YAMANA GOLD

NI 43-101 TECHNICAL REPORT
JACOBINA GOLD MINE
BAHIA STATE, BRAZIL

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Effective Date: December 31, 2019

Signature Date: May 29, 2020

YAMANAGOLD

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CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This report contains or incorporates by reference “forward-looking statements” and “forward-looking information” under applicable Canadian securities legislation within the meaning of the United States Private Securities Litigation Reform Act of 1995. Forward-looking information includes, but is not limited to: cash flow forecasts, projected capital, operating and exploration expenditures, targeted cost reductions, mine life and production rates, grades, infrastructure, capital, operating and sustaining costs, the future price of gold, potential mineralization and metal or mineral recoveries, estimates of mineral resources and mineral reserves and the realization of such mineral resources and mineral reserves, information pertaining to potential improvements to financial and operating performance and mine life at Jacobina (as defined herein) that may result from expansion projects or other initiatives, the timing and expected outcomes of the Phase 1 Optimization and the Phase 2 Expansion projects, maintenance and renewal of permits or mineral tenure, estimates of mine closure obligations, leverage ratios and information with respect to the Company’s (as defined herein) strategy, plans or future financial or operating performance. Forward-looking statements are characterized by words such as “plan,” “expect”, “budget”, “target”, “project”, “intend”, “believe”, “anticipate”, “estimate” and other similar words, or statements that certain events or conditions “may” or “will” occur, including the negative connotations of such terms. Forward-looking statements are statements that are not historical facts and are based on the opinions, assumptions and estimates of Qualified Persons considered reasonable at the date the statements are made, and are inherently subject to a variety of risks and uncertainties and other known and unknown factors that could cause actual events or results to differ materially from those projected in the forward-looking statements. These factors include, but are not limited to: the impact of general domestic and foreign business; economic and political conditions; global liquidity and credit availability on the timing of cash flows and the values of assets and liabilities based on projected future conditions; fluctuating metal and commodity prices (such as gold, silver, diesel fuel, natural gas and electricity); currency exchange rates (such as the Brazilian real and the Canadian dollar versus the United States dollar); changes in interest rates; possible variations in ore grade or recovery rates; the speculative nature of mineral exploration and development; changes in mineral production performance, exploitation and exploration successes; diminishing quantities or grades of reserves; increased costs, delays, suspensions, and technical challenges associated with the construction of capital projects; operating or technical difficulties in connection with mining or development activities, including disruptions in the maintenance or provision of required infrastructure and information technology systems; damage to the Company’s or Jacobina’s reputation due to the actual or perceived occurrence of any number of events, including negative publicity with respect to the handling of environmental matters or dealings with community groups, whether true or not; risk of loss due to acts of war, terrorism, sabotage and civil disturbances; risks associated with infectious diseases, including COVID-19; risks associated with nature and climatic conditions; uncertainty regarding whether Jacobina will meet the Company’s capital allocation objectives; the impact of global liquidity and credit availability on the timing of cash flows and the values of assets and liabilities based on projected future cash flows; the impact of inflation; fluctuations in the currency markets; changes in national and local government legislation, taxation, controls or regulations and/or changes in the administration of laws, policies and practices, expropriation or nationalization of property and political or economic developments in Brazil; failure to comply with environmental and health and safety laws and regulations; timing of receipt of, or failure to comply with, necessary permits and approvals; changes in project parameters as plans continue to be refined; changes in project development, construction, production and commissioning time frames; contests over title to properties or over access to water, power, and other required infrastructure; increased costs and physical risks including extreme weather events and resource shortages related to climate change; availability and increased costs associated with mining inputs and labor; the possibility of project cost overruns or unanticipated costs and expenses, potential impairment charges, higher prices for fuel, steel, power, labour, and other consumables contributing to higher costs; unexpected changes in mine life; final pricing for concentrate sales; unanticipated results of future studies; seasonality and unanticipated weather changes; costs and timing of the development of new deposits; success of exploration activities; risks related to relying on local advisors and consultants in foreign jurisdictions; unanticipated reclamation expenses; limitations on insurance coverage; timing and possible outcome of pending and outstanding litigation and labour disputes; risks related to enforcing legal rights in foreign jurisdictions, vulnerability of information systems and risks related to global financial conditions. In addition, there are risks and hazards associated with the business of mineral exploration, development, and mining, including environmental hazards, industrial accidents, unusual or unexpected formations, pressures, cave-ins, flooding, failure of plant, equipment, or processes to operate as anticipated (and the risk of inadequate insurance, or inability to obtain insurance, to cover these risks), as well as those risk factors discussed or referred to herein and in the Company's Annual Information Form filed with the securities regulatory authorities in all of the provinces and territories of Canada and available under the Company’s profile at www.sedar.com, and the Company’s Annual Report on Form 40-F filed with the United States Securities and Exchange Commission. Although the Company has attempted to identify important factors that could cause actual actions, events, or results to differ materially from those described in forward-looking statements, there may be other factors that cause actions, events, or results not to be 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. The Company undertakes no obligation to update forward-looking statements if circumstances or management’s estimates, assumptions, or opinions should change, except as required by applicable law. The reader is cautioned not to place undue reliance on forward-looking statements. The forward-looking information contained herein is presented for the purpose of assisting investors in understanding the Company’s expected financial and operational performance and results as at and for the periods ended on the dates presented in the Company’s plans and objectives and may not be appropriate for other purposes.

Cautionary Note to United States Investors Concerning Estimates of Mineral Reserves and Mineral Resources

This report has been prepared in accordance with the requirements of the securities laws in effect in Canada, which differ in certain material respects from the disclosure requirements promulgated by the Securities and Exchange Commission (the "SEC"). For example, the terms "Mineral Reserve", "Proven Mineral Reserve", "Probable Mineral Reserve", "Mineral Resource", "Measured Mineral Resource", "Indicated Mineral Resource" and "Inferred Mineral Resource" are Canadian mining terms as defined in accordance with Canadian National Instrument 43-101 Standards of Disclosure for Mineral Projects and the Canadian Institute of Mining, Metallurgy and Petroleum (the "CIM") - CIM Definition Standards on Mineral Resources and Mineral Reserves, adopted by the CIM Council, as amended. These definitions differ from the definitions in the disclosure requirements promulgated by the SEC. Accordingly, information contained in this report may not be comparable to similar information made public by U.S. companies reporting pursuant to SEC disclosure requirements.

Non-GAAP Measures

The Company has included certain non-GAAP financial measures and additional line items or subtotals, which the Company believes that, together with measures determined in accordance with IFRS, provide investors with an improved ability to evaluate the underlying performance of the Company. Non-GAAP financial measures do not have any standardized meaning prescribed under IFRS, and therefore they may not be comparable to similar measures employed by other companies. The data is intended to provide additional information and should not be considered in isolation or as a substitute for measures of performance prepared in accordance with IFRS. The non-GAAP financial measures included in this report include: free cash flow, cash costs per gold-equivalent ounce sold, and all-in sustaining costs per gold-equivalent ounce sold. Please refer to section 11 of the Company's current annual Management's Discussion and Analysis, which is filed under the Company's profile on SEDAR at www.sedar.com and which includes a detailed discussion of the usefulness of the non-GAAP measures. The Company believes that in addition to conventional measures prepared in accordance with IFRS, the Company and certain investors and analysts use this information to evaluate the Company's performance. In particular, management uses these measures for internal valuation for the period and to assist with planning and forecasting of future operations.

LIST OF ABBREVIATIONS

Units of measurement used in this report conform to the metric system. All currency in this report is listed in US dollars (US$) unless noted otherwise.

°	degrees
>	greater than
<	less than
%	percent
a	annum
A	ampere
Ag	silver
ANM	National Mining Agency
ARD	acid rock drainage
Au	gold
BRL, R$	Brazilian real
°C	degree Celsius
cfm	cubic feet per minute
CIP	carbon-in-pulp
cm	centimetre
d	day
DCF	discounted cash flow
EPCM	engineering, procurement, construction management
g	gram
g	peak ground acceleration
G	giga (billion)
Ga	billion years ago
g/t	grams per tonne
ha	hectare
hp	horsepower
h	hour
HSEC	Health, safety, environment and community
Hz	hertz
IFRS	international financial reporting standards
JMC	Jacobina Mineração e Comércio S. A.
k	kilo (thousand)
kg	kilogram
km	kilometre

km^2	square kilometre
km/h	kilometres per hour
kVA	kilovolt-amperes
kW	kilowatt
kWh	kilowatt-hour
IFC	International Finance Corporation
LOM	life of mine
L	litre
LOM	life of mine
m	metre
M	Mega, million
m^2	square metre
m^3	cubic metre
masl	metres above sea level
µg	microgram
Ma	million years ago
m^3/h	cubic metres per hour
ML	metal leaching
µm	micrometre, micron
mm	millimetre
MW	megawatt
MWh	megawatt-hour
NSR	net smelter return
NPV	net present value
oz	Troy ounce (31.1035g)
PFS	pre-feasibility study
PS	performance standards
ppb	parts per billion
ppm	parts per million
QA/QC	quality assurance/quality control
RC	reverse circulation
ROM	run-of-mine
s	second
SD	standard deviation
SLS	sublevel longhole stoping

SMU	selective mining units
SOP	standard operating procedure
t	metric tonne
tpy	metric tonnes per year
tpd	metric tonnes per calendar day
TSF	tailings storage facility
USD, US$	United States dollar
V	volt
VSO	Vulcan Stope Optimizer
W	watt
yd^3	cubic yard
y	year

Jacobina Mining Blocks	
JBN	João Belo
MCZ	Morro do Cuscuz
MVT	Morro do Vento
SCO	Serra do Córrego
CAS	Canavieiras South
CAC	Canavieiras Central
CAN	Canavieiras North

1 Summary

This report documents the Jacobina Mine (Jacobina), an underground gold mine located in the state of Bahia of northeastern Brazil. Yamana Gold Inc. (Yamana) holds a 100% interest in the property through its subsidiary, Jacobina Mineração e Comércio S. A. (JMC).

Yamana is a Canadian-based precious metals producer with significant gold and silver production- and development-stage properties, exploration properties, and land positions throughout the Americas, including Canada, Brazil, Chile, and Argentina. Yamana plans to continue to build on this base through expansion and optimization initiatives at existing operating mines, development of new mines, advancement of its exploration properties and, at times, by targeting other consolidation opportunities, with a primary focus on the Americas.

This NI 43-101 technical report prepared in accordance with National Instrument 43-101 – Standards of Disclosure for Mineral Projects (NI 43-101) documents the mineral resource and mineral reserve estimate of Jacobina as of December 31, 2019; it also summarizes the current mining operation at the Jacobina Gold Mine as of December 31, 2019; it summarizes the LOM plan and cost estimates for the Phase 1 Optimization scenario with a plant throughput of 6,500 tpd; and it summarizes the results of a pre-feasibility study (PFS), conducted by Ausenco Limited (Ausenco) with a signature date of March 31, 2020, that evaluated a mill expansion, referred to as the Phase 2 Expansion, that would increase throughput to 8,500 tpd, a 30% increase in annual gold production.

1.1 Property Description

The Jacobina Mine Complex is located approximately 340 km by road northwest of the city of Salvador. The Jacobina project area forms a long rectangle measuring 155 km in a north-south direction and 5 to 25 km in an east-west direction. The shape of the claim package reflects the underlying geology as the stratigraphy favourable for hosting gold mineralization trends north-south.

The core mine area measures roughly eight kilometers in length, extending from João Belo (JBN) in the south through Morro do Cuscuz (MCZ), Morro do Vento (MVT) and the Canavieiras Sector (CAV) (that comprises Canavieiras South (Sul) (CAS), Canavieiras Central (CAC), and Canavieiras North (Norte) (CAN)), at the north end. All sectors of the mine are connected by roads and underground development. The core mine and the extension to the south are covered by mining leases whereas the exploration potential to the north are covered by exploration concessions.

Yamana acquired Jacobina when it completed the purchase of Desert Sun Mining Corp. (Desert Sun) in April 2006. The mineral rights of the Jacobina property consist of approximately 5,954 ha of mining concessions, 71,045 ha of exploration permits, and one 650 ha mining claim; all of which are held by JMC. JMC has all required permits to continue carrying out the proposed mining operations on the Jacobina property.

JMC does not pay royalties, however, it does pay taxes to the federal mineral sector agency; these taxes, called Compensação Financeira pela Exploração de Recursos Minerais (CFEM) and also known as the Brazilian mining royalty, are set at a rate of 1.5%. JMC does not have any obligations in respect to back-in rights, payments, or other agreements or encumbrances.

1.2 Geology and Mineralization

The Serra de Jacobina Mountains have been mined for gold since the late 17th century. Numerous old workings from artisanal miners (garimpeiros) can be seen along a 15-km strike length, following the ridges of the Serra Do Ouro mountain chain. Since mining commenced at Jacobina in 1983, over 33 Mt of tonnes have been processed at an average grade of 2.19 g/t gold for a production of over 2.2 Moz of gold.

The gold mineralization at Jacobina is hosted almost entirely within quartz pebble conglomerates of the Serra do Córrego Formation, the lowermost sequence of the Proterozoic-age Jacobina Group. The gold-bearing reefs range from less than 1.5 m to 25 m in thickness and can be followed along strike for hundreds of metres, and in some cases for kilometres. Although they are quite homogeneous along their strike and dip extensions, the gold-bearing conglomerates differ from one another in stratigraphic position and pattern of gold distribution. The differences are likely due to variations in the sedimentary source regions, erosion and transportation mechanisms, and the nature of the depositional environments. Not all conglomerates of the Serra do Córrego Formation are gold-bearing.

1.3 Exploration Status

Since acquiring Jacobina in 2006, Yamana has carried out regional mapping and sampling with the goal of identifying additional surface occurrences of mineralized conglomerates along the strike length of the Jacobina belt. The favourable gold-bearing stratigraphy at Jacobina has been traced along a strike length for approximately 150 km.

The significant exploration results at Jacobina were obtained by underground core drilling. Drilling activities since 2017 have been successful in defining the plunge of the higher-grade portions of mineralized zones and have led to the discovery of new mineralized zones. On the basis of these exploration successes and the production history at Jacobina, good potential exists in the proximity of the current mine infrastructure for the discovery of new mineralized zones and of the strike and dip extents of known mineralized horizons.

Analytical samples include both drill core and channel samples. The drill core samples are generated from exploration and infill drilling programs that are conducted on surface and underground; they are used for target generation and estimation of mineral resources and reserves. The sample preparation, sample security, and analytical procedures at Jacobina are adequate and consistent with industry standards. The verification of the sampling data by Yamana and external consultants, including the analytical quality control data produced by Yamana for samples submitted to various laboratories, suggests that the analytical results delivered by the laboratories are sufficiently reliable for the purpose of mineral resource and mineral reserve estimation.

1.4 Mineral Resource and Mineral Reserve Estimates

Preparation of the mineralized wireframe models used to estimate the block grades began with the preparation of a structural model that reflected the current understanding of the location and offsets of the many post-mineralization faults present in the mining areas. A series of lithological wireframe models was subsequently prepared to depict the overall location and distribution of the quartz-pebble conglomerate reefs and the interbedded massive quartzite beds. These lithological models were subsequently used to prepare wireframe models of the mineralized intervals. No minimum thickness was applied to the mineralized wireframes used to generate the grade estimation domains. The mineralized wireframes were created using a cut-off grade of 0.5 g/t gold. However, minimum thickness-reporting criteria for mineral resources was applied during the generation of conceptual mining shapes.

Jacobina mineral resources have been estimated in conformity with generally accepted standards set out in CIM Mineral Resource and Mineral Reserves Estimation Best Practices Guidelines (November 2019) and were classified according to CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014). Mineral resources are not mineral reserves and have not demonstrated economic viability. Underground mineral resources are estimated within conceptual underground mining shapes at a cut-off grade of 1.00 g/t gold, which corresponds to 75% of the break-even cut-off used to estimate the mineral reserves. A minimum mining width of 1.5 m is used to construct the conceptual mining shapes. Mineral resources are reported considering internal waste and dilution.

The Mineral Resource Statement of Jacobina as of December 31, 2019, exclusive of mineral reserves, is presented in Table 1-1.

Table 1-1: Jacobina Mineral Resource Statement, December 31, 2019

Category	Tonnage (kt)	Gold Grade (Au g/t)	Contained Gold (koz)
Measured	27,705	2.26	2,014
Indicated	14,765	2.27	1,076
Total Measured + Indicated	**42,470**	**2.26**	**3,090**
Inferred	18,528	2.36	1,406

1. *Mineral resources have been estimated by the Jacobina Resources Geology Team under the supervision of Renan Garcia Lopes, Senior Geologist, Registered Chartered Professional Member of Australasian Institute of Mining and Metallurgy, MAusIMM CP(Geo) Number 328085,*

a full-time employee of JMC, and a qualified person as defined by National Instrument 43-101. The mineral resource estimate conforms to the CIM (2014) Standards.

2. *Mineral resources are reported exclusive of mineral reserves.*
3. *Mineral resources are not mineral reserves and do not have demonstrated economic viability.*
4. *Underground cut-off grade is 1.00 g/t Au, which corresponds to 75% of the cut-off used to estimate the mineral reserves.*
5. *Minimum mining width of 1.5 m, considering internal waste and dilution*
6. *All figures are rounded to reflect the relative accuracy of the estimate. Numbers may not add up due to rounding.*

The methodology used at Jacobina to convert mineral resources to mineral reserves is summarized as follows:

- Verify geometries for the block model and resource wireframes.
- Confirm accurate block model depletion with current excavated development and stope solids up to the effective reporting date.
- Discard any resources within 30 m of the surface topography.
- Create automated stope shapes using MSO in Datamine using variable break-even cut-off grades by zone and stope dimensions of 10 × 10 m.
- Design stope polygons in Maptek Vulcan based on MSO stope shapes at section spacing of 5 to 10 m, depending on continuity of mineralization.
- Design the stope shapes in Maptek Vulcan based on the stope polygons and the stope design parameters, considering orebody geometry, mine layout, historical information, and geotechnical analysis.
- Design development shapes and cut development shapes from stope shapes.
- Evaluate all shapes against the block model and report ore tonnes and grade by classification. Exclude stope shapes and associated development below the cut-off grades.
- Exclude all stopes that contain mostly inferred mineral resources.
- Design capital and auxiliary development, including ramps, ventilation, materials handling, access, and infrastructure.
- Complete an economic analysis of each stope shape and exclude all stope shapes that are not cash-flow positive when considering associated development and infrastructure.

- Complete a geotechnical analysis of each sector and make adjustments to the design where required.
- List stopes as “approved” or “not approved” based on cut-off grade, economic and geotechnical analyses prior to conversion to mineral reserves. Apply the mining extraction factor.

The Mineral Reserve Statement of Jacobina as of December 31, 2019, is presented in Table 1-2.

Table 1-2: Jacobina Mineral Reserve Statement, December 31, 2019

Zone	Proven			Probable			Total Reserves		
	Tonnes	Gold Grade	Contained Gold	Tonnes	Gold Grade	Contained Gold	Tonnes	Gold Grade	Contained Gold
	kt	g/t Au	koz	kt	g/t Au	koz	kt	g/t Au	koz
JBN	6,591	1.93	408	3,388	1.87	203	9,979	1.91	612
MVT	2,268	2.11	154	5,674	2.44	445	7,942	2.35	599
MCZ	1,449	1.93	90	87	1.96	5	1,536	1.93	95
SCO	673	1.93	42	1,356	2.1	92	2,030	2.04	133
CAS	5,761	2.33	432	1,117	2.12	76	6,878	2.3	508
CAC	2,640	3.39	288	1,372	2.56	113	4,012	3.1	400
CAN	1,338	2.59	111	461	2.29	34	1,799	2.51	145
Total	**20,720**	**2.29**	**1,525**	**13,456**	**2.24**	**968**	**34,176**	**2.27**	**2,493**

1. *Mineral reserves have been estimated by the Jacobina long-term mine planning team under the supervision of Eduardo de Souza Soares, Registered Chartered Professional Member of Australasian Institute of Mining and Metallurgy, MAusIMM CP(Min) Number 330431, a full-time employee of JMC, and a qualified person as defined by National Instrument 43-101. The mineral reserve estimate conforms to the CIM (2014) Standards.*
2. *Mineral reserves are reported by zone at variable cut-off grades ranging from of 1.12 g/t to 1.30 g/t gold. Lower-grade stopes were subsequently excluded from the life of mine plan and mineral reserves inventory to optimize the cash flow model. The cut-off grade is based on metal price assumptions of US$1,250/oz for gold, a gold processing recovery assumption of 96%, and operating cost assumptions ranging from US$42.60 to 49.52/t processed.*
3. *Mineral reserves are stated at a mill feed reference point and account for minimum mining widths, diluting material, and mining losses.*
4. *All stope shapes contain a majority of measured and indicated mineral resources and may include minority portions of inferred resources and unclassified material with modelled gold grades.*
5. *Numbers may not add up due to rounding.*

1.5 MINING AND PROCESSING METHODS

Jacobina utilizes the sublevel longhole stoping (SLS) method without backfill to achieve an average production rate of approximately 6,500 tpd from the ramp-accessed underground mines; these include João Belo, Canavieiras, Serra do Córrego, Morro do Cuscuz, and Morro do Vento.

Yamana is currently reviewing alternative mining methods and testing the suitability of the Jacobina tailings for paste fill or hydraulic fill applications. The results will be considered in a conceptual study that will evaluate the potential for constructing a fill plant at Jacobina. The use of cemented rock fill is also being evaluated. Alternative mining methods and the use of backfill is likely to increase mining extraction and has the potential to increase conversion of measured and indicated mineral resources to mineral reserves.

The major assets and facilities associated with Jacobina are: the mining and processing infrastructure, including office buildings, shops, and equipment; a conventional processing plant which produces gold doré and is equipped with crushers, ball mills, leach tanks and carbon-in-pulp (CIP) tanks; and a TSF with a final design capacity for the life of mine (LOM).

Jacobina Mine is connected to the National Electric Grid through a 138 kV transmission line connected to the Jacobina II electric substation in the City of Jacobina.

The tailings produced at the Jacobina mill are presently stored in a fully lined tailings storage facility, TSF B2, located 2.5 km north of the mineral processing plant. TSF B2 consists of a cyclone sand dam built following a downstream construction method. TSF B1 is a legacy tailings facility that has not been in operation since 2012.

The Jacobina mineral processing plant uses conventional gold processing methodologies to treat run-of-mine (ROM) material from the underground mines. Comminution comprises three stages of crushing followed by wet grinding. Within the grinding circuit, gravity concentration of gold is performed on a bleed stream of classification cyclone underflow. Rejects from the gravity circuit are returned to the grinding circuit. The cyclone overflow is sent to leaching in a conventional cyanide leaching process, and gold extraction from the leach solution is performed by carbon adsorption in the CIP tanks. Gold is stripped in an elution circuit and final gold recovery is performed in an electrowinning circuit. The sludge and solids from electrowinning are dried and smelted in an induction furnace to produce doré bars. The overall gold recovery in 2019 was 96.7%.

The Phase 1 life of mine (LOM) plan, including optimization of the processing plant to stabilize throughput at a sustainable 6,500 tpd (Phase 1 Optimization) due for completion in mid-2020, has been developed based on the mineral reserves inventory of Jacobina as of December 31, 2019, resulting in a mine life of 14.5 years.

1.6 Environmental Studies, Permitting, and Social or Community Impact

No environmental issues were identified from the documentation available for review that could materially impact the ability to extract the mineral resources and mineral reserves. Jacobina has the operational licences required for operation according to the national legislation. The approved licences address the authority's requirements for mining extraction and operation activities. For expired licences in the process of being renewed, they remain valid until the revalidation process is completed by Instituto do Meio Ambiente e Recursos Hídricos (INEMA), the environmental agency for the state of Bahia. In compliance with conditions established in the operating licences, annual environmental assurance technical reports are submitted to the authorities.

An environmental monitoring program is in place at Jacobina for weather, surface water quality, groundwater quality, air quality and emissions, and ambient noise. Monitoring of flora and fauna was initiated in the first quarter of 2020.

Acid rock drainage (ARD) and metal leaching (ML) associated with TSF B1 and the João Belo stockpile (both inactive facilities), are managed through ponds and groundwater interceptor wells located downstream of the facilities. Water quality is monitored by Yamana at various locations downstream. Yamana is planning to install additional groundwater monitoring wells in the TSF areas. TSF B1 is being rehabilitated.

The water management system implemented at Jacobina appears to be sound and follows common practices applicable for the protection of the environment.

The ore processing system was designed to maximize the recirculation of process water and minimize the requirement for freshwater. The mine water is pumped back to the underground operations. The water collected in the active TSF B2 is recirculated to the process plant. Freshwater required for ore processing is supplied from a reservoir built in the Cuia River. There is no discharge of industrial water to the environment. The site wide water balance mitigates the risk to water supply due to drought as well as the risk of excess water to the operation.

Yamana has implemented an integrated management system covering health, safety, environment, and community through internationally accredited systems.

A conceptual mine closure plan was developed in 2018 for the mine components that includes a closure cost estimate. The latest version was completed in December 2018. With the potential for impacts to water from ARD/ML, and an existing sulphate/metals plume collection system, there could be long-term water management and treatment requirements post-closure. Long-term closure costs could potentially extend several years beyond closure.

No known social issues were identified from the documentation available for review. At present, Yamana's operations at Jacobina are a positive contribution to sustainability and community well-being. Jacobina has demonstrated a commitment to employee health, safety, and well-being; community programs; and ongoing outreach and data collection to support issues management and mitigation. Yamana has established and continues to implement its various policies, procedures, and practices in a manner broadly consistent with relevant IFC Performance Standards.

1.7 Phase 2 Expansion Pre-Feasibility Study

Yamana commissioned Ausenco to conduct a pre-feasibility study (PFS) of the proposed Phase 2 Expansion. This study, dated March 31, 2020, considered an expansion scenario that would increase the processing plant's throughput capacity from 6,500 tpd to 8,500 tpd.

In 2019, Jacobina began optimizing the processing plant to stabilize throughput at a target rate of 6,500 tpd. Yamana refers to this optimization as Phase 1 Optimization. The first step of the optimization was the installation of an Advanced Process Control system in early 2019 to increase the level of plant automation. Other components of the optimization include additional gravity concentrators, a new induction kiln, replacement of screens, and new carbon-in-pulp (CIP) tanks. The Phase 1 Optimization project is on track for completion in mid-2020.

Jacobina achieved the Phase 1 Optimization throughput objective of 6,500 tpd in the first quarter of 2020, a full quarter ahead of schedule and without the benefits expected from the installation of all the plant modifications. Yamana continues to evaluate the actual Phase 1 performance and pursue further debottlenecking initiatives to determine the sustainable throughput level in excess of 6,500 tpd that the mill can achieve without additional investment. JMC is already permitted for throughput of up to 7,500 tpd.

Following up on Phase 1 Optimization, Yamana is studying the increase in throughput to 8,500 tpd; this is referred to as the Phase 2 Expansion. The throughput increase is expected to be achieved through the installation of an additional grinding line and incremental upgrades to the crushing and gravity circuits. If implemented, the Phase 2 Expansion is expected to increase annual gold production by 31%, reduce costs, and generate significant cash flow and attractive returns. The total capital cost of the Phase 2 Expansion is estimated at US$57 M, of which US$35 M is assigned for the processing plant, US$14 M for underground mining, and US$8 M for infrastructure.

The Phase 2 Expansion LOM (or PFS case) is based on the mineral reserves with an effective date of December 31, 2019. The PFS case LOM plan considers a mine life of 11.5 years, starting with a plant feed rate of 6,500 tpd for 2020 and 2021, ramping up production in 2022, to reach the average plant feed rate of 8,500 tpd by 2023. Plant throughput will be maintained at 8,500 tpd until 2030 and will decrease in 2031. The LOM gold production profile of the PFS case increases from a target Phase 1 Optimization running rate of 175 koz per year to approximately 230 koz per year.

For internal planning purposes, an extended mine plan (Extended Case) has been developed that considers the addition of 9.5 Mt of plant feed with an average grade of 2.40 g/t gold, assuming the successful conversion of mineral resources into reserves. This would increase the mine life of the Phase 2 Expansion scenario from 11.5 years to 14.5 years.

Detailed engineering for the Phase 2 Expansion is currently scheduled to commence soon after commissioning of the Phase 1 Optimization in mid-2020. This would allow engineering and construction to be completed by early 2023.

Capital costs associated with the Phase 2 Expansion would not commence until 2021. These timelines are dependent on completion of the Phase 2 Expansion feasibility study by mid-2021. The feasibility study will look to further refine and optimize operating costs and also take into account the actual realized potential under the Phase 1 Optimization to determine the true potential of the Phase 2 Expansion. Yamana may choose to normalize operations under the Phase 1 Optimization for a period of time in order to determine the true realizable throughput for this phase before proceeding with the Phase 2 Expansion.

JMC has applied for permitting and expects the permits to be issued by late 2021, within the timeframes currently assumed for implementation of the Phase 2 Expansion. The permit application is for higher throughput than what is contemplated in the Phase 2 Expansion; this to ensure future flexibility.

1.8 CONCLUSIONS AND RECOMMENDATIONS

More than 2.2 Moz of gold have been produced from Jacobina since modern mining commenced in 1983. Annual gold production has increased year-after-year from 74 koz in 2013 to more than 159 koz in 2019, through increases in plant throughput, gold feed grade, and metallurgical recovery.

Drilling activities in previous years have been successful in defining the plunge of the higher-grade portions of the mineralized zones and have led to the discovery of new mineralized zones, such as João Belo Sul and the extension of mineralization in the East Block. On the basis of these exploration successes and the production history at Jacobina, good potential exists in the proximity of the current mine infrastructure for discovering new mineralized zones and/or the strike and dip extents of the known mineralized horizons.

In terms of the regional exploration potential, the favourable stratigraphy hosting the gold mineralization at Jacobina has been traced along a strike length of approximately 150 km. Exploration programs have discovered many gold occurrences along this favourable stratigraphy, including the Jacobina Norte project where gold mineralization has been discovered along a continuous 15 km-long trend. As of the end of December 2019, 7,067 drill holes were drilled in the Jacobina project area, for a total of 868,000 metres. Almost all of this drilling has been within the 11 km-long mining district, with the majority of the 88,000 hectares of exploration concessions still yet to be drilled.

Jacobina mineral resources and mineral reserves have been estimated in conformity with generally accepted CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines (November 2019) and are reported in accordance with CIM (2014) Standards. The total proven and probable mineral reserve at Jacobina as of December 31, 2019, is 34.2 Mt averaging 2.27 g/t gold, for approximately 2.5 Moz of contained gold. In addition, measured and indicated mineral resources total 42.5 Mt grading 2.26 g/t gold (3.1 Moz gold) and inferred mineral resources of 18.5 Mt grading 2.36 g/t gold (1.4 Moz gold).

In 2019, Jacobina began optimizing the processing plant to stabilize throughput at a target rate of 6,500 tpd, referred to as the Phase 1 Optimization, which is on track for completion in mid-2020. Jacobina achieved the Phase 1 Optimization objective of 6,500 tpd in the first quarter of 2020, a full quarter ahead of schedule and without the benefits expected from the installation of all the plant modifications. Yamana continues to evaluate the actual performance of the Phase 1 Optimization and pursue further debottlenecking initiatives to determine the sustainable throughput level in excess of 6,500 tpd that the mill can achieve without additional investment.

Following up on the Phase 1 Optimization, Jacobina is studying the increase in throughput to 8,500 tpd, referred to as the Phase 2 Expansion. Yamana completed a pre-feasibility study for the Phase 2 Expansion in the first quarter of 2020 and will continue with a feasibility study, scheduled for completion in mid-2021.

Three LOM plan scenarios have been developed. In all scenarios, mining and processing of lower-grade supplementary mineral reserves is deferred until late in the mine life where possible, allowing feed grades of approximately 2.4 g/t gold to be maintained. The Phase 1 Optimization LOM plan assumes a plant throughput rate of 6,500 tpd and is based on mineral reserves as of December 31, 2019. In this scenario, the mine life is 14.5 years, with gold production of 175,000 oz per year at a gold feed grade of 2.4 g/t, and a gold metallurgical recovery of 96.5%.

The second scenario, the Phase 2 Expansion PFS case, is based on the same mineral reserves as the Phase 1 case, but includes the Phase 2 Expansion with plant throughput ramping up to 8,500 tpd by 2023. With the higher throughput rate, mine life is reduced to 11.5 years and gold production increases to 230,000 oz per year. The third scenario, referred to as the Phase 2 Expansion Extended Case and that Yamana uses as a base case for internal planning purposes, is the same as the Phase 2 PFS case, but considers an additional 9.5 Mt of plant feed at an average grade of 2.4 g/t gold based on the expected conversion of current mineral resources to mineral reserves through infill drilling. Gold production remains at 230,000 oz per year and mine life is extended to 14.5 years. Based on the impressive track record of discovery and successful conversion of mineral resources to mineral reserves at Jacobina, Yamana is confident that, based on required infill drilling, the future conversion of mineral resources to mineral reserves will continue to show positive results. Furthermore, the favourable geological environment, both near mine and regionally, provides exceptional mineral potential that may eventually result in extending the mine life beyond the Extended Case

The capital and operating cost estimates for the Phase 1 Optimization LOM plan are based on mine budget data and operating experience, and are appropriate for the known mining methods and production schedule. Capital cost estimates include appropriate sustaining estimates. Under the assumptions in this technical report, Jacobina has positive project economics until the end of mine life, which supports the mineral reserve estimate. Capital and operating cost estimates for the Phase 2 Expansion scenarios were revised as part of the Phase 2 Expansion pre-feasibility study. Total Phase 2 Expansion project capital costs are estimated at US$57 M, of which $35 M is dedicated to the processing plant, $14M to underground mining, and $8 M to infrastructure. The project's capital cost is expected to be invested incrementally and would allow the project to be funded by Jacobina's cash flow. LOM average unit operating costs are estimated to decrease from US$41.04/t in the Phase 1 Optimization case to $37.50/t in the Phase 2 Expansion PFS case, due to improved efficiency and the distribution of fixed costs over a greater quantity of tonnes per year.

No environmental issues were identified from the documentation available for review that could materially impact the ability to extract the mineral resources and mineral reserves. Jacobina has all the operational licences required for operation according to the national legislation. The approved licences address the authority's requirements for mining extraction and operation activities. For the Phase 2 Expansion, Yamana has applied for permitting and expects the permits to be issued by late 2021, within the timeframes currently assumed for implementation of Phase 2. The permit application is for higher throughput than what is contemplated in Phase 2 to ensure future flexibility. JMC is already permitted for throughput of up to 7,500 tpd.

No social issues were identified from the documentation available for review. At present, Yamana's operations at Jacobina are a positive contribution to sustainability and community well-being. Jacobina has demonstrated a commitment to employee health, safety, and well-being; community programs; and ongoing outreach and data collection to support issues management and mitigation. Yamana has established and continues to implement its various policies, procedures, and practices in a manner broadly consistent with relevant IFC Performance Standards.

The results of this technical report are subject to variations in operational conditions including, but not limited to the following:

- Assumptions related to commodity and foreign exchange (in particular, the relative movement of gold and the Brazilian real/US dollar exchange rate)
- Unanticipated inflation of capital or operating costs
- Significant changes in equipment productivities
- Geological continuity of the mineralized structures

- Geotechnical assumptions in pit and underground designs
- Ore dilution or loss
- Throughput and recovery rate assumptions
- Changes in political and regulatory requirements that may affect the operation or future closure plans
- Changes in closure plan costs
- Availability of financing and changes in modelled taxes

In the opinion of the qualified persons, there are no reasonably foreseen inputs from risks and uncertainties identified in the technical report that could affect the project's continued economic viability.

Based on success in extending known mineral resources, Yamana should continue exploration at the mining operations. Due to the quantity of material in the mineral reserve category and its impact on mine life, Yamana's focus is to continue infill drilling programs in support of converting mineral resources to mineral reserves. An additional focus will be to carry out exploration programs in the vicinities of the current mines to search for the strike and depth extensions of known mineralization.

Based on processing plant performance in the first quarter of 2020, in which the processing plant throughput exceeded the Phase 1 Optimization target of 6,500 tpd, without the inclusion of the benefits expected from the installation of all the plant modifications, Yamana should continue to evaluate the Phase 1 Optimization actual performance and pursue further debottlenecking initiatives to determine the sustainable throughput level in excess of 6,500 tpd that the mill can achieve without additional investment.

Based on the positive results of the Phase 2 Expansion pre-feasibility study, Yamana should continue to advance the level of engineering for the Phase 2 Expansion and proceed to feasibility study. The feasibility study should look to further improve operating costs and also take into account the actual realized potential under the Phase 1 Optimization to determine the true potential of Phase 2 Expansion. In parallel to the Phase 2 Expansion feasibility study, Yamana should continue the application of permits for the increased throughput capacity.

Yamana should continue to evaluate the suitability of alternative mining methods and tailings as paste or hydraulic backfill, in addition to the use of multiple backfill types to optimize mining extraction. Yamana has initiated a separate study outside the Phase 2 Expansion PFS to evaluate the installation of a backfill plant to allow up to 2,000 tpd of tailings to be deposited in underground voids. Preliminary results indicate that the project has the potential to reduce the environmental footprint, extend the life of the existing tailing storage facility, and improve mining recovery, resulting in an increased conversion of mineral resources to mineral reserves.

Regarding environmental and social management, SLR recommends the following:

- Conduct geochemical sampling and characterization of waste rock before developing a new waste rock stockpile.
- Maintain a robust water quality monitoring program to verify compliance with applicable environmental standards and evaluate the appropriateness of the water management strategies that are in place.
- Continue to implement the environmental monitoring program, which monitors and manages potential environmental impacts resulting from the mine operations, to inform future permit applications and mine closure plan updates.
- Consider the implementation of a noise- and vibrations-monitoring program, consistent with the integrated 2016 HSEC Framework.
- Consider establishing an energy and emissions strategy/plan to determine, on a defined frequency, sources of energy consumption and associated greenhouse gas (GHG) emissions, consistent with the integrated 2016 HSEC Framework.
- The existing sulphate/metals plume originating from the decommissioned TSF B1 may potentially cause ongoing effects on water. This could result in long-term closure costs extending beyond the five-year post-closure treatment period that is currently outlined in the conceptual 2018 mine closure plan. It is recommended that the closure cost estimate be reviewed as the closure plan and designs for both TSF facilities are developed in more detail. Costs for long-term monitoring and maintenance of dams should also be reviewed.
- Considering that, historically, mine site closures have the potential to result in significant economic impacts to a community, a detailed social management plan should be developed to mitigate the economic and social effects of mine closure; this plan would include ongoing consultation, training, and planning.
- Incorporate a strategy for closure of the inactive open pit into the mine closure plan.

2 INTRODUCTION

The Jacobina Mine (Jacobina) is an underground gold mine located in the state of Bahia of northeastern Brazil, approximately 340 km by road northwest of the city of Salvador. Yamana Gold Inc. (Yamana) holds a 100% interest in the property through its subsidiary, Jacobina Mineração e Comércio S. A. (JMC).

Yamana is a Canadian-based precious metals producer with significant gold and silver production- and development-stage properties, exploration properties, and land positions throughout the Americas, including Canada, Brazil, Chile, and Argentina. Yamana plans to continue to build on this base through expansion and optimization initiatives at existing operating mines, development of new mines, advancement of its exploration properties and, at times, by targeting other consolidation opportunities, with a primary focus on the Americas.

Yamana acquired Jacobina when it completed the purchase of Desert Sun Mining Corp. (Desert Sun) in April 2006.

Yamana's other operations include:

- 100% ownership of the El Peñón underground and open-pit gold-silver mine near Antofagasta in northern Chile
- 50% ownership in the Canadian Malartic open-pit gold mine located in Malartic, Québec, Canada
- 100% ownership in the Cerro Moro underground and open-pit gold-silver mine located in Santa Cruz province, Argentina
- 100% ownership of the Minera Florida underground gold-silver mine located south of Santiago, Chile

This technical report was prepared in accordance with National Instrument 43-101 – *Standards of Disclosure for Mineral Projects* (NI 43-101); it documents the mineral resource and mineral reserve estimates for Jacobina as of December 31, 2019; it also summarizes the current mining operation at the Jacobina Gold Mine as of December 31, 2019; it summarizes the LOM plan and cost estimates for the Phase 1 Optimization scenario with a plant throughput of 6,500 tpd; and it summarizes the results of a pre-feasibility study (PFS), conducted by Ausenco Limited (Ausenco) with a signature date of March 31, 2020, that evaluated a mill expansion, referred to as the Phase 2 Expansion, that would increase throughput to 8,500 tpd, a 30% increase in annual gold production. Results of the Phase 2 expansion study are described in Section 24 of this technical report.

This technical report was prepared by Yamana following the guidelines of NI 43-101 and Form 43-101F1. The mineral resource and mineral reserve estimates reported herein were prepared in conformity with generally accepted standards set out in the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Mineral Resource and Mineral Reserves Estimation Best Practices Guidelines (November 2019) and were classified according to CIM Definition Standards for Mineral Resources and Mineral Reserves (CIM (2014) Standards).

2.1 Sources of Information

The qualified persons for this technical report are Eduardo de Souza Soares, MAusIMM CP (Min); Renan Garcia Lopes, MAusIMM CP (Geo); Henry Marsden, P.Geo.; Carlos Iturralde, P.Eng. (all full-time employees of Yamana); and Luis Vasquez, P.Eng., of SLR Consulting (Canada) Ltd. (SLR).

Mr. de Souza Soares is the Coordinator Technical Services of the Jacobina mine. He was last at the mine between May 10 and 21, 2020. Mr. Garcia Lopes is a senior geologist for Yamana, also assigned to the Jacobina mine. He was last at the mine on March 18, 2020. Mr. Marsden, Senior Vice President, Exploration, for Yamana visited the project on six occasions including most recently on September 12 to 14, 2019. Mr. Iturralde, Director, Tailings, Health, Safety & Sustainable Development at Yamana, and Mr. Vazquez, Senior Environmental Consultant and Hydrotechnical Engineer at SLR, have not visited the project due to travel restrictions related to the global COVID-19 pandemic.

Eduardo de Souza Soares is responsible for Sections 13, 15 to 19 (excluding sub-section 18.2), 21 to 22, and 24; he also shares responsibility for related disclosure in Sections 1, 25, 26, and 27 of the technical report. Renan Garcia Lopes is responsible for Section 11, 12, and 14, and shares responsibility for related disclosure in Sections 1, 25, 26, and 27 of the technical report. Henry Marsden is responsible for Sections 2 to 10, 23, and shares responsibility for related disclosure in Sections 1, 25, 26, and 27 of the technical report. Luis Vasquez is responsible for Section 20 (excluding sub-section 20.2.2), and shares responsibility for related disclosure in Sections 1, 25, 26, and 27 of the technical report. Carlos Iturralde is responsible for Sections 18.2 and 20.2.2, and shares responsibility for related disclosure in Sections 1, 25, 26, and 27 of the technical report.

In preparation of this technical report, the qualified persons reviewed technical documents and reports on Jacobina supplied by on-site personnel. The documentation reviewed, and other sources of information, are listed at the end of this technical report in Section 27-References.

The most recent technical report on Jacobina was compiled by RPA Inc. (RPA) with an effective date of June 30, 2019 and a signature date of September 30, 2019 (RPA, 2019). The 2019 RPA report served as the foundation for this current technical report which updates the information as of an effective date of December 31, 2019. This technical report also includes the results of a pre-feasibility study (PFS) conducted by Ausenco with a signature date of March 31, 2020.

3 Reliance on Other Experts

The information, conclusions, opinions, and estimates contained herein in this technical report are based on the following parameters:

- Information available to Yamana at the time of preparation of this technical report
- Assumptions, conditions, and qualifications as set forth in this technical report

The Brazilian government department responsible for mining lands, Agência Nacional de Mineração (ANM), maintains an internet-based system for accessing information on exploration concessions granted in Brazil. Yamana has a computerized claim management system that monitors this site regularly and updates claim data as required. The qualified persons have not performed an independent verification of the land title and tenure information, as summarized in Section 4 of this technical report, nor have they verified the legality of any underlying agreement(s) that may exist concerning the permits or other agreement(s) between third parties, as summarized in Section 4 of this technical report. For this topic, the qualified persons of this report have relied on information provided by the legal department of Yamana.

The qualified persons have relied on various Yamana departments for guidance on applicable taxes, royalties, and other government levies or interests, applicable to revenue or income from the Jacobina mine.

Except for the purposes legislated under applicable securities laws, any use of this technical report by any third party is at that party's sole risk.

4 Property Description and Location

4.1 Location

The Jacobina Mine Complex, as shown in Figure 4-1, is located in the state of Bahia in northeastern Brazil (11°15' S and 40°31' W), approximately 340 km by road northwest of the city of Salvador. Salvador is the state capital of Bahia and has a population of approximately 2.9 million inhabitants.

The Jacobina project area forms a long rectangle measuring 155 km in a north-south direction and 5 to 25 km in an east-west direction. The shape of the claim package reflects the underlying geology as the stratigraphy favourable for hosting gold mineralization trends north-south.

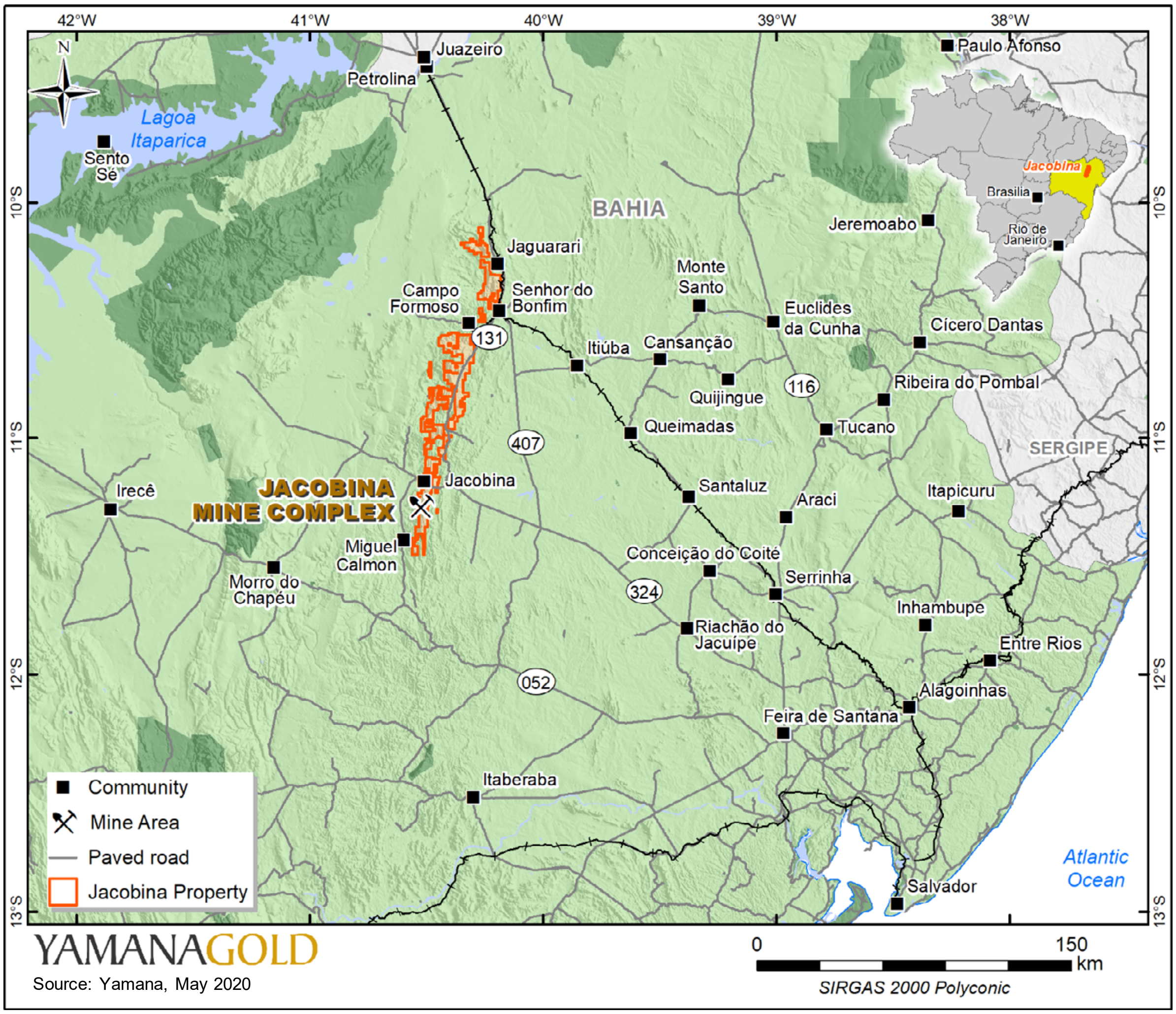

Figure 4-1: General location map

4.2 Property Description

The Jacobina property covers the core mine area as well as the on-strike exploration potential in the remainder of the Jacobina basin. The core mine area measures roughly eight kilometers in length, extending from João Belo (JBN) in the south through Morro do Cuscuz (MCZ), Morro do Vento (MVT) and the Canavieiras Sector (CAV) (which comprises Canavieiras South (Sul) (CAS), Canavieiras Central (CAC), and Canavieiras North (Norte) (CAN)), at the north end. All sectors of the mine are connected by roads and underground development. The core mine and the extension to the south are covered by mining leases while the exploration potential to the north are covered by exploration concessions.

4.3 Land Tenure

4.3.1 Surface Rights

Two general types of surface rights exist on the project: (1) rights of ownership and (2) rights of possession. Rights of ownership allow the title holder to occupy and sell the land while rights of possession allow occupation and use but are non-transferable and can not be sold. JMC holds all of the surface rights required for the development of its activities. There are no restrictions to surface rights in any of the areas encompassed by the project.

JMC holds rights of possession on 25 areas (Table 4-1) and 15 property titles (surface rights, rights of ownership) (Table 4-2), in Itapicurú, District of Jacobina, Bahia State, encompassing the entire project area.

Table 4-1: Jacobina – Rights of possession

Vendor	Area (ha)	Location	Date
André Santos da Silva	0.155	Itapicurú	September 2007
Augusto Barbosa da Silva	0.034	Itapicurú	August 2007
Augusto Barbosa da Silva	0.553	Itapicurú	June 2007
Djalma Botelho	0.436	Itapicurú	May 1987
Edivaldo Santos Santiago	0.004	Itapicurú	December 1995
Edivaldo Santos Santiago and his wife	0.004	Itapicurú	December 1995
Edivaldo Santos Santiago	8.276	Jaboticaba	May 2007
Edivaldo Santos Santiago	6.334	Jaboticaba	January 2008
Genivaldo Alves Bispo	0.449	Itapicurú	October 2007
José Mariano Júnior	5.227	Itapicurú	February 2005
José Martins de Olveira	22.825	Barra/Itapicurú	May 2007
José Martins De Oliveira	9.823	Jaboticaba	August 2005
Jovelina Ana Alves	Not registered	Itapicurú	March 1997
Jovelino Bispo do Nascimento	2.971	Itapicurú	April 2007
Luiz Carlos M. Evangelista	0.192	Itapicurú	October 2007
Manoel Xavier Mota	0.066	Itapicurú	April 2007
Márcio de Jesus Silva	0.004	Itapicurú	June 2008
Rita de Cássia Souza Lima	0.093	Itapicuruzinho	March 2005
Rita de Cássia Souza Lima	0.023	Itapicuruzinho	February 2005
Rita de Cássia Souza Lima	0.040	Itapicurú	February 2005
Rita de Cássia Souza Lima	0.217	Itapicurú	March 2005
Rita de Cássia Souza Lima	0.653	Itapicurú	March 2005
Rita de Cássia Souza Lima	0.133	Itapicurú	November 2005
Rita de Cássia Souza Lima	0.030	Itapicurú	April 2005
Valdivino Lopes de Lima	17.424	Canavieiras	January 2007
Total:	**75.96 ha**		

Table 4-2: Jacobina – Rights of ownership

Vendor	Area (ha)	Location	Acquisition Date	Registration
Adenício Francisco da Silva	21.78	Itapicurú	August 2007	4542
Álvaro de Carvalho Abreu	14.99	Genipapo e Itapicurú	-	-
Augusto Luiz Vieira Santos	91.12	Córrego da Barra e Laginha	September 2008	2063
Augusto Luiz Vieira Santos	17.50	Barra	September 2008	3089
Dionízio Moreira dos Santos	15.25	Barra de Baixo e Roseta	July 2007	4688
Dionízio Moreira dos Santos	35.20	Barra de Cima	July 2007	3779
Francisco Sales Verissimo	141.64	Genipapo e Itapicurú	-	-
João Macário da Silva	31.82	Itapicurú	July 2007	1643
João Macário da Silva	51.45	Itapicurú	July 2007	21038
José Monteiro da Silva	29.42	Estrada Nova Barra	June 2007	3012
Jovita lima de Oliveira	4.42	Itapicurú	May 2006	01-4.547
Luiz Eduardo Lima dos Santos	189.69	Córrego da Barra e Laginha	September 2008	6887, 6886, 6883, 6895
Luiz Maximiano dos Santos	96.99	Córrego da Barra e Laginha	-	-
Maria Adélia Gomes Sales	98.36	Genipapo e Itapicurú	September 2007	3095
Unigeo Ltda.	261.36	Canavieiras	-	-
Total:	**1,100.99 ha**			

4.3.2 Mineral Rights

The mineral rights of the Jacobina property consist of approximately 5,954 ha of mining concessions, 71,045 ha of exploration permits, and one 650 ha mining claim; all of which are held by JMC (Figure 4-2). The leases and granted exploration concessions have been surveyed and are marked by permanent concrete monuments at each corner. A complete list of the mining and exploration concessions with their current status as of April 2020 is included in Appendix A. Exploration concessions are renewable on a three-year basis and have annual fees ranging from US$1.00/ha to US$1.55/ha.

Most of mining concessions numbers 157, 608, and 1461 are located within the boundary of Parque Sete Passagens (Seven Passes State Park) or in the park's buffer zone. While mining is not permitted within the park, JMC has valid mining concessions issued by the National Mining Agency, Agência Nacional de Mineração (ANM) and is currently negotiating for access into the park with state government and park officials.

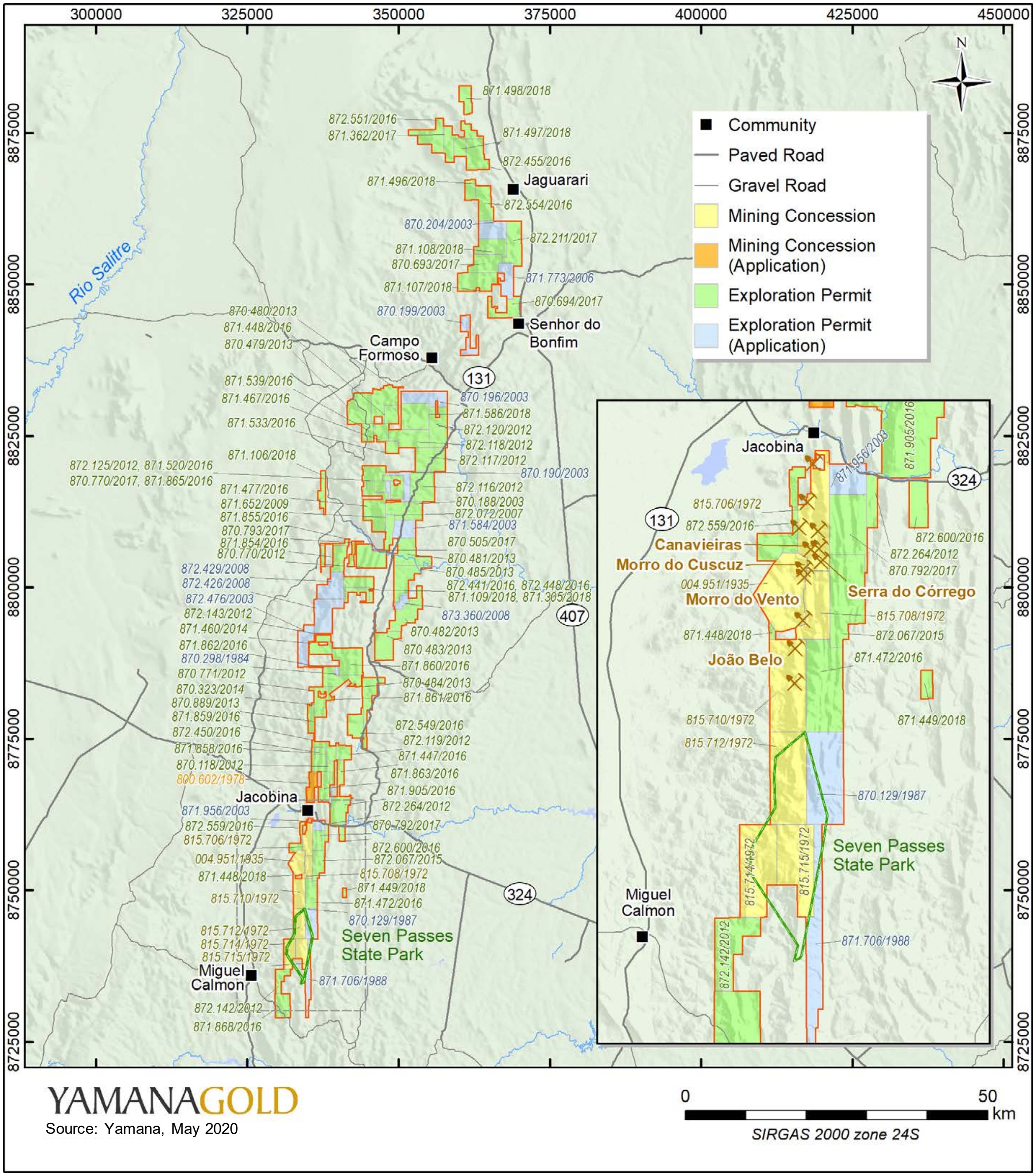

Figure 4-2: Mining and exploration concessions

JMC does not pay royalties, however, it does pay taxes to the federal mineral sector agency; these taxes, called Compensação Financeira pela Exploração de Recursos Minerais (CFEM) and also known as the Brazilian mining royalty, are set at a rate of 1.5%. JMC does not have any obligations in respect to back-in rights, payments, or other agreements or encumbrances.

JMC has all required permits to continue carrying out the proposed mining operations on the Jacobina property. Further details of these permits can be found in Section 20 of this report.

4.4 Environmental Considerations

The primary environmental considerations and potential liabilities for the Jacobina Mine are related to the operations of the tailings storage facility (TSF) and the management of seepage water and mine water. Yamana prioritizes the management of tailings and is in the process of aligning the company's tailings management system with best practices proposed by the Mining Association of Canada (MAC), Canadian Dam Association (CDA) guidelines and other international standards.

Tailings produced at the mill are currently managed in TSF B2, located approximately 2.5 km north of the main processing plant. TSF B2 is fully lined; this lining limits the flow of tailings or process water into the environment.

All water pumped from the underground mines and that seeps from the old tailings facility (TSF B1) is collected and pumped into the TSF B2 impoundment. Similarly, acid rock drainage (ARD) and run-off water in contact with the waste rock piles are monitored and collected for proper containment and/or treatment.

As stated in the Environmental Permit, the TSF area will be allowed to dry and consolidate once operations have ceased; this will allow for the installation of a geomorphic low-permeability closure cover and subsequent rehabilitation activities similar to reclamation activities being completed in TSF B1.

Additional details on tailings infrastructure and management at Jacobina are provided in Sections 18 and 20 of this technical report.

The qualified person responsible for this section is not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform mining and exploration work on the property.

5 Accessibility, Climate, Local Resources, Infrastructure, and Physiography

5.1 Accessibility

The Jacobina Mine is located 10 km from the town of Jacobina, which is accessible by paved secondary highway (Routes 130 and 324) from Salvador, the state capital of Bahia, located 340 km to the south-southeast (Figure 4-1) of the mine complex. Well-maintained paved roads from the town of Jacobina provide access to the project.

5.2 Climate

The town of Jacobina is located in a region of subtropical semi-arid climate. Summer months are much rainier than the winter months. Precipitation at Jacobina is somewhat higher than the regional average, likely due to the influence of the mountain range which hosts the deposits. Average annual precipitation is 840 mm, with May to October experiencing relatively less precipitation than the rest of the year. Temperatures vary little throughout the year. July is the coldest month with average daytime highs of 26ºC and nightly lows of 17ºC. February is the warmest month with average daily highs of 32ºC and nightly lows of 20ºC. Mining operations can be carried out on a year-round basis.

5.3 Local Resources

The town of Jacobina was founded in 1722 and is a regional agricultural centre with an official population of 79,247 as reported in 2010 by the Instituto Brasileiro de Geografia e Estatística. It provides all the accommodation, shopping, and social amenities necessary for the mine's labour force. Electrical services are supplied to the mine by Companhia de Electricidade do Estado da Bahia (COELBA). Telephone and high-speed internet service are available via the town of Jacobina. A combination of water wells, storm water catchment basins, and mine dewatering features satisfies the project's water requirements.

5.4 Infrastructure

Yamana holds sufficient surface rights for mining operations. Currently, the major assets and facilities associated with Jacobina are as follows:

- Mine and mill infrastructure including office buildings, shops, and equipment.
- A conventional flotation mill, with leach and carbon-in-pulp (CIP) tanks, which produces gold doré. The processing plant has a current nominal capacity of 6,500 tonnes per day (tpd).

- A TSF with a final design capacity for the life of mine (LOM).

5.5 PHYSIOGRAPHY

The town of Jacobina is located at an approximate elevation of 500 m with topography varying from flat terrain to low rolling hills. The immediate area surrounding the Jacobina Mine consists of steep-sided ridges rising to 1,200 m that are underlain by the resistive quartzites, metaconglomerates, and schists in the Serra de Jacobina mountain range (Figure 5-1).

The project is located in the upper reaches of the Itapicurú watershed, more precisely in the Upper Itapicurú region. The Itapicurú-Mirim River, an important tributary of the Itapicurú River, represents the main drainage in the mine site area. Groundwater recharge occurs by direct rainfall infiltration. In the Serra de Jacobina, which is underlain by quartzite and conglomerate, rainwater infiltration occurs through fractures, whereas in the recessive topography of the crystalline basement, the recharge occurs mainly through infiltration of porous strata. The recharge is estimated to be higher in the mountains. The water deficit in the region favors the recharge of aquifers only in the rainy season.

5.6 VEGETATION

The area of Jacobina and its surroundings host several ecosystems, including seasonal semi-deciduous forest, the Caatinga (shrublands) in the lower portions of the terrain and Cerrado (dry savannah) vegetation in the upper elevations. The town of Jacobina is located in a region of transition between several vegetation types: (1) the Atlantic Forest and the Caatinga and (2) between the Caatinga and the Cerrado.

The main phyto-physiognomy in the drainage region of the Itapicuruzinho watershed is represented by the seasonal semi-deciduous forest, one of the most important phyto-physiognomies of the Atlantic Forest biome. Due to local soil variations and land use over time, the development of secondary forests is observed riparian forests to the slopes and flat areas, where they occur in transition with the Caatinga and Cerrado. In some instances, vegetation of the Caatinga has even been observed along the river banks.

The Alluvial Seasonal Forest (FEA), commonly referred to as a riparian forest or gallery forest, is observed along the most enclosed and narrow watercourses. Within the project and the surrounding area, FEAs are observed along the Cuia, Itapicuruzinho, and Canavieiras rivers and their tributaries. Due to its location, this phyto-physiognomy corresponds to the Permanent Preservation Areas. Within the FEAs, the occurrence of dominant arboreal stratum and canopy formation is observed, in addition to the presence of species of ferns and epiphytes (bromeliads and orchids). There is still, however, a strong presence of ecotones, transition zones between areas with distinct abiotic conditions, with undifferentiated communities, where the floras interpenetrate. Shrub-tree Caatinga in particular is observed around the tailing dams, in the

Legal Reserve area, on the banks of the Santo Antonio stream at its intersection with the Itapicuruzinho river around the EMBASA dam, and around the Cuia dam.

5.7 AVIAN FAUNA

The use of birdlife as a biological indicator allows for efficient environmental characterization studies as the degree of change in a given environment can potentially be inferred from the presence or absence of species, decrease in numbers in a given area, or a species's disappearance. The heterogeneity of habitats and the availability of resources within a landscape is reflected by the composition of bird populations, the variation in species richness, and their abundance. In addition to being a great indicator of the quality and preservation of environments, avifauna is a key group in ecological processes; its high capacity for colonization of regenerating areas, even after intense modification of the environment, makes this group very efficient in the acceleration of successional processes by means of pollination and dispersion of seeds of native plants.

In the Jacobina area, a total of 100 taxa were documented in the FEAs, belonging to 33 families and 16 orders. The composition of the avifauna found is characterized by approximately 50% of general habitat species, those that use open areas of both the Caatinga and forests. The most representative families are Tyranidae, Thraupidae, Thamnophilidae and Trochilidae. Finally, approximately 60% of the documented species need forest areas and the majority of these (70%) presented low sensitivity to anthropogenic disturbances, as most Caatinga birds present low and medium sensitivity to man-made disorders.

Source: Yamana, May 2020

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Figure 5-1: Infrastructure and typical landscape

A: Serra de Jacobina and mineral processing plant
B: João Belo mine entrance
C: Mineral processing plant

6 HISTORY

The Serra de Jacobina Mountains have been mined for gold since the late 17th century. Numerous old workings from artisanal miners (garimpeiros) can be seen along a 15 km strike length, following the ridges of the Serra Do Ouro mountain chain (Golder Associates, 2008). Companhia Minas do Jacobina operated the Gomes Costa Mine in the Morro do Vento area between 1889 and 1896, with total reported production of 84 kg of gold from a 130 m long drift. The Canavieiras, João Belo, and Serra Branca mines opened in the 1950s. The Canavieiras Mine was the largest of these operations, and at a capacity of 30 tpd, produced 115,653 t with an average recovered grade of 18.13 g/t gold during the 1950s and 1960s.

6.1 PRIOR OWNERSHIP

The modern history of the Jacobina mining camp began in the early 1970s with extensive geological studies and exploration carried out by Anglo American Corporation (Anglo American). A feasibility study recommended that a mine be developed at Itapicurú (Morro do Vento area) with an initial plant capacity of 20,000 t per month. Mine development commenced in October 1980 and the processing plant was commissioned in November 1982. In 1983, the first full year of operation, production was 241,703 t with a recovered grade of 5.73 g/t gold, yielding 38,054 oz of gold.

Exploration between 1984 and 1987 at the João Belo Norte Hill outlined sufficient mineral reserves to warrant an open pit operation, the development of which commenced in August 1989. Concurrently, the processing plant capacity was increased to 75,000 t of ore per month. In 1990, 538,000 t grading 1.44 g/t gold were produced, mainly from the open pit. Total production at Jacobina in 1990 was 45,482 oz of gold from 680,114 t processed, for a recovered grade of 2.08 g/t gold. Underground development at João Belo commenced in 1990.

William Multi-Tech Inc. operated the João Belo and Itapicurú mines from August 1996 until December 1998, when the mines were closed due to depressed gold prices and the strong Brazilian currency. From 1983 to 1998, the project processed 7.96 Mt of ore at a recovered grade of 2.62 g/t gold, to produce approximately 670,000 oz of gold. The bulk of historical production came from the Itapicurú (Morro do Vento Intermediate and Morro do Vento Extension) and João Belo areas.

In September 2003, Desert Sun completed the required exploration expenditures to earn a 51% interest in the project and then exercised its option to acquire the remaining 49% interest in the project, comprising the mineral rights, mines, and a 4,000 tpd plant located on the Jacobina property. Desert Sun had initiated exploration in the project area in the fall of 2002 and this program was substantially expanded in September 2003. The original property holdings, which extended approximately 62 km along strike, were expanded considerably so that the current property covers a strike length of 155 km.

Reactivation of the João Belo Mine started in April 2004 and ore extraction began in July 2004. The cost of the capital project, including development of the João Belo mine, refurbishment of the mill facilities, and the purchase of all machinery, equipment, and vehicles, was approximately US$37 M. Desert Sun poured the first gold bar at the João Belo Mine in March 2005 and declared commercial production effective July 1, 2005.

Desert Sun reactivated the Morro do Vento Mine in August 2005, starting with the 720 Level portal and increasing the profile dimensions of the access adit. In November 2005, Desert Sun reported in the third quarter ending September 30, 2005, that total ore mined was 340,913 t and ore processed was 300,505 t at an average grade of 2.03 g/t gold. Gold production was 18,683 oz at an average cash cost of US$292/oz. The average recovery rate at the mill was 95.4%.

Yamana acquired Jacobina when it completed the purchase of Desert Sun in April 2006.

6.2 Historical Mineral Resource and Mineral Reserve Estimates

Although a number of historical mineral resource estimates and mineral reserve estimates have been prepared for Jacobina throughout its life, none of these estimates are currently regarded as significant.

6.3 Past Production

Total production for Jacobina since mining commenced in 1983 is shown in Table 6-1.

Table 6-1: Summary of gold production at the Jacobina mine, 1983 to 2019

Year	Tonnes Processed (t)	Gold Feed Grade (g/t Au)	Metallurgical Recovery (% Au)	Gold Produced (oz Au)
1983	241,703	5.73	85.46	38,054
1984	301,946	5.18	92.48	46,529
1985	282,878	4.56	92.50	38,345
1986	311,174	3.60	92.50	33,312
1987	247,838	5.10	96.00	38,991
1988	244,628	5.33	96.00	40,238
1989	257,247	3.02	96.00	23,979
1990	681,955	2.01	96.00	42,202
1991	775,839	2.70	90.30	60,847
1992	594,181	2.57	89.90	44,184
1993	518,889	2.32	93.20	36,039
1994	551,141	2.54	90.00	40,582
1995	579,913	2.57	95.60	45,813
1996	591,107	2.36	94.60	42,390
1997	865,681	2.13	92.20	54,778
1998	741,089	1.91	93.00	42,386
1999-2004	0	0.00	0.00	0
2005	906,759	1.90	96.00	53,170
2006	1,418,508	1.86	96.00	81,272
2007	1,040,174	1.70	95.00	54,068
2008	1,388,087	1.83	89.86	73,241
2009	1,996,989	1.88	91.77	110,514
2010	2,158,096	1.89	93.30	122,152
2011	2,148,275	1.89	93.11	121,675
2012	2,104,683	1.84	93.73	116,862
2013	1,575,628	1.57	92.48	73,695
2014	1,419,031	1.78	92.93	75,650
2015	1,469,095	2.17	94.43	96,715
2016	1,802,855	2.17	95.71	120,478
2017	1,978,409	2.22	96.35	135,806
2018	2,035,457	2.30	96.21	144,695
2019	2,254,793	2.28	96.70	159,499
Total	**33,484,048**	**2.19**	**93.91**	**2,208,161**

7 Geological Setting and Mineralization

The gold mineralization at Jacobina is hosted almost entirely within quartz pebble conglomerates of the Serra do Córrego Formation, the lowermost sequence of the Proterozoic-age Jacobina Group. This formation is typically 500-m thick but locally achieves thicknesses of up to 1 km.

The gold-bearing conglomerate units, known as reefs, range from less than 1.5 m to 25 m in width and can be followed along strike for hundreds of metres, and in some cases for kilometres. Some contacts between the reefs and crosscutting mafic and ultramafic intrusive rocks are enriched in gold. Although they are quite homogeneous along their strike and dip extensions, the gold-bearing conglomerates differ from one another in stratigraphic position and pattern of gold distribution. The differences are likely due to variations in the sedimentary source regions, in the erosion and transportation mechanisms, and in the nature of the depositional environments. Not all conglomerates of the Serra do Córrego Formation are gold-bearing.

7.1 Regional Geology

The Precambrian terranes of the northeastern part of the São Francisco Craton in the state of Bahia show evidence of prolonged terrane accretion history (Almeida, 1977). The three major Archean crustal units, the Gavião, Serrinha, and Jequié blocks, underwent several episodes of tectonism and metamorphism that culminated in a continent-continent collision during the Paleoproterozoic, when the consolidation of the craton took place along a main orogenic belt named the Itabuna-Salvador-Curaçá mobile belt, as shown in Figure 7-1. All rocks described in the report are metamorphic but as the protoliths are typically evident they are described in the following text by their protolith name. While metamorphic grade may vary considerably in the district, the rocks at the Jacobina Mine are characterized by the development of white mica, andalusite, and locally, kyanite.

A prominent zone of crustal weakness within this portion of the craton is the Contendas–Mirante–Jacobina lineament, a 500-km long and approximately north-trending suture zone located close to the eastern margin of the Gavião block (Figure 7-1). A reactivation of the Contendas–Mirante–Jacobina lineament during the Paleoproterozoic, prior to and during the continent-continent collision, gave rise to a continental margin rift-type basin where the siliciclastic sedimentary rocks of the Jacobina Group were deposited.

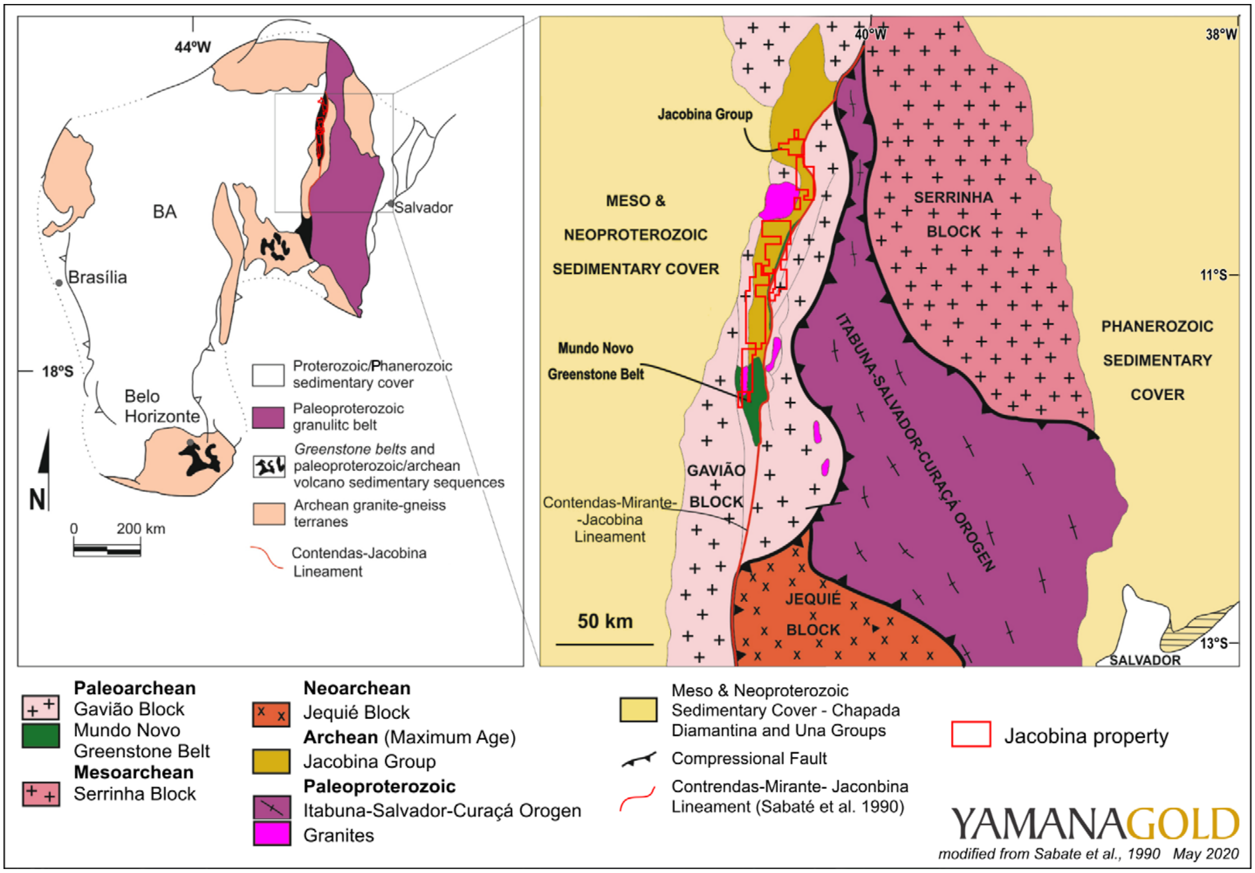

Figure 7-1: Tectonic assemblage map

7.2 Local and Property Geology

The Jacobina gold district coincides with most of the Jacobina Range, where quartzite, conglomerate, and schist units of the Paleoproterozoic Jacobina Group form a series of north-south-trending mountain ranges that rise up to 1,200 masl (Figure 7-2). The longitudinal north-south valleys as well as the east-west oriented valleys often correspond to recessive ultramafic sills and dykes. The Mairi Complex consists of a group of Archean-aged tonalitic, trondhjemitic, and granodioritic gneiss-dominated basement and related remnants supracrustal rocks of the Gavião Block; it underlies the flatter terrain east of the Jacobina range. East of the Mairi Complex, the fine-grained biotite gneisses of the Archean Saúde Complex also underlie a flat landscape. The transition between the hilly and the flatter topography of the eastern domains corresponds to the exposures of the Archean Mundo Novo Greenstone Belt.

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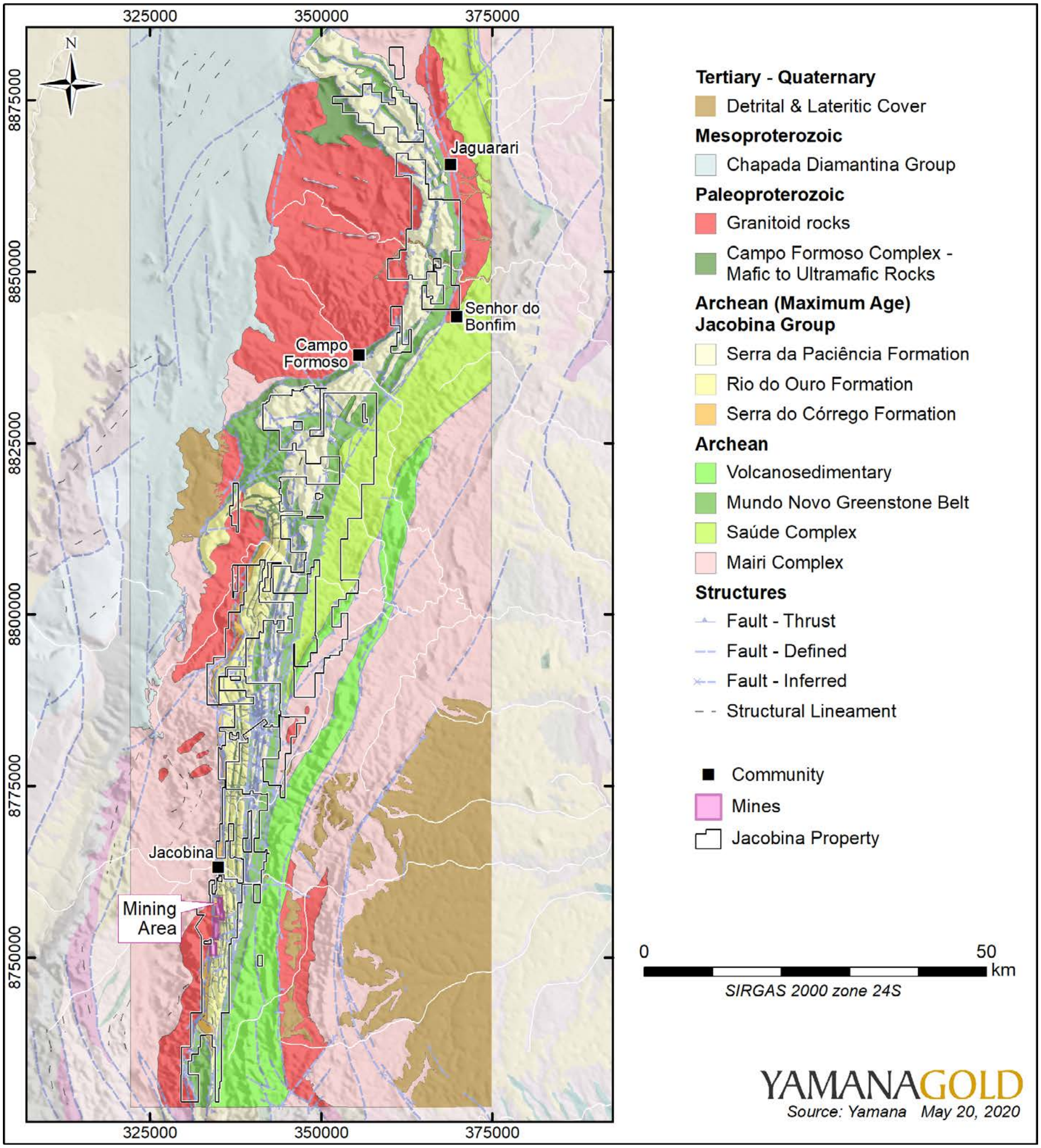


Figure 7-2: Geology of project area

7.2.1 JACOBINA GROUP

The stratigraphic subdivisions of the Jacobina Group (Griffon, 1967; Mascarenhas et al., 1998) have long been controversial. While the stratigraphy in the project area is well documented, it is challenging to develop a usable nomenclature to define the upper formations of the Jacobina Group, specifically the Cruz das Almas, Serra do Meio, and the Serra da Paciência Formations. Pearson et al. (2005) considers that the Jacobina Group only comprises the lower Serra do

Córrego and the upper Rio do Ouro formations, according to sedimentary and stratigraphic studies carried out by Oram (1975), Minter (1975), Strydom and Minter (1976), Couto et al. (1978), and Molinari et al. (1986). The stratigraphic nomenclature developed by these writers has been successfully employed within the project area for over 25 years and its usage has been maintained by Yamana.

Serra do Córrego Formation

The Serra do Córrego Formation forms the western ridge of the Serra da Jacobina mountain range and is exposed for a strike length of about 90 km. It consists of an interbedded series of orthoquartzite and oligomictic conglomerate units that collectively range in total thickness from 500 to 1,000 m. The conglomerate pebbles are composed of polycrystalline quartz with rare, fine-grained, fuchsite- and rutile-bearing quartzite. The conglomerate matrix is composed of quartz, sericite, and fuchsite with detrital zircon, non-chromiferous rutile, tourmaline, and chromite grains (Ledru et al., 1964).

The geological map (Figure 7-3) of the Jacobina area shows the distribution of the Serra do Córrego Formation. Figure 7-4 shows the stratigraphy of the Serra do Córrego Formation and the stratigraphic correlations between the various mine centres at Jacobina. Within the project area, the Serra do Corrego formation is divided into three units:

- The Lower Conglomerate (40–200-m thick) outcrops along the lower parts of the western slopes of the Serra do Córrego, Morro do Cuscuz, and Morro do Vento areas and is composed of interbedded quartzite, pebbly quartzite, and conglomerate units. The reef zones consist of oligomictic conglomerates that are interbedded with orthoquartzite. Pebble sizes range from 35 to 60 mm. This unit hosts the gold deposits of the Basal Reef and the Main Reef.
- The Intermediate Quartzite (130–425-m thick) consists primarily of orthoquartzite with little or no conglomerate. The upper part of this unit is characterized by a distinct horizon known as the “marker schist”, a highly sheared quartz-sericite-chlorite-andalusite schist.
- The Upper Conglomerate (120–400-m thick) comprises quartzite and pebbly quartzite interbedded with a number of conglomerate layers. The reef zones consist of interbedded conglomerate and orthoquartzite units with pebble sizes ranging from 50 mm at Canavieiras in the north to 100 mm at the João Belo Mine in the south. The Upper Conglomerate Unit hosts the main gold orebodies of the Canavieiras, Morro do Vento, João Belo and Serra do Córrego mineralized areas.

Oram (1975), Minter (1975), and Strydom and Minter (1976) concluded, based on isopachs and pebble size data, that the paleoslope during the sedimentation of the Serra do Córrego Formation was inclined to the west. The westerly paleocurrent direction, indicated by the vector data, drained a provenance area to the east of the present outcrop area, and deposited these sediments in a fluvial environment.

Rio do Ouro Formation

The Rio do Ouro Formation is composed of mostly pure, fine-grained to medium-grained quartzite which can be either white, gray, or light green in colour. The formation contains subordinate quantities of calcareous pelitic rocks which are intercalated with the various quartzite beds.

The presence of this formation is interpreted to mark the change from the fluvial sedimentary environment of the Serra do Córrego Formation to a shallow marine, intertidal depositional environment. This change in depositional environment is suggested by a change in the paleocurrent patterns as indicated by ripple marks, small-scale cross-bedding, and larger-scale herringbone cross-bedded features. The transition from the Serra do Córrego Formation to the Rio do Ouro Formation is marked by the presence of conglomerate units with limited lateral continuity. These locally developed conglomerate beds are present at the base of the Rio do Ouro Formation.

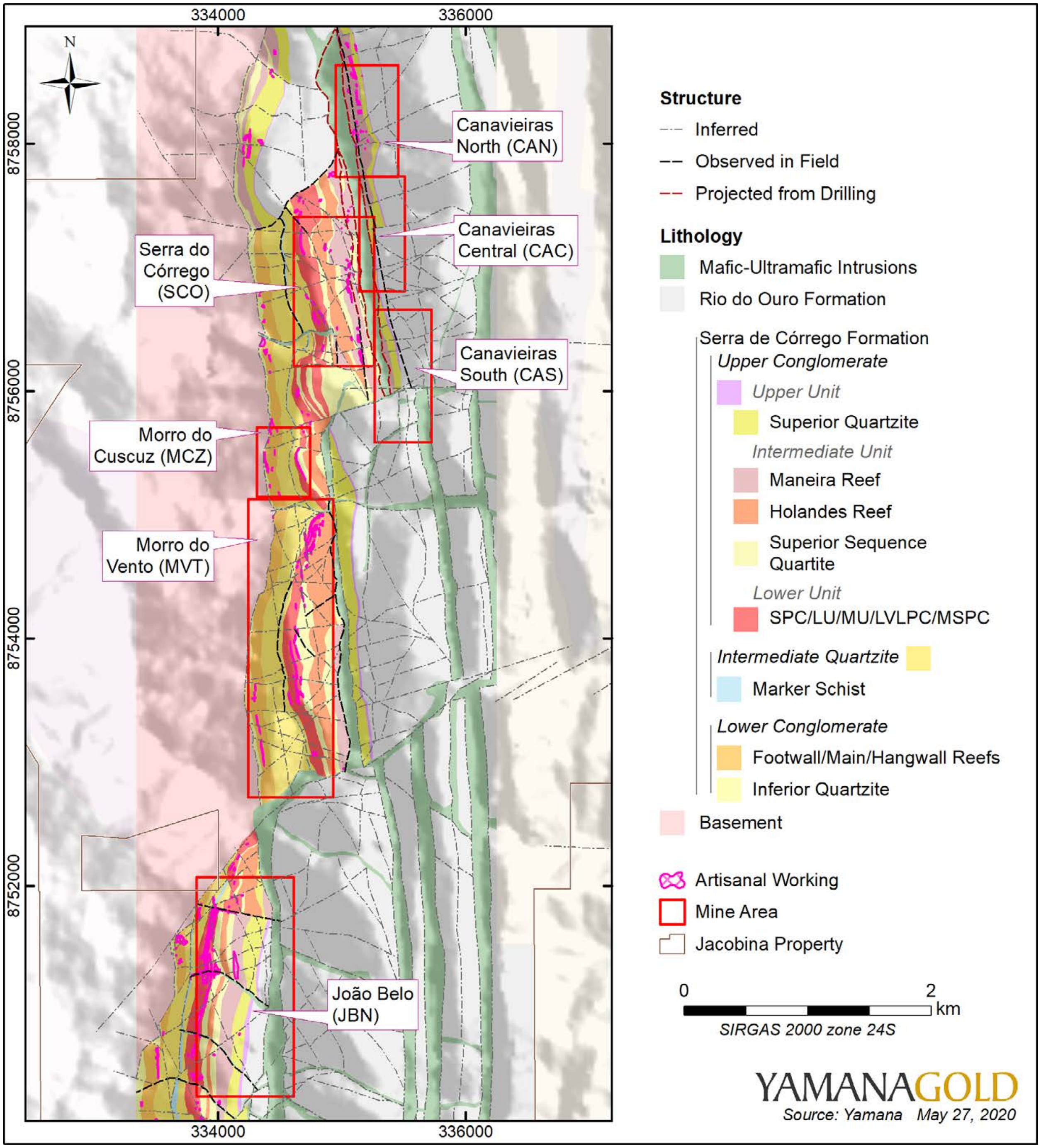


Figure 7-3: Geology of the Jacobina Mine Complex

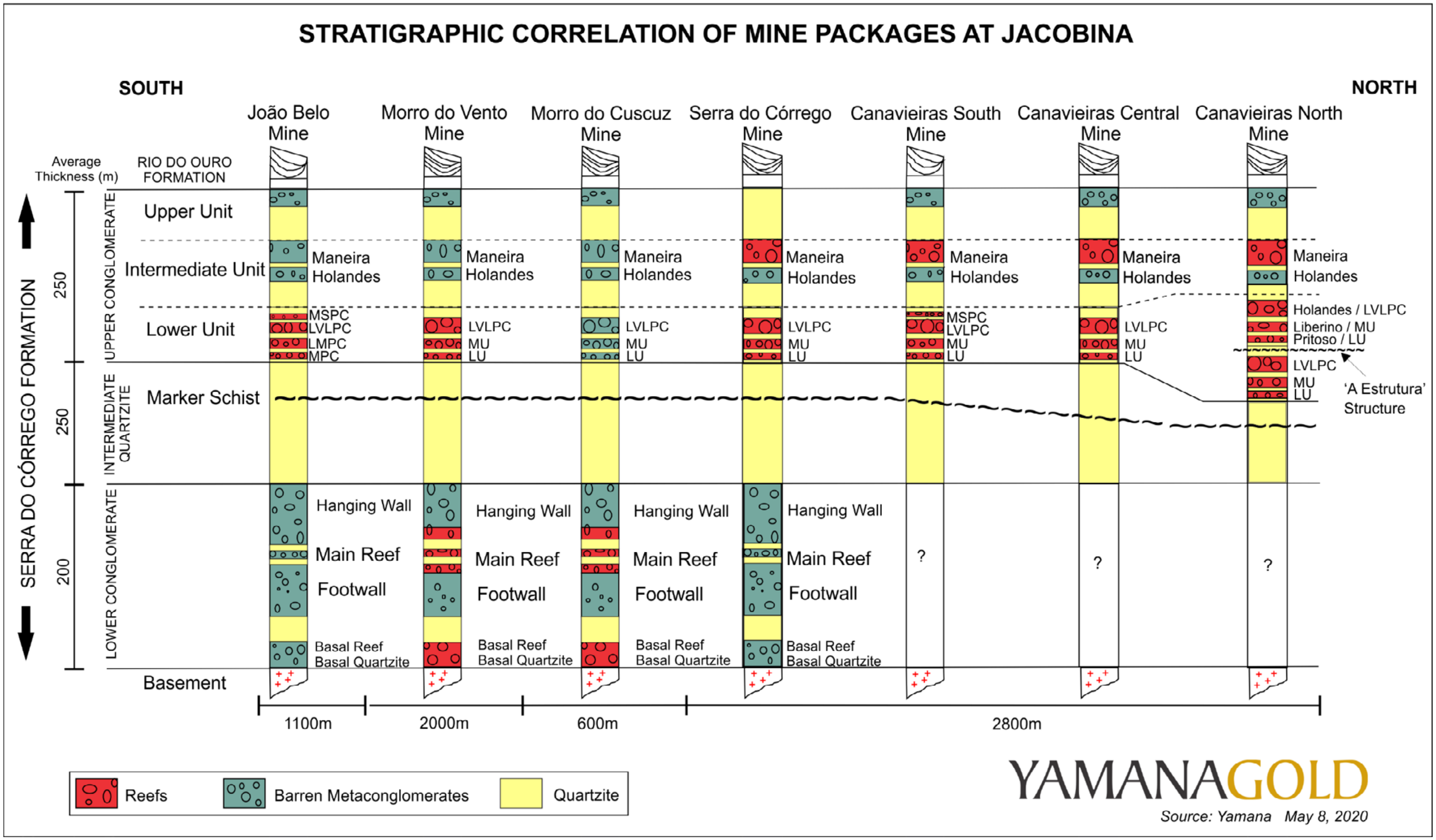


Figure 7-4: Stratigraphic correlation between mining blocks

7.2.2 Ultramafic Sills and Dykes

The deep longitudinal valleys bordering the mountains which form the Jacobina range often correspond to weathered pre- to syn-tectonic mafic to ultramafic sills and dikes. These intrusive rocks include dark green peridotite and pyroxenite, which acquire a brownish stain where weathered (Teixeira et al., 2001). According to these authors, deformation and metamorphism, coupled with hydrothermal alteration, have transformed these rocks into fine-grained schists containing talc, serpentine, chlorite, tremolite, and carbonate. In the project area, the ultramafic rocks, which were emplaced along both north-trending and east-trending structures, affected and reacted with the host rocks (quartzite and conglomerates of the Serra do Córrego and Rio do Ouro formations) producing metre-scale alteration zones in the hosts. The ultramafic rocks display textural variation from aphanitic borders to a medium to coarse-grained core, typical intrusive textures.

These intrusive rocks are known to locally host minor gold mineralization within the project area, and at several other places like Rio Coxo, Jaqueira, Mina Velha, and Várzea Comprida. The age of these sills and dikes is still unknown, but since they are deformed, they are interpreted to be of Archean or Paleoproterozoic age.

7.3 Structural Geology

Different styles of deformation are recognized within the Jacobina Group and surrounding Archean rocks, along and across the northern portion of the 50-km long north-trending Contendas–Mirante–Jacobina lineament. Thrust faults, oblique sinistral-reverse faults, and regional tight and open folds were developed in response to the strong westward-verging mass transport event caused by the Paleoproterozoic continent/continent collision.

To the west, the Jacobina Group is thrust over the Archean Mairi Complex, the Campo Formoso Mafic–Ultramafic Complex, and the late- to post-tectonic granitic intrusions (Miguel Calmon-Itapicurú, Mirangaba-Carnaíba and Campo Formoso intrusions), along a thrust fault named the Jacobina Fault. This structural setting changes eastwards to a series of steeply east-dipping blocks, bounded by east-dipping subparallel reverse faults.

As a result of the regional compression associated with the development of the Itabuna-Salvador-Curaçá fold belt, a series of ductile shear zones and brittle faults have developed in the area. The main elements of these include a series of north-trending strike-slip faults with a sinistral sense of movement, east-trending strike-slip faults with a dextral sense of movement, and northwest-trending shear zones with a sinistral sense of movement. These post-mineralization structures displaced and offset the various gold-bearing zones (Figure 7-5).

The Serra do Córrego Formation is exposed on the west side of the Jacobina Range where it forms part of an extensive homocline that dips consistently 50° to 70° to the east and youngs to the east, as indicated by ripple marks and cross-bedding. This orientation is interpreted to be the result of tilting during the intrusion of the late- to post-tectonic Mirangaba-Carnaíba granite.

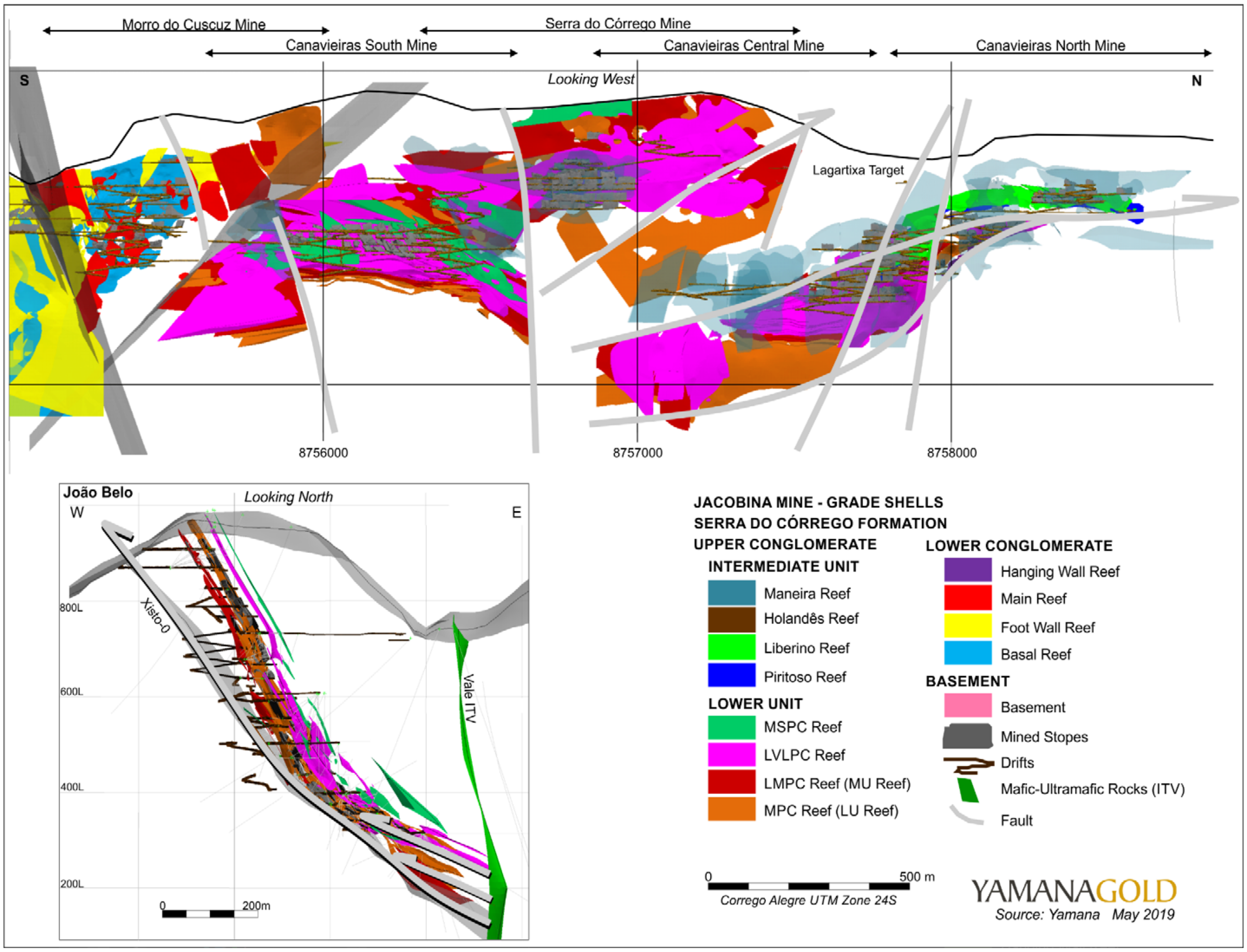


Figure 7-5: Examples of post-mineralization faults and shear zones

7.4 MINERALIZATION

The Jacobina gold district is defined by a 40-km long belt that extends from Campo Limpo, in the south, to Santa Cruz do Coqueiro, in the north. The vast majority of significant gold mineralization occurs within the matrix of the conglomerates; these include the Canavieiras, Morro do Vento, João Belo, Serra Branca deposits as well as other minor occurrences.

At Jacobina, the age of deposition of the host sedimentary sequence was broadly bracketed between 3.2 Ga and 2.3 Ga; however, the conglomerates yielded more restricted detrital zircon U-Pb ages of 3.4 to 3.2 Ga. (Teles at al., 2014), providing a maximum age. The deposit was overprinted by deformation and hydrothermal alteration associated with a younger orogenic event (at 1.9 Ga (Ledru et al. 1997)) that generated pervasive silicification, the development of chrome-sericite (fuchsite), and some gold remobilization along fractures and faults.

The gold mineralization found at Jacobina occurs as two styles of mineralization (Texeira et al, 2001):

- Conglomerate-hosted placer gold mineralization (the most important mineralization type in the Jacobina district)
- Post-depositional gold-bearing stockwork, shear zones, and associated extensional quartz veins. These styles of mineralization are relatively minor and do not contribute to the established resources at Jacobina.

The characteristics of these two styles of mineralization are described in the following subsections.

7.4.1 Conglomerate-Hosted Placer Gold Mineralization

Conglomerate-hosted deposits contain very fine grains of native gold, typically 20 to 50 µm in size, hosted in the matrix of the conglomerate. Gold may also be associated with rounded pyritic aggregates believed to be of sedimentary origin. There are no other significant elements present, with detailed studies of the reef chemistry showing only very minor enrichment in iron, titanium and uranium in some reefs associated with rounded grans of uraninite, ilmenite and rutile. Mineralization is typically hosted by well sorted, clast-supported conglomerate and may comprise micro-fractured, gold-bearing, recrystallized, silicified, and pyritic conglomerate units of the Serra do Córrego Formation, with a greenish fuchsite matrix and common hematite coatings along shear planes, joints, and fracture surfaces. Gold mineralization does not display a correlation with the pyrite or fuchsite content of the rock, although well-mineralized reefs are typically enriched in hematite and may contain red colored, oxidized pebbles.

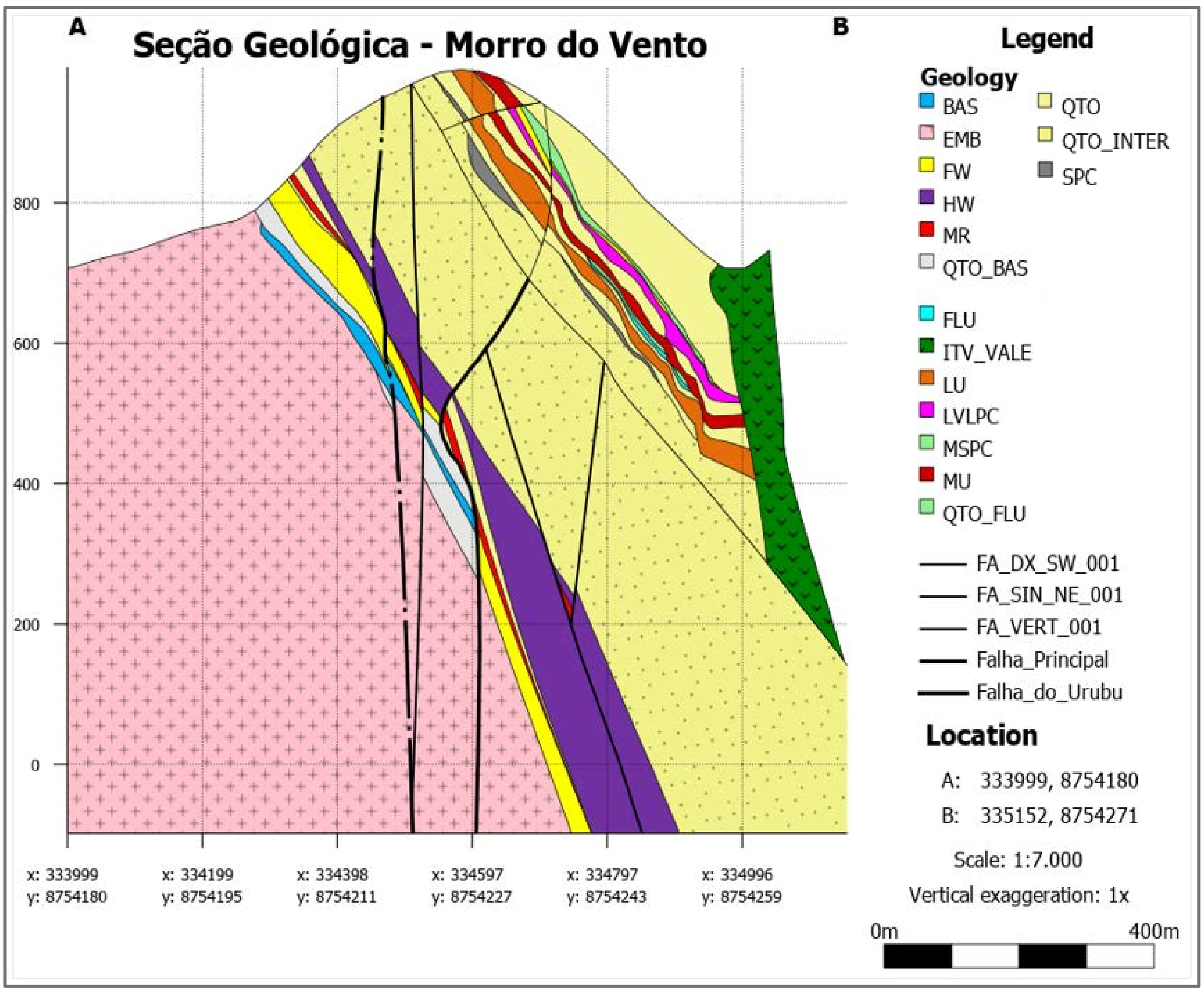
A north-trending and steeply dipping ultramafic dyke (Vale_ITV on Figure 7-5) subdivides the area into West and East blocks. All mineralized reefs that are exposed at surface along the west flank of the Serra do Córrego Formation (Figure 7-3) to the west of this dyke are considered on the West Block, whereas their down-dip extensions that are located east of the dyke, such as all of the Canavieiras zones, are considered on the East Block.

Gold mineralization rarely occurs in the pebbles themselves; however, when it does, it is along fractures. The interbedded quartzite units also host gold mineralization but almost exclusively along fractures, especially near late mafic dikes.

Historically, the most important past producers have been the Basal and Main reefs of the Lower Conglomerate Unit and the lower part of the Upper Conglomerate Unit. It is important to note, however, that only certain reefs within particular lithological units are gold-bearing. Other nearby subparallel reefs with similar sedimentary features may not be gold-bearing.

In addition, there is considerable local lateral variation in grade within particular reefs. For example, the Main and Basal reefs are well mineralized in the Morro do Vento Sector but are essentially barren to sub-economic in the Joao Belo and Canavieiras sectors. Despite this local grade variation, the overall average grade, based on production records, is remarkably consistent both along strike and down dip within specific ore shoots.

Figure 7-6 shows a cross-section of the João Belo area. In the mine area, stratigraphy dips consistently eastward at 50° to 70°, with some local flatter zones. Cross-bedding and ripple marks indicate that the sequence youngs upwards (i.e., stratigraphic tops are towards the east). Table 7-1 summarizes the principal characteristics of the main gold-mineralized reefs at Jacobina and lists the abbreviations for each reef.



Source: modified from RPA 2019

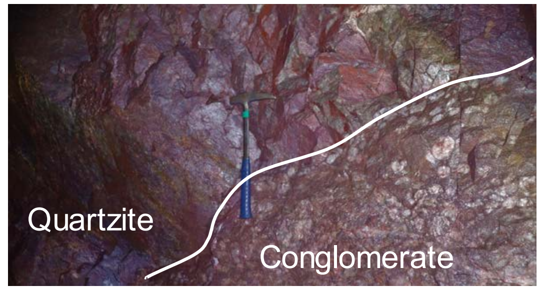
Figure 7-6: Generalized cross-section through the Morro do Vento Mine

EMB= Itapicarú intrusion, QTO=Quartzite, ITV_VALE = Mafic to ultramafic intrusion; Table 7-1 lists the key to the reef code abbreviations.

Table 7-1: Characteristics of gold mineralization at Jacobina

Zone	Code	Location	Strike length (m)	Thickness (m)	Average Grade (g/t Au)	Description
Morro do Vento / Morro do Vento Extension / Morro do Cuscuz (Itapicurú)						
LVLPC	LVLPC	Morro do Vento	400	2	4.8	Large to very large pebbles, only locally mineralized
MU (Upper) Reef	MU	Morro do Vento	1700	3 to 10	2.0	Medium to small pebbles
LU (Lower) Reef	FLU	Morro do Vento	1700	3 to 10	2.4	Medium to large pebbles
Hangingwall Reef	HW	Morro do Vento	3000	1 to 6	2.4	Large to medium pebbles
Main Reef	MR	Morro do Vento	3000	Beds: 0.1 to 3 Zone: up to 12	6.0	Pyritic, small to medium pebble conglomerate beds. Three channels of deposition, broken by faults.
Footwall Reef	FW	Morro do Vento	3000	Beds: 0.1 to 6	2.4	Pyritic, small to medium pebble conglomerate beds.
Basal Reef	BR	Morro do Vento	1600	3 to 10	4.0	Small to medium pebbles, enrichment of gold at its upper and lower portions.
Canavieiras						
Maneira		Canavieiras	≥600	Beds: 0.4 to 7 Zone: up to 70	1.7	Large to very large pebbles
Holandez		Canavieiras	≥600	Beds: 0.9 to 6 Zone: up to 30	1.7	Large to medium pebbles
MSPC	MSPC	Canavieiras	800	2 to 4	4.4	Medium size pebbles with abundant pyrite
LVL	LVL	Canavieiras	2600	0.5 to 5	2.6	Large to very large pebbles
Piritoso		Canavieiras	≥600	1 to 3	9.5	Medium size pebbles with abundant pyrite
Liberino		Canavieiras	≥600	1 to 3	6.1	10 m above Piritoso; medium to large pebbles
MU	MU	Canavieiras	≥400	10 to 25	3.2	Pyritic, medium to large pebble conglomerates
LU	LU	Canavieiras	≥400	1 to 10	2.2	Pyritic, large pebble conglomerate
João Belo						
LVLPC	LVLPC	João Belo North	≥1,000	1 to 3	4.4	Large to very large pebbles
LMPC	LMPC	João Belo North	≥1,000	10 to 25	2.2	Large to medium pebbles
MPC	MPC	João Belo North	≥1,000	1 to 4	3.6	Medium sized pebbles; locally contains gold values

Outcrop of conglomerate with large, very large, and medium pebbles.



Quartzite/conglomerate contact in drift at Morro do Vento Main Reef with medium and small pebbles and strong late oxidation (hematitic alteration).

Red pebbles, which have strong correlation to the gold grades in the Jacobina conglomerates, outlined by a late pyrite-fuchsite alteration.

Relict portion of fuchsitic alteration (green portion) within pervasive late oxidation.

Dendritic gold, associated with late oxidation, cross-cutting pebbles.

Granular gold between pebble and matrix, adjacent to several rounded grains of pyrite. This aggregate (pyrite + gold) is believed to be related to sedimentary deposition processes.

Gold beside a stretched chert pebble and associated fuchsitic matrix.

YAMANAGOLD

Source: Yamana, May 2020

Figure 7-7: Photographs of conglomerate-hosted gold mineralization

7.4.2 Post-Depositional Gold-Bearing Stockwork, Shear Zones and Extensional Quartz Veins

This group encompasses gold-bearing extensional quartz veins and veinlets related to semi-concordant shear zones hosted by quartzites, andalusite-graphite-quartz schists, and local conglomerates of the Rio do Ouro Formation (e.g., Goela da Ema, Biquinha, Cercadinho and Guardanapo gold workings). This style of gold mineralization is a very minor volumetric component at Jacobina and does not contribute significantly to the mineral resource. The main hydrothermal alterations associated with this style of mineralization are silicification, sericitization, chloritization, and pyritization (locally with chalcopyrite), and local tourmalinization.

The ultramafic and mafic rocks also host mineralization as narrow shear zones up to 4 m-thick in north-south oriented ultramafic sills and dikes, close to their footwall and hangingwall contacts with the hosting quartzite and conglomerate units of the Serra do Córrego, Rio do Ouro, and Serra da Paciência Formations. The mineralized shear zones are characterized by the development of gold-bearing quartz veins and/or stockwork. The main hydrothermal alteration types are silicification, fuchsitization, pyritization, and sericitization, with local tourmalinization. A number of examples of this group are known at the mine sites and surrounding areas (Canavieiras, Itapicurú, Serra do Córrego, Morro do Vento, and João Belo), and at Serra da Paciência (Mina Velha, Várzea Comprida, Ciquenta e Um, Cabeça de Nego and Milagres gold workings), in the north. This style of mineralization does not contribute significantly to the mineral resource at Jacobina.

7.5 Alteration

The overprinting hydrothermal alteration event at the Jacobina deposit consists of pyrite, pyrrhotite, quartz, chrome-sericite (fuchsite), chrome-rutile and chrome-tourmaline. The chromium-rich nature of this alteration assemblage is attributed to leaching of the mafic-ultramafic intrusive rock by circulating hydrothermal fluids.

8 DEPOSIT TYPES

The mineralization at Jacobina consists of conglomerate-hosted gold deposits generally interpreted to represent paleoplacer gold deposits, with some post-depositional modification by structural and hydrothermal events (Bateman, 1958; Cox, 1967; Gross, 1968; Minter, 1975; Strydom and Minter, 1976; Hendrickson, 1984). This type of deposit is similar to the Witwatersrand and Tarkwa deposits in South and West Africa (Pearson et al., 2005).

Karpeta (2004) argues that the gold was detrital and brought in and concentrated by fluvial processes. Several lines of evidence, with quoted similarities to both the Tarkwa and the Witswatersrand deposits, are provided.

1. Gold is not generally evenly distributed throughout the conglomerates, but concentrated in the top of the conglomerate beds with clean cross-bedded quartzite above them. This concentration of gold result from the aggradation and then incision of a braided fluvial system.

2. Gold mineralization appears to show a strong positive relationship with pebble size. This shows that gold grade can be correlated with fluvial current dynamics.

3. Although gold is always associated with pyrite and hematite, hematite and pyrite commonly occur without gold. This suggests that gold concentration is independent of the distribution of pyrite, hematite, and chrome-sericite.

4. Gold grade is higher in better-sorted, clast-supported conglomerates than in more poorly sorted matrix-supported conglomerate. This indicates that gold grade appears to be related to the degree of reworking of a conglomerate (although it could be related to their relative porosity/permeability characteristics).

5. Higher-grade zones have a well-defined plunge that is postulated to coincide with the predominant paleocurrent direction.

Teles et al. (2014) further note that the mineralized conglomerates at Jacobina have rounded grains of pyrite and gold, as well as uraninite, indicating detrital deposition.

Native gold is also present as flakes and thin films along fracture surfaces within the conglomerate units, and less frequently in the quartzite, suggesting remobilization of gold during a hydrothermal event (Karpeta, 2004) as described in Section 7.5.

9 EXPLORATION

Since acquiring Jacobina in 2006, Yamana has carried out regional mapping and sampling with the goal of identifying additional surface occurrences of mineralized conglomerates along the strike length of the Jacobina belt. The geological mapping team measured the surface locations of such mineralized outcroppings of conglomerates by means of a hand-held Garmin GPS unit (using the Córrego Alegre datum). For each occurrence, data collected included the host rock, the type and size of conglomerate pebbles, and descriptions of relevant geological features such as the presence of visible gold and type and intensity of alteration minerals (hematite, fuchsite, pyrite, and chlorite). All information was entered into a master geological database.

Chip or grab samples, mainly of conglomerate, were collected; samples weighed between one and three kilograms. A total of 9,629 chip samples were collected on the property by Yamana between 2010 and 2019. Samples were submitted to the Jacobina analytical laboratory for determination of their gold content. All chip samples were processed according to Yamana's quality assurance/quality control (QA/QC) protocols.

In 2018, a structural mapping program was carried out on surface in the immediate vicinity of the mines. The program focussed specifically on the Serra do Córrego, Canavieiras North, Canavieiras Central, and Canavieiras South mine areas, in addition to the Lagartixa and Morro da Viúva target areas (Figure 9-1). The results were used to reinterpret the structural setting and genesis of the Jacobina style of mineralization. This improved understanding informed the drilling programs completed in 2018 and 2019.

The significant exploration results at Jacobina that are material to this technical report were obtained by underground core drilling. This work and resulting interpretations are summarized in Sections 10, 14, and 15 of this technical report.

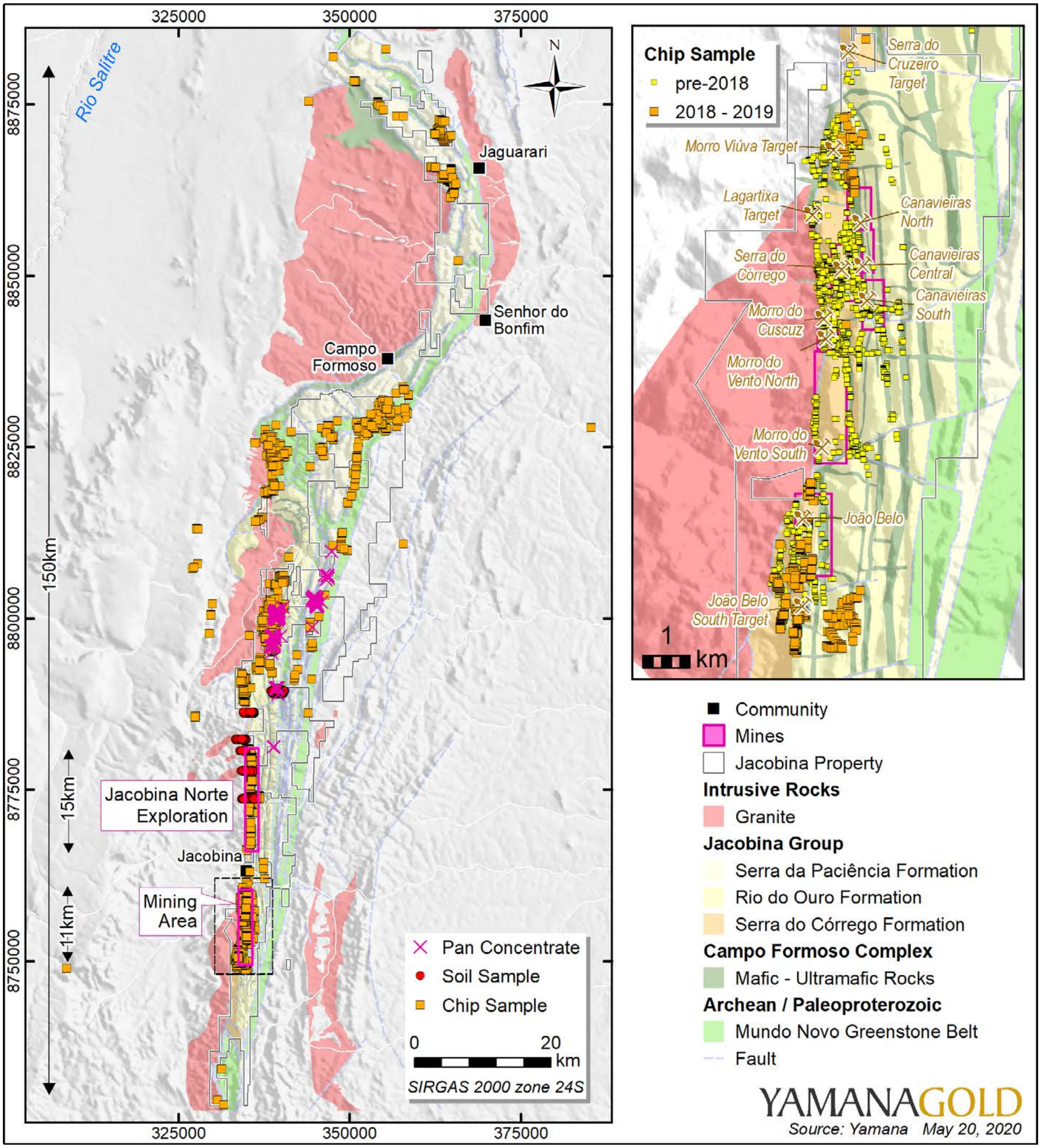


Figure 9-1: Location of geological mapping and sampling programs

9.1 EXPLORATION POTENTIAL

Exploration during 2018 and 2019 has focussed on the higher-grade deposits within the mine complex and have led to the discovery of significant extensions to mineralization at Moro do Vento, Moro do Cuscuz and Canavieiras. Drilling in 2019 has extended Canavieiras Sul both down dip and along strike and expanded the Canavieiras Central zone with excellent intercepts in the LU, MU, and LVLPC reefs. Notable results include the following estimated true width intervals: 10.5 g/t of gold over 5.4 metres (drill hole CAS492); 5.3 g/t of gold over 3.4 metres (drill hole CAS473); 4.8 g/t of gold over 4.2 metres (drill hole CAS471); 3.4 g/t of gold over 9.5 metres (drill hole CANEX60A); and 3.4 g/t of gold over 2.7 metres (drill hole CANEX86) while drilling down plunge on the high grade.

The Morro do Vento sector also continues to provide excellent results and show high potential as a new area for mineral reserve growth. Ongoing exploration drilling on a high grade shoot at Morro do Vento has defined the down plunge continuation of the Main, Hangingwall, and Footwall reefs with the following significant intercepts with estimated true width: 7.4 g/t of gold over 5.5 metres (drill hole MVTEX46); 8.4 g/t of gold over 2.3 metres (drill hole MVTEX32); and 4.9 g/t of gold over 3.3 metres (drill hole MVTEX43).

Overall, these exploration and infill drilling results suggest a significant expansion of both mineral reserves and mineral resources within the Canavieiras and Morro do Vento sectors by the end of 2020, while new potential in the João Belo and Morro da Viúva sectors indicate excellent potential for expansion of inferred mineral resources (Figure 9-2). The results, at minimum, support the Phase II Expansion production scenario presented in Section 24 of this technical report.

In terms of the regional exploration potential, the favourable gold-bearing stratigraphy at Jacobina has been traced along a strike length for approximately 150 km (Figure 9-1). Exploration programs have discovered many gold occurrences along this favourable stratigraphy, including the Jacobina Norte project, where gold mineralization has been discovered along a continuous 15-km-long trend (Figure 9-1).

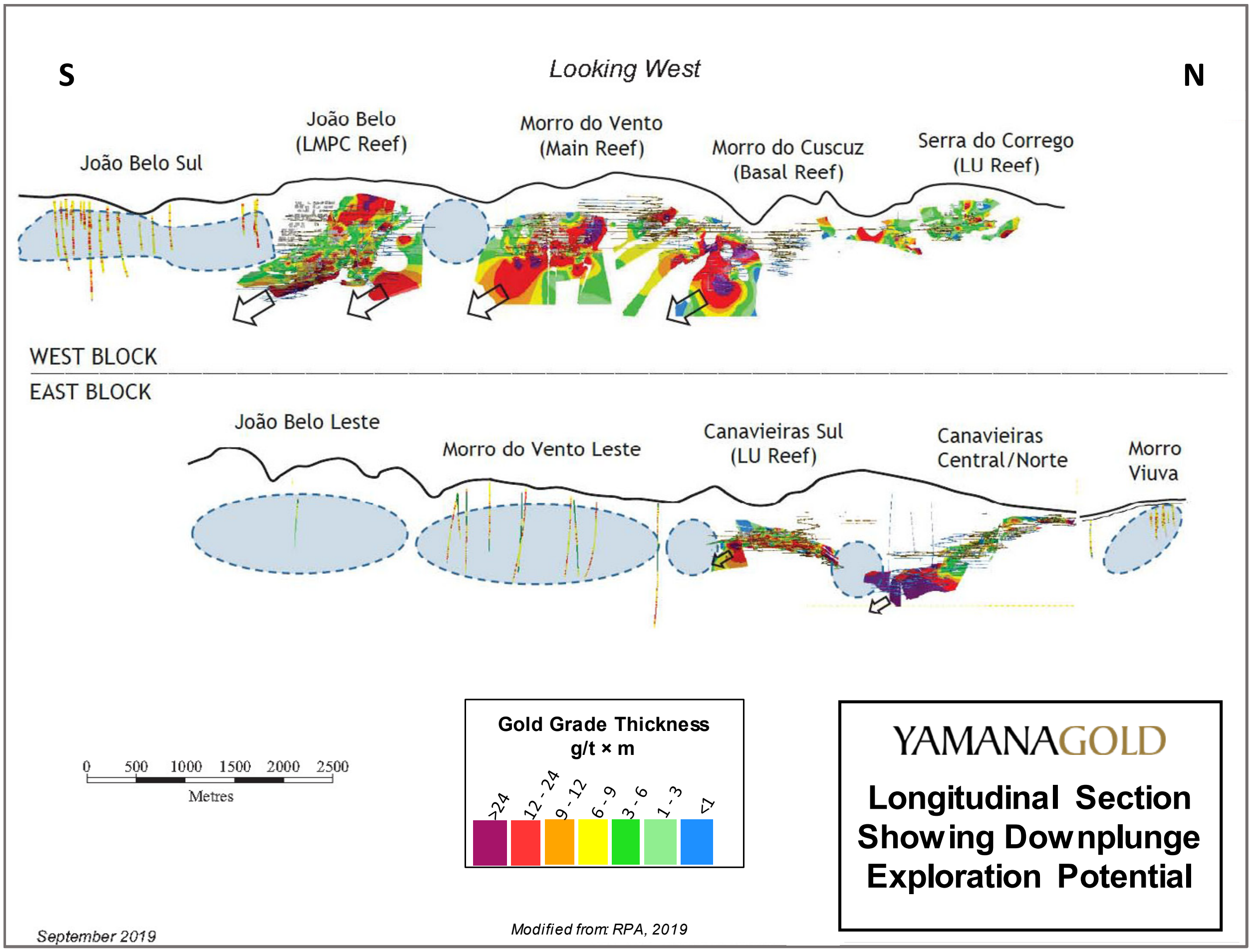


Figure 9-2: Jacobina longitudinal section showing down-plunge exploration potential

10 DRILLING

From 1970 to the end of December 2019, approximately 868,469 m of surface and underground drilling has been completed in the Jacobina project area (Table 10-1, Table 10-2, Figure 10-1 and Figure 10-2). Surface drilling is done using NQ-diameter (47.6 mm)-sized core; underground drilling uses LTK48-diameter core (35.3 mm) and BQ-diameter core (36.5 mm). The drill contractors used for surface drilling on the property were Geoserv Pesquisa Geologicas S.A., WFS Sondagem Ltda., Geocontrole, and Geologia e Sondagens Ltda. (Geosol). Underground core drilling was completed by Jacobina personnel. Any unsampled core is stored on site at the core storage facility.

Table 10-1: Summary of drilling history between 1970 and December 31, 2019

Company	Period	No. Drill Holes	Metres Drilled
Anglo American	1970 - 1996	886	109,697
William Multi-Tech	1996 - 1998	134	9,235
Desert Sun	2003 - 2006	429	63,426
Yamana	2006 - 2019	5,790	686,111
Total		**7,239**	**868,469**

Table 10-2: Historical distribution of drilling by mine as of December 31, 2019

Mining Block	Type	No. Drill Holes	Total Length (m)
João Belo	Surface	83	36,046
	Underground	2264	181,808
Morro do Vento	Surface	224	57,526
	Underground	1373	106,647
Morro do Cuscuz	Surface	42	13,673
	Underground	491	47,433
Serra do Córrego	Surface	118	25,037
	Underground	519	52,966
Canavieiras South	Surface	54	30,006
	Underground	543	89,951
Canavieiras Central	Surface	55	27,137
	Underground	343	56,074
Canavieiras North	Surface	35	9,190
	Underground	751	62,499
Exploratory	Surface	106	32,014
	Underground	8	2,552
Others		230	37,910
Total		**7,239**	**868,469**

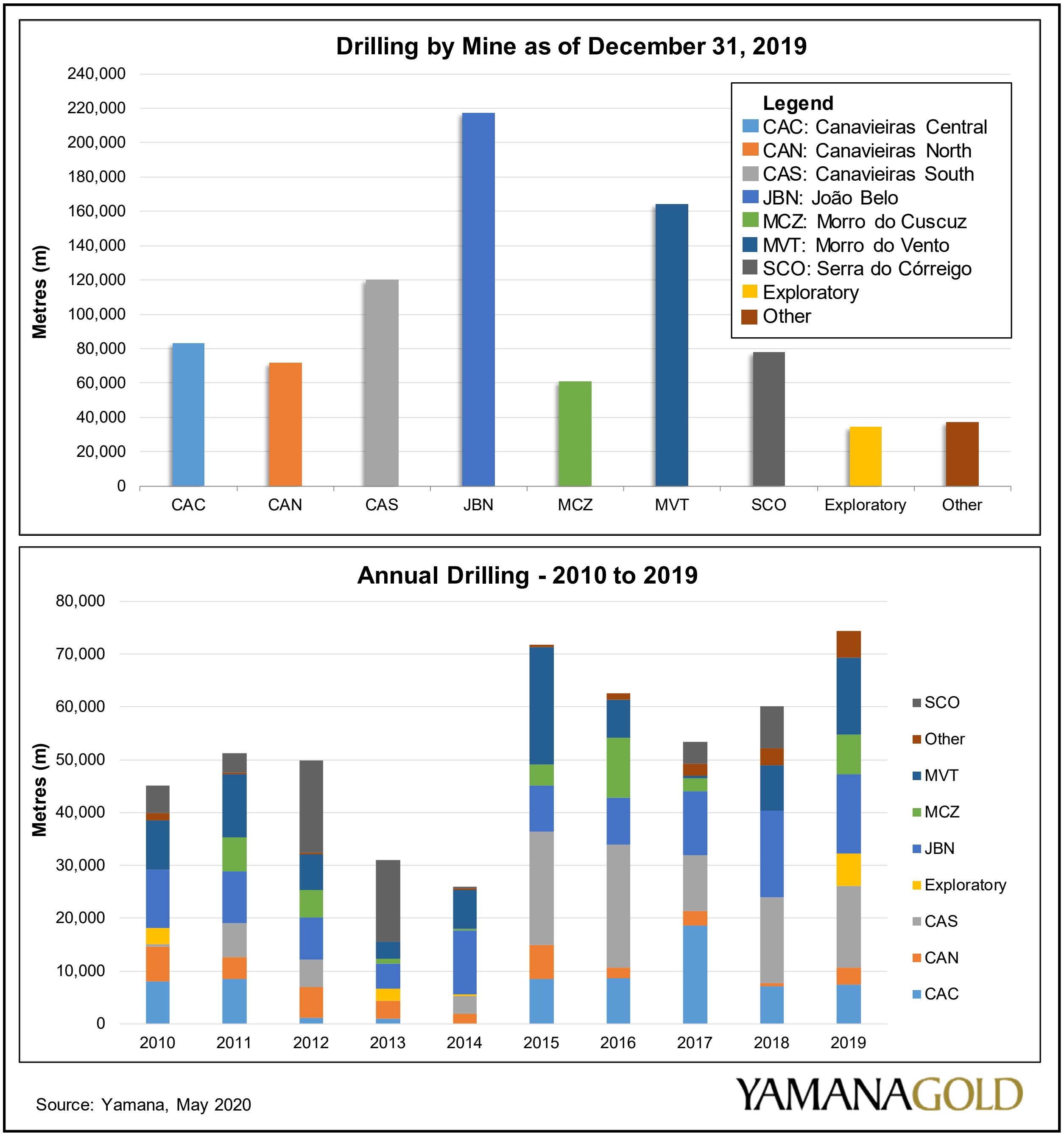


Figure 10-1: Distribution of drilling, by mine, as of December 31, 2019 (top); Drilling by year (2010–2019) (bottom)

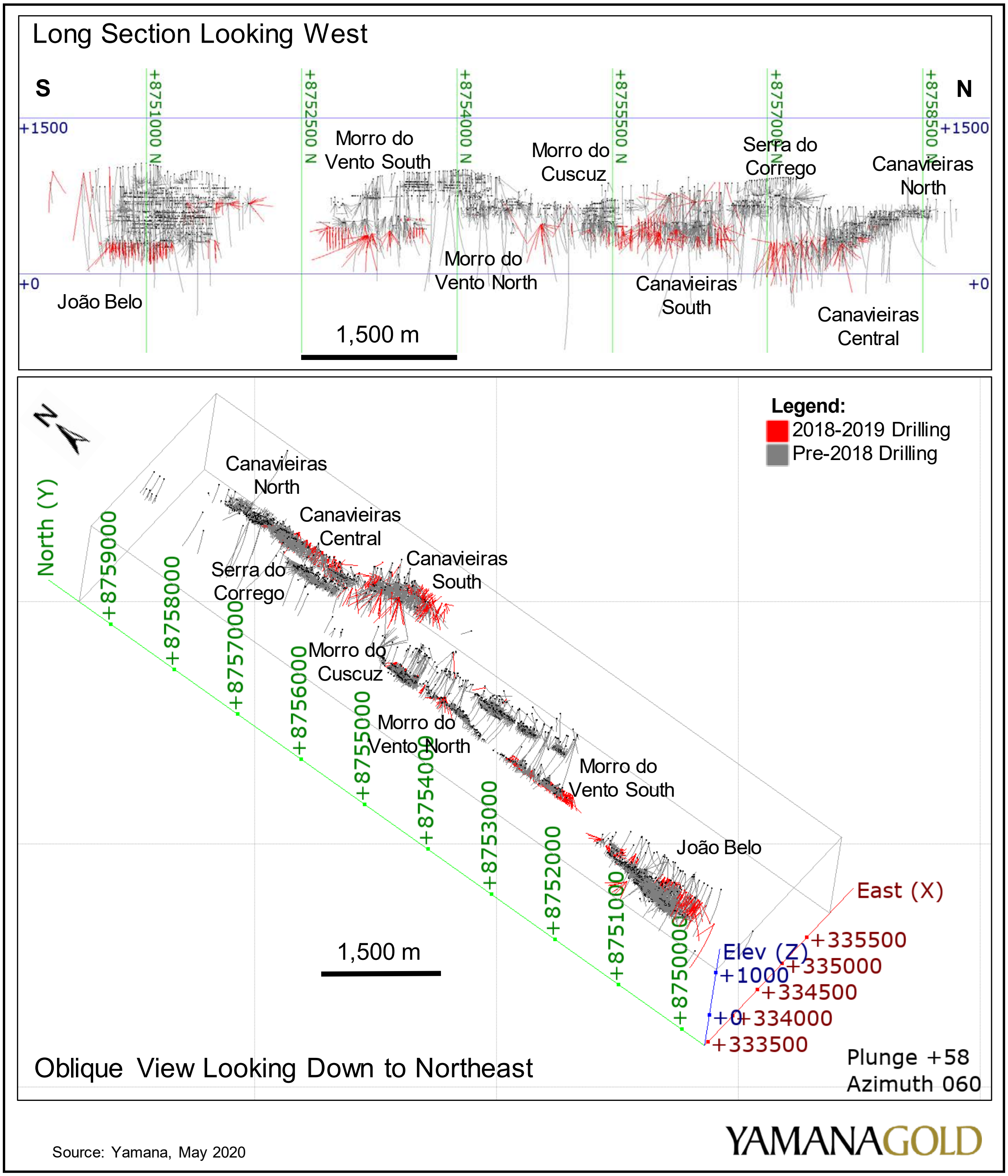


Figure 10-2: Location of drill holes

Jacobina geologists follow a series of standard operating procedures (SOPs) for the planning and execution of surface-based and underground-based core drilling programs (Table 10-3). In brief, the procedures currently used during the core drilling programs are as follows:

1. The collar locations of all drill holes are marked by Jacobina survey crews prior to drilling and the collars are surveyed using a differential base-station GPS after the completion of the drilling.

2. A Reflex Gyro survey instrument is used to provide control information on the directional deviation (both azimuth and inclination) at three-metre intervals in each hole.

3. Core is placed in labelled boxes at the drill site and the boxes are transported by the drill contractor to the logging facility.

4. All core is photographed.

5. Company geologist conduct lithological logging of drill core and recording of geotechnical observation, describing all downhole data including assay intervals. All information is recorded on paper forms and then entered in digital format. The following features are recorded:

    - Core diameter
    - Rock quality designation measurements
    - Core recovery record
    - Downhole inclination
    - Lithological contacts
    - Description of geology
    - Recording of heavy mineral and sulphide content
    - Type and intensity of various alterations
    - Structural features, such as fractures and fault zones
    - Core angles
    - Sampling intervals

Table 10-3: Drilling procedures

Procedure Number	Description
Planning and Execution	
POP-04-12-3.5-227	Drill hole planning
POP-04-12-3.5-358	Diamec U6 drill rig operation
POP-04-12-3.5-213	Diamec 252 drill rig operation
POP-04-12-3.5-001	Channel sampling and underground geological mapping
POP-04-12-3.5-412	Mobilization, demobilization, and operation of drill rigs
Logging and Sampling	
POP-04-12-3.5-318	Storage and organization of geological data and responsibilities
POP-04-12-3.5-372	Drill hole deviation measurement
POP-04-12-3.5-380	Photographic record of drill cores
POP-04-12-3.5-072	Lithological description

No overall core recovery statistics were reviewed, but it is estimated that overall core recovery is greater than 95%. The sampled core should provide a reliable reflection of the mineralization in the mining operation.

Drilling activities at Jacobina have been successful at expanding the extent of known gold mineralization and in defining the plunge of the higher-grade portions of mineralized zones. The results and interpretations of this work are summarized in Sections 14 and 15.

The qualified person responsible for this section of the technical report is of the opinion that the logging and recording procedures are consistent with industry standards, and that there are no known drilling, sampling, or recovery factors that could materially affect the accuracy and reliability of the results.

11 Sample Preparation, Analyses, and Security

Analytical samples include both drill core and channel samples. The drill core samples are generated from exploration and infill drilling programs that are conducted on surface and underground; they are used for target generation and estimation of mineral resources and reserves. The channel samples come from underground grade control channels in development drifts; they are used for short-term forecasting and grade control as well as for estimation of mineral resources and reserves.

11.1 Sample Preparation and Analysis

Sample preparation and analysis at Jacobina are carried out according to a series of SOPs (Table 11-1). The current methodology of sampling drill core and underground workings at Jacobina is described below.

Table 11-1: List of sample preparation and analytical standard operating procedures

Procedure Number	Description
POP-04-12-3.5-060	Storage and disposal of cores, chips, and pulps
POP-04-12-3.5-381	Drill core sampling
POP-04-12-3.5-403	QA/QC protocol
POP-04-12-3.5-404	Rock density test
POP-04-12-3.5-077	Preparation and dispatch of samples to the laboratory
POP-04-12-3.5-337	Sample reception by the laboratory
POP-04-12-3.5-359	Sample preparation
POP-04-12-3.5-367	Gold analysis by fire assay (FA)
POP-04-12-3.5-370	Gold determination by atomic absorption

Sampling of Drill Core:

1. Sampling/assay intervals are generally 0.5 m in length in the conglomerates and 1.0 m in the boundary quartzites, but can be shorter to respect geological boundaries. Four 0.5 m boundary samples are taken from the waste quartzites on each side of a conglomerate intersection.

2. Sample numbers are assigned to the intervals. Certified standards and blanks are inserted into the sample stream.

3. Core samples from the surface drilling (HQ and NQ core diameter, 63.5 mm and 47.6 mm, respectively) are cut in half by saw; one half is sent for assay and the remainder is stored on site. Underground drill core (BQ and LTK48 core diameter, 36.5 mm and 35.3 mm, respectively) is sampled in its entirety.

4. Exploration drill core samples are placed in bags and are sent to the commercial laboratory ALS Chemex (ALS) laboratory in Vespasiano, Brazil, for preparation and analysis.

5. Infill drill core samples are placed in bags and are sent to the mine laboratory at Jacobina for preparation and analysis.

Underground Channel Sampling:

1. Underground faces are washed and the contacts of the mineralization are marked.

2. Channel samples are taken at right angles to the dip across the face in both ore and waste, respecting the geological contacts. The normal sample length is 0.5 m.

3. Samples are bagged and sent to the Jacobina Mine Laboratory for preparation and assaying. Certified standards and blanks are inserted into the sample stream.

The results of the underground channel samples are used for short-term forecasting and grade control as well as in the grade estimation process for resource models.

In the opinion of the qualified person responsible for this section of the technical report, the sampling methodologies at Jacobina conform to industry standards and are adequate for use in mineral resource estimation.

Preparation and Analytical Procedures

Samples from the exploration drilling programs are assayed using ALS and the Jacobina laboratory as the primary laboratories, and SGS Geosol Lab Ltda (SGS Geosol) as the secondary laboratory, both located in Vespasiano, Minas Gerais state, Brazil. Samples from the infill drilling programs and from the grade control channels are assayed using the Jacobina laboratory as the primary laboratory and using SGS Geosol located in Vespasiano, Brazil, as the secondary laboratory. The Jacobina laboratory is owned and operated by Yamana and is not accredited. ALS and SGS Geosol laboratories are independent of Yamana and are accredited under ISO/IEC 17025.

The following procedures, including the insertion rate of the QA/QC samples, are used by the Jacobina laboratory and ALS laboratory for sample preparation and analysis:

1. A submittal form is filled out by a Jacobina geologist or technician and delivered with the samples to the Jacobina laboratory or to ALS.

2. Samples are sorted, logged in, opened, and dried at 110ºC.

3. The entire sample is crushed in a jaw crusher to better than 90% passing 10 mesh. Crushers are cleaned with compressed air between every sample

and with a quartz blank wash every 20th sample. Every second quartz blank wash sample is placed into the analytical sequence. Granulometric checks on the crushed material are done three times per shift.

4. A 500 g subsample is taken by a rotary splitter or by Jones riffle splitter. The split is pulverized using a steel ring mill to better than 95% passing 150 mesh. Pulverizers are cleaned with compressed air after each sample and with a quartz wash after every 20th sample. Every second quartz wash sample is placed into the analytical sequence. Granulometric checks on the pulverized material are done three times per shift.
5. Standard fire assay (FA) methods using a 50 g pulp sample are used to determine total gold content. Samples containing visible gold can be assayed using a screened metallic assay protocol. In this procedure, a 500 g or 1 kg split is pulverized to 95% passing 150 mesh; screening this pulp results in a fine and coarse fraction (possibly containing coarse gold) which are assayed separately.
6. The sample, fluxes, lead oxide litharge, and silver are mixed and fired at 1,100 to 1,170ºC for 50 to 60 minutes so that precious metals report to the molten lead metal phase. The samples are removed from the furnace and poured into moulds. Next, the slag is removed from the cooled lead button and the button is placed in a cupel and fired at 920ºC to 960ºC for one hour to oxidize all the lead and render a precious metal bead.
7. The cupels are removed from the furnace and the beads are separated by acid digestion using nitric and hydrochloric acid to dissolve the precious metals into solution. The sample solutions are analyzed by an atomic absorption spectrophotometer-AAS. For screened metallic assays, the coarse fraction is assayed in total and an aliquot of the fine fraction is analyzed. The gold concentration of the entire sample is determined by weighted average.
8. Analytical batches contain 42 client samples, two pulp duplicates, two reagent blanks, and two certified standards.

The qualified person responsible for this section of the technical report is of the opinion that the sample preparation, analytical, and assay procedures of drill core samples used for exploration and delineation are consistent with industry standards and adequate for use in the estimation of mineral resources.

11.2 Quality Assurance/ Quality Control Measures

Yamana employs a comprehensive QA/QC program for monitoring the assay results of exploration drilling programs, infill drilling programs, and grade control channel samples.

Yamana and JMC use certified reference materials (CRM or standards), blanks, field and coarse crush duplicate samples and pulp duplicates to monitor the precision, accuracy, contamination and quality of the laboratories. These standards are purchased from Geostats Pty Ltd. (Geostats) and ORE Pty Ltd. (OREAS), both in Australia. Currently, Yamana has protocols in place for describing the frequency and type of QA/QC submission, the regularity of analysis of QA/QC results, and failure limits. There are also set procedures to be followed in case of failure, or for flagging failures in the QA/QC database.

The results from the QA/QC program are reviewed and monitored by a dedicated Quality Control team who presents the results by means of detailed reports on a regular basis. These results are discussed in Section 12 of this technical report.

11.2.1 Standards

For drill core samples, Yamana inserts one standard for every 30 samples submitted to the primary laboratories (ALS or Jacobina laboratory). For channel samples, Jacobina geology staff insert one standard for every 40 channel samples submitted to the Jacobina laboratory. Standards of low, medium, and high gold grades are supplied in pre-packaged bags purchased from Geostats and OREAS. Geostats and OREAS provide Yamana with certificates listing the round-robin assay results and the expected standard deviation for each standard. The certified values are provided in Table 12-2.

Jacobina exploration staff submitted 2,949 standards with drill core samples between January 2019 and December 2019 (submission frequency of one standard per 32 samples). Between January 2019 and December 2019, Jacobina geology staff submitted 643 standard samples with channel samples (submission frequency of one standard per 39 samples).

11.2.2 Blank Samples

Blank samples are composed of siliceous material which is known to contain gold grades that are less than the detection limit of the analytical method (< 0.005 g/t gold) for both the Jacobina laboratory and ALS laboratory. Yamana inserts one blank sample for every 30 drill core samples submitted to the Jacobina laboratory and ALS laboratory. Jacobina geology staff insert one blank sample for every 40 channel samples submitted to the Jacobina laboratory.

Between January 2019 and December 2019, Jacobina exploration staff submitted 3,028 blank samples with drill core samples (submission frequency of one blank per 31 samples); geology staff submitted 735 blank samples with channel samples (submission frequency of one blank per 34 samples).

11.2.3 Coarse Crush Duplicates

Yamana's procedure requires the submission of one coarse crush duplicate for every 20 samples. Between January 2019 and December 2019, 4,605 drill core coarse crush duplicate samples and 1,325 channel sample crush duplicate samples were analyzed for gold.

The submission frequency in 2019 was one coarse crush duplicate per 20 drill core samples, and one coarse crush duplicate per 19 channel samples.

11.2.4 Field Duplicates

Yamana's procedure requires the submission of one field duplicate for every 20 samples. Between January and December 2019, 1,231 drill core field duplicate samples (one for every 24 samples) and 715 channel field duplicate samples (one per 34 samples) were analyzed for gold.

The procedure for sampling the drill core field duplicate is to saw the core in half, and to saw one of those halves to create two quarter-core samples. One quarter-core is sent as a regular sample and the other quarter-core is sent as the field duplicate for that same interval. The remaining half-core is stored in the box in the core shed.

Underground channel field duplicate procedure consists of collecting a separate sample parallel to the original sample from the underground rock face.

11.2.5 Inter-Laboratory Pulp Duplicates

The Jacobina laboratory and the ALS laboratory send 5% of pulp samples, as selected by Jacobina staff, on a monthly basis to the SGS Geosol laboratory in Vespasiano, Brazil, which is an independent ISO 9001-2015- and ISO/IEC 17025:2005- certified laboratory for check assays reanalysis. Analysis of these pulps is useful for measuring the precision of the analytical process of the ALS and Jacobina laboratories, assuring a better degree of accuracy and control on assays. A total of 4,568 pulp samples from drill core and 1,241 channel pulp samples were sent between January 2019 and December 2019.

The qualified person responsible for this section of the technical report is of the opinion that there are no drilling, sampling, or recovery factors that could materially affect the accuracy and reliability of the results.

11.3 Sample Security

Samples are handled only by personnel authorized by JMC. Channel samples from the mining operation are delivered directly to the Jacobina laboratory each day upon completion of underground sampling. All drill core from surface and underground drill holes is taken directly to authorized exploration personnel to a drill logging and sampling area within the secured and guarded mine property. The mineralized core intervals are logged and sampled. Core samples from infill drill holes are subsequently delivered to the Jacobina laboratory and core samples from exploratory drill core samples are loaded onto an outsourced company truck and delivered to ALS laboratory in Vespasiano, Minas Gerais, Brazil.

Each sample is assigned a unique sample number that allows it to be traced through the sampling, database, and analytical procedure workflow, and validated against the original sample site. For exploration drill holes, the remaining half of the split core is stored on-site as a control sample, available for review and resampling if required.

The photographic record is kept for all drill holes, for later consultation, if necessary.

In the opinion of the qualified person responsible for this section of the technical report, the sample preparation, sample security, and analytical procedures at Jacobina are adequate and consistent with industry standards.

12 Data Verification

12.1 Database Verification

Jacobina staff carried out a data verification program for the assay tables included in the drill hole databases by spot-checking the assay data from a selection of 2019 drill holes that intersected the underground mineralized wireframe domains, thus relevant to the current mineral resource estimate. The validation was done by comparing the selected information entered in the digital database with that of the original laboratory certificates.

Additional checks included a comparison of the drill hole collar location data with the digital models of the surface topography and excavation models as well as a visual inspection of the downhole survey information. The validation routines in Leapfrog Geo and Maptek Vulcan software, consisting of checking for overlapping samples and duplicate records, were also carried out.

Based on the data review, in the opinion of the qualified person responsible for this section of the technical report, the data entry and verification procedures of drill hole and channel samples data at Jacobina are consistent with industry standards and the data is adequate for the purposes of mineral resource estimation.

The QA/QC database prior to 2019 has been validated by independent consultants, most recently by RPA (2019).

12.2 Quality Assurance/Quality Control Results

The performance of the QA/QC program from January 1 to December 31, 2019 is presented in Table 12-1. Details on the performance of each type of control sample are provided below.

Table 12-1: Summary of QA/QC results, January 1 to December 31, 2019

Type	Standards				Blanks		
	Failure tolerance = 5% > ± 2SD				Failure tolerance = 5% > 5× Detection Limit		
	No of QC samples	% Approved	% Failures	% Bias	No of QC samples	% Approved	% Failures
Exploration Drilling – ALS	**536**	99.63	0.37	-0.23	**544**	99.63	0.37
Infill Drilling – ALS	**40**	100.00	0.00	0.49	**43**	100.00	0.00
Exploration Drilling – Jacobina lab	**486**	96.71	3.29	-0.95	**494**	99.61	0.39
Infill Drilling – Jacobina lab	**1,891**	97.46	2.54	-0.70	**1,929**	99.69	0.31
Underground Channels – Jacobina lab	**643**	98.29	1.71	-0.59	**735**	99.46	0.54

12.2.1 STANDARDS

Table 12-2 to Table 12-6 outline the performance and show the failure rates for the various standards submitted in 2019 as part of the drilling (exploration and infill) and channel sample stream at both the ALS and Jacobina laboratories. The overall failure rates are within the target of 5% standard failures; a failure is defined a gold analysis of a standard that assayed greater than plus or minus two standard deviations (> ± 2SD) from the certified value. In the opinion of the qualified person responsible for this section of the technical report, these results are considered acceptable.

Figure 12-1 shows the performance of the standards submitted with the exploration drill core samples, the infill drill core samples, and the underground channel samples that were assayed at either the ALS laboratory or the Jacobina laboratory.

Table 12-2: Performance of standards, ALS laboratory – exploration drilling

CRM no.	G308-7	OREAS 251	G909-1	G908-3	G901-7	OREAS 209	G472-1	G900-5	G310-9	OREAS 215	G903-6	G910-5	G307-7	G310-8	Total 14
Certified Au grade (g/t Au)	0.27	0.50	1.02	1.03	1.52	1.58	2.80	3.21	3.29	3.54	4.13	5.23	7.87	7.97	
Average Result (g/t Au)	0.26	0.51	1.02	1.04	1.48	1.69	2.83	3.15	3.35	3.58	4.09	5.10	7.95	7.70	
Au ppm Difference (g/t Au)	-0.01	0.01	-0	0.01	-0	0.1	0.03	-0.1	0.06	0.04	-0	-0.13	0.08	-0.28	
Average Bias (%)	-3.98	1.98	-0.5	0.66	-3	6.65	1.07	-1.9	1.66	1.13	-1.5	-2.58	0.99	-3.45	**-0.23**
Min. zScore	-1.65	0.4	-1.3	-1.1	-0.6	1.33	0.19	-0.4	-1.88	0.23	-3.3	-0.57	-1.04	-0.75	
Max. zScore	0.45	0.4	1.33	1.94	-0.6	1.33	0.19	-0.4	2.01	0.23	1.02	-0.46	1.75	-0.63	
Total No. of Samples	103	1	97	73	1	1	1	1	122	1	27	2	105	2	**537**
Failures +/- 2SD	0	0	0	0	0	0	0	0	1	0	1	0	0	0	**2**
% Failures +/- 2SD	0	0	0	0	0	0	0	0	0.82	0	3.7	0	0	0	**0.37**
Failures +/- 3SD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
% Failures +/- 3SD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00%**

Table 12-3: Performance of standards, ALS laboratory – infill drilling

CRM no.	G308-7	OREAS 251	G909-1	G908-3	OREAS 209	G310-9	OREAS 215	G903-6	G307-7	n=9
Certified Au grade (g/t Au)	0.27	0.50	1.02	1.03	1.58	3.29	3.54	4.13	7.87	
Average Result (g/t Au)	0.26	0.51	1.00	1.05	1.69	3.32	3.58	4.34	7.99	
Au Difference (g/t Au)	-0.01	0.01	-0.02	0.02	0.1	0.03	0.04	0.21	0.12	
Average Bias (%)	-2.36	1.98	-1.99	1.94	6.65	0.85	1.13	5.08	1.48	**0.49%**
Min. zScore	-0.65	0.4	-0.82	-0.19	1.33	-0.18	0.23	1.02	-0.3	
Max. zScore	0.05	0.4	0.17	1.07	1.33	0.43	0.23	1.02	0.86	
Total No. of Samples	8	1	4	5	1	10	1	1	9	**40**
Failures +/- 2SD	0	0	0	0	0	0	0	0	0	**0**
% Failures +/- 2SD	0	0	0	0	0	0	0	0	0	**0**
Failures +/- 3SD	0	0	0	0	0	0	0	0	0	**0**
% Failures +/- 3SD	0	0	0	0	0	0	0	0	0	**0**

Table 12-4: Performance of standards, Jacobina laboratory – exploration drilling

CRM no.	G308-7	OREAS 251	G909-1	G908-3	G901-7	OREAS 209	G472-1	G900-5	G310-9	OREAS 215	G903-6	G910-5	G307-7	G310-8	n=14
Certified Au grade (g/t Au)	0.27	0.50	1.02	1.03	1.52	1.58	2.8	3.21	3.29	3.54	4.13	5.23	7.87	7.97	
Average Result (g/t Au)	0.26	0.52	1.03	1.04	1.54	1.56	3.16	3.20	3.22	3.34	3.98	5.15	7.83	7.86	
Au Difference (g/t Au)	-0.01	0.02	0.01	0.01	0.02	-0.03	0.36	-0.02	-0.07	-0.2	-0.15	-0.08	-0.04	-0.11	
Average Bias (%)	-2.31	3.57	1.26	0.87	1.2	-1.58	13.02	-0.47	-2.11	-4.6	-3.53	-1.56	-0.54	-1.36	**-0.95%**
Min. zScore	-4	0.71	-0.77	-2.74	-0.78	-1.03	2.15	-1.89	-3.78	-1.88	-10.15	-1.5	-3.03	-0.71	
Max. zScore	0.9	0.71	1.22	8.16	0.86	0.39	2.41	1.02	4.26	0.2	2.66	0.88	1.11	0.12	
Total No. of Samples	87	1	71	54	8	2	2	9	91	3	36	8	102	8	**481**
Failures +/- 2SD	0	0	0	1	0	0	2	0	3	0	1	0	0	0	**7**
% Failures +/- 2SD	0.00	0.00	0.00	1.82	0.00	0.00	100.00	0.00	3.30	0.00	2.78	0.00	0.00	0.00	**1.44**
Failures +/- 3SD	1	0	0	1	0	0	0	0	4	0	2	0	1	0	**9**
% Failures +/- 3SD	1.12	0.00	0.00	1.82	0.00	0.00	0.00	0.00	4.40	0.00	5.26	0.00	0.98	0.00	**1.85%**

Table 12-5: Performance of standards, Jacobina laboratory – infill drilling

CRM no.	G307-7	G308-7	G310-9	G903-6	G908-3	G909-1	OREAS 209	OREAS 210	OREAS 215	OREAS 251	n=10
Certified Au grade (g/t Au)	7.87	0.27	3.29	4.13	1.03	1.02	1.58	5.49	3.54	0.50	
Average Result (g/t Au)	7.77	0.27	3.25	3.71	1.03	1.04	1.51	5.22	3.38	0.50	
Au Difference (g/t Au)	-0.1	0	-0.04	-0.42	0.001	0.02	-0.08	-0.27	-0.16	0	
Average Bias (%)	-1.27%	-1.04%	-1.18%	-10.25%	-0.37%	2.01%	-4.77%	-4.97%	-4.55%	-0.66%	**-0.70%**
Min. zScore	-19.95	-2	-18.36	-18.74	-14.62	-3.5	-2.66	-4.74	-1.9	-3.33	
Max. zScore	2.52	39	27.54	0.82	1.2	39.17	0.43	0.26	0.4	2.58	
Total No. of Samples	404	456	433	41	73	424	16	18	13	13	**1,891**
Failures +/- 2SD	2	2	7	3	0	1	2	0	0	1	**18**
% Failures +/- 2SD	0.50%	0.44%	1.62%	7.32%	0.00%	0.24%	12.50%	0.00%	0.00%	7.69%	**0.95%**
Failures +/- 3SD	10	4	5	4	1	3	0	2	0	1	**30**
% Failures +/- 3SD	2.48%	0.88%	1.15%	9.76%	1.37%	0.71%	0.00%	11.11%	0.00%	7.69%	**1.59%**

Table 12-6: Performance of standards, Jacobina laboratory – underground channel samples

CRM no.	G307-7	G308-7	G310-9	G908-3	G909-1	n=5
Certified Au grade (g/t Au)	7.87	0.27	3.29	1.03	1.02	
Average Result (g/t Au)	7.75	0.27	3.23	1.05	1.03	
Au Difference (g/t Au)	-0.12	-0.00	-0.06	0.02	0.01	
Average Bias	-1.61%	-0.23%	-1.62%	1.74%	0.98%	**-0.59%**
Min. zScore	-15.91	-1.2	-7.29	-0.41	-12.65	
Max. zScore	1.32	39.65	0.77	5.01	2.93	
Total No. of Samples	157	161	167	46	112	**643**
Failures +/- 2SD	0	0	2	0	2	**4**
% Failures +/- 2SD	0.00%	0.00%	1.20%	0.00%	1.79%	**0.62%**
Failures +/- 3SD	2	1	2	1	1	**7**
% Failures +/- 3SD	1.27%	0.62%	1.20%	2.17%	0.89%	**1.09%**

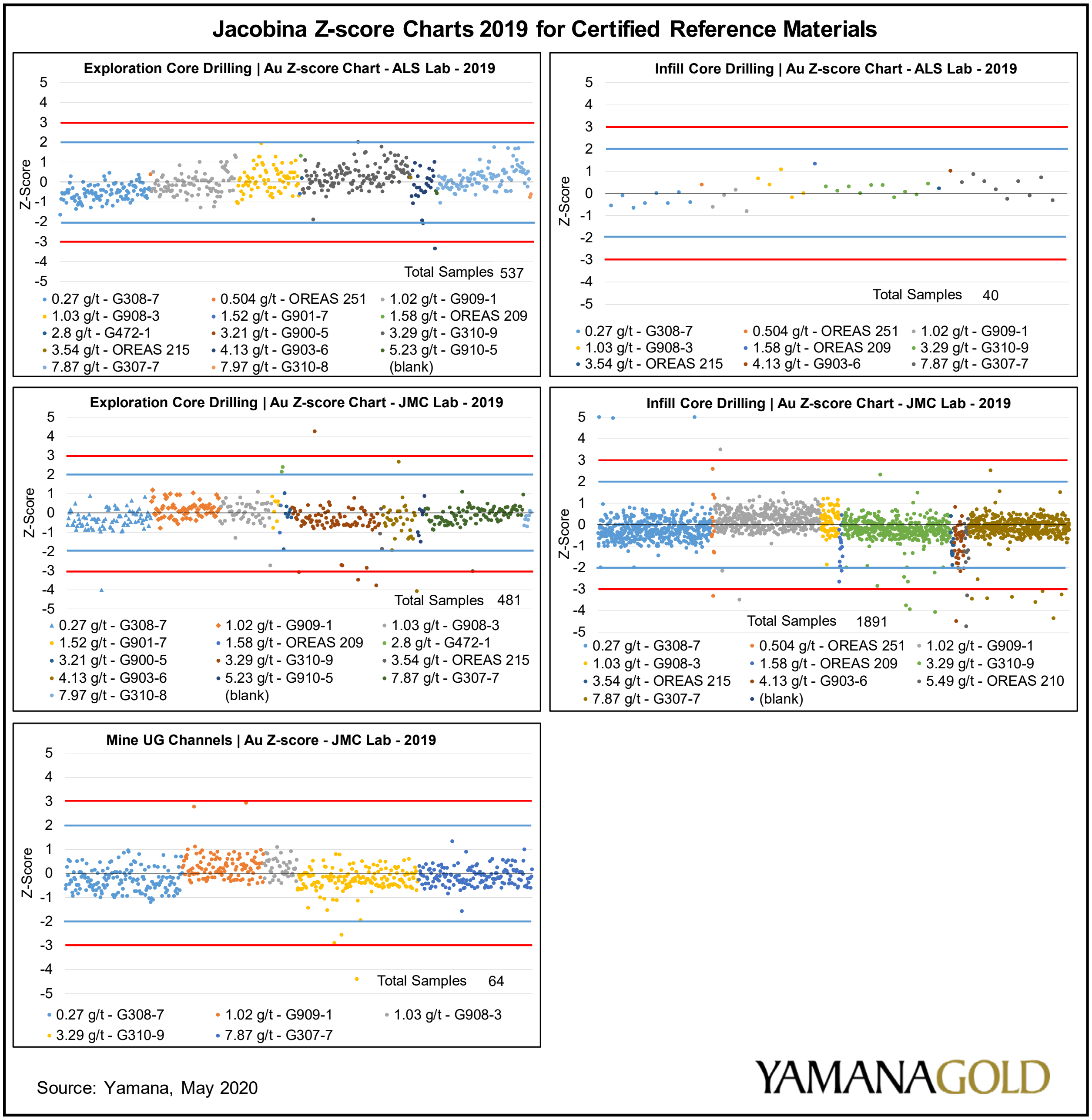


Figure 12-1: Assay results of standards analyzed at ALS and Jacobina laboratories

12.2.2 BLANKS

Of the 3,763 blanks submitted in the sample streams in 2019, two blank samples (0.34% of total) submitted with drill core at ALS, eight blank samples (0.33% of total) submitted with drill core at Jacobina laboratory, and four blank samples (0.54% of total) submitted with the channel samples at Jacobina laboratory returned assay results greater than the selected upper limit of 0.025 g/t gold. In the opinion of the qualified person responsible for this section of the technical report, these results are acceptable.

In cases of failure, Yamana's procedures require investigation by the laboratory as well as re-analysis of six adjacent samples or of the entire batch containing a failed blank sample. Figure 12-2 illustrates the results of the analyses of the blanks inserted into the sample stream for the drill core samples and channel samples, with the failure criteria (0.025 g/t gold) outlined in red.

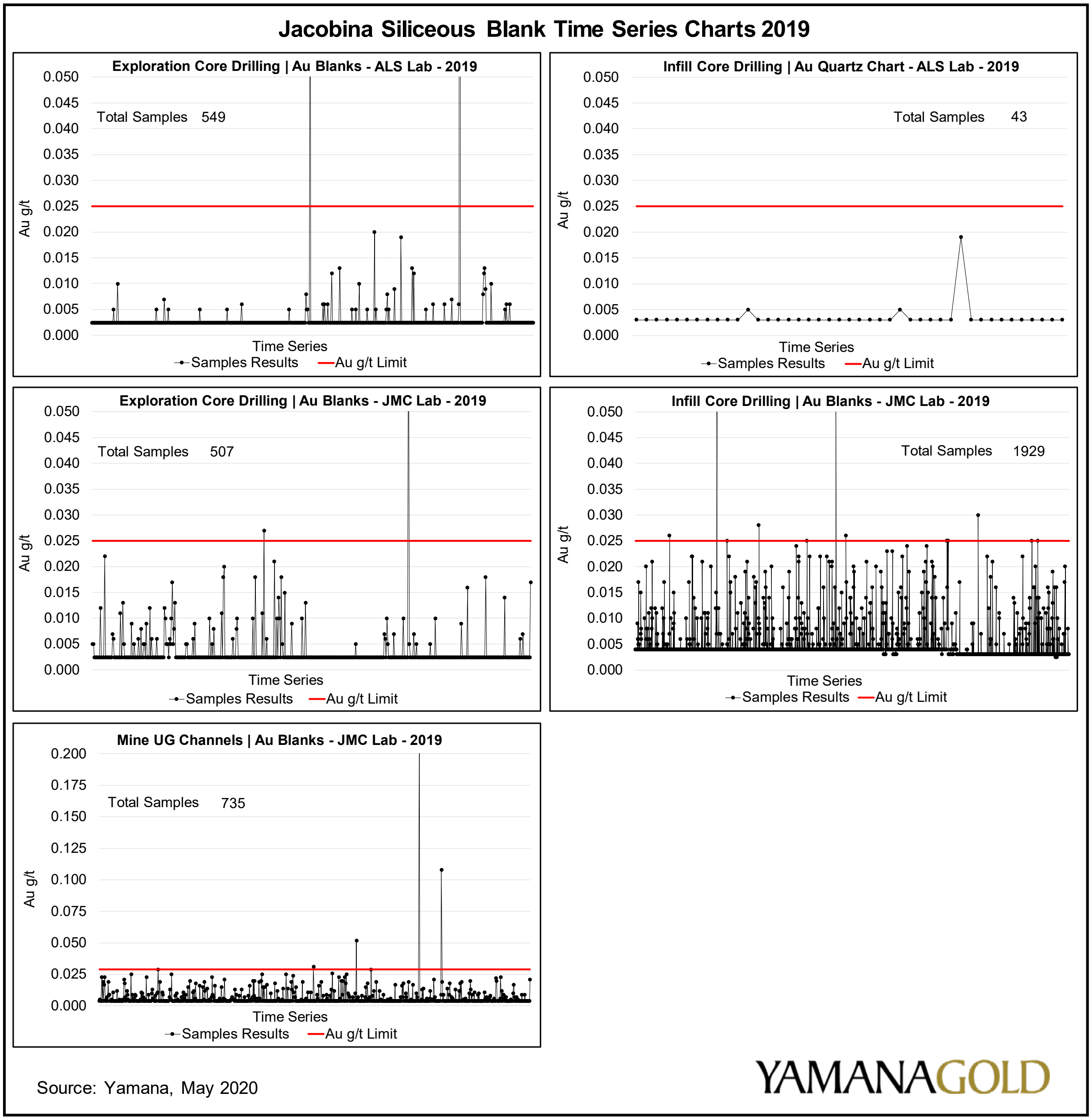


Figure 12-2: Assay results of inserted blank samples at ALS and Jacobina laboratories

12.2.3 Coarse Crush Duplicates

Yamana's procedure requires the submission of one coarse crush duplicate for every 20 samples. Between January and December 2019, 4,663 drill hole coarse crush duplicate samples and 1,325 channel sample crush duplicate samples were analyzed for gold. The dispersion pattern for these coarse crushed duplicate samples are consistent with expectations for this type of sample material (Figure 12-3).

12.2.4 Field Duplicates

Yamana's procedure requires the submission of field duplicates for every 20 samples. Between January and December 2019, 1,231 drill field duplicate samples and 715 channel field duplicate samples were analyzed for gold. The dispersion pattern for these field duplicate samples are consistent with expectations for this type of sample material. In view of the deposit characteristics, with the presence of free gold and nugget effect, the qualified person responsible for this section of the technical report is of the opinion that these results are satisfactory (Figure 12-4).

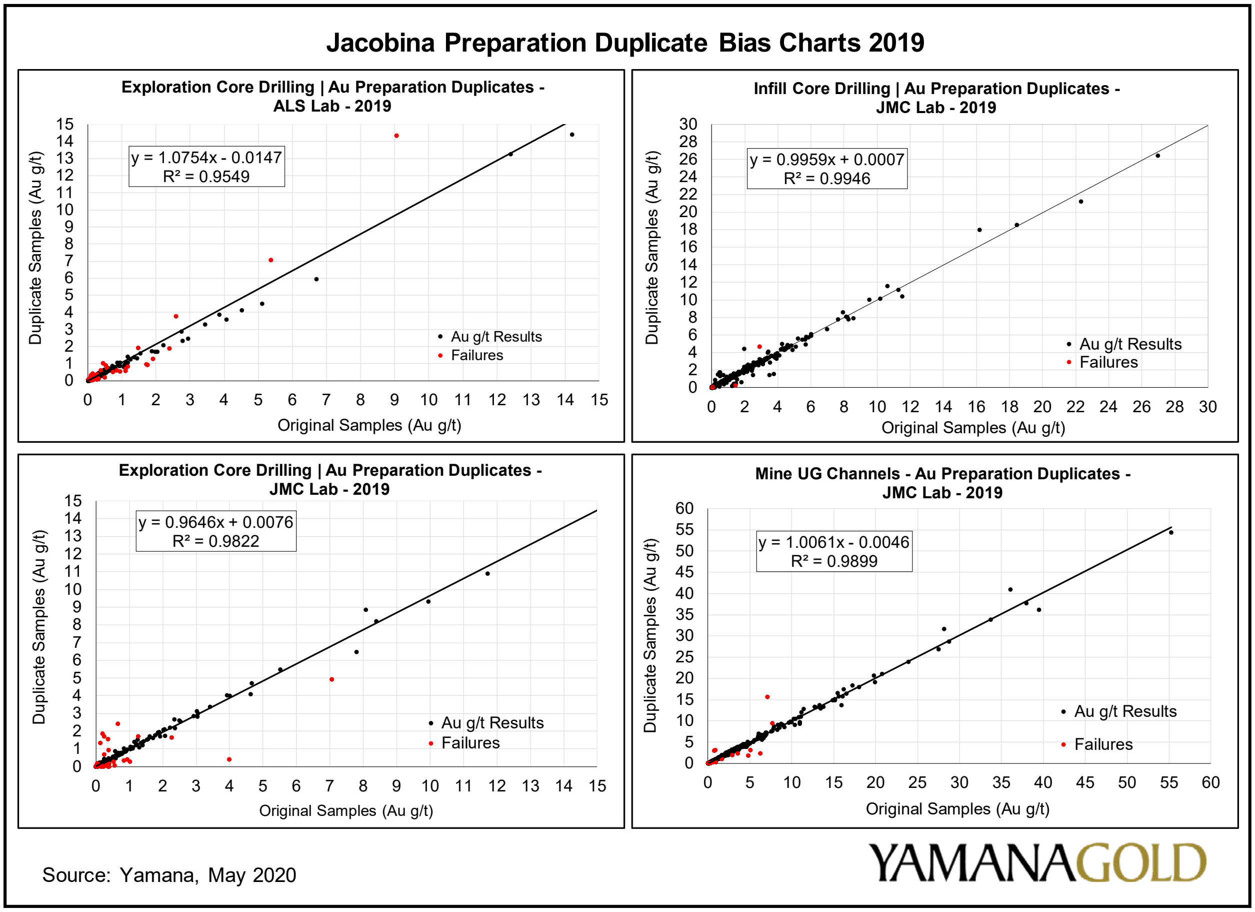


Figure 12-3: Bias charts for coarse crushed duplicates analyzed at ALS and Jacobina laboratories

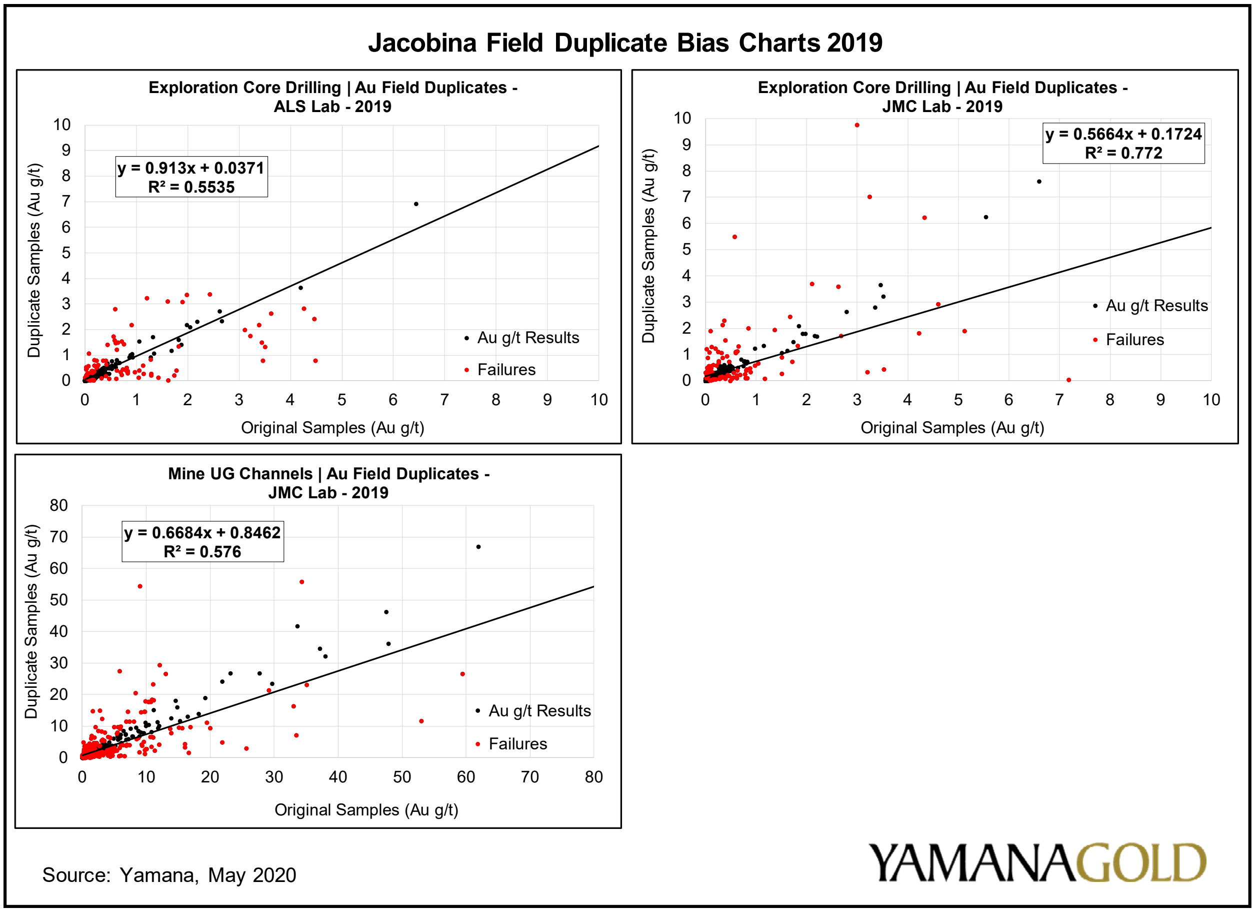


Figure 12-4: Bias charts for field duplicates analyzed at ALS and Jacobina laboratories

12.2.5 Inter-Laboratory Pulp Duplicates

The ALS and Jacobina laboratories send pulp samples, selected by the Jacobina geology team, on a monthly basis to the independent ISO 9001-2015 and ISO/IEC 17025:2005-certified SGS Geosol laboratory in Vespasiano, Minas Gerais for check assay reanalysis. Analysis of these pulps helps determine the precision of the analytical process at the external ALS laboratory and the internal Jacobina laboratory, ensuring a greater degree of accuracy and control on assays. A total of 4,568 pulp samples from the drilling programs and 1,241 pulp samples from underground channel sampling were sent to SGS Geosol between January and December 2019, the results of which are presented in Figure 12-5.

The dispersion pattern for these inter-laboratory pulp duplicate samples are consistent with expectations for this type of sample material. No material bias is detected between the primary and secondary laboratories.

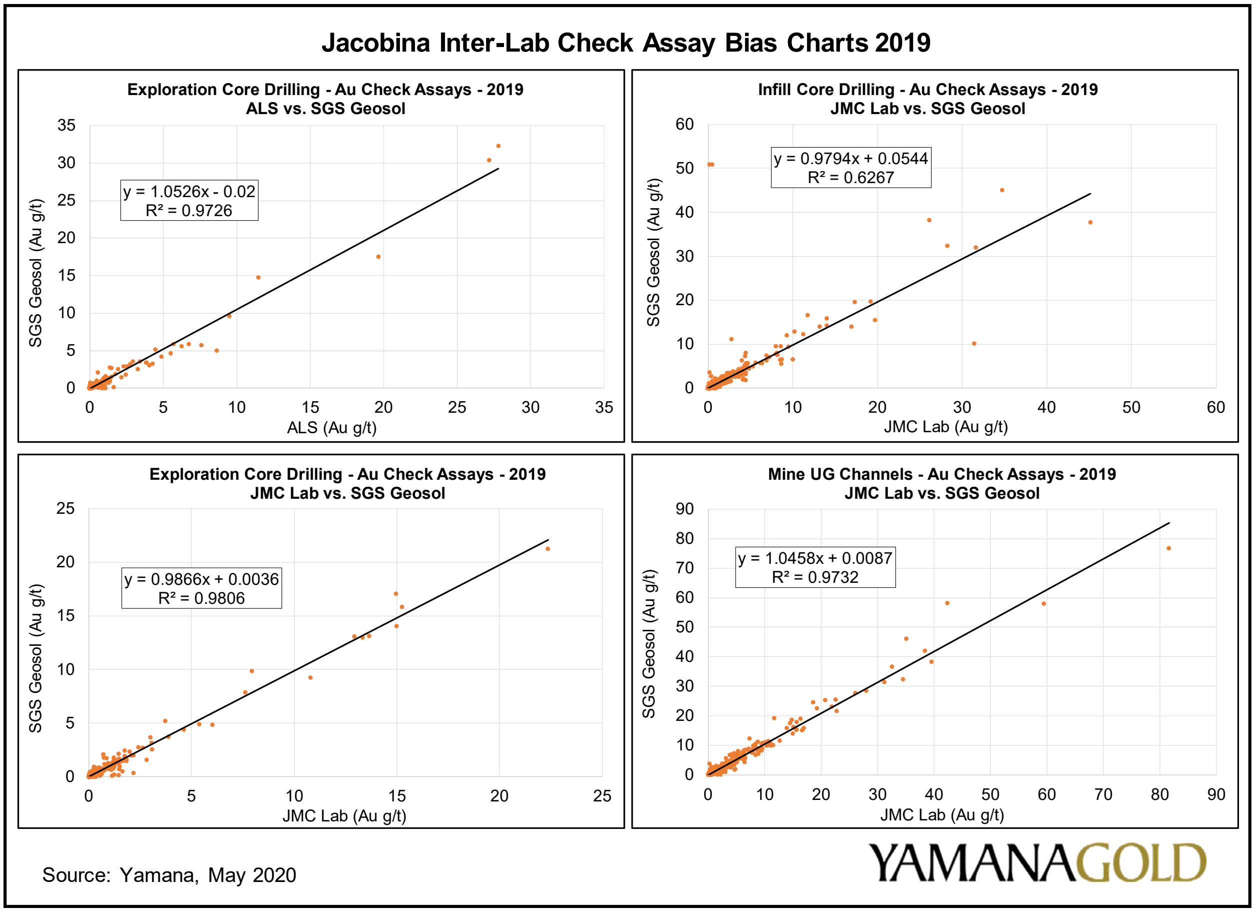


Figure 12-5: Bias charts of inter-laboratory check assay results

There were no limitations in the ability of the qualified person to verify the data. In the opinion of the qualified person responsible for this section of the technical report, the verification of the sampling data, including the analytical quality control data produced by Yamana for samples submitted to various laboratories, suggests that the analytical results delivered by the laboratories are sufficiently reliable for the purpose of mineral resource and mineral reserve estimation.

13 Mineral Processing and Metallurgical Testing

13.1 Processing Plant

The Jacobina mineral processing plant uses conventional gold processing methodologies to treat run-of-mine (ROM) material from the underground mines. Comminution comprises three stages of crushing followed by wet grinding. Within the grinding circuit, gravity concentration of gold is performed on a bleed stream of classification cyclone underflow. Rejects from the gravity circuit are returned to the grinding circuit. The cyclone overflow is sent to leaching in a conventional cyanide leaching process, and gold extraction from the leach solution is performed by carbon adsorption in the carbon-in-pulp (CIP) tanks. Gold is stripped in an elution circuit and final gold recovery is performed in an electrowinning circuit. The sludge and solids from electrowinning are dried and smelted in an induction furnace to produce doré bars. More information about the processing plant is provided in Section 17 of this technical report.

There are no known processing factors or deleterious elements that could have a significant effect on potential economic extraction.

13.2 Metallurgical Testing

13.2.1 Historical Test Work

Metallurgical tests were conducted on samples from pre-2006 core drill holes from the Morro do Vento target area.

The metallurgical test work was conducted to determine recoveries using conventional milling. SGS Lakefield Research Limited in Lakefield, Ontario (SGS Lakefield) completed the test work on six grade/ore-type composites and one overall master composite prepared from rejects of drill core samples from the Morro do Vento project. Samples were selected to provide a representative range of grades and a representative proportion of oxides and sulphides.

All samples were originally prepared and tested for gold by fire assay by SGS Geosol in Brazil. Metallurgical tests consisted of grinding tests on the master composite, and cyanidation tests on the master composite and the individual grade/ore-type composites. Average gold assay results for the individual composites ranged from 0.53 g/t gold for the low-grade oxide composite to 3.50 g/t gold for the high-grade oxide composite. Direct assay of the master composite by screened metallics indicated a grade of 1.73 g/t gold.

SGS Lakefield reported that the overall gold extraction for the master composite was 96.4% from tests that ranged from 95.7% to 97.0%. The leach times were 24 hours, and no significant difference in extraction was observed for the tests conducted over shorter (12 h), and longer (48 h) leach times. Cyanide and lime consumption for the master composite were found to be 0.81 kg/t and 0.22 kg/t, respectively. Extractions for the individual grade/ore-type composites ranged from 90.8% for low-grade oxide to 98.5% for high-grade mixed. Tailings gold grades for these samples ranged from 0.02 g/t to 0.07 g/t.

The test work did not identify any appreciable deleterious elements and there are no known processing factors that could have a significant effect on economic extraction.

Geometallurgical testing has been performed on an ongoing basis from the second half of 2015 through 2019. The results of these tests are reported internally and used for operational purposes in short-term production planning and processing plant operation. Integrating these test results has resulted in higher production rates and improved metallurgical recovery.

In the opinion of the qualified person responsible for this section of the technical report, the test work recoveries and grades expressed by the master composite demonstrate expected process plant recovery and correlate well with actual plant production. Actual plant-adjusted production for 2018 and 2019 is presented in Table 13-1 and Table 13-2, respectively. The monthly tonnage, gold grade, and gold recovery varied during 2018 and 2019; however, the overall gold recovery of 96.2% for 2018 and the overall gold recovery of 96.7% for 2019 fit well with the results of the 2006 test work. This demonstrates acceptable reconciliation between the test work and operational data and that an assumption of a gold recovery of 96.5% for the LOM appears reasonable. All mining sectors included in the year-end 2019 mineral reserves and LOM plan have been processed in the past, or are currently being processed, providing additional confidence in the LOM gold recovery assumption.

Table 13-1: 2018 Jacobina mineral processing plant production

Month	Production			Gold Recovery
	Tonnes (t)	Gold Grade (g/t Au)	Gold (oz)	(% Au)
January	166,576	2.25	11,716	97.0
February	162,199	1.98	9,960	96.3
March	174,057	2.37	12,849	96.7
April	176,748	2.29	12,598	96.7
May	186,176	2.18	12,390	95.1
June	172,398	2.38	12,743	96.5
July	130,586	2.53	10,097	95.1
August	191,805	2.25	13,374	96.4
September	156,959	2.42	11,897	97.4
October	163,164	2.46	12,408	96.1
November	172,821	2.34	12,352	94.8
December	181,969	2.15	12,311	97.7
Total	**2,035,457**	**2.30**	**144,695**	**96.2**

Table 13-2: 2019 Jacobina mineral processing plant production

Month	Production			Gold Recovery
	Tonnes (t)	Gold Grade (g/t Au)	Gold (oz)	(% Au)
January	184,080	2.31	13,374	97.7
February	168,098	2.30	12,095	97.3
March	181,907	2.30	13,149	97.8
April	182,912	2.16	12,188	95.8
May	192,964	2.11	12,648	96.7
June	187,783	2.40	14,115	97.4
July	192,663	2.42	14,512	96.7
August	202,719	2.08	13,080	96.6
September	194,338	2.12	12,565	95.1
October	199,452	2.18	13,499	96.5
November	185,300	2.47	14,231	96.9
December	182,577	2.49	14,044	95.9
Total	**2,254,793**	**2.28**	**159,499**	**96.7**

14 Mineral Resource Estimates

14.1 Mineral Resource Summary

Preparation of the mineralized wireframe models used to estimate the block grades began with the preparation of a structural model that reflected the current understanding of the location and offsets of the many post-mineralization faults present in the mining areas. A series of lithological wireframe models was subsequently prepared to depict the overall location and distribution of the quartz-pebble conglomerate reefs and the interbedded massive quartzite beds. These lithological models were subsequently used to prepare wireframe models of the mineralized intervals. No minimum thickness was applied to the mineralized wireframes used to generate the grade estimation domains. The mineralized wireframes were created using a cut-off grade of 0.5 g/t gold. However, minimum thickness-reporting criteria for mineral resources was applied during the generation of conceptual mining shapes.

Jacobina mineral resources have been estimated in conformity with generally accepted standards set out in CIM Mineral Resource and Mineral Reserves Estimation Best Practices Guidelines (November 2019) and were classified according to CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) guidelines. Mineral resources are reported exclusive of mineral reserves. Mineral resources are not mineral reserves and have not demonstrated economic viability. Underground mineral resources are estimated within conceptual underground mining shapes at a cut-off grade of 1.00 g/t gold, which corresponds to 75% of the break-even cut-off used to estimate the mineral reserves. A minimum mining width of 1.5 m is used to construct the conceptual mining shapes. Mineral resources are reported considering internal waste and dilution.

The Mineral Resource Statement of the Jacobina Gold Mine as of December 31, 2019, exclusive of mineral reserves, is presented in Table 14-1.

Table 14-1: Jacobina Mineral Resource Statement, December 31, 2019

Category	Tonnage (kt)	Gold Grade (Au g/t)	Contained Gold (koz)
Measured	27,705	2.26	2,014
Indicated	14,765	2.27	1,076
Total Measured + Indicated	**42,470**	**2.26**	**3,090**
Inferred	18,528	2.36	1,406

1. *Mineral resources have been estimated by the Jacobina Resources Geology Team under the supervision of Renan Garcia Lopes, Senior Geologist, Registered Chartered Professional Member of Australasian Institute of Mining and Metallurgy, MAusIMM CP(Geo) Number 328085, a full-time employee of JMC, and a qualified person as defined by National Instrument 43-101. The mineral resource estimate conforms to the CIM (2014) Standards.*
2. *Mineral resources are reported exclusive of mineral reserves.*
3. *Mineral resources are not mineral reserves and do not have demonstrated economic viability.*
4. *Underground cut-off grade is 1.00 g/t Au, which corresponds to 75% of the cut-off used to estimate the mineral reserves.*
5. *Minimum mining width of 1.5 m, considering internal waste and dilution*
6. *All figures are rounded to reflect the relative accuracy of the estimate. Numbers may not add up due to rounding.*

14.2 Resource Database and Validation

All drill core, survey, geological, and assay information used for the mineral resource and mineral reserve estimates is verified and approved by the Jacobina geological staff and maintained in an on-site database. Verification is done in part by using the Leapfrog Geo and Maptek Vulcan software data validation tools. A summary of the drilling and channel sampling databases is provided in Table 14-2.

Table 14-2: Summary of drilling and channel databases used for resource estimation

Mining Block	Crystallization Date	No. of Drill Holes	No. of Channels
Canavieiras North	July 11, 2019	807	1,770
João Belo	April 29, 2019	2,271	6,248
Morro do Cuscuz	July 4, 2018	499	950
Morro do Vento	March 11, 2019	1,503	3,536
Serra do Córrego	August 31, 2018	681	96
Canavieiras South	December 6, 2018	470	5,647
Canavieiras Central	October 28, 2018	348	2,471
Total		**6,579**	**20,718**

14.3 Interpretation of the Geological Structures, Lithology, and Mineralization

Given the strike length of the favourable mineralized stratigraphic units outlined to date, modelling and preparation of mineral resource estimates were undertaken only for those stratigraphic units located in the vicinity of the current mine infrastructure. To facilitate modelling activities, these were divided into seven mining blocks covering a total strike length of approximately 8,350 m (Table 14-3, Figure 7-3).

Table 14-3: Summary of modelling extents

Model Area	Minimum Northing (m)	Maximum Northing (m)	Strike Length (m)
João Belo	8,750,310	8,752,060	1,750
Morro do Vento	8,752,400	8,755,300	2,900
Morro do Cuscuz	8,755,050	8,756,600	1,550
Serra do Córrego	8,755,000	8,757,780	2,780
Canavieiras South	8,755,450	8,756,700	1,250
Canavieiras Central	8,756,870	8,757,910	1,040
Canavieiras North	8,757,600	8,758,850	1,250

The Leapfrog Geo software package was used to prepare three-dimensional (3D) models of the post-mineralization faults, the lithologies, and the mineralization zones. These fault surfaces were created as implicit models using various sources of information from drill holes, channel samples, and geological mapping (both current and historical mapping). At João Belo, a total of 19 fault planes were modelled in 2019, compared to the five fault planes modelled for the 2016 mineral resource estimate. These fault planes were used to constrain the subsequent lithological and mineralization wireframe models.

Lithological models for all major gold-bearing reefs, intervening massive fine-grained quartzite units, and post-mineralization intrusive units were modeled using available underground mapping and drilling data (the cross-section in Figure 7-6 shows an example of lithological modelling).

Separate models of the mineralized intervals were created using sampled assay values at a threshold grade of 0.5 g/t gold. Wireframes were snapped to the limit of the selected samples in each drill hole. The mineralized wireframe domains were constrained to within the respective reef models, and were also constrained to their respective fault blocks (Table 14-4).

All structural, lithological, and mineralization models are created in accordance with the procedures described in Jacobina's standard operating procedure POP-04-12-3.5-231.

Table 14-4: Number of mineralized wireframes (reefs) by model area

Model Area	No. of Mineralization Models (Reefs)
João Belo	10
Morro do Vento	18
Morro do Cuscuz	9
Serra do Córrego	16
Canavieiras South	16
Canavieiras Central	26
Canavieiras North	25
Total	**120**

14.4 Topography and Excavation Models

The mineralization at Jacobina was extracted by means of open-pit mining methods during the early phases of its production history. Mining of the plant feed is currently achieved by means of underground mining methods from a total of seven mining blocks that access the mineralized stratigraphy along a strike length of approximately eight kilometres. All of the mineralized horizons are accessed via adits and ramps (Figure 14-1).

A topographic surface of the project area, current as of May 2015, was used to code the block model. The topographic map includes one open pit mine (João Belo) that is now depleted; open pit mine operations there have ceased. Wireframe models of the completed underground excavations as of December 31, 2019, were prepared and used to code the block models for the portions of the mineralized zones that have been mined out. For older-vintage excavations, the wireframe models for the underground accesses and stopes were reconstructed by preparing 3D-solids models from information contained on existing two- dimensional paper maps and sections. For more recent underground excavations, solids models of the mine accesses were constructed digitally from data collected using a total station surveying instrument. Digital information collected using cavity-monitoring equipment was used to create 3D excavation models for stopes.

Excavation models were used to code the block model with a single value for both development and stope volumes. The sub-blocking functions of the Maptek Vulcan software package were employed to maximize the accuracy of the block model.

A separate set of depletion solids were created by manual digitization on cross sections so as to encompass the excavated stope and development volumes, any remaining intervening material residing as either ribs or sill pillars, and several metres of wall rock material in the hangingwall and footwall of the stope voids (Figure 14-2). The objective of creating this set of depletion solids is to code the block model so as to ensure this material is excluded from either the mineral resource or mineral reserve estimates.

An additional depletion solid was created to define a crown pillar at surface in compliance with geomechanical and environmental restrictions. This was achieved by creating a parallel surface approximately 30 m beneath the topographic surface.

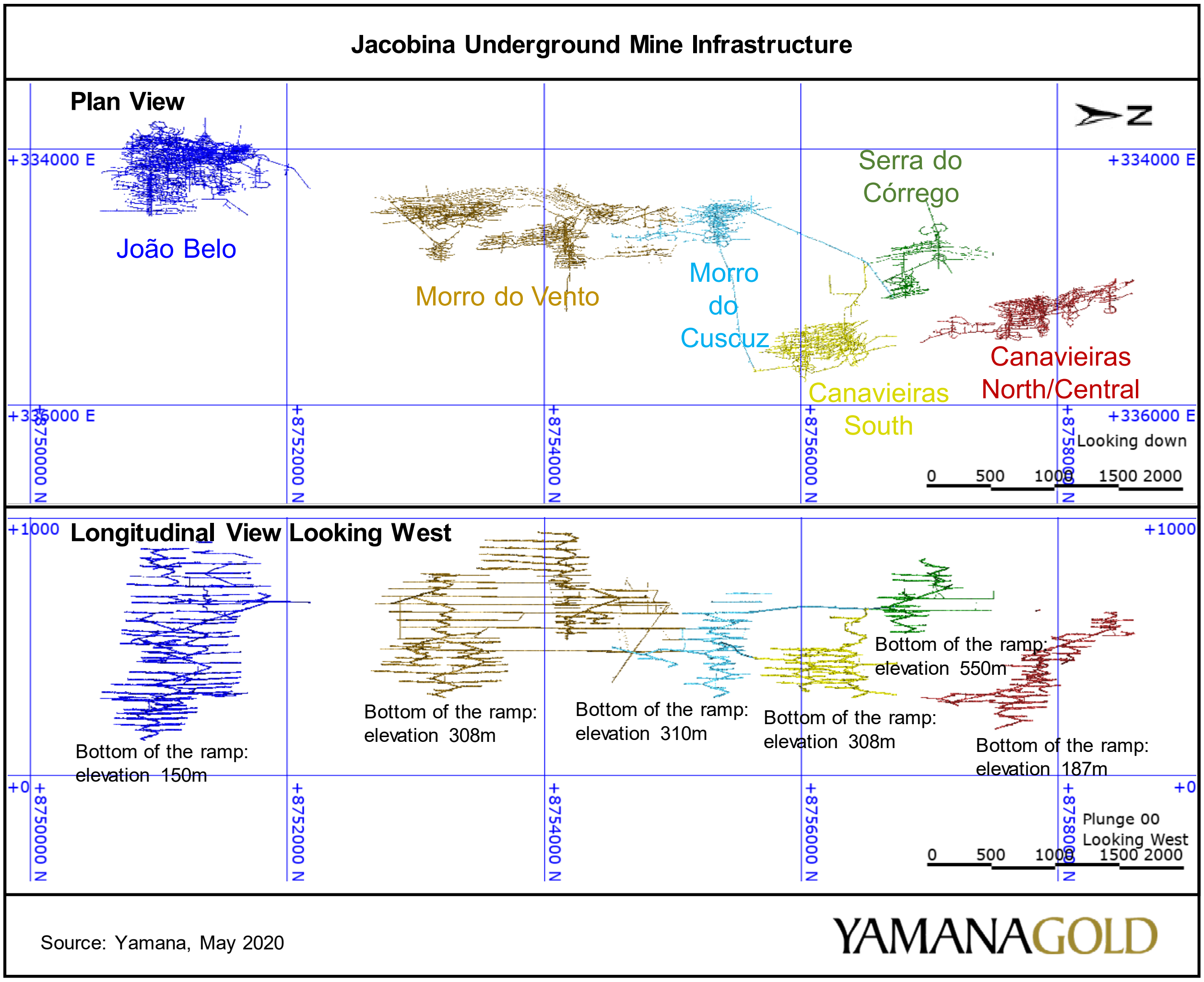


Figure 14-1: Plan (top) and longitudinal view (bottom) of the mine infrastructure

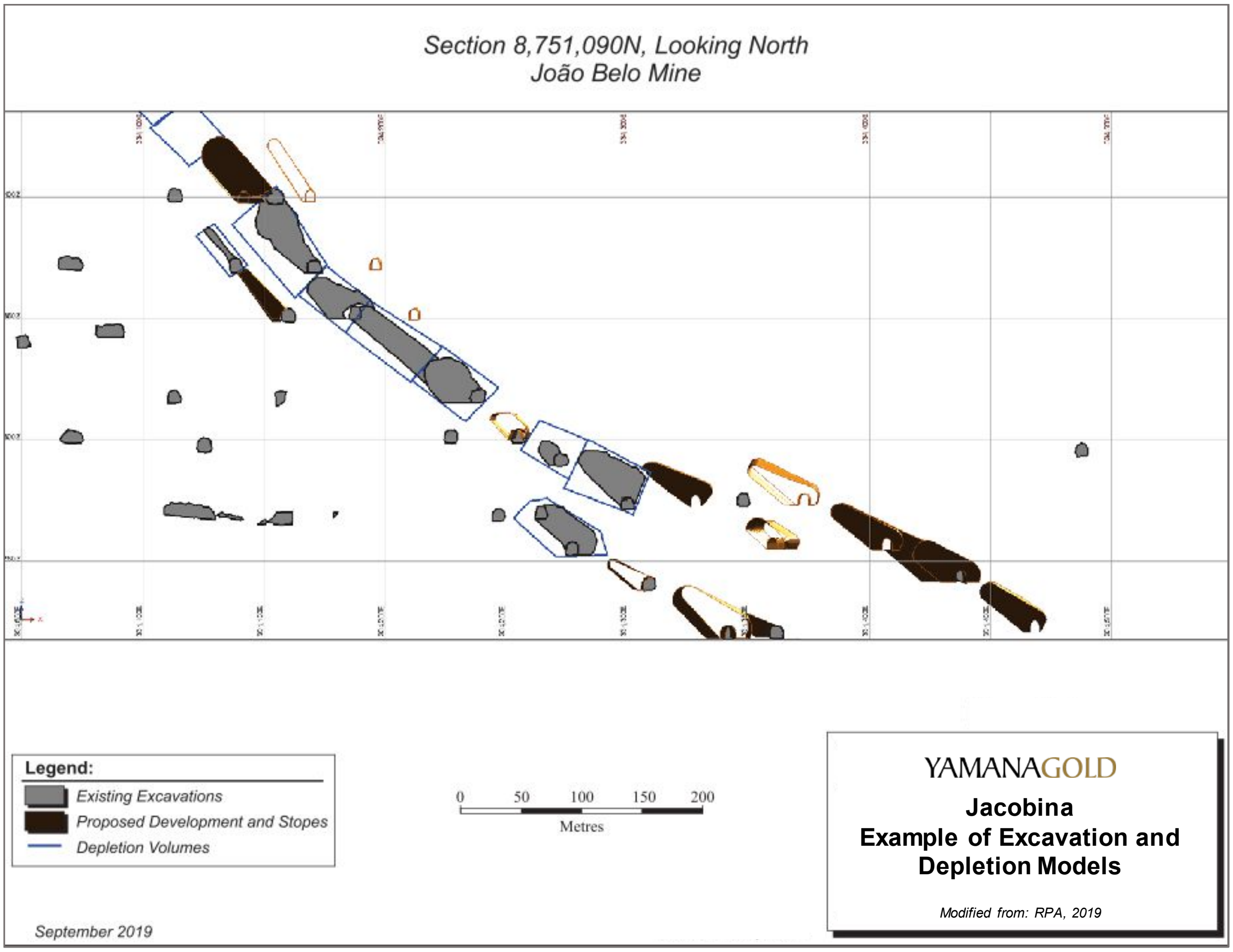
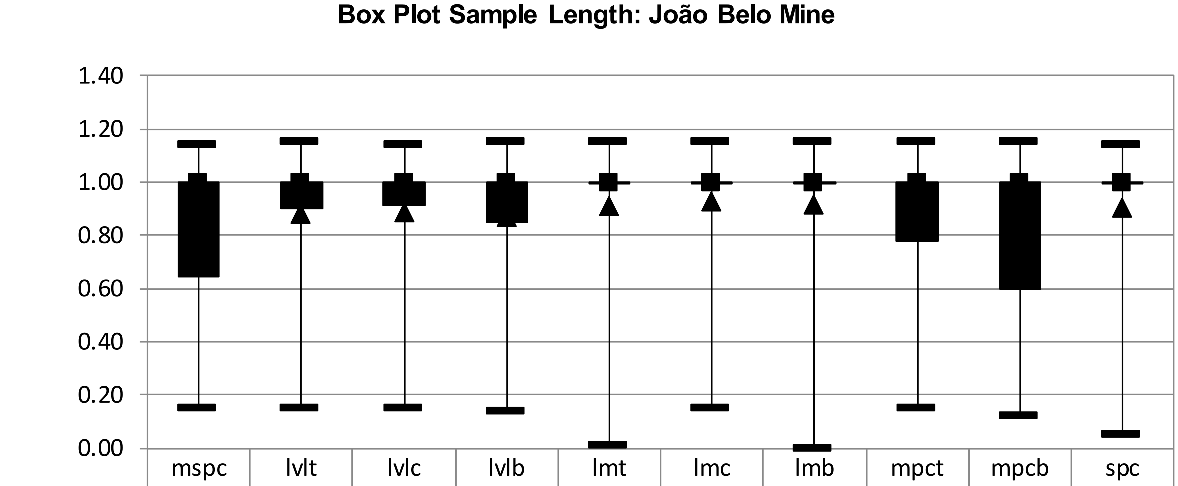


Figure 14-2: Example of excavation and depletion models

14.5 Compositing Methods

It has been determined that 0.5 m was the most common sample length at Jacobina. A composite length of 1.0 m was selected for all drill holes and channel samples so that the majority of the assay intervals were not split into separate composite values. Compositing is done by mineralized layer, so the last composite of a drill hole or a channel can be less than 1.0 m long. If the last composite is 0.15 m or less, the composite is merged with the previous composite. When a given channel sample's length is less than 1.0 m, the average grade of the composite sample is utilized. The summary statistics and box plots of the composited length are examined by mean, minimum, and maximum values and are shown in Figure 14-3.



	mspc	lvlt	lvlc	lvlb	lmt	lmc	lmb	mpct	mpcb	spc
Q1	0.65	0.90	0.91	0.85	1.00	1.00	1.00	0.78	0.60	1.00
– Min	0.15	0.15	0.15	0.14	0.01	0.15	0.00	0.15	0.12	0.05
■ Median	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
▲ Mean	0.84	0.88	0.89	0.87	0.91	0.93	0.92	0.86	0.83	0.91
– Max	1.14	1.15	1.14	1.15	1.15	1.15	1.15	1.15	1.15	1.14
Q3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSamples	397	2147	177	2592	7504	18631	9760	3054	994	718

Source: Yamana, May 2020

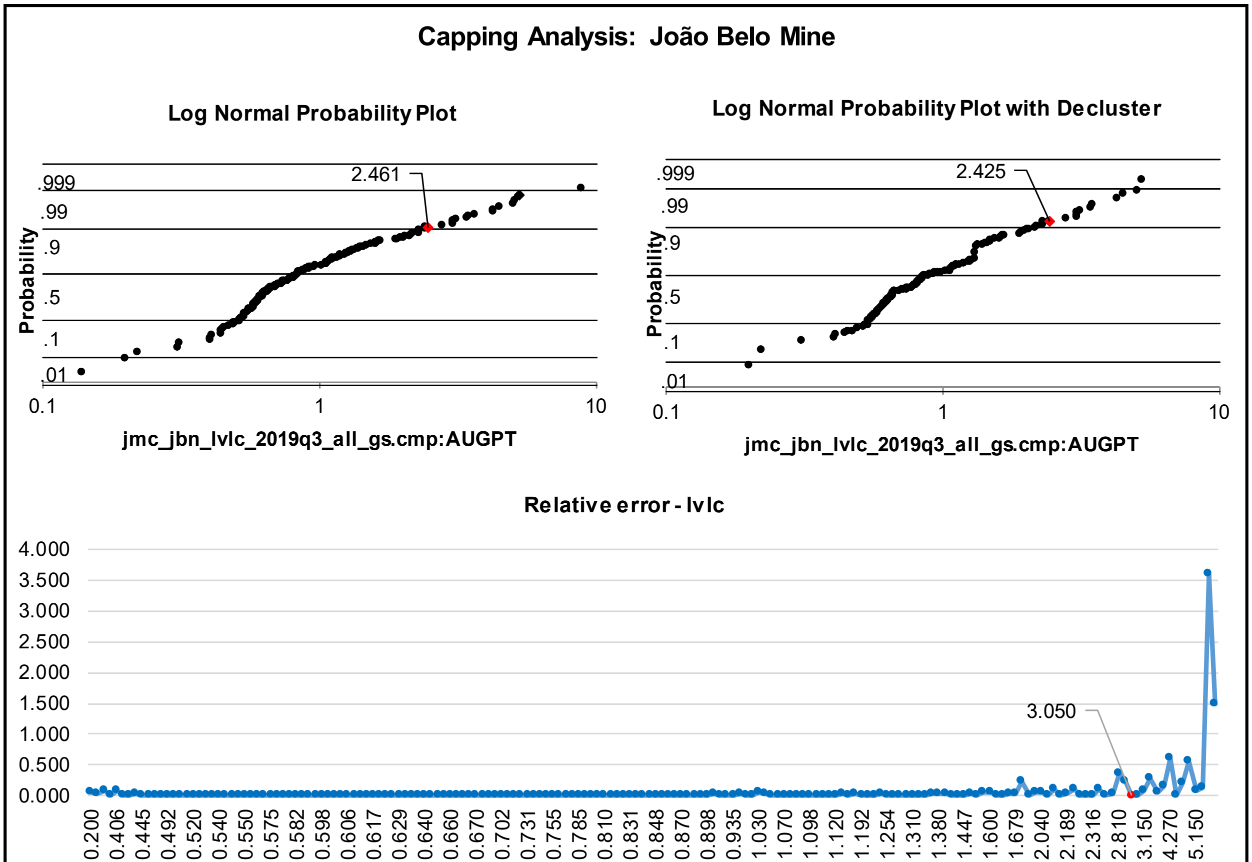
YAMANAGOLD

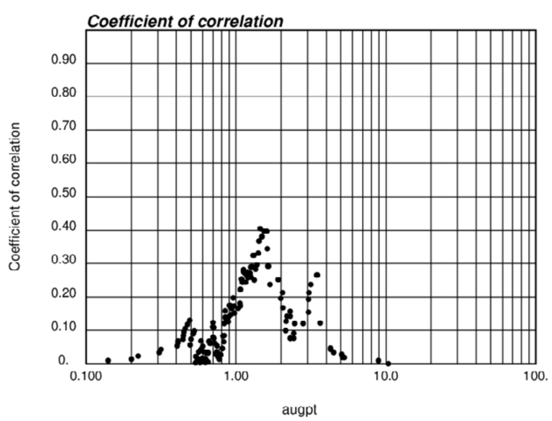
Figure 14-3: Box and whisker plot of João Belo composite samples

14.6 Sample Statistics and Grade Capping

Descriptive statistics were computed for every mineralized layer considering raw and composited datasets. Also, the exploratory analysis was done with histograms, probability plot and box-plots. This procedure is a check for inconsistencies in assay and length values. Declustering weights were also computed and were reviewed for statistical analysis.

The presence of local high-grade outliers could potentially affect the accuracy of the mineral resource estimate. Therefore, composite samples were statistically examined for the presence of grade outliers by using a combination of methodologies such as inspection of probability plots (calculated with and without considering declustering weights), histogram analysis, relative error analysis, Parrish method, and indicator correlation plot (Figure 14-4). Once the outliers were identified, appropriate capping values were established and used. Each mineralized layer was examined separately (Figure 14-4). The capping values are listed in Table 14-5.





JBN - lvlc	
Method	**Top Cut**
Probability Plot	2.50
Probability Plot with Decluster	2.50
Histogram	---
Relative Error	3.00
Parrish Method	---
Indicator Correlation Plot	3.50
Swath Plot	---
2019 Top Cut	**3.00**

YAMANAGOLD

Source: Yamana, April 2020

Figure 14-4: Graphical guides used for selection of capping values, João Belo Mine (lvlc reef)

Table 14-5: Summary of capping values by mineralized wireframe model

Reef	Capping Value (g/t Au)
JBN Reef	
Mspc	4.50
Lvlt	11.50
Lvlc	3.00
Lvlb	15.50
Mpct	21.00
Mpcb	18.50
Lmb	15.50
Lmc	19.00
Lmt	18.00
Spc	13.00

Reef	Capping Value (g/t Au)
MVT Reef	
Mspc	7.46
Lvlt	11.41
Lvlb	9.27
Mut	15.14
Muc	10.23
Mub	8.97
Flu	9.84
Lut	15.30
Luc	10.60
Lub	5.02
Hwt	6.50
Hwb	8.00
Mr	26.00
Fwt	11.00
Fwc	9.50
Fwb	6.50
Bast	18.43
Basb	21.84

Reef	Capping Value (g/t Au)
Sco Reef	
Man1	22.29
Man2	9.90
Mspc	8.03
Lvlt	5.43
Lvlc	11.21
Lvlc3	7.60
Lvlc4	4.71
Lvlc5	4.71
Lvlc8	4.71
Lvlb	12.98
Mut	14.21
Muc	11.36
Mub	15.14
Lut	27.13
Luc	6.11
Lub	8.75

Reef	Capping Value (g/t Au)
MCZ Reef	
Hw	8.53
Mrt	17.38
Mrb	8.50
Fwt	13.33
Fwc	10.57
Fwb	9.43
Bast	17.45
Basc	23.48
Basb	29.28

Reef	Capping Value (g/t Au)
Canavieieiras South	
Mspc	28.0
Lvlt	34.5
Lvlc	28.0
Lvlc1	14.5
Lvlc2	10.5
Lvlb	24.5
Mut	31.0
Muc	19.5
Mub	24.0
Lut	27.5
Luc	13.0
Lub	18.5
Mant	5.0
Manc	7.0
Manc1	2.5
Manb	4.0

Reef	Capping Value (g/t Au)
Canavieieiras Central	
Manc	3.0
Manc1	4.8
Manc2	4.0
Manc3	5.0
Manb1	11.5
Manb	23.5
Holc	3.5
Lvlt	12.0
Lvlc1	26.5
Lvlc2	16.0
Lvlc3	11.0
Lvlc4	5.5
Lvlc5	16.0
Lvlc6	13.0
Lvlc7	3.5
Lvlb	18.0
Mut	36.0
Muc	13.0
Mub	15.0
Lut	74.5
Luc	6.0
Lub	20.0
Qtolvlt	7.5
Qtomub	3.0
Qtolut	8.0
Qtomut	17.0

Reef	Capping Value (g/t Au)
Canavieiras North	
Manc1	6.5
Manc2	6.5
Manc3	9.5
Mant	9.0
Manb	25.0
Qtohol	5.0
Holt	21.0
Holc	24.5
Holb	8.5
Libb	19.0
libc	18.0
Libt	19.5
Qtopir	12.5
Pirb	36.5
Pirt	61.5
Lvlt	16.5
lvlb	18.0
Lvlc1	29.0
Lvlc2	7.5
Mut	12.5
Muc	23.5
Mub	10.5
Qtolu	11.0
Lut	58.0
Lub	15.5

14.7 BULK DENSITY

Several thousand density measurements have been collected on drill core over the years, resulting in good understanding of the density values and variations for the different mineralized zones and wall rocks. In general terms, the variation in density values of individual reefs is low (Figure 14-5). Density values, which are dependent on pyrite content, were determined individually for each mineralized zone and reef. These values are summarized in Table 14-5.

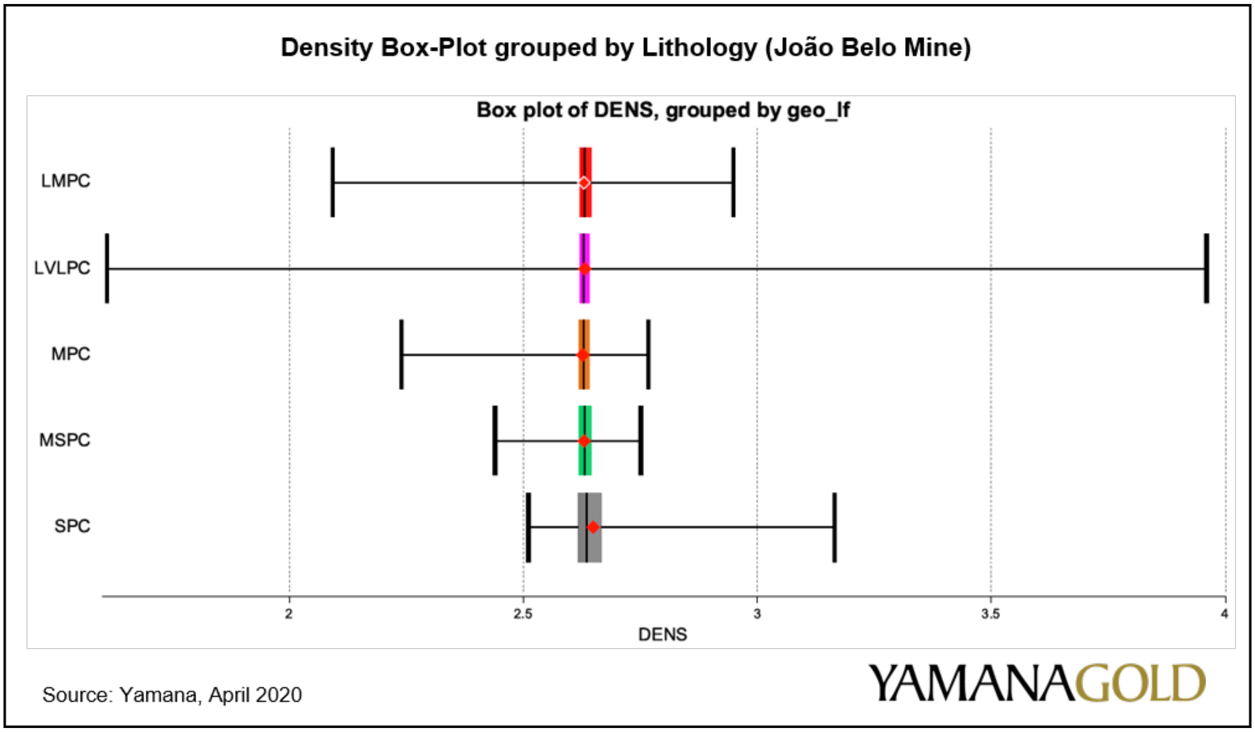


Figure 14-5: Summary of the density values for the João Belo Mine as of December 31, 2019

Table 14-6: Block model bulk density values

Reef	JBN	MCZ	MVT	SCO	CAS	CAC	CAN
	(t/m^3)						
man	-	-	-	2.63	2.64	2.64	2.63
hol	-	-	-	2.62	-	2.64	2.64
lib	-	-	-	-	-	-	2.63
pir	-	-	-	-	-	-	2.63
mspc	2.63	-	2.62	2.64	2.66	-	-
qto_lvl	-	-	-	-	-	2.63	2.66
lvl	2.63	-	2.62	2.62	2.68	2.65	2.64
qto_mu	-	-	-	-	-	2.63	2.66
mu	-	-	2.62	2.62	2.64	2.65	2.64
lmpc	2.63	-	-	-	-	-	-
flu			2.60	-	-		
qto_lu	-	-	-	-		-	2.66
lu	-	-	2.62	2.62	2.65	2.64	2.63
mpc	2.63	-	-	-	-	-	-
qto_spc	-	-	-	-	-	-	-
spc	2.65	-	-	-	-	-	-
hw	-	2.63	2.64	-	-	-	-
mr	-	2.65	2.64	-	-	-	-
fw	-	2.64	2.68	-	-	-	-
bas	-	2.63	2.63	-	-	-	-
waste	2.63	2.64	2.64	2.62	2.64	2.64	2.66

14.8 VARIOGRAPHY

Due to the degree of gentle undulations and the number of post-mineralization brittle faults that are observed in the mine stratigraphy, a modified workflow was adopted for the preparation of the block models in the various mining blocks. The process incorporates reconstruction and unfolding using the U-Fo software package developed by the Advanced Laboratory for Geostatistical Supercomputing at the University of Chile in Santiago.

The principal steps employed by the U-Fo software package begin with the preparation of wireframe models of the structure and mineralized zones using existing drill hole and channel sample information, combined with geological information derived from detailed production mapping. The wireframe models are used to prepare block models of the mineralization. These block models are then manually restored for any structural offsets using the U-Fo software. These displacements are also applied to all drill hole and channel sample information so as to reconstruct and reflect the mineralization distribution in the original state. The next step is to carry out an unfolding step in which the reconstructed folded block models and all sample information are transformed to a flattened plane.

Variography and grade estimation is completed on individual reefs after the block model and sampling data has been transformed back to its original stratigraphic position (unfaulted and unfolded). Once all estimation passes have been completed, the flattened block model is subjected to a back-transformation step that converts the estimated block grades back to the correct location in 3D space. The variogram parameters for the main reefs of each mine is presented in Table 14-7.

Table 14-7: Variogram parameters for the main reef of each mine

Mine/Reef	Structure	Contribution	Model	R1x	R1y	R1z	Angles*			Bearing	Plunge	Dip
				m	m	m	1	2	3	1	2	3
JBN / lmc	C0	4.300	Nugget	-	-	-	0	0	0	030	00	00
	C1	2.300	Sph	25	25	2	0	0	0	030	00	00
	C2	1.200	Sph	110	80	∞	0	0	0	030	00	00
	C3	0.500	Sph	110	∞	∞	0	0	0	030	00	00
MVT / basb	C0	0.546	Nugget	-	-	-	0	0	0	345	00	00
	C1	0.454	Sph	20	10	2	0	0	0	345	00	00
	C2	-	-	-	-	-	0	0	0	-	-	-
	C3	-	-	-	-	-	-	-	-	-	-	-
MCZ / basb	C0	0.388	Nugget	-	-	-	0	0	0	345	00	00
	C1	0.484	Exp	25.23	5	1	0	0	0	345	00	00
	C2	0.170	Sph	73.68	50	4	0	0	0	345	00	00
	C3	-	-	-	-	-	-	-	-	-	-	-
SCO / lut	C0	0.350	Nugget				0	0	0	000	00	00
	C1	0.490	Sph	18.5	45	1.6	0	0	0	000	00	00
	C2	0.160	Sph	70	50	2.1	0	0	0	000	00	00
	C3	-	-	-	-	-	-	-	-	-	-	-
CAS / lvlt	C0	0.400	Nugget	-	-	-	0	0	0	330	00	00
	C1	0.465	Exp	20	25	2	0	0	0	330	00	00
	C2	0.153	Exp	140	120	5	0	0	0	330	00	00
	C3	-	-	-	-	-	-	-	-	-	-	-
CAC / lu	C0	0.400	Nugget	-	-	-	0	0	0	330	00	00
	C1	0.540	Exp	7.2	13	3.2	0	0	0	330	00	00
	C2	0.060	Exp	50	70	4	0	0	0	330	00	00
	C3	-	-	-	-	-	-	-	-	-	-	-
CAN / pirb	C0	0.500	Nugget	-	-	-	0	0	0	285	00	00
	C1	0.496	Sph	20	50	2	0	0	0	285	00	00
	C2	0.100	Sph	50	30	5	0	0	0	285	00	00
	C3	-	-	-	-	-	-	-	-	-	-	-

** The rotation angles are shown in Maptek Vulcan convention and were calculated after the unfolding process*

14.9 Block Model Construction

Block models for all seven mining blocks were created for their original 3D position using the Maptek Vulcan mine modelling software package. The block models employed a variable block size strategy. For those blocks contained within a mineralized wireframe outline, the block sizes are set at 1 × 1 × 1 m. For those blocks that are located outside of the boundary of a mineralized wireframe, the parent block size was set at 10 × 10 × 10 m, with sub-blocking to 1 × 1 × 1 m. A summary of the block model attributes is provided in Table 14-8.

Table 14-8: Generalized block model parameters

Attribute Name	Type	Decimals	Background	Description
ad	Float	0	-99	Average distance Block x Samples
au	Float	0	-99	Gold estimated grades
bound	Character	-	waste	Flag orebody ID
chn	Integer	-	-99	Channel sample zone for classification
class_b	Integer	-	-99	Official Resource Classification
data	Integer	-	20190831	Date in yyyymmdd
dens	Float	0	2.624	Density
deplet	Integer	-	0	Geological deplete
geo	Character	-	out	Flag Reef Name
id3	Float	0	-99	Gold estimated grades with ID3
island	Integer	-	-99	Shell ufo
ke	Float	0	-99	Kriging efficiency
kv	Float	0	-99	Kriging variance
lp	Float	0	-99	Lagrange Parameter
mine	Character	-	jbn	JBN
mined_out	Integer	-	0	Mined out
nh	Integer	-	-99	Number of holes
nn	Float	0	-99	Gold estimated grades near neighbour
ns	Integer	-	-99	Number of samples
octi	Float	0	-99	Octant information
octu	Float	0	-99	Octant used
oxi	Integer	-	-99	1 Sap 2 oxi 3 Sulf
prazo	Character	-	mp	LP_Long-Term MP_Medium-Term CP_Short-Term
run	Integer	-	-99	Estimative Resource Classification
sil30	Integer	-	0	Blocks below 30 m surface
sr	Float	0	-99	Slope regression
topo	Character	-	rock	Topographic data

Block model grades were interpolated into blocks with the ordinary kriging (OK) algorithm, using the capped composite grades for each individual reef separately. Gold grades were estimated for the waste intervals located between the mineralized reefs. The restricted search function of the Maptek Vulcan software package was used to limit the influence of high-grade sample values to within 3 m of the composite. A discretization factor of 4 × 4 × 2 was used for all estimation passes. Several estimation passes were applied using increasing search ellipse sizes and different estimation parameters. A summary of the general search strategies used to prepare the estimation on the flattened block models is presented in Table 14-9.

Table 14-9: Summary of the general estimation search parameters

Parameter	1st Pass	2nd Pass	3rd Pass	4th Pass
Interpolation method	OK	OK	OK	OK
Search range X	6	35	65	150
Search range Y	15	30	60	100
Search range Z	1	2	4	15
Minimum number of composites	4	3	2	1
Maximum number of composites	8	10	12	8
Octant search	Yes	Yes	Yes	Yes
Minimum number of octant	4	3	2	-
Maximum number of composites per octant	6	6	6	-
Minimum number of composites per boreholes	3	3	2	-
Maximum number of composites per boreholes	2	2	2	2

**Search parameters vary for each mine and reef. The parameters shown in this table are the most common.*

14.10 Block Model Validation

The block grade models from each of the interpolated zones were systematically validated against their corresponding composite data set (capped and declustered), nearest neighbour (NN), and inverse distance to the power of three (ID^3) models in order to validate appropriate reproduction of the input data. The ID^3 interpolations were estimated with the same parameters as the OK estimate. The average grades of the various datasets are presented in Table 14-10 with an example from João Belo.

Visual inspection of the block model results against the input data is a useful tool to detect any spatial artefacts that may come from the interpolation setup. The block model should honour the input data within reasonable limits. The composite data, block model, and geological overlays were reviewed on the computer screen on cross-sections, longitudinal sections, and plans. This inspection determined that the representation of the grade distribution, according to the drilling information, was found to be adequate and accurate. An example swath plot is presented in Figure 14-6.

Table 14-10: Statistical validation of the estimated block model (João Belo – mspc reef)

	Samples (Declustered)	OK	ID3	NN
Number of blocks	-	991,927	991,927	991,927
Number of samples	397	-	-	-
Gold Statistics (g/t Au):				
Minimum	0.12	0.35	0.15	0.12
Q1	0.67	0.95	0.89	0.71
Median	1.03	1.26	1.23	1.12
Q3	1.81	1.64	1.74	2.01
Maximum	4.50	4.20	4.50	4.50
Mean	1.41	1.43	1.43	1.42
Standard deviation	1.00	0.75	0.80	0.95
Variance	1.01	0.56	0.63	0.91
Coefficient of variation	0.71	0.52	0.56	0.67

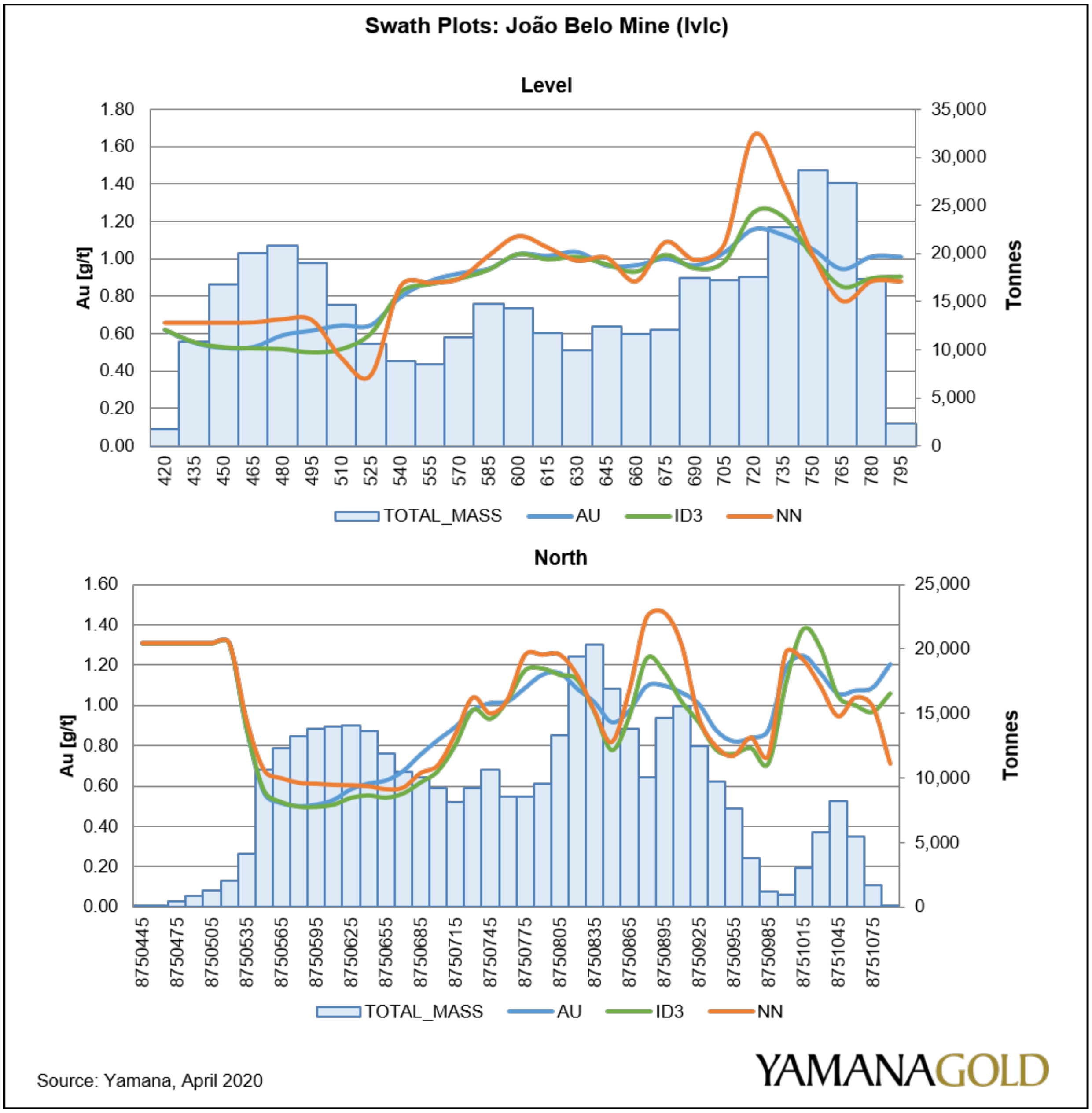
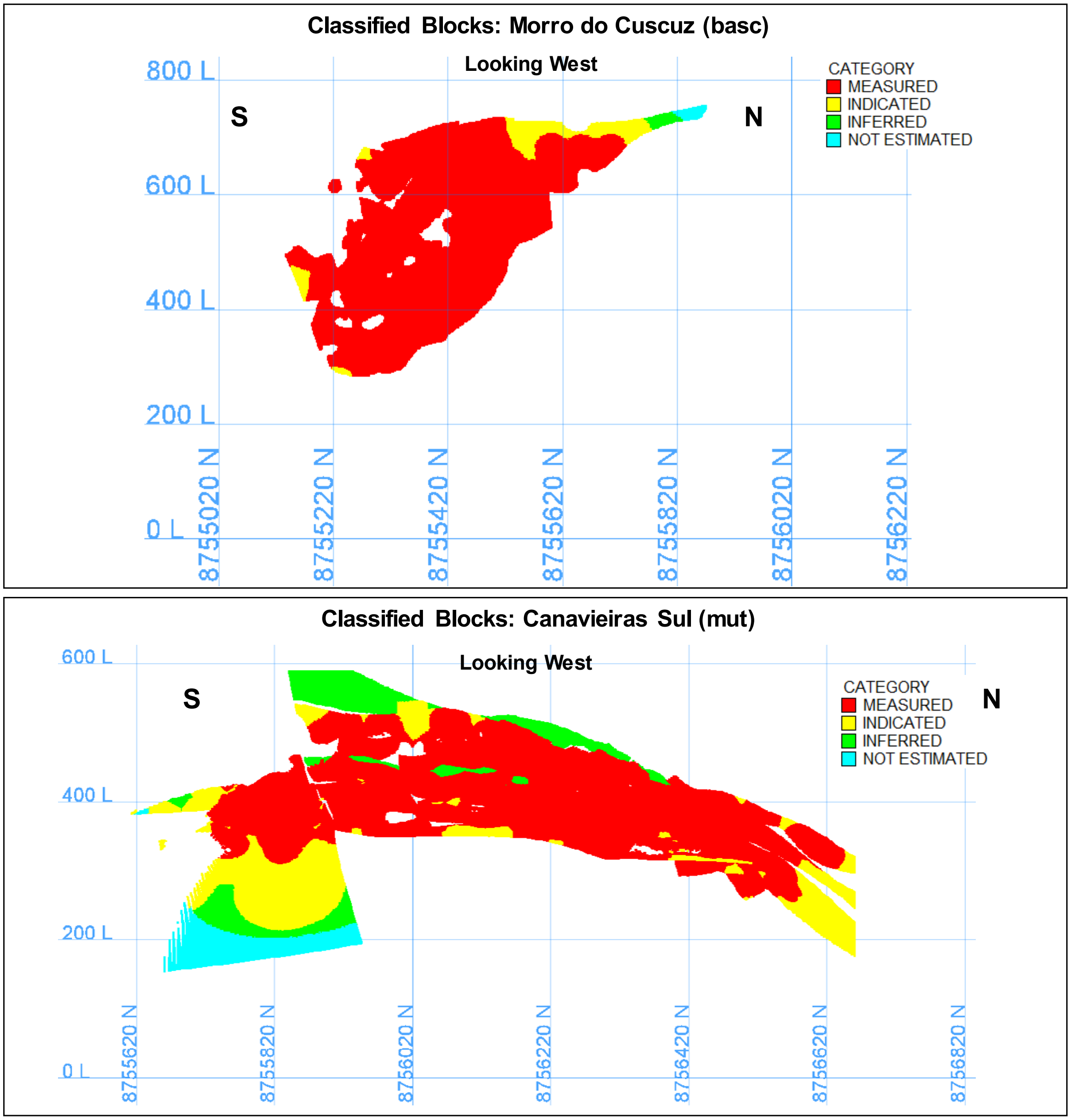


Figure 14-6: Swath plots for lvlc Reef, João Belo Mine

14.11 Classification of Mineral Resources

The mineral resource classification was done within each grade shell based on the distance from the drill holes. The block models were flagged using a distance buffer from the wireframe solids. The blocks inside a 30 m radius from a minimum of three drill holes composites were classified as measured mineral resources. The blocks inside a 30 to 80 m radius from the minimum of three drill holes composites were classified as indicated mineral resource. Finally, the blocks within a distance between 80 and 150 m from a single drill hole composite were classified as inferred mineral resource. A manual post-processing smoothing step was subsequently performed. Longitudinal sections of the mineral resource categories are shown in Figure 14-7 to Figure 14-9.



Source: Yamana, April 2020

Figure 14-7: Long section of classified block models at Morro do Cuscuz (top) and Canavieiras South (bottom)

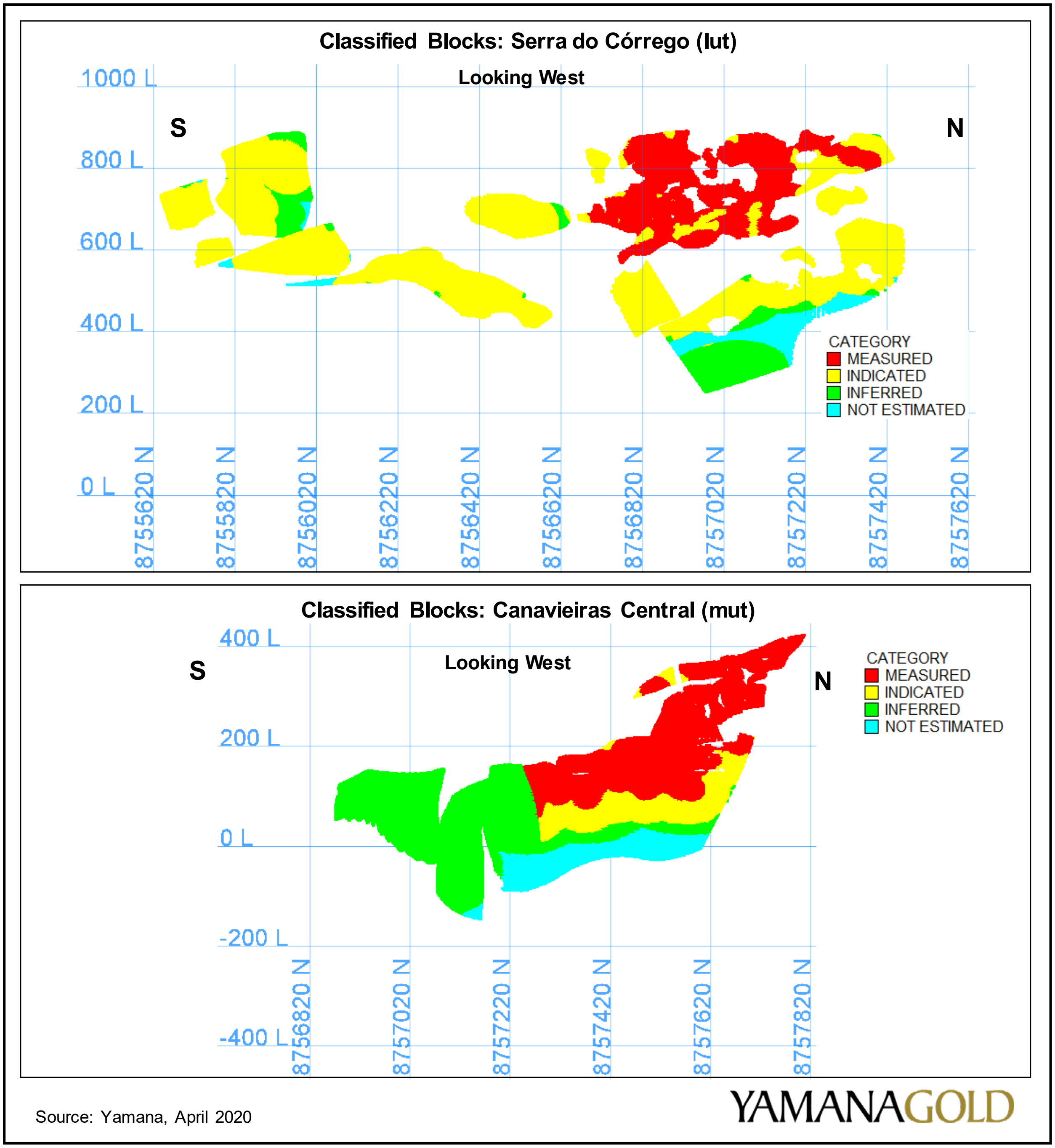


Figure 14-8: Long section of classified block models at Serra do Córrego (top) and Canavieiras Central (bottom)

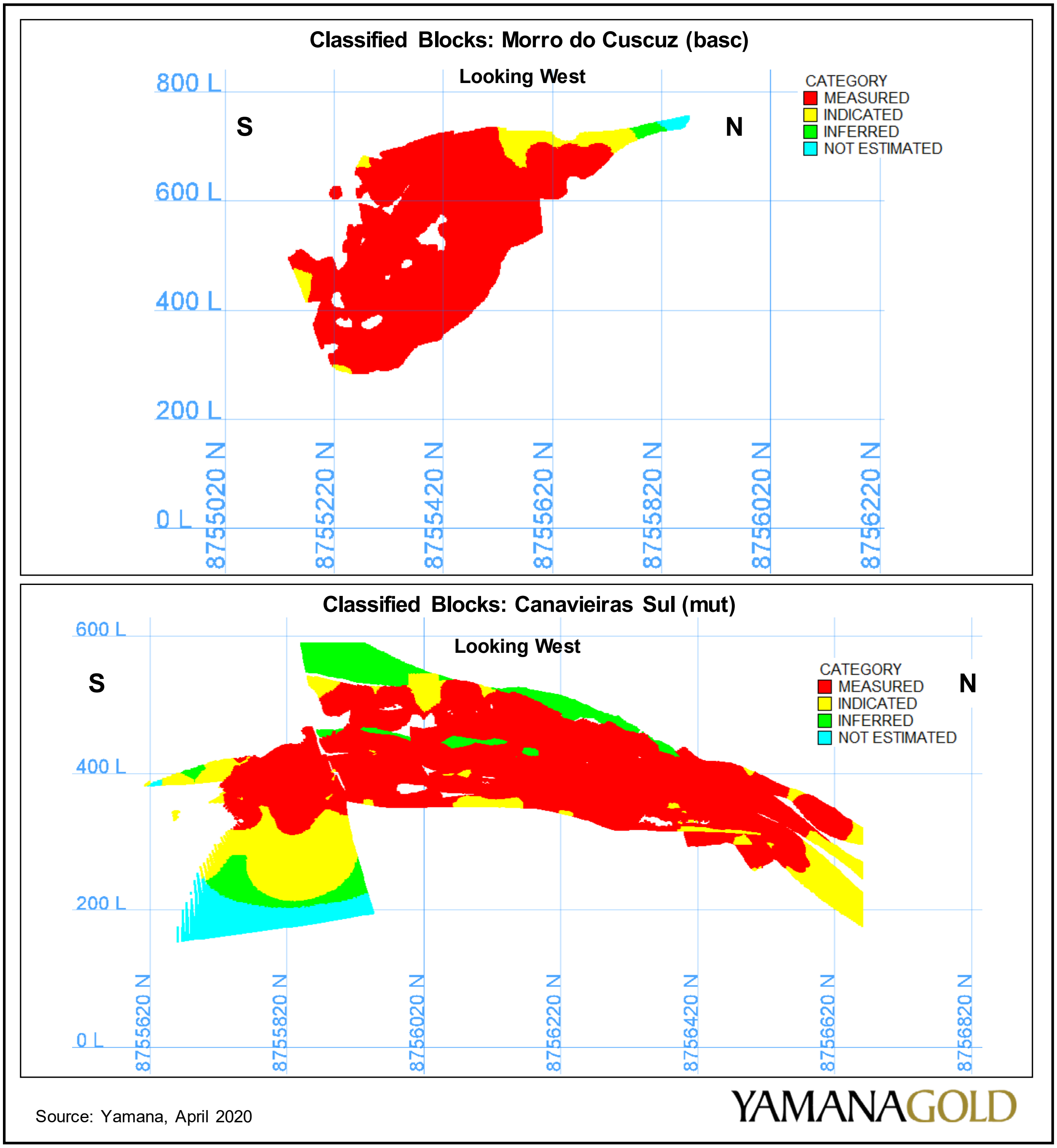


Figure 14-9: Long section of classified block models at João Belo (top) and Morro do Vento (bottom)

14.12 Mineral Resource Statement

The “reasonable prospect for eventual economic extraction” requirement in CIM Definition Standards for Mineral Resources and Mineral Reserves (2014) generally implies that the quantity and grade estimates meet certain economic thresholds and that the mineral resources are reported at an appropriate cut-off grade that takes into account extraction scenarios and processing recoveries. After evaluation, it was determined that underground extraction methods can be considered for mineral resource reporting at Jacobina.

A cut-off grade of 1.0 g/t gold was used for reporting the mineral resource estimates. This cut-off grade corresponds to approximately 75% of the break-even cut-off grade used to estimate the mineral reserves. Otherwise, the price, processing recovery, and operating cost assumptions are the same than those used to estimate mineral reserves.

The mineral resources are exclusive of mineral reserves and are prepared using Mineable Stope Optimizer (MSO) shapes that are based on a cut-off grade of 1.0 g/t gold, a stope size of 10 m × 10 m, and a minimum width of 1.5 m. Their use as constraints in preparing mineral resource estimates demonstrate that the mineralization meets the “reasonable prospects for eventual economic extraction” requirement for mineral resources as defined in the CIM definitions.

The Mineral Resource Statement for Jacobina as of December 31, 2019, exclusive of mineral reserves, is presented in at the beginning of this Section 14. A summary of the mineral resources by mining block is presented in Table 14-11.

Table 14-11: Summary of Jacobina mineral resources by mining block as of December 31, 2019

Category	Zone	Cut-Off Grade (g/t Au)	Tonnage (kt)	Gold Grade (g/t Au)	Contained Gold (koz)
Measured	JBN	1.0	11,175	2.07	744
	MVT	1.0	4,508	2.19	317
	MCZ	1.0	2,242	1.98	143
	SCO	1.0	696	2.32	52
	CAS	1.0	5,630	2.32	420
	CAC	1.0	1,767	3.35	190
	CAN	1.0	1,687	2.73	148
	Total Measured	**1.0**	**27,705**	**2.26**	**2,014**
Indicated	JBN	1.0	4,636	2.03	302
	MVT	1.0	6,178	2.52	501
	MCZ	1.0	282	1.60	14
	SCO	1.0	1,017	2.56	84
	CAS	1.0	1,058	1.45	49
	CAC	1.0	958	2.76	85
	CAN	1.0	637	1.98	41
	Total Indicated	**1.0**	**14,765**	**2.27**	**1,076**
Measured & Indicated	JBN	1.0	15,811	2.06	1046
	MVT	1.0	10,686	2.38	818
	MCZ	1.0	2,524	1.94	157
	SCO	1.0	1,713	2.46	136
	CAS	1.0	6,688	2.18	469
	CAC	1.0	2,724	3.14	275
	CAN	1.0	2,324	2.53	189
	Total M+I	**1.0**	**42,470**	**2.26**	**3,090**
Inferred	JBN	1.0	7,797	2.08	521
	MVT	1.0	6,019	2.59	501
	MCZ	1.0	69	1.57	3
	SCO	1.0	708	1.97	45
	CAS	1.0	1,286	1.66	69
	CAC	1.0	2,365	3.26	248
	CAN	1.0	285	2.13	20
	Total Inferred	**1.0**	**18,528**	**2.36**	**1,406**

1. *Mineral resources are reported exclusive of mineral reserves.*
2. *Mineral resources are not mineral reserves and do not have demonstrated economic viability.*

3. *Underground cut-off grade is 1.00 g/t Au, which corresponds to 75% of the cut-off used to estimate the mineral reserves.*
4. *Minimum mining width of 1.5 m, considering internal waste and dilution*
5. *All figures are rounded to reflect the relative accuracy of the estimate. Numbers may not add up due to rounding.*

The qualified person responsible for this section of the technical report is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political or other relevant factors that could materially affect the mineral resource estimate.

15 Mineral Reserve Estimates

15.1 Mineral Reserve Summary

The Mineral Reserve Statement of Jacobina as of December 31, 2019, is presented in Table 15-1.

Table 15-1: Jacobina Mineral Reserve Statement, December 31, 2019

Zone	Proven			Probable			Total Reserves		
	Tonnes	Gold Grade	Contained Gold	Tonnes	Gold Grade	Contained Gold	Tonnes	Gold Grade	Contained Gold
	kt	g/t Au	koz	kt	g/t Au	koz	kt	g/t Au	koz
JBN	6,591	1.93	408	3,388	1.87	203	9,979	1.91	612
MVT	2,268	2.11	154	5,674	2.44	445	7,942	2.35	599
MCZ	1,449	1.93	90	87	1.96	5	1,536	1.93	95
SCO	673	1.93	42	1,356	2.1	92	2,030	2.04	133
CAS	5,761	2.33	432	1,117	2.12	76	6,878	2.3	508
CAC	2,640	3.39	288	1,372	2.56	113	4,012	3.1	400
CAN	1,338	2.59	111	461	2.29	34	1,799	2.51	145
Total	**20,720**	**2.29**	**1,525**	**13,456**	**2.24**	**968**	**34,176**	**2.27**	**2,493**

1. *Mineral reserves have been estimated by the Jacobina long-term mine planning team under the supervision of Eduardo de Souza Soares, Registered Chartered Professional Member of Australasian Institute of Mining and Metallurgy, MAusIMM CP(Min) Number 330431, a full-time employee of JMC, and a qualified person as defined by National Instrument 43-101. The mineral reserve estimate conforms to the CIM (2014) Standards.*
2. *Mineral reserves are reported by zone at variable cut-off grades ranging from of 1.12 g/t to 1.30 g/t gold. Lower-grade stopes were subsequently excluded from the life of mine plan and mineral reserves inventory to optimize the cash flow model. The cut-off grade is based on metal price assumptions of US$1,250/oz for gold, a gold processing recovery assumption of 96%, and operating cost assumptions ranging from US$42.60 to 49.52/t processed.*
3. *Mineral reserves are stated at a mill feed reference point and account for minimum mining widths, diluting material, and mining losses.*
4. *All stope shapes contain a majority of measured and indicated mineral resources and may include minority portions of inferred resources and unclassified material with modelled gold grades.*
5. *Numbers may not add up due to rounding.*

15.2 Conversion Methodology

The methodology used at Jacobina to convert mineral resources to mineral reserves is summarized as follows:

- Verify geometries for the block model and resource wireframes.

- Confirm accurate block model depletion with current excavated development and stope solids up to the effective reporting date.
- Discard any resources within 30 m of the surface topography.
- Create automated stope shapes using MSO in Datamine using variable break-even cut-off grades by zone and stope dimensions of 10 × 10 m.
- Design stope polygons in Maptek Vulcan based on MSO stope shapes at section spacing of 5 to 10 m, depending on continuity of mineralization.
- Design the stope shapes in Maptek Vulcan based on the stope polygons and the stope design parameters outlined in Table 15-2, considering orebody geometry, mine layout, historical information, and geotechnical analysis.
- Design development shapes and cut development shapes from stope shapes.
- Evaluate all shapes against the block model and report ore tonnes and grade by classification. Exclude stope shapes and associated development below the cut-off grades outlined in Table 15-3.
- Exclude all stopes that contain mostly inferred mineral resources.
- Design capital and auxiliary development, including ramps, ventilation, materials handling, access, and infrastructure.
- Complete an economic analysis of each stope shape and exclude all stope shapes that are not cash-flow positive when considering associated development and infrastructure.
- Complete a geotechnical analysis of each sector and make adjustments to the design where required.
- List stopes as “approved” or “not approved” based on cut-off grade, economic and geotechnical analyses prior to conversion to mineral reserves. Apply the mining extraction factor.

Table 15-2: Stope design parameters

Sector	Minimum Mining Width (m)	Hangingwall Overbreak (m)	Stope Length (m)	Stope Height* (m)	Sill Pillar Height (m)	Rib Pillar Length (m)	Rib Pillar Length at Crosscut (m)
CAN	2.5 to 3.0	0.4 to 3.0	40	25 to 28	6 to 8	5	15
CAC	2.5 to 3.0	0.4 to 3.0	40	25 to 28	7 to 12	5	15
CAS	2.5 to 3.0	0.4 to 3.0	30	25 to 28	6 to 8	5	15
JBN	2.5 to 3.0	0.4 to 3.0	30	25 to 28	7 to 12	5	15
MVT	2.5 to 3.0	0.4 to 3.0	25	25 to 28	6 to 7	5	15
MCZ	2.5 to 3.0	0.4 to 3.0	30	25 to 28	6 to 7	5	15
SCO	2.5 to 3.0	0.4 to 3.0	50	25 to 28	6 to 8	5	15

**Stope height measured from floor of bottom drift to back of stope (inclined distance)*

15.3 Dilution and Extraction

Dilution of sublevel longhole stopes is modelled by applying an overbreak skin to the hanging walls of stope widths based on stope spans and dilution abacuses, averaging 15%. A variable extraction factor ranging from 92% to 93% is then applied to the resulting diluted tonnes of ore. The average operational dilution and extraction performance for 2019 was approximately 12% and 93%, respectively, which supports the values used for mineral reserve reporting as of December 31, 2019.

15.4 Cut-Off Grade

Cut-off grades for the mineral reserve estimate were calculated on a zone by zone basis, and range from 1.12 g/t gold to 1.30 g/t gold, as shown in Table 15-3.

Table 15-3: Cut-off grades

Description	Units	CAC	CAN	CAS	JBN	MCZ	MVC	MVS	SCO
Plant Recovery	% Au	96%	96%	96%	96%	96%	96%	96%	96%
Taxes – CFEM	%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%
Gold Price	US$/oz	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250
Mining Cost	US$/t processed	27.52	23.92	23.25	26.54	24.73	30.17	27.25	30.12
Plant Cost	US$/t processed	12.43	12.43	12.43	12.43	12.43	12.43	12.43	12.43
G&A + Other + Overhead	US$/t processed	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92
Cut-Off Grade	**g/t Au**	**1.23**	**1.14**	**1.12**	**1.21**	**1.16**	**1.30**	**1.23**	**1.30**

15.5 Reconciliation

Reconciliation for the period comprised between January and December 2019 for mined versus processed tonnage, and planned versus recalculated feed grade was analyzed. The reconciliation results are presented in Table 15-4.

Table 15-4: 2019 Reconciliation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2019
Mine (oz)	12,677	13,083	13,763	13,390	14,065	13,956	13,648	15,479	13,219	13,929	16,884	10,396	**164,489**
Plant Gold Recovery (oz)	12,900	12,329	13,218	12,658	13,782	13,800	13,029	12,933	12,743	13,797	13,560	13,173	**157,922**
Smelter Gold Recovery (oz)	13,374	12,095	13,149	12,188	12,648	14,115	14,512	13,080	12,565	13,499	14,231	14,044	**159,499**
Mine Variation vs. Smelter (%)	105	92	96	91	90	101	106	85	95	97	84	135	**97**

The qualified person responsible for this section of the technical report is not aware of any mining, metallurgical, infrastructure, permitting or other relevant factors that could materially affect the mineral reserve estimate.

16 MINING METHODS

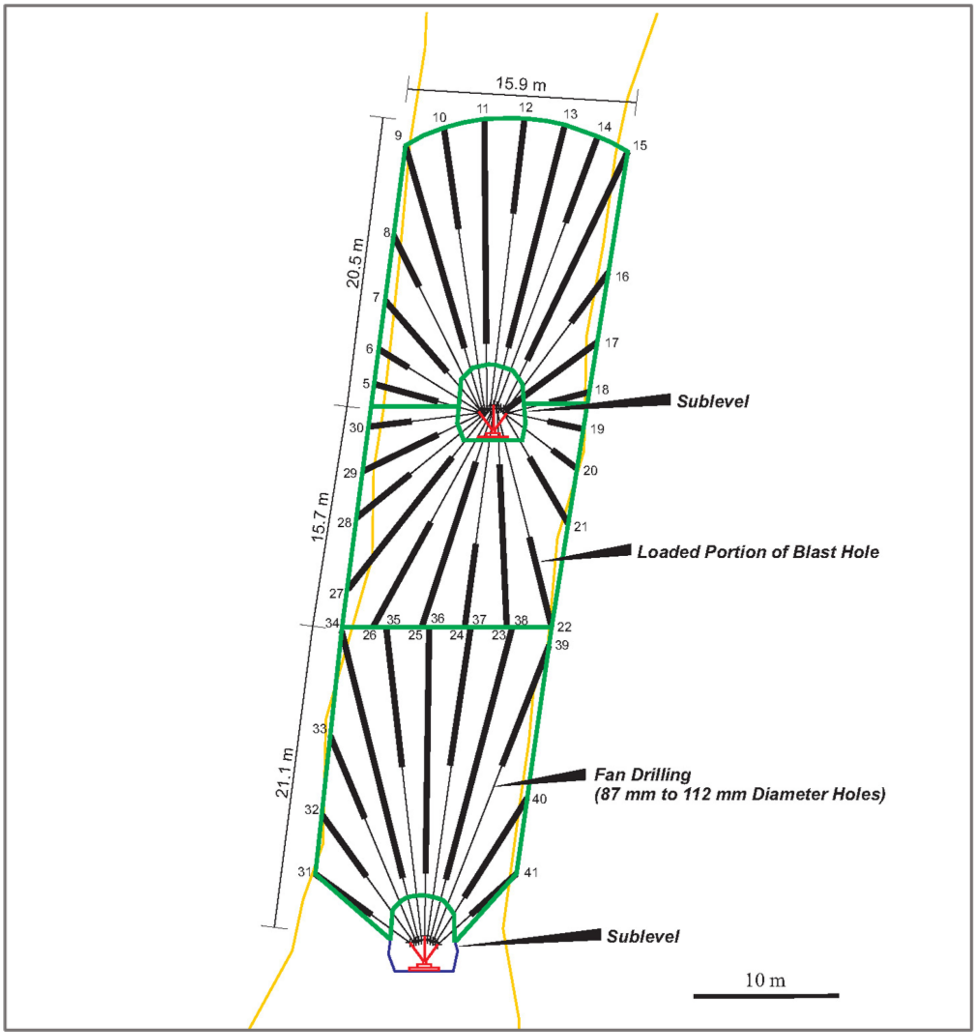
16.1 MINE DESIGN AND MINING METHOD

Jacobina utilizes the sublevel longhole stoping (SLS) method without backfill to achieve an average production rate of approximately 6,500 tpd from the ramp-accessed underground mines; these include João Belo, Canavieiras, Serra do Córrego, Morro do Cuscuz, and Morro do Vento.

The SLS method uses fan drilling as shown in Figure 16-1. Production drill holes vary from 76 to 112.5 mm in diameter and are drilled using three types of fan drills; these include the Solo 5 7F, the Solo DL 420, and the Solo DL 421. For the most part, drill holes are no longer than 25 m, which helps control deviation. Backfill is not required for the SLS mining method as the stopes are supported by pillars left in place. However, development waste is increasingly being deposited in underground voids.

Ramp access to the mineralized zones allows for a high degree of flexibility. Figure 16-2 to Figure 16-4 show the mined out areas and mineral reserves for the south (João Belo), central (Morro do Vento and Morro do Cuscuz) and north (Canavieiras and Serra do Córrego) portions of the mining complex.

Yamana is currently reviewing alternative mining methods and testing the suitability of the Jacobina tailings for paste fill or hydraulic fill applications. The results will be considered in a conceptual study that will evaluate the potential for constructing a fill plant at Jacobina. The use of cemented rock fill is also being evaluated. Alternative mining methods and the use of backfill is likely to increase mining extraction and has the potential to increase conversion of measured and indicated mineral resources to mineral reserves.



Source: RPA 2019

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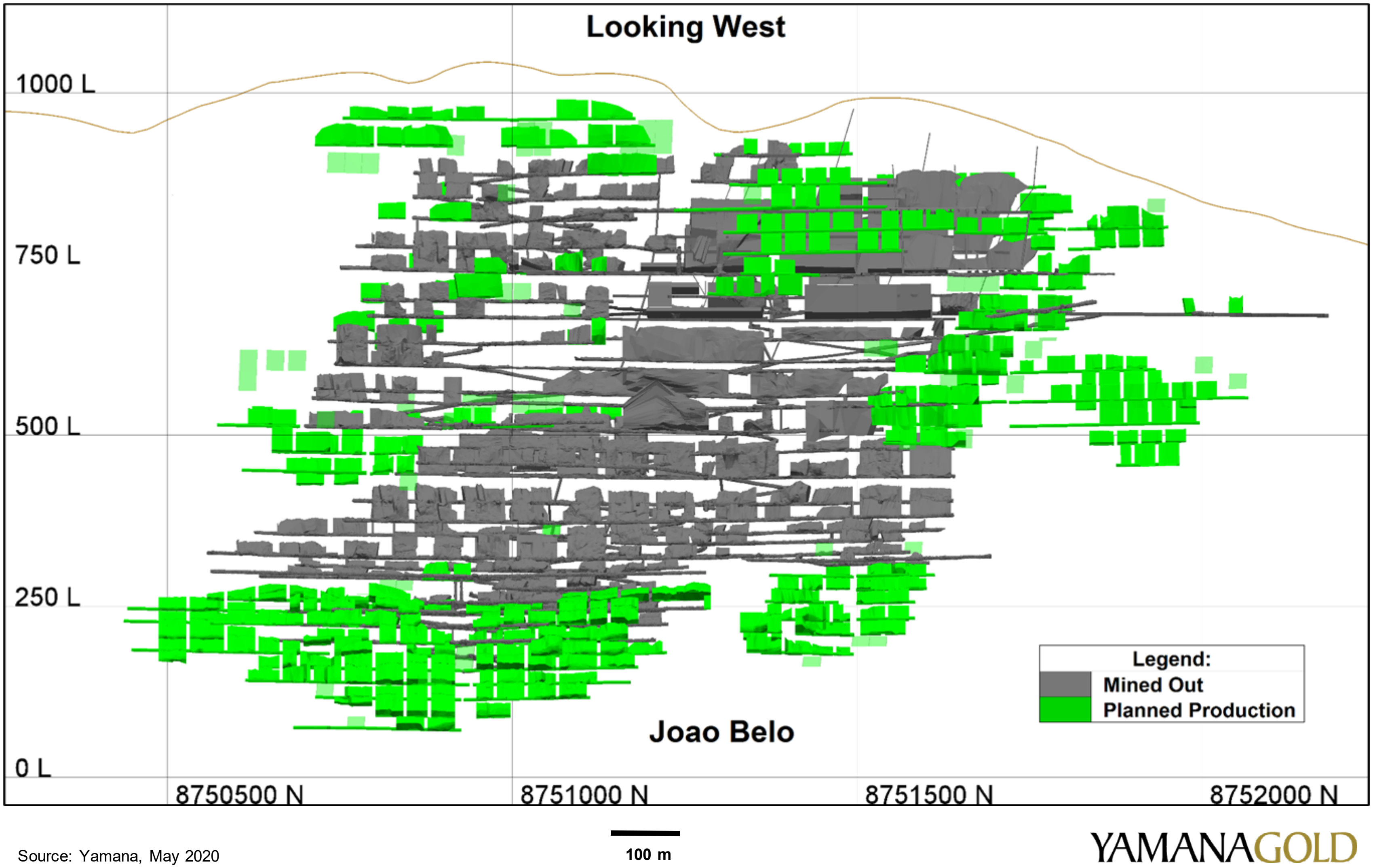
Figure 16-1: Schematic cross-section of sublevel stoping



Source: Yamana, May 2020

Figure 16-2: Mineral reserves – South Complex

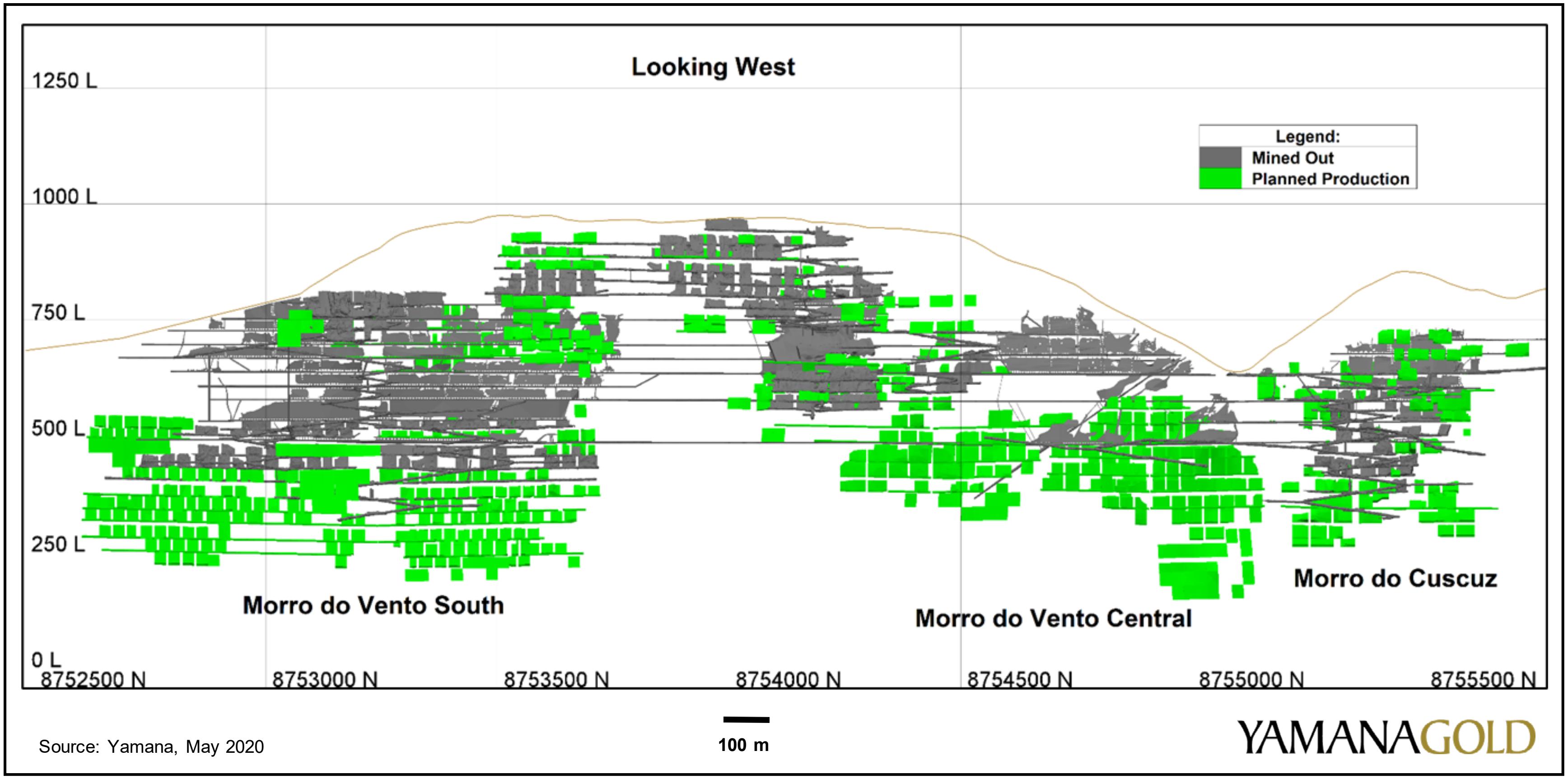


Figure 16-3: Mineral reserves – Central Complex

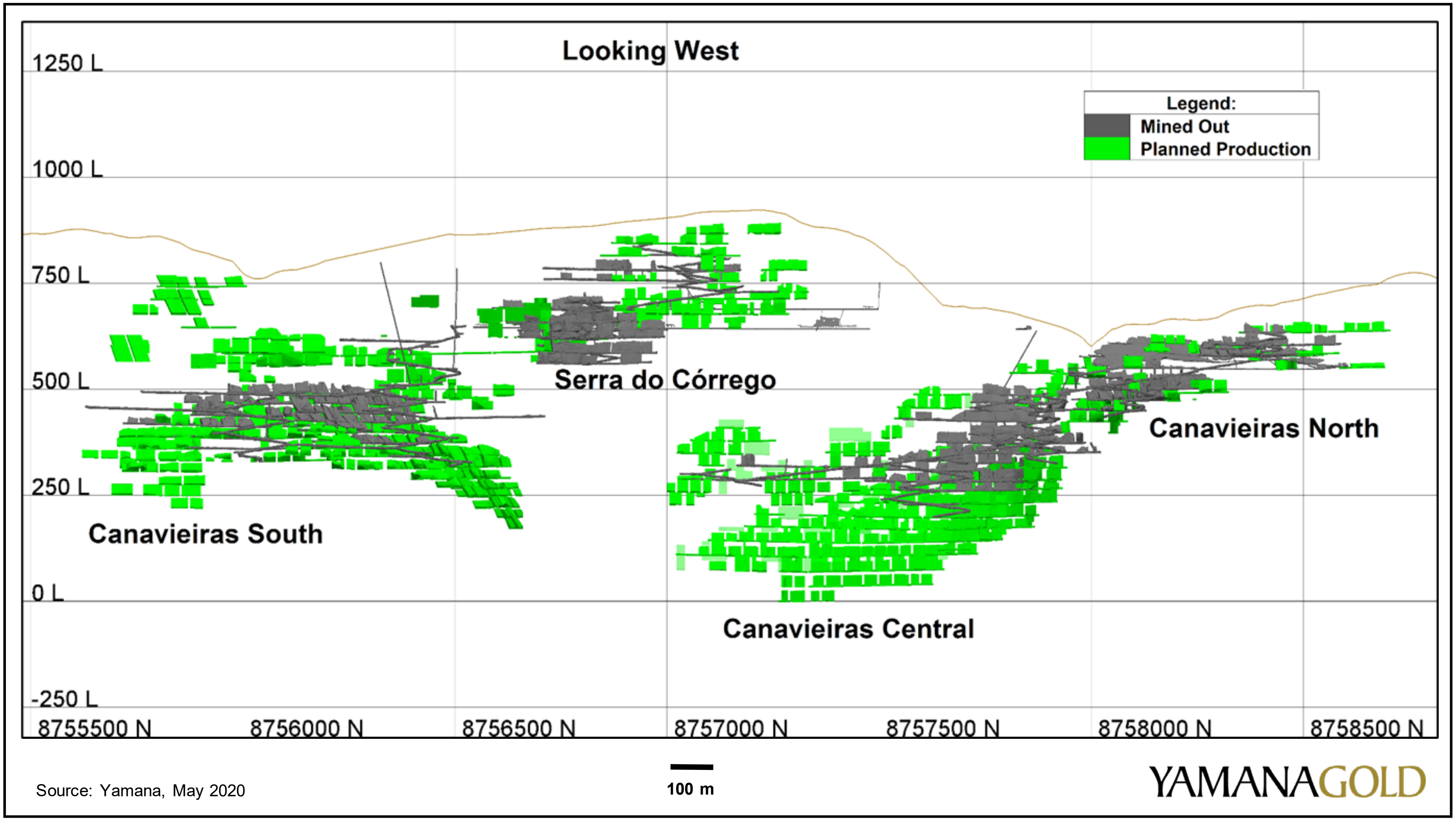


Figure 16-4: Mineral reserves – North Complex

16.2 GEOMECHANICS

Production dilution estimates at Jacobina have been developed through measurement of the stope geometries to evaluate the correlation between stope dilution and hydraulic radius.

Empirical models were developed to provide estimates of potential dilution using the Mathews method. Figure 16-5 shows an example of estimated dilution curves as a function of the rock mass rating and the dimensions and geometry of the stope. The N' input parameters are based on field measurement that assess the rock mass quality. Long-term rock mass quality values used for dilution estimates were prepared by E- Mining Technology S.A. as part of their geotechnical study for Jacobina in 2016 (E- Mining, 2016).

Stope stability is typically controlled through modification of the stope length as a way to manage the hydraulic radius of the hangingwall. For long-term planning, a hydraulic radius of approximately 13 is typically used, resulting in stope dilution estimates of 10% to 20%. Short-term planning dilution estimates are supported by the actual results of the reconciliation process.

Safety factor estimates of rib and sill pillars considered for short-term production plans are calculated using the Lunder and Pakalnis (1997) empirical method. The overall stability for long-term planning is estimated by means of numerical analysis with the MAP3D software.

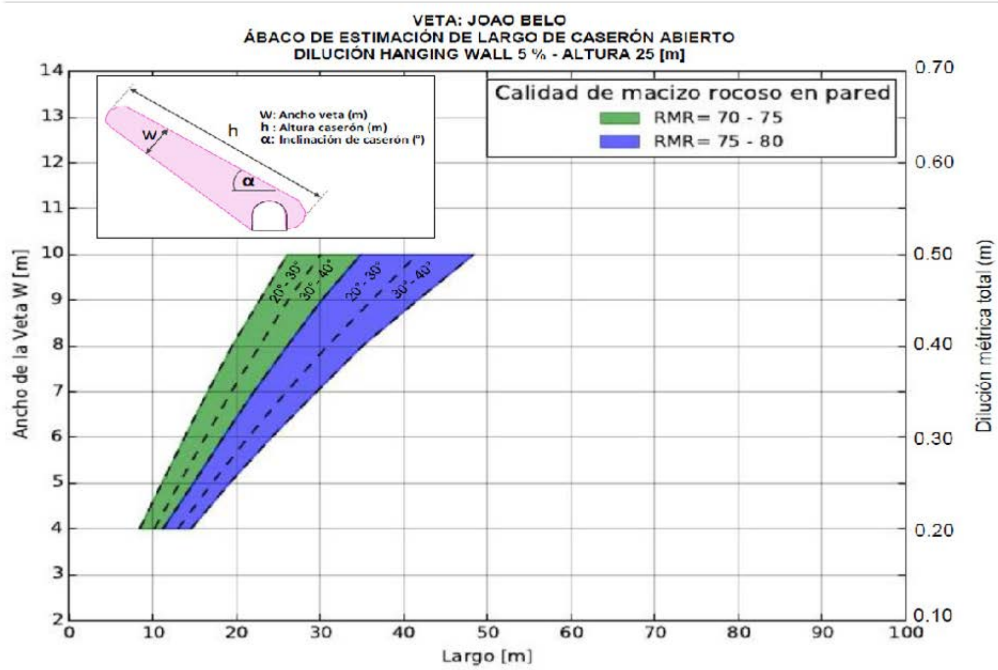
The rib pillar width is most commonly 5 m but can reach to up to 10 m; a 15 m pillar dimension is used for the protection of any main access. In 2007 and 2008, Itasca was commissioned to carryout studies following pillar failures. Since completion of the studies, there have been no pillar failures and the dimensions of the stope design and pillars have proven adequate.

The support standards applied to underground excavations are selected according to the classification of rock masses adopted by JMC; these are based on Barton's Q system and RMR classification methods, protocols that are internationally adopted by the civil construction and mining industries. The selection of ground support for temporary and permanent excavations depends on the class of the rock mass (geomechanical domain) in which they are located. Bolts; bolts and steel screen; or a combination of bolts, steel screen, and shotcrete are used. The bolts are the primary support element. They can be fixed with resin or cement cartridges and their spatial distribution varies in spacing and quantity according to the quality of the rock mass. Steel screens are installed in regions or areas of very fractured rocks to hold the rock blocks that form between the risers. Shotcrete is used in areas of extremely fractured rock, subject to popping or immediate rupture; its thickness can vary between 60 mm and 90 mm.

Typical ground support standards by excavation type and quality of the rock mass are summarized in Table 16-1.

Table 16-1: Jacobina ground support standards

Class	Bolt Length	Bolt Spacing (m)	Start Bolting Height (m)	Mesh Type	Shotcrete Thickness (cm)
Ramps and Permanent Development – 4.5 m x 5.5 m					
II	2.4 m Rebar	1.70 x 1.70	1.6	Welded	-
III	2.4 m Rebar	1.50 x 1.50	1.3	Welded	-
IV	2.4 m Rebar	1.25 x 1.25	1.3	Welded	60 to 90
V	2.4 m Rebar	1.10 x 1.10	1.0	Welded	60 to 90
Temporary Development – 4.0 m x 4.8 m					
II	2.4 m Rebar	1.70 x 1.70	1.6	Welded	-
III	2.4 m Rebar	1.50 x 1.50	1.3	Welded	-
IV	2.4 m Rebar	1.25 x 1.25	1.3	Welded	60 to 90
V	2.4 m Rebar	1.10 x 1.10	1.0	Welded	60 to 90



Source E-MINING, 2016

Figure 16-5: Stability chart with dilution curves

16.3 Life of Mine Plan

This section outlines the LOM plan of the Phase 1 scenario, including optimization of the processing plant to stabilize throughput at a sustainable 6,500 tpd (Phase 1 Optimization). Additional LOM scenarios, including the Phase 2 Expansion to 8,500 tpd, developed as part of the Phase 2 pre-feasibility study (PFS), are outlined in Section 24 of this technical report.

The Phase 1 LOM plan has been developed based on the mineral reserves inventory of Jacobina as of December 31, 2019, resulting in a mine life of 14.5 years. No additional mineral resources or exploration potential are considered in this mine plan. Mining of lower grade supplementary ore is deferred until late in the mine life where possible, allowing feed grades of approximately 2.4 g/t gold to be maintained.

A summary of the Phase 1 Optimization LOM plan by sector and processing plan is presented in Figure 16-6. At a throughput of 6,500 tpd, gold feed grade of 2.4 g/t and metallurgical recovery of 96.5%, gold production increases to approximately 175,000 oz per year, a shown in Figure 16-6. Lateral development requirements to achieve the LOM plan are approximately 64,000 metres of capital development and 100,000 metres of secondary development.

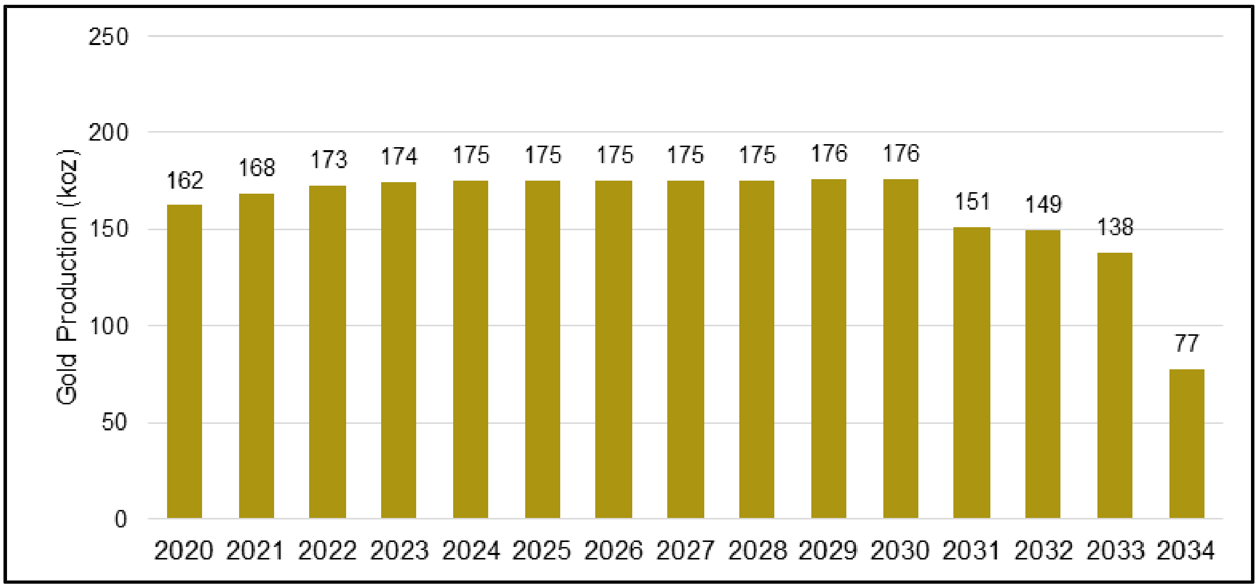


Figure 16-6: Phase 1 LOM gold production profile

Source: Yamana, May 2020

For internal planning purposes, Yamana includes conversion of inferred mineral resources in the later years of the LOM, which increases the Phase 1 Optimization LOM to 18.5 years. There is also a significant inferred mineral resource that may be converted to measured and indicated mineral resources in the future with the required infill drilling, which has potential to further extend the mineral reserve LOM plan.

Table 16-2: Life of mine plan – Phase 1 Optimization

Description	Units	LOM	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34
Tonnes Mined	**kt**	**34,248**	2,372	2,364	2,362	2,355	2,369	2,362	2,362	2,362	2,376	2,369	2,369	2,369	2,352	2,262	1,242
JBN	kt	**9,919**	707	733	751	552	205	442	364	483	563	567	933	912	943	946	816
MVC	kt	**4,412**	17	136	55	535	597	396	672	488	497	346	150	221	139	159	3
MVS	kt	**3,521**	154	101	149	206	436	100	287	282	206	262	468	171	271	301	127
CAS	kt	**6,873**	955	938	925	567	266	365	114	206	554	258	35	206	494	695	296
CAC	kt	**4,097**	196	180	304	116	292	421	439	379	199	344	433	442	281	73	0
MCZ	kt	**1,582**	237	102	41	231	27	143	116	217	83	91	178	79	37	0	0
SCO	kt	**2,029**	0	0	0	0	56	89	154	241	250	501	173	312	165	88	0
CAN	kt	**1,816**	106	173	138	147	489	406	216	67	25	0	0	27	21	0	0
Mining Grade	**g/t Au**	**2.27**	2.21	2.29	2.36	2.38	2.38	2.39	2.39	2.39	2.38	2.39	2.39	2.06	2.05	1.89	2.02
JBN	g/t Au	**1.88**	1.84	1.93	1.86	1.76	1.92	1.70	1.84	1.86	1.96	1.97	1.98	2.01	1.98	1.75	1.75
MVC	g/t Au	**2.50**	3.62	3.27	2.70	2.53	2.81	2.73	2.63	2.35	2.71	2.11	1.90	1.85	1.94	2.01	3.15
MVS	g/t Au	**2.17**	2.19	2.35	1.88	2.18	2.06	1.97	2.29	1.91	2.23	3.19	2.02	2.3	1.94	1.84	2.54
CAS	g/t Au	**2.32**	2.44	2.26	2.45	2.73	2.05	2.05	2.57	2.38	2.38	2.17	2.16	1.96	2.21	2.02	2.54
CAC	g/t Au	**3.09**	2.59	2.54	3.31	3.55	2.28	3.36	2.73	4.09	3.37	3.31	4.27	2.38	2.11	2.09	0.00
MCZ	g/t Au	**1.91**	1.85	2.05	1.54	2.13	1.35	1.79	2.20	2.02	1.83	1.69	1.85	1.85	1.57	0.00	0.00
SCO	g/t Au	**2.07**	0.00	0.00	0.00	0.00	2.15	2.07	2.00	1.89	2.16	2.25	1.95	1.88	2.22	2.00	0.00
CAN	g/t Au	**2.58**	2.37	3.11	2.95	2.61	2.65	2.5	2.33	2.09	2.04	0.00	0.00	1.91	2.11	0.00	0.00
Mill Feed																	
Ore Processed	kt	**34,348**	2,372	2,364	2,362	2,355	2,369	2,362	2,362	2,362	2,376	2,369	2,369	2,369	2,352	2,362	1,242
Feed Grade	g/t Au	**2.27**	2.21	2.29	2.36	2.38	2.38	2.39	2.39	2.39	2.38	2.39	2.39	2.06	2.05	1.88	2.00
Recovery	%	**96.5**	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5
Gold Produced	koz	**2,421**	162	168	173	174	175	175	175	175	175	176	176	151	149	138	77

16.4 Mine Equipment

A list of the active mine equipment at Jacobina is shown in Table 16-3. Equipment age varies, with most of the equipment acquired in 2019 for the internalization of mine development. Trucks are contractor-owned and operated. The equipment required to achieve the mine plan for the expansion case is outlined in Section 24 of this technical report.

Table 16-3: List of current mobile mining equipment

Equipment	Total
Fan Drills	6
Front-end Loaders	8
Jumbos	7
LHDs	8
Scalers	7
Scissor Lifts	11
Trucks	45
Graders	4
Backhoes	3
Water trucks	2
Shotcreters	2

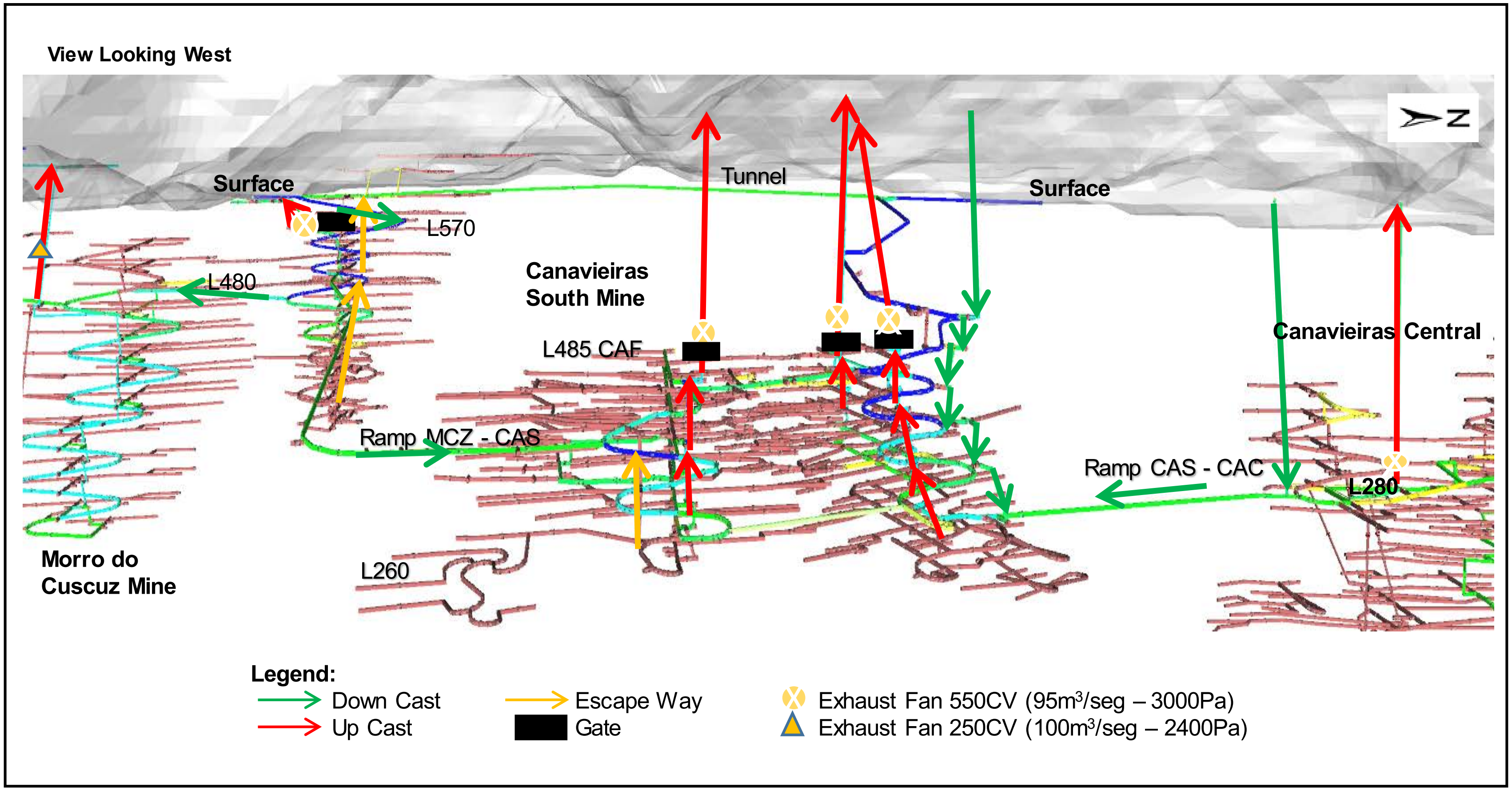
16.5 Ventilation

Primary ventilation of the underground mines at Jacobina is provided through the use of the main exhaust fans, ventilation raises, and ramps. Air is provided to the working faces through the use of auxiliary fan with flexible and rigid ventilation ducting. A schematic ventilation circuit for Canavieiras South Mine is shown in Figure 16-7. The underground ventilation fans utilized at the various underground mining sectors are shown in Table 16-4. Fan air flow rates range from 120 m^3/s to 200 m^3/s.

Table 16-4: Ventilation fans – Number of units

Mine	Auxiliary Fans (unit)					Main Exhaust Fans (unit)		
	75 hp	100 hp	125 hp	150 hp	Total	250 hp	550 hp	Total
JBN	4	12	-	3	19	1	4	5
MVS	5	5	1	-	11	1	1	2
MVN	-	2	-	-	2	1	-	1
SCO	-	-	-	-	-	-	-	-
CAS	3	15	-	6	24	-	3	3
CAC	-	11	-	2	13	-	2	2
SPARE	-	5	-	1	6	-	4	4
Total	**12**	**50**	**1**	**12**	**75**	**3**	**14**	**17**

Schematic Ventilation Circuit



Source: Yamana, May 2020

Figure 16-7: Schematic sectional view of ventilation circuit – Canavieiras South Mine

16.6 Compressed Air

Compressed air is used for the operation of development jumbos and production fan drills. Air is delivered from air compressors on surface to the underground working faces. Ramp access headings are fitted with 100-mm-diameter compressed air lines and off-takes into each level consist of 63-mm-diameter lines. The number of units installed and their capacities are indicated in Table 16-5. Other operations that will come on-line in the future will utilize a similar system.

Table 16-5: Compressed air

Mine	Equipment	No.	Pressure (bars)	Volume (m^3/h)
JBN / MVT S	AC GA 160	2	7.5	1,800
MVT C	AC GA 160	2	7.5	1,000
SCO / CAN S	AC GA 160	1	7.5	1,800
CAN N	AC GA 160	2	7.5	1,800

16.7 Dewatering

Dewatering of underground operations is completed via a system of sumps on each level which pump up to a main sump at the collar of the portals. This water is subsequently pumped to a treatment basin where the pH is adjusted to the required level using caustic soda. A typical dewatering system used at the João Belo Mine is shown in Figure 16-8, although there are slight variations from mine to mine. All the mine water is pumped back to the underground operations.

Dewatering is carried out with 13 hp Flygt submersible pumps and 50 hp and 100 hp Weir-type pumps, with 100 to 125 mm discharge lines being the standard.

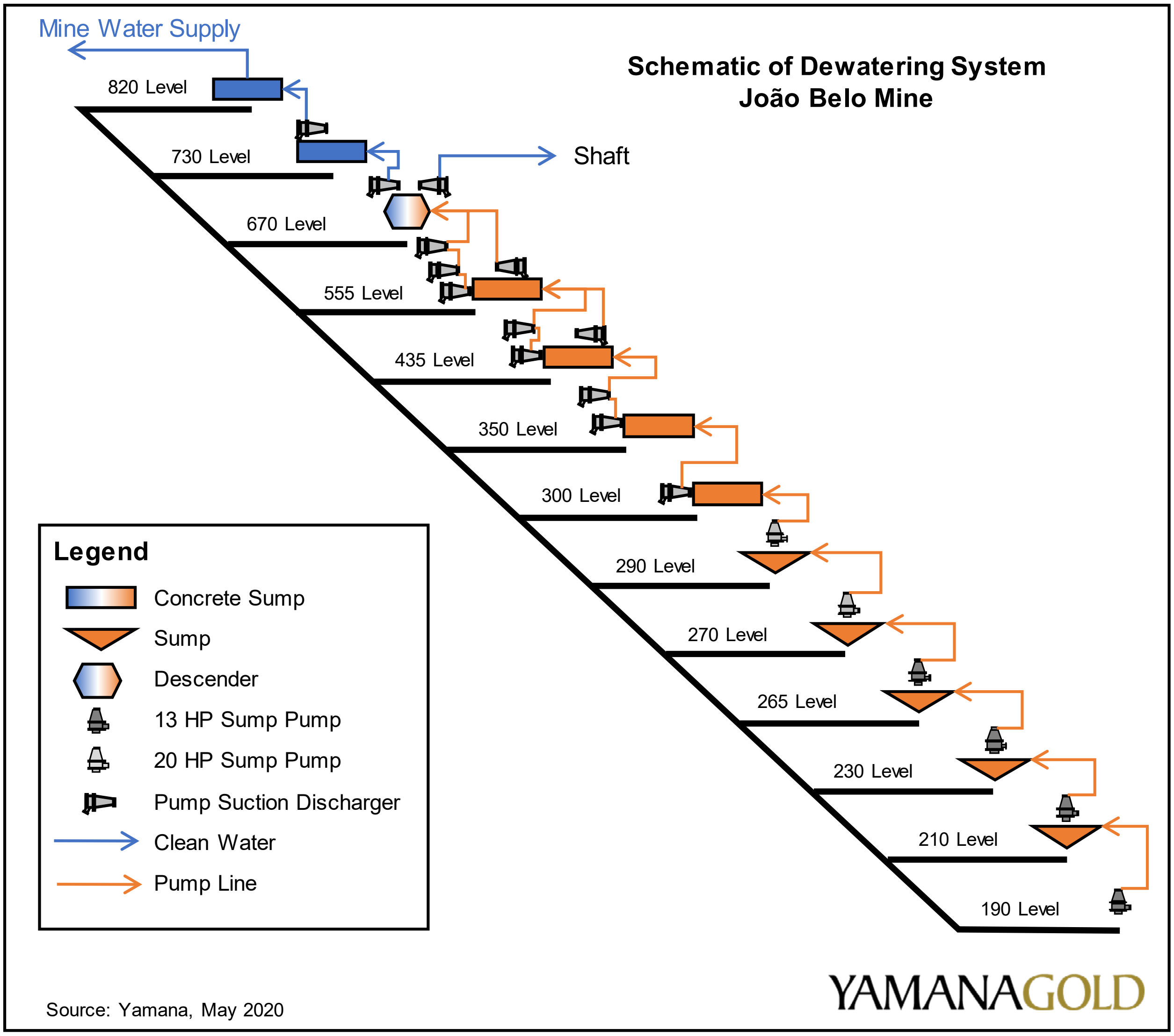


Figure 16-8: Schematic drawing of dewatering system at João Belo Mine

16.8 Power

The power supply and distribution at Jacobina is described in detail in Section 18 of this technical report.

16.9 Communications

Underground communications are carried out with the use of a Leaky Feeder system, which permits continuous contact between mine supervisors and operating and service crews in various locations throughout the mine complex.

Additional systems are used for better communication between the operators and the information center on the surface. The Newtrax system is a technology project implemented in 2018 and 2019 for controlling secondary fans, tracking underground personnel, and monitoring gas emissions. The system reduces energy consumption by stopping secondary fans during shift changes; improves logistics in times of emergency by tracking the location of personnel in the underground mines; and monitors gas levels in the underground working areas, which allows supervision to anticipate ventilation problems and minimize re-entry times after blasting.

Smartmine is a fleet control system which allows total control of equipment in the underground mines, delivering performance information and equipment status.

17 Recovery Methods

17.1 Processing Plant

The mineral processing plant at Jacobina is currently being optimized to support a daily production of 6,500 tpd at a gold recovery of 96.5%. The optimization project currently underway will stabilize the plant to ensure that the plant can achieve 6,500 tpd on a sustainable basis and maintain current recoveries as the feed grade is increased.

ROM ore is fed to the plant after three stages of crushing. The crushed ore feeds the grinding circuit where ball mill/cyclone combinations are used to grind and classify the ore to prepare it for feed to the leach circuit. Within the grinding circuit, gravity concentration of gold is performed on a portion of coarse recycled material that returns to grinding. The cyclone overflow feeds a dewatering circuit (a pre-leach thickener), which in turn feeds higher-density slurry to a leaching circuit that uses a conventional cyanide leaching process. Carbon adsorption is used for gold extraction from the leach solution, and gold recovery is performed by electrowinning a strip solution of highly concentrated gold from the desorption process used in the elution circuit. The current process flow sheet is depicted in Figure 17-1. The solids and sludge from the electrowinning circuit are dried and fluxed prior to being smelted to produce doré bars.

17.1.1 Crushing Circuit

The ROM material is trucked to the crushing facilities located adjacent to the processing plant. The broken ore is passed through a grizzly (80% passing (P80) < 180 mm) and fed to the jaw crusher with a capacity of 942 t/h. The coarsely crushed material is then passed through secondary and tertiary cone crushers with a capacity of approximately 556 t/h. The secondary crusher reduces the size of the feed to P80 < 40 mm, and the tertiary crusher further reduces the feed to P80 < 8 mm.

17.1.2 Grinding Circuit

The crushed ore feeds the grinding circuit where ball mill/cyclone combinations are used to grind and classify the ore to prepare the feed for the leach circuit. The product of the crushing circuit is fed to storage silos and then conveyed to the ball milling circuit where ore is ground to a P80 < 150 µm. Ball mill product is classified in cyclones, with the cyclone underflow being returned to the ball mills, and the overflow forming the feed to the leach circuit. A portion of the cyclone underflow is processed through Knelson concentrators with concentrate pumped to Acacia Reactors. It is estimated that 60% of the gold in the plant is recovered by the concentrator/reactor combination. Cyclone overflow from the grinding circuit is pumped through trash screens to the pre-leach thickener followed by the leach tanks.

17.1.3 Thickening, Leaching, and Adsorption

Cyclone overflow from the grinding circuit is pumped to the pre-leach thickener and then to the leach tanks. The leaching circuit consists of seven leaching tanks with a total capacity of

5,350 m^3. The pulp from the leaching circuit is delivered to the carbon-in-pulp (CIP) adsorption circuit which has been optimized to include two lines of five mechanically agitated CIP tanks (increased from one line of six CIP tanks). The activated carbon is pumped to a single screen per adsorption line. One of these screens is installed as part of the expansion project.

The loaded carbon from the CIP circuit is delivered to the elution circuit.

17.1.4 Elution Circuit

The loaded carbon from the CIP circuit reports to the acid wash column where concentrated hydrochloric acid is circulated through the bed of carbon to remove inorganic foulants such as scale and other salts. The acid-washed carbon is then transported to a separate elution column. The elution column is filled with NaCN and NaOH where the acid washed carbon is stripped to produce a high-grade solution which reports to the pregnant eluate tank.

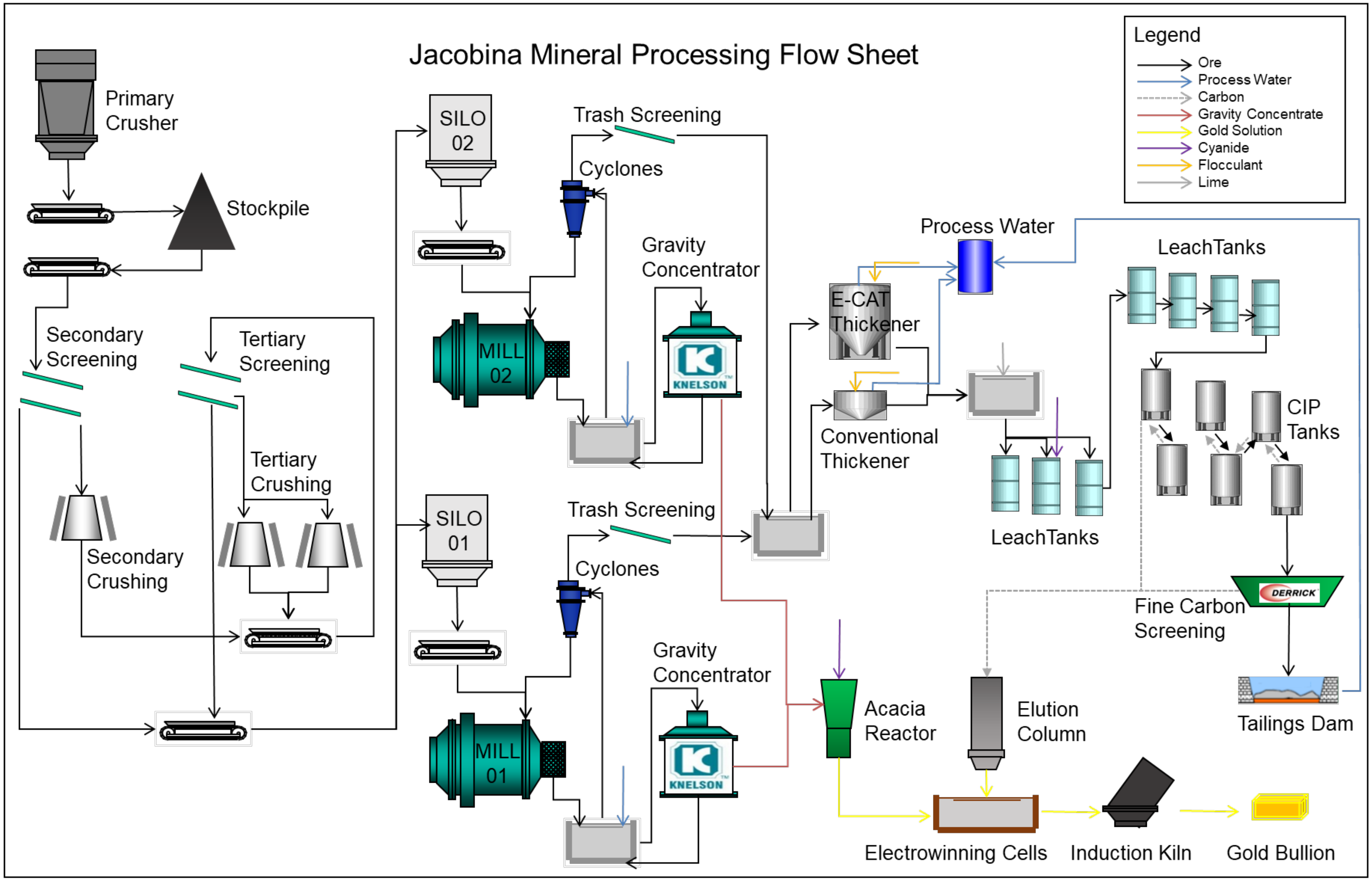
17.1.5 Electrowinning Circuit

The pregnant solution from the carbon elution circuit and from the Acacia reactor is circulated through electrolytic cells. Both gold rich streams are pumped to two plating cells in parallel where the gold is deposited in the cathode cell and the solution returned to the storage tank. Doré bars are produced from the resulting sludge; they have a nominal composition of 96.5% gold, 3% silver, and 0.5% other metals. The doré bars are transported by air to Umicore in São Paulo for refining.

17.1.6 Processing Plant Optimization and Expansion

In 2019, Jacobina commenced an optimization of the processing plant to stabilize throughput at a sustainable 6,500 tpd (Figure 17-2). Yamana refers to this optimization as the Phase 1 Optimization. The first phase of the optimization was the installation of an Advanced Process Control system in early 2019. Other components of the optimization include the installation of two additional gravity concentrators, a new induction kiln, replacement of screens, and new CIP tanks. The project is scheduled for completion in mid-2020. Jacobina achieved the Phase 1 Optimization objective of 6,500 tpd in the first quarter of 2020, a full quarter ahead of schedule and without the benefits expected from the installation of all the plant modifications expected by mid-2020.The flow sheet of the plant upon completion of Phase 1 Optimization is depicted in Figure 17-2.

The PFS studying the Phase 2 Expansion to increase throughput to 8,500 tpd was completed and is described in Section 24 of this technical report.



Source: Yamana, April 2020

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Figure 17-1: Current process flow sheet

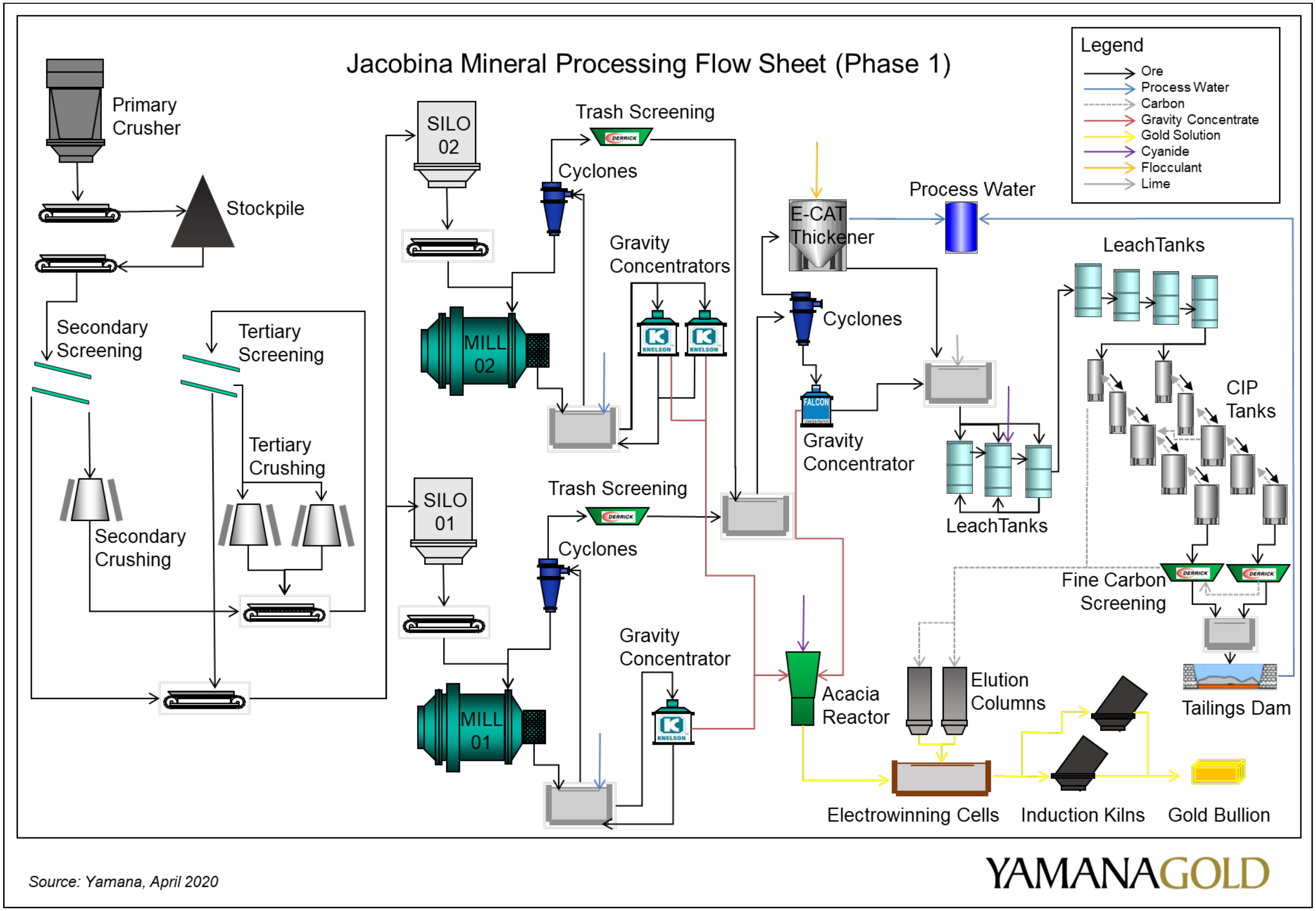


Figure 17-2: Phase 1 Optimization process flow sheet

18 PROJECT INFRASTRUCTURE

Jacobina currently operates five mines and has all required infrastructure necessary for a mining complex, including:

- Five underground mines: Canavieiras, João Belo, Morro do Cuscuz, Morro de Vento, and Serra do Córrego.
- A conventional processing plant, with crushers, ball mills, leach tanks and CIP tanks, which produces gold doré.
- Mine and processing plant infrastructure including office buildings, shops, and equipment.
- A fully lined tailings storage facility (TSF B2). It consists of a cyclone sand dam constructed following the downstream construction method and corresponding tailings and reclaim water pumping systems. The current phase (phase IV) has a dam height of 95 m at its highest point, at an elevation of 605 masl. At the final phase, Phase VII, TSF B2 will have an ultimate dam crest elevation of 640 masl. The TSF has an ultimate capacity of 27.8 M m^3 of slurry tailings and 14 M m^3 of cyclone sand used for construction of the main dam (DAM, 2020a).
- Water for the processing plant is mainly supplied by water pumped from the mine and by collected water in the tailings impoundment (94% recirculation).
- Electric power from the national grid.
- Mine ventilation fans and ventilation systems.
- Haulage roads from the mines to the plant.
- Stockpile areas.
- Maintenance facilities.
- Administrative office facilities.
- Core storage and exploration offices.
- Security gates and manned security posts at mine entries.
- Access road network connecting the mine infrastructure to the town site and to public roads.

The current infrastructure comprising the canteen, maintenance workshop and administrative office facilities is able to support the Phase 2 Expansion plan. The warehouse would need an expansion to store consumables and spare parts for the additional equipment. The project spans an approximate strike length of eight kilometres. The mine and processing plant infrastructure are illustrated in Figure 18-1. The TSF designs and management are described in sections 18.2 and 20.2.2.

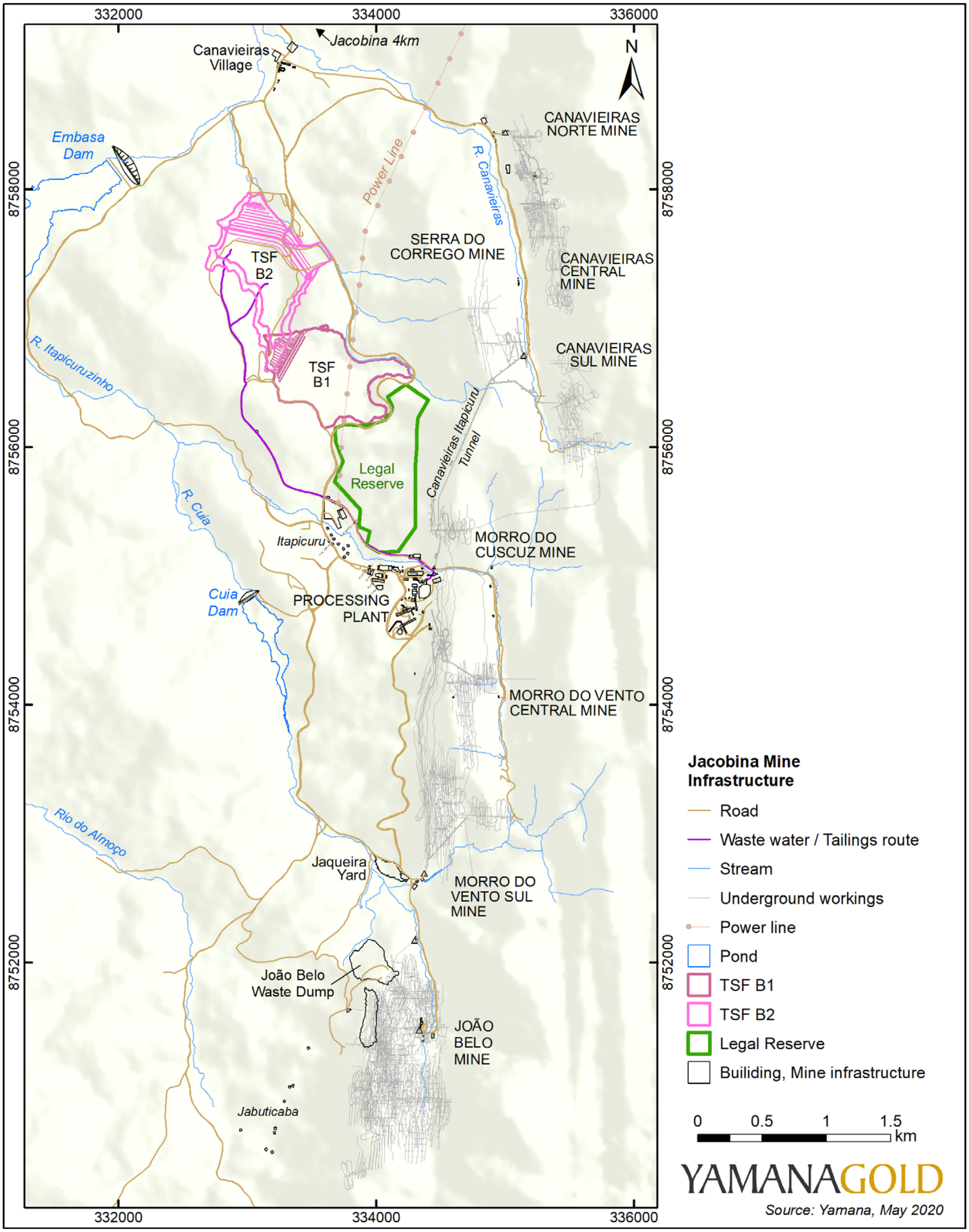


Figure 18-1: Site layout of mine infrastructure

18.1 Power

Jacobina Mine is connected to the National Electric Grid through a 138 kV transmission line connected to the Jacobina II electric substation in the City of Jacobina. Power is supplied by COELBA, an energy distribution company, with an average contracted demand of 15.0 MW at 138 kV. The contracted demand can be exceeded by up to 5% (to a maximum of 15.75 MW), but power demand in excess of 15.75 MW incurs additional charges. The contract is automatically renewed each year.

From the main substation at the Jacobina Mine, at 138 kV/13.8 kV, power is supplied to three distribution substations, at 13.8 kV/4.16 kV, which supply the processing plant with electrical power for crushing and grinding. Electrical transformers, at 4.16 kV/0.44 kV, feed the plant auxiliary loads.

Power distribution to the underground mines is divided into two areas. The South Mining Complex consists of the João Belo and Morro do Vento mines, and the North Mining Complex consists of the Canavieiras, Morro do Cuscuz, and Serra do Córrego mines. There are currently 34 underground portable substations in the South Complex and 31 substations in the North Complex to supply electrical energy to the mine production faces. The portable substations are rated at 13.8 kV/440 V and designed at 750, 1000 or 1500 kVA.

18.2 Tailings Dam Design and Construction

The tailings produced at the Jacobina mill are presently stored in a fully lined tailings storage facility, TSF B2, located 2.5 km north of the mineral processing plant. TSF B2 consists of a cyclone sand dam built following a downstream construction method. TSF B1 is a legacy tailings facility that has not been in operation since 2012. Figure 18-1 shows the location of both TSFs, B1 and B2.

TSF B2 will be built in seven construction phases. Phase IV construction was completed in 2018 to an elevation of 605 masl and it is currently in operation. Phase IV impoundment capacity is 4.27 M m^3, assuming a 2 m freeboard. Construction of phase V is planned to start in the second half of 2020. Phase V has a dam elevation of 620 masl. The final phase, Phase VII, has an ultimate dam elevation of 640 masl, as shown in Figure 18-2. The TSF designs for phases IV and V are summarized in design reports by DAM Projectos de Engenharia (DAM) (2017 and 2020a). The following paragraphs describe some of the key design characteristics for TSF B2.

The mine's Phase 2 expansion design assumes a processing rate of 8,500 tpd and operation until year 2032. TSF B2's ultimate capacity is of approximately 41.8 M m^3 of tailings, including 27.8 M m^3 of slurry fine tailings and 14 M m^3 of cyclone sand material used for construction of the embankment dam. The final storage capacity for TSF B2 will be sufficient to manage the mineral reserves as well as approximately 7 M additional tonnes of slurry fine tailings, assuming a density of 1.35 t/m^3.

The TSF B2 dam has an overall downstream slope of approximately 2.5H:1V and upstream slope of 1.8H:1V. The following features improve the drainage and stability of the dam:

- A rockfill initial embankment dam (compacted to a 95% standard proctor density)
- Coarse-grained underdrain system
- Coarse-grained material for erosion protection
- Construction of a tailings beach extending from the crest of the dam

In addition, the total surface area of TSF B2 is lined using a 1.5 mm-thick low-density geomembrane to limit potential seepage from the impoundment into the environment. Suitable borrow material encountered within the TSF impoundment area was used for construction of the fine-grained low permeability bedding layer underlying the geomembrane liner. Unsuitable materials and overburden soils were removed and stockpiled for use during closure and remediation activities.

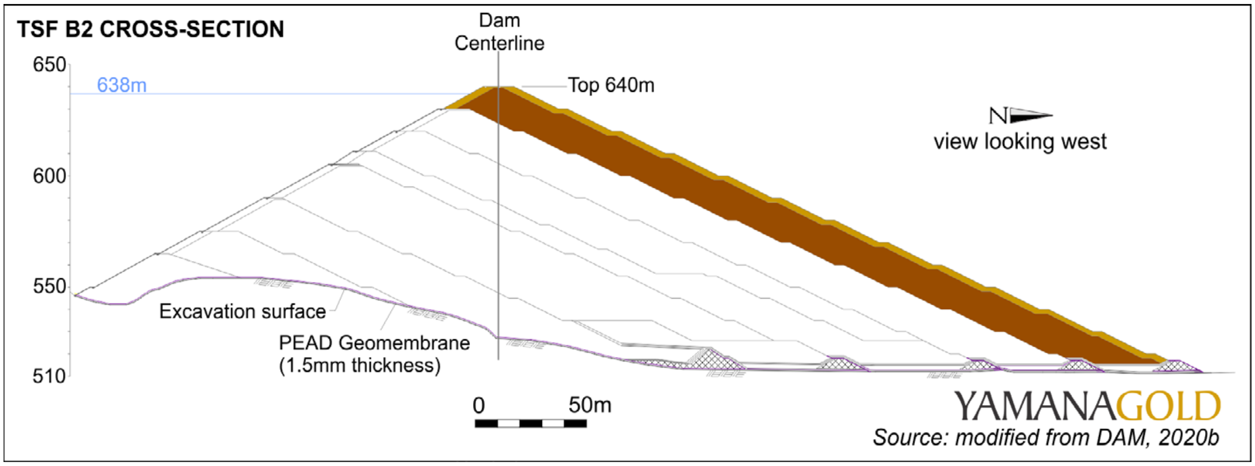


Figure 18-2: Cross-section of TSF B2 dam at final elevation

Monitoring instruments installed for performance monitoring of the cyclone-sand dam and tailings impoundment area include piezometers and survey monuments. Section 20.3 provides more information on monitoring instrumentation and activities in the tailings area.

The Canadian Dam Association (CDA) ranks dams as structures of low, significant, high, very high, and extreme consequence based on the potential social, environmental, and economic damage that a dam failure may cause to the floodplain area located immediately downstream of the facility. Based on the CDA's consequence classification guidelines (CDA, 2007), TSF B2 dam is considered of high consequence, as permanent populations are located in the downstream area of the dam.

The precipitation event considered in the TSF B2 design is the 1-in-10,000-year 24-hr storm event estimated at 286 mm (DAM, 2020b). The design considers a minimum of 2 m freeboard above the maximum supernatant pond level for Phase IV up to Phase VII. In addition, an emergency spillway with a flow capacity of 2.8 m^3 per second is installed for each dam raise.

TSF B2 was designed assuming a peak ground acceleration (PGA) of 0.05 *g*. For reference, a PGA of 0.025 *g* corresponds to the 1-in-475-year seismic event in the area (DAM, 2020b). Such low PGA values are typical of seismically inactive areas.

Foundations conditions in TSF B2 dam area generally consist of dense residual soils on top of bedrock. All alluvial material encountered at the bottom of the basin was removed during construction of the initial TSF phases.

Ancillary infrastructures include a service road and diversion water channels around the entire perimeter of the TSF. These were built as part of the initial construction activities for TSF B2.

18.2.1 Tailings Deposition and Reclaim Water System

Tailings enter a tailings thickener prior to being pumped into the system of cyclones located in the TSF area. Coarse tailings from the underflow are used for construction of the tailings dam while fine tailings are deposited in the TSF impoundment area. Process water from slurry tailings discharged in the TSF impoundment contribute to the creation of a supernatant pond. Water accumulated in the TSF pond that is not lost to evaporation is reclaimed into the process plant. On average, water available from the TSF pond represents a significant percentage of the overall water needs of the mineral processing plant. The remainder of process water supplied to the process plant is pumped from the mine dewatering operations and wells. Tailings deposition and water reclaim lines to and from the TSF are located within a secondary containment. There is no discharge of tailings or process water into the environment at Jacobina.

Precipitation and surface water run-off represent a significant additional volume that needs to be managed in the TSF impoundment area. The region has a net positive precipitation rate (evaporation < precipitation). To limit the supernatant pond size, the mine installed a system of water canons in 2018 that spray water to increase the evaporation rates.

19 Market Studies and Contracts

19.1 Markets

The principal commodity at Jacobina, gold, is freely traded at prices that are widely known, so that prospects for sale of any production are virtually assured. A gold price of US$1,250/oz was used for mineral reserve estimation as well as for completing the economic analysis outlined in section 22, which ensures the project is cash flow positive and therefore supports the mineral reserve estimate. The same gold price was also used to complete the economic analyses on the pre-feasibility study (PFS) on the expansion scenario outlined in section 24 of this technical report.

19.2 Contracts

JMC currently has a collective agreement with the workers union "Sindicato dos Trabalhadores na Indústria da Extração de Ouro e Metais Preciosos, Ferro, Metais Básicos, Pedras Preciosas, Semipreciosas, Mármore, Calcário, Pedras e Minerais Não Metálicos de Jacobina- Bahia e Região."

JMC also has existing contracts for equipment leasing, equipment operating, ore and waste haulage, material transport, and water trucks.

JMC has contracts for mine and plant consumables including drilling products and explosives.

Average prices for consumables during 2019 were as follows:

- Diesel fuel: US$0.76/L
- Lime: US$0.09/kg
- Steel balls: US$1.12/kg
- Cyanide: US$1.96/kg
- Power: US$56.99/MWh

The qualified person responsible for this section of the technical report has reviewed the market studies and contracts, the results of the review support the assumptions in the technical report. The terms, rates or charges for material contracts are within industry norms.

20 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

The information presented in this section is based on a review of available information and documentation, and a discussion held with Atila Almeida Rios, the Environmental Engineer at Jacobina. No site visit was conducted in support of the preparation of Section 20 of this technical report.

20.1 PROJECT PERMITTING AND AUTHORIZATIONS

The operation activities at Jacobina are regulated and inspected by Instituto do Meio Ambiente e Recursos Hídricos (INEMA), the environmental agency for the state of Bahia. All environmental issues related to Jacobina activities, both internal (environmental management, execution of environmental controls, attendance to environmental monitoring), and external (relationship with public agencies, environmental agency, renewal of licences), are supervised by the Technical Environmental Guarantee Commission (Comissão Técnica de Garantia Ambiental – CTGA), according to the requirements of the State Environmental Council of Bahia (Conselho Estadual de Meio Ambiente da Bahia – CEPRAM).

The Jacobina mine site includes the following facilities:

- Processing plant
- Water dam
- Tailings dam
- Administrative facilities
- Maintenance facilities
- Underground mining and stockpile areas
- Internal accesses – unpaved roads
- Concrete batching plant
- Fuelling stations (diesel)
- Water and wastewater treatment plants
- Inactive open pit/waste rock dump (legacy from previous mine operations)

Licences required by various government agencies covering the operation of the mines, mill, and TSF B2 have been obtained and applications for renewals have been filed. The information on operational licences and water permits presented below was taken from the PFS by Ausenco (2020).

Jacobina has two operational licences, one for underground mining (Operational License (L.O 1791/11)) and another for the processing plant and TSF (Operational License (L.O. 14.100/11)). The quantities and rates permitted by these licences are summarized in Table 20-1.

Table 20-1: Summary of environmental operational licences

Operational Licence	Activity	Permitted Quantity/Rate	Date of Issue	Valid Until*
L.O. 14.100/11	Processing plant	7,500 tpd	January 30, 2011	January 30, 2016
	Stockpile area	15,000 t		
	TSF	23,938,000 m^3		
L.O. 1791/11	Underground mining	2,500,000 tpy	December 28, 2011	December 28, 2016

** Because the requests for revalidations were submitted more than 120 days before the expiration dates, both of the licences remain valid until the process is analyzed and completed by INEMA.*

Yamana has commenced a process to renew and change these operational licences through the INEMA. Yamana met with INEMA in Salvador at the end of 2019 to present the Phase 2 Expansion. INEMA recommended that Jacobina should apply for a change licence for Operational Licence (L.O. 14.100/11) (i.e., Change Licence (L.O. 14.100/11)) because the renewal of the Operational Licence (L.O.14.100/11) is still in progress. On the week of March 9, 2020, INEMA visited the Jacobina mine site. Presentations were given on the processing plant, TSF, and environment, highlighting the changes to the operation that had occurred between 2015 and 2019.

Changes since 2015 are being reviewed by INEMA and include the following:

- Installation of a new gravimetric concentrator and hydrocylones
- Renovation of the gold refinery
- Installation of a concrete batching plant
- Operation of the hydraulic barrier downstream of TSF B2
- Increase of the stockpile area capacity from 15,000 t to 40,000 t
- Closure of João Belo waste dump

Yamana is applying for the following inclusions in Change Licence (L.O 14.100/11) (Process number 2020.001.001035/INEMA/LIC-01035):

- Increase of the processing plant throughput to 8,500 t per calendar day, with a maximum throughput of up to 10,000 t per operating day.
- Increase of the stockpile area capacity from 40,000 t to over 80,000 t.
- Decrease of the environmental free board of TSF B2 from 3 m to 2 m.
- Installation of a new ball mill, silo, electrowinning cell, and area for preparation of cyanide briquettes.
- Improvements to the tailings pumping system with new tanks, pumps, and cover of the entire pipeline.

- Construction of a new waste dump area and emulsion plant.

Yamana expects INEMA to request updates of the documents, to schedule presentations in Salvador regarding the João Belo Waste Dump Closure project and the final TSF B2, and to provide details of each phase. In parallel, the report for the Phase 2 Expansion will be submitted and another visit will be scheduled by INEMA. Yamana expects the renewal of the processing Operational Licence (L.O. 14.100/11) to be issued by the end of 2020 and the Change Licence (L.O. 14.100/11) to be issued in 2021. The renewal process of the mining Operational Licence (L.O. 1791/11) will be processed in parallel and is expected to be completed soon after.

A summary of water permits is provided in Table 20-2.

Table 20-2: Summary of water permits

Ordinance Granting Water Use	Object	Authorized Flow Rate (m^3/day)	Issue Date	Expiry Date
15.752/2018 Freshwater withdrawal	Authorizes freshwater withdrawal in the Itapicurú River watershed, from an existing dam, (Cuia) authorized through Ordinance No. 219/04	2,125	March 14, 2018	March 14, 2022
18.678/2018 Mine water discharge	Authorizes the discharge of effluent into the Itapicurú River watershed, on the "Sem Nome" River	7,200	July 16, 2019	July 16, 2023
Discharge grant exemption process water discharge (TSF) 2016.001.000691/ INEMA/LIC-00691	Exempts the discharge of effluent into the Itapicurú River watershed, on the Itapicurú Mirim River	3,840	February 9, 2017	February 09, 2052 (35 years)

20.2 Environmental Management

20.2.1 Environmental Management System

Yamana has implemented an integrated management system covering health, safety, environment, and community through internationally accredited systems that include the ISO 14001 Environment Management System, the OSHAS 18001 Occupational Health and Safety Management System, and the International Cyanide Management Code.

Jacobina is certified under ISO 14001 and for the International Cyanide Management Code. Jacobina has implemented the Yamana Management System (SYG for its acronym in Portuguese) to establish the organization's policies and objectives. This system supports the management of environmental and occupational health and safety policies, social responsibility, and community relations; it also helps manage proposed objectives and meet stakeholder needs, expectations, and requirements. A risk assessment matrix was developed for the Jacobina mine operation by integrating risk matrices for ISO 14001:2015 and OHSAS

18001:2007. An operational process standard was developed for the management of hazardous and non-hazardous solid waste (POP-04-02-3.5-039).

Yamana's 2016 integrated Health, Safety, Environment, and Community (HSEC) framework (2016 HSEC Framework) represents the company's approach to health & safety, environmental management, and social risk management. Its purpose is to help develop a common understanding across Yamana's operations of its general approach to HSEC management and how to achieve its vision. Yamana acknowledges that every operation is at a unique stage of development and situated in unique socio-political and legal contexts. Accordingly, the management framework specifically targets the following goals:

- Outline industry best practices for HSEC management.
- Guide the development of new tools, processes, procedures, policies and/or standards, whether they are developed at the site or at the corporate level.
- Assist operations in any evaluations or self-evaluations of their current state of practice.
- Improve the overall integration of HSEC into the operations.

Yamana has strict health and safety procedures that are applied in every operating unit, working on the prevention of accidents through the implementation of best practices. Yamana's safety standards provide safe working conditions for its staff and its contractors.

20.2.2 Tailings Management, Monitoring, and Water Management

Yamana prioritizes the management of tailings and it is currently in the process of aligning the company's tailings management system with best practices proposed by the Mining Association of Canada (MAC), Canadian Dam Association (CDA) guidelines, and other international standards, including technical guidance provided by the International Committee of Large Dams (ICOLD). Yamana currently has a dedicated Corporate Director whose sole responsibility is the governance of the tailings management system and to provide technical guidance and support to ensure compliance.

Since 2017, Yamana has implemented a tailings management system known as SYGBAR. The system is built on a six-point management system that focuses on the following protocols:

- Standards for design and construction, and the use of design reviews
- Constant TSF monitoring and site-specific key performance indicators for development and performance management
- Periodic safety inspection
- Documentation and monthly reporting
- Training and continuous improvement

- Emergency response plans with dam failure analysis

As a member of the MAC, Yamana will be assessing its current tailings management systems with respect to the tailings framework proposed in MAC (2019). MAC's tailings management systems and guidelines have been adopted by mining associations in Canada, Argentina, and Brazil in recent years. The MAC systems include the completion of a Dam Safety Review (DSR) that follows the guidelines and recommendations provided in CDA dam safety guidelines (CDA, 2007) and its corresponding mining bulletin.

The tailings produced at the Jacobina mill are presently stored in a fully-lined facility, TSF B2. TSF B1 is a legacy tailings facility that has not been in operation since 2012. TSF B1is currently being rehabilitated according to the Recovery Plan Report (PRAD) and INEMA standards, which include the installation of closure cover in the impoundment area (~50% completion) and the placement of a revegetation layer.

Both TSF B1 and TSF B2 are monitored on an ongoing basis for seepage and physical stability conditions. Monitoring includes collecting data on phreatic surface levels in the dams and potential signs of deformation or other physical instabilities. Monitoring instrumentation includes a network of piezometers and survey monuments installed in the B1 and B2 dams. Volumes of deposited tailings, grain size distribution and density of the tailings, and impoundment water levels and volumes are also recorded for TSF B2 on a regular basis.

In addition, the Jacobina tailings area is covered by an extensive environmental monitoring program; this consists of 21 surface water stations, 60 groundwater monitoring points, as well as the monitoring of effluent, sediment, air quality (dust fallout), noise, and weather. INEMA approved a project proposed by Yamana to collect sulphate emanating from the old TSF B1. The project was fully implemented by November 2017; it consists of a system of groundwater interception wells installed downstream of TSF B2, immediately upstream of the Itapicurú River, designed to intercept the sulphate plume from TSF B1. Monitoring in 2018 has shown a reduction in sulphate at downstream locations. In addition, metals potentially associated with TSF B1's water quality, such as lead, copper, and zinc, are now also being intercepted (MDGEO, 2018). Recommendations from MDGEO Servicos de Hidrogeologia Ltda. (MDGEO) included the installation of additional monitoring wells to better assess the system's performance.

As part of the mine's tailings management system, Jacobina completed several independent expert reviews for TSF B2 in recent years; these include a review in 2017 and 2018 performed by a renowned international expert, Mr. Steven Vick. The review process includes an assessment of the design, stability, construction, and operation of the tailings facility. Mr. Vick's assessment (Vick, 2018) concluded that there were no significant weaknesses nor discrepancies from international best practices.

More recent dam inspections of TSF B2 were completed by local engineering experts, including GeoHydroTech in 2019 and DAM Projetos de Engenharia (DAM) in 2020. DAM is the design firm responsible for the design of TSF B2. Both Dam Safety Inspections of TSF B2 concluded that the facility is in good condition, the instrumentation system in place is adequate, and the dam is stable and meets the recommended safety standards.

GeoHydroTech provided additional recommendations on maintenance and potential improvements, including completion of an assessment of the tailings materials characteristics in the dam, improved maintenance of the surface water diversion system, and cleaning of seepage water collection system at the toe of the dam. Similar recommendations for additional maintenance of the seepage collection system at the dam's toe and maintenance of surface water diversion system in the abutments areas were provided by DAM. In addition, DAM observed the need to drain water accumulating behind the geomembrane liner in the southern portion of the impoundment in TSF B2 at the toe of TSF B1. The mine is progressively working towards addressing these recommendations: the water behind the liner in TSF B2 was pumped and erosion gullies were repaired.

Finally, the current closure plan for TSF B2 is presently at a conceptual level. The existing closure plan needs to be further developed, including preparation of more detailed closure design to confirm the feasibility of the existing conceptual closure plan approved by the regional authority (ANM), including budgets, and implementation schedules. The mine closure plan needs to also consider a plan for the long-term management of sulphate/metals in water collected from TSF B1.

20.2.3 WATER MANAGEMENT

Water management is a primary focus at Jacobina and has two main goals: (i) to minimize freshwater consumption at all times, including during drought conditions, and (ii) to intercept and treat contact water and site effluent. Water management also includes the interception of a sulphate/metals plume emanating from TSF B1 to minimize downstream effects from the Jacobina mine operation on the Itapicurú River.

According to verbal communication between SLR and Yamana, no acid rock drainage (ARD) and metal leaching (ML) issues associated with the active operating facilities have been identified. The waste rock extracted from underground mining is used for underground backfill and for dam construction when required. ARD/ML management is required for legacy mine facilities located at the Jacobina mine site. The water quality of concern is collected from the TSF B1 and the João Belo stockpile, both inactive facilities.

The freshwater used for ore processing is collected in the Cuia dam reservoir located in the river of the same name, approximately 1.5 km from the industrial area. The water collected in the reservoir is clarified prior to being used in the metallurgical process. A portion of the water collected in this reservoir is conveyed to a potable water treatment plant for domestic use and drinking water supply.

The Phase 2 Expansion plan will not require increased consumption of freshwater from the Cuia dam reservoir. There will only be an increase in volume of process water pumped from the TSF B2 tailings pond (Hace, 2019).

The water used in underground mine operations is first pumped into sumps and from there to a water treatment tank where the pH is adjusted to the desired level using caustic soda. All the mine water is pumped back to the underground operations.

The Phase 2 Expansion involves the development of a waste rock stockpile; drainage collection channels will be installed to intercept surface runoff and convey it appropriately for use in mine operation activities.

TSF B1, no longer in operation, has no tailings pond as is being rehabilitated. TSF B2 is lined with a geomembrane which reduces water infiltration to the groundwater environment. Diversion channels around the TSFs minimize the catchment area that contributes surface runoff from precipitation. A total of four evaporators reduce the water inventory in the tailings pond, thus preventing the need to discharge excess water to the environment. The percolated solution of TSF B1 and seepage from TSF B2 are pumped to the tailings pond of the active TSF. Water collected in this tailings pond is recirculated and reused in the industrial process.

TSF B2 is equipped with an emergency overflow structure designed to safely convey the 1-in-10,000-year runoff event while maintaining a minimum freeboard from the dam crest to prevent dam overtopping. Operation requirements of the TSF B2 tailings pond include maintaining the storage availability between the maximum operating water level elevation and the invert elevation of the emergency overflow structure. The purpose of this storage allowance is to manage runoff resulting from extreme storm events without activating the emergency overflow. Operation of TSF B2 is currently planned to continue until year 2032.

The water management system of Jacobina has been designed as a closed circuit, where water collected in the tailings pond is either used in the industrial process (or other activities such as dust suppression) without discharge of water to the environment. However, as a contingency, an effluent treatment system located in the TSF area is intended to treat the supernatant solution stored in the tailings pond. The water treatment system involves use of flocculant and aluminum sulphate solution, oxidation tanks, use of sodium hypochlorite, carbon columns and addition of hydrogen peroxide to destroy remaining cyanide in the effluent in case excess water has to be discharged to the environment (SETE, 2018).

The TSF B1, built in the 1980s, is not lined with geomembrane to reduce water infiltration. In November 2017, with approval from INEMA, a system of groundwater interception wells was put into operation downstream of TSF B2 and upstream of the Itapicurú River; with the purpose of intercepting the sulphate plume from TSF B1 in an effort to reduce sulphate concentrations downstream of the TSF dam. The intercepted water is pumped back to the TSF B2 tailings pond. In addition to the sulphate, other metals such as lead, copper, and zinc, potentially associated with the tailings, are being intercepted. Monitoring in 2018 showed a reduction in sulphate at downstream locations after the system was implemented (RPA, 2019). Following a performance assessment in 2018, recommendations were made to include additional monitoring wells to improve the assessment, and to carry out a study to evaluate the installation of additional interception wells in some areas of the current system to improve collection of the plume (RPA, 2019).

During operations, the collected water is recirculated and used for mine operation activities; however, another plan for sulphate/metals management will be required post-closure. It is anticipated that during the closure and post-closure phases the water collected in the TSF B2 tailings pond will have to be treated prior to discharge to the environment to comply with national environmental legislation on water quality (SETE, 2018).

The sewage treatment plant receives and treats the sanitary effluent from the plant area and the support facilities.

Of note, the water from the waste rock stockpile of the former João Belo Mine is acidic. In 2019, a water collection pond was built downstream of the stockpile to collect runoff from the João Belo stockpile and prevent the water from draining to the Cuia River. The water is now pumped to the recirculation circuit of the Jacobina operation for use in the process. Furthermore, pilot-scale studies have been carried out for effluent water treatment of the João Belo stockpile at closure (SETE, 2018). The bench/pilot-scale studies conclude that the best alternative for full-scale treatment will be a passive treatment system.

A site-wide water balance has been developed to mitigate the risk to water supply due to drought as well as the risk of excess water to the operation. Recently and in response to drought conditions, Jacobina has been successful at reducing freshwater consumption.

The environmental unit of Jacobina carried out an Operational Excellence project in 2019. As part of this project, the operation's tracking of water balance was automated. The main objective was to integrate the automation systems of the mine and plant in the PI software, a database program used by the environmental unit for online monitoring of the main flows between the different areas of the operation.

20.3 Environmental Monitoring

To comply with environmental legislation and applicable standards, the Jacobina Mine carries out environmental monitoring in the areas influenced by the operation. The monitoring is carried out by an internal technical team, trained and qualified for execution and evaluation of the monitoring program, as well as externally by third parties contracted for each type of monitoring. Where applicable, accreditation of methods according to INMETRO/ABNT NBR ISO/IEC 17025 is requested from the external companies (Yamana, 2020).

The environmental monitoring program at Jacobina is extensive; it relies on 24 surface water stations, 18 effluent stations (including industrial, mine and sanitary), 52 groundwater wells, 8 sediment stations, 3 potable water stations, as well as monitoring of air quality (dust fallout), noise, and weather.

Monitoring of fauna and flora has not been a condition to current and previous operation licences, but will be a condition in subsequent operation licences. In a proactive approach, Jacobina initiated a monitoring program for fauna and flora with the completion of an initial inventory in March 2020. A work plan has been developed for implementation of the monitoring program moving forward.

An operational process standard has been developed for surface water, groundwater, and liquid effluent monitoring (POP-04-02-4.1-170). Water quality compliance is evaluated with reference to the following documents:

- CONAMA Resolution 357/2005 - Surface waters
- CONAMA Resolution 430/2011 - Effluents (Industrial, Mine and Sanitary)
- CONAMA Resolutions 420/2009 and 396/2008 - Groundwater
- CONAMA Resolution 454/2012 - Sediments
- PRC 5/2017 of the Ministry of Health - Potability
- International Cyanide Code - CIC3

CONAMA (Conselho Nacional do Meio Ambiente) is the National Environmental Council.

Water quality samples are analyzed in the Jacobina site laboratory for a suite of parameters that include alkalinity, pH, free cyanide, WAD cyanide, total cyanide, chloride, free residual chlorine, total coliforms (P/A), conductivity, colour, biochemical oxygen demand (BOD), chemical oxygen demand (COD), hardness, Escherichia coli (P/A), dissolved iron, ammoniacal nitrogen, oils and greases, dissolved oxygen (DO), total cadmium, total lead, total zinc, total dissolved solids (TDS), total suspended solids (TSS), sedimentable solids (SS), sulphate, temperature, and turbidity. In October 2019, Jacobina contracted Corplab Environmental Analytical Services, an accredited external laboratory affiliated with ALS, to analyze samples for an expanded suite of water quality parameters.

Determining the background groundwater quality concentrations that can serve as a reference to identify environmental impacts for the area is a complex task. Many parameters, such as antimony, arsenic, iron, lead, and manganese can occur naturally in concentrations above reference thresholds adopted for groundwater in mineralized areas. Historical high concentrations of anionic compounds and metals in the area downstream of TSF B1 are indicative of its influence on groundwater. Likewise, the influence of mining activities on groundwater is noticed in the processing area and João Belo area, where the water quality samples can present higher concentrations of some parameters than in areas located upstream.

In compliance with conditions established in the operating licences, annual environmental assurance technical reports are submitted to INEMA in March of every year, in addition to other submissions of monitoring results that take place throughout the year. The latest Environmental Assurance Technical Report summarizes reporting for 2019 (Yamana, 2020). Environmental monitoring is summarized in section 6 of the document, with the following supporting technical reports included as appendices:

- Water (surface water, groundwater, effluents, treated water [potable], water balance, meteorological and river monitoring, groundwater interception wells).
- Air quality and atmospheric emissions
- Noise

According to verbal communication between SLR and Yamana, no non-compliance issues have been raised by INEMA.

Surface water exceedances were consistently detected in 2019 for one parameter: dissolved iron. However, Yamana indicates that the exceedance is characteristic of the regional background and that the groundwater is not being used. Occasional exceedances in a small number of samples at some locations were also detected for BOD, ammoniacal nitrogen, TDS, total sulphate, turbidity, total lead, and total zinc. Results for pH values show a typical range from 6 to 9.

Groundwater exceedances were detected in 2019 for cadmium (one location), lead, and dissolved iron. Groundwater exceedances were detected in 2019 for chloride, TDS, and sulphate. Results for pH values show a typical range from 3.5 to 8 at most groundwater wells.

The water levels in the groundwater interception wells downstream of TSF B2 initially showed significant oscillation, but a decreasing trend in the water levels was observed in 2019.

A summary of licences and conditions is provided in section 7 of the annual environmental assurance technical report (Yamana, 2020), with compliance reports included as appendices G to Q:

- Status of Environmental Licences for Operation
- Status of Water Use Grants
- Status of Authorization for Suppression of Native Vegetation
- Conditions Ordinance IMA 14,100 – Industrial Plant and TSF
- Conditions Ordinance INEMA 1791/2011 – Mine Operation

20.4 ENVIRONMENTAL STATUS

The main programs undertaken by Jacobina to cover various environmental aspects in and around the mine complex are as follows:

- **Environmental Complex Project.** Aims to integrate environmental practices and sustainability concepts through reactivation of the sewage treatment station plant, implementation of temporary residue deposit program, implementation of composting unit, construction of tree nursery, and construction of environmental education center.
- **Solid Residue Management Program.** Aims at managing solid residues by the identification, collection, and disposal of selected residues to licensed recipients and by conducting experimental research and analytical work. Includes identification of requirements, and of licensed recipients as well as periodic revisions.
- **Degraded Areas Recovery Plan.** Mapping of the degraded areas, studies of fauna and flora interaction, definition of recovery methodology, chronogram of activities, and presentation to environmental authorities.
- **Water Balance and Water Use Program.** A comprehensive site-wide water balance has been developed with support of external consultants in order to mitigate the risk of both drought and excess water to the operation. Recently, and in response to drought conditions, Jacobina has been successful at reducing freshwater consumption.
- **Environmental Control and Monitoring Plan.** Monitoring of the TSF dams and acid rock drainage. Establishment of methods to monitor the impact and frequency of operation activities on surface water, groundwater, ambient noise, and air emissions (dust, gases, “black smoke”). Monitoring of flora and fauna was initiated in the first quarter of 2020.
- Other environmental initiatives such as environmental education and environmental emergency brigade.

20.5 COMMUNITY RELATIONS

20.5.1 GENERAL CONTEXT

The two closest communities to the Jacobina mine site include Jacobina (with an approximate population of 79,000) and the small town of Itapicurú (with an approximate population of 36,000). The Jacobina Mine is located within the Serra de Jacobina mountains, where gold mining has taken place since the late 17th Century.

Jacobina is one of the poorest towns in Bahia State. Most of the economic activity is centered around livestock, the service industry, manufacturing, and mining. Due to the semi-arid climate, the conditions are not ideal for agricultural activity beyond subsistence agriculture and most produce does not make it to market.

In comparison to other settlement areas in Bahia State, Jacobina is relatively more traditional and less developed. It has a relatively high unemployment rate as compared to the rest of Brazil, although the rate is slightly lower than observed across Bahia State. Household incomes in Jacobina are also lower than average in Brazil and also lower than the average for Bahia State. Jobs related to mineral extraction in Jacobina comprise about 9% of formal jobs, although wages from mining account for 1/5 of the total in the municipality.

This section presents the results of the social review that was based on available documentation for Yamana's JMC operations and compared to relevant International Finance Corporation (IFC) Performance Standards (PS). This social review does not represent a detailed audit of Yamana's compliance with the IFC Performance Standards. Yamana's social performance at Jacobina is benchmarked against the following IFC 2012 PS:

PS1: Social and Environmental Assessment and Management Systems requires that companies identify, assess, and mitigate the social and environmental impacts and risks they generate throughout the lifecycle of their projects and operations. From a social perspective, the requirement includes: a comprehensive social assessment; identification of critical social impacts and risks; community consultation and engagement; information disclosure; mitigation plans to address impacts and risks; and development of an organizational structure with qualified staff and budgets to manage the overall social management system.

PS2: Labour and Working Conditions incorporates the International Labour Organization conventions that seek to protect workers' basic rights and promote effective worker/management relations.

PS4: Community Health and Safety declares the project's duty to avoid or minimize risks and impacts to community health and safety, and addresses priorities and measures to avoid and mitigate project-related impacts and risks that might generate community exposure to risks of accidents and diseases.

PS5: Land Acquisition and Involuntary Resettlement considers the need for land acquisition or involuntary resettlement of any individual, family or group; including the potential for economic displacement.

PS7: Indigenous Peoples considers the presence of Indigenous groups, communities, or lands in the area that may be directly or indirectly affected by projects or operations.

PS8: Cultural Heritage. This standard is based on the Convention on the Protection of the World Cultural and Natural Heritage. The objectives are to preserve and protect irreplaceable cultural heritage during a project's operations, whether or not it is legally protected or previously disturbed and promote the equitable sharing of benefits from the use of cultural heritage in business activities.

PS3 Resource Efficiency and Pollution Prevention and **PS6 Biodiversity Conservation** are not included in this list for social performance as they correspond to environmental performance standards.

20.5.2 PS1: Social and Environmental Assessment and Management Systems

Yamana uses its corporate Integrated Health, Safety, Environment, and Community (HSEC) Framework (2016) to serve as guidance across operations to achieve the following objectives:

- Outline industry best practices for HSEC management
- Guide the development of new tools, processes, procedures, policies and/or standards
- Assist operations in any evaluations or self-evaluations or their current state of practice
- Improve the overall integration of HSEC into the operations

The HSEC Framework includes guidance for (i) Health and Safety, (ii) Environmental Management and (iii) Social Risk Management. Of relevance to this report and this section is the guidance for Social Risk Management, which includes the components listed in Table 20-3.

Table 20-3: Social risk management element of Yamana's 2016 HSEC Framework

Category	Management Elements
Stakeholder Engagement	Stakeholder Identification and Analysis (mapping)
	Stakeholder Engagement
	Identification of Issues
	Feedback Management
Impact Management	Impact Identification
	Impact Management
	Community Baseline Information Tracking
	Plans for Closure
Benefit Management	Expectation Management
	Local Employment and Procurement
	Community Investment

The 2016 HSEC Framework provides guidance to Yamana and its operations regarding the collection of information on relevant stakeholders, assessment of potential impacts, and development of mitigation measures.

In concordance with these guidance documents, Yamana has been tracking stakeholder issues and risks related to Jacobina and tries to communicate project activities and other programs to stakeholders and members of the public on an ongoing basis. Based on the available information, it is evident that at Jacobina, stakeholder outreach, communication, and monitoring is conducted, and complaints and feedback are also collected and reported on. However, at the time of preparing this technical report, the details on the collection methods and specific complaints and how they were resolved were not available.

In 2019, the number of external complaints for Jacobina doubled that of the previous year. Most of these complains were related to housing construction and noise, though noise and dust emissions were all within the regulated limits. Details on the complaints database were not available at the time of preparing this technical report, although it is clear that each complaint is considered and tabulated in Yamana's review process.

Jacobina holds a number of environmental certifications which are relevant to the social environment including:

- ISO 14001:2015, a tool to help companies identify, prioritize, and manage environmental risks.
- OHAS 18001:2007, consisting of a series of British Standards for guidance on the formation of an Occupational Safety and Health Management Certification System.

Regular audits and reports on social performance are conducted for Jacobina and recommendations are made to improve communications and performance based on the audit findings.

Yamana made the corporate commitment to adopt the Social Licence to Operate (SLO) Index in order to inform the company on how to improve its operations and its current risk level. In 2017, Yamana began to conduct a series of surveys and outreach throughout the year at each of its sites, including Jacobina. The surveys are administered through in-person interviews as well as short mobile-based surveys. The survey results help to inform Yamana on the overall level of trust and acceptance by the community and details on how to improve. Data can also be reviewed by location and neighborhood to help with targeted engagement strategies.

The 2017 and 2018 SLO Index scores were relatively strong for Jacobina using the scale developed by the implementing partner - CSIRO (the Commonwealth Scientific and Industrial Research Organization). Yamana reported that in 2019 at Jacobina, community trust in the mine operation is high, with some concerns regarding noise and dust, but with results demonstrating a continuous improvement over the two-year period. These survey results indicated that there was potential for Yamana to increase its engagement with the local community through more frequent outreach and communications.

At the time of preparing this technical report, a detailed social impact assessment for the Jacobina mine operation was not available. However, the impact assessment findings for the eventual mine closure were available (SETE, 2018). This document included an assessment of the mine closure on the local economy, workforce, communities, and provided recommended mitigation measures to help transition workers to new jobs.

20.5.3 PS2: Labour and Working Conditions

Workers at Jacobina are registered and fall under a collective bargaining agreement which was signed in 2019. Some examples of worker benefits include (but are not limited to):

- Christmas basket
- Overtime
- Compensation for dangerous activities
- Retirement bonus
- Profit sharing
- Food and meal cards
- Tuition aid for employees
- Educational supplements for employees and families
- Health plan
- Dental plan
- Life insurance
- Childcare benefits
- Holiday benefits

Jacobina has a large share of local employment with approximately 90% of workers coming from the local community. Approximately 6% are from the wider region and 4 % are sourced nationally.

A number of guidance documents provide the framework for health and safety measures at Jacobina. At a corporate level, Yamana relies on its 2016 HSEC Framework which acts as a guidance document for all its operations. Of relevance to this technical report and this section is the guidance for Health and Safety, which includes the components listed in Table 20-4.

Table 20-4: Health and safety management element of Yamana's 2016 HSEC Framework

Category	Management Elements
Leadership	Positive Recognition
	Leadership Training
Risk and Hazard Management	Hazard Identification
	Job Hazard Analysis
	Field Level Risk Assessment
	Employee Reporting and At-Risk Behaviour
	Standard Operating Procedures
	Hazardous Materials
	Safety Design Reviews
Health, Hygiene and Medical	Health and Hygiene
	Medical
	Drug and Alcohol

The 2016 HSEC Framework provides guidance to Yamana and its operations to inform the development of site-specific health and safety procedures and on how to improve operations based on monitoring and health and safety performance.

As stated above, Jacobina holds an environmental certification which is relevant to worker health and safety. OHAS 18001:2007, consists of a series of British standards for guidance on the formation of an Occupational Safety and Health Management Certification System.

In 2018, Jacobina initiated an action plan to reduce accidents, with participation from both workers and management at the mine site. The plan was implemented in 2019 with the following principal goals:

- Identify higher-risk activities and procedures
- Schedule workplace safety audits
- Provide training with visible leadership
- Perform workplace safety audits
- Provide leadership examples of health and safety behaviour
- Update Standard Operating Procedures
- Strengthen visible leadership

Regular audits and reports on worker health and safety are conducted for Jacobina and recommendations are made to improve performance based on the audit findings. Recent audit reports for 2019 report on a number of safety performance indicators including the following:

- Frequency of accidents with injury
- Severity and frequency of accidents with and without loss of time
- Accidents by type and company

The findings of the 2019 report indicate that most incidents were related to contractors as opposed to direct employees, resulting in recommendations to improve communications with contracted companies on health and safety measures. Jacobina maintains a tool to collect and monitor health and safety issues, and employees are encouraged to participate and fully consult in health and safety monitoring and meetings.

The environmental impact assessment on the effects of the future Jacobina closure (SETE, 2018) provides a summary of the potential effects on the local economy. The findings indicate that while the local economy is diversified and the overall effects are expected to be minimal and mitigation measures will help to provide additional training and support to workers in their transition to new employment.

20.5.4 PS4: Community Health and Safety

Yamana has made a number of commitments to community well-being, health, and safety at Jacobina, including the following:

- Corporate programs with direct investments in the community such as community developments, the "Open Doors" Program to improve community communications, and the "Integration Program" aimed at improving community quality of life.
- Arts and Education Programs.
- Community Strengthening Programs.

JMC provides updates on these programs to community members through presentations and ongoing discussions with stakeholders. Some of these recent and specific programs are listed below:

- Local housing projects and renovations
- Citizen meetings
- Seminar for Women Entrepreneurs
- Jacobina Micareta (Carnival)
- Walk of Light Cultural Event
- Actions to combat the sexual exploitation of children and adolescents
- Environment Week
- Itapicurú Watershed Committee
- Volunteer Day at the Fazendinha (little farm) project
- Storytelling at schools
- Broadcast of religious service on two local radio stations

This list is only a portion of the social, cultural, educational, economic, and religious programs supported by Yamana at Jacobina.

20.5.5 PS5: Land Acquisition and Involuntary Resettlement

At the time of preparing this technical report, since there are no new activities proposed outside of the existing project footprint, there is no new land acquisition or involuntary resettlement.

20.5.6 PS7: Indigenous Peoples

Based on available information there are no Indigenous Peoples residing in or using the project area lands. Therefore, this standard is not relevant to this review.

20.5.7 PS8: Cultural Heritage

Based on information received from Yamana, the area surrounding the Jacobina Mine is not known for archaeological resources and no related studies have been completed to date.

At the time of preparing this technical report, there was no available information on any Chance Find Procedures that might be required, should archaeological evidence be discovered in the future.

20.6 Mine Closure

The Jacobina operation involves mining and processing of gold ore. The mining unit consists of four underground mines (João Belo, Morro do Vento, Canavieiras and Basal) with respective openings for galleries and ventilation shafts, a metallurgical plant with ore processing facilities, the Cuia dam and reservoir (freshwater), TSF B1 and TSF B2, administrative and operational support facilities, and haul and access roads. Two additional inactive facilities, an open pit and a waste rock stockpile from the former João Belo Mine are located at the Jacobina mine site.

The mine closure plan for Jacobina will be developed in three stages: conceptual plan, basic plan and executive plan, with increased level of detail as the operation approaches the end of the mine life. The current mine closure plan (SETE, 2018), which corresponds to the conceptual stage, considers the beginning of mine closure in 2032. It was prepared based on Yamana's standard procedure PCS-00-00-3.5-015 – Closing of Mining Activities; these activities are in line with the recommendations of the International Council on Mining and Metals (ICMM, 2008) according to SETE (2018).

The mining regulatory norm NRM No. 20/2001 establishes administrative and operational procedures in case of mine closure (definitive cessation), suspension (temporary cessation), and resumption of mining operations. NRM No. 20/2001 also outlines the content requirements of the mine closure plan.

The mining regulatory norm NRM No. 21/2001 establishes administrative and operational procedures in case of rehabilitation of mined and impacted areas. According to this norm, rehabilitation projects must be prepared by legally qualified technicians and submitted to the National Mining Agency (ANM for its acronym in Portuguese) for evaluation.

The main objective of the conceptual mine closure plan for Jacobina is to present solutions to be implemented before, during, and after mine closure in order to avoid, eliminate, or minimize occurrences of long-term environmental liabilities and eventual future obligations for Yamana. The conceptual mine closure plan for Jacobina considers the following three phases:

- Pre-closure phase: encompasses a period of 2 years prior to commencement of decommissioning activities and execution of closure works. Final closure studies will be developed during this phase.
- Closure phase: encompasses decommissioning activities and execution of closure works for rehabilitation of the mine site area.
- Post-closure phase: expected minimum duration of 5 years encompassing environmental stabilization, post-closure monitoring and verification of physical, biological and socioeconomic stability, including maintenance activities. Post-closure monitoring of the tailings dams is expected to be required for a longer period, estimated to be 10 years.

A summary of the main proposed closure activities is presented in Table 20-5.

Table 20-5: Summary of main closure activities

	Mine Component	Closure Activities
Mine	Open pit mine (João Belo)	Removal of equipment and auxiliary infrastructure
		Construction of perimeter fencing
		Signage
	Underground mines	Dismantling and removal of mobile equipment for reuse or sale
		Dismantling and removal of water management, ventilation, and communication infrastructure
		De-energization and contaminant removal
		Installation of reinforced concrete at access points to block access
Waste Disposal Facilities	Waste rock stockpiles	Recontouring of slope, if needed, for physical stability
		Installation of low-permeability cover to limit infiltration and promote storage and evaporation of surface water runoff
		Construction of surface drainage system with erosion-protection lining for management of clean surface runoff
		Revegetation where possible
	Tailings storage facility	Consolidation and treatment of tailings by removing impounded water
		Levelling, slope stabilization, and recontouring
		Installation of low-permeability cover to limit infiltration, induce chemical stabilization, and promote storage and evaporation of surface water runoff
		Construction of drainage system as part of the cover
		Reconfiguration of non-contact water diversion channels
		Removal of equipment and auxiliary infrastructure
		Revegetation where possible
Other Infrastructure	Process plant Water management infrastructure Workshops Warehouse & auxiliary buildings Electrical substations Access and hauling roads Fuel station Gallery 7 Environmental complex	Disassembly of electrical, mechanical, and hydraulic systems
		Topographic regularization for revegetation, in compliance with the Degraded Areas Recovery Plan
		Adequate disposal of chemical substances, contaminated materials, non-contaminated materials, hazardous waste and non-hazardous waste
		Dismantling, demolition, salvaging, and disposal of structures; including buried structures when necessary
		Demolition of masonry building facilities
		General sanitation and cleaning
		Removal of equipment
		Verification of soil quality and removal of contaminated soils if required
		Scarification of access roads
		Transportation to authorized disposal or collection areas

	Mine Component	Closure Activities
		Maintenance of Gallery 7 for visitors in partnership with the Ouro Vivo Museum and in association with the Environmental Education Center
		Keep the environmental Education Center area operational. Seedling Nursery repurposed for cultivation of ornamental plants. Disposable Materials Center repurposed for commercialization of ornamental plants to be produced by the community.
Staff Facilities	Administrative buildings Potable water and sewage systems	Dismantling and removal of structures and equipment to authorized disposal areas
		Removal of prefabricated elements
		Demolition of concrete slabs
		Recontouring of surface topography for revegetation, in compliance to the PRAD
		Implementation of natural drainage

Physical, chemical, hydrological, and biological stability conditions following closure will be verified through implementation of a post-closure maintenance and monitoring program. Monitoring should also support the evaluation and verification of compliance with closure activities and targets, and the identification of deviations leading to the adoption of corrective measures.

The closure and post-closure initiatives and monitoring programs designed to achieve physical, chemical, biological, and social stability consist of both engineering measures, land revegetation, as well as socioeconomic measures. The closure initiatives and monitoring programs identified in the conceptual mine closure plan are as follows:

- Geochemical monitoring program
- Geotechnical monitoring program for open pit, waste rock piles, and dam slopes
- Air emissions and ambient noise control program
- Solid waste management program
- Erosive and settlement process control program
- Degraded areas recovery plan
- Flora and fauna monitoring program in rehabilitation areas
- Social communication program
- Program to promote the creation of an Association of Ornamental Plant Growers
- Program to promote creation of an Association of Productors and Collectors
- Labourers demobilization program
- Social and environmental closure performance monitoring program

It is noted that surface water and groundwater monitoring locations have not yet been proposed in the current mine closure plan. SLR recommends incorporating a preliminary closure and post-closure water monitoring program that identifies the future location of stations, the suite of water quality parameters to be sampled and analyzed, and the reporting procedures and their frequency.

As noted in RPA (2019), the 2018 mine closure plan does not provide details on the potential requirement for long-term water management and treatment, particularly in regard to the sulphate/metals plume from TSF B1, which is currently intercepted downstream of TSF B2. Due to the potential for environmental impacts to downstream water from the existing sulphate/metals plume, long-term closure costs could potentially extend decades beyond closure. SLR recommends that costs for management of water and for monitoring and maintenance of dams during the post-closure period be reviewed as the closure plan is developed in more detail.

Table 20-6 lists the current estimate for closure costs as presented in the 2018 mine closure plan (SETE, 2018), using an exchange rate of 4.00 BRL:USD (Brazilian real to US dollar).

Table 20-6 Total estimated costs for mining reclamation and closure (from 2018 mine closure plan)

Activity	Cost	Cost
	(R$)	(US$)
Future closure planning studies	969,000	242,250
Monitor, pump and treat groundwater - 60 months	2,162,000	540,500
Demolition, waste management, underground mine	44,302,000	11,075,500
Air and noise monitoring	544,000	136,000
Geotechnical monitoring	3,451,000	862,750
Revegetation, contaminated soil, contouring, fencing	76,508,000	19,127,000
Fauna monitoring	920,000	230,000
Environmental programs	10,200,000	2,550,000
20% contingency	27,811,000	6,952,750
Total	**166,867,000**	**41,716,750**

20.7 SLR COMMENTS

No environmental issues were identified from the documentation available for review that could materially impact the ability to extract the mineral resources and mineral reserves. Jacobina has the operational licences required for operation according to the national legislation. The approved licences address the authority's requirements for mining extraction and operation activities. For expired licences in the process of being renewed, they remain valid until the revalidation process is completed by INEMA. In compliance with conditions established in the operating licences, annual environmental assurance technical reports are submitted to the authorities.

An environmental monitoring program is in place at Jacobina for weather, surface water quality, groundwater quality, air quality and emissions, and ambient noise. Monitoring of flora and fauna was initiated in the first quarter of 2020.

ARD/ML associated with TSF B1 and the João Belo stockpile (inactive facilities), are managed through ponds and groundwater interceptor wells located downstream of the facilities. Water quality is monitored by Yamana at various locations downstream. Yamana is planning to install additional groundwater monitoring wells in the TSF areas. TSF B1 is being rehabilitated.

The water management system implemented at Jacobina appears to be sound and follows common practices applicable for the protection of the environment.

The ore processing system was designed to maximize the recirculation of process water and minimize the requirement for freshwater. The mine water is pumped back to the underground operations. The water collected in the active TSF B2 is recirculated to the process plant. Freshwater required for ore processing is supplied from a reservoir built in the Cuia River. There is no discharge of industrial water to the environment. The site-wide water balance mitigates the risk to water supply due to drought as well as the risk of excess water to the operation.

Yamana has implemented an integrated management system covering health, safety, environment, and community through internationally accredited systems.

A conceptual mine closure plan was developed in 2018 for the mine components that includes a closure cost estimate. The latest version was completed in December 2018. With the potential for impacts to water from ARD/ML, and an existing sulphate/metals plume collection system, there could be long-term water management and treatment requirements post-closure. Long term closure costs could potentially extend several years beyond closure.

No known social issues were identified from the documentation available for review. At present, Yamana's operations at Jacobina are a positive contribution to sustainability and community well-being. Jacobina has demonstrated a commitment to employee health, safety, and well-being; community programs; and ongoing outreach and data collection to support issues management and mitigation. Yamana has established and continues to implement its various policies, procedures, and practices in a manner broadly consistent with relevant IFC Performance Standards.

SLR recommends that Yamana should implement the following:

- Conduct geochemical sampling and characterization of waste rock before developing a new waste rock stockpile.
- Maintain a robust water quality monitoring program to verify compliance with applicable environmental standards and evaluate the appropriateness of the water management strategies that are in place.

- Continue to implement the environmental monitoring program, which monitors and manages potential environmental impacts resulting from the mine operations, to inform future permit applications and mine closure plan updates.
- Consider the implementation of a noise- and vibrations-monitoring program, consistent with the integrated 2016 HSEC Framework.
- Consider establishing an energy and emissions strategy/plan to determine, on a defined frequency, sources of energy consumption and associated greenhouse gas (GHG) emissions, consistent with the integrated HSEC framework (Yamana, 2016).
- The existing sulphate/metals plume originating from the decommissioned TSF B1 may potentially cause ongoing effects on water. This could result in long-term closure costs extending beyond the five-year post-closure treatment period that is currently outlined in the conceptual 2018 mine closure plan. It is recommended that the closure cost estimate be reviewed as the mine closure plan and designs for both TSF facilities are developed in more detail. Costs for long-term monitoring and maintenance of dams should also be reviewed.
- Considering that, historically, mine site closures have the potential to result in significant economic impacts to a community, a detailed social management plan should be developed to mitigate the economic and social effects of mine closure; this plan would include ongoing consultation, training, and planning.
- Incorporate a strategy for closure of the inactive open pit into the mine closure plan.

21 Capital and Operating Costs

The capital and operating costs outlined in this section of the technical report and based on the Phase 1 Optimization LOM plan presented in Section 16.3 of this technical report. Capital and operating costs for the Phase 2 expansion scenario are summarized in Section 24 of this technical report. The capital and operating cost estimates were prepared based on recent operating performance and on Yamana's current budget forecast. All costs in this section are in US dollars and are based on an exchange rate assumption of 4.00 BRL:USD, compared to an exchange rate assumption of 3.50 to 3.60 BRL:USD used in the most recent technical report on Jacobina compiled by RPA with an effective date of June 30, 2019 (RPA, 2019).

21.1 Capital Costs

The total LOM capital costs estimate is approximately US$357 M and is assumed to support sustaining capital requirements for the mining and processing of mineral reserves over the project's 14.5-year LOM. A summary of the LOM capital costs for the project is shown in Table 21-1.

Table 21-1: Life of mine capital costs

Category	Phase 1 Optimization Total LOM $US
Sustaining Capital Cost	**326,818,000**
Mine Development	142,164,000
Infrastructure	70,981,000
Vehicles & Machinery	52,140,000
Tailings Dam	30,144,000
Hardware & Software	13,016,000
Other Sustaining CAPEX	18,373,000
Expansionary Capital Costs	**30,259,000**
Capacity Increase	8,587,000
Tailings Dam Expansions	11,895,000
Expansion Mine Development	7,306,000
Other Expansionary CAPEX	2,471,000
Total Capital Cost	**357,077,000**

Capital costs do not include project financing and interest charges, working capital, sunk costs, capitalized exploration, closure costs, or capital costs estimated to be required for the construction of the Phase 2 Expansion project; these costs are outlined in Section 24 of this technical report.

The main capital costs are related to capitalized mine development; this consists of approximately 64,000 m over the LOM period.

Annual mine closure costs are listed in Section 20 of this technical report and cover rehabilitation, dismantling, tailings, and closure of mine accesses as well as post-closure monitoring for a five-year period.

21.2 Operating Costs

Operating costs are defined as the direct operating costs; these include mining, processing, tailings storage, water treatment, general and administrative and refining costs.

The production plan drove the calculation of the mining and processing costs as the mining mobile equipment fleet, manpower, contractors, power, and consumables requirements were calculated based on specific consumption rates.

The operating cost estimates rely on the following assumptions:

- The specific consumptions for all consumables for mining and processing were analyzed based on historical usage over the last 12 months and defined based on the continuous improvement projects, assuring alignment with the mine production and cost plan.
- Power cost was calculated based on power capacity load of each equipment and area, considering the availability, utilization, and power factor. The prices were based on the contract for demand and supply.
- Labour cost was calculated based on the estimated headcount requirements, including salaries, benefits, workload, and personal protective equipment (PPE).
- The maintenance costs were calculated at a task level for each equipment for both mining and processing areas. The drivers for those costs were equipment working hours, preventive maintenance plan, and useful life for spare parts and components.
- Contractor costs are based on existing contracts, where the most expensive costs are the mine hauling contract and light vehicles rental. The costs for the hauling contract were calculated considering contract rates, truck productivity, and necessary working hours to support the mine plan and. The fixed costs of this contract were also considered.
- General and administrative (G&A) costs consider the supporting areas, such as human resources, accounting, HSEC, IT, general services, security and procurement. The main costs are labour and contracts like surveillance, catering, environmental monitoring and consulting.

The operating cost has an exposure to the local currency of around 80%.

Operating costs are forecasted to average US$41.04/t over the LOM period, as set out in Table 21-2. Operating cost data for the expansion case scenarios, as well as the comparisons with the current estimate, are outlined in Section 24.7.

Table 21-2: LOM Average unit operating costs

	Base Case (US$/t processed)
Mining	23.33
Process	12.28
G&A	5.43
Total	**41.04**

22 Economic Analysis

Financial information has been excluded from this technical report as Yamana is a producing issuer and the Jacobina Mine is currently in production. Yamana has performed an economic analysis of the current project using a gold price of US$1,250/oz, at the forecasted production rates, metal recoveries, and capital and operating cost estimated in this technical report. Yamana confirms that the outcome is a positive cash flow that supports the mineral reserve estimate. Due to the nature of the mining business, these conditions can change significantly over relatively short periods of time. Consequently, actual results may be significantly more or less favourable.

Section 24 summarizes a pre-feasibility study based on the Phase 2 Expansion, an expansion scenario that would increase throughput to 8,500 tpd. The economic analysis for this scenario is presented in Section 24.8.

23 ADJACENT PROPERTIES

There are no adjacent properties that are relevant to this technical report. Yamana controls almost all of the Bahia Gold Belt except for a few small artisanal miner (garimpeiro) holdings.

24 OTHER RELEVANT DATA AND INFORMATION

Yamana commissioned Ausenco to conduct a pre-feasibility study (PFS) of the Phase 2 Expansion. This study, dated March 31, 2020, considered an expansion scenario that would increase the processing plant's throughput capacity of 6,500 tpd to 8,500 tpd (Ausenco, 2020). This section summarizes this pre-feasibility study.

In 2019, Jacobina began optimizing the processing plant to stabilize throughput at a target rate of 6,500 tpd. Yamana refers to this optimization as Phase 1 Optimization. The first step of the optimization was the installation of an Advanced Process Control system in early 2019 to increase the level of plant automation. Other components of the optimization include additional gravity concentrators, a new induction kiln, replacement of screens, and new carbon-in-pulp (CIP) tanks. The Phase 1 project is on track for completion in mid-2020.

Jacobina achieved the Phase 1 Optimization throughput objective of 6,500 tpd in the first quarter of 2020, a full quarter ahead of schedule and without the benefits expected from the installation of all the plant modifications. Yamana continues to evaluate the actual Phase 1 performance and pursue further debottlenecking initiatives to determine the sustainable throughput level in excess of 6,500 tpd that the mill can achieve without additional investment.

Following up on Phase 1 Optimization, Yamana is studying the increase in throughput to 8,500 tpd, referred to as the Phase 2 Expansion. The throughput increase is expected to be achieved through the installation of an additional grinding line and incremental upgrades to the crushing and gravity circuits. If implemented, the Phase 2 Expansion is expected to increase annual gold production by 31%, reduce costs, and generate significant cash flow and attractive returns. The total capital cost of the Phase 2 Expansion is estimated at US$57 M, of which US$35 M is assigned for the processing plant, US$14 M for underground mining, and US$8 M for infrastructure.

24.1 PHASE 2 EXPANSION – UNDERGROUND MINING EQUIPMENT AND INFRASTRUCTURE

The current mining equipment fleet and underground infrastructure can support most of the additional production requirements for the Phase 2 Expansion. However, a modest amount of additional mining equipment and ventilation and dewatering infrastructure is required and the acquisition of certain infrastructure will be brought forward to support the increased production rate.

A list of the active mine equipment at Jacobina is shown in Table 24-1 and is compared to the maximum amount of equipment that will be required to achieve the mine plan for the Phase 2 Expansion. Equipment replacement has also been included in sustaining capital cost estimates based on estimated equipment operating hours. Trucks will continue to be contractor-owned and operated.

Table 24-1: Mining equipment requirements

Equipment	Currently Active	Maximum Required for Phase 2 Expansion	Additional Equipment Required
Fan Drills	6	9	3
Front-end Loaders	8	8	0
Jumbos	7	10	3
LHDs	8	12	4
Scalers	7	9	2
Scissor Lifts	11	11	0
Trucks	45	62	17
Graders	4	4	0
Backhoes	3	3	0
Water trucks	2	2	0
Shotcreters	2	3	1

Ventilation infrastructure will be upgraded to provide adequate airflow to the additional working areas and for increased equipment fleet. The ventilation model has been simulated to estimate the required airflow quantities. At the Morro do Vento South, Morro do Vento North, and Morro do Cuscuz mines, additional airflow of 300 m^3/s will be required to support the increased production rates. The Canavieiras North Mine is currently served by the Canavieiras Central main ventilation circuit, where the existing raise infrastructure will be used to reactivate an independent ventilation circuit by 2023. Options are being currently being evaluated to determine if new fans will be purchased for Canavieiras North, or if existing fans will be relocated to that mine.

Additional dewatering infrastructure, not considered in the base case, will be required to achieve the Phase 2 Expansion scenario, such as an additional acid water treatment plant to treat dewatering effluent. The plant will be located close to the portals of the João Belo and Morro do Vento mines.

24.2 Phase 2 Expansion – Processing Plant

The mineral processing plant at Jacobina is currently being optimized to support a daily production throughput of 6,500 tpd. The Phase 2 Expansion would increase throughput to 8,500 tpd on a sustainable basis, while maintaining current gold recoveries of 96% to 97%.

Plant modifications include the replacement of the existing tertiary crusher with a larger capacity crusher, the addition of a third ball mill, and the addition of a new silo. The third ball mill is identical in size to the existing ball mill 2, which will enable synergies in maintenance and supply of spare parts. The target throughput rate of 8,500 tpd can be achieved with only two grinding lines in operation (ball mills 2 and 3). The intention is to shut down the smaller ball mill 1. With three ball mill lines in operation, plant throughput could be expanded to 10,000 tpd in the future.

The Phase 2 Expansion process flow sheet is depicted in Figure 24-1 and described in more detail below.

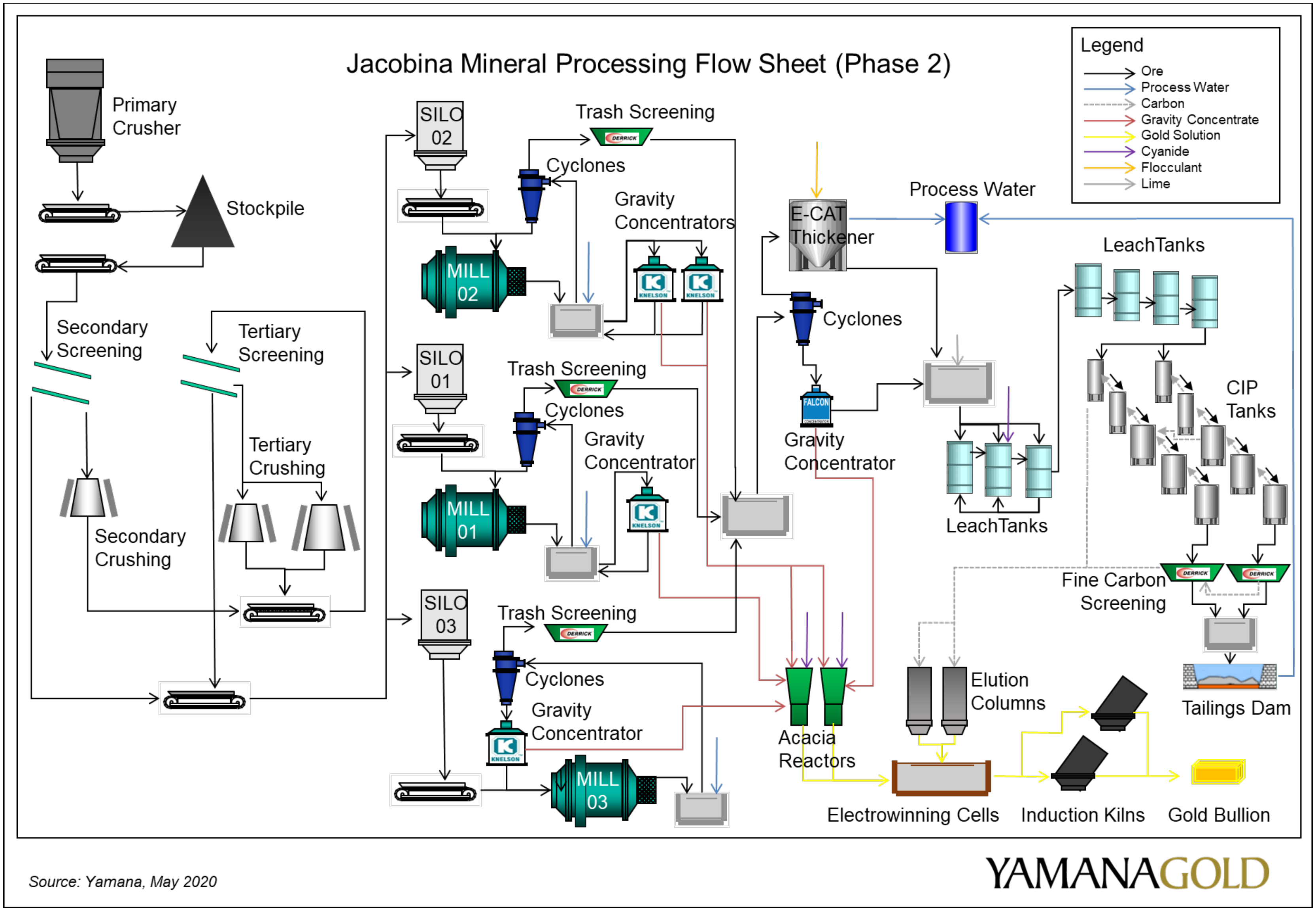


Figure 24-1: Phase 2 Expansion process flow sheet

24.2.1 Crushing Circuit

Several options were considered to increase secondary crushing capacity and provide the greater operational flexibility needed for the Phase 2 Expansion:

- Option 1: Operate the crushing circuit at an increased availability.
- Option 2: Include a third HP500 crusher.
- Option 3: Replace the two existing HP500 crushers with two HP6 crushers.
- Option 4: Replace an existing HP500 crusher with one HP800 crusher.

Option 1, while not requiring capital investment, would limit the crushing circuit's catch-up capacity, and would therefore present a risk to reaching the required production rate.

Option 2 would require a third HP500 crusher which is of a similar size as the existing crushers. Yamana indicated that the inclusion of a third crusher would require major changes in the secondary and tertiary crushing areas such as new conveyor belts, new belt feeder, modification of the crusher feed silo, relocation of the hydraulic units for all crushers (to allow for expansion of existing buildings) and structural works (concrete and steel structures). These changes were deemed complex, expensive, time consuming, and would impact the existing operation during construction and commissioning.

Option 3 considers the replacement of both HP500 secondary crushers with two HP6 crushers; the HP6 is slightly larger than the HP500.

Option 4 requires the replacement of one existing HP500 with a larger and heavier HP800.

Both options 3 and 4 can achieve the required throughput rates for the crushing circuit. Yamana has selected to proceed with option 4, in which the new crusher can be installed in the location of the existing HP500, offering the least impact on the operation.

24.2.2 Grinding Circuit

The Phase 2 Expansion project includes the following additional grinding equipment:

- A third ball mill (15' x 30'). The new ball mill is identical in size to the existing ball mill 2, which will enable synergies in maintenance and supply of spare parts.

- A 6,000 t capacity silo for additional storage of crushed ore to feed the third ball mill circuit.

- A new cyclone feed hopper and duty/standby pumping arrangement.

- A new cyclone cluster, screen, and gravity concentrator associated with the third ball mill.

- A new cyclone feed distribution box associated with ball mill 1 and ball mill 2 to split feed to an existing gravity concentrator as well as to a new gravity concentrator.
- A new Acacia intensive leach reactor to work in parallel with an existing Acacia intensive leach reactor.

24.2.3 Thickening of Grinding Product

The Phase 2 Expansion project includes a new distribution box and two additional trash screens (making four trash screens in total for this duty) to adequately process the higher volumetric flows from the grinding circuit.

The existing hydrocyclones in this part of the circuit will be optimized (increased number of operating cyclones) as a result of the increased flow rates. Similarly, the operation of the existing Falcon concentrator, which receives the hydrocyclone underflow, will also be optimized based on the higher design feed rate.

The hydrocylone overflow will report to the existing pre-leach thickener without needing any modification, based on existing operational experience.

The underflow from the pre-leach thickener feeds is combined with “reject” from the Falcon concentrator in order to provide a higher density slurry to the leaching circuit which uses a conventional cyanide leaching process.

24.2.4 Leaching Circuit

The leaching circuit consists of seven leaching tanks; no additional equipment is required for the increased flow rate resulting from the Phase 2 Expansion project. Both historical test work and operational experience provide confirmation that adequate residence time will be available to achieve the required gold dissolution.

24.2.5 CIP Adsorption Circuit

The pulp from the leaching circuit is delivered to the CIP adsorption circuit which has been optimized to include two lines of five mechanically agitated CIP tanks (increased from one line of six CIP tanks). The activated carbon is pumped to a single screen per adsorption line. One of these screens is installed as part of the Phase 2 Expansion project.

24.2.6 Elution Circuit

The Phase 1 Optimization already includes the installation of another elution system in parallel to the existing one; this meets the Phase 2 expansion needs.

24.2.7 Electrowinning Circuit

A new plating cell is planned for the Phase 2 Expansion project.

24.2.8 Tailings Disposal

A new tank of 585 m^3 capacity has been included to store tailings decant return water. This represents approximately 2 hours storage at the nominal throughput rate. The tailings pumping system will be upgraded with new tanks and pumps to manage the increased capacity, and the entire tailings pipeline will be covered. No changes to the TSF design are expected, although the construction schedule is accelerated to align with the increased processing rate.

24.2.9 Automation, Instrumentation, and Control

The current supervision and control system installed at Jacobina uses both programmable logic controllers (PLCs) and remote input/outputs (I/Os) from the Siemens Simatic line. The Phase 2 Expansion project includes the acquisition of new automation hardware compatible with the existing system and an update of the existing central processing units (CPUs).

24.2.10 Architecture and Construction

The current canteen, maintenance workshop, and administrative office facilities are able to support the Phase 2 Expansion plan. The warehouse would need to be expanded to store consumables and spare parts required for the additional equipment. Building constructions include an expansion of the warehouse and grinding building, and new sheds for cyanide preparation. These new and expanded buildings will follow the same architectural line as those of the existing infrastructure.

24.3 Phase 2 Expansion – Power Supply

The current power demand at Jacobina is approximately 17.2 MW. For the Phase 2 Expansion, the required power demand is estimated at 27.4 MW, representing an increase of approximately 10 MW. Energy consumption is expected to increase from 10,877 to 17,302 MWh/year after the Phase 2 Expansion. Yamana is currently working with the power distributor, COELBA, to plan the required infrastructure to support the increase in power demand.

This power demand is expected to increase gradually from 2020 to 2024, as additional equipment is progressively added to the processing plant and mine. The increased power demand at the processing plant is mostly related to the new ball mill and crusher, whereas the increased power demand at the mine is mostly related to ventilation and pumping.

24.4 Phase 2 Expansion – Life of Mine Plan

The Phase 2 Expansion LOM (PFS case) is based on the mineral reserves with an effective date of December 31, 2019, described in Section 15 of this technical report. The PFS case LOM plan considers a mine life of 11.5 years, starting with a plant feed rate of 6,500 tpd for 2020 and 2021, ramping up production in 2022, to reach the average plant feed rate of 8,500 tpd by 2023, as shown in Table 24-2. Plant throughput will be maintained at 8,500 tpd until 2030 and will decrease in 2031. The LOM gold production profile of the PFS case increases from a target

Phase 1 Optimization running rate of 175 koz per year to approximately 230 koz per year, as shown in Figure 24-2.

Total LOM underground development for the expansion scenario is unchanged from the base case, but higher annual development rates will be required to achieve increased mine production rates. LOM lateral development requirements are approximately 64,000 m of capital development and 100,000 m of secondary development. The development rate for the PFS expansion case peaks at a total of 19,300 m per year, compared to a peak annual development rate of 16,800 m required for the base case processing rate of 6,500 tpd.

For internal planning purposes, an extended mine plan (Extended Case) has been developed that considers the addition of 9.5 Mt of plant feed with an average grade of 2.40 g/t gold, assuming the successful conversion of mineral resources into reserves. This would increase the mine life of the Phase 2 Expansion scenario from 11.5 years to 14.5 years. The gold production profile of the Extended Case is shown in Figure 24-3.

Based on Jacobina's impressive track record of discovery and successful conversion of mineral resources to mineral reserves, Yamana is confident that, based on required infill drilling, the future conversion of mineral resources to mineral reserves will continue to show positive results. Furthermore, Jacobina's favourable geological environment, both near mine and regionally, provides exceptional mineral potential that may eventually result in extending the mine life beyond the Extended Case.

Table 24-2: LOM plan – Phase 2 Expansion PFS Case

Description	Units	LOM	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
Tonnes Mined	**kt**	**34,248**	2,372	2,364	2,540	3,106	3,138	3,130	3,130	3,130	3,138	3,130	3,154	1,917
JBA	kt	**9,919**	707	733	613	541	373	645	616	871	892	1319	1319	1290
MVC	kt	**4,412**	17	136	252	677	721	719	551	356	181	396	405	0
MVS	kt	**3,521**	154	101	89	197	517	628	625	274	520	281	133	0
CAS	kt	**6,873**	955	938	989	909	384	237	331	429	218	291	703	489
CAC	kt	**4,097**	196	180	372	208	418	390	506	741	666	377	42	0
MCZ	kt	**1,582**	237	102	26	265	182	97	188	113	230	33	54	55
SCO	kt	**2,029**	0	0	0	0	139	115	229	228	348	423	463	83
CAN	kt	**1,816**	106	173	198	308	404	298	84	117	83	9	36	0
Mining Grade	**g/t Au**	**2.27**	2.21	2.29	2.52	2.36	2.37	2.36	2.37	2.37	2.37	2.00	2.00	1.98
JBA	g/t Au	**1.88**	1.84	1.93	1.96	1.75	1.77	1.84	1.89	1.91	1.81	1.87	1.94	1.91
MVC	g/t Au	**2.50**	3.62	3.27	2.65	2.65	2.77	2.75	2.63	2.13	2.21	1.80	1.94	0.00
MVS	g/t Au	**2.17**	2.19	2.35	2.09	2.51	1.91	2.11	2.10	2.05	2.50	2.06	2.27	0.00
CAS	g/t Au	**2.32**	2.44	2.26	2.49	2.41	2.33	2.14	2.39	2.22	2.22	2.00	2.18	2.24
CAC	g/t Au	**3.09**	2.59	2.54	3.32	2.59	3.08	2.98	3.36	3.32	3.38	2.55	2.25	0.00
MCZ	g/t Au	**1.91**	1.85	2.05	1.78	2.04	1.94	1.87	1.92	2.25	1.82	1.61	1.57	1.58
SCO	g/t Au	**2.07**	0.00	0.00	0.00	0.00	2.00	2.11	2.08	2.17	2.29	2.09	1.92	1.71
CAN	g/t Au	**2.58**	2.37	3.11	3.07	2.67	2.43	2.70	1.90	2.25	2.10	1.73	1.85	0.00
Mill Feed														
Ore Processed	kt	**34,348**	2,372	2,364	2,540	3,106	3,138	3,130	3,130	3,130	3,138	3,130	3,154	2,018
Feed Grade	g/t Au	**2.27**	2.21	2.29	2.52	2.36	2.37	2.36	2.37	2.37	2.37	2.00	2.00	1.97
Recovery	%	**96.5**	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5
Gold Produced	koz	**2,421**	162	168	199	227	231	229	230	230	231	194	196	123

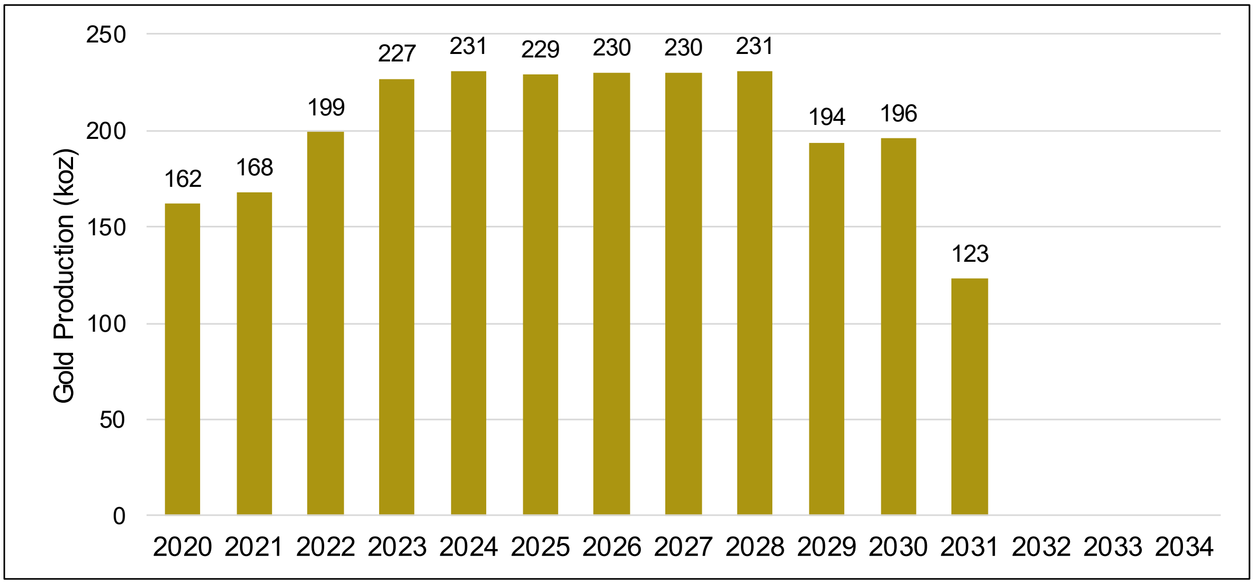


Figure 24-2: LOM production profile – Phase 2 Expansion PFS case

Modified from: Ausenco, 2020

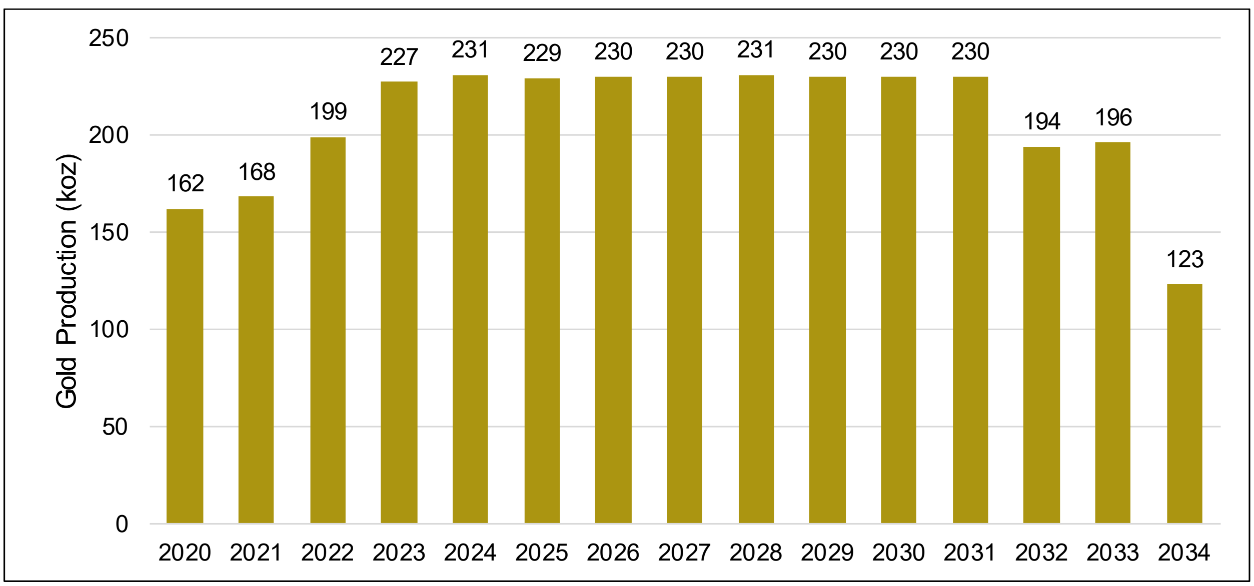


Figure 24-3: LOM production profile – Phase 2 Extended Case

Modified from: Ausenco, 2020

24.5 Phase 2 Expansion – Permitting

Yamana is applying to include the following features in the Change Licence (L.O 14.100):

- Increase the processing plant throughput to 8,500 t per calendar day, with a maximum throughput of up to 10,000 t per operating day.
- Increase of the stockpile area capacity from 40,000 t to over 80,000 t.
- Decrease the dam freeboard of TSF B2 from 3 m to 2 m.
- Installation of a new ball mall, silo, electrowinning cell, and area for preparation of cyanide briquettes.
- Improvements to the tailings pumping system with new tanks, pumps, and cover of the entire pipeline.
- New waste dump area and emulsion plant.

The renewal of the processing Operational Licence (L.O. 14.100) is expected by early 2021, with issuance of the Change Licence (L.O. 14.100) expected by late 2021. The renewal process of the mining Operational Licence (L.O. 1791) will be processed in parallel.

Yamana continues to work with the Bahia state environmental agency, INEMA, to provide the necessary information and coordinate site visits.

24.6 Phase 2 Expansion – Capital Cost Estimate

Capital cost estimates were prepared from the current budget and business plan, updated with capital cost estimates for the Phase 1 Optimization LOM plan and Phase 2 Expansion PFS case LOM plan. Costs estimates are based on an exchange rate assumption of 4.00 BRL:USD.

For the PFS case, the LOM capital costs estimate totals approximately US$ 414 M (Table 24-3). Total capital costs for Phase 2 Expansion are estimated at $57 M, of which $35 M is dedicated to the processing plant, $14 M to underground mining, and $8 M to infrastructure. The project's capital cost is expected to be invested incrementally and would allow the project to be funded by Jacobina's cash flow. A detailed summary of the Phase 2 plant expansion capital cost estimate is provided in Section 24.6.1.

Table 24-3: Phase 2 Expansion LOM Capital costs

Category	Phase 2 Expansion US$
Sustaining Capital Cost	**332,105,000**
Mine Development	117,742,000
Infrastructure	83,240,000
Vehicles & Machinery	72,282,000
Tailings Dam	27,696,000
Hardware & Software	12,901,000
Other Sustaining CAPEX	18,245,000
Expansion Capital Cost	**82,172,000**
Phase 2 Expansion	57,000,000
Other Expansionary LOM CAPEX	25,172,000
Total Capital Cost	**414,277,000**

The main capital costs are related to the plant expansion, tailings dam construction, capital mine development, and mining infrastructure. The sustaining cost estimate considers the primary mine development, tailings dam maintenance, mine infrastructure (dewatering, communication and ventilation), and mine fleet replacement and overhaul over the mine life. Underground development capital costs are estimated based on unit costs ranging from US$2,110/m to US$2,239/m, depending on the support requirements in the different underground mining sectors. Capital costs do not include working capital, capitalized exploration, or closure costs.

The expected run rate for sustaining capital is approximately US$ 30 M per year, decreasing towards the end of the mine life in line with the decrease in underground development rates.

24.6.1 PROCESSING PLANT EXPANSION CAPITAL COST

The processing plant Phase 2 Expansion capital cost estimate was prepared by Ausenco at an FEL (front-end loading)-II engineering level, assuming a range of accuracy of - 30% to + 40%, in accordance to American Association of Cost Engineering (AACE) CLASS 4, at an assumed exchange rate of 4.00 BRL:USD.

Direct costs include supply of electromechanical and process equipment, electrical materials, automation, instrumentation, communication, structures, platework, and piping, as well as civil works, infrastructure, and electromechanical assembly services.

Mechanical equipment includes the crusher, ball mill, screens, gravimetric concentrator, and slurry pumps. Prices were quoted by specialized equipment vendors. The cost of concrete is based on volume estimates for each area of the plant and includes concrete, steel bar reinforcement, formwork, excavation, anchor bolts, and inserts. The electromechanical assembly capital cost was estimated per equipped worker; the cost includes all the resources, tools, personal protective equipment, consumables, and other items necessary for the complete execution of services.

Indirect costs include the following:

- First fill
- Shipping and insurance
- Assembly supervision
- Commissioning and start-up
- Spare parts
- Owner costs
- Engineering, procurement, construction management (EPCM)
- Engineering risk insurance

Uncertainties and unassessed risks in the execution of Phase 2 Expansion are covered by a 35% contingency, applied on the total capital cost.

The total estimated capital cost for the Jacobina Phase 2 plant expansion project is US$35.5 M, including direct costs, indirect costs, and contingencies, as summarized in Table 24-4.

Table 24-4: Capital cost estimate by discipline

Code	Description	Cost (R$)	Cost (US$)	% Total
	Direct Costs			
F	**Supply**	**55,400,000**	**13,850,000**	**66.80%**
F-10	Mechanical	33,377,000	8,344,000	40.20%
F-15	Platework	3,341,000	835,000	4.00%
F-20	Piping, valves, fittings and accessories	4,344,000	1,086,000	5.20%
F-30	Electrical equipment, cables and materials	10,003,000	2,501,000	12.10%
F-40	Steel structures	2,661,000	665,000	3.20%
F-50	Automation, Instrumentation and telecom	1,674,000	418,000	2.00%
M	**Electromechanical Assembly**	**18,478,000**	**4,620,000**	**22.30%**
M-01	Construction site - Assembly	1,367,000	342,000	1.60%
M-10	Mechanical	3,341,000	835,000	4.00%
M-11	Modifications to existing equipment	253,000	63,000	0.30%
M-15	Platework	3,175,000	794,000	3.80%
M-20	Piping, valves, fittings and accessories	4,995,000	1,249,000	6.00%
M-30	Electrical equipment, cables and materials	3,000,000	750,000	3.60%
M-40	Steel structures	2,262,000	565,000	2.70%
M-50	Automation, Instrumentation and telecom	84,000	21,000	0.10%
C	**Civil Works**	**9,093,000**	**2,273,000**	**11.00%**
C-01	Site - Civil Works	673,000	168,000	0.80%
C-10	Concrete	8,135,000	2,034,000	9.80%
C-25	Infrastructure	285,000	71,000	0.30%
	TOTAL DIRECT COST	**82,971,000**	**20,743,000**	**78.90%**
	Indirect Costs			
E-15	EPCM	8,643,000	2,161,000	8.20%
E-15	Commissioning and Start-up	2,489,000	622,000	2.40%
E-15	First fills	1,245,000	311,000	1.20%
E-15	Assembly supervision	868,000	217,000	0.80%
E-15	Spare parts	4,338,000	1,084,000	4.10%
E-15	Shipping and insurance (national)	2,770,000	692,000	2.60%
E-15	Shipping and insurance (international)	526,000	132,000	0.50%
E-15	Engineering risk insurance	480,000	120,000	0.50%
E-15	Owner costs	830,000	207,000	0.80%
	TOTAL INDIRECT COSTS	**22,189,000**	**5,547,000**	**21.00%**
	Totals			
	Total without Contingency	**105,159,000**	**26,290,000**	**100.00%**
	Contingency (35%)	**36,806,000**	**9,201,000**	
	Total with Contingency	**141,965,000**	**35,491,000**	

Note: Numbers may not add up due to rounding.

24.7 PHASE 2 EXPANSION – OPERATING COST ESTIMATE

Mining, processing, and G&A operating costs were estimated based on the planned mining fleet, headcount, contractor requirements, power demand, and consumption of consumables, using a similar methodology to the one used for preparing annual budget cost estimates.

LOM average unit operating costs for the Phase 2 Expansion PFS case are compared to the Phase 1 Optimization case in Table 24-5. Unit costs are lower in the PFS case due to improved efficiency, the distribution of fixed costs over a greater quantity of tonnes per year, and the fewer total years of production.

Table 24-5: LOM average unit operating costs

	Phase 1 Optimization (US$/t processed)	Phase 2 Expansion (US$/t processed)
Mining	23.33	21.43
Process	12.28	11.51
G&A	5.43	4.56
Total	**41.04**	**37.50**

24.8 PHASE 2 EXPANSION – ECONOMIC ANALYSIS

The pre-feasibility economic analysis is based on a gold price assumption of $1,250 per oz. Costs incurred in Brazilian reals (B$ or BRL) have been converted to US dollars (US$ or USD) using an exchange rate assumption of 4.00 BRL:USD. A discount rate of 5% was used. The economic analysis is based on the Phase 2 PFS case and Extended Case mining and processing plans presented in Section 24.4.

The PFS case scenario, which is based on current mineral reserves only, delivers a net present value (NPV) of $777 M over an 11.5-year mine life. Under the Extended Case, which includes 9.5 Mt of additional plant feed with an average feed grade of 2.4 g/t of gold, the LOM increases to 14.5 years at 8,500 tpd. Under this scenario, the after-tax NPV increases to $993 M. Highlights of the economic analysis, comparing Phase 1 Optimization, Phase 2 PFS case, and Phase 2 Extended Case are shown in Table 24-6.

Table 24-6: Phase 2 LOM Summary

	Units	Phase 1 Optimization	Phase 2 Expansion	Phase 2 Extended Case
Life of mine	years	14.5	11.5	14.5
Throughput	tpd	6,500	8,500	8,500
Recovery rate	%	96.5	96.5	96.5
Annual gold production	koz	175	230	230
Cash flow (2020-2029)	US$ M	662	930	969
NPV (5%)	US$ M	699	777	993

Note: Based on metal price assumptions of US$1,250/oz for gold and an exchange rate assumption of 4.00 BRL:USD

The long-term strategic benefit to an expansion at Jacobina exists in the flexibility to bring cash flows forward, while quickly delivering additional value from the impressive mineral inventory and exploration potential at the immediate mine and in the surrounding mining concessions. These benefits are illustrated in Figure 24-4.

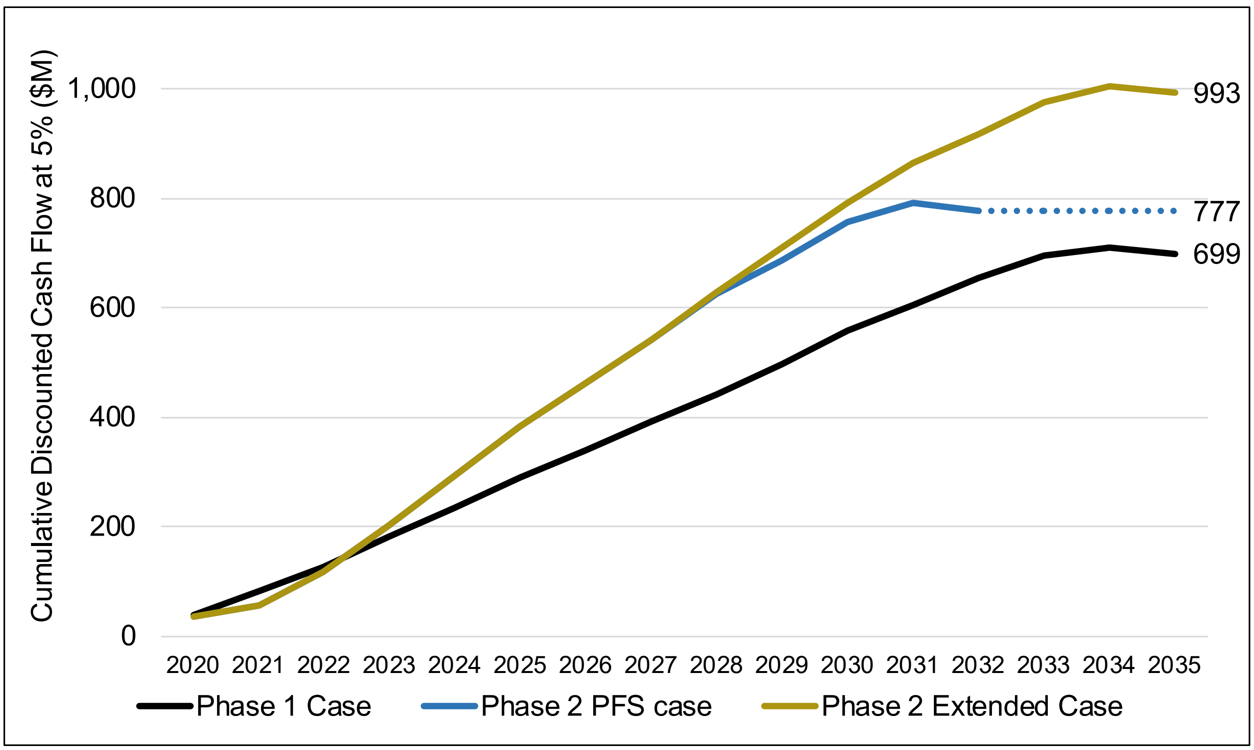


Figure 24-4: Cumulative discounted cash flow at 5% discount rate

Source: Yamana, May 2020

An additional benefit of the Phase 2 Expansion project is to increase the mine's leverage to gold prices. Sensitivities for both the Phase 2 PFS and Extended Case scenarios are presented at different gold prices in Table 24-7, assuming an exchange rate BRL:USD of 4.0:1, and in Table 24-8, assuming an exchange rate BRL:USD of 5.0:1.

Table 24-7: Phase 2 Expansion – Gold price sensitivity at BRL:USD exchange rate of 4.0:1

Gold Price (US$/oz)	$1,250	$1,450	$1,550
Phase 2 Expansion Case – Mineral reserves effective December 31, 2019			
NPV (millions)	777	1,079	1,229
Cash flow – first 5 years	569	761	858
Cash flow – first 10 years	953	1,264	1,419
Phase 2 Extended Case – Additional 9.5 Mt converted from mineral resources			
NPV (millions)	993	1,360	1,544
Cash flow – first 5 years	569	761	858
Cash flow – first 10 years	1,203	1,590	1,784

Table 24-8: Phase 2 Expansion – Gold price sensitivity at BRL:USD exchange rate of 5.0:1

Gold Price (US$/oz)	$1,250	$1,450	$1,550
Phase 2 Expansion Case – Mineral reserves effective December 31, 2019			
NPV (millions)	978	1,279	1,430
Cash flow – first 5 years	688	881	977
Cash flow – first 10 years	1,145	1,455	1,610
Phase 2 Extended Case – Additional 9.5 Mt converted from mineral resources			
NPV (millions)	1,238	1,602	1,779
Cash flow – first 5 years	688	881	977
Cash flow – first 10 years	1,444	1,825	2,007

24.9 Phase 2 Expansion – Implementation Schedule

The Phase 2 Expansion plan builds on the success of the Phase 1 Optimization project, which targeted a sustained throughput of 6,500 tpd and annual gold production of 175,000 oz. The Phase 1 Optimization includes the installation of an advanced processing control system, two additional gravity concentrators, an additional kiln, and four new carbon-in-pulp tanks.

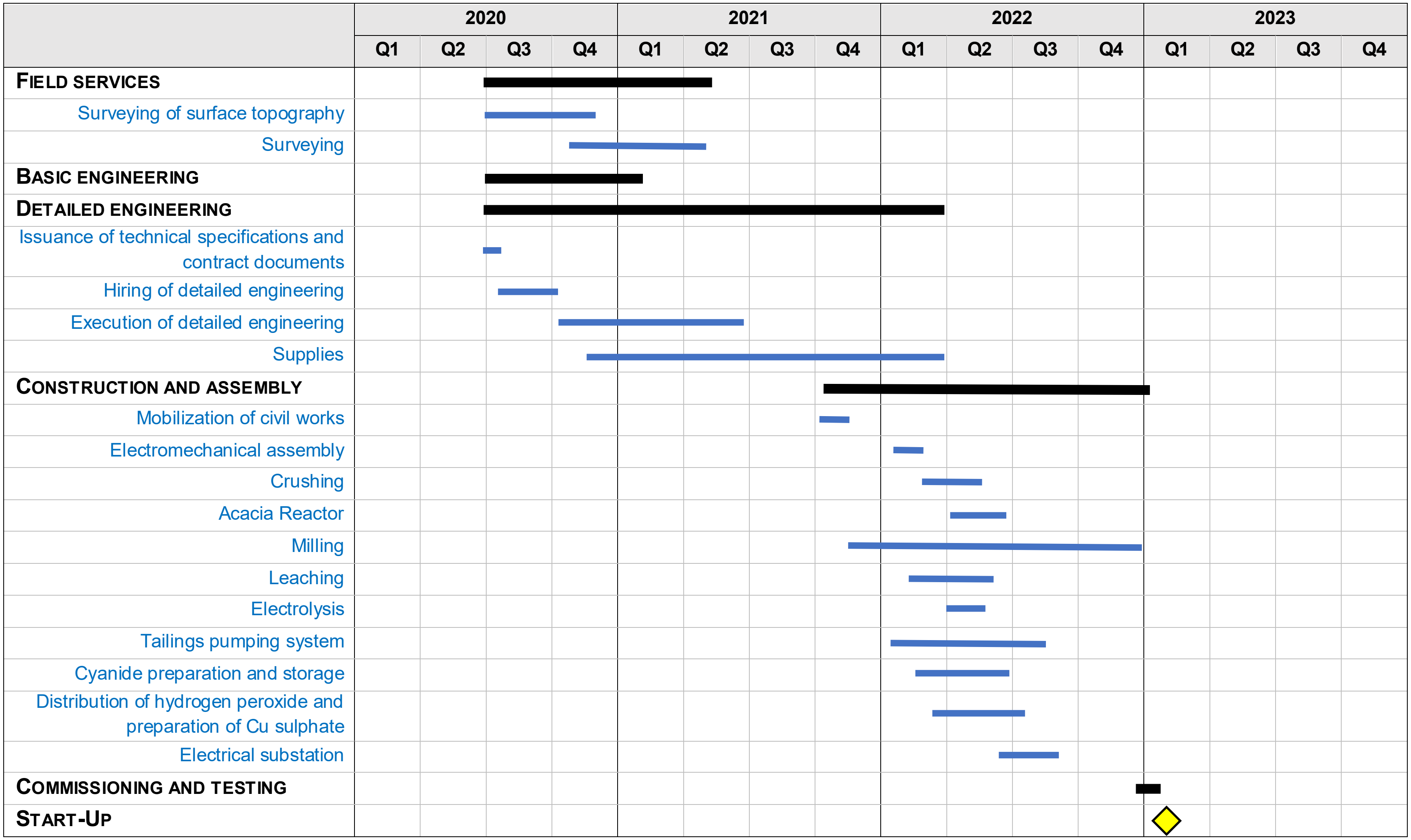
Jacobina achieved the Phase 1 Optimization objective of 6,500 tpd in the first quarter of 2020, a full quarter ahead of schedule and without the benefits expected from the installation of all the plant modifications, which are scheduled for completion in mid-2020. Yamana continues to evaluate the actual performance of Phase 1 Optimization and pursue further debottlenecking initiatives to determine the sustainable throughput level in excess of 6,500 tpd that the mill can achieve without additional investment.

Detailed engineering for the Phase 2 Expansion is currently scheduled to commence soon after commissioning of the Phase 1 Optimization in mid-2020. This would allow engineering and construction to be completed by early 2023, as shown in Table 24-9. An incremental increase in throughput to approximately 7,000 tpd could be achieved in 2022 after upgrading the crushing circuit. The critical path for the Phase 2 Expansion is in the grinding area, as the ball mill requires a long lead time to construct and deliver to site.

Capital costs associated with the Phase 2 Expansion would not commence until 2021; completion of the project would be then expected by early 2023. These timelines are dependent on completion of the Phase 2 Expansion feasibility study by mid-2021. The feasibility study will look to further refine and optimize operating costs and also take into account the actual realized potential under the Phase 1 Optimization to determine the true potential of the Phase 2 Expansion. Yamana may choose to normalize operations under the Phase 1 Optimization for a period of time in order to determine the true realizable throughput for this phase before proceeding with the Phase 2 Expansion.

JMC has applied for permitting and expects the permits to be issued by late 2021, within the timeframes currently assumed for implementation of the Phase 2 Expansion. The permit application is for higher throughput than what is contemplated in the Phase 2 Expansion; this to ensure future flexibility. JMC is already permitted for throughput of up to 7,500 tpd.

Table 24-9: Project implementation schedule



Source: Ausenco, 2020

25 INTERPRETATION AND CONCLUSIONS

More than 2.2 Moz of gold have been produced from Jacobina since modern mining commenced in 1983. Annual gold production has increased year-after-year from 74 koz in 2013 to more than 159 koz in 2019, through increases in plant throughput, gold feed grade, and metallurgical recovery.

Drilling activities in previous years have been successful in defining the plunge of the higher-grade portions of the mineralized zones and have led to the discovery of new mineralized zones, such as João Belo Sul and the extension of mineralization in the East Block. On the basis of these exploration successes and the production history at Jacobina, good potential exists in the proximity of the current mine infrastructure for discovering new mineralized zones and/or the strike and dip extents of the known mineralized horizons.

In terms of the regional exploration potential, the favourable stratigraphy hosting the gold mineralization at Jacobina has been traced along a strike length of approximately 150 km. Exploration programs have discovered many gold occurrences along this favourable stratigraphy, including the Jacobina Norte project where gold mineralization has been discovered along a continuous 15 km-long trend. As of the end of December 2019, 7,067 drill holes were drilled in the Jacobina project area, for a total of 868,000 metres. Almost all of this drilling has been within the 11 km-long mining district, with the majority of the 88,000 hectares of exploration concessions still yet to be drilled.

Jacobina mineral resources and mineral reserves have been estimated in conformity with generally accepted CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines (November 2019) and are reported in accordance with CIM (2014) Standards. The total proven and probable mineral reserve at Jacobina as of December 31, 2019, is 34.2 Mt averaging 2.27 g/t gold, for approximately 2.5 Moz of contained gold. In addition, measured and indicated mineral resources total 42.5 Mt grading 2.26 g/t gold (3.1 Moz gold) and inferred mineral resources of 18.5 Mt grading 2.36 g/t gold (1.4 Moz gold).

In 2019, Jacobina began optimizing the processing plant to stabilize throughput at a target rate of 6,500 tpd, referred to as the Phase 1 Optimization, which is on track for completion in mid-2020. Jacobina achieved the Phase 1 Optimization objective of 6,500 tpd in the first quarter of 2020, a full quarter ahead of schedule and without the benefits expected from the installation of all the plant modifications. Yamana continues to evaluate the actual performance of the Phase 1 Optimization and pursue further debottlenecking initiatives to determine the sustainable throughput level in excess of 6,500 tpd that the mill can achieve without additional investment.

Following up on the Phase 1 Optimization, Jacobina is studying the increase in throughput to 8,500 tpd, referred to as the Phase 2 Expansion. Yamana completed a pre-feasibility study

(PFS) for the Phase 2 Expansion in the first quarter of 2020 and will continue with a feasibility study, scheduled for completion in mid-2021.

Three LOM plan scenarios have been developed. In all scenarios, mining and processing of lower-grade supplementary mineral reserves is deferred until late in the mine life where possible, allowing feed grades of approximately 2.4 g/t gold to be maintained. The Phase 1 Optimization LOM plan assumes a plant throughput rate of 6,500 tpd and is based on mineral reserves as of December 31, 2019. In this scenario, the mine life is 14.5 years, with gold production of 175,000 oz per year at a gold feed grade of 2.4 g/t, and a gold metallurgical recovery of 96.5%.

The second scenario, the Phase 2 Expansion PFS case, is based on the same mineral reserves as the Phase 1 case, but includes the Phase 2 Expansion with plant throughput ramping up to 8,500 tpd by 2023. With the higher throughput rate, mine life is reduced to 11.5 years and gold production increases to 230,000 oz per year. The third scenario, referred to as the Phase 2 Expansion Extended Case and that Yamana uses as a base case for internal planning purposes, is the same as the Phase 2 PFS case, but considers an additional 9.5 Mt of plant feed at an average grade of 2.4 g/t gold based on the expected conversion of current mineral resources to mineral reserves through infill drilling. Gold production remains at 230,000 oz per year and mine life is extended to 14.5 years. Based on the impressive track record of discovery and successful conversion of mineral resources to mineral reserves at Jacobina, Yamana is confident that, based on required infill drilling, the future conversion of mineral resources to mineral reserves will continue to show positive results. Furthermore, the favourable geological environment, both near mine and regionally, provides exceptional mineral potential that may eventually result in extending the mine life beyond the Extended Case.

The capital and operating cost estimates for the Phase 1 Optimization LOM plan are based on mine budget data and operating experience, and are appropriate for the known mining methods and production schedule. Capital cost estimates include appropriate sustaining estimates. Under the assumptions in this technical report, Jacobina has positive project economics until the end of mine life, which supports the mineral reserve estimate. Capital and operating cost estimates for the Phase 2 Expansion scenarios were revised as part of the Phase 2 Expansion pre-feasibility study. Total Phase 2 Expansion project capital costs are estimated at US$57 M, of which $35 M is dedicated to the processing plant, $14M to underground mining, and $8 M to infrastructure. The project's capital cost is expected to be invested incrementally and would allow the project to be funded by Jacobina's cash flow. LOM average unit operating costs are estimated to decrease from US$41.04/t in the Phase 1 Optimization case to $37.50/t in the Phase 2 Expansion PFS case, due to improved efficiency and the distribution of fixed costs over a greater quantity of tonnes per year.

No environmental issues were identified from the documentation available for review that could materially impact the ability to extract the mineral resources and mineral reserves. Jacobina has all the operational licences required for operation according to the national legislation. The approved licences address the authority's requirements for mining extraction and operation activities. For the Phase 2 Expansion, Yamana has applied for permitting and expects the permits to be issued by late 2021, within the timeframes currently assumed for implementation of Phase 2. The permit application is for higher throughput than what is contemplated in Phase 2 to ensure future flexibility. JMC is already permitted for throughput of up to 7,500 tpd.

No social issues were identified from the documentation available for review. At present, Yamana's operations at Jacobina are a positive contribution to sustainability and community well-being. Jacobina has demonstrated a commitment to employee health, safety, and well-being; community programs; and ongoing outreach and data collection to support issues management and mitigation. Yamana has established and continues to implement its various policies, procedures, and practices in a manner broadly consistent with relevant IFC Performance Standards.

The results of this technical report are subject to variations in operational conditions including, but not limited to the following:

- Assumptions related to commodity and foreign exchange (in particular, the relative movement of gold and the Brazilian real/US dollar exchange rate)
- Unanticipated inflation of capital or operating costs
- Significant changes in equipment productivities
- Geological continuity of the mineralized structures
- Geotechnical assumptions in pit and underground designs
- Ore dilution or loss
- Throughput and recovery rate assumptions
- Changes in political and regulatory requirements that may affect the operation or future closure plans
- Changes in closure plan costs
- Availability of financing and changes in modelled taxes

In the opinion of the qualified persons, there are no reasonably foreseen inputs from risks and uncertainties identified in the technical report that could affect the project's continued economic viability.

26 RECOMMENDATIONS

Based on the information presented in this technical report, the qualified persons recommend the following action items.

Based on success in extending known mineral resources, Yamana should continue exploration at the mining operations. Due to the quantity of material in the mineral reserve category and its impact on mine life, Yamana's focus is to continue infill drilling programs in support of converting mineral resources to mineral reserves. An additional focus will be to carry out exploration programs in the vicinities of the current mines to search for the strike and depth extensions of known mineralization.

Drilling programs should continue to be carried out with the following objectives:

- Replacing the mined-out material and growing the mineral reserve base through conversion of inferred mineral resources to indicated and measured mineral resources. The focus of the drilling programs should be on the higher-grade sectors of the known mineralized zones.
- Increasing the inferred mineral resources through conversion of material that has been identified by exploration drilling located in close proximity to the current mining infrastructure into the inferred mineral resource category. The focus of this activity will be on those areas which have grades above 3.0 g/t gold, with the goal of building a higher-grade inventory of inferred mineral resources.
- Develop a long-term pipeline of brownfields exploration discoveries through testing of exploration targets.
- Evaluate the known gold mineralization at the Jacobina Norte project with the goal of developing a greenfields mineral resource target of over 1 Moz gold along the known strike length of 15 km.

Based on processing plant performance in the first quarter of 2020, in which the processing plant throughput exceeded the Phase 1 Optimization target of 6,500 tpd, without the inclusion of the benefits expected from the installation of all the plant modifications, Yamana should continue to evaluate the Phase 1 Optimization actual performance and pursue further debottlenecking initiatives to determine the sustainable throughput level in excess of 6,500 tpd that the mill can achieve without additional investment.

Based on the positive results of the Phase 2 Expansion pre-feasibility study, Yamana should continue to advance the level of engineering for the Phase 2 Expansion and proceed to feasibility study. The feasibility study should look to further improve operating costs and also take into account the actual realized potential under the Phase 1 Optimization to determine the true potential of Phase 2 Expansion. In parallel to the Phase 2 Expansion feasibility study, Yamana should continue the application of permits for the increased throughput capacity.

Yamana should continue to evaluate the suitability of alternative mining methods and tailings as paste or hydraulic backfill, in addition to the use of multiple backfill types to optimize mining extraction. Yamana has initiated a separate study outside the Phase 2 Expansion PFS to evaluate the installation of a backfill plant to allow up to 2,000 tpd of tailings to be deposited in underground voids. Preliminary results indicate that the project has the potential to reduce the environmental footprint, extend the life of the existing tailing storage facility, and improve mining recovery, resulting in an increased conversion of mineral resources to mineral reserves.

Regarding environmental and social management, SLR recommends the following:

- Conduct geochemical sampling and characterization of waste rock before developing a new waste rock stockpile.
- Maintain a robust water quality monitoring program to verify compliance with applicable environmental standards and evaluate the appropriateness of the water management strategies that are in place.
- Continue to implement the environmental monitoring program, which monitors and manages potential environmental impacts resulting from the mine operations, to inform future permit applications and mine closure plan updates.
- Consider the implementation of a noise- and vibrations-monitoring program, consistent with the integrated 2016 HSEC Framework.
- Consider establishing an energy and emissions strategy/plan to determine, on a defined frequency, sources of energy consumption and associated greenhouse gas (GHG) emissions, consistent with the integrated 2016 HSEC Framework.
- The existing sulphate/metals plume originating from the decommissioned TSF B1 may potentially cause ongoing effects on water. This could result in long-term closure costs extending beyond the five-year post-closure treatment period that is currently outlined in the conceptual 2018 mine closure plan. It is recommended that the closure cost estimate be reviewed as the closure plan and designs for both TSF facilities are developed in more detail. Costs for long-term monitoring and maintenance of dams should also be reviewed.
- Considering that, historically, mine site closures have the potential to result in significant economic impacts to a community, a detailed social management plan should be developed to mitigate the economic and social effects of mine closure; this plan would include ongoing consultation, training, and planning.

- Incorporate a strategy for closure of the inactive open pit into the mine closure plan.

27 References

Almeida FFM. 1977. O Cráton São Francisco, SBG Rev Bras Geoc, São Paulo, v7, pp. 349–364.

Ausenco, 2020. Jacobina Phase 2 Expansion; Final PFS Report; March 2020. Report prepared for Yamana Gold Inc., dated March 31, 2020. 124p.

Bateman JD. 1958. Uranium-Bearing Auriferous Reefs at Jacobina, Brazil. Econ. Geol., vol. 53. pp. 417–425.

Canadian Dam Association Dam Safety Guidelines 2007 (2013 Edition). Report available at www.cda.ca

Couto PA et al. 1978. Projeto Serra de Jacobina: Geologia e Prospecção Geoquímica, Relatório Final, Salvador, CPRM, Convenio DNPM-CPRM, 415 p.

Cox DP. 1967. Regional Environment of the Jacobina Auriferous Conglomerate, Brazil. Econ Geol., vol. 62, pp. 773–780.

DAM Projetos de Engenharia. 2017. Barragem de Rejeitos de Jacobina. 4a. Etapa de Alteamento – El. 605 m Sequenciamento do Revestimento do Reservatorio. JMC02-2390-C-RL-0066.

DAM Projetos de Engenharia. 2020a. Barragem de Rejeitos de Jacobina. 4a. Manual de Operacao e Construca, TSF B2 – Phase V. JMC02-2390-C-MO-0004.

DAM Projetos de Engenharia. 2020b. Barragem de Rejeitos de Jacobina. 5a. Etapa de Alteamento – El. 620 m. JMC02-2390-C-RL-0092.

E-Mining Technology S.A. 2016. Abaco de Estimación de Largo de Caserón Abierto, Mina João Belo, Minera Jacobina. PowerPoint presentation, June 2016.

GeoHydroTech Engenharia. 2019. Barragem de Rejitos B2, Relatório de Inspeção de Segurança Regular. September 2019.

Golder Associates. 2008. Report on Mineral Resource and Mineral Reserve Update for the Canavieiras, Serra do Córrego, Morro do Vento and João Belo Deposits, Jacobina Mine, Bahia State, Brazil. Technical Report for Yamana Gold Inc., March 2008, 127 p.

Griffon JC. 1967. Apresentação do Mapa Geológico (1:100,000) da parte Central da Serra de Jacobina (Bahia). *In* XXI Congresso Brasiliero de Geologia, Programa, Resumo das Comunicações, Roteiro das Excursões, SGB, Curitiba, pp. 33–34.

Gross WH. 1968. Evidence for a Modified Placer Origin for Auriferous Conglomerates, Canavierias Mine, Jacobina, Brazil. Econ. Geol., vol. 63, pp. 271–276.

Hace. 2019. Relatório Técnico Solicitação de Licença de Alteração Expansão da Planta Metalúrgica. Modernização e Ampliação da Capacidade Instalada. Yamana Gold. Unidade: Jacobina Mineração e Comércio (JMC). December 5, 2019.

ICMM (International Council on Mining and Metals). 2008. Planning for Integrated Mine Closure: toolkit.

Karpeta WP. 2004. A Comparison Between the Witwatersrand, Tarkwa and Jacobina Basins. Internal report, Desert Sun.

Ledru GW, Cox DP, and Carvalho JPP. 1964. Geologia da Parte Sul da Serra de Jacobina, Bahia, Brasil, Rio de Janeiro, DNPM/DGM, Boletim No. 209, 87 p.

Ledru P, Milesi JP, Johan V, Sabate P, and Maluski H. 1997. Foreland Basins and Gold-Bearing Conglomerates: A New Model for the Jacobina Basin (Sao Francisco Province, Brazil). Precambrian Research, vol. 86, Issues 3–4, 22 December 1997. pp. 155–176.

Mascarenhas JF, Ledru P, de Souza SL, Conceição Filho VM, Melo LFA, Lorenzo CL, and Milesi JP. 1998. Geologia e Recursos Minerais do Groupo Jacobina e da Parte Sul do Greenstone Belt de Mundo Novo, Salvador, CBPM, Série Arquivos Abertos, vol. 13. 58 p.

MDGEO Servicos de Hidrogeologia Ltda., 2018. Relatorio de Avaliacao de Perfromance da Barreira Hidraulica. Jacobina Mineracao e Comercio, Jacobina, BA. November 2018.Mello R and Petter R. 2007. Mineral Resource and Mineral Reserve Estimate Update for Canavieiras, Serra do Córrego, Morro do Vento and João Belo, Jacobina Mine, as of December 31, 2006. Technical Report by NCL Brasil for Yamana Gold Inc., February 2007. 132 p

Milesi JP, Ledru P, Marcoux E, Mougeot R, Johan V, Lerouge C, Sabaté P, Bailly L, Respaut JP, and Skipwith P. 2002. The Jacobina Paleoproterozoic Gold-Bearing Conglomerates, Bahia, Brazil; a "Hydrothermal Shear-Reservoir Model", Ore Geology Reviews 19 (2002). pp. 95–136.

Minter WEL. 1975. Sedimentological Aspects of the Serra do Córrego Formation with Particular Reference to the Main Reef Unit at Cuscuz and Morro do Vento near Jacobina, Bahia, Brazil. Unpublished report by Anglo American. 11 p.

Molinari L, Gama HB, and Schettini P. 1986. Estratigrafia do Groupo Jacobina. Unpublished report by Mineração Morro Velho.

Moreno R. 2007. Pindobaçu Project, Resource Estimate Report, Pindobaçu District, Brazil. Mineral Resource Report by Moreno & Associates for Jacobina Mineração e Comércio S. A., January 2007. 99 p.

Navarro F, Baeza D, Herreros D, and Valencia M. 2016. Calculating Ore Resources on Complex Geology Using a Geometric Restitution Methodology: *In* Modelling to the Estimation: 1st International Conference on Mining. 11 p.

Navarro F, Garrido M, González C, Baeza D, Soto F, Herreros D, Valencia M, and Egaña A. 2017, 10 p.

Oram WG. 1975. A Preliminary Sedimentological Study of the Serra do Córrego Formation at Jacobina, Brazil. Unpublished report by Anglo American. 22 pp.

Pearson W, Moura de Macedo P, Rubio A, Lorenzo C, and Karpeta P. 2005. Geology and Gold Mineralization of the Jacobina Mine and Bahia Gold Belt, Bahia, Brazil and a Comparison to Tarkwa and Witwatersrand; *in* Rhoden, H.N., Steininger, R.C., and Vikre, P.G., *editors*, Geological Society of Nevada Symposium 2005, pp. 757–785.

Pressacco R and Hennessey BT. 2007. An Updated Mineral Resource Estimate and Results of 2006 Exploration Program for the João Belo Mine, Jacobina Mine Project, Bahia State, Brazil. Technical Report by Micon International Limited for Yamana Gold Inc., February 2007. 202 pp.

Ramachandran P and Varoquaux G. 2011. Mayavi: 3D Visualization of Scientific Data: IEEE Computing in Science & Engineering, pp. 40–51.

RPA Inc. 2014. Technical Report on the Jacobina Mine Complex, Bahia State, Brazil: Unpublished Internal Yamana Gold Inc. Report, 157 p.

RPA Inc. 2018. Technical Report on the Jacobina Mine Complex, Bahia State, Brazil: Unpublished Internal Yamana Gold Inc. Report, 164 p.

RPA Inc. 2019. Technical Report on the Jacobina Mine Complex, Bahia State, Brazil. National Instrument 43-101 Technical Report dated September 30, 2019, with an effective date of June 30, 2019. 77 p. Report available on Sedar.

SETE. 2018. Actualização do Plano Conceitual Ambiental de Fechamiento de Mina – PFM (Update of Conceptual Environmental Mine Closure Plan). December 2018.

Strydom PM and Minter WEL. 1976. A Stratigraphic and Sedimentological Report of the Main Reef in the Itapicurú Prospect near Jacobina, Bahia, Brazil. Unpublished report by Anglo American, 20 p.

Teixeira JBG, Souza JAB, da Silva MdG, et al,. 1999, Metalogênese dos depósitos auíferos na Região Central da Serra de Jacobina, Bahia, Relatório Técnico preparado para a [*Technical Report prepared for*] William Resources Inc., Salvador. 39 pp.

Teixeira JBG, de Souza JAB, da Silva MdG, Leite CMM, Barbosa JSF, Coelho CES, Abram MB, Filho VMC, and Iyer SSS. 2001. Gold Mineralization in the Serra de Jacobina Region, Bahia, Brazil: Tectonic Framework and Metallogenesis, Mineralium Deposita (2001) 36, pp. 322–344.

Teles G, Chemale Jr F, Oliveira CG. 2014. Paleoarchean record of the detrital pyrite-bearing, Jacobina Au-U deposit, Bahia, Brazil. Precambrian Research, pp. 289–313.

Vick S. 2018. Dam Safety Review Jacobina Tailings Storage Facility and Joao Belo Mine Waste Facility, Jacobina, Brazil. November 19, 2018

Yamana. 2016. Integrated HSEC Framework. Version 1.0, April 2016.

Yamana. 2020. Relatório Técnico de Garantia Ambiental – RTGA. Ano-Base 2019. March 2020.

28 CERTIFICATES OF QUALIFIED PERSONS

CERTIFICATE OF QUALIFIED PERSON – EDUARDO DE SOUZA SOARES

I, Eduardo de Souza Soares, MAusIMM CP (Min), as an author of this report entitled "NI 43-101 Technical Report, Jacobina Gold Mine, Bahia State, Brazil" prepared for Yamana Gold Inc. (the Issuer) and dated effective as of December 31, 2019 (the Technical Report), do hereby certify the following:

1. I am Coordinator Technical Services at Jacobina Mineração e Comércio, a subsidiary of the Issuer, with an office at Itapicuru Farm, rural zone, Jacobina, Bahia, Brazil.
2. I graduated from the Universidade Federal de Bahia in 2011 with a Bachelor's degree in mining engineering and I obtained a Master of Business Administration from the Fundação Getulio Vargas in 2017. I am Chartered Professional Member of the Australasian Institute of Mining and Metallurgy (AusIMM) – MAusIMM CP(Min): 328085. I have practiced my profession continuously since 2011. My relevant experience for the purpose of the Technical Report includes the following:
   - Mining engineer at Yamana Gold Inc. operation in charge of mine design, sequencing, budgeting, and forecast.
   - Planning, organizing, and coordination of mine planning, ensuring compliance with operational procedures and health and safety guidelines.
3. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional 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.
4. I work at the project and was most recently at the project between May 10 and 21, 2020.
5. I am responsible for Sections 13, 15 to 19 (excluding sub-section 18.2), 21 to 22, 24, and share responsibility for related disclosure in Sections 1, 25, 26, and 27 of the Technical Report.
6. I am not independent of the Issuer. I am a full-time employee of Jacobina Mineração e Comércio, a subsidiary of the Issuer.
7. I have had prior involvement with the property that is the subject of the Technical Report in my role as Coordinator Technical Services at the project.
8. I have read NI 43-101 and the sections of Technical Report for which I am responsible have been prepared in compliance with NI 43-101 and Form 43-101F1.
9. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, Sections 13, 15 to 19 (excluding sub-section 18.2), 21 to 22, 24, and related disclosure in Sections 1, 25, 26, and 27 in the Technical Report for which I am responsible contain all the scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

"Signed"
Eduardo de Souza Soares, MAusIMM CP(Min) Dated this 29th day of May, 2020

CERTIFICATE OF QUALIFIED PERSON – RENAN GARCIA LOPES

I, Renan Garcia Lopes, MAusIMM CP (Geo), as an author of this report entitled "NI 43-101 Technical Report, Jacobina Gold Mine, Bahia State, Brazil" prepared for Yamana Gold Inc. (the Issuer) and dated effective as of December 31, 2019 (the Technical Report), do hereby certify the following:

1. I am Senior Geologist at Jacobina Mineração e Comércio, a subsidiary of the Issuer, with an office at Itapicuru Farm, rural zone, Jacobina, Bahia, Brazil.
2. I graduated from the University of São Paulo in 2010 with a B.Sc. and I obtained a M.Sc. degree from the same university in 2016. I am a Chartered Professional Member of the Australasian Institute of Mining and Metallurgy (AusIMM) – MAusIMM CP(Geo): 328085. I have practiced my profession continuously since 2010. My relevant experience for the purpose of the Technical Report includes the following:
    - Reviewing and reporting as a consultant and employee on numerous exploration and mining projects around the world for due diligence and regulatory requirements, including preparation of mineral resource estimates and NI 43-101 technical reports.
    - Execution of numerous assignments in a variety of deposit types and a variety of geological environments; commodities include Au, Zn, Mn, Al, Fe and industrial minerals.
    - Senior position with major multinational mining companies in South America, focusing on geostatistical studies, geological modelling, and resource modelling.
3. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional 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.
4. I work at the project and was most recently at the project on March 18, 2020.
5. I am responsible for Sections 11, 12 and 14, and share responsibility for related disclosure in Sections 1, 25, 26, and 27 of the Technical Report.
6. I am not independent of the Issuer. I am a full-time employee of Jacobina Mineração e Comércio, a subsidiary of the Issuer.
7. I have had prior involvement with the property that is the subject of the Technical Report in my role as Senior Geologist at the project.
8. I have read NI 43-101 and the sections of Technical Report for which I am responsible have been prepared in compliance with NI 43-101 and Form 43-101F1.
9. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, Sections 11, 12, 14, and related disclosure in Sections 1, 25, 26, and 27 in the Technical Report for which I am responsible contain all the scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

"Signed"
Renan Garcia Lopes, MAusIMM CP(Geo) Dated this 29th day of May, 2020

CERTIFICATE OF QUALIFIED PERSON – HENRY MARSDEN

I, Henry Marsden, P.Geo., as an author of this report entitled "NI 43-101 Technical Report, Jacobina Gold Mine, Bahia State, Brazil" prepared for Yamana Gold Inc. (the Issuer) and dated effective as of December 31, 2019 (the Technical Report), do hereby certify the following:

1. I am Senior Vice President, Exploration of the Issuer, with an office at Royal Bank Plaza, North Tower, 200 Bay Street, Suite 2200, Toronto, Ontario M5J 2J3.
2. I graduated from the University of British Columbia with a Bachelor of Science degree in Geology in 1987 and I graduated from Carleton University, Ottawa, Ontario, with a Master of Science degree in Earth Sciences in 1991; I am a Professional Geologist registered with the Association of Professional Geoscientists of Ontario (APGO #0885). My relevant experience for the purpose of the Technical Report includes the following:
    - I have worked as a geologist for over 30 years since my graduation, including more than 20 years as a consulting geologist working with a variety of clients and focusing on field exploration work.
    - I have played a key role in the discovery and advancement of several mineral deposits including Rio Blanco and Pico Machay in Peru, and the Timmins West gold deposit in Timmins, Ontario.
3. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional 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.
4. I visited the Jacobina project on six occasions since January 2017 and most recently between September 12 and 14, 2019.
5. I am responsible for Sections 2 to 10, 23, and share responsibility for related disclosure in Sections 1, 25, 26, and 27 of the Technical Report.
6. I am not independent of the Issuer. I am a full-time employee of the Issuer.
7. I have had prior involvement on the property in my role with the Issuer.
8. I have read NI 43-101 and the sections of Technical Report for which I am responsible have been prepared in compliance with NI 43-101 and Form 43-101F1.
9. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, Sections 2 to 10, 23, and related disclosure in Sections 1, 25, 26, and 27 in the Technical Report for which I am responsible contain all the scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

"Signed"
Henry Marsden, P.Geo.

Dated this 29th day of May, 2020

CERTIFICATE OF QUALIFIED PERSON – LUIS VÁSQUEZ

I, Luis Vasquez, P.Eng, as an author of this report entitled "NI 43-101 Technical Report, Jacobina Gold Mine, Bahia State, Brazil" prepared for Yamana Gold Inc. (the Issuer) and dated effective as of December 31, 2019 (the Technical Report), do hereby certify the following:

1. I am a Senior Hydrotechnical Engineer with SLR Consulting (Canada) Ltd., at 36 King St. East 4th Floor in Toronto, ON, M5C 1E5.
2. I am a graduate of Universidad de Los Andes, Bogotá, Colombia, in 1998 with a B.Sc. degree in Civil Engineering. I am registered as a Professional Engineer in the Province of Ontario (Reg. #100210789). I have worked as a as a Civil Engineer on mining-related projects for a total of 15 years since my graduation. My relevant experience for the purpose of the Technical Report includes the following:
   - Preparation of numerous environmental impact assessments for regulatory approval of mining projects located in Canada and South America.
   - Preparation of multiple mine closure plans for mining projects in Canada and South America.
   - Preparation of several scoping, pre-feasibility, feasibility, and detailed design level studies for projects located in North America, South America, the Caribbean, and Asia, with a focus on planning, design, and safe operation of water management systems.
3. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional 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.
4. I have not visited the Jacobina project due to travel restrictions related to the global COVID-19 pandemic.
5. I am responsible for Section 20 (excluding sub-section 20.2.2) and share responsibility for related disclosure in Sections 1, 25, 26, and 27 of the Technical Report.
6. I am independent of the Issuer.
7. I have had no prior involvement with the property that is the subject of the Technical Report.
8. I have read NI 43-101 and the sections of Technical Report for which I am responsible have been prepared in compliance with NI 43-101 and Form 43-101F1.
9. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, Section 20 (excluding sub-section 20.2.2) and related disclosure in Sections 1, 25, 26, and 27 in the Technical Report for which I am responsible contain all the scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

"Signed"
Luis Vásquez, P.Eng.

Dated this 29th day of May, 2020

CERTIFICATE OF QUALIFIED PERSON – CARLOS ITURRALDE

I, Carlos Iturralde, P.Eng., as an author of this report entitled "NI 43-101 Technical Report, Jacobina Gold Mine, Bahia State, Brazil" prepared for Yamana Gold Inc. (the Issuer) and dated effective as of December 31, 2019 (the Technical Report), do hereby certify the following:

1. I am Director, Tailings of the Issuer, with an office at Royal Bank Plaza, North Tower,200 Bay Street, Suite 2200, Toronto, Ontario M5J 2J3

2. I graduated from the University of Kansas with a dual major in Civil Engineering and Mathematics in 2002. I received a MSc. from the University of Tübingen in Applied Environmental Geosciences in 2007. I am a professional engineer registered with Engineers and Geoscientist British Columbia since 2010 (License # 40153). I have over 17 years of professional experience in the mining industry in technical and management aspects related to tailings management and related infrastructure. The following aspects of my experience are relevant for the purpose of the Technical Report:

    - Completion of design and engineering studies and dam safety reviews of tailings facilities
    - Best management practices following the Mining Association of Canada (MAC) and Canadian Dam Association (CDA) proposed framework and dam safety criteria.
    - Implementation of risk management and quality management strategies, including QA/QC programs and risk evaluation and mitigation through identification of critical controls.
    - Since 2015, I have been an active member of MAC's tailings working group (TWG) and participated in the development of the 3rd edition of MAC's tailings management guidelines.

3. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional 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.

4. I have not visited the project due to travel restrictions related to the global COVID-19 pandemic.

5. I am responsible for Sections 18.2 and 20.2.2 and share responsibility for related disclosure in Sections 1, 25, 26, and 27 of the Technical Report.

6. I am not independent of the Issuer. I am a full-time employee of the Issuer.

7. I have had no prior involvement with the property that is the subject of the Technical Report.

8. I have read NI 43-101, and the sections of Technical Report for which I am responsible have been prepared in compliance with NI 43-101 and Form 43-101F1.

9. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, Sections 18.2 and 20.2.2 and related disclosure in Sections 1, 25, 26, and 27 in the Technical Report for which I am responsible contain all the scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

"Signed"
Carlos Iturralde, P.Eng. Dated this 29th day of May, 2020

APPENDIX A – MINERAL TITLE

Mining concessions

Licence	Process Number	Area (ha)	Application Date
416	004.951/35	889.14	1935
239	815.706/72	821.19	1972
206	815.708/72	532.86	1972
1128	815.710/72	1,000.00	1972
1461	815.712/72	1,000.00	1972
157	815.714/72	903.75	1972
608	815.715/72	807.5	1972
Total		**5,954.44**	

Mining claim

Licence	Process Number	Area (ha)	Final Report Submission	Final Report Approval	Status
1236	800.602/78	650	27/12/1989	19/08/2003	Mining Claim

Note: Application for Mining Concession submitted on May 12, 2006.

Exploration permits

JMC Land Control	Area (ha)	Application Date	ANM Exploration Permit No	Expiry Date	Status
870.188/03	1,696	10/02/2003	4996		Under review by ANM
871.652/09	770	13/07/2009	8,543		Under review by ANM
872.072/07	5	20/06/2007	232		Under review by ANM
870.770/12	1,695	22/03/2012	8,688	12/09/2021	Renewal Approved
870.771/12	50	22/03/2012	8,689	03/10/2021	Renewal Approved
870.323/14	894	20/03/2014	7,626	04/01/2021	Renewal Approved
870.479/13	1,919	08/03/2013	10,367	03/10/2021	Renewal Approved
870.480/13	1,840	08/03/2013	10,368	03/10/2021	Renewal Approved
870.481/13	1,885	08/03/2013	10,369	12/09/2021	Renewal Approved
870.482/13	1,854	08/03/2013	10,370	12/09/2021	Renewal Approved
870.483/13	1,607	08/03/2013	10,371	12/09/2021	Renewal Approved
870.484/13	1,638	08/03/2013	10,372	14/11/2021	Renewal Approved
870.485/13	1,715	08/03/2013	10,373	12/09/2021	Renewal Approved
870.118/12	349	17/01/2012	8,423	22/08/2021	Renewal Approved
872.264/12	193	23/10/2012	9,295	12/09/2021	Renewal Approved
872.116/12	2,000	08/10/2012	9,252	03/10/2021	Renewal Approved
872.117/12	2,000	08/10/2012	9,253	03/10/2021	Renewal Approved

JMC Land Control	Area (ha)	Application Date	ANM Exploration Permit No	Expiry Date	Status
872.118/12	1,825	08/10/2012	9,254	03/10/2021	Renewal Approved
872.119/12	630	08/10/2012	9,255	22/08/2021	Renewal Approved
872.120/12	1,911	08/10/2012	9,256	03/10/2021	Renewal Approved
872.125/12	1,406	08/10/2012	9,257	03/10/2021	Renewal Approved
872.142/12	597	10/10/2012	9,258	31/12/2020	Under review by ANM
872.143/12	273	10/10/2012	9,259	12/09/2021	Renewal Approved
871.460/14	701	26/08/2014	15,188	12/09/2021	Renewal Approved
870.889/13	547	18/04/2013	14,555	03/10/2021	Renewal Approved
872.067/15	821	23/09/2015	16,555	12/09/2021	Renewal Approved
871.447/16	528	12/07/2016	11,196	31/12/2020	Under review by ANM
871.448/16	682	12/07/2016	11,197	31/12/2020	Under review by ANM
871.467/16	686	12/07/2016	10,970	31/12/2020	Under review by ANM
871.472/16	968	12/07/2016	10,971	31/12/2020	Under review by ANM
871.477/16	1,695	12/07/2016	11,417	31/12/2020	Under review by ANM
871.520/16	553	14/07/2016	11,420	31/12/2020	Under review by ANM
871.533/16	443	14/07/2016	10,978	31/12/2020	Under review by ANM
871.539/16	579	14/07/2016	60	31/12/2020	Under review by ANM
871.854/16	1,208	11/08/2016	2,098	31/12/2020	Under review by ANM
871.855/16	211	11/08/2016	2,099	31/12/2020	Under review by ANM
871.858/16	779	11/08/2016	2,101	15/04/2023	Renewal Approved
871.859/16	713	11/08/2016	2,102	15/04/2023	Renewal Approved
871.860/16	1,948	11/08/2016	2,103	31/12/2020	Under review by ANM
871.861/16	267	11/08/2016	2,104	31/12/2020	Under review by ANM
871.862/16	1,365	11/08/2016	2,105	31/12/2020	Under review by ANM
871.863/16	831	11/08/2016	2,106	15/04/2023	Renewal Approved
871.865/16	875	11/08/2016	2,276	31/12/2020	Under review by ANM
871.868/16	1,000	11/08/2016	2,277	15/04/2023	Renewal Approved
871.905/16	1,420	12/08/2016	2,582	15/04/2023	Renewal Approved
872.549/16	1,009	10/11/2016	1,593	27/03/2023	Renewal Approved
872.551/16	1,721	10/11/2016	1,594	31/12/2020	Under review by ANM
872.554/16	1,421	10/11/2016	1,595	31/12/2020	Under review by ANM
872.559/16	451	10/11/2016	1,596	27/03/2023	Renewal Approved
872.600/16	263	21/11/2016	1,597	20/03/2020	Under review by ANM
872.441/16	951	07/11/2016	1,572	27/03/2023	Renewal Approved
872.450/16	219	07/11/2016	1,576	31/12/2020	Under review by ANM
872.455/16	1,614	07/11/2016	1,577	31/12/2020	Under review by ANM
870.693/17	1,447	17/03/2017	6,248	21/08/2020	Permit Granted
870.694/17	1,261	17/03/2017	6,249	21/08/2020	Permit Granted
870.505/17	73	21/02/2017	9,345	21/12/2020	Permit Granted
870.770/17	20	28/03/2017	9,347	21/12/2020	Permit Granted
870.792/17	654	30/03/2017	9,349	21/12/2020	Permit Granted

JMC Land Control	Area (ha)	Application Date	ANM Exploration Permit No	Expiry Date	Status
870.793/17	322	30/03/2017	9,350	21/12/2020	Permit Granted
872.211/17	1,875	20/12/2017	3,140	07/05/2021	Permit Granted
871.362/17	1,618	29/06/2017	9,408	21/12/2020	Permit Granted
872.448/16	123	07/11/2016	238	07/01/2022	Permit Granted
871.106/18	598	30/07/2018	274	07/01/2022	Permit Granted
871.107/18	1,864	30/07/2018	275	07/01/2022	Permit Granted
871.108/18	1,337	30/07/2018	276	07/01/2022	Permit Granted
871.109/18	517	30/07/2018	277	07/01/2022	Permit Granted
871.305/18	42	04/09/2018	1,397	03/04/2022	Permit Granted
871.448/18	25	18/09/2018	2,008	29/04/2022	Permit Granted
871.496/18	582	25/09/2018	2,019	29/04/2022	Permit Granted
871.497/18	578	25/09/2018	2,020	29/04/2022	Permit Granted
871.586/18	1,989	09/10/2018	2,031	29/04/2022	Permit Granted
871.498/18	804	25/09/2018	2,021	29/04/2022	Permit Granted
871.449/18	100	18/09/2018	4,894	26/08/2022	Permit Granted
Total	**71,045**				