the proposed Project, and illegal miners on the project will have to be removed once the project is implemented. Several small-scale operations in the area operating under Primary Mining Licenses provide employment to the local populations, and TRX will offer employment to the local population.

20.7 Seismicity

Buckreef Gold Mine Project is located approximately 360 km north-east of the seismically active Lake Tanganyika Rift seismic zone. According to the Global Seismic Hazard Map produced by the Global

Seismic Hazard Assessment Program (GSHAP, 2015), the site is in an area of low seismicity but borders an area of moderate seismicity about 67km in the Southwest.

The risk of catastrophic failure during a seismic event because of liquefaction of top soils and saprolite material is negligible as the natural water table lies well below the clay and saprolite zones. Nevertheless, potential instability because of seismic ground acceleration and loading on low shear strength defects cannot be ruled out. The seismic acceleration coefficient applicable to the site is between 0.04g and 0.08g for a return period of 475 years (10% chance of exceedance in 50 years). Further study at the final design stage is recommended to ensure the hazard from the nearby source zone of moderate seismicity to the east of the site does not warrant an increase in the peak accelerations quoted above.

A search of seismic events (from the USGS/NEIC 1973 – present database) indicated that there have been 16 earthquakes of magnitude 3 or above since 1973 within a 300-km radius of the site. The most significant event was a M5.3 event in December1983, the epicentre of which was 92 km from site. The most recent earthquake event in September 2016 in Bukoba, was a 5.9 magnitude in Richter scale and the epicentre was 40km deep. This area is about 240km northwest of the Buckreef Mine Area. It is considered that these peak accelerations experienced at Buckreef Gold Mine from this event would have been negligible.

20.8 Environmental Sensitivities

Based on information available there are no known Endangered Species within the Buckreef area. There are Wild life parks or land within the project footprint and no special permits will be required to proceed with the project. There no areas of natural scientific and archaeological interest to inhibit the development of the gold project.

20.9 Regulatory Context

Mining operations has been taking place at Buckreef since 1990 until the underground mine closed down in 1994. Mining although on a small scale is the major source of income for the local communities in the area. Exploration has been conducted at the project since 2004. Based on the submission by TRX an EIA certificate valid for the life of the mine project was issued with the five major conditions. TRX understands that the project site is fully compliant with the existing environmental laws of Tanzania.

20.10 Current Regulatory Status

A copy of the EIA issued to Buckreef Gold Project is annexed in Appendix 20.1.

20.11 Preliminary Impacts

The design of the Buckreef Gold project is ongoing as well as the development of appropriate mitigation measures. A summary of the mitigation measures plans to incorporate into the operation of the project is give in table 20.2 in dealing with environmental effects of construction, operation and closure.

20.12 Preliminary Closure and Reclamation Plan

Mine reclamation will be carried out in accordance with applicable regulation of Tanzania. The primary closure consideration is the overall protection of human health and their safety and protection of the environment. The objective of the final closure plan for the project area is to bring the area back into an acceptable condition as per industry best practice.

The following are preliminary closure approach for the project. As much as possible work will be progressively carried out during operation which is the industry best management practice.

20.12.1 Mine excavations

Ensure safety of local villagers and livestock: Suitable safety bunds will be constructed around the pit perimeters.

Ensure health of local villagers and livestock: Establish hydro-geological and hydro-chemical monitoring mechanisms for water collected within the pit perimeters.

Ensure sustainable development use of open pit structure: Establish farming activities such as aqua-culture and irrigation schemes using pit as water dam.

20.12.2 Waste Rock Dump

Ensure safety of local villagers and livestock: Re-vegetate the clayey sections of the dump to increase slope stability.

Ensure health of local villagers and livestock: Establish hydro-geological and hydro-chemical monitoring mechanisms for water draining from the waste dump (acid water drainage monitoring).

20.12.3 Mine Infrastructure (work shop, offices, process plant, camp houses)

All serviceable equipment from workshop and process plant will be removed and either sold off to scrap metal dealers or other mining operators in the district.

All building structures will be surrendered to local village council for use as community offices or community health centre or establishment of a secondary school facility.

All electrical installations to camp house, workshops and offices will be left intact to supply power under the supervision and management by local government authority.

20.12.4 Roads

All existing major roads will be surrendered to the responsible local authority, e.g., through the District Roads Engineer.

20.12.5 Tailings Storage Facility

Continue monitoring of walls for stability and seepage into the ground.

20.12.6 ROMPAD

ROMPAD will be cleared of ore stockpiles to afford natural vegetation re-generation or use as arable land for farming under the proposed irrigation scheme.

Existing ore stockpiles can be sold off to nearby ore processing facilities with funds generated from this funding mine closure costs.

21. CAPITAL AND OPERATING COSTS ESTIMATES

The capital and operating costs estimates developed for this update prefeasibility study are based on the development of a open pit mine and processing plant facility having a nominal processing capacity of 2880tpd ramped up to 4320tpd of ore feed at steady production in year 4. The estimates presented in this study relates to the open pit, processing plant and surface infrastructure developed by Virimai Projects with consultation with TRX. Capital and operating costs related to the gold processing plant have been developed by Emisha Solutions while costs for the TSF were developed by Epoch. Virimai Projects consultants consolidated the costs information from various sources to determine the project capital and operating costs.

21.1 Capital Costs estimates

The capital costs estimates (CAPEX) for the Buckreef Gold Project has been prepared in accordance with industry practise for prefeasibility studies to intended accuracy of -15% to 20%. This estimate includes direct costs estimates based on current pricing for the common items required for the project of this nature. To establish current market pricing, various contractors, freight forwarders vendor and service providers were consulted in the process of compiling the capital estimates for the project.

21.1.1 Pricing

The pricing of the capital costs build up for the supply of equipment are budgetary and not based upon binding quotations. These budgetary quotes where obtained from reputable vendors and contractors who provide unit rates or prices. The capital costs estimates are inclusive of all local tax components as applicable.

21.1.2 Project Currency

All capital costs are expressed in US Dollars with costs based on the June 2018 market conditions with no escalation from that date. Costs submitted in Tanzanian Shillings were converted into US Dollars at the prevailing exchange rate of TZS 2,250 =US$1.00 used in this study.

21.1.3 Capital Costs Summary

The projected capital cost estimates for the project are estimated to be US$76.336 million inclusive of a 15% contingency sum for the Buckreef Gold Project. Taxes and land acquisition permitting licensing are included. The project capital costs summary is outlined in table 21.1 with all the capital cost breakdown descriptions.

Table 21.1 Summary of the Capital Costs estimates

Item	Capital Description	No	Unit Cost	Total Capex
1	**Mining**			
1.1	Mining Equipment (Fleet)	1		17,531,424
1.2	Loader	3	265,500	796,500
1.3	Water Truck	1	100,000	100,000
1.4	Service Truck	1	100,000	100,000
1.5	Light Trucks & Cars	8	41,500	332,000
1.6	Dewatering Pump	4	40,000	160,000
1.7	Survey Tools	1	45,000	45,000
1.8	Pit Optimisation	1	75,000	75,000
1.9	Mining Offices/Shop	1	300,000	300,000
1.1	Haul Roads	1	100,000	100,000
1.11	HME - Workshop Construction	1	700,000	700,000
1.12	Explosive magazine	1	150,000	150,000
1.13	Fuel Tanks with a Capacity to hold 400klt	1	240,000	240,000
	Subtotal Mining			**20,629,924**
2	**Processing Plant**			
2.1	TSF Construction & Design	1	1,750,000	1,750,000
2.2	Portable Water Plant	1	600,000	600,000
2.3	Laboratory	1	500,000	500,000
2.4	Process Plant Development	1	35,284,625	35,284,625
2.5	Generators 4No x 2.5MVa	1	1,100,000	1,100,000
2.6	Substation and Power Reticulation	1	500,000	500,000
2.7	Engineering Workshop for Plant +tools	1	400,000	400,000
	Subtotal Processing Plant			**40,134,625**
3	**Human Resources & Community**			
3.1	Camping Facilities	1	250,000	250,000
3.2	Camp Houses (2Bx20+4Bx30)	50	15,000	750,000
3.3	Relocation of Mnekezi road	1	250,000	250,000
3.4	Airport/Aerodrome	1	35,000	35,000
3.5	Helicopter Pad	1	10,000	10,000
3.6	Compensation - Relocation from SML	1	2,500,000	2,500,000
3.7	Sewer Ponds & Facilities	1	350,000	350,000
3.8	Security fencing	1	520,000	520,000
	Subtotal Human Resources & Community			**4,665,000**
4	**HSE**			
4.1	Clinic	1	100,000	100,000
4.2	Waste Handling Facilities	1	75,000	75,000
	Subtotal HSE			**175,000**
5	**Finance + IT**			
5.1	Computer & Server	1	40,000	40,000
5.2	Desktop	1	45,000	45,000
5.3	Laptop	1	30,000	30,000
5.4	Networking & Communication	1	40,000	40,000
5.5	Process Plant Insurance - 6% Plant Cost	1	600,000	600,000
5.6	Mining Equipment Insurance - 2.5% Equip Cost	1	19,913	19,913
	Subtotal Finance +IT			**774,913**
6	**Contingency 15%**	**15%**		**9,956,919**
7	**Total Capex**			**76,336,381**

21.1.4 Open Pit Mining Capital Cost Estimate

Open pit mining equipment will be owned and operated by the mine to carry out all the mining operations and related activities at Buckreef. Virimai Projects has not carried out an option analysis on owner mining versus contractor mining as the client preferred owner mining to contract mining. The acquisition of the mobile mining equipment is phased in line with the ramp up in production of the Buckreef project. The total capital for mobile equipment is estimated at US$20 million. The quotes for the supply of the earthmoving equipment are based on quotes from Bell Equipment a major equipment supplier in Tanzania.

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21.1.5 Process Plant Capital Costs

The design of the processing plant and associated infrastructure was carried out by Emisha Metallurgical Consultants (Emisha). Using their experience and the general layout and drawings Emisha developed estimates capital costs in the sum of US$35.285 million for the procurement and installation of the processing plant facilities as defined in the flow sheet diagrams in Appendix 13. Other plant related costs and equipment as itemised in table 21.1 have been included the costs to bring it to a sum total of US$39 million.

21.1.6 Tailings Storage Facility

Tailings Storage Facility is the other major component required to support the Buckreef Gold project. In coming up with the capital estimates for the facility the following philosophy was adopted in guiding the design of the tailings storage facility (TSF).

- Economical Stage 1 development of the TSF
- Efficient use of area and use of local construction materials
- Maximum water recovery; and
- Minimum environmental impacts (location relative to streams, dams)

The estimate design costs are included in the TSF Capital costs and the construction costs are estimated by DE Cooper Associates Geotechnical Engineers as a sum of US$1.75 million for stage 1. Stage 2 and subsequent TSF facilities have been assumed in this study to be financed from operating capital.

21.1.7 Surface Infrastructure

In support of the mining operation Buckreef will aim at housing its employees in camping facilities to be built on the project premises. Most of the project employees will be recruited from the nearby surrounding villages and town centres. The surface infrastructure required to support the Buckreef Project is fully outlined in section 18.3 of this report. The total estimate for these facilities is given in table 21.1.

21.1.8 Primary Access Roads

The capital costs estimates for the road works were based on the preliminary BOQ of the earthworks and storm water drainage systems required to divert the road which currently passes through the mine. The Geita District Council had put plans for the diversion of the gravel road away from the mine site. However, Buckreef have set aside funds to assist the council in expediting the construction work. Quotes received for the works put the total upgrading and diversion costs at US$250,000.00.

21.1.9 On-Site Roads

All site road construction within the mine will be constructed as part of the pit excavations and utilising hard waste material from the pits. A provision has been made for a sum of $100,000 to cater for some roads which are not related to the mining activities.

21.1.10 Airstrip

The cost of US$45k for the construction of a new gravel airstrip is based on the use of current mine equipment in clearing and compacting the runway.

21.1.11 Office Buildings and Workshops

The costs of building up the camp facilities, operations and maintenance buildings, plant and open pit buildings are based on the Tanzanian rebuilding costs of the defined structures. The estimate rebuilding costs for the steel structure with brick cladding under IBR roofing in Geita Town range from US$500/$m^2$ to 750/m^2 while that for camp and housing facilities range from US$250 to US$350/m^2. Using these factors Virimai Projects was able to estimate the capital costs for putting up the proposed infrastructure at Buckreef as itemised in table 21.1.

21.1.12 Laboratory

In addition to the cost of putting up the building there will be the cost of equipping the laboratory with state of the art equipment for use in assaying samples from the plant and for grade control in the pits. The full estimate costs for the construction and equipping is a total of US$0.5 million.

21.1.13 Fuel Storage facilities

The cost of the fuel tanks is based on installation of above ground fuel storage tanks of 50,000lt capacity each at $30,000 each.

21.1.14 Explosives Magazine

The magazine construction is based on reinforced concrete structure under a reinforced concrete roof for storage of explosive material. In view of the amount of oxides ore material to be mined at Buckreef a view was taken that this capital cost will come late in the life of the project in year 2 or 3.

21.1.15 Power Plant and Distribution

The total requirement for the mine at peak production is estimated at 4.5MVA supplied from the national grid and backed up with a number of diesel generators. A total of 5No 1.6MVA generators will be purchased to back up power supply to the project TRX has been assured that enough grid power will be available for the mine requirements. The estimate costs for the power plant and the substation for the mine is summarised as sum of US$1.1 million. This cost is inclusive of power lines used to deliver power to various locations within Buckreef Gold Project area.

21.1.16 Fresh Water Supply, Fire Suppression Water and Distribution

Buckreef portable water supply will be met through additional boreholes drilled on mine site including an additional water purification unit for the mine complex. The total cost of the new system is US$300,000 with the total for the two units coming to $600k.

21.1.17 Sewage Collection and Disposal

In keeping with the environmental philosophy of the mine capital estimates for modern collection of all mine sewer through sewer line to the stabilisation ponds has been provided for. The treatment process facility consisting of stabilisation ponds catering for a mine population of say 500 people at a time have been estimated at US$350,000

21.1.18 Site Security

A high-level security fence will be constructed to enclose the main Buckreef operations which include the camp site, process facility and open pits and tailings storage facility. In view of the local invasion of mining areas by small scale miners the need for security perimeter fencing around the pits becomes more critical. The total perimeter fencing for the Buckreef main is 16km and for Tembo and Bingwa pits the perimeter fencing is 2km each. The estimate cost of installation of 1.8m high diamond mesh security fence at US$26/m for the project is a sum of US$520,000.

21.1.19 Rehabilitation and Mine Closure Costs

It has been assumed in the study that progressive rehabilitation will be carried out as development of the mine is been carried out. These costs have been considered as part of the mine operating costs at a unit rate of $0.03per tonne of waste mined. However, some capital costs have been factored in to come in two or so years from the end of life of the mine for the removal of some of the mine infrastructure, equipment and plant at the end of the project. This capital sum has been estimated at US$4.5 million. To reduce the overall costs of plant and equipment removal, scrap steel dealers will be engaged to recover most of the steel on site for resale.

21.1.20 Sustaining Costs

Sustaining capital is the periodic addition of capital required by the gold project to maintain operations at existing levels of production. The main components of sustaining capital required for the Buckreef relates to the replacement of aging equipment during the life of the project. With TRX concurrence, this capital has been pegged at USD22.95 million over the life of the project.

21.2 Operating Costs

21.2.1 Introduction

The operating costs estimates include all recurring costs for labour, service contractors, mine operation maintenance parts and supplies, consumables supplies, freight transport etc to operate the facilities as described in the study. Operating costs is defined as any recurring expenditure which can be expensed in the tax year in which it is incurred.

The Buckreef mine and plant operating regime schedule is summarised as follows:

- Two 12 hour shifts daily for the mining operation.
- Salaried staff will be paid monthly including vacation
- Hourly personnel will be paid hourly excluding vacation

Operating expenses commence with the introduction of feed into the plant in year 1

The operating costs are summarised as follows:

- Mining
- Process
- Power
- Tailings
- Labour
- General & Administration (G&A)

All costs details were developed for a typical year and extended over the years of operation. The estimates are considered complete in terms of the scope and allowances for all the planned and anticipated events, activities and occurrences throughout the life of the Buckreef project. The level of estimate detail was determined by the general significance of the item and its cost and the degree of definition available.

21.2.2 Scope

The recurring annual operating expense estimate includes all labour, spares supplies, services, logistical and turnaround costs to mine, process and service the operation for a nominal 1.5Mt ore per year operation. It includes all costs to be incurred by TRX management organisation and includes all activities from the start of mining operations through to gold product transfer to the buyer.

21.2.3 Mining Operating Costs

The Buckreef Mine operating costs encompass the labour material/supply/power costs incurred in the mining and haulage of RoM ore to the processing plant. These mine operating costs include the costs associated with the typical surface mining activities (such as drilling, blasting, load and haul of waste and ore), maintenance and operational support for the mining operations, grade control, rehabilitation and direct supervision of the mining operation.

To allow for a more thorough analysis and reporting of the mining operations expenses, costs were aggregated separately for each of the primary mine functions, drill and blast, load and haul and rehabilitation.

Table 21.1 Summary of the Mining Operating Costs

Description	Unit	Rate $/t	Comment
Drilling and Blasting Waste	$/t	0.74	Based on Virimai Estimation
Drilling and Blasting Ore	$/t	0.90	Based on Virimai Estimation
Load and Haul Ore	$/t	1.13	Based on Virimai Estimation
Load and Haul waste	$/t	1.03	Based on Virimai Estimation
Overhaul rate	$/t/km	0.08	Based on Virimai Estimation
Mine Rehabilitation (Pits & Dumps)	$/t	0.03	Based on Virimai Estimation
Note	0.1	km per 10m bench at 10% grade.	

21.2.4 Labour Costs

Buckreef Mine labour requirements were estimated using a zero-based approach with the annual staffing levels for the mine determined by the level of deployment of staff to manning various sections of the operations of the Buckreef Gold Project. Most of the labour will be employed in the pits and in the processing plant. The main departments of the Buckreef will comprise of the following sections each headed by a departmental head.

- Management
- Open Pit Operations
- Engineering
- Technical Services
- Processing Plant and Metallurgy
- Safety Health and Environment
- Human Resources Management
- Administration and Accounts

A total staffing level estimated for the Buckreef operation is about 307 employees ranging from salaried staff to hourly paid employees. The annual cost labour costs at full production is estimated at USD$2.87 million which works out at US$1.98/t based on annual ore production of 1. 497Mt.The full schedule of assumed staffing levels of the project over the life of the project is summarized in table 21.2.

21.2.5 Security Costs & Other Licenses

Mine security will be provided by Tanzanian local company which has provided security over the exploration projects of the company over the last 10years. In addition to the local security company the Tanzanian national police will be contracted for periodic security duties for the security of the gold product. The annual costs of security in Tanzanian shillings are in the sum of TZS1,007 million and have been converted to US$448k at the current exchange rate of TZS2,250 to 1US$. This equates to about US$0.29/t of ore milled at full production.

21.2.6 SHE & Licenses

During the operation of the mine a number of licenses are required for the abstraction of water, landfill permits etc and the operation of aerodrome to the Tanzanian Government air traffic control authority and annual audits stipulated by the Environmental Management Agency of Tanzania in the Buckreef EIA certificates. These costs are estimated at about at TSZ580 million per year which at current rate of exchange is US$0.17/t milled at the planned production rate of 1.5Mtpa.

21.2.7 Open Pit Mining

Mine operating costs were estimated assuming all mining functions would be directly performed by the owner using company owned equipment and company employees. All mining will be carried out using a fleet of hydraulic excavators loading into 40tonne capacity articulated dump truck. The mining costs relate to the running cost of the mining mobile equipment which include for the fuel, maintenance (spares and labour), operators and other consumables.

Table 21.2: Mining rates for the Buckreef

Item	Description	Unit	Rate
3	Load and Haul Ore	$/t	1.13
4	Load and Haul waste	$/t	1.03
5	Overhaul rate	$/t/km	0.08

21.2.8 Power

The power supply estimate is based on the use of combination of grid power from Tanesco and diesel generators powered by diesel fuel at an assumed ratio of 80% and 20% respectively. The current grid power cost from Tanesco is 159TZS /kWhr which equates to US$0.07/kWhr. The inclusion of generators is to provide backup power for the operations in the case of power outages. The operating load estimate for the plant and other mine facilities has been developed based mostly on equipment sized in the study. Price of power used in this update study for the Buckreef is a weighted average of the grid and generator power at ratio of 80% to 20% grid supply and diesel power supply respectively.

21.2.9 Fuel Cost

The fuel cost includes selling price at source plus taxes and transport cost for delivery at the mine site. The current delivery price of diesel fuel to the mine from the Mwanza is at US$1.20/lt. All fuel costs have being captured in the other respective costs centres like mining and processing.

21.2.10 Process

The processing operating cost estimates were prepared from quotes presented by various suppliers and on metallurgical test results on reagent consumption levels. The metallurgical test results on which the costs are based on are from Emisha Metallurgical Solutions and the metallurgical tests results from CN Solutions. Based on the current test results and reagent consumption levels this update study has estimated the process operating costs at US$ 10.24 /t of ore milled. The process plant has been designed in three modules of 60tphr capacity each sized to process 3888tpd in total with an availability of 90%. The costs include the costs of direct process operations, labour, consumables and reagents maintenance and laboratory assay costs. A detailed process operating reagent cost estimate is provided in table 21.3.

Table 21.3: Processing Chemical Consumption & Cost estimation

Item	Description	Unit	Cons Kg/t	Unit price $/kg	Costs $/$t_{RoM}$
1	**Flocculent**	kg/t	1.085	0.2	0.217
2	Lime	kg/t	1.01	3	3.031
3	Cyanide	kg/t	0.007	0.68	0.005
4	HCL	kg/t_c	0.213	1.27	0.27
5	NaOH	kg/t_c	0.001	3.78	0.004
6	Carbon	kg/t_c	0.036	22.73	0.814
7	Ferrous Sulphate	kg/t	8E-04	1.2	0.001
8	Diesel	kg/t	1.085	0.2	0.217
9	Total Consumable Costs $/$t_{RoM}$				4.39

21.2.11 Tailing Storage Facility (TSF)

The TSF operating costs were developed and provided by Fraser Alexander of South Africa and the estimate operating costs cover routine maintenance and servicing of the TSF infrastructure which include the earthworks related tailings and water handling systems presented in the update study report.

Table 21.4: Annual TSF Management Costs

Description	Annual Costs $/yr	Unit Cost $/t
TSF management	84,375	0.06

The prices of liners and steel balls in the crushing and grinding section of the plant are based on vendor data and industry standards. In summary the processing costs estimates are given in table 21.5.

Table 21.5: Summary of Processing Costs estimates

Item	Description	Unit	Rate
1	Processing reagents	$/t	4.39
2	General spares & mechanical consumables	$/t	0.52
3	General spares and consumables	$/t	1.66
4	Power	$/t	1.56
5	Process Labour	$/t	1.76
6	TSF management	$/t	0.06
7	RoM Ore Re-handle	$/t	0.28
8	Processing Costs	$/t	10.23

21.2.12 Labour Costs

Buckreef Mine labour requirements were estimated using a zero-based approach with the annual staffing levels determined by the level of manpower requirements dictated by the production sequence. The manpower requirements necessary for the operation which is inclusive of supervising the mining operations in the pits, running the processing plant and the other production support facilities were based on the respective operating shifts. The engineering staffing levels were based on Virmiai Projects engineering experience in the allocation of manning levels to maintain the facilities and the equipment on the project. Support labour and mine supervisory personnel were assigned in accordance with manning conventions at other Tanzanian mines and as deemed necessary to adequately support the production requirements of the Buckreef Project.

The total annual salaries and wage for labour at the mine were based on salary information provided by TRX and Table 21.6 is the summarised annual cost by section of the mine.

Table 21.6: Labour and General Costs Summary

ITEM	CATEGORY	NO	Annual USD
1	MANAGEMENT	3	162,000
2	MINE OPERATION	111	385,800
3	MINING ENGINEERING	42	558,000
4	TECHNICAL SERVICES	15	297,600
5	PROCESS PLANT	18	60,000
6	SAFETY, HEALTH & ENVIRONMENT	8	201,600
7	METALLURGICAL LABORATORY	6	80,400
8	HUMAN RESOURCES	12	132,000
9	PURCHASING	7	74,400
10	ACCOUNTING	11	210,000
11	CAMP	28	127,200
12	TOTAL	261	2,289,000
13	Skills Development Levy	5%	103,005
14	Workers Compensation Fund	1%	22,890
15	Company social contribution	10%	228,900
16	SUB TOTAL		2,643,795
17	Other Non-Labour G& A	10%	228,900
18	GRAND TOTAL		2,872,695
19	Annual Tonnage		1,450,656
20	UNIT LABOUR COSTS	$/t	1.98

21.2.13 Summary

On the basis of estimated steady state production of 1,497,000tpa of ore milled the average operating costs for the mine at Buckreef are summarised in table 21.7. This cost is not inclusive of additional costs required for exploration for the addition of more resources to the reserve pipeline in order to sustain the mine to the end of the life of the station. Further these costs are not inclusive of the overhead costs incurred by the head office in Toronto.

Table 21.7: Operating Costs Summary

Item	Description	Unit	Rate
1	**Mining Rates**		
1.1	Mining Drilling and Blasting Waste	$/t_w$	0.90
1.2	Mining Drilling and Blasting Ore	$/t_o$	1.20
1.3	Load and Haul Ore	$/t_o$	1.88
1.4	Load and Haul waste	$/t_w$	1.88
1.5	Overhaul rate	$/t/km	0.08
2	**Processing Rates**		
2.1	**Processing reagents**	$/t_o$	**5.07**
2.2	General spares & mechanical consumables	$/t_o$	2.05
2.3	RoM Ore Re-handle	$/t_o$	0.28
3	**Power (Diesel Generators)**	$/t_o$	3.11
4	**TSF Management**	$/t_o$	0.06
5	**Labour Costs & General Costs**	$/t_o$	1.98

Note : t_o = tonnes of ore material tw =tonnes of waste material

In the cash flow model, the unit costs of material were used in determining the net annual cash-flows based on the scheduled tonnages of materials from the each of the pits of Buckreef Project.

22. ECONOMIC ANALYSIS

22.1 Cash-flow Model

A cash flow model was developed by Virimai Projects to allow a after-tax economic evaluation of the Buckreef Gold Project to be carried out. The model was subsequently reviewed by TRX to ensure that all cost considerations were catered for. As noted elsewhere all costs are stated in US Dollars and the cash flow and financial analysis are presented in June 2018 dollars and no provision of inflation was made in the model.

The capital and operating costs that were developed during the study were entered into the model and the annual cash flow forecasts were made on the basis of the scheduled tonnages and these cash-flows are shown in Table 22.1

As described elsewhere in the study report the mine is planned to operate for 15 years or more utilising surface mining. The surface mining operations begins in year 1 producing from the outcrops of the oxide ore areas in the pits. Surface mining reaches full production of 1.497Mtpa RoM in year four of starting operation.

A summary of the unit average operating costs used in the model are given in Table 21.4 in section 21 of the report.

22.2 Discount Rate

The cash flow in the model was discounted at 3%, 5% and 8% per annum after tax. The current commercial lending rates worldwide are relatively low. TRX has been operating for many years in Tanzania without difficulty; and had good relations with all levels of authority. It has a partnership with Stamico, a state mining company; it has provided access to its properties to artisan miners and it has active and positive relations with local communities. After all the foregoing considerations, the base case discount rate for the project is therefore pegged at 5%.

22.3 Tax

The financial analysis for the study was performed on after-tax basis. The Buckreef Project is subject to income tax at 30% of taxable income. Virimai Projects compiled the tax calculations for the Buckreef with the assistance of Mr John Shimbala, a tax consultant and partner/director with Ark Associates Limited of Tanzania. Ark's consent is shown in Figure 32.14 in the Appendices

The summary of Government taxes and levies used, where appropriate, in the computation of costs and the financial model are listed below for the record:

Table 22.1 Summary of Government taxes and levies used in costing and the Financial Model

Corporate Tax	30%	
VAT	18%	
Capital Gains Tax	10%	Resident
Capital Gains Tax	15%	Non-resident
Withholding Tax on Services	5%	Local
Withholding Tax on Services	15%	Foreign
Stamp Duty	1%	
Skills Development Levy	5%	
Workmen's Compensation	1%	
Company Social Contribution	10%	
Gov. Royalties	6%	
Export Fee	1%	
Other Applicable Fees (Local Service Levy)	0.3%	

22.4 Inflation

No inflation factor was applied to the analysis. The escalation of costs and revenues were assumed to be equal throughout the life of the project.

22.5 Revenue

The projections of revenue are based on the quantity of gold produced at Buckreef based on the production scheduling as fully outlined in the study over the life of the project LoM at constant gold price of $1300/oz.

22.6 Royalty

The Government of Tanzania has established that the state and district are entitled to receive royalties for the exploitation of mineral resources by holders of mining concessions. The government royalty rate for gold is currently at 6% arising from the sale of the gold product and the district council service levy is pegged at 1.3% of revenue.

22.7 Selling Costs

The gold selling costs as levied by the government is US$40/oz which is deducted directly from the proceeds of sales.

22.8 Summary of the Parameters Used in the Financial Model

The following data was fed into a financial model built by Virimai Projects to carry out an economic assessment of the Buckreef Gold Project.

Table 22.2 Summary of the inputs into the Financial Model

DESCRIPTION	UNIT	VALUE
Total Ore (Mineral Reserves)	(tonnes)	19,202,000
Grade (Mineral Reserves)	(g/t)	1.54
Waste (In Pit)	(tonnes)	180,707,000
Average Stripping Ratio		9.54
Production Rate	Mtpa	1.497
In Situ Ounces	(oz)	943,850
Mining Dilution	%	5
Gold Price	(USD/oz)	1,300
Discount Rate	(%)	5%
Royalty Rate	(%)	7.3%
Capital Costs	USD($Million)	76.5
Expansion Year 1	USD($Million)	36.8
Expansion Year 2	USD($Million)	5.8
Expansion Year 3	USD($Million)	14.3
Expansion Year 4	USD($Million)	19.6

22.9 Financial Analysis

Table 22.3 below shows the full after tax financial analysis:

Table 22.3: Financial Analysis of the Buckreef Gold Project

			YEARS																
Description	**Rates**	**Fact**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**	**Year 12**	**Year 13**	**Year 14**	**Year 15**	**Year 16**	**Total**
Ore Mining																			
Oxide Ore (Tonnes)	kt		349	188	57	209	73	30	159	66	309	118	21	-	41	2	8	-	1,629
Oxide Ore (g/t)	g/t		2.00	1.40	1.24	1.28	1.17	1.20	1.02	2.07	1.98	3.92	0.97	-	2.11	1.65	1.65	-	
Trans Ore (Tonnes)	kt		92	151	136	133	106	78	40	28	82	309	270	52	17	6	21	-	1,520
Trans Ore (g/t)	g/t		2.18	2.68	1.72	1.46	1.25	1.01	1.57	1.06	1.05	3.27	1.30	0.92	2.72	1.41	1.41	-	
Hard Ore (Tonnes)	kt		43	146	290	625	1,271	1,347	1,251	1,356	1,060	1,028	1,160	1,399	1,392	1,446	1,323	915	16,053
Hard Ore (g/t)	g/t		1.37	2.15	1.69	1.55	1.63	1.39	1.25	1.89	1.57	1.26	1.34	1.23	1.31	1.64	1.40	1.70	
Oxide Waste	kt		2,713	1,443	2,087	598	191	1,551	2,086	2,140	1,978	3,323	918	82	1,046	-	-	-	20,155
Trans Waste	kt		1,296	1,097	2,134	1,410	733	1,525	1,930	1,277	1,629	2,700	2,878	1,368	368	-	-	-	20,346
Hard Waste	kt		508	1,766	4,055	6,824	7,781	6,839	7,985	9,294	14,640	12,160	14,550	15,490	12,149	12,888	13,176	1,102	141,207
Oxide & Trans Ore Recovery	%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	
Sulphide Ore Recovery		85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	
Mining Dilution	%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	
Gold produced																			
Fine (kg)	kg		876	869	677	1,208	1,878	1,621	1,468	2,225	1,989	2,405	1,599	1,433	1,595	1,924	1,535	1,258	24,559
Fine (oz) (1oz =31.1034768grams)	koz		28,162	27,944	21,752	38,837	60,375	52,111	47,181	71,532	63,956	77,320	51,412	46,069	51,295	61,851	49,347	40,448	789,593
Gold price (US$000)	$/oz	1300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	
Gross revenue	US ($000)	0	36,610	36,327	28,277	50,488	78,487	67,744	61,336	92,992	83,143	100,516	66,835	59,890	66,684	80,406	64,151	52,583	1,026,471
Less Royalties & Selling Costs																			-
: Royalties 7.3% on Revenue		7.3%	(2,673)	(2,652)	(2,064)	(3,686)	(5,730)	(4,945)	(4,478)	(6,788)	(6,069)	(7,338)	(4,879)	(4,372)	(4,868)	(5,870)	(4,683)	(3,839)	(74,932)
: Selling Costs per oz of gold		4.40	(124)	(123)	(96)	(171)	(266)	(229)	(208)	(315)	(281)	(340)	(226)	(203)	(226)	(272)	(217)	(178)	(3,470)
Net revenue			33,814	33,553	26,117	46,631	72,492	62,570	56,651	85,889	76,792	92,838	61,730	55,315	61,590	74,264	59,251	48,566	948,064

			YEARS																
Description	**Rates**	**Fact**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**	**Year 12**	**Year 13**	**Year 14**	**Year 15**	**Year 16**	**Total**
Capital Costs	US ($k)																		
Start up Capital			36,799	5,804	14,334	19,563													76,501
Closure Costs	U$																	4,507	4,507
Sustaining Costs	U$	7.5%	-	-	-		5,738	-	-	5,738	-	-	5,738	-	-	5,738		-	22,950
Total Capital Costs	U$	-	**36,799**	**5,804**	**14,334**	**19,563**	**5,738**	**-**	**-**	**5,738**	**-**	**-**	**5,738**	**-**	**-**	**5,738**	**-**	**4,507**	103,958
Operating expenditure	**U$**																		
Mining Rates	US ($k)																		
Drill & Blast Waste	$/tw	0.74	1,337	2,122	3,796	6,103	6,310	6,198	7,348	7,834	12,057	11,013	12,916	12,493	9,276	9,551	9,764	817	118,936
Drill & Blast Ore	$/to	0.90	122	269	385	685	1,244	1,287	1,166	1,250	1,031	1,208	1,291	1,310	1,274	1,312	1,213	827	15,876
Load and Haul Ore	$/to	1.13	544	546	544	1,088	1,632	1,637	1,632	1,632	1,632	1,637	1,632	1,632	1,632	1,637	1,520	1,030	21,609
Load and Haul waste	$/tw	1.03	4,663	4,444	8,541	9,115	8,983	10,231	12,384	13,118	18,831	18,764	18,933	17,481	13,996	13,300	13,597	1,138	187,519
Overhaul rate	$/t/km	0.08																	
Mine Rehabilitation	$/tw	0.03	136	129	248	265	261	297	360	381	547	545	550	508	407	387	395	33	5,451
Processing Rates																			
Processing reagents	$/to	10.24	4,952	4,966	4,952	9,905	14,853	14,894	14,853	14,853	14,853	14,894	14,853	14,853	14,853	14,894	13,836	9,370	196,646
Labour Costs	$/to	1.98	958	960	958	1,915	2,872	2,880	2,872	2,872	2,872	2,880	2,872	2,872	2,872	2,880	2,675	1,812	38,023
Total operating costs	US ($k)		**12,712**	**13,436**	**19,424**	**29,076**	**36,156**	**37,425**	**40,616**	**41,942**	**51,825**	**50,941**	**53,048**	**51,151**	**44,310**	**43,960**	**43,001**	**15,026**	**584,048**
Opex +Capex	US ($k)	-	**49,511**	**19,240**	**33,758**	**48,639**	**41,894**	**37,425**	**40,616**	**47,679**	**51,825**	**50,941**	**58,786**	**51,151**	**44,310**	**49,698**	**43,001**	**19,533**	**688,006**
Pre Tax Net Cash Flows	US ($k)	-	**(15,697)**	**14,313**	**(7,641)**	**(2,008)**	**30,598**	**25,145**	**16,035**	**38,210**	**24,967**	**41,897**	**2,944**	**4,165**	**17,280**	**24,567**	**16,250**	**29,033**	**260,058**
Taxable Income	US ($k)		**12,644**	**27,206**	**16,607**	**31,338**	**50,119**	**33,483**	**23,247**	**48,350**	**25,515**	**42,444**	**9,229**	**4,712**	**17,828**	**30,852**	**16,797**	**34,088**	**424,457**
Tax Payable	US ($k)		**3,793**	**8,162**	**4,982**	**9,401**	**15,036**	**10,045**	**6,974**	**14,505**	**7,654**	**12,733**	**2,769**	**1,414**	**5,348**	**9,255**	**5,039**	**10,226**	**127,337**
Net Cashflows after Tax	US ($k)		**(19,490)**	**6,151**	**(12,623)**	**(11,409)**	**15,563**	**15,100**	**9,061**	**23,705**	**17,313**	**29,164**	**176**	**2,751**	**11,932**	**15,311**	**11,211**	**18,807**	**132,721**
Add back Depreciation	US ($k)		**5,955**	**7,090**	**9,913**	**13,783**	**13,783**	**8,338**	**7,212**	**4,403**	**547**	**547**	**547**	**547**	**547**	**547**	**547**	**547**	**74,854**
Net Cashflow after tax adjusted for tax dep	US ($k)		**(13,536)**	**13,240**	**(2,709)**	**2,373**	**29,346**	**23,438**	**16,273**	**28,107**	**17,860**	**29,711**	**723**	**3,298**	**12,479**	**15,859**	**11,758**	**19,354**	**207,575**
After Tax NPV @ (3%)	US ($k)	**3%**		**156,552**															
After Tax @ NPV (5%)	US ($k)	**5%**		**130,964**															
After Tax @ NPV (8%)	US ($k)	**8%**		**101,495**															
After Tax IRR	**%**			**74%**															
Cash cost per oz	**$/oz**		**451**	**481**	**893**	**749**	**599**	**718**	**861**	**586**	**810**	**659**	**1,032**	**1,110**	**864**	**711**	**871**	**371**	**735**
All in cash costs	**$/oz**		**1,758**	**689**	**1,552**	**1,252**	**694**	**718**	**861**	**667**	**810**	**659**	**1,143**	**1,110**	**864**	**804**	**871**	**483**	**933**

22.10 Financial Analysis Summary

The results of the Buckreef Project's economic analysis based on mining the identified open-pit Mineral Reserve, indicate a positive after-tax Net Present Value (NPV) of $130.96 million at a discount rate of 5% pa with an Internal Rate of Return (IRR) of 74% as summarized in Table 22.3. 30% Corporate tax was used.

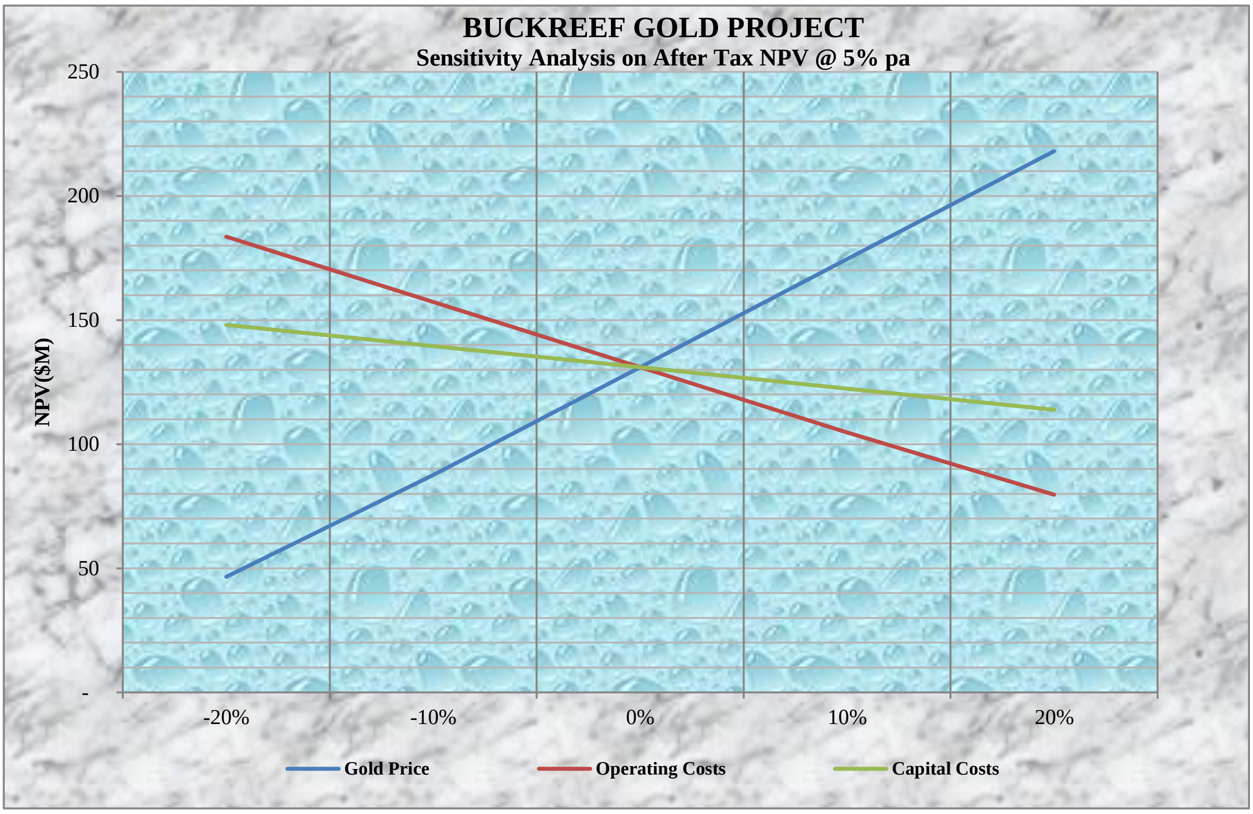
Table 22.4: Results of the After-Tax Financial Analysis of the Buckreef Gold Project

Item	Description	Units	Amount
1	**Mining Profile**		
1.1	Mineral Reserves (Prove +Probable)	Mt	19.202
1.3	In situ Grade	g/t	1.54
1.4	Waste in Pit Shell	Mt	181
1.5	Mine Dilution	%	5
2.4	Stripping Ratio in Area 1	waste/ore	9.54
2	**Processing**		
2.1	Annual Ore Milling	Mtpa	1.497
2.1.1	Year 1-2	Mtpa	0.486
2.1.2.	Year 3-4	Mtpa	0.972
2.1.3	Year 4-16	Mtpa	1.497
2.2	Life of Mine in Years	Years	16
2.3	**Gold Production**		
2.3.1	Average Gold Production per year	(oz)	51,000
2.3.2	Total Gold Production (LoM)	(oz)	822,000
3	**Capital Expenditure**		
3.1	Start-up Capital Plant etc	USD$ M	76.5
3.2	Sustaining capital costs	USD$ M	22.95
3.3	Closure Costs (in Opex)	USD$M	4.500
4	**Financial Modelling Result**		
4.1	Average LoM Cash Costs	USD$/oz	735
4.2	After Tax NPV @ 5%pa	USD$M	130.96
4.3	IRR	%	74

22.11 Financial Model Sensitivity Analysis

A financial sensitivity analysis was conducted on the base case cash flow net present value (NPV) and internal rate of return on the following variable: capital costs, operational costs, gold price, and recoveries. A deterministic sensitivity analysis was carried out by varying the input values and calculating the new net present value at discount rate of 5% pa. The input values where varied by up to plus and minus 20% on the follows:

- Price of gold (revenue parameters)
- Operating costs
- Capital costs



	After - Tax	
Gold Price	NPV($M)	IRR (%)
1,100	65	39%
1,150	81	47%
1,200	97	55%
1,250	114	64%
1,300	131	74%
1,350	148	85%
1,400	164	98%
1,450	181	114%
1,500	198	132%

Figure 22.1 Buckreef After-tax Sensitivity Analysis on NPV @ 5%

23. ADJACENT PROPERTIES

The Buckreef project is situated within the Lake Victoria Gold Belt (LVGB), which is host to numerous small and a number of large scale gold mining operations as illustrated in figure 23.1.

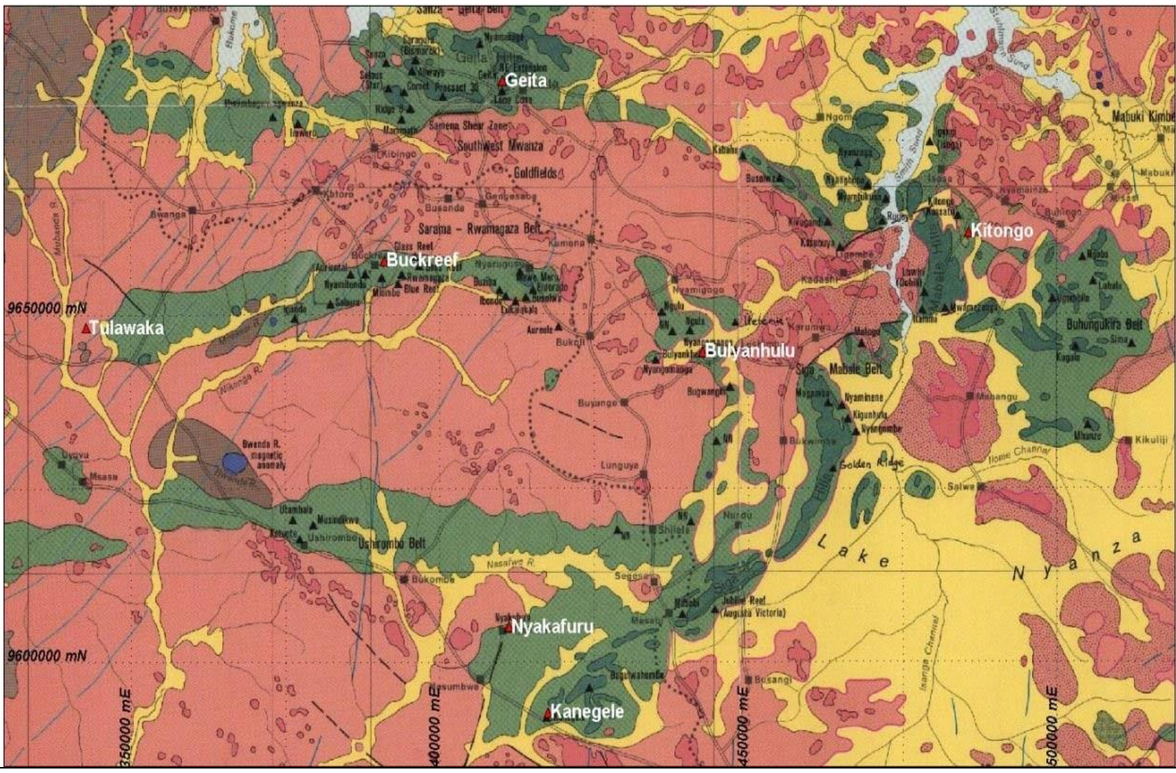


Figure 23.1 Location of adjacent Gold Properties to Buckreef

The nearest large-scale gold mines projects are outlined as follows:

- Geita Gold Mine: It is and open pit and underground mine and is one of AngloGold Ashanti's flagship mines. The mine has been in operation as a large-scale mine since the 1930s. A total of 7.7 million ounces of gold have been produced since AngloGold Ashanti commissioned the mine in 2000. As at December 2016 the Mineral Resource was estimated at 7.32 million ounces (www.infomine.com);
- Tulawaka Project: an exploration project and gold mine currently owned by STAMIGOLD a subsidiary of STAMICO. The Tulawaka Mine produced 124,743oz of gold in 2005 and 94,000oz in2009 (www.infomine.com); and
- Bulyanhulu Mine owned by Barrick Gold Corporation and produced 350,000oz of gold in 2004 (www.infomine.com).

The LVGB represents an important, large scale gold province in which regional mineralising systems have utilised rheologic, chemical and structural boundaries to remobilise and concentrate gold to produce economic deposits. Buckreef Project occurs in the LVG context with similarly suitable lithologic and structural features and theoretically therefore, could prove as potentially prospective.

Virimai Projects has not verified the public domain information with regards the Geita, Tulawaka and Bulyanhulu Mines and the information provided is not necessarily indicative of the mineralisation at Buckreef Project.

24. OTHER RELEVANT DATA AND INFORMATION

Not applicable

25. INTERPRETATION AND CONCLUSIONS

25.1 General

The Buckreef Gold Mine Project has been investigated at prefeasibility level through a series of value engineering studies that include resource exploration, metallurgical sampling and testing, resource estimation, mine design process design infrastructure design, environmental assessment, capital and operating costs estimates and economic analysis. The extent and level of the investigation and study for each of the outlined areas is considered to be consistent with what is normally associated with prefeasibility study level studies for mineral resource development projects.

This prefeasibility study has been performed using the 2014 Venmyn Deloitte block model with current (June 2018) operating costs based on owner mining and use of conventional gold processing system which employs EDS for milling and the power supply for the project has been assumed to be based on 80% grid power and 20% on diesel generator power source.

Based on the cumulative findings of the various studies, the economic analysis performed on the Buckreef shows that the project is both technically and economically viable to progress to the Feasibility Study stage.

25.2 Mineral Resources Estimates

The Mineral Resource estimate updated in 2014 by Venymn Deloitte the results of which are reported in the update report completed under NI43-101 standards and amended and filed on the System for Electronic Document Analysis and Retrieval, “SEDAR”, (www.sedar.com), on April 30, 2014. These estimates were reviewed by Virimai Projects in this study to ascertain their suitability for use in the prefeasibility study. The result of the review concluded that the mineral resource estimates are as reported in 2014 with some minor adjustments. After the validation, Virimai Projects took the full responsibility of the Minerals Resources as published by Venmyn Deloitte on February 24, 2014

25.3 Mineral Processing and Metallurgical Testing

Over the period 2010 to 2017 a number of metallurgical test programs were undertaken on the oxides and sulphides ores of the Buckreef samples. The test work results show that the mineralisation can recover gold with gravity and CIL process. The test works indicate that the ores can be milled using the new system of rock milling using the EDS system.

25.4 Mining Methods

The mining studies were completed using the resource estimates as of the April 30, 2014 by Venmyn Deloitte and verified by Virimai Projects. The mining studies include for the following:

- Pit optimisation of the four deposits of the Buckreef at a gold price of US$1,300/oz to come out with the ultimate pit limits for each of the deposit.
- Final pits were designed for the Buckreef, Eastern Porphyry, Bingwa and Tembo with bench and overall pit slopes being based on the preliminary geotechnical studies done for the Buckreef done by SRK Canada.

The Buckreef Gold Mine Mineral Reserves were then determined from defined mineral resources by taking into account geologic, mining, processing, legal and environmental considerations. The mineral reserves are therefore classified in accordance with the 2014 CIM definition Standards for Mineral Resources and Reserves.

The Mineral Reserves for the Buckreef project represent the mineral resources (**Measured +Indicated**) contained in the selected pit shells. The Mineral Reserves for the Buckreef as at 26th June 2018 are as summarised.

- the 2018 Buckreef Proven Mineral Reserves are **9.352Mt at a grade of 1.72g/**t for **517,358oz** contained metal
- the 2018 Buckreef Probable Mineral Reserves are **9.730Mt at a grade of 1.36g/t** for **426,492oz** contained metal
- the 2018 Buckreef Proven Mineral Reserves are **119,726t at a grade of 1.86g/t** for **7,160oz** contained metal (This relates to the tonnage on the RoM stockpile)

Inferred Mineral Resources **(of 9.25Mt grading at 1.36g/t)** within the pit shells have **not** been converted to reserves and instead have been treated as waste material for the planning purposes in the study. The total waste enclosed in the selected pits is 180Mt and with 19Mt of ore, the overall stripping ratio is 9.54 for the four pits over the planned 16-year life of the project.

Mining of the ore and waste will be completed with size appropriate earthmoving equipment in the form of 40t articulated dump trucks matched with 6.5cum hydraulic excavator and other supporting equipment such as tracked and wheel dozers, drilling rigs graders and water trucks. Grade control will be provided by reverse circulation drill rigs working in advance in oxide zones while in the fresh rock the blast holes cuttings will be used for the grade control.

25.5 Recovery Methods

The gold recovery methods for the Buckreef are modular processing units with a nominal capacity of 1.5Mtpa for the three units designed to treat both oxides and sulphides ores grading 1.5g/t Au. According to the updated mine plan it is anticipated that the soft oxides material from all the four pits will be processed first followed by the hard, fresh rock ores. The harder fresh rock ores will be milled by EDS system.

25.6 Project Infrastructure

Buckreef Project is an old mine with existing infrastructure but will require considerable new and the existing infrastructure to handle the proposed tonnages planned for in the prefeasibility study.

The new infrastructure required for the project will include upgrading of the access roads, water supply, new processing plant, workshop and offices buildings for the mine and the plant tailings storage facilities. The locations of these facilities were selected to take advantage of proximity to the main open pit taking into account the pit blasting free zones and other environmental considerations.

The new infrastructure proposed for the project includes for the following:

- Upgrading of the link access road
- Mine haul roads
- Heavy and light vehicle workshops.
- Fuel storage and distribution.
- Explosives storage and handling.
- Waste Storage Facility (WSF) and overburden facility.
- ROM stockpile.
- Tailings Storage facility (TSF)
- Processing Plant
    - Crushing facility including vibratory feeder, jaw crusher and associated material handling equipment.
    - Surge bin with temporary stock pile.
    - Gravity concentration, electrowinning and associate facilities.
    - Cyanidation and related gold recovery.
    - Reagent storage and handling.
    - Facilities for administration and an assay laboratory.

- Power supply and distribution system.
- Water supply and distribution system.

• Sewage collection and management.

• Surface water management system.

• Camp site facilities

• Air strip and helipad.

• Medical centre.

25.7 Capital costs

The capital cost in the prefeasibility study considers owner mining option throughout the life of the project. The Buckreef pit has been phased into four to allow for limited amount of pre-stripping at the start of the project. About four cutbacks have been scheduled in the pits to cater for this phased approach. Additional equipment required to meet these increased mining requirements have been factored in the capital costs. Replacement equipment to sustain the operating at the planned production have been factored in the capital costs at $22.95 over the life of the project.

The capital cost estimates employed in the study include all direct and indirect costs along with appropriate project estimating contingencies of 15% for all the facilities required to bring the Buckreef Project into production as defined in the prefeasibility study. All equipment and materials are assumed to be new in the study. Where appropriate Tanzanian import tariffs have been applied. No allowances for escalation or exchange rate fluctuations have been factored for in the study. The capital costs estimates have been estimated at US$76,5 million at June 2018 price levels.

Included in the capital costs is the closure cost estimates at the end of the project life to be spent in the final year of the life of the mine.

25.8 Operating costs

The mining operating costs estimates are dominated by the equipment operating costs (fuel, tyres, spares, ground engaging tools, maintenance, labour). Also included are the drilling and blasting costs and other services. The labour rate build up is based on the statutory laws governing benefits to workers currently in place in Tanzania. The annual costs have then been converted at the current exchange rate into US$. The operating costs have been based on actual pricing and build-up of staff compliment to meet the operations requirements. Estimates for the processing have been developed by Emisha Mining Innovations.

The results of the financial analysis are given in the table 25.1 below:

Table 25.1: Results of the After-tax Financial Analysis of the Buckreef Gold Project

Item	Description	Units	Amount
1	**Mining Profile**		
1.1	Mineral Reserves (Prove +Probable)	Mt	19.202
1.3	In situ Grade	g/t	1.54
1.4	Waste in Pit Shell	Mt	181
1.5	Mine Dilution	%	5
2.4	Stripping Ratio in Area 1	waste/ore	9.54
2	**Processing**		
2.1	Annual Ore Milling	Mtpa	1.497
2.1.1	Year 1-2	Mtpa	0.486
2.1.2.	Year 3-4	Mtpa	0.972
2.1.3	Year 4-16	Mtpa	1.497
2.2	Life of Mine in Years	Years	16
2.3	**Gold Production**		
2.3.1	Average Gold Production per year	(oz)	51,000
2.3.2	Total Gold Production (LoM)	(oz)	822,000
3	**Capital Expenditure**		
3.1	Start-up Capital Plant etc	USD$ M	76.50
3.2	Sustaining capital	USD$ M	22.95
3.3	Closure Costs (in Opex)	USD$M	4.50
4	**Financial Modelling Result**		
4.1	Average LoM Cash Costs	USD$/oz	735
4.2	After-Tax NPV @ 5% pa	USD$M	130.96
4.3	After-Tax IRR	%	74

25.9 Risks

Virimai Projects believes that this pre-feasibility is a reasonable presentation of the project potential. As such it is not without potential risks. Thus, Virimai Projects briefly outlines some of the major risk likely to be faced by the project.

25.9.1 Gold price

TRX has not indicated plans to hedge the gold production from its operations. At the time of compilation of this study the prevailing gold price has been within the reasonable margin of the selected long-term gold price. Among other factors it found that Buckreef Project is highly sensitive to gold price. Therefore, for not hedging, the project will be fully exposed to the risks and rewards associated with the market dynamics and fluctuations in the price of gold.

25.9.2 Financing and liquidity

In order to develop and operate the project TRX will need to raise the required funding within a reasonable timeframe to be able to capture the stable prevailing gold price. The company has however not indicated the timeframe of acquiring the capital required to start the operation. As a result, it is thought that there is risk associated with an inability to raise the funds necessary to setup and start up the operations.

25.9.3 Operating costs

Estimated costs of operations for owner mining which inherently assumes certain levels of operating efficiencies and if these are not met then there will be costs overruns which will have some negative impacts on the projected cash flows.

25.9.4 Pit shell selection

Larger shell selection is positively considered as an option to increase gold production and extend mine life. However, by selecting larger shells the project is exposed to potential significant drop in value in case of one or more of the key parameters changing in the negative direction. Thus, selection of larger pits than nominal or optimal reduces the robustness of the project on profitability.

25.9.5 Geotechnical assessment

There is no detailed geotechnical assessment completed, design criteria used for this project are based on preliminary assessment. This presents a risk in terms of achievable pit sizes in case detailed study reveals that the designs need to conform to lower inter-ramp angles. This will affect mining stripping ratio and the total recoverable gold and total operating costs.

26. RECOMMENDATIONS

The Buckreef Gold Mine Projects is ready to proceed to Feasibility Study and designs, with concomitant infill drilling, processing piloting, further geotechnical studies and economic analysis.

Table 26.1: Cost Estimates for Pre-project Implementation work

Item	Activity	Estimate Costs US$
1	Resource infill drilling	550,000
2	Process plant pilot test	1,000,000
3	Feasibility Study	750,000
	Total	**2,300,000**

The project is planned to start with low annual production rate of 0.48Mtpa then ramping up to the steady state of 1.5Mtpa in three years. This phasing approach adopted in the study will help TRX with time to carry out more tests and address most of the highlighted risks and those that will arise in future. The following is a set of recommendations that if implemented can help to reduce long term risks of the project. Virimai Projects' recommendations are: -

26.1 Resource development

Virimai Projects recommends additional drilling to infill the gaps and improve the classification of the inferred resources in the pits and improve further the resource levels of the Buckreef project.

Additional drill is recommended in sterilization of areas earmarked for the sitting of infrastructure like tailings storage facility, waste dumps, and other related buildings etc.

26.2 Recovery test works

On the processing side it is recommended that the following test work be conducted:

- A process piloting or simulation run of the EDS mill in recirculation mode using a screen size of 100 micron, followed by bulk gravity concentration and bulk leaching of the tailings;
- Site water characterization;
- Settling and thickening test work;
- Tailings characterization

26.3 Future gold price

The project is a low-grade gold deposit which is highly sensitive to the price of the commodity the gold price used in the study will require further thought and study. The current gold price over the last decade has been very stable and favourable and the conditions are predicted to continue.

26.4 Low grade

Virimai Projects recommends stringent grade control measures as this factor is paramount in limiting the amount of waste mined with ore to reduce dilution levels. Selective mining to obtain relatively high-grade material in the early life of the project is proposed to improve the cash flow of the project

26.5 Pit slope analysis

The current slopes for the study have been based on the preliminary investigations and pit slope analysis Virimai Projects recommends detailed pit slope stability study for the pits especially the Buckreef considering the impact it is going to have on the stripping ratios and the depth of the pit.

26.6 In-pit dumps

In view of the lateral extent of the Buckreef pit the option of in-pit dumping should be investigated to reduce the costs of haulage of waste from the pit at depth.

26.7 Metallurgy and processing

The process design adopted in the prefeasibility study is preliminary and further optimization on the plant layout and designs are recommended. The costs associated the processing will require firming up in the next stage of the feasibility study.

26.8 Capital costs

In view of the need to reduce the capital costs further, the project costs can be reduced further through the purchase of second hand mining and processing equipment which is increasingly becoming available. In considering this option, TRX will have to weigh in the increased costs of operating these second-hand units.

26.9 Operating costs

Buckreef Project is a low grade high tonnage operation and its viability is hinged on its ability at recovery gold at low cost regime. Virimai Projects recommends further detailed study of the input data into the operating costs for the project.

Effective dated: June 26, 2018.

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27. REFERRENCE

- RSG Global, - Metallurgical Test-work Review and Recommendations for the Buckreef Project, July 2004
- Metallurgical Project Consultants Pty Limited, - Phase 2 Metallurgical Test-work Summary, February 2007
- Hellman & Schofield Pty Ltd (H&S), Estimates of the Gold Resources at Buckreef Prospect – Tanzania, June 2007
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- Venmyn Independent Projects (Pty) Limited, - National Instrument 43-101 Preliminary Economic Assessment of Tanzania Royalty Exploration Corporation's Buckreef Gold Mine, Re-development Project in Tanzania, May 31st, 2012
- ENATA LTD, - Environmental Impact Assessment for Gold Mining Project at Mnekezi Village in Geita District, Geita Region, Tanzania; February 2014
- Venmyn Deloitte, - Update National Instrument 43-101, Independent Technical Report on the Buckreef Project in Tanzania for Tanzanian Royalty Exploration Corporation; February 24th, 2014
- Mark Noppe, - Reporting Mineral Resources and Ore Reserves – How Confident are we? – MINERAL RESOURCE & ORE RESERVE ESTIMATION bulletin, June 2014
- Sphere Envirotech & Engineering (T)Ltd – Buckreef Gold Mine, Environment Management Plan (EMP) Update, January 2016
- Tanzania Minerals Audit Agency: https://www.tmaa.go.tz - Accessed on 23rd January 2017.
- MMSA Report No 15/059 r1 "Metallurgical testwork on oxide and sulphide gold bearing ore samples" by Juan van der Merwe, MMSA, 11 January, 2016.
- Project 6011 "Phase 2 Metallurgical Test work Summary Project 6011" prepared by Peter Banovich of Metallurgical Project Consultants Pty Ltd, dated February 2011.

28. ABBREVIATIONS GENERAL

ADT	as in ADT Truck, referring to rear articulated dump
ANFO	a site-mixed blend of Ammonium Nitrate (prills) & Fuel Oil (predominantly diesel, used as a
CoG	Cut-off Grade
CAPEX	Capital Costs Expenditure
DTM	Digital Terrain Model
EDS	Energy and Densification Systems
EIA	Environmental Impact Assessment
EPC	refers to Engineering, Procurement and Construction management of a project by a contractor
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
Hex	Hydraulic Excavator
JV	Joint Venture
IRR	Internal Rate of Return
NPV	net present value of a cash flow at a stated discount rate
OPEX	Operating Costs Expenditure
PFS	Preliminary Feasibility Study
ROMPAD	Run of Mine Ore Stockpile
RL	Reduced Level, referring to the height of a point above datum
ROM	Run of Mine, referring to excavated material that has not been further treated
RT	as in RT Dozer, referring to rubber tyred Dozer
SR	Strip Ratio, being the tonnes of waste to be moved to expose a tonne of ore
TSF	Tailings Storage facility
TZS	Tanzanian Shilling

29. MEASURES OF QUANTITY

bcm	bank cubic metre, being a volumetric measure of (undisturbed) rock
cm	cubic metre, used to classify the volume of loader buckets, truck size etc
DOH	Direct Operating Hour, an hour in which a unit of equipment works without delay
ha	hectare, or 10,000 square metres
in-situ	refers to undisturbed (un-blasted, un-dug) material
k	as a suffix to a number refers to a thousand (103) units
kg	kilogram
km	kilometre
lcm	loose cubic metre, being a volumetric measure applied to, broken rock
m	as a suffix to a number refers to a metre length
M	as a suffix to a number refers to a million (106) units
m2	as a suffix to a number refers to a square metre of area
mm	as a suffix to a number refers to a millimetre
OH	Operating Hour, being an hour in which a unit of equipment is working
pa	as a suffix to a number refers to a value per annum
PF	Powder Factor, a measure of the kg of explosive to be blasted per tonne of rock
t	tonne, being a metric tonne of 1,000 kg
W	watt, being a measure of electrical power
m.a.m.s.l	metres above mean sea level

30. ORGANISATIONS

ARSM	Associate of the Royal School of Mines
CM	Commissioner of Minerals
GOT	Government of Tanzania
FSAIMM	Fellow of South African Institute of Mining and Metallurgy
LBMA	London Bullion Market Association
MEM	Ministry of Energy and Minerals
MSAIMM	Member of South African Institute of Mining and Metallurgy
MAusIMM	Member of Australian Institute of Mining and Metallurgy
MZIE	Member of the Zimbabwe Institution of Engineer
NEMC	National Environment Management Council
TRX	Tanzanian Royalty Exploration Corporation
STAMICO	State Mining Corporation of Tanzania
USGS	United States Geological Survey

31. GLOSSARY

Archaean	Geological eon – subdivision of the Precambrian 2.5Ga to 3.8Ga
Assay	A chemical test performed on a sample of ore or minerals to determine the amount of valuable metals contained.
Basalt	Fine grained mafic volcanic rock
Borehole	A hole drilled from surface or underground, in which core of the rock is cut by a diamond drill bit as the cutting edge.
Bulk sample	A large sample of mineralized rock, frequently hundreds of tonnes, selected in such a manner as to be representative of the potential orebody being sampled. Used to determine metallurgical characteristics. Large sample which is processed through a small-scale plant, not a laboratory.
Carbon-in-leach	The recovery process in which Au is leached from Au ore pulp by cyanide and simultaneously adsorbed onto activated carbon granules in the same vessel. The loaded carbon is then separated from the pulp for subsequent Au removal by elution. The process is typically employed where there is a naturally occurring Au adsorbent in the ore.
Conglomerate	Sedimentary rock comprising of pebbles in a finer grained matrix
Cross section	A diagram or drawing that shows features transacted by a vertical plane drawn at right angles to the longer axis of a geologic feature.
Cyanidation	Method of extracting gold by dissolving in potassium cyanide solution
Density	Measure of the relative “heaviness” of objects with a constant volume, density = mass/volume
Deposit	Any sort of earth material that has accumulated through the action of wind, water, ice or other agents.
Diamond drilling	A drilling method, where the rock is cut with a diamond bit, to extract cores.
Dip	The angle that a structural surface, i.e. a bedding or fault plane, makes with the horizontal measured perpendicular to the strike of the structure.
Dyke	Intrusive igneous rock vertically or sub-vertically emplaced.
Estimation	The quantitative judgement of a variable.

Exploration	Prospecting, sampling, mapping, diamond drilling and other work involved in the search for mineralization.
Exploration License/ Property	A Mineral Asset which is being actively explored for Mineral deposits or petroleum fields, but for which economic viability has not been demonstrated.
Facies	An assemblage or association of mineral, rock, or fossil features reflecting the environment and conditions of origin of the rock.
Fault	A fracture in earth materials, along which the opposite sides have been displaced parallel to the plane of the movement
Feasibility study	A definitive engineering estimate of all costs, revenues, equipment requirements and production levels likely to be achieved if a mine is developed. The study is used to define the economic viability of a project and to support the search for project financing.
Grade	The relative quantity or percentage of gold within the rock mass. Measured as grams per tonnes in this report.
Greenstone Belt	Archaean sequence of mafic and ultramafic rocks
Hanging wall	The overlying unit of a stratigraphic horizon, fault ore body or stope
In situ	In its original place, most often used to refer to the location of the mineral resources.
Indicated Mineral Resource	That part of a mineral resource for which tonnage, densities, shape, physical characteristics, grade and average mineral content can be estimated with a reasonable level of confidence. It is based on exploration sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes. The locations are too widely or inappropriately spaced to confirm geological and/or grade continuity but are spaced closely enough for continuity to be assumed and sufficient minerals have been recovered to allow a confident estimate of average mineral value.
Inferred Mineral Resource	That part of a mineral resource for which tonnage, grade and average mineral content can be estimated with a low level of confidence. It is inferred from geological evidence and assumed but not verified by geological and/or grade continuity. It is based on information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that may be limited or of uncertain quality and reliability.
Laterite	Residual soil in humid climates form the leaching of silica and aluminium and enrichment in iron

Lava	Molten silicate material extruded by a volcano.
License, Permit, Lease or other similar entitlement	Any form of license, permit, lease or other entitlement granted by the relevant Government department in accordance with its mining legislation that confers on the holder certain rights to explore for and/or extract minerals that might be contained in the land or ownership title that may prove ownership of the minerals.
Life-of-Mine/LoM	Expected duration of time that it will take to extract accessible material.
Liberation	Release of Au from the host rock through processing.
Lithologies	The description of the characteristics of rocks, as seen in hand-specimens and outcrops based on colour, grain size and composition.
Lode	Metalliferous ore that fills a fissure
Mineral Reserve	The economically mineable material derived from a Measured and/or Indicated Mineral Resource. It is inclusive of diluting materials and allows for losses that may occur when the material is mined. Appropriate assessments, which may include feasibility studies, have been carried out, including consideration of and modification by, realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction is reasonably justified. Mineral Reserves are sub-divided in order of increasing confidence into Probable Mineral Reserves and Proven Mineral Reserve.
Mineral Resource	A concentration of material of economic interest in or on Earth's crust in such form, quality and quantity that there are reasonable and realistic prospects for eventual economic extraction. The location, quantity, grade, continuity and other geological characteristics of a Mineral Resource are known, estimated from specific geological evidence and knowledge, or interpreted from a well constrained and portrayed geological model. Mineral Resources are subdivided, in order of increasing confidence in respect of geoscientific evidence, into Inferred, Indicated and Measured categories.
	A deposit is a concentration of material of possible economic interest in, on or near the Earth's crust. Portions of a deposit that do not have reasonable and realistic prospects for eventual economic extraction must not be included in a Mineral resource.

Measured Mineral Resource	That part of a mineral resource for which tonnage, densities, shape, physical characteristics, grade and mineral content can be estimated with a high level of confidence. It is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill-holes. The locations are spaced closely enough to confirm geological and grade continuity.
MEM	Ministry of Energy and Minerals
Mineralization	The presence of a target mineral in a mass of host rock.
Mining Property	A Mineral Asset which is in production.
National Instrument 43-101	Canadian National Instrument on the reporting of exploration, mineral resources and mineral reserves for the TSX.
Opencast / Open pit	Surface mining in which the ore is extracted from a pit. The geometry of the pit may vary with the characteristics of the ore body.
Orebody	A continuous well-defined mass of material of sufficient ore content to make extraction economically feasible.
Overburden	The alluvium and rock that must be removed in-order to expose an ore deposit.
Porphyry	Fine grained igneous rock with large feldspar crystals
Probable reserves	The economically mineable material derived from a Measured and/or Indicated Mineral Resource. It is estimated with a lower level of confidence than a Proven Reserve. It is inclusive of diluting materials and allows for losses that may occur when the material is mined. Appropriate assessments, which may include feasibility studies, have been carried out, including consideration of, and modification by, realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction is reasonably justified.
Prospect	A deposit with the potential for economic extraction.
Pyrite	Fool's gold a common yellow sulphide mineral, FeS. Pyrite forms under a wide range of pressure-temperature conditions, and so is found in many geological environments.
Quartzite	A metamorphic rock consisting primarily of quartz grains, formed by the recrystallisation of sandstone by thermal or regional metamorphism or a sandstone composed of quartz grains cemented by silica.

Recovered grade/Yield	The actual grade of ore realised after the mining and treatment process.
Reef	Mineralized lode.
Rehabilitation	The process of restoring mined land to a condition approximating to a greater or lesser degree its original state. Reclamation standards are determined by the Russia Federation Department of Mineral and Energy Affairs and address ground and surface water, topsoil, final slope gradients, waste handling and re-vegetation issues.
Rhyolite	One of a group of extrusive rocks commonly showing flow texture, and typically porphyritic, with phenocrysts of quartz and potassium feldspar in a glassy to microcrystalline groundmass.
Sample	The removal of a small amount of rock pertaining to the deposit which is used to estimate the grade of the deposit and other geological parameters.
Sampling	Taking small pieces of rock at intervals along exposed mineralization for assay (to determine the mineral content).
Saprolite	In situ weathered profile on laterite terrane where the soil comprises mostly clays
Sedimentary	Formed by the deposition of solid fragmental or chemical material that originates from weathering of rocks and is transported from a source to a site of deposition.
Specific gravity/S.G.	Measure of quantity of mass per unit of volume, density.
Stockpile	A store of unprocessed ore or marginal grade material.
Stripping	Removal of waste overburden covering the mineral deposit.
Stripping ratio	Ratio of ore rock to waste rock.
Subduction	The movement of one crustal plate (lithospheric plate) under another so that the descending plate is consumed.
Tailings	The waste products of the processing circuit. These may still contain very small quantities of the economic mineral.
Tailings dam	Dams or dumps created from waste material from processed ore after the economically recoverable metal or mineral has been extracted.
Tonnage	Quantities where the tonne is an appropriate unit of measure. Typically used to measure reserves of metal-bearing material in-situ or quantities of ore and waste material mined, transported or milled.

Trenching	Making elongated open-air excavations for the purposed of mapping and sampling.
Veins	A tabular or sheet like body of one or more minerals deposited in openings of fissures, joints or faults, frequently with associated replacement of the host rock.
Yield/Recovered grade	The actual grade of ore realised after the mining and treatment process.

32. APPENDICES

32.1 Certificates of Qualified Persons

Certificate of Qualified Person

I, **Frank K. Crundwell** of 89J Victoria Drive, London, SW196PT, United Kingdom, am the author of the sections for metallurgical test work and recovery methods for the report (the "**Amended Buckreef Report**") entitled **"Amended NATIONAL INSTRUMENT 43-101 Independent Technical Mining Reserve Estimate and Pre-Feasibility Study on the Buckreef Gold Mine Project, Tanzania, East Africa"** with an effective date of April 27, 2017 (the "Effective Date") and with an amendment date of June 26, 2018, do hereby certify that:

1. I am a Director of CM Solutions (Pty) Ltd, a company registered in South Africa, and I am a Consulting Engineer with Crundwell Metallurgy Limited, a company registered in the United Kingdom.
2. I graduated with a BSc Engineering degree in Chemical Engineering from the University of the Witwatersrand, Johannesburg in 1983. I also hold MSc (Eng) and PhD degrees from the same university.
3. I am a member/fellow of the following professional association
    a. Fellow of the Southern African Institute of Mining and Metallurgy (SAIMM), membership number 56496.
    b. A Registered Professional Engineer with Engineering Council of South Africa, registration number 20040172.
    c. Fellow of the Institution of Chemical Engineers, membership number 99963109.
4. I have worked as a metallurgical engineer for 35 years since my graduation from university in 1983.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional organization (as described in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purpose of NI 43-101.
6. I witnessed the bulk milling test work conducted using the EDS mill pilot rig in Johannesburg, South Africa.
7. I am responsible for the "Metallurgical test work" (Item 13) and the "Recovery methods" (Item17) sections of the Amended Buckreef Report.
8. I have not received and do not expect to receive any interest, either direct or indirect, in any properties of Tanzanian Royalty Exploration Corporation (the "Issuer") and I do not beneficially own, either directly or indirectly, any securities of the Issuer.
9. I am independent of the Issuer as set out in section 1.5 of NI 43-101.

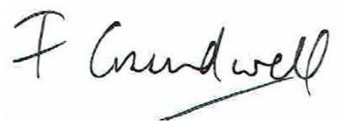
10. I have had no prior involvement with the Buckreef property that is the subject of the Amended Buckreef Report.

11. I have read NI 43-101 and Form 43-101F1 and the Amended Buckreef Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

12. As at the Effective Date of the Amended Buckreef Report, to the best of my knowledge, information and belief, the Amended Buckreef Report contains all scientific and technical information that is required to be disclosed to make the Amended Buckreef Report not misleading.

13. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Dated June 26, 2018.



Frank Crundwell
BSc (Eng) Chem, BSc (Hons) Financial Maths, MSc (Eng) Chem, PhD,
Pr Eng, FSAIMM, FIChemE
Metallurgical Consultant

Summary of Recent Experience

YEAR	CLIENT	COMMODITY	TYPE OF STUDY	PROJECT DESCRIPTION
2018	Horizon Mining	Copper/cobalt	DFS	EPCM
2018	Anglo Platinum	Platinum	FS	Pressure leaching
2018	Sumitomo	Cobalt	Scoping	Optimization
2018	Undisclosed	Nickel	Consulting	Board document
2017	Undisclosed	Gold	Metallurgical dispute	Analysis, assessment
2017	Kansanshi	Copper/gold	Metallurgical test work	Test work
2017	Undisclosed	Gold/Sb	Metallurgical test work	Test work

Certificate of Qualified Person

I, **Wenceslaus Kutekwatekwa** of Block 4, Tunsgate Office Park, 30 Tunsgate Road, Mount Pleasant, Harare, Zimbabwe, as author of the report (the "**Amended Buckreef Report**") entitled **"Amended NATIONAL INSTRUMENT 43-101 Independent Technical Mining Reserve Estimate and Pre-Feasibility Study on the Buckreef Gold Mine Project, Tanzania, East Africa"** with an effective date of April 27, 2017 (the "Effective Date") and with an amendment date of June 26, 2018, do hereby certify that:

I am a senior mining engineer in Zimbabwe of Virimai Projects and hold the designation of Consulting Director.

I graduated with a BSc (Hons) degree in Mining Engineering the from University of Zimbabwe in 1989.

I am a member/fellow of the following professional association

d. Fellow Southern African Institute of Mining and Metallurgy (SAIMM), membership number 703812.

e. Fellow Institute of Directors Zimbabwe (IoDZ), membership number ZW11768/13

f. Member Project Management Institute of Zimbabwe (PMIZ) membership number PMH132

I have worked as a mining engineer for 29 years since my graduation from university

I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional organization (as described in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purpose of NI 43-101.

I visited the Buckreef property on and spent a total of 16 hours visiting mine sites, test pit, test processing plant, analysing core and general ground truthing, looking at plans and technical data

I am responsible for all sections of the Amended Buckreef Report.

I have not received and do not expect to receive any interest, either direct or indirect, in any properties of Tanzanian Royalty Exploration Corporation (the "Issuer") and I do not beneficially own, either directly or indirectly, any securities of the Issuer.

I am independent of the Issuer as set out in section 1.5 of NI 43-101.

I have had no prior involvement with the Buckreef property that is the subject of the Amended Buckreef Report.

I have read NI 43-101 and Form 43-101F1 and the Amended Buckreef Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

As at the Effective Date of the Amended Buckreef Report, to the best of my knowledge, information and belief, the Amended Buckreef Report contains all scientific and technical information that is required to be disclosed to make the Amended Buckreef Report not misleading.

I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Dated June 26, 2018.

____

Wenceslaus Kutekwatekwa
BSc (Hons) Ming Eng. MBA
FSAIMM, FIoDZ, MAMMZ, MPMIZ
Mining Consultant

Summary of Recent Experience

YEAR	CLIENT	COMMODITY	TYPE OF STUDY	PROJECT DESCRIPTION
2018	Hanzu	Gold	DFS	EPCM
2018	Anglo Platinum Unki	Platinum	Scoping	Decline Access and
2018	Metallon Gold	Gold	PEA	Scoping Study of Corporate Growth Strategy
2017	Samrec Vermiculite	Vermiculite	LOM	Pit Optimisation Scheduling and LoM Planning
2017	Prospect Resources	Lithium	PFS	Open Pit Optimisation design and Scheduling
2016	Global Platinum Resources	Platinum	PFS	Green Field Project PFS
2015	Mimosa Mining Company	Platinum	LOM	Scoping Study of the Mtshingwe expansion

32.2 PROCESS FLOW DIAGRAMS

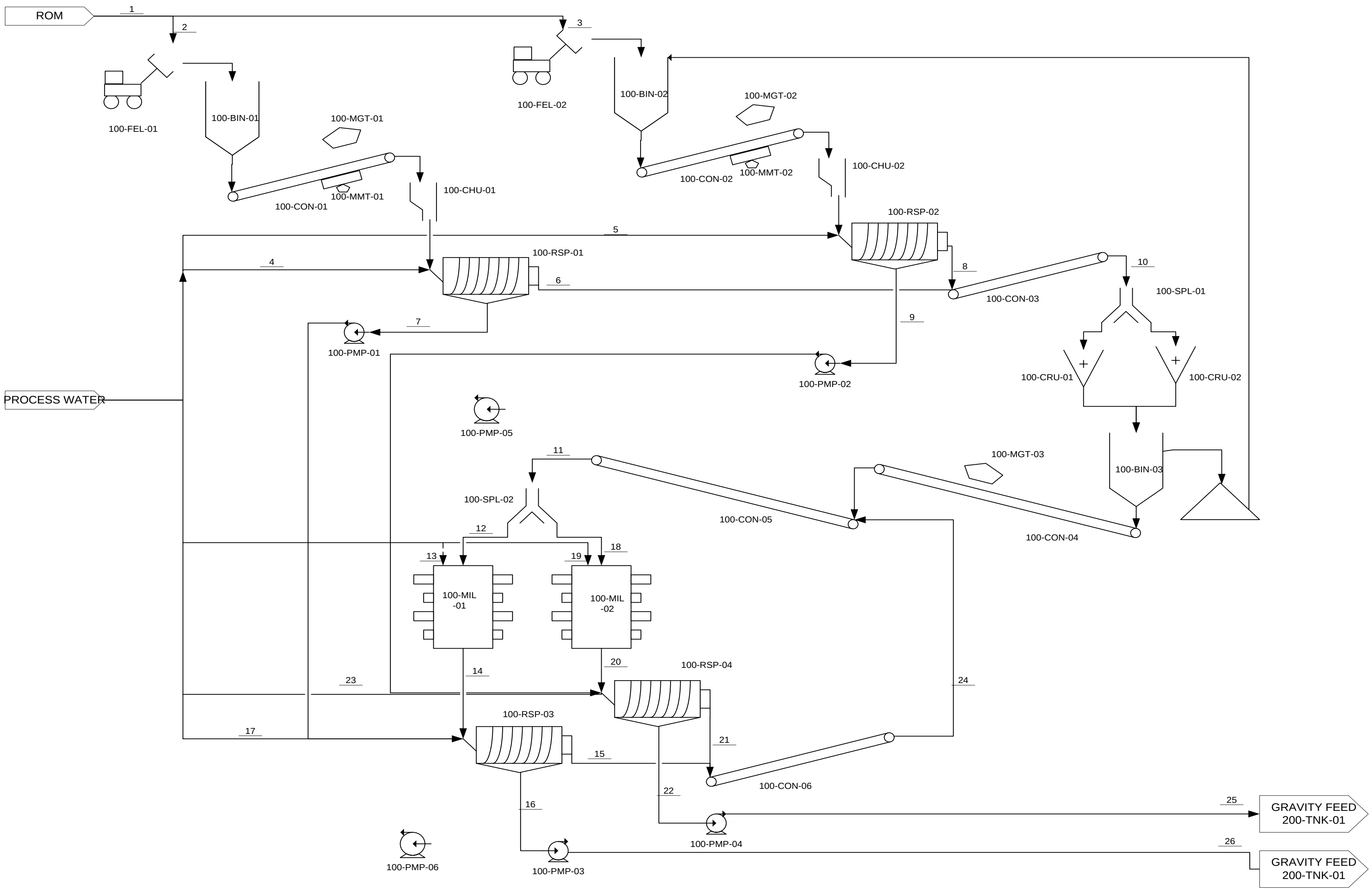


Figure 32.1: Process flow diagram for Area 100

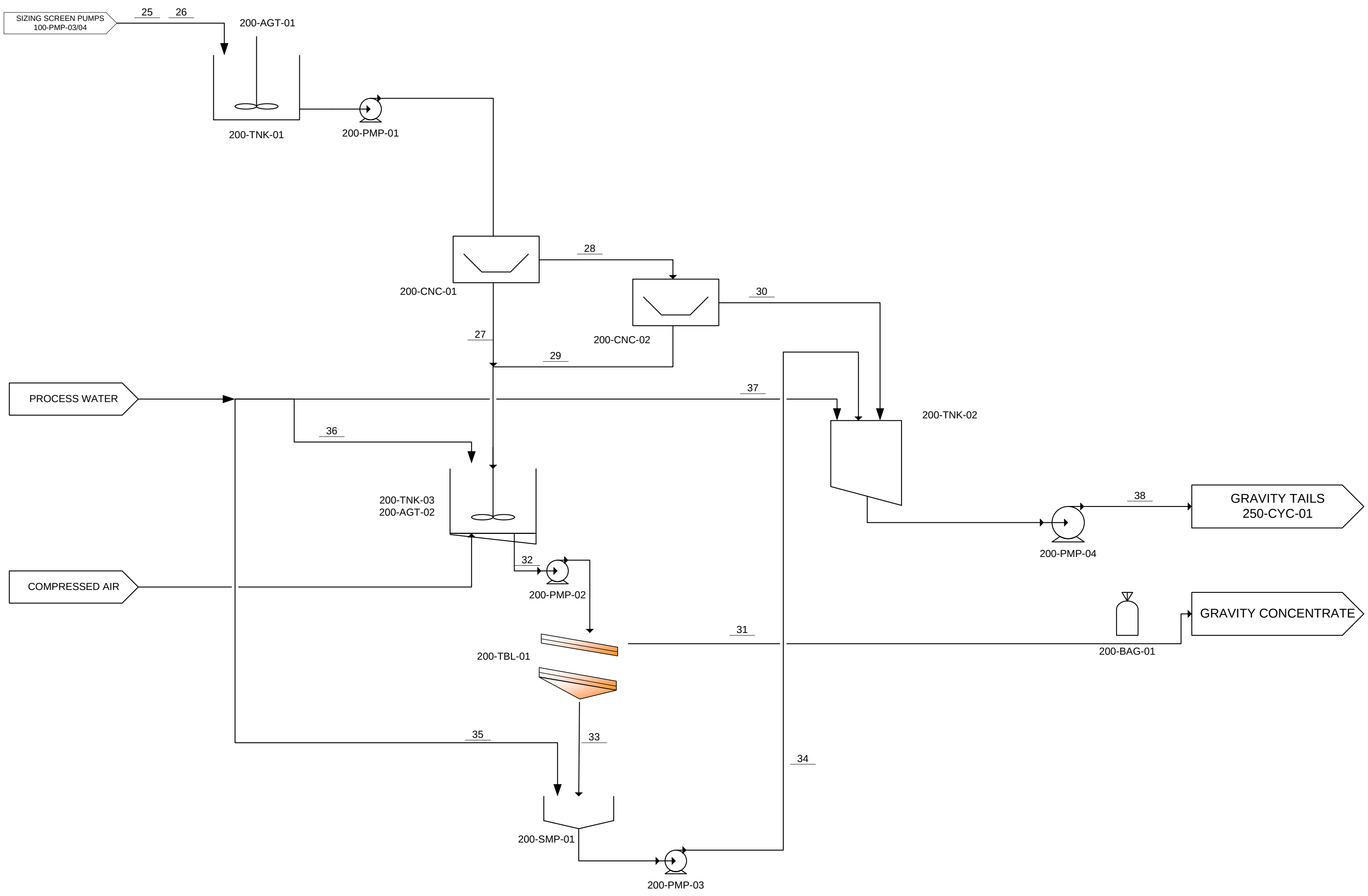


Figure 32.2. Process flow diagram for Area 200

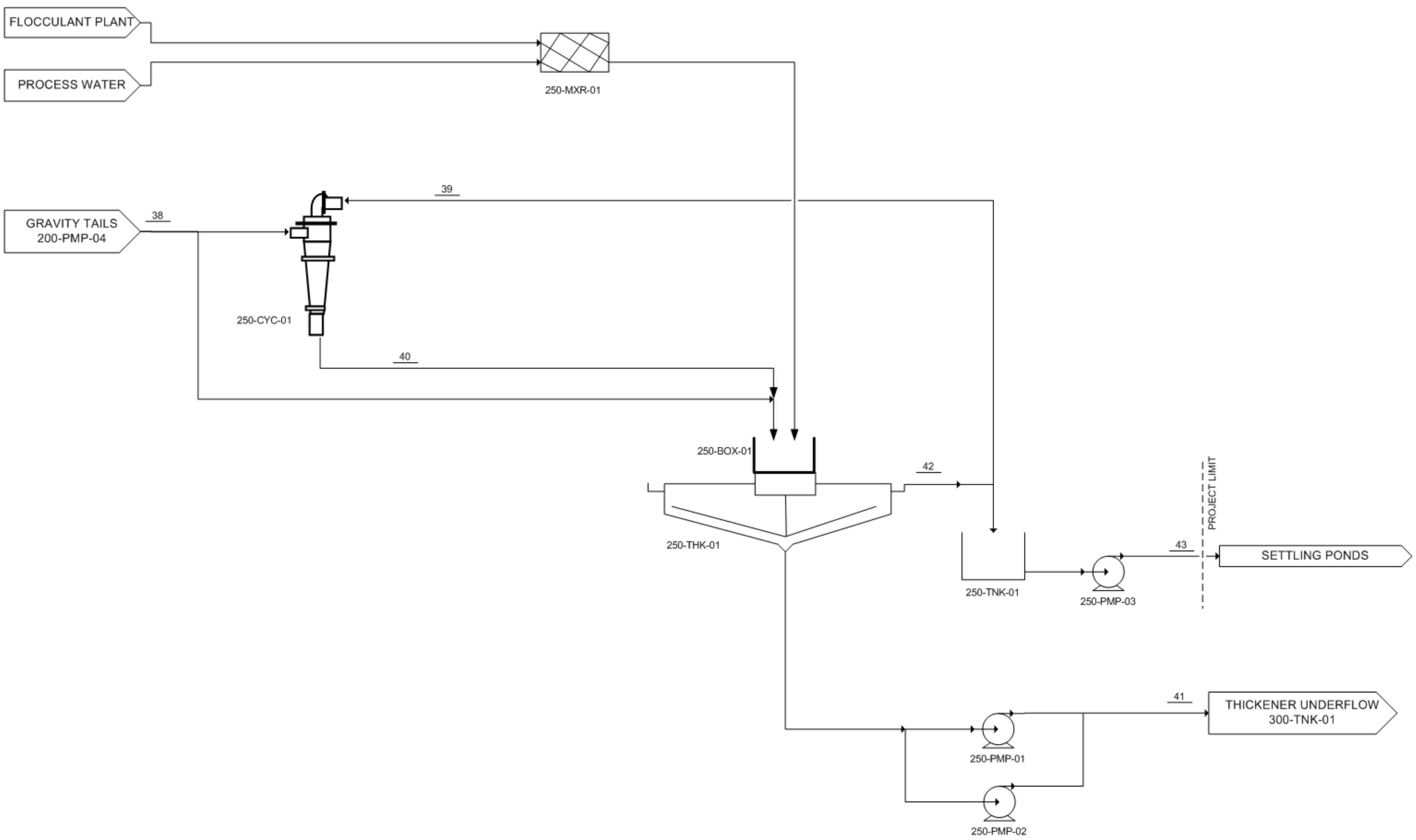


Figure 32.3. Process flow diagram for Area 250

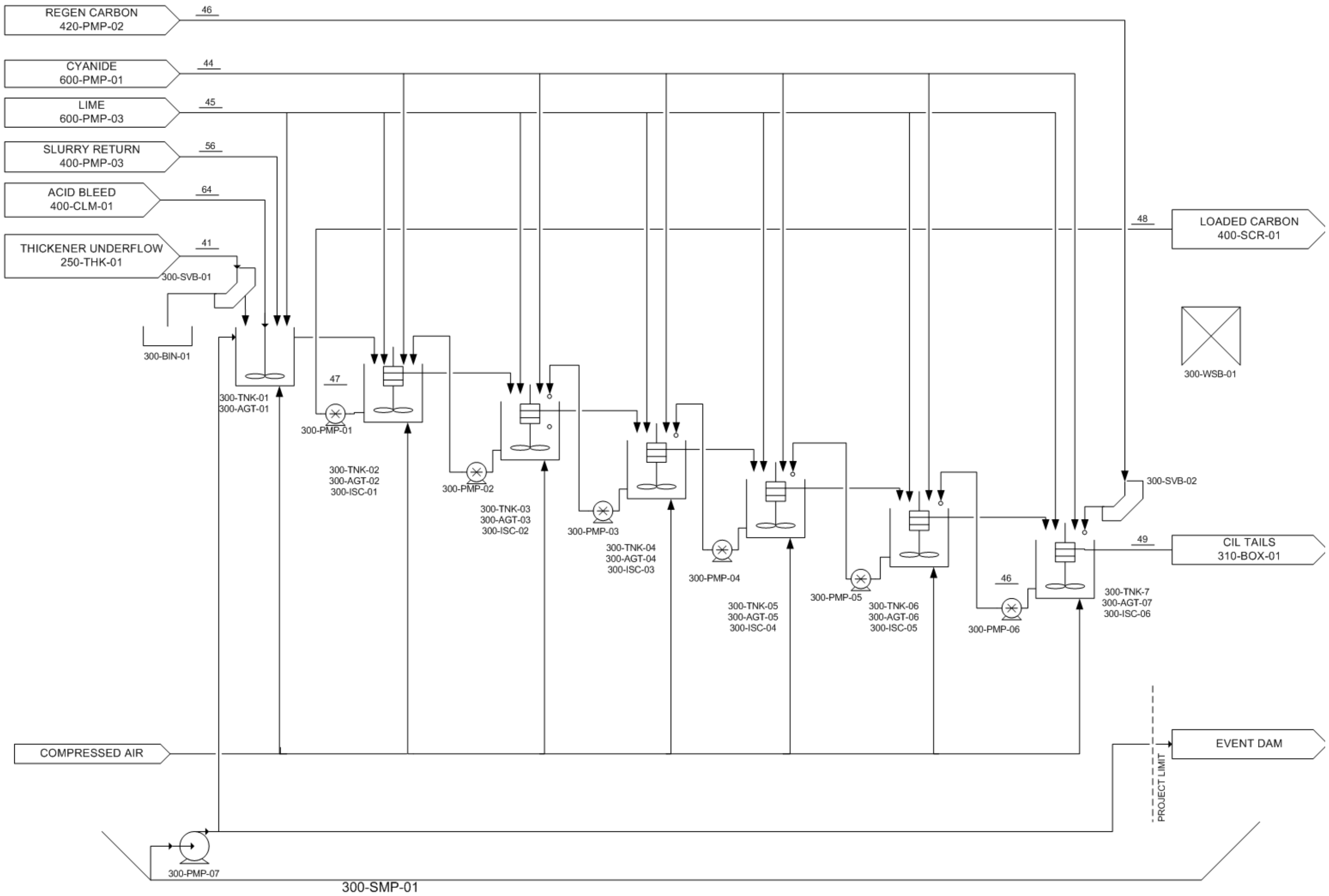


Figure 32.4. Process flow diagram for Area 300

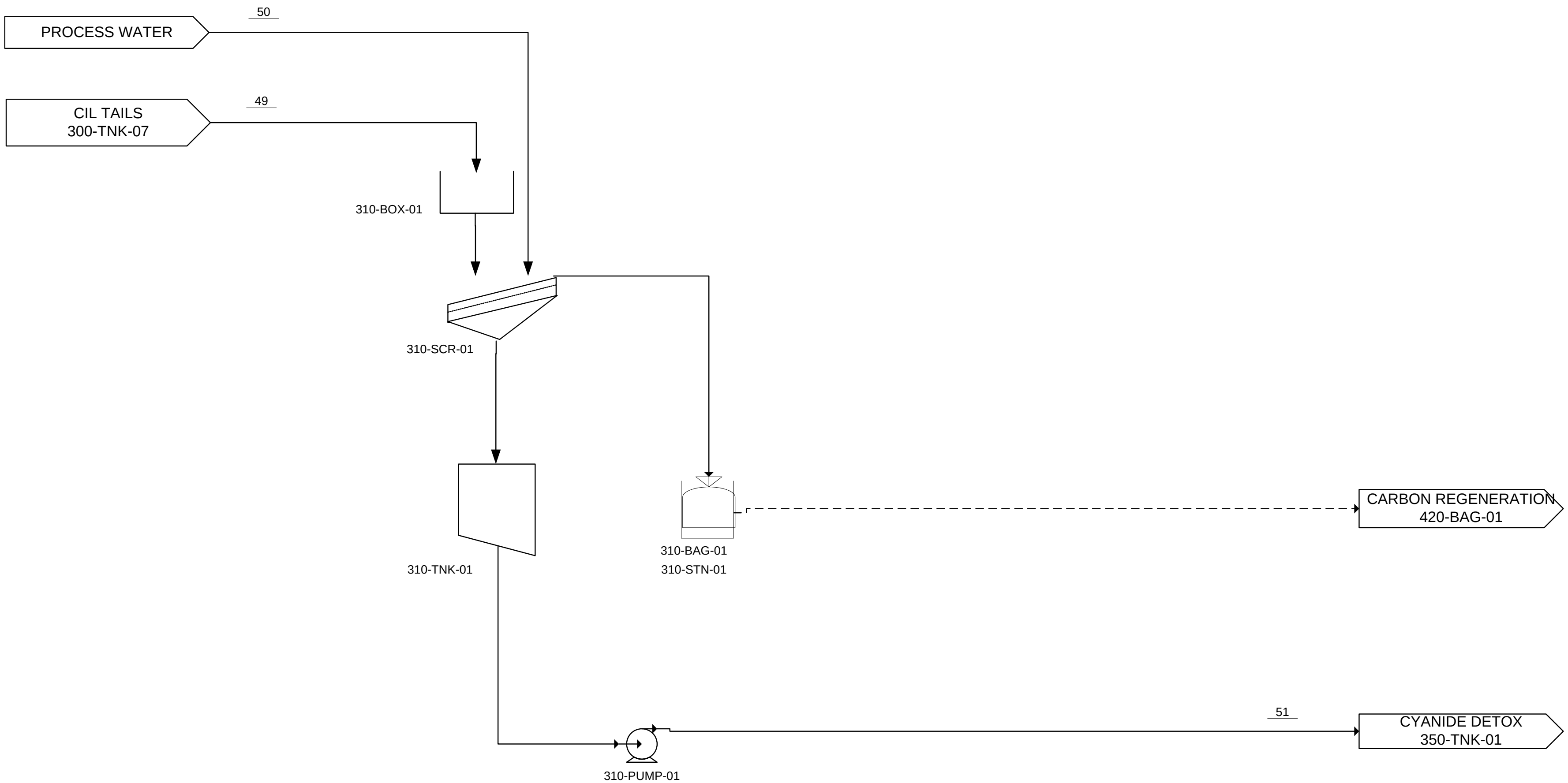


Figure 32.5. Process flow diagram for Area 310

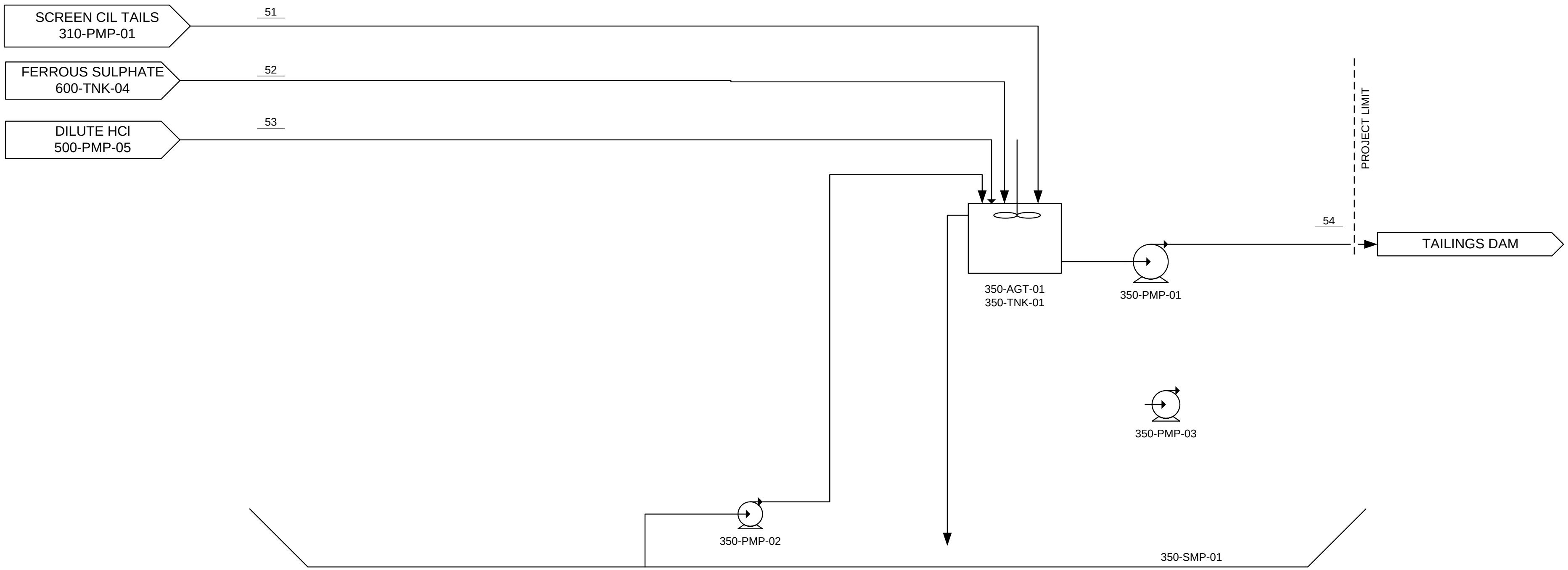


Figure 32.6. Process flow diagram for Area 350

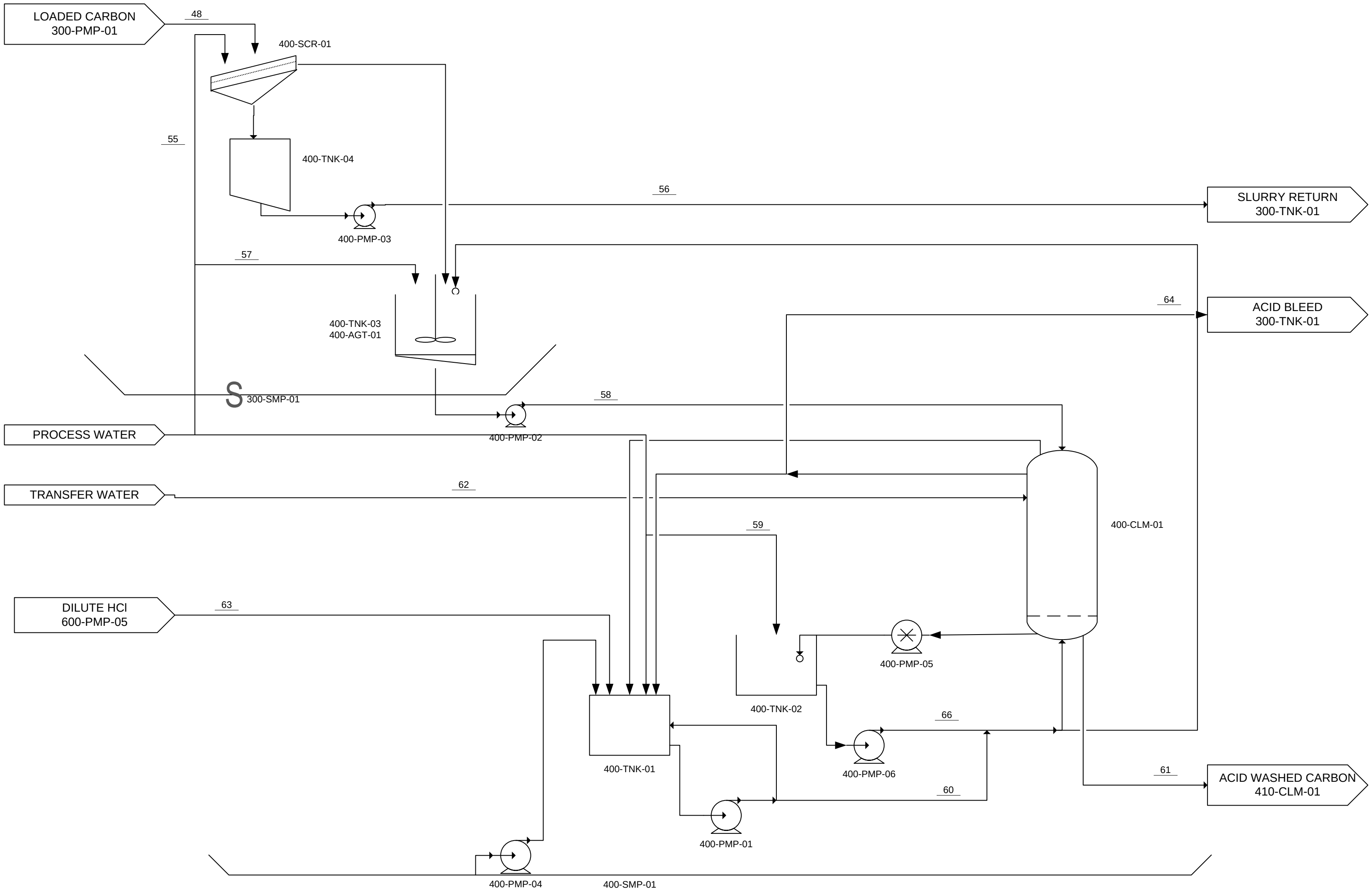


Figure 32.7. Process flow diagram for Area 400

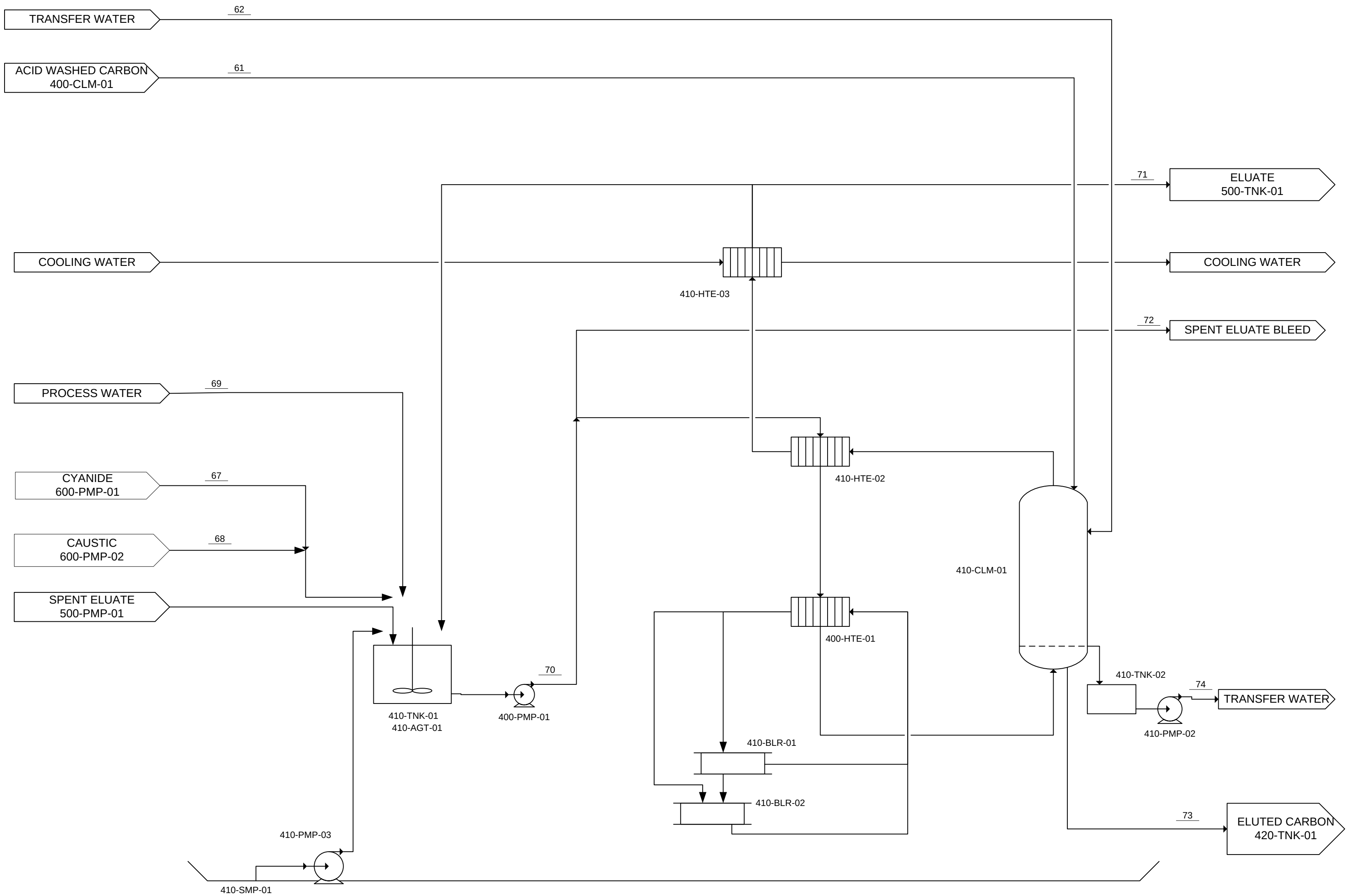


Figure 32.8. Process flow diagram for Area 410

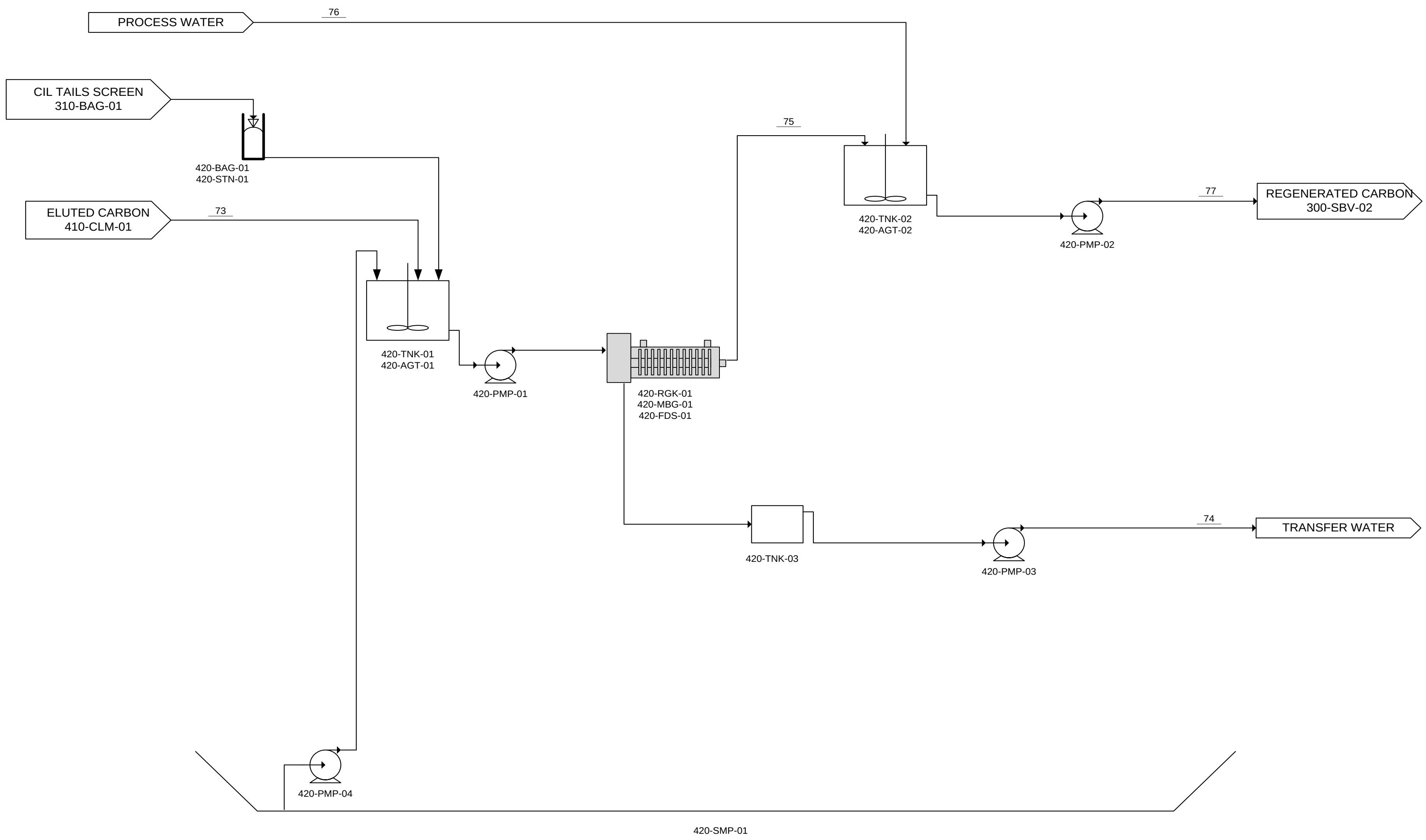


Figure 32.9. Process flow diagram for Area 420

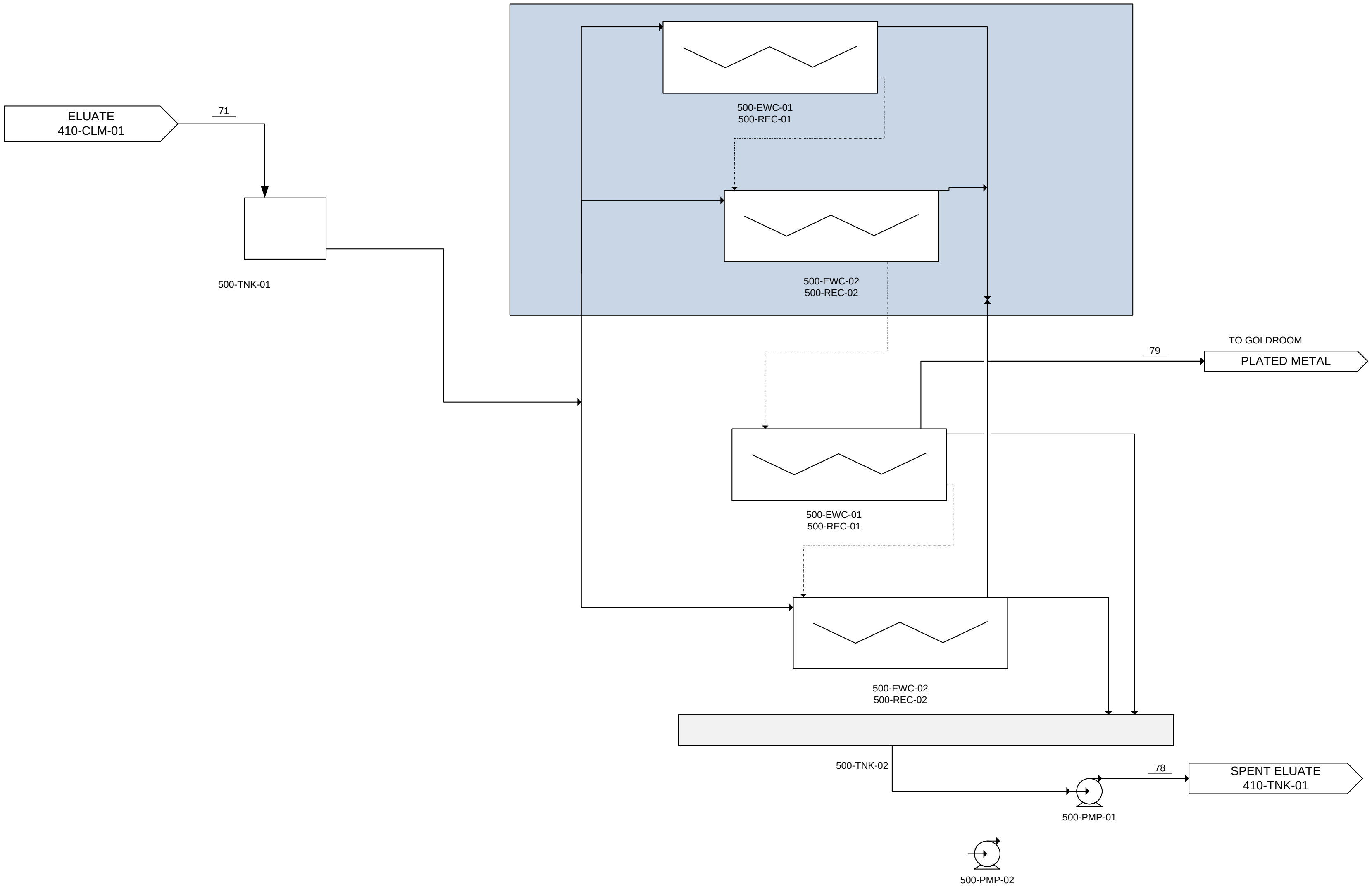


Figure 32.10. Process flow diagram for Area 500

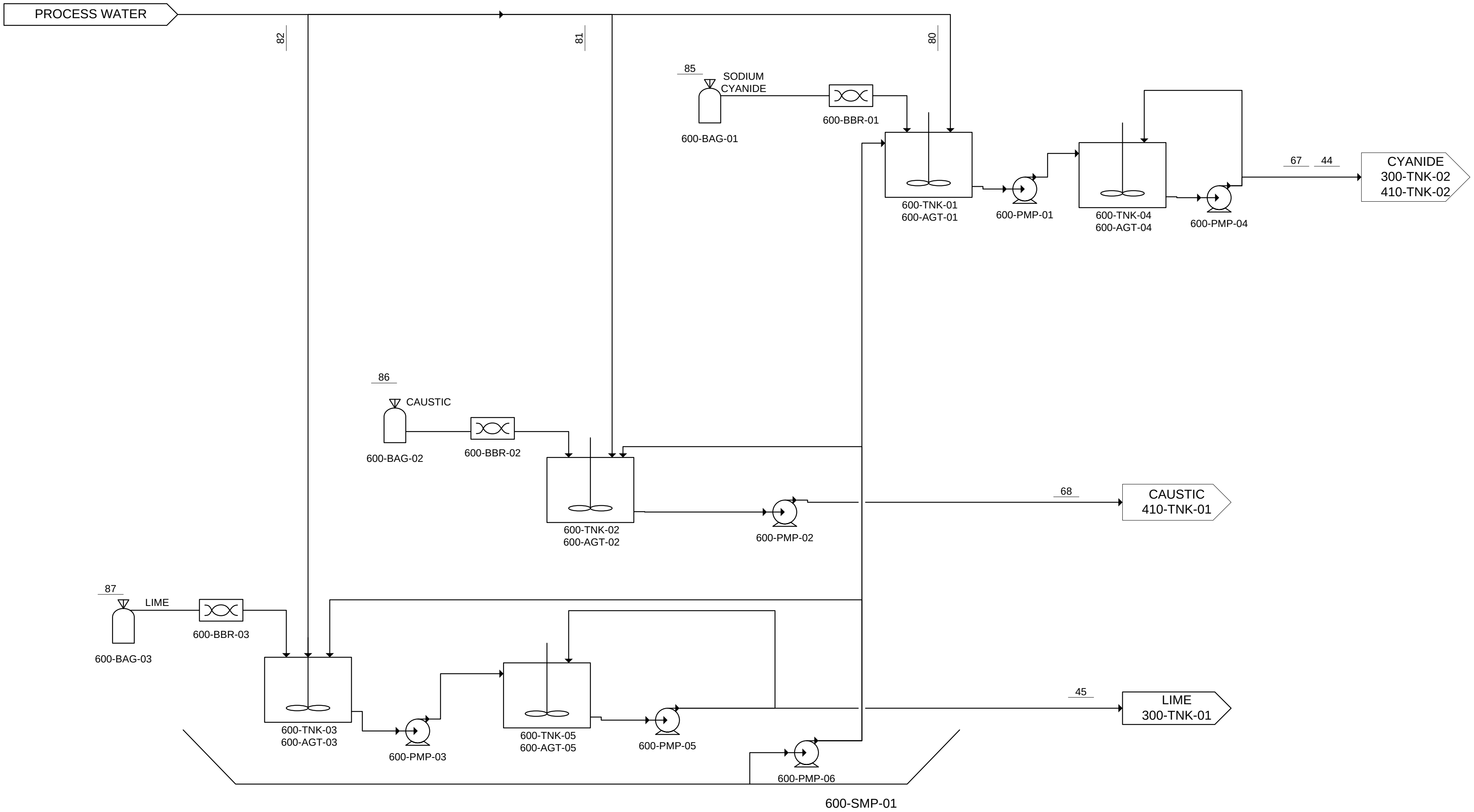


Figure 32.11. Process flow diagram for Area 600

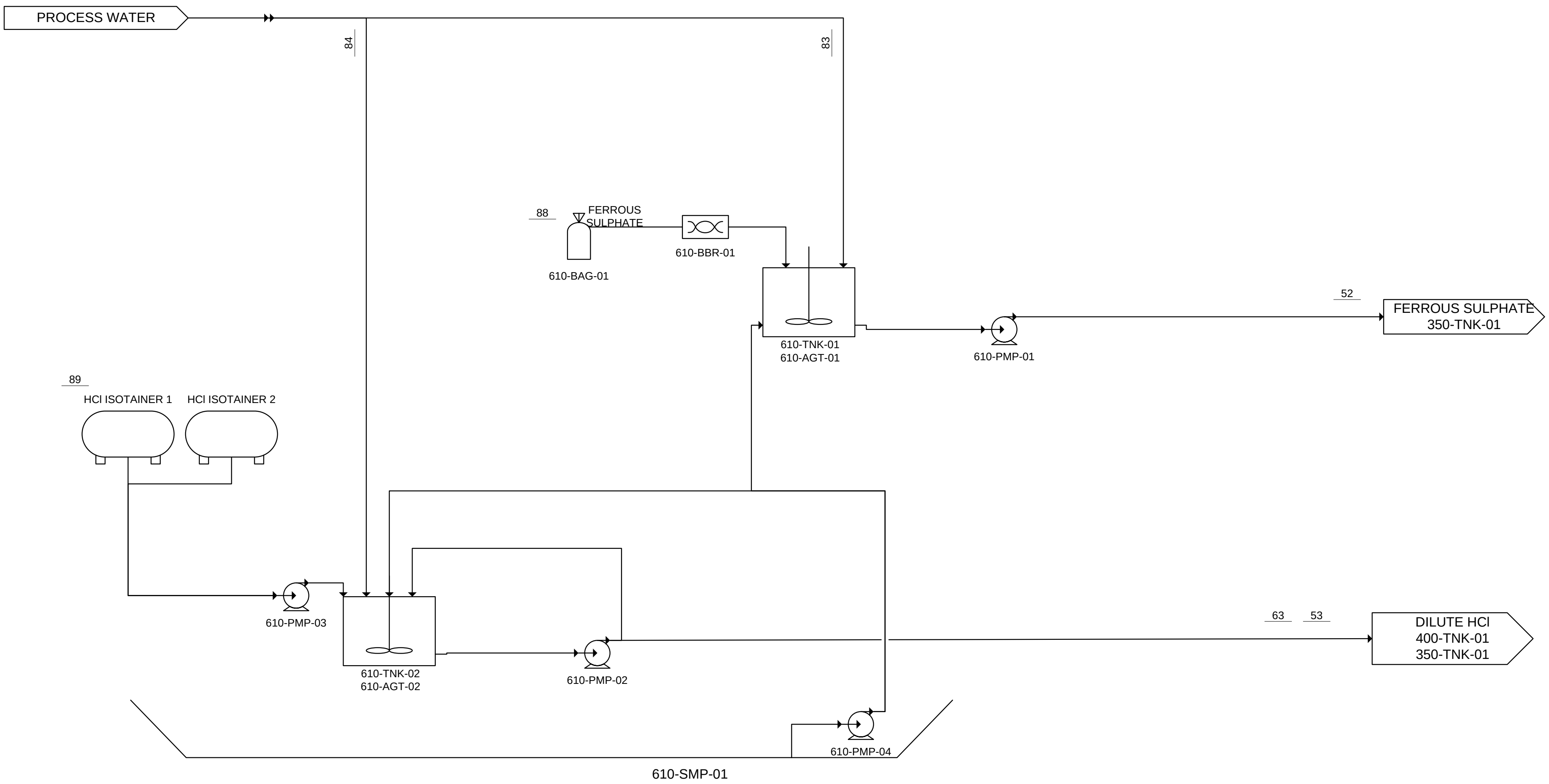


Figure 32.12. Process flow diagram for Area 610

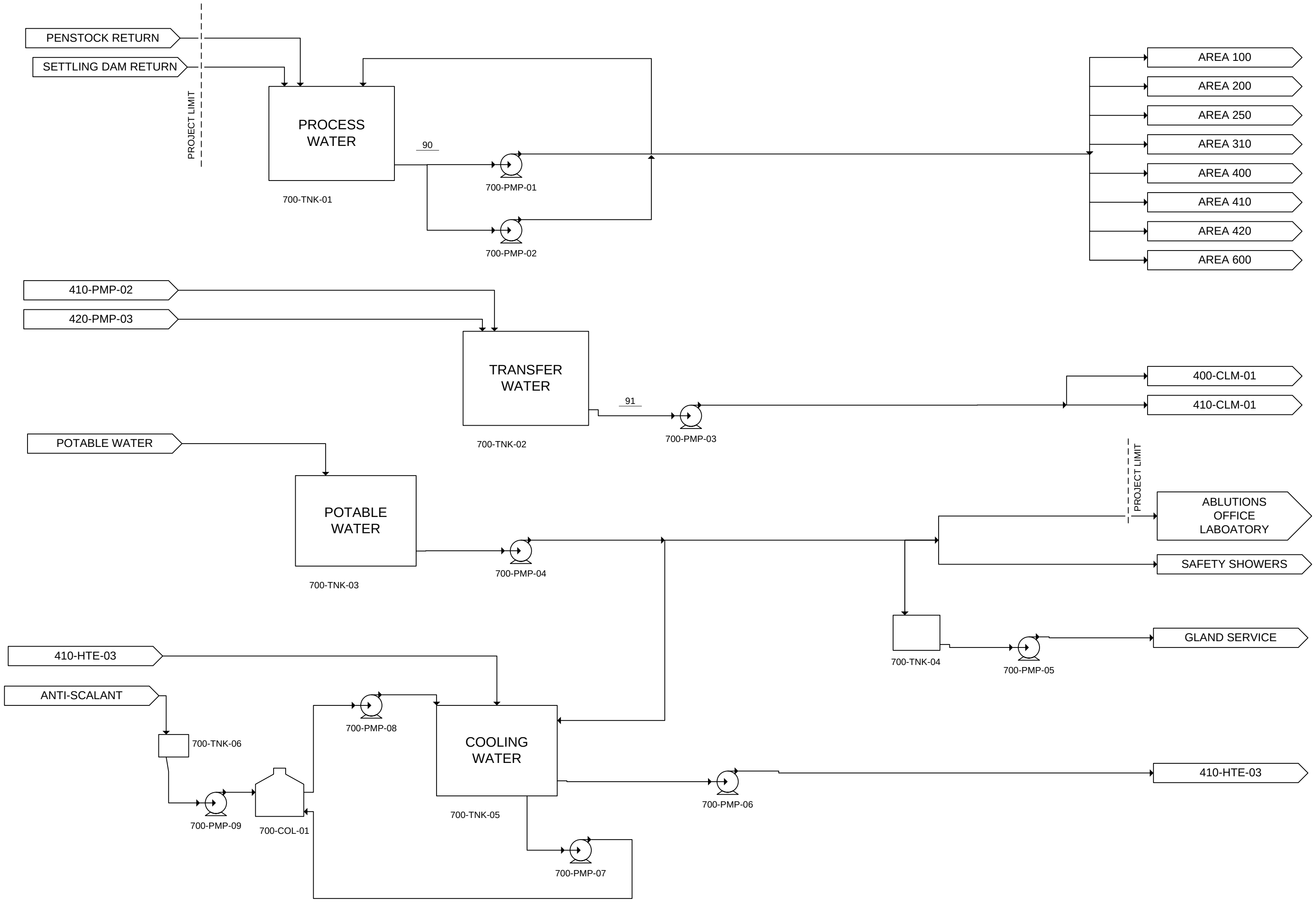


Figure 32.13. Process flow diagram for Area 700

32.3 PROCESSING PLANT MECHANICAL ITEMS

Equipment Tag			Description	Total feed	Volumetric flow	Design volume	Design Flow	
Area	Description	Sequential number		t/h	m^3/h	m^3	m^3/h	t/h
100	BIN	01	Feed Bin 1	31	17.6	22.0		
100	BIN	02	Feed Bin 2	31	17.6	22.0		
100	BIN	03	Jaw Crusher Discharge Overflow Bin	67	35.3	43.0		
100	CHT	01	Rotaspiral 1 Feed Chute	63	43.8		52.5	
100	CHT	02	Rotaspiral 2 Feed Chute	63	43.8		52.5	
100	CRU	01	Jaw Crusher 1	67	35.3			103
100	CRU	02	Jaw Crusher 2	67	35.3			103
100	CON	01	Feed Bin 1 Conveyor	31	17.6			38
100	CON	02	Feed Bin 2 Conveyor	31	17.6			38
100	CON	03	Scrubbing Rotaspiral Oversize Conveyor	67	35.3			80
100	CON	04	Jaw Crusher Discharge Conveyor	67	35.3			80
100	CON	05	Mill Feed Conveyor	89	45.8			107
100	CON	06	Classification Rotaspiral Oversize Conveyor	22	10.5			27
100	FEL	01	ROM Front End Loader					
100	FEL	02	ROM Front End Loader					
100	MGT	01	Feed Bin 1 Conveyor Magnet	31				
100	MGT	02	Feed Bin 2 Conveyor Magnet	31				
100	MGT	03	Jaw Crusher Discharge Conveyor Magnet	67				
100	MIL	01	EDS Mill 1	42				51
100	MIL	02	EDS Mill 2	42				51
100	MMT	01	Feed Bin 1 Conveyor Weightometer	31				
100	MMT	02	Feed Bin 2 Conveyor Weightometer	31				
100	PMP	01	Scrubbing Rotaspiral 1 Underflow Pump	50	38.5		47	
100	PMP	02	Scrubbing Rotaspiral 2 Underflow Pump	50	38.5		47	
100	PMP	03	Classification Rotaspiral 1 Underflow Pump	75	55.5		67	
100	PMP	04	Classification Rotaspiral 2 Underflow Pump	75	55.5		67	
100	RSP	01	Scrubbing Rotaspiral 1	63	43.8		53	76
100	RSP	02	Scrubbing Rotaspiral 2	63	43.8		53	76
100	RSP	03	Classification Rotaspiral 1	82	55.9		68	99
100	RSP	04	Classification Rotaspiral 2	82	55.9		68	99
100	SPL	01	Jaw Crusher 2-way Splitter	67	35.3			103
100	SPL	02	EDS Mill 2-way Splitter	89	45.8			107
100	PMP	05	Standby 100-PMP-01/02					

Equipment Tag			Description	Total feed	Volumetric flow	Design Flow	
Area	Description	Sequential number		t/h	m^3/h	m^3/h	t/h
200	AGT	01	Gravity Feed Tank Agitator				
200	AGT	02	Gravity Concentrate Tank Agitator				
200	BAG	1	Gravity Concentrate	2			
200	CNC	01	Gravity Concentrator 1	150	110.9	134	180
200	CNC	02	Gravity Concentrator 2	150	110.9	134	180
200	PMP	01	Gravity Feed Pump	150	110.9	134	
200	PMP	02	Gravity Concentrate Pump	5	3.1	4	
200	PMP	03	Shaking Table Sump Pump		10.0	12	
200	PMP	04	Gravity Tails Pump	153	108.3	131	
200	SMP	01	Shaking Table Sump				
200	TBL	01	Shaking Table	2.5			
200	TNK	01	Gravity Feed Tank	150.0	110.9		
200	TNK	02	Gravity Tails Tank	148.0	110.0		
200	TNK	03	Gravity Concentrate Tank	5.0	3.1		

Equipment Tag			Description	Total feed	Volumetric flow	Design volume	Design Flow	
Area	Description	Sequential number		t/h	m^3/h	m^3	m^3/h	t/h
250	BOX	01	Thickener Feed Box	137.3	93.4	0.5		
250	CYC	01	Dewatering Cyclone	150.4	106.5			
250	MXR	01	Flocculant Mixer					
250	PMP	01	Thickener Underflow Pump	118.1	79.8		96	
250	PMP	02	Thickener Underflow Pump (Standby)	118.1	79.8		96	
250	PMP	03	Thickener Overflow Pump	32.3	32.3		39	
250	THK	01	Hi-rate Thickener	137.3	93.4			
250	TNK	01	Thickener Overflow Tank	32.3	32.3	19.4		

Equipment Tag			Description	Total feed	Volumetric flow	Design volume	Design Flow	
Area	**Description**	**Sequential number**		**t/h**	**m^3/h**	**m^3**	**m^3/h**	**t/h**
310	BAG	01	CIL Tails Fine Carbon Collection Bag			1.0		
310	BOX	01	CIL Tails Screen Feed Box	122	77.9	3.1		
310	PMP	01	CIL Tails Transfer Pump	130	85.6		103	
310	SCR	01	CIL Tails Carbon Fine Screen	122	77.9			
310	STN	01	CIL Tails Bag Stand			1.0		
310	TNK	01	CIL Tails Tank	122	77.9	6.2		

Equipment Tag			Description	Total feed	Volumetric flow	Design volume	Design Flow	
Area	**Description**	**Sequential number**		**t/h**	**m^3/h**	**m^3**	**m^3/h**	**t/h**
350	AGT	01	Detox Tank Agitator			344.7		
350	PMP	01	Detox Tank Discharge	131	91.7		111	
350	PMP	02	Detox Spillage Pump		10.0		12	
350	SSH	01	Detox Safety Shower					
350	SMP	01	Detox Spillage Sump					
350	TNK	01	Detox Tank	130	85.6	344.7		
350	PMP	03	Standby 310/350					

Equipment Tag			Description	Total feed	Volumetric flow	Design volume	Design Flow	
Area	**Description**	**Sequential number**		**t/h**	**m^3/h**	**m^3**	**m^3/h**	**t/h**
400	AGT	01	Loaded Carbon Tank Agitator			11.3		
400	CLM	01	Acid Wash Column			4.4		
400	PMP	01	Acid Wash Pump		3.7		4.4	
400	PMP	02	Loaded Carbon Transfer Pump		9.2		13.8	
400	PMP	03	Slurry Return Pump		79.7		96	
400	PMP	04	Acid Wash Spillage Pump		10.0		12	
400	PMP	05	Column Pump	14.73	7.37		9	
400	PMP	06	Wash Water Pump		3.7		5	
400	SCR	01	Loaded Carbon Screen		69.8			
400	SMP	01	Acid Wash Spillage Sump					
400	SSH	01	Safety Shower					
400	TNK	01	Acid Wash Tank	3.68	3.6	21.1		
400	TNK	02	Wash Water Tank	7.4	7.4	8.8		
400	TNK	03	Loaded Carbon Tank	0.4	0.4	11.3		
400	TNK	04	Slurry Return Tank	113.2	79.7	34.0		

Equipment Tag			Description	Total feed	Volumetric flow	Design volume	Design Flow	
Area	**Description**	**Sequential number**		**t/h**	**m^3/h**	**m^3**	**m^3/h**	**t/h**
410	AGT	01	Eluate Agitator			21.1		
410	BLR	01	Elution Boiler 1					
410	BLR	02	Elution Boiler 2					
410	CLM	01	Elution Column			4.40		
410	HTE	01	Primary Heat Exchanger					
410	HTE	02	Secondary Heat Exchanger					
410	HTE	03	Tertiary Heat Exchanger					
410	PMP	01	Elution Pump	3.68	3.7		4.4	
410	PMP	02	Transfer Water Pump	14.73	14.7		17.7	
410	PMP	03	Elution Spillage Pump		10.0		12.0	
410	SMP	01	Elution Spillage Sump					
410	SSH	01	Safety Shower					
410	TNK	01	Elution Tank			21.1		
410	TNK	02	Transfer Water Tank	7.37	7.4	4.4		

Equipment Tag			Description	Total feed	Volumetric flow	Design volume	Design Flow	
Area	**Description**	**Sequential number**		**t/h**	**m^3/h**	**m^3**	**m^3/h**	**t/h**
420	AGT	01	Eluted Carbon Tank Agitator			20.1		
420	AGT	02	Regenerated Carbon Agitator			21.7		
420	BAG	01	CIL Tails Carbon Bag			1.0		
420	FDS	01	Regeneration Kiln Screw Feeder	0.4	0.4			
420	MBG	01	Kiln DC Drive					
420	PMP	01	Kiln Carbon Pump	0.4	0.4		0.56	
420	PMP	02	Regeneration Carbon Pump	0.4	0.4		0.56	
420	PMP	03	Water Transport Pump	7.4	7.4		8.84	
420	PMP	04	Carbon Regeneration Sump Pump		10.0		12.00	
420	RGK	01	Carbon Regeneration Kiln	1.8	1.7			
420	SMP	01	Carbon Regeneration Sump					
420	STN	01	CIL Tails Carbon Bag Stand			1.0		
420	TNK	01	Eluted Carbon Tank	9.2	8.4	20.1		
420	TNK	02	Regenerated Carbon Tank	9.2	9.0	21.7		
420	TNK	03	Transfer Water Tank	9.2	9.0	43.4		

Equipment Tag			Description	Total feed	Volumetric flow	Design volume	Design Flow	
Area	Description	Sequential number		t/h	m^3/h	m^3	m^3/h	t/h
500	EWC	01	Electrowinning Cell 1	1.8	1.8	26.5		
500	EWC	02	Electrowinning Cell 2	1.8	1.8	26.5		
500	PMP	01	Electrowinning Discharge Pump		1.8		2.2	
500	REC	01	Electrowinning Rectifier 1	1.8	1.8			
500	REC	02	Electrowinning Rectifier 2	1.8	1.8			
500	TNK	01	Electrowinning Overflow Discharge Tank		1.8	26.5		
500	PMP	02	Standby 500/420					

Equipment Tag			Description	Total feed	Volumetric flow	Design volume	Design Flow	
Area	Description	Sequential number		t/h	m^3/h	m^3	m^3/h	t/h
600	AGT	01	Cyanide Make-up Agitator			14.8		
600	AGT	02	Caustic Make-up Agitator			15.8		
600	AGT	03	Lime Make-up Agitator			24.9		
600	AGT	04	Cyanide Tank Agitator			14.8		
600	AGT	05	Lime Tank Agitator			24.9		
600	BAG	01	Sodium Cyanide Reagent	12.0				
600	BAG	02	Caustic Reagent	6.0				
600	BAG	03	Lime (Calcium Oxide) Reagent	6.0				
600	BBR	01	Bag Breaker Cyanide					
600	BBR	02	Bag Breaker Caustic					
600	BBR	03	Bag Breaker Lime					
600	PMP	01	Cyanide Make-Up Pump		3.1		3.39	
600	PMP	02	Caustic Pump		6.6		7.92	
600	PMP	03	Lime Make-Up Pump		20.7		24.88	
600	PMP	04	Cyanide Pump					
600	PMP	05	Lime Pump					
600	PMP	06	Base Sump Pump		10.0		12.00	
600	SMP	01	Base Sump					
600	SSH	02	Base Safety Shower					
600	TNK	01	Cyanide Make-up Tank		0.5	14.8		
600	TNK	02	Caustic Make-up Tank		1.1	15.8		
600	TNK	03	Lime Make-up Tank		3.5	24.9		
600	TNK	04	Cyanide Tank			14.7744	0	0
600	TNK	05	Lime Tank			24.8832	0	0
610	AGT	01	Ferrous Sulphate Agitator			22.9		
610	AGT	02	Acid Agitator			8.7		
610	BAG	01	Ferrous Sulphate Reagent	12.0				
610	BBR	01	Bag Breaker Ferrous Sulphate					
610	PMP	01	Ferrous Sulphate Tank Pump		1.6		1.91	
610	PMP	02	Dilute Acid Pump		3.6		4.37	
610	PMP	03	Concentrate Acid Pump		1.1		1.34	
610	PMP	04	Acid Sump Pump		10.0		12.00	
610	SMP	01	Acid Sump					
610	SSH	01	Acid Safety Shower					
610	TNK	01	Ferrous Sulphate Make-Up Tank		0.8	22.9		
610	TNK	02	Dilute Acid Tank		3.6	8.7		

Equipment Tag			Description	Total feed	Volumetric flow	Design volume	Design Flow	
Area	Description	Sequential number		t/h	m^3/h	m^3	m^3/h	t/h
700	PMP	01	Process Water Pump		107		128.9	
700	PMP	02	Process Water Pump (Stand-by)		107		128.9	
700	PMP	03	Transfer Water Pump		7		8.84	
700	PMP	04	Potable Water Pump					
700	PMP	05	Gland Water Pump					
700	PMP	06	Cooling Water Pump					
700	PMP	07	Cooling Tower Feed Pump					
700	PMP	08	Cooling Tower Return Pump					
700	PMP	09	Anti-Scalant Pump					
700	TNK	01	Process Water Tank	107	107	257.7		
700	TNK	02	Transfer Water Tank	7	7	8.8		
700	TNK	03	Potable Water Tank			20		
700	TNK	04	Gland Water Tank			5		
700	TNK	05	Cooling Water Tank			20		
700	TNK	06	Anti-Scalant Tank			5		

32.4 TABLES APPENDICES

Table 32.1: Buckreef Project Full Schedule of Mined Tonnages

TRX Mine Plan 2019																	
YEAR	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**Total**
MINING Summary																	
Oxide Ore (Tonnes)	274,483	256,217	79,578	109,536	38,713	30,525	159,318	64,833	320,880	117,506	16,298	1,232	40,585	-	-	-	-
Oxide Ore (g/t)	2.04	1.53	1.13	0.89	0.70	1.22	1.02	2.08	1.98	3.92	0.74	0.79	2.11	-	-	-	-
Oxide Waste	2,713,383	1,442,951	2,086,748	597,909	191,169	1,550,517	2,085,844	2,140,360	1,978,185	3,322,567	918,366	81,707	1,045,748	-	-	-	-
Oxide Ore & Waste	2,987,867	1,699,167	2,166,326	707,445	229,881	1,581,042	2,245,162	2,205,193	2,299,065	3,440,074	934,664	82,939	1,086,332	-	-	-	-
Trans Ore (Tonnes)	91,927	191,820	149,582	93,467	92,763	91,086	40,183	21,171	81,587	341,223	255,904	51,915	17,472	-	-	-	-
Trans Ore (g/t)	2.18	2.86	1.63	0.87	1.01	1.01	1.57	1.04	1.05	3.10	1.29	0.91	2.72	-	-	-	-
Trans Waste	1,296,460	1,097,386	2,134,297	1,410,330	732,696	1,524,586	1,929,790	1,276,813	1,629,170	2,700,193	2,878,323	1,367,761	367,706	-	-	-	-
Trans Ore & Waste	1,388,387	1,289,207	2,283,879	1,503,798	825,459	1,615,673	1,969,973	1,297,984	1,710,757	3,041,416	3,134,227	1,419,675	385,177	-	-	-	-
Hard Ore (Tonnes)	42,968	186,569	346,182	554,797	1,246,759	1,522,363	1,269,055	1,262,780	1,059,983	1,122,314	1,091,578	1,439,843	1,496,521	1,386,337	1,110,020	915,073	-
Hard Ore (g/t)	1.37	2.14	1.73	1.49	1.63	1.48	1.29	1.86	1.57	1.26	1.31	1.22	1.29	1.65	1.41	1.70	-
Hard Waste	508,278	1,766,057	4,054,862	6,824,336	7,781,025	6,839,042	7,984,725	9,294,444	14,640,194	12,160,196	14,549,531	15,490,042	12,148,632	12,887,663	13,175,550	1,102,370	-
Hard Ore & Waste	551,246	1,952,626	4,401,044	7,379,132	9,027,784	8,361,405	9,253,780	10,557,224	15,700,177	13,282,510	15,641,109	16,929,886	13,645,153	14,273,999	14,285,570	2,017,443	-
Total Ore (Tonnes)	409,378	634,606	575,342	757,800	1,378,235	1,643,974	1,468,556	1,348,784	1,462,450	1,581,043	1,363,781	1,492,990	1,554,578	1,386,337	1,110,020	915,073	-
Total Ore (g/t)	2.00	2.11	1.62	1.33	1.56	1.45	1.27	1.85	1.63	1.85	1.30	1.21	1.32	1.65	1.41	1.70	-
Total Waste	4,518,121	4,306,394	8,275,908	8,832,575	8,704,890	9,914,145	12,000,359	12,711,617	18,247,549	18,182,956	18,346,219	16,939,510	13,562,085	12,887,663	13,175,550	1,102,370	-
Total Ore & Waste	4,927,500	4,941,000	8,851,250	9,590,375	10,083,125	11,558,119	13,468,915	14,060,401	19,709,999	19,763,999	19,709,999	18,432,500	15,116,663	14,273,999	14,285,570	2,017,443	-
MILL FEED Summary																	
Oxide Ore (Tonnes)	348,730	187,710	57,425	208,941	73,014	29,574	159,318	66,452	308,940	117,506	21,063	-	40,585	2,241	7,930	-	1,629,430
Oxide Ore (g/t)	2.00	1.40	1.24	1.28	1.17	1.20	1.02	2.07	1.98	3.92	0.97	-	2.11	1.65	1.65	-	1.79
Trans Ore (Tonnes)	91,927	150,814	136,218	133,167	106,462	77,843	40,183	27,971	81,587	308,576	269,834	51,538	17,472	5,842	20,668	-	1,520,100
Trans Ore (g/t)	2.18	2.68	1.72	1.46	1.25	1.01	1.57	1.06	1.05	3.27	1.30	0.92	2.72	1.41	1.41	-	1.92
Hard Ore (Tonnes)	42,968	146,426	289,982	625,143	1,271,034	1,347,066	1,251,009	1,356,088	1,059,983	1,028,401	1,159,613	1,398,972	1,392,453	1,446,401	1,322,530	915,073	16,053,143
Hard Ore (g/t)	1.37	2.15	1.69	1.55	1.63	1.39	1.25	1.89	1.57	1.26	1.34	1.23	1.31	1.64	1.40	1.70	1.48
	483,625	484,950	483,625	967,250	1,450,510	1,454,484	1,450,510	1,450,510	1,450,510	1,454,484	1,450,510	1,450,510	1,450,510	1,454,484			
Total Ore (Tonnes)	483,625	484,950	483,625	967,250	1,450,510	1,454,484	1,450,510	1,450,510	1,450,510	1,454,484	1,450,510	1,450,510	1,450,510	1,454,484	1,351,128	915,073	19,202,673
Hard Ore (g/t)	1.98	2.02	1.64	1.48	1.58	1.37	1.23	1.88	1.63	1.90	1.33	1.22	1.35	1.64	1.40	1.70	1.54
Oz Fed to Plant	30,748	31,540	25,534	45,975	73,767	64,004	57,394	87,814	75,987	88,989	61,959	56,839	62,911	76,537	60,916	50,091	951,012
Oxide Waste	2,713,383	1,442,951	2,086,748	597,909	191,169	1,550,517	2,085,844	2,140,360	1,978,185	3,322,567	918,366	81,707	1,045,748	-	-	-	-
Trans Waste	1,296,460	1,097,386	2,134,297	1,410,330	732,696	1,524,586	1,929,790	1,276,813	1,629,170	2,700,193	2,878,323	1,367,761	367,706	-	-	-	-
Hard Waste	508,278	1,766,057	4,054,862	6,824,336	7,781,025	6,839,042	7,984,725	9,294,444	14,640,194	12,160,196	14,549,531	15,490,042	12,148,632	12,887,663	13,175,550	1,102,370	-
Total	4,518,121	4,306,394	8,275,908	8,832,575	8,704,890	9,914,145	12,000,359	12,711,617	18,247,549	18,182,956	18,346,219	16,939,510	13,562,085	12,887,663	13,175,550	1,102,370	
SR	9.34	8.88	17.11	9.13	6.00	6.82	8.27	8.76	12.58	12.50	12.65	11.68	9.35	8.86	9.75	1.20	9.56

Table 32.2 Buckreef Project Summary of Schedule of Milled Tonnages

Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
MINING Summary																
Oxide Ore (Tonnes)	274	256	80	110	39	31	159	65	321	118	16	1	41	-	-	-
Oxide Ore (g/t)	2.04	1.53	1.13	0.89	0.70	1.22	1.02	2.08	1.98	3.92	0.74	0.79	2.11	-	-	-
Oxide Waste	2,713	1,443	2,087	598	191	1,551	2,086	2,140	1,978	3,323	918	82	1,046	-	-	-
Oxide Ore & Waste	2,988	1,699	2,166	707	230	1,581	2,245	2,205	2,299	3,440	935	83	1,086	-	-	-
Trans Ore (Tonnes)	92	192	150	93	93	91	40	21	82	341	256	52	17	-	-	-
Trans Ore (g/t)	2.18	2.86	1.63	0.87	1.01	1.01	1.57	1.04	1.05	3.10	1.29	0.91	2.72	-	-	-
Trans Waste	1,296	1,097	2,134	1,410	733	1,525	1,930	1,277	1,629	2,700	2,878	1,368	368	-	-	-
Trans Ore & Waste	1,388	1,289	2,284	1,504	825	1,616	1,970	1,298	1,711	3,041	3,134	1,420	385	-	-	-
Hard Ore (Tonnes)	43	187	346	555	1,247	1,522	1,269	1,263	1,060	1,122	1,092	1,440	1,497	1,386	1,110	915
Hard Ore (g/t)	1.37	2.14	1.73	1.49	1.63	1.48	1.29	1.86	1.57	1.26	1.31	1.22	1.29	1.65	1.41	1.70
Hard Waste	508	1,766	4,055	6,824	7,781	6,839	7,985	9,294	14,640	12,160	14,550	15,490	12,149	12,888	13,176	1,102
Hard Ore & Waste	551	1,953	4,401	7,379	9,028	8,361	9,254	10,557	15,700	13,283	15,641	16,930	13,645	14,274	14,286	2,017
Total Ore (Tonnes)	409	635	575	758	1,378	1,644	1,469	1,349	1,462	1,581	1,364	1,493	1,555	1,386	1,110	915
Total Ore (g/t)	2.00	2.11	1.62	1.33	1.56	1.45	1.27	1.85	1.63	1.85	1.30	1.21	1.32	1.65	1.41	1.70
Total Waste	4,518	4,306	8,276	8,833	8,705	9,914	12,000	12,712	18,248	18,183	18,346	16,940	13,562	12,888	13,176	1,102
Total Ore & Waste	4,927	4,941	8,851	9,590	10,083	11,558	13,469	14,060	19,710	19,764	19,710	18,432	15,117	14,274	14,286	2,017
MILL FEED Summary																
Oxide Ore (Tonnes)	349	188	57	209	73	30	159	66	309	118	21	-	41	2	8	-
Oxide Ore (g/t)	2.00	1.40	1.24	1.28	1.17	1.20	1.02	2.07	1.98	3.92	0.97	-	2.11	1.65	1.65	-
Trans Ore (Tonnes)	92	151	136	133	106	78	40	28	82	309	270	52	17	6	21	-
Trans Ore (g/t)	2.18	2.68	1.72	1.46	1.25	1.01	1.57	1.06	1.05	3.27	1.30	0.92	2.72	1.41	1.41	-
Hard Ore (Tonnes)	43	146	290	625	1,271	1,347	1,251	1,356	1,060	1,028	1,160	1,399	1,392	1,446	1,323	915
Hard Ore (g/t)	1.37	2.15	1.69	1.55	1.63	1.39	1.25	1.89	1.57	1.26	1.34	1.23	1.31	1.64	1.40	1.70
	484	485	484	967	1,451	1,454	1,451	1,451	1,451	1,454	1,451	1,451	1,451	1,454	1,351	915
Total Ore (Tonnes)	484	485	484	967	1,451	1,454	1,451	1,451	1,451	1,454	1,451	1,451	1,451	1,454	1,351	915
Hard Ore (g/t)	1.98	2.02	1.64	1.48	1.58	1.37	1.23	1.88	1.63	1.90	1.33	1.22	1.35	1.64	1.40	1.70
Oz Fed to Plant	31	32	26	46	74	64	57	88	76	89	62	57	63	77	61	50
Oxide Waste	2,713	1,443	2,087	598	191	1,551	2,086	2,140	1,978	3,323	918	82	1,046	-	-	-
Trans Waste	1,296	1,097	2,134	1,410	733	1,525	1,930	1,277	1,629	2,700	2,878	1,368	368	-	-	-
Hard Waste	508	1,766	4,055	6,824	7,781	6,839	7,985	9,294	14,640	12,160	14,550	15,490	12,149	12,888	13,176	1,102

Table32.3: Full Schedule of Staffing Requirements of the Buckreef Project

			2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
MANAGEMENT		(US$)																	
Chief Operating Officer	M	120,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
General Manager		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Executive Secretary	S	42,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TOTAL		**162,000**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
MINE OPERATION																			
Mine /Production Manager	M	72,000		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pit Superintendent		0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shift Supervisor	S	12,000		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Driller-Contractor/Supervisor	C	9,000		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Blasters-Contractor/Supervisor	C	9,000		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Loader Operator	S	9,600		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Excavator Operator	S	9,600	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Truck Driver /Dumper	S	8,400	1	10	10	10	5	10	10	10	10	10	10	10	10	10	10	10	10
Wheel Dozer Operator	S	9,600	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Track Dozer Operator	S	9,600	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Water Truck Operator	S	8,400	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Grader Operator	S	9,600		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Lube Fuel Truck Operator	S	9,000		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Ore Spotter	S	9,000	2	2	2	2	6	2	2	2	2	2	2	2	2	2	2	2	2
Pit Pump Operator	S	9,000	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Laborer	L	9,000	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
TOTAL		**202,800**	**12**	**36**	**36**	**36**	**35**	**36**	**36**	**36**	**36**	**36**	**36**	**36**	**36**	**36**	**36**	**36**	**36**
MINING ENGINEERING																			
Engineering Manager		60,000	0	0	0	0	1	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shift Supervisor	S	30,000	2	3	4	5	4	7	4	3	3	3	3	3	3	3	3	3	3
Mine Engineers	S	24,000	1	2	2	2	2	2	1										
Fitters and Mechanics	S	12,000	10	20	20	20	20	10	10										
Fuel Bay Attendants Fitter Asst	L	6,000	4	4	4	4	14	4	4	2	2	2	2	2	2	2	2	2	2
Data Clerks	L	6,000	1	1	1	1	1	1	1	11	7	7	7	7	7	7	7	7	7
TOTAL			**18**	**30**	**31**	**32**	**42**	**24**	**20**	**16**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**
TECHNICAL SERVICES																			
Geology Manager		0	0	0	0	0	0	0	0	0.0									
Mine Surveyor	S	30,000	2	2	2	2	3	3	3										
			2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035

Geotechnical Engineer	L	21,600	1	1	1	1	1	1	1										
Survey Technician	L	10,800	1	3	3	3	4	4	4										
Geotechnical Technicisn	L	10,800	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
Mine/Exploration Geologist	S	36,000	2	2	2	2	2	2	1										
Resource Geologist		0	0	0	0	0	0	0	0										
Geology Technician	L	10,800	4	2	4	4	4	4	4										
Data Clerk	L	6,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TOTAL			**12**	**13**	**15**	**15**	**17**	**17**	**16**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
PROCESS PLANT																			
Plant Manager/Supritendent	M	72,000		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Process/Maintanance Engineer	S	30,000		1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1
Shift Supervisor	S	30,000		2	2	2	0	2	2	2	2	2	2	2	2	2	2	2	2
Gold Room Supervisor	S	30,000		2	2	2	0	2	2	2	2	2	2	2	2	2	2	2	2
Operators	L	10,800		20	20	20	0	20	20	20	20	20	20	20	20	20	20	20	20
Fitters and Mechanics	S	10,800		2	2	2	0	2	2	2	2	2	2	2	2	2	2	2	2
Metallurgist	S	24,000	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1
Effluent Treatment Operator	L	8,400		2	2	2	0	2	2	2	2	2	2	2	2	2	2	2	2
TOTAL			**1**	**31**	**31**	**31**	**1**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**
SAFETY, HEALTH & ENVIRONMENT																			
SHE Manager	M	60,000		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Medical Doctor	S	36,000		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Safety/Environment Officer	S	30,000	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Nurse	S	11,400		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Lab Technician	S	11,400	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
TOTAL			**2**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**
METALLURGICAL LABORATORY																			
Chief Chemist	S	36,000		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Assayers	S	8,400		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Sample Preparation	L	8,400		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Instrumentation Techn.	S	10,800		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TOTAL			**0**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**
HUMAN RESOURCES																			
Human Resource Manager		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HR Officer	S	30,000		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Community Relations Officer	S	18,000	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
			2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035

Administration Officer	S	18,000		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
TOTAL			**1**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**
PURCHASING																			
Chief Buyer	S	48,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Procurement Officer	S	12,000		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Receiving Supervisor		0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Data Clerks	L	7,200		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
TOTAL			**1**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
ACCOUNTING																			
Chief Accountant	M	72,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Accountant/Payroll Officer	S	36,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Accountant/Accounts payable officer	S	36,000	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Cost accountant/PPE	S	48,000	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IT Technician	S	18,000	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TOTAL			**2**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
CAMP																			
Camp Manager	S	42,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Chief Cook	S	30,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Assistant Cook	L	10,200	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Kitchen Assistant	L	10,200	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Office Cleaners	L	7,200	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
TOTAL			**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**

Table32.4: Summary of Capital Costs Estimates

Item	Capital Description	No	Unit Cost	Total Capex	Year 0	60tph Prod Year 1	Year 2	120tph Prod Year 3	180tph Prod Year 4	Year 5	Year 6
	Capital Plan		**USD**	**USD**							
1	**Mining**										
1.1	Mining Equipment (Fleet)	1	17,531,424	17,531,424	8,737,653	4,581,271		4,212,500			
1.2	Loader	3	265,500	796,500	796,500						
1.3	Water Truck	0	100,000	100,000	100,000						
1.4	Service Truck	1	100,000	100,000	100,000						
1.5	Light Trucks & Cars	8	41,500	332,000	166,000	166,000					
1.6	Dewatering Pump	4	40,000	160,000	160,000						
1.7	Survey Tools	1	45,000	45,000	45,000						
1.8	Pit Optimisation	1	75,000	75,000	75,000						
1.9	Mining Offices/Shop	1	300,000	300,000	300,000						
1.1	Haul Roads	1	100,000	100,000	100,000						
1.11	HME - Workshop Construction	1	700,000	700,000	700,000						
1.12	Explosive magazine	1	150,000	150,000		150,000					
1.13	Fuel Tanks with a Capacity to hold 400klt	1	240,000	240,000	240,000						
	Subtotal Mining			**20,629,924**	**11,520,153**	**4,897,271**	**0**	**4,212,500**			
2	**Processing Plant**										
2.1	TSF Construction & Design	1	1,750,000	1,750,000	1,250,000		250,000	250,000			
2.2	Portable Water Plant	1	600,000	600,000	300,000		300,000				
2.3	Laboratory	1	500,000	500,000	500,000						
2.4	Process Plant Development	1	35,284,625	35,284,625	11,500,000	150,000	11,500,000	12,134,625			
2.5	Generators 4No x 2.5MVa	1	1,243,000	1,243,000	414,333	-	414,333	414,333			
2.6	Substation and Power Reticulation	1	500,000	500,000	500,000						
2.7	Engineering Workshop for Plant +tools	1	400,000	400,000	400,000						
	Subtotal Processing Plant		**40,277,625**	**40,277,625**	**14,864,333**	**150,000**	**12,464,333**	**12,798,958**			
3	**Human Resources & Community**										
3.1	Camping Facilities	1	250,000	250,000	250,000						
3.2	Camp Houses (2Bx20+4Bx30)	50	15,000	750,000	750,000						
3.3	Relocation of Mnekezi road	1	250,000	250,000	250,000						
3.4	Airport/Aerodrome	1	35,000	35,000	35,000						
3.5	Helicopter Pad	1	10,000	10,000	10,000						
3.6	Compensation - Relocation from SML	1	2,500,000	2,500,000	2,500,000						
3.7	Sewer Ponds & Facilities	1	350,000	350,000	350,000						
3.8	Security fencing	1	520,000	520,000	520,000						
	Subtotal Human Resources & Community		**3,930,000**	**4,665,000**	**4,665,000**	**0**	**0**	**0**			
4	**HSE**										
4.1	Clinic	1	100,000	100,000	100,000						

						60tph Prod		120tph Prod	180tph Prod		
Item	**Capital Description**	**No**	**Unit Cost**	**Total Capex**	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
4.2	Waste Handling Facilties	1	75,000	75,000	75,000						
	Subtotal HSE		**175,000**	**175,000**	**175,000**	**0**	**0**	**0**			
5	**Finance + IT**										
5.1	Computer & Server	1	40,000	40,000	40,000						
5.2	Desktop	1	45,000	45,000	45,000						
5.3	Laptop	1	30,000	30,000	30,000						
5.4	Networking & Communication	1	40,000	40,000	40,000						
5.5	Process Plant Insurance - 6% Plant Cost	1	600,000	600,000	600,000						
5.6	Mining Equipment Insurance - 2.5% Equip Cost	1	19,913	19,913	19,913						
	Subtotal Finance +IT		**774,913**	**774,913**	**774,913**	**0**	**0**	**0**			
6	**Contingency 15%**	**15%**		**9,978,369**	**4,799,910**	**757,091**	**1,869,650**	**2,551,719**			
7	**Total Capex**			**76,500,831**	**36,799,309**	**5,804,362**	**14,333,983**	**19,563,177**			
	For Depreciation			**Total Capex**	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
1	**Plant and Equipment**	US$		**64,707,681**	**26,873,384**	**5,876,725**	**14,657,200**	**20,113,750**			
2	**Building and Infrastructure**	US$		**11,059,500**	**10,887,000**	**3,952,500**	**3,780,000**	**3,780,000**			
3	**Office & Computers Equipment**	US$		**891,150**	**891,150**	**0**	**0**	**0**			
4	**Total**	US$		**76,658,331**	**38,651,534**	**9,829,225**	**18,437,200**	**23,893,750**			

Table 32.50: Equipment Operating Costs\

FUEL PRICE	USD 1.20	Type	TRACKED BULL DOZER	TRACKED BULL DOZER	MOTOR GRADER	HYDRAULIC EXCAVATOR	HYDRAULIC EXCAVATOR	ARTICULATED DUMP TRUCK	FUEL BOWSER	WATER BOWSER	TRACKED DRILL RIG
ENGINE OIL	USD 4.60	Make	**BELL**	**CAT**	**CAT**	**CAT**	**LIEBHEER**	**BELL**	**BELL**	**BELL**	**Sandvik**
TRANS OIL	USD 7.17	Model	**PR754**	**D8R**	**140H**	**374**	**R966**	**B40D**	**B25E**	**B30E**	
HYD OIL	USD 4.60	kW		123	112						
F / DRIVE OIL	USD 5.10	kg	32,000	17,083	13,529						32,000
Delivery Price	**DP**		USD 683,771.00	USD 850,000.00	USD 385,000.00	USD 855,000.00	USD 855,000.00	USD 540,000.00	USD 343,000.00	USD 385,000.00	USD 675,750.00
Residual Value At Replacement	**RVR**		USD 0.00	USD 85,000.00	USD 38,500.00	USD 85,500.00	USD 85,500.00	USD 54,000.00	USD 34,300.00	USD 38,500.00	USD 0.00
Value To Be Recovered Through Work	**VRTW**		USD 683,771.00	USD 765,000.00	USD 346,500.00	USD 769,500.00	USD 769,500.00	USD 486,000.00	USD 308,700.00	USD 346,500.00	USD 675,750.00
Estimated Ownership	**N**	years	5	5	5	5	5	6	10	5	5
Estimated Usage	**H**	hours/year	7,200	7,200	7,200	7,200	7,200	7,200	4,500	7,200	7,200
Ownership Usage	**T**	hours	36,000	36,000	36,000	36,000	36,000	43,200	45,000	36,000	36,000
Cost Per Hour	**CPH**	USD/hr	USD 18.99	USD 21.25	USD 9.63	USD 21.38	USD 21.38	USD 11.25	USD 6.86	USD 9.63	USD 18.77
Simple Interest Rate	**SI**	%	12%	12%	12%	12%	12%	12%	12%	12%	12%
Interest Costs	**SIC**	USD/hr	USD 6.84	USD 8.50	USD 3.85	USD 8.55	USD 8.55	USD 5.25	USD 5.03	USD 3.85	USD 6.76
Insurance Rate	**IN**	%	2%	2%	2%	2%	2%	2%	4%	4%	2%
Insurance Costs	**INSC**	USD/hr	USD 1.14	USD 1.42	USD 0.64	USD 1.43	USD 1.43	USD 0.88	USD 1.68	USD 1.28	USD 1.13
TOTAL OWNING COSTS	**TOC**	**USD/hr**	**USD 0.00**	**USD 0.00**	**USD 0.00**	**USD 0.00**	**USD 0.00**	**USD 0.00**	**USD 0.00**	**USD 0.00**	**USD 0.00**
Fuel Consumption Rate	**F**	litres/hour	35	35	20	60	60	28	20	27	28
Fuel Price	**FP**	USD/litre	USD 1.20	USD 1.20	USD 1.20	USD 1.20	USD 1.20	USD 1.20	USD 1.20	USD 1.20	USD 1.20
Dry (D) Or Wet (W) Rate	**D/W**	w	w	w	w	w	w	w	w	w	w
Fuel Consumption	**FC**	USD/hour	USD 42.00	USD 42.00	USD 24.00	USD 72.00	USD 72.00	USD 33.60	USD 24.00	USD 32.40	USD 33.60
Engine Oil Price	**EOP**	USD	USD 4.60	USD 4.60	USD 4.60	USD 4.60	USD 4.60	USD 4.60	USD 4.60	USD 4.60	USD 4.60
Engine Oil Consumption Rate	**EOCR**	litres/hour	0.160	0.140	0.140	0.300	0.200	0.150	USD 0.15	0.150	0.160
Transmission Oil Price	**TOP**	USD	USD 4.60	USD 4.60	USD 4.60	USD 4.60	USD 4.60	USD 4.60	USD 4.60	USD 4.60	USD 4.60
Transmission Oil Consumption Rate	**TOCR**	litres/hour	0.150	0.144	0.047	0.000	0.000	0.040	USD 0.04	0.040	0.150
Final Drives Fluid Price	**FDFP**	USD	USD 5.10	USD 5.10	USD 5.10	USD 5.10	USD 5.10	USD 5.10	USD 5.10	USD 5.10	USD 0.00
Final Drives Fluid Consumption Rate	**FDFCR**	litres/hour	0.015	0.013	0.065	0.150	0.040	0.050	USD 0.05	0.050	0.015
Hydraulic Oil Price	**HOP**	USD	USD 4.60	USD 4.60	USD 4.60	USD 4.60	USD 4.60	USD 4.60	USD 4.60	USD 4.60	USD 0.00
Hydraulic Oil Consumption Rate	**HOCR**	litres/hour	0.075	0.050	0.019	1.000	1.000	0.250	USD 0.25	0.250	0.075
Grease Price	**GP**	USD	USD 6.20	USD 6.20	USD 6.20	USD 6.20	USD 6.20	6.200	USD 6.20	USD 6.20	USD 6.20
Grease Consumption Rate	**GCR**	kg/hour	0.140	0.139	0.139	0.200	0.200	0.140	0.140	0.140	0.140
Engine Oil Cost	**EOC**	USD/hour	USD 0.74	USD 0.64	USD 0.64	USD 1.38	USD 0.92	USD 0.69	USD 0.69	USD 0.69	USD 0.74
Transmission Oil Cost	**TOC**	USD/hour	USD 0.69	USD 0.66	USD 0.22	USD 0.00	USD 0.00	USD 0.18	USD 0.18	USD 0.18	USD 0.69
Final Drives Fluid Cost	**FDFC**	USD/hour	USD 0.08	USD 0.07	USD 0.33	USD 0.77	USD 0.20	USD 0.26	USD 0.26	USD 0.26	USD 0.00
Hydraulic Oil Cost	**HOC**	USD/hour	USD 0.35	USD 0.23	USD 0.09	USD 4.60	USD 4.60	USD 1.15	USD 1.15	USD 1.15	USD 0.00
Grease Cost	**GC**	USD/hour	USD 0.87	USD 0.86	USD 0.86	USD 1.24	USD 1.24	USD 0.87	USD 0.87	USD 0.87	USD 0.87
Filter Cost [From Tables]	**FILC**	USD/hour	USD 2.00	USD 1.50	USD 1.50	USD 2.50	USD 2.50	USD 2.00	USD 2.00	USD 2.00	USD 2.00
Total Lubricants, Oils And Filter Cost	**LC**	USD/hour	USD 6.51	USD 6.51	USD 3.72	USD 11.16	USD 11.16	USD 5.04	USD 3.72	USD 5.02	USD 5.21
Number Of Wheels	**NW**			0	6	0	0	6	6	6	0
Tyre Size	**TS**			0	17.5x25	0	0	26.5R25	26.5R25	26.5R25	0
Tyre Price	**CT**			USD 0.00	USD 2,500.00	USD 0.00	USD 0.00	USD 6,500.00	USD 6,500.00	USD 6,500.00	0
Life Of Tyre	**LT**	hours		0	2,000	0	0	4,500	6,000	3,000	0
Tyre Replacement Cost	**TRC**			USD 0.00	USD 7.50	USD 0.00	USD 0.00	USD 8.67	USD 6.50	USD 13.00	USD 0.00

FUEL PRICE	USD 1.20	Type	TRACKED BULL DOZER	TRACKED BULL DOZER	MOTOR GRADER	HYDRAULIC EXCAVATOR	HYDRAULIC EXCAVATOR	ARTICULATED DUMP TRUCK	FUEL BOWSER	WATER BOWSER	TRACKED DRILL RIG
ENGINE OIL	USD 4.60	Make	**BELL**	**CAT**	**CAT**	**CAT**	**LIEBHEER**	**BELL**	**BELL**	**BELL**	**Sandvik**
TRANS OIL	USD 7.17	Model	**PR754**	**D8R**	**140H**	**374**	**R966**	**B40D**	**B25E**	**B30E**	
Impact Factor	**IF**		0.4	0.4	0.0	0.5	0.4	0.0	0.0	0.0	0.4
Abrasiveness	**A**		0.6	0.6	0.0	0.6	0.6	0.0	0.0	0.0	0.6
"Z" Factor	**Z**		0.5	0.5	0.0	1.0	1.0	0.0	0.0	0.0	0.5
Undercarriage Basic Factor	**Ba**		10.0	10.0	0.0	10.0	10.0	0.0	0.0	0.0	6.0
Extended Use Multiplier	**EM**		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Basic Repair Factor	**BF**		10	10	5.0	10.0	10.0	10.0	6.0	6.0	4
Undercarriage Repair Costs	**URC**	USD/hour	USD 15.00	USD 15.00	USD 0.00	USD 21.00	USD 20.00	USD 0.00	USD 0.00	USD 0.00	USD 9.00
Repair Reserve	**RR**		USD 10.00	USD 10.00	USD 5.00	USD 10.00	USD 10.00	USD 10.00	USD 6.00	USD 6.00	USD 11.00
Price Of Cutting Edges/Bucket	**PCE**	USD	USD 400.00	USD 460.00	USD 248.39	USD 20,000.00	USD 20,000.00	USD 0.00	USD 0.00	USD 0.00	USD 0.00
Price Of Ripper Tips/Picks	**PRT**	USD	USD 200.00	USD 230.00	USD 16.16	USD 0.00	USD 0.00	USD 0.00	USD 0.00	USD 0.00	USD 0.00
Price Of Bucket Tips/Pick Holders	**PBT**	USD	USD 0.00	USD 0.00	USD 0.00	USD 400.00	USD 400.00	USD 0.00	USD 0.00	USD 0.00	USD 0.00
Price Of Bin Liners/Corner Piece/End Ring	**PEB**	USD	USD 350.00	USD 402.50	USD 281.54	USD 0.00	USD 0.00	USD 3,000.00	USD 2,000.00	USD 2,000.00	USD 0.00
No. Of Cutting Edges	**NCE**		2	2	2	1	1	0	0	0	0
No. Of Ripper Tips/Picks	**NRT**		1	3	3	0	0	0	0	0	0
No. Of Bucket Tips/Pick Holders	**NRT**		0	0	0	4	4	0	0	0	0
No. Of Bin Liners/Corner Piece/Endrings	**NEB**		2	2	2	1	0	1	1	1	0
Life Of Cutting Edges/Bucket	**LCE**	hours	200	200	200	2,000	2,000	0	0	0	0
Life Of Ripper Tips/Picks	**LRT**	hours	200	200	200	0	0	0	0	0	0
Life Of Bucket Tips/Pick Holders	**LBT**	hours	0	0	0	150	150	0	0	0	0
Life Of Bin Liners/Corner Piece/End Ring	**LEB**	hours	200	250	0	0	0	2,500	4,000	4,000	0
Cost Of Cutting Edges	**CCE**	USD/hour	USD 4.00	USD 4.60	USD 2.48	USD 10.00	USD 10.00	USD 0.00	USD 0.00	USD 0.00	USD 0.00
Cost Of Ripper Tips	**CRT**	USD/hour	USD 1.00	USD 3.45	USD 0.24	USD 0.00	USD 0.00	USD 0.00	USD 0.00	USD 0.00	USD 0.00
Cost Of Bucket Tips	**CBT**	USD/hour	USD 0.00	USD 0.00	USD 0.00	USD 10.67	USD 10.67	USD 0.00	USD 0.00	USD 0.00	USD 0.00
Cost Of Bin Liners	**CEB**	USD/hour	USD 3.50	USD 3.22	USD 0.00	USD 0.00	USD 0.00	USD 1.20	USD 0.50	USD 0.50	USD 0.00
Special Wear Items	**SWI**	USD/hour	USD 8.50	USD 11.27	USD 2.73	USD 20.67	USD 20.67	USD 1.20	USD 0.50	USD 0.50	USD 0.00
Operator Costs	**OPC**	USD/hour	USD 0.00	USD 0.00	USD 0.00	USD 0.00	USD 0.00	USD 0.00	USD 0.00	USD 0.00	USD 0.00
TOTAL OPERATING CXOSTS	**TOC**	**USD/hour**	**USD 82.01**	**USD 84.78**	**USD 42.95**	**USD 134.83**	**USD 133.83**	**USD 58.51**	**USD 40.72**	**USD 56.92**	**USD 58.81**
		USD/hour	**USD 82.01**	**USD 84.78**	**USD 42.95**	**USD 134.83**	**USD 133.83**	**USD 58.51**	**USD 40.72**	**USD 56.92**	**USD 58.81**

Table 32.7: Buckreef Cash Flow Analysis

			YEARS																
Description	**Rates**	**Fact**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**	**Year 12**	**Year 13**	**Year 14**	**Year 15**	**Year 16**	**Total**
Ore Mining																			
Oxide Ore (Tonnes)	**kt**		**349**	**188**	**57**	**209**	**73**	**30**	**159**	**66**	**309**	**118**	**21**	**-**	**41**	**2**	**8**	**-**	1,629
Oxide Ore (g/t)	**g/t**		**2.00**	**1.40**	**1.24**	**1.28**	**1.17**	**1.20**	**1.02**	**2.07**	**1.98**	**3.92**	**0.97**	**-**	**2.11**	**1.65**	**1.65**	**-**	
Trans Ore (Tonnes)	**kt**		**92**	**151**	**136**	**133**	**106**	**78**	**40**	**28**	**82**	**309**	**270**	**52**	**17**	**6**	**21**	**-**	1,520
Trans Ore (g/t)	**g/t**		**2.18**	**2.68**	**1.72**	**1.46**	**1.25**	**1.01**	**1.57**	**1.06**	**1.05**	**3.27**	**1.30**	**0.92**	**2.72**	**1.41**	**1.41**	**-**	
Hard Ore (Tonnes)	**kt**		**43**	**146**	**290**	**625**	**1,271**	**1,347**	**1,251**	**1,356**	**1,060**	**1,028**	**1,160**	**1,399**	**1,392**	**1,446**	**1,323**	**915**	16,053
Hard Ore (g/t)	**g/t**		**1.37**	**2.15**	**1.69**	**1.55**	**1.63**	**1.39**	**1.25**	**1.89**	**1.57**	**1.26**	**1.34**	**1.23**	**1.31**	**1.64**	**1.40**	**1.70**	
Oxide Waste	**kt**		**2,713**	**1,443**	**2,087**	**598**	**191**	**1,551**	**2,086**	**2,140**	**1,978**	**3,323**	**918**	**82**	**1,046**	**-**	**-**	**-**	20,155
Trans Waste	**kt**		**1,296**	**1,097**	**2,134**	**1,410**	**733**	**1,525**	**1,930**	**1,277**	**1,629**	**2,700**	**2,878**	**1,368**	**368**	**-**	**-**	**-**	20,346
Hard Waste	**kt**		**508**	**1,766**	**4,055**	**6,824**	**7,781**	**6,839**	**7,985**	**9,294**	**14,640**	**12,160**	**14,550**	**15,490**	**12,149**	**12,888**	**13,176**	**1,102**	141,207
Oxide & Trans Ore Recovery	**%**	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	
Sulphide Ore Recovery		**85%**	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	
Mining Dilution	**%**	**5%**	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	
Gold produced																			
Fine (kg)	kg		876	869	677	1,208	1,878	1,621	1,468	2,225	1,989	2,405	1,599	1,433	1,595	1,924	1,535	1,258	24,559
Fine (oz) (1oz =31.1034768grams)	koz		28,162	27,944	21,752	38,837	60,375	52,111	47,181	71,532	63,956	77,320	51,412	46,069	51,295	61,851	49,347	40,448	789,593
Gold price (US$000)	**$/oz**	**1300**	**1,300**	**1,300**	**1,300**	**1,300**	**1,300**	**1,300**	**1,300**	**1,300**	**1,300**	**1,300**	**1,300**	**1,300**	**1,300**	**1,300**	**1,300**	**1,300**	
Gross revenue	**US ($000)**	**0**	**36,610**	**36,327**	**28,277**	**50,488**	**78,487**	**67,744**	**61,336**	**92,992**	**83,143**	**100,516**	**66,835**	**59,890**	**66,684**	**80,406**	**64,151**	**52,583**	1,026,471
Less Royalties & Selling Costs																			-
: Royalties 7.3% on Revenue		7.3%	(2,673)	(2,652)	(2,064)	(3,686)	(5,730)	(4,945)	(4,478)	(6,788)	(6,069)	(7,338)	(4,879)	(4,372)	(4,868)	(5,870)	(4,683)	(3,839)	(74,932)
: Selling Costs per oz of gold		4.40	(124)	(123)	(96)	(171)	(266)	(229)	(208)	(315)	(281)	(340)	(226)	(203)	(226)	(272)	(217)	(178)	(3,470)
Net revenue			**33,814**	**33,553**	**26,117**	**46,631**	**72,492**	**62,570**	**56,651**	**85,889**	**76,792**	**92,838**	**61,730**	**55,315**	**61,590**	**74,264**	**59,251**	**48,566**	948,064

			YEARS																
Description	**Rates**	**Fact**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**	**Year 12**	**Year 13**	**Year 14**	**Year 15**	**Year 16**	**Total**
Capital Costs	US ($k)																		
Start up Capital			36,799	5,804	14,334	19,563													76,501
Closure Costs	U$																	4,507	4,507
Sustaining Costs	U$	7.5%	-	-	-		5,738	-	-	5,738	-	-	5,738	-	-	5,738		-	22,950
Total Capital Costs	U$	-	**36,799**	**5,804**	**14,334**	**19,563**	**5,738**	**-**	**-**	**5,738**	**-**	**-**	**5,738**	**-**	**-**	**5,738**	**-**	**4,507**	103,958
Operating expenditure	**U$**																		
Mining Rates	US ($k)																		
Drill & Blast Waste	$/tw	0.74	1,337	2,122	3,796	6,103	6,310	6,198	7,348	7,834	12,057	11,013	12,916	12,493	9,276	9,551	9,764	817	118,936
Drill & Blast Ore	$/to	0.90	122	269	385	685	1,244	1,287	1,166	1,250	1,031	1,208	1,291	1,310	1,274	1,312	1,213	827	15,876
Load and Haul Ore	$/to	1.13	544	546	544	1,088	1,632	1,637	1,632	1,632	1,632	1,637	1,632	1,632	1,632	1,637	1,520	1,030	21,609
Load and Haul waste	$/tw	1.03	4,663	4,444	8,541	9,115	8,983	10,231	12,384	13,118	18,831	18,764	18,933	17,481	13,996	13,300	13,597	1,138	187,519
Overhaul rate	$/t/km	0.08																	
Mine Rehabilitation	$/tw	0.03	136	129	248	265	261	297	360	381	547	545	550	508	407	387	395	33	5,451
Processing Rates																			
Processing reagents	$/to	10.24	4,952	4,966	4,952	9,905	14,853	14,894	14,853	14,853	14,853	14,894	14,853	14,853	14,853	14,894	13,836	9,370	196,646
Labour Costs	$/to	1.98	958	960	958	1,915	2,872	2,880	2,872	2,872	2,872	2,880	2,872	2,872	2,872	2,880	2,675	1,812	38,023
Total operating costs	US ($k)		**12,712**	**13,436**	**19,424**	**29,076**	**36,156**	**37,425**	**40,616**	**41,942**	**51,825**	**50,941**	**53,048**	**51,151**	**44,310**	**43,960**	**43,001**	**15,026**	**584,048**
Opex +Capex	US ($k)	-	**49,511**	**19,240**	**33,758**	**48,639**	**41,894**	**37,425**	**40,616**	**47,679**	**51,825**	**50,941**	**58,786**	**51,151**	**44,310**	**49,698**	**43,001**	**19,533**	**688,006**
Pre Tax Net Cash Flows	US ($k)	-	**(15,697)**	**14,313**	**(7,641)**	**(2,008)**	**30,598**	**25,145**	**16,035**	**38,210**	**24,967**	**41,897**	**2,944**	**4,165**	**17,280**	**24,567**	**16,250**	**29,033**	**260,058**
Taxable Income	US ($k)		**12,644**	**27,206**	**16,607**	**31,338**	**50,119**	**33,483**	**23,247**	**48,350**	**25,515**	**42,444**	**9,229**	**4,712**	**17,828**	**30,852**	**16,797**	**34,088**	**424,457**
Tax Payable	US ($k)		**3,793**	**8,162**	**4,982**	**9,401**	**15,036**	**10,045**	**6,974**	**14,505**	**7,654**	**12,733**	**2,769**	**1,414**	**5,348**	**9,255**	**5,039**	**10,226**	**127,337**
Net Cashflows after Tax	US ($k)		**(19,490)**	**6,151**	**(12,623)**	**(11,409)**	**15,563**	**15,100**	**9,061**	**23,705**	**17,313**	**29,164**	**176**	**2,751**	**11,932**	**15,311**	**11,211**	**18,807**	**132,721**
Add back Depreciation	US ($k)		**5,955**	**7,090**	**9,913**	**13,783**	**13,783**	**8,338**	**7,212**	**4,403**	**547**	**547**	**547**	**547**	**547**	**547**	**547**	**547**	**74,854**
Net Cashflow after tax adjusted for tax dep	US ($k)		**(13,536)**	**13,240**	**(2,709)**	**2,373**	**29,346**	**23,438**	**16,273**	**28,107**	**17,860**	**29,711**	**723**	**3,298**	**12,479**	**15,859**	**11,758**	**19,354**	**207,575**
After Tax NPV @ (3%)	US ($k)	**3%**		**156,552**															
After Tax @ NPV (5%)	US ($k)	**5%**		**130,964**															
After Tax @ NPV (8%)	US ($k)	**8%**		**101,495**															
After Tax IRR	**%**			**74%**															
Cash cost per oz	**$/oz**		**451**	**481**	**893**	**749**	**599**	**718**	**861**	**586**	**810**	**659**	**1,032**	**1,110**	**864**	**711**	**871**	**371**	**735**
All in cash costs	**$/oz**		**1,758**	**689**	**1,552**	**1,252**	**694**	**718**	**861**	**667**	**810**	**659**	**1,143**	**1,110**	**864**	**804**	**871**	**483**	**933**

ark

Reference: 2018-L01

16 July 2018

Buckreef Gold Company Limited
Plot No. 263, Chato Street, Regent Estate
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Buckreef Gold Company Limited; TIN: 116-448-459
Expert Opinion on Net Present Value (NPV) Model for Buckreef Project covering a 16 years period

We have reviewed the NPV Model for the Buckreef project in accordance with our understanding of the taxation laws as currently applicable in Tanzanian. Based on our review, we confirm as experts in the taxation field in Tanzania that the parameters in the summary below for the 16 years model period (model attached) represent a true and fair view of the cash flow and project cost assumptions.

Table of NPV model results for Buckreef project

Description	Years 1 to 16 (US$(k))
Gross revenue	1,026,471
Royalties and selling costs	(78,402)
Net revenue	948,069
Capital costs	(103,958)
Operating costs	(584,048)
Pre-tax net cash flows	260,062
Tax	(127,337)
Net cash-flow after Tax	132,725
Add back tax depreciation	74,854
Net cash-flow after tax & depreciation adjustments	207,579
After Tax NPV @ (3%) – US ($k)	**156,552**
After Tax NPV @ (5%) – US ($k)	**130,964**
After Tax NPV @ (8%) – US ($k)	**101,495**
After Tax IRR (%)	**74%**

We are available to provide clarifications in case of any queries on this confirmation.

Yours faithfully

John Shimbala, Director
Ark Associates Limited

ARK ASSOCIATES LIMITED
REG: NO. 126462
DATE: 16/7/18
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Figure 32.14. Expert Opinion on Buckreef Gold Project After-Tax Cashflow, NPV & IRR