



# MATUNDASI GOLD MINING PROJECT

## FEASIBILITY STUDY

Presented by:

**PAULSAM GEO-ENGINEERING COMPANY LIMITED**  
PROPRIETARY MATERIAL

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“The value of gold historically comes from its emotional, cultural and financial value. All across the world, people from different socioeconomic and cultural backgrounds recognise gold as a sign of wealth and security”



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### Acronyms and Abbreviations:

BFS:	Bankable Feasibility Study
CAPEX:	Capital Expenditure
CARAT	Measure of Gold Purity 24 being pure
CBA:	Cost Benefit Analysis
CIP:	Carbon in Pulp
CIL:	Carbon in Leach
ESIA:	Environmental and Social Impact Assessment
EBIT:	Earnings Before Interest and Taxes
EBITD:	Earnings Before Interest, Taxes and Depreciation
EIRR:	Economic Internal Rate of Return
KML:	Kimani Minerals Ltd
IRR:	Internal Rate of Return
LME:	London Metal Exchange
MADC:	Matundasi ASM Development Co. Ltd NPV: Net Present Value
O&M:	Operation and Maintenance
OPEX:	Operating Expenditure
Oz	Troy Ounce (equivalent to 31,103 grams)
PSM	PaulSam Geo-engineering Company Ltd
RoE:	Return on Equity
RoI:	Return on Investment
ROM	Run of Mine
TFS	Tanzania Forest Services
TSF	Tailings Storage Facility
TZS:	Tanzania Shilling
VAT:	Vessel for liquid holding and leaching



## Disclaimer

The information provided in this study is confidential and intended for the exclusive use of aimed recipients. The recipient may transmit the information contained in this study to its directors, officers, employees or professional advisors provided that such individuals are informed by the recipient of the confidential nature of this report.

The author and indeed PSG does not claim that contents of the study are all exhaustive in all details but rather presenting a fair view of the proposed MADC gold mining project. Ordinarily, the recipients are expected to carry independent due diligence to satisfy their evaluation criteria when deciding to support the MADC gold mining project.





## Section One

### 1. BACKGROUND

#### 1.1. PaulSam Geo-engineering Co. Ltd (PSG)

PSG is among leading local consulting firms in the construction and mining industries providing services ranging from mineral exploration, mining engineering, mineral processing, geo-technical engineering, environmental studies, social and resettlement studies. The company is well known for technical feasibility studies in fossil fuel energy, environmental impact assessment studies as well as due diligence studies in Tanzania.

Founded in May 2005 in Dar es Salaam, PSG is a wholly owned company by Eng. Dr. Samuel G. Mafwenga, Eng. Paul S. Gongo and Eng. Benedict A. Mushingwe all being registered and highly experienced mining engineers in Tanzania. Eng. Dr. Samuel G. Mafwenga and Eng. Paul S. Gongo worked as lecturers at the University of Dar es Salaam and consultants for various multi-national companies in Tanzania and neighbouring countries.

Owing to PSG knowledge and experience in the sector, the company is acclaimed for exemplary services rendered to local as well as international companies operating in the region such as Total East Africa Midstream BV of France, Peak Resources of Australia, Lahmeyer International of Germany, Arab Contractors of Egypt, Hydro China Huadong of China, Barrick Gold of Canada and Uranex of Australia. Others local companies include MM Integrated Steel Mills, Tanga Cement Company, Mbeya Cement Company, Kiwira Coal



Mine, Tanzanite One Ltd, MMG Gold Ltd, Green Resources Ltd, Canaco Ltd, East African Crude Oil Pipeline, JV of Arab Contractors and Elsewedy Electrics, Bulyankulu Gold Mines and many others. To all these, PSG provided highest standard of environmental, engineering consulting and project management services.

PSG works and collaborates with the Ministry of Energy, Ministry of Minerals, The National Council for Technical Education, State Mining Corporation, National Development Corporation and University of Dar es Salaam. To all these, PSG professionals have researched, designed, built and operated their projects notably gold mines, coal mines, industrial mineral complexes as well as quarries.

## **1.2. Matundasi ASM Development Co. Ltd. (MADC)**

In 2008, PSG shareholders established Matundasi ASM Development Co. Ltd. (MADC) and immediately acquired a closed gold mining operation from the Ministry of Energy and Minerals (by then) located at Matundasi Village, 95 kms Northwest of Mbeya City at Chunya District, Mbeya Region.

MADC is wholly owned by PSG shareholders as a company specialising in mining projects mostly gold, industrial minerals, coal and quarries. A sister company, Kimani Exploration and Geotechnical Services Ltd (KEGS), also wholly owned by PSG shareholders is a professional Exploration and geo-technical drilling company undertaking survey of engineering characteristics of soils and rocks for construction of large structures and infrastructural projects.

After acquiring the gold mine at Matundasi, MADC rehabilitated the mine and was encouraged by the high-grade ores inside the mine and within the licenses and also large stockpiles of tailings in the area, which when assayed indicated grades in the range of 1.5 – 3.0 g/t. This prompted MADC to develop the underground mine and allied facilities and infrastructure to start production of gold.

MADC has other mineral tenement in the Chunya District which will be developed concurrently with the Matundasi Underground Gold mine. This is the Mkwajuni tenement located some 20 kms Southwest of the Matundasi Gold project. This tenement measuring 10 sq. km is under application for a Mining License. Significant mineralized targets have been identified in the license area, which will be developed for mining. Gold ore mined from the



Mkwajuni license area will be transported by trucks to the Matundasi site for central processing to produce gold.

### 1.3. The MADC Feasibility Study

The purpose of this feasibility study is to determine the financial and economic viability of the resolve to expand and modernise all MADC mining sites (Matundasi and Mkwajuni) to support a daily processing capacity of 240 metric tons of blended run-of-mine ore at an average grade of 6.0 g/ton.

The study is referred to as a Bankable Feasibility Study (BFS) due to its focus on financial and economic aspects addressed to Banks and Financial Institutions as well as other prospective investors as reference document for extending support to the MADC project.

The study evaluates production and revenue streams from sale of gold at 85% purity against major cost outlays categorised as:

- Capital Costs (CAPEX) comprising mine specific investment costs, plant and machinery, custom duties, port charges and fees, preliminary expenses and how the costs are proposed to be funded.
- Operating Costs (OPEX) comprising mining and processing expenses, overheads, financial and capital charges.

Economic and commercial pointers (such as national and international inflation, exchange rate fluctuation, commodity markets, etc.) and other external factors that may affect the MADC project are also assessed.

The BFS considers that the site works will begin on securing funds from Banks and Investors likely by the third quarter of 2022 and that all initial investments (construction of new pits, procurements, civil, mechanical, electrical works etc) will be carried out from late 2022 to mid 2023. Prudentially however, the study considers commencement of full commercial production in early 2024. The span of the evaluations is based on the design life of the proposed processing plant (10 years).

Emerging from the financial and economic analyses, the study recommends Bank financing of the MADC project to achieve the envisaged benefits and high returns. Detailed technical and



engineering aspects of the project are freely available on request from PSG as they form the basis of key assumptions of this report, recommended to be read together.



## Section Two

### 2. EXECUTIVE SUMMARY

#### 2.1. MADC Gold Mines Resources:

	License Area (Hectares)	Annual Run of Mine (Tons)	Potential Gold Recovery (Kgs)
Matundasi	161.99	504,000	3,024
Mkwajuni	170.00	216,000	1,296
Total	331.99	720,000	4,320

#### 2.2. Capital Investment:

	Local	Foreign	Total
Land and Civil Works	\$3,755,157	\$0	\$3,755,157
Plant and Equipment	\$1,749,082	\$2,022,160	\$3,771,242
Furniture and Fittings	\$230,481	\$0	\$230,481
Motor Vehicles	\$464,045	\$565,000	\$1,029,045
Pre-Operational Expenses	\$690,227	\$0	\$690,227
Total Capital Investment	\$6,888,992	\$2,587,160	\$9,476,151

#### 2.3. Financing Plan:

	Local	Foreign	Total
MADC Equity	\$3,119,413	\$0	\$3,119,413
Bank Loans	\$3,769,578	\$2,587,160	\$6,356,738
Total Financing	\$6,888,992	\$2,587,160	\$9,476,151

#### 2.4. Financial Attractiveness:

	2024	2025	2026
Net Sales Revenue	\$15,974,902	\$16,973,333	\$17,971,764
Cost of Sales:	\$7,097,633	\$7,526,235	\$7,954,837
Gross Profit:	\$8,877,268	\$9,447,098	\$10,016,927



Operating Expenses:	\$4,627,300	\$4,627,300	\$4,627,300
Operating Profit:	\$4,249,968	\$4,819,798	\$5,389,627
PaulSam Management Fees:	\$691,745	\$750,190	\$808,634
Profit After Management Fees	\$3,558,223	\$4,069,608	\$4,580,993
Financial & Capital Charges:	\$1,629,288	\$1,503,249	\$1,503,249
Profit Before Tax	\$1,928,935	\$2,566,359	\$3,077,744
Cash Balance	\$1,399,172	\$4,310,510	\$5,635,668
Net Worth	\$5,107,394	\$6,903,846	\$9,058,266

## 2.5. Ratio Analysis (8 years average):

EBITDA	20%
Internal Rate of Return	30%
Return on Investment	36%
Pay Back Period	2 <sup>1</sup> / <sub>2</sub> Years
Debt Service Coverage	0.90
Security Cover	1.55

## 2.6. Borrowed Funds:

Amount:	\$6,356,738
<u>Security:</u>	1 <sup>st</sup> Charge on all deposits, immovable and movable assets and Insurance cover of all assets in the name of Bank
<u>Use of Loan:</u>	
Financing Cost Components of the Expansion Scheme	



## Section Three

### 3. THE MADC PROJECT

#### 3.1. Objective of the Project

The project envisages expansion and modernisation of the MADC gold production capacity to mine and process daily about 240 tons of run-of-mine ore (6 grams/ton) in order to be produce an average of 1.22 kgs of gold at 92% purity.

#### 3.2. Project Location and Sites

MADC holds mining rights and other licenses at Kungutas site as the head office and also as the main mining and gold processing area. The other prominent site is the Mkwajuni mineral right located some 20 kms from the Matundasi area.

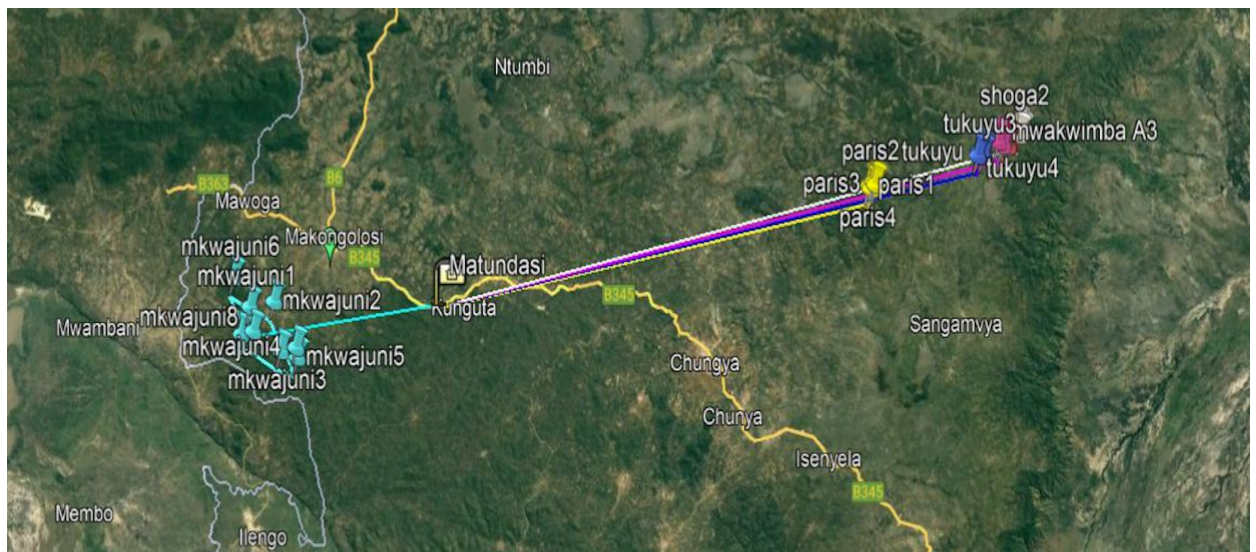


Figure 1: MADC Mining Sites

##### 3.2.1. Matundasi

Matundasi is accessible from Mbeya via the Mbeya-Chunya-Makongolosi paved road about 95 km to Kunguta village outside Matundasi township.

The climate at Chunya is generally classified as tropical with precipitation highest from November to April with highest rainfall average of 778mm in January and lowest of 3.99mm in August. July



is the coldest month with temperatures averaging 10°C while the hottest month is October reaching 28°C.

Most of the roads in Chunya District and particularly from Matundasi site to other mining sites are accessible throughout the year albeit the frequent heavy downpours in between December and February. The climate is generally not a major hindrance to mining and transportation activities thus the assumed prudential operating period of 300 days as a full operation year is realistic.

MADC holds 19 PMLs measuring 162.00 Hectares at Kunguta village with no. 0019678 – 0019688; 0019691-0019693; 0019695 – 0019697; 0018255SWZ and 0017581 explored to an indicated resource estimate level.

	<b>PML19678</b>	<b>PML19679</b>	<b>PML19680</b>		<b>PML19681</b>	<b>PML19682</b>
	<b>PML19683</b>	<b>PML19684</b>	<b>PML18255SWZ</b>	<b>PML19687</b>	<b>PML19685</b>	<b>PML19686</b>
<b>PLM19697</b>	<b>PML19688</b>		<b>PML19690</b>		<b>PML19692</b>	<b>PML19691</b>
	<b>PML19693</b>				<b>PML19696</b>	<b>PML17581</b>

Figure 2: Matundasi Sites PML's

At Matundasi site, MADC mining activities are guided by seventeen boreholes dipping between 45° and 60° to depths ranging between 70m to 150m. Drilling results at Matundasi site gaga reef proved to have an average rock density of the sulphide reef of 2.6 tons/cum; average grade of mineralization of 12grams/ton and in some intersections above 20grams/ton.

Considering a strike length of 200m of the mineralised reef of 1.2 m wide and a mining depth of 100m using the existing shaft, the resource estimate at the active area is put at 748 kgs of gold [calculated as 100m x 1.2m x 200m x 2.61 t/cum x 12g/t]/1000g/kg = 748 kgs ] or 24,148 troy ounces worth approximately US\$29 million.



### 3.2.2. Mkwajuni:

It is envisaged to open another underground mine at Mkwajuni site concurrently as the Matundasi underground mines are being developed. The ore will be transported by 30-tonne dumping trucks to Matundasi plant for processing of the gold ore.

The licensed area is fairly undulated with tropical vegetation on red clay soil. The areas is essentially woodland characterized by scrub forests with secondary grassland hence not challenging in developing an underground and transportations of mined ore to Matundasi plant at Kungutas.

The Mkwajuni site will be a fully-fledged underground mining operation equipped with modern hoisting systems with two shafts, expected to produce about 100 tons of ore at 6g/t per day. Infrastructural development at Mkwajuni will include access roads of about 10-km, power generation plant (generator), dewatering systems, weigh bridge, a camp office and accommodation site, fuel storage, packing sheds, workshop and security fencing at strategic areas. Main equipment will include underground facilities, compressors, hand held drill rigs, etc., and dump trucks for haul of ore to Matundasi.

For the purposes of estimating the ore resource, induced polarization surveys followed by core drilling have already been conducted at Matundasi and Mkwajuni sites.



### 3.3. Technical Aspects:

#### 3.3.1. Production Process

At Matundasi site, the main MADC mine, an exploratory shaft has been constructed now to a depth of 60 meters against a target of 200 meters. The shaft at Matundasi constitutes typical underground mining method for accessing ore and transporting it out for gold processing and recovery. Similar shaft will be developed at Mkwajuni and will altogether contribute blended ore demand to the Matundasi processing plant.

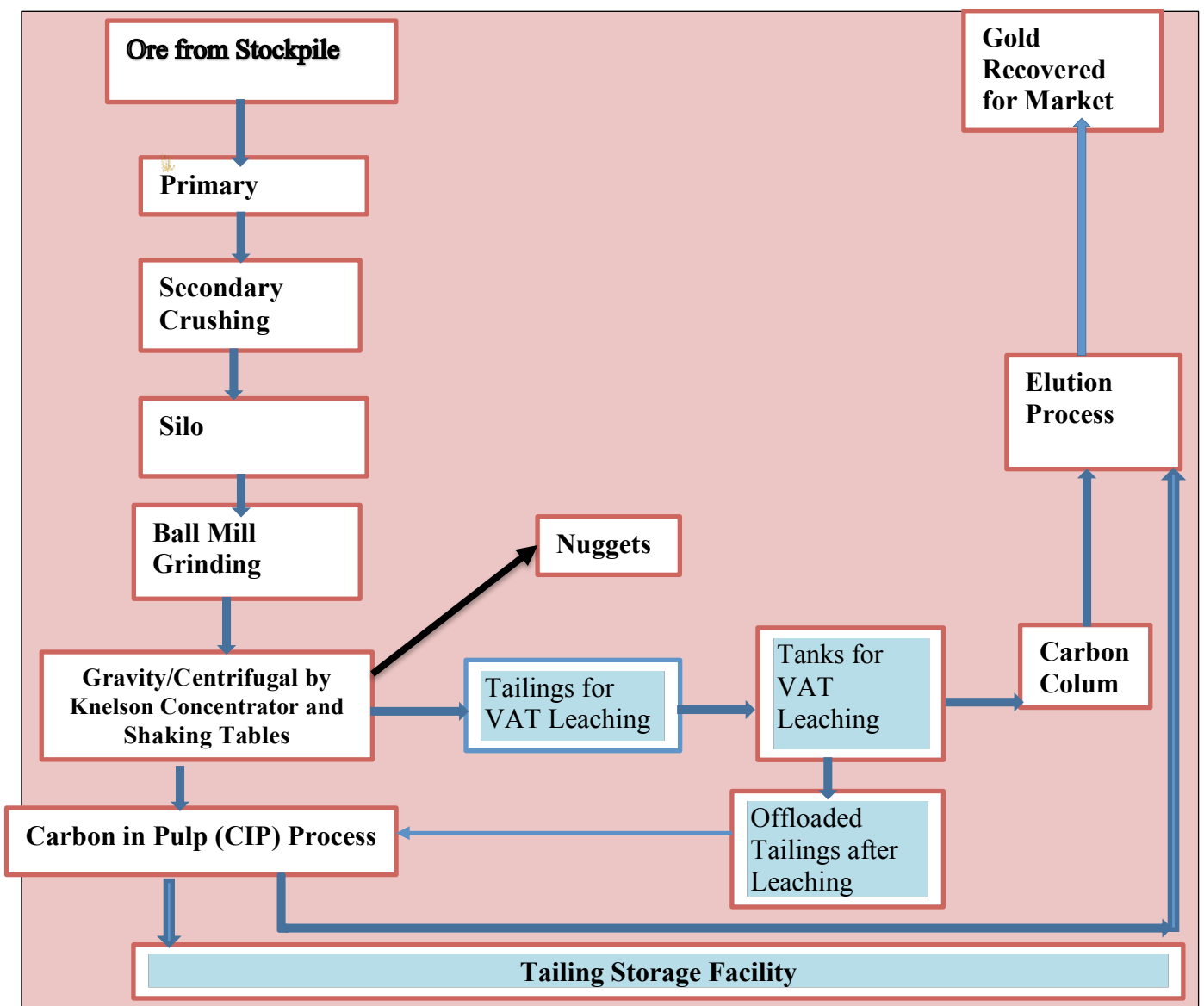


Figure 3: Production Process



MADC ore comes from commercial hard rock mining operations whereby gold is extracted from the rock where it was originally deposited. Run of mine ore from all the mines will be stockpiled to the Matundasi site close to the processing plant. As seen above, the blended ore from stockpile at Matundasi will be loaded to primary jaw crusher which allows only certain crushed size to pass through to the secondary jaw crusher which will also allow certain size to pass through to a silo bin for feeding to the grinding process by a wet ball mill. Ore from the ball mill in the form of slurry containing both concentrate and tailing contents necessitating improvisation of either Knelson concentrator (centrifugal method) or shaking table (gravity method) to separate and capture nuggets while the rest of the slurry will be leached as tailings by CIP method as well as the Vat system

### **3.3.2. Leaching and Adsorption:**

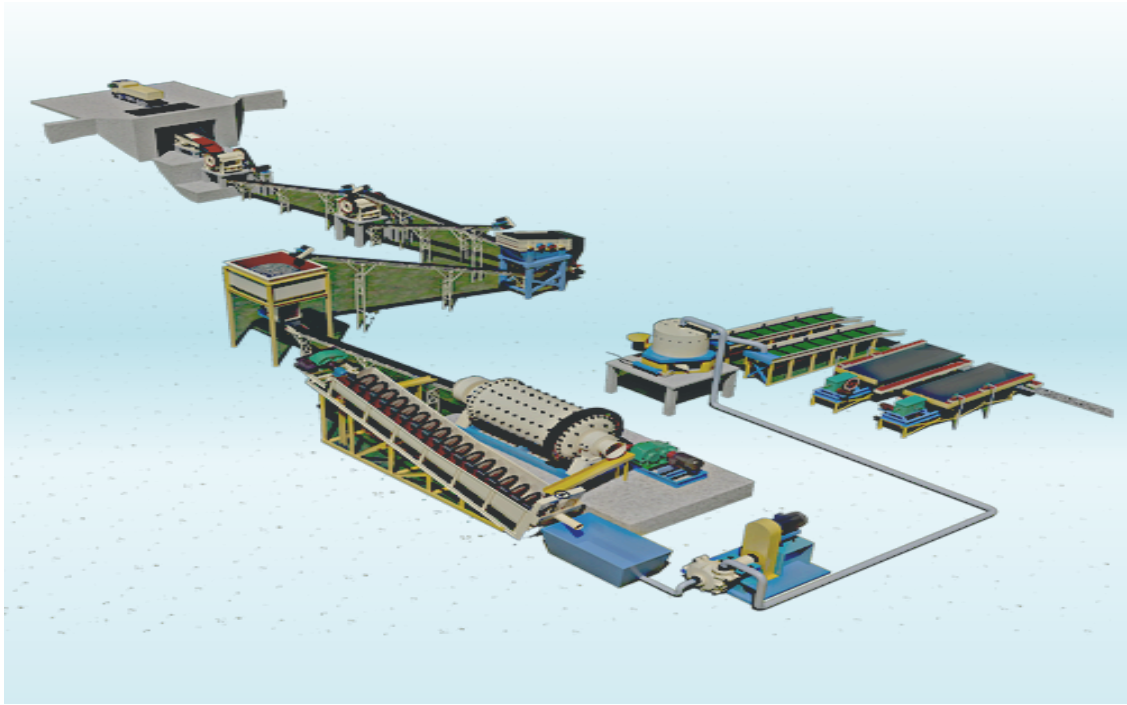
It is intended to use modern CIP (carbon in pulp) process whereby, the slurry flows into 8 sets of double impellers leaching tanks where well-mixed sodium cyanide agents are added at the first tank followed by activated carbon, which is added at the second to the eighth tank. Activated carbon from the second agitator is fed to carbon screen to get gold-loaded carbon and after cleaning, the gold-loaded carbon enters the desorption and electrolysis stage while the slurry left goes back to the second tank. Activated carbon is lifted from the tank while tailings flow through safety screen so as to recycle fine-size gold-loaded carbon before flowing to tailings water treatment stage.

### **3.3.3. Tailings Water Treatment:**

The tailings are lifted to the filter press and the filter cake obtained is transported by belt conveyor or trucked to the tailings yard, while filter liquor flows to circulating water tank for recycling, which helps save sodium cyanide and other chemicals.

### **3.3.4. Gold-Loaded Carbon Treatment:**

At the existing elution plant, gold-loaded carbon is processed by desorption and electrolysis equipment in batches to get gold-dust. The gold-dust goes to gold melting furnace and turns to gold bar or nugget ready for immediate sale at the Chunya Gold Auction Mart under Government supervision.



## Section Four

### 4. MATUNDASI EXPANSION SCHEME:

#### 4.1. The Expansion Plan



The proposed MADC expansion scheme entails further geological explorations at all sites to determine resource base further and inform mine development plans. Geological explorations and mine development will be a continuous activity at MADC.

Other activities will entail development of underground mining infrastructure which has already started at a modest scale at Matundasi to be followed by Mkwajuni the overall target being to deliver a minimum of 240 tons blended rom ore (6g/t) to the MADC processing complex at Matundasi site.

Achieving the estimated throughput will entail acquisition and development of new and more efficient underground mining and material handling infrastructure, construction of freshwater system as well as tailings storage facility (TSF), rehabilitation of existing processing plant and acquisition of a new CIP plant at Matundasi site, construction of site houses and peripheral security fences at all sites, all constituting about 39% of total project cost.

Other investments will include acquisition of mining yellow equipment, transportation equipment, supporting working tools, acquisition of new CIP leaching facilities as part of the new processing plant at Matundasi site as well as utilities all estimated to constitute 39% of project cost.

The expansion scheme will entail also human capacity development by engaging efficient technical personnel, training supervisors, maintenance crew, plant operators as well as skilled mine-front workers. The scheme will call for engaging efficient administrative personnel especially in financial, audit, procurement, logistics as well as IT and security.

#### **4.1.1. Capital Investment**

The capital cost outlay for MADC expansion and modernisation project is currently estimated at US\$ \$6.36 million made up of the cost of rehabilitation of Matundasi mine, establishing new pits at Matundasi and Mkwajuni and acquisition of new CIP processing plant.

Capital outlay will also include the cost of new mining equipment, earth moving equipment, transportation facilities, electrical and supporting facilities.

Preliminary cost outlay items comprise all pre-operational expenses associated with the expansion project as well as resources mobilization expenses, pre-operational financial charges, and human resource recruitment costs.



	<b>Existing</b>	<b>Additional</b>	<b>Total</b>
<b>Land and Civil Works</b>	\$2,201,865	\$1,553,292	<b>\$3,755,157</b>
<b>Plant and Equipment</b>	\$728,902	\$3,042,339	<b>\$3,771,242</b>
<b>Furniture and Fittings</b>	\$30,481	\$200,000	<b>\$230,481</b>
<b>Motor Vehicles</b>	\$105,665	\$923,380	<b>\$1,029,045</b>
<b>Pre-Operational Expenses</b>	\$52,500	\$637,727	<b>\$690,227</b>
<b>Total Capital Investment</b>	<b>\$3,119,413</b>	<b>\$6,356,738</b>	<b>\$9,476,151</b>

#### 4.1.1.1. Land and Civil Works

Land costs include expenses associated with titling the sites and mining licenses, environmental impact assessment (EIA) for all sites and fees charged by the Tanzania Forest Services (TFS) since the sites are in forested areas.

Civil works will consist mainly vegetation and granite boulders removal, unpaved roads and earth, drains creation alongside roads, buildings, platforms construction, concrete shallow foundations of electrical and main processing equipment.

As part of civil works will be water supply through wells and some of the water will be pumped to treatment plant for domestic use. Perimeter security will be part of civil works to be done by steel and wire fence topped with barbed wire as well as industry-standard CCTV system:

Civil works will also include costs for development of Mkwajuni underground mine and ongoing expansion of Matundasi underground mine.

MADC civil works costs will include real estate development at all sites which will include offices, accommodation units, warehouses, security posts and weigh bridges. Others will include costs for construction of a tailings storage facility (TFS) at Matundasi.

To ensure high standards of workmanship, it is recommended to implement the civil works under EPC contract arrangement for main and sub-contracts including underground infrastructure, mining shafts and hoisting equipment installation, electrification, underground air supply, water network etc.

#### 4.1.1.2. Plant and Machinery



For efficient underground mining activities, main plant and machinery will include drum and auxiliary hoists, electric scraper (slusher) hoists, air compressors, booster compressors, airleg drills, sinker drills, hydraulic drifters, grouting plants (cement and rock bold).

Underground mining equipment will also include rail cars towed by air powered winch tuggers (heavy duty and portable), battery chargers, cap lamps, underground communications system, self-rescuer respirators, axial fans and steel cache self-rescue assembly units for six persons. Others will include, electricity generator, compressors, jack hammers and accessories, which will be deployed in all the underground mining sites.

At Matundasi site, plant and equipment costs will include cost of rehabilitating the existing gold processing plant, acquisition, and installation of a new gold processing plant to process 240 tons rom ore per day, electricity generator, compressors, and accessories.

For planning purposes, it is expected to acquire Chinese gold processing facilities from reputed and reliable manufacturers. The popular CIL Processing plant by Shandong Xinhai Mining Technology & Equipment Inc has been used in the study for evaluation purposes due to simplicity, low installation and assembly cost and high gold recovery from the ores.

Other costs will be associated with office and workshop tools including IT facilities, welding equipment and tools, mechanical and electrical workshop equipment and tools, tyre service equipment and tools, diagnosis and testing facilities.

To ensure supply of utilities, the expansion scheme will also entail investment in water supply, storage and distribution system, fuel filling station at Matundasi site.

Under the proposed contract, specifications for these facilities will be determined and sourced by the contractor in collaboration with PSG. The contract will include responsibility for procurement, installation, testing and commissioning of all facilities. The contract will also carry responsibility for training MADC personnel in operation and maintenance of the new plant and machinery.

#### 4.1.1.3. Motor Vehicles

Motor vehicles recommended for the purpose of the study will include popular and proven brands in Chunya mainly the Chinese Shacman H3000 tractors, Shacman F3000 tippers, CIMC tipping trailers, Shacman lowbed semitrailer, light weight vehicles and field vehicles.



#### 4.1.1.4. Furniture and Fittings

The expansion scheme will entail acquisition of modern Office Furniture, fixtures, and fittings along with domestic and canteen facilities.

#### 4.1.1.5. Preliminary Expenses

The expansion scheme Development Expenses will include licensing costs, consultancy fees, legal and documentation fees, pre-operational interest, value added tax (VAT) and miscellaneous development expenses.

### 4.1.2. Financing Plan

It is intended to finance the cost of the expansion scheme through equity funds as well as loans:

	Existing	Expansion	Total	
Equity	\$3,119,413	\$637,727	\$3,757,140	40%
Loans	\$0	\$5,719,011	\$5,719,011	60%
<b>Total</b>	<b>\$3,119,413</b>	<b>\$6,356,738</b>	<b>\$9,476,151</b>	<b>100%</b>

#### 4.1.2.1. Equity

The investors have funded the project from inception to-date and are intending to part finance the expansion scheme particularly expansion cost components that might not attract loan funding such as local cost components of imported items, local fees and levies as well as pre-operational expenses.

#### 4.1.2.2. Loans

It is intended to approach Banks and Financial Institutions to raise long term loan denominated in foreign currency for financing the expansion scheme. The proposed loan will be denominated in foreign currency since the Matundasi gold produced will be sold entirely in foreign currency

It is expected to secure a 5-year loan with 2-year moratorium, repayable in 6 equal half yearly instalments. It is expected that the loan will carry competitive foreign currency based interest rate, currently lower than 8% per annum on outstanding balance serviced in foreign currency.

The loan servicing schedule will be as follows:



	2024	2025	2026	2027	2028
Opening Balance	\$5,719,011	\$5,719,011	\$5,719,011	\$3,812,674	\$1,906,337
Interest 8% P.A	\$457,521	\$457,521	\$457,521	\$305,014	\$152,507
Repayment	\$0	\$0	\$1,906,337	\$1,906,337	\$1,906,337
Closing Balance	\$5,719,011	\$5,719,011	\$3,812,674	\$1,906,337	\$0

### 4.1.3. Operating Assumptions

#### 4.1.3.1. Capacity Utilisation Assumptions

The evaluation of MADC project is based on envisaged daily production target of 1.22 kgs of gold with 92% purity, entailing mining, delivery and feeding of 240 tons ore (6g/t) to the MADC processing complex at Matundasi site.

It is planned to operate the processing plant for 330 days per year allowing for maintenance time, statutory holidays and other unforeseen events. Considering the time needed for capacity building in mining, material handling, processing and efficiency of other support activities, the evaluation assumes that the MADC complex will start at a conservative capacity utilisation level of 80% of the installed capacity during the first year rising to 85% during the second year and 90% from the third year onwards summarised as follows:

		Daily	2024	2025	2026
Capacity Utilisation			80%	85%	90%
Number of Days (330 days/year)			330	330	330
Ore Mined (at average grade of 6.0 g/ton)		240	79,200	79,200	79,200
Gold Produced	Grams	1,440.00	380,160	403,920	427,680
Gold Recovery at 85%	Kgs	1.22	323.14	343.33	363.53

#### 4.1.3.2. Revenue Assumptions and Estimates

Due to its intrinsic value, gold is transparently purchased and sold under strict regulations and supervision overseen by the Government of Tanzania. This is mainly to ensure compliance and full Government revenue collection.



By law, before loading of carbon at elution plant along with nuggets, permission must be obtained from the Government through the Ministry of Mines (Madini) who would visit and immediately set seal at the carbon column and 24 hours thereafter, a team of Madini and State Security officials would return to verify if the seal was not tampered with before allowing opening of the column.

All stages to production of raw gold will be undertaken at the elution plant area under watchful eye of Government and on completion, the final package would be sealed, registered and allowed to go for auctioning within a period of 12 hours.

MADC has a reliable master dealer who handles all auctioning activities and secures the best price for MADC consignment and pays direct to the MADC account after deducting Government levy/royalty and other fees. MADC however, is processing a master dealers licence to enable direct export of Matundasi gold to international markets.

The price of gold fluctuates as it is guided by market variables including the demand and supply of gold, futures market, rate of inflation, value of major currencies mainly USA Dollar where currently the Federal Reserve stance is to sap gold as a safe-haven hence rising demand. Evaluation of the expansion project is based on current published price at 22k gold at Chunya mineral auction mart of US \$ 53,248 per Kg. or \$1,656 per troy ounce which is lower than LME spot price of \$1,843 per troy ounce of 22k gold, a competitive discount rate of about 10% below LME.

	Daily	2024	2025	2026
Gold recovery at 85% (kgs)	1.22	323.14	343.33	363.53
Chunya published price (22k purity)	\$53,248	\$53,248	\$53,248	\$53,248
Gross sales revenue:	\$65,175	\$17,206,213	\$18,281,601	\$19,356,989
Selling and freight costs	1.2%	\$211,636	\$224,864	\$238,091
Royalty	6.0%	\$1,019,675	\$1,083,404	\$1,147,134
Net sales revenue	\$60,511	\$15,974,902	\$16,973,333	\$17,971,764

#### 4.1.3.3. Running Cost Assumptions and Estimates

MADC running expenses are categorised into mining, bulk transportation, processing, elution and sales expenses.



Running costs assumptions are based on experience gained thus far running the Matundasi site. The costs are based on current rates for utilities, consumables and labour summarised as follows:.

MADC Running Costs:		2024	2025	2026	
<b>Raw Ore Production</b>		79,200	79,200	79,200	
Capacity Utilisation		80%	85%	90%	
Total Production		63,360	67,320	71,280	
<b>Mining Costs:</b>					
Drilling, Blasting, Excavation, Loading, Hoisting, Dumping	\$/Ton Mined	\$50	\$3,168,000	\$3,366,000	\$3,564,000
Delivery Cost to Matundasi Plant	75% Mining Cost	\$38	\$1,782,000	\$1,893,375	\$2,004,750
<b>Processing Expenses:</b>					
Diesel, Wear Parts, Spares and Maintenance	\$/Ton Mined	\$12	\$764,694	\$812,488	\$860,281
Additional Exploration			\$200,000	\$200,000	\$200,000
Miscellaneous		20%	\$1,182,939	\$1,254,373	\$1,325,806
<b>Total Cost of Sale</b>			<b>\$7,097,633</b>	<b>\$7,526,235</b>	<b>\$7,954,837</b>

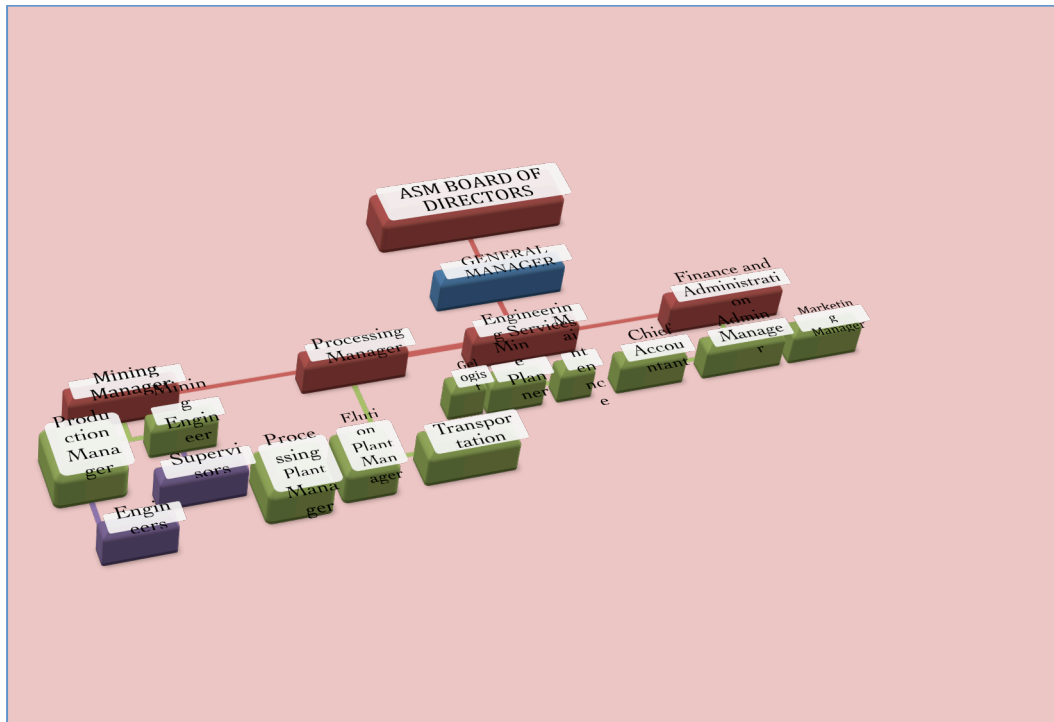
#### 4.1.4. Organization Structure and Management

##### 4.1.4.1. Organisation Structure

MADC is organised under a Board of Directors made up of shareholders of the company. The daily activities of the company are overseen by a General Manager with vast experience in gold mining, management and trading.

Operations of the company are categorised into operations and administration. The operations activities are grouped into mining, processing, and engineering services departments all headed by department managers. Administration activities are grouped into finance and administration headed by managers.

At optimal operation, MADC has potential to employ about 200 people in the various sections emerging among lead employers in Chunya.



#### 4.1.4.2. Human Resource Cost

MADC offers competitive salaries and wages in the bid to attract and retain skilled and efficient labour force in Chunya. The estimated wage bill is 20% of gross sales turnover and is three times higher than administrative overheads demonstrating MADC employment creation emphasis. The mine front employees, after attending tailored training at the Matundasi training centre, earns a salary of \$300, almost twice the statutory minimum wage, not obtained in other mines.

Together with statutory payroll payments and allowances, the company intends to spend about 10% of its wage bill towards social welfare including medical support, establishing voluntary savings and credit schemes, sports and others.

#### 4.1.5. Management Overheads

Overhead expenses related to MADC operations range from head office support services in Dar es Salaam, rent, directors' fees, board expenses, procurement expenses, travelling, transport, printing and stationery, telecommunication, licenses, legal and audit fees, to canteen and medical expenses. Overhead expenses are based on experience gained at Matundasi over the past years.



	Monthly	2024	2025	2026
Head Office Expenses	\$8,333	\$100,000	\$100,000	\$100,000
Office Rent and Other Costs (Dsm Office)	\$1,750	\$21,000	\$21,000	\$21,000
Directors Fees and Board Expenses	\$3,333	\$40,000	\$40,000	\$40,000
Procurement Expenses	\$6,667	\$80,000	\$80,000	\$80,000
General Transport and Patrol Costs	\$10,000	\$120,000	\$120,000	\$120,000
Travelling	\$5,000	\$60,000	\$60,000	\$60,000
Printing & Stationery	\$2,500	\$30,000	\$30,000	\$30,000
Postage & Communication	\$2,500	\$30,000	\$30,000	\$30,000
Medical & Staff Welfare	\$5,000	\$60,000	\$60,000	\$60,000
Canteen and Accommodation Expenses	\$16,667	\$200,000	\$200,000	\$200,000
Audit, Legal & Secretarial Services	\$4,167	\$50,000	\$50,000	\$50,000
Overhead Expenses	\$8,333	\$100,000	\$100,000	\$100,000
Licenses, Fees and Donations	\$16,667	\$200,000	\$200,000	\$200,000
Miscellaneous 20%	20%	\$218,200	\$218,200	\$218,200
Total Sales and Admin. Exp.		\$1,309,200	\$1,309,200	\$1,309,200

#### 4.1.6. Working Capital Requirement

##### 4.1.6.1. Stocks:

To support MADC operations, the company will maintain stocks of essential mining and processing materials and consumables. Based on experience, it is intended to maintain a stock of vital materials to sustain 30 days of operations. Also, part of stocks will be the gold in various stages of processing. As a master dealer, MADC will keep stock of gold for export after the auctioning process is completed.

##### 4.1.6.2. Debtors

It is expected that after auction, master dealer's gold will be sold online to reliable foreign buyers, a logistical process that may require time to effect delivery of gold to the buyer and full remittance thus the necessity to make provision for debtors, for which MADC is providing 10 days sales as receivables.



#### 4.1.6.3. Creditors:

On the other hand, MADC will enjoy credit services in form of consumables, utilities, salaries and wages as well as overheads for 30days.

The assumptions point to a net working capital requirement of US\$ 1,575,491 during the first year of operation increasing by \$122,069 during the second and third years of operation. It is expected to finance the initial working capital requirement through Bank Overdraft facility to be raised from the main Banker. It is further assumed that the facility will charge interest at 8% instead of the market rates since the repayment will be in foreign currency proceeds from sale of gold and will be secured along with the long-term loan.

	DA YS	2024	2025	2026	2027
<b><u>STOCKS:</u></b>					
MINING & PROCESSING	30	\$393,26	\$417,84	\$442,42	\$442,42
CONSUMABLES		9	9	8	8
GOLD IN REFINERY PROCESS	10	\$236,58	\$250,87	\$265,16	\$265,16
REFINED GOLD	15	\$798,74	\$848,66	\$898,58	\$898,58
		5	7	8	8
		<u>\$1,428,6</u>	<u>\$1,517,3</u>	<u>\$1,606,1</u>	<u>\$1,606,</u>
		<u>02</u>	<u>90</u>	<u>78</u>	<u>178</u>
<b><u>DEBTORS:</u></b>					
GOLD SALES	10	\$532,49	\$565,77	\$599,05	\$599,05
		7	8	9	9
SUB TOTAL		<u>\$1,961,0</u>	<u>\$2,083,1</u>	<u>\$2,205,2</u>	<u>\$2,205,</u>
		<u>99</u>	<u>68</u>	<u>36</u>	<u>236</u>
<b><u>CREDITORS:</u></b>					
ADMINISTRATIVE COSTS	30	\$100,00	\$100,00	\$100,00	\$100,00
SALARIES & WAGES	30	\$285,60	\$285,60	\$285,60	\$285,60
		0	0	0	0
		<u>\$385,60</u>	<u>\$385,60</u>	<u>\$385,60</u>	<u>\$385,60</u>
		<u>8</u>	<u>8</u>	<u>8</u>	<u>8</u>
NET WORKING CAPITAL		\$1,575,4	\$1,697,5	\$1,819,6	\$1,819,
		91	59	28	628
INCREASE IN WORKING CAPITAL		\$1,575, 491	\$122,06 9	\$122,06 9	\$0



#### **4.1.7. Implementation Schedule**

The MADC strategy is to constantly expand mining areas, mining capacity and processing capacity over the years by steadily expanding underground mining activities at Matundasi and Mkwajuni, opening the other sites and securing more advanced processing facilities assuring recovery up to 95%. These will improve financial performance significantly allowing MADC to build its internal capacity to develop, finance, manage and operate a significantly bigger gold mining operation.

Strategically, MADC is aiming at implementing the other phases of 240 tons after the initial five-year period to reach 480 tons per day, considered as a medium scale plant at Chunya.

It is recommended to build the processing plant through an Engineering Procurement and Construction (EPC) Contract to enable transfer of technology while allowing continuation of regular operations by MADC during the construction period.



IMPLEMENTATION SCHEDULE	Months	2022												2023												2024
		jun	jul	aug	sep	oct	nov	dec	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	jan					
Approval by Bank Board	3	CONSULTANT																								
Documentation	2				LEGAL			Dec																		
Disbursement of Funds	1						PSM																			
Recruit EPC Contractor and sub-contractors	2							PSM																		
Ordering and Confirmation of L/cs	1							PSM																		
Shipping to Delivery DSM	2								PSM																	
Clearing & Delivery	1									PSM																
Contingency	2																									
Recruitment and Training	2												PSM	EPC												
Real Estate and Landed Assets	7																									
Installation of Processing Plant Matundasi	3																									
Underground Mine Development Matundasi, Mwakwimbi, Tukuvu, Paris and	6																									
Open Pit Mining Activities Mkwajuni	3																									
Fresh water storage dams	1																									
VAT Leaching Tailings dams	1																									
Waste Water Dam	1																									
Trial Run	2																									
Hand Over to MADC	1																				MADC					
Full Commercial Operation																					MADC					



## Section Five

### 5. MARKET ANALYSIS

#### 5.1. Gold in the Tanzania Economy

The National Bureau of Statistics (NBS) recently released its Economic Report for The Quarter ending December 2021 where the Tanzania's Gross Domestic Product (QGDP) in absolute terms increased to TZS 43.4 trillion up from TZS 40.4 trillion recorded in the corresponding quarter in 2020 QGDP. NBS forecasts that in 2022, GDP growth will reach 5.2%

Economic activities that significantly contributed to the growth include Agriculture (23.2%), Construction (12.5%), Trade and Repair (9.0%); Manufacturing (8.4%), Mining and Quarrying (6.4%); Public Administration (5.8%); and Finance and Insurance services (5.6%).

Apart from the significant contribution to the growth of Tanzania economy, mining contributed more than 50% of the country's total exports, of which a large part came from gold. Tanzania is now the fourth-largest gold miner in Africa after South Africa, Mali and Ghana

The country gold reserve is estimated at 45 million ounces, with potential to generate revenue of over \$70 billion at current prices.

The long-term national plan is to increase mining sector contribution to DGP to at least 10% by 2025 entailing among others, increase in investments in exploration and exploitation, beneficiation and local value addition.

#### 5.2. Tanzania Gold Production

Gold exploration and exploitation was concentrated mostly on the greenstone belt around Lake Victoria where gold mining is undertaken by international conglomerates, medium scale, small scale and artisanal miners. Exploration efforts countrywide in recent years by the Ministry of Minerals has indicated prospects in many parts of Tanzania thereby opening activities in almost all zones.



Among operating and licensed companies, the bulk of gold is supplied by Bulyanhulu Gold Mine, Buzwagi Gold Mine, North Mara mine, all being owned by Twiga Minerals Ltd, a JV company between Barrick Gold of Canada and the Government of Tanzania. Others are Strandline Resources Limited, Geita Gold Mine, Golden Pride Gold Mine, Kirondatal Gold Mine, Shanta Gold; New Luka Mine, Mkuju River mine, New Luika Gold Mine, Aura Minerals, Geita, Autrad Mining Company Limited, Sekenke Gold Mine, Gleam Company Limited, Sold Rock Minerals Ltd, YNC Mining Company (T) Limited, Orica Tanzania Ltd – Geita Site, Kasco, East African Mining and Stamigold Company Limited.

During the quarter ending March 2021 these companies produced 10,009.6 kgs of gold worth US\$ 469 Million, representing more than 90% of the country's mineral exports.

Bulk of Tanzania gold is exported in raw form to smelters and other buyers mainly in South Africa, India, Dubai, Singapore, USA, and other countries. To increase contribution of natural resources, including gold, to the GDP, efforts are directed towards local value addition.

Todate, almost all banks have opened mining sector portfolio with gold ranking as the leading. To enable local processing, the Mwanza Precious Metal Refinery Ltd (MPMR) has been established as part of the government's resolve to add value to gold.

MPMR is a partnership between State Mining Corporation, Dubai based Rozella General Trading LLC and Singapore's ACME Consultant Engineers PTE Ltd. MPMR refining plant has capacity to extract 480 kilograms per day of 99.99% gold and 60 kilograms of silver per day.

### **5.3. Price and Trading MADC Gold:**

Gold prices are determined by supply and demand, like all exchange traded markets. So, if the gold market becomes saturated by supply and gold demand doesn't rise to match, the price of gold will fall. Besides if the demand for gold rises, without an increase in supply, the price of gold will rise.

Earlier in January 2022, Goldman Sachs had raised their 12-month gold price forecast to \$2150 per ounce on the view that an impending global growth slowdown would lead to increased concerns of a global recession. Since then, prices have surged thus far to



around \$2,050 per ounce in the backdrop of the ongoing Russia – Ukraine conflict and there is more headroom over the next few months for the prices to rise another 25% to \$2,500 per troy ounce by the year-end, as predicted by Goldman Sachs. This trend is corroborated by analysts at London Metal Exchange (LME) seen below.

MADC is currently trading its gold bars, coins and nuggets at the Chunya Auction through a renowned master dealer. On securing MADC dealership license, gold will be sent to MPMR for smelting before exporting. As a future consideration, MADC will venture into lapidary for enhancing value of its gold through sale of jewellery.



A conclusion can be drawn that MADC gold will continue to enjoy lucrative market price to enable realisation of the envisaged benefit from the investment. Gold trading is known for its long-term stability, which has made it one of the most popular investments for storing wealth. MADC is engaging an experienced trader/officer who will not only deal with buyers directly, but one well versed with the practice of speculating on price to make a profit usually via futures, options, spot prices etc. At Chunya, however, physical gold bars or coins are traded in cash.



## Section 6

### 6. PROJECT ATTRACTIVENESS:

#### 6.1. Financial Viability.

##### 6.1.1. Profitability Assessment:

Financial valuation of the MADC gold mining complex has been modelled on operation of four interrelated sections namely mining, crushing, processing and elusion with support services of transportation, engineering, finance, marketing and administration clearly depicted in section 3.3.2.

Operation assumptions have been based on conservatively estimated capacity utilization level of 80% during the first year of operation, rising to 85% as efficiency improves during the second year and a maximum of 90% from the third year onwards.

The MADC complex project should generate a turnover of US\$ 15.9 million during the first year rising to US\$ 16.9 million during the second year and US\$ 17.9 million from the fourth year onwards. The estimates are based on price published at Chunya Mineral Auction mart of US \$ 53,248 per kg or \$1,656 per troy ounce for 22k which is lower than LME spot price of \$54,461 per kg, a discount rate of 22% on LME.

Direct running costs have been based on standard requirements for underground mining and surface processing operations comprised of materials, consumables, energy, labour and other items leading to gross profit margin of about 56% of turnover averaged for eight years. Similarly, overheads have been based on standard rates learned from current operations at Matundasi leaving an operating profit averaged at 29% and net profit before tax of 29% regarded as realistic. In light of the high profitability level as outlined in Table 8, MADC should allow declaration of dividends right from the first year of operations.



#### 6.1.2. Liquidity Assessment:

The project promises positive liquidity level from the first year of operation and net cash balance is expected to accumulate from US\$ 1.39 million to US\$ 13.1 million over the eight after full servicing of the loan and re-investment in key assets. Table 9 confirms that based on conservative assumptions contained in the analysis, MADC liquidity should assure credit repayments as scheduled.

#### 6.1.3. Sustainability Assessment:

Table 10 indicates that expansion scheme will contribute to the rapid growth of MADC net worth which is projected to grow fourfold from US\$ 5.1 million to US\$ 21.4 million over the eight-year period confirming self-perpetuation ability of the proposed expansion project.

#### 6.1.4. Financial Ratio Analysis

The project has an internal rate of return after tax of 30% considered as high given the assumed cost of capital of 8% on foreign currency denominated loan. The return on investment is averaged at about 36% while the return on equity is 59% with pay-back-period of about 2 1/2 years. The security cover is 1.66 while the debt equity ratio is 0.69. These parameters indicate that the MADC complex proposal is financially healthy and properly leveraged.

#### 6.1.5. Risk Assessment

Risks associated with the MADC project with potential to negate the envisaged benefits of the project are categorised as internal and external risks, whereby internal risks range from project implementation, resource mobilisation, management efficiency to governance while exogenous risks are associated with the world economic, political upheavals, inflation, catastrophe or a combination of all.



#### 6.1.5.1. Endogenous Risks:

Typical risks at implementation stage are faults, miscalculations and errors in designing and planning the mining and processing activities and poor choices of technology and facilities, delays in raising financial and other key resources, delays and mismanagement in procurement of key facilities, poor installation workmanship, incompetent and inefficient personnel, poor yield from underground operations and frequent and extended downtime.

Since the proposed project is an expansion and modernisation scheme of the project than a greenfield start-up, it is reasonable to assume that the typical initial implementation risks sited have already been faced and averted over the past five years. Practical solutions to mitigate implementation stage challenges have already been found and will be improvised to enable smooth completion and commissioning of the expansion phase.

It is prudent also to assume that the company is capable of minimising operational risks and downtime owing to the valuable experience gained during the past five years to ensure planned capacity utilisation levels in all sections of the MADC project.

Furthermore, MADC shareholders are competent individuals and acclaimed mining engineers and professionals currently sought after by other mining and mineral processing projects in the country in light of their academic and professional qualifications. MADC started with a training centre expressly to address practical human capacity needs and competencies, particularly for critical mine front labour and support personnel. MADC training centre will address productivity and human capital issues thereby mitigating productivity risks.

As part of governance, MADC has a Board of Directors with competent Chairman overseeing the management team. The governance structure will be improved further as part of activities of the expansion scheme preferably to include Board Committees as well as external non-executive directors representing vital institutions including financing and oversight agencies for success of MADC.



#### 6.1.5.2. Exogenous Risks:

Exogenous risk aspects of the MADC proposal are mainly associated with contemporary world economic and political events particularly upheavals. These events are risky to MADC in so far as they disrupt trading and demand for gold where MADC will have no control on them. Fortunately, like it is happening now, such events including wars have a destructive impact on currencies leading to demand for gold as a more liquid and safer haven for protecting wealth. It also takes time for such disruptions to subside and world economy to regain confidence hence the long demand and price trajectory of gold unlike other commodities.

Other exogenous events and risk factors include inflation currently experienced worldwide. For fear of losing value of cash savings, human nature has the propensity to switch from volatile currencies to gold hence causing a rise in demand and price of gold.

Force de majeure in form of natural calamities, pandemics and disasters caused by global climatic change or a combination of all are unavoidable risks normally mitigated through insurance schemes.

Measuring risk by sensitivity analysis on number of working days, capacity, throughput can be shown in the accompanying IRR benchmark table

#### 6.1.6. Sensitivity Analysis

The analysis serves as basis for making recommendations for project's sustainability through estimation of relative impact of core risk aspects outlined above. Table 14 measures and compares the impact of key risk and sensitive factors to the viability of MADC expansion scheme.

This sensitivity assessment has been done on relative change/impact on the Internal Rate of Return (IRR) on cost, revenue and performance related aspects, results of which indicate that the project is more sensitive to changes in price of gold than volume of underground mine throughput followed by overall time spent in production, capacity utilisation than production cost and capital investment outlay.



The analysis underscores the need for MADC to address price aspects by penetrating lucrative markets aggressively as a direct dealer but also to add value to its gold so as to benefit from purity enhancements from smelting which will also facilitate recovery of other valuable metals such as silver. These measures will mitigate the risk of falling prices beyond the predicted LME levels to affect the project adversely.

The analysis underscores the need to ensure that all the underground pits are operated efficiently in order to guarantee availability of ore for processing at the Matundasi plant. This calls for continuous exploration efforts to determine rife veins and to ensure ideal working conditions and efficient tools and facilities underground. It underscores the need to operate the mines as much as possible and where possible to increase the number of mining shifts.

Relative Change	Base case IRR	10%	30%	50%
Increase in Capital Cost	30%	27%	21%	17%
Increase in Production Cost	30%	24%	11%	-2%
Decrease in Mining Throughput (rom)	30%	22%	5%	-16%
Decrease in Capacity Utilisation	30%	23%	10%	-6%
Decrease in Price of Gold	30%	16%	-13%	
Decrease in Number of Days	30%	22%	7%	-16%

#### **6.1.7. Government Revenue and Public Contributions:**

Over the eight year period the Government of Tanzania will earn about US\$ 22.1 million by way of fees, custom duty, VAT, labor levies and Corporate Tax and royalty from MADC payments constituting an average of 16% of the gross sales revenue of the project.

