

# Business Plan

FOR

ML448-535



ZEM DEVELOPMENT (T) CO. LTD

P.O.Box2008 Mwanza

TANZANIA

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## Acronyms and Abbreviation

| <b>Acronyms and Abbreviation</b> | <b>Definition</b>    |
|----------------------------------|----------------------|
| a                                | Annum                |
| AC                               | Alternating Current  |
| Au                               | Gold                 |
| dB                               | Decibel              |
| DC                               | Direct Current       |
| g/t                              | Grams per ton        |
| kg                               | Kilogram             |
| km                               | Kilometre            |
| kV                               | Kilo Volt            |
| kVA                              | Kilo Volt-Amps       |
| kW                               | KiloWatt             |
| kWh                              | kilowatt-hour        |
| m                                | Metre                |
| mg                               | Milligram            |
| ML                               | Mining License       |
| oz                               | Ounces               |
| QDS                              | Quarter Degree Sheet |
| t/a                              | Tons per annum       |
| V                                | Volt                 |

## EXECUTIVE SUMMARY

The ML448-ML535 project constitutes the main three mineralized zones M1, M2 and M3. The mineralization is made up of magnetite, followed by pyrite, siderite, pyrrhotite, and arsenopyrite. The gangue minerals in the original ore are mainly quartz, followed by chlorite, biotite, calcite, anthophyllite, albite, and muscovite. Whilst M1 and M2 zones have been evaluated with a high degree of confidence, the M3 zone is newly discovered with a relatively low degree of confidence. Several exploration lines with about 10,000 m of diamond drilling work have been done and the estimated reserve is around 8,856,877t of ore with 34,295 kg of Au at an average grade of 3.87 g/t Au.

The proposed underground mining method utilises the main ramp and inclined shaft at a recommended production rate of 360,000 t/a comparative to 1200 t/d. The stoping technology employed for the production is caving method, the waste production will be at a rate of 300 t/d to be stored at waste rock dump. To gain access to the ore a development work of about 103,114 m<sup>3</sup> is necessary.

The mined ore will be sent to the processing plant by railway then trucks. The plant will operate at a throughput rate of 1200 t/d, the head grade of 3.5 g/t and recovery of 86.2%. The tailings from the processing plant will be treated at the tailings workshop before being discharged to the tailings storage facility as dry tailings.

The mining area contains no previous industrial buildings, tourism centres, cultural relics protection areas, natural reserves or important facility near the area. There is no existence of a settlement, major roads, oil and gas pipelines. The mining activities will take place underground hence minimizing the footprint covered by the project on surface. The major facilities that will occupy a large footprint on the surface including the processing plant, the tailings storage facility, waste rock dump and accommodation area. Main environmental concerns in these facilities will be noise and dust to be handled with dust suppression mechanism and the use of personal protective equipment.

Several social impacts are expected from the project including employment, business opportunities at the local level and revenue at district and national level.

The project evaluated with a production rate of 360,000 t/a at an average head grade of 3.5 g/t for 10.4 years. An exchange rate of 1 US dollar = 6.9448-yuan, an interest rate of 12% and a gold price of 262 yuan/g were in use and resulted in internal rate of return of 19.92%, payback period of 5.8 years

and Net Present Value of 103,407,700 yuan (14,889,946.43 USD), hence the viability of ML448-ML535 Development Project.

# 1 INTRODUCTION

## 1.1 Location and Accessibility

The ZEM gold mine project is located on the QDS47/4, Shinyanga Villagedistrict, Shinyanga region (Figure 1), in north-western Tanzania. On the north of the project, there is Lake Victoria. The project is about 110km away from Shinyanga region and about 120km away from Mwanza region. On the southeast of the project, there is about 54km of asphalt road to Mahawa, and to the southwest, via Mananguthere is about 66km of gravel road to the tenement area.



Figure 1: Location and access to ZEM gold mine Project, Shinyanga-Tanzania.

## 1.2 Topography and Climate

The topography of the area is characterized by gently undulating terrain in the eastern part of the East African Plateau and north-western Tanzania. Whilst, northeast and southwest of the area is characterized by higher elevation, the middle area is characterized by low elevation and the entire area has an average elevation above 1140 m.

The project is located at tropical grassland climate with an average annual temperature between 22°C to 23°C; the hottest months are from August to October with an average temperature between 24°C to 26°C; the area characterised by low temperature in March to April.

The area has both dry and rainy seasons. The rainy season is from November of the current year to April of the following year and accompanied with humidity. The rainfall accounts for about 88% of the whole year. Dense tall grasses and shrubs are growing in the area and mixed with sparse trees. Large areas of stagnant water are formed in the low-lying areas of the project area, forming seasonal swamps. The dry season starts from May to October each year and the rainfall accounts for about 12% of the year, the dry season is characterized with dry and cracked soil, withered and fallen leaves. The average annual rainfall days are about 86.4 days, the annual average rainfall is about 810.6mm, the monthly average rainfall in the rainy season is about 118mm, the maximum monthly rainfall is 318.1mm, and the maximum daily rainfall is 64.5mm. The average monthly rainfall is about 15mm.

The annual evaporation in the project area is 2237~2838mm, which is 1.9~3.4 times the annual rainfall; the monthly average relative humidity is 30%~98%, the extreme time is October and April, and the annual average relative humidity is 44%~96 %, the extreme time is 15 o'clock and 6 o'clock respectively; the wind speed on the ground is relatively small, generally less than 5m/s at night, and 6-8m/s during the day; the annual average sunshine hours is about 3142 hours, with longer hours in July and August with an average of 10 hours per day, and the lowest in January, with an average of only 6.8 hours.

### 1.3 Site Layout

The layout (Figure 2) of the site comprises of the proposed area for waste rock dump, proposed area for the tailing's storage facility, mining area, an adit and so forth. The site selection process considered various factors including the need to meet the requirements of various protection distances and specifications; the minimization of haul distances to reduce power consumption and hence low operating costs; and the use of wind direction and terrain to minimize mutual interference and strengthen environmental protection.

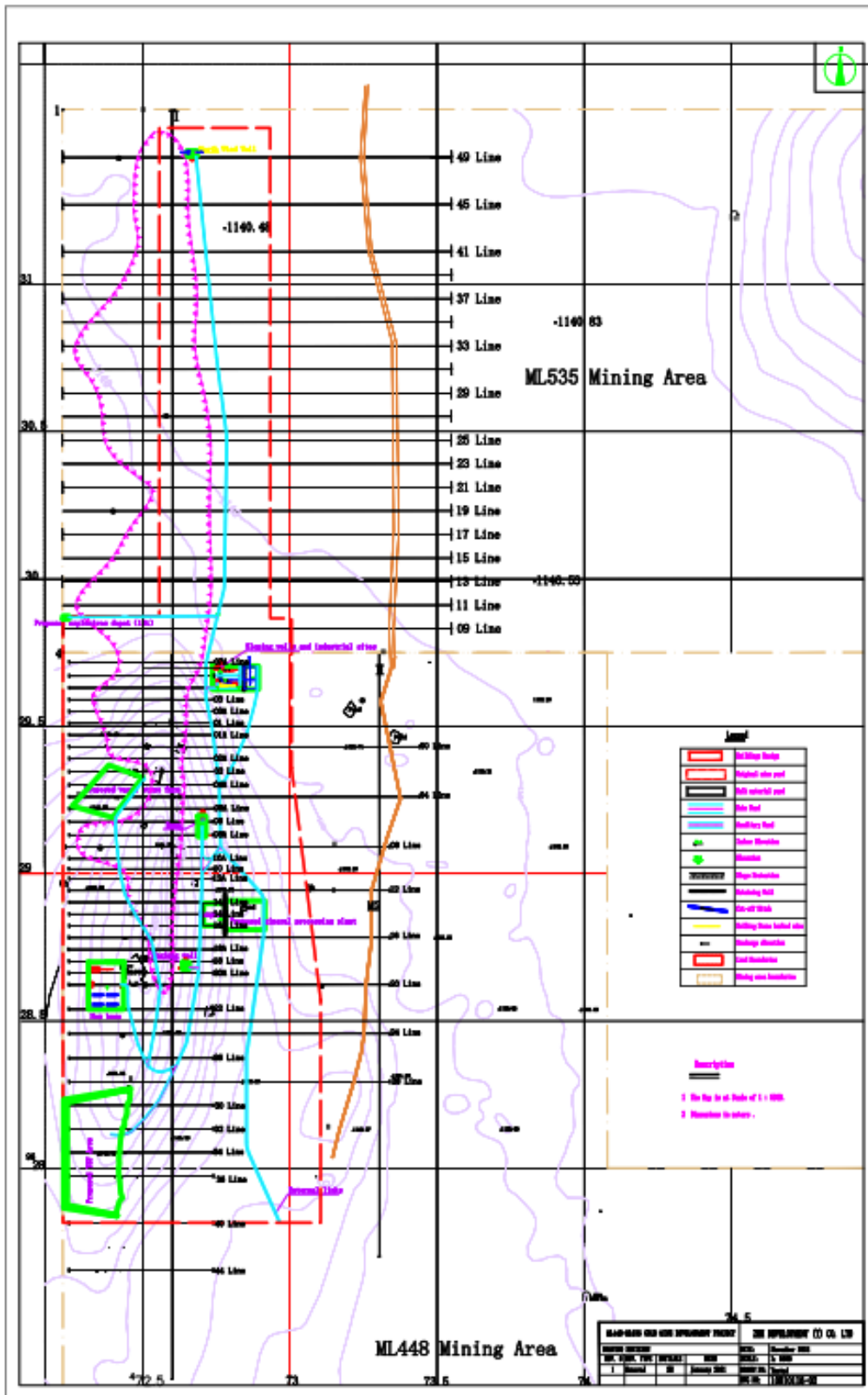


Figure 2: Site Layout of the ML448-ML535 Project

### 1.3.1 Adit location

The newly-built adit is located near the number 07 line outside the range of the rock movement zone in the footwall. The net profile of an adit is 2.8 m x 2.8 m at an inclined angle of 25° and wellhead elevation of +1145 m. Based on the comprehensive analysis of the topography, the mining area is located on the east side of an adit for easy transportation of material and installation of pipelines and cables. Figure 3 shows the plan and cross-section views of the ramp layout.

The southern wellbore is located near the outer lower disc ore rock movement line 18 with a profile of 2.8 m x 2.8 m at an angle of 25°. The wellhead elevation is +1150 m.

The upcast ventilation shaft on the southern wing is equipped with pedestrian steps and handrails as part of underground safety.

### 1.4 Mineral Tenure and Surface Rights

The two mining rights areas ML448 and ML535 included in the mining area are connected from north to south, the north is the ML535 mining rights area, and the south is the ML448 mining rights area. The mining licenses of the two mining rights areas are owned by Henan Asia-Africa Geological Engineering (Tanzania) Company. The company is a wholly-owned subsidiary of Henan Yukuang Kaiyuan Mining Co., Ltd. registered in Tanzania, and the ownership of the mineral rights is undisputed. ML448/2011 mining right has an area of 9.89km<sup>2</sup> and the exploratory expiration date is from December 22, 2011, to December 21, 2021; ML535/2014 mining right has an area of 9.83km<sup>2</sup> and the exploratory expiration date is from October 30<sup>th</sup>, 2014 to October 29<sup>th</sup>, 2024. The entitled rights are for gold mineral.

Table 1: Boundary Coordinates for ML448

| Boundary Point | Latitude       | Longitude    |
|----------------|----------------|--------------|
| A              | -03° 21'00.00" | 32°45'00.00" |
| B              | -03° 21'00.00" | 32°46'00.00" |
| C              | -03° 21'57.00" | 32°46'00.00" |
| D              | -03° 21'57.00" | 32°46'30.00" |
| E              | -03° 23'15.00" | 32°46'30.00" |
| F              | -03° 23'15.00" | 32°45'00.00" |

Table 2: Boundary Coordinates for ML535

| Boundary point | Latitude       | Longitude    |
|----------------|----------------|--------------|
| A              | -03° 20"00.00" | 32°45'00.00" |
| B              | -03° 20"00.00" | 32°48'27.70" |
| C              | -03° 21"00.00" | 32°48'27.70" |
| D              | -03° 21"00.00" | 32°45'00.00" |

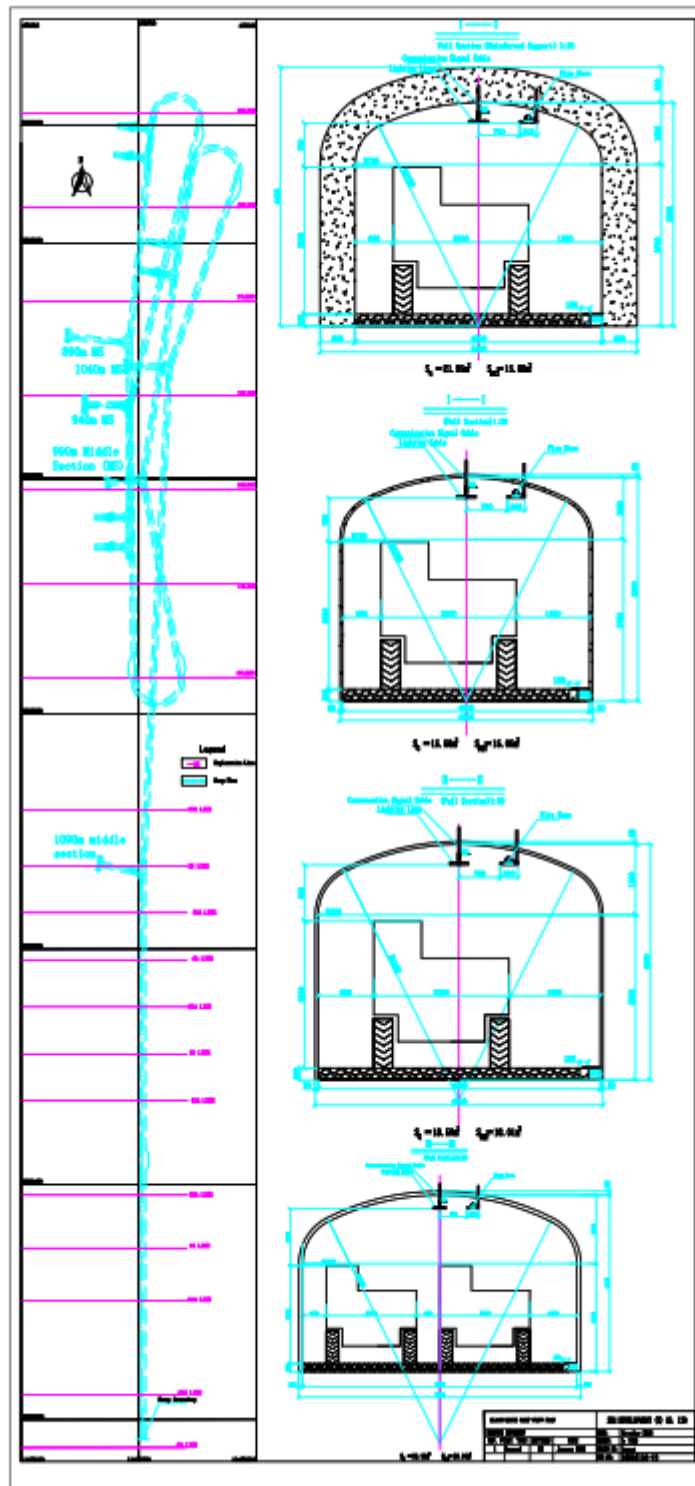


Figure 3: Ramp Floor Layout

## 2 GEOLOGY AND RESOURCE

### 2.1 Regional and Local Geology

#### 2.1.1 Regional Geology

The Precambrian Shield of Tanzania is subdivided into the older, Early-Archaean comprising the Dodoman system, which is overlain by the Nyanzian and Kavirondian Systems. The Early-Archaean craton is bracketed between >3.12 to 2.53 Ga (K-Ar whole-rock ages: (Harpum, 1970)). The Dodoman System is underlain by a complex of juxtaposed, EW-trending schist belts including quartzite, amphibolite-granulite facies amphibolite, concordant granitoids and granitoid gneisses in migmatite (equivalent to the Dodoma Basement Complex: (Quennell et al 1956)).

The Early Archaean rocks (Dodoman System) extend to form the basement crust over which Nyanzian System rocks formed as roof pendants (Harpum, 1970); (Kimambo, 1984). The Nyanzian System includes two major belts, the Singida-Geita Belt and the East Lake Region Belt typified by greenstone lithologies (BIFs, meta-volcanic rocks and chlorite schist). In the East Lake Region Belt, the greenstones crop out in isolation in areas around Musoma and Mara, while in areas around Serengeti and Kilimafedha, greenstones define linear trends wrapped against granitoids. In contrast, however, the greenstones in the Singida-Geita Belt crop out in large, but isolated patches separated largely by deep weathering profiles, although they still define an overall NW-SE trend from Singida to Biharamulo(Harpum, 1970).

The eastern and western boundaries between the Early-Archaean Craton and the Late Archaean Usagaran and Ubendian Mobile Belts are clearly defined by rock types, their metamorphic grade, and degree of deformation. The absence of granitoids, but the presence of extensive meta-calcareous and pelitic-sedimentary rocks, and E-W-trending proto-crust typifies the Usagaran Belt. A high grade of metamorphism, poly-deformation, and abundance of granitoids are typical features of the poly-deformed Ubendian Mobile Belt.

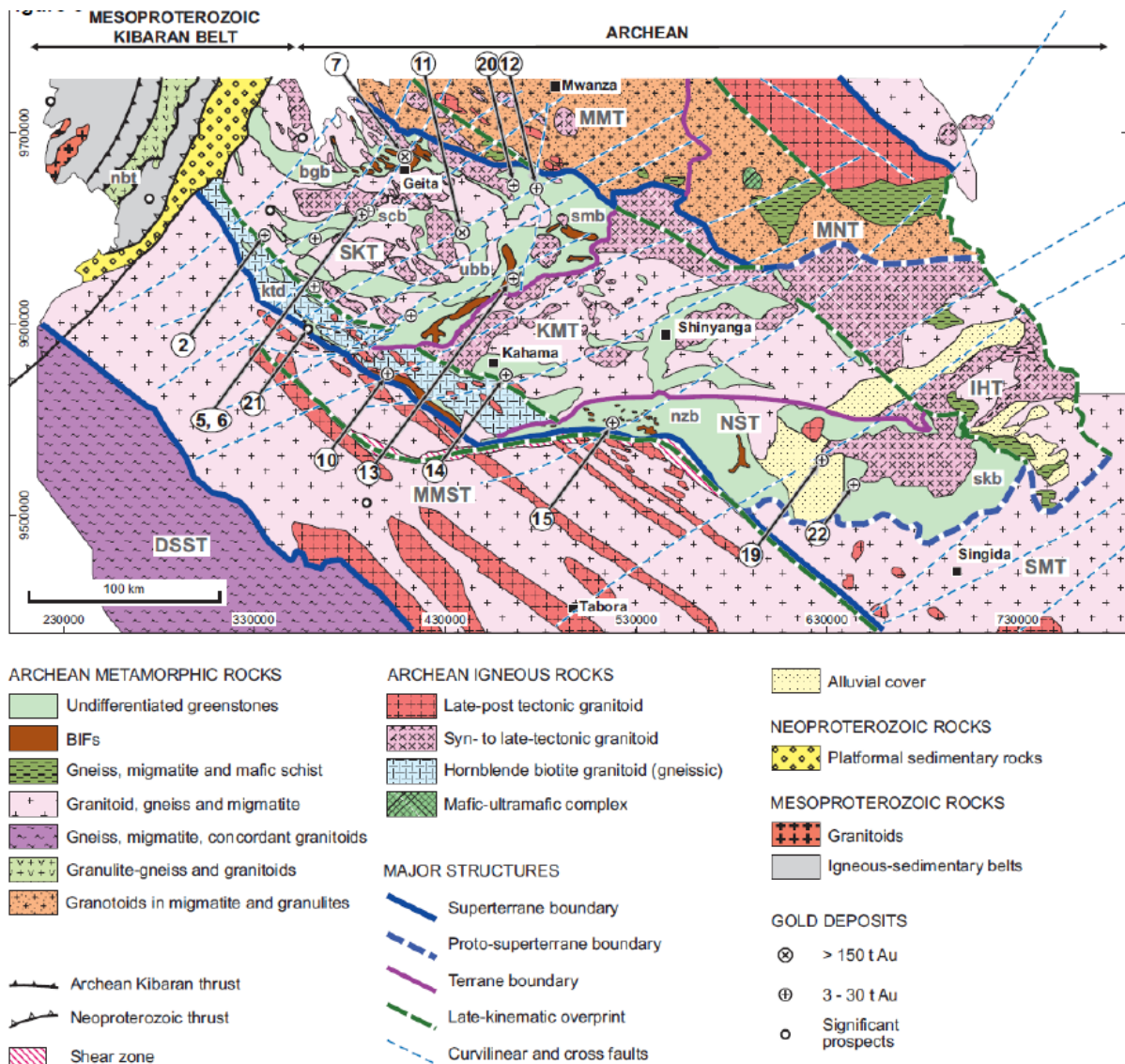


Figure 4: Geological Map of Sukumaland Superterrane

Geological map of the Sukumaland Superterrane, showing contained terranes (provinces), domains (camps) and large to giant deposits in the Lake Victoria Region of Tanzania. Gold deposits and occurrences include: 0) Mumwendo; 1) Lusahunga; 2) Tulawaka; 3) Matabe; 4) Sheba; 5) Buckreef; 6) Rwamagaza; 7) Geita; 8) Ushirombo; 9) Nyakafuru; 10) Miyabi; 11) Bulyanhulu; 12) Kitongo; 13) Golden Ridge; 14) Buzwagi; 15) Golden Pride; 16) Buhemba; 17) North Mara; 18) Kakindu; 19) Sekenke; 20) Nyanzaga; 21) Kigosi; 22) Kirondatal (Kabete et al 2012).

### 2.1.2 Geology of the Lake Victoria Goldfields

The Lake Victoria Goldfields is subdivided, from older to younger, as follows: Archean Granitoid Shield, Archean Greenstone Belt, Proterozoic-Late Archean intrusive rocks, and Proterozoic and Cenozoic rocks.

In the Archaean Granitoid Shield, the oldest rocks are granitoids and gneisses, overlain by undifferentiated granites, gneisses and potassic-feldspar granitoid. The Archaean Greenstone Belt overlies the Archaean Granitoid Shield and is defined from the bottom to the top, as follows: Nyanzian System, migmatite-facies Nyanzian System of supracrustal igneous sedimentary rocks and Kavirondian System of continentally-derived siliciclastic sedimentary rocks (BRGM et al, 2014). Apart from that, the Lake Victoria Goldfields is intruded by Proterozoic to Late-Archaean intrusive rocks of mafic-ultramafic composition, and almost 40% of the belts are covered by Cenozoic regolith and recent and proto-lake sediments. Magnetic lineaments are shown as mafic dykes, some specifically as gabbro dykes.

Interpretation of remotely sensed imagery was used to establish the bedrock geology and structures and an overall understanding of the regional lithostructural geometries and sequencing. This process led to the subdivision of the Lake Victoria Region into three superterrane, which are from north to south: 1) East Lake Victoria Superterrane; 2) Lake Victoria-Lake Eyasi Superterrane; and, 3) Lake Nyanza Superterrane (Figure 4 & Figure 5). The terrane-based tectonic subdivisions constitute a modern concept used globally to assist in understanding endowment and in targeting new prospective districts. It invokes orogenic gold deposits as end-products of much larger mineral systems operating at lithospheric scale.

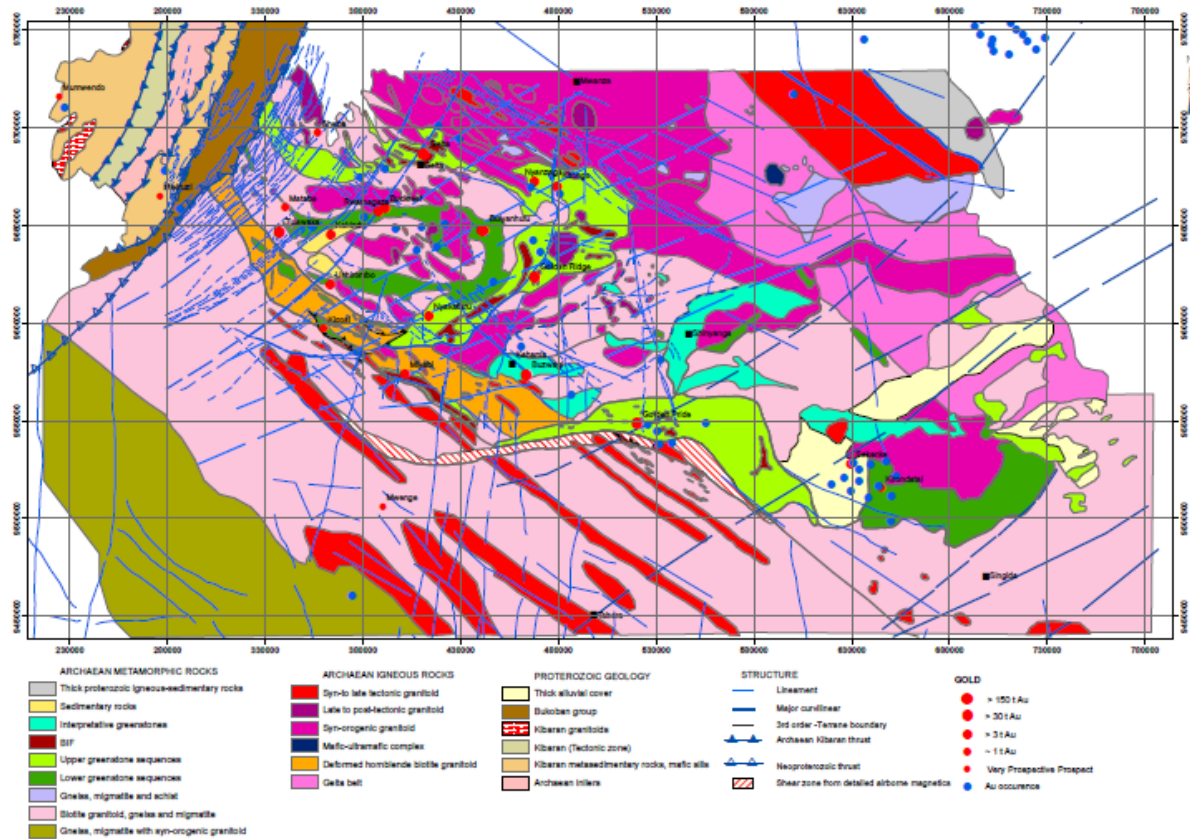


Figure 5: The Geology and Gold Prospects in the Lake Nyanza Goldfields

Source (Kabete et al., 2012)

### 2.1.3 Local Geology

The mining area is located in the eastern part of the Kahama greenstone belt, one of the eight greenstone belts around Lake Victoria in Tanzania, and is connected to the Mabale-Buhungukira greenstone belt to the east (Figure 6), mainly by the greenstone belt Archaeozoic Nyanza group on the formation composition, containing as lithology felsic and mafic volcanic rocks, banded iron formation (BIF) and the like. The regional tectonic activity is strong, and the rock layers are mostly steeply inclined; the Archean magmatic activity is strong, forming a large area of magmatic rock.



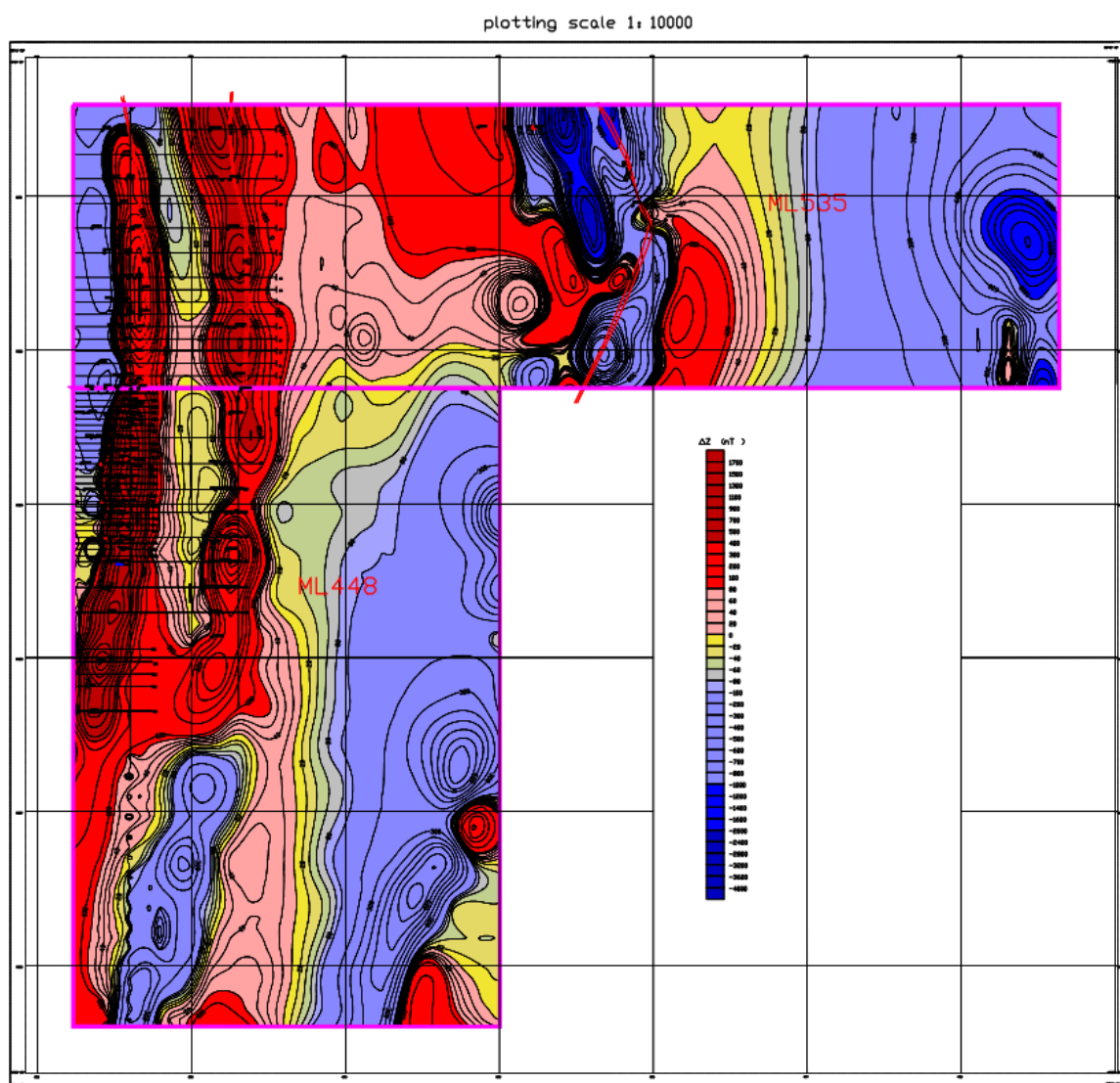


Figure 7: Magnetic Field Plane Contour Map for ML448-ML535 Area

Drilling and testing have delineated 4 magnetic anomaly zones related to gold mineralization and selected M1 and M2 magnetic anomaly zones for further work. Through surface engineering and sparse drilling engineering verification, gold deposits (chemicals) were found in the M1 anomaly zone.

PL2539 (ML448) mining area census fieldwork began in early 2010, and by the end of 2011, the main fieldwork was completed. It mainly uses surface trenching, deep drilling and other exploration methods to reveal the gold ore bodies that have been discovered in the M1 gold mineralization alteration zone of the PL2539 (ML448) mining area. At the same time, the sparseness is used in the M2 magnetic anomaly zone. Drilling verification also found gold ore bodies.

In 2012, the "General Survey of Maheiga Gold Mine in Mwamola, Tanzania" adopted large-scale topographic and geological surveys, hydro-environmental geological work, trenching, drilling and other technical means to carry out systematic engineering exposure and sampling tests. A detailed investigation of the exploration line between 20-07 of the mineralized alteration zone, a general investigation of the exploration line between the 20-48 exploration line of the M1 gold mineralization alteration zone and the M2 gold mineralization alteration zone in the ML448 mining area; at the same time, learn from the work of the ML448 mining area Experience, using high-magnetic survey, soil geochemical survey, drilling and other technical means, delineated the geophysical and geochemical anomaly area in the PL7438 (ML535) mining area, carried out anomaly verification, and found that the M1 and M2 gold mineralization alteration zone continued to extend north and south. It runs through the PL7438 (ML535) mining area and controls the sparseness of the gold deposits exposed on the M1 vein in the area.

In 2013, the detailed investigation of gold mines in the ML448-PL7438 (ML535) mining area was in full swing, mainly based on the general detailed investigation of the area in 2012, with an engineering distance of 160×160m, in the M1-1 gold ore body. The exploration line between the 07 exploration line is based on the drilling boreholes to expand the scale of the gold ore body; besides, the project spacing is not more than 160×160m, in the PL7438 (ML535) mining area M1-1 gold ore body 07-51 exploration line, The location of the ore body (mostly concentrated in the ore body oblique depth of about 200-320m) as the centre, traced along the strike and inclination; at the same time, the M3 magnetic anomaly zone discovered by the geophysical magnetic survey was verified by engineering.

## Borehole bar diagram of ZK000 in ML448 gold mining area

Opening date: 2012-5-21  
 Date of final hole: 2012-5-24  
 End hole depth: 100.50m

Exploration Line No. : 00  
 Drilling No. : ZK000

Orifice coordinates: X= 9629426.137  
 Y= 472590.531  
 H= 1147.99m  
 dip angle of hole 70°  
 Borehole orientation: 90°

| Return to the first step (m) | Core to take | In depth (m)     | Lift height (m)  | Long core layer (m) | Stratification (m) | Adoption rate (%) | A histogram      | Mark: the number | Rock core description   | Take sample conditions |                       | The test results |
|------------------------------|--------------|------------------|------------------|---------------------|--------------------|-------------------|------------------|------------------|---|------------------------|-----------------------|------------------|
|                              |              |                  |                  |                     |                    |                   |                  |                  |   | Sample number          | Sampling location (m) |                  |
| form                         | to           | Core to take (m) | Core to take (%) | Core to take (m)    | Core to take (%)   | Core to take (%)  | Core to take (%) | Core to take (%) | Core to take (%)  | Core to take (%)       | Core to take (%)      | Core to take (%) |
| 0.00                         | 2.20         | 2.20             | 1.00             | 11.00               |                    |                   |                  |                  | Residual deposit:<br>Brown yellow, mainly clay, silt, and a small amount of medium and fine sand and gravel, gravel particle size is generally 3 - 5mm. |                        |                       |                  |
| 2.20                         | 4.90         | 2.70             | 2.00             | 17.00               | 4.50               | 4.50              | 3.00             | 64.40            |   |                        |                       |                  |
| 4.90                         | 6.20         | 1.30             | 1.00             | 10.20               |                    |                   |                  |                  |   |                        |                       |                  |
| 6.20                         | 7.50         | 1.30             | 1.00             | 14.60               |                    |                   |                  |                  |   |                        |                       |                  |
| 7.50                         | 8.80         | 1.30             | 1.00             | 30.00               |                    |                   |                  |                  |   |                        |                       |                  |
| 8.80                         | 10.20        | 1.40             | 1.00             | 30.00               |                    |                   |                  |                  |   |                        |                       |                  |
| 10.20                        | 12.20        | 2.00             | 1.70             | 18.20               | 11.30              | 1.00              | 7.00             | 61.60            |   |                        |                       |                  |
| 12.20                        | 13.50        | 1.30             | 1.00             | 34.80               |                    |                   |                  |                  |   |                        |                       |                  |
| 13.50                        | 15.25        | 1.75             | 1.65             | 34.80               |                    |                   |                  |                  |   |                        |                       |                  |
| 15.25                        | 16.50        | 1.25             | 1.05             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 16.50                        | 17.80        | 1.30             | 1.20             | 37.50               |                    |                   |                  |                  |   |                        |                       |                  |
| 17.80                        | 19.15        | 1.35             | 1.05             | 36.40               |                    |                   |                  |                  |   |                        |                       |                  |
| 19.15                        | 20.50        | 1.35             | 1.00             | 35.00               |                    |                   |                  |                  |   |                        |                       |                  |
| 20.50                        | 21.85        | 1.35             | 1.10             | 36.40               |                    |                   |                  |                  |   |                        |                       |                  |
| 21.85                        | 23.20        | 1.35             | 1.05             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 23.20                        | 24.55        | 1.35             | 1.00             | 34.20               |                    |                   |                  |                  |   |                        |                       |                  |
| 24.55                        | 26.00        | 1.45             | 1.00             | 34.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 26.00                        | 27.45        | 1.45             | 1.00             | 34.60               |                    |                   |                  |                  |   |                        |                       |                  |
| 27.45                        | 28.90        | 1.45             | 1.00             | 35.70               | 30.00              | 17.50             | 14.74            | 64.20            |   |                        |                       |                  |
| 28.90                        | 30.35        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 30.35                        | 31.80        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 31.80                        | 33.25        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 33.25                        | 34.70        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 34.70                        | 36.15        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 36.15                        | 37.60        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 37.60                        | 39.05        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 39.05                        | 40.50        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 40.50                        | 41.95        | 1.45             | 1.00             | 35.70               | 41.25              | 30.45             | 8.79             | 34.10            |   |                        |                       |                  |
| 41.95                        | 43.40        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 43.40                        | 44.85        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 44.85                        | 46.30        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 46.30                        | 47.75        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 47.75                        | 49.20        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 49.20                        | 50.65        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 50.65                        | 52.10        | 1.45             | 1.00             | 35.70               | 51.97              | 12.72             | 11.44            | 68.90            |   |                        |                       |                  |
| 52.10                        | 53.55        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 53.55                        | 55.00        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 55.00                        | 56.45        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 56.45                        | 57.90        | 1.45             | 1.00             | 35.70               | 60.30              | 6.33              | 6.05             | 95.60            |   |                        |                       |                  |
| 57.90                        | 59.35        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 59.35                        | 60.80        | 1.45             | 1.00             | 35.70               | 62.64              | 2.34              | 2.20             | 94.00            |   |                        |                       |                  |
| 60.80                        | 62.25        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 62.25                        | 63.70        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 63.70                        | 65.15        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 65.15                        | 66.60        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 66.60                        | 68.05        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 68.05                        | 69.50        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 69.50                        | 70.95        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 70.95                        | 72.40        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 72.40                        | 73.85        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 73.85                        | 75.30        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 75.30                        | 76.75        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 76.75                        | 78.20        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 78.20                        | 79.65        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 79.65                        | 81.10        | 1.45             | 1.00             | 35.70               | 82.55              | 19.91             | 19.53            | 91.10            |   |                        |                       |                  |
| 81.10                        | 82.55        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 82.55                        | 84.00        | 1.45             | 1.00             | 35.70               | 85.30              | 2.75              | 2.65             | 96.40            |   |                        |                       |                  |
| 84.00                        | 85.45        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 85.45                        | 86.90        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 86.90                        | 88.35        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 88.35                        | 89.80        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 89.80                        | 91.25        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 91.25                        | 92.70        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 92.70                        | 94.15        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 94.15                        | 95.60        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 95.60                        | 97.05        | 1.45             | 1.00             | 35.70               |                    |                   |                  |                  |   |                        |                       |                  |
| 97.05                        | 98.50        | 1.45             | 1.00             | 35.70               | 100.50             | 15.20             | 15.18            | 99.70            |   |                        |                       |                  |

## 2.3 Resource model

Currently, the area mainly evaluates two gold mineralization alteration zones, M1 and M2, which have a relatively high degree of control. The M3 gold mineralization alteration zone is newly discovered in 2013 with a relatively low degree of control.

### 2.3.1 M1 mineralization alteration zone gold

The M1 gold mineralization alteration zone is located in the west of the mining area, running through the entire mining area from north to south. The north strikes nearly north-south, and the south strikes gradually change from north-northeast to south-southwest; the M1 area (ML448-ML535) extends about 4000m in length and continues to extend north and south. The horizontal projection width is 20-30m, inclined at 240 ° to 320 °, The overall inclination is about 278°, and the inclination angle is 67°to 87°.

### 2.3.2 M2 gold mineralization alteration zone

The M2 gold mineralization alteration zone is distributed parallel to the east side of the M1 gold mineralization alteration zone about 600m, and the entire area extends more than 4000m; its tendency is the same as the M1 gold mineralization alteration zone, and the overall inclination is roughly 278°. The inclination angle is around 50°~84° with the most common value of around 80°. A total of two gold ore bodies, M2-1 and M2-2, are delineated on this gold mineralization alteration zone.

### 2.3.3 M3 gold mineralization alteration zone

The M3 gold mineralization alteration zone is located about 2km east of M2, mainly in the middle of the PL7438 (ML535) mining area. It strikes almost north-south and extends about 1.8km in the area. At present, there are 3 mines in the verification drilling completed in the area, and the mine locations are the same as the M1, M2 gold mineralization alteration zone, located between the banded iron-bearing formation rock formation and the acidic volcanic sedimentary rock layer. The side of the iron-bearing formation near the shear fracture zone, and showing similar alteration characteristics to M1 and M2, its extension and scale need to be further explored to understand; also, the results of geological surveys and geomagnetic surveys in the mining area It shows that the M3 magnetic anomaly belt extends northward into another mining tenure owned by the local company, and the company controls a large number of drilling holes in the M3 magnetic anomaly belt. Based on the above knowledge, it is preliminarily determined that there should be an M3 gold

mineralization alteration zone in this area, which extends northward to the outside of the area. According to the mining project, the mineralized alteration zone initially delineates the M3 -1 gold ore body.

## 2.4 Mineral Resource Estimates

### 2.4.1 Primary orebodies

At present, all the gold ore bodies delineated on the M1 gold mineralization alteration zone are located in the area north of the 44<sup>th</sup> exploration line (between the 44<sup>th</sup> and 49<sup>th</sup> exploration lines) of the mineralization zone. Among them, the M1-1 gold ore body is the largest in the whole area. The M1 mineralization zone is located between the 20-49 exploration line (the two mining areas ML448 and PL7438 (ML535) from north to south), which is the most important gold ore body in the area. The single ore body gold resource reaches 31357 kg, accounting for the gold resources of the whole area and 91.43% of the total; the smaller M1-2 gold ore bodies are distributed between the 44-40 exploration line, which coincides with the structural space position of the M1-1 gold ore body. The remaining 13 secondary gold ore bodies are very small in scale, with a total amount of gold metal of 318 kg, all located between the 12 to 41 exploration lines. They are small ore bodies controlled by secondary fissures on both sides of the main tectonic metallogenic belt. The ore bodies are roughly parallel. M1-2 has a low thickness, between 1.00m and 2.24m, the average thickness of only 1.56m; ore grade of between 1.04 g/t and 1.60g/t, the average grade of 1.32g/t. On the whole, the grade and thickness of the ore body have no obvious changes in direction and tendency.

The M2-1 gold ore bodies delineated on the M2 gold mineralization alteration zone is distributed between the 28~04 exploration lines, and are located in the main structure near the contact zone between the banded iron-bearing structural rock strata of the M2 mineralization zone and the acid volcanic clastic rock strata. In the metallogenic zone, it belongs to the second-largest gold ore body in the region, with a single ore body gold resource of 1459kg, accounting for 4.25% of the total gold resources in the region; the M2-2 gold ore body is a small mine controlled by secondary fissures. Body, roughly parallel to the M2-1 gold ore body. The maximum thickness of the ore body is 2.06m, the minimum thickness is 0.40m, the average thickness is 1.04m, and the thickness variation coefficient is 50.59%, which is stable; the highest grade in the ore body is 15.25g/t, the lowest grade is 1.00g/t, and the average grade is 3.94g/t, the grade variation coefficient is 85.53%, which is a uniform type.

The M3-1 gold ore body delineated on the M3 gold mineralization alteration zone is located in the main tectonic metallogenic zone near the contact zone between the banded iron-bearing structural

rock formations of the M3 mineralization zone and the acidic volcanic clastic rocks. the first three gold, single gold ore resources 924kg, accounting for 2.69% of the total gold resources of the region.

Most of the gold ore bodies delineated in the area are layered and quasi-layered. The minimum thickness of a single ore body is 0.74m and the maximum thickness is 7.45m. The highest Au grade of in the area is 31.43g/t, and the lowest Au grade is 1.07g/t, and the average grade of Au in the deposit is 3.87g/t.

#### 2.4.2 Secondary Orebodies

Except for the four main ore bodies of M1-1, M1-2, M2-1 and M3-1, which are distributed in the main structural metallogenic belt, the remaining 14 secondary gold ore bodies are small in scale and have low engineering control. It cannot accurately reflect its geological characteristics, and here is only a list of its main geological parameters.

Table 3: Characteristics of Secondary Orebodies

| Mineralization zone number | Orebody number | Stored elevation (m) | Buried depth (m) | Orebody size |                   | Orebody shape | Average thickness (m) | Average Au grade (g/t) | Orebody Occurrence |             |
|----------------------------|----------------|----------------------|------------------|--------------|-------------------|---------------|-----------------------|------------------------|--------------------|-------------|
|                            |                |                      |                  | Length (m)   | The extension (m) |               |                       |                        | tendency           | inclination |
| M1                         | M1-3           | 982~1122             | 30~170           | 200          | 54~154            | Lenticular    | 1.97                  | 2.27                   | 278                | 71 °        |
|                            | M1-4           | 1087~1127            | 20~60            | 40           | 40                | Lenticular    | 0.86                  | 2.66                   | 278                | 71 °        |
|                            | M1-5           | 1132~1142            | 0~10             | 40           | 10                | Lenticular    | 7.45                  | 2.73                   | 278                | 71 °        |
|                            | M1-6           | 970~1030             | 118~178          | 38           | 60                | Lenticular    | 1.51                  | 5.32                   | 278                | 71 °        |
|                            | M1-7           | 1005~                | 40~              | 20           | 52                | Lenticular    | 0.84                  | 2.13                   | 278                | 71 °        |

| Mineralization zone number | Orebody number | Stored elevation (m) | Buried depth (m) | Orebody size |                   | Orebody shape | Average thickness (m) | Average Au grade (g/t) | Orebody Occurrence |             |
|----------------------------|----------------|----------------------|------------------|--------------|-------------------|---------------|-----------------------|------------------------|--------------------|-------------|
|                            |                |                      |                  | Length (m)   | The extension (m) |               |                       |                        | tendency           | inclination |
|                            |                | 1055                 | 90               |              |                   |               |                       |                        |                    |             |
|                            | M1-8           | 801~875              | 271~345          | 40           | 80                | Lenticular    | 0.74                  | 4.05                   | 278                | 71 °        |
|                            | M1-9           | 857~944              | 198~285          | 115          | 80                | Lenticular    | 1.00                  | 2.18                   | 278                | 71 °        |
|                            | M1-10          | 998~1066             | 75~143           | 40           | 70                | Lenticular    | 1.26                  | 1.7                    | 278                | 71 °        |
|                            | M1-11          | 1018~1093            | 47~122           | 40           | 80                | Lenticular    | 0.84                  | 2.32                   | 278                | 71 °        |
|                            | M1-12          | 1046~1098            | 52~104           | 40           | 57                | Lens shape    | 0.96                  | 1.29                   | 278                | 71 °        |
|                            | M1-13          | 1005~1055            | 47~97            | 38           | 53                | Lenticular    | 0.90                  | 1.75                   | 278                | 71 °        |
|                            | M1-14          | 948~1006             | 142~200          | 38           | 60                | Lenticular    | 1.33                  | 31.43                  | 278                | 71 °        |
|                            | M1-15          | 1078~1123            | 23~68            | 30           | 45                | Lenticular    | 0.89                  | 1.07                   | 278                | 71 °        |
| M2                         | M2-2           | 1037~1108            | 34~105           | 40           | 76                | Lenticular    | 1.30                  | 2.27                   | 278                | 80 °        |

A total of 18 gold ore bodies are delineated in the mining area. The estimated (331) + (332) + (333) gold ore is 8,856,877 t, the gold metal volume is 34,295kg, and the average gold grade of the deposit is 3.87g/t. Among them, (331) + (332) gold ore is 2,249,176 tonnes, gold metal is 10179kg, accounting for 29.68% of total gold metal volume; (333) gold ore volume is 6,607,701t, gold metal is 24,116kg, accounting for 70.32% of total gold metal volume.

The ore of the industrial ore body is 6,155,49 tonnes, the gold metal volume is 30146kg, and the average gold grade is 4.90g/t, accounting for 87.90% of the gold metal content in the whole area.

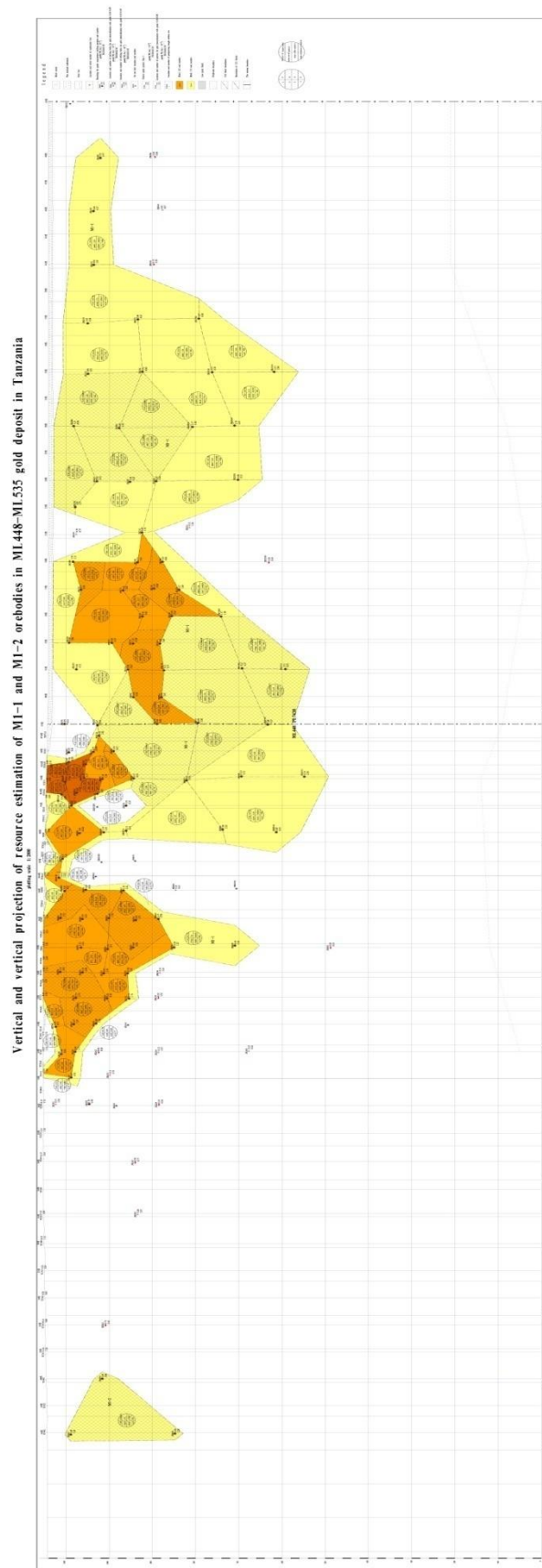
Among them, (331) gold ore is 167,007 tonnes, gold metal is 920kg; (332) gold ore is 1,383,053t, gold metal is 8064kg; (333) gold ore volume is 4,605,430t, gold metal volume is 21,162kg.

The amount of low-grade orebody is 2,701,387t, the amount of gold metal is 4,149kg, and the average gold grade is 1.54g/t, accounting for 12.10% of the total amount of gold metal content in the region. Among them, (331) low gold ore volume is 7253t, gold metal content is 13kg; (332) low gold ore volume is 691863t, gold metal content is 1,182kg; (333) low gold ore volume is 200,2271t, gold metal content is 2,954kg. See Table 4 for details.

Table 4: Resource Estimation Summary

| Mineralized zone  | Orebody number      | Resource level | Ore Quantity (T) | Metal amount (Kg) | Average grade (g/t) | Remarks |
|-------------------|---------------------|----------------|------------------|-------------------|---------------------|---------|
| M1                | M1-1                | 331            | 167007           | 920               | 5.51                |         |
|                   |                     | 331D           | 7253             | 13                | 1.79                |         |
|                   |                     | 332            | 1345537          | 7952              | 5.91                |         |
|                   |                     | 332D           | 691863           | 1182              | 1.71                |         |
|                   |                     | 333            | 4233762          | 18817             | 4.44                |         |
|                   |                     | 333D           | 1707404          | 2473              | 1.45                |         |
|                   |                     | Subtotal       | 8152826          | 31357             | 3.85                |         |
|                   | M1-2                | 333D           | 173987           | 230               | 1.32                |         |
|                   | M1-3                | 333D           | 71922            | 163               | 2.27                |         |
|                   | M1-4                | 333            | 1897             | 5                 | 2.64                |         |
|                   | M1-5                | 333            | 2597             | 7                 | 2.70                |         |
|                   | M1-6                | 333            | 3024             | 16                | 5.29                |         |
|                   | M1-7                | 333D           | 848              | 2                 | 2.36                |         |
|                   | M1-8                | 333            | 1887             | 8                 | 4.24                |         |
|                   | M1-9                | 333D           | 10302            | twenty-two        | 2.14                |         |
|                   | M1-10               | 333D           | 3624             | 4                 | 1.10                |         |
|                   | M1-11               | 333D           | 2120             | 5                 | 2.36                |         |
|                   | M1-12               | 333D           | 1711             | 2                 | 1.17                |         |
|                   | M1-13               | 333 D          | 1526             | 3                 | 1.97                |         |
|                   | M1-14               | 333            | 2559             | 80                | 31.26               |         |
| M1-15             | 333D                | 1061           | 1                | 0.94              |                     |         |
| M2                | M2-1                | 332            | 37516            | 112               | 2.99                |         |
|                   |                     | 333            | 308158           | 1305              | 4.23                |         |
|                   |                     | 333D           | 24801            | 42                | 1.69                |         |
|                   |                     | Subtotal       | 370475           | 1459              | 3.94                |         |
|                   | M2-2                | 333D           | 2965             | 7                 | 2.36                |         |
| M3                | M3-1                | 333            | 51546            | 924               | 17.93               |         |
| Total mining area | Industrial ore body | 331            | 167007           | 920               | 5.51                |         |
|                   |                     | 332            | 1383053          | 8064              | 5.83                |         |
|                   |                     | 333            | 4605430          | 21162             | 4.60                |         |
|                   |                     | total          | 6155490          | 30146             | 4.90                |         |
|                   | Low                 | 331D           | 7253             | 13                | 1.79                |         |

| Mineralized zone | Orebody number | Resource level | Ore Quantity (T) | Metal amount (Kg) | Average grade (g/t) | Remarks |
|------------------|----------------|----------------|------------------|-------------------|---------------------|---------|
|                  | grade          | 332D           | 691863           | 1182              | 1.71                |         |
|                  |                | 333D           | 2 002271         | 2954              | 1.48                |         |
|                  |                | total          | 2701387          | 4149              | 1.54                |         |
|                  | total          |                | 8856877          | 34295             | 3.87                |         |



### 3 MINING

According to the requirements of the mine, this design is for the resources above the level of +890m between the 22<sup>nd</sup> to the 49<sup>th</sup> line of the M1 mineralization zone within the scope of the mining right, and the mining target is the M1 in the M1 mineralization zone above +890m orebody and 13 minor gold ore bodies nearby.

The target ore body of this design has a longer trend, of which the main M1-1 domain (the proportion of metal is 91.43% of the whole area, and 99.04% of the total amount of metals used in this design) strike length is 2808m. According to this design, the main orebody case M1-1 is divided into four segments as shown in Table 5 shown.

Table 5: The distribution of resources in each section of the M1-1 Orebody

| Mine section number | Divide the area                   | Metal amount (kg) | Ore volume (t) | Average grade (g/t) | The proportion of metal content (%) |
|---------------------|-----------------------------------|-------------------|----------------|---------------------|-------------------------------------|
| 1                   | 20~02 line, above 890m elevation  | 3021              | 832068         | 3.63                | 10.17                               |
| 2                   | Line 02-21, above 890m elevation  | 10879             | 2225942        | 4.89                | 36.62                               |
| 3                   | 21~49 lines, above 890m elevation | 4010              | 1395877        | 2.87                | 13.50                               |
| 4                   | Below 890 m elevation             | 11794             | 3265677        | 3.61                | 39.71                               |
| total               |                                   | 29704             | 7719564        | 3.85                | 100                                 |

It can be seen from Table 5 that the metal content of section 2 is 36.62%, the ore grade is 4.89g/t, and the depth of this part of the ore body is shallow, the level of resource exploration is high, and the mining difficulty is relatively small. The ore volume of this part of the resources (331+332) of the mine section 1 and 2 is 3058010t, the average grade is 4.55g/t, and the gold metal content is 13,900kg, accounting for 77.61% of the resources within the design scope. It can be used as the first mining section of the mining area.

The mining target of the first phase project is the ore body within the range of +890m elevation to the surface (namely No. 1, 2, and 3 mine sections). The resource (331+332+333) within the design scope of the first phase project is 4,453,887t with an average grade of 4.02 g/t, the amount of gold metal is 17910kg.

Considering that the mine should reduce infrastructure construction time, reduce infrastructure investment, and recover the investment as soon as possible, this design adopts phased mining, and the south of Line 21 is used as the first mining area.

### 3.1 Geotechnical

In the gold mineralization alteration zone in the area, the roof and floor are mainly metatuffs, magnetite quartzite, siliceous rock, metatuffite sandstone, chlorite phyllite, and sericite phyllite. Except for the shallow parts affected by weathered fissures, the middle and deep ore bodies and surrounding rocks are mostly compact and massive, with undeveloped fissures.

The depth of the mining area is generally above 42.6m, which is an oxidation zone, with ore bodies locally occurring, with medium-poor rock quality and poor rock integrity. The following is the primary ore, which is hard crystalline rock with massive structure, high rock strength, excellent rock quality, complete rock mass, non-conducting and non-water-conducting, and is a water barrier.

The engineering geological problems in the mining area are relatively simple, and the fracture structure is not developed. For future mining, it is generally not prone to major engineering geological problems, and support can be carried out as appropriate. However, the top rock quality of the ore body is extremely poor, and the rock mass is broken and shallow. Engineering geological problems, such as collapse and roof fall, may occur in mining in the local area, which should be prevented.

The engineering geological exploration type of the mining area belongs to the second type and the first type, that is, deposits with simple engineering geological conditions as the main block rock.

### 3.2 Mining Design

#### 3.2.1 The Selection of Mining Method

The engineering geological conditions of the mining area are simple, and the hydrogeological conditions are simple. The main ore body M1-1 in the mining area has an inclination angle of 71° and an average thickness of 2.61m.

There are no industrial buildings, non-tourism areas, cultural relics protection areas, nature reserves, and important facilities near the mining area. No people are living in the planned mining area, no major roads, oil and gas pipelines, and no important buildings within the rock movement range. New design Buildings and industrial facilities are all arranged outside the moving range of the ground.

According to the deposit's ore body conditions, mining technical conditions, and hydrogeological conditions, this design mainly adopts the sill-less shallow hole retention method and the sub-drilling stage mine room method.

The orebody with a thickness of fewer than 5m in this design adopts the sill-less shallow hole retention method, accounting for 90%; for the orebody with a thickness of  $\geq 5\text{m}$ , the design with the sub-drilling stage is adopted, accounting for 10%. It is recommended that the mining method test be carried out after the completion of the mine infrastructure, and the mining method ratio should be adjusted according to the actual production engineering geological conditions.

### 3.2.2 Main ramp

The opening of the newly-built ramp is located near line 06 (Figure 8) outside the range of the rock moving belt of the footwall of the ore body, the elevation of the wellhead is +1145m, and the lowest service middle section +890m middle section. Cross-section 4.2m  $\times$  3.8m, 12% gradient of straight-line segments, corners slope gradients and 3%, the level average gradient of 10%. The ramp serves as the main transportation channel for mines and waste rock, as well as the trackless equipment up and down the channel, as well as the main channel for personnel to go up and down, and is responsible for a small amount of air intake and safe exit tasks in the middle of the mining area.

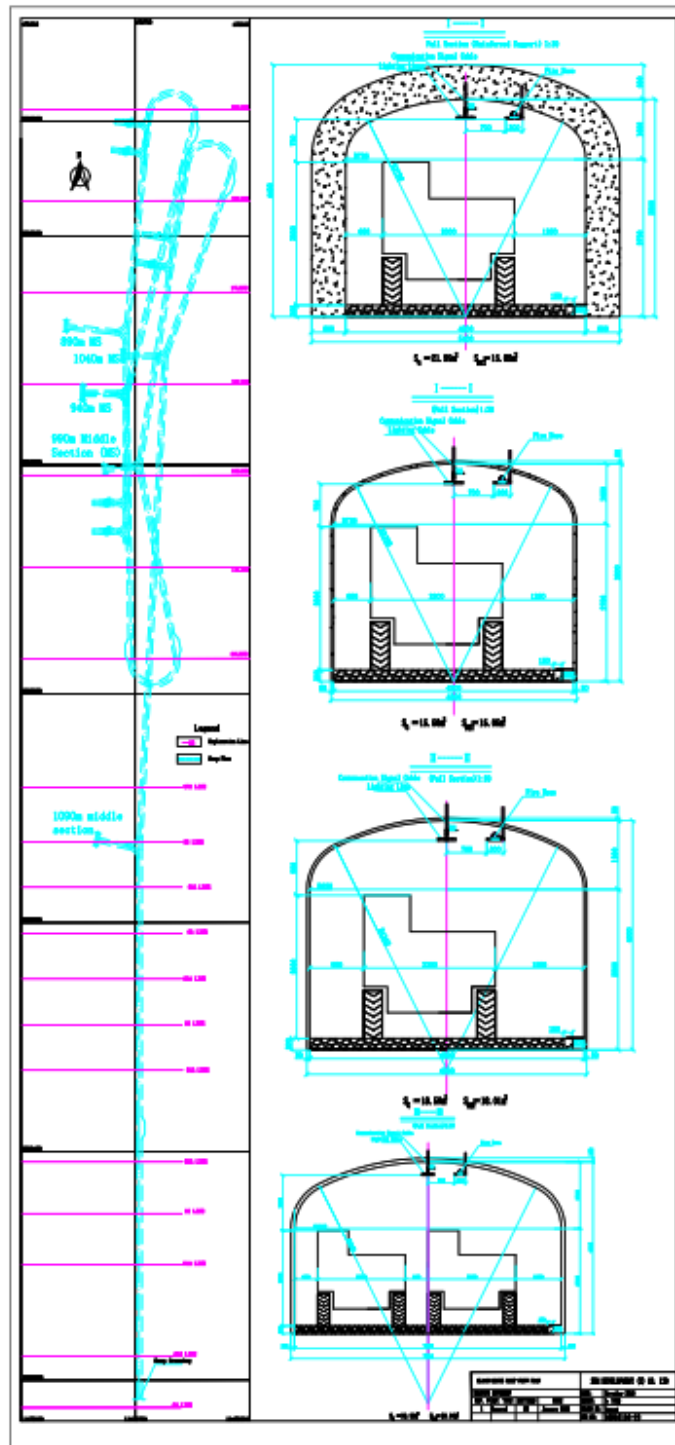


Figure 8: Main Ramp Floor Layout

### 3.2.3 Inclined Shaft

The newly built inclined shaft is located near line 07 outside the range of the rock movement zone of the bottom wall of the ore body. The shaft section is 2.8m×2.8m, the head elevation is +1145m, the bottom elevation is +890m, the inclination angle is 25°, and the azimuth is 0°0'0". The inclined length

is 603.4m, and there are five middle sections of +1090m, +1040m, +990m, + 940m, and +890m. It adopts JTP-1.6×1.2 hoisting winch and the hoisting method of single hook tandem car. The well bears less in the pit some mines and waste rock lifting and material devolving tasks are combined into air shafts and tube and cable shafts. Pedestrian steps are set up in the shafts as underground safety exits.

#### 3.2.4 Auxiliary shaft

A newly-built vertical shaft is used as an auxiliary shaft. The shaft is located near Line 15 outside the range of the rock movement zone of the bottom wall of the ore body. The net section of the shaft is  $\phi 3.8\text{m}$ , the elevation of the shaft is +1145m, the elevation of the bottom of the shaft is +875m, and the full depth of the shaft is 270m, with +1090m, there are 5 middle sections of +1040m, +990m, +940m, and +890m. The shaft uses 2JK-2×1.25/20 winding hoist, No. 2 double-layer cage with counterweight hoist. This shaft is responsible for a small part of the mine, waste rock lifting and material devolving tasks in the pit, as well as air intake shaft, cable shaft and safety exit.

#### 3.2.5 southerly shaft

The newly-built inclined shaft as the south wind shaft is located near line 18 outside the rock moving zone of the ore body. The net section of the shaft is 2.8m×2.8m, the inclination angle is 25°, the elevation of the shaft head is +1150m, the elevation of the bottom of the well is +1040m, and the inclined length of the shaft is 260.3m with an azimuth of 350°0'0 ".

#### 3.2.6 North Ventilation Shaft

The newly-built north ventilation shaft inclined shaft is located near line 49 outside the rock moving zone of the bottom wall of the ore body. The net section of the shaft is 2.4m×2.6m, the inclination angle is 30°, the elevation of the shaft head is +1142m, the elevation of the bottom of the well is +1090m, the inclined length of the shaft is 104m, and the azimuth is 177°0'0", there is a middle section of +1090m. Below the middle section of +1090m, there is an inverted section of the air shaft. The shaft is used as a return air shaft in the north wing of the mining area, and the shaft is equipped with pedestrian steps and handrails as a safety exit under the mine.

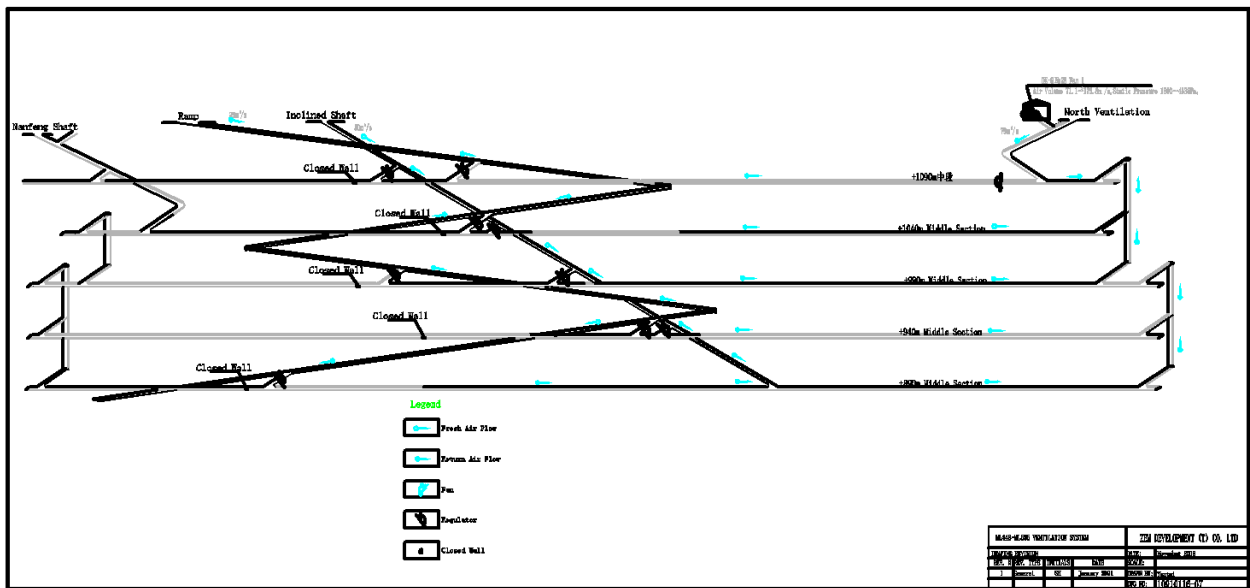


Figure 9: Ventilation System Connected to North Ventilation Shaft

### 3.2.7 Stope Technology

The ore blocks are arranged along the strike, the design ore block length is 50m, the ore block height is the mid-section height (50m), the stoping width is the thickness of the orebody, there is no sill flat bottom structure, the ore vein passageway interval is 5-7m, and the top pillar is 3m.

Bottom-up layered mining is adopted, and operations such as collapse(caving), ventilation, partial ore drawing, levelling and loose rock treatment are carried out in each layer. The stratification height is less than 2m, and the working face is arranged in steps.

### 3.3 Drilling

Drilling will be conducted with two different machines which are YT-27 and YGZ-90. The YT-27 type drilling rig is adopted, and the rock drilling adopts the upward inclined rock drilling method. The YGZ-90 rock drill with disk support is used to drill up and fan-shaped medium and deep holes in the segmented rock tunnel.

### 3.4 Blasting and Haulage

#### 3.4.1 Blasting

The stratified working face is propelled in steps, using artificial charging, segmented millisecond blasting, non-electrically conductive blasting tube detonation, and secondary crushing is carried out in the stope. Blasting parameters are presented in Table 6.

Table 6: Blasting Parameters

|                     |                                  |                               |                    |
|---------------------|----------------------------------|-------------------------------|--------------------|
| Blast hole layout   | Parallel arrangement             | Minimum resistance line W (m) | 0.8                |
| Hole depth (m)      | 1.8~2.2                          | Hole spacing (m)              | 0.8                |
| Charge method       | Artificial                       | Explosive type                | Emulsion Explosive |
| Initiating material | non-electrically conductive tube | Charge coefficient            | 0.8                |

### 3.4.2 Haulage

Mining from the stope is carried out within the ore veins by drilling and blasting. The working face of the stope is levelled to allow the rock loader to move material from the stope. The rock loader shovels the ore into the mine cart, and then the battery-type electric locomotive hauls the mine cart to the middle section of the chute and transfers it to the pit truck to transport to the surface.

The haulage is based on the production of 1200 t/d and 300 t/d of ore and waste respectively. The ore has a specific gravity of 3.14 t/m<sup>3</sup> and waste has a density of 3.10 t/m<sup>3</sup>. The loose factor of 1.6 was used and 300 working days per year, 3 shifts per day and 8 hours per shift.

The average transportation distance in the middle section of production is 900m, and the transportation volume of the single middle section is 600t/d of ore and 150t/d of waste rock.

According to the transportation distance and transportation volume, the design of transporting mine waste rock adopts CTY8-6/144 battery-type electric locomotive to haul YCC1.2-6 mine car. Table 7 shows the transportation calculation.

The designed transportation roadway adopts monorail transportation, and the underground is all laid 22kg/m light rail, the gauge is 600mm, the 622-5-15 turnout is used, the 300mm~320mm ballast is laid, and the heavy truck has a slope of 3%.

Table 7: Transportation calculation for the middle section

| Serial number | Calculate the content              | Unit             | Mid-production transportation |                        |
|---------------|------------------------------------|------------------|-------------------------------|------------------------|
|               |                                    |                  | Underground ore               | Underground waste rock |
| 1             | Transport task                     | t/d              | 600                           | 150                    |
| 2             | Electric locomotive specifications |                  | CTY8-6/144                    | CTY8-6/144             |
| 3             | Uneven coefficient                 |                  | 1.2                           |                        |
| 4             | Ore weight                         | t/m <sup>3</sup> | 3.14                          | 3.10                   |
| 5             | Loose factor                       |                  | 1.6                           |                        |
| 6             | Lose weight                        | t/m <sup>3</sup> | 1.962                         | 1.938                  |
| 7             | Fill factor                        |                  | 0.85                          | 0.85                   |
| 8             | mine model                         |                  | YCC1.2-6                      | YCC1.2-6               |

| Serial number | Calculate the content         |              | Unit           | Mid-production transportation |                        |
|---------------|-------------------------------|--------------|----------------|-------------------------------|------------------------|
|               |                               |              |                | Underground ore               | Underground waste rock |
|               | car                           | Self-respect | kg             | 1000                          | 1000                   |
|               |                               | Volume       | m <sup>3</sup> | 1.2                           | 1.2                    |
| 9             | Effective load                |              | kg             | 2000                          | 1977                   |
| 10            | Number of mine cars per train |              | A              | 10                            | 10                     |
| 11            | Effective load per train      |              | kg             | 20000                         | 19770                  |
| 12            | Transport distance            |              | m              | 900                           | 900                    |
| 13            | Train speed                   |              | m/s            | 2.16                          | 2.16                   |
| 14            | Shunting time                 |              | s              | 180                           | 180                    |
| 15            | Loading time                  |              | s              | 1500                          | 1500                   |
| 16            | Unexpected delay              |              | s              | 180                           | 180                    |
| 17            | operation hours               |              | s              | 833                           | 833                    |
| 18            | Give uptime                   |              | s              | 180                           | 180                    |
| 19            | Cycle time                    |              | s              | 2873                          | 2573                   |
| 20            | Class working hours           |              | h              | 5.5                           | 5.5                    |
| twenty-one    | Cycle times of a locomotive   |              | Times/shift    | 6.89                          | 6.89                   |
| twenty-two    | Required capacity per shift   |              | Tons/shift     | 240                           | 60                     |
| twenty-three  | Number of cycles required     |              | Times          | 12                            | 3.03                   |
| twenty-four   | Number of trains required     |              | station        | 1.74                          | 0.44                   |
| 25            | Select the number of trains   |              | station        | 2                             | 1                      |

According to the above calculation, one train can complete the transportation task of ore waste rock in a single production middle section. Choose 6 CTY8-6/ 144 battery-type electric locomotives, 4 electric locomotives to transport ore, 2 electric locomotives to transport waste rock and standby, and 30 YCC1.2-6 type mining vehicles.

### 3.5 Mine Production

The average stope production capacity is 150t/d with a rock loader efficiency of 200t/set, mining loss rate of 16.96%, mining dilution rate 19.21% and drilling rate of 9.93 m/kt.

According to mine requirements, the design recommended production scale is  $36 \times 10^4$  t/a (1200t/d), and there is room for expansion of the production scale.

### 3.6 Equipment Selection

For development and production work, various equipment is required, Table 8 shows the main equipment utilized in the project.

Table 8: Main Mining Equipment

| Serial number | Equipment name | model      | unit    | jobs | spare | total | power (Kw/set) | Remarks                     |
|---------------|----------------|------------|---------|------|-------|-------|----------------|-----------------------------|
| 1             | Rock loader    | Z-17W      | station | 13   | 3     | 16    | 10.5           |                             |
| 2             | Local fan      | JK58-1№4   | station | 10   | 2     | 12    | 5.5            |                             |
| 3             | Local fan      | JK58-1№4.5 | station | 3    | 1     | 4     | 11             |                             |
| 4             | Rock drill     | YT-27      | station | 26   | 10    | 36    |                |                             |
| 5             | Rock drill     | YSP-45     | station | 4    | 2     | 6     |                |                             |
| 6             | Pit truck      | CA-20      | station | 6    | 1     | 7     |                |                             |
| 7             | Main fan       | DK-8-№28   | station | 1    | 0     | 1     | 2×450          | Air shaft wellhead fan room |

### 3.7 Stockpiles

The stockpile existing in the site is the ROMPAD located near and west of the processing plant for ore storage. The ore from underground is transported by truck to the ROMPAD of the processing plant. The footprint covered by the ROMPAD is around 5,574 m<sup>2</sup>.

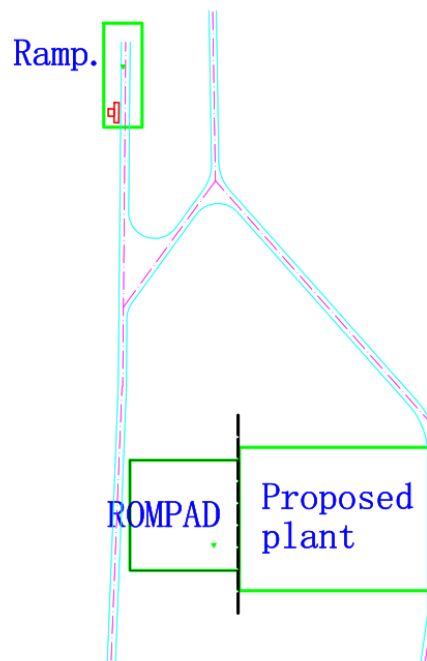


Figure 10: ROMPAD

### 3.8 Production rate, Mining Sequence and Scheduling

#### 3.8.1 Production Rate

According to mine requirements, the design recommended production scale is  $36 \times 10^4$  t/a (1200t/d), and there is room for expansion of the production scale. Table 9 represent the production capacity of the middle section.

It can be seen from the middle section production capacity table that under the condition that the utilization coefficient of the middle section ore block is not greater than 0.4, the production capacity of 1200t/d during the two middle sections and mining south of line 21 and north of mining line 21 can be met.

Table 9: Production Capability of the Middle Section

| Mining section   | Middle section | Number of cloth ore blocks | Nugget utilization factor | Number of ore blocks that can be produced simultaneously | Nugget production capacity (average) | By-product ore rate | Mid-stage production capacity |                    |
|------------------|----------------|----------------------------|---------------------------|--|--------------------------------------|---------------------|-------------------------------|--------------------|
|                  |                |                            |                           |  | (T/d)                                | (%)                 | (T/d)                         | (Ten thousand t/a) |
| South of Line 21 | +1090m         | 30                         | 0.4                       | 12   | 78                                   | 9.44                | 1034                          | 31                 |
|                  | +1040m         | 30                         | 0.4                       | 12   | 78                                   | 9.44                | 1034                          | 31                 |
|                  | +990m          | 28                         | 0.4                       | 11.2   | 78                                   | 9.44                | 965                           | 29                 |
|                  | +940m          | 20                         | 0.4                       | 8  | 78                                   | 9.44                | 689                           | twenty-one         |
|                  | +890m          | twenty-two                 | 0.4                       | 8.8  | 78                                   | 9.44                | 758                           | twenty-three       |
|                  | average        | 26                         | 0.4                       | 10.4   | 78                                   | 9.44                | 896                           | 27                 |
| North of Line 21 | +1090m         | twenty-four                | 0.4                       | 9.6  | 78                                   | 9.44                | 827                           | 25                 |
|                  | +1040m         | twenty-four                | 0.4                       | 9.6  | 78                                   | 9.44                | 827                           | 25                 |
|                  | +990m          | twenty-two                 | 0.4                       | 8.8  | 78                                   | 9.44                | 758                           | twenty-three       |
|                  | +940m          | twenty-two                 | 0.4                       | 8.8  | 78                                   | 9.44                | 758                           | twenty-three       |
|                  | +890m          | 18                         | 0.4                       | 7.2  | 78                                   | 9.44                | 620                           | 19                 |
|                  | average        | twenty-two                 | 0.4                       | 8.8  | 78                                   | 9.44                | 758                           | twenty-three       |

The mid-year decline rate verification was performed and the results are presented in Table 10.

After it is put into production, two middle-stage productions will be adopted. When the comprehensive descent speed of the mine is 19.7m, the production scale can reach  $36 \times 10^4$  t/a. Compared with the annual decline rate of similar mines in the south of the 21<sup>st</sup> line, the decline rate is similar, and the annual decline rate of the north of the 21<sup>st</sup> line is faster than the annual decline rate of similar mines, but through strengthening production management, it can reach  $36 \times 10^4$  t/a production scale.

According to the layout of the mining area development system, the ore body has relatively little change in direction and inclination, and the amount of development, prospecting, and mining and cutting works in each middle section is not much different. The length of excavation and excavation in the middle section south of the 21<sup>st</sup> line is taken as 1500m, the average engineering intensity of the middle section is 200m/month, and the opening time of the middle section is 8 months. If the construction period of the mining and cutting project is increased by 4 months, the preparation time for the new middle section is about 1.5 years. The average service life of the mid-section mining and mining services is 1.7 years. From the above calculation, it can be seen that the mid-section preparation time meets the  $36 \times 10^4$  t/a production continuation requirement.

Through the above verification, the designed mine production capacity of  $36 \times 10^4$  t/a (1200t/d) is feasible and reliable.

Table 10: Calculation Results for Rate of Decline in Production Capacity

| Mining section   | Middle section | Ore volume (t) | Mid-stage production capacity |                   | Loss rate (%) | Depletion rate (%) | Mid-section height (M) | Geological influence coefficient | speed of decent (M/a) | Middle service life (A) |
|------------------|----------------|----------------|-------------------------------|-------------------|---------------|--------------------|------------------------|----------------------------------|-----------------------|-------------------------|
|                  |                |                | t/d                           | $\times 10^4$ t/a |               |                    |                        |                                  |                       |                         |
| South of Line 21 | +1090          | 484067         | 600                           | 18                | 13.74         | 16.27              | 50                     | 0.9                              | 20.05                 | 2.49                    |
|                  | +1040          | 552300         | 600                           | 18                | 13.74         | 16.27              | 50                     | 0.9                              | 17.58                 | 2.84                    |
|                  | +990           | 522938         | 600                           | 18                | 13.74         | 16.27              | 50                     | 0.9                              | 18.56                 | 2.69                    |
|                  | +940           | 485917         | 600                           | 18                | 13.74         | 16.27              | 50                     | 0.9                              | 19.98                 | 2.50                    |
|                  | +890           | 434451         | 600                           | 18                | 13.74         | 16.27              | 50                     | 0.9                              | 22.34                 | 2.24                    |
|                  | total          | 2479673        | 600                           | 18                | 13.74         | 16.27              | 250                    | 0.9                              | 19.70                 | 2.55                    |
| North of Line 21 | +1090          | 117524         | 600                           | 18                | 13.74         | 16.27              | 50                     | 0.9                              | 82.59                 | 0.61                    |
|                  | +1040          | 430905         | 600                           | 18                | 13.74         | 16.27              | 50                     | 0.9                              | 22.53                 | 2.22                    |
|                  | +990           | 313309         | 600                           | 18                | 13.74         | 16.27              | 50                     | 0.9                              | 30.98                 | 1.61                    |
|                  | +940           | 135566         | 600                           | 18                | 13.74         | 16.27              | 50                     | 0.9                              | 71.60                 | 0.70                    |
|                  | +890           | 145887         | 600                           | 18                | 13.74         | 16.27              | 50                     | 0.9                              | 66.54                 | 0.75                    |
|                  | total          | 1143191        | 600                           | 18                | 13.74         | 16.27              | 250                    | 0.9                              | 54.85                 | 1.18                    |

### 3.8.2 Mine Scheduling

The project is a mining technology transformation project, combining the resources of the mining area, and according to the principle of a single-middle stage production, the mining plan is prepared to make stable production.

According to the mining progress plan, the mine has a service life of 10.4 years, and production will be reached when it is put into operation. The designed stable production year is 10.4 years. Table 11 and Table 12 shows mining output statistics and mining schedule respectively.

Table 11: Ore Recovery Statistics

| Middle elevation (m) | Design and utilization of ore |                   |                     | Mined ore volume |                   |                     | Loss rate | Depletion rate |
|----------------------|-------------------------------|-------------------|---------------------|------------------|-------------------|---------------------|-----------|----------------|
|                      | Ore quantity (t)              | Metal amount (kg) | Average grade (g/t) | Ore quantity (t) | Metal amount (kg) | Average grade (g/t) | %         | %              |
| +1090                | 601591                        | 2,649.67          | 4.4                 | 619761           | 2,285.61          | 3.69                | 13.74     | 16.27          |
| +1040                | 983205                        | 4,188.5           | 4.26                | 1012901          | 3613.00           | 3.57                | 13.74     | 16.27          |
| +990                 | 836247                        | 3596              | 4.17                | 861504           | 3101.91           | 3.60                | 13.74     | 16.27          |
| +940                 | 621483                        | 25 91.15          | 4.17                | 640254           | 2,235.13          | 3.49                | 13.74     | 16.27          |
| +890                 | 580338                        | 2,229.16          | 3.84                | 597866           | 1922.87           | 3.22                | 13.74     | 16.27          |
| total                | 3622864                       | 15,254.48         | 4.21                | 3732286          | 13158.51          | 3.53                | 13.74     | 16.27          |

### 3.9 Waste Rock Dumps

The proposed waste rock dump is located as shown in Figure 11 and its design is in progress.

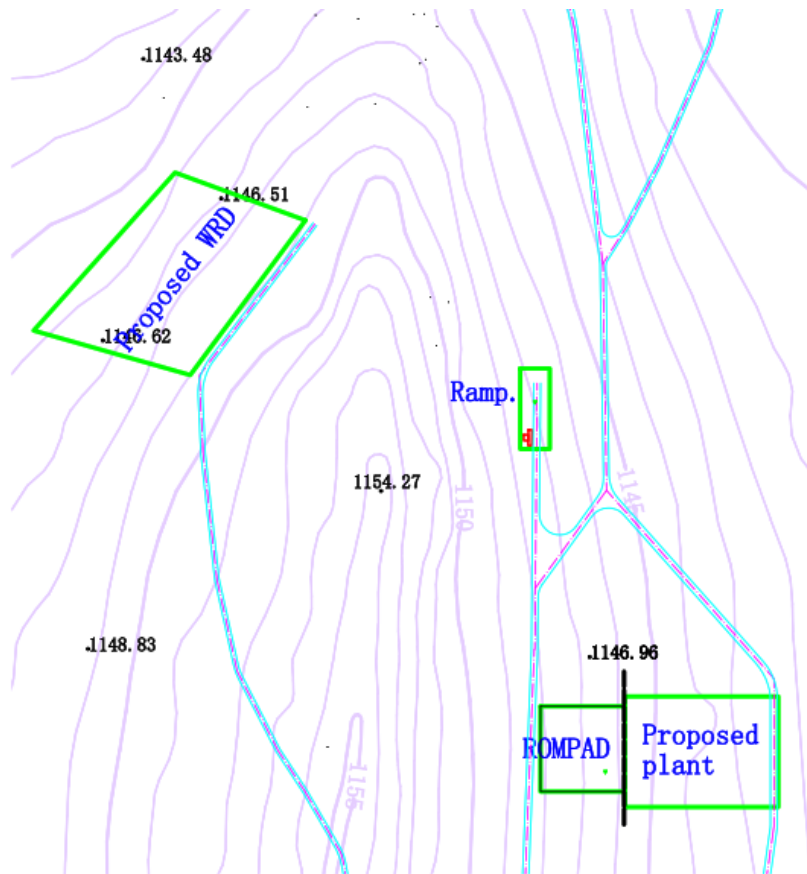


Figure 11: Proposed Location for Waste Rock Dump

Table 12: Mine Schedule

| Middle section | the first year |       |          | the second year |       |          | The third-year |       |          | fourth year |       |               |
|----------------|----------------|-------|----------|-----------------|-------|----------|----------------|-------|----------|-------------|-------|---------------|
|                | Ore            | grade | Metal    | Ore             | grade | Metal    | Ore            | grade | Metal    | Ore         | grade | Metal content |
|                | (t)            | g/t   | kg       | (t)             | g/t   | kg       | (t)            | g/t   | kg       | (t)         | g/t   | kg            |
| +1090          | 180000         | 3.78  | 680.34   | 180000          | 3.78  | 680.34   | 138687         | 3.78  | 524.19   |             |       |               |
| +1040          | 180000         | 3.86  | 694.20   | 180000          | 3.86  | 694.20   | 208981         | 3.86  | 805.97   |             |       |               |
| +990           |                |       |          |                 |       |          | 12331          | 3.82  | 47.16    | 180000      | 3.82  | 688.37        |
| +940           |                |       |          |                 |       |          |                |       |          | 180000      | 3.73  | 671.60        |
| total          | 360000         | 3.82  | 1,374.53 | 360000          | 3.82  | 1,374.53 | 360000         | 3.83  | 1,377.32 | 360000      | 3.78  | 1,359.98      |
| Middle section | fifth year     |       |          | Sixth year      |       |          | Seventh year   |       |          | Eighth year |       |               |
|                | Ore            | grade | Metal    | Ore             | grade | Metal    | Ore            | grade | Metal    | Ore         | grade | Metal content |
|                | (t)            | g/t   | kg       | (t)             | g/t   | kg       | (t)            | g/t   | kg       | (t)         | g/t   | kg            |
| +1090          |                |       |          |                 |       |          | 121074         | 3.31  | 400.74   |             |       |               |
| +1040          |                |       |          |                 |       |          | 58926          | 3.20  | 188.31   | 133102      | 3.20  | 425.35        |
| +990           | 180000         | 3.82  | 688.37   | 178732          | 3.82  | 683.53   |                |       |          |             |       |               |
| +940           | 180000         | 3.73  | 671.60   | 140593          | 3.73  | 524.57   |                |       |          |             |       |               |
| +890           |                |       |          | 40674           | 3.34  | 135.86   | 180000         | 3.34  | 601.22   | 226898      | 3.34  | 757.86        |
| total          | 360000         | 3.78  | 1,359.98 | 360000          | 3.73  | 1,343.96 | 360000         | 3.31  | 1,190.27 | 360000      | 3.29  | 1,183.22      |
| Middle section | Ninth year     |       |          | Tenth year      |       |          | Eleventh year  |       |          |             |       |               |
|                | Ore            | grade | Metal    | Ore             | grade | Metal    | Ore            | grade | Metal    |             |       |               |
|                | (t)            | g/t   | kg       | (t)             | g/t   | kg       | (t)            | g/t   | kg       |             |       |               |
| +1040          | 180000         | 3.20  | 575.23   | 71892           | 3.20  | 229.75   |                |       |          |             |       |               |
| +990           | 180000         | 3.23  | 580.89   | 142772          | 3.23  | 460.75   |                |       |          |             |       |               |
| +940           |                |       |          | 139661          | 2.63  | 367.35   |                |       |          |             |       |               |
| +890           |                |       |          | 5676            | 2.85  | 16.16    | 144617         | 2.85  | 411.77   |             |       |               |
| total          | 360000         | 3.21  | 1156.12  | 360000          | 2.98  | 1074.00  | 144617         | 2.85  | 411.77   |             |       |               |

## 4 DRAINAGE AND HYDROLOGY

### 4.1 Drainage Method and System

A centralized drainage system is used in the design pit. A permanent sump and pump room will be built near the depot at the bottom of the inclined shaft +890m.

The flowing water from each middle section of the well is collected into the +890m middle section sump, which is discharged by the pump through the inclined well to the high surface pool.

The normal underground water inflow is  $2055\text{m}^3/\text{d}$ , the maximum water inflow is  $3083\text{m}^3/\text{d}$ , and the production backwater is  $225\text{m}^3/\text{d}$ .

According to the downhole water inflow and production backwater. The designed sump volume is  $800\text{m}^3$ , which can accommodate 8.42h of water flowing during the normal flow period and meet the drainage requirements in the pit.

The sump layout adopts single-sided layout, that is, the sump is arranged on one side of the pump room, and two independent sumps are parallel to each other.

The pump room adopts the suction type, including pump room, suction well, water distribution tunnel and connecting channel.

To facilitate the management, the pump room and the substation chamber are arranged jointly and close to the wellbore. There are two exits in total, connecting with the +890m middle sections of the parking lot.

### 4.2 Hydrology

There is a need to strengthen mine hydrology information through a study of underground water inflow in the case of an increase in precipitation during the rainy season and provide a reliable basis for the selection of underground drainage.

## 5 MINERAL PROCESSING

### 5.1 Processing Layout

#### 5.1.1 Basic Principles for General Layout

The overall layout of the enterprise should meet the requirements of the overall urban and rural planning, combined with the technical, economic and natural conditions of the area where the enterprise is located and should meet the requirements of production, transportation, earthquake prevention, flood prevention, fire prevention, safety, sanitation, environmental protection, water and soil conservation and staff living facility's Needs.

The overall layout should correctly handle the short-term and long-term relationship and should achieve centralized layout in the short-term, reserved development in the long-term, and requisition in phases.

The overall layout should be based on the composition of the enterprise with the main industrial site as the main body and should be comprehensively planned and coordinated. The mutual position of each part should be compactly arranged under the premise of meeting the requirements of safety, health, energy-saving and environmental protection, and should fully reflect the economic, social and environmental benefits of the enterprise.

The overall layout should meet the technological process. It is advisable to enable the main materials to be transported by themselves, to reduce the transportation distance of various materials, and to meet the requirements of convenient production management, energy saving, reduction of enterprise operating costs, and improvement of economic benefits.

It is not advisable to arrange multiple industrial sites with pollution sources near the same extension line where the wind prevails all year round. On the premise of meeting the needs of the main project, the facilities with the greatest pollution hazards should be located far away from non-polluting facilities, the corresponding locations of other facilities should be reasonably determined, and the mutual influence of each site should be reduced.

Waste materials should not be stacked randomly, and a dedicated storage yard should be set up, and its location should not be too far away from the waste discharge point and should be located on the upwind side of the industrial site and residential area with the lowest frequency wind direction throughout the year. The waste storage yard should maintain a certain safety and sanitary protection distance from residential areas and water sources. The topography and engineering

geological conditions of the waste storage yard should be compatible with the storage and stability of the waste.

The waste storage yard should make full use of valleys, depressions, wasteland, and poor land. It is strictly forbidden to occupy good land, and less cultivated land should be occupied. It is strictly prohibited to use water source protection areas, rivers, and lakes as waste dumps. It is strictly forbidden to occupy historical sites and natural reserves.

#### 5.1.2 General Layout

A processing plant is located southeast of the adit about 200m from the main underground entrance with an area of 4.39 hm<sup>2</sup>. The production area of the processing plant includes raw ore storage yard, crushing workshop, screening workshop, fine ore warehouse, ball milling workshop, leaching adsorption workshop, analytical electrolysis and carbon regeneration workshop, tailings filtering workshop (close to the solid waste storage yard), machine (Auto) repair workshop, general step-down substation, backwater pump room and so forth.

According to the requirements of the process flow, the whole plant area is arranged in steps from high to low. On the premise of meeting the requirements of the technological process, make full use of the existing site terrain conditions to reduce the amount of earthwork as much as possible, the layout is compact and reasonable, the in and out of materials are smooth, the auxiliary facilities are close to the main service objects, the maintenance is convenient, and the fire protection is unobstructed. All major platforms consider transportation requirements and are connected by roads in the factory. The roadway leads to the main platforms of the plant, and a return yard is set up at the corresponding site.

#### 5.1.3 Vertical layout

According to the process flow and plant configuration of the concentrator, the vertical layout of the concentrator plant adopts a stepped layout. According to the terrain conditions, from high to low, they are ore storage yard, crushing workshop, screening workshop, fine ore warehouse, ball milling workshop, leaching and adsorption workshop, analytical electrolysis and carbon regeneration workshop, tailings filtering workshop, etc. Make full use of the terrain height difference, facilitate the flow of the main process, realize gravity transportation, and save operating costs; at the same time, it also minimizes the amount of earthwork and saves investment. According to the different design elevations of the steps of each site, the slope treatment should be carried out according to local conditions, or the corresponding retaining walls or different forms of slope protection should

be constructed to ensure the stability of the platform steps. Guardrails are provided on the top of the retaining wall 1.2m above the ground.

Other industrial sites, administrative offices and living quarters are all arranged in flat slopes due to their small land area and flat terrain. The drainage ditch is provided at the lower part of each slope.

#### 5.1.4 Site Drainage

The site rainwater removal measures include the followings:

Combining the site topography, topography and vertical layout, the mineral processing plant area adopts open ditch drainage, which is arranged along the retaining wall and the road inside the plant. The surface water of the plant area is collected by the open ditch and is collected into the side ditch outside the plant. The drainage ditch is a rectangular concrete ditch with a width of 0.6m; The rainwater of the newly-built factory building is collected through the dispersing ditch and then discharged into the nearby newly-built drainage ditch;

Flood interception ditch shall be set up at the junction of the boundary of every building, structure and each site (including dumping ground) and the surrounding hillside to prevent mountain torrents from invading the site;

In the design of the internal and external roads of each site, drainage ditches shall be set up per the regulations, and they shall be discharged into the downstream rivers after gathering;

#### 5.1.5 Plant greening

Greening is an effective means to improve the environmental climate, reduce pollution, and beautify the plant area. This project takes into account the local climatic conditions, designing green belts on both sides of the main roads and walls in the plant area; implement key greening in front of important buildings and road junctions; implement a larger area of greening in the front area of the plant; Under the premise of functional needs, greening will be carried out on both sides of the vacant land and roads in the factory area to form a greening system combining points, lines and surfaces. Trees and lawns can effectively vacuum and reduce noise. Local trees that vacuum, absorb harmful gases, and absorb sounds, such as rubber trees, alpine ficus, and other trees, shrubs, flowers and climbing plants, should be selected timely and appropriately. The slope protection method combined with vegetation slope protection shall be adopted as far as possible for the slope grading around the plant area. At the same time, effective protection measures should be taken for the existing vegetation in the plant area that does not affect the construction of the project.

### 5.1.6 Processing Plant Fire Protection

The fire protection work in the mining area is managed by the company and the local fire department. This project is designed to provide necessary fire-fighting equipment and facilities (including portable dry powder fire extinguishers and outdoor ground-type fire hydrants, etc.) in various industrial sites and office and living areas for emergency use. There are 6 fire management personnel in the factory.

The horizontal clear distance between buildings and structures and the setting of firewalls shall meet the requirements of building design fire protection codes. To facilitate production management, a fence is set around the site.

### 5.1.7 Internal Transportation

Internal transportation is mainly including the raw ore transported from the ramp to the raw ore storage yard of the beneficiation plant. The average transport distance is 260 m, and the transport volume is 36 ×10<sup>4</sup>t/a; quarry blasting equipment transported from the wellhead master depots; other materials are transported from warehouses (such as spare parts warehouse, oil depot, etc.) to users, with a transportation capacity of 769.257t.

### 5.1.8 External Transportation

External transportation is mainly to transport blasting equipment, oil (including diesel, gasoline, lubricating oil, etc.), sodium cyanide, calcium oxide, primary steel balls, liners, activated carbon, belts, screens and other spare parts and production needs from outside. The total amount of materials shipped is about 2936.817 t/a; gold will be shipped out.

## 5.2 Crushing and Grinding

After lifting the ore to the surface, through the ore heap directly to the motor vehicle field, and then sent to the forklift ore bin, the maximum ore size is 300mm.

### 5.2.1 Crushing and Grinding Process

The crushing adopts two-stage and one-closed-circuit process. The ore size is <math>-300\text{mm}</math>. The ore is transported to the original ore warehouse by forklifts and other equipment. After two stages of crushing, the final product size is <math>-12\text{mm}</math>. Grinding adopts a two-stage grinding process. The first stage mill is composed of an MQG 320/450 ball mill and a hydro cyclone. The ore size ranges from <math>-12\text{mm}</math> to <math>-200\text{ mesh}</math>, accounting for 70 %. The second stage mill is composed of MQY 320/450 a ball mill and hydro cyclone closed configuration, entering the cyanide leaching of <math>-200\text{ mesh}</math> particle size reaches 95%.

### 5.2.2 Cyanide Leaching Process

According to the above-mentioned beneficiation test report and the development trend of domestic and foreign cyanide leaching, as well as the investigation and understanding of domestic and foreign markets, the all-slime cyanidation process is formulated regarding the test and production practice of similar domestic mines. After the cyclone overflow is removed by the vibrating screen, it is concentrated to 40%, and then sent to 5  $\phi$  10.5  $\times$  11 m leaching tanks with sand pumps. The sodium cyanide leaching time is 36 h, the leaching slurry concentration is 40%, and the leaching slurry pH value is 11.7.

### 5.2.3 Carbon Slurry Adsorption Process

The leached pulp enters 5  $\phi$  10.5  $\times$  11 m adsorption tanks, the adsorption time is 36 h, the gold-loaded carbon and gold are 3-4kg/t, the activated carbon is added from the fifth tank during normal production, and is quantified regularly from the latter trough to the forward trough, the gold-loaded carbon is taken out from the first trough.

### 5.2.4 Analysis and Electrolysis Process

The gold-loaded carbon is sent to the JCC-2000 analysis and electrolysis device for analysis and electrolysis, and each batch processes 2000kg of gold-loaded carbon. The gold-containing precious liquid discharged from the analytical column flows into the electrowinning tank after cooling, and when the solution flows through the steel wool cathode, the gold powder is electroplated on the steel wool. The electrowinning lean solution can be returned to the analysis operation as an eluent.

The gold-loaded cathode is regularly taken out of the tank, and flux is added to smelt to obtain a gold ingot.

## 5.3 Equipment Selection

### 5.3.1 Principles for The Selection of Main Equipment

The type, specification and number of selected equipment should meet the scale of the processing plant, the physical and chemical properties of the ore processed, and the user's requirements for product quality.

Try to choose domestic, advanced, reliable, high-quality, high-efficiency, energy-saving, and low-consumption large-scale equipment that ensures the realization of process indicators and matches the production scale to promote the development of domestic equipment. Domestic models or quality cannot meet the production equipment Should consider importing from abroad.

According to its mine production situation, the crushing equipment is imported from abroad.

When selecting large-scale equipment, consideration should be given to factors such as flexibility in production and management, local transportation conditions and power supply conditions.

Taking into account the fluctuations in the amount, grade and indicators of the ore in production, the slurry fluctuation coefficient of 1.15~1.5 is considered when calculating the sorting operation and equipment selection.

### 5.3.2 Comparison of Main Equipment Selection Schemes

#### 5.3.2.1 Comparison of Crushing Equipment Schemes

This design conducts a relatively extensive and in-depth investigation and understanding of the crushing equipment, and the crushing equipment needs to adopt foreign advanced equipment. Combining the production practice of similar concentrators, the design of the crushing and screening process is compared and selected: three-stage one closed-circuit crushing and screening process and two-stage one closed-circuit crushing and screening process. Detailed comparative crushing process scheme is shown in Table 13.

Table 13: Comparison of Crushing Process Plan

| Program         | I                                   | II                                  |
|-----------------|-------------------------------------|-------------------------------------|
| name            | Three-stage broken                  | Two pieces of broken                |
| flow chart      |                                     |                                     |
| Major equipment | Coarse crushed C80/75kW 1 set       | Crushed C95/90kW 1 set              |
|                 | Medium crush HP200/132kW 1 set      |                                     |
|                 | Finely crushed HP300/200kW 1 set    | Finely crushed HP300/200kW 1 unit   |
|                 | Vibrating screen 2YA2160/22kW 1 set | Vibrating screen 2YA2160/22kW 1 set |

|   |   |   |
|---|---|---|
| Installed power (kW)                                  | 429   | 312   |
| The total price of main equipment (ten thousand yuan) | 690   | 450   |
| Plant area (m <sup>2</sup> )                          | 520   | 306   |
| Feeding and discharging particle size (mm)            | Raw ore feed size $\leq 300\text{mm}$ ,<br>Particle size under sieve $\leq 10\text{mm}$   | Raw ore feed size $\leq 300\text{mm}$ ,<br>Particle size under sieve $\leq 12\text{mm}$   |
| Technical characteristics comparison                  | Advantages: Realize more crushing and less grinding, energy-saving and consumption reduction<br><br>Disadvantages: the process and configuration are relatively complicated, the one-time investment is more, and the production and maintenance costs are more expensive | Advantages: simple process; low investment in disposable equipment; a centralized arrangement of equipment, easy production management, small floor space, and few related supporting facilities<br><br>Disadvantages: crushed product particle size than the program I crude |

#### 5.3.2.2 Comparison of Grinding Equipment Schemes

According to production practice and process design specifications, when the grinding particle size is less than 0.074mm and the particle size content does not exceed 65%, one stage grinding should be used. When the grinding particle size is less than 0.074mm, the content of the grain grade is 65% to 90%, and two-stage grinding should be adopted. According to the beneficiation test report, the grinding fineness is 95%, so the number of grinding stages is two.

#### 5.4 Tailings Storage Facility

The proposed location (Figure 2) for the tailings storage facility is on the south waste about 975 metres from the processing plant. The produced tailings will be pressed and filtered before being sent to the TSF with a belt conveyor. The TSF design is in progress which will provide all the details about construction material selection, foundation stability, operating condition and so forth.

## 6 INFRASTRUCTURE, EQUIPMENT AND POWER SUPPLY

### 6.1 Infrastructure

To meet the required level 3 mine volume and form complete development transportation, ventilation system, power supply system, water supply and drainage system, the mine infrastructure projects mainly include the new main ramp, inclined shaft, pump house, water storage, substation, and a middle section open up and cut mining engineering.

The amount of infrastructure construction is 103,114 m<sup>3</sup>, and the construction period is 2.1a.

### 6.2 Equipment Selection

#### 6.2.1 Mining equipment

From the selection of mining technology to the selection of equipment, full consideration is given to reducing energy consumption and improving economic benefits. The design adopts the sill-less shallow hole retention method and the segmented rock drilling stage ore room method, and the Z-17W type rock loader is used to extract the ore. The ore exploded in the stope falls to the bottom of the stope by its weight, which improves efficiency and reduces power consumption.

#### 6.2.2 main electrical equipment

The power transformer selects S11 energy-saving oil-immersed type, KSG energy-saving mine dry type, and SCB11 energy-saving dry-type power transformer according to the use environment. 10kV switchgear GKG-12 metal armoured withdrawable mining switchgear. Microcomputer integrated protection device and automatic monitoring system select domestic well-known brand products. The DC device uses lead-acid maintenance-free battery high-frequency switch DC screen. The ground surface of the low-voltage power distribution panel adopts the fixed GGD type low-voltage power distribution panel; the GKD type mine low-voltage power distribution panel is used in the underground. The main electrical components adopt domestic well-known brands or joint venture brand products. All electrical equipment within the scope of mine safety sign management is selected for mining (KA) mark products.

### 6.3 Power Supply

The main power supply of the mining project is supplied by the 10kV side of the mine 33/10kV total step-down substation and is transmitted to the substations by overhead lines and cables.

Among the electrical loads of this project, there is a primary electrical load with a maximum working capacity of 1230kW. The main fan, underground drainage, emergency lighting and other electrical

equipment require dual power supplies. At the same time, the construction unit requires that the power supply capacity of the backup power supply should meet the power consumption of most mining production equipment. The power supply range includes two air compressors, mining equipment and all primary loads. The setting method is that 4 units are operated in parallel. The design uses diesel generator sets to provide backup power. According to the first-level load capacity and the construction unit's requirements for backup power, considering factors such as equipment start-up, this mining project plans to install four XG-720GF (10kV, 720kW) diesel generators, intelligent One set of parallel cars. The mine is on the beneficiation industrial site, close to the 33/10kV general step-down substation, a newly built diesel power station, which is set up as a diesel generator set to provide backup power for mining and beneficiation and auxiliary facilities. Four diesel generators and an intelligent paralleling device are used for mining engineering, which is placed in the main diesel power station. 10kV power generator output, YJV22-10kV-3 × 95 via the cable to the 33 / 10kV substation total downside, the drop of the total for 10kV power distribution voltage to each substation workshop.

#### 6.3.1 Load calculation

The total installed capacity of electrical equipment for the entire mining project is 3118kW, and the working capacity is 2546kW; the calculated load is:

Active power: 1839kW

Reactive power: 1072kvar

Apparent power: 2128kVA

The annual power consumption is  $743.69 \times 10^4$  kWh.

The maximum working capacity of the first-level load electrical equipment is 1230kW, and the calculated apparent power is 1196kVA.

#### 6.3.2 Supply system

High-voltage power distribution system: The 10kV power distribution system that supplies power to the first-level load adopts a single busbar segmented wiring method. The normal busbar does not operate in segments. The two power sources do not work at the same time. One is used and the other is standby. The main power supply bears all electrical loads. The standby power supply bears the primary power load. The 10kV power distribution system without first-class load power supply adopts single busbar and non-segmented wiring.

Low-voltage power distribution system: The 380V low-voltage power distribution system that supplies power to the first-level load adopts a single busbar segmented connection mode. The operation mode is that the normal busbar does not run-in segments. When one power supply fails, the other power supply can carry all the load. The 380V power distribution system without first-class load power supply adopts single busbar and non-segmented wiring.

The first-level load adopts dual-circuit power supply, which is drawn from the two busbars of the corresponding voltage level power supply according to the voltage level of the first-level load equipment.

The incoming line voltage of the power supply of this project is 10kV, the incoming line voltage of the substation of each workshop is 10kV; the low-voltage distribution voltage of the ground workshop is ~380/220V, the power load is ~380V, and the lighting voltage is ~220V; the power supply of the underground substations The incoming line voltage is 10kV, the low-voltage power load distribution voltage is ~380V, the transportation main lane lighting voltage and branch roadway lighting voltage are ~127V, the mining face voltage is ~36V, and the high-voltage vacuum circuit breaker operating power supply uses DC or AC 220V.

### 6.3.3 Workshop substation, mining area substation

Inclined shaft hoisting substation: a newly built substation adjacent to the inclined shaft hoisting machine room is equipped with 12 GKG-12 mine high-voltage switch cabinets, and another SCB11-315/10 transformer, responsible for hoists and auxiliary equipment, Power consumption for wellhead equipment, mining office areas, battery-electric locomotive charging stations, machine repair workshops and other facilities. The 10kV substation adopts dual power supply, dual-loop incoming line, and the dual loop overhead line is transferred from the mine 33/10kV total step-down substation 10kV side bus section I and II.

Air compressor station substation: a new air compressor station substation adjacent to the air compressor station, with an S11-1 25 0/10 transformer inside, responsible for the air compressor, mining office area, battery-electric locomotive charging station, 0.4kV equipment power consumption such as machine repair workshop. The power supply of the substation is led from the 10kV side of the inclined shaft hoisting substation by cable.

+890m pump room substation: a new pump room substation is built next to the drainage pump room in the middle section of +890m underground, with 10 GKG-12 mine high-voltage switch cabinets and two KSG-400/10 transformers. One use and one backup, responsible for the electricity consumption of 0.4kV equipment such as drainage pumps and lighting in the middle pump room of

+890m. The 10kV substation adopts dual power supply and dual loop incoming lines, and uses dual loop cables to lead from the surface inclined shaft to lift the substation 10kV two sections of busbars, and lay them along the inclined shaft wall.

Nanfengjing Substation: At the head of the Nanfengjing, a newly built substation adjacent to the ventilation machine room is equipped with 6 high-voltage load switch cabinets, including one SCB9-50/10 transformer, the neutral point is grounded, and the main Electricity for facilities such as fans and lighting.

+1090m mining area substation: build a mining area substation near the stope in the middle of +1090m, equipped with a GKG-12 type high-voltage load switch cabinet for mines, a KS G - 315 /10 transformer, the neutral point is not grounded, GKD mine low-voltage distribution electrical screen 2 is responsible for the production of middle mining, local ventilation, lighting and other electrical equipment. Its 0.4kV power distribution system adopts single busbar and non-segmented wiring. The power supply of the substation is led from the 10kV side of the substation of the surface inclined shaft hoist by a cable.

#### 6.4 Maintenance Plans

Designed to build a new simple maintenance workshop in the surface industrial site of the inclined shaft collar, with equipment such as drilling presses, grinders, AC arc welding machines, etc., which are mainly responsible for small and medium-sized mine equipment such as electric locomotives, scrapers, rock drills, mining trucks, etc. Replacement, repair, and daily maintenance of vulnerable parts such as the water pump to ensure the normal operation of the equipment.

## 7 ENVIRONMENT AND SOCIAL COMPLIANCE

For environmentally friendly operation the design adhered several principles:

Conscientiously implement the work policies of comprehensive planning, rational layout, turning harm into benefits, protecting the environment, and benefiting the people, and adhere to the principles of focusing on prevention, combining prevention and control, and comprehensive management.

Persist in the implementation of the "three simultaneous" principle, so that pollution prevention measures are designed, constructed and operated at the same time as the main project.

Actively adopt advanced technology and equipment to improve the utilization rate of resources and energy, so that the construction project can obtain the best economic and environmental benefits after it is put into production.

### 7.1 Main pollution sources, pollutant discharge and their treatment

The main pollutants produced by this project are dust, waste gas, wastewater, solid waste and noise. The design strictly implements the relevant national environmental protection laws and regulations and adopts advanced production technology and equipment to minimize the harm of pollutants.

#### 7.1.1 Wastewater

The wastewater produced in this project is mainly underground drainage and daily sewage. Underground drainage is used for mining production.

Domestic sewage discharge is roughly divided into two categories: one is manure water, which is discharged from the toilet; the other is domestic washing water, which contains pollutants such as detergent, organic matter, and sediment. All sewage enters the domestic sewage treatment system to be treated as reclaimed water after reaching the standard.

#### 7.1.2 Solid Waste

The solid waste of this project is mainly mining waste rock and domestic garbage. Mining waste rock for levelling the ground, road, dumped tailings dam, the remaining waste rock transported to the waste rock dump. The domestic waste is managed in a unified manner and is transported out regularly by the environmental sanitation department.

#### 7.1.3 Dust and emitted gas

The dust production process of this project mainly includes dust raising during the infrastructure construction period, underground rock drilling and blasting, transportation raising dust, etc.

To prevent dust generated in the construction of the industrial site, road excavation and filling, material transportation and other projects, water should be sprayed on each site and road regularly to suppress dust. Construction and vehicles should run at a speed limit, which can reduce the amount of dust and reduce vehicle noise. At the same time, it is beneficial to the safety of the construction site. When unloading, reduce the height as much as possible, and take measures to suppress dust by spraying water on bulk materials such as sand and storage yards.

To prevent the pollution of dust in the material storage yard, simple material sheds should be set up for bulk building materials. In dry weather and high wind speed, dust-prone materials should be covered. Packed building materials should be stacked in a material warehouse to reduce open-air stacking. Temporary roads with more vehicles must be watered frequently to reduce dust during driving. Wet rock drilling is used underground, and regular spraying is used to reduce the dust concentration at the operation site.

Equipped with complete fresh air and smoke exhaust system to ensure the supply of fresh air for underground production and ensure air quality.

#### 7.1.4 Noise

During the construction period, noise at the construction site has a greater impact on the environment, so the construction unit should take corresponding noise prevention measures. Noise control during the construction phase must meet the requirements of laws and regulations to minimize the impact of noise on surrounding residents.

Avoid a lot of power machinery equipment arrangements while at the same construction site, to avoid local sound level to be too high. During the general layout of the construction, place the high-noise equipment as far away as possible from the acoustic environment-sensitive points inside and outside the site boundary, and strictly abide by the night noise equipment operating rules to control the construction noise to disturb the residents.

Low-noise equipment should be used in equipment selection. Fixed mechanical equipment and earth-moving and earth-moving machinery (such as excavators, bulldozers, etc.) can reduce noise through exhaust pipe mufflers and isolating engine vibration parts. The noise level during operation is increased due to the vibration of the loose parts or the damage of the muffler. Regular maintenance and maintenance of power machinery and equipment. Transport vehicles should slow down when entering the scene and reduce their whistle.

The main processes that generate noise during the production period include underground blasting, rock drilling, air compressor room, etc. The main noise generating equipment includes fans, air compressors, rock drills, vehicles, etc., and the noise level is 85dB (A) the above. In addition to damping the equipment foundation, the design also uses building sound insulation to reduce the impact of noise. The fan is placed in a separate fan room to reduce noise transmission.

At the same time, strictly manage and require operators to wear protective equipment as required to reduce noise hazards;

In the general layout, the production plant is far away from the living area, and a large number of noise-reducing trees and flowers are planted around the production plant, which reduces the spread of noise to a certain extent.

Through the above various measures, it can ensure that the noise at the factory boundary meets the standard requirements.

#### 7.1.5 Greening and reclamation

Greening plays a special role in preventing pollution, protecting and improving the environment. It has better functions such as temperature regulation, humidity regulation, dust collection, air purification and noise reduction. Vigorously carrying out greening and afforestation have a certain significance for protecting the environment, improving working conditions, enhancing the health of employees, and improving work efficiency.

According to the climatic conditions and soil properties of the area, choose the trees and flowers that are easy to grow in the area for greening, so that the environment can be beautified.

The main target of land reclamation is an industrial plant area, and the main source of land resources is the excavation part of the process of engineering construction. Therefore, to carry out land reclamation and greening work well, the land resources should be protected first. The topsoil resources excavated in the process of project construction should be well protected and utilized.

## 7.2 Environmental impact of the construction project on the surrounding area

### 7.2.1 Impact of dust and exhaust gas emissions

Through effective dust, ventilation, dust concentration in the workplace control  $2\text{mg}/\text{m}^3$  within the allowable range, into the outdoor concentration was controlled to  $30\text{mg}/\text{m}^3$  or less.

### 7.2.2 Impact of wastewater discharge

The rational use of underground drainage not only reduces the pollution to the surrounding environment of the mining area but also solves the large demand for new water production and avoids the massive extraction of groundwater.

After the domestic wastewater is treated, it is used as water for dispersing dust and preventing dust, which will not affect the local environment.

### 7.2.3 Impact of solid waste

The rational use of waste rock and slag in this project not only creates significant economic and social benefits but also solves the problem of environmental damage caused by solid waste stacking, which is of far-reaching significance.

### 7.2.4 Influence of noise

The noise from mining equipment factory, there is currently no complete elimination of these methods and techniques of noise, but the use of sound insulation in buildings and on the surrounding ring muffler to reduce the influence of the environment is also effective.

In terms of the general layout, the industrial area is far away from the living area, and the greening of the field area also greatly reduces the impact of noise on the production and life of employees in the mining area.

The above analysis shows that after this project is completed and put into production, it will have less impact on the surrounding environment and the effect of science and technology demonstration is obvious. Therefore, from the perspective of environmental protection, the construction of this project is feasible.

## 7.3 Environmental management and monitoring

### 7.3.1 Environmental monitoring tasks, scope and content

The task of environmental monitoring is to conduct regular monitoring of various environmental elements, grasp the status and development trend of environmental quality, monitor and monitor the discharge of pollutants, and provide accurate and reliable monitoring data and information for comprehensive environmental management.

The design of the environmental monitoring per national family and local environmental standards for pollution enterprises to carry out daily monitoring of major pollutants focus on monitoring, analysis, control its characteristics, emissions law to guide the production. At the same time, it sorts

out the monitoring data, establishes a monitoring account, and compiles and submits monitoring reports following regulations.

### 7.3.2 Monitoring system and layout of monitoring points

#### 7.3.2.1 Water quality

Monitoring items of produced water: pH value, suspended solids.

Monitoring system: Fully monitor once after it is put into production, and regularly monitor thereafter.

#### 7.3.2.2 Dust

Monitoring items: dust concentration;

Monitoring location: each dust-producing point.

#### 7.3.2.3 Noise

The noise of the factory boundary and working place is measured once every six months.

### 7.3.3 Environmental protection agency

There is an environmental protection agency in the factory area with 1 staff. The environmental protection management department (safety and environmental protection department and laboratory) is responsible for environmental protection testing and environmental management and is equipped with monitoring stations and corresponding instruments.

## 8 FINANCIAL EVALUATION

### 8.1 Capital Costs

This project is the mining project of the ML448+ML535 gold mine in Tanzania, with a design scale of 1200t/d, adopts the main ramp + inclined shaft development plan. The development system is composed of the main ramp, the inclined shaft, the south ventilation shaft, the north ventilation shaft, and the middle transport roadway. quantity is 103,114m<sup>3</sup>.

The investment in this project is priced in renminbi (RMB) as the official currency of China. The total investment (including initial working capital) of the project is 335,199,000 yuan, of which: construction investment is 313,742,700-yuan, construction period loan interest is 16,552,900 yuan, and initial working capital is 4,903,400 yuan.

#### 8.1.1 Compilation principles and basis

##### 8.1.1.1 Basic principles for preparing budget estimates

Complete, accurate accurately reflect the design content. Carefully understand the design intent, and accurately calculate the engineering quantity according to the design documents, drawings, and professional conditions.

This budget estimate combines the actual conditions of the proposed project and reflects the price level of the project location so that the budget estimate reflects the design content, construction conditions and actual prices as much as possible.

##### 8.1.1.2 The main basis for preparing budget estimates

Engineering quantity calculated according to the project design drawings, engineering quantity list and equipment table provided.

Labour wages established according to the construction unit, the unit price of surface construction and installation engineering is 160 yuan/man-day; the unit price of underground labour (direct cost) is 240 yuan/man-day; the unit price of underground labour (auxiliary fee) Take 180 yuan/workday.

Material price derived according to the construction unit to provide, fried medicine and other pyrotechnics materials, cement, sand, stone, masonry and other purchased locally, other materials imported from China. The main material prices: Explosive 25 yuan/kg, cement 1200 yuan/t; gravel 125 yuan/m<sup>3</sup>, sand 83 yuan/m<sup>3</sup>.

Construction machinery shift fee established according to the construction unit, there is no local mechanical equipment rental market in Tanzania, and all construction machinery is purchased from China.

Transportation fees and taxes are according to the construction unit, the goods shall be transported by land to Tianjin Port or Shanghai Port, then by sea to Tanzania Dar es Salaam Port, and finally transported by land to the mining area. The comprehensive freight (Table 14) for the above process (including domestic port charges, excluding Tanzanian customs clearance fees and Shipping company's port yard expenses) account for about 17% of the domestic purchase value of goods.

Taxes and fees related to the import of Tanzanian materials:

Table 14: Detailed Transportation Fees and Taxes

|  |   |
|--|---|
| Import tariffs   | To product import tariff rate of 25%  |
| Storage fee  | 1.5% of the value   |
| Customs service fee  | Mainly customs documentation fees and handling fees, etc., which are levied at 0.6% of the value of the goods   |
| Railway Development Tax  | 1.5% of the value   |
| import value-added tax   | The tax base is the sum of the CIF value, import duties, customs service fees and railway development tax, and the tax rate is 18%. Individual materials with a value-added tax of 20 million shillings (approximately 62,000 yuan) and above can apply for VAT exemption |
| demurrage  | The second and third weeks after arrival at the port will be charged at USD 40 per box; the fourth week and afterwards will be charged at USD 80 per box  |
| Customs clearance agency fee   | \$300/box   |
| Other miscellaneous fees mainly include unpacking fees, fumigation fees, reagent testing fees, and agricultural inspection fees. | 1 % in total  |
| <b>Note:</b> The above tax items are taxes levied at the same time when importing materials or equipment.                        |   |
| The above tax collection base is the CIF price of the goods.   |   |
| The above container refers to a 40-foot container.   |   |

#### 8.1.2 Estimated investment scope and cost composition

The investment budget is composed of construction project engineering costs, other engineering construction costs, engineering reserve costs, loan interest during the construction period and initial working capital.

The main engineering content includes the main ramp, inclined shaft, south wind shaft, middle section of the transportation roadway and other infrastructure development projects in the pit, mining equipment, pit transportation, drainage, lifting, ventilation, air compressor, equipment maintenance, power supply and other mechanical and electrical equipment purchase and installation projects, Laying tracks and cables in the pit; hoisting room, air compressor room, fan room, simple machine repair room, high-level pool, substation, diesel power station, warehouse, guard, weighbridge room, office, dormitory, canteen, bathroom and other structures; Factory roads, site hardening, retaining walls, earth and stone works, general plan transportation, weighing equipment.

### 8.1.3 Estimate Method

#### 8.1.3.1 Construction project investment estimate

Buildings and structures are compiled according to the main design principles, building structure forms, and similar project cost data. The quota adopts the 2016 edition of " Shandong Construction Engineering Consumption Quota " and is adjusted according to the price of human resources provided by the construction unit. Among them: the steel structure metal components are considered to be processed into finished products in China and shipped to the construction site for installation.

#### 8.1.3.2 An estimated investment of mine engineering

Mineshaft engineering, based on physical quantities, using the 2014 version of the "golden industrial engineering construction budget quota" and the root according to talent machine construction unit price offered to adjust.

#### 8.1.3.3 Investment estimate of the installation project

Installation projects such as equipment and materials adopt the 2016 version of "Shandong Province Installation Project Consumption Quota" and 2014 version of the "Golden Industrial Project Construction Budget Quota" according to the technical characteristics, and are adjusted according to the price of human resources provided by the construction unit.

#### 8.1.3.4 Equipment cost estimate

The price of standard equipment is calculated according to the current ex-factory price of the manufacturer; the price of non-standard equipment is calculated according to the "Non-standard equipment pricing method" and adjusted accordingly.

Equipment transportation and miscellaneous fees: calculated at 17% of the original price of the equipment.

Spare parts fee is calculated at 2% of the original price of the equipment. According to the information currently available, tariffs on equipment with a unit price of more than \$50,000 may be reduced to zero after the negotiation. The tariffs on trucks, main fans and air compressors in the investment pit are calculated as zero.

#### 8.1.3.5 An estimate of other costs of construction

It is compiled referencing the 2014 edition of the "Gold Industrial Engineering Construction Other Cost Quota". The unit price for land use fee is calculated at 1636 yuan/mu; construction unit management fee: China's domestic standard is 2.1%-2.5% of the project cost, and this design is calculated at 6% (including the initial cost); project construction supervision fee: Calculated with reference to China's "Fagai Price [2007] No. 670" document; temporary facilities and measures fee of the construction unit: calculated at 1.5% of the construction and installation project cost; environmental assessment, safety ratings the evaluation fee by: fees refer to China, with 80-million-yuan terms; engineering survey fee: calculated at 0.4% of the engineering cost; engineering design fee: included in the contract price; mine roadway maintenance cost: calculated at 1% of the shaft engineering cost; project insurance fee: calculated at 0.3% of the project cost; joint trial operation fee: including the cost of no-load joint trial operation and load joint trial operation, calculated at 0.6% of the project cost; purchase cost of tools and production furniture: 0.5% of equipment purchase cost; construction drawing design review fee: calculated at 0.2% of the construction and installation project cost.

#### 8.1.3.6 An estimated engineering reserve cost

The basic reserve cost is calculated at 10% of the sum of the project cost and other costs, without the price difference reserve cost.

#### 8.1.3.7 Exchange Rate

The exchange rate applied in this project for economic analysis is 1 US dollar = 6.9448 yuan.

### 8.1.4 Estimated Total Investment and Investment Analysis

#### 8.1.4.1 Analysis of Total Cost Composition

The total investment (including initial working capital) of the project is 335,199,900 yuan, of which, engineering costs 255.7264-million-yuan, other engineering construction costs 28.5221-million-yuan,

reserve costs 28.5221-million-yuan, loan interest during the construction period of 16.55229 million yuan, and initial working capital is 490.34 Ten thousand yuan.

#### 8.1.4.2 Investment Analysis Table

The investment analysis by investment composition is shown in Table 15, Table 16 represent the investment analysis by production purpose and by professional planning sub-investment analysis are shown in Table 17.

Table 15: Investment Composition Analysis

| project name                   | Construction works | Equipment | Installation work | other    | Total estimated value |
|--------------------------------|--------------------|-----------|-------------------|----------|-----------------------|
| Investment (ten thousand yuan) | 17,809.54          | 6810.60   | 952.50            | 7,947.26 | 33,519.90             |
| Percentage of investment       | 53.13%             | 20.32%    | 2.84%             | 23.71%   | 100.00%               |

Table 16: Production by end-use Investment Analysis

| Serial number | project name                            | Investment (ten thousand yuan) | Investment ratio | Remarks |
|---------------|---|--------------------------------|------------------|---------|
| 1             | Project costs                           | 25,572.64                      | 76.29%           |         |
| 2             | Other costs of engineering construction | 2,949.42                       | 8.80%            |         |
| 3             | Preparation fee                         | 2852.21                        | 8.51%            |         |
| 4             | Interest during construction period     | 1,655.29                       | 4.94%            |         |
| 5             | Liquidity                               | 490.34                         | 1.46%            |         |
|               | Total estimated value                   | 33,519.90                      | 100.00%          |         |

Table 17: Professional Division Investment Analysis

| Serial number | project name   | Investment (ten thousand yuan) | Investment ratio | Remarks |
|---------------|----------------|--------------------------------|------------------|---------|
| 1             | Geology        | 506.00                         | 1.51%            |         |
| 2             | Mining ore     | 17,938.26                      | 53.52%           |         |
| 3             | Mining machine | 1,853.55                       | 5.53%            |         |
| 4             | electricity    | 2,248.29                       | 6.71%            |         |
| 5             | Civil works    | 795.78                         | 2.37%            |         |

| Serial number | project name                            | Investment (ten thousand yuan) | Investment ratio | Remarks |
|---------------|---|--------------------------------|------------------|---------|
| 6             | General map                             | 2,230.76                       | 6.66%            |         |
| 7             | Other costs of engineering construction | 2,949.42                       | 8.80%            |         |
| 8             | Preparation fee                         | 2852.21                        | 8.51%            |         |
| 9             | Interest during construction period     | 1,655.29                       | 4.94%            |         |
| 10            | Liquidity                               | 490.34                         | 1.46%            |         |
|               | Total estimated value                   | 33,519.90                      | 100.00%          |         |

#### 8.1.5 Investment Budget

The total investment budget is presented in Table 18.

Table 18: The Total Investment Budget

| sequence number | Project cost name                  | Value (ten thousand yuan) |                     |                   |                   |             | Technical and economic indicators |            | Percentage of total investment |
|-----------------|------------------------------------|---------------------------|---------------------|-------------------|-------------------|-------------|-----------------------------------|------------|--------------------------------|
|                 |                                    | Construction works        | Equipment purchases | Installation work | Miscellaneous fee | total value | Quantity and unit                 | Unit value |                                |
|                 | The first part of the project cost |                           |                     |                   |                   |             |                                   |            |                                |
| 1               | Geological Prospecting Engineering | 506.00                    |                     |                   |                   | 506.00      |                                   |            | 1.51%                          |
| 2               | Infrastructure Project             | 14,442.25                 |                     |                   |                   | 14,442.25   |                                   |            | 43.09%                         |
|                 | Ramp                               | 6009.60                   |                     |                   |                   | 6009.60     |                                   |            | 17.93%                         |
|                 | auxiliary shaft                    | 1,268.00                  |                     |                   |                   | 1,268.00    |                                   |            | 3.78%                          |
|                 | Nanfengjing                        | 443.53                    |                     |                   |                   | 443.53      |                                   |            | 1.32%                          |
|                 | Pass                               | 693.53                    |                     |                   |                   | 693.53      |                                   |            | 2.07%                          |
|                 | +1090m middle section              | 1163.27                   |                     |                   |                   | 1163.27     |                                   |            | 3.47%                          |
|                 | +990m middle section               | 2217.35                   |                     |                   |                   | 2217.35     |                                   |            | 6.62%                          |
|                 | +1040m middle section              | 2217.35                   |                     |                   |                   | 2217.35     |                                   |            | 6.62%                          |
|                 | +890m middle section               | 429.62                    |                     |                   |                   | 429.62      |                                   |            | 1.28%                          |
| 3               | Mining equipment and installation  |                           | 2,119.85            | 15.05             |                   | 2,134.90    |                                   |            | 6.37%                          |
| 4               | Transportation facility            | 350.58                    | 449.41              | 18.27             |                   | 818.26      |                                   |            | 2.44%                          |
| 5               | Upgrade facilities                 | 143.64                    | 301.57              | 94.02             |                   | 539.22      |                                   |            | 1.61%                          |
| 6               | Wind supply facility               | 88.00                     | 235.65              | 117.88            |                   | 441.54      |                                   |            | 1.32%                          |

| sequence number | Project cost name   | Value (ten thousand yuan) |                     |                   |                   |             | Technical and economic indicators |            | Percentage of total investment |
|-----------------|---|---------------------------|---------------------|-------------------|-------------------|-------------|-----------------------------------|------------|--------------------------------|
|                 |   | Construction works        | Equipment purchases | Installation work | Miscellaneous fee | total value | Quantity and unit                 | Unit value |                                |
| 7               | Ventilation facilities  | 105.00                    | 462.47              | 31.64             |                   | 599.11      |                                   |            | 1.79%                          |
| 8               | Water supply and drainage facilities  | 100.00                    | 37.09               | 153.13            |                   | 290.22      |                                   |            | 0.87%                          |
| 9               | Simple maintenance facility   | 56.00                     | 16.82               | 2.00              |                   | 74.82       |                                   |            | 0.22%                          |
| 10              | Power supply facility   | 195.78                    | 1,729.72            | 518.57            |                   | 2,444.07    |                                   |            | 7.29%                          |
| 11              | office  | 114.00                    |                     |                   |                   | 114.00      |                                   |            | 0.34%                          |
| 12              | General drawing project   | 1708.29                   | 591.03              | 1.94              |                   | 2301.26     |                                   |            | 6.87%                          |
| 13              | Purchasing and transportation fees for shafts, construction and installation of construction machinery (temporarily estimated based on new purchases) |                           | 867.00              |                   |                   | 867.00      |                                   |            | 2.59%                          |
|                 |   |                           |                     |                   |                   |             |                                   |            |                                |
|                 | <b>Total engineering cost</b>   | 17,809.54                 | 6810.60             | 952.50            |                   | 25,572.64   |                                   |            | 76.29%                         |
|                 |   |                           |                     |                   |                   |             |                                   |            |                                |
|                 | Part Two Other Expenses of Project Construction   |                           |                     |                   |                   |             |                                   |            |                                |
| 1               | Land use fee  |                           |                     |                   | 27.64             | 27.64       |                                   |            | 0.08%                          |
| 2               | Construction unit management fee (including   |                           |                     |                   | 1534.36           | 1534.36     |                                   |            | 4.58%                          |

| sequence number | Project cost name                                   | Value (ten thousand yuan) |                     |                   |                   |             | Technical and economic indicators |            | Percentage of total investment |
|-----------------|---|---------------------------|---------------------|-------------------|-------------------|-------------|-----------------------------------|------------|--------------------------------|
|                 |   | Construction works        | Equipment purchases | Installation work | Miscellaneous fee | total value | Quantity and unit                 | Unit value |                                |
|                 | preliminary expenses)                               |                           |                     |                   |                   |             |                                   |            |                                |
| 3               | Project supervision fee                             |                           |                     |                   | 260.44            | 260.44      |                                   |            | 0.78%                          |
| 4               | Construction unit's temporary facility fee          |                           |                     |                   | 281.43            | 281.43      |                                   |            | 0.84%                          |
| 5               | EIA, safety assessment and other evaluation costs   |                           |                     |                   | 80.00             | 80.00       |                                   |            | 0.24%                          |
| 6               | Engineering survey fee                              |                           |                     |                   | 102.29            | 102.29      |                                   |            | 0.31%                          |
| 7               | Engineering design fee                              |                           |                     |                   | 76.00             | 76.00       |                                   |            | 0.23%                          |
| 8               | Construction drawing budget preparation fee         |                           |                     |                   | 7.60              | 7.60        |                                   |            | 0.02%                          |
| 9               | Compilation fee for project completion drawing      |                           |                     |                   | 6.08              | 6.08        |                                   |            | 0.02%                          |
| 10              | Roadway maintenance costs                           |                           |                     |                   | 144.42            | 144.42      |                                   |            | 0.43%                          |
| 11              | Engineering insurance                               |                           |                     |                   | 76.72             | 76.72       |                                   |            | 0.23%                          |
| 12              | Joint commissioning fee                             |                           |                     |                   | 40.86             | 40.86       |                                   |            | 0.12%                          |
| 13              | Personnel training fee and advance entry fee        |                           |                     |                   | 180.00            | 180.00      |                                   |            | 0.54%                          |
| 14              | Office and living furniture purchase costs          |                           |                     |                   | 60.00             | 60.00       |                                   |            | 0.18%                          |
| 15              | The purchase cost of tools and production furniture |                           |                     |                   | 34.05             | 34.05       |                                   |            | 0.10%                          |
| 16              | Construction drawing design review fee              |                           |                     |                   | 37.52             | 37.52       |                                   |            | 0.11%                          |

| sequence number | Project cost name                                    | Value (ten thousand yuan) |                     |                   |                   |             | Technical and economic indicators |            | Percentage of total investment |
|-----------------|--|---------------------------|---------------------|-------------------|-------------------|-------------|-----------------------------------|------------|--------------------------------|
|                 |  | Construction works        | Equipment purchases | Installation work | Miscellaneous fee | total value | Quantity and unit                 | Unit value |                                |
|                 |  |                           |                     |                   |                   |             |                                   |            |                                |
|                 | <b>Total other costs of engineering construction</b> |                           |                     |                   | 2,949.42          | 2,949.42    |                                   |            | 8.80%                          |
|                 | Part Three Reserve Fee                               |                           |                     |                   | 2852.21           | 2852.21     |                                   |            | 8.51%                          |
|                 | Part 4. Loan interest during the construction period |                           |                     |                   | 1,655.29          | 1,655.29    |                                   |            | 4.94%                          |
|                 | The fifth part of the bottom of the working capital  |                           |                     |                   | 490.34            | 490.34      |                                   |            | 1.46%                          |
|                 |  |                           |                     |                   |                   |             |                                   |            |                                |
|                 | <b>Total estimated value</b>                         | 17,809.54                 | 6810.60             | 952.50            | 7,947.26          | 33,519.90   |                                   |            | 100.00%                        |

## 8.2 Operating Costs

The cost calculation is based on the following technical and economic conditions:

- The design basis of the final product is gold ore.
- Auxiliary materials, fuel and power consumption indicators are provided by various majors.
- The prices of auxiliary materials, fuels and power are provided by the mine, and the insufficient part shall refer to market prices.
- The total salary of employees is 28.705 million yuan/year.
- Electricity fee is calculated at 1.1 yuan/kWh.
- Repair costs are calculated at 2.5% for buildings and others, and 4% for equipment and installation.
- The depreciation method of enterprise fixed assets adopts the average life method, and the fixed assets are classified and depreciated according to the specified depreciation life. In this design, based on the actual situation of the project, buildings and structures are depreciated for 20 years; machinery and equipment are depreciated for 10 years, and the net residual value rate is determined according to 5% of the original value of fixed assets.
- Amortization charges: no intangible assets amortization period of 10 years; other assets are amortized 5 years.
- Financial expenses refer to the interest expenses incurred during production and operation.
- Manufacturing expenses refer to the various expenses incurred by the mining workshop for production and operation, including management staff salaries, labour protection expenses, depreciation expenses, repair expenses and other manufacturing expenses.

### 8.2.1 Total Cost Calculation Results

According to the above-mentioned technical and economic conditions, the average cost and expenses of the mining workshop in the year of reaching production capacity are calculated, and the result is 275.78 yuan/t (the total annual cost is 99,280,600 yuan).

Production costs and expenses in normal production years are presented in Table 19.

Table 19: Normal Production Year Average Total Costs and Expenses

| Serial number | project                       | unit              | The total cost of ore | The unit cost of ore (Yuan/t) |
|---------------|-------------------------------|-------------------|-----------------------|-------------------------------|
| 1             | total cost                    | Ten thousand yuan | 9928.06               | 275.78                        |
| 2             | Mining manufacturing costs    | Ten thousand yuan | 7,357.76              | 204.38                        |
|               | Of which: direct mining costs | Ten thousand yuan | 4,654.18              | 129.28                        |
|               | Mining manufacturing expenses | Ten thousand yuan | 2,703.58              | 75.10                         |
| 3             | Financial expenses            |                   | 364.82                | 10.13                         |
| 4             | Management fees               | Ten thousand yuan | 2,205.47              | 61.26                         |

### 8.3 Market and Price

From the current gold market analysis and forecast, in line with the principle of sound economic evaluation, the average gold price of 262 yuan/g, converted to the ore price of 601.16 yuan/t have been used.

### 8.4 Project risk and Assessments

#### 8.4.1 Breakeven Analysis

In the first year of production, the total cost of the mine was 112,164,500 yuan, of which fixed costs were 74,744,400-yuan, variable costs were 37,420,100-yuan, operating income was 23,196,600-yuan, the value-added tax was 32,538,600 yuan, and skills development tax was 129.17 Ten thousand yuan, the government royalties are 11.9083 million yuan. The break-even point calculated from this is 49.49%, that is, when the annual production of 178,200 tons of ore is reached, the break-even is reached. When the output is exceeded, the profit can be made, and vice versa.

#### 8.4.2 Sensitivity Analysis

To predict the changes in some factors in the future and the impact on the economic benefits of the project, this project conducts a sensitivity analysis on the impact of changes in construction investment, operating costs and operating income on the project's internal rate of return. The results are shown in Table 20.

Table 20: Sensitivity Analysis

| Change of factors       | Change rate (%) | Internal Rate of Return (%) | Remarks |
|-------------------------|-----------------|-----------------------------|---------|
| Basic plan              |                 | 19.92                       |         |
| Operating income        | +10             | 26.19                       |         |
|                         | +5              | 23.13                       |         |
|                         | -5              | 16.55                       |         |
|                         | -10             | 12.99                       |         |
| operating cost          | +10             | 17.96                       |         |
|                         | +5              | 18.81                       |         |
|                         | -5              | 21.01                       |         |
|                         | -10             | 22.07                       |         |
| Construction Investment | +10             | 17.98                       |         |
|                         | +5              | 18.97                       |         |
|                         | -5              | 21.03                       |         |

It is evident from Table 20 that, operating income is the most sensitive factor, followed by operating costs and construction investment. The factors that affect operating income include gold price, ore grade, etc. Therefore, in the process of production and operation, enterprises must strengthen internal management to reduce ore loss, dilution and production costs, and do a good job of price forecasting and analysis in the sales market, and be flexible Grasp the sales opportunity and improve the overall economic benefits of the enterprise.

#### 8.4.3 Comprehensive Economic Effect Evaluation

When the mine reaches the design scale, it will produce 360,000 tons of ore annually. In the normal production year, the operating income is 217.9499 million yuan, the total annual profit is 76,235,100 yuan, the after-tax profit is 5,364,600 yuan, and the annual tax payment to the state and local governments is 65,304,800 yuan.

In terms of profitability, the internal rate of return is 19.92%, and the net present value (i=12%) is 103,407,700 yuan, which shows that the project has strong profitability.

From the perspective of the investment payback period, the net fixed assets payback period of the project is 5.8 years, indicating that the project can be recovered quickly.

From the perspective of uncertainty analysis, the company's break-even point is 49.49%, indicating that the company has a strong ability to resist risks. Enterprises should strengthen production

organization in production and operation management, strive to reduce production costs, ensure the normal use of production capacity, and improve the economic benefits of the enterprise.

In summary, the project has good economic benefits.

#### 8.5 Revenues

The revenue on this project will be from selling produced gold ore as presented in Table 21 yearly.

#### 8.6 Government Payments

The government payments including royalties, corporate tax and service levy are presented in Table 22.

Table 21: Production Rate and Operating Income Calculation

| sequence number | Item                | unit              | Production period |           |           |           |           |           |           |          |          |           |         |
|-----------------|---------------------|-------------------|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|----------|----------|-----------|---------|
|                 |                     |                   | 4                 | 5         | 6         | 7         | 8         | 9         | 10        | 11       | 12       | 13        | 14      |
| 1               | Production load     | %                 | 100               | 100       | 100       | 100       | 100       | 100       | 100       | 100      | 100      | 100       | 100     |
| 2               | Production capacity | Ten thousand t/d  | 36                | 36        | 36        | 36        | 36        | 36        | 36        | 36       | 36       | 36        | 14.46   |
| 3               | Outgoing grade: Au  | g/t               | 3.82              | 3.82      | 3.83      | 3.78      | 3.78      | 3.73      | 3.31      | 3.29     | 3.21     | 2.98      | 2.85    |
| 4               | Ore price           | Yuan/t            | 650.55            | 650.55    | 652.25    | 643.73    | 643.73    | 635.22    | 563.69    | 560.29   | 546.66   | 507.49    | 485.36  |
| 5               | Operating income    | Ten thousand yuan | 23,419.66         | 23,419.66 | 23,480.96 | 23,174.42 | 23,174.42 | 22,867.88 | 20,292.95 | 20170.33 | 19679.87 | 18,269.78 | 7018.23 |

Table 22: Yearly Profit and Profit Distribution Calculation

| sequence number | Item                   | unit of measurement | Production period |           |           |           |           |           |           |          |          |           |         |
|-----------------|------------------------|---------------------|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|----------|----------|-----------|---------|
|                 |                        |                     | 4                 | 5         | 6         | 7         | 8         | 9         | 10        | 11       | 12       | 13        | 14      |
| 1               | Operating income       | Ten thousand yuan   | 23,419.66         | 23,419.66 | 23,480.96 | 23,174.42 | 23,174.42 | 22,867.88 | 20,292.95 | 20170.33 | 19679.87 | 18,269.78 | 7018.23 |
| 2               | VAT                    | Ten thousand yuan   | 3253.86           | 3253.86   | 3,263.21  | 3216.45   | 3216.45   | 3,169.69  | 2,776.90  | 2,758.20 | 2,683.38 | 2,468.29  | 943.13  |
| 3               | Skills development tax | Ten thousand yuan   | 129.17            | 129.17    | 129.17    | 129.17    | 129.17    | 129.17    | 129.17    | 129.17   | 129.17   | 129.17    | 129.17  |

|    |                                  |                   |           |           |           |          |          |          |          |          |          |          |          |
|----|----------------------------------|-------------------|-----------|-----------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 4  | Government royalties             | Ten thousand yuan | 1,190.83  | 1,190.83  | 1,193.95  | 1,178.36 | 1,178.36 | 1162.77  | 1031.84  | 1025.61  | 1000.67  | 928.97   | 356.86   |
| 5  | Total cost and expenses          | Ten thousand yuan | 11,216.45 | 10,736.95 | 10,236.32 | 9711.45  | 9,563.24 | 9,563.24 | 9,563.24 | 9,563.24 | 9,563.24 | 9,563.24 | 3825.29  |
| 6  | The total profit                 | Ten thousand yuan | 7,629.35  | 8108.84   | 8,658.32  | 8,938.99 | 9087.20  | 8843.01  | 6791.79  | 6,694.11 | 6,303.41 | 5180.12  | 1,763.78 |
| 7  | Income tax                       | Ten thousand yuan | 2,288.80  | 2,432.65  | 2,597.50  | 2,681.70 | 2,726.16 | 2,652.90 | 2037.54  | 2008.23  | 1,891.02 | 1,554.04 | 529.13   |
| 8  | Profit after tax                 | Ten thousand yuan | 5,340.54  | 5,676.19  | 6060.82   | 6,257.30 | 6361.04  | 6,190.11 | 4,754.25 | 4,685.88 | 4,412.38 | 3626.08  | 1234.65  |
| 9  | Distributable profit             | Ten thousand yuan | 5,340.54  | 5,676.19  | 6060.82   | 6,257.30 | 6361.04  | 6,190.11 | 4,754.25 | 4,685.88 | 4,412.38 | 3626.08  | 1234.65  |
| 10 | Surplus Provident Fund           | Ten thousand yuan | 534.05    | 567.62    | 606.08    | 625.73   | 636.10   | 619.01   | 475.43   | 468.59   | 441.24   | 362.61   | 123.46   |
| 11 | Profit payable                   | Ten thousand yuan |           |           |           |          | 5724.94  | 5571.10  | 4,278.83 | 4,217.29 | 3 971.15 | 3,263.47 | 1111.18  |
| 12 | undistributed profit             | Ten thousand yuan | 4,806.49  | 5,108.57  | 5,454.74  | 5,631.57 |          |          |          |          |          |          |          |
| 13 | Accumulated undistributed profit | Ten thousand yuan | 4,806.49  | 9915.06   | 15,369.80 | 21001.37 | 21001.37 | 21001.37 | 21001.37 | 21001.37 | 21001.37 | 21001.37 | 21001.37 |

Table 23: Total Investment Cashflow (x 10,000 Yuan)

| number | Item                                       | Infrastructure period |           |           | Production period |           |           |           |           |           |           |           |           |           |           |
|--------|--|-----------------------|-----------|-----------|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|        |  | 1 (0.1)               | 2         | 3         | 4                 | 5         | 6         | 7         | 8         | 9         | 10        | 11        | 12        | 13        | 14        |
| One    | Cash inflow                                |                       |           |           | 2341 9.66         | 23,419.66 | 23,480.96 | 23,174.42 | 23,174.42 | 22,867.88 | 20,292.95 | 20170.33  | 19679.87  | 19,250.45 | 17,794.93 |
| 1      | Product operating income                   |                       |           |           | 23,419.66         | 23,419.66 | 23,480.96 | 23,174.42 | 23,174.42 | 22,867.88 | 20,292.95 | 20170.33  | 19679.87  | 18,269.78 | 7018.23   |
| 2      | Recovery of residual value of fixed assets |                       |           |           |                   |           |           |           |           |           |           |           |           |           | 10,122.92 |
| 3      | Back to close liquidity                    |                       |           |           |                   |           |           |           |           |           |           |           |           | 980.67    | 653.78    |
| two    | Cash outflow                               | 3,137.43              | 12,549.71 | 15,687.14 | 16016.95          | 14,526.35 | 14,703.66 | 14,725.52 | 14,769.98 | 14,634.38 | 13,495.30 | 13,441.05 | 13,224.09 | 12,600.30 | 4,966.23  |
| 1      | Construction Investment                    | 3,137.43              | 12,549.71 | 15,687.14 |                   |           |           |           |           |           |           |           |           |           |           |
| 2      | Use the original net value of fixed assets |                       |           |           |                   |           |           |           |           |           |           |           |           |           |           |
| 3      | Working capital                            |                       |           |           | 1634.4 5          |           |           |           |           |           |           |           |           |           |           |
| 4      | operating cost                             |                       |           |           | 7519.84           | 7519.84   | 7519.84   | 7519.84   | 7519.84   | 7519.84   | 7519.84   | 7519.84   | 7519.84   | 7519.84   | 3007.93   |
| 5      | Income tax                                 |                       |           |           | 2,288.80          | 2,432.65  | 2,597.50  | 2,681.70  | 2,726.16  | 2,652.90  | 2037.54   | 2008.23   | 1,891.02  | 1,554.04  | 529.13    |
| 6      | VAT  |                       |           |           | 3253.86           | 3253. 86  | 3,263.21  | 3216.45   | 3216.45   | 3,169.69  | 2,776.90  | 2,758.20  | 2,683.38  | 2,468.29  | 943.13    |
| 7      | Skills development tax                     |                       |           |           | 129.17            | 129.17    | 129.17    | 129.17    | 129.17    | 129.17    | 129.17    | 129.17    | 129.17    | 129.17    | 129.17    |
| 8      | Government royalties                       |                       |           |           | 1,190.83          | 1,190.83  | 1,193.95  | 1,178.36  | 1,178.36  | 1162.77   | 1031.8 4  | 1025.61   | 1000.67   | 928.97    | 356.86    |

|       |                          |          |           |           |           |           |          |          |           |           |           |          |          |          |           |
|-------|--------------------------|----------|-----------|-----------|-----------|-----------|----------|----------|-----------|-----------|-----------|----------|----------|----------|-----------|
| three | Net cash flow            | -3137.43 | -12549.71 | -15687.14 | 7,402.70  | 8893.31   | 8,777.30 | 8,448.90 | 8404.44   | 8,233.51  | 6,797.65  | 6,729.28 | 6,455.78 | 6650.15  | 12,828.71 |
| four  | Cumulative net cash flow | -3137.43 | -15687.14 | -31374.27 | -23971.57 | -15078.26 | -6300.96 | 214 7.94 | 10,552.38 | 18,785.89 | 25,583.54 | 32312.82 | 38768.60 | 45418.76 | 58,247.46 |

## 9 CONCLUSION AND RECOMMENDATIONS

### 9.1 Project Description

The ML448-ML535 development project is estimated from about 8,856,877t of ore with 1209720.5251 oz (34295 kg) of Au at an average grade of 3.87 g/t Au. The proposed underground mining method adopt main ramp and inclined shaft at a recommended production scale of  $36 \times 10^4$  t/a equivalent to 1200 t/d with a room for expansion. The waste material will be produced at a rate of 300 t/d. development work requires handling of 103,114 m<sup>3</sup> of material. The processing plant is designed to process 1200 t/d with a head grade of 3.5 g/t and recovery of 86.2%.

### 9.2 Socio-Economic and Environmental Aspects

The ML448-ML535 development project will have a significant direct impact on socio-economic development. The communities surrounding the project will benefit from employment and business opportunities as a result of the project operation. The Project will generate positive economic benefits to the local community, national and regional level, including government revenue at the national and district levels, and job creation. In light of the emphasis by the government of Tanzania on growth in the mining sector, the development of the project is consistent with national policy. The potential direct negative impacts of the project are considered to be limited. The ML448-ML535 Development Project is located away from settlement areas, thus minimizing impacts on local settings.

### 9.3 Economic evaluation

The project evaluated with a production rate of 360,000 t/a with an average head grade of 3.5 g/t for 10.4 years. An exchange rate of 1 US dollar = 6.9448-yuan, an interest rate of 12% and a gold price of 262 yuan/g were in use and resulted in internal rate of return of 19.92%, payback period of 5.8 years and Net Present Value of 103,407,700 yuan (14,889,946.43 USD), hence the viability of ML448-ML535 Development Project.

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ML448-ML535, Tanzania. Topographic, geological and engineering map of the gold deposit  
plotting scale 1:10000

