# CORINGA GOLD PROJECT, BRAZIL

## Feasibility Study NI 43-101 Technical Report

**Prepared for:**


**Anfield Gold Corp.**
410–625 Howe Street
Vancouver, British Columbia
Canada V6C 2T6
Tel: 1 (604) 646-1890


**Prepared by:**


MTB Project Management Professionals, Inc.

8301 E. Prentice Avenue, Suite 210
Greenwood Village, Colorado 80111
(303) 741-9633


**Authors and Qualified Persons**


Neil Prenn, P.E.
Edwin Peralta, P.E.
Larry Breckenridge, P.E.
Robert Sim, P.Geo.
Bruce M. Davis, FAusIMM
Mark Smith, P.E.
Robert Michel
Nelson King
Brendan Fisher, Ph.D., P.E.



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# 1 SUMMARY

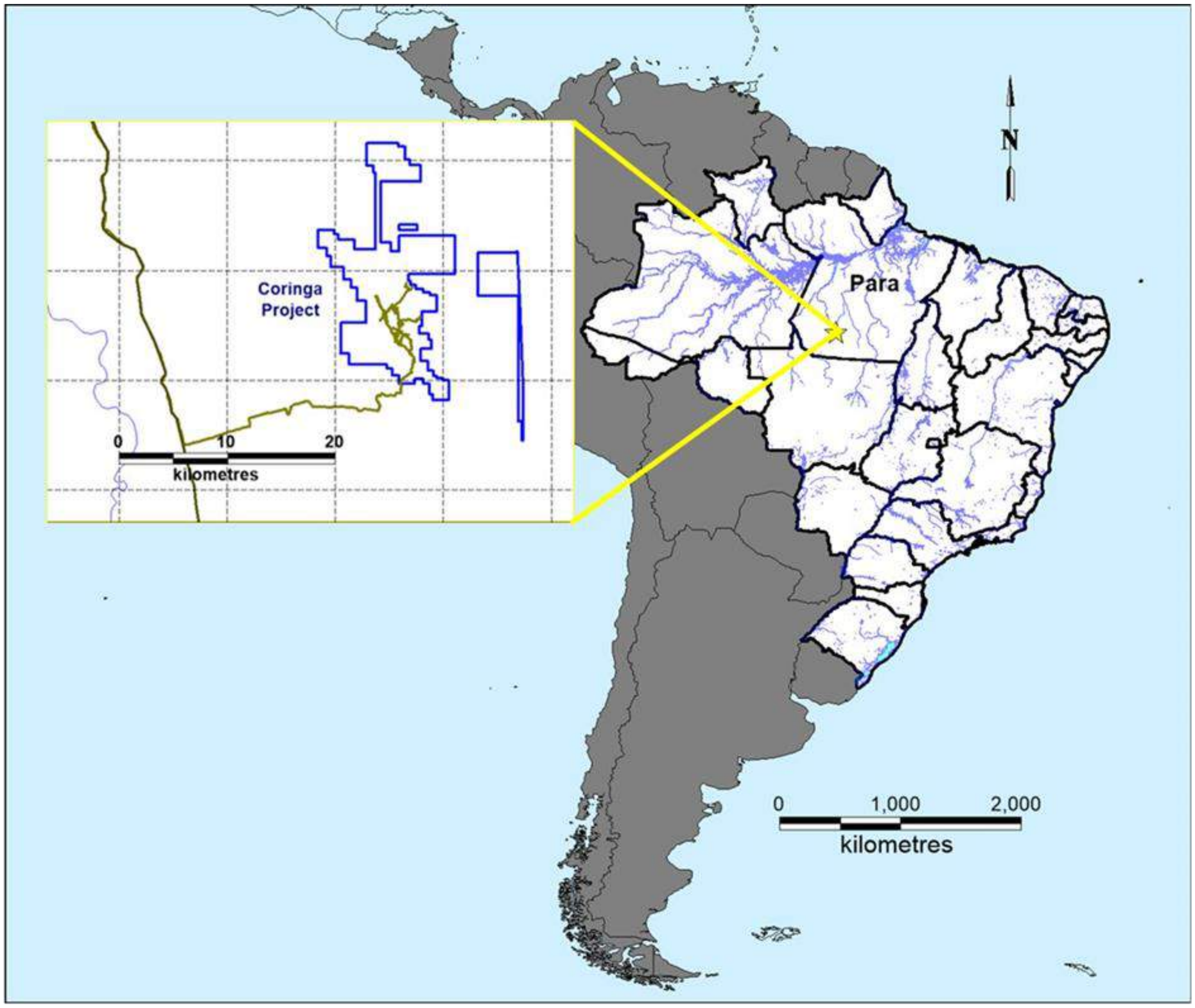
## 1.1 Introduction

This technical report has been prepared in support of the results of the Feasibility Study (FS) for the Coringa gold project in Brazil (Coringa Gold Project). The report has been prepared for Anfield Gold Corp. (Anfield) by, or under the supervision of, Qualified Persons (QPs) within the meaning of National Instrument 43-101 *Standards of Disclosure for Mineral Projects* (NI 43-101) and as described in Section 28 (Date and Signature Page) of this report.

Anfield contracted MTB Project Management Professionals, Inc. (MTB), to compile and prepare a technical report, for the Coringa Gold Project, with contributions by other consultants with extensive expertise in their respective fields. The QPs for this technical report are: Robert Sim, P.Geo. (Mineral Resource), of SIM Geological Inc. (Sim Geological); Bruce M. Davis, Ph.D., FAusIMM (Mineral Resource), of BD Resource Consulting Inc. (BDRC); Nelson King, SME Registered Member (Metallurgy and Process), of ND King Consulting, LLC, (NKing); Neil Prenn, P.E. and Edwin Peralta, P.E. (Mining and Mineral Reserves), of Mine Development Associates (MDA); Robert Michel, SME Registered Member (Economic Analysis and Infrastructure), of Robert Michel Enterprises, (RME); Brendan Fisher, Ph.D., P.E. (Mine Geotechnical), of Fisher Rock Engineering LLC (FR Engineering); Larry Breckenridge, P.E. (Hydrology, Hydrogeology, Geochemistry, and Infrastructure), of Global Resource Engineering, Ltd. (GRE), and Mark Smith, P.E. (Tailings Management Facility), of RRD International LLC (RRD). MTB's work was completed under the supervision of Robert Michel, a QP within the meaning of NI 43-101. All the QPs are independent of Anfield.

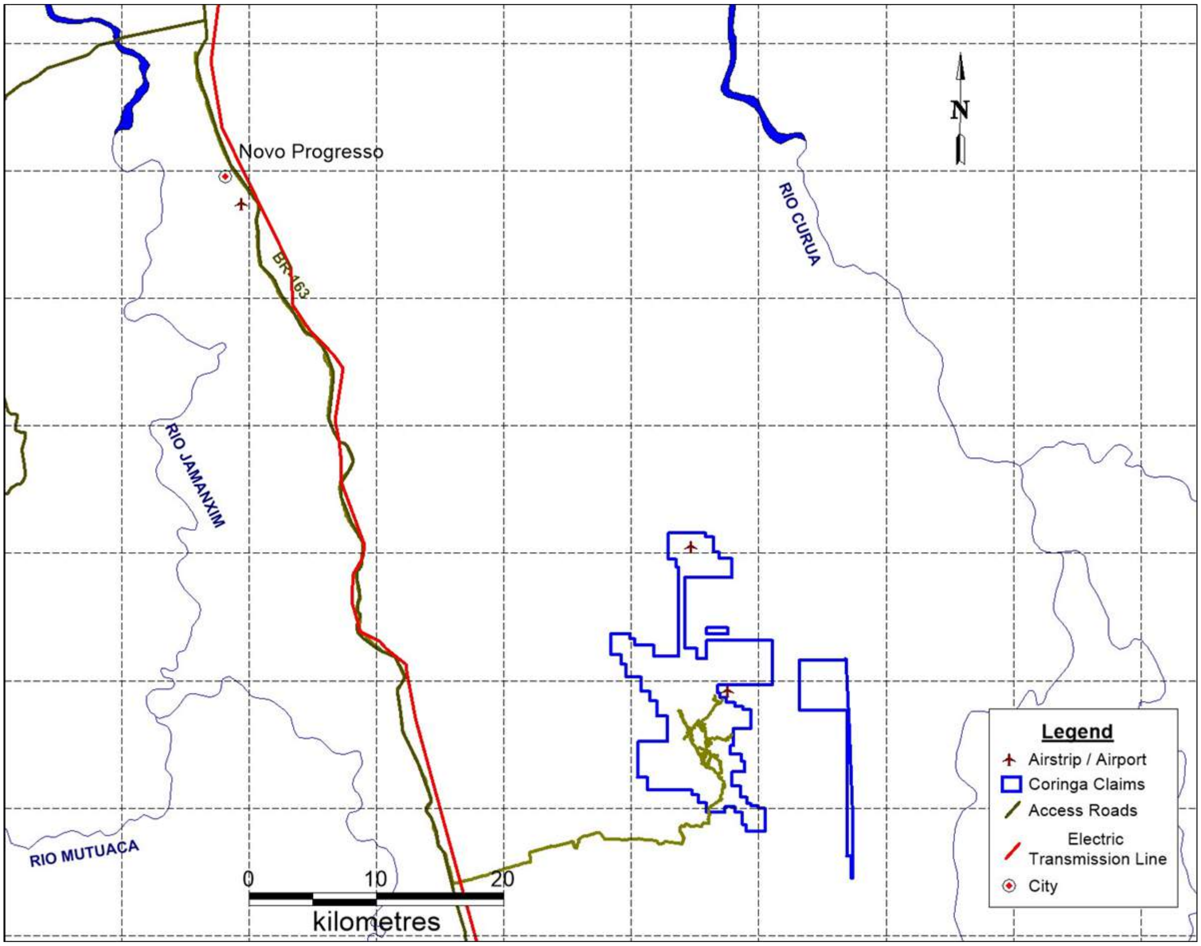
## 1.2 Property Description and Location

The Coringa Gold Project is located in north-central Brazil, in the Province of Pará (Figure 1.1), 70 km southeast of the city of Novo Progresso. The UTM coordinates for the Coringa Gold Project are 9,166,700 North and 715,500 East (geographic projection: WGS84, Zone 21S). Access to the property is provided by paved (National Highway BR-163) and gravel roads (Figure 1.2)




Source: Anfield, 2017

**Figure 1.1:Location Map**




Source: Anfield, 2017

**Figure 1.2: Access to the Coringa Gold Project**

### *1.2.1 Land Tenure*

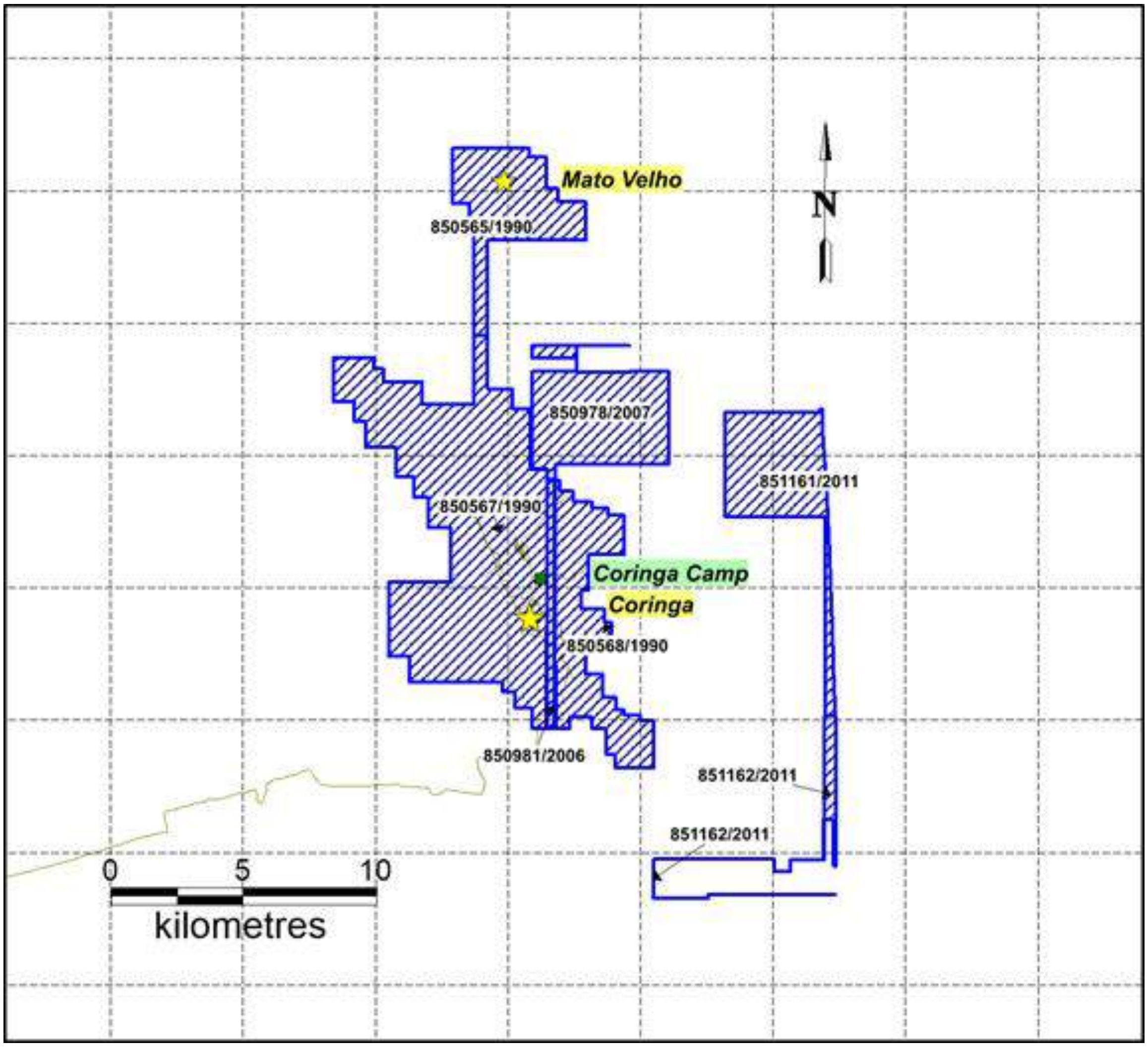
The Coringa Gold Project consists of seven concessions totalling 13,647.78 ha. The concessions are fully owned by Anfield through its 100% owned Brazilian subsidiary, Chapleau Exploração Mineral Ltda. (Chapleau). The concessions are described in Table 1.1 and shown in Figure 1.3.

A company holding concessions in Brazil has to pay certain fees in order to maintain the rights to those concessions. The 2017 fees were paid and all concessions are in good standing. In Brazil, surface rights are not associated with title to either a mining lease or a claim, and must be negotiated with the landowner. The landowner’s right to participate in any proceeds from a mine is documented in the Federal Mining Code.

Anfield was formerly named Anfield Nickel Corp. Upon completion of its acquisition of Magellan Minerals Ltd. (including Chapleau and the Coringa Gold Project) its name was changed to Anfield Gold Corp. on May 10, 2016 (Anfield, 2016b).

**Table 1.1: Mining Concessions**

| Tenure Number | Area (ha) | Phase | Renewal Status | Date of Registration (dd/mm/yyyy) | Expiration Date (dd/mm/yyyy) |
|---|---|---|---|---|---|
| 851.161/2011 | 1683.21 | Exploration License | In progress | 02/10/2015 | 02/10/2018 |
| 851.162/2011 | 192.31 | Exploration Application | No Title granted yet | No Title granted yet | |
| 850.567/1990 | 6224.23 | Exploitation Application | Final report approved | 28/09/2006 | Being converted to a Mining Concession |
| 850.565/1990 | 1529.57 | Exploitation Application | Final report approved | 28/09/2006 | |
| 850.568/1990 | 1840.83 | Exploitation Application | Final report approved | 14/12/2006 | |
| 850.981/2006 | 259.99 | Exploitation Application | Final report approved | 13/12/2007 | |
| 850.978/2007 | 1917.64 | License Extension requested | Pending Appeal | 16/09/2009 | Pending Appeal |




Source: Anfield, 2017

**Figure 1.3: Claim Map**

### *1.2.2 Royalties*

The Brazilian government has a 1% royalty on all gold and silver production. In addition, local land owners receive a royalty equal to one half the Brazilian government's, or 0.5% net smelter returns (NSR). Also, Sandstorm Gold Ltd. (Sandstorm), based in Vancouver, Canada, holds a 2.5% NSR royalty on all production from the Coringa Gold Project.

### *1.2.3 Production Permits*

On May 10, 2017, Anfield received the Instituto Nacional de Colonização e Reforma Agrária's (INCRA) formal consent for the Coringa Gold Project to be permitted by SEMAS. INCRA's consent was required by SEMAS as a prerequisite for issuing permits to allow construction and mining operations to begin at the Coringa Gold Project. Anfield continues to communicate with SEMAS as the agency works to finalize and issue the required permits.

**Update on Regulatory Compliance Requirements and Permitting Considerations**

On August 9, 2017, Chapleau received key permits from SEMAS, which were requirements for commencing major construction of the Coringa Gold Project. These included:

- a license of operation for exploration and trial mining;
- a vegetation suppression permit; and
- a fauna capture and relocation permit.

These SEMAS permits include a number of specific conditions for the conservation and protection of fauna and flora that are currently being integrated into planning for the Coringa Gold Project.

The next major step in the permitting process is the issuance of trial mining licenses by the Departamento Nacional de Produção Mineral (“DNPM”), which will authorize the Company to undertake commercial production from the Coringa mine. The Company anticipates that DNPM approval will be received within the projected construction timeline. Licenses are issued for specific claims and should authorize mining and mill feed processing of up to 50,000 tonnes of ore per year from claim 850.567, which contains the entirety of the Serra and Galena veins, as well as the bulk of the known Meio resources. Under applicable regulations, once the trial mine is operational, the Company is permitted to apply to the DNPM to increase the processing limit.

In order to expand to full scale operations (i.e., the processing of up to 750 t/d of ore), Anfield will have to obtain further permits from SEMAS, culminating in an Operating License. Anfield is in the process of finalizing all required environmental impact studies [i.e., the Coringa Gold Project Estudo de Impacto Ambiental/ Relatório de Impacto Ambiental (EIA/RIMA)], the submission of which will initiate the environmental approvals process. The EIA/RIMA is expected to be submitted to SEMAS in the fourth quarter of 2017.

In addition, under the trial mining permits, Chapleau is required to comply with various additional regulatory compliance and permitting requirements addressing a wide range of operational needs. These include fuel storage; non-hazardous and hazardous waste accumulation, storage, and disposal; transportation, storage, and safe use of explosives and mineral processing reagents; surface water drainage; archaeological resource assessment; worker health and safety programs; and other needs. None of these permits have been obtained as of the issue date of this technical report. Anfield will also be required to submit regular reports on operational, environmental, occupational health and safety, and social performance.

As of the issue date of this technical report, applications for all required camp and processing start-up water have been submitted, and a tailings storage facility (TSF) permit request is nearing completion and is anticipated to be filed with SEMAS early in Q4 2017. Also, discussions for long-term land access agreements are underway with INCRA, a government agency which claims ownership of the surface rights where the Coringa Gold Project is situated.

The aforementioned conditions and requirements will be systematically addressed through the implementation of appropriately designed management systems, plans, and procedures, as part of the normal course of operations at the Coringa Gold Project. Project management systems will also provide for the legal resources to monitor pending and promulgated regulatory changes that may affect operations at the Coringa Gold Project, as well as standards for regular monitoring to ensure the Coringa Gold Project maintains continued compliance with all applicable regulatory requirements and obligations.

## 1.3 Accessibility, Climate, and Local Resources and Infrastructure

### *1.3.1 Accessibility*

Access to the property is provided by paved (National Highway BR-163) and gravel roads (Figure 1.2)

### *1.3.2 Climate*

The climate is tropical and is characterized by high humidity and high temperatures averaging 26°C. Average annual rainfall is between 1,500 mm and 2,000 mm with a wet season from October to April. Work on the property can be carried out year-round.

### *1.3.3 Local Resources and Infrastructure*

Novo Progresso (population approximately 30,000) is the closest major urban centre, and it can provide reasonable accommodation and basic goods and services. It is located along Highway BR-163 which is the main route for trucks carrying soya crops from the Sinop area in Mato Grosso State to ports in Itaituba and Santarem, on the Amazon River. Charter flights are available to and from Novo Progresso. In Novo Progresso, Anfield has a small office in a fenced, protected building that provides space for around 20 personnel, as well as a leased core storage facility. A high-voltage powerline which is part of the national electric grid is located along Highway BR-163, 21 km west of the project.

## 1.4 History

The Coringa Gold Project is located in the southeastern part of the Tapajós gold district, Brazil's main source of gold from the late 1970s to the late 1990s. Artisanal mining produced an estimated 10 t of gold (322,600 oz) from alluvial and primary sources (Dzick, 2015). Deep saprolite or oxidized parts of shear zones were mined using high-pressure water hoses or hand-cobbing to depths of 15 m.

Other than the artisanal workings, no other production has occurred on the Coringa Gold Project. Historical exploration activities are described below in Section 1.6.

## 1.5 Geology and Mineralization

The Coringa Gold Project is located in the southeastern part of the Tapajós gold district where past production exceeds 10 M oz of gold (DNPM). The project is underlain by Proterozoic granites and rhyolitic volcanics. The main structural trends are northwest and north-northwest. The Coringa shear-vein system is coincident with the north-northwest trend ($345^0$) and dips $70^0$ to $90^0$ the northeast. It is interpreted as a Riedel shear (R-shear) related to dextral strike slip movement along the northwest-trending structures. Five zones of vein mineralization (Valdette, Galena, Mãe de Leite, Meio, Come Quieto) occur along the main shear zone, which is 7 km long. Many other parallel mineralized structures, including the Serra and Demetrio veins, are also present.

Gold occurs in quartz-sulphide veins which range in thickness from 0.15 to 14.0 m. Chlorite-hematite alteration is distal and sericite-pyrite alteration is proximal to the veins.

## 1.6 Exploration

In the late 1970s, local miners (garimpeiros) recovered gold from alluvial workings and small surface pits on many of the quartz veins. Artisanal mining activity ceased in 1991 after the devaluation of the Brazilian currency reduced the realized gold price and increased the price of fuel. A local Brazilian company (Tamin Mineração Ltda.) staked the area in 1990. Subsequently, the concessions were optioned to Chapleau Resources Ltd. (via its then subsidiary, Chapleau) in August 2006. On September 1, 2009, Magellan Minerals Ltd. (Magellan Minerals) acquired Chapleau Resources Ltd.

Between 2007 and 2013, extensive exploration programs were completed on the property. This included: airborne magnetic, radiometric and EM surveys; surface IP surveys; stream, soil, and rock sampling; and trenching and diamond drilling (179 holes; 28,437 m).

On May 9, 2016, Anfield acquired Magellan Minerals and the resulting company was named Anfield Gold Corp. (Anfield, 2016a, 2016b). Anfield completed an infill drill program (183 holes; 26,413.61 m) for the Serra and Meio veins in 2016 and 2017.

The Coringa Gold Project is an advanced project currently at the resource development stage.

## 1.7 Drilling

Between 2007 and 2013, Magellan Minerals completed five drill programs on the Coringa Gold Project. A total of 179 holes (28,437 m) were drilled to test a number of veins on the main Coringa Gold Project property (i.e., Serra, Meio, Galena, Valdette, Mãe de Leite, Demetrio, Sr. Domingo, and Come Quieto).

In 2016 and 2017, Anfield completed an infill drill program on the Meio, Serra and Galena veins to gather the additional information required to develop a mine plan. A total of 183 exploration holes were drilled (26,413.61 m), most of which produced HQ-size drill core. In addition, four PQ-size drill holes were drilled (284.8 m) for metallurgical samples.

## 1.8 Sample Database and Validation

A review of the sample collection and analytical practices used during the various drilling campaigns indicates that this work was conducted using generally accepted industry procedures.

The data have been validated using several methods, including visual observations and comparisons with the assay results, and direct comparisons with assay certificates. The sampling programs conducted by Magellan Minerals and Anfield were monitored using a Quality Assurance/Quality Control (QA/QC) program that is typically accepted in the industry. To confirm the results, selective drill core and sample pulps from previous drill programs were resampled. Similarities between data of all drilling campaigns (e.g., location, style, and tenor) suggest that there is no reason to question the results from the earlier drill programs.

It is the QPs' opinion that the database is sufficiently accurate to support estimates of mineral resources.

## 1.9 Mineral Processing and Metallurgical Testing

Metallurgical testing for the Coringa Gold Project has been performed since 2008. Table 1.2 below lists the laboratories and summarizes the types of metallurgical test programs each completed.

**Table 1.2: Metallurgical Test Programs**

| Laboratory (Location) | Dates | Key Testing Programs | Materials Tested |
|---|---|---|---|
| | | | |
| SGS Geosol Mineral Lab (SGS Geosol) | Mar-08 | Gravity Concentration | Two Composites (High and Low Grade) |
| (Belo Horizonte, MG, Brazil) | May-08 | Flotation | |
| | | Whole-Ore Leaching | |
| | | | |
| Resource Development Inc (RDi) | Mar-10 | Grinding Work Index | Two Composites (Serra and |
| (Wheat Ridge, CO, USA) | | Gravity Concentration | Guaxebinha-Meio-Onza Zones) |
| | | Flotation | |
| | | Whole-Ore Leaching | |
| | | | |
| Testwork Desenvolvimento | Jun-13 | Gravity Concentration | Two Composites (Serra-Galena-Mae de Leite |
| de Processo Ltda (TDP) | Nov-13 | Whole-Ore Leaching | and Meio-Come Quieto Zones) |
| (Nova Lima, MG, Brazil) | Dec-13 | Gravity-Intensive Leach | |
| | | Flotation, Float-Leach | |
| | | Cyanide Neutralization | |
| | | Settling | |
| | | Grinding Work Index | |
| | | | |
| C.H. Plenge & CIA. S.A. (Plenge) | May-17 | Comminution (UCS, Crush) | 1/2 HQ core Master Composite (Serra-Meio Zones) |
| (Miraflores, Lima, Peru) | Jul-17 | Comminution (Abrasion, BWi) | 1/2 HQ core Variability Composites (8 Serra, 6 Meio) |
| | | Gravity Concentration | Comminution Samples (26 Serra, 26 Meio) |
| | | Gravity-Conc Intensive Leach | Sliced PQ core Variability Composites (4 Serra, 2 Meio) |
| | | Gravity Tails Leach | |
| | | Whole-Ore Leaching | |
| | | Whole-Ore Flotation, Leaching | |
| | | Leach Tails Flotation | |
| | | Cyanide Neutralization | |
| | | Settling | |
| | | Gravity Concentrate Mineralogy | |

Plenge conducted metallurgical testing in connection with the preparation of the FS. Results from the Plenge test program have been used to project the metallurgical performance of materials planned for mining and processing at the Coringa Gold Project. Results from the earlier RDi and TDP test programs support results from the Plenge program and altogether are useful to support the stated overall representativeness of the samples to the various deposits. The samples tested are spatially representative of the zones currently planned for mining and processing in the project development plan. Results from the test programs are acceptable to use to project the metallurgical response of the materials planned for processing.

The projected gold and silver recoveries for the main deposits at the Coringa Gold Project are presented below:

- Serra and Galena deposits – 96% for gold and 57% for silver

- Meio deposit – 94% for gold and 74% for silver

The above recoveries are the average results, after an applied discount, from Plenge's testing of variability composites when subjected to gravity concentration, intensive leaching (IL) of gravity concentrates and carbon-in-leach (CIL) processing of gravity tails. The recoveries were discounted 3% for gold and 5% for silver to reflect typical losses experienced in industrial process plants, such as less efficient gravity concentration, solution losses, carbon losses, lower silver carbon-loading than anticipated, and grind variations. The recoveries compare well with the results from Plenge's whole-ore CIL processing tests as well as the gravity/IL/CIL tests run in 2013 by TDP.

The Plenge test program consisted of the following:

- Comminution and physical properties
- Whole-ore cyanidation
- Gravity concentration, IL of concentrates, leaching of gravity tails
- Whole-ore flotation
- Cyanide neutralization
- Flotation of detoxified leach tails
- Settling
- Variability sample testing
- Gravity Concentrate mineralogy
- Production of a representative tails sample for tailings characterization by others

Galena zone recoveries are estimated to be similar to Serra recoveries based on results from TDP's testing of Composite 1, a mixture of Galena, Mãe de Leite, and Serra zone materials.

In addition to projected (discounted) recoveries, Bond Ball Mill Work Index (BWi), and sodium cyanide (NaCN) and lime consumptions are shown in Table 1.3 below.

**Table 1.3: Projected Metallurgical Response for Coringa Deposits**

| Deposit | BWi kWh/t | Gold Rec. % | Silver Rec. % | NaCN kg/t | Lime kg/t |
|---|---|---|---|---|---|
| | | | | | |
| Serra & Galena | 18.2 | 96 | 57 | 1.3 | 1.6 |
| | | | | | |
| Meio | 19.0 | 94 | 74 | 1.7 | 2.0 |

## 1.10 Mineral Resource Estimate

This report includes estimates for mineral resources. The mineral resource estimate was generated using drill hole sample assay results and the interpretation of a geological model which relates to the spatial distribution of gold and silver. Interpolation characteristics were defined based on the geology, drill hole spacing, and geostatistical analysis of the data.

Estimations are made from 3D block models based on geostatistical applications using commercial mine planning software (MineSight® v12.0). The project limits are based in the UTM coordinate system (WGS84 Zone 21S) using a nominal block size measuring 1 x 5 x 2 m (5 m along the strike of the zones, 1 m across the strike direction, and 2 m in the vertical direction). Drill holes, collared from surface, penetrate the sub-vertical veins to maximum depths of about 250 m below the surface. The mineral resource estimate was generated using drill hole sample assay results and the interpretation of a geological model which relates to the spatial distribution of gold and silver. Estimates for copper, lead, and zinc are also included to provide a better understanding of these elements for metallurgical purposes. Interpolation characteristics were defined based on the geology, drill hole spacing, and geostatistical analysis of the data. The mineral resources were classified according to their proximity to the sample data locations and are reported, as required by NI 43-101, according to the CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014).

A base case cut-off grade of 2 g/t Au is estimated based on an assumed metal price of $1,300/oz Au, metallurgical recoveries of 95%, and total onsite operating and processing costs of $80 per tonne. There are no adjustments to the estimate of mineral resources to account for mining recoveries or dilution. Table 1.4 illustrates the mineral resource estimate as of May 3, 2017.

**Table 1.4: Estimate of Mineral Resources (May 3, 2017)**

| Zone | ktonnes | Average Grade | | | | | Contained Metal | |
|---|---|---|---|---|---|---|---|---|
| | | Au (g/t) | Ag (g/t) | Cu (%) | Pb (%) | Zn (%) | Au (koz) | Ag (koz) |
| **Indicated** | | | | | | | | |
| Serra | 488 | 7.45 | 16.1 | 0.04 | 0.09 | 0.04 | 117 | 253 |
| Meio | 160 | 10.69 | 20.7 | 0.12 | 1.38 | 0.65 | 55 | 106 |
| Galena | 78 | 9.36 | 14.7 | 0.13 | 0.70 | 0.45 | 24 | 37 |
| **Total** | **726** | **8.36** | **17.0** | **0.07** | **0.44** | **0.22** | **195** | **396** |
| **Inferred** | | | | | | | | |
| Serra | 262 | 4.30 | 8.7 | 0.02 | 0.03 | 0.01 | 36 | 73 |
| Meio | 229 | 4.18 | 6.1 | 0.03 | 0.22 | 0.12 | 31 | 45 |
| Galena | 63 | 3.41 | 3.5 | 0.03 | 0.38 | 0.15 | 7 | 7 |
| Mãe de Leite | 244 | 5.92 | 2.6 | 0.01 | 0.18 | 0.04 | 46 | 20 |
| Come Quieto | 253 | 4.50 | 7.5 | 0.06 | 0.02 | 0.01 | 37 | 61 |
| Valdette | 249 | 2.96 | 1.0 | 0.00 | 0.04 | 0.03 | 24 | 8 |
| **Total** | **1,301** | **4.32** | **5.1** | **0.02** | **0.11** | **0.05** | **181** | **215** |

Note: Base case cut-off is 2 g/t Au.
Mineral resources are not mineral reserves because the economic viability has not been demonstrated.

The average horizontal thicknesses for the veins included in the resources are: Serra 0.82 m, Meio 0.97 m, Galena 1.12 m, Mãe de Leite 0.98 m, Come Quieto 0.91 m, and Valdette 0.80 m.

## 1.11 Mineral Reserves

### *1.11.1 Mineral Reserves*

MDA was provided the mineral resource block models for the Serra, Meio, and Galena deposits. The mineral reserve estimates and the corresponding designs and mine schedule are based on the provided block models as well as the solids used to create the mineral resource block models. The vein solids were created during the resource modeling to spatially define the veins and control the estimate. All planned mining in the FS has been based on the location and width of the vein solids. The block models provided to MDA contained only material that was incorporated into the Indicated mineral resource and Inferred mineral resource categories in the mineral resource estimate. Only material that was incorporated into the Indicated mineral resource category was taken into account in the mineral reserve estimate for the Coringa Gold Project.

Table 1.5 shows the estimated mineral reserves for the main deposits at the Coringa Gold Project.

**Table 1.5: Minable Mineral Reserves – Coringa Deposits**

| | | Probable Reserves |
|---|---|---|
| Serra | K Tonnes | 498.3 |
| | g Au/t | 6.05 |
| | K Oz Au | 96.9 |
| | g Ag/t | 12.76 |
| | K Oz Ag | 204.4 |
| Meio | K Tonnes | 196.0 |
| | g Au/t | 7.38 |
| | K Oz Au | 46.5 |
| | g Ag/t | 14.64 |
| | K Oz Ag | 92.3 |
| Galena | K Tonnes | 74.3 |
| | g Au/t | 7.09 |
| | K Oz Au | 16.9 |
| | g Ag/t | 11.24 |
| | K Oz Ag | 26.8 |
| Total | K Tonnes | 768.6 |
| | g Au/t | 6.49 |
| | K Oz Au | 160.3 |
| | g Ag/t | 13.09 |
| | K Oz Ag | 323.5 |

*Total tonnes include dilution material*
*Grades are fully diluted*

- The reserves summarized in the table above include diluting material, thus the grades are fully diluted.
- Probable Reserves are reported based on Indicated resources inside of mining shapes and after it was demonstrated that it can be mined at a profit.
- Indicated resources below the mining cut-off grade, and inside of mining solids are also included in reserves as internal dilution.
- Rounding may result in apparent summation differences.
- The effective date of the mineral reserves estimate is July 1, 2017.

Once in production, some of the waste and Inferred material can be segregated when mining and the material can be left in-situ as pillars, thus reducing the dilution.

### *1.11.2 Economic Parameters*

Table 1.6 shows the economic parameters that were used to define the mining cut-off grades for the Serra and Meio deposits. The parameters used for the Serra deposit were also used for the

Galena deposit. Cut-off grades and reserves have been stated using a $1,250 oz gold price. Note that these parameters were used for defining stopes and may differ slightly from the final economic analysis.

**Table 1.6: Economic Parameters**

| | Serra | Meio | Units |
|---|---|---|---|
| **Mining Cost** | | | |
| UG Mining Cost | 41.00 | 43.00 | U.S. $/t-ore |
| **Processing Cost** | | | |
| Milling | 43.00 | 40.00 | U.S. $/t-ore |
| Refining | 1.00 | 1.00 | U.S. $/Oz Au |
| **Recoveries** | | | |
| Milling Gold | 96.00 | 94.00 | % |
| **G&A** | | | |
| Mining and Processing | 4.00 | 4.00 | U.S. $/t-ore processed |

### *1.11.3 Dilution and Ore Loss*

The designs outlining the minable blocks were undertaken using a 0.80 m minimum mining width. Estimated Indicated mineral inside of these designs that is not above the mining cut-off grade is added at the respective grade, and Inferred mineral resources and un-estimated material is added at zero grade (and are therefore not included in the estimated mineral reserves); both materials are considered internal dilution. This dilution material amounts to approximately 121 ktonnes at 0.16 g Au/t and 2.6 g Ag/t for both Serra and Meio combined. Ore loss for Galena is assumed to also be 5% of the resource, or 2.5 kt.

Dilution due to wall over-break from blasting at the stopes was taken into account in the schedule summaries at zero grades. Dilution from cleaning the ribs and the back is considered negligible. The approximate tonnage of this dilution material for both Serra and Meio combined is 75 ktonnes at zero grades. Dilution material for Galena is estimated to be approximately 2.5 kt, also at zero grade.

The sill drives, which are developed in ore along the vein, have a higher amount of internal dilution material. Most of this material is classified as undefined, thus it does not contribute any metal to the process. MDA considered different mining techniques to mitigate this dilution in the sill drives, however, the techniques would prove more costly than processing all the material produced from the sill drives.

On an overall tonnage basis, the total dilution included is approximately 16%. In the designs with additional mining dilution, it ranges from 10 to 20% depending on the mining method applied at each mining location.

Ore loss has been estimated at 5% to account for sill pillars that might be needed in between main levels at 60 m maximum height of open stopes as per the geotechnical recommendations.

## 1.12 Mining Methods

### *1.12.1 Introduction*

The Coringa Gold Project has been planned as an underground mining operation. The advantages of underground mining include:

- underground mining helps to reduce the footprint of the mine and its environmental impacts;
- the Serra, Meio, and Galena deposits are high-grade, narrow vein deposits which are ideally suited to underground mining methods which minimize dilution from the mining process; and
- underground selectivity will help to maximize run-of-mine (ROM) feed grades.

### *1.12.2 Development General Schedule*

Mining will commence at Serra with construction of a portal followed by development of a decline ramp and access to the mineralized veins. A typical cross section of the ramp showing the location of utilities (ventilation duct, water supply and dewatering lines, communications, and power) and a haulage truck (20 t capacity) is shown below in Figure 1.4. The decline gradient is designed at a maximum 14% where the ramp is straight. In places where curves are required, the ramp is designed at a slope of 10%. Primary development will be finished with utility lines, electrical cable, and ventilation ducting, as required. Main mine development at Serra is finished approximately in the second year of life of the Serra mine, at the end of which development of the Meio mine will start. Galena will be developed for the final year of the project. All primary development will be completed by Anfield personnel. Vertical development is considered to be developed by a subcontractor.

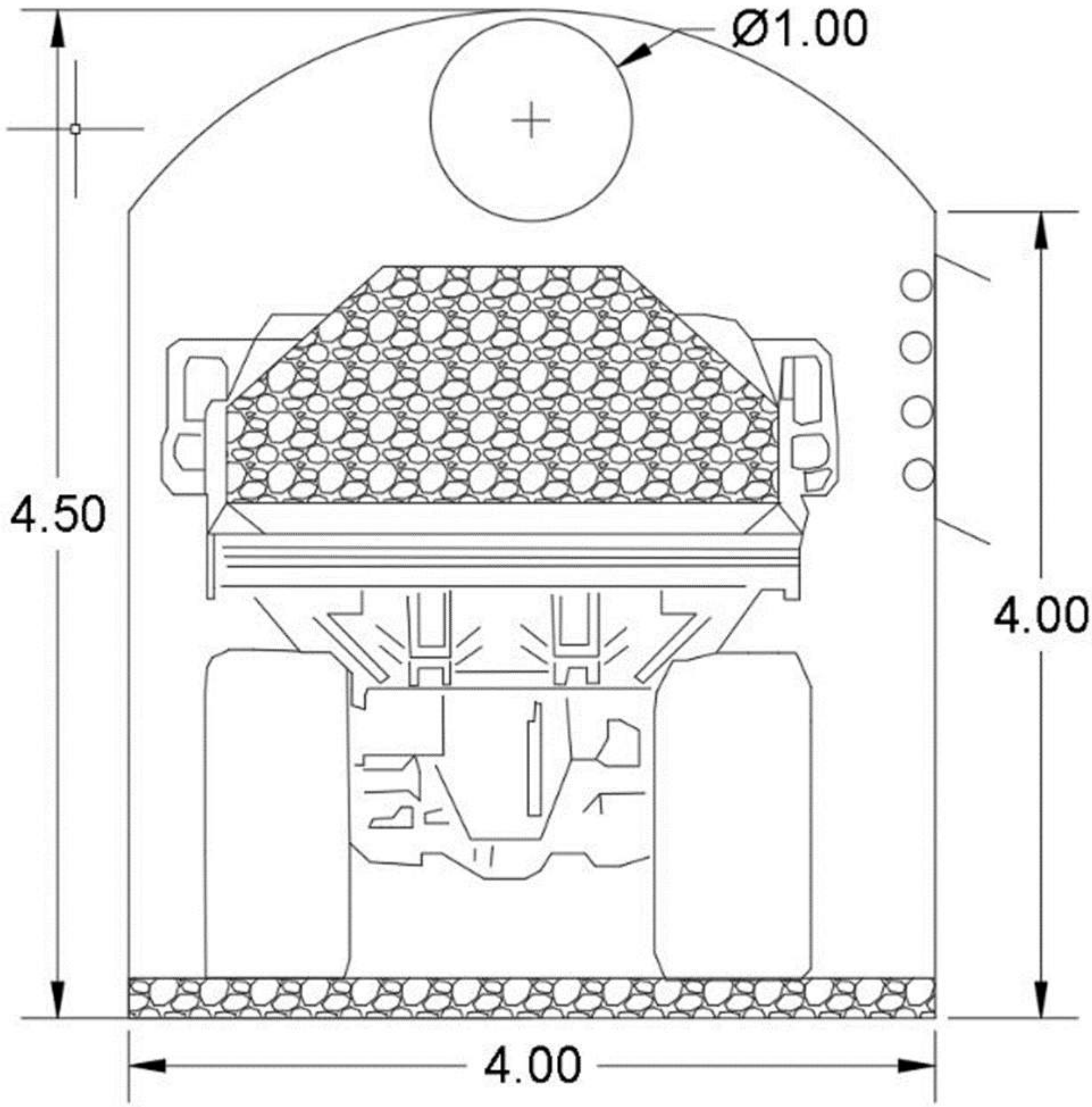



**Figure 1.4: Decline Typical Cross Section**

### *1.12.3 Portal/Ramp*

Each mine will be accessed through a single portal entrance. Geotechnical conditions for the portals' construction were evaluated for Serra and Meio by Quanta Subsurface (Quanta b & c) and designs for the portals and the main ramps at Serra and Meio are based on Quanta's geotechnical recommendations. Dedicated geotechnical holes were drilled at the Meio portal site and along the line of the decline. At Serra dedicated geotechnical borings were advanced along the decline heading. These drill holes and other exploration holes around the decline centerlines were used for the geotechnical analysis of the ground conditions at the portals and ramps. In general, rock is expected to be “Good” according to the Q-System empirical rating system in both locations. With the water considered, the overall rock quality ratings and designs are very similar. Water at Serra is higher in elevation while the rock is slightly better. In general, very little support is expected to be required, although there is likely a need for some support to provide a safer working environment.

Development will include construction of a decline, main haulage drifts, and crosscuts to provide access to the production locations. Long sections for Serra and Meio primary development are shown below in Figures 1.5 and 1.6.

Primary development for Serra will be built on the footwall (FW) facilitating access mine the main vein first, which is considerably larger than the other two veins.

Primary development at Serra will be built in between two veins which are an average 50 m apart. Although four veins were modeled at Meio, only two of them will be mined. Main development for Meio will be built in between the veins reducing the length of the stope access to both veins. Primary development to mine the current reserves will total 6,800 m; Serra at 3,100 m; Meio at 2,500 m, and; Galena at 1,200 m.

Additional development will be required for muck bays and temporary workshops. Muck bays will be used as drill stations; however, additional drilling stations might need to be developed for delineation drilling of the deposit.

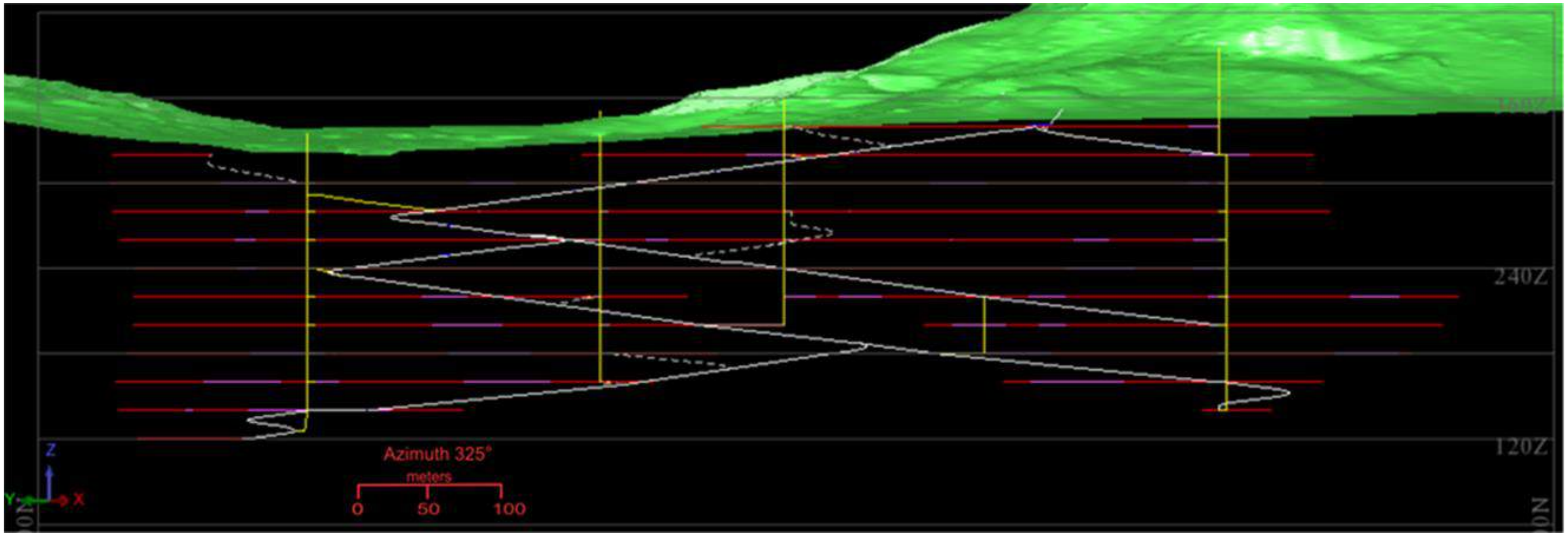



**Figure 1.5: Serra Underground Development – Long View**

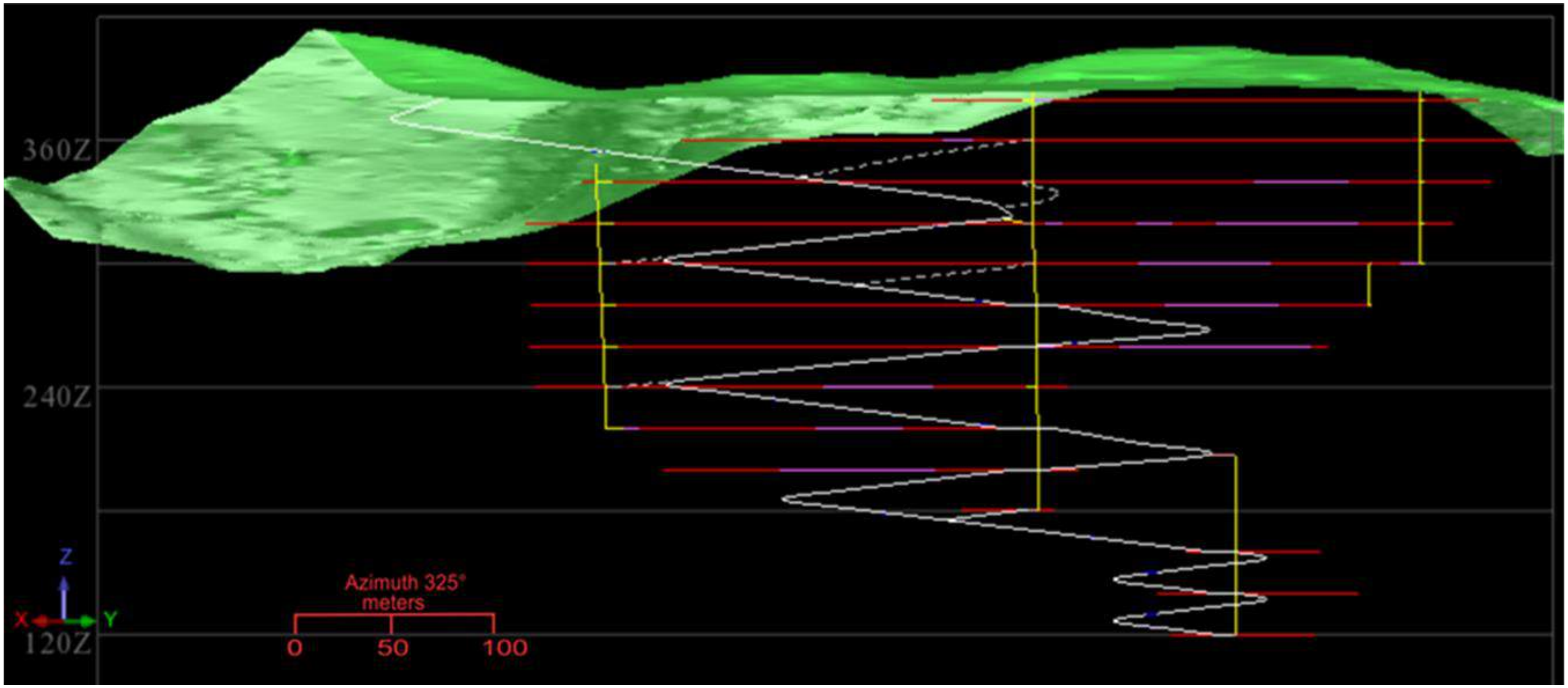



**Figure 1.6: Meio Underground Development – Long View**

### *1.12.4 Mining Method*

The primary mining method for the Serra deposit is shrinkage. Having higher metal grades, the Meio deposit will be mined using a combination of shrinkage and narrow-vein longhole mining. The Meio deposit has similar characteristics to Serra, however, the higher grades will allow it to be mined with some extra dilution that the longhole mining methods might require to accommodate the mining equipment. Galena mine will use shrinkage mining similar to the Serra mine.

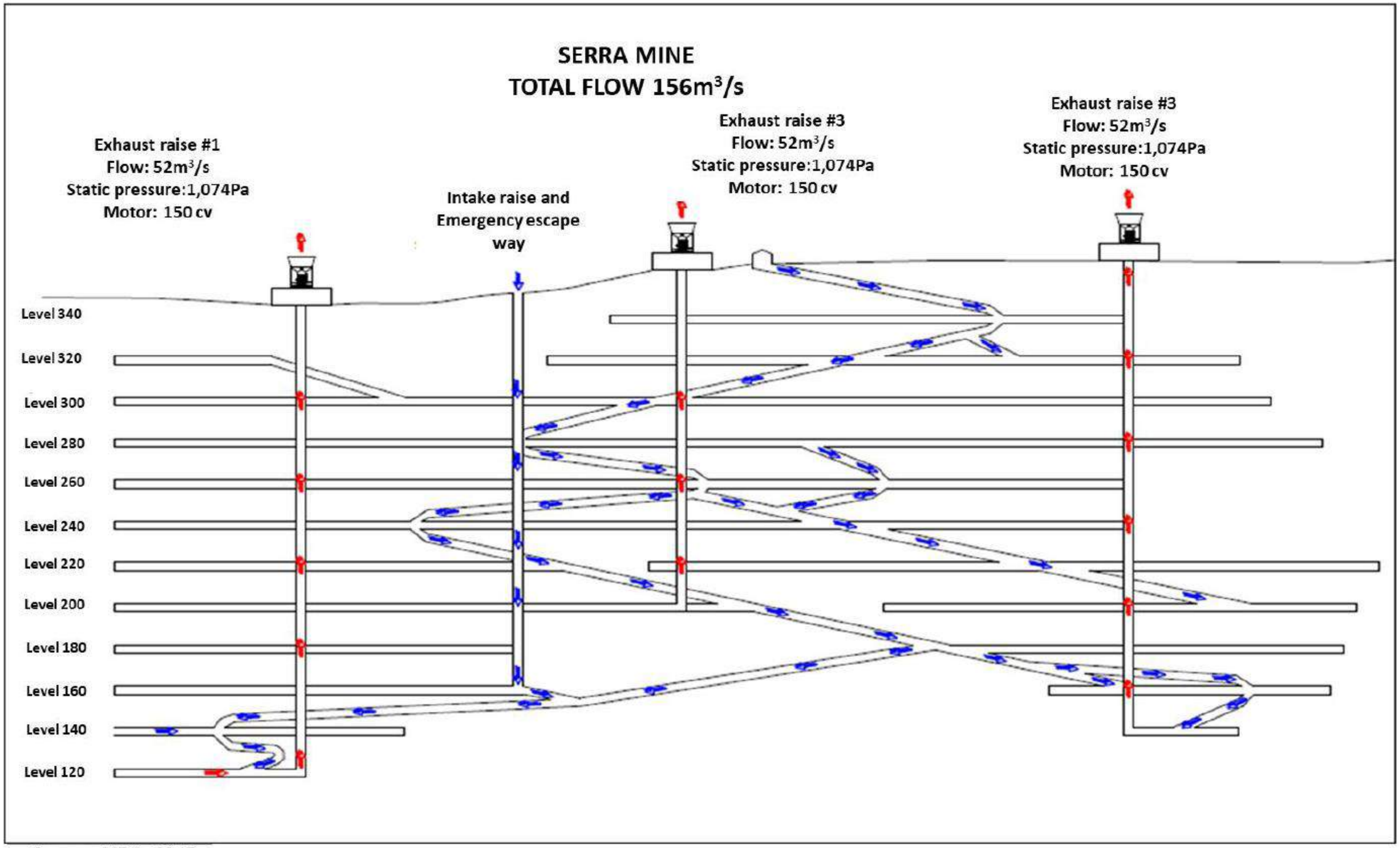
### *1.12.5 Ventilation*

All mine ventilation designs and studies were carried out by Provente Ventilacao Subterranea, (Provente) of Belo Horizonte, Brazil. The studies and designs satisfy the required Brazilian standards and regulations.

The ventilation systems at both Serra and Meio are designed to provide fresh air throughout the active headings in the mine. Production areas will be connected to the main ventilation circuit by means of ventilation ducts and secondary drifts. Fresh air will be supplied through the main ramp and the contaminated air will be exhausted through vertical raises connected to the surface.

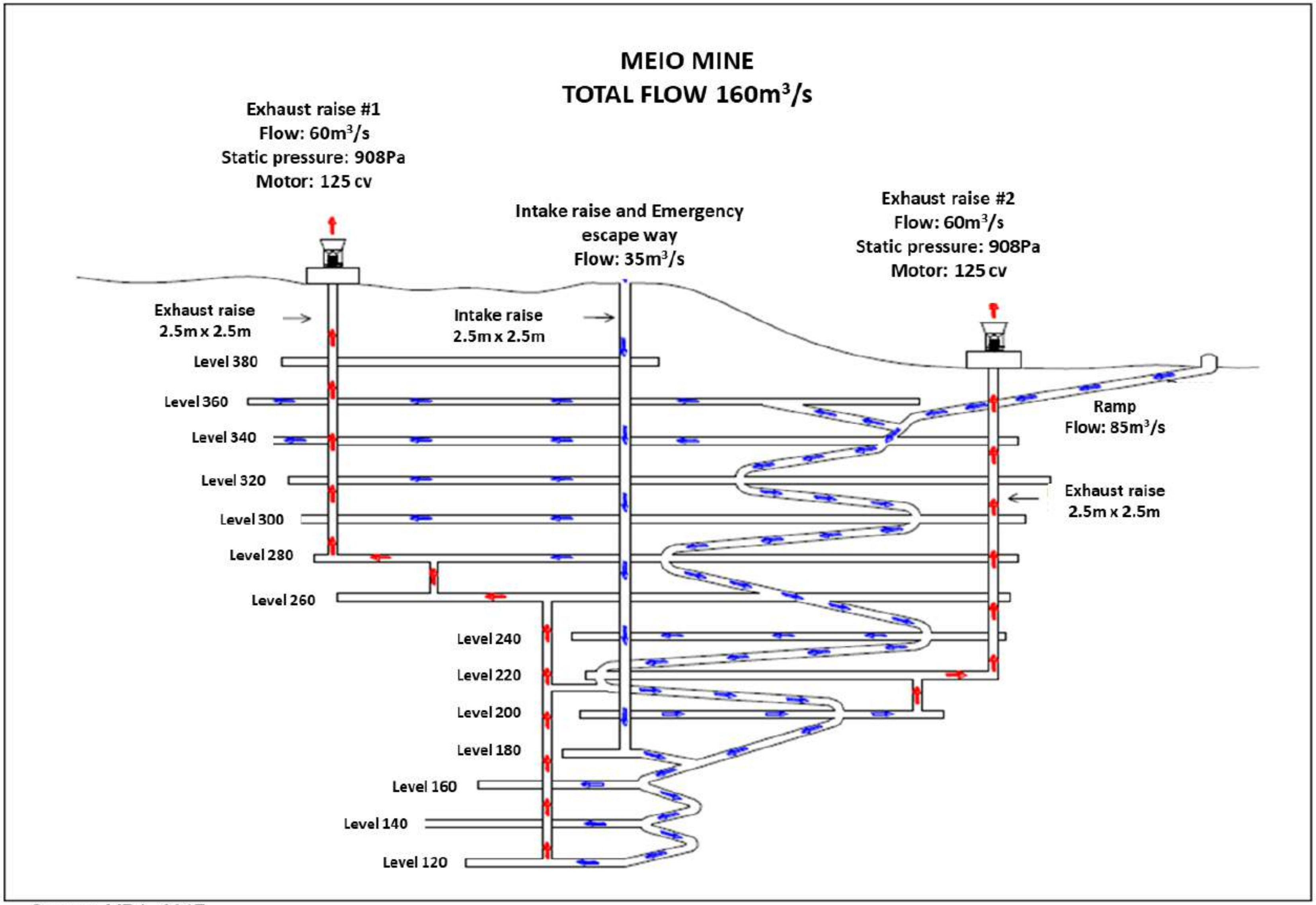
The Serra mine will have three vertical raises. Meio will require only two exhaust raises due to its size. Ventilation shafts have been designed to be 3 m in diameter. A total of 800 m of ventilation raises have been designed for the life of the mine.

Airflow paths and ventilation raises are shown on Figure 1.7 for Serra and Figure 1.8 for Meio.




Source: MDA, 2017

**Figure 1.7: Airflow Paths - Serra**




Source: MDA, 2017

**Figure 1.8: Airflow Paths - Meio**

### 1.12.6 Mine Production Schedule

Production will begin with the sill preparation. Once the sills are fully developed to a maximum length of 200 m, production will start from the stopes. No mine backfill was considered in the schedule, however, if needed, waste rock from development in waste will be used for backfill material. Open stopes will also serve as temporary or permanent storage areas for waste material. Table 1.7 shows the yearly mine production.

**Table 1.7: Yearly Mine Production**

| | | Units | PreProduc | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Ore Development | Sill Drive | m | 243 | 2,439 | 3,099 | 2,621 | 2,831 | 1,250 | **12,482** |
| | Ore Tonnes | | 4,918 | 48,695 | 62,862 | 54,307 | 59,595 | 26,681 | **257,057** |
| | Gold Ounces | oz | 308 | 4,832 | 6,230 | 5,300 | 6,291 | 2,813 | **25,775** |
| | Gold | g/t | 1.95 | 3.09 | 3.08 | 3.04 | 3.28 | 3.28 | **3.12** |
| | Silver Ounces | oz | 535 | 10,045 | 13,543 | 9,470 | 14,330 | 4,399 | **52,322** |
| | Silver | g/t | 3.39 | 6.42 | 6.70 | 5.42 | 7.48 | 5.13 | **6.33** |
| Stope Production | Ore Tonnes | | 0 | 95,898 | 108,069 | 107,113 | 126,908 | 73,531 | **511,519** |
| | Gold Ounces | oz | 0 | 23,186 | 30,733 | 23,590 | 37,728 | 19,316 | **134,553** |
| | Gold | g/t | 0.00 | 7.52 | 8.85 | 6.85 | 9.25 | 8.17 | **8.18** |
| | Silver Ounces | oz | 0 | 49,703 | 70,103 | 45,994 | 71,056 | 34,307 | **271,165** |
| | Silver | g/t | 0.00 | 16.12 | 20.18 | 13.36 | 17.41 | 14.51 | **16.49** |
| | Total ORE Tonnes | | 4,918 | 144,593 | 170,931 | 161,420 | 186,503 | 100,212 | **768,577** |
| | Total Au Ounces | oz | 308 | 28,018 | 36,963 | 28,890 | 44,019 | 22,129 | **160,328** |
| | Total Ag Ounces | oz | 535 | 59,749 | 83,646 | 55,464 | 85,386 | 38,706 | **323,487** |
| | ROM | | 51,816 | 278,266 | 302,957 | 318,339 | 264,332 | 135,712 | **1,351,421** |

### 1.12.7 Mine Equipment

Anfield has acquired mine equipment from an operation with similar characteristics which will reduce the capital cost required for purchasing mine equipment. A short list of the additional equipment to be purchased is shown below in Table 1.8. Existing equipment is listed in Table 1.9.

**Table 1.8: Serra and Meio Equipment**

| | Type - Manufacturer | Model - Capacity | Pre-Production | Y1 | Y2 | Y3 | Y4 | Y5 |
|---|---|---|---|---|---|---|---|---|
| Development | Scoop Tram - Caterpillar | R1600G - 4.8 $m^3$ | 1 | 2 | 2 | 2 | 2 | 2 |
| | Truck - Volvo | FMX 6x4R - 16$m^3$ | 2 | 2 | 2 | 2 | 2 | 2 |
| | Jumbo - Atlas Copco | Boomer 104 | 3 | 4 | 4 | 4 | 4 | 4 |
| | Loader | Volvo L90F - 2.3 $m^3$ | 1 | 1 | 1 | 1 | 1 | |
| Production | Jumbo - Atlas Copco | Boomer 282 | 1 | 2 | 2 | 2 | 2 | 2 |
| | Scoop Tram - Atlas Copco | ST2G - 1.9 $m^3$ | 2 | 3 | 3 | 3 | 3 | 3 |
| | Truck - Volvo | FMX 6x4R - 16m3 | | 2 | 2 | 2 | 2 | 2 |
| | Handheld Drills | Boar Max - Dl | 3 | 6 | 8 | 8 | 10 | |

**Table 1.9: Existing Mine Equipment**

| ITEM | MODEL | BRAND | YEAR |
|---|---|---|---|
| 1 | PICKUP L200 GL 2.5 4X4 CD | MITSUBISHI | 2011 |
| 2 | PICKUP L200 GL 2.5 4X4 CD | MITSUBISHI | 2011 |
| 3 | PICKUP L200 TRITON 3.2 DIESEL MT GLS | MITSUBISHI | 2012 |
| 4 | PICKUP L200 TRITON GLS3.2CDTB INT D M | MITSUBISHI | 2014 |
| 5 | PICKUP L200 TRITON GLS3.2CDTB INT D M | MITSUBISHI | 2014 |
| 6 | PICKUP HILUX CD SRV D4D 4X4 3.0 TDI AU | TOYOTA | 2010 |
| 7 | PICKUP HILUX CS 4X4 3.0 CHAS | TOYOTA | 2011 |
| 8 | PICKUP HILUX CD 4X4 DIESEL | TOYOTA | 2011 |
| 9 | PICKUP HILUX 4CDL DX | TOYOTA | 2003 |
| 10 | TRUCK P124 CB 360 6X4 NZ | SCANIA | 2000 |
| 11 | FLATBED | NOMA | 2004 |
| 12 | PICKUP L200 TRITON GLX DIESEL 3.2 MT | MITSUBISHI | 2016 |
| 13 | PICKUP L200 TRITON GLX DIESEL 3.2 MT | MITSUBISHI | 2016 |
| 14 | PICKUP L200 TRITON GLX DIESEL 3.2 MT | MITSUBISHI | 2016 |
| 15 | PICKUP L200 TRITON GLX DIESEL 3.2 MT | MITSUBISHI | 2016 |
| 16 | PICKUP L200 TRITON GLX DIESEL 3.2 MT | MITSUBISHI | 2016 |
| 17 | CARGO 1422 + MUNCK TRUCK | FORD | 1997 |
| 18 | AMBULANCE | TOYOTA | 2016 |
| 19 | WATER TRUCK 31.320 6X4 | VOLKSWAGEN | 2011 |
| 20 | FRONT END LOADER L70F | VOLVO | 2008 |
| 21 | LHD R1600G | CATERPILLAR | 2012 |
| 22 | MINI LOADER | VOLVO | 2008 |
| 23 | JUMBO RB282 | ATLAS COPCO | 2008 |
| 24 | JUMBO RB104 | ATLAS COPCO | 2010 |
| 25 | VOLVO TRUCK A30F | VOLVO | 2012 |
| 26 | VOLVO TRUCK A30E | VOLVO | 2008 |
| 27 | DRILL RIG LM-75 | BOART LONGYEI | 2011 |
| 28 | DRILL RIG DIAMEC U-4 | ATLAS COPCO | 2008 |
| 29 | DRILL RIG MACH 320 | MACH SONDA | 2010 |
| 30 | EXCAVATOR DX53W | DOOSAN | 2012 |
| 31 | TELEHANDLER TL642 | CATERPILLAR | 2012 |
| 32 | GATOR | JOHN DEERE | 2011 |
| 33 | FIREFIGHTING TRAILER | | |

### 1.12.8 Manpower

Anfield has put together a team of experienced technical staff who will be managing the development and mining at the Coringa Gold Project. The technical team is experienced in narrow vein operations similar to the Coringa Gold Project in Brazil and internationally.

The mine will operate 24 h/d and 7 d/wk with three shifts during the day. All mine personnel will be accommodated at the camp located on the project property. Manpower requirements at full production are 229. Additional details are provided in Table 16.8 located in Section 16.

### 1.12.9 Mine Dewatering

The predicted flow rates are summarized in Table 1.10 below. Inflows within the mine increase with depth and are highly dependent on the hydraulic conductivity.

**Table 1.10: Predicted Annual Inflow Rates**

| Mine Yr | Serra | | | Meio | | |
|---|---|---|---|---|---|---|
| | Sill Elev (mASL) | Ramp Elev (mASL) | FlowRate (m3/d) | Sill Elev (mASL) | Ramp Elev (mASL) | FlowRate (m3/d) |
| 0.0 | n/a | 340 (srf) | 0 | n/a | 380 (srf) | 0 |
| 0.5 | n/a | 280 | 209 | n/a | 380 (srf) | 0 |
| 1.0 | 320 | 226.5 | 582 | n/a | 380 (srf) | 0 |
| 1.5 | 300 | 200 | 887 | n/a | 380 (srf) | 0 |
| 2.0 | 260 | 170 | 1,043 | n/a | 380 (srf) | 0 |
| 2.5 | 220 | 120 | 1,411 | n/a | 380 (srf) | 0 |
| 3.0 | 200 | 120 | 1,363 | n/a | 380 (srf) | 0 |
| 3.5 | 180 | 120 | 1,446 | n/a | 338.4 | 2 |
| 4.0 | 160 | 120 | 1,506 | 340 | 260 | 87 |
| 4.5 | 120 | 120 | 1,479 | 280 | 175 | 234 |
| 5.0 | n/a | n/a | n/a | 240 | 120 | 338 |
| 5.5 | n/a | n/a | n/a | 120 | 120 | 358 |

Groundwater flows are dominated by secondary-porosity and are expected to result in short but intense dewatering periods during development that quickly subside as storage within the fractured rock aquifer is exhausted. As a result, the values contained in Table 1.10 should be looked at as averages, but more pumping capacity will be required to accommodate the sudden inflow of water from newly-contacted water-filled fracture zones.

## 1.13 Recovery Methods

### 1.13.1 Process Design

The ore processing facility for the Coringa Gold Project is a conventional carbon-in-leach (CIL) gold cyanidation plant. It has been designed to treat 460 tpd (159,000 tpa) of ore containing 6.5 gpt gold and 13.1 gpt silver over a 4.8-year period. The plant has the capacity to increase production to over 750 tpd with relatively modest additional capital investment, if required in the future. Annual gold production will average 32,000 ozs. The gold-silver doré product will be shipped to a refinery for further processing.

The process plant will be a combination of new and refurbished equipment, tanks, and structures. A similar sized crush/grind/gravity/leach gold ore process facility, located in Brazil, was purchased and relocated to the site of the Coringa Gold Project for re-use of the suitable equipment and materials.

Metallurgical test results of representative material from the Coringa Gold Project deposits were utilized to develop the final process flowsheet and plant design criteria.

Figure 1.9 presents the process flow diagram which is a detailed descriptive view of the overall processing scheme. Figure 1.10 illustrates the general arrangement of the process plant, related infrastructure, and ancillary facilities.

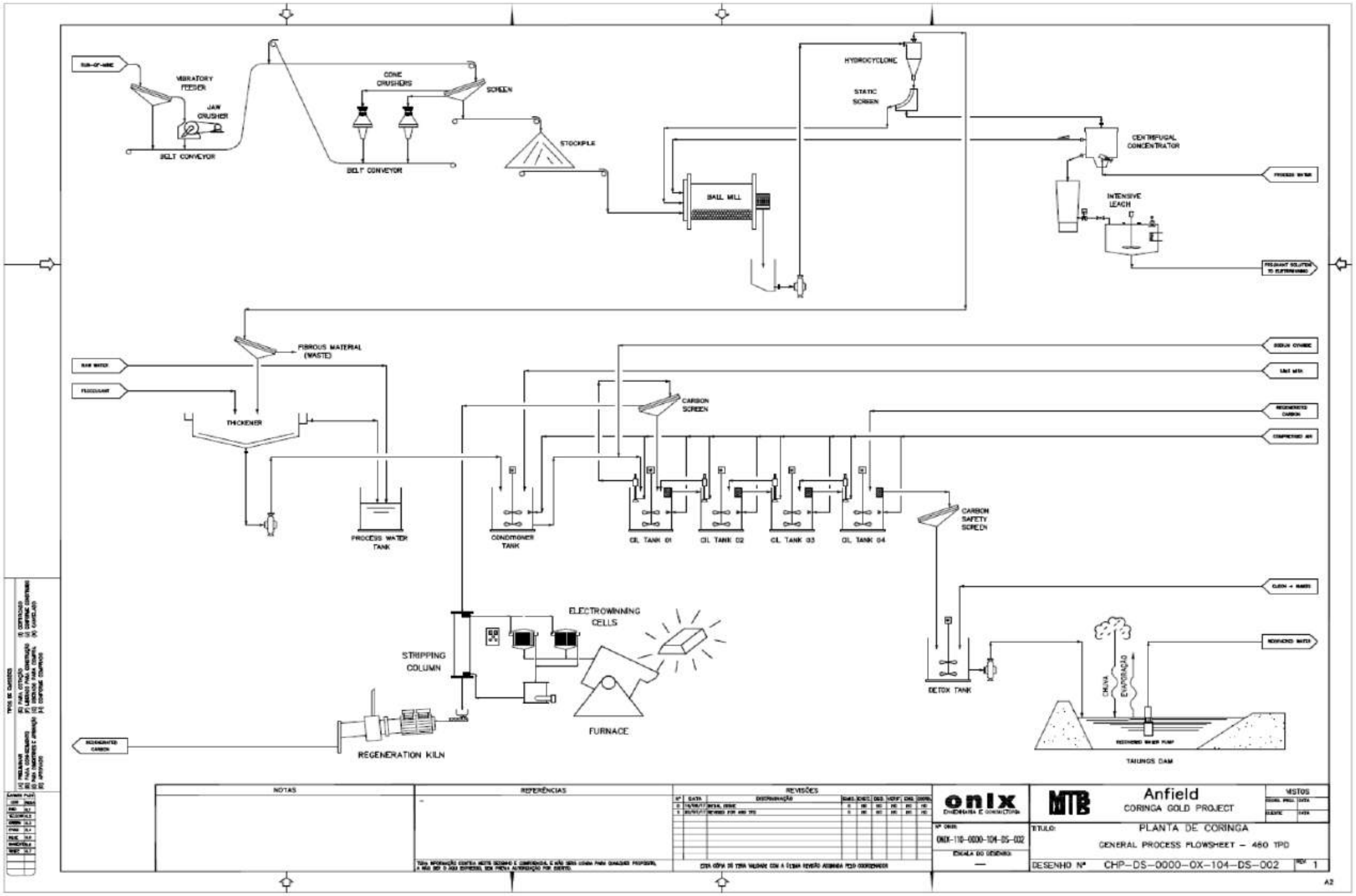



**Figure 1.9: Process Flow Diagram**

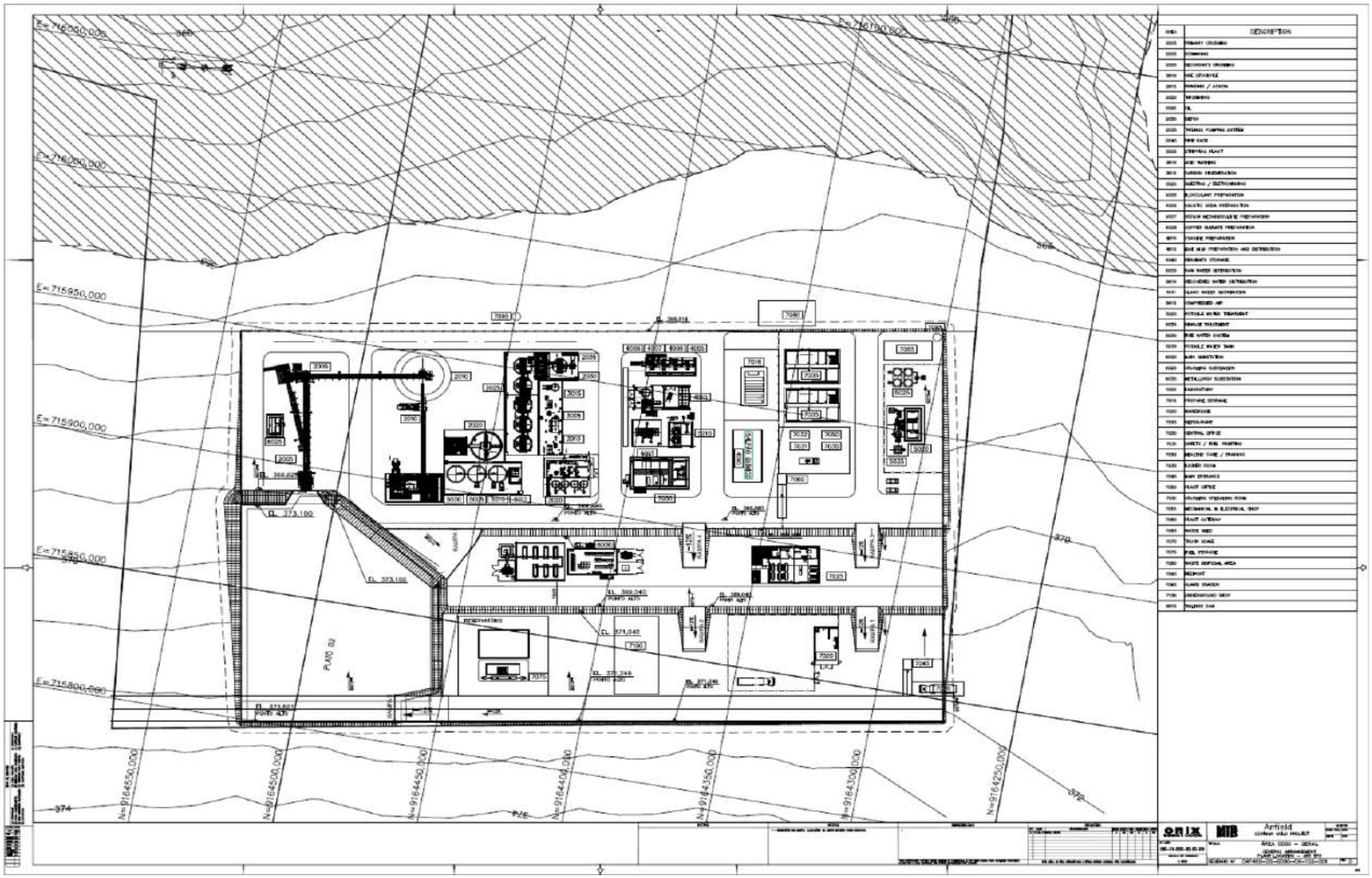


**Figure 1.10: Plant General Arrangement**

### *1.13.2 Process Plant Description*

A brief description of the process plant is presented below.

- The ROM ore is stockpiled and then reclaimed by front-end loader. The loader dumps the ore into a hopper equipped with a vibrating feeder that discharges into an 800 mm by 600 mm primary jaw crusher.
- The jaw crusher product discharges onto a conveyor that feeds a 4 m long by 1.5 m wide double-deck vibrating screen. The oversize from the top deck feeds a 1 m diameter Symons cone crusher while the bottom deck oversize feeds an H2800 Sandvik cone crusher. The crushed material from the secondary and tertiary crushers is collected and recycled via conveyor back to the vibrating screen.
- The final crushed product (undersize from the screen bottom deck), at an average particle size of 80% passing 10 mm, discharges onto a belt conveyor that feeds the fine ore stockpile. Crushed ore is reclaimed from the stockpile via feeders and a conveyor that feeds the 4.3 m long by 3.5 m wide ball mill equipped with a 900 hp motor.
- The ball mill grinding is in closed circuit with cyclones which classify the ground ore to a final particle size of 80% less than 105 microns. The cyclone underflow feeds a Knelson centrifugal (gravity) concentrator for free gold and silver recovery. The concentrator tails are returned to the mill for further grinding. The gravity concentrates flow to an Acacia IL leach reactor. Acacia leach tails are pumped to the CIL circuit while the Acacia reactor gold solutions are collected, stored, and then pumped to a dedicated electrowinning cell.
- The grinding circuit product, cyclone overflow at 20% solids by weight, passes over a trash screen and then is directed to a 12m diameter thickener. Thickener underflow densities are targeted to be about 41% solids by weight for leaching.
- The clarified overflow water from the thickener is pumped to a tank for storage and later used as process water. The thickener underflow is pumped to a conditioning tank prior to CIL for aeration and pH adjustment to about 11.5 using hydrated lime.
- After conditioning the slurry is transferred to a series of four aerated 8 m high by 6 m diameter CIL tanks, equipped with static sieve screens. The CIL tanks have a total slurry retention time of 24 hours. Gold and silver are leached with cyanide and then adsorbed by activated carbon present in the tanks.
- Each tank will have a carbon concentration of 25 gpl. The activated carbon is retained in each tank by static sieve screens installed ahead of each tank discharge pipe.
- The slurry flows downstream from tank to tank then through a carbon safety screen.
- The metal-loaded carbon is transferred from the last tank up-stream to the one before, and so on, countercurrent to the slurry descending from tank to tank.

- The highest metal loaded carbon is in the first CIL tank. From the first tank the carbon is transferred to a screen for preliminary cleaning/washing, then directed to the desorption column for further washing and metal stripping.
- In the desorption column, carbon is washed with a weak solution of hydrochloric acid and then a caustic soda solution, then a NaCN solution for metal stripping. This strip (pregnant) solution is pumped through a dedicated electrowinning cell where gold and silver are deposited on cathodes. The cathodes are periodically removed from the cells, washed, then the gold/silver sludge is dried, mixed with flux reagents and then smelted to produce a doré' product which is then shipped offsite for refining.
- The barren (metal removed) electrowinning solution is then recycled to the leaching circuit.
- After stripping, carbon is washed with water and transferred to the regeneration kiln. The carbon is heat-treated in the kiln and then returned to the last (fourth) CIL tank.
- The slurry from CIL, after passing through the carbon safety screen, flows to the cyanide destruction tank that utilizes the $SO_2$/Air process to destroy cyanide in the tailing slurry. Copper sulphate and sodium metabisulphite (SMBS) are added to the aerated mix tank to destroy the cyanide. The detoxified slurry is then pumped to the tailings storage facility (TSF) impoundment for disposal.
- At the TFS, a floating pump will be installed that will collect and recycle decanted water to the plant for use as process water.
- The site water balance indicates that not all decant water can be returned to the plant because of retention in the settled solids. The deficit (make-up) volume will be provided from a local source of fresh water (mine, runoff) to provide an overall water balance.

#### *1.13.3 Energy Consumption*
Process plant total power demand at full production is 1.877 MW, 0.264 for crushing and 1.613 MW for processing.

#### *1.13.4 Process Water Requirements*
During normal plant operation, it is estimated that the plant will consume 70 $m^3$/h of water. The pre-leach thickener will internally recycle 46 $m^3$/h resulting in a makeup water requirement of 29 $m^3$/h (after adjustment for evaporation and tailings entrainment losses). During plant start-up, prior to tailing decant water recycle, it is estimated that the full 29 $m^3$/h will have to come from other sources (runoff, mine operations). Once the TSF is capable of recycling water then only 2 $m^3$/h of water will be needed from other sources.

#### *1.13.5 Process Plant Manpower*
The plant will operate 24 h/d, 365 d/y on two 12 hour shifts per day. Four shift crews will work four days on and four days off. Total plant manpower will be 57 for operations, maintenance, and laboratory operations.

## 1.14 Project Infrastructure

### *1.14.1 Site Plan*

Figure 1.11 is the overall site plan which shows the locations of the principal facilities relative to each other. Principal facilities shown are: main gatehouse, onsite access road, Meio portal and waste storage facility (WSF), plantsite, TSF, Serra portal and WSF, explosives storage facility, and camp complex. Details of the plantsite general arrangement are shown in Figure 1.10 and details of the TSF are shown in Figure 18.2 and Figure 18.3, both located in Section 18 of this report.

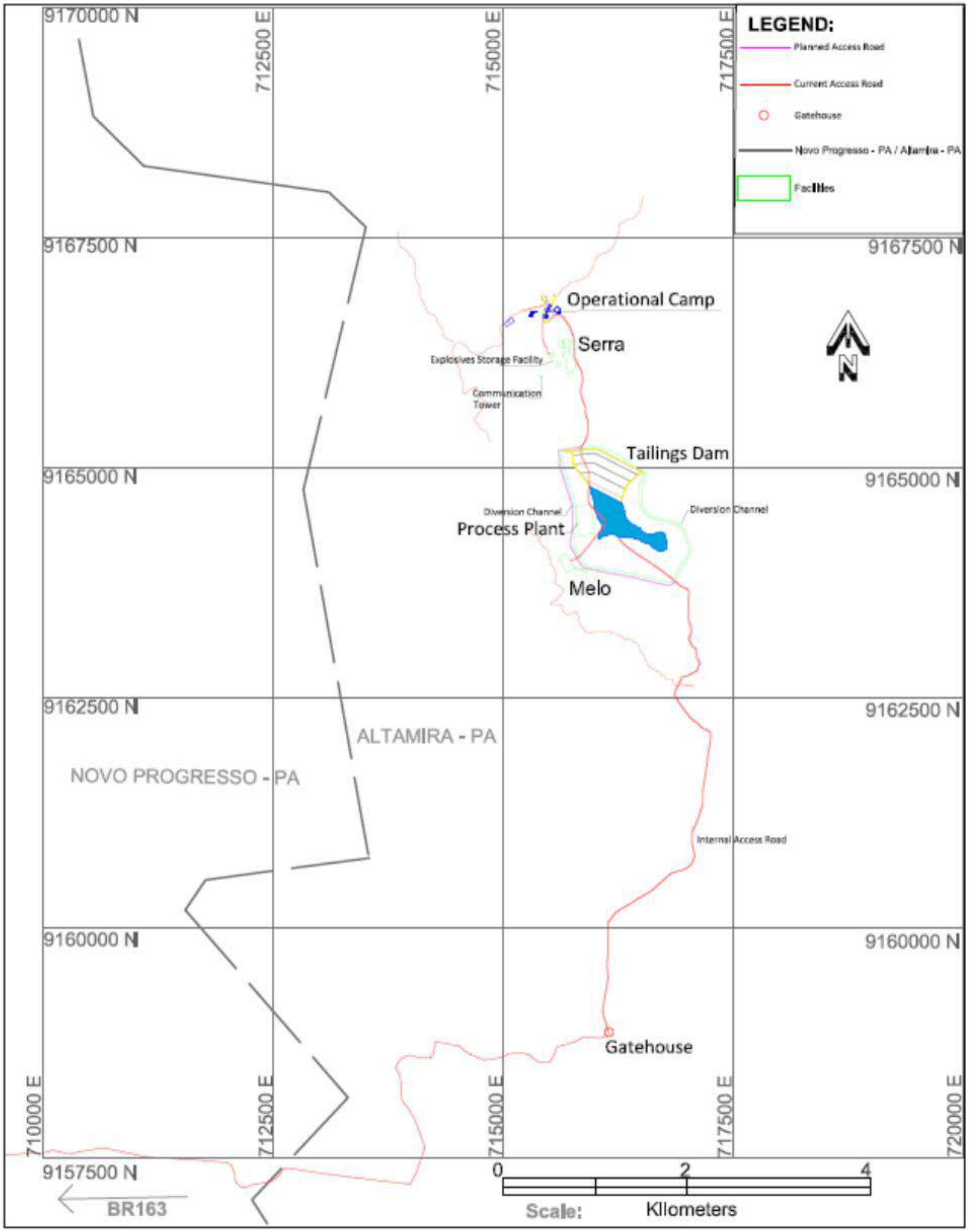



**Figure 1.11: Overall Site Plan**

#### *1.14.2 Tailings*

Anddes Asociados S.A.C. (Anddes) completed a feasibility-level design for the TSF. Detailed information about the TSF design is discussed in Section 18. The TSF design was reviewed by BVP Engenharia of Belo Horizonte, Brazil to confirm its compliance with Brazilian standards and regulations. The TSF meets Brazilian and international design standards and regulations.

The TSF will be created using a rock-fill and compacted earth-fill dam with a maximum height of less than 14 m and a spillway designed to safely pass the peak flow from the 1,000-year return storm event. The dam will be constructed in one preproduction and two production phases, called Phase 1, 2, and 3 for an operating life of 60-65 months. The first phase will be created using a conventional rock-fill dam with the upstream slope lined by an HPDE geomembrane. Dam raises will be constructed of compacted earth fill using conventional downstream methods. The TSF has been designed to store a total of 0.9 Mt of tailings, including a supernatant pond over the tailings with capacity to store operating solutions and peak storm accumulations. Tailings will be conventionally thickened and discharged to the TSF via spigots; those spigots will operate from the inside face of the dam during normal operations, and will be moved around the impoundment as the dam reaches capacity to facilitate closure.

#### *1.14.3 Waste Management*

Detailed lists of typical materials considered for each waste classification discussed below, as well as estimated quantities, are included in Table 18.11 in this technical report.

Hazardous Waste

Hazardous waste will be collected and stored in an onsite hazardous waste storage facility pending systematic removal of hazardous materials by a licensed contractor for disposal in accordance with Brazilian regulations.

The hazardous waste storage facility will be enclosed, under cover, and have internal divisions for classification and separation of different types of waste. The facility will be enclosed by fencing to restrict access for safety and security reasons.

Nonhazardous Waste

Nonhazardous waste will be disposed of in an onsite engineered landfill, the design of which will meet Brazilian regulatory requirements.

Materials with be placed in the landfill on a daily basis, and covered with a layer of soil to preclude dispersal by wind or access by local fauna. The landfill will be fenced to control unauthorized access by individuals and larger animals.

Design, construction, and operation will utilize a cell basis. When one cell has been filled, it will be closed and reclaimed. Deposition of nonhazardous materials will shift to the next planned cell in the design, and so on throughout mine life.

#### *1.14.4 Power Supply*

Site power demand during full production for the mine, process plant, and camp is 3.039 MW.

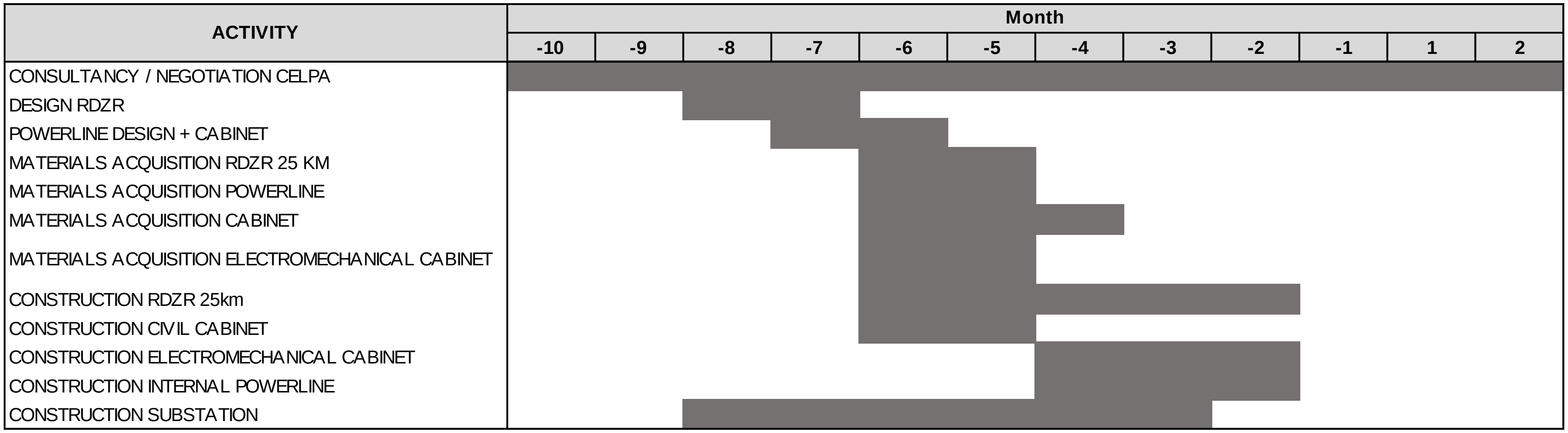
During the preproduction/construction period of ten months and the first eight months of production, power will be supplied by diesel generators located at the plantsite. Power will be generated by six operating 750 kva gensets with one additional 750 kva genset in reserve. The number of operating generators was determined by considering their normal steady state operation at 70-80% of rated load. Average power generation cost using diesel generators at the current delivered fuel price, including all applicable taxes and current exchange rates, is $0.24 kWh.

Following completion of the Centrais Elétricas do Pará / Power Plants of Pará (CELPA) power supply, assumed for the FS schedule and cash flow to be 18 months after project initiation, power will be supplied by the regional utility.

The schedule shown in Figure 1.12 below represents all the activities required to tap the 138 kv transmission line adjacent to highway BR-163, install a substation (5 MVA or 10 MVA depending on CELPA's business plan and area load estimate and growth potential), design and permit a transmission line, construct, and commission the power supply. Although the schedule shows activities being completed in 9-10 months, based on experience with regulators, local land owners, and area residents, Chapleau and MTB staff elected to base the project schedule and cash flow on an 18-month duration.

A decision still must be made in negotiations with CELPA regarding the transmission voltage between the BR-163 138 kv substation and the Coringa Gold Project 34.5 kv substation. There are potential risks and losses associated with the use of a 25 km 34.5 kv transmission line. However, the cost to construct a 69 kv line is higher. An engineering and cost trade-off study will need to be completed before coming to a final agreement with CELPA. Average power cost from CELPA using CELPA's current rate schedule, estimated demand consumption quantities, and current exchange rates, is $0.0825 kWh.

For easy access for construction and maintenance during operations, as well as anticipated easier right-of-way (ROW) negotiations, the powerline is expected to run parallel to the existing site access road, both offsite and onsite.




RDZR=Rural distribution network

**Figure 1.12: CELPA Power Supply Schedule**

#### *1.14.5 Water Supply*

Water supply for the Coringa Gold Project is comprised of four sources: the camp water well, the coffer dam pond (if needed), the tailings reclaim pool, and underground dewatering.

##### *1.14.5.1 Plantsite and Mine*

Raw water will be provided initially from the precipitation runoff captured by the coffer dam in the TSF prior to and during plant start-up. Thereafter, about six months into operations, raw water will be supplied from mine dewatering of the Serra underground operations. All raw water will be treated at a package water treatment plant located at the plantsite prior to its use.

During start-up, without recycle of the supernatant process water from the TSF, the plant will require 773 $m^3$/d of make-up water. A temporary coffer dam pond will be required. The coffer dam must be situated far enough upstream of the TSF workings to accommodate Phase 1 of the tailings storage and ponding (Figure 1.13). The location of the coffer dam pond utilizes the natural topography to minimize the embankment construction volume.

At the end of its service life, the pond embankment will be abandoned and ultimately buried under tailings during normal operations.

Based on sampling performed on camp water well A-COR-14, it is anticipated that mine dewatering water will be of sufficiently good quality to meet all required plant needs.

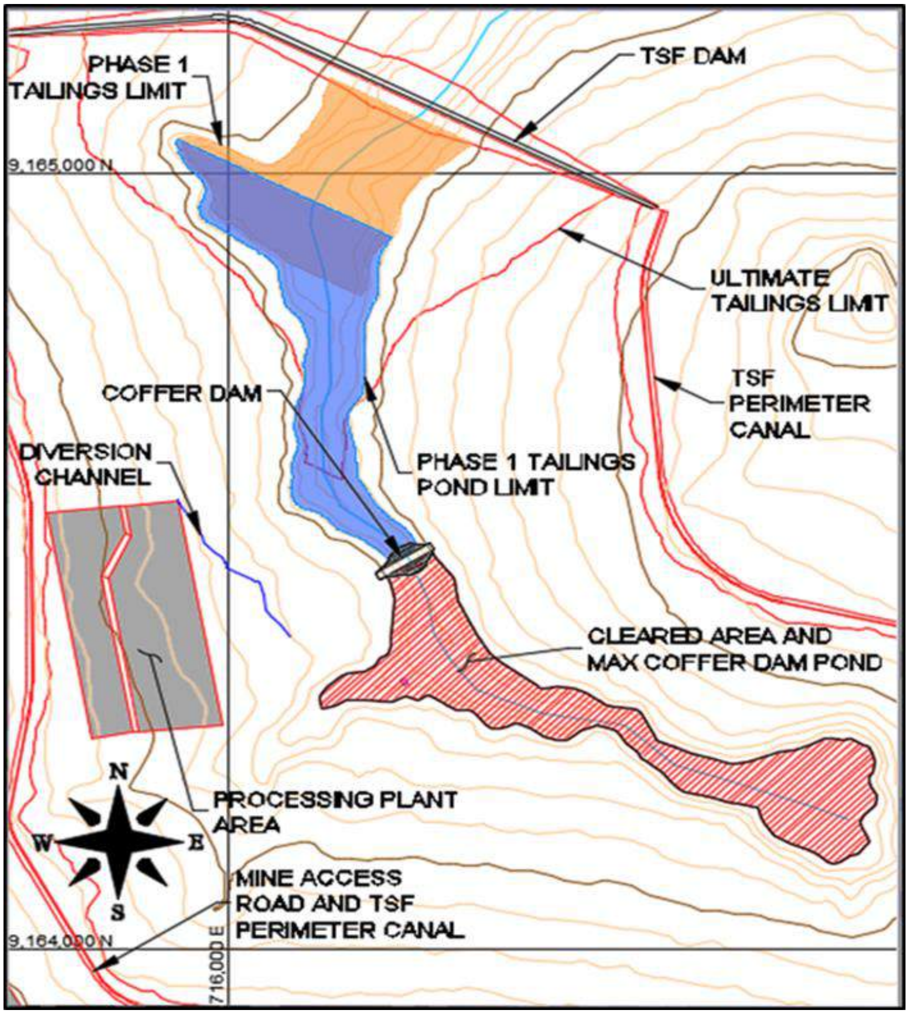



**Figure 1.13: Coffer Dam Pond Location**

### *1.14.5.2 Camp Water Supply*

A-COR-14, a vertical well, was drilled to intercept a water bearing fracture zone. A PVC well case was installed, a submersible pump was positioned at 35 m below ground surface, and a single well aquifer test was performed. Drawdown data was analyzed using the confined Theis solution (Todd, 1980). Pumping data for A-COR14 was analyzed using AQTESOLV (Duffield, 2007) software. For the 48-hour pumping test the well transmissivity was estimated to be 0.11 m3/s, suggesting a sustainable pumping rate of approximately 1.0 L/s.

It is important to note that fracture-supplied groundwater wells are subject to unexpected decreases in yield due to the exhaustion of storage or interference with mine dewatering.

### *1.14.6 Camp Infrastructure*

#### *1.14.6.1 Camp*

The existing Coringa exploration camp was expanded to accommodate construction and operation needs. New facilities constructed include accommodations, offices, kitchen and cafeteria, maintenance shop, warehouse, and recreational areas. 68 new accommodation units are available for 212 employees. A female accommodation unit can accommodate 18 employees, for a total of 230 employees.

During the construction period, the capacity will be increased to 270 employees, through construction of a new accommodation unit. A fully-equipped kitchen and cafeteria with 120-seat capacity is available to provide meals prepared by Chapleau's catering staff. A water well supplies up to 80 $m^3$/d of potable water. A 500 KVA diesel generator, with a 340 KVA spare generator, provides power to operate the camp. A fully-equipped clinic and a health team with a doctor and nurse technicians provides medical support for sickness and injuries onsite. A four-wheel drive ambulance is available to transfer personnel to the municipality of Novo Progresso in case of more severe injuries.

Additional details are available in Section 18 of this technical report.

#### *1.14.6.2 Communications*

As part of the initial capital, a digital radio system is planned to be installed onsite to increase safety and productivity through fast and effective communication. The system will include the installation of repeater towers for surface and underground communication. Surface towers will cover the entire operational area, with a signal reaching Anfield's operational base at the Municipality of Novo Progresso. The signal also covers the access road between the camp and the operational base, aiming to ensure safety communication, since there is no other type of communication available in 115 km of the road.

Communication onsite also includes a 5 MB dedicated internet service, which provides Wi-Fi capability for the operational camp area. Four portable satellite phones are available for emergency situations, when internet or radio signals are unavailable.

The underground communication system will use a network of leaky feeder cables and amplifiers connected to a base station, which will encode the radio frequencies and transmit information to both underground and surface operations. Continuous extension of the underground communication network is considered in the sustaining capital with 1,200 m of annual ramp development necessitating annual extension of the leaky feeder system.

#### *1.14.6.3 Ancillary Facilities*

Ancillary facilities will be constructed to support the mine and process activities at the Coringa Gold Project. These facilities include: reagent storage; liquefied petroleum gas storage (LPG); fuel storage; physical laboratory; chemical laboratory; warehouse; maintenance shop; water treatment plant; sewage treatment plant; truck scale, and; cafeteria.

Fuel storage will be provided for 150 $m^3$ of diesel, which provides a seven-day reserve supply in case of logistics delays caused by heavy rain, road blockages, labor disputes, etc. The facility will consist of a steel tank on a reinforced concrete slab, with containment walls to contain leakage, or, potentially the total contents of a ruptured tank.

A small cafeteria will be erected at the plantsite to preclude lost time moving personnel back to the main cafeteria at the camp. On-shift process operations, maintenance, health, safety and environmental, and logistics staff will consume hot meals prepared at the main kitchen/cafeteria in the camp and transported to this satellite cafeteria.

## 1.15 Environmental

The environmental and social aspects of the Coringa Gold Project and associated permitting considerations are summarized in the following paragraphs and elaborated in greater detail in Section 20.

### *1.15.1 Environmental Aspects*

The Coringa Gold Project is located between lands impacted by decades of government-promoted agriculture and forest areas reserved as an indigenous buffer. Forested areas have also been previously impacted by illegal logging and uncontrolled artisanal/small scale, garimpeiro, mining. For years, Chapleau has controlled the surface area required for the construction and operation of the Coringa Gold Project and no garimpeiro mining, logging, or agriculture is permitted.

The Coringa Gold Project has been designed with a minimal environmental and social footprint. Environmental and social impact prevention, minimization, and mitigation measures are currently being identified through Brazilian environmental impact study (EIS) processes. The EIS is also supported by baseline water quality, air quality, and flora and fauna studies as well as targeted geochemical investigations to assess the potential for Acid Rock Drainage (ARD) and other potential impacts to water quality. The impact prevention, minimization, and mitigation measures identified by the EIS will be implemented in compliance with governing regulations over the life of the mine, within the context of an integrated management system based on internationally recognized standards and that is focused on continual improvement and the minimization of environmental and social risks and impacts. The latter are generally minimal, but include direct and indirect environmental impacts from mine construction, operation, decommissioning, and closure, as well as the potential for garimpeiro mining influx and potential legal uncertainties involving local stakeholders. The project is separated from a Kayapo indigenous land reserve by a 10-km forested buffer zone and is over 30 km from the nearest Kayapo village; unauthorized travel or interaction by the Anfield workforce will be strictly prohibited, and social risks involving indigenous issues are considered minimal.

Brazilian regulations permit limited (trial mining) processing of up to 50,000 t/y in compliance with a Utilization Guide (Guia) and Operating License for Mining Exploration (LOPM). Chapleau exercised this trial mining option and obtained approval of its LOPM by SEMAS. Chapleau was also awarded accompanying permits for fauna capture and relocation and vegetation suppression. The Company also has authorization to continue exploration activities.

The SEMAS permits include a number of specific conditions for the conservation and protection of fauna and flora that are currently being integrated into the Coringa Gold Project planning. In addition, under the trial mining permits, Anfield is required to comply with various additional regulatory compliance and permitting requirements addressing a wide range of operational needs. These include fuel storage; non-hazardous and hazardous waste accumulation, storage, and disposal; transportation, storage, and safe use of explosives and mineral processing reagents; surface water drainage; archaeological resource assessment; worker health and safety programs; and other needs. Anfield is also required to submit regular reports on operational, environmental, occupational health and safety, and social performance

In order to operate at production capacity, Chapleau will have to complete a three-part environmental permitting process consisting of a Prior License (LP: Licenca Previa), which confirms the location of the proposed mining operation; an Installation License (LI: Licenca de Instalacao) which allows the construction of the mine subject to the conditions of the LP; and the final Operations License (LO: Licenca de Operacao). SEMAS conducts the approval process with input from other regulatory bodies at the national, state, and municipal levels. Additional lower-tier permitting processes involving one or more of federal, state, and municipal authorities will apply to vegetation suppression/clearance and other permits; the usage of surface and groundwater; design and operation of the TSF; transportation, storage, and handling of fuel, explosives, and reagents; waste disposal; power transmission; airstrip design and operation; and other aspects of mine design and operation. Environmental permits are typically renewed every one to five years, with the actual term of the permit and requirements for resubmittal included as conditions from the approving agency.

A comprehensive mine reclamation and closure plan will be prepared and periodically updated to maintain currency with changes in mine infrastructure or operations, changes in regulation, and changing external stakeholder considerations. The plan will address progressive, potential interim, and final closure actions, including:

- actions to restore the site to approximate baseline environmental conditions;
- actions to minimize the attractiveness of the closed site for illegal mining;
- actions to eliminate chemicals and any toxic residues from the site and prevent future impacts to the environment and public health and safety;
- actions to support potentially beneficial uses of land (and, potentially, elements of mine infrastructure) as may be negotiated with the Coringa Gold Project stakeholders;
- interim care and maintenance actions that may be taken in response to any temporary cessation of mining operations; and
- post-closure inspection and monitoring actions leading to final closure.

#### *1.15.2 Social Aspects*

The Coringa Gold Project is located in the municipality of Altamira in western Pará, near its border with Mato Grosso, and just within Altamira’s southwestern border with the Novo Progresso municipality. The capital of Altamira and most of the population are located far to the northeast of the district, approximately 830 km from Novo Progresso and over 900 km from the Coringa Gold Project by road. Novo Progresso is the capital of the municipality of the same name, and is located about 80 km north of the Coringa Gold Project on the BR-163 national highway. The town has a small airstrip, and will serve as a transit point for workers and contractors, as needed. Anfield will also maintain a small administrative office and core storage facility in Novo Progresso.

In the late 1980s this region was part of an aggressive governmental program to open up lands in the Amazon basin for homesteading and settlement. Many of the earliest settlers first came seeking gold, then high-value timber, and lastly to pursue ranching and small-scale agriculture. At present, large industrial agriculture operations have expanded into southwestern Pará and the natural resources of the region are fueling a growing economy and continued expansion and occupation. Given the rapid pace of development and relatively weak governance, the process of land occupation has not been well regulated and most land rights have not been properly or completely formalized. In the area of Novo Progresso, settlers typically do not have actual legal title to lands they have held for many years.

The nearest settlement to the Coringa Gold Project is Terra Nossa, a small rural settlement located alongside several kilometers of the access road that connects the Coringa Gold Project and BR-163 that was initially established and promoted by the INCRA. Land possession at the settlement is controlled by INCRA, although historically INCRA has not exercised active management responsibilities. The settlement has faced legal challenges in its registration process and has had to work with neighboring ranchers to address boundary disputes resulting from overlapping possessions. The legality of the settlement is not fully resolved and legal disputes over land in the area can be expected to continue. Terra Nossa faces significant limitations in terms of infrastructure. There is a lack of agricultural and potable water in the dry season. There is no rural electrification and the secondary roads are typically in poor condition during the rainy season. There is a public school maintained at Terra Nossa by the municipality of Novo Progresso that currently has about 90 students.

Chapleau has an active community relations program with a strong focus on Terra Nossa. Chapleau has assisted the community by repairing and periodically maintaining the main access road from BR-163 and will assist in the electrification process when the mine is connected to the national grid. The majority of residents appear to believe that the Coringa Gold Project may be able to assist with local development, and some residents may be interested in the Coringa Gold Project employment. Chapleau's community relations plan is designed to facilitate the identification and management of all social issues and risks linked to the Coringa Gold Project, and addresses a wide range of social considerations, including communication and consultation, local employment and contracting, workforce induction training (for social context), influx management, social investment, indigenous peoples, and management of complaints.

## 1.16 Detailed Capital Costs

The capital cost estimate has been prepared for the FS, assuming the processing of a nominal 168,000 t/y of predominantly gold and silver bearing ore.

The total estimated initial cost to design, procure, construct, and commission the facilities described in this technical report is $28.8 M. Table 1.11 summarizes the initial capital costs by major area.

## Table 1.11: Summary of Initial Capital Costs

| Description | Cost | Total |
|---|---|---|
| **Mine** | | |
| Maintenance Shop, Warehouse, & Tools | 55,000 | |
| Explosive Storage | 68,750 | |
| **Plant** | | |
| Concrete | 721,586 | |
| **Equipment** | | |
| Mechanical & Electrical Equipment | 751,894 | |
| Lab Equipment | 74,750 | |
| Plant Mobile Equipment | 93,750 | |
| Generators | 624,678 | |
| Mechanical Materials | 1,096,594 | |
| Electrical Equipment & Materials | 869,285 | |
| Refurbishment | 119,677 | |
| Construction Labor | 1,113,043 | |
| Ancillary Facilities | 427,521 | |
| **Site and Offsite Development** | | |
| Vegetation Suppression | 870,251 | |
| Site Preparation | 426,446 | |
| **Tailings Storage Facility** | 1,126,224 | |
| **CELPA Power Supply** | 2,667,795 | |
| **Total Contracted Directs** | | **11,107,244** |
| Catering | 436,681 | |
| Services | 122,296 | |
| Accommodations | 98,406 | |
| Freight | 203,281 | |
| Crane & Flatbed | 143,300 | |
| **Total Construction Indirects** | | **1,003,964** |
| Miscellaneous Consultants | 145,302 | |
| Initial Fills | 517,847 | |
| Plant Equipment Spare Parts | 46,875 | |
| Geotechnical QAQC | 61,292 | |
| Geotechnical Detailed Design | 67,849 | |
| Geotechnical Field Investigations | 20,313 | |
| Process/Infrastructure Design & Drawings | 373,852 | |
| **Total Contracted Indirects** | | **1,233,330** |
| Portal Construction | 131,250 | |
| Capitalized Mine Op Cost | 214,923 | |
| Capital Development | 2,938,341 | |
| Mining Consultants | 189,681 | |
| Purchased Mine Equipment | 1,883,672 | |
| Camp | 284,448 | |
| Training & Materials | 31,531 | |
| Communication/IT Equipment | 233,433 | |
| Security & Safety Equipment | 120,203 | |
| Environmental | 27,638 | |
| **Total Owner Direct Cost** | | **6,055,120** |
| Preproduction Employment & Training | 1,318,103 | |
| Admin Consultants | 583,142 | |
| Employee Benefits & Assistance | 1,214,788 | |
| Travel - In-Country | 419,014 | |
| Project Management | 692,683 | |
| Mining Support | 7,803 | |
| Camp Catering | 340,655 | |
| ROW & Land Rental Fees | 46,875 | |
| Legal, Permits, & Fees | 348,008 | |
| IT/Software Expenses & Maintenance | 170,628 | |
| Utilities & Maintenance | 30,413 | |
| Insurance | 152,263 | |
| Environmental | 360,652 | |
| Security Services | 578,656 | |
| Occupational Health & Services | 90,125 | |
| Community Development/Relations | 245,863 | |
| Offsite Facility Rentals | 28,750 | |
| Corporate Travel and Services | 103,438 | |
| Office/Janitorial Supplies & Service | 24,221 | |
| Transportation & Fuel | 139,587 | |
| Vehicle Maintenance | 170,288 | |
| **Total Owner Indirect Cost** | | **7,065,955** |
| Subtotal Project Cost | | 26,465,613 |
| Contingency | | 1,984,921 |
| Invoices Prior to July 1, 2017 - Not Paid | | 314,271 |
| **Total Initial Capital Costs (USD)** | | **$ 28,764,805** |

#### *1.16.1 Exclusions and Clarifications*

The capital cost estimate is expressed in second quarter 2017 United States dollars (USD) and the following items are not included in the capital cost estimate:

- Sunk costs that were incurred prior to completion of the FS, which is the basis for this technical report;
- All federal and state income taxes (excluding sales/use taxes), which are included in the financial analysis;
- Reclamation costs, which are included in the financial analysis;
- Working capital and sustaining capital, which are included in the financial analysis;
- Interest and financing costs;
- Escalation beyond second quarter 2017; and;
- Risk due to political upheaval, government policy changes, labor disputes, permitting delays, weather delays, or any other force majeure occurrences.

**Currency conversion has been made at a rate of 3.2 Brazilian Reais (R$) per 1 USD($).**

#### *1.16.2 Contingency*

A contingency of $2 M (7.5%) has been included in the initial capital cost. This contingency is based on the level of definition that was used to prepare the capital cost estimate and the QP's confidence in the quality of the information and estimating methodologies used.

#### *1.16.3 Estimate Preparation*

The QPs responsible for this section have reviewed and approved the capital cost estimates for inclusion in this technical report.

#### *1.16.4 Construction Schedule*

The Coringa Gold Project construction schedule reflects actions required to accomplish detailed engineering, site development, construction, commissioning, and start-up. Main milestones of the construction period include: procurement of major equipment and services; contractors' mobilization; field investigations; detailed engineering; licensing and permitting; site and offsite development; construction of process plant, coffer, and tailings dams; mine portal and ramp development, and; plant commissioning and start-up. The schedule predicts construction completion and metallurgical commissioning in 10 months. This schedule forms the basis for the initial capital cost estimate.  A significant amount of process and mining equipment is already at site, helping to expedite the mine development and plant construction completion.

##### *1.16.4.1 Critical Path*

The completion of the TSF is key for the entire mine start-up. The activities required to accomplish its construction represent the critical path of the project. Its construction represents the longest path for completion due to the time required for licensing and permitting.

The critical path starts in procurement, which is constrained by the approval of the project. The package of services to be procured includes: vegetation suppression; geotechnical investigation, identification, and evaluation of borrow material areas; detailed engineering design; licensing consultants; acquisition of construction aggregates; establishment of the onsite QA/QC laboratory, and; dam construction.

#### *1.16.4.2 Construction Manpower*

Construction manpower peaks at 250 workers, including 168 contractors and 82 Chapleau staff in month 4 of the construction schedule. Once construction starts, the number of contractors' workers increases rapidly to 168 then decreases to 11 in the last month of construction. Chapleau manpower consists mainly of mine staff, as well as electrical and mechanical maintenance staff who will work on the plant refurbishment and concrete construction.

## 1.17 Operating Costs

Operating costs have been estimated according to the main project areas identified as mining, processing, general and administration and site costs (G&A) (Table 1.12).

**Table 1.12: LOM Average Operating Cost Summary (USD)**

| Area Description | Total Life of Mine Cost | Average LOM Unit Cost $/t ore |
|---|---|---|
| Mining | 32,035,509 | 41.68 |
| Processing | 25,756,467 | 33.51 |
| G&A and Site Costs | 25,471,096 | 33.14 |
| **Total LOM Operating Cost** | **$ 83,263,072** | **$ 108.33** |

Average life of mine (LOM) costs per tonne of ore were calculated using 768,577 tons LOM throughput. This same factor was used in calculating unit costs for each area of operation.

Major cost inputs utilized were:

- Fuel - $2.76/L delivered to the Coringa Gold Project, including all taxes
- Energy
  - Diesel Generators* - $0.24/kWh based on the energy consumptions for the detailed electrical load demand list, using above fuel cost and generator manufacturer's calculated fuel consumption.
  - CELPA Utility Power* - $0.0825/kWh applied to the electrical load demand list, calculated consumption, and application of CELPA rates from its current rate schedule and historical experience.
- Labor – Total labor cost by job classification, including burden, benefits, and subsidies, based on actual current payroll details.

*Diesel generators have been incorporated for the preproduction period and for the first eight months of production operations. Thereafter the CELPA power supply has been assumed to be complete and utility power in use.

Additional details regarding mining and processing operating costs may be found in Sections 21.2.2 and 21.2.3, respectively.

#### *1.17.1 General and Administration and Site Costs*

G&A costs are fixed rather than variable; that is they are time-dependent rather than production throughput dependent.

G&A costs are those costs which do not specifically apply to mining and processing functions, services, or materials. Specifically, finance and administration labor including burden, benefits, and subsidies, is considered to be a typical G&A cost component.

Services and materials which apply to the entire company, as opposed to mining or processing specifically, are also included as part of G&A.

Site costs are costs for project or site-specific elements which may not be necessary on other projects. Examples could be associated with remote location factors, such as camp accommodations, higher personnel travel costs, and site security requirements. Other site-specific or project-specific costs could be the result of extensive environmental and permitting requirements.

Most of the G&A and site cost items in Table 21.7 have been estimated using actual costs for identical or similar services or materials purchased since Anfield acquired the Coringa Gold Project in May 2016 or before at Reinarda Mineracao Ltda.'s Andorinhas property (Andorinhas) (a similar mining and processing operation).

#### *1.17.2 Exclusions and Clarifications*

Operating costs are expressed in second quarter 2017 USD. **The exchange rate from Reais to USD is 3.2 Reais (R$) to 1.0 USD($).**

The following items are not included in the operating cost estimate:

- Contingency allowance;
- Escalation beyond second quarter 2017, and;
- Transportation, insurance, and refining costs for doré are included in the financial analysis.

## 1.18 Economic Analysis

Economic model inputs are shown below in Table 1.13.

**Table 1.13: Economic Model Inputs**

| Description | Values |
|---|---|
| Construction Period | 10 months |
| Preproduction Period | 10 months |
| Life of Mine (LOM) after Preproduction | 4.8 years |
| LOM Ore (tonnes) | 768,577 |
| LOM Gold Production (troy ozs) | 152,908 |
| LOM Silver Production (troy oz) | 198,075 |
| **LOM Grade** | |
| Gold (grams per tonne) | 6.5 |
| Silver (grams per tonne) | 13.1 |
| Avg Annual Gold Production (troy oz) | 31,856 |
| Avg Annual Silver Production (troy oz) | 41,266 |
| **Market Price (USD/troy oz)** | |
| Gold | $1,250 |
| Silver | $18.00 |
| **Cost and Tax Criteria** | |
| Estimate Basis | 1-Jul-17 |
| Foreign Exchange Rate (R$/USD) | 3.2 |
| Inflation/Currency Fluctuation | None |
| Leverage | 100% Equity |
| Tax - Federal (IRPJ) | 25% |
| Tax - SUDAM Incentive (IRPJ Reduction beginning Year 2) | -18.75% |
| Tax - Federal (CSLL) | 9% |
| **Depreciation** | |
| Vehicles & Mobile Equipment (24 hr/day, 7 day/wk) | 40% |
| Production Equipment, Underground Development | UOP |
| Ancillary Facilities (Camp, Kitchen, Maintenance Shop) | 4% |
| **Royalties** | |
| Sandstorm | 2.50% |
| Brazil (Federal Government) | 1.0% |
| Land | 0.50% |
| **Transportation Charges** | |
| Dore Shipment Cost (per shipment, site to refinery) | $41,563 |
| **Payment Terms** | |
| Advance | 95% |
| Settlement | 8 days |

### 1.18.1 Production Summary

At the foundation of the economic model, data was drawn from the mine and plant production schedules, which were produced by MDA and MTB (under the QP's supervision), respectively, and are summarized below in Table 1.14.

**Table 1.14: Process Production Schedule**

| Year | Total Ore Mined | Total Ore Processed | Year End Stockpile | Gold Produced* | Silver Produced* |
|---|---|---|---|---|---|
| | *Tonnes* | *Tonnes* | *Tonnes* | *Troy Ozs* | *Troy Ozs* |
| **-1** | 4,918 | | 4,918 | | |
| **1** | 144,593 | 149,008 | 503 | 27,120 | 33,934 |
| **2** | 170,931 | 169,764 | 1,670 | 35,371 | 47,136 |
| **3** | 161,420 | 163,090 | - | 27,845 | 31,797 |
| **4** | 186,503 | 178,776 | 7,727 | 40,448 | 59,051 |
| **5** | 100,212 | 107,939 | - | 22,124 | 26,158 |
| **LOM** | **768,577** | **768,577** | | **152,908** | **198,075** |

*Note: After metallurgical recovery and refining loss.

For purposes of the economic model, the gold price of $1,250 oz was used, and $18 oz of silver was used.

### 1.18.2 Transportation

Transportation charges for collecting gold doré from the Coringa Gold Project plant, then flying the doré to a refinery in Sao Paulo, Brazil, were provided as a budgetary quotation by Brinks Global Services.

### 1.18.3 Treatment Charges, Refining Charges, and Penalties

The economic model's costs for treatment and refining charges and penalties were taken from a quotation received from Republic Metals Corporation of Miami, Florida and are considered to be typical for gold and silver refining. Treatment charges are quoted at $0.30 oz/Au, metal returns are 99.95% for gold and 99.0% for silver. Deleterious element penalties were provided in the quotation with the only element relevant to Coringa being Pb. Sample doré from Coringa contains 1.1% Pb, with no other deleterious elements exceeding Republic Metal's free upper limit.

### 1.18.4 Royalties

The Coringa Gold Project has a royalty agreement with Sandstorm providing Sandstorm with a 2.5% royalty on the NSR of recoverable minerals produced from the Coringa Gold Project. The agreement, dated May 11, 2012, was assigned from Magellan Minerals to Anfield in connection with Anfield's acquisition of Magellan Minerals.

In addition, the Federal Government of Brazil requires a 1% royalty on gold produced in Brazil. Proceeds of the 1% royalty are divided between local, state, and federal governments: 65% of the proceeds go to the municipality where the mineral is being exploited, 23% of the proceeds go to the state (Pará), and 12% of the proceeds go to Brazil's Federal Government (DNPM, Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis/Brazilian Institute of Environment and Renewable Natural Resources (IBAMA), Ministerio da Cultura e Tecnologia/ Ministry of Culture and Technology (MCT).

Under Brazilian mining law, in the case where the land is not owned by the miner, local land owners receive a royalty equal to one half of the Federal royalty. Therefore, the economic model includes a 0.5% royalty payable to local land owners in the Coringa Gold Project area. The 0.5% royalty was added to the 1% Federal royalty in the cash flow model.

These royalties are based upon proceeds paid by smelters less certain costs, including costs incurred to transport the concentrates to the smelters, or NSR, for mineralized material produced in the property area subject to the royalties.

#### *1.18.5 Foreign Exchange Rate*

For the purposes of the economic model, all capital, operating, and sustaining capital costs were evaluated based upon the currency used to pay the cost. As a result, all capital and operating expenses, and the vast majority of sustaining capital expenses, were evaluated in the source currency of R$, then converted to USD for the cash flow analysis. **The exchange rate from Reais to USD 3.2 Reais (R$) to 1.0 USD($).** It is based on the approximate rounded mid-point of 2017 trading values preceding the effective date of the report. The USD:R$ exchange rate closed at 3.31 on June 30, 2017 and has traded between 3.06 and 3.38 year-to-date.

### 1.19 Sustaining Capital Costs

Acquiring additional assets, increasing facility capacities, or replacing assets are considered sustaining capital expenses over the life of the project. Sustaining capital costs are estimated to total $28.7 M over the LOM and are summarized below in Table 1.15.

**Table 1.15: Sustaining Capital Cost Summary**

| Area Description | LOM Total | Y1 | Y2 | Y3 | Y4 | Y5 |
|---|---|---|---|---|---|---|
| Mine Development | 20,396,602 | 4,877,168 | 4,586,363 | 5,192,318 | 4,045,747 | 1,695,007 |
| Mine Equipment | 4,601,321 | 2,811,619 | 585,863 | 799,446 | 357,268 | 47,125 |
| Light /vehicle Replacement | 700,000 | 200,000 | 200,000 | 150,000 | 150,000 | |
| Underground Communication | 131,063 | 26,213 | 26,213 | 26,213 | 26,213 | 26,213 |
| Surface Ventilation | 62,500 | 31,250 | 15,625 | | 15,625 | |
| Infill Drilling | 1,157,529 | 144,900 | 174,117 | 194,655 | 194,655 | 449,201 |
| TSF Expansion | 1,616,756 | 965,664 | | 651,092 | | |
| Total Annual Sustaining Capital Cost | $28,665,770 | $9,056,813 | $5,588,180 | $7,013,724 | $4,789,508 | $2,217,545 |

### 1.20 Working Capital

Defined as the highest amount of funding needed during the initial operating period, working capital is used to cover expenses prior to the cumulative revenue exceeding the cumulative expenses, or the point at which the operation becomes self-sustaining in its cash flow.

The largest deficit of funds is expected to occur in week 9, in the amount of $1.5 M. This working capital investment was reflected in the cash flow model in year -1, with recovery at the end of mine life in year 5.

## 1.21 Base Case Analysis

This FS estimates payback to occur late in the second year of mine life, approximately 2.9 years after initial production.

The Coringa Gold Project is estimated to have an after-tax internal rate of return (IRR) of 30.1%. Assuming a discount rate of five percent over an estimated mine life of 4.8 years, the after-tax net profit value (NPV) is estimated to be approximately $30.5 M.

## 1.22 Sensitivity Analysis

Sensitivities for IRR and NPV in increments of negative and positive deviation from the base case for gold price, operating and capital cost, foreign exchange, and metallurgical recovery are detailed in Section 22.16 of this technical report.

## 1.23 Economic Model

The complete cash flow model is presented in Table 1.16.

# Table 1.16: Coringa Cash Flow Model

**Cash Flow - Indicated Resource**
**Anfield Gold**
**Coringa Project**
**Final Revised**
**August 28, 2017**

| | Item | Rate | Units | Total or Average | Pre-Production -1 | Production 1 | Production 2 | Production 3 | Production 4 | Production 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PRODUCTION SUMMARY** | | | | | | | | | |
| | Ore Mined | | t | 768,577 | 4,918 | 144,593 | 170,931 | 161,420 | 186,503 | 100,212 |
| | Ore Processed | | t | 768,577 | | 149,008 | 169,764 | 163,090 | 178,776 | 107,939 |
| | **GROSS INCOME** | | | | | | | | | |
| | **Market Price** | | | | | | | | | |
| 1 | Gold | $ 1,250 | /Toz | $ 1,250 | | $ 1,250 | $ 1,250 | $ 1,250 | $ 1,250 | $ 1,250 |
| | Silver | $ 18 | /Toz | $ 18 | | $ 18 | $ 18 | $ 18 | $ 18 | $ 18 |
| | **Contained Metals** | | | | | | | | | |
| | Gold | | | 160,328 | | 28,264 | 36,863 | 29,053 | 42,960 | 23,187 |
| | Silver | | | 323,487 | | 60,134 | 83,529 | 55,731 | 82,222 | 41,871 |
| | **Recovery** | | | | | | | | | |
| 1 | Gold | | | *95.37%* | | *96.00%* | *96.00%* | *95.89%* | *94.20%* | *95.46%* |
| | Silver | | | *61.23%* | | *57.00%* | *57.00%* | *57.63%* | *72.54%* | *63.10%* |
| | **Payable Metals** | | | | | | | | | |
| | Gold Recovered (After Refining Loss) | | Toz | 152,908 | | 27,120 | 35,371 | 27,845 | 40,448 | 22,124 |
| | Silver Recovered (After Refining Loss) | | Toz | 198,075 | | 33,934 | 47,136 | 31,797 | 59,051 | 26,158 |
| | **Metal Revenues** | | | | | | | | | |
| | Gold | | USD | $ 191,135,133 | | $ 32,925,320 | $ 44,213,608 | $ 34,806,687 | $ 50,560,507 | $ 28,629,011 |
| | Silver | | USD | $ 3,565,357 | | $ 610,804 | $ 848,442 | $ 572,346 | $ 1,062,919 | $ 470,845 |
| | **Gross Revenue** | | **USD** | **$ 194,700,490** | | **$ 33,536,124** | **$ 45,062,051** | **$ 35,379,033** | **$ 51,623,427** | **$ 29,099,856** |
| | **NSR** | | | | | | | | | |
| | Doré produced | 14,739 | kg | 14,739 | | 2,525 | 3,507 | 2,366 | 4,394 | 1,946 |
| | Doré Freight & Insurance- Brazil | $ 41,563 | /Shipment | $ (2,410,625) | | $ (623,438) | $ (498,750) | $ (498,750) | $ (498,750) | $ (290,938) |
| | Doré TC/RC | $ 0.30 | /Toz | $ (45,872) | | $ (8,136) | $ (10,611) | $ (8,354) | $ (12,135) | $ (6,637) |
| | Penalty Charge (Pb > 1%) | $ 100 | /t | $ (1,474) | | $ (253) | $ (351) | $ (237) | $ (439) | $ (195) |
| | Total Transportation, TC/RC | | | $ (2,457,971) | | $ (631,826) | $ (509,712) | $ (507,340) | $ (511,324) | $ (297,769) |
| | **NSR** | | | **$ 192,242,518** | | **$ 32,904,298** | **$ 44,552,339** | **$ 34,871,692** | **$ 51,112,103** | **$ 28,802,087** |
| | **ROYALTY** | | | | | | | | | |
| | Brazil Royalty on NSR | *1.5%* | Percent | $ (2,883,638) | | $ (493,564) | $ (668,285) | $ (523,075) | $ (766,682) | $ (432,031) |
| | Sandstorm Royalty on NSR | *2.5%* | Percent | $ (4,806,063) | | $ (822,607) | $ (1,113,808) | $ (871,792) | $ (1,277,803) | $ (720,052) |
| | **Gross Income from Mining** | | | **$ 184,552,818** | | **$ 31,588,126** | **$ 42,770,245** | **$ 33,476,825** | **$ 49,067,619** | **$ 27,650,003** |
| | **OPERATING MARGIN** | | | | | | | | | |
| | **Operating Cost** | | | | | | | | | |
| | **Unit Costs** | | | | | | | | | |
| | Mining | $ 41.68 | /t ore | $ (32,035,509) | | $ (6,232,053) | $ (7,019,834) | $ (6,545,993) | $ (7,587,978) | $ (4,649,652) |
| | Processing | $ 33.51 | /t ore | $ (25,756,467) | | $ (6,385,104) | $ (5,393,219) | $ (5,199,514) | $ (5,710,353) | $ (3,068,276) |
| | G&A | $ 33.14 | /t ore | $ (25,471,096) | | $ (5,623,759) | $ (5,610,843) | $ (5,610,843) | $ (5,610,843) | $ (3,014,808) |
| 1 | **Total Annual Operating Cost** | **$ 108.33** | **/t ore** | **$ (83,263,072)** | | **$ (18,240,916)** | **$ (18,023,897)** | **$ (17,356,350)** | **$ (18,909,174)** | **$ (10,732,736)** |
| | **Mine Closure, Reclamation & Severance** | | | **$ (1,625,313)** | | **$ -** | **$ -** | **$ -** | **$ -** | **$ (1,625,313)** |
| | **Net Profit** | | | **$ 99,664,433** | | **$ 13,347,210** | **$ 24,746,348** | **$ 16,120,474** | **$ 30,158,445** | **$ 15,291,955** |
| | **PRE-TAX INCOME** | | | **$ 99,664,433** | | **$ 13,347,210** | **$ 24,746,348** | **$ 16,120,474** | **$ 30,158,445** | **$ 15,291,955** |
| | Depreciation & Amortization | | | $ (62,925,236) | | $ (12,211,703) | $ (14,014,036) | $ (13,250,533) | $ (15,228,588) | $ (8,220,376) |
| | **Net Income Before Depletion and Taxes** | | | **$ 36,739,197** | | **$ 1,135,507** | **$ 10,732,313** | **$ 2,869,941** | **$ 14,929,857** | **$ 7,071,579** |
| | Depletion | | | $ (6,360,179) | | $ (1,272,036) | $ (1,272,036) | $ (1,272,036) | $ (1,272,036) | $ (1,272,036) |
| | **Net Income Before Taxes** | | | **$ 30,379,018** | | **$ (136,529)** | **$ 9,460,277** | **$ 1,597,905** | **$ 13,657,821** | **$ 5,799,543** |
| | Federal Income Taxes | | | $ (3,257,535) | | $ - | $ (1,009,885) | $ (170,576) | $ (1,457,972) | $ (619,101) |
| | **NET INCOME AFTER TAXES** | | | **$ 27,121,483** | | **$ (136,529)** | **$ 8,450,392** | **$ 1,427,329** | **$ 12,199,849** | **$ 5,180,442** |
| | Add-Back Depreciation & Amortization | | | $ 62,925,236 | | $ 12,211,703 | $ 14,014,036 | $ 13,250,533 | $ 15,228,588 | $ 8,220,376 |
| | Add-Back Depletion | | | $ 6,360,179 | | $ 1,272,036 | $ 1,272,036 | $ 1,272,036 | $ 1,272,036 | $ 1,272,036 |
| | **NET INCOME FROM OPERATIONS** | | | **$ 96,406,898** | | **$ 13,347,210** | **$ 23,736,464** | **$ 15,949,898** | **$ 28,700,473** | **$ 14,672,854** |
| | Spare Parts, Initial Fills | | | $ - | $ (500,637) | | | | | $ 500,637 |
| | Working Capital | | | $ - | $ (1,529,134) | | | | | $ 1,529,134 |
| 1 | **Initial Capital** | **(Includes $286,106 Non-Refundable ICMS)** | | **$ (28,264,164)** | **$ (28,264,164)** | | | | | |
| | Sustaining Capital | | | | | | | | | |
| | Mine Development | | | $ (20,396,602) | | $ (4,877,168) | $ (4,586,363) | $ (5,192,318) | $ (4,045,747) | $ (1,695,007) |
| | All Other Sustaining Capital | | | $ (8,269,168) | | $ (4,179,645) | $ (1,001,817) | $ (1,821,406) | $ (743,761) | $ (522,538) |
| 1 | **Total Sustaining Capital** | | | **$ (28,665,770)** | | **$ (9,056,813)** | **$ (5,588,180)** | **$ (7,013,724)** | **$ (4,789,508)** | **$ (2,217,545)** |
| | **ANNUAL AFTER-TAX CASH FLOW** | | | **$ 39,476,964** | **$ (30,293,935)** | **$ 4,290,397** | **$ 18,148,284** | **$ 8,936,173** | **$ 23,910,965** | **$ 14,485,080** |
| | **CUMULATIVE AFTER-TAX CASH FLOW** | | | | **$ (30,293,935)** | **$ (26,003,538)** | **$ (7,855,254)** | **$ 1,080,920** | **$ 24,991,884** | **$ 39,476,964** |
| | **PRESENT VALUE OF MID-YEAR CASH FLOW AT DISCOUNT = 5.0%** | | | **$ 30,457,749** | **$ (30,293,935)** | **$ 4,186,999** | **$ 16,867,535** | **$ 7,910,034** | **$ 20,157,402** | **$ 11,629,714** |
| | | | | | | | | | | |
| | **NET CASH COST/OZ** | | | **588** | | **722** | **550** | **671** | **504** | **529** |
| | **ALL IN SUSTAINING NET CASH COST/OZ** | | | **786** | | **1,056** | **708** | **923** | **623** | **703** |

| **After-tax** | |
|---|---|
| IRR | *30.1%* |
| $NPV_{(5\%)}$ | $ 30,457,749 |
| AISC/oz | $ 786 |
| Payback (years) | 2.9 |

| | |
|---|---|
| EBITDA | $ 99,664,433 |

## 1.24 Interpretations and Conclusions

Based on the evaluation of the data available from the FS, the QPs have drawn the following conclusions:

- At the effective date of this technical report, Anfield holds a 100% interest in the Coringa Gold Project property.
- The deposits at the Coringa Gold Project are composed of several semi-continuous, steeply dipping gold-bearing veins and shear zones hosted in granite and rhyolite. The mineralized vein system extends for over 7,000 m in a northwesterly direction, has variable widths ranging from zero to over 14 m, and has been defined to depths of 250 m.
- Most veins remain open to further expansion through drilling both along strike and at depth.
- Drilling to date has outlined an Indicated mineral resource estimate (at a cut-off grade of 2 g/t Au) of 726 ktonnes at 8.4 g/t Au and 17 g/t Ag which contains 195 koz of gold and 396 koz of silver.
- Drilling to date has also outlined an Inferred mineral resource estimate (at a cut-off grade of 2 g/t Au) of 1.3 Mtonnes at 4.3 g/t Au and 5.1 g/t Ag which contains 181 koz of gold and 215 koz of silver.
- The narrow but high-grade veins at the Coringa Gold Project are considered to be amenable to underground extraction methods.
- There are no known factors related to metallurgical, environmental, permitting, legal, title, taxation, socio-economic, marketing, or political issues which could materially affect the mineral resource estimates.
- In the QPs' opinion, the analytical procedures were appropriate and consistent with common industry practice. The laboratories are recognized, accredited commercial assayers. There is no relationship between Anfield and ALS Minerals (ALS) or CDN Resource Laboratories Ltd. (CDN). The sampling has been carried out by trained technical staff under the supervision of a QP and in a manner that meets or exceeds common industry standards. Samples are properly identified and transported in a secure manner from site to the lab.
- There are no quality-control issues with the Magellan Minerals (2007–2013) and Anfield (2016–2017) drill programs.
- Observation of the drilling and core handling procedures during the site visit inspection and validation of the collected data indicate that the drill data are adequate for interpretation.
- In the QPs' opinion, the database management, validation, and assay QA/QC protocols are consistent with common industry practices. The quality of the database supports the estimation of Indicated resources.

- Results from the Plenge test program have been used to project the metallurgical performance of materials planned for mining and processing at the Coringa Gold Project. Results from the earlier RDi and TDP test programs support results from the Plenge program and altogether are useful to support the stated overall representativeness of the samples to the various deposits.

  The projected gold and silver recoveries for the Coringa Gold Project deposits are presented below:

  - Serra and Galena deposits – 96% for gold and 57% for silver
  - Meio deposit – 94% for gold and 74% for silver
- The total seepage from the TSF at the end of mine life is on the order of 20-60 $m^3$/d of additional groundwater flow depending on the selected conductivity for the prepared foundation of the TSF.
- The water balance shows that the Coringa Gold Project mine has sufficient water to operate. The plant under prolonged extreme drought conditions. The project has a net-discharge requirement each wet season from the TSF. In extreme wet conditions, the mine has higher discharge, but within accepted regulatory limits.
- The TSF has elevated sulfate, ammonia, and nitrate concentrations (with respect to applicable Brazilian water quality standards). These elevated concentrations appear to be manageable through active dilution strategies in conjunction with controls on the over-addition of SMBS.
- Based on the results obtained, the new configuration for the Meio WSF exceeds the minimum established Factor of Safety (FOS). It is recommended that additional space between the toe of the WSF and the crest of the sediment pond be incorporated during detailed design if a reduction in WSF volume is acceptable.
- The stability of the Serra sediment pond can be improved by allowing for a larger offset between the WSF toe and sediment pond crest, however further modification of the pond orientation results in cut/fill boundaries outside of the required permit area.
- From a mine geotechnical standpoint, the underground geotechnical conditions and data at the Meio and Serra veins was scrutinized and used by Quanta to develop portal, decline, ramp, and underground workings recommendations. Rock core data at Galena was also reviewed by Quanta and found to be similar to that encountered at Serra and this is the basis for assuming that mining methods at Serra and Galena will be similar. Additional geotechnical investigation and design is required for the Valdette, Mãe de Leite, Come Quieto, and Demetrio veins while additional geotechnical design is required at Galena to confirm the mine designs at these veins.

#### *1.24.1 Risks*

- Some upper levels might be mined-out. It is unknown how deep surface mining has occurred, however, a 20-m surface sill pillar was left in the reserve estimation. Mining might have occurred for more than 20 m from the surface in some areas.
- Although initially the stockpile will be from sill preparation, the current plan does not allow much time for underground stope definition or infill drilling.
- Sill preparation (development in mineralization) in veins 0.8 m wide will result in over-dilution.
- Possible islands of waste in the mineral might result in “ore losses”.
- Proper mine ventilation demands high consumption of electrical power. The more active mining areas, the higher the demand for fresh air.
- Refurbished equipment at early stages of mine development could be risky. A good supply of spare parts should be readily available.
- The TSF design has used conservative methods for each of the critical components, with particular attention to the embankment design (utilizing down-stream construction methods) and the spillway (sized to safely pass the 1,000-yr event). Nevertheless, all dams pose risks and should be managed and closed accordingly. The principal risk for this facility is improper management of surface waters and poor maintenance of the emergency spillway system. Operating and monitoring plans should be developed and implemented to reduce the likelihood of these occurring.
- Brazilian political change, fluctuations in the national, state, and local economies and regulations and social unrest.
- Currency exchange fluctuations.
- Fluctuations in the prices for gold and silver, as well as other minerals.
- Anfield’s development of the Coringa Gold Project, including permitting delays, land access, and social and political pressure from local stakeholders.
- Risks relating to being adversely affected by the regulatory environment, including increased regulatory burdens and changes of laws.

#### *1.24.2 Opportunities*

- There is a potential for increasing the estimated mineral reserves with infill drilling as well as exploration drilling from underground and surface.
- As the primary development progresses, more active areas for mining will be available and daily mining rates could be increased.
- Higher grades than reported in the FS could be mined at lower tonnages using split blasting techniques.
- While the mineralized trend of veins is known to extend over a minimum 7 km strike length (Figure 7.2), only in few places has it been drilled sufficiently to identify inferred or higher mineral resources (Serra, Meio, Galena, Mãe de Leite, Come

Quieto, and Valdette). Large segments of veins remain untested or partially tested, some with significant mineralized vein intersections that remain open to offset drilling. These zones could yield additional mineralization for the project through discovery or enhancement of currently identified inferred- to indicated-resources. Highest priority targets for resource expansion include Come Quieto, Mãe de Leite, and Galena, all of which host open Inferred mineral resources and in the case of Galena, Indicted mineral resources. Other zones such as Demetrio, Valdette, and Mato Vehlo have yielded significant mineral intersections, but have not been drilled in sufficient density for inclusion as inferred resource. Enhancement of mineral resources at the Coringa Gold Project has a high probability with additional drilling.

- The project is fully staffed with capable management, engineers and geologists and supporting personnel which will minimize training.
- The project is located in an area with existing and active mining operations with similar characteristics to the mining techniques proposed in this study.
- There is good potential for marketing gravity concentrate IL residues as a by-product though it has not yet been evaluated. The IL residues may carry enough un-leachable gold and silver, plus lead (30%) due to the mineralogy, that it might be possible to market this material and improve project economics.
- Flotation of a concentrate was performed on a sample of detoxified tails to determine the potential for recovering and marketing a by-product. A bulk lead/zinc concentrate was produced that weighed 1.5% of the feed weight and assayed 401 gpt silver, 1.7 gpt gold, 31% lead and 31% zinc. The metal recoveries, based on the original head grade prior to leaching, were 32% for silver, 0.4% for gold, 72% for lead, and 88% for zinc.
- This TSF location is suitable for additional tailings storage, up to at least 2.5 Mt, should the reserves increase.

The following opportunities for reduced cost, reduced risk, or improved operations should be investigated in the next stage of engineering, or during plant operations.

- If 0.9 Mt of tailings storage is not required, the size of the dam can be reduced. This decision can be made any time before completion of the Phase 3 dam raise.
- The impoundment storage capacity was estimated using constant average tailings density. However, deeper tailings should be denser and this may allow some additional capacity. Further, the actual tailings density achieved in the impoundment should be verified during operations and the size of the final raise of the dam adjusted accordingly.
- Optimization of the beach slopes may be possible through close management of spigots, through using cyclones to separate sand from fines, or building small internal berms. These can be field tested during operations of the first phases of the TSF.

## 1.25 Recommendations

### *1.25.1 Overall Recommendation*

Based on the results of the FS, the QPs' overall recommendation is:

- The Coringa Gold Project should be advanced to construction.

### *1.25.2 Recommendations from Individual QPs*

#### *1.25.2.1 Exploration/Resource Development*

- Undertake additional drilling to enhance mineral resources.

#### *1.25.2.2 Mining*

- Detailed surveys around the surface mined areas should be done to determine if the locations should be backfilled to allow mining below the surface crown pillar.
- As more data is available, the resource block models should be updated and refined. Additional underground infill drilling might lend further confidence to the block models and add additional reserves to current mine plans.

#### *1.25.2.3 Processing*

- The marketing potential for a bulk lead/zinc concentrate as a silver-lead concentrate has not been investigated. Additional testing is recommended to further define this concept.

#### *1.25.2.4 Geotechnical*

- Recommendations include collection of additional field data and an optimization of the sedimentation basins. Additional geotechnical stability analysis on the pond embankments is also recommended.
- It is understood that waste generation and construction material borrow is expected to be a dynamic process. As a result, it is recommended that the Serra and Meio WSF layouts be revised after a construction material schedule has been developed to optimize the configuration of the WSF and ponds. Once this schedule is available, the stability should be confirmed. Due to stability concerns and steep ground, it may be necessary to consume a greater portion of the Serra and Meio waste.
- Although Quanta expects that the geotechnical conditions throughout the Coringa property are similar to those verified at the Meio and Serra Veins, additional vein-specific underground geotechnical data and design is required at the Valdette, Mãe de Leite, Come Quieto and Demetrio veins.
- The geotechnical conditions at Galena appear to be similar to those at Serra, however, additional underground geotechnical design is required prior to mine construction at Galena.

#### 1.25.2.5 Geochemistry

- Additional evaluation is required to confirm existing predictions that dilution and mixing are sufficient to mitigate the potential water quality impacts of excess water discharge from the TSF. Transport and fate geochemical modeling is required to determine the impact of the nitrification of ammonia, and the treatment potential of downstream wetlands to consume nitrogen compounds and reduce sulfate concentrations through chemical reactions.
- Additional evaluation of the cyanide destruction method is required to ensure effective destruction while minimizing sulfate production in the supernatant.
- Additional geochemical characterization is required on the tailings. GRE recommends an additional supernatant sample, static geochemical testing sample, and a long-duration kinetic testing program for one representative sample taken from future plant operations, or future metallurgical testing should it occur.

***Cautionary Note Regarding Forward-looking Information and Statements***

Information and statements contained in this technical report that are not historical facts are “forward-looking information” or “forward-looking statements” within the meaning of Canadian securities legislation and the U.S. Private Securities Litigation Reform Act of 1995 (hereinafter collectively referred to as “forward-looking statements”) that involve risks and uncertainties. Examples of forward-looking statements in this technical report include information and statements with respect to: Anfield’s plans and expectations for the Coringa Gold Project, estimates of mineral resources; estimates of mineral reserves; estimates of metal prices; timing for completion and the anticipated costs of construction of the mine at the Coringa Gold Project; LOM of the Coringa Gold Project; estimates of timing to obtain necessary permits and licenses for operations at the Coringa Gold Project; the IRR of the Coringa Gold Project; the annual production of the Coringa Gold Project; NPV of the Coringa Gold Project; plans to continue the exploration drilling program, and possible related discoveries or extensions of new mineralization or increases or upgrades to reported mineral resources estimates; the metallurgical testing program in connection with the Coringa Gold Project and plans to conduct further comprehensive engineering, and metallurgical studies; anticipated environmental liabilities; and budgets for recommended work programs.

In certain cases, forward-looking statements can be identified by the use of words such as "budget", or "estimates", or variations of such words and phrases or state that certain actions, events or results "may", "would", or "will" occur. These forward-looking statements are based, in part, on assumptions and factors that may change, thus causing actual results or achievements to differ materially from those expressed or implied by the forward-looking statements. Such factors and assumptions include, but are not limited to, assumptions concerning copper, base metal and precious metal prices; cut-off grades; accuracy of mineral resource estimates, mineral reserve estimates and mineral resource and mineral reserve modelling; reliability of sampling and assay data; representativeness of mineralization; accuracy of metallurgical testwork; timely receipt of regulatory approvals; that Anfield will have access to the necessary financing; and that the political environment where Anfield operates will continue to support the development and operations of the Coringa Gold Project.

Forward-looking statements involve known and unknown risks, uncertainties and other factors which may cause the actual results, performance or achievements of Anfield to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements. Such risks and other factors include, among others, fluctuation in the price of base and precious metals; expropriation risks; currency fluctuations; requirements for additional capital; government regulation of mining operations; environmental, safety and regulatory risks; unanticipated reclamation expenses; title disputes or claims; limitations on insurance coverage; changes in project parameters as plans continue to be refined; failure of plant, equipment or processes to operate as anticipated; accidents, labour disputes and other risks of the mining industry; competition inherent in the mining exploration industry; delays in obtaining governmental approvals or financing or in the completion of exploration, development or construction activities; inherent uncertainty of production and cost estimates; the potential for unexpected costs and expenses; actual ore mined varying from estimates of grade, tonnage, dilution, and metallurgical and other characteristics; risks associated with the estimation of mineral resources and mineral reserves, and the grade and continuity of mineral deposits; that mineral resources may never become mineral reserves and do not demonstrate economic viability; Anfield may not be able to achieve the base case during actual mining at the Coringa Gold Project; risks related to adverse weather conditions; changes in general economic conditions or conditions in the financial markets; and changes to business and economic conditions in the mining industry generally, as well as those factors discussed in the sections entitled “Risks and Uncertainties” in Anfield’s annual management discussion and analysis. Although Anfield and the authors of this technical report have attempted to identify important factors that could affect Anfield and may cause actual actions, events or results to differ, perhaps materially, from those described in forward-looking statements, there may be other factors that cause actions, events or results not to be as anticipated, estimated or intended.

There can be no assurance that forward-looking statements will prove to be accurate, as actual results and future events could differ materially from those anticipated in such statements. Accordingly, readers should not place undue reliance on forward-looking statements. The forward-looking statements in this technical report are based on beliefs, expectations and opinions as of the effective date of this technical report. Anfield and the authors of this technical report do not undertake any obligation to update any forward-looking information and statements included herein, except in accordance with applicable securities laws.

# 2 INTRODUCTION

## 2.1 Purpose of the Technical Report

Anfield is a Vancouver, Canada based precious metal exploration and development company focused on the development of the Coringa Gold Project located in Pará State, Brazil.

Anfield engaged MTB to commence a FS for the Coringa Gold Project in June 2016. This technical report has been prepared in support of the results of the FS and defines the current overall scope of the Coringa Gold Project and provides information necessary to make decisions regarding the development of an underground mine and processing facilities.

## 2.2 Sources of Information

In preparing this technical report, the QPs relied on geological reports, maps, and miscellaneous technical papers listed in Section 27 (References) of this technical report. The authors have relied on published and unpublished reports and literature for information that is provided in this technical report.

This technical report has been prepared for Anfield by MTB under the supervision of in support of Anfield's disclosure of scientific and technical information for the Coringa Gold Project.

This technical report is based on information known to the QPs as of July 1, 2017.

The below-listed QPs are responsible for the information provided in the indicated items.

MTB is responsible for the preparation of this technical report. MTB assisted in completing this report under the supervision of the QPs listed below:

Edwin R. Peralta, P.E. of Mine Development Associates, is responsible for the information provided in Items 15 and 16 and portions of 1, 25, 26, and 27.

Neil B. Prenn, P. Eng. of Mine Development Associates, is responsible for the information provided in Items 15 and 16, and portions of 1, 21, 25, 26, and 27.

Larry Breckenridge, P.E. of Global Resource Engineering Ltd., is responsible for the information provided in Items 2, 3, 20, 23 and portions of 1, 4, 16, 18, 25, 26, and 27.

Robert Sim, P. Geo. of SIM Geological Inc., is responsible for the information provided in Items 5, 6, 7, 8, 9, 10, 14, 23 and portions of 1, 25, 26, and 27.

Bruce M. Davis, FAusIMM of BD Resource Consulting, Inc., is responsible for the information provided in Items 11 and 12, and portions of 1, 25, 26, and 27.

Mark E. Smith, P.E., PEng., of RRD International LLC., is responsible for the information provided in portions of Items 1, 3, 18, 25, 26, and 27.

Nelson King, Principal Consultant, of ND King Consulting LLC, is responsible for the information provided in Items 13 and 17 and portions of 1, 25, 26, and 27

Brendan Fisher, Ph.D., P.E., of Fisher Rock Engineering, LLC, is responsible for the information provided in portions of Items 1, 16, 25, 26, and 27.

Robert S. Michel, Registered Member SME, of Robert Michel Enterprises, is responsible for the information provided in Items 19, 22, and portions of 1, 18. 21, 25, 26, and 27.

All measurement units used in this report are metric, and currency is expressed in US dollars, unless stated otherwise. The currency used in Brazil is the Brazilian Reais (R$), but all costs associated with the project are in USD ($).

## 2.3 Personal Inspection of the Coringa Gold Project

Robert Sim and Bruce M. Davis visited the Coringa Gold Project from December 3–8, 2016. They inspected drill core from numerous holes and visited several drill sites and the core storage facility.

Brendan Fisher visited the Coringa Gold Project from December 3-8, 2016. The purpose of the site visit was to examine core and review geology.

Edwin Peralta visited the Coringa Gold Project from December 3-8, 2016 and May 1-10, 2017. The purposes of the site visits were to examine core, work with Chapleau's mine department to determine the best mining methods, and to commence mine development scheduling and production scheduling.

Nelson King visited the Coringa Gold Project from May 19-21, 2016. The purpose of the site visit was to observe site conditions and historical drill core stored at the Coringa Gold Project and the condition of the used process equipment at Andorinhas prior to dismantling and transporting it to the Coringa Gold Project site.

Larry Breckenridge visited the Coringa Gold Project from March 3 - 8, 2017. The purpose of the site visit was to inspect and evaluate the environmental network and sampling plan onsite together with Chapleau team, select geochemical samples for analysis, evaluate core drilling results for the waste rock facility, and present hydrological and hydrogeological issues to other tailings dam consultants that were visiting the site in that period.

Neil B. Prenn, Mark E. Smith, and Robert S. Michel have not conducted personal inspections of the Coringa Gold Project.

## 2.4 Abbreviations and Acronyms

Abbreviations and acronyms used throughout this report are shown in Table 2.1.

## Table 2.1: Abbreviations and Acronyms

| Abbreviations | Description | Abbreviations | Description |
|---|---|---|---|
| amsl | Above mean sea level | $m^3$, m^3 | cubic meters |
| A | Ampere | $m^3$/day, $m^3$/d | cubic meters per day |
| a | Annum (year) | $m^3$/hour | Cubic meters per hour |
| Ag | Silver | $m^3$/s | cubic meters per second |
| Au, AU | Gold | Ma | Million years |
| BCM | Bank cubic meter | MCC | Motor control centre |
| Bt | Billions tonnes | MD&A | management discussion and analysis |
| cm | Centimetre | mg | Milligrams |
| cm/s | Centimetre per seond | mg/l | Milligrams per litre |
| CSLL | Social Contribution on Net Income | MIBC | Methyl isobutyl carbinol |
| c | Cohesion | mmt | Million metric tonnes (megatonne) |
| Cu | Copper | Mt, Mtonnes | million tonnes |
| CU | Consolidated undrained | Mt/y | Million tonnes per year |
| cu. | Cubic | Ma | million years |
| cv | Cavalo-vapor = 0,98632 hp | mm | millimetre |
| d | Day | min | Minute (time) |
| d/wk | Days per week | mo | Month |
| d/a | Days per year (annum) | mph | Miles per hour |
| ° | Degrees | mV | millivolts |
| $^0$C | Degrees Celsius | MVA | Megavolt-ampere |
| dmt | dry metric tonne | MW | Megawatt |
| E | east | N | north |
| EHS | Environment, Health and Safety | NQ | Drill core size (about 47.5 mm) |
| EM | Electromagnetic | Ω | Ohm (electrical) |
| EPCM | Engineering, procurement and construction management | ORP | Oxydation Reduction Potencial |
| FAusIMM | Fellow of the Australasian Institute of Mining and Metallurgy | oz | Ounce |
| Fe | Iron | ϕ | Internal friction |
| FEFLOW | Finite Element subsurface FLOW system, softawe | PE | Professional Engineer |
| FEL | Front-end loader | % | Percent |
| FX | Foreign Exchange | %RH | Percent moisture (relative humidity) |
| g | Gram | P.Geo, P.G | Professional Geoscientists |
| g/cc | Grams per cubic centimetre | P80 | Size at which 80% (mass) is finer |
| g/l | Grams per litre | Pa | Pascal |
| g/t | Grams per tonne | Pb | Lead |
| Ga | Billion years | pF | Power factor |
| gpl | Grams per liter | Ph | Phase (electrical) |
| GPS | Global Positioning System | pH | hydrogenation potential |
| gpt | grams per ton | PLC | Programmable logic controller |
| h | Hour | ppb | Parts per billion |
| h/d | Hours per day | ppm | Parts per million (equivalent to g/t) |
| h/a, h/y | Hours per year (annum) | PQ | drill core size (diameter 85 mm) |
| H:V | Slope ratio, Horizontal:Vertical | RTP magnetics | reduced to pole magnetics |
| ha | Hectare | s | Second (time) |
| HDPE | High-density polyethylene | S | south |
| HP | Horsepower | SAG | Semi-autogenous grinding |
| HQ | Drill core size (about 63.5 mm) | SCADA | Supervisory, Control and Data Acquisition |
| HQ (HTW) | drill core size (diameter 63.5 mm) | SCN | Thiocyanate |
| ICMS | tax on the movement of goods and services | SMU | selective mining unit |
| ICP | inductively coupled plasma | Snowden | Snowden Mining Industry Consultants Inc. |
| ICP-MS | ICP mass spectrometry | SO2 | Sulfur dioxide |
| INDE | Infraestrutura Nacional de Dados Espaciais | sq m/tpd; $m^2$/t/d | square meters per tonne per day |
| IP | Induced polarization | ST2G | Scooptram Atlas Copco LHD ST2G |
| IRPJ | income tax of legal person | Tamin | Tamin Mineração Ltda. |
| k | Kilo or thousand | t | metric tonne |
| kg | Kilogram | t/d, tpd | Tonnes per day |
| kg/$m^3$ | Kilogram per cubic metre | t/h | Tonnes per hour |
| km | Kilometre | t/y, tpa | Tonnes per year |
| $km^2$ | Square kilometre | t/hr/sq m; t/hr/$m^2$ | Tonnes per hour per square meter |
| kg/t | kilograms per ton | t/$m^3$ | tonnes per cubic meter |
| Kn/$m^3$ | Kilonewton per cubic meter | Toz | Thousand ounces |
| koz | Thousand ounces | TR-20 | Time of recurrence of 20 years (storm) |
| KPa | Kilopascal | troy oz, troy ozs | Ounces |
| kt | Kiloton | TDS | Total dissolved solids |
| kt, ktonnes | Thousand tonnes | TSS | Total suspended solids |
| kV | Kilovolt | UOP | Unit of Production |
| kVA | Kilovolt-ampere | USCS | Unified Soil Classification System |
| kW | Kilowatt (power) | USD/troy oz, US | US dollar per ounce |
| kWh | Kilowatt-hour | UTM | Universal Transverse Mercator |
| kWh/a | Kilowatt-hours per year (annum) | V | Volt |
| kWh/t | Kilowatt-hour per tonne | VTEM | Versatile time domain electromagnetic |
| L x W x H | length x width x height | W | Watt (Joules per second) |
| l, L | Litre | W | west |
| L/d | Liters per day | w/w | Weight/weight |
| L/m, lpm | Liters per minute | WAD | Weak Acid Dissociable |
| L/s | Liters per second | WGS | World Geodetic System |
| lb | Pound (avoirdupois) | wk | Week |
| M | Mega or million | yd | Yard |
| m | Metre | yr, y | Year (US) |
| masl | Meters above sea level | Zn | Zinc |
| Mb/s | Megabytes per second | ~ | Approximately |
| m/d | meters per day | < | Less than |
| m/month | meters per month | ±, +/- | plus - minus |
| m/s | Meters per second | 3D | three dimensional |
| $m^2$ | Square meter | µm or micron | Micrometer |

# 3 RELIANCE ON OTHER EXPERTS

For the purpose of disclosure relating to ownership of data and information (mineral, surface, and access rights) in this technical report, the authors have relied exclusively on information provided by Anfield. Anfield's local counsel in Brazil conducted a title search of the property on May 15, 2017 with the Ministry of Mines and Energy, Brazil, and all concessions are owned by Anfield and are in good standing. The authors have not researched the property title or mineral rights for the Coringa Gold Project and express no legal opinion as to the ownership status of the property.

The conclusions and recommendations contained herein are based on:

- The field observations of the QPs
- Data, reports, and other information supplied by Anfield and other third parties
- Data, reports, and other information prepared by the QPs for their respective areas

For the tailings facility design, the QP's opinions contained herein are based on information provided by other experts throughout the course of the FS. The specialists relied upon for specific advice are:

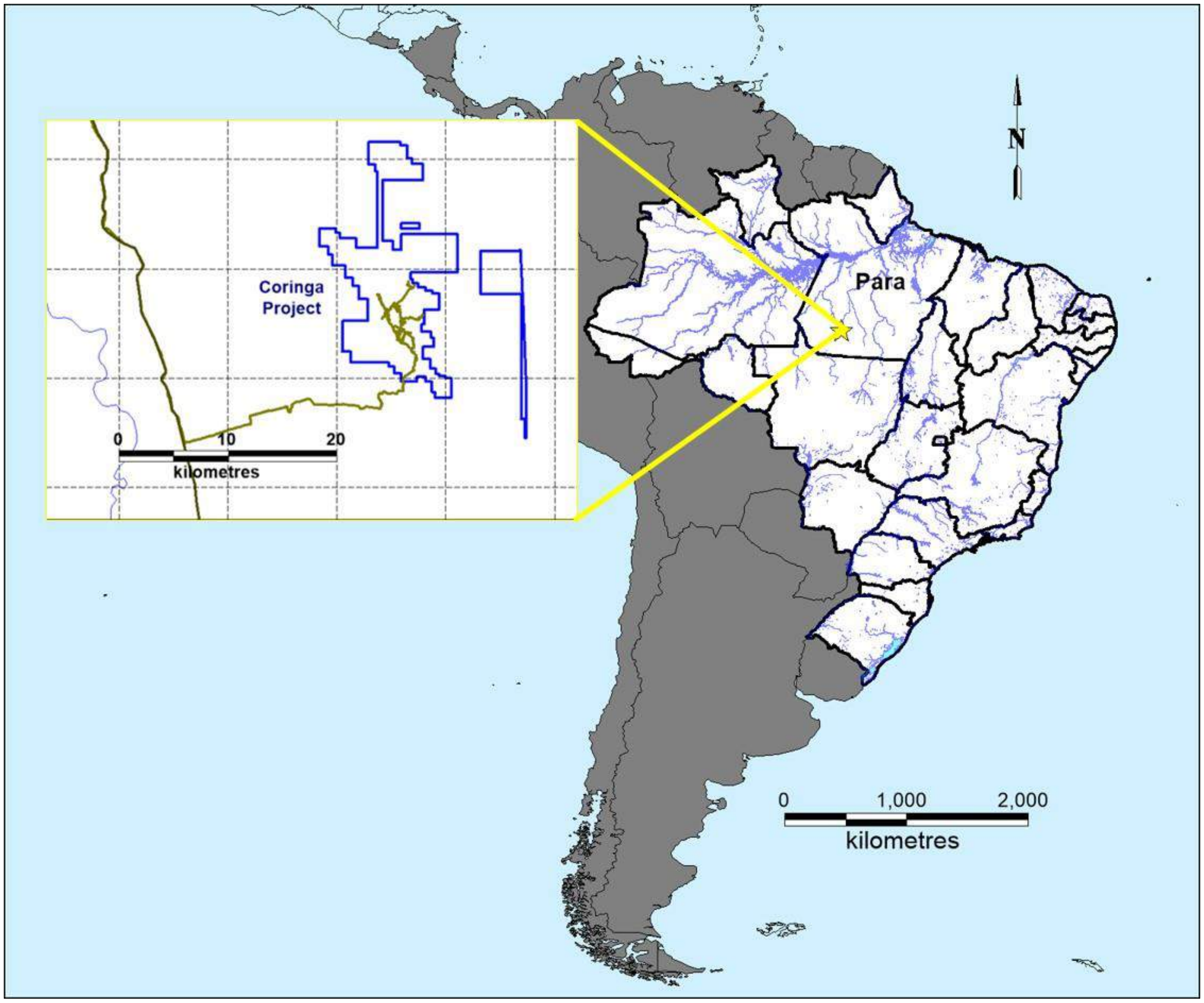
- Denys Parra, M.Sc., SME Registered Member, principal engineer, Anddes Asociados S.A.C.
- Paulo R.C. Cella, Ph.D., principal engineer, BVP Engenharia

The QPs have taken reasonable measures to verify information provided by others.

# 4 PROPERTY DESCRIPTION AND LOCATION

## 4.1 Location

The Coringa Gold Project is located in north-central Brazil, in the Province of Pará (Figure 4.1), 70 km southeast of the city of Novo Progresso. The UTM coordinates for the Coringa Gold Project are 9,166,700 North and 715,500 East (geographic projection: WGS84, Zone 21S). Access to the property is provided by paved (National Highway BR-163) and gravel roads.




**Source: Anfield, 2017**

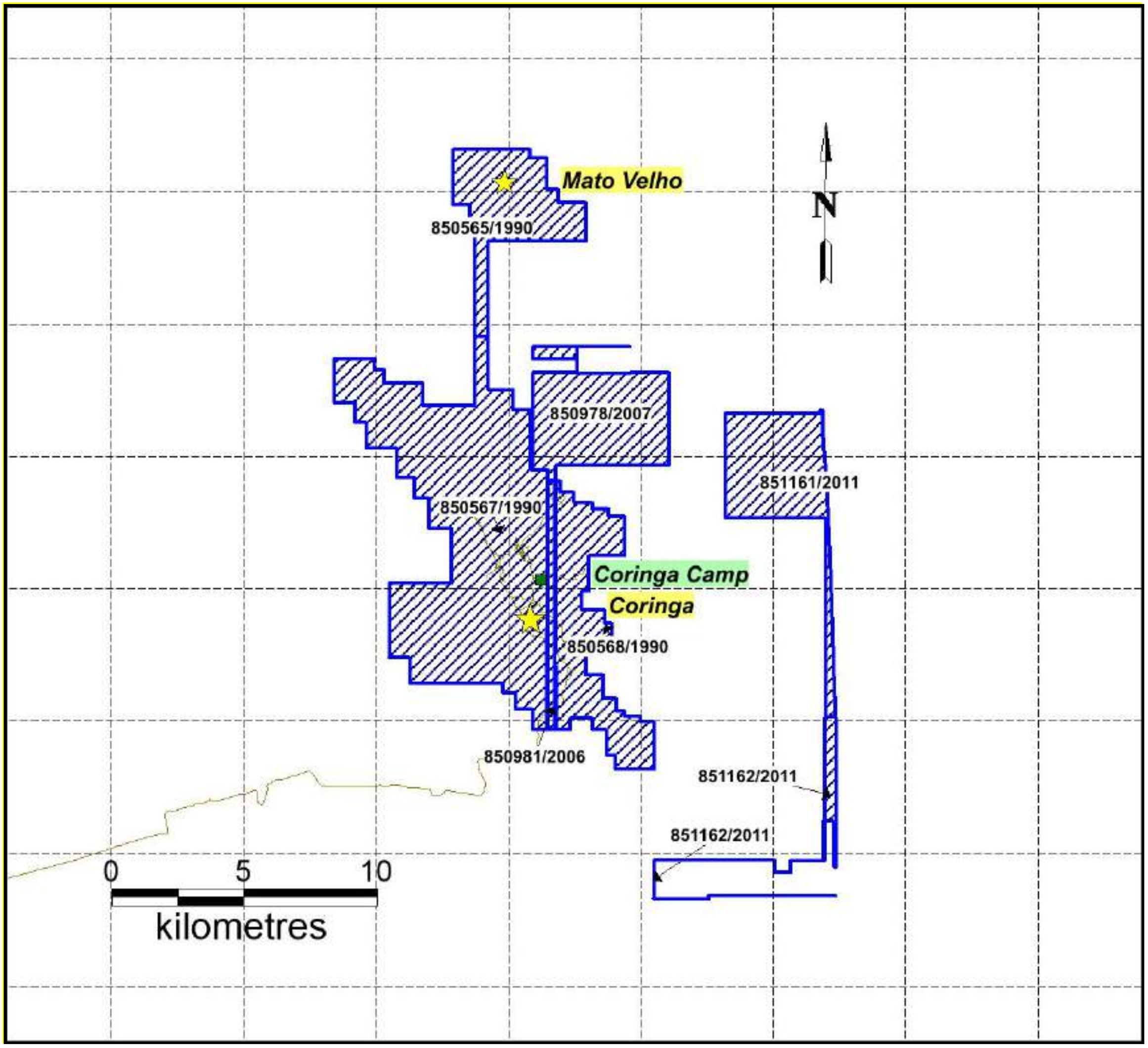
**Figure 4.1: Location Map**

## 4.2 Land Tenure

The Coringa Gold Project consists of seven exploration concessions or tenements totalling 13,647.78 ha. All concessions are owned by Chapleau, the 100% owned Brazilian subsidiary of Anfield. The concessions are described in Table 4.1 and shown in Figure 4.2.

**Table 4.1: Mining Concessions**
**Coringa Gold Property**

| Tenure Number | Area (ha) | Phase | Renewal Status | Date of Registration (dd/mm/yyyy) | Expiration Date (dd/mm/yyyy) |
|---|---|---|---|---|---|
| 851.161/2011 | 1683.21 | Exploration License | In progress | 02/10/2015 | 02/10/2018 |
| 851.162/2011 | 192.31 | Exploration Application | No Title granted yet | No Title granted yet | |
| 850.567/1990 | 6224.23 | Exploitation Application | Final report approved | 28/09/2006 | Being converted to a Mining Concession |
| 850.565/1990 | 1529.57 | Exploitation Application | Final report approved | 28/09/2006 | |
| 850.568/1990 | 1840.83 | Exploitation Application | Final report approved | 14/12/2006 | |
| 850.981/2006 | 259.99 | Exploitation Application | Final report approved | 13/12/2007 | |
| 850.978/2007 | 1917.64 | License Extension requested | Pending Appeal | 16/09/2009 | Pending Appeal |




Source: Anfield, 2017

**Figure 4.2: Claim Map**

In 2015, the DNPM approved Anfield's final exploration reports for 850.565/1990, 850.567/1990, 850.568/1990, and 850.981/2006. On October 28, 2016, Anfield submitted an Economic Exploitation Plan (PAE) to DNPM and requested that it issue a mining concession comprising these four tenements.

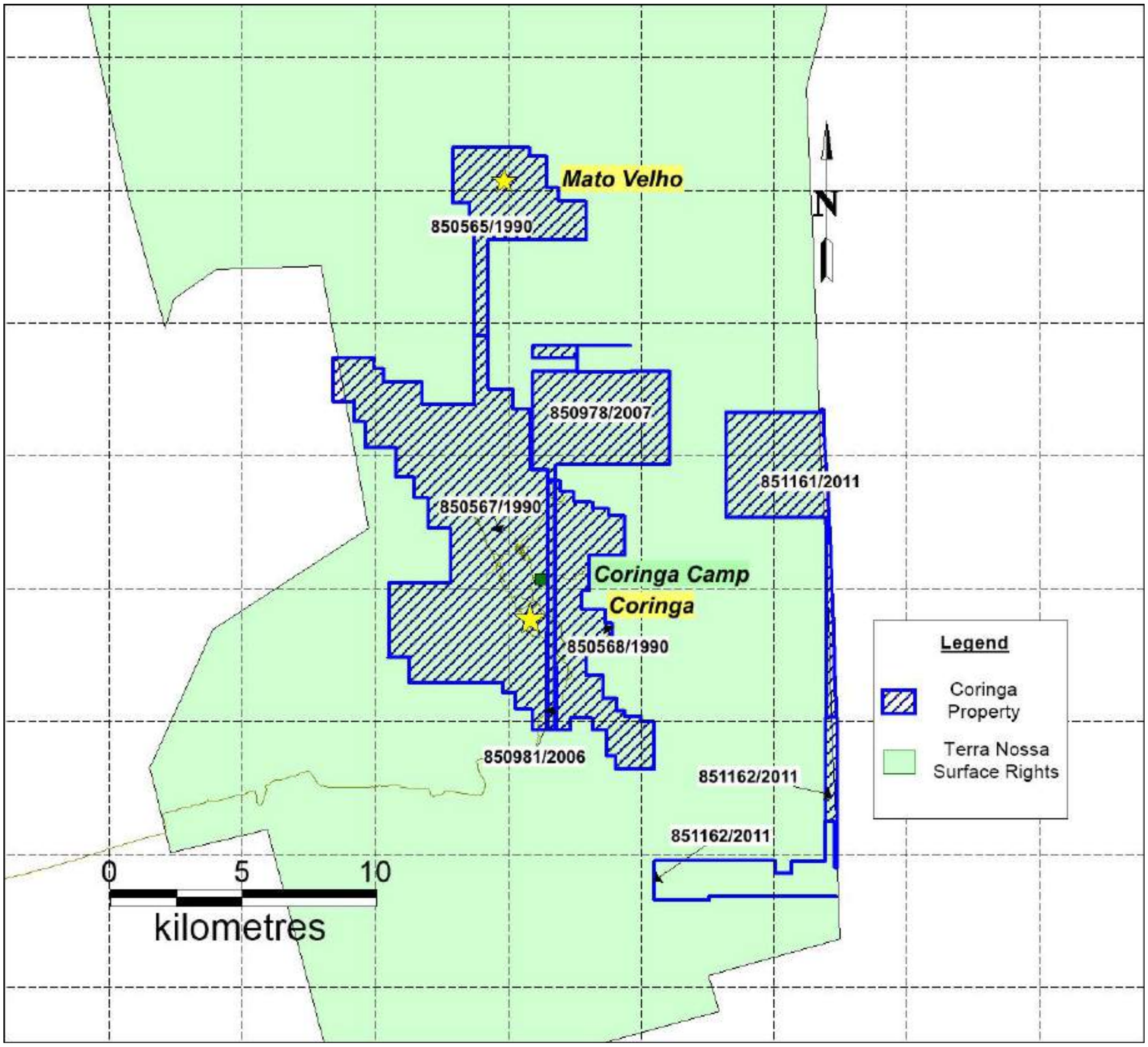
The maintenance of each exploration license requires an annual payment that is due before January 31$^{st}$ for exploration licenses published between July 1$^{st}$ and December 31$^{st}$, and due before July 31$^{st}$ for exploration licenses published between January 1$^{st}$ and June 30$^{th}$. The 2017 fees were paid and all concessions are in good standing.

In Brazil, surface rights are not associated with title to either a mining lease or a claim, and must be negotiated with the landowner. The landowner's right to participate in any proceeds from a mine is documented in the Federal Mining Code of Brazil. The relevant text reads as follows: "The participation will be 50% of what is payable to the States, Municipalities, and Administrative

Agencies, as a financial compensation for the exploitation of a mineral resource”. This financial compensation is calculated from the mineral sales value, minus taxes, transport costs, and insurances. The percentage of financial compensation varies by mineral type, but is 1% for gold.

In western Pará state, surface rights are typically not formalized. The land in the Coringa Gold Project area has been owned by a series of individuals. Most recently, the land was owned by two families whose title over the Fazenda Coringa (Coringa Farm) was never formally registered and to whom Magellan Minerals has for years paid surface access payments. In 2006, INCRA established a Sustainable Development Project (PDS) in the area, which included the Coringa and Mato Velho tenement areas. INCRA declared itself the owner of this land and resettled a community called Terra Nossa located along the access road to the Fazenda Coringa (Figure 4.3). The legality of this action and the creation of numerous other PDSs were called into question by the Federal Prosecutor’s Office (MPF), which litigated against INCRA to declare the establishment illegal.

In 2017, Anfield, following communications with regulators, made a strategic decision to negotiate land access rights, going forward, with INCRA. On May 10, 2017, Anfield entered into a Protocol of Intentions with INCRA listing company commitments, including future rental payments. INCRA also gave its consent to SEMAS for the Coringa trial mining permitting process to proceed. Anfield is currently negotiating with INCRA the specific terms and conditions under which it will operate on the PDS.




Source: Anfield, 2017

**Figure 4.3: Surface Rights**

## 4.3 Royalties

The Brazilian government has a 1.0% NSR on all gold and silver production. In addition, local land owners receive a royalty equal to one half the Brazilian government's, or 0.5% NSR. Also, Sandstorm, a gold-streaming and royalty company based in Vancouver, Canada, holds a 2.5% NSR on all production from the Coringa Gold Project.

## 4.4 Production Permits

On May 10, 2017, Anfield received INCRA's formal consent for the Coringa Gold Project to be permitted by SEMAS. INCRA's consent was required by SEMAS as a prerequisite for issuing permits to allow construction and mining operations to begin at the Coringa Gold Project. Anfield continues to communicate with SEMAS as the agency works to finalize and issue the required permits.

**Update on Regulatory Compliance Requirements and Permitting Considerations**

On August 9, 2017, Chapleau received key permits from SEMAS, which were requirements for commencing major construction of the Coringa Gold Project. These included:

- a license of operation for exploration and trial mining;
- a vegetation suppression permit; and
- a fauna capture and relocation permit.

These SEMAS permits include a number of specific conditions for the conservation and protection of fauna and flora that are currently being integrated into planning for the Coringa Gold Project.

The next major step in the permitting process is the issuance of trial mining licenses by the Departamento Nacional de Produção Mineral ("DNPM"), which will authorize the Company to undertake commercial production from the Coringa mine. The Company anticipates that DNPM approval will be received within the projected construction timeline. Licenses are issued for specific claims and should authorize mining and mill feed processing of up to 50,000 tonnes of ore per year from claim 850.567, which contains the entirety of the Serra and Galena veins, as well as the bulk of the known Meio resources. Under applicable regulations, once the trial mine is operational, the Company is permitted to apply to the DNPM to increase the processing limit.

In order to expand to full scale operations (i.e., the processing of up to 750 t/d of ore), Anfield will have to obtain further permits from SEMAS, culminating in an Operating License. Anfield is in the process of finalizing all required environmental impact studies [i.e., the Coringa Gold Project Estudo de Impacto Ambiental/ Relatório de Impacto Ambiental (EIA/RIMA)], the submission of which will initiate the environmental approvals process. The EIA/RIMA is expected to be submitted to SEMAS in the fourth quarter of 2017.

In addition, under the trial mining permits, Chapleau is required to comply with various additional regulatory compliance and permitting requirements addressing a wide range of operational needs. These include fuel storage; non-hazardous and hazardous waste accumulation, storage, and disposal; transportation, storage, and safe use of explosives and mineral processing reagents; surface water drainage; archaeological resource assessment; worker health and safety programs; and other needs. None of these permits have been obtained as of the issue date of this technical report. Anfield will also be required to submit regular reports on operational, environmental, occupational health and safety, and social performance.

As of the issue date of this technical report, applications for all required camp and processing start-up water have been submitted, and a tailings storage facility (TSF) permit request is nearing completion and is anticipated to be filed with SEMAS early in Q4 2017.  Also, discussions for long-term land access agreements are underway with INCRA, a government agency which claims ownership of the surface rights where the Coringa Gold Project is situated.

The aforementioned conditions and requirements will be systematically addressed through the implementation of appropriately designed management systems, plans, and procedures, as part of the normal course of operations at the Coringa Gold Project. Project management systems will also provide for the legal resources to monitor pending and promulgated regulatory changes that may affect operations at the Coringa Gold Project, as well as standards for regular monitoring to ensure the Coringa Gold Project maintains continued compliance with all applicable regulatory requirements and obligations.

## 4.5 Environmental Regulations and Permitting

### *4.5.1 Environmental Regulations and Permitting*

Brazilian Federal Law 6938/1981 establishes general environmental policy and permitting requirements for all activities with contamination potential, or involving extraction of natural resources. Prior to obtaining a mining concession, project proponents may conduct mineral exploration and limited (trial mining) processing of up to 50,000 t/y of ore (in case of gold ore) with a Guia and pre-requisite environmental approval, the LOPM. Depending on the ecological circumstances, an applicant may also have to obtain authorizations for vegetation suppression/restoration and fauna capture/relocation. Companies may apply for expansions of trial mining ore processing limits once they are in production. Anfield has exercised this trial mining option for tenements 850.567/1990 and 850.568/1990.

Mine developers must also first obtain permits from the respective state permitting authority. In the case of Chapleau, this authority is SEMAS. The environmental permitting process for the full mining operation has three stages, is summarized as follows:

- Prior License: (LP: Licença Prévia): this permit confirms the selection of the best place for developing and conducting extractive activities, based on submission of a detailed EIA/RIMA. In addition, in Pará State, public hearings are required to be held by the municipalities whose administrative areas encompass the project's social and environmental Direct Areas of Influence (AIDs). Upon issuing the LP, SEMAS may choose to invoke specific requirements, known as LP conditions, which the applicant must implement before it can obtain its LI. Legislated timing for issuing the LP is twelve months after the date of application, provided no further details and/or supplemental information is required by the regulator.
- Installation License (LI: Licença de Instalação): this permit allows the construction of the mine, pursuant to compliance with conditions raised in the LP. It also establishes conditions for obtaining the final LO. The LI application also requires submission of a detailed Environmental Control Program [Programa de Controle Ambiental (PCA)]. The granting of the LI means: (i) approval of the control, mitigation, and compensation measures proposed by the project proponent in the PCA, as well as the timetable for the implementation of such measures, (ii) approval of the characteristics of the specific engineering project, including its timetable for implementation, and, (iii) manifestation of the agreement between the project proponent and the regulatory authorities regarding adherence to the conditions of the LP. Legislated timing for issuing the license is six months after

the date of application, provided no further details and/or supplemental information are required by the regulator.

- Operation License (LO: Licença de Operação): this permit is issued following demonstration of compliance with LI conditions and allows the mine to commence production operations. The LO may establish additional mandatory conditions. Legislated timing for issuing the LO is six months after the date of application, provided no further details and/or complementary information are required by the regulator.

In actual practice in Pará State, the time required for SEMAS approval may vary from the guidelines in the Federal law, depending on the complexity of the project and availability of review resources, among other factors. In addition, whenever applicable, SEMAS must also assess the opinion reports of other regulatory bodies at the national, state, and municipal levels that are involved in the licensing procedure; these may include INCRA, ITERPA (Pará Land Institute), FUNAI (National Indian Foundation), ICMBio (Chico Mendes Institute for the Conservation of Biodiversity), ANA (National Water Agency), and IPHAN (National Institute of Historic and Artistic Patrimony), among others.

In addition, CONAMA (National Council for the Environment) Resolution 237/1997 is a key component of the environmental licensing process and defines the specific activities or ventures that require an environmental license, including major elements of a mining operation. These include:

- mineral exploration involving drilling;
- underground mining;
- processing of non-ferrous metals, including gold;
- construction and operation of tailings impoundments and water diversion and drainage structures;
- construction and operation of electrical transmission lines and substations;
- construction and operation of water treatment plants;
- construction and operation of sewage treatment plants;
- treatment and disposal of solid wastes; and,
- transportation, storage, and handling of dangerous material.

Transportation, storage, handling, and usage of explosives and chemical reagents requires separate approval by the Brazilian Army. Depending on the final design characteristics of Coringa Gold Project's fuel depot, additional approvals may be required from the National Petroleum, Natural Gas, and Biofuels Agency (ANP).

Municipal administrations are responsible for participating directly in the environmental licensing process and must issue a document that establishes their position as to whether or not the project is in conformity with municipal soil use, occupation, and other regulations. In the case of the Coringa Gold Project, two municipalities are involved: Altamira, which administers the rural area within which most of the mining concessions and the actual mine and operational infrastructure would be located, and Novo Progresso, which includes part of the concessions as well as the two settlements (Terra Nossa and the town of Novo Progresso) in which most of the social impacts and benefits of the project will be expressed. Other specific federal and Pará State public administration agencies may also engage in various aspects of the licensing process over which they may have technical authority or shared interest.

Environmental laws also provide for the participation of communities during the environmental licensing process. In practice, this occurs during public hearings.

With respect to water usage, the National Commission of Hydric Resources (CNRH) Resolution 55/2005 classifies mining ventures based on their impact on water resources. The Coringa Gold Project will be classified as a Scale 2 venture under this classification scheme, as it would involve:

- limited use of surface water in the initial start-up of mining operations;
- use of groundwater (collected as mine wastewater) for use in the mineral separation process; and,
- limited discharges of excess water from the TSF in certain high precipitation/wet season conditions.

All uses of superficial water and groundwater at the Coringa Gold Project are therefore subject to a grant or "dispensation" process, which applies to uses that include the construction and operation of water collection ponds, diversion of watercourses, discharge of liquid effluents in watercourses, alteration of the rates of flow of watercourses, and any activities that would impact the level of the water table.

Additional permits required to operate a mine may include:

- Potable water wells: the Coringa Gold Project must also obtain permits for all water wells through SEMAS.
- Fuel storage tanks and refueling stations: permits must be obtained from the ANP any time installed storage capacity reaches 15,000 L or more.
- Power transmission system: installation of a powerline to the project site will require an environmental licensing process that includes LP, LI, and LO phases. It is expected that this process will be implemented by the power utility. As the powerline will follow an existing road ROW, it is likely to have low environmental impact.
- Airstrip: permitting is governed by the Brazilian Aeronautical Code. Primary permitting agencies are the ANAC (National Civil Aviation Agency) and the local SEMAS office. The former deals primarily with technical aspects while the latter approves the LP, LI, and LO, which will proceed in accordance with a Simplified Environmental Report (RAS) and PCA.
- Landfill: landfill permits are governed by CONAMA Resolution 404, which states that small scale sanitary landfills are those in which 20 tons of solid waste per day are disposed of; wastes must be classified as not dangerous and inert (also referred to as domestic or urban wastes). This is considered an activity with local

environmental impact, so permitting will be governed by the Municipality of Altamira.

The current status of the Coringa Gold Project permitting efforts is elaborated in Section 20.

### *4.5.2 Environmental Baseline*

The Coringa Gold Project concession is situated near a boundary between primary forest areas reserved as an indigenous buffer zone, and land areas previously impacted by government-sponsored agricultural clearances and ongoing agriculture. Forested areas within the Coringa Gold Project and the adjacent buffer zone have also been previously impacted by illegal logging of high-value tree species and by artisanal/small scale garimpeiro mining.

The first significant baseline studies of water quality, air quality, and flora and fauna within the Coringa Gold Project concession were conducted by Terra Meio Ambiente (Terra) in 2015 and 2016 to support the development of the EIA and RIMA for the project, as well as the individual environmental clearance permits required for the construction of specific elements of mine infrastructure. The latter permits typically include specific conditions that must be met as a condition of approval, including the monitoring of fauna displaced by clearance activities, the potential capture and relocation of individuals from specific species, and the collection and replanting of selected floral species.

### *4.5.3 Reclamation Activities*

Chapleau will prepare a Mine Reclamation and Closure Plan for the Coringa Gold Project based on the conceptual closure plan and closure costs models described in Sections 20.4, 20.5, and 20.6. The Mine Reclamation and Closure Plan will be periodically updated to maintain current with changes in mine infrastructure or operations, changes in regulation, and changing external stakeholder considerations, in keeping with applicable Brazilian regulations, as well as the International Finance Corporation (IFC) EHS Guidelines for Mining (IFC, 2007) and other international best management practices for gold mining operations. The Mine Reclamation and Closure Plan will address progressive, potential interim, and final closure actions.

### *4.5.4 Other Significant Factors and Risks Affecting Access or Title*

The primary environmental, social, and legal risks associated with the Coringa Gold Project are summarized in Section 20.3.4, along with a discussion of Chapleau's general approach to risk mitigation. Additional details on the monitoring, assessment, and management of social risks are addressed in Section 20.

## 4.6 Environmental Liabilities

Environmental risks and liabilities associated with construction activities at the Coringa Gold Project are minimal, but will include areas of forest clearance for construction of access roads and facilities; noise from traffic, construction equipment, and generator operation; dust from roadways and work areas during dry season operation; potential spills of fuel and lubricants, and the potential for grass fires in dry conditions.

The Coringa Gold Project includes a number of historical garimpeiro workings which represent potential physical safety and environmental hazards if field investigations to support detailed design or construction activities are conducted in adjacent areas. Hazards will be clearly marked and physically barricaded where necessary, and no effluents will be permitted to drain from the garimpeiro workings to the exploration site or construction sites, or vice versa.

As of the effective date of this technical report, Anfield is in compliance with all environmental regulations required for the Coringa Gold Project.

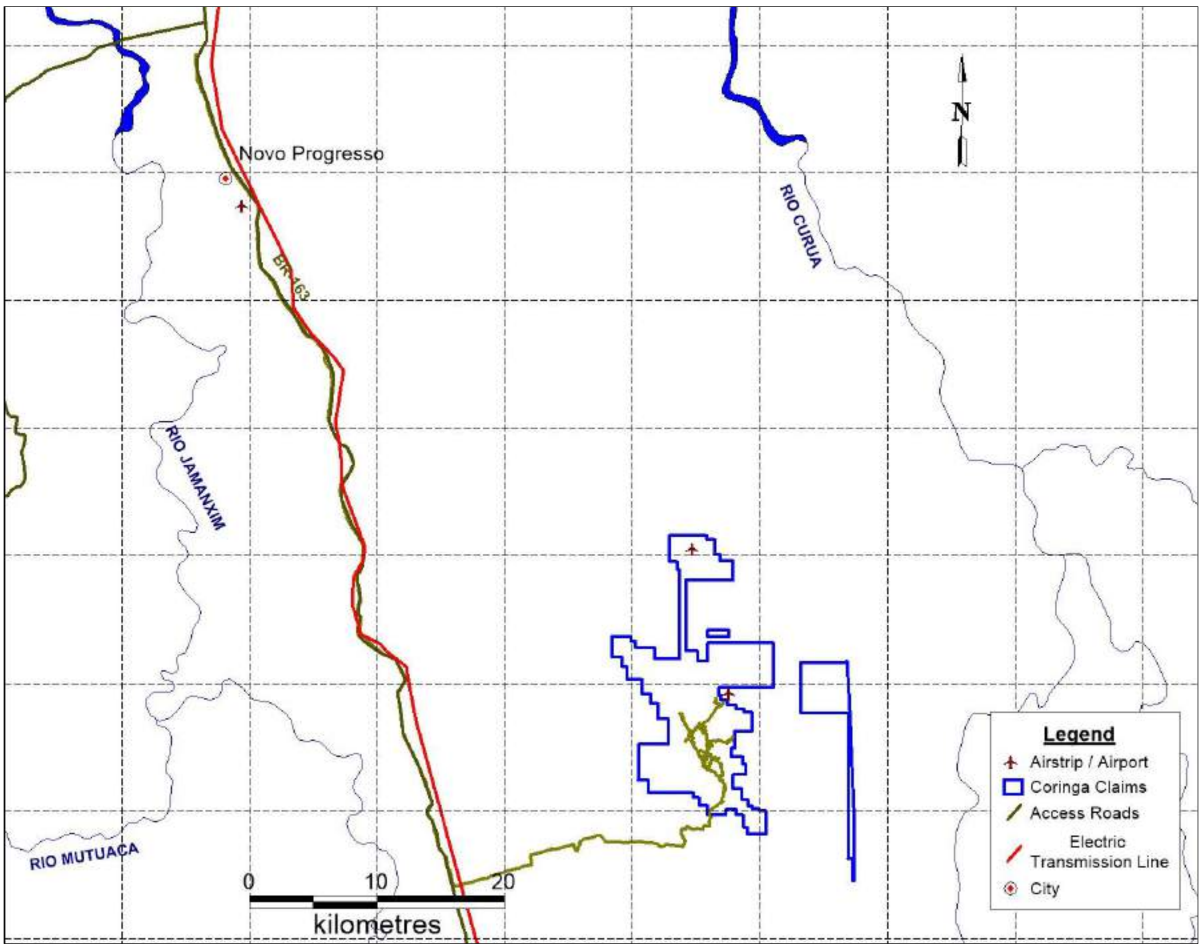
### 4.7 Other Risk Factors

Other than as disclosed in this section of the technical report and elaborated further in Section 25, the QPs are not aware of any other significant factors and risks that may affect access, title, or the ability to perform work on the property.

# 5 ACCESSIBILITY, CLIMATE, INFRASTRUCTURE, AND PHYSIOGRAPHY

## 5.1 Accessibility

The Coringa Gold Project is located in north-central Brazil, approximately 70 km southeast of the city of Novo Progresso. The Coringa Gold Project is accessed by paved Highway BR-163 and gravel roads (Figure 5.1), and the driving time from Novo Progresso to the Coringa Gold Project camp is typically two hours.




Source: Anfield, 2017

**Figure 5.1: Access to the Coringa Gold Project**

## 5.2 Climate

The climate is tropical and is characterized by high humidity and high temperatures averaging 26°C. Average annual rainfall is between 1,500 mm and 2,000 mm with a wet season from October to April. Work on the property can be carried out year-round.

## 5.3 Local Resources and Infrastructure

Novo Progresso (population approximately 30,000) is the closest major urban centre, and it can provide reasonable accommodation and basic goods and services. It is located along Highway BR-163 which is the main route for trucks carrying soya crops from the Sinop area in Mato Grosso State to ports in Itaituba and Santarem, on the Amazon River. Charter flights are available to and from Novo Progresso. In Novo Progresso, Anfield has a small office in a fenced, protected building that provides space for around 20 personnel. A high-voltage powerline which is part of the national electric grid is located along Highway BR-163, 21 km west of the project.

A 200-person field camp and core logging and temporary storage facility are located on the Coringa Gold Project property. Core is later transferred to permanent, secure storage in Novo Progresso. Two water wells provide the camp with drinking water, and septic tanks and leach fields provide for sewage waste disposal. A new sewage treatment plant provides waste disposal for the new camp facilities. Power at the camp is supplied by diesel generators. Telephone and internet service are via radio links to Novo Progresso. Short-wave radios provide communication within the project area. There is sufficient room in the vicinity of the Serra and Meio veins for tailings, waste rock storage, and a processing plant.

## 5.4 Physiography and Fauna

The Coringa Gold Project has deeply incised topography forming northwesterly trending ridges that are 150 m above the surrounding valleys. Most of the property is covered by tropical jungle with a tree canopy reaching up to 30 m. Elevations range between 250 and 450 m asl.

Minor grazing and small farm agricultural activity is present in the area. Historical artisanal mine workings are common on the property, and they often form elongated trenches along mineralized trends. These trenches are commonly filled with water.

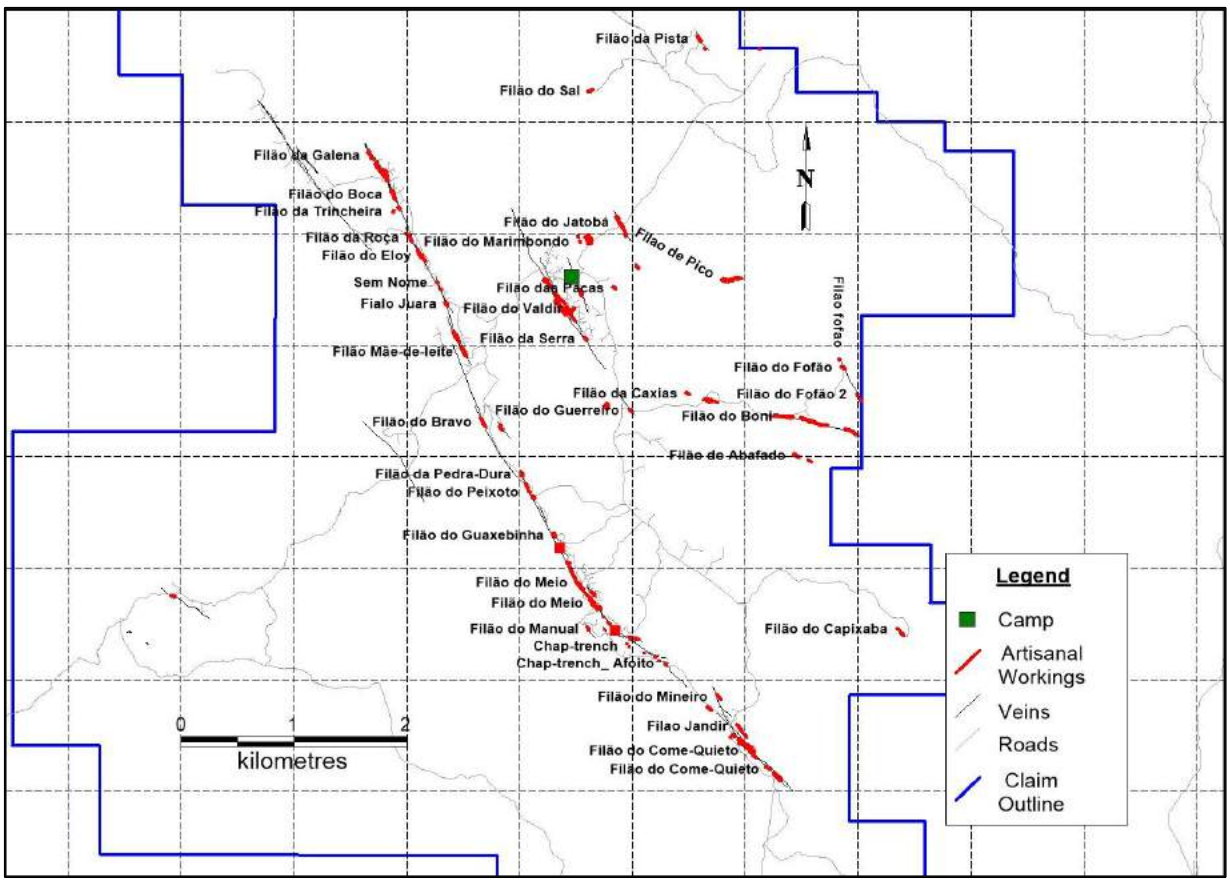
Typical fauna for the Amazon jungle are present such as tapir, capybara, monkeys, tropical birds, snakes, and insects.

# 6 HISTORY

The Tapajós gold district was Brazil's main source of gold from the late 1970s to the late 1990s. Over 80,000 artisanal miners exploited alluvial deposits, and total gold production estimates range from 5 to 30 M oz, but no accurate totals exist (Santos et al., 2001; Coutinho (CPRM), 2008).

The Coringa Gold Project is located in the southeastern part of the Tapajós gold district. Artisanal mining produced an estimated 10 t of gold (322,600 oz) from alluvial and primary sources (Dzick, 2015). Deep saprolite or oxidized parts of shear zones were mined using high-pressure water hoses or hand-cobbing to depths of 15 m. Artisanal workings are shown in Figure 6.1.

Other than the artisanal workings, no other production has occurred on the Coringa Gold Project.




Source: Anfield, 2017

**Figure 6.1: Artisanal Workings Coringa Gold Project**

Previous exploration and disclosure of prior ownership and changes to ownership at the Coringa Gold Project are summarized in Table 6.1 and discussed in greater detail in Chapman et al. (2009), Gunesch and Black (2012, 2015), and Dzick (2015).

**Table 6.1: Exploration History of the Coringa Gold Project**

| Year | Company | Description |
|---|---|---|
| 1980s | Artisanal miners | Placer mining and hard rock mining of weathered top parts of the gold-bearing veins |
| 1990 | Tamin Mineração Ltda. (Tamin) | Claim staking, no work recorded |
| 2006 | Chapleau | Options Coringa claims from Tamin |
| 2009 | Magellan Minerals | Acquires 100% of Chapleau |
| 2010 | Magellan Minerals | Final payment to Tamin to earn a 100% interest in the Coringa Gold Project |
| 2007–2013 | Chapleau/Magellan Minerals | Regional stream sediment and geological mapping, airborne magnetics, radiometrics, soil and rock geochemistry, Induced Polarization survey, core drilling (179 drill holes; 28,437 m) |
| 2016–2017 | Anfield | Drilling of the Serra, Meio, & Galena veins (183 drill holes; 26,413.61 m) |

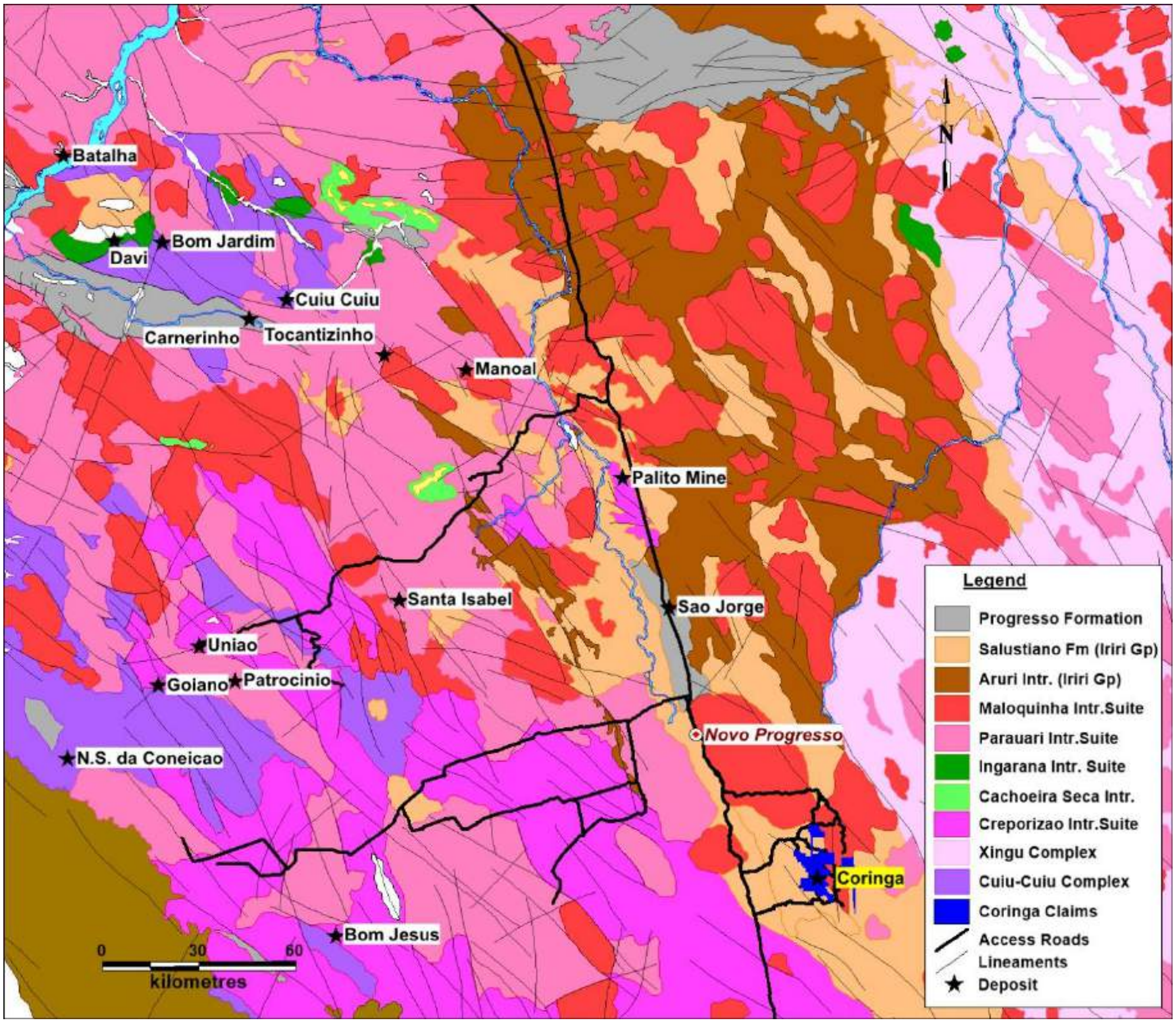
There have been several historic mineral resource estimates for the veins exposed on the Coringa Gold Project. The most recent mineral resource estimate is provided in Snowden's 2015 PEA report (Dzick, 2015). This mineral resource estimate was based on a cut-off grade of 2.5 g/t Au. The estimate includes: a Measured mineral resource of 0.27 Mt at 12.79 g/t Au (110, 000 oz), an Indicated mineral resource of 1.91 Mt at 7.20 g/t Au (440,000 oz), and an Inferred mineral resource of 2.06 Mt at 5.43 g/t Au (360,000 oz). The differences between Snowden's mineral resource estimate and the mineral resource estimate published in this technical report are discussed in Section 14.15 (Comparison with Previous Estimate).

Mato Velho is another zone of garimpeiro workings separate from the main Coringa veins. It is located in the northern part of the Coringa Gold Project property. In 2007, Chapleau carried out mapping, soil sampling, and diamond drilling in the area (13 holes; 1,980 m).

# 7 GEOLOGICAL SETTING

## 7.1 Regional Geology

The Coringa Gold Project is located in the southeastern part of the Tapajós gold district which is located in the central part of the Amazon Craton. Regionally there are over 400 alluvial occurrences (Santos et al., 2001) and over 20 hard rock gold showings (Coutinho, 2008) (Figure 7.1).




Source: Anfield, 2017; INDE, 2004

**Figure 7.1: Regional Geology Coringa Gold Project**

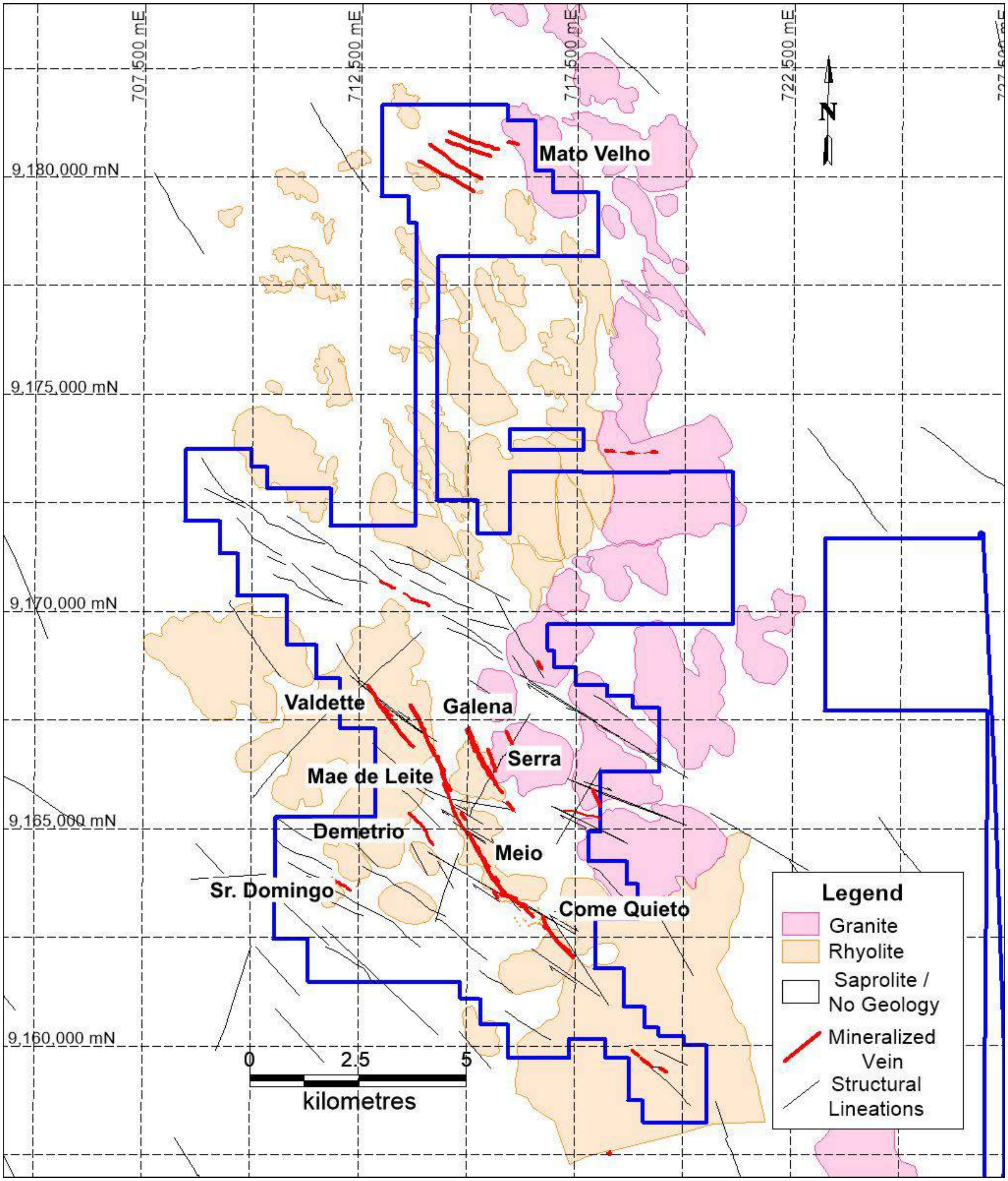
The Tapajós gold district is underlain by the Cuiú-Cuiú (2.0–2.4 Ga) and Jacareacanga (2.1 Ga) metamorphic complexes (Coutinho, 2008). The Cuiú-Cuiú complex consists of granites, gneisses, and amphibolites and the Jacareacanga complex consists of metamorphosed sediments and volcanics. Both are intruded by monzogranites and granodiorites of the Parauari group (2000–1900 Ma), granodiorites of the Tropas group (1907–1898 Ma), and granitic rocks of the Creporizão group (1893–1853 Ma). Younger felsic to intermediate volcanics of the Iriri group (1.87–1.89 Ga) and alkaline granites of the Maloquinha group (1880 Ma) also crosscut the metamorphic complexes. The Maloquinha granites are the possible source of the gold in the Tapajós gold district.

A regional northwest-southeast-trending shear zone, the Tocantinzinho Trend, is associated with many of the gold occurrences in the district (e.g., Cuiú-Cuiú, Palito, Tocantinzinho, União, Coringa, and Mato Velho) (Reconsult Geofisica, 2008). Mineralization consists of native gold occurring in quartz-carbonate-sulphide veins or with disseminated sulphides. Pyrite is the dominant sulphide with minor sphalerite, chalcopyrite, and galena.

## 7.2 Property Geology

### *7.2.1 Lithology*

The Coringa Gold Project is underlain by granitic intrusions of the Maloquinha group and rhyolites of the Iriri group (Salustiano Formation) (Figure 7.2). The granites are granular, medium-grained, and consist of pink feldspar and quartz. The rhyolites are fine to medium-grained, porphyritic, and strongly magnetic. Sanidine and quartz phenocrysts occur in a fine-grained matrix of sanidine-quartz. Minor amounts of biotite also occur in the matrix and it is altered to chlorite.




Source: Anfield, 2017

**Figure 7.2: Local Geology Coringa Gold Project**

### 7.2.2 Structure

There are two dominant structural trends on the Coringa Gold Project property (Figure 7.2):

- The $310^0$ structures are interpreted as strike-slip faults with probably a dextral (right lateral) sense of displacement.
- Structures trending at $345^0$ are interpreted as R-shears.

Mineralized veins at the Coringa Gold Project are associated with the R-shears. The dip of the veins ranges from $75^0$ to the east to vertical, but they occasionally dip steeply westward (e.g., Galena Vein).

### 7.2.3 Mineralization

Mineralization at the Coringa Gold Project is associated with a shear/vein system that has a strike length of over 7 km. The mineralized zones vary in thickness from <1 cm up to 14 m. Several veins (i.e., Galena, Mãe de Leite, Meio, and Come Quieto) occur along the main mineralized corridor and others, such as Serra, Demetrio, and Valdette, form subparallel zones. The average horizontal thicknesses for the veins included in the estimate of mineral resources (assuming a minimum horizontal thickness of 0.8 m) are: Serra 0.82 m, Meio 0.97 m, Galena 1.12 m, Mãe de Leite 0.98 m, Come Quieto 0.91 m, and Valdette 0.80 m.

Gold mineralization is almost exclusively associated with quartz-sulphide veining. Pyrite is the main sulphide, but minor concentrations of chalcopyrite, galena, and sphalerite are common. A genetic study of mineralization indicated that pyrite-chalcopyrite (+/- quartz) mineralization occurred first, followed by gold, with galena and sphalerite introduced late. Gold is typically free (or within electrum) and occupies fractures within sulphide grains. It is usually very fine grained and visible gold is rare (Boutillier & Rollinson, 2017). Gold in electrum is closely associated with quartz and pyrite. The bulk of the gold has a preference for deposition in the quartz matrix/groundmass (48% locking affinity) and within pyrite (31%) occurring in either fractures or as inclusions, as well as in other sulphides, oxides, and, to a lesser extent and depending on tectonic conditions, in silicates.

### 7.2.4 Alteration

Almost all the core at the Coringa Gold Project is strongly silicified and hematitic. Distal chlorite-hematite alteration forms wide selvages (50 m) to veins hosted in rhyolites and narrower selvages (10 m) to veins hosted in granite. A more proximal pale green sericite-pyrite alteration forms a wider halo in rhyolites (1 m) compared to granites (0.5 m).

# 8 DEPOSIT TYPES

The mineralized veins exposed on the Coringa Gold Project are similar to those found in Orogenic gold deposits. This deposit type has been described by McCuaig and Kerrich (1998), Groves et al. (1998), and Goldfarb et al. (2001). These deposits formed over a 3 Ga time frame with peaks at 3.1 Ga, 2.7 to 2.5 Ga, 2.1 to 1.8 Ga, and 0.6 to 0.05 Ga corresponding to the episodic growth of juvenile continental crust. A large percentage of the world's gold resource is associated with these periods. Orogenic gold deposits are the source of many of the great placer gold districts (e.g., Tapajós; Klondike; Mother Lode, California; East Russia).

Characteristics of an Orogenic gold deposit are as follows:

- Proximity to large scale structures which allow for large scale fluid migration. Deposits are commonly in secondary and tertiary structures.
- Magmatic-meteoric hydrothermal fluids have low salinity and moderate temperatures (200 to 600ºC). High concentrations of dissolved sulphur and gold in fluids and overall fluid volumes are critical to the formation of economic deposits.
- These deposits commonly have large vertical extents (1-2 km) and can have extensive down-plunge continuity.
- Gold mineralization is hosted in quartz-dominant vein systems which have low (<3 – 5%) sulphide content. Carbonate content ranges from <5% to 15%. Pyrite is the dominant sulphide.
- Veins have high gold grades (5 to 30 g/t).
- Alteration haloes around mineralized veins include carbonate, sulphide, and sericite±chlorite assemblages.

Other deposits in the Tapajós Gold District that are similar to the Coringa Gold Project include Serabi Gold plc's Palito deposit (Guzman, 2012) and Gold Mining Inc.'s São Jorge deposit (Rodriguez and Moraes Soares, 2014).

# 9 EXPLORATION

The Coringa Gold Project property has only seen modern gold exploration since 2007. A detailed review of the work and sampling procedures for the geochemical surveys between 2007 and 2013 is presented in Dzick (2015) and summarized in Table 9.1.

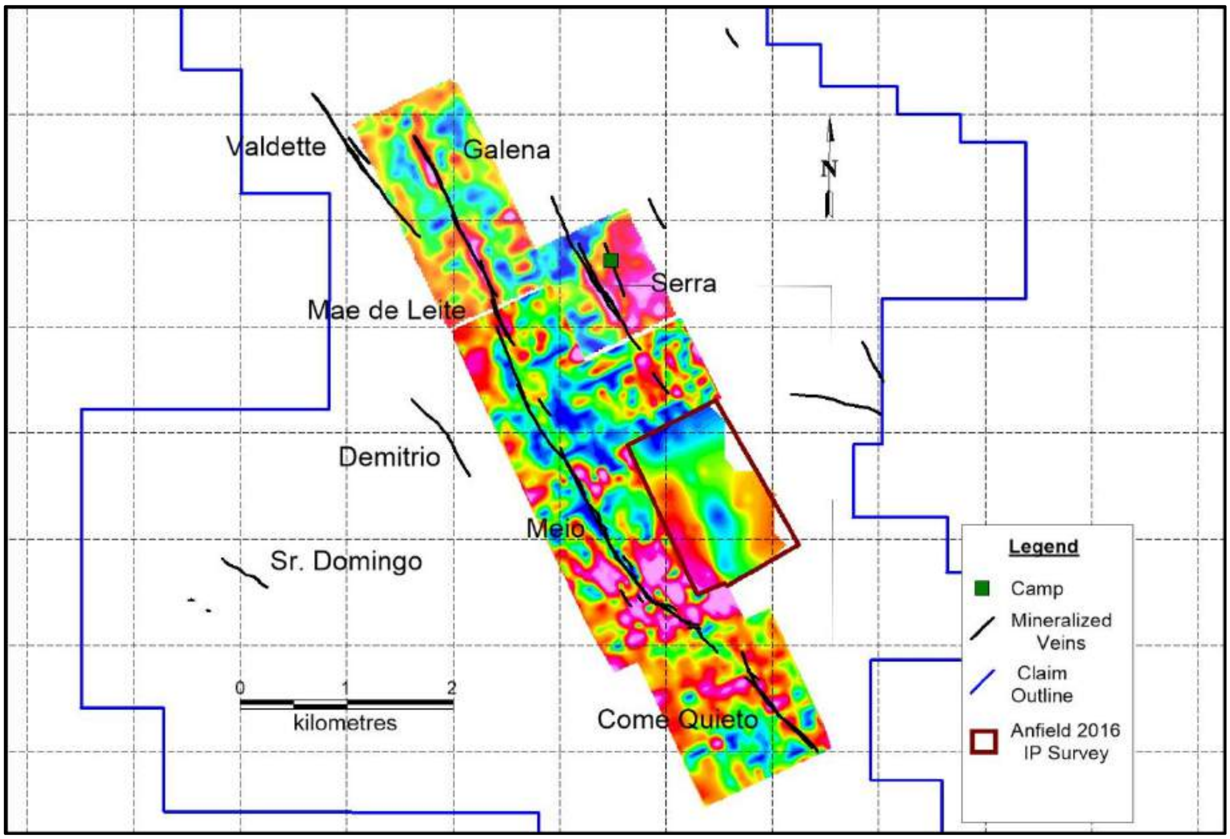
Since 2007, exploration resulted in the collection of 19,595 soil samples, 757 stream samples, and 1,922 rock samples. The only exploration work completed on behalf of Anfield occurred in 2016–2017.

**Table 9.1: Exploration Work Highlights Coringa Property**

| Year | Description |
|---|---|
| January 2007 to June 2007 | Structural interpretation using satellite images; locate garimpeiro workings; rock, soil, stream sediment samples; 22 HQ drill holes (1,774 m), petrography |
| June 2007 to March 2008 | Airborne survey – magnetics, radiometrics (549 $km^2$ with lines spaced at 200 m); IP dipole-dipole (34 km) over Galena-Mãe de Leite; metallurgical testing (SGS); 44 HQ drill holes (5,032 m) |
| March 2008 to December 2008 | IP dipole-dipole survey (70.7 km) over Serra, Meio and Come Quieto veins; geotech airborne VTEM-mag (860 km); 15 HQ drill holes (1,979 m) |
| January 2009 to September 2009 | Geological mapping, trenching (18 trenches) between Mãe de Leite and Come Quieto; soil sampling |
| September 2009 to December 2009 | Soil sampling |
| January 2010 to December 2010 | Soil sampling; 28 HQ drill holes (3,396 m) |
| January 2011 to December 2011 | Soil sampling; trenching (Valdette – 14, Demetrio – 3); 51 HQ drill holes (11,912 m) |
| January 2012 to December 2013 | Soil sampling; 19 HQ drill holes (4,344 m) |
| 2016–2017 | Assaying of soil samples taken previously by Magellan; IP dipole-dipole survey (3.5 km); infill drilling – Serra, Meio veins (180 holes; 25,212 m) |

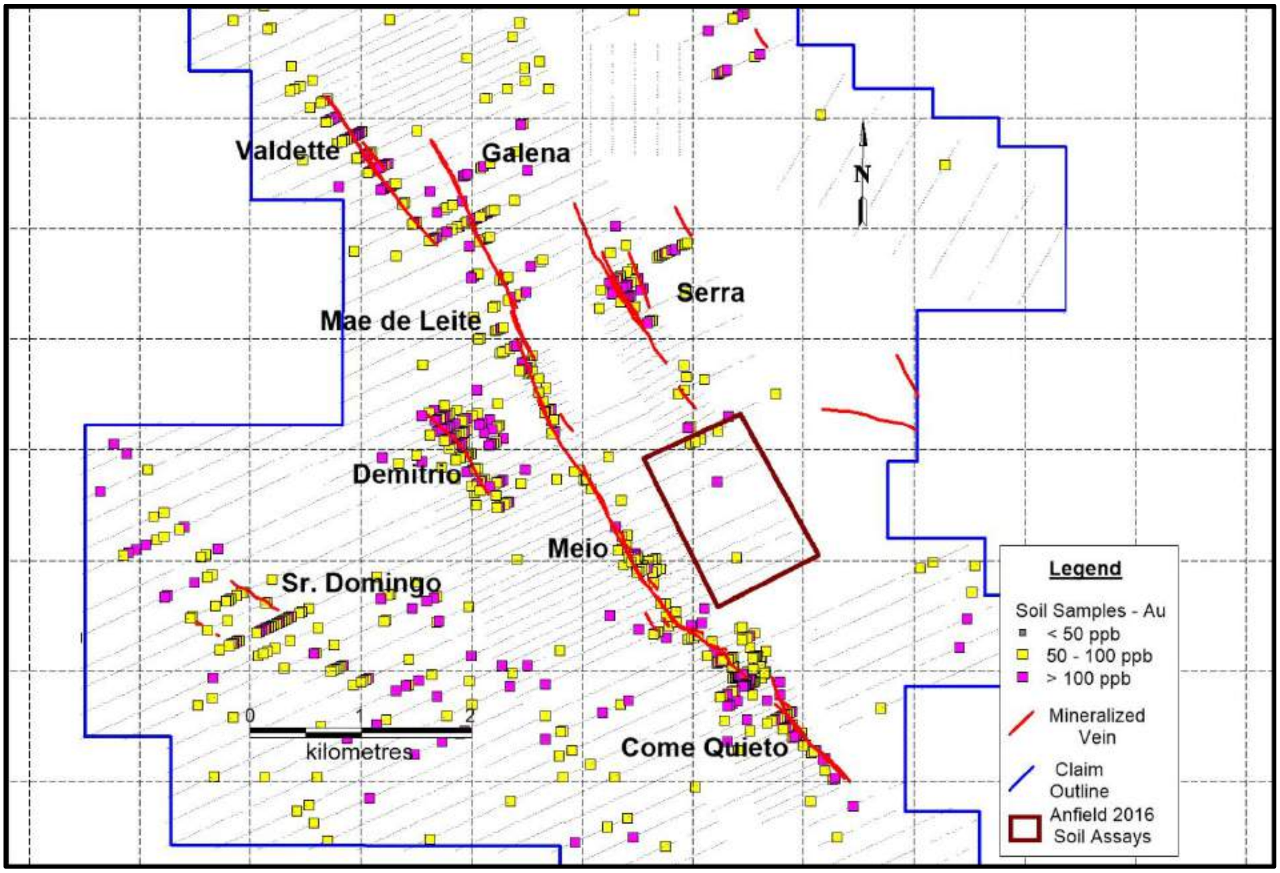
The mineralized veins are characterized by IP chargeability anomalies as shown in Figure 9.1. Soil geochemistry is a reliable tool to identify the location of gold-bearing veins as shown in Figure 9.2.

In 2016, Anfield assayed soil samples taken previously by Magellan Minerals for gold and completed a 3.5 km IP survey over an area located east of the Meio vein which is being considered as a tailings facility. No significant gold soil or IP anomalies are present.




Source: Anfield, 2017

**Figure 9.1: IP Chargeability n=4, Main Veins**




Source: Anfield, 2017

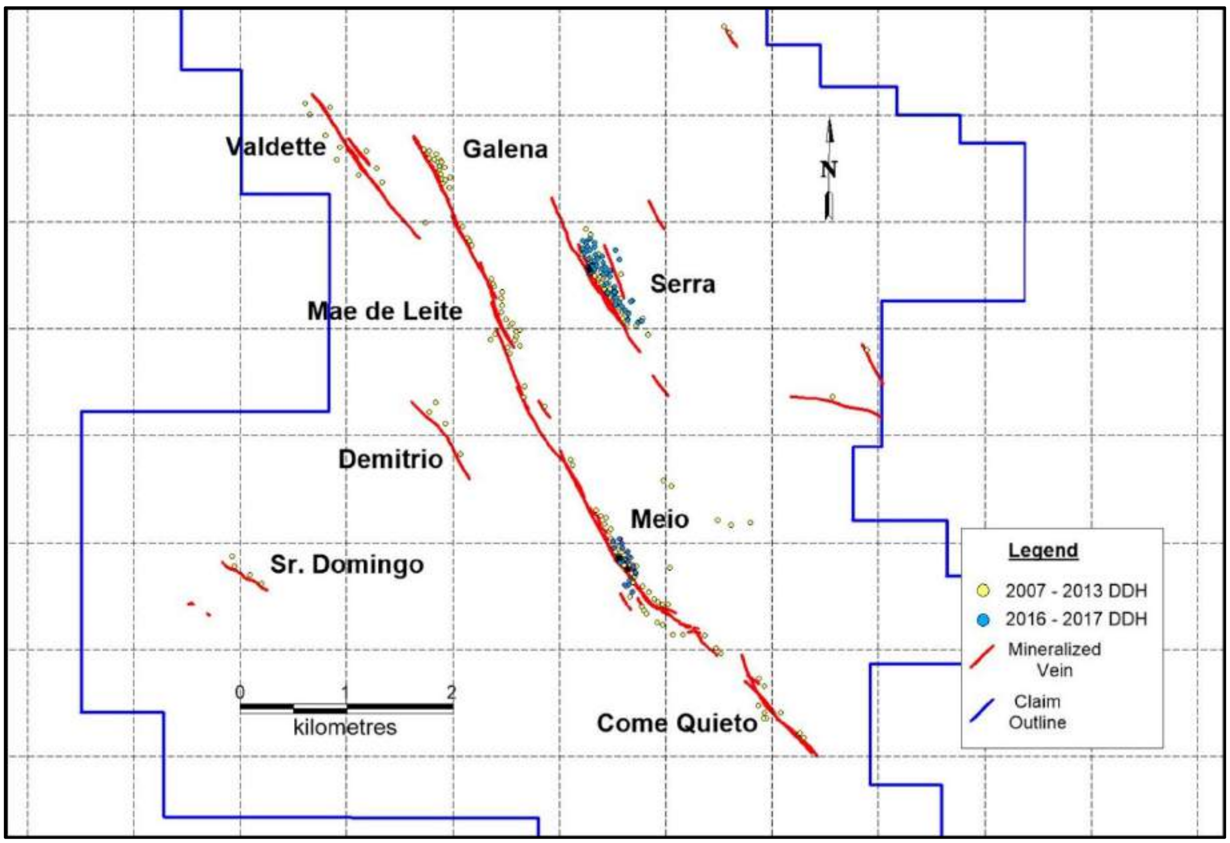
**Figure 9.2: Soil Geochemistry – Gold**

# 10 DRILLING

Between 2007 and 2013, Magellan Minerals drilled 179 holes (28,437 m) to test a number of veins on the property comprising the Coringa Gold Project (i.e., the Serra, Meio, Galena, Valdette, Mãe de Leite, Demetrio, Sr. Domingo, and Come Quieto veins).

In 2016 and 2017, Anfield completed an infill drill program on the Meio, Serra and Galena veins to gather the additional information required to develop a mine plan. A total of 183 exploration holes were drilled (26,413.61 m), most of which produced HQ-size drill core. In addition, four PQ-size drill holes were drilled (284.8 m) for metallurgical samples.

The location of all drill holes completed at the Coringa Gold Project is shown in Figure 10.1. All drill core from the project is temporarily stored in dry, secure buildings located on the property, adjacent to the camp before being transferred to permanent, secure storage in Novo Progresso. All holes were located using a hand-held GPS, but the holes at Meio and Serra were re-surveyed in 2016-2017 using a differential GPS.




Source: Anfield, 2017

**Figure 10.1: Drill Collar Plan Map Coringa Gold Project**

## 10.1 Magellan Minerals (2007–2013)

Five drill programs were completed at the Coringa Gold Project between 2007 and 2013. Magellan Minerals used several different contractors to do this work:

- 2007–2008, Geoserv Pesquisas Geológicas S.A. (Boart Longyear)
- 2010, Layne do Brasil Sondagens Ltda. (Layne)
- 2013, Geosol-Geologia e Sondagens S.A. (Geosol)

Drills were moved between sites using a bulldozer. Detailed descriptions of these drill programs are provided in Dzick (2015).

## 10.2 Anfield (2016–2017)

In 2016 and early 2017, Anfield used Servitec Foraco Sondagem S.A. (Foraco), Layne, Geológica Sondagens Ltda. (Geologica), and Geotechreserves do Brasil – Serviços de Perfurações e Sondagens LTDA (GTR) to complete an infill drill program on the Serra and Meio veins.

To reduce the cost and save time, most of the holes were pre-collared using a reverse circulation (RC) drill. This work was completed by Foraco. Every pre-collared hole was cased with PVC pipe to a depth of 18 m, below the contact between saprolite and un-weathered bedrock to prevent holes from caving. There were no samples collected from the pre-collar RC drilling.

Layne, Geologica, and GTR re-entered pre-collared holes and finished drilling with HQ core. Layne (CS-10 and CS-14) and Geologica (Sandvik 710) rigs were moved between holes with a dozer or an excavator. Two of the three GTR rigs (LF-90D) were self-propelled.

Details of the 2016–2017 infill drill program are summarized in Table 10.1. At both Serra and Meio, a 60 m by 60 m grid was drilled on 10 m centres to assess the variability of the mineralization. Resource drilling was done on a 50-m grid.

**Table 10.1: 2016–2017 Drill Program**

| Vein | | # of Holes | Meterage |
|---|---|---|---|
| Serra | Detailed Grid | 48 | 2,711 |
| | Resource Drilling | 67 | 13,877 |
| | **Total** | **115** | **16,589** |
| Meio | Detailed Grid | 34 | 2,459 |
| | Resource Drilling | 31 | 6,164 |
| | **Total** | **65** | **8,623** |

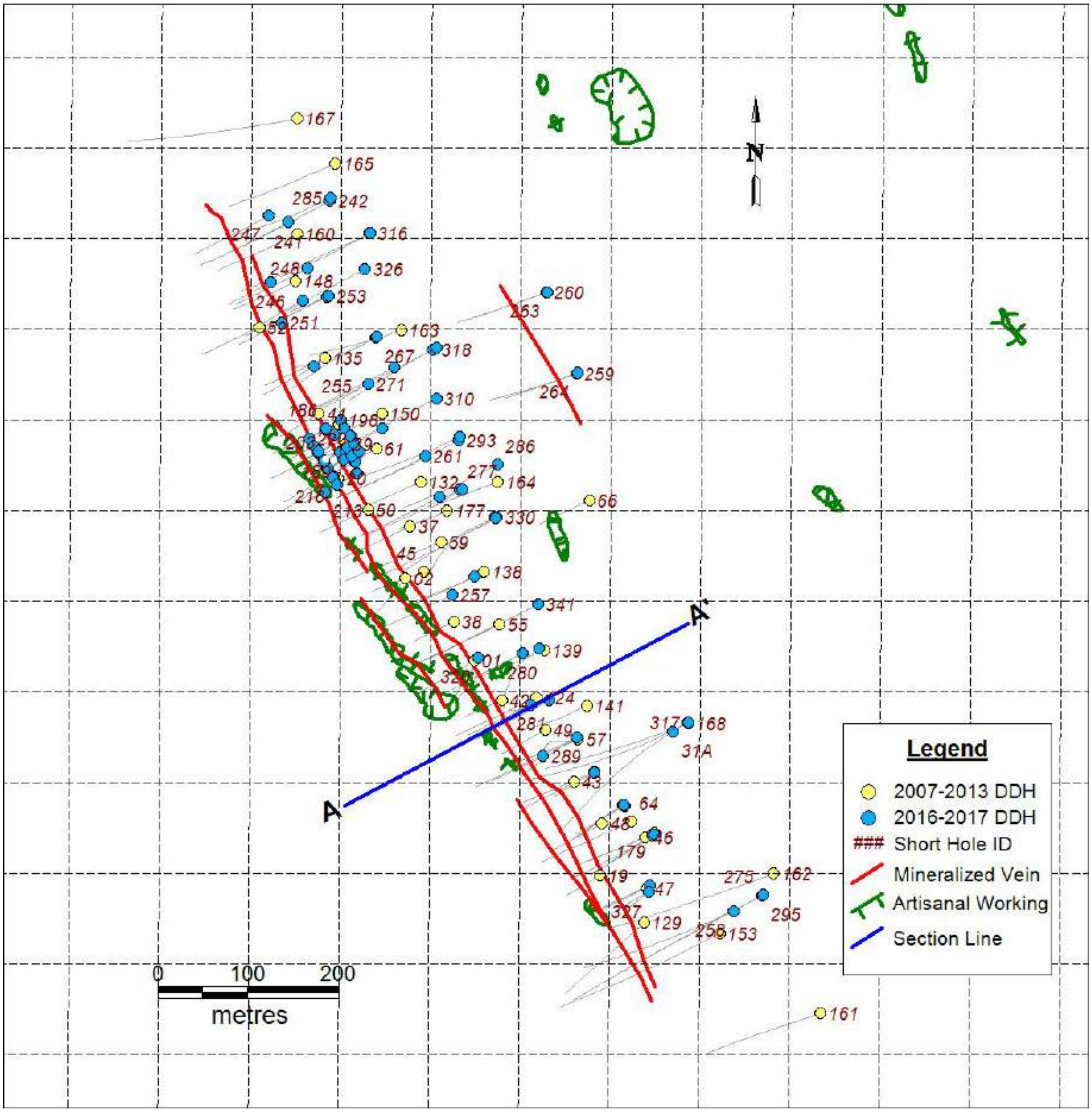
Down-hole surveys were completed using the following downhole survey devices: Layne: REFLEX Maxibor, Geologia: DEVICO Deviflex, and GTR: DEVICO Deviflex and SPT North-seeking GyroTracer. Down-hole surveys were collected at 3 m intervals.

## 10.3 Mineralized Zones

The shape and location of veins are interpreted in plan maps and cross sections for the Serra, Meio, Galena, Valdette, Come Quieto, and Mãe de Leite veins. The location of drilling on these various zones is shown in Figure 10.1. Snowden (Dzick, 2015) also included mineral resource estimates for the Demetrio zone; however, the QPs responsible for this section of the technical report do not believe that there is sufficient drilling information (4 holes) to support the estimation of mineral resources at Demetrio. The mineralized vein structures are similar in all areas. The two more prominent mineralized zones are described in greater detail below.

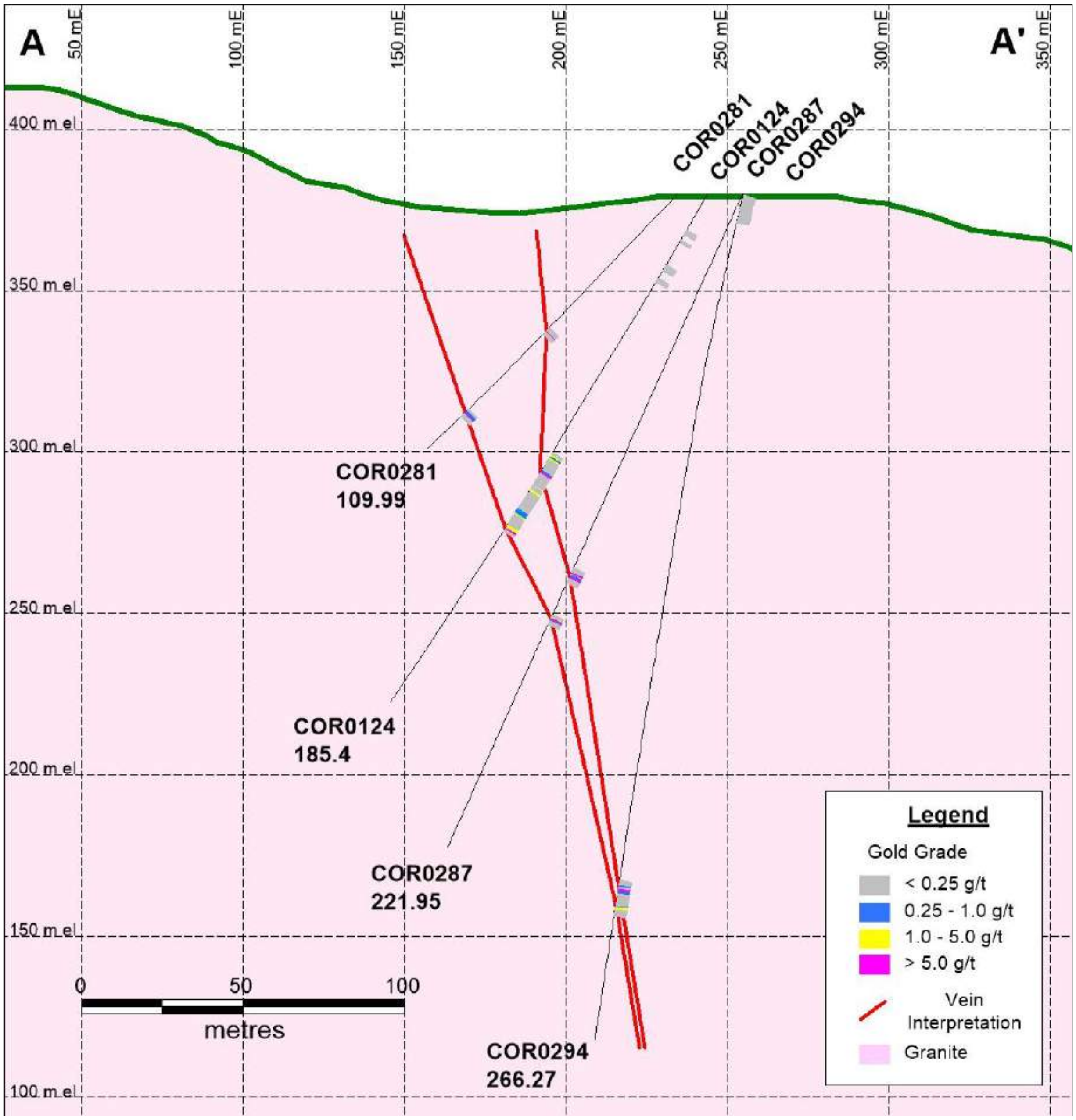
### *10.3.1 Serra Vein*

The Serra vein consists of three subparallel veins that are exposed over a strike length of 1,000 m and to depths of 250 m below surface. The veins trend at an azimuth of $330^0$ to $340^0$ and dip steeply ($75^0$) to the northeast. Figure 10.2 is a plan map showing drill hole collars, traces, and garimpeiro workings at Serra. Figure 10.3 is a typical vertical cross section of the Serra vein (A-A').




Source: Anfield, 2017

**Figure 10.2: Plan Map – Serra Vein**



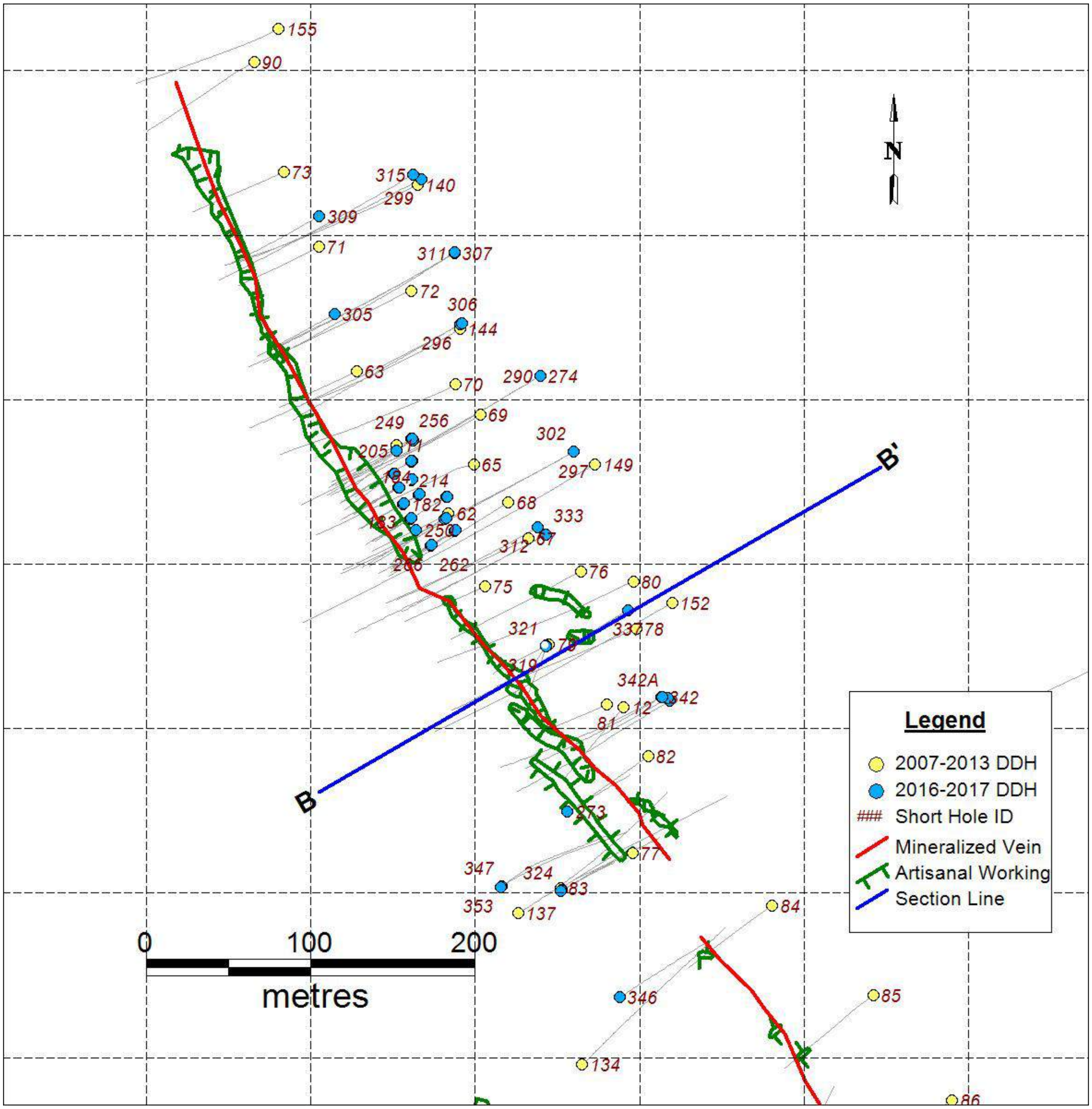

Source: Anfield, 2017

**Figure 10.3: Cross Section – Serra Vein**

### *10.3.2 Meio Vein*

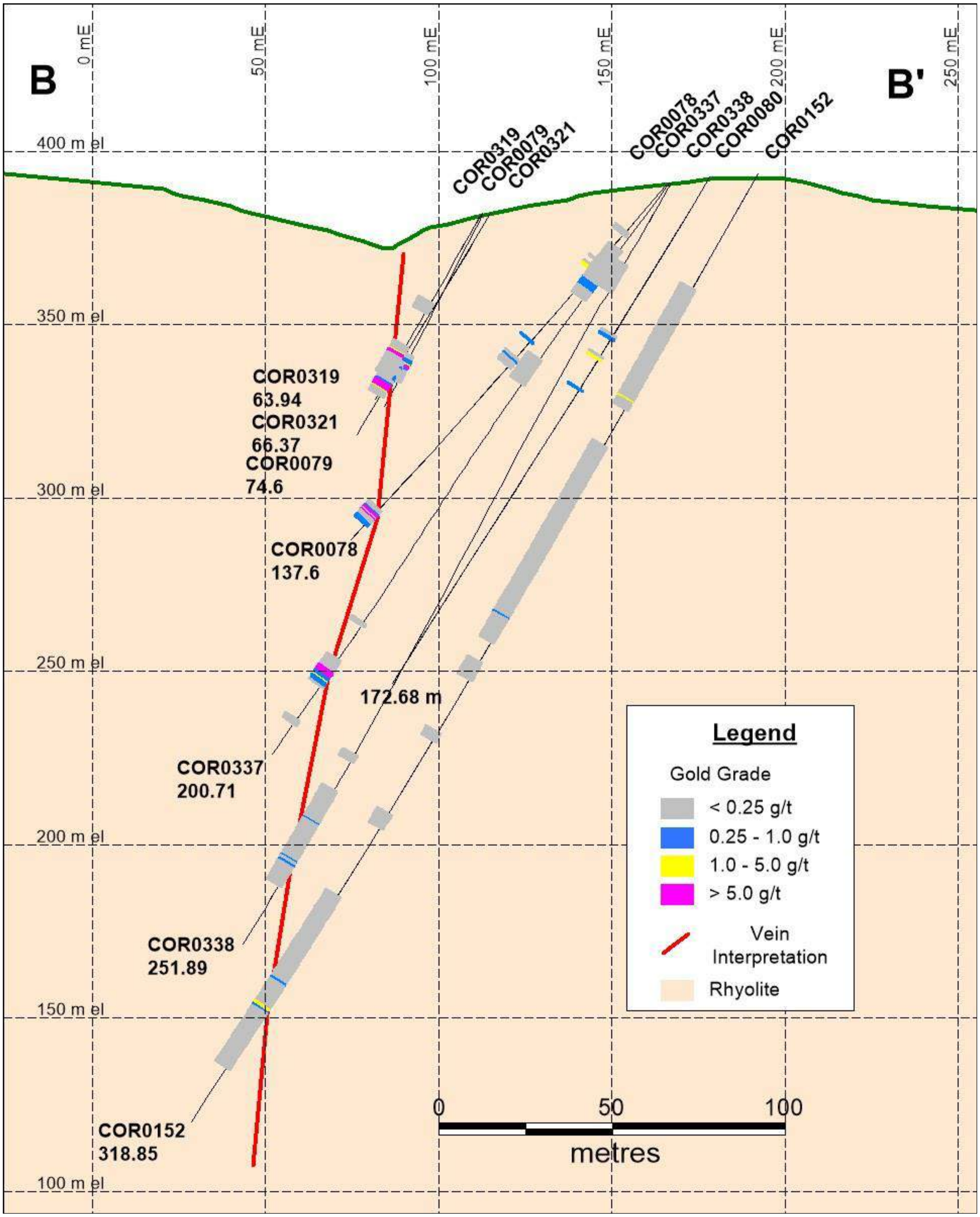
The majority of significant gold mineralization at Meio occurs in one main vein structure that is interpreted to correlate with Galena and Mãe de Leite to the northwest and Come Quieto to the southeast, a total distance of about 7 km. Anfield's drilling concentrated on the central part of the vein at Meio, testing a strike length of 500 m to depths approaching 250 m below surface. At Meio, the vein is subvertical or has a steep dip ($75^0$) to the southwest. There is local evidence that other veins may be present at Meio, but these tend to be less continuous and contain lower gold grades.

Figure 10.4 is a plan map showing drill hole collars, traces, and garimpeiro workings at Meio. Figure 10.5 is a typical vertical cross section of the Meio vein (B-B').




Source: Anfield, 2017

**Figure 10.4: Plan Map – Meio Vein**




Source: Anfield, 2017

**Figure 10.5: Cross Section – Meio Vein**

# 11 SAMPLING PREPARATION, ANALYSES, AND SECURITY

## 11.1 Magellan Minerals (2007–2013)

Dzick (2015) describes in detail the sampling procedures used by Magellan Minerals between 2007 and 2013. A brief summary is as follows:

The core was cut in half using a diamond saw and mostly 0.5 m long samples were sent to the lab. For sample preparation, Magellan Minerals used SGS Geosol (SGS Geosol) laboratories in Belo Horizonte and/or ACME laboratory (ACME) in Itaituba. Prepared pulps by ACME were sent to ACME's assay laboratory in Santiago, Chile, and pulps prepared by SGS were analyzed in Belo Horizonte, Brazil. Pulps were analyzed for gold using a fire assay procedure with an atomic absorption finish on a 30 g charge. Some batches of samples were digested in aqua regia and were analyzed by ICP.

Magellan Minerals tested several samples for metallic gold via a screen fire assay technique, but concluded that the Coringa Gold Project does not have a significant quantity of coarse gold.

A duplicate sample was inserted every 20$^{th}$ sample. Blanks were inserted after the veins, and a certified standard from RockLab was inserted every 21 samples (on average).

## 11.2 Anfield (2016–2017)

Anfield used the following procedures for its 2016–2017 drill program:

The drillers placed the HQ drill core in wooden boxes (three rows; approximately 3 m per box in total). Wooden tags marked with the down-hole depth were placed in the box. Lids were placed on the boxes and taped shut. The core was then transported by truck to the core storage facility for geological and geotechnical logging and sampling.

Anfield geologists or field assistants checked the depth and recorded the "from-to" intervals on the outside of the box, calculated core recovery, and photographed both dry and wet core.

Anfield geologists examined the core and prepared geotechnical and geological logs. The geotechnical log includes: Rock Quality Designation (RQD), core recovery, fracture and vein quantity, and vein angles. Point-load tests were taken at approximately 10 m intervals, and density measurements were taken to represent different lithologies, alterations, and veins. This information was entered directly into an Excel® spreadsheet for each hole.

After sample intervals were marked, bar-coded sample tags were stapled to the core box and the core was photographed again. The core was then cut in half using a diamond saw. Half the core was put into a plastic sample bag, and the other half was returned to the core box, and stored onsite. Bar-coded sample tags were included in each sample bag. Sample bags were secured with a tamper-proof plastic tie and put into larger mesh sacks which were also secured with a tamper-proof nylon tie. These sacks were stored in a secured room in the core storage facility.

When a sample batch was ready for shipment, a representative from ALS picked up the samples from the Anfield camp and transported them to ALS facility in Belo Horizonte, Brazil. At ALS, samples were checked, dried, crushed, and pulverized to 150 mesh. For each sample, approximately 250 g of pulverized material was placed in a paper craft bag and shipped to ALS, in Lima, Peru for analysis. Certified reference standards, purchased from CDN, were inserted into every sample batch to control the analytical quality. All samples were analyzed for gold using a fire assay technique on a 30 g charge. In addition, a 48-element ICP-MS analysis was completed using a 4-acid digestion.

QA/QC samples (standards and duplicates) were inserted after every 20 core samples. These included one of three certified standards (high, medium, and low gold grades) and/or a coarse duplicate. In addition to the regular insertions, after every mineralized interval or quartz vein, a blank sample was inserted in the sample stream. Initially, Anfield used a limited number of pulp blanks that were purchased from CDN, but then it began purchasing the QA/QC blanks from a Brazilian supplier who provides blank cleaning material to ALS's lab in Belo Horizonte. These blanks were coarse with fragment sizes up to 3 cm, and they could test both the crusher and the pulverizer for quality control.

During the 2016-2017 drill program, a total of 5,850 samples were analyzed at the laboratory: 496 of these were blanks, 282 were certified reference material, 280 were coarse duplicates, and the remaining 4,792 were samples collected from drill core. Assaying of standard material produced only four failures. Each failure was investigated and no systematic errors were discovered. Blank material assaying indicated no contamination occurred from sample to sample. Coarse reject duplicate assays showed the sample preparation protocol produced sufficiently precise results.

In the opinion of the QP responsible for this section, the analytical procedures were appropriate and consistent with common industry practice. The laboratories are recognized, accredited commercial assayers with ISO 17025:2005 accredited methods and ISO 9001:2008 registration. There is no relationship between Anfield and ALS or CDN. The sampling has been carried out by trained technical staff under the supervision of a QP and in a manner that meets or exceeds common industry standards. Samples are properly identified and transported in a secure manner from site to the lab. The quality of the assay database supports the estimation of Indicated resources.

# 12 DATA VERIFICATION

## 12.1 Database Validation

### *12.1.1 Collar Coordinate Validation*

Drill hole collar coordinates for all drill holes on the Serra and Meio veins were surveyed using a differential GPS field survey. The collar locations correlate well with the 3D digital terrain surface and with roads and drill sites visible in registered aerial photographs.

### *12.1.2 Down-hole Survey Validation*

The down-hole survey data were validated by identifying any large discrepancies between sequential dip and azimuth readings. No significant discrepancies were noted.

### *12.1.3 Assay Verification*

All drill collars, down-hole surveys, geology, and assays were exported from Excel® files into MineSight® software for validation. No identical sample identifications exist; all FROM_TO data are zero or a positive value, and no interval exceeds the total depth of its hole.

To validate the data, the following checks were confirmed:

- The maximum depth of samples was checked against the depth of the hole.
- The less-than-the-detection-limit values were converted into a positive number equal to one-half the detection limit.
- All gold values greater than 1 g/t from each drill hole were checked against values listed in the original assay certificates.

Analyses of core recoveries show no indications of potential bias between sample grades and core recovery. Note that core recoveries averaged 99% during the Anfield drilling program. Similar recoveries were achieved during the Magellan Minerals drilling programs.

A series of studies were conducted to test whether the Magellan Minerals drill results were consistent with the Anfield results. This included the collection and re-assay of ¼ core samples collected from holes drilled by Magellan Minerals, a review of metallurgical sample grades compared to Magellan Minerals initial assay sample grades, and a spatial comparison of Magellan Minerals drill hole results that are in proximity to Anfield's drilling. In the opinion of the QP responsible for this section, the Magellan Minerals vein sample results are compatible with those from the Anfield drilling.

## 12.2 Geological Data Verification and Interpretation

Several geological variables were captured during core logging. The geological data were verified by confirming that the geological designations were correct in each sample interval. This process included the following:

- Examine FROM_TO intervals for gaps, overlaps, and duplicated intervals.
- Look for collar and sample identification mismatches.
- Verify correct geological codes.

A geological legend was provided, and it was used to compare the values logged in the database. The geological model was found to be reasonable and adequate for use.

## 12.3 QA/QC Protocol

A review of the QA/QC protocols was conducted prior to drilling and formalized in a detailed QA/QC manual developed by Anfield. The drilling phase was reviewed by a QP who was onsite during the drill program. The procedures for core processing and the insertion of blanks and standards were examined. The QA/QC program was conducted in accordance with industry best practice as described in Section 11 (Sampling Preparation, Analyses, and Security) of this technical report.

During the 2016–2017 drill program, a total of 5,850 samples were analyzed at the laboratory: 496 were blanks, 282 were certified reference material, 280 were coarse duplicates, and the remaining 4,792 samples were samples collected from drill core. After receiving each batch of analytical results from the laboratory, the QA/QC samples were reviewed by an Anfield geologist and, periodically, by Anfield’s QA/QC consultant.

## 12.4 Assay Database Verification

All gold values greater than 1.0 g/t Au from Magellan Minerals' 2007–2013 and Anfield’s 2016–2017 drill programs were manually compared to values listed on the original assay certificates. No errors were found.

In the opinion of the QP responsible for this section, the database management, validation, and assay QA/QC protocols are consistent with common industry practices and the database is acceptable for the purposes used in this technical report,

# 13 MINERAL PROCESSING AND METALLURGICAL TESTING

## 13.1 Introduction

Metallurgical testing for the Coringa Gold Project has been performed since 2008 at four laboratories. Table 13.1 lists the laboratories and summarizes the types of metallurgical test programs that each completed. The results of the various programs are described in detail in Section 13.3.

**Table 13.1: Metallurgical Test Programs**

| Laboratory (Location) | Dates | Key Testing Programs | Materials Tested |
|---|---|---|---|
| | | | |
| SGS Geosol Mineral Lab (SGS Geosol) | Mar-08 | Gravity Concentration | Two Composites (High and Low Grade) |
| (Belo Horizonte, MG, Brazil) | May-08 | Flotation | |
| | | Whole-Ore Leaching | |
| | | | |
| Resource Development Inc (RDi) | Mar-10 | Grinding Work Index | Two Composites (Serra and |
| (Wheat Ridge, CO, USA) | | Gravity Concentration | Guaxebinha-Meio-Onza Zones) |
| | | Flotation | |
| | | Whole-Ore Leaching | |
| | | | |
| Testwork Desenvolvimento | Jun-13 | Gravity Concentration | Two Composites (Serra-Galena-Mae de Leite |
| de Processo Ltda (TDP) | Nov-13 | Whole-Ore Leaching | and Meio-Come Quieto Zones) |
| (Nova Lima, MG, Brazil) | Dec-13 | Gravity-Intensive Leach | |
| | | Flotation, Float-Leach | |
| | | Cyanide Neutralization | |
| | | Settling | |
| | | Grinding Work Index | |
| | | | |
| C.H. Plenge & CIA. S.A. (Plenge) | May-17 | Comminution (UCS, Crush) | 1/2 HQ core Master Composite (Serra-Meio Zones) |
| (Miraflores, Lima, Peru) | Jul-17 | Comminution (Abrasion, BWi) | 1/2 HQ core Variability Composites (8 Serra, 6 Meio) |
| | | Gravity Concentration | Comminution Samples (26 Serra, 26 Meio) |
| | | Gravity-Conc Intensive Leach | Sliced PQ core Variability Composites (4 Serra, 2 Meio) |
| | | Gravity Tails Leach | |
| | | Whole-Ore Leaching | |
| | | Whole-Ore Flotation, Leaching | |
| | | Leach Tails Flotation | |
| | | Cyanide Neutralization | |
| | | Settling | |
| | | Gravity Concentrate Mineralogy | |

Results from the Plenge test program have been used to project the metallurgical performance of materials planned for mining and processing at the Coringa Gold Project. Results from the earlier RDi and TDP test programs support results from the Plenge program and altogether are useful to support the stated overall representativeness of the samples to the various deposits.

The projected gold and silver recoveries for the main deposits at the Coringa Gold Project are presented below:

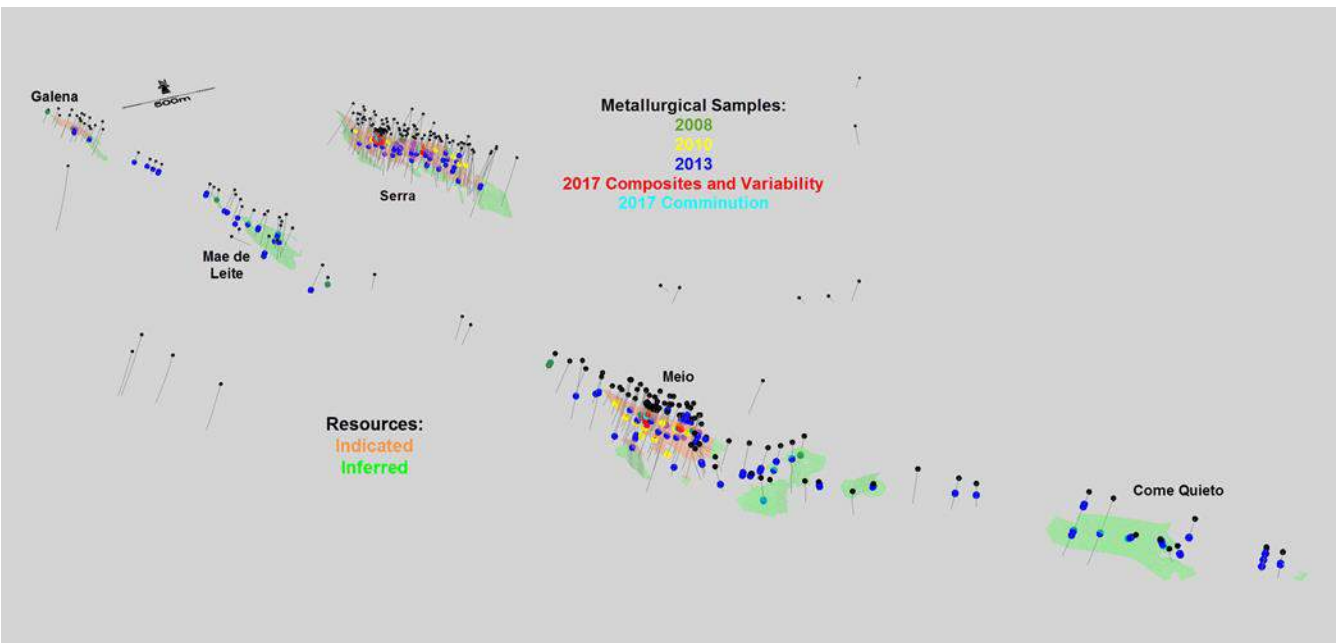
- Serra and Galena Deposits – 96% for gold and 57% for silver
- Meio Deposit – 94% for gold and 74% for silver

The above recoveries are the average results, after an applied discount, from Plenge's testing of variability composites when subjected to gravity concentration, IL of gravity concentrates, and CIL processing of gravity tails. The recoveries were discounted 3% for gold and 5% for silver to reflect typical losses experienced in industrial process plants, such as less efficient gravity concentration, solution losses, carbon losses, lower silver carbon-loading than anticipated, and grind variations. The recoveries compare well with the results from Plenge's whole-ore CIL processing tests as well as the gravity/IL/CIL tests run in 2013 by TDP.

## 13.2 Metallurgical Samples

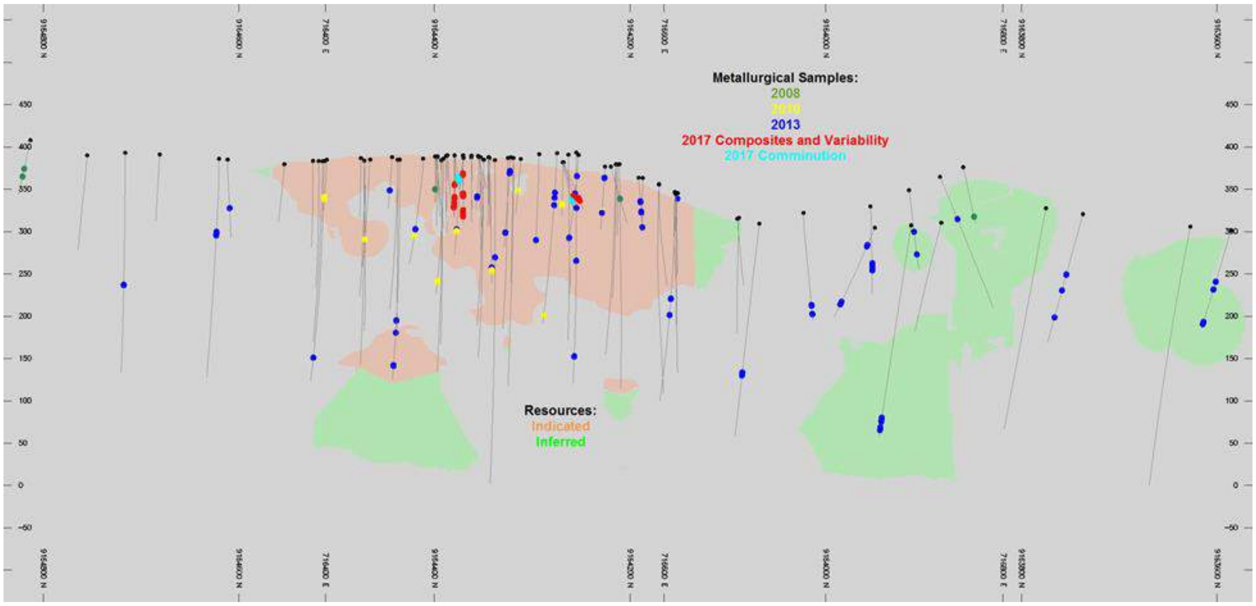
### *13.2.1 Metallurgical Sample Locations*

Drill holes and sample intervals for the materials selected for the four test programs are shown in Figure 13.1 (all samples and all zones), Figure 13.2 for the Meio deposit, and Figure 13.3 for the Serra deposit. The samples tested are spatially representative of the zones currently planned for mining and processing in the project development plan. Results from the test programs are acceptable to use to project the metallurgical response of the materials planned for processing.



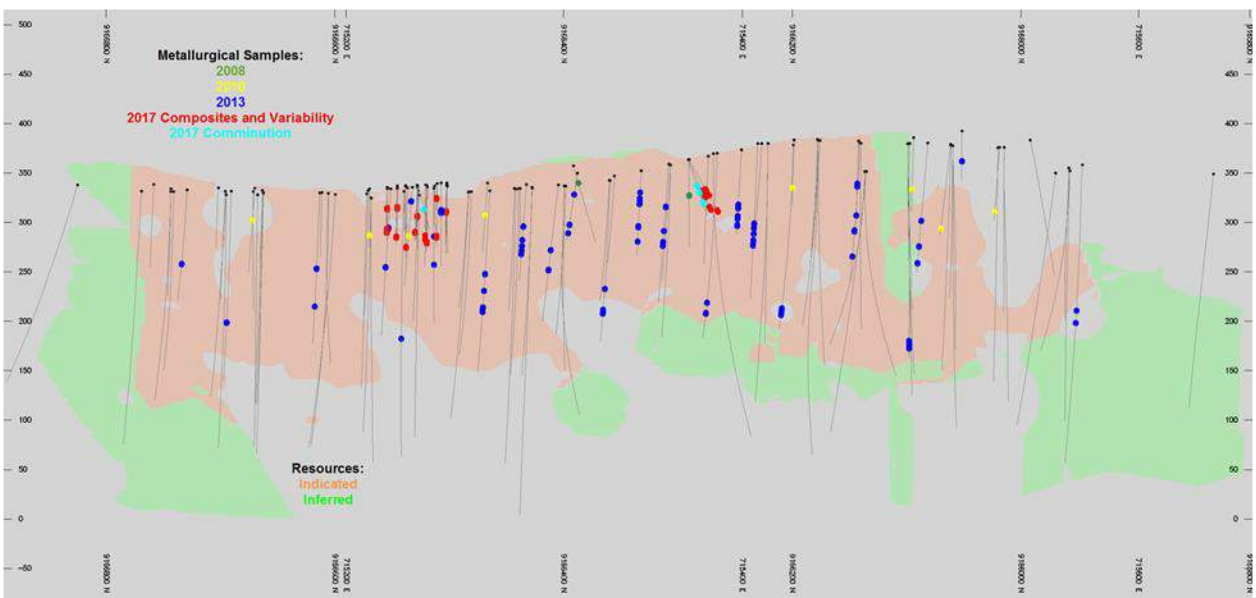

Source: Sim Geological, 2017

**Figure 13.1: Plan View – All Metallurgical Sample Locations**




Source: Sim Geological, 2017

**Figure 13.2: Longsection – Meio Metallurgical Sample Locations**




Source: Sim Geological, 2017

**Figure 13.3: Longsection – Serra Metallurgical Sample Locations**

### *13.2.2 Metallurgical Sample Mineralogy*

In February 2017, ten samples of drill core from the Coringa Gold Project were sent to Camborne School of Mines in Cornwall, UK to complete a petrographic and Qemscan study. Seven samples were from the Serra zone and three from the Meio zone. Polished thin sections of each sample were prepared and then examined optically and photographed. Three samples (two from Meio and one from Serra) were then selected based upon their gold potential and variations in mineralogy to be run on Qemscan in 10-micron field scan mode. The results are reported in the March 2017 report entitled "A Petrographic and Qemscan Study of Drill Core Samples from the Coringa Gold Project, Tapajos Region, Brazil" authored by Dr. Nicholas Le Boutillier with Dr. Gavyn Rollinson and a summary of the findings is below:

- Gold, within electrum (Au, Ag), was found optically in two of the ten samples.
- Three samples were selected, including the above two, for Qemscan analysis.
- Gold was found in all three samples selected by Qemscan.
- Electrum is closely associated with quartz (48%).
- Quartz is the dominant gangue phase with electrum residing in fractures and as inclusions.
- Electrum is also closely associated with pyrite (31%) within fractures and along grain margins.
- Chalcopyrite, galena, hematite, and chlorite are also repositories for electrum.
- A total of 363 grains of electrum were found in the study.
- Of those found, 296 (81.5%) were less than 15 microns in size.
- 347 electrum grains (95%) were less than 35 microns in size.
- Electrum grain sizes ranged from 75 microns to < 15 microns.
- Gold content in the electrum particles ranged from 71% to 90% and averaged 81%.

## 13.3 Metallurgical Testing

### *13.3.1 SGS Geosol*

In 2008, SGS Geosol of Belo Horizonte, MG, Brazil issued reports describing very preliminary test programs that investigated size-by-size gold analysis, gravity concentration, flotation, and cyanide leaching of samples from the Coringa Gold Project. Samples were collected from 20 different drill holes and used to prepare two composites, a high-grade composite contained 23 gpt gold and a low-grade composite contained 3 gpt gold.

Size-by-size analyses, at five separate size fractions (+300 microns to -38 microns), indicated that the gold assay values were very similar in each size fraction meaning that the gold is evenly disseminated. The combined assays also compared well to the initial assays of each composite.

Gravity concentration was performed using a Knelson concentrator with the tails being treated on a Mozley table. Results were similar for each composite with about 40% of the gold being recovered into a combined Knelson and Mozley concentrate weighing about 7% of the feed material weight.

Cyanide leaching of the Mozley table middling and tails for each composite, after grinding to less than 1 mm, resulted in gold recoveries from the middling ranging from 40% to 64% and from the tails ranging from 34% to 87%.

Flotation of Mozley table tails and middling materials, for each composite, after grinding to 150 microns, resulted in gold recoveries of 93% from the middling and 86% from the tails. Concentrate weights ranged from 6% to 12% of the feed weights. Silver, lead, zinc, and copper recoveries in the flotation concentrates were similar to gold recoveries. Cleaner concentrate assays ranged from 2% to 11% lead and about 3% zinc.

The SGS Geosol test program results indicated that there was potential for reasonable metal recoveries being obtained from the materials from the Coringa Gold Project. Further programs were deemed necessary to refine the processing schemes and recovery projections. Those programs are discussed below.

#### *13.3.2 RDi*

In 2010, RDi of Wheat Ridge, Colorado, USA issued a report that presented results from a scoping-level metallurgical test program. Two composite samples were prepared using 114 kg of analytical reject materials from drill holes of the Serra and Guaxenbinha-Meio-Onza (Meio) Zones. The composites were subjected to indirect ball mill work index determinations, gravity concentration, flotation, and whole-ore cyanide leaching. The Serra composite was made from 19 drill hole samples while the Meio composite consisted of 52 samples.

Head assays of the Serra and Meio composites were:

- Serra - 8.2 gpt gold, 14.9 gpt silver, 0.26% lead, 0.13% zinc
- Meio - 11.1 gpt gold, 16 gpt silver, 1.6% lead, 0.52% zinc

Indirect ball mill work index determinations were performed due to lack of coarse material available to perform standard BWi tests. It was estimated that Serra had a BWi of 18.8 and Meio had a value of 22.3, both very hard materials.

Gravity concentration testing was performed on both composites via a 3.5-inch diameter Knelson concentrator with rougher concentrates cleaned on a Gemini table. Samples were ground to three size fractions (p80's of 210, 150, and 105 microns) prior to testing. Gold recoveries ranged from 37% to 68% into concentrates weighing about 1% of the feed weight. Silver recoveries ranged from 10% to 23%. Gravity concentrates assayed over 400 gpt gold and 260 gpt silver.

Two flotation test series were performed on the composites including bulk-sulfide flotation and differential flotation. Bulk-sulfide flotation recovered 90% to 95% of the gold and 70% to 80% of the silver into a concentrate assaying over 90 gpt gold and 106 gpt silver. Concentrate weights ranged from 8% to 12% of the feed weights. Differential flotation resulted in the precious metals distributed across the lead, zinc, and pyrite concentrates with perhaps only the lead concentrates being of sufficient quality for marketing.

Whole-ore cyanide leaching of the composites was performed using cyanide with and without activated carbon (CIL Process). Without carbon, gold recoveries from the Serra and Meio composites were 92% and 87% and silver recoveries were 63% and 60%, respectively. Using CIL, gold recoveries for Serra and Meio composites were 99% and 86%, respectively, while silver recoveries were 74% and 63%, respectively. NaCN consumptions ranged from 1.8 to 2.7 kg/t and lime consumptions ranged from 6.8 to 10.2 kg/t.

Additional CIL tests were performed to investigate pre-aeration prior to leaching and a coarser grind size. For Serra, the coarser grind resulted in a reduced gold recovery by 2% (from 99% to

97%), similar silver recoveries (92%), and a lower NaCN consumption to 1.1 kg/t. For Meio, the coarser grind resulted in a reduced gold recovery by 5% (from 98% to 93%), however, the pre-aeration prior to leaching improved gold recovery from 86% in the earlier work to 98%. Silver recoveries were similar for each grind size; however, the pre-aeration step greatly improved the silver recovery from 63% to 93%. NaCN consumption was 1.4 kg/t. The whole-ore CIL test metal recoveries were very good with a grind size p80 of 74 microns and a pre-aeration step prior to leaching found to be optimum.

Table 13.2 presents the whole-ore cyanide leach results.

**Table 13.2: RDi Whole-Ore Cyanide Leach Results**

| Composite | Grind p80 (microns) | Leach Time (Hours) | Carbon Addition | Pre-Air (4 hours) | Gold Rec (%) | Silver Rec (%) | NaCN (kg/t) | Lime (kg/t) |
|---|---|---|---|---|---|---|---|---|
| Serra | 74 | 48 | No | No | 91.7 | 63.4 | 1.8 | 10.2 |
| Serra | 74 | 48 | Yes | No | 98.9 | 74.3 | 2.0 | 7.7 |
| Serra | 74 | 48 | Yes | Yes | 99.0 | 92.2 | 1.2 | N/A |
| Serra | 150 | 48 | Yes | Yes | 97.2 | 92.2 | 1.1 | N/A |
| | | | | | | | | |
| Meio | 74 | 48 | No | No | 86.5 | 60.4 | 2.4 | 6.8 |
| Meio | 74 | 48 | Yes | No | 86.0 | 63.2 | 2.7 | 7.8 |
| Meio | 74 | 48 | Yes | Yes | 97.7 | 93.2 | 1.8 | N/A |
| Meio | 150 | 48 | Yes | Yes | 93.2 | 93.2 | 1.1 | N/A |

### *13.3.3 TDP*

During 2013, TDP of Nova Lima, MG, Brazil, issued reports that presented results of tests performed on two composites. Composite 1 was made from 10 samples, weighed 244 kg, and represented the Galena-Mãe de Leite-Serra zones (Serra). Composite 2 was made from 11 samples, and weighed 281 kg, and represented the Meio-Come Quieto zones (Meio). Composite 1 contained approximately 20% of its material from the Galena zone, 20% from the Mãe de Leite zone, and 60% from the Serra zone.

Head assay analyses of the composites were:

- Composite 1 (Serra) - 3.2 gpt gold, 9.3 gpt silver, 0.15 % lead, 0.07 % zinc, 0.04 % copper
- Composite 2 (Meio) – 2.7 gpt gold, 5.8 gpt silver, 0.23 % lead, 0.20 % zinc, 0.04 % copper

The TDP testing program included:

- gravity concentration and IL of gravity concentrates
- whole-ore and gravity tails cyanide leaching with and without activated carbon
- flotation of gravity tails and cyanide leaching of flotation concentrates
- cyanide neutralization
- settling
- BWi tests

Gravity concentration testing was performed on each composite at three grind sizes. Table 13.3 shows the results of the gravity concentration, at a water fluidization flow of 5 L/m, followed by IL of the gravity concentrates. Gravity recoveries ranged from 52% to 66% for gold and 24% to 34% for silver. IL extractions ranged from 95% to 99% for gold and 54% to 72% for silver. The high leach recoveries of gold indicate that the gold particles are likely free in the concentrates with the finer the grind the higher the recoveries.

**Table 13.3: Gravity Concentration and Intensive Leach Tests**

| Composite | Grind p80 (microns) | Gravity Mass Rec (%) | Gravity Gold Rec (%) | Gravity Silver Rec (%) | Int. Leach Gold Rec (%) | Int. Leach Silver Rec (%) |
|---|---|---|---|---|---|---|
| Serra | 150 | 2.2 | 64.4 | 34.3 | 94.9 | 60.7 |
| Serra | 106 | 1.7 | 65.8 | 33.0 | 99.1 | 70.7 |
| Serra | 75 | 1.4 | 57.8 | 24.6 | 99.3 | 67.0 |
| | | | | | | |
| Meio | 150 | 2 | 56.2 | 30.3 | 95.8 | 53.7 |
| Meio | 106 | 1.7 | 58.4 | 27.5 | 98.1 | 62.5 |
| Meio | 75 | 1.3 | 52.2 | 24.5 | 98.9 | 72.2 |

Whole-ore cyanide leaching tests, with and without activated carbon, were performed on both composites. Test results are presented in Table 13.4 and indicate that gold recoveries improve with finer grinding and when using activated carbon (CIL process). At the finest grinds and when using carbon, gold recoveries were 99% for Serra and 97% for Meio while silver recoveries were both at about 77%. The average cyanide and hydrated lime consumptions for all tests were 0.52 kg/t and 0.4 kg/t, respectively.

**Table 13.4: TDP – Whole Ore Cyanide Leach Tests**

| Composite | Grind p80 (microns) | Carbon Addition | Gold Rec (%) | Silver Rec (%) |
|---|---|---|---|---|
| Serra | 150 | No | 91.1 | 62.8 |
| Serra | 150 | Yes | 96.7 | 46.6 |
| Serra | 106 | No | 91.7 | 77.4 |
| Serra | 106 | Yes | 98.0 | 76.0 |
| Serra | 75 | No | 93.0 | 70.7 |
| Serra | 75 | Yes | 99.0 | 78.0 |
| | | | | |
| Meio | 150 | No | 89.2 | 62.7 |
| Meio | 150 | Yes | 92.3 | 68.0 |
| Meio | 106 | No | 91.1 | 76.6 |
| Meio | 106 | Yes | 94.8 | 64.8 |
| Meio | 75 | No | 90.7 | 69.3 |
| Meio | 75 | Yes | 96.7 | 76.7 |

Further testing included gravity concentration, IL of the gravity concentrates and leaching of the gravity tailing combined with the leach residues. Table 13.5 presents the results. The gravity concentrates masses, prior to intensive cyanidation, were all about 1.3% of the feed weight. When using activated carbon the overall gold recoveries for Composite 1 (Serra) were 98% and for Composite 2 (Meio) were 97%, both 1% to 2% higher than the tests run without carbon. Silver recoveries were 66% for Serra and 53% for Meio when using carbon. Cyanide consumptions were reasonable and ranged from 0.5 kg/t to 1.3 kg/t for all tests.

**Table 13.5: Gravity Concentration, Intensive Cyanidation, and Tails Leaching (at 75 micron grinds)**

| Composite | Int. Leach Au Rec. (%) | Int. Leach Ag Rec. (%) | Carbon (gpl) | Leach Density (%) | Tails Leach Au Rec. (%) | Tails Leach Ag Rec. (%) | Total Au Rec. (%) | Total Ag Rec. (%) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| Serra | 63.8 | 16.3 | 0 | 40 | 33.3 | 53.8 | 97.1 | 70.1 |
| Serra | 60.5 | 15.5 | 0 | 50 | 36.9 | 58.0 | 97.3 | 73.5 |
| Serra | 68.3 | 18.3 | 18 | 40 | 29.8 | 46.3 | 98.2 | 64.6 |
| Serra | 63.7 | 17.3 | 18 | 40 | 34.8 | 51.4 | 98.4 | 68.7 |
| | | | | | | | | |
| Meio | 44.3 | 11.9 | 0 | 40 | 50.6 | 48.5 | 94.9 | 60.4 |
| Meio | 37.5 | 12.8 | 0 | 50 | 57.4 | 49.5 | 94.9 | 62.3 |
| Meio | 48.1 | 14.4 | 18 | 50 | 48.6 | 37.3 | 96.7 | 51.7 |
| Meio | 39.6 | 16.7 | 18 | 50 | 57.7 | 37.5 | 97.3 | 54.1 |

After the successful gravity and cyanidation test results, it was decided to investigate the possibility of using flotation to produce a concentrate from the combined gravity tails and IL residues and then leach that flotation concentrate to reduce the amount of overall material that might be leached.

The two composites were first subjected to gravity concentration at three different grind sizes with the gravity concentrates then cyanide leached. Results of these tests were similar to the gravity/IL tests shown in Table 13.4. Gold recoveries for Serra ranged from 62% to 68% and for Meio from 44% to 51%. Silver recoveries after IL were also similar to previous tests and ranged from 14% to 20%. Gravity tails combined with leach residues from the above tests were then subjected to flotation.

Results were positive with Serra gold and silver recoveries into the concentrates averaging 98% and 93%, respectively. Meio gold and silver flotation recoveries averaged 96% and 89%, respectively. Concentrate mass pulls averaged about 12% for all tests. Four flotation confirmation tests were performed at those optimum conditions with gold and silver recoveries averaging 97% and 93%, respectively, about the same as the previous tests.

Flotation concentrates from each composite were then cyanide leached. Gold and silver flotation concentrate leach recoveries for Serra were 95% and 43%, respectively, and for Meio were 93% and 37%, respectively.

The overall gold and silver recoveries from the above gravity, IL, flotation, and concentrate leach tests for Serra were 95.5% for gold and 48% for silver. Meio recoveries overall were 92.4% for gold and 42.1% for silver. These overall recoveries are slightly lower than the tests that used gravity, IL, and leaching of gravity tails with IL residues.

Cyanide neutralization tests were performed on whole-ore leach tailings of both composites with the cyanide concentrations of slurries prior to treatment ranging from 56 mg/l to 132 mg/l. The tests that used higher ratios of $SO_2$ to CN reduced CN levels to less than 1 mg/l in 1 to 2 hours, the others reached 5 mg/l in 2.5 hours. The tests are considered preliminary, however, did confirm that CN levels can be reduced effectively using a standard treatment process in a reasonable time period.

Settling tests were performed on the two composites to determine settling (thickener) requirements for finely ground material prior to leaching. To achieve a targeted 50% solids in the thickener underflow and a clear overflow, from a feed density of 21% solids the unit settling area for both composites was 0.13 m2/t/d of feed.

A BWi test was performed on each composite. The work index values for the Serra and Meio composites were 20.3 kWh/t and 25.2 kWh/t, respectively, both very hard.

TDP showed that the samples all responded very well to gravity concentration, whole-ore cyanidation, and flotation. Results from TDP's tests were used to design the Plenge test program discussed below.

### *13.3.4 Plenge*

In May and July 2017, Plenge of Miraflores, Lima, Peru issued reports that presented results of metallurgical tests performed on samples of recently drilled core from the Serra and Meio deposits, conducted in connection with the preparation of the FS. In February 2017, a total of

659 kg of samples were received at the lab with 71 samples being from Serra and 50 from Meio. A total of 61 samples of ½ HQ core were used to prepare a master composite and eight variability composites. A total of 52 samples from whole HQ drill core were used for comminution testing. Sliced PQ core samples were used to prepare six composites for additional variability and comminution testing.

The Plenge test programs consisted of the following:

- Comminution and physical properties
- Whole-ore cyanidation
- Gravity concentration, IL of concentrates, leaching of gravity tails
- Whole-ore flotation
- Cyanide neutralization
- Flotation of detoxified leach tails
- Settling
- Variability sample testing
- Gravity concentrate mineralogy
- Produce a representative tails sample for tailings characterization by others

A 100 kg master composite was prepared using 50 kg each of Serra (39 samples) and Meio (22 samples). The head assays of the ½ HQ core master composite, eight ½ HQ core variability composites, and six sliced PQ core variability composites are presented in Table 13.6.

## Table 13.6: Plenge – ½ HQ Core Master and Variability Composite Head Assays and Sliced PQ Core Variability Composite Head Assays

| 1/2 HQ Core Master and Variability Composite Head Assays | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Element | Units | Master Composite Assay | Serra Hi Grade Assay | Serra Med Grade Assay | Serra Lo Grade Assay | Serra Mine Grade Assay | Meio Hi Grade Assay | Meio Med Grade Assay | Meio Lo Grade Assay | Meio Mine Grade Assay |
| | | | | | | | | | | |
| Au | gpt | 13.6 | 44.3 | 13.3 | 2.9 | 7.8 | 24.9 | 12.3 | 3.1 | 8.8 |
| Ag | gpt | 24 | 120 | 34 | 3 | 14 | 26 | 13 | 3 | 10 |
| Cu | % | 0.11 | 0.20 | 0.09 | 0.02 | 2.00 | 0.24 | 0.16 | 0.03 | 0.09 |
| Cu CN | % | 0.04 | 0.08 | 0.04 | 0.01 | 0.03 | 0.04 | 0.08 | 0.01 | 0.02 |
| Hg | ppm | 0.32 | 0.21 | 0.15 | 0.05 | 0.11 | 1.18 | 0.25 | 0.10 | 0.17 |
| S (total) | % | 1.85 | 1.55 | 1.91 | 0.25 | 0.74 | 3.83 | 0.97 | 0.71 | 2.88 |
| C (total)] | % | 0.09 | 0.14 | 0.07 | 0.09 | 0.08 | 0.07 | 0.12 | 0.05 | 0.12 |
| C (org) | % | 0.08 | 0.08 | 0.06 | 0.07 | 0.06 | 0.06 | 0.10 | 0.04 | 0.10 |
| Sp. Grav. | g/cc | 2.65 | 2.58 | 2.54 | 2.47 | 2.42 | 2.65 | 2.60 | 2.56 | 2.60 |
| Fe | % | 2.45 | 2.88 | 2.53 | 1.16 | 1.71 | 3.30 | 2.11 | 1.90 | 3.52 |
| Pb | % | 0.93 | 0.42 | 0.30 | 0.04 | 0.23 | 3.27 | 1.00 | 0.26 | 1.22 |
| Zn | % | 0.50 | 0.14 | 0.18 | 0.03 | 0.13 | 1.85 | 1.08 | 0.17 | 0.28 |
| Bi | ppm | 30 | 196 | 59 | 9 | 25 | 6 | < 5 | 5 | < 5 |
| Cd | ppm | 27 | 10 | 16 | 3 | 9 | 94 | 61 | 7 | 15 |
| Co | ppm | 3 | 8 | 6 | 4 | 4 | 2 | 1 | 2 | 3 |
| Mo | ppm | < 5 | < 5 | < 5 | < 5 | < 5 | < 5 | < 5 | < 5 | < 5 |
| Sb | ppm | < 5 | < 5 | < 5 | < 5 | < 5 | < 5 | < 5 | < 5 | < 5 |

| Sliced PQ Core Variability Composite Head Assays | | | | | | | |
|---|---|---|---|---|---|---|---|
| Element | Units | Serra Met 17-2 HV Assay | Serra Met 17-2 FV Assay | Serra Met 17-4 MV Assay | Serra Met 17-4 F Assay | Meio Met 17-1 Assay | Meio Met 17-3 Assay |
| | | | | | | | |
| Au | gpt | 1.89 | 0.35 | 0.07 | 1.92 | 7.15 | 19.3 |
| Ag | gpt | 11.20 | 1.04 | <0.2 | 4.70 | 35.90 | 19.34 |
| Cu | % | 0.01 | 0.01 | 0.01 | 0.02 | 0.28 | 0.29 |
| Cu CN | % | 0.00 | 0.00 | 0.00 | 0.01 | 0.12 | 0.06 |
| Hg | ppm | <0.02 | <0.02 | 0.02 | 0.02 | 0.94 | 0.35 |
| S (total) | % | 0.45 | 0.29 | 0.06 | 0.21 | 3.25 | 3.07 |
| C (total)] | % | 0.07 | 0.06 | 0.05 | 0.09 | 0.16 | 0.08 |
| C (org) | % | 0.04 | 0.03 | 0.04 | 0.04 | 0.05 | 0.05 |
| Sp. Grav. | g/cc | 2.59 | 2.62 | 2.51 | 2.65 | 2.79 | 2.69 |
| Fe | % | 1.26 | 1.03 | 0.87 | 1.08 | 2.73 | 2.94 |
| Pb | % | 0.05 | 0.26 | 0.01 | 0.06 | 5.00 | 1.73 |
| Zn | % | 0.02 | 0.06 | 0.01 | 0.04 | 1.47 | 0.82 |
| Bi | ppm | 12 | <5 | <5 | <5 | <5 | <5 |
| Cd | ppm | 3 | 6 | 3 | 5 | 90 | 47 |
| Co | ppm | 2 | 1 | 1 | 1 | <1 | <1 |
| Mo | ppm | 6 | 5 | 5 | 6 | 9 | 9 |
| Sb | ppm | <5 | <5 | <5 | <5 | 24 | 18 |

Comminution testing of the Serra and Meio samples was performed to determine Uniform Compressive Strength (UCS), Crushing Work Index (CWi), Abrasion Index (Ai), and BWi. Results are presented in Table 13.7. Serra has the higher UCS, CWi, and Ai but both have similar BWis at about 18.6 kWh/t.

**Table 13.7: Plenge – Comminution Results**

| Samples | UCS (Mpa) | CWi kWh/t | Ai* (grams) | BWi* kWh/t |
|---|---|---|---|---|
| | | | | |
| Meio | 26.2 | 6.5 | 0.3422 | 19.0 |
| No. Samples tested | 14 | 23 | 26 | 26 |
| | | | | |
| Serra | 63.5 | 10.9 | 0.4114 | 18.2 |
| No. Samples tested | 13 | 24 | 26 | 26 |
| | | | | |
| Average | 44.9 | 8.7 | 0.3768 | 18.6 |

* Abrasion and Bond Work Index tests for each deposit were performed on 2 composites. Each comp contained 13 samples.

A preliminary whole-ore standard cyanidation test was performed on the master composite. Gold and silver recoveries were 98.3% and 58.7%, respectively, similar to previous lab programs, with leaching mostly completed within 24 hours. Cyanide and lime consumptions were 2.2 and 3.4 kg/t, respectively.

Gravity concentration, in three stages, followed by intensive cyanidation of the three concentrates was performed on the master composite at descending grind sizes. The samples were coarse-ground and then passed through a lab scale Falcon DB-4 centrifugal concentrator with the concentrates passed over a Mozley table for cleaning. Falcon tails from each stage were then reground and passed again through the Falcon concentrator. All three Mozley concentrates were cyanide leached for 24 hours. The results of the staged tests are presented in Table 13.8

**Table 13.8: Plenge – Gravity Concentration & Intensive Leaching of Master Composite by Stages**

| Grind Size by Stage | Product | Wt % | Gold Conc (gpt) | Gold Rec by Grav (%) | Gold Rec by CN by stage (%) | Gold Rec by CN from Heads (%) | NaCN (kg/t) | Lime (kg/t) |
|---|---|---|---|---|---|---|---|---|
| 100% | Cleaned Conc. | 0.21 | 1720 | 26.5 | 85.8 | 22.7 | 0.034 | 0.006 |
| < 800 microns | | | | | | | | |
| 60% | Cleaned Conc. | 0.14 | 2096 | 21.9 | 93.0 | 20.4 | 0.026 | 0.006 |
| < 75 microns | | | | | | | | |
| 80% | Cleaned Conc. | 0.16 | 1290 | 15.2 | 94.7 | 14.4 | 0.027 | 0.006 |
| < 75 microns | | | | | | | | |
| **Totals** | | **0.51** | | **63.6** | **90.4** | **57.5** | **0.087** | **0.018** |

| Grind Size by Stage | Product | Wt % | Silver Conc (gpt) | Silver Rec by Grav (%) | Silver Rec by CN by stage (%) | Silver Rec by CN from Heads (%) | NaCN (kg/t) | Lime (kg/t) |
|---|---|---|---|---|---|---|---|---|
| 100% | Cleaned Conc. | 0.21 | 1658 | 12.9 | 61.4 | 7.9 | 0.034 | 0.006 |
| < 800 microns | | | | | | | | |
| 60% | Cleaned Conc. | 0.14 | 1680 | 8.9 | 79.8 | 7.1 | 0.026 | 0.006 |
| < 75 microns | | | | | | | | |
| 80% | Cleaned Conc. | 0.16 | 1166 | 6.9 | 78.9 | 5.5 | 0.027 | 0.006 |
| < 75 microns | | | | | | | | |
| **Totals** | | **0.51** | | **28.7** | **71.4** | **20.5** | **0.087** | **0.018** |

Two bulk rougher flotation tests were performed on the master composite followed by cyanidation of the flotation cleaner concentrates, cleaner tails, and rougher tails. The average results for the two tests are shown in Table 13.9. Combining all leach results indicates that 97% of the gold and 50% of the silver can be recovered, similar to the preliminary whole-ore standard leach test in gold recovery but slightly lower for silver.

**Table 13.9: Plenge – Whole Ore Flotation and Cyanidation of Concentrates**

| Product | Wt % | Clnr Conc Gold (gpt) | Clnr Conc Silver (gpt) | Float Rec Gold (%) | Float Rec Silver (%) | Stage Leach Rec Gold (%) | Stage Leach Rec Silver (%) | Total Rec Flt + Leach Gold (%) | Total Rec Flt + Leach Silver (%) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| Clean Conc. | 7.0 | 172 | 313 | 91.0 | 91.8 | 98.5 | 51.7 | 89.7 | 47.4 |
| Clnr Tails | 12.1 | 6.5 | 8.3 | 5.9 | 4.2 | 86.4 | 8.8 | 5.1 | 0.4 |
| Tails | 80.9 | 0.51 | 1.19 | 3.1 | 4.0 | 80.1 | 52.9 | 2.5 | 2.1 |
| | | | | | | | | | |
| Heads | 100 | 13.4 | 24.0 | | | | | | |

A total of 18 cyanide leach tests were performed to investigate the following seven conditions and their impacts on metal recoveries and consumptions of cyanide and lime:

- P80 grind sizes of 74 and 105 microns
- With and without gravity concentration prior to leaching
- With and without activated carbon addition during leaching
- With and without pre-aeration prior to leaching
- Cyanide strengths of 200 and 800 ppm in leach solutions
- With and without the addition of lead nitrate in leaching
- pH levels 10.5 to 11.5 during leaching

Table 13.10 presents the results from those tests.

**Table 13.10: Plenge – Summary of 18 Gravity, Leach Tests on Master Composite**

| Test No. | Gravity | Pre-Ox | Carbon (CIL) | Grind (p80) | pH | NaCN (ppm) | PbNO3 (gpt) (gpt) | Grav + Leach Gold Rec (%) | Grav + Leach Silver Rec (%) | NaCN kg/t | Lime kg/t |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| 1 | yes | no | no | 74 | 11.5 | 200 | 0 | 97.4 | 60.5 | 0.6 | 1.2 |
| 2 | no | no | no | 105 | 11.5 | 800 | 80 | 97.5 | 56.7 | 1.2 | 1.3 |
| 3 | yes | no | no | 105 | 10.5 | 800 | 27 | 97.5 | 63.7 | 1.5 | 1.0 |
| 4 | yes | yes | no | 74 | 10.5 | 800 | 80 | 97.5 | 62.5 | 1.3 | 0.8 |
| 5 | yes | yes | no | 74 | 10.5 | 800 | 80 | 97.5 | 63.2 | 1.3 | 0.8 |
| 6 | no | no | no | 105 | 11.5 | 800 | 80 | 97.5 | 57.8 | 1.2 | 1.2 |
| 7 | yes | no | yes | 105 | 10.5 | 200 | 80 | 97.1 | 54.5 | 0.7 | 0.6 |
| 8 | yes | yes | yes | 105 | 11.5 | 800 | 0 | 97.7 | 57.9 | 1.3 | 1.6 |
| 9 | yes | yes | yes | 105 | 11.5 | 800 | 0 | 97.8 | 56.8 | 1.3 | 1.6 |
| 10 | no | yes | no | 74 | 11.5 | 800 | 0 | 98.4 | 54.0 | 1.0 | 1.4 |
| 11 | no | no | no | 74 | 10.5 | 200 | 53 | 97.3 | 48.3 | 0.7 | 0.6 |
| 12 | yes | no | no | 74 | 11.5 | 200 | 0 | 97.4 | 60.8 | 0.7 | 1.3 |
| 13 | no | no | yes | 74 | 10.5 | 800 | 0 | 98.3 | 54.2 | 1.8 | 0.6 |
| 14 | no | yes | no | 105 | 10.5 | 200 | 0 | 96.7 | 50.3 | 0.4 | 0.8 |
| 15 | no | yes | yes | 74 | 11.5 | 200 | 80 | 96.9 | 46.0 | 0.6 | 1.6 |
| 16 | yes | yes | no | 105 | 11.5 | 200 | 80 | 97.0 | 61.8 | 0.5 | 1.1 |
| 17 | yes | no | yes | 74 | 11.5 | 800 | 53 | 98.1 | 59.4 | 1.7 | 1.2 |
| 18 | no | yes | yes | 74 | 11.5 | 200 | 80 | 96.9 | 47.0 | 0.6 | 1.6 |
| | | | | | | | | | | | |
| **Average** | | | | | | | | **97.5** | **56.4** | **1.0** | **1.1** |

Based on analysis of the test results the following observations were made:

- Gold recoveries averaged 97% and silver recoveries averaged 56% for all tests
- Cyanide and lime consumptions averaged 1.0 kg/t and 1.1 kg/t for all tests, respectively
- Gravity concentration prior to leaching improves silver recoveries by about 9%
- Grinding to 74 microns has a slight advantage in gold recovery
- Carbon addition (CIL) improves recoveries but increases cyanide consumption
- Pre-aeration decreases NaCN consumption
- Higher NaCN concentrations improve metal recoveries
- Lead nitrate addition had no impact
- Higher pH increases recoveries while lowering cyanide consumption

Four master composite confirmation tests were performed using the following optimum conditions developed in the previous 18 tests:

- Gravity concentration prior to leaching at a grind p80 of 210 microns
- Intensive cyanidation of gravity concentrates
- Re-grinding gravity tails to a p80 of 74 microns

- Pre-aeration prior to leaching
- pH's of 11.5 for leaching
- 24-hours leach time
- Carbon addition (CIL) in the leaching of gravity tails
- Initial cyanide concentrations of 800 ppm

The total gold and silver recoveries for the four confirmation tests were all similar and averaged 98% and 61%, respectively. The gravity recoveries were 63% for gold and 37% for silver, in concentrates weighing 0.55% of the feed weights. The average cyanide and lime addition in the four tests was 1.1 kg/t and 1.3 kg/t, respectively. Solution analyses of CIL leach tails slurry averaged 90 ppm of copper.

Gravity concentrate leach residues contain some gold and silver, plus lead. An assay analysis was performed on one sample of concentrates to determine its potential for marketing after IL. An assay result is shown below.

- Gold – 35 ppm (can range from 10 to 50 ppm, depending on head grades)
- Silver – 537 ppm (can range from 100 to 800 ppm, depending on head grades)
- Lead – 29%
- Copper – 0.33%
- Iron – 31%
- Zinc – 2%
- Sulfur (total) – 37%

To supply sufficient material for cyanide neutralization (detox) tests a large-scale whole-ore CIL cyanide leach test was performed using optimized conditions. No gravity concentration prior to CIL was performed. The gold and silver recoveries were 98% and 55%, respectively. Cyanide and lime consumptions were 1.5 kg/t and 1.4 kg/t, respectively. The gold recoveries were similar in the previous gravity/leach tests; however, the silver recoveries were lower, mainly due to lack of gravity concentration.

Five cyanide detox tests were performed, 3 in batch mode and 2 in continuous mode, using the standard $SO_2$/Air process technique with SMBS as the oxidant. The best results were obtained from a continuous test treating a feed slurry containing CN (WAD) of 378 ppm and CN (Total) of 412 ppm. After two hours of treatment the resulting solution analyses are shown below.

- pH = 8.1
- ORP = 133 mV
- Dissolved Oxygen = 4 mg/l
- Iron = 0.2 mg/l
- Free CN = 0.6 mg/l
- WAD CN = 1.4 mg/l
- Total CN = 2.9 mg/l

- SCN = 110 mg/l
- Reagent Consumptions: 3.9 kg/t SMBS, 0.5 kg/t lime, 0.2 kg/t copper sulfate

Flotation of a concentrate was performed on a sample of detoxified tails to determine the potential for recovering and marketing a by-product. A bulk lead/zinc concentrate was produced that weighed 1.5% of the feed weight and assayed 401 gpt silver, 1.7 gpt gold, 31% lead, and 31% zinc. The metal recoveries, based on the original head grade prior to leaching, were 32% for silver, 0.4% for gold, 72% for lead, and 88% for zinc.

Three settling tests, using the standard Kynch Method, were performed on a sample of gravity concentration tails to determine thickening requirements prior to pre-aeration and CIL. The tests compared three flocculants at dosages of 10 g/t of feed, pH of 11.0, a feed density of 15% solids, and underflow density of 44%. The best results were when using the Praestol Flocculant 3130, a medium weight non-ionic polymer, which created the lowest area requirement of 0.139 $m^2$/t/d of feed. Higher underflow densities (to 51%) would require an area of 0.180 $m^2$/t/d.

Four ½ HQ core variability composites were formed for each of the deposits. Composites represented gold and silver grades that were high, medium, low, and mine grade. The head grades were shown in Table 13.6. Each composite was subjected to standard whole-ore CIL leaching and gravity/IL/CIL of tails testing for comparison of results.

Results of the four Serra whole-ore CIL tests are shown in Table 13.11 and results of the Serra gravity/IL/leach tests are shown in Table 13.12. Gold and silver recoveries in the whole-ore tests averaged 98.4% and 43.3%, respectively. Gold and silver recoveries in the gravity/IL/leach tests averaged 99.3% and 62%, respectively.

**Table 13.11: Plenge – Serra Variability Tests – Whole-Ore CIL Leach**

| Serra Composite | Heads Au (gpt) | Heads Ag (gpt) | Residue Au (gpt) | Residue Ag (gpt) | Rec Au (%) | Rec Ag (%) | NaCN (kg/t) | Lime (kg/t) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| High Grade | 40.0 | 122 | 0.507 | 75.8 | 98.7 | 37.8 | 1.6 | 1.5 |
| Medium Grade | 12.7 | 36 | 0.093 | 23.1 | 99.3 | 34.8 | 1.3 | 1.6 |
| Low Grade | 2.8 | 3 | 0.083 | 1.2 | 97.1 | 58.7 | 1.1 | 1.6 |
| Mine Grade | 7.2 | 13 | 0.102 | 7.6 | 98.6 | 41.8 | 1.3 | 1.1 |
| | | | | | | | | |
| **Average** | **15.7** | **43** | **0.196** | **26.9** | **98.4** | **43.3** | **1.3** | **1.5** |

**Table 13.12: Plenge – Serra Variability Tests – Gravity/IL/CIL Tails Leach**

| Serra Composite | Heads Au (gpt) | Heads Ag (gpt) | Grav Rec Au (%) | Grav Rec Ag (%) | CIL Rec Au (%) | CIL Rec Ag (%) | Total Rec Au (%) | Total Rec Ag (%) | NaCN (kg/t) | Lime (kg/t) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| High Grade | 44.3 | 120 | 68.5 | 34 | 31.0 | 22 | 99.5 | 56 | 1.7 | 1.8 |
| Medium Grade | 13.3 | 34 | 66.0 | 39 | 33.2 | 20 | 99.2 | 59 | 1.4 | 1.8 |
| Low Grade | 2.9 | 3 | 69.0 | 48 | 30.2 | 24 | 99.3 | 71 | 1.1 | 1.8 |
| Mine Grade | 7.9 | 14 | 67.1 | 42 | 32.1 | 21 | 99.1 | 62 | 1.2 | 1.6 |
| | | | | | | | | | | |
| **Average** | **17.1** | **43** | **67.7** | **41** | **31.6** | **22** | **99.3** | **62** | **1.4** | **1.7** |

The results of the four Meio whole-ore CIL tests are shown in Table 13.13 and results of the Meio gravity/IL/leach tests are shown in Table 13.14. Gold and silver recoveries in the whole-ore tests averaged 94.5% and 73.5%, respectively. Gold and silver recoveries in the gravity/leach tests averaged 97.2% and 78.5%, respectively.

**Table 13.13: Plenge – Meio Variability Tests – Whole-Ore CIL Leach**

| Meio Composite | Heads Au (gpt) | Heads Ag (gpt) | Residue Au (gpt) | Residue Ag (gpt) | Rec Au (%) | Rec Ag (%) | NaCN (kg/t) | Lime (kg/t) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| High Grade | 26.2 | 27.6 | 1.84 | 8.2 | 93.0 | 70.2 | 1.6 | 2.1 |
| Medium Grade | 12.8 | 13.0 | 0.35 | 2.8 | 97.3 | 78.4 | 2.8 | 2.3 |
| Low Grade | 3.3 | 2.6 | 0.18 | 0.7 | 94.6 | 74.8 | 1.2 | 2.3 |
| Mine Grade | 8.5 | 8.6 | 0.59 | 2.5 | 93.1 | 70.7 | 1.2 | 2.0 |
| | | | | | | | | |
| **Average** | **12.7** | **12.9** | **0.74** | **3.6** | **94.5** | **73.5** | **1.7** | **2.2** |

**Table 13.14: Plenge – Meio Variability Tests – Gravity/IL/CIL Tails Leach**

| **Meio Composite** | **Heads Au (gpt)** | **Heads Ag (gpt)** | **Grav Rec Au (%)** | **Grav Rec Ag (%)** | **CIL Rec Au (%)** | **CIL Rec Ag (%)** | **Total Rec Au (%)** | **Total Rec Ag (%)** | **NaCN (kg/t)** | **Lime (kg/t)** |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| High Grade | 25.6 | 28.9 | 38.4 | 24.3 | 59.5 | 51.6 | 97.8 | 75.8 | 1.6 | 2.0 |
| Medium Grade | 12.7 | 14.3 | 57.7 | 41.9 | 40.2 | 41.4 | 97.9 | 83.3 | 2.6 | 2.0 |
| Low Grade | 3.4 | 3.1 | 34.7 | 29.0 | 60.9 | 49.7 | 95.6 | 78.8 | 1.3 | 1.9 |
| Mine Grade | 8.9 | 9.1 | 43.2 | 34.2 | 54.3 | 42.0 | 97.5 | 76.2 | 1.2 | 1.8 |
| | | | | | | | | | | |
| **Average** | **12.6** | **13.8** | **43.5** | **32.3** | **53.4** | **41.9** | **97.2** | **79** | **1.7** | **1.9** |

There does not appear to be a relationship between gold and silver head grades to recoveries in any of the above variability tests. Serra samples, however, have a 4% higher gold recovery than Meio samples. Silver recoveries from Serra samples are lower than Meio probably due to the higher silver grades and different silver mineralogy.

A gravity/CIL tails leach test was performed on the Serra and Meio variability composites that examined coarsening the grind size to a p80 of 150 microns from 74 microns. For the coarse grind, gold and silver recoveries for Serra samples were 98% and 59%, respectively, versus 99% and 62% for the finer grind size. For coarse-ground Meio samples, gold and silver recoveries were 92% and 72%, respectively, versus 97% and 79% for the finer grind. Reduced recoveries are more evident in the Meio samples.

Two composites, one for Serra and one for Meio, were prepared using samples from 13 separate ½ HQ drill cores. Each composite was subjected to gravity concentration in a Falcon 4B concentrator after an initial grind p80 of 210 microns. Concentrates from each composite were collected and separated into three size fractions (-2mm to +150 microns, -150 to +74 microns, and -74 to +15 microns), passed over a Mozley table and the concentrates subjected to optical mineralogical examination. Observations are noted below for each composite:

- Serra – The gold particles are mostly liberated with colors ranging from yellow (high grade) to white (electrum). The yellow gold particles are the most abundant, rounded, of various size (up to 2 mm) and are either free and/or associated peripherally with sulfide particles such as sphalerite, galena, or hematite and oxides. The white gold particles are less abundant, generally elongated and locked mostly in sulfides like pyrite and galena which are the most abundant minerals.
- Meio – The gold particles are primarily electrum, with minor yellow gold, and are associated with sulfides and gangue as inclusions of various size. Pyrite and galena are the most abundant minerals.

Six additional variability composites were prepared using the sliced PQ core, four for Serra and two for Meio. The head grades for the six composites were presented in Table 13.6. The Serra composites are lower in grade compared to the four previous Serra variability composites while the Meio composites are comparable to the previous high grade Meio variability composite with even higher values indicated for lead and silver. The composites were subjected to gravity/IL/CIL leaching of gravity tails (at various grind sizes and leach densities) and comminution tests.

Average comminution test results for all six sliced PQ core variability composites are presented below and are comparable to results presented earlier in Table 13.7:

- CWi – 10.95 kWh/t
- Ai – 0.3604 g
- BWi – 16.85 kWh/t

Gravity concentration of the six composites yielded the following results:

- Serra composites – 0.56% weight in concentrates with gold and silver recoveries for all four tests averaging 63.2% and 43.9%, respectively. Gold recoveries ranged from 45% to 79% while silver recoveries ranged from 34% to 53%.
- Meio composites – 0.56% weight in concentrates with gold and silver recoveries for both tests averaging 40.7% and 20%, respectively. Gold recoveries ranged from 33% to 48% while silver recoveries ranged from 7% to 33%.

Gravity concentrates from each composite were subjected to Intensive Cyanide Leaching. The results of the IL tests are presented below:

- Serra composites – Gold and silver recoveries averaged 98.5% and 26.4%, respectively. Gold recoveries ranged from 98% to 99% while silver recoveries ranged from 20% to 57%.
- Meio composites - Gold and silver recoveries averaged 55.3% and 59.3%, respectively. Gold recoveries ranged from 53% to 64% while silver recoveries ranged from 56% to 68%.

Cyanide leaching of the gravity tailings was performed on the six composites. Metal recoveries for the four Serra composites and one of the Meio composites were comparable to previous variability leach tests when using typical leach densities of 45% solids at a grind p80 of 74 microns. Low recoveries were experienced when leaching gravity tailings for Meio sample Met 17-1 (high silver, copper, and lead) but improved significantly when leached at lower slurry densities.

Gravity tailings leach results are discussed below:

- Serra composites - Gold and silver recoveries averaged 90% and 41%, respectively, for all four composites. Gold recoveries ranged from 88% to 93% while silver recoveries ranged from 36% to 51%. At a grind p80 of 105 microns for one test the gold and silver recoveries were lower at 83% and 46%, respectively.
- Meio composite (Met 17-1) - Gold and silver recoveries, when leached at a density of 45% solids and grind p80 of 74 microns, were 67% and 61%, respectively. At a grind p80 of 105 microns and the same density, gold and silver recoveries dropped to 43% and 58%, respectively. At a grind p80 of 74 microns and lower leach densities (16% to 21% solids), gold and silver recoveries for two tests averaged 94% and 73%, respectively. Thus, for samples with high precious metals and sulfides (particularly copper and zinc) it is best to leach at lower densities or blend with lower grade materials.
- Meio composite (Met 17-3) – Gold and silver recoveries were 96% and 68%, respectively, comparable to results obtained from Met 17-1 composite when it was leached at the lower densities.

Overall metal recoveries for the six additional variability composites are discussed below:

- Serra composites – Total gold and silver recoveries (after gravity and CIL leaching) averaged 96% and 67%, respectively, for all four composites.
- Meio composites – Total gold and silver recoveries averaged 97% and 76%, respectively, for both composites at optimum conditions.
- The above total recovery results compare reasonably well to the earlier master composite and variability composite test results.

### 13.3.5 Summary of Test Results

Selected results from the RDi, TDP, and Plenge test programs are presented in Table 13.15.

**Table 13.15: Selected Laboratory Results**

| Laboratory | Test | Deposit Composite | Au Rec (%) | Ag Rec (%) | NaCN kg/t | Lime Kg/t | Comments |
|---|---|---|---|---|---|---|---|
| **RDI - 2010** | CIL, Pre-Air, 48 hours, 74 microns | Serra | 99 | 92 | 1.2 | | |
| | CIL, Pre-Air, 48 hours, 74 microns | Meio | 98 | 93 | 1.8 | | |
| | | | | | | | |
| | Gravity Concentration at 210 microns | Serra | 62 | 20 | | | |
| | Gravity Concentration at 210 microns | Meio | 48 | 23 | | | |
| | | | | | | | |
| **TDP - 2013** | CIL, 48 hours, 74 microns | Serra | 99 | 78 | 0.5 | 0.4 | |
| | CIL, 48 hours, 74 microns | Meio | 97 | 77 | 0.5 | 0.4 | |
| | | | | | | | |
| | CIL, 48 hours, 105 microns | Serra | 98 | 76 | 0.5 | 0.4 | |
| | CIL, 48 hours, 105 microns | Meio | 95 | 65 | 0.5 | 0.4 | |
| | | | | | | | |
| | Gravity Concentration at 150 microns | Serra | 66 | 34 | | | |
| | Gravity Concentration at 150 microns | Meio | 56 | 30 | | | |
| | | | | | | | |
| | Gravity/IL/CIL tails leach, 24 hours, 74 microns | Serra | 98 | 66 | 0.5 | 1.3 | |
| | Gravity/IL/CIL tails leach, 24 hours, 74 microns | Meio | 97 | 53 | 0.5 | 1.3 | |
| | | | | | | | |
| | Bond Ball Mill Work Index (Bwi in kwh/t) | Serra | 20.3 | | | | one test |
| | Bond Ball Mill Work Index (Bwi in kwh/t) | Meio | 25.2 | | | | one test |
| | | | | | | | |
| **Plenge - 2017** | CIL, 24 hours, 74 microns | Serra-Meio | 98 | 57 | 1.0 | 1.1 | 10 tests |
| | CIL, 24 hours, 105 microns | Serra-Meio | 97 | 56 | 1.0 | 1.1 | 8 tests |
| | | | | | | | |
| | Gravity/CIL tails leach, 24 hours, 74 microns | Serra-Meio | 98 | 55 | 1.5 | 1.4 | 1 test to supply detox |
| | | | | | | | |
| | Gravity Concentration | Serra-Meio | 64 | 29 | | | 3 tests @ 3 sizes |
| | | | | | | | |
| | Gravity/IL/CIL tails leach, 24 hours, 74 microns | Serra-Meio | 98 | 61 | 1.1 | 1.3 | 4 tests Ave. |
| | | | | | | | |
| | Gravity/IL/CIL tails leach, 24 hours, 74 microns | Serra | 99 | 62 | 1.4 | 1.7 | 4 Variability Ave. |
| | Gravity/IL/CIL tails leach, 24 hours, 74 microns | Meio | 97 | 78 | 1.7 | 1.9 | 4 Variability Ave. |
| | | | | | | | |
| | CIL,24 hours, 74 microns | Serra | 98 | 43 | 1.3 | 1.5 | 4 Variability Ave. |
| | CIL,24 hours, 74 microns | Meio | 95 | 74 | 1.7 | 2.2 | 4 Variability Ave. |
| | | | | | | | |
| | CIL,24 hours, 74 microns | Serra | 99 | 62 | | | 1 Variability |
| | CIL,24 hours, 150 microns | Serra | 98 | 59 | | | 1 Variability |
| | CIL,24 hours, 74 microns | Meio | 97 | 79 | | | 1 Variability |
| | CIL,24 hours, 150 microns | Meio | 92 | 72 | | | 1 Variability |
| | | | | | | | |
| | Bond Ball Mill Work Index (Bwi in kwh/t) | Serra | 18.2 | | | | 2 comps w/26 samples |
| | Bond Ball Mill Work Index (Bwi in kwh/t) | Meio | 19.0 | | | | 2 comps w/26 samples |
| | | | | | | | |

## 13.4 Projected Metallurgical Performance

Results from the Plenge test program have been used to project metallurgical performance of the materials planned for mining and processing at the Coringa Gold Project. Results from the RDi and TDP programs effectively support results from the Plenge program and altogether are useful to support the stated overall representativeness of the samples to the various deposits.

The projected metallurgical responses are presented in Table 13.16. Gold and silver recoveries shown are the average results, with an applied discount, from Plenge's eight ½ HQ core variability composites subjected to gravity/IL/CIL tails leach processing. The recoveries are each discounted 3% for gold and 5% for silver to reflect typical losses experienced in these types of process plants, such as less efficient gravity concentration, solution losses, carbon losses, lower silver carbon-loading than anticipated, and grind variations. The recoveries compare well with the results from whole-ore CIL leaching as well as similar tests run in 2013 by TDP. Galena zone recoveries are estimated to be similar to Serra recoveries based on results from TDP's testing of Composite 1, a mixture of Galena, Mãe de Leite, and Serra zone materials.

Cyanide and lime consumptions shown in Table 13.16 are also averages from the eight ½ HQ core variability tests. BWi values shown are also from Plenge's testing as this was the most extensive comminution work performed since testing began.

**Table 13.16: Projected Metallurgical Response for Coringa Deposits**

| Deposit | BWi kWh/t | Gold Rec. % | Silver Rec. % | NaCN kg/t | Lime kg/t |
|---|---|---|---|---|---|
| | | | | | |
| Serra & Galena | 18.2 | 96 | 57 | 1.3 | 1.6 |
| | | | | | |
| Meio | 19.0 | 94 | 74 | 1.7 | 2.0 |

# 14 MINERAL RESOURCES

## 14.1 Introduction

The mineral resource estimate for the Coringa Gold Project was prepared under the direction of Robert Sim, P.Geo, with the assistance of Bruce M. Davis, PhD, FAusIMM and reported in the previous mineral resource estimate report, "Coringa Gold Project, Brazil, NI 43-101 Technical Report" dated June 15, 2017. The mineral resource section from the previous report is incorporated herein in its entirety for the readers' continuity. Mr. Sim is the independent QP within the meaning of NI 43-101 for the purposes of mineral resource estimates contained in this report. This section of the technical report describes the mineral resource estimation methodology and summarizes the key assumptions considered by the QP to prepare a mineral resource model for the gold, silver, copper, lead, and zinc mineralization at a series of mineralized zones at the Coringa Gold Project.

This is the second estimate of mineral resources for the Coringa Gold Project. The previous mineral resource estimate was generated by Walter Dzick from Snowden and is described in the "Coringa Mineral Resource NI 43-101 Technical Report" dated May 13, 2015.

In the opinion of Mr. Sim, the mineral resource evaluation reported herein is a reasonable representation of the mineralization found at the Coringa Gold Project at the current level of sampling. The mineral resource was estimated in conformity with the generally accepted CIM *Estimation of Mineral Resource and Mineral Reserves Best Practices Guidelines* (November 23, 2003) and is reported in accordance with NI 43-101. Mineral resources are not mineral reserves, and they do not have demonstrated economic viability. There is no certainty that all or any part of the mineral resource will be converted into a mineral reserve upon application of modifying factors.

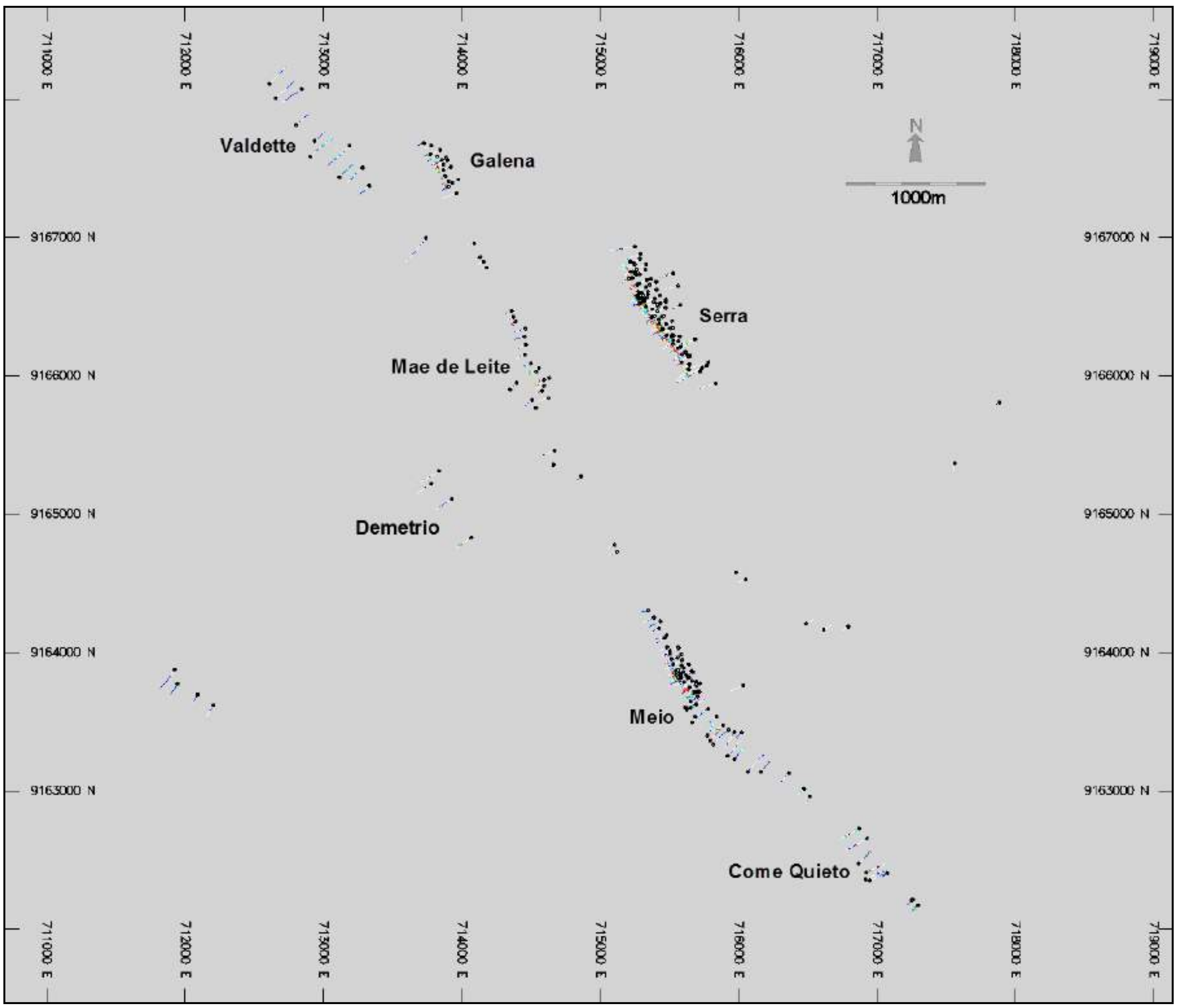
Estimations are made from 3D block models based on geostatistical applications using commercial mine planning software (MineSight® v12.0). The project limits are based in the UTM coordinate system (WGS84 Zone 21S) using a nominal block size measuring 1 x 5 x 2 m (5 m along the strike of the zones, 1 m across the strike direction, and 2 m in the vertical direction). Drill holes, collared from surface, penetrate the sub-vertical veins to maximum depths of about 250 m below surface.

The mineral resource estimate was generated using drill hole sample assay results and the interpretation of a geological model which relates to the spatial distribution of gold and silver. Estimates for copper, lead, and zinc are also included to provide a better understanding of these elements for metallurgical purposes. Interpolation characteristics were defined based on the geology, drill hole spacing, and geostatistical analysis of the data. The mineral resources were classified according to their proximity to the sample data locations and are reported, as required by NI 43-101, according to the CIM *Definition Standards for Mineral Resources and Mineral Reserves* (May 2014).

Since the completion of the mineral resource estimates presented in this report (in May 2017), Anfield has drilled six additional holes that intersect the Galena zone. The results of this drilling have been evaluated by the QP and they do not result in a material change to the mineral resources presented in this report.

### 14.2 Available Data

Anfield provided the drill hole sample data for the Coringa Gold Project on April 12, 2017. This comprised a series of Excel (spreadsheet) files containing collar locations, down-hole survey results, geologic information and assay results for a total of 359 drill holes representing 53,648 m of drilling conducted in an area measuring roughly 7 x 7 km. The distribution of all drilling in the database is shown in plan in Figure 14.1. All holes are diamond (HQ) drill holes except for four PQ-holes drilled by Anfield. About one half of the drilling was conducted by Magellan Minerals between 2007 and 2013 (179 holes; 28,437 m) and the remainder was drilled by Anfield between 2016 and 2017 (180 holes; 25,212 m), which concentrated on the delineation of the mineralized veins at the Serra and Meio zones.



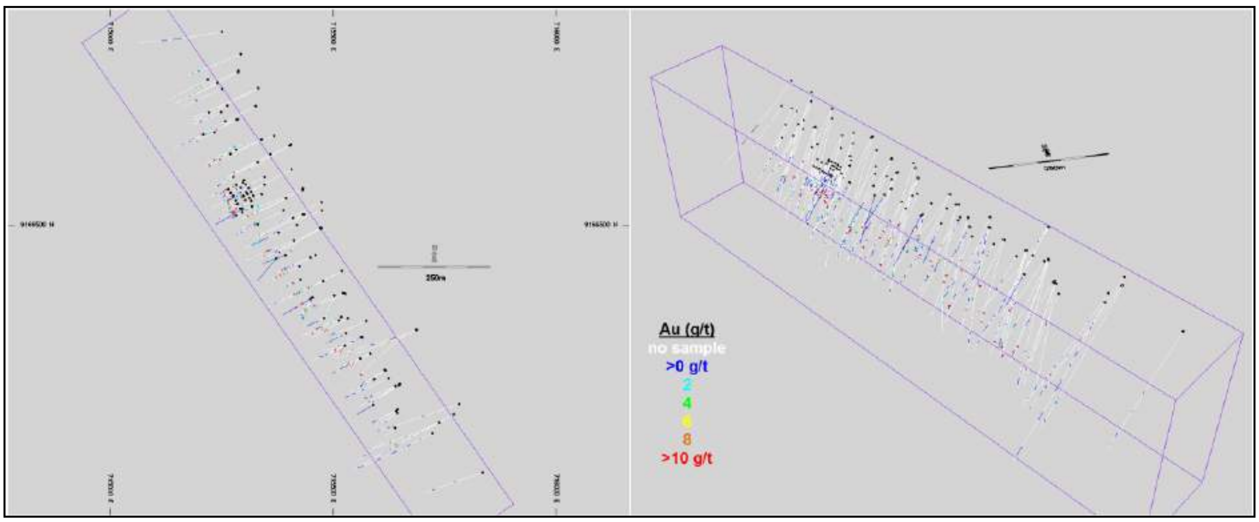

Source: Sim Geological, 2017

**Figure 14.1: Plan View of Drill Holes**

The majority of drilling has occurred in two zones: Serra (156 holes; 23,898 m) and Meio (114 holes; 16,784 m). Other areas with sufficient drilling to support the estimation of mineral resources include Galena (17 holes; 1,952 m), Mãe de Leite (15 holes; 1,914 m), Come Quieto (10 holes; 1,868 m), and Valdette (10 holes; 2,498 m).

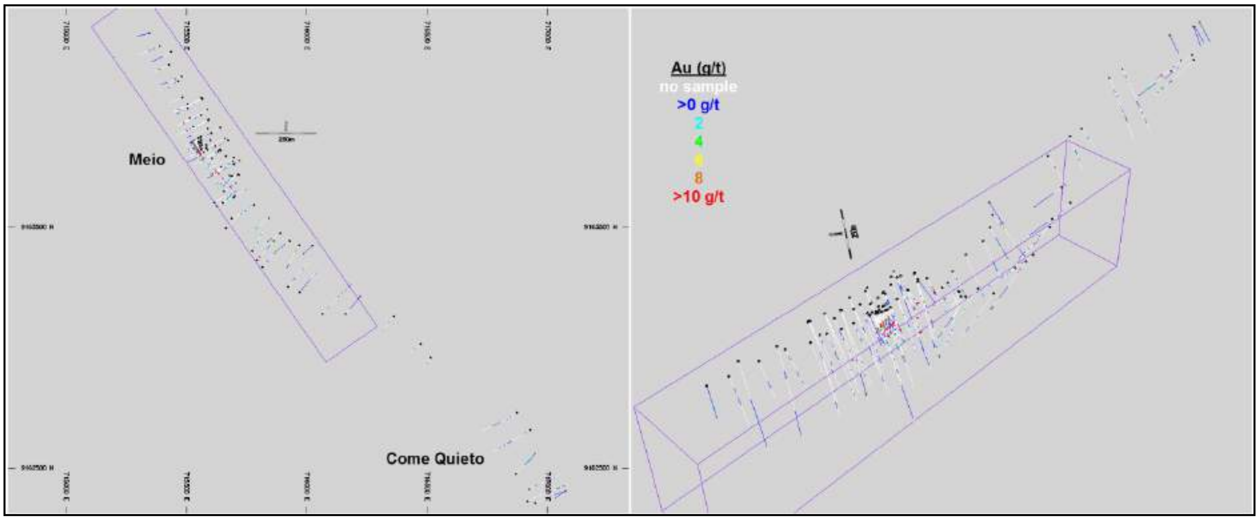
The distribution of gold in drilling at Serra is shown in Figure 14.2, at Meio and Come Quieto in Figure 14.3, and Galena, Mãe de Leite, and Valdette in Figure 14.4. The remaining drill holes test numerous other satellite zones in the general vicinity; many of these have intersected significant gold mineralization requiring further exploration.

Drill holes are collared from surface and oriented with dips typically ranging from $-45^0$ to $-70^0$ intersecting the sub-vertical mineralized veins at core angles from $35^0$ to $90^0$. The majority of drill holes pierce the veins at depths less than 200 m below surface, but some holes are as deep as 300 m below surface. The 2016–17 drilling program was designed to delineate portions of Serra and Meio with intersections spaced on a nominal 50 m grid pattern. Also included in the 2016–17 drilling program, were two "detailed" panels of holes comprising 10 x 10 m spaced holes over panels measuring 60 x 60 m at both Serra and Meio. These panels provide additional information regarding the continuity of mineralization using closely spaced sample data.



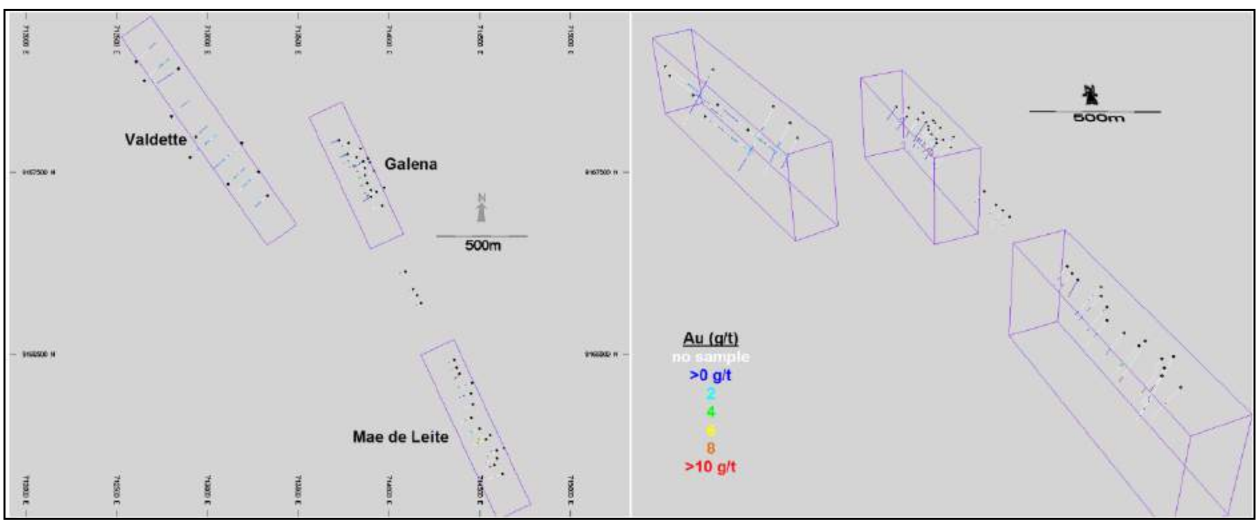

Source: Sim Geological, 2017

**Figure 14.2: Plan and Isometric Views of Gold in Drilling at Serra**




Source: Sim Geological, 2017

**Figure 14.3: Plan and Isometric Views of Gold in Drilling at Meio and Come Quieto**




Source: Sim Geological, 2017

**Figure 14.4: Plan and Isometric Views of Gold in Drilling at Galena, Mãe de Leite, and Valdette**

There are a total of 14,202 individual samples in the project database; most samples were analyzed for a variety of elements (as part of multi-element package). The selection of samples for analyses is controlled primarily by the visual presence of geologic conditions that indicate the presence of gold mineralization. These conditions include silicification and quartz veining, sulphides, faulting or brecciation, and other types of alteration, such as sericite, hematite, and chlorite. It was assumed that if no samples were selected from a core interval, then there was “no mineralization present” and the samples had zero-grade values.

Assay results for gold, silver, copper, lead, and zinc were extracted from the main database and imported into MineSight® for use in the development of the mineral resource model. Individual sample intervals range from a minimum of 0.05 m to a maximum of 3 m and average 0.78 m in length. Sample intervals tend to be shorter in the mineralized zones reflecting local geologic contacts. Approximately 33% of samples are exactly 0.5 m in length and another 33% of samples are 1 m in length.

Drill core recoveries have been excellent throughout the various drill programs. Overall recoveries average 98.7% and recoveries in the vein domains average 98.9%.

A total of 831 samples (Magellan Minerals: 455 samples, Anfield: 376 samples) were tested for specific gravity using the "wet" method (weight in air vs. weight in water). Samples have been collected within the vein domains as well as from the surrounding rocks.

Topographic data were provided in the form of 3D contour lines on 20 m (vertical) intervals. This information was used to generate a 3D digital terrain surface over the property. Topographic data do not extend over the whole surface of Galena, Come Quieto, and Valdette—alternate surfaces have been generated using the drill hole collar locations for these areas.

Geologic information, derived from observations during core logging, were also used, including lithology type, the presence of alteration assemblages, structural features, depth of overburden, and depth of saprolite.

The basic statistical properties of the sample data in the various mineralized zones are shown in Tables 14.1 through 14.6.

**Table 14.1: Summary of Basic Statistics of Sample Data at Serra**

| Element | # of Samples | Total Sample Length (m) | Min | Max | Mean | Std. Dev. |
|---|---|---|---|---|---|---|
| Gold (g/t) | 6,568 | 3,045.4 | 0.003 | 230.500 | 0.625 | 5.951 |
| Silver (g/t) | 5,657 | 2,531.8 | 0 | 504.00 | 2.54 | 18.01 |
| Copper (%) | 5,657 | 2,531.8 | 0 | 1.62 | 0.01 | 0.06 |
| Lead (%) | 5,657 | 2,531.8 | 0 | 12.90 | 0.03 | 0.21 |
| Zinc (%) | 5,657 | 2,531.8 | 0 | 7.52 | 0.02 | 0.13 |

Note: Original sample data weighted by sample length.

**Table 14.2: Summary of Basic Statistics of Sample Data at Meio**

| Element | # of Samples | Total Sample Length (m) | Min | Max | Mean | Std. Dev. |
|---|---|---|---|---|---|---|
| Gold (g/t) | 6,500 | 3,670.4 | 0.003 | 182.500 | 0.725 | 6.550 |
| Silver (g/t) | 5,134 | 2,753.1 | 0 | 265.00 | 2.21 | 9.91 |
| Copper (%) | 5,134 | 2,753.1 | 0 | 1.92 | 0.01 | 0.09 |
| Lead (%) | 5,134 | 2,753.1 | 0 | 20.00 | 0.15 | 0.96 |
| Zinc (%) | 5,134 | 2,753.1 | 0 | 12.10 | 0.10 | 0.60 |

Note: Original sample data weighted by sample length.

**Table 14.3: Summary of Basic Statistics of Sample Data at Galena**

| Element | # of Samples | Total Sample Length (m) | Min | Max | Mean | Std. Dev. |
|---|---|---|---|---|---|---|
| Gold (g/t) | 841 | 656.2 | 0.003 | 57.918 | 0.283 | 2.941 |
| Silver (g/t) | 841 | 656.2 | 0 | 188.00 | 1.16 | 6.51 |
| Copper (%) | 841 | 656.2 | 0 | 1.20 | 0.00 | 0.05 |
| Lead (%) | 841 | 656.2 | 0 | 6.80 | 0.03 | 0.24 |
| Zinc (%) | 841 | 656.2 | 0 | 5.80 | 0.03 | 0.19 |

Note: Original sample data weighted by sample length.

**Table 14.4: Summary of Basic Statistics of Sample Data at Mãe de Leite**

| Element | # of Samples | Total Sample Length (m) | Min | Max | Mean | Std. Dev. |
|---|---|---|---|---|---|---|
| Gold (g/t) | 476 | 352.8 | 0.003 | 52.200 | 0.431 | 2.858 |
| Silver (g/t) | 476 | 352.8 | 0 | 47.00 | 0.58 | 2.49 |
| Copper (%) | 476 | 352.8 | 0 | 0.12 | 0.00 | 0.01 |
| Lead (%) | 476 | 352.8 | 0 | 6.20 | 0.03 | 0.25 |
| Zinc (%) | 476 | 352.8 | 0 | 0.55 | 0.01 | 0.03 |

Note: Original sample data weighted by sample length.

**Table 14.5: Summary of Basic Statistics of Sample Data at Come Quieto**

| Element | # of Samples | Total Sample Length (m) | Min | Max | Mean | Std. Dev. |
|---|---|---|---|---|---|---|
| Gold (g/t) | 1,259 | 829.8 | 0.003 | 22.600 | 0.155 | 1.059 |
| Silver (g/t) | 940 | 632.7 | 0.1 | 54.10 | 1.08 | 3.48 |
| Copper (%) | 940 | 632.7 | 0 | 0.47 | 0.00 | 0.02 |
| Lead (%) | 940 | 632.7 | 0 | 0.99 | 0.02 | 0.05 |
| Zinc (%) | 940 | 632.7 | 0 | 1.40 | 0.02 | 0.09 |

Note: Original sample data weighted by sample length.

**Table 14.6: Summary of Basic Statistics of Sample Data at Valdette**

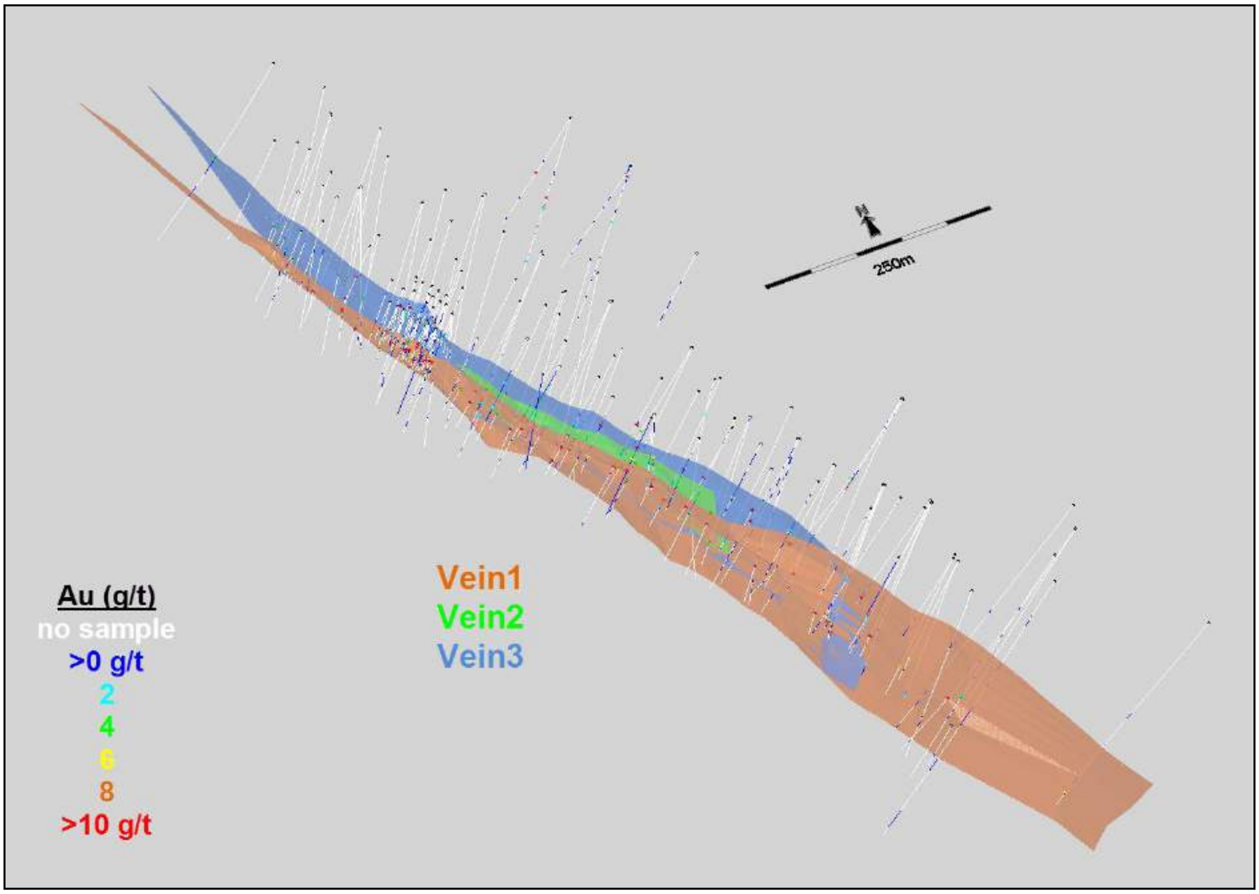
| Element | # of Samples | Total Sample Length (m) | Min | Max | Mean | Std. Dev. |
|---|---|---|---|---|---|---|
| Gold (g/t) | 1,396 | 1,151.5 | 0.003 | 5.433 | 0.156 | 0.401 |
| Silver (g/t) | 1,058 | 907.0 | 0.1 | 14.80 | 0.38 | 0.80 |
| Copper (%) | 1,058 | 907.0 | 0 | 0.05 | 0.00 | 0.00 |
| Lead (%) | 1,058 | 907.0 | 0 | 1.57 | 0.02 | 0.07 |
| Zinc (%) | 1,058 | 907.0 | 0 | 1.02 | 0.02 | 0.08 |

Note: Original sample data weighted by sample length.

## 14.3 Geological Model, Domains and Coding

Mineralization on the Coringa Gold Project property tends to occur in a series of quartz veins that often contain appreciable amounts of sulphide mineralization, including pyrite, chalcopyrite, galena, and bornite. A series of 3D wireframe domains have been interpreted that represent the distribution of the veins at the various mineralized areas. The veins are marked by elevated gold grades, visual evidence of a vein or a similar structurally controlled mineralized zone. These mineralized zones tend to be quite narrow, often less than 0.5 m in thickness. A minimum thickness of 0.8 m horizontal was applied during the interpretation of the veins; this distance, as defined by mining engineers, is the minimum thickness that can be extracted using underground mining methods. The hanging wall (HW) contact is interpreted for each vein, and this HW contact is then copied for a horizontal distance of 0.8 m representing the FW contact. Adjustments are made to the FW contact for drill intersections which exceed the 0.8 m (horizontal) minimum. All sample data contained within the interpreted vein domains are used to estimate the in-situ mineral resources. It is assumed that any unsampled core intervals located inside a vein domain have zero-grade values.

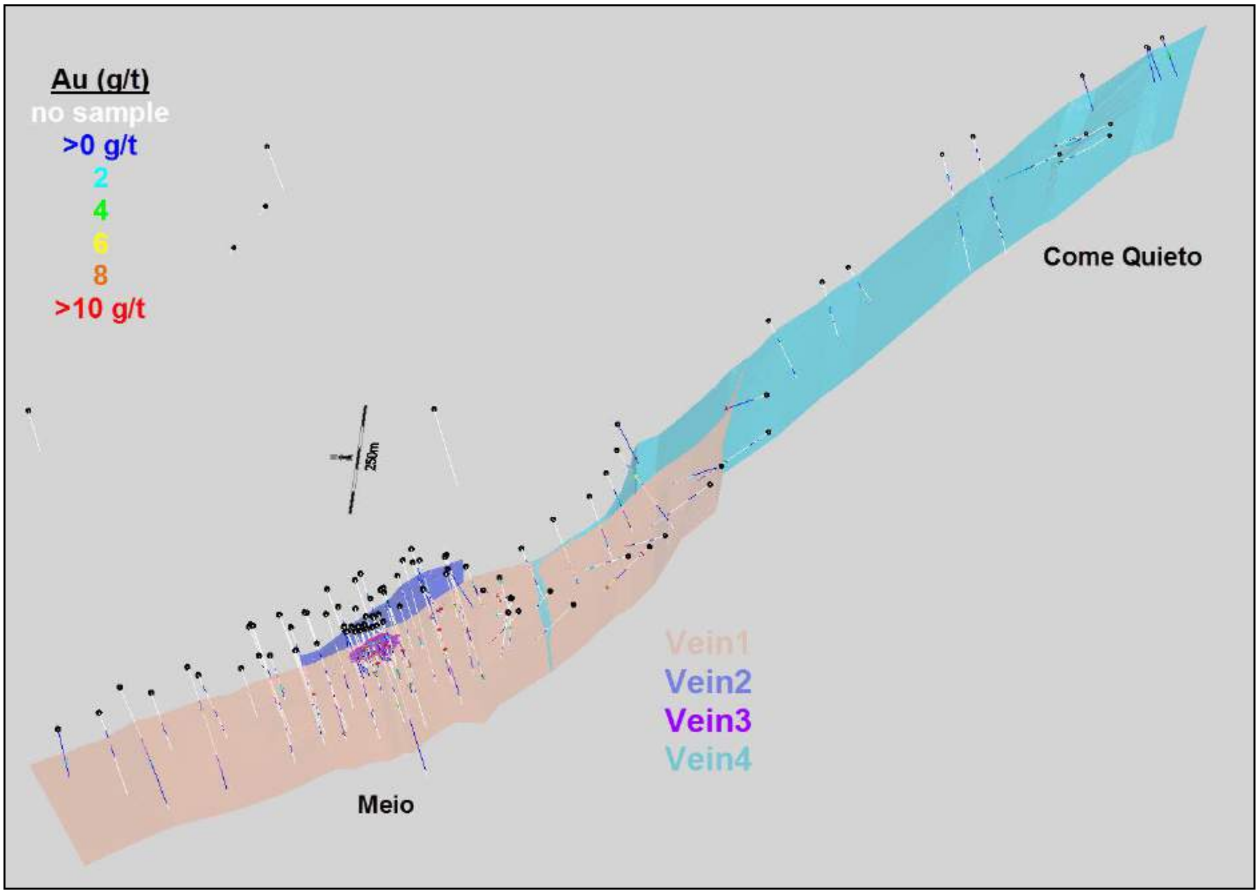
At Serra, there are three separate interpreted vein domains: more extensive FW (vein1) and HW (vein3) veins and a smaller and lower-grade vein in the middle (vein2). All three veins trend at an azimuth of $330^0$ and dip steeply ($-75^0$ to $-85^0$) to the northeast. The three interpreted veins at Serra are shown in Figure 14.5.




Source: Sim Geological, 2017

**Figure 14.5: Isometric View of Vein Domains at Serra**

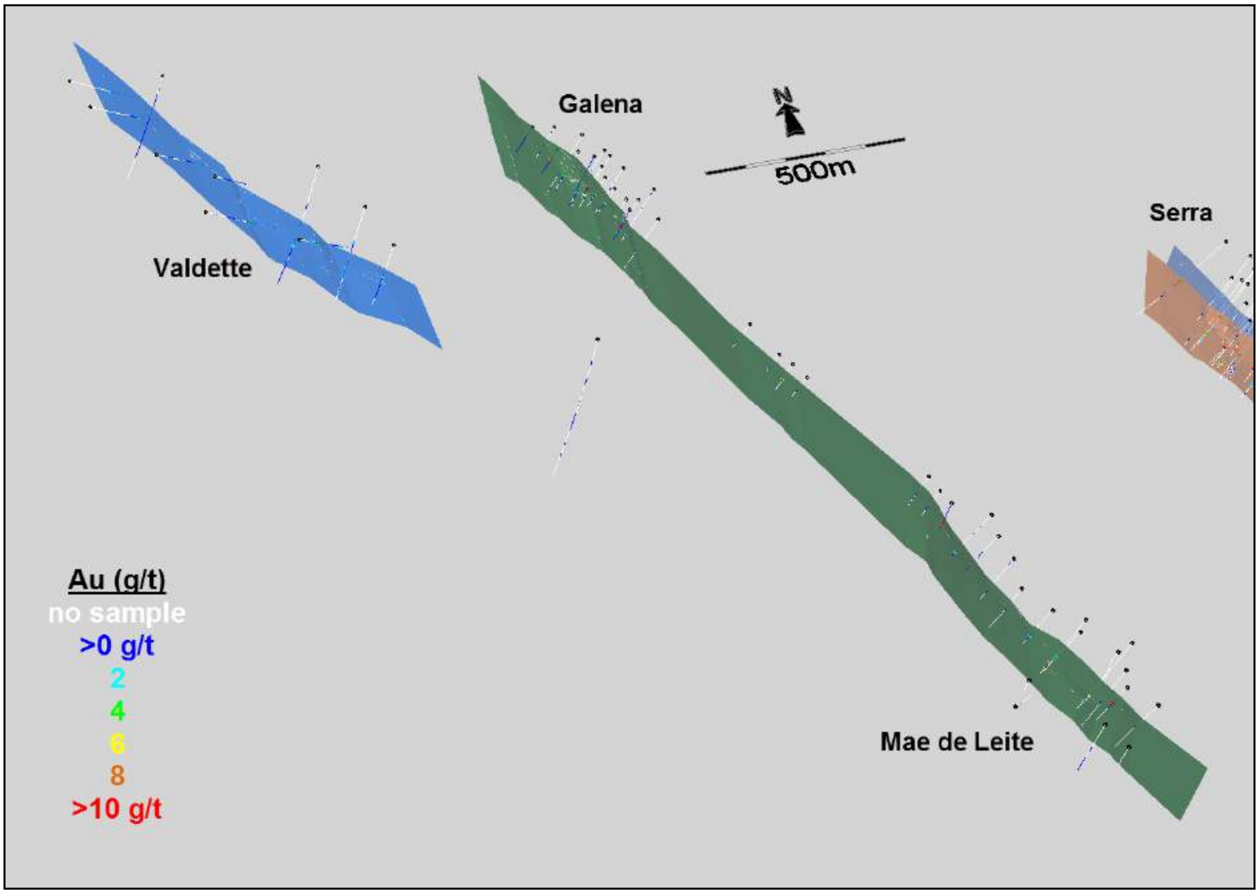
At Meio, the majority of resources occur in one vein (vein1) which strikes variably at $330^0$ and dips steeply ($-75^0$ to $-85^0$) to the southwest. A low-grade vein (vein2) is interpreted in the FW of vein1 that dips steeply ($-80^0$) to the northeast. Vein3 is a small splay that occurs in the HW of vein1, and vein4 is a FW vein that extends for 2 km south of Meio to Come Quieto. The four interpreted veins at Meio and Come Quieto are shown in Figure 14.6.




Source: Sim Geological, 2017

**Figure 14.6: Isometric View of Vein Domains at Meio and Come Quieto**

There is one vein interpreted from Galena through to Mãe de Leite, a distance of more than 2 km that runs from Galena to Mãe de Leite. This vein strikes at $335^0$, and it dips at $-80^0$ to the northeast. Several drill holes at Valdette have intersected several veins, but only one vein domain is interpreted from the current data. The vein strikes at $325^0$, and it dips at $-80^0$ to the northeast. The shape and extent of the veins at Galena, Mãe de Leite, and Valdette are shown in Figure 14.7.




Source: Sim Geological, 2017

**Figure 14.7: Isometric View of Vein Domains at Galena, Mãe de Leite and Valdette**

In most areas, the rocks consist of rhyolite. There is a mix of rock types at Serra, with granite in the central and deeper areas, overlain by rhyolite in the upper areas to the north and south. The base of saprolite, interpreted using core-logging observations, is generally less than 10 m below surface. There is relatively little overburden, and this is included in the saprolite zone.

## 14.4 Specific Gravity Data

A total of 831 specific gravity (SG) measurements were taken using the water immersion or “wet” method (weight in air vs. weight in water). A total of 455 samples were measured during the 2007–2013 drill programs (Magellan Minerals) and 376 samples were measured during the 2016–2017 drill program (Anfield). Attempts were made to collect at least one SG measurement from each vein intersection, plus additional samples from the surrounding rocks. SG values range from 2.1 to 3.85 and average 2.69. Approximately 28% of the SG samples were taken from the mineralized veins averaging 2.81. The remaining SG samples are from rocks outside of the veins averaging 2.67. Although there is reasonable coverage of SG samples across all mineralized areas, the distribution is not considered sufficient to support estimation into blocks in the models. As a result, an average SG value of 2.80 was used to calculate mineral resource tonnage for all veins in fresh rocks. Blocks located in saprolite are assigned SG values of 2.10.

## 14.5 Compositing

Compositing the drill hole samples helps standardize the database for further statistical evaluation. This step eliminates any effect that inconsistent sample lengths might have on the data.

To retain the original characteristics of the underlying data, a composite length was selected that reflects the average original sample length. The generation of longer composites can result in some degree of smoothing which could mask certain features of the data. The average length of samples located inside the vein domains are 0.42 m at Serra; 0.45 m at Meio / Come Quieto; and, 0.37 m at Galena / Mãe de Leite and Valdette. A composite length of 0.5 m was used for all areas.

Drill hole composites are length-weighted and generated down-the-hole honoring the vein domain contacts; this means that composites begin at the top of each hole, where it intersects a vein domain boundary, and are generated at 0.5 m intervals for the length of the hole inside the domain. Composites at the end of a domain that are less than 0.25 m in length are included in the previous composite.

## 14.6 Exploratory Data Analysis

Exploratory data analysis (EDA) involves the statistical summarization of the database to better understand the characteristics of the data that may control grade. One of the main purposes of this exercise is to determine if there is evidence of spatial distinctions in grade which may require the separation and isolation of domains during interpolation. The application of separate domains prevents unwanted mixing of data during interpolation and, therefore, the resulting grade model will better reflect the unique properties of the deposit. However, applying domain boundaries in areas where the data are not statistically unique may impose a bias in the distribution of grades in the model.

A domain boundary, which segregates the data during interpolation, is typically applied if the average grade in one domain is significantly different from that of another domain. A boundary may also be applied if there is evidence that a significant change in the grade distribution has occurred across the contact.

### *14.6.1 Basic Statistics by Vein Domain*

The basic statistics for the distribution of gold, silver, copper, lead, and zinc in each vein domain at the various mineralized areas are shown in Tables 14.7 through 14.12. The results show that the vein domains contain the majority of the significant mineralization in all areas. Outside the vein domains, there are rare intervals of high-grade mineralization that cannot be interpreted into additional vein domains.

**Table 14.7: Summary Statistics of Composited Sample Data by Vein at Serra**

| Vein | Element | # of Samples | Total Sample Length (m) | Min | Max | Mean | CV |
|---|---|---|---|---|---|---|---|
| Vein1 | Gold (g/t) | 325 | 162.22 | 0 | 230.5 | 6.557 | 2.78 |
| | Silver (g/t) | 325 | 162.22 | 0 | 504 | 18.47 | 2.93 |
| | Copper (%) | 325 | 162.22 | 0 | 0.92 | 0.044 | 2.96 |
| | Lead (%) | 325 | 162.22 | 0 | 5.55 | 0.141 | 3.49 |
| | Zinc (%) | 325 | 162.22 | 0 | 1.9 | 0.063 | 2.81 |
| Vein2 | Gold (g/t) | 41 | 20.56 | 0 | 12.722 | 1.912 | 1.69 |
| | Silver (g/t) | 41 | 20.56 | 0 | 30.50 | 4.31 | 1.64 |
| | Copper (%) | 41 | 20.56 | 0 | 0.04 | 0.00 | 2.50 |
| | Lead (%) | 41 | 20.56 | 0 | 1.13 | 0.07 | 2.65 |
| | Zinc (%) | 41 | 20.56 | 0 | 0.12 | 0.02 | 1.47 |
| Vein3 | Gold (g/t) | 282 | 140.4 | 0 | 181.500 | 3.855 | 3.68 |
| | Silver (g/t) | 282 | 140.4 | 0 | 327.00 | 8.90 | 3.10 |
| | Copper (%) | 282 | 140.4 | 0 | 1.24 | 0.03 | 4.17 |
| | Lead (%) | 282 | 140.4 | 0 | 1.53 | 0.04 | 3.22 |
| | Zinc (%) | 282 | 140.4 | 0 | 0.45 | 0.02 | 2.10 |
| Outside Veins | Gold (g/t) | 5,310 | 2,747.3 | 0.003 | 108.000 | 0.094 | 15.24 |
| | Silver (g/t) | 4,501 | 2,258.7 | 0 | 219.00 | 0.93 | 5.81 |
| | Copper (%) | 4,501 | 2,258.7 | 0 | 1.49 | 0.00 | 14.99 |
| | Lead (%) | 4,501 | 2,258.7 | 0 | 12.90 | 0.02 | 9.18 |
| | Zinc (%) | 4,501 | 2,258.7 | 0 | 7.52 | 0.02 | 7.10 |

Note: Original sample data weighted by sample length.

**Table 14.8: Summary Statistics of Composited Sample Data by Vein at Meio**

| Vein | Element | # of Samples | Total Sample Length (m) | Min | Max | Mean | CV |
|---|---|---|---|---|---|---|---|
| Vein1 | Gold (g/t) | 449 | 199.5 | 0 | 149.798 | 10.929 | 2.10 |
| | Silver (g/t) | 449 | 199.5 | 0 | 195.80 | 16.82 | 1.68 |
| | Copper (%) | 449 | 199.5 | 0 | 1.92 | 0.13 | 2.13 |
| | Lead (%) | 449 | 199.5 | 0 | 10.21 | 1.30 | 1.84 |
| | Zinc (%) | 449 | 199.5 | 0 | 10.21 | 0.78 | 2.21 |
| Vein2 | Gold (g/t) | 177 | 75.4 | 0 | 22.600 | 1.087 | 2.61 |
| | Silver (g/t) | 177 | 75.4 | 0 | 100.90 | 3.66 | 3.14 |
| | Copper (%) | 177 | 75.4 | 0 | 0.44 | 0.02 | 3.57 |
| | Lead (%) | 177 | 75.4 | 0 | 2.46 | 0.12 | 3.06 |
| | Zinc (%) | 177 | 75.4 | 0 | 2.28 | 0.06 | 3.76 |
| Vein3 | Gold (g/t) | 98 | 42.2 | 0.005 | 85.800 | 4.860 | 2.73 |
| | Silver (g/t) | 98 | 42.2 | 0.2 | 111.00 | 5.54 | 2.34 |
| | Copper (%) | 98 | 42.2 | 0 | 0.92 | 0.04 | 2.67 |
| | Lead (%) | 98 | 42.2 | 0 | 10.21 | 0.62 | 2.39 |
| | Zinc (%) | 98 | 42.2 | 0 | 7.90 | 0.30 | 2.83 |
| Vein4 | Gold (g/t) | 92 | 40.3 | 0 | 22.600 | 2.088 | 1.94 |
| | Silver (g/t) | 92 | 40.3 | 0 | 100.90 | 6.79 | 2.23 |
| | Copper (%) | 92 | 40.3 | 0 | 0.44 | 0.03 | 2.68 |
| | Lead (%) | 92 | 40.3 | 0 | 2.46 | 0.12 | 3.16 |
| | Zinc (%) | 92 | 40.3 | 0 | 2.28 | 0.07 | 3.81 |
| Outside Veins | Gold (g/t) | 5,574 | 3,402.0 | 0.003 | 52.200 | 0.069 | 13.20 |
| | Silver (g/t) | 4,259 | 2,504.0 | 0 | 91.90 | 0.92 | 3.07 |
| | Copper (%) | 4,259 | 2,504.0 | 0 | 1.31 | 0.00 | 8.68 |
| | Lead (%) | 4,259 | 2,504.0 | 0 | 9.35 | 0.04 | 5.56 |
| | Zinc (%) | 4,259 | 2,504.0 | 0 | 10.31 | 0.04 | 4.83 |

Note: Original sample data weighted by sample length.

**Table 14.9: Summary Statistics of Composited Sample Data by Vein at Come Quieto**

| Vein | Element | # of Samples | Total Sample Length (m) | Min | Max | Mean | CV |
|---|---|---|---|---|---|---|---|
| Vein1 | Gold (g/t) | 35 | 15.1 | 0.005 | 22.600 | 2.862 | 1.80 |
| | Silver (g/t) | 35 | 15.1 | 0 | 54.10 | 5.49 | 2.00 |
| | Copper (%) | 35 | 15.1 | 0 | 0.44 | 0.05 | 2.17 |
| | Lead (%) | 35 | 15.1 | 0 | 0.23 | 0.04 | 1.42 |
| | Zinc (%) | 35 | 15.1 | 0 | 0.14 | 0.01 | 1.89 |
| Outside Veins | Gold (g/t) | 1,210 | 813.5 | 0.003 | 13.100 | 0.098 | 6.09 |
| | Silver (g/t) | 900 | 618.8 | 0.1 | 42.00 | 0.93 | 3.02 |
| | Copper (%) | 900 | 618.8 | 0 | 0.15 | 0.00 | 3.65 |
| | Lead (%) | 900 | 618.8 | 0 | 0.99 | 0.01 | 3.84 |
| | Zinc (%) | 900 | 618.8 | 0 | 1.40 | 0.02 | 4.85 |

Note: Original sample data weighted by sample length.

**Table 14.10: Summary Statistics of Composited Sample Data by Vein at Galena**

| Vein | Element | # of Samples | Total Sample Length (m) | Min | Max | Mean | CV |
|---|---|---|---|---|---|---|---|
| Vein1 | Gold (g/t) | 55 | 24.3 | 0.003 | 57.918 | 6.564 | 2.10 |
| | Silver (g/t) | 55 | 24.3 | 0.5 | 188.00 | 11.58 | 2.62 |
| | Copper (%) | 55 | 24.3 | 0 | 1.20 | 0.07 | 3.08 |
| | Lead (%) | 55 | 24.3 | 0 | 6.80 | 0.46 | 2.45 |
| | Zinc (%) | 55 | 24.3 | 0 | 5.80 | 0.33 | 2.61 |
| Outside Veins | Gold (g/t) | 758 | 624.3 | 0.003 | 6.317 | 0.041 | 6.15 |
| | Silver (g/t) | 758 | 624.3 | 0 | 34.00 | 0.76 | 2.76 |
| | Copper (%) | 758 | 624.3 | 0 | 0.10 | 0.00 | 5.51 |
| | Lead (%) | 758 | 624.3 | 0 | 0.89 | 0.01 | 4.29 |
| | Zinc (%) | 758 | 624.3 | 0 | 1.00 | 0.02 | 3.22 |

Note: Original sample data weighted by sample length.

**Table 14.11: Summary Statistics of Composited Sample Data by Vein at Mãe de Leite**

| Vein | Element | # of Samples | Total Sample Length (m) | Min | Max | Mean | CV |
|---|---|---|---|---|---|---|---|
| Vein1 | Gold (g/t) | 43 | 22.4 | 0.016 | 52.200 | 5.374 | 1.85 |
| | Silver (g/t) | 43 | 22.4 | 0 | 47.00 | 3.37 | 2.70 |
| | Copper (%) | 43 | 22.4 | 0 | 0.12 | 0.01 | 3.17 |
| | Lead (%) | 43 | 22.4 | 0 | 6.20 | 0.27 | 3.46 |
| | Zinc (%) | 43 | 22.4 | 0 | 0.55 | 0.06 | 1.89 |
| Outside Veins | Gold (g/t) | 391 | 322.9 | 0.003 | 8.776 | 0.095 | 4.76 |
| | Silver (g/t) | 391 | 322.9 | 0 | 13.00 | 0.39 | 1.74 |
| | Copper (%) | 391 | 322.9 | 0 | 0.02 | 0.00 | 6.48 |
| | Lead (%) | 391 | 322.9 | 0 | 1.16 | 0.01 | 4.51 |
| | Zinc (%) | 391 | 322.9 | 0 | 0.18 | 0.01 | 1.73 |

Note: Original sample data weighted by sample length.

**Table 14.12: Summary Statistics of Composited Sample Data by Vein at Valdette**

| Vein | Element | # of Samples | Total Sample Length (m) | Min | Max | Mean | CV |
|---|---|---|---|---|---|---|---|
| Vein1 | Gold (g/t) | 27 | 13.6 | 0.264 | 5.433 | 2.049 | 0.73 |
| | Silver (g/t) | 27 | 13.6 | 0 | 3.90 | 1.40 | 0.75 |
| | Copper (%) | 27 | 13.6 | 0 | 0.00 | 0.00 | 0 |
| | Lead (%) | 27 | 13.6 | 0 | 0.19 | 0.06 | 0.98 |
| | Zinc (%) | 27 | 13.6 | 0 | 0.20 | 0.05 | 1.01 |
| Outside Veins | Gold (g/t) | 1,368 | 1,137.86 | 0.003 | 2.959 | 0.1331 | 2.2741 |
| | Silver (g/t) | 1,033 | 894.66 | 0.1 | 14.8 | 0.37 | 2.15 |
| | Copper (%) | 1,033 | 894.66 | 0 | 0.05 | 0.001 | 5.38 |
| | Lead (%) | 1,033 | 894.66 | 0 | 1.57 | 0.015 | 4.375 |
| | Zinc (%) | 1,033 | 894.66 | 0 | 1.02 | 0.022 | 3.357 |

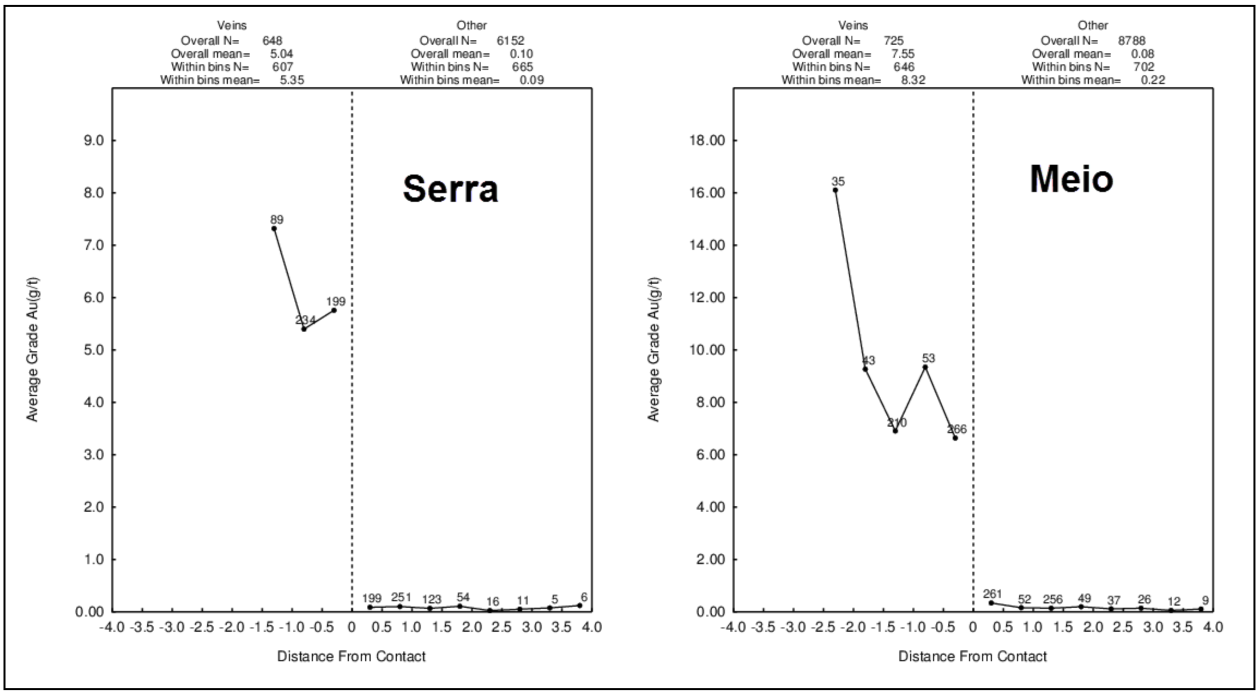
Note: Original sample data weighted by sample length.

### *14.6.2 Contact Profiles*

Contact profiles evaluate the nature of grade trends between two domains: they graphically display the average grades at increasing distances from the contact boundary. Contact profiles that show a marked difference in grade across a domain boundary indicate that the two datasets should be isolated during interpolation. Conversely, if a more gradual change in grade occurs across a contact, the introduction of a hard boundary (e.g., segregation during interpolation) may result in a much different trend in the grade model; in this case, the change in grade between domains in the model is often more abrupt than the trends seen in the raw data. Finally, a flat contact profile indicates no grade changes across the boundary; in this case, hard or soft domain boundaries will produce similar results in the model.

A series of contact profiles were generated to evaluate the nature of gold and silver grades across the vein domain boundaries at Serra and Meio. Abrupt changes in grades occurred across this contact in all cases.

Examples showing the change in gold grades at the vein domain contacts at Serra and Meio are shown in Figure 14.8.




Source: Sim Geological, 2017

**Figure 14.8: Contact Profiles for Gold Inside vs. Outside Vein Domains at Serra and Meio**

#### *14.6.3 Conclusions and Modelling Implications*

The results of the EDA indicate that the vein domains interpreted at Serra and Meio contain essentially all of the significant gold, silver, copper, lead, and zinc mineralization, and these differ significantly from sample grades outside of the veins. As a result, the vein domains should be treated as a distinct or hard domain during block grade estimations.

### 14.7 Evaluation of Outlier Grades

Histograms and probability plots for the distribution of gold, silver, copper, lead, and zinc were reviewed to identify the presence of anomalous outlier grades in the composited (0.5 m) database. Following a review of the physical location of potentially erratic samples in relation to the surrounding sample data, it was decided that these would be controlled during block grade interpolations using a combination of traditional top-cutting and the application of outlier limitations. An outlier limitation controls the distance of influence of samples above a defined grade threshold.

The various treatments and results are summarized in Tables 14.13 through 14.17. The proportion of metal lost due to these measures at Serra, Meio, and Galena are calculated in blocks in the Indicated category. All other mineral resources are in the Inferred category. Additionally, there are no anomalous samples at Valdette.

**Table 14.13: Treatment of Outlier Sample Data at Serra**

| Element | Vein | Maximum | Top-cut Limit | Outlier Limit | Range of Outlier Threshold (m) | Metal Lost (%) |
|---|---|---|---|---|---|---|
| Gold (g/t) | 1 | 230.500 | 150 | 70 | 35 | -5.4 |
| | 2 | 12.722 | - | - | 35 | |
| | 3 | 181.500 | 150 | 60 | 35 | |
| Silver (g/t) | 1 | 504.0 | 400 | 150 | 35 | -6.0 |
| | 2 | 30.50 | - | 15 | 35 | |
| | 3 | 327.00 | 200 | 150 | 35 | |
| Copper (%) | 1 | 0.92 | - | 0.8 | 35 | -3.7 |
| | 2 | 0.04 | - | - | 35 | |
| | 3 | 1.24 | - | 0.8 | 35 | |
| Lead (%) | 1 | 5.55 | - | 2 | 35 | -3.0 |
| | 2 | 1.13 | - | - | 35 | |
| | 3 | 1.53 | - | 0.4 | 35 | |
| Zinc (%) | 1 | 1.90 | - | 1 | 35 | -8.1 |
| | 2 | 0.12 | - | - | 35 | |
| | 3 | 0.45 | - | 0.15 | 35 | |

Note: 0.5 m composited drill hole data.

**Table 14.14: Treatment of Outlier Sample Data at Meio**

| Element | Vein | Maximum | Top-cut Limit | Outlier Limit | Range of Outlier Threshold (m) | Metal Lost (%) |
|---|---|---|---|---|---|---|
| Gold (g/t) | 1 | 149.798 | - | 80 | 25 | -2.6 |
| | 2 | 22.600 | - | 15 | 25 | |
| | 3 | 85.800 | - | 20 | 10 | |
| | 4 | 22.600 | - | 15 | 75 | |
| Silver (g/t) | 1 | 195.80 | - | 100 | 25 | -2.8 |
| | 2 | 100.90 | - | 30 | 25 | |
| | 3 | 111.00 | - | 50 | 10 | |
| | 4 | 100.90 | - | 30 | 50 | |
| Copper (%) | 1 | 1.92 | - | 0.9 | 25 | -1.8 |
| | 2 | 0.44 | - | 0.3 | 25 | |
| | 3 | 0.92 | - | 0.4 | 10 | |
| | 4 | 0.44 | - | 0.25 | 50 | |
| Lead (%) | 1 | 10.21 | - | 8 | 25 | -2.7 |
| | 2 | 2.46 | - | 1.5 | 25 | |
| | 3 | 10.21 | - | 5 | 10 | |
| | 4 | 2.46 | - | 1.5 | 50 | |
| Zinc (%) | 1 | 10.21 | - | 8 | 25 | -1.3 |
| | 2 | 2.28 | - | 0.5 | 25 | |
| | 3 | 7.90 | - | 3 | 10 | |
| | 4 | 2.28 | - | 0.3 | 50 | |

Note: 0.5 m composited drill hole data.

**Table 14.15: Treatment of Outlier Sample Data at Galena**

| Element | Vein | Maximum | Top-cut Limit | Outlier Limit | Range of Outlier Threshold (m) | Metal Lost (%) |
|---|---|---|---|---|---|---|
| Gold (g/t) | 1 | 57.918 | - | 40 | 35 | -12 |
| Silver (g/t) | 1 | 188.00 | 100 | 50 | 35 | -18 |
| Copper (%) | 1 | 1.20 | - | - | 35 | 0 |
| Lead (%) | 1 | 6.80 | - | 4 | 35 | -5 |
| Zinc (%) | 1 | 5.80 | - | 2 | 35 | -6 |

Note: 0.5 m composited drill hole data.

**Table 14.16: Treatment of Outlier Sample Data at Come Quieto**

| Element | Vein | Maximum | Top-cut Limit | Outlier Limit | Range of Outlier Threshold (m) | Metal Lost (%) |
|---|---|---|---|---|---|---|
| Gold (g/t) | 1 | 22.600 | - | 15 | 50 | -13 |
| Silver (g/t) | 1 | 100.90 | - | 30 | 50 | -13 |
| Copper (%) | 1 | 0.44 | - | 0.30 | 50 | -16 |
| Lead (%) | 1 | 2.46 | - | 1.5 | 50 | 0 |
| Zinc (%) | 1 | 2.28 | - | 0.5 | 50 | 0 |

Note: 0.5 m composited drill hole data.

**Table 14.17: Treatment of Outlier Sample Data at Mãe de Leite**

| Element | Vein | Maximum | Top-cut Limit | Outlier Limit | Range of Outlier Threshold (m) | Metal Lost (%) |
|---|---|---|---|---|---|---|
| Gold (g/t) | 1 | 52.200 | 35 | 20 | 50 | -18 |
| Silver (g/t) | 1 | 47.00 | 30 | - | 35 | -18 |
| Copper (%) | 1 | 0.12 | - | - | 35 | 0 |
| Lead (%) | 1 | 6.20 | 3 | - | 35 | -25 |
| Zinc (%) | 1 | 0.55 | - | - | 35 | 0 |

Note: 0.5 m composited drill hole data.

The proportion of lost metal is slightly higher at Serra than at Meio due to the presence of higher grade samples that are considered anomalous based on the current level of sampling. The proportion of metal lost at Galena, Mãe de Leite, and Come Quieto is primarily due to the larger spacing between sample data; this is an indication that additional drilling is required in these areas.

Overall, these measures are considered appropriate for a deposit with this distribution of delineation drilling.

## 14.8 Variography

The degree of spatial variability in a mineral deposit depends on both the distance and direction between points of comparison. Typically, the variability between samples increases as the distance between those samples increases. If the degree of variability is related to the direction of comparison, then the deposit is said to exhibit anisotropic tendencies which can be summarized with a search ellipse. The semi-variogram is a common function used to measure the spatial variability within a deposit.

The components of the variogram include the nugget, the sill, and the range. Often samples compared over very short distances, even samples compared from the same location, show some degree of variability. As a result, the curve of the variogram often begins at some point on the y-axis above the origin: this point is called the *nugget*. The nugget is a measure of not only the natural variability of the data over very short distances but also a measure of the variability which can be introduced due to errors during sample collection, preparation, and the assay process.

The amount of variability between samples typically increases as the distance between the samples increases. Eventually, the degree of variability between samples reaches a constant, maximum value: this is called the *sill*, and the distance between samples at which this occurs is called the *range*.

In this report, the spatial evaluation of the data was conducted using a correlogram rather than the traditional variogram. The correlogram is normalized to the variance of the data and is less sensitive to outlier values, generally giving better results.

Variograms were generated using the commercial software package Sage 2001© developed by Isaaks & Co. Multidirectional variograms were generated from the distributions of gold, silver, copper, lead, and zinc samples located inside the vein domains; however, many of the veins contain insufficient data to generate reliable variograms, such as Serra vein2, Meio vein3, and Meio vein4. Examples of the variogram results for gold and silver in the main veins (vein1) at Serra and Meio are shown in Table 14.18.

**Table 14.18: Variogram Parameters for Vein1 at Serra and Meio**

| Domain/Element | Nugget | Sill 1 | Sill 2 | 1st Structure Range (ft) | 1st Structure Azimuth (º) | 1st Structure Dip | 2nd Structure Range (ft) | 2nd Structure Azimuth (º) | 2nd Structure Dip |
|---|---|---|---|---|---|---|---|---|---|
| Serra Vein1 Gold | 0.300 | 0.653 | 0.047 | 25 | 325 | -5 | 324 | 325 | -5 |
| | Spherical | | | 12 | 325 | 85 | 51 | 325 | 85 |
| | | | | 2 | 55 | 0 | 3 | 55 | 0 |
| Meio Vein1 Gold | 0.270 | 0.479 | 0.251 | 56 | 90 | 90 | 228 | 90 | 90 |
| | Spherical | | | 55 | 145 | 0 | 206 | 145 | 0 |
| | | | | 2 | 55 | 0 | 3 | 55 | 0 |
| Serra Vein1 Silver | 0.600 | 0.259 | 0.141 | 111 | 96 | 56 | 2202 | 153 | 30 |
| | Spherical | | | 65 | 206 | 13 | 395 | 59 | 7 |
| | | | | 12 | 304 | 31 | 8 | 137 | -59 |
| Meio Vein1 Silver | 0.333 | 0.527 | 0.139 | 29 | 111 | -13 | 184 | 312 | 43 |
| | Spherical | | | 22 | 23 | 7 | 65 | 35 | -8 |
| | | | | 18 | 141 | 75 | 29 | 117 | 46 |

Note: Correlograms conducted on 0.5 m composite sample data.

## 14.9 Model Setup and Limits

A series of block models were initialized in MineSight® and the dimensions are defined in Tables 14.19 through 14.24. The models are rotated approximately parallel to the general strike orientation of each set of veins. The block model limits are represented by the purple rectangles shown in Figures 14.2, 14.3, and 14.4. The selection of a nominal block size measuring 1 m x 5 m x 2 m is a reflection of the typically narrow nature of the veins at the Coringa Gold Project and is considered appropriate with respect to the selective mining unit (SMU) size that is typical of an operation of this type and scale.

**Table 14.19: Block Model Limits at Serra**

| Direction | Minimum | Maximum | Block Size (m) | # of Blocks |
|---|---|---|---|---|
| X (Az 55) | 0 | 200 | 1 | 200 |
| Y (Az 325) | 0 | 1400 | 5 | 280 |
| Z (elevation) | 0 | 400 | 2 | 200 |

(Model is horizontally rotated by -35$^0$ about origin 715740E, 9165760N)

**Table 14.20: Block Model Limits at Meio**

| Direction | Minimum | Maximum | Block Size (m) | # of Blocks |
|---|---|---|---|---|
| X (Az 55) | 0 | 260 | 1 | 260 |
| Y (Az 325) | 0 | 1700 | 5 | 340 |
| Z (elevation) | 0 | 400 | 2 | 200 |

(Model is horizontally rotated by -35$^0$ about origin 716080E, 9162940N)

**Table 14.21: Block Model Limits at Galena**

| Direction | Minimum | Maximum | Block Size (m) | # of Blocks |
|---|---|---|---|---|
| X (Az 65) | 0 | 200 | 1 | 200 |
| Y (Az 335) | 0 | 800 | 5 | 160 |
| Z (elevation) | 0 | 400 | 2 | 200 |

(Model is horizontally rotated by -25$^0$ about origin 713900E, 9167080N)

**Table 14.22: Block Model Limits at Mãe de Leite**

| Direction | Minimum | Maximum | Block Size (m) | # of Blocks |
|---|---|---|---|---|
| X (Az 65) | 0 | 200 | 1 | 200 |
| Y (Az 335) | 0 | 1000 | 5 | 200 |
| Z (elevation) | 0 | 400 | 2 | 200 |

(Model is horizontally rotated by -25$^0$ about origin 714600E, 9165590N)

**Table 14.23: Block Model Limits at Come Quieto**

| Direction | Minimum | Maximum | Block Size (m) | # of Blocks |
|---|---|---|---|---|
| X (Az 55) | 0 | 600 | 1 | 600 |
| Y (Az 325) | 0 | 2200 | 5 | 440 |
| Z (elevation) | 0 | 400 | 2 | 200 |

(Model is horizontally rotated by -35$^0$ about origin 716975E, 9161750N)

**Table 14.24: Block Model Limits at Valdette**

| Direction | Minimum | Maximum | Block Size (m) | # of Blocks |
|---|---|---|---|---|
| X (Az 55) | 0 | 200 | 1 | 200 |
| Y (Az 325) | 0 | 1400 | 5 | 280 |
| Z (elevation) | 0 | 400 | 2 | 200 |

(Model is horizontally rotated by -35$^0$ about origin 713330E, 9167100N)

Blocks in the model that intersect an interpreted vein domain were assigned specific vein codes for segregation during grade interpolation. The proportion of model blocks located inside the vein domain was also determined, and it is used to calculate the in-situ vein resources.

## 14.10 Interpolation Parameters

The block model grades for gold, silver, copper, lead, and zinc were estimated using the Inverse Distance (ID) weighting interpolation method. Block estimates have also been produced using ordinary kriging (OK). The OK estimates tend to be locally smoother or, in other words, the OK estimates generate larger local volumes of slightly lower grade but with essentially the same amount of contained metal. While the global distributions generated by both the ID and OK estimates are similar, the restricted, local character of the ID estimates better mimics the distribution of gold observed in local drill holes and at other operating mines with similar deposits in the area. There appears to be less local continuity in the gold distributions than is represented by the OK estimates and, as a result, the ID model was selected for the estimation of mineral resources.

Although the global resources generated using OK are essentially the same as those generated using ID, the ID grade distribution is considered to be more representative of the underlying sample data on a local scale. The results of the ID estimation were compared with the Hermitian Polynomial Change of Support model (also referred to as the Discrete Gaussian Correction). This method is described in more detail in Section 14.11 (Validation).

The Coringa Gold Project ID models were generated with a relatively limited number samples to match the change-of-support or Herco (*Her*mitian *Co*rrection) grade distribution. This approach reduces the amount of smoothing or averaging in the model, and, while there may be some uncertainty on a localized scale, this approach produces reliable estimates of the recoverable grade and tonnage for the overall deposit.

At Serra, block grades are estimated using a maximum of 4 composites from a single drill hole and a maximum of 12 composites for gold in vein1 and vein2, and silver in vein3 that use a maximum of 3 composites per hole and a maximum of 9 in total. The maximum search range is 150 m. Most estimates are made using ID2, but gold in vein1 and vein2, and silver in vein3 used ID3 estimation. All estimates use length-weighted composite data, and the data are evenly distributed using quadrant selection applications.

At Meio, block grades are estimated using a maximum of 4 composites from a single drill hole and a maximum of 12 composites. The maximum search range is 150 m. All estimates are made using ID2. All estimates use length-weighted composite data, and the data are evenly distributed using quadrant selection applications.

At Galena and Mãe de Leite, block grades are estimated using a maximum 12 composites with a maximum of 4 composites from a drill hole. The maximum search range is 150 m, and estimates are made using ID3.

At Come Quieto, block grades are estimated using a maximum 12 composites with a maximum of 4 composites from a drill hole. The maximum search range is 250 m, and estimates are made using ID2.

At Valdette, block grades are estimated using a maximum 9 composites with a maximum of 3 composites from a drill hole. The maximum search range is 250 m, and estimates are made using ID3.

## 14.11 Validation

The results of the modeling process were validated using several methods. These include a thorough visual review of the model grades in relation to the underlying drill hole sample grades, comparisons with the change-of-support model, comparisons with other estimation methods, and grade-distribution comparisons using swath plots.

### *14.11.1 Visual Inspection*

A detailed visual inspection of the block model was conducted in both section and plan to ensure the desired results following interpolation. This includes confirmation of the proper coding of blocks within the individual vein domains. The estimated gold, silver, copper, lead, and zinc in the model appear to be a valid representation of the underlying drill hole sample data.

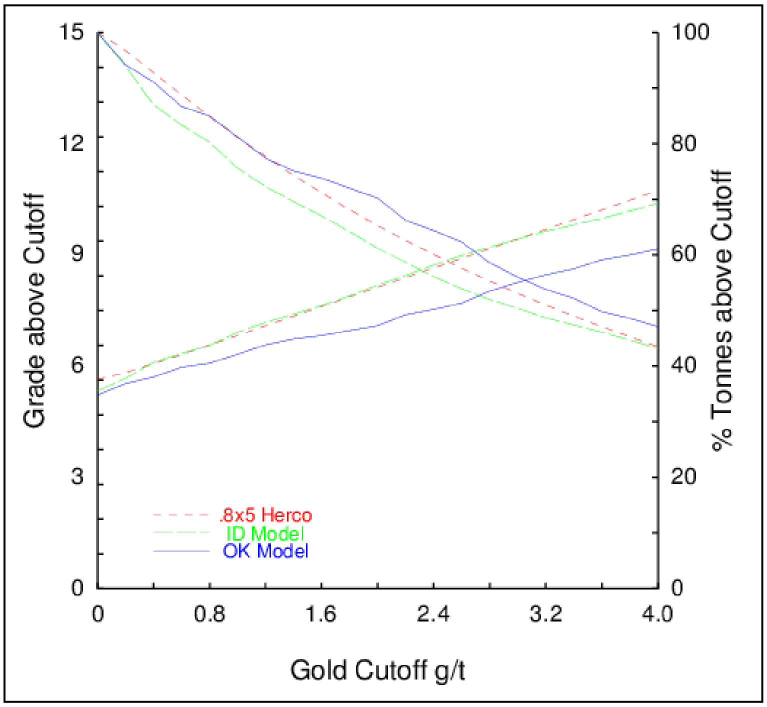
### *14.11.2 Model Checks for Change of Support*

The relative degree of smoothing in the block model estimates were evaluated using the Discrete Gaussian of Hermitian Polynomial Change of Support method (described by Journel and Huijbregts, Mining Geostatistics, 1978). With this method, the distribution of the hypothetical block grades can be directly compared to the estimated (ID) model through the use of pseudo-grade/tonnage curves. Adjustments are made to the block model interpolation parameters until an acceptable match is made with the Herco distribution. In general, the estimated model should be slightly higher in tonnage and slightly lower in grade when compared to the Herco distribution at the projected cut-off grade. These differences account for selectivity and other potential ore-handling issues which commonly occur during mining.

The Herco (*Her*mitian *Co*rrection) distribution is derived from the declustered composite grades which were adjusted to account for the change in support, moving from smaller drill hole composite samples to the larger blocks in the model. The transformation results in a less skewed distribution but with the same mean as the original declustered samples.

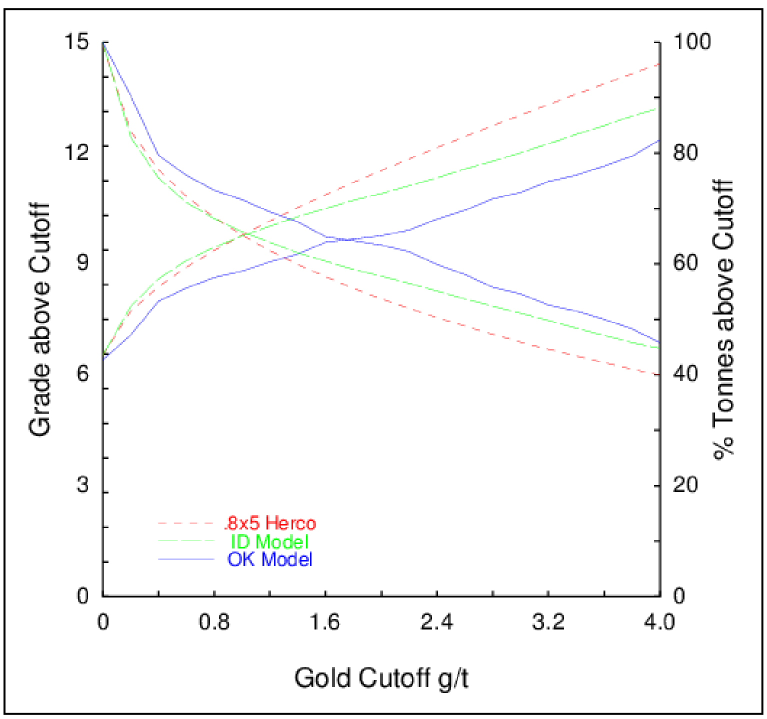
The Herco analysis was conducted on the distribution of gold and silver, the most potentially prominent revenue contributors, in the block models, and a reasonable level of correspondence was achieved in all cases. Examples showing the distribution of the gold models in vein1 at Serra and Meio are shown, respectively, in Figures 14.9 and 14.10.

It should be noted that the change-of-support model is a theoretical tool intended to direct model estimation. There is uncertainty associated with the change-of-support model, and its results should not be viewed as an absolutely correct value. In cases where the model grades are greater than the change-of-support grades, the model is relatively insensitive to any changes to the modelling parameters. Any extraordinary measures to make the grade curves change are not warranted.




Source: Sim Geological, 2017

**Figure 14.9: Herco Grade/Tonnage Plot for Gold in Serra Vein1**




**Source: Sim Geological, 2017**

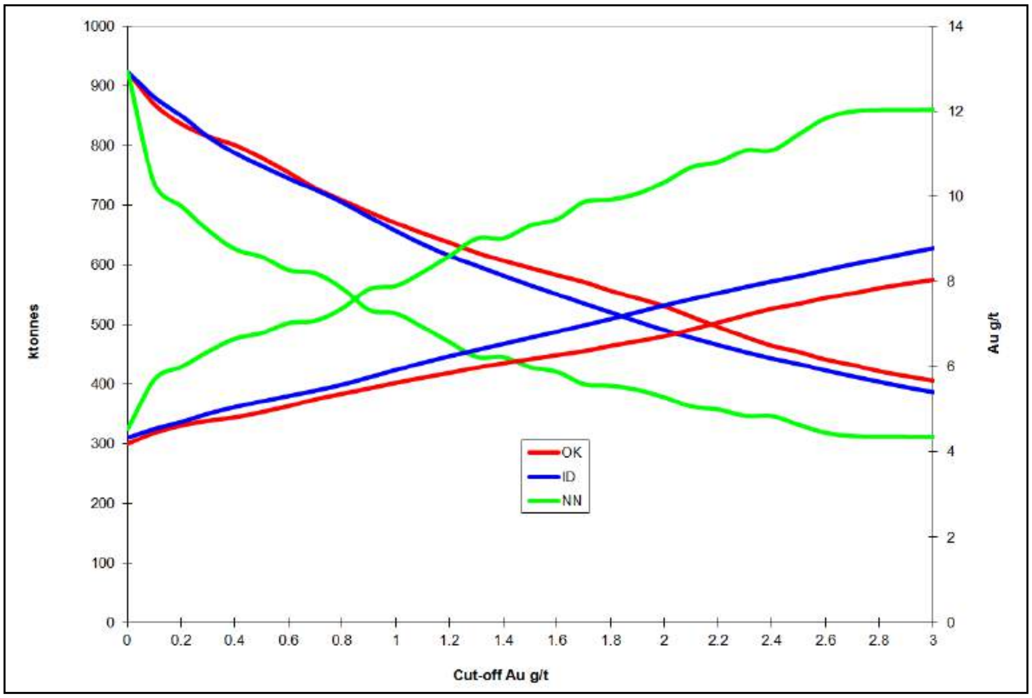
**Figure 14.10: Herco Grade/Tonnage Plot for Gold in Meio Vein1**

### *14.11.3 Comparison of Interpolation Methods*

For comparison purposes, additional models for gold, silver, copper, lead, and zinc were generated using both OK and nearest neighbour (NN) interpolation methods (the NN model was created using data composited to the full thickness of the veins).

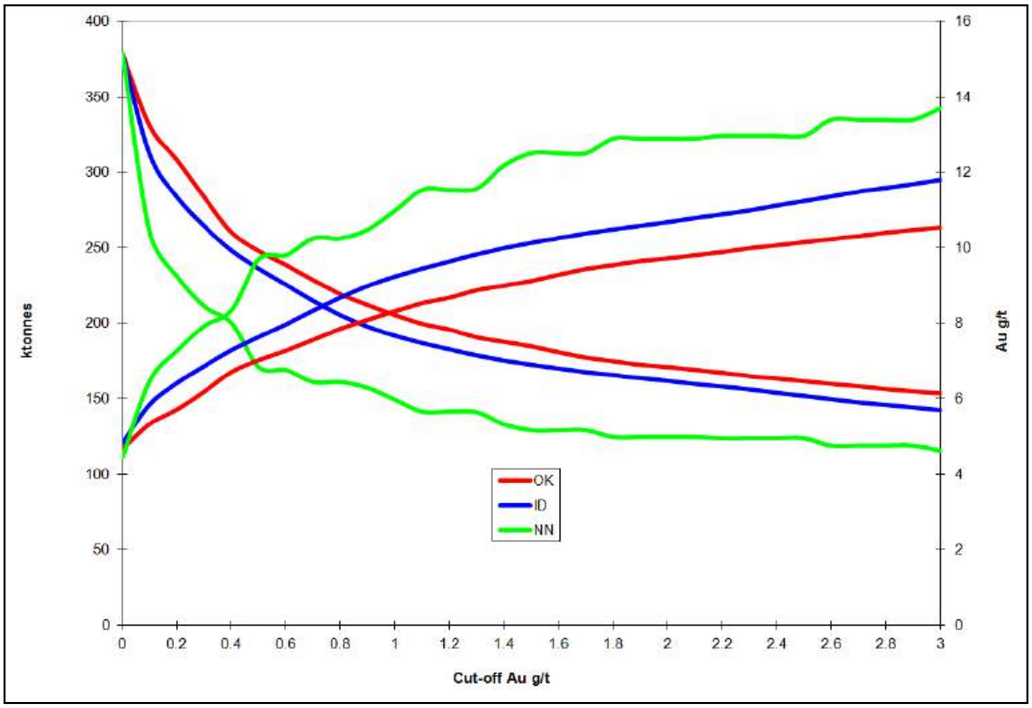
Comparisons are made between these models on grade/tonnage curves. Examples of the grade/tonnage curves for gold at Serra and Meio are shown, respectively, in Figures 14.11 and 14.12. There is reasonable correlation between the OK and ID models throughout the range of cut-off grades. The increased level of smoothing is evident in the OK models. The NN distribution, generally showing less tonnage and higher grade, is the result of the absence of smoothing in this modeling approach. Similar results were achieved with the silver, copper, lead, and zinc models.

Reproduction of the model using different methods tends to increase the confidence in the overall resource.




Source: Sim Geological, 2017

**Figure 14.11: Grade/Tonnage Comparison of Gold Models at Serra**




Source: Sim Geological, 2017

**Figure 14.12: Grade/Tonnage Comparison of Gold Models at Meio**

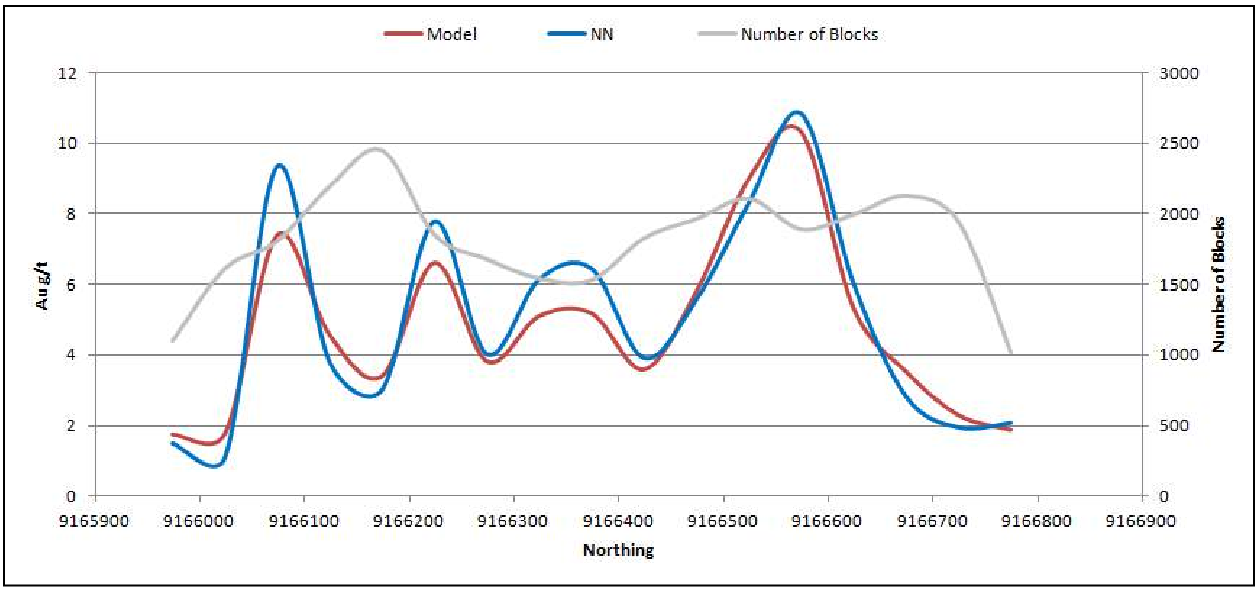
### 14.11.4 Swath Plots (Drift Analysis)

A swath plot is a graphical display of the grade distribution derived from a series of bands, or swaths, generated in several directions through the deposit. Grade variations in the swath plot from the ID model are compared to the distribution derived from the declustered (NN) grade model.

On a local scale, the NN model does not provide reliable estimations of grade, but, on a much larger scale, it represents an unbiased estimation of the grade distribution based on the underlying data. Therefore, if the ID model is unbiased, the grade trends may show local fluctuations on a swath plot, but the overall trend should be similar to the NN distribution of grade.

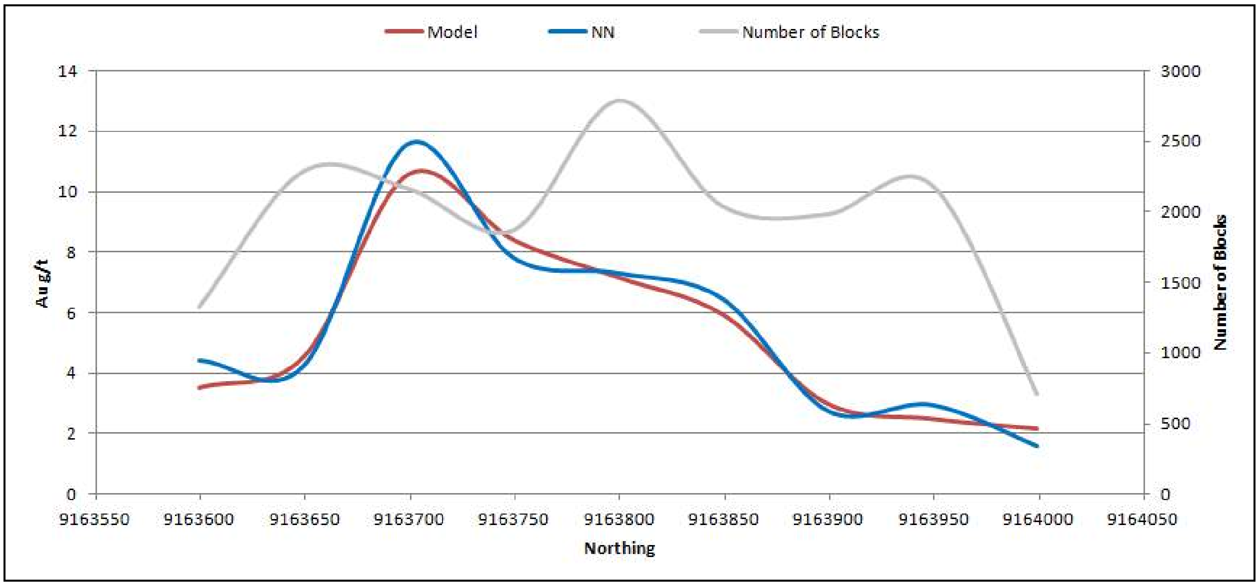
Swath plots were generated in three orthogonal directions for all models. Examples showing the gold distribution in east-west swaths at Serra and Meio are shown, respectively, in Figures 14.13 and 14.14.

There is good correspondence between the models in most areas. The degree of smoothing in the ID model is evident in the peaks and valleys shown in the swath plots. The validation results indicate that the ID model is a reasonable reflection of the underlying sample data.




Source: Sim Geological, 2017

**Figure 14.13: Swath Plot of Gold ID and NN Models by Northing at Serra**




Source: Sim Geological, 2017

**Figure 14.14: Swath Plot of Gold ID and NN Models by Northing at Meio**

## 14.12 Resource Classification

The mineral resources for the Coringa Gold Project were classified in accordance with the CIM *Definition Standards for Mineral Resources and Mineral Reserves* (May 2014). The classification parameters are defined relative to the distance between sample data and are intended to encompass zones of reasonably continuous mineralization that exhibit the desired degree of confidence. These parameters are based on visual observations and statistical studies. Classification parameters are based primarily on the nature of the distribution of gold data because it is the main contributor to the relative value of these polymetallic deposits.

The spatial variation pattern of gold in the Coringa Gold Project veins can be represented by a variogram or correlogram. Using the variogram and the drill hole spacing, the reliability of estimated grades in large volumes can be predicted. The measure of estimation reliability, or uncertainty, is expressed by the width of a confidence interval or the confidence limits.

In the Coringa Gold Project veins, gold distribution appears to be somewhat similar in Serra and Meio. Assumptions made for the confidence interval calculations are determined using information derived from gold variograms, an assumed annual production rate representing 50,000 troy ozs, and a regular pattern of drill holes on a nominal 50 m grid pattern. Based on this information, yearly uncertainty for contained gold in the Coringa Gold Project veins is estimated to be between ±25–30% with 90% confidence. This means that resources in the Indicated category provide estimates of contained ounces of gold within ±30% of “actual” for 9 out of 10 years.

The following criteria were used to define mineral resources in the Indicated and Inferred categories. At this stage of project evaluation, the data only support mineral resources in the Indicated and Inferred categories. There are no mineral resources included in the Measured category.

**Indicated Mineral Resources**

Mineral resources in this category are estimated using a minimum of three drill holes that are spaced on a nominal 50 m grid pattern.

**Inferred Mineral Resources**

Mineral resources in this category include model blocks that are within a maximum distance of 100 m from a drill hole.

In some areas that are currently inaccessible for drilling, mineral resources in the Indicated category have been extended from drilling to surface for distances approaching 60 m. These areas are retained in the Indicated mineral resource category because there is surface evidence that previous artisanal mining has occurred, which is generally an indication of the presence of significant gold mineralization at the surface.

## 14.13 Mineral Resources

The CIM *Definition Standards for Mineral Resources and Mineral Reserves* (May 2014) defines a mineral resource as:

"*[A] concentration or occurrence of solid material of economic interest, in or on the Earth's crust in such form, grade or quality and quantity, that there are reasonable prospects for eventual economic extraction. The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling.*"

The "reasonable prospects for eventual economic extraction" requirement generally implies that quantity and grade estimates meet certain economic thresholds and that mineral resources are reported at an appropriate cut-off grade taking into account extraction scenarios and processing recovery.

Mineralization at the Coringa Gold Project tends to occur in narrow veins that are relatively continuous over distances of several hundred metres and are tested with drilling to depths of about 250 m below surface. It is assumed that the resources at the Coringa Gold Project are considered to be amenable to underground extraction methods and that any or all of the mineral resource could be readily accessible using surface decline ramps. A base case cut-off grade of 2 g/t Au is estimated based on an assumed metal price of $1,300 oz Au, metallurgical recoveries of 95%, and total onsite operating and processing costs of $80 t. There are no adjustments to the estimate of mineral resources to account for mining recoveries or dilution. It is important to recognize that any discussions of underground mining parameters are only provided to test the "reasonable prospects for eventual economic extraction," and do not represent an attempt to estimate mineral reserves. Mineral resources that are not mineral reserves do not have demonstrated viability.

The estimate of mineral resources (as at May 3, 2017) is shown in Table 14.25. The distribution of the base case mineral resource is shown in several isometric views in Figures 14.15 through 14.17.

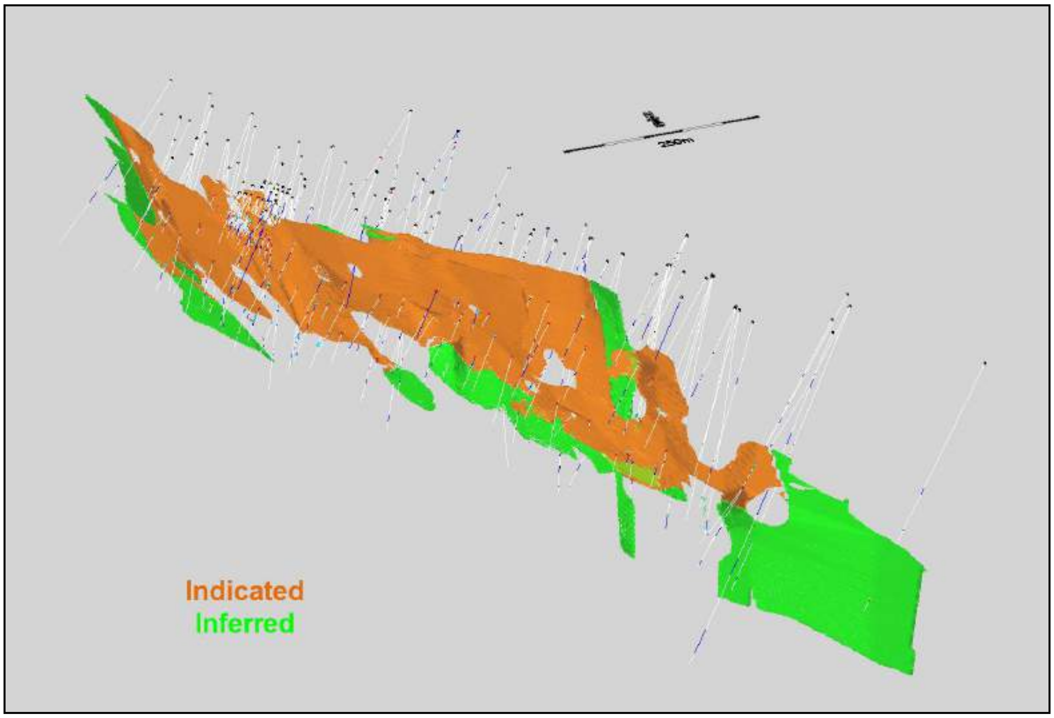
There are no known factors related to environmental, permitting, legal, title, taxation, socio-economic, marketing, or political issues which could materially affect the mineral resource. Mineral resources in the Inferred category have a lower level of confidence than mineral resources in the Indicated category, and, although there is sufficient evidence to imply geologic grade and continuity, these characteristics cannot be verified based on the current data. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.

**Table 14.25: Estimate of Mineral Resources (May 3, 2017)**

| Zone | ktonnes | Average Grade | | | | | Contained Metal | |
|---|---|---|---|---|---|---|---|---|
| | | Au (g/t) | Ag (g/t) | Cu (%) | Pb (%) | Zn (%) | Au (koz) | Ag (koz) |
| **Indicated** | | | | | | | | |
| Serra | 488 | 7.45 | 16.1 | 0.04 | 0.09 | 0.04 | 117 | 253 |
| Meio | 160 | 10.69 | 20.7 | 0.12 | 1.38 | 0.65 | 55 | 106 |
| Galena | 78 | 9.36 | 14.7 | 0.13 | 0.70 | 0.45 | 24 | 37 |
| **Total** | **726** | **8.36** | **17.0** | **0.07** | **0.44** | **0.22** | **195** | **396** |
| **Inferred** | | | | | | | | |
| Serra | 262 | 4.30 | 8.7 | 0.02 | 0.03 | 0.01 | 36 | 73 |
| Meio | 229 | 4.18 | 6.1 | 0.03 | 0.22 | 0.12 | 31 | 45 |
| Galena | 63 | 3.41 | 3.5 | 0.03 | 0.38 | 0.15 | 7 | 7 |
| Mãe de Leite | 244 | 5.92 | 2.6 | 0.01 | 0.18 | 0.04 | 46 | 20 |
| Come Quieto | 253 | 4.50 | 7.5 | 0.06 | 0.02 | 0.01 | 37 | 61 |
| Valdette | 249 | 2.96 | 1.0 | 0.00 | 0.04 | 0.03 | 24 | 8 |
| **Total** | **1,301** | **4.32** | **5.1** | **0.02** | **0.11** | **0.05** | **181** | **215** |

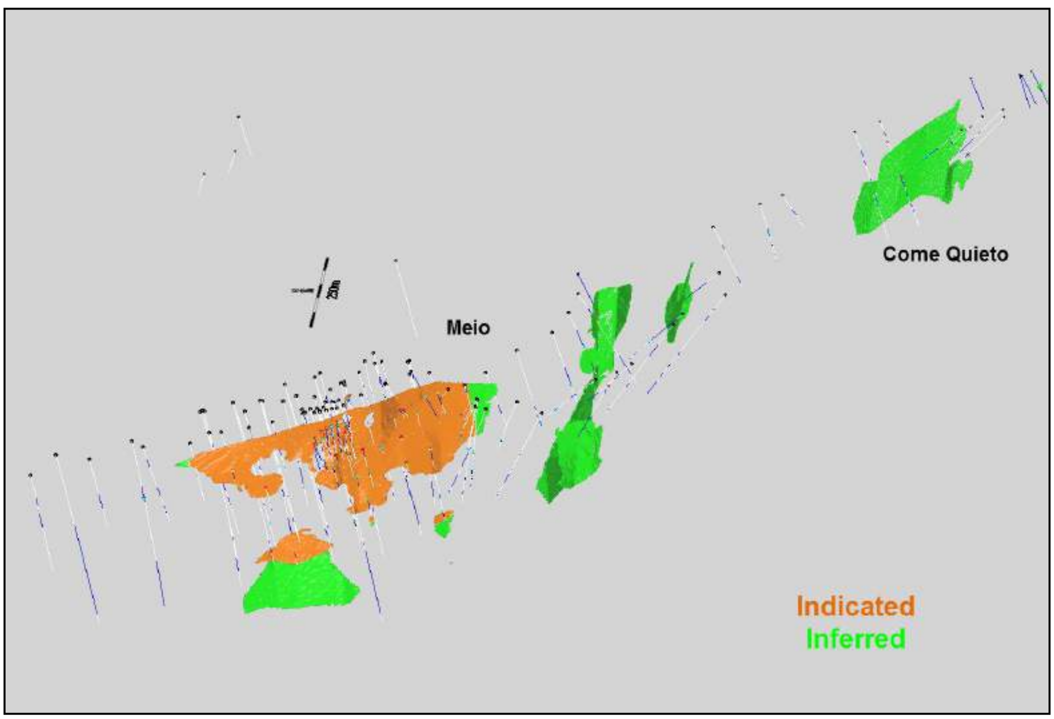
Notes: Base case cut-off is 2 g/t gold. Minimum thickness 0.8 m horizontal.
Some values may not add due to rounding.
Mineral resources are not mineral reserves because the economic viability has not been demonstrated.

The average horizontal thickness of resources is: Serra 0.82 m, Meio 0.97 m, Galena 1.12 m, Mãe de Leite 0.98 m, Come Quieto 0.91 m, and Valdette 0.8 m.



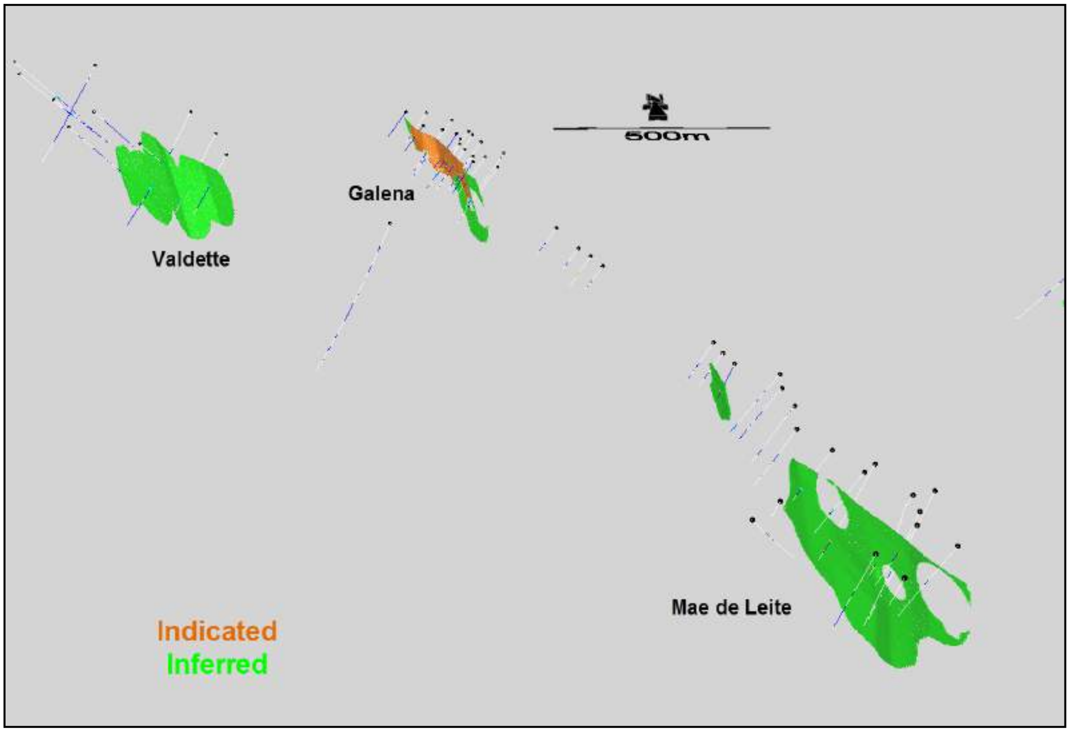

Source: Sim Geological, 2017

**Figure 14.15: Isometric View of Base Case Mineral Resource at Serra**




Source: Sim Geological, 2017

**Figure 14.16: Isometric View of Base Case Mineral Resource at Meio and Come Quieto**




Source: Sim Geological, 2017

**Figure 14.17: Isometric View of Base Case Mineral Resource at Galena, Mãe de Leite and Valdette**

## 14.14 Sensitivity of Mineral Resources

The sensitivity of mineral resources to cut-off grade is shown for resources in the Indicated category at Serra and Meio in Tables 14.26 and 14.27, respectively. In general, the tonnage and grades change as the cut-off changes, but there tends to be little change in the amount of contained gold and silver.

**Table 14.26: Sensitivity of Indicated Mineral Resources to Cut-off Grade at Serra**

| Cut-off Au (g/t) | ktonnes | Average Grade | | | | | Contained Metal | |
|---|---|---|---|---|---|---|---|---|
| | | Au (g/t) | Ag (g/t) | Cu (%) | Pb (%) | Zn (%) | Au (koz) | Ag (koz) |
| 1 | 653 | 5.93 | 13.4 | 0.03 | 0.08 | 0.04 | 125 | 282 |
| 1.5 | 563 | 6.69 | 14.9 | 0.04 | 0.09 | 0.04 | 121 | 270 |
| **2** | **488** | **7.45** | **16.1** | **0.04** | **0.09** | **0.04** | **117** | **253** |
| 2.5 | 431 | 8.13 | 17.1 | 0.04 | 0.10 | 0.04 | 113 | 237 |
| 3 | 384 | 8.79 | 18.0 | 0.04 | 0.10 | 0.04 | 109 | 222 |
| 3.5 | 349 | 9.35 | 18.8 | 0.05 | 0.10 | 0.05 | 105 | 211 |

Notes: Base case cut-off is 2 g/t Au. Minimum thickness 0.8 m horizontal. Mineral resources are not mineral reserves because the economic viability has not been demonstrated.

**Table 14.27: Sensitivity of Indicated Mineral Resources to Cut-off Grade at Meio**

| Cut-off Au (g/t) | ktonnes | Average Grade | | | | | Contained Metal | |
|---|---|---|---|---|---|---|---|---|
| | | Au (g/t) | Ag (g/t) | Cu (%) | Pb (%) | Zn (%) | Au (koz) | Ag (koz) |
| 1 | 189 | 9.24 | 18.3 | 0.10 | 1.20 | 0.57 | 56 | 111 |
| 1.5 | 170 | 10.13 | 19.8 | 0.11 | 1.31 | 0.62 | 55 | 108 |
| **2** | **160** | **10.69** | **20.7** | **0.12** | **1.38** | **0.65** | **55** | **106** |
| 2.5 | 150 | 11.25 | 21.6 | 0.13 | 1.45 | 0.68 | 54 | 104 |
| 3 | 140 | 11.82 | 22.4 | 0.13 | 1.51 | 0.71 | 53 | 101 |
| 3.5 | 131 | 12.43 | 22.9 | 0.14 | 1.56 | 0.74 | 52 | 96 |

Notes: Base case cut-off is 2 g/t Au. Minimum thickness 0.8 m horizontal.
Mineral resources are not mineral reserves because the economic viability has not been demonstrated.

### 14.15 Comparison with Previous Estimate

The mineral resource estimate generated by Snowden is described in a technical report dated May 13, 2015. The resources listed in the 2015 technical report are summarized in Table 14.28.

**Table 14.28: Snowden May 2015 Estimate of Mineral Resources (2.5 g/t Au cut-off)**

| Zone | ktonnes | Au (g/t) | Au (koz) |
|---|---|---|---|
| **Measured** | | | |
| Serra | 140 | 11.8 | 60 |
| Meio | 90 | 14.14 | 40 |
| Galena | 40 | 13.3 | 20 |
| **Total Measured** | **270** | **12.79** | **110** |
| **Indicated** | | | |
| Serra | 650 | 8.9 | 180 |
| Meio | 810 | 6.1 | 160 |
| Galena | 460 | 6.9 | 100 |
| Valdette (1 g/t cut-off) | 150 | 1.6 | 10 |
| **Total Indicated** | **1910** | **7.20** | **440** |
| **Total Measured and Indicated** | **2180** | **7.89** | **550** |
| **Inferred** | | | |
| Serra | 140 | 7.7 | 30 |
| Meio | 810 | 5.8 | 150 |
| Galena | 340 | 6.3 | 70 |
| Valdette (1 g/t cut-off) | 360 | 1.15 | 10 |
| Demetrio | 770 | 4.3 | 110 |
| **Total Inferred** | **2060** | **5.43** | **360** |

Although Snowden tabulated resources based on a 2.5 g/t Au cut-off threshold, compared to 2 g/t Au in the new mineral resource estimate, it still had Measured plus Indicated resources with almost three times more contained gold than the current Indicated estimate. Similarly, Snowden reported twice the amount of contained gold in Inferred class resources compared to the current estimate. These differences are primarily attributed to classification and infill drilling as described here.

**Classification**

Snowden used the following classification parameters as described in the 2015 technical report: "*Classification was applied based on geologic confidence, data quality and grade variability. Areas classified as Measured Resources are informed within clusters of drill hole intersection with area of influence of 25 m. Indicated resources are informed within clusters of drill hole intersection with* *area of influence between 25 m and 75 m. The remainder of the Mineral Resource is classified as Inferred Mineral Resource where there is some drilling information and the blocks lie within the mineralized interpretation.*"

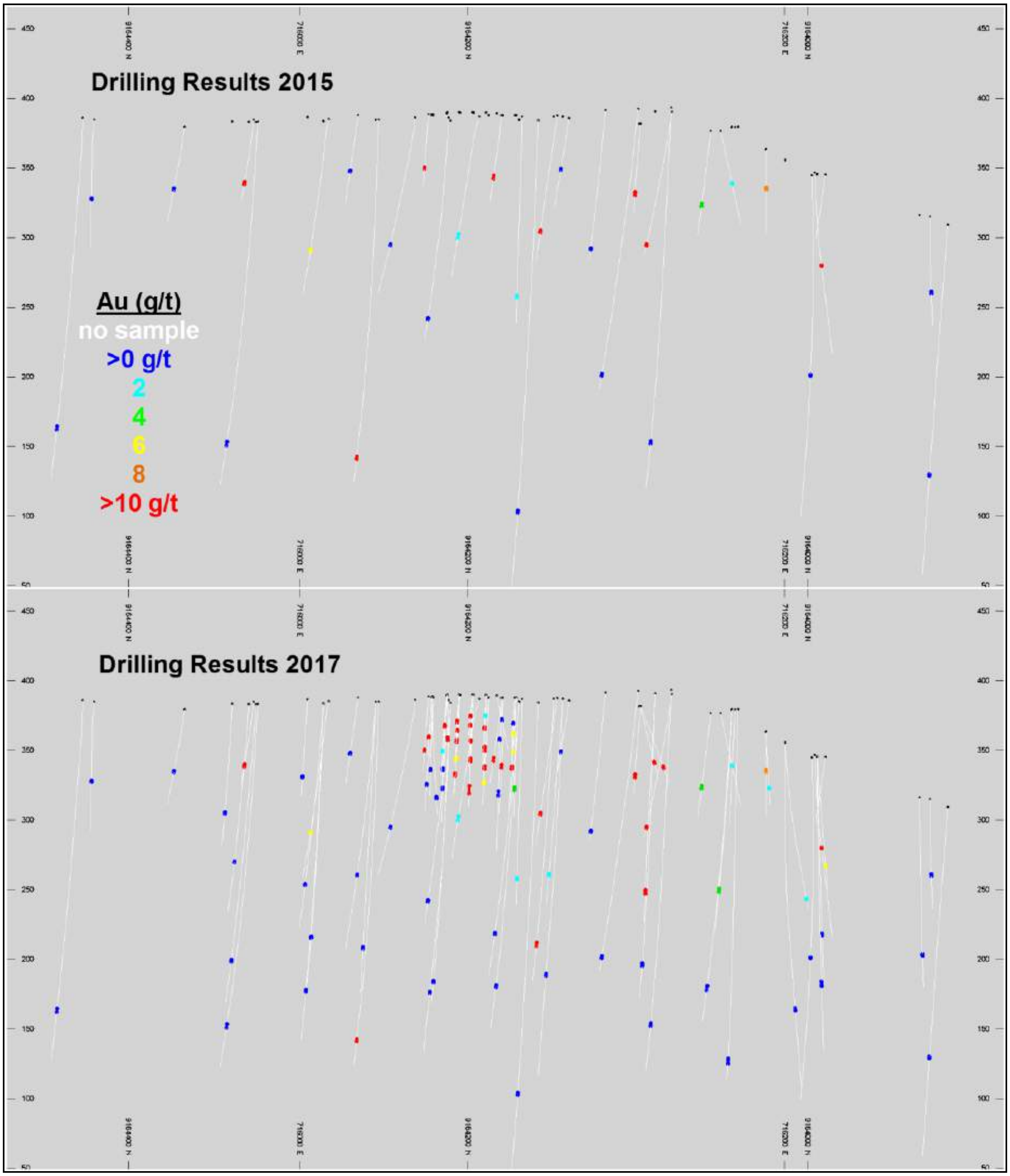
The mineral resource estimate provided in this technical report uses a more rigorous approach to classification that results from the analysis of a more extensive and robust sample database compared to what was available to Snowden in 2015.

Based on evaluations of the continuity exhibited by the current sample data, there are no mineral resources included in the Measured category, and resources in the Indicated category must be supported by a minimum of three drill holes that are spaced on a regular grid pattern with a maximum spacing of 50 m. Where Indicated mineral resources in Snowden's report extended for distances up to 75 m from drilling, they are now limited to a maximum distance of about 25 m from drill holes. Similarly, Snowden extended Inferred mineral resources for distances exceeding 200 m from a drill hole, whereas the Inferred mineral resources provided in this technical report are restricted to a maximum distance of 100 m from a drill hole intersection.

Changes in the classification criteria have resulted in significant reductions to mineral resources in all areas shown in Table 14.25 compared to the Snowden mineral resource shown in Table 14.28. Note that previous resources at Demetrio (770 kt at 4.3 g/t Au for 110 koz contained gold) are not included in the current estimates because, in the opinion of the QP, estimates of mineral resources cannot be confidently supported by the four drill holes currently available in this area. Further exploration is recommended at Demetrio.

**Infill Drilling**

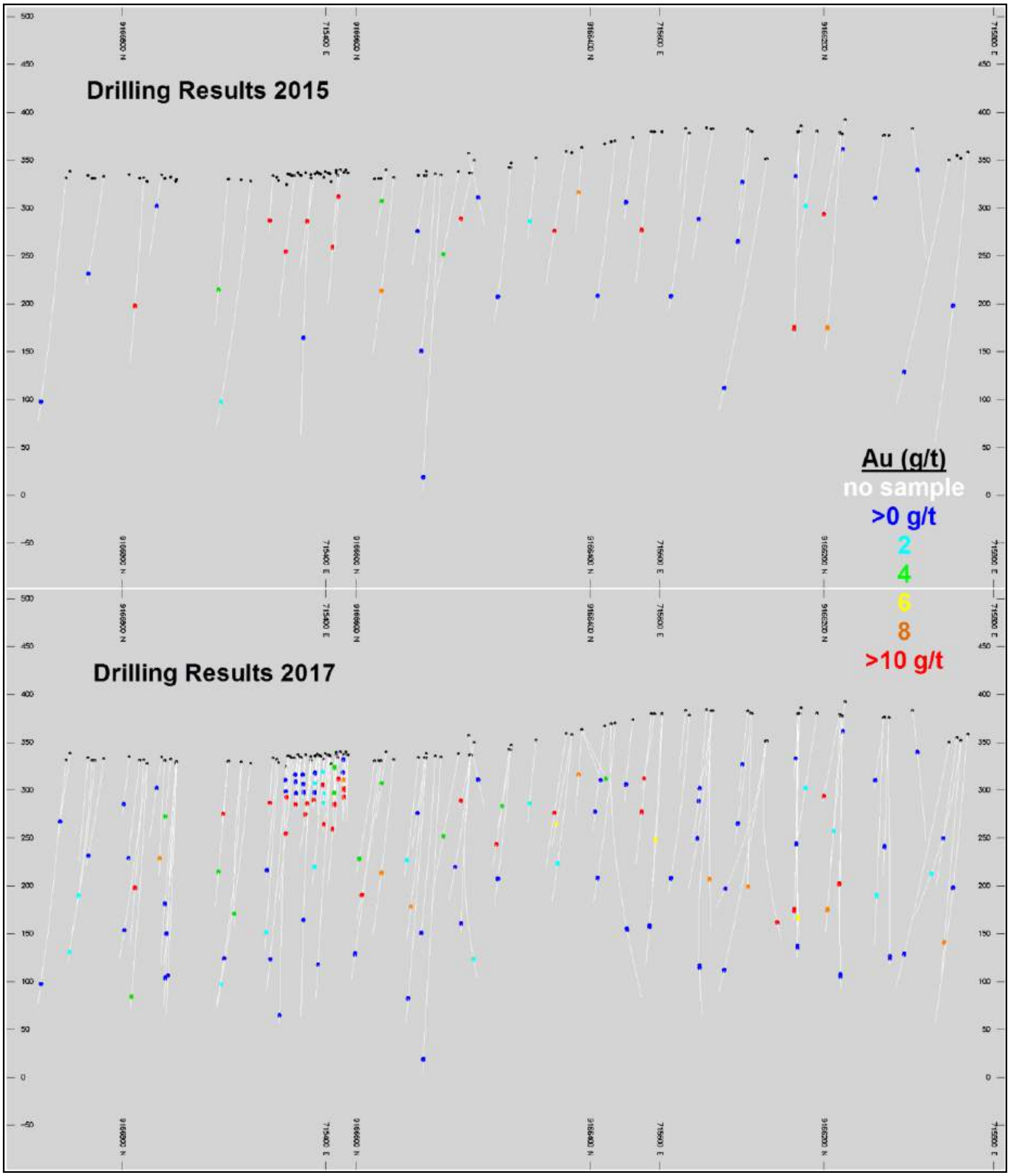
In some areas, the continuity of mineralization was not found with the additional, more closely spaced drilling completed by Anfield in 2016–17. An example from Meio is shown in Figure 14.18 with long section views, looking northeast, of drilling before and after the Anfield drilling program for vein1 at Meio. The continuity of mineralization in the northern part of the deposit was not retained in the new drilling, resulting in a reduction in resources at Meio.




Source: Sim Geological, 2017

**Figure 14.18: Long Section Views (Looking Northeast) of Drilling on Vein1 at Meio (2015 vs. 2017)**

Figure 14.19 shows a similar comparison for vein1 at Serra, where the new drilling did not encounter the continuity that had been assumed prior to the 2016 program.




**Source: Sim Geological, 2017**

**Figure 14.19: Long Section Views (Looking Northeast) of Drilling on Vein1 at Serra (2015 vs. 2017)**

# 15 MINERAL RESERVES

MDA was provided the resource block models for the Serra, Meio, and Galena deposits. Mineral reserve estimates and corresponding designs and mine schedule are based on the block models and the solids used to create the mineral resource block models. The vein solids were created during the resource modeling to spatially define the veins and control the estimate. All planned mining in the FS has been based on the location and width of the vein solids. The block models provided to MDA contained only material incorporated into the Indicated and Inferred mineral resource categories. Only material that was incorporated into the Indicated mineral resource category was taken into account in the mineral reserve estimate for the Coringa Gold Project.

While designing the mine, MDA engineers found the data and model to be clean and usable. MDA feels that the current vein model, which is used to control the estimate and the mine design, cannot adequately represent local variations in grade or vein thickness from current 50m drill spacing. The deposit will require grade-control drilling and sampling to successfully select ore from waste. Only infill drilling on tighter spacing will resolve these issues consequently the feasibility study includes the cost of pre-production infill drilling. Otherwise, the estimate is accepted as is with the understanding that local grade and vein-thickness variability will likely be greater than presented.

The resource model is a diluted model in that there is a minimum 0.8m horizontal thickness. Because of this requirement used in defining the solid for resource estimation, the quartz vein, which MDA understands is the main visual guide to gold, is often a small portion of the vein solid. As evidence of the dilution contained within the model, 67% of the total sample lengths in Serra's Vein Solid 1 are less than the economic cut-off grade of 2.5g Au/t, and about 43% are less than 0.1g Au/t. As engineers, we accept the geologists' interpretation of the vein solid, but mention that the vein solid will likely be modified with pre-production infill drilling data, resulting in a more accurate guide for effective mining.

## 15.1 Mineral Definition

MDA classified mineral reserves in order of increasing confidence into Probable and Proven categories to be in compliance with the "CIM Definition Standards - For Mineral Resources and Mineral Reserves" (2014) and therefore NI 43-101. CIM mineral reserve definitions are given below, with CIM's explanatory material shown in italics:

**Mineral Reserves**

*Mineral Reserves are sub-divided in order of increasing confidence into Probable Mineral Reserves and Proven Mineral Reserves. A Probable Mineral Reserve has a lower level of confidence than a Proven Mineral Reserve.*

A mineral reserve is the economically minable part of a Measured and/or Indicated mineral resource. It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at prefeasibility or feasibility level as appropriate that include application of modifying factors. Such studies demonstrate that, at the time of reporting, extraction could reasonably be justified.

The reference point at which mineral reserves are defined, usually the point where the ore is delivered to the processing plant, must be stated. It is important that, in all situations where the reference point is different, such as for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported.

The public disclosure of a mineral reserve must be demonstrated by a prefeasibility study or feasibility study.

*Mineral Reserves are those parts of Mineral Resources which, after the application of all mining factors, result in an estimated tonnage and grade which, in the opinion of the Qualified Person(s) making the estimates, is the basis of an economically viable project after taking account of all relevant Modifying Factors. Mineral Reserves are inclusive of diluting material that will be mined in conjunction with the Mineral Reserves and delivered to the treatment plant or equivalent facility. The term 'Mineral Reserve' need not necessarily signify that extraction facilities are in place or operative or that all governmental approvals have been received. It does signify that there are reasonable expectations of such approvals.*

*'Reference point' refers to the mining or process point at which the Qualified Person prepares a Mineral Reserve. For example, most metal deposits disclose mineral reserves with a "mill feed" reference point. In these cases, reserves are reported as mined ore delivered to the plant and do not include reductions attributed to anticipated plant losses. In contrast, coal reserves have traditionally been reported as tonnes of "clean coal". In this coal example, reserves are reported as a "saleable product" reference point and include reductions for plant yield (recovery). The Qualified Person must clearly state the 'reference point' used in the Mineral Reserve estimate.*

**Probable Mineral Reserves**

A Probable mineral reserve is the economically minable part of an Indicated, and in some circumstances, a Measured mineral resource. The confidence in the modifying factors applying to a Probable mineral reserve is lower than that applying to a Proven mineral reserve.

*The Qualified Person(s) may elect, to convert Measured Mineral Resources to Probable Mineral Reserves if the confidence in the Modifying Factors is lower than that applied to a Proven Mineral Reserve. Probable Mineral Reserve estimates must be demonstrated to be economic, at the time of reporting, by at least a Pre-Feasibility Study.*

**Proven Mineral Reserve**

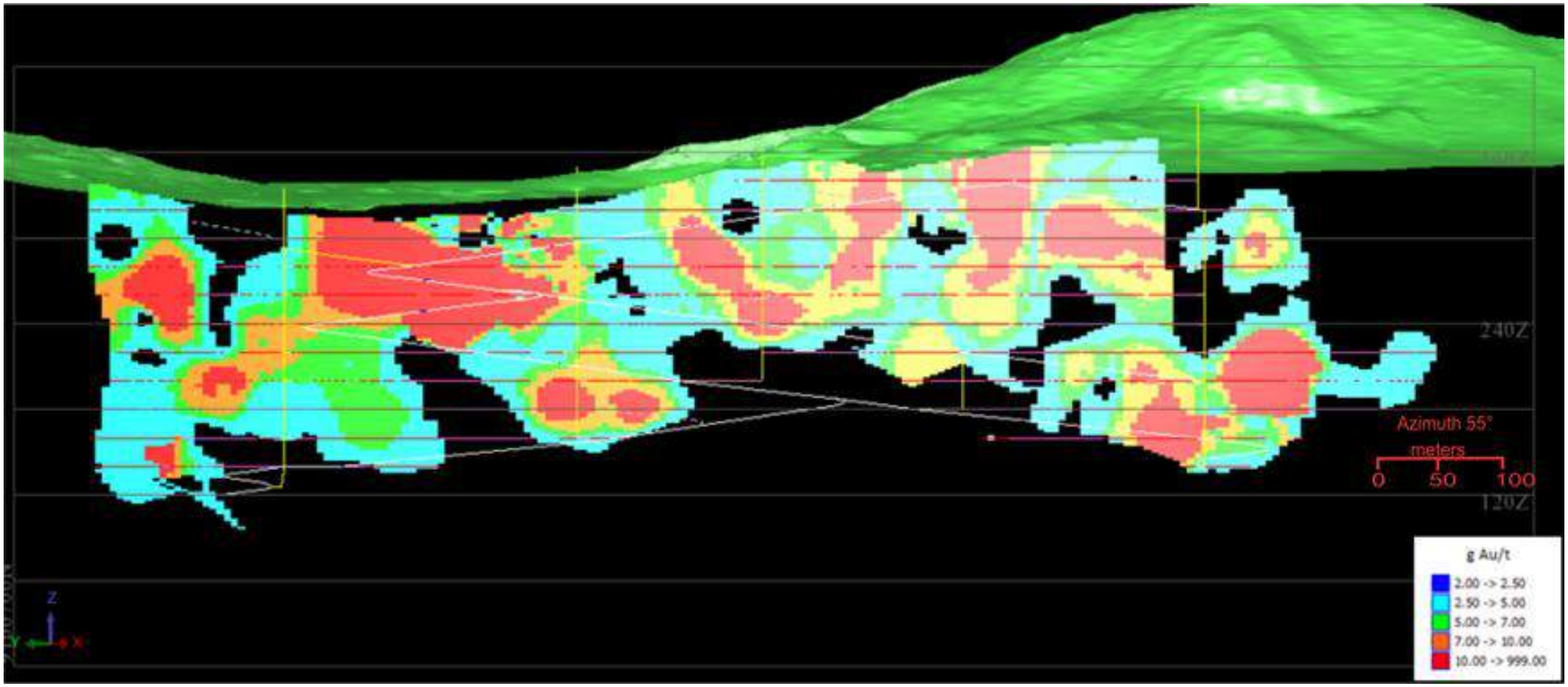
A Proven mineral reserve is the economically minable part of a Measured mineral resource. A Proven mineral reserve implies a high degree of confidence in the modifying factors.

*Application of the Proven Mineral Reserve category implies that the Qualified Person has the highest degree of confidence in the estimate with the consequent expectation in the minds of the readers of the report. The term should be restricted to that part of the deposit where production planning is taking place and for which any variation in the estimate would not significantly affect the potential economic viability of the deposit. Proven Mineral Reserve estimates must be demonstrated to be economic, at the time of reporting, by at least a Pre-Feasibility Study. Within the CIM Definition standards the term Proved Mineral Reserve is an equivalent term to a Proven Mineral Reserve.*

### Modifying Factors

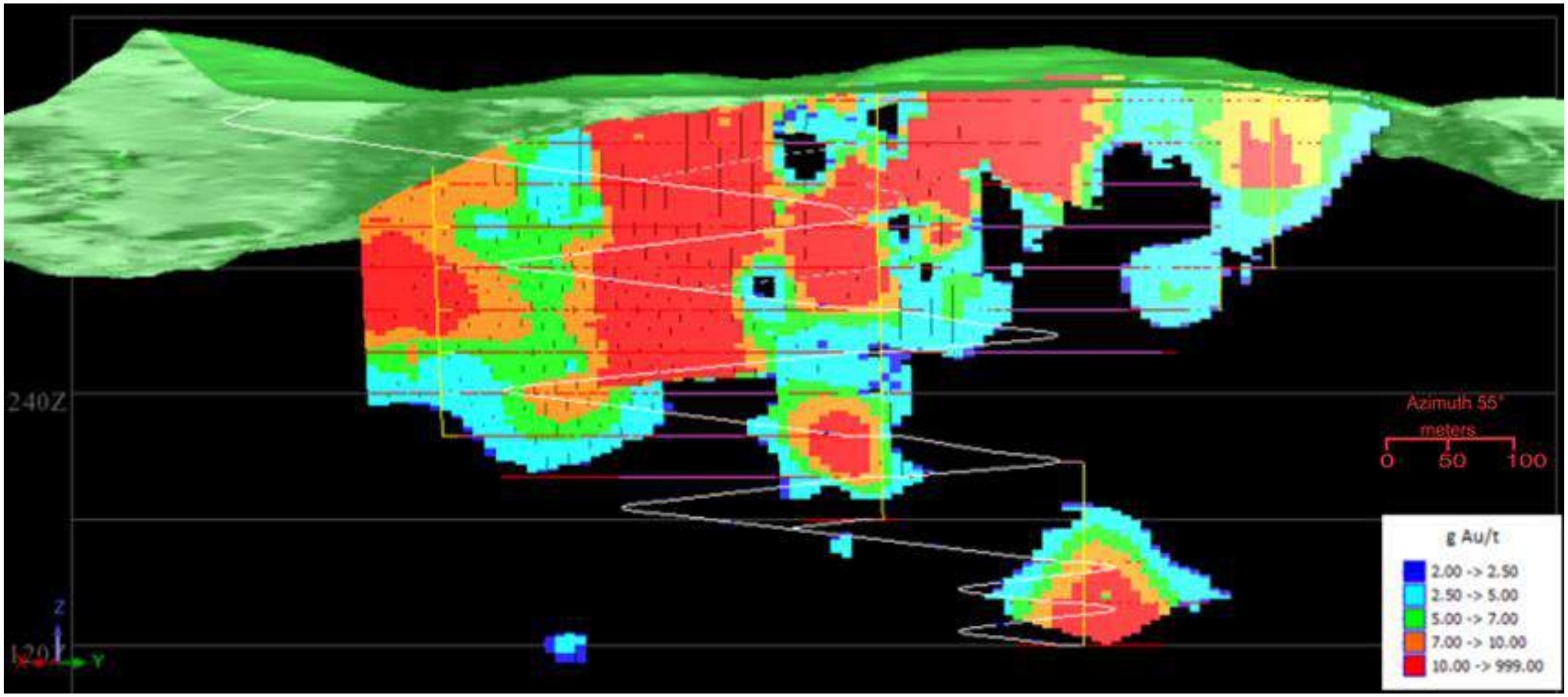
Modifying factors are considerations used to convert mineral resources to mineral reserves. These include, but are not restricted to, mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and governmental factors.

Mineable reserves were developed using the resource model provided for the deposits. A mining cut-off grade in g/t was estimated and blocks greater than or equal to the mining cut-off were included. Resource model blocks above the mining cut-off grade are shown in Figure 15.1 for the Serra deposit. Resource model blocks above the mining cut-off for the Meio deposit are shown in Figure 15.2.




Source: MDA, 2017

**Figure 15.1: Resources at Serra (Vein 1)**




**Source: MDA, 2017**

**Figure 15.2: Resources at Meio**

Mineral reserves were estimated based on the mineral resource model. To define blocks that might be minable, the following steps were taken:

- Polygons outlining blocks greater than or equal to the mining cut-off were digitized at 5 m vertical sections.
  - The polygons were also constrained to the solids used in the resource estimations.
  - Polygons were designed to a minimum mining width of 0.8 m.
- Diluted stope grades, using only measured and indicated undiluted grades, were estimated in the block models.
  - Blocks with grades below the cut-off grade are treated as dilution blocks. Note that there is additional dilution from included waste and inferred resources added at zero grade.
- Revised stope solids to flag low-grade stopes.
  - Blocks with low-grade values were retained where required to maintain continuous blocks within a stope.
- Mineral resources inside of each stope solid were summarized.
- Blocks within a 20 m surface topography sill pillar were flagged and removed, however, these blocks within the surface sill pillar could be mined from the surface in later stages of the mine.
- Centerline development was refined to access each stoping area.

The stope solids reflect the material that is to be mined and sent to be processed. As such, all Indicated mineral resources inside of the stope solids, including mineral resources below the mining cut-off grades of 2.5g Au/t for the Serra deposit and 2.38g Au/t for the Meio deposit (internal dilution), are considered to be Probable mineral reserves.

Material below the cut-off grades is considered internal dilution. If this material is classified as an Indicated mineral resource the grades contribute to the total grade of the stopes. Inferred mineral resource material within the solids is considered dilution and does not contribute to the total grade of the stopes.

The minable material within sills and stopes is summarized in Table 15.1. The Galena deposit will be mined last and accounts for about 10% of the project resources. Since this deposit will be the last to be mined, contains a small mineral resource, and is similar to the Serra deposit in vein width, detailed mine designs were not completed for this deposit. Instead, the Galena mineral reserves and required development were based on the proportions of development meters per ton of reserves from Serra, and the ratio of reserve tons per resource ton from Serra to estimate the Galena reserves. The dilution due to the 80-cm minimum mining width was also based on the Serra percentage. MDA believes that this approach is reasonable due to the size and timing of the planned mining. After additional drilling is completed, detailed designs should be completed for Galena.

**Table 15.1: Mineable Reserves – Coringa Deposits**

| | | Probable Reserves |
|---|---|---|
| Serra | K Tonnes | 498.3 |
| | g Au/t | 6.05 |
| | K Oz Au | 96.9 |
| | g Ag/t | 12.76 |
| | K Oz Ag | 204.4 |
| Meio | K Tonnes | 196.0 |
| | g Au/t | 7.38 |
| | K Oz Au | 46.5 |
| | g Ag/t | 14.64 |
| | K Oz Ag | 92.3 |
| Galena | K Tonnes | 74.3 |
| | g Au/t | 7.09 |
| | K Oz Au | 16.9 |
| | g Ag/t | 11.24 |
| | K Oz Ag | 26.8 |
| Total | K Tonnes | 768.6 |
| | g Au/t | 6.49 |
| | K Oz Au | 160.3 |
| | g Ag/t | 13.09 |
| | K Oz Ag | 323.5 |

*Total tonnes include dilution material*
*Grades are fully diluted*

- The reserves summarized in the table above include diluting material, thus the grades are fully diluted.
- Probable Reserves are reported based on Indicated resources inside of mining shapes and after it was demonstrated that it can be mined at a profit.
- Indicated resources below the mining cut-off grade, and inside of mining solids are also included in reserves as internal dilution.
- Rounding may result in apparent summation differences.
- The effective date of the mineral reserves estimate is July 1, 2017.

Once in production, some of the waste and Inferred material can be segregated when mining and the material can be left in-situ as pillars, thus reducing the dilution.

## 15.2 Economic Parameters

Table 15.2 shows the economic parameters that were used to define the mining cut-off grades for the Serra and Meio deposits. The parameters used for the Serra deposit were also used for the Galena deposit. Cut-off grades and reserves have been stated using a $1,250/oz Au. Note that these parameters were used for defining stopes and may differ slightly from the final economic analysis.

**Table 15.2: Economic Parameters**

| | Serra | Meio | Units |
|---|---|---|---|
| **Mining Cost** | | | |
| UG Mining Cost | 41.00 | 43.00 | U.S. $/t-ore |
| **Processing Cost** | | | |
| Milling | 43.00 | 40.00 | U.S. $/t-ore |
| Refining | 1.00 | 1.00 | U.S. $/Oz Au |
| **Recoveries** | | | |
| Milling Gold | 96.00 | 94.00 | % |
| **G&A** | | | |
| Mining and Processing | 4.00 | 4.00 | U.S. $/t-ore processed |

## 15.3 Dilution and Ore Loss

The designs outlining the minable blocks were undertaken using a 0.80 m minimum mining width. Estimated Indicated resources inside of these designs that is not above the mining cut-off grade is added at the respective grade, and Inferred mineral resources and un-estimated tonnage is added at zero grade 9 and are therefore not included in the estimated mineral reserves); both materials are considered internal dilution. This dilution material amounts to approximately 121 kt at 0.16 g Au/t and 2.6 g Ag/t for both Serra and Meio combined.

Dilution due to wall over-break from blasting at the stopes was taken into account in the schedule summaries at zero grades. Dilution from cleaning the ribs and the back is considered negligible. The approximate tonnage of this dilution material for both Serra and Meio combined is 75 ktonnes at zero grades. Dilution material for Galena is estimated to be approximately 2.5 kt, also at zero grade.

The sill drives, which are developed in ore along the vein, have a higher amount of internal dilution material. Most of this material is classified as undefined, thus it does not contribute any metal to the process. MDA considered different mining techniques to mitigate this dilution in the sill drives, however, the techniques would prove more costly than processing all the material produced from the sill drives.

On an overall tonnage basis, the total dilution included is approximately 16%. In the designs with additional mining dilution, it ranges from 10 to 20% depending on the mining method applied at each mining location.

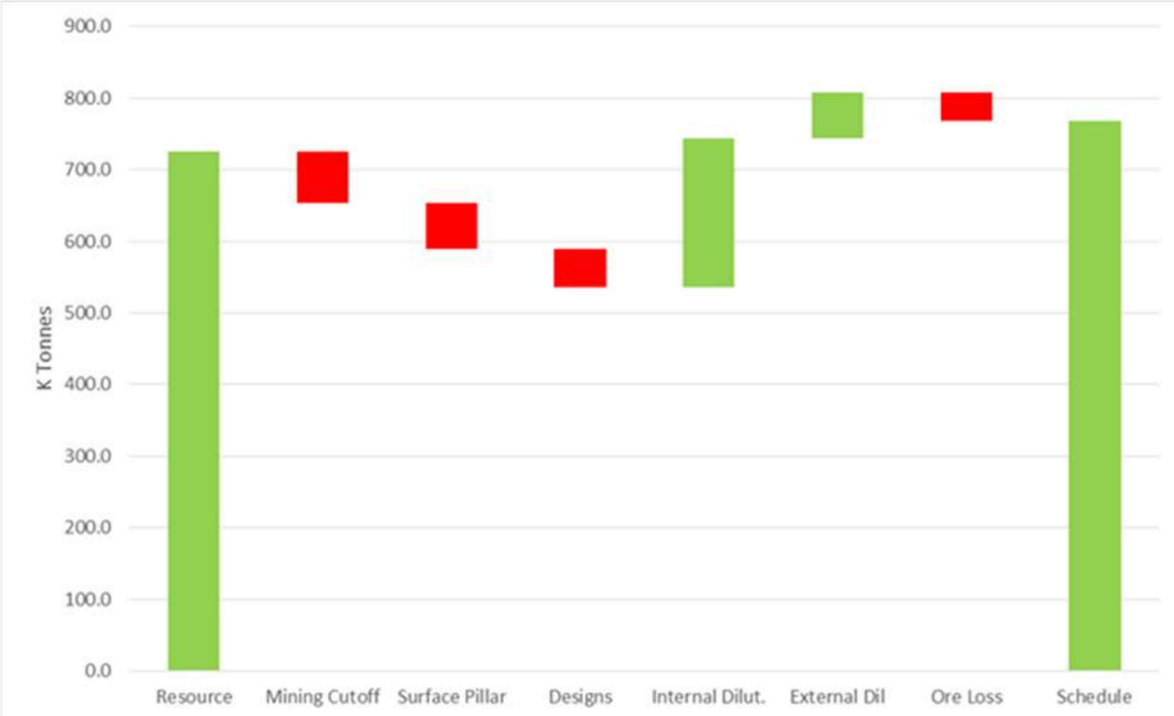
Ore loss has been estimated at 5% to account for sill pillars that might be needed in between main levels at 60 m maximum height of open stopes as per the geotechnical recommendations. Ore loss for Galena is assumed to also be 5% of the resource, or 2.5 kt.

## 15.4 Reserve Conversion

The FS is based on the reported geological resources. During the process of estimating the reserves, material and metal content change depending on different factors such as application of mining cut-off, designs, and dilution factors. The process of converting resources to reserves is summarized in Table 15.4 below. Figure 15.3 shows the conversion of tonnes, Figure 15.4 represents the conversion of gold, and Figure 15.5 shows the conversion of silver resources to reserves. These figures are a visual representation of Table 15.3 and the red color indicates loss.

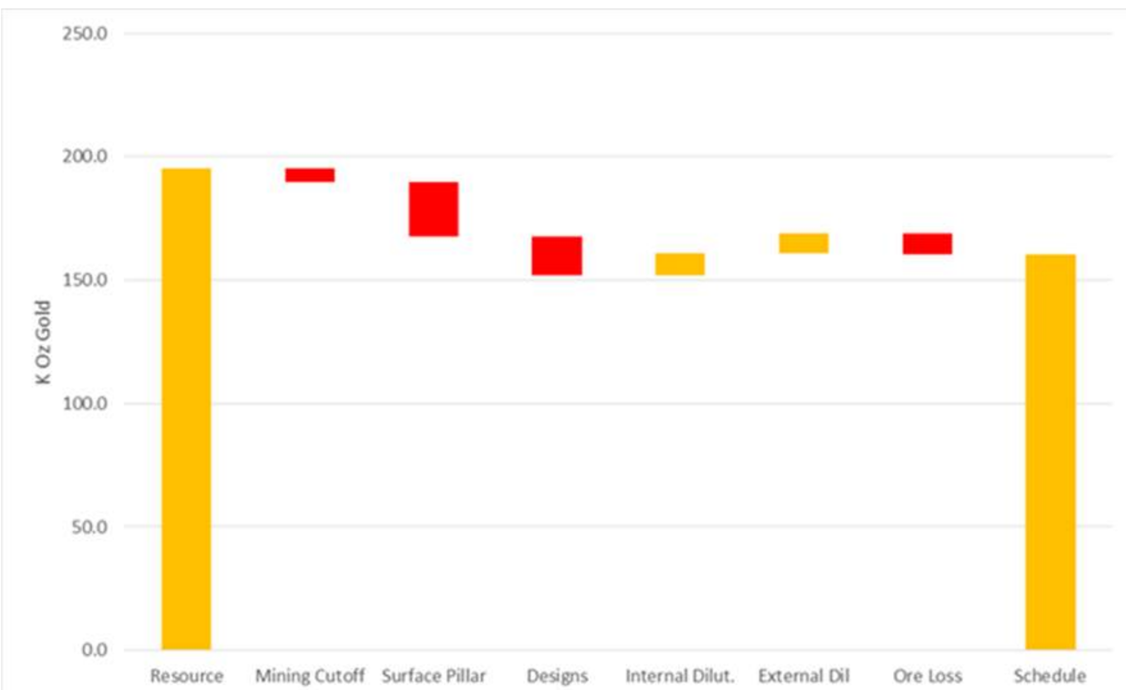
**Table 15.3: Changes from Geological Resources to Reserves**

| | | Change due to: | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Resource | Mining Cutoff | Surface Pillar | Designs | Internal Dilut. | External Dil | Ore Loss | Schedule |
| Serra | K Tonnes | 487.9 | 430.8 | 389.9 | 355.8 | 498.0 | 524.5 | 498.3 | 498.3 |
| | g Au/t | 7.45 | 8.13 | 8.20 | 8.22 | 6.22 | 6.05 | 6.05 | 6.05 |
| | K Oz Au | 116.8 | 112.6 | 102.7 | 94.0 | 99.6 | 102.0 | 96.9 | 96.9 |
| | g Ag/t | 16.11 | 17.08 | 17.38 | 17.09 | 12.99 | 12.76 | 12.76 | 12.76 |
| | K Oz Ag | 252.8 | 236.6 | 217.8 | 195.4 | 208.0 | 215.1 | 204.4 | 204.4 |
| Meio | K Tonnes | 159.5 | 149.2 | 137.7 | 128.0 | 171.3 | 206.3 | 196.0 | 196.0 |
| | g Au/t | 10.69 | 11.25 | 10.04 | 10.08 | 8.05 | 7.38 | 7.38 | 7.38 |
| | K Oz Au | 54.8 | 54.0 | 44.4 | 41.5 | 44.1 | 48.9 | 46.5 | 46.5 |
| | g Ag/t | 20.71 | 21.61 | 20.63 | 20.29 | 16.41 | 14.64 | 14.64 | 14.64 |
| | K Oz Ag | 106.2 | 103.6 | 91.3 | 83.5 | 89.2 | 97.1 | 92.3 | 92.3 |
| Galena | K Tonnes | 78.1 | 74.0 | 62.4 | 52.9 | 74.0 | 78.0 | 74.3 | 74.3 |
| | g Au/t | 9.36 | 9.74 | 10.30 | 9.63 | 7.29 | 7.09 | 7.09 | 7.09 |
| | K Oz Au | 23.5 | 23.2 | 20.7 | 16.4 | 17.4 | 17.8 | 16.9 | 16.9 |
| | g Ag/t | 14.73 | 15.35 | 15.88 | 15.05 | 11.45 | 11.24 | 11.24 | 11.24 |
| | K Oz Ag | 37.0 | 36.5 | 31.9 | 25.6 | 27.2 | 28.2 | 26.8 | 26.8 |
| Total | K Tonnes | 725.5 | 654.1 | 590.0 | 536.6 | 743.3 | 808.8 | 768.6 | 768.6 |
| | g Au/t | 8.37 | 9.03 | 8.85 | 8.80 | 6.74 | 6.49 | 6.49 | 6.49 |
| | K Oz Au | 195.1 | 189.8 | 167.9 | 151.8 | 161.1 | 168.7 | 160.3 | 160.3 |
| | g Ag/t | 16.98 | 17.92 | 17.98 | 17.65 | 13.58 | 13.09 | 13.09 | 13.09 |
| | K Oz Ag | 396.0 | 376.8 | 341.0 | 304.5 | 324.4 | 340.4 | 323.5 | 323.5 |



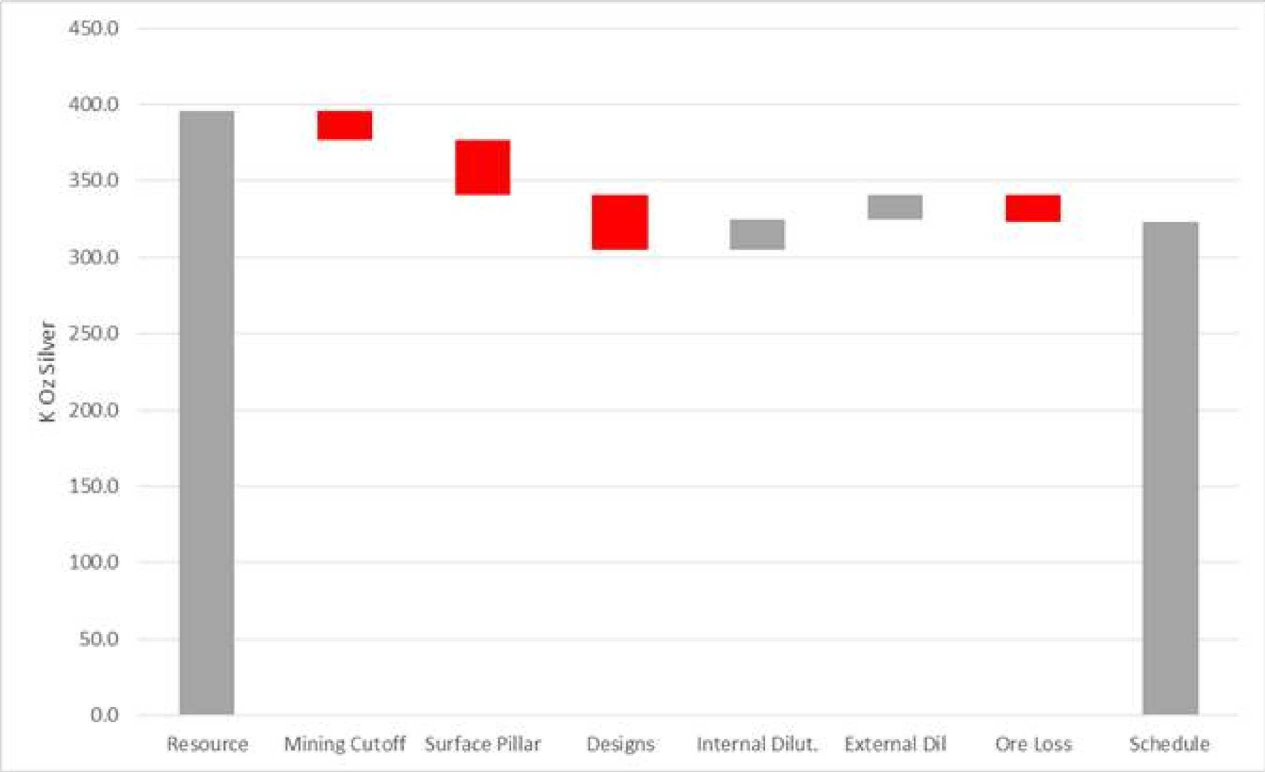

Source: MDA, 2017

**Figure 15.3: Changes in Tonnage – Geological Resources to Reserves**




Source: MDA, 2017

**Figure 15.4: Changes in Ounces of Gold – Geological Resources to Reserves**




Source: MDA, 2017

**Figure 15.5: Changes in Ounces of Silver – Geological Resources to Reserves**

# 16 MINING METHODS

The Coringa Gold Project has been planned as an underground mining operation. The advantages of underground mining include:

- Underground mining helps to minimize the footprint of the mine and its environmental impacts;
- The Serra, Meio, and Galena deposits are high-grade, narrow vein deposits which are ideally suited to underground mining methods which minimize dilution from the mining process compared with open pit mining; and
- Underground selectivity will help to maximize ROM feed grades.

Anfield has put together a team of experienced technical staff who will be managing the development and mining at the Coringa Gold Project. The technical team is experienced in narrow vein operations. Costs for development and mining methods are based on the previous experience of the team and also based on similar operations in the region. These costs have been adopted in the cost estimates for mine development and production for the Serra, Meio, and Galena deposits.

Anfield will provide the infrastructure for mining activities. The infrastructure is to include mechanical shops, warehouse, fuel supply, electrical power, transportation, and onsite camp accommodations for their employees.

Mining will commence at Serra with construction of a portal followed by development of a decline ramp and access to the mineralized veins. Main mine development at Serra is finished approximately in the second year of life of the Serra mine, at the end of which development of the Meio mine will start. Galena will be developed for the final year of the project.

The primary mining method for the Serra deposit is shrinkage. Having higher metal grades, the Meio deposit will be mined using a combination of shrinkage and narrow-vein longhole mining. The Meio deposit has similar characteristics to Serra, however, the higher grades will allow it to be mined with some extra dilution that the longhole mining methods might require to accommodate the mining equipment. Galena mine will use shrinkage mining similar to the Serra mine.

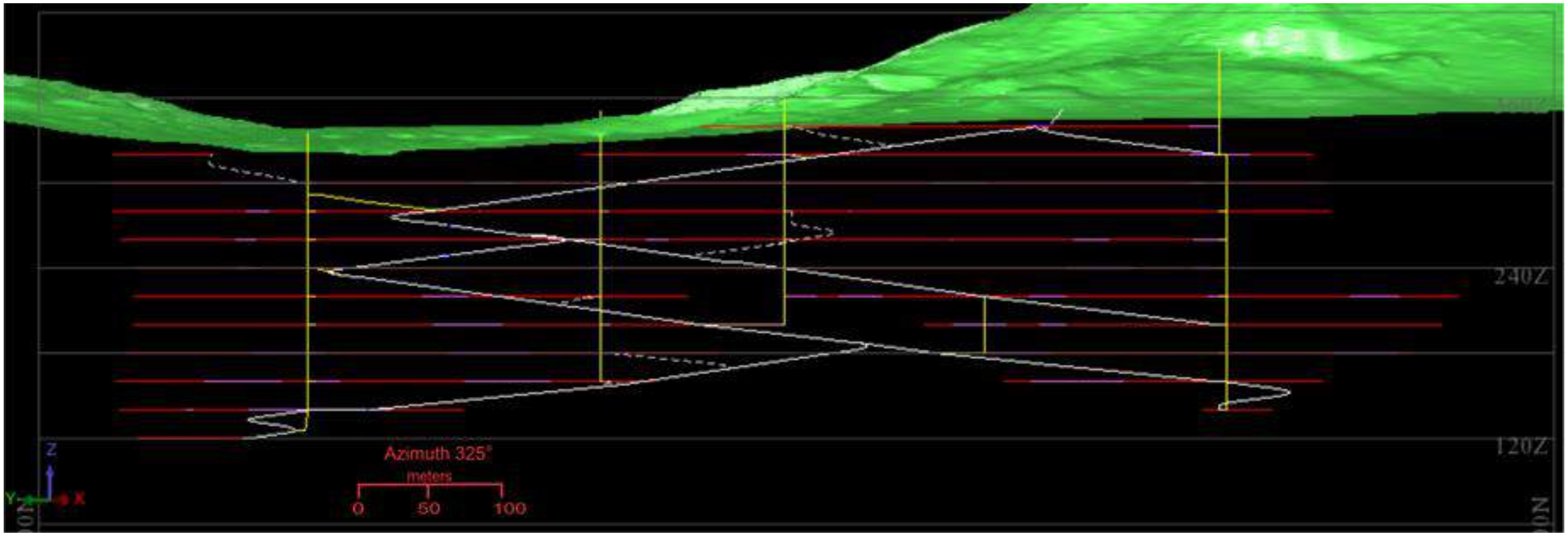
## 16.1 Underground Development

Each mine will be accessed through a single portal entrance. Development will include construction of a decline, main haulage drifts, and crosscuts to provide access to the production locations. Underground ventilation will require development of vent shafts or vent raises connecting the underground levels to the surface and connecting levels in between. Some of the vent raises will also be used as secondary escape ways.

Primary development for Serra will be built on the FW, facilitating initial access to the main vein.

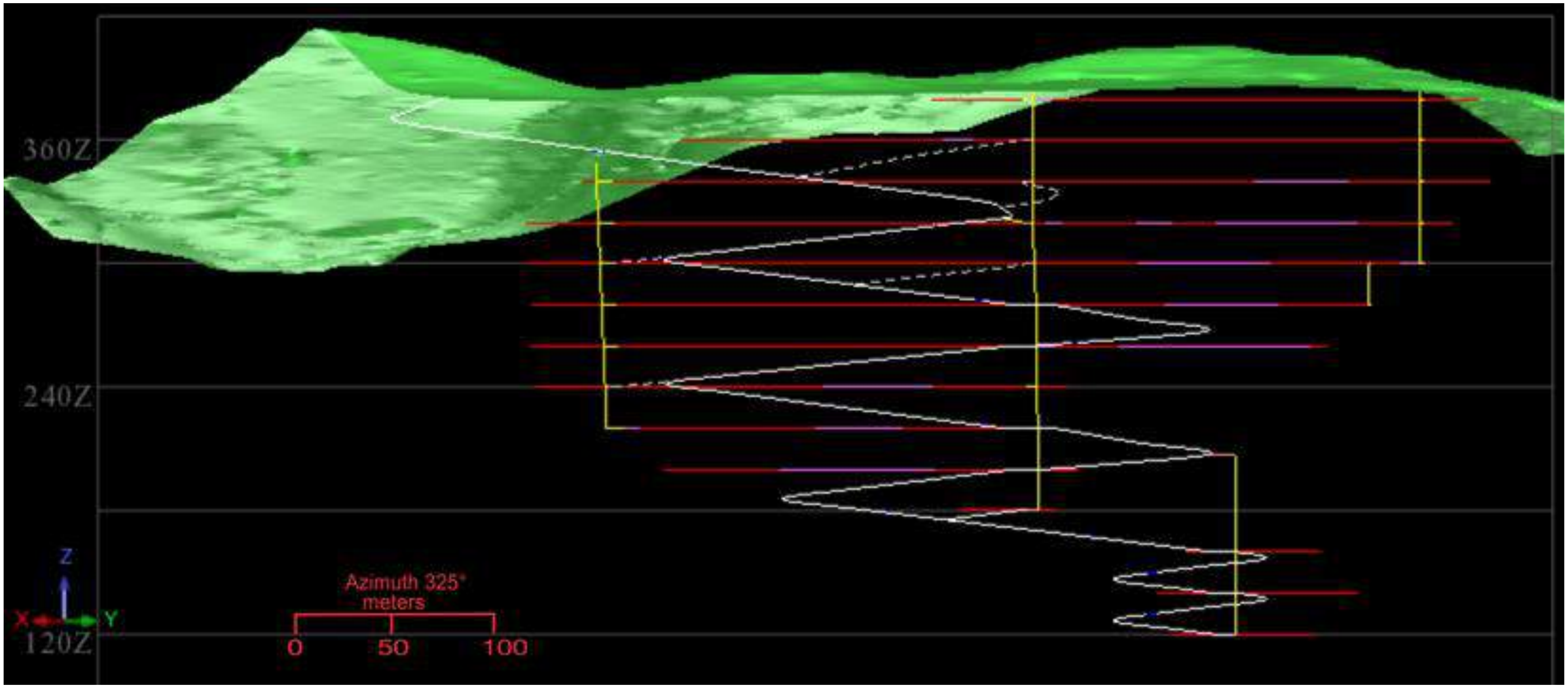
Primary development at Meio will be built in between two veins which are an average 50 m apart. Although four veins were modeled at Meio, only two of them containing higher grades will be mined. Main development for Meio will be built in between the veins reducing the length of the stope access to both veins.

Figure 16.1 and Figure 16.2 show in long section view the underground development design for Serra and Meio, respectively. The development of Serra and Meio in plan view is shown in Figure 16.3 and Figure 16.4, respectively. The next section discusses the various components of the underground development.



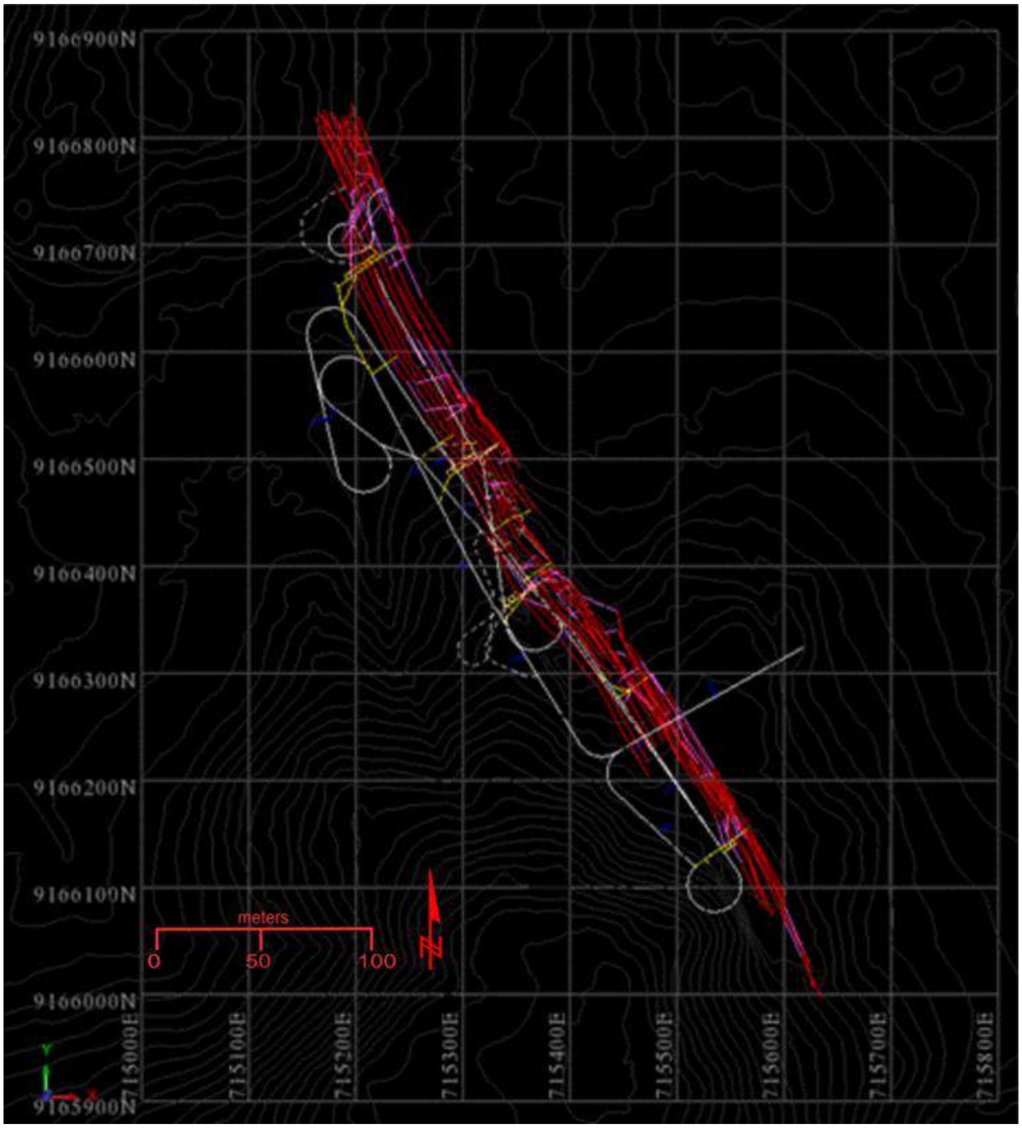

Source: MDA, 2017

**Figure 16.1: Serra Underground Development – Long View**



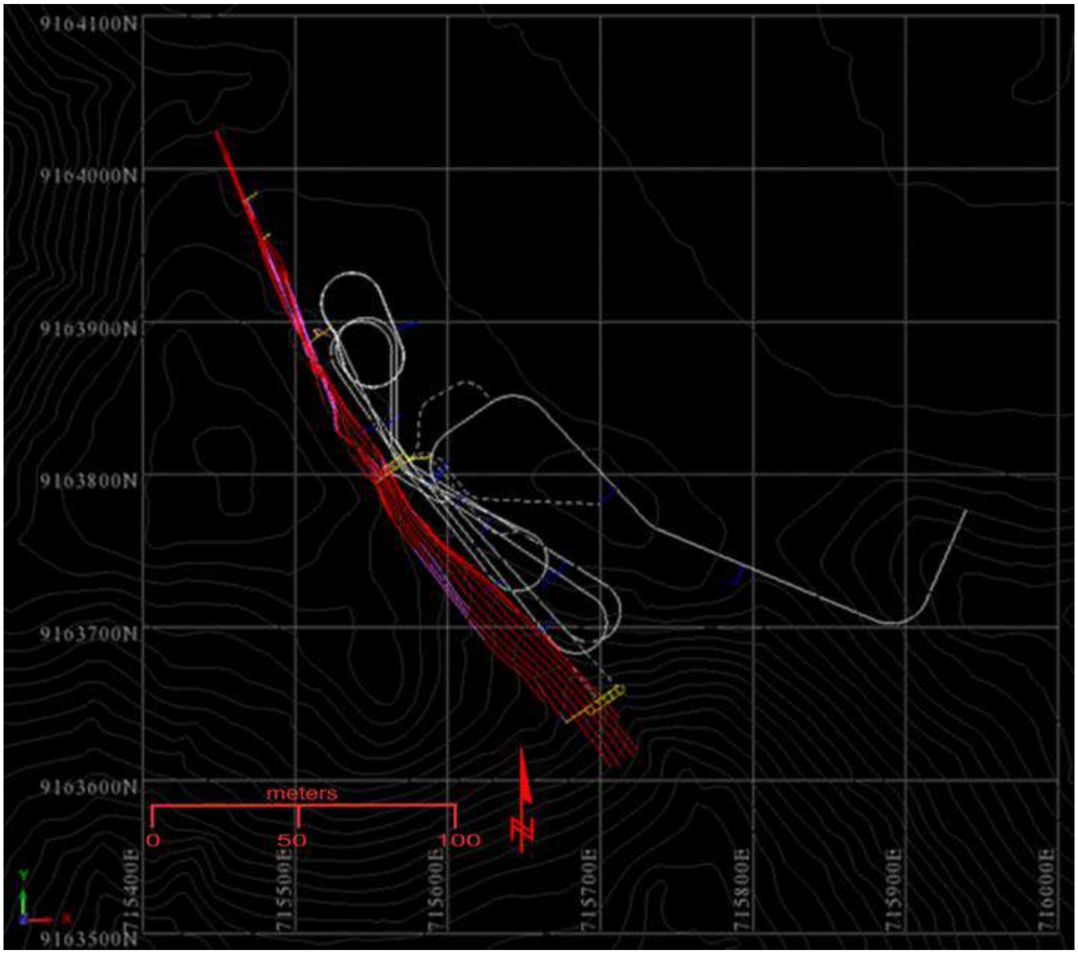

Source: MDA, 2017

**Figure 16.2: Meio Underground Development – Long View**




Source: MDA, 2017

**Figure 16.3: Serra Underground Development – Plan View**




Source: MDA, 2017

**Figure 16.4: Meio Underground Development – Plan View**

### *16.1.1 Portal Construction*

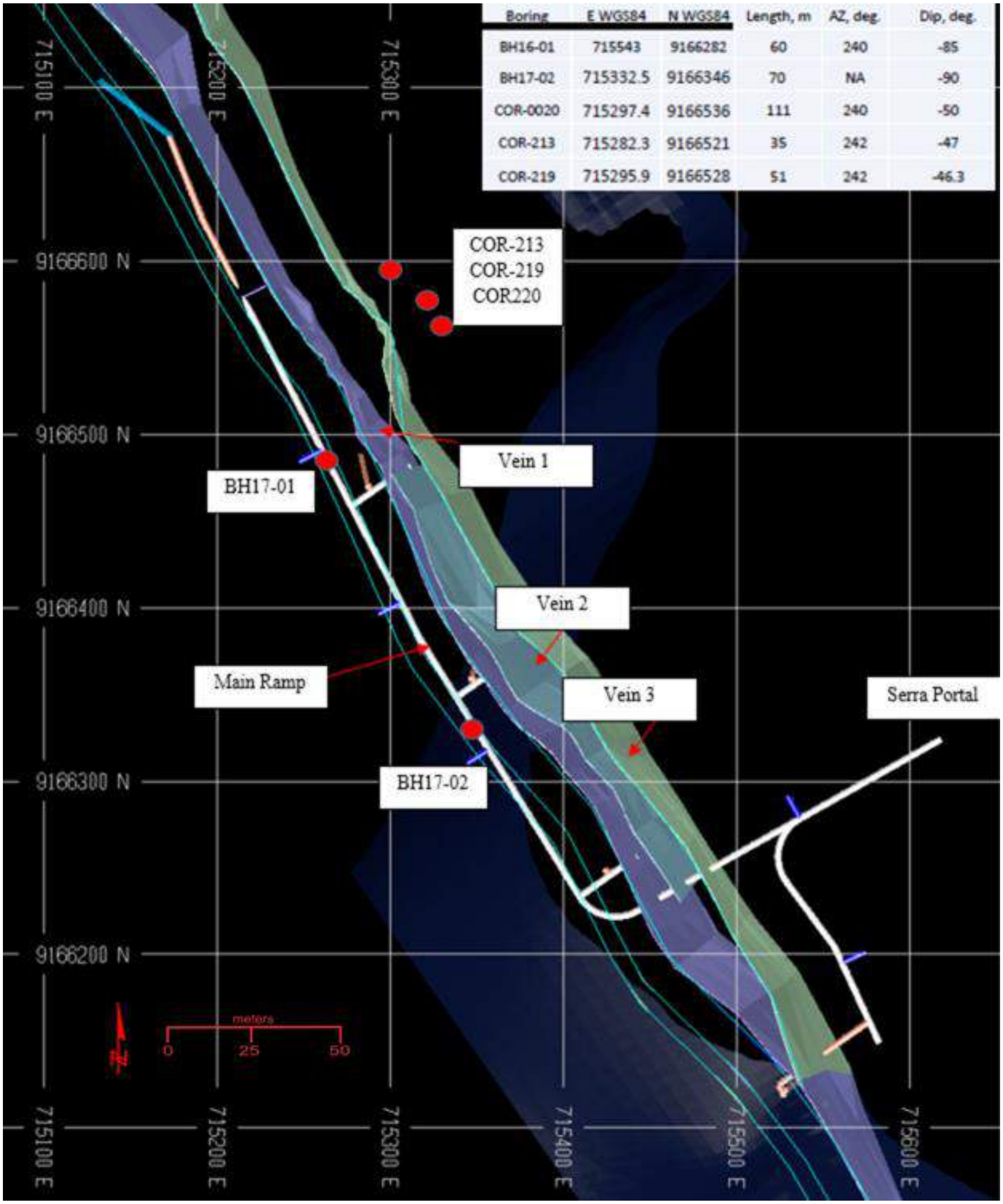
The portal locations for the three mines facilitate direct access to the deposit while providing the area necessary for locating temporary and permanent facilities near the portal area. These facilities will service the underground mine. They also provide a convenient location for transporting mined material to the adjacent processing plant or to temporary ore and waste stockpiles. The approximate portal location coordinates and elevations are shown in Table 16.1.

**Table 16.1: Portal Coordinates and Elevations**

| | East | North | Elev. |
|---|---|---|---|
| Serra | 715,618 | 9,166,324 | 350 |
| Meio | 715,940 | 9,163,777 | 380 |
| Galena | 714,043 | 9,167,448 | 310 |

#### 16.1.1.1 Geotechnical Conditions

Geotechnical conditions for the portals' construction were evaluated for Serra and Meio by Quanta Subsurface (Quanta, 2017 b & c) and designs for the portals and the main ramp are based on Quanta's geotechnical recommendations. Dedicated geotechnical holes were drilled at the portal site and along the line of the decline for Meio. At Serra, dedicated geotechnical boreholes were drilled along the decline heading. These drill holes and other exploration holes around the decline centerlines where used for the geotechnical analysis of the ground conditions at the portals and along the decline. Figure 16.5 shows the drill hole collar locations or Serra and Figure 16.6 shows the approximate collar locations for Meio.

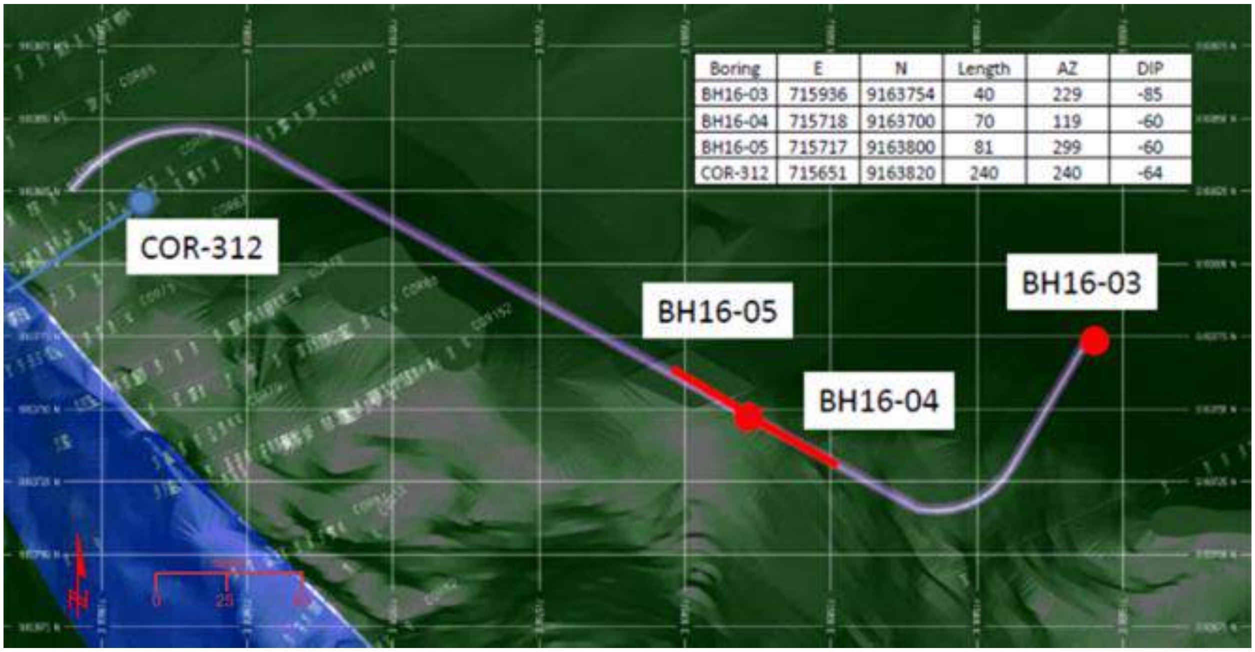


| Boring | E WGS84 | N WGS84 | Length, m | AZ, deg. | Dip, deg. |
|---|---|---|---|---|---|
| BH16-01 | 715543 | 9166282 | 60 | 240 | -85 |
| BH17-02 | 715332.5 | 9166346 | 70 | NA | -90 |
| COR-0020 | 715297.4 | 9166536 | 111 | 240 | -50 |
| COR-213 | 715282.3 | 9166521 | 35 | 242 | -47 |
| COR-219 | 715295.9 | 9166528 | 51 | 242 | -46.3 |



Source: MDA, 2017

**Figure 16.5: Serra Geotechnical Drill Hole Collars**




Source: MDA, 2017

**Figure 16.6: Meio Geotechnical Drill Hole Collars**

In general, rock quality is expected to be “Good” in both locations (according to the Q-System empirical rock mass rating system). The water table at Meio is below the main decline. At Serra, the water table is above the decline, therefore it is expected to have water inflow. With the water considered, the overall rock quality ratings and designs are very similar to Serra. Water at Serra is higher in elevation while the rock is slightly better. In general, very little support is expected to be required, although there is likely a need for some support to provide a safer working environment.

#### *16.1.1.2 Portal Excavations*

The portals should be benched with a steep bench angle to decrease erosion. Saprolite grading should provide drainage of surface runoff away from the portal. Initial design estimates show that reinforcement of the portal excavation is not required. However, it is recommended that pattern bolting with shotcrete is used.

#### *16.1.1.3 Portal to 100 m Into the Decline*

Design calculations show that roof wedges are possible but not likely, thus requiring minimum support. However, it is also recommended that pattern bolts and shotcrete are warranted for the first 100 m of the decline. Also, where the decline encounters saprolite, light steel sets will be installed as required.

#### *16.1.1.4 Decline Beyond 100 m*

Design calculations show that wedges could form in the roof of both declines. This is expected as there are quite a few joint sets identified in the rock mass throughout the project. The reality is that for these wedges to form, the joint sets have to be located in the roof of the tunnel and intersect each other. The likelihood of this is low and therefore, with regard to reinforcement of the declines greater than about 100 m in, it is recommended that geologic mapping coupled with spot bolting would be appropriate; the alternative is to come up with a bolt pattern for the roof. After mapping a few hundred meters into the declines, it should become apparent whether or not the spot bolts are sufficient. The reinforcement recommendations for Serra are summarized in Table 16.2 below and Table 16.3 summarizes the recommendations for the Meio mine. Galena is expected to have similar conditions to Serra.

**Table 16.2: Reinforcement Recommendations for Serra Decline**

| Decline Segment | Span/Height (m) | Support Recommendations (L = length, S = spacing) |
|---|---|---|
| Portal | Up to 30 | Saprolite above portal; 3 m bench height, 65° BFA, 3 m catch benches.<br>Rock slope above portal; 70 deg. face, 5 cm fibre-reinforced shotcrete with drains & 25 mm diameter split sets; L = 3.2 m, S = 1.5 m |
| Decline Heading 0m to 100m | 4.5 | Saprolite; light steel sets; S = 1.5 m<br>Rock; 5 cm fibre-reinforced shotcrete with drains, 25 mm diameter split sets; L = 2 m, S = 1.5 m |
| Decline Heading 100m+ | 4.5 | Spot bolts as required; 25 mm diameter split sets, typical L = 2 m, typical S = 1.5 m |
| Decline Intersections | 6.4 | 5 to 6 cm of fibre-reinforced shotcrete with drains, 25 mm diameter split sets; L = 2 m, S = 1.5 m |

**Table 16.3: Reinforcement Recommendations for Meio Decline**

| Decline Segment | Span/Height (m) | Support Recommendations (L = length, S = spacing) |
|---|---|---|
| Portal | Up to 30 | Saprolite above portal; 3 m bench height, 65° BFA, 3 m catch benches.<br>Rock slope above portal; 70 deg. face, 5 cm fibre-reinforced shotcrete with drains & 25 mm diameter split sets; L = 3.2 m, S = 1.5 m |
| Decline Heading 0m to 100m | 4.5 | Saprolite; light steel sets; S = 1.5 m<br>Rock; 5 cm fibre-reinforced shotcrete with drains, 25 mm diameter split sets; L = 2 m, S = 1.5 m |
| Decline Heading 100m+ | 4.5 | Spot bolts as required; 25 mm diameter split sets, typical L = 2 m, typical S = 1.5 m |
| Decline Intersections | 6.4 | Minimum requirement is spot bolts similar to "Decline Heading 100m+". Maximum requirement is 5 to 6 cm of fibre-reinforced shotcrete with drains & pattern bolts L = 3 m, S = 1.7 to 2.1-m |

#### *16.1.1.5 Ramps*

Ramp excavations will be supported by spot bolts where the geologic mapping shows this is required. Ramp intersection support will consist of pattern bolts and shotcrete according to the recommendations by Quanta (2017b & c).

#### *16.1.1.6 Longhole Stoping Design*

On average, longhole stopes will have a maximum width of 2 m and depending on the depth at which they are planned, the stope lengths vary from 20 m to 30 m. Backfill is recommended prior to mining an adjacent longhole stope to increase ground stability. Waste material from development will be used as backfill material for mined out stopes as needed.

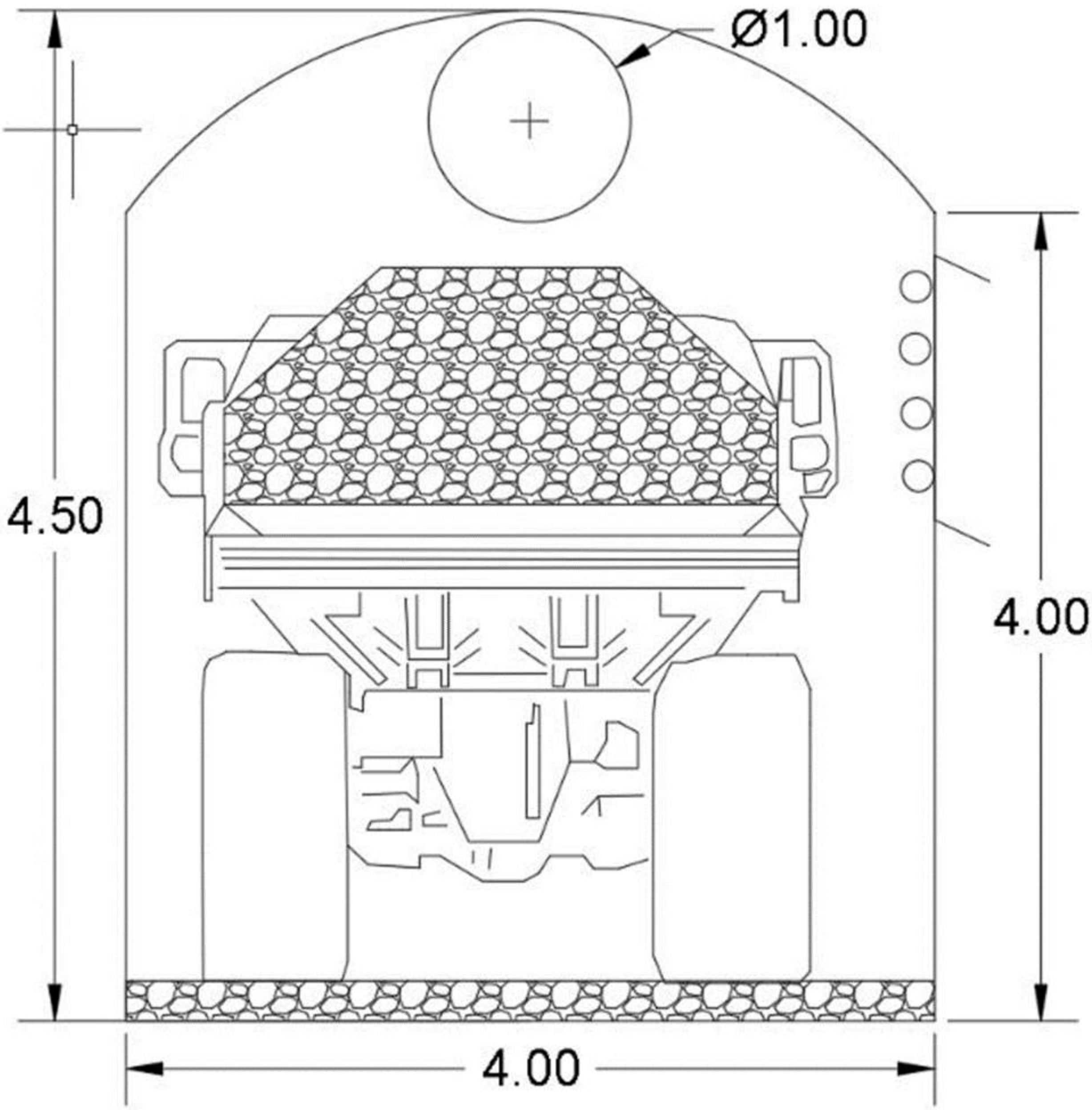
#### 16.1.1.7 Shrinkage Stoping Design

Quanta recommends leaving a sill pillar at every 60-m vertical interval. Shrinkage stopes will have a maximum length of 120 m and a maximum height of 20 m. Pillars within the stopes will be left as needed depending on the local structural geology and rock mass characteristics.

Additional geotechnical information is provided in the Quanta geotechnical reports (Quanta, 2017a, b, & c).

#### *16.1.1.8 Typical Cross Section of the Ramp*

A typical cross section of the ramp showing the location of utilities (ventilation duct, water supply and dewatering lines, communications, and power) and a haulage truck (20 t capacity) is shown below in Figure 16.7.




Source: MDA, 2017

**Figure 16.7: Decline Typical Cross Section**

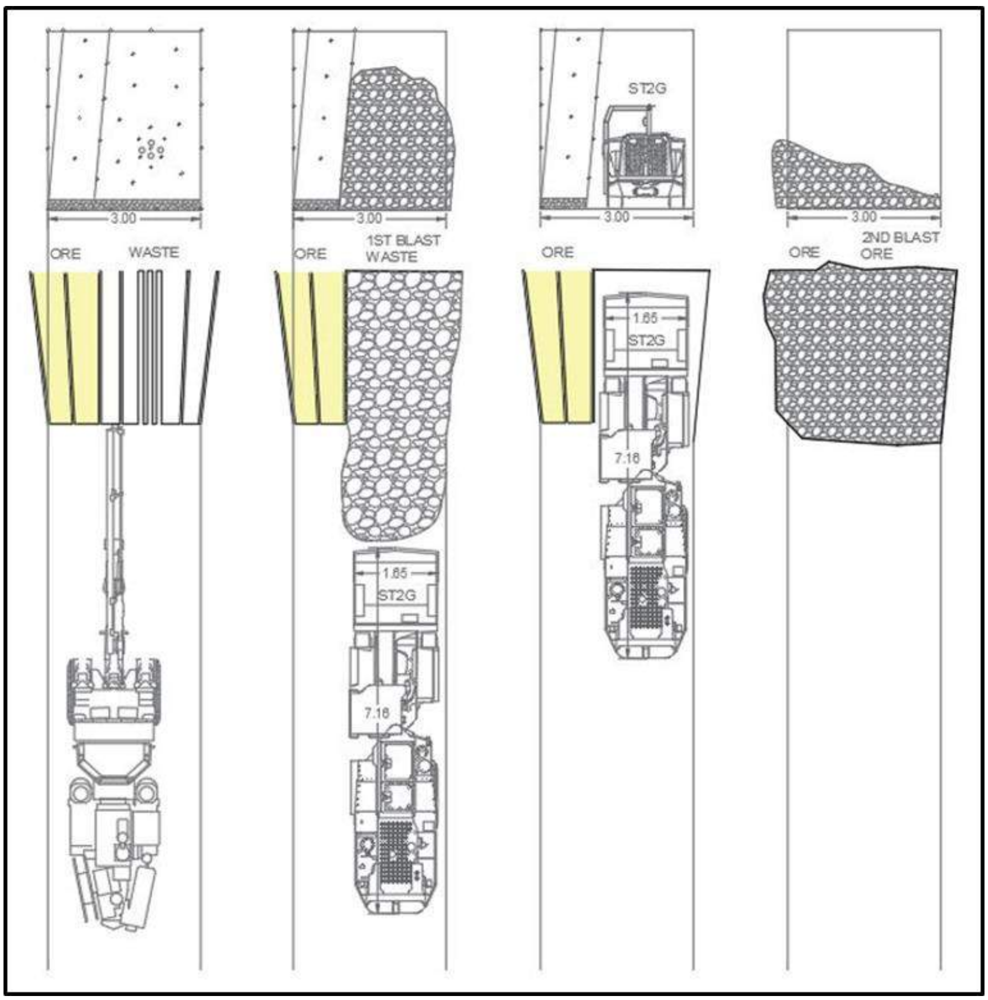
### *16.1.2 Primary Development*

Primary development extends from the portal entrance to the deposit and is a continuation of the ramp excavation as previously described. Primary development has a cross-sectional area of 4.0

m by 4.5 m and it has been designed using a main ramp and sublevel ramps parallel to the deposit approximately 25 m into the mineralized zones, which are connected by crosscuts measuring 4.0 m by 4.0 m in cross section. The primary development gradient is designed at a maximum 14% where the development is straight. In places where curves are required, the development is designed at a slope of 10%. Primary development will be finished with utility lines, electrical cable, and ventilation ducting as required. Primary development to mine the current reserves will total 6,800 m; Serra at 3,100 m; Meio at 2,500 m, and; Galena at 1,200 m.

### *16.1.3 Sill Drives and Development in Ore*

Sill drives will be developed in the strike of the mineralization to minimize development meters. The sill drives will be used as haulage ways. The dimensions of the sill drives are 3.0 m by 3.5 m. They are designed at 20 m vertical spacing. To minimize ore dilution, "split blasting" will be applied; on completion of the sill drives, shrinkage stoping can start. Figure 16.8 shows an schematic of sill development at Serra.




Source: MDA, 2017

**Figure 16.8: Sill Development Schematic**

#### *16.1.4 Ventilation Shaft, Raises, and Lifts*

Ventilation shafts and raises have been designed and will be connected to primary development. Three ventilation shafts have been incorporated into the designs to provide proper ventilation circuits. Additional ventilation raises connect to various levels to provide proper ventilation and access to secondary escape ways. Ventilation shafts have been designed to be 2.5 m in diameter, though the final diameter may change during engineering design, depending on final ventilation requirements for the mine. A total of 800 m of ventilation raises have been designed for the life of the mine.

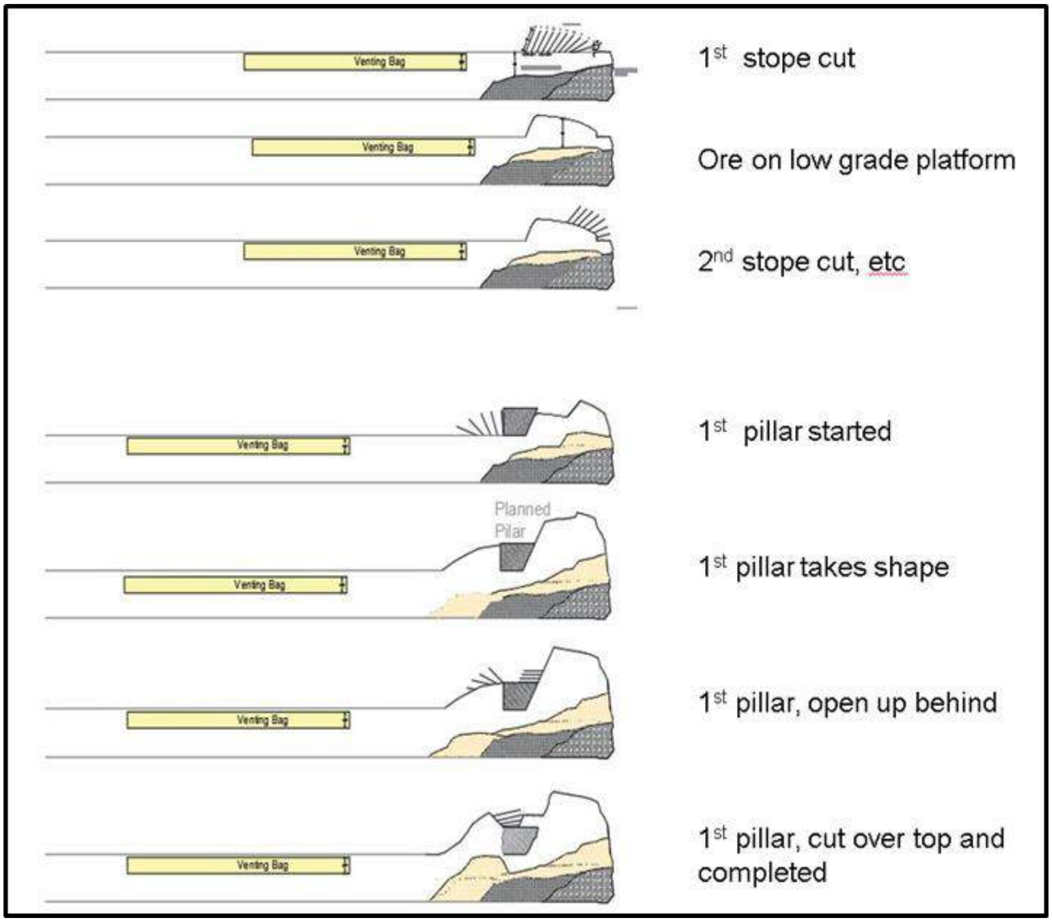
Ventilation drifts connect the ventilation raises with the primary development. Initial ventilation drift dimensions are 4.0 m by 4.5 m with crowned backs.

#### *16.1.5 Other Development*

Additional development will be required for muck bays and temporary workshops. Muck bays will be used as drill stations, however additional drilling stations might need to be developed for delineation drilling of the deposit.

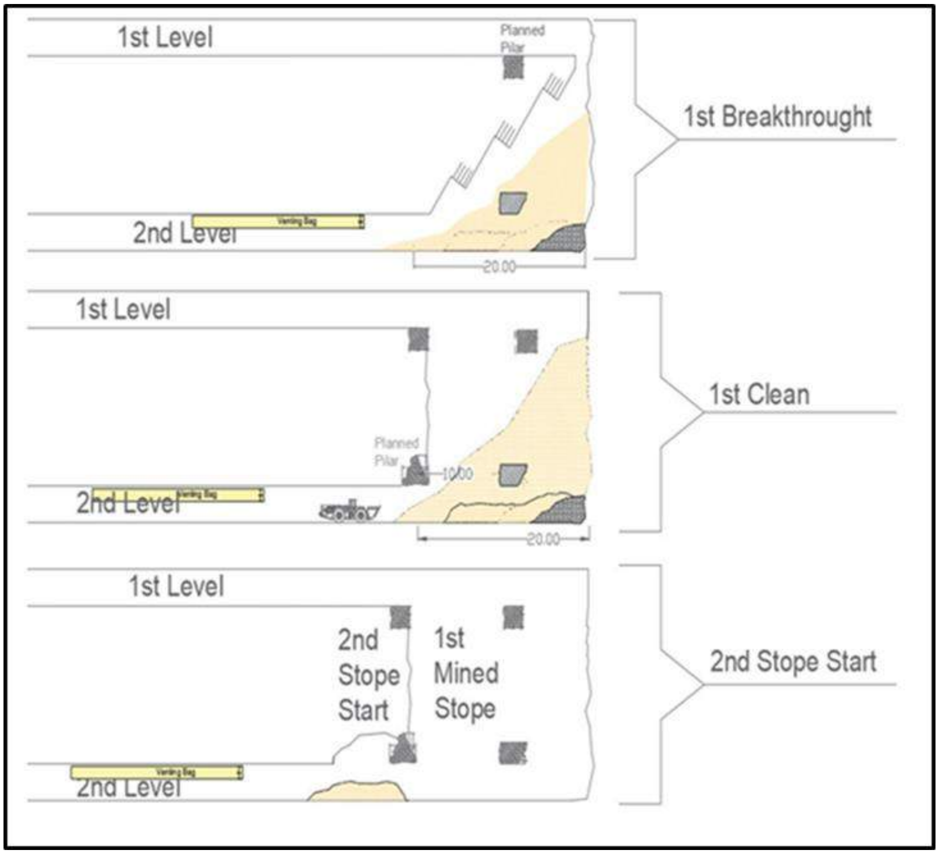
## 16.2 Stoping Methods – Serra Deposit

Two mining methods will be used at the Coringa Gold Project. Shrinkage mining methods and longhole mining methods will be used to exploit the deposit. At Serra, upon completion of sill development, shrinkage will start. Broken ore is placed on the floor, providing a platform for the jack leg drill operator and assistant to work and for supervisors and technical services to monitor work activities. As the stope opens up, ore is only removed to accommodate the swell of blasted material and level the working platform. Pillars, with varying widths depending on the depth below the ground surface, are left in the stope as required, on a regular spacing and per Quanta's recommendation (Quanta 2017a). Between levels, 1.5 m sill pillars are also maintained during the mining phase until stope mining is completed. Figure 16.9 and Figure 16.10 show the mining sequence for shrinkage stope mining methods.




Source: MDA, 2017

**Figure 16.9: Shrinkage Stoping Sequence**




Source: MDA, 2017

**Figure 16.10: Shrinkage Stoping Cross Section**

To minimize explosive usage, jack leg holes are drilled at an angle without the need of a burn-cut and the ore is slashed and thrown in the direction of the sill access during blasting.

### *16.2.1 Mucking*

Ore mucking will be done using narrow vein load-haul-dump (LHD). Once the stopes are open connecting top and bottom sills, only enough ore will be removed to provide room to set up a platform to continue drilling. The narrow vein LHD's will haul the material to temporary muck bays. Front-end loaders will be used to load the ore to the trucks from the muck bays.

### *16.2.2 Overall Stope Geometry*

In general, the stopes will be developed in levels that are 20 m in height sill to sill, leaving a 2.5 m pillar every 60 m. Pillar recovery was not included in the mine plan but it was accounted for as ore loss.

The minimum mining width used for stope designs is 0.8 m, with additional 0.1 m over-break and to provide sufficient room for the operator to safely work in the stopes. Ground and rock conditions are expected to be favorable, the length of the sill drives is limited to 250 m. If the sill drives are required to be longer than the maximum length, they will be connected to a service shaft which will also be used as ventilation intake or exhaust.

## 16.3 Stoping Methods – Meio Deposit

The preferred mining method for Meio is longhole mining which will be implemented per Quanta's geotechnical recommendations. This mining method was selected mainly because of the advantage in productivity. The higher-grade content at Meio allows for the higher dilution factor that this mining method will require due to hole deviation in drilling and / or the necessary widths needed to accommodate the equipment. However, if necessary, the mining method can easily be switched to shrinkage mining method similar to the method chosen for exploiting the Serra deposit.

## 16.4 Ventilation

All mine ventilation designs and studies were carried out by Provente of Belo Horizonte, Brazil (Provente, 2017). The studies and designs satisfy the standards and regulations required. The designs and ventilation models for Serra, Meio, and Galena will be updated as the mine development progresses.

The ventilation systems at both Serra and Meio are designed to provide fresh air throughout the active headings in the mine. Production areas will be connected to the main ventilation circuit by means of ventilation ducts and secondary drifts. Fresh air will be supplied through the main ramp and the contaminated air will be exhausted through vertical raises connected to the surface.

The Serra mine will have three vertical raises. Meio will require only two exhaust raises due to its size.

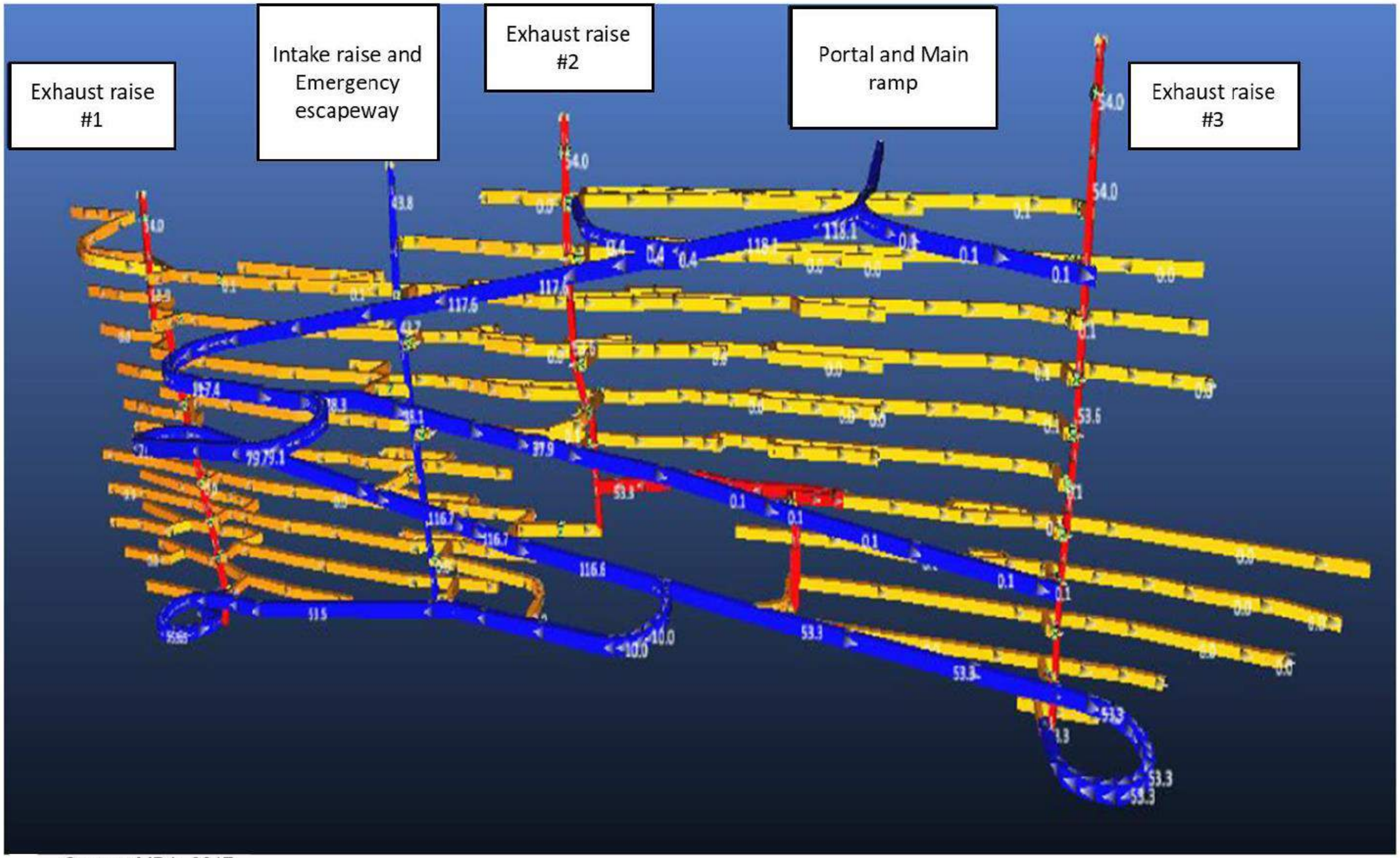
Each exhaust raise will have an exhaust fan and all the exhaust fans will work 24 h/d, 365 d/y. They should be shut down only for preventive maintenance and/or repairs.

Blasting times should be well planned and coordinated with entry and exit of employees, leaving sufficient time for removing contaminated air from the blasts prior to the next shift.

### *16.4.1 Layout and Dimensions*

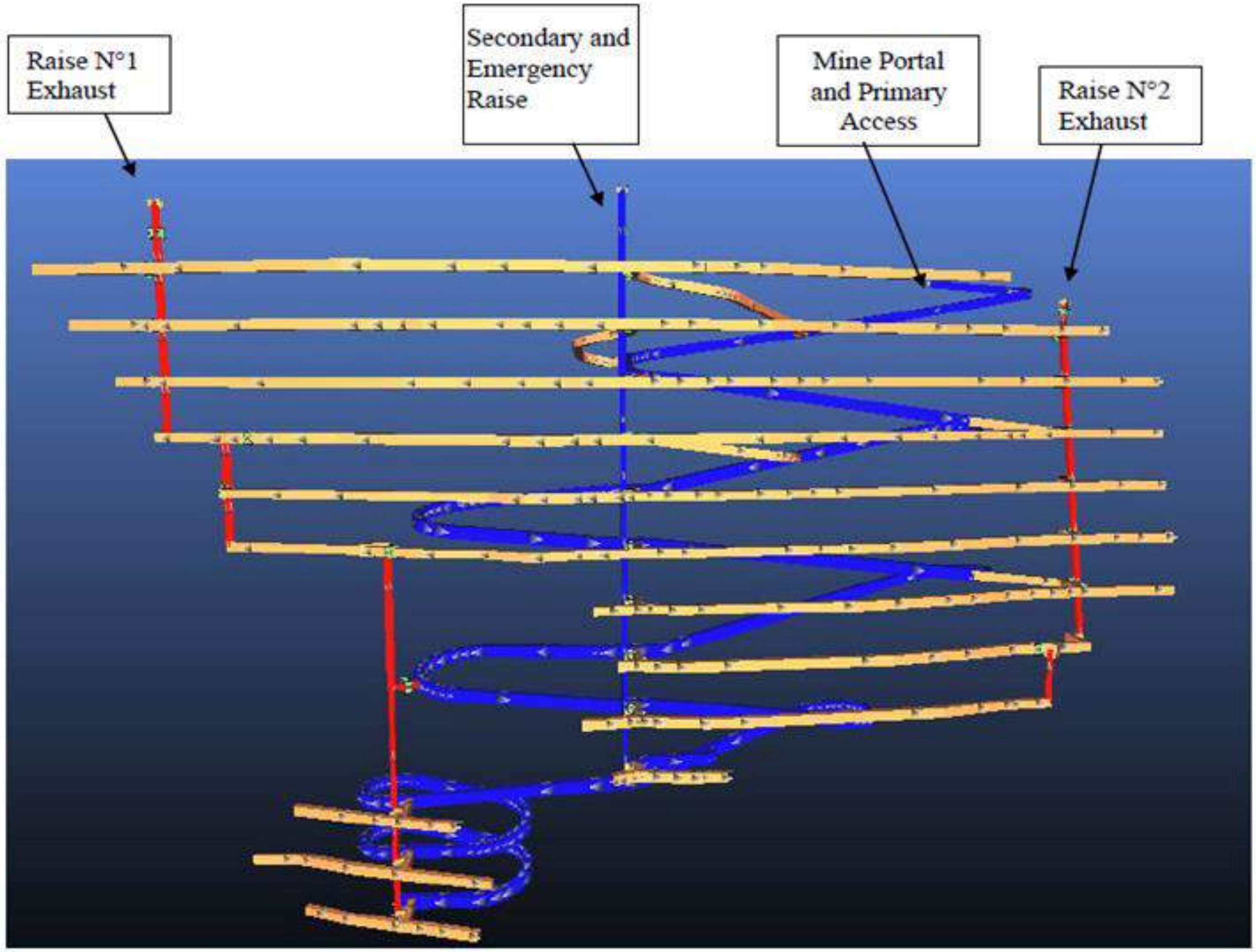
Access to the mine for personnel, as well as utilities and ore haulage, will be through the portal and main ramp. The main ramp at both Serra and Meio connects the mine portal and all the levels down to elevation 120 m. Initial dimensions for the ventilation raises are 2.5m by 2.5m. These dimensions for each of the mines will need to be verified once the mine is in production. The relative locations of the ventilation raises for Serra and Meio are shown in Figure 16.11 and Figure 16.12 respectively.

At full production, a total of 156 $m^3$/s will be required at Serra and 160 $m^3$/s at Meio. The initial estimated quantities and airflow directions for Serra are shown as a schematic in Figure 16.13. and Figure 16.14 shows the estimates and ventilation circuits for Meio.



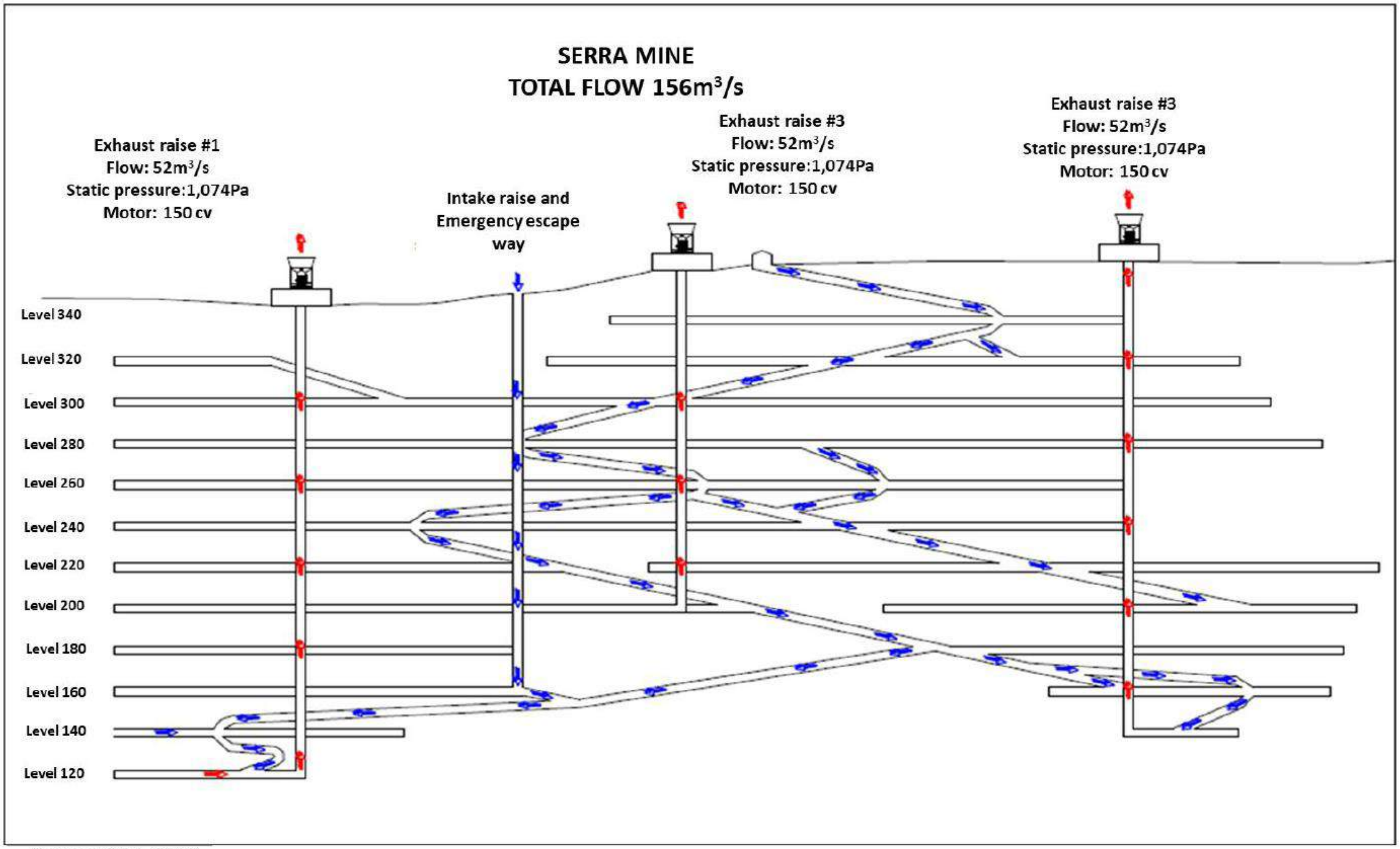

Source: MDA, 2017

**Figure 16.11: Ventilation Design - Serra**



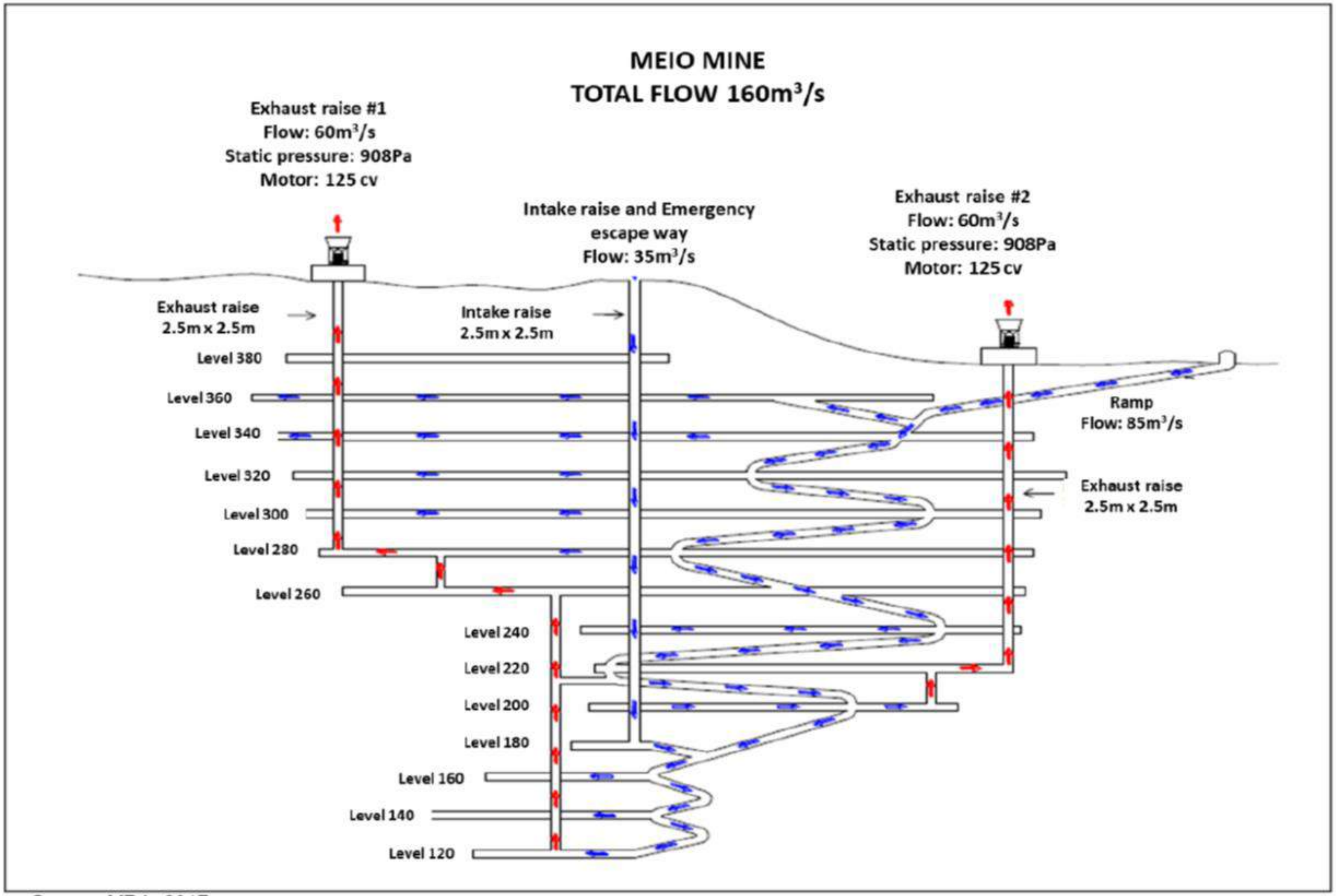

Source: MDA, 2017

**Figure 16.12: Ventilation Design - Meio**




Source: MDA, 2017

**Figure 16.13: Airflow Paths - Serra**




Source: MDA, 2017

**Figure 16.14: Airflow Paths - Meio**

#### *16.4.2 Airflow Velocity*

In the quantity of airflow required, airflow velocities were also considered. Excessive air velocities not only create problems with dust control, but might also cause discomfort to mine personnel. In compliance with regulations, the air velocities in the designs were kept below the 8 m/s limit.

## 16.5 Hydrological Studies

GRE conducted a hydrological study (GRE, 2017) using historical data and data collected since January 2017. The groundwater model was designed to predict water inflows in both Serra and Meio throughout the life of both mines. The results of the groundwater model then were used to size the equipment necessary to dewater the mine.

The results of the study demonstrate that nearly all the water in the system comes from the seasonal precipitation in the area. An initial estimation of the rainfall shows an average annual precipitation of 2,200 mm. Surface water streams near the deposits are seasonal; they could be strong in the wet season and they could dry out in the dry season. Surface water was also evaluated assessing the possible impact on water inflows to the mines. Subsurface water contributing to surface water inflows are considered minor compared to other sources. Groundwater seems to occur within infrequent fracture zones that do not seem to be correlated with water production, thus it is expected to encounter infrequent groundwater occurrences at the headings. Subsurface water is expected in the range of 0 to 2 L/s.

To minimize the impact of surface water inflows, a system of berms and diversion ditches will be necessary around the mine portals. Additionally, the area near the portal will have a positive gradient to avoid further water inflow. Sumps for collecting all underground water will be constructed along the main ramp. Water then will be pumped to the portal using 50-HP water pumps. Water at the portal will be collected and sent to the sedimentation ponds adjacent to each WSF to confirm its quality prior to discharge or re-use.

## 16.6 Development and Production Scheduling

Mine development and production were scheduled using Geovia's MineSchedTM software (version 9.04). Development and production locations and rates were input based on the anticipated ramp-up schedule and coordinated with Anfield engineers and management.

The schedule includes a ten-month preproduction period, which includes two months for completing permitting and mobilization for portal construction. During that time, the portal and the main decline will be developed to the first production level. Subsequently, additional levels will be developed as areas become accessible. Development of the first production level is anticipated four months after finishing construction of the portal. Once access to the first production stope is developed, stockpiling of ore will continue for approximately 3 months.

Production will start in year 1, focusing on upper levels first as they become available. Once enough mining locations are available, higher grade stopes will be prioritized. Production will ramp-up relatively quickly. Full production capacity of 460 t/d is expected to be achieved in a year. The ramp-up period for production is two months. The following subsections describe the mine development and mine production schedules.

### 16.6.1 Mine Development Schedule

Development plan centerlines and development rates were entered into Geovia's MineSched software. Precedents were used to ensure that development was completed in a sequential manner. The centerline design for Serra is shown in Figure 16.1. and Figure 16.2 shows the design for the Meio mine.

Although geotechnical information shows relatively favorable conditions for the ramp development, it is anticipated that the development of the first 25 m of the ramp will be done at a maximum rate of 3 m/d. Once in good ground, the total capacity of developing the ramp will increase to 6 m/d.

All primary development will be completed by Anfield personnel. Vertical development is considered to be developed by a subcontractor. Table 16.4 shows the development schedule for the three deposits combined.

**Table 16.4: Yearly Development Schedule**

| | | Units | PreProduc | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Waste Development | Main Ramp | m | 638 | 1,215 | 1,428 | 1,515 | 1,182 | 225 | **6,203** |
| | Bay | m | 39 | 65 | 91 | 117 | 95 | 20 | **427** |
| | Secondary Ramp | m | 102 | 391 | 148 | 284 | 189 | 100 | **1,215** |
| | Stope Acess | m | 72 | 193 | 241 | 173 | 131 | 0 | **810** |
| | Drift Waste | m | 59 | 496 | 441 | 909 | 599 | 303 | **2,808** |
| | ***Sub-Total*** | ***m*** | ***911*** | ***2,360*** | ***2,349*** | ***2,998*** | ***1,438*** | ***648*** | ***10,704*** |
| | ***Waste Tonnes*** | ***m*** | ***44,360*** | ***114,990*** | ***114,431*** | ***146,069*** | ***67,556*** | ***31,587*** | ***518,993*** |
| | Services Drift | m | 12 | 196 | 128 | 84 | 135 | 71 | **626** |
| | Ventilation Drift | m | 16 | 58 | 111 | 48 | 11 | 0 | **244** |
| | Sub Total Meters | m | 27 | 254 | 240 | 131 | 146 | 71 | **870** |
| | Drift Tonnes | m | 1,230 | 11,381 | 10,731 | 5,877 | 6,559 | 3,203 | **38,982** |
| | Total meters | m | 938 | 2,614 | 2,588 | 3,129 | 1,585 | 720 | **11,574** |
| | Total, tonnes | | 45,590 | 126,371 | 125,162 | 151,946 | 74,115 | 34,791 | **557,974** |
| Raises | Services raise | | 0 | 123 | 348 | 115 | 125 | 41 | **751** |
| | Ventilation Raise | | 75 | 294 | 44 | 189 | 208 | 0 | **810** |
| | ***Sub-total*** | ***m*** | ***75*** | ***417*** | ***392*** | ***303*** | ***333*** | ***41*** | ***1,561*** |
| | ***Raise Tonnes*** | | ***1,308*** | ***7,303*** | ***6,863*** | ***4,973*** | ***3,713*** | ***710*** | ***24,870*** |
| | **Total Waste, Meters** | **m** | **1,013** | **3,032** | **2,980** | **3,433** | **1,917** | **760** | **13,135** |
| | **Total Waste, tonnes** | | **46,898** | **133,674** | **132,025** | **156,919** | **77,829** | **35,500** | **582,845** |

Development in waste was limited to 120 m/month and sill development will be limited to 90 m/month. Development will also be limited to two simultaneous headings per jumbo.

### 16.6.2 Mine Production Schedule

Mine production was scheduled along with the development using Geovia's MineSched software. Production will begin with the sill preparation. Once the sills are fully developed to a maximum length of 200 m, production will start from the stopes. No mine backfill was considered in the schedule, however, if needed, waste rock from development in waste will be used for backfill material. Open stopes will also serve as temporary or permanent storage areas for waste material. Table 16.5 shows the yearly mine production.

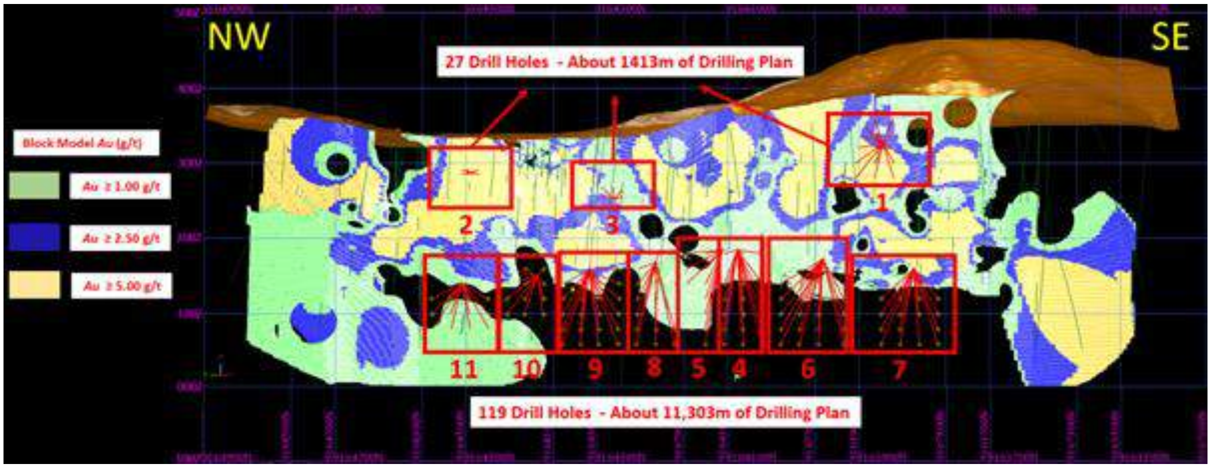
**Table 16.5: Yearly Mine Production**

| | | Units | PreProduc | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Ore Development | Sill Drive | m | 243 | 2,439 | 3,099 | 2,621 | 2,831 | 1,250 | **12,482** |
| | Ore Tonnes | | 4,918 | 48,695 | 62,862 | 54,307 | 59,595 | 26,681 | **257,057** |
| | Gold Ounces | oz | 308 | 4,832 | 6,230 | 5,300 | 6,291 | 2,813 | **25,775** |
| | Gold | g/t | 1.95 | 3.09 | 3.08 | 3.04 | 3.28 | 3.28 | **3.12** |
| | Silver Ounces | oz | 535 | 10,045 | 13,543 | 9,470 | 14,330 | 4,399 | **52,322** |
| | Silver | g/t | 3.39 | 6.42 | 6.70 | 5.42 | 7.48 | 5.13 | **6.33** |
| Stope Production | Ore Tonnes | | 0 | 95,898 | 108,069 | 107,113 | 126,908 | 73,531 | **511,519** |
| | Gold Ounces | oz | 0 | 23,186 | 30,733 | 23,590 | 37,728 | 19,316 | **134,553** |
| | Gold | g/t | 0.00 | 7.52 | 8.85 | 6.85 | 9.25 | 8.17 | **8.18** |
| | Silver Ounces | oz | 0 | 49,703 | 70,103 | 45,994 | 71,056 | 34,307 | **271,165** |
| | Silver | g/t | 0.00 | 16.12 | 20.18 | 13.36 | 17.41 | 14.51 | **16.49** |
| | Total ORE Tonnes | | 4,918 | 144,593 | 170,931 | 161,420 | 186,503 | 100,212 | **768,577** |
| | Total Au Ounces | oz | 308 | 28,018 | 36,963 | 28,890 | 44,019 | 22,129 | **160,328** |
| | Total Ag Ounces | oz | 535 | 59,749 | 83,646 | 55,464 | 85,386 | 38,706 | **323,487** |
| | ROM | | 51,816 | 278,266 | 302,957 | 318,339 | 264,332 | 135,712 | **1,351,421** |

Shrinkage mining will be used at Serra and Galena while Meio will be mined using conventional narrow vein longhole mining. Serra is to start first in year 1 with production ramping up to 50,000 t and 120,000 t in the remaining years. Meio development starts as soon as all primary development at Sera finishes. And similarly, Galena will be developed as soon as the primary development in Serra finishes. Between the three mines it will be possible to maintain the annual plant requirements.

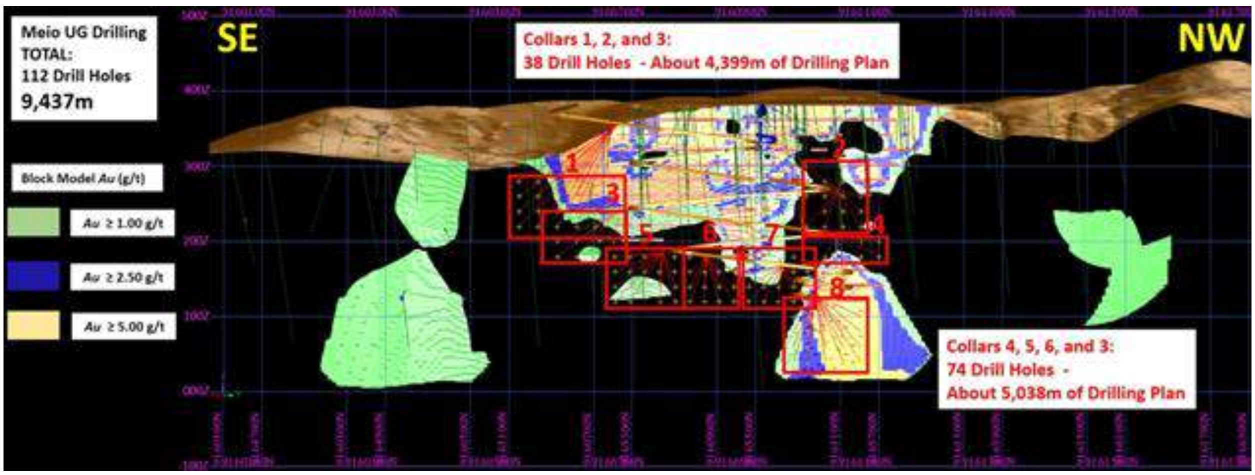
## 16.7 Infill Drilling and Exploration Drilling

A total of 146 drill holes from 11 locations, totaling 12,716 m have been planned for Serra underground diamond drilling. At Meio 112 drill holes have been planned with a total 9,437 m. Figure 16.15 shows in long section the areas where underground drilling is planned to occur at Serra and Figure 16.16 shows the planned drilling at Meio.




Source: MDA, 2017

**Figure 16.15: Underground Drilling at Serra**




Source: MDA, 2017

**Figure 16.16: Underground Drilling at Meio**

The drilling will be done from drilling stations off the main ramp and it is designed to achieve a mesh of 25 m, prioritizing mineralized structural intercepts near development levels of the mine.

## 16.8 Mine Equipment

Anfield has acquired mine equipment from an operation with similar characteristics which will reduce the capital cost required for purchasing mine equipment. A short list of the additional equipment to be purchased is shown below in Table 16.6. Existing equipment is listed in Table 16.7.

## Table 16.6: Serra and Meio Equipment

| | Type - Manufacturer | Model - Capacity | Pre-Production | Y1 | Y2 | Y3 | Y4 | Y5 |
|---|---|---|---|---|---|---|---|---|
| Development | Scoop Tram - Caterpillar | R1600G - 4.8 m$^3$ | 1 | 2 | 2 | 2 | 2 | 2 |
| | Truck - Volvo | FMX 6x4R - 16m$^3$ | 2 | 2 | 2 | 2 | 2 | 2 |
| | Jumbo - Atlas Copco | Boomer 104 | 3 | 4 | 4 | 4 | 4 | 4 |
| | Loader | Volvo L90F - 2.3 m$^3$ | 1 | 1 | 1 | 1 | 1 | |
| Production | Jumbo - Atlas Copco | Boomer 282 | 1 | 2 | 2 | 2 | 2 | 2 |
| | Scoop Tram - Atlas Copco | ST2G - 1.9 m$^3$ | 2 | 3 | 3 | 3 | 3 | 3 |
| | Truck - Volvo | FMX 6x4R - 16m3 | | 2 | 2 | 2 | 2 | 2 |
| | Handheld Drills | Boar Max - DI | 3 | 6 | 8 | 8 | 10 | |

## Table 16.7: Existing Mine Equipment

| ITEM | MODEL | BRAND | YEAR |
|---|---|---|---|
| 1 | PICKUP L200 GL 2.5 4X4 CD | MITSUBISHI | 2011 |
| 2 | PICKUP L200 GL 2.5 4X4 CD | MITSUBISHI | 2011 |
| 3 | PICKUP L200 TRITON 3.2 DIESEL MT GLS | MITSUBISHI | 2012 |
| 4 | PICKUP L200 TRITON GLS3.2CDTB INT D M | MITSUBISHI | 2014 |
| 5 | PICKUP L200 TRITON GLS3.2CDTB INT D M | MITSUBISHI | 2014 |
| 6 | PICKUP HILUX CD SRV D4D 4X4 3.0 TDI AU | TOYOTA | 2010 |
| 7 | PICKUP HILUX CS 4X4 3.0 CHAS | TOYOTA | 2011 |
| 8 | PICKUP HILUX CD 4X4 DIESEL | TOYOTA | 2011 |
| 9 | PICKUP HILUX 4CDL DX | TOYOTA | 2003 |
| 10 | TRUCK P124 CB 360 6X4 NZ | SCANIA | 2000 |
| 11 | FLATBED | NOMA | 2004 |
| 12 | PICKUP L200 TRITON GLX DIESEL 3.2 MT | MITSUBISHI | 2016 |
| 13 | PICKUP L200 TRITON GLX DIESEL 3.2 MT | MITSUBISHI | 2016 |
| 14 | PICKUP L200 TRITON GLX DIESEL 3.2 MT | MITSUBISHI | 2016 |
| 15 | PICKUP L200 TRITON GLX DIESEL 3.2 MT | MITSUBISHI | 2016 |
| 16 | PICKUP L200 TRITON GLX DIESEL 3.2 MT | MITSUBISHI | 2016 |
| 17 | CARGO 1422 + MUNCK TRUCK | FORD | 1997 |
| 18 | AMBULANCE | TOYOTA | 2016 |
| 19 | WATER TRUCK 31.320 6X4 | VOLKSWAGEN | 2011 |
| 20 | FRONT END LOADER L70F | VOLVO | 2008 |
| 21 | LHD R1600G | CATERPILLAR | 2012 |
| 22 | MINI LOADER | VOLVO | 2008 |
| 23 | JUMBO RB282 | ATLAS COPCO | 2008 |
| 24 | JUMBO RB104 | ATLAS COPCO | 2010 |
| 25 | VOLVO TRUCK A30F | VOLVO | 2012 |
| 26 | VOLVO TRUCK A30E | VOLVO | 2008 |
| 27 | DRILL RIG LM-75 | BOART LONGYEI | 2011 |
| 28 | DRILL RIG DIAMEC U-4 | ATLAS COPCO | 2008 |
| 29 | DRILL RIG MACH 320 | MACH SONDA | 2010 |
| 30 | EXCAVATOR DX53W | DOOSAN | 2012 |
| 31 | TELEHANDLER TL642 | CATERPILLAR | 2012 |
| 32 | GATOR | JOHN DEERE | 2011 |
| 33 | FIREFIGHTING TRAILER | | |

## 16.9 Manpower

The mine will operate 24 h/d and 7 d/wk with three shifts during the day. All mine personnel will be accommodated at the camp located on the project property. Manpower requirements at full production are shown below in Table 16.8.

## Table 16.8: Mine Personnel Requirements

| Mine Personnel | |
|---|---|
| **POSITIONS** | **Number** |
| Mine Manager | 1 |
| Mine Engineer | 1 |
| Administrative assistant | 2 |
| Mason | 2 |
| Shift Boss | 4 |
| Jumbo Operators | 12 |
| LHD Operators | 16 |
| Operator Scaler | 4 |
| Truck operators | 16 |
| Blaster | 4 |
| Driver support | 4 |
| Jackleg Operator | 32 |
| Jackleg Auxiliary | 32 |
| Mine Auxiliary | 20 |
| ***SUBTOTAL Mine Personnel*** | ***150*** |

| Mine Technical Services | |
|---|---|
| **POSITIONS** | **Number** |
| Technical Services Manager | 1 |
| Coordinator Geologist | 1 |
| Planning Engineer | 2 |
| Geologist | 2 |
| Topoghaphy Boss | 1 |
| Sampling Boss | 2 |
| Sampler | 4 |
| Sampling Auxiliary | 6 |
| Topography | 4 |
| Tophography Auxiliary | 4 |
| ***SUBTOTAL Technical Services*** | ***27*** |

| Mine Maintenance | |
|---|---|
| **POSITIONS** | **Number** |
| General Maintenance Boss | 1 |
| Maintenance technician | 2 |
| Mechanical Preventive | 3 |
| Auxiliary Mechanical Preventive | 4 |
| Mechanic | 4 |
| Mechanic Auxiliary | 4 |
| Preventive electrician | 3 |
| Welder | 3 |
| Mechanic Pneumatic (Jacklegs) | 3 |
| Lubricator | 3 |
| Repairman | 2 |
| Maintenance Controller | 3 |
| Turner | 2 |
| ***SUBTOTAL Maintenance*** | ***37*** |

| Mine Electrical | |
|---|---|
| **POSITIONS** | **Number** |
| General Eletrical Boss | 1 |
| Electrician | 4 |
| Electrician auxiliary | 4 |
| Mechanical Pump | 3 |
| Electrical Assistant | 3 |
| ***SUBTOTAL Electrical*** | ***15*** |

| | |
|---|---|
| **Total** | **229** |

## 16.10 Mine Water

Both the Serra and Meio mine workings will be below the phreatic surface (groundwater level) as a result, it will be necessary to dewater the mines. GRE performed a field study and a groundwater model to predict the rate of inflow into the underground mine working. The results are included in the economic model, and in Section 18.4 because the underground mine will be the primary source of clean make-up water for plant operations.

### *16.10.1 Field Investigation*

In 2013 and 2016/2017, GRE conducted two rounds of field characterization of the host rock of the Serra and Meio veins. The hydrogeologic investigation involved the drilling of 17 borings and the execution of 37 packer tests. Vibrating wire piezometers were installed in three borings to measure the phreatic surface in the hard-rock hosted aquifer.

In general, the field study found that the rock was competent. Few fractures exist, and existing fractures did not necessarily have sufficient inter-connectivity or water storage to be classified as "aquifers." However, water-bearing fractures exist (as seen in SP-49, SP-80, and A-COR-14 in the Serra vein). In summary, the field investigation determined that groundwater exists, but likely in widely-dispersed and low storage fracture zones that do not appear to be interconnected.

### *16.10.2 Groundwater Model*

To predict the groundwater inflow, GRE created a groundwater model in FEFLOW which simulates the inflow of groundwater into the underground workings based on the up-to-date time-variant schedule of mine development activities and the aquifer parameters discovered in the field investigation (see Section 16.10.1 above, and GRE 2017e).

### *16.10.3 Conceptual Groundwater Model*

The conceptual model for the Coringa groundwater flow site is described below and was the foundation of subsequent computer modeling. Because the site is located near drainage basin divides, all the water entering the model domain is precipitation. Most of the precipitation arriving at the ground surface does not enter the aquifer, but rather is lost to evaporation, plant transpiration, or rapid runoff to streams. Where saprolite overlies bedrock, water that is not lost to runoff or evapotranspiration infiltrates into the saprolite as recharge. In areas of bedrock outcrop, water will enter bedrock via interconnected open fracture systems exposed at the surface. However, it is hypothesized that there is little interaction between shallow and deep groundwater because the hydraulic conductivity of the saprolite is considerably higher than that of the granite/rhyolite bedrock, little of the water that makes it into the saprolite enters the underlying bedrock. Instead, the water remains mostly within the saprolite, leaving the groundwater domain relatively quickly after traveling laterally through the saprolite layer a short distance to a discharge point at the nearest downgradient stream segment. At the saprolite/bedrock contact, essentially no water will cross the contact into the bedrock in places where the bedrock is unfractured. However, some leakage through the contact will take place where interconnected bedrock fracture zones intersect the bedrock surface.

Additional evidence for the separation between shallow and deep groundwater can be found by looking at water quality. Groundwater discovered in conductive fractures in A-COR-14 has a different chemical signature than shallow groundwater and has elevated concentrations of manganese which could be from long-duration contact with mineralized host rock. As a result, the amount and direction of flow within fractures will not necessarily be a function of recharge, but instead it will be a function of the extent of the fracture zones, their degree of interconnectivity, hydraulic characteristics of the fractured material, and hydraulic gradient.

#### *16.10.4 Active Mining Conditions*

During mining, the expanding network of ramps, sill drives, and stopes will constitute a growing groundwater sink. As the sink is gradually deepened and expanded, the hydraulic gradient between the sink and enclosing regions of rock and saprolite will become larger, and inflow to the workings will increase proportionately. The lateral extent of the hydraulic impact will be limited by the low average hydraulic conductivity of the bedrock and saprolite.

Some degree of seasonality should appear in mine inflow rates. However, this effect should be most pronounced in the shallowest portions of the workings, which have the best chance of responding to near-surface conditions. The volume of flow for water entering the mines at the deepest levels, especially in regions where the tops of the stopes are substantially below the surface level, should show little seasonal variation.

#### *16.10.5 Numerical Modeling*

Flow in the underground Meio and Serra mines was modeled as a fractured rock aquifer using FEFLOW software. The project hydrostratigraphy was defined as: saprolite, transition zone, hard rock, and veins – with veins being the primary hydrostructure within the model. Each unit was assigned its respective material hydraulic properties based on field testing and published data. Prior to modeling of the active mining conditions, a steady-state model, followed by a pre-mining transient model, were developed and calibrated using the available record of observed water levels around the project. The groundwater flow simulation of active mining conditions was performed using a transient simulation, taking into account the seasonal variation in groundwater recharge. Mine stage development was discretized into semi-annual periods for years one through the end of mine life. For each time-period, groundwater inflow rates into the mine were predicted. The predicted flow rates are summarized in Table 16.9. Inflows within the mine increase with depth and are highly dependent on the hydraulic conductivity.

**Table 16.9: Predicted Annual Inflow Rates**

| Mine Yr | Serra | | | Meio | | |
|---|---|---|---|---|---|---|
| | Sill Elev (mASL) | Ramp Elev (mASL) | FlowRate (m3/d) | Sill Elev (mASL) | Ramp Elev (mASL) | FlowRate (m3/d) |
| 0.0 | n/a | 340 (srf) | 0 | n/a | 380 (srf) | 0 |
| 0.5 | n/a | 280 | 209 | n/a | 380 (srf) | 0 |
| 1.0 | 320 | 226.5 | 582 | n/a | 380 (srf) | 0 |
| 1.5 | 300 | 200 | 887 | n/a | 380 (srf) | 0 |
| 2.0 | 260 | 170 | 1,043 | n/a | 380 (srf) | 0 |
| 2.5 | 220 | 120 | 1,411 | n/a | 380 (srf) | 0 |
| 3.0 | 200 | 120 | 1,363 | n/a | 380 (srf) | 0 |
| 3.5 | 180 | 120 | 1,446 | n/a | 338.4 | 2 |
| 4.0 | 160 | 120 | 1,506 | 340 | 260 | 87 |
| 4.5 | 120 | 120 | 1,479 | 280 | 175 | 234 |
| 5.0 | n/a | n/a | n/a | 240 | 120 | 338 |
| 5.5 | n/a | n/a | n/a | 120 | 120 | 358 |

Groundwater flows are dominated by secondary-porosity and are expected to result in short but intense dewatering periods during development that quickly subside as storage within the fractured rock aquifer is exhausted. As a result, the values contained in Table 16.9 should be looked at as averages, but more pumping capacity will be required to accommodate the sudden inflow of water from newly-contacted water-filled fracture zones.

# 17 RECOVERY METHODS

## 17.1 Process Design

The ore processing facility for the Coringa Gold Project is a conventional gold cyanidation plant. It has been designed to treat 460 tpd (159,000 tpa) of ore containing 6.5 gpt gold and 13.1 gpt silver over a 4.8-year period. Annual gold production will average 32,000 ozs. The gold-silver doré product will be shipped to a refinery for further processing.

The process plant will be a combination of new and refurbished equipment, tanks and structures. A similar sized crush/grind/gravity/leach gold ore process facility, located in Brazil, was purchased and relocated to the Coringa Gold Project site for re-use of the suitable equipment and materials.

Metallurgical test results of representative material from the Coringa Gold Project deposits were utilized to develop the final process flowsheet and plant design criteria.

A brief description of the process facilities and the estimated consumptions of energy, water and process plant consumables are also presented below.

### *17.1.1 Selected Process Flowsheet*

The process plant design incorporates the following standard unit process operations:

- ROM ore stockpile area and reclaim hopper
- Primary, secondary, and tertiary crushing with screening
- Ore stockpile with reclaim feeders
- Single-stage ball mill in closed-circuit with cyclones
- Knelson gravity concentrator and Acacia IL reactor for concentrate leaching
- Cyclone overflow to trash removal screen and a pre-leach thickener
- Thickener underflow pumped to a lime/pre-aeration mix tank prior to leaching
- CIL tanks equipped with carbon screens and a safety screen
- Cyanide destruction tank using $SO_2$/Air process followed by tailings storage
- Carbon wash/elution/strip/regeneration circuit with a 1 tpd carbon capacity
- Reagent storage, mixing, and distribution systems
- Electrowinning cells for Acacia and stripped carbon solutions to recover gold and silver
- Smelting and doré handling and security systems

Figure 17.1 presents a simplified block flow diagram of the recovery process and Figure 17.2 presents the process flow diagram which is a more detailed and descriptive view of the overall processing scheme. Figure 17.3 illustrates the general arrangement of the process plant, related infrastructure, and ancillary facilities. Figures 17.4, 17.5, 17.6, and 17.7 illustrate the crushing plant, grinding and classification circuit, thickening and process water equipment, and CIL circuit general arrangement plans and sections, respectively.

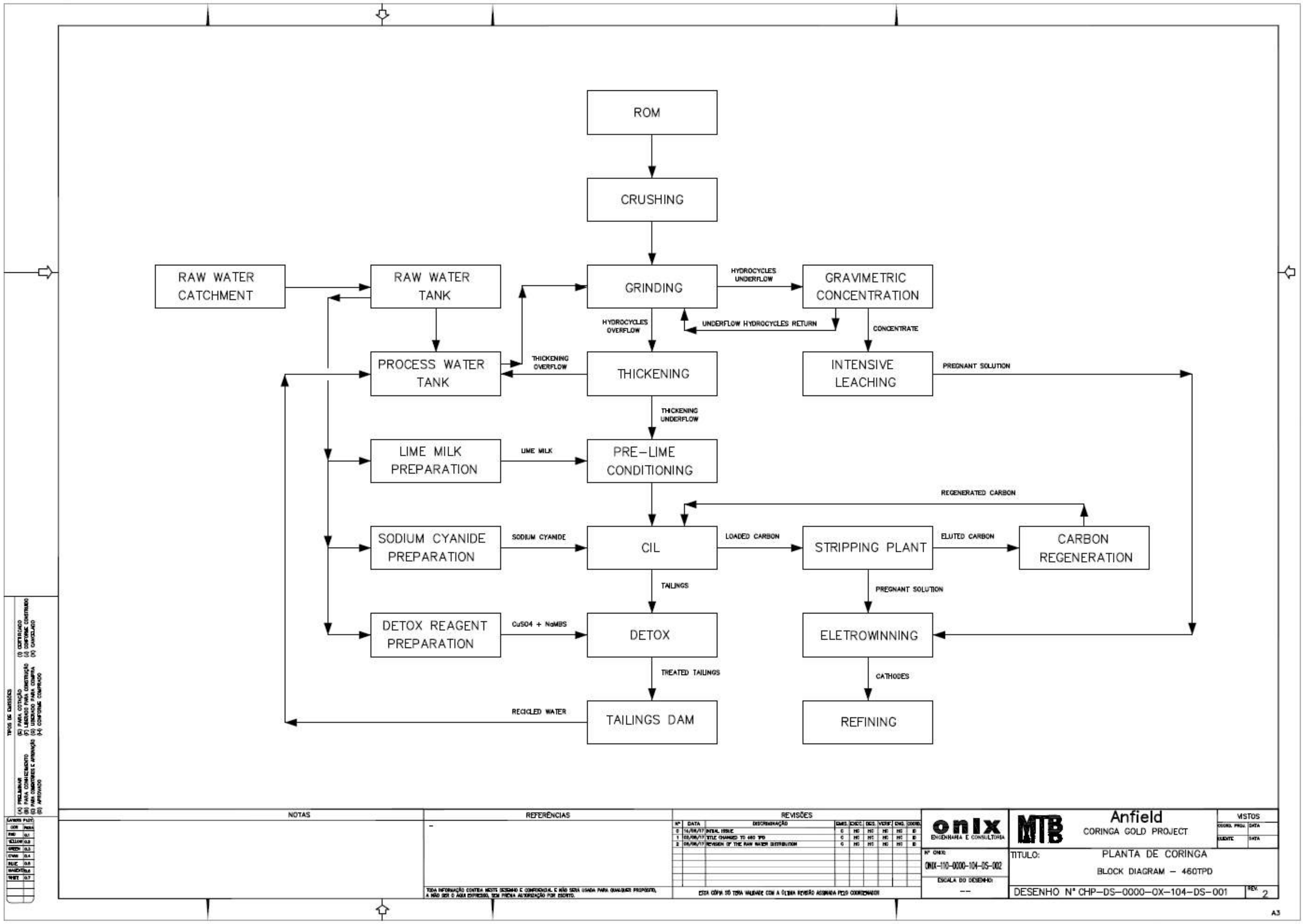



**Figure 17.1: Process Block Flow Diagram**

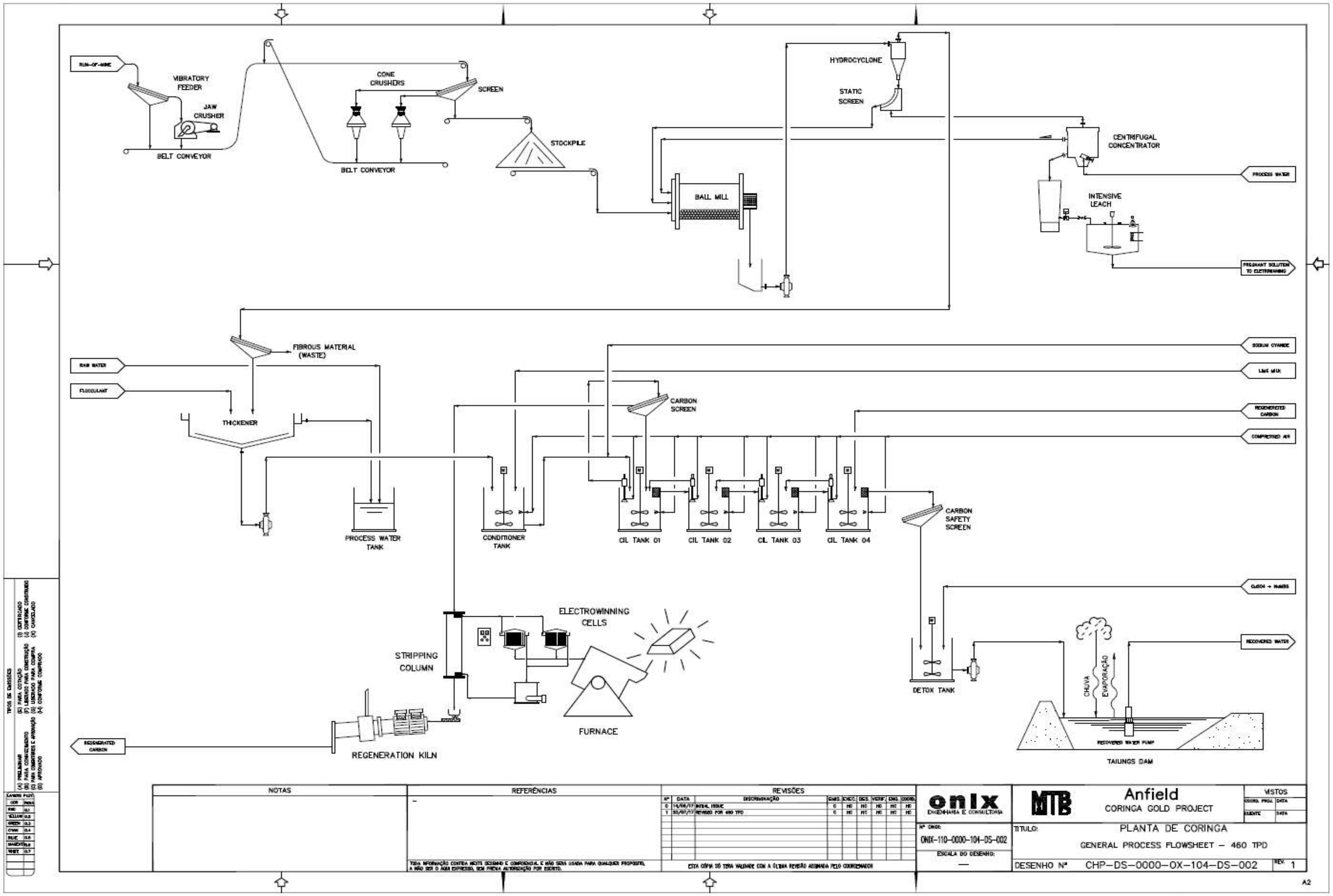



**Figure 17.2: Process Flow Diagram**

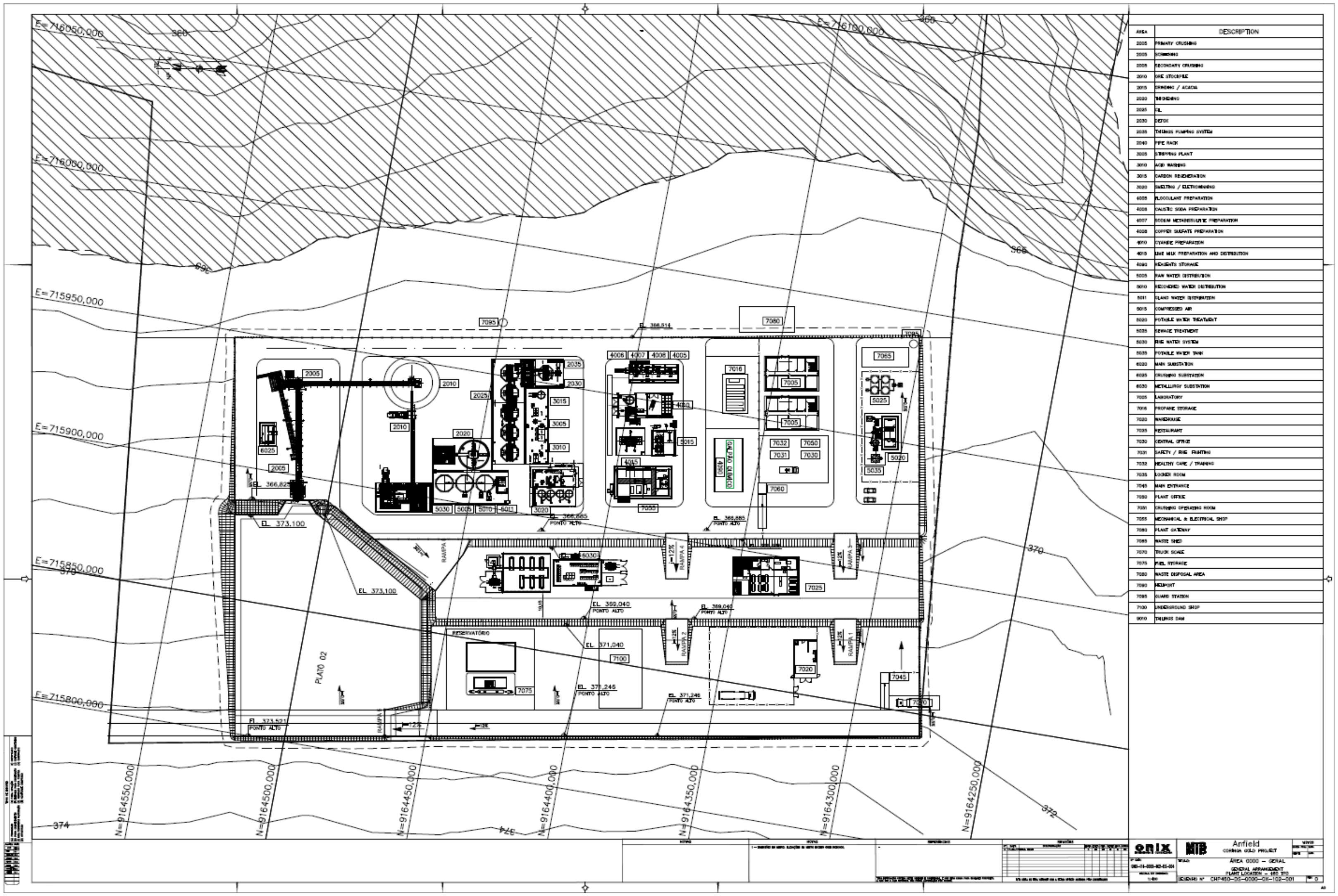


**Figure 17.3: Plant General Arrangement**

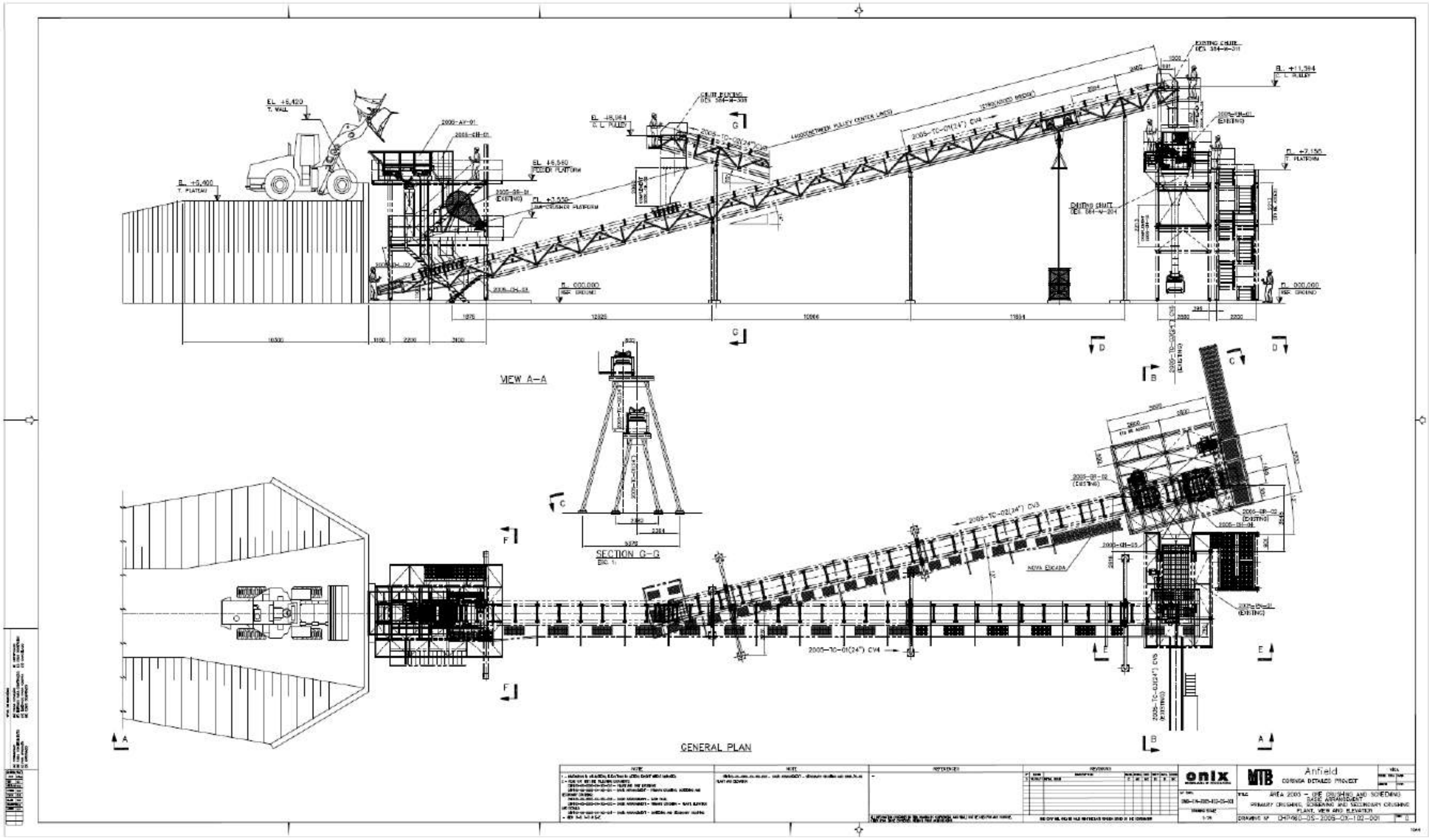



**Figure 17.4: Primary Crushing**

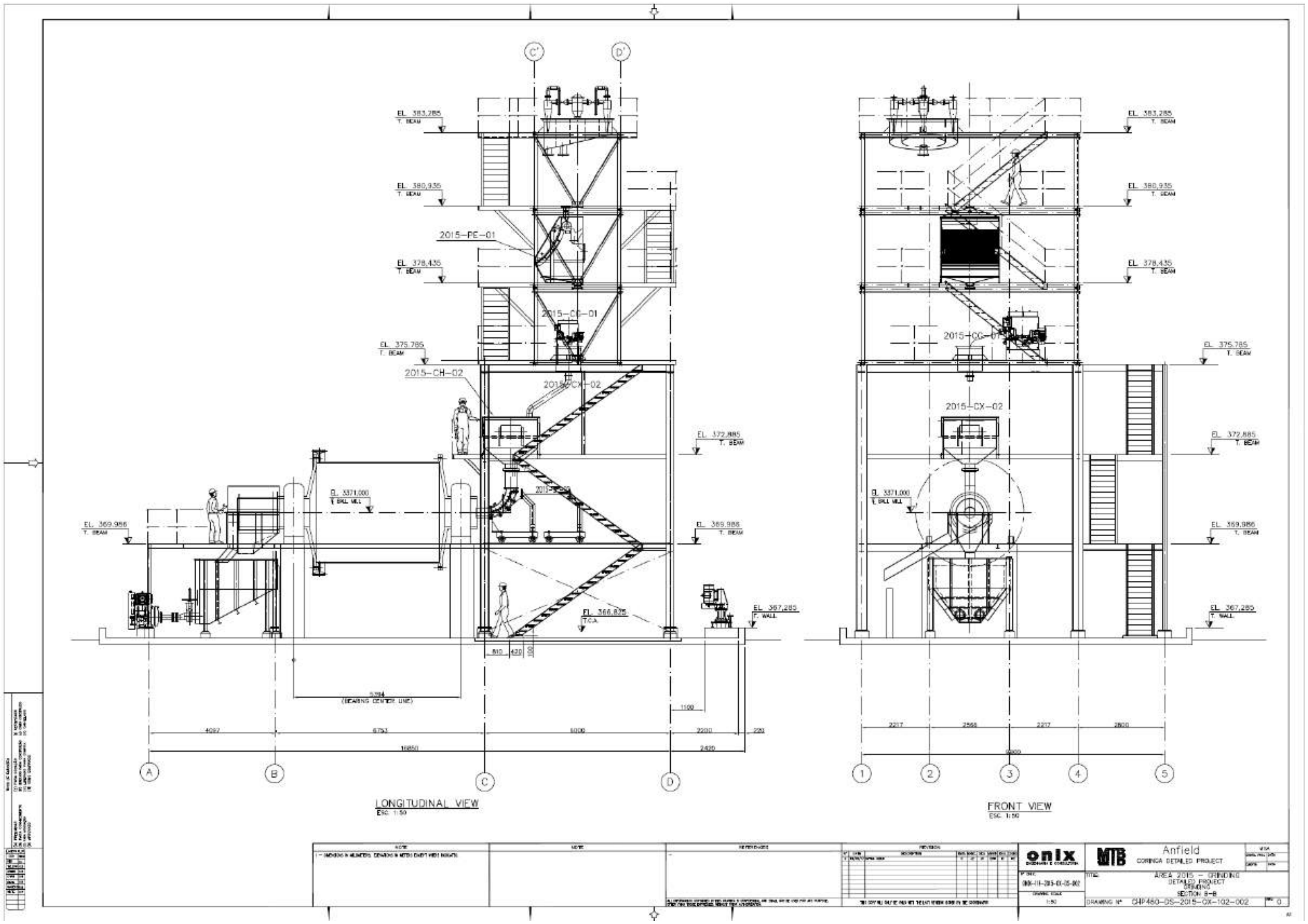



**Figure 17.5: Grinding and Classification Circuit**

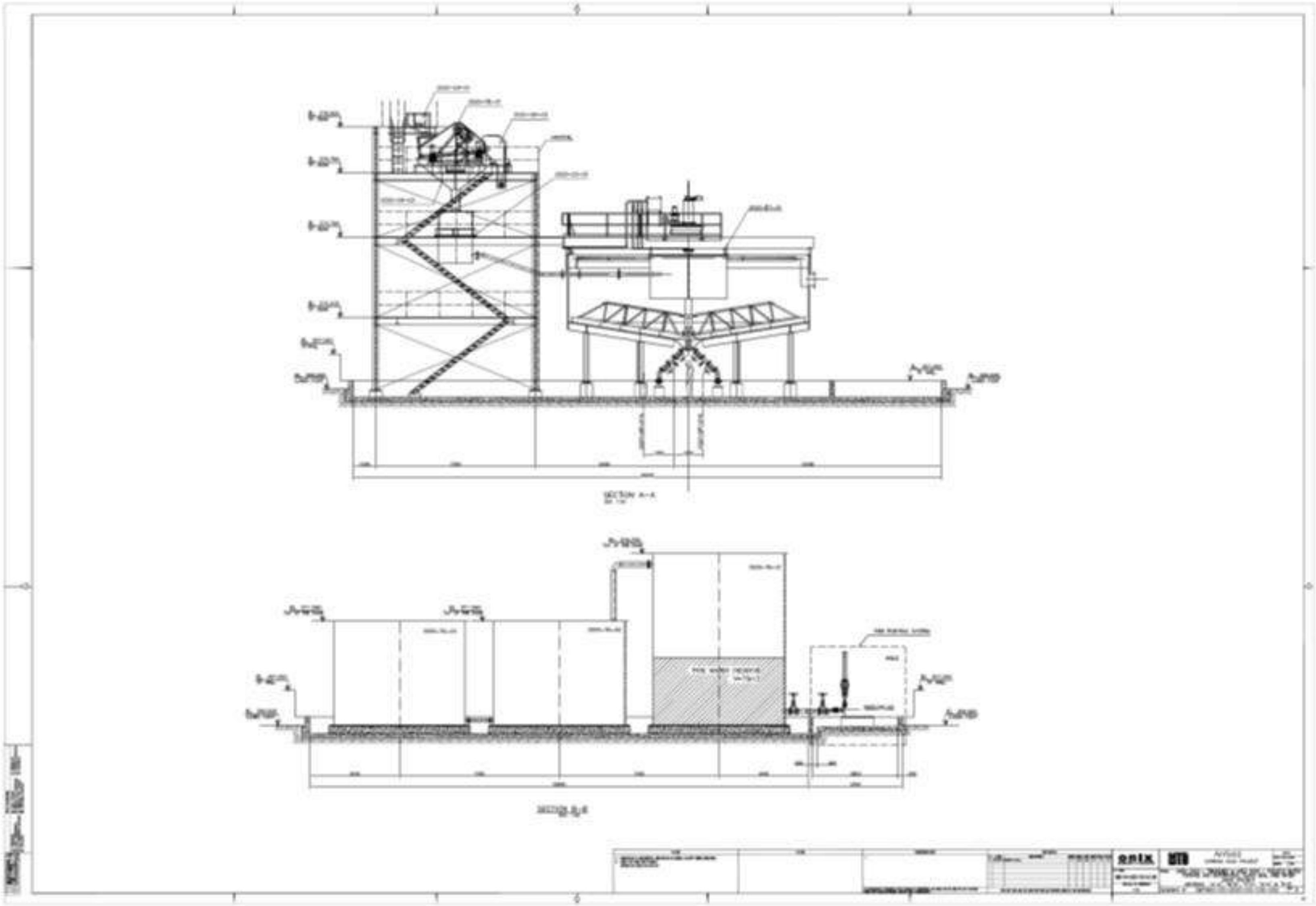


**Figure 17.6: Thickening and Process Water**

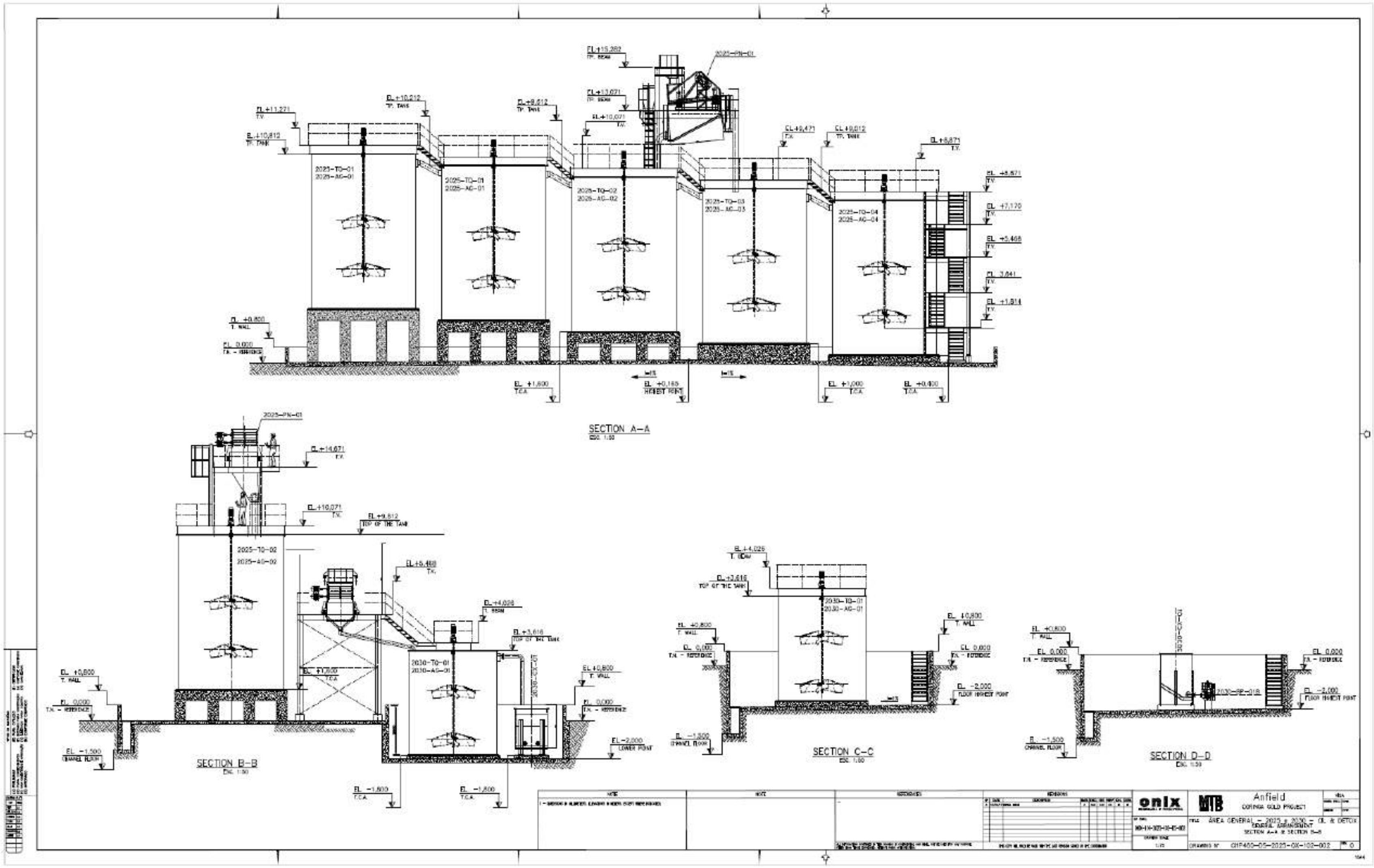



**Figure 17.7: CIL Circuit**

### *17.1.2 Key Process Design Criteria*

The key process design criteria are listed in Table 17.1 and formed the basis for the detailed process design criteria and the mechanical equipment list developed for the FS.

**Table 17.1: Key Process Design Criteria**

| Criteria | Units | Design Value | Source |
|---|---|---|---|
| | | | |
| Plant Throughput | tpd | 460 | Client |
| Plant Throughput | tpa | 167,900 | Client |
| Plant Throughput | tph | 20.8 | Calc for Design |
| Head Grade | gpt Au | 6.5 | Client |
| Head Grade | gpt Ag | 13.1 | Client |
| Ore Specific Gravity | g/cc | 2.6 | Testwork |
| Gravity Gold Recovery | % | 50 | Calc from Testwork |
| Gravity Silver Recovery | % | 25 | Calc from Testwork |
| Overall Gold Recovery - Serra & Galena | % | 96 | Calc from Testwork |
| Overall Silver Recovery - Serra & Galena | % | 57 | Calc from Testwork |
| Overall Gold Recovery - Meio | % | 94 | Calc from Testwork |
| Overall Silver Recovery - Meio | % | 74 | Calc from Testwork |
| Crushing Plant Availability | % | 70 | Client |
| Grind/Recovery Plant Availability | % | 92 | Client |
| Uniform Compressive Strength (UCS) | Mpa | 42.9 | Testwork - Average |
| Crushing Work Index (CWi) | kWh/t | 8.7 | Testwork - Average |
| Bond Ball Mill Work Index (BWi) | kWh/t | 18.6 | Testwork - Average |
| Bond Abrasion Index (Ai) | g | 0.377 | Testwork - Average |
| Grind Size (p80) | microns | 105 | Testwork |
| Grind Thickener Sizing | t/hr/sq m | 0.25 | Testwork |
| Leach (CIL) Retention Time | hours | 24 | Testwork |
| Leach Slurry pH | pH | 11.5 | Testwork |
| Leach Slurry Density | % Solids | 41 | Testwork |
| Number of Pre-Aeration Tanks | value | 1 | Engineer |
| Number of Leach Tanks | value | 4 | Engineer |
| Cyanide Destruction Method | process | $SO_2$/Air | Testwork |
| Detox Tank Retention Time | hours | 3.4 | Testwork |

## 17.2 Process Plant Description

A brief description of the process plant is presented below.

- The ROM ore is stockpiled and then reclaimed by front-end loader. The loader dumps the ore into a hopper equipped with a vibrating feeder that discharges into an 800 mm by 600 mm primary jaw crusher.
- The jaw crusher product discharges onto a conveyor that feeds a 4 m long by 1.5 m wide double-deck vibrating screen. The oversize from the top deck feeds a 1 m

diameter Symons cone crusher while the bottom deck oversize feeds an H2800 Sandvik cone crusher. The crushed material from the secondary and tertiary crushers is collected and recycled via conveyor back to the vibrating screen.

- The final crushed product (undersize from the screen bottom deck), at an average particle size of 80% passing 10 mm, discharges onto a belt conveyor that feeds the fine ore stockpile. Crushed ore is reclaimed from the stockpile via feeders and a conveyor that feeds the 4.3 m long by 3.5 m wide ball mill equipped with a 900 hp motor.
- The ball mill grinding is in closed circuit with cyclones which classify the ground ore to a final particle size of 80% less than 105 microns. The cyclone underflow feeds a Knelson centrifugal (gravity) concentrator for free gold and silver recovery. The concentrator tails are returned to the mill for further grinding. The gravity concentrates flow to an Acacia intensive leach reactor. Acacia leach tails are pumped to the CIL circuit while the Acacia reactor gold solutions are collected, stored and then pumped to a dedicated electrowinning cell.
- The grinding circuit product, cyclone overflow at 20% solids by weight, passes over a trash screen and then is directed to a 12 m diameter thickener. Thickener underflow densities are targeted to be about 41% solids by weight for leaching.
- The clarified overflow water from the thickener is pumped to a tank for storage and later used as process water. The thickener underflow is pumped to a conditioning tank prior to CIL for aeration and pH adjustment to about 11.5 using hydrated lime.
- After conditioning the slurry is transferred to a series of four aerated 8 m high by 6 m diameter CIL tanks, equipped with static sieve screens. The CIL tanks have a total slurry retention time of 24 hours. Gold and silver are leached with cyanide and then adsorbed by activated carbon present in the tanks.
- Each tank will have a carbon concentration of 25 gpl. The activated carbon is retained in each tank by static sieve screens installed ahead of each tank discharge pipe.
- The slurry flows downstream from tank to tank then through a carbon safety screen.
- The metal-loaded carbon is transferred from the last tank up-stream to the one before, and so on, countercurrent to the slurry descending from tank to tank.
- The highest metal loaded carbon is in the first CIL tank. From the first tank the carbon is transferred to a screen for preliminary cleaning/washing, then directed to the desorption column for further washing and metal stripping.
- In the desorption column, carbon is washed with a weak solution of hydrochloric acid and then a caustic soda solution, then a NaCN solution for metal stripping. This strip (pregnant) solution is pumped through a dedicated electrowinning cell where gold and silver are deposited on cathodes. The cathodes are periodically removed from the cells, washed, then the gold/silver sludge is dried, mixed with

flux reagents and then smelted to produce a doré' product which is then shipped offsite for refining.

- The barren (metal removed) electrowinning solution is then recycled to the leaching circuit.
- After stripping, carbon is washed with water and transferred to the regeneration kiln. The carbon is heat-treated in the kiln and then returned to the last (fourth) CIL tank.
- The slurry from CIL, after passing through the carbon safety screen, flows to the cyanide destruction tank that utilizes the $SO_2$/Air process to destroy cyanide in the tailing slurry. Copper sulphate and SMBS are added to the aerated mix tank to destroy the cyanide. The detoxified slurry is then pumped to the TSF for disposal.
- At the TSF, a floating pump will be installed that will collect and recycle decanted water to the plant for use as process water.
- The site water balance indicates that not all decant water can be returned to the plant because of retention in the settled solids. The deficit (make-up) volume will be provided from a local source of fresh water (mine, runoff) to provide an overall water balance.

## 17.3 Energy Consumption

Power for the project will initially be generated onsite via diesel generators. Generators will operate for about 18-months, through construction and the first eight months of plant operation, after which line power will be available. Diesel power will be generated at an estimated cost of US$0.24 kWh while line power will be supplied at a cost of US$0.085 kWh. Table 17.2 presents the estimated electrical power demand for the Coringa Gold Project at full operation by area (processing, mining, and camp) and totals 3.039 megawatts (MW).

**Table 17.2: Site Power Demand**

| Area | Demand MW* |
|---|---|
| | |
| Process Plant | |
| Crushing | 0.264 |
| Process | 1.613 |
| | |
| Mining | |
| 1st Qtr | 0.189 |
| 2nd Qtr | 0.577 |
| 3rd Qtr | 0.604 |
| 4th Qtr (Full) | 1.072 |
| | |
| Camp | 0.090 |
| | |
| Total (Full Operation) | 3.039 |
| * megawatts | |

## 17.4 Process Water Requirements

During normal plant operation, it is estimated that the plant will consume 70 $m^3$/h of water. The pre-leach thickener will internally recycle 46 $m^3$/h resulting in a makeup water requirement of 29 $m^3$/h (after adjustment for evaporation and tailings entrainment losses). During plant start-up, prior to tailing decant water recycle, it is estimated that the full 29 $m^3$/h will have to come from other sources (runoff, mine operations). Once the TSF is capable of recycling water then only 2 $m^3$/h of water will be needed from other sources. Other planned sources are discussed in Section 18.4.

## 17.5 Process Plant Consumables

Table 17.3 presents the estimated process plant consumables for a typical year of operation and includes reagents, grinding media, mill liners, and crusher liners.

**Table 17.3: Process Consumables**

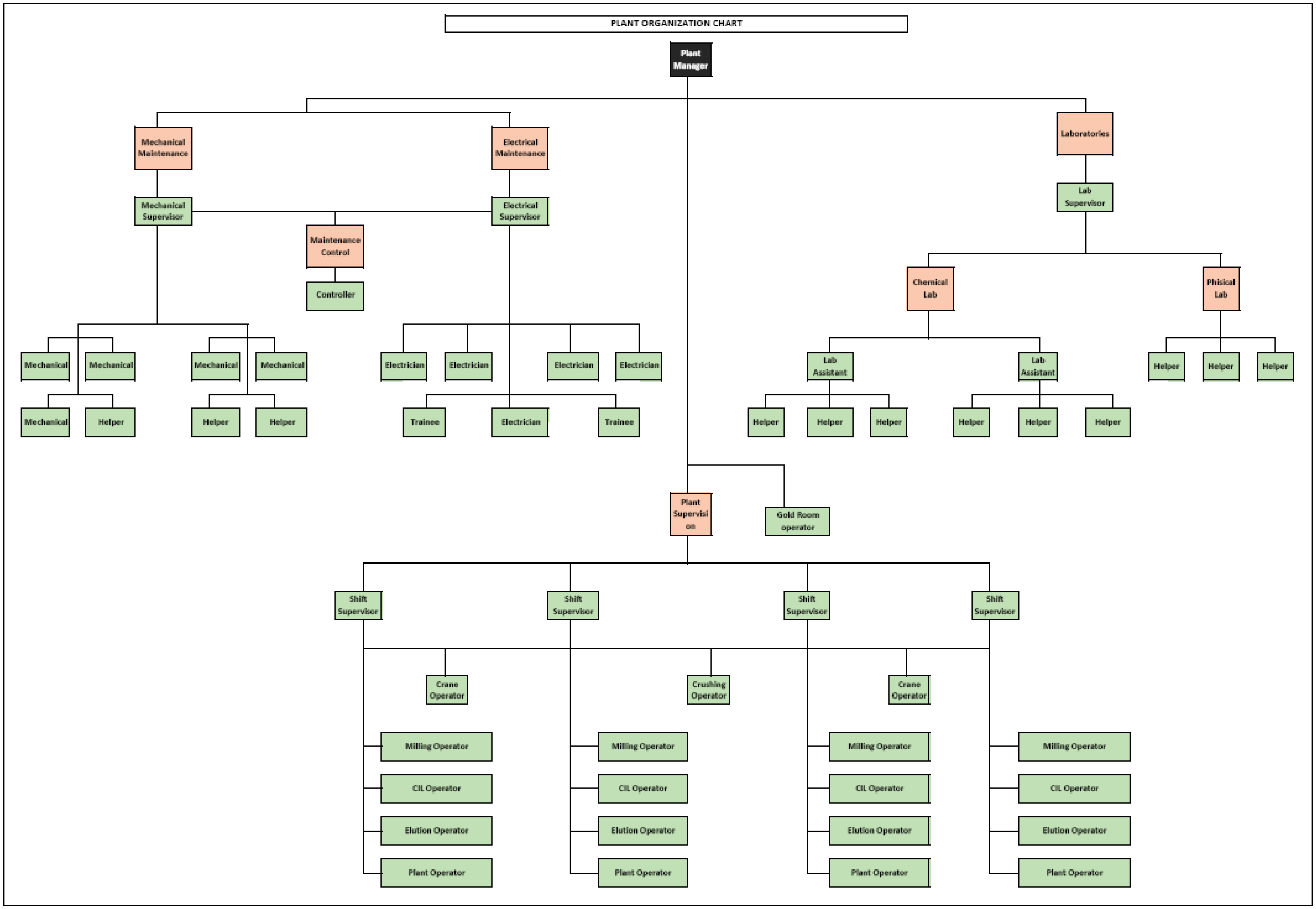
| Consumables | Unit Cons. (kg/t) | Annual Cons. (kg) |
|---|---|---|
| Primary Crusher Liners | 0.016 | 2340 |
| Secondary/Tertiary Liners | 0.016 | 2340 |
| Ball Mill Liners | 0.055 | 7877 |
| Grinding Balls | 1.500 | 216000 |
| Hydrated Lime | 1.500 | 216000 |
| Sodium Cyanide | 1.300 | 187200 |
| Activated Carbon | 0.220 | 31680 |
| Sodium Hydroxide | 0.840 | 120960 |
| Hydrochloric Acid | 0.220 | 31680 |
| Sodium Metabisulfite | 0.400 | 57600 |
| Copper Sulfate | 0.200 | 28800 |
| Flocculant | 0.010 | 1152 |
| Smelting Reagents | 0.010 | 1152 |

## 17.6 Process Plant Manpower

Figure 17.8 below shows the plant organization chart.

Tables 17.4 and 17.5 state the plant operations, maintenance, and laboratory staffing levels for the preproduction and first year of production operations periods, respectively.

The plant will operate 24 h/d, 365 d/y on a two 12 hour shifts per day.  Four shift crews will work four days on and four days off.




Source: Anfield, 2017

**Figure 17.8: Process Plant Staffing**

**Table 17.4: Preproduction Staffing Per Area**

| AREA | Project Month | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | -10 | -9 | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 |
| Management | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Control | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Mechanical Maintenance | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 8 |
| Electrical Maintenance | 5 | 5 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 |
| Laboratory | 2 | 2 | 2 | 2 | 2 | 5 | 5 | 5 | 5 | 9 |
| Operations | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 24 |
| **TOTAL** | **19** | **19** | **33** | **33** | **33** | **36** | **36** | **36** | **36** | **62** |

**Table 17.5: Production Staffing Per Area**

| AREA | Project Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Management | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Control | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Mechanical Maintenance | 8 | 8 | 8 | 8 | 8 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| Electrical Maintenance | 7 | 7 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 8 | 8 | 8 |
| Laboratory | 9 | 9 | 10 | 10 | 10 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Operations | 24 | 24 | 24 | 24 | 24 | 26 | 26 | 26 | 26 | 26 | 26 | 26 |
| **TOTAL** | 50 | 50 | 51 | 51 | 51 | 56 | 57 | 57 | 57 | 57 | 57 | 57 |

# 18 PROJECT INFRASTRUCTURE

Project location and access to the Coringa Gold Project area are shown in Figures 4.1 and 5.1, respectively.

## 18.1 Site Plan

Figure 18.1 is the overall site plan which shows the locations of the principal facilities relative to each other. Principal facilities shown are: main gatehouse, onsite access road, Meio portal and WSF, plantsite, TSF, Serra portal and WSF, explosives storage facility, and camp complex. Details of the plantsite general arrangement are shown in Figure 17.3. Details of the TSF are shown in Figure 18.2 and Figure 18.3.

Locations and layouts of the facilities were based on the following considerations:

- Utilization of existing topography to minimize site development, mass earthworks, and energy consumption.
- Minimization of impact to existing vegetation.
- Consolidation of facilities to facilitate effective management and operation, and to minimize inefficiency and cost of distribution of infrastructure and lost time for personnel travel between facilities.

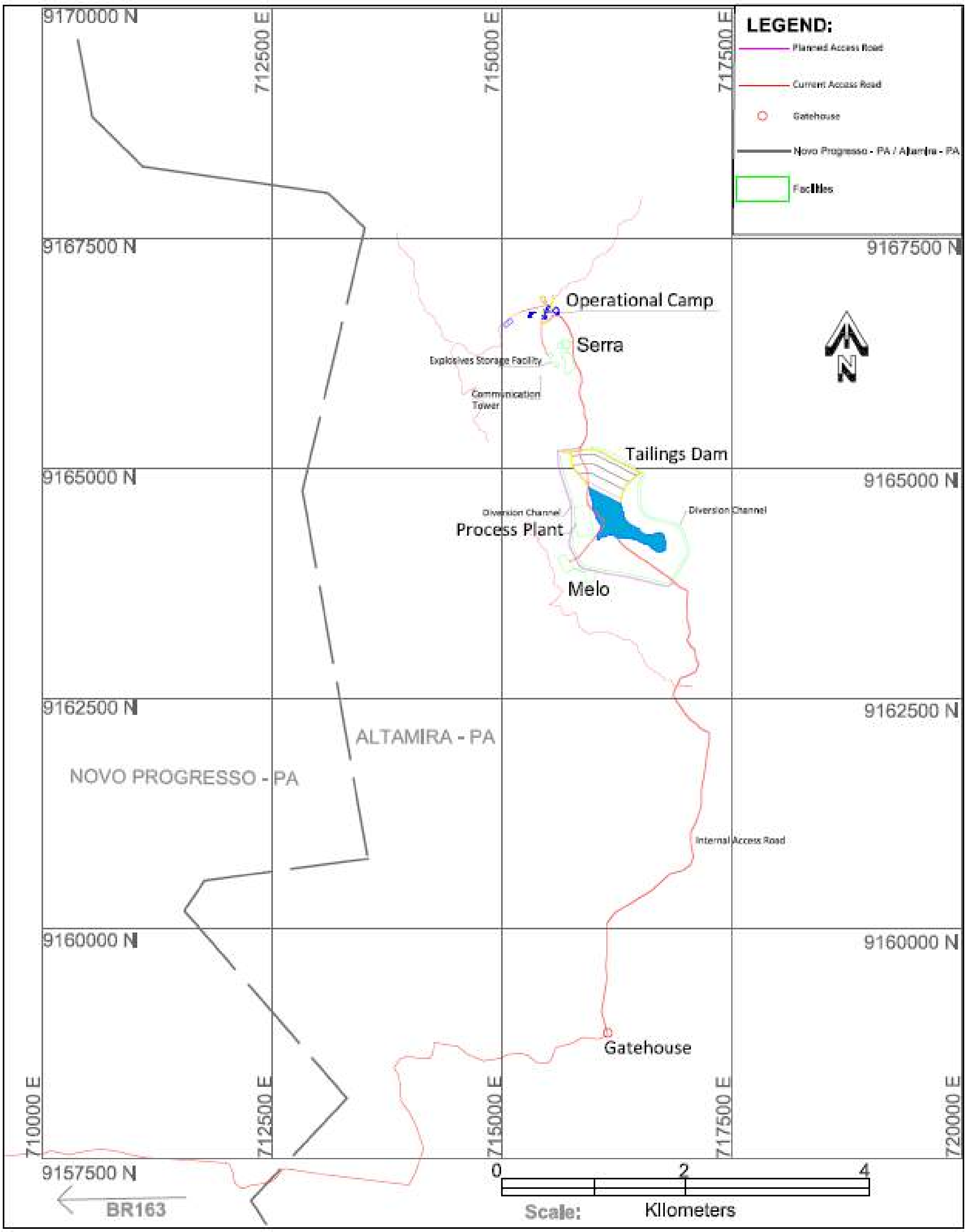



**Figure 18.1: Overall Site Plan**

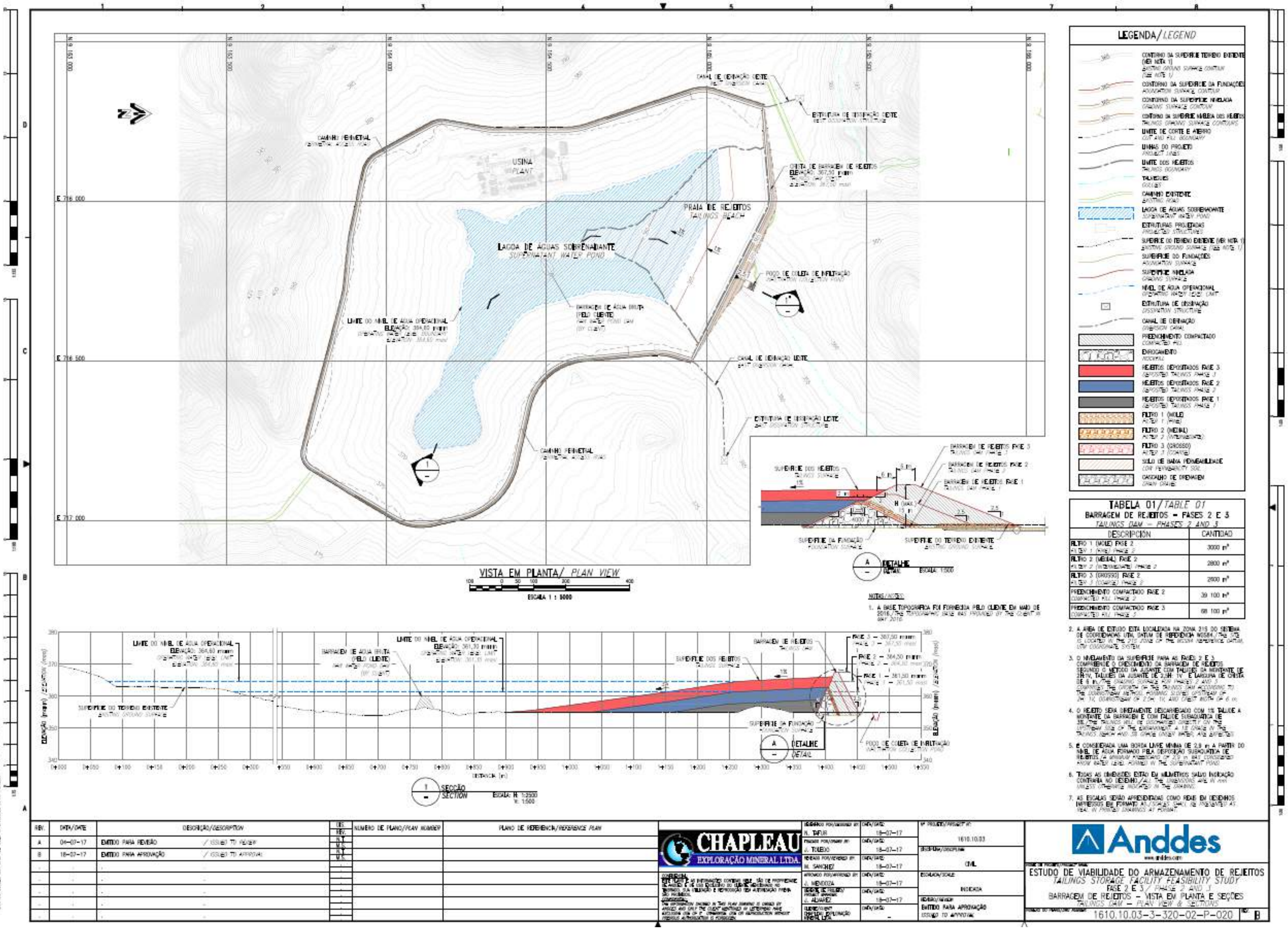


Figure 18.2: Tailings Dam – Plan View and Section

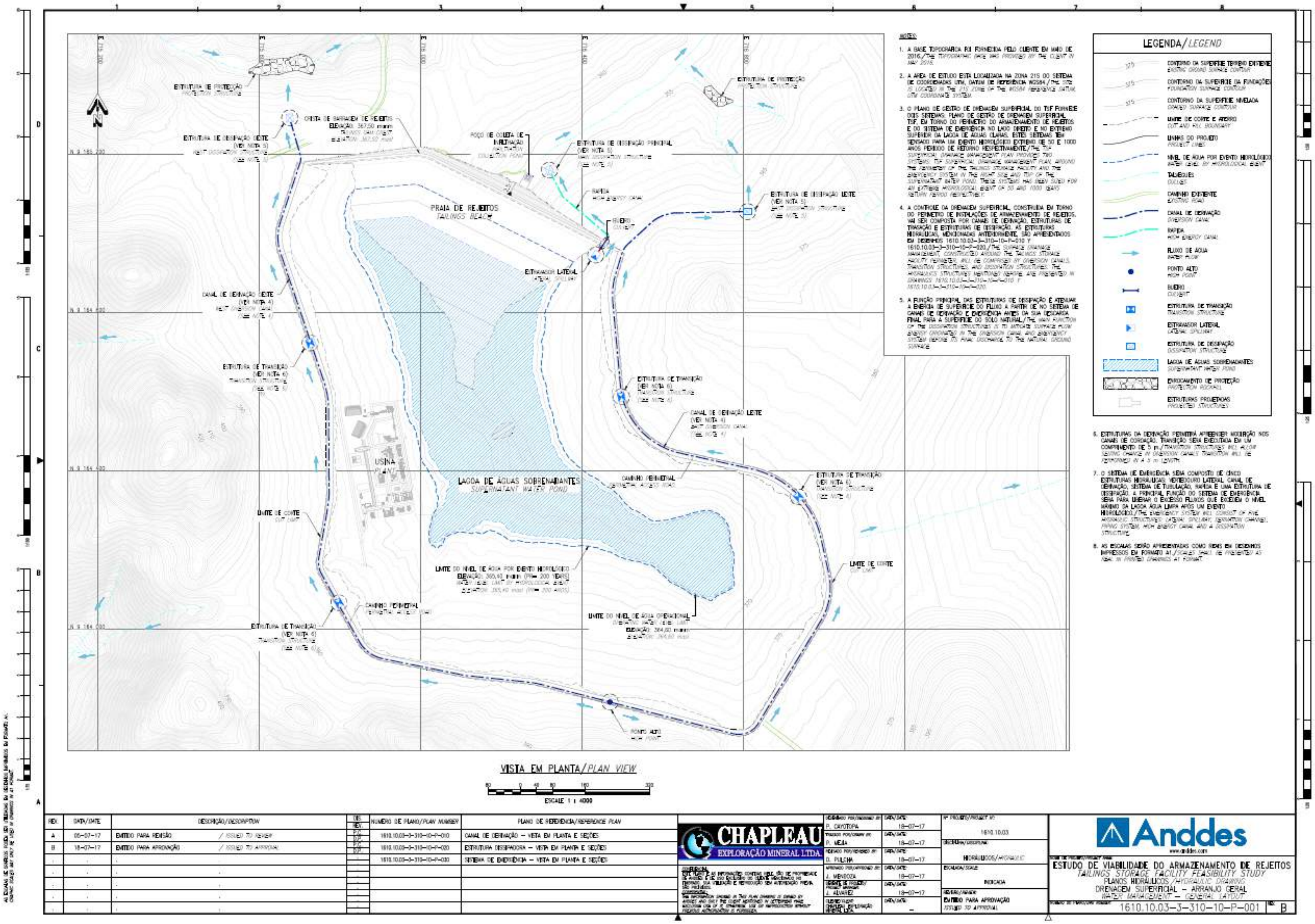



**Figure 18.3: Tailings Facility Water Management**

## 18.2 Solid Waste Management

### *18.2.1 Tailings*

Anddes, of Lima, Peru was engaged to design the TSF including the geotechnical and hydrological investigations. Anddes further engaged BVP of Belo Horizonte, Brazil to assist with their work, providing local geotechnical, hydrology, and regulatory expertise. Anddes' work was reviewed by Mark E. Smith of RRD, with a view to ensuring the TSF engineering was amenable to a feasibility level design. The design study included geotechnical field and laboratory investigation programs, and the report of this study and the TSF design, entitled "Tailings Storage Facility Feasibility Study Coringa Project Final Feasibility Report, Revision B, July 2017". This work also included water balance and hydrological studies, entitled "Tailings Storage Facility Feasibility Study Coringa Project Water Balance Report, Revision 0, July 2017" and "Tailings Storage Facility Feasibility Study Coringa Project Hydrological Study, Revision 0, July 2017".

#### *18.2.1.1 Design Criteria*

The design criteria used for the TSF are summarized in Table 18.1 below. All components were developed on the basis of data and design criteria that have been calculated and established by the international standards of geotechnical, civil, and mining engineering.

## Table 18.1: Tailings Design Criteria

| Description | Unit | Design Criteria |
|---|---|---|
| Tailings capacity | Mt | 0.9 |
| Tailings production | tpd | 460 |
| Operation time | Months | 60 to 65 |
| Type of tailings | Type | Thickened |
| Dry density | $t/m^3$ | 1.3 |
| Specific gravity | | 2.8 |
| Percentage of solids (see note 1) | % | 40.4 |
| Method of dam raising | type | Downstream |
| | | Compacted Earth fill |
| Required storage capacity (see note 2) | | |
| | m3 | 692,300 |
| | t | 900,000 |
| Embankment slope stability | | |
| Static factor of safety, short term (minimum) | | 1.3 |
| Static factor of safety, long term (minimum) | | 1.5 |
| Beaching: | | |
| Stored tailings above water level (nominal slope) | % | 1 |
| Stored tailings below water level (nominal slope) | % | 3 |
| Freeboard | | |
| Minimum | m | 1 |
| (Note 3) | | |
| Disposal techniques | type | Spigots |
| | | (note 5) |
| Reclaim water recovery | type | Pumping |
| Geomembrane liner (Upstream face of starter embankment) | | 1.5mm thick |
| | | Single, smooth |
| | | HDPE |
| Perimeter Canals: | | |
| Return period | years | 50 |
| Precipitation for design storm | mm | 243 |
| Minimum flow-line slope | % | 0.5 |
| Minimum freeboard | m | 0.3 |
| Liner type | type | Riprap |
| Canal section | type | Trapezoidal |
| Side slope | H:V | 2:01 |
| Dissipation structure type / liner | type | Pond |
| | | Riprap |
| Spillway: | | |
| Return period | years | 1,000 |
| Precipitation for design storm | mm | 365 |
| Intake structure | | Pond |
| Piping system type, minimum slope | | HDPE, 1.0% |
| High energy canal: | | |
| Slope, minimum | % | 5 |
| Freeboard, minimum | m | 0.3 |
| Liner type | Type | Stone masonry |
| Canal section | Type | Trapezoid |
| Side slope | H:V | 2:01 |

***Notes:***

1. The percentage of solids and maximum reclaim to process plan have been obtained from Onix (2016).
2. Required storage capacity includes 20% contingency on tonnage as allowance for any changes during detailed design or production.
3. Minimum vertical distance between the maximum supernatant pond level and the dam crest at end of Phase 3.
4. The percentage of water retained in tailings has been estimated from the tailings dry density and specific gravity.
5. Spigot discharge will principally be from the upstream face of the embankment for the early years of operation, then alternating between the embankment and upstream portions of the impoundment to create
6. For the water balance simulation upon a hydrological event of 200-year return period was considered.

#### *18.2.1.2 Geotechnical Characterization*

To characterize the TSF, field and laboratory programs were carried out. The field investigation included a site visit; surface mapping; excavation, logging and sampling of 26 test pits (up to 5.1 m deep) and 7 vertical diamond drill holes (up to 30.7 m deep) including RQD, RMR, and GSI determinations; and one surficial sampling point for a rockfill borrow source. The field testing program included: measuring *in-situ* moisture content and density (13 tests); Standard Penetration Tests (SPT) in each drill hole (42 tests); and LeFranc permeability tests in the test pits (4 tests in the foundation of the dam and 3 in the impoundment for a total of 7).

The laboratory testing program included: classification and general physical properties; specific gravity; standard and modified Proctor compaction; hydraulic conductivity; triaxial shear strength (UU and CU); consolidation; and point load. In association with this program, GRE carried out a hydraulic testing program to characterize the hydraulic properties of the tailings. This program included: *in-situ* permeability tests in the drill holes (six tests in the foundation of the dam and 7 in the impoundment); slug tests in drill hole piezometers (four tests); and laboratory hydraulic conductivity testing.

The project area is largely underlain by intrusive bodies often seen as circular expressions within granites, probably of the Maloquinha Suite. The granite has a typical granular texture, with pink feldspar and quartz crystals. Most of the granite outcrops are rounded topographic peaks. Overlying the granites are rhyolites, probably from the Salustiano Formation. These have a typical porphyritic texture, with white phenocrystals in a dark matrix. Locally, the project area evidences rhyolite outcrops, overlying the formation, colluvial and alluvial deposits, and unconsolidated soils, composed of residual ground product of the in-situ rock alteration is evidenced, whose description is quoted below:

- Colluvial deposits: This unit is found in most of the area of the TSF, and are accumulations formed by alterations and weathering of in-situ rocks located on the upper slopes and subsequent transport by gravity. According to USCS, this deposit is formed by silt with sand and gravel (ML), non-plastic to medium plasticity, from firm to very rigid consistency and dry to slightly wet.
- Alluvial deposits: This unit is present along the axis of the TSF and contribution areas, as well as the axis of the projected dam, and is composed by water transport and its subsequent accumulation in gully areas. According to USCS, this deposit is formed by: silt, silt with sand, sandy silt, silt with gravel, gravelly silt (ML), silty sand, silty sand with gravel (SM) and silty gravel with sand (GM) non-plastic to medium plasticity, firm to string consistency loose to very dense compactness and dry to wet.
- Residual soils: This unit is present along the axis of the TSF, formed by in-situ weathering of the bedrock. According to the USCS, this deposit is formed by:
    - Silt, and slightly wet to wet silt with sand, sandy silt, silt with gravel and sand (ML), to medium plasticity, soft to strong consistency and slightly wet to wet.
    - Clay (CH), high plasticity, rigid consistency and wet.

  - Poorly graded gravel with silt (GP-GM) and silty gravel with sand (GM) non-plastic to low plasticity, loose to very dense compactness and wet.
- Bedrock: This unit is formed by igneous rock outcrops of the rhyolite type, probably belonging to the Salustiano formation. This unit is present along the axis of the TSF, as well as North of the tailings dam. According to the ISRM standards, this rock has medium to extremely high strength, slightly altered to undisturbed, mostly moderately fractured to massive, RQD between 50-100% and basic RMR between 42 to 83 (regular to very good rock).
- Water table: Based on the drill holes, groundwater is present at depths generally of 1 to 10 m.

#### *18.2.1.3 Tailings Impoundment Dam*

The TSF will include the dam and the impoundment created by the dam, the surface water diversion ditches, the tailings delivery and distribution system, the reclaim water recovery system, the spillway, and the seepage collection system (see Figure 18.3).

The TSF will be created in one preproduction and two production phases (Phase 1 and Phases 2-3, respectively). The Phase 1 will be created using conventional rock-fill dam with upstream slope lined with a HPDE geomembrane. Dam raises for Phases 2 and 3 will be constructed using conventional downstream methods with compacted earth fill using slopes of 2H:1V (upstream slope) and 2.5H:1V (downstream slope), with a maximum height of 14 m (see Fig. 18.2). An interior drain will be included to control the development of a phreatic surface within the embankment. Table 18.2 below shows the tailings dam characteristics.

The ultimate embankment crest elevation will be 367.5 amsl. The embankment will include geotechnical monitoring instrumentation to provide operational feedback. Below the dam will be an infiltration control pond, which will collect any seepage and allow that to be pumped back to the impoundment.

The impoundment has been designed to store a total of 900,000 t of tailings at an average in-place dry density of 1,300 kg/m$^3$. A supernatant pond will be maintained over the tailings, providing capacity to store operating solutions and accumulations from storm events up to the 200-year/24-hour event.

Tailings will be conventionally thickened (see Section 17.17) and discharged to the TSF via spigots. Initially these spigots will operate from and near the inside crest of the dam, but once the operating pool is developed they will periodically be moved around the facility to hold the pool in the optimum location. During closure the spigots will be used to fill in the pool and create positive slopes on the surface of the tailings to provide for stable long-term drainage. Beach slopes of 1% and 3% above and below the pond surface, respectively, have been assumed in the design.

Details of the spillway design proposed and a typical dam cross section are shown in figures 18.4 and 18.5, respectively.

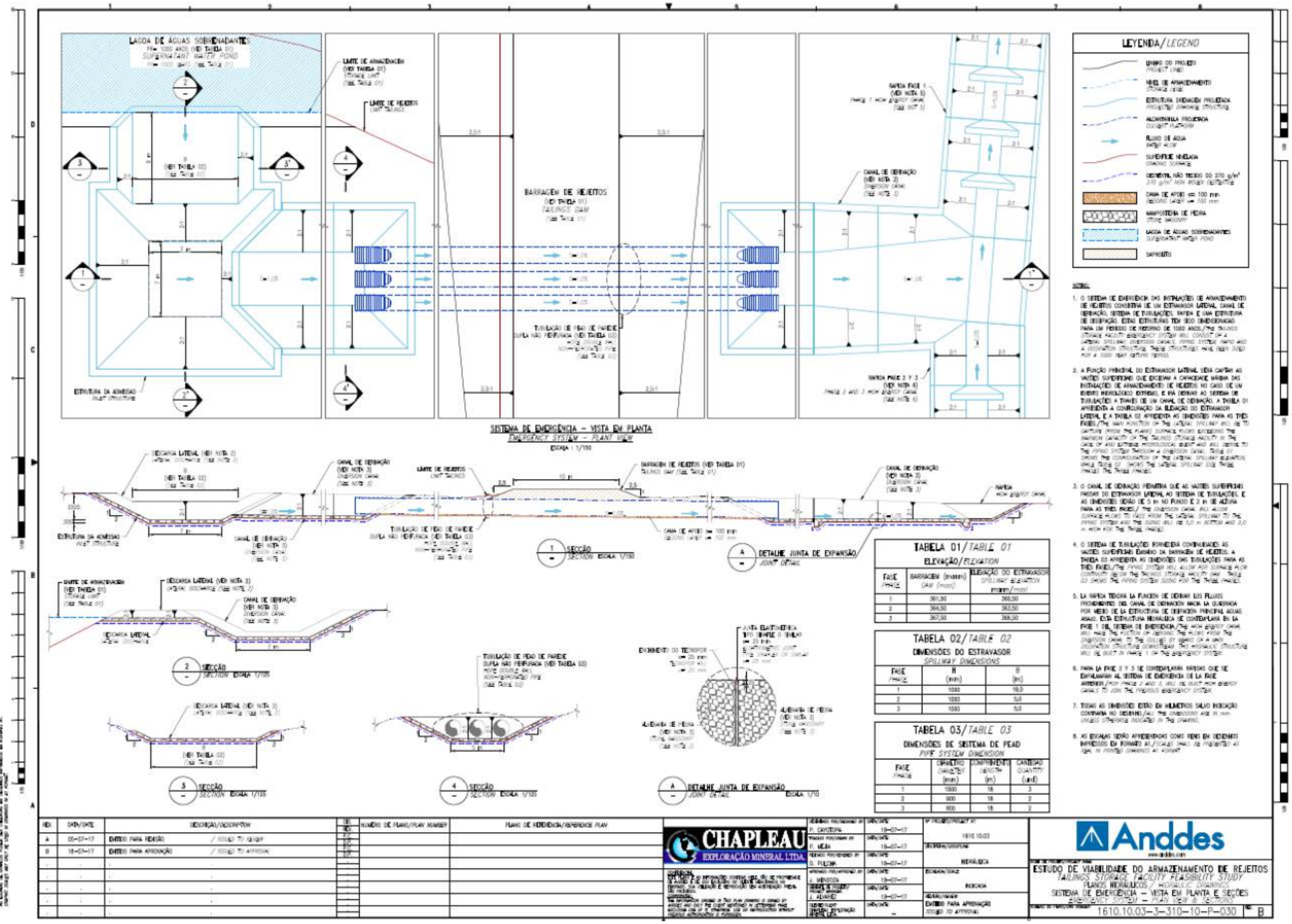
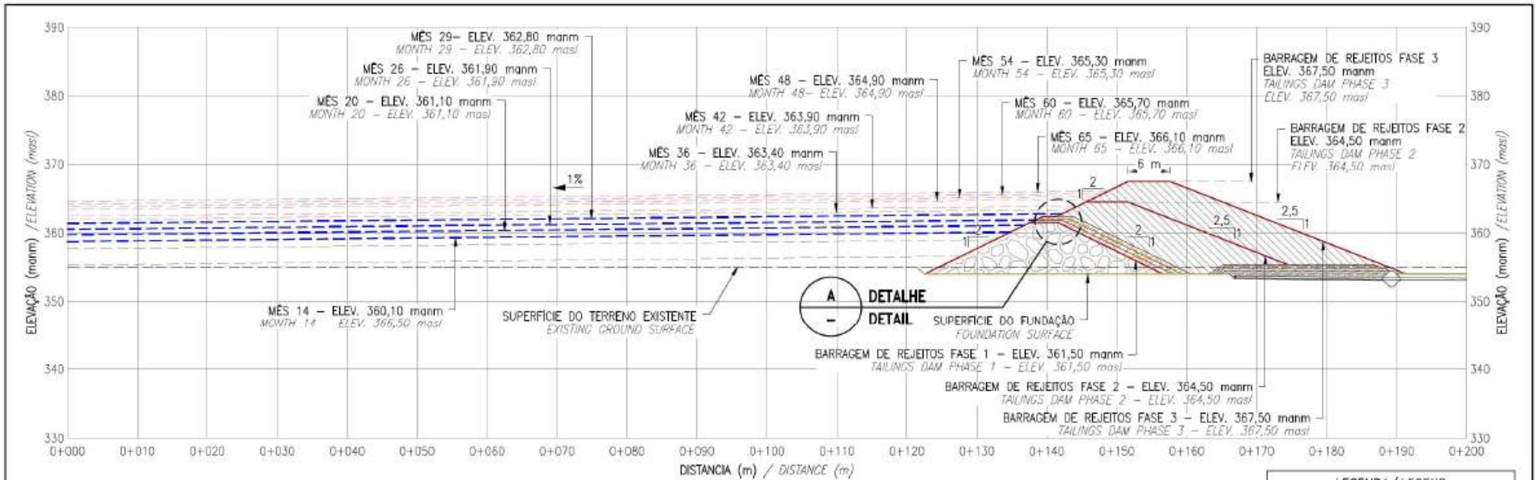
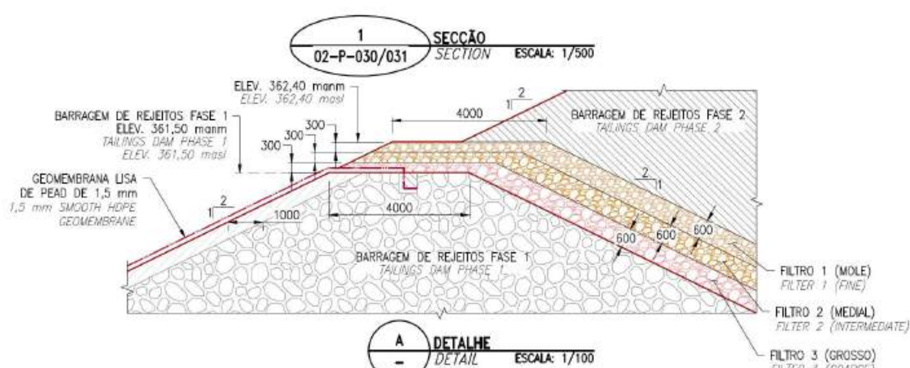


**Figure 18.4: TSF Spillway**



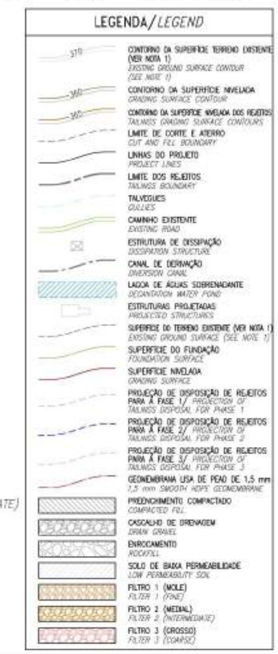




**TABELA 01/*TABLE 01***
**TABELA DE CAPACIDADES/*CAPACITY TABLE***

| MÊS *MONTH* | FASE *PHASE* | ELEVAÇÃO DO REJEITO (manm) *TAILINGS ELEVATION (masl)* | CAPACIDADE DO REJEITO (Mt) *TAILINGS CAPACITY (Mt)* | ELEVAÇÃO DO NÍVEL DE ÁGUA OPERACIONAL (manm) *ELEVATION OF OPERATING WATER LEVEL (masl)* |
|---|---|---|---|---|
| 14 | FASE 2 *PHASE 2* | 360,10 | 195,96 | 358,60 |
| 20 | | 361,10 | 280,60 | 359,60 |
| 26 | | 361,90 | 364,32 | 360,40 |
| 29 | | 362,80 | 406,64 | 361,30 |
| 36 | FASE 3 *PHASE 3* | 363,40 | 504,16 | 361,90 |
| 42 | | 363,90 | 588,80 | 362,40 |
| 48 | | 364,90 | 672,06 | 363,40 |
| 54 | | 365,30 | 756,70 | 363,80 |
| 60 | | 365,70 | 839,96 | 364,20 |
| 65 | | 366,10 | 910,34 | 364,60 |

4. OS MESES MOSTRADOS NAS VISTAS EM PLANTA CORRESPONDEM AOS SEGUINTES MESES DE PRODUÇÃO: 60 E 65 (FASE 3)./*THE PLAN VIEWS CORRESPOND TO THE FOLLOWING MONTHS OF PRODUCTION: 60 AND 65 (PHASE 3).*

5. TODAS AS DIMENSÕES ESTÃO EM MILIMETROS SALVO INDICAÇÃO CONTRARIA NO DESENHO./*ALL THE DIMENSIONS ARE IN mm UNLESS OTHERWISE INDICATED IN THE DRAWING.*

6. AS ESCALAS SERÃO APRESENTADAS COMO REAIS EM DESENHOS IMPRESSOS EM FORMATO A1./*SCALES SHALL BE PRESENTED AS REAL IN PRINTED DRAWINGS A1 FORMAT.*

**Figure 18.5: TSF Section**

The planned operating life of the TSF is 60-65 months.

The TSF design includes several design features that significantly improve the stability of the facility, as follows:

- Conventional rock-fill dam with upstream slope lined by a HPDE geomembrane in Phase 1;
- Conventional earth-fill dam in downstream raises of Phases 2 and 3;
- Robust peak storm event management systems, compliant with both Brazilian regulations and the Canadian Dam Association (CDA) guidelines;
- The TSF dam FOS against slope failure exceeds applicable regulations and industry standards;
- Liberal freeboard allowances;
- The normal operating pond will be a minimum of 400 m from the crest of the dam; and,
- Closure includes using tailings to fill the pond and provide positive drainage away from the center of the impoundment, minimizing long-term water infiltration.

**Table 18.2: Tailings Dam Characteristics**

| Description | Units | Phase 3 |
|---|---|---|
| Crest elevation (a.m.s.l) | m | 367.5 |
| Crest width | m | 4 |
| Dam height | m | 13.5 |
| Upstream slope | H:V | 2:01 |
| Downstream slope | H:V | 2.5:1 |
| Stored tailings (cumulative) (see Note | m3 | 692,300 |
| | t | 900,000 |
| Supernatant water pond capacity | $m^3$ | 965,800 |
| Supernatant water pond area | | |
| | ha | 31.17 |

***Notes:***

1. The TSF volume contains a 20% contingency above the volume required for the current processed ore schedule.

#### 18.2.1.4 Geotechnical Analyses

In order to validate the design proposed for the tailings dam, geotechnical assessments of the dam for construction, operations, and long-term conditions were performed. Specific analyses included seepage, consolidation, and slope stability.

Seepage through the embankment was analyzed under steady-state conditions to provide estimates of the maximum phreatic levels within the tailings and embankment. This, in turn, provided estimates of pore pressures, which were used in the stability analyses. The seepage analyses were performed using the seepage module of the software Slide version 7.0 (Rocscience, 2016), which employs the finite element method. With this application, Darcy´s law and the solution of differential equations of this technique, the pore pressures generated in the finite element mesh nodes are determined and from these results, the phreatic level was determined. The following considerations were considered:

- The geometry of the tailings dam corresponding to the final phase of construction, along the central section (maximum dam height) of the dam.
- The ponded surface water was considered to be located a minimum distance upstream from the tailings dam of 400 m.

The dam seepage results were integrated into the physical stability analysis, in terms of long-term pore pressures condition. Graphic results of the seepage analysis, which include geometric information, finite element mesh, materials property, pore pressures, and the resulting piezometric level are provided in the Anddes report (2017). Seepage from the impoundment was estimated by GRE (2017) using a 3D modeling.

The consolidation analyses addressed the natural soils in the dam foundation, which have relatively high fines content and thus are subject to consolidation settlement and the production of excess pore pressures. Consolidation properties were taken from the laboratory test results. The time to 99% dissipation of consolidation was estimated at 4.5 years.

The stability of the dam was analyzed for each phase of construction and for long-term conditions using two-dimensional limit equilibrium methodology (Slide v. 7.0, Rocscience, 2016). The minimum required factors of safety were adopted from the CDA and are presented in the Design Criteria table. For each phase of construction, the critical (maximum) cross section of the dam was analyzed.

The following key issues were considered in the stability analyses:

- The critical section evaluated presents foundation soil formed by alluvial deposits, and residual soil of different particle sizes, which overlay the bedrock.
- The shear strength properties of the materials vary according to the time of exposure time and to the type of load. Therefore, two analysis conditions were considered: the first corresponds to the construction and operation phase; and the second condition considers long-term conditions.
- For the construction and operation conditions, variations of the shear strength by phases were considered; that is, undrained and drained parameters. Based on the consolidation analysis performed, the estimated time for the pore water pressures

dissipation is about 4.5 years, therefore, the following geotechnical parameters were used:

- For Phases 1 and 2, undrained strength parameters were considered for the foundation soils based on the UU triaxial tests, since these phases are included within the first 4.5 years that the foundation soil will take for consolidating; however, the foundation soils experience an increase in shear strength as the consolidation process develops. In the case of the dam material, undrained strength parameters have been considered from the CU triaxial test since the material will be compacted.
- For Phase 3, according to the consolidation analysis, the foundation soil already will have dissipated almost entirely the excess pore pressure and will be consolidated, so any variation of the phreatic level due to a load variation corresponds to a CU type behavior.

- For the long-term condition, drained strength properties were considered, since, in time, excess pore pressure will not exist and all the materials will have already been consolidated, and there will not be an increase in additional load to the final configuration of the dam. Therefore, for this analysis, effective stress shear strength parameters were used.
- The stability analysis for the pseudo-static condition was not performed within this study, due to low very seismicity within the study area as indicated in Santos (2004), which includes a seismic coefficient of 0.05 for a return period of 475 years, which is negligible.

The results obtained in the static short- and long-term slope stability analyses are presented in Table 18.3. These results indicate that the tailings dam is stable, and the factors of safety are greater than the minimum applicable criteria.

**Table 18.3: Stability Analysis Results by Limit Equilibrium**

| Structure | Section | Failure mechanism | Phase | Safety factor | |
|---|---|---|---|---|---|
| | | | | Short-term static | Long-term static |
| Tailings dam | 1-1' | Circular | 1 | 1.78 | - |
| | | | 2 | 1.66 | - |
| | | | 3 | 1.66 | 1.84 |

#### *18.2.1.5 Surface Water Management*

The surface water management system includes two systems: a perimeter access road/diversion ditch system, and an emergency spillway.

The access road/diversion ditch system is designed to divert surface water away from the TSF to below the dam. The diversion ditches are sized to safely divert the 50-year return storm. Peak

50-year event flows in the diversion ditches will range from under 4 $m^3/s$ to about 12 $m^3/s$ depending on location.

The emergency spillway is designed to safely pass the peak flow from the 1,000-year, 24-hour event. For each phase of dam construction, this system consists of a combination of a lateral spillway, piping, a diversion channel, and a dissipation structure.

#### 18.2.1.6 Tailings Storage Facility Construction

Construction during the wet season has been assumed for Phase 1. Compacting the embankment fill will be the most weather sensitive construction operation to improve wet season performance. Development rock from underground mining will be used to the embankment fill. It will also improve construction scheduling if the surface diversion works and the foundation of the dam are completed as soon as practical, and if the bulk of the embankment construction can be completed away from the wettest months, which are typically December through March.

The other two phases can be scheduled for seasonal construction only, if desired, without impacting the completion dates.

#### 18.2.1.7 Tailings Disposal

Tailings will be discharged from the dam crest in the upstream direction with beach slopes of 1% above the water and 3% below. Table 18.4 shows the tailings and water volumes for each phase.

**Table 18.4: Tailings Disposal**

| Dam crested | | | Tailings | | | Water | |
|---|---|---|---|---|---|---|---|
| Phase N° | Elevation (m a.m.s.l.) | Month of operation | Maximum elevation | Accumulated Volume ($m^3$) | Accumulated Capacity (t) | Surface water elevation (m a.m.s.l.) | Volume ($m^3$) |
| Phase 1 | 361.5 | 1 | 356.7 | 10,969 | 14,260 | 355.2 | 6,000 |
| | | 7 | 359 | 75,723 | 98,440 | 357.5 | 101,506 |
| Phase 2 | 364.5 | 14 | 360.5 | 150,738 | 195,960 | 359 | 186,872 |
| | | 20 | 361.5 | 215,846 | 280,600 | 360 | 265,590 |
| | | 26 | 362.6 | 280,246 | 364,320 | 361 | 363,058 |
| | | 29 | 363 | 312,800 | 406,640 | 361.5 | 416,638 |
| Phase 3 | 367.5 | 36 | 363.5 | 387,815 | 504,160 | 362 | 476,868 |
| | | 42 | 364.1 | 452,923 | 588,800 | 362.6 | 557,548 |
| | | 48 | 364.7 | 516,969 | 672,060 | 363.2 | 659,290 |
| | | 54 | 365.2 | 582,077 | 756,700 | 363.7 | 760,431 |
| | | 60 | 365.7 | 646,123 | 839,960 | 364.2 | 870,359 |
| | | 65 | 366.1 | 700,262 | 910,340 | 364.6 | 965,877 |

### 18.2.2 Mine Waste Rock

#### 18.2.2.1 Introduction

As part of the FS, GRE has been tasked with determining the geotechnical stability of the Serra and Meio WSFs. This scope of work has been performed using the topographic data provided by MTB, a waste production schedule provided by Anfield, and results obtained from the geotechnical investigation conducted between the months of January and February 2017.

Additionally, this analysis incorporates the addition of sedimentation ponds within the delineated vegetation suppression boundaries adjacent to the Serra and Meio portals. The analysis presented here assumes a conservative approach where 50% of the total production of waste rock must be stored within the provided limits. It therefore assumes that 50% of the Coringa Gold Project waste rock will be consumed in construction and roadbed.

#### *18.2.2.2 Soil Properties*

The soil properties used for the analysis originate from laboratory testing, field data, and engineering judgment based on previous project experience. The soil properties used for this stability analysis are presented in Table 18.5.

**Table 18.5: Mohr-Coulomb Strength Criteria and Hydraulic Conductivity Values**

| Material Name | Unit Weight (Kn/m$^3$) | c (kPa) | ϕ (°) |
|---|---|---|---|
| Mine Waste Fill (MW | 20 | Leps Average Bound | |
| Buttress | 20 | Leps Average Bound | |
| Saprolite | 12.8 | 27 | 0 |
| Transition | 16.7 | 30 | 50 |
| Bedrock | Impenetrable | | |

#### *18.2.2.3 Design Criteria*

The design criteria and storage capacities for the Serra and Meio WSFs are shown in Table 18.6 and Table 18.7.

**Table 18.6: Serra WSF Design Criteria**

| Design Parameter | Value |
|---|---|
| Batter Angle | 32° with first bench at 1.5:1 |
| Bench Height | 10 m |
| Berm Width | 5 m |
| Ramp Width | 8 m |
| Design Capacity | 50% of total waste production |

**Table 18.7: Meio WSF Design Criteria**

| Design Parameter | Value |
|---|---|
| Batter Angle | 38° |
| Bench Height | 10 m |
| Berm Width | 3 m |
| Buttress Slope | 1.2:1 |
| Buttress Bench Width | 10 m |
| Buttress Height | Variable, Maximum of 10 m |
| Ramp Width | 8 m |
| Design Capacity | 50% of total waste production |

The total waste production for each portal was provided by Anfield to GRE on June 13, 2017 in tonnes, and volume was calculated with a SG of 1.88 t/m$^3$ for material placed in the WSF. Table 18.8 shows the total waste flow to the WSFs. Additionally, due to the requested permit limits, the toe of the WSFs were set back from the requested boundary in order to avoid overlapping the sediment ponds and diversion channels.

**Table 18.8: Waste Flow for Each Portal by Year in Cubic Meters**

| Year* | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Meio | 55,065 | 64,340 | 5,898 | 0 |
| Serra | 57,249 | 70,461 | 37,946 | 20,465 |

*Note: Waste shown by mine year, not chronological year

#### *18.2.2.4 Sections and Results*

Stability analysis of Serra and Meio sections was performed using Slope/W software. Sections were cut based on the most critical-sections of each WSF. For Meio, two sections were cut (Meio Section A-A' and Meio Section B-B'). For Serra, two sections were cut (Serra Section A-A' and Serra Section B-B').

It is anticipated that a portion of the waste rock generated during the life of the mine will be used for construction purposes. For the purposes of this study, half of the total waste from each portal was assumed to report to the WSF, the other half will be used as mine backfill, construction fill, or roadbed. Waste in the WSF that is not used in construction during the mine life can be recontoured upon closure. Based on this assumption, the WSF can be considered as temporary structure and a minimum FOS of 1.3 has been adopted. Stability analysis has been run for static conditions only. Pseudo-static stability accounting for earthquake conditions has not been performed. This is appropriate as the earthquake risk for the Coringa Gold Project can be considered to be low (Hampshire, Santos, de Souza, 2008). Table 18.9 presents a summary of the final stability results.

**Table 18.9: Coringa Mine WSF Stability Result Summary**

| Analysis | Static FOS | Observations |
|---|---|---|
| Meio WSF Section A-A' | 1.4 | A buffer zone between the toe of the WSF and the pond is recommended. |
| Meio Section B-B'_L-R | 2 | No major observation. |
| Serra WSF Section A-A' | 1.1 | A buffer zone between the toe of the WSF and the pond is recommended. |
| Serra WSF Section B-B' | 1.5 | No major observation. |

Due to the previously mentioned constraints with the permitted boundaries, the ramp entrance of the Serra WSF was moved south so the sediment pond could be placed within the permitted boundary. The new Serra access ramp conflicts with the permit boundary. Additionally, accommodating the sediment pond leads to a reduction in the storage capacity of the Serra WSF. Table 18.10 presents a summary of the volumes and net differences for the Serra and Meio WSFs.

**Table 18.10: Mine Waste Rock Flow and Storage**

| Mine | Total Waste Flow from Mine | 50% Waste Flow from Mine | Waste Capacity in Dump | Difference | Waste Stored in Dump | Dump Capacity Filled | Excess Capacity | Waste Consumption Outside of Dump |
|---|---|---|---|---|---|---|---|---|
| **Portal** | **$m^3$** | **$m^3$** | **$m^3$** | **$m^3$** | **%** | **%** | **$m^3$** | **$m^3$** |
| Meio | 125,303 | 62,652 | 81,310 | 18,658 | 100% | 77% | 18,658 | -62,652 |
| Serra | 186,121 | 93,060 | 65,380 | -27,680 | 70% | 100% | 0 | -120,740 |

In summary, this table indicates that approximately 65 % (15% storage deficiency plus the 50% already assumed) of the total waste generated from the Serra mining operations needs to be consumed during construction to meet the storage capacity available at this site. However, some of the excess waste could potentially be stored at the Meio site, where there is excess capacity.

### *18.2.3 Hazardous and Nonhazardous Waste Management*

Table 18.11 describes the various types of waste which constitute hazardous and nonhazardous waste classifications. Also shown are storage vessels and estimated weights of each waste type generated during the construction period and a typical year of operation.

Hazardous Waste

Hazardous waste will be collected and stored in an onsite hazardous waste storage facility pending systematic removal of hazardous materials by a licensed contractor for disposal in accordance with Brazilian regulations.

The hazardous waste storage facility will consist of 160 $m^2$ constructed of a steel structure erected on a concrete floor slab with concrete column foundations, masonry walls, and a galvanized metal roof. The building will have internal divisions for classification and separation of different types of waste. The facility will be enclosed by fencing to restrict access for safety and security reasons.

Nonhazardous Waste

Nonhazardous waste will be disposed of in an onsite engineered landfill, the design of which will meet Brazilian regulatory requirements. The landfill will be located in a section of the Coringa Gold Project property which falls within the jurisdiction of the Municipality of Altamira. Chapleau has held discussions with Altamira officials regarding appropriate design standards to meet their requirements.

The landfill will be located above the water table and away from the path of any surface drainage. Materials with be placed in the landfill on a daily basis, and covered with a layer of soil to preclude dispersal by wind or access by local fauna. The landfill will be fenced to control unauthorized access by individuals and larger animals.

Design, construction, and operation will utilize a cell basis. When one cell has been filled, it will be closed and reclaimed. Deposition of nonhazardous materials will shift to the next planned cell in the design, and so on throughout mine life.

Chapleau requested and received a proposal for design and construction of the landfill; this work is pending. The proposed cost for design and construction was included in the FS initial capital cost estimate.

## Table 18.11: Hazardous and Nonhazardous Waste During Construction and Operations

| WASTE TYPE | INITIAL CONDITIONING | FINAL CONDITIONING | CONSTRUCTION PERIOD (ton) | OPERATION (tpa) |
|---|---|---|---|---|
| Soil | To segregate clay soil and fertile soil (organic soil), for use onsite and in the recovery of degraded areas. | In stacks, not more than 1.5m high, near the reuse site. | 30 | 5 |
| Concrete blocks, bricks, mortar, concrete, tiles, and other products qualified by CONAMA Resolution 307, of 05/07/2002 | In stacks, formed at the site of residue generation. | In stationary buckets;<br>In the bucket of trucks that make the removal of the material. | 200 | 10 |
| Wood | In stacks, formed at the site of residue generation. | In stationary bays or buckets. | 100 | 20 |
| Plastics (packaging and leftover piping) | Specified and marked containers, located at the generation site. | In signposted bays or buckets. | 12 | 8 |
| Paper and cardboard | Specific and marked containers located near the generation site. | In signposted bays or buckets. | 10 | 5 |
| Metals (iron, steel, coated wires, wires, structural steel, etc.) | Specific and marked containers located near the generation site.<br>Large parts are stacked close to the generation site. | In signposted bays or buckets. | 230 | 100 |
| Food scraps, packaging, and dirty paper (cafeteria, toilets, etc.) | Garbage baskets (plastic garbage bag) | Plastic bags containing the waste suitable for public collection. | 10 | 12 |
| Hazardous waste (soils contaminated with oil, paint, asphalt, waterproofing etc.). | Handling in accordance with the precautions recommended by the manufacturer.<br>Immediate transport by the user to the final storage location. | In duly marked containers and for use restricted by those responsible for the handling of such waste;<br>The residues of the oil and grease separator box and those arising from oil spills must be packed and identified, stored in a place intended for this purpose, with impermeable soil. | 300 | 360 |
| PPE's | 120 liter plastic bag | Plastic container | 0.8 | 1 |
| Health service waste | White bag (within plastic container) with infecting signalizng and the yellow box for the disposal of sharp materials. | White bag (within plastic container) with infecting signalizng and the yellow box for the disposal of sharp materials. | 0.1 | 0.2 |
| Fluorescent lamps | Garbage container | Metalic case | 1 | 1.2 |
| Batteries and chargers | Containers | Containers | 0.1 | 0.1 |
| Ferrous and non-ferrous scrap metals | Containers | Containers | 100 | 120 |
| Laboratory reagents | 5liters bottles | 5 liter bottles | 0.1 | 0.2 |
| Food waste | 120 liter plastic bag | 120 liter plastic bag | 7.5 | 10 |
| | | **TOTAL** | **1002** | **653** |

## 18.3 Power Supply

Site power demand during full production for the mine, process plant, and camp is summarized in Table 17.2. During the preproduction/construction period of ten months and the first eight months of production, power will be supplied by diesel generators located at the plantsite. Following completion of the CELPA power supply, assumed for the FS schedule and cash flow to be 18 months after project initiation, power will be supplied by the regional utility.

### *18.3.1 Preproduction and Initial Production Supply by Diesel Generators*

The electrical single line diagram shown in Figure 18.6 shows the diesel generator power plant distribution of power to the main project load centers at the plant, mine, and remote infrastructure sites. Power will be generated by six operating 750 kva gensets with one additional 750 kva genset in reserve. The number of operating generators was determined by considering their normal steady state operation at 70-80% of rated load.

### *18.3.2 Permanent Operations Power Supply from the Regional Utility (CELPA)*

The schedule shown in Figure 18.7 below represents all the activities required to tap the 138 kv transmission line adjacent to highway BR-163, install a substation (5 MVA or 10 MVA depending on CELPA's business plan and area load estimate and growth potential), design and permit a transmission line, construct, and commission the power supply. Although the schedule shows activities being completed in 9-10 months, based on experience with regulators, local land owners, and area residents, Chapleau and MTB staff elected to base the project schedule and cash flow on an 18-month duration.

A decision still must be made in negotiations with CELPA regarding the transmission voltage between the BR-163 138 kv substation and the Coringa Gold Project 34.5 kv substation. There are potential risks and losses associated with the use of a 25 km 34.5 kv transmission line. However, the cost to construct a 69 kv line is higher. An engineering and cost trade-off study will need to be completed before coming to a final agreement with CELPA.

For easy access for construction and maintenance during operations, as well as anticipated easier ROW negotiations, the powerline is expected to run parallel to the existing site access road, both offsite and onsite.

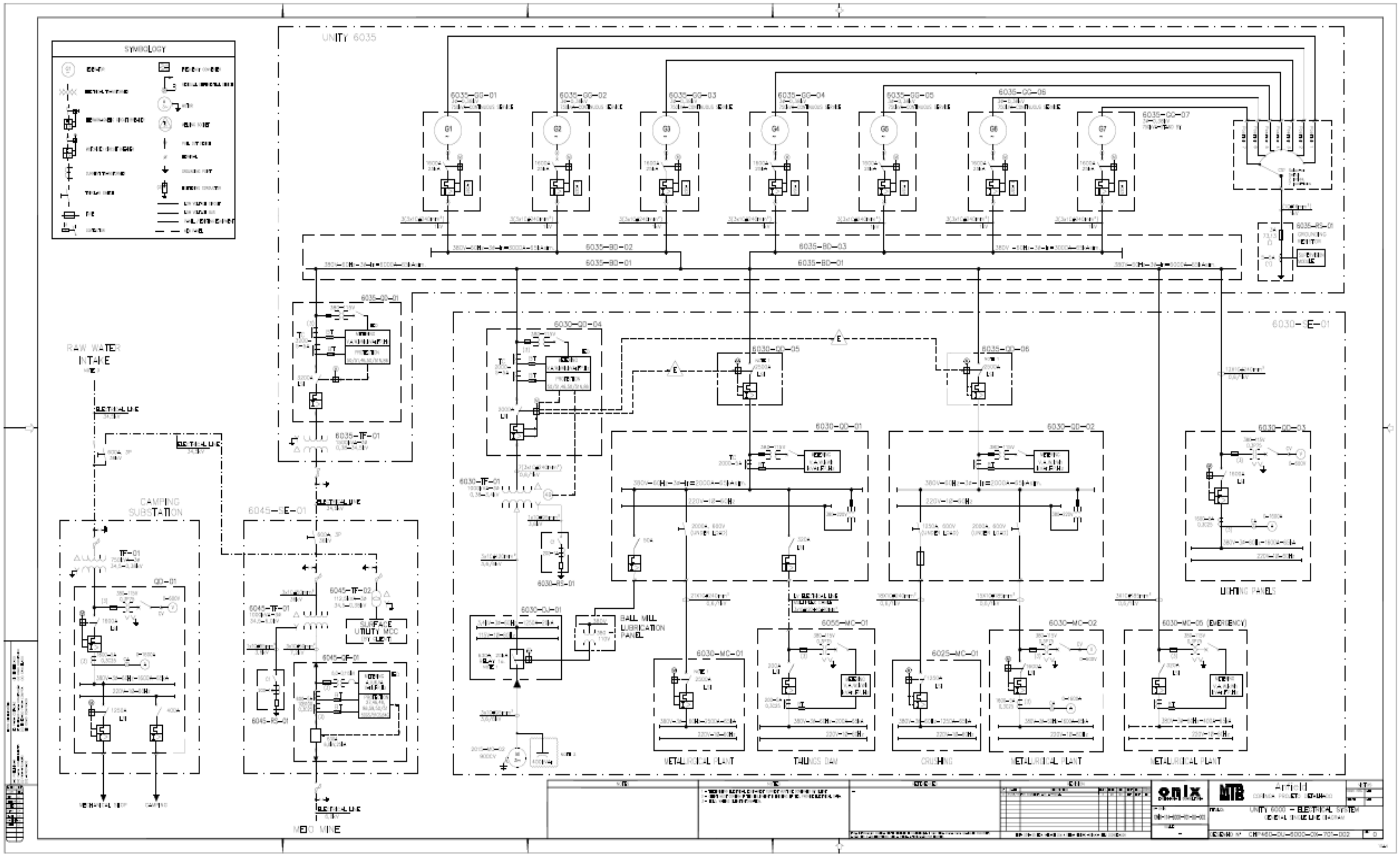
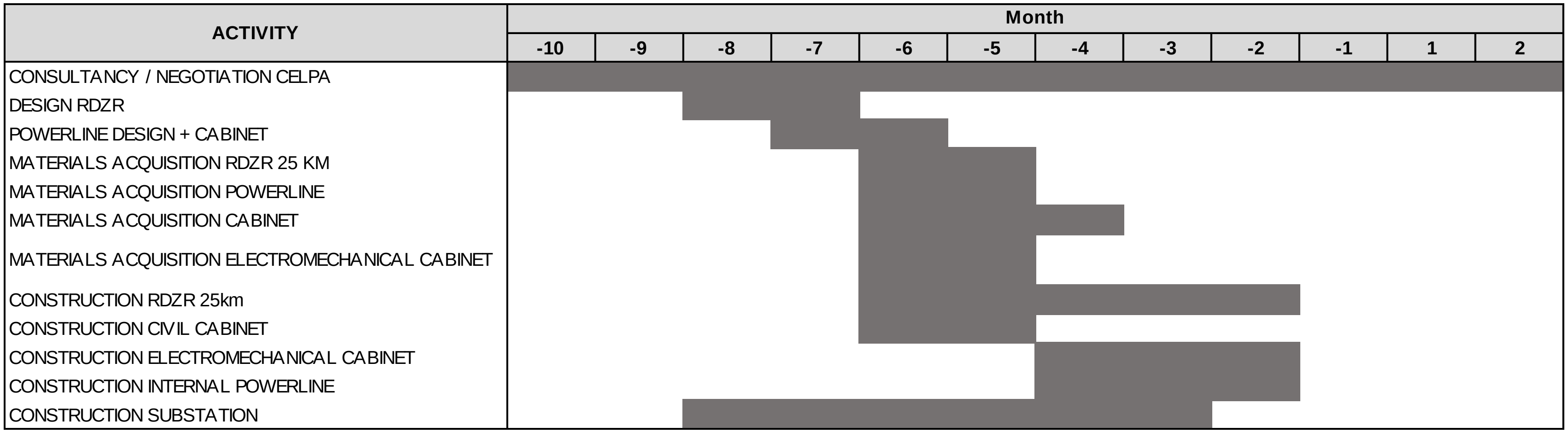



Figure 18.6: Electrical Single Line Diagram (Diesel Generator Supply)




RDZR=Rural distribution network

**Figure 18.7: CELPA Power Supply Schedule**

## 18.4 Water Supply

Water supply for the Coringa Gold Project is comprised of four sources: the camp water well, the coffer dam pond (if needed), the tailings reclaim pool, and underground dewatering. The predicted mine water supply condition is summarized in Table 18.12 below.

**Table 18.12: Coringa Raw Water Supply and Demand**

| Mine Yr | Serra Discharge ($m^3$/day) | Meio Discharge ($m^3$/day) | Plant Clean Water Demand ($m^3$/day) | Plant Makeup Water Demand ($m^3$/day) | Total Plant Demand ($m^3$/day) | Coffer Dam Pond Supply ($m^3$/day) | TSF Reclaim Pool ($m^3$/day) | A-COR-14 Supply ($m^3$/day) |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0 | 0 | 75 | 155 | 230 | 230 | | 86 |
| 0.5 | 209 | 0 | 75 | 155 | 230 | | 155 | 86 |
| 1.0 | 582 | 0 | 220 | 452 | 672 | | 452 | 86 |
| 1.5 | 887 | 0 | 220 | 452 | 672 | | 452 | 86 |
| 2.0 | 1,043 | 0 | 220 | 452 | 672 | | 452 | 86 |
| 2.5 | 1,411 | 0 | 220 | 452 | 672 | | 452 | 86 |
| 3.0 | 1,363 | 0 | 220 | 452 | 672 | | 452 | 86 |
| 3.5 | 1,446 | 2 | 220 | 452 | 672 | | 452 | 86 |
| 4.0 | 1,506 | 87 | 220 | 452 | 672 | | 452 | 86 |
| 4.5 | 1,479 | 234 | 220 | 452 | 672 | | 452 | 86 |
| 5.0 | n/a | 338 | 220 | 452 | 672 | | 452 | 86 |
| 5.5 | n/a | 358 | 220 | 452 | 672 | | 452 | 86 |

For a dry-season start-up, it is necessary to store water in the coffer dam pond to meet demand until other sources come on-line. Tailings reclaim water and mine dewatering will fulfill the mine's water demand for the remainder of mine life. The mine is nearly always in a situation where there is excess water due to extreme wet-season precipitation.

The camp will be provided with potable water from the A-COR-14 well, located near the camp. Each source of water is described in greater detail below and in GES's Water Supply Memo (GRE, 2017d).

### *18.4.1 Camp Water Supply*

A-COR-14, a vertical well, was drilled to intercept a water bearing fracture zone. A PVC well case was installed, a submersible pump was positioned at 35 m below ground surface, and a single well aquifer test was performed. Drawdown data was analyzed using the confined Theis solution (Todd, 1980). Pumping data for A-COR14 was analyzed using AQTESOLV (Duffield, 2007) software. For the 48-hour pumping test the well transmissivity was estimated to be 0.11 $m^3$/s, suggesting a sustainable pumping rate of approximately 1.0 L/s.

It is important to note that fracture-supplied groundwater wells are subject to unexpected decreases in yield due to the exhaustion of storage or interference with mine dewatering.

### *18.4.2 Plantsite and Mine*

Raw water will be provided initially from the precipitation runoff captured by the coffer dam in the TSF during plant start-up. Thereafter, about six months into operations, raw water will be supplied from mine dewatering of the Serra underground operations. All raw water will be treated at a package water treatment plant located at the plantsite prior to its use.

Startup/Initial Operations

Based on a process water requirement provided by MTB, during start-up, the plant will require 773 $m^3$/d of make-up water. In the event of a dry season start-up, insufficient amounts of surface water (or tailings reclaim water) will be available and a temporary coffer dam pond will be required. The coffer dam must be situated far enough upstream of the TSF workings to accommodate Phase 1 of the tailings storage and ponding (Figure 18.8). The location of the coffer dam pond utilizes the natural topography to minimize the embankment construction volume.

This designed coffer dam pond will require 4,500 $m^3$ of engineered fill, with a maximum storage capacity of approximately 103,850 $m^3$ of raw water. At the end of its service life, the pond embankment will be abandoned and ultimately buried under tailings during normal operations.

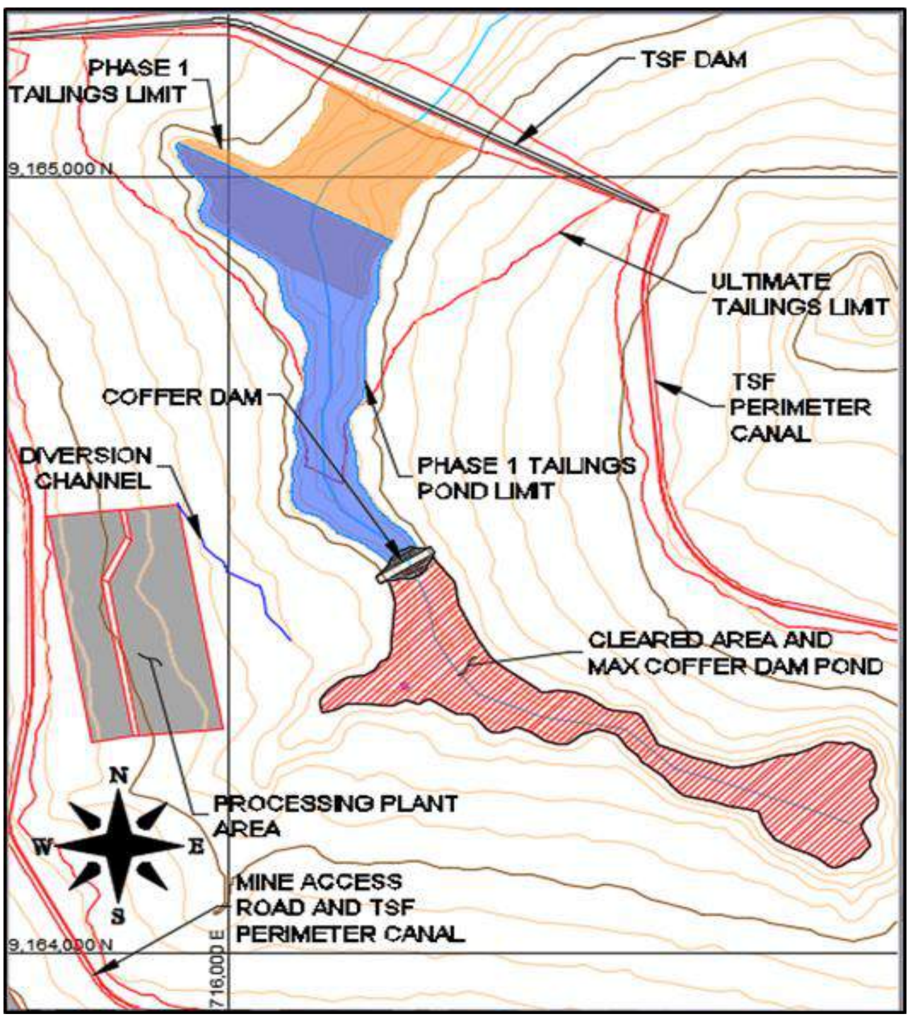



**Figure 18.8: Coffer Dam Pond Location**

Coffer dam and pond design characteristics are listed below in Table 18.13.

**Table 18.13: Coffer Dam and Pond Design Criteria and Characteristics**

| | | | |
|---|---|---|---|
| Maximum dam and slope height | 5.75 | m | Maximum elevation climb to dam crest. |
| Crest Elevation | 360.5 | m | Dam crest elevation. |
| Water Elevation | 360 | m | Max containment elevation, same as spillway elevation. Set to 0.5m below the crest elevation. |
| Crest Width | 10 | m | Width of dam crest. |
| Crest Length | 75.23 | m | Inner crest length. |
| Coordinates of dam axis | 716,171 E | 9,164,480 N | SW centerline intersections. |
| Coordinates of dam axis | 716,235 E | 9,164,520 N | NE centerline intersections. |
| Overall Slope Angle | 2.5H:1V | | Side slope of dam fill. |
| Bench height (if any) | N/A | | No benches. |
| Width of edges (if any) | N/A | | No benches. |
| Total volume of compacted soil for the dam embankment | 4,431.00 | $m^3$ | Volume of dam embankment. |
| Total area occupied by the embankment | 1,850.66 | $m^2$ | 3D area of the dam footprint of the existing ground. |
| Maximum discharge of emergency spillway | 11.84 | $m^3/s$ | Based on 2-YR storm (112mm) max flow during peak storage. |
| Pond area | 54,137.76 | $m^2$ | 3D area of the maximum storage boundary of the existing ground. |
| Volume area | 53,681.90 | $m^2$ | 2D area of the maximum storage boundary (pond surface). |

The plan and section drawing of the coffer dam and pond is shown below in Figure 18.9.

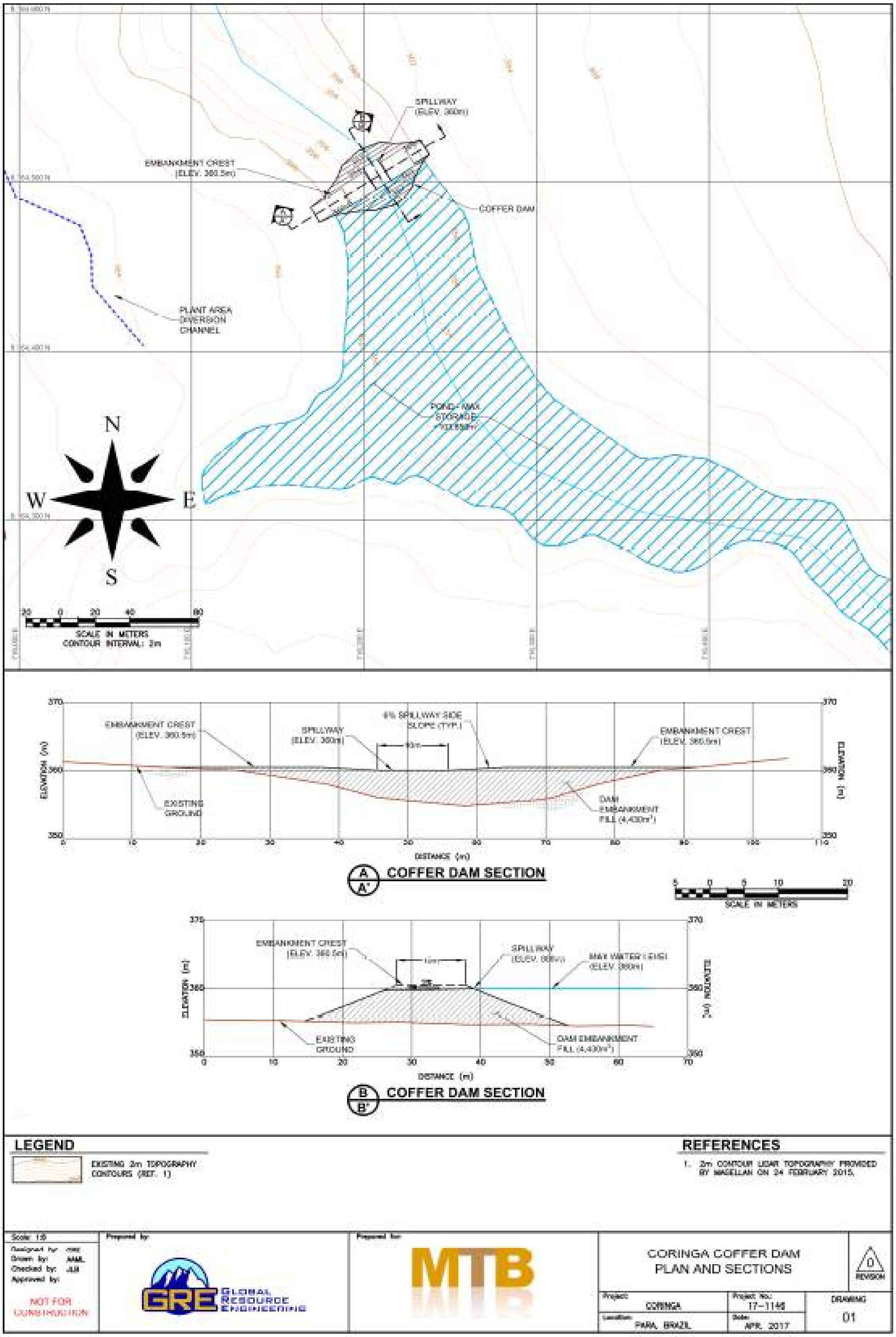



**Figure 18.9: Coffer Dam and Pond - Plan and Sections**

- Sustained Operations

  Modelled mine dewatering rates for both the Serra and Meio underground mines are shown above in Table 18.8. Mine dewatering will be more than adequate to satisfy all raw water requirements.

  Groundwater from mine dewatering of the Serra and Meio development areas will be the source of process make-up water for the majority of the LOM. To predict this flow, an underground groundwater model was created to simulate the development of the Meio and Serra mines using FEFLOW software (see Section 16.10.2). Semi-annual groundwater discharge flow rates were predicted. Beginning in mine year 1.5, the dewatering of the Serra and Meio workings will supply ample water for operations. Based on sampling performed in A-COR-14, it is anticipated that mine dewatering water will be of sufficiently good quality to meet all required plant needs.

## 18.5 Camp and Catering

The operational camp facilities are shown in Figure 18.10 below. They consist of the components listed as items 1-11 on the layout.

The operational camp is constructed in an area of 50,040 $m^2$, with 960 m of perimeter security fencing. Two gates give access to site; one is the main entrance and the second is a service gate to the generator area sited outside the security area. Security is provided by guards at the main gate and around the camp by surveillance.

A total of 3,884 $m^2$ of new facilities were constructed and incorporated with the 1,386 $m^2$ previously available, giving a total of 5,272 $m^2$ of constructed area. New facilities constructed include accommodations, offices, kitchen and cafeteria, maintenance shop, warehouse, and recreational areas. 68 new accommodation units are available for 212 employees. A female accommodation unit can accommodate 18 employees, for a total of 230 employees.

During the construction period, the capacity will be increased to 270 employees, through construction of a new accommodation unit. A fully equipped kitchen and cafeteria with 120-seat capacity is available to provide meals prepared by Chapleau's catering staff. A water well supplies up to 80 $m^3$/d of potable water. A 500 KVA diesel generator, with a 340 KVA spare generator, provides power to operate the camp. A fully equipped clinic and a health team with a doctor and nurse technicians provide medical support for sickness and injuries onsite. A four-wheel drive ambulance is available to transfer personnel to the municipality of Novo Progresso in case of more severe injuries.

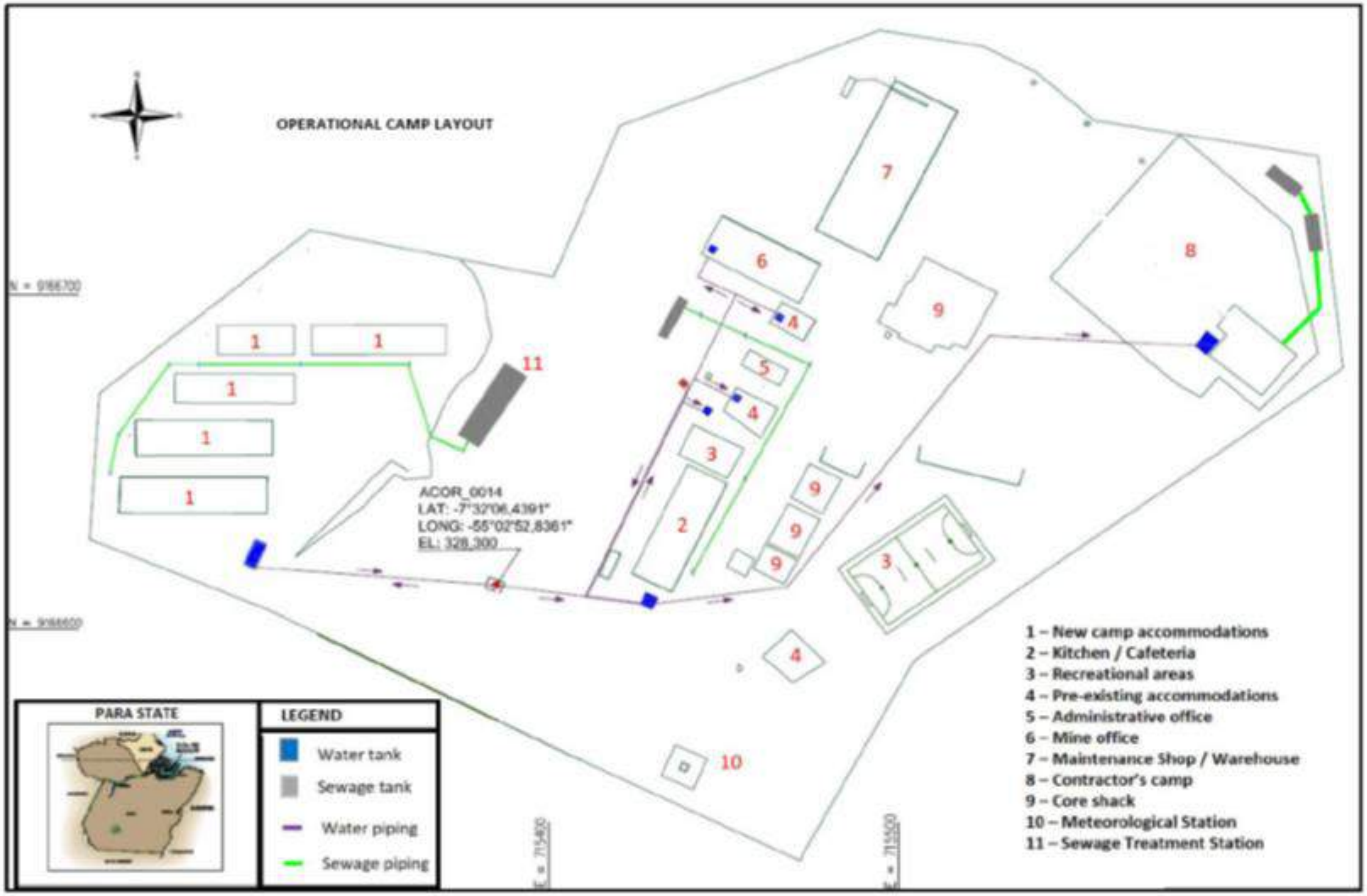



**Figure 18.10: Operational Camp Layout**

## 18.6 Communications

While approximately 30 analog radios were acquired as part of the purchase of the Andorinhas plant, since January 2013 all licenses for radio systems are issued only for implementation in digital format per Brazilian regulations. The use of analog radio system format is allowed only for the licenses issued prior to December 31, 2012.

As part of the initial capital, a digital radio system is planned to be installed onsite to increase safety and productivity through fast and effective communication. The system will include the installation of repeater towers for surface and underground communication. Surface towers will cover the entire operational area, with a signal reaching the operational base of the company at the Municipality of Novo Progresso. The signal also covers the access road between the camp and the operational base, aiming to ensure safety communication, since there is no other type of communication available in 115 km of the road.

Communication onsite also includes a 5 MB dedicated internet service, which provides Wi-Fi capability for the operational camp area. Six Wi-Fi routers are installed in the main facilities, including the contractors' camp, offices, and operational accommodations. Internet signal will be used to allow server communication and backup. Four portable satellite phones are available for emergency situations, when internet or radio signals are unavailable.

The underground communication system will use a network of leaky feeder cables and amplifiers connected to a base station, which will encode the radio frequencies and transmit information to both underground and surface operations. Repeaters, amplifiers, portable, mobile, and base station radios are included in the package considered in the initial capital. Continuous extension of the underground communication network is considered in the sustaining capital, 1,200 m of annual ramp development resulting from development.

## 18.7 Fire Protection

A fire protection system is implemented at the operations camp. A water truck equipped with a firefighting system, as well as a firefighting brigade with 20 well-trained employees allows quick response in case of a fire event onsite. Extinguishers are positioned in all facilities to allow quick response in case of fire. The system will be updated during the construction period in accordance with municipal licensing requirements, when a system with dedicated tank storage, dedicated pumps, and hydrants are planned to be installed.

For the plant, a comprehensive fire protection system is budgeted in the capex to be installed late in the construction period, prior to the plant start-up. A series of hydrants and pumps will be installed at site, together with a dedicated water tank. By Brazilian regulations, a dedicated source of water, as well as a dedicated pump and hydrants, must be available to handle at least 2 hours of fire resistance in the facility. 100 $m^3$ of water will be retained in the bottom of the raw water tank to guarantee water availability. Hydrants will be installed in strategic positions. Special lighting and signs will be installed to ensure proper evacuation in the event of a fire. A 20,000 L capacity water truck equipped with a firefighting system is also available to control a fire.

## 18.8 Ancillary Facilities

Ancillary facilities will be constructed to support the mine and process activities at the Coringa Gold Project. These facilities include: reagent storage; LPG storage; fuel storage; physical laboratory; chemical laboratory; warehouse; maintenance shop; water treatment plant; sewage treatment plant; truck scale, and; cafeteria. These facilities are briefly described below.

- Reagent Storage – Reagents will be stored in a 294 $m^2$ building constructed of existing steel and metal siding from Andorinhas. A new concrete slab, masonry walls covered with fiberglass, and roofing will be provided. Any spillage will be captured by a channel in the concrete slab, with contaminated effluents collected in a separator box for later treatment. Sodium cyanide will be stored in a separate facility.
- Liquefied Petroleum Gas Storage – LPG will be used in the elution circuit, gold room, and physical laboratory. The 129 $m^2$ area will consist of five horizontal tanks with 3,000 kg capacity mounted on concrete saddles. The concrete will be protected to provide at least two hours of fire resistance. The area will be enclosed with security fencing to limit access for safety and security reasons.
- Fuel storage – Fuel storage will be provided for 150 $m^3$ of diesel, which provides a seven-day reserve supply in case of logistics delays caused by heavy rain, road blockages, labor disputes, etc. The facility will consist of a steel tank on a reinforced concrete slab, with containment walls to contain leakage, or, potentially the total contents of a ruptured tank. Contaminated effluents will be collected by drainage channels and directed to a water/oil separator. Separated effluents will be transported to the hazardous waste storage facility discussed earlier in Section 18.0 and periodically removal by a certified contractor for disposal.
- Physical laboratory – This is a laboratory to prepare exploration or operations grade control samples for assaying. It will be reconstructed as it was at Andorinhas, a 288 $m^2$ facility using existing steel and siding. The concrete floor slab, column foundations, and masonry walls will be new, as will bathroom tiles, counter tops, wooden doors, and windows.
- Chemical laboratory – This laboratory will service process control samples, as well as provide all analytical laboratory capabilities using its Atomic Adsorption (AA) units and ICP units. The 226 $m^2$ facility will be constructed of existing steel and siding from Andorinhas erected on a new concrete floor slab and column foundations. New ceramic block walls will be used. As with the physical laboratory, new bathroom tiles, countertops, wooden doors, and windows will be required.
- Warehouse – The 108 $m^2$ warehouse will store mine and plant spare parts, tools, and equipment. The facility will be constructed of new concrete foundations and masonry walls, as well as existing steel and metal siding from Andorinhas.
- Maintenance shop – The 252 $m^2$ maintenance shop will provide areas for mechanical and electrical maintenance activities. Existing steel and siding from

Andorinhas will be installed with a new concrete floor, column foundations, and masonry walls. A drainage channel will be constructed around the workshop to direct contaminated fluids to an oil/water separator system.

- Water treatment plant – The water treatment plant will occupy an area of approximately 100 $m^2$ and will treat 230 $m^3$ of water per day for domestic and plant use.
- Sewage treatment station – The sewage treatment station will be a pre-fabricated vendor package consisting of multiple stages of tanks containing bacterial colonies to digest the sewage. The tanks will be mounted on concrete bases. The effluent will be suitable for certain uses, excluding human consumption, such as irrigation of vegetation, dust control of roads and work areas. The system must be cleaned annually by a sewage pumping truck.
- Truck scale – An 80-ton truck scale will be installed to allow weighing consumables used in the process. The vendor-provided scale will be mounted in a metal structure fixed in a leveled concrete base. An access ramp will be constructed at each end of the scale.
- Cafeteria – A small cafeteria (96 $m^2$) will be erected at the plantsite to preclude lost time moving personnel back to the main cafeteria at the camp. On-shift process operations, maintenance, health, safety and environmental, and logistics staff will have hot meals prepared at the main kitchen/cafeteria in the camp and transported to this satellite cafeteria.

## 18.9 Surface Water Management

The Coringa Gold Project is located in an area that receives heavy seasonal precipitation. The undisturbed landscape is characterized by dense vegetation with a high initial absorption, and therefore is not expected to generate significant runoff. However, as is typical of tropical soils, the project is also characterized by a thin layer of topsoil underlain by low permeability saprolite with a short time-to-ponding, resulting in high runoff. Disturbed areas such as road cuts, portal pads, waste piles, and other areas that are cleared of vegetation and topsoil are expected to generate significant runoff which will require active management efforts during construction and operations. The surface water management plan (SWMP) is comprised of five main areas:

- Access roads
- Camp area
- Serra portal
- Meio portal
- Galena portal

The surface water management features were designed using the TR-20 runoff method and the 25-year, 24-hour storm event (212 mm). The SWMP is described in greater detail in the Surface Water Management Report (GRE, 2017b). The SWMP has three main study areas: runoff conveyance structures, sedimentation basins, and erosion control best management practices (BMPs).

### *18.9.1 Runoff Conveyance Structures*

In summary, for all phases of the project, there are approximately 3.6 km of runoff diversion and collection ditches around the project to manage surface water along roads, mine portals, facilities, etc. The diversion channels were sized according to their respective watersheds and are designed to contain the 25-year, 24-hour storm event as per guidance from the IFC (IFC, 2007). For any ditch where modeled flow velocity exceeds 1.54 m/s, a grouted rip-rap lining has been specified. A minimum diversion channel grade of 1% was used when determining diversion alignment along natural ground.

Culverts were used to route runoff under roads; the culverts were designed based on onsite culvert criteria including concrete material, a maximum round culvert diameter of 1 m, a maximum of two round culverts in parallel at each crossing, a maximum width and height of 2 m for box culverts, and a maximum flow gradient of 2%.

### *18.9.2 Sedimentation Basins*

The mine portal dewatering will require the use of sedimentation basins to settle out total suspended solids before the water is released to natural drainages or consumed by the process plant. The sedimentation basin was sized to contain runoff from the WSFs, the portal dewatering effluent, and the 10-year 24-hour storm event (175 mm) for the catchment zone. At this time, no laboratory testing has been completed to characterize the particle size makeup of runoff water or the predicted settling velocity of said particles, therefore a conservative particle size diameter has been used.

### *18.9.3 Ongoing Best Management Practices for Erosion Control*

BMPs for erosion control of disturbed landscapes will be employed continuously and simultaneously during construction and operations. Passive storm-water controls such as check dams, swales, and sedimentation ponds will be further employed to improve runoff water quality before discharge. Actively stabilizing project areas created or disturbed by project construction will be an on-going part of the construction and operations SWMP. Appendix A of the SWMP Report (GRE, 2017b) contains a description of the BMPs that will be applied to control erosion.

## 18.10 Water Balance

### *18.10.1 Introduction*

GRE prepared a site-wide contact-water balance for the Coringa Gold Project (GRE, 2017c). Contact water is defined as water that is impacted by, or used in, the mining process. The TSF and the TSF supernatant pond is the core of the mine contact water system.

### *18.10.2 Water Balance Dynamics*

Water can enter and exit the TSF such that the following simple water balance equation would be satisfied:

$$\Delta Storage = \sum Inflows - \sum Outflows$$

(change in storage equals the sum of inflows minus the sum of outflows)

The GoldSim water balance model stochastically predicts precipitation and evaporation on a daily time step. Using GoldSim, GRE has created probability distributions that reflect the variance and average precipitation and evaporation conditions.

The model then performs 10,000 realizations of the stochastic model. Each realization "calls" the probability distributions for precipitation and evaporation to create a value. Once the realization is complete, the results are saved. The population of 10,000 realizations is analyzed, and within these populations, the 23$^{rd}$ percentile results show the impact of extreme dry conditions, and the 85$^{th}$ percentile results predict the impact of extreme wet conditions.

### *18.10.3 Design Considerations*

Because 90% of the annual precipitation occurs in October through April, the Coringa Gold Project faces the challenge of managing and discharging large quantities of water in the wet season, while maintaining sufficient make-up water to meet plant demands during the dry season.

As a result, the TSF pond must be sufficiently sized to:

- Accommodate the 200-year storm without overtopping;
- Store sufficient water to meet plant demands during the driest conditions; and
- Avoid storing too much extra water that may hamper tailings consolidation.

This balance must be achieved each year by attempting to dewater the tailings sufficiently to allow consolidation, but not dewatering the pond too much to jeopardize future water supply.

### *18.10.4 Model Results*

The following sections show the model results. The figures presented in the subsequent section show the range of probabilities using color-graded line thickness. The extremes of the line thickness show the extreme results of the stochastic model runs. Figure 18.11 displays the supernatant pond storage over all probabilities and Figure 18.12 displays the supernatant pond storage at the 50$^{th}$ percentile.

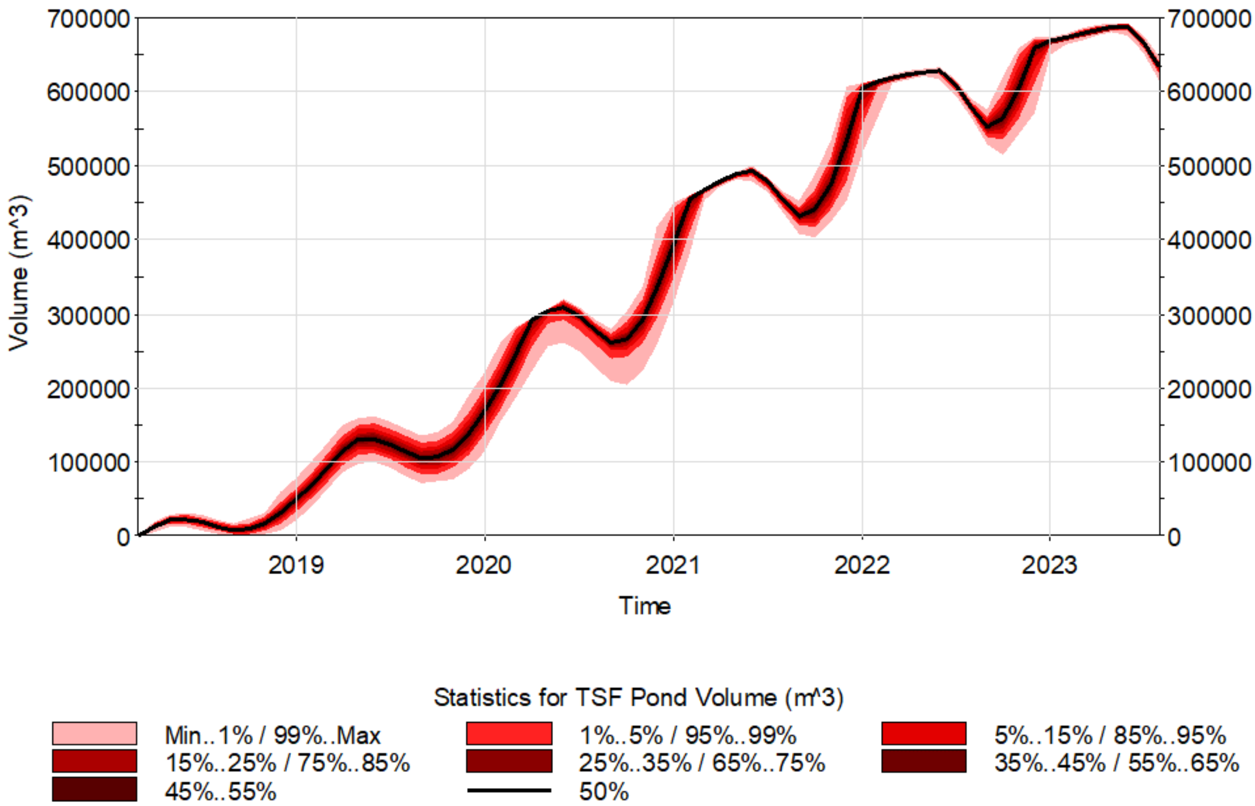



**Figure 18.11: TSF Pond Storage**

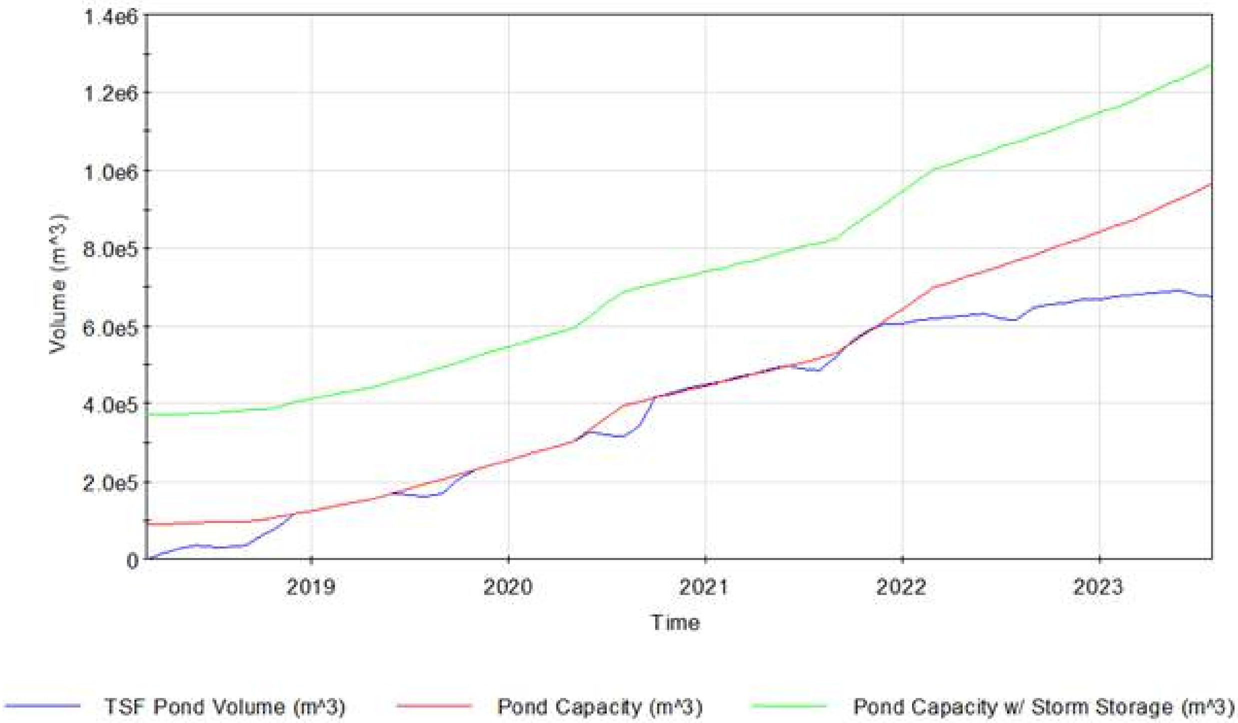



**Figure 18.12: TSF Pond Storage – 50th Percentile**

Figure 18.9 demonstrates that the supernatant pond sizing is sufficient across all probabilities. In Figure 18.10, the green line indicates the total pond storage capacity including the 200-year storm event, the red line indicates the operational pond storage capacity, and the blue line indicates the volume of water stored in the pond. The operational pond capacity is the maximum working capacity of the pond allowing for the total storage of the 200-year precipitation event, as calculated by Anddes. GRE elected to operate the pond below the available operational capacity later in mine life to maximize tailings consolidation and to ensure the pond has ample storage capacity as the mine enters closure.

The mine has excess water in the wet season that must be discharged to the environment. Figure 18.11 displays the required discharge to the environment across all probabilities.

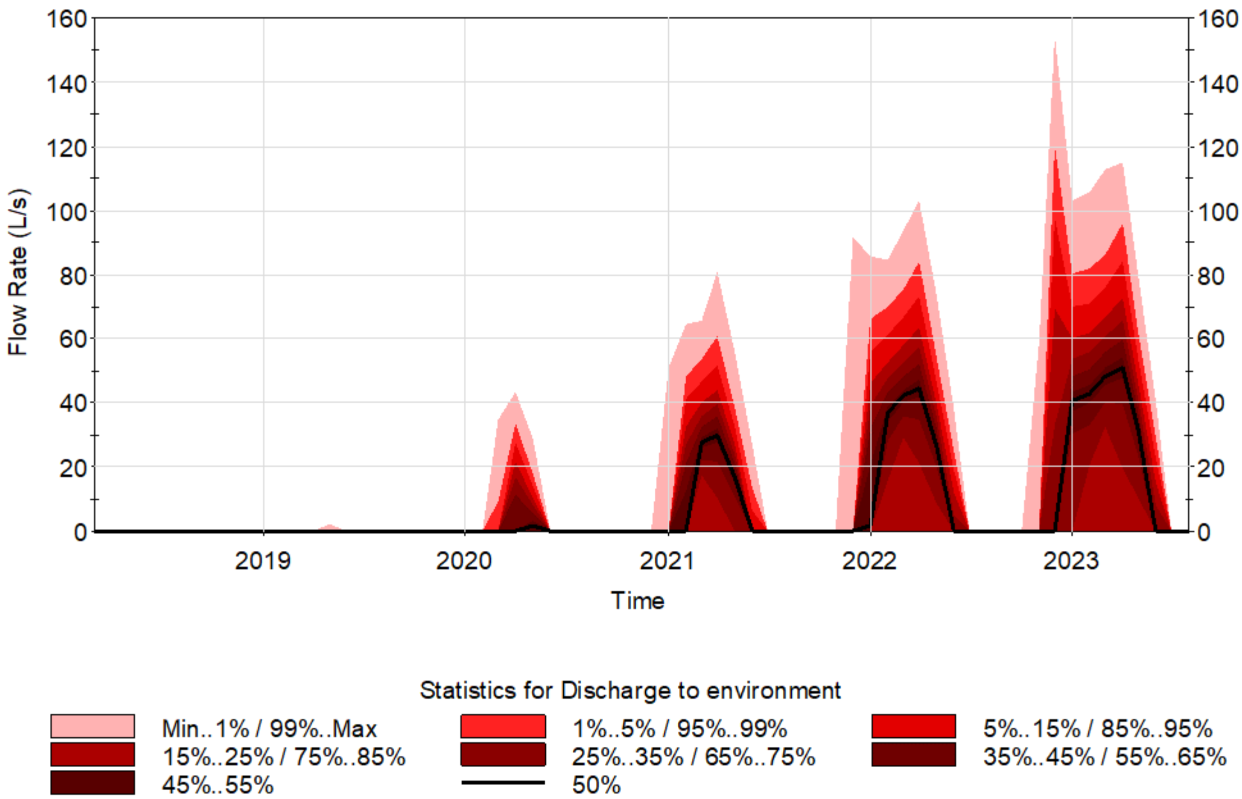



**Figure 18.13: Discharge to the Environment**

Pond discharge peaks in December 2022 at a rate of 154.6 L/s, a 99th percentile result, which conforms to CONAMA's maximum discharge standard of 3,000 $m^3$/h (833.3 L/s). Further, a maximum discharge of 160 L/s is consistent with manageable water discharge in terms of channel capacity and water quality concerns.

### *18.10.5 Extreme Dry Conditions*

It is prudent to analyze the effects of a drought throughout the entirety of operations because a water balance is intended to analyze the worst-possible scenarios and because droughts typically occur over multiple-year periods. Prolonged, multi-year droughts raise concern as to whether sufficient make-up water is available to supply the plant demand. Annual precipitation for the 23rd percentile is 1,063 mm/year. The minimum recorded precipitation is 1,036.0 mm (Anddes 2016b). As a result, GRE believes that the 23rd percentile is a good estimate for a prolonged multi-year drought condition. Figure 18.12 displays the 23rd percentile pond storage and Figure 18.15 displays the 23rd percentile discharge to the environment and make-up water requirements.

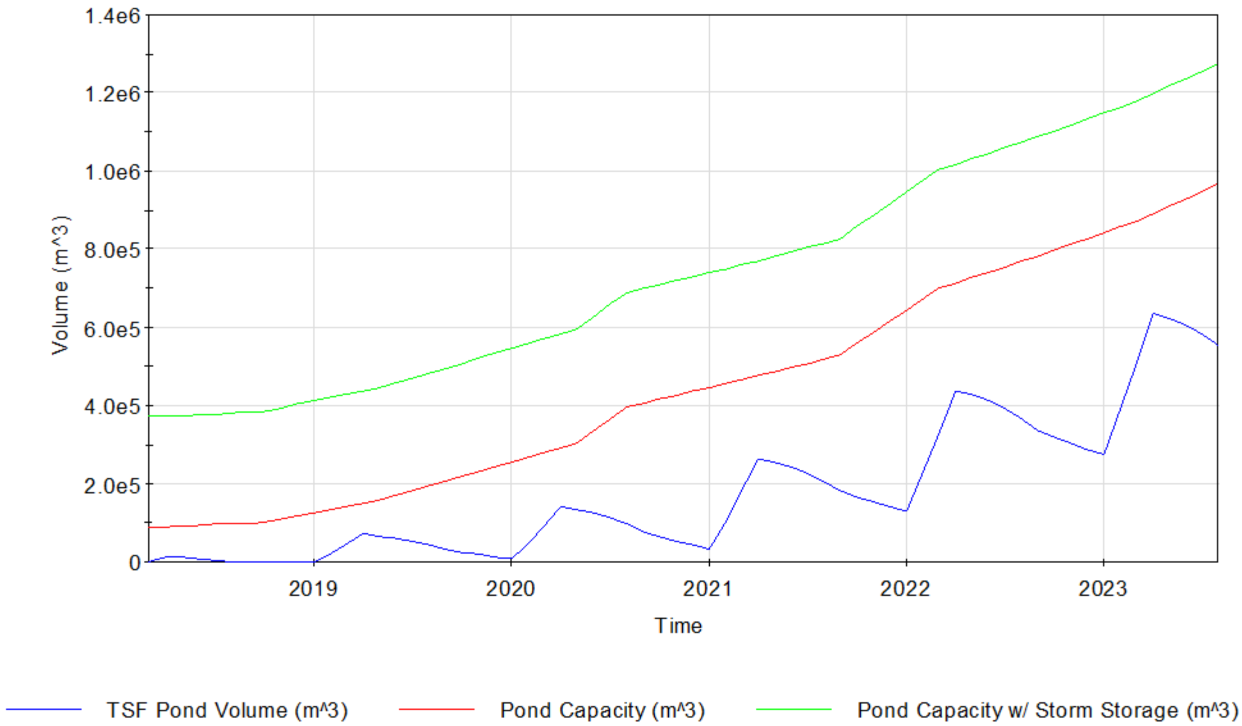



**Figure 18.14: TSF Pond Storage – 23rd Percentile**

Figure 18.14 shows that the project still has water in the TSF pond during the dry season of each year. As a result, even under a prolonged multi-year drought, the project has sufficient water for operations.

Under extreme dry conditions, 1.9 L/s of make-up water is required at the end of the dry season in 2019 mine life due to the pond's small surface area and relatively low runoff from the tailings surface. Figure 18.15 shows the make-up water requirements over mine life in extreme dry conditions.

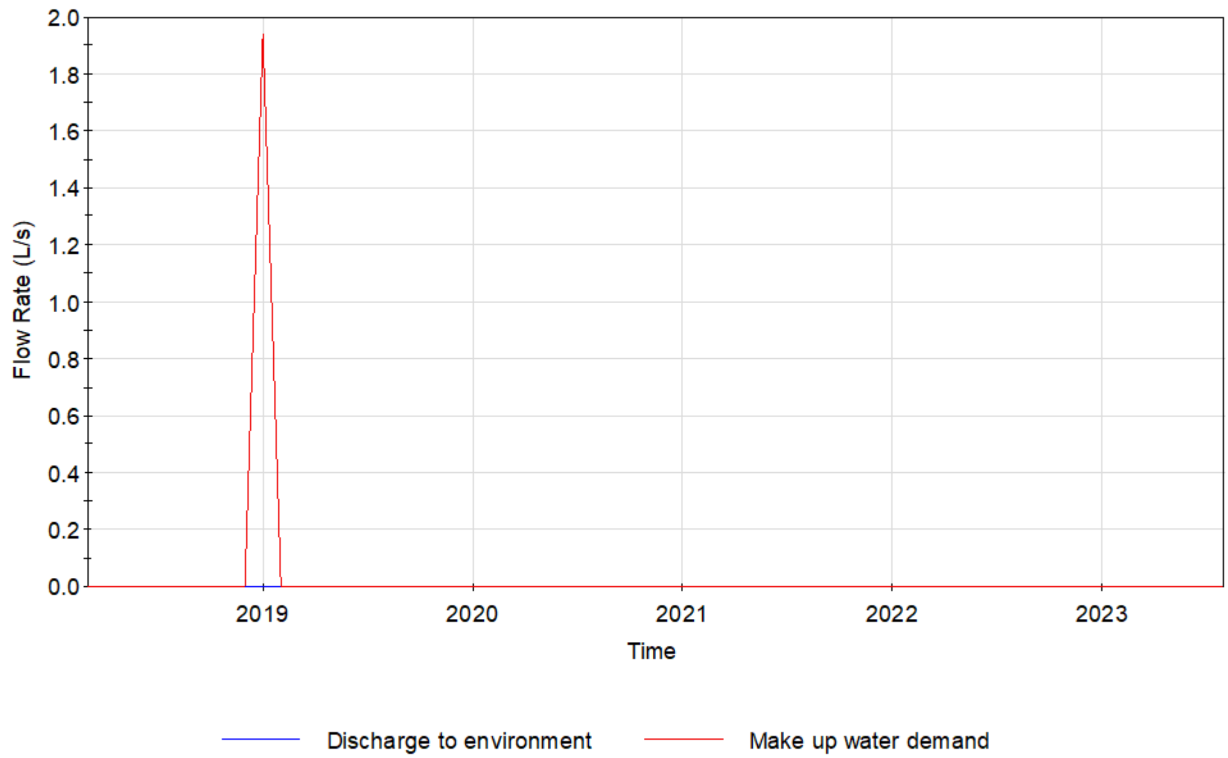



**Figure 18.15: Discharge to Environment and Makeup Requirements – 23rd Percentile**

The early mine life make-up water demand is satisfied by water stored in the TSF coffer dam pond. After the 2019 dry season, the coffer dam pond will store enough water to supply the plant, and the volume stored in the pond never falls below 6,500 $m^3$. Under extreme dry conditions, no mine impacted water is discharged from the TSF.

### *18.10.6 Extreme Wet Analysis*

The effects of extreme wet conditions throughout operations were evaluated as they put the greatest stress on the storage capacity of the Coringa Gold Project. While a maximum discharge rate has not yet been specified, a maximum permitted discharge flow rate of 3,000 $m^3$/h (833.3 L/s) was assumed based on GRE's experience with a similar project in Maranhão, Brazil with a maximum permitted discharge flow rate of 3,000 $m^3$/h.

Annual precipitation for the 85th percentile is 4,712 mm, which exceeds the maximum expected total of 3,395.9 mm/year by 1,316.1 mm. Figure 18.16 displays the 85th percentile pond storage and Figure 18.17 displays the 85th percentile discharge to the environment and make-up water requirements.

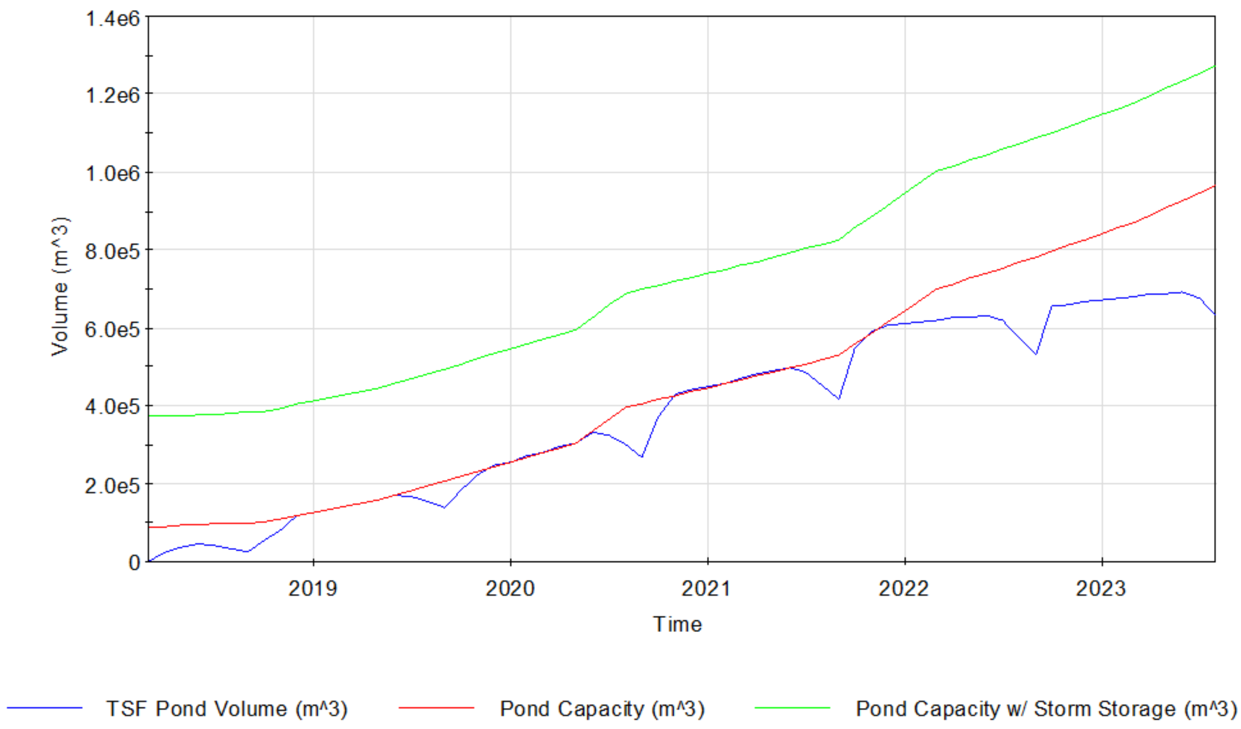



**Figure 18.16: TSF Pond Storage – 85th Percentile**

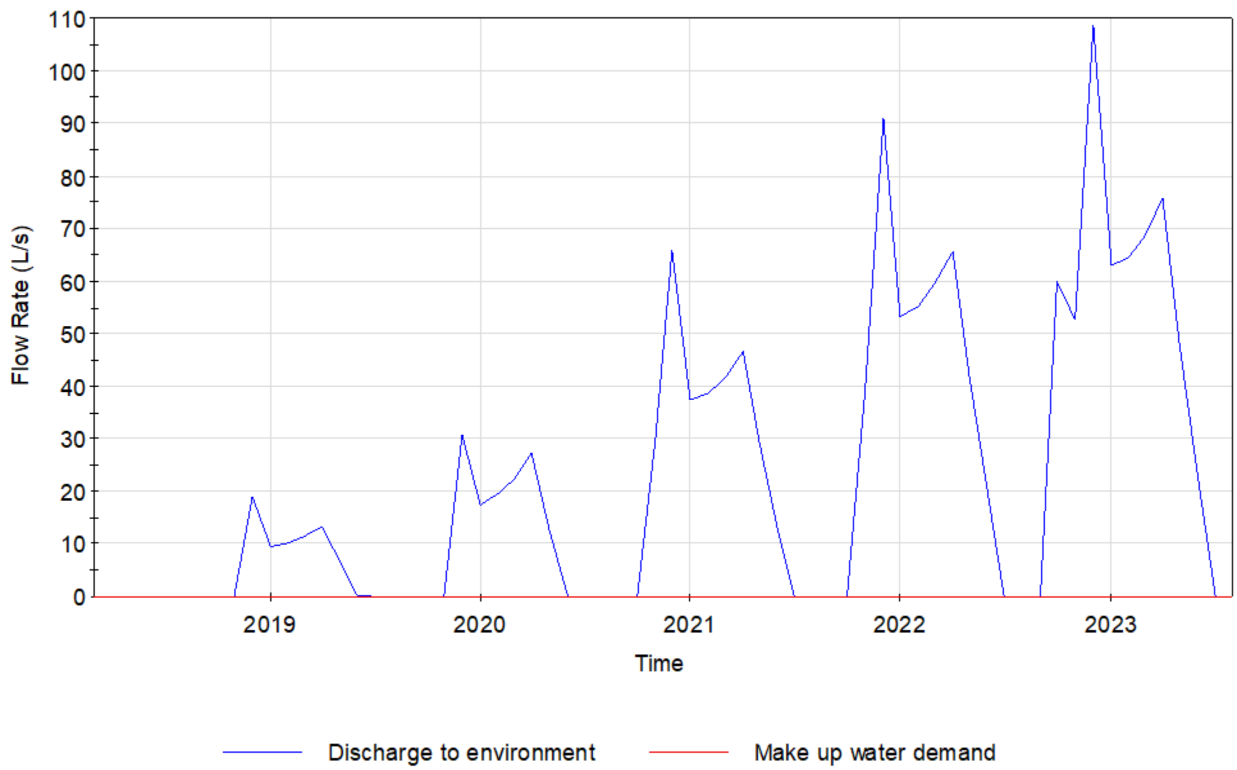



**Figure 18.17: Discharge to the Environment & Makeup Water Requirements – 85th Percentile**

Figure 18.16 and Figure 18.17 demonstrate that during six years of extreme moisture, the supernatant pond can operate without exceeding a discharge rate of 110 L/s, which is well within the maximum discharge rate of 833.3 L/s.

### *18.10.7 Water Quality Concerns*

The tailings supernatant chemistry has elevated sulfate and ammonia concentrations. The supernatant does not exceed standards for most dissolved metals nor pH. However, the average sulfate concentrations of approximately 3,000 mg/L and 1,618 mg/L for 2016 and 2014 supernatant, respectively, greatly exceed the CONAMA standard (RESOLUÇÃO No 357, DE 17 DE MARÇO DE 2005) of 250 mg/L.

It is important to note that the sulfate concentration in the 2016 tailings sample is the result of an over-dose of SMBS. SMBS is used as a convenient supply of $SO_2$ in the oxidation of cyanide. It is apparent from the testing protocol that the testing engineers over-dosed SMBS in order to ensure 100% cyanide destruction.

It is clear from the 2014 sample that complete cyanide destruction can be achieved with half as much sulfate production. As a result, it will be a requirement of the mine operations that the minimum quantity of SMBS be used to achieve full cyanide destruction. Over-application will not be permitted due to the potential impact to water quality. This limitation to the operations will result in sulfate concentrations similar to the 2014 sample (~1600 mg/L).

Ammonia is also in excess of standards. The ammonia concentration of 87.7 mg/L in the 2016 sample greatly exceeds the CONAMA standard of 2.0 mg/L. Because ammonia is a by-product of cyanide destruction, it is assumed to be similar in the 2014 sample even thought it was not analyzed. Copper is also in excess of standards at approximately 0.15 mg/L.

GRE conducted a sulfate balance, ammonia balance, and a nitrate balance to ensure the water that is being discharged to the environment meets water quality standards. The sulfate and ammonia balances assume a 1 km downstream mixing zone from where the discharge enters natural waters. This mixing zone is permitted by Brazilian law. Thus, the point of compliance is 1 km downstream from the discharge location.

#### *18.10.7.1 Mixing Zone Model*

Sulfate, ammonia, and nitrate enter the TSF through slurry pipe discharge at a concentration of 1,618 mg/L, 87.7 mg/L, and 0.41 mg/L, respectively. The slurry is diluted with fresh water from direct precipitation and runoff. Sulfate, ammonia, and nitrate are further removed from the TSF through plant recycle and tailings pore water entrainment. Excess water is discharged from the TSF pond to a hydraulic dissipation structure where it mixes with upstream runoff that is diverted around the TSF. The natural aeration that occurs within the dissipation structure converts a portion of the ammonia into nitrate, thus reducing the ammonia concentration while simultaneously increasing the nitrate concentration. The discharged water then travels 1 km downstream where it further mixes with direct precipitation and runoff. At the point of compliance, 1 km downstream of the toe of the TSF dam, the sulfate concentration must be below 250 mg/L, ammonia concentration must be below 2.0 mg/L, and the nitrate concentration must not exceed 10.0 mg/L. Figure 18.18 displays the water quality mixing model flowchart.

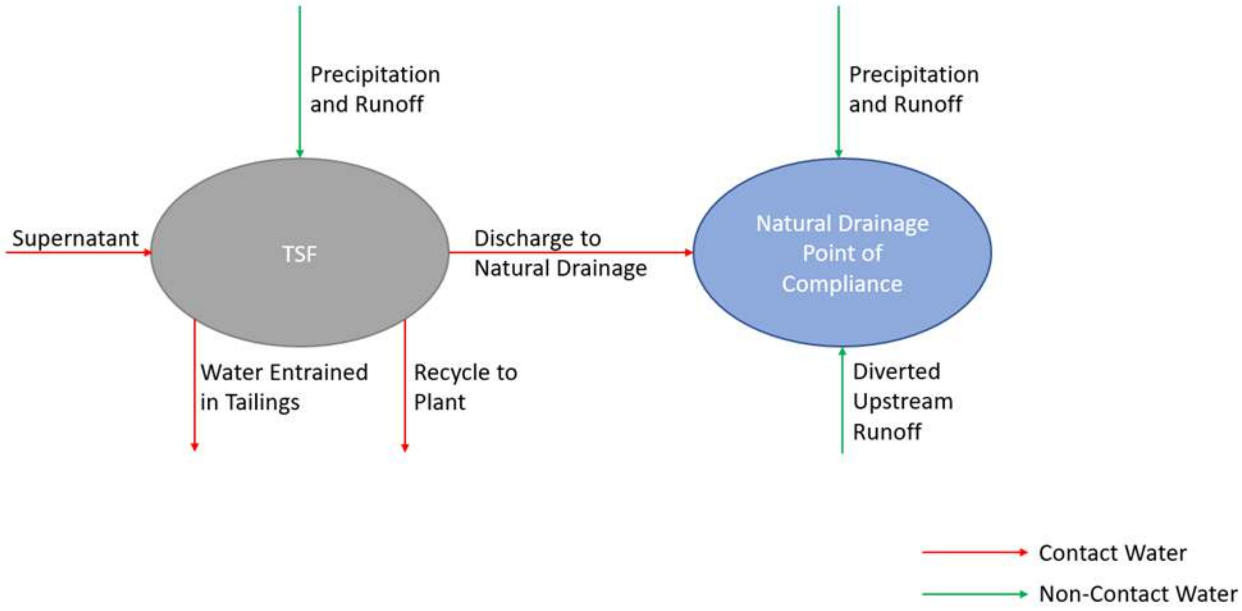
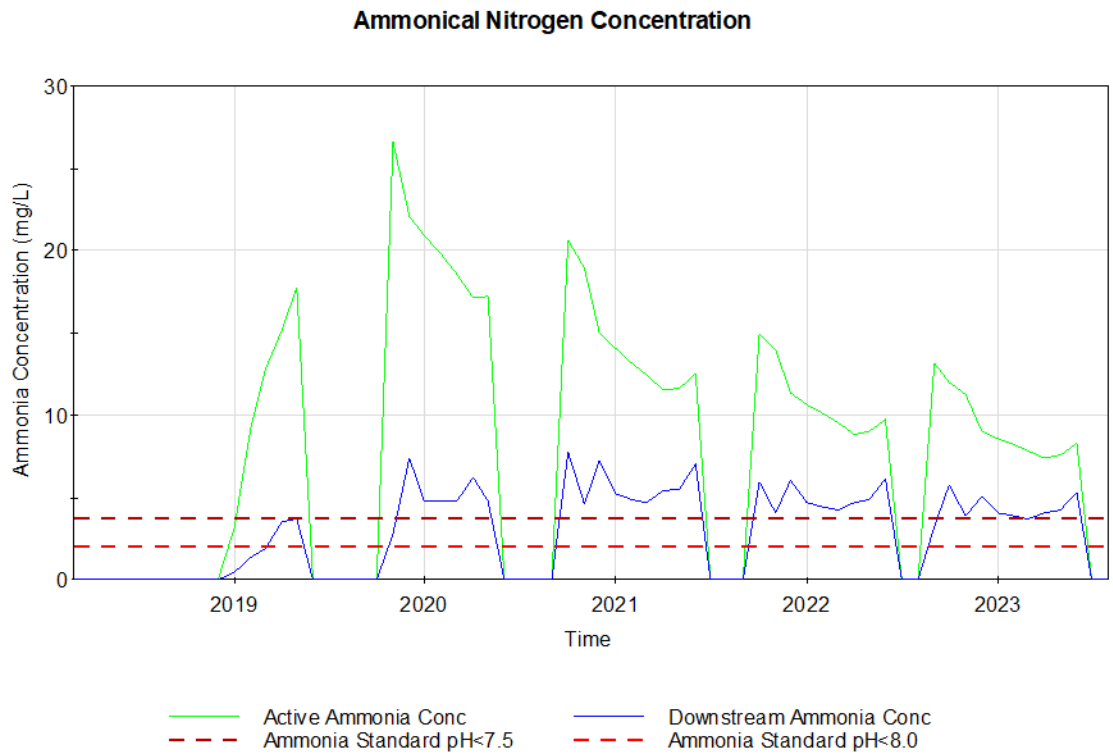
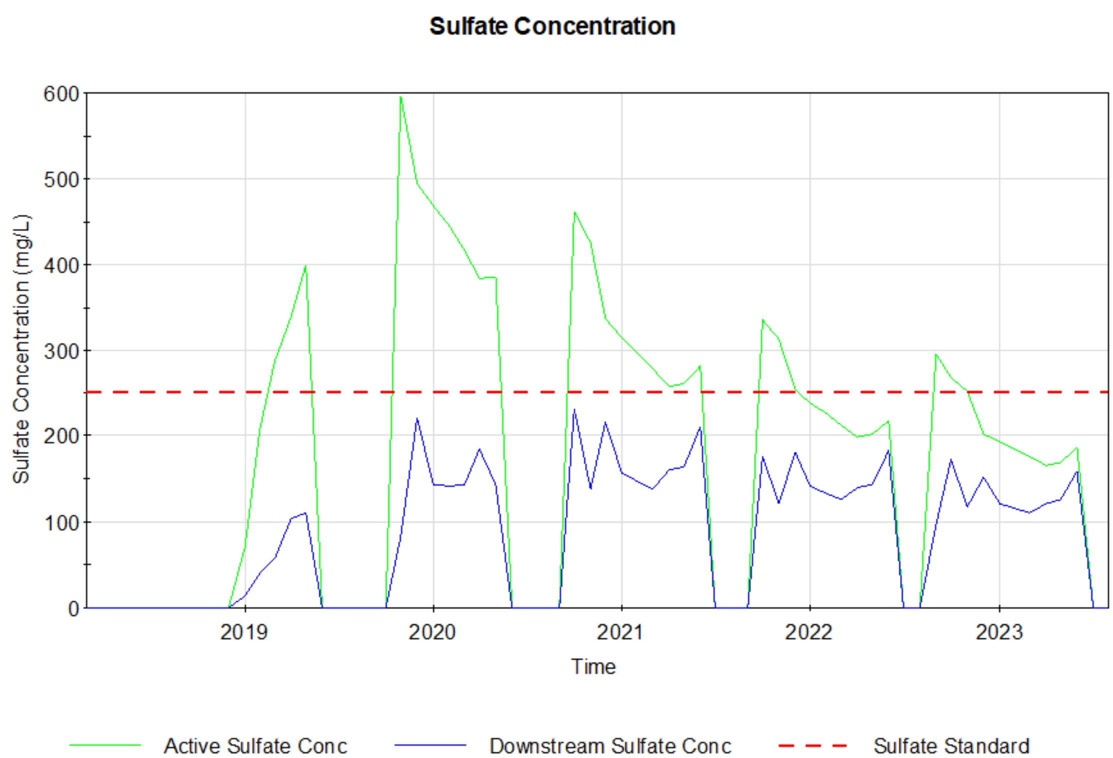



**Figure 18.18: Water Quality Mixing Model Flowchart**

### *18.10.8 Water Quality Predictions*

As a result of the elevated ammonia and sulfate concentrations and the seasonal discharge of excess water, GRE created an ammonia balance and a sulfate balance within the water balance. The respective balances calculated the deposition of the chemical of concern in the TSF and the dilution from natural waters to predict the concentration in discharge water. Figure 18.19 displays the results of the ammoniacal nitrogen balance water quality predictions, the sulfate water quality predictions, and the nitrate water quality predictions.


Ammonical Nitrogen Concentration
30
20
10
0
Ammonia Concentration (mg/L)
2019
2020
2021
2022
2023
Time
Active Ammonia Conc
Downstream Ammonia Conc
Ammonia Standard pH<7.5
Ammonia Standard pH<8.0


Sulfate Concentration
600
500
400
300
200
100
0
Sulfate Concentration (mg/L)
2019
2020
2021
2022
2023
Time
Active Sulfate Conc
Downstream Sulfate Conc
Sulfate Standard

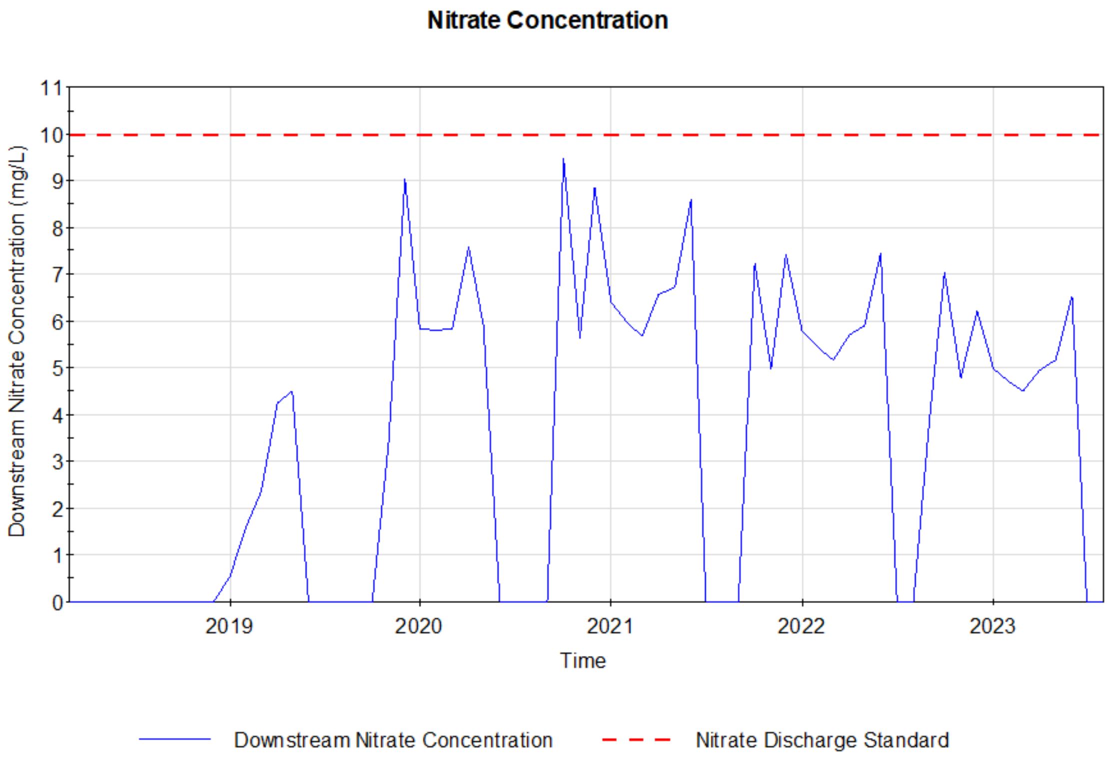



**Figure 18.19: Water Quality Predictions**

The green line Figure 18.19 displays the concentration at the point of discharge from the TSF, the blue line displays the concentration 1 km downstream, and the red line displays the Brazilian water quality standard. Since the ammoniacal nitrogen discharge standard is pH based, the red hashed line is the discharge standard when the pH is less than 8.0 and the maroon hashed line is the discharge standard when the pH is less than 7.5.

Based on the assumptions contained in the water balance and the geochemical considerations, the project is close (within a few milligrams per liter) to meeting the discharge requirements for ammonia. Additional analysis of the fate of ammonia in the system is required prior to final design, but the initial results show that it is feasible to use dilution as the mitigation measure for elevated ammonia in the excess mine water.

Sulfate can also be managed by dilution alone. At the compliance point, the sulfate remains below 250 mg/L.

Nitrate can also be managed by dilution. However, if ammonia breakdown is higher than 25%, the ammonia concentration will decrease but the nitrate concentration will increase by a factor of four for each unit of ammonia. Additional study is required to determine the fate of nitrogen species, but at this level of study, the results appear within reasonable range of the discharge standards showing that the concept of dilution is possible and should be pursued as the primary mitigation strategy.

## 18.11 TSF Seepage

### *18.11.1 Model Objective*

The objective of the TSF groundwater model is to predict the seepage from the TSF over time during development, operation, and post-closure. It is apparent from supernatant solution testing that the supernatant solution will contain elevated concentrations of sulfate (1,618 mg/L). The water quality discharge standard in Brazil is 250 mg/L. As a result, seepage from the TSF has the potential to degrade local and regional water quality. Therefore, predicting the seepage over the project life is essential to ascertaining future potential water quality impacts.

### *18.11.2 Hydrogeologic Investigation*

In support of the seepage model, GRE performed a hydrogeologic investigation of the TSF-area groundwater system in conjunction with and concurrent to, the Anddes geotechnical investigation. The groundwater investigation involved well installation, laboratory test work, packer testing, and aquifer testing to define the hydraulic conductivity of all the stratigraphic units beneath the TSF.

### *18.11.3 Modeling*

#### *18.11.3.1 Conceptual Model*

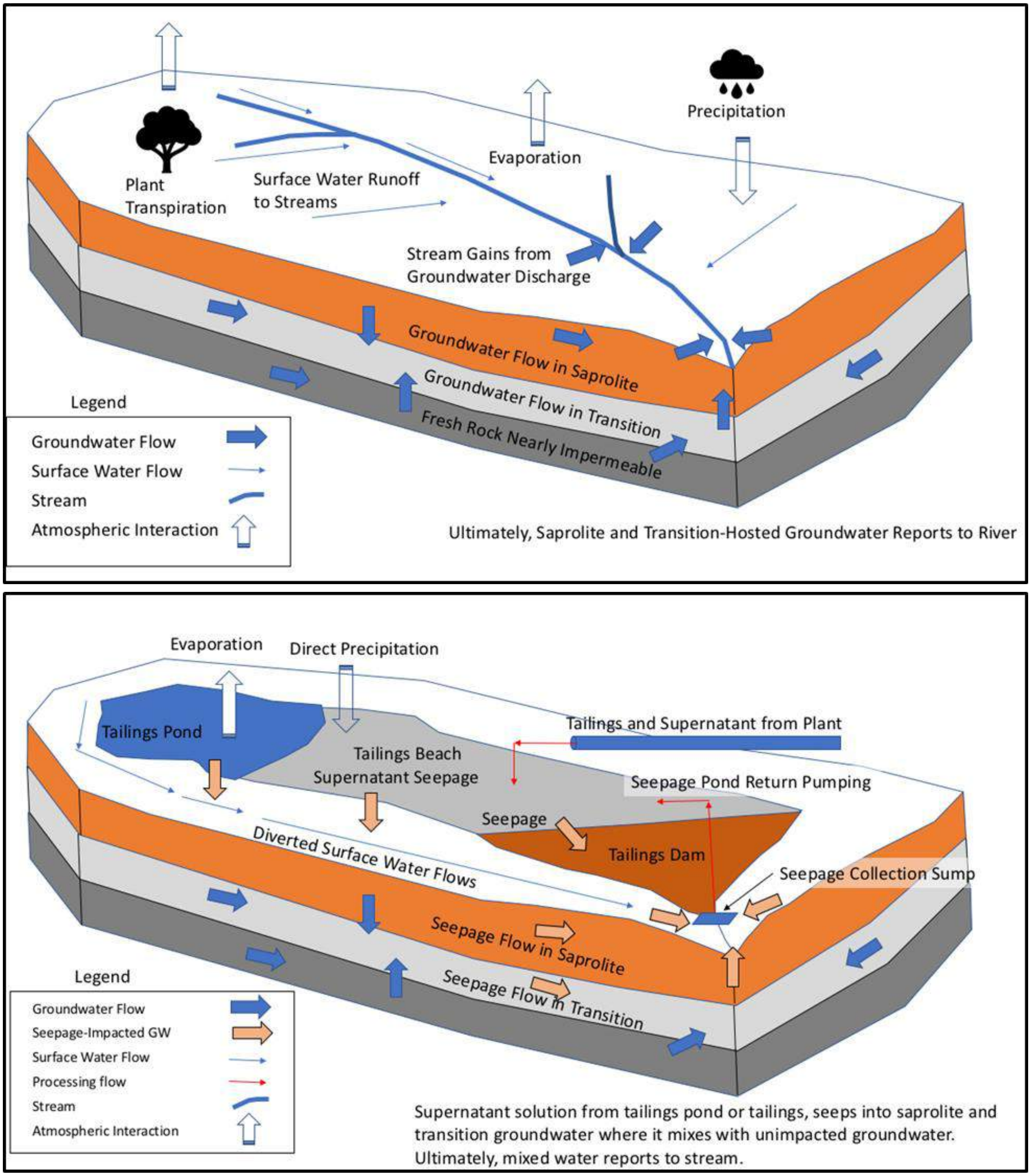
An early and essential step in the construction of a numerical model is generation of a conceptual model of the aquifer being simulated. A conceptual model is a description of how the aquifer works. It describes how water enters the aquifer, travels through it, and leaves. After the conceptual model is complete, it becomes the blueprint for design and assembly of the digital components that make up the numerical model. The elements of the conceptual model are illustrated schematically in Figure 18.20.

The source of all the water entering the model domain is precipitation. Most of the precipitation arriving at the ground surface does not enter the aquifer. Much water is lost to evaporation, plant transpiration, or runoff to streams. In Figure 18.20, rainfall, runoff, and evapotranspiration are indicated by the blue arrows above ground surface.

Where saprolite overlies bedrock, water that is not lost to runoff or evapotranspiration infiltrates into the saprolite. Because the hydraulic conductivity of the saprolite is considerably higher than that of the granite/rhyolite bedrock, little of the water that makes it into the saprolite enters the underlying bedrock. Instead, the water remains mostly within the saprolite, leaving the groundwater domain relatively quickly after traveling laterally through the saprolite layer a short distance to a discharge point at the nearest downgradient stream segment.

The transition zone acts as an aquifer. But its interconnectivity and conductivity are difficult to determine due to the variance in the dataset and the variable thickness of the unit. However, it is assumed for the most-conservative case that the transition zone is capable of acting as an aquifer and has a conductivity in excess of the saprolite above it, or the hard rock below it.

At the saprolite/bedrock contact, essentially no water will cross the contact into the bedrock in places where the bedrock is unfractured. However, some leakage through the contact will take place where interconnected bedrock fracture zones intersect the bedrock surface (though individual fracture zones are not shown in Figure 18.20). The amount and direction of flow will be a function of the extent of the fracture zones, their degree of interconnectivity, hydraulic characteristics of the fractured material, and hydraulic gradient. Packer testing in the hard rock revealed consistent low conductivity. The hard rock is therefore an aquitard and forms an impermeable foundation to the TSF basin.




Source: GRE, 2017

**Figure 18.20: Conceptual Model**

Under pre-mining conditions, most water will escape from the region represented by the modeled domain by being discharged at the streams. Stream discharge rates will vary seasonally. As seasonally-higher recharge produces higher aquifer water levels (as shown by the behavior of the monitoring points in Figure 18.20), hydraulic gradients will increase between upland recharge regions and downgradient streams, increasing discharge rates. In the drier seasons, as captured rainwater gradually escapes from the aquifer into the streams, aquifer water levels decline, the gradient subsides, and so does the rate of discharge to the streams. However, it is not believed that streambeds become substantial sources of aquifer recharge when water levels in the aquifer fall below the level of the streams. The aquifer level only falls below the streambed during the dry season. This is accompanied by a lack of flow in the streams. Thus, when the flow direction is from the stream to the aquifer, little water is available to leak into the underlying saprolite.

During mining, the filling of the TSF provides a large new source of water. The tailings slurry is expected to be 39.7% solids resulting in a 1,150 $m^3$/d new source of water to the system.

#### *18.11.4 Numerical Model*

The modeling project was carried out using MODFLOW-SURFACT, a finite difference program for simulating three-dimensional groundwater flow (HGL Inc., 2016). The model was calibrated to pre-mining water levels, and was calibrated to capture the seasonal response to the wet season water level increases.

#### *18.11.5 Results*

The primary source of groundwater in the project is the infiltration of recharge. The primary discharge of groundwater is to evaporation, followed by rivers and streams. Distributed seepage (discharge to areas not designated as rivers or streams where the water table encounters ground surface) is a small additional discharge.

##### *18.11.5.1 Simulation of Tailings Filling*

In order to simulate the TSF filling, GRE utilized the Anddes filling curve corresponding to a 460 tpd production rate with project ramp-up

The tailings filling history was evaluated for each cell in the grid and a spatially-variant and time variant general head boundary was applied to each cell in the TSF footprint to simulate its filling behavior over time.

Based on the cell top elevation (natural ground), each cell was evaluated at a time step to determine if it is covered with tailings. If it is covered, the head rises as per the tailings filling curve and the boundary condition is provided with the conductivity of the tailings (see below). If it is not yet covered, the boundary condition associated with it has an elevation associated with the tailings filing curve but the boundary condition representing tailings addition is “turned off” by an extremely low general head boundary conductivity value. In this manner, one can simulate the temporal and spatial filling history specific to each node.

The results of this filling can be seen in Figure 18.21 below. The four locations shown in Figure 18.19 are as follows:

- The deepest point in the TSF which is covered with tailings at the start of operations;
- A point located at approximately the upstream extent of Phase II deposition in the streambed;
- A location that is high on the embankment that is not filled until later in mine life; and
- A point located to the south that will only have a tailings pond.

The differential filling curves are shown below.

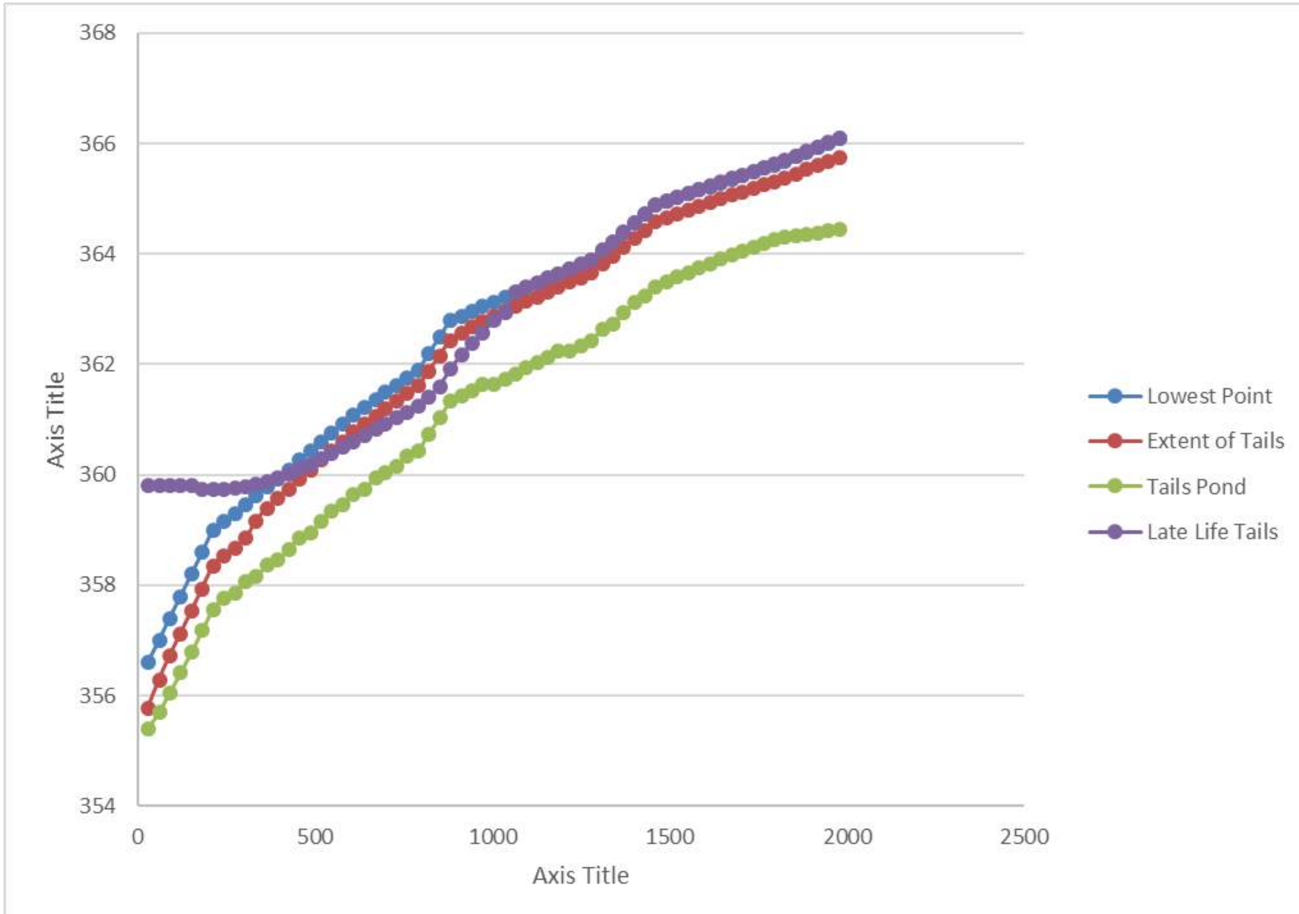



**Figure 18.21: TSF Filling Curves at Various Locations**

Three points located in the streambed show a rapid filling with the TSF following the TSF filling curve. The "late life tails" location shows the dynamics of an area that is covered with mine tailings later in the mine life. The elevation stays constant until the area is covered with tailings. At that point, it is covered with tailings and follows the tailings filling curve.

Anddes plans to compact the tailings foundation using moisture conditioning and truck traffic. GRE assumes that the high conductivity range for the compaction is $1x10^{-5}$ cm/s and the low range for subgrade compaction is $1x10^{-6}$ cm/s. The higher conductivity subgrade is shown below, and the lower-conductivity case is shown in Section 18.11.

### *18.11.6 Seepage Predictions*

Seepage predictions have been made for the TSF over time. The key seepage elements are as follows:

- Seepage in the saprolite aquifer (layer 2);
- Seepage that crosses the dam face and migrates downstream, and
- Seepage that reports to the seepage pond.

To calculate seepage, a vertical plane is cut within the groundwater model on the downstream end of the TSF dam. All water reporting to groundwater through this plane is reported as total seepage across the dam face. Seepage to the environment is defined as seepage through the plane minus the seepage captured in the seepage collection pond. The environmental impact is determined by looking at the baseline (pre-TSF) flow through the dam face (approximately 40 m/d, time t = 0) and comparing it to the seepage rate over mine life.

Figure 18.22 shows the seepage rates over time.

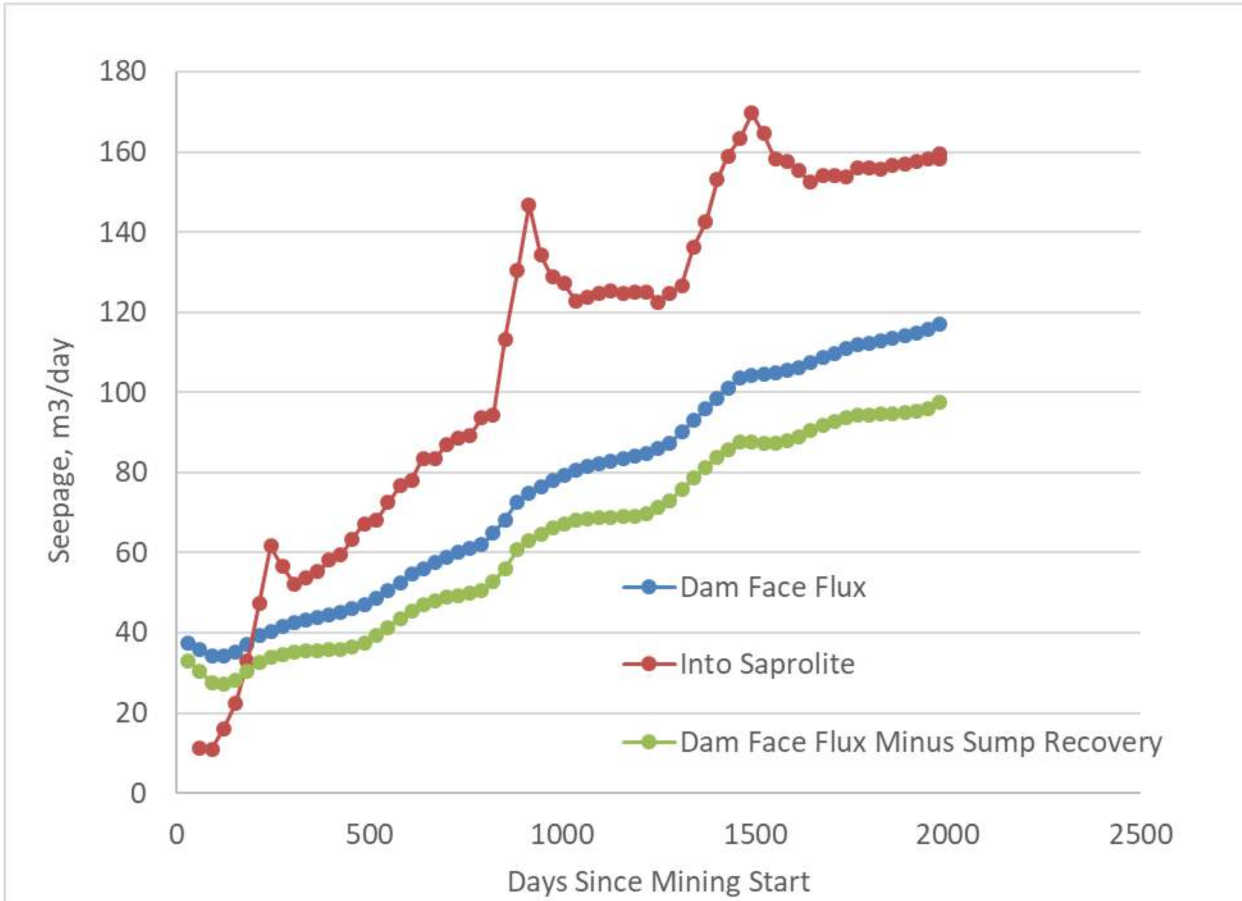



**Figure 18.22: Seepage Rates from TSF**

The maximum seepage to the environment is approximately 160 $m^3$/d (1.8 L/s) which is the total seepage into the saprolite aquifer. However, the differential seepage downstream of the TSF is approximately 100 $m^3$/d (green line at day 2000) minus 40 $m^3$/d baseflow, for a total environmental discharge of 60 $m^3$/d or 0.7 L/s of tailings-related seepage entering the environment down-stream from the dam.

### *18.11.7 Sensitivity*

A sensitivity analysis was performed to see the impact of a lower conductivity subgrade beneath the tailings. The maximum seepage to the downstream environment in the lower-conductivity case (Dam Face Minus Sump Recovery) is 50 $m^3$/d minus the 30 m/d baseflow (prior to mining) for a total discharge to the environment of approximately 20 $m^3$/d or approximately 0.25 L/s. Achieving better compaction in the subgrade beneath the TSF results in a decrease of 66% when compared to the lower-compaction case.

Total seepage into the saprolite aquifer is greatly reduced from 160 $m^3$/d maximum to a 55 $m^3$/d maximum. The result of the sensitivity analysis show that better compaction creates better containment.

## 18.12 Waste Management – Geochemistry

### *18.12.1 Mine Waste Geochemistry*

The following section presents a summary of the geochemical characterization of the waste rock that will be produced by the underground mine development, the supernatant solution discharged by the plant, and the tailings that will be produced from the benefaction process. The objective of the geochemical characterization was to ascertain if mine waste had the potential to impact local and regional water quality. While the study focused chiefly on the assessment of ARD it also considered impacts from other geochemical reactions and the impact the plant operations would have on downstream water quality.

Geochemical characterization was performed on 60 total samples taken over the course of five separate (4 static rounds of testing and one kinetic round of testing) sampling programs from 2010 to 2017. 50 of those samples were hard rock taken from drill core, 8 grab samples from surficial garimpeiro waste piles, and 2 tailings samples. Samples underwent static testing comprised of acid-base accounting (ABA) and whole rock compositional analysis. Additional samples were subjected to kinetic testing via humidity cells (HCT). All potential sources of ARD were considered in the geochemical characterization, as follows:

- Mine dewatering water and potential water discharge from mine portals after mine closure;
- Runoff and leachate from the WSFs and legacy waste;
- Supernatant solution discharge from the TSF, and
- Seepage and leachate from the TSF.

### *18.12.2 Mine Waste Rock*

Some waste rock samples located near the vein have sulfide mineralization and some samples show potentially acid generating behavior. However, most waste rock will come from development crosscuts and down ramps, and this waste rock appears to be acid consuming due to the presence of calcite and an absence of sulfide minerals. All waste samples, even those with acid-generating potential, failed to realize that potential in over a year of humidity cell testing. This provides strong evidence that the waste rock will not generate acid during the life of the mine. ABA analysis shows that all samples have less than 1% total sulfur, and most samples have nearly 100% of the sulfur present in the sulfide form. ABA analysis also shows that the sulfur has not been oxidized and that ARD reactions have not yet occurred. Figure 18.23 applies the cut-off values that define the NAG and PAG material, which then suggests that the majority of the samples collected fall in the Non-Acid Generating section of the graph. Some samples fall in the Uncertain or Acid Generating category, and no samples are clearly located in the Acid Generating classification zone.

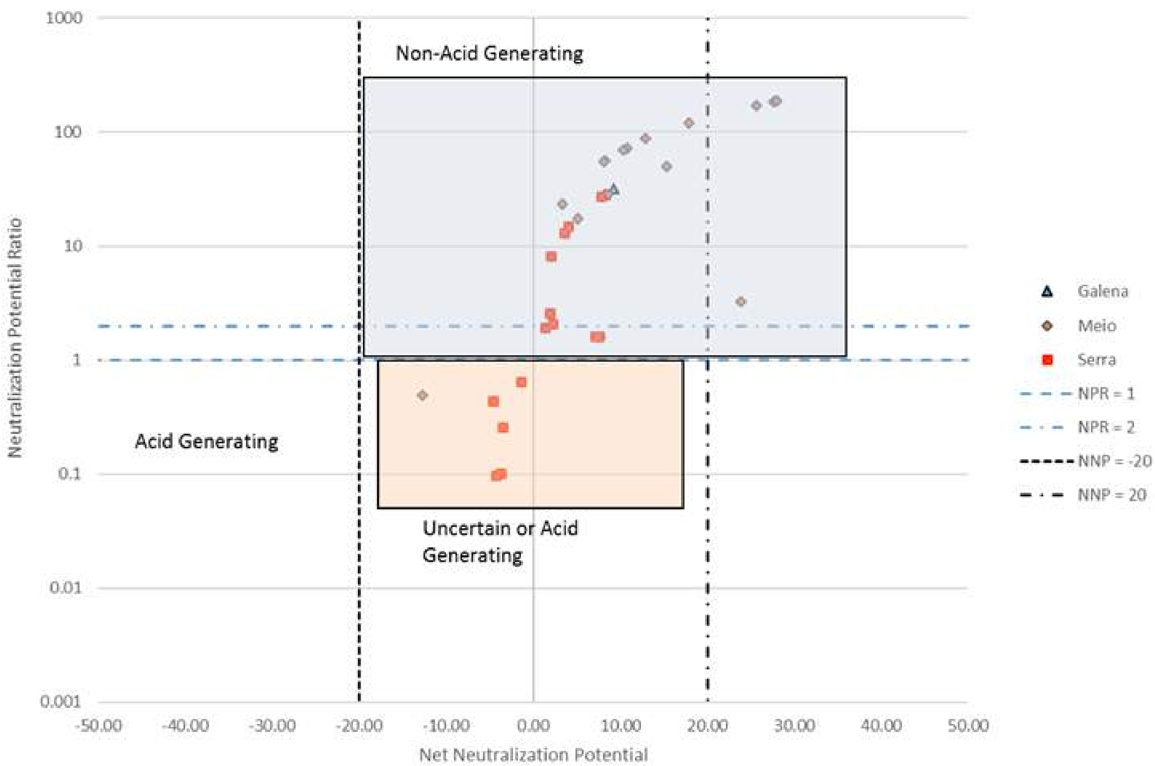



**Figure 18.23: Waste Rock Classification**

As an added protection, the mine waste rock piles will be closed in a manner to mitigate the risk of long-term ARD formation and to maximize the effectiveness of existing neutralization potential.

### *18.12.3 Garimpeiro Waste*

Two garimpeiro waste piles located on the property are acid generating: one in Come Quieto near the Meio portal, and one in Mãe de Leite in an area that will not be developed by the project. Both sites currently produce acidic seepage with elevated aluminum, manganese, iron, and acidity concentrations. Additionally, both sites have samples with elevated mercury concentrations from historic processing using mercury amalgamation. Due to its presence within the immediate zone of activity, Chapleau will evaluate alternatives for managing these environmental tailings.

### *18.12.4 Tailings*

The tailings are potentially acid generating, but long-duration kinetic testing did not empirically observe any acidic leachate. As a result, it appears that the time-frame for ARD formation in tailings is at least more than a year, even under ideal conditions. During operations, this acid-generating potential will be mitigated by the residual alkalinity of tailings supernatant solution and by the oxygen-deficient environment expected to exist within the deposited tailings during operations.

Upon closure, the tailings are expected to remain largely saturated. They will be stored below the local water level and will have water-filled pore spaces. The existing alkalinity is expected to be sufficient to prevent the formation of ARD in the long-term due to the anoxic storage conditions.

However, in order to be protected decades into the future, the tailings must be covered with an evapotranspiration (ET) cover to minimize infiltration and to minimize the diffusion of oxygen into the tailings. It is expected that leachate produced from the closed TSF will have elevated sulfate, ammonia, nitrate, copper, and manganese concentrations. During operations, Anfield will collect actual operational data, evaluate treatment options, and implement effective treatment to meet long term environmental requirements.

Tailings supernatant solution was found to contain elevated concentrations of sulfate and ammonia. This is typical for mines that use the sulfur dioxide cyanide destruction process. The Site Wide Water Balance (SWWB) (GRE 2017) shows that a discharge of excess water occurs during operations, and this water must be properly managed to meet Brazilian regulatory discharge guidelines. A mixing/dilution model was created to ascertain the final concentration of excess TSF supernatant water quality after mixing with natural waters. The results determined that, if properly managed, discharge can meet regulatory standards.

# 19 MARKET STUDIES AND CONTRACTS

This section is not applicable.

# 20 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

On August 9, 2017 Chapleau was awarded environmental approvals for trial mining from SEMAS, including the LOPM, vegetation suppression, and fauna capture permits (see discussion of Production Permitting in Section 20.3). Subsequent approval is required from the DNPM to sell production, and Chapleau has initiated the process for obtaining this approval. Anfield also can continue to conduct exploration activities.

On May 10, 2017, Anfield received formal consent for the Coringa Gold Project from INCRA. INCRA's consent was required by SEMAS as a prerequisite to the issuance of the trial mining license and related permits needed to begin construction and operations at the Coringa Gold Project. Pursuant to the terms of that consent, the Company must negotiate a long-term land access agreement with INCRA.

Relationships with local communities have been managed through regular, ongoing social communication activities, which have included dialogue workshops with community members and site visits with local authorities, business leaders, and media. Anfield has dedicated professionals who manage social outreach and environmental issues.

Efforts are focused primarily on the community of PDS Terra Nossa and the nearby Municipality of Novo Progresso, where Anfield has its administrative offices and sources its labour, goods and services. In addition, Anfield must obtain some permits from the Altamira Municipality, where the Coringa Gold Project is located, and the sub-district of Castelo dos Sonhos. Anfield also co-ordinates certain matters with stakeholders in Castelo dos Sonhos and in smaller towns located along the main highway that provide access to the project site.

## 20.1 Project Setting

As noted in Section 4 and Figures 4.2 and 4.3, the Coringa Gold Project concession is located within the boundaries of a farm (the Fazenda Coringa) situated along a boundary area between primary forest areas reserved as an indigenous buffer zone, and land areas previously impacted by decades-old government-sponsored agricultural clearances and ongoing agriculture. Forested areas within the Coringa Gold Project concession and the adjacent buffer zone have also been previously impacted by illegal logging of high-value tree species and by artisanal/small scale, garimpeiro, mining. Chapleau controls the surface area required for the construction and operation of the Coringa Gold Project from the Fazenda Coringa, and no garimpeiro mining, logging, or agriculture will be permitted within the boundaries of the project during the construction, operation, and decommissioning/closure phases of mine life.

The Coringa Gold Project has been designed with a view to minimizing its environmental and social footprints and any associated negative impacts. Impact prevention, minimization, and mitigation measures are currently being identified through Brazilian EIS processes and will be implemented in compliance with governing regulations, within the context of an integrated Health, Safety, Environmental, and Social (HSES) management system based on internationally recognized standards. The latter include the International Finance Corporation (IFC)

Environmental, Health, and Safety (EHS) Guidelines for Mining (IFC, 2007); the International Cyanide Management Code (ICMC, 2017); ISO 14001 (International Organization for Standardization, 2015); and OHSAS 18001 (OHSAS Project Group Secretariat, 2007).

## 20.2 Environmental Studies

The first significant baseline studies of water quality, air quality, and flora and fauna within the Coringa Gold Project concession were conducted by Terra in 2015 and 2016 to support the development of the EIA/RIMA for the Coringa Gold Project, as well as the individual environmental clearance permits required for the construction of specific elements of mine infrastructure. The latter permits typically include specific conditions that must be met as a condition of approval, including the monitoring of fauna displaced by clearance activities, the potential capture and relocation of individuals from specific species, and the collection and replanting of selected floral species.

The results of these studies and clearance actions will be detailed and summarized in the final iteration of the EIA/RIMA; however, draft results available as of the submittal date of this technical report confirm that although the Coringa Gold Project is located in areas previously impacted by intrusive human activities, forested areas still support a wide range of floral and faunal species. In keeping with these findings (and in addition to the relocation and replanting efforts required as part of the aforementioned permitting actions), Chapleau will establish a comprehensive *Environmental Monitoring Plan* as an element of its HSES management system, in order to assess the ongoing impact of Project operations on surface and groundwater quality and the key indicator species. The *Environmental Monitoring Plan* is designed to systematically prompt corrective and preventive action in response to any observations of negative trends detected from environmental monitoring.

Additional geochemical baseline studies were performed by GRE in 2013, 2015, and 2017 (GRE 2017). These studies collected geochemical samples of potential mine waste rock and mine tailings to determine the potential to create ARD or other impacts to water quality resulting from mining operations.

## 20.3 Permitting

### *20.3.1 Legal and Regulatory Framework*

Brazilian Federal Law 6938/1981 spells out general environmental policy and permitting requirements for all activities with contamination potential, or involving extraction of natural resources. Prior to obtaining a mining concession, project proponents may conduct mineral exploration and limited (trial mining) processing of up to 50,000 t/y of ore with a Guia and pre-requisite environmental approval, the LOPM. Depending on the ecological circumstances, an applicant may also have to obtain authorizations for vegetation suppression/restoration and fauna capture/relocation. Companies may apply for expansions of trial mining ore processing limits once they are in production. As previously discussed, the Coringa Gold Project exercised this trial mining option and on August 9, 2017 was awarded an LOPM and accompanying fauna capture and relocation and vegetation suppression permits.

Chapleau is also engaged in a three-part environmental permitting process, which is required for the approval of the full mining operation. This process is summarized as follows:

- Prior License (LP: "Licenca Previa"): this permit confirms the selection of the best place for developing and conducting extractive activities, based on submission of a detailed EIA and RIMA, respectively. In addition, in Para State, public hearings are required to be held by the municipalities whose administrative areas encompass the project's social and environmental AIDs. Upon issuing the LP, SEMAS may choose to invoke specific requirements, known as LP conditions, which the applicant must implement before it can obtain its Installation License. Legislated timing for issuing the LP is nominally twelve months after the date of application, provided no further details and/or supplemental information is required by the regulator.
- Installation License (LI: "Licenca de Instalacao"): this permit allows the construction of the mine, pursuant to compliance with conditions raised in the LP. It also establishes conditions for obtaining the final Operations License. The LI application also requires submission of a detailed PCA. The granting of the LI means: (i) approval of the control, mitigation, and compensation measures proposed by the project proponent in the PCA, as well as the timetable for the implementation of such measures, (ii) approval of the characteristics of the specific engineering project, including its timetable for implementation, and, (iii) manifestation of the agreement between the project proponent and the regulatory authorities regarding adherence to the conditions of the LP. Legislated timing for issuing the license is nominally six months after the date of application, provided no further details and/or supplemental information are required by the regulator.
- Operations License (LO: "Licenca de Operacao"): this permit is issued following demonstration of compliance with LI conditions and allows the mine to commence production operations. The LO may establish additional mandatory conditions. Legislated timing for issuing the LO is six months after of the date of application, provided no further details and/or complementary information are required by the regulator.

In actual practice in Pará State, the time required for SEMAS approval may vary from the guidelines in the Federal law, depending on the complexity of the project and availability of review resources, among other factors. SEMAS will typically conduct the licensing process once it has evaluated the technical examination that was completed by the environmental agencies of the municipalities administering the areas in which the project is located. In addition, whenever applicable, SEMAS must also assess the opinion reports of other regulatory bodies at the national, state, and municipal levels that are involved in the licensing procedure; these may include INCRA, ITERPA, FUNAI, ICMBio, ANA, and IPHAN, among others.

In addition, CONAMA Resolution 237/1997 is a key component of the environmental licensing process and defines the specific activities or ventures that require an environmental license, including major elements of a mining operation. These include:

- mineral exploration involving drilling;
- underground mining;
- processing of non-ferrous metals, including gold;
- construction and operation of tailings impoundments and water diversion and drainage structures;
- construction and operation of electrical transmission lines and substations;
- construction and operation of water treatment plants;
- construction and operation of sewage treatment plants;
- treatment and disposal of solid wastes; and,
- transportation, storage, and handling of dangerous materials.

Transportation, storage, handling, and usage of explosives requires separate approval by the Ministry of Defense. Depending on the final design characteristics of the Coringa Gold Project's fuel depot, additional approvals may be required from ANP.

Municipal administrations are responsible for participating directly in the environmental licensing process and must issue a document that establishes their position as to whether or not the project is in conformity with municipal soil use, occupation, and other regulations. In the case of the Coringa Gold Project, two municipalities are involved: Altamira, which administers the rural area within which most of the mining concessions and the actual mine and operational infrastructure are located, and Novo Progresso, which includes part of the concessions as well as the two settlements (Terra Nossa and the town of Novo Progresso) in which most of the social impacts and benefits of the project will be expressed. Other specific federal and Pará State public administration agencies may also engage in various aspects of the licensing process over which they may have technical authority or shared interest.

Environmental laws also provide for the participation of communities during the environmental licensing process. In practice, this occurs during public hearings.

With respect to water usage, the CNRH Resolution 55/2005 classifies mining ventures based on their impact on water resources. The Coringa Gold Project would be classified as a Scale I venture under this classification scheme, as it would involve:

- Limited use of surface water in the initial start-up of mining operations;
- Use of groundwater (collected as mine dewatering water) for use in the mineral separation process;
- Use of groundwater to supply the needs of the mining camp; and,
- Discharges of excess water from the TSF in high precipitation/wet season conditions.

All uses of superficial water and groundwater at the Coringa Gold Project are subject to a grant process; such uses include the construction and operation of water collection ponds, diversion of watercourses, discharge of liquid effluents in watercourses, alteration of the rates of flow of watercourses, and any activities that would impact the level of the water table. Additionally, project proponents must also permit all water wells.

### *20.3.2 Current Status of Permitting*

Environmental permits typically need to be renewed every one to five years, with the actual term of the permit and requirements for resubmittal included as conditions from the approving agency. In the case of the Coringa Gold Project, an initial permit application or “Terms of Reference” was prepared and submitted to SEMAS for exploration, and defined the scope of a previous EIA/RIMA, which was carried out by Chapleau through Terra, an environmental consulting firm based in Belem, Pará State. This original study was presented to SEMAS in January 2009, and approved for exploration, including diamond drilling, in August 2009. In March 2012, an application was made for the operation of the LOPM, approval of which was received on August 9, 2017, accompanied by issuance of vegetation suppression and fauna capture authorizations. This will enable Chapleau to build and operate the mine, mineral separation facility, and supporting infrastructure, and is a prerequisite for issuing the Guia by DNPM, which will permit commercialization of 50,000 t/y of production during the trial mining phase.

In October 2016, Chapleau filed the PAE which is the first step in the process of obtaining a full mining concession for its primary tenements (850.565/1990, 850.567/1990, 850.568/1990, and 850.981/2006). Final approval of the PAE is contingent on the issuance of an LO by SEMAS.

Before it can start mineral separation plant operations, Chapleau will have to comply with a number of permit conditions including obtaining a separate tailings disposal permit. New camp facilities are also in the process of being reviewed for approval by the Municipality of Altamira. In addition, it is anticipated that the Coringa Gold Project may require additional permits for roads, installation of potable water wells, temporary capture of water to support start-up of the mineral separation plant, and specific types of facilities; each of these permitting actions will be processed with SEMAS or other responsible regulators on an as-needed basis.

Chapleau is working with engineering and environmental consultants to finalize an application for a permit for tailings dam construction and operation, in particular the accompanying Relatorio de Control Ambiental (RCA) and PCA, as well as a watercourse diversion permit. The submission will be accompanied by a Tailings Dam Safety Plan and Dam Break Analysis. According to legal advisors, this process typically takes between four and six months to complete. If Chapleau needs to use raw water stored in the tailings dam facility or from the coffer dam pond, it may be required to obtain a dispensation.

Following submission of the tailings application, Chapleau intends to complete and submit its EIA/RIMA to SEMAS and thus initiate the permitting process for the full Coringa Gold Project mining operation. The RIMA is a non-technical report whose intended audience is the general populace and therefore presents the major conclusions of the EIA in layman´s terms. CONAMA Resolution 01/1986 provides basic criteria and general provisions to be addressed in the EIA/RIMA. As part of the EIA/RIMA filing process, Anfield will also have to file a Risk Management Plan that describes Chapleau's HSES management system and identifies the specific measures to be adopted and processes to be maintained in order to manage risk and mitigate occurrences of negative environmental and social impacts.

Filing of the EIA/RIMA will trigger the LP process, which is expected to include site inspections and public hearings.

The environmental permitting process for full mining operations is expected to take over a year to run its course, as Chapleau obtains the LP, LI, LO, and other permits required to obtain complete environmental approval for the mine, mineral processing plant, and supporting infrastructure.

Chapleau is also in the process of filing for a water dispensation from SEMAS to use a resource identified in proximity to the camp site for potable water. In addition, Chapleau will apply to SEMAS for rights to use and recycle local surface water for the initial start-up and operation of the mineral separation plant; this permit process is anticipated to take from three to six months to complete. As the water balance is positive (i.e. the mine is projected to have excess water each year), it is not expected that an additional water permit will be required for long-term use of raw water.

Additional permits required to operate a mine may include:

- **Explosives and Reagents -** authorization for transportation, storage, handling and usage of explosives and reagents must be obtained from the Brazilian Army.
- **Fuel storage tanks and refueling stations -** permits must be obtained from the ANP any time installed storage capacity reaches 15,000 L or more.
- **Power transmission system -** installation of a powerline to the project site will require an environmental licensing process that includes LP, LI and LO phases. It is expected that this process will be implemented by the power utility. As the powerline will follow an existing road right of way, it is likely to have low environmental impact.
- **Airstrip -** permitting is governed by the Brazilian Aeronautical Code. Primary permitting agencies are the ANAC and the local SEMAS office. The former deals primarily with technical aspects while the latter approves the LP, LI, and LO, which will proceed in accordance with a RAS and PCA.
- **Landfill -** landfill permits are governed by CONAMA Resolution 404, which states that small scale sanitary landfills are those in which 20 tons of solid waste per day are disposed of; wastes must be classified as not dangerous and inert (also referred to as domestic or urban wastes). This is considered an activity with local environmental impact, so permitting will be governed by the Municipality of Altamira.

#### *20.3.3 Regulatory Reporting Requirements*

Once the mine is operating, Chapleau must file regular reports on environmental and operational performance, as suggested in the RCA/PCA and RIAA, and as may be confirmed or elaborated in the LO. Examples could include air quality or water quality monitoring reports; fuel, explosives, reagent usage data; and workforce illness/injury statistics.

#### *20.3.4 Risks and Liabilities*

Primary risks and liabilities associated with the Coringa Gold Project are summarized as follows, along with the Anfield's general approach to risk mitigation:

- **Environmental risks:** Environmental risks and liabilities associated with exploration activities are minimal, but will include limited areas of forest clearance for construction of access roads; the construction of drilling pads; noise from traffic, drill rig, and generator operation; dust from roadways during dry season operation; potential spills of fuel, lubricants, and drilling mud; and the potential for grass fires in dry conditions.

  Risks during operations include potential reagent spills, generation of ARD, improper management of mine water, and fugitive dust emission.

  Chapleau will prevent or mitigate and manage the potential impacts associated with these risk and liabilities in accordance with: applicable Brazilian regulations; Anfield's corporate *Sustainable Development Policy; Community Relations Policy;* and *Health, Safety, and Environmental Policy*; and the BMPs drawn from the sources listed in Section 20.1. Additionally, the project will be designed to prevent, minimize, and mitigate environmental risks. For example, tanks with hazardous chemicals will have engineered secondary containment, and the TSF is constructed to withstand extreme weather events, and the site has an ARD management plan (GRE 2017a). Environmental practices will be documented and administered within the context of Chapleau's integrated, project-specific HSES management system.

- **Artisanal/small-scale mining:** As previously noted, Chapleau's concession area includes a number of historical garimpeiro workings which represent potential physical safety and environmental hazards if exploration sampling, trenching, core drilling, engineering field investigations, or construction activities are conducted in adjacent areas. Physical hazards will be clearly marked and physically barricaded where necessary.

  There are two areas of garimpeiro mine waste on the site. One is the Mãe de Leite area located along the road between the Serra and Galena portals. This is an area of intensive historical garimpeiro activity including about 2.3 ha of tailings deposition. The Mãe de Leite tailings are acid-generating and contain elevated concentrations of mercury from historical amalgamation processing. In the wet season, the Mãe de Leite area produces acidic leachate and runoff, typically with a pH of between 3.5 and 4.0. This water could potentially cross the access road to the Galena portal and flow to the northwest. In addition, the Come Quieto garimpeiro area lies adjacent to the current access road at the point where the Meio vein crosses the road. This area is smaller (approximately 0.5 ha of exposed tailings) and also produces acidic leachate. Due to its presence within the immediate zone of activity, Chapleau will evaluate alternatives for managing these environmental tailings.

  While illegal miners are no longer operating at the Coringa Gold Project, the threat of garimpeiro influx to Anfield's concessions remains, and Chapleau must therefore maintain an effective and vigilant security program. In addition, possible garimpeiro activity near the property or upriver from its operations could impact local stakeholders and possibly generate social and/or environmental problems for Anfield.

- **Prior legal actions:** It should be noted that in September 2008, local inspectors from IBAMA issued an assessment notice to Chapleau for a fine and work embargo, on the basis that Chapleau was completing exploration activities without an appropriate environmental permit. Chapleau challenged this assessment notice with the Executive Manager of IBAMA in the local office of Santarem, arguing that the assessment was in error as a permit is only required when mineral extraction is performed. The executive manager of IBAMA in the Santarem office agreed with Chapleau's position and rescinded the work embargo on the condition that mineralized ore is not removed in quantities that characterize extraction and that the exploration does not produce any significant environmental impacts, until the project has been permitted. Although the formal administrative closure of the assessment notice provided to Chapleau for the fine is still pending, legal guidance is that no further action by IBAMA on the matter is anticipated.
- **Landowner payments:** Surface rights in Brazil are not associated with title to either a mining lease or a claim, and must be negotiated with the affected landowner. The landowner's right to participate in any proceeds from a mine is documented in Article 11(b) of the Federal Mining Code, which notes that "The participation will be 50% of what is payable to the States, Municipalities, and Administrative Agencies, as a financial compensation for the exploitation of a mineral resource". This financial compensation is calculated from the mineral sales value, minus taxes, transport costs, and insurances. The percentage of financial compensation varies by mineral type, but is 1% for gold.
- **Land rights:** Surface rights in western Pará state typically are not formalized. The land in the area of the Coringa Gold Project was possessed by a series of individuals over the years, most recently two families whose title over the Fazenda Coringa was never formally registered and to whom Chapleau paid surface access payments. In 2006, INCRA established a PDS in the area, which also encompassed the surface of the entire Fazenda Coringa, as well as the area of Mato Velho and almost all other exploration assets. INCRA proclaimed itself the owner of this land and resettled a community called Terra Nossa into an area along the access road to the Fazenda Coringa. The legality of this action and creation of numerous other PDSs was questioned by the MPF, which litigated against INCRA to declare the establishment illegal. Anfield, following communications with regulators, made a strategic decision to secure its land access rights going forward from the INCRA, terms of which are expected to be defined in a final agreement to be negotiated in 2017.
- **Archaeological resources:** The Coringa Gold Project concession area has been impacted by many decades of intrusive human activity (e.g., logging, agricultural clearances, and garimpeiro mining) and is not known to contain any significant archeological resources. However, the EIA/RIMA must include the results of a

professional survey and assessment of the archaeological setting of the project and the archeological resources that the setting may contain. The survey is currently in process; its scope was established via negotiations with IPHAN, and IPHAN will review and approve the final report, which will be appended to the EIA/RIMA. Chapleau will implement appropriate management controls over any resources that may be discovered in the survey, as well as a "chance finds" procedure for the proper handling of any artifacts that may be revealed in environmental clearance or mining activities.

- **Indigenous peoples:** The project is located near a 10-km buffer zone that surrounds a Kayapo indigenous land reserve. There are three small Kayapo villages in the vicinity of the project, the closest two of which are about 40 km northeast from the project in a straight line, and access by road or river from the Coringa Gold Project area takes several hours. Since these villages are located far from the Coringa Gold Project, they will not incur any negative impacts; there will be no mine-related traffic near them and they will not experience noise, water, or dry season dust impacts. Unauthorized travel or interaction with the Kayapo by Chapleau's workforce or contractors will be strictly prohibited. For these reasons, Anfield's position is that risks are minimal and no special social studies are required.

## 20.4 Conceptual Closure

### *20.4.1 Mine Reclamation and Closure Plan*

Chapleau will prepare a *Mine Reclamation and Closure Plan* for the Coringa Gold Project based on the conceptual model described in the following paragraphs. The *Mine Reclamation and Closure Plan* will be periodically updated to maintain currency with changes in mine infrastructure or operations, changes in regulation, and changing external stakeholder considerations, in keeping with applicable Brazilian regulations, as well as Section 1.4 of the IFC EHS Guidelines for Mining (IFC, 2007), and Standard of Practice 5 of the International Cyanide Management Code (ICMI, 2017). The *Mine Reclamation and Closure Plan* will address progressive, potential interim, and final closure actions. To the extent practicable, these will include:

- actions to restore the site to approximate baseline environmental conditions;
- actions to minimize the attractiveness of the closed site for illegal mining;
- actions to eliminate chemicals and any toxic residues from the site and prevent future impacts to the environment and public health and safety;
- actions to support potentially beneficial uses of land (and, potentially, elements of mine infrastructure) as may be negotiated with Project stakeholders;
- interim care and maintenance actions that may be taken in response to any temporary cessation of mining operations, and
- post-closure inspection and monitoring actions leading to final closure.

At least one year prior to commencing the closure process, the *Mine Reclamation and Closure Plan* will be updated to incorporate final edits on closure planning and schedule, and additional levels of procedural detail as necessary to guide all required closure actions.

#### *20.4.2 Summary of Site Closure and Waste Disposal Strategy*

Unless other land uses, mixtures of land use, or other beneficial uses of specific elements of Coringa Gold Project infrastructure are specifically negotiated with regulatory authorities, landowners, or other stakeholders, the overall goals for decommissioning, reclamation, and closure will be to return the land to a physically, biologically, and chemically stable and ecologically functional condition that approximates baseline environmental conditions. To the extent practicable, Chapleau will also attempt to minimize the potential attractiveness of the decommissioned site with respect to illegal or uncontrolled small scale or artisanal mining activities.

Mining areas, structures, and/or facilities to be physically closed at the end of mine life include:

- Mine portals, ventilation shafts, support facilities, and underground infrastructure;
- Explosives magazines;
- Waste rock stockpiles;
- ROM stockpile area;
- Core storage facility;
- Power distribution substation, transmission lines, and emergency generators;
- Fuel storage tank, secondary containments, and fueling station;
- Mineral processing facilities, including ore sorting, crushing, grinding, reagent mixing and storage tanks, CIL tanks, elution plant, and cyanide detoxification circuits;
- Gold room;
- TSF, reclaim barge, and associated tailings and reclaim water pipelines;
- Mine wastewater accumulation pond/waste rock stockpile sedimentation pond;
- Mechanical and maintenance shops and warehouses;
- "Boneyard"/ laydown areas;
- Permitted solid waste landfill and biofarm soil treatment area;
- Hazardous waste storage area;
- Airstrip/helipad;
- Haul and access roads inside concession boundary;
- Camp and administrative buildings;
- Water supply well(s) and potable water treatment system;
- Wastewater treatment plant and septic systems;
- Monitoring wells and exploration boreholes; and

- Perimeter fence/gates.

Progressive closure options will be sought, wherever possible in the construction and operational phases of mine life, in an effort to minimize the potential for subsidence and erosion damage, to enhance biodiversity and the restoration of natural habitats, and to minimize the attractiveness of the site to garimpeiro mining or other intrusive activities. These options will include:

- establishment and maintenance of stockpiles of topsoil, mulch, and nurseries stocked with cuttings, seeds, or seedlings of appropriate naturally occurring, fast-growing plant species, to support progressive, interim, and final re-vegetation;
- progressive reclamation and re-vegetation of access and haul road ROWs and construction borrow areas;
- progressive reclamation and re-vegetation of areas encountered within the Coringa Gold Project areas that may have been damaged by illegal or historical garimpeiro mining;
- progressive placement of soil covers and re-vegetation of surfaces of waste rock stockpiles, establishment of stable natural drainage channels, and installation of settling ponds at each stockpile, if required for sediment control; and
- periodic removal of used, scrap, or surplus mining equipment or materials from the site for beneficial reuse or recycling.

With respect to final decommissioning and closure, to the extent practicable, Chapleau will attempt to sell equipment, scrap metal, and other infrastructure items for beneficial reuse or for recycling value.

Nonhazardous wastes will be disposed of in Chapleau's permitted onsite landfill or licensed offsite alternatives. If permitted, certain categories of inert waste (e.g., concrete rubble, used belting, worn/unrecyclable HDPE piping or geosynthetic membrane) may be disposed of in cells constructed in the waste rock stockpiles. Any such disposal cells and the onsite landfill will be covered with an engineered cap and closed. Residual hazardous materials (e.g., unused reagents, fuel, lubricants, paints, insecticides, or explosives) will be returned to suppliers for credit, or otherwise sold to properly licensed or reputable dealers, and strictly for the purposes intended by the manufacturer. Any residual hazardous wastes will be routed to the onsite hazardous waste accumulation facility pending shipment to an approved offsite hazardous waste disposal facility.

## 20.5 Post-Closure Environmental Monitoring

For the purposes of this technical report, a nominal 2-year post-closure monitoring period has been proposed and is reflected in the initial closure cost estimate, although routine maintenance of the Passive Treatment System (PTS) at the TSF and monitoring of its effectiveness in achieving chemical stability in TSF effluent is expected to continue for at least three additional years thereafter. However, in actual practice, the predicted length of the post-closure monitoring period will be periodically refined in annual reviews of the *Mine Reclamation and Closure Plan,* as Chapleau gains experience with actual progressive closure actions and develops reliable monitoring data that can be used to assess the effectiveness of the PTS and other selected reclamation, revegetation, and erosion prevention strategies that will be applied in final closure. The final version of *Mine Reclamation and Closure Plan* submitted to the regulatory authorities may also include additional negotiated or supplemental post-closure monitoring actions; potential reductions or extensions to the monitoring schedule; or other inspection and reporting requirements that may be required as a condition of regulatory approval. These actions will be designed to facilitate final relinquishment of the Coringa Gold Project concession, and may include:

- physical maintenance and inspection of earthworks, including embankments and any permanent drains, settling or attenuation ponds, or diversion channels in accordance with the Coringa Gold Project *Tailings Facility Management Plan* and *Water Management Plan*;
- Physical maintenance of the PTS, including repair/refurbishment, and possible replacement of the organic substrate in the treatment cells.
- Continuation of surface and groundwater monitoring programs, in accordance with the Coringa Gold Project *Environmental Monitoring Plan*;
- Continued monitoring of revegetation areas to assess success of vegetative rebound, also in accordance with the *Environmental Monitoring Plan*; and
- Continued monitoring for the colonization of reclaimed areas by native fauna, in accordance with the *Environmental Monitoring Plan*.

## 20.6 Closure Costs

Based on standard practices for the development of engineering estimates and Chapleau's prior mine decommissioning experience in Pará State, costs for implementing the conceptual closure strategy described above are estimated at approximately R$ 2 M, or USD$ 625,000 (assuming a 3.2:1 exchange rate). A more detailed cost estimate will be made when the first iteration of the Mine Reclamation and Closure Plan is issued early in the operational phase of the Coringa Gold Project; this estimate will be updated in concert with all subsequent revisions of the plan.

It should be noted that Brazilian Federal and Pará State regulations currently do not specifically require a bond or financial surety to cover the cost of closure and post-closure monitoring. However, in keeping with the BMPs defined in (IFC, 2007) and (ICMI, 2017), Anfield/Chapleau will establish an appropriate cash accrual system capable of covering the costs of closure at any stage in the mine life, including potential early or temporary closures.

## 20.7 Socioeconomic Conditions

### *20.7.1 Social Context/Stakeholders*

**General Background:** The Coringa Gold Project is located in the municipality of Altamira within the state of Pará, near its border with Mato Grosso, just within Altamira's southwestern border with the Novo Progresso municipality. However, the ranches and settlements in the area have much stronger socioeconomic links with Novo Progresso than with Altamira.

In the late 1980s the Brazilian government began to aggressively open up lands in the Amazon basin for homesteading and settlement. High priority was given to integrating the region with the rest of Brazil. The INCRA led this program. Settlers were required to clear the land for ranching and agriculture in order to establish possession. This process first focused on opening the frontier in Mato Grosso state and later expanded north into Pará. Many of the earliest settlers first came looking for gold, then for high-value timber, and lastly to pursue ranching and small-scale agriculture. At present, large industrial agriculture operations have expanded into southwestern Pará. The natural resources of the region are fueling a growing economy and continued expansion and occupation.

Given the rapid pace of development and relatively weak conditions of governance, the process of land occupation has not been well regulated and most land rights have not been properly or completely formalized. In the area of Novo Progresso, settlers typically do not have actual legal title to lands they have held for many years.

In general, settlers in this region are seeking opportunities for a better future; gold, timber, agriculture, and ranching have generated significant economic activity and a standard of living that continues to drive growth. The population of Novo Progresso municipality increased from less than 16,000 in 1996 to over 25,000 in 2010. In the same period the population shifted from 76% rural to 71% urban. As a result, there are lower expectations for employment opportunities with an individual mining project, compared to more impoverished areas of Brazil or in other Latin American countries. The Coringa Gold Project generates some local interest, but is not currently under significant pressure to directly provide economic opportunities.

**Garimpeiro Miners:** Artisanal and small-scale miners called garimpeiros have been an important driver in the settlement of Novo Progresso and the surrounding area, and remain an important economic force. While there is little garimpeiro activity in the immediate area of the Coringa Gold Project, the risk of incursions is permanent. There also is significant garimpeiro activity near the town of Castelo dos Sonhos and in other parts of Novo Progresso. The town of Novo Progresso is an important base for garimpeiro operations, both as a source of equipment and supplies and as a market for their production, as there are numerous gold buyers in the community.

**Ranchers or Fazendeiros:** There are several ranches or *fazendas* in the area surrounding the Coringa Gold Project, which can consist of up to several thousand hectares and are mainly dedicated to grazing livestock in open pasture, although soybean farming is increasing. Several ranchers have achieved enough success that they are independent and not especially interested in working directly for the Coringa Gold Project. However, some do see the Coringa Gold Project as a potential driver of local development and hence good for their business.

**Indigenous Peoples**: As noted previously, a large indigenous reserve for the Kayapo people is located to the east of the Coringa Gold Project area. The project is located near a 10-km buffer zone that surrounds a Kayapo indigenous land reserve.

Virtually all of the reserve is uninhabited, although the Kayapo travel routinely over a significant area for hunting, fishing, and other activities. There are two small Kayapo settlements, totaling about 300 total inhabitants, about 40 km northeast of the Coringa Gold Project area near the Curua River. In 2015, a few Kayapo families established a third smaller settlement over 60 km to the southeast of the Coringa Gold Project close to Castelo dos Sonhos. This settlement is even more isolated and has about 25 residents. Road access from these Kayapo settlements to Novo Progresso and BR-163 is by routes far to the north or south of the Coringa Gold Project area; therefore, in ordinary circumstances, Coringa Gold Project personnel should not come into contact with the Kayapo.

As is the case with all indigenous peoples in Brazil, the Kayapo are considered wards of the State. The agency charged with indigenous responsibilities is the FUNAI. The Coringa Gold Project cannot interact with the Kayapo without FUNAI's approval, and unauthorized contact is strictly forbidden. The Kayapo have established the nongovernmental organization (NGO) "Instituto Kabu", the purpose of which is to help implement development programs and assist with the involvement of FUNAI. Anfield interacts with the Kayapo largely through collaborations with the Instituto Kabu.

**Novo Progresso:** Novo Progresso is the capital of the municipality of the same name, and is located about 80 km north of the Coringa Gold Project on the BR-163 national highway. The town has a small airstrip, and will serve as a transit point for Chapleau workers and contractors. Anfield will maintain a small administrative office and core storage facility in town; in addition, some members of the workforce may choose to reside there.

Novo Progresso town was settled in the early 1970s and became a recognized municipality in 1991. The 2014 census lists the municipality as having 25,169 inhabitants, and that number has grown significantly since then. The town was originally a rest stop on the BR-163 Cuiabá - Santarém Highway established in 1973, but by 1983 it had become a key town in the region with a church and a school. The discovery of gold in the region in 1984 led to a gold rush and saw the population surge to nearly 20,000. Since then it has grown steadily to become an important hub of local economic activity, legal and otherwise.

The town of Novo Progresso has limited infrastructure. All the neighborhoods in the city are connected to the city water supply, but there is no sewer or waste management system or landfill. The town now has 15 km of paved streets (out of a total of more than 200 km), but only nine km of those have storm drainage, making them useless after a typical rainy season downpour. The power grid is spotty and blackouts occur often. Road maintenance is poor and in the rainy season most of the non-paved roads turn to mud. There is no urban transportation but there is an interurban/interstate terminal with bus service and there also is an airport with flights to other parts of Pará state. Essential government services such as police, health care, transportation, education, retirement and pension services, and courts, are limited or non-existent. There is no fire department, sanitation authority, or health inspection authority.

**Altamira:** The Coringa Gold Project is located near the southwestern corner of the municipality of Altamira. Altamira is the largest municipality in Brazil. It has an area larger than Portugal, but in 2014 had a population of only about 100,000. The capital of Altamira and most of the population are located far to the northeast of the Coringa Gold Project, approximately 830 km from Novo Progresso and over 900 km from the Coringa Gold Project, by road. Most of Altamira (and the rest of Pará) is significantly different from Novo Progresso and the Coringa Gold Project area. Altamira was founded over 100 years ago, and its population is representative of a greater mix of indigenous, African, and colonial cultures than is seen in the recent rapid colonization of Novo Progresso.

The nearby town of Castelo dos Sonhos is on the extreme edge of Altamira municipality on BR-163, 154 km south of Novo Progresso and about 88 km from the Coringa Gold Project, by road. It is the only significant settlement in southwestern Altamira. However, it is also socially and economically integrated with Novo Progresso municipality and to the neighboring state of Mato Grosso. Castelo dos Sonhos depends heavily on garimpeiro activity and stakeholders there tend to view the potential development of the Coringa Gold Project as a positive contribution to the area.

**Terra Nossa:** Terra Nossa is a rural settlement located alongside several kilometers of the access road that connects the Coringa Gold Project and BR-163 that was initially established and promoted by the INCRA. The settlement has faced legal challenges in its registration process and has had to work with neighboring ranchers to address boundary disputes resulting from overlapping possessions; indeed, the legality of the settlement is not fully resolved and legal disputes over land in the area can be expected to continue. INCRA has indicated that it laid out 310 settlement plots of 20 ha each for participating families and that 290 were occupied. One local leader has estimated that as many as 150 families reside in the area, but the number may be less. These families use their land to pursue small-scale agriculture and animal husbandry. The settlers, however, do not own the land, which is reportedly controlled by INCRA (although INCRA does not exercise active management responsibilities). There are six local organizations representing different groups of participating families.

The main collective of Terra Nossa is working on formalizing their land rights. Working together, they appear to be strong and have the ability to network and mobilize their membership. They have led at least two protests that have catalyzed INCRA to take additional action to resolve the uncertainties around land tenure. The majority of residents appear to believe that the Coringa Gold Project may be able to assist with local development, and some of these colonists may be interested in work with the Coringa Gold Project if the opportunity arises, either directly or for their relatives.

Terra Nossa faces significant limitations in terms of infrastructure. There is a lack of agricultural and potable water in the dry season. There is no rural electrification and the secondary roads are typically in poor condition during the rainy season. There is a public school maintained at Terra Nossa by the municipality of Novo Progresso that has about 90 students. Chapleau has assisted the community by repairing and periodically maintaining the main access road from BR-163.

**Mil:** Mil is a small roadside settlement 9km from the intersection of BR-163 and the unsurfaced road used to access the Coringa Gold Project area. The settlement stretches along about one kilometer of the highway and is about three blocks deep on either side. The Coringa Gold Project may use Mil as a temporary staging area for transportation of some major items of equipment during construction, but is unlikely to maintain any continuous presence in the town.

### *20.7.2 Social Management*

**Social Policy:** Anfield/Chapleau corporate policies recognize the need to manage both the social impacts and expectations associated with the eventual development and operation of the Coringa

Gold Project across a broad range of stakeholders. Chapleau will share the Coringa Gold Project's benefits in a manner that stakeholders consider meaningful, fair and demonstrative of commitment, and will make modest but strategic social investments.

Expectations for a share of these benefits also exist among the neighboring settlers and ranchers, the residents and businesses of Novo Progresso, Castelo dos Sonhos and smaller local towns, as well as, to a lesser extent, among the Kayapo. Expectations also exist at a state level, where Chapleau has signed a Protocol of Intentions with the State of Pará committing to promote local development, including employment and training. Although there may not yet be significant expectations within Altamira, these may grow as full mine permitting advances. Chapleau will communicate regularly and intensively with all stakeholder groups with the object of preventing the development of unrealistic expectations; in keeping with this objective, Chapleau will implement a *Community Relations Plan* to address these challenges.

**Community Relations Plan:** The *Community Relations Plan* will be managed as an element of Chapleau's HSES management system, as described in Section 20.1, and will be designed to ensure that the complete scope of community relations activities is identified, understood and effectively managed. The objectives of the plan are to facilitate the identification and management of all social issues and risks linked to the Coringa Gold Project.

Specific management programs in the plan will include:

- Communication and Consultation Program,
- Local Employment Program,
- Local Contracting Program,
- Workforce Induction on Social Context Program,
- Influx Management Program,
- Social Investment Program,
- Indigenous Peoples Program, and
- Complaint Management Program.

Each of these programs is briefly described below.

**Communication and Consultation Program:** Chapleau communicates and consults with diverse stakeholders. The objectives of the program are to: improve stakeholder understanding of the Coringa Gold Project and vice versa; ensure rapid identification of local concerns and opportunities in order to identify and manage issues before they can develop into more complex situations; and, build relationships, dialogue and trust with local stakeholders. Communication guidelines will be provided in the *Community Relations Plan*, and messaging will be updated on an ongoing basis. A team of Community Relations professionals, supported by senior Chapleau management, manages the majority of Chapleau's engagement with stakeholders and stakeholder organizations through regular dialogue across multiple settings and through a variety of media, including company publications. Chapleau will also participate in local associations and forums, and will arrange escorted visits to the Coringa Gold Project for interested stakeholders.

**Local Employment Program:** Chapleau policy is to maximize local employment, ideally from the municipalities of Altamira and Novo Progresso, but if necessary from elsewhere within the state of Pará. In order to ensure an adequate plan to achieve this commitment, Chapleau will:

- identify its requirements for future workers, including the skills and experience that will be needed for different positions;
- for each position, determine whether potential workers may be found or developed locally or if they would need to be brought in from other areas (preferably within Pará state), as well as efforts required to formalize local workers lacking necessary documentation; and,
- identify and provide training as necessary to assist local candidates to meet the Coringa Gold Project requirements.

**Local Contracting Program:** Chapleau will include local businesses within its supply chain where possible. Although Coringa is a new project, it is in a fairly unique situation since it plans to use a plant, mining fleet and associated team that operated previously at a different project in another region of the state of Pará. Chapleau's advanced understanding of the operational needs for the plant in terms of goods, services and equipment enables it to efficiently identify contracts that may be fulfilled locally. This allows for more effective engagement with potential local contractors so that they can better understand the opportunities and requirements for working with the Anfield. Chapleau will monitor the program's progress and seek constant improvement of its performance in local contracting as its development advances.

**Workforce Induction on Social Context Program:** Chapleau will routinely implement induction training for the Coringa Gold Project employees and contractors that includes:

- Chapleau's *Sustainable Development Policy* and its social and environmental commitments;
- the social context and history of the area, including settlements and local expectations;
- overview of the Kayapo indigenous people, their reserve, the buffer area and the relevant laws and regulations regarding Coringa Gold Project interaction, including how to handle unanticipated contact;
- overview of the social performance measures covered in the *Community Relations Plan;* and,
- the relevant elements of the Worker Code of Conduct and other corporate policies with a social context or content.

**Influx Management Program:** The Coringa Gold Project is a relatively small mining project, particularly by Brazilian and Pará standards. With proper social management and communication, it should not generate significant in-migration to areas near the Coringa Gold Project. However, potential population influx is always a potential concern. The key social management measures to control the risk of population influx concern local employment and contracting. The fundamental measure to avoid in-migration will be to ensure that it is known that local hiring is done solely in Novo Progresso, not at the project site. Settlers in Terra Nossa might be given some degree of heightened eligibility for work, if they can demonstrate that they are registered long-term residents. Chapleau will support these management measures with clear communications.

**Social Investment Program:** Chapleau's social investment program seeks to:

- build robust relationships of trust across the settler community;
- work together with settlers situated on the access road to construct positive and lasting contributions to social development, based on needs identified by the members of the community through workshops and/or other grassroots approaches; and,
- ultimately strengthen the social capital of the community to allow stakeholders to manage their future development.

As a first step in its social investment process, Chapleau began working with Terra Nossa community by supporting a Participatory Rural Assessment Process (PRA), which is a proven methodology for working with a local population to understand their situation, needs and priorities. The PRA enabled identification and implementation of future opportunities for collaboration with Coringa on effective initiatives. The results of the PRA have been shared with the settlers and initial collaboration actions are underway. As the Coringa Gold Project enter the operational phase, it is expected that similar social programs may be initiated with schools, authorities, and community associations in Novo Progresso.

**Indigenous Peoples Program**: The Coringa Gold Project is located near a 10-km buffer zone that surrounds a Kayapo reserve. There are three small Kayapo villages in the vicinity of the project, the closest two of which are about 40 km to the northeast in a straight line, and access by road or river from the Coringa Gold Project area takes several hours; these communities have about 110 and 180 inhabitants. A smaller village located 100 km southeast of the project has about 25 residents.

In Brazil, indigenous peoples are considered wards of the State and the specific responsibility of the FUNAI agency. Chapleau maintains constructive relations with the local FUNAI representative in Novo Progresso and is collaborating with a local NGO implementing social support programs for the Kayapo villages. However, as these villages are located far from the Coring Gold Project, they will not incur any negative impacts; there will be no mine-related traffic anywhere near them and they will not experience any noise, water, or dry season dust impacts. Unauthorized travel to or interaction with the Kayapo on the part of Chapleau's workforce or contractors will be strictly prohibited. For these reasons, Anfield's position is that risks are minimal and no special social studies are required. The construction and operation of the mine will not directly impact either the indigenous reserve area or the Kayapo villages. However, Chapleau seeks to promote positive relations with the Kayapo and intends to ensure that the Coringa Gold Project's presence creates lasting benefits for them.

Anfield's relations with the Kayapo, FUNAI, and Instituto Kabu have been positive. Chapleau 's objectives with the Kayapo are to:

- build relationships, strengthen trust and maintain open communication with the Kayapo in a manner that complies with FUNAI requirements;

- build mutual understanding with Kayapo leaders and community members regarding their development needs and the identification of projects that Coringa can reasonably support; and,
- collaborate with the Kayapo, Instituto Kabu, and third parties to implement the projects so identified.

**Complaint Management:** Most questions and concerns will be addressed through ongoing stakeholder communication and consultation activities. Nonetheless, Chapleau will implement a formal complaint management program designed to ensure a fair and rapid response in addressing stakeholder and worker grievances, provide constructive approaches for resolving issues, and build trust and mutual confidence with Coringa Gold Project stakeholders.

# 21 CAPITAL AND OPERATING COSTS

## 21.1 Initial Capital Cost Estimate

### *21.1.1 Summary*

The capital cost estimate has been prepared for the FS, assuming the processing of a nominal 168,000 t/a of predominantly gold and silver bearing ore.

The key objectives of the capital cost estimate are to:

- Support the FS evaluation of the project;
- Support the identification and assessment of the processes and facilities that will provide the most favorable return on investment; and
- Provide guidance and direction for project financing and execution.

The total estimated initial cost to design, procure, construct, and commission the facilities described in this technical report is $28.8 M. Table 21.1 summarizes the initial capital costs by major area.

The Coringa Gold Project utilizes substantial used equipment and materials obtained through Anfield's purchase of the Andorinhas process plant and infrastructure facilities. Additionally, certain new equipment will be purchased to enhance the process, or replace existing equipment or materials for which refurbishment due to cost or condition was impractical.

## Table 21.1: Summary of Initial Capital Costs

| Description | Cost | Total |
|---|---|---|
| **Mine** | | |
| Maintenance Shop, Warehouse, & Tools | 55,000 | |
| Explosive Storage | 68,750 | |
| **Plant** | | |
| Concrete | 721,586 | |
| **Equipment** | | |
| Mechanical & Electrical Equipment | 751,894 | |
| Lab Equipment | 74,750 | |
| Plant Mobile Equipment | 93,750 | |
| Generators | 624,678 | |
| Mechanical Materials | 1,096,594 | |
| Electrical Equipment & Materials | 869,285 | |
| Refurbishment | 119,677 | |
| Construction Labor | 1,113,043 | |
| Ancillary Facilities | 427,521 | |
| **Site and Offsite Development** | | |
| Vegetation Suppression | 870,251 | |
| Site Preparation | 426,446 | |
| **Tailings Storage Facility** | 1,126,224 | |
| **CELPA Power Supply** | 2,667,795 | |
| **Total Contracted Directs** | | **11,107,244** |
| Catering | 436,681 | |
| Services | 122,296 | |
| Accommodations | 98,406 | |
| Freight | 203,281 | |
| Crane & Flatbed | 143,300 | |
| **Total Construction Indirects** | | **1,003,964** |
| Miscellaneous Consultants | 145,302 | |
| Initial Fills | 517,847 | |
| Plant Equipment Spare Parts | 46,875 | |
| Geotechnical QAQC | 61,292 | |
| Geotechnical Detailed Design | 67,849 | |
| Geotechnical Field Investigations | 20,313 | |
| Process/Infrastructure Design & Drawings | 373,852 | |
| **Total Contracted Indirects** | | **1,233,330** |
| Portal Construction | 131,250 | |
| Capitalized Mine Op Cost | 214,923 | |
| Capital Development | 2,938,341 | |
| Mining Consultants | 189,681 | |
| Purchased Mine Equipment | 1,883,672 | |
| Camp | 284,448 | |
| Training & Materials | 31,531 | |
| Communication/IT Equipment | 233,433 | |
| Security & Safety Equipment | 120,203 | |
| Environmental | 27,638 | |
| **Total Owner Direct Cost** | | **6,055,120** |
| Preproduction Employment & Training | 1,318,103 | |
| Admin Consultants | 583,142 | |
| Employee Benefits & Assistance | 1,214,788 | |
| Travel - In-Country | 419,014 | |
| Project Management | 692,683 | |
| Mining Support | 7,803 | |
| Camp Catering | 340,655 | |
| ROW & Land Rental Fees | 46,875 | |
| Legal, Permits, & Fees | 348,008 | |
| IT/Software Expenses & Maintenance | 170,628 | |
| Utilities & Maintenance | 30,413 | |
| Insurance | 152,263 | |
| Environmental | 360,652 | |
| Security Services | 578,656 | |
| Occupational Health & Services | 90,125 | |
| Community Development/Relations | 245,863 | |
| Offsite Facility Rentals | 28,750 | |
| Corporate Travel and Services | 103,438 | |
| Office/Janitorial Supplies & Service | 24,221 | |
| Transportation & Fuel | 139,587 | |
| Vehicle Maintenance | 170,288 | |
| **Total Owner Indirect Cost** | | **7,065,955** |
| Subtotal Project Cost | | 26,465,613 |
| Contingency | | 1,984,921 |
| Invoices Prior to July 1, 2017 - Not Paid | | 314,271 |
| **Total Initial Capital Costs (USD)** | | **$ 28,764,805** |

### 21.1.2 Exclusions and Clarifications

The capital cost estimate is expressed in second quarter 2017 USD and the following items are not included in the capital cost estimate:

- Sunk costs that were incurred prior to completion of the FS, which is the basis for this technical report;
- All federal and state income taxes (excluding sales/use taxes), which are included in the financial analysis;
- Reclamation costs, which are included in the financial analysis;
- Working capital and sustaining capital, which are included in the financial analysis;
- Interest and financing costs;
- Escalation beyond second quarter 2017; and;
- Risk due to political upheaval, government policy changes, labor disputes, permitting delays, weather delays, or any other force majeure occurrences.

**Currency conversion has been made at a rate of 3.2 Brazilian Reais (R$) per 1 USD($).**.

### 21.1.3 Contingency

A contingency of $2 M (7.5%) has been included in the initial capital cost. This contingency is based on the level of definition that was used to prepare the capital cost estimate and the QP's confidence in the quality of the information and estimating methodologies used.

Contingency is an allowance to cover unforeseeable costs that may arise during the project execution, which reside within the scope-of-work but cannot be explicitly defined or described at the time of the estimate, due to lack of information. However, it does not cover scope changes or project exclusions. For the purposes of the financial analysis, it is assumed that the contingency will be spent.

### 21.1.4 Estimate Preparation

Utilizing the methodology described in Section 21.1.5 below, the capital cost estimate included in this technical report has been developed to a level sufficient to assess/evaluate various development options and project feasibility.

Initial contracted direct and indirect capital costs were estimated by: Chapleau mine operations staff and MDA for mine-related items; Chapleau process operations staff, Onix (process and infrastructure engineer), and MTB for process and infrastructure items; Anddes (TSF engineer) and MTB for TSF cost, and; GRE and MTB for miscellaneous site infrastructure items.

Owners direct and indirect costs were estimated by Chapleau operations staff and MTB.

The QPs for this section have reviewed and approved the capital cost estimates for inclusion in this technical report.

### 21.1.5 Estimating Methodology

The capital cost estimate addresses the proposed engineering, procurement, construction, and start-up of the mine, process plant and their related infrastructure, and ancillary facilities.

The capital cost estimate is based on use of refurbished equipment and the assumption that new equipment and materials will be purchased on a competitive basis and installation contracts will be awarded in defined packages for lump sum or unit rate contracts. Various sources for pricing were used, including commercial quotations, in-house recent data for similar completed work, factors, and estimators' judgment.

The estimating methodology for the major areas of the initial capital cost estimate are described below.

Contracted Direct Costs

- Mine-related Facility - Costs were developed from detailed plans and estimates prepared by Chapleau mine department staff. Where possible, pricing from local contractors doing other work at the Coringa Gold Project was used.
- Plant:
  - New equipment pricing was developed from detailed specifications prepared by Onix, and proposals from a minimum of three qualified vendors with which Chapleau, Reinarda, or Onix had previous satisfactory experience.
  - Bulk materials (platework, structural and miscellaneous steel, piping, and electrical cables, cable trays and conduit), were priced based on material takeoffs prepared by Onix using engineering drawings, and vendor proposals based on Onix detailed technical specifications.
  - Ancillary facilities, as listed and described in Section 18.9 were priced based on areas or volumes defined by sketches prepared by Chapleau operations staff, to which unit costs from local contractors were applied.
  - Construction labor cost was developed from a detailed estimate of manhours prepared by Chapleau operations staff, MTB, and an existing construction contractor which had dismantled the process plant and related facilities at Andorinhas during the period July 2016 – September 2016. The responsibility for construction was divided between the contractor's forces and Chapleau operations and maintenance labor based on specific scope and experience. Construction hourly burdened labor costs by classification, escalated from the 2016 contract and revised to incorporate specific conditions at the Coringa Gold Project, were applied to the contractor's designated scope. Chapleau's actual burdened payroll costs were applied to the manhours allocated to Chapleau labor.

    Plant electrical construction manhours were estimated by Chapleau electrical maintenance managerial staff, and Chapleau's burdened labor rates applied to these manhours. The core group, managerial and key supervisory staff which previously performed the dismantling of the plant and facilities at Andorinhas, is the same group designated for the electrical construction at the Coringa Gold Project.

- Site and Offsite Development:
  - Vegetation suppression pricing was obtained from commercial proposals recently provided by six pre-qualified and experienced contractors. The proposals were prepared from a detailed Request for Proposal (RFP), prepared by MTB, incorporating surveyed vegetation suppression areas, topographic mapping, and detailed vegetation inventories completed for each area by Terra, Chapleau's environmental consulting firm.
  - Site preparation costs were estimated by applying unit costs from earthwork contractors which had completed recent work at the Coringa Gold Project to detailed material takeoffs completed by Onix using AutoCAD and site rough grading drawings.
- Tailings Storage Facility: Detailed material takeoffs were prepared by Anddes using AutoCAD final feasibility level drawings. Anddes applied unit costs provided by MTB project staff based on recently completed work by local contractors at Coringa.
- CELPA Power Supply: Estimated costs for the CELPA substation to be located at the existing 138 kv transmission line and the estimated 25 km long transmission line to the Coringa Gold Project, were completed by Eng. Elton Nunes, a specialty power consultant known previously by Chapleau staff for his work at Andorinhas.

  Estimated costs are based on material takeoffs and pricing obtained in discussions with vendors, contractors, and CELPA, as well as recent historical costs for similar work.

Construction Indirect Costs

Estimating basis/methodology for construction indirect costs are described below:

- Catering: The monthly construction manpower was derived from the detailed construction schedule shown and discussed below in Section 21.1.6. Unit meal costs for three meals per day per person from the current construction camp catering contractor, LRB Alimentos do Brasil Ltda. (LRB), were applied to the estimated manpower levels.
- Services: Cleaning services for the construction camp facilities, laundry services for construction camp residents and linen supply are provided by LRB on a flat monthly basis. The current monthly rate from their contract was applied to the ten month construction period.
- Accommodations: Costs for construction personnel accommodations were derived from the flat monthly rental fee for the existing leased camp. The monthly costs were applied to the ten month anticipated construction period.
- Freight: All purchased materials and equipment were identified in a comprehensive spreadsheet showing the: description of the item(s); the weight and size of the item(s); the estimated number of truck loads based on size and weight; the loading

location; the distance and estimated transit time to the Coringa Gold Project, and; any additional ICMS tax liability not already included in the purchase price. Freight rates based on historical Andorinhas experience and current vendor contact information were used to assign costs to each load. 45 loads have been estimated.

- Craneage: The site plan, general arrangement plan and sections, and equipment weights were used to evaluate the boom length and lifting capability required to construct the plant. The detailed construction schedule was also used to determine the number of rental cranes required and the duration of their use onsite. Commercial proposals were requested by Chapleau operations and logistics staff which provided hourly rental rates (including operator), mobilization, and demobilization costs.

Contracted Indirect Costs

Estimating basis/methodology for contracted indirect costs are described below:

- Contracted Technical Services: Costs for contracted technical services from third parties, such as Geotechnical QA/QC, Geotechnical Detailed Design, Geotechnical Field Investigations, and Process/Infrastructure Design and Drawings, were derived from commercial proposals submitted by known providers in response to detailed RFPs with scope of work prepared, clarified, and negotiated by MTB project staff. All selected providers have done prior work at the Coringa Gold Project, hence are familiar with the site and project conditions.
- Initial Fills: Initial fills consist of an initial mill ball charge, initial carbon loading for the CIL circuit, initial charge and inventory for process reagents (predominantly lime and NaCN). Due to the remoteness of the area, shipping lead times from the vendors, and estimated transport times, initial fill quantities were adjusted beyond the concept of initial charges to the process. Additionally, one filling of the onsite 150,000 L diesel storage tanks was included. All costs were taken from current commercial quotations, including all freight and taxes.
- Plant Equipment Spare Parts: Much of the equipment used in the process is existing, and in some cases (cone crushers, compressors, motors), refurbished equipment from Andorinhas. A substantial inventory of spare parts already exists in the Coringa Gold Project warehouse for this equipment.

  New equipment and known additional needs for existing equipment were reviewed by Chapleau operations and maintenance management staff to identify additional items which might be needed. Allowances were made for the following items; mechanical equipment spares ($80,000); electrical equipment spares ($20,000); and; spare conveyor belt ($50,000). Allowances were developed based on historical experience.

Owner's Direct Costs

Estimating basis/methodology for owner's direct costs are described below:

- Mine-Related Costs (includes portal construction, capitalized mine operating cost, capital development, and purchased mine equipment): were developed by the Chapleau mine department. Estimated costs were developed from detailed plans, schedules, and equipment lists using recent historical actual costs, or, in some cases (i.e. purchased equipment) proposals including all freight, taxes, and duties, if applicable. Labor costs were developed from monthly staffing schedules associated with the phased mine development, and using actual Chapleau payroll costs including burden, benefits, and subsidies.
- Other items were developed by each department head based on estimated requirements and quoted or actual costs from Coringa Gold Project or historical costs from Andorinhas. Specific areas of significant cost are briefly discussed below:
    - Camp: Commercial proposals for outstanding items to complete the new operations accommodation, kitchen/cafeteria, or water supply/sewage treatment facilities were used as the cost basis.
    - Communications and IT Equipment: IT staff and MTB project staff determined additional IT systems, software, and individual computer requirements and allocated recent historical or quoted pricing to these items.

      The project wide digital radio system mandated by current Brazilian regulations was specified and competitive proposals sought from the two leading system suppliers in Brazil. After numerous clarifications and refinements, the final proposal amount was included as the basis for the cost estimate

Owner's Indirect Costs

Estimating basis/methodology for major items or grouping of items included as owner's indirect costs are described below:

- Preproduction Employment & Training, Administration Consultants, and Employee Benefits and Assistance: With the exception of mine department staffing costs (included in mine-related preproduction development costs described above) and Chapleau operations and maintenance staff costs for individuals directly involved in Coringa Gold Project construction activities (as discussed below in Section 21.1.6) a monthly staffing schedule was developed for Chapleau staff and administration consultants for the 10 month preproduction/construction period. Actual payroll based burdened labor costs, including benefits and subsidies, have been applied to all current and projected staffing. Costs for contracted administration consultants were applied at current contract rates.
- In-country Travel: Using the staffing schedule discussed above, rotation schedules, known and projected home bases, and current travel fares, travel-related costs were estimated by Chapleau administrative and MTB project staff.

- Project Management: Using the detailed construction schedule as a reference for activities and their respective durations, MTB estimated the level of effort required to provide engineering supervision and overall project and construction management functions, including cost monitoring, control and reporting, schedule monitoring and control, and contract management/administration. Travel-related expenses were estimated and billable labor costs applied to estimated hours.
- Camp Catering: The number of Chapleau staff who would be residents at the Coringa operations camp was estimated for each month of the preproduction/construction period using individual department staffing schedules. Meal costs per manday based on recent actual costs were applied to the total number of mandays calculated.
- Environmental: Consulting costs for ongoing environmental work to support licensing and permitting work was included based on actual proposals. Additional costs for ongoing air and water baseline sampling and analysis were included based on number of sampling events and actual unit costs from recent experience.
- Security Services: Actual monthly contracted security services costs were applied to the ten month preproduction/construction period at current contract rates. Security services cover Chapleau's presence in Novo Progresso, the Coringa Gold Project site, and the Coringa Gold Project camp complex.
- Community Development/Relations: Anfield and Chapleau staff developed estimated costs for community relations programs included in Chapleau's community relations plan. Overall costs also included ongoing part-time monthly support from Anfield's community relations consultant at existing contract rates.
- Other Indirect Costs: All other cost items were estimated by Chapleau department managers and MTB project staff using recent historical expenses, updated by current commercial quotations where warranted.

#### *21.1.6 Coringa Gold Project Construction Schedule and Execution Plan*

Schedule

The Coringa Gold Project construction schedule reflects actions required to accomplish detailed engineering, site development, construction, commissioning, and start-up. Main milestones of the construction period include: procurement of major equipment and services; contractors' mobilization; field investigations; detailed engineering; licensing and permitting; site and offsite development; construction of process plant, coffer, and tailings dams; mine portal and ramp development, and; plant commissioning and start-up. The schedule predicts construction completion and metallurgical commissioning in 10 months. This schedule forms the basis for the initial capital cost estimate.

Please refer to Figure 21.1 below. This is the summary level schedule, condensed from a detailed schedule.

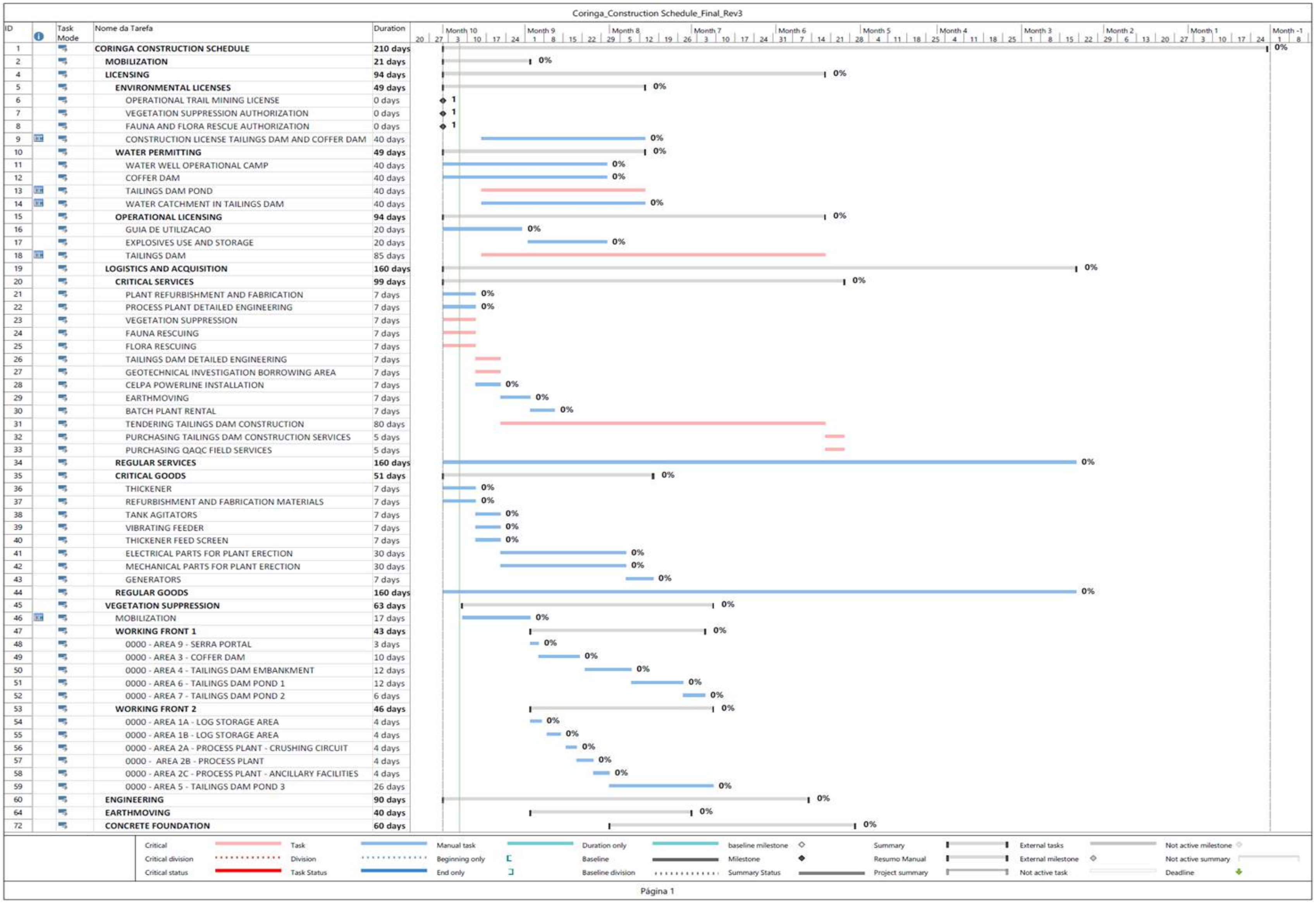
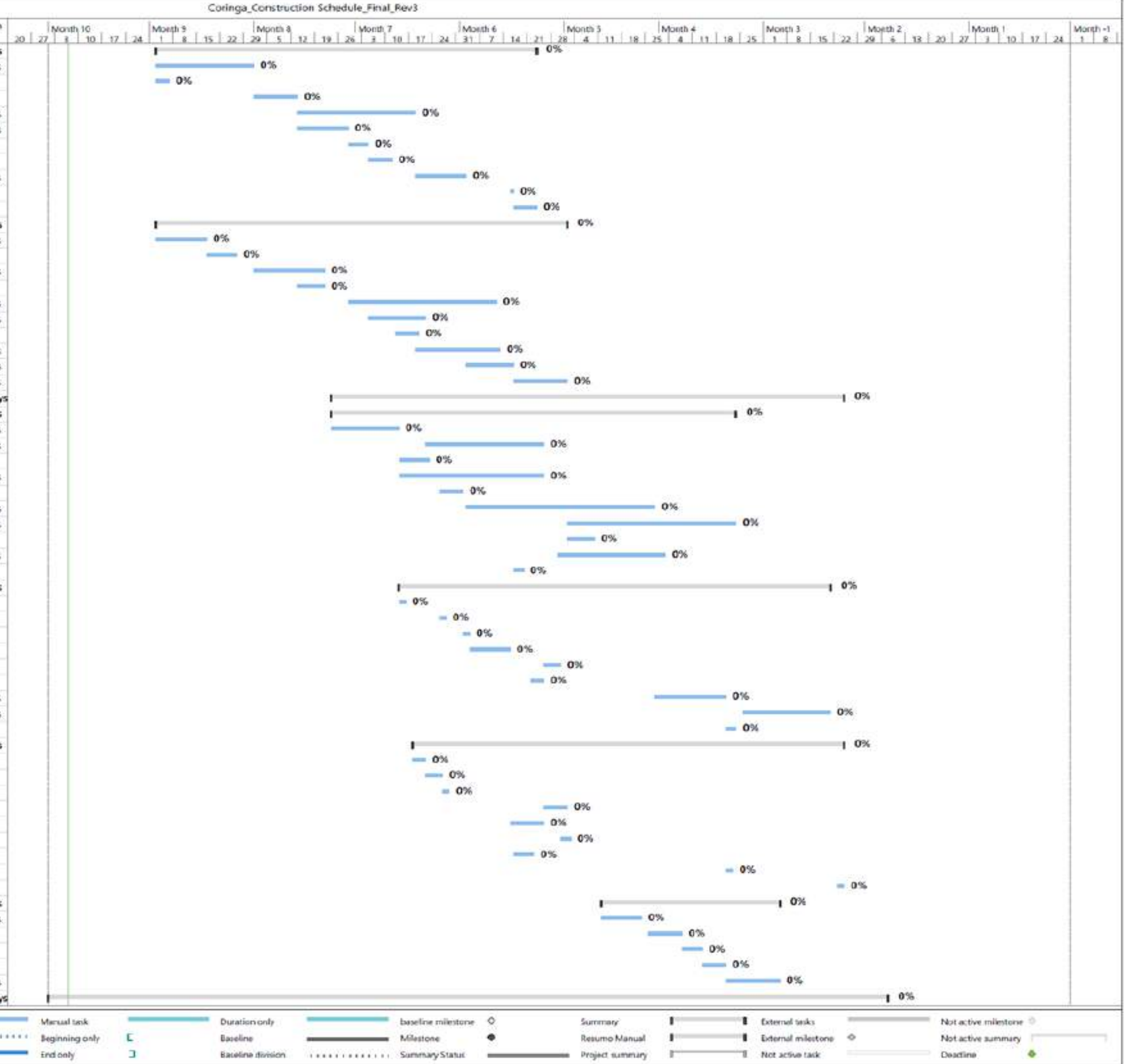



**Figure 21.1: Project Summary Construction Schedule**

Coringa_Construction Schedule_Final_Rev3

| ID | Nome da Tarefa | Duration |
|---|---|---|
| 106 | REFURBISHMENT | 76 days |
| 107 | 2005 - CRUSHING CIRCUIT | 20 days |
| 108 | 2030 - DETOX | 4 days |
| 109 | 2010 - ORE TUNNEL | 8 days |
| 110 | 3000 - ELUTION | 23 days |
| 111 | 2025 - CIL CIRCUIT | 10 days |
| 112 | 4000 - REAGENTS | 4 days |
| 113 | 3020 - GOLD ROOM | 5 days |
| 114 | 2015 - MILLING | 10 days |
| 115 | 2040 - PIPE RACK | 1 day |
| 116 | 5015 - COMPRESSORS STORAGE SHACK | 5 days |
| 117 | FABRICATION | 83 days |
| 118 | 2005 - CRUSHING CIRCUIT | 10 days |
| 119 | 2030 - DETOX | 7 days |
| 120 | 2020 - THICKENER | 13 days |
| 121 | 2010 - ORE TUNNEL | 5 days |
| 122 | 2025 - CIL CIRCUIT | 30 days |
| 123 | 4000 - REAGENTS | 12 days |
| 124 | 3020 - GOLD ROOM | 5 days |
| 125 | 3000 - ELUTION | 18 days |
| 126 | 2015 - MILLING | 10 days |
| 127 | 2040 - PIPE RACK | 12 days |
| 128 | ERECTION | 106 days |
| 129 | STRUCTURES | 84 days |
| 130 | 2005 - CRUSHING CIRCUIT | 13 days |
| 131 | 4000 - REAGENTS | 24 days |
| 132 | 2010 - ORE TUNNEL | 7 days |
| 133 | 2015 - MILLING | 30 days |
| 134 | 2030 - DETOX | 5 days |
| 135 | 2020 - THICKENER | 40 days |
| 136 | 2025 - CIL CIRCUIT | 36 days |
| 137 | 2040 - PIPE RACK | 6 days |
| 138 | 3000 - ELUTION | 24 days |
| 139 | 3020 - GOLD ROOM | 3 days |
| 140 | MAJOR EQUIPMENT | 91 days |
| 141 | 2005 - CRUSHING CIRCUIT | 2 days |
| 142 | 2010 - ORE TUNNEL | 2 days |
| 143 | 2030 - DETOX | 2 days |
| 144 | 3000 - ELUTION | 8 days |
| 145 | 2015 - MILLING | 3 days |
| 146 | 3020 - GOLD ROOM | 4 days |
| 147 | 2020 - THICKENER | 15 days |
| 148 | 2025 - CIL CIRCUIT | 20 days |
| 149 | 5015 - COMPRESSORS | 3 days |
| 150 | MINOR EQUIPMENT | 91 days |
| 151 | 2005 - CRUSHING CIRCUIT | 4 days |
| 152 | 2010 - ORE TUNNEL | 2 days |
| 153 | 2030 - DETOX | 2 days |
| 154 | 4000 - REAGENTS | 5 days |
| 155 | 3000 - ELUTION | 8 days |
| 156 | 2015 - MILLING | 3 days |
| 157 | 3020 - GOLD ROOM | 4 days |
| 158 | 2020 - THICKENER | 2 days |
| 159 | 2025 - CIL CIRCUIT | 2 days |
| 160 | PIPING | 39 days |
| 161 | 5020 - WATER PIPING | 10 days |
| 162 | 5015 - COMPRESSED AIR PIPING | 8 days |
| 163 | 7016 - GAS PIPING | 4 days |
| 164 | 2005 - LUB PIPING | 5 days |
| 165 | 4090 - REAGENTS PIPING | 12 days |
| 166 | ANCILLARY FACILITIES | 171 days |

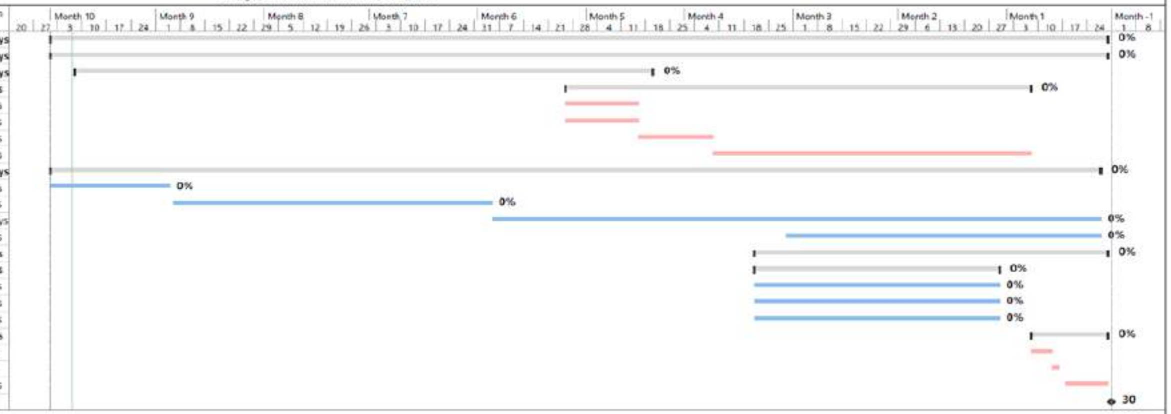


Página 2

**Project Summary Construction Schedule (continued)**

Coringa_Construction_Schedule_Final_Rev3

| ID | Task Mode | Nome da Tarefa | Duration |
|---|---|---|---|
| 193 | | **POWER SUPPLY** | **210 days** |
| 194 | | **CELPA** | **210 days** |
| 207 | | **GENERATORS** | **112 days** |
| 215 | | **TAILINGS DAM** | **95 days** |
| 216 | | 9010 - MOBILIZING CONSTRUCTOR | 15 days |
| 217 | | 9010 - MOBILIZING LABORATORY | 15 days |
| 218 | | 9015 - CONSTRUCTING COFFER DAM | 15 days |
| 219 | | 9010 - CONSTRUCTING TAILINGS DAM PHASE 1 | 65 days |
| 220 | | **MINE** | **208 days** |
| 221 | | MOBILIZATION | 23 days |
| 222 | | SERRA PORTAL | 60 days |
| 223 | | MAIN RAMP | 124 days |
| 224 | | SILL DRIVE LEVEL 340m | 64 days |
| 225 | | **PLANT COMMISSIONING** | **73 days** |
| 226 | | **PRE-COMMISSIONING** | **50 days** |
| 227 | | COLD TESTS | 50 days |
| 228 | | INSPECTIONS | 50 days |
| 229 | | CALIBRATIONS | 50 days |
| 230 | | **COMMISSIONING** | **16 days** |
| 231 | | HOT TESTS | 4 days |
| 232 | | STARTUP TEST | 2 days |
| 233 | | ASSISTED OPERATION | 10 days |
| 234 | | **STARTUP** | **0 days** |




Critical | Task | Manual task | Duration only | Baseline milestone | Summary | External tasks | Not active milestone
Critical division | Division | Beginning only | Baseline | Milestone | Resumo Manual | External milestone | Not active summary
Critical status | Task Status | End only | Baseline division | Summary Status | Project summary | Not active task | Deadline

Página 3

**Project Summary Construction Schedule (continued)**

Critical Path

The completion of the TSF is key for the entire mine start-up. The activities required to accomplish its construction represent the critical path of the project. Its construction represents the longest path for completion due to the time required for licensing and permitting.

The critical path starts in procurement, which is constrained by the approval of the project. The package of services to be procured includes: vegetation suppression; geotechnical investigation, identification, and evaluation of borrow material areas; detailed engineering design; licensing consultants; acquisition of construction aggregates; establishment of the onsite QA/QC laboratory, and; dam construction.

Construction Equipment

Critical construction equipment includes two 70-ton cranes, two flatbed trucks, a telehandler, and a *Munck* crane, which will be used mainly for erection of the plant equipment. Mine equipment includes two Atlas Copco jumbos, two Volvo A30 trucks, a Doosan Scaler, LHD, and jackhammers, which will be used to open the portal and develop the ramp during the construction period. The equipment required to complete vegetation suppression, earthmoving, and other construction, such as the tailings dam, will be supplied by the contractors as part of their contracts.

Construction Manpower

As can be seen below in Table 21.2, construction manpower peaks at 250 workers, including 168 contractors and 82 Chapleau staff in month -4 of the construction schedule. Once construction starts, the number of contractors' workers increases rapidly to 168 then decreases to 11 in the last month of construction. Chapleau manpower consists mainly of mine staff, as well as electrical and mechanical maintenance staff who will work on the plant refurbishment and concrete construction.

**Table 21.2: Construction Manpower**

| | Construction Period (Project Month) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Manpower Estimate** | -10 | -9 | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 |
| Contractor | 21 | 126 | 145 | 168 | 120 | 106 | 98 | 55 | 31 | 11 |
| Chapleau | 14 | 42 | 56 | 82 | 82 | 82 | 112 | 112 | 112 | 107 |
| Total | 35 | 168 | 201 | 250 | 202 | 188 | 210 | 167 | 143 | 118 |

Temporary Facilities and Services

A temporary camp will accommodate contractors onsite. It is a fully equipped container camp with 1,680 $m^2$ provided by 52 containers, including 32 quadruple accommodations. Comfortable accommodations for 128 workers, contractor supervision offices, and bathrooms with hot showers are included. Catering, laundry, housekeeping, and sewage waste collection services will be provided by service companies. A fully equipped kitchen and cafeteria with 200 seat capacity will serve 3 meals per person per day.

A water well supplies up to 80$m^3$/day of potable water. A 500 KVA diesel generator, with a 340 KVA spare generator, provides power to operate the camp. A 15,000 L fuel storage facility with all applicable environmental controls provides fuel for the generators, contractor's equipment, and Chapleau operations.

A fully equipped clinic and a health team with a doctor and nurse technicians provide medical support for sickness and accidents onsite. A four-wheel drive ambulance is available to transfer personnel to the municipality of Novo Progresso in case of more severe injuries. A water truck equipped with firefighting systems, as well as a firefighting brigade of 20 well-trained employees allows prevention measures and quick reaction in case of a fire event onsite.

Site security and access control is provided by Chapleau's security consultant for all activities on the Coringa property, whether for operations or construction.

Wireless internet is available for all personnel at site with 5 MB upload and download speeds. A digital radio system will be implemented to allow surface and underground communications. Portable satellite telephones are available for emergency communications.

Contracting Plan

The individual work packages and the split of responsibilities between Chapleau and consultant/contractor workforces are detailed below in Table 21.3.

**Table 21.3: Contracting Plan**

| PACKAGE | AREA | ITEM | RESPONSIBLE |
|---|---|---|---|
| Detailed Engineering | Plant | Detailed design | Contractor |
| | Tailings Dam | Detailed design | Contractor |
| | | Geotechnical field investigation | Contractor |
| Site and off site preparation | Vegetation Suppression | Vegetation Supression | Contractor |
| | | Fauna rescue | Contractor |
| | | Flora rescue | Contractor |
| | Access road improvement | Improvement of offsite roads | Contractor |
| | | Improvement of onsite roads | Contractor |
| | Plant | Earthmoving | Contractor |
| | | Concrete foundation | Chapleau/Contractor |
| | | Electrical refurbishment, fabrication and erection | Chapleau |
| | | Mechanical refurbishment, fabrication and erection | Contractor |
| | Tailings dam | Construction | Contractor |
| | | Field QAQC | Contractor |
| | Mine | Serra Portal | Chapleau |
| | | Ramp development | Chapleau |
| | Ancillary facilities | Warehouse | Contractor |
| | | Crushing control room | Contractor |
| | | Fuel storage facility | Contractor |
| | | Generators area | Contractor |
| | | Sanitary landfill | Contractor |
| | | Maintenance shop | Contractor |
| | | Cafeteria | Contractor |
| | | Truck scale | Contractor |
| | | Chemical laboratory | Contractor |
| | | Physical laboratory | Contractor |
| | | Reagents | Contractor |
| | | Plant office | Contractor |
| | | Compressed air storage facility | Contractor |
| | | Water catchment stations | Contractor |
| | | Water treatment station | Contractor |
| | | Sewage treatment station | Contractor |
| | | Firefighting system | Contractor |
| | | Harzadous waste storage facility | Contractor |
| | | Mine substation | Contractor |
| | | Plant substation | Contractor |
| | | Plant fence | Contractor |
| | | Gas storage facility | Contractor |
| | | Airstrip | Contractor |

Average time for contractors' mobilization to site is 20 days.

Execution Plan

Engineering Execution

Engineering is being conducted to ensure proper construction and operation of the project. Basic engineering for the plant, feasibility level design for the TSF, and mine design have been completed. Detailed design of the plant has started and will be completed in month -6 of the construction period.

The feasibility level design of the TSF was completed to define the concept, layout, capital, and schedule requirements to construct the facility, as well as to support permitting activities by demonstrating compliance with technical and regulatory requirements. The design was complemented by geotechnical and hydrogeological field investigations and laboratory testing.

Relatively minor additional geotechnical field investigation is required to support completion of detailed design of the TSF. Detailed design will produce final construction drawings and technical specifications to facilitate quality construction. Three months will be needed to complete the additional geotechnical field investigations, laboratory testing, and detailed design of the TSF.

Procurement Execution

The procurement execution plan will be put in place for acquisition and transport of goods for construction. 45 loads will be needed to accomplish the transportation of around 1,125 tons of equipment and materials to the construction site. Due to the remote nature of the project, logistics will be a critical factor for successful project completion. Acquisitions will be made in six states around Brazil, with distances varying from 560 km up to 2,660 km, with 1,910 km of average distance to the construction site. Average transportation time is 12 days.

Critical procurement items are categorized in three areas:

- Equipment and materials: items with longer lead times, such as the thickener, generators, and materials for plant refurbishment and fabrication will be procured first.
- Critical services to be engaged first are: vegetation suppression, including rescue of flora and fauna services; earthmoving; coffer and tailings dam construction, and; powerline installation.
- Rental of construction equipment, primarily cranes for plant erection, concrete batch plant and mixers for concrete construction, and a flatbed truck for transport of materials and equipment between the laydown area and the construction areas, is needed early.

Purchasing, expediting, and logistics functions will be provided by Chapleau staff. Logistics will commence immediately after the purchase order is approved. A list of key transport companies will provide transportation of goods. An expediter will oversee the timely provision and delivery of materials and services, analyzing the manufacturing or assembly status per contracts and schedules, to ensure that the delivery deadlines established will be achieved. A list of major purchases to commence the project are described in Table 21.4.

**Table 21.4: Major Purchases**

| PACKAGE | AREA | MAJOR CRITICAL ITEMS | SCHEDULED PURCHASE PROJECT MONTH |
|---|---|---|---|
| Power | General | Technical Consultancy | -10 |
| | | CELPA Substation and powerline | -10 |
| Equipment | Plant | Thickener | -10 |
| | | 7 generators | -9 |
| | | 8 agitators | -8 |
| | | Vibrating feeder | -10 |
| | | Thickener feed screen | -8 |
| Detailed Engineering | Plant | Detailed design | -10 |
| | Tailings Dam | Detailed design | -10 |
| | | Geotechnical field investigation | -10 |
| | | Laboratory analyzes | -9 |
| Site and off site preparation | Serra Portal, Plant, Tailings dam | Vegetation Supression | -10 |
| | | Fauna rescue | -10 |
| | | Flora rescue | -10 |
| | | Clinic | -10 |
| | | Seed nursery | -10 |
| | | Log donation | -10 |
| | | Fauna and Flora transfering | -10 |
| Construction | Plant | Earthmoving | -9 |
| | | Concrete | -8 |
| | | Third party labor (refurbishment/fabrication/erection) | -10 |
| | | Materials (refurbishment) | -10 |
| | | Materials (mechanical erection) | -10 |
| | | Electrics (electrical erection) | -10 |
| | Tailings dam | Construction | -7 |
| | | Field QAQC | -7 |

* Project starts on month -10 and finishes in month -1

Slippage of the purchasing/contracting dates shown above will result in corresponding slippage of the construction completion date.

Construction Execution

- Vegetation Suppression - An area of 29.6 ha of vegetation suppression of native forest is planned to be completed within 60 days after the mobilization of the contractor in month -9. Vegetation suppression includes sites for the process plant, ancillary facilities, coffer and tailings dams, and the Serra portal facilities. The sequence planned for vegetation suppression reflects the priority of construction of the main infrastructure at site. To accomplish the suppression, two teams will be working on two fronts concurrently. The first front includes the clearing of the sites for log and timber storage, the process plant, the coffer dam, and part of the tailings pond. The second front will be responsible for clearing the Serra mine portal, the tailings dam embankment, and part of the tailings pond. Priorities are to clear areas for log storage, the Serra Portal, the crushing circuit, and the coffer dam. Early completion of the crushing circuit will allow crushing of benign mine waste rock for aggregate during construction and for road aggregate to increase safety during the wet season. The coffer dam will be used as a storage facility for runoff during the wet season to be used for plant commissioning and start-up during the dry season and before reclaim water is available from the TSF.

- Earthworks – Rough grading of the process plant area is scheduled to be accomplished in 45 days. Earthmoving is sequenced as follows: first the site where the crushing circuit will be constructed; second the areas for thickening, classification, leaching, and detox circuits, as well as the generators, substation, fuel tank and maintenance shop facilities; the third area includes mainly ancillary facilities and the security gate, and; last is the ore stockpile area, which will be filled with material excavated from the three previous stages of the earthmoving.

  Modifications and refurbishment of internal and external access roads are included in site and offsite development of the project. These activities are planned to take place in months -10 and -9 of the schedule to allow completion before the beginning of the rainy season.

- Concrete - Concrete work for the process plant commences immediately after the first earthmoving stage is completed. The mill concrete work is planned to have been completed in month -6 of the schedule. Two crews will be working concurrently at different sites: the first team will progressively complete the crushing, milling, classification, and elution circuits, and; the second team will progressively complete the leaching, detox, gold room, and thickening circuits, as well as the reagent areas, and substations. Cure time for concrete is also allowed in the schedule before setting equipment. Concrete and earthmoving overlap 30 days during months -9 and -8 of the schedule. Ancillary facilities will be constructed independently by other crews between months -8 and -2 of the construction schedule.

- Plant Erection – Plant erection is planned to commence progressively as concrete foundations have been completed and adequate curing time has been allowed. The sequence of erection will match the concrete sequence, commencing with the crushing circuit. Erection of major equipment will precede the erection of minor equipment. Equipment showing major lead time, i.e. the thickener and tank agitators will be erected later in the schedule. All existing equipment and materials for the process plant are currently dismantled and stored in the laydown area. Refurbishment and fabrication will take place between months -9 and -6 mainly by

Chapleau staff, preceding plant erection. Mechanical erection will be completed by third party contractors, while electrical erection will be completed by Chapleau staff, some temporarily hired for this purpose. A pre-commissioning phase will commence in month -3, with cold tests, inspections, and calibrations, allowing time for corrections and correct setup of the plant. The final commissioning phase is planned to commence in month -1 of the construction schedule, with hot tests, startup, and assisted operation during the last 10 days of the schedule.

- TSF – The construction of the first phase of the TSF will start in month -5, immediately after the construction license has been received and the detailed design has been completed. The construction will be completed in three months. A temporary coffer dam will be constructed upstream of the tailings embankment to capture runoff from precipitation during the wet season. The coffer dam will enable quality construction in a dry area, as well as capturing water to be used during the commissioning and start-up periods. Material for its construction will be borrowed within 1 km of the embankment. Critical specified aggregates, such as for embankment drains, will be purchased from regional suppliers. As previously mentioned, QA/QC laboratory analyzes will be completed by a technician at an onsite laboratory to ensure proper quality and adherence to Brazilian construction standards and regulations, especially if construction takes place during the rainy season. In this case, a drainage system will be put in place to allow quick resumption of work immediately after a rainfall. Moisture control and compaction testing will be critical during construction.
- Mine Development – Mine development will start immediately after the vegetation suppression of the portal area has been completed. All mine activities will be executed by Chapleau staff. The Serra portal is planned to commence in month -9 and be completed in month -7. Ramp development will be executed using mining equipment already available, i.e. jumbo, LHD, and trucks. 140 m of a 14% decline ramp are planned to be completed in month -4 of the construction schedule when the ramp will reach level 340 m, the first level to be mined commencing in month -3 of the schedule. The sill drive will be opened by using selective development in the first level to expose the quartz vein. Concurrent to the sill drive development, the ramp will continue to go down to reach level 340 m, where the bottom sill drive will be developed. Vertical development will open ventilation raises between levels.
- Project/Construction Management and Supervision – Overall project and construction management will be provided by MTB, the same company which developed and managed the early project implementation and FS. Experienced Chapleau staff will work with MTB to provide construction supervision services. The mine portal and the ramp development will be completed and managed by Chapleau staff. The onsite QA/QC laboratory and laboratory technician will assist the construction management and supervision team to ensure quality construction of the coffer dam, tailings dam, and concrete foundations for the process plant.

Management procedures will include shift meetings and site inspections on a daily basis to ensure adequate flow of proposed activities. Safety and environmental inspections are key procedures to ensure appropriate work conditions at the work sites. A three week look ahead schedule will be updated on a weekly basis to facilitate daily coordination and short term detailed planning of activities. Management Key Performance Indictors (KPIs) will be applied to monitor timeliness, budget, quality, and effectiveness of actions proposed, being accompanied in a summarized dashboard. The proper management of KPIs is key to ensure planned execution within the proposed budget.

## 21.2 Operating Cost Estimate

### *21.2.1 Summary*

Operating costs have been estimated according to the main project areas identified as mining, processing, and G&A. Methodologies and further details are summarized in sections that follow. Table 21.5 shows the LOM operating cost summarized by area. Average LOM costs per tonne of ore were calculated using 768,577 tons LOM throughput. This same factor was used in calculating area-specific unit costs in the tables that follow for each area of operation.

**Table 21.5: LOM Average Operating Cost Summary (USD)**

| Area Description | Total Life of Mine Cost | Average LOM Unit Cost $/t ore |
|---|---|---|
| Mining | 32,035,509 | 41.68 |
| Processing | 25,756,467 | 33.51 |
| G&A and Site Costs | 25,471,096 | 33.14 |
| **Total LOM Operating Cost** | **$ 83,263,072** | **$ 108.33** |

### *21.2.2 Operating Costs - Mining*

Operating costs for mining were derived from detailed monthly mine production and development schedules throughout mine life.

Advance rates in meters, production rates in tons, and equipment production capabilities (in penetration rates, load capacity, cycle time, utilization and availability) were considered in developing the detailed schedules.

Equipment, labor, and materials costs were then developed to yield the production stated in the schedules. Mine operating costs were assessed using recent historical production history from Andorinhas, equipment specifications, and current pricing for energy, fuel, and labor. Labor staffing at full mine production is described in Table 16.7 in Section 16 of this report.

Detailed mine operating costs were developed for each of the following areas, utilizing the schedules and costs described above:

- Drilling
- Blasting
- Load & haul
- Infrastructure
- Ventilation
- Roof support
- Other civil
- Pumping
- Labor
- Energy
- Maintenance
- Support equipment

Major cost inputs utilized were:

- Fuel - $2.76/L delivered to the Coringa Gold Project, including all taxes
- Energy
  - Diesel Generators* - $0.24/kWh based on the energy consumptions for the detailed electrical load demand list, using above fuel cost and generator manufacturer's calculated fuel consumption.
  - CELPA Utility Power* - $0.0825/kWh applied to the electrical load demand list, calculated consumption, and application of CELPA rates from its current rate schedule and historical experience.
- Labor – Total labor cost by job classification, including burden, benefits, and subsidies, based on actual current payroll details.

*Diesel generators have been incorporated for the preproduction period and for the first eight months of production operations. Thereafter the CELPA power supply has been assumed to be complete and utility power in use.

LOM total mine operating cost and average LOM unit cost per ton of ore are $32,035,509 and $41.68, respectively, as shown in Table 21.5 above.

### *21.2.3 Operating Costs - Processing*

Process operating costs are summarized above in Table 21.5 for total LOM cost and average LOM unit cost per ton ore. The operating costs are detailed by area in Table 21.6 below.

**Table 21.6: Detailed Process Operating Costs**

| Area Description | Fixed or Variable | Life of Mine Total Cost *(USD)* | Average LOM Unit Cost $/t ore |
|---|---|---|---|
| Labor | Fixed | 7,396,427 | 9.63 |
| Maintenance Supplies & Materials | Fixed | 1,279,355 | 1.67 |
| Power | Variable | 7,178,085 | 9.34 |
| Crushing & Grinding Steel | Variable | 3,662,800 | 4.76 |
| Reagent Chemicals | Variable | 5,173,400 | 6.72 |
| Laboratory | Variable | 1,066,400 | 1.39 |
| **Total LOM Process Operating Cost** | | **$ 25,756,467** | **$ 33.51** |

Fixed costs are costs that remain the same from period to period because they are time-related, not throughput related. Variable costs, on the other hand, are a function of the tonnage processed during the time period.

The bases for the operating costs are:

- Process operating and maintenance labor, including the laboratory, is reflected in the organization chart and the staffing schedule shown in Figure 17.4 and Tables 17.4 and 17.5, respectively.
- Similar to labor for mine operating costs discussed in Section 21.2.2 above, labor costs for the process are based on actual payroll costs, including burden, benefits, and subsidies.
- Power costs have been developed from a detailed electrical load list prepared by Onix for the plant and related infrastructure and ancillary facilities. Availability, utilization, and demand load have been assessed for each electrical load. The same unit cost basis, as described for mining energy costs above, has been used for the process.
- Reagent chemicals and crushing and grinding steel quantities have been quantified by Onix from current metallurgical testwork, and, in a few cases, from historical experience at similar operating plants.
- All reagents and materials, including fuel, have been competitively tendered at a commercial level. The pricing received and used herein includes all taxes, and delivery to Coringa.

### *21.2.4 General and Administration and Site Costs*

The components that comprise G&A are listed below with their estimated values in Table 21.7. G&A costs are fixed rather than variable; that is they are time-dependent rather than production throughput dependent.

G&A costs are those costs which do not specifically apply to mining and processing functions, services, or materials. Specifically, finance and administration labor as shown in the Figure 21.2, organization chart, along with the associated burden, benefits, and subsidies, is considered to be a typical G&A cost component.

Services and materials which apply to the entire company, as opposed to mining or processing specifically, are included as part of G&A.

Site costs are costs for project or site-specific elements which may not be necessary on other projects. Examples could be associated with remote location factors, such as camp accommodations, higher personnel travel costs, and site security requirements. Other site-specific or project-specific costs could be the result of extensive environmental and permitting requirements.

Most of the G&A and site cost items in Table 21.7 have been estimated using actual costs for identical or similar services or materials purchased since Anfield acquired the Coringa Gold Project in May 2016 or before at Andorinhas (a similar mining and processing operation).

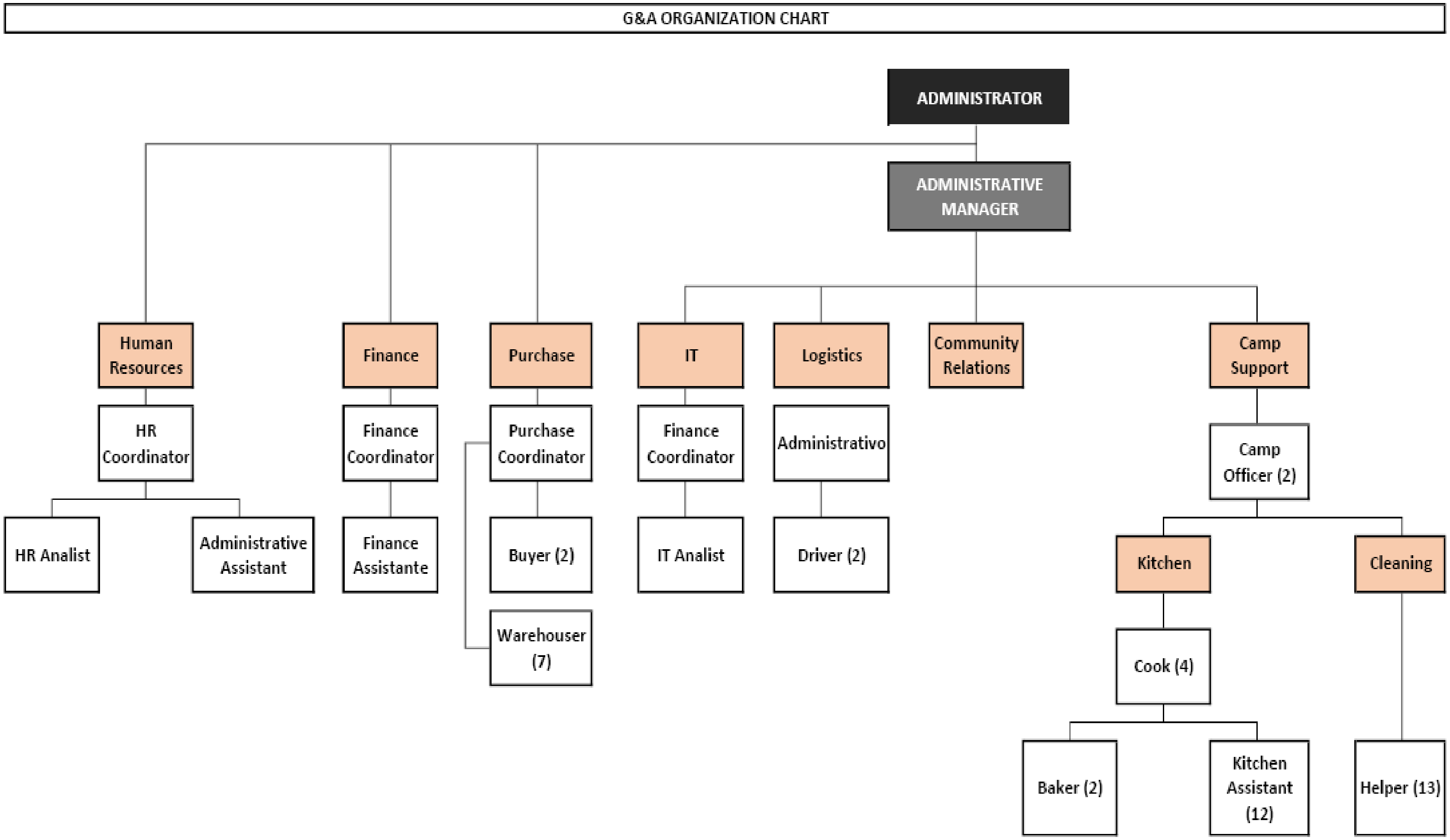



**Figure 21.2: General and Administration Organization Chart**

**Table 21.7: Detailed G&A Operating Costs**

| General and Administration and Site Costs | | Y1 (US$) | Y2 (US$) |
|---|---|---|---|
| Burdened Labor | Fixed | $ 1,147,559 | $ 1,134,643 |
| Recruiting/Turnover/Hiring costs | Fixed | $ 69,825 | $ 69,825 |
| Employee Subsidies (food, housing assistance) | Fixed | $ 88,066 | $ 88,066 |
| Employee Benefits (insurance) | Fixed | $ 278,281 | $ 278,281 |
| Travel & Accommodations (meals & other related expenses) | Fixed | $ 57,103 | $ 57,103 |
| Employee Housing (NP) | Fixed | $ 22,500 | $ 22,500 |
| Employee Meals (NP employees and visitors) | Fixed | $ 52,380 | $ 52,380 |
| Camp Catering | Fixed | $ 1,286,250 | $ 1,286,250 |
| ROW and Land Rental Fees | Fixed | $ 56,250 | $ 56,250 |
| Legal, Permits, and Fees | Fixed | $ 244,500 | $ 244,500 |
| IT Software and Hardware Maintenance | Fixed | $ 204,750 | $ 204,750 |
| Utilities and Maintenance | Fixed | $ 36,495 | $ 36,495 |
| Insurance | Fixed | $ 156,658 | $ 156,658 |
| Environmental Services and Supplies | Fixed | $ 128,013 | $ 128,013 |
| Health and Safety (incl. Medical) Services and Supplies | Fixed | $ 146,583 | $ 146,583 |
| Security Services | Fixed | $ 930,000 | $ 930,000 |
| Community Development/Relations | Fixed | $ 139,880 | $ 139,880 |
| Offsite Facility Rentals | Fixed | $ 34,500 | $ 34,500 |
| Corporate Travel and Expenses | Fixed | $ 124,500 | $ 124,500 |
| Office/Janitorial Supplies and Services | Fixed | $ 29,066 | $ 29,066 |
| Transportation and Fuel | Fixed | $ 167,505 | $ 167,505 |
| Vehicle Maintenance | Fixed | $ 204,345 | $ 204,345 |
| Miscellaneous Consultants (allowance) | Fixed | $ 18,750 | $ 18,750 |
| **Total LOM Operating Cost - General and Administration (US$)** | | **$ 5,623,759** | **$ 5,610,843** |

### *21.2.5 Exclusions and Clarifications*

Operating costs are expressed in second quarter 2017 USD. **The exchange rate from Reais to USD is 3.2 Reais (R$) to 1.0 USD($).**

The following items are not included in the operating cost estimate:

- Contingency allowance
- Escalation beyond second quarter 2017
- Transportation, insurance, and refining costs for doré are included in the financial analysis

# 22 ECONOMIC ANALYSIS

## 22.1 General Criteria

MTB, under the supervision and in conjunction with the QP responsible for this section, has completed a FS level economic evaluation of the Coringa Gold Project for Anfield. Key objectives of developing the economic model were to:

- Gather information from various professionals in related disciplines including mine development, engineering, and metallurgy, among others;
- Identify and balance components in the model to determine the most favorable return on investment;
- On a high level, simulate operation over the expected life of the project;
- Allow for assessment of the project's potential economic viability;
- Support management in the financial decision-making process; and
- Provide a foundation for the next phase of project advancement.

Methodology involved in developing the FS economic model is explained in the following sections and technical parameters are provided as applicable. Summations of key project data are presented in tables extracted from the model. A listing of select model inputs is given in Table 22.1.

**Table 22.1: Economic Model Inputs**

| Description | Values |
|---|---|
| Construction Period | 10 months |
| Preproduction Period | 10 months |
| Life of Mine (LOM) after Preproduction | 4.8 years |
| LOM Ore (tonnes) | 768,577 |
| LOM Gold Production (troy ozs) | 152,908 |
| LOM Silver Production (troy oz) | 198,075 |
| **LOM Grade** | |
| Gold (grams per tonne) | 6.5 |
| Silver (grams per tonne) | 13.1 |
| Avg Annual Gold Production (troy oz) | 31,856 |
| Avg Annual Silver Production (troy oz) | 41,266 |
| **Market Price (USD/troy oz)** | |
| Gold | $1,250 |
| Silver | $18.00 |
| **Cost and Tax Criteria** | |
| Estimate Basis | 1-Jul-17 |
| Foreign Exchange Rate (R$/USD) | 3.2 |
| Inflation/Currency Fluctuation | None |
| Leverage | 100% Equity |
| Tax - Federal (IRPJ) | 25% |
| Tax - SUDAM Incentive (IRPJ Reduction beginning Year 2) | -18.75% |
| Tax - Federal (CSLL) | 9% |
| **Depreciation** | |
| Vehicles & Mobile Equipment (24 hr/day, 7 day/wk) | 40% |
| Production Equipment, Underground Development | UOP |
| Ancillary Facilities (Camp, Kitchen, Maintenance Shop) | 4% |
| **Royalties** | |
| Sandstorm | 2.50% |
| Brazil (Federal Government) | 1.0% |
| Land | 0.50% |
| **Transportation Charges** | |
| Dore Shipment Cost (per shipment, site to refinery) | $41,563 |
| **Payment Terms** | |
| Advance | 95% |
| Settlement | 8 days |

## 22.2 Production Summary

At the foundation of the economic model, data was drawn from the mine and plant production schedules, which were produced by MDA and MTB (under the QP's supervision), respectively, and are summarized in Table 22.2. The QP responsible for this section has compiled, reviewed, and approved the production schedules for inclusion into this technical report.

**Table 22.2: Process Production Schedule**

| Year | Total Ore Mined | Total Ore Processed | Year End Stockpile | Gold Produced* | Silver Produced* |
|---|---|---|---|---|---|
| | *Tonnes* | *Tonnes* | *Tonnes* | *Troy Ozs* | *Troy Ozs* |
| **-1** | 4,918 | | 4,918 | | |
| **1** | 144,593 | 149,008 | 503 | 27,120 | 33,934 |
| **2** | 170,931 | 169,764 | 1,670 | 35,371 | 47,136 |
| **3** | 161,420 | 163,090 | - | 27,845 | 31,797 |
| **4** | 186,503 | 178,776 | 7,727 | 40,448 | 59,051 |
| **5** | 100,212 | 107,939 | - | 22,124 | 26,158 |
| **LOM** | **768,577** | **768,577** | | **152,908** | **198,075** |

*Note: After metallurgical recovery and refining loss.

## 22.3 Gross Revenue from Mining

For purposes of the economic model, the gold price of $1,250/oz was used, and $18/oz of silver was used.

The precious metal markets are highly liquid and benefit from terminal markets around the world (e.g., London, New York, Tokyo, and Hong Kong). The gold and silver prices used in the economic analysis were selected by Anfield, and are informed by the 2017 trading values preceding the effective date of the report. The London PM fix for gold and silver on June 30, 2017 was USD$1,242/oz and USD$16.47/oz, respectively. Year-to date, gold has traded between USD$1,151 oz and USD$1,294 oz and silver has traded between USD$15.22/oz and USD$18.56/oz using the London PM fix.

Market prices for silver and gold are applied to corresponding recovered silver and gold ounces in the economic model. A sensitivity analysis was completed as part of the overall economic analysis. The results of this are discussed in Section 22.16. Table 22.7 shows the gold price sensitivity in the economic results.

## 22.4 Transportation

Transportation charges for collecting gold doré from the Coringa Gold Project plant, then flying the doré to a refinery in Sao Paulo, Brazil, were provided as a budgetary quotation by Brinks

Global Services. The doré has been assumed to have a gold content of approximately 30% by weight, and silver content of approximately 42% by weight, based on preliminary process calculations. Using this basis, the mass of doré produced was calculated for use in transportation, treatment and refining charges (TC/RCs), and penalty calculations.

## 22.5 TC, RC, and Penalties

The economic model's costs for TC/RCs and penalties were taken from a quotation dated May 5, 2017 received from Republic Metals Corporation of Miami, Florida considered to be typical for gold and silver refining. This quotation is based on providing approximately 50,000 oz/y of gold. TCs are quoted at $0.30/oz of gold, metal returns are 99.95% for gold and 99.0% for silver. Settlement is scheduled for eight days after receipt and an advance rate of 95% was provided. Deleterious element penalties were provided in the quotation, given in Table 22.3, with the only element relevant to the Coringa Gold Project being lead (Pb). Sample doré from the Coringa Gold Project contains 1.1% lead, with no other deleterious elements exceeding Republic Metal's free upper limit.

**Table 22.3: Republic Metals Deleterious Penalty/Fees**

SCHEDULE "B"

DELETERIOUS PENALTY/FEES

REPUBLIC METALS CORPORATION
Refiners of Precious Metals

| Element | | Free Upper Limit -% | Increments % | Maximum Level % | Increment Charge per MT |
|---|---|---|---|---|---|
| Arsenic | As | 0.01 | 0.01 | 2 | 30 |
| Antimony | Sb | 2 | 1 | 10 | 70 |
| Bismuth | Bi | 0.01 | 0.01 | 1 | 25 |
| Cadmium | Cd | 0.01 | 0.01 | 1 | 35 |
| Mercury | Hg | 0.01 | 0.01 | 0.05 | 350 |
| Selenium | Se | 0.1 | 0.05 | 2 | 35 |
| Tellurium | Te | 0.1 | 0.05 | 1 | 75 |

| | Base Metals | Free Upper Limit | | Maximum Level % | Increment Charge per MT |
|---|---|---|---|---|---|
| Tin | Sn | 2 | 1 | 10 | 50 |
| Nickel | Ni | 1 | 1 | 10 | 50 |
| Zinc | Zn | 5 | 1 | 15 | 20 |
| Lead | Pb | 1 | 1 | 8 | 100 |

## 22.6 Royalties

The Coringa Gold Project has a royalty agreement with Sandstorm providing Sandstorm with a 2.5% royalty on the NSR of recoverable minerals produced from the Coringa Gold Project. The agreement, dated May 11, 2012, transferred from Magellan Minerals to Anfield upon purchasing the Project, in accordance with Article 7 of the Royalty Agreement.

In addition, the Federal Government of Brazil requires a 1% royalty on gold and silver produced in Brazil. Proceeds of the 1% royalty are divided between local, state, and federal governments: 65% of the proceeds go to the municipality where the mineral is being exploited, 23% of the proceeds go to the state (Pará), and 12% of the proceeds go to Brazil's Federal Government (DNPM, IBAMA, MCT).

Under Brazilian mining law, in the case where the land is not owned by the miner, local land owners receive a royalty equal to one half of the Federal royalty. Therefore, the economic model includes a 0.5% royalty payable to local land owners in the Coringa Gold Project area. The 0.5% royalty was added to the 1% Federal royalty in the cash flow model.

These royalties are based upon proceeds paid by smelters less certain costs, including costs incurred to transport the concentrates to the smelters, or NSR, for mineralized material produced in the property area subject to the royalties.

## 22.7 Foreign Exchange Rate

For the purposes of the economic model, all capital, operating, and sustaining capital costs were evaluated based upon the currency used to pay the cost. As a result, all capital and operating expenses, and the vast majority of sustaining capital expenses, were evaluated in the source currency of R$, then converted to USD for the cash flow analysis. **The exchange rate from Reais to USD of 3.2 Reais (R$) to 1.0 USD($) was used in the economic analysis.** It is based on the approximate rounded mid-point of 2017 trading values preceding the effective date of the report. The USD$:R$ exchange ratio closed at 3.31 on June 30, 2017 and has traded between 3.06 and 3.38 year-to-date.

A sensitivity analysis was completed as part of the overall economic analysis. The results of this analysis are discussed in Section 22.16. Table 22.10 shows the Coringa Gold Project's sensitivity to the exchange rate.

## 22.8 Operating Costs

Operating costs as previously described in Section 21.2 of this report served as input to the economic model.

## 22.9 Mine Development Costs

Mine development costs as previously described in Section 21.2 of this report served as input to the economic model.

## 22.10 Depreciation

In calculating depreciation, all initial and sustaining capital costs were assigned asset types in accordance with Brazil's tax law. Asset types are itemized in Table 22.4 according to depreciation method. Note that Brazil allows double the normal depreciation rate for vehicles and mobile equipment when that equipment is utilized on a 24-hour basis, as planned for the Coringa Gold Project. This doubles the normal 20% depreciation rate to 40%.

**Table 22.4: Depreciation**

| Property Description | Annual Depreciation |
|---|---|
| Vehicles & Mobile Equipment | 40%* |
| Production Equipment | Unit of Production |
| Underground Development | Unit of Production |
| Camp, Kitchen, Maintenance Shop | 4% |

*24/7 operation allows for double depreciation rate

## 22.11 Income Taxes

Income taxes are provided in the model based on Brazil's federal tax rates after anticipated deductions, including tax loss carryforward and exploration costs, which are deducted from net profit on a depletion basis. Additionally, the economic model applies the SUDAM tax incentive, an 18.75% reduction in Federal tax rate, starting in Year 2. SUDAM is designed to stimulate economic activity in Pará, among other states. This tax treatment is reliant on advice from Brazilian tax lawyers, BMA – Barbosa, Müssnich, Aragão, who reviewed the after-tax economic model, provided feedback, and agreed to the tax treatment therein.

## 22.12 Initial Capital Costs

Initial capital cost estimates as previously described in Section 21 of this technical report served as input to the economic model.

Of the total, just over $500,000 is identified as spare parts, consumables, and initial fills. Because the cost of these items is recaptured at the end of mine life in year 5, their value is represented as a separate line item in the cash flow after being deducted from other initial capital costs.

## 22.13 Sustaining Capital Costs

Acquiring additional assets, increasing facility capacities, or replacing assets are considered sustaining capital expenses over the life of the project. Such expenditures fall into seven categories for the Coringa Gold Project: mine development, mine equipment, light vehicle replacement, underground communication, surface ventilation, infill drilling, and TSF expansion. The largest single item is mining equipment estimated at approximately $20.4 M. Determining each piece of equipment's useful life upon acquisition allows for its replacement capital cost to be scheduled in the last year of its useful life. Additional mining equipment and primary and ancillary equipment will be needed as well as miscellaneous items. Sustaining capital costs are estimated to total $28.7 M over the LOM and are summarized in Table 22.5.

**Table 22.5: Sustaining Capital Cost Summary**

| Area Description | LOM Total | Y1 | Y2 | Y3 | Y4 | Y5 |
|---|---|---|---|---|---|---|
| Mine Development | 20,396,602 | 4,877,168 | 4,586,363 | 5,192,318 | 4,045,747 | 1,695,007 |
| Mine Equipment | 4,601,321 | 2,811,619 | 585,863 | 799,446 | 357,268 | 47,125 |
| Light /vehicle Replacement | 700,000 | 200,000 | 200,000 | 150,000 | 150,000 | |
| Underground Communication | 131,063 | 26,213 | 26,213 | 26,213 | 26,213 | 26,213 |
| Surface Ventilation | 62,500 | 31,250 | 15,625 | | 15,625 | |
| Infill Drilling | 1,157,529 | 144,900 | 174,117 | 194,655 | 194,655 | 449,201 |
| TSF Expansion | 1,616,756 | 965,664 | | 651,092 | | |
| **Total Annual Sustaining Capital Cost** | **$28,665,770** | **$9,056,813** | **$5,588,180** | **$7,013,724** | **$4,789,508** | **$2,217,545** |

## 22.14 Working Capital

Defined as the highest amount of funding needed during the initial operating period, working capital is used to cover expenses prior to the cumulative revenue exceeding the cumulative expenses, or the point at which the operation becomes self-sustaining in its cash flow. Considering production schedule ramp-up, revenue was applied on a bi-weekly basis.

Projected revenue receipt was based upon shipments every two weeks during the initial three months of production, allowing for an initial lag of one week leading up to first shipment. Bi-weekly shipments would occur thereafter through the working capital period. For gold and silver, receipt of 95% of funds one week after issuance of the shipping bill of lading, the 5% balance of funds were considered received one week later, allowing for delivery, assaying, and accounts payable functions.

Weekly expenditure rates were calculated from the operating and development costs estimated for year 1.

The largest deficit of funds is expected to occur in week 9, in the amount of $1.5 M. This working capital investment was reflected in the cash flow model in year -1, with recovery at the end of mine life in year 5.

## 22.15 Base Case Analysis

This FS estimates payback to occur late in the second year of mine life, approximately 2.9 years after initial production.

The base case financial model was developed from information described in this section. Based upon this information, the Coringa Gold Project is estimated to have an after-tax IRR of 30.1%. Assuming a discount rate of five percent over an estimated mine life of 4.8 years, the after-tax NPV is estimated to be approximately $30.5 M. Base-case NPVs at other discount rates are presented in Table 22.6.

**Table 22.6: NPV at Various Discount Rates**

| Discount Rate | 0% | 2.5% | 5% | 7.5% |
|---|---|---|---|---|
| NPV (USD) ($M) | $39.5 | $34.7 | $30.5 | $26.6 |

## 22.16 Sensitivity Analysis

Table 22.7 reflects the sensitivities for IRR and NPV in 10% increments of negative and positive deviation from the base case for gold price, and operating and capital cost sensitivity analyses are presented in Tables 22.8 and 22.9. Foreign exchange sensitivity is shown in Table 22.10 in 10% increments. Variances in metallurgical recovery of gold are shown in Table 22.11 in one percent recovery increments.

**Table 22.7: Gold Price Sensitivity**

| Gold Price | $/oz | IRR | NPV(5) $M |
|---|---|---|---|
| *-20%* | 1000 | *4.5%* | $ 0.2 |
| *-10%* | 1125 | *17.8%* | $ 15.4 |
| ***100%*** | ***1250*** | ***30.1%*** | ***$ 30.5*** |
| *+10%* | 1375 | *41.0%* | $ 44.6 |
| *+20%* | 1500 | *51.4%* | $ 58.8 |

**Table 22.8: Operating Cost Sensitivity**

| OPEX | OPERATING COST | IRR | NPV(5) $M |
|---|---|---|---|
| *-20%* | $ 66,610,458 | *40.4%* | $ 43.3 |
| *-10%* | $ 74,936,765 | *35.3%* | $ 36.9 |
| ***100%*** | **$ 83,263,072** | ***30.1%*** | ***$ 30.5*** |
| *+10%* | $ 91,589,379 | *24.4%* | $ 23.6 |
| *+20%* | $ 99,915,686 | *18.6%* | $ 16.6 |

**Table 22.9: Capital Cost Sensitivity**

| CAPEX | $ Initial CAPEX | IRR | NPV(5) $M |
|---|---|---|---|
| *-20%* | $ 22,611,331 | *39.7%* | $ 36.1 |
| *-10%* | $ 25,437,748 | *34.5%* | $ 33.3 |
| ***100%*** | ***$ 28,264,164*** | ***30.1%*** | ***$ 30.5*** |
| *+10%* | $ 31,090,581 | *26.3%* | $ 27.6 |
| *+20%* | $ 33,916,997 | *22.9%* | $ 24.8 |

**Table 22.10: Foreign Exchange Rate Sensitivity**

| FX | R$/USD | IRR | NPV(5) $M |
|---|---|---|---|
| *-20%* | 2.56 | *4.0%* | -0.5 |
| *-10%* | 2.88 | *17.7%* | 16.8 |
| ***100%*** | ***3.20*** | ***30.1%*** | ***30.5*** |
| *+10%* | 3.52 | *41.4%* | 41.3 |
| *+20%* | 3.84 | *52.0%* | 50.2 |

**Table 22.11: Gold Recovery Sensitivity**

| % Recovery | IRR | NPV(5) $M |
|---|---|---|
| *93.4%* | *27.6%* | $ 27.3 |
| *94.4%* | *28.9%* | $ 28.9 |
| ***95.4%*** | ***30.1%*** | ***$ 30.5*** |
| *96.4%* | *31.3%* | $ 32.0 |
| *97.4%* | *32.5%* | $ 33.5 |

Graphical representations follow of the sensitivities of IRR and NPV to the incremental changes in gold price in Figures 22.1 and 22.2 and capital costs versus operating costs in Figures 22.3 and 22.4, respectively. In addition, IRR and NPV sensitivities to foreign exchange rates are illustrated in Figures 22.5 and 22.6, respectively. Metallurgical recovery rate sensitivities are illustrated in Figures 22.7 and 22.8.


**Figure 22.1: IRR Sensitivity Analysis – Gold Price**


**Figure 22.2: NPV Sensitivity Analysis – Gold Price**

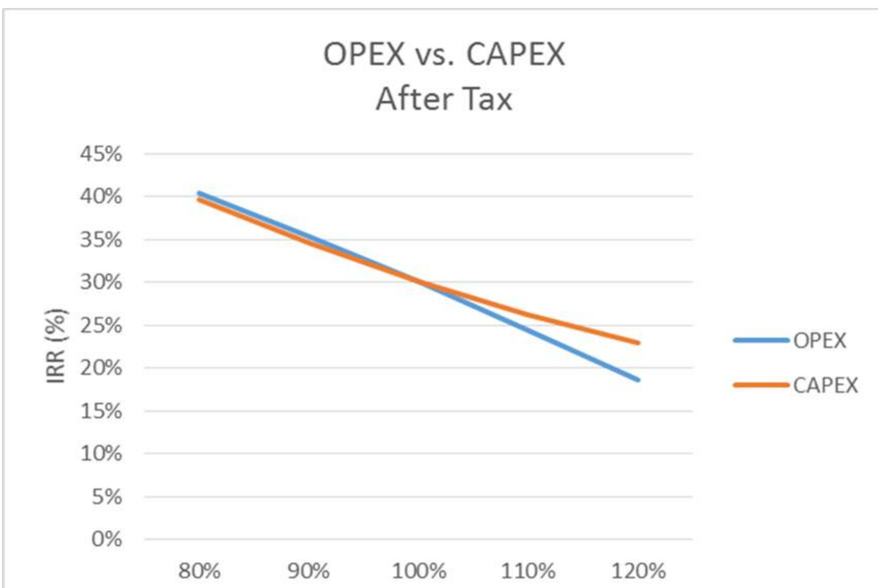



**Figure 22.3: IRR Sensitivity Analysis – Capital v Operating Costs**

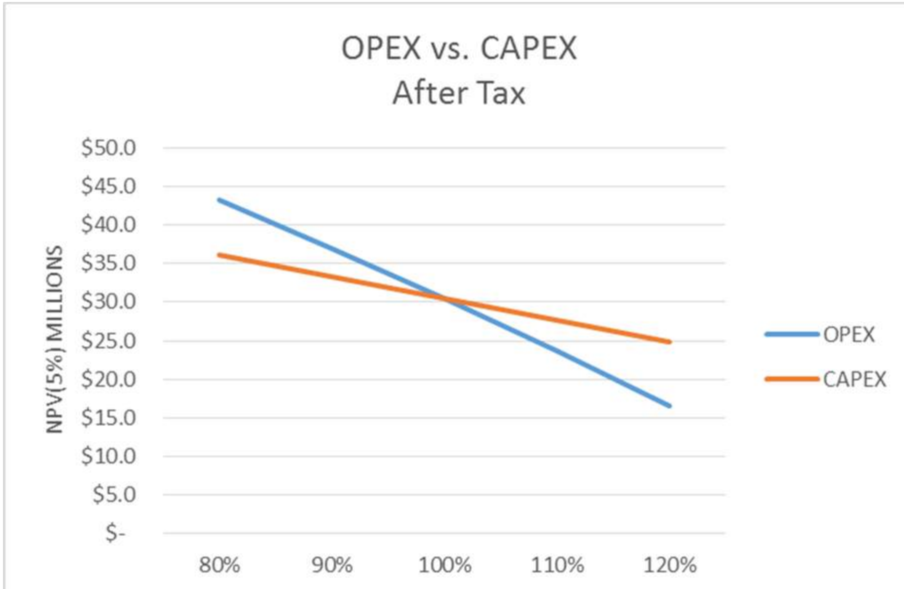



**Figure 22.4: NPV Sensitivity Analysis – Capital v Operating Costs**

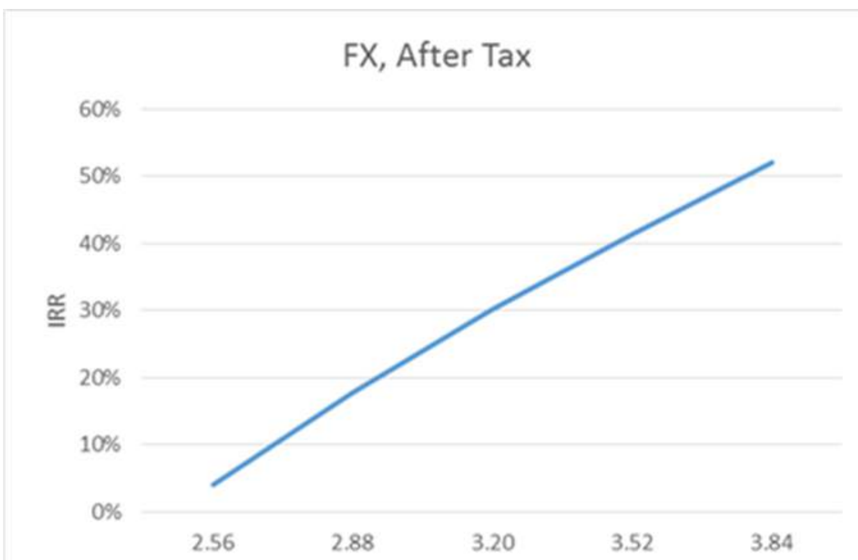



**Figure 22.5: IRR Sensitivity Analysis – Foreign Exchange Rates**

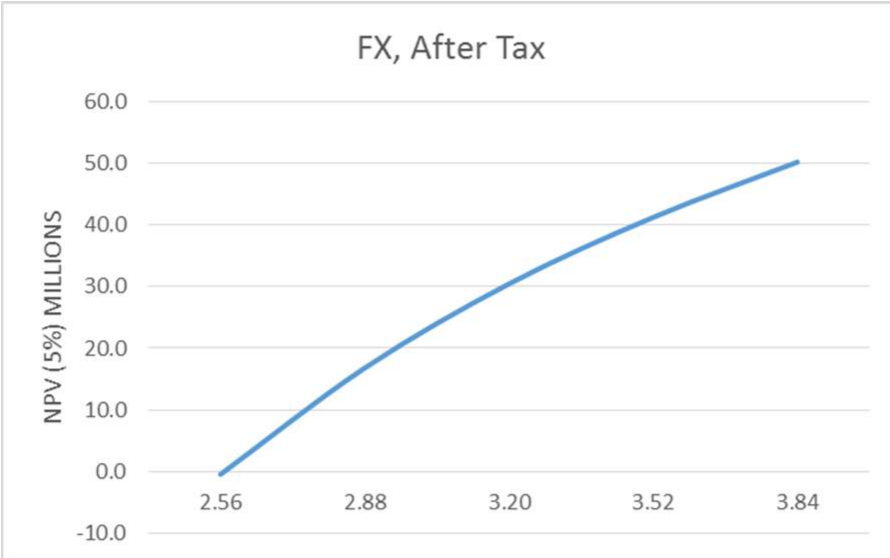



**Figure 22.6: NPV Sensitivity Analysis – Foreign Exchange Rate**

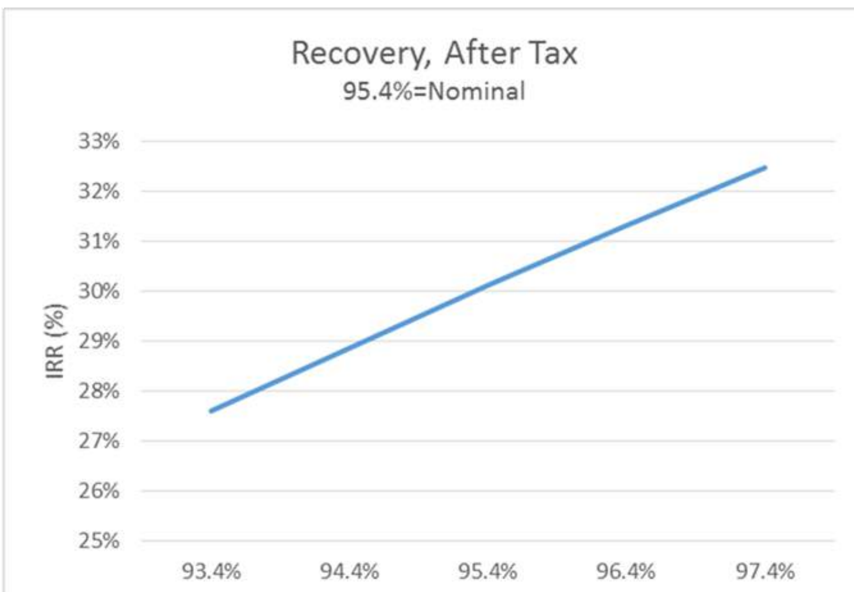



**Figure 22.7: IRR Sensitivity Analysis - Recovery**

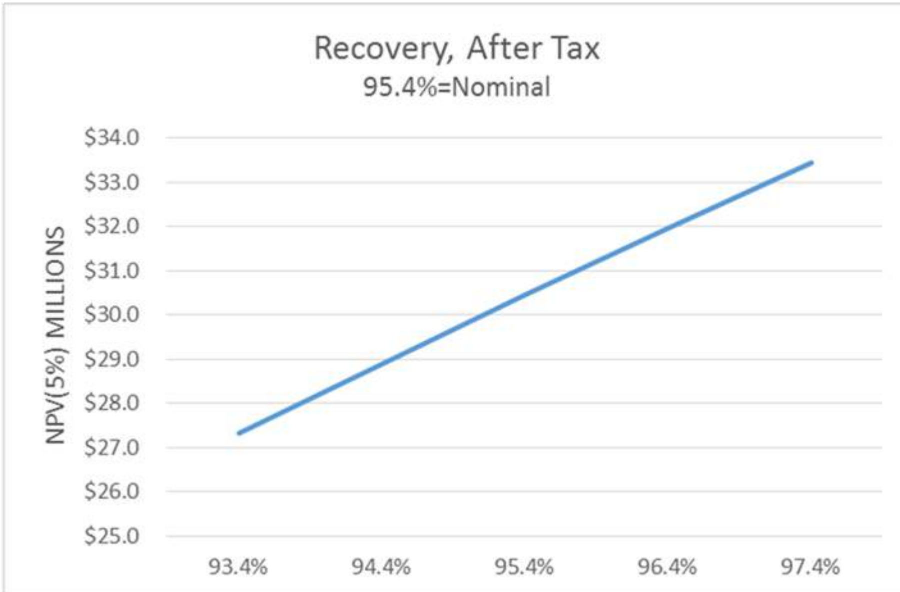



**Figure 22.8: NPV Sensitivity Analysis - Recovery**

## 22.17 Economic Model

The complete cash flow model is presented in Table 22.12.

## Table 22.12: Coringa Cash Flow Model

**Cash Flow - Indicated Resource**
**Anfield Gold**
**Coringa Project**
**Final Revised**
**August 28, 2017**

| | | | Units | Total or Average | Pre-Production -1 | Production 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PRODUCTION SUMMARY** | | | | | | | | | |
| | Ore Mined | | t | 768,577 | 4,918 | 144,593 | 170,931 | 161,420 | 186,503 | 100,212 |
| | Ore Processed | | t | 768,577 | | 149,008 | 169,764 | 163,090 | 178,776 | 107,939 |
| | **GROSS INCOME** | | | | | | | | | |
| | **Market Price** | | | | | | | | | |
| 1 | Gold | $ 1,250 | /Toz | $ 1,250 | | $ 1,250 | $ 1,250 | $ 1,250 | $ 1,250 | $ 1,250 |
| | Silver | $ 18 | /Toz | $ 18 | | $ 18 | $ 18 | $ 18 | $ 18 | $ 18 |
| | **Contained Metals** | | | | | | | | | |
| | Gold | | | 160,328 | | 28,264 | 36,863 | 29,053 | 42,960 | 23,187 |
| | Silver | | | 323,487 | | 60,134 | 83,529 | 55,731 | 82,222 | 41,871 |
| | **Recovery** | | | | | | | | | |
| 1 | Gold | | | *95.37%* | | *96.00%* | *96.00%* | *95.89%* | *94.20%* | *95.46%* |
| | Silver | | | *61.23%* | | *57.00%* | *57.00%* | *57.63%* | *72.54%* | *63.10%* |
| | **Payable Metals** | | | | | | | | | |
| | Gold Recovered (After Refining Loss) | | Toz | 152,908 | | 27,120 | 35,371 | 27,845 | 40,448 | 22,124 |
| | Silver Recovered (After Refining Loss) | | Toz | 198,075 | | 33,934 | 47,136 | 31,797 | 59,051 | 26,158 |
| | **Metal Revenues** | | | | | | | | | |
| | Gold | | USD | $ 191,135,133 | | $ 32,925,320 | $ 44,213,608 | $ 34,806,687 | $ 50,560,507 | $ 28,629,011 |
| | Silver | | USD | $ 3,565,357 | | $ 610,804 | $ 848,442 | $ 572,346 | $ 1,062,919 | $ 470,845 |
| | **Gross Revenue** | | **USD** | **$ 194,700,490** | | **$ 33,536,124** | **$ 45,062,051** | **$ 35,379,033** | **$ 51,623,427** | **$ 29,099,856** |
| | **NSR** | | | | | | | | | |
| | Doré produced | 14,739 | kg | 14,739 | | 2,525 | 3,507 | 2,366 | 4,394 | 1,946 |
| | Doré Freight & Insurance- Brazil | $ 41,563 | /Shipment | $ (2,410,625) | | $ (623,438) | $ (498,750) | $ (498,750) | $ (498,750) | $ (290,938) |
| | Doré TC/RC | $ 0.30 | /Toz | $ (45,872) | | $ (8,136) | $ (10,611) | $ (8,354) | $ (12,135) | $ (6,637) |
| | Penalty Charge (Pb > 1%) | $ 100 | /t | $ (1,474) | | $ (253) | $ (351) | $ (237) | $ (439) | $ (195) |
| | Total Transportation, TC/RC | | | $ (2,457,971) | | $ (631,826) | $ (509,712) | $ (507,340) | $ (511,324) | $ (297,769) |
| | **NSR** | | | **$ 192,242,518** | | **$ 32,904,298** | **$ 44,552,339** | **$ 34,871,692** | **$ 51,112,103** | **$ 28,802,087** |
| | **ROYALTY** | | | | | | | | | |
| | Brazil Royalty on NSR | *1.5%* | Percent | $ (2,883,638) | | $ (493,564) | $ (668,285) | $ (523,075) | $ (766,682) | $ (432,031) |
| | Sandstorm Royalty on NSR | *2.5%* | Percent | $ (4,806,063) | | $ (822,607) | $ (1,113,808) | $ (871,792) | $ (1,277,803) | $ (720,052) |
| | **Gross Income from Mining** | | | **$ 184,552,818** | | **$ 31,588,126** | **$ 42,770,245** | **$ 33,476,825** | **$ 49,067,619** | **$ 27,650,003** |
| | **OPERATING MARGIN** | | | | | | | | | |
| | **Operating Cost** | | | | | | | | | |
| | **Unit Costs** | | | | | | | | | |
| | Mining | $ 41.68 | /t ore | $ (32,035,509) | | $ (6,232,053) | $ (7,019,834) | $ (6,545,993) | $ (7,587,978) | $ (4,649,652) |
| | Processing | $ 33.51 | /t ore | $ (25,756,467) | | $ (6,385,104) | $ (5,393,219) | $ (5,199,514) | $ (5,710,353) | $ (3,068,276) |
| | G&A | $ 33.14 | /t ore | $ (25,471,096) | | $ (5,623,759) | $ (5,610,843) | $ (5,610,843) | $ (5,610,843) | $ (3,014,808) |
| 1 | **Total Annual Operating Cost** | **$ 108.33** | **/t ore** | **$ (83,263,072)** | | **$ (18,240,916)** | **$ (18,023,897)** | **$ (17,356,350)** | **$ (18,909,174)** | **$ (10,732,736)** |
| | **Mine Closure, Reclamation & Severance** | | | **$ (1,625,313)** | | **$ -** | **$ -** | **$ -** | **$ -** | **$ (1,625,313)** |
| | **Net Profit** | | | **$ 99,664,433** | | **$ 13,347,210** | **$ 24,746,348** | **$ 16,120,474** | **$ 30,158,445** | **$ 15,291,955** |
| | **PRE-TAX INCOME** | | | **$ 99,664,433** | | **$ 13,347,210** | **$ 24,746,348** | **$ 16,120,474** | **$ 30,158,445** | **$ 15,291,955** |
| | Depreciation & Amortization | | | $ (62,925,236) | | $ (12,211,703) | $ (14,014,036) | $ (13,250,533) | $ (15,228,588) | $ (8,220,376) |
| | **Net Income Before Depletion and Taxes** | | | **$ 36,739,197** | | **$ 1,135,507** | **$ 10,732,313** | **$ 2,869,941** | **$ 14,929,857** | **$ 7,071,579** |
| | Depletion | | | $ (6,360,179) | | $ (1,272,036) | $ (1,272,036) | $ (1,272,036) | $ (1,272,036) | $ (1,272,036) |
| | **Net Income Before Taxes** | | | **$ 30,379,018** | | **$ (136,529)** | **$ 9,460,277** | **$ 1,597,905** | **$ 13,657,821** | **$ 5,799,543** |
| | Federal Income Taxes | | | $ (3,257,535) | | $ - | $ (1,009,885) | $ (170,576) | $ (1,457,972) | $ (619,101) |
| | **NET INCOME AFTER TAXES** | | | **$ 27,121,483** | | **$ (136,529)** | **$ 8,450,392** | **$ 1,427,329** | **$ 12,199,849** | **$ 5,180,442** |
| | Add-Back Depreciation & Amortization | | | $ 62,925,236 | | $ 12,211,703 | $ 14,014,036 | $ 13,250,533 | $ 15,228,588 | $ 8,220,376 |
| | Add-Back Depletion | | | $ 6,360,179 | | $ 1,272,036 | $ 1,272,036 | $ 1,272,036 | $ 1,272,036 | $ 1,272,036 |
| | **NET INCOME FROM OPERATIONS** | | | **$ 96,406,898** | | **$ 13,347,210** | **$ 23,736,464** | **$ 15,949,898** | **$ 28,700,473** | **$ 14,672,854** |
| | Spare Parts, Initial Fills | | | $ - | $ (500,637) | | | | | $ 500,637 |
| | Working Capital | | | $ - | $ (1,529,134) | | | | | $ 1,529,134 |
| 1 | **Initial Capital** | **(Includes $286,106 Non-Refundable ICMS)** | | **$ (28,264,164)** | **$ (28,264,164)** | | | | | |
| | Sustaining Capital | | | | | | | | | |
| | Mine Development | | | $ (20,396,602) | | $ (4,877,168) | $ (4,586,363) | $ (5,192,318) | $ (4,045,747) | $ (1,695,007) |
| | All Other Sustaining Capital | | | $ (8,269,168) | | $ (4,179,645) | $ (1,001,817) | $ (1,821,406) | $ (743,761) | $ (522,538) |
| 1 | **Total Sustaining Capital** | | | **$ (28,665,770)** | | **$ (9,056,813)** | **$ (5,588,180)** | **$ (7,013,724)** | **$ (4,789,508)** | **$ (2,217,545)** |
| | **ANNUAL AFTER-TAX CASH FLOW** | | | **$ 39,476,964** | **$ (30,293,935)** | **$ 4,290,397** | **$ 18,148,284** | **$ 8,936,173** | **$ 23,910,965** | **$ 14,485,080** |
| | **CUMULATIVE AFTER-TAX CASH FLOW** | | | | **$ (30,293,935)** | **$ (26,003,538)** | **$ (7,855,254)** | **$ 1,080,920** | **$ 24,991,884** | **$ 39,476,964** |
| | **PRESENT VALUE OF MID-YEAR CASH FLOW AT DISCOUNT = 5.0%** | | | **$ 30,457,749** | **$ (30,293,935)** | **$ 4,186,999** | **$ 16,867,535** | **$ 7,910,034** | **$ 20,157,402** | **$ 11,629,714** |
| | | | | | | | | | | |
| | **NET CASH COST/OZ** | | | **588** | | **722** | **550** | **671** | **504** | **529** |
| | **ALL IN SUSTAINING NET CASH COST/OZ** | | | **786** | | **1,056** | **708** | **923** | **623** | **703** |

| **After-tax** | |
|---|---|
| IRR | *30.1%* |
| $NPV_{(5\%)}$ | $ 30,457,749 |
| AISC/oz | $ 786 |
| Payback (years) | 2.9 |

| | |
|---|---|
| EBITDA | $ 99,664,433 |

# 23 ADJACENT PROPERTIES

There is no information and no published reserves for any garimpeiro operations adjacent to the Coringa Gold Project.

# 24 OTHER RELEVANT DATA

Since the completion of the mineral resource estimates presented in this report (in May 2017), Anfield has drilled six additional holes that intersect the Galena zone. The results of this drilling have been evaluated by the QP and they do not result in a material change to the mineral resources presented in this report.

There are no other relevant data or information.

# 25 INTERPRETATION AND CONCLUSIONS

Based on the evaluation of the data available from the FS, the QPs have drawn the following conclusions:

- At the effective date of this technical report, Anfield holds a 100% interest in the Coringa Gold Project property.
- The deposits at the Coringa Gold Project are composed of several semi-continuous, steeply dipping gold-bearing veins and shear zones hosted in granite and rhyolite. The mineralized vein system extends for over 7,000 m in a northwesterly direction, has variable widths ranging from zero to over 14 m, and has been defined to depths of 250 m.
- Most veins remain open to further expansion through drilling both along strike and at depth.
- Drilling to date has outlined an Indicated mineral resource estimate (at a cut-off grade of 2 g/t Au) of 726 ktonnes at 8.4 g/t Au and 17 g/t Ag which contains 195 koz of gold and 396 koz of silver.
- Drilling to date has also outlined an Inferred mineral resource estimate (at a cut-off grade of 2 g/t Au) of 1.3 Mtonnes at 4.3 g/t Au and 5.1 g/t Ag which contains 181 koz of gold and 215 koz of silver.
- The narrow but high-grade veins at the Coringa Gold Project are considered to be amenable to underground extraction methods.
- There are no known factors related to metallurgical, environmental, permitting, legal, title, taxation, socio-economic, marketing, or political issues which could materially affect the mineral resource estimates.
- In the QPs' opinion, the analytical procedures were appropriate and consistent with common industry practice. The laboratories are recognized, accredited commercial assayers. There is no relationship between Anfield and ALS Minerals (ALS) or CDN Resource Laboratories Ltd. (CDN). The sampling has been carried out by trained technical staff under the supervision of a QP and in a manner that meets or exceeds common industry standards. Samples are properly identified and transported in a secure manner from site to the lab.
- There are no quality-control issues with the Magellan Minerals (2007–2013) and Anfield (2016–2017) drill programs.
- Observation of the drilling and core handling procedures during the site visit inspection and validation of the collected data indicate that the drill data are adequate for interpretation.
- In the QPs' opinion, the database management, validation, and assay QA/QC protocols are consistent with common industry practices. The quality of the database supports the estimation of Indicated resources.

- Results from the Plenge test program have been used to project the metallurgical performance of materials planned for mining and processing at the Coringa Gold Project. Results from the earlier RDi and TDP test programs support results from the Plenge program and altogether are useful to support the stated overall representativeness of the samples to the various deposits.

  The projected gold and silver recoveries for the Coringa Gold Project deposits are presented below:

  - Serra and Galena deposits – 96% for gold and 57% for silver
  - Meio deposit – 94% for gold and 74% for silver
- The total seepage from the TSF at the end of mine life is on the order of 20-60 $m^3$/d of additional groundwater flow depending on the selected conductivity for the prepared foundation of the TSF.
- The water balance shows that the Coringa Gold Project mine has sufficient water to operate. The plant under prolonged extreme drought conditions. The project has a net-discharge requirement each wet season from the TSF. In extreme wet conditions, the mine has higher discharge, but within accepted regulatory limits.
- The TSF has elevated sulfate, ammonia, and nitrate concentrations (with respect to applicable Brazilian water quality standards). These elevated concentrations appear to be manageable through active dilution strategies in conjunction with controls on the over-addition of SMBS.
- Based on the results obtained, the new configuration for the Meio WSF exceeds the minimum established Factor of Safety (FOS). It is recommended that additional space between the toe of the WSF and the crest of the sediment pond be incorporated during detailed design if a reduction in WSF volume is acceptable.
- The stability of the Serra sediment pond can be improved by allowing for a larger offset between the WSF toe and sediment pond crest, however further modification of the pond orientation results in cut/fill boundaries outside of the required permit area.
- From a mine geotechnical standpoint, the underground geotechnical conditions and data at the Meio and Serra veins was scrutinized and used by Quanta to develop portal, decline, ramp, and underground workings recommendations. Rock core data at Galena was also reviewed by Quanta and found to be similar to that encountered at Serra and this is the basis for assuming that mining methods at Serra and Galena will be similar. Additional geotechnical investigation and design is required for the Valdette, Mãe de Leite, Come Quieto, and Demetrio veins while additional geotechnical design is required at Galena to confirm the mine designs at these veins.

#### *25.1.1 Risks*

- Some upper levels might be mined-out. It is unknown how deep surface mining has occurred, however, a 20-m surface sill pillar was left in the reserve estimation. Mining might have occurred for more than 20 m from the surface in some areas.
- Although initially the stockpile will be from sill preparation, the current plan does not allow much time for underground stope definition or infill drilling.
- Sill preparation (development in mineralization) in veins 0.8 m wide will result in over-dilution.
- Possible islands of waste in the mineral might result in “ore losses”.
- Proper mine ventilation demands high consumption of electrical power. The more active mining areas, the higher the demand for fresh air.
- Refurbished equipment at early stages of mine development could be risky. A good supply of spare parts should be readily available.
- The TSF design has used conservative methods for each of the critical components, with particular attention to the embankment design (utilizing down-stream construction methods) and the spillway (sized to safely pass the 1,000-yr event). Nevertheless, all dams pose risks and should be managed and closed accordingly. The principal risk for this facility is improper management of surface waters and poor maintenance of the emergency spillway system. Operating and monitoring plans should be developed and implemented to reduce the likelihood of these occurring.
- Brazilian political change, fluctuations in the national, state, and local economies and regulations and social unrest.
- Currency exchange fluctuations.
- Fluctuations in the prices for gold and silver, as well as other minerals.
- Anfield’s development of the Coringa Gold Project, including permitting delays, land access, and social and political pressure from local stakeholders.
- Risks relating to being adversely affected by the regulatory environment, including increased regulatory burdens and changes of laws.

#### *25.1.2 Opportunities*

- There is a potential for increasing the estimated mineral reserves with infill drilling as well as exploration drilling from underground and surface.
- As the primary development progresses, more active areas for mining will be available and daily mining rates could be increased.
- Higher grades than reported in the FS could be mined at lower tonnages using split blasting techniques.
- While the mineralized trend of veins is known to extend over a minimum 7 km strike length (Figure 7.2), only in few places has it been drilled sufficiently to identify inferred or higher mineral resources (Serra, Meio, Galena, Mãe de Leite, Come

Quieto, and Valdette). Large segments of veins remain untested or partially tested, some with significant mineralized vein intersections that remain open to offset drilling. These zones could yield additional mineralization for the project through discovery or enhancement of currently identified inferred- to indicated-resources. Highest priority targets for resource expansion include Come Quieto, Mãe de Leite, and Galena, all of which host open Inferred mineral resources and in the case of Galena, Indicted mineral resources. Other zones such as Demetrio, Valdette, and Mato Vehlo have yielded significant mineral intersections, but have not been drilled in sufficient density for inclusion as inferred resource. Enhancement of mineral resources at the Coringa Gold Project has a high probability with additional drilling.

- The project is fully staffed with capable management, engineers and geologists and supporting personnel which will minimize training.
- The project is located in an area with existing and active mining operations with similar characteristics to the mining techniques proposed in this study.
- There is good potential for marketing gravity concentrate IL residues as a by-product though it has not yet been evaluated. The IL residues may carry enough un-leachable gold and silver, plus lead (30%) due to the mineralogy, that it might be possible to market this material and improve project economics.
- Flotation of a concentrate was performed on a sample of detoxified tails to determine the potential for recovering and marketing a by-product. A bulk lead/zinc concentrate was produced that weighed 1.5% of the feed weight and assayed 401 gpt silver, 1.7 gpt gold, 31% lead and 31% zinc. The metal recoveries, based on the original head grade prior to leaching, were 32% for silver, 0.4% for gold, 72% for lead, and 88% for zinc.
- This TSF location is suitable for additional tailings storage, up to at least 2.5 Mt, should the reserves increase.

The following opportunities for reduced cost, reduced risk, or improved operations should be investigated in the next stage of engineering, or during plant operations.

- If 0.9 Mt of tailings storage is not required, the size of the dam can be reduced. This decision can be made any time before completion of the Phase 3 dam raise.
- The impoundment storage capacity was estimated using constant average tailings density. However, deeper tailings should be denser and this may allow some additional capacity. Further, the actual tailings density achieved in the impoundment should be verified during operations and the size of the final raise of the dam adjusted accordingly.
- Optimization of the beach slopes may be possible through close management of spigots, through using cyclones to separate sand from fines, or building small internal berms. These can be field tested during operations of the first phases of the TSF.

# 26 RECOMMENDATIONS

## 26.1 Overall Recommendation

Based on the results of the FS, the QPs overall recommendation is:

- The Coringa Gold Project should be advanced to construction.

## 26.2 Recommendations from Individual QPs

### *26.2.1 Exploration/Resource Development*

- Undertake additional drilling to enhance mineral resources

### *26.2.2 Mining*

- Detailed surveys around the surface mined areas should be done to determine if the locations should be backfilled to allow mining below the surface crown pillar.
- As more data is available, the resource block models should be updated and refined. Additional underground infill drilling might lend further confidence to the block models and add additional reserves to current mine plans.

### *26.2.3 Processing*

- The marketing potential for a bulk lead/zinc concentrate as a silver-lead concentrate has not been investigated. Additional testing is recommended to further define this concept.

### *26.2.4 Geotechnical*

- Recommendations include collection of additional field data and an optimization of the sedimentation basins. Additional geotechnical stability analysis on the pond embankments is also recommended.
- It is understood that waste generation and construction material borrow is expected to be a dynamic process. As a result, it is recommended that the Serra and Meio WSF layouts be revised after a construction material schedule has been developed to optimize the configuration of the WSF and ponds. Once this schedule is available, the stability should be confirmed. Due to stability concerns and steep ground, it may be necessary to consume a greater portion of the Serra and Meio waste.
- Although Quanta expects that the geotechnical conditions throughout the Coringa property are similar to those verified at the Meio and Serra Veins, additional vein-specific underground geotechnical data and design is required at the Valdette, Mãe de Leite, Come Quieto and Demetrio veins.
- The geotechnical conditions at Galena appear to be similar to those at Serra, however, additional underground geotechnical design is required prior to mine construction at Galena.

### *26.2.5 Geochemistry*

- Additional evaluation is required to confirm existing predictions that dilution and mixing are sufficient to mitigate the potential water quality impacts of excess water discharge from the TSF. Transport and fate geochemical modeling is required to determine the impact of the nitrification of ammonia, and the treatment potential of downstream wetlands to consume nitrogen compounds and reduce sulfate concentrations through chemical reactions.
- Additional evaluation of the cyanide destruction method is required to ensure effective destruction while minimizing sulfate production in the supernatant.
- Additional geochemical characterization is required on the tailings. GRE recommends an additional supernatant sample, static geochemical testing sample, and a long-duration kinetic testing program for one representative sample taken from future plant operations, or future metallurgical testing should it occur.

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# 28 DATE AND SIGNATURE PAGE

**CERTIFICATE OF QUALIFIED PERSON**

**Bruce M. Davis, FAusIMM, BD Resource Consulting, Inc.**

I, Bruce M. Davis, FAusIMM, do hereby certify that:

1. I am an independent consultant of BD Resource Consulting Inc., and have an address at 4253 Cheyenne Drive, Larkspur, Colorado USA 80118.
2. I graduated from the University of Wyoming with a Doctor of Philosophy (Geostatistics) in 1978.
3. I am a Fellow of the Australasian Institute of Mining and Metallurgy, Number 211185.
4. I have practiced my profession continuously for 38 years and have been involved in mineral resource and reserve estimations and feasibility studies on numerous underground and open pit base metal and gold deposits in Canada, the United States, Central and South America, Europe, Asia, Africa and Australia.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 *Standards of Disclosure for Mineral Projects* ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
6. I am responsible for the preparation of Sections 11 and 12, and portions of Sections 1, 25, 26, and 27 of the Technical Report titled Coringa Gold Project, Brazil, Feasibility Study NI 43-101 Technical Report, dated September 8, 2017, with an effective date of July 1, 2017 (the "Technical Report").
7. I most recently visited the Coringa Gold Project from December 3 to 8, 2016.
8. I am independent of Anfield Gold Corp. applying all of the tests in Section 1.5 of NI 43-101.
9. I was previously responsible for the preparation of the Technical Report titled *Coringa Gold Project, Brazil, NI 43-101 Technical Report*, dated June 15, 2017, with an effective date of May 3, 2017, but otherwise have had no prior involvement with the property that is the subject of the Technical Report.
10. I have read NI 43-101, Form 43-101F1 and the Technical Report and confirm the Technical Report has been prepared in compliance with that instrument and form.
11. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 8th day of September, 2017.

"original signed and sealed"

Bruce M. Davis, FAusIMM

## CERTIFICATE OF QUALIFIED PERSON

### Robert Sim, P.Geo, SIM Geological Inc.

I, Robert Sim, P.Geo, do hereby certify that:

1. I am an independent consultant of SIM Geological Inc. and have an address at 508–1950 Robson Street, Vancouver, British Columbia, Canada V6E 1E8.
2. I graduated from Lakehead University with an Honours Bachelor of Science (Geology) in 1984.
3. I am a member, in good standing, of the Association of Professional Engineers and Geoscientists of British Columbia, License Number 24076.
4. I have practiced my profession continuously for 33 years and have been involved in mineral exploration, mine site geology and operations, mineral resource and reserve estimations and feasibility studies on numerous underground and open pit base metal and gold deposits in Canada, the United States, Central and South America, Europe, Asia, Africa and Australia.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 *Standards of Disclosure for Mineral Projects* ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
6. I am responsible for the preparation of Sections 5, 6, 7, 8, 9, 10, 14, 24, and portions of Sections 1, 25, 26 and 27 of the Technical Report titled Coringa Gold Project, Brazil, Feasibility Study NI 43-101 Technical Report, dated September 8, 2017, with an effective date of July 1, 2017 (the "Technical Report").
7. I most recently visited the Coringa Project from December 3 to 8, 2016.
8. I am independent of Anfield Gold Corp. applying all of the tests in Section 1.5 of NI 43-101.
9. I was previously responsible for the preparation of the Technical Report titled *Coringa Gold Project, Brazil, NI 43-101 Technical Report*, dated June 15, 2017, with an effective date of May 3, 2017, but otherwise have had no prior involvement with the property that is the subject of the Technical Report.
10. I have read NI 43-101, Form 43-101F1 and the Technical Report and confirm the Technical Report has been prepared in compliance with that instrument and form.
11. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 8th day of September, 2017.

"original signed and sealed"

__________________________________

Robert Sim, P.Geo

## CERTIFICATE OF QUALIFIED PERSON

**Edwin R. Peralta, P.E.**

I, **Edwin R Peralta, P.E.**, do hereby certify that:

1. I am a Senior Mining Engineer by Mine Development Associates and have an address at 210 South Rock Blvd., Reno, Nevada 89502.
2. I graduated with a Bachelor of Science degree in Mining Engineering in 1995 from the Colorado School of Mines, Golden Colorado. I also have a Master of Science degree in Mining and Earth Systems Engineering from the Colorado School of Mines (2001).
3. I am a Professional Engineer (#023216) licensed in the State of Nevada, and I am a Registered Member (#4033387RM) of the Society of Mining, Metallurgy and Exploration.
4. I have worked as a mining engineer for a total of 22 years since my graduation from undergraduate school. Relevant experience includes mining exploration, project development, underground construction and mine ventilation. Also, as a mining engineer I have been involved for more than 12 years in mine design, mine planning and project evaluation for open pit and underground mining projects.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 *Standards of Disclosure for Mineral Projects* ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
6. I am responsible for the preparation of Sections 15, 16 and portions of Sections 1, 25, 26 and 27 of the Technical Report titled Coringa Gold Project, Brazil, Feasibility Study NI 43-101 Technical Report, dated September 8, 2017, with an effective date of July 1, 2017 (the "Technical Report").
7. I most recently visited the Coringa Gold Project on December 1-8, 2016.
8. I am independent of Anfield Gold Corp. applying all of the tests in Section 1.5 of NI 43-101.
9. I have had involvement with the Coringa Gold Project since January 2016.
10. I have read NI 43-101, Form 43-101F1 and the Technical Report and confirm the Technical Report has been prepared in compliance with that instrument and form.
11. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 8th day of September, 2017.

"original signed and sealed"

**Edwin R. Peralta, P.E.**

## CERTIFICATE OF QUALIFIED PERSON

**Neil B. Prenn, P. Eng.**

I, **Neil B. Prenn, P. Eng.,** do hereby certify that:

1. I am a registered Professional Engineer in the State of Nevada, employed at Mine Development Associates, whose address is 210 S. Rock Blvd., Reno, NV 89502.
2. I graduated from Colorado School of Mines with an Engineer of Mines Degree granted in 1967.
3. I am a Professional Engineer licensed in the State of Nevada.
4. I have worked as a Mining Engineer for more than 45 years, providing mine designs, reserve estimates and economic analyses for dozens of base- and precious-metals deposits and industrial minerals deposits in the United States and various countries of the world. During this period I have worked as a general manager of an operating heap leach gold mine in Nevada. I started Mine Development Associates in 1987.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 *Standards of Disclosure for Mineral Projects* ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
6. I am responsible for the preparation of Sections 15, 16 and portions of Sections 21, 25, 26 and 27 of the Technical Report titled Coringa Gold Project, Brazil, Feasibility Study NI 43-101 Technical Report, dated September 8, 2017, with an effective date of July 1, 2017 (the "Technical Report").
7. I have not visited the Coringa Gold Project.
8. I am independent of Anfield Gold Corp. applying all of the tests in Section 1.5 of NI 43-101.
9. My prior involvement in the property has been as the author or co-author of previous Technical Reports.
10. I have read NI 43-101, Form 43-101F1 and the Technical Report and confirm the Technical Report has been prepared in compliance with that instrument and form.
11. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 8th day of September, 2017.

"original signed and sealed"

**Neil B. Prenn, P. Eng.**

## CERTIFICATE OF QUALIFIED PERSON

**Larry Breckenridge, P.E.**

I, Larry Breckenridge, P.E., do hereby certify that:

1. I am an Environmental Engineer and have an address at 600 Grant Street, Suite 975, Denver, Colorado 80203
2. I graduated from Dartmouth College and the Colorado School of Mines.
3. I am a member, in good standing, of the Board of Colorado Professional Engineers
4. I have 20 years of experience in environmental engineering, mine water management, and geochemistry.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 *Standards of Disclosure for Mineral Projects* ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
6. I am responsible for the preparation of Sections 2, 3, 20, 23 and portions of Sections 1, 4, 16, 18, 25, 26 and 27 of the Technical Report titled Coringa Gold Project, Brazil, Feasibility Study NI 43-101 Technical Report, dated September 8, 2017, with an effective date of July 1, 2017 (the "Technical Report").
7. [I most recently visited the Coringa Gold Project from March 1st to March 8th 2017.
8. I am independent of Anfield Gold Corp. applying all of the tests in Section 1.5 of NI 43-101.
9. My prior involvement with the project has been as a technical consultant on prior Feasibility Study work performed on the project.
10. I have read NI 43-101, Form 43-101F1 and the Technical Report and confirm the Technical Report has been prepared in compliance with that instrument and form.
11. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 8th day of September, 2017.

"original signed and sealed"

**Larry Breckenridge, P.E.**

## CERTIFICATE OF QUALIFIED PERSON

**Mark E. Smith, P.E.**

I, **Mark E. Smith, P.E., P.Eng.,** do hereby certify that:

1. I am currently the owner and president of RRD International LLC with an office at 759 Eagle Drive, Incline Village, Nevada, 89451.
2. I graduated with a Bachelor of Science (Civil Engineering) degree from the University of California (Davis) in 1979 and a Masters of Science (Civil Engineering) degree from the University of Nevada (Reno) in 1986. I have practiced my profession continuously since 1979.
3. I am a registered civil and geotechnical engineer in California (#CE35469 and #G2082), a registered professional engineer and water rights surveyor in Nevada (#6546 and #701), a registered professional engineer in Arizona, Montana, Colorado, Idaho, Texas, South Dakota and Yukon Territory, and a registered structural engineer in Idaho and Utah. I am a Registered Member of the Society for Mining, Metallurgy & Exploration (#3005800). I hold a Diplomate in Geotechnical Engineering from AGP/ASCE. I am the qualifying officer for contractor licenses for general building and engineering construction in California.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I am responsible for the preparation of portions of Items 1, 18, 25, 26, and 27 of the Technical Report entitled Coringa Gold Project, Brazil, Feasibility Study NI 43-101 Technical Report, dated September 8, 2017, with an effective date of July 1, 2017 (the "Technical Report").
6. I have not visited the Coringa mine site but have relied on the opinions of specialists in hydrology, geomechanics and tailings management who have.
7. I am independent of Anfield Gold Corp. applying all of the tests in Section 1.5 of NI 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101, Form 43-101F1 and the Technical Report and confirm the Technical Report has been prepared in compliance with that instrument and form.
10. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 1st day of September, 2017.

"original signed and sealed"

**Mark E. Smith, P.E., P.Eng.**

## CERTIFICATE OF QUALIFIED PERSON

**Nelson D. King, Principal Consultant**

I, Nelson D. King, Principal Consultant, do hereby certify that:

1. I am a Principal Consultant (Metallurgical Engineer) with N D King Consulting LLC and have an address at 8317 Devinney Street, Arvada, Colorado, U.S.A.
2. I graduated from Colorado School of Mines with a B.Sc. degree in Metallurgical Engineering in 1972.
3. I am a member, in good standing, of the Society for Mining, Metallurgy and Exploration, Inc (SME) and am an SME Registered Member, No. 4152661RM.
4. I have 44 years of relevant experience including work in copper, gold, silver, lead, zinc and molybdenum operations in the U.S.A., engineering and construction company experience in the U.S.A. and Canada and metallurgical consulting experience on global mining projects from offices located in the U.S.A. and Australia.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 *Standards of Disclosure for Mineral Projects* ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
6. I am responsible for the preparation of Sections 13 and 17 and portions of Items 1, 25, 26 and 27 of the Technical Report titled Coringa Gold Project, Brazil, Feasibility Study NI 43-101 Technical Report, dated September 8, 2017, with an effective date of July 1, 2017 (the "Technical Report").
7. I most recently visited the Coringa Gold Project from May 19, 2016 to May 21, 2016.
8. I am independent of Anfield Gold Corp. applying all of the tests in Section 1.5 of NI 43-101.
9. I have had no prior involvement with the property that is the subject of the Technical Report.
10. I have read NI 43-101, Form 43-101F1 and the Technical Report and confirm the Technical Report has been prepared in compliance with that instrument and form.
11. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 8th day of September, 2017.

"original signed and sealed"

**Nelson D. King, Principal Consultant**

## CERTIFICATE OF QUALIFIED PERSON

**Brendan Fisher, Ph.D., P.E.**

I, **Brendan Fisher, Ph.D., P.E.**, do hereby certify that:

1. I am geotechnical engineer and have an address at 601 Jordan Ave Radford, Virginia, USA.
2. I graduated from Virginia Polytechnic University in 2000 with a Master's degree geotechnical engineering and in 2009 with a Doctorate degree in geological engineering from the University of British Columbia.
3. I am a member, in good standing, of the Association of Engineering Geologists and American Association of Civil Engineers.
4. I have been practicing my profession full time since about 2000.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 *Standards of Disclosure for Mineral Projects* ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
6. I am responsible for the preparation of portions of Sections 1, 16, 25, 26 and 27 of the Technical Report titled Coringa Gold Project, Brazil, Feasibility Study NI 43-101 Technical Report, dated September 8, 2017, with an effective date of July 1, 2017 (the "Technical Report").
7. I visited the Coringa Gold Project from December 6 to 8, 2016. I am independent of Anfield Gold Corp. applying all of the tests in Section 1.5 of NI 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101, Form 43-101F1 and the Technical Report and confirm the Technical Report has been prepared in compliance with that instrument and form.
10. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 8th day of September, 2017.

"original signed and sealed"

**Brendan Fisher, Ph.D., P.E.**

## CERTIFICATE OF QUALIFIED PERSON

**Robert S. Michel, SME Registered Member**

I, **Robert S. Michel, SME Registered Member**, do hereby certify that:

1. I am a Principal Consultant and have an address at 133 Furman Ave., Asheville, NC.
2. I graduated from the Colorado School of Mines with a B.S. in Metallurgical Engineering in 1984 and from Kettering University with a M.S. in Manufacturing Management in 1993.
3. I am a member, in good standing, of the Society for Mining, Metallurgy and Exploration, Inc. (SME) and am an SME Registered Member, No. 4170421RM.
4. I have worked as a Metallurgical Engineer, manufacturing manager, or Project Manager continuously for a total of 33 years since my graduation from university. In the past nine years I have worked as a Project Manager on the development of underground and open pit mining projects and related infrastructure in Peru, Chile, Columbia, Macedonia, Mali, and in the United States.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 *Standards of Disclosure for Mineral Projects* ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
6. I am responsible for the preparation of Sections 19, 22 and portions of Sections 1, 18, 21, 25, 26 and 27 of the Technical Report titled Coringa Gold Project, Brazil, Feasibility Study NI 43-101 Technical Report, dated September 8, 2017, with an effective date of July 1, 2017 (the "Technical Report").
7. I have not visited the Coringa Project.
8. I am independent of Anfield Gold Corp. applying all of the tests in Section 1.5 of NI 43-101.
9. I have had no prior involvement with the property that is the subject of the Technical Report.
10. I have read NI 43-101, Form 43-101F1 and the Technical Report and confirm the Technical Report has been prepared in compliance with that instrument and form.
11. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 8th day of September, 2017.

"original signed and sealed"

**Robert S. Michel, SME Registered Member**