Report to:

East Africa Metals Inc.

National Instrument 43-101 Technical Report and Preliminary Economic Assessment for the Mato Bula Deposit, Adyabo Property, Tigray National Regional State, Ethiopia

Project No. 704-ENG.VMIN03019-01

TETRA TECH

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EAST AFRICA METALS INC.

NATIONAL INSTRUMENT 43-101 TECHNICAL REPORT AND PRELIMINARY ECONOMIC ASSESSMENT FOR THE MATO BULA DEPOSIT, ADYABO PROPERTY, TIGRAY NATIONAL REGIONAL STATE, ETHIOPIA

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GLOSSARY

UNITS OF MEASURE

annum (year) .... a
centimetre .... cm
coefficient of variation CV
cubic metre .... m^3
day .... d
days per year .... d/a
degrees Celsius .... °C
degrees .... °

delta	δ
dry metric tonnes	dmt
dynamic unfolding	DU
grams per litre	g/L
grams per tonne	g/t
grams	g
hectare	ha
hour	h
hours per day	h/d
kilogram	kg
kilometre	km
kilotonnes	kt
kilovolts	kV
kilowatt hour per tonne	kWh/t
kilowatt hour	kWh
kilowatt	kW
litre	L
metres above sea level	masl
micron	µm
millimetres per day	mm/d
millimetres per month	mm/mo
millimetres per year	mm/a
millimetres	mm
million cubic metres	Mm^3
million pounds	Mlb
million tonnes per year	Mt/a
million tonnes	Mt
minutes	min
month	mo
parts per billion	ppb
parts per million	ppm
per mille	‰
percentage	%
plus/minus	±
pound	lb
specific gravity	SG
square kilometre	km^2
tonne	t
tonnes per cubic metre	t/m^3
tonnes per day	t/d
tonnes per hour	t/h
tonnes per year	t/a
troy ounce	tr oz
US dollars	US$

Abbreviations and Acronyms

Aberdeen International	Aberdeen
ACME Analytical Laboratories (Vancouver) Ltd.	ACME Vancouver
ACME Analytik Ankara	ACME Turkey
ALS Global	ALS
ammonium nitrate and fuel oil	ANFO
Arabian Nubian Shield	ANS
arsenic	As
Ashanti Gold Field	Ashanti
atomic absorption spectroscopy	AAS
atomic absorption	AA
back-scatter detector	BSE
Banded Iron Formation	BIF
barium	Ba
Beles Engineering PLC	Beles
Blue Coast Research Ltd.	BCR
Bond Work Index	BWi
caesium	Cs
Canadian Institute of Mining, Metallurgy and Petroleum	CIM
CDN Resource Laboratories Ltd.	CDN Labs
certified reference materials	CRMs
copper	Cu
cyanide-in-leach	CIL
differential global positioning system	DGPS
diisobutyl ketone	DIBK
discrete Gaussian model	DGM
dynamic unfolding	DU
East Africa Metals Inc.	EAM
east	E
electromagnetic	EM
energy dispersive x-ray spectroscopy	EDSX
engineering, procurement and construction management	EPCM
environmental and social impact assessment	ESIA
Environmental Impact Assessment	EIA
Ethiopian Institute of Geological Surveys	EIGS
exploratory data analysis	EDA
Ezana Mining Development PLC	EMD
Federal Democratic Republic of Ethiopia	FDRE
fire assay	FA
free board marine	FOB
free carrier	FCA
general and administrative	G&A
geographical information system	GIS
Geological Survey of Ethiopia	GSE

Geostats Pty Ltd.	Geostats
GEOVIA Whittle4X™	Whittle4X™
global positioning system	GPS
gold	Au
induced polarization	IP
inductively coupled plasma - atomic emission spectroscopy	ICP-AES
inductively coupled plasma-emission spectroscopy	ICP-ES
inductively coupled plasma-mass spectroscopy	ICP-MS
internal rate of return	IRR
International Organization for Standardization	ISO
International Union for Conservation of Nature and Natural Resources	IUCN
inverse distance to the power of three	IDW^3
Kluane Drilling Ltd.	Kluane
lead	Pb
life-of-mine	LOM
locked cycle test	LCT
mercury	Hg
metho isobutyl carbinol	MIBC
Met-Solve Laboratories Inc.	Met-Solve
Ministry of Mines, Petroleum and Natural Gas	MoMPNG
molybdenum	Mo
National Instrument 43-101	NI 43-101
nearest neighbor	NN
net present value	NPV
net smelter return	NRS
niobium	Nb
non-acid generating	NAG
north	N
OMAC Laboratories Limited	OMAC
ordinary kriging	OK
portable x-ray fluorescence	pXRF
potentially acid generating	PAG
Preliminary Economic Assessment	PEA
Project Affected Person	PAP
Qualified Person	QP
quality assurance	QA
quality control	QC
Quality Management System	QMS
rock quality designation	RQD
run-of-mine	ROM
scanning electron microscopy	SEM
selenium	Se
silver	Ag
sodium cyanide	NaCN
sodium isopropyl xanthate	SPIX

south	S
Standard Reference Material	SRM
Sweden Agency for Research Cooperation with Developing Countries	SAREC
tailings containment facility	TCF
tellurium	Te
Tetra Tech Canada Inc.	Tetra Tech
Tigray Resources Inc.	TRI
volcanogenic massive sulphide	VMS
volts	V
waste rock storage facility	WRSF
west	W
work breakdown structure	WBS
x-ray diffraction	XRD
x-ray fluorescence	XRF
zinc	Zn

1.0 SUMMARY

1.1 INTRODUCTION

East Africa Metals Inc. (EAM) through its wholly-owned subsidiary Tigray Resources Inc. (TRI), owns the Adyabo Project, which includes the Mato Bula and Da Tambuk deposits.

The Mato Bula and Da Tambuk deposits are high-sulphidation gold-rich volcanogenic massive sulphide (VMS) submarine porphyry related systems located in the southern part of the Arabian Nubian Shield (ANS) in the Tigray region of northern Ethiopia.

EAM commissioned Tetra Tech Canada Inc. (Tetra Tech) to complete a Preliminary Economic Assessment (PEA) on the Mato Bula deposit, which follows the Mineral Resource estimate prepared by David G. Thomas, P.Geo. A PEA report for the Da Tambuk deposit has been prepared separately.

This PEA reports Mineral Resource estimates, open pit mining, metallurgy and processing methods, and related infrastructures for the Mato Bula deposit. The copper and gold recovery uses gravity and flotation concentration to produce a copper concentrate containing gold and silver, a gravity concentrate (melted on site to produce doré), as well as gold-bearing pyrite material which is planned to be further treated by cyanide leaching offsite.

The effective date of this PEA is April 30, 2018 and the effective date of the Mato Bula deposit Mineral Resource estimate is May 29, 2015.

The key outcomes for the Mato Bula Project are summarized in Table 1.1.

Table 1.1 Mato Bula Project Summary

Description	Unit	Value
Commodity	-	Au, Ag, Cu
LOM	years	8
Total Initial Capital, excluding Leasing Cost	US$ million	54,198
Total LOM Capital	US$ million	59,795
Operating Cost including pre-stripping	US$/t processed	47.53
Gold Price	US$/tr oz	1,325
Copper Price	US$/lb	3.00
Silver Price	US$/tr oz	17.0
Pre-tax NPV (8%)	US$ million	83,820
Post-tax IRR	%	28.4
Post-tax NPV (8%)	US$ million	56,660

Notes: LOM – life-of-mine; IRR – internal rate of return – NPV = net present value, Au – gold, Ag – silver, Cu - copper

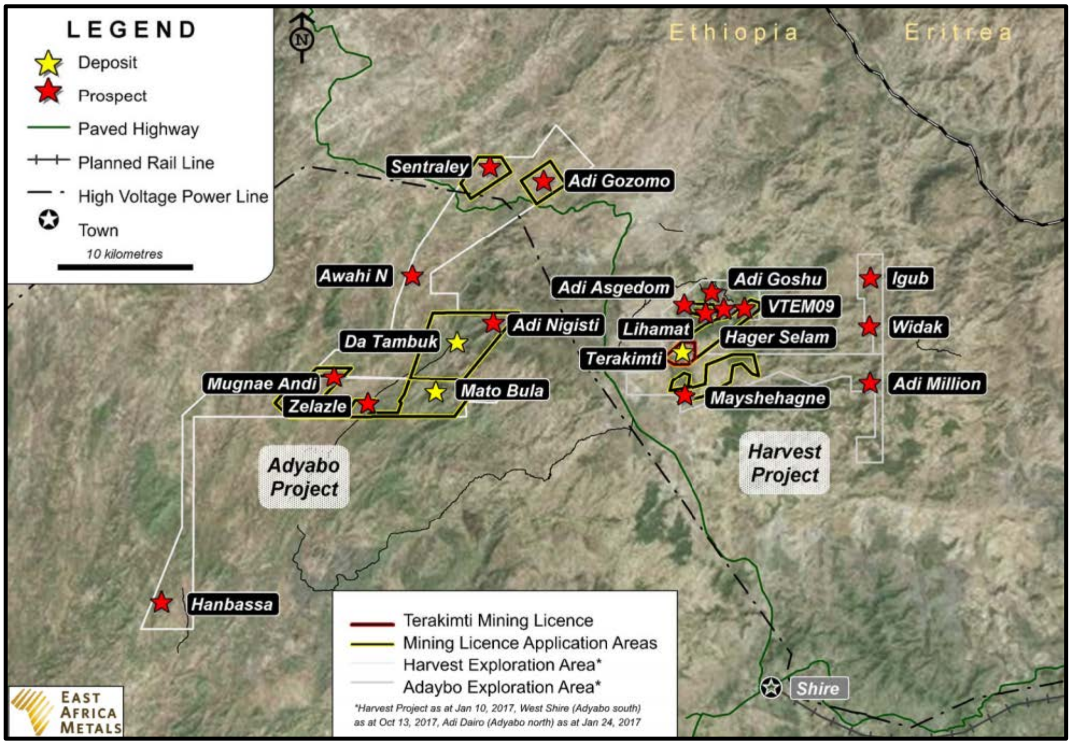
A PEA should not be considered a prefeasibility or feasibility study, as the economics and technical viability of the Project have not been demonstrated at this time. A PEA is preliminary in nature and includes Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves. Furthermore, there is no certainty that the conclusions or results as reported in the PEA will be realized. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

1.2 PROPERTY DESCRIPTION AND LOCATION

EAM, through TRI, holds mineral tenure to the West Shire concession, which covers an area of 86.5 km^2 in northern Ethiopia. The concession is host to the Mato Bula Project, which consists of an open pit mine, and auxiliary facilities.

Mato Bula is located approximately 600 km (1,100 km ground distance) north-northeast of the capital city of Addis Ababa (pop. 3,385,000 in 2008), and 33 km northwest of the town of Shire (formerly Indaselassie).

Figure 1.1 Mato Bula Concession Map



Source: EAM

1.3 HISTORY

The Adyabo Property was first identified in a regional scale geological mapping and mineral exploration performed by the Ethiopian Institute of Geological Surveys (EIGS) (now known as the Geological Survey of Ethiopia (GSE) and Ezana Mining Development PLC (EMD) during the 1960s and 1970s; EMD is a private Ethiopian company. Later EIGS and EMD completed the reconnaissance mapping and prospecting for precious and base metals from 1991 to 1993. The encouraging results from this survey led EMD to acquire the exploration licences in 1993. In 1996, EMD and Ashanti Gold Field (Ashanti) signed a joint-venture agreement for base and precious metals exploration in the Adyabo Project area. In 2011 TRI acquired an undivided 80% interest of the Adyabo Property, In February 2016, EAM obtained another 20% interest of the Adyabo Property; therefore, the Adyabo Property is 100% owned by TRI.

1.4 GEOLOGY AND MINERALIZATION

The Adyabo Property is located within the Neoproterozoic ANS of Ethiopia. Steeply dipping assemblages of the host belt trend north-northeast in the Adyabo Property area.

The Mato Bula deposit, and hosting Mato Bula trend, are situated at the sheared and altered boundary area of felsic to intermediate rocks to the east, and predominantly sedimentary assemblages to the west. mineralization. Structural patterns indicate the

Mato Bula area is situation within a tight antiformal fold. The gold-copper host mineralized horizon, approximately up to 110 m thick, predominantly comprises variably mineralized (pyrite and chalcopyrite) sericite schist, bedded jasper (hematized chert), massive jasper, bedded chert, massive silica flooded zones, and chlorite schist. Mineralization is steeply dipping. This sequence was intruded parallel to the foliation/bedding by a highly altered quartz-eye porphyry. Mineralization at Mato Bula has been traced over 1.5 km by soil geochemistry, geological mapping, channel sampling, drilling, and the presence of numerous deep artisanal gold workings. The target sequence of interest (Mato Bula trend) has been interpreted to extend northward towards the Da Tambuk deposit, 5 km to the north.

1.5 MINERAL RESOURCE ESTIMATE

Mineral Resources for the Mato Bula Project were classified under the 2014 Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves by application of a cut-off grade that incorporated mining and metallurgical recovery parameters. Open pit Mineral Resources are constrained to a pit shell based on commodity prices, metallurgical recoveries, and operating costs.

Underground Mineral Resources are constrained to blocks with enough value to cover the underground marginal cut-off grade. Isolated blocks have been removed from the underground Mineral Resource Estimate.

The Qualified Person (QP) for the Mineral Resource estimate is David G. Thomas, P.Geo. Mineral Resources are reported using the long-term metal prices. The Mato Bula Mineral Resources have an effective date of May 31, 2016. The Indicated Mineral Resource is shown subdivided by area and pit constrained or underground in Table 1.2 and the Inferred Mineral Resource is shown subdivided in Table 1.3.

Table 1.2 Mato Bula Project Indicated Mineral Resource Estimate David G. Thomas, P.Geo. (Effective Date: May 31, 2016)

Area	Cut-off (US$/t)	Tonnes (t)	Gold (g/t)	Copper (%)	Silver (g/t)	Gold Equivalent (g/t)	Gold Metal (tr oz)	Copper Metal (Mlb)	Silver Metal (tr oz)	Gold Equivalent Metal (tr oz)
Mato Bula	23.9	2,280,000	3.74	0.28	1.1	4.18	278,000	14.0	70,000	310,000
Underground Mineral Resource										
Mato Bula	63.9	160,000	3.57	0.25	1.0	3.96	18,000	0.9	3,000	20,000

Table 1.3 Adyabo Project Inferred Mineral Resource Estimate David G. Thomas, P.Geo. (Effective Date: May 31, 2016)

Area	Cut-off (US$/t)	Tonnes (t)	Gold (g/t)	Copper (%)	Silver (g/t)	Gold Equivalent (g/t)	Gold Metal (tr oz)	Copper Metal (Mlb)	Silver Metal (tr oz)	Gold Equivalent Metal (tr oz)
Mato Bula	23.9	3,010,000	2.13	0.34	2.4	2.67	207,000	22.2	237,000	259,000
Mato Bula North	23.9	2,470,000	0.27	0.70	3.2	1.49	22,000	38.3	252,000	119,000
Underground Mineral Resource										
Mato Bula	63.9	330,000	2.77	0.651	5.4	3.82	30,000	4.7	58,000	41,000
Mato Bula North	63.9	15,000	0.75	0.79	2.6	2.10	300	0.3	1,000	1,000

Notes: Fladgate reviewed EAM's quality assurance and quality control programs on the mineral resources data. Fladgate concludes that the collar, survey, assay, and lithology data are adequate to support Mineral Resources estimation.
Domains were modelled in 3D to separate mineralised rock types from surrounding waste rock. The domains were modelled based on copper and gold grades.
Raw drillhole assays were composited to 2 m lengths broken at domain boundaries.
Capping of high grades was considered necessary and was completed for each domain on assays prior to compositing.
Block grades for gold and silver were estimated from the composites using an IDW^3 interpolation method into 5 m (along strike) by 2 m (across strike) by 5 m (vertical) blocks coded by domain.
Dry bulk density varied by deposit area. The dry bulk densities are based on 1,665 specific gravity measurements at Mato Bula and 231 specific gravity measurements at Mato Bula North.
Blocks were classified as Inferred in accordance with CIM Definition Standards 2014. Inferred resources are classified on the basis of blocks falling within the mineralised domain wireframes (i.e. reasonable assumption of grade/geological continuity) with a maximum distance of 100 m to the closest composite.
The Mineral Resource estimate is constrained within an optimised pit with a maximum slope angle of 50°. Metal prices of US$1,400/tr oz, US$3.20/lb and US$20.0/tr oz were used for gold, copper and silver respectively. Metallurgical recoveries of 81% for gold, 87.5% for copper and 50% for silver were applied at Mato Bula and Mato Bula North.
An open pit US$ per tonne cut-off was estimated based on a total process and G&A operating cost of US$23.90/t of ore mined. An additional mining cost of US$40/t was used to estimate a US$ per tonne cut-off of US$63.90/t for reporting underground Mineral Resources.

The contained gold, copper and silver figures shown are in situ. No assurance can be given that the estimated quantities will be produced. All figures have been rounded to reflect accuracy and to comply with securities regulatory requirements. Summations within the tables may not agree due to rounding.
Mineral Resources which are not Mineral Reserves do not have demonstrated economic viability. The estimate of mineral resources may be materially affected by environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues.
The quantity and grade of reported Inferred Resources in this estimation are conceptual in nature and there has been insufficient exploration to define these Inferred Resources as an Indicated or Measured Mineral Resource and it is uncertain if further exploration will result in upgrading them to an Indicated or Measured Mineral Resource category.

1.6 MINERAL PROCESSING AND METALLURGICAL TESTING

Metallurgical test work was conducted in 2015 and 2018 on the samples collected from the Mato Bula and Silica Hill zones, in the Mato Bula deposit. The metallurgical test work program was performed by Blue Coast Research Ltd. (BCR). The test work program evaluated metallurgical responses of the mineral samples to gravity concentration, flotation and agitated cyanide leaching treatments. The findings produced from the test work are summarized below:

The Mato Bula and Silica Hill test work program demonstrated that a conventional flotation concentration was successful in achieving gold and copper recovery to a copper-gold concentrate with marketable grades.

- Copper recovery to flotation concentrate was 93% for the Mato Bula sample and 82% for the Silica Hill sample.
- Gold recovery to flotation concentrate was 83% for the Mato Bula sample and 38% for the Silica Hill sample.
- Concentrate grades for the Mato Bula sample were 27% copper and 166 g/t gold.
- Concentrate grades for the Silica Hill sample were 23% copper and 409 g/t gold.

Approximately 5% of the gold can be recovered from the Mato Bula composite into a gravity concentrate containing 3,300 g/t gold and 17% from the Silica Hill composite to a gravity concentrate with 4,700 g/t gold.

Additional gold recovery was achieved for both the Mato Bula and Silica Hill composites by agitated cyanide leaching of gold-bearing flotation products (pyrite concentrate and copper cleaner tailings). With leaching of the flotation products, the overall gold recovery was 89% for the Mato Bula sample and 88% for the Silica Hill sample, respectively.

The preliminary Bond grindability test results show that the mineralization is medium hard.

The samples used in the test work have much higher head grades, compared to the average grades of the planned mill feed. Further test work should be conducted on more representative samples to confirm the metallurgical responses.

1.7 MINING METHODS

The mine is planned to be operated as a conventional open pit truck and shovel operation. Mill feed will be trucked to the crushing plant and waste rock will be trucked to the waste rock storage facility (WRSF) to the east of the pit.

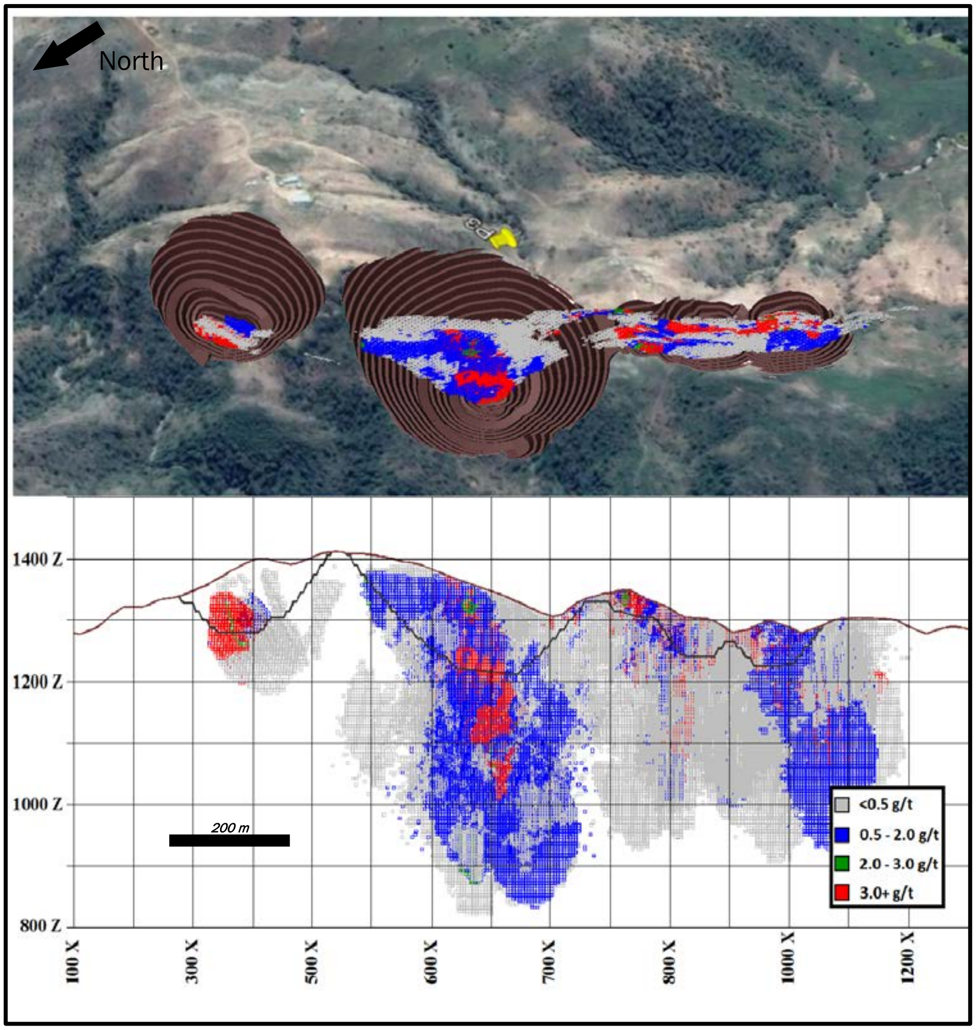
Tetra Tech conducted pit optimisation using GEOVIA Whittle4X™ (Whittle4X™) software to determine an ultimate pit, resulting in an open pit containing 3.3 Mt of potential mill feed, with 30 Mt of waste rock. Figure 1.2 shows the layout of the open pit plan.

The average net smelter return (NRS) for the pit contained resources is $111/t.

Table 1.4 shows the mining schedule for Mato Bula. The schedule pre-stripping of 2.8 Mt of waste rock before the start of production.

Additional Mineral Resources exist below the planned pit which may be amenable to underground mining, however these Mineral Resources have not been included in the mine plan or the economic analysis for this PEA.

Figure 1.2 PEA Level Open Pit Design for Mato Bula



Mining has been planned to meet a design mill throughput of 1,400 t/a.

Table 1.4 Mato Bula Open Pit Mining Schedule

Item	Units	Pre stripping	Operations								Total
		Year –1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	
Tonnage Mined	kt	2,780	5,029	4,644	5,035	5,020	5,842	3,113	2,018	168	33,650
Waste Rock	kt	2,697	4,428	4,148	4,650	4,413	5,385	2,366	1,414	118	30,315
Mined Directly to Mill	kt	-	196	112	135	332	380	486	382	32	2,054
Mined to Stockpile	kt	83	405	384	251	275	77	261	221	18	1,976
Stockpile to Mill	kt	-	83	392	369	172	124	18	122		1,280
Total Fed into Mill	kt	-	279	504	504	504	504	504	504	32	3,335
Diluted Head Grades											
Gold Grade	g/t	-	4.31	2.96	2.26	3.20	3.83	2.81	2.11	4.92	3.01
Copper Grade	%	-	0.19	0.15	0.13	0.17	0.37	0.24	0.22	0.63	0.22
Silver Grade	g/t	-	0.49	0.37	0.36	0.58	1.06	1.22	0.57	3.35	0.71

1.8 RECOVERY METHODS

The process flowsheet was developed based on the metallurgical test results. The Mato Bula processing facilities are designed to process a nominal rate of 500,000 t/a, or 1,400 t/d, of gold-copper bearing material from an open pit mining operation. The designed mill availability is 90%.

The process at the Mato Bula site will utilize a combination of conventional crushing, grinding, gravity concentration followed by flotation to recover copper and gold values from the mineralization. The concentrator is designed to produce a copper concentrate containing a high level of gold and a gold concentrate which is produced by gravity concentration. The flotation concentrate will be transported to offsite smelters however the gravity concentrate can be melted on site to produce gold doré. A gold-bearing by-product produced from the flotation process contains a sufficient level of gold which can be treated utilizing agitated cyanide leaching to maximize gold recovery. This material will be treated off site at the Da Tambuk processing plant or other facilities.

The process flowsheet will utilize conventional crushing and ball mill grinding for comminution and cyclones for particle size classification. A centrifugal gravity concentrator in the grinding circuit will be used to recover coarse, liberated gold particles and a shaking table used to upgrade the gravity concentrate. The ball mill cyclone overflow will be treated in a conventional rougher-cleaner-scavenger flotation circuit to produce a gold bearing copper concentrate.

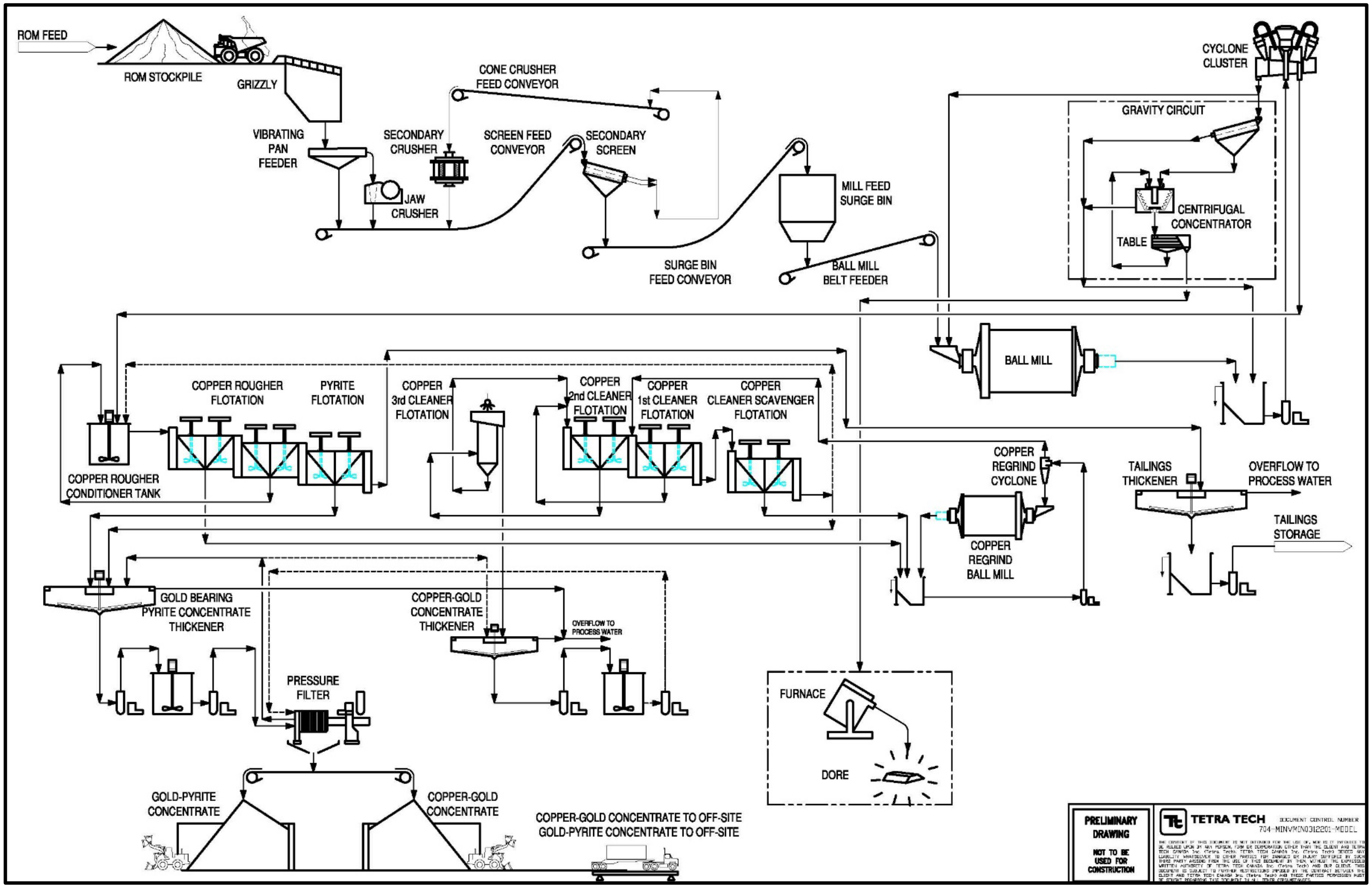
The rougher flotation concentrate will be reground and upgraded in three stages of cleaner flotation to produce a final copper-gold concentrate. The final concentrate from the third cleaner flotation will be pumped to the concentrate dewatering circuit, consisting of thickening and filtration, to reduce the moisture content to approximately 8 to 10% prior to being transported offsite for sale.

The copper rougher flotation tailings will be directed to a pyrite flotation circuit to recover gold-bearing pyrite not recovered in the copper rougher flotation circuit. After being dewatered, the pyrite flotation concentrate, together with the copper cleaner scavenger tailings, will be transported to the nearby Da Tambuk cyanide-in-leach (CIL) circuit or other facilities for additional gold recovery by cyanidation.

The pyrite flotation circuit tailings are the final tailings and will be pumped to the tailings thickener. The tailings thickener underflow will be pumped to the tailings containment facility while the thickener overflow will be reused as process water.

The concentrate and tailings thickener overflows will be reused as process water, which will be supplemented with the water recovered from the tailings containment facility. Fresh water will be used for reagent preparation and pump gland seal and for water make-up purposes, as required.

Figure 1.3 Mato Bula Process Flowsheet



1.9 PROJECT INFRASTRUCTURE

In addition to mining, process and tailings infrastructure, ancillary facilities will be required for operations. These include road access, power, water, offices, fuel storage, explosives storage, and reagent storage and administration facilities.

The Mato Bula site layout is shown in Figure 1.4.

1.9.1 WASTE MANAGEMENT, TAILINGS CONTAINMENT AND WATER MANAGEMENT

Over the life of the operations at Mato Bula, waste rock will be hauled to a designated WRSF east of the open pit. The current storage location is sited in a valley adjacent to the pit.

Any potentially acid generating (PAG) waste rock is to be encapsulated within the non-acid generating (NAG) waste rock. This, along with surface water diversion, will mitigate potential downstream water quality impact.

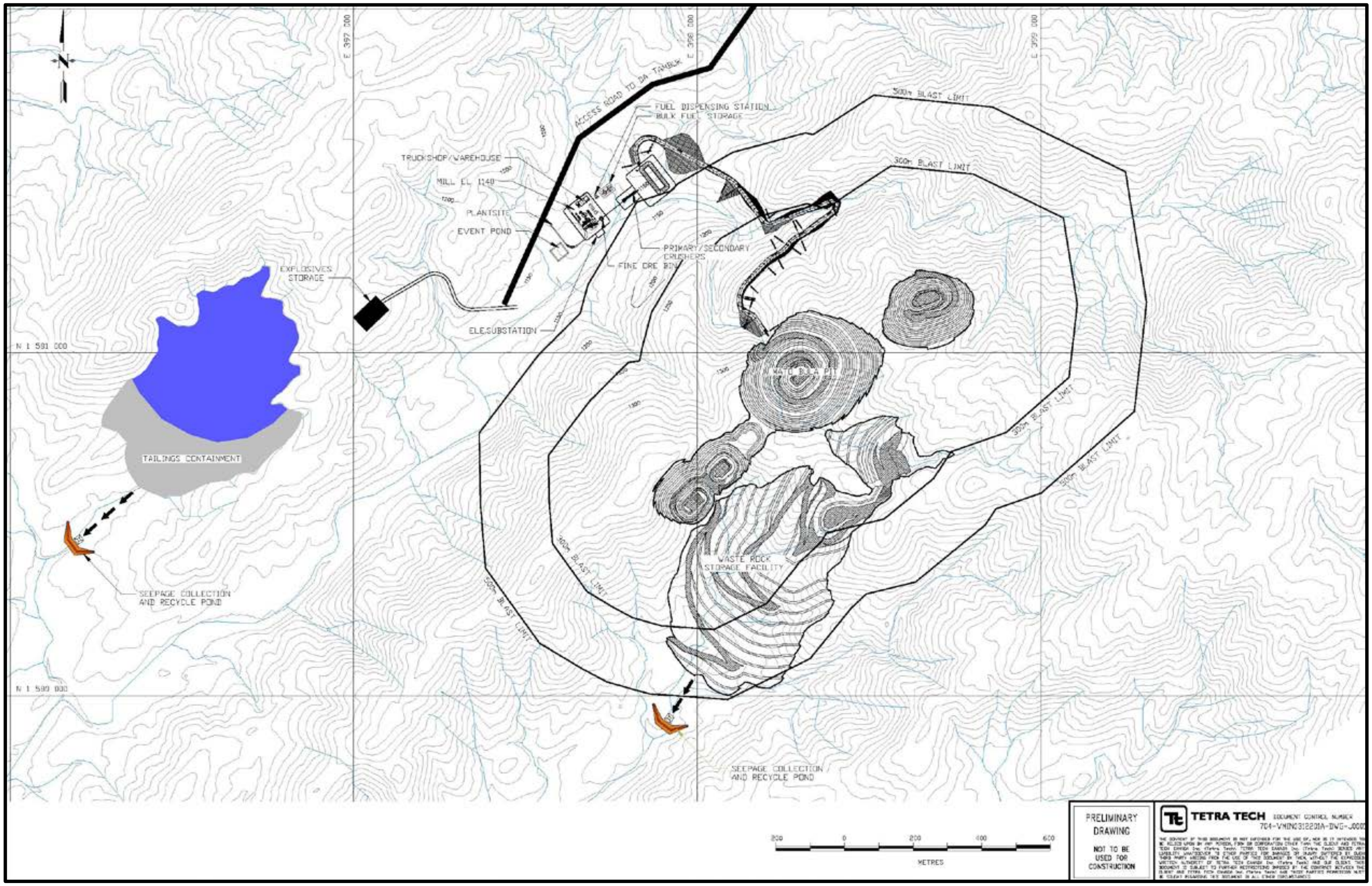
The design of the tailings containment facility (TCF) for the Matobula Project considers optimizing tailings containment capacity using available construction materials, maximizing tailings density, and mitigating potential environmental impact. The facility was designed based on eight years of production at up to 500,000 dmt during peak operations and a lower production initial and last year. At total tailings volume of 3.3 Mt, and assumed 1.3 t/m^3 for the slurry tailings, the storage was designed for a capacity of 2.5 Mm^3 of tailings.

The TCF is located approximately 0.9 km southwest of the plant, where the topographical location allows for containment by constructing an embankment on one end. Initially, a starter dyke will be constructed to provide capacity for the initial two years of LOM using waste rock and/or clayey borrow. Following the starter dyke, subsequent raises will be constructed using the downstream construction method.

The water management for Mato Bula will consist of diverting run-off (non-contact water) away from the mine site and containing and managing contact water within the mining area. Two clean water diversions have been sited, one northeast of the WRSF and one southwest of the mill pad. A contact water ditch will be constructed on the south side of the WRSF along the toe that will collect contact water and feed it to a collection pond. The TCF will also have a seepage pond constructed to the south of the facility.

The annual water balance shows that the mine should have a negative water balance for most the year except for June through September when precipitation is highest.

Figure 1.4 Mato Bula Overall Conceptual Site Layout



1.10 Environmental and Social Impact Assessment

EAM, through TRI, engaged an independent consulting firm, Beles Engineering PLC (Beles) in July 2017 to undertake an environmental and social impact assessment (ESIA) for the Adyabo area, which contains the Mato Bula Project and the nearby Da Tambuk Project. Beles completed the ESIA in November 2017 and submitted the final report to TRI.

1.11 Capital and Operating Cost Estimates

The capital and operating costs for the Project have been estimated and are summarized in Table 1.5 and Table 1.6.

Table 1.5 Summary of Capital Costs

Description	Total (US$ million)
Initial Capital Costs	54.2
Sustaining Capital for LOM	5.6

Table 1.6 Summary of Operating Costs

Description	LOM Operating Cost (US$ million)	Unit Operating Cost (US$/t processed)
Mining	85.4	25.61
Processing	32.4	9.69
Off-site Leaching of Pyrite Material	15.7	4.73
G&A	19.9	5.96
Total (Excluding Pre-stripping)	**153.4**	**45.99**
Total (Including Pre-stripping)	**158.5**	**47.53**

Note: G&A – general and administrative

1.12 Economic Analysis

A PEA should not be considered a prefeasibility or feasibility study, as the economics and technical viability of the Project have not been demonstrated at this time. A PEA is preliminary in nature and includes Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves. Furthermore, there is no certainty that the conclusions or results as reported in the PEA will be realized. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

Material information in this report was compiled from data previously disclosed by EAM, information available in the public domain, and work done by external consultants.

Financial results are based on the following key assumptions:

- gold price of US$1,325/tr oz
- silver price of US$ 17.00/tr oz
- copper price of US$3.00/lb.

The key financial results are shown in Table 1.7.

Table 1.7 Summary of Financial Results

Financial Summary	Units	Value
LOM	years	8
Annual Tonnage Processed	kt	504
Tonnes Mined including Waste Rock	kt	33,650
Tonnes Processed	kt	3,335
Tonnes Concentrate Produced (dry mass)	kt	24.7
Gold Recovered to Concentrate	'000 tr oz	102.3
Copper Recovered to Concentrate	'000 tr oz	13,899
Silver Recovered to Concentrate	'000 tr oz	18.8
Gold Recovered to Doré	'000 tr oz	175.9
Silver Recovered to Doré	'000 tr oz	18.8
Off-site Costs (Concentrate)	US$ millions	6.82
Off-site Costs (Doré)	US$ millions	1.24
Net Revenue from Sales	US$ millions	396.4
Capital costs		
Pre-production Capital Costs	US$ millions	54.2
LOM Sustaining Costs	US$ millions	5.6
Cash Flow		
Pre-tax Operating Cash Flow	US$ millions	139
Ethiopian Government Royalty	US$ millions	27.0
Taxes	US$ millions	42.0
Post tax NPV at 8%	**US$ millions**	**56.7**
IRR	**%**	**28.4**
Payback Period	**years**	**3.01**

Note: Values may not sum perfectly due to rounding.

1.13 RECOMMENDATIONS

1.13.1 GENERAL

Tetra Tech recommends that EAM advance the Mato Bula Project through completion of a Prefeasibility Study. Prior to completion of a Prefeasibility Study, additional exploration drilling and Mineral Resource work will be required to potentially upgrade confidence of the Inferred Mineral Resources to enable categorization as Indicated Mineral Resources.

1.13.2 GEOLOGY

Extension potential to known mineralization, laterally and at depth, should be traced via further geophysical IP surveying, and extension drilling, in particular concentrating on the Halima Hill IP chargeability target extending from the south end of the present known resource.

1.13.3 MINING

The inclusion of underground mining in the mine plan to access Mineral Resources below the planned open pit and potentially to replace areas of the open pit with high strip ratios, should be investigated. Geotechnical assessments should be carried out for open pit high walls, to better understand the requirements for stability.

1.13.4 METALLURGY, PROCESS, AND WATER SUPPLY

Additional metallurgical test work on representative samples of the Mato Bula deposit is planned to provide additional metallurgical information required to establish design parameters for the detailed engineering of the Mato Bula process plant. The test work to be completed is identified below:

- Verify metallurgical recovery responses of the samples collected from various rock zones, lithological zones and spatial locations of the deposit. The test work should include coarse gold recovery by gravity concentration, copper and gold recovery by flotation and gold recovery from the gold bearing pyrite product by cyanidation. The flowsheet development should include the investigation of the optimum copper grade of the copper-gold concentrate to maximize the gold recovery into the concentrate.
- Comminution test work including the determination of abrasion indices, crushing indices and Bond work indices to establish comminution design-related parameters.
- Settling test work on samples of flotation concentrate and flotation tailings to determine settling rates. This information will be required to establish design parameters for the concentrate and tailings thickeners.

Additional assessment of the potential water sources in the Mato Bula Project area is planned to confirm the optimum supply source (or sources), with regard to location, quantity and seasonal variation. This assessment will include assessment of groundwater sources in addition to surface sources.

2.0 INTRODUCTION

2.1 INTRODUCTION

EAM. through its wholly-owned subsidiary TRI, owns the Adyabo Project, which includes the Mato Bula and Da Tambuk deposits.

The Mato Bula and Da Tambuk deposits are high sulphidation gold rich VMS submarine porphyry related systems located in the southern part of the ANS in the Tigray region of northern Ethiopia.

EAM have commissioned Tetra Tech to complete a PEA on the Mato Bula deposit, which follows the Mineral Resource estimate prepared by David Thomas, P.Geo.

A PEA for the Da Tambuk deposit has been prepared separately.

This PEA reports on open pit mining of the Mato Bula deposit using flotation to recover copper concentrate containing gold and silver as well as gold-bearing pyrite material which is planned to be further treated by cyanide leaching offsite.

The effective date of this PEA is April 30, 2018 and the effective date of the Mato Bula Mineral Resource estimate is May 31, 2016.

2.2 QUALIFIED PERSONS

A summary of the QPs responsible for this report is provided in Table 2.1. The following QPs conducted site visits of the Property:

- David Thomas, P.Geo., visited the Mato Bula site from March 22 to 25, 2015.
- Mark Horan, P.Eng., visited the Mato Bula site on April 6, 2017.

Table 2.1 Summary of QPs

Report Section		Company	QP
1.0	Summary	All	Sign-off by Section
2.0	Introduction	Tetra Tech	Mark Horan, P.Eng.
3.0	Reliance on Other Experts	Tetra Tech	Mark Horan, P.Eng. Hassan Ghaffari, P.Eng.
4.0	Property Description and Location	Tetra Tech	Mark Horan, P.Eng.
5.0	Accessibility, Climate, Local Resources, Infrastructure and Physiography	Tetra Tech	Mark Horan, P.Eng.
6.0	History	Tetra Tech	Mark Horan, P.Eng.
7.0	Geological Setting and Mineralization	DKT	David G. Thomas, P.Geo.

table continues...

Report Section		Company	QP
8.0	Deposit Types	DKT	David G. Thomas, P.Geo.
9.0	Exploration	DKT	David G. Thomas, P.Geo.
10.0	Drilling	DKT	David G. Thomas, P.Geo.
11.0	Sample Preparation, Analyses and Security	DKT	David G. Thomas, P.Geo.
12.0	Data Verification	DKT	David G. Thomas, P.Geo.
13.0	Mineral Processing and Metallurgical Testing	Tetra Tech	Jianhui (John) Huang, Ph.D., P.Eng.
14.0	Mineral Resource Estimates	DKT	David G. Thomas, P.Geo.
15.0	Mineral Reserve Estimates	Tetra Tech	Mark Horan, P.Eng.
16.0	Mining Methods	Tetra Tech	Mark Horan, P.Eng.
17.0	Recovery Methods	Tetra Tech	Jianhui (John) Huang, Ph.D., P.Eng.
18.0	Infrastructure	Tetra Tech	Mark Horan, P.Eng.
19.0	Market Studies and Contracts	Tetra Tech	Mark Horan, P.Eng.
20.0	Environmental Studies, Permitting and Social or Community Impact	Tetra Tech	Hassan Ghaffari, P.Eng.
21.0	Capital and Operating Costs	Tetra Tech	Mark Horan, P.Eng. Hassan Ghaffari, P.Eng. Jianhui (John) Huang, Ph.D., P.Eng.
22.0	Economic Analysis	Tetra Tech	Mark Horan, P.Eng.
23.0	Adjacent Properties	Tetra Tech	Mark Horan, P.Eng.
24.0	Other Relevant Data and Information	Tetra Tech	Mark Horan, P.Eng.
25.0	Interpretation and Conclusions	All	Sign-off by Section
26.0	Recommendations	All	Sign-off by Section
27.0	References	All	Sign-off by Section

Note: DKT – DKT Geosolutions Inc.

2.3 SOURCES OF INFORMATION

All sources of information are shown in Section 27.0

2.4 UNITS OF MEASUREMENT AND CURRENCY

All measurements are reported in metric units, unless otherwise noted. All gold and silver weights are in troy ounces, unless otherwise notes.

All currency is reported in US dollars, unless otherwise noted.

3.0 RELIANCE ON OTHER EXPERTS

Tetra Tech followed standard professional procedures in preparing the contents of this report. Data used in this report has been verified where possible and Tetra Tech has no reason to believe that the data was not collected in a professional manner.

Technical data provided by EAM for use by Tetra Tech in this PEA is the result of work conducted, supervised, and/or verified by EAM consultants.

Tetra Tech has not independently verified the legal status or title of the claims or exploration permits, and has not investigated the legality of any of the underlying agreement(s) that may exist concerning the Property.

Mark Horan, P.Eng. relied on the legal audit and opinion with regard to the title, mining concessions, and registration issues provided by Worku Fantahun Shumiye, Legal Affairs Consultant and Attorney at Law (Addis Ababa, Ethiopia) in a letter dated October 7, 2013. This information pertains to Section 4.0.

Mr. Horan also relied on Peter Granata, C.P.A., C.A., Chief Financial Officer, East Africa Metals, concerning tax matters relevant to this report. The tax, royalty and government participation rates applied to the economic analysis in this PEA were taken from the current Ethiopian federal government tax proclamation for mining. This information pertains to Section 22.0.

Hassan Ghaffari, P.Eng. relied on Beles Engineering Pvt. Ltd. Co. (Beles) concerning environmental matters relevant to this report. Beles is one of the very few firms in Ethiopia which provides a wide spectrum of services in water, land and environment including consultancy, training, and construction. They provide services pertaining to consultations, investigations of natural resources, feasibility studies, design and design review, environmental and social impact assessment studies, and baseline surveys. This reliance is based on the report titled *Environmental and Social Impact Assessment (ESIA) Study of Mato Bula Gold/Copper Mining Project, Northwestern Zone, Tigray National Regional State, Northern Ethiopia* and dated May 2016. This information pertains to Section 20.0.

4.0 PROPERTY DESCRIPTION AND LOCATION

4.1 PROPERTY LOCATION

The Mato Bula Project is located in the Tigray National Regional State of the Federal Democratic Republic of Ethiopia. The Mato Bula Property is located approximately 600 km (1,100 km ground distance) north-northeast of the capital city of Addis Ababa (population 3,385,000 in 2008), and 33 km northwest of the town of Shire (formerly Indaselassie) as shown in Figure 4.1. The Federal Democratic Republic of Ethiopia comprises a total area of 1,104,300 km² and is located between longitudes 33°E to 48°E and latitudes 3°N to 15°N. The country is bounded by Eritrea to the north, Djibouti and Somalia to the east, Somalia and Kenya to the south, with Sudan and South Sudan to the west.

Figure 4.1 Property Location Map

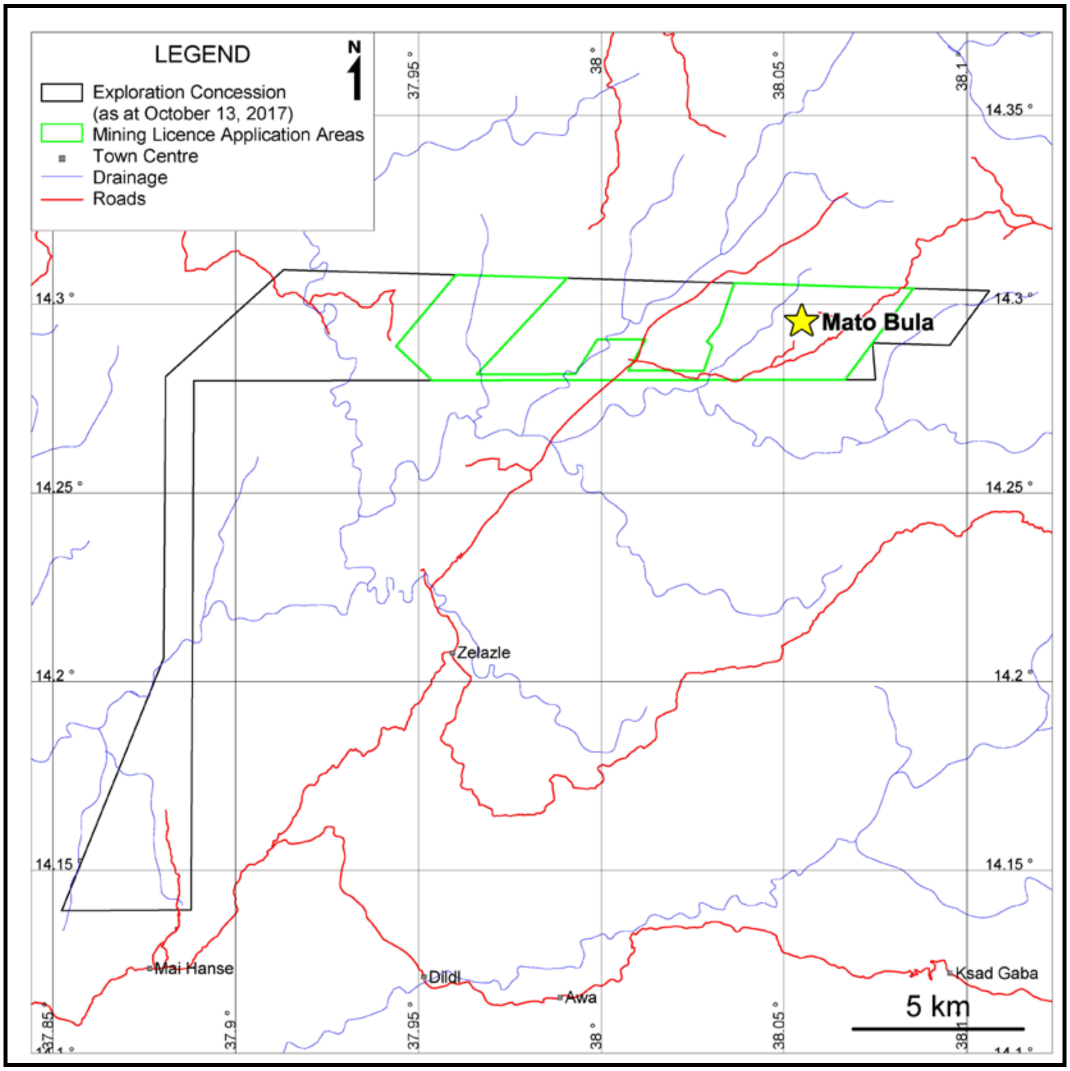
Source: Archibald et al. (2015)

4.2 MINERAL TENURE

EAM, through TRI, held a Precious and Base Metals West Shire exploration concession (No. MOM/0138-0182/2000) which covered an area of 86.5026 km^2 as of October 13, 2017). In December 2017, TRI submitted an application for a mining licence covering the Mato Bula deposit and other satellite prospects (Figure 4.2). The concession and mining licence application area corners were established by geographical information system (GIS) coordinate points, and have not been surveyed or marked on the ground (Table 4.1 and Table 4.2).

The West Shire concession was originally granted to Aberdeen International Inc. (Aberdeen) and transferred to EAM/TRI on October 5, 2012.

Figure 4.2 West Shire Concession Map



Source: TRI (2017)

Table 4.1 West Shire Exploration Concession Coordinates

No. MOM/0138-0182/2000		
Corner No.	Northing Coordinate	Easting Coordinate
1	14°18'13.00"	38°6'22.00"
2	14°17'21.00"	38°5'43.00"
3	14°17'23.00"	38°4'27.00"
4	14°16'48.00"	38°4'30.00"
5	14°16'47.00"	37°53'19.00"
6	14°8'22.00"	37°53'16.00"
7	14°8'21.30"	37°51'8.70"
8	14°12'22.00"	37°52'49.00"
9	14°16'51.00"	37°52'51.00"
10	14°18'32.90"	37°54'47.30"

Note: All coordinates in latitude/longitude (Adindan) projection

Table 4.2 Mato Bula Mining Licence Application Area Corner Points

Corner Point	Latitude (Adindan)	Longitude (Adindan)	Area (km^2)
WSML1	14.2889	37.9439	25.18
WSML2	14.3078	37.9602	
WSML3	14.3069	37.9907	
WSML4	14.2814	37.9659	
WSML5	14.2815	37.9929	
WSML6	14.2907	37.9989	
WSML7	14.2907	38.0122	
WSML8	14.2825	38.0074	
WSML9	14.2824	38.0281	
WSML10	14.2889	38.0304	
WSML11	14.2901	38.0289	
WSML12	14.2945	38.0324	
WSML13	14.3056	38.0363	
WSML14	14.3042	38.0853	
WSML15	14.2800	38.0666	
WSML16	14.2798	37.9537	

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 ACCESSIBILITY

The Adyabo Property can be accessed directly by scheduled flights from Addis Ababa to Shire (population 43,967) and Axum (population 47,320) year-round. Alternatively, the Adyabo Property may be reached with a two-day drive on paved highway from Addis Ababa.

The TRI head office is maintained in Addis Ababa and Adyabo Project office in Shire Indaselassie. The Adyabo Project area can be accessed from this base via a paved highway that passes along the eastern side of the concession area, followed by dirt road, partially constructed and maintained by TRI.

5.2 CLIMATE

The Adyabo Project region is characterized by a temperate to hot climate and has both dry and wet seasons. The rainy season extends from mid-June to mid-September with average rainfall of 800 to 1,000 mm/a. Mean daily temperatures range from a high of 32.5°C in March to a low of 13°C in January. Most of the region is devoid of natural vegetation, with minor areas of shrub brush and trees most commonly located along tributaries and main drainages. Farming is the main land use and the growing season coincides with the rainy season. During this time crops, such as teff and maize are grown for harvest in November (Archibald at al. 2014)

The climate chart below (Table 5.1) typifies weather in the town of Shire, Tigray region. Extreme heat is tempered by the elevated plateau present throughout much of Ethiopia.

Mining activity can be conducted year-round, although extra caution must be exercised on roads and while crossing streams in the wet season (June to September).

Table 5.1 Climate Chart for Shire, Tigray Region (1,900 m)

Month	Temperature			Precipitation		
	Average High (°C)	Daily Mean (°C)	Average Low (°C)	Average Monthly (mm/mo)	Average Daily (mm/d)	Maximum Daily (mm/d)
January	28.0	19.2	10.5	2.0	0.1	15.0
February	29.8	20.7	11.6	1.0	0.0	4.0
March	30.3	21.5	12.7	3.0	0.1	34.0
April	31.8	23.3	14.9	22.0	0.7	29.0
May	31.1	23.1	15.1	48.0	1.5	55.0
June	29.5	21.9	14.4	119.0	4.0	57.0
July	23.6	18.1	12.7	297.0	9.6	94.0
August	23.4	18.2	13.0	274.0	8.8	82.0
September	26.7	19.7	18.2	110.0	3.7	102.0
October	28.3	20.1	11.9	15.0	0.5	60.0
November	28.7	19.4	10.2	14.0	0.5	40.0
December	27.5	18.6	9.7	-	0.0	10.0
Year	28.2	20.3	12.5	905.0	29.5	-

5.3 PHYSIOGRAPHY

The Tigray region is an upland landlocked area in northern Ethiopia. The landscape consists of steep hilly terrain with deeply incised river valleys and lowland plain areas (Figure 5.1). Rivers over the concession area follow the regional stratigraphy, and drain from northeast to southwest where they meet and flow west to join the Tekezze River.

The largest river on the concession is the Mai Hanse River, which flows from just south of the Adi Nebrid and Zagr. This river is associated with flat plains and the majority of agriculture activities. The highest point on the concession is on the northeast corner at 1,865 m and the lowest is 1,085 m.

Vegetation consists of open grassland and arable fields on the river valleys, whereas steep hills and ridges are typically covered in small shrubs. Soil cover is typically less than 1 m.

Figure 5.1 West Shire Concession in the Dry Season (March)

Note: Photograph taken from the Mato Bula field camp (looking northwest). The Silica Hill North prospect is located in the foreground, and the Mato Bula North prospect is on the right-hand side of the photograph.
Source: Archibald et al. (2015)

5.4 LOCAL RESOURCES AND INFRASTRUCTURE

Ethiopia is a landlocked country. Addis Ababa, the capital city has international air service to major cities in Africa and other global centres. There is good paved highway access from Addis Ababa to the port of Djibouti, 770 km by road. The highway is suitable for the movement of containerized and heavy lift cargo, and it is the main import and export route of the country. In addition, the Government of Ethiopia has undertaken a major transportation infrastructure program for the country, including significant new railway routes. A new railway route from Addis Ababa to Djibouti was completed in 2016. Although numerous rivers drain Ethiopia's diverse topography, the only navigable waterway is the Baro River (a tributary of the Nile), located on the country's western border with Sudan. Historically, Gambela in the southern part of the country has served as a port along the Baro River.

There is a paved highway from Addis Ababa to Axum and to Shire in northern Ethiopia, and this highway will be used to transport equipment and goods to the Mato Bula Project. Approximately 50 civil airports exist in the country, including five in the Tigray Region (Axum, Dansha, Humera, Makale, and Shire), along with two major military airports. In

June of 2009, the Ethiopian government announced plans to construct 5,000 km of new railway for the country, primarily to facilitate the transportation of goods.

Shire is a university town with a population of 47,284 (2007 census). Many districts of the town have modern amenities such as running water, sewerage, and a hospital. A scheduled air service is operated year-round and a variety of commercial premises are located in the town. However, a subsistence lifestyle is evident in the villages in proximity to the Mato Bula Project, and only limited power and water is available for the inhabitants. Livestock and agriculture are emphasized.

High-voltage power lines are located along the Shire to Adi Dairo and Adi Nebried to Shiraro Roads, the voltage of the line is 33 kV (Figure 5.2).

Other significant infrastructure includes a heliport 1 km south of Adi Dairo, and an airport at Shire. The cellular network and internet are reliable over the majority of the concession area.

Figure 5.2 Paved Road, and High-tension Power Lines Near the Eastern Boundary of the Mato Bula Project

Source: Archibald et al. (2014)

6.0 HISTORY

6.1 PROJECT OWNERSHIP

The Adyabo Property was first identified in a regional scale geological mapping and mineral exploration performed by the EIGS and EMD during the 1960s and 1970s; EMD is a private Ethiopian company. Later, EIGS and EMD completed the reconnaissance mapping and prospecting for precious and base metals from 1991 to 1993. The encouraging results from this survey led EMD to acquire the exploration licences in 1993. In 1996, EMD and Ashanti signed a joint-venture agreement for base- and precious-metals exploration in the Adyabo Project area. In 2011 TRI acquired an undivided 80% interest of the Adyabo Property, in February 2016 EAM obtained the remaining 20% interest. EAM, through TRI, owns 100% of the Adyabo Property and has full ownership of the Mato Bula Project, located within the Adyabo Property.

6.2 PREVIOUS EXPLORATION

Historic exploration on the Adyabo Property is summarized as follows:

- Regional scale geological mapping and mineral exploration performed by the EIGS and EMD during the 1960s and 1970s.
- Hunting Geology and Geophysics Ltd. conducted a regional airborne geophysical survey in 1971 over a large portion of the Tigray Greenstone Belt. Encouraging results were noted; however, the lack of geological knowledge for most of the area prohibited follow up work.
- In 1985, a regional gravity survey, funded by the Sweden Agency for Research Cooperation with Developing Countries (SAREC), was conducted along drivable roads at 5 km stations. The results were inconclusive due to sparse data density caused by a limited regional infrastructure. No follow-up work was performed.
- Reconnaissance mapping and prospecting for precious and base metals was undertaken by the EIGS from 1991 to 1993. The encouraging results from the survey led EMD to acquire the exploration licences in 1993.
- In 1996, EMD and Ashanti signed a joint-venture agreement for base- and precious- metals exploration in the Adyabo Project area. Details of the work program are unknown.
- In 1997, the EIGS produced a 1:250,000 scale geology map covering 9,600 km^2 of the area between Axum and Shiraro.
- In 2007, Aberdeen International (Aberdeen) acquired the West Shire Licence, and during the 2007–2010 period, they conducted Airborne an electromagnetic

(EM) survey totalling 2200 line-km; 1707 line-km of airborne magnetics and radiometrics; 858 rock chip samples generally on a grid of 150 m line spacing with some targeted rock chip sampling over EM anomalies; 1,139 -80 mesh stream sediment samples; and reconnaissance mapping (Dudek 2008; Fox 2008).

- Between 2009 and 2010, Landsat imagery interpretation was performed over the West Shire concession to identify geological contacts, structures, and lineaments. Geological mapping was conducted at 1:50,000 scale over an area of 269 km^2, and 11 rock chip samples were taken in areas of recorded sulphide mineralization.
- During the 2010–2011 exploration period, Aberdeen completed the following work programs: purchase of Landsat and Worldview satellite images; structural interpretation using Landsat and satellite imagery; data capture of stream and rock chip data; thematic mapping and interpretation of stream and rock chip data, geological fact mapping at 1:2,000 scale, soil sampling on a 40 m by 40 m grid, and channel sampling across artisanal pits conducted on a selected target area.

7.0 GEOLOGICAL SETTING AND MINERALIZATION

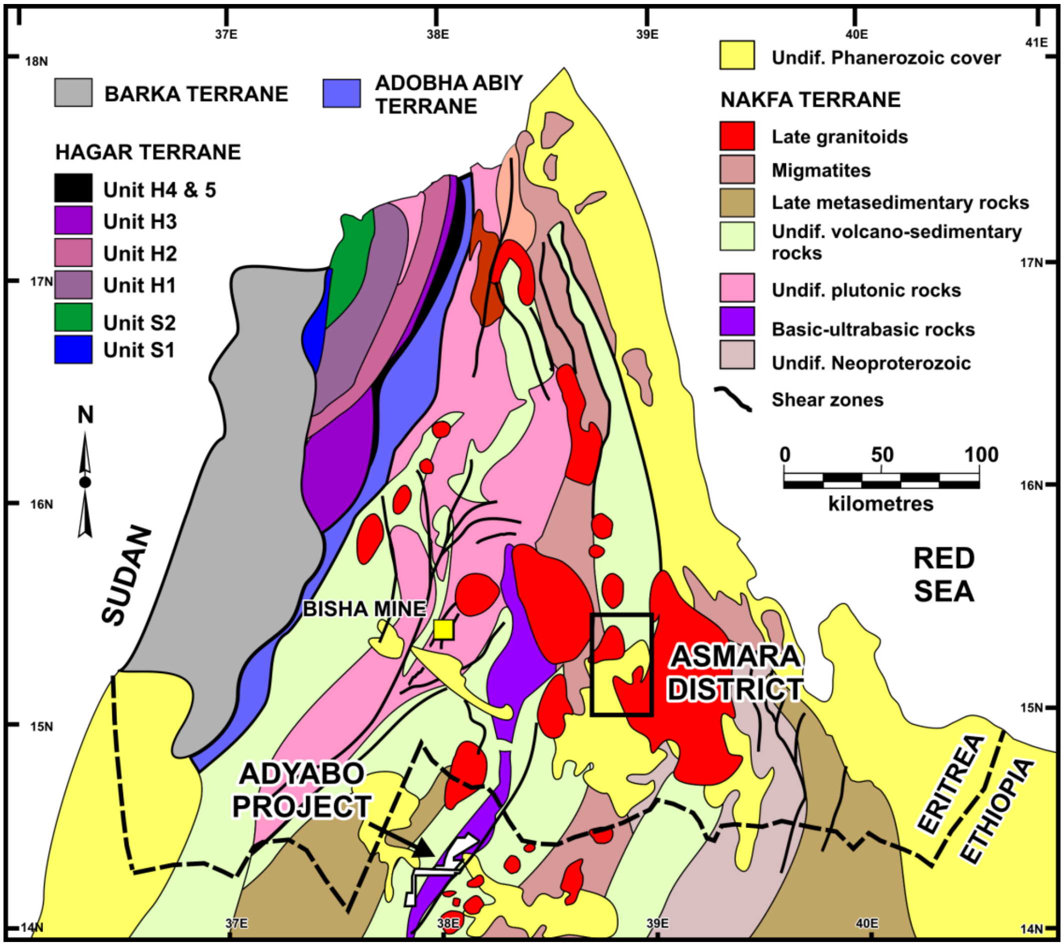
7.1 GEOLOGICAL SETTING

7.1.1 REGIONAL GEOLOGY

Northern Ethiopia is located within the ANS, an area of Neoproterozoic continental crust covering a large portion of northeast Africa and the western Middle East (Figure 7.1; Drury and De Souza-Filho 1998). Formation of the ANS took place around 870 to 550 Ma during the collision of East and West Gondwana (Johnson & Woldehaimanot 2003). Situated in the northern half of the East African Orogen, it consists of Neoproterozoic juvenile arcs, later-formed sedimentary and volcanic basins, large granitoid and gabbroic intrusions, and enclaves of pre-Neoproterozoic crust (Johnson et al. 2011; Hamimi et al. 2014). Deformation, metamorphism, and uplift occurred due to the Gondwana collision, producing a range of predominantly greenschist facies metamorphic rocks in the Pan-African ANS (Archibald et al. 2015). A later intrusive event, comprising calc-alkaline plutons and subordinate alkaline intrusions (dated at 680 to 600 Ma and 610 to 580 Ma, respectively, in the northern ANS), emplaced the major granitoids within the ANS (Morag et al. 2011). These metamorphics and volcanics collectively represent granitoid-greenstone terranes; analogous to the Canadian terranes that host some of the world's largest gold-rich VMS deposits (e.g., Bousquet 2-Dumagami, LaRonde Penna; Trench & Groves 2015). This is probably significant to the gold-rich VMS and orogenic gold prospectivity of the Pan-African ANS, as recently discovered systems (mostly within the last three to four years) symbolize an emerging gold province, with regional resource potential in excess of 28 million tr oz of gold.

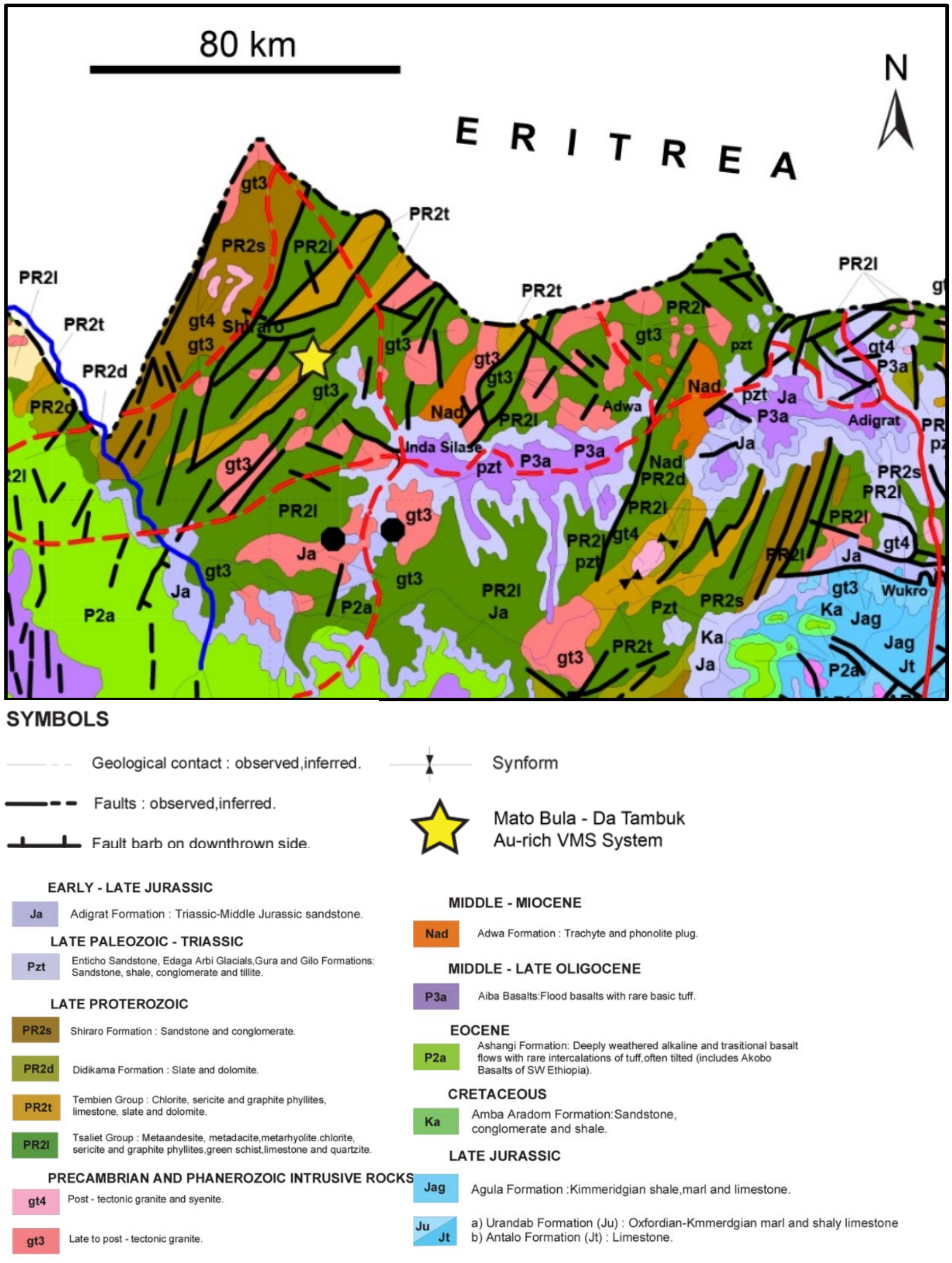
The northern Ethiopian basement is primarily a granitoid-greenstone terrane (Figure 7.1). The Late Proterozoic Tambien Group and Tsaliet Group are two of the major sequences, which host the Mato Bula–Da Tambuk system. The Tsaliet Group is the older of the two, composed of metavolcanic and metavolcaniclastic sequences, with mineral assemblages that indicate peak regional metamorphism of pumpellyite-actinolite to lower greenschist facies (approximately 245 to 375°C; Alene et al. 2006). Conversely, the Tambien Group is a younger, metasedimentary slate and carbonate succession, with metamorphic temperatures inferred (by chlorite thermometry) to have been at the lower end of those experienced by the Tsaliet Group (approximately 250°C; Alene et al. 2006). The contact between the two Groups is inferred to be either unconformable or gradational (Beyth 1971; Alene et al. 1998).

Figure 7.1 Geological Setting Map in Relation to Asmara Properties and Bisha Mine



Source: Redrawn after Drury and De Souza-Filho (1998)

Figure 7.2 Geology of the Region Surrounding the Mato Bula-Da Tambuk System in Northern Ethiopia



Source: adapted from Tefera et al. (1996)

7.1.2 STRUCTURAL SETTING

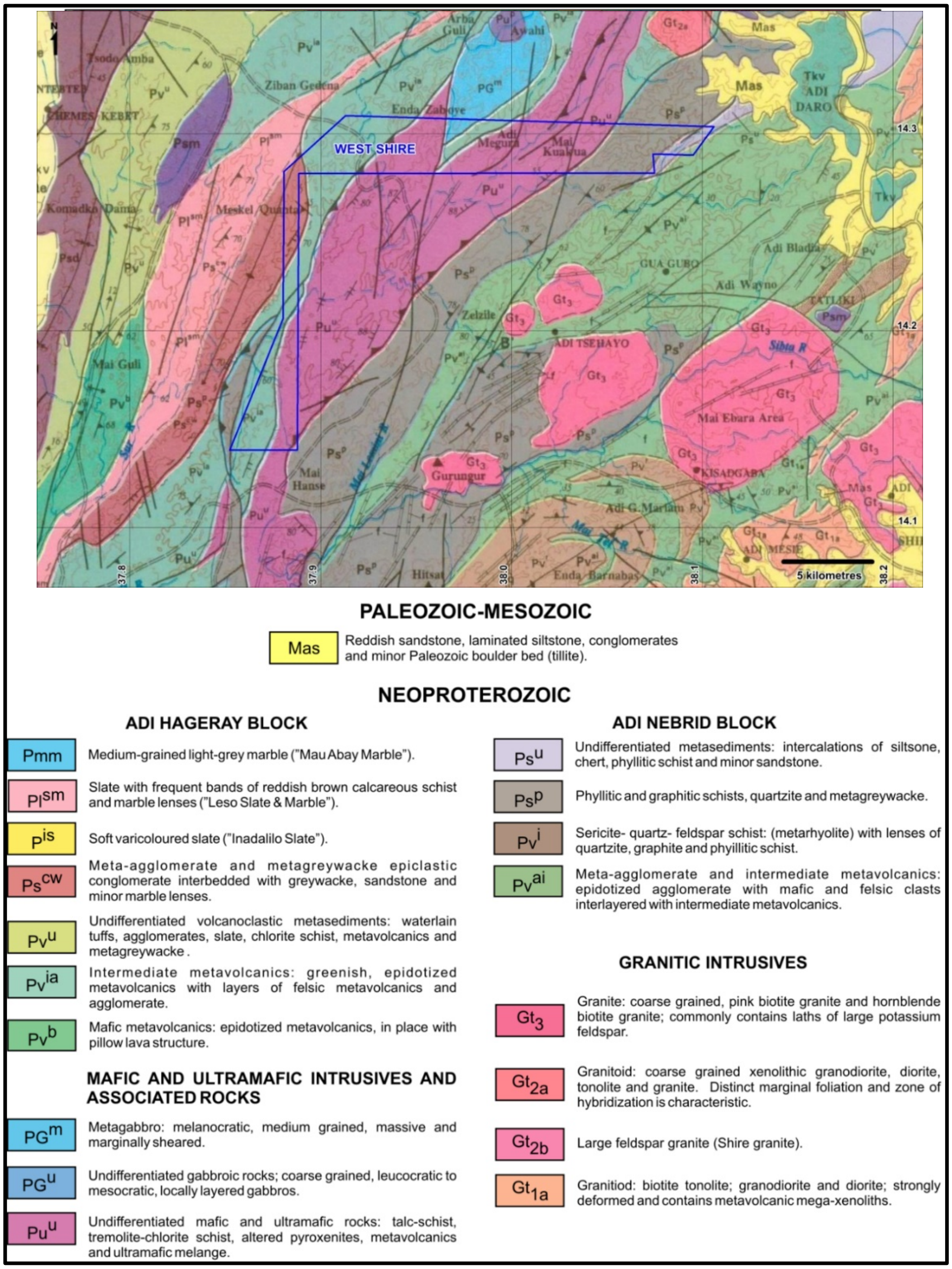
Numerous accreted terranes and microcontinents reflect episodic terrane collision and closure of the Mozambique Ocean from about 800 to 550 Ma as part of the East African Orogeny. Inner terranes collided against and deformed older Archaean to Mesoproterozoic crust of eastern Africa, and are mainly high metamorphic grade. The final 100 Ma of the orogeny was dominated by strike-slip movement along suture zones between the obliquely colliding terranes. The ANS is characterized by an extremely broad group of such strike slip faults.

The overall structural trend of the Tigray region is northeast directed with multiple phases of folding and faulting observed across the belt including isoclinal folding, recumbent folding, and thrust and shear faults. Deformational structures within both the Tambien and Tsaliet Groups can be linked to two major phases of folding: D1; a north-south regional compression, and D2; an approximately east-west regional compression (Alene & Sacchi 2000). The D1 compression produced mm-dm wavelength upright and tight folds within bedding, formed between approximately 700 to 650 Ma, along with elongation lineations and regional foliations that exhibit a transposed fabric. The later D2 compression, likely associated with the final collisional phases between east and west Gondwana, produced more regional scale structures (e.g., stretching lineations) in addition to large, mostly upright, open folds with a lack of pervasive cleavage (Abdelsalam & Stern 1996; Alene & Sacchi 2000; Alene et al. 2006). Textural features and mineral assemblages indicate that the metamorphism affecting the Tsaliet Group occurred during D1, while either D2-synchronous metamorphism or pre-D2 local contact metamorphism (from granitoid intrusives) is responsible for the production of the Tambien Group metamorphics (Alene & Sacchi 2000).

7.1.3 LOCAL GEOLOGY

The Adyabo Project is located in the suture zone of the Adi Nebrid and the Adi Hageray structural blocks (Figure 7.3). The rocks present in the concession area comprise predominantly metavolcanics (Tambien Group) and younger meta-sedimentary rocks of the Tsaliet Group. The centre of the licence area is dominated by a northeast-trending liner thrust belt of mafic and ultramafic rocks called the Zager Mafic and Ultramafic Belt (Tadesse 1996). The geology of the area is complicated by the development of a fold and thrust belt, which appears to contain thrusted and back-thrusted blocks.

Figure 7.3 Published Geology Map of the Adyabo Project Area



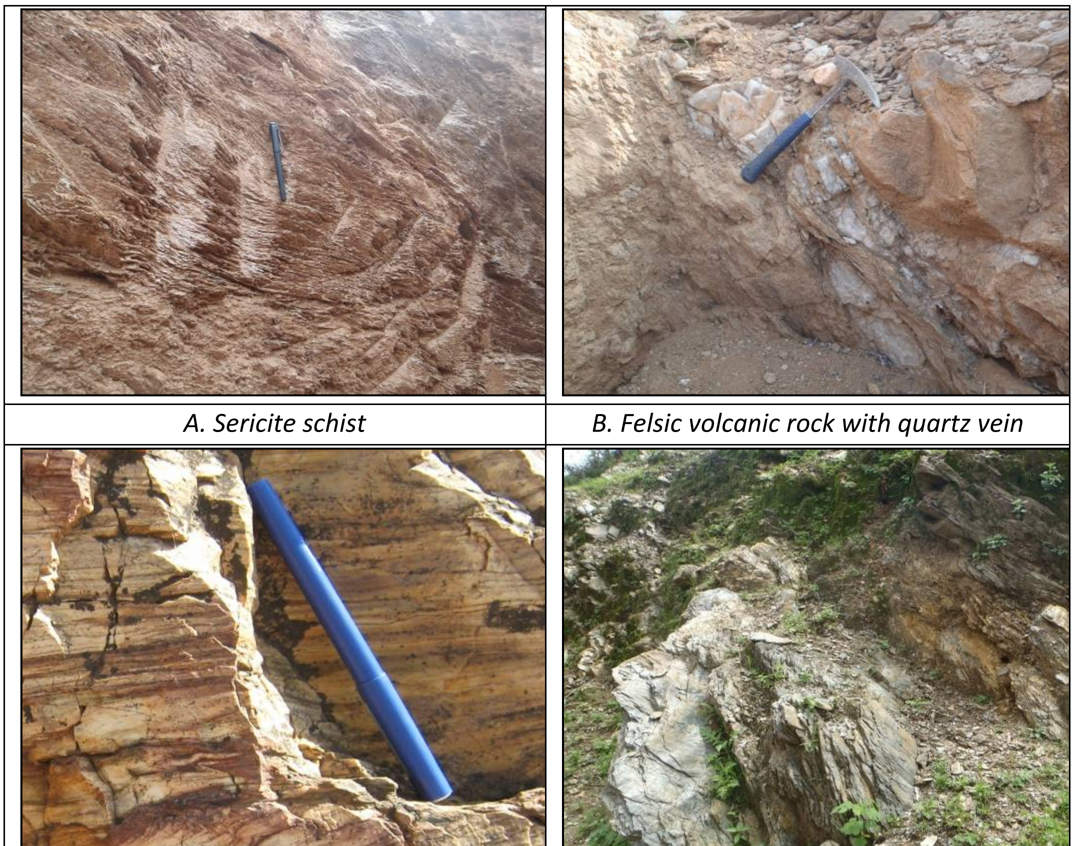
Source: EGS (1997)

Regionally, from west to east, the project geology includes slate with marble lenses (Leso Formation), metaconglomerates, greywackes and sandstone (Tsaliet Group); a sequence of older Adi Hageray Block intermediate metavolcanic and volcaniclastic rocks (intruded by mafic intrusions) that have been thrust over the Tsaliet Group; the central part of the

West Shire concession is underlain by metamorphosed mafic and ultramafic rocks (talc-schist, tremolite-chlorite schist and altered pyroxenite-bearing metavolcanic rocks) comprising the Zager Mafic and Ultramafic Belt; the east part of the project area is underlain by phyllic and graphitic schist, meta-chert, and intermediate metavolcaniclastic rocks of the Adi Nebrid Block (Gardoll et al. 2015). Photographs of some of the lithologies present in the project area are illustrated in Figure 7.4. Syn- and post-tectonic granite and granodiorites are present in the Adyabo Project area, and numerous porphyritic dykes and stocks have also been documented. On the western and northern edge of the Adyabo Project area, two large (greater than 5 km) melanocratic metagabbros are present, and these bodies could be contemporaneous with the metabasalts in the Adi Hageray Block.

Owing to the low competence of many of the country rocks, especially the ultramafic units, the rocks have been extensively sheared. The intrusive margins are sheared, but little deformation is evident in the centre of the bodies. Figure 7.3 presents the location of the West Shire Licence concessions overlain on the 1:250,000 scale Bedrock Map from the Geological Survey of Ethiopia.

Figure 7.4 Typical Rock Types Found Throughout the Adyabo Property



A. Sericite schist

B. Felsic volcanic rock with quartz vein

C. Banded chert

D. Phyllite

E. Sheared black shale

F. Gossan

G. Hornblende mafic (diorite)

H. Dolerite

I. Ultramafic unit (talc schist, tremolite-chlorite schist)

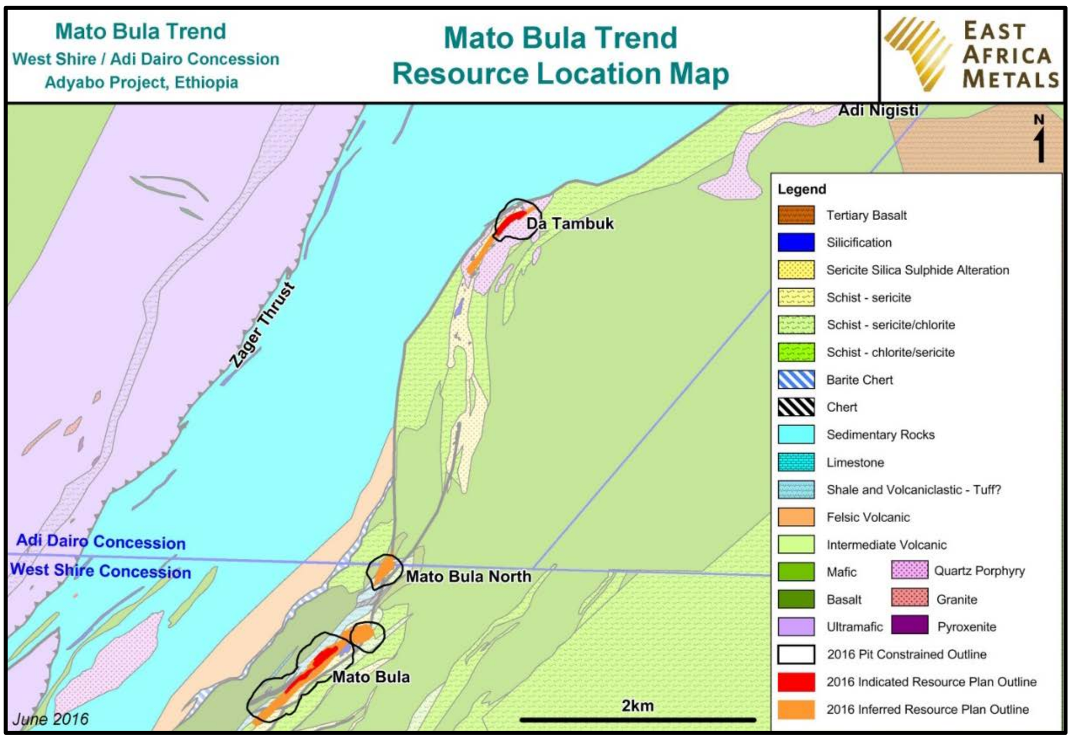
J. Visible gold

Locally, there is potential for several mineralization styles including orogenic gold and VMS. Many artisanal miners are present across the project area extracting gold from alluvial, elluvial and bedrock sources. Several types of mineralization have been identified including gold-bearing quartz veins, gold-rich VMS style copper±zinc mineralization, gold-rich jasperoidal exhalites, disseminated sulphides (pyrite and chalcopyrite), porphyry- and granodiorite-hosted sulphide gold mineralization, elluvial and alluvial gold, and secondary malachite and azurite.

Based on all geological, geochemical, and structural evidence collected to date, the mineralization appears to be stratiform, formed in a sea-floor caldera complex.

The main interpreted prospective assemblage trend on the concession exists between the Mato Bula area, and the Da Tambuk area on the Adi Dairo concession (5). This region remains to be further tested through geophysics and targeted drill testing.

Figure 7.5 Mato Bula Resource Location Map



7.2 HOST GEOLOGY OF THE MATO BULA DEPOSIT

The Mato Bula gold-rich VMS deposit is the main deposit discovered to date within the Adyabo Project, and covers the Mato Bula North, Silica Hill North, Silica Hill, Mato Bula, Jasper Hill and Halima Hill mineralized zones (Figure 7.6 and Figure 7.7). It is underlain by a variety of rock types, including footwall lithologies of mafic tuff, sericite-chlorite schist, felsic tuff, and a laterally extensive sericite schist unit that hosts the mineralization. The gold-copper host mineralized horizon, approximately up to 110 m thick, predominantly comprises variably mineralized (pyrite and chalcopyrite) sericite schist, bedded jasper (hematized chert), massive jasper, bedded chert, massive silica flooded zones, and chlorite schist. This sequence was intruded parallel to the foliation/bedding by a highly altered quartz-eye porphyry. Hanging wall lithologies comprise mafic tuff (locally with abundant carbonate alteration); sericite chlorite schist; black shales with mafic tuff; a thick sequence of mafic tuff capped by baritic chert above the mineralized zone, overlain in turn by felsic volcanic rocks and black graphitic shales; and finally, a thick succession of shale containing graphitic horizons. The whole sequence exhibits shearing, owing to the rheology of the differing lithologies, and crustal shortening due to the principal stresses during post-depositional tectonics. The general trend of the lithologies is northeast-southwest, and dips close to vertical or slightly to the northwest at a high angle.

Figure 7.6 Mato Bula Deposit Geology

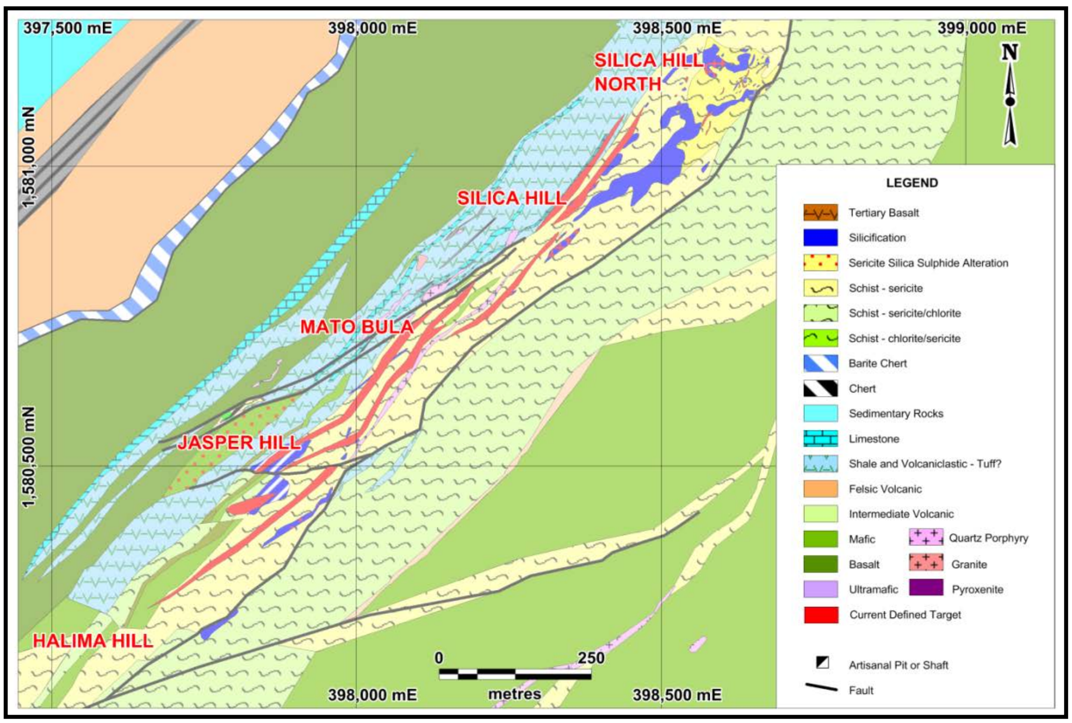
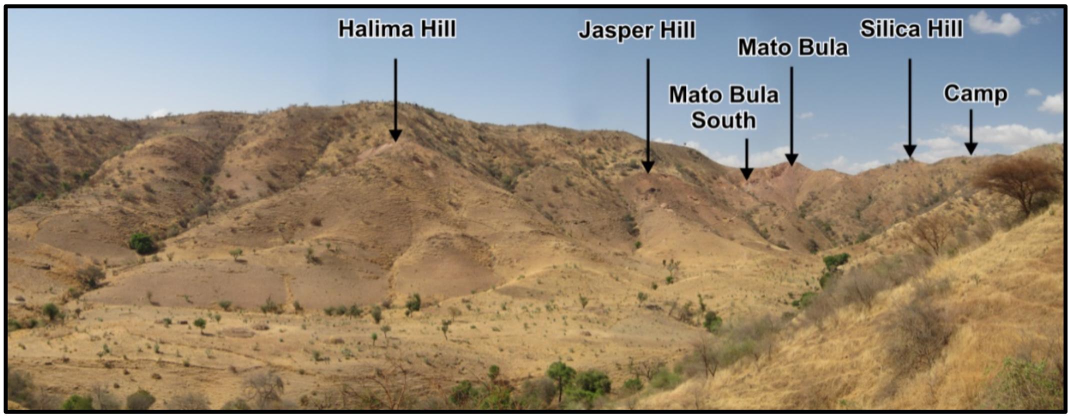


Figure 7.7 Mato Bula Prospect Looking Northwest



Note: The hanging wall contact of the gold-copper mineralization is indicated by the arrows. Silica Hill North is behind Silica Hill along strike.
Source: Archibald 2015

Mineralization at Mato Bula has been traced over 1.5 km by soil geochemistry, geological mapping, channel sampling, drilling, and the presence of numerous deep artisanal gold workings. The recent geophysical induced polarization (IP) work is suggestive of the mineralized trend extending northward and southward beyond this initial footprint, and also remaining open to depth. Mineralization appears to be stratiform in nature, and corresponds spatially to silica exhalites (±jasper) and highly altered sulphide-bearing sericite schist. The local and regional geology, combined with the style of mineralization, suggests that mineralization took place in a seafloor caldera setting (Groves et al. 2015).

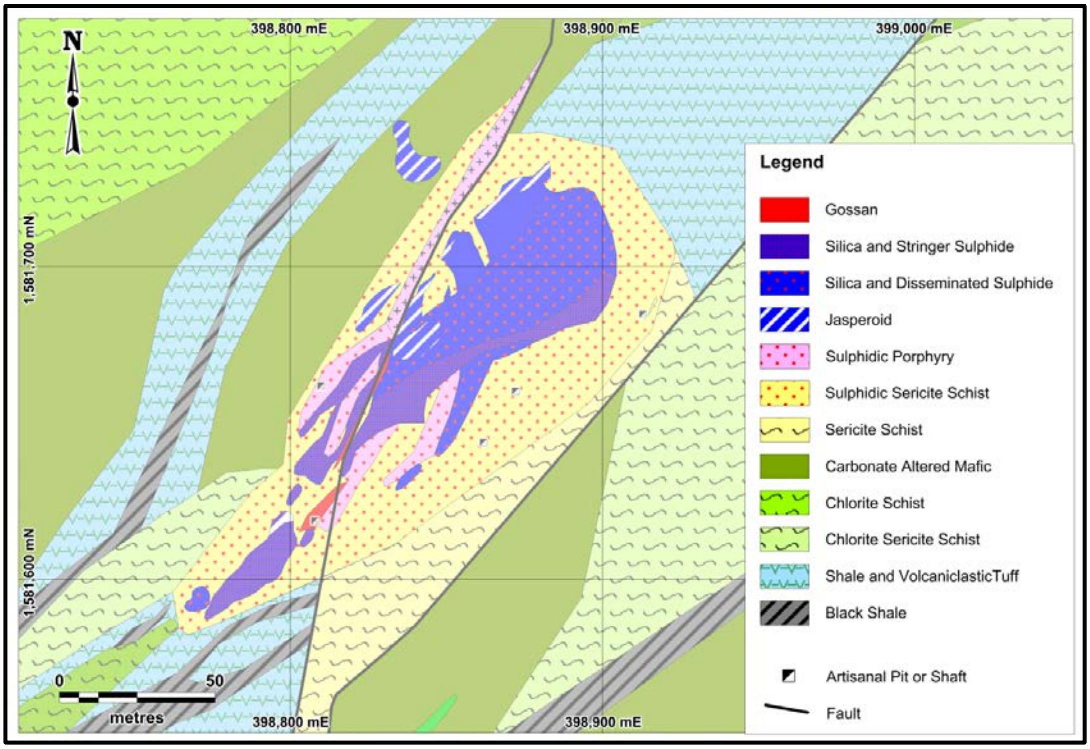
7.2.1 MATO BULA NORTH

The Mato Bula North prospect is a 200 m long malachite-stained silica altered zone that occurs approximately 500 m to the northeast of the main Mato Bula prospect, and is likely part of the same system, albeit off-set by a north-northeast-trending fault (Figure 7.8). There appears to be more evidence for crustal shortening due to later reverse faulting. Footwall lithologies at the prospect are: mafic tuff (extensively carbonate altered), black graphitic shale, sericite chlorite schist, and minor diorite dykes – all suggesting a slightly distal setting to any exhalative mineralization. A reverse fault appears to separate the aforementioned lithologies from the immediate footwall, which is comprised of sericite schist. Like the main Mato Bula prospect, the sericite schist transitions into an intensely altered (and sulphide-bearing) sericite schist that also contains massive silica flood zones rich in sulphides (forming gossans) and bedded jasper. The mineralized zone appears to transition into mafic tuffs along strike, and is capped by carbonate altered mafic tuffs, graphitic shale, chlorite sericite schist and bedded baritic chert (similar to Mato Bula). Mineralization is also present within quartz eye porphyry intrusions that conform to the interpreted stratigraphy, but is absent from similar NE-trending porphyry that follows a late NE-trending fault. The true displacement of the fault is not known, but is not considered significant.

Figure 7.8 Mato Bula North Prospect (Looking North)

Source: Archibald et al. (2015)

Figure 7.9 Mato Bula North Prospect Geology

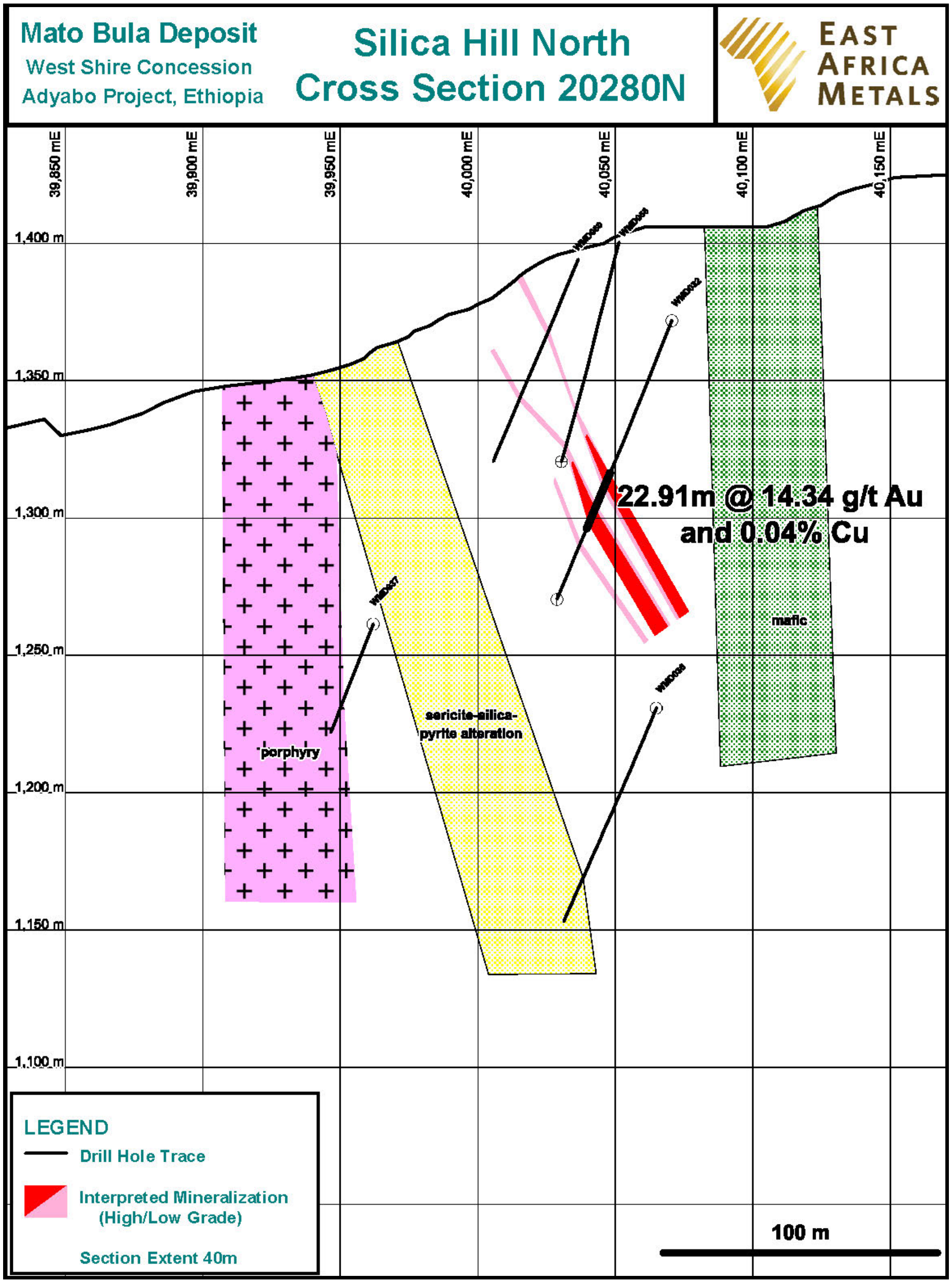


Source: EAM (2015)

7.2.2 SILICA HILL NORTH

The Silica Hill North prospect was identified as an exploration target during soil sampling (through a greater than 300 ppb gold sample), follow-up 10 m by 10 m x-ray fluorescence (XRF) soil geochemistry, and the presence of several small artisanal gold workings at a similar stratigraphic level as those 80 m to the south at Silica Hill. The best intercept that has been drilled at the prospect is at WMD032, which returned 22.91 m grading at 14.34 g/t gold (including 8.50 m at 36.92 g/t gold) from a depth of 101.09 m (seeFigure 7.10). The host rock to the mineralization was a series of vertical quartz-carbonate veins associated with silica breccia, brown carbonate-rich silica (siderite or ankerite), containing rare blebs of chalcopyrite. Assay data shows that the high-grade shoot contains no silver, zinc, lead, and only minor copper (0.04%). Interestingly, the prospect is defined by a pronounced gold-selenium-molybdenum soil anomaly and absence of barium, copper, lead and zinc, which are present at all other targets on the Mato Bula trend.

Figure 7.10 Silica Hill North Drill Section 20,280N (looking northeast)



7.2.3 SILICA HILL (UPPER LODE)

Gold mineralization at Silica Hill is hosted within a sheared silica-sericite-pyrite altered rock up to twenty-metres below the sediment/volcaniclastic dominant hanging wall contact. Gold occurs with small quantities of chalcopyrite in abundant narrow quartz veins and zones of intense silica alteration (Figure 7.11 and Figure 7.12) over a maximum true thickness of 22 m. Higher gold grades are encountered when "black" silica is present. Numerous artisanal shafts are present over a distance of approximately 120 m, working the high-grade ore shoot. The shoot is located to the west of the massive siliceous mound, which forms the summit of Silica Hill, and is interpreted to have a subvertical to steep southwest plunge, and dips steeply to the west (Figure 7.13 and Figure 7.14). The lode has been traced to a depth of 250 m by drilling.

The lode is gold-rich, with low silver (0.58 g/t Ag), weak copper (0.19% Cu), and no lead or zinc. Based on metal signatures and the local geology, Gardoll et al. (2015) consider the Silica Hill Lode to be part of the feeder system to the exhalite.

Figure 7.11 High-Grade Gold Mineralization from Silica Hill (WMD006)

Notes: High-grade gold mineralization within a heavily deformed silicified sericite schist and silica bands. 1.09 m @ 9.6 g/t Au, WMD023. Source: Archibald, 2015

Figure 7.12 High-Grade Gold Mineralization from Silica Hill (WMD006)

Notes: Visible gold (circled) within an interbedded quartz-carbonate-chlorite schist, 0.70 m @ 284.5 g/t Au, WMD006. Source: Archibald, 2015

Figure 7.13 Silica Hill Drill Section 19,880N (looking northeast)

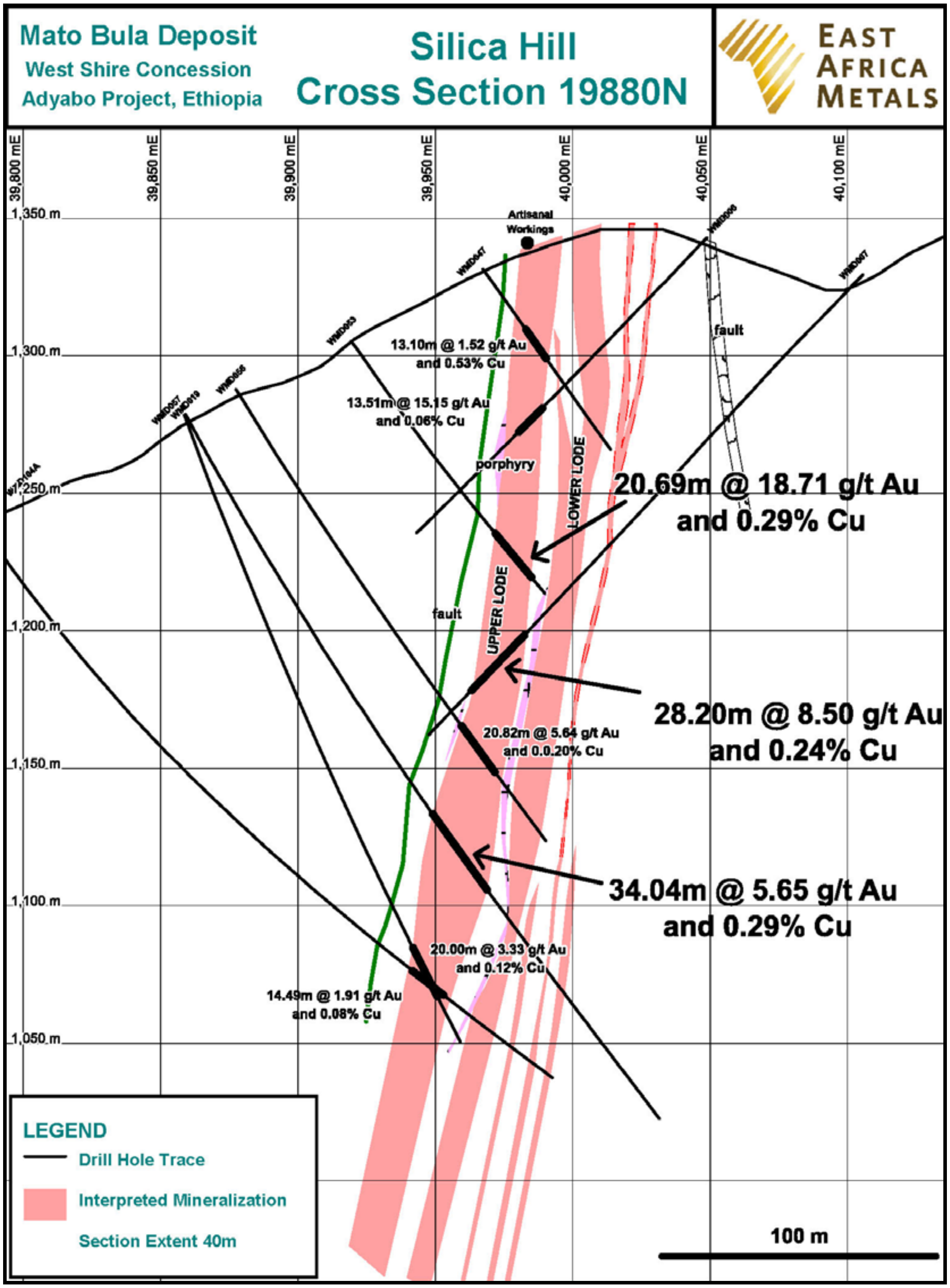
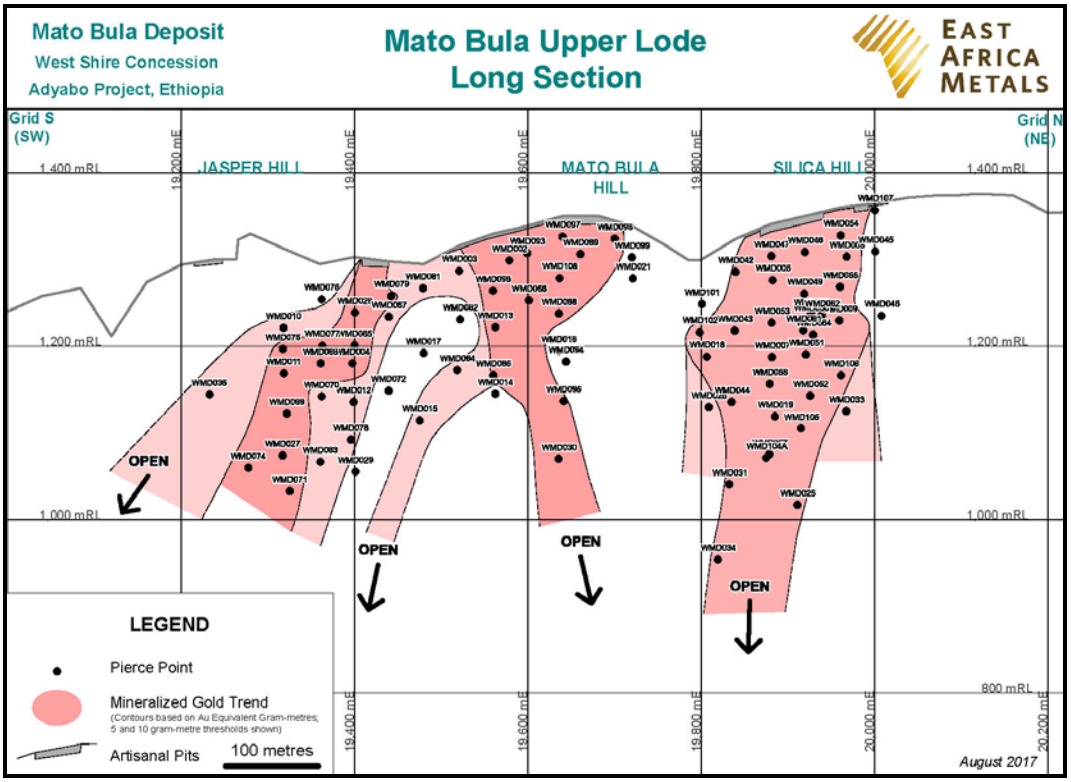


Figure 7.14 Mato Bula Upper Lode Long Section



7.2.4 MATO BULA (MAIN AND UPPER LODES)

Two mineralized structures are present at Mato Bula Hill; the Main lode and the Upper lode

MAIN LODE

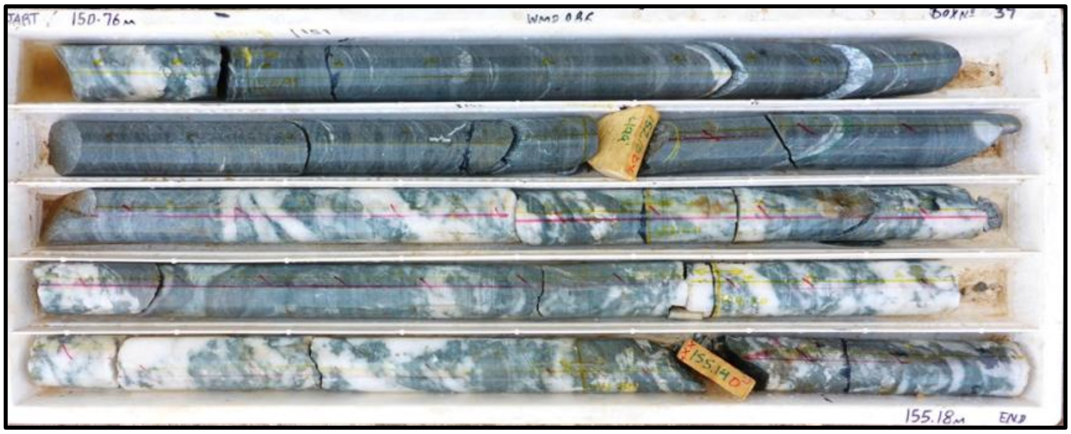
The Main lode at Mato Bula is located south of the crest of the Mato Bula Hill, and is a narrow high-grade gold shoot extending over a strike length of 120 m at surface. Numerous active artisanal gold bedrock workings are present at Mato Bula exploiting this gold lode, and an upper lode, reportedly to a depth of 46 m.

The shoot has steep dip, vertical plunge, and maximum true width of 3 m. At depth the maximum strike of the shoot is reduced to 80 m, but the structure remains open at depths greater 220 m below surface (see Figure 7.15 and Figure 7.16).

Silica-pyrite alteration is extensive laterally (750 m strike) and in thickness (159 m wide), and zones of silica-pyrite are present in the hanging wall and along strike, in a zone up to 150 m wide and 750 m long.

Mineralization is hosted within a shear zone that contains abundant quartz veining, silicification, sericitization and carbonate alteration (Figure 7.17). Gold is associated with chalcopyrite-rich veins in intense silica alteration, and also the presence of possibly V-rich mica (roscoelite). The Main lode averages 5.5 g/t gold and 0.61% copper, and has a high gold:silver ratio of 10.2. Lead and zinc concentrations are negligible. A full list of drilling results from Mato Bula is presented in Section 10.1.4 (Drilling).

Figure 7.15 Photo WMD086: Interval between 150.77 and 155.18 m Anomalous in Niton Silver, Copper, Mercury and Selenium



The hole was sampled between 125.00 and 170.37 m, and the assay results indicate that the Main Lode was intersected between 150.40 and 158.00 m (14.59 g/t gold, 1.5 g/t silver, 0.62% copper, 0.03% zinc).

Figure 7.16 Mato Bula Drill Section 19,640N (looking northeast)

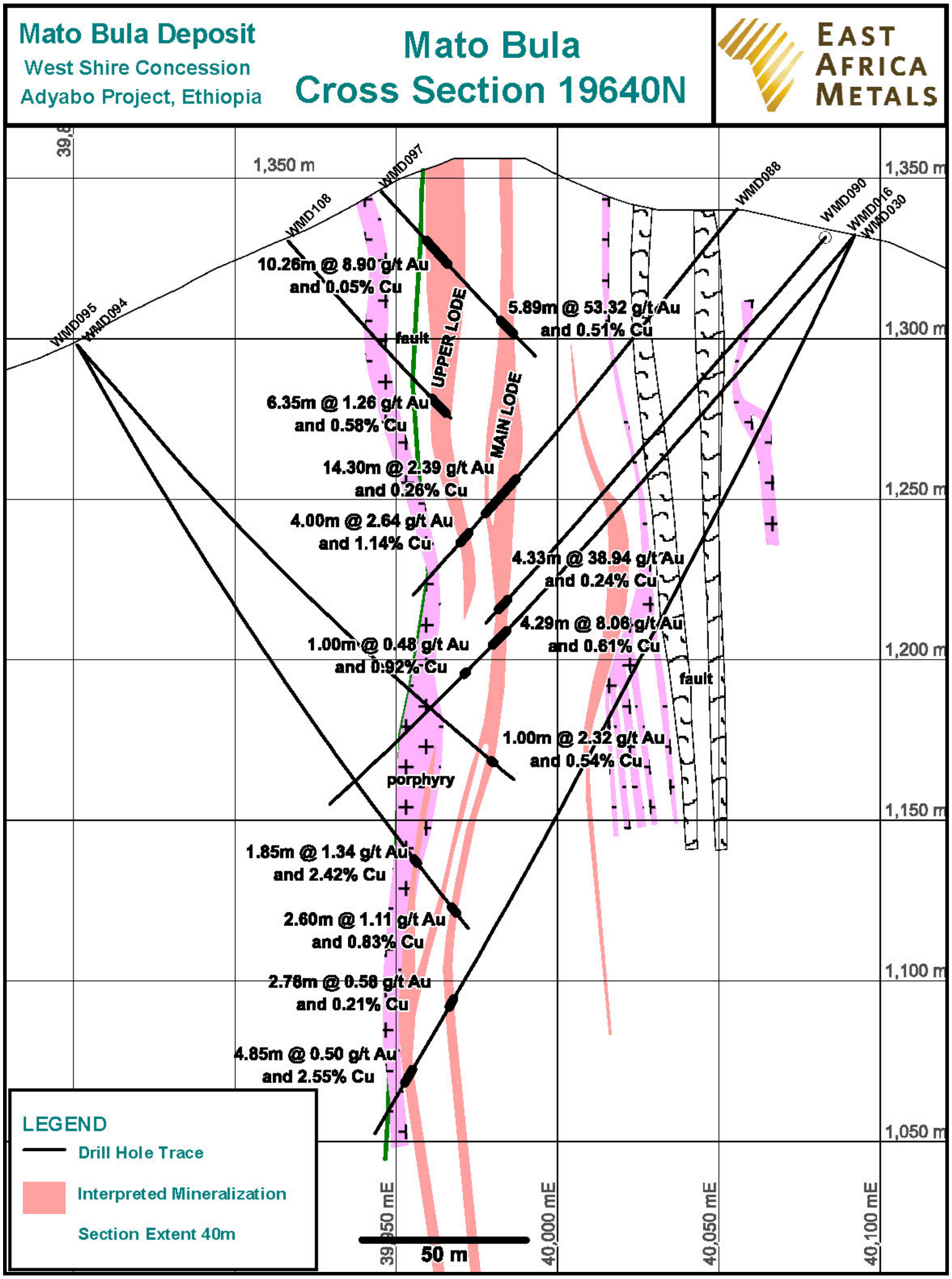
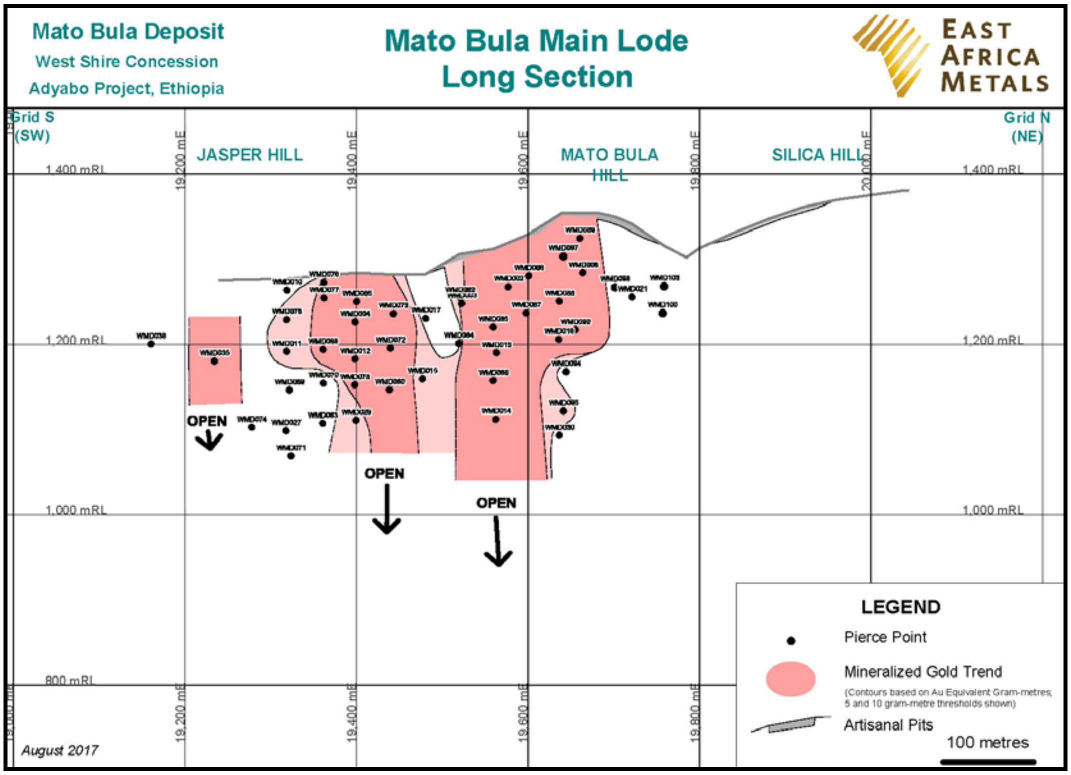


Figure 7.17 Mato Bula Main Lode Long Section

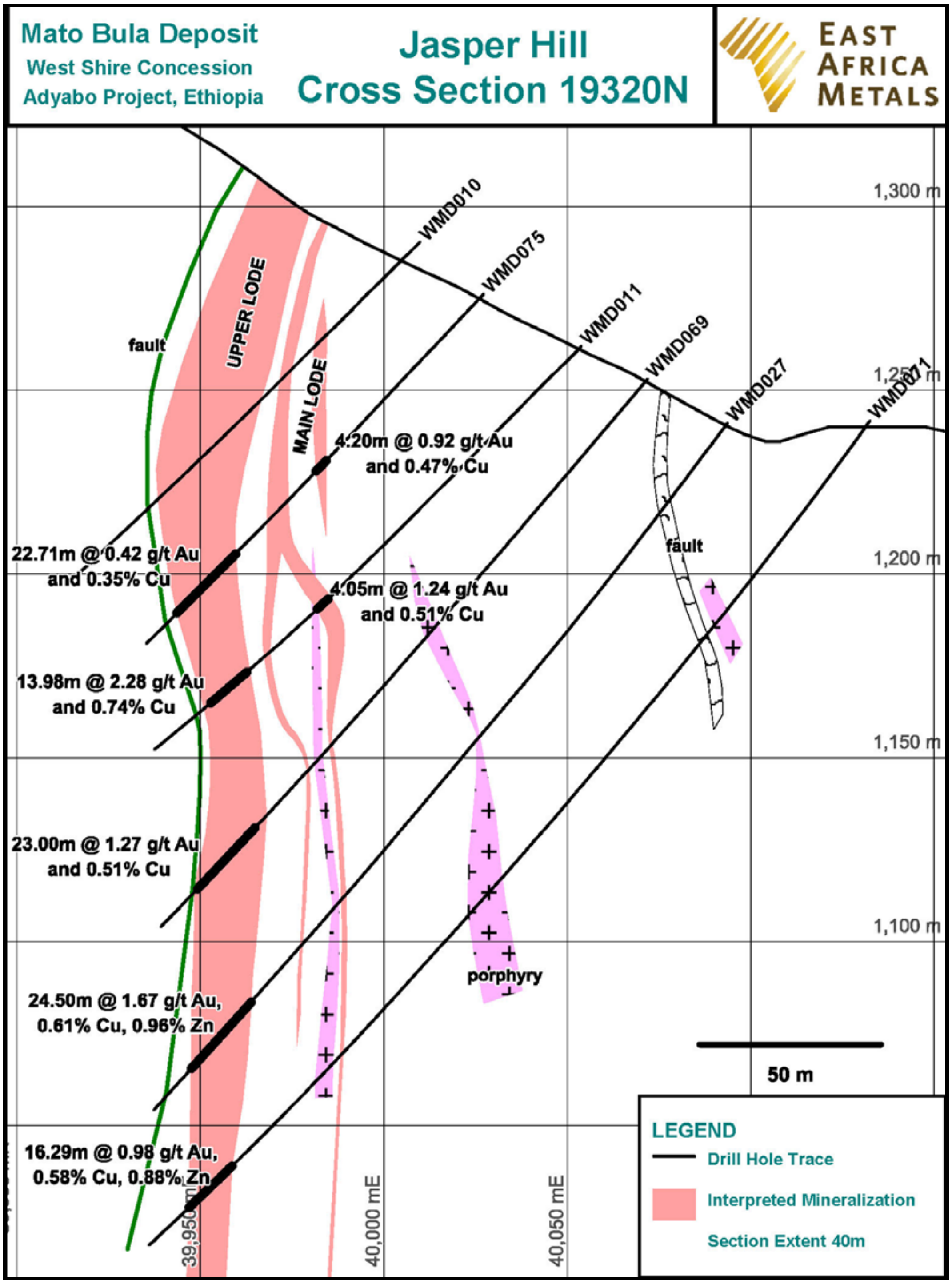


JASPER HILL (MAIN AND UPPER LODES)

The Jasper Hill zone (sometimes known as Mato Bula South) contains structurally controlled gold lodes (vein/wall rock porphyry hosted), and extend from the Mato Bula zone in the north towards Halima Hill in the south (Figure 7.4). The upper and main lodes within this zone exhibit more complex geometry due to possible faulting (or slumping) and wall rock interaction. Mineralization is lithologically controlled with the gold-bearing zones within a jasperoid alteration zone. Gold concentration decreases, with increasing zinc concentration, moving away from the jasperoid unit. Gold-bearing veins have also been identified perpendicular to the long core axis.

The Main lode at Jasper Hill is located 40 m southeast of the Upper lode, south-westwards along strike from the Mato Bula zone, and outcrops along strike for 80 m (Figure 7.18). The structure has a maximum true thickness of 9 m, and an average gold grade of 4.53 g/t and copper grade of 0.85%. It has the highest gold:silver ratio in the Mato Bula prospect of 5.3:1, and a low gold:copper (x10) ratio of 0.56:1. The average silver concentration is low, 0.85 g/t, and only trace amounts of lead and zinc are present. The lode plunges at approximately 60 to 70° to the southwest, and remains open down plunge below depths of 200 m from surface.

Figure 7.18 Jasper Hill Drill Section 19,320N (looking northeast)



The Upper lode is a thick exhalite horizon comprised of banded to laminated jasperoidal silica, carbonate (dolomite and minor calcite), with laminated cyclical bands of pyrite, chalcopyrite and sphalerite. The immediate hanging wall to the mineralization is limestone, variably altered to chloritoid spotted dolomite. Figure 7.19 illustrates increasing zinc content at depth.

The lode occurs along strike for a distance of 80 to 160 m, and attains a maximum thickness of 16 m. Interpretation of drilling data suggests that the lode plunges towards the southwest, and appears to remain open at depths 250 m below surface.

Artisanal workings follow the surface expression of the structure, but were only started while drilling took place at the site in 2014. The average grade of the lode is 3.56 g/t gold and 0.74% copper, and is geochemically distinct from other lodes with a low gold:silver ratio of 0.4:1, and a low gold:copper (x10) ratio of 0.5:1. Compared to other lode at Mato Bula, the Jasper Hill Upper lode contains high average concentrations of silver, zinc and lead at 9.4 g/t, 0.35%, and 0.08%, respectively. Peak drill results in the initial phases of drilling were24.5 m (approximately 17.7 m true thickness) at 0.61% copper and 1.67 g/t gold in WMD027, which includes a 3.35 m interval (2.33 true thickness) containing 5.45 g/t gold, 0.61% copper, 12.51 g/t silver, and 0.89% zinc.

Based on the geological setting, lithologies, mineralogy, and metal chemistry, an exhalative origin to the mineralization within the Jasper Hill Upper lode is interpreted.

Figure 7.19 Mineralization in WMD074

The drillhole was sampled between 100.00 m and 238.50 m, and assay results indicate that the Upper Lode was intersected between 216.60 m and 237.00 m (1.09 g/t gold, 12.8 g/t silver, 0.43% copper, 0.61% zinc)

7.2.5 HALIMA HILL

The most southerly manifestation of the Mato Bula Trend is the mineralized zone at Halima Hill, 320 m to the southwest of the Jasper Hill zone. Halima Hill was targeted due to the presence of artisanal trenching, with lower order gold-copper geochemistry present within an alteration zone. Apart from a zone of subcrop at Halima Hill, much of the southern part of the trend is covered in thick (50 cm to 2 m) transported colluvium, thus reducing the geochemical signature at Halima Hill relative to the hilltop workings of Mato Bula North, Silica Hill and Mato Bula.

Drilling at Halima Hill intersected 1 m at 0.43% copper and 1.77 g/t gold from a depth of 98.5 m (WMD039). Mineralization was present as pyrite-chalcopyrite bearing quartz-veins within altered tuffs. The assay results and visual interpretation of alteration at Halima Hill indicate the Mato Bula system is weakening to the south near surface, however the IP survey is suggestive of additional increasing potential at depth.

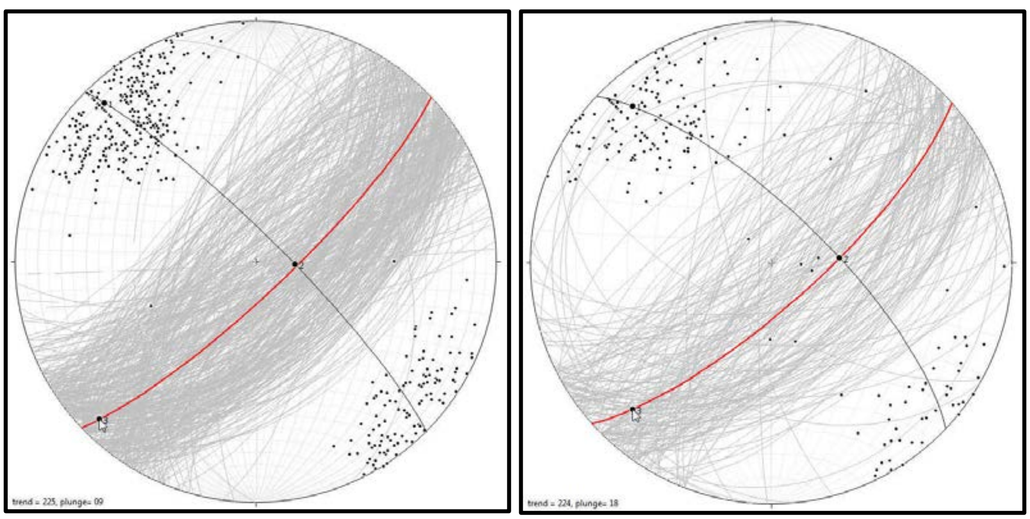
7.2.6 STRUCTURAL INTERPRETATION

Sufficient mapping and diamond drilling, including that of the 2017 infill program, has been conducted at the Mato Bula area that some structural interpretation can be derived from strike and dip measurements.

All 108 drillholes in the Mato Bula and Silica Hill were drilled using oriented core. A series of stereonets were plotted using this data and are displayed below. The holes were divided between the Mato Bula and Silica Hill zones, and data from foliation (including lamination, banding and bedding) and vein measurements were plotted. Any data with poor confidence in the orientation mark was omitted from these plots.

In the general Mato Bula area, a total of 52 holes contained orientation/structure data of high enough confidence. A total of 448 foliation measurements from 48 holes and 191 vein measurements from 44 holes were plotted and are displayed in Figure 7.20.

Figure 7.20 Mato Bula Stereonets



Note: Foliation above and veins below. Poles to planes in black and fold axis in red.

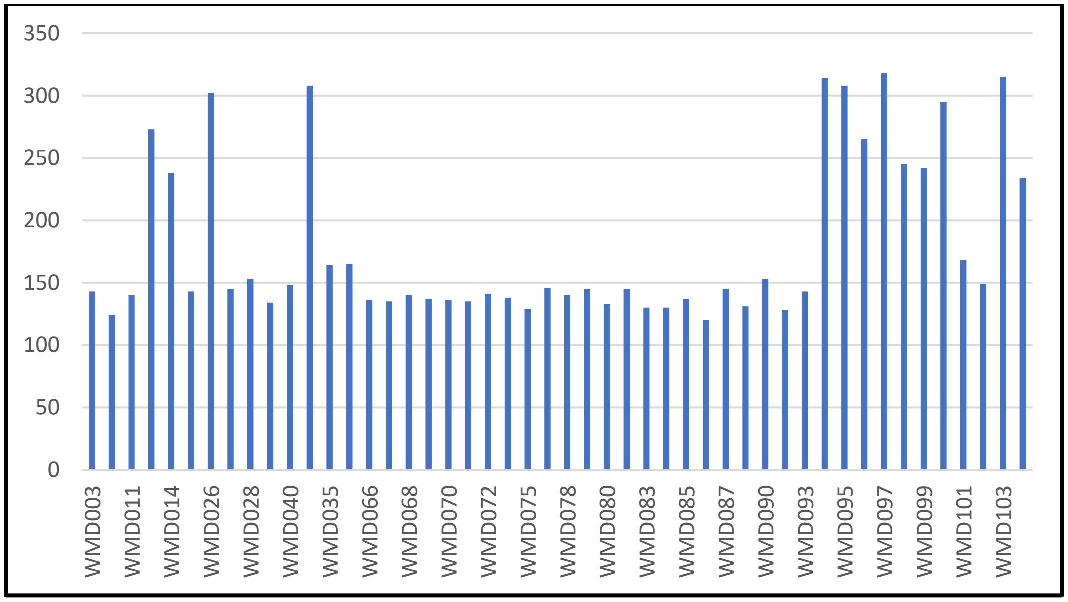
The foliation pattern in Figure 7.20 indicates a slightly inclined tight fold that plunges gently to the southwest. The evidence for this is:

- two clusters of poles to foliation on the best fit girdle (one for each limb)
- the almost straight fold axis (red)
- point 3 is the fold axis and does not plot on the primitive indicating a plunge of 10 to 225°.

The veins in the Mato Bula area appear to be predominantly foliation parallel, and they indicate the same pattern of folding. Only scattered veins in the dataset plotted do not appear to be foliation parallel.

To determine that the variation in dip direction that indicates folding was not caused by variations in measurements down hole or skewed by a large amount of structural measurements from one drill hole, the average dip direction for each drill hole was calculated and is presented in Figure 7.21.

Figure 7.21 Average Dip Direction – Mato Bula Drillholes

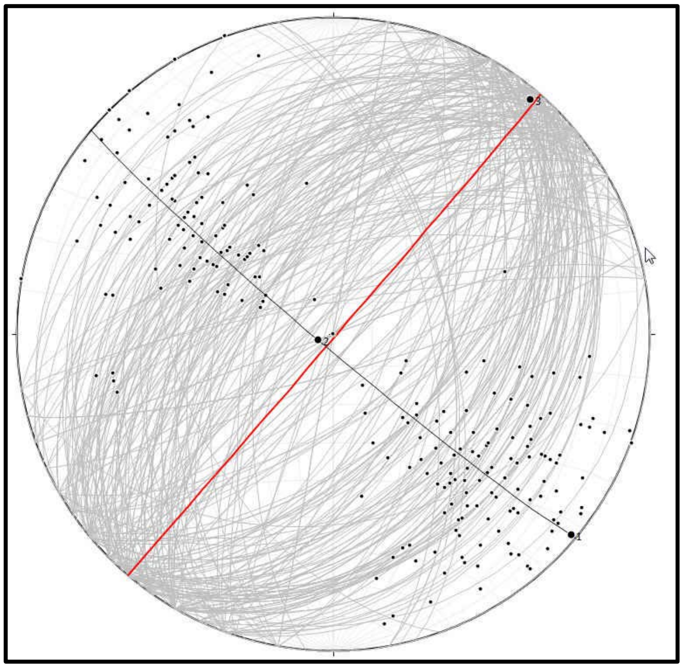


This clearly shows that dip direction varies between drill holes rather than within drillholes. Where dip is approaching vertical, the dip direction may be spurious, and this did affect the averages somewhat. Lastly, a map was produced displaying the average dip direction in ranges between 0 and 180° and 180 and °360. This was to ensure that the variations in dip direction are not spatially random. This is convincing evidence that the Mato Bula target is folded into a tight fold along a northeast-southwest axis.

Structural data from Mato Bula from surface mapping was plotted in the same manner. Figure 7.22 displays the stereonet from surface mapping data. The surface outcrops indicate a similar pattern of folding: a tight fold along a northeast-southwest axis, although the surface measurements indicate a very shallow plunge to the northeast.

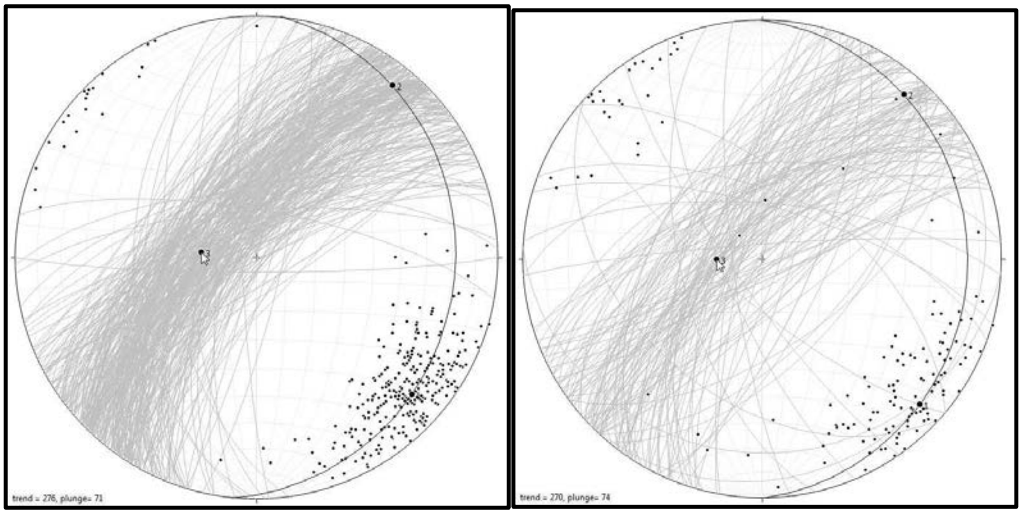
The structural pattern observed in the Mato Bula area appears to clearly indicate a tight antiformal fold trending northeast-southwest. However, Figure 7.22 displays the mapped/interpreted faulting in the Mato Bula area that may have an impact on the distribution of different dip directions. The locally steep topography in this weathered terrain might lead to slumpage and the presence of more dispersed dip signatures, from surfacing structural measurements. The displacement and sense of movement on the mapped/interpreted faults in the Mato Bula area are not well understood and require further work.

Figure 7.22 Mato Bula Surface Structural Measurements



Silica Hill (Figure 7.23) initially appears to have a much more dominant foliation pattern dip to the northwest. A much smaller number of points appear to dip in the opposite direction. When average dip direction from Silica Hill is plotted on a map (Figure 7.24), a reason for this becomes apparent: an easterly dip direction was recorded from only two holes. Western dip directions are clustered in holes to the northwest. This is the same pattern as observed at Mato Bula. The data from Silica Hill may indicate that Silica Hill is folded in the same manner as Mato Bula, and that only two holes were drilled into the eastern limb. This may explain the uneven distribution of data.

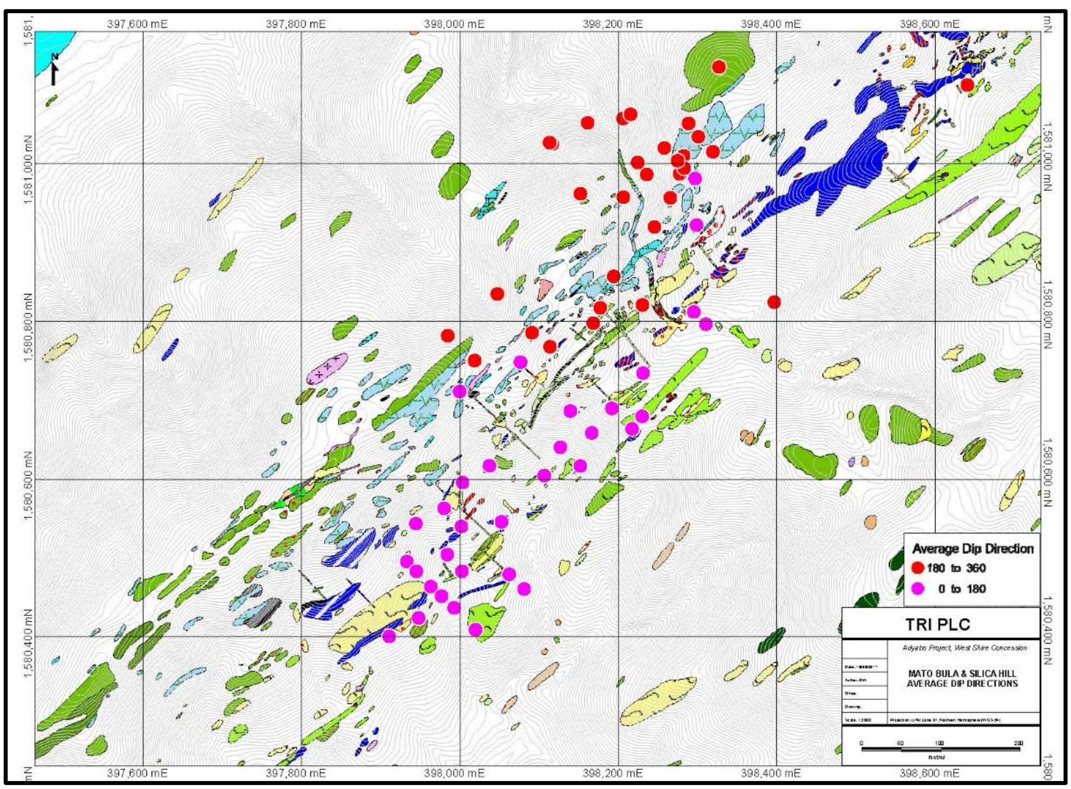
Figure 7.23 Silica Hill Stereonets



Note: Foliation on the left and veins on the right. Poles to planes in black

The presence of folding at Mato Bula and Silica Hill has been shown convincingly from the structural data gathered and presented herein. The relationship between this folding and the mineralization is currently not well understood and will require further investigation.

Figure 7.24 Mato Bula and Silica Hill Average Dip Direction



The Mato Bula North prospect presents at surface as a 200 m long malachite-stained silica altered zone that occurs approximately 500 m to the north northeast of the main Mato Bula prospect, and is likely part of the same mineralized system, albeit off-set by a north-northeast-trending fault. There appears to be more evidence for crustal shortening due to later reverse faulting. Footwall lithologies at the prospect are mafic tuff (extensively carbonate altered), black graphitic shale, sericite chlorite schist, and minor diorite dykes—all suggesting a slightly distal setting to any exhalative mineralization. A reverse fault appears to separate the aforementioned lithologies from the immediate footwall, which comprises sericite schist. Like the main Mato Bula prospect, the sericite schist transitions into an intensely altered (and sulphide-bearing) sericite schist that also contains massive silica flood zones rich in sulphides (forming gossans) and bedded jasper. The mineralized zone appears to transition into mafic tuffs along strike, and is capped by carbonate altered mafic tuffs, graphitic shale, chlorite sericite schist and bedded baritic chert (similar to Mato Bula). Mineralization is also present within quartz eye porphyry intrusions that conform to the interpreted stratigraphy, but is absent from similar northeast-trending porphyry that follows a late northeast-trending fault. The true displacement of the fault is not known but is not considered significant.

8.0 DEPOSIT TYPES

8.1 VOLCANOGENIC MASSIVE SULPHIDES

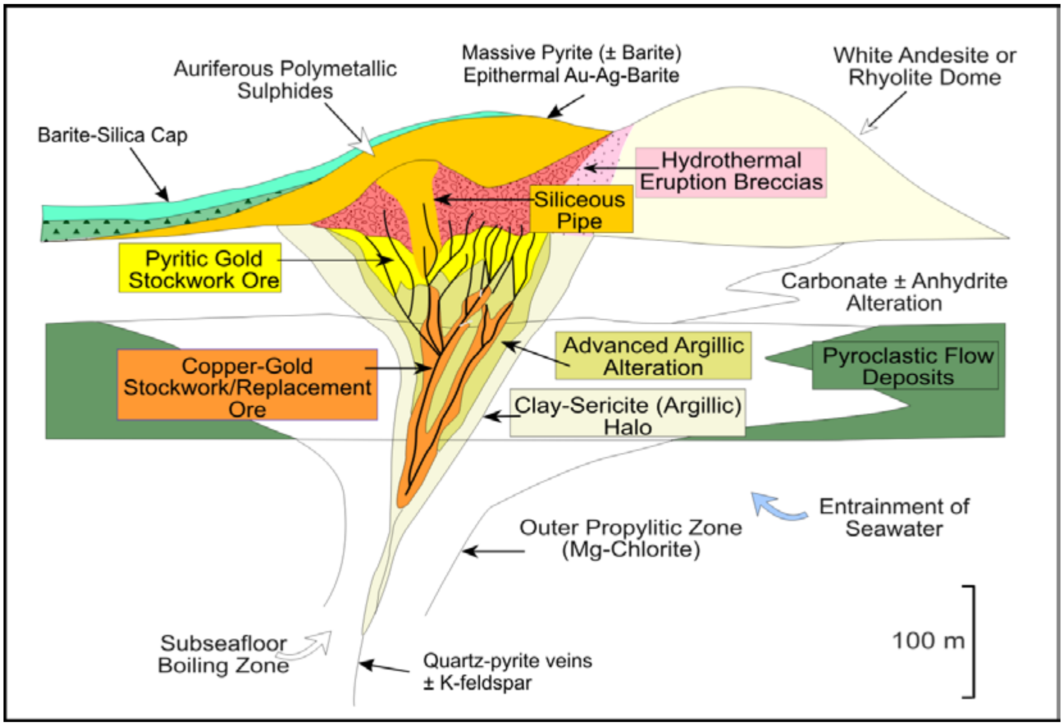
The ANS hosts approximately sixty VMS deposits in several districts (Barrie & Hannington 1999; Barrie et al. 2007), most notably in Saudi Arabia, Sudan and Eritrea, and the largest examples are illustrated in Figure 8.1. The geology of the Adyabo project area, occuring within the Adi Nebried/Asmara back arc basin (Figure 8.1) is analogous to the host rocks for gold-rich VMS deposits located at Bisha and the Hassai districts in the ANS.

The VMS mineralization in the Adi Nebried/Asmara back arc basin has been variably described as Kuroko-type (Chewaka & DeWit 1981) and as bi-modal mafic type (Hannington 2009), with mineralization hosted within volcanic- and metasedimentary rocks. Generally, VMS deposits contain footwall mineralization consisting of quartz-chalcopyrite stringers (stockwork), overlain by primary bedded (stratiform) sulphides composed of pyrite, chalcopyrite, ±sphalerite, ±galena, ±barite, ±tetrahedrite/tennantite. In some deposits, the stratiform massive sulphide lens makes up the entire economic deposit, whereas in other deposits, large quantities of ore are also mined from the stockwork zone. The stratiform sulphides are typically overlain by, or grade into, an iron-rich silica facies that is usually manifested as a Banded Iron Formation (BIF). Surficial weathering results in the primary sulphides forming secondary, supergene minerals such as chalcocite, covellite, digenite, and bornite. The surface manifestation of a VMS system is the total leaching of metals, with the exception of silica and iron, to produce a hematite-goethite gossan. VMS deposits usually consist of several mineralized lenses that can attain thicknesses up to 50 m and strike lengths up to 1,500 m (Galley 2004; Franklin et al. 2005). The schematic model of active VMS formation, alteration and mineralization is presented in Figure 8.2.

Figure 8.1 Gold-Rich VMS and Orogenic Gold Deposits of the Arabian-Nubian

Source: Trench and Groves, 2015).

Figure 8.2 Schematic Illustration of Geological Setting and Hydrothermal Alteration Associated with Gold-rich VMS Systems



Source: Dubé et al. 2007

Gold-rich VMS are a sub-type of both VMS and lode gold deposits (Poulsen & Hannington 1996; Hannington et al. 1999; Huston 2000; Poulsen et al. 2000; Dubé et al. 2007a). This sub-type consists of semi-massive to massive sulphide lenses, which are underlain by discordant stockwork feeder zones. However, gold-rich VMS differ from other types of VMS deposits by their gold concentration (in grams per tonne of gold), which exceeds the associated combined copper, lead, and zinc grades (in weight percent) (Dubé et al. 2001).

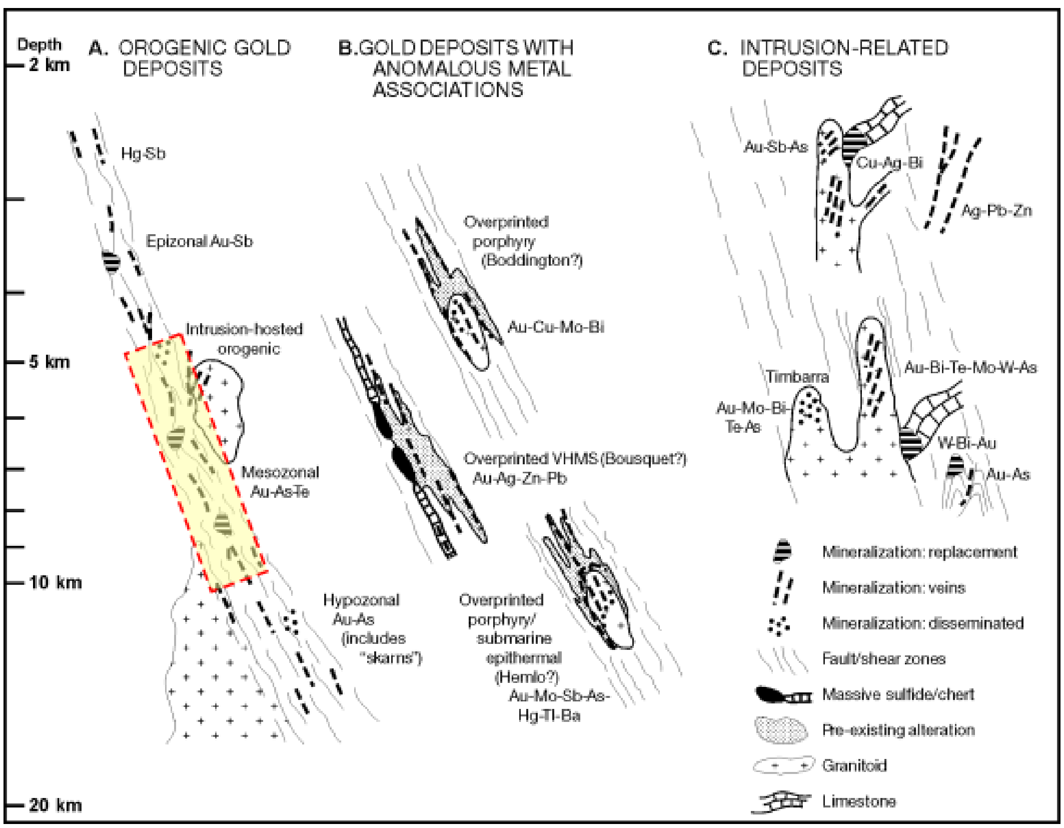
Host rocks are exclusively felsic to intermediate volcanic or volcaniclastic rocks, with subvolcanic tonalitic intrusions common at the district scale, e.g., Bousquet 2 - LaRonde 1 and LaRonde Penna (Dubé et al., 2007b; Dubé et al., 2013). Alteration is advanced argillic at the deposit scale, and when present in a metamorphosed environment (aluminous alteration with andalusite) may be common at the deposit scale (Dubé et al. 2007a; Pilote et al. 2014). The sulphide mineralogy of the gold-bearing ores is commonly more complex than in traditional gold-poor VMS deposits (Hannington et al. 1999). Sulphide minerals are mainly pyrite, chalcopyrite, sphalerite, pyrrhotite, and galena with a complex assemblage of minor phases including locally significant amounts of bornite, tennantite, sulphosalts, arsenopyrite, mawsonite, and tellurides (Hannington et al. 1999; Dubé et al. 2007a; Mercier-Langevin et al. 2011).

8.2 OROGENIC GOLD DEPOSITS

Lode-gold deposits are intimately associated with orogeny and other plate collision events within geologic history. Most lode-gold deposits are sourced from metamorphic rocks, because it is thought that the majority are formed by dehydration of basalt during metamorphism. The gold is transported up faults by hydrothermal fluids and deposited when the water cools, boils, reacts and with the wall rock, or with another fluid, precipitating the gold in solution.

The ANS is also a significant gold producer with numerous gold deposits and artisanal workings across the whole terrane (Figure 8.3). The host rocks range from graphitic mica schist and ultramafic rocks (Lega Dembi, Ethiopia), to granite stocks (Sukhaybarat East, Saudi Arabia), and along granite contact facies (El Sid and Umm Rus, Egypt). Other host rocks from the area include metamorphosed mafic lavas, volcaniclastic tuff, phyllites and deformed granodiorites. All the mineralization is epigenetic and present in a variety of forms, e.g., quartz veins, pods, veinlets, stringers, stockworks, and breccias. Vein mineralogy is dominated by quartz, carbonate (calcite, dolomite and siderite), pyrite, arsenopyrite and pyrrhotite, and the wall rock alteration is typically sericite, chlorite, and carbonate.

Figure 8.3 Schematic Representation of Crustal Environments of Orogenic Gold Deposits



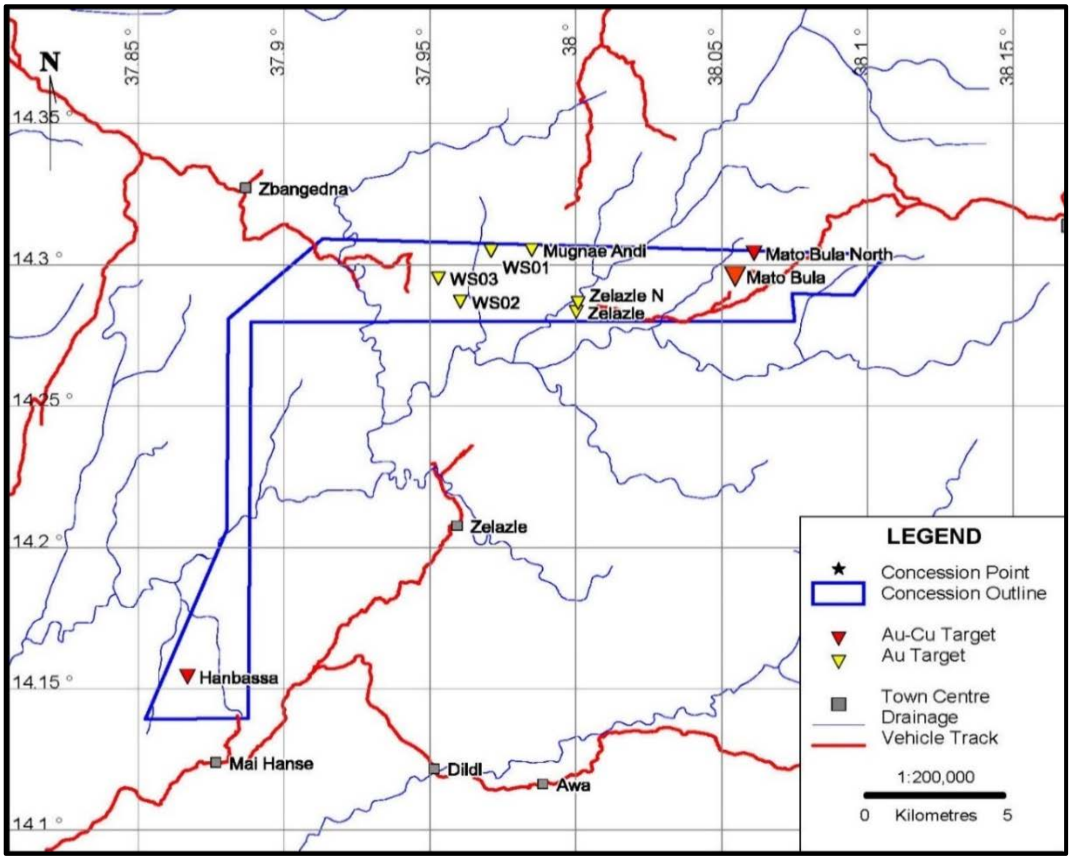
Note: The most likely depth of Formation of Gold in the Arabian-Nubian Shield is between 5 and 10 km (shown in yellow box).

Many gold occurrences are also noted in the district with widespread artisanal workings. Gold is associated with shear hosted quartz veining and often occurs in association with sulphides hosted within vein quartz. The lode dimensions and orientation are varied across the terrane. At Lega Dembi, the steeply-dipping ore zones are located within a 1,500 m long by 200 m wide belt. Individual veins are up to 3 m thick. Quartz veins at the Zalm mine are as long as 300 m and as wide as 3 m. In the Al Wajh district, individual veins are less than 100 m long and 1 m wide, but combine to make sheeted zones 100 to 200 m long and greater than 2 m wide. Most lodes are oriented north-south, parallel to the main trend of the orogeny.

Typically, the ore minerals are pyrite, arsenopyrite and pyrrhotite. In Saudi Arabia, grades average 2.5 g/t at the Sukhaybarat East deposit, and 3 to 4 g/t for veins in the Al Wajh district. Some small southern Saudi Arabian vein systems are much higher grade (e.g., Ad Duwayah equals 11 g/t and Bi'r Tawilah equals 14 g/t). Parts of the vein system at the Zalm mine grade near 100 g/t, although grades typically average between 2.5 to 12.5 g/t.

Exploration efforts on the Adyabo Property currently target two deposit types, these being gold-rich VHMS and orogenic lode-gold mineralization. A spatial relationship between these deposit types is noted on the property and may be related to reactivation of hydrothermal pathways or redistribution of deposited mineralization during orogenesis. Further discussion of orogenic gold style of mineralization is not included in this report. Figure 8.4 highlights the distribution of current targets and trends at Adyabo.

Figure 8.4 West Shire Exploration Target Locations by Defined Mineralized Trend



Source: West Shire annual report (2015)

9.0 EXPLORATION

Recent exploration on the Adyabo Property is summarized below.

Seven licence renewals in previous years are listed below with key milestones achieved by the company:

- The licence was renewed for the first time on July 6, 2011, effective from October 13, 2010. Exploration work was conducted by Aberdeen.
- The licence was renewed for the second time on April 20, 2012, for the period ending October 13, 2012. The licence area granted was 274.126 km^2. Following delays with renewals and transfer status from Aberdeen to TRI, all exploration work in the second renewal period was conducted from May 2012 to October 2012 under TRI management. This work included 430 stream sediment samples, 424 rock chip samples, 718 channel samples, 3,567 soil samples taken with 5,027 handheld portable x-ray fluorescence (pXRF) samples analyzed, and 4,831 laboratory (for gold and/or base metals) assays. Mapping campaigns were conducted at a range of scales: 164 km^2 at 1:10,000 scale, 11 km^2 at 1:2500-1:5000 scale and 7 km^2 at less than 1:2500 scale. At this time, the Mato Bula gold prospect was discovered.
- The third licence was renewed on March 22, 2013, for the period ending October 13, 2013. The licence area granted was 205.455 km^2. The work completed included 963 m of diamond drilling, 913 drill core assays, collection of 430 rock chip samples, 566 m of trenching, 382 channel samples, 5,055 soil samples, 884 geochemical sample assays, 6,977 handheld pXRF analyses, and geographical information system (GIS) and remote sensing. Mapping campaigns were conducted at a range of scales: 21 km^2 at 1:2500 to 1:6000 scale and 20 km^2 at less than 1:2,500 scale. The satellite gold prospects were discovered at Mato Bula including Silica Hill and Mato Bula North.
- The license was renewed for the fourth time on January 28, 2014, for the period starting October 14, 2013, and ending October 13, 2014. The licence area retained was 155.591 km^2. On the Adyabo Project, TRI completed 3,356 m of diamond drilling, 4.51 km^2 of detailed mapping, 1,303 m of trenching with 665 channel samples, 183 rock chip samples, and high-resolution handheld pXRF soil sampling on 8,219 soil samples. A total of 3,403 geochemical assay results were received and 10,928 handheld pXRF were analyzed (for rock chips, soil samples, drill core and channel samples). A new 5 km unpaved road to access the Hanbassa target was constructed, and the 13.26 km Mato Bula Road was maintained throughout the year. Additional exploration work included topography contour generation, petrography, x-ray diffraction (XRD), and scanning electron microscopy (SEM) work on selected samples.

- The licence was renewed for the fifth time for the period starting on October 14, 2014, ending October 13, 2015. The retained licence area is 115.601 km^2. On the Adyabo Project, TRI completed 4,652 m of diamond drilling, 0.4 km^2 of detailed mapping (Silica Hill North), and high-resolution handheld pXRF analysis of approximately 4,000 soil samples. A total of 2,251 drilling geochemical assay results were received and 5,827 handheld pXRF analyzed (for rock chips, soil samples, drill core and channel samples). 13 km of the Mato Bula Road was maintained throughout the year. The Mato Bula and Mato Bula North gold-rich VMS deposits were defined as National Instrument 43-101 (NI 43-101) compliant economic resources.
- The sixth licence renewal was granted for the period starting on October 14, 2015, and ending on October 13, 2016. The renewal licence area was exempted from 25% relinquishment, and the retained licence area was 115.601 km^2. Works completed during the sixth renewal period included 19 diamond drillholes with a total depth of 2,532.12 m, 17 resource trenches totalling 987 m, 594 channel samples were collected and assayed, and 1 km^2 of detailed mapping (along the eastern margin of Mato Bula). This work allowed an upgrade of the Mato Bula (Mato Bula and Silica Hill) Mineral Resource model. The Mineral Resource is defined to depths of 450 m for Mato Bula and 170 m for Mato Bula North, with potential for further lateral and depth extensions. An Adyabo mineral resource update was press released by EAM on June 14, 2016. The seventh licence renewal was granted for the period starting on October 14, 2016, and ending on October 13, 2017, with a reduced area of 86.5026 km^2. Work completed during the current renewal period included 48 drillholes totalling 7,025.79 m on the Mato Bula and Silica Hill targets. pXRF analysis was carried out on 7,835 drill core samples and 4,580 half core samples (including quality assurance (QA)/quality control (QC)) were submitted for gold and multi-element analysis. A further 211 half core and 307 channel samples (from 14 trenches) were submitted for gold and multi-element analysis to better define the mineralized lode models. At the time of writing, the upgrade to the Mato Bula Mineral Resource model is still ongoing and results are awaited. Mineral Resource upgrade work included metallurgical test work on a selection of 136 quarter core samples, the results of which are pending as of the time of writing. A trial IP and magnetic survey was carried out over known mineralization at Mato Bula and Silica Hill. Ten lines were carried out to determine the technique's potential for exploration along the Mato Bula mineralized trend.

9.1 GEOLOGICAL MAPPING

Geological mapping of the Adyabo Property was performed by the GSE and EMD. However, the first detailed mapping of the property was undertaken by EAM geologists in March 2012 at a scale of 1:2000 and covering an area of 1.2 km^2 at Mato Bula. This was followed by the mapping of a 1 km^2 area at 1:500 in May 2012, and 3.75 km^2 at 1:2000 scale in August 2012. Additional mapping programs have been carried out since 2012 on other prospects on the property at scales varying from 1:2500 to 1:250. However, most mapping is performed at 1:500 scale. During 2013-2015, mapping campaigns were conducted at a range of scales: 21 km^2 at 1:2500-1:6000 scale and 20 km^2 at less than 1:2,500 scale. The geological mapping conducted by EAM involved field identification and recording of outcrop based geological information, with cross checking conducted regarding interpretation such that better consistency could be attained. Where doubt exists, hand specimens are returned to base camp for additional examination. Factors such as soil cover and extensive arid weathering render clear identification and interpretations challenging in some situations. More detailed mapping was conducted in prioritized areas of interest. A detailed geological map for the entire Adyabo property was created from the collective mapping conducted on the property.

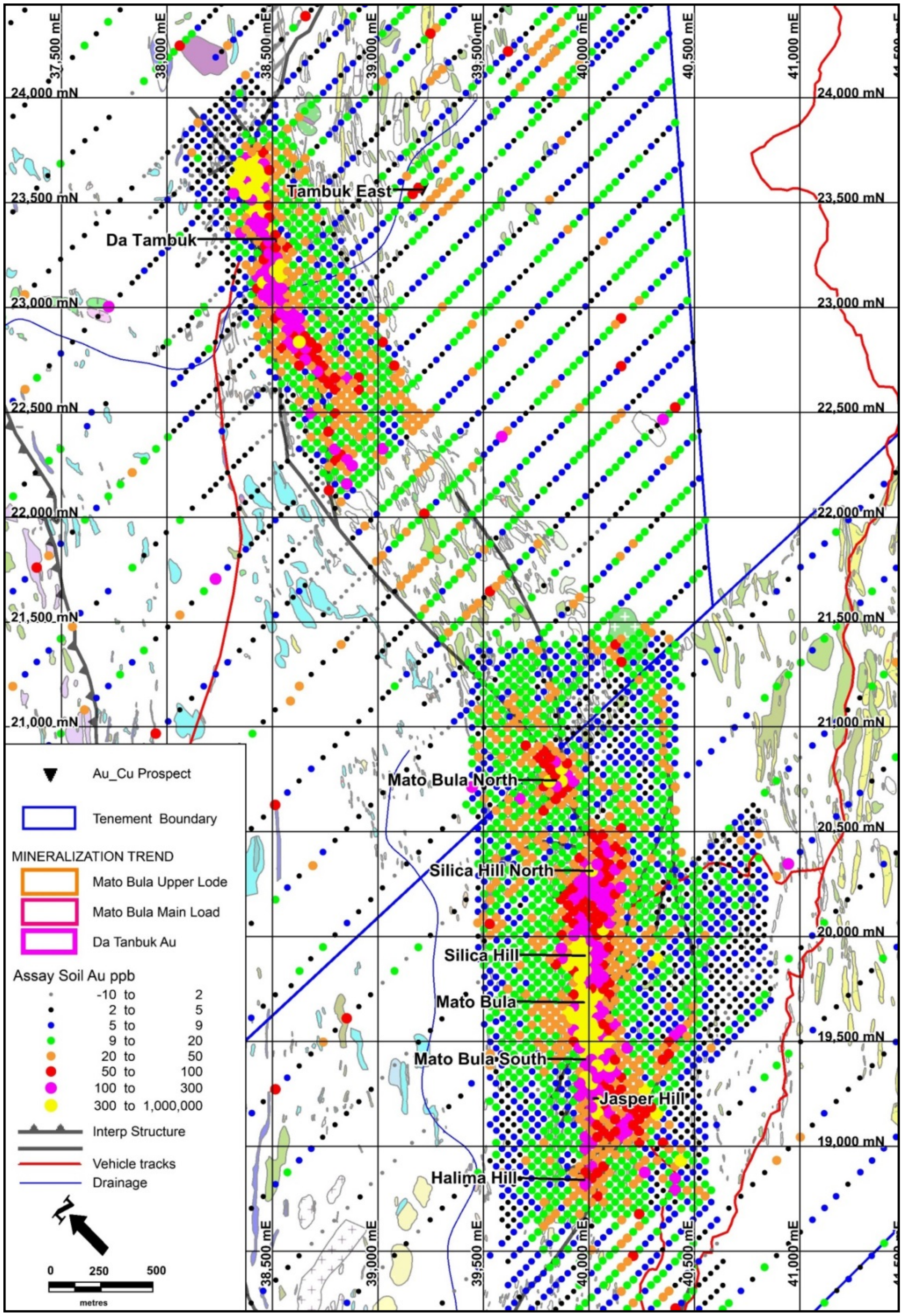
9.2 Soil Sampling

9.2.1 Gold Soil Geochemistry

EAM has carried out regional and detailed soil geochemistry surveys over much of the Adyabo Property. A total of 25,373 soil samples (18,104 in 2012, 6,210 in 2013, and 1,059 in 2014) were collected throughout the property and analyzed for gold, at the locations shown in Figure 9.1. The initial measurements were taken with a sample spacing of 80 m on an east-west oriented line, with a line spacing of 320 m. An infill grid of 40 m by 160 m was employed over areas that were considered anomalous following the initial survey. If anomalism persisted then a grid with a spacing of 40 m by 40 m was employed to resolve the anomaly.

From this work, a number of elongate gold soil anomalies were identified, including the Mato Bula-Da Tambuk trend (Figure 9.1).

Figure 9.1 Distribution of Gold Shallow Soil Sampling on the Mato Bula Trend

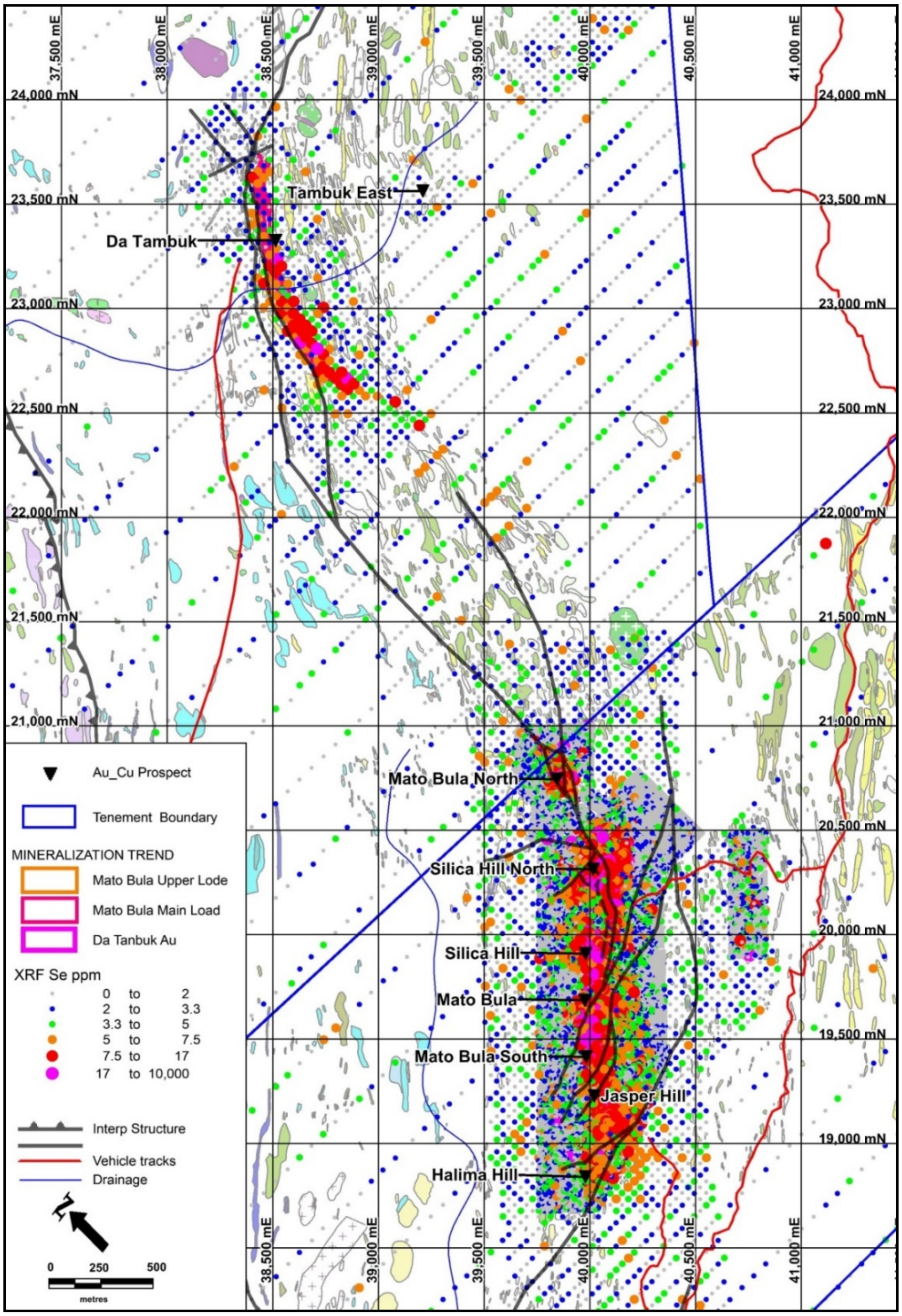


Source: EAM (2015)

9.2.2 PORTABLE XRF GEOCHEMISTRY

A total of 47,987 soil samples (20,060 in 2012, 10,132 in 2013, 13,440 in 2014, and 4355 in 2015) were collected throughout the Adyabo Property (including relinquished parts of the Adyabo licence) and analyzed for multiply elements. The results are shown in Figure 9.2.

Figure 9.2 XRF Soil Sampling Results for Selenium Distribution over the Mato Bula Trend



Source: EAM (2015)

9.3 STREAM SEDIMENT SAMPLING

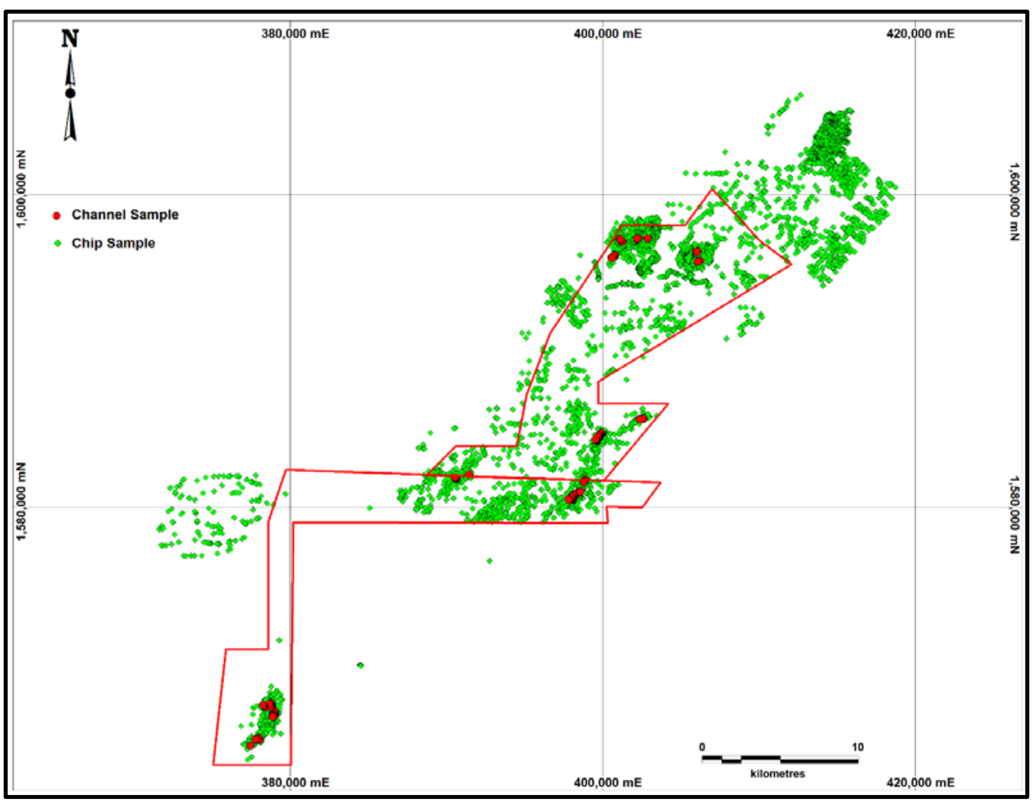
Steam sediment sampling was carried out by EAM over both concessions, but as most of the samples are outside of the current licence boundaries. Stream sediment sampling occurred in 2012 with a total of 2,966 samples collected and analysed, of which 696 are present within the current Adyabo Property. Elements analyzed include gold, silver, arsenic, barium, copper, lead, and zinc. This method was utilized to quickly prospect a large area of ground when the concessions were first acquired.

Samples collected in the program identified gold mineralization at Mato Bula and Da Tambuk and Adi Nigisti.

9.4 LITHOGEOCHEMICAL SAMPLING/TRENCHING

A total of 8,647 rock samples were collected from February 2012 to November 2014 of the Adyabo Property, of which 6,561 are located on the current concessions. The location of the samples is illustrated in Figure 9.3. Lithogeochemical samples (grab, chip or channel) were taken during routine prospecting and also during trenching programs (August 2012 to November 2013). Samples are analysed using the *Niton* XRF analyser and assayed for gold.

Figure 9.3 Lithogeochemical Sample Locations



Source: Archibald et al. (2015)

Trenching and channel sampling has taken place at nine locations in the Adyabo Property, namely: Mato Bula (11 trenches and a number of channel samples, totalling 725 m and 726 samples)); Mato Bula North (4 trenches with 133 samples), Da Tambuk (7 trenches totalling 624 m and including 422 samples); Hanbassa (16 trenches with 814 samples); Mugnae Andi (2 trenches with 89 samples); Adi Nigisti (2 trenches with 100 samples); Zager (3 trenches with 135 samples); Sentraley (4 trenches with 137 samples)and Adi Gozomo (3 trenches with 127 samples). Additional trench and channel sampling was conducted during 2016 and 2017, with 307 additional channel samples taken from 14 new trenches or trench extensions. Areas were targeted via revised interpretation, and identification of open areas of mineralization in existing trenches. This work provide for closing off surface areas of mineralization for mineral resource estimation.

Results were encouraging, with four of the five prospects drilled following the trenching programs. Mato Bula, Mato Bula North, Da Tambuk, Hanbassa, Mugnae Andi, and Adi Gozomo. Only a few isolated samples at Adi Nigisti, Zager, and Sentraley returned gold grades greater than 0.5 g/t over 1 m. From a total of 2,643 samples analysed during the channel sampling program, 170 samples (6.4%) contained gold concentrations greater than 0.5 g/t (typically over 1 m). The maximum gold concentration recorded was 27.8 g/t from a 1 m interval at Da Tambuk).

9.5 AIRBORNE GEOPHYSICS

A single airborne geophysical survey was performed on the Adyabo Property previously by Aberdeen in 2007. EAM did not perform their own survey, but reinterpreted some of the data from the 2007 survey.

Aeroquest conducted a heliborne aeromagnetic, radiometric, and AeroTEM™ surveys on their EM 1 Block and EM 2 Block licences (Dudek 2008). EM 1 Block was the original licence area currently covered by the Adyabo Project.

Most of the EM anomalies are linear in nature, and appear to be related to black- and graphitic-shale units in the region

9.6 2017 GROUND INDUCED POLARIZATION AND GROUND MAGNETIC SURVEYS

A trial IP/resistivity and magnetic survey was carried out over known mineralization at Mato Bula and Silica Hill. A total of 23.5 line-km on 10 separate lines was completed between May 10 and June 4, 2017. This work aimed to determine the mineralization-identifying potential of these techniques for further exploration along the Mato Bula mineralized trend. The work also confirmed that the mineralized trend is identifiable using IP, and interpretation indicates the resource horizon remains open for exploration to depth, and both north and south along the trend. Depth slice IP and three-dimensional (3D) images highlight results from the survey and confirm that additional IP work is warranted.

The results of this work are illustrated in Figure 9.4 to Figure 9.7.

Figure 9.4 100 m Chargeability Depth Slice (mineralized body outline in blue)

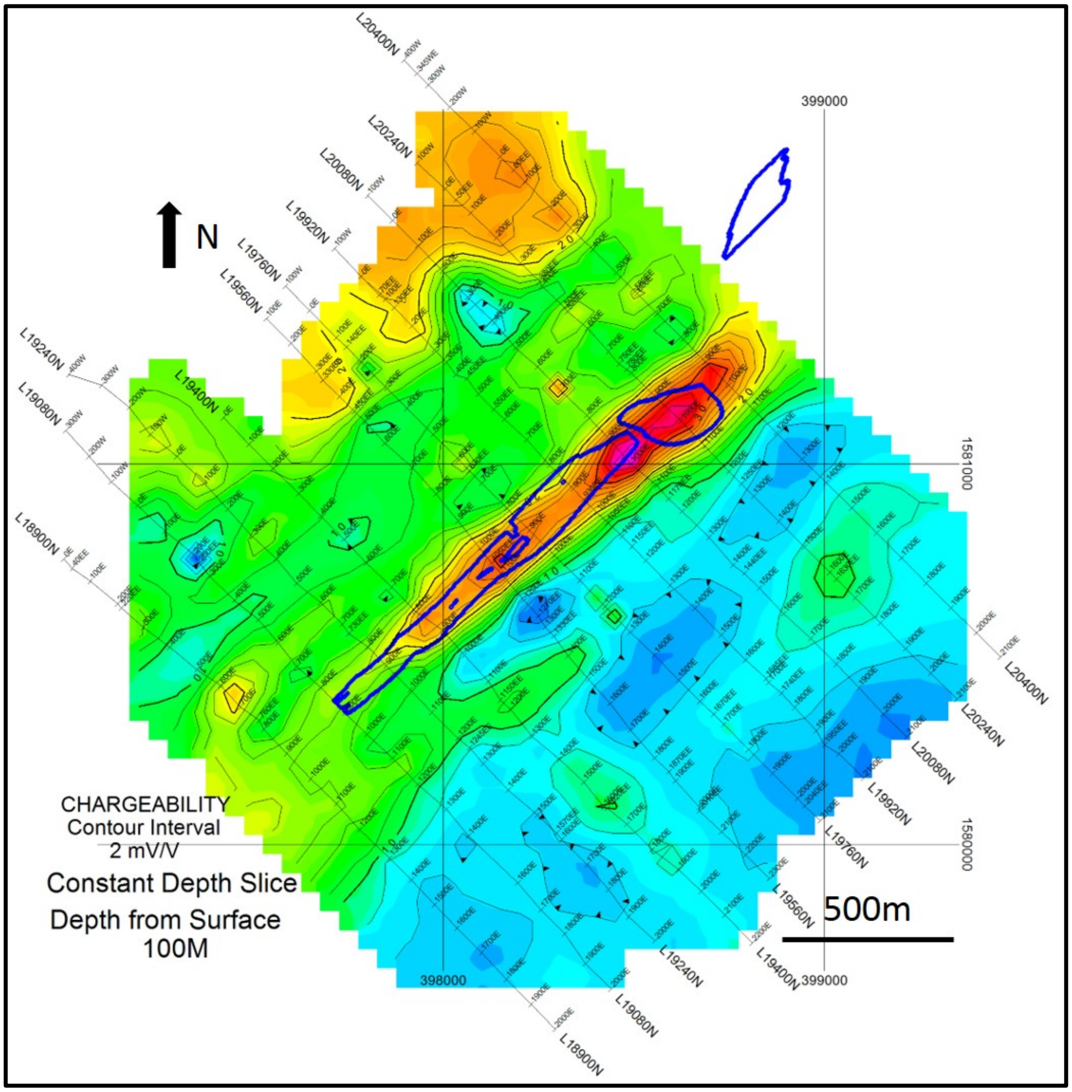


Figure 9.5 400 m Chargeability Depth Slice (mineralized body outline in blue)

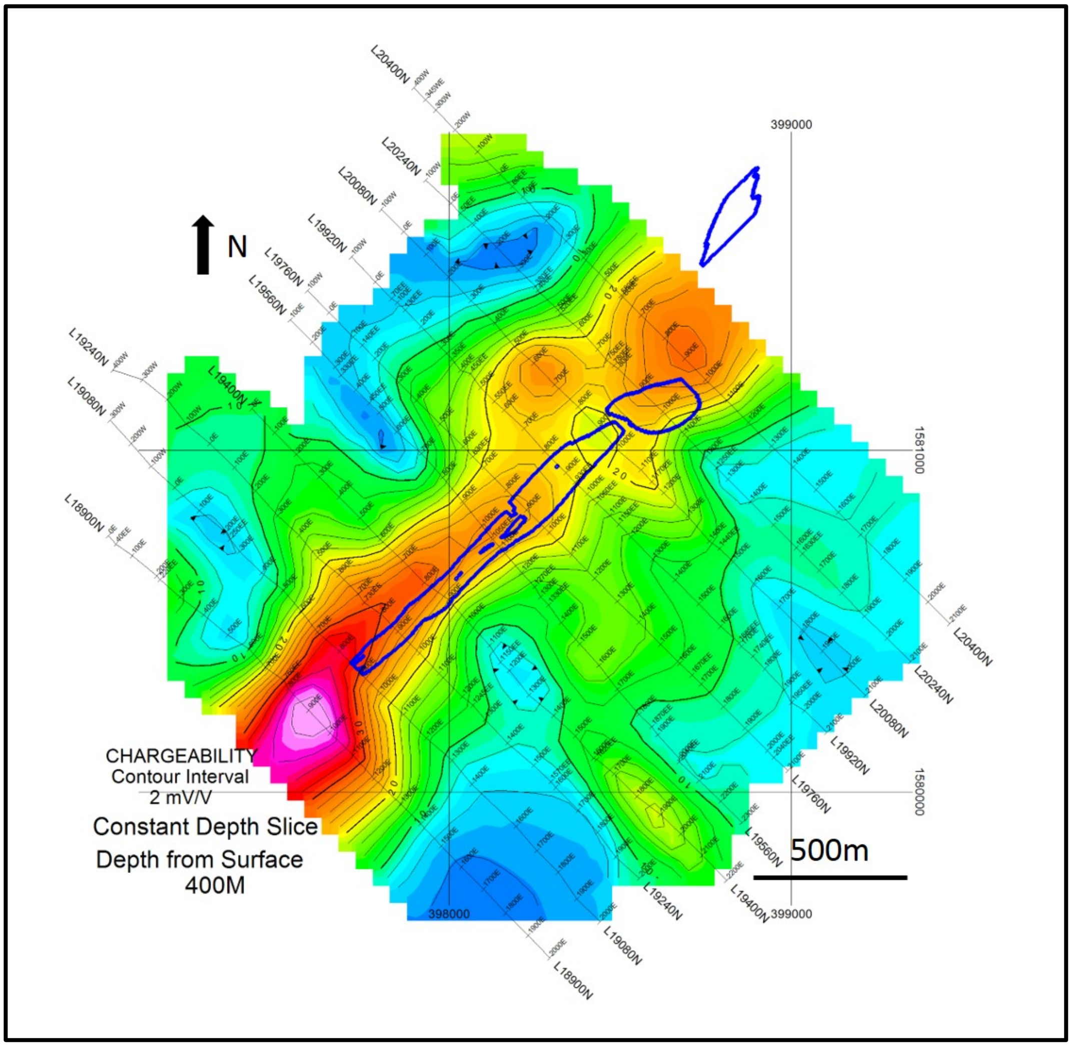


Figure 9.6 3D Chargeability Inversion

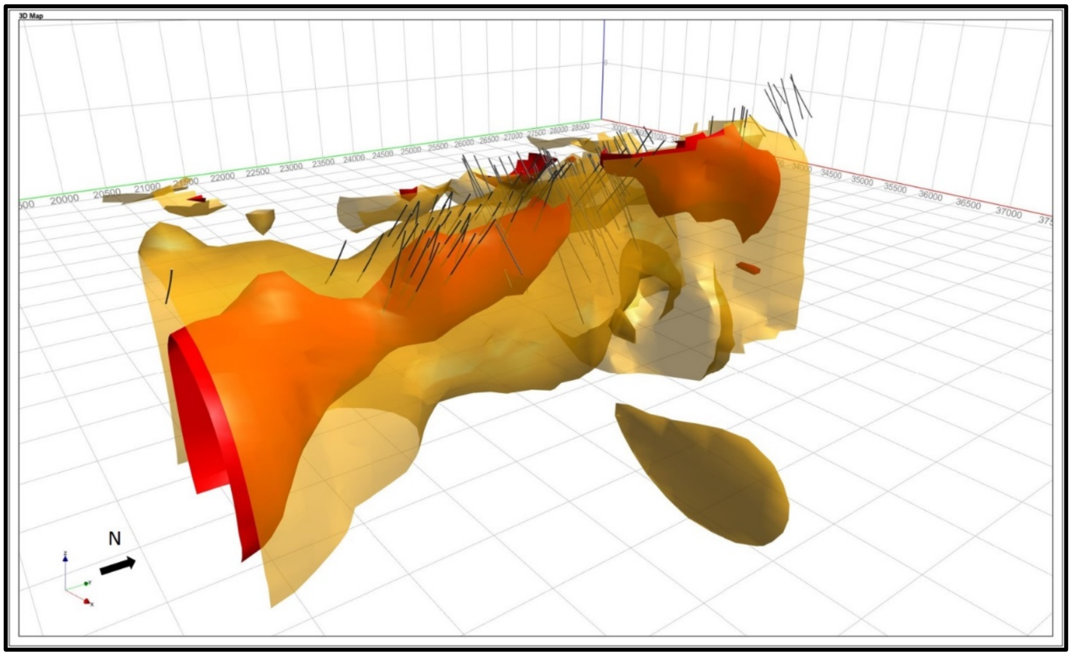
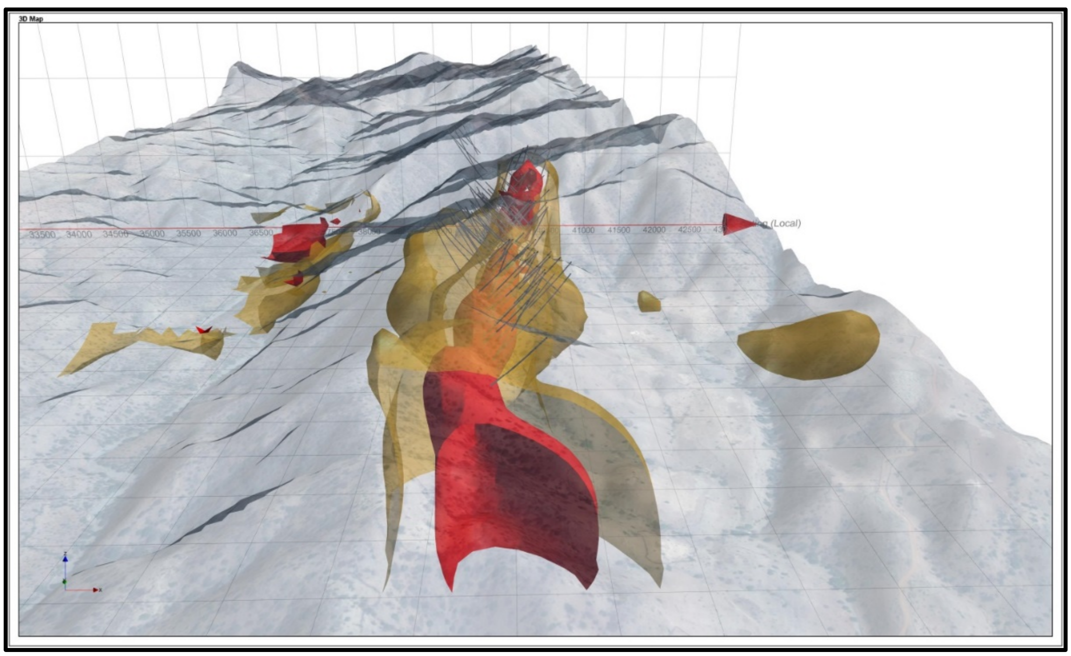


Figure 9.7 3D Chargeability Inversion-Surface Overlay, Looking Grid North



9.7 PETROGRAPHIC STUDIES

No process-specific mineralogical studies have been conducted to date on the three composites tested; however, petrographic studies were conducted independent from the metallurgical work (Wilson 2014). A total of 25 drill core samples were examined for mineralogical and textural features. Described minerals for the deposit zoned include pyrite, chalcopyrite, with lesser amounts of iron poor sphalerite, galena, tetrahedrite, bornite, chalcocite, and covellite, as well as oxides hematite and rutile. Sulphides are dominated by chalcopyrite, with traces of bornite, covellite, chalcocite, and tetrahedrite. Native gold was also identified. The mean modal mineralogy from grain-counting exercises on 25 samples indicated that quartz (64%), pyrite (5%), micas (17%), chlorites (5%) and carbonates (7%) were the dominant gangue phases. Hydrothermal alteration was again widely reported in the petrographic studies, suggesting some of the micas may have converted to forms of clay. Of the four grains of gold found, all were associated with sulphides and were relatively coarse, typically sized in the 20 to 60 μm range.

9.7.1 University of Leicester (2013)

Five samples taken from the supergene oxide zone outcrops at the Mato Bula prospect were submitted for petrographic analysis by Dr. Gawen Jenkin and his team, at University of Leicester in 2013 (Mitchinson et al. 2014). The samples were made into polished thin sections and analyzed under transmitted and reflected light. The study showed the samples were originally pyrite±chalcopyrite bearing quartz-rich schists. Sulphides were present as porphyroblasts during deformation as illustrated by quartz fringes around the voids, which are the negative pseudomorphs of these crystals. The quartz-rich nature could relate to early silicification during mineralization prior metamorphism. The presence of a few large feldspar crystals suggests that the original protolith may have been acid volcanic rocks.

9.7.2 Hummingbird Geological Services (2014)

Three samples from Mato Bula drill core were submitted to Hummingbird Geological Services, in December 2014 for petrographic analysis of polished thin sections (optical, and SEM using back-scatter detector (BSE) and energy dispersive x-ray spectroscopy (EDSX) techniques), x-ray diffraction (XRD) analysis, and three samples for whole rock geochemistry (Dalsin 2014). The main aim of the study was to determine the location of gold within the samples.

The samples comprised of sulphidic-quartz-muscovite schist (WMD006; 88.85 to 89.00 m), and two samples classified as sulphidic-quartz-muscovite metasomatite (WMD004; 64.44 to 64.52 m, and 132.15 to 132.33 m). Mineralogy was relatively simple, with the sulphides composed of pyrite, chalcopyrite, sphalerite, covellite and galena. Trace amounts of enargite, rutile, melonite, bornite and digenite were also observed.

9.7.3 Turnstone Geological Services (2014)

Twenty-nine from Mato Bula drill core and an additional 25 samples from Da Tambuk were investigated by Graham Wilson from Turnstone Geological Services in October and December 2014 (Wilson 2014). The investigation provided basic mineralogy of the samples, but did not identify all distinct minerals (i.e., carbonate species) or the presence of several minerals identified in the Hummingbird Geological Services study, such as barite, enargite, pyrophyllite or digenite.

Minerals present at Mato Bula, in order of abundance, include: silica, carbonate, mica, chlorite, chloritoid, rutile, leucoxene and hematite. Minor feldspar and garnet were also noted. Sulphide minerals present include pyrite, chalcopyrite (altered to, or replaced, by bornite, covellite and chalcocite), pale (low-iron) sphalerite, and galena. Lithologies identified include fine-grained volcaniclastic sediments, and highly altered and deformed porphyries.

9.7.4 Hugh Graham M.Sc. Thesis (2016)

Hugh Graham of the University of Leicester completed an Master of Science thesis entitled *Understanding the Mato Bula – Da Tambuk Au-rich VMS system in the Arabian-Nubian Shield, Northern Ethiopia*.

A total of 27 samples were selected for use from the variety of mineralized zones along the Mato Bula Trend.

Petrographic and qualitative element analyses (scanning electron microscope and electron microprobe) were conducted, and reveal a relative abundance of selenium and tellurium-bearing minerals along the trend. Additionally, saline fluid inclusions (0.2 to 13.4 wt.% NaCl eq.) and cool fluid temperature (105 to 190°C) may indicate a distal setting. Light $\delta 34S$ signatures range from –9.29‰ to –2.27‰. Several phases of mineralization deposition are suggested, varying from proximal to distal in setting. Affinities to both VMS and epithermal processes are noted.

9.8 Remote Sensing

In 2013 Worldview-2 colour satellite imagery was purchased from, and interpreted by, PhotoSat Information Ltd, Vancouver. The 50 km^2, 0.46 cm resolution image was used to generate 1 m topographic contours. The image and contour files are used as base maps during field exploration.

10.0 DRILLING

Drilling was undertaken to define gold mineralization identified by earlier prospecting, geochemical sampling, mapping, and trenching. The initial drill program was conducted in 2013, and the most recent program was completed in 2017. The drilling from the most recent season was not included in the current Mineral Resource estimate, however the author is satisfied that the additional infill drilling will not materially affect the Mineral Reesource estimate. Core was predominately NTW rod diameter; however, four holes were drilled in early 2017 with HTW diameter rods to facilitate additional samples potentially required for more metallurgical work.

Table 10.1 Summary of Drilling at the Mato Bula Deposit

Year	Prospect	Diamond	
		Holes	Metres
2013	Mato Bula	6	963.32
2014	Mato Bula	29	7,061.16
2015	Mato Bula	25	3,600.75
2016	Mato Bula	-	-
2017	Mato Bula	48	7,013.6
Totals	-	**108**	**18,638.83**

A plan of all of the drillholes and trenches completed to date is presented in Figure 10.1 and Figure 10.2.

Figure 10.1 Mato Bula Diamond Drillhole Locations

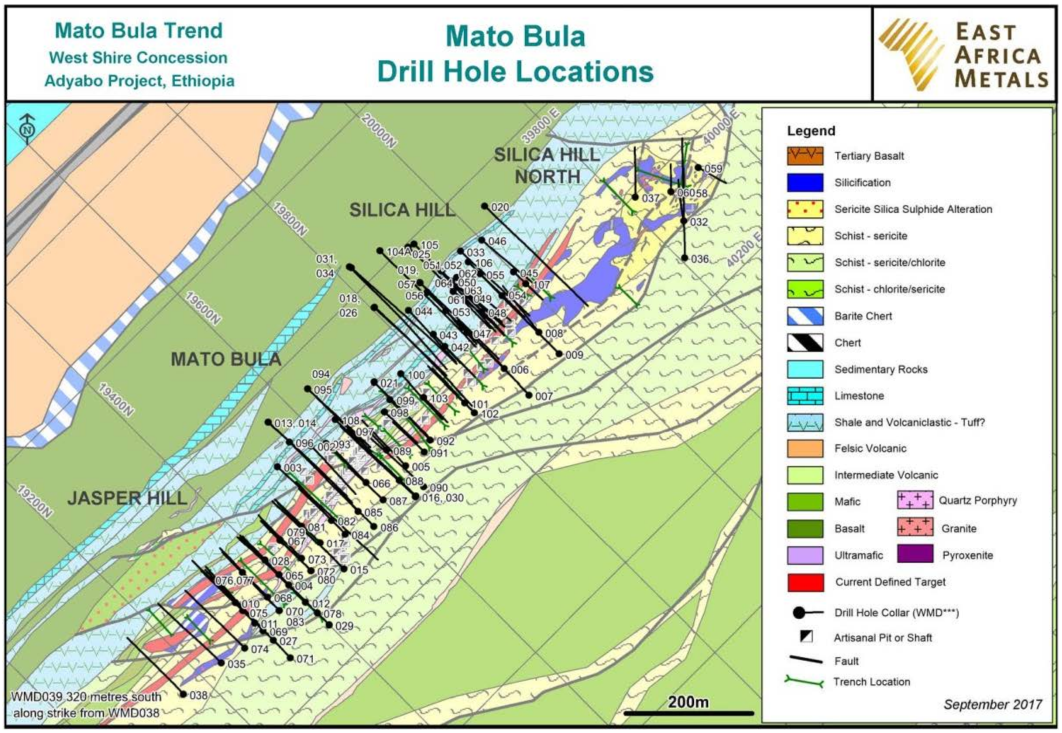
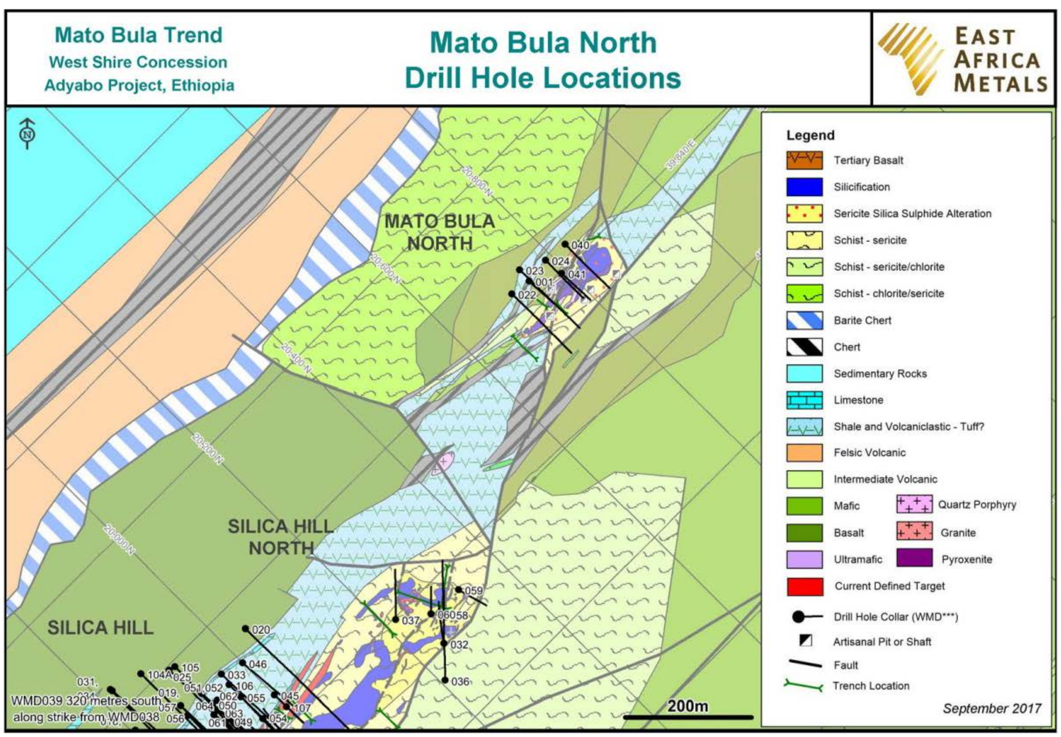


Figure 10.2 Mato Bula North Diamond Drillhole Locations



10.1 Diamond Drilling

10.1.1 Drill Contractors

Diamond drilling at the property was conducted by one contractor, Kluane Drilling Ltd. (Kluane) (Yukon, Canada). From April 2013 to June 2017, Kluane completed 18,638.83 m of diamond drilling using a man portable diamond drill rig. Kluane drilled predominantly with NTW diameter rods; however, they completed 4 HTW diameter rod holes at Silica Hill in early 2017.

10.1.2 Drill Surveying

Drilling collar locations were accurately surveyed in using a differential global positioning system (DGPS) system, where drilling pads were cleared and built up. Most diamond drill holes were completed on a 40 to 80 m grid spacing and were drilled at a local grid azimuth of 270° or 90°. This proposed drill spacing was chosen to facilitate Mineral Resource estimation, and to allow infill drilling to maintain an even-spaced grid. Drilling targeting down dip was planned to intersect the mineralization at 40 m down dip intervals. Pierce points for the drilling targets were perpendicular to the interpreted strike of targeted mineralization to make sure intersections were as close to true thickness as possible in the target rocks. Downhole survey measurements were taken at various depths, ranging from 6 to 50 m intervals down each drill hole using a Reflex EZ-Shot orientation instrument. A final reading was taken approximately 6 m from the bottom.

During exploration, TRI and the drilling contractor conducted the drilling programs according to industry best practices. Drillhole collar coordinates were again surveyed at completion of the holes and were capped with concrete monuments. Both pre- and post-drilling coordinates were surveyed by a qualified TRI mining surveyor using a DGPS Epoch 25 with a measurement accuracy of ±1 cm. The drill contractor used a multi-shot Reflex EZ-Shot orientation instrument for down-hole surveys for all drill holes azimuth and dip information was recorded down hole at roughly 30 m intervals, and a final reading approximately 6 m from the bottom of every hole.

Core orientation information was initially taken at approximately 30 m intervals, and reduced to 6 m intervals in areas of mineralization to determine the orientation of mineralization and structures (e.g., foliation) within the rock.

10.1.3 Core Recovery

Drill core recoveries for the project were acceptable, and the samples collected were representative of the observed mineralization. Determining the exact true thickness from individual drillholes is difficult, but generally based on the consistent drillhole orientation, the intercepts represent 60 to 90% of the true thickness.

10.1.4 SIGNIFICANT DRILL CORE MINERAL INTERSECTIONS

The vertical cross-sections and longitudinal sections presented in Figures 10.3 to 10.5 show the relationship between the sampled intervals and true thickness of the mineralization. The mineralization extends for over 1 km in strike length, and remains open along strike in both directions, and at depth.

Table 10.2 shows published mineralized intercepts for the 2017 drill program at Mato Bula.

Table 10.2 Published Mineralized Intercepts at Mato Bula for the 2017 Drill Program

Hole ID		From (m)	To (m)	Interval (m)*	Copper (%)	Gold (g/t)	Silver (g/t)	Zinc (%)	Local Azimuth (°)	Dip (°)
WMD061		105.84	126.26	20.42	0.34	8.52	1.8	0.03	84	-55
	including	106.84	123.45	16.61	0.35	10.36	1.9	0.03		
	including	106.84	116.84	10.00	0.37	15.02	2.3	0.05		
WMD062		101.70	119.13	17.43	0.11	1.46	0.7	0.00	84	-45
	including	108.20	117.50	9.30	0.16	2.22	1.0	0.00		
		125.26	130.26	5.00	0.04	1.78	0.9	0.00		
WMD063		92.85	118.55	25.70	0.19	5.06	1.6	0.01	84	-47
	including	92.85	105.47	12.62	0.32	9.21	2.4	0.02		
	including	99.47	105.47	6.00	0.44	14.84	2.6	0.03		
WMD064		111.32	142.87	31.55	0.10	9.40	1.1	0.01	84	-50
	including	119.10	125.10	6.00	0.23	44.33	3.5	0.02		
WMD065		36.58	47.00	10.42	0.23	0.97	0.50	0.0	270	-47
		105.00	112.59	7.59	0.64	1.82	10.1	1.02		
WMD066		50.78	56.50	5.72	0.28	6.06	0.7	0.03	270	-47
		86.50	96.25	9.75	0.27	1.10	4.5	0.06		
WMD067		19.81	23.86	4.05	0.01	1.76	2.2	0.00	270	-66
		65.09	68.09	3.00	0.68	1.79	2.0	0.05		
WMD068		94.00	96.00	2.00	0.83	5.48	1.7	0.00	270	-47
		109.00	119.00	10.00	0.90	1.93	10.8	0.71		
	including	112.39	117.00	4.61	1.47	3.59	18.7	1.29		
WMD069		162.30	185.30	23.00	0.51	1.27	6.1	0.60	270	-50
	including	175.30	179.30	4.00	0.70	4.54	6.5	0.09		
WMD070		152.90	158.50	5.60	0.34	0.82	3.6	0.21	270	-49
WMD071		267.43	283.72	16.29	0.58	0.98	9.6	0.88	270	-54
WMD072		79.67	97.33	17.66	0.77	1.63	1.1	0.00	270	-50
	including	94.92	97.33	2.41	4.41	9.30	5.0	0.00		

table continues...

Hole ID		From (m)	To (m)	Interval (m)*	Copper (%)	Gold (g/t)	Silver (g/t)	Zinc (%)	Local Azimuth (°)	Dip (°)
WMD073		46.80	54.50	7.70	0.38	3.75	0.9	0.00	270	-47
		59.50	65.00	5.50	1.05	2.09	1.2	0.00		
WMD074		216.60	237.00	20.40	0.43	1.09	12.8	0.61	270	-62
	including	223.30	229.00	5.70	0.52	2.41	11.6	0.47		
WMD075		62.30	66.50	4.20	0.47	0.92	1.2	0.00	270	-47
		77.25	85.67	8.42	0.34	0.56	6.5	0.97		
		97.83	120.54	22.71	0.35	0.42	5.0	0.16		
WMD076		16.24	19.00	2.76	0.04	5.13	1.7	0.01	270	-45
		40.01	46.00	5.99	0.26	2.29	8.0	0.30		
WMD077		30.00	36.00	6.00	0.55	1.36	1.2	0.02	270	-69
		63.80	67.00	3.20	0.21	0.92	4.1	1.11		
		71.80	93.00	21.2^	0.23	0.28	4.7	1.02		
	including	88.00	93.00	5.00	0.32	0.47	6.3	0.57		
WMD078		40.23	41.00	0.77	0.14	1.90	0.0	0.01	270	-49
		143.26	147.00	3.74	1.13	4.22	1.2	0.00		
		151.30	154.90	3.60	1.70	0.51	2.6	0.00		
		228.00	232.73	4.73^	0.28	0.25	6.8	1.57		
WMD079		34.30	40.64	6.34	0.01	0.54	1.7	0.00	270	-45
		50.00	53.80	3.80	0.52	4.84	5.9	0.06		
WMD080		105.00	110.00	5.00	0.90	0.61	1.8	0.00	270	-63
		129.00	135.00	6.00	0.06	5.39	1.1	0.00		
	including	133.00	135.00	2.00	0.06	14.95	2.0	0.00		
WMD081		22.86	25.91	3.05	0.00	2.24	0.2	0.00	270	-47
WMD082		47.00	50.00	3.00	0.93	0.81	0.6	0.00	270	-47
		81.00	81.58	0.58	0.37	2.17	0.0	0.00		
WMD083		214.91	218.30	3.39^	0.18	0.68	11.8	2.41	270	-62
		216.30	220.30	4.00	0.25	0.76	11.2	0.34		

table continues…

Hole ID		From (m)	To (m)	Interval (m)*	Copper (%)	Gold (g/t)	Silver (g/t)	Zinc (%)	Local Azimuth (°)	Dip (°)
WMD084		96.07	97.30	1.23	0.86	1.89	1.1	0.00	270	-49
		125.00	127.00	2.00	0.21	4.25	0.0	0.00		
		135.48	135.93	0.45	0.95	12.30	19.3	0.05		
WMD085		77.40	90.00	12.60	0.66	12.59	1.5	0.03	270	-56
		146.22	153.53	7.31	0.45	0.80	3.3	0.08		
WMD086		150.40	158.00	7.60	0.62	14.59	1.5	0.03	270	-58
	including	153.00	155.65	2.65	1.44	37.12	3.6	0.03		
WMD087		101.53	108.40	6.87	0.29	3.74	0.7	0.02	270	-48
WMD088		108.70	123.00	14.30	0.26	2.39	0.6	0.01	270	-51
	including	108.70	115.00	6.30	0.44	4.59	1.2	0.02		
		131.00	135.00	4.00	1.14	2.64	2.8	0.01		
WMD089		31.00	41.23	10.23	0.25	6.46	0.9	0.02	270	-47
	including	36.30	39.55	3.25	0.59	17.73	1.7	0.03		
		60.00	62.86	2.86	1.65	1.17	17.1	1.46		
WMD090		160.60	164.93	4.33	0.24	38.94	2.6	0.01	270	-49
	including	161.51	163.33	1.82	0.48	91.95	5.6	0.01		
WMD091		52.00	53.00	1.00	0.05	1.21	0.6	0.00	270	-48
WMD092		22.80	25.80	3.00	0.26	0.44	0.5	0.00	270	-46
WMD093		32.94	42.81	9.87	0.76	1.59	7.2	0.04	90	-47
WMD094		182.68	183.68	1.00	0.54	2.32	0.9	0.01	90	-49
WMD095		191.25	193.10	1.85	2.42	1.34	38.5	0.02	90	-60
		210.20	212.80	2.60	0.83	1.11	0.9	0.00		
WMD096		96.37	102.00	5.63	0.45	1.30	2.4	0.08	90	-49
		118.96	120.05	1.09	0.76	19.10	5.2	0.00		
WMD097		20.54	30.80	10.26	0.05	8.90	3.7	0.02	90	-47
		54.56	60.45	5.89	0.51	53.32	2.6	0.03		
WMD098		26.55	34.80	8.25	0.10	2.62	1.4	0.01	90	-58
WMD099		106.85	107.80	0.95	0.15	1.88	0.8	0.00	90	-49

table continues…

Hole ID		From (m)	To (m)	Interval (m)*	Copper (%)	Gold (g/t)	Silver (g/t)	Zinc (%)	Local Azimuth (°)	Dip (°)
WMD100	No Significant Results								90	-49
WMD101	No Significant Results								271	-49
WMD102		51.00	52.00	1.00	0.08	3.90	0.0	0.00	270	-51
		119.15	137.26	18.11	1.30	0.70	9.2	0.20		
WMD103	No Significant Results								90	-52
WMD104A		237.31	251.80	14.49	0.08	1.91	1.2	0.00	90	-55
		264.60	274.00	9.40	0.08	0.68	1.1	0.00		
WMD105		200.00	232.75	32.75	0.11	0.92	1.0	0.00	90	-53
	including	201.60	205.00	3.40	0.12	3.00	1.4	0.01		
		247.00	254.00	7.00	0.02	0.49	0.4	0.00		
WMD106		169.64	188.00	18.36	0.02	0.77	2.2	0.00	90	-63
	including	182.00	185.00	3.00	0.02	1.74	0.6	0.00		
WMD107		9.07	20.47	11.40	0.00	0.41	0.0	0.00	90	-46
WMD108		66.25	72.60	6.35	0.58	1.26	8.4	0.77	90	-48

Notes: *Intervals stated are 40 to 100% true thickness. Intervals use a 0.3 g/t gold cut-off value. No top cut has been used on assay values.
^Zinc interval, not subject to gold cut-off criteria
Calculated intervals for gold are based on rounding to two decimal places.

Figure 10.3 Reinterpreted Section 19640N

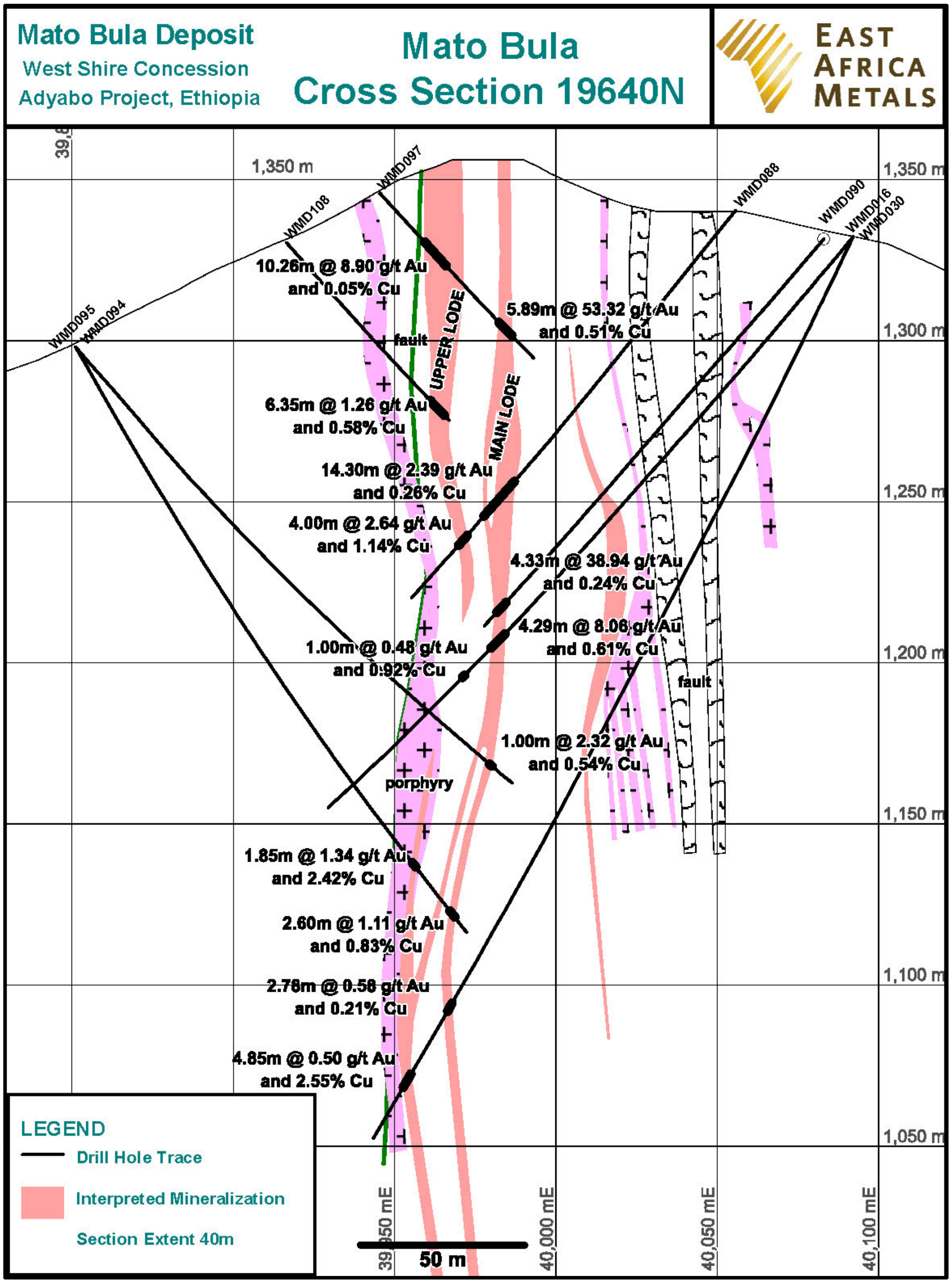


Figure 10.4 Diamond Drilling Main Lode Long Section

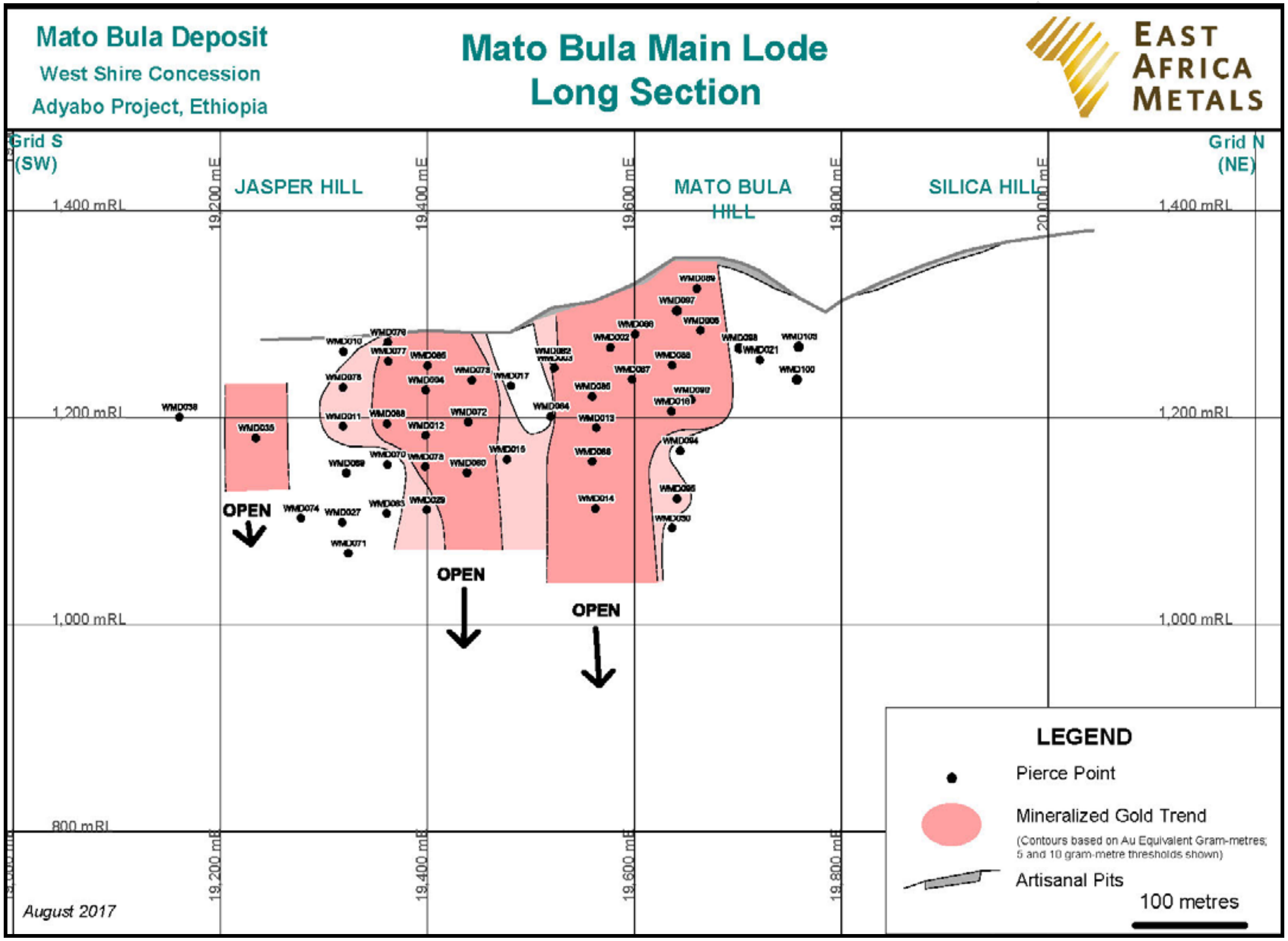
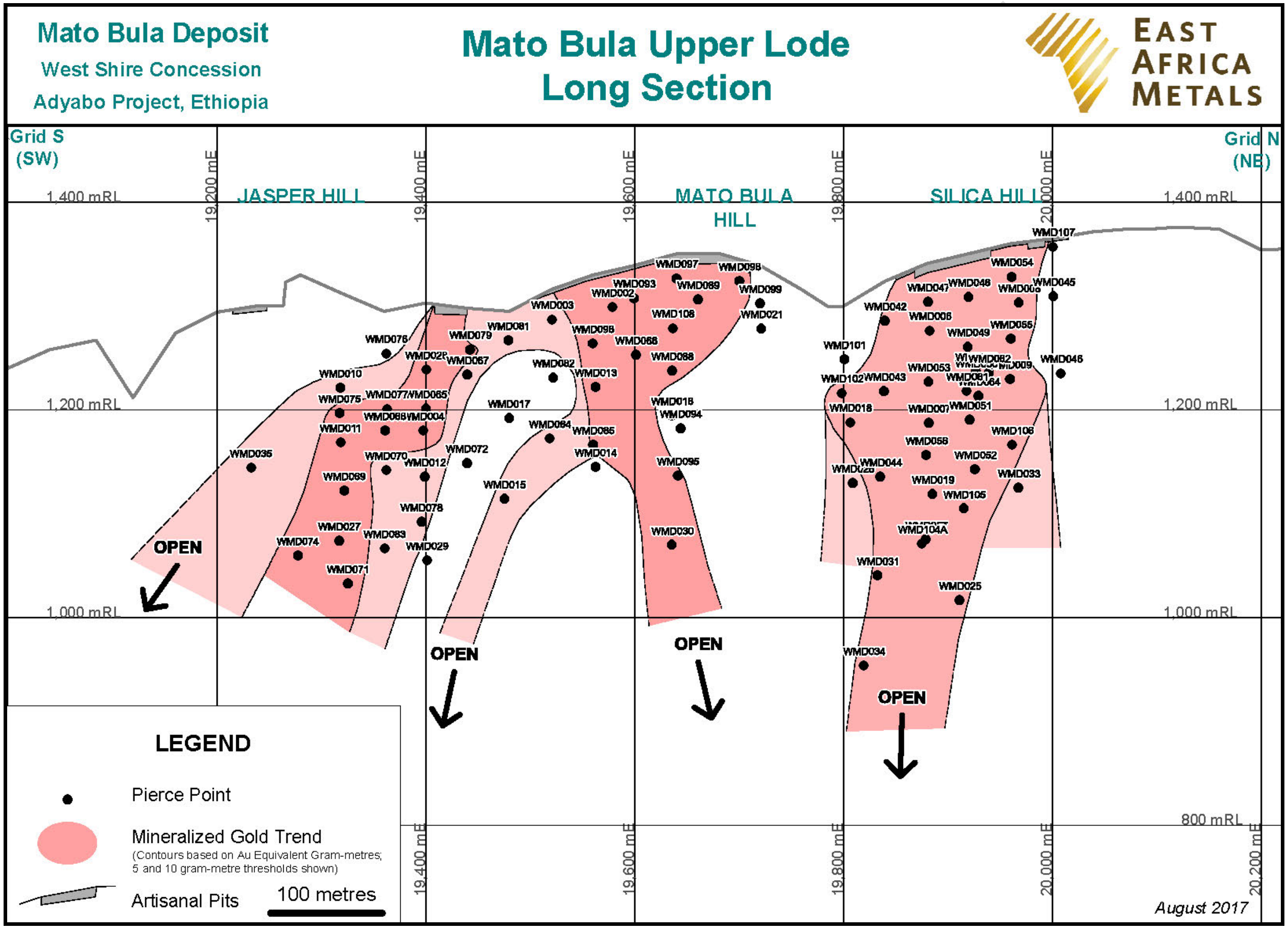


Figure 10.5 Diamond Drilling Upper Lode Long Section



10.2 COLLAR AND DOWNHOLE SURVEYS

All drillhole and trench locations were established through a DGPS. Drill hole information is presented below in table 10.3.

Downhole survey measurements were typically taken at 3 or 6 m depth intervals, but ranging from 1 to 30 m, down each drillhole using a Reflex EZ-Shot orientation instrument. A final reading was taken approximately 3 m from the bottom.

Table 10.3 Drill Hole Locations at Mato Bula from the 2017 drill Program

Hole ID	Easting	Northing	Azimuth (°)	Dip (°)	Total Depth (m)	Prospect
WMD061	398277.21	1580987.77	129.0	-55.0	153.92	Silica Hill
WMD062	398282.35	1581010.49	129.0	-45.0	149.35	Silica Hill
WMD063	398283.14	1580994.85	129.0	-47.0	140.21	Silica Hill
WMD064	398274.54	1581004.19	129.0	-50.0	153.92	Silica Hill
WMD065	398001.73	1580540.97	315.0	-47.0	120.09	Mato Bula
WMD066	398139.24	1580687.32	315.0	-47.0	110.95	Mato Bula
WMD067	398003.59	1580596.01	315.0	-66.0	103.63	Mato Bula
WMD068	397983.82	1580505.39	315.0	-47.0	146.30	Mato Bula
WMD069	397976.73	1580452.84	315.0	-50.0	199.64	Jasper Hill
WMD070	398002.14	1580484.05	315.0	-49.0	193.50	Mato Bula
WMD071	398019.72	1580410.18	315.0	-54.0	298.70	Jasper Hill
WMD072	398052.22	1580547.21	315.0	-50.0	172.21	Mato Bula
WMD073	398037.65	1580566.25	315.0	-47.0	121.52	Mato Bula
WMD074	397947.66	1580425.22	315.0	-62.0	262.13	Jasper Hill
WMD075	397944.89	1580484.24	315.0	-47.0	132.28	Jasper Hill
WMD076	397944.37	1580544.68	315.0	-45.0	59.44	Mato Bula
WMD077	397944.37	1580544.68	315.0	-69.0	110.03	Mato Bula
WMD078	398062.21	1580480.46	315.0	-49.0	251.46	Mato Bula
WMD079	398003.28	1580596.75	315.0	-45.0	72.95	Mato Bula
WMD080	398052.53	1580547.00	315.0	-63.0	150.88	Mato Bula
WMD081	398037.28	1580617.98	315.0	-47.0	77.72	Mato Bula
WMD082	398084.58	1580627.14	315.0	-47.0	118.87	Mato Bula
WMD083	398002.53	1580484.32	315.0	-62.0	240.79	Mato Bula
WMD084	398106.44	1580605.50	315.0	-49.0	152.40	Mato Bula
WMD085	398126.76	1580641.43	315.0	-56.0	158.50	Mato Bula
WMD086	398151.85	1580617.65	315.0	-58.0	170.99	Mato Bula
WMD087	398166.29	1580659.50	315.0	-48.0	114.30	Mato Bula
WMD088	398191.77	1580690.60	315.0	-51.0	156.97	Mato Bula
WMD089	398172.06	1580738.53	315.0	-47.0	69.80	Mato Bula
WMD090	398230.08	1580680.46	315.0	-49.0	170.69	Mato Bula
WMD091	398231.06	1580735.36	315.0	-48.0	100.58	Mato Bula

table continues...

Hole ID	Easting	Northing	Azimuth (°)	Dip (°)	Total Depth (m)	Prospect
WMD092	398240.54	1580754.06	315.0	-46.0	56.39	Mato Bula
WMD093	398076.28	1580749.24	135.0	-47.0	70.10	Mato Bula
WMD094	398047.14	1580835.49	135.0	-49.0	192.02	Mato Bula
WMD095	398047.14	1580835.49	135.0	-60.0	218.76	Mato Bula
WMD096	398018.28	1580751.18	135.0	-49.0	129.54	Mato Bula
WMD097	398113.67	1580768.76	135.0	-47.0	70.10	Mato Bula
WMD098	398168.20	1580798.82	135.0	-58.0	129.54	Mato Bula
WMD099	398177.10	1580817.92	135.0	-49.0	120.40	Mato Bula
WMD100	398194.07	1580857.85	135.0	-49.0	135.64	Mato Bula
WMD101	398295.26	1580812.78	316.4	-49.0	105.16	Mato Bula
WMD102	398310.43	1580797.25	315.0	-51.0	156.97	Mato Bula
WMD103	398230.20	1580821.68	135.0	-52.0	85.34	Mato Bula
WMD104	398161.29	1581052.28	135.0	-55.0	12.19	Silica Hill
WMD104A	398161.29	1581052.28	135.0	-55.0	301.75	Silica Hill
WMD105	398215.15	1581063.13	135.0	-53.0	266.70	Silica Hill
WMD106	398300.88	1581034.60	135.0	-63.0	213.97	Silica Hill
WMD107	398391.87	1581000.14	135.0	-46.0	51.82	Silica Hill
WMD108	398090.69	1580786.55	135.0	-48.0	74.68	Mato Bula

Note: Projection WGS84 Zone 37N

11.0 SAMPLE PREPARATION, ANALYSIS AND SECURITY

The following sections summarize the extent of the author's knowledge regarding the sample preparation, analysis, security and QA/QC protocols used in the drilling programs at the Adyabo Project.

11.1 SAMPLING METHOD AND APPROACH

Several exploration sampling techniques are employed on the Adyabo Project including: sieved soil samples, stream sediment samples, rock chip samples, channel samples, and diamond drilling. The emphasis of the collection techniques is to collect geological material using standardized sample procedures, and insertion of suitable blanks, standards and replicates to monitor the accuracy and precision of sampling errors and deficiencies in laboratory procedures and results. Although not stated in the text most lithological samples are 2 kg. The following descriptions of sampling procedures, with the exception of drilling, are taken from the EAM protocol manual and 2014 TRI annual report (Gardoll et al. 2014).

11.2 STREAM SAMPLE PROCEDURE

Stream sediment samples are taken on a regional scale to identify anomalous catchment areas for further follow up work. Samples are taken from the surface of the stream bed and sieved using –60 mesh (250 µm) with a final weight of approximately 250 g. Active river sediment (excluding sand) is collected in stream samples. All samples are bagged into soil packets or plastic bags to avoid contamination. Standards and replicates are routinely inserted for quality control and quality assurance purposes. Pans are cleaned between sample sites to avoid contamination.

The productivity of a stream sample program is routinely maximized with the geologist making notes on geology, taking grab samples of any mineralized float or outcrop, and recording the location of alluvial workings as appropriate. This process is delayed in the wet weather when sieving samples is impossible and streams are flowing.

11.3 SOIL SAMPLE PROCEDURE

Soil samples are collected on a predetermined soil sample grid at a variety of scales depending on the stage of exploration (e.g., regional soil programs or detailed infill grids over a prospect).

A sample is taken from a depth of 0.15 m below surface and sieved using –60 mesh (250 µm) to remove coarse material. The total sample weight aims to be at least

200 g. Standards and replicates are routinely inserted for QA/QC purposes. Pans are cleaned between sample sites to avoid contamination.

The sampler may adapt the program in the field if required. For example; issues with the safety of sample site or non-representative surface material (e.g., flood plain material or disturbed ground chemically altered by farming processes). This process is delayed in wet weather when sieving samples is impossible.

The 2 kg samples were collected in clear plastics bags and a sample tag was inserted prior to sealing. Sample standards and duplicate samples were inserted at 50 sample intervals. The samples were transported to the assay laboratory (Ultratrace, Perth, Australia), and upon arrival they were dried, sieved using a 2 mm screen, split to produce a 25 to 50 g aliquot, which was digested in aqua regia and diisobutyl ketone (DIBK), prior to atomic absorption (AA) gold analysis.

11.4 Rock Chip Sample Procedure

Rock chip samples are taken from surface outcrops or float material to assess metal contents of selected rock samples. Wherever possible, fresh material is sampled. The location of the sample should be recorded with accurate GPS coordinates.

11.5 Trenching Procedure

Trenches are dug down to fresh or saprolitic rock, generally 1 m. Trenches are not dug above shoulder height for safety reasons and during the rainy season care must be taken to only work when conditions are safe. They are dug with a pre-planned orientation perpendicular to mineralization. The geologist will adapt the trench as required for safety or geological reasons.

11.6 Channel Sample Procedure

Channel rock chip samples are taken as a method of continuous geochemical analysis. They are collected along the face of an artisanal working or from a purpose dug exploration trench. Samples are typically taken over 1 m intervals (dependent on geology) with continuous chips taken equally along the length of the sample interval.

11.7 Handheld XRF Analysis

All exploration samples are analyzed on site using a handheld Niton® XRF instrument for a range of elements including base metals: silver, arsenic, barium, bismuth, calcium, cadmium, cobalt, chromium, caesium, copper, iron, mercury, potassium, manganese, molybdenum, niobium, nickel, lead, palladium, rubidium, sulphur, antimony, scandium, selenium, tin, strontium, tellurium, thorium, titanium, uranium, vanadium, tungsten, zinc, and zirconium. This technique can also be used in the field to allow for geochemical traverses of either soil or rock material.

To ensure the XRF is operating correctly the instrument is routinely calibrated, and a range of standards are analyzed before and during sampling exploration materials, typically every 100 analyses. Sample standards were purchased from the Canadian

National Laboratory and were analysed via inductively coupled plasma – atomic emission spectroscopy (ICP-AES) and atomic absorption spectroscopy (AAS) finish. A silicon dioxide (SiO_2) blank was provided by the XRF manufacturer to limit contamination in the XRF sample window. The XRF data is currently used for internal company reconnaissance checks.

11.8 DRILL CORE

Geotechnical and lithological logging was performed on the core samples at the drill site to avoid unnecessary breaks that might affect the rock quality designation (RQD) of the core. Core orientation marks were taken every 6 m using a spear and the core was oriented and marked. The core logging process involved an initial cleaning of the core and checking of the core tags, and mark-ups on the individual boxes. Any discrepancies noted were addressed with the driller who was responsible for the core. At the drill site all core was photographed prior to being logged by the geologist with an emphasis on structure, lithology, alteration and mineralization. Completed drill core logs are always scrutinized by a senior geologist to check consistency in logging. Upon completion of the logging the core was transported by pick-up truck to the Guna processing facility in Shire.

Sample intervals were marked-up by the geologist logging the core and were based on sample intervals of either 0.7 m for mineralized core or 1 m for non-mineralized core. Sample intervals did not cross geological contacts. The physical sampling of the core was done with a diamond blade core cutting saw. The core was sawn in half along the line marked by the geologist to ensure a representative sample is taken.

The split core was moved to the sampling area for final preparation by trained technicians. Individual samples were then bagged in pre-numbered cloth sample bags, and the ticket book filled out with tickets added to the sample and affixed to the core box. The “side” of the split core was chosen systematically by reference to the orientation line and foliation in order to prevent any bias in sample selection. The samples from each drillhole were laid out in succession within the sampling area and loosely tied before being taken to the specific gravity station, where the specific gravity is determined and recorded by emersion of the sample in water. The samples are patted dry and then re-bagged, whereupon they are securely tied using the draw string and a final weight of the sample, and bag, is recorded for export purposes. All bags were sealed at the end of each shift. All sample preparation, and in particular the selection and insertion of QC samples, was undertaken under the direct supervision of the logging/project geologist. The remaining core was retained in the core trays and taken to the storage area. The individual sealed sample bags were placed in 60 L polypropylene barrels and sealed with tape preparation for shipment to the preparation laboratories. All samples are individually inspected by the Ministry of Mines, Petroleum and Natural Gas (MoMPNG) in Addis Ababa to obtain an export permit. This requires the local EAM representative to be present while the barrels are opened and bags removed. The MoMPNG official opens each sample to visually inspect the contents and weighs each sample to ensure no extra material is being exported. Once an export permit has been obtained the EAM representative seals the samples and barrels again, and takes them directly to the shipping company. The next time the samples are opened it is at the sample preparation laboratory in Ankara.

Certified reference materials are stored in the main office building in clearly marked plastic bags. The clear plastic bags hold individual 100 g standards in clear plastic bags with removable identification labels to minimize the insertion of an incorrect standard. Certified blanks are stored in 100 g sealed plastic bags in the office. Coarse reject pulverized rock samples and the remainder of the base pulps (the remainder of the initial 1 kg of pulverized sample) are stored at the initial preparation facility in Turkey (ACME Analytik Ankara (the Turkish subsidiary of Acme Analytical Laboratories (ACME Turkey)), and analytical pulps are stored at ACME Analytical Laboratories (Vancouver) Ltd. (ACME Vancouver).

Duplicate soil sample paper bags are sorted and placed in cloth calico bags before being catalogued and stored in the core shed at Guna. Similarly, diamond drill core is stored inside in one of two sheds at Guna. The core shed is clean and well organized.

In the QPs, industry best practices have been employed during the sampling of the drill core, the storage of the reference materials and storage of returned samples.

11.9 LABORATORY PROCEDURES

All drill core samples were collected and provided to independent laboratories by EAM. This report presents an independent review and validation of the procedures and data for results that have been analyzed to the date of March 31st, 2015.

Sampling was performed systematically on each drillhole where mineralization and/or alteration were recorded during the core logging procedure. The resultant samples were submitted to ACME Turkey for sample preparation (crushing and pulverization) analysis. The sample powders were then shipped to ACME Vancouver for geochemical analysis. ACME Turkey has International Organization for Standardization (ISO) 9001:2008 Quality Management System (QMS) accreditation, and ACME Vancouver carries current ISO 9001:2008 accreditation for the provision of assays and geochemical analyzes.

The sample preparation and assay methodologies used at each of the laboratories, employed by EAM, are largely comparable. A summary of the preparation and analytical procedures at Ultratrace and ACME is detailed in Table 11.1.

Table 11.1 Ultratrace and ACME Preparation and Analytical Procedures Summary

Sample Type	Laboratory	Preparation	Analytical Technique	Analytes	Detection Limit
Soil and Stream	Ultratrace	Samples Pulverised	Aqua Regia Digest and ICP-MS Analysis	Au	1 ppb
				Ag	0.05 ppm
Drilling, (diamond), Rock chip, Trenching, and Channel Sample	ACME	Samples crushed 1 kg to 80% passing 10 mesh, split 1,000 g and pulverized to 85% passing 200 mesh	Hot Aqua Regia Digestion for Base Metal	Cu, Pb, Zn, Ag plus other multi-elements; Al, As, Bi, Ca, Cd, Co, Cr, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sb, Sr, W	Ag 2 ppm
			Sulphide and Precious-Metal Pres. ICP-ES Analysis		Cu 0.001%
					Pb 0.01%
					Zn 0.01%
			FA	Au	0.005 ppm
			Gravimetric FA if Au >10 ppm	Au	>10 ppm
			Gravimetric FA if Ag >300 ppm	Ag	>300 ppm
			Volumetric Titration if Cu >20%	Cu	>20%
			Titration if Pb >10%	Pb	>10%
			Titration if Zn >40%	Zn	>40%

Note: ICP-MS – inductively coupled plasma – mass spectroscopy; ICP-ES – inductively coupled plasma – emission spectroscopy; FA – fire assay

In the author's opinion, all drill core samples were prepared and assayed using appropriate techniques at the laboratories.

11.10 Sample Security and Chain of Custody Procedures

The chain of custody procedure from the extraction of the core from the core barrel, through logging and sampling up to the point of dispatch to the laboratory is described in Section 11.2. Through all of these stages the responsibility for security lies with EAM and their on-site personnel. Samples are transported from Shire to the MoMPNG in Addis Ababa, then onwards to Bole International Airport by an Ethiopian haulage company. After this the samples are in the care of airline cargo companies and international courier companies when shipped to the overseas laboratories. The security of the sample during transit cannot be guaranteed as tamper proof seals are not used on the sample bags. Upon receipt at the laboratory, the chain of custody passes to the assayer. Following assay, the remaining material is stored under secure conditions at the laboratory facilities. Approximately 1 kg of pulp is created from each drillcore sample, with 100 g sent to Acme's Vancouver laboratory for analysis and the remaining 900 g stored in Turkey for potential follow-up work. The chain of custody reverts to EAM if the samples leave the assay laboratory storage facilities. This is the case with remaining pulp material following analyzes, which is transferred back to EAM in Vancouver, who then sent to a secured warehouse location for storage.

In general, industry best practices with respect to chain of custody procedures are followed on site. However, the weakest point in any chain of custody is during transport. The absence of tamper proof fastenings on the samples has been noted and their introduction would greatly improve the chain of custody between the site and laboratory. However, the physical inspection and weighing of all exported material by the MoMPNG in Addis Ababa adds complexity to this solution.

11.11 Drill Program Quality Assurance/Quality Control

Diamond drilling at Mato Bula and Da Tambuk was supervised at all times by EAM geologists. The geologists directed and managed the preparation, logging and sampling of core. With several geologists logging the drillholes variation in lithologies invariably occurs. However, this potential variation is mitigated by the senior geology staff that reviewed the drill core and logs and amended any discrepancies that arose.

During sampling, quality control standards and blanks were inserted to confidentially monitor laboratory performance. Refinement of QA/QC procedures during the drill program included the implementation of field, reject and pulp duplicates, as well as specific programs of re-analysis and umpire laboratory assaying; all consistent with industry best practice.

The samples from the drillholes were prepared at the ACME Turkey laboratory and analyzed at the ACME Vancouver laboratory. QA/QC procedures and results are presented in the following sections.

11.11.1 2015 Diamond Drilling Quality Assurance/Quality Control

During sampling, quality control standards and blanks were inserted to independently monitor laboratory performance. The QA/QC procedures at the Adyabo Project included the implementation of field, reject and pulp duplicates, as well as specific programs of re-analysis and check assaying at secondary laboratories; all consistent with industry best practice.

Certified Reference Materials (Standards)

A variety of certified reference materials (CRMs) derived from certified laboratories in Australia and Canada were used during the sampling of the drillholes. Specifically, certified laboratory standards were obtained from CDN Resource Laboratories Ltd. (CDN Labs) and Geostats Pty Ltd. (Geostats) for incorporation into the sampling sequence. 405 CRM samples were inserted into the sample batches (for an insertion rate of 6.5%) and were analyzed at ACME. A summary of the standards and the results is presented in Table 11.2.

Table 11.2 Summary of CRMs and ACME Laboratory Results

CRM	Copper				Gold				Silver			
	Number	Expected Value (%)	ACME Lab Mean (%)	Bias (%)	Number	Expected Value (g/t)	ACME Lab Mean (g/t)	Bias (%)	Number	Expected Value (g/t)	ACME Lab Mean (g/t)	Bias (%)
CDN-CGS-28	9	2.03	2.04	0	9	0.73	0.77	-6	0	-	-	-
CDN-CM-15	23	1.28	1.32	-3	23	1.25	1.29	-3	0	-	-	-
CDN-CM-18	7	2.37	2.49	-5	7	5.28	5.33	-1	0	-	-	-
CDN-CM-19	5	2.04	2.05	0	5	2.11	2.14	-2	0	-	-	-
CDN-CM-22	12	1.00	1.00	0	12	0.72	0.74	-3	0	-	-	-
CDN-CM-35	55	0.25	0.25	-1	55	0.32	0.35	-6	0	-	-	-
CDN-FCM-7	9	0.53	0.53	0	9	0.90	0.90	0	9	64.70	67.33	-4
CDN-GS-20A	0	-	-	-	8	21.12	22.79	-7	0	-	-	-
CDN-GS-20B	0	-	-	-	3	20.23	23.23	-13	0	-	-	-
CDN-GS-2M	0	-	-	-	5	2.21	2.30	-4	0	-	-	-
CDN-GS-7F	0	-	-	-	12	6.90	6.81	1	0	-	-	-
CDN-ME-11	5	2.44	2.48	-2	5	1.38	1.40	-1	5	79.30	82.80	-4
CDN-ME-1101	7	0.66	0.71	-7	7	0.56	0.62	-9	7	68.20	69.00	-1
CDN-ME-1204	19	0.52	0.53	-1	19	0.98	0.96	1	19	58.00	61.37	-5
CDN-ME-1205	19	0.22	0.22	0	19	2.20	2.13	3	19	25.60	26.26	-3
CDN-ME-1304	15	0.27	0.27	-1	15	1.80	1.79	0	15	34.00	35.33	-4
CDN-ME-1305	2	0.62	0.63	-2	2	1.92	1.99	-3	2	231.00	241.50	-4
CDN-ME-16	13	0.67	0.68	-1	13	1.48	1.46	1	13	30.80	32.23	-4
G302-10	0	-	-	-	44	0.18	0.18	1	0	-	-	-
G306-3	0	-	-	-	1	8.66	7.66	13	0	-	-	-
G398-2	0	-	-	-	39	0.42	0.52	-20	0	-	-	-

table continues...

CRM	Copper				Gold				Silver			
	Number	Expected Value (%)	ACME Lab Mean (%)	Bias (%)	Number	Expected Value (g/t)	ACME Lab Mean (g/t)	Bias (%)	Number	Expected Value (g/t)	ACME Lab Mean (g/t)	Bias (%)
G900-7	0	-	-	-	14	3.19	3.16	1	0	-	-	-
G901-7	0	-	-	-	18	1.53	1.47	4	0	-	-	-
G903-10	0	-	-	-	16	0.21	0.20	6	0	-	-	-
G995-1	0	-	-	-	13	2.64	2.70	-2	0	-	-	-
G995-4	0	-	-	-	10	8.48	8.89	-5	0	-	-	-
GBM307-1	5	0.01	0.00	18	0	-	-	-	5	0.60	0.00	n/a
GBM309-16	1	5.23	4.99	5	0	-	-	-	1	225.20	226.00	0
GBM310-2	2	0.69	0.69	1	0	-	-	-	2	45.50	48.50	-6
GBM310-3	2	1.44	1.45	0	0	-	-	-	2	19.40	20.50	-5
GBM908-10	3	0.36	0.36	1	0	-	-	-	3	3.00	3.00	0
GBM908-11	1	17.70	16.84	5	0	-	-	-	1	11.40	10.00	14
GBM998-9	8	0.00	0.00	26	0	-	-	-	8	101.20	99.75	1
Overall Bias	222	-	-	0.03	383	-	-	0.54	111	-	-	0.10

It should be noted that the GBM series standards are base metal CRMs and are not certified for gold and therefore are not used as a monitor for gold assay performance and precision.

Pass/fail thresholds for standard performance is set in accordance with the published certificate as follows:

- Any CRM analysis in excess of ± 2standard deviations from the recommended value was considered a “caution”.
- Any CRM measurement in excess of ±3 standard deviations from the recommended value was considered a “fail”.

Control charts of standard performance during Phase 1 sampling program were created and reviewed. Overall, there is no measurable bias in the analytical results from the analysis of CRMs.

BLANKS

Non-mineralized basalt was used as a blank control sample during sampling of the drilling. 386 blank samples were inserted in the batches of samples (for an insertion rate of 6.2%) analyzed at ACME.

Control charts for all of the metals of interest (gold, silver and copper) were created and reviewed. A total of five blanks failed (using a pass/fail threshold of 10 times the lower detection limit) for a failure rate of 1.3%. Charts plotting the grade of the failed blank against the preceding sample (in the sample sequence) show no correlation, therefore no systematic contamination is suspected.

CHECK ASSAYS

A suite of check samples was collected from ACME Vancouver and submitted to ALS Global (ALS) (Vancouver) for assay. These samples represent pulp duplicates which are prepared at the primary laboratory and then set aside for later submission to a second laboratory for re-homogenization and assay. This approach provides a test of sample preparation and splitting procedure in the laboratory in addition to analytical accuracy. A total of 54 check assays were selected to cover a range of grades.

The check assay results for gold show an excellent correlation (r_2= 0.987) with the ACME assay results. Similar correlations are observed for copper (r_2= 0.9996) and silver (r_2= 0.9444).

One outlier value was removed from the gold check assay data. Overall, the ALS biases (using linear least squares regression) with respect to ACME are:

- +6.7% for gold
- -0.9% for copper
- -8.5% for silver.

The positive bias observed in silver check assays can in part be explained by the use of differing analytical techniques (ACME used an analytical method with a lower detection limit of 2 ppm silver, ALS used an analytical method with a lower detection limit of 0.01 ppm silver).

Figure 11.1 Accuracy Plot of ALS vs. ACME, Gold

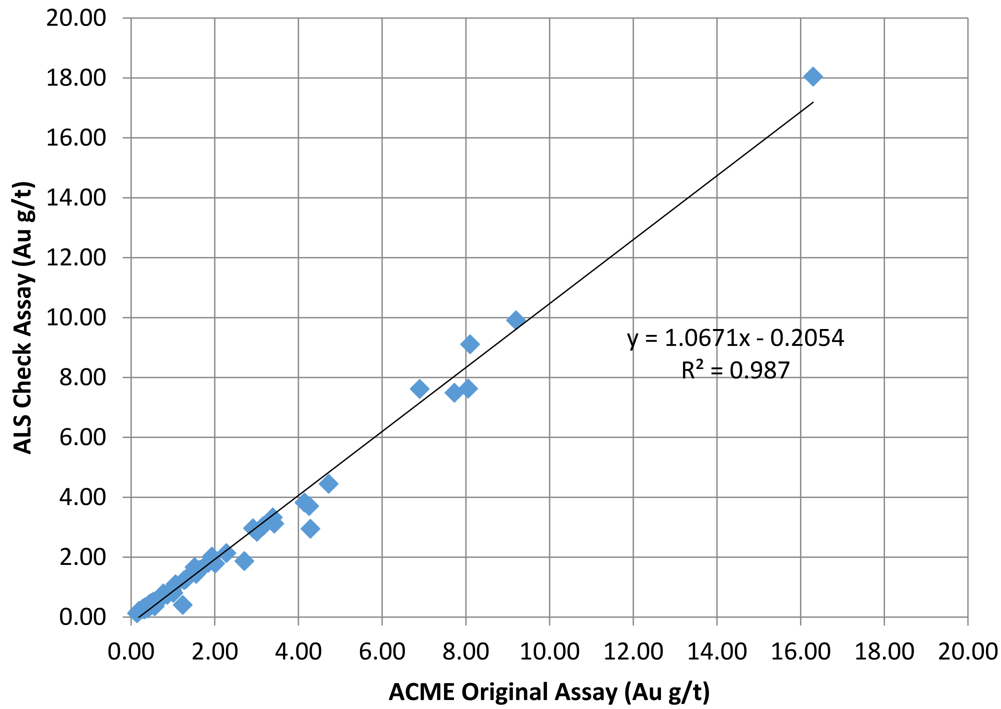
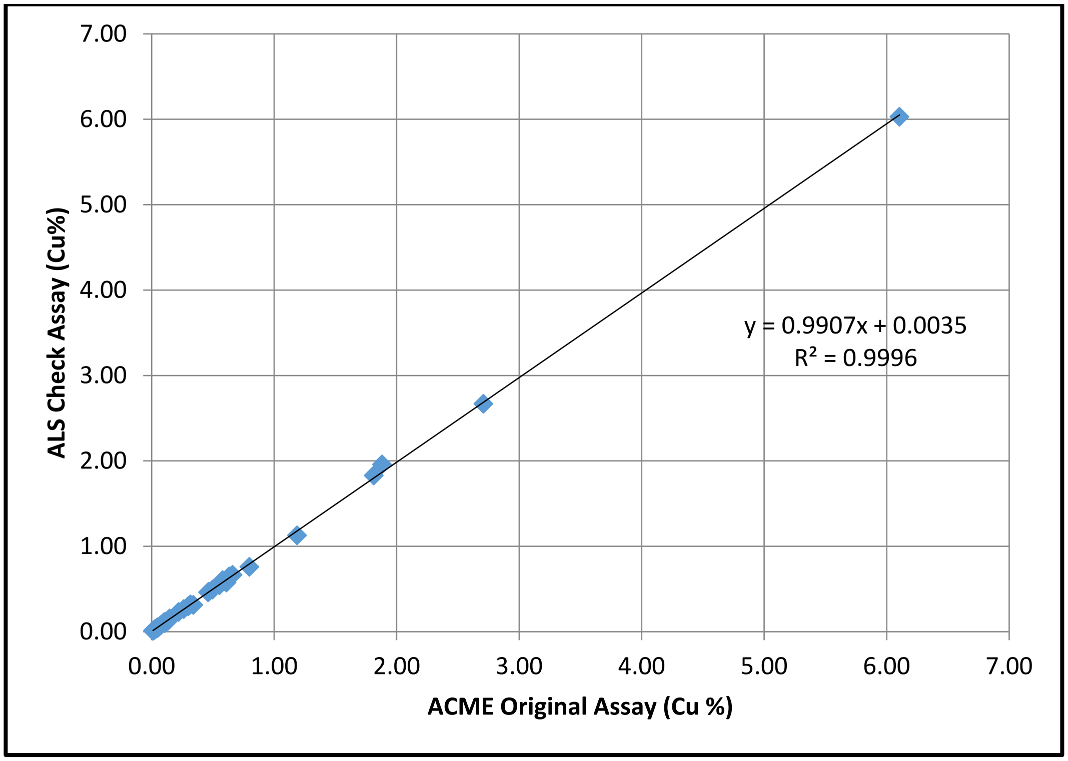


Figure 11.2 Accuracy Plot of ALS vs. ACME, Copper



Field Duplicate Assays

Field duplicates were taken routinely as part of the drillhole sampling procedures. Three hundred and sixty-seven (367) quarter core duplicate samples were taken from the drillholes for an insertion rate of 5.9% or slightly more than 1 sample in 20. These samples were prepared at ACME Ankara and analyzed at ACME Vancouver using the same techniques as the original samples.

The 90th percentile precision values (pair difference/pair mean) for gold and copper are shown in Table 11.3 and Table 11.4.

Table 11.3 Duplicate Sample 90th Percentile Precision Values, Gold

Duplicate Type	Number	90th Percentile Precision (%)
Pulp Duplicates	334	±27.0
Pulp Duplicates (<0.03 g/t Removed)	243	±22.0
Coarse Reject Duplicates	338	±28.2
Coarse Reject Duplicate (<0.03 g/t Removed)	332	±33.3
¼ Core Field Duplicates	367	±67.0

Table 11.4 Duplicate Sample 90th Percentile Precision Values, Copper

Duplicate Type	Number	90th Percentile Precision (%)
Pulp Duplicates	334	±10.5
Coarse Reject Duplicates	338	±22.2
¼ Core Field Duplicates	367	±49.0

Coarse Reject Duplicate Assays

Coarse reject duplicates are splits of a sample taken after the coarse crush but before pulverizing and then assayed as a separate, duplicate sample. Coarse reject duplicates measure the homogeneity of the sample at the coarse reject stage and assesses combined preparation and analytical precision.

A total of 338 coarse reject duplicate samples (for an insertion rate of 5.4%) were taken from the drilling programs on the Adyabo Project. These samples underwent further preparation at ACME Ankara and analysis at ACME Vancouver using the same techniques as the original samples.

The 90th percentile precision values (pair difference/pair mean) for gold and copper are shown in Table 11.3 and Table 11.4. Precision for gold coarse reject duplicates is somewhat higher (although still acceptable) than copper and is caused by the presence of a nugget effect.

Pulp Duplicate Assays

Pulp duplicate samples are taken from the unused analytical pulp returned from the laboratory and are then sent for analysis at the same laboratory. This sample type provides an assessment of analytical precision.

A total of 334 pulp duplicate samples (for an insertion rate of 5.4%) were taken from the drilling programs. These samples were analyzed at ACME Vancouver using the same techniques as the original samples.

The 90th percentile precision values (pair difference / pair mean) for gold and copper are shown in Table 11.3 and Table 11.4. Precision for gold pulp duplicates is somewhat higher (although still acceptable) than copper and is caused by the presence of a nugget effect.

11.11.2 2016 Quality Assurance/Quality Control Review

Fladgate Exploration Consulting Corporation (Fladgate) briefly reviewed the QA/QC data used by EAM to monitor the quality of the assay data in the 2015–2016 drilling campaign.

ACME Laboratory Accuracy

Standard Reference Material

To monitor the accuracy of the assay data, EAM submitted samples of Standard Reference Materials (SRMs) inserted into the sequence of regular samples submitted for analysis. A total of 177 SRMs were submitted for analysis for an insertion rate of approximately 10%. Although individual SRMs show biases of more than 5%, overall the biases are within acceptable limits (less than 5%).

SRM summary statistics are presented in Table 11.5.

Table 11.5 SRM Summary Statistics, 2015-2016 Drill Campaign

Standard	Gold				Copper				Silver			
	Number	Expected (g/t)	Mean (g/t)	Bias	Number	Expected (%)	Mean (%)	Bias	Number	Expected (g/t)	Mean (g/t)	Bias
CDN-CGS-28	3	0.73	0.77	-6	3	2.03	2.05	-1	0	-	-	-
CDN-CM-15	13	1.25	1.29	-3	13	1.28	1.30	-2	0	-	-	-
CDN-CM-18	6	5.28	5.30	0	6	2.37	2.48	-4	0	-	-	-
CDN-CM-19	7	2.11	2.17	-3	7	2.04	2.04	0	0	-	-	-
CDN-CM-22	8	0.72	0.75	-4	8	1.00	0.99	0	0	-	-	-
CDN-CM-23	2	0.55	0.64	-14	2	0.47	0.47	0	0	-	-	-
CDN-CM-35	22	0.32	0.33	-3	22	0.25	0.25	-1	0	-	-	-
CDN-GS-20A	6	21.12	21.82	-3	0	-	-	-	0	-	-	-
CDN-GS-2M	4	2.21	2.27	-3	0	-	-	-	0	-	-	-
CDN-GS-7F	7	6.90	6.86	1	0	-	-	-	0	-	-	-
CDN-ME-1204	2	0.98	0.95	2	2	0.52	0.53	-2	2	58.00	60.50	-4
CDN-ME-1205	11	2.20	2.20	0	11	0.22	0.22	-1	11	25.60	27.32	-6
CDN-ME-1304	6	1.80	1.84	-2	6	0.27	0.27	-1	6	34.00	36.62	-7
CDN-ME-1305	2	1.92	2.01	-5	2	0.62	0.61	0	2	231.00	235.90	-2
G306-3	6	8.66	8.34	4	0	-	-	-	0	-	-	-
G900-7	5	3.19	3.14	1	0	-	-	-	0	-	-	-
G995-1	2	2.64	2.88	-8	0	-	-	-	0	-	-	-
G995-4	9	8.48	8.80	-4	0	-	-	-	0	-	-	-
G398-2	13	0.42	0.53	-20	0	-	-	-	0	-	-	-
G901-7	7	1.53	1.50	2	0	-	-	-	0	-	-	-
G302-10	14	0.18	0.18	2	0	-	-	-	0	-	-	-
G903-10	22	0.21	0.20	6	0	-	-	-	0	-	-	-
Overall Bias (Slope)	177	-	-	2.4	82	-	-	2.7	21	-	-	1.4
Overall Bias (Mean)	-	2.69	2.74	1.8	-	0.88	0.89	1.5	-	50.65	53.00	4.6

Check Assays

EAM submitted a total of 24 check assays to a secondary laboratory (Met-Solve Laboratories Inc. (Met-Solve) for check assay. The results are shown in Table 11.6. Fladgate concludes that the observed biases are within acceptable limits (less than 5%).

Table 11.6 Check Assays Summary Statistics, 2015-2016 Drill Campaign

Element	ACME Mean	Met-Solve Mean	Bias in Mean (%)	Bias in Slope of Regression (%)
Gold	3.04	2.90	4.6	2.3
Silver	1.97	2.09	-6.1	5.0
Copper	0.22	0.21	4.5	3.5

ACME Precision from Duplicate Analyses

EAM submitted 113 quarter core samples, 100 coarse reject duplicates and 101 pulp duplicates for analysis at the ACME laboratory. Overall, the duplicate insertion rate is approximately 6% to 7%. Fladgate calculated 90% absolute relative difference (absolute pair difference/pair mean) values (ARD) for pairs of duplicate samples. The 90% ARD values are shown below in Table 11.7. The variability of the gold assay duplicates is somewhat high; however, they are acceptable for Mineral Resource estimation. For example, 10% of the gold coarse duplicates show differences of more than 43.6%.

Table 11.7 90% ARD Values for Duplicate Samples, 2015-2016 Drill Campaign

Duplicate Type	Gold (%)	Copper (%)
Pulps	±18.90	±9.80
Coarse Rejects	±43.60	±22.00
1/4 Core	±110.80	±56.80

Blank Analyses

EAM submitted a total of 168 samples (for an insertion rate of approximately 10%) of analytical blank material together with regular samples to check for sample contamination during sample preparation. Only one sample assayed more than 5 times the detection limit (0.09 g/t). Fladgate concludes that the assay data show no evidence of significant sample contamination. Following the review of the QA/QC data, Fladgate concludes that the assay data is acceptable for mineral resource estimation.

11.11.3 2017 Diamond Drilling QA/QC

During sampling, quality control standards and blanks were inserted to independently monitor laboratory performance. The QA/QC procedures at the Mato Bula deposit included the implementation of field, reject and pulp duplicates, as well as specific programs of re-analysis and check assaying at secondary laboratories; all consistent with industry best practice.

Certified Reference Materials (Standards)

A variety of certified reference materials (CRMs) derived from certified laboratories in Australia and Canada were used during the sampling of the drillholes. Specifically, certified laboratory standards were obtained from CDN Resource Laboratories Ltd. (CDN Labs) and Geostats Pty Ltd. (Geostats) for incorporation into the sampling sequence. 268 CRM samples were inserted into the sample batches (for an insertion rate of 6.8%) and were analyzed at Bureau Veritas Commodities Canada Ltd. (Bureau Veritas). A summary of the standards and the results is presented in Table 11.2.

Table 11.8 Summary of CRMs and ACME Laboratory Results

Standard	Gold				Copper				Silver			
	Number	Expected Value (g/t)	BV Lab Mean (g/t)	Bias (%)	Number	Expected Value (g/t)	BV Lab Mean (g/t)	Bias (%)	Number	Expected Value (g/t)	BV Lab Mean (g/t)	Bias (%)
CDN-CGS-28	18	0.73	0.74	-2	18	2.03	2.04	0	-	-	-	-
CDN-CM-15	14	1.25	1.31	-4	14	1.28	1.29	-1	-	-	-	-
CDN-CM-18	25	5.28	5.29	0	25	2.37	2.48	-5	-	-	-	-
CDN-CM-19	5	2.11	2.12	0	5	2.04	2.01	2	-	-	-	-
CDN-CM-22	3	0.72	0.67	7	3	1.00	0.98	1	-	-	-	-
CDN-CM-35	32	0.32	0.35	-9	32	0.25	0.26	-4	-	-	-	-
CDN-GS-10D	7	9.50	9.51	0	-	-	-	-	-	-	-	-
CDN-GS-1K	3	0.87	0.84	3	-	-	-	-	-	-	-	-
CDN-GS-20A	9	21.12	21.70	-3	-	-	-	-	-	-	-	-
CDN-GS-8A	1	8.25	8.71	-5	-	-	-	-	-	-	-	-
CDN-ME-1204	34	0.98	0.96	2	34	0.52	0.52	0	34	58.00	59.61	-3
CDN-ME-1205	13	2.20	2.20	0	13	0.22	0.22	-1	13	25.60	25.95	-1
CDN-ME-1301	4	0.44	0.43	1	4	0.30	0.30	-1	4	26.10	27.30	-4
CDN-ME-1302	1	2.41	2.37	2	1	0.58	0.60	-3	1	418.90	423.40	-1
CDN-ME-1304	21	1.80	1.76	2	21	0.27	0.27	-1	21	34.00	34.74	-2
CDN-ME-1305	33	1.92	1.92	0	33	0.62	0.62	-1	33	231.00	236.31	-2
CDN-ME-1307	2	1.02	1.01	1	2	0.54	0.56	-4	2	54.10	54.55	-1
CDN-ME-1312	3	1.27	1.22	4	3	0.45	0.45	-2	3	22.30	24.10	-7
CDN-ME-1414	3	0.28	0.28	2	3	0.22	0.22	-1	3	18.20	18.43	-1
STD X	37	0.21	0.21	2	-	-		-	-	-	-	-
Overall Bias	268	-	-	2.8	211	-	-	1.6	114	-		1.2

Pass/fail thresholds for standard performance is set in accordance with the published certificate as follows:

- Any CRM analysis in excess of ± 2 standard deviations from the recommended value was considered a “caution”.
- Any CRM measurement in excess of ±3 standard deviations from the recommended value was considered a “fail”.

Control charts of standard performance during the 2017 sampling program were created and reviewed. Overall, there is no measurable bias in the analytical results from the analysis of CRMs.

Blanks

Non-mineralized basalt was used as a blank control sample during sampling of the drilling. 231 blank samples were inserted in the batches of samples (for an insertion rate of 5.9%) analyzed at Bureau Veritas.

Control charts for all of the metals of interest (gold, silver and copper) were created and reviewed. One blank failed (using a pass/fail threshold of 10 times the lower detection limit) for a failure rate of 0.4%. Charts plotting the grade of the failed blank against the preceding sample (in the sample sequence) show no correlation, therefore no systematic contamination is suspected. One additional sample upon initial review appeared to fail, however the sample was later confirmed to have been switched in sequence at the lab.

Check Assays

A suite of check samples was collected from Bureau Veritas Vancouver and submitted to MS Analytical for assay. These samples represent pulp duplicates which are prepared at the primary laboratory and then set aside for later submission to a second laboratory for re-homogenization and assay. This approach provides a test of sample preparation and splitting procedure in the laboratory in addition to analytical accuracy. A total of 30 check assays were selected to cover a range of grades.

The check assay results for gold show an excellent correlation (r_2= 0.973) with the Bureau Veritas assay results. Similar correlations are observed for copper (r_2= 0.9991) and silver (r_2= 0.9963).

Overall, the MS Analytical biases (using linear least squares regression) with respect to Bureau Veritas are:

- +2.4% for gold
- +6.2% for copper
- +5.6% for silver.

The positive bias observed in silver check assays can in part be explained by the use of differing analytical techniques (Bureau Veritas used an analytical method with a lower detection limit of 0.5 ppm silver, MS Analytical used an analytical method with a lower detection limit of 0.01 ppm silver).

Figure 11.3 Accuracy Plot of MS Analytical vs. Bureau Veritas, Gold

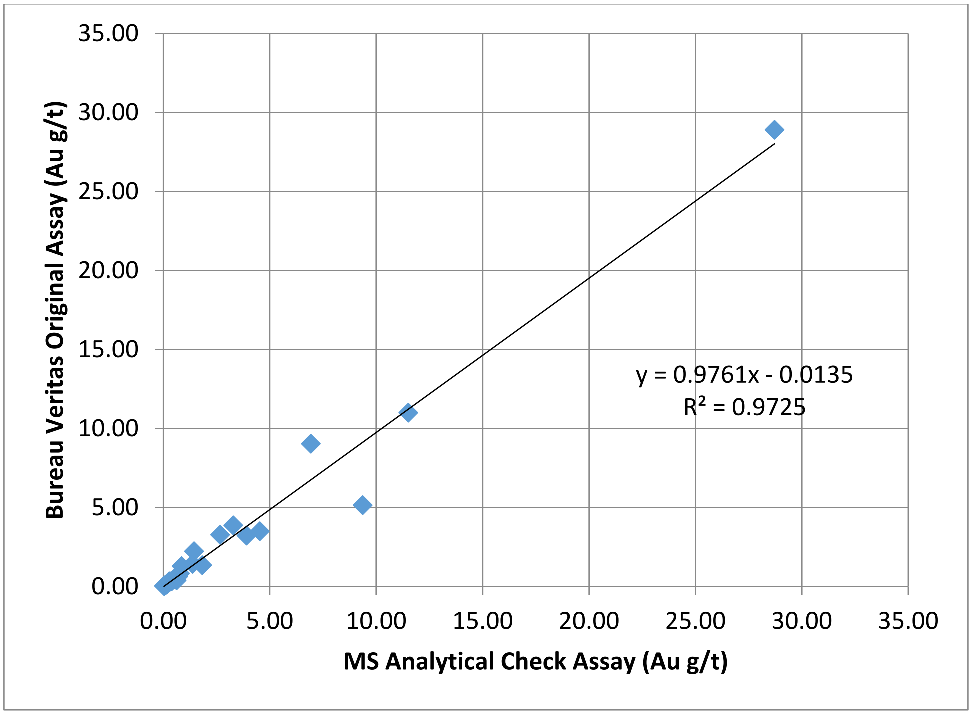
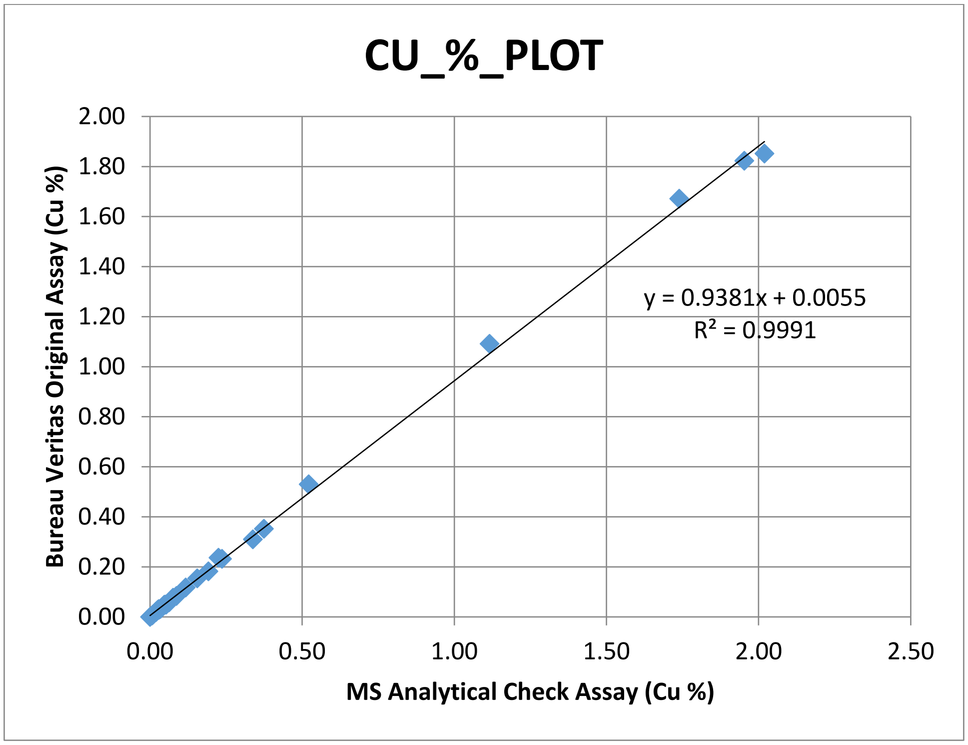


Figure 11.4 Accuracy Plot of MS Analytical vs. Bureau Veritas, Copper



FIELD DUPLICATE ASSAYS

Field duplicates were taken routinely as part of the drillhole sampling procedures. Two hundred and forty-four (244) quarter core duplicate samples were taken from the drillholes for an insertion rate of 6.2% or slightly more than 1 sample in 20. These samples were prepared at Bureau Veritas Ankara and analyzed at Bureau Veritas Vancouver using the same techniques as the original samples.

The 90th percentile precision values (pair difference/pair mean) for gold and copper are shown in Table 11.3 and Table 11.4.

Table 11.9 Duplicate Sample 90th Percentile Precision Values, Gold

Duplicate Type	Number	90th Percentile Precision (%)
Pulp Duplicates	229	±31.7
Pulp Duplicates (<0.03 g/t Removed)	189	±24.3
Coarse Reject Duplicates	230	±38.7
Coarse Reject Duplicate (<0.03 g/t Removed)	183	±27.0
¼ Core Field Duplicates	244	±48.3

Table 11.10 Duplicate Sample 90th Percentile Precision Values, Copper

Duplicate Type	Number	90th Percentile Precision (%)
Pulp Duplicates	229	±12.8
Coarse Reject Duplicates	230	±22.6
¼ Core Field Duplicates	244	±40.7

COARSE REJECT DUPLICATE ASSAYS

Coarse reject duplicates are splits of a sample taken after the coarse crush but before pulverizing and then assayed as a separate, duplicate sample. Coarse reject duplicates measure the homogeneity of the sample at the coarse reject stage and assesses combined preparation and analytical precision.

A total of 230 coarse reject duplicate samples (for an insertion rate of 5.9%) were taken from the drilling program on the Mato Bula Project. These samples underwent further preparation at Bureau Veritas Ankara and analysis at Bureau Veritas Vancouver using the same techniques as the original samples.

The 90th percentile precision values (pair difference/pair mean) for gold and copper are shown in Table 11.3 and Table 11.4. Precision for gold coarse reject duplicates is somewhat higher (although still acceptable) than copper and is caused by the presence of a nugget effect.

PULP DUPLICATE ASSAYS

Pulp duplicate samples are taken from the unused analytical pulp returned from the laboratory and are then sent for analysis at the same laboratory. This sample type provides an assessment of analytical precision.

A total of 229 pulp duplicate samples (for an insertion rate of 5.8%) were taken from the drilling program. These samples were analyzed at Bureau Veritas Vancouver using the same techniques as the original samples.

The 90th percentile precision values (pair difference / pair mean) for gold and copper are shown in Table 11.3 and Table 11.4. Precision for gold pulp duplicates is somewhat higher (although still acceptable) than copper and is caused by the presence of a nugget effect.

11.11.4 QA/QC SUMMARY

Throughout the drilling programs on the Adyabo Project, EAM has progressively monitored and improved their QA/QC procedures. This is reflected in the introduction of supplementary quality control samples such as field, reject and pulp duplicates in addition to umpire samples. Where issues have been identified, the company has been proactive in seeking a resolution to the problem through introducing new CRMs, re-analysis of failing samples and running check sample program to determine the veracity of the laboratory techniques used.

In the author's opinion the sample preparation, security and analytical procedures are adequate to support mineral resource estimation.

12.0 DATA VERIFICATION

In consideration of the data summarized below, as well as information provided elsewhere in this report, the author of this section believes the current Mato Bula Project data are acceptable for the purposes used in this PEA.

12.1 2017 Data Verification

No further data verification has been performed on the 2017 drill data. EAM's database integrity has been audited several times previously and, in each case, no significant errors were found. The procedures used in previous drill campaigns have been maintained. The author is confident that the 2017 drill data is similarly error-free.

12.2 2016 Data Verification

In 2016, both Aurum and Fladgate completed data verification on the data from Mato Bula. The data verification programs are described in the following sections.

12.2.1 Electronic Database

Fladgate requested the original certificates from the primary laboratory (ACME). The assay certificates were sent directly to Fladgate. A comparison of the assay certificates was made with the assay values within the EAM database.

A total of 1,329 out of 1,737 assays were compared, representing 76.5% of the drillhole assays from the 2015-2016 exploration campaign. Fladgate found no significant differences between the original assay certificates and the EAM assay database used for mineral resource estimation.

12.3 2015 Data Verification

12.3.1 Electronic Database

Initially, an Access database and related Microsoft® Excel spreadsheets were provided by EAM to Aurum as a universal project dataset along with a full set of assay certificates. Additional GIS data was provided in the form of MapInfo data files.

Information recorded from diamond drill core logging and assaying was integrated using industry standard data management software (Maxwell DataShed). The resultant data was reviewed, including validation of a random selection of data against the source information, and it is considered acceptable for the purpose of this report.

12.3.2 DRILLHOLE COLLARS

Seventeen drillhole collar checks were undertaken by Aurum during the site visit using a hand-held Garmin GPSmap 62s unit. Thirteen checks were completed at the Mato Bula prospect. At Mato Bula the average deviation was 2.24 m for the easting and 1.77 m for the northing, with the largest easting deviation recorded being 2.49 m (WMD021), and the largest northing deviation of 5.42 m (WMD009).

In 2015, Fladgate also checked the collar location of three holes at Mato Bula. No significant differences between the coordinates in the database and the coordinates collected during the site visit.

12.4 FLADGATE DRILL CORE LOGGING VERIFICATION

During the site visit, Fladgate examined drill core from four drillholes and verified the drillhole logging. Fladgate made a comparison of the logged intervals of sulphide mineralization in the database with Fladgate's own observations of the sulphide mineralization.

Fladgate found no significant differences.

12.5 DOWNHOLE SURVEY CHECKS

The original downhole survey documents were scrutinized and a comparison with the downhole survey records found in the project database was made. No discrepancies were found between the original documents and the database used for mineral resource estimation.

12.6 INDEPENDENT VERIFICATION OF MINERALIZATION

As part of the review of mineralized intervals within the EAM drill core, four independent samples were collected for assaying. The samples consisted of quartered core from selected intervals from drillholes WMD012, WMD023, WMD028 (all Mato Bula), and ADD002 (and Da Tambuk). One CRM (CDN-ME-1305) was included with the core samples, which were then submitted to OMAC Laboratories Limited (OMAC), a subsidiary of ALS Minerals based in Loughrea, Republic of Ireland for fire assay, using the Au-GRA21 technique, and base metal assaying using the ME-ICPORE technique.

Given the strong nugget effect typically seen with gold, the variation between the original ACME assay and the ALS verification results is in good agreement. Base metal concentrations are in good agreement with the original data.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 INTRODUCTION

BCR, located near Vancouver, British Columbia Canada, performed a metallurgical test work program on samples of crushed diamond drill cores collected from the Mato Bula deposit in 2015.The test work report (Project #: PJ5162) was completed in February 2016. The objective of the test work was:

- to confirm gold and copper metallurgical response to industry standard technology, including flotation and cyanidation; and
- to develop a process flowsheet for treating the Mato Bula mineralization.

The test work program evaluated gold and copper recovery using gravity concentration, flotation and cyanide leaching technologies. The Mato Bula deposit includes the Mato Bula and Silica Hill zones. Separate metallurgical tests were performed on samples of both the zones.

In 2018, a further cyanide leach test work (Project #: PJ5247) was conducted to investigate whether additional gold can be extracted from the cyanide leach residues produced from the PJ5162 test program.

13.2 SUMMARY OF RESULTS

The Mato Bula and Silica Hill test work program demonstrated that a conventional flotation flowsheet was successful in achieving gold and copper recovery to a copper-gold concentrate with marketable grades. The key flotation metallurgical data are shown below:

- Gold recovery using flotation was 83% for the Mato Bula sample and 38% for the Silica Hill sample.
- Copper recovery to flotation concentrate was 93% for the Mato Bula sample and 82% for the Silica Hill sample.
- Concentrate grades for the Mato Bula sample were 27% copper and 166 g/t gold and for the Silica Hill sample were 23% copper and 409 g/t gold.

Additional gold recovery was achieved for both the Mato Bula and Silica Hill composites by agitated cyanide leaching of gold bearing flotation products (pyrite scavenger concentrate and copper cleaner 1 tailings). With leaching the overall gold recovery was 89% for the Mato Bula sample and 88% for the Silica Hill sample.

Table 13.1 summarizes the gold/copper recoveries and concentrate grades using combined flotation and agitated cyanide leaching.

Table 13.1 Summary of Metallurgical Results

Sample	Flotation Concentrate					Leach Extraction (% Au)	Total Gold Recovery* (% Au)
	Grade	Recovery					
	Bulk Cu-Au Concentrate (% Cu)	Bulk Cu-Au Concentrate		Pyrite Scavenger Concentrate (% Au)	Cu Cleaner Tailings (% Au)		
		(% Cu)	(% Au)				
Mato Bula	27	93	83	8	3	52	89
Silica Hill	23	82	38	12	43	91	88

Note: *based on gold extraction only, excluding gold loss in gold adsorption, elusion, electrowinning and melting

The additional test work conducted in 2018 shows that with regrinding and extending the leach retention time, the gold extraction can be improved, in particular, for the Silica Hill sample.

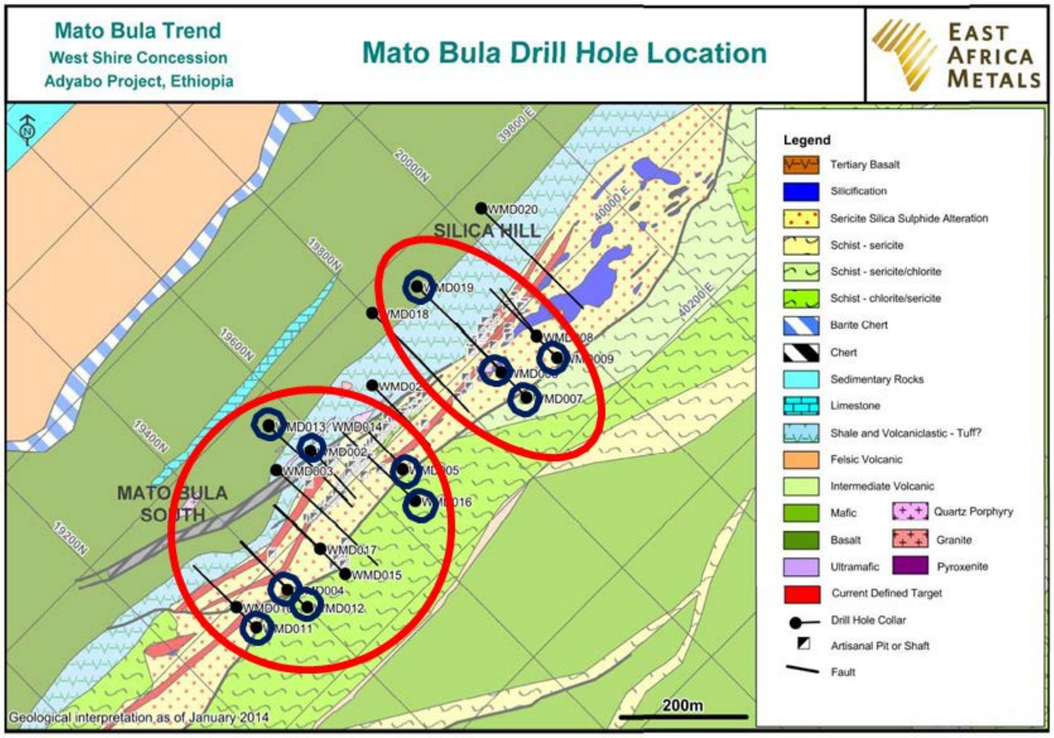
The samples used in the test work have higher head grades, especially copper head grade, compared to the average feed grades that are planned to be fed to the proposed mill. Further test work should be conducted on more representative samples to confirm the metallurgical responses.

13.3 SAMPLE COLLECTION

A sample collection program was developed by TRI and BCR metallurgical and geological personnel after reviewing the Mato Bula deposit geological data, including an assessment of grade, mineralogy, lithology, zonation and distribution as recorded in diamond drill logs. The objective was to generate a suite of samples for the test work that represents the overall Mato Bula mineralization, including the Silica Hill zone, taking into account mineralogical variation and geographic distribution. The metallurgical samples comprised samples of crushed diamond drill core. Approximately 1 kg of crushed drill core was selected from each specific interval of drill core selected. Approximately 50 kg of sample was collected from both the Mato Bula and Silica Hill zones. The samples were weighed and logged, packaged, sealed and prepared for transport to the BCR Laboratory.

The locations of the drillholes from which the metallurgical samples were collected are shown in Figure 13.1.

Figure 13.1 Mato Bula and Silica Hill Drillhole Locations



The individual samples collected from each of the drill holes are listed in Table 13.2.

Table 13.2 Mato Bula Sample Details

Hole	From	To	Sample ID	Interval Length	Weight to Composite (kg)	Interval Assays (East Africa) Au (g/t)	Interval Assays (East Africa) Cu (%)
WMD002	92.14	93.14	69673	1.00	1.3	6.32	0.43
WMD002	93.14	94.14	69674	1.00	1.3	21.80	3.10
WMD002	94.14	95.14	69676	1.00	1.3	10.40	0.55
WMD002	95.14	96.14	69677	1.00	1.6	4.35	0.44
WMD002	96.14	97.14	69678	1.00	1.3	0.97	0.08
WMD004	60.72	61.26	70482	0.54	0.7	4.67	10.20
WMD004	61.26	62.06	70483	0.80	1.0	0.12	0.02
WMD004	62.06	62.93	70484	0.87	1.1	0.46	0.35
WMD004	62.93	63.80	70487	0.87	1.1	7.73	6.10
WMD004	63.80	64.80	70488	1.00	1.3	3.42	0.10
WMD004	64.80	65.84	70489	1.04	1.4	3.16	0.04
WMD004	65.98	67.10	70490	1.12	1.5	0.45	0.13
WMD004	67.10	68.25	70491	1.15	1.5	0.30	0.03
WMD004	68.25	68.95	70492	0.70	0.9	2.91	2.71

table continues...

Hole	From	To	Sample ID	Interval Length	Weight to Composite (kg)	Interval Assays (East Africa)	
						Au (g/t)	Cu (%)
WMD004	68.95	69.65	70493	0.70	0.9	1.82	1.12
WMD004	69.80	70.50	70494	0.70	0.9	0.67	0.05
WMD004	70.50	71.30	70501	0.80	1.0	0.15	0.01
WMD004	71.30	72.10	70502	0.80	1.0	0.06	0.01
WMD004	72.10	72.80	70503	0.70	0.9	0.10	0.01
WMD004	72.80	73.62	70504	0.82	1.1	61.60	3.69
WMD005	82.48	83.48	70704	1.00	1.3	0.30	0.08
WMD005	83.48	84.48	70706	1.00	1.3	1.17	0.34
WMD005	84.48	85.55	70707	1.07	1.4	0.73	0.13
WMD005	85.55	86.59	70708	1.04	1.4	0.21	0.01
WMD005	86.59	87.09	70709	0.50	0.7	61.30	0.82
WMD005	87.09	88.09	70710	1.00	1.3	1.26	0.34
WMD005	88.09	89.09	70711	1.00	1.3	0.69	0.38
WMD011	97.40	98.30	72766	0.90	1.2	2.33	0.81
WMD011	98.30	99.20	72767	0.90	1.2	1.13	0.39
WMD011	99.20	100.03	72768	0.83	1.1	0.34	0.17
WMD011	100.03	100.88	72769	0.85	1.1	0.01	0.06
WMD011	100.88	101.45	72770	0.57	0.7	2.83	1.40
WMD012	105.62	106.47	72916	0.85	1.1	3.81	0.68
WMD012	106.47	107.22	72917	0.75	1.0	57.80	8.62
WMD012	107.22	107.97	72918	0.75	1.0	7.61	2.70
WMD012	107.97	108.72	72919	0.75	1.0	0.86	0.52
WMD013	203.70	204.48	73239	0.78	1.0	14.50	1.09
WMD013	204.48	205.25	73240	0.77	1.0	0.40	0.19
WMD013	205.25	205.95	73241	0.70	0.9	2.17	0.21
WMD013	205.95	206.65	73242	0.70	0.9	0.51	0.11
WMD013	206.65	207.65	73243	1.00	1.3	0.48	0.26
WMD016	165.85	166.80	73668	0.95	1.2	0.47	0.23
WMD016	166.80	167.50	73669	0.70	0.9	14.80	0.52
WMD016	167.50	168.25	73670	0.75	1.0	0.58	0.34
WMD016	168.25	169.25	73671	1.00	1.3	9.91	1.26
WMD016	169.25	170.14	73672	0.89	1.4	15.10	0.58
Mata Bula Composite Total					**52.06**	**6.57**	**0.99**

Table 13.3 Silica Hill Sample Details

Hole	From	To	Sample ID	Interval Length	Weight to	Interval Assays (East Africa) Au (g/t)	Cu (%)
WMD019	171.98	172.83	74001	0.85	0.9	13.20	0.34
WMD019	172.83	173.68	74002	0.85	0.9	84.20	0.85
WMD019	173.68	174.54	74003	0.86	0.9	2.80	0.51
WMD019	174.54	175.24	74004	0.70	0.7	1.99	0.49
WMD019	175.24	176.14	74006	0.90	0.9	1.68	0.40
WMD019	176.14	177.14	74007	1.00	1.0	9.80	0.51
WMD019	177.14	178.04	74008	0.90	0.9	21.00	2.10
WMD019	178.04	179.00	74009	0.96	1.0	0.81	0.03
WMD019	179.00	180.00	74010	1.00	1.0	1.97	0.09
WMD019	180.00	181.00	74011	1.00	1.0	4.13	0.09
WMD019	181.00	182.00	74012	1.00	1.0	6.83	0.19
WMD019	182.00	183.00	74013	1.00	1.0	1.84	0.11
WMD019	183.00	183.90	74014	0.90	0.9	2.68	0.47
WMD019	183.90	184.80	74016	0.90	0.9	16.20	0.41
WMD019	184.80	185.70	74017	0.90	0.9	2.25	1.00
WMD019	185.70	186.61	74018	0.91	0.9	3.55	0.73
WMD019	186.61	187.56	74019	0.95	1.0	5.44	0.04
WMD019	187.56	188.51	74020	0.95	1.0	1.56	0.05
WMD019	188.51	189.46	74021	0.95	1.0	5.12	0.04
WMD006	86.20	87.00	70367	0.80	0.8	6.90	0.22
WMD006	87.00	88.16	70368	1.16	1.2	8.05	0.47
WMD006	88.46	89.10	70369	0.64	0.6	4.26	0.50
WMD006	89.10	89.85	70370	0.75	0.8	16.30	0.80
WMD006	89.85	90.95	70371	1.10	1.1	0.68	0.03
WMD006	90.95	91.95	70372	1.00	1.0	0.72	0.13
WMD006	91.95	93.19	70373	1.24	1.2	0.81	0.22
WMD006	93.19	94.28	70374	1.09	1.1	9.60	0.13
WMD006	94.28	95.50	70376	1.22	1.2	38.40	0.28
WMD006	95.50	96.55	70377	1.05	1.1	17.30	0.12
WMD006	96.55	97.38	70378	0.83	0.8	30.30	1.07
WMD006	97.38	98.48	70379	1.10	1.1	15.90	0.10
WMD007	189.25	190.25	72121	1.00	1.0	2.22	0.11
WMD007	190.25	191.25	72122	1.00	1.0	7.64	0.37
WMD007	191.25	192.25	72123	1.00	1.0	0.91	0.07
WMD007	192.25	193.25	72124	1.00	1.0	0.79	0.03
WMD007	193.25	194.25	72126	1.00	1.0	2.25	0.07
WMD007	194.25	195.10	72127	0.85	0.9	1.16	0.12
WMD007	195.10	195.80	72128	0.70	0.7	2.14	0.12

table continues...

Hole	From	To	Sample ID Interval Length		Weight to	Interval Assays (East Africa) Au (g/t)	Cu (%)
WMD007	195.80	196.60	72129	0.80	0.8	9.25	0.06
WMD007	196.60	197.60	72130	1.00	1.0	3.06	0.40
WMD007	197.60	198.60	72131	1.00	1.0	18.70	0.07
WMD007	198.60	199.60	72132	1.00	1.0	9.55	0.14
WMD007	199.60	200.60	72133	1.00	1.0	1.71	0.53
WMD007	200.60	201.60	72134	1.00	1.0	7.66	0.23
WMD007	201.60	202.60	72136	1.00	1.0	16.70	0.73
WMD007	202.60	203.60	72137	1.00	1.0	18.40	0.65
WMD007	203.60	204.50	72138	0.90	0.9	28.50	0.30
WMD007	204.50	205.30	72139	0.80	0.8	3.07	0.11
WMD007	205.30	206.10	72140	0.80	0.8	82.20	0.61
WMD007	206.10	206.80	72141	0.70	0.7	54.30	0.32
WMD009	166.40	167.40	72438	1.00	1.0	2.76	0.03
WMD009	167.40	168.25	72439	0.85	0.9	23.90	0.07
WMD009	168.25	169.05	72440	0.80	0.8	6.23	0.04
WMD009	169.05	169.90	72441	0.85	0.9	6.77	0.03
WMD009	169.90	170.75	72442	0.85	0.9	6.50	0.10
WMD009	170.75	171.60	72443	0.85	0.9	3.57	0.19
WMD009	171.60	172.50	72444	0.90	0.9	6.40	0.01
WMD009	172.50	173.40	72446	0.90	0.9	15.30	0.02
WMD009	173.40	174.30	72447	0.90	0.9	1.04	0.02
Silica Hill Composite Total					**54.91**	**11.12**	**0.30**

13.4 Sample Composite Preparation and Head Assays

The composite samples received at BCR were splits (portions) of crushed drill core that had been sent for assay, otherwise known as “coarse assay rejects”. At BCR, the two composite samples were separately screened to remove finer than 1.7 mm (10 mesh) material and separately crush the screen oversize materials to finer than 1.7 mm. Then each of the composites was thoroughly blended using a rotary splitter, and a series of 2.0 kg metallurgical test charges were prepared. Triplicate head assay sub-samples were taken from each of the composites. The head assay samples were analyzed for gold, copper, zinc, arsenic, iron and sulphur. Base metals assays were conducted using AA (aqua regia digestion), gold by fire assay, and sulphur by Leco analyzer. The head assay results for the composite samples are summarized in Table 13.4 for Mato Bula sample and Table 13.5 for Silica Hill sample.

Table 13.4 Mato Bula Head Assay Data

Sample ID	Au Fire (g/t)	Cu** (%)	Zn** (%)	As** (%)	Fe** (%)	S*** (%)
Mato Bula Composite Head A	6.2	0.98	0.016	0.001	7.05	6.99
Mato Bula Composite Head B	7.0	0.99	0.014	0.001	7.01	7.25
Mato Bula Composite Head C	6.9	1.02	0.014	0.001	7.25	7.23
Average	6.7	1.00	0.015	0.001	7.10	7.16
Drill Core Assay	6.6	0.99				

Note: *by fire assay
**by aqua regia digestion with AA finishing
***by LECO analyzer

Table 13.5 Silica Hill Head Assay Data

Sample ID	Au* (g/t)	Cu** (%)	Zn** (%)	As** (%)	Fe** (%)	S*** (%)
Silica Upper Hill Composite Head A	11.1	0.29	0.014	0.004	5.62	6.37
Silica Upper Hill Composite Head B	13.7	0.29	0.009	0.004	5.60	6.28
Silica Upper Hill Composite Head C	16.8	0.29	0.010	0.004	5.59	6.20
Average	13.9	0.29	0.011	0.004	5.60	6.28
Drill Core Assay	11.1	0.30				

Note: *by fire assay
**by aqua regia digestion with AA finishing
***by LECO analyzer

Compared to the drill core assay data provided by TRI (copper and gold only) the metallurgical composite assays reconcile well with the average resource drill core assays shown in Table 13.4 and Table 13.5. However, there is a variability in the gold assays. The gold assay variance is likely due to the presence of coarse or particulate free gold in the samples.

When compared to the assay results with the average grades from the resource estimates, the tested samples had much higher grades.

13.5 METALLURGICAL TEST WORK RESULTS

This test work program assessed gravity concentration, flotation and agitated cyanide leaching of flotation scavenger pyrite concentrate and copper cleaner flotation tailings for gold and copper recovery using bottle roll leaching procedure.

13.5.1 GRAVITY CONCENTRATION TEST WORK

The gravity concentration tests were conducted on the composite samples respectively by passing a single 2 kg ground sample (80% passing (P_{80}) 75 μm) through a Knelson concentrator at standard operating parameters. The concentrate from the Knelson concentrator is further upgraded on a MAT table to produce a table concentrate and a table tailings.

The results of the gravity concentration test work demonstrate that gravity concentration would effectively recover a portion of the gold from both the Mato Bula and Silica Hill samples. The results are summarized in Table 13.6 to Table 13.8. The test results indicate that the gravity concentration can produce a gravity concentrate containing approximately 3,000 to 5,000 g/t golf. The gold recoveries by the gravity concentration were 5.5% for the Mato Bula composite and 16.5% for the Silica Hill composite.

Table 13.6 Gravity Concentration Results Summary

Composite	Grind Size (P80, µm)	Knelson Concentrate Recovery (Au %)	Knelson Concentrate Grade (Au g/t)	MAT Concentrate Recovery (Au %)	MAT Concentrate Grade (Au g/t)
Mato Bula	75	78	313.6	5.5	3,321
Silica Hill	75	66	159.3	16.5	4,693

Table 13.7 Mato Bula Gravity Test Results

	Mass (g)	Weight (%)	Grade (Au g/t)	Recovery (Au %)
MAT Tip	0.63	0.03	3,321	5.5
MAT Tailings	94.4	4.73	293.5	72.5
Knelson Tailings	1,900.2	95.24	4.43	22.0
Calculated Head	1,995.2	100.00	19.15	100.0
Head	2,000	-	6.72	-
Reconciliation (%)	99.8	-	285.0	-

Table 13.8 Silica Hill Gravity Test Results

	Mass (g)	Weight (%)	Grade (Au g/t)	Recovery (Au %)
MAT Tip	0.82	0.04	4,693	16.5
MAT Tailings	95.2	4.80	120.4	49.5
Knelson Tailings	1,890.6	95.16	4.18	34.0
Calculated	1,986.7	100.00	11.68	100.0
Head	2,000	-	13.89	-
Reconciliation (%)	99.3	-	84.1	-

13.5.2 FLOTATION TESTS

BATCH FLOTATION TEST WORK

For the Mato Bula composite, the flotation test results demonstrated that good gold and copper recovery to a copper concentrate can be achieved with copper and gold concentrate grades that meet specifications as typically required by smelters.

For the Silica Hill composite, the flotation test work achieved satisfactory copper recovery and copper-gold concentrate grades; however, both copper and gold recoveries to flotation concentrate were lower than that achieved from the Mato Bula sample, particularly for gold.

MATO BULA FLOTATION

Seven batch flotation tests were conducted on the Mato Bula composite: six rougher flotation tests and an open circuit cleaner flotation test. A number of variables were evaluated in the six rougher flotation tests:

- Collector dosage – sodium isopropyl xanthate (SPIX) was used as the base case with two dosage levels tested: 32 g/t in Test MB F-1 and 8 g/t in Test MB F-2.
- Collector type – SIPX and alternative collectors, namely F-1234 (*Flottec* thionocarbamate) and F-305 (*Flottec* Ally Alkyl Xanthate Ester).
- Primary grind size – The primary grind size was varied from P_{80} 80 µm to P_{80} 160 µm using F-1234 as collector.
- Rougher flotation pH – Lime was used as the pH modifier in all tests, starting from pH 9.5 for pyrite rejection.
- Pyrite scavenger flotation – To float gold bearing pyrite from the copper flotation tailings for additional gold recovery.

Table 13.9 summarizes the rougher flotation test conditions for the Mato Bula composite.

Table 13.9 Rougher Flotation Test Conditions Summary - Mato Bula Composite

Test ID	Grind Size (P80, µm)	Rougher Flotation pH	Pyrite Scavenger Flotation	Collector			Flotation Time (min)
				SIPX (g/t)	F-305 (g/t)	F-1234 (g/t)	
MB F-1	117	9.5	No	32			8
MB F-2	117	10.5	No	8			8
MB F-3	120	10.5	Yes	10		4	12
MB F-4	120	10.5	Yes	10	3		12
MB F-5	80	10.5	Yes	10		4	12
MB F-6	160	10.5	Yes	10		4	12

The results for these tests are detailed in Table 13.10 and Figure 13.2 for copper grade vs copper recovery and Figure 13.3 for gold recovery vs. mass pull.

Table 13.10 Summary of Rougher Flotation Results - Mato Bula Composite

Test ID	Cu Rougher Concentrate				Pyrite Scavenger Concentrate Recovery (Au %)	Total Recovery (Au %)
	Grade		Recovery			
	(Cu %)	(Au g/t)	(Cu %)	(Au %)		
MB F-1	4.5	30.6	98.2	92.2	-	92.2
MB F-2	5.4	34.7	97.4	91.5	-	91.5
MB F-3	16.0	100.2	95.8	83.8	4.3	88.1
MB F-4	18.9	100.8	88.0	71.1	20.5	91.6
MB F-5	16.5	108.1	96.7	86.6	8.2	94.8
MB F-6	15.1	97.0	95.8	82.5	9.5	92.1

Figure 13.2 Rougher Flotation Copper Grade vs Recovery Curves – Mato Bula Composite

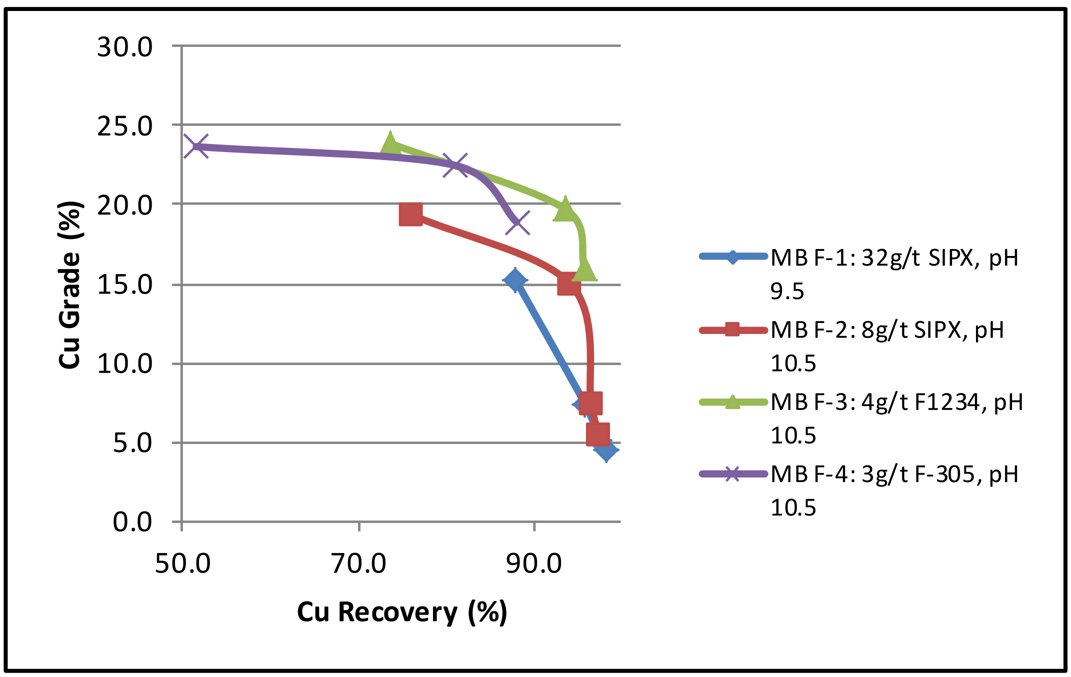
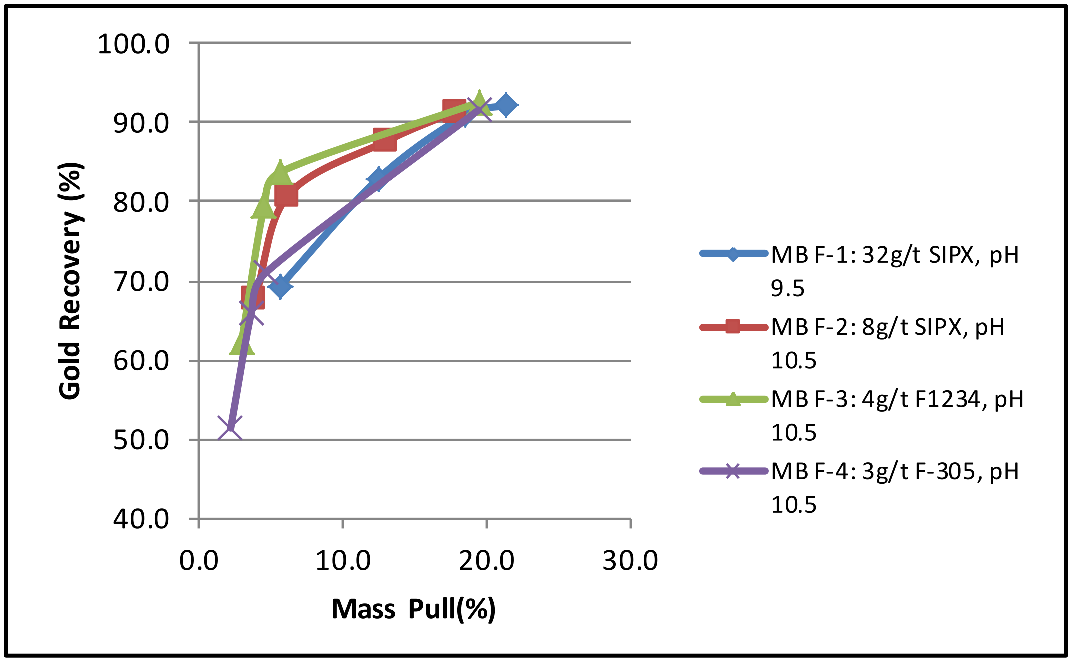


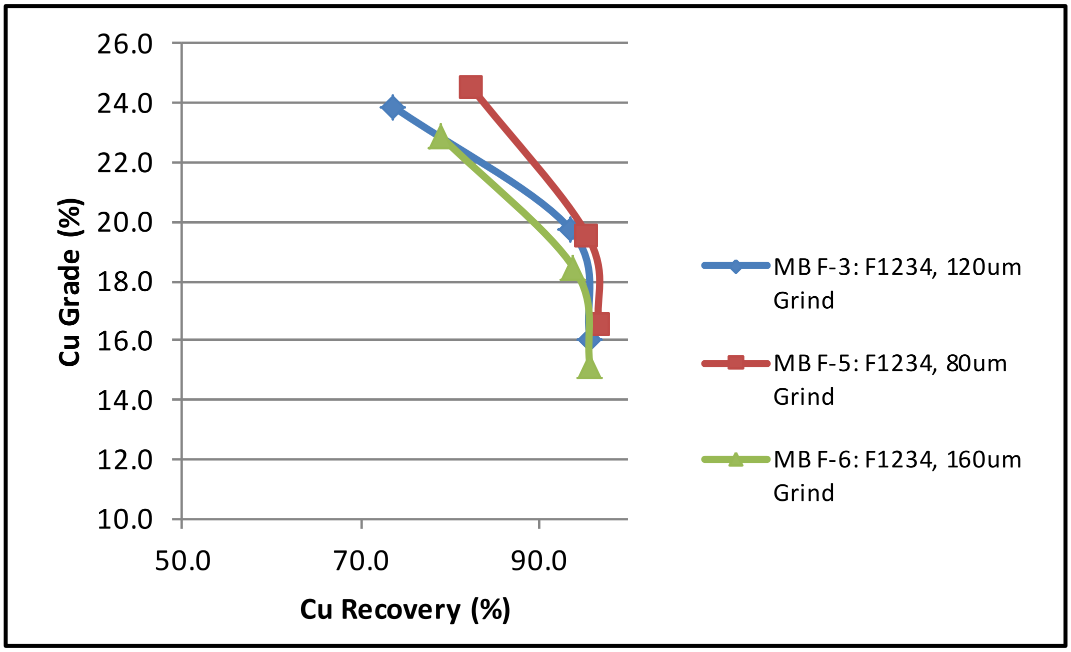
Figure 13.3 Rougher Flotation Gold Recovery vs Mass Pull Curves – Mato Bula Composite



Of the initial four rougher flotation tests conducted, Test MB F-3 provided the optimum trade-off between copper rougher flotation concentrate grade and copper and gold recoveries. An additional 20% gold recovery reported to the pyrite scavenger concentrate.

Primary grind size sensitivity tests were conducted using F1234 as collector and the results are summarized in Figure 13.4.

Figure 13.4 Effect of Primary Grind Size on Copper Metallurgical Performance – Mato Bula Composite



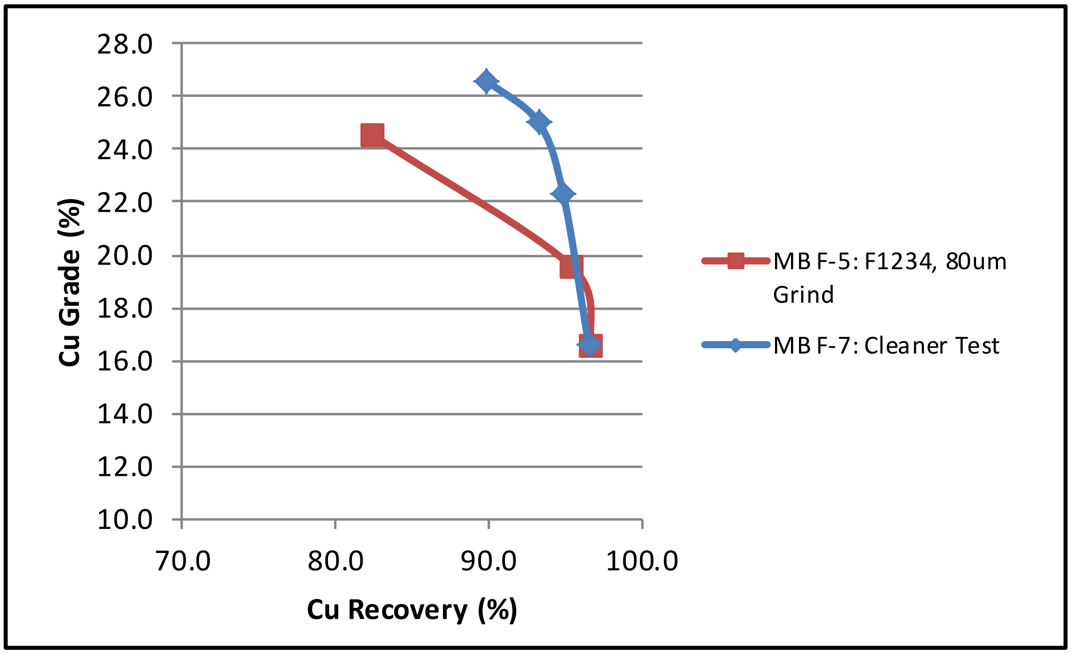
Although the difference in copper performance at the grind size range of 80% passing 80 to 160 µm is not significant, the finer grind size did yield a higher concentrate grade and the gold recovery to copper rougher and pyrite scavenger concentrates (combined) was high at 95%.

A single cleaner test (Test MB F-7) was conducted on the Mato Bula composite employing Test MB F-5 rougher flotation conditions with the finer grind size and F-1234 as collector. The regrind size and cleaner flotation conditions were as follows:

- Copper rougher concentrates feeding the copper cleaner circuit. Pyrite scavenger concentrate as final product.
- Regrind – none employed due to the relatively fine primary grind.
- Three stages of copper cleaning at pH 10.5 with 1 g/t F-1234 added to the first cleaner conditioning stage.

The final concentrate from this test graded 26.6% copper and 166 g/t gold at 89.9% copper recovery and 78.8% gold recovery. No further optimization work was conducted before a full circuit locked cycle test (LCT). Test MB F-7 copper results are summarized in Figure 13.5 alongside the Test F-5 rougher grade recovery curve. The curves clearly show the significant increase in copper concentrate grade after three stages of cleaner flotation.

Figure 13.5 Cleaner Flotation Copper Grade vs Recovery Curve – Mato Bula Composite



SILICA HILL FLOTATION

Six rougher tests were performed on the Silica Hill composite. The same basic flowsheet employed for the Mato Bula composite sample was used for the Silica Hill composite. A summary of the test conditions employed in these tests is provided Table 13.11.

Table 13.11 Rougher Flotation Test Condition Summary - Silica Hill Composite

Test ID	Grind Size (P_{80}, µm)	Rougher Flotation pH	Pyrite Scavenger Flotation	Collector SIPX (g/t)	Collector F-305 (g/t)	Collector F-1234 (g/t)	Flotation Time (min)
SH F-1	120	9.5	No	13	-	-	8
SH F-2	120	10.5	No	6	-	-	8
SH F-3	120	11.5	No	4	-	-	8
SH F-4	120	10.5	No	-	12	-	8
SH F-5	120	10.5	No	-	-	12	8
SH F-6	70	10.5	Yes	10	-	6	12

The results for these tests are summarized in Table 13.12 and Figure 13.6 and Figure 13.7.

Table 13.12 Summary of Rougher Flotation Results – Silica Hill Composite

Test ID	Cu Rougher Concentrate				Pyrite Scavenger Concentrate Recovery (Au %)	Total Recovery (Au %)
	Grade		Recovery			
	Cu %	Au g/t	Cu %	Au %		
SH F-1	1.4	50.2	97.4	91.8	-	91.8
SH F-2	1.7	64.9	96.9	91.4	-	91.4
SH F-3	3.0	130.3	93.5	86.3	-	86.3
SH F-4	3.8	117.5	92.4	72.5	-	72.5
SH F-5	3.5	104.5	94.3	81.0	-	81.0
SH F-6	5.0	158.1	94.7	86.0	9.7	95.7

Figure 13.6 Rougher Flotation Copper Grade vs. Recovery Curves – Silica Hill Composite

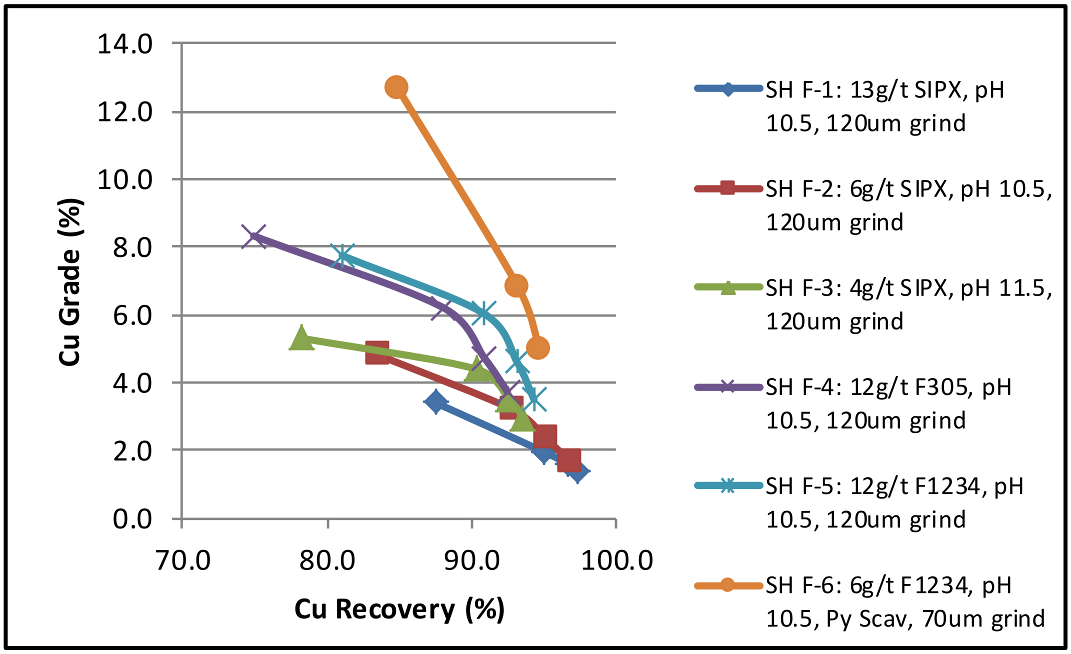
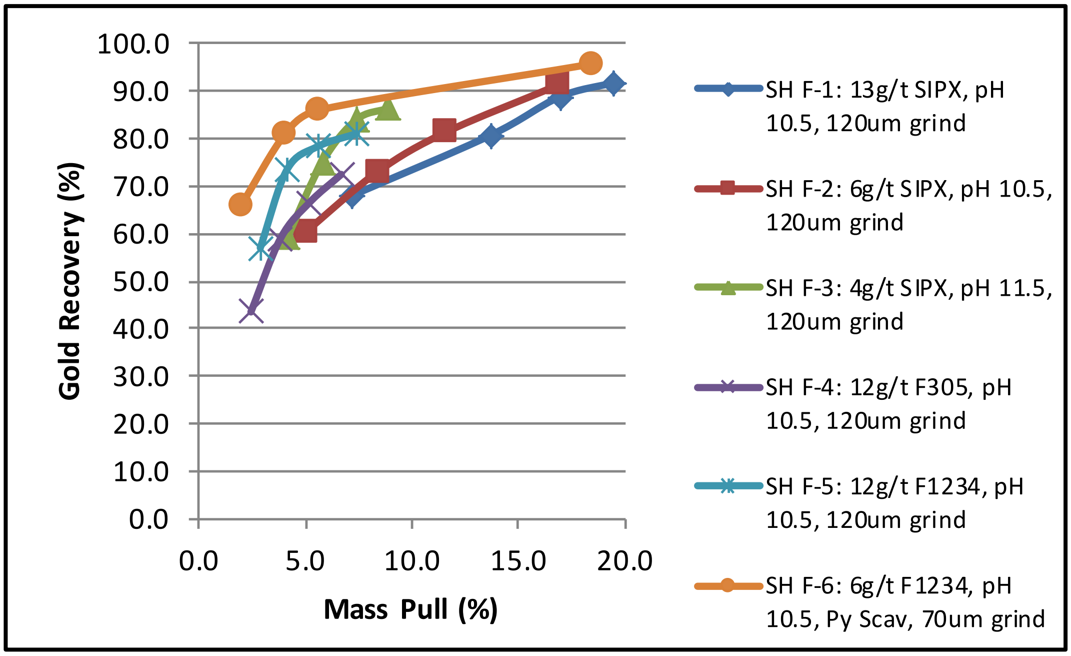


Figure 13.7 Rougher Flotation Test Gold Recovery vs Mass Pull Curves – Silica Hill Composite



- Figure 13.6 suggests that F-1234 and F-305 are selective to copper flotation, compared to SIPX).
- Increasing pH to 11.5 in Test SH F-3 (with SIPX as the collector) did not significantly improve copper flotation selectivity, compared to pH 10.5 (Test SH F-2).
- The finer primary grind size of P80 70 µm produced the best rougher metallurgical performance (Test SH F-6: 6 g/t of F-1234 collector and rougher flotation pH of 10.5). Copper rougher recovery was 94.7% to a rougher concentrate containing 5% copper and 158 g/t gold.
- Gold recovery to copper rougher concentrate was 86%. The addition of a pyrite scavenger flotation increased overall gold recovery to 95.7%.
- The pyrite scavenger concentrate graded 7.8 g/t gold and 0.08% copper, making it a good candidate for cyanide leaching to recover additional gold.

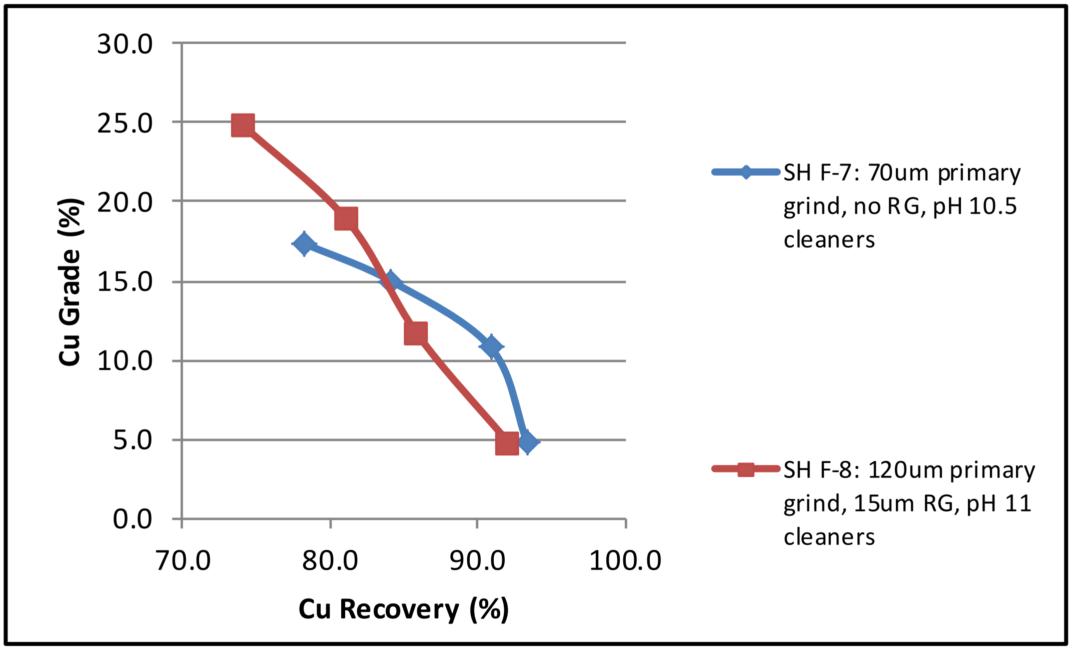
Two cleaner flotation tests were conducted using the test conditions as follows:

- Test SH F-7: primary grind size of P_{80} 70 µm, no regrind, three-stages of copper cleaning at pH 10.5, F-1234 as collector.
- Test SH F-8: primary grind size of P_{80} 120 µm, regrind to P_{80} 15 µm, three-stages of copper cleaning at pH 11, 2 g/t, F-1234 as collector.

The results of these tests are summarized below and the copper metallurgical performances are shown in Figure 13.8.

- Gold recoveries to the final concentrate was 65.5% at a gold grade of 525 g/t for Test SH F-7 and 37.8% at a gold grade 504 g/t for Test F-8.
- Test SH F-8 produced a higher-grade copper concentrate (24.8% Cu versus 17.4% copper in Test SH F-7). This was achieved at a slightly lower copper recovery, but a significantly lower gold recovery. The results suggest that some of the gold is associated with the pyrite.
- Further optimization would be required for the regrinding and cleaner circuits to increase gold recovery while maintaining a saleable copper concentrate.

Figure 13.8 Cleaner Flotation Copper Grade vs Recovery Curves – Silica Hill Composite



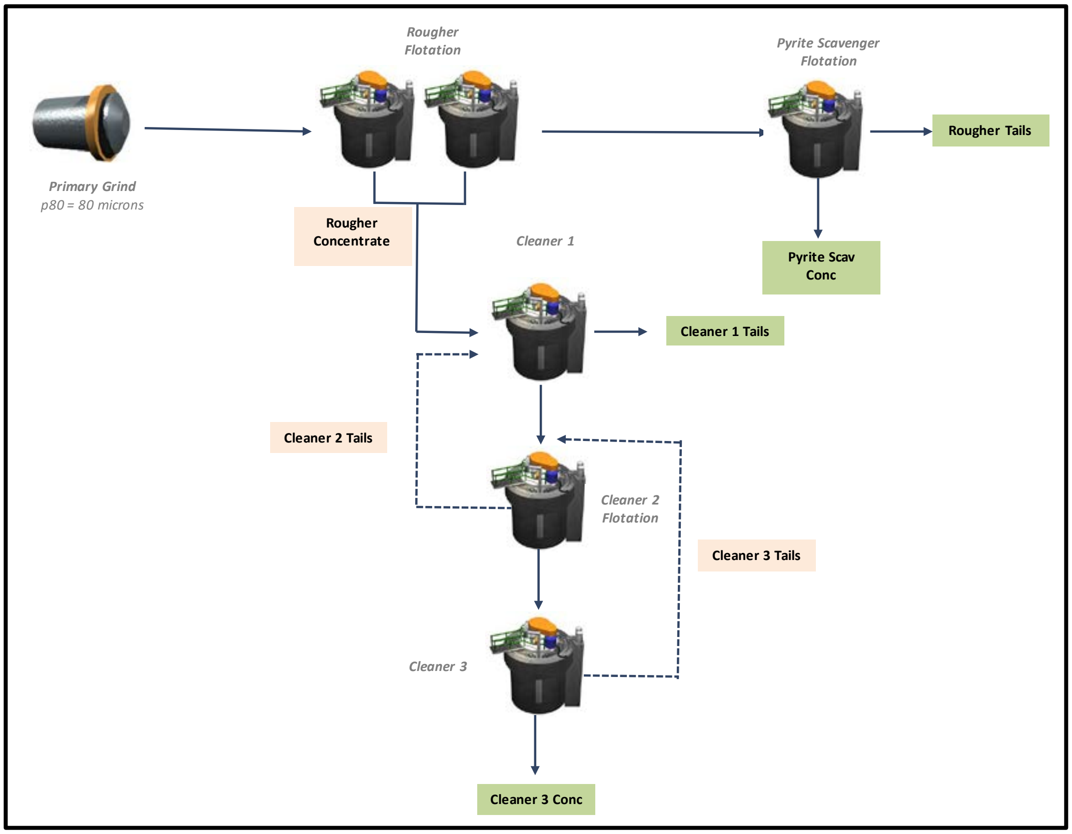
13.5.3 LOCKED CYCLE FLOTATION

Two LCTs were conducted in this program: one for the Mato Bula composite and one for the Silica Hill composite.

MATO BULA LOCKED CYCLE FLOTATION

The LCT conditions for the Mato Bula composite were based on the batch cleaner test flowsheet used in Test MB F-7, and the flowsheet configuration is depicted in Figure 13.9. As per the batch cleaner flotation test for the Mato Bula composite, no regrind was included in the flowsheet.

Figure 13.9 LCT Flowsheet Schematic – Mato Bula Composite



The LCT conditions (average of last three cycles) are summarized in Table 13.13. The primary grind size employed in this test was 80% passing 80 µm.

Table 13.13 LCT Test Reagent Scheme (Cycles 4-6) – Mato Bula Composite

Flotation Stage	Reagent (g/t)				pH	
	Lime	F-1234	SIPX	MIBC	Start	End
Primary Grind	655	-	-	-	9.5	9.5
Rougher 1	155	1	-	16	10.5	10.0
Rougher 2	50	2	-	9	10.5	9.8
Pyrite Scavenger	0	-	10	16	9.8	9.3
Cleaner 1	43	1	-	6	10.5	9.3
Cleaner 2	28	-	-	6	10.5	9.3
Cleaner 3	17	-	-	6	10.5	9.1
Total	**948**	**4**	**-**	**60**	**-**	**-**

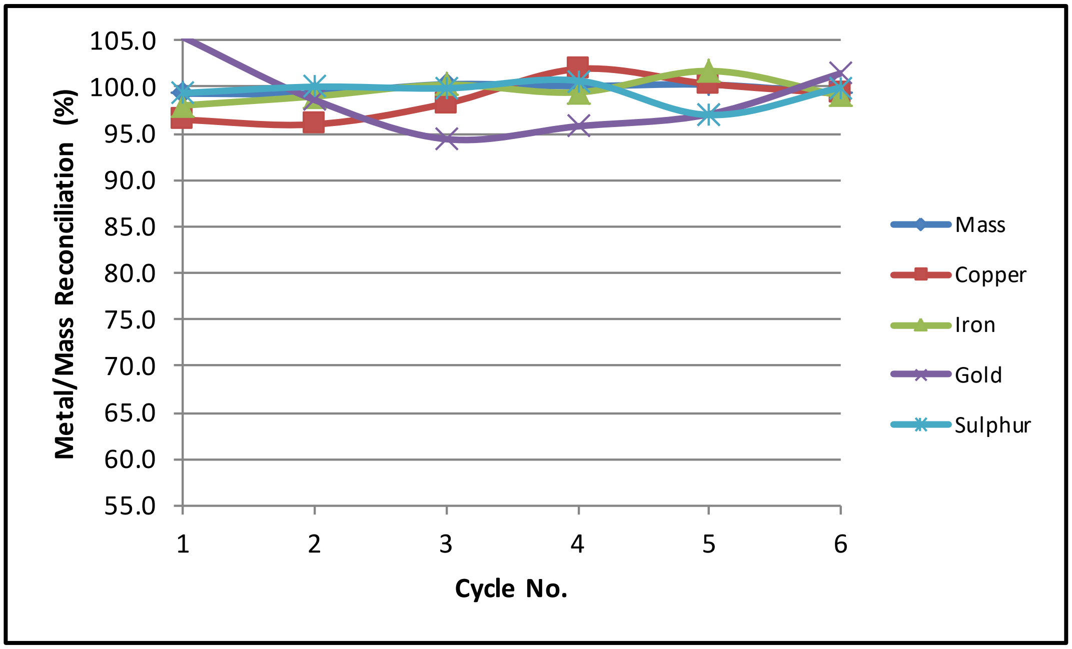
Note: MISC – methyl isobutyl carbinol

BCR projected metallurgical balance based on the data from the last three cycles of the test. The projections are summarized in Table 13.14 while the stability data from the test is shown in Figure 13.10.

Table 13.14 LCT Metallurgical Projection – Mato Bula Composite

Product	Assay			Recovery (%)			
	Cu (%)	Au (g/t)	S (%)	Mass	Cu	Au	S
Cu Cleaner 3 Concentrate	26.8	166.8	31.4	3.4	93.4	82.9	15.8
Cu Cleaner Tailings	1.44	11.6	7.2	1.7	2.6	3.0	1.9
Pyrite Scavenger Concentrate	0.15	4.4	40.0	13.0	2.1	8.4	77.8
Rougher Tailings	0.023	0.5	0.4	81.9	1.9	5.7	4.6
Total	**0.96**	**6.8**	**6.68**	**100.0**	**100.0**	**100.0**	**100.0**

Figure 13.10 LCT Metal and Mass Stability – Mato Bula Composite



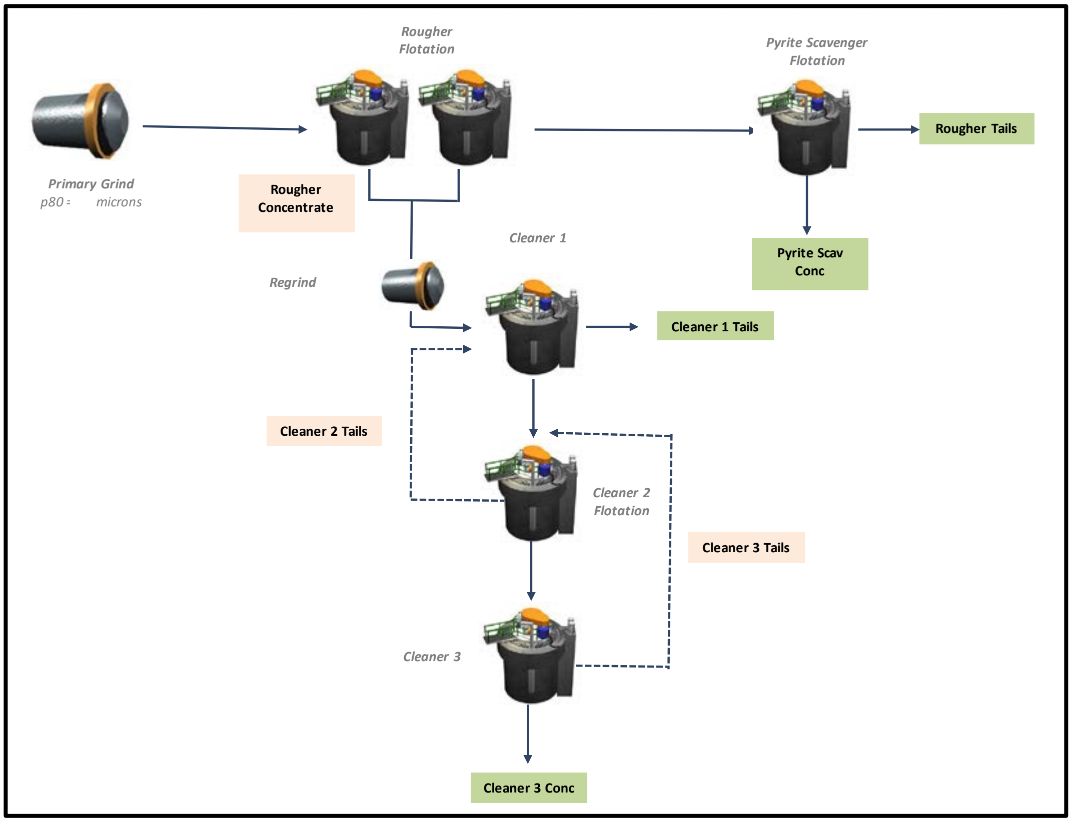
BCR drew following conclusions from this test:

- A copper concentrate grading 26.8% copper, 167 g/t gold and 31.4% sulphur was produced.
- Copper and gold recoveries to the copper concentrate were 93.4% and 82.9% respectively.
- An additional 8% of the gold reported to the pyrite scavenger concentrate, grading 4.4 g/t gold.

SILICA HILL LOCKED CYCLE FLOTATION

Silica Hill LCT conditions were based on the batch cleaner test conditions used in Test SH F-8, and the flowsheet configuration is depicted in Figure 13.11. The flowsheet was similar to the one employed for the Mato Bula composite, but at a coarser primary grind size of with the addition of a rougher concentrate regrind (P_{80} = 15 µm).

Figure 13.11 LCT Flowsheet Schematic – Silica Hill Composite



The LCT conditions (average of last three cycles) are summarized in Table 13.15. The primary grind size employed in this test was 80% passing 120 µm.

Table 13.15 LCT Reagent Regime (Cycles 4-6) Silica Hill Composite

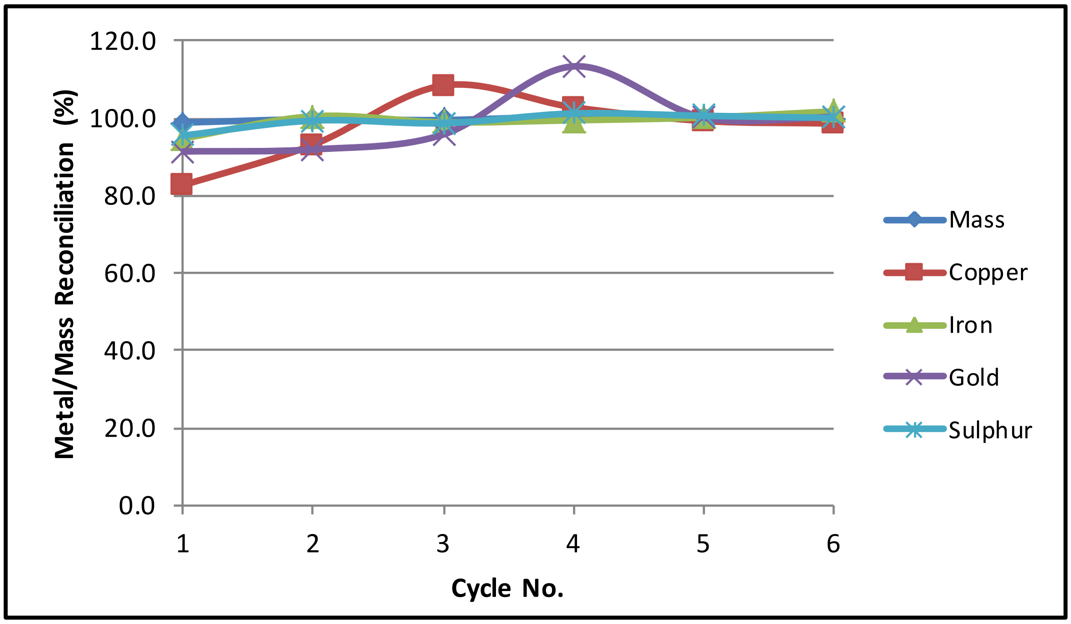
Flotation Stage	Reagent (g/t)				pH	
	Lime	F-1234	SIPX	MIBC	Start	End
Primary Grind	650	-	-	-	-	-
Rougher 1	0	2	-	16	10.5	-
Rougher 2	0	2	-	8	10.5	-
Pyrite Scavenger	0	-	-	16	-	-
Rougher Concentrate Regrind	-	-	-	-	-	-
Cleaner 1	250	-	10	-	11.0	-
Cleaner 2	0	-	-	4	11.0	-
Cleaner 3	00	-	-	4	11.0	-
Total	**900**	**4**	**10**	**48**	**-**	**-**

BCR projected metallurgical balance based on the data from the last three cycles of the test. The projections are summarized in Table 13.16 while the stability data are shown in Figure 13.12.

Table 13.16 LCT Metallurgical Projection – Silica Hill Composite

Product	Assay			Recovery (%)			
	Cu (%)	Au (g/t)	S (%)	Mass	Cu	Au	S
Cu Cleaner 3 Concentrate	22.6	409.1	25.3	1.0	82.1	38.2	4.3
Cu Cleaner Tailings	0.72	113.5	19.9	4.1	10.5	42.8	13.6
Pyrite Scavenger Concentrate	0.10	9.0	32.9	13.9	5.1	11.6	77.0
Rougher Tailings	0.008	1.0	0.4	81.0	2.3	7.4	5.0
Total	**0.28**	**10.8**	**5.95**	**100.0**	**100.0**	**100.0**	**100.0**

Figure 13.12 LCT Metal and Mass Stability - Silica Hill Composite



The following conclusions are drawn by BCR from this test:

- A copper concentrate grading 22.6% copper and 409 g/t gold was produced.
- Copper and gold recoveries to the copper concentrate were 82.1% and 38.2% respectively.
- An additional 11.6% of the gold reported to the pyrite scavenger concentrate, grading 9 g/t gold.
- 42.8% of the gold reported to the copper cleaner 1 tailings.

13.5.4 FLOTATION CONCENTRATE QUALITY ANALYSIS

Final LCT concentrates from the Mato Bula and Silica Hill composites were submitted for concentrate quality analysis, including ICP assay and mercury analysis using cold vapour procedure. The results are summarized in Table 13.17 and Table 13.18.

Table 13.17 LCT Final Copper Concentrate Multi-Element Analysis – Mato Bula Composite

Element	Unit	Content	Element	Unit	Content	Element	Unit	Content
Ag	ppm	78.2	Ge	ppm	2	S	%	32.9
Al	%	0.14	Hf	ppm	<0.1	Sb	ppm	5.88
As	ppm	133	Hg	ppm	2.2	Sc	ppm	0.5
Au	ppm	>10	Ho	ppm	<0.1	Se	ppm	484
B	ppm	<1	In	ppm	7.57	Sm	ppm	0.2
Ba	ppm	<0.5	K	%	0.02	Sn	ppm	5.39
Be	ppm	<0.1	La	ppm	<0.5	Sr	ppm	2.8
Bi	ppm	178	Li	ppm	0.7	Ta	ppm	<0.05
Ca	%	0.09	Lu	ppm	<0.1	Tb	ppm	<0.1
Cd	ppm	7.95	Mg	%	0.11	Te	ppm	359
Ce	ppm	<0.01	Mn	ppm	85	Th	ppm	<0.1
Co	ppm	34.6	Mo	ppm	77.1	Ti	%	<0.001
Cr	ppm	<0.1	Na	%	0.009	Tl	ppm	0.08
Cs	ppm	0.04	Nb	ppm	<0.1	Tm	ppm	<0.1
Cu	ppm	>10,000	Nd	ppm	0.31	U	ppm	<0.1
Dy	ppm	<0.1	Ni	ppm	22	V	ppm	5
Er	ppm	<0.1	P	%	0.002	W	ppm	<0.1
Eu	ppm	<0.1	Pb	ppm	62.4	Y	ppm	0.22
Fe	%	18.3	Pr	ppm	<0.1	Yb	ppm	<0.1
Ga	ppm	0.54	Rb	ppm	0.4	Zn	ppm	400
Gd	ppm	0.1	Re	ppm	0.195	Zr	ppm	2.1

Table 13.18 LCT Final Copper Concentrate Multi-Element Analysis – Silica Hill Composite

Element	Unit	Content	Element	Unit	Content	Element	Unit	Content
Ti	%	< 0.001	Ga	ppm	0.54	Hg	ppm	14.9
S	%	25.7	Ge	ppm	4.7	Sm	ppm	0.2
P	%	< 0.002	As	ppm	197	Se	ppm	1,190
Li	ppm	0.2	Rb	ppm	0.7	Eu	ppm	<0.1
Be	ppm	< 0.1	Sr	ppm	72	Gd	ppm	0.2
B	ppm	< 1	Y	ppm	0.4	Tb	ppm	<0.1
Na	%	0.012	Zr	ppm	2.8	Dy	ppm	0.1
Mg	%	0.02	Nb	ppm	< 0.1	Ho	ppm	< 0.1
Al	%	0.09	Mo	ppm	63.1	Er	ppm	< 0.1
K	%	0.03	Ag	ppm	>100	Tm	ppm	< 0.1
Bi	ppm	29	In	ppm	4.04	Yb	ppm	< 0.1
Ca	%	0.16	Sn	ppm	6.74	Lu	ppm	< 0.1
Sc	ppm	0.2	Sb	ppm	25.1	Hf	ppm	< 0.1
V	ppm	3	Te	ppm	239	Ta	ppm	< 0.05
Cr	ppm	< 1	Cs	ppm	0.08	W	ppm	< 0.1
Mn	ppm	9	Ba	ppm	1.7	Re	ppm	0.095
Fe	%	15.3	La	ppm	<0.5	Au	ppm	> 10
Co	ppm	23.3	Ce	ppm	<0.01	Tl	ppm	0.22
Ni	ppm	10.3	Cd	ppm	18.9	Pb	ppm	1,170
Cu	ppm	> 10,000	Pr	ppm	<0.1	Th	ppm	0.1
Zn	ppm	2,010	Nd	ppm	0.37	U	ppm	<0.1

Based on the chemical analyses, the level of deleterious elements present is expected to be below typical penalty levels. In addition, the silver content is high and it may be payable by the smelters.

13.6 FLOTATION PRODUCT CYANIDATION

The flotation test results show some of the gold reporting to the pyrite concentrate as well as the flotation cleaner 1 tailings, especially for the Silica Hill composite. To explore the gold recovery from the gold bearing minerals, preliminary cyanidation tests were conducted. The cyanide leach tests were conducted at a cyanide concentration of between 5.0 and 7.0 g/L, a pulp density of between 35 and 40% w/w, pH higher than 10.5 with lime and a leach retention time of longer than 48 hours.

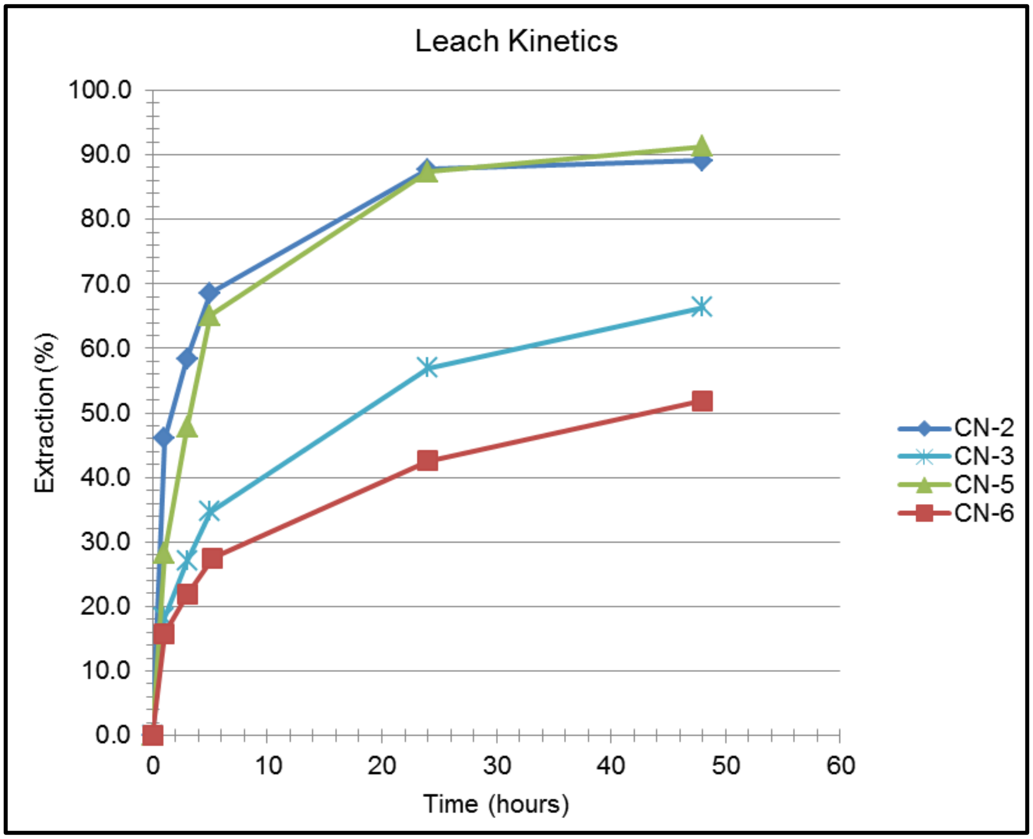
Table 13.19 and Figure 13.13 summarize the test conditions and results from these tests:

Table 13.19 Summary of Flotation Product Cyanidation – Bottle Roll Tests

Test	Composite	Flotation Product	NaCN, (g/L)	Au Extraction (%)
CN-2	Silica Hill	Pyrite Scavenger Concentrate (Open Bench Flotation)	5	89.1
CN-3	Mato Bula	Pyrite Scavenger Concentrate (Open Bench Flotation	5	66.3
CN-5	Silica Hill	Pyrite Scavenger Concentrate & Cleaner 1 Tailings (LCT Test)	5.5	91.3
CN-6	Mato Bula	Pyrite Scavenger Concentrate & Cleaner 1 Tailings (LCT Test)	7	51.9

Note: NaCN – sodium cyanide

Figure 13.13 Summary of Flotation Product Leach Kinetics Curves

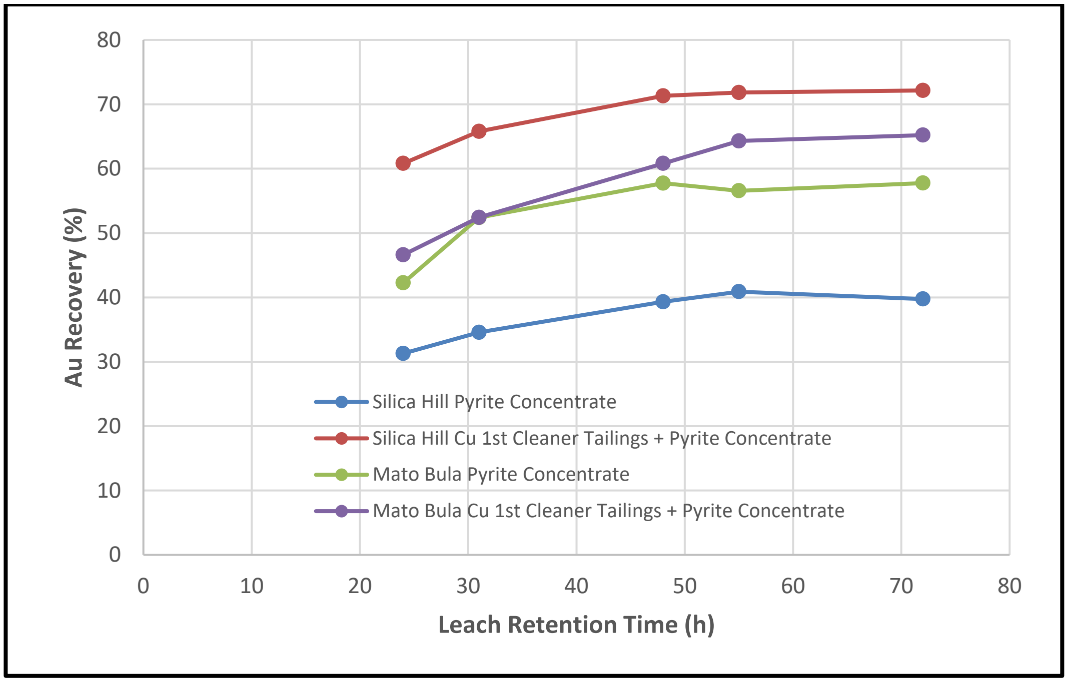


The data shows that for the Silica Hill composite, the gold extractions using agitated cyanidation were 89% for the pyrite scavenger concentrate and 91% for the combined pyrite scavenger concentrate/copper cleaner 1 tailings respectively.

For the Mato Bula samples, the gold extractions from both the pyrite scavenger concentrate and the combined pyrite scavenger concentrate/copper cleaner 1 tailings were significantly lower at 66% and 52%, respectively, compared to the Silica Hill flotation samples. BCR indicates that it is possible that higher cyanide dosages may be needed to effectively leach the gold from the Mato Bula flotation products.

In 2018, a further cyanide leach test work (Project #: PJ5247) was conducted to investigate whether additional gold can be extracted from the cyanide leach residues produced from the PJ5162 test program. The leach residues were reground to 80% passing approximately 25 µm and then leach at the cyanide strength of 5 g/L for 72 hours. The test results are shown in Figure 13.14.

Figure 13.14 Cyanide Leach Test results on Leach Residues



Note: Regrind size: Silica Hill Pyrite Concentrate – 83% passing 25 µm
Silica Hill Cu 1st Cleaner Tailings/Pyrite Concentrate Blend
Mato Bula Pyrite Concentrate – 83% passing 25 µm
Mato Bula Cu 1st Cleaner Tailings/Pyrite Concentrate Blend

The test results show that with regrinding and additional leach retention time, the gold extractions were improved significantly. Also, the curves in Figure 13.14 show rapid leaching kinetics for the initial 24 hours.

13.7 COMMINUTION

A Bond Work Index (BWi) test on a composite sample from the lower area of the deposit consisting of subsamples of one quarter diamond drill cores selected from eight diamond drill holes. The test shows a BWi of 10.7 kWh/t. This would classify the material as medium hardness.

13.8 PROJECTIONS ON COMBINED FLOTATION/CYANIDATION RECOVERY

On average, the centrifugal concentration would be able to recover approximately 10% of the gold from the mineralization. Both the mineralization from the Mato Bula and silica zones responded well to the conventional flotation for copper recovery. The gold from the Mato Bula zone responded reasonably well to the flotation, but the gold in the Silica Hill mineralization showed inferior metallurgical performance to the flotation concentration. However, the gold reporting to the gold-pyrite materials responded well to cyanidation. By combining the flotation recoveries from the LCT tests with the data from agitated cyanide leaching tests on the flotation products, BCR projected the metallurgical performances for the Mato Bula and Silica Hill mineralization. The BRC's projections are summarized in Table 13.20 Summary of Metallurgical Performance Projection By BCR.

Table 13.20 Summary of Metallurgical Performance Projection By BCR

Sample	Flotation Concentrate					Leach Extraction (% Au)	Total Gold Recovery (% Au)
	Grade	Recovery					
	Bulk Cu-Au Concentrate (% Cu)	Bulk Cu-Au Concentrate		Pyrite Scavenger Concentrate (% Au)	Cu Cleaner Tailings (% Au)		
		(% Cu)	(% Au)				
Mato Bula	27	93	83	8	3	52	89
Silica Hill	23	82	38	12	43	91	88

The samples used in the test work have higher head grades, compared to the average feed grades that are planned to be fed to the proposed mill. To reflect the potential impact of the head grade differences on metal recoveries, the projected plant recoveries have been reduced for the PEA study. Further test work should be conducted on more representative samples to confirm the metallurgical responses.

14.0 MINERAL RESOURCE ESTIMATES

The Mineral Resource estimate was completed in May 2016 (with an effective date of May 31, 2016). Since that time, EAM have completed and additional 48 drillholes for a total of 7,013.6 m. DKT reviewed the 2017 infill drillholes on section and in plan. The additional drilling does not significantly change the geological interpretation and the copper and gold grades are similar to those intersected in 2016. DKT concludes that the 2017 infill drilling will not result in a material change to the Mato Bula Mineral Resource estimate.

14.1 WIREFRAME MODELS AND MINERALISATION MATO BULA

EAM provided Fladgate with sectional interpretations of the mineralization based on copper and gold grades. Fladgate created wireframe models of the mineralized zones using EAM's drillhole intercepts with MineSight's implicit modeller. Fladgate reviewed the wireframe models and found the wireframe boundaries were correctly snapped to the drill hole intercepts. Fladgate inspected drill holes displaying gold and copper grades. No significant zones of mineralization fall outside the wireframes.

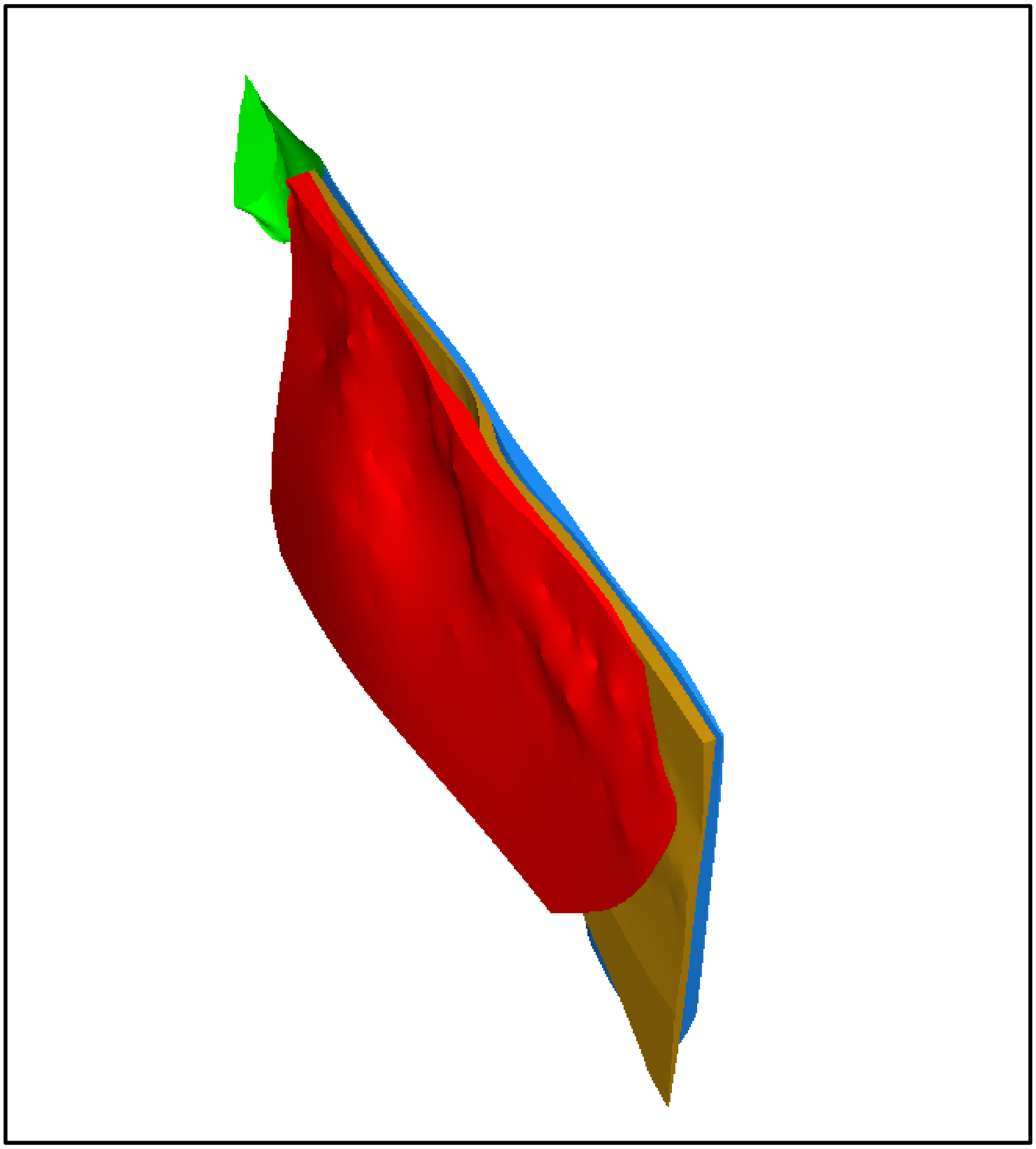
Fladgate coded each zone separately. The zone codes are show in Table 14.1.

Table 14.1 Adyabo Project Domain Codes

Domain	Code
Zone 100	100
Zone 150	150
Zone 200	200
Zone 300	300

The wireframe models used to constrain Mineral Resource estimation are shown below in Figure 4.1. Fladgate created partial items and stored the percentage of each block falling within the wireframes.

Figure 14.1 3D View of Mineralization Wireframes Looking Northeast, Mato Bula



Note: Zone 100 is shown in red. Zone 150 shown in orange. Zone 200 is shown in blue. Zone 300 is shown in green.

14.1.1 Exploratory Data Analysis

Exploratory data analysis (EDA) comprised basic statistical evaluation of the assays and composites for gold, copper, silver and sample length.

14.1.2 ASSAYS

HISTOGRAMS AND PROBABILITY PLOTS

Log-scaled histograms and probability plots for copper, gold and silver within the zones show evidence for mixed populations. The log-scaled histograms for each zone show included higher-grade populations, comprising 10% to 20% of the samples. Fladgate concludes that this amount of included higher-grade material warrants further domaining. The gold histograms and probability plots for Zone 100 and Zone 200 are shown below in Figure 14.2 and in Figure 14.3.

Figure 14.2 Zone 100 Histograms and Probability Plots, Assays

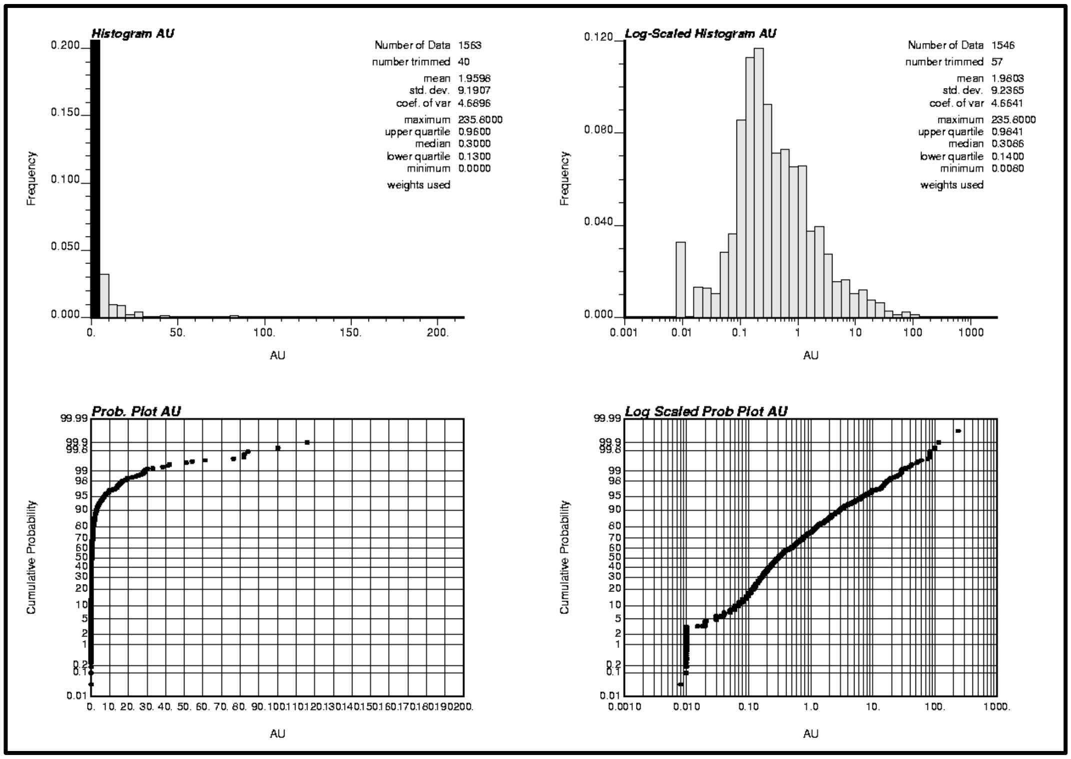
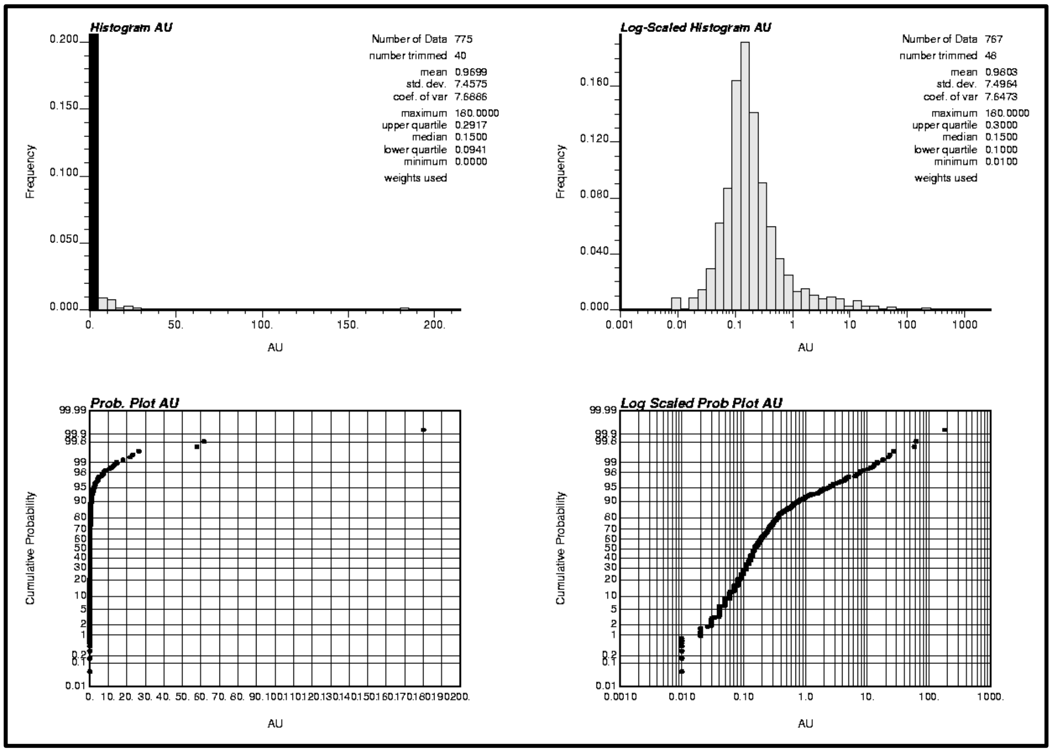


Figure 14.3 Zone 200 Histograms and Probability Plots, Assays



Grade Capping/Outlier Restrictions

Fladgate evaluated length-weighted, normal-scaled and log-scaled histograms and probability plots of the assays to define grade outliers for gold, copper and silver within each of the domains separately.

The capping grade thresholds and the amount of metal removed within the domains are shown below in Table 14.2, Table 14.3 and Table 14.4. Capping was completed on the assays before compositing.

Fladgate selected capping thresholds for each that are somewhat higher than would typically be selected (based on the histograms and probability plots) because the high grades are spatially clustered in steeply plunging higher-grade zones within the mineralization.

Assay Statistics

Fladgate tabulated summary length-weighted statistics for gold and silver within each domain. The summary statistics are shown below in Table 14.2, Table 14.3 and Table 14.4.

Table 14.2 Length Weighted Assay Statistics for Gold within Each Domain

Domain	Number	Minimum	Maximum	Mean (g/t)	CV	Capping Threshold (g/t)	Capped Mean (g/t)	Capped CV	Metal (%)	Number of Assays Capped
Zone 100	1563	0.00	235.80	1.96	4.69	80	1.82	3.68	-7	4
Zone 150	684	0.01	284.50	0.65	14.26	15	0.37	3.10	-44	3
Zone 200	775	0.00	180.00	0.97	7.69	30	0.70	3.92	-28	2
Zone 300	295	0.01	101.00	1.40	6.23	50	1.11	5.39	-20	2

Table 14.3 Length Weighted Assay Statistics for Copper within Each Domain

Domain	Number	Minimum	Maximum	Mean (%)	CV	Capping Threshold (%)	Capped Mean (%)	Capped CV	Metal (%)	Number of Assays Capped
Zone 100	1563	0.00	8.68	0.20	2.59	6.0	0.20	2.46	-1	2
Zone 150	684	0.00	1.86	0.05	2.06	0.7	0.05	3.48	-3	2
Zone 200	781	0.00	10.20	0.09	5.46	4.0	0.08	3.67	-12	3
Zone 300	295	0.00	1.03	0.02	3.52	_	0.02	3.52	0	0

Table 14.4 Length Weighted Assay Statistics for Silver within Each Domain

Domain	Number	Minimum	Maximum	Mean (g/t)	CV	Capping Threshold (g/t)	Capped Mean (g/t)	Capped CV	Metal (%)	Number of Assays Capped
Zone 100	1444	0.0	312.0	2.0	6.0	55	1.6	2.8	-17.3	3
Zone 150	618	0.0	17.0	0.3	3.5	_	0.3	3.5	0.0	0
Zone 200	678	0.0	29.0	0.2	8.4	_	0.2	8.4	0.0	0
Zone 300	295	0	18.5	0.1	8.5	_	0.1	8.5	0.0	0

The coefficient of variation (CV) values of the capped assays within each zone are generally over 2. Fladgate concludes that further domaining of the copper and gold grades may be warranted.

COMPOSITES

To normalize the weight of influence of each sample, Fladgate regularized the assay intervals by compositing the drillhole data into 2 m lengths using the mineralization zone domain boundaries to break the composites. The original samples are mostly 1 m in length; therefore, a 2 m composite length reduces the amount of sample splitting.

Fladgate back-tagged the 2 m composites using the mineralization zone solids. Summary 2 m composite statistics are shown below in Table 14.5, Table 14.6 and Table 14.7.

Table 14.5 Length Weighted 2 m Composite Statistics, Gold

Domain	Number	Minimum (g/t)	Maximum (g/t)	Mean (g/t)	CV	Capped Mean (g/t)	Capped CV	Capped Assay Mean (g/t)
Zone 100	761	0.00	120.19	1.96	3.44	1.82	2.74	1.82
Zone 150	337	0.01	99.91	0.65	8.47	0.37	2.26	0.37
Zone 200	380	0.00	90.36	0.97	5.44	0.70	2.93	0.70
Zone 300	145	0.01	84.78	1.39	5.84	1.11	4.99	1.11

Table 14.6 Length Weighted 2m Composite Statistics, Copper

Domain	Number	Minimum (%)	Maximum (%)	Mean (%)	CV	Capped Mean (%)	Capped CV	Capped Assay Mean (%)
Zone 100	761	0.00	3.82	0.20	2.01	0.20	1.93	0.20
Zone 150	337	0.00	1.31	0.05	1.67	0.05	1.30	0.05
Zone 200	380	0.00	4.06	0.10	3.62	0.08	2.97	0.08
Zone 300	145	0.00	0.37	0.02	2.38	0.02	2.38	0.02

Table 14.7 Length Weighted 2m Composite Statistics, Silver

Domain	Number	Minimum (g/t)	Maximum (g/t)	Mean (g/t)	CV	Capped Mean (g/t)	Capped CV	Capped Assay Mean (g/t)
Zone 100	697	0.0	131.3	2.0	3.8	1.6	2.2	1.6
Zone 150	304	0.0	6.3	0.3	2.8	0.3	2.8	0.3
Zone 200	327	0.0	7.8	0.1	7.5	0.1	7.5	0.2
Zone 300	145	0.0	4.4	0.1	4.0	0.1	4.0	0.1

Fladgate notes that the length-weighted mean grades of 2 m length composites are very similar to those of the assays; therefore, Fladgate is confident that the compositing process works as intended. Except for copper within zones 100 and 150, the capped CV values of the composites are high to very high (over 2).

Gold histograms and probability plots for zone 100 and zone 200 are shown in Figure 4.4 and Figure 4.5.

Figure 14.4 Mato Bula Zone 100 Histograms and Probability Plots, Capped Composites

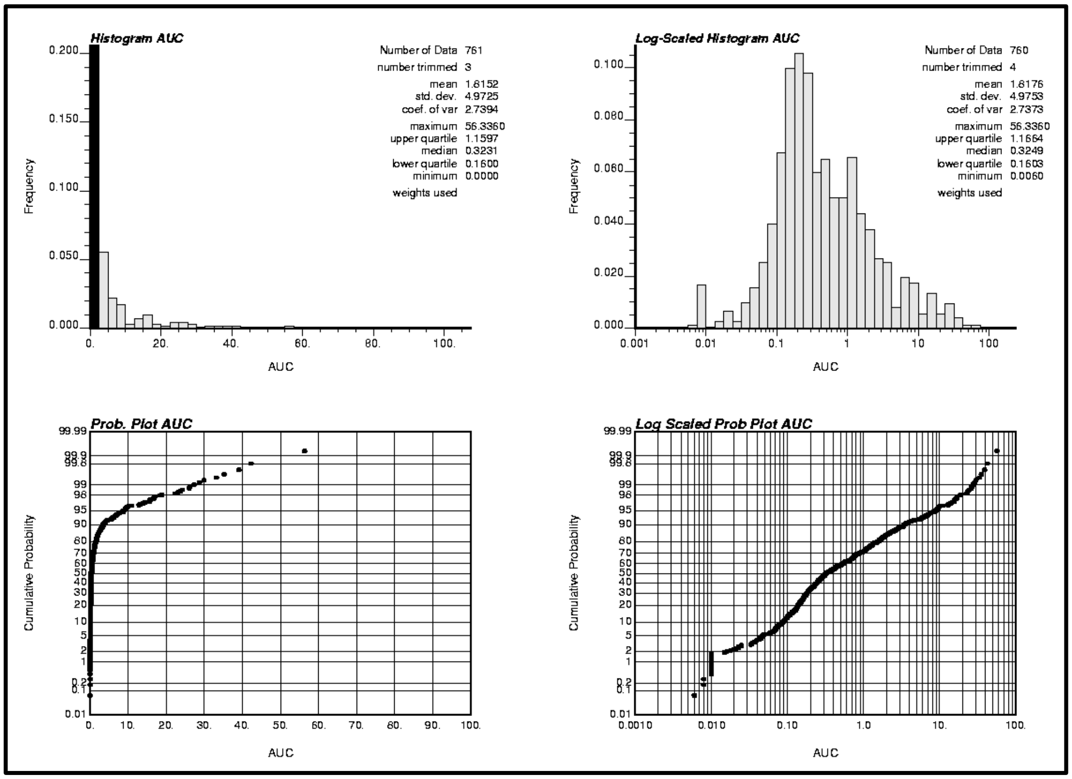
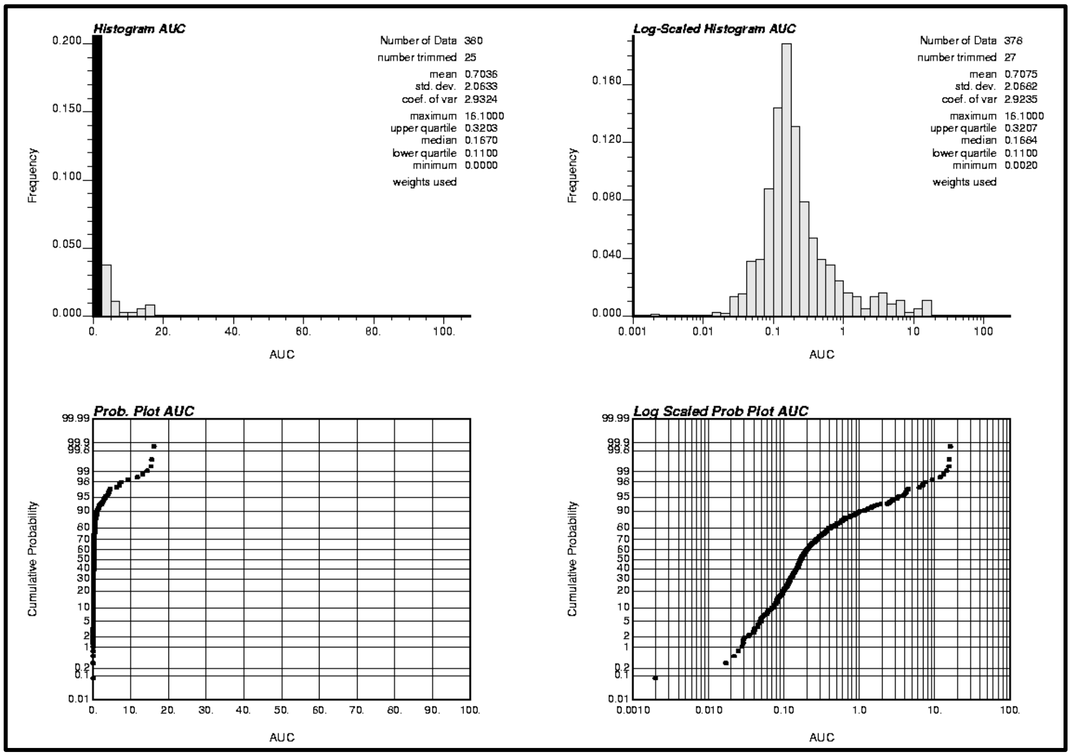


Figure 14.5 Mato Bula Zone 200 Histograms and Probability Plots, Capped Composites



INDICATOR SUBDOMAINING

As a result of the multiple gold composite populations and high CV within all zones and within zone 200 for copper, Fladgate created probabilistic indicator models.

Indicator grade thresholds were selected by inspection of probability plots of the composites for inflection points and by minimizing the total CV of the grades above and below the thresholds. The CV plots are shown in Figure 14.6 and the selected grade thresholds are shown in Table 14.8.

Figure 14.6 CV Plots, Zones 100, 150 and 200

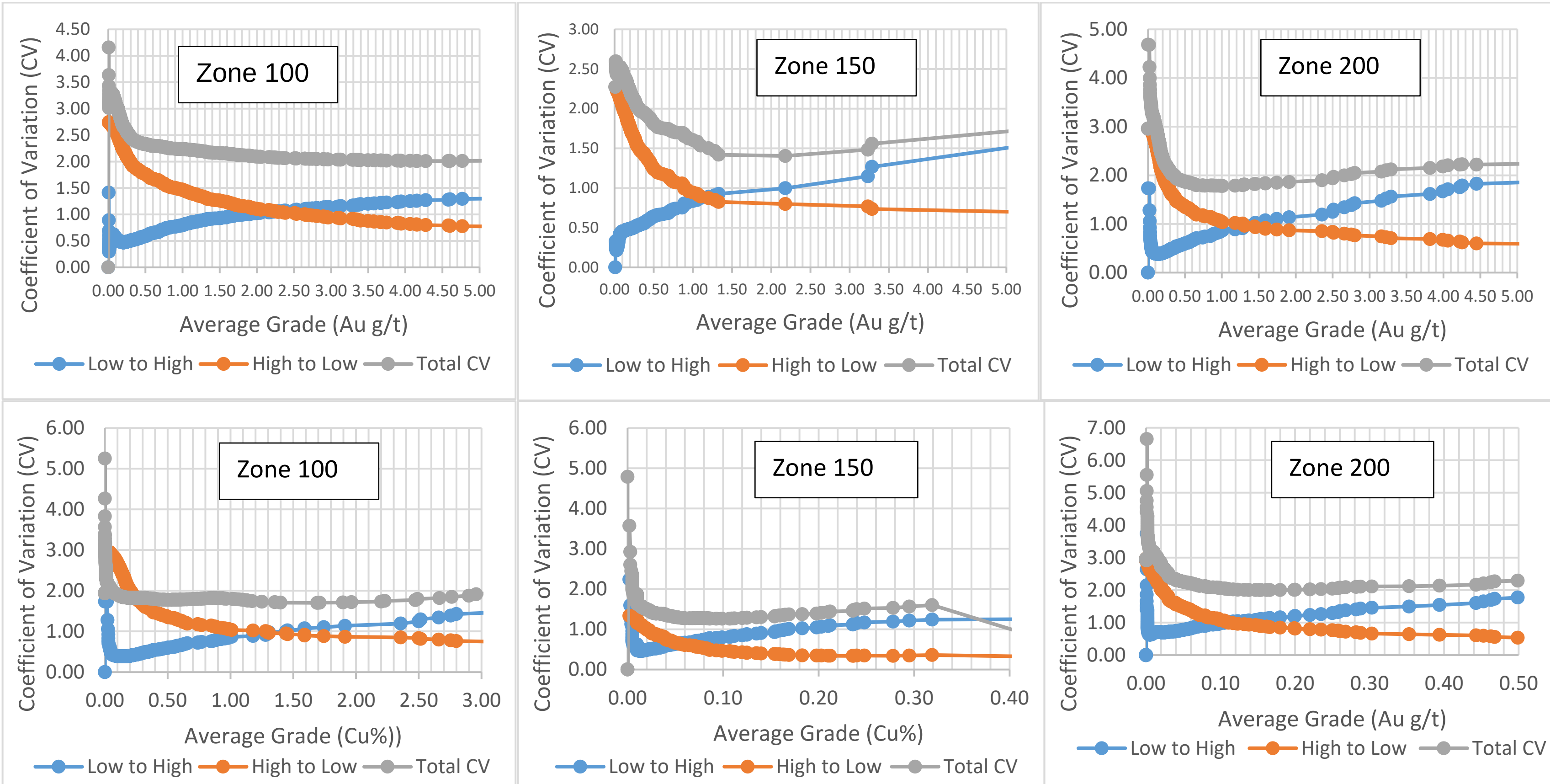


Table 14.8 Gold Indicator Grade Thresholds

Zone	Threshold (Au g/t)	Threshold (Cu %)
100	2.3	1.4
150	1.2	-
200	1.4	0.12
300	0.5	-

Fladgate coded the composites with a value of 1 if the gold grade was greater than or equal to the chosen threshold and a code of 0 if the gold grade was below the threshold. The composite indicator values were used to estimate block indicator values using inverse distance to the power of three (IDW^3). A nearest neighbour (NN) model was estimated and assumed to represent an unbiased estimate of the proportion of blocks above the grade threshold.

Threshold indicator values were selected in the IDW^3 model to achieve a close approximation of the number of blocks with an indicator value of one in the NN model (Table 14.9). Blocks were coded above and below this indicator threshold. The composites were then back-tagged with the code from the blocks.

Summary statistics of the coded composites are shown below in Table 14.10. Minor adjustments were made to the classification of composites to avoid high grade composites coded to the lower-grade subdomain and vice versa. Overall, the indicator coding is successful in separating low-grade mineralization from higher-grade mineralization.

Table 14.9 Block Indicator Subdomaining Results, All Zones

Zone	Threshold	Indicator Threshold	Number of Blocks	NN Number	Difference (%)
100	2.3 g/t	0.35	9,501	9,597	-1.0
150	1.2 g/t	0.35	1,590	1,590	0.0
200	1.4 g/t	0.34	4,740	4,660	1.7
300	0.5 g/t	0.33	2,061	2,054	0.3
100 Copper	1.4%	0.37	1,678	1,625	3.3
200 Copper	0.12%	0.40	5,450	5,596	-2.6

Table 14.10 Composite Indicator Subdomaining Results, All Zones

Zone	Mean		CV	
	Low Grade	Higher Grade	Low Grade	Higher Grade
100	0.52 g/t	2.24 g/t	1.16	0.51
150	0.26 g/t	2.84 g/t	1.43	0.91
200	0.23 g/t	0.98 g/t	0.98	0.68
300	0.15 g/t	8.57 g/t	0.62	1.67
100 Copper	0.16%	1.78%	1.48	0.58
200 Copper	0.03%	0.47%	3.20	1.12

VARIOGRAPHY

Fladgate constructed down-hole and directional correlograms for gold and copper grades within the mineralized domains. Fladgate used a single spherical model and a nested exponential model and a coarse gold effect to fit the experimental correlograms. Table 14.11 shows the correlogram models.

Fladgate notes that the gold variogram shows a moderate coarse gold effect with short range structures.

Table 14.11 Variogram Models, Mato Bula

Grade Element	Coarse Gold Effect	Sill		Structure Type		Ranges First Structure			Ranges Second Structure		
		1st Structure	2nd Structure	First	Second	Y	X	Z	Y	X	Z
Au	0.383	0.370	0.247	Spherical	Exponential	10.0	10.0	10.0	160	80	40
Cu	0.313	0.345	0.342	Spherical	Exponential	15	15	15	160	90	50

Note: No Rotations are given as the interpolation plan uses distances in the plane of the wireframe.

14.1.3 ESTIMATION/INTERPOLATION METHODS

The block model consists of regular blocks (5 m along strike by 2 m across strike by 5 m vertically). The block size was chosen to reflect geological contacts reasonably and to support selective mining scenarios.

In zones 100, 150 and 200, Fladgate used an ordinary kriging (OK) grade interpolation method in two passes. Fladgate used MineSight's dynamic unfolding (DU) module to account for significant changes in the orientation of the mineralization wireframe. The DU module uses input surfaces to calculate non-linear distances between composites and blocks to composites. Search distances used in grade estimation are in metres along the strike (x-axis), down-dip (y-axis) and perpendicular to dip (z-axis) orientations of the wireframe. In Zone 300, Fladgate used an inverse-distance weighted (to the power of three) grade interpolation method in two passes.

Grade estimation used a composite and block matching scheme based on the domain codes. For example, composites coded to the Zone 100 were only used to estimate blocks falling within Zone 100. The same grade estimation plan was used for gold, copper and silver.

The indicator subdomains were used as hard boundaries. Only composites coded as falling within the higher-grade subdomains were used to estimate blocks falling within the higher-grade subdomains.

Table 14.12 and Table 14.13 show the composite restrictions and search distances for the estimation domains. A longer search distance was selected in the vertical direction of the wireframe based on visual inspection of gold grades on a long-section along the strike of the deposit and based upon the anisotropy of the variogram models. The long-section shows several steeply plunging zones of higher-grade mineralization.

Table 14.12 Grade Model Interpolation Plan, Pass 1

	Search Ellipse Dimensions Pass 1			Composite Restrictions			Number of Holes		Rotation Angles		
Domain	X-Axis	Y-Axis	Z-Axis	Minimum	Maximum	Maximum Per Hole	Minimum	Maximum	Z-Axis	X-Axis	Y-Axis
Zone 100	40	80	20	3	8	2	2	4	-	-	-
Zone 150	40	80	20	3	8	2	2	4	-	-	-
Zone 200	40	80	20	3	8	2	2	4	-	-	-
Zone 300	40	80	20	3	8	2	2	4	-60	60	0

Table 14.13 Grade Model Interpolation Plan, Pass 2

	Search Ellipse Dimensions Pass 1			Composite Restrictions			Number of Holes		Rotation Angles		
Domain	X-Axis	Y-Axis	Z-Axis	Minimum	Maximum	Maximum Per Hole	Minimum	Maximum	Z-Axis	X-Axis	Y-Axis
Zone 100	80	160	40	1	8	2	1	4	-	-	-
Zone 150	80	160	40	1	8	2	1	4	-	-	-
Zone 200	80	160	40	1	8	2	1	4	-	-	-
Zone 300	80	160	40	1	8	2	1	4	-60	60	0

Note: For Zone 300, search ellipse orientations are given using the LRR rotation convention as used in GSLIB. No orientations are given for domains using Dynamic Unfolding.

14.1.4 Density Assignment

A total of 1,755 specific gravity (SG) determinations were performed on drill core samples collected from material within the mineralized zones at Mato Bula. The determinations were performed at site using unsealed immersion technique to measure the weight of each sample in air and in water. Fladgate assigned an average SG of 2.84 to blocks within zones 100 and 150 and an SG of 2.85 to blocks within Zone 200. An SG of 2.83 was used in Zone 300. The SG values have been used directly as the dry bulk density to report the tonnage estimates of the mineral resource.

The rock types intercepted in the drill holes are generally not porous; therefore, the amount of porosity is not expected to cause a large difference between the SG and bulk density. However, Fladgate recommends that at least 10% of the SG determinations be repeated using a wax-sealed immersion method of SG measurement in a commercial laboratory.

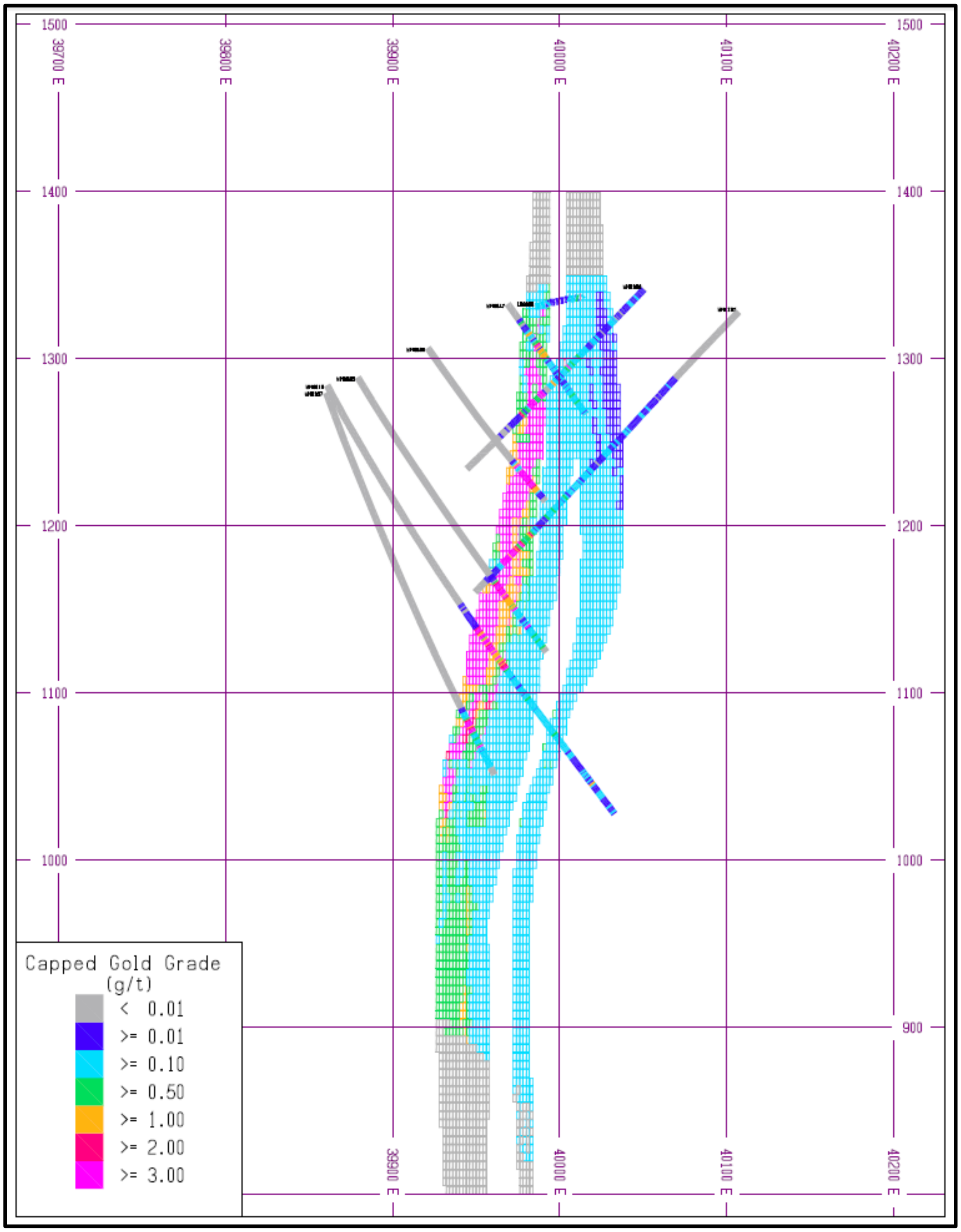
14.1.5 Block Model Validation

Fladgate validated the Mato Bula block model to ensure appropriate honouring of the input data. NN grade models were created from 2 m composites to validate the OK grade models.

Visual Inspection

A visual inspection of block grade versus composited data in section and plan view was conducted. The visual inspection showed a good reproduction of the data by the model. An east-west oriented cross-section is shown in Figure 14.7.

Figure 14.7 East-West Cross-Section, 19,880 N



Metal Removed by Capping

Fladgate evaluated the impact of capping by estimating uncapped and capped grade models. Generally, the amounts of metal removed by capping in the models are consistent with the amounts calculated during the grade capping study on the composites. The amounts of metal removed are shown below in Table 14.14.

Table 14.14 Metal Removed from Models by Capping

Zone	Gold (%)	Copper (%)	Silver (%)
100	-6.6	-0.6	-15.3
150	-2.2	-2.2	-0.0
200	-20.7	-7.0	-11.8
300	-0.0	-20.7	-0.0

GLOBAL BIAS CHECKS

A comparison between the OK and NN estimates was completed on classified blocks to check for global bias in the grade estimates. Differences were generally within acceptable levels (less than 5% for the Indicated category and less than 10% for the Inferred category). Summary statistics are shown in Table 14.15, Table 14.16, Table 14.17 and Table 14.18.

Table 14.15 NN and OK/IDW^3 Model Statistics Comparison, Indicated Blocks

Grade	NN Blocks Capped		OK/IDW^3 Blocks Capped		% Differences
	Mean	Number	Mean	Number	Mean (NN-OK)
Gold (g/t)	2.27	33,718	2.34	33,718	3.3
Copper (%)	0.21	33,797	0.20	33,797	-1.7
Silver (g/t)	0.9	31,509	0.9	31,509	-4.4

Table 14.16 2 m Composite, NN and OK/IDW^3 Model Statistics Comparison, Gold

Domain	Code	2 m Capped Composites		NN Blocks Capped		OK/IDW^3 Blocks Capped		% Differences	
		Mean Au (g/t)	Number	Mean Au (g/t)	Number	Mean Au (g/t)	Number	Mean (Composites - NN)	Mean (NN-OK)
Zone 100	100	1.82	761	0.94	127,409	0.98	127,409	-93.1	6.6
Zone 150	150	0.37	337	0.22	59,641	0.22	59,641	-67.8	-1.0
Zone 200	200	0.70	380	0.42	92,453	0.41	92,453	-68.3	-1.6
Zone 300	300	1.11	145	1.04	28,474	0.90	28,474	-6.5	-13.3

Table 14.17 2 m Composite, NN and OK/IDW^3 Model Statistics Comparison, Copper

Domain	Code	2 m Capped Composites		NN Blocks Capped		OK/IDW3 Blocks Capped		% Differences	
		Mean Cu (%)	Number	Mean Cu (%)	Number	Mean Cu (%)	Number	Mean (Composites - NN)	Mean (NN - OK)
Zone 100	100	0.20	761	0.16	127,409	0.17	127,409	-20.0	2.1
Zone 150	150	0.05	337	0.06	59,798	0.05	59,664	15.8	-4.3
Zone 200	200	0.10	380	0.07	116,556	0.07	116,556	-22.6	-3.4
Zone 300	300	0.02	145	0.02	28,474	0.02	28,474	-7.7	-1.3

Table 14.18 2 m Composite, NN and OK/IDW^3 Model Statistics Comparison, Silver

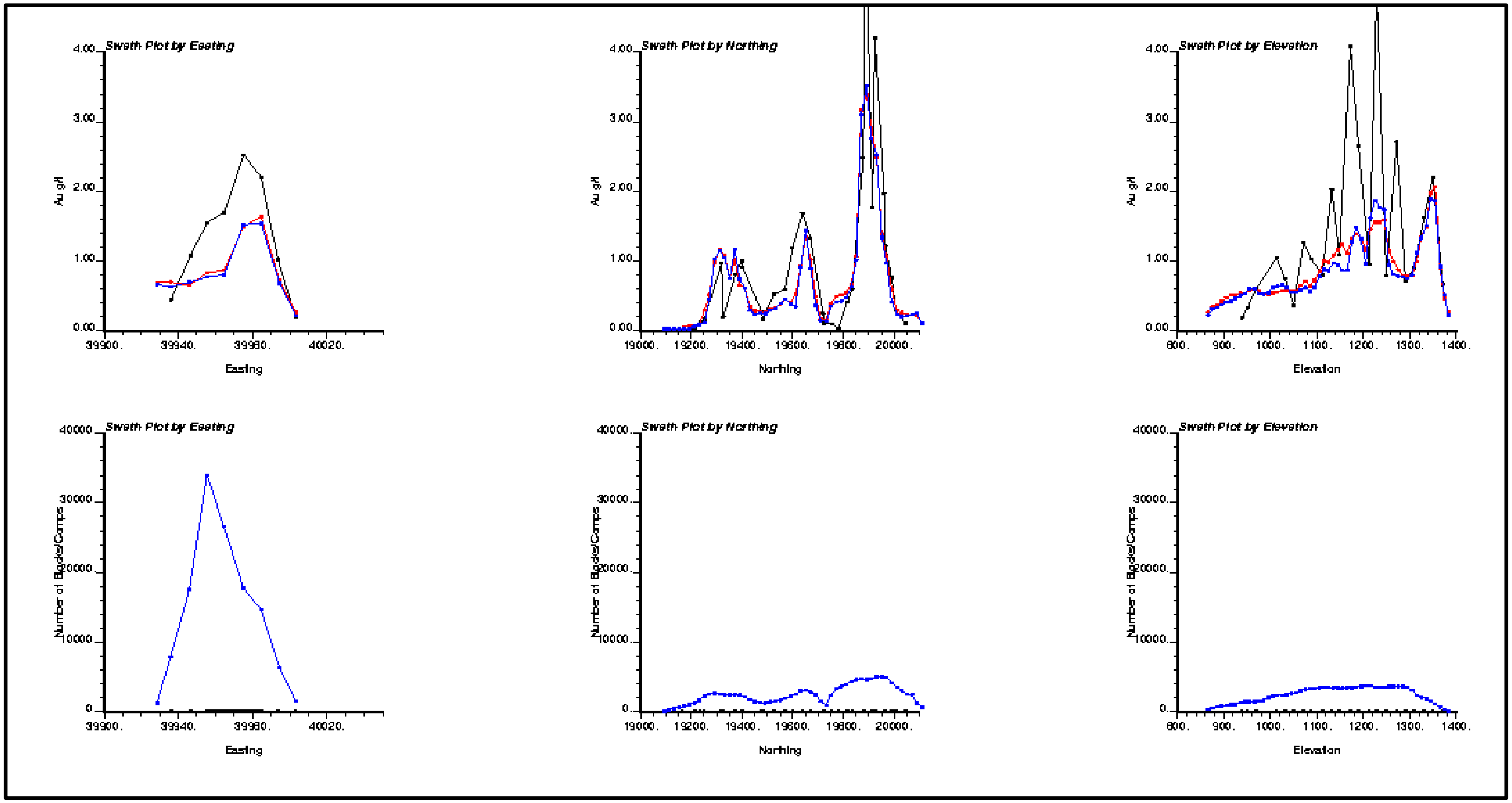
Domain	Code	2 m Capped Composites		NN Blocks Capped		OK/IDW^3 Blocks Capped		% Differences	
		Mean Ag (g/t)	Number	Mean Ag (g/t)	Number	Mean Ag (g/t)	Number	Mean (Composites - NN)	Mean (NN - OK)
Zone 100	100	1.6	697	1.9	120,002	1.9	120,002	12.9	0.9
Zone 150	150	0.3	304	0.3	47,136	0.4	47,136	8.9	22.2
Zone 200	200	0.1	327	0.1	85,548	0.1	85,548	-24.3	-23.5
Zone 300	300	0.1	145	0.1	28,474	0.1	28,474	27.4	37.0

LOCAL BIAS CHECKS

Fladgate checked for local bias by plotting the average gold and copper grades of composites, NN and OK models in swaths oriented along the model northings, eastings and elevations.

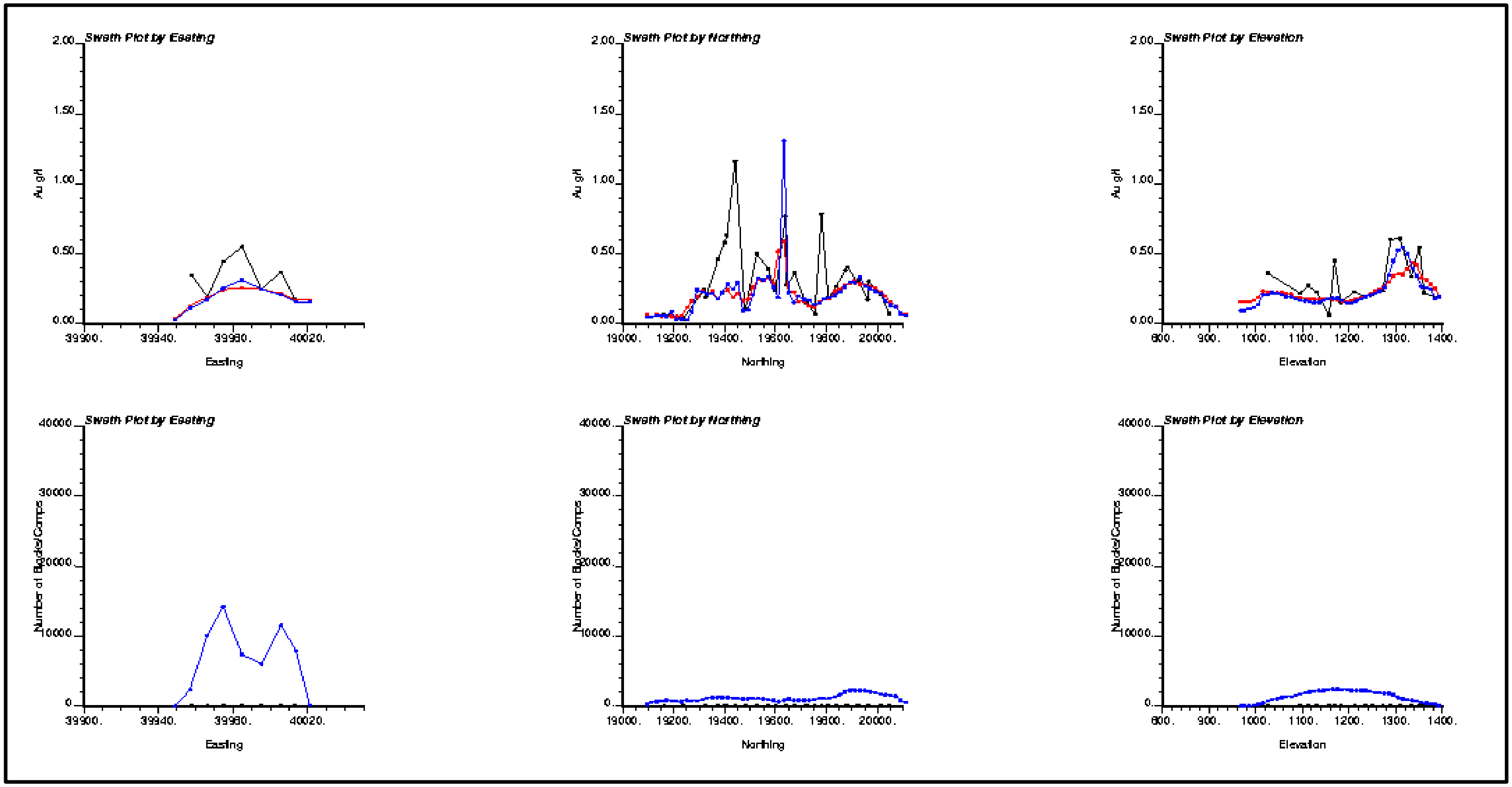
Fladgate reviewed the swath plots and found only minor discrepancies between the NN and OK model grades. In areas with significant extrapolation beyond the drill holes, the swath plots indicate less agreement for all variables. The gold swath plots for each zone are shown below in Figure 14.8, Figure 14.9 and Figure 14.10.

Figure 14.8 Gold Swath Plots by Easting, Northing and Elevation for Zone 100



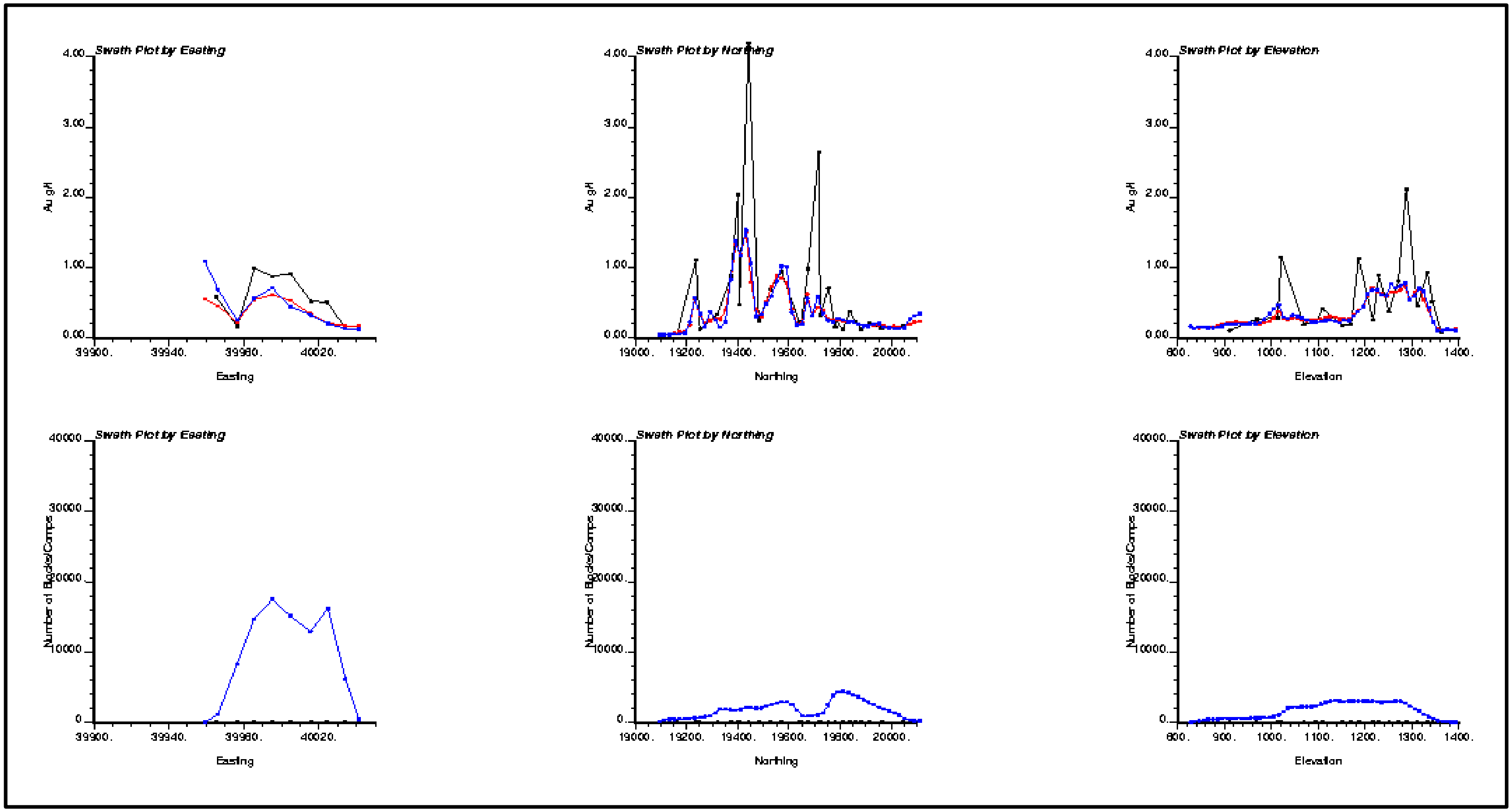
Note: Upper Swath plots show the grades; lower swath plots show number of blocks or composites. Red line represents OK model. Blue line represents NN model. Black line represents composites.

Figure 14.9 Gold Swath Plots by Easting, Northing and Elevation for Zone 150



Note: Upper Swath plots show the grades; lower swath plots show number of blocks or composites. Red line represents IDW3 model. Blue line represents NN model. Black line represents composites.

Figure 14.10 Gold Swath Plots by Easting, Northing and Elevation for Zone 200

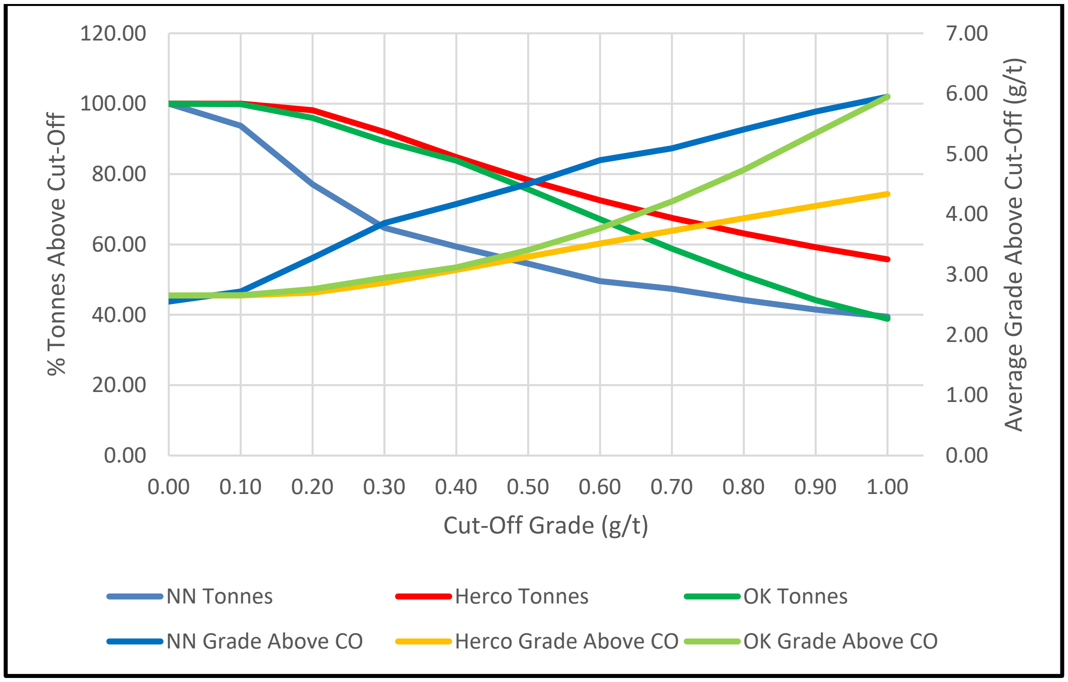


Note: Upper Swath plots show the grades; lower swath plots show number of blocks or composites. Red line represents IDW3 model. Blue line represents NN model. Black line represents composites

Grade Smoothing/Model Selectivity Checks

Fladgate checked grade smoothing (model selectivity) for potential open pit mining using a global change-of-support correction (a discrete Gaussian model or DGM) to the NN model. The check was completed for gold in the oxide and transition domains for gold. The results show that the amount of smoothing is acceptable for a block size of 4 m by 5 m by 5 m around the cut-off grades of interest and is generally less than 5%. A grade-tonnage curve comparing the OK model to the reference discrete Gaussian model is shown below in Figure 14.11.

Figure 14.11 Grade-Tonnage Curve Comparison of OK Model with NN and DGM Models



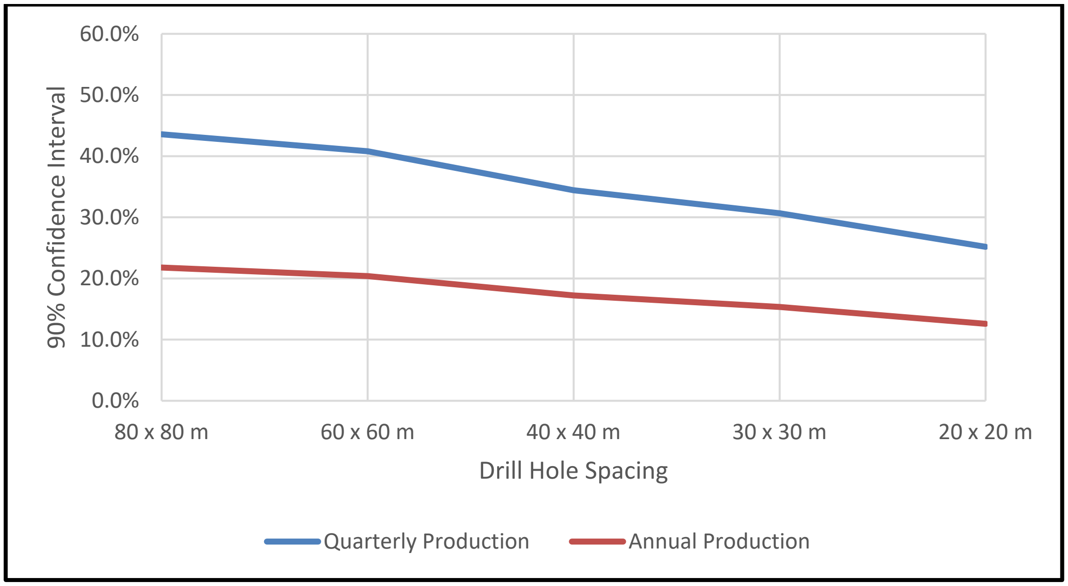
14.1.6 Classification of Mineral Resources

Fladgate classified blocks with a maximum distance of 80 m to the closest composite to the Inferred category.

Fladgate reviewed the geological model, data quality, geological continuity and metallurgical characteristics for classifying mineral resources. The mineralized zone wireframes are supported by drilling with a spacing of approximately 80 m, which is enough to assume that the mineralization is continuous between drillholes. An 80 m maximum distance to the closest composite permits a reasonable local estimate of grades (as demonstrated by model validation).

Fladgate analyzed confidence limits using quarterly panels of production for a 4,500 t/d open pit mine operation. The accuracy of grade estimates was then scaled to annual production. Accuracy of ±15% or better at a 90% confidence limit on annual production was used as the criteria to select a drill hole spacing to be used to classify Indicated mineral resources. The results (Figure 14.12) show that a drill hole spacing of 40 m (along the easting) by 40 m (along the northing) is sufficient to classify Indicated mineral resources.

Figure 14.12 Drillhole Spacing Study Results



Fladgate also analyzed the classification categories using conditional simulation of grades within Zone 100. Fladgate selected a confidence limit of ±15% or better at a 90% confidence limit to select blocks as potential candidates for the Indicated category.

The results of the conditional simulation show that the blocks classified as Indicated have a mean 90% confidence limit of ±15.3% with a minimum of ±9.6% and a maximum of ±27.6%.

Fladgate compared the updated mineral resource model within the area infill drilled to 40 m by 40 m spacing. The results of the comparison, shown in Table 14.19, show that the contained tonnes, grade and metal have changed enough to support the classification of Indicated mineral resources. The tonnage compared represents somewhat more than an annual production increment. At this stage of project development, the annual production throughput rate is not known but can be projected from the general size of the mineral resource.

Table 14.19 Mato Bula Model Comparison, Area of Infill Drilling

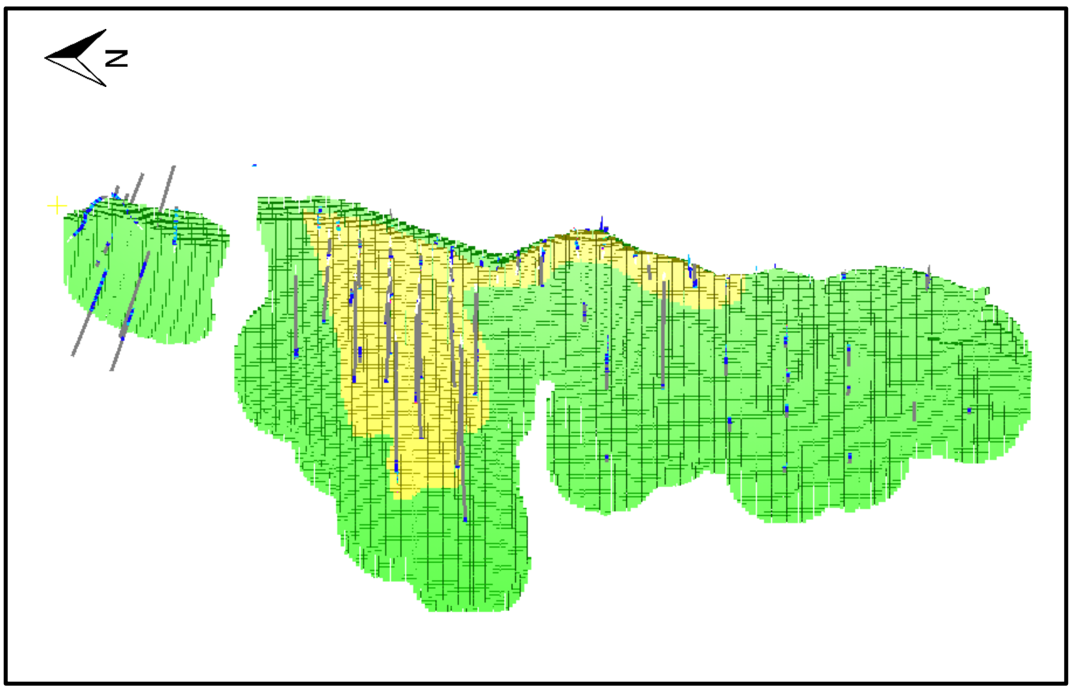
	NSR Cut-off (US$/t)	Tonnes	Gold Grade (Au g/t)	Copper Grade (Cu %)	Silver Grade (Ag g/t)	Gold (tr oz)	Copper (Mlbs)	Silver (tr oz)
Indicated 2016 Model	23.9	2,064,619	3.93	0.28	0.9	260,604	12.8	56,754
Inferred 2016 Model	23.9	68,426	0.59	0.63	1.6	1,289	1.0	3,628
Combined 2016 Model	23.9	2,133,045	3.82	0.29	0.88	261,893	13.7	60,382
Inferred 2015 Model	23.9	1,903,667	4.02	0.23	1.0	245,919	9.7	60,041
% Difference		12.0%	-5.0%	27.1%	-10.2%	6.5%	42.4%	0.6%

Fladgate classified blocks to the Indicated category using the following criteria:

- A maximum distance to the closest hole of 40 m.
- A maximum average distance from two holes of 31 m (approximately half the diagonal distance within a 40 m by 40 m grid with a 10% contingency).

A three-dimensional view of the resulting resource classification is shown in Figure 14.13.

Figure 14.13 Mato Bula Mineral Resource Classification



Note: Indicated shown in yellow. Inferred shown in green

14.2 MATO BULA NORTH MINERAL RESOURCE ESTIMATE

14.2.1 WIREFRAME MODELS AND MINERALIZATION MATO BULA NORTH

EAM provided Fladgate with sectional interpretations of the mineralization based on copper and gold grades. Fladgate created wireframe models of the mineralized zones using EAM's drillhole intercepts with Minesight's implicit modeler. Fladgate reviewed the wireframe models and found the wireframe boundaries were correctly snapped to the drill hole intercepts. Fladgate inspected drillholes displaying gold and copper grades. No significant zones of mineralization fall outside of the wireframes.

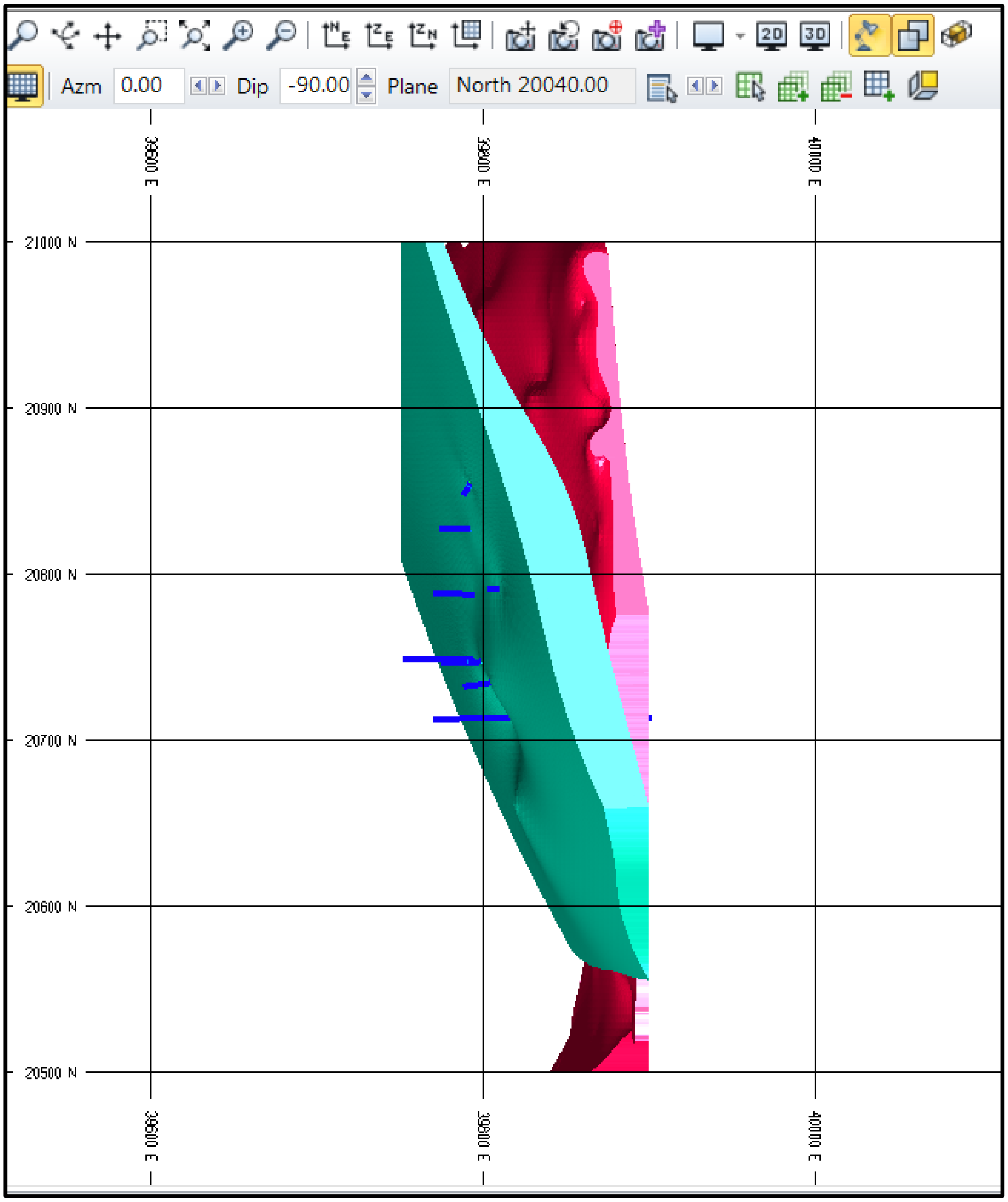
Fladgate coded each zone separately. The zone codes are show in Table 14.20.

Table 14.20 Mato Bula North Domain Codes

Domain	Code
Zone 100	100
Zone 200	200

The wireframe models used to constrain Mineral Resource estimation are shown below in Figure 14.14. Fladgate created partial items and stored the percentage of each block falling within the wireframes.

Figure 14.14 Horizontal Projection of Mineralization Wireframes, Mata Bula North



Note: Zone 100 is shown in light blue. Zone 200 is shown in light red.

14.2.2 Exploratory Data Analysis

EDA comprised basic statistical evaluation of the assays and composites for gold, copper, silver and sample length.

14.2.3 Assays

Histograms and Probability Plots

Log-scaled histograms and probability plots for copper, gold and silver within the zones show little evidence for mixed populations. Fladgate concludes that no further domaining is warranted. The copper histograms and probability plots for the 100 and 200 zones are shown below in Figure 4-28 and in Figure 4-29.

Figure 14.15 Zone 100 Histograms and Probability Plots, Assays

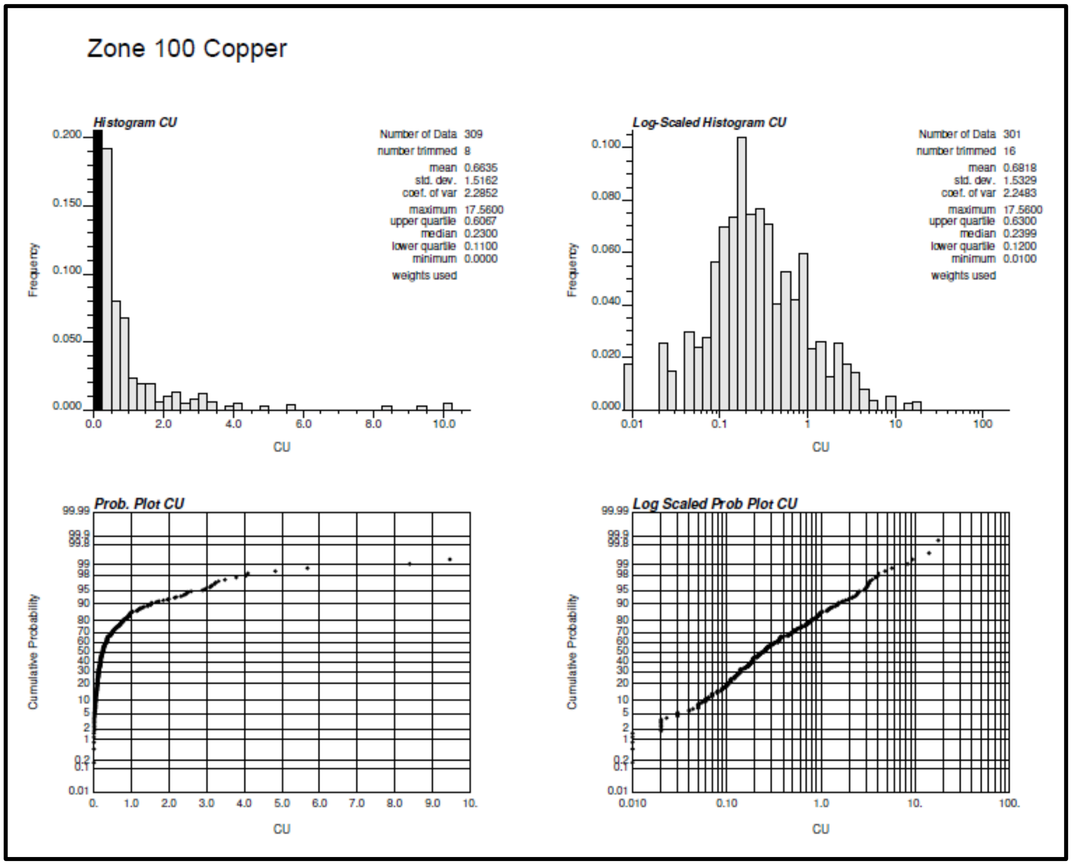
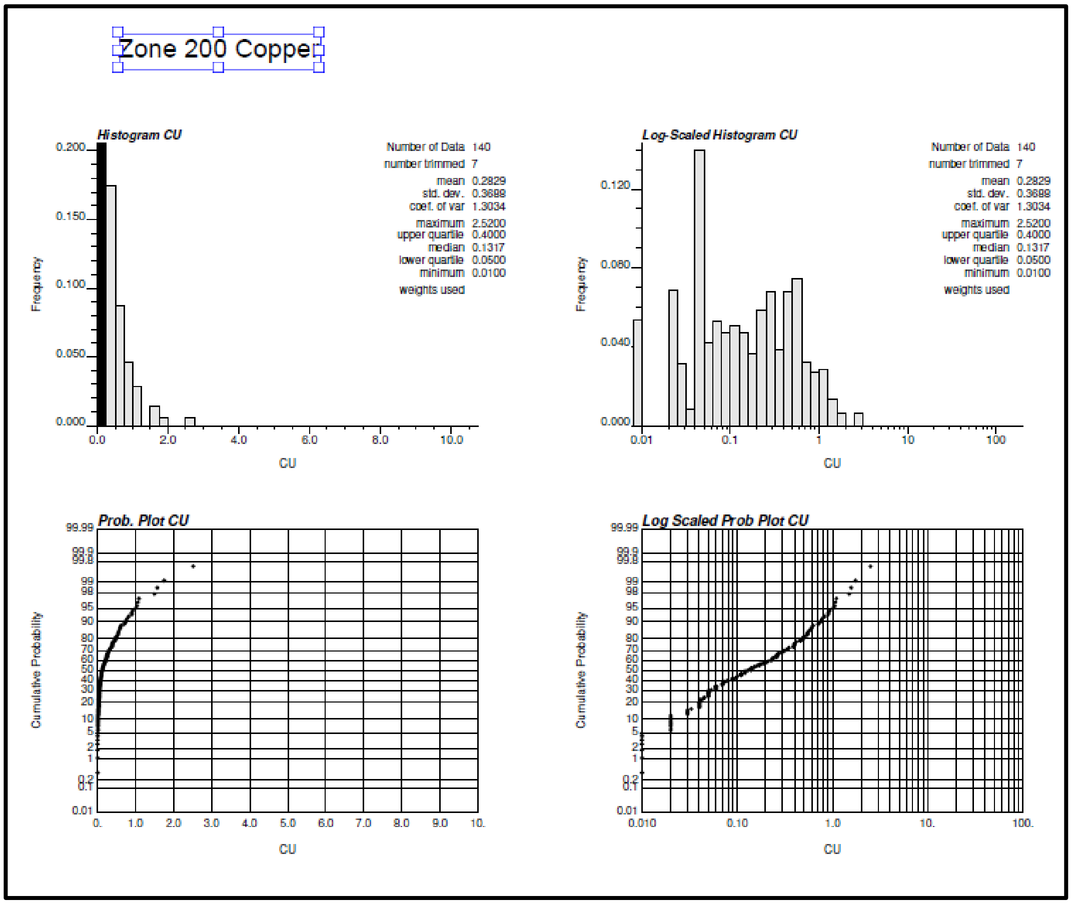


Figure 14.16 Zone 200 Histograms and Probability Plots, Assays



Grade Capping/Outlier Restrictions

Fladgate evaluated length-weighted, normal-scaled and log-scaled histograms and probability plots of the assays to define grade outliers for gold, copper and silver within each of the domains separately.

The capping grade thresholds and the amount of metal removed within the domains are shown below in Table 14-40 to Table 14-42. Capping was completed on the assays before compositing.

Assay Statistics

Fladgate tabulated summary length-weighted statistics for gold and silver within each domain. The summary statistics are shown below in Table 14.21, Table 14.22 and Table 14.23.

Table 14.21 Length-Weighted Assay Statistics for Gold within Each Domain

Domain	Number	Minimum	Maximum	Mean (g/t)	CV	Capping Threshold (g/t)	Capped Mean (g/t)	Capped CV	% Metal	Number of Assays Capped
Zone 100	309	0.00	4.09	0.17	1.90	2.5	0.17	1.77	-2%	1
Zone 200	140	0.00	24.70	0.64	4.62	2.5	0.31	1.47	-52%	2

Table 14.22 Length-Weighted Assay Statistics for Copper within Each Domain

Domain	Number	Minimum	Maximum	Mean (%)	CV	Capping Threshold (%)	Capped Mean (%)	Capped CV	% Metal	Number of Assays Capped
Zone 100	309	0.00	17.56	0.66	2.29	6	0.60	1.66	-10%	4
Zone 200	140	0.01	2.52	0.28	1.30	1.8	0.28	1.24	-2%	1

Table 14.23 Length-Weighted Assay Statistics for Silver within Each Domain

Domain	Number	Minimum	Maximum	Mean (g/t)	CV	Capping Threshold (g/t)	Capped Mean (g/t)	Capped CV	% Metal	Number of Assays Capped
Zone 100	245	0.00	63.00	3.31	2.29	33	3.02	1.90	-9%	4
Zone 200	127	0.00	132.00	1.87	6.51	12	0.85	2.30	-55%	1

The CV values of the capped assays within each zone are generally below 2. Fladgate concludes that no further domaining of the gold grades is warranted. The amounts of metal removed from each domain are consistent with the limited amount of drilling completed.

14.2.4 COMPOSITES

In order to normalize the weight of influence of each sample, Fladgate regularized the assay intervals by compositing the drill hole data into 2 m lengths using the mineralization zone domain boundaries to break the composites. The original samples are mostly 1 m in length up to a maximum of 1.4 m; therefore, a 2 m composite length minimizes the amount of sample splitting.

Summary 2 m composite statistics are shown below in Table 14.24, Table 14.25 and Table 14.26. Fladgate notes that the length-weighted mean grades of 2 m length composites are very similar to those of the assays; therefore, Fladgate is confident that the compositing process is working as intended. The capped CV values of the composites are low to moderate (1.0 to 1.5).

Copper histograms and probability plots for zone 100 and zone 200 are shown in Figure 14.17 and Figure 14.18.

Table 14.24 Length Weighted 2 m Composite Statistics, Gold

Domain	Number	Minimum (g/t)	Maximum (g/t)	Mean (g/t)	CV	Capped Mean (g/t)	Capped CV	Capped Assay Mean (g/t)
Zone 100	142	0.00	1.33	0.17	1.38	0.17	1.36	0.17
Zone 200	63	0.01	12.51	0.64	3.30	0.31	1.23	0.31

Table 14.25 Length Weighted 2m Composite Statistics, Copper

Domain	Number	Minimum (%)	Maximum (%)	Mean (%)	CV	Capped Mean (%)	Capped CV	Capped Assay Mean (%)
Zone 100	142	0.01	10.35	0.66	1.78	0.60	1.34	0.60
Zone 200	63	0.03	1.76	0.28	1.09	0.28	1.04	0.28

Table 14.26 Length Weighted 2m Composite Statistics, Silver

Domain	Number	Minimum (g/t)	Maximum (g/t)	Mean (g/t)	CV	Capped Mean (g/t)	Capped CV	Capped Assay Mean (g/t)
Zone 100	109	0.00	44.67	3.32	1.80	3.03	1.53	3.02
Zone 200	56	0.00	75.66	1.84	4.92	0.84	1.81	0.85

Figure 14.17 Mato Bula North Zone 100 Histograms and Probability Plots, Capped Composites

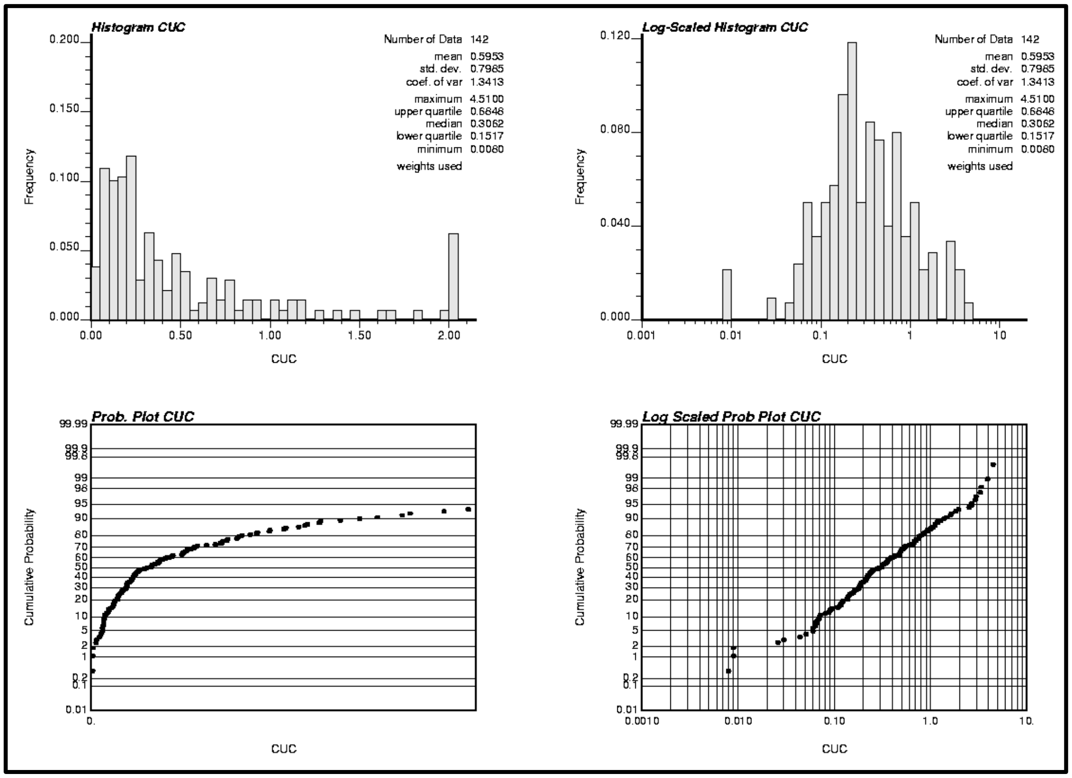
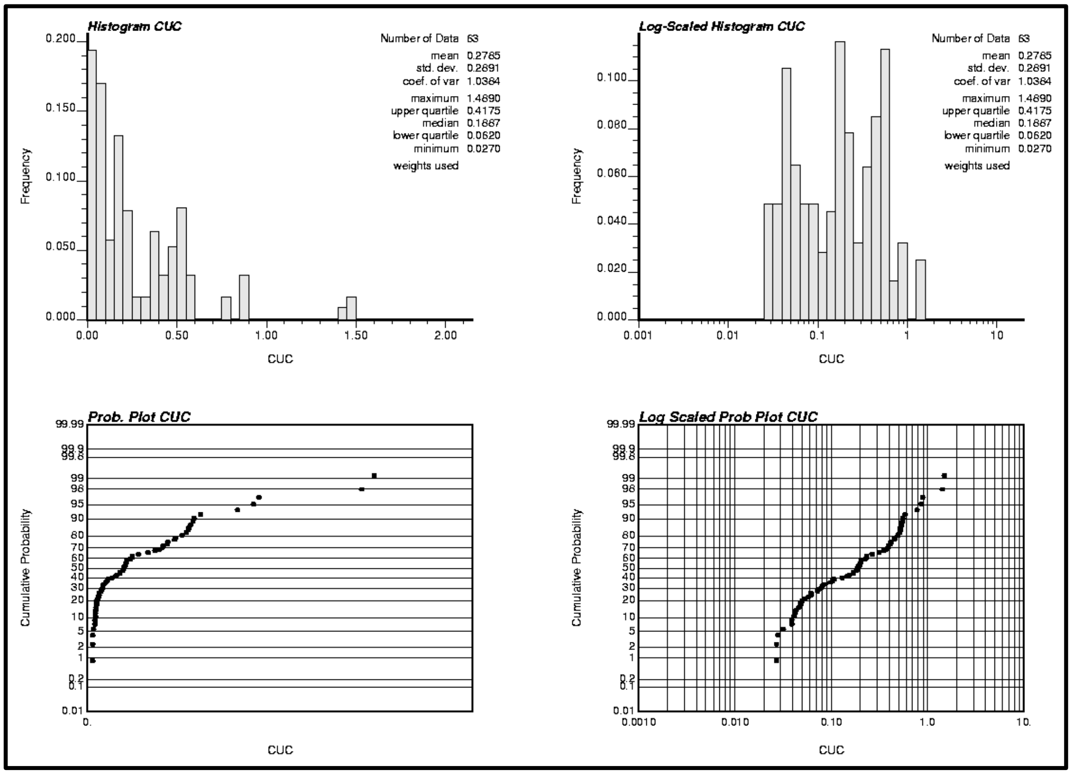


Figure 14.18 Mato Bula North Zone 200 Histograms and Probability Plots, Capped Composites

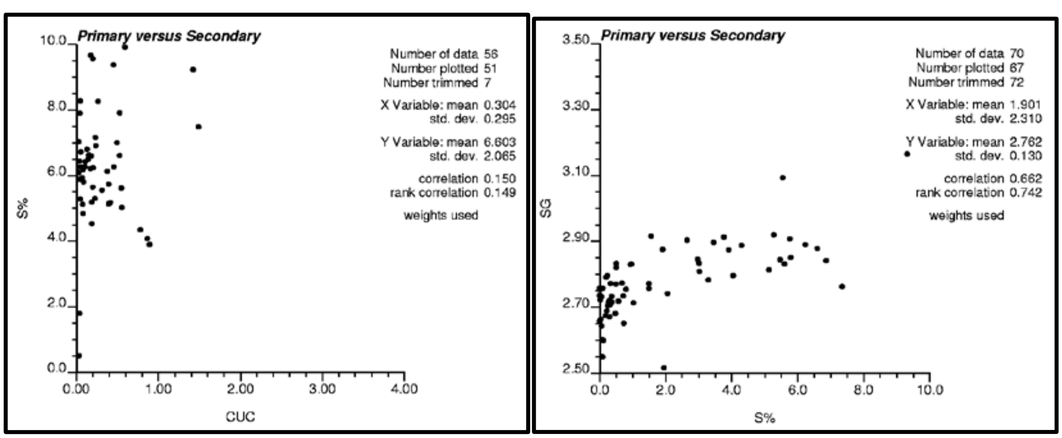


Scatter Plots

Fladgate examined scatterplots between sulphur and specific gravity (SG) and between copper and sulphur for zone 100 (Figure 14.19).

The scatter plot shows a very low correlation (correlation coefficient of 0.15) between copper and sulphur and a moderate correlation between sulphur and SG (correlation coefficient of 0.66). Separate domains for sulphur and SG are therefore not warranted.

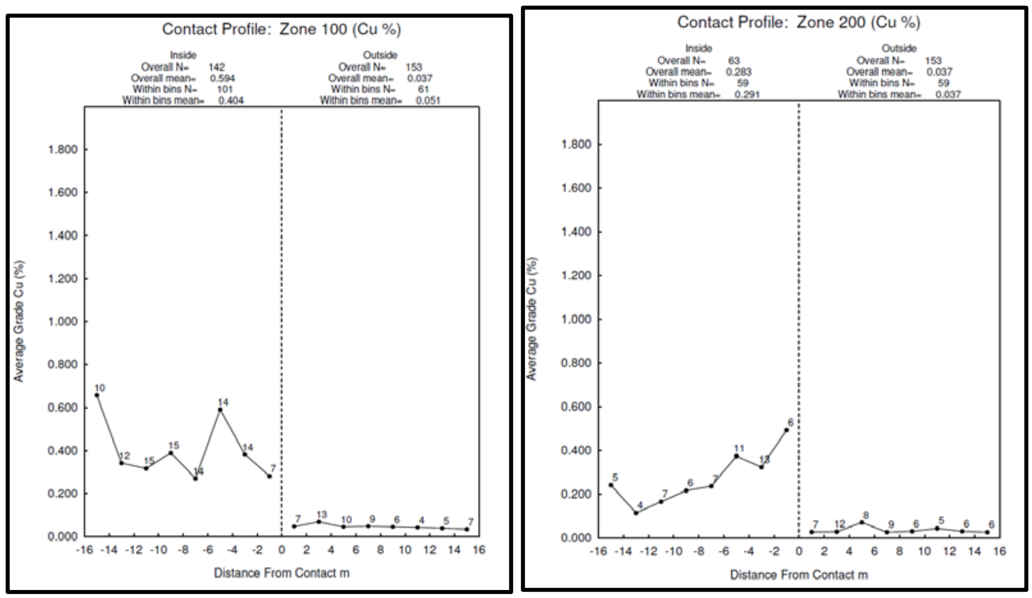
Figure 14.19 Scatter plots of Sulphur against Copper and SG against Sulphur, Zone 100



CONTACT PROFILES

Fladgate plotted contact plots displaying average grades of copper in distance classes on either side of the contact of the mineralization wireframes (Figure 14.20). The contact profiles show a sharp change in copper grade across the contact. Fladgate used the contacts as a hard boundary during grade estimation.

Figure 14.20 Contact Profile, Zone 100 and Zone 200



14.2.5 ESTIMATION/INTERPOLATION METHODS

The block model consists of regular blocks (5 m along strike by 2 m across strike by 5 m vertically). The block size was chosen to reflect geological contacts and to support selective mining scenarios.

Fladgate used an IDW^3 grade interpolation method in two passes.

In the first pass, Fladgate used MineSight's DU module to account for significant changes in the orientation of the mineralization wireframe. The DU module uses input surfaces to calculate non-linear distances between composites and blocks to composites. Search distances used in grade estimation are in metres along the strike, down-dip and perpendicular to dip orientations of the wireframe.

In the second pass, Fladgate used conventional grade estimation to estimate grades in blocks that were not estimated in the first pass.

Grade estimation used a composite and block matching scheme based on the domain codes. For example, composites coded to zone 100 were only used to estimate blocks falling within zone 100. The same grade estimation plan was used for gold, copper and silver.

Table 14.27 and Table 14.28 show the composite restrictions, search ellipse orientations and search distances for the estimation domains.

Table 14.27 Grade Model Interpolation Plan, IDW^3

Domain	Search Ellipse Dimensions Pass 1			Search Rotations			Composite Restrictions			Number of Holes	
	X-Axis	Y-Axis	Z-Axis	Z-Axis	X-Axis	Y-Axis	Minimum	Maximum	Maximum Per Hole	Minimum	Maximum
Zone 100	200	100	50	-20	0	80	1	12	2	1	6
Zone 200	200	100	50	-20	0	80	1	12	2	1	6

Note: Search ellipse orientations are given using the LRR rotation convention as used in GSLIB

Table 14.28 Grade Model Interpolation Plan, Pass 2

Domain	Search Ellipse Dimensions Pass 1			Composite Restrictions			Number of Holes		Rotation Angles		
	X-Axis	Y-Axis	Z-Axis	Minimum	Maximum	Maximum Per Hole	Minimum	Maximum	Z-Axis	X-Axis	Y-Axis
Zone 100	100	200	50	1	12	2	1	6	0	90	90
Zone 150	100	200	50	1	12	2	1	6	0	90	90
Zone 200	100	200	50	1	12	2	1	6	0	90	90

Note: Search ellipse orientations are given using the LRR rotation convention as used in GSLIB

14.2.6 Density Assignment

A total of 231 SG determinations were performed on drill core samples collected from material within the mineralized zones at Mato Bula North. The determinations were performed at site using unsealed immersion technique to measure the weight of each sample in air and in water. Fladgate assigned an average SG of 2.77 to blocks within zone 100 and an SG of 2.88 to blocks within zone 200. The SG values were used directly as the dry bulk density to report the tonnage estimates of the mineral resource.

The rock types intercepted in the drill holes are generally not porous; therefore, the amount of porosity is not expected to cause a large difference between the SG and bulk density. However, Fladgate recommends that at least 10% of the SG determinations be repeated using a wax-sealed immersion method of SG measurement in a commercial laboratory.

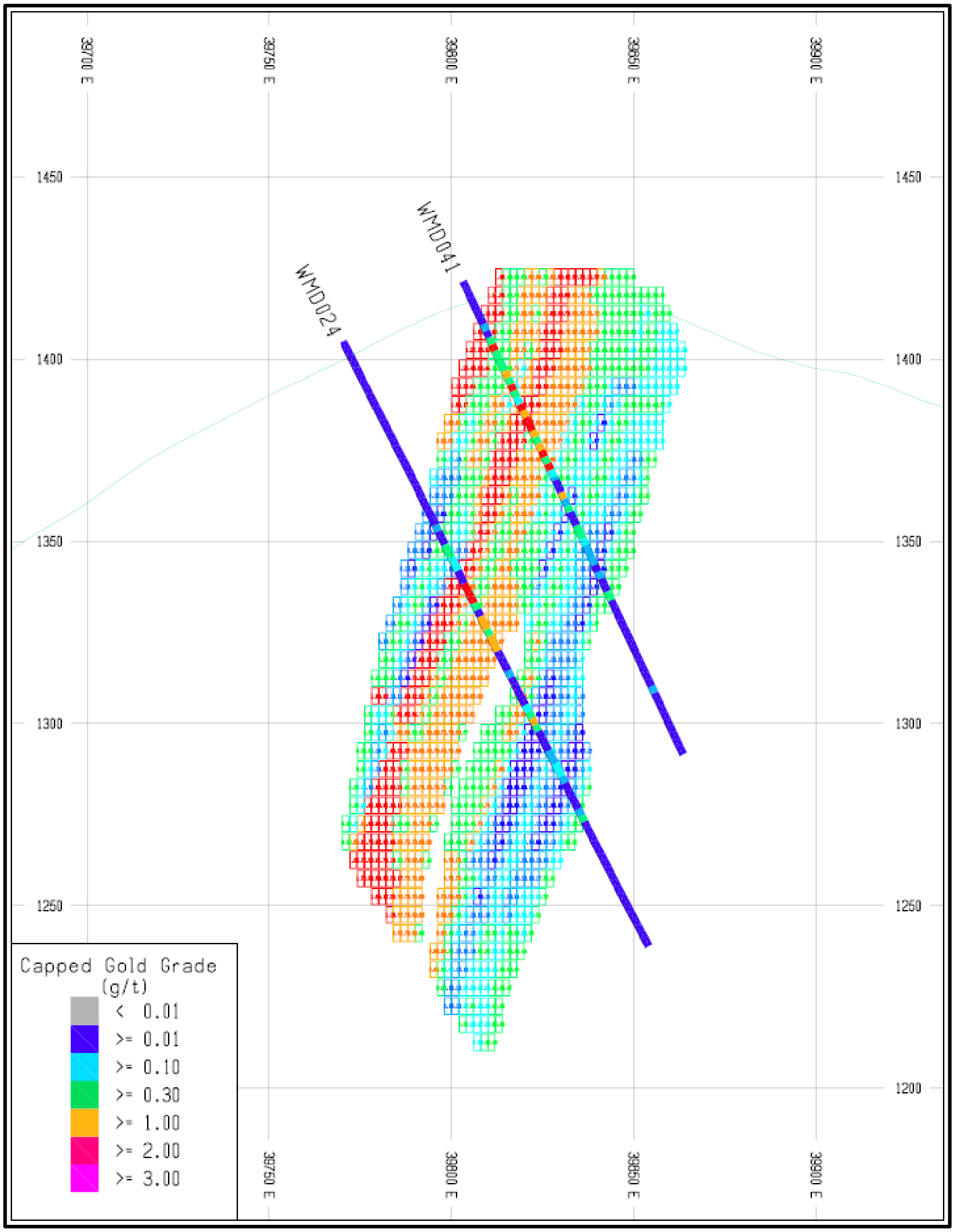
14.2.7 Block Model Validation

Fladgate validated the Mato Bula North block model to ensure appropriate honoring of the input data. NN grade models were created from 2 m composites to validate the IDW^3 grade models.

Visual Inspection

A visual inspection of block grade versus composited data in section and plan view was conducted. The visual inspection showed a good reproduction of the data by the model. An east-west oriented cross-section is shown in Figure 14.21.

Figure 14.21 East-West Cross-Section, 20,795 N



METAL REMOVED BY CAPPING

Fladgate evaluated the impact of capping by estimating uncapped and capped grade models. Generally, the amounts of metal removed by capping in the models are consistent with the amounts calculated during the grade capping study on the composites.

GLOBAL BIAS CHECKS

A comparison between the IDW^3 and NN estimates was completed on classified blocks to check for global bias in the grade estimates. Differences were generally within acceptable levels (less than 10%). Summary statistics are shown in Table 14.29, Table 14.30 and Table 14.31.

Table 14.29 2 m Composite, NN and IDW3 Model Statistics Comparison, Gold

		2 m Capped Composites		NN Blocks Capped		IDW^3 Blocks Capped		% Differences	
Domain	Code	Mean Au (g/t)	Number	Mean Au (g/t)	Number	Mean Au (g/t)	Number	Mean (Composites - NN)	Mean (NN - IDW^3)
Zone 100	100	0.17	142	0.19	21,762	0.20	21,762	12.4%	5.2%
Zone 200	200	0.31	63	0.29	14,457	0.31	14,457	-6.0%	7.6%

Table 14.30 2 m Composite, NN and IDW3 Model Statistics Comparison, Copper

		2 m Capped Composites		NN Blocks Capped		IDW^3 Blocks Capped		% Differences	
Domain	Code	Mean Cu (%)	Number	Mean Cu (%)	Number	Mean Cu (%)	Number	Mean (Composites - NN)	Mean (NN - IDW^3)
Zone 100	100	0.60	142	0.57	21,762	0.62	21,762	4.5%	9.6%
Zone 200	200	0.28	63	0.29	14,457	0.31	14,457	12.0%	8.8%

Table 14.31 2 m Composite, NN and IDW3 Model Statistics Comparison, Silver

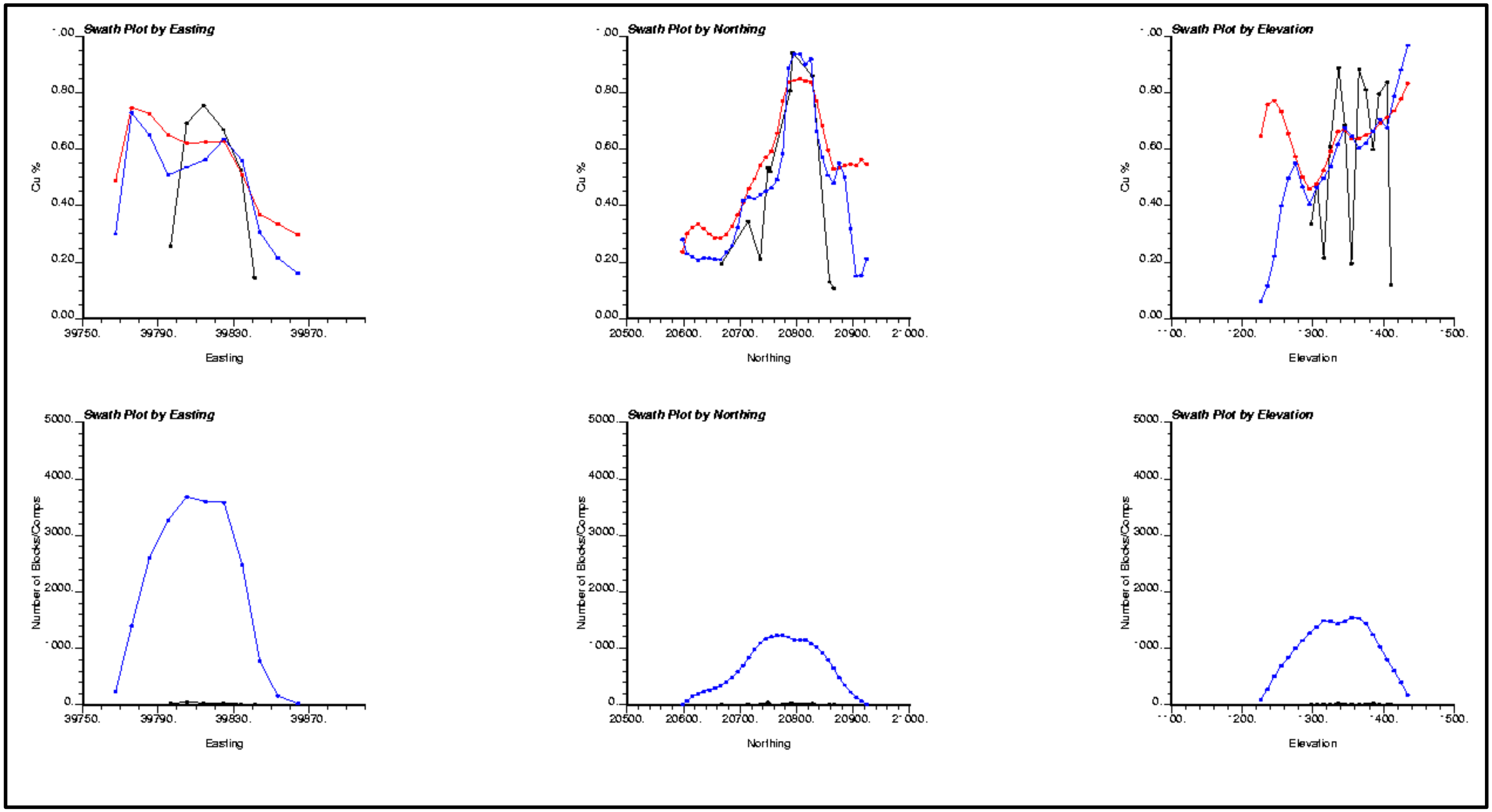
		2 m Capped Composites		NN Blocks Capped		IDW^3 Blocks Capped		% Differences	
Domain	Code	Mean Ag (g/t)	Number	Mean Ag (g/t)	Number	Mean Ag (g/t)	Number	Mean (Composites - NN)	Mean (NN - IDW^3)
Zone 100	100	3.03	109	2.97	16,955	3.18	21,758	-1.8%	7.0%
Zone 200	200	0.84	56	0.87	13,060	1.01	14,457	3.0%	16.1%

LOCAL BIAS CHECKS

Fladgate performed a check for local bias by plotting the average gold and copper grades of composites, NN and IDW^3 models in swaths oriented along the model northings, eastings and elevations.

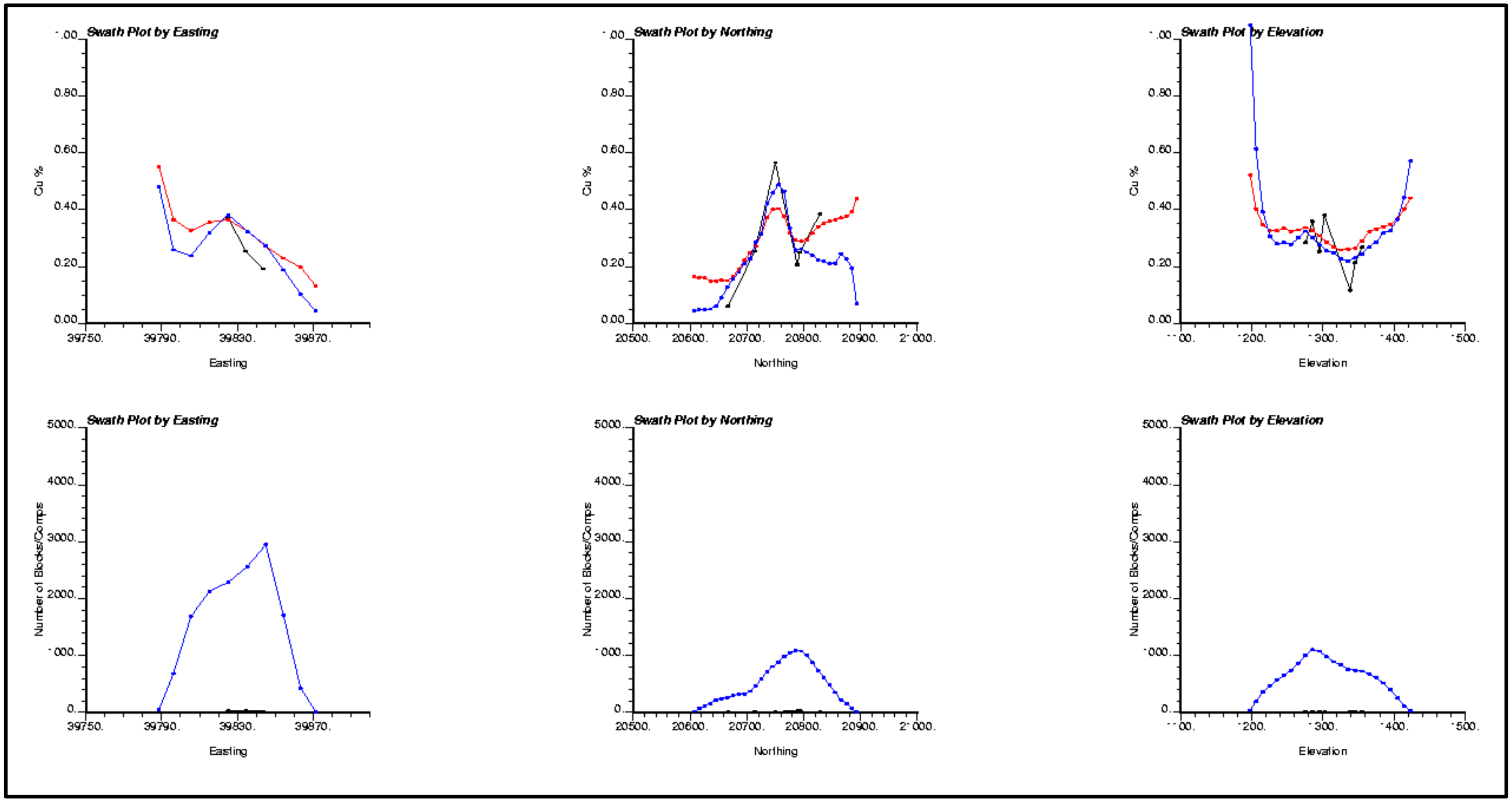
Fladgate reviewed the swath plots and found only minor discrepancies between the NN and IDW^3 model grades. In areas with significant extrapolation beyond the drill holes, the swath plots indicate less agreement for all variables. The copper swath plots for the zone 100 and zone 200 are shown below in Figure 14.22 and Figure 14.23.

Figure 14.22 Copper Swath Plots by Easting, Northing and Elevation for Zone 150



Note: Upper Swath plots show the grades; lower swath plots show number of blocks or composites. Red line represents IDW3 model. Blue line represents NN model. Black line represents composites.

Figure 14.23 Copper Swath Plots by Easting, Northing and Elevation for Zone 200



Note: Upper Swath plots show the grades; lower swath plots show number of blocks or composites. Red line represents IDW3 model. Blue line represents NN model. Black line represents composites

14.2.8 CLASSIFICATION OF MINERAL RESOURCES

Fladgate classified blocks with a maximum distance of 80 m to the closest composite to the Inferred category.

Fladgate reviewed the geological model, data quality, geological continuity and metallurgical characteristics for classifying mineral resources. The mineralized zone wireframes are supported by drilling with a spacing of approximately 40 m. This drill spacing is sufficient to assume that the mineralization is continuous between drillholes. An 80 m maximum distance to the closest composite permits a reasonable local estimate of grades (as demonstrated by model validation).

14.3 REASONABLE PROSPECTS OF ECONOMIC EXTRACTION

Fladgate assessed the classified blocks for reasonable prospects of economic extraction by applying preliminary economics for potential open pit mining methods. Metallurgical test-work was completed for the mineralization.

Fladgate used input process and operating costs, metal prices, metallurgical recovery and a 50° slope angle to optimize a pit shell using a Lerchs-Grossman algorithm.

The assessment does not represent an economic analysis of the deposit, but was used to establish reasonable assumptions for determining the mineral resource. The assumed long-term gold and silver prices used by Fladgate for mineral resources are shown below in Table 14.32. The metal prices are similar to metal prices used by other companies to report base metal and gold mineral resources. Fladgate therefore considers these metal prices to be suitable for mineral resource estimation at the time of reporting.

Table 14.32 Fladgate Long-term Metal Price Assumptions

Metal Prices	Unit	Price
Gold	US$/tr oz	1,400
Copper	US$/lb	3.20
Silver	US$/tr oz	20.0

14.3.1 MARGINAL CUT-OFF GRADE CALCULATION

Fladgate estimated the marginal cut-off dollar values of US$23.90/t for open pit mining and US$63.9/t for underground mining based on the total costs shown in Table 14.33. The marginal cut-off is based on the generally accepted practice that mined material above the marginal cut-off grade will lose less money if it is sent to the mill rather than if it is sent to the WRSF. It is considered for further processing if its value is greater than the costs to process it. The assumed metallurgical recoveries are shown in Table 14.34.

Fladgate calculated dollar values for the blocks using the metal prices and process recoveries, and used dollar value cut-off grades of US$23.90/t and US$63.90/t for reporting Mineral Resources potentially amenable to open pit or underground mining methods.

Table 14.33 Fladgate Mining Costs and Ore-Based Costs Used for NSR Calculations

Description	Unit	Value (US$)
Mining Costs		
Waste Mining Reference Cost	$/t mined	2.0
Total Reference Mining Costs	$/t mined	2.0
Underground Mining Cost	$/t mined	40.0
Ore Based Costs		
Process Cost	$/t ore	17.9
G&A Cost	$/t ore	6.0
Total Ore Based Costs	$/t milled	23.9

Table 14.34 Metallurgical Recovery Assumptions for Mineral Resource Constraints

	Metallurgical Recoveries (%)		
	Gold	Copper	Silver
Mato Bula	88.5	87.5	50.0
Mato Bula North	81.0	87.5	50.0

14.3.2 Mineral Resource Statement

Mineral Resources for the project were classified under the 2014 CIM Definition Standards for Mineral Resources and Mineral Reserves by applying a cut-off grade that incorporated mining and metallurgical recovery parameters. Pit constrained Mineral Resources are based on commodity prices, metallurgical recoveries and operating costs.

Underground Mineral Resources are constrained to blocks with enough value to cover the underground marginal cut-off grade. Isolated blocks were removed from the underground mineral resource estimate.

The QP for the Mineral Resource estimate is David Thomas, P.Geo. Mineral resources are reported using the long-term metal prices as shown in Table 14.35 and Table 14.36. Resources have an effective date of May 31, 2016.

The Indicated Mineral Resources is shown subdivided by area and pit constrained or underground in Table 14.35 and the Inferred Mineral Resource is shown subdivided in Table 14.36.

Table 14.35 Mato Bula Project Indicated Mineral Resource Estimate David Thomas, P. Geo. (Effective Date: May 31, 2016)

Pit Constrained										
Area	Cut-off ($/t)	Tonnes	Gold (g/t)	Copper (%)	Silver (g/t)	Gold Equivalent (g/t)	Gold Metal (tr oz)	Copper Metal (Mlb)	Silver Metal (tr oz)	Gold Equivalent Metal (tr oz)
Mato Bula	23.90	2,280,000	3.74	0.28	1.1	4.18	278,000	14.0	70,000	310,000
Underground Mineral Resource										
Mato Bula	63.90	160,000	3.57	0.25	1.0	3.96	18,000	0.9	3,000	20,000

Table 14.36 Adyabo Project Inferred Mineral Resource Estimate David Thomas, P. Geo. (Effective Date: May 31, 2016)

Pit Constrained										
Area	Cut-off ($/t)	Tonnes	Gold (g/t)	Copper (%)	Silver (g/t)	Gold Equivalent (g/t)	Gold Metal (tr oz)	Copper Metal (Mlb)	Silver Metal (tr oz)	Gold Equivalent Metal (tr oz)
Mato Bula	23.9	3,010,000	2.13	0.34	2.4	2.67	207,000	22.2	237,000	259,000
Mato Bula North	23.9	2,470,000	0.27	0.70	3.2	1.49	22,000	38.3	252,000	119,000
Underground Mineral Resource										
Mato Bula	63.9	330,000	2.77	0.651	5.4	3.82	30,000	4.7	58,000	41,000
Mato Bula North	63.9	15,000	0.75	0.79	2.6	2.10	300	0.3	1,000	1,000

Notes: Fladgate reviewed EAM's quality assurance and quality control programs on the mineral resources data. Fladgate concludes that the collar, survey, assay, and lithology data are adequate to support Mineral Resources estimation.
Domains were modelled in 3D to separate mineralised rock types from surrounding waste rock. The domains were modelled based on copper and gold grades.
Raw drillhole assays were composited to 2 m lengths broken at domain boundaries.
Capping of high grades was considered necessary and was completed for each domain on assays prior to compositing.
Block grades for gold and silver were estimated from the composites using an IDW^3 interpolation method into 5 m (along strike) by 2 m (across strike) by 5 m (vertical) blocks coded by domain.
Dry bulk density varied by deposit area. The dry bulk densities are based on 1,665 specific gravity measurements at Mato Bula and 231 specific gravity measurements at Mato Bula North.
Blocks were classified as Inferred in accordance with CIM Definition Standards 2014. Inferred resources are classified on the basis of blocks falling within the mineralised domain wireframes (i.e. reasonable assumption of grade/geological continuity) with a maximum distance of 100 m to the closest composite.
The Mineral Resource estimate is constrained within an optimised pit with a maximum slope angle of 50°. Metal prices of US$1,400/tr oz, US$3.20/lb and US$20.0/tr oz were used for gold, copper and silver respectively. Metallurgical recoveries of 81% for gold, 87.5% for copper and 50% for silver were applied at Mato Bula and Mato Bula North.
An open pit US$ per tonne cut-off was estimated based on a total process and G&A operating cost of US$23.90/t of ore mined. An additional mining cost of

US$40/t was used to estimate a US$ per tonne cut-off of US$63.90/t for reporting underground Mineral Resources.
The contained gold, copper and silver figures shown are in situ. No assurance can be given that the estimated quantities will be produced. All figures have been rounded to reflect accuracy and to comply with securities regulatory requirements. Summations within the tables may not agree due to rounding.
Mineral Resources which are not Mineral Reserves do not have demonstrated economic viability. The estimate of mineral resources may be materially affected by environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues.
The quantity and grade of reported Inferred Resources in this estimation are conceptual in nature and there has been insufficient exploration to define these Inferred Resources as an Indicated or Measured Mineral Resource and it is uncertain if further exploration will result in upgrading them to an Indicated or Measured Mineral Resource category.

14.3.3 FACTORS THAT MAY AFFECT THE MINERAL RESOURCE ESTIMATE

Areas of uncertainty that may materially affect the Mineral Resource estimates include:

- long-term commodity price assumptions
- long-term exchange rate assumptions
- operating cost assumptions used
- metal recovery assumptions used
- changes to the tonnage and grade estimates as a result of new assay and bulk density information
- variance in future tonnage and grade estimates as more drilling is completed
- changes to the metallurgical recovery assumptions as a result of new metallurgical test work
- any changes to the slope angle of the pit wall as a result of geotechnical information would affect the pit shell used to constrain the Mineral Resources.

15.0 MINERAL RESERVE ESTIMATES

A Mineral Reserve is the economically mineable part of a Measured or Indicated Mineral Resource and has not been estimated for the Mato Bula deposit as part of this PEA.

16.0 MINING METHODS

16.1 INTRODUCTION

For the purpose of the PEA, only open pit mining is currently considered in the mine plan. Tetra Tech evaluated underground mining finding that the addition of underground mining is likely to improve project economic performance. This is further discussed in Section 16.8.

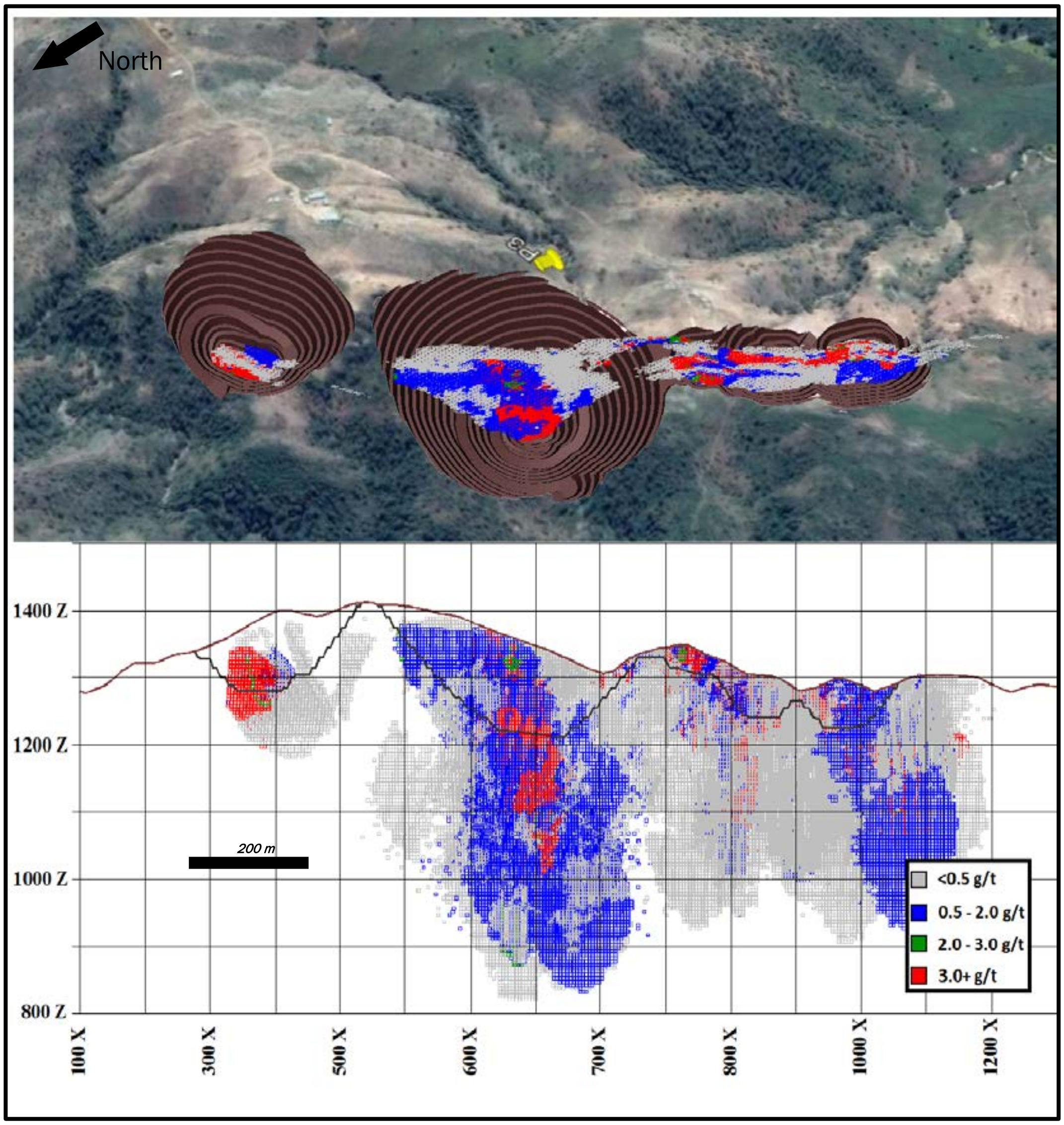
Open pit mining is planned as conventional truck and shovel open pit mining with drill and blast.

The PEA open pit contains the following:

- 3.3 Mt of potential mill feed
- 30 Mt of waste rock (including mineralized material below cut-off grade)
- 322,000 tr oz of gold
- 75,000 tr oz of silver
- average NSR US$111/t processed

Figure 16.1 Shows the layout of the open pit design for the PEA. The pit consists of three distinct sections, namely a northern satellite pit with high grades, a central pit from which much of the mill feed will be sourced and a southern limb which mines shallow mineralisation with lower grade.

Figure 16.1 Mato Bula Top View and Long Section Looking Northwest to Southeast



Mining has been planned to meet a design mill throughput of 1,400 t/d.

The LOM stripping ratio is approximately 9.1:1 (waste to ore). Total material mined will average approximately 4 Mt/a.

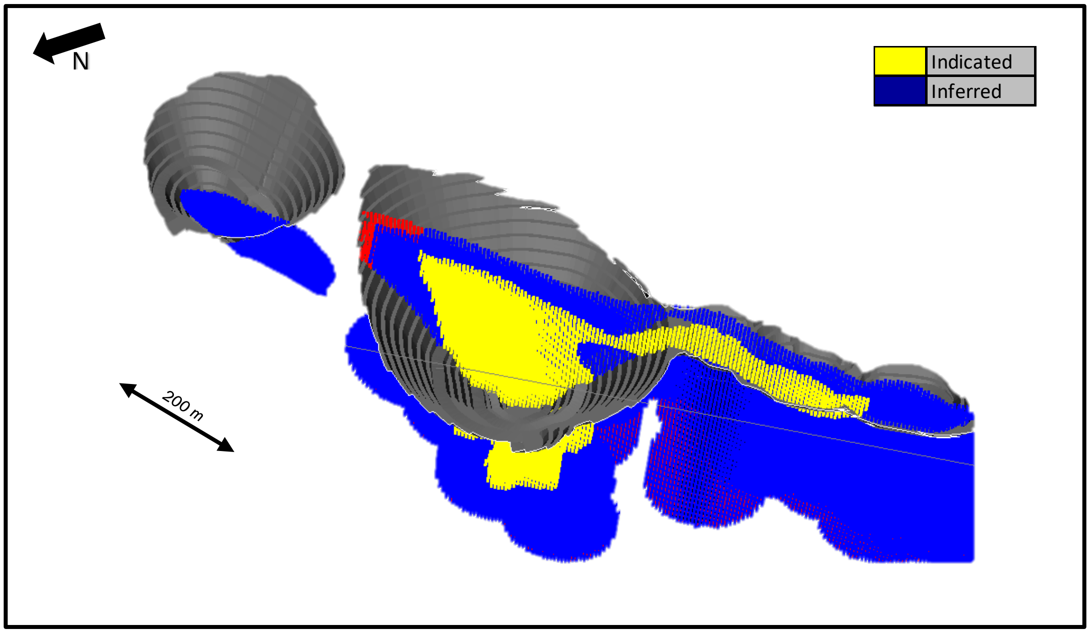
16.2 Classification of Resources used in the PEA

For the sake of the PEA, Indicated and Inferred Mineral Resources were included in the mine plan. The mine plan uses roughly 57% Indicated Mineral Resources and 43% Inferred Mineral Resources.

Table 16.1 Breakdown of Indicated vs Inferred Mineral Resources used in the PEA Open Pit

Category	Resource Percentage (%)
Indicated	57
Inferred	43
Total	**100**

Figure 16.2 Mato Bula Open Pit Design Showing Indicated and Inferred Blocks with and below the Pit Shell



Note: Yellow is indicated, blue is inferred, red is not categorised.

16.3 OPEN PIT OPTIMIZATION

Open pit mining pit shapes were optimized using Whittle 4x™. The optimization was based on economic and geometric criteria as summarized in Table 16.2, and NSR estimation parameters are shown in Table 16.2. The NSR includes consideration of metal recoveries and offsite costs. This provides the basis for the net recoverable value of the contained metal in the ground. The net economic value of a block of ground to be mined is the NSR less the operating costs to mine and process the block.

Table 16.2 Mato Bula Open Pit Optimization Criteria

	Value	Units	Notes
Block Size as Re-blocked	X 10, Y 5, Z 5	m	-
Mill Throughput	1,400	t/d	-
Mining Costs	$2.92*	US$/t mined	Only for optimization
Processing Costs	$7.50*	US$/t processed	Only for optimization
G&A	$6.36*	US$/t processed	Only for optimization
Mining Dilution	5%	-	-
Mining Recovery	98%	--	-
Selling Price (NSR)	=30*Gold (g/t)+4784* Copper(%)+0.23*Silver (g/t)**	US$/t	NSR value calculation input in mining package
Maximum Pit Slopes	49	degrees	-

Notes: *Costs and revenue calculations used in pit optimization work were preliminary and have been updated based on the results, as presented in the summary of costs and the financial analysis.

16.3.1 Open Pit Optimisation Results

The results of the pit optimization exercise are presented in Figure 16.3. Pit shell no. 19 was selected as the basis for the engineered pit design and mine planning moving forward. The results of pit shell no. 19 are shown in Table 16.3.

Figure 16.3 Pit Optimisation Results

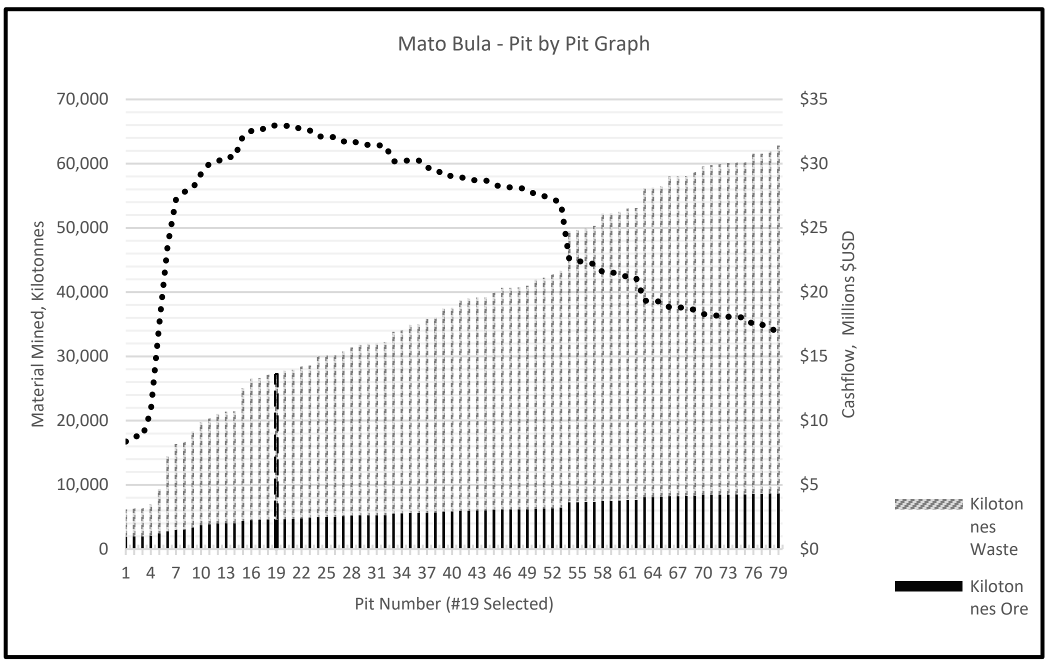


Table 16.3 Tonnes and Grade in Selected Whittle™ Shell

Item	Units	Value
Mineralized Material	Mt	4,6
Diluted Gold Grade	g/t	2.41
Diluted Silver Grade	g/t	0.56
Diluted Copper Grade	%	0.17
Waste rock	Mt	22.6
Strip Ratio	-	4.9

16.3.2 ASSUMPTIONS USED IN NET SMELTER RETURN (COPPER CONCENTRATE ONLY)

Revenue for Mato Bula will be derived from sale of a copper-concentrate containing gold. off-site charges, such as smelting, refining and transportation of concentrate, must therefore be deducted from the value of the metals in the ground and recovered from processing. The assumptions included in net smelter return calculations are shown in Table 16.4.

Table 16.4 Net Smelter Return Assumptions

	Value	Units
Metal Prices		
Gold Price	1,275	US$/tr oz
Copper Price*	2.90	US$/lb
Silver Price*	17.00	US$/tr oz
Metal Recovery to Copper Concentrate		
Gold*	83	%
Copper	93	%
Silver	50	%
Copper Grade of Concentrate*	25	%
Moisture Content of Copper Concentrate	8	%
Concentrate Trucking Cost	60.00	US$/wmt
Concentrate Shipping Cost	25.00	US$/wmt
Concentrate Handling Charges	20.00	US$/wmt
Concentrate Payable		
Silver*	90.0	%
Copper* (or 4% deduction)	96.5	%
Gold*	97.8	%
Treatment Charges		
Copper Refining Charge	0.08	US$/lb
Gold Refining Charge*	10.00	US$/tr oz
Silver Refining Charge	0.50	US$/tr oz
Concentrate treatment charge	90.00	US$/dmt

table continues...

	Value	Units
Royalties		
Ethiopian Government Royalty on Precious Metals	7	%
Ethiopian Government Royalty on Base Metals	5	%

Note: *After completion of the mine plan and schedule, further adjustments and optimisation work was completed and as such the parameters used in NSR calculations for the mine plan may not match the parameters used in the final financial model for the project

Additional revenue was determined for gold leaching of pyrite material. The revenue was based on production of gold doré. The revenue was based on the gold price (US$1,275/tr oz) and deductions for refining, freight and insurances.

16.4 MINE DESIGN

The pit slope design is based on a maximum overall slope of 49°. The bench heights for mining are designed at 5 m high, with triple benching between catch benches of 5 m wide. Haul roads are designed around the width of 25 t articulated dump trucks and are planned as 15 m wide. Table 16.5 summarizes the pit slope design parameters, and Figure 16.4 shows a typical pit slope as designed for Mato Bula, while Figure 16.5 shows the design of open pit ramps.

Table 16.5 Design Parameters for the Mato Bula Open Pit

Aspect	Unit	Value
Maximum Overall Slope Angle	degrees	49
Bench Face Slope Angle	degrees	67
Berm Width	m	5
Bench Height	m	5
Bench Stack Height	m	15
Haul Road Width – two-way traffic	m	15
Haul Road Width – one-way traffic	m	11
Haul Road Width Minimum – pit bottom only	m	6

Figure 16.4 Overall Pit Slope Design

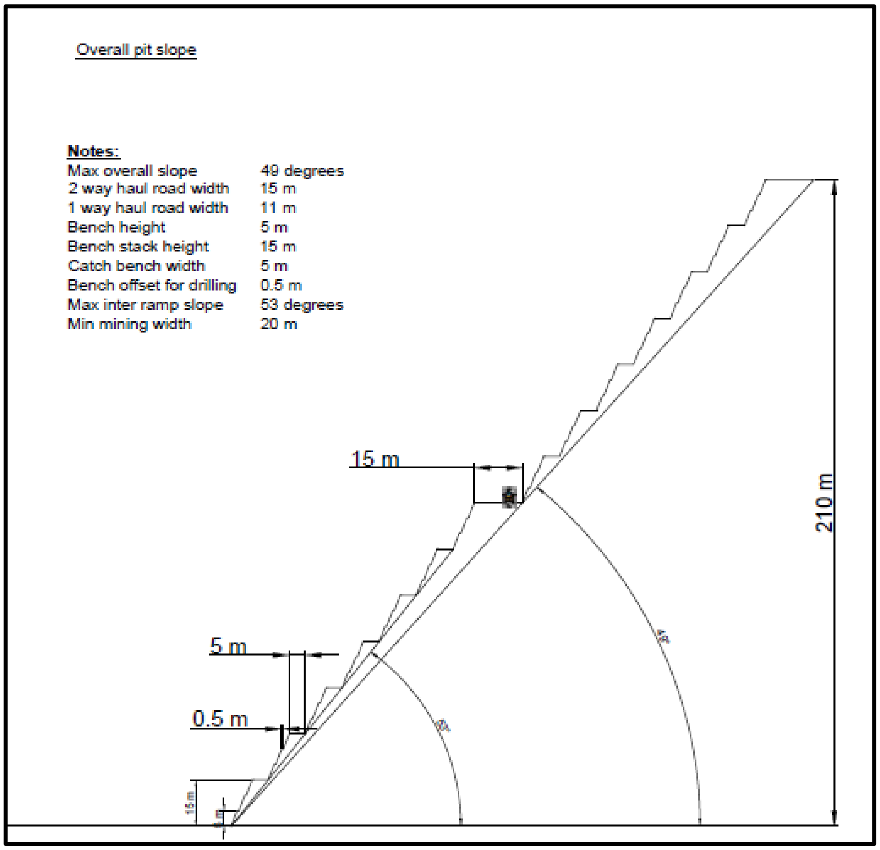
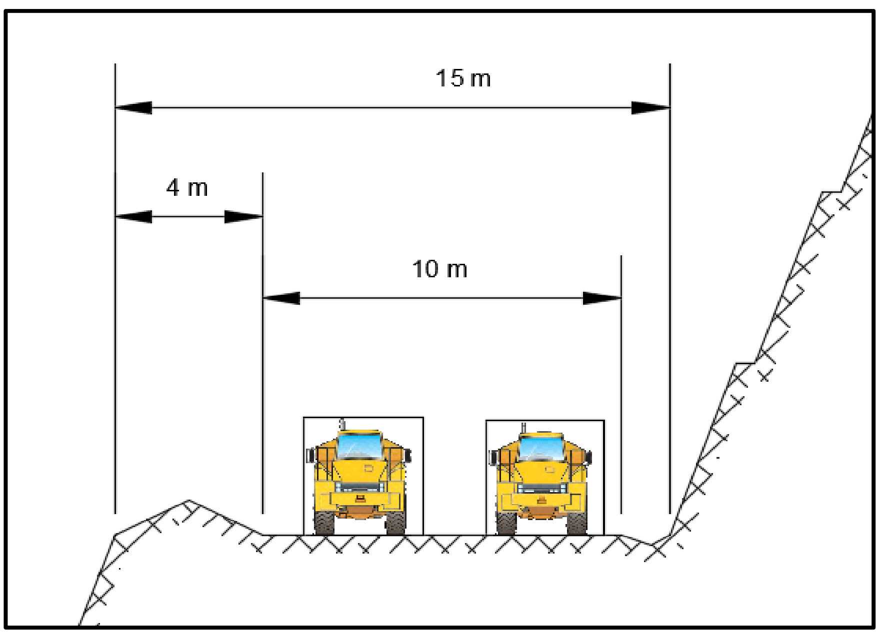


Figure 16.5 Ramp Widths used in Open Pit Design



16.4.1 CUT-OFF GRADE

Once the final pit was selected and designed, additional cut-off grade optimization was undertaken to reach the mining schedule.

The cut-off grade for Mato Bula was determined through a combination of economic objectives and maximizing use of resources against fixed costs.

An optimization of cut-off grade included evaluation of fixed versus variable costs for the potential operation. For a block considered for mining (i.e. falling within the planned open pit shell), a variable cost of roughly US$9.00/t was determined. In other words, the marginal cost of processing the block versus discarding the block as waste is US$9.00/t.

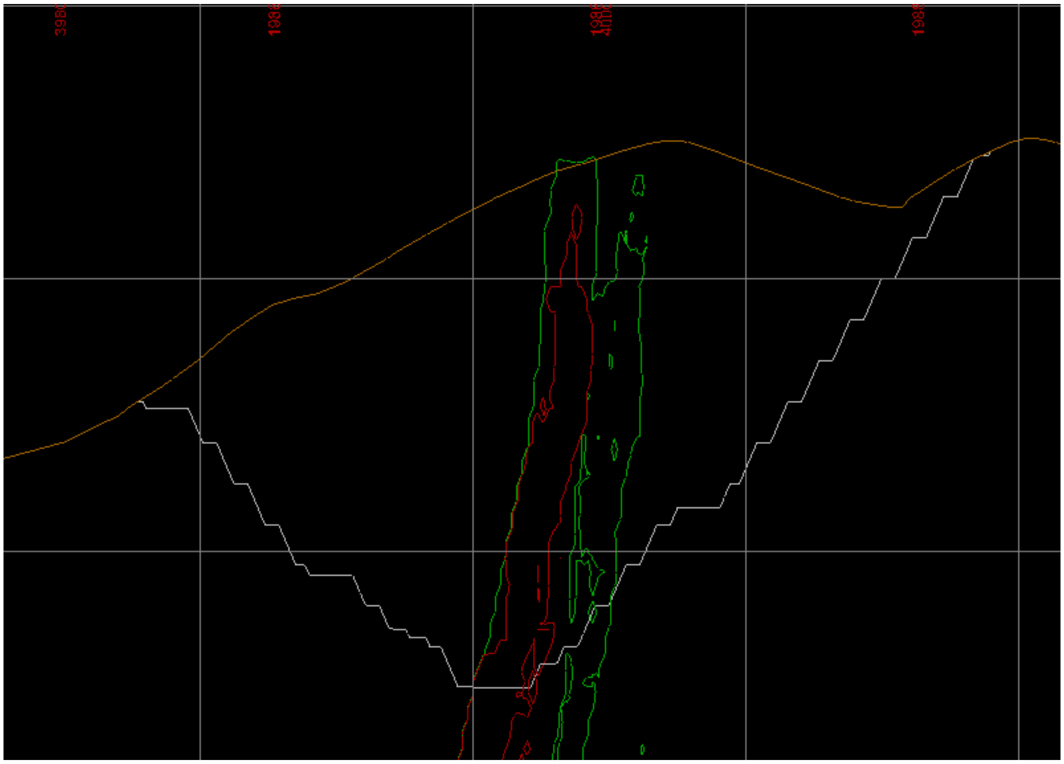
Table 16.6 shows the cut-off grade strategy applied to Mato Bula in pit material to derive the resulting mining schedule. Note that material is drawn from the stockpile to make-up process feed. Figure 16.3 shows grade shells for breakeven cut-off grade versus marginal cut-off grade.

Table 16.6 Cut-off grades applied to pit phases as NSR $/tonne

Cut off Grades Applied	Direct Mill Feed	Stockpiled
Phase 1	50	25
Phase 2	75	25
Phase 3	75	10
Phase 4	75	9
Phase 5	35	9
Phase 6	35	9
Phase 7	15	9
Phase 8	15	9
Phase 9	15	9
Phase 10	15	9
Phase 11	15	9

Based on this cut-off strategy the resulting average NSR for blocks processed is US$111/t.

Figure 16.6 Marginal Cut-off vs Breakeven Grade Shown in Mato Bula Open Pit



Note: green – marginal cut-off halo, red – is zone above breakeven grade

16.4.2 NOTE ON PIT OPTIMISATION

Subsequent to completing the initial pit optimisation, EAM and Tetra Tech conducted multiple reviews of metallurgical recoveries and processing costs. Based on these reviews it was decided that offsite pyrite leaching should be included for Mato Bula as the current metallurgical results indicate that a portion of the gold will report to pyrite as well as the copper. These changes would affect pit optimisation, however for the PEA the pit optimisation and mine schedule produced a positive cashflow under the revised scenario and as such no further pit optimisation was undertaken.

As such further optimisation of pit shape and mining schedule may produce better results if based on revised metallurgical recoveries and processing costs.

16.5 MINING OPERATIONS

The mine is planned to be operated as a conventional truck and shovel operation. Mining will be managed by qualified engineering professionals such that the operations are conducted safely and efficiently. The management of operations will include mine planning, surveying of open pits, assaying of rock to be mined for minerals, and geotechnical engineering for pit walls and WRSF stability.

Mining will be done by first drilling and blasting the rock so that it can be loaded by loader onto haul trucks. Waste rock will be transported by haul trucks to designated WRSF, while rock containing mineralization will be transported to the crusher for subsequent processing.

16.5.1 Drilling and Blasting

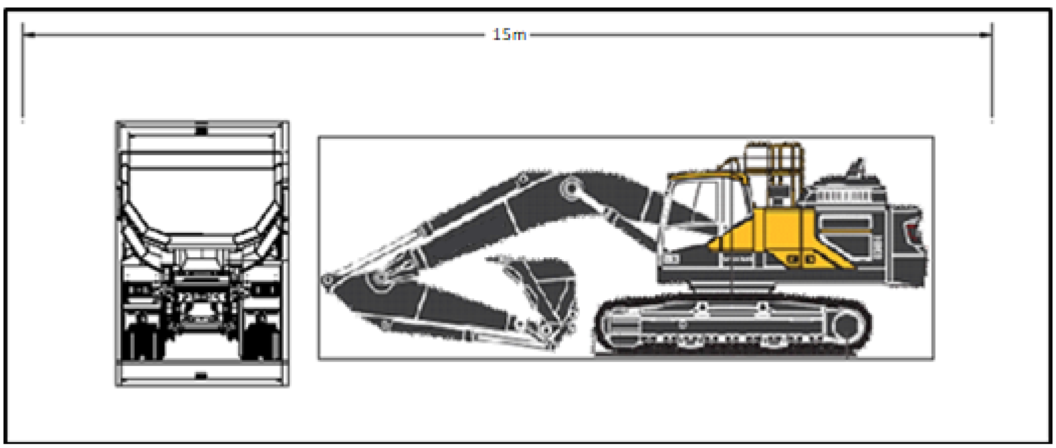
Drilling and blasting has been considered for the PEA. It is assumed to consist of drilling of 5 to 10 m bench heights with 89 and 115 mm holes. Tetra Tech has made provisions for track mounted drill rigs for drilling blast holes.

The holes would be charged primarily with ammonium nitrate and fuel oil (ANFO) where possible and cartridged emulsion explosive if holes are wet. Initiation is assumed to be carried out using nonel systems with pentolite boosters. Explosives will be stored onsite, with blasting carried out at the end of shifts to ensure minimal disruption to other pit activities.

16.5.2 Loading and Hauling

For this PEA, loading was assumed to be done by excavator with support from a wheeled loader. The minimum mining width has been included in the design as 15 m based on selected equipment operating widths (Figure 16.7).

Figure 16.7 Minimum Mining Width



16.5.3 Mining Equipment

Mining equipment requirements were evaluated to be in line with the production schedule. Table 16.7 shows the equipment list for mining.

Table 16.7 Summary of Mining Equipment Selected for the Mato Bula Project

Mining Equipment List	Initial Units	Peak Usage	Sustaining Purchases
Drill rigs	2	3	1
Excavators	2	3	2
Trucks	7	15	8
Loaders	1	1	2
D8 Bull dozers	1	1	1
D7 Bull dozers	0	1	2
Graders	1	1	-
Pumps	1	3	3
Mechanic trucks	1	1	-
Tractor	1	1	-
Explosive delivery trucks	1	1	-
LDVs	3	3	-
Busses	2	2	-
Lighting plants	4	4	5

16.5.4 Ancillary Mining Operations

To support core mining operations (drilling, blasting, loading and hauling), EAM/TRI will provide mining support operations that will include:

- equipment refuelling
- haul road maintenance
- supervision
- grade control
- geology
- equipment maintenance
- dewatering
- environmental services
- dust suppression.

The cost of the services above was estimated and included in the mine operating cost.

16.5.5 Mining Labour Requirements

A total of 170 employees are planned for the mining staff at Mato Bula. This will include 160 employees in mining production and 10 employees involved in mine planning. A summary of personnel planned for mining is including in Table 16.8.

Table 16.8 Mato Bula Mining Labour Requirements

Position	No. of Personnel Required
Mining Management and Planning	10
Mining Production Manager	1
Chief Engineer	1
Mine Planning Engineer Expat	1
Mine Planning Engineer Local	1
Chief Surveyor	1
Surveyor	1
Chief Geologist	1
Pit Geologist	1
Grade Control and Assaying	2
Production	129
Mining Fleet Supervisors	4
Blaster	3
Magazine Master/Stores	2
Drill Rig Operator	8
Dozer Operator	8
Excavator Operators	12
Truck Drivers	60
Loader Operator	4
Blasting Assistants	8
Pumping Crew	4
Labourers/Spotters	8
Safety Reps	4
Grader Operator	2
Bus Driver	2
Maintenance	31
Mechanics	1
Pit Blacksmiths and Electricians	8
Fueling Attendants	6
Mechanic Helpers	8
Tool Store Clerk	4
Pit Construction	4
Total Mining Labour	**170**

16.6 MINING SCHEDULE

The mining schedule was prepared using MiningMath Simsched™ software as well as Microsoft® Excel.

Table 16.9 shows the mining schedule for Mato Bula. The schedule includes pre-stripping 1.8 Mt of waste rock before the start of production. A portion of the material is expected to be suitable for constructing the TCF.

The schedule includes stockpiling mineralized material where mineralized material mined is expected to exceed the mill capacity.

Table 16.9 Mato Bula Open Pit Mining Schedule

Item	Units	Pre stripping	Operations								Total
		Year –1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	
Tonnage Mined	kt	2,780	5,029	4,644	5,035	5,020	5,842	3,113	2,018	168	33,650
Waste Rock	kt	2,697	4,428	4,148	4,650	4,413	5,385	2,366	1,414	118	30,315
Mined Directly to Mill	kt	-	196	112	135	332	380	486	382	32	2,054
Mined to Stockpile	kt	83	405	384	251	275	77	261	221	18	1,976
Stockpile to Mill	kt	-	83	392	369	172	124	18	122		1,280
Total Fed into Mill	kt	-	279	504	504	504	504	504	504	32	3,335
Diluted Head Grades											
Gold Grade	g/t	-	4.31	2.96	2.26	3.20	3.83	2.81	2.11	4.92	3.01
Copper Grade	%	-	0.19	0.15	0.13	0.17	0.37	0.24	0.22	0.63	0.22
Silver Grade	g/t	-	0.49	0.37	0.36	0.58	1.06	1.22	0.57	3.35	0.71

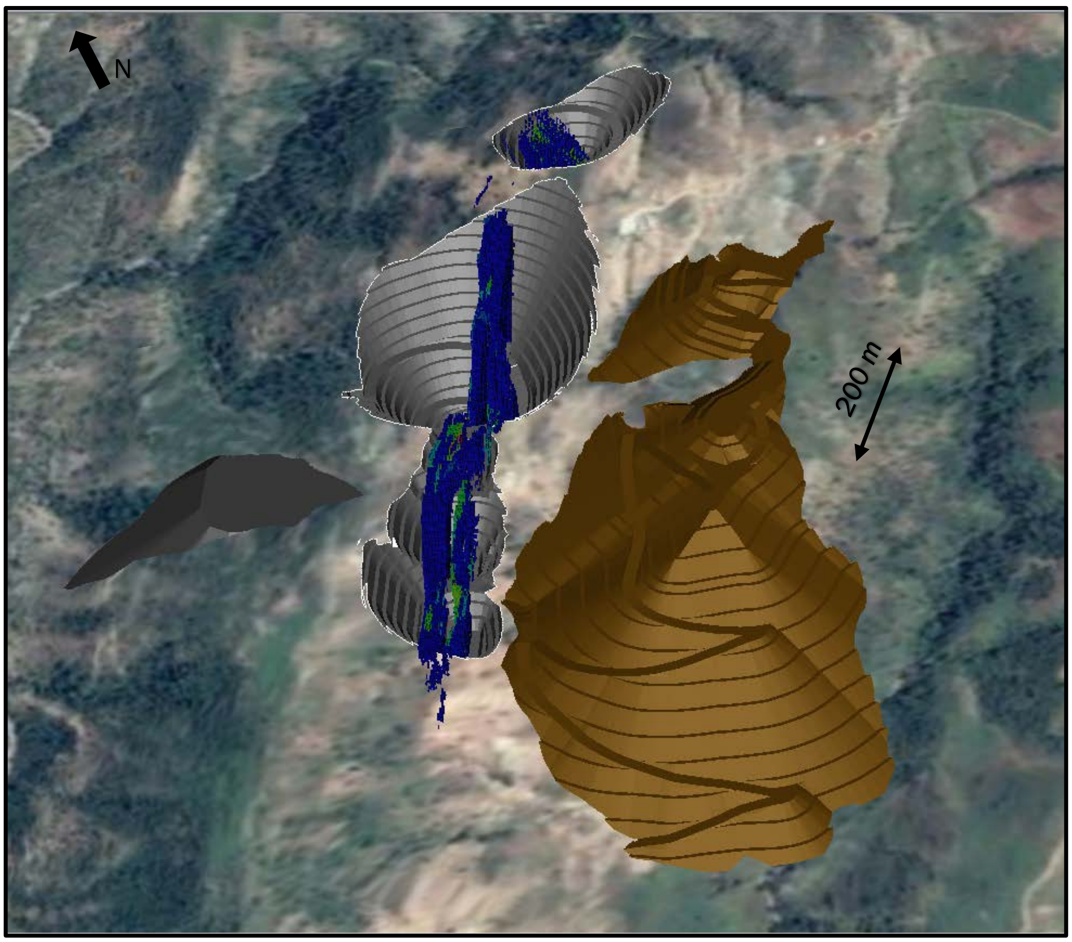
16.7 WASTE ROCK MANAGEMENT

Waste rock from mining will be placed in an engineered WRSF located approximately 120 m southeast of the open pit as shown in Figure 16.8, the parameters of which can be found in Table 16.10. Waste rock is planned to be used for haul road construction, tailings containment facility construction and other infrastructure pads at the mine site.

Table 16.10 WRSF Design Parameters

Item	Unit	Value
Dump Bench Height	m	15
Dump Bench Width	m	5
Dump Face Angle	degrees	30
Overall Pit Slope Angle	degrees	18

Figure 16.8 Planned WRSF for Open Pit Mining at Mato Bula

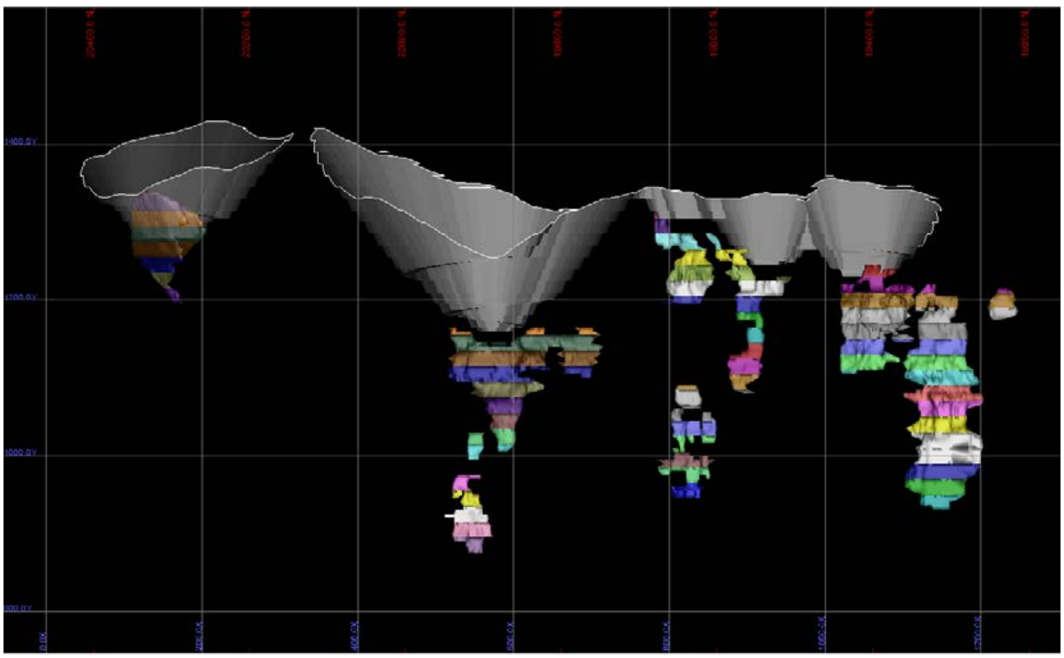


16.8 UNDERGROUND MINING POTENTIAL

Tetra Tech conducted a high-level assessment of underground potential for Mato Bula. The objective was to determine if underground mining could replace areas of the open pit with high strip ratios, as well as evaluating the potential to mine tonnes below the extent of the open pit.

In particular, the northern satellite pit shown in Figure 16.1 and Figure 16.9 below was removed from the open pit schedule and included in the underground mine plan. The remaining tonnage for underground would come from areas below the open pit considered for the PEA.

Figure 16.9 Mato Bula underground potential



Note: Coloured shapes show potential areas of underground mining. The northern satellite pit would be replaced completely with underground mining.

Tetra Tech isolated blocks with a NSR of greater than US$50/t for potential inclusion in an underground mine plan. Based on the resulting tonnage, Tetra Tech designed preliminary stope shapes to determine tonnage available for processing.

Table 16.11 shows the preliminary diluted tonnage and grade from the underground mining evaluation.

Table 16.11 Underground Mine Plan Tonnes and gGade

Description	Amount	Unit
Tonnage in situ Targeted (After Deductions for Pillars)	1,150,070	t
Planned Dilution in Stope Shapes	360,362	t
Unplanned Dilution of 10%	151,043	t
Mining Losses of 10% (Mined Ore Losses)	166,148	t
Total Dilution	511,405	t
Total Percent Dilution	44%	%
Total Tonnes Mill Feed	1,495,328	t
Au Head Grade	4.36	g/t
Cu Head Grade	0.45	%
Ag Head Grade	3.77	g/t
NSR in Mill Feed	161.00	US$/t processed
LOM	6.0	years

The underground mining plan was based on the following criteria:

- throughput of 550 t/d
- mining cost of US$30.00/t
- processing costs of US$13.00/t
- G&A costs of US$7.00/t.

Tetra Tech concludes that a combination of underground mining and open pit mining has good economic potential. Further optimisation between underground and open has the potential to produce the following advantages:

- reduced strip ratios
- higher head grades
- reduces waste rock volumes
- extended LOM
- ability to store or discard waste rock or tailings in mined out excavations.

17.0 RECOVERY METHODS

17.1 INTRODUCTION

The Mato Bula processing facilities is designed to process a nominal 500,000 t/a, or 1,400 t/d, of gold-copper-bearing material from an open pit mining operation. The concentrator is designed to produce a copper concentrate containing a high level of gold and a gold concentrate produced by gravity concentration that can be sold directly. A gold-bearing by-product of the flotation process contains a sufficient level gold that will be treated using agitated cyanide leaching to maximize gold recovery. This material is planned to be treated off site at the nearby Da Tambuk process plant, which is proposed for development, or other facilities.

17.2 SUMMARY

The unit processes selected were based on the results of metallurgical testing performed at BCR Tetra Tech's experience. The metallurgical processing procedures selected for the design incorporated industry standard technologies that have been widely used in processing the copper and gold mineralization.

The conventional crushing and ball mill grinding in closed circuit with hydrocyclones are proposed for comminution. A centrifugal gravity concentrator has been incorporated in the grinding circuit to recover coarse and liberated gold particles, and a shaking table will be used to upgrade the gravity concentrate. The ball mill cyclone overflow will be treated in a conventional flotation circuit to produce a gold-bearing copper concentrate and a gold-bearing pyrite product for further cyanidation treatment to recover gold.

The rougher flotation copper-gold concentrate will be reground by a regrind ball mill to improve copper and gold mineral liberation. The copper-gold bulk flotation tailings will be further floated to produce a gold-bearing pyrite concentrate. The discharge of the regrind ball mill circuit in closed circuit with a cyclone will report to the cleaner flotation circuit for upgrading to produce a final copper gold concentrate. The cleaner flotation circuit consists of three stages of cleaning. The cleaner scavenger concentrate will report to the rougher concentrate regrinding circuit. The cleaner scavenger flotation tailings carrying some gold will be directed to the gold-bearing pyrite dewatering circuit where the pyrite concentrate will report.

The final concentrate from the third cleaner flotation will be pumped to the concentrate thickener for dewatering with the decant solution recycled to the process. Concentrate thickener underflow will be pumped to a final concentrate holding tank and then to a pressure filter for further dewatering. The filter cake) will be conveyed to a concentrate storage shed prior to being transported offsite. The haul trucks will be equipped with dust covers to prevent concentrate dust from escaping during transport. The concentrate will be hauled to the designated seaport for ocean shipment to offshore copper smelters.

The gold-bearing pyrite flotation concentrate, together with the copper cleaner scavenger concentrate, will be sent to a gold-bearing pyrite concentrate thickener for dewatering, and the pyrite thickener underflow will be further dewatered by a plate and frame type pressure filter. The dewatered pyrite concentrate will be transported to the nearby Da Tambuk cyanide leaching plant or other facilities for additional gold recovery.

The pyrite flotation circuit tailings are the final tailings and will be pumped to the tailings thickener. The tailings thickener underflow will be pumped to the TCF while the thickener overflow will be reused as process water.

Both the cleaner scavenger flotation tailings and the pyrite flotation concentrate will be dewatered. The blended gold-bearing material will then be transported to the nearby planned Da Tambuk cyanidation process plant or other facilities for gold recovery.

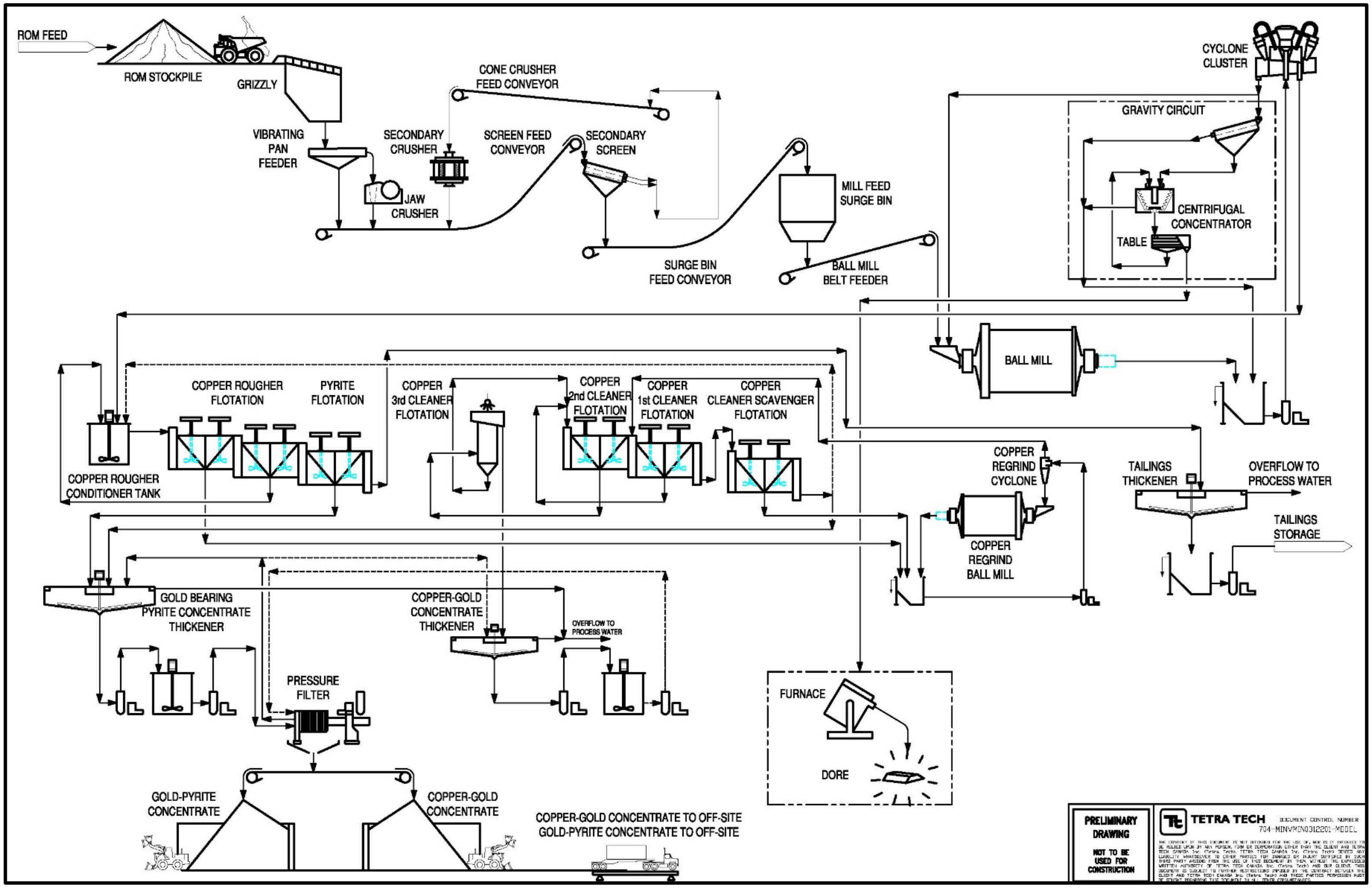
The overflows of the concentrate, pyrite and tailings thickeners and the recovered water from the TCF will be reused as the process water. Fresh water will be used for gland services, reagent preparation and gravity circuit fluidization, as well as for process water make-up purposes, as required.

The Mato Bula processing facility will consist of the following unit operations:

- two-stage crushing with the second stage in closed circuit with a screen
- crushed material bin storage and reclaim
- ball mill grinding in closed circuit with cyclone
- gravity recovery circuit
- copper-gold bulk rougher flotation circuit
- regrind ball mill in closed circuit with cyclone
- three stages of cleaner flotation circuit
- concentrate dewatering circuit, including a thickener and a pressure filter
- concentrate storage and loadout
- gold-bearing pyrite flotation circuit
- gold-bearing material dewatering and loadout
- tailings thickening
- TCF
- process water and fresh water supply systems.

The process flowsheet is shown in Figure 17.1.

Figure 17.1 Mato Bula Process Flowsheet



17.3 PLANT DESIGN

17.3.1 MAJOR DESIGN CRITERIA

The process plant is designed to treat copper-gold material at the rate of 1,400 t/d, equivalent to 500,000 t/a. The major criteria used in the design are outlined in Table 17.1.

Table 17.1 Major Design Criteria

Criteria	Unit	Value
Operating Days per Year	d	365
Crushing Circuit Utilization	%	75
Grinding and Flotation Utilization	%	90
Crushing Circuit Throughput Rate	t/h	116.7
Grinding and Flotation Process Rate	t/h	64.8
Ball Mill Feed Size, 80% Passing	µm	10,000
Ball Mill Product Size, 80% Passing	µm	75
Ball Mill Circulating Load	%	250-300
Bond Ball Mill Work Index, design	kWh/t	12.0
Bond Abrasion Index, design	g	0.25
Specific Gravity Ore		2.80
Moisture Content Ore	%	2.0 - 3.0
Head Grade, Design	Au g/t	7.5
Head Grade, Average	Au g/t	3.4
Head Grade, Design	Cu %	0.50
Head Grade, Average	Cu %	0.24
Anticipated Copper Recovery Flotation Concentrate, LOM Average	Cu %	93.0
Anticipated Gold Recovery to Flotation Concentrate, LOM Average	Au %	31.8
Anticipated Gold Recovery to Doré including Gravity Concentrate), LOM Average	Au %	54.6%

The design parameters selected are based on test work results obtained from BCR and typical industry parameters for this type of process as provided by Tetra Tech.

The grinding mill was sized based on Bond Work Index test data measured by BCR and typical experience for the type deposits. The flotation circuit was designed based on the results of the metallurgical test work by BCR. In addition, typical industry standard plant design parameters were considered appropriate for this process design.

17.4 OPERATING SCHEDULE AND AVAILABILITY

The flotation processing plant and related concentrate and tailings dewatering circuits are designed to operate 24 h/d for 365 d/a. The crushing plant will be operated for

16 h/d in two 8-hour shifts per day. The grinding and flotation plant operations will have three 8-hour shifts per day.

The crushing circuit utilization is projected to be 75% and the ball mill grinding, flotation and thickening circuit utilization will be 90%. These utilizations are based on typical industry experience and will allow enough downtime for the scheduled and unscheduled maintenance of the crushing and process plant equipment.

17.5 PROCESS PLANT DESCRIPTION

17.5.1 CRUSHING CIRCUIT

The crushing circuit will reduce the mined material size from a nominal top size of 500 mm to a product size of 80% passing (P_{80}) 10 mm in preparation for the grinding process. The crushing circuit facility will contain the following main items of equipment:

- stationary grizzly
- run-of-mine (ROM) surge bin
- vibrating feeder to jaw crusher
- jaw crusher, 93 kW
- conveyor belts
- belt magnet and metal detector
- sizing screen
- cone crusher, 224 kW
- belt scale
- crushed mill feed bin.

Haulage trucks with a nominal capacity of 25 t will bring ROM material to the crushing plant. The material will be dumped directly from the trucks for crushing, although provision has been made for material to be dumped onto a temporary ROM stockpile in the event of unscheduled crusher plant stoppages.

The trucks will dump the ROM material onto a stationary grizzly. This grizzly will prevent oversize rocks from entering the ROM surge bin. The surge bin will have a nominal capacity of 40 t (live capacity). The surge bin will be equipped with a vibrating feeder which will feed the ROM material to the jaw crusher. The jaw crusher will reduce the feed size from finer than 500 mm to a size 80% passing approximately 60 mm. The crushed material will be discharged onto the conveyor belt together with the vibrating feeder undersize material to the sizing screen. A belt magnet will be installed to remove tramp metal, followed by a metal detector which will activate an alarm and stop the conveyor belt, allowing tramp metal to be manually removed or by-pass the cone crusher. The crusher plant utilization will be 75%, and the design throughput will be 116.7 t/h.

The sizing screen will receive the crushed material from the jaw crusher. The sizing screen will be a vibrating screen with a final product size P_{80} of 10 mm. The screen oversize will be conveyed to a cone crusher for additional crushing. The crushed material from the cone crusher will be returned by conveyor belt to the sizing screen feed conveyor. The screen undersize, less than approximately 13 mm material, will be discharged onto a conveyor, which will transport the fine crushed material to the crushed ball mill feed surge bin. The bin will have a live capacity of 1500 t, equivalent to approximately one day's operation.

17.5.2 Grinding Circuit

The grinding circuit will reduce the size of the crushed material to a final product size of 80% passing 75 µm, suitable for subsequent copper and gold recovery by flotation processes. The grinding process will be single-stage with a ball mill in closed circuit with classifying cyclones. The grinding circuit will have the following main items of equipment:

- conveyor belt
- conveyor belt weigh scale
- ball mill, 4.2 m diameter by 5.3 m long
- mill discharge pumpbox
- cyclone feed slurry pumps
- classification cyclone cluster.

The material in the ball mill feed surge bin will be drawn from the bin under controlled feed rate of approximately 64.8 dmt/h new feed using a belt conveyor. A belt scale will control the feed to the ball mill. The cyclone underflow will also constitute part of the total feed to the mill. Process water will be added as required to maintain the slurry density in the ball mill at approximately 72% solids. The ball mill will operate at a rotational speed that is approximately 75% of the critical speed.

The ball mill will be in closed circuit with a classification cyclones. A gravity concentrator will treat a portion of the cyclone underflow to recover the free coarse gold grains. The discharge from the ball mill will be directed into a pumpbox where the gravity concentration tailings will also report. Dilution water will be added to the pumpbox as required to adjust the slurry density for efficient cyclone classification. The slurry in the mill discharge pumpbox will be pumped to a cyclone cluster for particle size classification. The grinding circuit circulating load will be approximately 250 to 300%. The cyclone overflow particle size will be 80% passing approximately 75 µm. The cyclone underflow will be returned to the ball mill together with feed material for further grinding. A 30% split of the cyclone underflow stream will be directed to the gravity concentration circuit.

The cyclone overflow at a density of approximately 35% solids will flow into the flotation conditioning tank, ahead of the first stage rougher flotation circuit.

Provision will be made for adding lime to the ball mill to adjust the pH of the slurry in the grinding circuit before the flotation process.

Grinding balls will be added to the mill as required to maintain the grinding efficiency and mill power draw. Steel balls will be added using a ball charging kibble.

17.5.3 GRAVITY CONCENTRATION

The gravity concentration circuit, consisting of a centrifugal concentrator and a table, will produce a concentrate containing coarse gold recovered from the grinding circuit. The shaking table will upgrade the gravity concentrate suitable for onsite/offsite smelting at a refinery.

The main items of equipment in this circuit will include:

- feed preparation sizing screen
- centrifugal gravity concentrator
- concentrate holding tank
- shaking table.

Approximately 30% portion of the cyclone underflow will be directed to the gravity circuit as gravity circuit feed. The gravity circuit feed will initially be screened over a vibrating feed preparation screen to remove oversize and grit particles greater than 2 mm in size. The screen oversize material will be directly returned to the grinding circuit for further grinding.

The screen undersize will feed to the centrifugal concentrator. The concentrator will operate continuously and will be flushed twice every hour to remove the concentrate collected in the unit. The concentrator flush will be pumped to the concentrate holding tank, which will collect all the concentrate from the centrifugal concentrator over an entire day of production. Gravity tailings will be discharged from the concentrator and returned to the cyclone feed pumpbox in the grinding circuit.

The centrifugal gravity concentrate will be upgraded on the shaking table daily as a batch process. The table tailings will be returned to the centrifugal concentrator. The table concentrate will be collected, dried and stored for smelting.

17.5.4 COPPER-GOLD BULK FLOTATION CIRCUIT

ROUGHER FLOTATION AND CONCENTRATE REGRIND

The cyclone overflow from the primary grinding circuit will flow into an agitated conditioning tank before feeding into feed box of the first of two stages of rougher flotation. The first and second rougher concentrate froth will overflow into the concentrate launders and report to the regrind cyclone feed pumpbox. The copper-gold bulk flotation tailings will be further floated to recover gold-bearing pyrite in the pyrite scavenger flotation circuit.

The rougher concentrate will be pumped to the regrind cyclone with the cyclone underflow reporting to the concentrate regrind ball mill. The regrind ball mill will serve to grind the rougher concentrate to a finer particle size of 80% passing approximately 35 to 40 µm prior to the next stages of flotation.

The regrind ball mill discharge, together with the rougher concentrate, will be pumped to the regrind cyclone for particle size classification. The regrind cyclone overflow will report to the feed box of the first cleaner flotation.

The rougher flotation circuit includes the following equipment.

- conditioning tank with a mixer
- rougher flotation cells, eight 10 m^3 tank cells.
- regrind cyclone feed pumps
- regrind ball mill, 1.5 m diameter by 2.1 m long, 56 kW
- regrind cyclones.

CLEANER FLOTATION

The cleaner flotation circuit will consist of three stages of cleaner flotation together with a cleaner scavenger flotation. The cleaner flotation circuit serves to upgrade the rougher flotation concentrate to produce a final concentrate to meet specifications for sale to offsite smelters.

First Cleaner Flotation

The overflow from the regrind cyclone will feed into the first cleaner flotation cell bank, consisting of three, 3 m^3 tank cells. The first cleaner concentrate will report into the second cleaner flotation cells. The first cleaner tailings will flow into the cleaner scavenger flotation circuit.

Second Cleaner Flotation

The second cleaner flotation concentrate from two, 2 m^3 flotation tank cells will be sent to the third flotation cleaner circuit. The second cleaner flotation tailings will be recycled back into the first cleaner flotation cells.

Third Cleaner Flotation

The concentrate produced in the third stage of cleaner flotation will be the final concentrate containing high levels of gold, and is expected to meet the grade and quality specifications typically required by smelters.

The third cleaner flotation will be conducted in a column type cell. The concentrate collected will be pumped to the concentrate thickener for dewatering. The tailings from the third cleaner flotation will be recycled to the feed of the second cleaner flotation cells.

Cleaner Scavenger Flotation

The cleaner scavenger flotation serves as a final copper flotation stage to recover slow floating or poorly liberated copper minerals. The cleaner scavenger concentrate will be pumped to the concentrate regrind circuit to increase particle liberation before being recycled to the cleaner flotation circuit for reprocessing.

The cleaner scavenger tailings contain significant levels of the gold that is not recovered by flotation, but is recoverable by agitated cyanide leaching. Therefore, the cleaner scavenger tailings, together with gold-bearing pyrite concentrate, will be sent to the dewatering circuit consisting of thickening and filtering. The filtered pyrite concentrate and cleaner scavenger tailings will be transported by truck to the cyanidation plant at the proposed nearby Da Tambuk gold plant or other facilities, where the material will be subjected to agitated cyanide leaching to recover the gold.

17.5.5 CONCENTRATE DEWATERING

The final concentrate from the third cleaner flotation will be dewatered to a moisture level of 8 to 9% before being transported offsite. The reduction in the moisture content will be achieved in two stages:

- thickening to a solid density of approximately 60% solids
- pressure filtration to further reduce the concentrate moisture content to 8 to 9%.

The final concentrate dewatering circuit will include the following equipment:

- high-rate thickener, equipped with thickening mechanism, 2 m diameter
- thickener underflow pumps
- concentrate holding tank with a mixer
- plate and frame pressure filter (automated) and related filter pumps and air compressors, shared with the gold-bearing products
- filter cake belt conveyor; shared with copper-gold bulk concentrate.

The final concentrate will be pumped to the concentrate thickener where the concentrate solids will settle to the bottom of the thickener. The thickened concentrate (thickener underflow) will be approximately 60% solids by weight. The thickened concentrate will be pumped to a concentrate holding tank prior to being further dewatered in the pressure filter. The decant solution from the thickener is recycled back to the process.

From the concentrate holding tank, the concentrate will be pumped to the final dewatering in a 64 m^2 pressure filter which will be shared with the gold-bearing pyrite material. The pressure filter will be an automated plate and frame type of filter. The concentrate slurry will be pumped into the filter. The solids will be collected on filter cloths on the plates while the solution passes through the filter cloths and is discharged from the filter unit to the concentrate thickener feed well.

The filter press will be automatically operated, including filter feeding, pressing, air drying and cake discharging. The dried concentrate will be conveyed to the concentrate storage shed before being transported off site.

17.5.6 PYRITE FLOTATION AND DEWATERING

A separate pyrite flotation circuit is included to recover the gold-bearing pyrite as a separate product for subsequent treatment using agitated cyanide leaching at the proposed Da Tambuk site or other facilities to recover gold from the pyrite. The cyanidation feed will also include the copper cleaner scavenger flotation tailings that will be dewatered together with the pyrite concentrate at the Mato Bula site.

The pyrite flotation circuit and the dewatering circuit will include the following equipment.

- pyrite flotation cells, seven 10 m^3 tank cells
- high-rate thickener, equipped with thickening mechanism, 5 m diameter
- thickener underflow pumps
- concentrate holding tank with a mixer
- plate and frame pressure filter (automated) and related filter pumps and air compressors; shared with copper-gold bulk concentrate
- filter cake belt conveyor; shared with copper-gold bulk concentrate.

The copper rougher flotation tailings will flow to a dedicated pyrite flotation bank where the pyrite will be recovered into a pyrite concentrate. The pyrite flotation concentrate, together with the copper cleaner scavenger flotation tailings, will be sent to a dedicated pyrite thickener for dewatering. The thickener underflow will be pumped to a gold-bearing pyrite product surge tank before being pumped to a plate -frame type pressure filter for further dewatering. The filter cake will be transported by truck to the proposed nearby Da Tambuk gold processing plant or other facilities where it will be treated in the cyanide leach circuit to recover contained gold. The pyrite thickener decant solution and the pressure filter decant will be recycled back to the process. The pyrite flotation tailings will be final tailings and will report to the final tailings thickener.

17.5.7 TAILINGS DEWATERING

The pyrite flotation tailings will be delivered to a 15 m diameter tailings thickener for dewatering to approximately 60% solids by weight. The thickener underflow will be pumped to the TCF. The decant solution from the thickener will be recycled to the process.

17.5.8 CONCENTRATE STORAGE AND LOADOUT

Separate concentrate storage sheds will be provided to hold the dewatered final copper-gold concentrate and gold-bearing pyrite material. The sheds will have a concrete floor and side walls and a permanent roof. The shed will keep the dewatered materials dry and protect them from wind, thereby preventing dusting and losses due to wind. The concentrate storage sheds will have a capacity to hold approximately two weeks (200 t) of the concentrate production and approximately five days of the gold-bearing pyrite material production.

A truck weigh scale will be installed to weigh the empty and loaded haul trucks for transport weight monitoring and inventory accounting.

A truck wash station will be provided for washing of the haul trucks. The wash station is designed to collect all wash water and any materials washed off the trucks.

17.6 REAGENT PREPARATION

The reagent preparation section will prepare the reagents for use in the various parts of the processing circuit.

The reagent preparation section will be under a roof to protect the reagents and equipment from rain. Most reagents will be received in bulk as in palletized bags, chemtainers, drums or bulk bags. The reagent preparation section will contain strategically located safety showers and eyewash stations. Each reagent preparation area will be bunded to contain accidental spillage that may arise during the preparation, each bunded area served by a sump pump for the cleaning up and control of any spillage arising.

17.6.1 LIME

The design is based on using hydrated lime as the pH modifier for the various unit processes. Hydrated lime will be delivered in 1 t capacity bulk bags or 40 t trucks, depending on the local supply capability. It will be added to the grinding circuit, and flotation circuits to control the pH levels as required for efficient flotation. The hydrate lime will be added to the hydrated lime mixing tank. The lime slurry will then be stored in a holding tank. The hydrated lime slurry strength will be 20%. The lime will then be distributed to the addition points via a closed loop piping system.

17.6.2 COLLECTORS

Solid collectors will be delivered in sealed drums. The collectors will be transferred to a mixing tank and mixed with water to achieve the desired solution strength, and then added to the flotation cells at controlled rates. The collectors will be added as solutions of approximately 10 to 20% strength.

The liquid collectors will be delivered in sealed drums. The reagents will be added into the flotation circuits with or without dilution via metering pumps at controlled rates.

17.6.3 Frothers

The frother will be delivered in sealed drums. The reagent(s) will be added into the flotation circuits without dilution via metering pumps at controlled rates.

17.6.4 Flocculants

Flocculent will be used in the concentrate and tailings thickeners as an aid in the solids settling process. The flocculants will be prepared at the required concentration in a proprietary vendor-supplied flocculants preparation facility. Flocculent will be delivered in bulk bags. A screw conveyor will deliver the correct amount of dry flocculants powder to be hydrated with water before being delivered into the flocculants mix tank and then to the holding tank where it will be made up to the required dosing strength. A metering pump will transfer the required amount of flocculant from the holding tank to the point of addition at the concentrate and tailings thickeners.

17.6.5 Water Circuit

The water supply systems will provide the fresh water and process water required in different areas of the process plant. The main items of equipment will be the water tanks and pumps for the different water circuits.

The water supply for the process plant consists of the following systems:

- fresh water supply system
- fire water supply system
- gland service water supply system
- process water supply system.

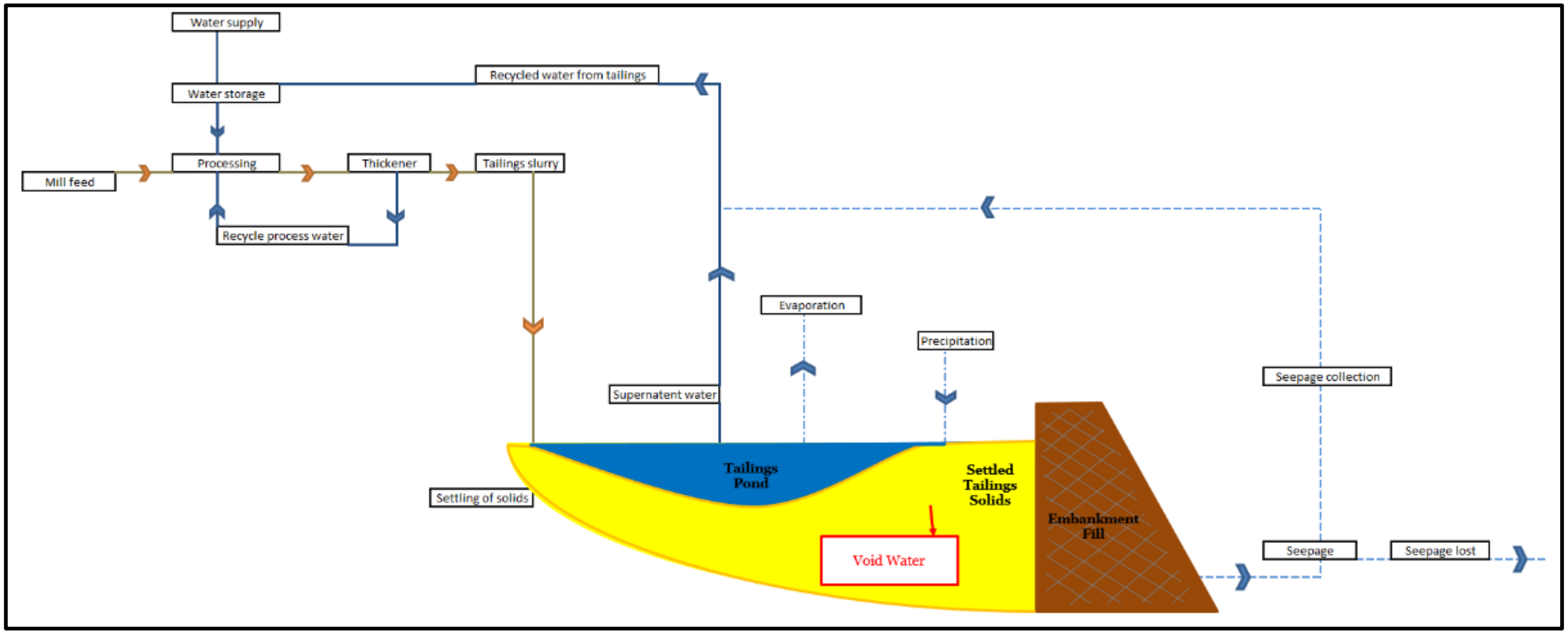
Fresh Water

Fresh water will be supplied from surface water sources and/or boreholes (water wells) in the area. The fresh water will be pumped to the fresh/fire water tank for distribution to the gland water service circuit, and the reagent preparation section, and to the plant water system as make-up water, as required. The fresh water will be used as fire water.

Process Water

The concentrate, gold-bearing pyrite and tailings thickener overflow solutions will make up the bulk of the process water with the remainder coming from the tailings storage facility and the fresh water tank. This process water will be used for grinding and in other parts of the plant as required. Figure 17.2 shows a schematic of the process water flowsheet. The thickener underflow will have a solid density of around 60% and will be pumped to the TCF. Water is then recovered from the TCF less losses due to evaporation, unrecoverable water in tailings mass (void water) and unrecoverable seepage. Water is recovered from the tailings both from pumping out of supernatant water. Additional water will enter the TCF from precipitation. The capacity of the TCF is designed to contain the additional water from precipitation, which will continue to be used through the dry months as process water.

Figure 17.2 Mato Bula Process Water Flowsheet



17.6.6 AIR SUPPLY

Air will be required for process and instrumentation use. The main items of equipment required will be:

- air compressors and receivers
- plant and instrument air filter, drier and receiver
- air blowers.

Two air compressors will supply the required plant and instrument air to the process plant using one common distribution system. The air will pass through air filters to remove remnant grease/oil or other contaminants and then be compressed by the compressors. The air will be then fed to an air receiver. A dedicated air system, including an air dryer, will be provided for servicing the plant instruments. A dedicated air compressor will be provided for the plate and frame filters.

Low pressure air blowers will be provided to supply low pressure air to the flotation cells.

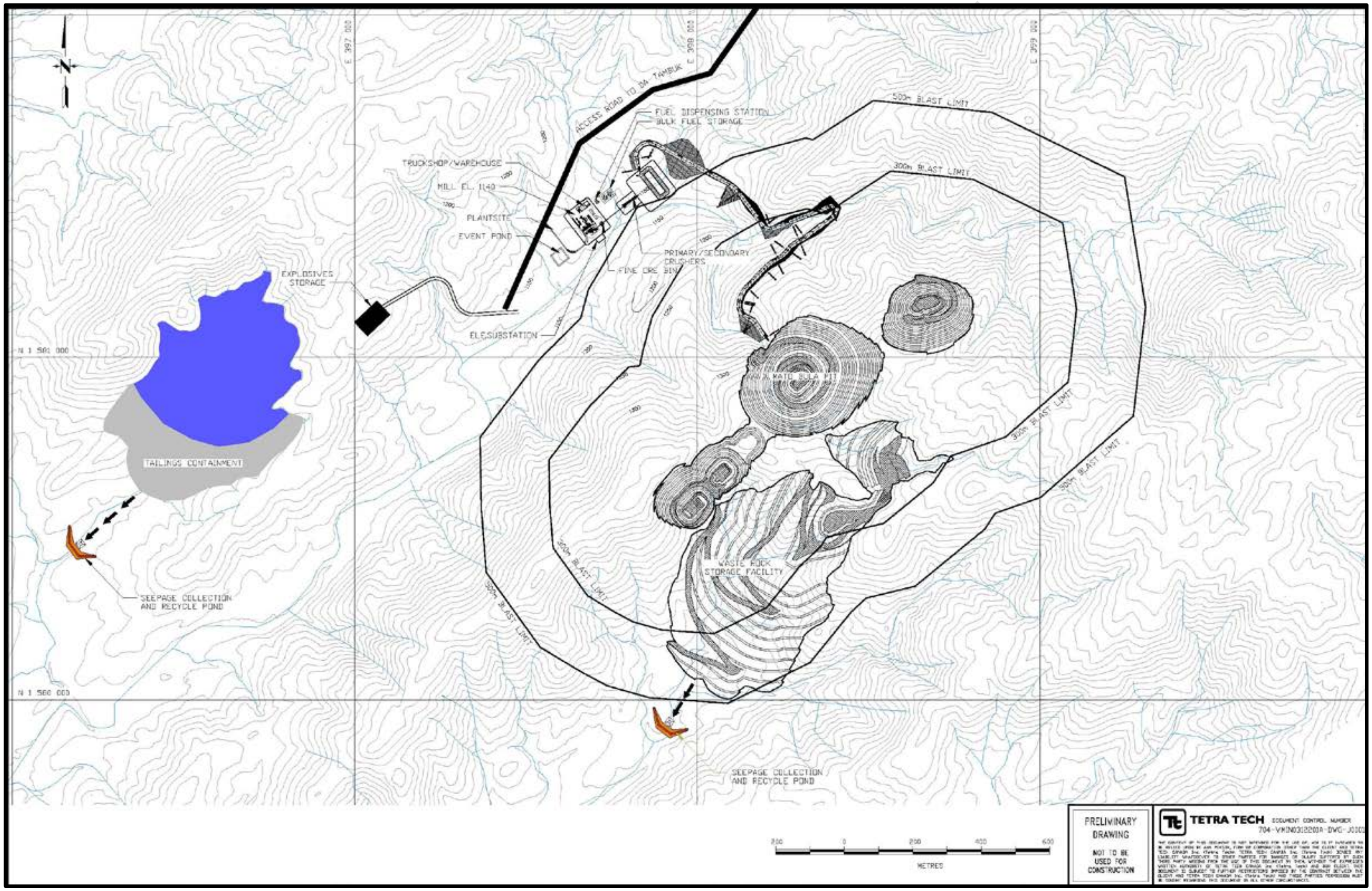
18.0 PROJECT INFRASTRUCTURE

18.1 SITE LAYOUT

Tetra Tech completed and prepared preliminary infrastructure layouts and estimated the cost of infrastructure to support the Mato Bula Project. The infrastructure required to support the mining and processing operations will include the following:

- mining:
  - equipment laydown areas
  - mobile equipment maintenance facilities
  - fuel storage area
  - explosives storage and magazines
  - WRSF
- processing:
  - process plant
  - crushing facilities and conveying equipment
  - grinding, gravity concentration, flotation and tailings thickening circuits
  - concentrate thickening and handling facilities
  - assay and metallurgical laboratories
  - warehouse for supplies, consumables and spare parts
  - reagent storage area
  - electrical substation and distribution
  - water supply
  - TCF
- general:
  - mine site administration office building with emergency first aid room
  - site water purification and distribution system
  - electrical systems
  - fire water system.

Figure 18.1 Mato Bula Overall Conceptual Site Layout



18.2 MINING FACILITIES

In addition to the open pit and waste rock storage, EAM will provide ancillary facilities to support mining operations.

18.2.1 EQUIPMENT LAYDOWN AREAS

The equipment laydown area is required for storing large or bulk equipment and supplies used in operations. The laydown area may include a shift change parking area for mine mobile equipment. The equipment laydown area will include a brake check facility, so that brake checks can be performed on the mobile equipment, before each shift, before the equipment descends into the pit.

18.2.2 EQUIPMENT MAINTENANCE FACILITIES (TRUCK SHOP)

EAM will provide a mobile equipment maintenance facility which will comprise a roofed structure, with a concrete floor. This facility will be used for mobile equipment maintenance and miscellaneous equipment repairs, and will house tools, steel working equipment and a tire replacement and compressor facility.

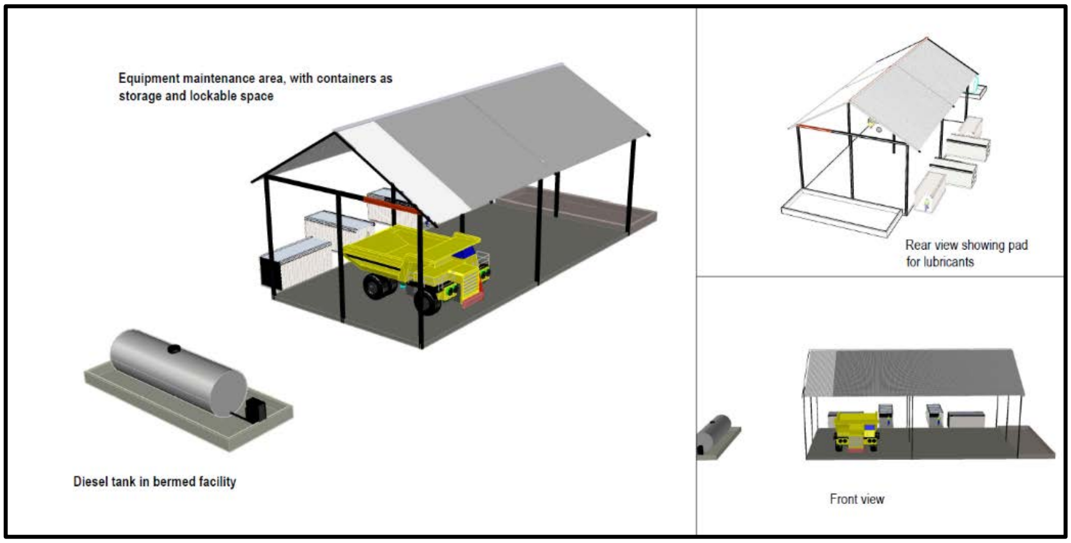
The facility will include a lined area for storing lubricants and other fluids used in equipment maintenance. Storage of parts and office supplies will be provided in customized containers, placed at the facility.

The facility will include washrooms and change rooms for employees.

18.2.3 FUEL STORAGE AREA

The fuel for mobile equipment will be stored in a tank which will be placed on a curbed (bunded) concrete pad. The curbed concrete pad will be sized to contain 110% of the full volume of the fuel tank. The fuel tank is planned to be located adjacent to the equipment maintenance facility (truck shop) as shown in Figure 18.2.

Figure 18.2 Mobile Equipment Maintenance Building (Truck Shop)



18.2.4 EXPLOSIVES STORAGE AND MAGAZINES

Explosives will be stored in purpose-built structures in a designated area a minimum of 500 m away from any inhabited or active area. The explosive storage will include two areas, namely ammonium nitrate prill storage and magazines for detonators and cartridges. No sensitive explosives including heat sensitive or flame sensitive explosives will be used on site. All explosives will be of the type that requires a detonation charge for detonation.

18.3 LUBRICANT STORAGE

Lubricant storage for mining equipment and processing equipment will be stored in a curbed concrete facility next to the equipment maintenance workshop. The facility may be enclosed with a lean-to structure, if necessary.

18.4 PROCESS PLANT AND ADMINISTRATION FACILITIES

The process plant and the administration facilities will be located to the west of the open pit and will consist of distinct areas as identified below:

- crushing facility
- overland conveyor to the grinding plant
- grinding facility
- gravity concentration
- flotation
- reagent systems

- concentrate dewatering, storage and load out
- tailings thickening
- control room
- electrical substation
- administration office
- assay and metallurgical laboratories.

The Mato Bula plant site layout is presented in Figure 18.3 and the crushing circuit is shown in Figure 18.4.

Figure 18.3 Mato Bula Conceptual Plant Site Layout

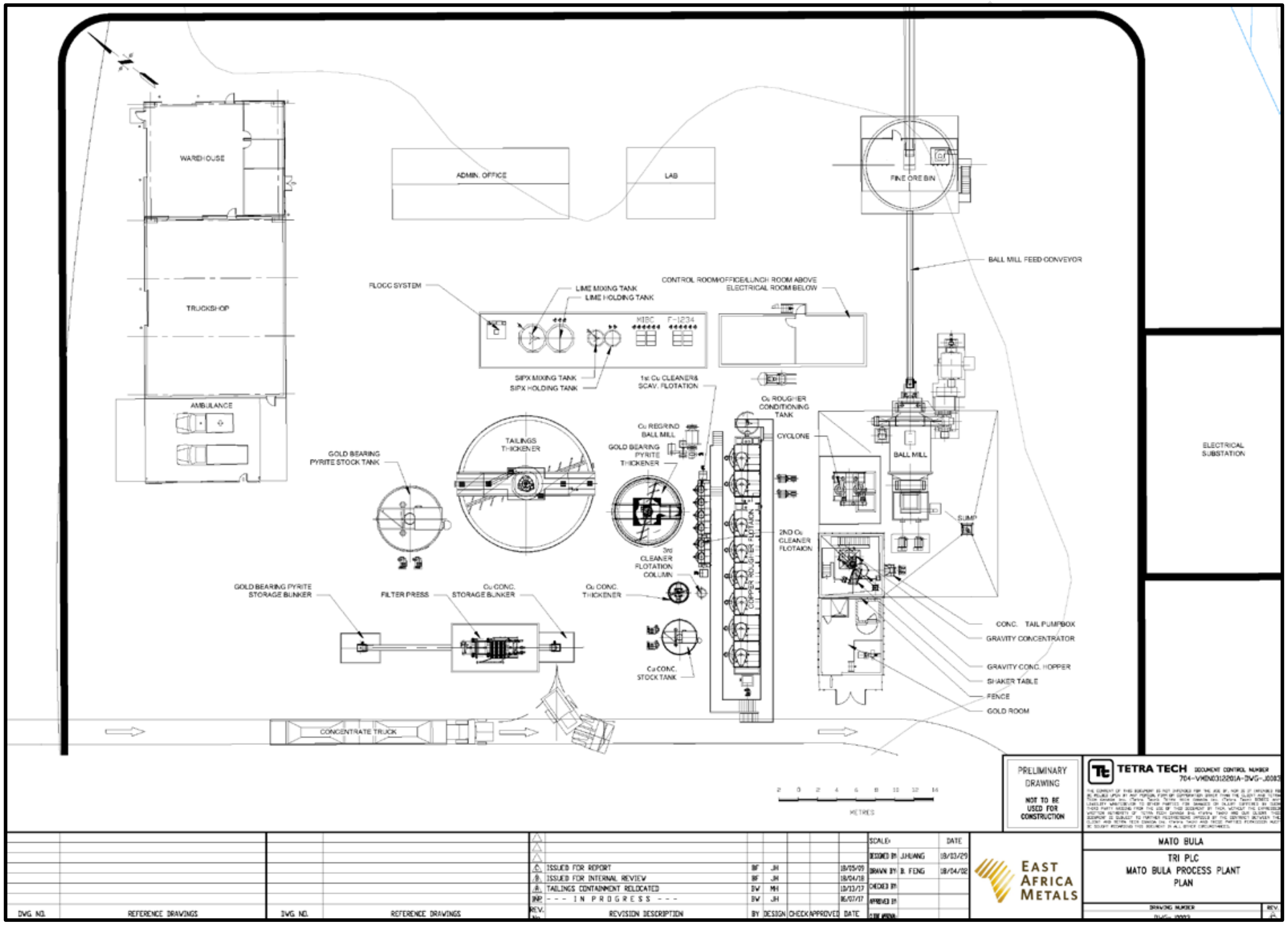
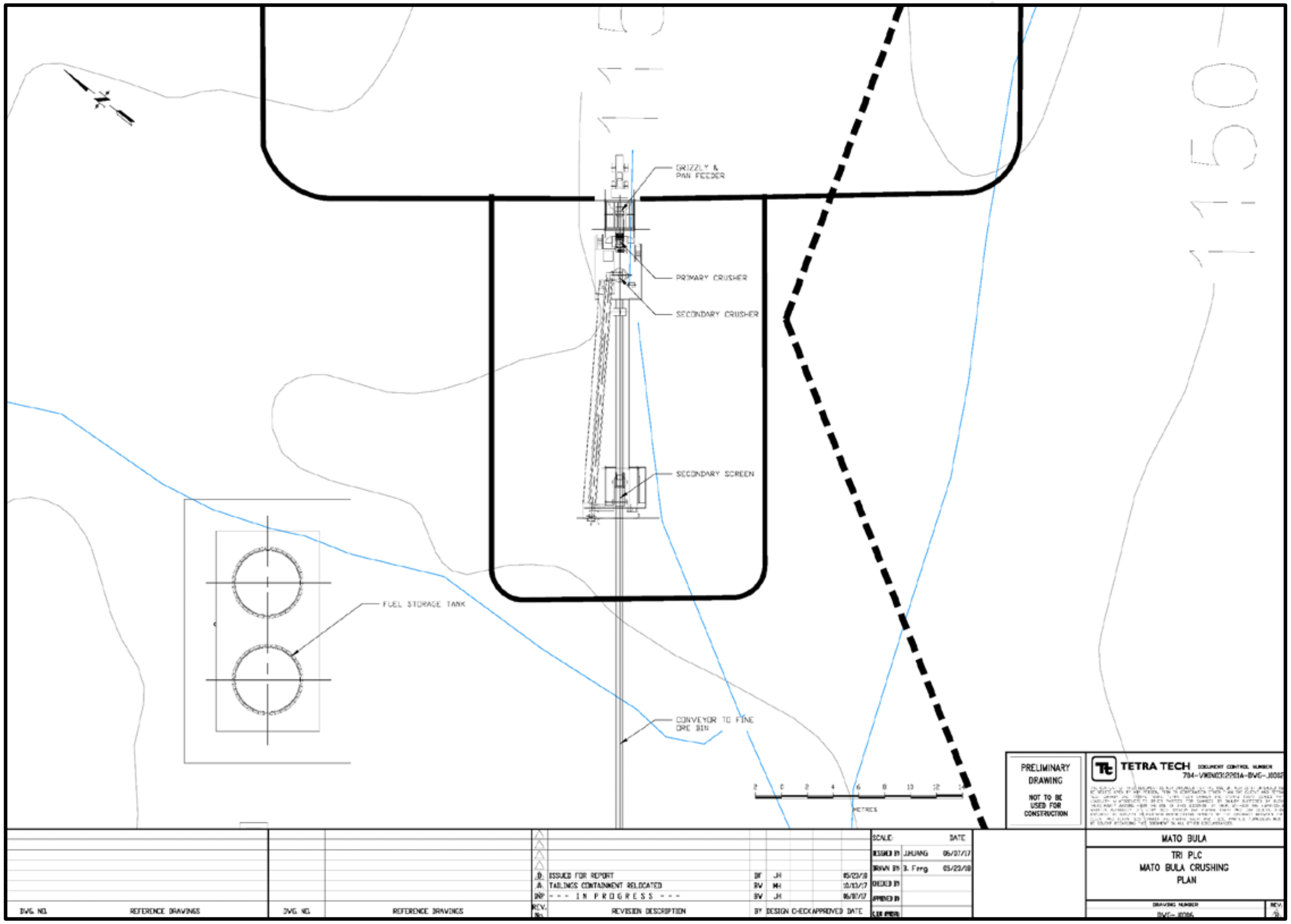


Figure 18.4 Mato Bula Conceptual Crushing Circuit Layout



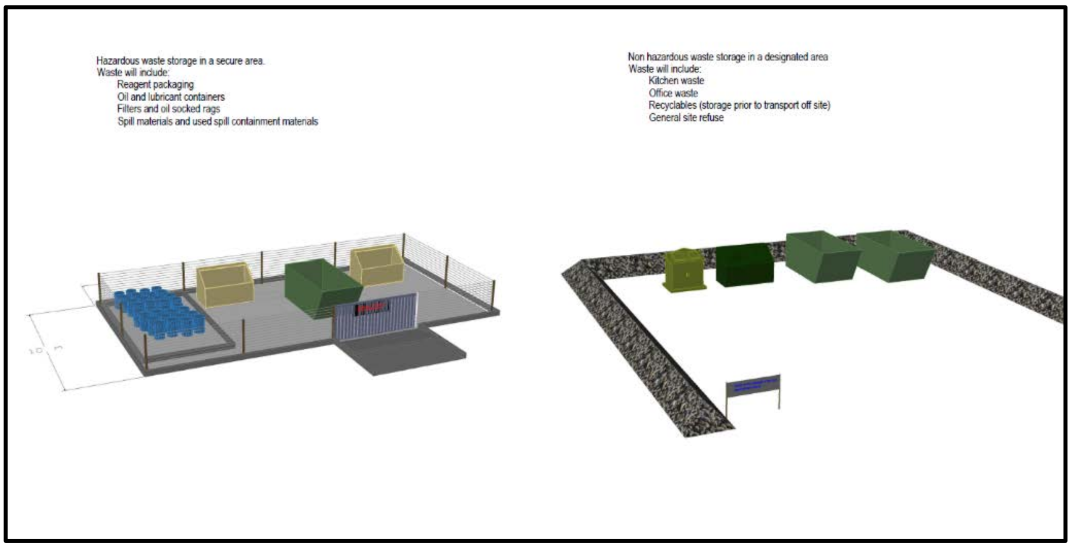
18.4.1 Waste Management Facilities

EAM will maintain strict standards for managing all potential waste originating from the mine site. A dedicated facility will be constructed for managing hazardous wastes. Figure 18.5 shows a conceptual layout of hazardous waste facilities for the mine. An area will be allocated for storing general waste from the mine site, such as:

- kitchen and office waste
- non-hazardous waste from mine site
- building rubble
- recyclable waste.

A dedicated pad will be constructed for hazardous waste, which will be used to store waste that could be hazardous (EAM will put processes in place to eliminate or significantly reduce residual hazardous material from mine site). This will include reagents packaging, old oil containers, general hazardous substances from offices and the mine site.

Figure 18.5 Waste Management Facilities



18.5 Waste Rock Storage

Over the life of the operations at Mato Bula, waste rock will be hauled to a designated WRSF located east of the open pit. The current storage location is sited in a valley adjacent to the pit, which will minimize the hauling distance. The overall capacity of the storage is 11.1 Mm^3.

Any PAG will be encapsulated within the NAG. This along with surface water diversion will mitigate potential downstream water quality impact. The following summarizes the waste rock storage design criteria and details:

- waste rock lifts of 15 m
- safety berms of 5 m per lift
- lift face slope of 30°
- overall slope of 18°

The footprint of the WRSF will be prepared, including removing unsuitable foundation material. The topsoil in the footprint will be stripped for use during closure.

18.6 TAILINGS CONTAINMENT FACILITY

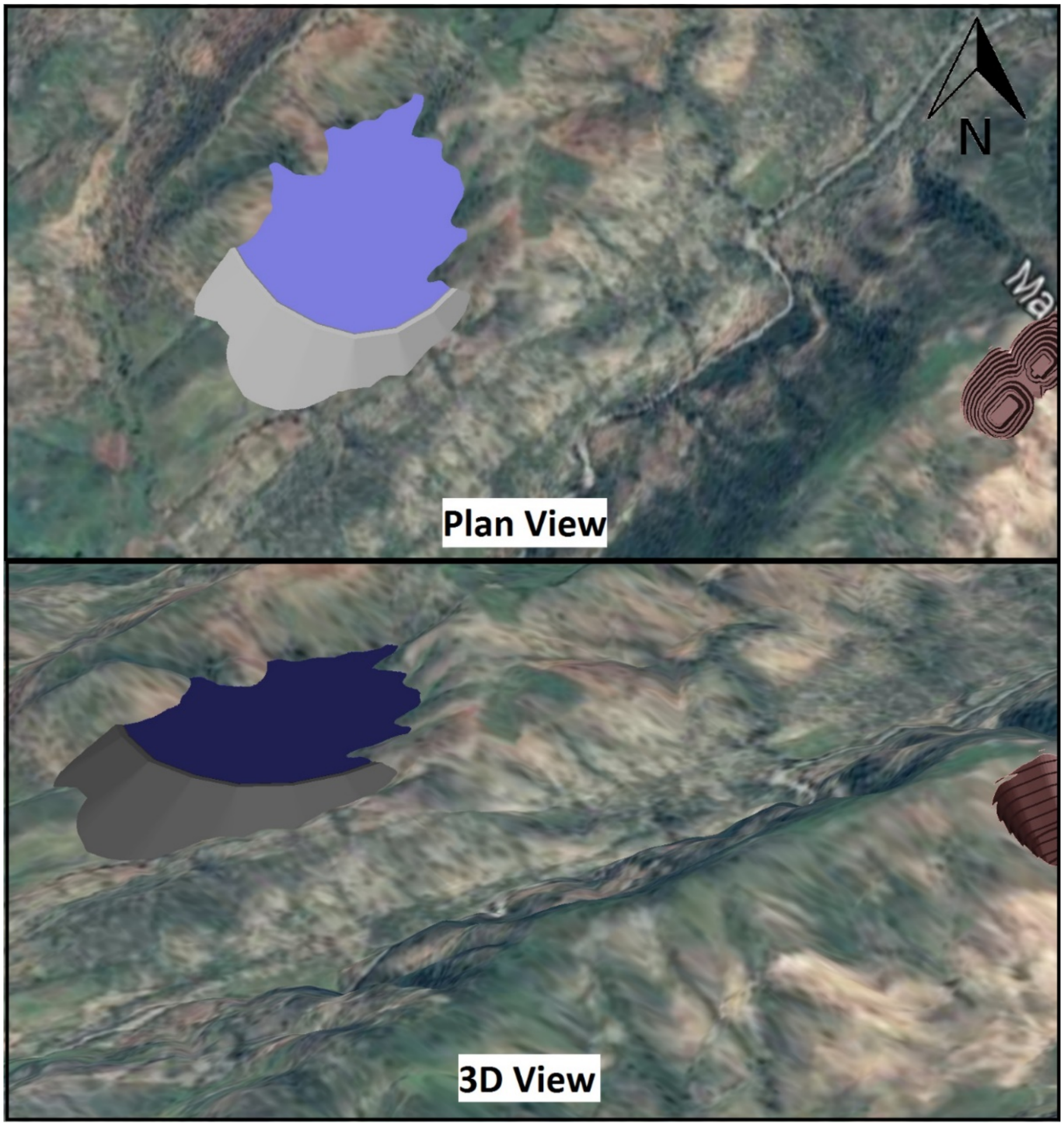
The design of the TCF for the Mato Bula Project considers optimizing tailings storage capacity using available construction materials, maximizing tailings density, and mitigating potential environmental impact.

The facility was designed based on the following criteria:

- eight years of production at up to 500,000 dmt/a of copper flotation tailings
- total tailings production requiring storage is 3.3 Mt tailings
- assumed settled dry density of 1.3 t/m^3 slurry tailings density for resulting in approximately 2.5 Mm^3 tailings storage required
- an allowance for operational water management and freeboard capacity
- topographic setting, arid environment, and abundant mine waste rock availability for construction materials favoring downstream raising construction in a cross-valley type storage facility
- an underdrainage collection, surface water diversion ditches, and a supernatant water return system incorporated into the TCF design
- topsoil in the TCF footprint stripped and stockpiled for use at closure.

Figure 18.6 shows the TCF alignment at full capacity. The facility is located approximately 0.9 km southwest of the plant. The valley TCF storage facility is formed by construction of an embankment across a valley outlet. The site was selected at a location downstream of the plant site in a valley that would provide adequate capacity and in a location outside the limits of the 1:200 design flood of the Mato Bula Valley.

Figure 18.6 Tailing Containment Facility



The starter embankment will be constructed using mine waste rock on a prepared foundation and include a key trench to intercept shallow seepage. If not enough fine-grained mine waste rock is available, then clayey borrow will be used to construct the core zone of the embankment. Some of the mine waste will likely be PAG, and this material will not be used for embankment construction. A downstream blanket drain will be incorporated into the design to promote drainage from the downstream slope of the embankment. The raise construction will be staged to suit tailings capacity requirements and mine waste rock availability.

The starter embankments and raised embankments will have design slopes of 3H:1V (horizontal to vertical) downstream and 2.5H:1V upstream slopes. The maximum embankment height at the end of the facility life will be nominally 70 m.

Tailings will be deposited using sub-aerial deposition techniques from multiple spigot locations along the embankment. The tailings spigots should be located to maintain the supernatant water pond around a decant structure positioned towards the northern end of the facility and away from the embankment.

The design incorporates a decant structure for water return within the facility. A pump deployed within the decant structure will return water to the plant. The water will be stored in a pond constructed near the plant ready for re-use in the process. The decant tower will consist of slotted concrete pipes stacked vertically on one another and surrounded by filter rock. The decant access way will be aligned to minimize earth fill requirements. The decant access way and decant structure will be raised in stages along with the perimeter embankments using mine waste and the centreline construction method.

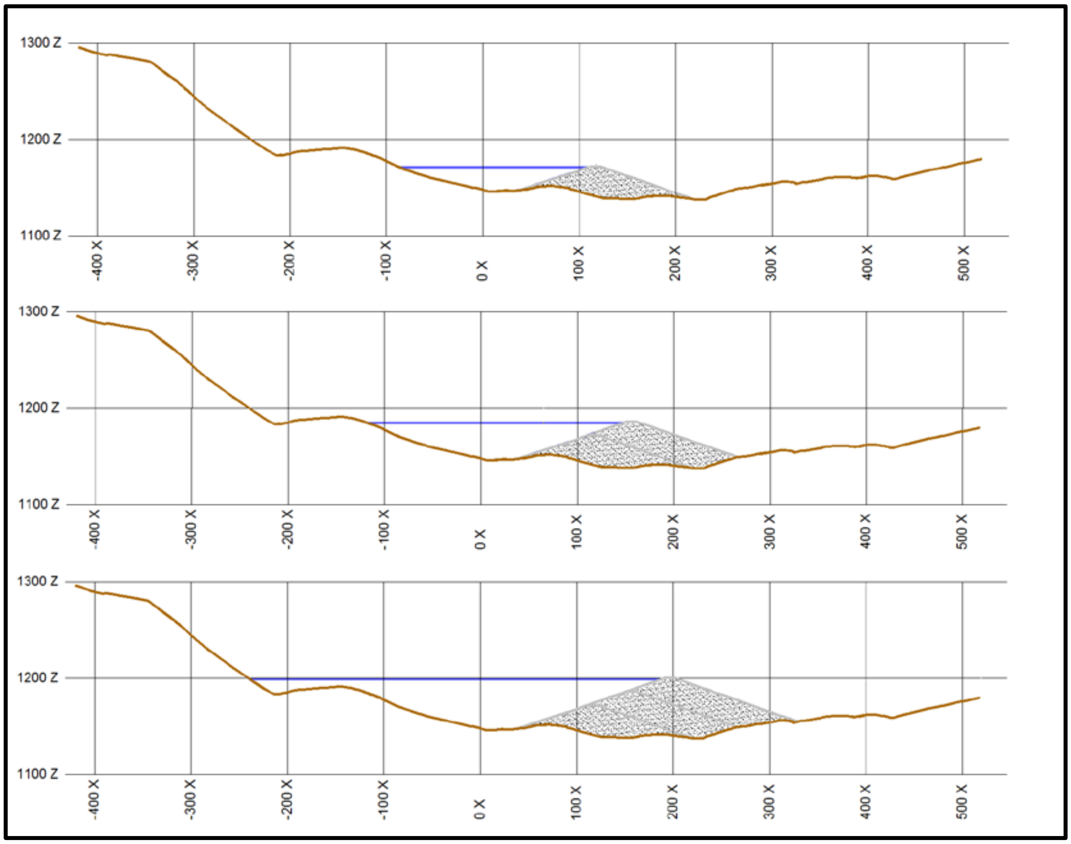
An underdrainage system has been incorporated into the design to assist in recovering water from the tailings and to reduce the potential for horizontal seepage losses. The underdrainage system will be installed in the TCF basin and drain by gravity outfall pipes allowing discharge of underdrainage water to an external sump. The underdrainage lines will consist of slotted pipe surrounded by a filter zone composed of aggregate and sand, wrapped in geotextile and stabilized with select rock.

18.6.1 Tailings Containment Facility Phased Construction Approach

The TCF will be constructed in three different phases. The initial starter dyke will provide enough capacity along with adequate freeboard for the first two years of mining. The material required for this initial dyke will be 445,000 m^3. This will limit the initial capital expenditure required for start-up, pushing subsequent construction costs later out into the life of mine.

The construction will then again commence in year two, where a raise will be constructed using the downstream construction method as shown in Figure 18.7. This will provide additional capacity for the mine to carry out operations until the end of year five. The last raise will be constructed in year five and will provide the required capacity until end of mine life.

Figure 18.7 Tailings Containment Facility Phases



18.6.2 Tailings Containment Facility Water Balance

A preliminary water balance assessment was conducted for the Mato Bula Tailings Containment Facility (TCF) to assess the excess or shortage of water within the impoundment. The analysis was completed using the end of mine geometry of the tailings facility and would help in understanding the behaviour of impoundment for various seasons. A detailed GoldSIM modeling is later required to assess the water balance through the life of mine.

The water balance input to the Mato Bula TCF includes precipitation and water in tailings slurry.

The water balance losses from the TCF include evaporation, water in tailings voids, seepage flows.

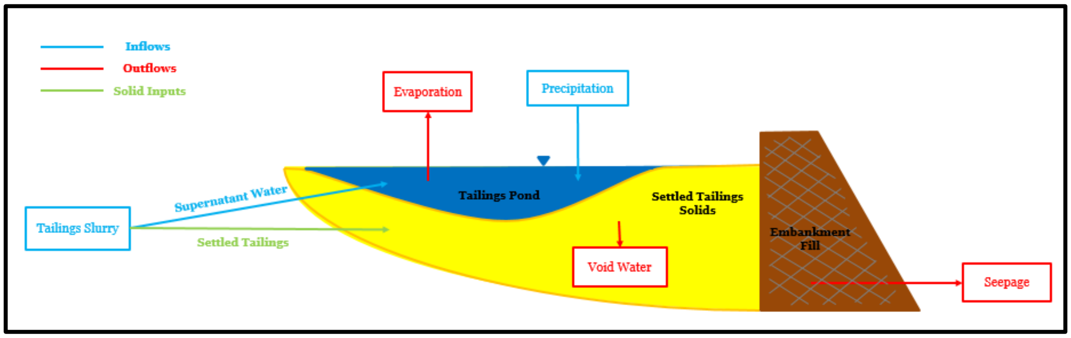
The water balance was completed using spreadsheet analysis on a monthly time step. The assumptions and parameters used in the water balance analysis are summarized below:

- The seepage was roughly estimated using a high-level flow analysis and the Darcy formula.

- The mill production used in the analysis was 1,383 t/d.
- The tailings solids specific gravity was 2.8 t/m³, the density of placed tailings was 1.3 t/m³, and percent solids by weight was 70%.

A general schematic of the water balance processes at the Mato Bula TCF is illustrated in Figure 18.8.

Figure 18.8 TCF Water Balance Processes



It should be noted that later in the mine life, the TCF will contain water from precipitation and from the settled tailings slurry. This water will be recycled to the mill and as such less make-up water is required than prior years, when the TCF may not have adequate water all year round, depending on precipitation.

18.7 SITE WATER MANAGEMENT

The key facilities for the water management plan are:

- open pit
- waste rock management facilities
- process plant (including fresh and process water tanks)
- TCF
- diversion and water management structures
- fresh water supply
- sediment and erosion control measures for the facilities.

An overall high-level average site water balance assessment was carried out to determine the preliminary water management strategy and process makeup water requirements for the Mato Bula Project. A detailed GoldSIM modelling will be conducted during the next phase of the Mato Bula Project, to assess the site water balance through the LOM.

18.7.1 EVAPORATION

Evaporation data was not available from the Shire Weather Station and from the National Meteorology Agency of Ethiopia. The data was collected from the sources listed below and averages are provided in Table 18.1.

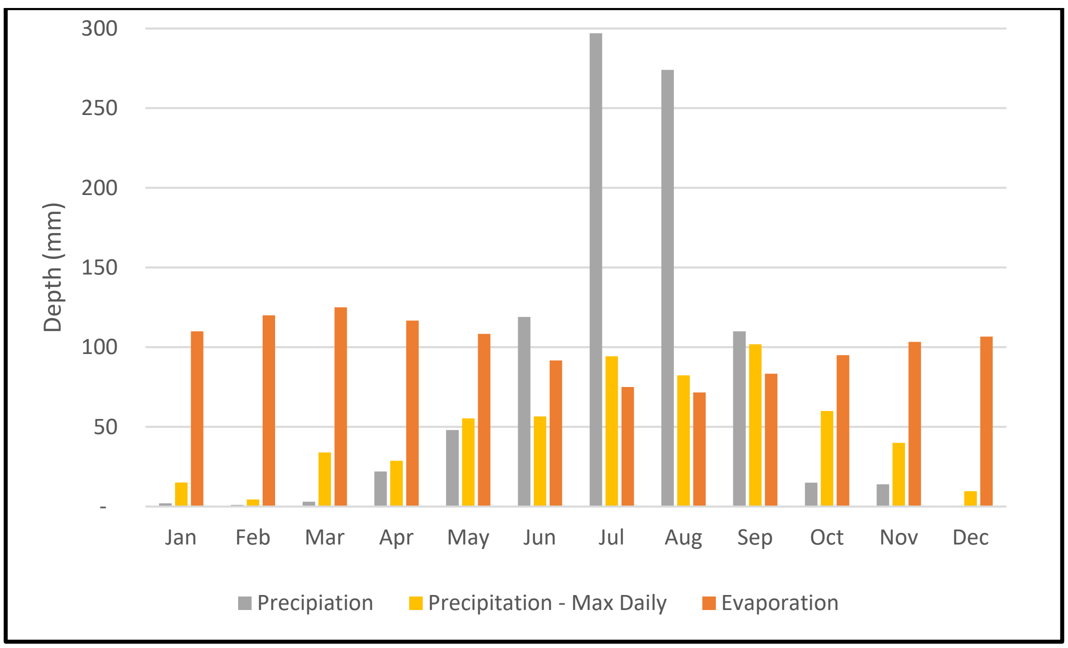
- Gebreegziabher, Yemane. February 2004. Assessment of the Water Balance of Lake Awassa Catchment, Ethiopia. International Institute for Geo-information Science and Earth Observation Enschede, The Netherlands.
- M. U. Lemma, et al. May 2016. Analyzing the Impacts of on Onset, Length of Growing Period and Dry Spell Length on Chickpea Production in Adaa District (East Showa Zone) of Ethiopia.

Table 18.1 Summary of Average Monthly Evaporation Data

Month	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Average Monthly (mm/mo)	110	120	125	117	108	92	75	72	83	95	103	107	1,207

A comparison of the monthly average precipitation and evaporation is shown in Figure 18.9. Evaporation is nearly constant throughout the year and peaks at 125 mm/mo. Precipitation, however, has a substantial seasonal variation. Precipitation is negligible from October through April, yet increases considerably for the rest of the year with a peak of approximately 300 mm/mo in July.

Figure 18.9 Comparison of Monthly Precipitation, Daily Maximum Precipitation and Evaporation at the Proposed Mato Bula Mine Site



18.7.2 OVERALL PROCESS MAKE-UP WATER REQUIREMENTS

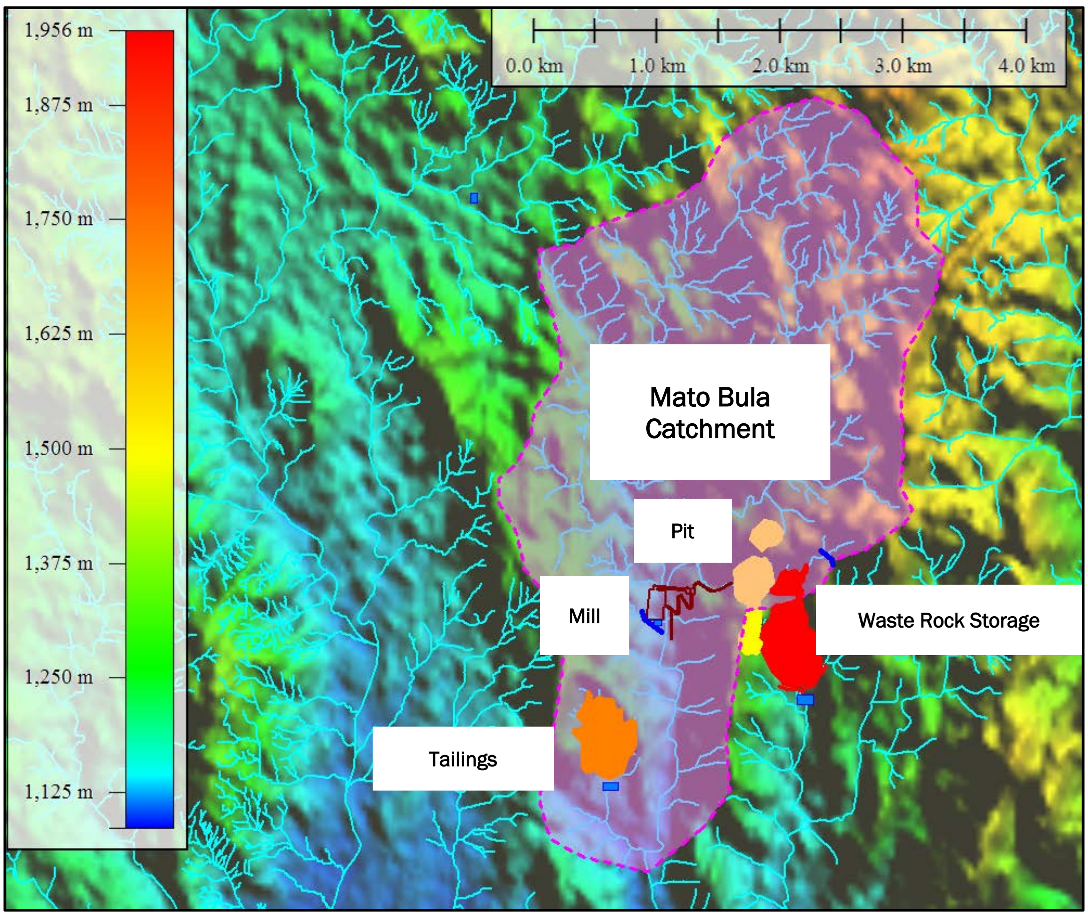
The overall process make-up water will be a function of rainfall for each year of operation. However, the estimate for make-up water requirements is based on the dry season and a dry year. As such the make-up water requirements are estimated to be 216,000 m^3 for a dry year. Dry months will require as much as 18,000 m^3.

18.7.3 HYDROLOGIC ANALYSIS

For sizing ponds and diversions and assessing the river inundation at each site, a rainfall runoff hydrological model was completed.

The catchments were delineated using Global Mapper V18 and the river catchment boundaries are shown in Figure 18.10

Figure 18.10 Catchment Delineation- Flow Pattern



A summary of catchment areas is shown in Table 18.2.

Table 18.2 Catchment Delineation

Catchment ID	Catchment Area (km²)
Mato Bula Main Stream	11.90
Mato Bula Mill Collection	0.06
Mato Bula WRD Collection Ditch	0.61
Mato Bula Mill Diversion North	0.27
Mato Bula Mill Diversion South	0.10
Mato Bula WRD Diversion	0.12

The hydrological data were input into HEC-HMS model, and the runoff hydrographs were generated. Table 18.3 summarizes the peak flow and volume for the delineated catchments.

Table 18.3 Runoff Peak Flow and Volumes

Catchment ID	Storm Event Year	Peak Flow (m^3/s)	Flood Volume ('000 m^3)
Mato Bula Main Stream	1:100	125	715
Mato Bula Mill Collection	1:100	1.6	5.4
Mato Bula WRD Collection Ditch	1:100	13.5	45.5
Mato Bula Mill Diversion North	1:10	3.7	12.2
Mato Bula Mill Diversion South	1:10	1.4	4.5
Mato Bula WRD Diversion	1:10	1.7	5.5

A detailed hydrological modelling will be conducted during the next phase of the Mato Bula Project, to assess the storm water management requirements through the LOM.

18.8 EARTHWORKS

For various infrastructure aspects at Mato Bula, cut-and-fill is required to form level working areas for building sites and vehicle traffic. Cut-and-fill slopes have been designed with 3:1 slopes (20° from horizontal) where excavations or pads need to be created for the different infrastructure around the mine site. Fill material will be sourced from pre-stripping of the open pit or borrow sites, based on suitability assessment at the time of construction.

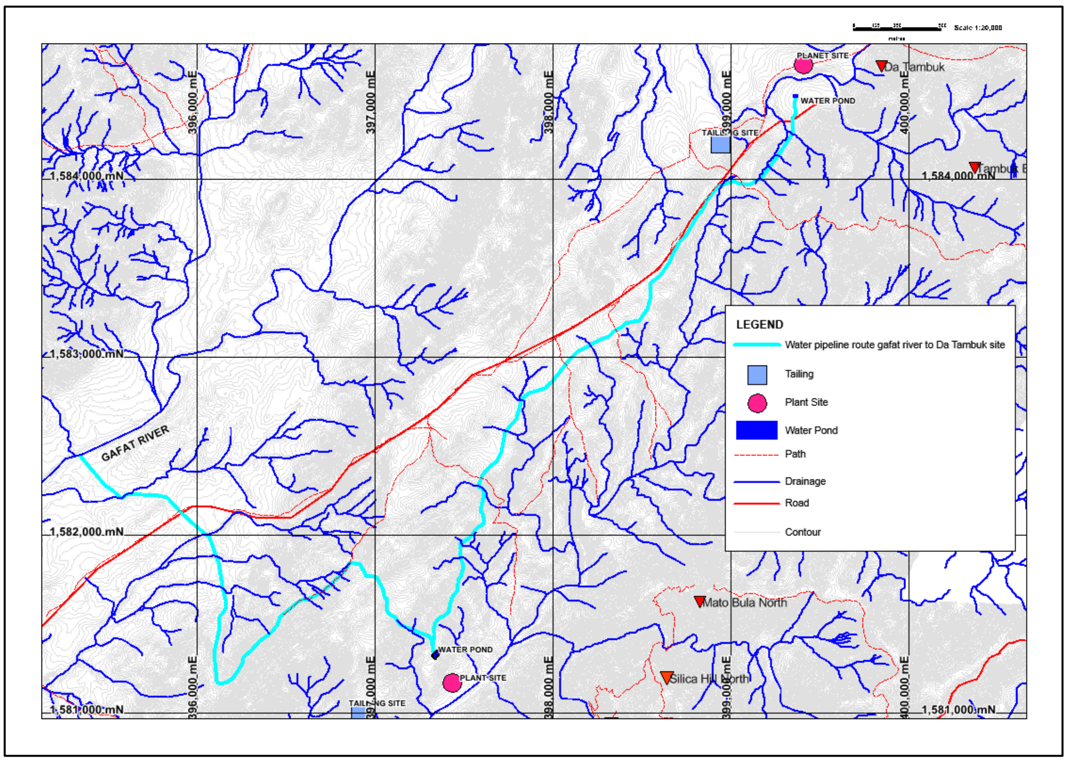
18.9 WATER SUPPLY

Water supply for Mato Bula will be sourced from either wells or from the nearby Gafat River. Preliminary work has been completed by EAM to determine the potential alignment of a water supply pipeline to provide water for Mato Bula as well as the wholly-owned Da Tambuk Project, to the north of the Mato Bula Project.

In addition, contact water collected at the mine site, including pit dewatering, tailings water and process site run-off will be reused and recirculated through the processing facility.

Figure 18.11 shows the potential alignment of the pipeline to source water from the Gafat River.

Figure 18.11 Water supply to Mato Bula and Da Tambuk project sites



18.10 POWER SUPPLY AND DISTRIBUTION

Power for the project will be sourced from the Ethiopian national grid. According to TRI, there is a high voltage power line located approximately 10 km northeast of Mato Bula site. EAM will request a connection point along the high-voltage power line from the Ethiopian electricity authority. From this point, a line would be constructed 10 km towards the southwest to the mine site. The following infrastructure would be required for power supply to the mine:

- a tap point near Adi Dairo
- approximately 15 km 34 kV line from tap point to mine site
- substation at mine site including:
  - mine site disconnect
  - three-phase stepdown transformer from 34 kV to lower voltages
  - main switch gear and metering equipment
  - grounding protection
- mine site power distribution cabling
- flotation mill facility distribution board
- crushing facility distribution board
- office and laboratory complex distribution boards.

18.11 STAFF ACCOMMODATIONS AND TRANSPORTATION

EAM project employees will live in the nearby towns and villages, and the company will provide daily bus transportation to the site. A cafeteria will be constructed to provide an eating area and hot meal service for employees.

18.12 SECURITY

EAM will provide security services for the mine site project facilities, personnel, and key activities. EAM intends to contract an experienced and highly respected Ethiopian-based security service.

18.13 EMERGENCY AND FIRE RESPONSE

EAM will provide emergency response capabilities at the mine site. This will include the following key tasks:

- emergency first aid training for dedicated site safety personnel
- fire response training for dedicated safety personnel
- completing an emergency response plan, including incident training for potential site incidents
- hazardous materials safe handling
- provision of equipment to support first aid, safety, fire control and other emergency response procedures.

Site firefighting equipment will include alarm system, a diesel fire water pump and site firewater distribution system including fire hoses and portable fire extinguishers. Water storage for the mine site operations will include a water reserve for firefighting that is not accessible for operations.

18.14 ADMINISTRATION FACILITY

EAM will provide a site administration building. The administration building will include the following:

- reception and meeting room
- roughly 5 offices, 10 workstations and data storage areas
- training room with audio/visual equipment
- kitchen and dining areas
- toilets and change rooms
- parking area
- potable water treatment.

18.15 OFF-SITE INFRASTRUCTURE

A power line and substation will be installed to connect the Mato Bula Project site to the grid approximately 10 km northeast of the project site.

EAM will maintain minimal offsite infrastructure including an office and company guest house in Shire.

18.15.1 ROADS

For the Mato Bula operations, a road is proposed to be constructed to access the existing Zelazle Road to the south of the project site. This road would require approximately 14 km of upgrade to an existing track, and would need to be constructed to a width required for highway trucks.

A number of river crossings are also required.

18.15.2 PREVIOUS ROAD MAINTENANCE AND UPGRADE

Access maintenance was required before starting the drilling programs each year, as summer heavy rainfall and fast flowing water washed away parts of the road and filled the creeks with mud and rocks (Figure 18.12). Road maintenance was conducted for permanent solutions to the erosion and mud stuck along the Adyabo access routes. The work involved:

- tracing (contouring the land to slow down water flow speed)
- building of road pads (over muddy areas)

- channelling (divert the direction of the water away from the road)
- building drains (when water must be diverted under the road).

Figure 18.12 Road Maintenance Along the Road to the Mato Bula Deposit

picture shows muddy creek difficult for driving (before)

picture shows foundation and filling stones to construct the pad (during construction)

cement concrete pad over the muddy creeks

picture shows strong flash water gorge needs to maintain with systematic drainage

19.0 MARKET STUDIES AND CONTRACTS

19.1 MARKET STUDIES

There were no market studies conducted or contracts negotiated for this PEA.

The PEA assumes that copper concentrates produced will be transported by road and sea to an overseas location for further processing.

Smelter terms applied to the concentrates include the following:

- production of 25% copper concentrate with a gold content averaging 129 g/t and silver content of 24 g/t
- 1% payable deduction of copper
- 1 g/t deduction from payable gold in concentrates
- 1 tr oz/t deduction from payable silver in concentrates
- 97.5% of payable gold paid by smelter
- 92% of payable silver paid by smelter
- US$80/t for road transport of copper concentrate
- US$25/t for ocean freight of copper concentrate
- US$90/t treatment charges for copper concentrate
- refining charge of US$0.08/lb of copper
- refining charge of US$5.00/tr oz of gold
- refining charge of US$0.50/tr oz of silver.

20.0 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL AND COMMUNITY IMPACT

20.1 KEY FINDINGS OF THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

Most of the proposed Mato Bula Project area has no farm land due to the steep, mountainous topography. There exists some farmland and a few houses in the southern and northern ends of the Mato Bula Project area. Many of the houses are temporary and constructed for artisanal miners. The land is covered with patchy grassland with bushes, and there is no thick woodland or forests in the Mato Bula Project area.

The proposed mine development will require change in land use and land cover in the immediate area of the mine and will require relocating inhabitants from the immediate Mato Bula Project area. The most important social issue is relocating and compensating the local inhabitants directly affected by the proposed project development.

The assessments indicate that there are no endangered, endemic or rare species in the Mato Bula Project area.

The source of water for the mining operations will be either from boreholes and/or surface water sources. This may include the Gafat River located approximately 7 km from the Mato Bula Project site. Importantly, the study concludes that the Mato Bula project consumption of water is relatively low relative to the supply and therefore will not negatively impact the water available for local inhabitants.

There are no cultural heritage sites or archeologically or socially sensitive areas within the mining area.

Overall, most of the community stated that they are in favour of implementing the Mato Bula Project, on the basis that proper compensation for land use will be made, basic public services will be improved, and project development will result in creating better livelihood and services to the local community.

Based on the findings of the environmental and social impact assessment (ESIA), the independent consultant concluded that it is possible to mitigate all probable environmental impacts from the proposed project. The consultant further recommends issues related to compensation for land access and relocation of those inhabitants directly affected by the Mato Bula Project be negotiated and agreed before project development. Such negotiations should include the relevant governmental authorities and result in a mutually agreed Resettlement Action Plan.

The ESIA demonstrates that the benefits of the project are very important and the adverse impacts identified can be satisfactorily mitigated through implementing the proposed management and monitoring plan included in the ESIA. Therefore, the independent consultant recommends implementing the Mato Bula Project with strict observation and compliance to the environmental and monitoring plans.

20.2 LOCATION, ENVIRONMENTAL AND PHYSICAL SETTING

The Mato Bula Project area is located in the Tigray National Regional State approximately 600 km north-northwest of the capital city Addis Ababa. The Tigray region is characterized by a temperate to hot climate and has both dry and wet seasons. The wet season extends from mid-June to mid-September with average rainfall of 800 to 1,000 mm/a, with high intensity rainfall events. Mean daily temperatures range from a high of 32.5°C in March to a minimum of 13°C in January.

The Mato Bula Project area is located in an area of varying relief ranging from 1,120 to 1,550 masl. Mountain slopes are generally steep and valleys range from very wide gently undulating to very narrow. Rivers in the area mainly drain south and southwest wards ultimately towards the Tekeze River approximately 75 km south of the project area. All of the streams in the region are seasonal. There are few perennial rivers including Gafat River which is considered as the most viable source for the water supply to the Mato Bula Project.

Most of the region is devoid of vegetation, particularly during the dry season, with small areas of shrub brush and trees most commonly located along rivers and their tributaries or ephemeral drainage.

The closest protected areas to the Mato Bula Project are the Shire Wildlife Reserve and the Simien Mountains National Park. The Shire Wildlife Reserve, covering an area of 75,300 ha, is located approximately 55 km south of the project area. The Simien Mountains National Park covers an area of 17,900 ha and is located approximately 110 km to the southeast.

20.3 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROGRAMME

EAM, through TRI engaged Beles in July 2017 to undertake an ESIA for the Adyabo area, which contains the Mato Bula Project and the nearby Da Tambuk Project. Beles completed the ESIA in November 2017. Subsequently, in November 2017 the ESIA Study Report was submitted to the MoMPNG in support of Mining Licence applications for both the Mato Bula and Da Tambuk projects.

Beles is a qualified Ethiopian environmental and social consultancy based in Addis Ababa. Beles has strong national and international links with companies working in water, land and environment. Beles has a Grade I licence from the Ministry of Environment, Forest and Climate Change to conduct ESIA study in any development projects.

The ESIA study was carried out as per the requirements prescribed under the Ethiopian Environmental Impact Assessment (EIA) Proclamation (No. 299/2002) in order to proceed to mining activities. The scale of the project is rated as Schedule I which requires a full-fledged ESIA study. The ESIA report was prepared taking into account the guidelines of the Federal Democratic Republic of Ethiopia (FDRE) Environmental Protection Authority and the current Ministry of Environment Forest and Climate Change and the World Bank Operative Directive (OD)4.01. In addition, the World Bank Environmental Assessment requirements are based on a three part classification system with Category A, Category B, and Category C. A project designated as Category A requires a full environmental assessment followed by Independent Environmental Review, Category B requires a lesser level of environmental investigations, and Category C requires no environmental analysis beyond that determination. The Mato Bula Project falls under Category A.

The ESIA describes the baseline environmental and social conditions in the Mato Bula Project area, presents an assessment of potential impacts associated with the project, and proposes mitigation and management measures to minimize potential impacts. The report in its entirety is submitted independently along with this Preliminary Economic Assessment report.

20.4 BASELINE INVESTIGATION METHODS

Site visits were made to collect data and update baseline information of the project area. Observations were made on biophysical and socio-economic environment of the project area. Photographic images that depict key environmental features were taken, and GIS was used for spatial analysis. Samples of water were collected and analysed. In situ measurements for water quality and noise levels were made. Soil samples were also described based on visual observations.

During the field visits, consultations were held with local community, community leaders and key informants in the affected area. Opinions and attitudes of Project Affected persons (PAPs) were assessed through questionnaires, Focused Group Discussions and public meetings at the community level. In addition, consultations with officials at Kebele, Woreda, zone and region levels were made. The environmental and social impacts of the project were identified by considering all proposed activities during the mobilization, construction, operation and decommissioning phases and the concerns and issues raised by stakeholders. The interactions (impact) of each activity with the environmental and socio-economic receptors were assessed using a matrix.

20.5 SOCIO-ECONOMIC CONDITIONS

The ESIA study indicated that most people living in the project area belong to the Tigre ethnic group. The large majority of residents are Orthodox Christians with few Muslims. Tigrigna is the working language of the Woreda that is spoken by the majority of the residents, however; other languages such as Amharic are spoken by a few residents of the Woreda. Agriculture forms the basis of livelihood of a large part of the inhabitants of the Kebele, with artisanal mining also practiced in the project area.

There are 50 schools in the Woreda: 47 primary schools, two secondary schools, and one preparatory school. The number of females continuing their education at the high school and preparatory level far exceeds the number of male students due to the fact that most male students prefer to begin working as miners rather than continue their education. Literacy in the region is still considered low, as 56.7% of study respondents are not able to read or write.

20.6 FLORA

The study areacharacterized by scattered vegetation (wood land species) dominated by Acacia spp. and considerable vegetated land with shrubs dominated by *Dodonaea Angustifolia*. Less common are woody and herbaceous climbers. The semi mountainous areas of the region are covered by dense shrub vegetation including Tahises (Dodonaea Angustifolia). Woody vegetation exists along major perennial rivers such as the Gafat River. The typical landscape and vegetation cover is shown in Figure 20.1 and Figure 20.2.

Figure 20.1 Typical Topography and Bush Vegetation Cover

Figure 20.2 Typical Topography Showing Dry Stream Bed and Bush Vegetation Cover

20.7 FAUNA

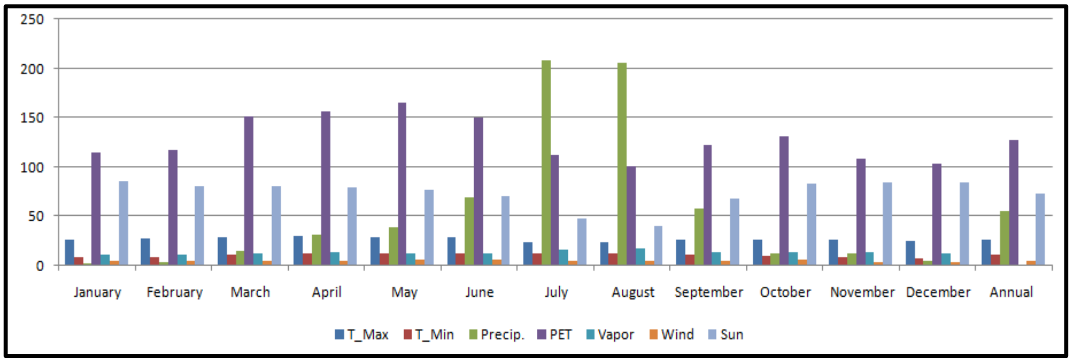
The wildlife information in the project area is obtained through formal and informal discussions with the local communities, elders and experts living in the project area based on their daily experience and historic observation, plus visual observations made by traversing the study area. In addition to visual observations of fauna evidence of their presence was studied in the form of tracks, nests, burrows, and feathers etc. The baseline study documented thirteen mammals, one amphibian, three reptiles, fifteen bird species and six species of invertebrates. The assessments also indicate that there are no endangered, endemic or rare species in the project area. Some of the species are listed as Least Concern and Vulnerable on the International Union for Conservation of Nature and Natural Resources (IUCN) Red List data.

20.8 CLIMATE

The nearest meteorological station for the project site is located at the town of Shire, approximately 33 km from the Mato Bula Project area. The data shows that the climate is semi-arid. The annual average precipitation and potential evapotranspiration is 55.23 mm and 127.91 mm, respectively. The average annual temperature is 21°C.

The meteorological record shows wide seasonal variations in meteorological parameters. The area receives significant rainfall from June to September, and December to March is the dry season. Major water stress exists in January, February and March. The region has unimodal rainfall pattern. The main groundwater recharge and surface runoff occurs from June to September, the peak rainfall occurs in July. Figure 20.3shows the seasonal variation of meteorological elements.

Figure 20.3 Long-term Average Meteorological Data at Shire



20.9 WATER RESOURCES AND GROUNDWATER HYDROLOGY

Due to relatively low rainfall intensity the discharge of the streams is low for most of the year. Many streams are dry during the dry season or have very low discharge. However, in July and August (the wet season) the discharge of the streams and rivers is relatively high due to the high level of precipitation and of the low permeability of the basement rocks which enhances surface runoff.

The only nearest perennial river to the Mato Bula Project area is the Gafat which is anticipated to be the primary water source for mine operation. Importantly, the study concludes that the Mato Bula Project consumption of water is relatively low relative to the supply and therefore will not negatively impact the water available for local inhabitants.

Conventional hydrogeological investigation has been carried out to understand the hydrogeological conditions. Brief description of the hydrogeology based on the conventional field observations is indicated below.

According to the hydrogeological map of Ethiopia (Mengesha Tefera et al. 1998) the region has low to medium groundwater potential. In general depth to groundwater level is shallow. Deep groundwater resources are unlikely to exist except in proximity to large regional faults. Relatively better productive shallow wells are confined along the course of rivers and close to major faults. The main source of the groundwater recharge is precipitation during the wet season.

20.9.1 COMMUNITY WATER SUPPLY

The rural residents in the area gets water from hand dug wells and springs along the course of streams and rivers. More recently, boreholes fitted with hand pumps are being used in some areas, although the wells are not well distributed in the region. Some people travel long distance to fetch water in the highland rugged areas.

20.10 PERMITTING

In November 2017 EAM/TRI submitted an application for a Mining Licence for the Mato Bula project to the MOMPNG. As part of the formal application review process, the MOMPNG requested clarification on a number of aspects of the proposed project. EAM/TRI submitted a formal response with the additional information in May 2018. As of the date of this report, the Mining Licence application is still under review.

21.0 CAPITAL AND OPERATING COST ESTIMATES

21.1 SUMMARY

The capital and operating costs for the Project have been estimated and are summarized in Table 21.1 and Table 21.2.

Table 21.1 Summary of Capital Costs

Area		Cost (US$ million)
Direct Costs		
10	Overall Site	2.90
30	Mining	4.34
40	Process	13.66
50	Tailings Containment	3.70
70	On-site Infrastructures	2.23
Direct Cost Subtotal		**26.83**
Indirect Costs		
90	Project Indirects	12.55
98	Owner's Costs	4.50
99	Contingencies	10.31
Indirect Cost Subtotal		**27.36**
Total Capital Cost		**54.19**

Table 21.2 Summary of Operating Costs

Description	LOM Operating Cost (US$ million)	Unit Operating Cost (US$/t processed)
Mining	85.4	25.61
Processing	32.4	9.69
Off-site Leaching of Pyrite Material	15.7	4.73
G&A	19.9	5.96
Total Operating Cost (Excluding Pre-stripping)	**153.4**	**45.99**
Total Operating Cost (Including Pre-stripping)	**158.5**	**47.53**

All costs are reflected in Q1 2018 US Dollars unless otherwise specified. The expected accuracy range of the cost estimates is –20% to +35%. When required, costs in this report have been converted using currency exchange rates of US$1.00:Ethiopian Birr (ETB) 23.00.

21.2 CAPITAL COST ESTIMATES

Tetra Tech developed and prepared the capital cost estimate for the Mato Bula Project with input from EAM.

Tetra Tech established the capital cost estimate using a hierarchical work breakdown structure (WBS). The accuracy range of the estimate is -20% to +35%. The base currency of the estimate is US dollars. Tetra Tech used a foreign currency exchange rate of US$1.00 to ETB23.00, where applicable. A blended labour rate of US$8.00/h was used throughout the estimate.

The total estimated initial capital cost for the design, construction, installation, and commissioning of the Project is US$54.2 million. This total includes all direct costs, indirect costs, Owner's costs, and contingency. A summary breakdown of the initial capital cost is provided in Table 21.1.

Table 21.3 Capital Cost Summary

Area		Cost (US$ million)
Direct Costs		
10	Overall Site	2.90
30	Mining	4.34
40	Process	13.66
50	Tailings Containment	3.70
70	On-site Infrastructures	2.23
Direct Cost Subtotal		**26.83**
Indirect Costs		
90	Project Indirects	12.55
98	Owner's Costs	4.50
99	Contingencies	10.31
Indirect Cost Subtotal		**27.36**
Total Capital Cost		**54.19**

21.2.1 MINING CAPITAL COST ESTIMATE

The capital cost for mining is based on purchase of mining equipment and on pre-stripping. A total of US$4.34 million was estimated for mining equipment. An additional, US$5.1 million of waste rock pre-stripping cost has been allocated to the financial model.

Sustaining capital of US$3.1 million was included for additional and replacement mining equipment.

21.2.2 PROCESSING CAPITAL COST ESTIMATE

A total of US$13.66 million was estimated for procurement, shipping, installation and commissioning of all process equipment. The cost includes crushing, grinding, gravity concentration, flotation, dewatering, concentrate loadout, reagent systems and the assay lab.

All process equipment and material costs are included as free carrier (FCA) or free board marine (FOB) manufacturer plants and are exclusive of spare parts, taxes, duties, freight, and packaging. These costs, if appropriate, are covered in the indirect cost section of the estimate.

21.2.3 OVERALL SITE INFRASTRUCTURE CAPITAL COST ESTIMATE

A total of US$2.9 million was estimated for site preparation, earthworks, foundations, procurement, shipping, installation and commissioning for the overall site infrastructure, including heap leach pads and pond and their pipe work and liner systems. The cost includes administration building, truck shop, explosive storage, laydown area, water supply, sewage, on-site roads and the plant mobile fleet.

21.2.4 PROJECT INDIRECT COSTS

The estimated project indirect costs of US$12.5 million include construction indirects, spare parts, and freight and logistics, are calculated on a percentage basis based on Tetra Tech's work experience. Allowances for initial fills are provided for grinding media, reagents, lubricants and fuel. Engineering, procurement and construction management (EPCM) allowance is calculated on a percentage basis based on Tetra Tech in-house experience. Commissioning and start-up, and vendor assistance allowances are calculated based on the number of engineers required on site, estimated duration, and the average man-hour rates.

21.2.5 OWNER'S COSTS AND CONTINGENCIES

The US$4.5 million owner's costs were provided by EAM. The estimated contingencies, totalling US$10.31 million, are allowances for undefined items of work which is incurred within the defined scope of work covered by the estimate. Each discipline was allocated different contingency factors due to the varied risk level. The average contingency for the Project is 38 % of the total direct costs.

21.2.6 EXCLUSIONS

The following items are excluded from the capital cost estimate:

- pre-production mine pre-stripping (included in the financial model)

- working capital (included in the financial model)
- financing costs
- refundable taxes and duties
- land acquisition
- currency fluctuations
- lost time due to severe weather conditions
- lost time due to force majeure
- additional costs for accelerated or decelerated deliveries of equipment, materials, or services resultant from a change in project schedule
- warehouse inventories, other than those supplied in initial fills
- any project sunk costs (studies, exploration programs, etc.)
- mine reclamation costs (included in financial model)
- mine closure costs (included in financial model)
- escalation costs
- community relations.

21.2.7 SALVAGE

Since the mine life is shorter than other comparable projects and typical equipment life, it is expected that most of the process equipment will be salvageable at the end of the eight-year LOM.

21.2.8 SUSTAINING CAPITAL COST ESTIMATE

The sustaining capital cost during the LOM is US$5.6 million. This includes sustaining capital for mining equipment of US$3.1 million, process equipment of US$850,000 and TCF upgrades of US$1.6 million.

21.3 OPERATING COSTS

On average, the LOM on-site operating costs for the Mato Bula Project were estimated to be US$47.53/t of material processed. The operating costs are defined as the direct operating costs including mining, processing, site servicing, and G&A costs, including related freight costs. Table 21.4 shows the cost breakdown for various areas.

Table 21.4 Operating Costs Summary

	LOM Cost (US$ million)	Unit Cost (US$/t processed)
Mining	85.4	25.61
Processing	32.4	9.69
Off-site Leaching of Pyrite Material	15.7	4.73
G&A	19.9	5.96
Total Operating Cost (Excluding Pre-stripping)	**153.4**	**45.99**
Total Operating Cost (Including Pre-stripping)	**158.5**	**47.53**

The cost estimates in this section are based on information from Tetra Tech's in-house database, published information from the industry or experience in similar projects. The expected accuracy range of the operating cost estimate is –20% to +35%. All the costs have been estimated in US dollars, unless specified.

It is assumed that operation personnel will reside in towns or villages nearby, excluding the management and senior technical team. There will be no accommodation or catering services to be provided at the site. Personnel would commute to the site by company bus for which costs are included in the operating costs. Labour costs include provision for the following burden costs (approximately 50% of the base payment):

- annual leave
- sick leave (as per labour proclamation of the country)
- accident and illness insurance
- social security provisions
- vacation allowance
- travel costs and airfares for expatriates.

The operating costs exclude shipping and marketing charges for concentrate and gold and silver doré, which are included in financial analysis.

21.3.1 Mining Operating Cost Estimate

The estimated mining costs have been modelled based on the mining schedule. Mining is considered as Owner mining. The costs presented in include the following items:

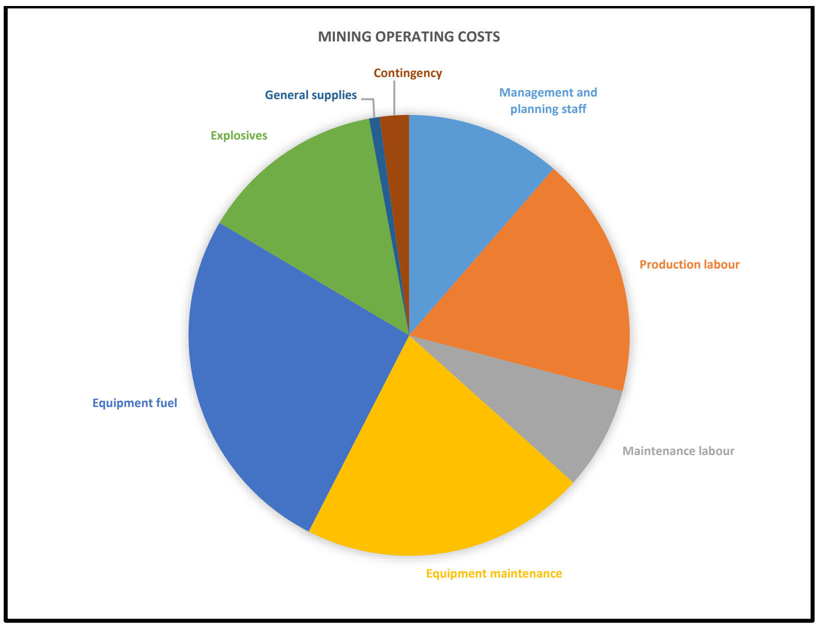
- fuel costs of US$0.85/L
- explosive costs of US$900/t (ANFO, per budgetary estimate from AEL Mining Services)
- labour rates from US$2.00 to US$63.00 (excluding burden rates)
- labour burden of 50%.

Table 21.5 Mining Operating Costs

Area	LOM Costs Excluding Pre-stripping (US$ million)	Unit Cost (US$/t mined)	Unit Cost (US$/t processed)
Management and Planning Staff	9.62	0.31	2.88
Production Labour	15.12	0.49	4.53
Maintenance Labour	6.55	0.21	1.96
Equipment Maintenance	17.84	0.58	5.35
Equipment Fuel	22.24	0.72	6.67
Explosives	11.58	0.38	3.47
General Supplies	0.62	0.02	0.19
Contingency	1.83	0.06	0.55
Total Mining Operating Costs	**85.39**	**2.77**	**25.61**

The mining operating cost breakdown is shown graphically in Figure 21.1.

Figure 21.1 Split of Mining Operating Costs



21.3.2 Process Operating Cost Estimate

The average LOM unit process operating cost was estimated as US$9.70/t processed, at a nominal processing rate of 1,400 t/d, or 510,000 t/a, including the power cost for the processing plant.

The breakdown for the estimated process operating cost is summarized in Table 21.4.

Table 21.6 Process Operating Costs

Description	Manpower	Annual Cost (US$)	Unit Cost (US$/t mill feed)
Manpower			
Operating Labour	145	1,380,600	2.70
Subtotal Manpower	**145**	**1,380,600**	**2.70**
Supplies			
Steel Consumables		819,293	1.60
Reagent Consumables		321,266	0.63
Maintenance Supplies		907,000	1.77
Operating Supplies		102,900	0.20
Power Supply		1,101,659	2.16
Subtotal Supplies		3,252,118	6.36
Plant G&A		80,000	0.16
Others		257,000	0.50
Total Process Operating Costs	**145**	4,969,718	9.73

The process operating cost estimate includes:

- personnel requirements including supervision, technical supports, operation and maintenance; and salary/wage levels, including burdens as listed in Section 21.3.1
- steel grinding ball consumptions estimated by Bond ball work index and abrasion index and jaw crusher and cone crusher liner consumptions from the Tetra Tech's experience; steel prices from Tetra Tech's database
- reagent consumptions, based on test results and reagent prices from quotations or the Tetra Tech's database, the main reagents including lime, F-1234 and SIPX as collectors, MIBC as frother, flocculant and anti-scalant
- maintenance supplies, based on approximately 8 to 10% of major equipment capital costs or estimated based on the information from the Tetra Tech's database/experience;
- other operation consumables, including laboratory and service vehicles consumables;
- power consumption for the processing plant based on the preliminary plant equipment load estimates and a power unit cost of US$0.07/kWh
- plant G&A costs.

All operating cost estimates exclude taxes unless otherwise specified. The cost estimates do not include the treatment costs related to recovering additional gold from the gold-bearing materials by cyanide leaching and related gold recovery from leach solution to doré. The shipping cost and smelting cost for the copper-gold concentrate are also not included the operating cost estimates. These off-site costs are included in financial analysis.

21.3.3 OFFSITE COSTS FOR LEACHING GOLD FROM PYRITE MATERIAL

Tetra Tech has estimated a toll milling cost of US$4.70/t milled or US$25.60/t leached for offsite costs of leaching gold from pyrite material.

This cost has been based on the use of EAM's Da Tambuk project and cyanide leaching circuit to conduct pyrite leaching. The Da Tambuk operation would be 5 km from Mato Bula and has planned to include adequate capacity to leach additional material from Mato Bula.

In addition, capital costs have been included for Mato Bula for additional equipment to handle pyrite material.

21.3.4 GENERAL AND ADMINISTRATIVE OPERATING COST ESTIMATE

Table 21.7 summarizes estimated G&A costs and site service costs over the LOM. The costs include the expenditures that do not relate directly to the mining or process operating costs.

Table 21.7 General and Adminstrative Costs for Mato Bula

Area	Unit Cost (US$/t processed)
Consumables	0.08
Management and Labour	3.19
General Site Maintenance	0.11
Power Demand Charge	0.11
Insurance	0.53
Accounting Services	0.79
Communications	0.01
IT and computing	0.11
Training and Consulting Services	0.10
Government Fees and Permit Expenses	0.03
Expatriate and Other Travel	0.47
Community Development Fund	0.15
Other Expenses	0.28
Total G&A Operating Costs	5.96

21.3.5 OTHER COSTS

Table 21.8 summarizes costs that occur over the LOM that do not fall into any other category. Reclamation costs are allocated to meet the required regulatory standards of Ethiopia.

Table 21.8 Other Operating Costs

Area	Unit Cost (US$ million)
Reclamation Costs	3.00
Government Mandated Community and Social Program Expenses	7.40
Ethiopia Head Office Expenses	1.00

22.0 ECONOMIC ANALYSIS

A PEA should not be considered a Prefeasibility or Feasibility study, as the economics and technical viability of the Project have not been demonstrated at this time. The PEA is preliminary in nature and includes Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves. Furthermore, there is no certainty that the conclusions or results reported in the PEA will be realized. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

The economic analysis was based on the sale of copper concentrate containing gold and silver as well as sale of doré produced from leaching of pyrite concentrate.

Leaching of pyrite concentrate is assumed to be carried out offsite, and costs have been included for this activity. EAM owns an additional mining project 5 km to the north of Mato Bula, called Da Tambuk, which would be operated as a cyanide leaching circuit capable of leaching the pyrite concentrate from Mato Bula.

The key financial results of the PEA show a LOM of eight years, with one year of pre-stripping, recovering 278,000 tr oz of gold, 13.9 Mlb of copper and 37,600 tr oz of silver. Financial results are based on the following key assumptions:

- gold price of US$1,325/tr oz
- copper price of US$3.00/lb
- silver price of US$17.00/tr oz
- exchange rate of US$1.00:ETB23.00
- Ethiopian net sales royalty of 7% for revenue from precious metals
- Ethiopian net sales royalty of 5% for revenue from copper.

The key financial results are shown in Table 22.1.

Table 22.1 Summary of Financial Results

Financial Summary	Units	Value
Mine Information		
LOM	years	8
Annual Tonnage Processed	kt	504
Tonnes Mined Including Waste Rock	kt	33,650
Tonnes Processed	kt	3,335
Tonnes Concentrate Produced (Dry Mass)	kt	24.7
Gold Recovered to Concentrate	'000 tr oz	102.3
Copper Recovered to Concentrate	'000 tr oz	13,899.0
Silver Recovered to Concentrate	'000 tr oz	18.8
Gold Recovered to Doré	'000 tr oz	175.9
Sales		
Off-site Costs (Concentrate)	US$ millions	6.82
Off-site Costs (Doré)	US$ millions	1.24
Net Revenue from Sales	US$ millions	396.40
LOM Operating Costs		
Mining (Excluding Pre-stripping)	US$ millions	85.40
Processing (Flotation Mill)	US$ millions	32.40
Offsite Leaching of Pyrite Concentrates	US$ millions	15.60
G&A	US$ millions	19.90
Total LOM Operating Costs	US$ millions	153.4
Other Costs		
Reclamation Costs	US$ millions	3.00
Pre-Stripping Costs	US$ millions	5.13
Government Mandated Community and Social Expenses	US$ millions	7.39
Ethiopia Head Office Expenses	US$ millions	0.95
Ethiopian Government Royalty	US$ millions	27.00
Capital Costs		
Pre-production Capital Costs	US$ millions	54.20
LOM Sustaining Costs	US$ millions	5.60
Cash Flow		
Pre-tax Operating Cash Flow	US$ millions	139.00
Taxes	US$ millions	42.00
Post-tax NPV at 8%	**US$ millions**	**56.70**
IRR	**%**	**28.4**
Payback Period	**years**	**3.0**

Note: Values may not sum perfectly due to rounding.

22.1 BASIS OF FINANCIAL EVALUATIONS

The production schedule has been incorporated into the 100% equity pre-tax financial model to develop monthly recovered metal production from the relationships of tonnes processed, head grades, and recoveries.

Copper, gold, and silver payable values were calculated based on base case metal prices. Net invoice value was calculated each year by subtracting the applicable refining charges from the payable metal value. At-mine revenues are then estimated by subtracting transportation and insurance costs. Government royalties were deducted from net revenues from sales of doré.

Operating costs were then deducted from the remaining revenue to derive operating cash flow. Allowable capital cost depreciation, sustaining costs and other cash expenses were then deducted from operating cash flow to derive taxable income.

Capital costs were deducted in the year of expense, with non-cash costs (depreciation added back) to get pretax cash flow.

Taxes were calculated based on allowable deductions, are then deducted from pretax cash flow to derive post-tax cash flows.

22.2 SUMMARY OF FINANCIAL RESULTS

A summary of key financial results is shown in Table 22.2. Various gold and copper prices were applied to evaluate project sensitivities.

Table 22.2 Summary of Financial Results at Different Metal Prices

	Units	Base Case	Low	Five-year Average	Long Term
Gold Price	US$/oz.	1,325	1,200	1,250	1,379
Copper Price	US$/lb	3.00	2.50	2.75	3.25
Tonnes Processed	kt	3,335	3,335	3,335	3,335
Waste Rock	kt	30,315	30,315	30,315	30,315
Payable Gold	'000 tr oz	275	275	275	275
Payable C	'000 lb	13,354	13,354	13,354	13,354
Payable Silver	'000 tr oz	19	19	19	19
Gross Revenue from Gold	US$000	362,348	328,002	341,740	377,186
Gross Revenue from Silver	US$000	610	610	610	610
Gross Revenue from Copper	US$000	33,738	27,062	30,400	37,077
Precious Metals Royalties	US$000	27,073	24,335	25,463	28,278
Total Project Revenue Less Royalties	US$000	369,320	331,035	346,983	386,291
Operating Costs (Excluding Pre-stripping)	US$000	153,366	153,366	153,366	153,366
Other Costs	US$000	11,334	11,334	11,334	11,334
Capital Costs	US$000	59,795	59,795	59,795	59,795
Cash Flow from Operations	US$000	139,700	102,181	117,810	156,331
Taxes and Proclamation	US$000	41,991	31,699	35,714	46,772
Post-tax Cash Flow	US$000	97,709	70,482	82,096	109,559
Post-tax NPV At 8%	US$000	56,659	36,181	44,895	65,564
Post-tax IRR	%	28.4	21.4	24.5	31.3
Post-tax Payback Period	years	3.01	3.82	3.45	1.73
C1 Cash Cost	US$/tr oz Au	412	437	424	400
All-in Sustaining Cost	US$/tr oz Au	620	632	625	614

22.3 POST-TAX ANALYSIS

Tetra Tech was assisted by EAM in estimating of taxes payable over the LOM of the Mato Bula Project.

The following assumption were made for tax purposes.

- It has been assumed that the Mato Bula project will be 100% financed through equity.
- The only taxable jurisdiction has been assumed to be Ethiopia.
- A statutory income tax rate of 25% has been assumed with the following additional deductions payable to the Ethiopian government:
  - 7% net sales royalty on the value of metal doré sold
  - 5% net sales royalty on the value of copper sold
  - 5% net profit deduction
- A portion of operating losses incurred during exploration have been carried forward to operations.
- Is has been assumed that taxes are payable in the month of April in the year after incurrence of revenues.

22.3.1 TAXES INCLUDED IN THE FINANCIAL MODEL

Table 22.3 summarises post tax results for the Mato Bula Project.

Table 22.3 Post-tax Results for the Mato Bula Project

Item	Amount (US$ million)
Total Sales Income	397.0
Ethiopian Government Royalty	27.0
Net Operating Income after Operating Expenses	216.0
Other Expenses	78.0
Taxable Income	138.0
Income Tax	37.0
Government Proclamation (5% of Net Profits)	5.5
Post-tax Cashflow	**98.0**

22.4 SENSITIVITY ANALYSIS

Tetra Tech conducted sensitivity analysis of several key financial inputs into the financial model (Figure 22.1, Figure 22.2, and Figure 22.3). This analysis was done using the post-tax NPV at an 8% discount rate.

Between recovery (or metal price), capital costs and operating costs, the financial results are most sensitive to variations in gold price (or recovery) as seen in Figure 22.1. NPV is expected to be zero at a gold price of roughly US$920. The Mato Bula

Project is relatively insensitive to changes in both silver and copper prices/recoveries as seen in Figure 22.1.

The Mato Bula Project is more sensitive to changes in operating cost versus capital cost as seen in Figure 22.2. An increase in operating costs of 62% would result in negative NPV, while the NPV will become negative for an increase in capital costs of 92%.

Tetra Tech ran sensitivities from –10% to 100% on operating costs. The project is most sensitive to mining operating costs as opposed to processing and G&A costs as shown in Figure 22.3. The NPV is less than US$1 million for a doubling of mining costs.

Figure 22.1 Metal Price Sensitivities

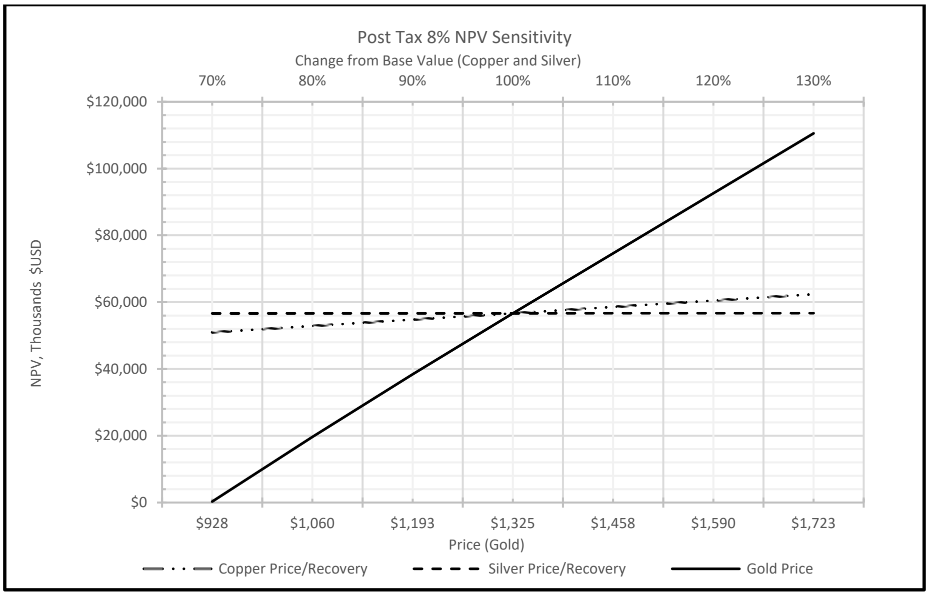


Figure 22.2 Capital and Operating Cost Sensitivities

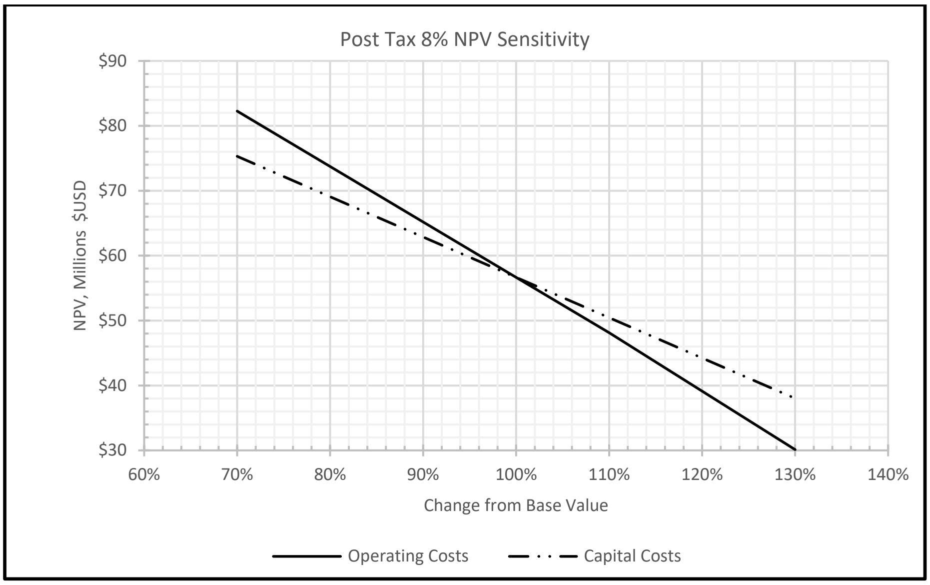
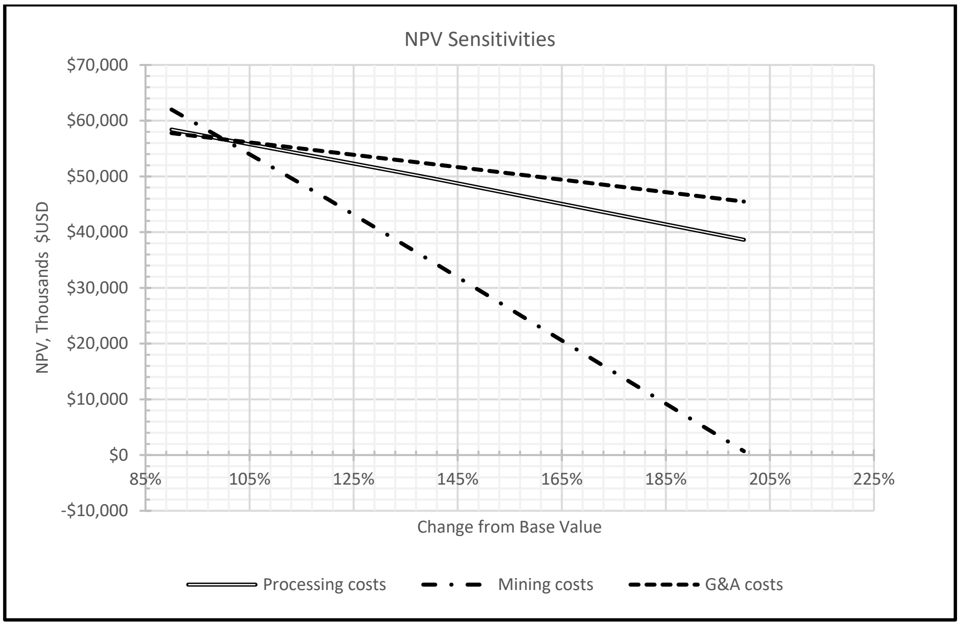


Figure 22.3 Operating Cost Sensitivities



22.5 MATO BULA CASH FLOW

A summary of the cash flow on which the financial analysis has been undertaken for Mato Bula, is presented in Table 22.4.

Table 22.4 Mato Bula Project Cash Flow

Mine Production Schedule	Unit	Total / Average	Year -2	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Mill Feed	kt	3,335			279	504	504	504	504	504	504	32		
Waste	kt	29,619		2,697	4,428	4,148	4,650	4,413	5,385	2,366	1,414	118		
Tonnes to Stockpile	kt	696										696		
Total Tonnes Moved	kt	33,650		2,780	5,029	4,644	5,035	5,020	5,842	3,113	2,018	168		
Mill Feed Grades														
Gold	g/t	3.0			4.31	2.96	2.26	3.20	3.83	2.81	2.11	4.92		
Copper	%	21.6%			19.2%	14.7%	12.7%	17.4%	37.2%	24.2%	22.2%	63.4%		
Silver	g/t	0.70			0.49	0.37	0.36	0.58	1.06	1.22	0.57	3.35		
Flotation Concentrates														
Gold Recovery	%	31%			31.9%	29.4%	25.1%	30.9%	36.1%	33.1%	32.6%	39.1%		
Copper Recovery	%	87.42%			86.8%	84.3%	80.0%	85.8%	91.0%	88.0%	87.5%	94.0%		
Silver Recovery	%	25%			25%	25%	25%	25%	25%	25%	25%	25%		
Leach Feed														
Pyrite Concentrate fed to CIL	kt	500.2			41.8	75.6	75.6	75.6	75.6	75.6	75.6	4.8		
CIL Concentrates														
Gold Recovery	%	54.3%			56.1%	56.7%	60.0%	55.5%	51.2%	52.8%	52.3%	49.8%		
Silver Recovery	%	25%			25%	25%	25%	25%	25%	25%	25%	25%		
Total Recovered Metals														
Flotation Concentrate														
Gold	koz.	102.3			12.3	14.1	9.2	16.0	22.4	15.0	11.1	2.0		
Copper	thousand lbs	13,899			1,024	1,376	1,132	1,656	3,760	2,369	2,163	419		
Silver	koz.	18.8			1.1	1.5	1.5	2.3	4.3	5.0	2.3	0.86		
Dry Concentrate Tonnes	kt	24.7			1.82	2.45	2.01	2.95	6.69	4.21	3.85	0.74		
Wet Concentrate Tonnes	kt	26.9			1.99	2.67	2.19	3.21	7.29	4.59	4.19	0.81		
Doré														
Gold	koz.	175.9			21.7	27.2	22.0	28.8	31.8	24.0	17.9	2.5		
Silver	koz.	18.8			1.1	1.5	1.5	2.3	4.3	5.0	2.3	0.86		
Metal Deductions														
Flotation Concentrate														
Copper	lbs	1.0%			40,161	53,964	44,376	64,942	147,466	92,912	84,805	16,417		
Gold	oz.	0.03 oz./t			54.64	73.42	60.38	88.36	200.63	126.41	115.38	22.34		
Silver	oz.	1 oz./t			1,821	2,447	2,013	2,945	6,688	4,214	3,846	745		
Metal Payment Factors	%													
Flotation Concentrate														
Copper	%	100.00%			100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%		
Gold	%	97.50%			97.50%	97.50%	97.50%	97.50%	97.50%	97.50%	97.50%	97.50%		
Silver	%	92.00%			92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%		
Doré														
Gold	%	99.95%			99.95%	99.95%	99.95%	99.95%	99.95%	99.95%	99.95%	99.95%		
Silver	%	95.00%			95.00%	95.00%	95.00%	95.00%	95.00%	95.00%	95.00%	95.00%		
Metal Net of Payables														
Flotation Concentrate														
Copper	lbs	13,353,537			983,939	1,322,116	1,087,205	1,591,085	3,612,911	2,276,350	2,077,711	402,220		
Gold	oz.	98,978			11,954	13,687	8,923	15,540	21,672	14,548	10,754	1,899		
Silver	oz.	785								682		103		
Doré														
Gold	oz.	175,795			21,647	27,201	22,009	28,771	31,794	23,991	17,872	2,508		
Silver	oz.	17,882			1,053	1,414	1,396	2,221	4,072	4,707	2,206	814		
Value of Payables														
Flotation Concentrate														
Copper		$ 40,061			$ 2,952	$ 3,966	$ 3,262	$ 4,773	$ 10,839	$ 6,829	$ 6,233	$ 1,207		
Gold		$ 131,146			$ 15,839	$ 18,135	$ 11,823	$ 20,590	$ 28,716	$ 19,276	$ 14,250	$ 2,517		
Silver		$ 13.4								$ 12		$ 2		
Doré														
Gold		$ 232,928			$ 28,683	$ 36,042	$ 29,162	$ 38,122	$ 42,127	$ 31,789	$ 23,680	$ 3,323		
Silver		$ 304			$ 17.9	$ 24.0	$ 23.7	$ 37.8	$ 69.2	$ 80.0	$ 37.5	$ 13.8		
Off Site Costs														
Flotation Concentrate														
Transport and Concentrate Loadout	US$/t	$ 80.0			$ 158.8	$ 213.4	$ 175.5	$ 256.8	$ 583.2	$ 367.4	$ 335.4	$ 64.9		
Ocean Freight	US$/t	$ 25.0			$ 49.6	$ 66.7	$ 54.8	$ 80.3	$ 182.2	$ 114.8	$ 104.8	$ 20.3		
Treatment Charges Copper	US$/t	$ 90.0			$ 178.7	$ 240.1	$ 197.4	$ 288.9	$ 656.1	$ 413.4	$ 377.3	$ 73.0		
Refining Charges Copper	US$/lb	$ 0.08			$ 78.7	$ 105.8	$ 87.0	$ 127.3	$ 289.0	$ 182.1	$ 166.2	$ 32.2		
Refining Charges Gold	US$/oz.	$ 5.0			$ 59.8	$ 68.4	$ 44.6	$ 77.7	$ 108.4	$ 72.7	$ 53.8	$ 9.5		
Refining Charges Silver	US$/oz.	$ 0.50								$ 0.34		$ 0.05		
Total Off Site Costs for the Flotation Concentrate		$ 6,817			$ 525.61	$ 694.39	$ 559.35	$ 830.99	$ 1,818.88	$ 1,150.81	$ 1,037.46	$ 199.98		
Net Revenue from Flotation Concentrate		$ 164,402			$ 18,265.70	$ 21,407.44	$ 14,524.86	$ 24,532.37	$ 37,735.37	$ 24,966.08	$ 19,445.27	$ 3,524.95		
Doré														
Freight and Insurance for Gold	US$/oz.	$ 2.0			$ 43.3	$ 54.4	$ 44.0	$ 57.5	$ 63.6	$ 48.0	$ 35.7	$ 5.0		
Refining Charges for Gold	US$/oz.	$ 5.0			$ 108.2	$ 136.0	$ 110.0	$ 143.9	$ 159.0	$ 120.0	$ 89.4	$ 12.5		
Freight and Insurance for Silver	US$/oz.	$ 0.30			$ 0.3	$ 0.4	$ 0.4	$ 0.7	$ 1.2	$ 1.4	$ 0.7	$ 0.2		
Refining Charges for Silver	US$/oz.	$ 0.30			$ 0.3	$ 0.4	$ 0.4	$ 0.7	$ 1.2	$ 1.4	$ 0.7	$ 0.2		
Total Doré Off Site Costs		$ 1.24			$ 152	$ 191	$ 155	$ 203	$ 225	$ 171	$ 126	$ 18		
Net Revenue from Doré		$ 232			$ 28,549	$ 35,875	$ 29,031	$ 37,957	$ 41,971	$ 31,698	$ 23,591	$ 3,319		
Total Concentrate Net Revenue		$ 396,393			$ 46,814	$ 57,282	$ 43,556	$ 62,489	$ 79,707	$ 56,664	$ 43,036	$ 6,844		
Total Ethiopian Government royalty		$ (27,073)			$ (3,227)	$ (3,943)	$ (2,994)	$ (4,294)	$ (5,397)	$ (3,851)	$ (2,908)	$ (459)		
Total Revenue less Royalties		$ 369,320			$ 43,587	$ 53,339	$ 40,562	$ 58,195	$ 74,310	$ 52,812	$ 40,129	$ 6,385		
Operating Costs														
Mining Costs		$ (90,515)		$ (5,125)	$ (11,508)	$ (11,534)	$ (12,396)	$ (13,329)	$ (14,864)	$ (11,071)	$ (9,287)	$ (1,399)		
Flotation		$ (32,312)			$ (2,700)	$ (4,884)	$ (4,884)	$ (4,884)	$ (4,884)	$ (4,884)	$ (4,884)	$ (309)		
CIL (Toll Mill)		$ (15,782)			$ (1,319)	$ (2,385)	$ (2,385)	$ (2,385)	$ (2,385)	$ (2,385)	$ (2,385)	$ (151)		
G&A		$ (19,882)			$ (2,686)	$ (2,686)	$ (2,686)	$ (2,686)	$ (2,686)	$ (2,686)	$ (2,686)	$ (1,080)		
Total		$ (153,366)			$ (18,213)	$ (21,490)	$ (22,351)	$ (23,285)	$ (24,819)	$ (21,027)	$ (19,242)	$ (2,938)		
Other Expenses														
Reclamation		$ (3,000)											$ (1,000)	$ (2,000)
Contribution Expenses		$ (7,386)			$ (872)	$ (1,067)	$ (811)	$ (1,164)	$ (1,486)	$ (1,056)	$ (803)	$ (128)		
Ethiopia Head Office / In Country G&A		$ (947)	$ (95)	$ (95)	$ (95)	$ (95)	$ (95)	$ (95)	$ (95)	$ (95)	$ (95)	$ (95)		
Total Other Expenses		$ (11,334)	$ (95)	$ (95)	$ (966)	$ (1,162)	$ (906)	$ (1,259)	$ (1,581)	$ (1,151)	$ (897)	$ (222)		
Capital Investment														
Initial Capital		$ (54,198)	$ (13,961)	$ (40,237)										
Mining Sustaining		$ (3,132)			$ (420)	$ (165)	$ (856)	$ (600)	$ (886)	$ (205)				
Process Sustaining		$ (850)			$ (250)	$ (100)	$ (100)	$ (100)	$ (100)	$ (100)	$ (100)			
Tailings Sustaining		$ (1,616)						$ (1,616)						
Working Capital		$ -			$ (6,071)	$ (2,229)	$ 4,691	$ (4,996)	$ (9,876)	$ 5,531	$ 3,480	$ 5,555	$ 3,913	
Total Capital Investment		$ (59,795)	$ (13,961)	$ (40,237)	$ (6,741)	$ (2,494)	$ 3,736	$ (7,312)	$ (10,862)	$ 5,226	$ 3,380	$ 5,555	$ 3,913	
Pre-Tax Cashflow Analysis														
Pre-Tax Net Present Value (8%)		$ 83,804	$ (14,055)	$ (45,457)	$ 16,358	$ 24,172	$ 16,703	$ 19,361	$ 25,214	$ 22,598	$ 13,636	$ 4,743	$ 1,457	$ (926)
Pre-Tax Internal Rate of Return	%	34.1%												
Post Tax & Participation Cashflow Analysis														
Income Tax Payable		$ (36,514)				$ (2,424)	$ (4,096)	$ (577)	$ (4,324)	$ (11,731)	$ (7,582)			
Post Tax Net Annual Cash Flow		$ 103,186	$ (14,055)	$ (45,457)	$ 17,666	$ 25,770	$ 16,945	$ 25,763	$ 32,724	$ 24,130	$ 15,787			
Government Participation (Proclamation No. 816/2013)		$ (5,477)				$ (364)	$ (614)	$ (87)	$ (649)	$ (1,760)	$ (1,137)			
Net Annual Cash Flow - After Tax & Govt Participation		$ 97,709	$ (14,055)	$ (45,457)	$ 17,666	$ 25,406	$ 16,330	$ 25,676	$ 32,075	$ 22,371	$ 14,650			
Post-Tax Net Present Value (8%)		$ 56,659	$ (14,055)	$ (45,457)	$ 16,358	$ 21,782	$ 12,963	$ 18,873	$ 21,830	$ 14,097	$ 8,548	$ 1,654	$ 994	$ (926)
Post-Tax Internal Rate of Return	%	28.4%												
Operating Payback - After-Tax	years	3.01												

23.0 ADJACENT PROPERTIES

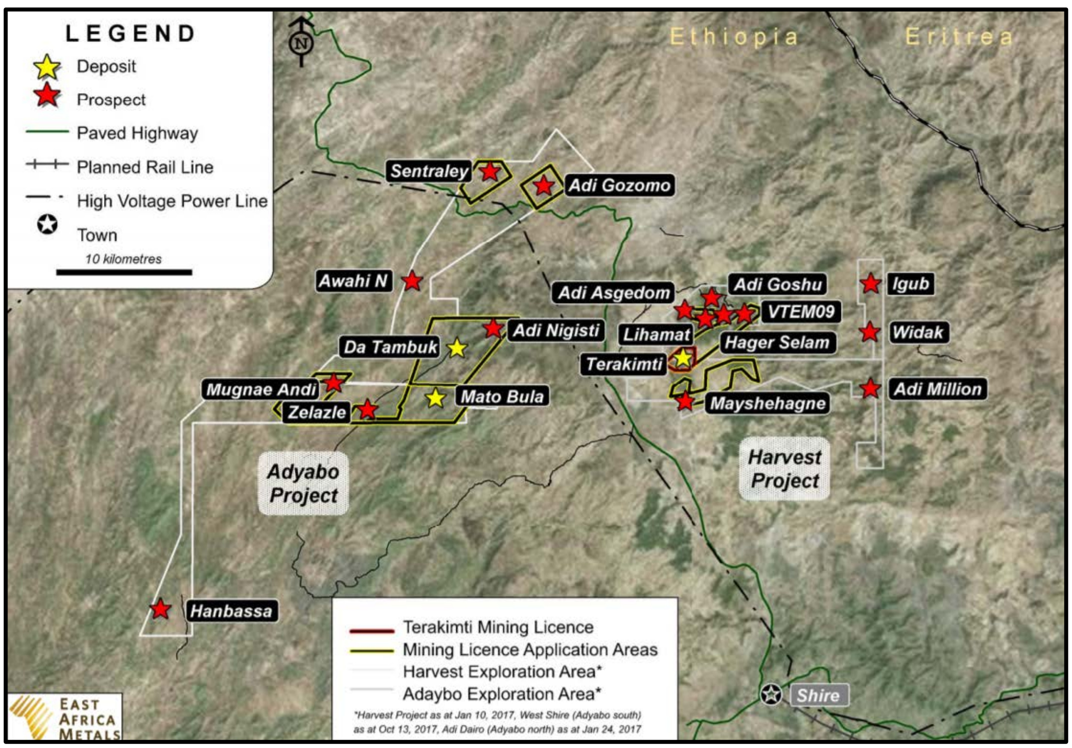
The Mato Bula deposit forms part of the Adyabo Project, which is owned by TRI, wholly-owned by EAM. The Adyabo Project extends to the north east and south west of the Mato Bula deposit and includes the Da Tambuk deposit, for which EAM has conducted a PEA.

EAM also owns 70% of the Harvest Project, which includes the Terakimti Property, now permitted for mining.

The geographical locations of these properties in relation to Mato Bula is shown in Figure 23.1.

EAM and Tetra Tech have conducted preliminary studies on merging of Mato Bula and Da Tambuk projects showing positive results.

Figure 23.1 Properties Surrounding the Mato Bula Project



24.0 OTHER RELEVANT DATA AND INFORMATION

24.1 PROJECT DEVELOPMENT PLAN

To achieve the project schedule, the long-lead process equipment will need to be identified at the beginning of the detailed engineering stage. The critical path for the Project will be the supply and delivery of this equipment.

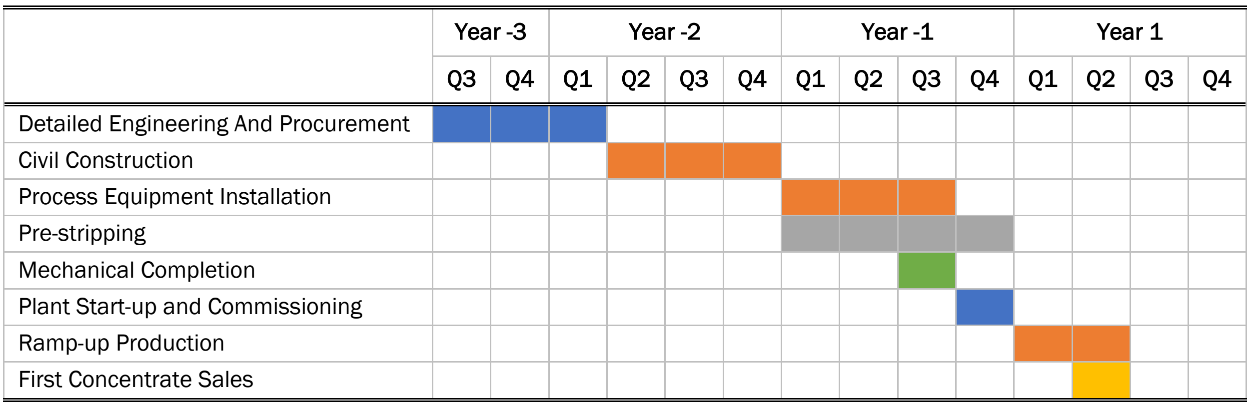
Upon construction commencement, the temporary construction facilities will be mobilized, including the batch plant and aggregate plant, or concrete will be sourced from nearby towns. Site preparation, grading, and road construction will commence immediately upon receipt of permits and approvals. Modular construction will be utilized wherever practical to reduce field construction.

Upon completion of foundation preparation, the concrete for the main process building, truck shop, and powerhouse building foundations will be poured to allow the buildings to be erected. Once the buildings are erected, the concrete inside the buildings (including equipment supports) can be poured.

Electrical and mechanical installation contracts will be bid lump sum to qualified contractors. A start-up and commissioning period has been allowed at the completion of construction in order to complete mechanical check out and acceptance and commissioning of the facilities.

A conceptual summary schedule for the Mato Bula Project is shown in Figure 24.1.

Figure 24.1 Conceptual Project Summary Schedule



25.0 INTERPRETATIONS AND CONCLUSIONS

25.1 GENERAL

The current understanding of Mineral Resources, metallurgical test work and expected costs shows that there is potential for economic extraction of gold, copper and silver at Mato Bula.

The PEA also highlights the fact that a potential merging of Mato Bula and Da Tambuk projects, and the addition of underground mining at Mato Bula shows potential to increase the LOM by adding deeper resources and to reduce capital costs through sharing of infrastructure.

Preliminary work by Tetra Tech including adding a cyanide leaching circuit to the Mato Bula processing facility, with the capacity to process Mato Bula pyrite material as well as Da Tambuk whole rock improved the overall economics of Mato Bula.

25.1.1 RISKS

The following risks have been identified for Mato Bula:

- High grade of metallurgical test work samples may not provide a reliable indication of recoveries at average head grades.
- High strip ratios with relatively steep pit angles could affect mining costs if unforeseen geotechnical conditions result in flatter pit slopes.

25.1.2 OPPORTUNITIES

The following opportunities have been identified for Mato Bula:

- Underground mining has potential to increase the LOM as well as feed grades. Other benefits including reducing the size of the open pit and conducting underground mining in areas with high strip ratios as well as below the designed open pit.
- Merging of Mato Bula and Da Tambuk operations may provide for reducing capital costs and operating costs for both operations, thereby offering potential to significantly improve the economics of both projects.

25.2 GEOLOGY

The Adyabo Property has undergone extensive exploration using traditional and modern exploration techniques since the concessions were optioned in 2012. Geochemical sampling programs (gold in soil, and portable XRF soil sampling) have been particularly successful in identifying anomalous areas for follow up drilling, and have identified gold rich VMS related and orogenic gold exploration targets. In the area of the Mato Bula deposit, resource definition drilling was undertaken at Mato Bula and has delineated gold-rich VMS style mineralization.

The Mato Bula deposit at the West Shire concession of Adyabo is located within the large-scale target horizon known as the Mato Bula trend. This trend extends northward from the Mato Bula area towards the Da Tambuk deposit located on the Adi Dairo concession of Adyabo, approximately 5 km to the north. This trend is defined geologically via alteration assemblages, multi-element soil geochemical signatures, and localized artisanal workings. The majority of exploration expenditures on the West Shire concession have been focused toward the Mato Bula deposit, with minor early stage first pass drill testing also completed at the Hanbassa target.

The drill testing to date has identified the Mato Bula deposit as the prioritized, most prospective target on the Adyabo Project. Successive drill campaigns at Mato Bula included the completion of 108 drillholes for a total of 18638.38 m. The gold-copper mineralization is present over a strike distance of 800 m and includes at least five separate plunging shoots that extend to a known depth of 370 m from surface.

Mineralization is hosted with intensely silicified sericite schist, which contain abundant replacement and exhalative silica (jasperoid) in two lodes (Main and Upper). The Main lode is copper-rich and has been interpreted to represent a vent proximal (or feeder) environment, whereas the Upper lode is interpreted to represent an exhalite facies. The sulphide mineralogy of the lodes is dominated by pyrite, with subordinate chalcopyrite, and lesser amounts of bornite, covellite, chalcocite, and tetrahedrite.

A 2017 drill infill program was completed, and results will be incorporated into an updated resource on completion of additional metallurgical work. Significantly this infill program, in combination with a 2017 localized IP geophysical survey over Mato Bula, are suggestive of continued permissive prospectivity for the Mato Bula mineralized system, with the identification of a large IP chargeability feature building in size beyond the south end of the known identified Mato Bula resource. The IP chargeability feature remains open to the south, to depth and northward. The mineralized drill intersections at the southern end of the Mato Bula resource contain increasing amounts of zinc and silver mineralization, in association with the gold and copper mineralized horizon. As such, this southern area constitutes a compelling target for additional drill testing. Additionally, with the IP survey bringing definition to the Mato Bula trend, additional prospectivity remains for further exploration using IP to extend this definition beyond present survey limits to the north and south of present survey limits over the test Mato Bula survey area, and along the interpreted Mato Bula Trend. Therefore, potential remains for the discovery and delineation of additional resources.

The geologic understanding of the deposit settings, lithologies, and structural and alteration controls on mineralization is sufficient to support estimation of Mineral Resources. The mineralization style and setting is well understood and is sufficient to support Mineral Resource estimation. The exploration programs completed to date are appropriate to the style of mineralization found in the deposit. The quality of the EAM drill core, and channel analytical data is reliable and sample preparation, analysis, and security are generally performed in accordance with exploration best practices and industry standards.

Mineral Resource estimation is well-constrained by 3D wireframes representing geologically realistic volumes of mineralization.

EDA conducted on assays and composites shows that the wireframes are suitable domains for mineral resource estimation.

As a result of validation of the mineral resource block model Fladgate concludes:

- Visual inspection of block grade versus composited data shows a good reproduction of the data by the model.
- Checks for global bias in the grade estimates show differences generally within acceptable levels (less than 10%). Domains with larger differences between the NN model and OK model have a low number of composites.
- Checks for local bias (swath plots) indicate good agreement for all variables except in areas where there is significant extrapolation beyond the drillholes.
- Fladgate evaluated the impact of capping by estimating uncapped and capped grade models. Generally, the amounts of metal removed by capping in the models are consistent with the amounts calculated during the grade capping study on the assays.
- Fladgate classified the Mineral Resource using distances which permit a reasonable assumption of geological and grade continuity.
- Mineral Resources are constrained and reported using economic and technical criteria such that the Mineral Resource has reasonable prospects of economic extraction.
- The Mineral Resource is not sensitive to changes in metal price.

Fladgate have estimated mineral resources for the Mato Bula deposit which conform to the requirements of CIM Definition Standards (2014).

25.3 MINING

Tetra Techs finds that open pit mining of a portion of the Mato Bula is technically feasible. The near surface mineralization ensures that minimal pre-stripping is required to access the mineralization.

The topography and steep dipping nature of the deposit results in high strip ratios. Further work should be undertaken to evaluate the potential to mine deeper resources from underground.

25.4 METALLURGY

Metallurgical test work showed that the Mato Bula samples responded well to a combination of flotation and cyanidation processes. Also some of the gold in the mineralization is recoverable by gravity concentration. Approximately 5% of the gold can be recovered from the Mato Bula composite sample into a gravity concentrate containing 3,300 g/t gold and 17% from the Silica Hill composite sample to a gravity concentrate with 4,700 g/t gold.

The locked test results show 93% and 82% of the copper can be recovered by flotation into copper-gold flotation concentrates from the Mato Bula sand Silica Hill samples respectively. The gold recoveries to the flotation concentrates were 83% for the Mato Bula composite and 38% for the Silica Hill composite respectively. The impurity contents of the concentrates produced from the LCT tests are projected to be lower than the penalty thresholds set by most of smelters.

The gold in the gold bearing pyrite products (cleaner scavenger tailings and pyrite concentrate blends) responded well to cyanidation, gold extractions were 52% and 91% respectively from the Mato Bula and Silica Hill products. The overall gold recoveries were approximately 89% for the Mata Bula mineralization and 88% for the Silica Hill mineralization.

The preliminary grindability test results show that the mineralization is medium hard to ball mill grinding.

The samples used in the test work have much higher head grades, compared to the average grades of the planned mill feed. Further test work should be conducted on more representative samples to confirm the metallurgical responses.

25.5 PROCESS

The proposed 1,400 t/d processing plant will utilize a combination of conventional crushing, grinding, gravity concentration and flotation to recover copper and gold from the Mato Bula deposit. The processing plant will produce a high-grade gold concentrate (to be melted on site to produce gold doré or sold to off-site smelters), a copper-gold concentrate and a gold-bearing pyrite product. The -copper-gold concentrate will be sold to offsite smelters, while the gold bearing pyrite product will be further treated at the proposed nearby Da Tambuk facility or other facilities to recover the gold using cyanidation treatment. A trade-off study should be conducted to assess the economics of leaching the gold-bearing pyrite product on site and off site.

The flotation tailings will be stored in the TCF.

The flowsheet and equipment selected for the Mato Bula Project have been widely used in mining industry. It is anticipated that the lead time for the major processing equipment would be reasonable.

25.6 INFRASTRUCTURE

Tetra Tech provided estimates of infrastructure for the project to enable completion of the PEA. In summary, the project is relatively accessible from nearby towns and grid power is within 10 km of the Mato Bula Project site.

Tetra Tech has not identified any significant challenges relating to infrastructure for the Mato Bula Project.

25.7 ECONOMICS

The PEA for Mato Bula, indicates that the project has robust economic development potential. The basis of the economic assessment includes Inferred Mineral Resources. To gain further confidence in the project economics, the Inferred Mineral Resources require upgrading to indicated through additional exploration drilling, metallurgical testing and Mineral Resource evaluation work.

26.0 RECOMMENDATIONS

26.1 GENERAL

Tetra Tech recommends that prior to advancing the Mato Bula project, EAM conduct additional metallurgical testwork and geotechnical studies for the open pit and significant infrastructure such as tailings facilities and mill locations.

In addition, Tetra Tech recommends that EAM complete more advanced project evaluations such as Prefeasibility Study or Feasibility Study prior to advancing the project to detailed design or construction.

26.2 GEOLOGY

The Mato Bula deposit remains open to mineralization extension both laterally and to depth, and 2017 geophysical IP work identifies that the mineralized horizon has a definitive chargeability response. The identification of zinc bearing mineralization in the southern area of the deposit warrants additional metallurgical work to establish potential recovery information, and further assist in qualifying the mineralization in this area. Future work should be concentrated resource expansion where the system remains open, with the extension of the IP survey from the present survey footprint both southward, towards a large open IP chargeability feature identified, and northward, along the Mato Bula trend towards the Da Tambuk deposit area. Additionally, nearby orogenic gold targets should undergo further drill assessment as warrant merits.

It is recommended that the path forward for the Mato Bula deposit area of the Adyabo Property should include the following main activities during the next two phases of the project.

26.2.1 PHASE I

Infill and extension drilling of the Mato Bula mineralization are recommended to fully assess the Mato Bula deposit. The drilling should be preceded by a more extensive IP survey to fully define the response of the Mato Bula Trend. Specifically, the recommended work program will include:

- Profile the Mato Bula trend by conducting IP surveying south and north of the present grid over Mato Bula, extending the line length as better depth penetration than 400 m is indicated by the initial survey.
- Diamond drill testing of high grade depth extensions in the central Mato Bula area.
- Extension diamond drill testing to the south of Mato Bula, where a large IP chargeability feature has been identified. Conduct extension drilling on the Mato Bula North portion of the Adyabo resource.

- Diamond drill test a revised interpretation of the mineralized zone in the area of Silica Hill North.

26.2.2 PHASE II

If positive results are achieved in Phase I, a second phase of work should be undertaken to further refine the mineral resources identified. This program will include:

- Additional infill and extension drilling as warranted at resource locations, and at defined targets along the Mato Bula trend.
- Conduct metallurgical investigations are required to bring any new mineralization into a resource context.

In total, the cost of this work is expected to be up to approximately US$6,200,000. A summary of the expenditure break-down is presented in Table 26.1.

Table 26.1 Summary of Expenditure

Phase	Description of Work	Cost (US$)
1	Extension and infill diamond drilling Mato Bula and Mato Bula North	3,060,000
	IP surveying, extensions from previous survey along mineralized trend	60,000
	Subtotal Phase 1	**3,120,000**
2	Mato Bula Metallurgy/Geotechnical	50,000
	Mato Bula Resource Update	30,000
	Halima Hill infill, southerly extension identified.	3,000,000
	Subtotal Phase 2	**3,080,000**
Total		6,200,000

26.3 MINING

26.3.1 UNDERGROUND MINING

Tetra Tech recommends that EAM further investigates underground mining at Mato Bula which will help mitigate risks relating to steep pit walls and high stripping ratios.

Tetra Tech's initial work shows that grades and resulting NSR values for potential resources mined underground show that there is potential for roughly 1.5 Mt to be mined from underground.

26.3.2 GEOTECHNICAL

A geotechnical assessment including the drilling of additional geotechnical holes for initial mining areas, geotechnical core logging, rock quality analysis and rock strength testing is planned. his assessment will provide additional information on the strength of the rock, the nature and orientation of jointing, and the interaction of the rock mass with mining which is required to optimize the mine plan for detailed engineering design of the open pit mine and determination of safe pit wall slopes.

The proposed budget for underground review work and geotechnical assessment is estimated to be US$150,000.

26.4 METALLURGY AND PROCESS

Additional metallurgical test work on representative samples of the Mato Bula deposit is recommended for better understanding of the metallurgical performances and providing additional metallurgical information required to establish design parameters for the Mato Bula process plant. The test work to be completed is identified below:

- Verify metallurgical recovery responses of the samples collected from various rock zones, lithological zones and spatial locations of the deposit. The test work should include coarse gold recovery by gravity concentration, copper and gold recovery by flotation and additional gold recovery from the gold bearing pyrite product by cyanidation. The flowsheet development should include the investigation of the optimum copper grade of the copper-gold concentrate to maximize the gold recovery into the concentrate.
- Comminution test work including the determination of abrasion indices, crushing indices and Bond Work Indices to establish comminution design-related parameters.
- Settling test work on samples of flotation concentrates and flotation tailings to determine settling rates; filtration test work on the flotation concentrates to determine unit filtration rates.

The estimated cost for the test work is approximately US$200,000.

Further assessment of the plant water balance and the potential water sources in the Mato Bula project area should be conducted to confirm the optimum water supply source (or sources), with regard to location, quantity and seasonal variation. This assessment should include assessment of groundwater sources in addition to surface sources.

26.5 INFRASTRUCTURE

Tetra Tech recommends the following regarding infrastructure:

- Geotechnical work is advanced for key infrastructure including tailings storage facilities, waste dumps, haul roads, processing facilities and water management infrastructure.
- Further field work studies regarding supply of water and electricity are conducted.
- EAM conduct a study on the access road from Zelazle Is conducted, in particular to evaluate river or stream crossing upgrades required for the operations.

The budget to complete the above investigations is estimated to be US$200,000.

26.6 COSTS

Tetra Tech recommends that more in depth studies are conducted to better understand costs in Ethiopia. This should include engagement with potential Ethiopian suppliers and international supplies to better gauge the expected costs.

The budget to complete the above investigations is estimated to be US$20,000.

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DAVID G. THOMAS, P.GEO.

I, David G. Thomas, P. Geo., of #601 – 1788 West Georgia Street, Vancouver, British Columbia, Canada, do hereby certify that:

- I am the principal mineral resource geologist and owner of the geological consulting firm DKT Geosolutions Inc.

- This certificate applies to the technical report entitled 'Technical Report and Preliminary Economic Assessment for the Mato Bula Deposit, Adyabo Property, Tigray National Regional State, Ethiopia' with an effective date of April 30th, 2018 (this "Technical Report") that was prepared for the Issuer.

- I am a graduate of Durham University, in the United Kingdom with a Bachelor of Science degree in Geology and am a graduate of Imperial College, University of London, in the United Kingdom with a Master of Science degree in Mineral Exploration.

- I have practiced my profession for over 23 years. In that time, I have been directly involved in reviews of exploration programs, geological models, exploration data, sampling, sample preparation, quality assurance-quality control, databases, and mineral resource estimates for a variety of mineral deposits, including VMS deposits and other copper-gold deposit types (Canada, Ethiopia and Eritrea).

- I am a member in good standing of the Association of Professional Geoscientists of British Columbia (APEGBC NRL # 149114). I am also a member of the Australasian Institute of Mining and Metallurgy (MAusIMM # 225250).

- I have read the definition of "Qualified Person" set out in National Instrument 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.

- I most recently visited the subject property from March 22 to March 25, 2015.

- I am responsible Sections 1.4, 1.5, 1.13.2, 7.0, 8.0, 9.0, 10.0, 11.0, 12.0, 14.0, 25.2, 26.2, and 27.0 of the Technical Report.

- I am independent of the Issuer applying all the tests in Section 1.5 of NI 43-101.

- I have had prior involvement with the property that is the subject of this Technical Report. I completed the initial Mineral Resource estimate at Mato Bula (with effective date of April 27, 2015) and subsequently updated the Mineral Resource estimate (with an effective date of May 31st, 2016)

- I have read NI 43-101 and NI 43-101F1 and this Technical Report has been prepared in compliance with that instrument and form.

- As of the effective date of this Technical Report, to the best of my knowledge, information and belief, this Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

// Signed and Sealed //

David G. Thomas, P.Geo.

DATED at Bogota, Colombia, this 11th day of June 2018.

HASSAN GHAFFARI, P.ENG.

I, Hassan Ghaffari, P.Eng., of Vancouver, British Columbia, do hereby certify:

- I am a Director of Metallurgy with Tetra Tech Canada Inc. located at Suite 1000, 10th Floor, 885 Dunsmuir Street, Vancouver, British Columbia, V6C 1N5.
- This certificate applies to the technical report entitled "Technical Report and Preliminary Economic Assessment for the Mato Bula Deposit, Adyabo Property, Tigray National Regional State, Ethiopia" dated April 30th, 2018 (the "Technical Report").
- I am a graduate of the University of Tehran (M.A.Sc., Mining Engineering, 1990) and the University of British Columbia (M.A.Sc., Mineral Process Engineering, 2004). I am a member in good standing of the Association of Professional Engineers and Geoscientists of British Columbia (#30408). My relevant experience includes 27 years of experience in mining and plant operation, project studies, management, and engineering. As the lead metallurgist for the Pebble Copper/Gold Moly Project in Alaska, I am coordinating all metallurgical test work and preparing and peer reviewing the technical report and the operating and capital costs of the plant and infrastructure for both the scoping and prefeasibility studies. For the Ajax Copper-Gold Project in BC, I was the Project Manager responsible for the process, infrastructure and overall management of the 60,000 t/d mill. As well, I was the Project Manager responsible for ongoing metallurgical test work and technical assistance for the La Joya Project Copper/Silver/Gold Project in Durango, Mexico. I am a "Qualified Person" for the purposes of National Instrument 43-101 (the "Instrument").
- I have not completed a personal inspection of the Property that is the subject of this Technical Report.
- I am responsible for Sections 1.10, 3.0, 20.0, 21.2, and 27.0 of the Technical Report.
- I am independent of East Africa Metals Inc. as defined by Section 1.5 of the Instrument.
- I have no prior involvement with the Property.
- I have read the Instrument and the sections of the Technical Report that I am responsible for have been prepared in compliance with the Instrument.
- As of the date of this certificate, to the best of my knowledge, information and belief, the sections of the Technical Report that I am responsible for contains all of the scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Signed and dated this 8th day of June 2018 at Vancouver, British Columbia.

"Original document signed and sealed by
Hassan Ghaffari, P.Eng."

Hassan Ghaffari, P.Eng.
Director of Metallurgy
Tetra Tech Canada Inc.

Jianhui (John) Huang, Ph.D., P.Eng.

I, Jianhui (John) Huang, Ph.D., P.Eng., of Coquitlam, British Columbia, do hereby certify:

- I am a Senior Metallurgist with Tetra Tech Canada Inc. located at Suite 1000, 10th Floor, 885 Dunsmuir Street, Vancouver, British Columbia, V6C 1N5.
- This certificate applies to the technical report entitled "Technical Report and Preliminary Economic Assessment for the Mato Bula Deposit, Adyabo Property, Tigray National Regional State, Ethiopia" dated April 30th, 2018 (the "Technical Report").
- I am a graduate of North-East University, China (B.Eng., 1982), Beijing General Research Institute for Non-ferrous Metals, China (M.Eng., 1988), and Birmingham University, United Kingdom (Ph.D., 2000). I am a member in good standing of the Association of Professional Engineers and Geoscientists of British Columbia (#30898). My relevant experience includes over 35 years involvement in mineral processing for base metal ores, gold and silver ores, and rare metal ores. I am a "Qualified Person" for purposes of National Instrument 43-101 (the "Instrument").
- I have not completed a personal inspection of the Property that is the subject of this Technical Report.
- I am responsible for Sections 1.6, 1.8, 1.13.4, 13.0, 17.0, 21.3.2, 21.3.3, 25.4, 25.5, 26.4, and 27.0 of the Technical Report.
- I am independent of East Africa Metals Inc. as defined by Section 1.5 of the Instrument.
- My prior involvement with the Property includes some internal studies in 2017.
- I have read the Instrument and the sections of the Technical Report that I am responsible for have been prepared in compliance with the Instrument.
- As of the date of this certificate, to the best of my knowledge, information and belief, the sections of the Technical Report that I am responsible for contains all of the scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Signed and dated this 8th day of June 2018 at Vancouver, British Columbia.

"Original document signed and sealed by Jianhui (John) Huang, Ph.D., P.Eng."

Jianhui (John) Huang, Ph.D., P.Eng.
Senior Metallurgist
Tetra Tech Canada Inc.

MARK HORAN, P.ENG.

I, Mark Horan, P.Eng., of North Vancouver, British Columbia, do hereby certify:

- I am a Senior Mining Engineer with Tetra Tech Canada Inc. located at Suite 1000, 10th Floor, 885 Dunsmuir Street, Vancouver, British Columbia, V6C 1N5.
- This certificate applies to the technical report entitled "Technical Report and Preliminary Economic Assessment for the Mato Bula Deposit, Adyabo Property, Tigray National Regional State, Ethiopia" dated April 30th, 2018 (the "Technical Report").
- I have a BSc. Mining Engineering degree from the University of Witwatersrand, South Africa and a MSc. from Rhodes University, South Africa. I am a member in good standing of the Association of Professional Engineers and Geoscientists of British Columbia (#170768). I have 18 years' experience including working in precious and base metal operations and in consulting. I am a "Qualified Person" for purposes of National Instrument 43-101 (the "Instrument").
- My most recent personal inspection of the Property that is the subject of this Technical Report was on April 6th, 2017, for one day.
- I am responsible for Sections 1.1, 1.2, 1.3, 1.7, 1.9, 1.11, 1.12, 1.13.1, 1.13.3, 2.0, 3.0, 4.0, 5.0, 6.0, 15.0, 16.0, 18.0, 19.0, 21.1, 21.3.1, 21.3.3, 21.3.4, 21.3.5, 22.0, 23.0, 24.0, 25.1, 25.3, 25.6, 25.7, 26.1, 26.3, 26.5, 26.6, and 27.0 of the Technical Report.
- I am independent of East Africa Metals Inc. as defined by Section 1.5 of the Instrument.
- I have no prior involvement with the Property.
- I have read the Instrument and the sections of the Technical Report that I am responsible for have been prepared in compliance with the Instrument.
- As of the date of this certificate, to the best of my knowledge, information and belief, the sections of the Technical Report that I am responsible for contains all of the scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Signed and dated this 8th day of June 2018 at Vancouver, British Columbia.

"Original document signed and sealed by
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