

A scoping study on the Baboto ore body

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1. Executive Summary

The Baboto ore body is situated along the same geological structure as the Yalea and the Loulo3 ore bodies. It is located approximately 10km north east of the ROMPAD, 1km north of the village of Baboto. It stretches 5km to the north, a part of the Baboto North ore body lies in the Kofi permit. Relative little sampling has been done; core drilling every 25m, so all reserves are inferred. A block model has been made using ordinary kriging. This estimates the reserves at 11.9Mt with an average grade of 2.06 g/tonne. The ore body will be split up into two categories, all ore with a grade higher than 2.5 g/t shall be classified as high grade ore and all ore with a lower grade than 2.5 g/t shall be classified as low grade ore. The high grade ore will be processed at the processing plant. For the low grade ore the option of processing via a heap leaching process is being investigated. Metallurgical bottle roll tests have shown a possible plant recovery for the high grade ore of 89 to 94%. Heap leaching recovery is being estimated around 80%. Pit optimization using Gemcom's Whittle software with a gold price of \$1,200 per tonne produces 3 pits which would produce 5.74Mt of ore, or 462,166 ounces of gold content that will be processed. 301,164 ounces gold content is qualified as high grade ore, 161,002 ounces are from low grade ores. The main objective in mining is to have a continuous feed of the plant of 50,000 tonnes per month. This can best be done by first mining Baboto Center, than Baboto North after which Baboto South is the final area to be mined. This will result in a total mine life of 3.7 years. The total mining costs are assumed to be approximately \$2.85 per tonne. The high grade ore will be transported to the plant by the same trucks as currently used for Goukoto and 3 trucks shall be needed. The route from the Baboto ROM to the crusher at the ROMPAD will be approximately 12.5km, of which approximately 9km will be newly constructed. The low grade material from Gara and Yalea currently stockpiled next to the ROMPAD including the scats, are probably useful material for heap leaching. This is 1.57Mt at an average grade of 1.67 g/t. So the first 2.6 years the trucks will bring this material along on their way back to Baboto. This would only require a detour of 583m and 10 minutes of loading and dumping extra. The total transport costs for the high grade ore from Baboto to the crusher and the stockpile material from the ROMPAD to Baboto will be approximately \$4.68 per tonne, including capital depreciation. The scats, just as the Baboto oxide ores, will not have to be crushed and can be used for heap leaching right away, the other non-oxide ores will have to be crushed. The leaching time for the ore on the heaps will be 60 days, after which it will be extracted via activated carbon and transported as high gold content liquid to the processing plant. Here it will undergo the same process as the comparable fluids at the plant. The estimated costs for heap leaching are \$12.56 per tonne for the scats and \$14.06 per tonne for all other ores. Whereas the processing costs for the high grade ore in the plant is \$21.66 per tonne. 3 months will be needed for the entire infrastructure for the project to be constructed. With the G&A costs set at \$5.98 per tonne of ore the total costs for all Baboto operations including the heap leaching of the ROMPAD stockpiles the costs will be \$297.1M. This will produce 467,650 ounces of gold, which would give at a gold price of \$1,200 per ounce a revenue of \$561.2M. With an annual discount rate of 0% this would result in a NPV of \$264.0M and an IRR at annual rate of 476%.

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3. General introduction

3.1 Company

Randgold Resources is a Jersey incorporated gold mining/exploration company which has its major activities in West Africa and Central Africa. It has been established in 1995. The company's major activities are in Mali, Ivory Coast and the Democratic Republic of Congo. In Mali are the Loulo-Goukoto and Morilla mines, in Ivory Coast the Togon mine and in the DRC a start has been made on the Kibali mine.

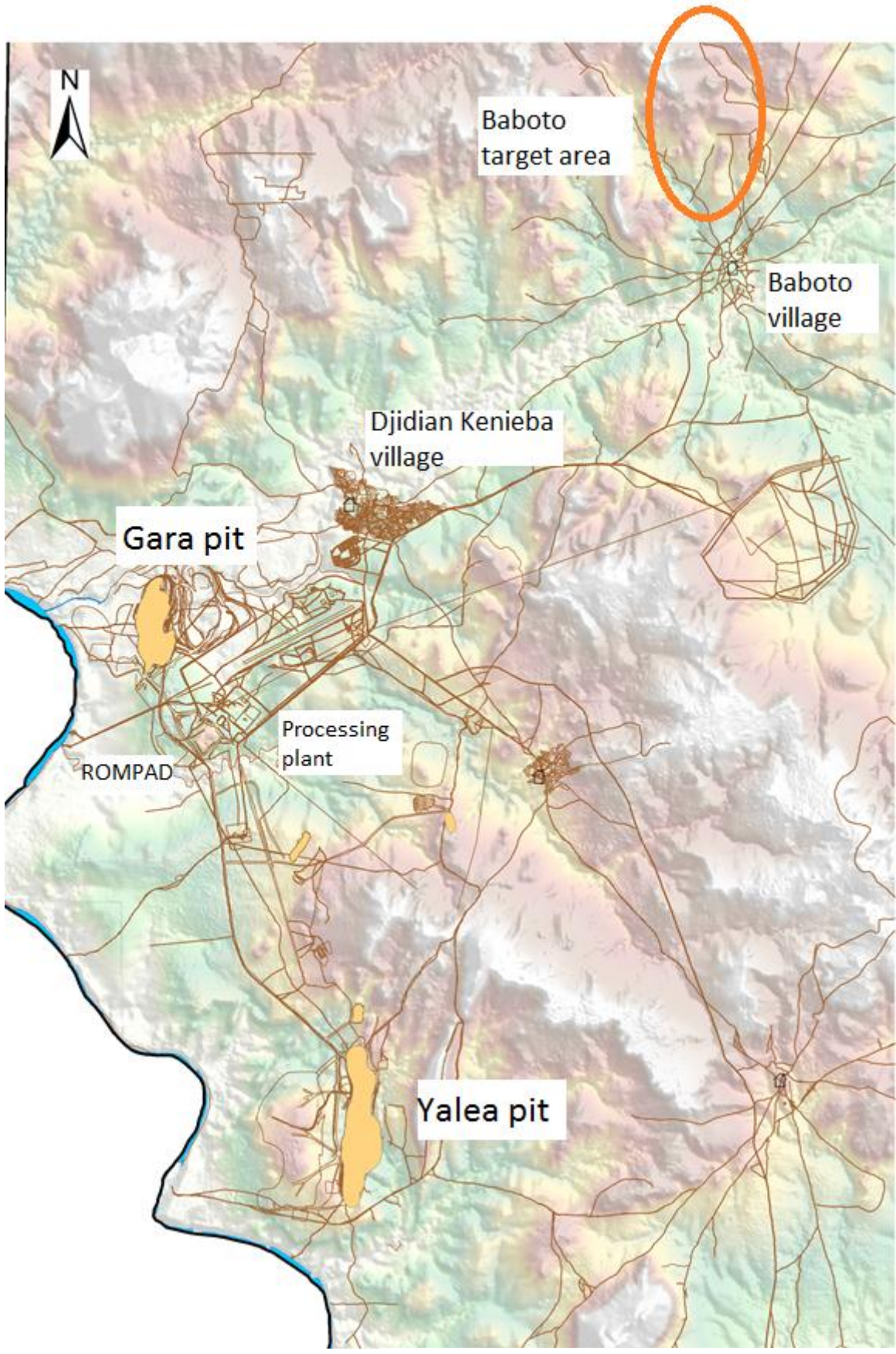
3.2 Loulo

The Loulo gold mine area is located in the west of Mali, at the east flanks of the Falémé River which is also the border with Senegal. It is situated 350 kilometers west of Bamako and 220 kilometers south of Kayes. The Loulo mine is operated by Somilo SA which is owned for 80% by Randgold Resources and for 20% by the Malian government. The exploitation permit covers an area of approximately 372 km². The area has been split into two main focus areas, the Loulo area in the north which contains the Gara, Yalea and Loulo3 mines and several satellite pits, and the Goukoto area in the south which now mainly consists out of the Goukoto pit, but has several other promising ore bodies. Main focus in the last years has been on open pit mining, but since the Gara and Yalea pits have reached their economic boundaries underground operations has also started on these ore bodies. All open pit and underground mines are being mined by contractors. The open pit mines are being mined using the conventional drill and blast method. Underground mines are mined via a sublevel stoping method.

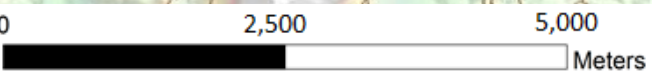
Gold ore is being processed using a conventional cyanide solution method. The plant capacity is around 350,000 tonnes of ore per month and has a typical recovery of about 90 percent.

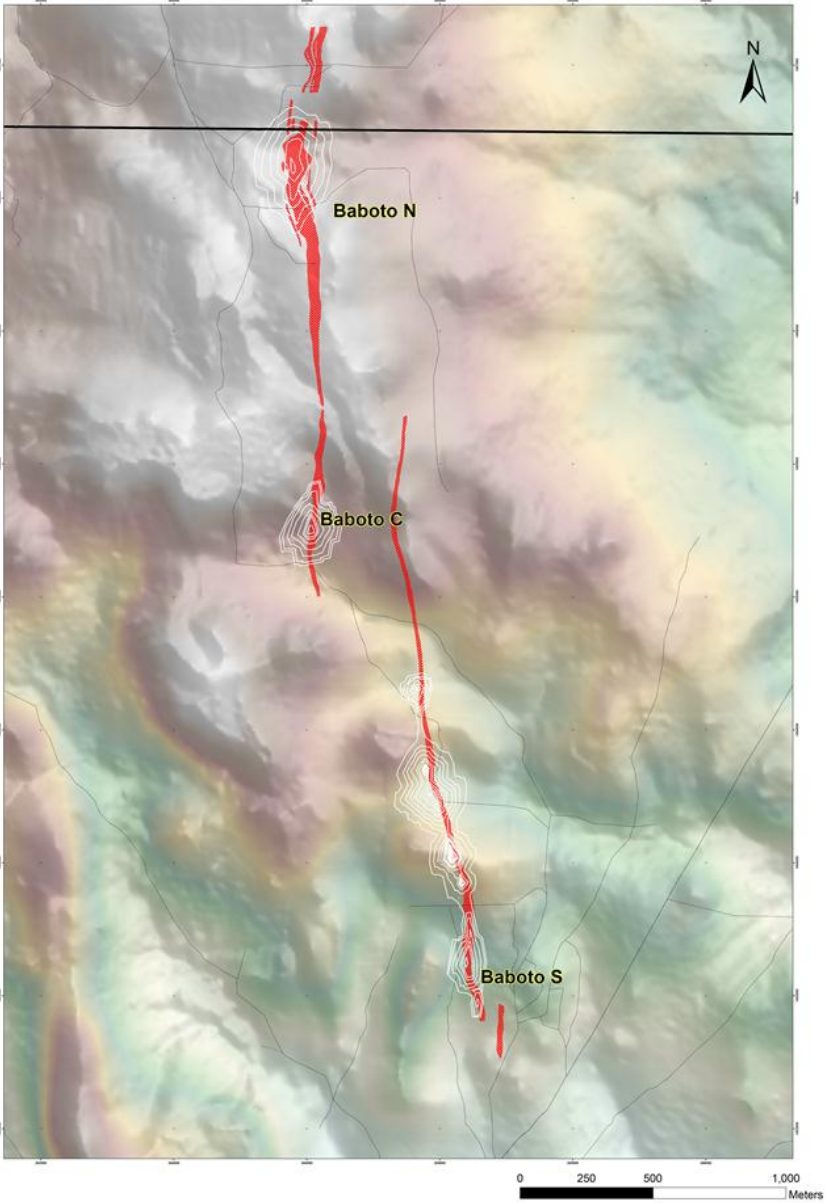
3.3 Baboto

The Baboto deposit is located about 10 kilometers north east of the ROMPAD, few hundred meters north of the Baboto village. The deposit has been known since several years but has been investigated at a low rate. Because Goukoto and the underground mines of both Gara and Yalea won't be able to supply enough ore to run the plant at full capacity, Baboto is being investigated as possible extra source. The deposit can be divided into 3 main focus areas being called Baboto South, Baboto Center and Baboto North.



Loulo area overview





Baboto area overview including ore body and permit boundary

4. Geology

This chapter consists of reports created by the Randgold Resources geology department in Loulo.

4.1 General Geology

Baboto is situated along the northern extension of the Yalea structure, approximately 14 km from Yalea deposit. This 5km long structure contains the Baboto South, Baboto Centre and Baboto North targets within the Loulo permit and continues to the Kofi permit to the north.

Baboto is dominated by a thick sequence of metasediments consisting of siltstone, sandstone, greywacke and polymictic conglomerate with intercalations of strongly sheared argillite. Late cross-cutting mafic intrusives transgress all lithological units. A very weak tourmaline alteration affecting the medium and coarse grained greywacke is observed in the extreme north-west and east of the target.

Strike of bedding varies from north-northeast to west-northwest and the dip varies from steeply east to steeply west. The main shear zones are vertical to steeply west dipping. Mineralization (hosted by a competent unit) is generally low-grade and varies with the strike and the depth. The mineralization intersected has confirmed a broad N170° low-grade steeply west dipping envelope related to a NS shear zone. There is an apparent plunge of 30° to the South.

Mineralization consists of pyrite, arsenopyrite, and accessory chalcopyrite and may be fine or coarsely disseminated, or in linear clusters following the fabric, however their distribution is not uniform in the core. Pyrite can be tabular or fine, whereas arsenopyrite is nodular, or acicular.

Gold mineralization is mainly associated with the finely disseminated pyrite occurring in the brittle-ductile deformation affecting the competent unit where shearing and brecciation, with silica, carbonate, and chlorite alteration are particularly well developed. These zones generally follow the lithological contacts between the conglomerate, quartzite and greywacke, indicating a rheological control. The tabular pyrite or arsenopyrite does not correlate with gold mineralization, while the fine acicular arsenopyrite is often associated with the mineralized zones. The hanging wall and footwall to the mineralization are in general strongly foliated. Multiple sub parallel dilation structures host mineralized zones which have a lensoidal shape. These dilation zones are defined by a series of sub-parallel N-S shears oriented 168°-180°, steeply west dipping, and a 202° - 220° shear dipping 60°-85°.

The low-grade envelope is probably related to the dilation created by the 202°-220° early sinistral shear. High-grade (4.4-12.2g/t) en echelon quartz veins (oriented 240° and dipping 40° to 85° NW and bounded within N-S trending shears) might be explained by the reactivation of the early 202°-220° sinistral shear by the later dextral movement.

The mineralized zones intersected are steeply dipping to the west and are in general low grade. Nevertheless some high grade zones are intersected through the different mineralized zones.

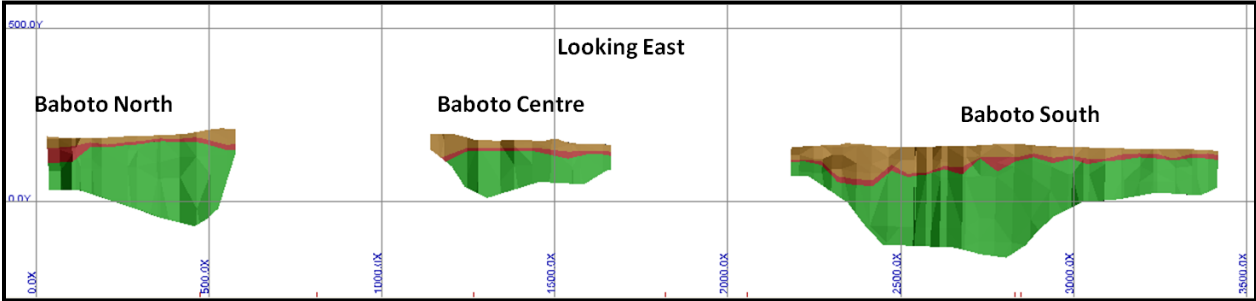
The metallurgical test results from the Baboto South ore returned excellent values from Bottle Roll CIL test with average results for oxides of 94.2%, transitional 91.9% and sulphides 89.6%.

4.2 Resources

4.2.1 Wireframing

The geological solid model is generated in GEMCOM from a combination of about 50m spaced vertical sections. These sections were based on trench, RC and diamond drilling holes, using the hanging wall and footwall geological contacts. The total Baboto ore body is comprised of three vertical to subvertical solids which are separated into saprolite, transitional and fresh by base of saprolite and top of fresh surfaces. The solids were cropped against the topographic surface and a basal surface, constructed from our deep drill intersections.

The total model of Baboto is shown in figure below



Baboto Ore Model in long section

4.2.2 Density Modelling

Density modeling was calculated by the water inversion method on drill core and surface samples. Distributions of each group were studied with outliers being excluded before mean value was calculated. The fresh material density in the ore zone has been assumed to be 2.74, the transitional material, 2.30 and the saprolite, 1.75kg/m³

| | Rock Class | Specific Density |
|----------|------------|------------------|
| Ore Zone | SAP | 1.75 |
| | TRANS | 2.30 |
| | FR | 2.74 |

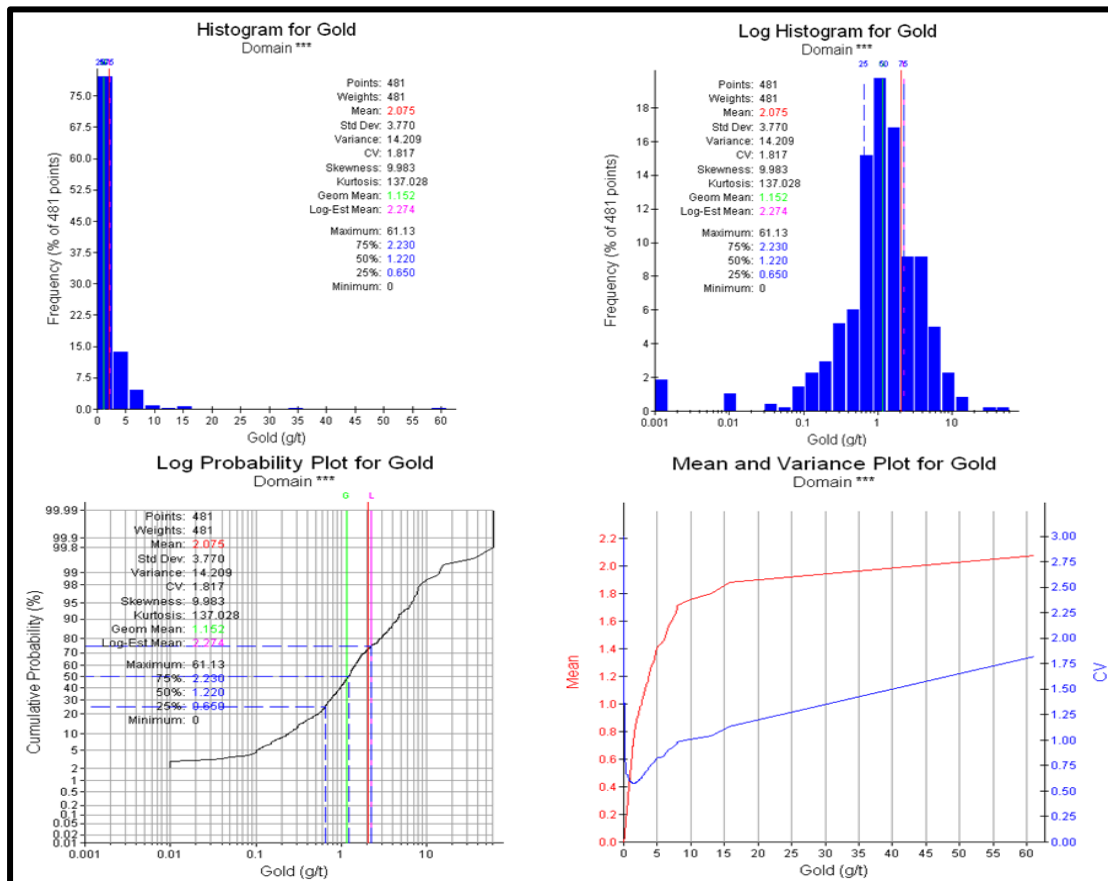
Baboto densities in the ore zone

4.2.3 Data Used and QAQC

The data used in Baboto estimation includes:

27 exploration diamond drill holes, 26 RC holes

This data set constitutes 481 composite 1.5m samples in total, with a mean grade of 2.07g/t, a minimum of 0.00g/t and a maximum of 61.13g/t. A capping grade of 35.75g/t has been used based on analysis to limit the high grade influence. The log normal graph and log probability plot have shown almost one single population. The CV is 1.82 (see figure below)



Baboto Statistical analysis

No available QAQC

4.2.4 Resources estimation and classification

The estimate is based on 57 cross-sections oriented at NNW-SSE, spaced at 50m. Due to the lack of a significant number of data, the block grades were estimated using inverse distance method. So no variography model was carried out. The block size used in the estimation process is 20m x 50m x 10m. The table below gives search parameters used in the calculation.

| Run | Search radius | Samples for search | Search type |
|-----|-------------------|--|-------------|
| 1 | 100m x 25m x 10m | Minimum points to estimate a block: 4 Maximum point to estimate a block: 75 | Ellipsoidal |
| 2 | 200m X 50m X 20m | | |
| 3 | 300m X 100m X 40m | | |

Baboto inverse distance parameters.

The Mineral resources of Baboto are classified as inferred based on the relative irregularity and large inter hole spacing and estimation method used. A total of 11.89Mt of inferred mineral resources has been identified, at an average grade of 2.06 g/t containing 0.79Moz of gold as reported below. A more detailed resources description can be found in appendix A.

| Area | Mass (Mt) | Grade (g/t) | Gold content (kozs) |
|----------------------|--------------|-------------|---------------------|
| Baboto South | | | |
| Saprolite | 0.84 | 3.15 | 85.3 |
| Transitional | 0.30 | 2.84 | 27.0 |
| Fresh Rock | 3.25 | 2.20 | 229.7 |
| Baboto Center | | | |
| Saprolite | 0.32 | 2.15 | 22.0 |
| Transitional | 0.15 | 2.79 | 13.8 |
| Fresh Rock | 0.81 | 2.12 | 55.5 |
| Baboto North | | | |
| Saprolite | 0.51 | 1.71 | 27.8 |
| Transitional | 0.52 | 1.82 | 30.4 |
| Fresh Rock | 5.20 | 1.77 | 295.4 |
| Total | 11.89 | 2.06 | 786.9 |

Baboto inferred mineral resources.

The weathering depth differs per zone. The minimum, maximum and average depth is given in the table below:

| | Baboto South | | Baboto Centre | | Baboto North | |
|---------------|-------------------|--------------|-------------------|--------------|-------------------|--------------|
| | Base of saprolite | Top of fresh | Base of saprolite | Top of fresh | Base of saprolite | Top of fresh |
| Minimum Depth | 8 | 24 | 18 | 29 | 10 | 19 |
| Maximum Depth | 17 | 98 | 41 | 55 | 45 | 67 |
| Average Depth | 39 | 51 | 25 | 38 | 23 | 40 |

Baboto weathering depth

5. Environmental

This chapter consists of parts quoted from an environmental study done by Digby Wells Environmental for Somilo. See appendix K for the whole report.

5.1 Environmental Management Plan

Loulo Gold Mine currently has an Operational EMP which has been updated and attached as Appendix 5 of this report. This updated EMP document focussed on the operational areas for easy implementation. From the existing objectives, commitments and action items, a working management sheet was developed for the new and proposed developments. The working sheet provides potential solutions to issues that are occurring, which are not in line with stated commitments. This will allow for better implementation of the EMP as well as to interconnect with the Environmental Management System (EMS), which is currently in place. The Integrated Water Management Plan (IWMP) is not part of this Operational EMP but will be developed as a separate project.

The updated EMP includes:

- Water Management (Geohydrology and Surface Water);
- Dust Management;
- Waste Management;
- Management of Raw materials;
- Hydrocarbons Management; and
- Social Management.

5.2 Risk Assessment for the Heap Leach Pad at Baboto

Risk assessment is a step in a risk management procedure. Risk assessment is the determination of quantitative or qualitative value of risk related to a concrete situation and a recognized threat (also called hazard). For the purpose of this project, the following methodology was applied to the high level risk assessment of the proposed Heap Leach pad at Baboto.

| P= PROBABILITY, POTENTIAL OR LIKELIHOOD OF THE EVENT OCCURRING | | | | |
|--|---|-----------|---|--|
| A | 5 | Very High | Common regular Occurrence - Certain to occur | Almost certain to happen (>90%) |
| B | 4 | High | Possibility of regular occurrence - known to happen | Likely to happen at some point (50 - 90%) |
| C | 3 | Moderate | Isolated incidents - could happen here - has been reported from elsewhere | Moderate: possible, heard of so it might happen (20-50%) |
| D | 2 | Low | Not likely to occur - heard of happening - but not impossible | Unlikely: not likely to happen(5 - 20 %) |
| E | 1 | Very Low | Rare - very unlikely- never heard of | Rare: Practically impossible (< 5%) |

When considering consequence, the most likely or maximum reasonable outcome must be taken into account, not necessarily the worst case scenario. When the consequence of the risk has been established (5-1), the risk ranking can be obtained by aligning this with the probability of the consequence being realised (A-E) on the risk score calculator below.

| | | Probability, Potential or Likelihood of Occurring | | | | |
|--------------------------------|---|---|----|----|----|----|
| | | A | B | C | D | E |
| | | 5 | 4 | 3 | 2 | 1 |
| MRC | 5 | 25 | 24 | 22 | 19 | 15 |
| Maximum Reasonable Consequence | 4 | 23 | 21 | 18 | 14 | 10 |
| | 3 | 20 | 17 | 13 | 9 | 6 |
| | 2 | 16 | 12 | 8 | 5 | 3 |
| | 1 | 11 | 7 | 4 | 2 | 1 |

| Maximum Reasonable Consequence (MRC) | | | | |
|--------------------------------------|---|--|--|-------------------------|
| | PEOPLE Health and Safety | PROPERTY or PRODUCTION | ENVIRONMENTAL AND COMMUNITY | Financial Impact |
| 5 | Could kill or permanently disable. | Could cause very major damage >\$500K | A major event creating irreversible environmental damage, loss of company credibility with key stakeholders, national publicity and complaints or could close the operation permanently. Cat V | > R 10M |
| 4 | Could cause serious injury or disease (major LTI) | Could cause major damage \$100K - \$500K | An event having a substantial and permanent consequence to the environment such as an environmental incident which would result in prosecution, adverse local publicity and complaints. Cat IV | > R 2.5 M and < R 10M |
| 3 | Could cause typical MTI / RWI / LTI | Could cause moderate damage \$50K - \$100K | An event creating substantial temporary or minor permanent damage to the environment, such as a reportable incident. Not likely to result in prosecution, eg: a water discharge. Cat III | > R 5000 k and < R 2.5M |
| 2 | Could cause First-Aid injury | Could cause damage \$5K - \$50K | An event having temporary and minor effects on the environment, such as a non-reportable environmental incident, eg: a minor oil spill Cat II | > R 5000 but < 500k |
| 1 | Couldn't cause injury or disease | Couldn't cause damage or <\$5K damage | No detrimental impact on the environment is measurable or envisaged Cat I | <R 5000 |

Actions

| | |
|----------------------|---|
| High 20 - 25 | Immediate Action to reduce risk. Introduce hard barriers and adequate controls to reduce risk. Control Hazard/s. Monitor regularly |
| Moderate 11 - 19 | Urgent attention to improve controls and reduce inherent risks. Monitor systems controls and audit quality and implementation of controls |
| Acceptable 1 - 10 | Controls in place. Tolerable risk level. Ensure monitoring is as per HSEC Management System. |

Based on the methodology described above, the following table provide a summary of the risk assessment undertaken for the proposed Heap Leach pad at Baboto.

LOULO GOLD MINE: HEAP LEACH PAD FOR BABOTO, HIGH LEVEL RISK ASSESSMENT

| No | Concerning issue | Potential unwanted event | Current Controls | Cons | Prob | Risk | Additional Controls needed |
|----------------------|---|---|---|------|------|------|--|
| Surface water | | | | | | | |
| 1 | Potential release of toxic water to downstream users. | During a wet period the rainwater causes the cyanide containing ponds to overflow. | Sizing of ponds to contain a large rainfall event. Detox facilities for excess water. | 5 | 3 | 22 | Design for conservative climatic data, realising that data is not sufficient for detailed design purposes. Have covers ready for surface of heap leach to divert rainwater off the area. Make it impossible to have unplanned discharges. Desilt ponds regularly to ensure that ponds continue to have the capacity that they were designed for. Independent check of design parameters. |
| | | Spills occur from chemical mixing areas | Mixing and storage area to be bunded and have sealed floors | 5 | 3 | 22 | Regular audits to ensure adequacy of bunds and management practises. |
| | | Cyanide spills during transport of containers and during unloading | Transport and loading protocols | 5 | 2 | 19 | Ensure adherence to cyanide management codes. Regular audits of practises |
| 2 | Siltation of streams below the site | Streams erode the sides of the pads causing erosion and siltation in the liner system and downstream. | Surface water diversion measures to be put in place. | 3 | 4 | 17 | Silt traps in trenches and before dams. Regular emptying of the silt traps. |
| | | Water erodes pad area and cleared areas. | Storm water management plan including minimising surface flow over the land surface. | 3 | 4 | 17 | Minimise areas of disturbance |
| 3 | Direct toxic effects on wildlife | Fauna dying – open contaminated water bodies attract wildlife (e.g. birds, baboons) for drinking | Bird balls are used to cover open CN contaminated water. Area is continually patrolled. | 4 | 4 | 21 | Fence whole area sufficiently to prevent access by mammals |
| | | | Dedicated bird scaring team. Eliminate CN solution ponding on the leach pad by inducing infiltration and physically chase off birds | | | | |
| | | Bad publicity for company and project due to animal deaths. | Prevention of deaths by above management measures. | 4 | 2 | 14 | Educational programme for community and authorities on what is and can occur. |
| Ground water | | | | | | | |
| 4 | Contamination of underground aquifers | The liner leaks allowing cyanide containing water to enter the groundwater regime | Leak detection layers installed below the pad. Borehole monitoring around | 4 | 3 | 18 | Independent check of liner specification. Maintenance schedule. Second liner. |

| | | | | | | | |
|-------------------|--|---|---|---|---|----|--|
| | | | the heap leach pad and pond area. Groundwater monitoring programme. | | | | |
| | | Groundwater contamination affects drinking water supplies | Siting of pad in area where contamination does not affect water supplies if accidents had to occur. | 5 | 2 | 19 | Independent check of heap leach pad and infrastructure placement |
| Dust | | | | | | | |
| 5 | Spreading of dust particles | Air dispersal of fine particulate material from the heap leach pad, roads from pits and preparation area. | Watering systems for roads. Dust monitoring to be put in place. Active areas are kept wet | 3 | 3 | 13 | Management plan not to operate in windy conditions. Dust sprays at crushers and conveyors. React to monitoring data. |
| Vegetation | | | | | | | |
| 6 | Wind disperses toxic leach mixture | Vegetation dies around area of heap leach due to droplet dispersal | Use of drip irrigation | 3 | 3 | 13 | Management plans to stop placing of liquid during windy periods. No use of sprinkler type systems, rather drip irrigation. |
| 7 | Vegetation clearing | Destruction of vegetation over disturbed footprint area and affecting protected species. | Increasing pad lift height. Site selection based on baseline studies. Implementation of management plans from specialist studies. This will decrease area affected in the short term, but may seriously affect the ability to slope out to 1:6 at closure for sustainable closure plan. Proper planning is essential. | 2 | 5 | 16 | Detailed site survey and management plan for rare or endangered species |
| Community | | | | | | | |
| 8 | Drowning of people in water bodies. | Access is gained to the site and people fall or slip into ponds. | Fencing of the site and patrols by security. All plastic lined ponds to have ropes and flotation devices. Education of workers. | 5 | 2 | 19 | Educational programs for the local community. Safety programs to be audited on site. Additional fences around ponds. |
| 9 | Poisoning occurs due to people accessing dangerous areas | Access is gained. | Fencing of the site and patrols by security | 5 | 2 | 19 | As above |
| Closure | | | | | | | |

| | | | | | | | |
|--|---|---|--|---|---|----|---|
| 10 | Closure costs are underestimated or not provided for. | Sustainable closure of the site is not achieved. | Estimate of closure costs for capital cost. Annual update of cost assessment. | 4 | 3 | 18 | Ensure funds are available for planned and unplanned closure. |
| Note: Apart from closure costs, closure planning must begin with the initial conceptual planning. This will involve ensuring that the site selected is large enough for the ultimate design (outslopes <1:5 or 1:6), and that sufficient material is stripped from the footprint to cover the heap leach dump with the planned cover mix. Modeling of the final design should be used to define the thicknesses of saprolite and topsoil needed to reduce outflow of contaminated water to sustainable levels) | | | | | | | |
| Air quality | | | | | | | |
| 11 | Poisonous gas | Cyanide gas may form and contaminate local airsheds | Inactive area is rehabilitated. pH is kept at level that does not allow gas escape | 5 | 2 | 19 | |

5.3 Closure

5.3.1 Introduction

As described in Chapter 3 of this ESIA Amendment Report, the new facilities planned as part of the mine expansion will need to be taken into consideration with regard to their closure. The closure suggested in the section of the ESIA Amendment Report is however very generic and will need to be updated as plans for the various facilities become more defined. It should also be noted that these are very broad closure considerations and that a detailed closure plan needs to be compiled approximately 5 years before the end of the mine life. If various facilities are closed before the end of all of the operations then they must be closed in such a way that the closure fits in with the overall planned closure of the whole mine. Lessons learned when closing each of these facilities needs to be applied to the whole closure. This is applicable to the costs for closure as well as the methodologies which are assumed to work or not for each facet of closure.

5.3.2 Closure Implications for the various facilities

5.3.2.1 New Open pits

The expansion of the mining facilities at the new open pits such as PQ 10 and Baboto mean that more surface area is disturbed, more pits are created and more roads are required to get to the pits. Each pit will also have a waste rock dump associated with it. The standard and accepted closure methods for the other existing pits at Loulo have been assumed for the new pits as part of the ESIA expansion. It has been assumed that the pits will remain open as the holes in the ground, and will not be filled and that the slopes where there is weathered material will be sloped down to 27 degrees by bulldozing and that these slopes will be vegetated.

If possible however, the pits need to be filled with material from nearby pits as part of progressive closure. It is also assumed that the rock dumps associated with these various satellite pits will be sloped down to a 1:6 overall slope. Water control measures will be implemented on top of these

slopes and that this will be sufficient to control the erosion. Even though these are very general closure methods for this stage of the investigation and the methodology has been assumed to be effective. These interventions should cover all aspects related to long term erosion control and stability as well as community safety aspects. For the satellite pits the amount of material which needed to be dozed was based on the pit outline contained on the plans received. This outline was used to calculate how much additional area would need to be dozed to achieve a slope of 27 degrees in the soft material. Weathered horizons were assumed to be 20 m deep. It was also assumed that the rock stockpiles associated with each pit are shaped to a 1:6 slope during closure and vegetated. It is assumed that there are no additional measures required for managing and treating acid mine drainage.

Please note: Due to the lack of information on the dimensions of the waste rock dumps, no cost allowance has yet been made to vegetate the waste rock dumps at each pit yet.

5.3.2.2 Heap leach facilities at Baboto

It has been assumed that the heap leach pad sides will be constructed quite steeply during operations and that at closure they will need to be shaped down to a stable slope. It has been assumed that these slopes will be an overall slope of 32 degrees at the end of the life of the pad and that they will be sloped down to a 1:6 on the side slopes and whatever top soil is available in the area will be placed over these dumps. An allowance has been made to have a cover of at least 0.5 m of saprolite and topsoil over these dumps for the whole of the final surface area. There should be sufficient saprolite adjacent to the Baboto pits as a result of the mining which has occurred there. This extensive shaping should hopefully mean that the liner facilities will be too deep for the local people to be able to dig up the lining.

Please note: We do not know the expected size of these facilities and for now have assumed a size of 1300m by 500m and that it will be 50 m high.

No allowance has been made for the decontamination of cyanide containing liquids within the heap leach pad as it has been assumed that this will be part of the operational costs. At closure all liquids need to be transported to the main plant if they are at all hazardous. In addition at the heap leach it has been assumed that the break down will be required for mechanical equipment around the heap leach and that all foundations will be removed and disposed of in a satellite pit nearby and any lined facilities which could be possibly dug up by people afterwards is removed and either disposed of suitably or decontaminated for use by people. An allowance has been made to vegetate these heap leach facilities.

5.3.3 Closure costs

The basis for estimating the increase in closure costs should be taken as indicative as it is very difficult to estimate an accurate closure cost based on the level of information available. These closure costs should be updated annually.

| | |
|-------------------------------|-----------|
| 1. Heap Leach project | 6 739 167 |
| 2. Pit expansions & new pits: | |
| - Baboto North, | 1 965 268 |
| - Baboto South | 626 918 |
| - Baboto Central; | 912 924 |

5.4 Recommendations

Based on the findings in this report, a number of recommendations have been identified for the Loulo Gold Mine. These recommendations have been summarised in the following table.

| ASPECT | DETAILS / DESCRIPTION |
|--|--|
| 1. <i>Geohydrology, Hydrology and Modelling</i> | A separate, detailed hydrological study of the Heap Leach area at Baboto, as well as the Heap Leach area at Goukoto will be undertaken. |
| 2. <i>Fauna Management Plan</i> | A Fauna management program with focus on birds but inclusion of vegetation transects, biomonitoring of fish and aquatic invertebrates as well as mammals and amphibians will be compiled for the Loulo Gold Mine and the Fauna and Flora report must be updated accordingly. |
| 3. <i>Air Quality</i> | Air pollution control measures and quality monitoring programme must be in place, dust fallout and PM10 monitoring should continue. If it is not already installed, it is recommended that full meteorological station that will record all parameters on an hourly basis (wind speed, wind direction, ambient temperature, relative humidity, barometric pressure, solar radiation, and precipitation) is commissioned. It is also recommended that the full air quality impact assessment study is conducted that will incorporate compilation of an emission inventory and deployment of an atmospheric dispersion model in order to assess the impact of proposed developments at the Loulo Gold Mine. |
| 4. <i>Agricultural survey (Soil and Land Use Capability)</i> | A comprehensive soil and land capability survey including land use will be undertaken. This must be undertaken to establish the significance and severity of potential impacts of the new and proposed developments on the soil, land capability and land use. Measures to monitoring and management these impacts will form part of the social management and community development plans. The scope of work for the agricultural survey must include: |

| | |
|----------------------------------|--|
| | <p><u>Baboto</u> – heap leach area (incl. Pits and ore transport route) – inside the fence line or wherever people will not be allowed to cultivate</p> <p><u>Loulo</u> – The agricultural land availability around the mine areas will be evaluated to demonstrate the availability of cultivable land.</p> <p><u>Goukoto</u> – heap leach area (incl. Pits and ore transport route) – inside the fence line or wherever people will not be allowed to cultivate</p> |
| 5. <i>Rehabilitation</i> | Heap Leach pad Rehabilitation program must be compiled, which will focus on hydrology. Soil and vegetation management objectives also need to be set. |
| 6. <i>Social Management Plan</i> | <p>Social management and monitoring plan will be implemented; The survey will be conducted for the communities (household), to give direction for future development. A separate proposal will be considered to conduct these studies. It is recommended that the following studies be undertaken to address the social aspects:</p> <ul style="list-style-type: none"> - Completion of Social Impact Assessment. Update of Social Management Plan. Household survey for Baboto and Boribanta Villages; Land use survey. - Technical assistance for agricultural enhancements and agri-business opportunities. - Skills survey. |
| 7. <i>GHG Management Plan</i> | The development of a GHG management plan was not included in the scope of work of this assessment, but is included in the report for the CDP, with the objective of improving the mine’s GHG management performance. |
| 8. <i>Noise Assessment</i> | It is recommended to conduct an updated noise assessment to compare to the last study conducted in 2009 with more recent data to determine if it is within the recommended range of the WHO levels for residential areas. It is also recommended to set up a noise monitoring programme where longer duration baseline data is obtained and monitoring is done annually. |

5.5 Conclusion

The new and proposed developments at Loulo Gold Mine will have a number of positive and negative impacts on the biophysical and socio-economic and socio-cultural environment. Some of these developments have already commenced. The new and proposed activities will ensure the extension of the life of mine by approximately 20 years (2050), which could lead to the continuation of socio-economic benefits and skills development and training. There are a number of negative impacts foreseen for the new and proposed developments. The biggest area of concern is related to cyanide

management and thus the heap leach projects at Baboto (Loulo Gold Mine) and Goukoto. Due to the introduction of hazardous chemicals such as cyanide, additional studies would be required. Conditional to the effective implementation of mitigation measures outlined in this report, the new and proposed developments did not present any fatal flaws for development to proceed. It is recommended that the new and proposed developments proceed in line with the guidelines and recommendations outlined in the Operational EMP and ESIA Amendment Report.

6. Processing

The ore with a grade higher than 2.5 gram/tonne will be classified as high grade ore and shall be processed in de Loulo processing plant. The plant is located at approximately 12.5 km by road from the Baboto ROM. Carbon-In-Leach (CIL) method is used to process the high grade ore. Metallurgical bottle roll tests have been done on the ore. A new set of samples is currently being tested in the lab. The processing costs have been estimated to be \$21.66 per tonne. The test results from the first bottle roll tests are given in the table below.

| Rock type | Recovery (%) |
|------------------|---------------------|
| Saprolite | 94.2 |
| Transitional | 91.9 |
| Fresh rock | 89.6 |

Results Bottle Roll test

In total 2,219,350 tonnes of high grade ore will be processed in 3.7 years.

7. Heap Leaching

All ore produced at Baboto with a grade lower than 2.5 gram/tonne shall be classified as low grade ore. This low grade ore will not be processed at the processing plant but shall be processed by the new to Loulo processing method of heap leaching.

In total 5,095,313 tonnes or 2,790,794 m³ will be processed in 3.9 years.

7.1 General heap leaching

For the heap leaching process, the low grade material is crushed to smaller sizes and is stacked upon a big pile. Most of the time the ore will have to be agglomerated to create a sufficient permeability to guarantee percolation of the leaching liquid and to create a steep enough slope angle. A cyanide bearing fluid that can react with the gold in the ore will be seeping through the pile for a certain period, typically about 2 months in gold processing. The gold bearing solution, called pregnant solution, is being collected at the bottom of the heap when it reaches a 1.5mm thick HDPE inclined layer after which it will be stored in a pond. After this the gold will be separated from the fluid by the use of activated carbon. The cyanide solution, now called barren solution, will most of the time be reused for leaching or occasionally be sent to a settling pond. The activated carbon solution that contains gold will be transported to the processing plant for elution, electrowinning and smelting, just as the conventional method.

Since there is little experience within Randgold Resources on heap leaching an American consultancy agency, Kappes, Cassidy & Associates have been consulted, see appendix B1 and B2. Based on previous experience they expect:

- recovery efficiency of 80%
- leaching time of 60 days
- cyanide consumption of 0.3 kg/tonne
- cement consumption for agglomeration 8 kg/tonne
- ore has to be crushed to 37mm (80% passing)

7.2 Baboto heap leach reserves

The tonnage and grade after 10% dilution and 3% ore loss of the minable low grade ore from Baboto is given in the next table, including the volume with an expansion factor of 1.3:

| Area | Mass (tonne) | Volume (m ³) | Grade (g/t) | Gold content (oz) |
|----------------------|------------------|--------------------------|-------------|-------------------|
| Baboto South | | | | |
| Saprolite | 298,986 | 222,752 | 1.45 | 13,931 |
| Transitional | 84,268 | 47,119 | 1.55 | 4,204 |
| Fresh Rock | 142,213 | 66,889 | 1.69 | 7,740 |
| Baboto Center | | | | |
| Saprolite | 85,443 | 63,657 | 1.21 | 3,331 |
| Transitional | 50,947 | 28,488 | 1.15 | 1,876 |
| Fresh Rock | 92,513 | 43,515 | 1.10 | 3,283 |
| Baboto North | | | | |
| Saprolite | 363,600 | 270,891 | 1.40 | 16,387 |
| Transitional | 385,343 | 215,470 | 1.21 | 14,974 |
| Fresh Rock | 2,018,156 | 949,255 | 1.47 | 95,275 |
| Total | 3,521,472 | 1,908,037 | | 161,002 |

Leachable low grade ore facts

7.3 Other heap leachable sources

Not only the low grade ore from Baboto is suited for heap leaching. Also the scats at the ROMPAD and the low grade ores from Gara and Yalea stockpiled next to the ROMPAD could be good heap leaching feed. Since they are already stocked next to the point where the trucks will drop off the Baboto ore, the trucks could just as well be filled at the ROMPAD and drive back fully loaded with these ores. The Gara and Yalea ores could directly be crushed at the ROM of Baboto. The scats are already crushed and can be used directly for heap leaching when they arrive. The tonnage, volume and density of the Gara and Yalea ore are well known. The data from the scats, or mill reject, however was monitored less precise. For that reason the surface mining survey team has measured its volume, see appendix C. The total amount of other leachable material is given in the table below:

| Material | Mass (tonne) | Density (t/m ³) | Volume (m ³) | Grade (gr/t) | Gold content (oz) |
|--------------|------------------|-----------------------------|--------------------------|--------------|-------------------|
| Mill reject | 539,623 | 1.518 | 355,483 | 1.85 | 32,096 |
| Gara | 802,906 | 1.85 | 434,003 | 1.61 | 41,462 |
| Yalea | 231,312 | 2.48 | 93,271 | 1.50 | 11,192 |
| Total | 1,573,841 | | 882,757 | | 84,751 |

Other leachable ore data

7.4 Heap leaching design

The design of the heaps has been based on the design of the operation at Yatela. The heaps there are built out of 3 levels, each 8 meter high, and have a length of 900 meter. The slope angle is 34 degrees and the face angle 37 degrees. This results in a volume per heap of approximately 717,342 m³. This means that the amount of heaps required for the Baboto ore body is 2.66, for the other leachable ores 1.23. So to process all low grade ores combined 3.89 heaps are required. See appendix D. The heap building will be done via a conveyor stacking system. 3 ponds will be needed for the pregnant solution, the barren solution and to handle storm water with a combined surface of approximately 110,000 m².

7.5 Cost estimation

Also based on the consulting work from Kappes, Cassidy & Associates the capital and operational costs have been estimated.

7.5.1 Capital costs

In the next table the capital costs have been summarized.

| Item | Quantity | Cost (\$) |
|--|------------------------|-------------------|
| Leach pad | 252,000 m ² | 6,465,000 |
| Ponds - preg, barren, storm water | 110,000 m ³ | 1,900,000 |
| Crusher – 2 stage conventional cone plant, portable plant, loader fed | | 2,500,000 |
| Agglomeration drum | | 1,440,000 |
| Cement storage silo & feed system | | 500,000 |
| Conveyor stacking | | 2,956,000 |
| Solution pumping and carbon adsorption | | 2,880,000 |
| Heap irrigation piping – initial install | | 200,000 |
| Power supply | | 200,000 |
| Office/shop/warehouse buildings | | 400,000 |
| Fencing, roads, communications misc. services | | 250,000 |
| Mobile equipment – front end loader, backhoe, forklift, service truck, pickups, etc. | | 900,000 |
| Subtotal | | 20,591,000 |
| Shipping | | 483,000 |
| Spares | | 204,000 |
| EPCM | | 1,694,000 |
| Subtotal | | 22,972,000 |
| Contingency, 20% | | 4,594,400 |
| TOTAL, US\$ | | 27,566,400 |

Estimation of capital costs for heap leaching

All these capital expenses will have to be made before any heap leaching process starts, so this shall be done in the 3 months preparation and construction time before mining will commence.

7.5.2 Operational costs

Assumptions for the operational costs that have been made by Kappes, Cassidy & Associates are quoted:

- Power (diesel generated) – 10 kWh/t at US\$0.20/kWhr;
- Cement – 8kg/t at US\$0.216/kg;
- Cyanide - 0.3 kg/t at US\$ 2.0/kg;
- Crushing wear costs at US\$0.25/t;
- Annual maintenance parts costs at 5% of mechanical equipment cost;
- Labor costs – based on operators & mechanics at \$24,000/a, laborers/helpers at \$18,000/a; foreman at \$30,000/a. These costs are for all costs including burdens.
- Irrigation system non-labor maintenance costs of US\$ 0.10/t;
- Carbon losses of 10% of carbon stripped due to hauling to/from Loulo;
- Antiscalant – 5ppm to preg to carbon cols; 10 ppm to irrigation system;
- Miscellaneous support from Loulo operations of US\$ 150,000/yr;
- G&A costs (insurance, road maint, lab support, legal, accounting, water supply, consultants, etc) of US\$1.00/t.

Of all these costs only the G&A has been changed, since this is known for all Loulo operations and is currently approximately \$5.98 per tonne.

The operational cost estimation can be found in the table below.

| | \$/tonne |
|--|-------------|
| Reagents | 2.43 |
| Power | 2.00 |
| Labor | 2.80 |
| Mobile Equipment – fuel & maint | 0.40 |
| Crushing wear | 0.25 |
| Equipment maintenance, excluding labor | 0.39 |
| Irrigation system | 0.10 |
| Misc Loulo support services | 0.28 |
| TOTAL | 8.65 |

Estimation of operational costs for Baboto heap leaching

The operational costs for the Gara and Yalea ores that shall also be heap leached will be just as high as the costs for the Baboto ores. The costs for the mill reject however shall be lower since this material will not have to be crushed anymore. The operational cost per tonne of mill reject will come down to \$7.15.

8. Hauling

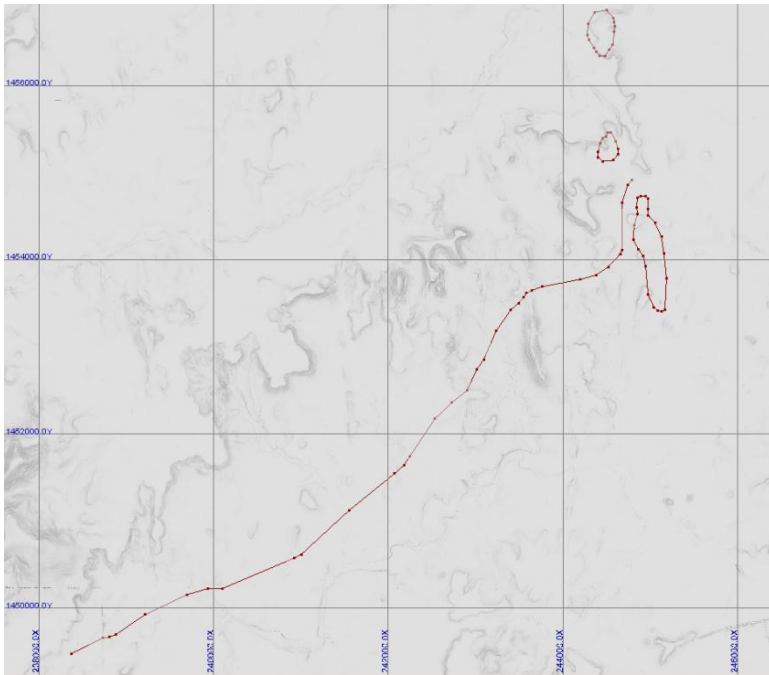
Assumptions made for the haulage calculations are:

- Exchange rate \$/Euro: 1.40
- Diesel fuel \$ per liter: 1.10
- Oil price \$ per liter: 2.90
- Shifts: 2
- Hours per shift: 10

8.1 Hauling road

The Baboto ore body is located approximately 10km north east of the ROMPAD and 1km north of the village of Baboto. This village can be accessed via the public road that goes through Djidian Kenieba. It would be very unfavorable to transport the ore via this route. An alternative route will have to be constructed. The two main options for the road location from the ROMPAD to Baboto would be first heading east towards Loulo3 after which the route will go north and pass the village of Djidian Kenieba on the east side. The other option would be to follow the road west of the Gara pit up to PQ10 and construct a road heading north east from that point on. This second route has been chosen to be most favorable. It passes a hardly populated area that is relative flat, the crossing of the Gara River has already been constructed for the route to PQ10 and a geologically interesting area called PQ10 North will then be closer to a decent haul road.

The remaining part of road that has to be constructed to access the Baboto ROM will be 8986 meter as can be seen on the sketch below. Making the total route from the Baboto ROM to the crusher at the ROMPAD approximately 12,470 meter.



Part of haul road to the Baboto ROM that has to be constructed starting at PQ10

The road construction details and costs have been based on the data from the construction of the road to Goukoto see appendix E. However the road to Baboto will not need to be as wide since it will be used less frequent. A summary of the cost can be found in the table below:

| Operation | Unit price | Total price (\$) |
|----------------------------------|------------------------|------------------|
| Bush Clearing | 0.22 \$/m ² | 104,184 |
| Excavate to spoil | 4.05 \$/m ³ | 247,838 |
| Excavate from borrow pit to road | 7.25 \$/m ³ | 1,094,495 |
| Total | | 1,446,517 |

Road construction costs

8.2 Hauling

The transport of the high grade ore from the Baboto ROM to the crusher at the ROMPAD shall be done by the same trucks as currently used for the Goukoto project. The first period the trucks shall transport both ore from the Baboto ROM to the crusher and the ores stockpiled at the ROMPAD to the Baboto ROM on the way back. The extra loading on the way back will only cost an extra 10 minutes of loading and dumping, a detour of 583 meter and slightly higher diesel consumption. To calculate the cycle time the following variables have been used: an average speed of 45 km/h, a loading time of 7 minutes and an offloading time of 3 minutes. The total cycle time will be 54.8 minutes. Because the plant has to be fed with 50,000 tonnes per month it will take 2.6 years to transport all stockpiles currently at the ROMPAD to Baboto. After this period only Baboto ore will have to be transported, so the

total cycle time shall be reduced to 43.3 minutes. Just as with the Goukoto project transport will take place in two shifts of 10 hours each. The trucks are expected to have an availability of 85% and a utilization of 85%. 30 minutes has been taken into account for shift changes. The trucks needed are given in the next table.

| Period | Truck utilization | Capacity (t/month) |
|--------------------|------------------------------------|---------------------------|
| Day 1 – Day 956 | 2 full time + 1 at 11 shifts/month | 50,056.5 |
| Day 956 – Day 1348 | 1 full time + 1 at 45 shifts/month | 50,096.3 |

Baboto trucking data

8.3 Finances

The capital expenses that have to be made are summarized in the table below. A more detailed overview can be found in appendix F.

| | Cost per tonne | Total cost |
|--------------------------|-----------------------|-------------------|
| Depreciation and finance | 0.99 | 3,755,538 |
| Mobilization cost | 0.19 | 730,000 |
| Road construction | 0.38 | 1,446,517 |
| Total | 1.56 | 5,932,055 |

Transport capital expenses summary

The operational expenses are summarized in the table below.

| | Cost per tonne |
|--------------|-----------------------|
| Maintenance | 0.98 |
| Freight cost | 0.12 |
| Manpower | 0.58 |
| Oils | 0.05 |
| Diesel | 0.95 |
| Mark up | 0.34 |
| Total | 3.02 |

Transport operational expenses summary

9. Mining

The Baboto ore body shall be mined as three separate zones: Baboto South, Baboto Center and Baboto North. Each of these zones will be subdivided in 3 rock zones, the saprolite zone, the transitional zone and the fresh rock zone. This subdivision is based on the rock properties and will cause different mining conditions. All these resources will be divided again, based on grade. The ore with a grade between 0 and 2.5 g/t will be mined as low grade ore and shall be processed near the mines via a heap leaching process, the ore with a grade higher than 2.5 g/t will be classified as high grade ore and shall be processed in the Loulo processing plant.

9.1 Movable resources

A Gemcom Whittle run has been done on the geological model. The optimal pits have been selected at given parameters. The movable resources and the waste rock within these pits are given in the tables below.

Baboto South:

| | Low grade ore (tonnes) | High grade ore (tonnes) | Waste rock (tonnes) | Total mass (tonnes) | Total volume (BCM) |
|--------------|------------------------|-------------------------|---------------------|---------------------|--------------------|
| Saprolite | 281,029 | 345,082 | 9,152,693 | 9,778,805 | 6,301,085 |
| Transitional | 78,130 | 116,067 | 2,381,981 | 2,576,178 | 1,102,374 |
| Fresh rock | 132,130 | 420,271 | 4,129,015 | 4,681,416 | 1,715,980 |
| Total | 491,289 | 881,420 | 15,663,690 | 17,036,398 | 9,119,439 |

Minable rock mass and in situ volume Baboto South

Baboto Center:

| | Low grade ore (tonnes) | High grade ore (tonnes) | Waste rock (tonnes) | Total mass (tonnes) | Total volume (BCM) |
|--------------|------------------------|-------------------------|---------------------|---------------------|--------------------|
| Saprolite | 80,311 | 72,933 | 1,494,095 | 1,647,339 | 1,057,760 |
| Transitional | 47,237 | 52,876 | 877,652 | 977,764 | 418,592 |
| Fresh rock | 85,958 | 161,413 | 1,720,786 | 1,968,157 | 720,898 |
| Total | 213,506 | 287,222 | 4,092,532 | 4,593,260 | 2,197,249 |

Minable rock mass and in situ volume Baboto Center

Baboto North:

| | Low grade ore (tonnes) | High grade ore (tonnes) | Waste rock (tonnes) | Total mass (tonnes) | Total volume (BCM) |
|--------------|------------------------|-------------------------|---------------------|---------------------|--------------------|
| Saprolite | 341,763 | 79,444 | 3,253,735 | 3,674,942 | 2,353,505 |
| Transitional | 357,279 | 130,669 | 3,590,661 | 4,078,609 | 1,746,622 |
| Fresh rock | 1,875,105 | 690,308 | 9,154,373 | 11,719,786 | 4,290,141 |
| Total | 2,574,147 | 900,421 | 15,998,769 | 19,473,336 | 8,390,267 |

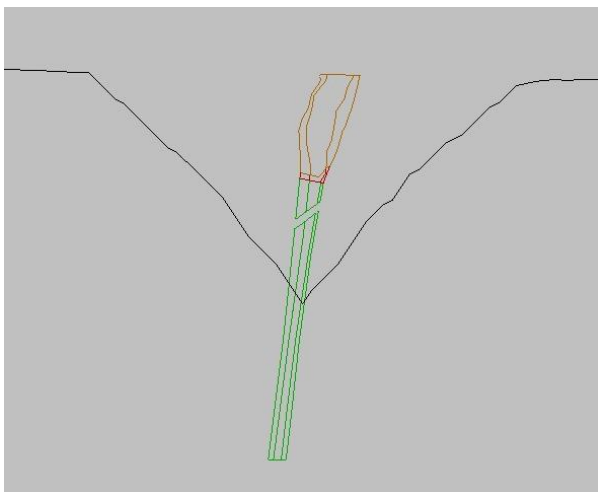
Minable rock mass and in situ volume Baboto North

Baboto Total:

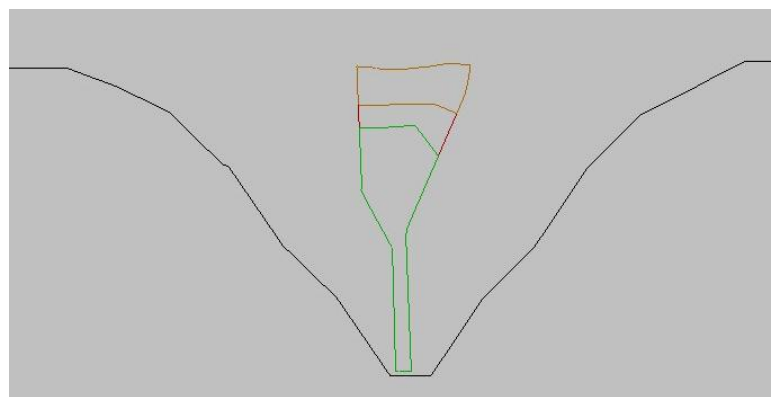
| | Low grade ore (tonnes) | High grade ore (tonnes) | Waste rock (tonnes) | Total mass (tonnes) | Total volume (BCM) |
|--------------|------------------------|-------------------------|---------------------|---------------------|--------------------|
| Saprolite | 703,104 | 497,459 | 13,900,523 | 15,101,086 | 9,712,350 |
| Transitional | 482,646 | 299,612 | 6,850,293 | 7,632,550 | 3,267,588 |
| Fresh rock | 2,093,192 | 1,271,992 | 15,004,175 | 18,369,359 | 6,727,018 |
| Total | 3,278,942 | 2,069,063 | 35,754,991 | 41,102,995 | 19,706,956 |

Minable rock mass and in situ volume Baboto Total

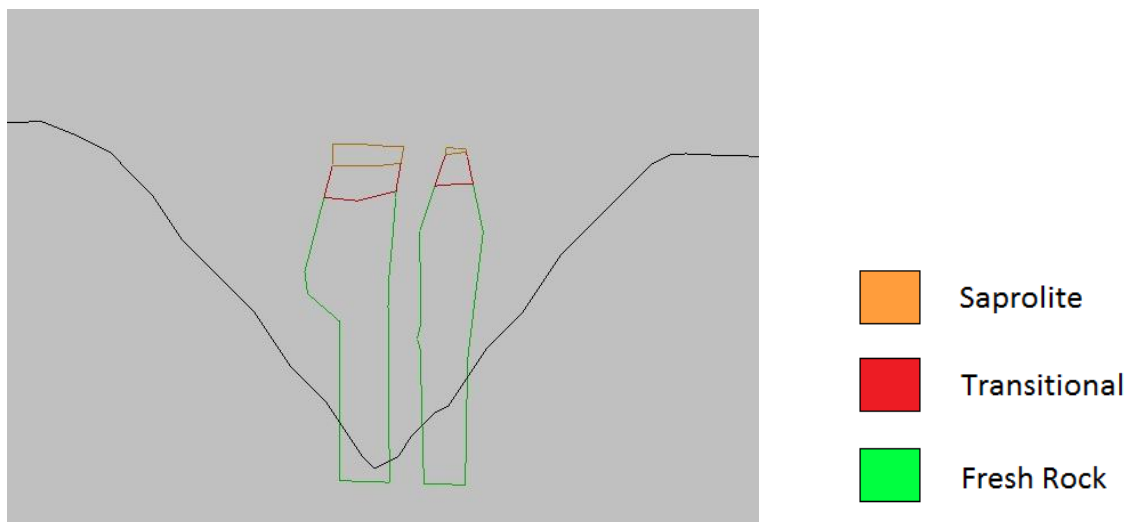
These are cross sections of the Whittle pits to give an impression of the ore bodies:



Cross section Baboto South. Pit depth: 172m, width: 321m



Cross section Baboto Center. Pit depth: 119m, width: 226m



Cross section Baboto North. Pit depth: 175, width: 330m

9.2 Pit design parameter

Because of the difference in rock properties each zone has different parameters. All parameters have been selected on previous experience with other mines at Loulo.

9.2.1 Slope angles

The used slope angles used are the same for both the hanging wall and the footwall. The slope angles applied in Baboto South, Center and North are given in the table below:

| Rock Type | Angle (degrees) |
|--------------|-----------------|
| Saprolite | 40 |
| Transitional | 45 |
| Fresh Rock | 50 |

Slope angles used

9.2.2 Financial parameters

| Parameter | Unit | Value | Description |
|----------------|---------------|-------|---|
| Gold price | \$/troy ounce | 1,200 | This is the price currently used for long term planning within Randgold Resources. Other prices have been used in sensitivity analysis. |
| Mining cost | \$/BCM | 2.85 | Costs are based on previous projects at Loulo. |
| G&A cost | \$/tonne | 5.98 | Current costs for G&A at Loulo. |
| Royalty | % | 6 | 6% royalty has to be paid to the Malian government over all gold sales. |
| Transport cost | \$/tonne | 4.58 | Transport cost for high grade ore |

Financial parameters

During the process of mining a 3% ore loss has been taken into account, as well as an ore dilution by waste rock of 10%.

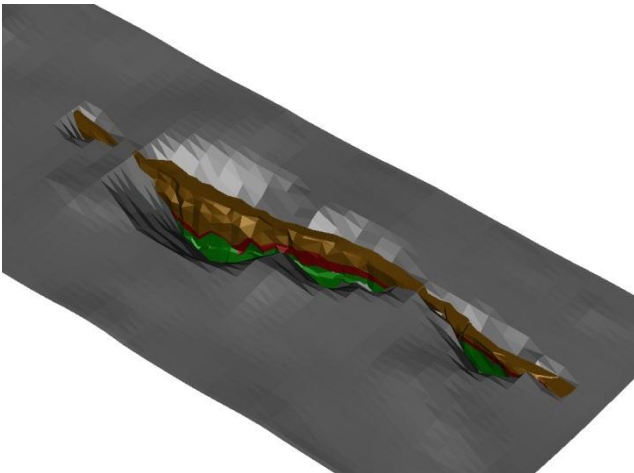
9.2.3 Processing costs

The current costs for processing one tonne of gold ore at the treatment plant is \$21.66. These costs have been used for the high grade ore. A recovery of 90% has used.

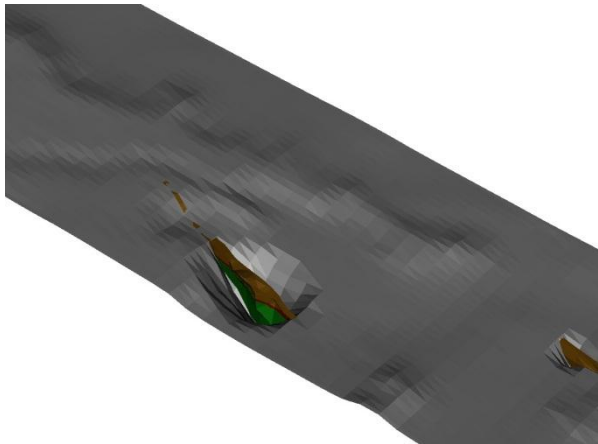
For the low grade ore an estimation has been made on the costs of heap leaching. This resulted in \$14.06/tonne, capex and opex combined. This all at a recovery of 80%.

9.2.4 Whittle mine design

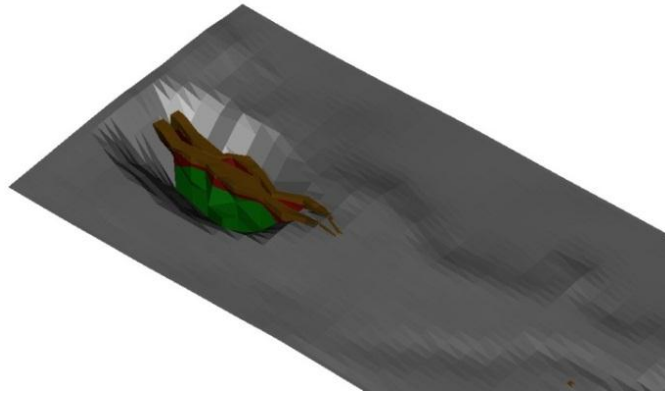
Putting all these parameters in gemcom's whittle combined with the geological model it produces optimal pit locations. This data can be extracted to gemcom's gems to get an impression of the pit shapes and sizes. These images, including the ore bodies inside the pits, are plotted below.



Baboto South pit. Length: 1203m, maximum width: 321m, maximum depth: 172m



Baboto Center pit. Length: 304m, maximum width: 226m, maximum depth: 119m



Baboto North pit. Length: 554m, maximum width: 330m, maximum depth: 176m



All Baboto pits from a side view, watching east

9.3 Mine plan

The objective of the mine plan is to supply 50,000 tonnes per month of high grade ore to the plant. The low grade material can be processed on the heap leaching site next to the Baboto ROM. Mining shall start after 3 months, that time will be needed to prepare all infrastructure.

9.3.1 Equipment

The available excavating and hauling equipment capacities per rock type, based on a 85% availability, a utilization of 85% and 1.5 hour loss per day due to shift changes, are given in the table below. Note: the drill capacity is included 3% redrill.

| | Saprolite | Transitional | Fresh Rock | |
|-------------------------|-----------|--------------|------------|---------|
| Liebherr 994B excavator | 775 | 675 | 575 | BCM/hr |
| | 12,599 | 10,973 | 9,347 | BCM/day |
| CAT 5130B excavator | 500 | 400 | 350 | BCM/hr |
| | 8,128 | 6,503 | 5,690 | BCM/day |
| CAT 777 D/F Trucks | 125 | 115 | 110 | BCM/hr |
| | 2,033 | 1,870 | 1,789 | BCM/day |
| Drills | 35 | 25 | 18 | m/hr |
| | 552 | 394 | 284 | m/day |

Mining equipment capacities

With these given capacities all possible excavator combinations have been worked out for every individual mine and rock type. The high grade ore extraction and the needed support equipment is also calculated. See appendix G.

The number of drills needed is the sum of the drills needed to drill production holes and the ones needed to create presplit holes. In the saprolite drilling is not required since the excavators can easily pick up all the rock. The drill pattern in transitional rock is 5x5 meter, in the fresh rock it is 4x4.5 meter. The drill pattern is wider spread in the transitional zone than that in the fresh rock zone because the rock is a lot weaker and thus needs less energy to be made available for the excavator.

Presplit holes will only have to be drilled in fresh rock at 1.3 meter apart from each other. To get an estimation of the number of presplit holes needed calculations have been done on a in size decreasing circumference of an ellipse. With the top sizes of the ellipse as the outer sizes of the pits and the size decreasing being taken every 10 meters at the rate of the slope angle. All levels in the pits are 10 meter deep and all drill holes are 10 meter plus one meter undercut. The estimated presplit meters that have to be drilled are given in the table below:

| Area | Presplit drill meters |
|---------------|------------------------------|
| Baboto South | 78,452 |
| Baboto Center | 23,892 |
| Baboto North | 125,950 |
| Total | 228,294 |

Presplit meters per mine

The mining plan has been made to mine as much gold as soon as possible without creating huge stockpiles of high grade ore that are not able to be processed at the plant. For that reason it is preferable to mine the Baboto North mine as soon as possible since this mine contents most ore and can be mined at the lowest stripping ratio. Because even with the highest excavation combination, two Liebherr 994B's and two Caterpillar 5130B, it is not possible to mine 50,000 tonnes of high grade ore per month. So there has been chosen to mine the Baboto Center mine first to feed the plant at a proper rate and create a stockpile at the Baboto ROM to buffer the start of the Baboto North mine. After 143 days the Baboto Center mine will be completed and a start can be made on the Baboto North mine. This will be mined for 548 days after which the Baboto South mine will be the final mine to be mined at the Baboto ore body. The total life of mine for the whole Baboto project will be 3.68 years. And the plant feeding time at a rate of 50,000 tonnes per month will be 3.69 years, an additional time of almost 5 days. An overview of the needed equipment and daily high grade ore production is given in the next table. All mining data can be found in appendix H.

| Day of start | Location | Excavator | Drills | 777's | Mining days | Production tonne/day | Grade gr/tonne | Stockpile Baboto ROM |
|--------------|----------------------------|---------------------|--------|-------|-------------|----------------------|----------------|----------------------|
| 0 | BC sap | 2 L994B | 0 | 12.4 | 42 | 1,847.5 | 5.80 | 8,436.2 |
| 42 | BC tra | 1 L994B + 1 Cat5130 | 2.0 | 9.3 | 24 | 2,354.9 | 5.87 | 25,434.7 |
| 66 | BC fresh | 1 L994B | 3.1 | 5.2 | 77.1 | 2,232.9 | 6.06 | 70,639.0 |
| 143.1 | BN sap | 2 L994B + 1 Cat5130 | 0 | 16.4 | 70.6 | 1,197.2 | 2.56 | 38,909.3 |
| 213.7 | BN tra | 1 L994B + 1 Cat5130 | 2.0 | 9.4 | 99.9 | 1,410.8 | 2.99 | 15,348.3 |
| 313.6 | BN fresh | 2 Cat5130 | 3.6 | 6.4 | 377 | 1,970.8 | 3.18 | 137,553.0 |
| 690.6 | BS sap | 2 L994 | 0 | 12.4 | 250.1 | 1,467.9 | 5.23 | 92,871.2 |
| 940.7 | BS tra | 1 L994B | 1.2 | 5.9 | 100.5 | 1,245.6 | 4.68 | 52,461.2 |
| 1,041.2 | BS fresh | 1 Cat5130 | 2.1 | 3.2 | 301.6 | 1,499.8 | 4.50 | 7,795.2 |
| 1,342.8 | Trucking rest of stockpile | | | | 4.7 | -1,647.9 | | |

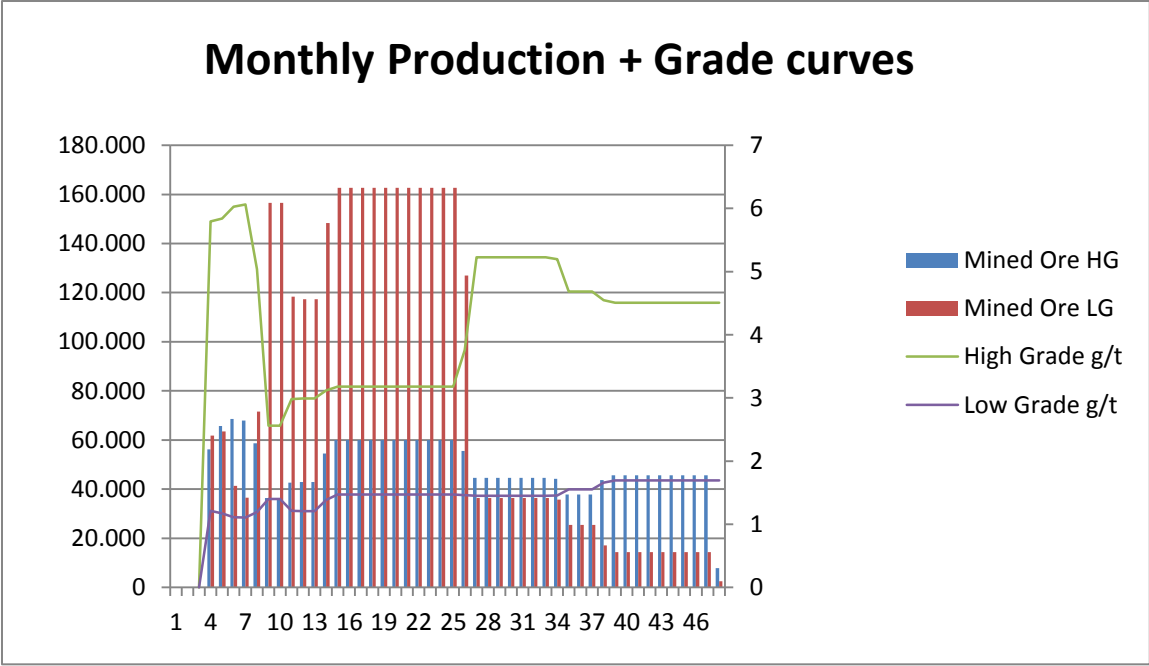
Baboto mining plan overview

9.3.2 Production

The overall mining production is plotted in the table and the graph below:

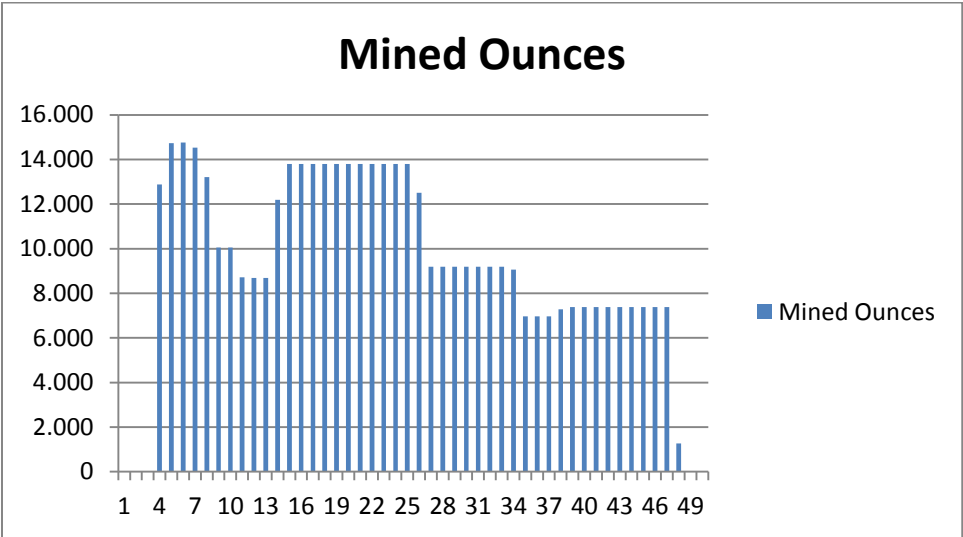
| Day of start | Location | Mining days | Production HG t/day | Grade HG gr/tonne | Production LG t/day | Grade LG gr/tonne |
|--------------|----------|-------------|---------------------|-------------------|---------------------|-------------------|
| 0 | BC sap | 42 | 1,847.5 | 5.80 | 2,034.4 | 1.21 |
| 42 | BC tra | 24 | 2,354.9 | 5.87 | 2,122.8 | 1.15 |
| 66 | BC fresh | 77.1 | 2,232.9 | 6.06 | 1,199.9 | 1.10 |
| 143.1 | BN sap | 70.6 | 1,197.2 | 2.56 | 5,150.2 | 1.40 |
| 213.7 | BN tra | 99.9 | 1,410.8 | 2.99 | 3,857.3 | 1.20 |
| 313.6 | BN fresh | 377 | 1,970.8 | 3.18 | 5,353.2 | 1.47 |
| 690.6 | BS sap | 250.1 | 1,467.9 | 5.23 | 1,195.5 | 1.45 |
| 940.7 | BS tra | 100.5 | 1,245.6 | 4.68 | 838.5 | 1.55 |
| 1,041.2 | BS fresh | 301.6 | 1,499.8 | 4.50 | 471.5 | 1.69 |
| 1,342.8 | | 4.7 | -1,647.9 | | | |

Baboto mining plan production overview



Graph: Mined high and low grade ore plotted with their grade curves

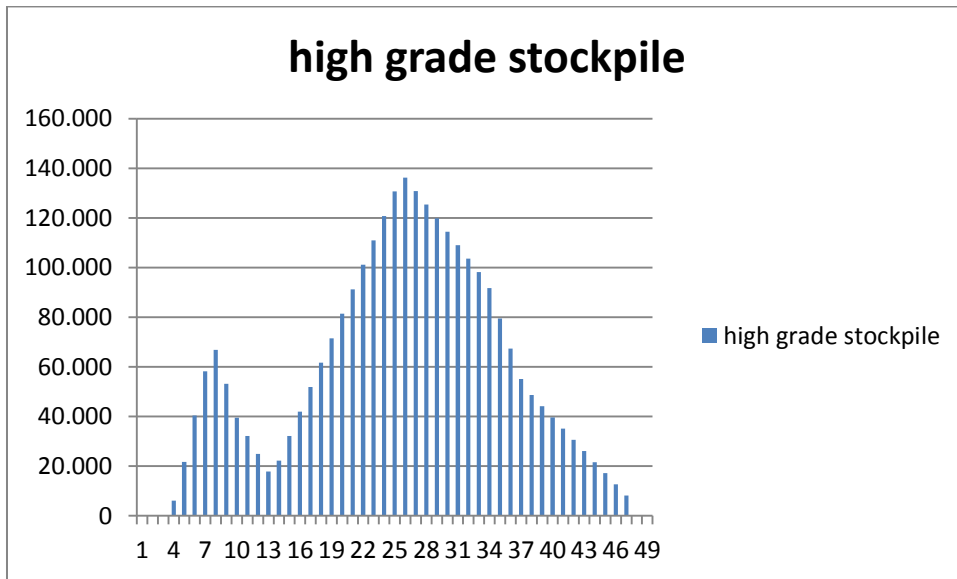
The graph shows the monthly ore production on the left vertical axis and the grade lines on the right vertical axis. The Baboto Center mine starts in month 4, after all preparation works on the infrastructure has been completed, Baboto North starts in month 9, the South mine begins production in month 26. Despite having a lower grade, the Baboto North mine clearly has the most resources, mainly caused by the low grade ore which is so highly present that the Baboto North mine can be mined with an average stripping ratio of only 4.6. A very low ratio compared to the other mines; Baboto Center: 8.2, and Baboto South: 11.4. All this makes that the Baboto North mine mines the most ounces of gold per month, followed by the Baboto Center and finally the Baboto South mine. This has been plotted in the graph below.



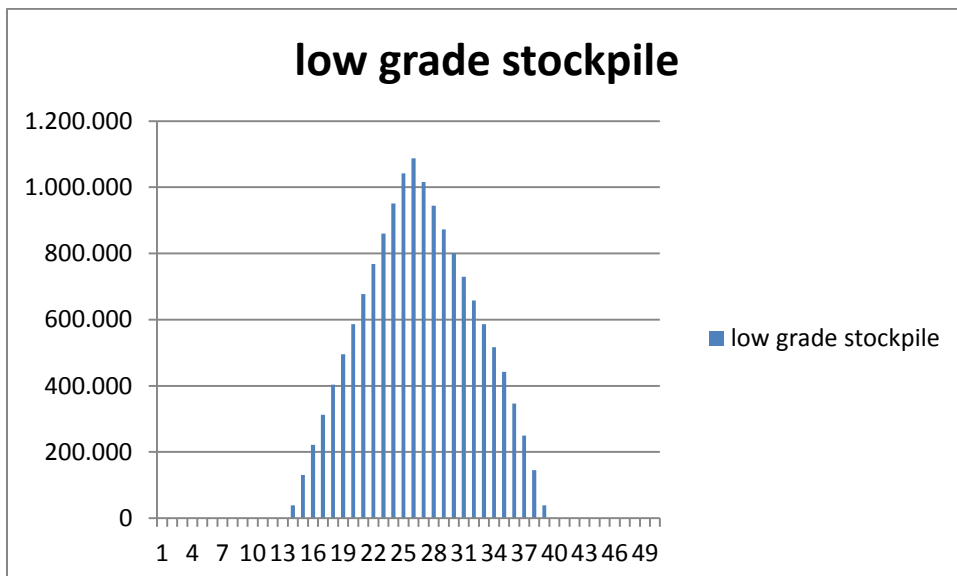
Mined ounces per month, high grade and low grade combined

9.4 Stockpiles

Due to the low grade crusher's maximum capacity of 4,000 tonnes per day and the high grade trucking of 50,000 tonne per month stockpiles will be produced. For the high grade ore this will be needed to guarantee a continuous feed to the plant, for the low grade ore this is due to the maximum capacity of the crusher. The overview of the stockpile development per month is plotted below. More detailed information can be found in appendix H.



High grade stockpile at Baboto ROM



Low grade stockpile at Baboto ROM

9.5 Waste rock

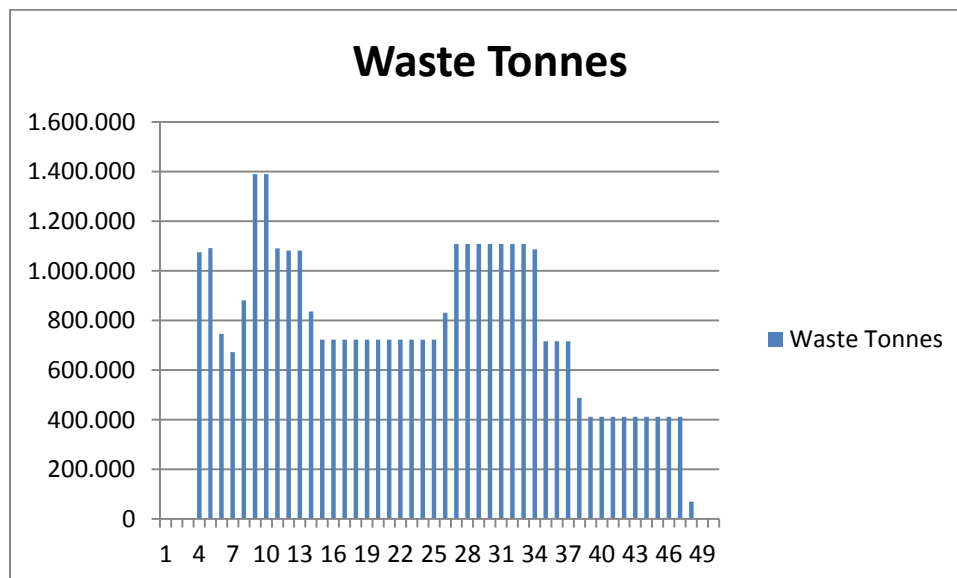
9.5.1 Volume and production

During the mining of the whole Baboto project 35,362,173 tonnes shall be mined as waste rock, which is a volume of 17,301,600 BCM. An overview of the mined waste rock and the strip ratio's, corrected for an ore loss of 3% and an ore dilution of 10%, is given in the table below:

| Area | Strip ratio | Waste tonnes | Waste Volume (BCM) |
|---------------|-------------|--------------|--------------------|
| Baboto South | 10.5 | 15,566,274 | 8,432,486 |
| Baboto Center | 7.6 | 4,058,090 | 1,961,040 |
| Baboto North | 4.2 | 15,737,809 | 6,908,073 |
| Total | 6.2 | 35,362,173 | 17,301,600 |

Waste tonnes produced, strip ratios and in situ waste volume

The waste production can be seen in the graph below, again with Baboto North starting in month 8 and Baboto South starting in month 26.



Waste tonnes produced per month

9.5.2 Waste dump design

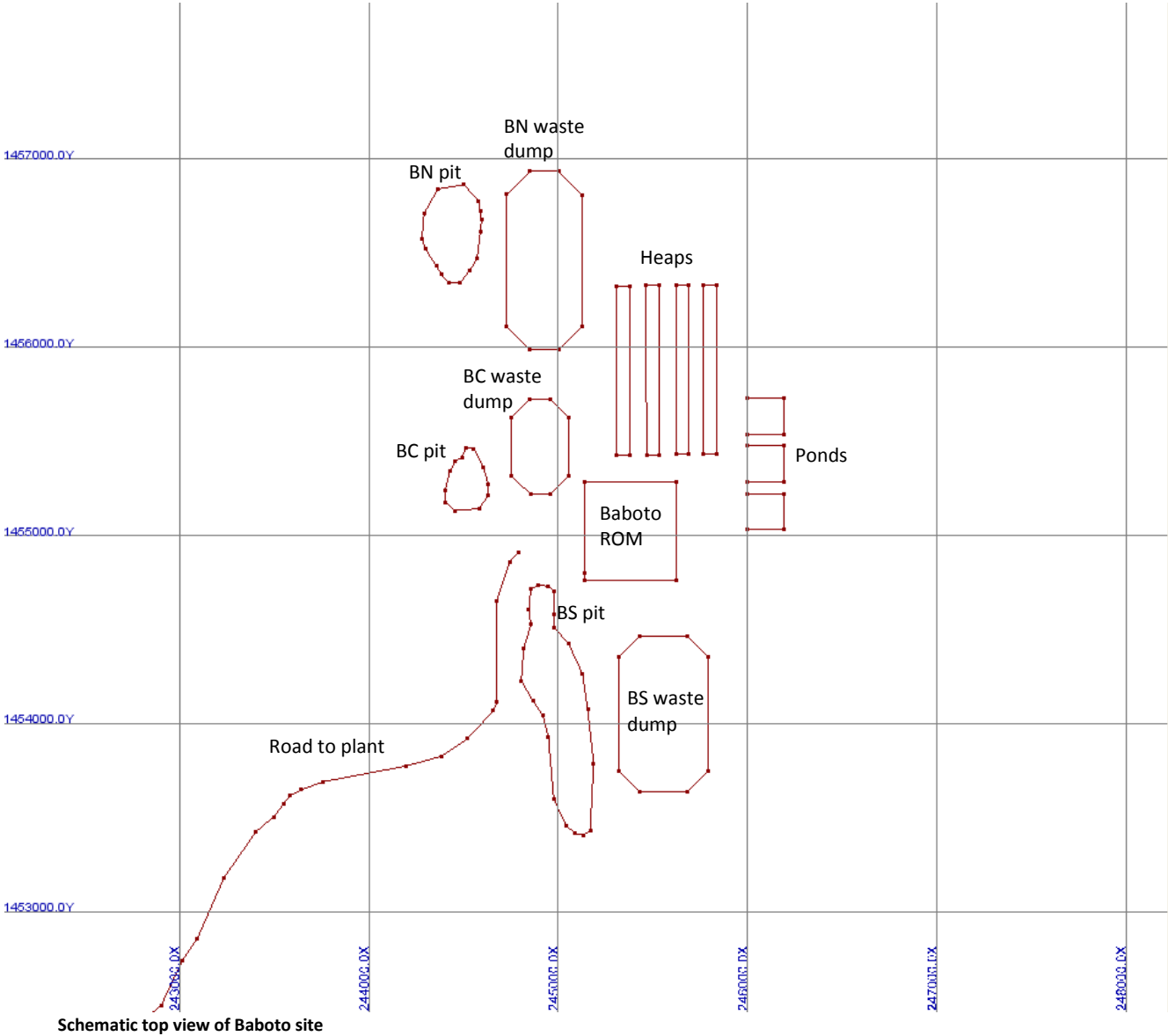
The waste dump design uses a slope angle of 20 degrees conform rehabilitation standards. The face angle shall be 37 degrees. A swell factor of 1.4 has been used to calculate the volume of waste based on the geological model. The ramp has an inclination of 10%, which roughly increases the waste dump by 10%. The maximum height of the waste dumps is 50 meter. The total surface can be decreased if 2 or even 3 waste dumps can be combined to one waste dump. Disadvantage of this is that the 777's will have to drive a longer distance. For that reason only a combined waste dump from the Center and North pit could be

investigated. For more detailed data see appendix I. The surface needed by the waste dumps is given in the table below:

| Area | Volume (m ³) | Height (m) | Surface (m ²) |
|---------------------|--------------------------|------------|---------------------------|
| South | 11,805,480 | 50 | 396,173 |
| Center | 2,745,456 | 30 | 133,601 |
| North | 9,671,302 | 50 | 347,744 |
| Total | 24,222,239 | | 877,518 |
| All combined in one | 24,222,239 | 50 | 718,687 |

Baboto waste dump design

Another option would be to design the mines in such a way that the waste dumps of the Baboto Center and Baboto North mine would be combined into one waste dump. This would reduce the total surface needed for all waste dumps from 87.8 hectares to 80.2 hectares.



Schematic top view of Baboto site

10. Financial analysis

10.1 Costs and revenues

An overview of all costs:

| | Cost per tonne (\$) | Total cost (\$) |
|----------------------------------|---------------------|--------------------|
| Mining | 2.85 | 117,143,536 |
| Processing Baboto high grade ore | 21.66 | 48,071,124 |
| Heap Leaching | | |
| Capex | | 27,566,400 |
| Opex Baboto low grade ore | 8.65 | 30,460,729 |
| Opex Stockpile Gara + Yalea ore | 8.65 | 8,945,986 |
| Opex Stockpile mill reject | 7.15 | 3,858,306 |
| Transport | | |
| Capex | | 5,932,055 |
| Opex Baboto high grade ore | 3.03 | 6,704,441 |
| Opex ROMPAD stockpiles | 3.03 | 4,754,422 |
| G&A | | |
| Baboto ore | 5.98 | 34,330,114 |
| ROMPAD stockpiles | 5.98 | 9,411,571 |
| | | |
| Total | | 297,178,683 |

All costs overview

The amount of mined and processed ounces is given in the table below. The gold price has been set at \$1,200 per ounce.

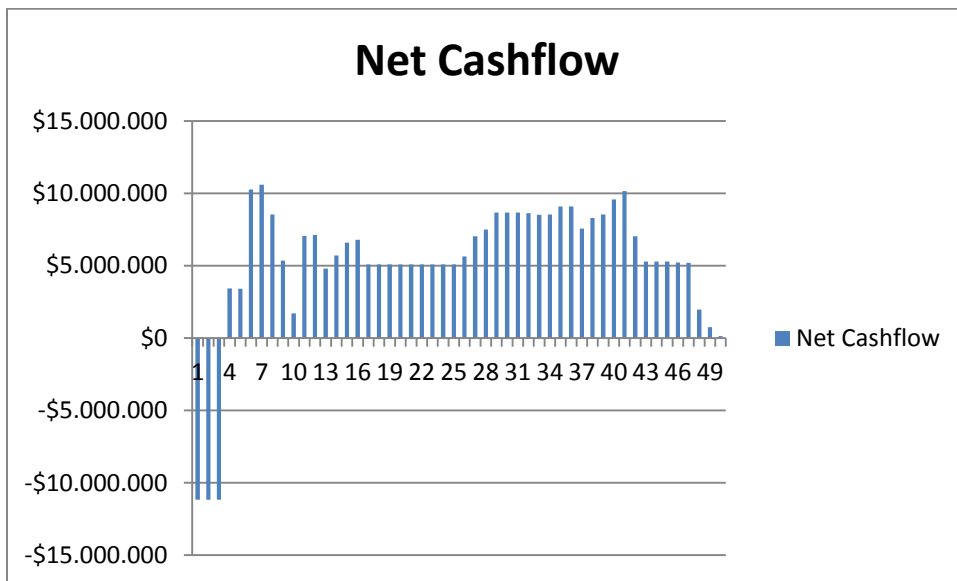
| Ore | Mined ounces | Recovered ounces | Revenue |
|-------------------|----------------|------------------|--------------------|
| Baboto high grade | 301,165 | 271,048 | 325,257,886 |
| Baboto low grade | 161,002 | 128,801 | 154,561,650 |
| ROMPAD stockpiles | 84,751 | 67,801 | 81,360,601 |
| Total | 546,917 | 467,650 | 561,180,137 |

Revenue overview

If the royalty rate of 6% on the revenue is taken into account the profit of the total project would be: **\$230,330,646**

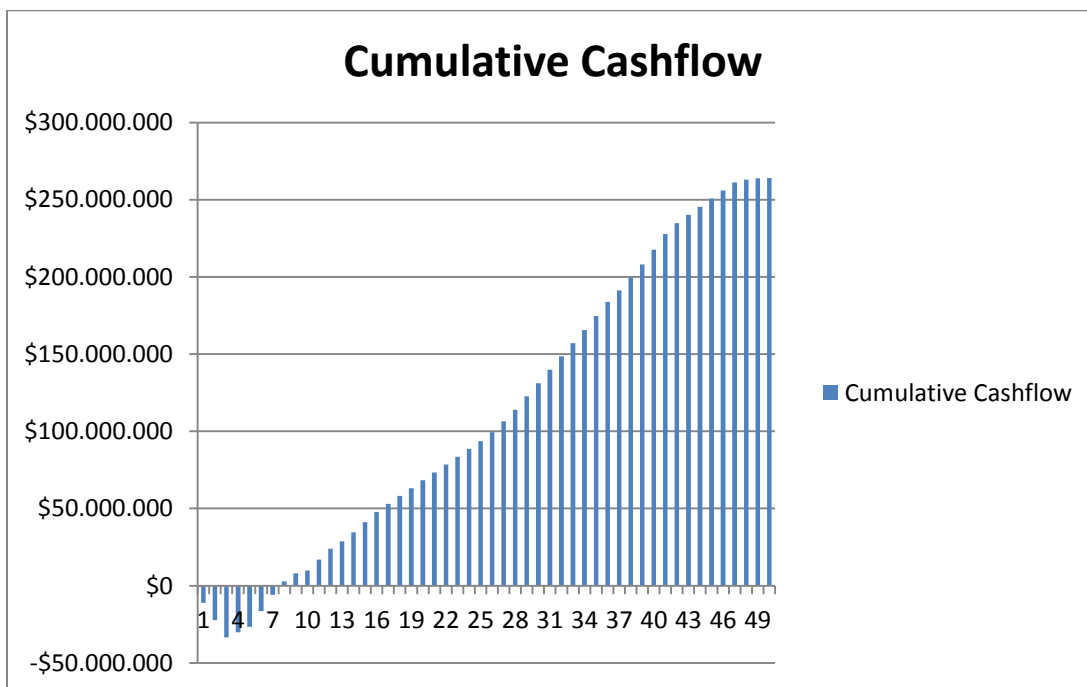
10.2 Cash flow, NPV & IRR

Cash flow analysis have been done, see appendix J.



Net cash flow chart for the whole Baboto project

The project will start to make a profit in month 8, which can clearly be seen in cumulative cash flow chart.



Cumulative cash flow chart for the whole Baboto project

The table below shows the net present value (NPV) analysis:

| Annual rate | Monthly rate | NPV (\$) |
|-------------|--------------|-------------|
| 0% | 0.000% | 264,001,464 |
| 5% | 0.407% | 234,043,712 |
| 10% | 0.797% | 208,936,451 |
| 15% | 1.171% | 187,691,437 |
| 20% | 1.531% | 169,557,006 |

NPV analysis

The internal rate of return (IRR) monthly rate is 16%, the IRR annual rate is 476%.

10.3 Sensitivity analysis

A sensitivity analysis on the gold price of the NPV and annual rate IRR can be found in the table below:

| Annual rate | \$800 | \$1200 | \$1300 | \$1400 | \$1800 | \$2200 |
|-------------|--------------|---------------|---------------|---------------|---------------|---------------|
| 0% | \$76,941,416 | \$264,001,464 | \$310,766,476 | \$357,531,488 | \$544,591,536 | \$731,651,584 |
| 5% | \$64,917,207 | \$234,043,712 | \$276,325,339 | \$318,606,965 | \$487,733,470 | \$656,859,976 |
| 10% | \$54,945,036 | \$208,936,451 | \$247,434,304 | \$285,932,158 | \$439,923,573 | \$593,914,987 |
| 15% | \$46,594,677 | \$187,691,437 | \$222,965,627 | \$258,239,817 | \$399,336,577 | \$540,433,338 |
| 20% | \$39,540,840 | \$169,557,006 | \$202,061,048 | \$234,565,089 | \$364,581,255 | \$494,597,421 |
| IRR | 86% | 476% | 630% | 812% | 1872% | 3603% |

NPV and IRR sensitivity analysis for different gold prices

11. Conclusions and recommendations

11.1 Conclusions

Based on the results of this report the conclusions can be drawn that:

- With the given parameters the Baboto project will be profitable after 8 months.
- Heap leaching should be considered as a viable option for processing low grade ores.

11.2 Recommendations

Based on the results of this report and the process of creating it I have the following recommendations:

- Invest in further research on the Baboto ore body.
- Create a more detailed geological model, by core drilling and sampling, to prove up the reserves into the reserve category.
- Further investigate the option of heap leaching, as this could be a very attractive gold recovery process for low grade ores.
- Consider the scats stocked at the Loulo ROMPAD as a possible feed for the heap leaching process.
- Look at the options of acquiring mining rights for the whole Baboto North ore body since now a part of it lies within the Kofi permit.

12. References

The maps in in chapter 3 'General introduction' have been provided by the geology department.

Chapter 4 'Geology' is provided by the Loulo geology and exploration department. 4.1 'General geology' has been created by Ousman Coulibaly from the exploration department. 4.2 'Resources' was made by Abdoulaye Ngom from the geology department.

Chapter 5 'Environment' fully consists of fragments from the Digby Wells Environmental report on order of the Loulo environmental department. The full study can be found in appendix K.

The cost estimation tables and lists in chapter 7 'Heap Leaching' are quoted from, or based upon reports by Kappes, Cassidy & Associates. See appendix B1 and B2.

13. Appendices

Appendix A: Resources

An overview over the resources, their volumes, masses and grades within the pits created by Whittle.

Appendix B: 1&2 Heap Leaching Report

Reports made by the consultancy company Kappes, Cassidy & Associates on their expectations concerning Baboto heap leaching regarding the design and capital costs (appendix B1) and the operating costs (appendix B2).

Appendix C: Other Leachable Resources - Scats

Volume estimation scats stockpiled next to the ROMPAD, created by the surface mining survey team.

Appendix D: Heap Leaching Size Estimates

Estimations on the heap leaching sizes.

Appendix E: Road Section

The road design used for the road to Goukoto.

Appendix F: Hauling Costs

An overview of all the costs involved in the haulage process of high grade ore from Baboto to the crusher and the low grade material near the ROMPAD to Baboto.

Appendix G: Mining Equipment

An overview of all possible excavating equipment per zone, combined with the required support equipment.

Appendix H: Mining Plan Monthly

The mining plan, including the required trucks, the production per month, the production per zone, the mined grades, the monthly feed to the heap leaching, the high and low grade stockpiles at the Baboto ROM and the total processed ounces per month.

Appendix I: Waste Dump Design

Estimation on the waste dump sizes.

Appendix J: Financial Analysis

An overview of all finances from the Baboto project.

Appendix K: Environmental Report

An environmental study performed by Digby Wells Environmental on the Baboto project.