SolGold plc and Cornerstone Capital Resources Inc

Cascabel Project, Imbabura Province, Ecuador

NI 43-101 Technical Report on Pre-Feasibility Study

Effective date 31 March 2022

Cecilia Artica, BSc MSc RMSME – (formerly) Mining Plus Pty Ltd
Andrew Fowler, Ph.D., MAusIMM, CP(Geo) – Mining Plus Pty Ltd
Karl John Roa, B.Eng, PhD, EurGeol/IGI – Independent
Aaron Spong, BEng FAusIMM CP (Min) – Mining Plus Pty Ltd
Tim Rowles, BSc MSc FAusIMM CP RPEQ – Knight Piésold Pty Ltd
Peter Gron, BSc FAusIMM – Wood Australia Pty Ltd
Steve Klose, BEng MSc FAusIMM – Wood Australia Pty Ltd
Kirk Hanson, MBA PE – Wood Australia Pty Ltd
Christopher Heath, BSc Hons PhD FAusIMM – Wood Mackenzie

June 2022

CERTIFICATE of QUALIFIED PERSON

I, Timothy David Rowles, FAusIMM (CP) am employed as Regional Manager, with Knight Piésold Pty Limited, Level 1, 36 Cordelia Street, Brisbane, QLD 4101, Australia.

This certificate applies to the Technical Report titled "Cascabel Project, Imbabura Province, Ecuador, NI 43-101 Technical Report on Pre-Feasibility Study", that has an effective date of 31 March 2022 (the Technical Report). I am a current Fellow of the Australian Institute of Mining and Metallurgy (No 227249) and have been awarded the status of Chartered Professional (CP) in the field of Environmental Engineering. I am a Registered Professional Engineer of Queensland (Environmental Engineering) and in good standing with the Board of Professional Engineers of Queensland, Australia (No 10166). I am a current member of the Australian Institute of Geoscientists (No. 8161) and also a current member of the Australian National Committee on Large Dams.
I graduated from the Royal School of Mines, Imperial College, London with a Bachelor of Science in Environmental Geology in 1996 and from the University of Manchester with a Masters Degree in Earth and Environmental Science in 1998. I was awarded a Professional Certificate in Tailings Management by AusIMM in 2021.

I have practiced my profession continuously within the mining industry since 1999 and have been responsible for the environmental assessment, design, construction, operation and closure of tailings management systems, water dams and minesite infrastructure throughout that time. I have experience in the design and assessment of waste dumps, surface water / sediment management systems, geotechnical, hydrogeological & hydrological investigation and geochemical characterisation of mine waste and tailings. This experience includes mine sites in Australasia, Africa, Asia, Europe and South America.

I have read the definition of "Qualified Person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I am a "Qualified Person" for purposes of NI 43-101.

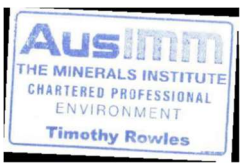
I have personally visited the project site between the 6-8 of February 2020.
I am responsible for sections 1.17 (Part), 1.18, 1.20 (Part), 18.5, 18.6, 20, 21.1.2.3 and 26.4 (Part).
I am independent of the Issuer and related companies in accordance with Section 1.5 of NI 43-101.
I have had no prior involvement with the Cascabel Project prior to commencing work on the Technical Report.

I have read NI 43-101 and the sections of the Technical Report I am responsible for have been prepared in compliance with NI43-101.

As at the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report I am responsible for contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Signed, dated and sealed (if applicable): 27th day of May 2022

"*Timothy Rowles*"



Timothy David Rowles, BSc., MSc., FAusIMM (CP), RPEQ

CERTIFICATE of QUALIFIED PERSON

I, Cecilia Artica, M.Sc, SME #4262398 RM, formerly employed as a Principal Geologist, with Mining Plus, Lv 17, 127 Creek Street, Brisbane, Queensland, Australia, do hereby certify that:

This certificate applies to the Technical Report titled "Cascabel Project, Ecuador, NI 43-101 Technical Report on Pre-Feasibility Study" which has an effective date 31 March 2022 (the Technical Report).

I am a Registered Member of the Society for Mining, Metallurgy and Exploration (Membership no. 4262398). I am a graduate of the Universidade de Brasilia (M.Sc, 2004) and the Universidad Nacional de San Agustin de Arequipa (Ing. Geo, 1998).

I have practiced my profession continuously since completing my masters degree in 2004, and also for five years between my bachelors and masters degrees. My relevant experience at the time of reporting included 11 years in various roles with Southern Peru Copper Corporation, five years as a Senior Resource Geologist with AMEC Foster Wheeler, and two years as a Principal Geologist with Mining Plus.

I have read the definition of a "qualified person" as set out in National Instrument 43-101 (NI 43101) 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 fulfil the requirements to be a "qualified person for the purpose of NI 43-101.

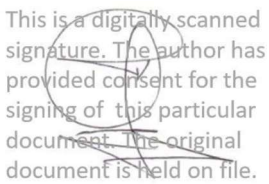
I completed a personal inspection of the Property from the 13th to 16th November 2018;

I am responsible for all Items and sub-sections of the Technical Report relating to the Alpala Deposit Geology and Mineralisation (Sub-sections: 7.1, 7.3, 7.5, Item 8), Exploration (Item 9), Drilling (Item 10), Sample Preparation, Analyses and Security (Sub-sections: 11.1, 11.2, 11.3, 11.4.1, 11.5, 11.6, 11.7, 11.8, 11.9, 11.10), Data Verification (Sub-section: 12.1) and Mineral Resource Estimate (Item 14; excepting Sub-sections: 14.3.2, 14.11.2, 14.14.2, 14.15.2), and sections pertaining thereto in Item 1: Summary (excepting Sub-section 1.12.2), Item 25 Interpretation and Conclusions,. Item 26 Recommendations, and Item 27 References.

I am independent of the Issuer and related companies in accordance with Section 1.5 of NI 43-101.

I have read NI 43–101 and the sections of the technical report for which I am responsible have been prepared in compliance with that Instrument.

As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make those sections of the Technical Report not misleading.
Signed,: 18th day of May 2022



Full name and post nominal(s)

Cecilia Artica, M.Sc, SME #4262398 RM

CERTIFICATE of QUALIFIED PERSON

I, Andrew Fowler, Ph.D., MAusIMM, CP(Geo), employed as a Principal Geologist, with Mining Plus, Lv 17, 127 Creek Street, Brisbane, Queensland, Australia, do hereby certify that:

This certificate applies to the Technical Report titled "Cascabel Project, Ecuador, NI 43-101 Technical Report on Pre-Feasibility Study" which has an effective date 31 March 2022 (the Technical Report).

I am a Chartered Professional in the discipline of Geology and a registered member of the Australasian Institute of Mining and Metallurgy (#301401).

I am a graduate of the University of Melbourne (Ph.D., 2004).

I have practiced my profession continuously since November 2004. My relevant experience includes two years as Exploration Geologist with a junior greenfields explorer, Mithril Resources, two years as Project Geologist/Head Geologist with the Costerfield gold-antimony mine operated by AGD Operations, eight years as a Senior Geologist with AMC Consultants Pty Ltd, one year as Manager of Mineral Resources at MMG Las Bambas, and three years as Principal Geologist at Mining Plus.

I have read the definition of a "qualified person" as set out in National Instrument 43-101 (NI 43101) 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 fulfil the requirements to be a "qualified person for the purpose of NI 43-101.

I have not completed a personal inspection of the Property.

I am responsible for Item 2: Introduction, Item 3: Reliance on other Experts, Item 4: Property Description and Location, Item 5: Accessibility, Climate, Local Resources, Infrastructure and Physiography, and Item 6: History. Additionally, I am responsible for all Items and sub-sections of the Technical Report relating to the Tandayama-America Deposit Geology and Mineralisation (Item 7; excepting Sub-section: 7.3, Item 8), Sample Preparation, Analyses and Security (Item 11; excepting Sub-sections: 11.1, 11.2, 11.3, 11.4.1, 11.5, 11.6, 11.7, 11.8, 11.9, 11.10), and Mineral Resource Estimate (Item 14; excepting Sub-sections: 14.3.1, 14.11.1, 14.14.1, 14.15.1), and sections pertaining thereto in Item 1 Summary (excepting Sub-section 1.12.1), 25 Interpretation and Conclusions,. 26 Recommendations, and 27 References.

I am independent of the Issuer and related companies in accordance with Section 1.5 of NI 43-101
I have read NI 43–101 and the sections of the technical report for which I am responsible have been prepared in compliance with that Instrument.
As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make those sections of the Technical Report not misleading.

Signed,: 18th day of May 2022

This is a digitally scanned signature. The author has provided consent for the signing of this particular document. The original document is held on file.

Full name and post nominal(s)
Andrew Fowler, Ph.D., MAusIMM, CP(Geo)

CERTIFICATE of QUALIFIED PERSON

I, Aaron Spong, BEng FAusIMM (CP), employed as a Principal Mining Consultant, with Mining Plus, Lv 14, 500 Collins Street, Melbourne, Victoria, Australia, do hereby certify that:

This certificate applies to the Technical Report titled "Cascabel Project, Ecuador, NI 43-101 Technical Report on Pre-Feasibility Study" which has an effective date 31 March 2022 (the Technical Report).
I am a Fellow and Chartered Professional of the Australasian Institute of Mining and Metallurgy (Membership no. 307001).

I am a graduate of the University of Ballarat (BEng, 2002).

I have practiced my profession continuously since completing my Bachelor degree in 2002. My relevant experience at the time of reporting included 11 years in as a Principal Mining Consultant with Mining Plus Pty Ltd on various copper and gold caving projects.

I have read the definition of a "qualified person" as set out in National Instrument 43-101 (NI 43101) 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 fulfil the requirements to be a "qualified person for the purpose of NI 43-101.

I completed a personal inspection of the Property from the 6th to the 8th February 2020;

I am responsible for all Items and sub-sections of the Technical Report relating to the Alpala Deposit Mineral Reserves (Item 15), Mining Methods (Item 16), and sections pertaining thereto in Item 1: Summary (excepting Sub-section 1.4 to 1.11 and 1.17 to 1.20), Item 21 (Capital and Operating Costs) Item 25 Interpretation and Conclusions,. Item 26 Recommendations, and Item 27 References.

I am independent of the Issuer and related companies in accordance with Section 1.5 of NI 43-101.

I have read NI 43–101 and the sections of the technical report for which I am responsible have been prepared in compliance with that Instrument.

As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make those sections of the Technical Report not misleading.

Signed,: 21th day of May 2022



Full name and post nominal(s)

Aaron Spong, BEng FAusIMM (CP)

CERTIFICATE of QUALIFIED PERSON

I, Karl John Roa, EurGeol am a consultant economic geologist and qualified person operating out of Faro, Portugal.

This certificate applies to the Technical Report titled "Cascabel Project, Imbabura Province, Ecuador, NI 43-101 Technical Report on Pre-Feasibility Study" which has an effective date 31 March 2022 (the Technical Report).

I am a member of the European Federation of Geologists (EFG member No. 1392), the Institute of Geologists of Ireland (IGI member No. 269), fellow of the Society of Economic Geologists and an Associate of the Camborne School of Mines.

I graduated with a degree in Industrial Geology from the University of Exeter (Camborne School of Mines) in 1996 and obtained a PhD in Geology from Trinity College Dublin in 2005.

I have worked as an exploration geologist for a total of 18 years since my graduation from university. I have been directly involved in the generation of, and review of, metallurgic assessment and design, risk analyses, preliminary economic assessment, pre-feasibility, and feasibility studies, and due diligence studies in Ecuador, Brazil, Mexico, Mongolia and Australia during this time, I have completed numerous Porphyry Copper / Gold Deposit Projects.

I have read the definition of a "qualified person" as set out in National Instrument 43-101 (NI 43-101) and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a "qualified person for the purpose of NI 43-101.

I visited the "Cascabel Project" from the 18th to the 20th of August 2021.

I am responsible for Item 7 (excepting Sub-section 7.3), Item 11 (excepting Sub-sections: 11.1, 11.2, 11.3, 11.4.1, 11.5, 11.6, 11.7, 11.8, 11.9, 11.10) and Sub-section 12.2 that relate to the Tandayama Mineral Resource.

I am independent of the Issuer and related companies in accordance with Section 1.5 of NI 43-101.

I have read NI 43–101 and the sections of the technical report for which I am responsible have been prepared in compliance with that Instrument.

As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make those sections of the Technical Report not misleading.

Signed,

"*Karl Roa*"

Karl Roa, B.Eng, PhD, EurGeol 13th May 2022

CERTIFICATE of QUALIFIED PERSON

I, Peter Gron, FAusIMM am employed as a Principal Process Engineer, with Wood, L11, 144 Edward Street, Brisbane, QLD 4000 Australia.

This certificate applies to the Technical Report titled "Cascabel Project, Ecuador NI 43-101 Technical Report on Pre-Feasibility Study" which has an effective date of 31 March 2022.

I am a Fellow of the Australian Institute of Mining and Metallurgy (Membership no. 332346).

I graduated from Queen's University at Kingston with a BSC Chemical Engineering.

I have practiced professionally since graduation in 1979. In that time, I have been directly involved in the generation of, and review of, metallurgic assessment and design, risk analyses, preliminary economic assessment, pre-feasibility, and feasibility studies, and due diligence studies in Australia, Canada, USA, Iran, PNG, Guyana and Chile. During this time, I have completed numerous Porphyry Copper / Gold Deposit Projects.

I have read the definition of a "qualified person" as set out in National Instrument 43-101 (NI 43101) 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 fulfil the requirements to be a "qualified person for the purpose of NI 43-101.

I have not visited the "Cascabel Project" site.

I am responsible for Sections: S1.10 Metallurgical Testing, S1.16 Recovery Methods, S1.26 Interpretation and Conclusions (relating to the Process Plant), S1.27 Recommendations (relating to the Process Plant), S13 Mineral Processing and Metallurgical Testing, S17 Recovery Methods, S25.5 Metallurgical Testwork, S25.9 Recovery Plan, S25.18 Conclusions, S26 Recommendations (relating to the Process Plant)

I am independent of the Issuer and related companies in accordance with Section 1.5 of NI 43-101 I have read NI 43–101 and the sections of the technical report for which I am responsible have been prepared in compliance with that Instrument.

As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make those sections of the Technical Report not misleading.

peter.gron
Digitally signed by peter.gron
Date: 2022.05.23 12:43:25 +10'00'

Signed and dated: 23th day of May 2022

Peter Gron, BSC (Chem Eng) FAusIMM

CERTIFICATE of QUALIFIED PERSON

I, Steven Mark Klose, FAusIMM am employed as a Senior Study Manager, with Wood Australia, Level 11,144 Edward Street Brisbane, Queensland Australia.

This certificate applies to the Technical Report titled "Cascabel Project, Imbabura Province, Ecuador, NI 43-101 Technical Report on Pre-Feasibility Study" which has an effective date of 31 March 2022.

I am a Fellow of the Australian Institute of Mining and Metallurgy (Membership no. 304089).

I graduated from Curtin University Perth - BEng (Minerals Engineering) & MSc (Project Management).

I have practiced professionally since graduation in 1989. In that time, I have been directly involved in the generation of, and review of, metallurgic assessment and design, risk analyses, preliminary economic assessment, pre-feasibility, and feasibility studies, and due diligence studies in Australia, South Africa, Chile, Peru, Indonesia, Russia, Uzbekistan, Ecuador & Sweden. During this time, I have completed numerous Porphyry Copper / Gold Deposit Projects.

I have read the definition of a "qualified person" as set out in National Instrument 43-101 (NI 43101) 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 fulfil the requirements to be a "qualified person for the purpose of NI 43-101.

I have visited the "Cascabel Project" site.

I am responsible for Sections: S2.3 Personal Inspection of the Cascabel property, S1.17 Infrastructure, S1.26 Interpretation and Conclusions (relating to the Process Plant), S1.27 Recommendations (relating to the Process Plant), S17 Process Plant, S18 Infrastructure, S21.1.2 CAPEX Direct Costs – Process Plant, Port & Surface Infrastructure, S21.2.4 OPEX Direct Costs – Process Plant, Port & Surface Infrastructure, S24.11.3.3 Execution Plan - Process Plant & Infrastructure, S26.9 Process Plant, S26.10 Infrastructure

I am independent of the Issuer and related companies in accordance with Section 1.5 of NI 43-101 I have read NI 43–101 and the sections of the technical report for which I am responsible have been prepared in compliance with that Instrument.

As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make those sections of the Technical Report not misleading.

steven.klose Digitally signed by steven.klose
Date: 2022.05.26 15:16:31 +10'00'

Signed, dated and sealed (if applicable): 23rd day of May 2022

Full name and post nominal(s)
Steven Mark Klose BEng, MSc, FAusIMM

CERTIFICATE of QUALIFIED PERSON

I, Kirk Hanson, MBA, P.E., am employed as a Technical Director Open Pit Mining and Financial Modeling, with Wood Group USA, Inc , 961 Matley Lane, Suite 110 Reno, NV 89502.

This certificate applies to the Technical Report titled "Cascabel Project, Northern Ecuador, Alpala Copper-Gold-Silver Deposit, NI 43-101 Technical Report on Preliminary Economic Assessment" which has an effective date 25 March 2019 and an amended date 6 November 2019 (the Technical Report).

I am registered as a Professional Engineer in the State of Idaho (#11063). I graduated with a B.Sc. degree from Montana Tech of the University of Montana, Butte, Montana in 1989 and from Boise State University, Boise, Idaho with an MBA degree in 2004.

I have practiced my profession for 32 years. I was Engineering Superintendent at Barrick's Goldstrike operation, where I was responsible for all aspects of open-pit mining, mine designs, mine expansions and strategic planning. After earning an MBA in 2004, I was assistant manager of operations and maintenance for the largest road department in Idaho. In 2007, I joined AMEC (now Wood) as a principal mining consultant. Over the past 15 years, I have been the mining lead for multiple scoping, pre-feasibility, and feasibility studies. I have also done financial modelling for multiple mines as part of completing the scoping, pre-feasibility and feasibility studies.

I have read the definition of a "qualified person" as set out in National Instrument 43-101 (NI 43101) 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 fulfil the requirements to be a "qualified person for the purpose of NI 43-101.

I have not visited the "Cascabel Project" site.

I am responsible for Sections: 1.22, 22, 25.15, 26.4.7

I am independent of the Issuer and related companies in accordance with Section 1.5 of NI 43-101

I have read NI 43–101 and the sections of the technical report for which I am responsible have been prepared in compliance with that Instrument.

As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make those sections of the Technical Report not misleading.

Signed,

"*Kirk Hanson*"

Kirk Hanson, MBA, P.E., 25th May 2022

Important Notice

This report was prepared as National Instrument 43-101 Technical Report for SolGold plc and Cornerstone Capital Resources Inc by qualified persons employed by Mining Plus Pty Ltd, Knight Piésold Pty Ltd, Wood Australia Pty Ltd and Wood Mackenzie plc (the Consultants). The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in the Consultant's services, based on i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This report is intended for use by SolGold plc subject to terms and conditions of the contracts with the respective Consultants. Except for the purposes legislated under Canadian provincial and territorial securities law, any other use of this report by any third party is at that party's sole risk.

Table of Contents

Important Notice ix

1 Summary 1

1.1 Key Outcomes 1

1.2 Introduction 1

1.3 Terms of Reference 2

1.4 Project Setting 2

1.5 Mineral Tenure, Surface Rights, Royalties and Agreements 3

1.6 Geology and Mineralisation 3

1.7 History 4

1.8 Exploration, Drilling, Sampling and Assaying 4

1.9 Data Verification 5

1.10 Metallurgical Testwork 5

1.11 Mineral Resource Estimation 7

1.12 Mineral Resource Statement 8

1.12.1 Alpala Deposit 9

1.12.2 Tandayama-America Deposit 10

1.13 Mineral Reserve Estimation 11

1.14 Mineral Reserve Statement 12

1.15 Mining Methods 13

1.15.1 Geotechnical Considerations 13

1.15.2 Hydrogeological Considerations 14

1.15.3 Mine Design 14

1.15.4 Mine Operation 15

1.15.5 Mine Ventilation 15

1.15.6 Mine Production 16

1.15.7 Underground Infrastructure 16

1.15.8 Mining Equipment 16

1.16 Recovery Methods 16

1.17 Project Infrastructure 17

1.17.1 Roads 17

1.17.2 Waste Management Facilities 17

1.17.3 Tailings Storage Facility (TSF) 18

1.17.4 Water Management 19

1.17.5 Parambas Water Storage Facility 19

1.17.6 On-Site Infrastructure 19

1.17.7 Off-Site Infrastructure 20

1.17.8 Power and Electrical 20
1.17.9 Communications 20
1.18 Environmental, Permitting and Social Considerations 20
1.18.1 Community 22
1.19 Markets and Contracts 23
1.20 Capital Cost Estimates 24
1.21 Operating Cost Estimates 25
1.22 Economic Analysis 26
1.23 Sensitivity Analysis 28
1.24 Risks and Opportunities 28
1.25 Interpretation and Conclusions 29
1.26 Recommendations 29
2 Introduction 30
2.1 Terms of Reference 30
2.2 Qualified Persons 30
2.3 Personal Inspection of the Cascabel Property 31
2.4 Effective Date 31
2.5 Information Sources and References 32
3 Reliance on Other Experts 33
3.1 Legal Title 33
3.2 Taxation 33
4 Property Description and Location 34
4.1 Summary 34
4.2 Location 34
4.3 Mineral Tenure 36
4.4 Underlying Agreements 38
4.5 Licences and Authorisations 39
4.6 Environmental Considerations 41
4.7 Mineral Rights in Ecuador 41
4.8 Comments on Section 4 43
5 Accessibility, Climate, Local Resources, Infrastructure and Physiography 44

5.1 Summary 44
5.2 Accessibility 44
5.3 Local Resources and Infrastructure 46
5.4 Climate 47
5.5 Physiography 47
5.6 Location of Mine Facilities 49
5.7 Comments on Section 5 50
6 History 51
7 Geological Setting and Mineralisation 53
7.1 Regional Geology 53
7.2 Cascabel Concession 54
7.2.1 Structural Framework 54
7.2.2 Local Stratigraphy 55
7.2.3 Local Geology 56
7.3 Alpala Deposit 58
7.3.1 Geology 58
7.3.2 Mineralisation 62
7.3.3 Hydrothermal Alteration 65
7.4 Tandayama-America Deposit 68
7.4.1 Geology 68
7.4.2 Mineralisation 70
7.4.3 Hydrothermal Alteration 70
7.5 Comments on Section 7 70
8 Deposit Types 71
8.1 Deposit Types 71
8.2 Comments on Section 8 73
9 Exploration 75
9.1 Historical Exploration 75
9.2 Current Exploration 75
9.3 Comments on Section 9 79
10 Drilling 80
10.1 Introduction 80
10.2 Collar Surveys 82

10.3 Downhole Surveys 83
10.4 Diamond Drilling Procedures 83
10.5 Core Recovery 83
10.6 Core Storage 83
10.7 True Thickness 83
10.8 Comments on Section 10 84

11 Sample Preparation, Analyses and Security 85

11.1 Sampling Methods 85
11.1.1 Core Sample Selection and Mark-up 85
11.1.2 Core Cutting 85
11.1.3 Core Sample Collection 85
11.1.4 Core Magnetic Susceptibility Analysis 85
11.1.5 Channel Sampling 86

11.2 Bulk Density Determinations 86

11.3 QAQC Sample Protocols 87
11.3.1 Sampling and Analytical Methods 87
11.3.2 Certified Reference Materials (Standards) 87
11.3.3 Field Duplicates 87
11.3.4 Blanks 88
11.3.5 Umpire Laboratory Checks 88

11.4 QAQC Sample Results 88
11.4.1 Alpala MRE#3 Dataset 88
11.4.2 Tandayama-America MRE#1 Dataset 89

11.5 Analytical and Test Laboratories 90

11.6 Sample Preparation and Analysis 91
11.6.1 ACME Laboratory – Historical Drilling 91
11.6.2 Met-Solve Laboratories – Historical Drilling 92
11.6.3 ALS Global – Arequipa Geochemistry, Peru (Current Laboratory) 92
11.6.4 Bureau Veritas (Peru) (Formerly Inspectorate) – External Check Laboratory 92

11.7 Referential Geological Database 93
11.8 Sample Security 93
11.9 Sample Storage 93
11.10 Comments on Section 11 94

12 Data Verification 95
12.1 Alpala QP Verifications by Mrs Cecilia Artica 95
12.2 Tandayama-America QP Verifications by Dr Karl John Roa 95

13 Mineral Processing and Metallurgical Testing 98
13.1 Introduction 98
13.2 Initial Metallurgical Testwork 98
13.3 Pre-Feasibility Study Testwork 98
13.3.1 Testwork Program 98
13.3.2 Sample Provenance 100
13.3.3 Mineralogy 102
13.3.4 Comminution 103
13.3.5 Flotation 106
13.3.6 Variability 118
13.3.7 Confirmation 122
13.3.8 Settling and Filtration 125
13.3.9 Gold Recovery 126
13.4 Recovery Estimates 127
13.4.1 Copper Concentrate 127
13.4.2 Doré 135
13.5 Concentrate Quality 136
13.6 Comments on Section 13 136
14 Mineral Resource Estimates 138
14.1 Introduction 138
14.2 Data Supplied 138
14.3 Drill hole Data Used and Excluded 139
14.3.1 Alpala Deposit 139
14.3.2 Tandayama-America Deposit 140
14.3.3 3D Lithological and Mineralisation Modelling 140
14.4 Exploratory Data Analysis 141
14.5 Drill Hole Compositing 141
14.6 Estimation Domains 141
14.7 Outlier Management and Capping Strategy 141
14.8 Contact Profiles and Boundary Analysis 141
14.9 Variographic Analysis 142
14.10 Block Model Construction and Estimation 142
14.10.1 Block Model Parameters 142
14.10.2 Estimation Method 142
14.11 Bulk Density 143
14.11.1 Alpala Deposit 144
14.11.2 Tandayama-America Deposit 144
14.12 Model Validation 144

14.13 Mineral Resource Classification 144
14.14 Reasonable Prospects for Eventual Economic Extraction 145
14.14.1 Alpala Deposit 146
14.14.2 Tandayama-America Deposit 147
14.15 Mineral Resource Statement 150
14.15.1 Alpala Deposit 150
14.15.2 Tandayama-America Deposit 152
15 Mineral Reserve Estimates 154
15.1 Introduction 154
15.2 Underground Block Cave Mining 154
15.3 Mineral Reserve Statement 154
15.4 Factors that Could Affect the Mineral Reserve 155
16 Mining Methods 156
16.1 Summary 156
16.2 Geotechnical Considerations 156
16.2.1 Geotechnical Domains 156
16.2.2 Stress Model 157
16.2.3 Intact Rock Strength 157
16.2.4 Rock Mass Assessment 158
16.2.5 Geotechnical Material Properties 158
16.2.6 Hydrogeological Considerations 158
16.3 Design Parameters 159
16.3.1 Geotechnical Parameters 159
16.3.2 Geological Parameters 162
16.3.3 Hydrological/Hydrogeological Parameters 162
16.3.4 Dilution and Recovery Parameters 162
16.3.5 Mining Parameters 162
16.3.6 Economic Criteria 163
16.3.7 Design Method 164
16.4 Mine Design 167
16.4.1 Lateral Access 167
16.4.2 Footprint Layout 169
16.4.3 Materials Handling Layout 170
16.4.4 Ventilation Layout 171
16.4.5 Mining Physicals 173
16.5 Mining Schedule 173
16.5.1 Development and Production Rates 173
16.5.2 Schedule Milestones 174
16.5.3 Production Schedule 175
16.6 Mining Equipment 177

16.6.1 Mobile Fleet ... 177
16.6.2 Materials Handling ... 178
16.6.3 Ventilation ... 179
16.6.4 Dewatering ... 183
16.7 Manning Levels ... 184
16.8 Comments on Section 16 ... 186
17 Recovery Methods ... 187
17.1 Introduction ... 187
17.2 Process Flowsheet ... 188
17.3 Process Design Criteria ... 193
17.4 Reagents, Consumables and Utilities ... 194
17.4.1 Reagents and Consumables ... 194
17.4.2 Utilities ... 195
17.5 Comments on Section 17 ... 196
18 Project Infrastructure ... 198
18.1 Introduction ... 198
18.2 Cascabel Project Facility Design Considerations ... 198
18.3 Roads ... 198
18.3.1 Access ... 198
18.3.2 Internal Roads ... 199
18.3.3 Tailings Pipeline Road ... 199
18.4 Waste Management Facilities ... 199
18.4.1 Sewage ... 199
18.4.2 Solid Wastes ... 199
18.4.3 Liquid Wastes ... 200
18.5 Tailings Storage Facility ... 200
18.5.1 Design Criteria ... 201
18.5.2 Tailings Geochemical Characteristics ... 201
18.5.3 Tailings Settling Characteristics ... 202
18.5.4 Site Characteristics ... 203
18.5.5 Technology Study ... 203
18.5.6 Site Selection ... 203
18.5.7 Coastal Plains TSF ... 204
18.5.8 Surface Water Management ... 207
18.5.9 Tailings Pipelines ... 208
18.5.10 Decant System ... 209
18.5.11 Quantities and Cost Estimates ... 209
18.5.12 Opportunities and Risks ... 209
18.6 Water Management ... 210
18.6.1 Water Balance Modelling ... 210

18.6.2 Parambas Water Storage Facility 210

18.7 On-Site Infrastructure 212
18.7.1 Site Buildings 212
18.7.2 Fire Protection 214
18.7.3 Laydown Areas 214

18.8 Off-Site Infrastructure 214
18.8.1 Camp and Accommodation 214
18.8.2 Off-Site Surface Infrastructure 215
18.8.3 Port 215

18.9 Power and Electrical 216
18.9.1 Power Supply 216
18.9.2 Power Distribution 216
18.9.3 Emergency Power 216

18.10 Communications 217
18.10.1 Data Systems 217
18.10.2 CCTV 217

18.11 Comments on Section 18 217

19 Market Studies and Contracts 219

19.1 Introduction 219

19.2 Market Studies 219

19.3 Commodity Price Projections 220

19.4 Contracts 220
19.4.1 Sales and Marketing Contracts 220
19.4.2 Other Contracts 221

19.5 Comments on Section 19 221

20 Environmental, Permitting and Social Considerations 222

20.1 Introduction 222

20.2 Project Permitting 222
20.2.1 Legal Framework 222
20.2.2 Environmental and Social Impact Assessment 223
20.2.3 Current Permitting 224

20.3 Environmental Studies 225
20.3.1 Meteorology 225
20.3.2 Surface Hydrology 229
20.3.3 Surface Water Quality 231
20.3.4 Geochemical Analysis 233
20.3.5 Air Quality 233
20.3.6 Greenhouse Gas Emissions 233
20.3.7 Noise 234
20.3.8 Flora and Fauna 234

20.3.9 Environmental Program Development 234
20.4 Social and Community Requirements 235
20.4.1 Local Socio-Economy 235
20.5 Outreach Activities 237
20.6 Indigenous Communities 242
20.7 Archaeology and Culture 243
20.8 Closure Planning 243
20.8.1 Closure and Bonding Requirements 243
20.8.2 Closure Planning 243
20.9 Comments on Section 20 245
20.9.1 Baseline Studies 245
20.9.2 Closure Plan 245
20.9.3 Environmental Considerations 245
20.9.4 Permitting 246
20.9.5 Social Considerations 246
21 Capital and Operating Costs 247
21.1 Capital Cost Estimates 247
21.1.1 Basis of Estimate 247
21.1.2 Direct Costs 249
21.1.3 Indirect Costs 251
21.1.4 Sustaining Costs 251
21.1.5 Closure Costs 251
21.1.6 Capital Cost Summary 252
21.2 Operating Cost Summary 252
21.2.1 Basis of Estimate 252
21.2.2 General and Administration 253
21.2.3 Mining 253
21.2.4 Process Plant, Port and Surface Infrastructure 254
21.2.5 Operating Cost Summary 254
21.3 Comments on Section 21 255
22 Economic Analysis 256
22.1 Cautionary Statement 256
22.2 Financial Model Methodology 256
22.3 Financial Model Parameters 256
22.3.1 Metal Prices 257
22.3.2 Commercial Terms 257
22.3.3 Royalties 259
22.3.4 Capital and Operating Costs 260
22.3.5 Corporate Tax Regime 261
22.3.6 Reclamation and Closure Costs 263

22.3.7 Financing 264
22.3.8 Inflation 264
22.3.9 Working Capital 264
22.3.10 Salvage Value 264
22.4 Financial Model Results 264
22.5 Sensitivity Analysis 265
22.6 Comments on Section 22 267
23 Adjacent Properties 274
24 Other Relevant Data and Information 275
24.1 Workforce Considerations 275
24.1.1 Personnel Requirements 275
24.1.2 Human Resources 275
24.1.3 Training 276
24.2 Risk Management 276
24.2.1 Risk Management Strategy 276
24.2.2 Risk Workshops 276
24.2.3 Risk Matrix 277
25 Interpretation and Conclusions 279
25.1 Introduction 279
25.2 Mineral Tenure, Surface Rights, Royalties and Agreements 279
25.3 Geology and Mineralisation 279
25.4 Exploration, Drilling and Analytical Data Collection in Support of Mineral Resource Estimation 280
25.5 Metallurgical Testwork 280
25.6 Mineral Resource Estimates 280
25.7 Mineral Reserve Estimates 281
25.8 Mining Plan 281
25.9 Recovery Plan 282
25.10 Infrastructure 282
25.11 Environmental, Permitting and Social Considerations 283
25.12 Markets and Contracts 284
25.13 Capital Cost Estimates 284
25.14 Operating Cost Estimates 284
25.15 Economic Analysis 284

25.16 Execution Plan 285
25.17 Risk and Opportunities 285
25.18 Conclusions 285
26 Recommendations 286
26.1 Introduction 286
26.2 In-Country Works 286
26.3 Technical Works 286
26.3.1 Pre-Feasibility Addendum 286
26.3.2 Early Mine Access 287
26.3.3 Feasibility 287
26.4 Additional Data Collection 287
26.4.1 Exploration 287
26.4.2 Hydrogeology 287
26.4.3 Geotechnical 287
26.4.4 Geochemistry 288
26.4.5 Process 288
26.4.6 Tailings Management 289
26.4.7 Economic Analysis 289
27 References 290

List of Tables

Table 1.1 : Project economics at copper, gold and silver prices US$3.60/lb Cu, US$1,700/oz Au and US$19.90/oz Ag respectively 1
Table 1.2 : Cash Flow US$ M 1
Table 1.3 : Sensitivity analysis (±20%, after-tax) 1
Table 1.4 : Alpala Mineral Resource Statement (effective date 18 March 2020) 9
Table 1.5 : Tandayama-America Mineral Resource Statement (Effective date 30 March 2022) 10
Table 1.6 : Alpala Economic Criteria 11
Table 1.7 : Alpala Probable Reserves 12
Table 1.8 : Pre-Feasibility design parameters 14
Table 1.9 : Schedule Rates 16
Table 1.10 : Initial Capital Cost Summary 25
Table 1.11 : Operating Cost Summary 26
Table 1.12 : Financial Results 27
Table 1.13 : Total Cash Cost Summary 27
Table 2.1 : Qualified Persons 30
Table 4.1 : Property information 34
Table 4.2 : Cascabel Exploration Concession Boundary Coordinates Registered Under the Ecuador Mining Cadastre 36
Table 6.1 : Cascabel Ownership History and Key Activities 51

Table 7.1 : Geological Modelling Codes Utilised for the Alpala Deposit, which form the Foundation of Geological Interpretation and 3D Modelling of the Alpala Deposit, showing mineralised deposit forming porphyry phases inside red outline (QD10 to G20) 61
Table 7.2 : Geological modelling codes utilised for the Tandayama-America deposit, which form the foundation of geological interpretation and 3D modelling of the Tandayama-America deposit, showing mineralised deposit forming porphyry phases inside red outline (QD10 to QD30) 69
Table 11.1 : Analytical and Test Laboratories 90
Table 12.1 : List of core samples and results sent for check assay 96
Table 13.1 : Cascabel Project Pre-Feasibility testwork reporting 99
Table 13.2 : Cascabel Project sample comminution and flotation testwork 101
Table 13.3 : Initial phase variability sample bulk mineralogical analysis summary (KM 5922 summary) 102
Table 13.4 : Rougher concentrate regrind power estimates 105
Table 13.5 : Flotation parameterisation investigations, Alpala deposits 107
Table 13.6 : Reagents 108
Table 13.7 : BML, batch rougher and cleaner testwork findings 116
Table 13.8 : Rougher tailings composites 117
Table 13.9 : +150 µm deportment 117
Table 13.10 : KM 5922 Kynch test conditions, calculation results[1,2] 125
Table 13.11 : Diagnostic leach of pyrite concentrate 127
Table 13.12 : LCT for recovery equations 128
Table 13.13 : Cascabel Project Alpala underground concentrate quality 136
Table 14.1 : Drill holes Excluded from the MRE 139
Table 14.2 : Summary of Inputs into Optimisation 146
Table 14.3 : Summary of Inputs Into Pit Optimisation 148
Table 14.4 : Summary of Inputs Into Underground Optimisation 149
Table 14.5 : Alpala Mineral Resource Statement (effective date 18 March 2020) 151
Table 14.6 : Tandayama-America Mineral Resource Statement (effective date 30 March 2022) 152
Table 15.1 : Alpala Economic Criteria 154
Table 15.2 : Alpala Probable Reserves 155
Table 16.1 : Estimated Principal Stresses for Alpala Deposit 157
Table 16.6 : Results summary of extraction level stability analysis (Itasca Australia Pty Ltd, 19 November 2021) 161
Table 16.7 : Recovery Factors 162
Table 16.8 : Pre-Feasibility design parameters 163
Table 16.9 : NSR model parameters 163
Table 16.10 : Cost Estimation Parameters 164
Table 16.11 : Mining Physicals 173
Table 16.12 : Schedule Rates 174
Table 16.13 : Key Schedule Milestones 174
Table 16.14 : Key Schedule Milestones 175
Table 16.15 : Mining Physicals 176
Table 16.16 : Fixed facilities airflow requirements 180
Table 16.17 : Equipment Airflow Requirements 181
Table 16.18 : Groundwater flow assumptions. Itasca 2020 183
Table 16.19 : Life of Mine Headcount 184
Table 17.1 : Major Equipment List 191
Table 17.2 : Summary Process Design Criteria 193
Table 17.2 : Production Summary 197
Table 18.1 : Summary of Estimated PGA for the Cascabel Project 198

Table 18.2 : Key Design TSF Parameters 201
Table 19.1 : Cascabel Project typical metal payabilities in copper concentrate 220
Table 20.1 : Schedule of Major Permits for Construction and Operation 222
Table 20.2 : Communities in the Concession Area 236
Table 21.1 : Consultants' Contribution 247
Table 21.2 : Initial Capital Cost Summary 252
Table 21.3 : Cascabel Project Total Capital Cost summary 252
Table 21.4 : Operating Cost Summary 254
Table 22.1 : Exchange Rates 257
Table 22.2 : Metal Selling Price 257
Table 22.3 : Concentrate Shipping Costs 258
Table 22.4 : European Smelter Terms 258
Table 22.5 : Asian Smelter Terms 259
Table 22.6 : Royalties Payable 260
Table 22.7 : Total Cash Cost Summary 261
Table 22.8 : Corporate Taxes 262
Table 22.9 : CST Rate 263
Table 22.10 : Before-tax Financial Results 264
Table 22.11 : After-tax Financial Results 264
Table 22.12 : Project Cash Flow 269
Table 24.1 : Project Risk Register Summary 278

List of Figures

Figure 1.1 : Cascabel Project Pre-Feasibility testwork program 6
Figure 1.2 : After-tax NPV_8 Sensitivity Analysis 28
Figure 4.1 : Cascabel Project Location 35
Figure 4.2 : Location and Vertices of the Cascabel Concession 37
Figure 5.1 : Location of Tandayama-America, Alpala and Aguinaga deposits at the Cascabel project, showing the location of current drill testing underway at Moran target 45
Figure 5.2 : Topographic map of Ecuador (after Belik, 2008) 48
Figure 5.3 : Typical Landscape in the Cascabel Project Area (Photo: courtesy of SolGold) 49
Figure 7.1 : Cascabel Regional Geology (modified from Boland et al., 2000), Showing Location of the Cascabel Concession (yellow polygon), Alpala Cu-Au-Ag deposit and Llurimagua (Junin) Cu-Mo deposit 53
Figure 7.2 : Mineralised Structural Corridors, Cascabel 54
Figure 7.3 : Deep Residual Magnetics and Structure Detection Imagery by Fathom Geophysics 55
Figure 7.4 : Simplified Stratigraphy of the Alpala Deposit (after Tosdal et al., 2019) 56
Figure 7.5 : Geology and Structure of the Cascabel Project Area 57
Figure 7.6 : Vertical Cross-Section 82,950N Through the Alpala Central Zone (Looking Northwest) Along the Trend of the Alpala Intrusive Complex, Centred on a 100m Wide Viewing Window, and Highlighting the Extensive Vertical Geometry and Episodic Nature of the Intrusions 59
Figure 7.7 : Vertical Long-Section Through the Alpala Central Zone (Looking West-Southwest), Centred on a 100 m Wide Viewing Window, and Highlighting the Extensive Vertical Geometry and Episodic Nature of the Intrusions 60
Figure 7.8 : Example Long-Section Through the Centre of Alpala Deposit, Looking West-Southwest, and Across the Trend of the Alpala Intrusive Complex, showing the geometric framework of intrusions (A), and high, medium and low abundance zones of porphyry-type quartz veins (B) ..62

Figure 7.9 : Example Long-Section Through the Centre of Alpala Deposit, Looking West-Southwest, and Across the Trend of the Alpala Intrusive Complex, showing excellent correlation with high, medium and low grade zones (C), and block model grades above the 0.21% CuEq shut-off-grade, classification shells, and the Mineral Resource Outline (MRO) limit (D) 62
Figure 7.10 : Simplified Scaled Schematic Intrusive and Vein Paragenesis Model for the Alpala Deposit 63
Figure 7.11 : Alpala Deposit Cross-Section 82,950 m N (window + 50 m), Showing the Relationships Between Rock Units, Porphyry Style B-type Quartz Vein Abundance, CuEq grade (Garwin et al., 2018) 64
Figure 7.12 : Photographs of Drill Core from the Alpala Deposit, Showing Examples of the Most Important Vein Types Recognised in Alpala 64
Figure 7.13 : Early Alteration Phases at the Alpala Deposit Shown in Section-View Looking Northwest (window + 50 m) (courtesy ENSA Geology Department, 2020) 66
Figure 7.14 : Late Alteration Phases at the Alpala Deposit Shown in Section-View Looking Northwest (window + 50 m) (ENSA Geology Department, 2020) 67
Figure 7.15 : Example Cross-Section, Looking northwest, centred upon a 100m wide window, showing 3D Geological Models (left), B-Type Quartz Vein Abundance Models (centre), and Grade Models (right) with drill holes displaying downhole geology 68
Figure 7.16 : Example cross-section through the centre of Tandayama-America deposit, looking northwest showing the geometric framework of intrusions (left), and copper equivalent grade shells (right) 70
Figure 8.1 : Location of the Alpala Porphyry Copper-Gold-Silver Deposit, Cascabel Project in the Eocene Porphyry Belt of Northern Ecuador 72
Figure 8.2 : Schematic of an Idealised Copper Porphyry Deposit Illustrating the Classic Generic Model and Possible Related Deposit Types (After Sillitoe, 2010) 73
Figure 9.1 : Summary of Soil Geochemical Results for the Cascabel Concession, showing Mo, Mn and Cu/Zn Ratio 76
Figure 9.2 : Cascabel Concession Area (red outline), Showing High Resolution RTP Magnetic Imagery with the 2017 Ground Magnetic Survey Area (black outline) Over Previously Flown Heliborne RTP Magnetic Imagery 78
Figure 10.1 : Porphyry Deposits and Prospects at the Cascabel Concession, Northern Ecuador 80
Figure 10.2 : Drill plan of the Alpala Deposit 81
Figure 10.3 : Drill plan for the Tandayama-America Deposit 82
Figure 13.1 : Cascabel Project Pre-Feasibility Testwork Program 99
Figure 13.2 : Metallurgical sample locations, 200 m section, plan view through the Alpala deposit envelope 101
Figure 13.3 : Cascabel Project comminution parameters – Axb 104
Figure 13.4 : Cascabel Project comminution parameters – Rod Mill Work Index (RWi) kWh/t 104
Figure 13.5 : Cascabel Project comminution parameters – Ball Mill Work Index (BWi) kWh/t 105
Figure 13.6 : Eliason rougher concentrate regrind signature plots 106
Figure 13.7 : KM 5754 rougher parameterisation, where LC=LG, IC=MG, and HC=HG composites, copper recovery 109
Figure 13.8 : KM 5922 rougher primary grind and reagent parameterisation, copper recovery 110
Figure 13.9 : BML, Alpala underground rougher primary grind parameterisation, copper recovery 111
Figure 13.10 : BML, Alpala open pit, rougher primary grind parameterisation, copper recovery 111
Figure 13.11 : BML, Alpala underground rougher reagent parameterisation, copper recovery 112
Figure 13.12 : BML, Alpala open pit, rougher reagent parameterisation, copper recovery 112
Figure 13.13 : KM 5754 cleaner parameterisation, where LC=LG, IC=MG, and HC=HG composites, copper recovery 113
Figure 13.14 : KM 5922 cleaner regrind parameterisation, copper and gold recovery 114
Figure 13.15 : BML, Alpala underground cleaner regrind & reagent parameterisation, copper recovery 115

Figure 13.16 : BML, Alpala open pit cleaner reagent parameterisation, copper recovery 115
Figure 13.17 : Copper and gold size by assay recovery (KM 5794) 116
Figure 13.18 : Raw variability rougher testwork results, with recovery on the left vertical axis and grade in % or g/t on the right vertical axis 120
Figure 13.19 : Raw variability cleaner testwork results, with recovery on the left vertical axis and grade in % or g/t on the right vertical axis. Copper concentrate grade bands shown in the uppermost figure as 22-28% Cu 121
Figure 13.20 : Variability batch testwork, average mass balance for LG, MG and HG sample categories 122
Figure 13.21 : Locked cycle flowsheet for ALS Kamloops KM 5754 123
Figure 13.22 : Locked cycle flowsheet for ALS Kamloops KM 5922, 6204, BML 123
Figure 13.23 : LCT v Batch testwork, comparisons 124
Figure 13.24 : LCT testwork, average mass balance for LG, MG and HG sample categories 124
Figure 13.25 : KM 5922 Rougher tailings Kynch testwork 126
Figure 13.26 : KM 5922 Cleaner scavenger tailings Kynch testwork 126
Figure 13.27 : Cascabel Project Alpala underground recovery relationships 129
Figure 13.28 : Cascabel Project Alpala underground Rougher stage flotation relationships 130
Figure 13.29 : Cascabel Project Alpala underground Cleaner 1 stage flotation relationships 131
Figure 13.30 : Cascabel Project Alpala underground Cleaner 1 Scavenger stage flotation relationships 132
Figure 13.31 : Cascabel Project Alpala underground Cleaner 2 stage flotation relationships 133
Figure 13.32 : Cascabel Project Alpala underground Cleaner 3 stage flotation relationships 134
Figure 13.33 : Cascabel Project Alpala underground flotation stage mass recovery relationships 135
Figure 14.1 : Perspective view towards northeast showing UOS at 0.21% CuEq shut-off grade (red) with estimated blocks > 0.21 % CuEq (white) 147
Figure 14.2 : Section views, looking south, with window thickness 1700 m, showing the optimisation shapes 150
Figure 16.1 : Isometric view of the caveability LOM footprints (Herbert, 2021) 160
Figure 16.3 : Cross-section through footprint showing extraction drive spacing and pillars 164
Figure 16.4 : Perimeter drive offsets and undercut veranda 165
Figure 16.5 : Minimum crusher offset from footprint 165
Figure 16.6 : Haulage level offset 166
Figure 16.7 : Plan view showing recommended shaft collar offsets (Lachenicht, Solgold Concept Shaft Design Offset Recommendations, 2021) 167
Figure 16.8 : Cross Section – Conveyor – Main Decline 168
Figure 16.9 : Plan View – Twin Declines 168
Figure 16.10 : Plan View – Ventilation Drives and connections to surface ventilation shafts 169
Figure 16.11 : Section View – Showing Development for "W" style Undercut 170
Figure 16.12 : Plan View – Haulage Level detail, including Conveyor Feeders 171
Figure 16.13 : Isometric View – Ventilation Shafts 172
Figure 16.14 : Plan View – Ventilation Drives and connections to surface ventilation shafts 173
Figure 16.15 : Scheduled Ore Tonnes by Years 177
Figure 16.16 : Mobile Fleet Requirements 178
Figure 16.17 : Production Load & Haul Equipment 178
Figure 16.18 : Conveyor MHS process flow diagram 179
Figure 16.19 : Illustration of Conveyor MHS Concept Design 179
Figure 16.20 : Primary Ventilation network schematic 180
Figure 16.21 : LOM Airflow Requirements 182
Figure 16.22 : Dewatering requirements to deal with groundwater 184
Figure 16.23 : Owner Personnel Labour 185
Figure 16.24 : Contractor Personnel Labour 186

Figure 17.1 : Simplified Process Flowsheet 189
Figure 18.1 : Tailings Acid Formation Plots 202
Figure 18.2 : Coastal Plains TSF General Arrangement 204
Figure 18.3 : Coastal Plains TSF Cleaner Facility General Arrangement 206
Figure 18.4 : Coastal Plains TSF Cleaner Facility Embankment Section 206
Figure 18.5 : Coastal Plains TSF Main Facility Embankment Section 207
Figure 18.6 : Coastal Plains Main (Rougher) and Cleaner Tailings Pipeline Long Sections and Hydraulics 208
Figure 18.7 : Coastal Plains Decant Pipelines (Main and Cleaner) Long Section and Hydraulics 209
Figure 18.8 : Parambas Water Storage Facility General Arrangement 211
Figure 18.9 : Parambas Water Storage Facility Embankment Section 212
Figure 20.1 : Long-Term Synthetic Monthly Averaged Temperatures At Rocafuerte Station 226
Figure 20.2 : Rocafuerte Station Wind Rose 227
Figure 20.3 : Alpala Station Wind Rose 227
Figure 20.4 : Total Daily Precipitation Rocafuerte Station 228
Figure 20.5 : Total Daily Precipitation Alpala Station 228
Figure 20.6 : Area Drainages and Water Quality Sampling Locations 229
Figure 20.7 : Hydrometric Monitoring Locations 231
Figure 20.8 : Communities in and Around the Concession 237
Figure 20.9 : Environmental Monitoring with Community Member Involvement 238
Figure 20.10 : Program for Chicken Farming Enhancements 239
Figure 20.11 : Assistance with transportation of market goods between the Cahuasquí and Jacinto Jijón y Caamaño parishes 240
Figure 20.12 : Distribution of 2,600 masks to the La Carolina parish 241
Figure 20.13 : Construction of Sanitary Washing Stations in the Lita parish 242
Figure 22.1 : After-tax Cash Flow Distribution 265
Figure 22.2 : Before-tax NPV_8 Sensitivity Analysis 266
Figure 22.3 : After-tax NPV_8 Sensitivity Analysis 266
Figure 22.4 : Before-tax IRR Sensitivity Analysis 267
Figure 22.5 : After-tax IRR Sensitivity Analysis 267
Figure 24.2 : Personnel Requirements 275
Figure 24.3 : Risk Rating Summary 277

1 Summary

1.1 Key Outcomes

Table 1.1 : Project economics at copper, gold and silver prices US$3.60/lb Cu, US$1,700/oz Au and US$19.90/oz Ag respectively

Area	Units	Pre-tax	Post-tax
Net present value at an 8% discount rate (NPV_8)	US$ M	5,241	2,907
Internal rate of return (IRR)	Percent	25.3	19.3
Capital payback after commencement of production	Years	4.2	4.7

Table 1.2 : Cash Flow US$ M

Area	Y1	Y2	Y3	Average Y1-10	Life of Mine
Concentrate revenue	242	601	1,239	1,705	30,763
Doré revenue	13.5	31.0	59.7	79.9	1,492
Total revenue	**255**	**632**	**1,299**	**1,785**	**32,256**
Operating costs	(111)	(235)	(256)	(262)	(6,771)
Operating profit	**144**	**397**	**1,042**	**1,524**	**25,484**
Taxes and royalties	(51.2)	(5.6)	(118)	(484)	(8,464)
Capital cost estimate	(829)	(186)	(369)	(190)	(4,881)
Changes in working capital	(22.3)	(36.1)	(80.6)	(18.6)	0
Cash flow (after-tax)	**(758)**	**169**	**475**	**830**	**12,139**

Table 1.3 : Sensitivity analysis (±20%, after-tax)

Area	Units	US$3.00/lb Cu	Base Case US$3.60/lb Cu	US$4.00/lb Cu
NPV_8	US$ M	2.097	2,907	3,672
IRR	Percent	16.8	19.3	21.4

1.2 Introduction

Wood plc has compiled this Technical Report (the Report) on "Cascabel Project, Imbabura Province, Ecuador, NI 43-101 Technical Report on Pre-Feasibility Study" (Cascabel Project) on behalf of SolGold Plc (SolGold) and Cornerstone Capital Resources Inc (Cornerstone).

The following companies and consultants are providing Qualified Persons (QPs) responsible for the content of their respective section in this report. This NI 43-101 report is based on a Pre-Feasibility study completed in Q1 2022 (the Pre-Feasibility) and supporting documents prepared for the Pre-Feasibility, are, in alphabetical order:

- Knight Piésold Pty Ltd (Australia and Canada) (collectively Knight Piésold)
- Mining Plus Pty Ltd (Mining Plus)
- Wood Australia Pty Ltd (Wood)
- Wood Mackenzie (Wood Mac).

The Alpala and Tandayama-America deposits, the subject of this NI 43-101 Technical Report, are wholly contained within the Cascabel Property, which is wholly owned by Exploraciones Novomining S.A. (ENSA). SolGold holds an 85% legal and beneficial interest in ENSA.

1.3 Terms of Reference

The Report has been used in support of first-time disclosure of mineral reserves on the Cascabel property, as reported in SolGold's press release dated 20 April 2022, that is entitled "SolGold plc Pre-Feasibility supports long-life, high-value Cascabel Project".

Currency is expressed in US dollars unless stated otherwise; units presented are metric units, such as metric tonnes, unless otherwise noted.

Calendar years are used in some sections of the Report, in relation to the proposed mine plan and execution plan. The years shown are for illustrative purposes; the actual timing may vary. Formal approval is required from the SolGold Board for mine construction, and additional permits need to be granted by the Government of Ecuador.

1.4 Project Setting

The Cascabel Project is located in northern Ecuador approximately 3 hours' drive north of Quito, the capital city of Ecuador. Access is via sealed highways through the closest major centre of Ibarra, located approximately 80 km south of the property. The Cascabel concession area contains three small settlements: Santa Cecilia Village, Rocafuerte Office Complex and the Alpala Base Camp. Four further settlements exist proximal to the project area at Rocafuerte, San Pedro, Urbina and Cachaco.

The topography of the project area is moderate to steep, with elevations rising from 750 m to 2,140 m above sea level. The rugged terrain is deeply incised by four large drainage complexes. Vegetation is tropical forest with a well-developed soil horizon up to 12 m thick in places.

The climate of the project area is characterised by humid weather, with bi-modal rain seasons that peak in December and March each year. Total average rainfall for the region is approximately 1,500 mm per annum. Regionally, temperatures remain relatively consistent throughout the year, with average annual temperatures of approximately 17°C, with maxima in excess of 30°C and minima typically around 10°C.

International flights regularly arrive and depart from Mariscal Sucre International airport, 18 km east of Quito, from major carriers including KLM, American Airlines, Air Canada, Lufthansa, and Copa Airlines.

The Cascabel Project is easily accessible from Quito, via the multi-lane E35 Pan-American North highway to Ibarra (approximately 100 km) and connected to the northern margin of the licence area near Rocafuerte Village (approximately 90 km) via the sealed two lane E10 Salinas-San Lorenzo highway that runs along the Rio Mira river valley. Driving time to the project offices at Rocafuerte is approximately 3 hours.

Within the Cascabel concession area, access to the Rocafuerte Office Complex, the Alpala and Tandayama-America deposits, and Alpala Base Camp is via Carmen Road, a maintained two-lane dirt road from Rocafuerte village, through Santa Cecilia village. The main exploration prospects within Cascabel are accessible via a series of maintained single lane dirt roads, single lane four wheel drive tracks and hiking trails off the Carmen road.

1.5 Mineral Tenure, Surface Rights, Royalties and Agreements

The Cascabel concession (Code 402288) is now considered one of the most relevant mining projects in recent years in Ecuador, and on which SolGold has invested significant resources in exploration, making the area one of the most important assets not only for the Company, but for the Ecuadorian State and the communities in the area of influence.

On 26 April 2010, the Undersecretary of Mines of the Ministry of Non-Renewable Natural Resources issued the title of the exploration concession for metallic minerals called Cascabel (Code 402288). The Resolution was protocolised in the Thirty-Second Notary Office of the Quito Canton on 30 April 2010 and was registered in the Mining Registry by the Ibarra Mining Regulation and Control Agency on 7 May 2010 under Registry No. 0022-2010, Directory 024, Volume 001.

On 20 August 2018, ENSA notified the Zonal Sub-secretariat for Mining North of the Ministry of Mining of the start of the Economic Evaluation period for the Cascabel Project, in accordance with articles 27 and 37 of the Mining Law.

On 25 April 2019, the North Zonal Co-ordination (Zones 1, 2 and 9) of the Ministry of Energy and Non-Renewable Natural Resources issued Resolution No. MERNNR-CZN-2019-0042-RM that contains the Resolution of the Beginning of the Economic Evaluation Period of the Cascabel Project. This duly notarised Resolution was registered in the Mining Registry by the Regulatory Agency and Ibarra Mining Control dated 20 June 2019 under the Repertoire Book No.20, Volume No. 1, Item No. 1 and Folio No. 31.

On 19 November 2021 SolGold plc and SolGold Finance AG (together the "Investors"), and Exploraciones Novomining S.A. and SolGold-Ecuador S.A. (together the "Receiving Companies") signed a preliminary commitment declaration with regard to an Exploration Investment Protection Agreement (IPA) with Ecuador Ministry of Production, Foreign Trade, Investments and Fisheries (MPCEIP). The IPA includes an intention to invest a total of approximately US$430 M over the 10 years between 2013 and 2023 in minerals exploration activities in the Cascabel concession, in the canton of Ibarra, province of Imbabura, Ecuador. The US$430 M total includes both historical investments, with a total of approximately US$238 M estimated through to the end of 2021 and planned future investments through to the end of 2023 when the Exploration Phase of activities as defined under the mining law is anticipated to finish.

On 3 January 2022, the Northern Zonal Coordinator of the Ministry of Energy and Non-Renewable Natural Resources issued the Resolution Nº MERNNR-CZN-2022-0001-RM authorizing the extension of the economic evaluation of the deposit in Cascabel. The resolution was duly registered in the Mining Registry on 17 March 2022.

1.6 Geology and Mineralisation

The Eocene Alpala and Tandayama-America deposits lie in a zone of overlap between the Eocene and Miocene Andean porphyry belts that extend from Colombia through Ecuador and Peru into Chile and Argentina. Situated at the margins of a large regional batholith and centred at the confluence of a major northeast trending fault zone, the location of the deposits are controlled by the first order tectonic structure, the Toachi Fault Zone (TFZ), with a northwest trending second order tectonic structure, typical of the location of a number of porphyry deposits globally.

The major host rock types of the Cascabel Project consist of gabbroic and basaltic basement rocks, overlain by Cretaceous siltstones and minor sandstones that are unconformably overlain by a sequence of Tertiary

volcano-sedimentary and andesitic lavas. This sequence has been intruded by a series of Middle to Late-Eocene (Bartonian) hornblende-bearing diorites, quartz diorites and tonalities that form plutons, stocks and dykes.

The porphyry related vein types and mineral paragenesis at the Project indicate a systematic evolution of the deposits over time. Early-stage veins contain quartz and/or magnetite. Planar and pervasive, B-type quartz veins crosscut the early vein types and consist of quartz-magnetite-chalcopyrite. At least two stages of B-type veins have been recognised, B1 and B2, with magnetite more abundant in early B1 veins and chalcopyrite more common in the later B2 veins. B-type veins contain the majority of the Cu and Au in the deposit.

1.7 History

From 1980 to the present, 10 different entities have conducted field activities and/or studies over the Cascabel area. Historical exploration of the project area, undertaken from 1980 to May 2012, highlighted widespread geochemical anomalism in stream pan-concentrates, stream sediments and rock chips over a 9 km^2 area in the northern half of the license area. Previous explorers focused on the source of Au, Cu, Pb and Zn in stream sediments, which led to the location of gold-bearing, polymetallic base-metal sulphide quartz veins in streams that flank the northern periphery of the Alpala deposit.

The Cascabel concession was granted to Santa Barbara Copper and Gold S.A. (SBCG) on 26 April 2010. Santa Barbara Copper and Gold S.A. was renamed to Exploraciones Novomining S.A. on 27 July 2011. On 29 March 2011, Cornerstone signed a definitive agreement to acquire Santa Barbara Copper and Gold S.A.

On 24 July 2012, SolGold entered into a Earn-in Agreement with Cornerstone, ENSA and CESA to explore the Cascabel licence. On 18 February 2013, the Earn-in Agreement was supplemented by a binding Term Sheet between SolGold, Cornerstone, CESA and ENSA. A revised Term Sheet was executed on 24 February 2014.

In May 2012, SolGold commenced the first systematic exploration program at Cascabel. The surface expression of the Alpala deposit was discovered the same month, during reconnaissance mapping which located an 80 m wide zone of Cu and Au bearing, dominantly sheeted and stockwork porphyry-style quartz veining in Alpala Creek. After follow-up mapping, geochemical and geophysics programs were conducted and other porphyry related stockwork veins were subsequently discovered in the Moran, Tandayama and America Creeks.

1.8 Exploration, Drilling, Sampling and Assaying

Exploration techniques employed by SolGold (ENSA) on the Cascabel Project have included reconnaissance mapping, geochemical sampling of stream sediment, soil and rock, and geophysical methods including a helicopter-borne magnetic and radiometric survey, 3D airborne laser scanning Light Detection and Ranging (Lidar) topographic survey and a ground magnetic survey.

This work identified a number of anomalies, a portion of which have been drill tested. The exploration and drilling methods used were suitable for the models used of porphyry style deposits, and the results were instrumental in properly outlining the extent of the mineralisation and defining the Alpala and Tandayama-America deposits, and other prospects. There is considerable remaining exploration potential in the Property.

Since drilling commenced on 1 September 2013, a total of 290,135.3 m (as of 30 March 2022) of diamond drilling has been completed on the Cascabel Project. Drilling includes: 243450.4 m at the Alpala deposit, 30,940.1 m at Tandayama-America deposit, 8,970.6 m at the Aguinaga deposit, and a further 6,774.2 m of drilling completed on infrastructure, sterilisation and water monitoring.

Drillholes are logged and sampled following industry standard methods. Data are stored in an acQuire referential database that has restricted data entry protocols and validation procedures. The database is routinely backed-up to an offsite server.

Samples are assayed by internationally certified laboratories ALS and Bureau Veritas who apply industry standard assay methods. To monitor the ongoing quality of its analytical database, SolGold's QAQC protocol encompasses the insertion of certified powder blanks, coarse chip blanks, standards, umpire duplicates and field duplicates. The blanks and standards are Certified Reference Materials supplied by Ore Research and Exploration, Australia (OREAS).

Following a review of the sample preparation, assay QAQC protocols and results, chain of custody, data security procedures and assaying methods employed by SolGold for the Alpala and Tandayama-America deposits, the respective QPs were of the opinion that they were consistent with industry best practices and suitable for use in the respective Mineral Resource Estimates.

1.9 Data Verification

Mrs Cecilia Artica (QP Alpala) was of the opinion from the November 2018 field audit that the quality of the geological and assay data collected in relation to the Alpala Deposit, as well as their validation and storage were aligned with industry best practices. As such, the QP considered the geological and assay data to be robust and suitable for inclusion in a MRE.

Dr Karl John Roa (QP Tandayama-America) was of the opinion from the August 2021 field audit that the quality of the geological and assay data for Tandayama-America as well as their validation and storage were highly satisfactory. The QP hereby considers the geological and assay data to be robust and suitable for inclusion in a MRE in support of a Pre-Feasibility.

1.10 Metallurgical Testwork

Metallurgical testwork for the Alpala underground deposit commenced in 2014. From 2018 to 2021 phases 1, 2 and 2a testwork were undertaken with Alpala underground deposit samples. Following a gap analysis additional testwork commenced in 2021 with Alpala underground and potential open pit deposit samples. This testwork is ongoing and reported here where results are available.

Testwork shown in the figure below has been undertaken for the Cascabel Project.

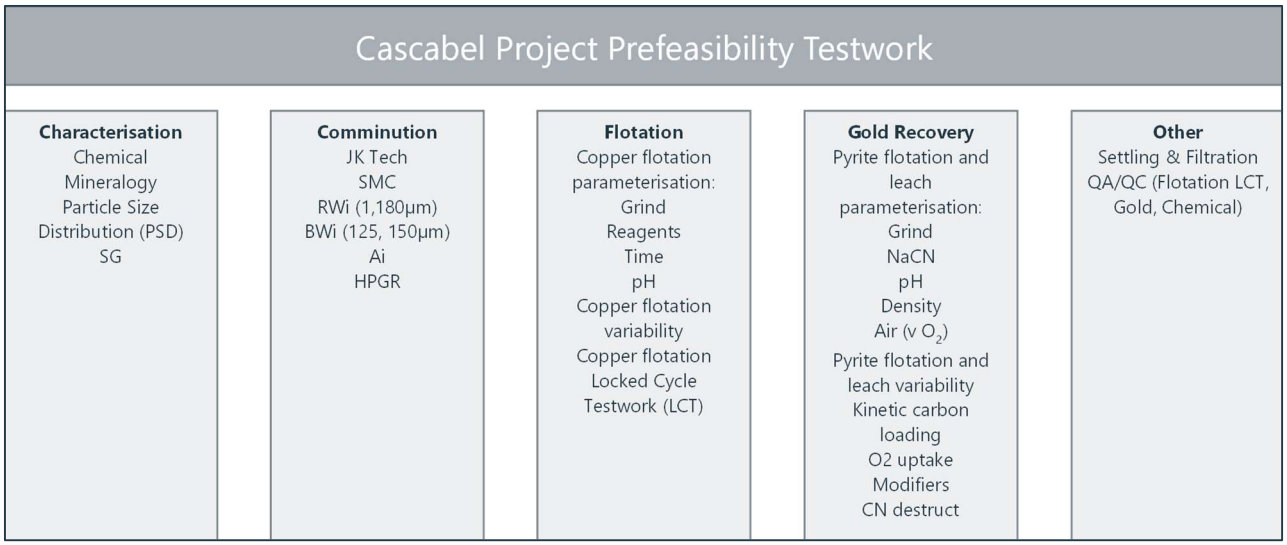


Figure 1.1 : Cascabel Project Pre-Feasibility testwork program

Mineralogical analyses for the Cascabel Project Alpala deposit included phase variability and mineral association. Variability samples 1-20 generally averaged 60% copper sulphide liberation at the nominal target primary grind (P_{80} 150 µm). However, this decreased significantly to an average of 50% for variability samples 21-53. There was also a similar increase in copper sulphides in binary with non-sulphide gangue from 30% to over 40%.

Gold was observed to be hosted in refractory form – chemically bound in the mineral structure – with compositional zoning and gold rich inclusions. Au-Ag-telluride phases may be important to the overall Au forms present.

Comminution parameters investigated included JK parameters, DWi and Axb, SMC test, Bond rod (RWi kWh/t), ball mill (BWi kWh/t) work indices and Abrasion index (Ai).

From the comminution testwork (58 samples) completed to date, the following observations can be made:

- Lower grade resources (<0.65% Cu) are generally more competent and abrasive
- Volcanic and D15 lithologies are generally more competent
- Deposit competency generally increases with depth
- Reducing the primary grind P80 from 150 to 125 µm for the lower grade deposits may require an increase in Ball Mill power demand of 5-15%.

Following the initial flotation sighter testwork undertaken by the Inspectorate Metallurgical Division, Bureau Veritas Commodities Canada Ltd, multiple parameterisation programs were undertaken with composites prepared from the Alpala deposits. The initial parameterisation phase was undertaken with three composites prepared from the first 20 variability samples. The composites were generally of a higher grade and did not represent the lower grade areas of the Alpala underground deposit.

Following this, additional parameterisation testwork was undertaken with four composites prepared from the first 20 next 33 variability samples. Phase 2a from the previous testwork was undertaken to address gaps which were identified following the phase 2 testwork.

Parameterisation testwork undertaken from 2021 was undertaken with five composites. This testwork confirmed improved recoveries of copper and gold were achievable with finer grind targets (primary and regrind) and additional flotation reagents.

Final concentrates showed reasonable copper, gold and silver grades, with low impurities. Flotation recovery relationships were able to be developed for the Alpala underground deposit for copper, gold, silver and mass. These relationships have been applied to the mine production plans to develop the process plant production plans. In the first 5 years' copper, gold and silver flotation recoveries are estimated be approximately 88%, 74% and 65% respectively. Over the initial project life copper, gold and silver flotation recoveries are estimated be approximately 86%, 68% and 65% respectively.

In 2019, the phase 1 testwork program was extended to specifically target cleaner circuit gold losses, via implementation of a pyrite recovery circuit treating cleaner 1 tailings.

Approximately 60% of the copper and 50% of the gold in copper cleaner tailing was recovered to the pyrite concentrate. This product was then used as the basis for the gold recovery investigations described below.

In 2021, the testwork program was defined to specifically investigate pyrite flotation of the cleaner scavenger tailings for the Alpala underground deposit only, with a view to recovering as much gold and silver as could be reasonably recovered to a concentrate for downstream processing.

This represented a variation from the previous testwork, whereby the cleaner scavenger concentrate was considered a pyrite concentrate.

Gold recovery from initial batch flotation testwork indicated 35-75% (ranging from HG to LG) of the gold and approximately 65% of the silver may be recovered to a concentrate. The concentrate recovered from subsequent bulk flotation testwork is the basis for the gold recovery testwork, which is currently in progress.

Based on recovery equations provided by SolGold, gold and silver recovery to doré for the first 5 years of production are estimated be approximately 8.5% and 8% respectively. Over the initial project life gold and silver doré recoveries are estimated be approximately 10.5% and 8.1% respectively. These recoveries are based on limited cyanidation testwork with further testwork in progress to confirm the achievable gold and silver recovery to doré.

1.11 Mineral Resource Estimation

Since drilling commenced on 1 September 2013, a total of 290,135.3 m (as of 30 March 2022) of diamond drilling has been completed on the Cascabel Project. Drilling includes: 243450.4 m at the Alpala deposit, 30,940.1 m at Tandayama-America deposit, 8,970.6 m at the Aguinaga deposit, and a further 6,774.2 m of drilling completed on infrastructure, sterilisation and water monitoring.

SolGold made available all technical and scientific data and interpretations relevant to the Alpala and Tandayama-America Mineral Resource Estimates, which have been reviewed and validated by the respective QPs.

The Alpala and Tandayama-America MREs were prepared following industry best practice as described in the "Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines" (CIM, 2019). Geology was interpreted in two-dimensional vertical and plan sections before being modelled as three-dimensional wireframes. The wireframes were then used to define estimation domains and domain boundary conditions

through exploratory data analysis. Once domains were defined, variography was completed and search and estimation plans were developed. The estimation was completed with ordinary kriging (OK), with check estimates completed using the nearest neighbour (NN) estimation method.

Block model validation showed good agreement between the input composite grades and the estimated block grades. The MRE was classified in accordance with the CIM Definition Standards (CIM, 2014) and was informed by a drill hole spacing study.

The cut-off or shut-off grades used for reporting was based on recent third-party metal price research and forecasts of Cu and Au prices, copper and gold metallurgical recoveries to concentrate as well as an operating cost structure based on mining studies on the Alpala deposit. Operating costs included mining, processing and general and administration (G&A). Net Smelter Return (NSR) included metallurgical recoveries and off-site realisation (TCRC) including royalties. Metal prices used were US$3.40/lb for Cu and US$1,400/oz for Au.

Open pit and underground optimisations were run for the mineralised and classified material that was potentially mineable by open pit and underground methods respectively. Three-dimensional underground optimised shapes (UOS) were generated for reporting the Alpala and Tandayama-America MREs at 0.21% CuEq and 0.28% CuEq cut-off or shut-off grades for the Alpala and Tandayama-America deposits respectively. These UOS maximised the tonnes above the cut-off or shut-off grade while ensuring that all material was part of a minimum mining unit with geometry appropriate for a block cave. These minimum mining dimensions for a block cave were defined in the PEA and as such, the resulting shape contains planned internal and edge dilution that the QP considers appropriate.

A potentially open-pittable Mineral Resource was reported for Tandayama-America with a cut-off grade of 0.163% CuEq, while no potentially open-pittable Mineral Resource was reported for Alpala.

1.12 Mineral Resource Statement

Mining Plus was commissioned by SolGold plc (SolGold) to prepare a Mineral Resource Estimate (MRE) and subsequent Technical Report for the Alpala Porphyry Copper-Gold-Silver Deposit in the Cascabel Property (the Property) in Northern Ecuador, with an effective date of 18 March 2020. Subsequently, Mining Plus was commissioned by SolGold to prepare a MRE and subsequent Technical Report for the Tandayama-America (Tandayama-America) Porphyry Copper-Gold Deposit in the Property, with an effective date of 30 March 2022.

The Cascabel Property is registered as an Advanced Exploration Licence for metallic minerals. Exploraciones Novomining S.A. (ENSA) is the registered holder of the mineral tenure of the Property, which is located in northern Ecuador.

The Cascabel Property has in place the necessary regulatory licenses and authorisations required for its current status as an Advanced Exploration project. Furthermore, with the support of the community and government organisations, it is expected that future license and authorisation requirements to advance the Property will successfully be attained.

To the best of Mining Plus's knowledge, there are no other environmental, permitting, legal, title, tax, socio-economic, market, political or other relevant factors that would affect the Mineral Resource Estimate other than what are presented in this Technical Report.

1.12.1 Alpala Deposit

The MRE (MRE#3) for the Alpala deposit was reported in accordance with the Canadian National Instrument 43-101 (NI 43-101) Standards for Disclosure for Mineral projects. The estimation process followed the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) "Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines" (CIM, 2019). Mrs Cecilia Artica, who was a full-time employee of Mining Plus at the time of reporting takes Qualified Person (QP) responsibility for the Alpala MRE.

The Alpala Porphyry Copper-Gold-Silver Deposit (Alpala deposit), at a shut-off grade of 0.21% Cu equivalent (CuEq), comprises 2,663 Mt at 0.53% CuEq in the Measured plus Indicated categories, which includes 1,192 Mt at 0.72% CuEq in the Measured category and 1,470 Mt at 0.37% CuEq in the Indicated category (Table 1.4). The Alpala Inferred category contains an additional 544 Mt at 0.31% CuEq.

The Alpala MRE comprises a contained metal content of 9.9 Mt Cu and 21.7 Moz Au in the Measured plus Indicated categories, which includes 5.7 Mt Cu and 15.0 Moz Au in the Measured category, and 4.2 Mt Cu and 6.6 Moz Au in the Indicated category. The Inferred category contains an additional 1.3 Mt Cu and 1.9 Moz Au.

Table 1.4 : Alpala Mineral Resource Statement (effective date 18 March 2020)

Shut-off Grade (CuEq %)	Resource Category	Tonnage (Mt)	Grade				Contained Metal			
			CuEq (%)	Cu (%)	Au (g/t)	Ag (g/t)	CuEq (Mt)	Cu (Mt)	Au (Moz)	Ag (Moz)
0.21	Measured	1,192	0.72	0.48	0.39	1.3	8.6	5.7	15.0	52.4
	Indicated	1,470	0.37	0.28	0.14	0.8	5.5	4.2	6.6	39.8
	Measured + Indicated	**2,663**	**0.53**	**0.37**	**0.25**	**1.0**	**14.0**	**9.9**	**21.7**	**92.2**
	Inferred	544	0.31	0.24	0.11	0.6	1.7	1.3	1.9	10.6
	Planned dilution	*5*	*0.0*	*0.00*	*0.00*	*0.00*	*0.0*	*0.0*	*0.0*	*0.0*

Notes:

1. Mrs. Cecilia Artica, SME Registered Member, formerly Principal Geology Consultant of Mining Plus, is responsible for this Mineral Resource statement and is an "independent Qualified Person" as such term is defined in NI 43-101.
2. Reasonable prospects of eventual economic extraction were assessed by enclosing the mineralised material in the block model estimate in a 3D wireframe shape that was constructed with adherence to a minimum mining unit with geometry appropriate for a block cave.
3. Cut-off grade for the shape was defined as the shut-off grade under a breakeven, eventual economic extraction criteria. The shut-off grade of 0.21% CuEq was calculated using (copper grade (%)) + (gold grade (g/t) x 0.613).
4. All material within this shape was reported in the Mineral Resource statement as block caving is a non-selective method and all material extracted is treated as mill feed.
5. The material inside the shape without a Mineral Resource category was reported as planned dilution.
6. The resulting shape contained planned internal and edge dilution that the QP considers appropriate.
7. Shut-off inputs included:
   a. Metal prices of Cu at US$3.40/lb and Au at US$1,400/oz,
   b. Recoveries of Cu 93% and Au 85%,
   c. Costs including mining, processing and general and administration (G&A) and
   d. Off-site realization (TCRC) including royalties.
8. Shut-off inputs excluded:
   a. Capital costs (non-mining, access and footprint establishment),
   b. Unplanned dilution and
   c. The time value of money.

9. The QP considers that the Mineral Resource has reasonable prospects for eventual economic extraction by an underground mass mining method such as block caving.
10. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.
11. Mineral Resources are reported inclusive of those Mineral Resources that were converted to Mineral Reserves.
12. The statement uses the terminology, definitions and guidelines given in the CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) as required by NI 43-101.
13. Figures may not sum due to rounding.

1.12.2 Tandayama-America Deposit

The Tandayama-America deposit lies approximately 3 km north of the Alpala deposit. Dr Andrew Fowler, who is a full-time employee of Mining Plus at the time of reporting takes Qualified Person (QP) responsibility for the Tandayama-America MRE (Table 1.5).

Table 1.5 : Tandayama-America Mineral Resource Statement (Effective date 30 March 2022)

Potential Mining Method	Cut-off/Shut-off Grade (CuEq %)	Resource Category	Tonnage (Mt)	Grade			Contained Metal		
				Cu (%)	Au (g/t)	CuEq (%)	Cu (Mt)	Au (Moz)	CuEq (Mt)
Open Pit	0.16	Measured	17.8	0.20	0.16	0.30	0.04	0.09	0.05
		Indicated	338.7	0.23	0.21	0.36	0.78	2.28	1.23
		Inferred	35.7	0.22	0.23	0.36	0.08	0.26	0.13
Underground	0.28	Indicated	172.0	0.26	0.14	0.35	0.45	0.78	0.60
		Inferred	69.4	0.26	0.16	0.36	0.18	0.36	0.25
Total Measured + Indicated			528.5	0.24	0.19	0.36	1.27	3.16	1.89
Total Inferred			105.1	0.24	0.18	0.36	0.26	0.62	0.38

Notes:

1. Dr Andrew Fowler, MAusIMM CP(Geo), Principal Geology Consultant of Mining Plus, is responsible for this Mineral Resource statement and is an "independent Qualified Person" as such term is defined in NI 43-101.
2. Reasonable prospects of eventual economic extraction were assessed by:
   a. First presenting the mineralised material in the block model estimate to a conventional Lersch-Grossman open pit optimisation routine based on a cut-off grade of 0.16 % CuEq, and the cost and revenue assumptions listed below. Mineralised material inside the revenue factor one pit and above the cut-off grade were then reported in the “Open pit” section of the Mineral Resource statement.
   b. Subsequently, the remaining material was enclosed in a 3D wireframe shape that was constructed with adherence to a minimum mining unit with geometry appropriate for a block cave.
3. Cut-off grade for the potentially open pittable material was 0.16% CuEq, which was calculated using (copper grade (%)) + (gold grade (g/t) x 0.632).
4. Cut-off grade for the underground shape was defined as the shut-off grade under a breakeven, eventual economic extraction criteria. The shut-off grade of 0.28% CuEq was calculated using (copper grade (%)) + (gold grade (g/t) x 0.654).
5. All material within the underground shape was reported in the “Underground” section of the Mineral Resource statement as block caving is a non-selective method and all material extracted is treated as mill feed.
6. The resulting shape contained planned internal and edge dilution that the QP considers appropriate.
7. Cut-off/Shut-off inputs included:
   a. Metal prices of Cu at US$3.30/lb and Au at US$1,700/oz,
   b. Recoveries of Cu 84.4% and Au 65%,
   c. Costs including mining, processing and general and administration (G&A) and
   d. Off-site realization (TCRC) including royalties.
8. Cut-off/Shut-off inputs excluded:

a. Capital costs (non-mining, access and footprint establishment),
b. Unplanned dilution and
c. The time value of money.

9. The QP considers that the Mineral Resource has reasonable prospects for eventual economic extraction by open pit or an underground mass mining method such as block caving as presented in the Mineral Resource statement.
10. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.
11. Mineral Resources are reported inclusive of those Mineral Resources that were converted to Mineral Reserves.
12. The statement uses the terminology, definitions and guidelines given in the CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) as required by NI 43-101.
13. Figures may not sum due to rounding.

Potentially open pittable Mineral Resources comprise 356.5 Mt @ 0.36% CuEq in the Measured plus Indicated categories, plus 35.7 Mt @ 0.36% CuEq in the Inferred category, at a cut-off grade of 0.16% CuEq.

Mineral Resources potentially mineable by underground bulk mining methods comprise 172.0 Mt @ 0.35% CuEq in the Indicated category, plus 69.4 Mt @ 0.36% CuEq in the Inferred category, at a shut-off grade of 0.28% CuEq.

1.13 Mineral Reserve Estimation

The Mineral Reserve for the Cascabel Project Alpala underground resource was converted from the resource categories assigned in the Mineral Resource Estimate. Only Measured and Indicated categories have been considered for the reserve, with Inferred categories considered as waste and grades set to zero. The Mineral Reserves estimates were estimated using the following economic assumptions for block caving.

Two block caves footprints, defined as BC1 and BC2, are the source of the Mineral Reserve and mining schedule output of 25 Mt/y. The mining boundaries for BC1 and BC2 were defined using the assumptions outlined in Table 1.6 and the use of PCBC software to optimise the footprint and determine the cave columns heights. The footprint was sized and situation following optimisation studies to identify the highest value material within the deposit for first 25 years mining activity. Additional material exists outside of the Mineral Reserve, but this material will be further explored in future studies.

The ore and waste classification has been applied at 0.1% CuEq, which has been used in the schedule for simplicity. An economic optimisation of this shut-off has a very marginal effect on the project, as the focus of this Mineral Reserve is on the higher grade material.

Table 1.6 : Alpala Economic Criteria

Parameter	Units		Values	
	(Cu)	(Au)	(Cu)	(Au)
Metal price	US$/lb	US$/oz	3.30	1,700
Unit conversion	lb/t	g/oz	2,204	31.103
Government royalty – based on sales of principal and secondary minerals[1]	%	%	5	8
Refining charge	US$/lb	US$/oz	0.079	5
Smelting	US$/dmt		79	
Shipping water content	%		9	
Shipping (including port cost)	US$/wmt	US$/wmt	46.3	
Average LOM concentrate grade	%	g/t	28	17

Table 1.6 : Alpala Economic Criteria				
Parameter	**Units**		**Values**	
	(Cu)	**(Au)**	**(Cu)**	**(Au)**
Metallurgical recovery	%	%	85	70
NSR/grade unit	US$/%	US$/g/t	53.4	35.1

Notes:
1. Calculated on gross income, less refining and transport costs.

1.14 Mineral Reserve Statement

The Mineral Reserve Estimate for the Alpala Underground Porphyry Copper-Gold-Silver Deposit, Cascabel Property, with an effective date of 31 March 2022 has been prepared by Mining Plus Pty Ltd (Mining Plus). Mining Plus employee, Aaron Spong, is the Qualified Person responsible for the Reserve Estimate.

The Reserve estimation process followed the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) "Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines" (CIM, 2019). The Mineral Reserve Estimate is stated in accordance with the CIM Definition Standards (CIM, 2014) and Canadian National instrument 43-101 (NI 43-101).

The Reserve has been estimated for a block caving method and takes into account the effect of mixing of indicated material with dilution from low grade or barren material originating from within the caved zone and the overlying cave backs. As stated above only Measured and Indicated categories have been considered for the reserve, with Inferred categories considered as waste and grades set to zero

Table 1.7 : Alpala Probable Reserves							
Classification	**Tonnes**	**Copper Grade (%)**	**Gold Grade (g/t)**	**Silver Grade (g/t)**	**Copper Metal (kt)**	**Gold Metal (koz)**	**Silver Metal (Moz)**
Probable	558	0.58	0.52	1.65	3.26	9.37	30
Total	**558**	**0.58**	**0.52**	**1.65**	**3.26**	**9.37**	**30**

Notes:
1. Effective date of the Mineral Reserves is 31 March 2022.
2. Only Measured and Indicated Mineral Resources were converted to Probable Mineral Reserves.
3. Mineral Reserve reported above are not additive to the Mineral Resource and are quoted on a 100% project basis.
4. The Mineral Reserve is based on the March 2020 Mineral Resource.
5. Totals may not match due to rounding.
6. The Mineral Reserve Estimate has been reported to conform with the CIM Definition Standards on Mineral Resources and Mineral Reserves (CIM, 2014).
7. The Mineral Reserve Estimate for Alpala was independently verified by Aaron Spong FAusIMM CP (Min), a full-time employee of Mining Plus, who takes responsibility for the Mineral Reserve Estimate.

The Mineral Reserve could be materially affected by the changes to the following factors, but not limited to mining, metallurgy, infrastructure and permitting:

- Commodity prices fluctuations
- Metallurgical recoveries
- Geotechnical analysis and assumptions

- Hydrological and Hydrogeological analysis and assumptions
- Cut-off and shut-off grade criteria
- Permitting and licensing, including environmental, social and governance
- Input assumptions into the mine design such as cave layouts and outlines
- Cost assumptions used to determine the Mineral Reserve
- Potential impact of seismic events to project facilities.

1.15 Mining Methods

The mine plan uses the block caving method which is considered to be the appropriate method due to the size, grade, ground conditions and depth of the Alpala deposit. High level studies have highlighted some areas of the deposit that may be mined using other bulk underground methods, such as sublevel caving, but that these are small and not material to the plan at this early stage of study.

The mine plan considered in this Pre-Feasibility study directly relates to the first 30 years of production. In this plan, the highest value material is targeted. Column heights are up to 700 m and a relatively even draw across each footprint ensures even cave propagation.

This approach is in line with SolGold's corporate strategy which is to maximise extraction of the Alpala deposit while still optimising the economics of the project. Targeting the high value material in the first phase ensures and optimises the project economics. Mining the lower value second phase later maximises extraction without compromising the economics of the project.

1.15.1 Geotechnical Considerations

Mining Plus used empirical and analytical analyses of this data to determine the geotechnical characteristics of various lithological and alteration domains within the deposit. Where information was unavailable, Mining Plus used industry accepted practices and assumptions to complete the study.

The data used for the Alpala geotechnical study was provided by SolGold.

In total, 62 structures were interpreted with one principal, 52 major, and 9 intermediate structures categorised. The faults were imported and modelled into the geotechnical studies on caveability and extraction level stability.

The geotechnical properties for the Alpala deposit were determined from the intact lab strengths, investigation of the core logging database, rock mass statistics, and empirical databases where no information was available. The upper (above 650 MASL) and lower databases (below 650 MASL) were separated to account for the differences noted in rock masses. For each database, the low, middle, and high cases were determined to reflect the variation within the rock strengths and rock masses.

The geotechnical properties informed to:

- Caveability and critical span/hydraulic radius (HR) required for caving
- Stability of long-term excavations
- Primary and secondary cave fragmentation

- Stand-offs required for underground infrastructure
- Surface subsidence zone.

1.15.2 Hydrogeological Considerations

Based on the compilation and analyses of all available hydrogeologic data and the mine plans for underground infrastructure (including ramps, drifts, and shafts) and block caving, Itasca developed a conceptual hydrogeologic model and the three-dimensional numerical groundwater flow model. The numerical groundwater flow model was calibrated to the groundwater levels measured during hydraulic testing performed in boreholes drilled across the Project.

The calibrated groundwater flow model was used to predict the seepage to the underground workings and the effects of mining on baseflow and groundwater levels during a 38-year underground mining period (8 years for underground infrastructure development prior to commencing block caving and 30 years of block caving operations).

During development when there are only small tunnel voids available, dewatering needs to be able to handle ~30 L/s. When production starts and the cave begins propagating, pumping needs to be increased to 120 L/s. The last 25 years of production have the greatest groundwater inflow as it is assumed that the cave propagation has broken through to surface, as such, pumping needs to be able to handle ~185 L/s.

These pumping requirements assume that surface water (rainwater run off) is recharging groundwater aquifers and is not directly contributing to the mine's water inflow.

Hydrological conditions are not considered to materially affect mining development rates or pumping costs relative to other block caving operations.

1.15.3 Mine Design

Mining parameters used in the design are listed in Table 1.8 table below.

Table 1.8 : Pre-Feasibility design parameters

Parameter	Value
Maximum height of draw	700 m
Minimum column height	200 m
Height of draw variation	80 m
Decline/Conveyor Drive max gradient	1 in 6
Average decline development rate (Drill & Blast)	220 m/mo
Draw column draw rate (1st 160m on 300L footprint)	60 m/y
Draw column draw rate (all other draw columns)	70 m/y
Production Rate	25 Mt/y

The main lateral mine access needs to be suitable for personnel and material movement and also accommodate the Material Handling System (MHS). A secondary function of the development will be to provide ventilation flow.

The lateral access design for Cascabel includes twin declines running parallel to each other developed from a boxcut at the surface. The declines are 50 m from centreline to centreline and based on the 5.5 mW x 5.8 mH profile (main access decline) and 6.5 mW x 6.0 mH (conveyor decline) with a pillar of 44 m/46 m between them. The 6.5 m span in the Conveyor Decline will allow for the installation, and ongoing servicing of the materials handling conveyor system in the conveyor decline. A separation of 44 m will be kept between the inside walls of the two declines. Both declines have a nominal gradient of 15.6% (1:-6.4), which is suitable for both the conveyor and the running of haul trucks.

The cave footprint is focussed on the 300 mRL with the layout consisting of an undercut, extraction and haulage level. All levels have ventilation drives which connect to internal shafts forming part of the primary ventilation network.

The extraction level has an "El Teniente" layout with crosscuts (or Extraction Drives) spaced 32 m centre to centre. Drawpoints are spaced at 20 m. There are tip points for the loader to transfer ore from the cave to passes which report to the haulage level below. Turning bays are designed at the start of each crosscut for efficient movement of the loaders.

1.15.4 Mine Operation

The extraction level has a Haulage Level running underneath it which will be utilised for material handling during the production Phase of each level.

The haul drives allow trucks to transfer the ore from ore passes to the level crushers where the crushed ore will be transferred to the main decline conveyor via transfer conveyors.

These drives also form part of the ventilation circuit for the level development. The drives have a profile of 5.5 mW x 5.8 mH and currently are designed without gradient.

1.15.5 Mine Ventilation

In addition to the initial access shaft and the access and conveyor declines, the design includes 7 shafts for ventilation (5 exhaust shafts and 2 intake shafts). Each of these shafts is 5.0 m in diameter to suit the ventilation requirements for the steady-state operating mine. The early access shaft will also become a source of fresh air intake once all early access requirements are completed, and the decline development reaches the footprint.

All 7 shafts are mined in two set of legs; first legs are established to the 910L underground level 910 (910 FAD drive and 910 RAD drive), and second legs are established to 255L (255 FAD drive and 255 RAD drive).

This discrepancy in length is due to the undulating surface topography.

Ventilation drives connect to internal shafts forming part of the primary ventilation.

The drives which handle air have a profile of 5.5 mW x 6.1 mH and are currently designed without gradient. It is envisaged that appropriate gradients will be applied at the detailed design stage to enable adequate drainage.

1.15.6 Mine Production

The mine scheduling was undertaken with a base case mine production rate of 25 Mt/y. The 25 Mt/y base case was in-line with the material handling system assumptions provided by Wood. Further analysis is recommended to best optimise the production rate.

Outputs from the PCBC Footprint Finder tool and a set target of 25 Mt/y were used to create the column design.

Scheduling of the mine plan was completed in Deswik mine planning software. Rates applied in this schedule are shown in the table below.

Table 1.9 : Schedule Rates

Activity	General Rates	Rates Applied for Ramp Up
Decline Development	180 m/mo	220 m/mo
Lateral Development	100 m/mo	220 m/mo
Vertical Development (Small Ø)	60 m/mo	-
Ventilation Shaft	55 m/mo	-
Drawbell	7/mo	-
Undercut	5,000 m^2/mo	-

In order to meet production requirements, high speed development rates will be required for the initial access development. Critical advance rates to the 300 L will be 220 m per month. To achieve the required critical advance rates, development equipment will need to be over resourced, to maintain 100% face utilisation of all active and critical path headings.

1.15.7 Underground Infrastructure

As directed by Wood, a single stream incline conveyor materials handling system has been selected for this study to enable the production profile to be met. This system requires material to be delivered from drawpoints by diesel loaders to battery electric truck haulage loops, via ore passes and automated loading chutes. The truck haulage loop delivers material to the crushing system, which discharges to the incline conveyor via series of transfer conveyors and surge bins.

1.15.8 Mining Equipment

The mine plan assumes that development and production activities will be undertaken with a rubber tyred, diesel-powered and battery electric mechanised mining fleet. It is proposed that the production haulage fleet consist of Battery Electric truck from reputable suppliers, such as Sandvik. The mine layout, ventilation requirements and cost estimates have been based on this assumption. The mining equipment numbers have been obtained using first principals and then benchmarked against other block cave operations.

1.16 Recovery Methods

The Cascabel Project Alpala underground resource contains copper, predominantly as chalcopyrite, with some bornite. Gold is not always associate with the pyrite minerals and is present predominantly as gold contained in sulphides (refractory), with some fine free gold and gold contained in other forms (e.g. silicates). Silver is more generally associated with the pyrite minerals.

A conventional comminution and flotation process was selected to maximise the recovery of copper and as much gold as may be recovered to a concentrate. A pyrite flotation and carbon in pulp (CIP) process was added to maximise gold and silver recovery with the production of doré from a pyrite concentrate produced from the cleaner scavenger tailings stream.

Ore from the underground mine will be crushed underground in two primary gyratory crushers. The crushed ore is conveyed to a screening plant, with the oversize directed to secondary cone crushers. The secondary crushed ore is stockpiled and reclaimed to a screening plant, ahead of tertiary high pressure grinding rolls (HPGR) crushers.

The crushed ore is then directed to the ball milling circuit, where the crushed ore is ground and cyclone to P_{80} 125-150 µm. The cyclone overflow is directed to a rougher flotation circuit, with the rougher concentrate then ground to P_{80} 15-25 µm and processed through a three-stage flotation circuit.

Cleaner concentrate is thickened and pumped to the port, where it is further thickened and filtered to meet marine transport requirements.

Cleaner scavenger tailings are directed to the gold recovery circuit where a pyrite flotation circuit recovers pyrite, gold and silver to concentrate, which is subsequently thickened and directed to the CIP plant. Gold and silver in pyrite concentrate are recovered to doré.

Rougher and pyrite tailings are thickened and pumped separately to the tailings storage facility. Water from an on-site water dam will make up water requirements to the process.

Online monitoring of ore quality to the process plant will enable the process plant to optimise reagent additions and maximise recovery through the flotation plant.

As the underground mine ramps up over a period of years, the process plant has been configured as two modules, with the second module online 2 years after the first module commences operation.

Concentrate production in the first 5 years is estimated to range 92 to 795 kt/y as mine production increases. Over the initial project life concentrate production is estimated to average 422 kt/y.

Doré production in in the first 5 years is estimated to range 8 to 70 koz Au/y and 19-124 koz Ag/y as mine production increases. Over the initial project life doré production is estimated to average 33 koz Au/y and 88 koz Ag/y.

1.17 Project Infrastructure

1.17.1 Roads

Primary access to the Cascabel Project process plant and mine will be via a new section of road starting from the E10 highway (two lane sealed road) that runs along the Rio Mira River valley. The project site is within mountainous terrain, ranging from 40% to 80% slope.

1.17.2 Waste Management Facilities

The project will use modular sewage plants using a bio-oxidation process.

Solid waste materials will be stored on site before being transported off-site for disposal be a third party contractor. Solid wastes will be classified as either:

- Recyclable – paper, glass, metal, plastics
- General waste – putriable or non-recyclable waste suitable for landfill
- Contaminated – soils and materials including used spares such as oil filters.

Liquid wastes consist primarily of used or contaminated oils, fuels or lubricants derived from maintenance activities. These will be stored on site in suitable sealed containers and stored in bunded or enclosed areas prior to removal from site by an authorised contractor for disposal.

1.17.3 Tailings Storage Facility (TSF)

Separate handling and disposal of rougher and cleaner tailings will occur at the Coastal Plains TSF. Water for process demands will be sourced from the Parambas water storage facility throughout the life of operations.

The key design objectives for the Tailings Management System are summarised as follows:

- Eliminate, manage or control environmental, health and safety risks with a zero-harm aspiration
- Design of the tailings management system to meet or exceed the requirements of Ecuadorian and international tailings design guidelines, standards and regulations
- Permanent, safe and secure containment of all solid waste materials in facilities designed, constructed and operated engineered to international best practice
- Maximise tailings densities using effective tailings deposition strategies
- Minimise the risk of oxidation of potentially acid generating tailings by minimising the exposure to atmospheric oxygen
- Minimise the water retained in the tailings facilities, when possible, to only that required for operational requirements
- Design for and manage seepage to acceptable levels
- Design which can be constructed and operated in an efficient manner
- Allow for effective rehabilitation at cessation of use of the facilities in line with the closure objective.

A technology study was conducted to assess the various tailings technology available to the project. Filtered and paste technology were ruled out as they have not been applied to throughputs commensurate with the design throughput at the Cascabel Project and are considered and untested technology for these throughputs. Unthickened and deep-sea disposal were ruled out as they were considered to not be preferred based on environmental and sustainability goals of SolGold. Thickened tailings was the selected technology although the potential to use cyclone tailings as a source of a portion of the construction material at Coastal Plains TSF should be retained as an option in future studies, albeit this technology and construction method will be extremely challenging in the climate experience at the site.

At closure, the majority of the tailings beach will be covered with rewon topsoil and borrow material and revegetated with the pond retained to maintain saturation of the cleaner tailings post closure.

1.17.4 Water Management

1.17.4.1 Water Balance Modelling

A site wide water balance model was developed for each of the production cases assessed as part of the Pre-Feasibility. The model was used to size the TSF embankment stages and to determine the amount of water which would require discharge as well as assessing the availability of water for processing operations and the required capacity of the Parambas water storage facility. At Pre-Feasibility stage this water balance has been run as a deterministic analysis to assess dry and wet conditions with a recurrence of 1 in 100 year ARI as well as average conditions. The key finding of the water balance model were as follows:

- The Coastal Plains Cleaner TSF required discharge up to 1.5 Mm^3 per month until the Coastal Plains Main Facility is fully operational and then will discharge via the spillway to the Coastal Plains Main Facility
- The Coastal Plains Main Facility requires discharge up to 8 Mm^3 per month whilst operating
- Parambas water storage facility has been sized to minimise the risk of water shortfalls during operation. The resulting volume was a capacity of 7 Mm^3.

1.17.5 Parambas Water Storage Facility

The Parambas embankment is located in a steep valley orientated approximately south–north draining into Mira River. The embankment crest elevation will be approximately 60 m below the processing plant elevation. The Parambas facility has been designed at the Pre-Feasibility level as a robust embankment which will have flexibility to accommodate a range of construction material qualities and will allow for downstream raising of the facility is additional capacity is required at a later stage of project development. The Parambas embankment will have an embankment length of 639 m. The crest height to the downstream toe will be 125 m and 65 m to the upstream toe (a centreline height of 85 m).

The Parambas embankment will remain in place after site closure. The facility will be allowed to fill and discharge from a modified spillway lowering the max pond level. This will ensure the final max pond level is below embankment in the case of PMF and seismic event.

1.17.6 On-Site Infrastructure

On-site infrastructure will include:

- Administration buildings – offices, security and medical facilities
- Mine infrastructure – offices, control room, LV and HV workshop and wash bays, tyre bay, batch plant, explosives
- Process Plant – offices, control room, laboratory, workshops, warehouse
- Port – offices, control room, workshops, warehouse
- Coastal Plains TSF – offices, control room, laboratory, workshops, warehouse.

Each area of the mine site will be provided with an appropriate fire protection system. Fire protection systems have been included in the mine infrastructure area, process plant, port and administration areas. Each individual fire system will be for the exclusive use for that area and is not intended to have connections for use by other services, neither temporary nor permanent, or for uses not directly related to firefighting.

Laydown areas for construction and operations have been included for all areas of the Cascabel Project: mine, process plant, port and Coastal Plains TSF areas. These areas will be securely fenced and monitored.

1.17.7 Off-Site Infrastructure

A construction camp will be established for works to commence on the construction of the underground decline. The initial camp will be a 1,000-man camp. Once construction of the process plant commences the camp will be increased in size to 3,000-man camp.

Facilities within the camp will include dormitories, health care facility, messing areas and recreation areas. The sizing and services of this camp will be reviewed once the project execution strategy is further defined in the Feasibility study.

Facilities to accommodate administration, workshop and warehouse facilities will be located at a centre for services which are not required to be located on-site at the Port, Coastal Plains TSF or Cascabel Concession areas.

The Port of Esmeraldas is proposed for the concentrate filtration and load out.

1.17.8 Power and Electrical

Approximately 96% of Ecuador's power is hydroelectric and grid connected power would come from public hydroelectric systems.

The power to the site will be supplied by the expansion of the Pimampiro 230 kV substation. A dual circuit 230 kV transmission line from Pimampiro 230 kV substation will supply power to the Cascabel Project substation. The transmission line will be approximately 60 km long.

The Cascabel Project will utilise the following voltages:

- 230 kV feed to the main substations at the Alpala substation
- 23 kV for reticulation in the process areas, with transformers located in the process plant
- 23 kV for reticulation to the MIA, underground mine, explosive store and ventilation surface facilities
- 13.8 kV for emergency generation. This can also be connected to the local area distribution network
- 4.16 kV for medium voltage motors
- 480 V for process equipment and motors
- 220/480 V for general light and power.

1.17.9 Communications

The communications system for the Project will consist of a fibre-optic network infrastructure, telephony system, radio communications, mobile telephony, closed circuit television (CCTV), and satellite communications. The data management system will be connected to the communications systems.

1.18 Environmental, Permitting and Social Considerations

SolGold has made considerable efforts to undertake environmental studies and community engagement in order to facilitate the advancement of the project. In anticipation of entering the permitting process with an

Environmental and Social Impact Assessment (ESIA) in 2022, several environmental baseline studies have been initiated, including:

- Meteorology
- Surface hydrology
- Water quality
- Geochemical assessment
- Air quality
- Noise
- Flora and fauna.

In the current baseline condition, the project area is largely agrarian and/or in a natural state, and generally does not present exceedances of national or international limits for monitored parameters. The exception to this includes some high concentrations of select metals in surface water samples, associate with the mineralised zone and is considered natural.

A total of 8 vegetation species, 6 mammal species, 11 bird species, and 29 amphibian and reptile species are listed as Vulnerable or Endangered. Additionally, 1 species of tree, 2 species of frog, and 1 species of fish have been identified within the concession and are listed as Critically Endangered. It will be necessary to incorporate habitat and conservation needs of these species to mitigation planning for the Project.

Ecuadorian law requires that an Environmental and Social Impact Assessment (ESIA) be conducted prior to authorisation of construction and operations. In order to comply with the EIA submission necessary to obtain mining permits, SolGold will prepare and submit an EIA with the following minimum components:

- Legal Framework
- Detailed description of the project, including an alternatives analysis
- Determination of the Area of Influence for all planned project infrastructure on the environmental and social landscape
- Characterisation of the physical and biological baseline condition
- Characterisation of the socio-economic baseline condition
- Characterisation of the archaeological baseline condition
- Identification, prediction, and evaluation of environmental impacts
- Risk assessment
- Forest inventory and economic evaluation
- Citizen participation process
- Environmental management plan, which includes:
  - Mitigation plan
  - Waste management plan
  - Communication, training, and environmental education plan.

In addition to Ecuadorian requirements, SolGold will ensure that the ESIA is compliant with appropriate international standards. At minimum, these would include the Equator Principles, and the International Finance Corporation (IFC) Performance Standards and Environmental, Health, and Safety Guidelines.

Additionally, the Mining Law of Ecuador specifies that a Closure Plan is required as part of the ESIA. The Closure Plan will include an estimated closure cost, upon which a financial guarantee or insurance policy in favour of the government will be required, which must remain in force until the final closure of operations. Preliminary closure costs were developed and are reported in Section 21. For the Cascabel project costs are estimated to be US$ 78 M.

1.18.1 Community

The mining concession is principally located within the Lita and La Carolina parishes, within the Ibarra Canton, Imbabura Province.

According to the 2010 census conducted by the National Institute of Statistics and Census (INEC, or Instituto Nacional de Estadísticas y Censos), the Lita parish has of a population of 3,349, the La Carolina parish has a population of 2,875, and the Jijón y Caamaño parish has 2,017 inhabitants.

The primary access to the area is by Ecuador Highway 10 (E10, Transversal Fronteriza), which runs from Salinas to San Lorenzo. At Salinas, E10 joins with all other major highway systems in the country connecting to major urban centres such as Ibarra and Quito to the south.

Each community in this area is relatively young, many having been founded in the 1900s. They are populated primarily with descendants of workers brought in the 1950s to construct the now defunct Ibarra – San Lorenzo railroad. Workers settled in the areas work camps, which now form local communities. The principal economic activity of the area is farming of naranjilla, a fruit-bearing shrub, and cabuya, an agave plant grown for production of fibres used to make twine, as well as bananas and corn.

The Coastal Plains TSF is located in a remote area with minimal existing infrastructure. Residents are largely subsistence farmers, with some reliance on artisanal mining. There are no towns or villages within the Coastal Plains TSF area.

There are no identified indigenous individuals or communities within the concession or the immediate surroundings.

An archaeological study identified sites pertaining to the pre-Incan Caranqui culture in the project area. Zones of archaeological sensitivity were outlined and assessed as high, medium, low, or null for the entire concession. Within this framework the company carries out exploration, monitoring and, if necessary, rescue with qualified archaeologists.

SolGold operates a robust community engagement program within the concession area, with a permanent presence at the project, and a meeting room available to the public and that is used as a base for outreach activities. Interviews with representatives of organisations, local governments, community leaders and members of the public in the local communities are conducted often to continually educate communities on the project activities. Open houses and community presentations are conducted regularly, and community members are invited and trained to participate with ongoing environmental monitoring.

Outreach activities include implementation of a number of social programs, including preferential employment and training for local residents. Over 400 Ecuadorian nationals are employed at the project, representing approximately 97% of the total workforce. Financial support of school, health care and social events is provided, with the focus being training, capacity building, and community strengthening.

SolGold constructed an agro-forestry nursery in 2013, which is managed by qualified agrologists. The nursery produces approximately 30,000 plants of native commercial and horticultural species, which are dispersed to the community along with professional advice to farmers, education on sustainable agriculture, and assistance with planting. Community members are also employed to work at the nursery.

Other recent initiatives include:

- Enhancement of chicken farming for communities to increase food quality and security
- Food services contracts for SolGold camps and workers
- Improvements to health services, especially for children, pregnant women, elderly and the disabled
- Training for trades such as construction, mechanical, welding, etc.
- Post-harvest training and mechanisation of coffee production and sales
- Pre-school education programming for young children
- Small business loan and mentoring program
- Transportation services of goods for sale.

These activities build on long-standing involvement in the community and successful programs developed in previous years.

1.19 Markets and Contracts

Wood Mackenzie was engaged to prepare an independent marketing report for the Cascabel Project concentrate and doré products.

Metallurgical testwork of the Cascabel Project concentrate indicates that it is a clean, precious metal enriched concentrate containing very low levels of deleterious elements. It can therefore be expected to be in strong demand globally.

Generally the Cascabel Project concentrate payability is approximated based on the market location. In summary, based on grade in concentrates metal is payable as follows:

- Cu -1%, 96.5% payable
- Au -1 g/t, 90-98% payable
- Ag -30 g/t, 90-97% payable.

Long term copper concentrate treatment and refining costs (TCRC) were analysed, and multiple scenarios investigated. In view of these scenarios, and in consideration of directional feedback provided to SolGold from market, a long-term TCRC modelling price of US$79/t and 7.9c/lb (real 2021$) is supported.

Precious metal sold as doré will receive a payability commensurate to the purity of the doré. For doré at 90% or above gold content, payability is typically 99.93 – 99.95% of the gold value. If the doré content is less, the

payability would typically decrease 0.01% for a gold content range of 80-90%, and a further 0.01% to 70-80% gold.

For silver doré payability is typically 99%.

In consideration of the specific attributes of the Cascabel Project including size, geology, and a planned life of mine, and in following guidance outlined by the Canadian Institute of Mining, Metallurgy and Petroleum, an appropriate long-term copper, gold and silver price of US$3.60/lb (real 2021$) for copper, US$1,700/oz (real 2021$) gold from 2030 and US$19.9/oz (real 2021$) silver are supported as reasonable commodity prices for Cascabel Project reserve modelling.

No offtake agreements have been entered into at the time of this report.

1.20 Capital Cost Estimates

The capital cost estimate meets the requirements for a Pre-Feasibility study, consistent with AACE® International cost estimating guidelines for a Class 4 estimate. The estimate accuracy range of ±25% is defined by the level of project definition, the time available to prepare the estimate and the amount of project cost data available.

The capital cost estimate is based on Q1 2022 assumptions.

The estimate has been compiled by Wood with inputs from consultants for their responsible scope of work:

- Mining Plus: Mine production, mine footprint and decline development, ventilation, dewatering & underground infrastructure
- Knight Piésold: Tailings storage and closure costs
- Wood: Process plant, port facilities, surface infrastructure, underground crushing & materials handling system, tailings pipelines, power supply and distribution, services and utilities and concentrate pipeline
- SolGold/All: Indirect costs, EPCM, owners' costs and contingency.

The mining costs are based on the assumption that all construction phase works to access the mine and set up for a caving operation are completed by a mining contractor.

The estimate methodology is major equipment pricing and semi detailed measurement of quantities. These are estimated from drawings, sketches or from similar projects/studies previously undertaken. Equipment pricing has been sourced from vendor budget prices and bulk material and labour rates are budgetary. Provisions are allowed if there are areas where further definition was not possible.

Quantities for the tailings storage facility have been measured from the 3D models generated for the embankments, spillways, diversion channels and roads. No allowance has been included for growth of the quantities (escalation in volume above the design volume) as the design is considered to be slightly conservative and some optimisation of the design is expected in the next phase of study.

Initial capital costs are estimated to be US$ 2,746 M as shown in the table below.

Table 1.10 : Initial Capital Cost Summary	
Area	**Initial Capital Cost US$ M**
Mine	900
Process plant	465
Tailings storage facility	309
Port facility	39
Surface infrastructure	175
Indirect costs	467
Contingency	391
Total	**2,746**

Expansion, sustaining capital and closure costs include the second process plant module, bringing the process plant capacity to 25 Mt/y, continued tailings storage facility development, equipment replacement and closure costs.

Expansion, sustaining capital and closure costs are estimated to be US$2,136 M. The total capital cost is therefore US$4,882 M.

1.21 Operating Cost Estimates

The operating cost estimate has been prepared in accordance with an AACE® International Class 4 estimate. The operating cost estimate for the Pre-Feasibility has been prepared to a level of accuracy of ±25%.

The estimate has been compiled by Wood with inputs from consultants for their responsible scope of work:

- General and administration: SolGold
- Mining Plus: Mine operations
- Wood: Production plant, tailings storage facility infrastructure (pumping and pipeline transport), surface infrastructure and port facility
- Knight Piésold: All costs included in capital cost estimate.

The mine operating cost model provides a first principles estimate, in US$, for the costs associated with underground mining of the Alpala deposit. The cost model has been constructed based on mining physicals.

Process plant and infrastructure operating costs have been developed on an annual basis for the life of the project based on the average throughput and feed rates for the project.

Core physical data used in the estimate includes the ore feed rate based on the mine and process plant production plan, SMC and Bond comminution data and the metallurgical response of the ore. The metallurgical response of the ore determined the concentrate production and grade and tailings production rates along with reagent dosage rates.

Infrastructure costs such as power supply and network charges have been excluded from this estimate.

Other cost estimate information was produced from a variety of sources from within the project, including calculations performed by the Wood engineering team, test work data, benchmarked data and internal Wood databases.

Infrastructure costs such as power supply and network charges have been excluded from this estimate.

Table 1.11 : Operating Cost Summary

Area	LOM Total US$ M	Unit Cost US$/t mill feed	Unit Cost US$/t Cu produced
General and administration	884	1.58	311
Mine	2,083	3.73	734
Process plant	3,564	6.38	1,256
Tailings storage facility	74	0.13	26
Port facility	163	0.29	57
Surface infrastructure	5	0.01	2
Total	**6,771**	**12.12**	**2,386**

1.22 Economic Analysis

The results of the economic analysis represent forward-looking information that are subject to a number of known and unknown risks, uncertainties, and other factors that may cause actual results to differ materially from those presented here. Forward-looking information includes Mineral Resource and Mineral Reserve estimates; commodity prices; smelter terms; the proposed mine production plan; projected recovery rates; use of a process method, infrastructure construction costs and schedule; and assumptions that Project environmental approval and permitting will be forthcoming from Local, State and Federal authorities.

Financial analysis of the Cascabel Project was carried out using a discounted cash flow (DCF) approach. This method of valuation requires projecting yearly cash inflows, or revenues, and subtracting yearly cash outflows such as operating costs, capital costs, and taxes. The resulting net annual cash flows are discounted back to the date of valuation and totalled to determine the net present value (NPV) of the project at selected discount rates.

The internal rate of return (IRR) is expressed as the discount rate that yields a zero NPV. Annual net cash flow projections have been discounted to the project valuation date using 8% for the base case. It should be noted that, for the sake of discounting, cash flows are assumed to occur end of year and are discounted to the start of project Year -5, the start of construction.

The payback period is the time calculated from the start of production until all initial capital expenditures have been recovered.

This economic analysis includes sensitivities to variation in operating costs, capital costs, grade, and metal price. Note that grade and metal price are multiplicative; consequently, the two sensitivity lines are coincidental with one overlying the other.

All pricing is stated in constant (Real) Q1 2022 United States dollars (US$). An amount of US$379 M of historical costs is considered in the financial model.

The after-tax NPV at an 8% discount rate over the estimated life of mine is US$2,907 M. The after-tax IRR is 19.3%. The after-tax payback of the initial capital investment is estimated to occur 4.7 years after the start of production. A summary of the financial analysis is presented in Table 1.12, with the base case discount rate highlighted below (8%).

Table 1.12 : Financial Results

Before-tax	**Units**	**Value**
Cash flow	US$M	19,121
NPV @ 5%	US$M	8,434
NPV @ 8%	**US$M**	**5,241**
NPV @ 10%	US$M	3,811
Payback period	years	4.2
IRR before-tax	%	25.3
After-tax		
Cash flow	US$M	12,139
NPV @ 5%	US$M	5,007
NPV @ 8%	**US$M**	**2,907**
NPV @ 10%	US$M	1,976
Payback period	years	4.7
IRR after-tax	%	19.3

The life of mine all in sustaining cost (AISC) is US$0.06/lb Cu payable (Table 1.13).

Table 1.13 : Total Cash Cost Summary

Description	**US$/lb Cu payable**
Operating costs on-site	
G&A	0.15
Mine	0.35
Process plant	0.59
TSF processing	0.01
Port	0.03
Surface infrastructure	0.00
Total operating costs on-site	**1.13**
Operating costs off-site	
Concentrate treatment and refining charges	0.34
Royalty	0.24
Local Tax	0.01
Total operating costs off-site	**0.59**
By-product credits	
Au premium	(1.82)
Ag premium	(0.04)

Table 1.13 : Total Cash Cost Summary	
Description	**US$/lb Cu payable**
Doré premium	(0.25)
Total by-product credits	(2.12)
Net direct cash cost (TCC)	**(0.40)**
Capital & Closure costs	
Sustaining costs	0.46
Capital Cost	0.35
Postproduction Costs	0.01
Total sustaining, royalties and closure costs	0.81
All-in sustaining cost (AISC)	**0.06**
All-in cost (AIC)	**0.41**

1.23 Sensitivity Analysis

A sensitivity analysis was completed over the ranges of ±30% for capital costs, operating costs, grade, and metal prices. Note that sensitivity to grade and metal price are coincidental and follow the same general trend. The after-tax NPV sensitivity results are shown in Figure 1.2.

The Project's NPV@8% is most sensitive to changes in copper price and grade followed by changes in gold price and grade. The Project's NPV@8% is least sensitive to changes in silver price and grade.

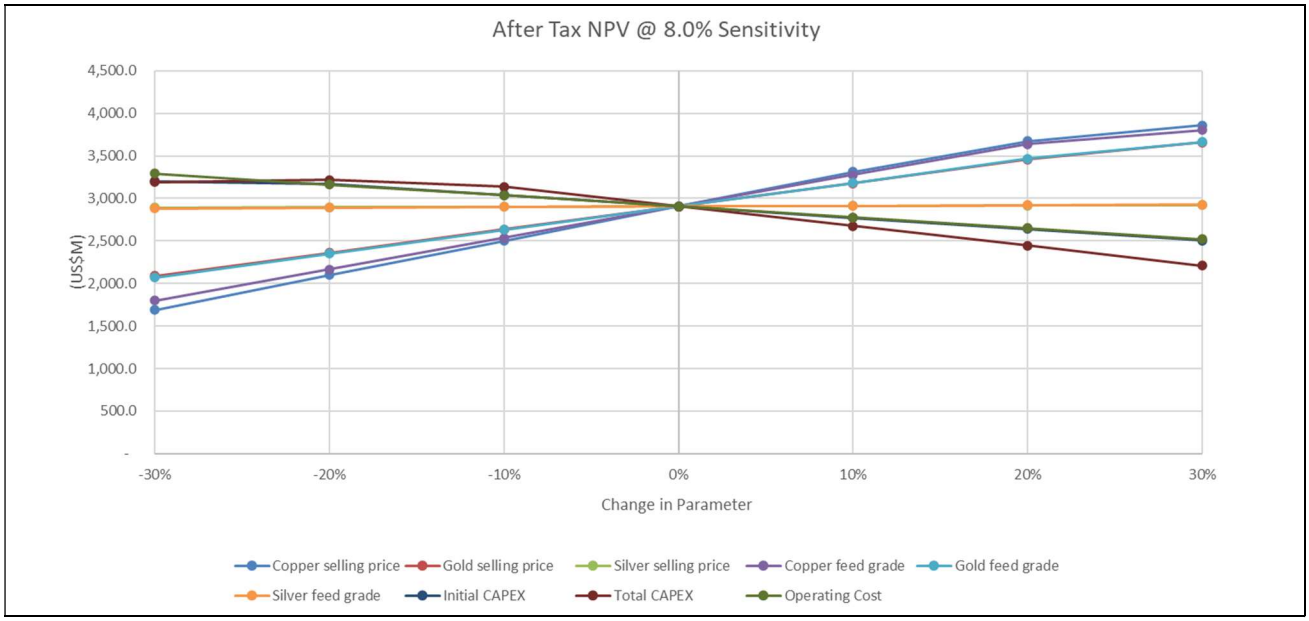


Figure 1.2 : After-tax NPV_8 Sensitivity Analysis

1.24 Risks and Opportunities

The risk assessment process was used to identify key design, operational, safety, financial and environmental risks of the project, and establish potential control measures to mitigate the identified risks to acceptable levels.

A series of internal risk assessment workshops were initially held with discipline-based groups to identify risks specific to the area being covered. Workshops were held for environmental & community, mine geotechnical and hydrogeological works, mining, process plant and infrastructure and tailings dams.

Preliminary risk registers were generated in each workshop and then consolidated into a single preliminary risk register.

The social aspects for the Cascabel Project were identified as a high priority risk, in additional to construction and operational risks associated with the mine and seismic events.

1.25 Interpretation and Conclusions

Based on the assumptions discussed in this Report, the Cascabel Project has the potential to return a positive economic outcome. The decision to continue study activities and initiate construction activities rests with SolGold management and will require permits by the Government of Ecuador.

1.26 Recommendations

Three key technical work fronts have been proposed for the Cascabel project:

1. Additional resource investigations
2. Early mine access to conduct technical investigations
3. Continued technical works and completion of a Feasibility study.

Continued activities associated with securing surface rights for the Cascabel Project and advancement of the ESIA and mine exploitation contract will also continue within Ecuador.

2 Introduction

Wood plc has compiled this Technical Report (the Report) on "Cascabel Project, Imbabura Province, Ecuador, NI 43-101 Technical Report on Pre-Feasibility Study" (Cascabel Project) on behalf of SolGold Plc (SolGold) and Cornerstone Capital Resources Inc (Cornerstone).

SolGold, through an unencumbered 85% interest in ENSA, holds 100% of the 50 km^2 Cascabel concession in Northern Ecuador. The project base is located at Rocafuerte within the concession in northern Ecuador, an approximately 3 hour drive on sealed highway north of Quito, close to water sources, power supply and in relative proximity to port facilities in the Pacific Ocean.

This report discusses the results of the Cascabel Project.

2.1 Terms of Reference

This Report supports SolGold disclosures in the new release dated 20 April 2022, entitled "Pre-Feasibility supports long-life, high-value Cascabel Project" which has an effective date 31 March 2022

All measurement units used in this Report are metric unless otherwise noted, and currency is expressed in United States (US$) dollars as identified in the text. All cost estimates are reported in US$.

The Alpala and Tandayama-America deposits, the subject this NI 43-101 Technical Report, are wholly contained within the Cascabel Property, which is wholly owned by Exploraciones Novomining S.A. (ENSA). SolGold holds an 85% legal and beneficial interest in ENSA.

This report has been produced in accordance with the Standards of Disclosure for Mineral Projects as contained in NI 43-101 and accompanying policies and documents. NI 43-101 utilises the definitions and categories of Mineral Resources and Mineral Reserves as set out in the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves (May, 2014).

A draft of this report was provided to SolGold for checking for factual accuracy.

2.2 Qualified Persons

The Qualified Persons for the "Cascabel Project, Imbabura Province, Ecuador, NI 43-101 Technical Report on Pre-Feasibility Study", that has an effective date of 31 March 2022, are detailed in the table below.

Table 2.1 : Qualified Persons

Category	Name	Company
Mineral Resource Estimate and data verification – Alpala	Cecilia Artica, BSc MSc RMSME	(formerly) Mining Plus Pty Ltd
Mineral Resource Estimate – Tandayama-America	Andrew Fowler, Ph.D., MAusIMM, CP(Geo)	Mining Plus Pty Ltd
Data verification – Tandayama-America	Karl John Roa, B.Eng, PhD, EurGeol/IGI	NA
Mineral Reserve Estimate	Aaron Spong, BEng FAusIMM CP (Min)	Mining Plus Pty Ltd
Environment, Social, Tailings & Water	Tim Rowles, BSc MSc FAusIMM CP RPEQ	Knight Piésold Pty Ltd
Metallurgy	Peter Gron, BSc FAusIMM	Wood Australia Pty Ltd

Table 2.1 : Qualified Persons		
Category	**Name**	**Company**
Process Plant & Infrastructure (including Process Plant Capital and Operating Costs)	Steve Klose, BEng MSc FAusIMM	Wood Australia Pty Ltd
Economic Analysis	Kirk Hanson, MBA PE	Wood Australia Pty Ltd
Marketing	Christopher Heath, BSc Hons PhD FAusIMM	Wood Mackenzie

2.3 Personal Inspection of the Cascabel Property

Mrs Cecilia Artica undertook a personal inspection of the Cascabel Property from the 13-16 November 2018 in relation to Alpala Mineral Resource Estimate, where she visited drill sites, logging stations, sample preparation and storage facilities and interviewed key SolGold personnel. The inspection was conducted with the full support of SolGold and without restriction in any respects.

Dr Karl John Roa undertook a personal inspection of the Cascabel Property from the 18-20 of August 2021 in relation to Tandayama-America Mineral Resource Estimate, where he visited drill sites, logging stations, sample preparation and storage facilities and interviewed key SolGold personnel. The inspection was conducted with the full support of SolGold and without restriction in any respects.

Mr Aaron Spong visited the Cascabel site from 6-8 of February 2020. Mr Spong has been involved with the Alpala Project since October 2018 as Mining Lead for the various mining studies undertaken since this date. During the site visit, Mr Spong visited the core and logging facilities, the proposed portal location and the Alpala Exploration Camp. The visit also incorporated the Pre-Feasibility study kick-off meeting and communications with all members of the study team.

Mr Tim Rowles visited the Cascabel site from 6-8 February 2020. Mr Tim Rowles has been involved with the Cascabel Project since January 2020 as the Knight Piésold Project Manager for various engineering and environmental studies undertaken since this date. During the site visit, Mr Rowles visited the proposed plant site, Parambas dam site and various potential TSF locations and the Alpala Exploration Camp. The visit also incorporated the Pre-Feasibility study kick-off meeting and communications with all members of the study team.

Mr Steven Klose visited the Cascabel site from 6-8 February 2020. Mr Steven Klose has been involved with the Cascabel Project since January 2020 as the Wood Project Manager for the Cascabel Pre-Feasibility in 2020/2021 and as the Project Director for all further studies beyond this date. During the site visit, Mr Klose visited the proposed portal location, plant site, Parambas dam site, the proposed raw water pumping station and various potential TSF locations within the area as well as the Alpala Exploration Camp. The visit also incorporated the Pre-Feasibility study kick-off meeting and communications with all members of the study team.

2.4 Effective Date

There are a number of effective dates pertinent to the Report, as follows:

- Effective date of the Alpala Mineral Resource estimates: 18 March 2020
- Effective date of the Tandayama-America Mineral Resource estimate: 30 March 2022
- Effective date of the Mineral Reserve estimates: 31 March 2022

- Date of the economic analysis that supports Mineral Reserve estimation: 31 March 2022.

The overall Report effective date is taken to be 31 March 2022; and is based on the effective date of the Mineral Reserve estimate and economic analysis that supports the Mineral Reserves.

2.5 Information Sources and References

This Report is primarily based on the Pre-Feasibility study reports and optimisation studies undertaken during a period from February 2020 to March 2022, as listed in Section 27.

The following personnel contributed to the various aspects of the Report under the supervision of the QPs:

- Dr Paul Hughes, Rock Mechanics Consultant, Mining Plus Canada Consulting Ltd
- William Bennett, Principal Mining Consultant, Mining Plus Pty Ltd
- Ronald Lachenicht, Principal Geotechnical Engineer, Itasca Australia Pty Ltd
- Eric Swanson, Senior Mining Hydrogeologist, Itasca Denver Inc
- Graham Greenaway, Specialist Geotechnical Engineer, Knight Piésold Ltd
- Chris Brodie, Manager Environmental Services, Knight Piésold Ltd
- Richard Wilson, Chairman of Metals Wood Mackenzie.

3 Reliance on Other Experts

3.1 Legal Title

The Qualified Person has relied, in respect of legal aspects, upon the work of the Expert listed below. To the extent permitted under NI 43-101, the Qualified Person disclaims responsibility for the relevant section of the Report.

- Expert: Cesar Zumarraga, Licenced Lawyer, 17 May 2022
- Report, opinion or statement relied upon letter "SolGold Plc – Legal Title Opinion on ENSA's Mining Portfolio", containing information on mineral tenure and status, title issues, royalty obligations, etc.
- Extent of reliance: full reliance following a review by the Qualified Person
- Portion of Technical Report to which disclaimer applies: Section 4.

3.2 Taxation

The Qualified Person has relied, in respect of legal aspects, upon the work of the Expert listed below. To the extent permitted under NI 43-101, the Qualified Person disclaims responsibility for the relevant section of the Report.

- Expert: Perez, Bustamante and Ponce (PBP), 30 May 2022
- Report, opinion or statement relied upon: letter prepared by (PBP) "NI 43-101 Technical Report Prepared for SolGold Plc – Taxation Narrative" containing information on Ecuador tax structure, royalty obligations, etc.
- Extent of reliance: full reliance following a review by the Qualified Person
- Portion of Technical Report to which disclaimer applies: Section 22.

4 Property Description and Location

4.1 Summary

Exploraciones Novomining S.A. (ENSA) is the registered titleholder of the Cascabel concession which comprises the Property. The summary details of the Cascabel Property are as shown in the table below.

Table 4.1 : Property information

Area	Description
Name	Cascabel
Code	402288
Owner	ENSA
Surface	4979 ha (49.79 km^2)
Date Registered	7 May 2010
Term	25 years counted from the registration date of the title
Location	Lita and La Carolina parishes, Ibarra canton, Imbabura province

Cascabel was duly and validly granted to ENSA in accordance with the applicable laws of Ecuador, and ENSA holds the exclusive right to perform exploration and mining activities free of encumbrances or liens. The Cascabel Property is wholly owned by ENSA. SolGold holds an 85% legal and beneficial interest in ENSA.

The concession is registered in the mining register of Ibarra branch of the Mining Control and Regulation Agency. Such registration shows that the concession is valid and is not subject to any liens or encumbrances. The concession is not in an area protected under the National System of Protected Areas.

Having fulfilled the earn-in requirements, SolGold is a registered shareholder with an unencumbered legal and beneficial 85% interest in ENSA, which holds 100% of the Cascabel concession. The junior equity owner in ENSA is required to repay 15% of costs since SolGold's earn-in was completed, from 90% of its share of distribution of earnings or dividends from ENSA or the Cascabel concession. It is also required to contribute to development or be diluted, and if its interest falls below 10%, it shall reduce to a 0.5% NSR royalty which SolGold may acquire for US$3.5 M.

4.2 Location

The Cascabel Property is located within the Imbabura province of northern Ecuador, approximately 100 km north of the capital city of Quito and approximately 50 km north-northwest of the provincial capital, Ibarra (Figure 4.1).

The northern border of the project lies approximately 20 km south of the Colombia-Ecuador border, and 75 km southeast of San Lorenzo, located on Ecuador's pacific coast.

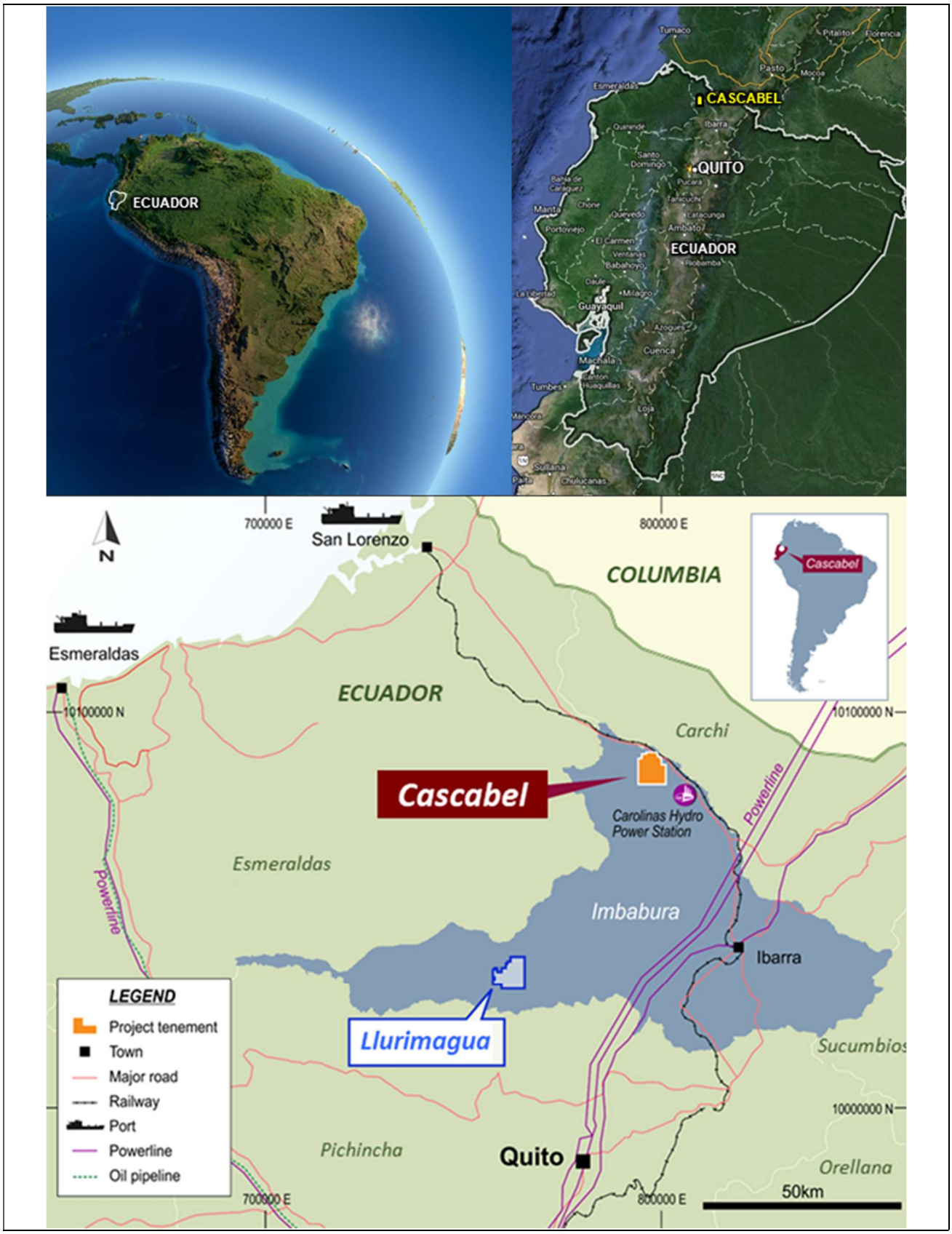


Figure 4.1 : Cascabel Project Location

4.3 Mineral Tenure

The Cascabel concession (Code 402288) is now considered one of the most relevant mining projects in recent years in Ecuador, and on which SolGold has invested significant resources in exploration, making the area one of the most important assets not only for the Company, but for the Ecuadorian State and the communities in the area of influence.

The Cascabel concession was initially granted to Santa Barbara Copper and Gold S.A. on 26 April 2010. Santa Barbara Copper & Gold S.A. reformed its statute, modifying its corporate name to Exploraciones Novomining S.A. (ENSA) on 27 July 2011, and was duly registered on the Commercial Registry on 29 November 2011.

The concession was granted over 5,000 hectares, valid for 25 years (starting 26 April 2010) and renewable for a further 25 years. Following a compulsory reduction on 16 December 2016, the Cascabel exploration concession now covers 4,979 hectares (49.79 km^2) and is currently registered as an Economic Evaluation Licence for metallic minerals under cadastral code 402288.

The license area is recorded under both political and geographical datums, being PSAD56-17S and WGS84-UTM-17N (Table 4.1). The Cascabel concession lies at the confluence of the parishes of Lita, La Carolina (Figure 4.2).

Table 4.2 : Cascabel Exploration Concession Boundary Coordinates Registered Under the Ecuador Mining Cadastre

Vertice ID	DATUM: WGS84-UTM-17N		DATUM: PSAD56-17S	
	X	Y	X	Y
PP	795741.75	89623.32	796000	90000
PP01	798441.75	89623.32	798700	90000
PP02	798441.75	89323.32	798700	89700
PP03	798741.75	89323.32	799000	89700
PP04	798741.75	88623.32	799000	89000
PP05	799441.75	88623.32	799700	89000
PP06	799441.75	88223.32	799700	88600
PP07	799741.75	88223.32	800000	88600
PP08	799741.75	86623.32	800000	87000
PP09	800741.75	86623.32	801000	87000
PP10	800741.75	81623.32	801000	82000
PP11	793741.75	81623.32	794000	82000
PP12	793741.75	88123.32	794000	88500
PP13	794741.75	88123.32	795000	88500
PP14	794741.75	89123.32	795000	89500
PP15	795741.75	89123.32	796000	89500
Transformation from PSAD56-17N to WGS84-UTM-17N* = ***N-258.25, E-376.68*				

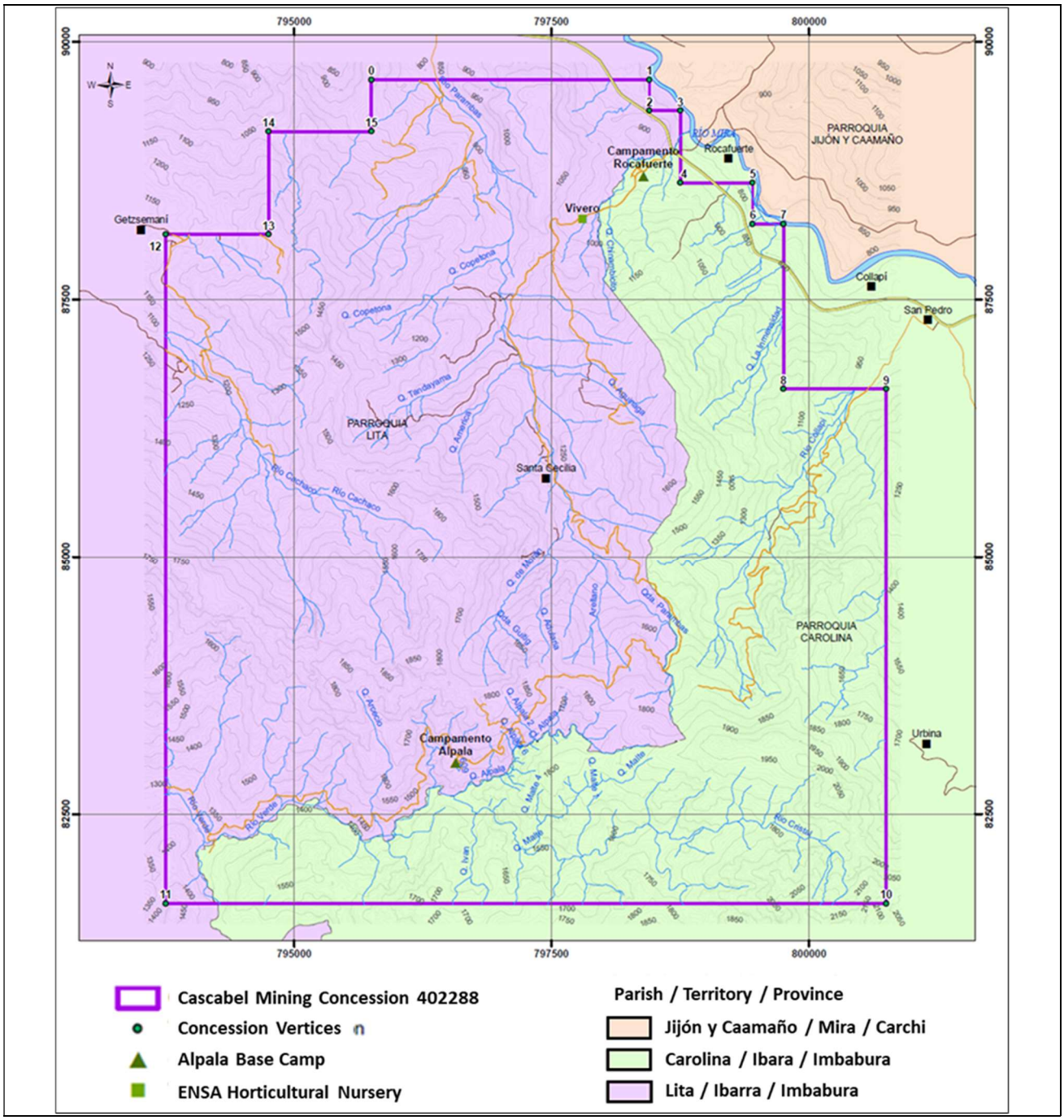


Figure 4.2 : Location and Vertices of the Cascabel Concession

On 29 March 2011, Cornerstone Capital Resources Inc. (Cornerstone) signed a definitive agreement to acquire 100% of the shares of Santa Barbara Copper and Gold S.A., a subsidiary of then Santa Barbara Resources (TSXV-SBL). Santa Barbara Copper and Gold S.A. was subsequently renamed Exploraciones Novomining S.A. after being sold to Cornerstone Ecuador S.A. (CESA), a subsidiary of Cornerstone Capital Resources Inc.

On 10 April 2012, SolGold entered into a binding Letter of Intent with Cornerstone to earn an 85% interest in ENSA. SolGold now holds an 85% registered and beneficial interest in ENSA. The Cascabel license is 100% owned by ENSA.

On 24 July 2012, SolGold entered into a Earn-in Agreement with Cornerstone, ENSA and CESA to explore the Cascabel licence. On 18 February 2013, the Earn-in Agreement was supplemented by a binding Term Sheet between SolGold, Cornerstone, CESA and ENSA. A revised Term Sheet was executed on 24 February 2014.

On 26 April 2010, the Undersecretary of Mines of the Ministry of Non-Renewable Natural Resources issued the title of the exploration concession for metallic minerals called Cascabel (Code 402288). The Resolution was protocolised in the Thirty-Second Notary Office of the Quito Canton on 30 April 2010 and was registered in the Mining Registry by the Ibarra Mining Regulation and Control Agency on 7 May 2010 under Registry No. 0022-2010, Directory 024, Volume 001.

On 20 August 2018, ENSA notified the Zonal Sub-secretariat for Mining North of the Ministry of Mining of the start of the Economic Evaluation period for the Cascabel Project in accordance with articles 27 and 37 of the Mining Law.

On 25 April 2019, the North Zonal Co-ordination (Zones 1, 2 and 9) of the Ministry of Energy and Non-Renewable Natural Resources issued Resolution No. MERNNR-CZN-2019-0042-RM that contains the Resolution of the Beginning of the Economic Evaluation Period of the Cascabel Project. This duly notarised Resolution was registered in the Mining Registry by the Regulatory Agency and Ibarra Mining Control dated 20 June 2019 under the Repertoire Book No.20, Volume No. 1, Item No. 1 and Folio No. 31.

On 19 November 2021 SolGold plc and SolGold Finance AG (together the "Investors"), and Exploraciones Novomining S.A. and SolGold-Ecuador S.A. (together the "Receiving Companies") signed a preliminary commitment declaration with regard to an Exploration Investment Protection Agreement (IPA) with Ecuador Ministry of Production, Foreign Trade, Investments and Fisheries (MPCEIP). The IPA includes an intention to invest a total of approximately US$430 M over the 10 years between 2013 and 2023 in minerals exploration activities in the Cascabel concession, in the canton of Ibarra, province of Imbabura, Ecuador. The US$430 M total includes both historical investments, with a total of approximately US$238 M estimated through to the end of 2021 and planned future investments through to the end of 2023 when the Exploration Phase of activities as defined under the mining law is anticipated to finish.

On 3 January 2022, the Northern Zonal Coordinator of the Ministry of Energy and Non-Renewable Natural Resources issued the Resolution Nº MERNNR-CZN-2022-0001-RM authorizing the extension of the economic evaluation of the deposit in Cascabel. The resolution was duly registered in the Mining Registry on 17 March 2022.

4.4 Underlying Agreements

As part of the terms of the sale of ENSA by Santa Barbara, Santa Barbara was granted a 2% Net Smelter Return (NSR). The NSR is the gross amount received from the sale of ores, concentrates or precipitates processed from the mine less the fair market costs of smelting, refining, sampling, charges and penalties for treatment and testing and also less the fair market costs of handling, transporting, securing and insuring that material.

Pursuant to the Earn-in Agreement and the Term Sheet, SolGold is entitled to purchase the 1% NSR for US$1 M within 3 months of the completion of a Feasibility Study. SolGold can purchase a further 1% NSR for US$3 M within 3 months of a decision made by the owners to mine the project. Since the dissolution of Santa Barbara in 2015, the benefit of the NSR has been held by a third-party agent in trust for the benefit of the prior shareholders of Santa Barbara.

In the event Cornerstone's equity interest in ENSA is diluted below 10%, Cornerstone's equity interest will be converted to a 0.5% NSR. SolGold has the right to purchase this NSR for US$3.5 M at any time. As of 31 March 2022, Cornerstone's equity interest in ENSA remained 15% and had therefore not diluted below 10%.

4.5 Licences and Authorisations

Regulatory licenses and authorisations currently in place at the Cascabel Property include:

- Registration of the Cascabel Mining Title for Economic Evaluation under Code 402288 and approved by the Ministry of Energy and Non-Renewable Natural Resources, Mines North Sub-secretariat, Ecuador (MRNNR-SRM), and the Mining Regulations and Control Agency of Ecuador (ARCOMM)
- Environmental License under Mining Title Code 402288 (Ministry of the Environment, Ecuador)
- Water Licensing approved by the National Secretariat of Water of the Republic of Ecuador (SENAGUA)
- Fuel Licensing approved by the Hydrocarbon Regulation and Control Agency (ARCH)
- ANEXO 2.5. Copia de la Declaración Juramentada (ANNEX 2.5 Copy of the Affidavit)
- Certificate of Compliance with Employers Obligations (Ecuadorian Social Security Institute).

SolGold has entered into Land Access Agreements to all areas of the Cascabel property with proprietors and maintains strong working relationships with all stakeholders.

ENSA is a corporation duly incorporated and validly existing under the laws of Ecuador. It is in good standing with respect to all applicable filing and regulatory requirements and has all the legal capacity to conduct its business in Ecuador.

The Concession is duly registered and in good standing and there are no liens or encumbrances registered. There is neither any indication of any potential issue that could result in the termination, revocation or suspension of the Concession, nor any evidence of grounds for the nullification of the ownership of the Concession held by ENSA.

ENSA, in accordance with the Mining Law, has complied on a timely basis with its obligations to pay the conservation patent fees and to file annual exploration reports with respect to the Concession.

ENSA holds the necessary licenses, permits and registrations, including all necessary environmental licenses and water permits, to carry out advanced exploration and economic evaluation of the deposit on the Concession for metallic minerals. Such licenses, registrations and permits have been duly granted to and are validly held by ENSA. There are no outstanding agreements or operations that may limit the right of ENSA to carry out mining activities. There are no agreements for operations with artisanal miners.

Environmental licenses do not have a specific term and are in effect while the licensed activities are developed. Certain annual reporting and auditing obligations apply to maintain the good status of the licenses. The environmental license is in good standing.

ENSA has two permits for industrial water use, conferred by the National Secretariat of Water (SENAGUA) and which are in force and valid. Industrial water use permits are granted for ten renewable years. One of these permits is valid until July 2023 and the other until August 2027.

Although the term for mining concessions is 25 years, the Mining Act establishes maximum terms for each mining phase for the industrial mining system. Once a mining concession is granted, concessionaires are subject to the following phases and terms within the exploration phase for medium-scale and large-scale mining:

- Up to 4 years of Initial Exploration
- Up to 4 years of Advanced Exploration
- Up to 2 years of Economic Evaluation of the deposit, which can be extended for an additional 2 year period.

Initial exploration commenced upon granting of the concession on 26 April 2010. The project progressed into the advanced exploration phase on 17 September 2014. On 31 July 2019, a request for an expansion of advanced exploration to encompass the entire area of the mining concession was presented to the Ministry of the Environment, through a Complementary Environmental Impact Study. Granting of the expansion of the advanced exploration area remains pending.

On 28 August 2018, the letter of notification was sent to the applicable Zone Co-ordinator of the Ministry in Ibarra and the current Economic Evaluation phase commenced.

During the final phase, the concessionaire must request the start of the exploitation phase of the project prior to the expiry of the economic evaluation phase. Within 6 months of starting the exploitation phase, large-scale mining concessionaires must sign an exploitation contract with the Ecuadorian government, although negotiations may begin during the economic evaluation phase.

Regulatory licenses and authorisations required for the future entry into the final phase of the Cascabel Project include:

- Environmental and water licensing for the operation and associated facilities
- Fiscal Package negotiations with the Government
- Exploitation Agreement executed with the Government
- Other permits and licenses including those applicable to construction, hazardous substances, transport and others.

There are no permanent illegal mining activities within the Cascabel concession. However, there is sporadic entry of artisanal miners panning alluvial gold and, according to the information provided by ENSA, when the presence of such miners is detected, they are asked to leave. In case they do not respond to this petition, there are recourses under Ecuadorian legislation to safeguard ENSA from legal liability in the unlikely event of potential environmental impacts.

There are no outstanding operations or any other kind of agreements that may limit ENSA's right to carry out mining activities. There are no operation agreements with artisanal miners.

No administrative, legal, or other form of claim or complaint has been made against ENSA by communities and/or indigenous groups regarding the Cascabel concession.

Administrative permits from ministries and applicable municipalities, for both on-site and off-site locations, required for the final operations phase will depend on the designs to be elaborated in the technical studies. Examples of these include:

- Explosives use and storage
- Special labour shifts
- Permits for construction (building permits) plant sites, access roads, water process plant(s), process water pond(s), accommodation and amenities, office complexes and tailings storage facilities
- Right of Way (ROW) permits applicable to pipelines, power transmission lines, tailings storage facilities, port facilities, water process plant(s), access roads, heavy transport, chemical storage and transportation as well as hazardous goods.

4.6 Environmental Considerations

Exploration and mining activities in Ecuador are subject to provisions of the Mining Act, 2009 (Ley de Minería). According to the Mining Act, the holders of mining licences must obtain and submit environmental studies to prevent, mitigate, control and repair the environmental and social impact resulting from such activities.

The Environmental Department of the Ministry of Energy and Mines is responsible for the approval of the environmental studies of the Project. According to the Environmental Regulation for Mining Activities (Reglamento Ambiental para Actividades Mineras), the required environmental studies are:

- Environmental Impact Preliminary Evaluation (EIPA). The EIPA is a general environmental study which describes the environmental components, project activities, potential environmental effects, and planned prevention, correction, and/or mitigation measures
- Environmental Impact Assessment (EIA). The EIA is a detailed, multidisciplinary technical study which identifies and evaluates the potential negative environmental effects and details specific preventative or corrective measures for the effects
- Environmental Audit (EA). The EA provides a means of assessing and controlling the measures proposed in the EIA and legal framework.

In August 2013, an Environmental Licence for advanced exploration including drilling was issued by the Ecuadorean Ministry of Environment. SolGold has commenced acquisition of landholdings in the Cascabel Property area in anticipation of infrastructure requirements for the project development. As of the 31 March 2022, SolGold has purchased 2,492 hectares comprising 80 properties with negotiations ongoing on other properties.

4.7 Mineral Rights in Ecuador

Mining in Ecuador is mainly governed by the Mining Act (MA), issued on 29 January 2009 and the General Regulation of the Mining Act (GRMA), issued on 16 November 2009, which regulates activity as a whole. The MA and GRMA recognise, regulate, and classify mining activities depending on production levels, namely: large-scale mining; medium-scale mining; small-scale mining; and artisanal mining.

To conduct exploration in Ecuador, a mining licence must be granted by the Ministry of Mining and registered with the respective mining registry managed by the Agency for Regulation and Control of Mining (Agencia de Regulacion y Control Minero) (ARCOM). The term of a mining licence is 25 years and is renewable for similar periods upon request by the licence holder. Once the licence has been granted, exploration may be conducted for a four year term, which is identified as the initial exploration period and governed by Article 37.

The holder of the licence is entitled to request a further 4 year period from the Ministry of Mines, under Article 37, to proceed with advanced exploration. At this point, part of the exploration licence will be relinquished, although there is no legislated minimum area to be dropped. The Ministry will process this application provided the company has met the minimum investment commitment during the initial exploration stage and submitted a plan of activities and minimum expenditures contemplated under the advanced exploration stage.

Other aspects of the Mining Act which are considered to be pertinent are described as follows:

Regarding taxation and royalties - The holder of the licence is subject to other taxes, payments and contributions such as:

- Income Tax – 25% of taxable profits
- Labour Profit-Sharing – 15% (12% to the State and 3% to employees in the case of large-scale mining, and 10% to the State and 5% to employees in the case of medium-scale mining; 5% to the State and 10% to employees in the case of small-scale mining)
- Value Added Tax – 12%
- Municipal taxes and contributions, social security contributions
- Annual conservation fee that the holder of the licence shall pay by March each year for each mining hectare. This equates to 2.5% of the government mandated basic salary, currently US$394 for the 2022 fiscal year, per hectare of the mining licence for the initial exploration period. This doubles to 5% of the basic salary per hectare for the advanced exploration and economic evaluation periods, and doubles again to 10% during the exploitation phase of the mining licence.

In addition to the taxes outlined above, the holder of the licence must pay to the State a royalty between 3% up to 8% of the value of the NSR for Au, Ag and Cu for large-scale mining.

The Ecuadorian government has various taxes, duties and levies that may or may not be applicable to future mining operations depending on the mining exploitation contract to be established between SolGold and the Ecuadorian government, the Investment Protection Agreement to be negotiated between the Ministry of Production and SolGold, and the laws in force at that time. These are addressed in Section 22.

Regarding surface rights - The holder of a mining licence has an easement over the surface land in order to duly exercise its mining rights. The rights emanating from this easement include, among others, the right to occupy certain areas for constructions required for mining activities, as well as rights related to waterways, railways, landing strips, ramps, transport belts, and electrical installations. The easement must be registered in the mining registry managed by ARCOM.

The owner of the surface land is entitled to receive payment from the holder of the mining licence for the easement granted. In certain cases, the easement rights, including terms and conditions, are expressly agreed to in contracts executed between the holder of the licence and the owner of the surface land. If no agreement is reached, ARCOM may order the creation of the easement and determine the mandatory payments due to the owner of the land.

In August 2013, an Environmental Licence for advanced exploration including drilling was issued by the Ecuadorean Ministry of Environment.

On 26 July 2013, the National Water Secretariat for the Mira Hydrographic Demarcation resolved to grant ENSA the right to exploit the waters of River Mira, to be used during the execution of the advanced mining

exploration period at the Cascabel Project. The water concession is valid for a renewable term of 10 years. The water intake shall be used in mining and industrial exploration activities within the area authorised by the Ministry of Mines. ENSA shall pay US$0.0039 per cubic metre to the National Water Secretariat.

On 7 August 2017 a second concession for the Use and Consumption of Industrial Water was granted by the National Water Secretariat for the Mira Hydrographic Demarcation for the Cascabel Project for advanced exploration activities. The combined concessions allow extraction from a maximum of 14 collection points or water sources (water collection points are included for use in advanced exploration activities and for use in camps); and an authorised flow rate of 1.5 L/s for each collection point.

The Mining Plus QP understands that SolGold holds all required permits and easements to operate across the Cascabel Property.

4.8 Comments on Section 4

The Cascabel Property has in place the necessary regulatory licenses and authorisations required for its current status as an Advanced Exploration project. Furthermore, with ongoing support of the community and government organisations, it is expected that future license and authorisation requirements to advance the project will continue to be successfully attained.

In the opinion of the QP:

- Information provided by experts contacted by SolGold on the mining tenure held by ENSA in the Project area supports that the Cascabel Project has valid title that is sufficient to support declaration of Mineral Resources and Mineral Reserves
- Additional negotiations and permits are required for the proposed operation (see discussion in Section 20)
- Environmental liabilities for the Project are typical of those that would be expected to be associated with a long-life mining operation.

To the extent known to the QP, there are no other significant factors and risks that may affect access, title, or the right or ability to perform work on the Project that are not discussed in this Report.

5 Accessibility, Climate, Local Resources, Infrastructure and Physiography

5.1 Summary

Cascabel is located in northern Ecuador approximately 3 hours' drive north of Quito, the capital city of Ecuador. Access is via sealed highways through the closest major centre of Ibarra, located approximately 80 km south of the property. The Cascabel concession area contains three small settlements: Santa Cecilia Village, Rocafuerte Office Complex and the Alpala Base Camp. Four further settlements exist proximal to the project area at Rocafuerte, San Pedro, Urbina and Cachaco.

The topography of the project area is moderate to steep, with elevations rising from 750 m to 2,140 m above sea level. The rugged terrain is deeply incised by four large drainage complexes. Vegetation is tropical forest with a well-developed soil horizon up to 12 m thick in places.

The climate of the project area is characterised by humid weather, with bi-modal rain seasons that peak in December and March each year. Total average rainfall for the region is approximately 1,500 mm per annum. Regionally, temperatures remain relatively consistent throughout the year, with average annual temperatures of approximately 17°C, with maxima in excess of 30°C and minima typically around 10°C.

5.2 Accessibility

International flights regularly arrive and depart from Mariscal Sucre International airport, 18 km east of Quito, from major carriers including KLM, American Airlines, Air Canada, Lufthansa, and Copa Airlines.

The Cascabel Project is easily accessible from Quito, via the multi-lane E35 Pan-American North highway to Ibarra (approximately 100 km) and connected to the northern margin of the licence area near Rocafuerte Village (approximately 90 km) via the sealed two lane E10 Salinas-San Lorenzo highway that runs along the Rio Mira valley. Driving time to the project offices at Rocafuerte is approximately 3 hours.

Within the Cascabel concession area, access to the Rocafuerte Office Complex, the Alpala and Tandayama-America deposits, and Alpala Base Camp is via Carmen Road, a maintained two-lane dirt road from Rocafuerte village, through Santa Cecilia village (Figure 5.1). The main exploration prospects within Cascabel are accessible via a series of maintained single lane dirt roads, single lane four wheel drive tracks and hiking trails off the Carmen road.

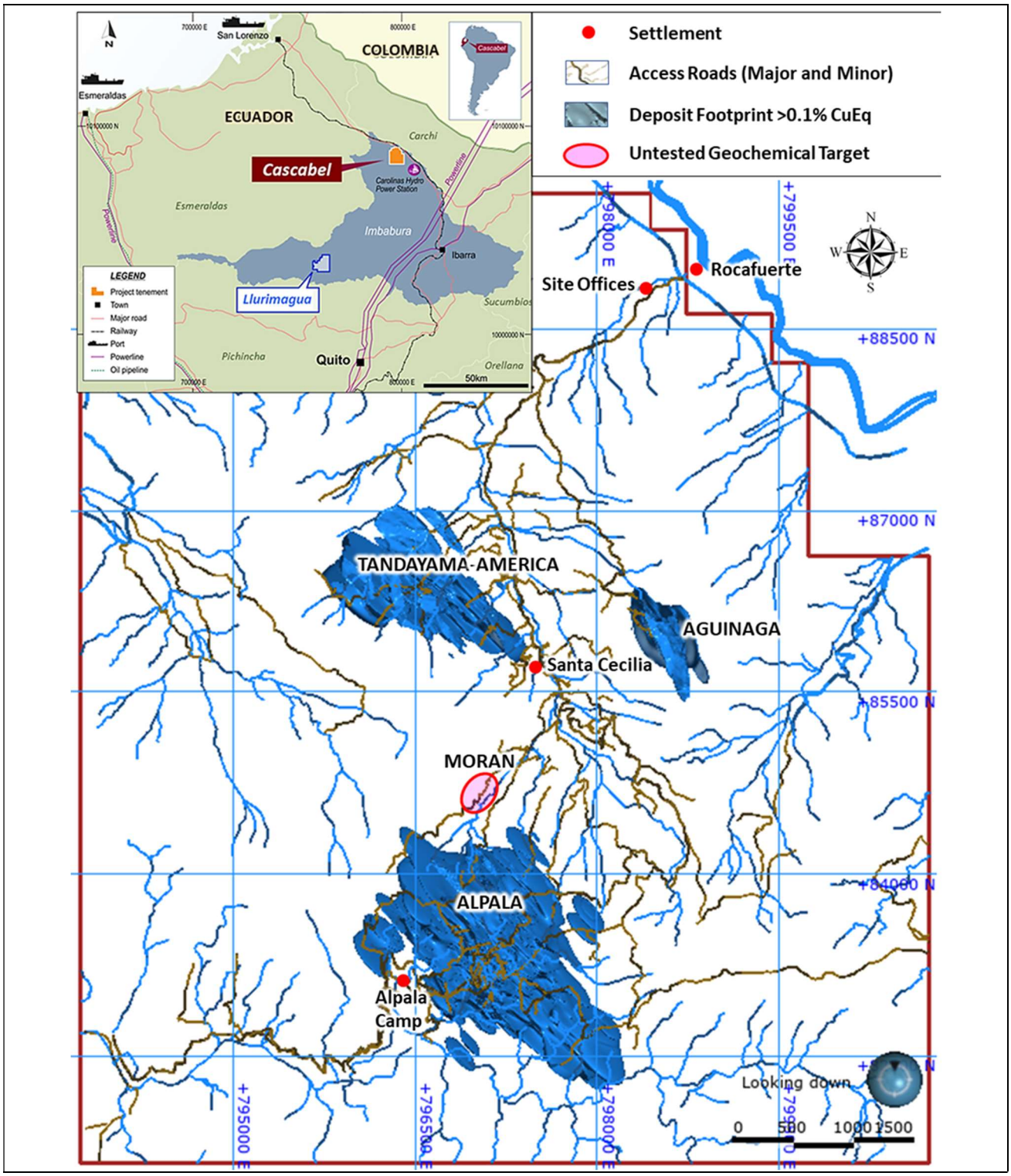


Figure 5.1 : Location of Tandayama-America, Alpala and Aguinaga deposits at the Cascabel project, showing the location of current drill testing underway at Moran target

5.3 Local Resources and Infrastructure

The property is largely undeveloped, containing only three small settlements, Santa Cecilia Village, Rocafuerte Base Camp and Alpala Camp. Three further settlements lie proximal to the project area at San Pedro, Urbina and Cachaco.

SolGold is continually developing its social and community programs around Cascabel with a view to maximising employment for Ecuadoreans, creating, supporting and endorsing local Ecuadorean businesses and providing financial assistance and support for secondary and tertiary educational institutions (including universities and technical colleges). This strategy is also being applied to SolGold's regional exploration activity areas.

Skilled and unskilled labourers, operators and helpers are readily available in the local area. The majority of local labourers, operators and helpers are drawn from these settlements, and a number of training programs are in place for the advancement of local assistants. Professional labour is sourced from all over Ecuador as well as a range of globally situated professionals and consultants. Other services and goods are often procured from the surrounding settlements, with further options available at Ibarra or Quito.

Infrastructure in the region and throughout Ecuador is generally of a high standard, with excellent road access, power, and water sources readily available in the local area. A two-lane sealed highway (E10) connecting the cities of Ibarra and San Lorenzo runs along the northern margin of the property, and a further multi-lane highway (E15) provides a link further south to the port city of Esmeraldas. A multi-lane highway (Pan-American E35) links Ibarra and the capital Quito.

Power generation in Ecuador is dominated by hydro-electricity, with 18 power plants across the state. Hydro-electric installed nominal power exceeds 5,000 MW whilst total installed nominal power exceeds 8,500 MW. Currently eight new hydro-electric dams are under construction in Ecuador, with the first completed in April 2016. Once fully operational, these power stations are set to generate 1,500 MW with Ecuador currently generating over 70% of electricity needs by hydropower.

The construction of new electrical substations near Ibarra in Northern Ecuador provide access to hydro-electric power for the provision of power needs to the Cascabel Project.

SolGold employs a staff of over 735 employees, including over 85 geologists, of whom 30% are female, on the ground in Ecuador exploring for economic Cu and Au deposits. The work force is approximately 98% Ecuadorean with a majority of over 500 employees employed through ENSA on the Cascabel Property. The remainder is employed on SolGold's regional projects. The in-country work force is expected to grow significantly as operations continue to expand at Cascabel, and in Ecuador generally.

SolGold focusses its operations to be safe, reliable and environmentally responsible and maintains close relationships with its local communities. SolGold has engaged an increasingly skilled, talented and experienced team of geoscientists using state of the art geophysical and geochemical modelling applied to an extensive data base to enable the delivery of ore grade intersections from nearly every drill hole at Alpala.

Ecuador is evolving rapidly in terms of infrastructure and development, with 10 renewed and 13 operating national airports, four of which are international airports. Ecuador has more than 966 km of state railways, linking highlands and coastal regions and mainly used for tourism purposes. The port system comprises seven state owned ports and ten private docks, specialised in general cargo and oil. The three major ports include Guayaquil, Manta, and Bolívar. The Ministry of Transport and Public Works contribute to national development

through the formulation of policies, regulations, plans, programs and projects to ensure a National Intermodal and Multimodal Transport, based on international quality transport network standards, aligned with economic, social, environmental guidelines and the national development plan.

5.4 Climate

Based on long term data from regional stations operated by the National Weather and Hydrology Institute (Insitituto Nacional de Meteorología e Hidrología, or INAMHI), the climate of the project area is characterised by humid weather, with a bi-modal rainy season, having peaks in December and March, each with rainfall in excess of 200 mm on average. Total average rainfall for the region is approximately 1,500 mm. The Alpala camp receives substantially higher rainfall than Rocafuerte, due to the orographic effect of its mountainous location. The driest month is July with less than 30 mm of rain on average.

The climate in the mountainous regions of Ecuador is typically cooler than coastal parts of the country due to the altitude. The Alpala camp lies at approximately 1,750 m RL and nightly temperatures can drop below 9°C. Rocafuerte lies at approximately 800 m RL and is often significantly warmer than Alpala.

Regionally, temperatures do not fluctuate greatly throughout the year. Average annual temperature is approximately 17°C, with maxima in excess of 30°C, and minima typically around 10°C.

5.5 Physiography

Ecuador comprises three main physical regions: The Costa (Pacific Coastal Region), the Sierra (Andes Region) and the Oriente (eastern Amazon Region). A central graben called the inter-Andean graben effectively divides the Sierra region into the Cordillera Real (Eastern Cordillera) and the Cordillera Occidental (Western Cordillera) (Figure 5.2).

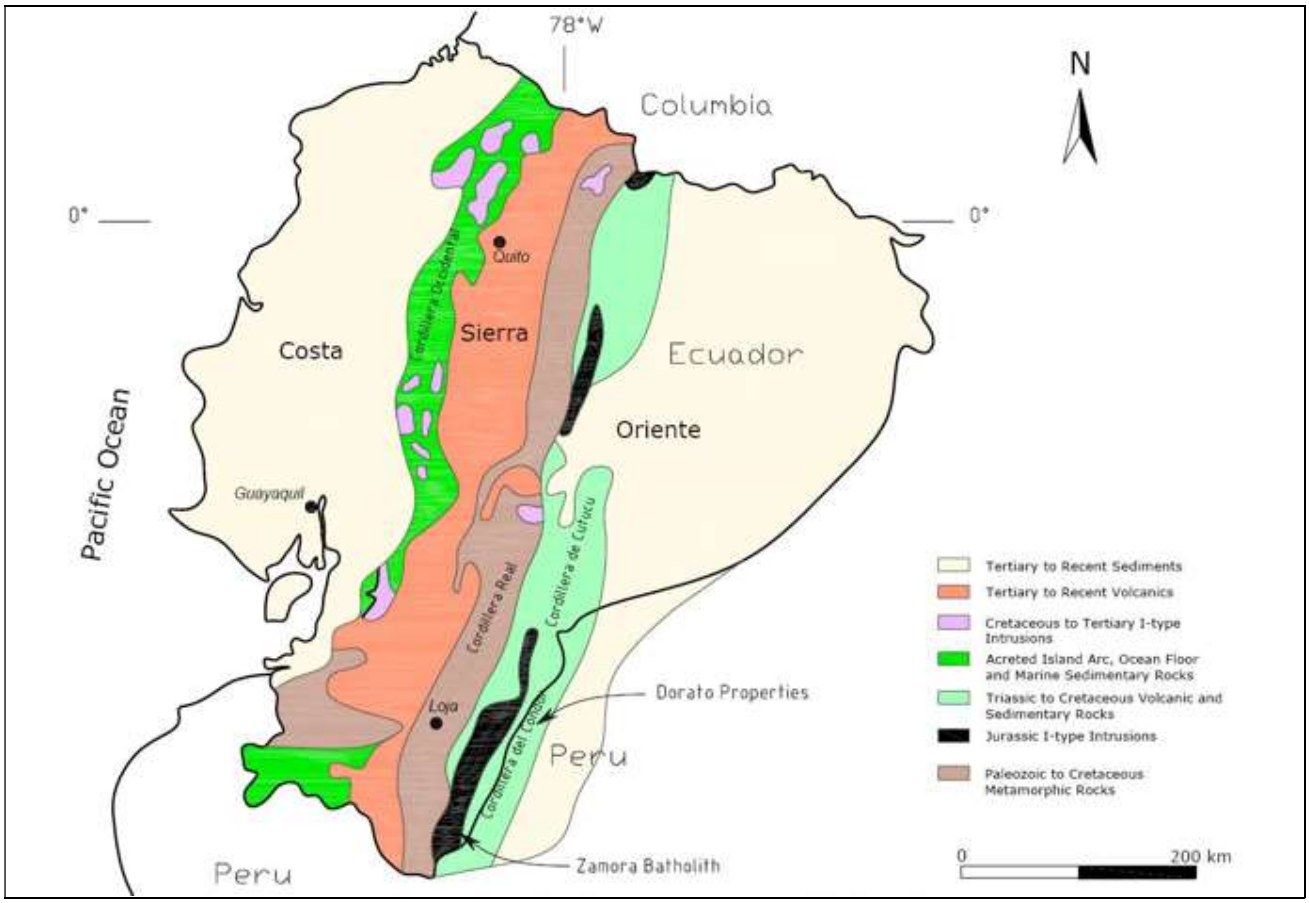


Figure 5.2 : Topographic map of Ecuador (after Belik, 2008)

The Cascabel Property is located on the lower western foothills of the Cordillera Occidental, within the tropical savannah climate zone of Ecuador. The topography of the project area is moderate to steep, with elevations of 750 m in the valley bottom to 2,200 m in the higher exploration zones, incised by dendritic drainage complexes within the tributary watersheds of the Mira River basin (Figure 5.3).



Figure 5.3 : Typical Landscape in the Cascabel Project Area (Photo: courtesy of SolGold)

The Property is characterised as having a patchwork of remnant mature tropical forest interspersed with disturbed forest and cleared/agricultural land. The nearest protected area is the Cotacachi Cayapas Ecological Reserve, which lies approximately 20 km southwest of the Cascabel concession. With its borders lying well outside of the Mira River catchment, the Cotacachi Cayapas Ecological Reserve watershed is well outside the area of influence of the project.

The rugged terrain is incised by four large drainage complexes. Vegetation is tropical forest with a well-developed soil horizon of up to 10 m thick in parts.

5.6 Location of Mine Facilities

Areas suitable for the location of mine facilities, including tailings storage facilities, processing plant, process water ponds, office and accommodation complexes, excess rock disposal, and suitable heavy vehicle access routes; have been evaluated as part of the study.

5.7 Comments on Section 5

In the opinion of the QP:

- The existing local and planned infrastructure, availability of staff, power, water, the design and budget for such facilities, and the methods whereby goods could be transported to the Project area and any planned modifications or supporting studies are reasonably well-established, or the requirements to establish such, are reasonably well understood by SolGold, and can support the declaration of Mineral Resources and Mineral Reserves
- There is sufficient area within the Project to host an underground mining operation, including mine and plant infrastructure, waste rock and tailings storage facilities
- It is a reasonable expectation that any additional surface rights that would be required to support Project development and operations can be obtained through appropriate negotiation
- It is expected that any future mining operations will be able to be conducted year-round.

6 History

From 1980 to the present, ten different entities have conducted field activities and/or studies over the Cascabel area. Historical exploration of the project area, undertaken from 1980 to May 2012, highlighted widespread geochemical anomalism in stream pan-concentrates, stream sediments and rock chips over a 9 km^2 area in the northern half of the license area. Previous explorers focused on the source of Au, Cu, Pb and Zn in stream sediments, which led to the location of gold-bearing, polymetallic base-metal sulphide quartz veins in streams that flank the northern periphery of the Alpala deposit.

The Cascabel concession was granted to Santa Barbara Copper and Gold S.A. (SBCG) on 26 April 2010. Santa Barbara Copper and Gold S.A. was renamed to Exploraciones Novomining S.A. on 27 July 2011. On 29 March 2011, Cornerstone signed a definitive agreement to acquire Santa Barbara Copper and Gold S.A.

On 24 July 2012, SolGold entered into an Earn-in Agreement with Cornerstone, ENSA and CESA (see Section 4.3), which was further supplemented by a binding Term Sheet executed on 24 February 2014.

In May 2012, SolGold commenced the first systematic exploration program at Cascabel. The surface expression of the Alpala deposit was discovered the same month, during reconnaissance mapping which located an 80 m wide zone of Cu and Au bearing, dominantly sheeted and stockwork porphyry-style quartz veining in Alpala Creek. After follow-up mapping, geochemical and geophysics programs were conducted and other porphyry related stockwork veins were subsequently discovered in the Moran, Tandayama and America Creeks.

A summary of the project ownership and key activities is provided in Table 6.1.

Table 6.1 : Cascabel Ownership History and Key Activities

Period	Company	Major Activities Advancing Cascabel Project
1980-1984	INEMIN (Ecuadorian Institute of Mining)	Noroccidente Project, including geological mapping and stream sediment sampling
1984-1985	INEMIN & BEM	Preliminary field inspections only
1986	INEMIN (ex-DGGM) & Rio Tinto Zinc Corp.	Western Cordillera I; analyses of samples from stream anomalies and extensions identified in previous INMEM/BEM study
1988-1991	Lumina Gold (ODIN Mining & Exploration)	Preliminary stream sediment sampling
1991-1997	Japan International Cooperation Agency	Reported discovery of mineralised porphyries that intrude the Apuela batholith at Junin (Llurimagua) approximately 60 km SW of Cascabel
1998-2000	Government of Ecuador (PRODEMINCA)	Western Cordillera II: Definition of geochemical provinces within the Western Cordillera including identification of polymetallic base metal sulphide veins at Moran Creek in Cascabel
1998-2000	INEMIN	EMDEC Project (Ecuadorian Mining Development & Environmental Control Project)
2008-2011	Santa Barbara Copper and Gold (SBCG)	26 Apr 2010: Tenement granted to SBCG
		Stream sediment, rock chip sampling and prospecting identified widespread geochemical anomalism
2011-2012	Cornerstone Capital Resources (CCR)	29 Mar 2011. CCR acquires 100% of SBCG
		27 Jul 2011: SBCG corporate name is modified to ENSA
		Stream sediment, pan-conc., and rock chip sampling (93 samples)

Table 6.1 : Cascabel Ownership History and Key Activities		
Period	**Company**	**Major Activities Advancing Cascabel Project**
2012-2022	SolGold Plc (SolGold)	12 April 2012: SolGold enters binding Letter of Intent with CCR to earn 85% interest in ENSA. Cascabel license 100% owned by ENSA
		3 Jan 2018: Alpala Maiden Mineral Resource Estimate (MRE)
		3 Jan 2019: Alpala MRE#2
		7 May 2019: Preliminary Economic Assessment (PEA) (Amended 19 Nov 2020)
		7 Apr 2020: Alpala MRE#3 (Amended 29 Sep 2020)

7 Geological Setting and Mineralisation

7.1 Regional Geology

The Eocene Alpala deposit lies in a zone of overlap between the Eocene and Miocene Andean porphyry belts that extend from Colombia through Ecuador and Peru into Chile and Argentina. The basement rocks consist of tholeiitic basalts of the Dagua-Piñon Terrane, an oceanic plateau that is believed to have accreted to South America in the Late Cretaceous. The magmatism in northern Ecuador and southern Colombia is characterised by the lack of a well-developed arc and erratic pluton distribution. This suggests a low-angle subduction environment, conducive to compression and porphyry mineralisation.

Submarine arc volcanism deposited the volcano-sedimentary rock sequence of the Macuchi Formation during the Palaeocene through the Eocene, followed by the sub-aerial deposition of volcanic and volcaniclastic rocks of the San Juan de Lachas Formation during the Oligocene to mid-Miocene. Late Eocene to Miocene age plutons and stocks of hornblende-bearing diorite, quartz diorite and tonalite form major intrusive complexes, known as the Santiago batholith (Eocene) and Apuela batholith (Miocene). The Apuela batholith hosts the Late Miocene Llurimagua (Junin) Cu-Mo porphyry deposit (Gribble, 2004).

The Toachi Fault Zone (TFZ) is a major north-northeast trending structure that separates Eocene magmatism to the west from Miocene magmatism to the east. The TFZ cuts though both the Macuchi and San Juan de Lachas Formations and juxtaposes these sequences against Cretaceous sedimentary rock units (Figure 7.1).

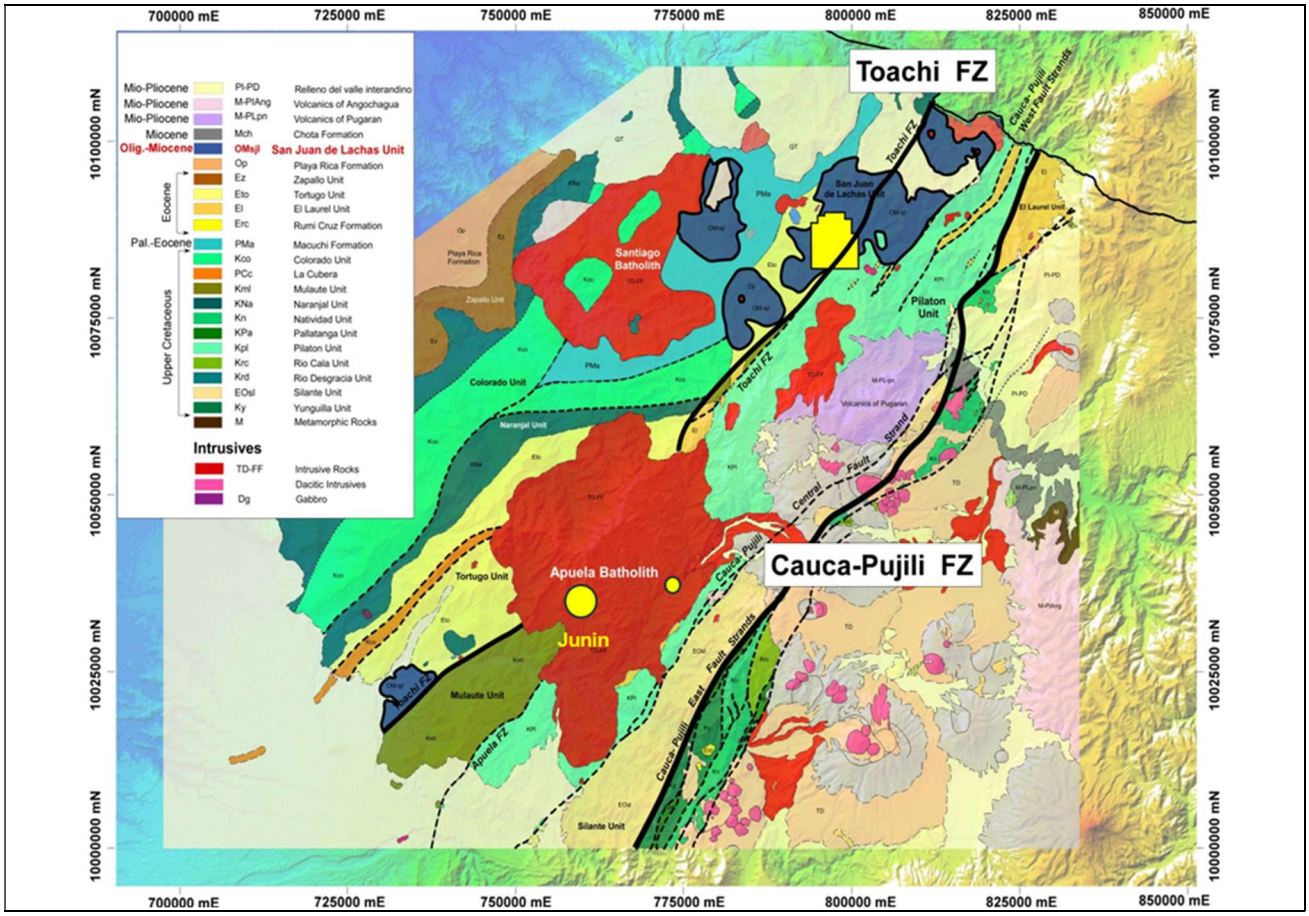


Figure 7.1 : Cascabel Regional Geology (modified from Boland et al., 2000), Showing Location of the Cascabel Concession (yellow polygon), Alpala Cu-Au-Ag deposit and Llurimagua (Junin) Cu-Mo deposit

7.2 Cascabel Concession

7.2.1 Structural Framework

An initial structural interpretation for the tenement area recognised several corridors of Cu-Au mineralisation determined by combining multiple datasets, including regional magnetics, electrical surveys, soil geochemistry, alteration mapping, topographic expression and the 1:500 to 1:2,000 scale mapping of Cu bearing quartz veins, sulphide veinlets and fractures, as summarised by Garwin et al., 2017 (Figure 7.2).

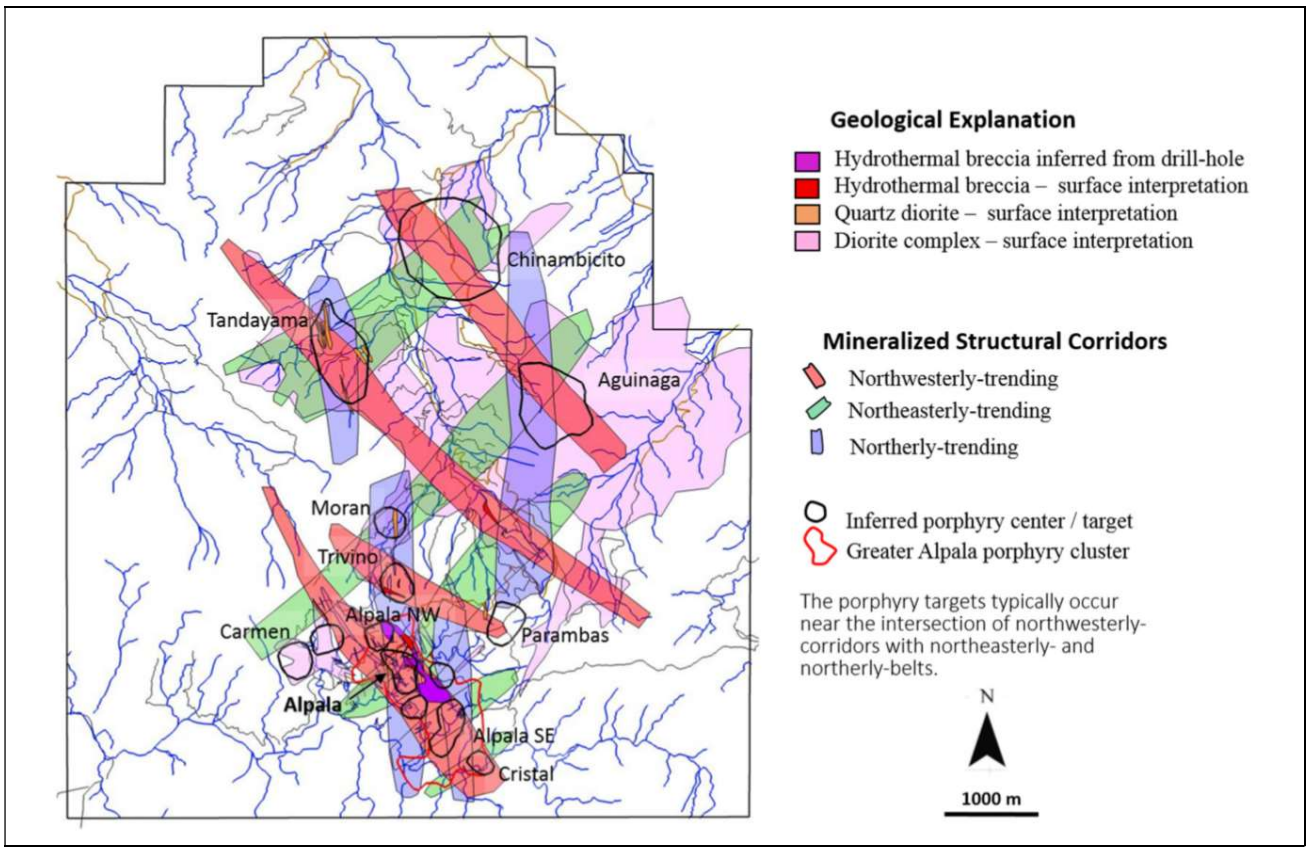


Figure 7.2 : Mineralised Structural Corridors, Cascabel

Mapping was completed using the Anaconda Method as described by Brimhall et al., 2006, Garwin et al., 2017 and Garwin, 2018. Three major veinlet and fracture orientations exist, northwest, north, and northeast, which are similar to the orientations expressed by the intrusions and faults.

A total of 15 Cu-Au targets have been delineated from the results of geological mapping, soil and rock chip geochemical anomalies and magnetic expression. Many of the targets lie near the intersection of the mineralised corridors.

This mapping work was further enhanced by specialist reprocessing and filtering of ground magnetic data by Fathom Geophysics to provide Deep Residual Magnetics and Structure Detection Imagery (Figure 7.3).

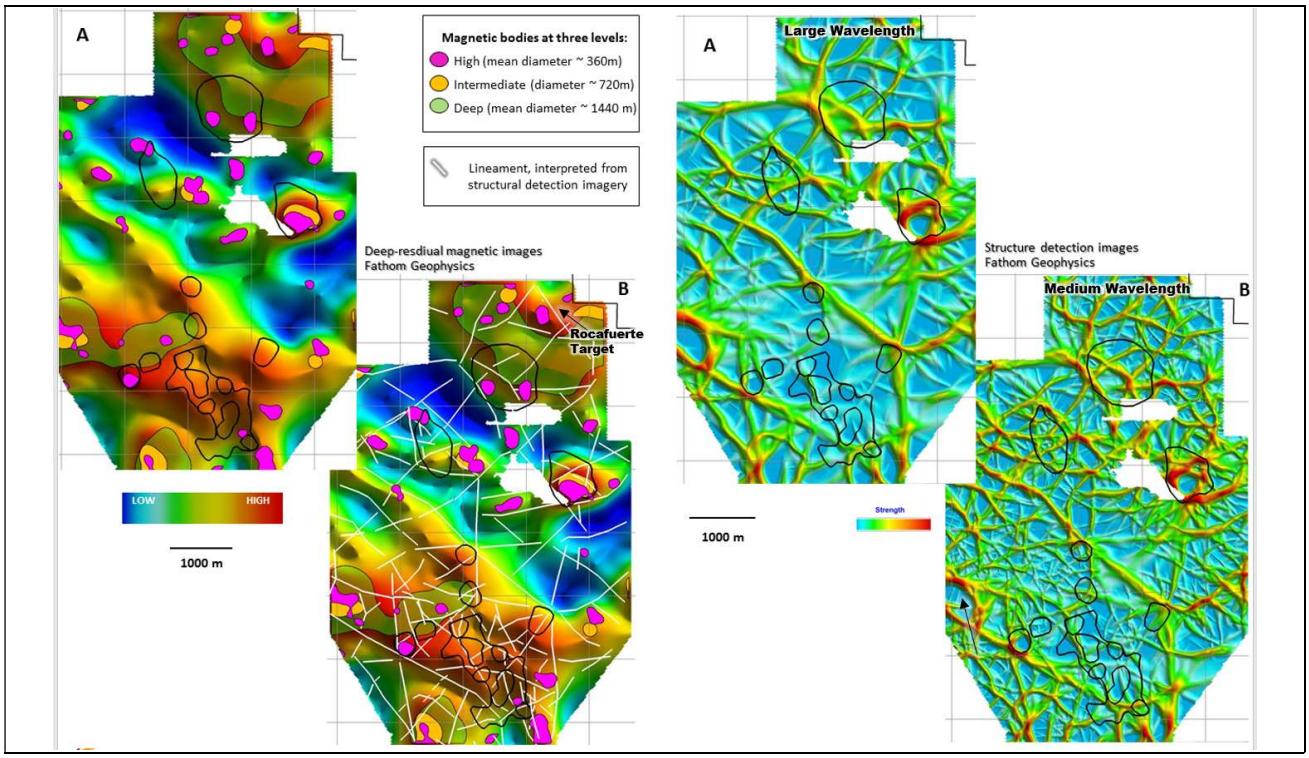


Figure 7.3 : Deep Residual Magnetics and Structure Detection Imagery by Fathom Geophysics

Interpretation of key structures within the concession areas revealed first order arc-parallel northeast trending faults, such as the TFZ, second order arc normal northwest trending faults, such as the Alpala Structural Zone (APZ), and third order north and north northeast trending faults.

The majority of the prospective porphyries within the Cascabel concession occur at the intersection of first order northeast to east northeast trending faults, with second order northwest trending faults, and third order north and north-northeast trending faults. This supports the hypothesis that the northeast and northwest structural trends have deep seated roots and may have provided a locus or crustal weakness for the ascension of mineralised porphyry stocks and their associated hydrothermal fluids in the Cascabel area.

Northwest trending structures exhibit important controls on intrusion emplacement and the localisation of mineralisation at intersecting northeast trending structures at Alpala.

7.2.2 Local Stratigraphy

Three critical constraints form the foundation for a robust understanding of the geometry of a porphyry Cu-(Au) deposit:

- The geometry of porphyry intrusions
- The orientation of veins within and around each intrusive phase
- The geometry of the host rock stratigraphic units.

No obvious marker horizon(s) occur(s) within the host stratigraphy at Alpala as it comprises a very complex volcanic, volcano-sedimentary, and sedimentary sequence where rapid and irregular lateral facies changes are

common. Horizons of andesite (and), andesite tuff (atu), and well-bedded volcano-sedimentary rocks (vs) provided the basis for establishing a simplified stratigraphic column (Figure 7.4).

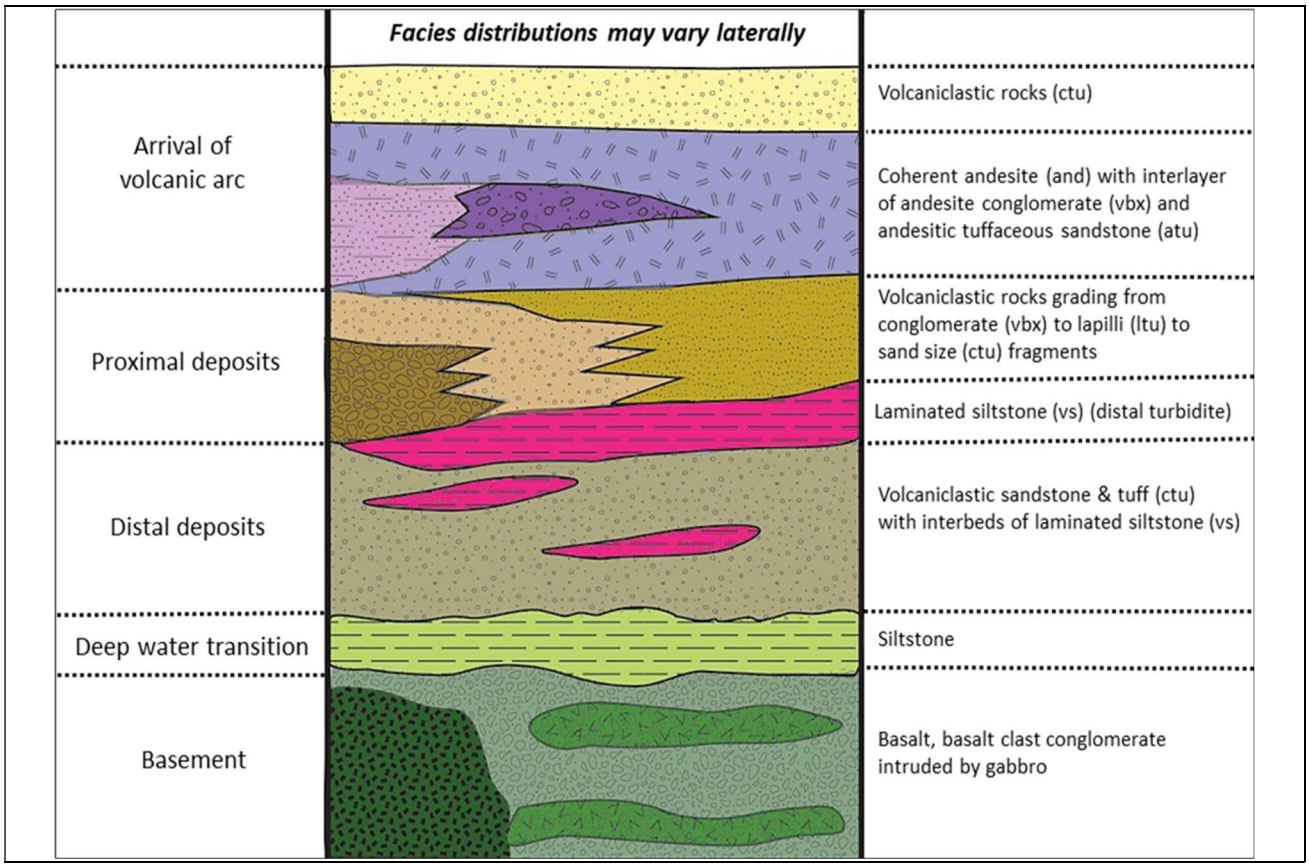


Figure 7.4 : Simplified Stratigraphy of the Alpala Deposit (after Tosdal et al., 2019)

7.2.3 Local Geology

The major rock types of the Cascabel concession consist of Cretaceous siltstones and minor sandstones which are unconformably overlain by a Tertiary sequence of andesitic lavas and volcano-sedimentary rocks. A series of hornblende-bearing diorites, quartz diorites and tonalities intruded the volcano-sedimentary sequence as plutons, stocks and dykes (Figure 7.5).

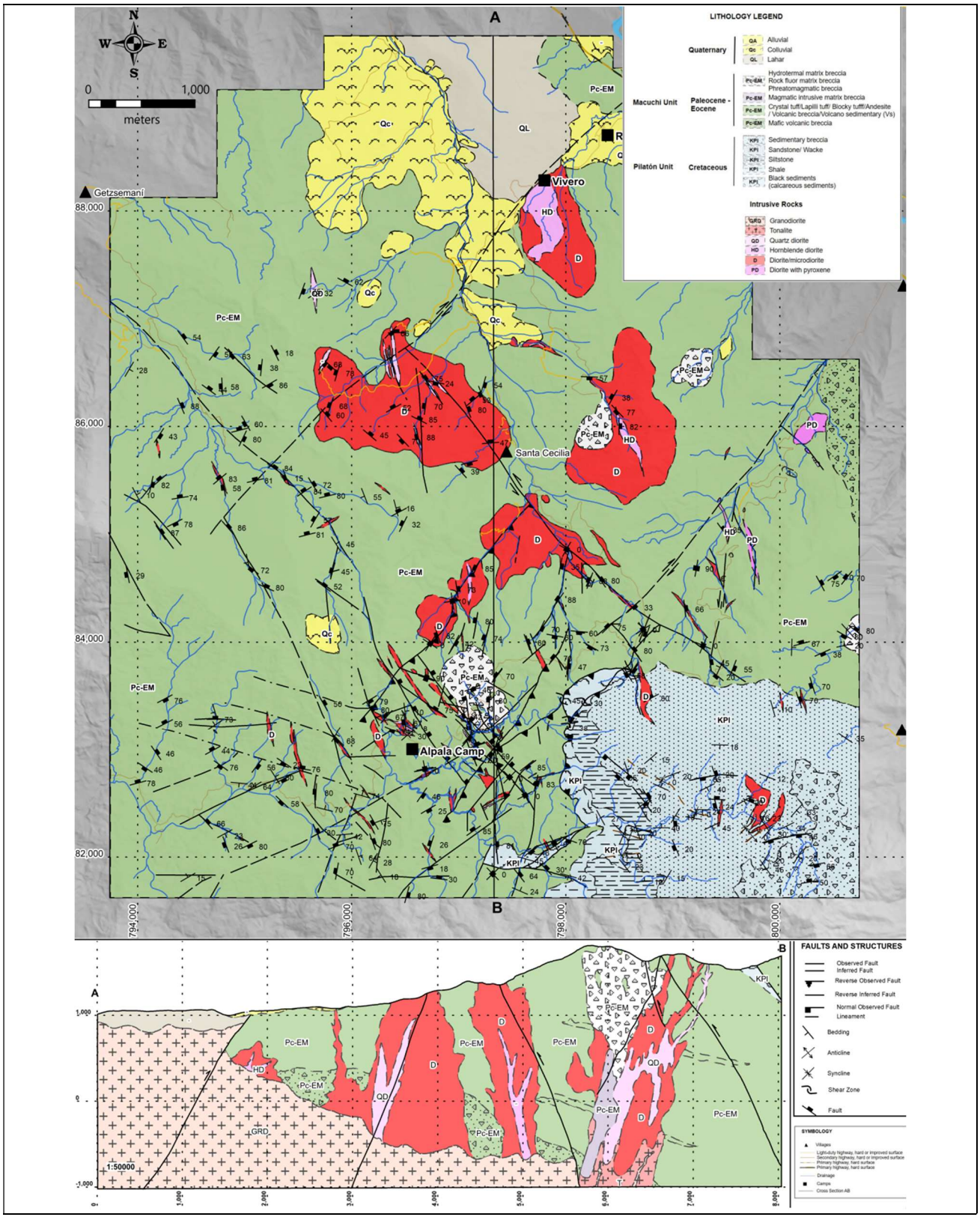


Figure 7.5 : Geology and Structure of the Cascabel Project Area

Three of these intrusions have been dated by SolGold, utilising the SHRIMP U/Pb zircon method, which indicates results of approximately 39 Ma for the Alpala and Moran porphyry centres and approximately 37 Ma for the Aguinaga porphyry centre (Armstrong, 2015 and 2016).

7.3 Alpala Deposit

7.3.1 Geology

Major host rock types of the deposit consist of gabbroic and basaltic basement rocks, overlain by Cretaceous siltstones and minor sandstones that are unconformably overlain by a sequence of Tertiary volcano-sedimentary and andesitic lavas. The volcanic and volcano-sedimentary sequences that host the deposit were previously mapped as the Macuchi Unit (Vallejo., 2007), a volcanic arc of tholeiitic and calc-alkaline composition which was formed on oceanic crust during the Eocene.

This sequence has been intruded by a series of Middle to Late-Eocene (Bartonian) hornblende-bearing diorites, quartz diorites and tonalities that form plutons, stocks and dykes.

Drilling has defined a northwest trending, steeply northeast dipping corridor known as the Greater Alpala Trend. This trend is centred upon a syn-mineralisation causal quartz-diorite intrusion (QD10) cut by a series of intra-mineralisation, late-mineralisation, and post-mineralisation stocks, dykes and breccias of diorite, hornblende diorite, quartz diorite, tonalite and granodiorite. Intrusions have been emplaced episodically such that each subsequent intrusion has introduced mineralising fluids (notably as porphyry-type quartz and quartz-sulphide veins) into the Alpala porphyry system, and/or remobilised existing mineralisation or contributed to localised overprinting and destruction of the pre-existing mineralisation.

Thin-section petrography reveals the presence of very fine-grained quartz in the groundmass of the intrusions, which suggests compositions that range from quartz diorite to tonalite. However, the intrusive rock types have been classified on observations made by the field geologist using a 20 times magnification hand lens (Garwin et al., 2017).

Two of the Alpala intrusions have been dated by the sensitive high-resolution Ion Micro Probe (SHRIMP) U/Pb zircon radiometric dating method, which indicates an approximate age of 39 Ma for the intrusions (Garwin et al., 2017).

Intrusions are typically emplaced with a stock-like geometry that is moderately elongate in a northwest direction. Intrusions often hold typically vertically and laterally extensive northwest trending, steeply dipping dyke extensions beyond their stock margins.

Due to the multi-episodic nature of the complex, several dykes appear rootless or ‘hanging’ in section view, however, these are seen to connect to the main stock or stocks in three dimensions or have been intruded and truncated by younger stocks.

The geometry of the various lithologies and intrusive bodies at Alpala is now well-understood and has been modelled from the completed drilling, demonstrating extensive sub-vertical continuity and highly complex intrusive relationships (Figure 7.6 and Figure 7.7).

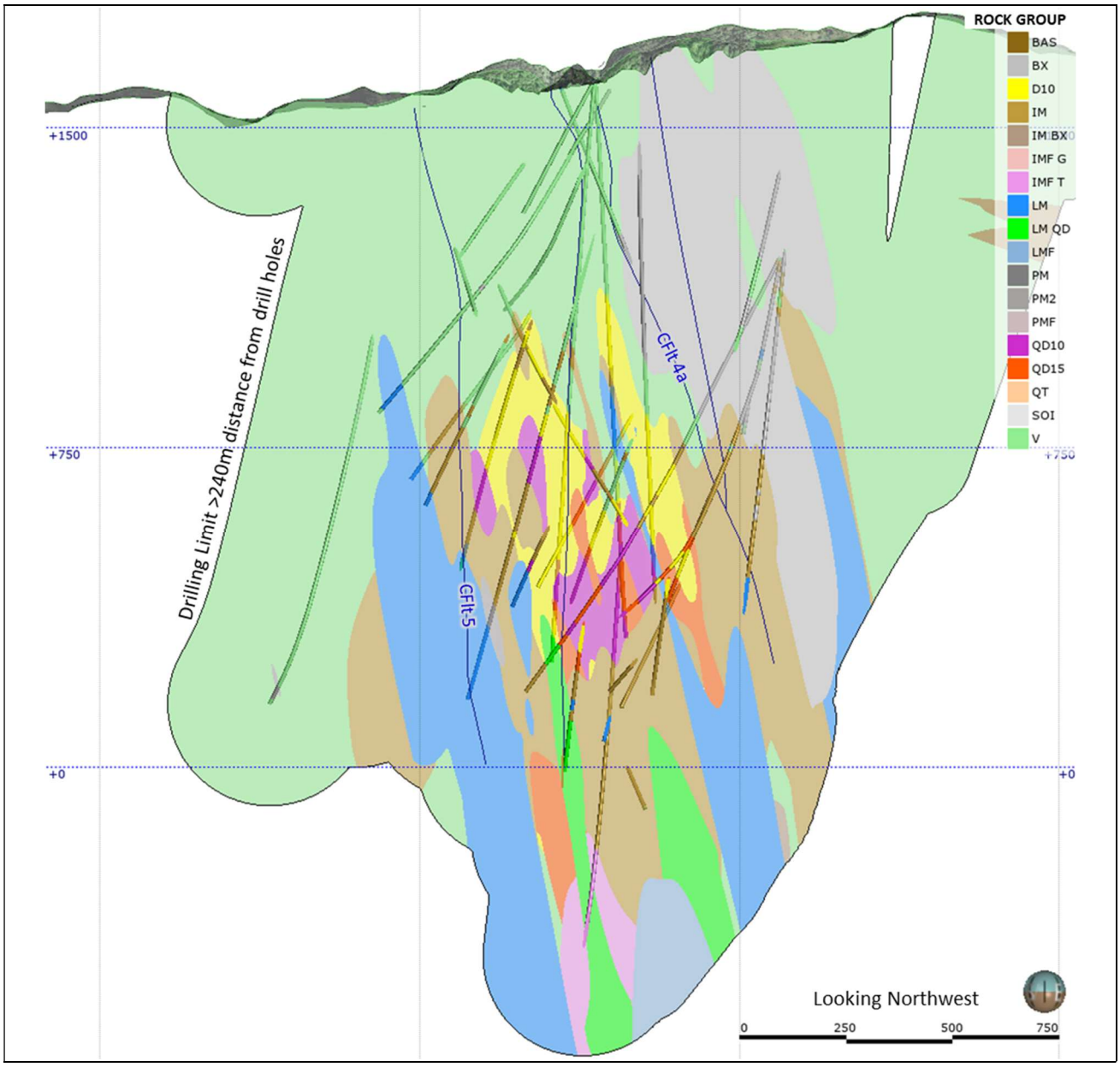


Figure 7.6 : Vertical Cross-Section 82,950N Through the Alpala Central Zone (Looking Northwest) Along the Trend of the Alpala Intrusive Complex, Centred on a 100m Wide Viewing Window, and Highlighting the Extensive Vertical Geometry and Episodic Nature of the Intrusions

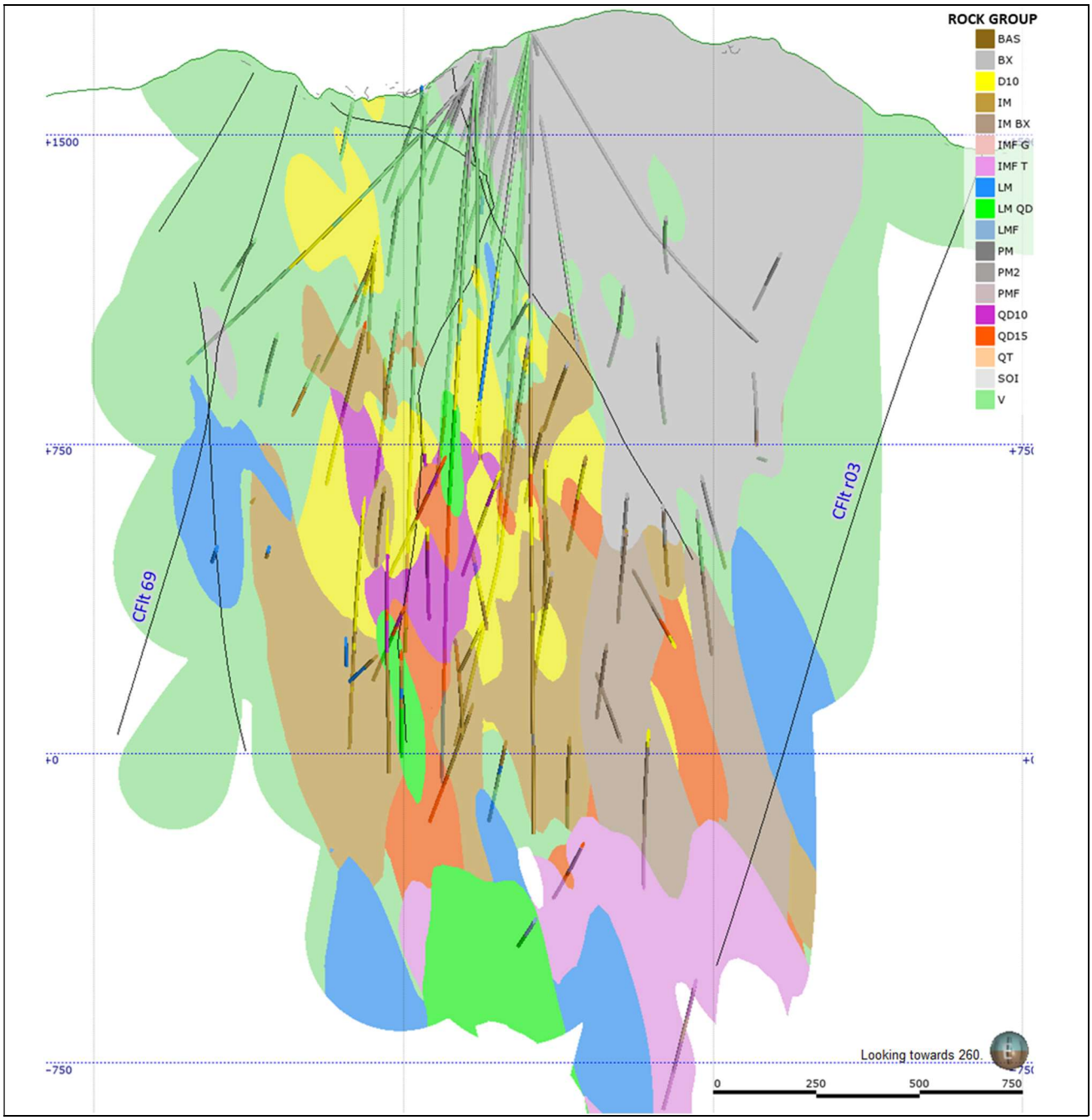


Figure 7.7 : Vertical Long-Section Through the Alpala Central Zone (Looking West-Southwest), Centred on a 100 m Wide Viewing Window, and Highlighting the Extensive Vertical Geometry and Episodic Nature of the Intrusions

Geological mapping and drill core logging has identified a total of 31 likely intrusion phases. These intrusions have been grouped into 18 major rock groups which have been delineated based on their mineralisation phase and resource group. All the major rock groups have been incorporated into the three-dimensional geological models created of the Alpala deposit.

A total of 20 major phases of mineralisation have been delineated on composition, relative timing relationships and porphyry related vein stages (Table 7.1).

Table 7.1 : Geological Modelling Codes Utilised for the Alpala Deposit, which form the Foundation of Geological Interpretation and 3D Modelling of the Alpala Deposit, showing mineralised deposit forming porphyry phases inside red outline (QD10 to G20)

Mineralisation Phase	Resouce Group	Rock Group	Rock Phase	Rock Description	Rock Group Relative Timing	Rock Phase Relative Timing	LithoGrade Domain CODE
Cover	NOT IN RES	SOI	SOI	Soil & Saprolite	350	350	na
		QT	QT	Quarternary	340	340	
Post Mineral		FLT	FLT	Post Mineral Faults	330	330	
		PM2	HD40	Post Mineral Hornblende Diorite	300	320	900
			D40	Post Mineral Diorite		310	
			QD40	Post Mineral Qtz Diorite		300	
		BX	RFBX	Rock Flour Matrix Bx	205	208	820
			UBX	Undifferentiated Late Bx		207	
			HBX	Hydrothermal Matrix Bx		206	
			IBX	Magmatic Intrusive Matrix Bx		205	
		PM	GRD30	Post Mineral Tonalite	170	200	800
			T30	Post Mineral Tonalite		190	
			D30	Post Mineral Diorite		180	
			QD30	Post Mineral Qtz Diorite		170	
Late-Mineral	LOW GRADE RES	LMF	G20	Granite	160	160	720
			T20	Late Tonalite	150	150	
		LM QD	QD20	Late Mineral Qtz Diorite	140	140	700
		LM	HD20	Horblende Diorite	120	130	600
			D20	Late Mineral Diorite		120	
Intra-Mineral	MED GRADE RES	IMF G	GRD15	Intra Mineral Granodiorite	115	115	540
	HiGH GRADE RES	IMF T	T15	Intra Mineral Tonalite	110	110	
		IM BX	IBXM	Intrusive Matrix Bx (Mineralised)	90	100	520
			HBXM	Hydrothermal Matrix Bx (Mineralised)		90	
		IM	D15	Intra Mineral Diorite	80	80	500
		QD15	QD15	Intra Mineral Qtz Diorite	70	70	400
Syn-Mineral		QD10	QD10	Syn? Mineral Qtz Diorite	60	60	300
Pre-Mineral	HOST ROCKS	D10	D10	Pre Mineral Diorite	50	50	200
		V	V	Pre Mineral Volcanics	40	40	100
	BASEMENT	BAS	MFR	Gabbro, Basalt	30	30	
			SED	Sst, Sltst, Mst, Lst		20	
			MIBX	Mafic Magmatic Intrusive Matrix Bx		10	

These intrusive rock phases are simplified into 11 major rock groups for three-dimensional modelling of the deposit and form the major low-grade, medium-grade and high-grade stages of mineralisation at Alpala.

The majority of the Cu and Au mineralisation at Alpala was added to the system by the QD10 intrusion with supplementary additions through time with the injection of the intra-mineralisation QD15, IM, IM BX, IMF T intrusive phases, with only very minor metal addition from late-mineralisation and post-mineralisation intrusions as the system waned.

A key point in understanding the Alpala deposit relates to the manner in which the geometric framework of various lithologies and intrusive bodies subsequently controlled the successive geometries and zonation of the

porphyry-style quartz vein abundance at Alpala, which in turn correlates with distribution of Cu and Au (Figure 7.8 and Figure 7.9).

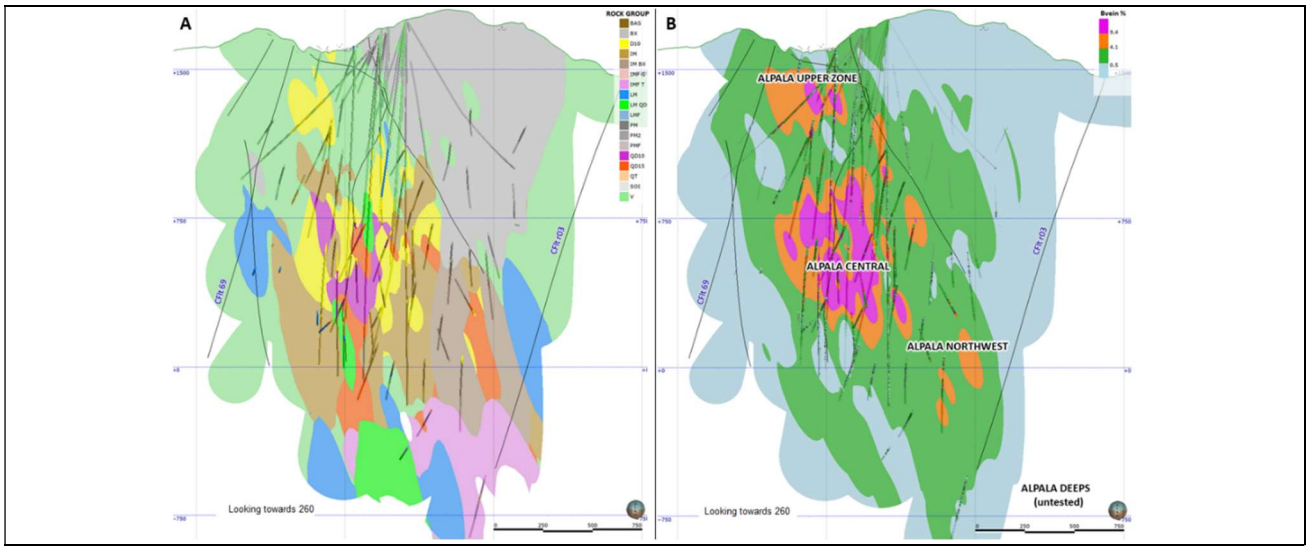


Figure 7.8 : Example Long-Section Through the Centre of Alpala Deposit, Looking West-Southwest, and Across the Trend of the Alpala Intrusive Complex, showing the geometric framework of intrusions (A), and high, medium and low abundance zones of porphyry-type quartz veins (B)

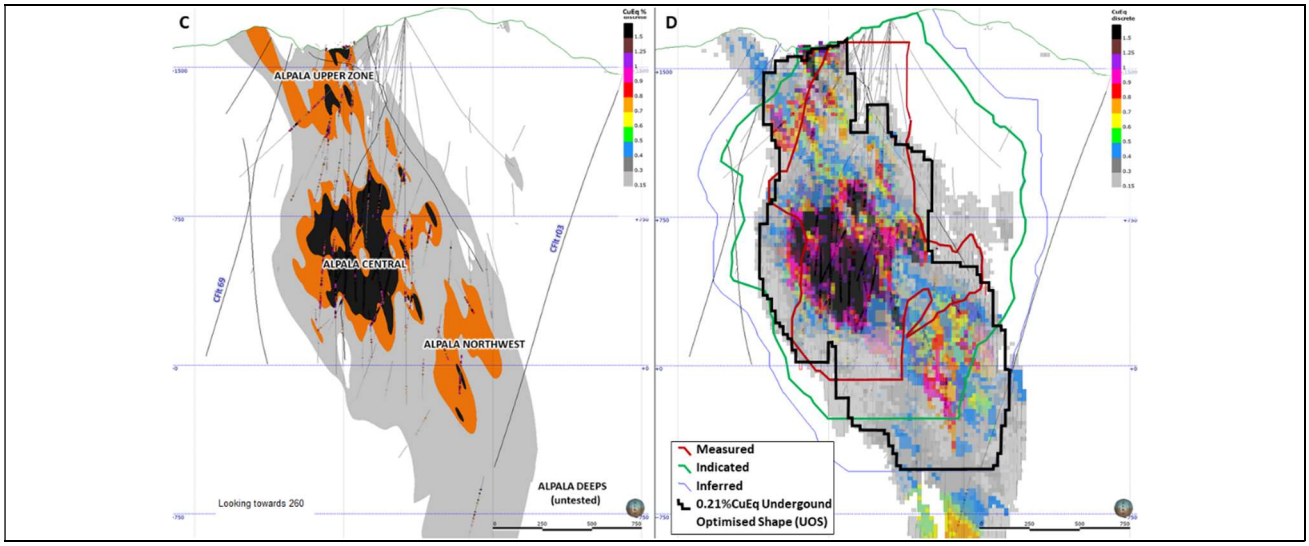


Figure 7.9 : Example Long-Section Through the Centre of Alpala Deposit, Looking West-Southwest, and Across the Trend of the Alpala Intrusive Complex, showing excellent correlation with high, medium and low grade zones (C), and block model grades above the 0.21% CuEq shut-off-grade, classification shells, and the Mineral Resource Outline (MRO) limit (D)

7.3.2 Mineralisation

The equigranular to sub-porphyritic, hornblende-bearing intrusions at Alpala are narrow, taper upwards, and are geometrically similar to grade models of Cu, Au and Ag mineralisation. Mineralisation occurs as a prolate body approximately 2,400 m northwest by 1,200 m northeast and 2,800 m in vertical extent, defined at a Cu equivalent (CuEq) shut-off criteria of greater than 0.15% CuEq and/or greater than 0.55% B-type quartz veins (Figure 7.10).

The Alpala deposit geological, structural and mineralisation all display a clear anisotropy which is prolate in a sub-vertical sense, dipping approximately 78° towards northeast, and oblate in plan (striking northwest). Recognition of this geometry, in the field and in various datasets, has played a critical role in the path to discovery of the Alpala deposit.

Representative mineralisation trends have been employed for each of the geology, vein and grade modelling processes utilising a combined trend model of the major trends identified from:

- Surface mapping of quartz vein orientations
- The Alpala Structural Zone (and CFlt4a interpreted from drill core)
- Intrusive contacts analysis
- Drill core vein abundance and orientation analysis (Global B-vein maximas), and
- Localised B-vein analysis.

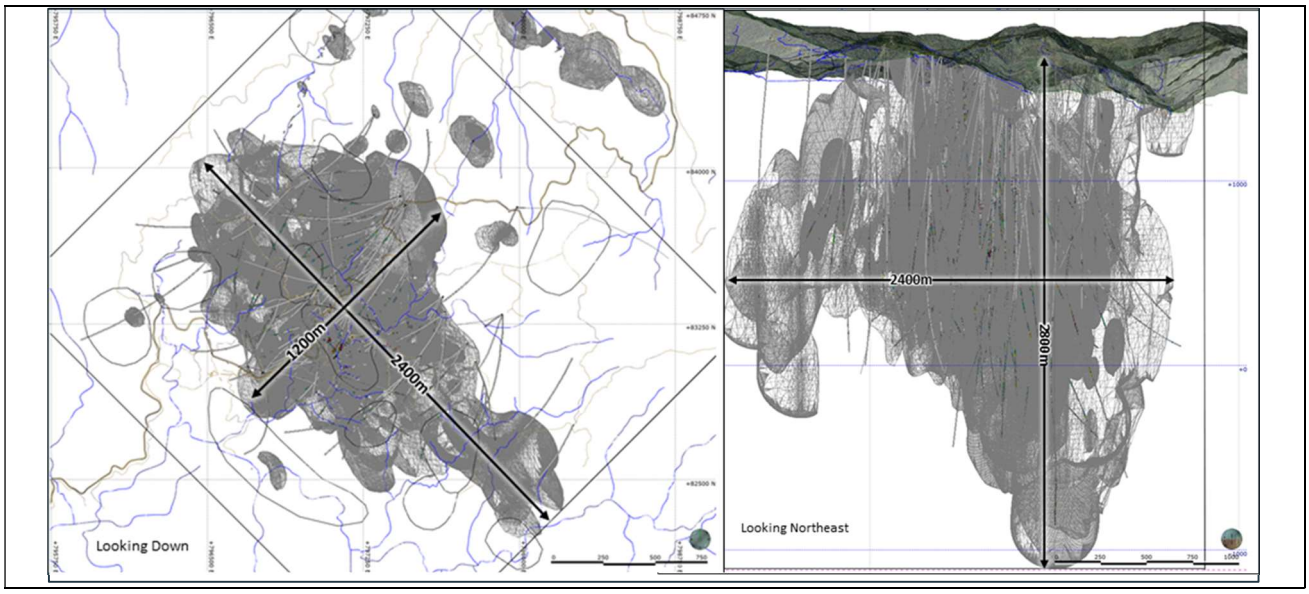


Figure 7.10 : Simplified Scaled Schematic Intrusive and Vein Paragenesis Model for the Alpala Deposit

The porphyry related vein types and mineralisation paragenesis at Alpala indicate a systematic progression in time and have been described by SolGold using the nomenclature originated by Gustafson and Hunt (1975).

Understanding of the intrusive phase relationships within the Alpala deposit was advanced following a detailed review of drill core in 2014, which focused on identifying the different vein types and their paragenesis. This work resulted in advances in the recognition of inconspicuous intrusive contacts and clearly showed that each intrusive phase contains a specific set of veins and resultant Cu and Au grades.

The geometry of the intrusive units and zones of porphyry style B-type quartz vein abundance correlate with Cu-Au grade distributions (Figure 7.11).

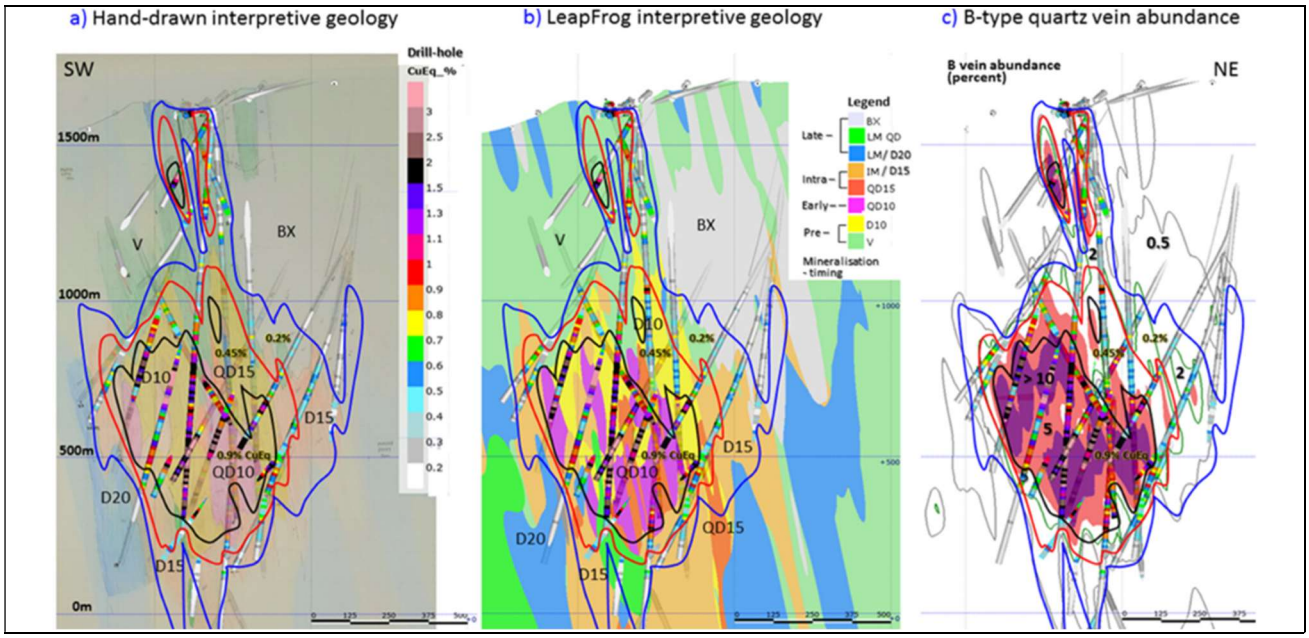


Figure 7.11 : Alpala Deposit Cross-Section 82,950 m N (window + 50 m), Showing the Relationships Between Rock Units, Porphyry Style B-type Quartz Vein Abundance, CuEq grade (Garwin et al., 2018)

Figure 7.12 displays some examples of the most important vein types recognised in the Alpala deposit, which are:

- Prismatic quartz showing unidirectional solidification texture (UST), cut by a chalcopyrite rich C-vein
- Intrusive contact between late QD20 and early D10, showing truncation of early B-veins and a late CD-vein that crosscuts the contact
- Chalcopyrite vein and late-stage bornite along fracture surface
- Magnetite bearing B1 quartz vein stockwork with clots of chalcopyrite (Cp)
- Late-stage pyritic D-vein with selvedge's of quartz-sericite.

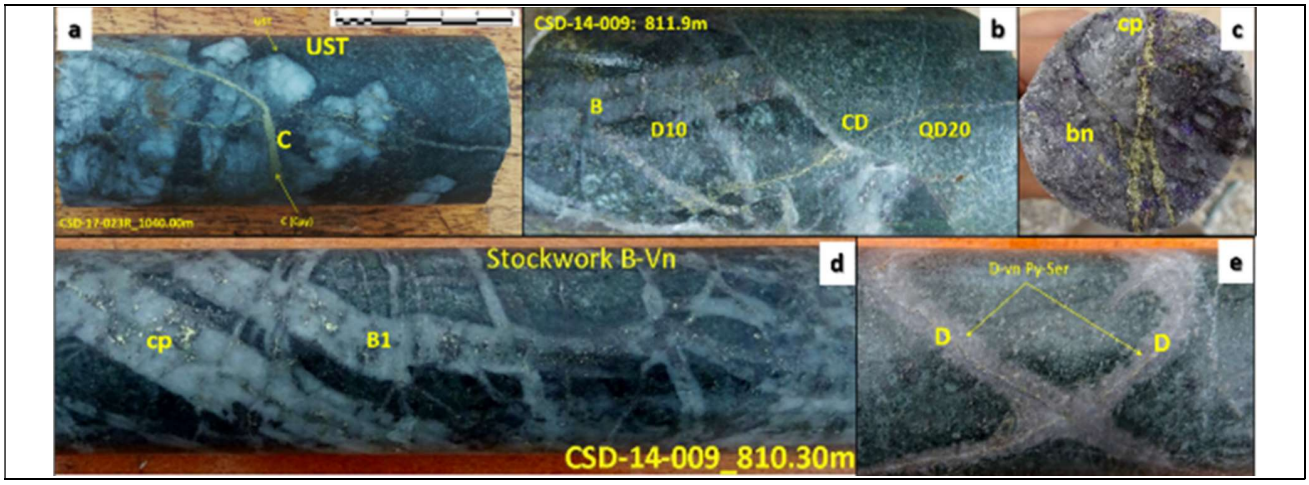


Figure 7.12 : Photographs of Drill Core from the Alpala Deposit, Showing Examples of the Most Important Vein Types Recognised in Alpala

7.3.3 Hydrothermal Alteration

Distinct spatial and temporal relationships are evident between hydrothermal alteration and copper-gold mineralisation, most notably emphasised by the following major hydrothermal alteration features at the Alpala deposit (Figure 7.13 and Figure 7.14):

- Intermediate argillic (chlorite-sericite-clay) alteration coincides with the majority of medium-grade to high-grade mineralisation (> 0.7% CuEq) in the deposit, which is characterised by abundant chalcopyrite and lesser amounts of pyrite. The core of the deposit typically contains more than two percent hydrothermal magnetite over vertical intervals that exceed 300 m. Local zones of greater than 4% magnetite occur over vertical intervals of 50 m to 100 m
- The high-grade core of the deposit, characterised by abundant chalcopyrite, coincides with transitional-stage chlorite-sericite alteration that overprints the contact zone between early-stage potassic-alteration and inner propylitic-alteration. The combined silicate-mineral assemblage of this early-alteration zone consists of chlorite-biotite-actinolite + epidote
- Late-stage quartz-sericite (phyllic), pyrophyllite-dickite (advanced argillic) and kaolinitic (argillic) alteration types are characteristic of the upper portions of the deposit, which contains abundant pyrite and lesser amounts of chalcopyrite and bornite.

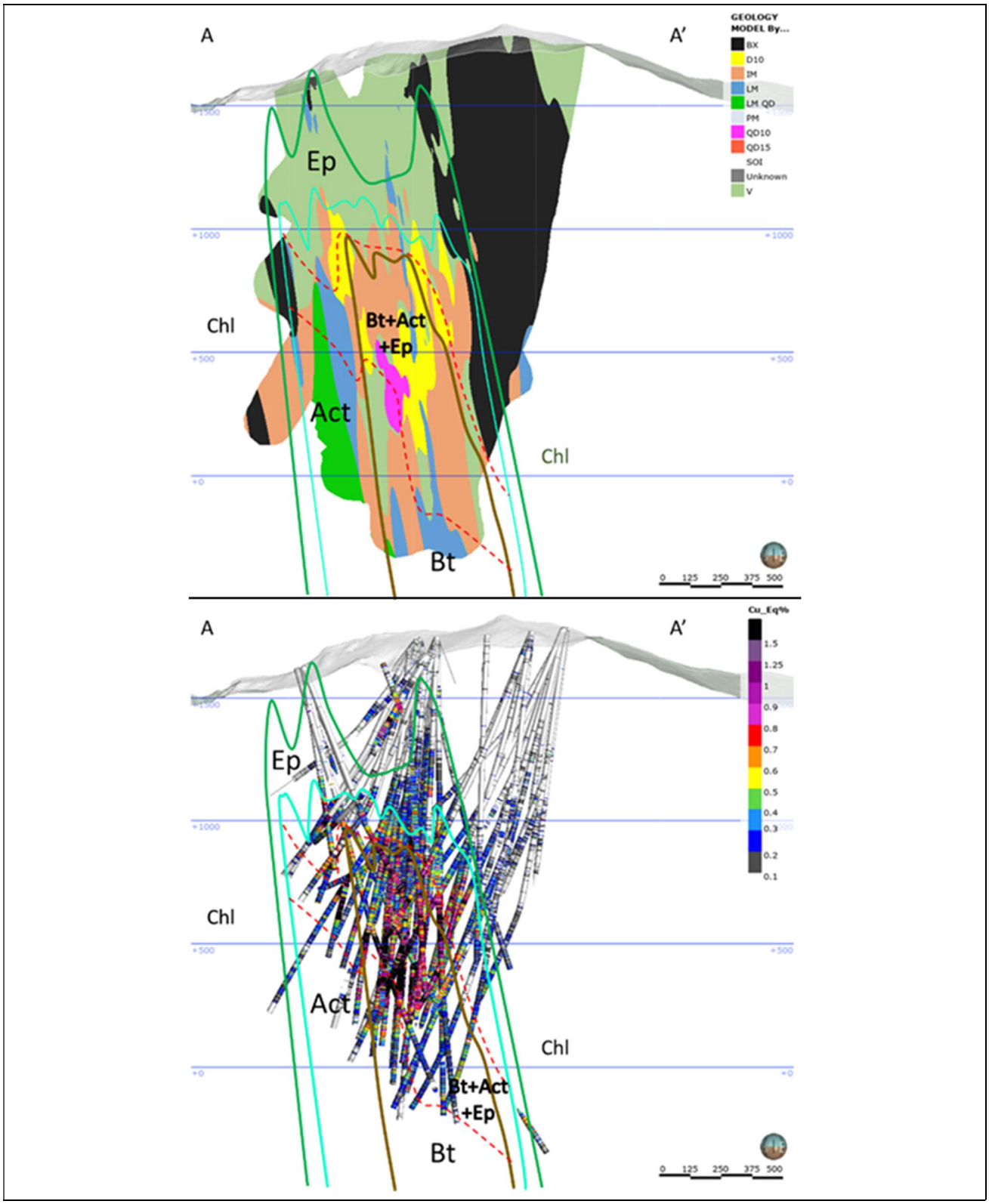


Figure 7.13 : Early Alteration Phases at the Alpala Deposit Shown in Section-View Looking Northwest (window + 50 m) (courtesy ENSA Geology Department, 2020)

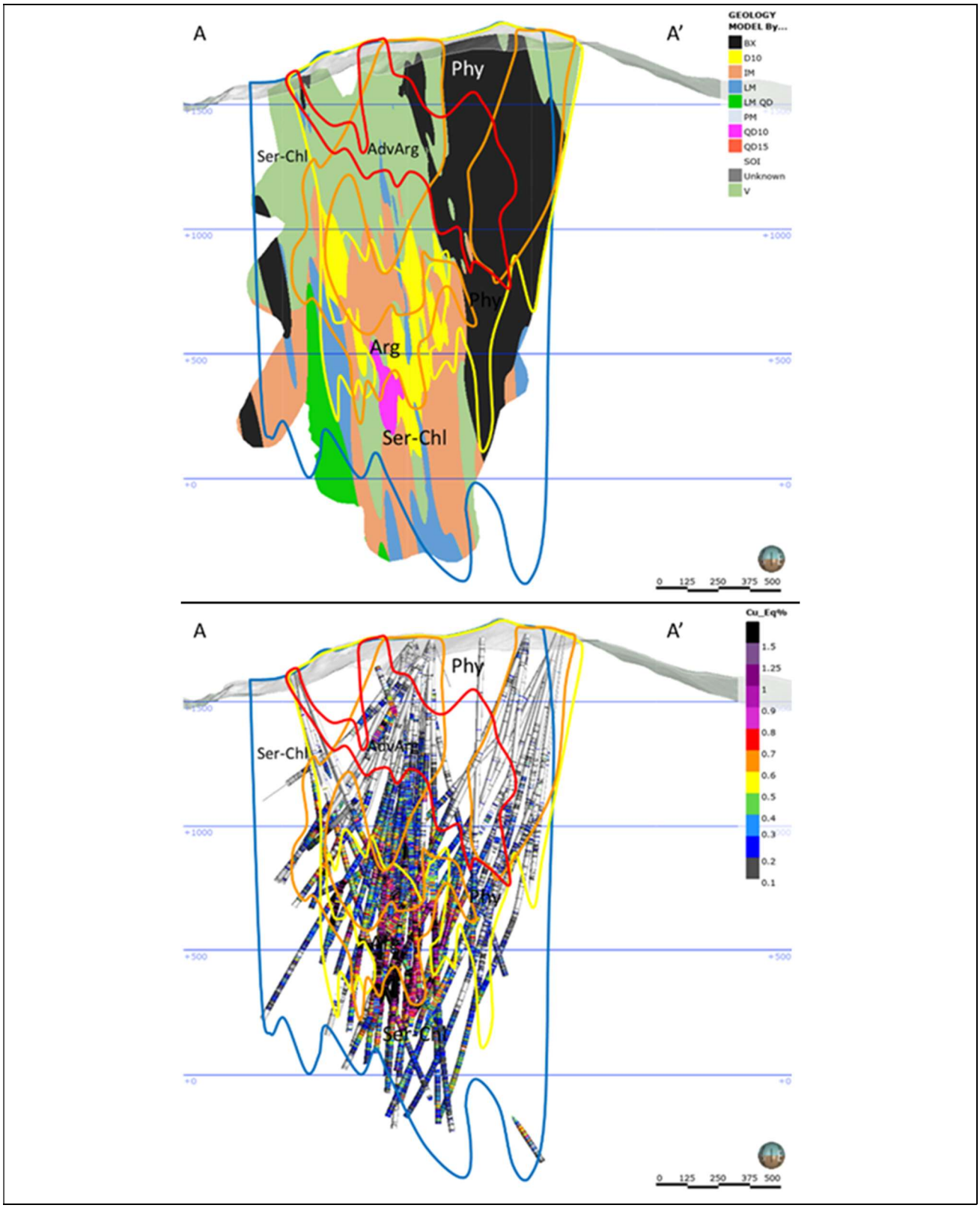


Figure 7.14 : Late Alteration Phases at the Alpala Deposit Shown in Section-View Looking Northwest (window + 50 m) (ENSA Geology Department, 2020)

The geometrical understanding of the deposit and its internal timing relationships between rock phases, veins, and Cu-Au grades was advanced by completion of hand-drawn cross-sections and level-plans for each dataset throughout the deposit. Hand-drawn cross-section interpretations of geology and B-vein abundance was performed at approximately 70 m (70.711 m) spacings across the deposit, with a window of approximately 35 m (±35.356 m) from section 82,650 N to section 83,450 N and are orientated northeast and centred upon a northwest trending baseline.

Hand-drawn level-plan interpretations of geology and B-vein abundance was also performed at 200 m levels throughout the deposit, with a window of ±100 m from surface to -300 mRL.

The geological modelling of rock groups was completed within the 3D software program Leapfrog Geo, which forms the foundation of the vein and grade modelling in the Mineral Resource estimation and compares well with hand-drawn level plans and sections.

Geological interpretation was completed as a first pass with subsequent B-vein interpretation utilising an underlay of geology such that interpretation can account for the sequence and relative timing between host intrusions.

The geometry of the intrusive units and accompanying zones of porphyry-style quartz vein abundance correlate exceedingly well with associated Cu and Au grade distribution (Figure 7.15).

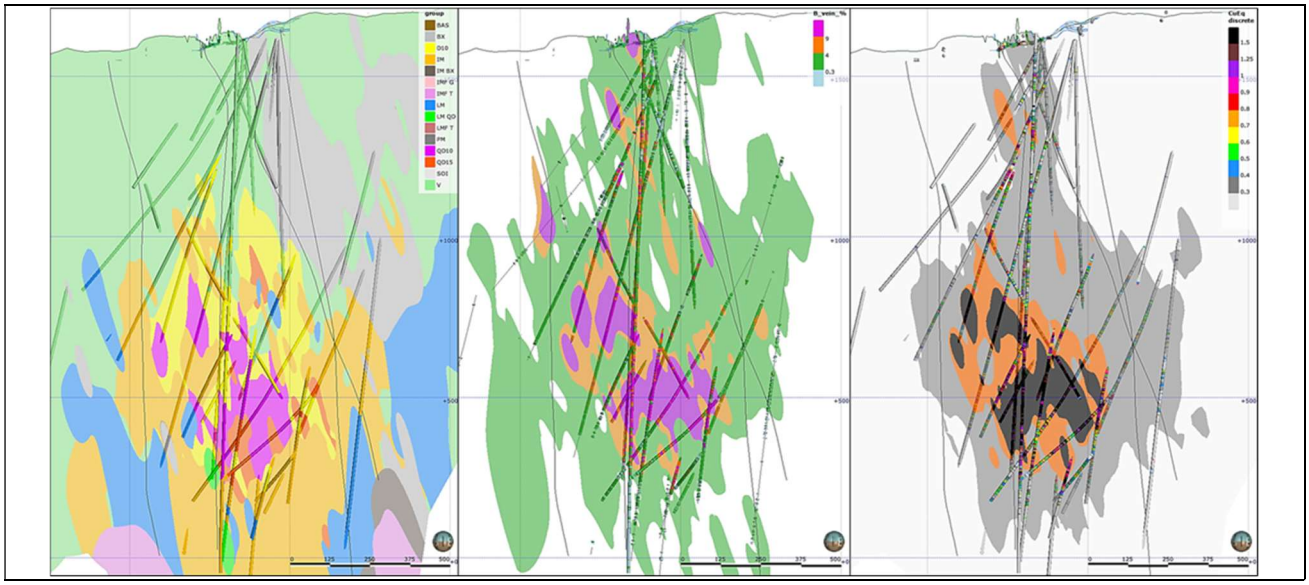


Figure 7.15 : Example Cross-Section, Looking northwest, centred upon a 100m wide window, showing 3D Geological Models (left), B-Type Quartz Vein Abundance Models (centre), and Grade Models (right) with drill holes displaying downhole geology

7.4 Tandayama-America Deposit

7.4.1 Geology

Major host rock types of the Tandayama-America deposit consist of a sequence of Tertiary volcano-sedimentary and andesitic lavas of the same age as those at the Alpala deposit. This sequence has also been intruded by a series of Middle to Late-Eocene (Bartonian) quartz diorites and diorites that form plutons, stocks and dykes.

Drilling at Tandayama-America has defined a northwest trending, steeply northeast dipping corridor regionally associated with the Greater Alpala Trend. This trend is also centred upon a syn-mineralisation causal quartz-diorite intrusion (QD10).

Geological mapping and drill core logging has identified a total of 13 likely intrusion and intrusion related breccia phases at Tandayama-America. These intrusions form a similar geometry to that of the Alpala deposit and have been grouped into 7 major rock groups which have been delineated based on their mineralisation phase and resource group. All the major rock groups have been incorporated into the three-dimensional geological models created of the Alpala deposit (Table 7.2).

Table 7.2 : Geological modelling codes utilised for the Tandayama-America deposit, which form the foundation of geological interpretation and 3D modelling of the Tandayama-America deposit, showing mineralised deposit forming porphyry phases inside red outline (QD10 to QD30)

Mineralisation Phase	Resouce Group	Rock Group	Rock Phase	Rock Description	Rock Group Relative Timing	Rock Phase Relative Timing	LithoGrade Domain CODE
Cover	N.I.R	SOI	SOI	Soil & Saprolite	na	na	na
		FLT	FLT	Post Mineral Faults	na	na	
Post-Mineral	BARREN	PM	QD30	Post Mineral Qtz Diorite	1190	1190	1400
			D30	Post Mineral Diorite		1180	1300
	BARREN - LOW GRADE		RFBX	Rock Flour Matrix Bx		1130	1200
			HBX	Hydrothermal Matrix Bx		1120	1100
Late-Mineral	LOW GRADE	LM	D20	Late Mineral Diorite	1110	1110	1000
			QD20	Late Mineral Qtz Diorite		1100	900
Intra-Mineral	MED GRADE	IM	QD15	Intra Mineral Qtz Diorite	1080	1080	800
			D15	Intra Mineral Diorite		1070	700
Early-Mineral	Hi GRADE	EM	D11	Syn? Early Mineral Diorite	1060	1060	600
			QD10	Syn? Early Mineral Qtz Diorite		1055	500
Pre-Mineral	HOST ROCKS	IBX	IBX	Pre Mineral Magmatic Intrusive Matrix Bx	1050	1050	400
		D10	D10	Pre Mineral Diorite	1045	1045	300
		V	V	Pre Mineral Volcanics	1040	1040	200
			VBAS	Pre Mineral Mafic Volcanics		1030	100

The majority of the Cu and Au mineralisation at Tandayama-America was added to the system by the QD10 intrusion with supplementary additions through time with the injection of the intra-mineralisation intrusive phases, with only very minor metal addition from late-mineralisation and post-mineralisation intrusions as the system waned.

The geometric framework of various lithologies and intrusive bodies subsequently controlled the successive geometries and zonation of the porphyry-style quartz vein abundance at Tandayama-America, which in turn correlates with the distribution of Cu and Au .

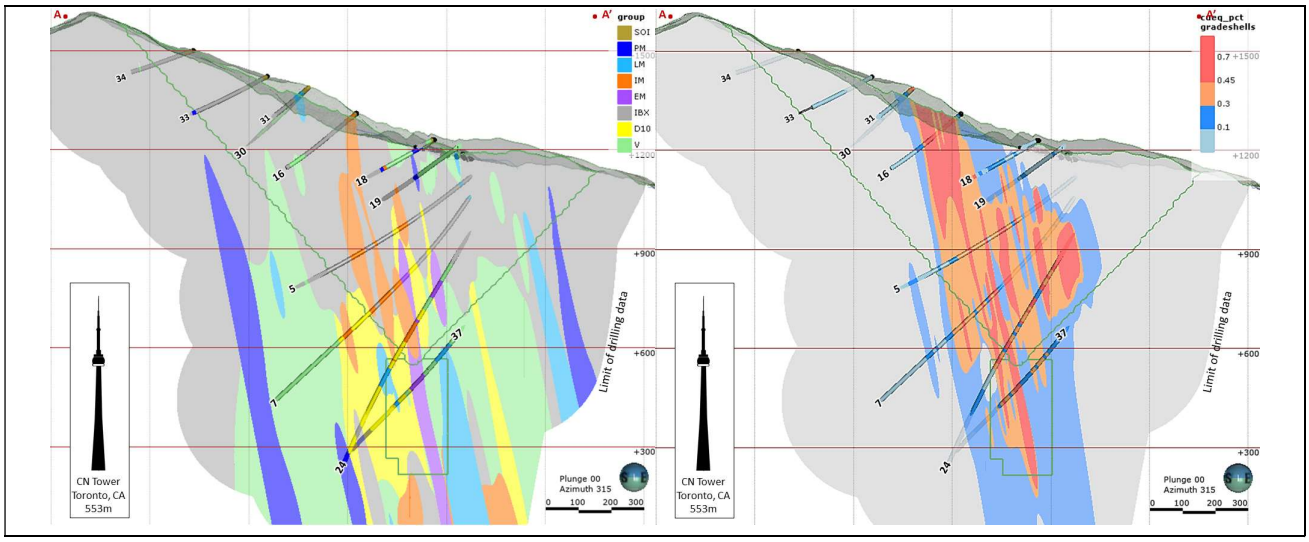


Figure 7.16 : Example cross-section through the centre of Tandayama-America deposit, looking northwest showing the geometric framework of intrusions (left), and copper equivalent grade shells (right)

7.4.2 Mineralisation

The mineralisation style and trend at Tandayama-America is essentially the same style as that seen in Alpala.

7.4.3 Hydrothermal Alteration

The following major hydrothermal alteration features at the Tandayama-America deposit are essentially the same style as that seen in Alpala, where intermediate argillic (chlorite-sericite-clay) alteration coincides with the majority of medium-grade to high-grade mineralisation (>0.3% CuEq) in the deposit, however, at Tandayama-America it is characterised by conspicuously abundant muscovite at approximately greater than 12%.

7.5 Comments on Section 7

In the opinion of the QPs, the knowledge of the deposit settings, lithologies, mineralisation style and setting, ore controls, and structural and alteration controls on mineralisation is sufficient to support Mineral Resource and Mineral Reserve estimation.

8 Deposit Types

8.1 Deposit Types

The mineralisation observed at surface and in the drill core along the trend of the Alpala deposit is considered as a classic porphyry Cu-Au system and exploration has been guided with this as the primary target. Exploration is also assessing the potential for surrounding economic porphyry deposits within a 1 to 2 km radius of the Alpala deposit, as well as the potential for discovery of epithermal and skarn deposits peripheral to these porphyry systems throughout the Cascabel Project area.

These mineralised systems are hosted within a linear belt (Andean Porphyry Belt) that extends from southern Chile right through to Ecuador and Colombia to Panama. The Andean Porphyry Belt is host to the largest concentrations of Cu in the world, including numerous deposits that are in active mining operations.

This geological setting is associated with the following mineral deposit types:

- Porphyry Cu-Au-Ag-Mo - related to the early stages of magmatism
- Epithermal Au, low and high-sulfidation - associated with volcanic regions above porphyry systems
- Polymetallic skarn - related to hydrothermal fluid flow from granite stocks through permeable and reactive calcareous host-rocks, such as limestone and calcareous siltstone.

Porphyry deposits are characterised by disseminated, veinlet and fracture controlled Cu-Fe sulphide minerals distributed throughout a large volume of rock in association with potassium silicate, sericitic, propylitic and less commonly, advanced argillic alteration in porphyritic plutons and in the immediate wall rocks (Meyer and Hemley, 1967; Lowell and Guilbert, 1970; Gustafson and Hunt, 1975; Titley and Beane, 1981; Einaudi, 1982). In porphyry systems, there exists a close spatial and temporal link between volumetrically small causative intrusions and broadly dispersed magmatic hydrothermal alteration and mineralisation. Porphyry-copper deposits are large, commonly hundreds to thousands of million tonnes, and low to medium in grade (0.3 to 1.5% Cu). The majority of gold-rich porphyry deposits occur in the circum-Pacific area and commonly contain 0.3 to 1.6 g/t Au (Sillitoe, 1990 and 1993).

The general characteristics of porphyry systems are:

- Small diameter, less than 2 km, causative intrusions of intermediate to felsic composition
- Shallow levels of emplacement, typically 1 to 4 km
- Porphyritic texture of causative intrusions, where feldspar, quartz and mafic phenocrysts are contained in a fine-grained to aplitic groundmass
- Multiple phases of intrusion, pre, syn and post-ore; late-stage diatremes are common in western Pacific volcanic-arc settings
- Several stages of hydrothermal alteration associated with each mineralising intrusion
- Extensive development of fracture-controlled alteration and mineralisation in both porphyritic intrusions and adjacent wall rock
- A progression from early, discontinuous and irregular veins and veinlets (A-veins), through transitional, planar veins (B-veins) to late, through-going veins (D-veins) and breccia bodies (vein terminology follows that of Gustafson and Hunt, 1975)

- A progression in hydrothermal alteration from early, central potassium silicate and distal propylitic styles to late sericitic/phyllic, advanced and intermediate argillic alteration types
- Sulphide and oxide minerals, which vary from early bornite-magnetite through transitional chalcopyrite-pyrite to late pyrite-hematite, pyrite-enargite or pyrite-bornite
- Fluid inclusion studies which indicate that early alteration and Cu mineralisation are generated by magmatic fluids with 30 to >60 wt. % NaCl equivalent over a temperature range of 400°C to greater than 700°C, whereas the fluids related to late alteration and mineralisation commonly include a meteoric component and are more dilute (less than 15 wt. % NaCl equivalent) and lower in temperature (200°C to 400°C).

The Andean Porphyry belt is a well-documented linear belt that hosts many known Cu porphyry deposits as well as epithermal concentrations of Au, Cu and Ag. The belt extends from southern Chile and Argentina in the south to Ecuador, Colombia and Panama in the north.

The Alpala and Tandayama-America deposits occur near the overlap of Eocene and Miocene Andean porphyry belts that extend from Colombia through Ecuador and Peru into Chile and Argentina (Figure 8.1). The deposit formed in the Eocene, which is similar in age to the giant La Escondida and El Abra deposits in Chile (Cunningham et al., 2008).

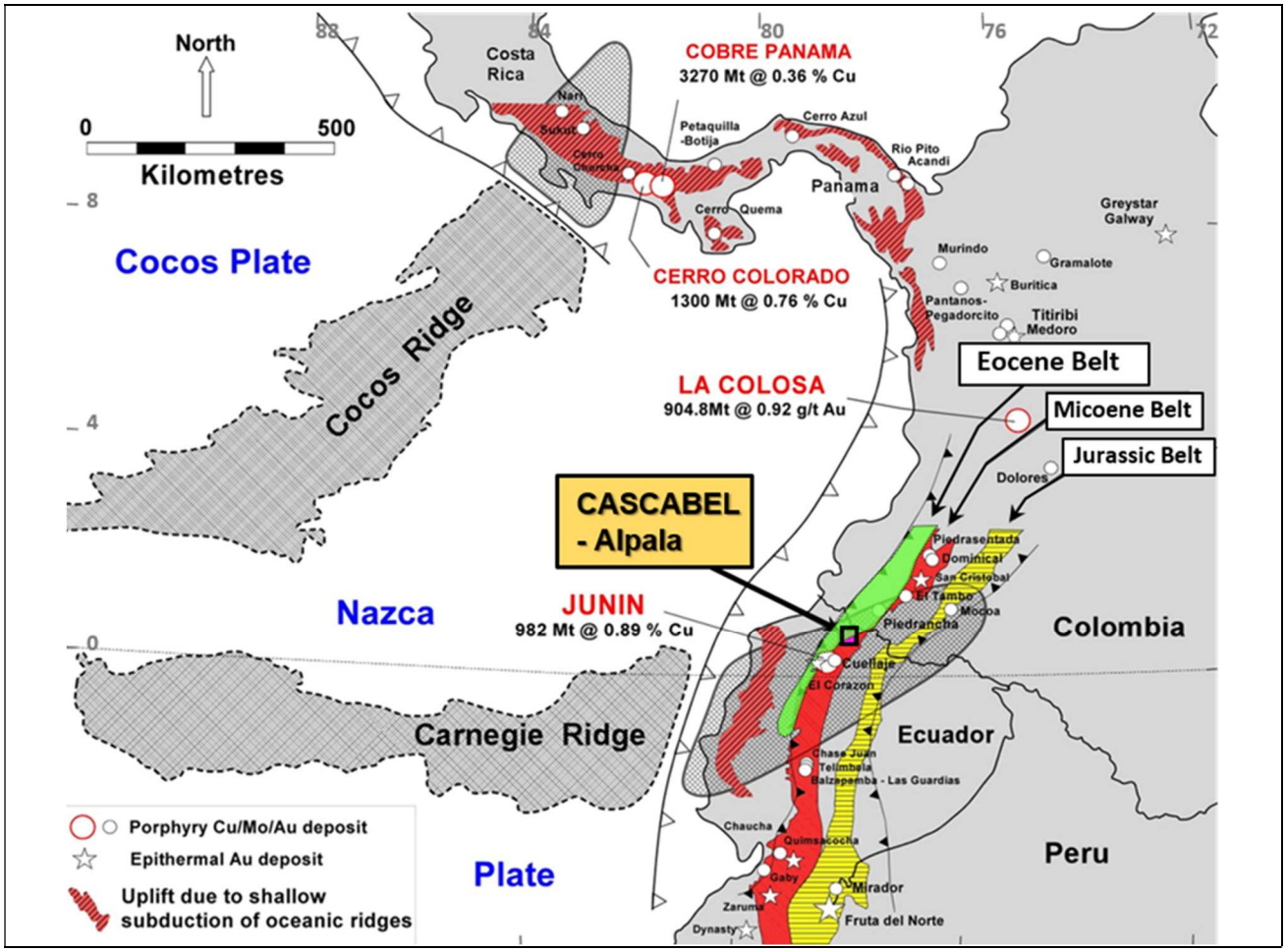


Figure 8.1 : Location of the Alpala Porphyry Copper-Gold-Silver Deposit, Cascabel Project in the Eocene Porphyry Belt of Northern Ecuador

An idealised schematic of Porphyry deposits illustrating the classic generic model and possible related deposit types are shown in Figure 8.2.

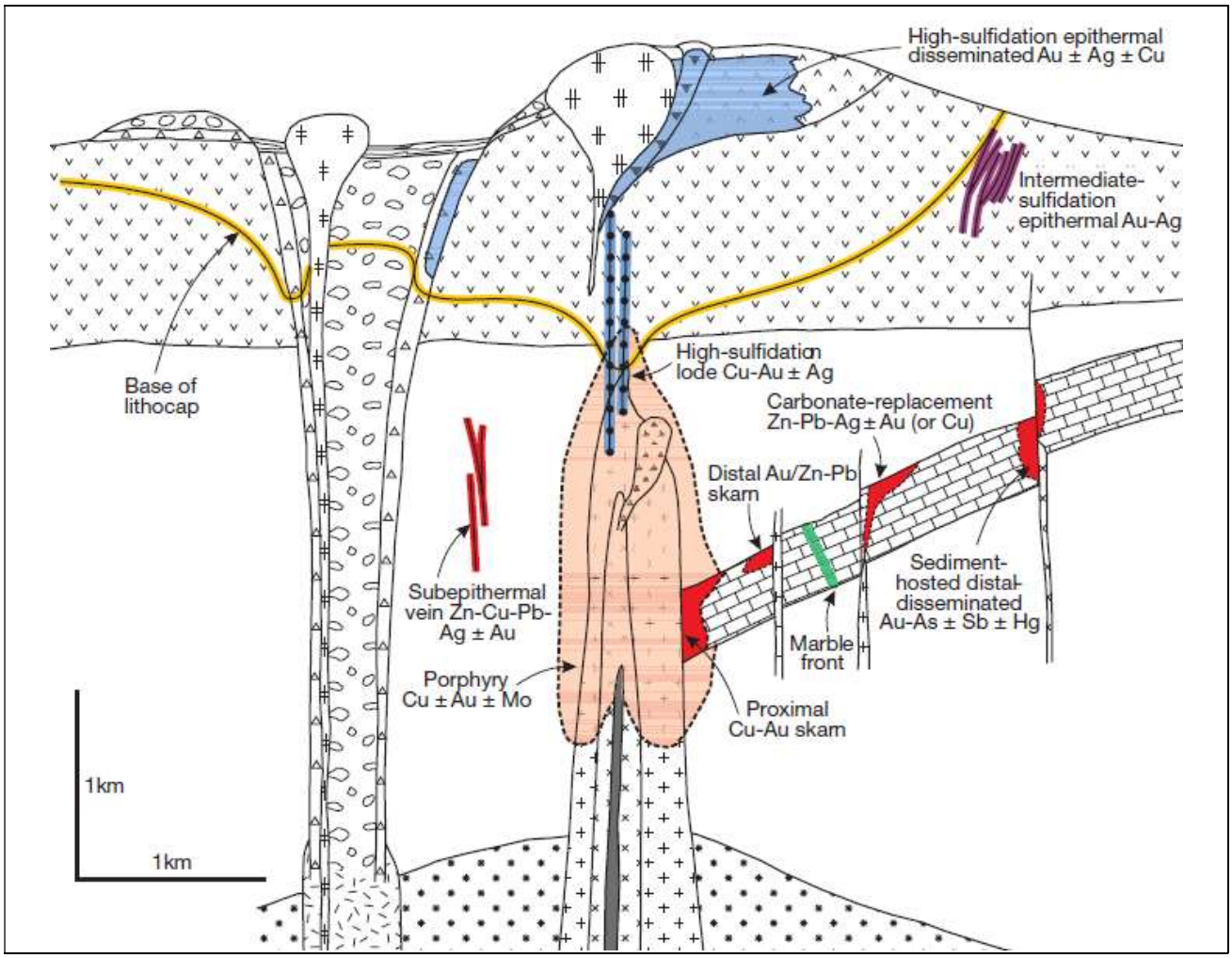


Figure 8.2 : Schematic of an Idealised Copper Porphyry Deposit Illustrating the Classic Generic Model and Possible Related Deposit Types (After Sillitoe, 2010)

8.2 Comments on Section 8

The mineralisation observed at surface and in the drill core along the trend in the Cascabel concession is considered as a classic porphyry Cu-Au system on the basis of:

- Porphyritic texture of causative intrusions, where feldspar, quartz and mafic phenocrysts are contained in a fine-grained to aplitic groundmass
- Several stages of hydrothermal alteration associated with each mineralising intrusion
- Extensive development of fracture-controlled alteration and mineralisation in both porphyritic intrusions and adjacent wall rock
- A progression from early, discontinuous and irregular veins and veinlets (A-veins), through transitional, planar veins (B-veins) to late, through-going veins (D-veins) and breccia bodies (vein terminology follows that of Gustafson and Hunt, 1975)

- A progression in hydrothermal alteration from early, central potassium silicate and distal propylitic styles to late sericitic/phyllic, advanced and intermediate argillic alteration types
- Sulphide and oxide minerals, which vary from early bornite-magnetite through transitional chalcopyrite-pyrite to late pyrite-hematite, pyrite-enargite or pyrite-bornite.

Two deposits have been developed to the Mineral Resource Estimate stage in the Cascabel concession, with additional prospects the subject of ongoing exploration programs.

9 Exploration

9.1 Historical Exploration

Previous exploration of the project area, extending from 1980 to 2011, focussed on the source of Au, Cu, Pb and Zn in stream sediments, which led to the location of Au-bearing, polymetallic epithermal quartz veins in streams that flank the Alpala deposit.

Previous explorers focussed on polymetallic base-metal Au veins and pan concentrate Au showings occurring some 800 m to 2,000 m from what would become the Alpala discovery outcrop at Alpala Creek. Intermediate epithermal polymetallic base metal Au veining and associated widespread Cu, Au, Mo, Zn anomalism typically form peripheral to porphyry centres.

Recent exploration at the Cascabel Project began with the acquisition of the project by Cornerstone from Santa Barbara Copper and Gold S.A. in 2011. Cornerstone expanded on preliminary exploration carried out in the 1980's by completing reconnaissance mapping alongside stream sediment, panned concentrate and rock chip sampling totalling 93 samples in June to July 2011.

9.2 Current Exploration

In May 2012, SolGold commenced the first systematic exploration on the concession with reconnaissance field mapping. SolGold's exploration has initially targeted the licence as a whole, as well as specifically targeting a number of the priority prospects within the licence. Amongst the first exploration techniques employed by SolGold (ENSA) on the Cascabel Project included reconnaissance mapping and the commencement of geochemical sampling of stream sediment, soil and rock which built on historical programs.

This early work noted the transition from chlorite-propylitic alteration in lower Moran Creek to epidote-(chlorite)-propylitic alteration in the Moran Creek headwaters, postulating a vector toward the south for a potential porphyry source. Soon after, a reconnaissance mapping team began exploring the southern watersheds of the concession and located an approximately 80 m wide zone of Cu and Au bearing, sheeted, porphyry-style quartz veins in Alpala Creek.

A helicopter borne magnetics and radiometric survey was conducted over the entire Cascabel tenement in November 2012. A reduced-to-the-pole magnetic high/low complex was identified to be broadly coincident with a 1.5 km by 2.2 km Mo (greater than 1.4 ppm) soil anomaly that encompasses the Alpala discovery zone.

The grid that is used for all co-ordinates on the project to date is WGS84-UTM-17N (EPSG:32617) and all historical data collected under the Peru South America Datum (PSAD56-17N) has been transformed to WGS84-UTM-17N. No local grids have been used for the project as yet, however, establishment of a local mine grid is planned for late 2022.

A 3D airborne laser scanning Light Detection and Ranging (Lidar) topographic survey was completed in November 2018. Following 3D airborne LiDAR and photogrammetry topographic surveys in February 2020, the DTM utilised for all studies was finalised.

Multi-element grid-based soil geochemistry studies took in approximately 3,287 soil grid samples and 550 soil auger samples across an area of approximately 35 km^2, and indicated several zones of coincident Au, Cu, Mo, and Cu-Zn ratio anomalies across a number of interpreted porphyry centres. The recognition of geochemical zoning has assisted drill targeting within the deposit and tenement-wide exploration. This zoning is

characterised by central Cu-Au; proximal Mo; proximal to distal Bi, Se and Te; and distal As, Mn and Zn. The central portions of the three major porphyry systems discovered to date show high Cu/Zn and Mo/Mn ratios in soil and rock-chip samples. Within the Alpala deposit, variations of Au/Cu ratios in drill holes assist in the delineation of different intrusion stages.

The soil survey identified widespread geochemical anomalies, including at least four major porphyry centres characterised by coincident Au, Cu and Mo highs which consist of the Alpala cluster, Moran, Aguinaga and Tandayama-America (Figure 9.1).

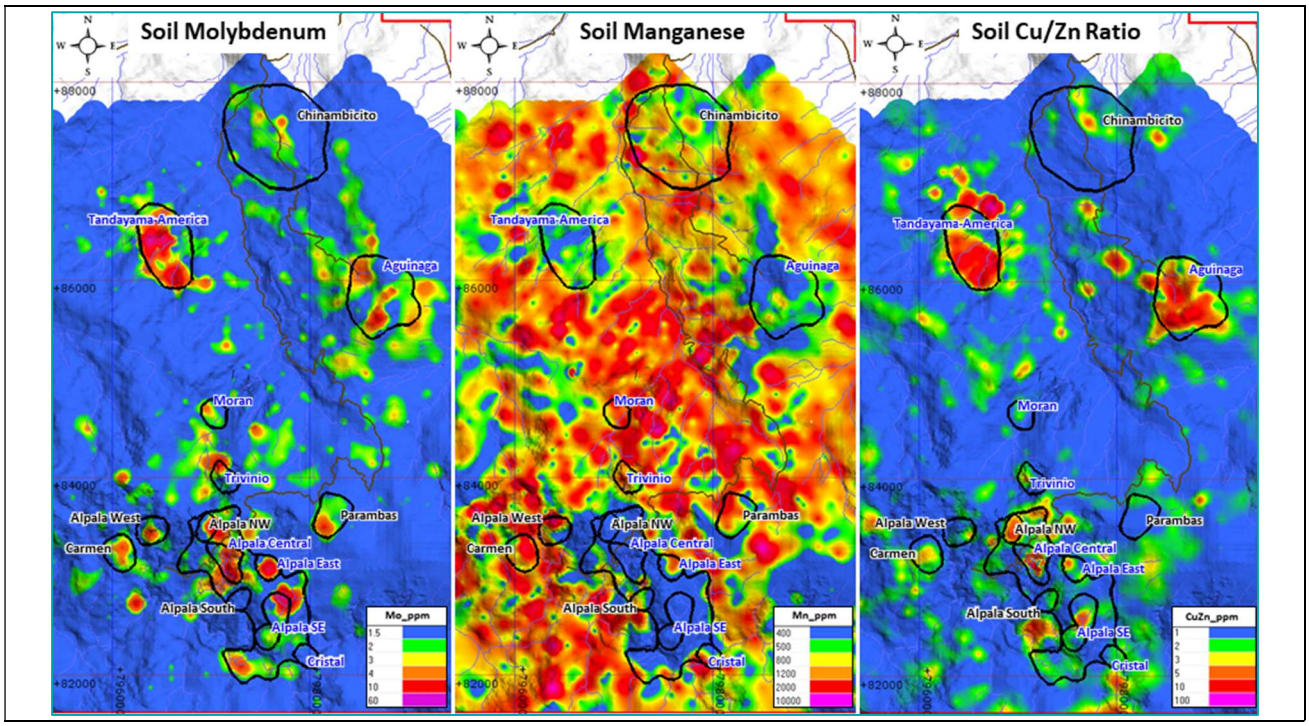


Figure 9.1 : Summary of Soil Geochemical Results for the Cascabel Concession, showing Mo, Mn and Cu/Zn Ratio

The application of the Anaconda method to geological mapping and drill core logging have facilitated the identification of more than six major intrusion stages and a vein paragenesis that allows for the prediction of Cu-Au grades in the Alpala deposit. The most important indicators of high-grade mineralisation include the presence of the early-stage causal intrusion(s), elevated porphyry-style vein abundance and an increased ratio of chalcopyrite to pyrite.

The spectral analysis of the grid soil samples led to the identification of zoned clay-mica alteration assemblages over an area of approximately 2.5 km by 1 km, centred approximately over the discovery outcrop and hydrothermal alteration (at surface). These results were deduced to represent the structurally controlled roots of a lithocap above the Alpala porphyry system.

Building on past 1:10,000 scale mapping of the project area, SolGold field teams commenced 1:2,000 and 1:500 scale Anaconda style geological mapping over the tenement area and updates to the local geology map remain on-going.

A total of 524 rock chip and grab samples have been taken across the tenement during reconnaissance mapping to identify and define the surface mineralisation and geology. This formed the basis of an extensive

channel sampling program which resulted in 1,434 rock-saw channel samples cut from 262 surface rock exposures. Rock-saw channel results confirmed the significance of sheeted, porphyry-style quartz veins in Alpala Creek and inferred an upper margin of a mineralised porphyry system.

The channel sampling and structural measurements of quartz veins over an area of approximately 430 m by 200 m at Alpala provided the geological context for a diamond drilling program using a man-portable drill rig that commenced in September 2013. Channel sampling across the Alpala discovery outcrops within Alpala Creek returned 4 m @ 0.99% Cu and 3.30 g/t Au; 33.3 m @ 0.65% Cu and 1.02 g/t Au; and 56.9 m @ 0.34% Cu and 1.16 g/t Au. These channel results allowed SolGold to plan the first targeted diamond core drill holes into the Alpala system.

The first four holes of the drill program confirmed the surface mineralisation to depths of approximately 200 m. However, the course of the program was changed by the length and high grades of chalcopyrite-bearing quartz vein stockworks encountered in Hole 5, which was started less than 18 months after the location of surface mineralisation. This fifth drill hole marks the discovery of the high-grade, world-class Alpala Porphyry Copper-Gold-Silver Deposit.

A ground magnetic survey was completed over an area of approximately 30 km^2 of the Cascabel tenement in February 2017. This represented 650 km of total-field magnetic data that was acquired from east-west oriented lines spaced every 50 m. The reduced-to-the-pole image for the ground magnetics data identified a major zone of magnetite destruction that occurs over much of the Alpala porphyry area.

The 3D magnetic inversion (MVI) models, based on the ground magnetic data in the Alpala region, mostly coincide with subsurface mineralised envelopes and reveal a northwest trending line of significant magnetic bodies at Moran, Trivinio, Alpala Northwest, and Alpala Central.

The reduced-to-the-pole image for the ground magnetics data shows that a major zone of magnetite destruction occurs over much of the Alpala porphyry area (Figure 9.2).

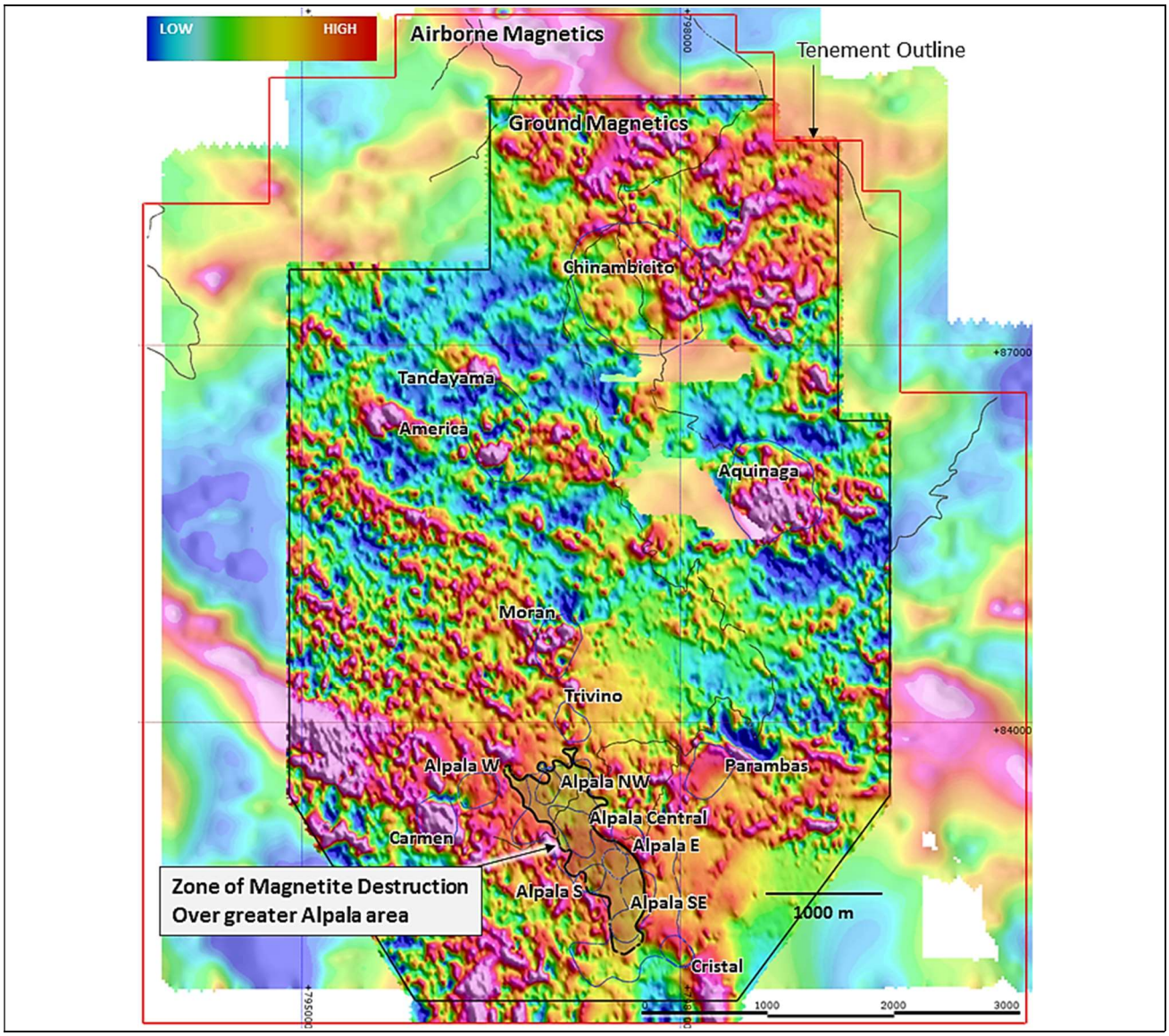


Figure 9.2 : Cascabel Concession Area (red outline), Showing High Resolution RTP Magnetic Imagery with the 2017 Ground Magnetic Survey Area (black outline) Over Previously Flown Heliborne RTP Magnetic Imagery

The zone of magnetite destruction at Alpala is related to intense hydrothermal, phyllic and advanced argillic alteration that has converted magnetite to pyrite (+hematite) and chalcopyrite from surface to depths of more than 750 m, as determined from drilling. Below this depth, high-grade Cu and Au mineralisation occurs with magnetite-rich, hydrothermally altered intrusions.

Petrographic studies have identified more than six major phases of intrusion that are delineated on composition and relative timing relationships with porphyry-related vein-stages.

Scanning Electron Microscopy (SEM) techniques indicate that the primary Cu minerals are chalcopyrite and bornite. Also, Au occurs as discrete grains of electrum (typically 65% to 85% Au) that range from one to 50 microns in diameter. The electrum grains occur within chalcopyrite, bornite, pyrite and rarely quartz and anhydrite. Grains of low-Ag electrum (greater than 90% Au) that are 1 to 3 µm in diameter are associated with sulphide grains and occur locally within silicate minerals.

9.3 Comments on Section 9

Geochemical sampling, geological mapping and geophysical surveys have identified a number of anomalies, a portion of which have been drill tested.

Exploration programs conducted are appropriate to the work phase conducted at the time.

The methods used were adequate for the models used of porphyry style deposits, and the results were instrumental in properly outlining the extent of the mineralisation and defining the Cascabel concession Alpala and Tandayama-America deposits and other prospects.

There is considerable remaining exploration potential within the Project area.

10 Drilling

10.1 Introduction

Drilling targets within the Cascabel concession comprised a cluster of Eocene aged porphyry deposits and prospects within the Cascabel concession area.

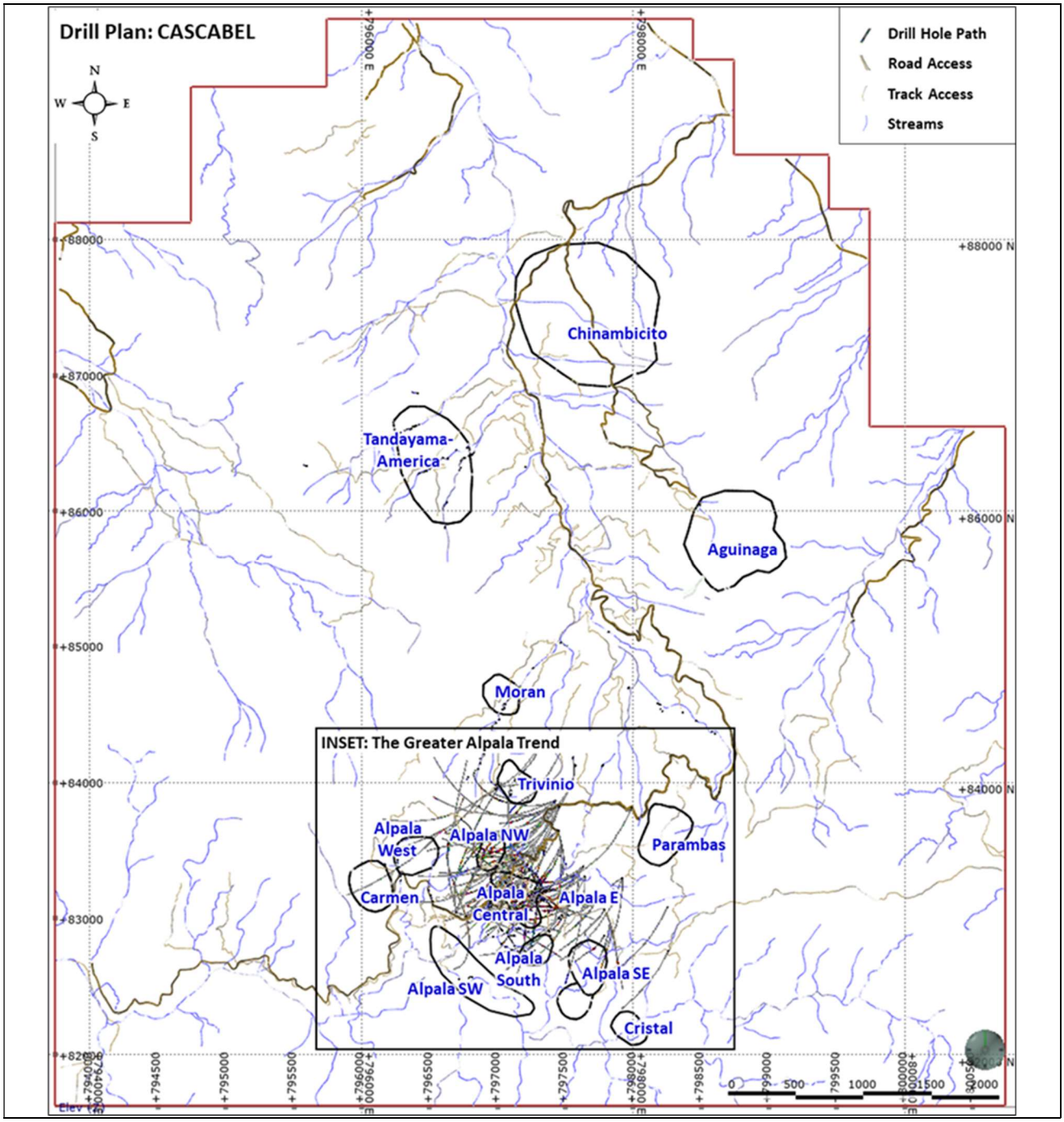


Figure 10.1 : Porphyry Deposits and Prospects at the Cascabel Concession, Northern Ecuador

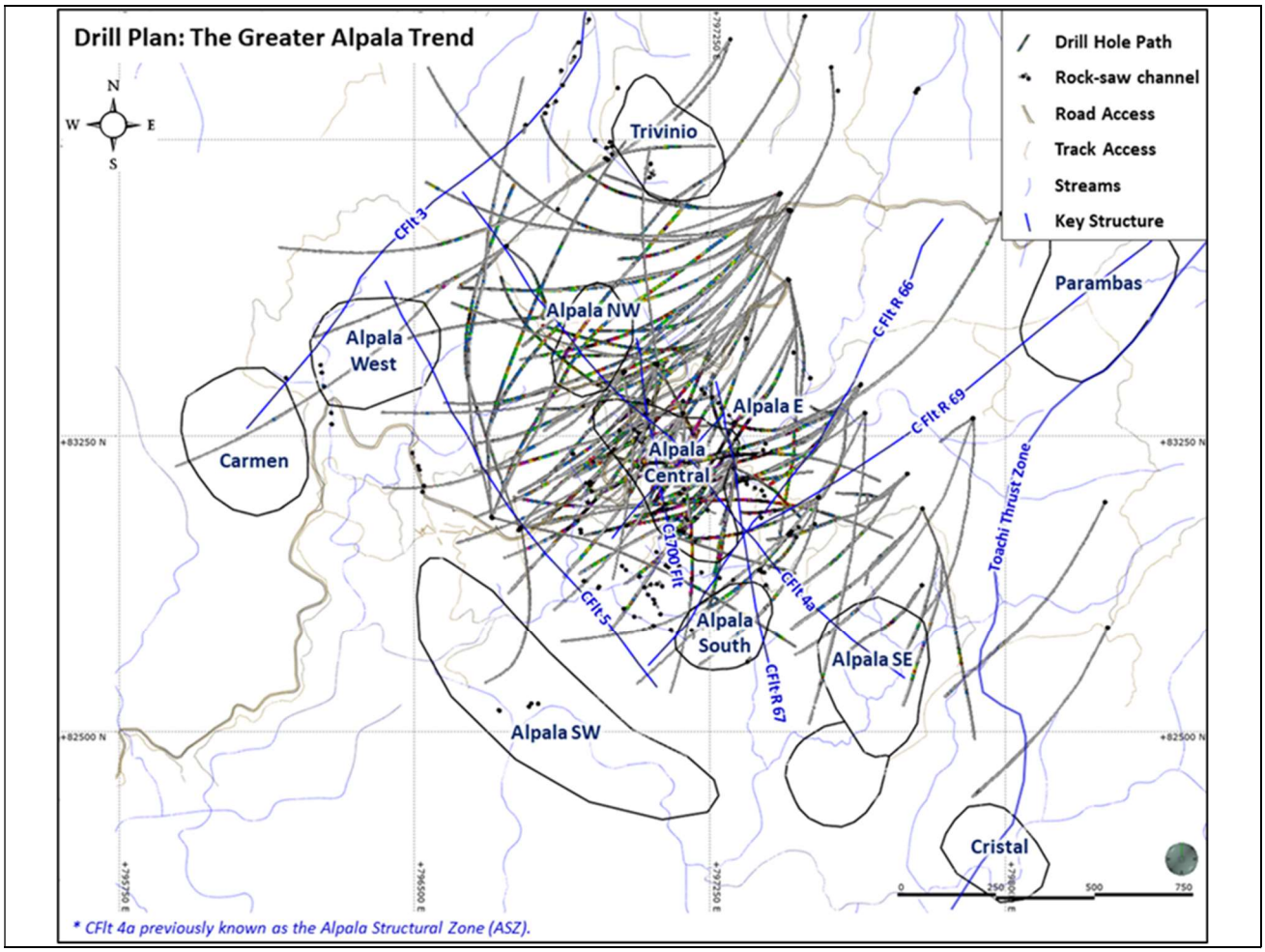


Figure 10.2 : Drill plan of the Alpala Deposit

Since drilling commenced on 1 September 2013, a total of 290,135.3 m (as of 30 March 2022) of diamond drilling has been completed on the Cascabel Project. Drilling includes: 243,450.4 m at the Alpala deposit, 30,940.1 m at Tandayama-America deposit, 8,970.6 m at the Aguinaga deposit, and a further 6,774.2 m of drilling completed on infrastructure, sterilisation and water monitoring.

The latest Alpala Mineral Resource Update (MRE#3) was estimated from 105,166 assays, 103,732 assays representing diamond drill core samples, and 1,434 assays representing rock-saw channel samples cut from surface rock exposures. Drill core samples were obtained from total of 217,225.9 m of drilling from 188 diamond drill holes. A summary of the interpreted drilling from the Alpala deposit is illustrated in:

- Figure 7.6, Figure 7.7, and Figure 7.8 showing geology
- Figure 7.9 showing mineralisation
- Figure 7.10 showing vein paragenesis
- Figure 7.11 and Figure 7.15 showing relationship between geology, quartz vein abundance and CuEq grade, and
- Figure 7.13 and Figure 7.14 showing alteration phases and CuEq grade.

The Tandayama-America Mineral Resource was estimated from 14,806 assays, 14,586 assays from diamond drill core samples, and 220 assays from rock-saw channel samples cut from surface outcrops. Drill core samples were obtained from 26,631.6 m of drilling from 41 diamond drill holes. Surface rock-saw channel samples were obtained from 458 m of channel intervals from 72 surface channels. A summary of the interpreted drilling from the Tandayama-America deposit is illustrated in:

- Figure 7.16 showing geology and CuEq grade, and
- Figure 10.3 showing CuEq grade.

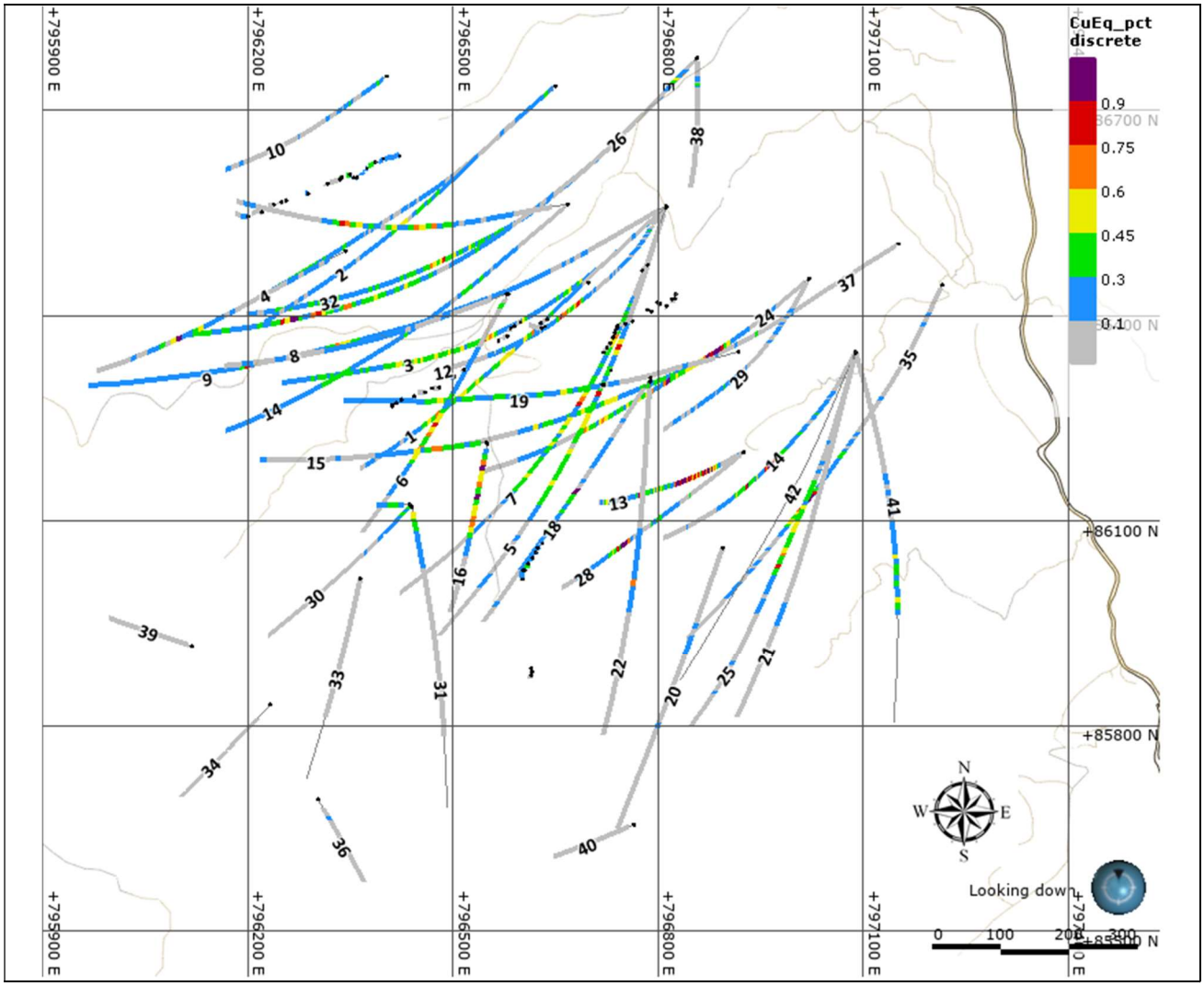


Figure 10.3 : Drill plan for the Tandayama-America Deposit

10.2 Collar Surveys

The azimuth and dip of the drill rig setup are measured and checked by SolGold ahead of the start of all drill holes. Collar locations are initially surveyed using hand-held GPS units by SolGold personnel; however, the final collar location is surveyed by professional surveyors after drilling has been completed using a Differential GPS (DGPS) theodolite.

All drill hole collars are clearly labelled and capped on completion.

10.3 Downhole Surveys

A Single Shot Reflex Ezi-Gyro system was used to provide downhole survey information upon completion of each drill hole. Readings were initially taken at 50 m intervals for holes 1 to 33. Thereafter, readings were taken at 30 m intervals and provided to the SolGold geology team. Any deflection of more than 10 degrees in dip or azimuth within a 30 m interval is resurveyed.

Where daughter holes are drilled, a magnetic survey tool integrated into the steerable Devico DeviDrill navigational tool is used at 1 m intervals to steer the hole onto the new azimuth/dip.

10.4 Diamond Drilling Procedures

Drilling utilised modified custom-built man-portable machines, capable of drilling NQ to 2,500 m. Track mounted Sandvik DE880 machines, capable of drilling NQ to 3,000 m and track mounted Tech 5000 machines capable of drilling NQ to 3,400 m were also used.

A steerable wireline core barrel was utilised to drill daughter holes from a parent hole and also to perform corrections to drill hole trajectories.

All drilling is undertaken using Diamond Core triple tube at either PQ3 (83.0 mm core), HQ3 (61.1 mm core) or NQ3 (45.0 mm core) core size. Core was produced in 3 m core runs and each core run underwent orientation. Drillholes were surveyed for dip and azimuth at 30 m intervals.

10.5 Core Recovery

Drill core recovery results achieved average recoveries of 97.5%.

10.6 Core Storage

Core is labelled and photographed ahead of being transported from the drill sites by four-wheel drive (4WD) vehicles to the project office at Rocafuerte where it is logged, re-photographed and sampled. All core from the Alpala Project is stored under cover at the camp, adjacent to the logging area.

10.7 True Thickness

The term "true thickness" is not generally applicable to porphyry-style deposits as the entire rock mass is potentially mineralised and there is often no preferred orientation to the mineralisation. In areas that display porphyry-style mineralisation, in general, most drill holes intersect mineralised zones at an angle, and the drill hole intercept widths reported for those drill holes are typically greater than the true widths of the mineralisation at the drill intercept point.

Significant down-hole drill intercepts were reported using a data aggregation method based on copper equivalent (CuEq) shut-off grades with up to 10 m internal dilution, excluding bridging to a single sample and with minimum intersection length of 50 m.

True width of down-hole intersections reported are expected to be approximately 25-70% of the down-hole lengths, depending on the attitude of the drill hole. Drill hole inclinations range from -45 to -90 degrees.

10.8 Comments on Section 10

The initial spread and design of the drill holes at Alpala was impacted by site access and topography, hence the use of man-portable rigs. This has resulted in some low intersection angles with the mineralised deposit, which is not uncommon when drilling a steeply dipping porphyry deposit. With the introduction of further drill rigs and the use of the Devico orientation device, SolGold were able to better target and drill the mineralisation at Alpala and Tandayama-America.

SolGold has managed to achieve a high degree of control over the complex multi-contractor drilling programs through the use of their own independent foreman.

From Mrs Cecilia Artica's (QP Alpala) and Dr Karl John Roa's (QP Tandayama-America) review during the technical site visit, the drilling at Alpala has been conducted in a professional manner using industry accepted practices and has produced core of sufficient quality and recovery to be used in Mineral Resource Estimations.

The Alpala and Tandayama-America QPs are unaware of any material factors that would impact the accuracy and reliability of the sample results.

11 Sample Preparation, Analyses and Security

11.1 Sampling Methods

11.1.1 Core Sample Selection and Mark-up

Prior to cutting and the collection of drill core samples, all core is marked up for sampling. A standard sampling interval of 2 m is employed by SolGold, although smaller samples may be taken in significant zones or narrow veins of geological significance.

A minimum sample length of 25 cm has been applied in all drilling phases. In the situation where a small sample interval is required, the zone is typically sampled at its geological contacts or limits. All drill core is half-cut, excepting special intervals during wedging, over-runs, or deviations. Half sample is retained within wooden or plastic core boxes, and the sampled half submitted for assay. On occasion, detailed lithotype, petrographic, or petrophysical samples may be taken as quarter core, leaving a quarter sample retained within the core box.

11.1.2 Core Cutting

All competent drill core is marked longitudinally at the drill site by field technicians during the core orientation process of each drill run. Where broken ground is encountered a longitudinal mark-up is often not practical.

Before cutting, all core is again re-marked longitudinally indicating the vertical axis of the drill hole and hence ensuring that the volume of core sampled is representative of half the drill core generated during drilling. Core is cut along the marked line by field technicians or a geologist.

Intervals of highly broken core, that may be washed away by the water supply during cutting, are wrapped in plastic and/or masking tape to increase retention of fines. Intervals of extremely broken or fragmented core, or clay rich core are left in the core tray without cutting using the saw and are split by cleaver and spatula.

Following cutting or splitting of each segment of core, the entire volume is returned to the appropriate location in the core box prior to being selected for sampling.

11.1.3 Core Sample Collection

Half core is sampled including coarse and fine rock fragments. Where there is significant fine material, a trowel is used to ensure that no less than 50% of the fines are included in the sample. All material is placed into high strength plastic sample bags, which in turn are placed into calico sample bags, ensuring that fine sample particles are not lost due to the open weave of the calico bag.

Sample numbers are written on the exterior of the plastic bags with a waterproof marker and a corresponding barcoded plastic sample ticket placed into each plastic bag.

11.1.4 Core Magnetic Susceptibility Analysis

Following sampling of the core, magnetic susceptibility measurements are taken of the bagged half core samples over the entire length of each drill hole at 2 m intervals. Each interval is measured three times for magnetic susceptibility and an averaged susceptibility value is utilised. All measurements are taken using a KT-10 Magnetic Susceptibility Meter, manufactured by Terraplus.

11.1.5 Channel Sampling

Rock outcrop channel samples were taken with the use of a handheld rock saw utilising 12" diamond saw blades. The channels were cut continuously across the rock face while being mindful to equally sample both visibly and non-visibly mineralised rock. All samples were cut at a nominal 50 mm width by 50mm depth and were sampled at either one or two metre intervals depending on the outcrop position and exposed length. The depth and width of the channels was approximately equivalent to the diameter of the NQ3 drillhole diameter (45 mm), which has been used in the Alpala and Tandayama-America MREs.

Samples were geologically logged, bagged and labelled using the same procedures as detailed for drill core, and sample dispatches were subject to the same QAQC protocols as diamond drillhole, which are detailed below.

For the Alpala MRE, the channel samples were used to guide the geological interpretation, however the grades were not used as input to the grade estimate.

For the Tandayama-America MRE, channel samples were used to guide the geological interpretation and their grades were also used as input to the grade estimate.

Dr Andrew Fowler (QP for Tandayama-America MRE) considers that the channel samples collected in relation to Tandayama-America were sufficiently similar in volume to the drillhole samples used the MRE and that the QAQC protocols in relation to sampling and assaying of the channel samples were sufficiently robust for the channel samples to be included as inputs to the Tandayama-America MRE.

11.2 Bulk Density Determinations

A total of 11,339 at Alpala and 858 at Tandayama-America bulk density determinations were assessed for the Resource Estimation. Bulk density has been conducted on 10 cm long pieces of drill core over all resource drilling programs at Cascabel.

Bulk density has been measured using a wax coated water immersion method. Core is sawed orthogonally to provide a smooth ended, 10 cm long, core cylinder and placed into a small drying oven at 150°C. PQ sized core is dried for a period of 3 hours, HQ sized core for 2 hours and NQ sized core or smaller is dried for 1 hour.

Core is then weighed to provide the mass of the dried unwaxed sample in air (Measurement A). The dried core is then coated in wax, before a second measurement of the mass of the wax-coated core in air is completed (Measurement B). The wax-coated core is then submerged in water and weighed to provide the mass of the submerged waxed coated sample (Measurement C).

The bulk density is then calculated using the equation below, utilising a density of 0.914 g/cm^3 for the paraffin wax.

$$BD = \frac{A}{[B - C] - (B - A)/0.914}$$

11.3 QAQC Sample Protocols

11.3.1 Sampling and Analytical Methods

SolGold operates according to its rigorous Quality Assurance and Quality Control (QAQC) protocol, which meets or exceeds industry accepted practices.

Primary sample collection involves secure transport from SolGold's concessions in Ecuador, to independent certified sample preparation facilities in Cuenca or Quito, Ecuador. Samples are then typically air freighted from Quito to certified laboratories in either Lima, Peru or Vancouver, Canada where the assaying of drill core, channel samples, rock chips and soil samples is undertaken. SolGold typically utilises ALS certified laboratories in Lima, Peru for geochemical analysis, and ALS certified laboratories in Vancouver, Canada for the analysis of metallurgical samples.

Samples are typically prepared and analysed using 100 g 4-Acid digest ICP with MS finish for 48 elements on a 0.25 g aliquot (ME-MS61). Laboratory performance is routinely monitored using umpire assays, check batches and inter-laboratory comparisons.

To monitor the ongoing quality of its analytical database, SolGold's QAQC protocol encompasses standard sampling methodologies, including the insertion of certified powder blanks, coarse chip blanks, standards, pulp duplicates and field duplicates. The blanks and standards are Certified Reference Materials supplied by Ore Research and Exploration, Australia (OREAS).

SolGold's QAQC protocol also monitors the ongoing quality of its analytical database. The Company's protocol involves independent data validation of the digital analytical database including searches for sample overlaps, duplicate or absent samples as well as anomalous assay and survey results. These are routinely performed ahead of Mineral Resource Estimates and Mining Studies. No material QAQC issues have been identified with respect to sample collection, security and assaying.

11.3.2 Certified Reference Materials (Standards)

Since the commencement of the drilling at Alpala, SolGold has utilised seven different Certified Reference Materials (CRMs) in the analysis sample stream, sourced from CDN Resource Laboratories Ltd, Canada (CDN), and which were in use between October 2013 and July 2016; and OREAS, in use from March 2015 to the present.

CRMs are inserted at specific sample numbers equating to approximately one every 50 metres of drilling and are typically 60 gm matrix-matched pulp CRMs, providing a range of low, medium and high grades. All standards are re-bagged and labelled with ENSA sample numbers before being inserted into the sample lot.

CRM utilisation represents a rate of 1:52 samples or 1.9%.

11.3.3 Field Duplicates

Field duplicate samples are collected from drill core during sampling and are selected at specific sample numbers equating to approximately one every 33 m of drilling.

The duplicate sample is cut from the existing half core assay sample to provide an original quarter core and a second quarter core Field Duplicate. The two samples are submitted to the assay laboratory for analysis and follow each other through the sample preparation and assaying process.

Field duplicate utilisation represents a rate of 1:35 samples or 2.8%.

11.3.4 Blanks

Certified blank material sourced from CDN and OREAS has been inserted into the sample stream at a typical rate of 1:50 samples (2%). All blanks used are 60 gm pulp CRMs, excepting the use of coarse chip blank (OREAS C27c), which was introduced in September 2017. The coarse chip blank was introduced in response to risks identified during a laboratory due diligence visit, noting that minor smearing of soft sulphide minerals and/or Au during ring milling pulverisation process could be monitored by the use of a coarse blank.

Field duplicate utilisation represents a rate of 1:50 samples or 2.0%.

11.3.5 Umpire Laboratory Checks

Routine inter-laboratory Umpire or Lab Check analyses are undertaken on pulp samples returned to the Quito storage facility. Batches of pulps from previously assayed samples (by ALS Global) representing a range of high, medium and low grades are selected, dispatched to a second umpire laboratory (Bureau Veritas/ACME) for analysis.

The number of required cross-check samples for a given period is determined by the database geologists as 5-7% of the returned samples. They generate a range of consecutive sample numbers from each dispatch to be located by a technician at the storage facility. The technician locates a consecutive range of samples from within the defined range and despatches to the umpire lab as instructed by the database geologist.

Umpire pulp duplicate utilisation represents a rate of 1:20 samples or 4.9%.

11.4 QAQC Sample Results

Detailed analysis of the results from the QAQC samples have been undertaken by SolGold and Independent QPs who have worked on the Alpala Project.

11.4.1 Alpala MRE#3 Dataset

Mrs Cecilia Artica (QP) made the following observations for the reporting period between November 2018 to November 2019:

11.4.1.1 Certified Reference Materials

- Cu CRM results showed good compliance for the period with zero results outside the error limits and no significant grade bias
- Au results for CRM 501c showed two errors, while results for CRM 502c showed one error. These represent 0.5% and 0.3% error rates respectively, which the QP considers immaterial for the MRE
- No significant bias was observed in the Au CRM results for the reporting period
- Ag CRM results showed good compliance for the period with zero results outside the error limits
- CRM 501c did show a negative bias, which was significant at -5.4%. The QP considers that Ag values for this CRM should be monitored closely in future, however, the result is acceptable for the current MRE.

11.4.1.2 Field Duplicates

- The Cu field duplicate results showed no significant bias and 78% of duplicate pairs had less than 30% Absolute Relative Paired Difference (ARPD), which the QP considers an acceptable result for this duplicate type
- The Au field duplicate results showed no significant bias and 78% of duplicate pairs had less than 30% ARPD, which the QP considers an acceptable result for this duplicate type
- The Ag field duplicate results showed no significant bias and 82% of duplicate pairs had less than 30% ARPD, which the QP considers an acceptable result for this duplicate type.

11.4.1.3 Blanks

- Acceptable failure rates are observed in Cu, Au and Ag with the pulp blank 22e, and in Au with the coarse blank C27c
- Unacceptable failure rates are observed in Cu and Ag with the coarse blank C27c
- Mining Plus considers that although some of the failures may reflect contamination, it is also evident that C27c is not suitable for use as a blank material for all elements
- The certification for C27c only certifies it as a blank for Au and the QP recommends against using it as a blank for Cu and Ag
- It is difficult to draw meaningful conclusions in relation to potential contamination based on C27c for Cu and Ag, however, the low failure rate for Au, suggests that the high failure rates for Cu and Ag are due to the unsuitability of C27c as a blank for Cu and Ag. Therefore, the QP is satisfied that cross-contamination during sample preparation has not been significant
- It is recommended that the blank material C27c be reassessed for its continued use.

11.4.1.4 Umpire Laboratory Checks

- The Cu umpire laboratory duplicate results showed no significant bias and that 83% of duplicate pairs had less than 10% ARPD, which is an acceptable result for this duplicate type.

11.4.2 Tandayama-America MRE#1 Dataset

Dr Andrew Fowler (QP Tandayama-America) made the following observations for the reporting period between January 2021 to August 2021.

11.4.2.1 Certified Reference Materials

- Cu results for CRM 501c showed four errors, while results for CRM 502c showed one error. These represent 2.6% and 0.8% error rates respectively, which the QP considers immaterial for the MRE
- One extreme outlier for CRM 501c is most likely a labelling error and should be investigated
- Au results for CRM 501c showed three errors, while results for CRM 502c showed one error. These represent 1.9% and 0.8% error rates respectively, which the QP considers immaterial for the MRE
- No significant bias was observed in the Cu or Au CRM results for the reporting period.

11.4.2.2 Field Duplicates

- The Cu field duplicate results showed no significant bias and 76% of duplicate pairs had less than 30% ARPD, which the QP considers an acceptable result for this duplicate type
- The Au field duplicate results showed no significant bias and 79% of duplicate pairs had less than 30% ARPD, which the QP considers an acceptable result for this duplicate type.

11.4.2.3 Blanks

- Acceptable failure rates are observed in Cu and Au with the pulp blank 22e, and in Au with the coarse blank C27c. Therefore, the QP is satisfied that cross-contamination during sample preparation has not been significant.

11.4.2.4 Umpire Laboratory Checks

- No significant bias was observed for the reporting period in either Cu or Au
- The Cu umpire laboratory duplicate results showed no significant bias and that 79% of duplicate pairs had less than 10% ARPD, which is an acceptable result for this duplicate type
- The Au umpire duplicate results showed that 62% of duplicate pairs had less than 10% ARPD, which should be investigated.

11.5 Analytical and Test Laboratories

Analyses of SolGold exploration samples have been performed by different laboratories over the life of the project (Table 11.1). All laboratories are independent of SolGold and ENSA and are accredited laboratories for the analysis methods used.

Table 11.1 : Analytical and Test Laboratories

Lab Code	Sample Type	Start	End	Preparation	Analyses
ACME	Core Rock Chip Sediment Soil Trench Umpire	Jul 2012	Aug 2016	Aucay and Associados (Cuenca)	Acme (Vancouver) Acquired by Bureau Veritas SA on February 23, 2012 (see Bureau Veritas below)
METSOLVE	Rock Chip	Apr 2016	Aug 2016	Aucay and Associados (Cuenca)	Met-Solve (Vancouver) Certified by Intertek for ISO 9001:2008. Valid 29 April 2014 to 28 April 2017
ALS	Core Rock Chip Trench	Oct 2014	Present	ALS (Quito)	ALS (Lima)

Table 11.1 : Analytical and Test Laboratories					
Lab Code	**Sample Type**	**Start**	**End**	**Preparation**	**Analyses**
	Metallurgical				Certified by SCC: ISO/IEC 17025:2017. Valid 20 March 2022 to 1 March 2026
Bureau Veritas	Umpire	Jul 2017	Present	NA	Bureau Veritas (Lima) Certified by Instituto Nacional de Calidad: NTP-ISO/IEC 17025:2017. Valid 3 June 2019 to 2 July 2023

11.6 Sample Preparation and Analysis

11.6.1 ACME Laboratory – Historical Drilling

All samples were sent to Luis Aucay and Associados, Cuenca Laboratory who undertook the preparation of samples on behalf of ACME (using the ACME procedures), all rock, channel and drill core samples were prepared using standard rock preparation procedures (ACME Code: R200-250/PRP70-250) including crushing (1 kg to ≥70% passing 10 mesh (2 mm)), splitting (split to 250 g) and pulverising (≥85% passing 200 mesh (75 µm)).

Prepared samples were then assayed by ACME Laboratories in Lima, Peru using three methods:

- Au by lead collection fire assay (FA) with Atomic Adsorption Spectrometry (AAS) on a 30 g charge sample (FA430/G601)
- Multi-acid digest ICP with an Emission Spectrometry (ES) finish for 35 elements on a 0.25 g aliquot (MA300/1E)
- Multi-acid digest ICP with ES finish for 23 elements on a 0.25 g aliquot (MA370/7TD) (for over limits Ag, Cu, Pb, Zn samples).

Method MA300 detailed above is only a partial analysis for some elements, especially in some S, Cr and Ba bearing minerals and some oxides of Al, Hf, Mn, Sn, Ta and Zr. Volatilisation during fuming may result in some loss of As, Sb and Au.

Soil samples submitted to ACME have undergone SS80 preparation which involved drying at 60˚C; sieving to 100 g passing -80 mesh), followed by AQ201 Aqua Regia 1:1:1 digestion ICP with a Mass Spectrometry (MS) analysis for 36 elements.

11.6.2 Met-Solve Laboratories – Historical Drilling

Samples submitted to Met-Solve laboratories underwent sample preparation at Luis Aucay and Asociados, Cuenca laboratory as detailed above.

Samples have been dispatched to Met-Solve laboratories in Langley, British Columbia Canada for assay by two methods:

- Au by lead collection FA with AAS finish on a 30 g charge sample (FAS-111)
- 4 acid digest ICP with Atomic Emission Spectrometry (AES) or MS finish on a 0.2 g aliquot (IMS-230/ICF-6Cu – Ore grade).

11.6.3 ALS Global – Arequipa Geochemistry, Peru (Current Laboratory)

ALS subcontracted sample preparation to Carlos Puig Associados, Quito until 2019 when they commissioned their own lab in Quito.

Samples sent to ALS Laboratories in Quito are prepared by crushing (CRU-31), logging (LOG-22), weighing (LOG-24), pulverisation of 1 kg to 85% passing 75 µm (PUL-32) and splitting (SPL-21), before being transferred to a new sample bag (TRA-21) and re-weighed.

Prepared samples are then dispatched to ALS Lima, Peru for assaying.

A variety of methods have been used for analysis of rock, channel and drill core samples by ALS:

- Acid digest ICP with MS finish for 48 elements on a 0.25 g aliquot (ME-MS61)
- Acid digest ICP with AES finish for 33 elements on a 0.25 g aliquot (ME-ICP61)
- Aqua-regia digest ICP with MS finish for 51 elements on a 0.5 g aliquot (ME-MS41)
- Au by lead collection FA with AAS finish on a 30 g charge sample (Au-AA23)
- Au by lead collection FA with gravimetric finish on a 30 g sample (GRA-21)
- Ag by aqua-regia digestion and AAS finish on a 0.5 g sample (Ag-AA46)
- Cu by aqua-regia digestion with AAS finish on a 0.5 g sample (Cu-AA46) (Over limits Cu)
- Cu by four acid digestion and AAS finish on a 0.4 g sample (Cu-AA62) (Over limits Cu).

Additionally, all samples submitted to ALS Laboratories have been scanned for hyper-spectral mineralogy, combining TerraSpec®, 4HR scanning and aiSIRISTM interpretation (HYP-PKG).

11.6.4 Bureau Veritas (Peru) (Formerly Inspectorate) – External Check Laboratory

External umpire check assays have been undertaken by Bureau Veritas (Peru) via their Quito office.

The analyses of pulps used the following three methods:

- Au by lead collection FA with AAS finish on a 50 g charge sample (FA450)
- 4 acid digest ICP with MS finish analysis on a 0.25 g sample (4A200)
- 4 acid digestion with AAS Finish (MA402).

11.7 Referential Geological Database

All geological and sample analysis data is managed in the AcQuire geological database. AcQuire uses an SQL Server to store its database, allowing security to be applied at both the database and server levels.

Access to the database is restricted and carefully managed. The data integrity is enforced through the relational database structure, such as the application of primary keys, parent child relationships and field validations, which combined with rules established to monitor data import, ensure that only valid data is stored in the database.

Three dedicated database geologists (DBGs) manage the database including the QAQC of the data and logging import schemes. Two additional geologists are responsible for managing the Terraspec™ spectral logging information.

Direct entry of geotech and bulk density information is undertaken by technicians in the core shed.

Read only access is provided through a web application to the database through pre-configured views.

The data collection systems have been configured to ensure minimum manual entry of information thus reducing the potential to introduce errors. Invalid data is flagged and must be corrected before it can be stored in the database.

Data is provided from geologists or assaying laboratories in predefined data templates. Data is loaded using import procedures designed specifically for those templates. This ensures that the data is loaded correctly and consistently independent of the operator performing each data load.

11.8 Sample Security

Sample security from drill site to laboratory is ensured by the samples always being attended to, stored in the guarded on-site preparation facility, or stored in a secure area prior to laboratory shipment.

Chain-of-custody procedures consist of sample despatch forms and transport certification sent to the laboratory with sample shipments to ensure that all samples are received by the laboratory.

Chain-of-custody management was achieved through bagging of samples with tamper proof tags.

11.9 Sample Storage

The Rocafuerte core facility is located in a secured compound with dedicated undercover processing and storage areas.

After logging and cutting, samples are bagged, and magnetic susceptibility readings taken in the sample area. Samples remain there until they are despatched.

Core is stored in stacked core boxes available for review and future sample requirements. Returned assay pulp samples are held at the laboratory for 90 days, then transported to the SolGold facility in Quito.

11.10 Comments on Section 11

Mrs Cecilia Artica (QP Alpala)

Following a review of the sample preparation, assay QAQC protocols and results, chain of custody, data security procedures and assaying methods employed by SolGold for the Alpala deposit, the QP was of the opinion that they were consistent with industry accepted practices and suitable for use in the Alpala Mineral Resource Estimate.

Dr Andrew Fowler (QP Tandayama-America)

Following a review of the sample preparation, assay QAQC protocols and results, chain of custody, data security procedures and assaying methods employed by SolGold for the Tandayama-America deposit, the QP was of the opinion that they were consistent with industry accepted practices and suitable for use in the Tandayama-America Mineral Resource Estimate.

12 Data Verification

12.1 Alpala QP Verifications by Mrs Cecilia Artica

Independent Qualified Person (QP) Mrs Cecilia Artica, who was then a full-time employee of Mining Plus, undertook a site visit to the Cascabel Property from the 13 to 16 of November 2018 in relation to the Alpala MRE#3. The QP undertook the following data verification checks during the site visit:

- Cross-checking location of drill hole collars with handheld GPS
- Drill hole platform visits with active drilling rigs
- Check-logging of drill core significant intersections
- Observing core sampling and bulk density measurement procedures in practice
- Observing storage and security of drill core and coarse rejects
- Reviewing database compilation and integrity
- Evaluating QAQC procedures
- Interviews with key SolGold personnel.

The QP made the following conclusions based on the site visit in November 2018:

- Core boxes from the 2014 to 2018 drill campaigns were stored in a tidy and organised way, aligned with best industry practices. Coarse and pulp reject sample storage in Quito city was not visited by the QP
- The QP's independent check-logging showed that the geology and contacts observed in the 2014 to 2018 drill core agreed well with contacts logged by SolGold personnel, and that the sample intervals marked on core and core boxes also corresponded well with intervals marked in the logs
- Collar survey procedures were in general according to best practices
- Hand-held GPS collar survey check measurements determined by the QP show a satisfactory agreement with the SolGold collar survey measurements
- Database validation procedures were not well-established. Errors were identified in the centralised acQuire database
- Bulk density determination procedures had not been followed carefully.

Subsequent to the November 2018 site visit, and as part of the Alpala MRE#3, the QP has cross-checked 100% of the database assay entries against the original assay certificates provided by the assay laboratories and has found no errors or inconsistencies in the database.

In summary, the QP was of the opinion from the November 2018 field audit that the quality of the geological and assay data collected in relation to the Alpala Deposit as well as their validation and storage were aligned with industry accepted practices. As such, the QP considered the geological and assay data to be robust and suitable for inclusion in a MRE.

12.2 Tandayama-America QP Verifications by Dr Karl John Roa

Dr Karl John Roa, economic geologist and independent Qualified Person (QP) conducted a site visit to the Cascabel Property from the 18 to 20 of August 2021 in relation to the Tandayama-America MRE. The purpose of the QP's site visit was to appraise the quality of core drilling and logging processes, the core and channel

sampling methods and the database integrity of these samples in support of the inaugural Tandayama-America MRE. The site visit encompassed:

- Check-logging of drill core over economically mineralised and lower grade intervals
- Evaluations of drill core logging, sampling, QAQC and bulk density measurement protocols
- Observations of the storage and security of drill core and coarse reject samples
- Cross-checks of the locations of drill hole collars with a handheld GPS
- Inspections of operating diamond drilling rigs
- Reviews of database compilations and their integrity
- Evaluating internal QAQC procedures
- Interviews with SolGold personnel involved in the MRE
- Independent check assaying of mineralised core (Table 12.1).

Table 12.1 : List of core samples and results sent for check assay

Hole ID	From (m)	To (m)	Sample No.	Cu% orig	Cu% check	% Difference	Au ppm orig	Au ppm check	% Difference
PDH-20-001	534	536	DO3000289	0.964	0.954	-1%	0.355	0.272	-23%
PDH-20-001	568	570	D03000308	1.286	0.998	-22%	0.202	0.157	-22%
PDH-20-007	430	432	D03004934	1.91	1.68	-12%	0.799	0.603	-25%
PDH-20-007	522	524	D03004983	0.347	0.42	21%	0.081	0.089	10%
PDH-20-007	560	562	D03005004	0.251	0.275	10%	0.141	0.135	-4%
PDH-20-003	30	32	D03001217	0.12	0.116	-3%	0.552	0.469	-15%
PDH-20-003	84	86	D03001246	0.163	0.135	-17%	0.06	0.062	3%
PDH-20-003	122	124	D03001267	0.364	0.365	0%	0.315	0.241	-23%
PDH-21-013	318	320	D03007773	0.376	0.286	-24%	0.187	0.164	-12%
PDH-21-013	388	390	D03007810	1.088	1.04	-4%	0.097	0.111	14%
CONTROL	STD 504C		D03010670	1.11	1.06	-5%	1.46	1.432	-2%

The QP has drawn the following conclusions from the site visit:

- The geological descriptions and logging conventions used by SolGold were deemed appropriate for an MRE in this particular style of mineralisation
- The core sampling procedures have produced unbiased samples in accordance with Canadian Institute of Mining, Metallurgy, and Petroleum (CIM) Best Practices reference in the Companion Policy of National Instrument 43-101 standards of disclosure for mineral projects
- The storage procedures and facilities at Rocafuerte base camp as well as warehouse facilities in Quito were deemed orderly and adequate for the preservation of drill core as well as their pulps and coarse rejects
- The QAQC protocols were adequate and suitable for the style of mineralisation encountered
- The drill hole collar surveying procedures are in accordance with industry accepted practices
- The bulk density measurement facility and protocols are reliable
- The core and channel sample database up to August 2021 cross-checked with assay certificates
- The QP has logged and cross-checked four drill holes for which copper and gold assays were available: TAD20-001, TAD21-007, TAD21-009 and TAD21-013 (totalling 4263.69 at a time when drilling operations

were active up to TAD21-23 for a total of 16,909.15 m drilled. The core intervals examined represent approximately 10% of the aforementioned drill holes.

In summary, the QP was of the opinion from the August 2021 field audit that the quality of the geological and assay data for Tandayama-America as well as their validation and storage were highly satisfactory. The QP hereby considers the geological and assay data to be robust and suitable for inclusion in a MRE in support of a Pre-Feasibility.

13 Mineral Processing and Metallurgical Testing

13.1 Introduction

Metallurgical testwork for the Alpala underground deposit commenced in 2014. From 2018 to 2021 phases 1, 2 and 2a testwork was undertaken with Alpala underground deposit samples. Following a gap analysis additional testwork commenced in 2021 with Alpala underground and potential open pit deposit samples. This testwork is ongoing and reported here where results are available.

13.2 Initial Metallurgical Testwork

An initial sighter testwork program was conducted in 2014 by the Inspectorate Metallurgical Division, Bureau Veritas Commodities Canada Ltd, under the supervision of SolGold. The testwork was limited to flotation rougher and open circuit, two stage cleaner flotation tests on three composites.

Bureau Veritas identified lower than expected cleaner circuit recovery (<95%) from rougher concentrate. Further work was recommended to improve the circuit recovery.

13.3 Pre-Feasibility Study Testwork

The development phase for the Pre-Feasibility flotation program has been undertaken in two phases: pre-2021 (initial phase), and 2021 (current phase).

The confirmation phase for the 2021 Pre-Feasibility metallurgical testwork program included the following:

- Gap analysis of the work undertaken to date
- Additional flotation parameterisation testwork as identified in the gap analysis
- Repeat flotation locked cycle testwork (LCT) once the development phase is completed
- Extended gold recovery testwork to Pre-Feasibility level.

13.3.1 Testwork Program

The testwork program for the Cascabel Project Pre-Feasibility study is summarised in the figure below. At the time of this report, some of the variability testwork is still in progress and not reported here.

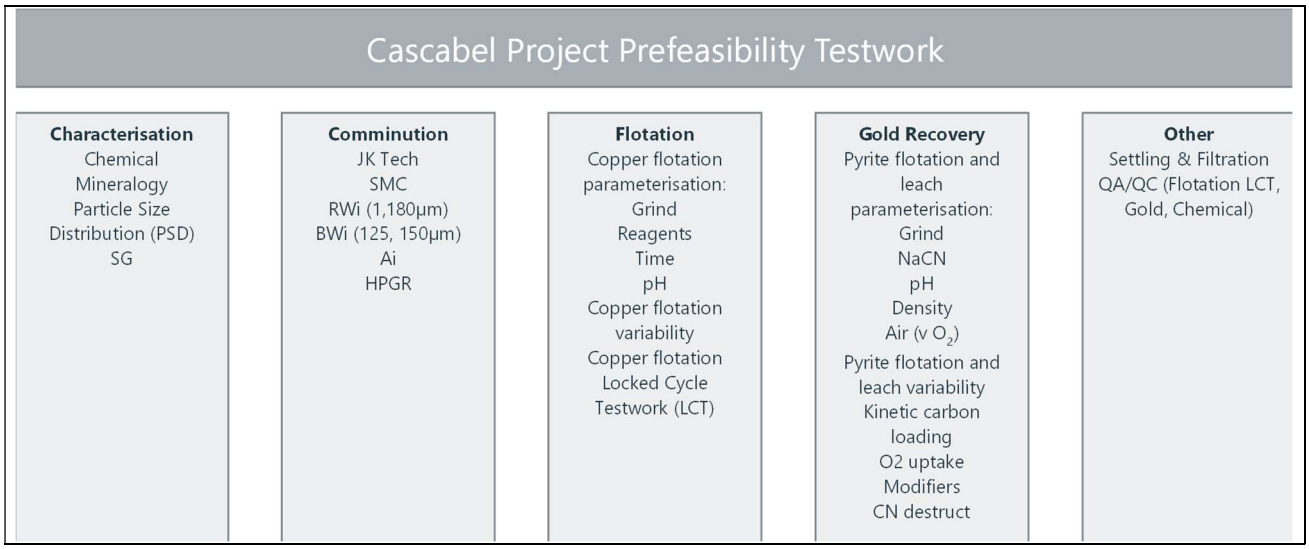


Figure 13.1 : Cascabel Project Pre-Feasibility Testwork Program

The testwork shown in the figure above is also reported in the table below.

Table 13.1 : Cascabel Project Pre-Feasibility testwork reporting

Testwork Facility	Report	Date	Testwork Summary
ALS Metallurgy Kamloops (ALS-K)	KM 5754	25 Mar 19	Chemical content Comminution variability (20 samples) Flotation rougher, cleaner development, locked cycle confirmation and variability (20 samples) Particle size distribution
ALS Metallurgy Kamloops	KM 5754 Addendum	3 Oct 19	Diagnostic leach of cleaner scavenger/pyrite concentrate
ALS Metallurgy Kamloops	KM 5922	21 Feb 20	Chemical content QEMSCAN BMA-Liberation Comminution variability (33 samples) Flotation rougher, cleaner development, locked cycle confirmation and variability (33 samples) Particle size distribution Aging Davis tube (Fe recovery)
ALS Metallurgy Kamloops	KM 5922 rev 1	13 Mar 20	As for KM 5922 excluding the aging testwork
ALS Metallurgy Perth	A 20620	June 21	Direct cyanidation, including one pyrite concentrate Acid leach residue cyanidation Thiosulphate leaching Bacterial oxidation Oxidative cyanidation
Core Resources	1189-001A	May 19	Albion process amenability

Table 13.1 : Cascabel Project Pre-Feasibility testwork reporting			
Testwork Facility	**Report**	**Date**	**Testwork Summary**
Brisbane Met Labs (BML)		2022	Chemical content QEMSCAN XRD Flotation rougher, cleaner development, locked cycle confirmation and variability (5+13 samples) Gold recovery (pyrite flotation, leach) (3 reported) Particle size distribution
JK Tech		2022	Comminution variability (5 reported, 13+25 samples in progress)
Fremantle Metallurgy		2022	Settling and filtration

13.3.2 Sample Provenance

Sample selection for the Cascabel Project is undertaken on the following basis:

- Drill hole numbers and sample intervals, which, when combined with collar co-ordinates, dip and azimuth provide spatial location of the samples within the deposit
- Lithology and alteration descriptions
- Grade of copper, and gold
- Selected geological measurements, including B vein percentage, magnetic susceptibility and rock quality designation (RQD)
- Spatial representation
- Early years of mining.

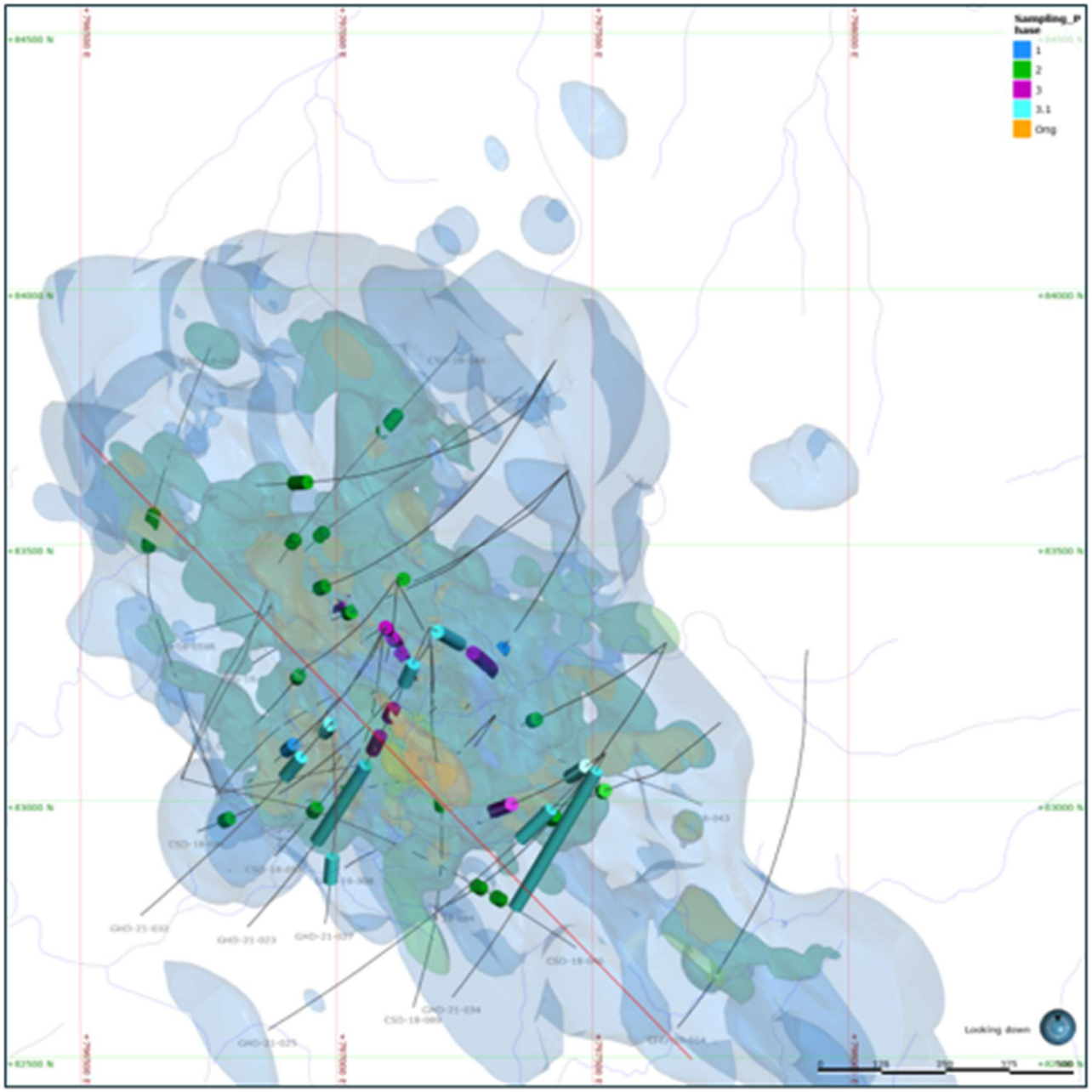


Figure 13.2 : Metallurgical sample locations, 200 m section, plan view through the Alpala deposit envelope

Table 13.2 : Cascabel Project sample comminution and flotation testwork

Work Phase	Facility	Year	Comminution	Master Flotation Composites	Flotation Variability Composites	Locked Cycle Tests	Gold Recovery
Historic	Bureau Veritas, BC Canada	2014	-	3	-	-	
Phase 1	ALS, Kamloops	2018-2019	20	3	20	3	
Phase 2	ALS, Kamloops ALS, Perth	2019-2020	33	4	33	8	1

Table 13.2 : Cascabel Project sample comminution and flotation testwork							
Work Phase	**Facility**	**Year**	**Comminution**	**Master Flotation Composites**	**Flotation Variability Composites**	**Locked Cycle Tests**	**Gold Recovery**
Phase 2a	ALS Metallurgy Kamloops	2020	-	7	-	7	
Phase 2 2021-2	BML, JK Tech	2021-2	15	5	13	13	13
Phase 2 2022	BML, JK Tech	2022	45	6	45	45	
Total	**-**	**-**	**113**	**28**	**111**	**76**	**14**

13.3.3 Mineralogy

The 53 variability samples for the initial phase of testwork were analysed at a nominal P_{80} 150 µm through QEM Scan bulk modal analyses by ALS-K. Key points from the mineralogy evaluation are shown in Table 13.3.

Table 13.3 : Initial phase variability sample bulk mineralogical analysis summary (KM 5922 summary)				
Mineral/Group	**Minimum, %**	**Maximum, %**	**Average, %**	**Observations**
Chalcopyrite	0.4	6.2	2.3	Primary copper mineral
Other Copper Sulphides	0.1	0.1	0.1	As bornite generally, as chalcocite, covellite and tennantite/enargite occasionally
Pyrite	0.4	7.8	2.6	Dominant sulphide mineral
Iron Oxides	0.1	12.6	3.0	As haematite or magnetite
Feldspars	1.2	37.2	11.8	
Quartz	28.6	69.4	45.7	
Micas	4.7	25.8	14.1	
Chlorite	4.7	19.7	11.7	
Calcium Sulphate	0.1	12	4.8	
Talc	0.1	0.3	0.2	Occurs within deposit. Specific locations not quantified yet
Other Non-Sulphide Gangue (NSG) Minerals	1.1	19	5.7	Where kaolinite is detected in quantity recoveries may be impacted

Variability samples 1-20 generally averaged 60% copper sulphide liberation at the nominal target primary grind (P_{80} 150 µm). However, this decreased significantly to an average of 50% for variability samples 21-53. There was also a similar increase in copper sulphides in binary with non-sulphide gangue from 30% to over 40%.

Additional microanalysis investigations were undertaken by the University of Tasmania (UTas) for the gold in pyrite, due to the small amount of gold in the samples.

The gold was observed to be hosted in refractory form – chemically bound in the mineral structure – with compositional zoning and gold rich inclusions. Au-Ag-telluride phases may be important to the overall Au forms present.

13.3.4 Comminution

Primary and regrind testwork was undertaken for the Cascabel Project and is reported here.

13.3.4.1 Primary Grind

Parameters investigated at both ALS-K and JK Tech Brisbane included:

- JK parameters, DWi and Axb
- SMC test
- Bond rod (RWi kWh/t) work index
- Ball mill (BWi kWh/t) work index
- Abrasion index (Ai).

This work was undertaken for the variability samples at ALS-K (data points in blue), and the current parameterisation samples at BML, comminution testwork by JK Tech Brisbane (orange data points).

The RWi and BWi closing screen sizes were set as follows:

- RWi 1,180 µm
- BWi 150 µm, and 125 µm for lower grade deposit samples in current program.

From the work undertaken to date, the following observations can be made:

- Lower grade deposits (<0.65% Cu) are generally more competent and abrasive
- Volcanics and D15 lithologies are generally more competent
- Deposit competency generally increases with depth
- Reducing the primary grind P_{80} from 150 to 125 µm for the lower grade deposits may require an increase in Ball Mill power demand of 5-15%.

A summary of the data is shown in the figures below. The blue data points represent the variability samples 001-053. The orange data points represent the current testwork samples.

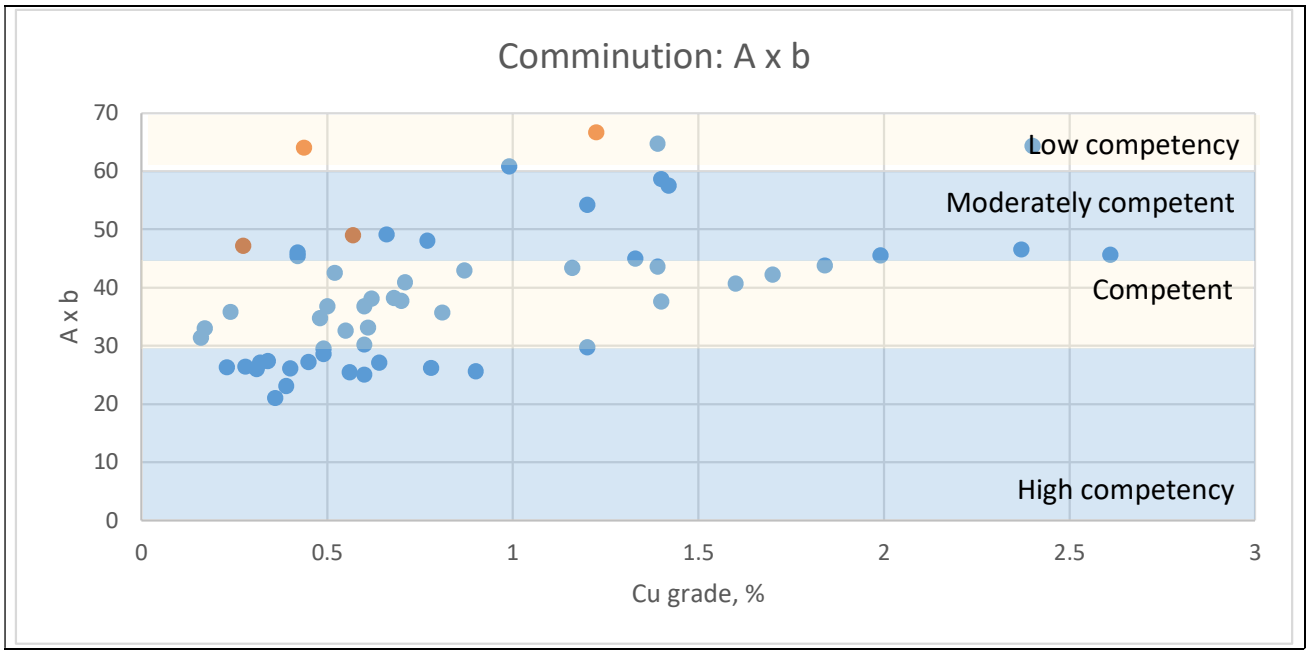


Figure 13.3 : Cascabel Project comminution parameters – Axb

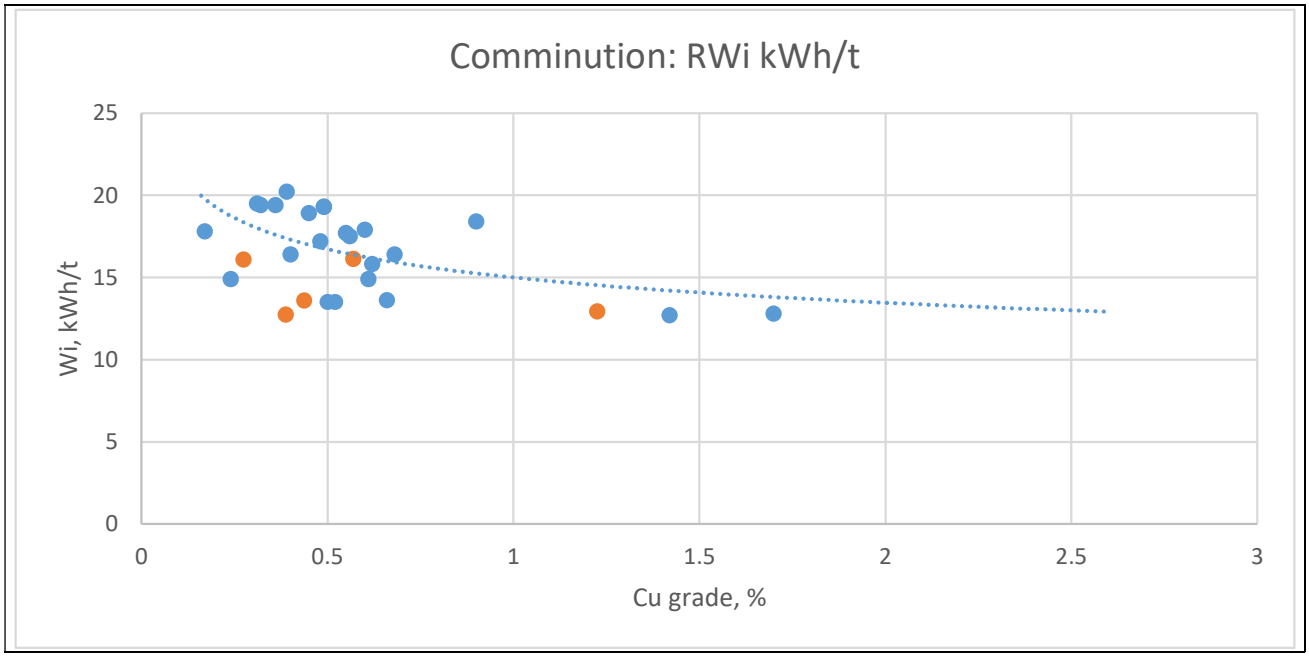


Figure 13.4 : Cascabel Project comminution parameters – Rod Mill Work Index (RWi) kWh/t

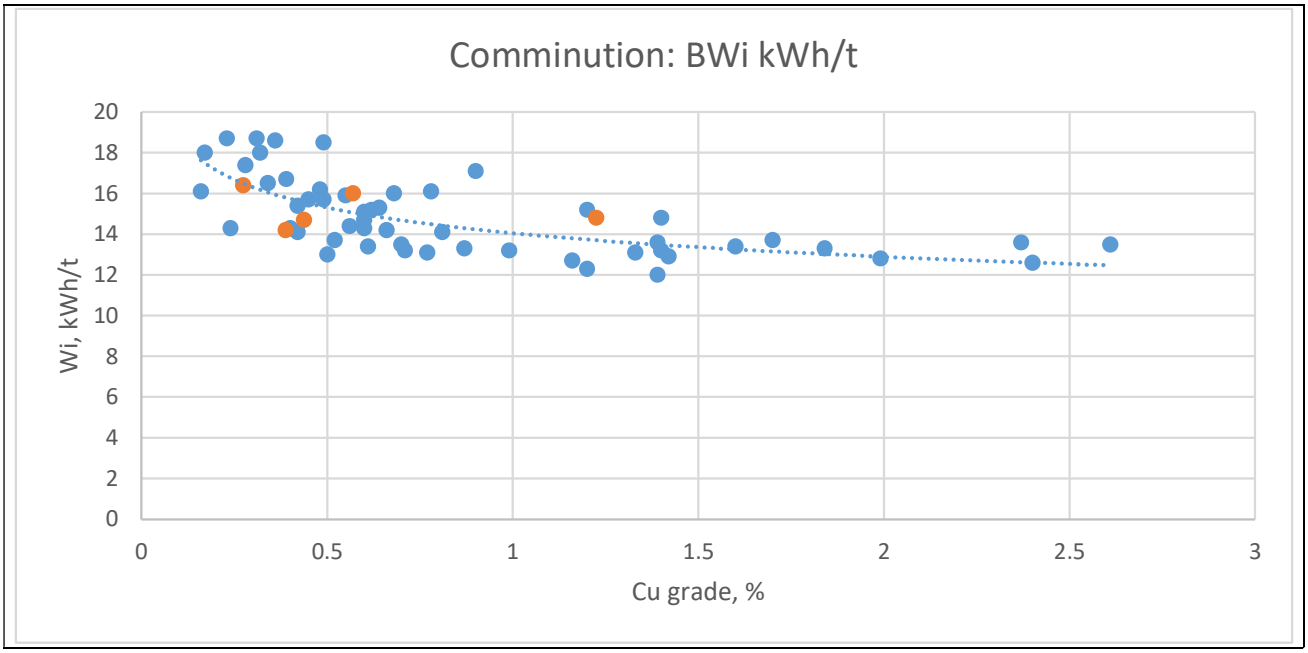


Figure 13.5 : Cascabel Project comminution parameters – Ball Mill Work Index (BWi) kWh/t

This information was used to estimate power requirements for the primary grind circuit, and size equipment.

13.3.4.2 Regrind

A series of six Eliason grinding tests were conducted to determine preliminary power consumption estimates for high intensity stirred mills. The Eliason rougher concentrate regrind signature plots generated for the composites are shown in the figure below, with power estimates required to achieve 10 µm, 15 µm and 25 µm provided in the table below.

Table 13.4 : Rougher concentrate regrind power estimates

Target P_{80} (µm)	**25**	**15**	**10**
Composite	**Estimated Power (kWh/t)**		
1	11.3	32.5	75.1
2	11.3	40.4	111.3
3	12.0	33.1	74.0
4	10.2	32.4	81.1
5	12.5	40.9	104.8
6	20.9	55.2	119.4
Average	**13.0**	**39.1**	**94.3**

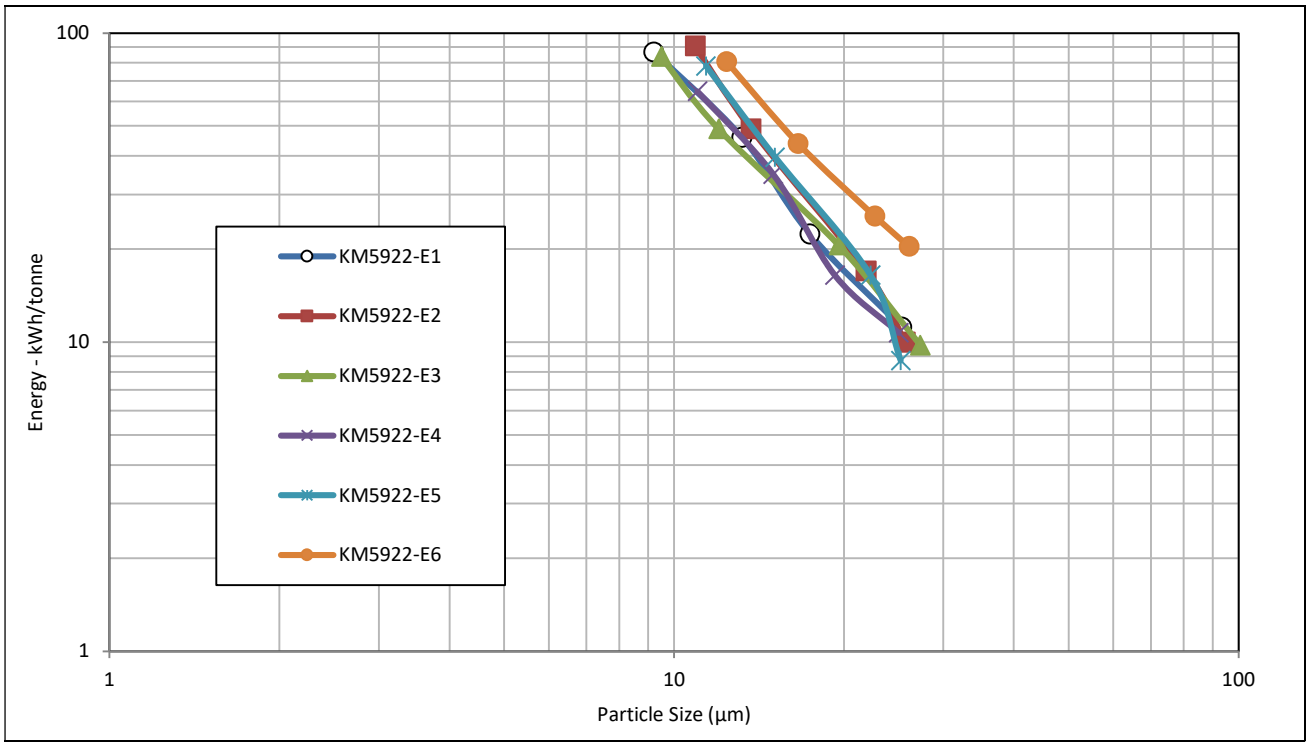


Figure 13.6 : Eliason rougher concentrate regrind signature plots

This information was used to estimate power requirements for the regrind circuit.

13.3.5 Flotation

The development of a flotation flowsheet generally occurred in three phases, namely:

1. Development phase
2. Variability phase
3. Confirmation phase.

The development phase for the Pre-Feasibility flotation program has been undertaken in two phases; pre-2021 (initial phase), and 2021- (current phase).

13.3.5.1 Flotation Parameterisation

The initial parameterisation phase was undertaken with three composites prepared from the first 20 variability samples. The composites were generally of a higher grade and did not represent the lower grade areas of the Alpala underground deposit.

Following this, additional parameterisation testwork was undertaken with four composites prepared from the first 20 next 33 variability samples, KM 5922 reports.

Phase 2a from the previous testwork was undertaken to address gaps which were identified following the phase 2 testwork reported in KM 5922, and this time addressed in KM 6204.

Following the sighter and phase 1 testwork, the composite designations have been refined and are now based on the following copper grade ranges:

- LG < 0.4 % Cu
- MG 0.4 % Cu < MG < 0.8% Cu
- HG > 0.8 % Cu.

The parameterisation testwork considered the parameters shown in the table below.

Table 13.5 : Flotation parameterisation investigations, Alpala deposits

Parameter	KM 5754 Phase 1	KM 5922 Phase 2	Current	Comment
Composites	LG, MG1, MG2, HG	LG, MG, HG	LG, MG, HG OC1, OC2	KM 6204 was an extension of KM 5922
Roughers				
Primary mill	Mild steel mill & media	Mild steel mill & media	Compare mild steel mill & media v stainless mill & media. Advance with stainless mill & media	The use of mild steel introduces another parameter as the mild steel may react with the more reactive sulphides in the samples
Primary grind	110, 150, 200, 220, 320	150, 200	Alpala UG: 90, 125, 150 µm Alpala OP: 90, 125, 150, 200 µm	
pH	Natural	Natural	Alpala OP: 6, 8	
Reagents: Collector Frother	 PAX, SIPX MIBC	 PAX, 3418+6697+ 400, 6697+400+ 208 MIBC	 PAX, SEX, PAX+3418, PAX+3418+ 3894, PAX+3418+208 MIBC	Following grind selection
Cleaners				
Regrind	15, 25, 30, 35, 40, 50, 70 Targets variable between composites	15, 20, 25	15, 25	Previously regrind targets variable between composites
pH	10, 11	10, 11	10, 11, 12	
Reagents: Collector Frother	 PAX MIBC	 PAX MIBC, W31	 PAX, SEX, PAX+3418, PAX+3418+ 3894, PAX+3418+208 MIBC	

Table 13.6 : Reagents	
Code	**Description**
PAX	Potassium amyl xanthate
SIPX	Sodium isopropyl xanthate
SEX	Sodium ethyl xanthate
3418	Aerophine 3418A, dithiophosphate
6697	Aerophine 6697, monothiophosphate
400	Aero 400, mercaptobenzothiazole
3894	Aerophine 3894, alkyl thiocarbamate
208	Aerofloat 208, dithiophosphate
MIBC	Frother, methyl isobutyl carbinol
W31	Polyfroth W31, glycol ether frother

It was not clear what the objectives of the cleaner test work were, for example, maximising recovery for a minimum copper in concentrate grade. The majority of samples were sourced from what would be considered medium and high-grade copper areas in the Alpala underground deposit.

13.3.5.2 Rougher Testwork Results

Results from the primary grind and reagent parameterisation rougher testwork are shown in the figures below.

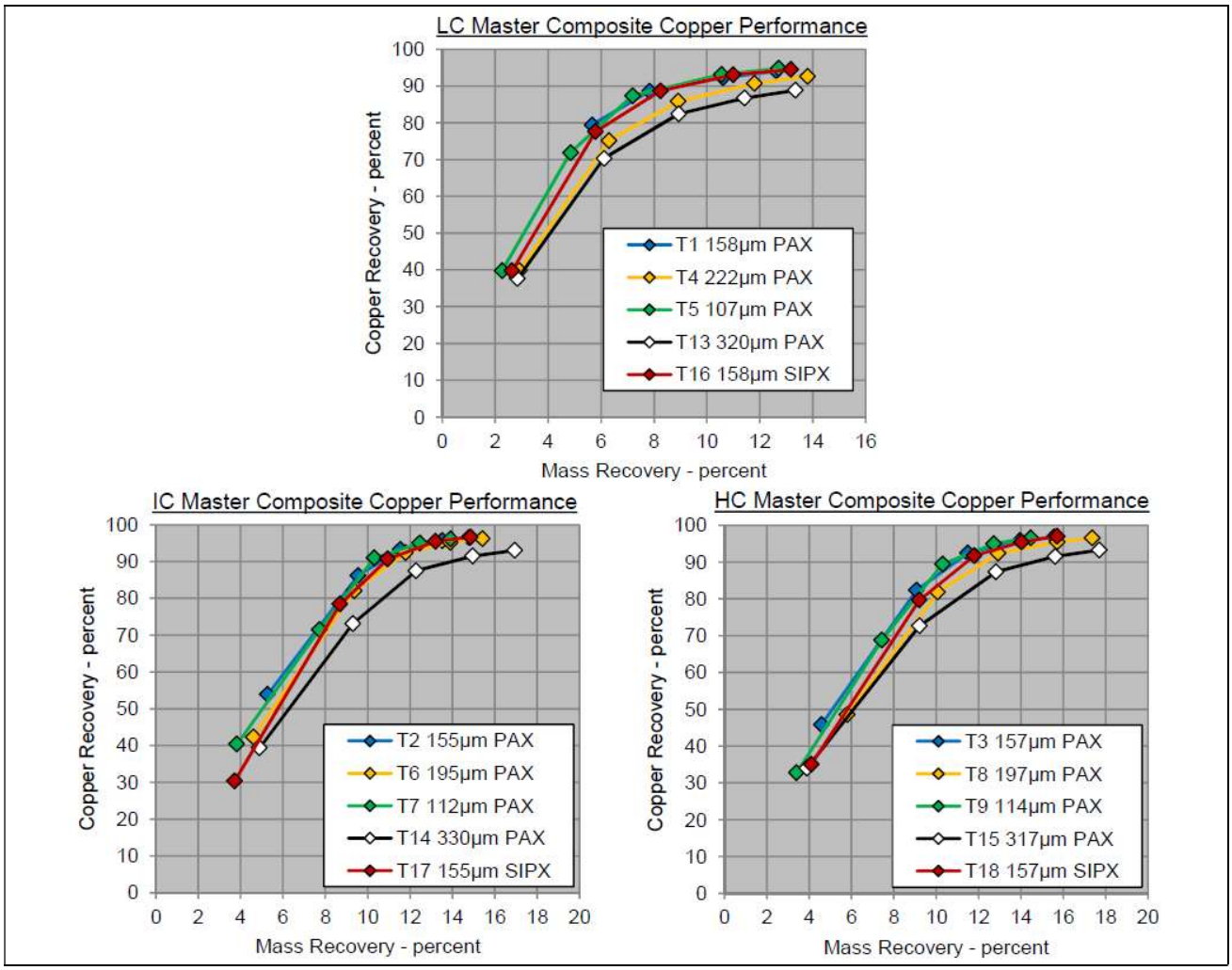


Figure 13.7 : KM 5754 rougher parameterisation, where LC=LG, IC=MG, and HC=HG composites, copper recovery

As the samples from the phase 1 testwork could be considered high grade samples, the performance was consistent and indicated that a coarser grind between P_{80} 150-200 µm could be supported for copper. In addition, the parameters identified in the phase 1 testwork were not able to be carried forwards unilaterally as low and medium grade copper samples had not been tested at this time.

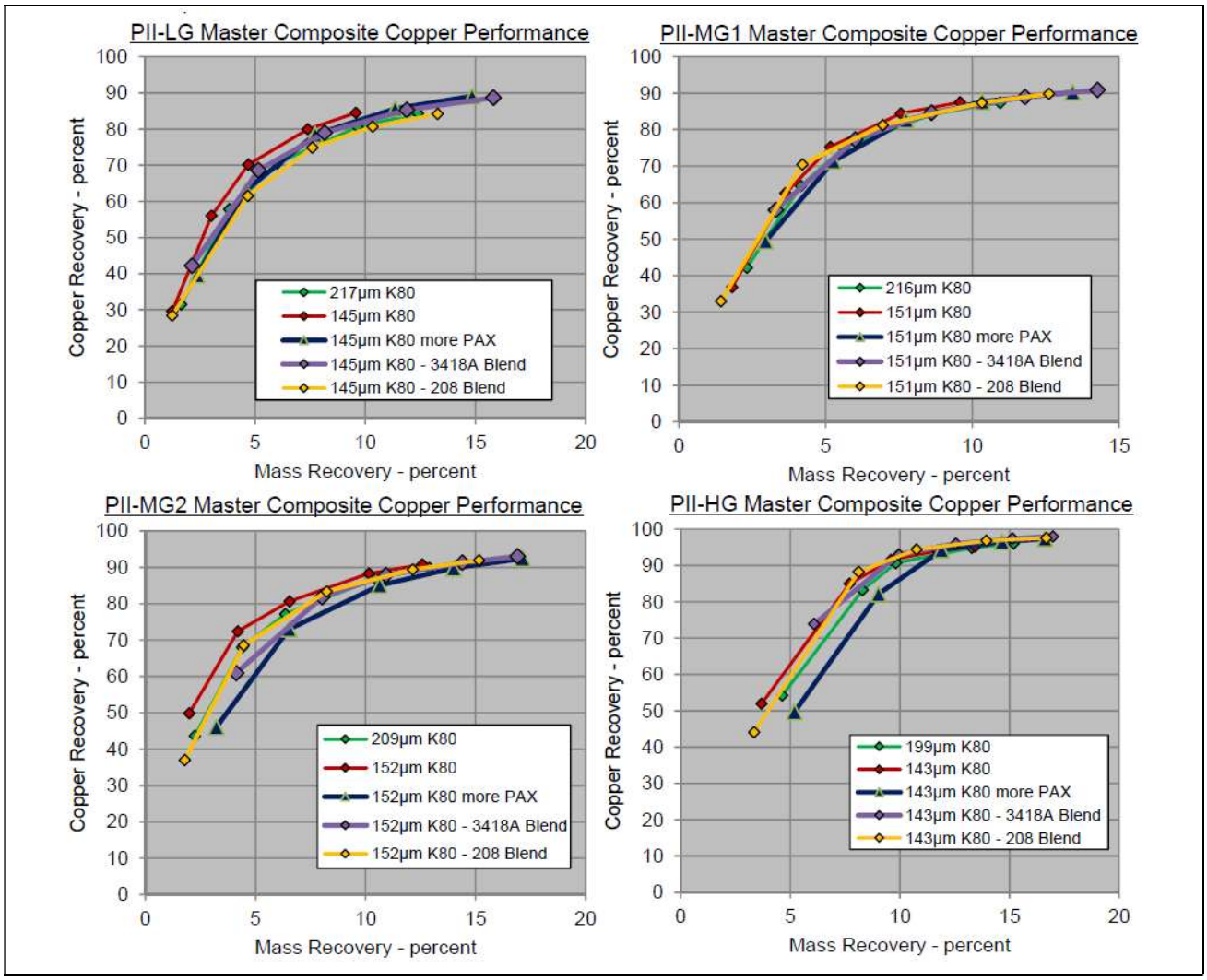


Figure 13.8 : KM 5922 rougher primary grind and reagent parameterisation, copper recovery

Following the reduced grind parameterisation and increased reagent investigations, the testwork confirmed the decision from the phase 2 testwork was to continue with rougher conditions as follows:

- Primary grind P_{80} 150 µm
- Natural pH
- PAX collector
- MIBC frother
- 11.5 min residence time.

The testwork results for the 2021 Pre-Feasibility for the batch rougher primary grind and reagent investigations are shown in the figures below.

The testwork confirmed a finer grind target P80 125 µm for the LG, MG and OC1 composites, and P80 150 µm for the HG and OC2 composites. PAX was also confirmed for the batch rougher flotation going forwards.

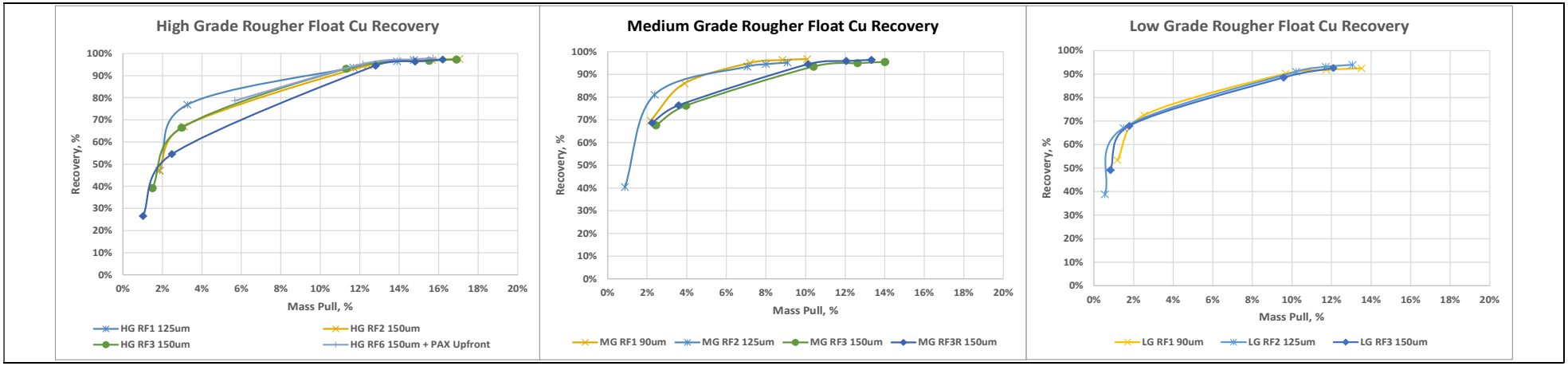


Figure 13.9 : BML, Alpala underground rougher primary grind parameterisation, copper recovery

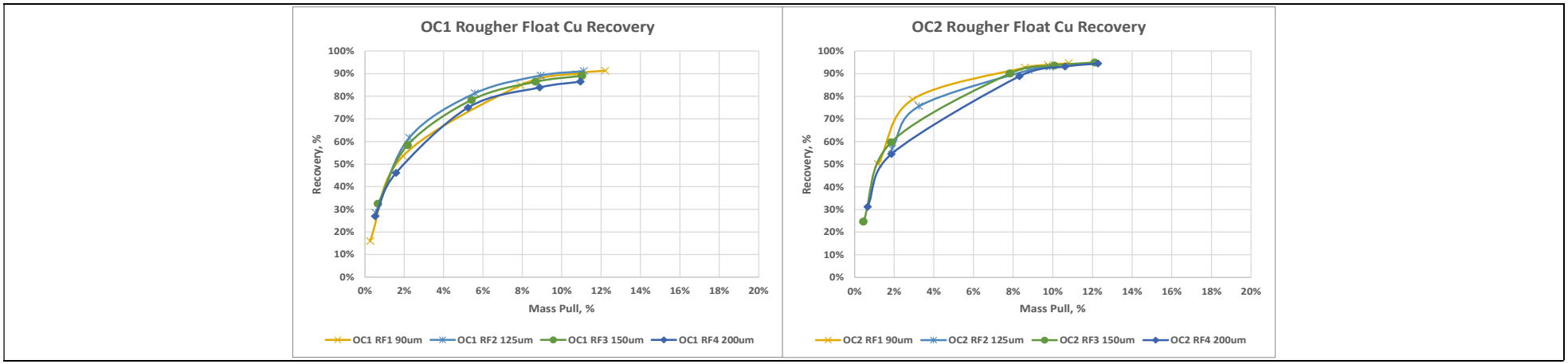


Figure 13.10 : BML, Alpala open pit, rougher primary grind parameterisation, copper recovery

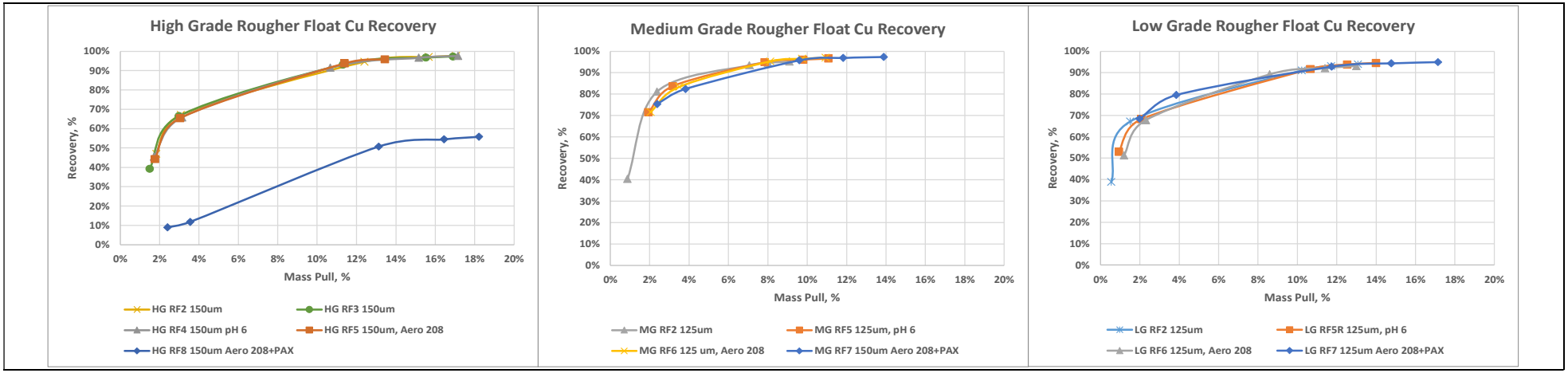


Figure 13.11 : BML, Alpala underground rougher reagent parameterisation, copper recovery

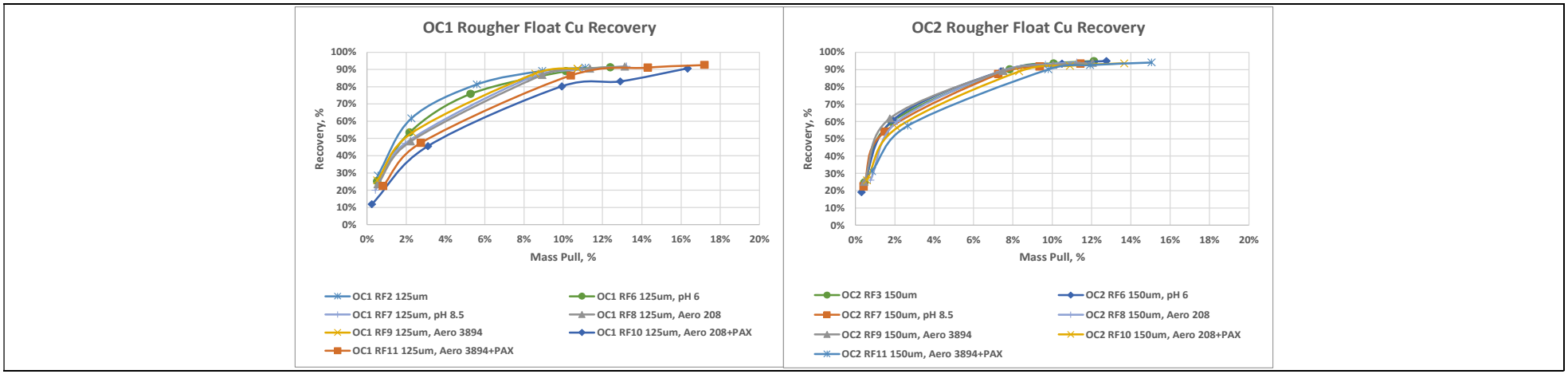


Figure 13.12 : BML, Alpala open pit, rougher reagent parameterisation, copper recovery

Following the current grind parameterisation and reagent investigations, the decision was to continue with rougher conditions as follows:

- Primary grind P_{80} 125-150 µm, with finer primary grind for low and medium grade composites
- Natural pH
- PAX collector
- MIBC frother
- 9 min residence time.

Air addition into the flotation cell was not investigated as a parameter.

13.3.5.3 Cleaner Testwork Results

Results from the regrind and reagent parameterisation cleaner testwork are shown in the figures below.

As expected, a finer regrind was required for the lower copper feed grade samples, although the initial testwork did not illustrate this as the samples were generally what would be considered high grade samples.

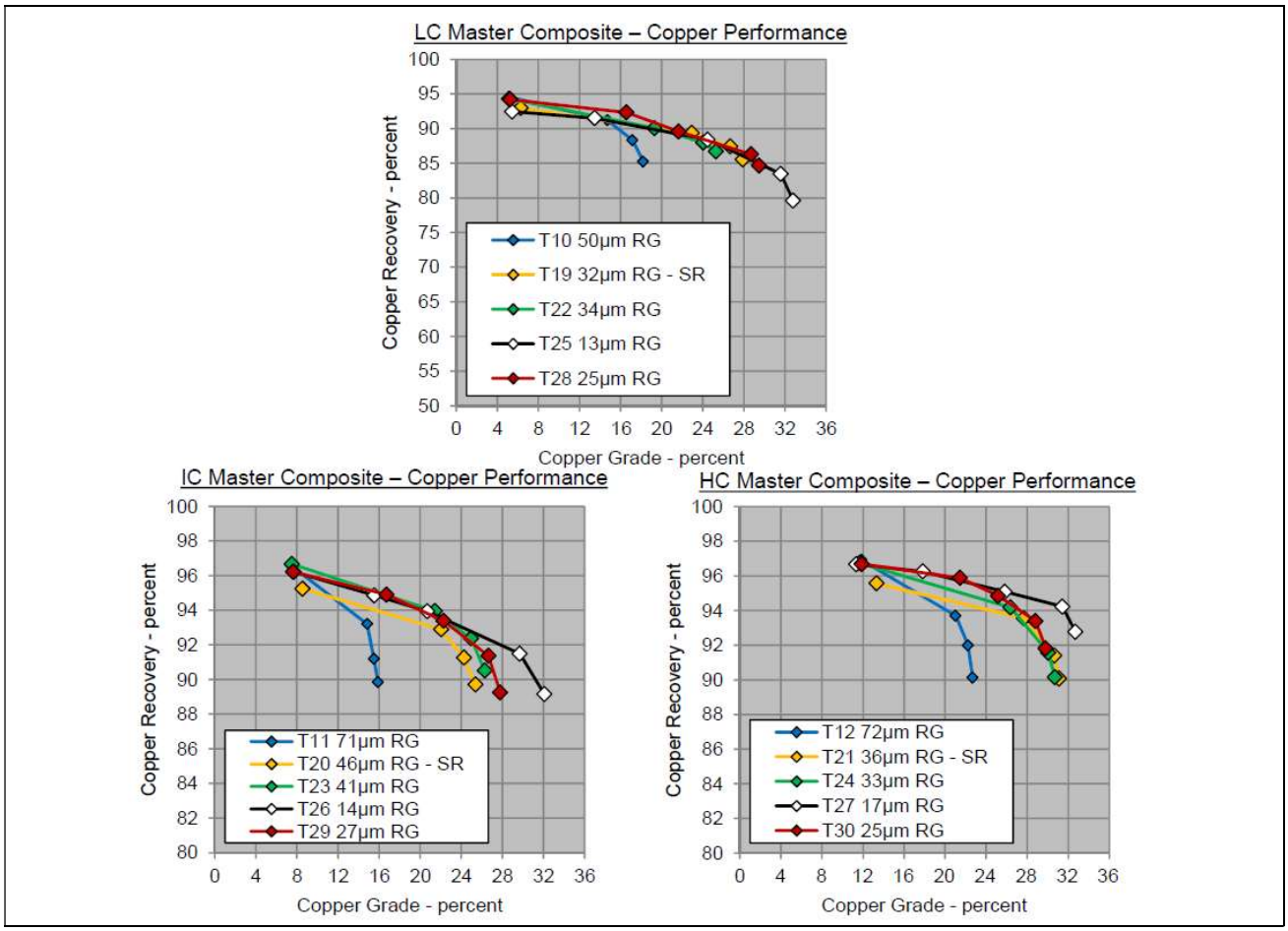


Figure 13.13 : KM 5754 cleaner parameterisation, where LC=LG, IC=MG, and HC=HG composites, copper recovery

Subsequent phase 2 testwork, with the wider range of copper feed grades, confirmed the requirement for finer regrind of the lower copper feed grade samples, as shown in the figure below.

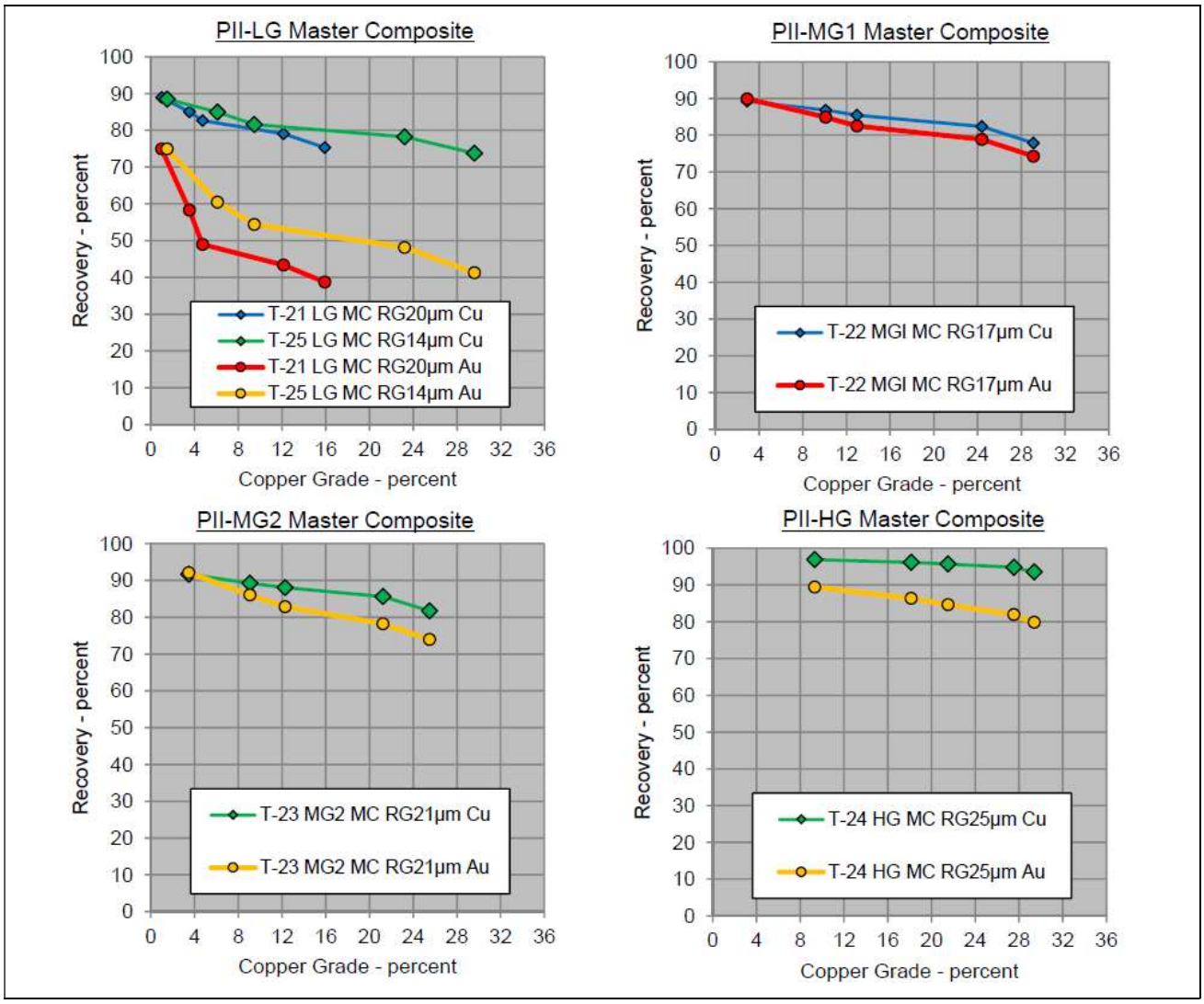


Figure 13.14 : KM 5922 cleaner regrind parameterisation, copper and gold recovery

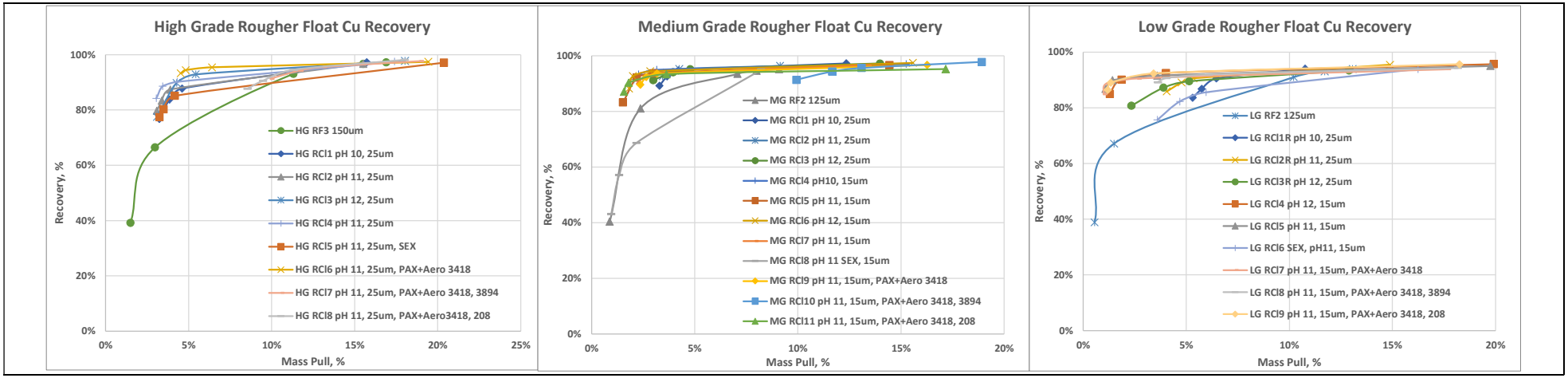


Figure 13.15 : BML, Alpala underground cleaner regrind & reagent parameterisation, copper recovery

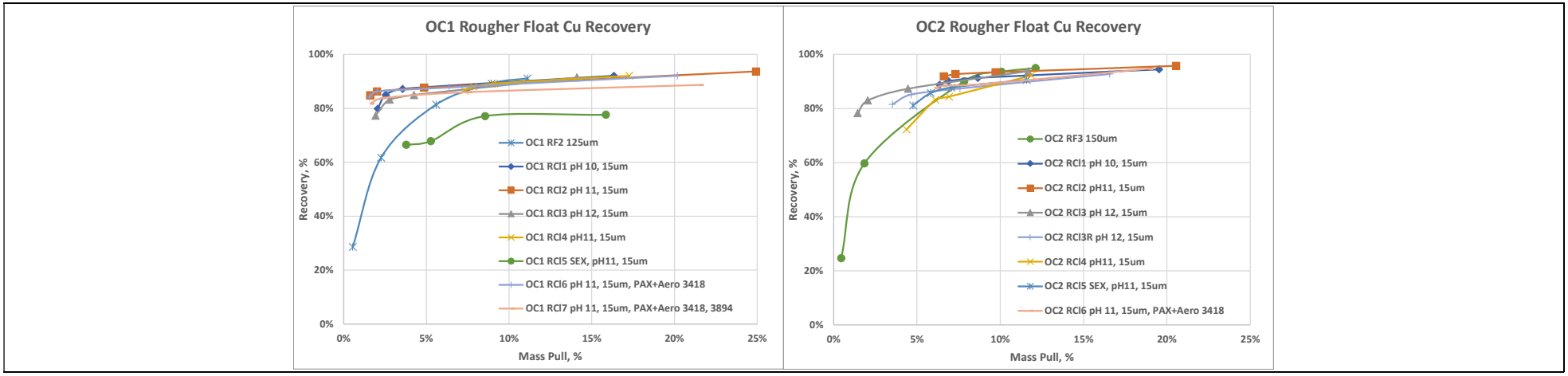


Figure 13.16 : BML, Alpala open pit cleaner reagent parameterisation, copper recovery

Following the investigations undertaken at BML, as shown in the figures below, the following flotation parameters were selected for the LCT and variability testwork.

Table 13.7 : BML, batch rougher and cleaner testwork findings

Composite	HG	MG	LG	OC1	OC2
Primary grind P_{80} µm Note 1	150	125	125	125	150
Rougher: pH Reagent	 Natural PAX	 Natural PAX	 Natural PAX	 Natural PAX	 Natural PAX
Cleaner: Regrind P_{80} µm pH Reagent	 25 11 PAX	 15 11 PAX 3418, 3894	 15 11 PAX 3418, 208	 15 11 PAX 3418	 15 11 PAX 3418
Comment	Tends to produce higher grade concentrate	Modifiers may not be required	Reduce mass pull to target concentrate grade	Modifiers may not be required	Reduce mass pull to target concentrate grade

Note 1: The Grinding Circuit in the Pre-Feasibility was designed for a P_{80} of 150 µm.

13.3.5.4 Size by Size Assay Analysis

During the phase 1 testwork size by size recovery analysis was conducted on low grade, intermediate grade and high-grade composites.

The figure below shows the rougher copper and gold recovery by size. Copper recovery is at its highest between 20 µm and 75 µm, with moderate declines above and below these sizes. Between 40% and 60% of the copper lost to rougher tailing resides in the <20 µm fraction, with approximately 20% in the >150 µm fraction. Most gold losses to rougher tailing reside in the >106 µm fraction, with only 10% of the losses in the <20 µm fraction.

The >150 µm size fraction represents a target for increasing rougher copper and gold recovery.

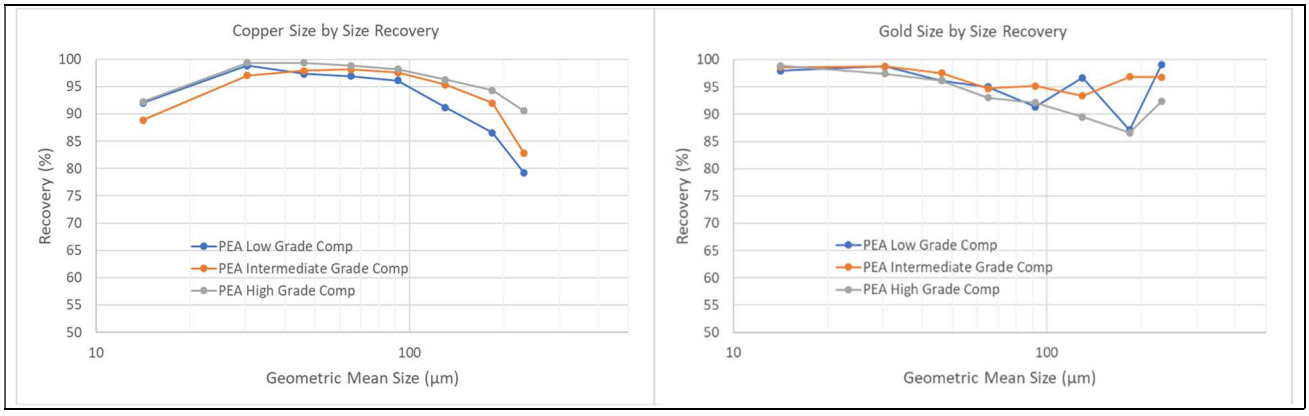


Figure 13.17 : Copper and gold size by assay recovery (KM 5794)

13.3.5.5 Ageing Testwork

A series of high-level aging tests were conducted (KM 5922).

Seven quarter core intersections were split, with control samples packaged and protected from the environment, while the "aged" half of each intersection was exposed to the environment. The duration of the aging was not recorded, however, as the samples were shipped by sea freight is anticipated that the ageing duration was approximately 2 months.

Each of the 14 samples were subjected to a batch cleaner flotation test to determine if the drill core which had been exposed to the environment performed differently than the sample which had been protected from exposure.

A slight degradation in performance was recorded for the samples exposed to the environment.

13.3.5.6 Rougher Tailings Retreatment

Rougher tailing samples from the ALS phase 2 testwork were composited to form samples for retreatment as shown in the table below.

Table 13.8 : Rougher tailings composites

Composite	Tailings Source
Phase 2 LG Rougher Tailing	KM5922-01, KM5922-05, KM5922-09, KM5922-21
Phase 2 MG1 Rougher Tailing	KM5922-02, KM5922-06, KM5922-10, KM5922-22
Phase 2 MG2 Rougher Tailing	KM5922-03, KM5922-07, KM5922-11, KM5922-23
Phase 2 HG Rougher Tailing	KM5922-04, KM5922-08, KM5922-12, KM5922-24

To approximate hydro-cyclone classification, the composites were screened at 150 µm. As shown below, there is an opportunity to upgrade the copper and gold in a simple classification stage for the LG and MG1 composites in particular.

Table 13.9 : +150 µm deportment

Composite	Fraction Reporting to Oversize, %				
	Mass	Cu	Fe	Au	Ag
Phase 2 LG Rougher Tailing	0.26	0.48	0.28	0.35	0.27
Phase 2 MG1 Rougher Tailing	0.21	0.32	0.21	0.40	0.21
Phase 2 MG2 Rougher Tailing	0.22	0.27	0.19	0.27	0.14
Phase 2 HG Rougher Tailing	0.22	0.20	0.22	0.27	0.20

The 150 µm oversize fractions (the equivalent of up to twice the rougher concentrate mass) were then ground to a P_{80} of ~53 µm and floated with a minor reagent addition for 4 minutes.

Once the coarse material was ground to a size more suited to a fines flotation up to 50% of gold and copper, and up to 70% of silver in the rougher tailing may be recovered to a low-grade concentrate. The various element grade-recovery curves increase with increasing rougher feed head grade, with recovery increasing with decreasing concentrate grade.

Potential recovery improvements were demonstrated as follows:

- Copper recovery improvement of 0.3 to 1.7%
- Gold recovery improvement of 1.0 to 3.9%
- Silver recovery improvement of 0.7 to 2.3%.

No additional work is planned at this stage as the primary grind target was subsequently re-visited in the Pre-Feasibility 2021-2 testwork.

13.3.6 Variability

A batch rougher test was completed on each of the 53 variability samples. The tests were completed at a nominal primary grinding target P_{80} of 150 µm, at natural pH, PAX as the collector. Equivalent rougher conditions were used for the open circuit cleaner tests, providing a cross check on rougher performance. The rougher flotation conditions did not employ any methods of selectivity against pyrite such as a selective collector, high pH, or depressant addition.

In terms of rougher reproducibility, the following was noted:

- Copper recovery reproducibility was high, with >80% of tests producing similar results between the initial roughing tests and those in the cleaner open circuit tests
- Gold recovery reproducibility was variable, with only 57% of tests producing similar results between the initial roughing tests and those in the cleaner open circuit tests. This may be a function of the presence of ultra-fine free gold
- Silver recovery reproducibility was poor, with <40% of tests producing similar results between the initial roughing tests and those in the cleaner open circuit tests.

Batch cleaner tests were completed at a nominal primary grinding target P_{80} 150 µm, and with a nominal regrind size target of P_{80} 25 µm. The cleaner circuit was conducted with a pulp pH of 11, moderated with lime. Rougher conditions were the same as the variability rougher tests. PAX additions in the rougher circuit were kept consistent between composites but addition rates in the cleaner circuit were elevated for higher grade samples.

Target cleaner performance, based on typical, similar porphyry operations were a concentrate grade >20% Cu, a cleaner circuit copper recovery >95%, and a cleaner circuit gold recovery >85%.

Under the above baseline conditions approximately 25% of the variability tests failed to achieve what were acceptable results in terms of concentrate grade and recovery (highlighted as red columns in the respective figures). Considering the effect of concentrate regrind on performance in the master composite testwork further tests were conducted on a selection of LG and MG variability samples. For the tests where regrind testwork targets were revised. On average, a reduction in P_{80} from 22.8 µm to 15.8 µm resulted in the following:

- A 10.4% Cu increase in concentrate grade from 17.0% Cu to 27.4% Cu
- A 2.4% increase in cleaner circuit copper recovery
- A 1.4% decrease in cleaner circuit gold recovery.

Three samples (MET029, MET030 and MET045) required regrind sizes approaching 10 µm to achieve acceptable performance. In addition, MET030 required a cleaner circuit pH increase to ~12 to achieve concentrate grade.

Further work is required to investigate the low batch cleaner grade/recovery tests, including mineralogical analysis of the cleaner scavenger tailings.

The results from the cleaner testwork are shown in the figures below prior to the repeat testwork with the finer regrind target.

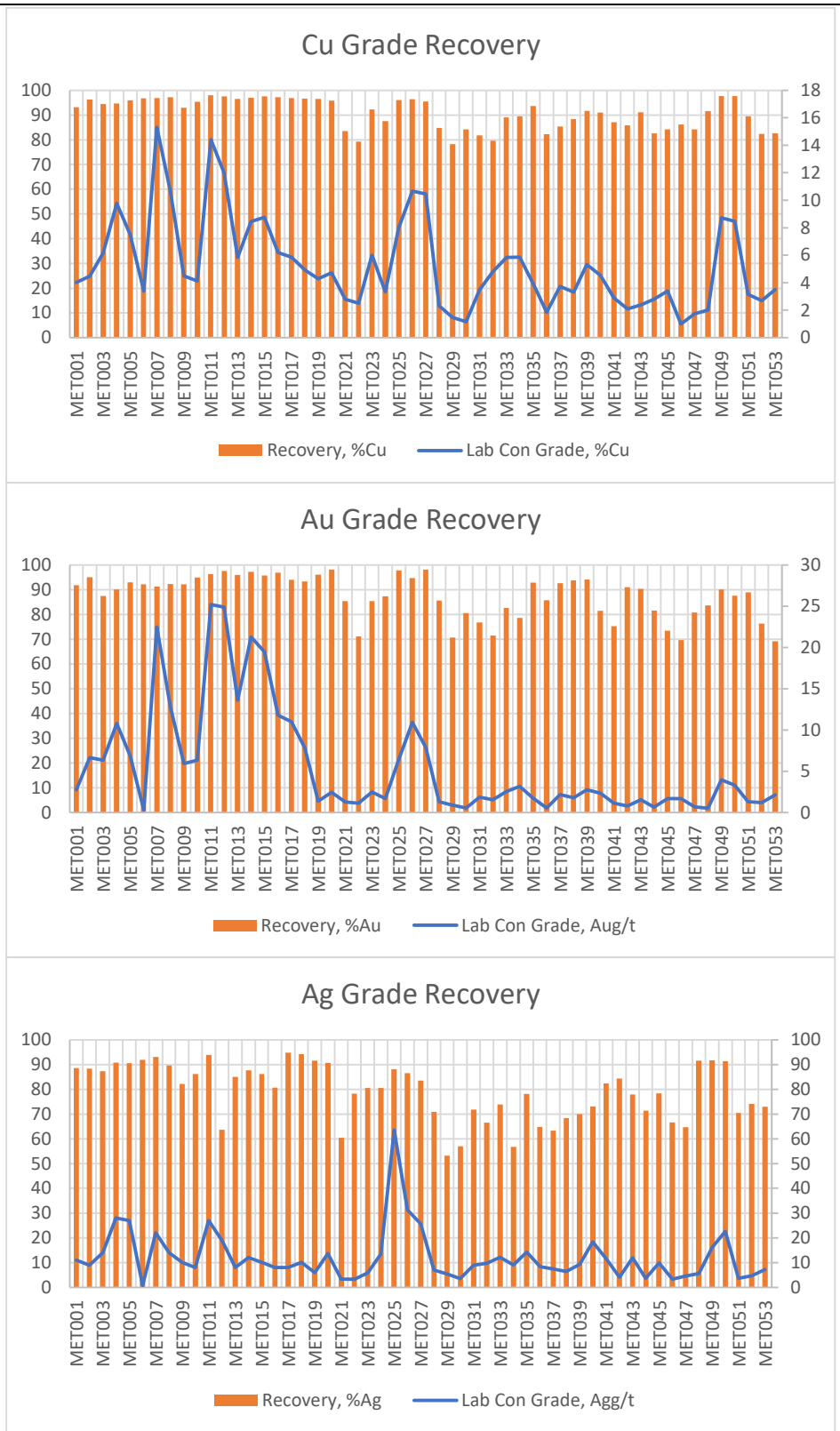


Figure 13.18 : Raw variability rougher testwork results, with recovery on the left vertical axis and grade in % or g/t on the right vertical axis

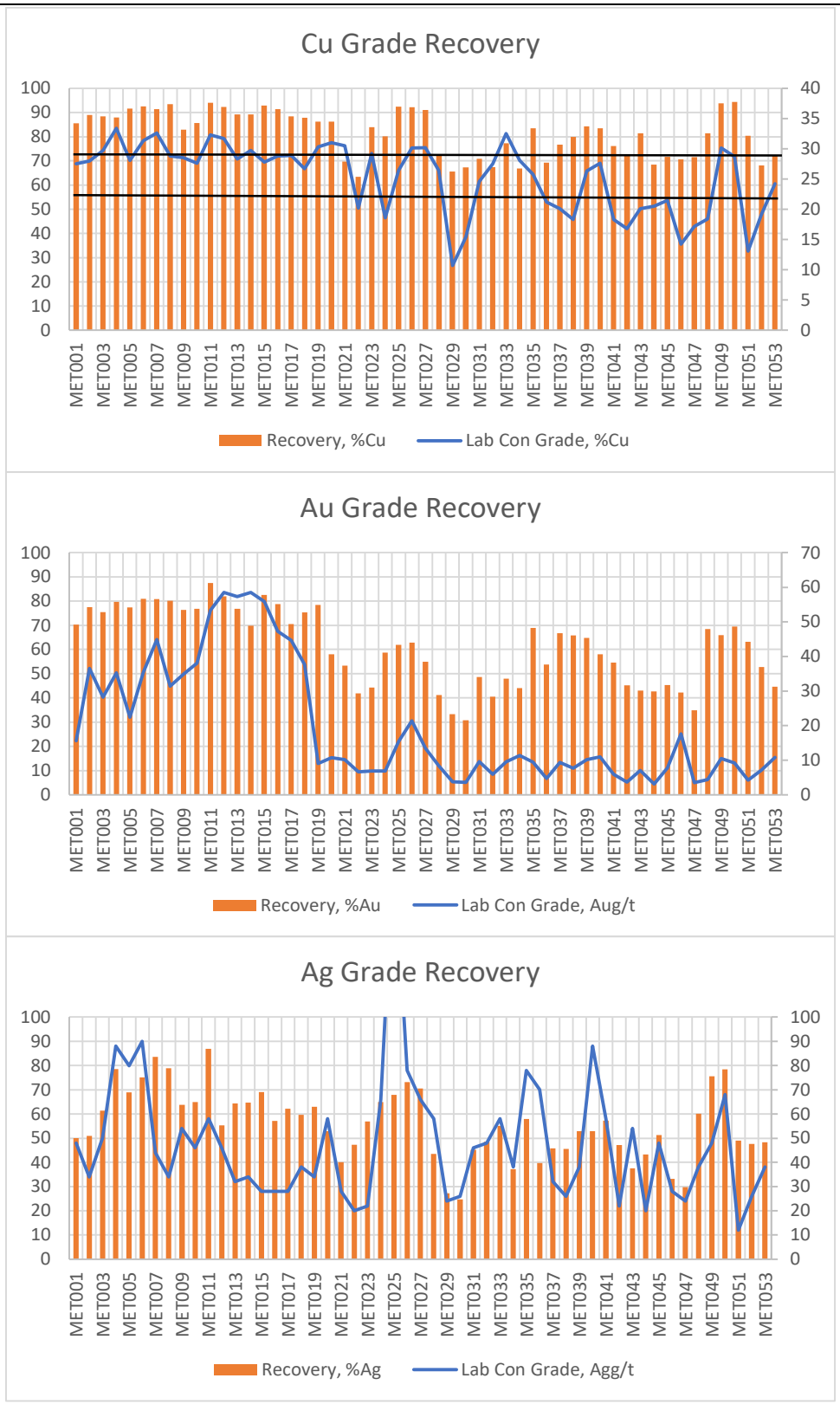


Figure 13.19 : Raw variability cleaner testwork results, with recovery on the left vertical axis and grade in % or g/t on the right vertical axis. Copper concentrate grade bands shown in the uppermost figure as 22-28% Cu

Following the raw testwork results as shown above, the data was reviewed for operations in order to better understand expected recovery when targeting concentrate grades within the range of 22-28% Cu in the lab (or 20-26% in operations).

For a significant proportion of the low (LG) and medium grade (MG) samples copper concentrate grade targets were not met (18 of 33 variability samples from phase 2). These samples also had correspondingly low recoveries for copper, gold and silver. Further investigations of copper cleaner scavenger tails are planned to determine what is occurring as the finer regrind is only part of the requirement to improve copper concentrate grade and recovery.

The figure below shows the average deportment for copper and gold for samples identified as LG, MG and HG copper feed grades. For gold in particular, the main losses as expected occur via the cleaner scavenger tailings, confirming the basis for the gold recovery investigations described below.

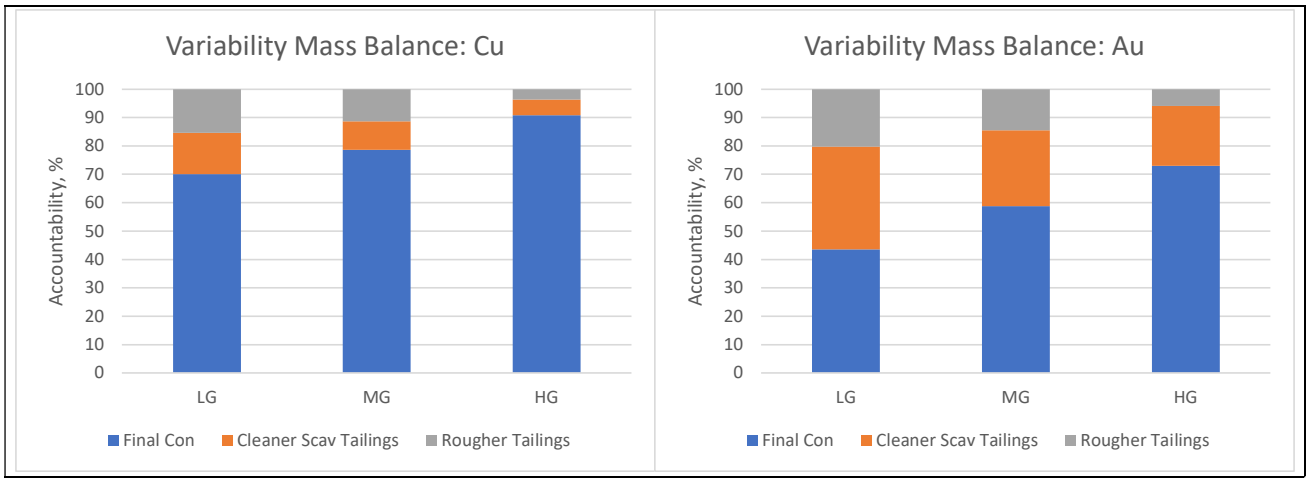


Figure 13.20 : Variability batch testwork, average mass balance for LG, MG and HG sample categories

13.3.7 Confirmation

To date, 18 locked cycle tests (LCT) have been conducted across the ten (10) master composites. This included:

- Single LCT on each of the three phase 1 master composites, using local Kamloops water
- Two LCT on each of the phase 2 master composites:
  - The first set using water sourced local to the project site and not recirculated through the cycles
  - The second set using water sourced local to the project site and recirculated through the cycles, to approximate the use of process water.
- One LCT on each of the phase 2a master composites, targeting increased recovery via movement down the grade recovery curve.

Final concentrates produced from each test were submitted for extended analysis.

The flowsheets for the LCT at each phase are shown in the figures below.

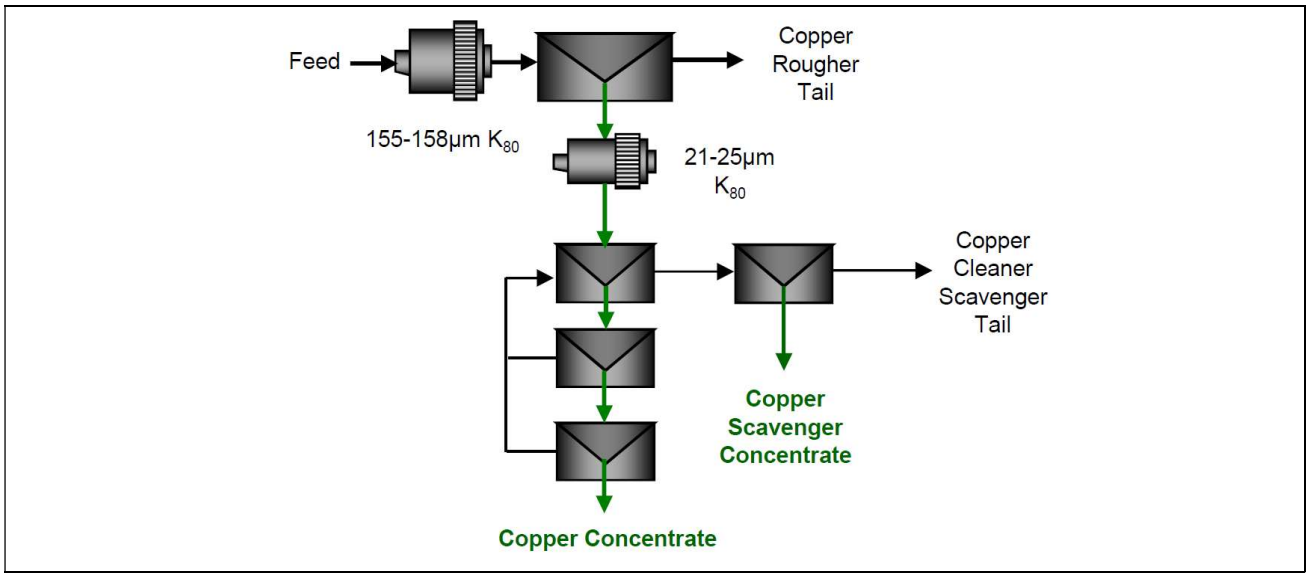


Figure 13.21 : Locked cycle flowsheet for ALS Kamloops KM 5754

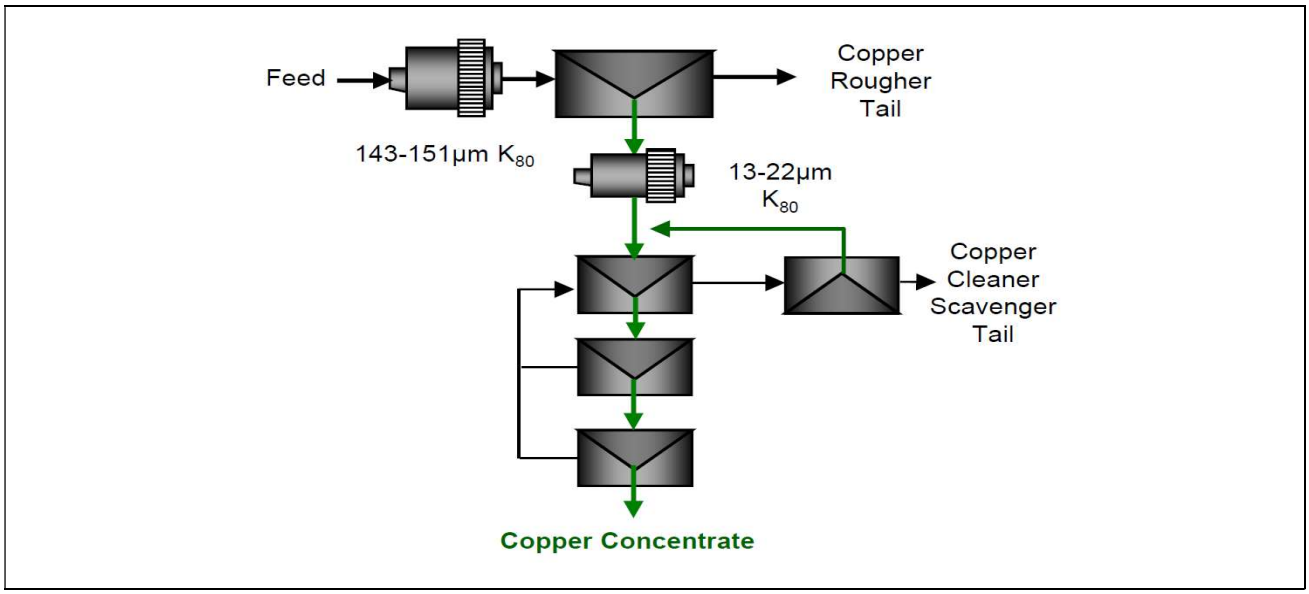


Figure 13.22 : Locked cycle flowsheet for ALS Kamloops KM 5922, 6204, BML

A comparison of the tap v site water LCT work was undertaken. To date only four (4) composites have been tested and no repeats. The results from this work are consistent, and no significant variation in copper or gold recovery was observed.

Batch v LCT testwork comparisons were also undertaken to identify potential relationships between the results, enabling batch testwork to be the predominant variability testwork method in the future. The results from this work indicate the possibility to apply this method, with offsets as shown in the figures below (5-10% lower recovery for batch testwork in comparison to the LCT testwork). As repeat testwork was not undertaken for the LCT and Cleaner batch tests, this will be required going forwards in order to validate the results achieved.

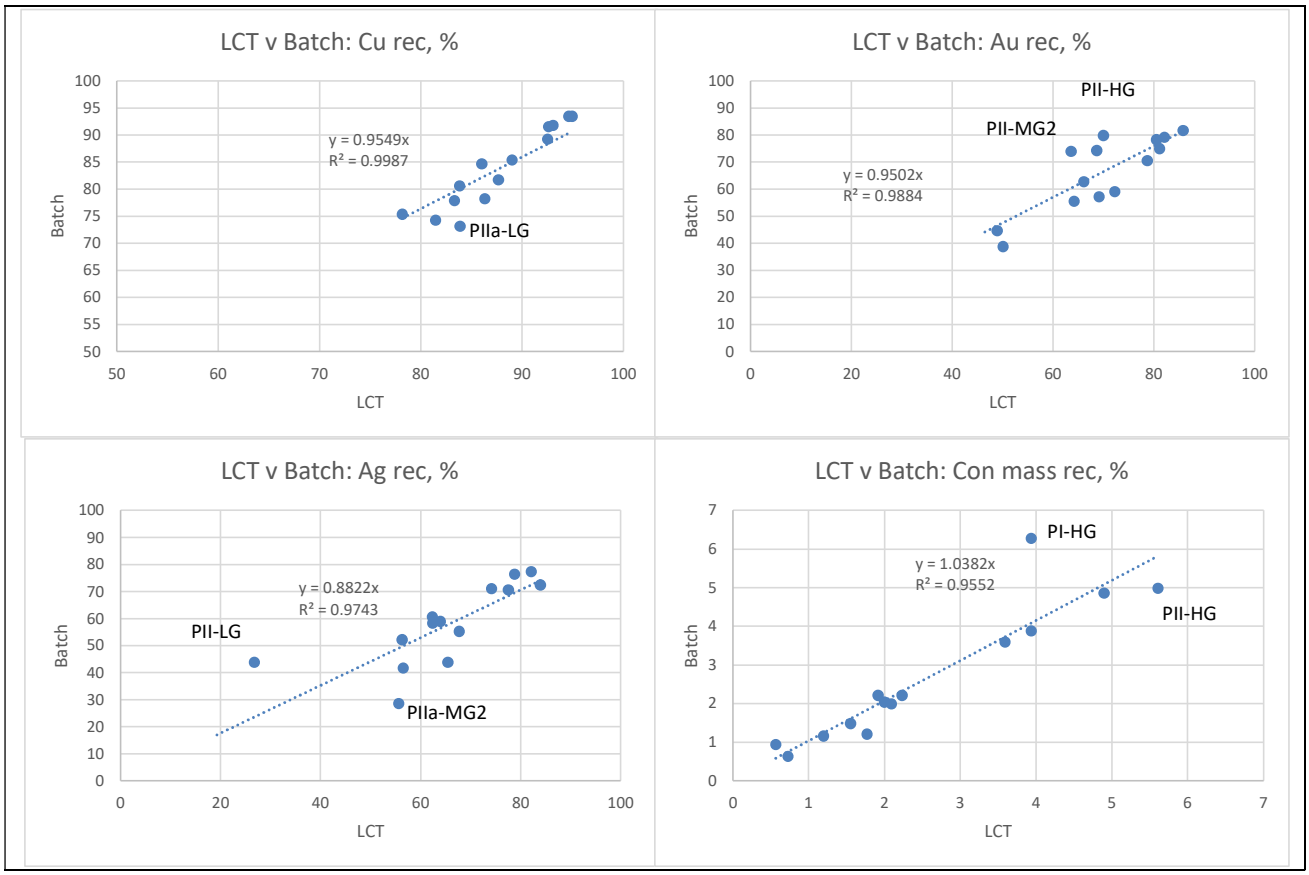


Figure 13.23 : LCT v Batch testwork, comparisons

Outliers from the batch v LCT investigations are identified above. The increased variability in the gold testwork data may be due to the low grades and findings that the gold only weakly associated with the copper.

In comparison to the variability batch testwork, the losses of copper and gold to tailings were approximately halved, and the losses of gold to cleaner scavenger tailings confirmed this stream as a target for additional gold recovery as 10-20% of all gold is lost to this stream.

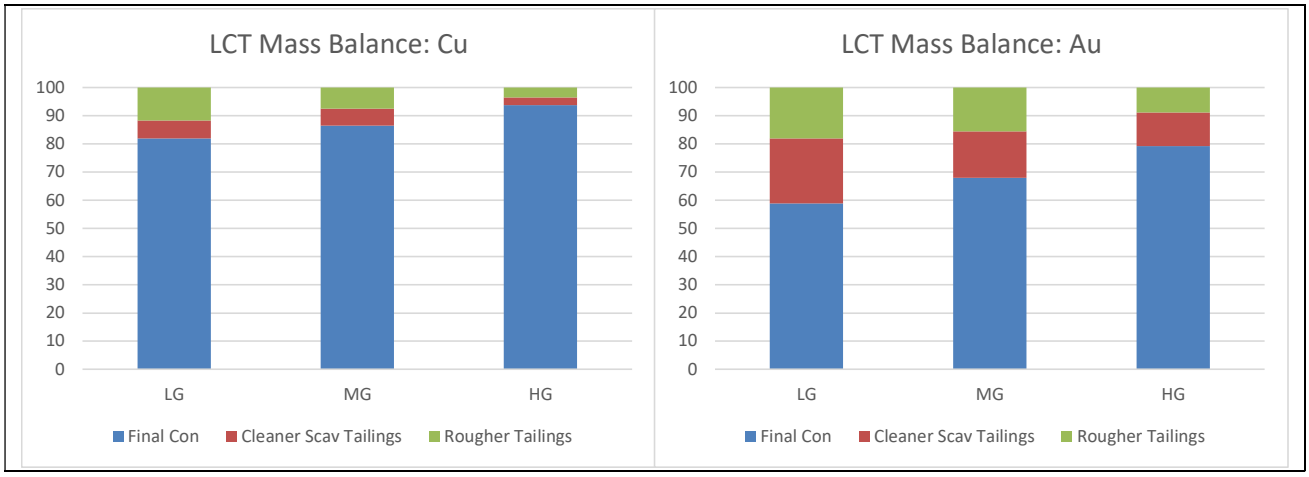


Figure 13.24 : LCT testwork, average mass balance for LG, MG and HG sample categories

13.3.8 Settling and Filtration

Testwork was undertaken by ALS Kamloops (KM 5922) with rougher tailings from LG, MG1, MG2 and HG composites. Two cleaner scavenger tailings composites were prepared from the variability cleaner scavenger tailings test residues.

The Kynch test conditions and best results are presented in the table below, from the results shown in the figures below. No flocculant screening was undertaken, and Magnafloc 100 was used for all testwork.

Table 13.10 : KM 5922 Kynch test conditions, calculation results[1,2]

Samples	pH	pH modifier	Floc g/t	Final Density % solids	Unit Area Settling Rate t/h/m^2
LG	8	-	0, 2, 5, 10	60.9	0.18-0.20
MG1	8	-	0, 2, 5, 10	58.5	0.14-0.18
MG2	8	-	0, 2, 5, 10	58.5	0.14
HG	8	-	0, 2, 5, 10	58.5	0.15
Cl scav tails 1	11	2.8 kg/t	10, 20	43.1-48.2	0.15-0.19
Cl scav tails 2	11	2.3 kg/t	10, 30	45.8	0.18-0.24

Notes:
[1] Settling area requirements were estimated using the Kynch technique as modified by Talmage and Fitch for continuous thickening (Ind. and Eng. Chem., Vol 47 No1).
[2] Settling curves were interpreted using the method described by Couche and Goldney (Proceedings Aust. I.M.M., No191, 1959).

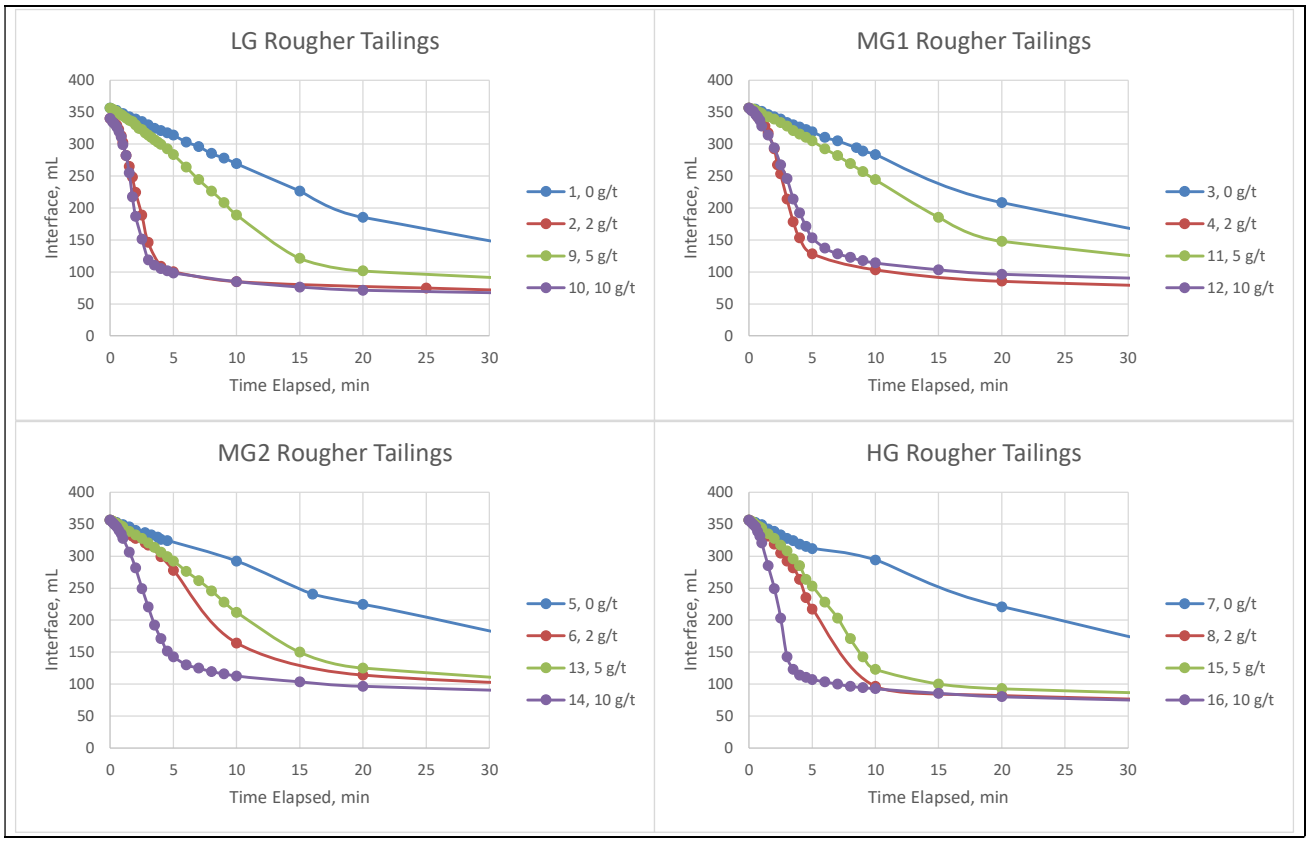


Figure 13.25 : KM 5922 Rougher tailings Kynch testwork

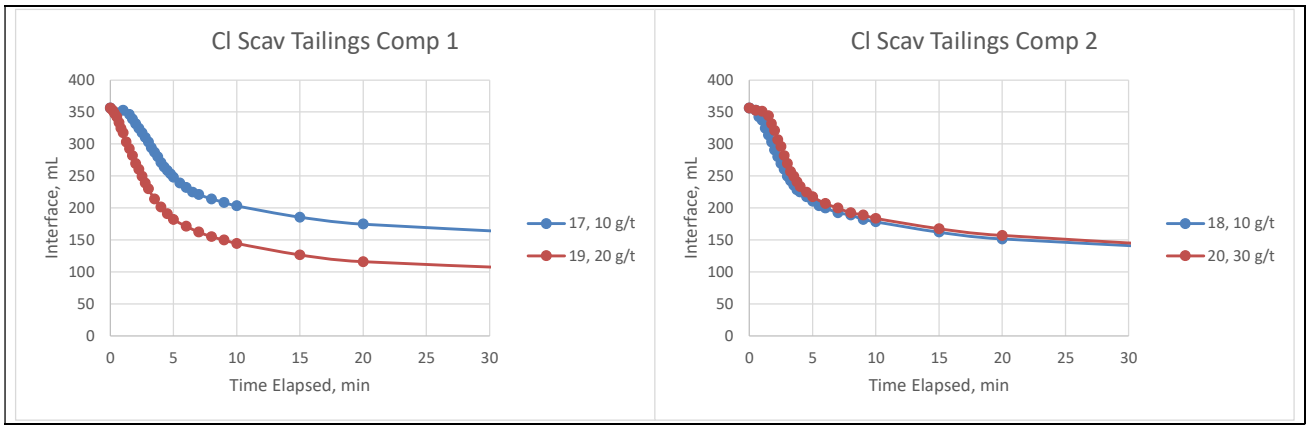


Figure 13.26 : KM 5922 Cleaner scavenger tailings Kynch testwork

13.3.9 Gold Recovery

In January 2019 (KM 5754), the testwork program was extended to specifically target cleaner circuit gold losses, via implementation of a pyrite recovery circuit treating cleaner 1 tailings.

Approximately 60% of the copper and 50% of the gold in copper cleaner tailing was recovered to the pyrite concentrate. This product was then used as the basis for the gold recovery investigations described below.

In 2021, the testwork program was defined to specifically investigate pyrite flotation of the cleaner scavenger tailings for the Alpala underground deposit only, with a view to recovering as much gold and silver as could be reasonably recovered to a concentrate for downstream processing.

This represented a variation from the previous testwork, whereby the cleaner scav concentrate was considered a pyrite concentrate.

Gold recovery from initial batch flotation testwork indicated 35-75% (ranging from HG to LG) of the gold and approximately 65% of the silver may be recovered to a concentrate. The concentrate recovered from subsequent bulk flotation testwork is the basis for the gold recovery testwork, which is currently in progress.

A series of tests were conducted to evaluate this further, including diagnostic leach, Leach Well tests, carbon-in-leach cyanidation and Albion Process™ amenability tests, direct cyanidation bottle roll tests, acid wash-cyanidation bottle roll tests, biological oxidation - cyanidation and thiosulphate leach tests.

13.3.9.1 Pyrite Concentrate Diagnostic Leach

Pyrite concentrate, from the testwork undertaken in 2019, was subjected to a diagnostic leach test (KM 5754) to evaluate the extraction of gold, copper and silver to solution. The results indicated that gold in the pyrite concentrate was generally amenable to free milling direct cyanidation (91.4%). Copper had a wide cyanide solubility, typical of chalcopyrite. Silver solubility was broad, indicating a variable refractory nature.

Table 13.11 : Diagnostic leach of pyrite concentrate

Diagnostic Leach Phase	Distribution - percent		
	Au	Ag	Cu
P1 - Cyanide Soluble	91.4	23.0	21.3
P2 - Carbonate Locked	6.7	21.7	20.7
P3 - Weak HNO_3 Soluble Mineral Locked	0.8	21.0	12.0
P4 - Strong HNO_3 Soluble Mineral Locked	1.0	4.6	1.6
P5 - Remaining Sulphide Encapsulated*	0.1	29.7	44.4
P6 - Remaining Non-Sulphide Gangue Encapsulated	0.1	-	-

13.4 Recovery Estimates

Recovery estimates for the Cascabel Project copper concentrate and doré products are described in the following sections.

13.4.1 Copper Concentrate

The overall recovery relationships for the flotation plant which were applied for the Pre-Feasibility study are shown in the figures below, based on the available locked cycle testwork (LCT). No corrections have been applied at this time for operability related losses. In addition, it is noted that there is minimal LCT for the lower copper feed grade materials in the Alpala underground deposit.

Table 13.12 : LCT for recovery equations	
Sample ID	**LCT Test ID**
PIIa-LG	KM6204-15
PIIa-MG1	KM6204-16
PIIa-MG2	KM6204-17
PIIa-HG	KM6204-18
PIIa-C1	KM6204-19
PIIa-C2	KM6204-20
PIIa-C3	KM6204-21
PII-LG	KM5922-51
PII-MG1	KM5922-50
PII-MG2	KM5922-52
PII-HG	KM5922-53
PII-LG	KM5922-54
PII-MG1	KM5922-55
PII-MG2	KM5922-56
PII-HG	KM5922-57
PI-LG	KM5754-31
PI-MG	KM5754-32
PI-HG	KM5754-33

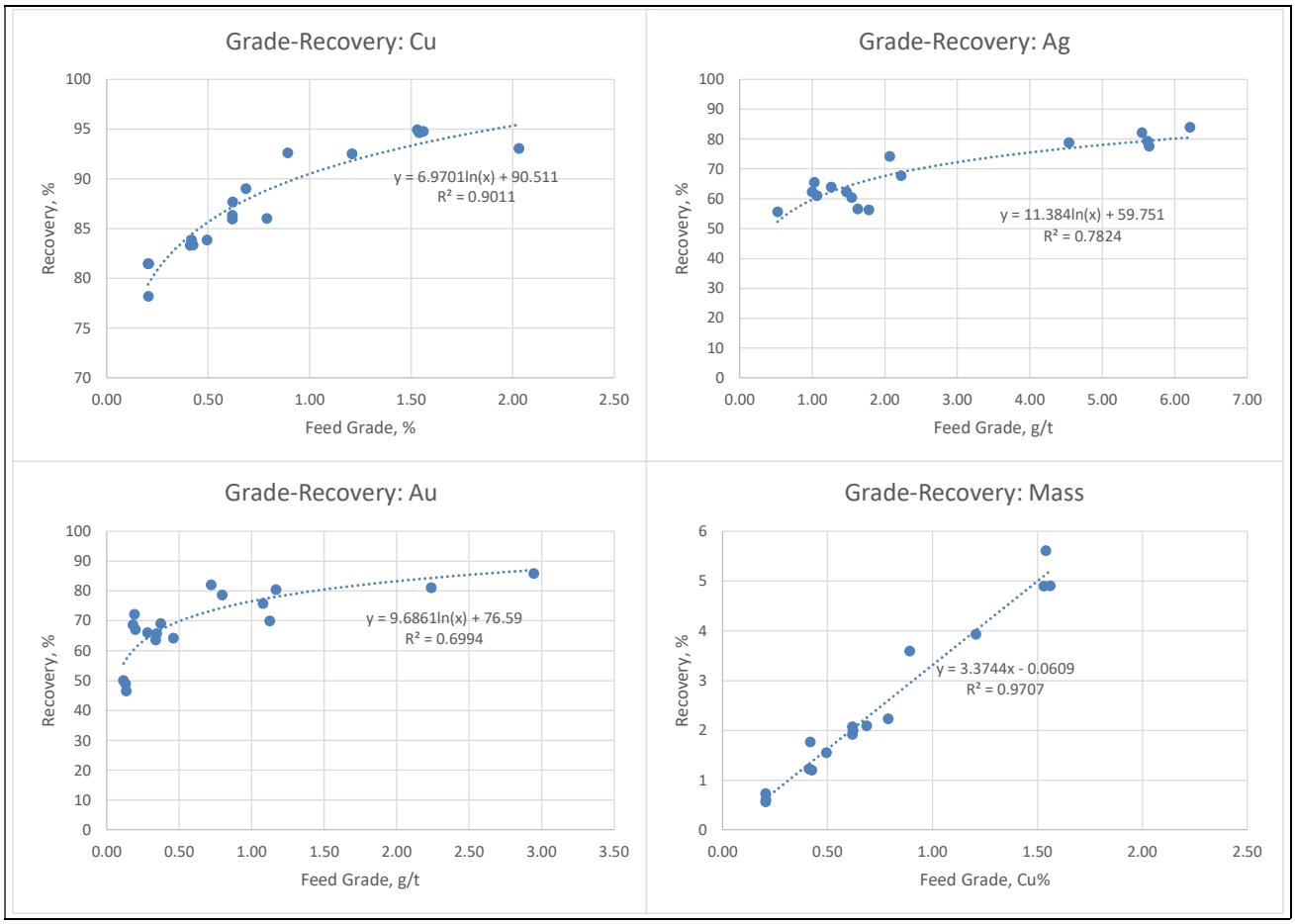


Figure 13.27 : Cascabel Project Alpala underground recovery relationships

Concentrate grade was determined using copper head grades, mass recovery and copper recovery in accordance with the equations above. KM5754-33 was excluded in the mass recovery equation development as the line fit was skewed incorrectly with the inclusion. It is noted that the mass pull should increase further from current estimations as the Cu feed grade increases. As the LCT database increases it is expected that this will address the low mass recovery estimation at the higher Cu feed grades.

Going forwards increased LCT and repeats will be undertaken to enable increased confidence in recovery relationships for the Cascabel Project deposits. These recovery relationships can be incorporated into the resource model for the Alpala UG deposit now.

13.4.1.1 Stage Flotation Recovery

Individual (stage-wise) recovery relationships were estimated for the mass balance to enable various feed qualities (within the limits of the testwork) to be investigated separately. The data applied for the overall recovery equation determinations was also applied to this work. Where applicable exclusions are referenced in the flotation stage sections below. Mass recoveries for each flotation stage are reported below.

Roughers

The Rougher flotation stage recovery relationships based on the LCT are shown in the figure below.

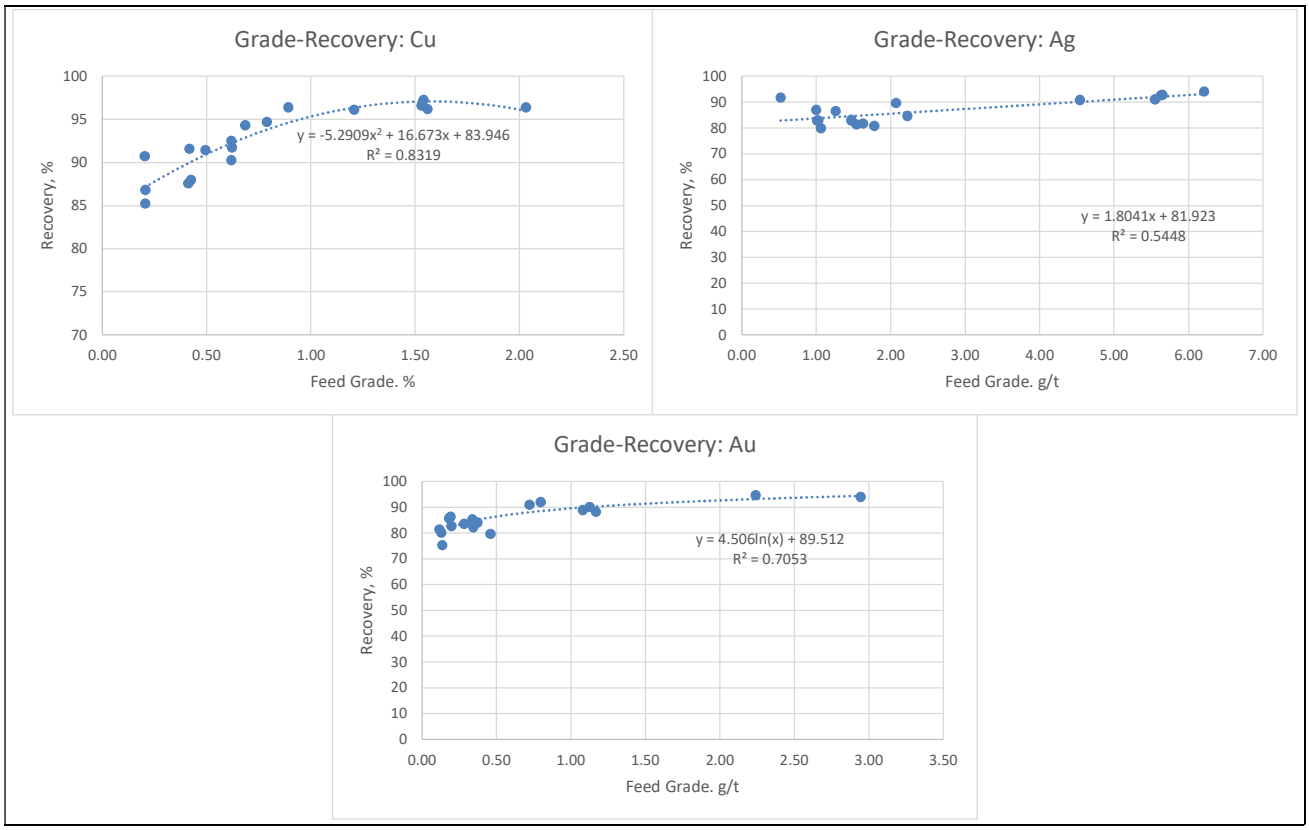


Figure 13.28 : Cascabel Project Alpala underground Rougher stage flotation relationships

Cleaner 1

The Cleaner 1 flotation stage recovery relationships based on the LCT are shown in the figure below. The grade-recovery relationship for Ag excludes the PII-LG results (KM5922-51 tap water, 54 site water) as they were not consistent with the initial and subsequent LCT tests with the same sample. Further investigation may be required, in addition to increasing the number of LCT investigations.

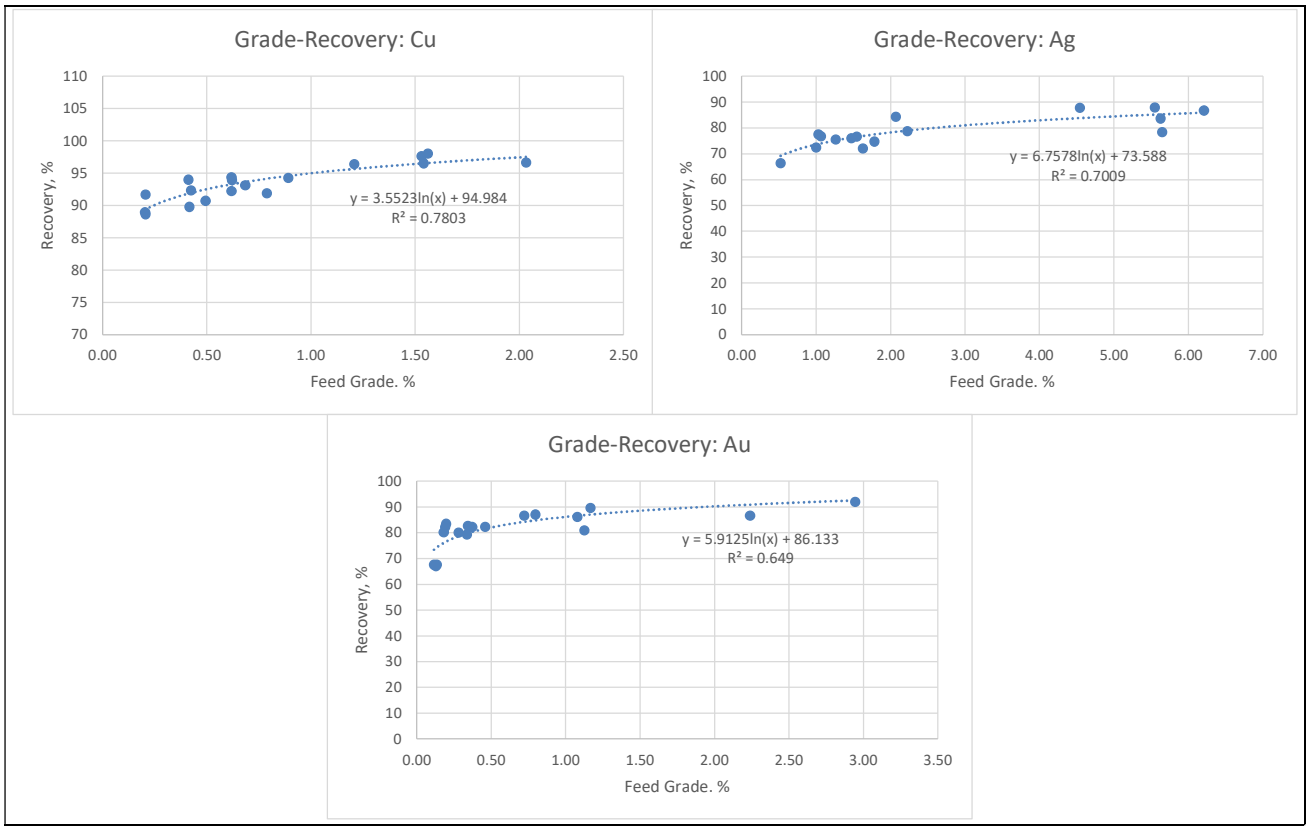


Figure 13.29 : Cascabel Project Alpala underground Cleaner 1 stage flotation relationships

Cleaner 1 Scavenger

The Cleaner 1 Scavenger flotation stage recovery relationships based on the LCT are shown in the figure below. It is recognised that the scavenger flotation stage in particular shows variable performance and un-optimised conditions. These relationships have been applied for convenience; however, a fixed value would also provide a reasonable approximation at this stage.

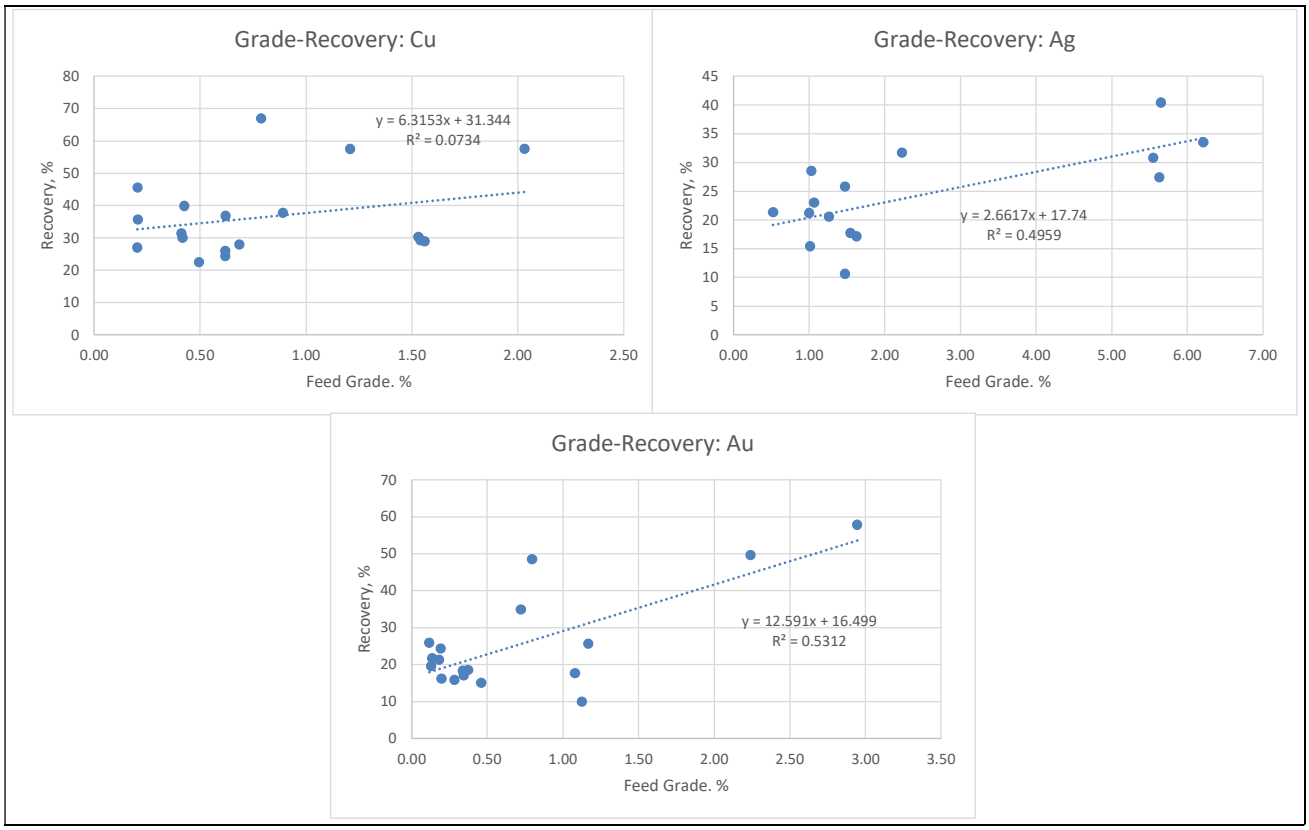


Figure 13.30 : Cascabel Project Alpala underground Cleaner 1 Scavenger stage flotation relationships

Cleaner 2

The Cleaner 2 flotation stage recovery relationships based on the LCT are shown in the figure below.

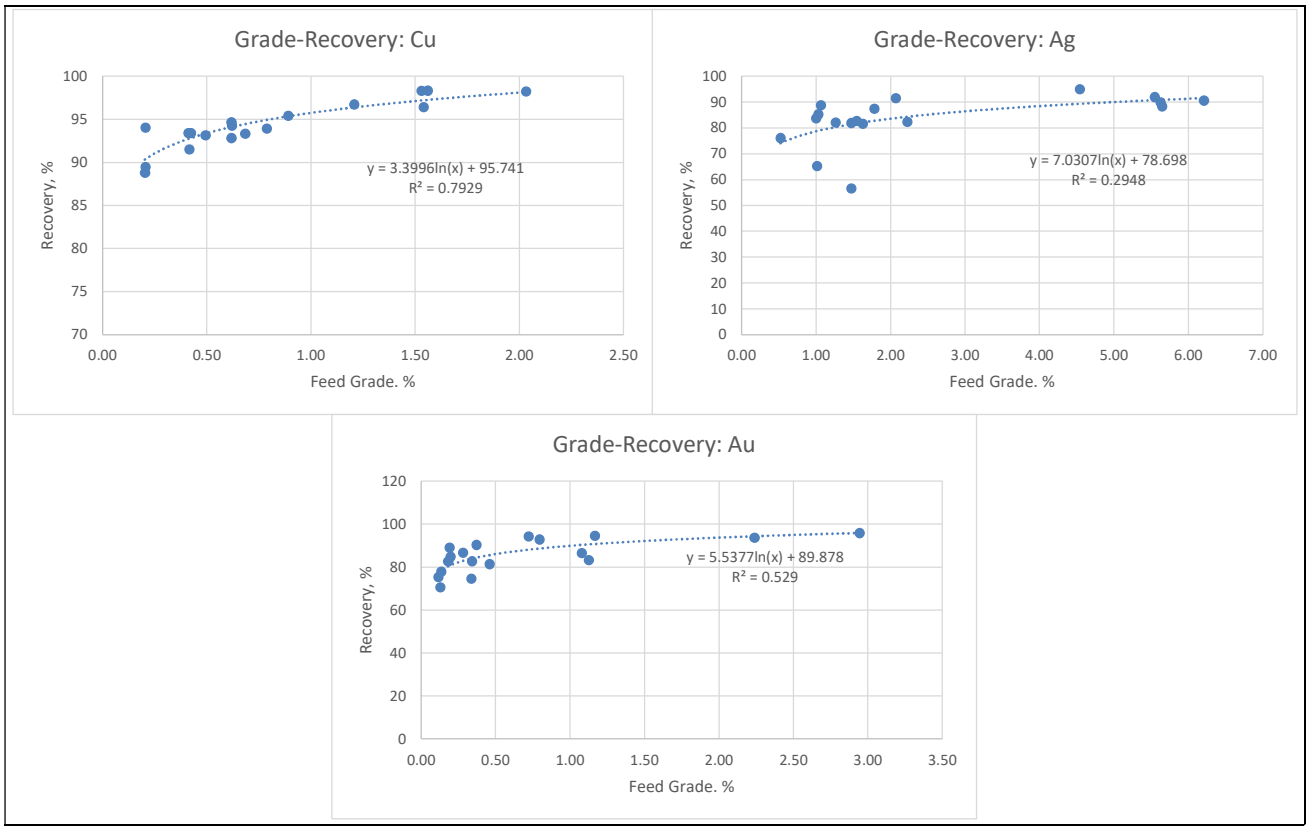


Figure 13.31 : Cascabel Project Alpala underground Cleaner 2 stage flotation relationships

Cleaner 3

The Cleaner 3 flotation stage recovery relationships based on the LCT are shown in the figure below.

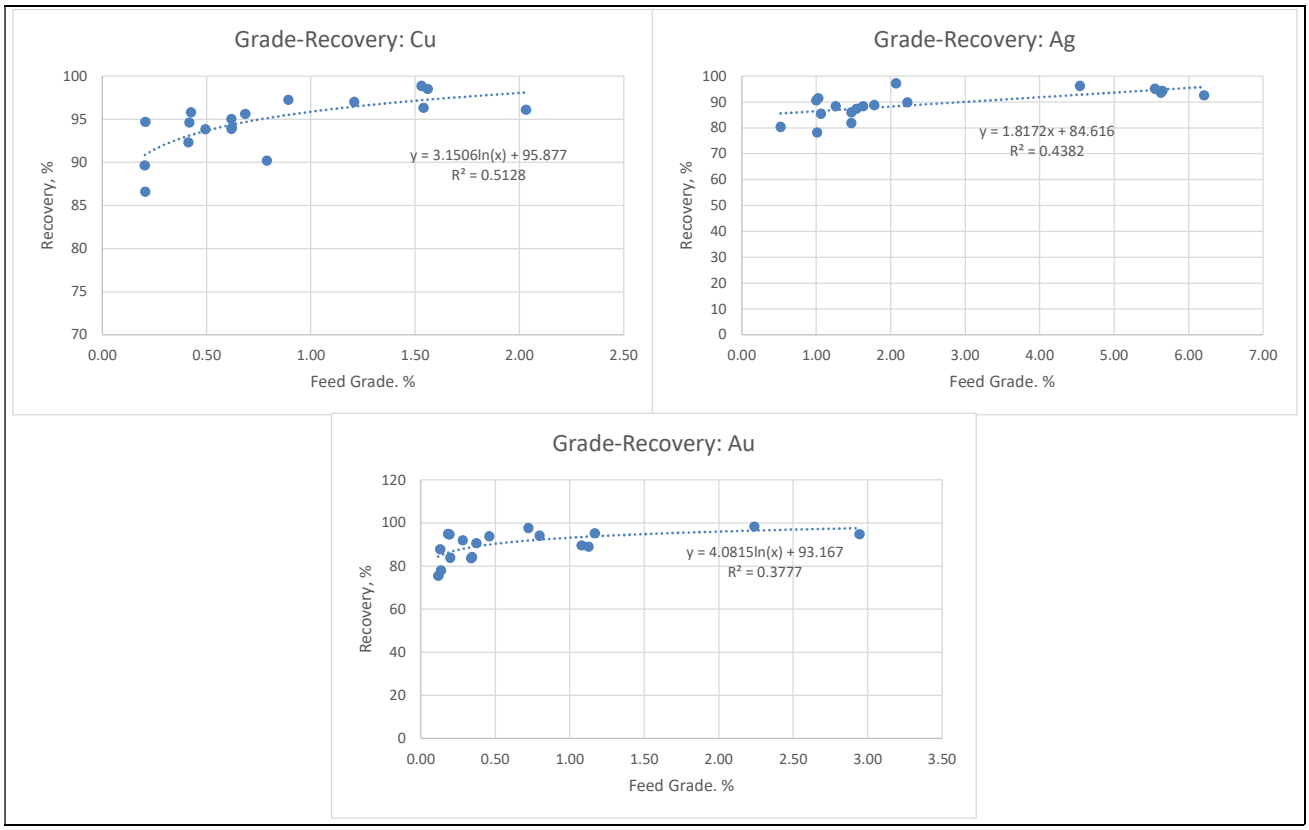


Figure 13.32 : Cascabel Project Alpala underground Cleaner 3 stage flotation relationships

Mass Recoveries

All flotation stage mass recovery relationships based on the LCT are shown in the figure below. The rougher and cleaner 1 scavenger relationships have the least confidence; for the roughers due to the narrow range in mass recoveries for the samples tested, and for the cleaner 1 scavenger due to the nature of the process stage, namely un-optimised scavenging.

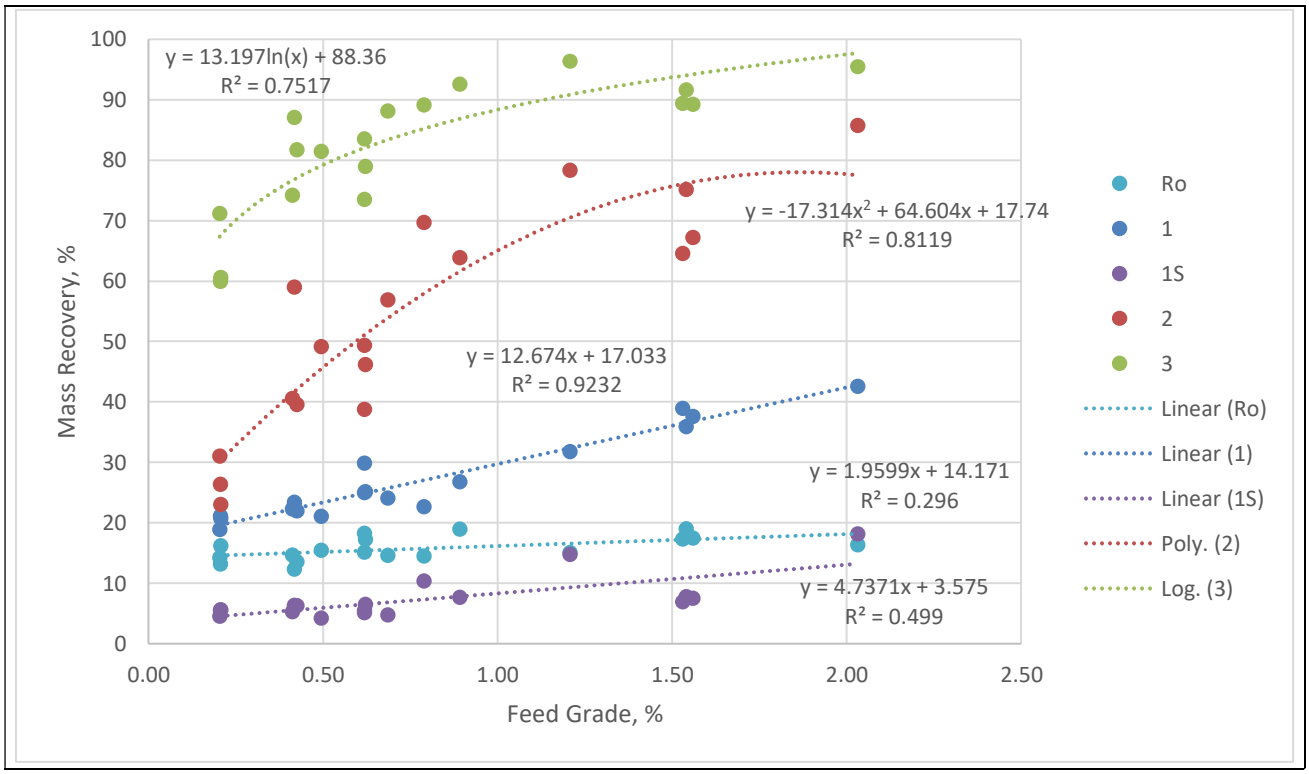


Figure 13.33 : Cascabel Project Alpala underground flotation stage mass recovery relationships

13.4.2 Doré

The Gold Recovery process plant is comprised of:

- Pyrite flotation
- Cyanidation.

Pyrite recovery and cyanidation testwork is still being finalised at the time of this report. There was insufficient data on which to base the gold and silver equations to doré. The Au and Ag recovery equations to doré were estimated by SolGold based on limited testwork.

Estimated Au recovery to doré = 60% x (1 – Ro[1] tails Au loss – Overall Au recovery) – estimated to be 60% of gold in cleaner scavenger tailings.

Where Ro tails Au loss = 1 – Ro con Au recovery.

Estimated Ag recovery to doré = 40% x (1 – Ro tails Ag loss – Overall Ag recovery) – estimated to be 40% of silver in cleaner scavenger tailings.

Where Ro tails Ag loss = 1 – Ro con Ag recovery.

The equations for the Rougher and Cleaner 3 Au and Ag recovery are reported in Figure 13.27 and Figure 13.28 respectively.

[1] Rougher

These equations will be updated as more testwork results become available.

13.5 Concentrate Quality

The concentrate quality shown in the table below is based on the LCT concentrate quality reported in KM 6204 and aligns with the revised (conventional) operating targets.

Table 13.13 : Cascabel Project Alpala underground concentrate quality

Element	Symbol	Units	Minimum	Maximum	Average
Antimony	Sb	g/t	1	12	5
Arsenic	As	g/t	7	124	61
Bismuth	Bi	g/t	4	9	6
Cadmium	Cd	g/t	5	46	16
Copper	Cu	%	20	29	25
Gold	Au	g/t	8	17	13
Iron	Fe	%	30	35	32
Lead	Pb	g/t	98	576	235
Molybdenum	Mo	g/t	136	1,930	715
Magnesium	Mg	%	0	0	0
Selenium	Se	g/t	111	170	143
Silver	Ag	g/t	38	122	66
Sulphide sulphur	S^{2-}	%	31	41	37
Total sulphur	S	%	31	41	37
Tellurium	Te	g/t	5	11	8
Thorium	Th	g/t	< 2	< 2	< 2
Uranium	U	g/t	< 1	< 1	< 1
Zinc	Zn	g/t	540	8,690	2,484

13.6 Comments on Section 13

The QP notes:

- The samples tested for the deposit are considered to be representative of the process plant feed and life of mine on a grade and spatial basis
- Acceptable copper, gold and silver recoveries were achieved using a flotation and CIP flowsheet by assuming gold and silver recoveries to doré based on limited test work. Further test work is required to confirm the gold and silver recovery to doré can be achieved
- Recovery relationships for copper, gold and silver to concentrate were able to be defined for the Pre-Feasibility study
- Assumptions based on initial testwork have been applied for gold and silver recovery to doré for the Pre-Feasibility study
- A saleable copper-gold-silver flotation concentrate was obtained using a conventional sulphide flotation process

- The concentrates produced during the most recent testwork phase contain relatively low levels of impurities and should not be subject to penalties (refer also to discussion in Section 17 and Section 19)
- Optimisation testwork could also be completed for settling testwork, which may lead to a reduction in thickener area or optimised flocculant usage.

14 Mineral Resource Estimates

14.1 Introduction

The MREs for Alpala and Tandayama-America were prepared following industry best practice as described in the "Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines" (CIM, 2019).

The QPs who take responsibility for the estimates are Mrs Cecilia Artica (QP Alpala) and Dr Andrew Fowler (QP Tandayama-America). Mrs Artica and Dr Fowler were both Principal Geology Consultants and full-time employees of Mining Plus at the time of reporting. Both were and are independent of SolGold.

Geology was interpreted in two-dimensional vertical and plan hard-copy sections before being transferred to Leapfrog software and modelled as three-dimensional wireframes. The wireframes were then used to define estimation domains and domain boundary conditions through exploratory data analysis. Once domains were defined, variography was completed and search and estimation plans were developed. The estimation for Alpala was undertaken in Datamine software, while for Tandayama-America, Leapfrog Edge software was used.

The estimation for both deposits was completed with ordinary kriging (OK), with check estimates completed using the nearest neighbour (NN) estimation method. Block model validation showed good agreement between the input composite grades and the estimated block grades in both Alpala and Tandayama-America.

The MREs have been classified in accordance with the CIM Definition Standards (CIM, 2014) and were both informed by a drill hole spacing study based on Alpala assumptions.

The reasonable prospects for eventual economic extraction (RPEEE) criteria were met by reporting inside optimised pit shells and/or underground optimisation shapes.

The cut-off or shut-off grades used for optimisation and reporting were based on third-party metal price research and forecasts of Cu and Au prices at the time of reporting, as well as operating cost structures for Alpala that were current at the time of reporting. Operating costs included mining, processing and general and administration (G&A). Net Smelter Return (NSR) included metallurgical recoveries and off-site realisation (TCRC) including royalties.

Open pit optimisation was completed using the conventional Lerchs-Grossman optimisation routine implemented in Whittle software, and the revenue factor one pit was selected for reporting the Mineral Resource.

Subsequently, a three-dimensional Underground Optimised Shape (UOS) was generated from the remaining mineralised material using Datamine software. The UOS maximised the tonnes above the shut-off while ensuring that all material was part of a minimum mining unit with geometry appropriate for a block cave. These minimum mining dimensions were consistent with Mining Plus's experience, and the resulting shapes contained planned internal and edge dilution that the QPs considered appropriate.

14.2 Data Supplied

Mining Plus was supplied with a drill hole database in the form of csv text files, which had been exported from SolGold's main database as maintained on site. The data was checked for internal consistency when loading into Leapfrog and Datamine software. Minor inconsistencies were identified and resolved in consultation with SolGold.

14.3 Drill hole Data Used and Excluded

14.3.1 Alpala Deposit

The Alpala Mineral Resource Update (MRE#3) was estimated from 105,166 assays, 103,732 assays representing diamond drill core samples, and 1,434 assays representing rock-saw channel samples cut from surface rock exposures. Drill core samples were obtained from total of 217,225.9 m of drilling from 188 diamond drill holes. Drill holes comprise 114 parent drill holes, 37 daughter holes, 8 re-drills, 20 over-runs and 9 geotechnical diamond drill holes. Surface rock-saw channel samples were obtained from 3,161.5 m of rock-saw cuts from 262 surface rock exposure trenches.

Nine geotechnical drill holes GHD-19-003 to GHD-19-010 and GHD19-108-D1, totalling 7,764.76 m, were included in the geological database utilised for this resource estimate, providing important geological data improving geological models. However, these drill holes were not assayed because whole drill core was retained for further geotechnical and geometallurgical test work.

Three sterilisation drill holes GHD-19-001, GHD-19-002 and GDH-19-002R were assayed, however, these drill holes lie outside the Alpala deposit resource estimation area and were omitted from the estimation. Six water monitoring drill holes, totalling 277.8 m (MW-19-001 to MW-19-003B) were drilled specifically for hydrological studies and these holes lie outside the Alpala deposit resource estimation area and are omitted from the estimation.

Of the 188 drillholes supplied in the collar file, 161 drill holes were used in the grade estimation of the MRE. Some holes contained logging information and not assay information, and these were used to inform the lithological interpretation. In total, 27 drill holes were excluded from the grade estimation due to not being assayed or being outside the MRE area (Table 14.1).

Table 14.1 : Drill holes Excluded from the MRE

Item	Issue	Drillhole ID	Item	Issue	Drillhole ID	Item	Issue	Drillhole ID
1	No assay	CSD-16-015R	13	No assay	CSD-18-078-OR	24	Outside the MRE area	GHD-19-002
2		CSD-16-020	14		CSD-18-085-OR	25		GHD-19-002-OR
3		CSD-17-023	15		CSD-18-086-OR	26		GHD-19-003
4		CSD-17-024-D1	16		CSD-18-092-OR	27		GHD-19-004
5		CSD-18-037-D2-OR	17		CSD-19-101-OR			
6		CSD-18-041-D1-D2-OR2	18		GHD-19-108-D1			
7		CSD-18-052-OR	19		CSD-19-110-D1			
8		CSD-18-058-D1-OR	20		CSD-19-110-OR			
9		CSD-18-059	21		CSD-19-115			
10		CSD-18-061-OR2	22		CSD-19-116			
11		CSD-18-062-OR	23		CSD-19-117			
12		CSD-18-071						

14.3.2 Tandayama-America Deposit

The Tandayama-America Mineral Resource was estimated from 14,806 assays, 14,586 assays from diamond drill core samples, and 220 assays from rock-saw channel samples cut from surface outcrops. Drill core samples were obtained from 26,631.6 m of drilling from 41 diamond drill holes. Surface rock-saw channel samples were obtained from 458 m of channel intervals from 72 surface channels.

14.3.3 3D Lithological and Mineralisation Modelling

Mining Plus periodically reviewed SolGold's lithological and mineralisation models during their construction, which resulted in several iterations and improvements before the models were finalised and issued to Mining Plus for use in the MRE. The results of this process are the lithological and mineralisation models constructed by SolGold using Leapfrog Geo software.

Mineralisation domain wireframes have been interpreted to honour lithological contacts and intrusion geometries and guided locally by structural measurements of B-vein orientations. Three mineralisation wireframes were interpreted by modelling copper equivalent (CuEq) grade and B-vein abundance and using the following guidance criteria:

Alpala Deposit

- Low grade - where CuEq exceeds 0.15% and B vein intensity exceeds 0.55%
- Medium grade - where CuEq grade exceeds 0.7% CuEq and B vein intensity exceeds 4.1%
- High grade - where CuEq grade exceeds 1.5% CuEq and B vein intensity exceeds 9.4%.

Copper equivalent grade for mineralisation modelling at Alpala was determined using metal prices of US$3.30/lb copper and US$1,500/oz gold and calculated using formula CuEq = (copper grade (%)) + (gold grade (g/t) x 0.663).

Tandayama-America Deposit

- Low grade (LG) - where CuEq exceeds 0.15% and <=0.3%
- Medium grade (MG) - where CuEq grade >0.3% and <=0.45%
- High grade (HG) - where CuEq grade >0.45%.

Copper equivalency used for mineralisation modelling was based on third party metal price research, forecasting of Cu and Au prices, and a cost structure from mining studies data available at the time. Costs include mining, processing and general and administration (G&A). Net Smelter Return (NSR) includes metallurgical recoveries and off-site realisation (TCRC) including royalties and utilising metal prices of Cu at US$3.30/lb and Au at US$1,700/oz, and a copper equivalency factor of 0.654 (whereby CuEq = Cu + Au x 0.654).

This CuEq formula for the cut-off or shut-off grade calculation was updated between the Alpala and Tandayama-America Resource Estimates to recognise metal price forecasts based on current information at the time of reporting. However, the QP considers that the use of different formulae for the mineralisation modelling and for the cut-off or shut-off grade has not materially impacted the stated Mineral Resource.

14.4 Exploratory Data Analysis

Mining Plus undertook Exploratory Data Analysis (EDA) by first investigating the statistics of each individual lithology and grade wireframe, before iteratively generating various groups of lithologies within each grade wireframe and comparing their statistics. The grouping of lithologies and grade wireframes was finalised when additional iterations did not appreciably improve the stationarity.

14.5 Drill Hole Compositing

To capture most of the samples in a standard composite length, while also maintaining sufficient resolution, a target composite length of 2 m was chosen with a minimum composite length of 1 m for both Alpala and Tandayama-America. Compositing honoured the lithology boundaries, and composite lengths less than 1 m were discarded.

Mining Plus checked the statistics of the discarded composites to ensure that the estimate would not be biased by removing the short length sample intervals, and no bias was identified.

14.6 Estimation Domains

Mining Plus derived estimation domains after considering the geological history, the geometry of the units and by iteratively combining various groups of lithologies within each grade wireframe and analysing the resulting statistics.

In Alpala, Cu, Au and Ag were estimated. Ag used the same domain definitions as Cu as it showed better correlation with Cu than Au, and because Ag only adds a small incremental value to the deposit. Au had its own estimation domain definitions.

In Tandayama-America, only Cu and Au were considered, and the estimation domains were developed independently for Cu and Au.

14.7 Outlier Management and Capping Strategy

For sample outlier population management, the samples were coded by estimation domain to interrogate the statistics for outlier capping or top-cutting. Histograms and log normal probability plots were used to identify outlier sample populations. These populations were subsequently confirmed not to form independent, volumetrically discrete, high-grade domains.

14.8 Contact Profiles and Boundary Analysis

Mineralisation contact profiles were used to establish if a mineralisation domain boundary represented “hard” (i.e. domains cannot share assays for grade interpolation) or “soft” boundaries (i.e. domains can share assays for grade interpolation).

For Alpala, boundary conditions were assessed and applied independently for each estimation domain boundary in Datamine.

For Tandayama-America, the majority of contact plots showed soft boundaries were appropriate. For the Cu domains an average of 8 m range of influence was used while for Au domains an average of 6 m was used, with these parameters applied equally to all boundaries in Leapfrog.

14.9 Variographic Analysis

Correlograms and normal score variograms were calculated to limit the influence of the proportional effect on the shape of the experimental variograms.

The experimental variograms were generated from capped composites in reference planes aligned with the overall strike and dip of the mineralisation. Other directions were investigated for some domains and elements where they showed a stronger continuity in a direction other than the overall strike and dip of the mineralisation.

Once the reference plane had been established, a variogram fan was produced at 10° increments in the reference plane. The direction that showed the best continuity (longest range) was modelled with the two perpendicular directions also modelled. Spherical models with a nugget and two or three structures were manually fit to the directional variograms.

Some domains had insufficient samples from which to model robust variography. In those cases, models from geologically similar domains were borrowed, or domains were grouped to generate meaningful variograms.

14.10 Block Model Construction and Estimation

14.10.1 Block Model Parameters

For Alpala, a block model was constructed without rotation using sub cells in Datamine, while for Tandayama-America, a rotated block model was constructed using sub cells in Leapfrog. In both deposits, grade was estimated into parent cells with dimensions of 20 mE by 20 mN by 10 mRL. Sub cells were used to fit the geometry of the lithology and grade wireframes more precisely, with these sub cells estimated at the parent cell scale. Minimum sub cell dimensions of 5 mE by 5 mN by 5 mRL were used at Alpala, while Tandayama-America used 2.5 mE by 2.5 mN by 2.5 mRL.

14.10.2 Estimation Method

Mining Plus chose Ordinary Kriging (OK) as the main estimation method for both deposits, with nearest neighbour (NN) estimations also run for verification purposes. Ordinary Kriging is commonly applied in the estimation of porphyry copper-style mineralisation, as it is appropriate for disseminated mineralisation exhibiting a low nugget effect.

Mining Plus notes the following with regards to the estimation of grade:

Alpala Deposit

- Grade estimation was completed in four search passes:
  - The first search pass used ranges approximately equal to the range of the correlogram and required at least three drill holes to complete an estimate
  - The second and third passes used ranges approximately double the range of the correlogram, with the third pass having more relaxed criteria so that a block could be estimated using two drill holes
  - The fourth pass had more relaxed criteria again with one drill hole required for the estimate to be completed. In Cu and Au, the same search dimension was used as the second and third passes,

however, for Au the search was three times the range of the correlogram to allow some blocks in isolated domains to be estimated

- Blocks that have not been estimated in the fourth pass were assigned the 25th percentile grade for that domain.

- Parent cell estimation was used and discretization of 3 (X) by 3 (Y) by 5 (Z) points applied. Five points were used to discretise the block vertically to approximately match the sample interval in the composite drill hole file
- Soft boundary estimation was used where contact analysis showed it to be appropriate. This was accomplished by duplicating composites either side of the contact and recoding them with the domain code on the other side of the contact. Two composites on either side of the contact were selected for soft boundary estimations
- Nearest neighbour estimation used samples that were composited by the bench compositing technique so that the vertical dimension of the composite matched the vertical dimension of the block (10 m). This ensured that the drill hole data was fully represented in the NN estimate,

Tandayama-America Deposit

- Grade estimation was completed in three search passes:
  - The first search pass used ranges approximately equal to half the range of the variogram and required at least three drill holes to complete an estimate
  - The second and third passes used ranges approximately double the range of the variogram, with the third pass having more relaxed criteria so that a block could be estimated using one drill hole
  - Unestimated blocks after the three passes were assigned the 30th percentile copper or gold grades for each domain. A nearest neighbour estimate was used to calculate the declustered 30th percentile grades (discussed below).
- Parent cell estimation was used and discretization of 4 (X) by 4 (Y) by 5 (Z) points applied. Five points were used to discretise the block vertically to approximately match the sample interval in the composite drill hole file
- Soft boundary estimation was used for all domain boundaries
- Nearest neighbour estimation was completed using a block model with 20 mE by 20 mN by 2.5 mRL parent blocks so that the vertical dimension of the composite approximated the vertical dimension of the block. This ensured that the drill hole data was fully represented in the NN estimate.

Neither deposit used the dynamic anisotropy estimation method (locally varying anisotropy) as there did not appear to be evidence of strong anisotropy during visual inspection of the drill hole data, in the variography or in the structural information.

14.11 Bulk Density

Mining Plus investigated whether the bulk density should be estimated or assigned by plotting measured bulk density statistics by lithology and grade wireframe, by checking with correlations with grade, and through visual inspection of the bulk density values in 3D.

14.11.1 Alpala Deposit

Bulk density values were observed to be very consistent throughout the deposit with no significant variation spatially or by lithology or grade wireframe. Therefore, it was concluded that there would be no material improvement gained by estimating the values into the block model. Instead, the bulk density values were assigned in the block model based on the mean values for each lithology.

14.11.2 Tandayama-America Deposit

Bulk density values were observed to have a relationship with elevation whereby lower bulk densities were found at higher elevations. Therefore, bulk density was estimated in a single pass using ordinary kriging with hard boundaries applied to density domains. Density domains were based on lithology groups. A minimum of 1 and a maximum of 16 samples were selected inside search ellipsoids with dimensions based on the range of the variogram for each domain. Variographic rotations and search ellipsoids were oriented to follow the geometry of the intrusions. Unestimated bulk density was assigned a value of 2.8 t/m^3, which was the mean bulk density of all samples.

14.12 Model Validation

Block model validation was undertaken to ensure the interpreted geological and grade characteristics were correctly modelled and estimated. Comparisons were between the declustered composite drill hole grades and the estimated block model grades. The comparison was both visual and statistical. Mining Plus undertook visual comparisons, comparisons of statistics by domain and moving average or swath plot comparisons.

In addition to the above comparisons, Mining Plus validated the following for the Alpala deposit:

- The degree of smoothing in the estimate through a change of support analysis
- The metal lost due to grade capping by comparing the estimates with and without grade capping
- The proportion of blocks estimated in each pass as a check on the search and estimation parameters.

Mrs Cecilia Artica (QP Alpala) considered that all checks conducted showed acceptable results for the Alpala deposit.

Dr Andrew Fowler (QP Tandayama-America) considered that all checks conducted showed acceptable results for the Tandayama-America deposit.

14.13 Mineral Resource Classification

A drillhole spacing study (DHSS) was conducted for the Alpala deposit to inform the classification, which indicated that the drill hole spacing should be approximately 96 m for Measured Resources and approximately 190 m for Indicated Resources. Mining Plus notes that these results imply a larger drill spacing at Alpala for a Measured or Indicated classification than many other deposits, however, this was primarily due to the low sample CV (0.73) in the study area and high anticipated production rate (40 Mt/y) relative to other deposits.

Mrs Cecilia Artica (QP Alpala), in her site inspection, data reviews and interviews with key personnel at the Alpala site and in the SolGold head office, found no reason to downgrade the classification derived from the DHSS.

Nevertheless, as this DHSS method only considered the error relating to grade uncertainty and did not consider the geological uncertainty, the QP Alpala therefore reduced the thresholds to 80 m for Measured Resources and 160 m for Indicated Resources to take account of the potential differences between the geological interpretation and the real geology.

Mrs Cecilia Artica noted that a different production rate associated with a mining method other than block caving could give a materially different classification result and therefore the classification should be reassessed upon completion of the Pre-Feasibility and FS to take account of any changes to the proposed production rate or mining method.

Dr Andrew Fowler (QP Tandayama-America) applied the same classification criteria to the Tandayama-America deposit as there was insufficient data available to run an independent DHSS.

Mining Plus then completed the following for both deposits to code the drill hole spacing into each block model and smooth the classification result:

- Average distance to the three nearest drill holes was estimated, which provides a smoother delimitation of boundaries than the distance to the nearest sample
- Distance and number of drillholes used in the estimate were then used to categorise each block into high, medium and low confidence
- Strings were then digitised in plan view along the boundaries of the confidence categories and linked to form 3D wireframes
- The block model was then coded with the wireframes for each Mineral Resource category.

14.14 Reasonable Prospects for Eventual Economic Extraction

Open pit and underground optimisations were run for the mineralised and classified material that was potentially mineable by open pit and underground methods respectively. The underground optimised shape (UOS) was then used to report the potentially underground portion of the Mineral Resource for each deposit. It is important to note that the resulting UOS should not be described as a "mineable shape". Mining factors excluded in this analysis include but are not limited to; capital costs (non-mining, access and footprint establishment), regional pillars, footprint geometries, unplanned dilution and the time value of money.

Nevertheless, the UOS did enclose a contiguous and appropriately diluted Mineral Resource that, by virtue of its grade and geometry, should be considered for inclusion within a mineable shape. As such, the QPs for Alpala and Tandayama-America considered that the reported underground portion of the Mineral Resources had reasonable prospects for eventual economic extraction by the block cave underground mining method at the specified shut-off grade.

An assessment of whether the project as a whole was economically viable was not made under this analysis. Furthermore, the UOS contained a small amount of material that was not classified as a Mineral Resource but would not be mined separately. This material was also reported in the Mineral Resource tabulation as "Planned dilution" in the interests of transparency.

14.14.1 Alpala Deposit

The shut-off grade used for reporting was based on up-to-date third party metal price research, forecasting of Cu and Au prices, and a cost structure from the May 2019 PEA at the Alpala Porphyry Copper-Gold-Silver Deposit.

Costs included mining, processing and general and administration (G&A). Net Smelter Return (NSR) included metallurgical recoveries and off-site realisation (TCRC) including royalties. Metal prices used included Cu at US$3.40/lb and Au at US$1,400/oz. The input assumptions are provided in Table 14.2.

Table 14.2 : Summary of Inputs into Optimisation

Description	Unit	Cu	Au
Metal rice	US$ per lb/oz	3.40	1,400
Government Royalty Gross Revenue		5%	5%
Refining Charge	US$ per lb/oz	0.07	5
Units Metal to Grade		2,204	0.0322
Units Factor		2,204	31.013
Smelter Payable		97.5%	98.0%
Smelting	US$ per dmt concentrate	70	
Water Content		5%	
Shipping	US$ per wmt concentrate	90	
Shipping dry tonnes		95	
Concentrate Slurry Pipeline	US$ per dmt concentrate	0.13	
Concentrate Grade		0.29	36
Metallurgical Recovery		0.93	0.85
NSR/grade unit		5,786	35
Factor	Gross Value to Mined Value	77%	79%
Equivalence Factor	Ratio to Cu grade unit	1	0.613
Mining Cost	US$ /mined t	5	
Processing	US$ /mined t	5.8	
Site G&A	US$ /mined t	1.5	
Total Increment Costs	US$ /mined t	12.3	
Shut-off (Cut-off grade)	CuEq grade	0.21%	

A UOS was generated at the 0.21% CuEq shut-off grade (Figure 14.1). This UOS maximised the tonnes above the shut-off while ensuring that all material was part of a minimum mining unit with geometry appropriate for a block cave of 80 m length by 80 m width by 200 m height.

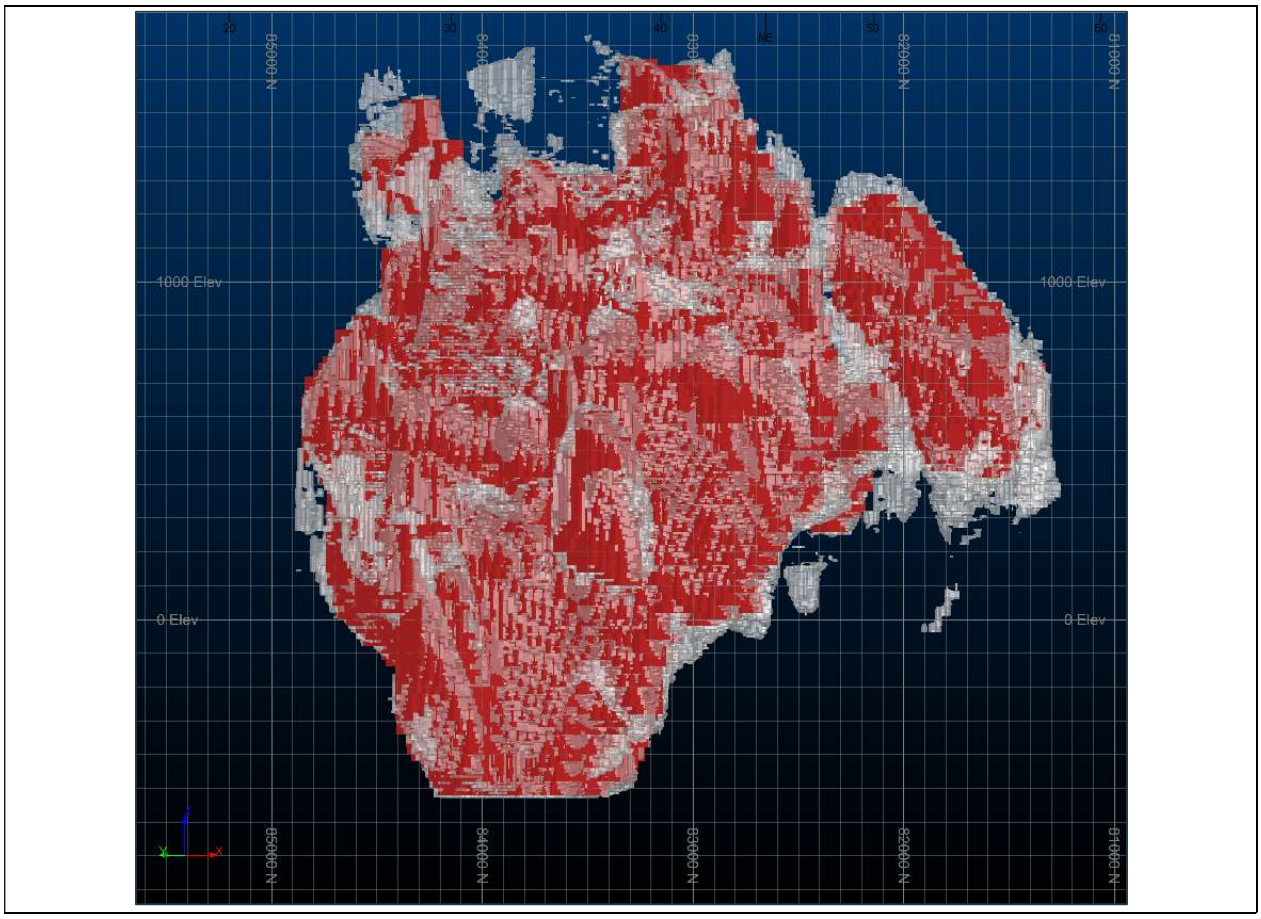


Figure 14.1 : Perspective view towards northeast showing UOS at 0.21% CuEq shut-off grade (red) with estimated blocks > 0.21 % CuEq (white)

These minimum mining dimensions for a block cave were based on a mining study that was current at the time of reporting and as such, the resulting shape contained planned internal and edge dilution that the QP considered appropriate.

14.14.2 Tandayama-America Deposit

The cut-off or shut-off grades used for reporting were based on third-party metal price research, forecasting of Cu and Au prices that was current at the time of reporting, and a cost structure from mining studies that were being reviewed at the time of reporting. Costs included mining, processing and general and administration (G&A). Net Smelter Return (NSR) included metallurgical recoveries and off-site realisation (TCRC) including royalties and utilising metal prices of Cu at US$3.30/lb and Au at US$1,700/oz. The input assumptions have been provided in Table 14.3 and Table 14.4.

Cut-off and shut-off grades were developed independently for open pit mining methods and underground bulk mining methods. The cut-off grade for potentially open pittable material was calculated at 0.16% CuEq using a copper equivalency factor of 0.632, while the shut-off grade for material potentially mineable by a bulk underground mining method such as block caving was calculated at 0.28% CuEq using a copper equivalency factor of 0.654.

Optimisation was completed in two stages, with the open pit optimisation initially applied to the block model. The remaining material was then considered for underground optimisation.

The open pit optimisation was completed using the conventional Lerchs-Grossman optimisation routine implemented in Whittle software, and the revenue factor one pit was selected for reporting the Mineral Resource. The QP considered that the open pit portion of the reported Mineral Resource, had reasonable prospects for eventual economic extraction at the specified cut-off grade.

Subsequently, a UOS was generated using Datamine software at a shut-off grade of 0.28% CuEq. This shut-off grade was based on costs associated with the block cave mining method. The UOS maximises the tonnes above the shut-off while ensuring that all material was part of a minimum mining unit with geometry appropriate for a block cave of 120 m length by 120 m width by 200 m height. These minimum mining dimensions for a block cave were determined based on the block model rotation and are consistent with Mining Plus's experience. The resulting UOS contained planned internal and edge dilution that the QP considered appropriate.

Table 14.3 : Summary of Inputs Into Pit Optimisation

Description	Unit	Cu	Au
Metal Price	US$/lb	$3.30	
	$/t Cu	**$7,275**	
	US$/oz		$1,700
Royalty	%	3.0%	3.0%
Refining Charge	US$/lb	$0.079	
Net Metal Price	$/lb Cu	$3.12	
	$/t Cu	$6,883	
	US$/oz		$1,649
Mill Recovery	%	84.4%	65.0%
Concentrate Grade	%	26.0%	20.0
Concentrate Moisture	%	9.0%	
Payability	%	96.5%	96.0%
Freight & Treatment	$/wmt concentrate	$31.10	
F&T	$/dmt concentrate	$34.18	
Smelting cost	$/dmt concentrate	$79.00	
Conc. Slurry pipeline	$/dmt concentrate	$0.00	
Concentrate Costs	$/t concentrate	$113.18	
Cathode Costs	$/t Cu	$0.00	
Net Payable	$/t concentrate	$1,614	
	$/t Cu	$6,207	
	$/Au oz		
Net Payable	per grade unit	$5,238	
Equivalence Factor			0.632
Processing Cost	$/t mill feed	$7.64	

Table 14.3 : Summary of Inputs Into Pit Optimisation			
Description	**Unit**	**Cu**	**Au**
G&A Costs / Sust Capital	$/t mill feed	$0.87	
Total PCAF		$8.51	
Cut-off grade	CuEq grade	0.1625%	
Mining Cost	$/t mined	$1.50	
Overall slope angle	deg	$40.87	

Table 14.4 : Summary of Inputs Into Underground Optimisation			
Description	**Unit**	**Cu**	**Au**
Metal Price	US$ per lb/oz	$3.30	$1,700
Govt		0.03	0.03
Refining Charge (TC/RC)	US$ per lb/oz	0.079	0
Units Metal to Grade		2204	0.032
Units Factor		2204	31.103
Smelter Payable		0.965	0.96
Smelting	US$ per dmt concentrate	79	
Water Content		0.09	
Shipping	US$ per wmt concentrate	31.1	
Shipping dry tonnes		34.176	
Concentrate Slurry Pipeline	US$ per dmt concentrate	0	
Concentrate Grade		0.26	20
Metallurgical Recovery		0.865	0.69
NSR/grade unit		5367.1	35.1
Factor	Gross value to Mined Value	0.738	0.643
Equivalence Factor	ratio to Cu grade unit	1	0.654
Mining Cost	US$/t mined	6.4	
OP Strip Ratio	waste t/mill feed t	0	
Processing	US$/t mill feed	7.64	
Site G&A	US$/t mill feed	0.87	
Total Incremental Costs	US$/t mill feed	14.91	
Shut-off grade	CuEq grade	0.28%	

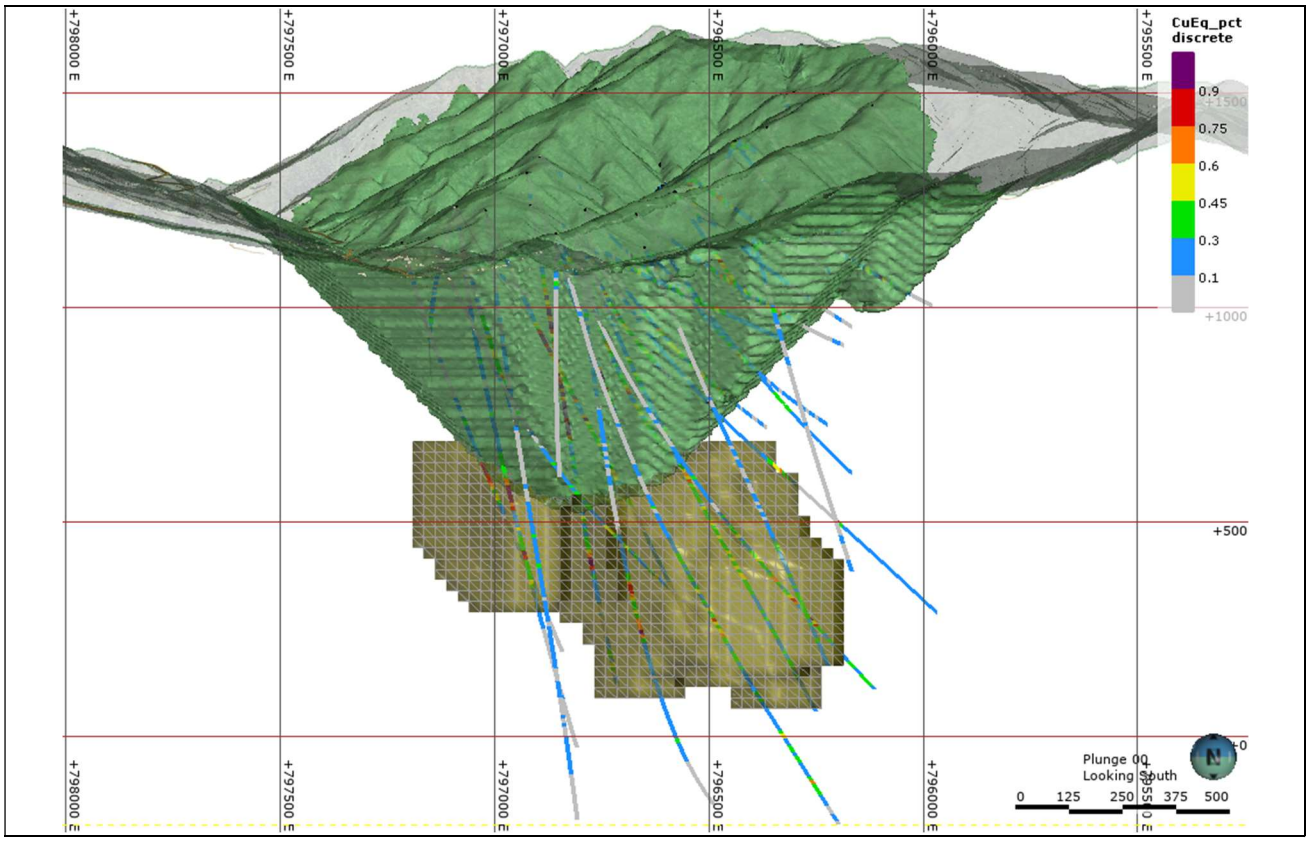


Figure 14.2 : Section views, looking south, with window thickness 1700 m, showing the optimisation shapes

14.15 Mineral Resource Statement

The Cascabel Property is registered as an Advanced Exploration Licence for metallic minerals. Exploraciones Novomining S.A. (ENSA) is the registered holder of the mineral tenure of the Property, which is located in northern Ecuador.

The Cascabel Property has in place the necessary regulatory licenses and authorisations required for its current status as an Advanced Exploration project. Furthermore, with the support of the community and government organisations, it is expected that future license and authorisation requirements to advance the Property will successfully be attained.

To the best of Mining Plus QP's knowledge, there are no environmental, permitting, legal, title, tax, socio-economic, market, political or other relevant factors other than what is presented in this Technical Report that would affect the Mineral Resource Estimate.

14.15.1 Alpala Deposit

The MRE (MRE#3) for the Alpala deposit was reported in accordance with the Canadian National Instrument 43-101 (NI 43-101) Standards of Disclosure for Mineral Projects. The estimation process followed the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) "Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines" (CIM, 2019). Mrs Cecilia Artica, who was a full-time employee of Mining Plus at the time of reporting is the Qualified Person (QP) responsible for the Alpala MRE.

The Alpala Porphyry Copper-Gold-Silver Deposit (Alpala deposit), at a shut-off grade of 0.21% Cu equivalent (CuEq), comprises 2,663 Mt at 0.53% CuEq in the Measured plus Indicated categories, which includes 1,192 Mt at 0.72% CuEq in the Measured category and 1,470 Mt at 0.37% CuEq in the Indicated category (Table 14.5). The Alpala Inferred category contains an additional 544 Mt at 0.31% CuEq.

The Alpala MRE comprises a contained metal content of 9.9 Mt Cu and 21.7 Moz Au in the Measured plus Indicated categories, which includes 5.7 Mt Cu and 15.0 Moz Au in the Measured category, and 4.2 Mt Cu and 6.6 Moz Au in the Indicated category. The Inferred category contains an additional 1.3 Mt Cu and 1.9 Moz Au.

Table 14.5 : Alpala Mineral Resource Statement (effective date 18 March 2020)

Shut-off Grade (CuEq %)	Resource Category	Tonnage (Mt)	Grade				Contained Metal			
			CuEq (%)	Cu (%)	Au (g/t)	Ag (g/t)	CuEq (Mt)	Cu (Mt)	Au (Moz)	Ag (Moz)
0.21	Measured	1,192	0.72	0.48	0.39	1.3	8.6	5.7	15.0	52.4
	Indicated	1,470	0.37	0.28	0.14	0.8	5.5	4.2	6.6	39.8
	Measured + Indicated	**2,663**	**0.53**	**0.37**	**0.25**	**1.0**	**14.0**	**9.9**	**21.7**	**92.2**
	Inferred	544	0.31	0.24	0.11	0.6	1.7	1.3	1.9	10.6
	Planned dilution	*5*	*0.0*	*0.00*	*0.00*	*0.00*	*0.0*	*0.0*	*0.0*	*0.0*

Notes:

1. Mrs. Cecilia Artica, SME Registered Member, formerly Principal Geology Consultant of Mining Plus, is responsible for this Mineral Resource statement and is an "independent Qualified Person" as such term is defined in NI 43-101.
2. Reasonable prospects of eventual economic extraction were assessed by enclosing the mineralised material in the block model estimate in a 3D wireframe shape that was constructed with adherence to a minimum mining unit with geometry appropriate for a block cave.
3. Cut-off grade for the shape was defined as the shut-off grade under a breakeven, eventual economic extraction criterion. The shut-off grade of 0.21% CuEq was calculated using (copper grade (%)) + (gold grade (g/t) x 0.613).
4. All material within this shape was reported in the Mineral Resource statement as block caving is a non-selective method and all material extracted is treated as mill feed.
5. The material inside the shape without a Mineral Resource category was reported as planned dilution.
6. The resulting shape contained planned internal and edge dilution that the QP considers appropriate.
7. Shut-off inputs included:
   a. Metal prices of Cu at US$3.40/lb and Au at US$1,400/oz,
   b. Recoveries of Cu 93% and Au 85%,
   c. Costs including mining, processing and general and administration (G&A) and
   d. Off-site realization (TCRC) including royalties.
8. Shut-off inputs excluded:
   a. Capital costs (non-mining, access and footprint establishment),
   b. Unplanned dilution and
   c. The time value of money.
9. The QP considers that the Mineral Resource has reasonable prospects for eventual economic extraction by an underground mass mining method such as block caving.
10. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.
11. Mineral Resources are reported inclusive of those Mineral Resources that were converted to Mineral Reserves.
12. The statement uses the terminology, definitions and guidelines given in the CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) as required by NI 43-101.
13. Figures may not sum due to rounding.

14.15.2 Tandayama-America Deposit

The Tandayama-America deposit lies approximately 3 km north of the Alpala deposit. Dr Andrew Fowler, who is a full-time employee of Mining Plus at the time of reporting takes Qualified Person (QP) responsibility for the Tandayama-America MRE (Table 14.6).

Table 14.6 : Tandayama-America Mineral Resource Statement (effective date 30 March 2022)

Potential Mining Method	Cut-off/Shut-off Grade (CuEq %)	Resource Category	Tonnage (Mt)	Grade			Contained Metal		
				Cu (%)	Au (g/t)	CuEq (%)	Cu (Mt)	Au (Moz)	CuEq (Mt)
Open Pit	0.16	Measured	17.8	0.20	0.16	0.30	0.04	0.09	0.05
		Indicated	338.7	0.23	0.21	0.36	0.78	2.28	1.23
		Inferred	35.7	0.22	0.23	0.36	0.08	0.26	0.13
Underground	0.28	Indicated	172.0	0.26	0.14	0.35	0.45	0.78	0.60
		Inferred	69.4	0.26	0.16	0.36	0.18	0.36	0.25
Total Measured + Indicated			528.5	0.24	0.19	0.36	1.27	3.16	1.89
Total Inferred			105.1	0.24	0.18	0.36	0.26	0.62	0.38

Notes:

1. Dr Andrew Fowler, MAusIMM CP(Geo), Principal Geology Consultant of Mining Plus, is responsible for this Mineral Resource statement and is an "independent Qualified Person" as such term is defined in NI 43-101.
2. Reasonable prospects of eventual economic extraction were assessed by:
   a. First presenting the mineralised material in the block model estimate to a conventional Lersch-Grossman open pit optimisation routine based on a cut-off grade of 0.16 % CuEq, and the cost and revenue assumptions listed below. Mineralised material inside the revenue factor one pit and above the cut-off grade were then reported in the “Open pit” section of the Mineral Resource statement.
   b. Subsequently, the remaining material was enclosed in a 3D wireframe shape that was constructed with adherence to a minimum mining unit with geometry appropriate for a block cave.
3. Cut-off grade for the potentially open pittable material was 0.16% CuEq, which was calculated using (copper grade (%)) + (gold grade (g/t) x 0.632).
4. Cut-off grade for the underground shape was defined as the shut-off grade under a breakeven, eventual economic extraction criterion. The shut-off grade of 0.28% CuEq was calculated using (copper grade (%)) + (gold grade (g/t) x 0.654).
5. All material within the underground shape was reported in the “Underground” section of the Mineral Resource statement as block caving is a non-selective method and all material extracted is treated as mill feed.
6. The resulting shape contained planned internal and edge dilution that the QP considers appropriate.
7. Cut-off/Shut-off inputs included:
   a. Metal prices of Cu at US$3.30/lb and Au at US$1,700/oz,
   b. Recoveries of Cu 84.4% and Au 65%,
   c. Costs including mining, processing and general and administration (G&A) and
   d. Off-site realization (TCRC) including royalties.
8. Cut-off/Shut-off inputs excluded:
   a. Capital costs (non-mining, access and footprint establishment),
   b. Unplanned dilution and
   c. The time value of money.
9. The QP considers that the Mineral Resource has reasonable prospects for eventual economic extraction by open pit or an underground mass mining method such as block caving as presented in the Mineral Resource statement.
10. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.
11. Mineral Resources are reported inclusive of those Mineral Resources that were converted to Mineral Reserves.

12. The statement uses the terminology, definitions and guidelines given in the CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) as required by NI 43-101.
13. Figures may not sum due to rounding.

Potentially open pittable Mineral Resources comprise 356.5Mt @ 0.36% CuEq in the Measured plus Indicated categories, plus 35.7Mt @ 0.36% CuEq in the Inferred category, at a cut-off grade of 0.16% CuEq.

Mineral Resources potentially mineable by underground bulk mining methods comprise 172.0 Mt @ 0.35% CuEq in the Indicated category, plus 69.4 Mt @ 0.36% CuEq in the Inferred category, at a shut-off grade of 0.28% CuEq.

15 Mineral Reserve Estimates

15.1 Introduction

The Mineral Reserve for the Cascabel Project Alpala underground resource were converted by applying modifying factors to the Mineral Resource Estimate. Only Measured and Indicated categories have been converted to Mineral Reserves, with Inferred categories considered as waste and grades set to zero.

The Mineral Reserves estimates were estimated using the following economic assumptions for block caving.

Table 15.1 : Alpala Economic Criteria

Parameter	Units		Values	
	(Cu)	(Au)	(Cu)	(Au)
Metal price	US$/lb	US$/oz	3.30	1,700
Unit conversion	lb/t	g/oz	2,204	31.103
Government royalty	%	%	5	8
Refining charge	US$/lb	US$/oz	0.079	5
Smelting	US$/dmt		79	
Shipping water content	%		9	
Shipping (including port cost)	US$/wmt	US$/wmt	46.3	
Average LOM concentrate grade	%	g/t	28	17
Metallurgical recovery	%	%	85	70
NSR/grade unit	US$/%	US$/g/t	53.4	35.1

15.2 Underground Block Cave Mining

Access to the Alpala underground mine is expected to be via twin declines commencing from a boxcut located near the surface and the first lift near the 300 mRL. Mining is planned to be a block caving mining method, whilst all horizontal development will be undertaken utilising conventional drill and blast practices. The vertical development for the main ventilation rises will be excavated using blind sinking methods.

15.3 Mineral Reserve Statement

The Mineral Reserve Estimate for the Alpala Underground Porphyry Copper-Gold-Silver Deposit, Cascabel Property, with an effective date of 31 March 2022 has been prepared under the supervision of Mining Plus Pty Ltd (Mining Plus) employee, Aaron Spong, who is the Qualified Person responsibility for the Mineral Reserve Estimate.

The Mineral Reserve estimation process followed the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) "Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines" (CIM, 2019). The Mineral Reserve Estimate is stated in accordance with the CIM Definition Standards (CIM, 2014) and Canadian National instrument 43-101 (NI 43-101).

The Mineral Reserve has been estimated for a block cave mining method and takes into account the effect of mixing of indicated material with dilution from low grade or barren material originating from within the caved zone and the overlying cave backs.

Table 15.2 : Alpala Probable Reserves							
Classification	**Tonnes**	**Copper Grade (%)**	**Gold Grade (g/t)**	**Silver Grade (g/t)**	**Copper Metal (kt)**	**Gold Metal (koz)**	**Silver Metal (Moz)**
Probable	558	0.58	0.52	1.6	3.26	9.37	30
Total	**558**	**0.58**	**0.52**	**1.6**	**3.26**	**9.37**	**30**

Notes:
1. Effective date of the Mineral Reserves is 31 March 2022.
2. Only Measured and Indicated Mineral Resources were converted to Probable Mineral Reserves.
3. Mineral Reserve reported above are not additive to the Mineral Resource and are quoted on a 100% project basis.
4. The Mineral Reserve is based on the March 2020 Mineral Resource.
5. Totals may not match due to rounding.
6. The Mineral Reserve Estimate has been reported to conform with the CIM Definition Standards for Mineral Resources and Mineral Reserves (CIM, 2014).
7. The Mineral Reserve Estimate for Alpala was independently verified by Aaron Spong FAusIMM CP (Min), a full-time employee of Mining Plus, who takes responsibility for the Mineral Reserve Estimate.

15.4 Factors that Could Affect the Mineral Reserve

The Mineral Reserve could be materially affected by the changes to the following factors, but not limited to mining, metallurgy, infrastructure and permitting:

- Commodity prices fluctuations
- Metallurgical recoveries
- Geotechnical analysis and assumptions
- Hydrological and Hydrogeological analysis and assumptions
- Cut-off and shut-off grade criteria
- Permitting and licensing, including environmental, social and governance
- Input assumptions into the mine design such as cave layouts and outlines
- Cost assumptions used to determine the Mineral Reserve
- Potential impact of seismic events to project facilities.

16 Mining Methods

16.1 Summary

This section describes the mine plan used in this Pre-Feasibility study. The mine plan uses the block cave mining method which is considered to be the appropriate method due to the size, grade, ground conditions and depth of the Alpala deposit. High level studies have highlighted some areas of the deposit that may be mined using other bulk underground methods, such as sublevel caving, but that these are small and not material to the plan at this early stage of study.

The mine plan considered in this Pre-Feasibility directly relates to the first 30 years of production. In this plan, the highest value material is targeted. Column heights are up to 700 m and a relatively even draw across each footprint ensures even cave propagation.

This approach is in line with SolGold's corporate strategy which is to maximise extraction of the Alpala deposit while still optimising the economics of the project. Targeting the high value material in the first phase ensures and optimises the project economics. Mining the lower value second phase later maximises extraction without compromising the economics of the project.

16.2 Geotechnical Considerations

Mining Plus has reviewed geotechnical data for the SolGold's Cascabel Project, located near Rocafuerte within the Cascabel concession in northern Ecuador. The purpose of the geotechnical study was to condense existing geotechnical data for rock mass characterisation, and numerical model inputs, numerical model analyses, and ground support recommendations.

Geotechnical inputs for the Mining Plus study were generated by SolGold technical staff and contracted engineering companies for specific studies. The primary inputs for the study were the in situ stress measurements; borehole surveys; digital wireframes; geotechnical database that includes rock mass assessments, discontinuity measurements, and televiewer logs; and rock strength laboratory testing.

Mining Plus's QP used empirical and analytical analyses of this data to determine the geotechnical characteristics of various lithological and alteration domains within the deposit. Where information was unavailable, Mining Plus's QP used industry accepted practices and assumptions to complete the study.

The data used for the Alpala geotechnical study was provided by SolGold.

16.2.1 Geotechnical Domains

Geotechnical Domains (Volumes) were classified at the onset of the program by SRK in 2020, based on combination of lithology, primary alteration, and secondary alteration after suggested methodology proposed by Flores and Karzulovic (2003) – the combined lithology and alteration profiles are referred to as Underground Geotechnical Units (UGT) within this report.

Mining Plus performed the analysis and produced the geotechnical model (UGT V3 delivered 7 August 2020). Mining Plus used SolGold's most recent MRE #3 lithology database with alteration modified from the "Terraspec_interp" database provided by SolGold. UGT V3 provided closed solids that provided volumes; subsequent recoding of the geotechnical database was performed. Twenty-one distinct geotechnical units were considered for the Alpala project based on lithology and alteration.

During investigation of the geology and core logs, further definition of existing damage zones was warranted. The damage zone study determined that the damage zones (RQD<50) match with the northwestern contact of the D10 intrusion, indicating a lithological control to the damage zone location and not necessarily a structural control. The strong damage zones (RQD<25) are bordering of the D10 unit contain high mineralisation (UGT units 4 and 5). Updating of existing wireframes was included in the geotechnical study.

Faults were interpreted by SRK Consulting (Chile) and summarised in a memorandum titled "Cascabel Structural Model Update, Project Number 01-2783-01", dated 15 May 2020. The faults were interpreted from geology and geotechnical boreholes and from structural interpretation of the region.

In total, 62 structures were interpreted with one principal, 52 major, and 9 intermediate structures categorised. The faults were imported and modelled into the geotechnical studies on caveability and extraction level stability.

16.2.2 Stress Model

In situ stress state information was derived from an interim report documenting the results of overcore measurements completed at the Cascabel Project (Mills, 2020) and a subsequent SRK memorandum reviewing the available Cascabel stress measurements (Russo, 2020).

The stress fields used in the geotechnical numerical models and associated work are provided in Table 16.1 (after Mills, 2020).

Table 16.1 : Estimated Principal Stresses for Alpala Deposit

	σ1	σ2	σ3
Dip	23	25	55
Dip Direction	264	163	032
Ratio to σ3	3.1	1.7	1.0
MPa/m	0.043	.024	.014

A dipping major principal stress field in excess of 20 degrees at the planned depth of the Cascabel footprint is considered unusual and will have a significant impact on design decisions and extraction strategy. However, there is nothing within the presented results to indicate that an assumed value based on regional scale is to be used in its place.

16.2.3 Intact Rock Strength

Three separate batches of laboratory testing were completed for the Pre-Feasibility study. The first round of testing (R1) was performed by Strata Testing Services (STS), located in Australia and was focused on the borehole breakout and overcore samples obtained in the In situ Stress Estimated testing; the second round of testing was performed by STS on boreholes within the upper portion of the deposit and decline area with samples obtained from geotechnical boreholes (R2); and the third round of testing performed by SGS Santiago on Laboratory testing on select samples from over-drilled wedge holes and other miscellaneous whole core samples that provided better definition of the geotechnical units and the deposit at depth (R3).
Laboratory samples were classified by Geotechnical Units and assessments were made to determine the minimum, average, median, and maximum values for each test type were determined for both valid tests (per

ISRM Standards), and for all test performed. There were limited samples within certain geotechnical units, and rather than eliminate invalid tests from the results, two sets of data are presented.

16.2.4 Rock Mass Assessment

Mining Plus performed a statistical analysis of the rock mass ratings provided by SolGold. The database contained RQD, Fracture Frequency, RMR89, GSI, NGI Q' Index, RMR90, and IRMR. The provided database was coded per the UGT such that each run interval was assigned a UGT. Intervals logged as Damage Zones or Faults were separated from the UGT and analysed separately for rock mass properties. Further separation of the UGT were made for the Decline, Lower Ore Body and Upper Ore Body location. In general, the rockmass ranges from Poor to Good, on average Fair by most classification schemes. Faults and damage zones are generally Poor to Very Poor by majority of classification schemes.

16.2.5 Geotechnical Material Properties

The geotechnical properties for the Alpala deposit were determined from the intact lab strengths, investigation of the core logging database, rock mass statistics, and empirical databases where no information was available. The upper (above 650 MASL) and lower databases (below 650 MASL) were separated to account for the differences noted in rock masses. For each database, the low, middle, and high cases were determined to reflect the variation within the rock strengths and rock masses. The rock mass inputs were used to determine the excavation stability and caveability through numerical analysis.

16.2.6 Hydrogeological Considerations

Based on the compilation and analyses of all available hydrogeologic data and the mine plans for underground infrastructure (including ramps, drifts, and shafts) and block caving, Itasca developed a conceptual hydrogeologic model and the three-dimensional numerical groundwater flow model. The numerical groundwater flow model was calibrated to the groundwater levels measured during hydraulic testing performed in boreholes drilled across the Project.

The calibrated groundwater flow model was used to predict the seepage to the underground workings and the effects of mining on baseflow and groundwater levels during a 38-year underground mining period (8 years for underground infrastructure development prior to commencing block caving and 30 years of block caving operations). The following conclusions were made from the groundwater flow model development and simulations:

- The groundwater flow model was calibrated to the groundwater levels measured during hydraulic testing (e.g. packer isolated shut-in tests) and other site hydrogeologic conditions
- The model-predicted inflow rate during the 8-year underground infrastructure development prior to commencing block caving ranged approximately from 730 to 2,400 m^3/d, and the average inflow rate was approximately 1,100 m^3/d
- After commencing the block caving, the model-predicted inflow rates ranged approximately from 2,500 to 10,100 m^3/d and from 7,700 to 15,900 m^3/d for the first 5 years and the remaining 25 years, respectively, for the 30 years of block caving operations. The predicted average inflow rates were approximately 6,500 and 11,300 m^3/d for the first 5 years and the remaining 25 years, respectively
- The baseflow rates in the Rio Parambas and Rio Verde Chico surface-water systems are predicted to decrease by approximately 17% and 43%, respectively, at the end of the mining period, as compared to the pre-mining conditions. The reduction in the baseflow of the Rio Mira by the underground mining is

predicted to be less than 0.1% during the LOM, although this loss is expected to be replaced by treated discharge from mine dewatering activities

- The maximum extent of measurable groundwater-table drawdown was determined by the model as a 10 m drawdown contour. This 10 m drawdown contour occurs along the decline ramps from the portal and around the block caving areas. The modelled extent of 10 m drawdown at the end of mining is contained within the Project boundary. A portion of the Rio Verde Chico and an upstream portion of the Rio Parambas reside within the extent of 10 m drawdown
- A sensitivity analysis was performed on the "Base Case" results of the groundwater model to examine the effect of variabilities of input parameters on predicted seepage rates. These sensitivity analyses show that the modelled High-K Case (high hydraulic conductivities for bedrock units) and High-Recharge Case (high recharge by precipitation falling inside the block caves) scenarios can increase seepage rates by up to 60% to 90% compared to the Base Case. The hydraulic properties of the surficial materials (topsoil, alluvium, and saprolite materials) and near-surface bedrock units have greater influence on mine inflow seepage than those of the deeper bedrock units.

16.3 Design Parameters

16.3.1 Geotechnical Parameters

The following geotechnical parameters are important drivers of the conceptual mine plan:

- Caveability and critical span/hydraulic radius (HR) required for caving
- Stability of long-term excavations
- Primary and secondary cave fragmentation
- Stand-offs required for underground infrastructure
- Surface subsidence zone.

16.3.1.1 Caveability and Critical Span

The critical span/hydraulic radius (HR) required for caving has been established using the MRMR system. Geotechnical analysis (Mining Plus, 2019) has established a modified rock mass rating (MRMR) in the range 22-37. This leads to a critical maximum HR of 18 m, which empirically has shown to produce caving conditions. All footprints in the concept design have spans larger than this critical HR.

Itasca assessed the caveability of the consolidated design for Alpala consisting of the BC-1 and BC-2 panel caves at the 300 mRL. The purpose of the study was to assess the cave propagation, surface breakthrough timing, and surface subsidence. An overview of the cave footprints assessed is provided in Figure 16.1.

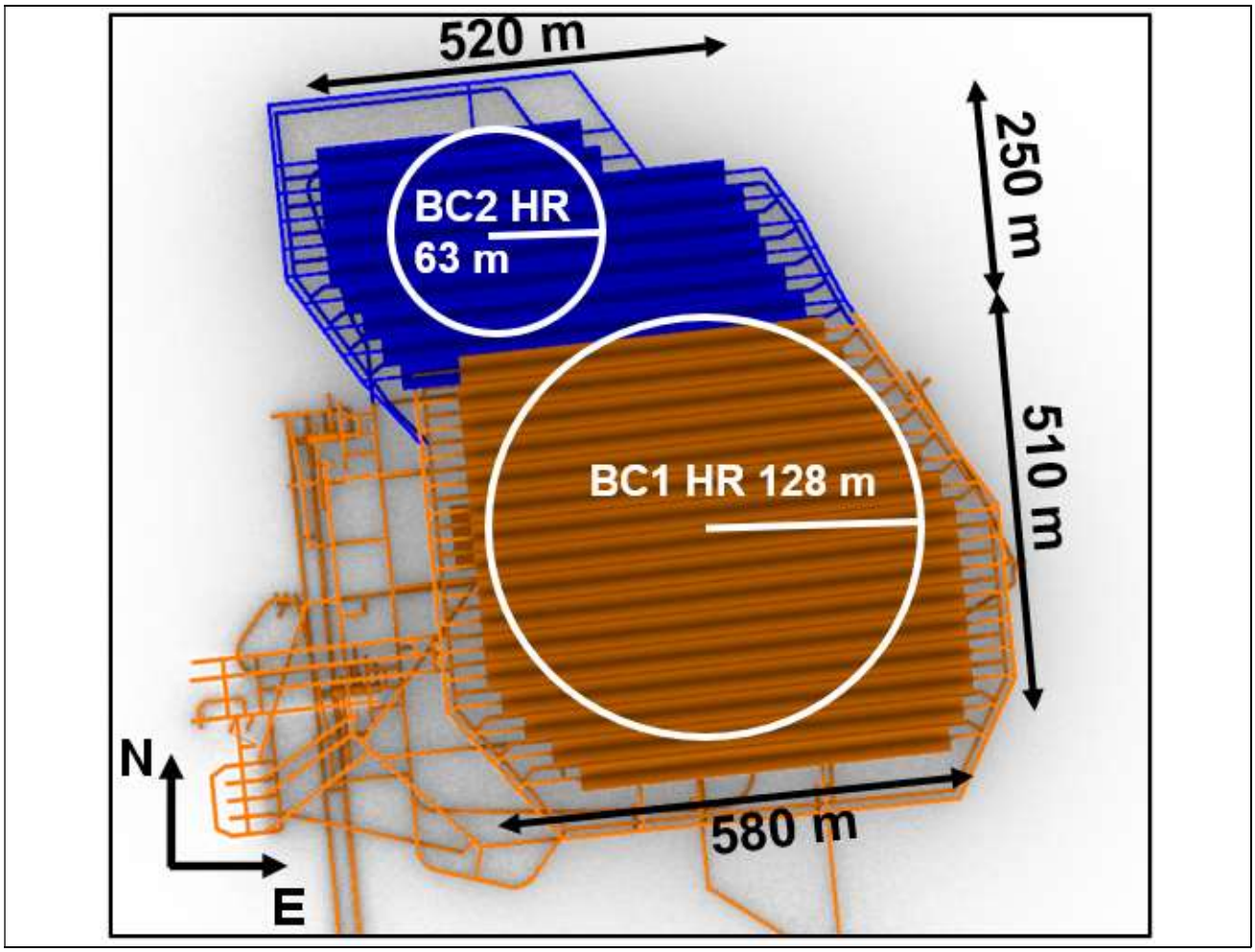


Figure 16.1 : Isometric view of the caveability LOM footprints (Herbert, 2021)

The caveability was simulated with Itasca optimised geotechnical codes within coupled FLAC3D and CAVESIM software. Cave footprints rock mass strength was provided by Mining Plus. It is recommended that further data be collected for these areas and then modelled to provide further insight before updating the mine design.

16.3.1.2 Excavation Stability

Itasca undertook numerical modelling for the Alpala Pre-Feasibility (Itasca Australia Pty Ltd, 19 November 2021) to assess the following mine designs per Figure 16.1.

The stability report finds that the Apala project will be within high-stress mining and the behaviour of the rock mass will be difficult as deformation and potential micro-seismicity risks were observed in the model. Mitigation measures and strategies exist to manage these risks; however, the impact of these measurements and strategies is outside of the scope of the geotechnical report. The Itasca report underlines that the management of geotechnical considerations of the mine is critical to the safe and economical extraction of ore at Alpala.

A summary of results for the two designs assessed in the Itasca report (Itasca Australia Pty Ltd, 2021)) Table 16.2. The feasibility of the block cave extraction level stability is sensitive to block design, in situ stress and rock mass strength. There is low confidence in geotechnical data due to the location of geotechnical boreholes

in relation to the cave footprints, and the methodology of logging core from photographs/split for the lower orebody database and low population of lab testing. Additionally, the models are sensitive to the in situ stress measurements. Given the low confidence of the in situ stress estimate at the site, the results of the model will require refinement once additional information is gathered. Future studies need to prioritise the gathering of geotechnical data to ensure that subsequent geotechnical analyses of the project are performed with high confidence data that will allow for a more definitive evaluation of the project.

Table 16.2 : Results summary of extraction level stability analysis (Itasca Australia Pty Ltd, 19 November 2021)

Mine Design	Block-ID	Undercut		Cave Interaction	Rock Mass	Model Results (1)		Design Issue	Possible Design Modification to Improve Stability
		Type	Sequence		Strength Domain	Undercut Level	Extraction Level		
Consolidated	C1	Advance (Big-W)	Chevron (North-East)	Lateral: South-Flank C2	Moderate-Strong	Conditionally Feasible	Conditionally Feasible	Design is feasible but moderate levels of and damage and seismicity indicated on UCL & EXL.	Recommend re-orienting ED direction and UC Face to bearing 264 deg.
	C2	Advance (Big-W)	Chevron (North-West)	Lateral: North-West Flank C1	Moderate-Strong	Conditionally Feasible	Conditionally Feasible	Design is feasible but face length exceeds industry standards.	Break C2 into 2 smaller caves. Recommend re-orienting ED direction and UC Face to bearing 264 deg.
					Lower-Moderate	Conditionally InFeasible	Conditionally InFeasible	Extensive damage in lower-moderate strength rock mass on east flank.	Investigate rock properties and extent of weak rock mass. Investigate alternative footprint layouts (re-oriented layout, smaller footprints, footprint depth etc)

(1) Itasca understands that assessment of Pre-Feasibility is based on limited and uncertain data subject to change
(2) All results in this table refer to Mid Case Properties

Terms and Definitions for Model Assessment

- Feasible: The models indicate the design is feasible and has a high probability of success.
- Conditionally Feasible: The models indicate the design is feasible and has a high probability of success, provided certain conditions are satisfied. These conditions typically include changes to ground support or minor aspects of the design, or verification of critical parameters and assumptions.
- Conditionally Infeasible: The models indicate the design is infeasible and has a high probability of failure, unless certain conditions or are not satisfied, or design modification implemented. These conditions typically include critical parameters and assumptions.
- Infeasible: The models indicate the design is infeasible and has a high probability of failure.

16.3.1.3 Fragmentation

Primary and secondary fragmentation analysis was undertaken for the rock mass and structural information within the proposed block cave column. The fragmentation study considers the discontinuity geometry from televiewer logs and geomechanical logs. The fragmentation study is to guide future draw point design, productivity, and equipment selection.

Preliminary findings from the Itasca report (Itasca Australia Pty Ltd, 07 December 2021) on the fragmentation are as follows:

- The results are limited due to the lack of geotechnical drill hole data available for this study, in the vicinity of the extraction levels below the 700 m RL
- The LQ and UQ fragmentation distributions indicate a wide range of possible fragmentation distributions reporting to the extraction level
- 23% of the 252 scenarios analysed for the initial data set estimate that 10% of block sizes reporting to the draw point will be greater than 2 m^3; whereas when updated UCS and addition of micro defects are considered in the analysis 14% of block sizes reporting to the draw point will be greater than 2 m^3.

16.3.1.4 Stand-offs and Surface Subsidence

The mine design has been developed on the assumption that all infrastructure is stood off the cave abutment zone by 100 m. The proposed decline portal and vent raise collar positions inherently place the life of mine access, materials handling and ventilation infrastructure away from potential subsidence zones, with development drives accessing the deposit laterally rather than vertically.

An empirical approach as per Laubscher (Laubscher, 2000) was performed and benchmarked against other operations detailed in Woo (Woo, Eberhardt, & Stead, 2013). Cave parameters were based on available information on mining cave footprint widths, depth of draw, draw point elevation and the modelled material

density. The depth of the proposed mine and height of draw of material may pose some challenges and a detailed study on surface subsidence is recommended in the next phase of design.

From the empirical analysis a cave angle of 76 degrees and the extent of failure of 68 degrees was determined at final cave draw. The magnitude of subsidence and the impact of the subsidence on slope stability, water courses and any surface infrastructure were not included in the geotechnical study. Further, there exists large scale fault features within the cave footprint; the empirical analysis is insensitive to large scale structural features.

Locations for rises to surface and the portal have been placed outside of these subsidence zones.

16.3.2 Geological Parameters

The mineable resource model used to inform the Pre-Feasibility design was the Mineral Resource Estimation geological model (MRE#3) BMSUBMINING.dm, as supplied by SolGold (Artica & Fowler, 2020). Grade estimation and geological modelling have been assumed to be correct.

16.3.3 Hydrological/Hydrogeological Parameters

Hydrological conditions are not considered to materially affect mining development rates or pumping costs relative to other block caving operations.

16.3.4 Dilution and Recovery Parameters

The recovery factor calculates the net losses of material which remain behind, either in situ, as a result of drill and blast design or inefficiency, or as broken material left in the cave due to the mining equipment and mining method inefficiency at the loading and hauling stage. The dilution factor calculates the grade of any unplanned material that is mined relative to the design grade of the excavation.

As shown in Table 16.3 lateral development is assumed to be over broken at 10%. Undercut material recovers only the swell required for drill and blast, while the drawbell tonnes are accounted for in the PCBC schedule. For all activities a dilution factor of 1 is applied, on the basis that the material immediately surrounding the excavations will be of a similar grade to the excavations themselves.

Table 16.3 : Recovery Factors

Activity	Recovery Factor
Lateral Development	1.1
Undercut Rings	0.3
Drawbells	0
All other activities	1.0

The PCBC production schedule models the draw of the in situ material, and as such all diluting material is from within the block model.

16.3.5 Mining Parameters

Mining parameters used in the design are listed in Table 16.4.

Table 16.4 : Pre-Feasibility design parameters	
Parameter	**Value**
Maximum height of draw	700 m
Minimum column height	200 m
Height of draw variation	80 m
Decline/Conveyor Drive max gradient	1 in 6
Average decline development rate (Drill & Blast)	220 m/mo
Draw column draw rate (1st 160 m on 300 L footprint)	60 m/y
Draw column draw rate (all other draw columns)	70 m/y
Production Rate	25 Mt/y

16.3.6 Economic Criteria

Economic parameters used to guide the design process are described below. These parameters were only used for design purposes, and a more detailed economic model was used to assess the overall project.

16.3.6.1 Revenue

The value of material in the geological model was estimated using a net smelter return (NSR) model. This valuation was traded-off against estimated costs to determine whether and when the material should be included it in the conceptual mine plan. Parameters provided by SolGold used in the estimated NSR plan are shown in Table 16.5.

Table 16.5 : NSR model parameters				
Parameter	**Units**		**Values**	
	Cu	**Au**	**Cu**	**Au**
Metal Price	US$/lb	US$/oz	3.30	1,700
Unit conversion	lb/t	g/oz	2,204	31.103
Gov. royalty	%	%	5	8
Refining charge	US$/lb	US$/oz	0.079	5
Smelting	US$/dmt		79	
Shipping Water content	%		9	
Shipping (incl. port cost)	US$/wmt	US$/wmt	46.3	
Average LOM concentrate grade	%	g/t	28	17
Met recovery	%	%	85	70
NSR/grade unit	US$/%	US$/g/t	53.4	35.1

More detailed metallurgical modelling has shown that at the lower grades mined in the second phase of the mine plan, the expected recoveries and concentrate grades are lower. This leads to the lower NSR per in situ grade shown below. Although this non-linear relationship between grade and NSR has been accounted for in the evaluation of the project economics, the simpler linear relationship shown Table 16.5 has been used in the basis of design.

If future work shows that the metallurgical process cannot be improved for the lower grade feed in the second phase of the mine plan, it is recommended that an iterative approach is used to calculate the nonlinear NSR on each block depending upon when the block will be mined in the schedule.

16.3.6.2 Cost

Design costs are shown in Table 16.6. These are estimated from the model developed in Phase 1 and 2 (Mining Plus Pty Ltd, 2021). Note that these costs are used for design purposes only and not for cost estimation.

Table 16.6 : Cost Estimation Parameters

Parameter	Value US$/t mined
Production draw cost	$3.75
Non-mining Opex	$10.0
Non-mining sustaining Capex	$1.80

16.3.7 Design Method

Mine infrastructure around the footprint was designed using standard mine planning and design parameters for a long lifetime hard rock underground mine. Within the footprint, specialised spacings and offsets were used based on guidance from Itasca's Geotechnical numerical modelling.

Geotechnical modelling showed that for stability of the excavations the extraction drives and undercut drives needed to be orientated at an azimuth of 264 degrees (Lachenicht, Alpala Pre-feasibility Optimisation Study, 2021). The same pillars, drawpoint and extraction drive spacing as the 50 Mt/y initial case were used for the 25 Mt/y case, namely a 32 m extraction drive spacing (centre to centre) Figure 16.2 and a 20 m drawpoint drive spacing (centre to centre measured along the extraction drive). This spacing was tested for interactive draw under both Laubscher and Bin theory by Itasca Australia.

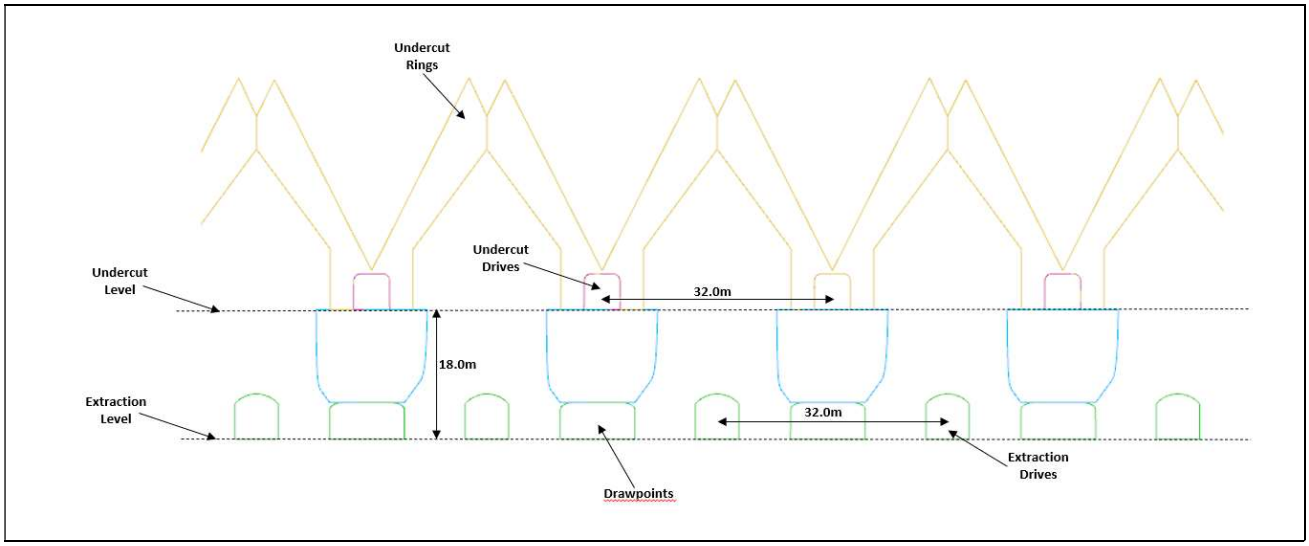


Figure 16.2 : Cross-section through footprint showing extraction drive spacing and pillars

Offsets around the footprint for long term infrastructure (perimeter drives, haulage drives crusher chambers) were developed through consultation between Mining Plus and Itasca, based on experience of equivalent

operations. A full geotechnical stress model has been used to confirm the stability of the layout that is designed following these parameters. These offsets are shown in Figure 16.3, Figure 16.4 and Figure 16.5.

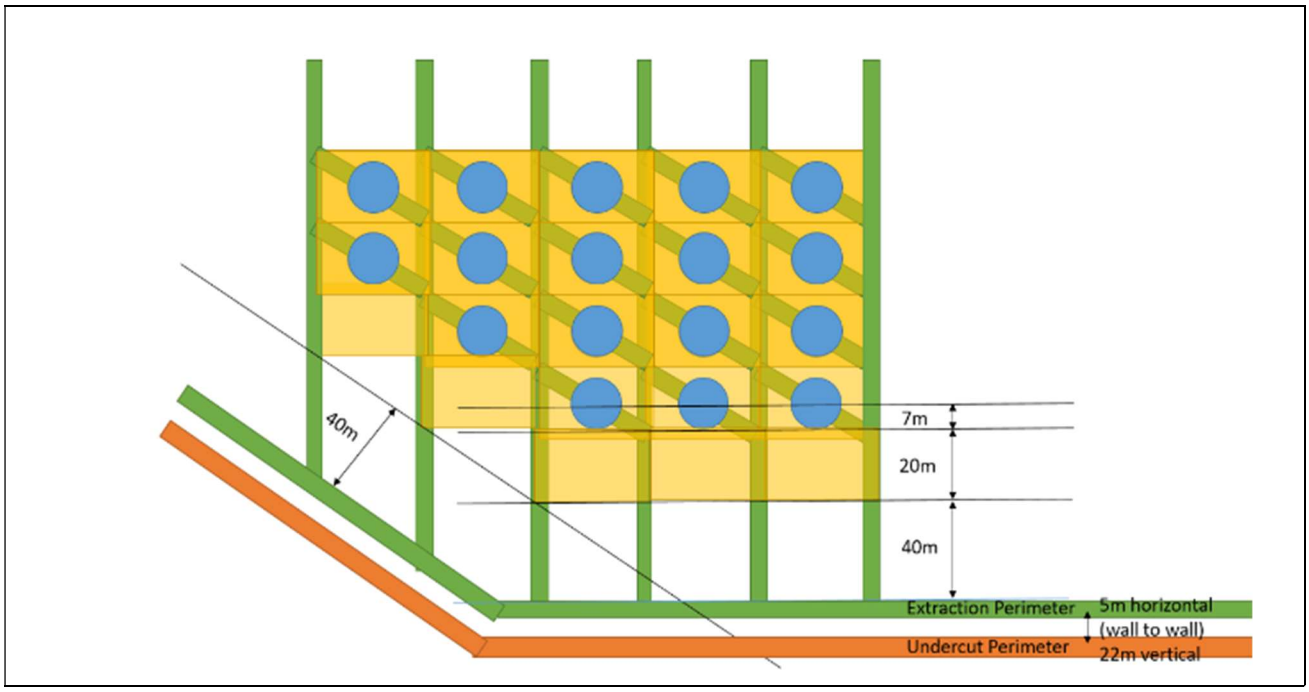


Figure 16.3 : Perimeter drive offsets and undercut veranda

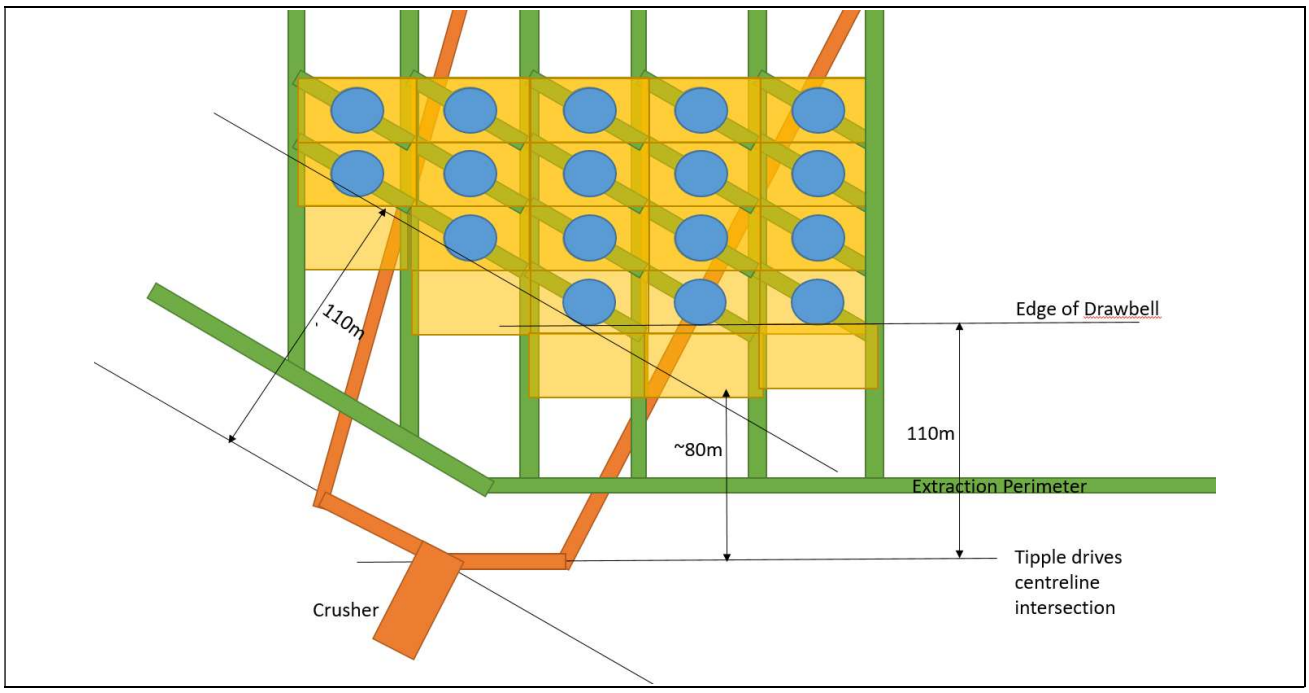


Figure 16.4 : Minimum crusher offset from footprint

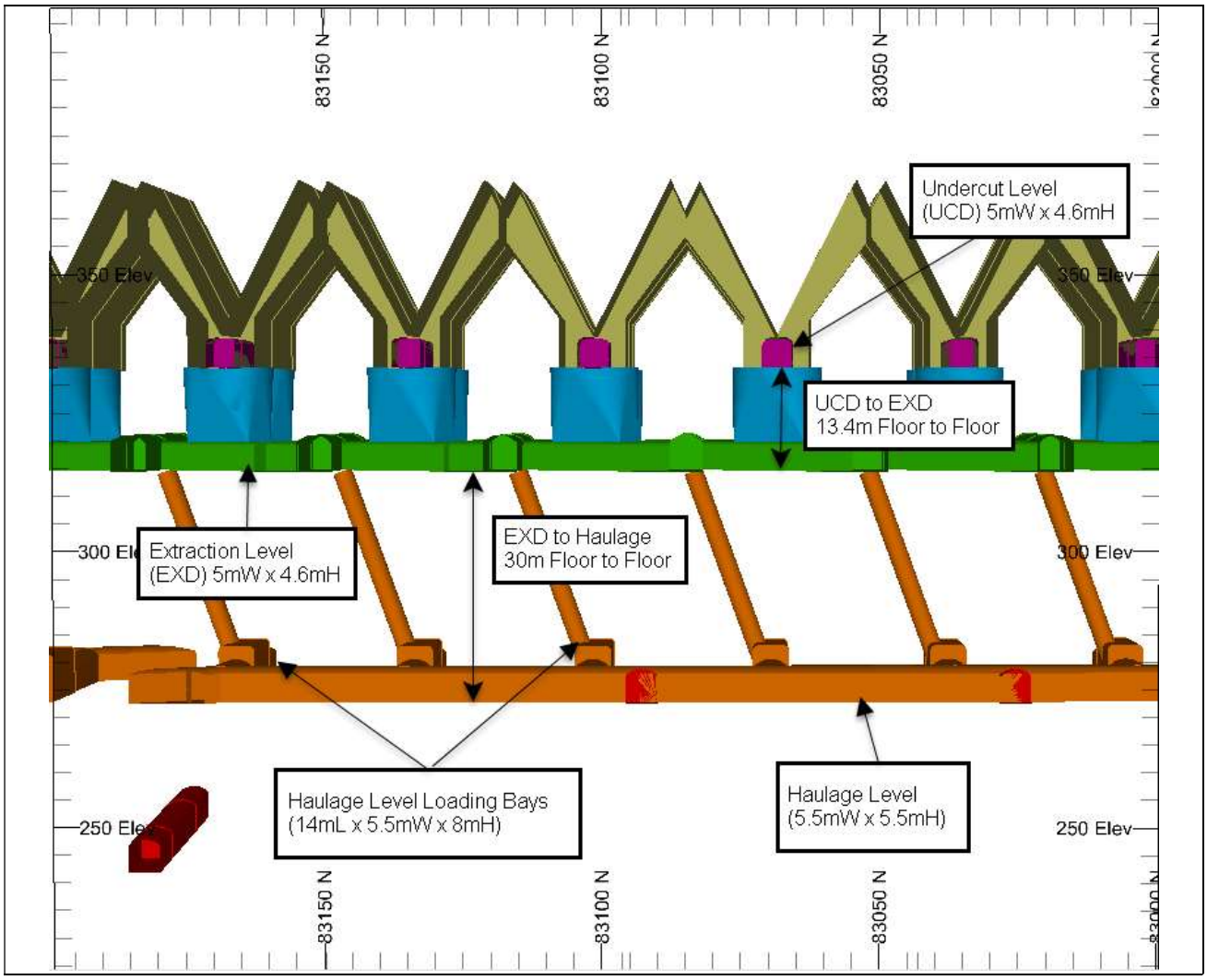


Figure 16.5 : Haulage level offset

Offsets for major infrastructure (shafts and declines) were revised by Itasca and summarised in SolGold Concept Shaft Design Offset Recommendations (Lachenicht, Solgold Concept Shaft Design Offset Recommendations, 2021). The key change was to use the modelled mid-case results rather than low-case. Offsets under this case are shown in Figure 16.6.

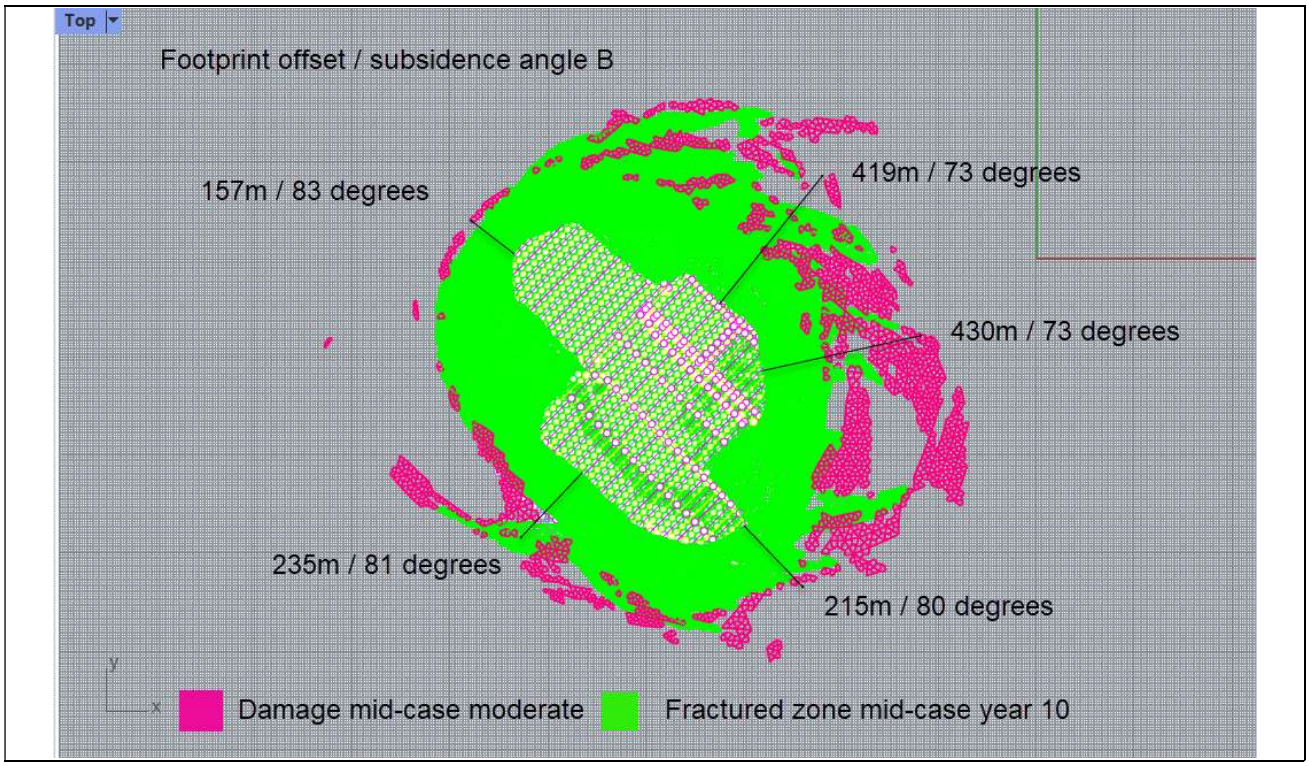


Figure 16.6 : Plan view showing recommended shaft collar offsets (Lachenicht, Solgold Concept Shaft Design Offset Recommendations, 2021)

16.4 Mine Design

16.4.1 Lateral Access

The main lateral mine access needs to be suitable for personnel and material movement and also accommodate the Material Handling System (MHS). A secondary function of the development will be to provide ventilation flow.

The lateral access design for Cascabel includes twin declines running parallel to each other developed from a boxcut at the surface. The declines are 50 m from centreline to centreline and based on the 5.5 mW x 5.8 mH profile (main access decline) and 6.5 mW x 6.0 mH (conveyor decline) with a pillar of 44 m/46 m between them (Figure 16.7). The 6.5 m span in the Conveyor Decline will allow for the installation, and ongoing servicing of the materials handling conveyor system in the conveyor decline. A separation of 44 m will be kept between the inside walls of the two declines. Both declines have a nominal gradient of 15.6% (1:-6.4), which is suitable for both the conveyor and the running of haul trucks. A plan view of the declines in relation to the orebody can be seen in Figure 16.8.

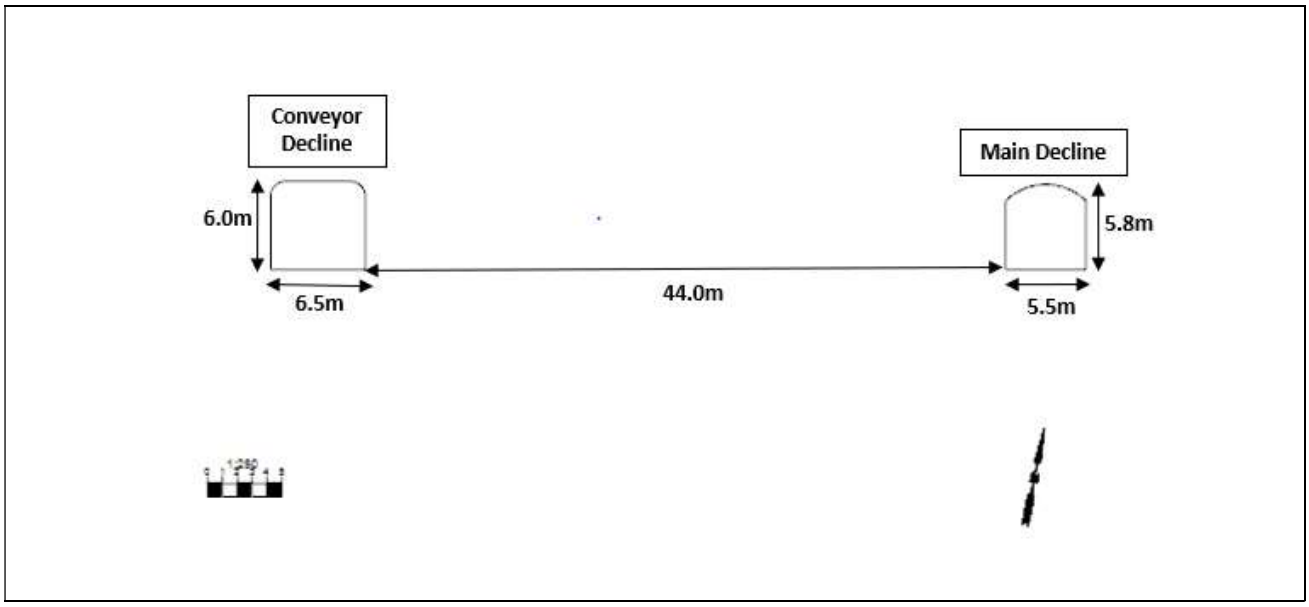


Figure 16.7 : Cross Section – Conveyor – Main Decline

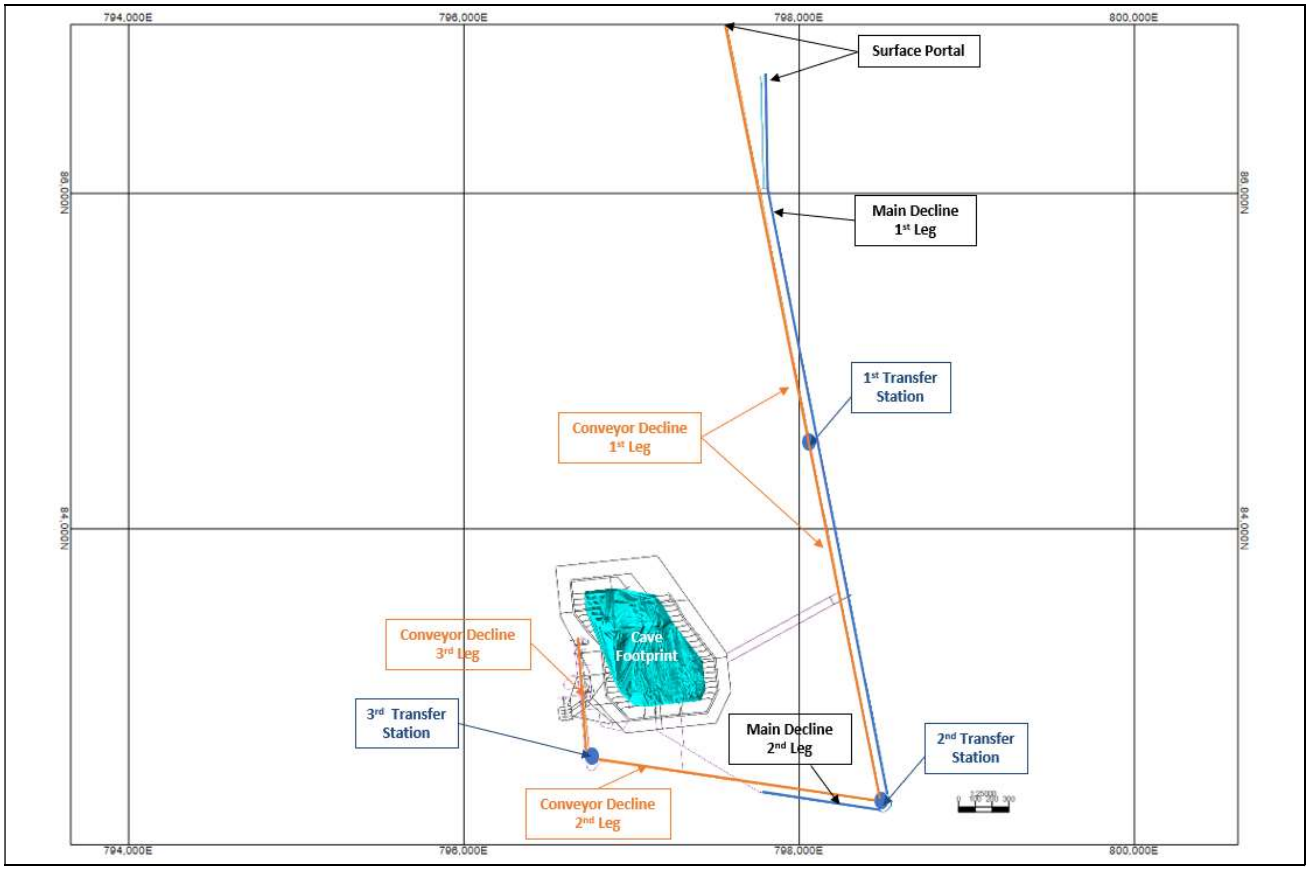


Figure 16.8 : Plan View – Twin Declines

16.4.2 Footprint Layout

The cave footprint is focussed on the 300 mRL with the layout consisting of an undercut, extraction and haulage level. All levels have ventilation drives which connect to internal shafts forming part of the primary ventilation network. Figure 16.9 shows the primary ventilation network for the footprint.

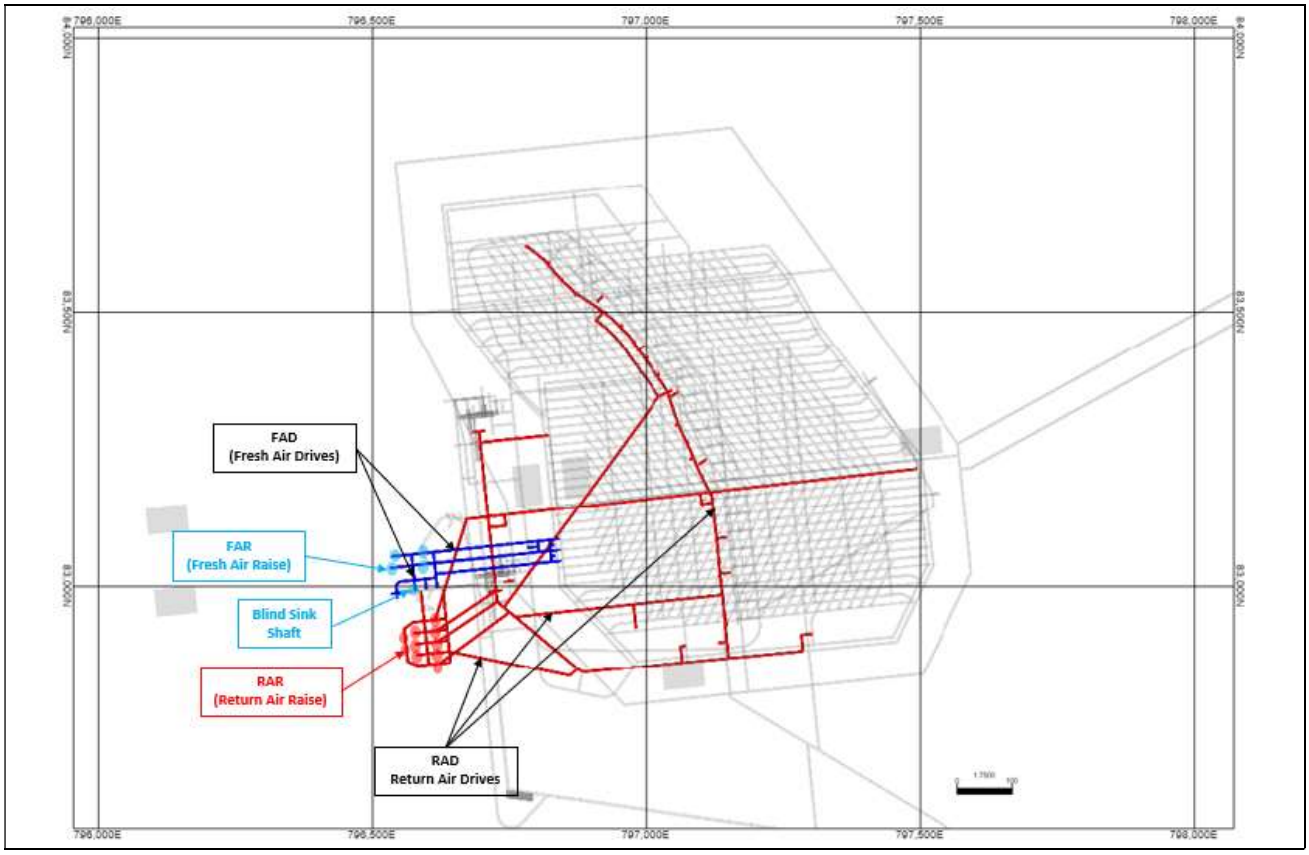


Figure 16.9 : Plan View – Ventilation Drives and connections to surface ventilation shafts

The extraction level has an "El Teniente" layout with crosscuts (or Extraction Drives) spaced 32 m centre to centre. Drawpoints are spaced at 20 m (Figure 16.10). There are tip points for the loader to transfer ore from the cave to passes which report to the haulage level below. Turning bays are designed at the start of each crosscut for efficient movement of the loaders. Ventilation drives connect to internal shafts forming part of the primary ventilation.

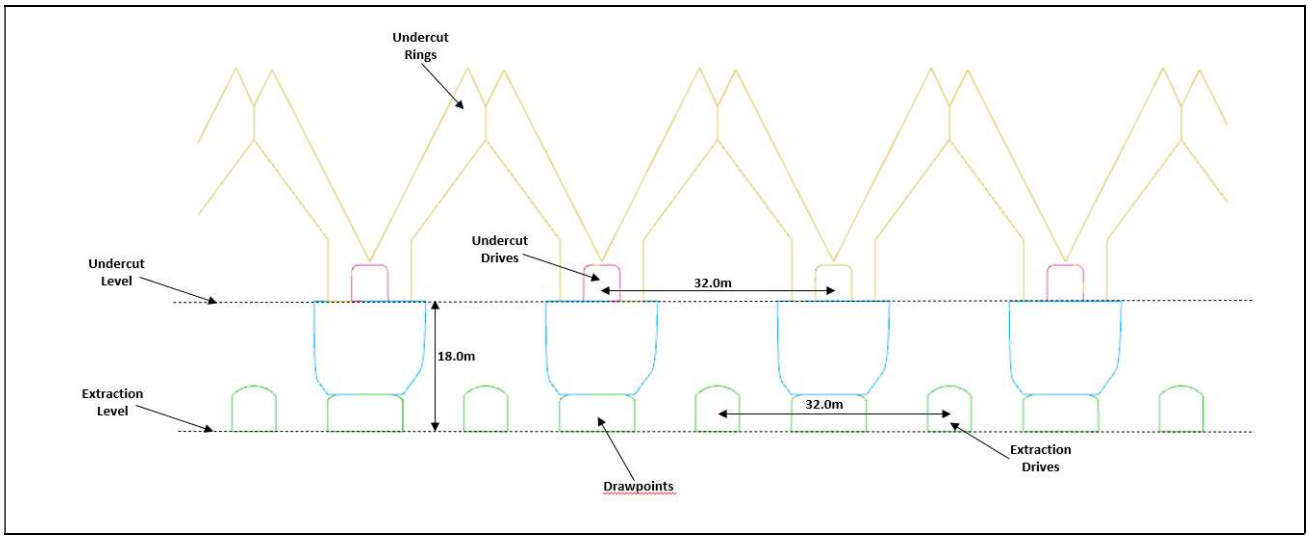


Figure 16.10 : Section View – Showing Development for "W" style Undercut

16.4.3 Materials Handling Layout

The extraction level has a Haulage Level running underneath it which will be utilised for material handling during the production Phase of each level (as shown on Figure 16.11).

The haul drives allow trucks to transfer the ore from ore passes to the level crushers where the crushed ore will be transferred to the main decline conveyor via transfer conveyors.

These drives also form part of the ventilation circuit for the level development. The drives have a profile of 5.5 mW x 5.8 mH and currently are designed without gradient.

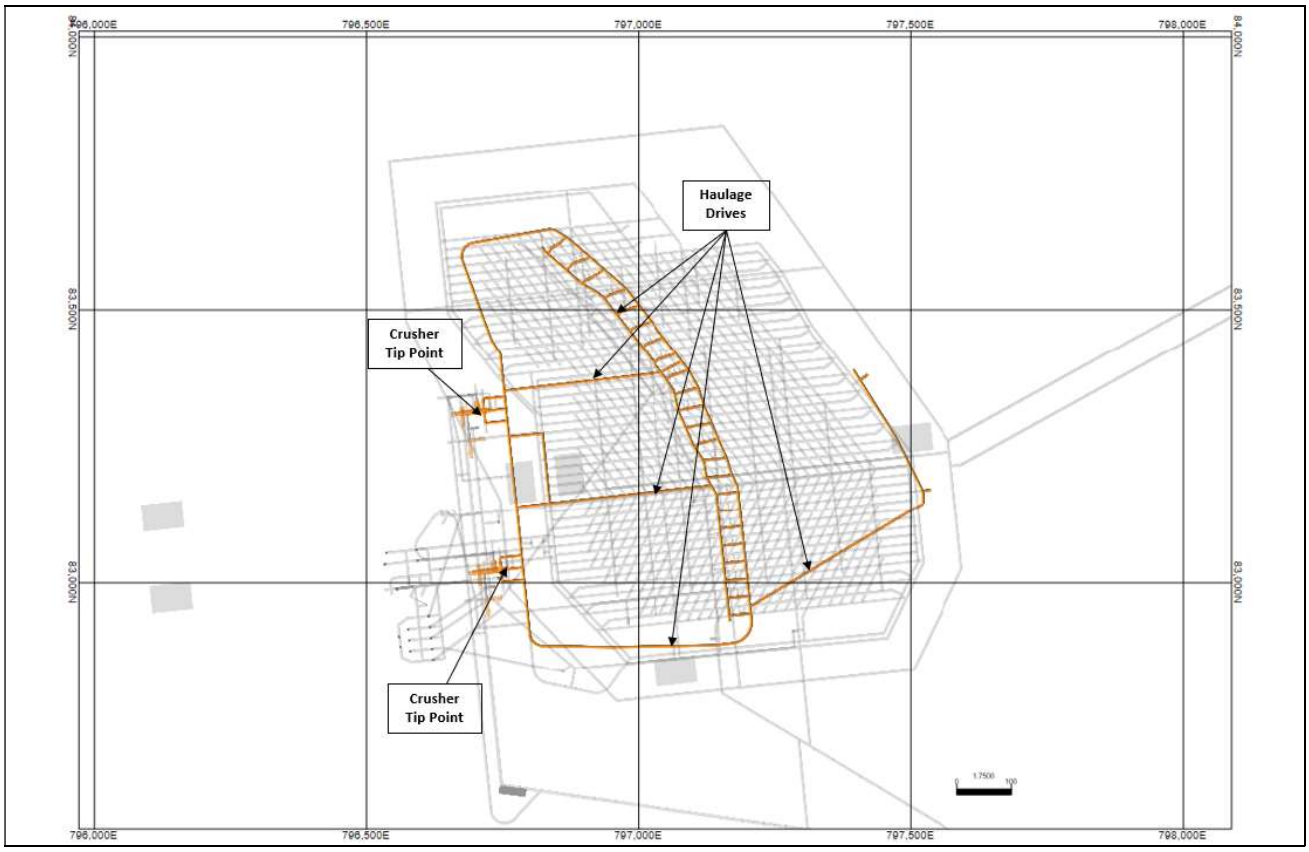


Figure 16.11 : Plan View – Haulage Level detail, including Conveyor Feeders

16.4.4 Ventilation Layout

In addition to the initial access shaft and the access and conveyor declines, the Pre-Feasibility design includes 7 shafts for ventilation (5 exhaust shafts and 2 intake shafts). Each of these shafts is 5.0 m in diameter to suit the ventilation requirements for the steady-state operating mine. The early access shaft will also become a source of fresh air intake once all early access requirements are completed, and the decline development reaches the footprint.

All 7 shafts are mined in two set of legs; first legs are established to the 910 L underground level 910 (910 FAD drive and 910 RAD drive) and second legs are established to 255 L (255 FAD drive and 255 RAD drive).

This discrepancy in length is due to the undulating surface topography (as shown Figure 16.12).

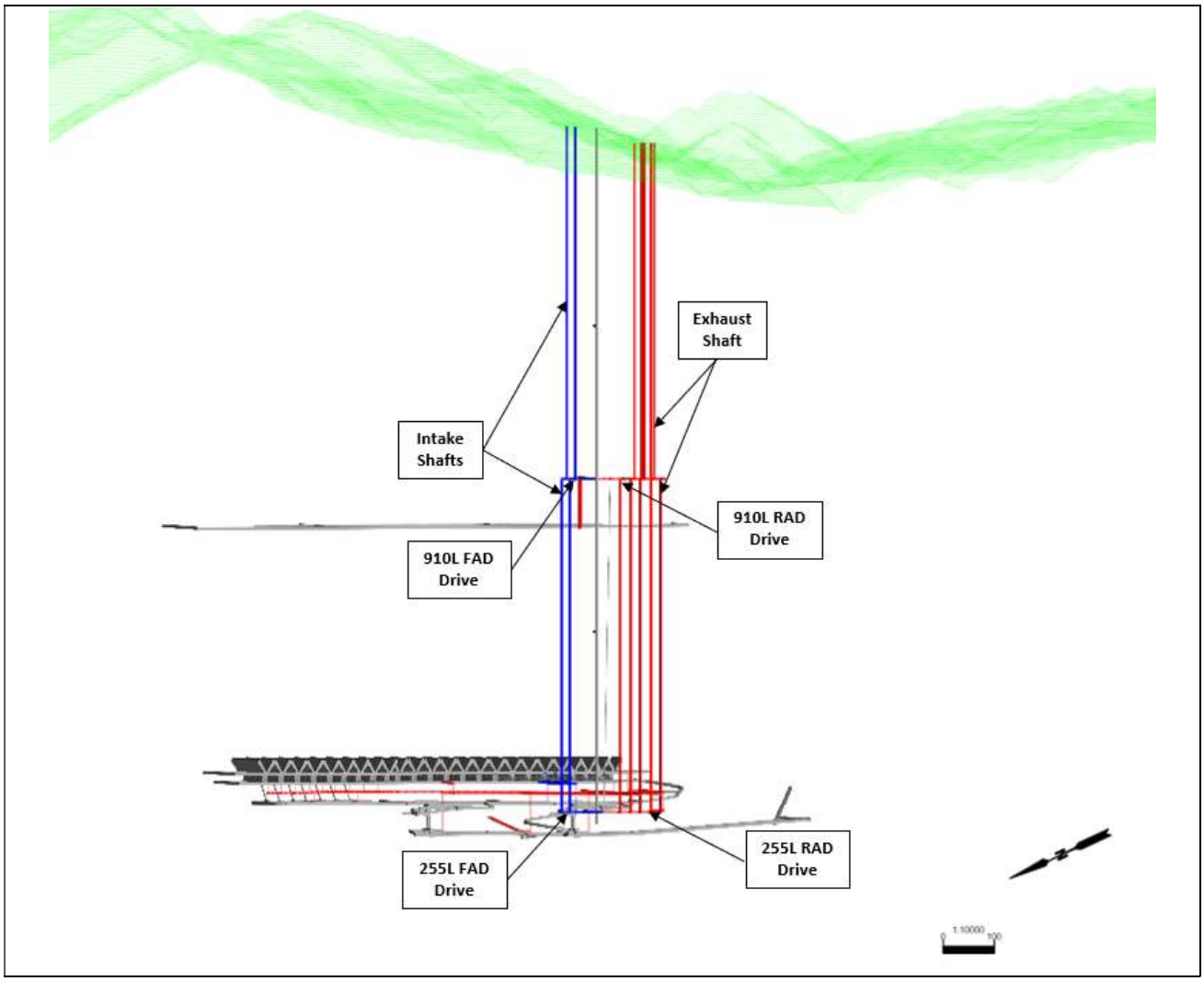


Figure 16.12 : Isometric View – Ventilation Shafts

Each block will have a ventilation level running between the extraction level and haulage drive. The ventilation levels are connected to the surface ventilation shafts and distribute the air along with the other working levels via connections to smaller, internal ventilation raises (as shown on Figure 16.13).

The drives which handle air have a profile of 5.5 mW x 6.1 mH and are currently designed without gradient. It is envisaged that appropriate gradients will be applied at the detailed design stage to enable adequate drainage.

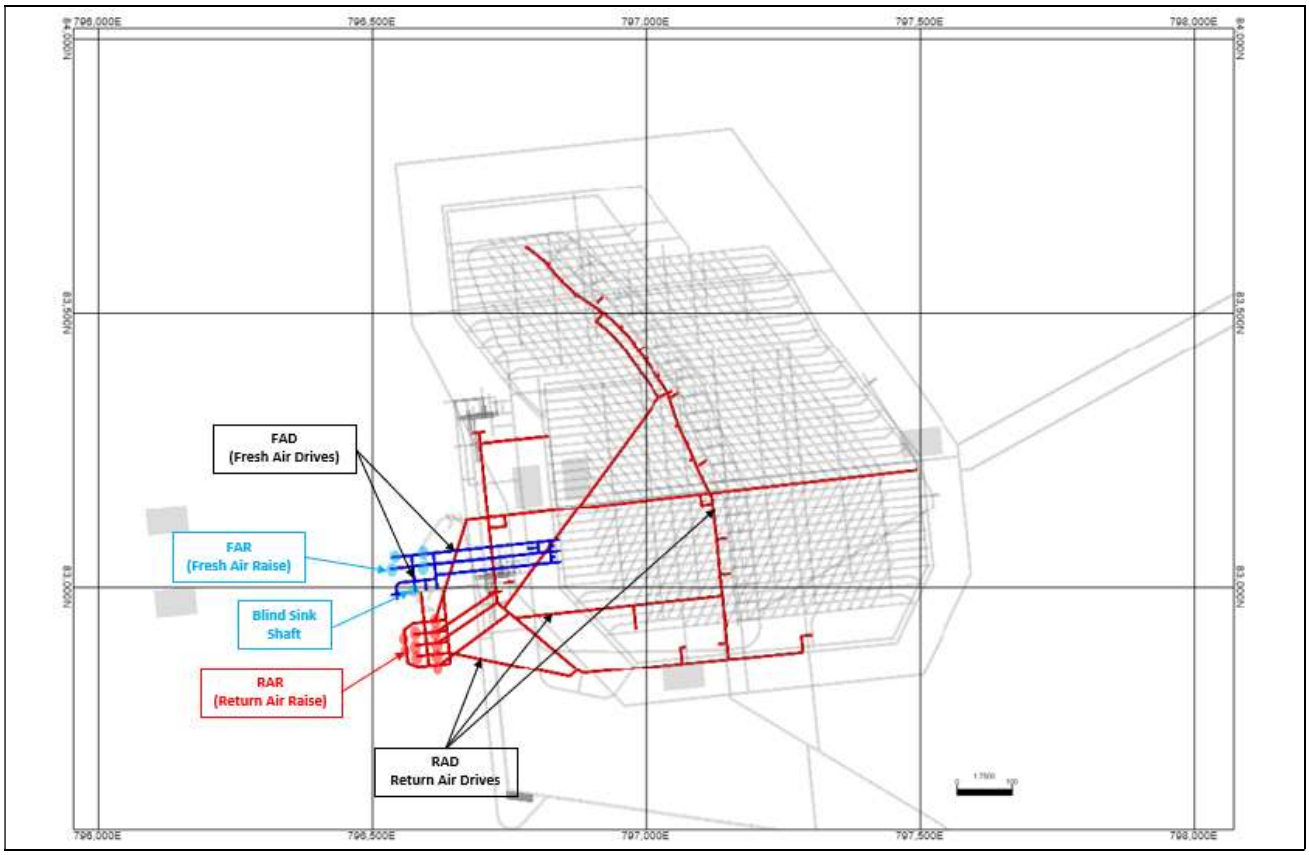


Figure 16.13 : Plan View – Ventilation Drives and connections to surface ventilation shafts

16.4.5 Mining Physicals

Key mining physicals (Table 16.7) for this design were calculated using Deswik mine planning software, directly from the Deswik generated design.

Table 16.7 : Mining Physicals

Mining Physical	Quantity	Units
Total Lateral Development	104,458	m
Total Vertical Development*	13,195	m
Production Tonnes	558	Mt

*Note: Vertical Development includes surface shafts, small diameter internal rises (ventilation extensions, ore passes, transfer bins) and production slot rises.

16.5 Mining Schedule

16.5.1 Development and Production Rates

The mine scheduling was undertaken with a base case mine production rate of 25 Mt/y. The 25 Mt/y base case was in-line with the material handling system assumptions provided by Wood. Further analysis is recommended to best optimise the production rate.

Outputs from the PCBC Footprint Finder tool and a set target of 25 Mt/y were used to create the column design.

Scheduling of the mine plan was completed in Deswik mine planning software.

Rates used in this schedule are shown in Table 16.8.

Table 16.8 : Schedule Rates

Activity	General Rates	Rates Applied for Ramp Up
Decline Development	180 m/mo	220 m/mo
Lateral Development	100 m/mo	220 m/mo
Vertical Development (Small Ø)	60 m/mo	-
Ventilation Shaft	55 m/mo	-
Drawbell	7/mo	-
Undercut	5,000 m^2/mo	-

In order to meet production requirements, high speed development rates will be required for the initial access development. Critical advance rates to the 300 L will be 220 m per month. To achieve the required critical advance rates, development equipment will need to be over resourced, to maintain 100% face utilisation of all active and critical path headings.

16.5.2 Schedule Milestones

Key schedule milestones are listed in Table 16.9 and Table 16.10. Ore production at the maximum 25 Mt/y rate is achieved 8 years and 7 months from the project start.

Table 16.9 : Key Schedule Milestones

Number	MILESTONES – Lateral Development	Date
1	Commence Twin Decline Development	0Y 1m
2	Commence Conveyor Decline	0Y 5m
3	Reach Conveyor Transfer Station 1 (2.7 km)	1Y 5m
4	Commence Access to Monitoring Level	1Y 9m
6	Reach Conveyor Transfer Station 2 (5.0 km)	2Y 2m
7	Complete final leg of Decline (5.6 km)	3Y 9m
9	Commence Access to 300L Footprint	2Y 11m
11	Reach Conveyor Transfer Station 3 (6.8 km)	4Y 2m
18	Reach Conveyor Feeder 2nd Crusher (7.5 km)	5Y 6m
19	Complete Conveyor Drive 2nd Crusher	6Y 2m
Number	**MILESTONES - Infrastructure**	**Date**
8	Commence 300L 1st Crusher Excavation	3Y 2m
10	Complete 300L 1st Crusher Excavation	3Y 11m
16	Commence 300L 2nd Crusher Excavation	5Y 3m
17	Complete 300L 2nd Crusher Excavation	6Y 2m

Table 16.9 : Key Schedule Milestones		
Number	**MILESTONES – Lateral Development**	**Date**
22	Complete 300L Zone CS Ore Passes	7Y 11m
23	Complete 300L Zone CN Ore Passes	8Y 9m
32	Complete 300L Zone NN Ore Passes	17Y 11m

Table 16.10 : Key Schedule Milestones		
Number	**MILESTONES - Ventilation**	**Date**
1	Commence Access Shaft	0Y 1m
5	Complete Access Shaft	2Y 0m
6	Commence Return Air Drive (RAD)	2Y 6m
9	Commence Return Air Rises (RAR)	2Y 8m
15	Commence Fresh Air Rises (FAR)	5Y 4m
20	Complete Fresh Air Rises (FAR)	7Y 7m
21	Complete Return Air Rises (RAR)	8Y 2m
29	Complete Return Air Drive (RAD)	16Y 11m
Number	**MILESTONES - Production**	**Date**
12	Commence Firing 300L Zone CS Undercut Rings	4Y 5m
12	Commence Firing 300L Zone CN Undercut Rings	4Y 5m
13	Commence Drawbell Zone CS	5Y 2m
14	Commence Drawbell Zone CN	5Y 2m
	Production at 25 Mt/y rate	8Y 7m
24	Complete Firing 300L Zone CS Undercut Rings	8Y 10m
25	Complete Drawbell Zone CS	9Y 7m
26	Complete Drawbell Zone CN	9Y 10m
27	Commence Firing 300L Zone NN Undercut Rings	15Y 11m
28	Commence Drawbell Zone NN	16Y 2m
30	Complete Firing 300L Zone CN Undercut Rings	8Y 12m
31	Complete Firing 300L Zone NN Undercut Rings	18Y 3m
33	Complete DBL Zone NN	18Y 4m

16.5.3 Production Schedule

The ore tonnes and grades (inclusive of development ore) are summarised on an annual basis in Table 16.11. The ore tonnes profile is shown graphically in Figure 16.14.

Table 16.11 : Mining Physicals				
Year	**Total Ore Tonnes (t)**	**Cu Grade (%)**	**Au Grade (g/t)**	**Ag Grade (g/t)**
0Y	0	0.00	0.00	0.0
1Y	1,835	0.02	0.16	0.2
2Y	300,121	0.14	0.08	0.5
3Y	673,746	0.31	0.23	0.9
4Y	1,398,716	0.46	0.36	1.0
5Y	3,732,802	0.50	0.46	1.0
6Y	9,652,025	0.62	0.69	1.3
7Y	15,087,056	0.75	0.92	1.6
8Y	22,756,755	0.85	1.09	2.0
9Y	25,123,977	0.93	1.20	2.2
10Y	25,124,847	0.92	1.14	2.2
11Y	25,124,850	0.79	0.89	2.0
12Y	25,193,684	0.76	0.78	2.1
13Y	25,235,808	0.70	0.64	2.1
14Y	25,367,131	0.68	0.60	1.8
15Y	25,516,131	0.66	0.59	1.8
16Y	26,324,260	0.63	0.57	1.8
17Y	25,939,776	0.56	0.48	1.6
18Y	25,196,285	0.51	0.39	1.5
19Y	25,124,848	0.47	0.32	1.5
20Y	25,193,684	0.44	0.27	1.4
21Y	25,124,849	0.41	0.24	1.3
22Y	25,124,850	0.43	0.25	1.2
23Y	25,124,848	0.43	0.24	1.1
24Y	25,193,683	0.43	0.23	1.2
25Y	25,124,849	0.45	0.24	1.4
26Y	23,704,750	0.45	0.24	1.3
27Y	20,649,811	0.38	0.20	1.2
28Y	16,264,639	0.33	0.15	1.0
29Y	12,991,099	0.31	0.13	1.1
30Y	1,141,755	0.32	0.13	1.2

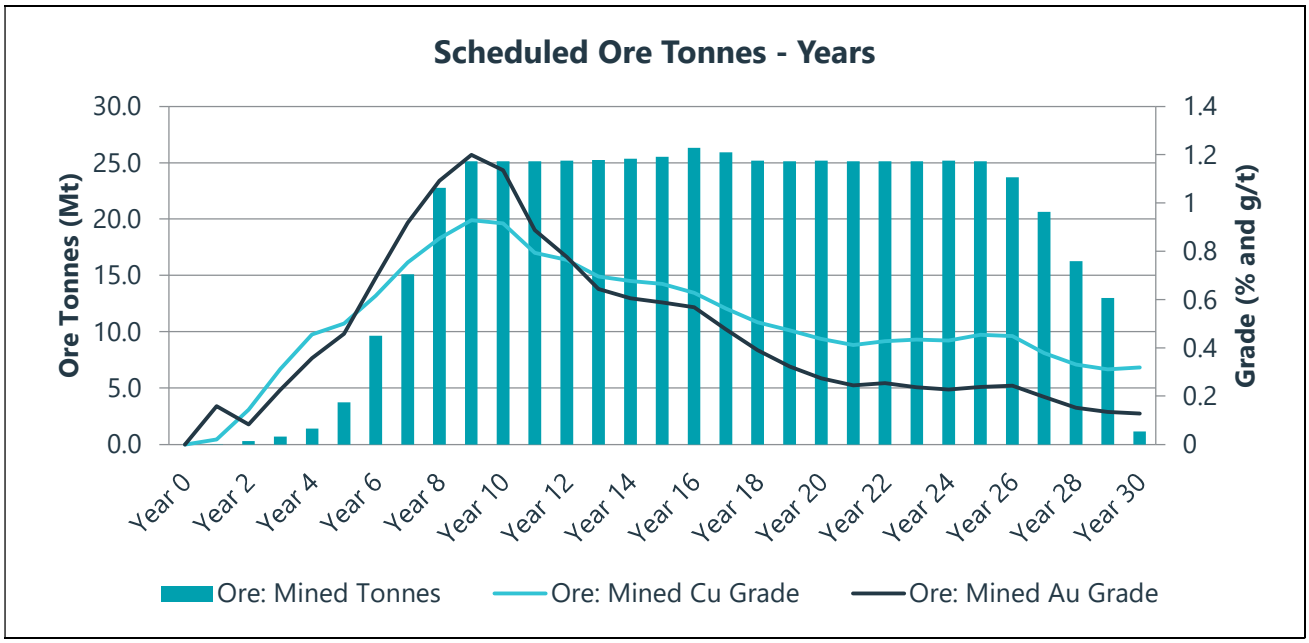


Figure 16.14 : Scheduled Ore Tonnes by Years

16.6 Mining Equipment

16.6.1 Mobile Fleet

The mine plan assumes that development and production activities will be undertaken with a rubber tired, diesel-powered and battery electric mechanised mining fleet. It is proposed that the production haulage fleet consist of Battery Electric truck from reputable suppliers, such as Sandvik. The mine layout, ventilation requirements and cost estimates have been based on this assumption. The mining equipment numbers have been obtained using first principals and then benchmarked against other block cave operations. Major mobile equipment for development and production required over the life of the mine are shown below.

Figure 16.15 shows the total mobile equipment fleet of the life of the mine. It can be seen that the number equipment owned by the Mine Contractor(s) for development activities and to set up the cave are quite sporadic over the mine life. The largest requirement is at the start of the project for the initial access and set up of the 300 mRL footprint, then there is another spike in requirement from around Year 13 of the project when the second cave on the 300 mRL footprint is established.

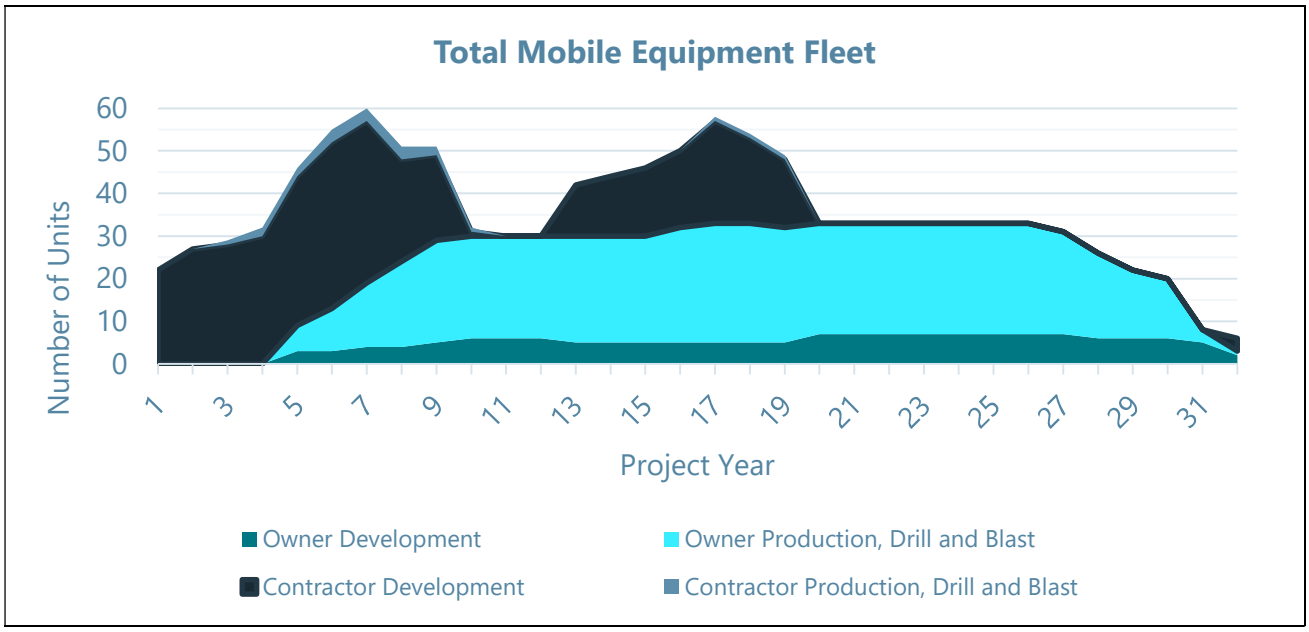


Figure 16.15 : Mobile Fleet Requirements

Figure 16.16 shows the Owner's production load and haul fleet requirements. As these are driven by the production rate, once a steady state of 25 Mt/y is achieved, equipment levels are constant.

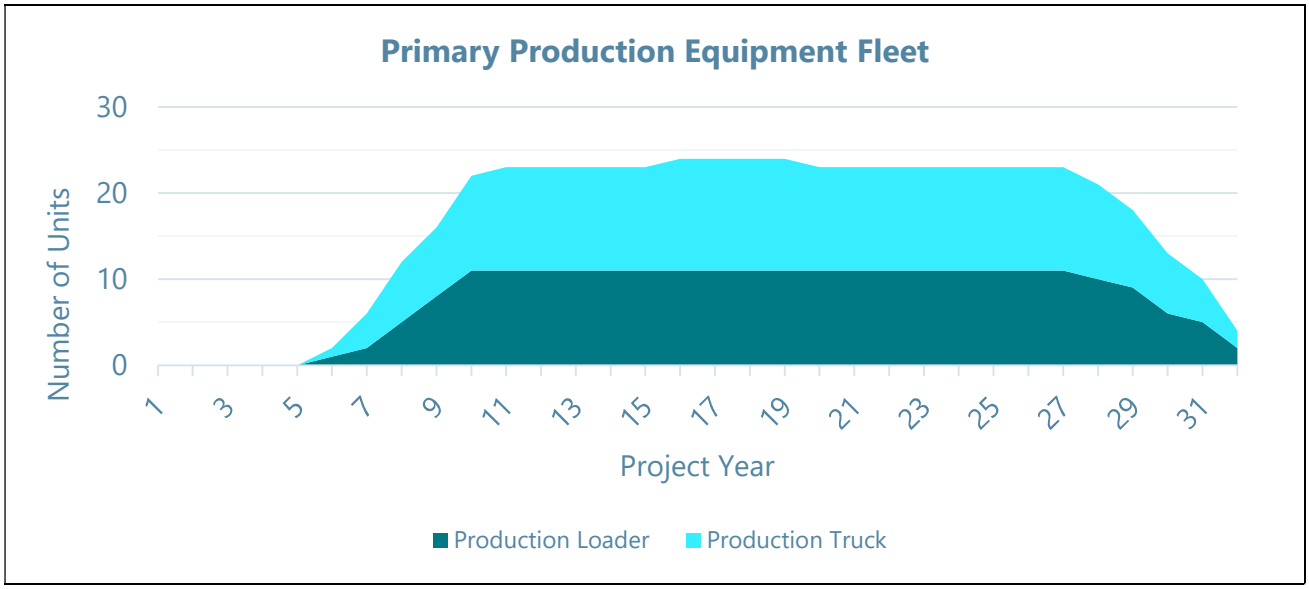


Figure 16.16 : Production Load & Haul Equipment

16.6.2 Materials Handling

As directed by Wood, a single stream incline conveyor materials handling system has been selected for this study to enable the production profile to be met. This system requires material to be delivered from drawpoints by diesel loaders to battery electric truck haulage loops, via ore passes and automated loading chutes. The truck haulage loop delivers material to the crushing system, which discharges to the incline conveyor via series

of transfer conveyors and surge bins. The process flow of the conveyor system is summarised in Figure 16.17 and illustrated in Figure 16.18.

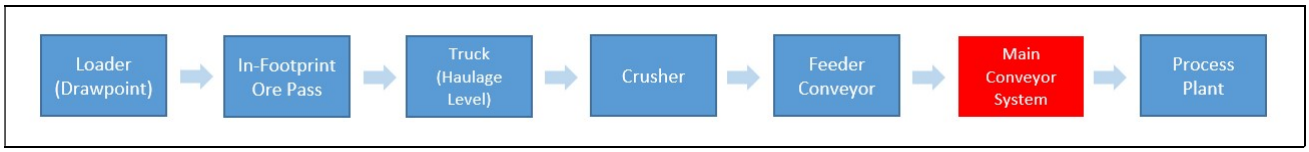


Figure 16.17 : Conveyor MHS process flow diagram

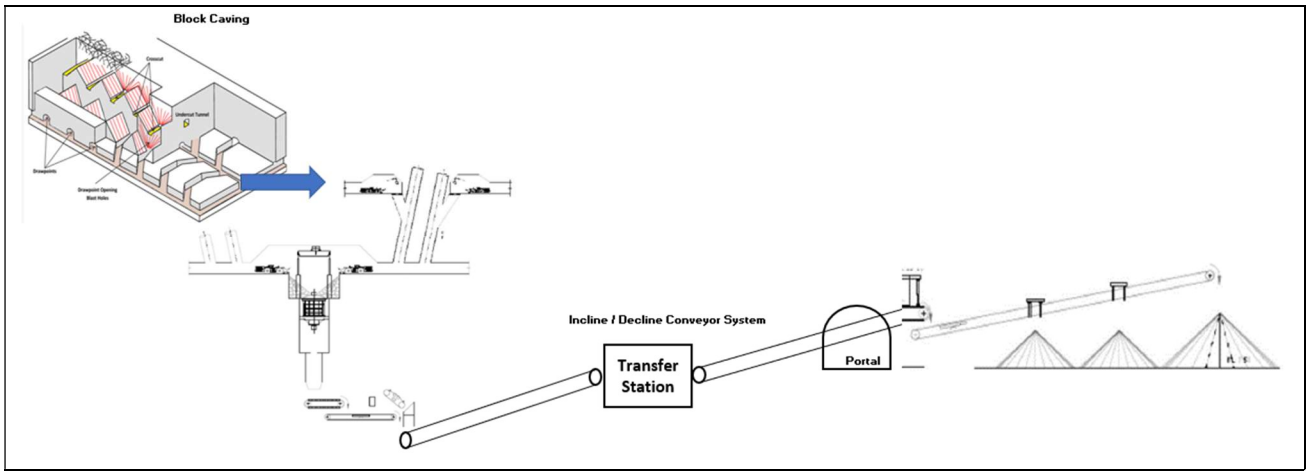


Figure 16.18 : Illustration of Conveyor MHS Concept Design

For the purposes of the Pre-Feasibility, it is considered that all production material generated from the extraction and undercut levels will be removed via the crushing complex and conveyor materials handling system. All development waste material is assumed to be trucked directly to the surface.

16.6.3 Ventilation

A number of surface connections, raises/shafts and declines, are planned to serve as dedicated intakes and exhausts, permitting adequate flows to be drawn in, and distributed around the mine.

The ventilation layout for the overall system (during the production phase of the 300 Level) is shown in Figure 16.19.

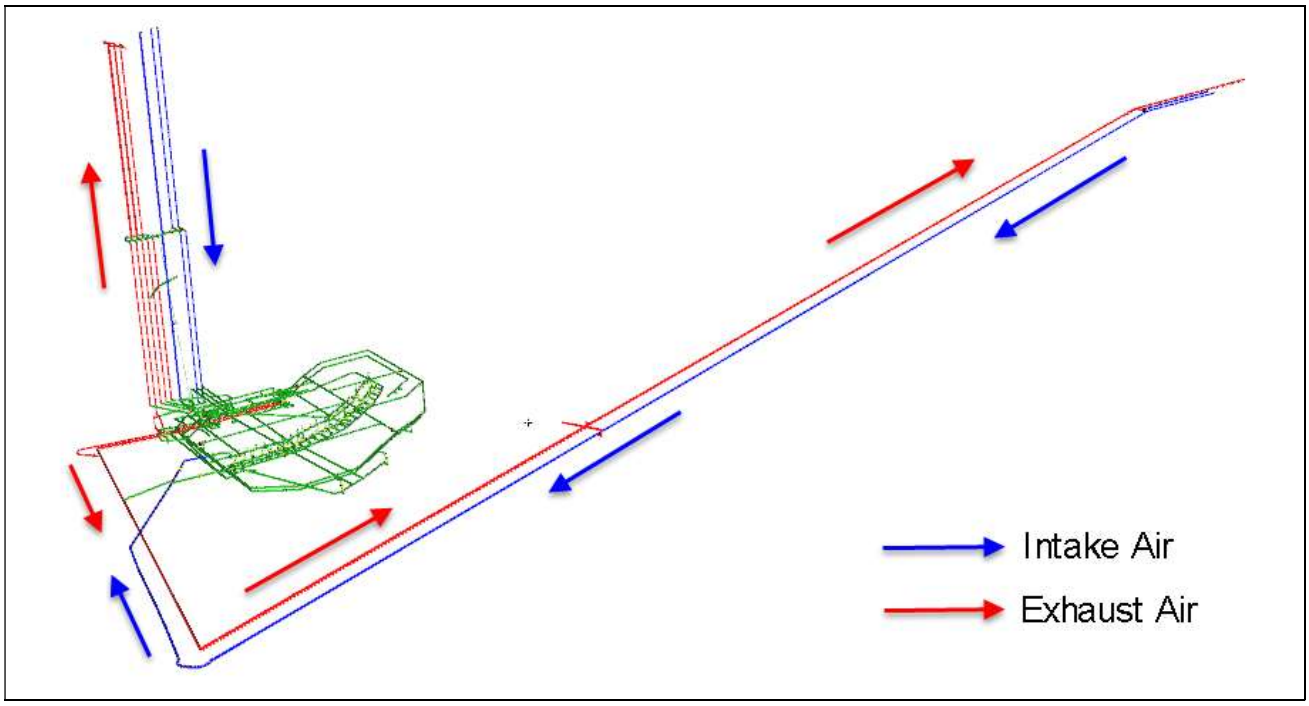


Figure 16.19 : Primary Ventilation network schematic

Ventilating the Alpala mine will require significant airflow to supply fresh air for the planned equipment fleet, fixed facilities, and cooling effects. Table 16.13 outlines the additional airflow required for fixed facilities; and Table 16.13 lists the equipment used, the expected usage of each, and the total airflow require.

Table 16.12 : Fixed facilities airflow requirements

Parameter	Value (m^3/s)	Notes
Crusher Airflow	120	2 x crusher
Workshop Airflow	80	2 shops * ~40m^3/s ea.
Explosives Mag Airflow	20	-

Table 16.13 : Equipment Airflow Requirements			
Equipment	**# of Units**	**U of A**	**Total Airflow Required (m^3/s)**
LHD - Dev	5	68%	76
LHD - Prod	8	85%	151
Truck - Prod	15	85%	454
Jumbo Drill - Dev	6	19%	9
Longhole Drill - Undercut	4	19%	6
Longhole Drill - Drawbells and Raises	5	19%	7
Cable Bolt Drill	6	19%	9
Secondary Break Drill	5	18%	7
Shotcrete sprayer	17	25%	30
Agitator Truck	34	48%	276
Charge-up Rig - Dev	3	30%	7
Charge-up Rig - Prod	3	30%	7
Charge-up Rig - Secondary Break	5	18%	7
Integrated Tool Carrier	6	24%	14
Service Truck	9	33%	24
Telehandler	9	33%	24
Water Truck	15	49%	162
Mobile Crane	2	49%	8
Water Cannon	5	23%	11
Mobile **Rock breaker**	5	23%	11
Grader	9	46%	41
Light Vehicle	100	24%	229

The airflows from the tables above were combined with the mine schedule to determine the airflow required over the Life of Mine, highlighting major milestones that have a significant effect on the ventilation network. This build up is shown in Figure 16.20. Based on the equipment, fixed facilities, and a leakage estimate of 15%, total airflow at the peak of mining is estimated to be 1,349 m^3/s. The ventilation model has been designed to allow for a maximum airflow of 1,650 m^3/s to allow for contingency within the overall system.

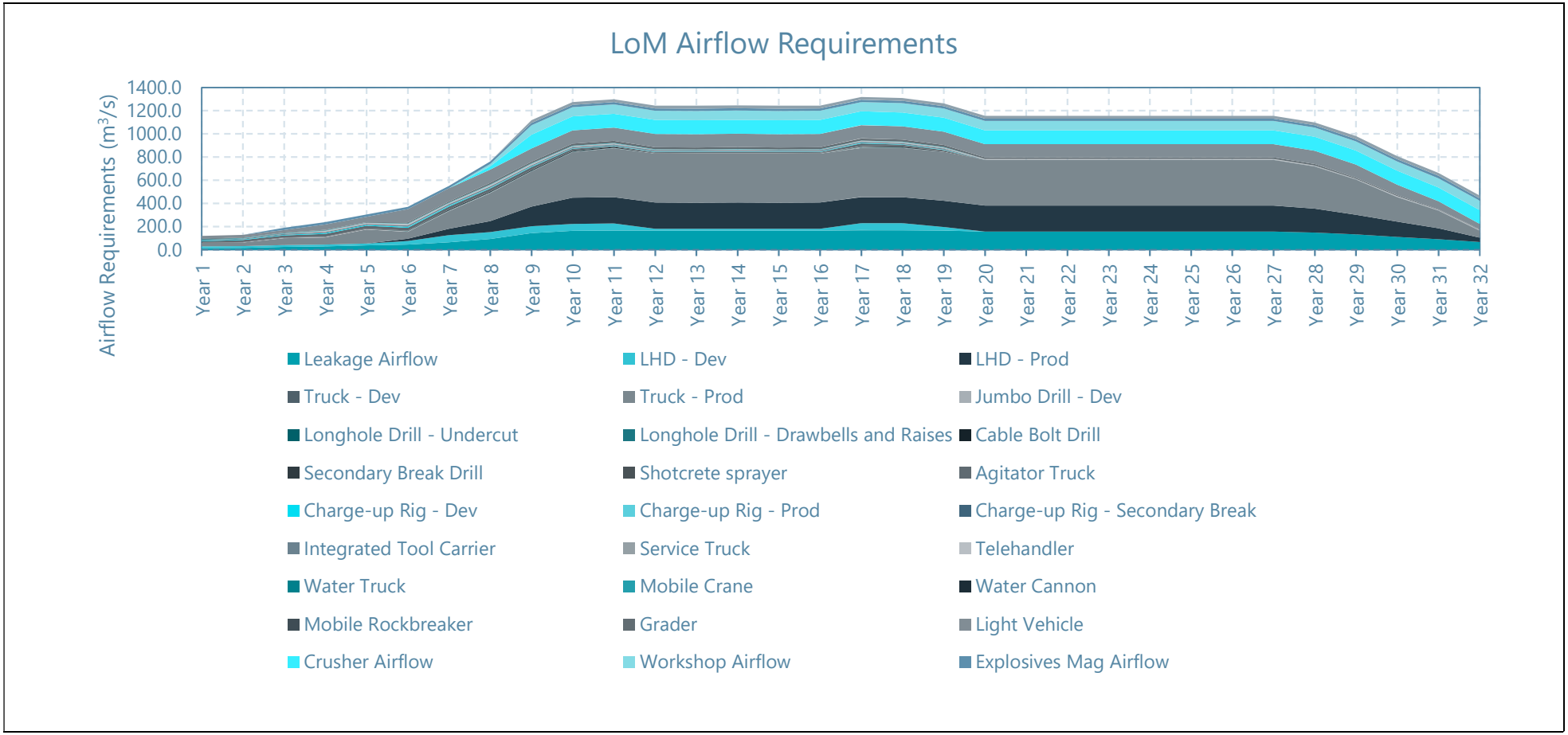


Figure 16.20 : LOM Airflow Requirements

16.6.4 Dewatering

16.6.4.1 Ground Water

Itasca Denver outlined the groundwater that would be present during 3 stages of the mine life:

- Development (years 1-8 of the project)
- The first 5 years of production (years 9-13 of the project)
- Remaining production years (years 14-38 of the project).

Table 16.14 outlines the ground water flow outlined by Itasca. Itasca provided water in m^3/d which were converted into L/s.

Table 16.14 : Groundwater flow assumptions. Itasca 2020

Water Inflow (m^3/d)	**Development (Years 1-8)**	**Production (Years 9-13)**	**Production (Years 14-38)**
Minimum	7,30	2,500	7,700
Average	1,100	6,500	11,300
Maximum	2,400	10,100	15,900
Water Inflow (L/s)	**Development (Years 1-8)**	**Production (Years 9-13)**	**Production (Years 14-38)**
Minimum	8	29	89
Average	13	75	131
Maximum	28	117	184

Figure 16.21 outlines the pumping requirements to deal with groundwater inflow at Cascabel. During development when there are only small tunnel voids available, dewatering needs to be able to handle ~30 L/s. When production starts and the cave begins propagating, pumping needs to be increased to 120 L/s. The last 25 years of production have the greatest groundwater inflow as it is assumed that the cave propagation has broken through to surface, as such, pumping needs to be able to handle ~185 L/s.

These pumping requirements assume that surface water (rainwater run off) is recharging groundwater aquifers and is not directly contributing to the mine's water inflow.

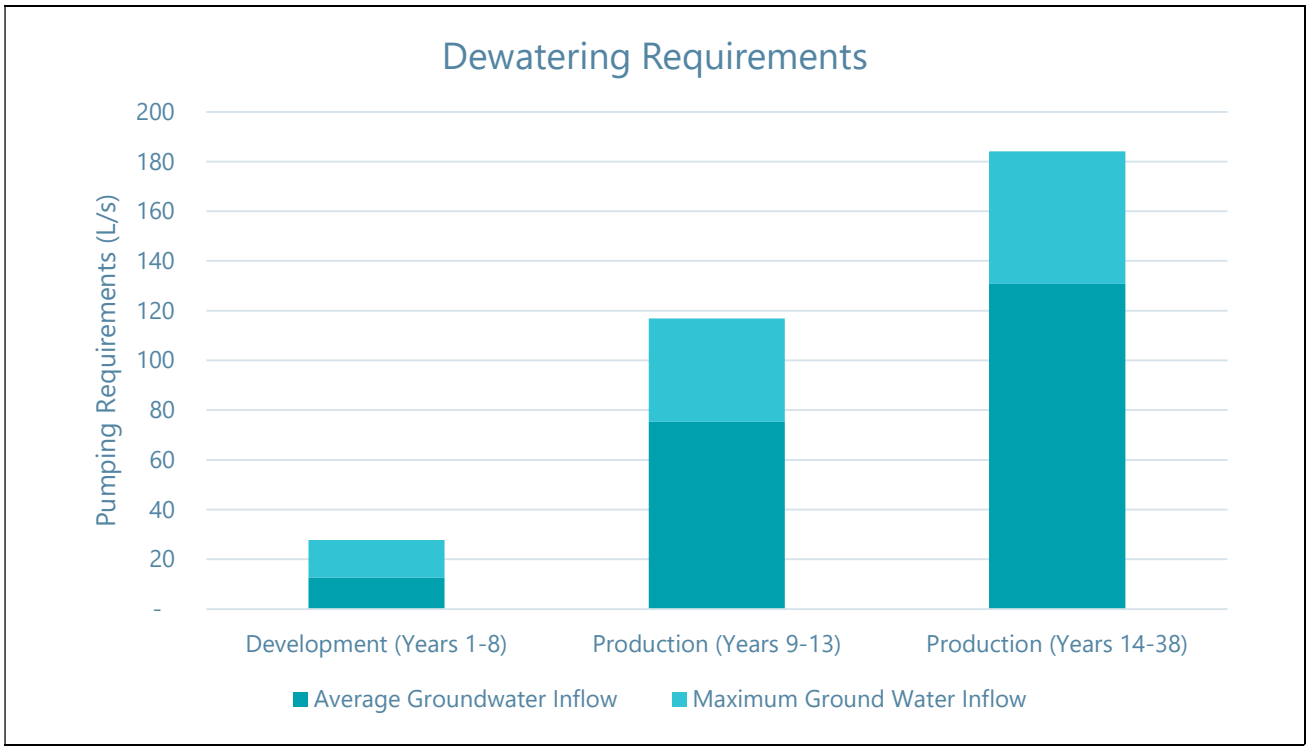


Figure 16.21 : Dewatering requirements to deal with groundwater

16.7 Manning Levels

The personnel numbers have been estimated through first principles, equipment matching and then benchmarking against other block cave operations.

It is assumed that the operation will employ both expatriate and local personnel, where appropriate, with expats working a 35/28 day roster and locals 12/14, 9/5, 5/2. Expatriate personnel with international mining experience are used in the first phases of development as trainers and management and technical staff to achieve the development and productivity rates scheduled. The mine will then transition to be fully local as the local workforce gain the required experience to operate the mine effectively.

Table 16.15 summarises the Mine Personnel headcount over the life of the mine.

It should be noted that numbers will fluctuate according to the operating Phase of the mine (as shown on Figure 16.22 and Figure 16.23).

Table 16.15 : Life of Mine Headcount

Personnel Type	Headcount
Owner	
UG Mobile Maintenance	312
Mine Operations	132
UG Fixed Plant	48
TOTAL	**492**

Table 16.15 : Life of Mine Headcount	
Personnel Type	**Headcount**
Contractor	
Mine Operations	292
Local Maintenance Employees	118
Local Electrician	8
TOTAL	**418**
TOTAL PERSONNEL	**910**

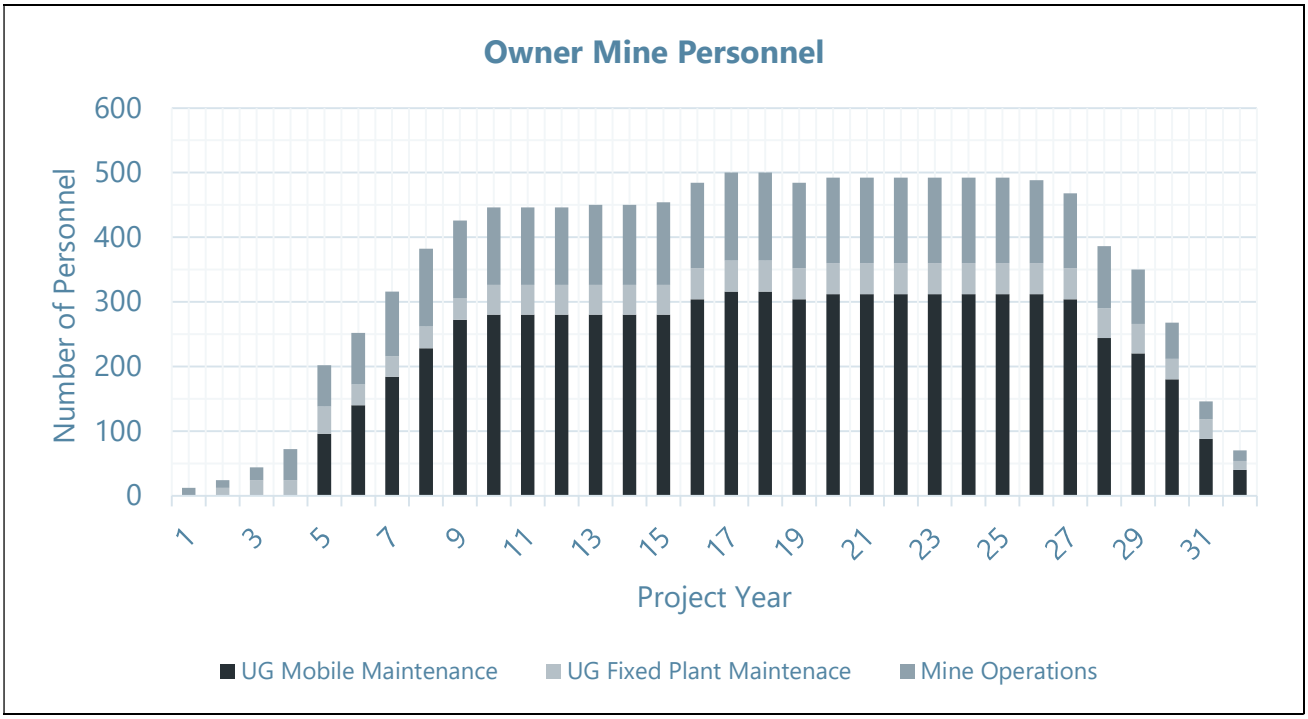


Figure 16.22 : Owner Personnel Labour

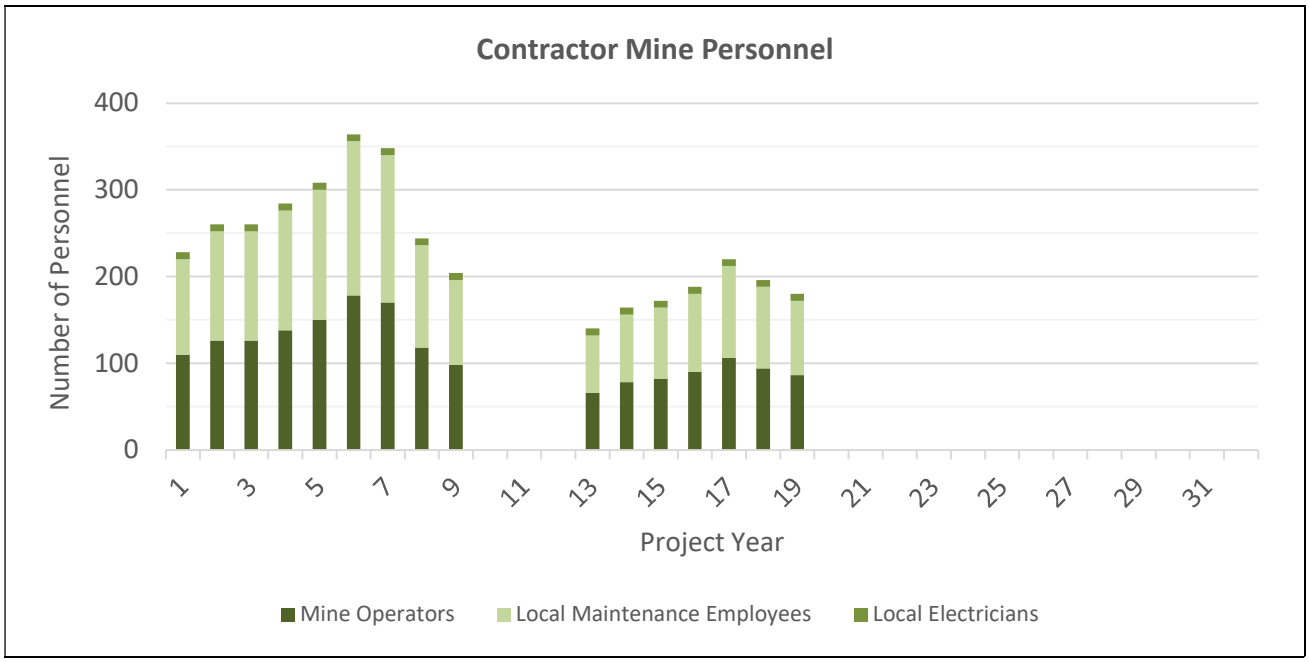


Figure 16.23 : Contractor Personnel Labour

16.8 Comments on Section 16

The Qualified Person notes the following:

- The proposed underground mine plan utilises a Block Cave mining method with two blocks BC1 and BC 2 mined in this order
- The excavation methods for the proposed mine are conventional methods commonly used in underground mining
- The mining fleet is commonly used equipment and readily available throughout the world from reputable suppliers
- The nameplated production rate 25 Mt/y is estimated to be achieved in Year 9 from project commencement with the projected mine life predicted to extend for 30 years
- Additional material can be further added to the mine plan should this material be classified as economically viable beyond the predicted mine life.

17 Recovery Methods

17.1 Introduction

The process design criteria has been derived from the metallurgical test work results which were provided by SolGold, and for which Wood had input.

There was no crusher work index (CWi) data available and limited UCS and SMC data from the core, as a result, the crushing circuit was sized by the vendors based on the limited information, their in-house databases and preliminary fragmentation data for the block cave. HPGRs were selected as the fine crushing circuit based on the outcomes of the comminution option study.

The ball mills were sized by Wood as part of the comminution option study based on the available testwork data and plant mass balance. Wood has used the 80th percentile data to size the mills. This testwork data and duty were supplied to vendors who then sized the mills based on their in-house systems.

The rougher flotation circuit was sized based on metallurgical testwork, flotation kinetic curves and standard scale up parameters. No kinetic flotation tests were conducted for the cleaner or pyrite flotation circuits. Scale-up factors were based on the rougher flotation testwork for these circuits.

The design of the flotation circuit production schedule has been undertaken utilising the recovery and grade equations provided SolGold based on the testwork completed.

Limited gold recovery test work for the pyrite flotation and cyanidation circuit have been undertaken to date. No testwork has been completed on carbon absorption or carbon stripping, nor has cyanide detoxification testwork been carried out.

Estimates for gold and silver recovery to doré were provided by SolGold. These are based on limited cyanidation testwork of the pyrite flotation concentrate which provide an estimate of the gold and silver extracted during cyanidation. Gold, silver, and copper recovery to carbon and stripping efficiencies have been assumed based on typical industry practices. Residence times through the cyanide leach circuit are based on the limited testwork performed to date. Residence times through the carbon in leach and cyanide detoxification circuits are based on typical industry practices. Cyanide and lime consumption are based on the cyanidation testwork performed to date. Carbon loading and elution cycles have been based on calculated mass balances around the gold recovery circuit. Stripped carbon values are based on typical industry practices.

The recovery/grade equations for the flotation circuit and the cyanidation circuit were used to determine the recoveries for copper, gold and silver to concentrate and doré as well as the copper concentrate grade used for the Pre-Feasibility.

The rougher tailings thickeners, the scavenger tailings thickener and the concentrate thickeners have been sized using the preliminary settling data derived from lab scale column settling tests. Flocculant usage rate for each duty were also derived from this testwork.

Additional gold and silver recovered to a pyrite concentrate was demonstrated in testwork to be recoverable through a cyanide leach process (the pyrite concentrate has been shown to be non-refractory in nature). A conventional carbon in pulp process, pending further testwork has been sized using preliminary testwork data and typical industry practices.

The carbon-handling circuits sizing is based on the carbon stripping batch size and frequency, gold and silver grades of material processed, expected dissolution rates and maximum expected loading onto carbon. The gold and silver recovery rate determined the sizing of the electrowinning and smelting circuits to produce doré.

The INCO cyanide destruction system sizing was based on standard design for such a system incorporating the cyanide leach tailings design flow rate and indicated residual cyanide content.

The carbon preparation and regeneration systems are based on estimates of carbon losses and the carbon stripping cycle. The reagent systems are sized to cover the indicated requirements per testwork or guidelines for similar batch circuits.

Water is recycled within process where practicable and treated as required to enable recycling. Make up water to the process is provided by an on-site catchment water dam, in additional to makeup from surface water management structures throughout the Cascabel concession.

Design values are the nominal hourly or average flows multiplied by an appropriate design factor for the specific process section or equipment and include equipment availability and utilisation. Design values (instantaneous values) take into account variability in process parameters, flows that operate for less than 24 hours in an operating day, or where additional capacity is required to allow for maintenance or catch-up capability. Design values do not relate to annual production nor are they cumulative to represent a metallurgical balance.

17.2 Process Flowsheet

The Cascabel Project process flowsheet (Figure 17.1) was selected based on the nature of the copper minerals in the plant feed. Potential additional gold and silver recovery from the cleaner scavenger tailings was identified following an assessment of initial metallurgical testwork and deportment of gold and silver through the flotation circuit. Major equipment selections to complement the description below, are shown in Table 17.1

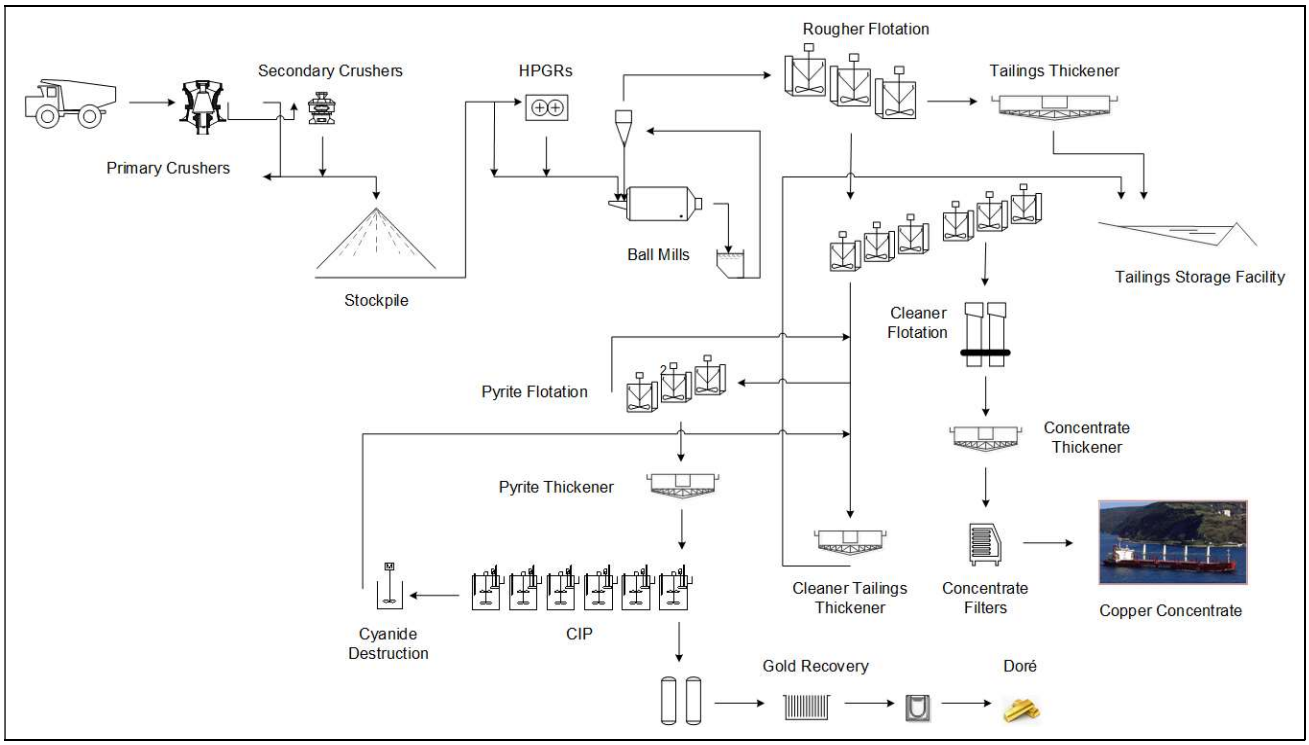


Figure 17.1 : Simplified Process Flowsheet

Ore will be fed to the respective crusher dump pocket by load-haul-dump vehicles. Ore dumping occurs from four tipping points located around the dump pocket perimeter. Crushing will be performed by 75 x 130 gyratory crushers. A rock-breaker will be installed at each crusher to handle oversize ore presented to the crushers.

An apron feeder at the base of each primary crusher surge pocket will regulate the withdrawal of crushed ore to its respective conveying system. The intermediate conveyors will transfer the crushed ore to an ore pass where the ore will be discharged to the main decline conveyor system.

Crushed ore from the mine will be directed to the secondary crushers, which operate in closed circuit with two single deck vibrating screens for each 12.5 Mt/y module. Secondary crushed ore is directed to the stockpile has been designed as a longitudinal stockpile fed along its length by a tripper conveyor. Material is withdrawn perpendicular to the feed to the stockpile through two reclaim tunnels (one per 12.5 Mt/y module), each fitted with three drawpoints.

HPGRs have been selected as the fine crushing circuit based on the outcomes of the comminution option study conducted as part of the Pre-Feasibility. The two HPGRs have been sized by the vendors using the preliminary test work data including SMC, BWi and Ai, mass balance data and vendor in-house databases.

Two ball mills in parallel (a single mill per module) have been selected as the plant grinding circuit. The balls mills are operated in closed circuit with hydrocyclones, with the hydrocyclone overflow reporting to the flotation circuit.

The copper flotation circuit will consist of rougher flotation with rougher concentrate regrind, three stages of cleaning and a cleaner-scavenger and subsequent pyrite flotation circuit to improve the overall recovery of

gold contained in pyrite. Rougher flotation will nominally be carried out with a pulp density of 30% solids and particle P_{80} sizing of 150 µm. The cyclone overflows from the grinding circuits will gravitate to a common distributor which will split the flow to the two 12.5 Mt/y flotation modules. Flotation reagents (collector and frother) will be added to the individual distribution/conditioning tanks feeding the independent rougher modules.

The concentrate stream from each rougher module will be treated in a dedicated regrind module to produce a target particle size of 80% passing 15-25 µm prior to further upgrading in the cleaner circuit.

Upgrading of the rougher concentrate from the regrind modules will occur within their respective cleaner module. Flotation of precious metals bound to pyritic sulphides is achieved with an individual flotation stage in each module. Recovery of concentrate will occur through tank and column cell technologies.

Final concentrate from the flotation plant will be thickened and pumped to the Port facility.

Concentrate from the pyrite flotation cells launders to a pump hopper and is pumped to a common pyrite thickener for all modules. Pyrite flotation tailings from each module launder to a common concentre launder which, in turn, will transfer the combined tailings stream to the cleaner scavenger tailings thickener distributor.

The concentrator will have two tailing streams exiting the flotation circuit that require disposal within the Coastal Plains TSF, namely:

- Rougher tails and
- Cleaner (cleaner scavenger) tails.

The tailings thickening and disposal area will include equipment required to thicken the tailing streams from the rougher and cleaner flotation circuits, provide emergency holding capacity and to enable the pumping of the combined tailing slurries to the Coast Plains TSF.

Thickened pyrite concentrate will discharge via gravity from the trash screen to the pre aeration tank. Air is injected into the pre aeration tank along with lime addition for pH conditioning to improve cyanide leach kinetics in the downstream leach tanks. The pre aeration tank will allow for 12 hours residence time ahead of the cyanide leach circuit which consists of 4 tanks with a residence time of 48 hours (the residence times are based on cyanidation testwork performed on the pyrite concentrate).

Slurry will gravity launder from the leach tanks to a series of six agitated CIP tanks having a residence time of 24 hours (based on typical industry practice). Gold and silver will be absorbed to the carbon within the tanks, as a swept interstage screen in each tank will maintain the carbon inventory within the tank. Barren carbon from the last tank will be advanced as a batch counter current to the slurry flow with a carbon transfer pump installed in each CIP tank. Loaded carbon will be pumped from the first CIP tank to a loaded carbon screen above an acid wash column. An AARL elution circuit will desorb gold and silver from the carbon into solution for recovery in an electrowinning cell. Cell sludge containing the precious metals will be smelted in an electric induction furnace to recover metals as doré bars.

Barren carbon from the elution column will be treated through a rotary regeneration kiln. Elevated temperature conditions will regenerate the carbon through removal of organic material that hinder the loading capacity of carbon. Regenerated carbon will discharge from the kiln into a quench tank from where it will be pumped to the barren carbon screen above the final CIP tank.

Slurry from the final CIP tank will gravity flow via a pipe launder to the first to two cyanide destruction tanks in series. The INCO SO_2/Air process will be used to reduce the free and WAD (weak acid dissociable) cyanide levels to below process discharge limits. Lime and SMBS reagents will be added to the cyanide destruction tanks. A dedicated duty/standby blower will provide air to an in-tank sparger in each cyanide destruction tank.

Discharge from the cyanide destruction tanks will flow via gravity over a carbon recovery screen installed above a pump hopper. Slurry is pumped to the distribution box for the cleaner scavenger tailings thickeners.

The pumped copper concentrate will be thickened in the port concentrate thickener, and the thickened copper concentrate slurry stored in agitated tanks which will provide surge capacity for the pressure filters, as pressure filters are a batch operation.

Reagents and consumables systems are located at the Process Plant and Port as required to enable the operations.

Utilities systems are also located at the Process Plant and Port as required to enable the operations. These systems include power, water, air and waste management systems.

Table 17.1 : Major Equipment List

Description	Number	Specification	Installed kW per Unit
Primary Crusher	2	Thyssenkrupp KB 75-130 Pro S	1,500
Rock Breaker	2		105
Fine Ore Pass Discharge Feeder	4	METSO OUTOTEC AF8-2134MN-8000	90
Intermediate Conveyors	2	800 m long total, Belt width 1.4 m	160
Main Decline Conveyors	3	2790 m long, Belt width 1.8 m	9,000
Secondary Crusher Sizing Screen Feed Conveyor	1	554 m long, Belt width 2.4 m	1,400
Secondary Crusher Feeder	2 per module	METSO OUTOTEC AF5-1829MN-7000	75
Secondary Sizing Screens	2 per module	2.4m x 6.1 mm DD, Single Deck Linear Motion	45
Secondary Crusher Feed Conveyor	1	575 m long, Belt width 2.0 m	3,000
Secondary Crusher Feeder	2 per module	METSO OUTOTEC AF10-3048MN-8800	200
Secondary Crusher	4	Thyssenkrupp Kubria, G150	315
Fine Ore Stockpile Feed Conveyor	1	408 m long, Belt width 1.8 m	800
Fine Ore Stockpile Reclaim Feeders	3 per module	METSO OUTOTEC AF8-2134MN-8000	110
Fine Ore Stockpile Reclaim Conveyor	1	131 m long, Belt width 1.2 m	185
HPGR Circuit Feed Conveyor	1	812 m long, Belt width 1.2 m	2,800
HPGR Sizing Screen Feeders	2 per module	METSO OUTOTEC AF5-1524MN-7000	37
HPGR Sizing Screens	2 per module	DU 3.6m x 8.5 mm DD, Single Deck Linear Motion	75

Table 17.1 : Major Equipment List			
Description	**Number**	**Specification**	**Installed kW per Unit**
HPGR Feed Conveyor	1	569 m long x 2.4 m wide	1,250
HPGR Feeders	1 per module	METSO OUTOTEC AF5-1829MN-7000	55
HPGR	1 per module	ThyssenKrupp 24/17	5,500
HPGR Sized Product Conveyor	1	313 m long x 1.8 m wide	900
Ball Mill Feeders	1 per module	METSO OUTOTEC AF5-1829MN-5200	37
Ball Mill Feed Conveyors	1 per module	155 m long x 1.2 m wide	160
Ball Mill Cyclone Cluster	1 per module	12 X gMAX33-20 10 Duty/2 Standby	-
Ball Mill	1 per module	7.9 m Dia x 14.5 m EGL	19,000
Cyclone Feed Pumps	2 per module		1,500
Ball Mill Liner Handling Machine	1		
Rougher Flotation Cells	8 per module	8 x 600m3 FLSmidth nextSTEP Flotation Cells	375
Regrind Cyclone Cluster Feed Pump	6		619
Regrind Cyclone Cluster	2 per module	15 X gMAX15-20, 13 Duty/2 Standby	-
Regrind Mills	2 per module	IsaMill M15000	3,800
1st Cleaner Flotation Cells	6 per module	6 x 70m3 FLSmidth nextSTEP Flotation Cells	90
Cleaner Scavenger Flotation Cells	5 per module	5 x 40m3 FLSmidth nextSTEP Flotation Cells	55
2nd Cleaner Flotation Cells	6 per module	6 x 30m3 FLSmidth nextSTEP Flotation Cells	45
3rd Cleaner Flotation Cells	4 per module	Column flotation cell 5.0 m D x 14.3 m H	-
Pyrite Flotation Cells	5 per module	5 x 160m3 FLSmidth nextSTEP Flotation Cells	185
Pyrite Concentrate Thickener	1	9.0 m Dia	3.7
Gold Pre-Aeration and Leach Tanks	5	10.4M D X 10.4M H, agitated	45
Gold CIP Tanks	6	7.3M D X 7.3M H. agitated	15
Cyanide Destruction Tanks	2	5.3M D X 5.3M H, agitated	150
Gold Recovery Plant	1 package	5 tonne AARL elution plant, electrowinning and induction furnace	-
Copper Concentrate Thickener	1 per module	27 m Dia	11.2

Table 17.1 : Major Equipment List			
Description	**Number**	**Specification**	**Installed kW per Unit**
Copper Concentrator Mainline Pumps	2	PD Pumps	630
Port Concentrate Thickener	1 per module	27 m Dia	11.2
Copper Concentrate Filter	2 per module	Larox PF 132/144 M60 1 45 132m2	131
Tailing Thickener	1 per module	50 m Dia	37
Cleaner Scavenger Tailings Thickener	1 per module	38 m Dia	
Tailing Thickener Underflow Pump	2 per module		375
Tailings Pumps – Rougher Tailings	1 stage per module	3 Duty / 3 Standby per module	1,800
Tailings Pumps – Cleaner Scavenger Tailings	1 Stage	2 Duty / 2 Standby	1,120
Process Water Distribution Pump	6		550
TSF Decant pump system			

17.3 Process Design Criteria

The Process Design Criteria was developed by SolGold based on their interpretation of the Metallurgical Test Work Results. For the gold plant metallurgical test work is not currently available that is representative of the proposed circuit. The Process Design Criteria for the gold circuit has been based on interpretation of the previous test work and assigning estimated mass pulls and recoveries in a pyrite flotation and gold cyanidation circuit. Gold circuit Process Design Criteria values were arrived at by SolGold with input from Wood where required and is based on the following:

- Previous test work indicated that the gold in the cleaner scavenger tailings is not refractory
- Previous cyanidation test work completed on the cleaner scavenger tailings
- Typical pyrite recovery and gold cyanidation circuit values.

Table 17.2 : Summary Process Design Criteria		
Description	**Unit**	**Design Value**
Ore throughput (nominal)	Mt/y	25
Overall availability		
Primary Crusher	%	70
Grinding / Flotation	%	92
Concentrate pipeline	%	97
Ore specific gravity	-	2.8
Crushed ore bulk density (volume calculations)	t/m^3	1.6
Ore bulk density (mass calculations)	t/m^3	2.0
ROM Moisture		

Table 17.2 : Summary Process Design Criteria		
Description	**Unit**	**Design Value**
Range	% w/w	2-4
Design (for mass balance)	% w/w	4
Angle of Repose	deg	38
Drawdown angle	deg	48
Operating schedule		
Actual hours per day	h	24
Calendar days per annum	d	365
Shifts per day	no.	2
Hours per shift	h	12
Production Plan		Mine plan by Mining Plus, conversion to Process Production plan by SolGold
Copper, Cu		
LOM Grade	%	0.388
Maximum LOM	%	0.942
Max Cu Head Grade for Cleaner Circuit Design	%	1.55
Gold, Au		
LOM Grade	g/t	0.279
Maximum LOM	g/t	1.098
Silver, Ag		
LOM Grade	g/t	1.136
Maximum LOM	g/t	1.929

17.4 Reagents, Consumables and Utilities

17.4.1 Reagents and Consumables

Receival, storage and distribution systems will be provided for the following reagents and consumables:

- Collector – Potassium Amyl Xanthate (PAX)
- Frother – MIBC and W31
- Flocculants
- Slaked lime (to both the flotation and cyanidation circuits)
- Gold circuit reagents:
  - Sodium metabisulphite (SMBS)
  - Copper Sulphate
  - Hydrochloric Acid
  - Sodium Hydroxide
  - Sodium Cyanide.
- Cooling tower reagents

- Grinding media.

Reagent mixing will be done in designated areas within the process plant. The design of these areas considers requirements such as section bunding, with dedicated sump pumps for individual reagents, segregated ventilation, and dust and fume control around reagents with potential for dust or fume release. The layout and general arrangement of the reagent area accounts for the separation between incompatible reagent types.

17.4.2 Utilities

The facility will include facilities and equipment to store and distribute the following water services:

- Raw water
- Fire water
- Filtered water
- Potable water (including safety shower/eye wash)
- Gland water
- Cooling water
- Process water
- Tailings decant water
- Underground mine dewatering water (treated).
- Air systems
- Diesel and lubricants.

17.4.2.1 Air

Compressors and blowers will provide air to the systems within the Process Plant and Port Facilities:

- Plant air
- Instrument air
- Low pressure blower air for the flotation tank cells
- High pressure blower air for the flotation column cells.

17.4.2.2 Water

Raw water will be sourced via pipeline from a local water catchment area and delivered to the raw water storage pond then to a raw water tank located on the main plant site. Raw water will be used in the underground mine, fire water, general distribution, potable water treatment, gland service, cooling water, reagent makeup and process water make-up.

Raw water for general use will be distributed to the various process points from the raw water storage tank. The raw water storage tank will have a dedicated fire water reserve.

Raw water will be filtered to remove fine suspended solids for:

- Cooling water system

- Dedicated low and high pressure gland water pumps
- Potable water system
- Reagent make-up.

Fire water will be distributed throughout the process plant via a dedicated jockey pump and electric fire water pump. A diesel-powered fire water pump will also be installed as emergency back-up to the electric fire water system.

17.4.2.3 Diesel and Lubricants

Diesel will be supplied to the mine site by truck and stored in the main fuel storage area located opposite the HV workshop. Diesel will be stored in three tanks with a total storage capacity of 30 days usage (approximately 3 M litres). The storage area will be fully bunded and have a capacity of 110% of the volume of one tank. The bunded will be fitted with a sump pump and an oily water separator. The fuelling pad and truck offloading area will be concrete pads graded to ensure spillage reports to the storage area sump.

The facility will have to supply diesel to both HV, and LV vehicles and suitable dispensers will be installed. The area will also have a fire detection system and foam type cannons for firefighting.

A smaller diesel storage tank will be installed at the emergency generator plant in the process plant. This will supply the emergency generator system and will be refuelled by truck as required. It will be laid out in a similar manner to the main storage area but will not have fuel dispensing facilities.

Oils and lubricants will be stored in bunded areas within the HV and LV workshop area in isotainers or drums dependent on the supplier packaging.

17.5 Comments on Section 17

The QP notes:

- The flowsheet design is conventional, and assumes a flotation-leach approach
- The grinding circuit is designed at the 80th percentile
- The flotation circuit is capable of recovering the copper, gold and silver associated with chalcopyrite. The remaining gold and silver associated with sulphides (pyrite) in the cleaner scavenger tailings is capable of being recovered for further processing in a cyanide leach plant
- The concentrate production rate is expected to be up to 795 kt/y from 25 Mt/y process plant feed. The concentrate quality will vary from month to month based on ore variability, mine planning as well as the geometallurgy
- The total copper, gold and silver production to concentrate is expected to be 2,837 kt, 6.75 Moz and 19.43 Moz during the LOM based on the flotation testwork completed to date
- The total gold and silver production to doré is expected to be 862 koz and 2,283 koz during the LOM based on the limited testwork completed to date.

Table 17.3 : Production Summary		
Description	**Units**	**Value**
Plant Feed		
Production	Years	26
Life of mine (LOM) plant feed	Mt	558
Feed grade (average)	% Cu g/t Au g/t Ag	0.58 0.52 1.6
Concentrate		
LOM concentrate production	Mt	10.96
Concentrate grade (average)	% Cu g/t Au g/t Ag	25.9 19.15 55.1
Doré		
LOM gold in doré production	koz	862
LOM silver in doré production	koz	2,283
LOM doré production	koz	3,145

18 Project Infrastructure

18.1 Introduction

The key infrastructure required for the Cascabel Project includes the following:

- Road works (access road, site roads, ramps and accesses, connections and signage, weighbridge)
- Waste management
- Tailings storage facility
- Surface water management (drainage networks, sediment control, bridges, culverts, etc.)
- On- and off-site buildings
- Camp – construction and permanent
- Firefighting systems (detection and control)
- Communications – telephone networks, radio systems, data networks, CCTV
- Power distribution
- Area and perimeter lighting.

18.2 Cascabel Project Facility Design Considerations

Preliminary seismic hazard assessment for the project area was conducted by Knight Piésold (Knight Piésold 5 & 6) in order to provide a preliminary indication of the design earthquake parameters for the key facility locations (Table 18.1).

Table 18.1 : Summary of Estimated PGA for the Cascabel Project

Seismic Level	Average period of recurrence (years)	Horizontal PGA (g)				
		Process Plant Site	Parambas Dam	Coastal Plains TSF	Port	Pipelines Route
Operating Basis Earthquake (OBE)	475	0.64	0.64	0.77	0.93	0.86
Safety Evaluation Earthquake (SEE)	MCE[1]	-	0.89	1.07	-	-

Note 1: MCE = Maximum Credible Event no return period assigned to this event.

18.3 Roads

18.3.1 Access

Primary access to the Cascabel Project process plant and mine will be via a new section of road starting from the E10 highway (two lane sealed road) that runs along the Rio Mira River valley. The project site is within mountainous terrain, ranging from 40% to 80% slope.

Culvert crossings with corrugated steel pipe are used on this alignment for major water crossings, and to maintain continuation of water flow.

The main access road joins into the secondary crushing and screening area between the portal box cut and the proposed plant site.

18.3.2 Internal Roads

Internal roads have been designed as two-way roads 8 m wide, with an all-weather unsealed surface.

The surface water drainage management design for the plant adopts a combination of overland flow with roadside swales and culverts, directed into the storm water pond located at the low point of the plant platforms. The storm water pond has been designed to accommodate a 10% AEP 24-hour rainfall event, with an emergency overflow system for runoff greater than 10% AEP. The pond will be lined with a single layer of 1.5 mm HDPE liner. Water from the pond is recycled to the plant.

18.3.3 Tailings Pipeline Road

The tailings pipeline corridor runs from the north end of the plant and joins into the Coastal Plains TSF access road. The alignment is a 12 m wide formation, to allow for a 7 m wide pipe corridor and 5 m wide single lane access track. There is a major road crossing (E10) approx. 1.2 km north of the plant. Allowance has been made for a road crossing at this point.

A tailings line dump pond is located at the low point of the road for the flushing and draining of the tailings lines. The pond will have a single layer of 1.5 mm HDPE liner provided for containment.

18.4 Waste Management Facilities

18.4.1 Sewage

The project will use modular sewage plants using a bio-oxidation process. Sewage plants will be located at the process plant area, the mine infrastructure area, the main administration building and at the camp. Each facility will be a standalone unit and process sewage and wastewater from the connected facilities located in that area. Pump stations will be used to feed each plant, and these will be located so as to enable gravity flow of waste to the pump station. Water from the facilities will be treated to the required standard and released to the environment. Solid treated waste will be periodically removed from the facility for disposal off site.

18.4.2 Solid Wastes

Solid waste materials will be stored on site before being transported off-site for disposal be a third-party contractor. Solid wastes will be classified as either:

- Recyclable – paper, glass, metal, plastics
- General waste – putriable or non-recyclable waste suitable for landfill
- Contaminated – soils and materials including used spares such as oil filters.

All materials will be stored in suitable containers and where required stored in bunded or enclosed areas prior to removal from site. Only qualified and licensed contractors will be used for disposal of waste materials from site.

18.4.3 Liquid Wastes

These consist primarily of used or contaminated oils, fuels or lubricants derived from maintenance activities. These will be stored on site in suitable sealed containers and stored in bunded or enclosed areas prior to removal from site by an authorised contractor for disposal.

18.5 Tailings Storage Facility

SolGold commissioned Knight Piésold Consulting (KP) to undertake the Pre-Feasibility level design for the tailings management component of the project. The Pre-Feasibility designs considered various throughput scenarios varying from 25 Mt to 50 Mt annual ore throughput and total ore tonnage varying from 494 Mt to 1.85 Bt. The base case has a nominal throughput rate of 25 Mt/y and a life of mine ore throughput of 558 Mt ore which results in the requirement to store 548 Mt of tailings over the project life considered. The high variability of both annual throughput and total tonnage required multiple tailings management configurations to be considered and analysed as part of the Pre-Feasibility.

This section of the Report provides details of the tailings management system proposed for the base case. Detailed standalone Pre-Feasibility study reports have been prepared for the tailings management designs which provide details of the other scenarios and configurations considered as part of the Pre-Feasibility.

Ore will be processed through a conventional flotation concentrator producing separate rougher and a pyrite concentrate streams, the pyrite concentrate will subsequently be cyanide leached to extract silver and gold followed by cyanide detoxification prior to disposal. The detoxified tailings from the cyanide leach have been termed the cleaner tailings.

The selected Pre-Feasibility design assumes that all tailings will be stored in a single Tailings Storage Facility (TSF) which is distal to the mine and processing plant being located on the edge of the Ecuadorian coastal plain approximately 40 km from the processing site. Separate handling and disposal of rougher and cleaner tailings will occur within the Coastal Plains TSF.

The key design objectives for the Tailings Management System are summarised as follows:

- Eliminate, manage or control environmental, health and safety risks with a zero-harm aspiration
- Design of the tailings management system to meet or exceed the requirements of Ecuadorian and international tailings design guidelines, standards and regulations
- Permanent, safe and secure containment of all solid waste materials in facilities designed, constructed and operated engineered to international best practice
- Maximise tailings densities using effective tailings deposition strategies
- Minimise the risk of oxidation of potentially acid generating tailings by minimising the exposure to atmospheric oxygen
- Minimise the water retained in the tailings facilities, when possible, to only that required for operational requirements
- Design for and manage seepage to acceptable levels
- Design which can be constructed and operated in an efficient manner
- Design which will allow for expansion should additional resources be processed, or processing rates increase above those considered as part of the preferred Pre-Feasibility scenario

- Allow for effective rehabilitation at cessation of use of the facilities in line with the closure objective.

18.5.1 Design Criteria

Based on the Global Industry Standard on Tailings Management the Coastal Plains TSF has been assigned an Extreme consequence category at the Pre-Feasibility stage with design criteria reflective of this consequence category adopted. This consequence category acknowledges the large environmental impact which could occur should a failure of the facility occur. The key design parameters for the design are provided in Table 18.2:

Table 18.2 : Key Design TSF Parameters

Parameter	Value	Source
Operating Basis Earthquake (OBE)	1 in 475 Year ARI (0.77 g)	ANCOLD 2019
Safety Evaluation Earthquake (SEE)	Maximum Credible (1.07 g)	ANCOLD 2019
Post Closure Earthquake	Maximum Credible Earthquake (MCE) (1.07 g)	ANCOLD 2019
Static long-term drained FOS	>1.5	ANCOLD 2019
Static short-term undrained FOS	>1.5	ANCOLD 2019
Post Seismic FOS	>1.2	ANCOLD 2019
Post Peak FOS	>1.0	ANCOLD 2019
Post Seismic Deformation (OBE)	Maintain Serviceability	ANCOLD 2019
Post Seismic Deformation (SEE)	No Loss of Containment	ANCOLD 2019
Design Storage	1 in 100-year ARI wet year	ANCOLD 2019
Operational spillways	PMP, with no catchment losses + diversion failure	ANCOLD 2019
Closure spillways	PMP, with no catchment losses + diversion failure	ANCOLD 2019

18.5.2 Tailings Geochemical Characteristics

A geochemical assessment has been conducted on both the cleaner and rougher tailings. The rougher tailings were classified as Non-Acid Forming with a low number of enriched elements in solids. The cleaner tailings classified as Potentially Acid Forming with a moderate number of enriched elements in solids. A combined tailings stream would be potentially acid generating therefore the tailings streams will be separately handled and disposed. The Acid Formation Plot for the rougher and cleaner tailings samples are provided in Figure 18.1.

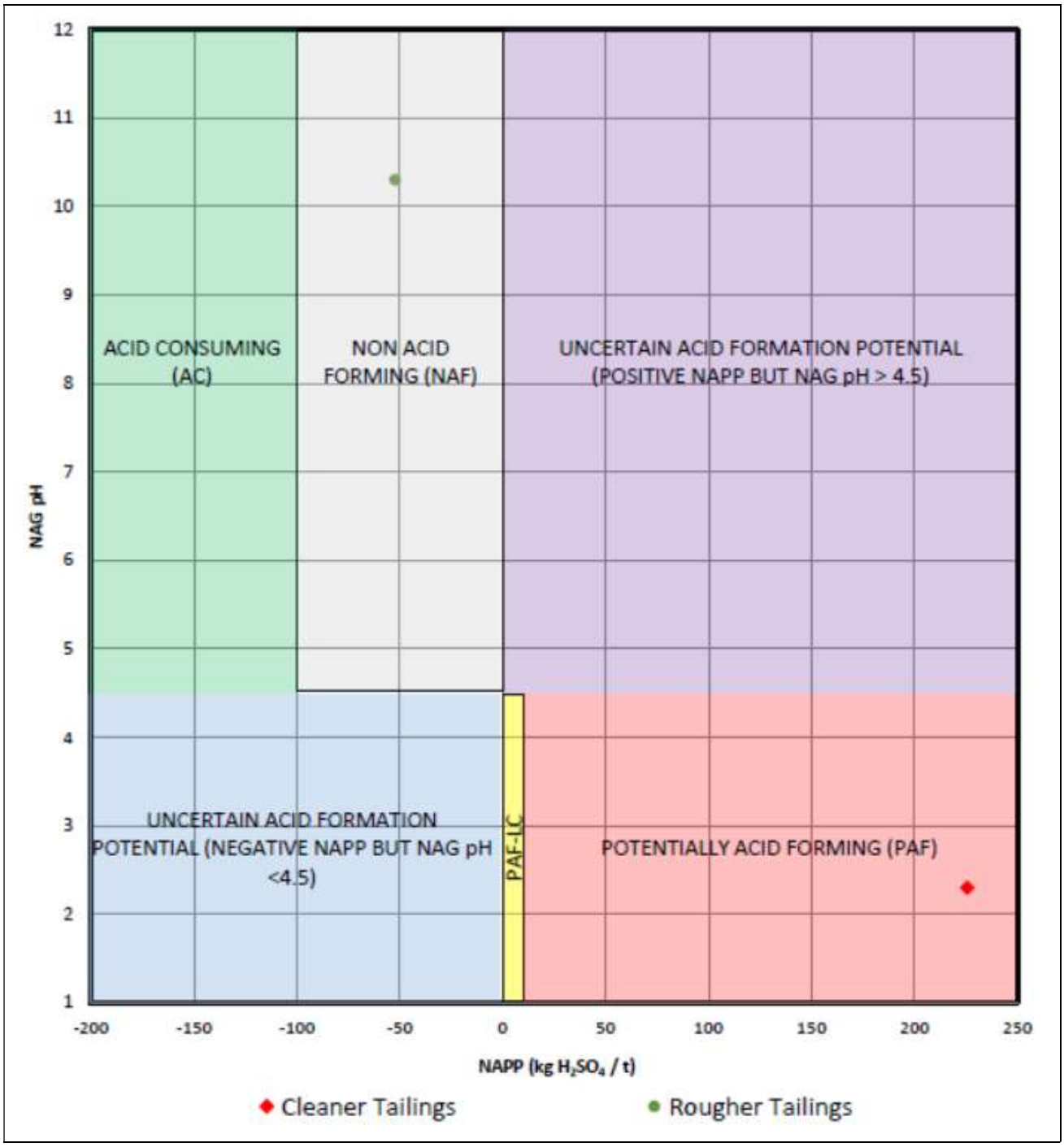


Figure 18.1 : Tailings Acid Formation Plots

18.5.3 Tailings Settling Characteristics

Samples of rougher and cleaner tailings were tested to determine their settling and consolidation parameters. The coarse-grained rougher tailings (P_{80} 150µm) were found to settle moderately quickly achieving a high dry density of 1.4-1.5 t/m^3 prior to consolidation. The fine-grained cleaner tailings (P_{80} 33µm) were found to settle moderately quickly but only achieved a low dry density of 0.9-1.0 t/m^3 prior to consolidation.

18.5.4 Site Characteristics

Knight Piésold have undertaken an assessment of the Hydrometeorology at the project. The regional climate around the Project is characterised by humid weather, with a bi-modal rainy season that typically peaks in December and March, when rainfall often exceeds 200 mm/month. The mean annual precipitation is 2,610 mm at Rocafuerte (location of the processing plant) increasing with elevation and local orographic effects. Estimates of extreme rainfall events have been produced by Knight Piésold which have been employed in the design of the water management components of the project.

Knight Piésold conducted a seismic hazard assessment for the Cascabel Project to provide the design earthquake parameters for the proposed TSF location and the processing and mining area. The assessment included a probabilistic analysis and a deterministic analysis to evaluate a maximum credible earthquake (MCE). The seismic hazard assessment indicates:

- The Cascabel Project is located in a region of high seismicity associated with interface (intraplate) subduction earthquakes, intraslab (inslab) earthquakes in the subducted oceanic tectonic plate and shallow crustal earthquakes
- Given the Cascabel Project is located in a high seismicity region with frequent earthquake occurrence it is appropriate to adopt the deterministically derived MCE events for design of the TSF rather than using probabilistic seismic hazard values associated with a low AEP. The results from the deterministic seismic hazard found that Intraslab subduction and interface subduction earthquakes represent the major hazards to the sites while the shallow crustal earthquakes were minor in comparison
- It is recommended that a PGA of 0.77 g for Coastal Plain TSF and 0.65 g for the processing and mining area be adopted for the Operating Basis Earthquake (OBE) for a 1 in 475-year return period
- For the Safety Evaluation Earthquake (SEE) it is recommended that a PGA of 1.07 g for Coastal Plain TSF and 0.89 g for the processing and mining area be adopted.

18.5.5 Technology Study

A technology study was conducted to assess various tailings technologies available for the project. Filtered and paste technology were ruled out as they have not been applied to throughputs commensurate with the design throughput at the Cascabel Project and are considered and untested technology for these throughputs. Unthickened and deep-sea disposal were ruled out as they were not preferred based on environmental and sustainability goals of SolGold. Thickened tailings was selected with cyclone tailings to be assessed at the next stage of study. For all options separate handling of the rougher and cleaner tailings was selected as the preferred option.

18.5.6 Site Selection

A comprehensive site selection study was carried out to identify potential tailings sites in an area up to 70 km around the site. A preliminary screening exercise reduced the potential sites down to four moderate size sites located close to the mine, two small sites close to the mine and three sites approximately 40-50 km west of the mine. A multiple account analysis was conducted to select the preferred tailings configuration for each of the throughput scenarios. The multiple accounts analysis considered technical/engineering, financial, environment and social criteria with the criteria weighted at 40% technical/engineering, 25% social, 20% financial and 15% environmental. Technical and Engineering criteria was considered the critical aspect as a technical failure could have major financial, social and environmental impacts.

18.5.7 Coastal Plains TSF

The Coastal Plains TSF is located distal to the proposed processing plant. The main embankment of the Coastal Plains Facility is approximately 40 km from the centroid of the processing plant. The final embankment crest elevation will be approximately 780 m below the processing plant elevation.

The facility will be operated such that the cleaner tailings which comprise approximately 13.5% of the total tailings will be deposited sub aqueously in a purpose-built facility (Coastal Plains Cleaner Facility) within the basin for the first 7 years of operation until such time as the supernatant pond develops along the south-eastern margin of the facility. Cleaner tailings will then be deposited into the main facility's supernatant pond area. Rougher tailings will be deposited from the embankment of the Coastal Plains Main facility. The General Arrangement of the Coastal Plains TSF showing both Rougher and Cleaner Facilities is shown on Figure 18.2.

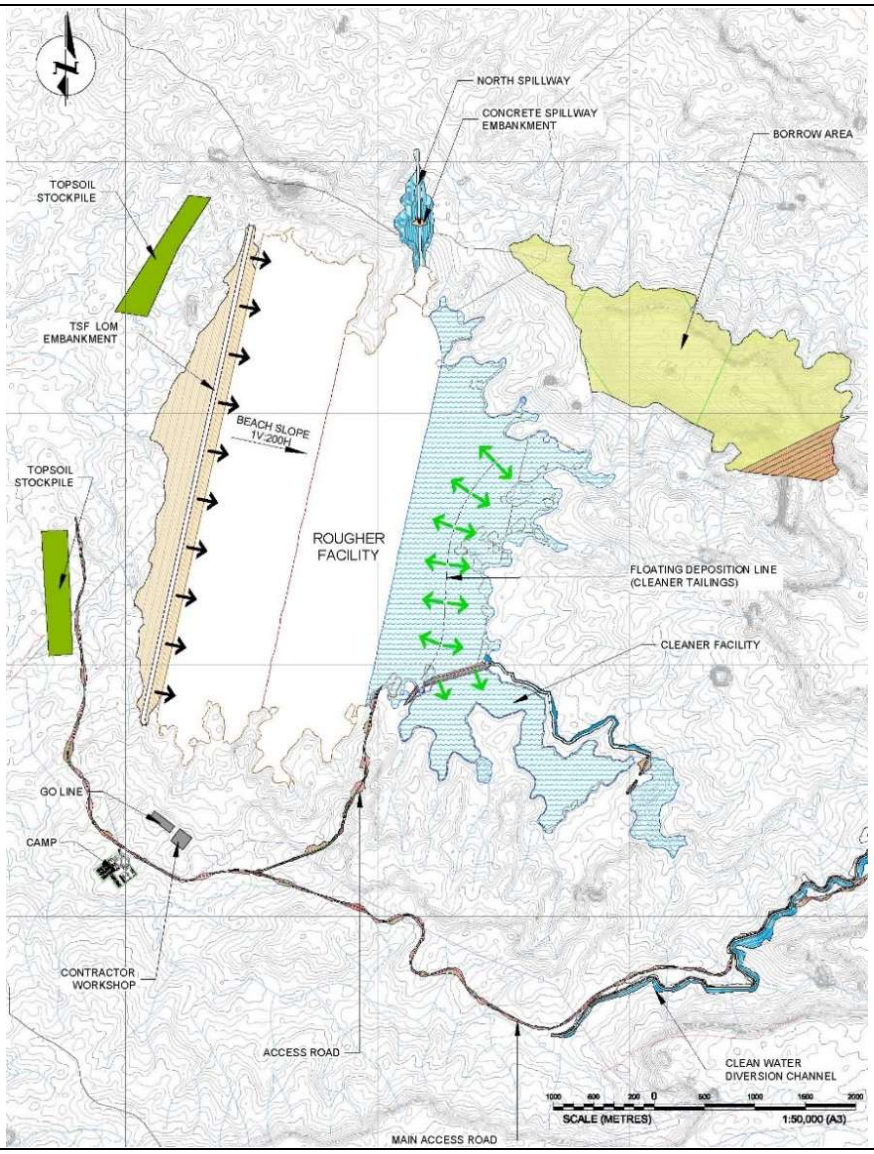


Figure 18.2 : Coastal Plains TSF General Arrangement

18.5.7.1 Cleaner Facility

The Coastal Plains Cleaner Facility will be constructed approximately 3.4 km upstream of the Coastal Plains Main Embankment at a natural constriction of the valley. The Cleaner Facility embankment will be 940 m long at crest and will be 76 m high from crest to downstream toe. The Cleaner Facility embankment is designed as a central core dam with a low permeability core protected on both upstream and downstream by two stage filter zones. The upstream and downstream structural zones have been designed to be constructed of competent rockfill with a slope of 1V:2.5H both upstream and downstream. The general arrangement of the cleaner facility is provided in Figure 18.3 with embankment cross section provided on Figure 18.4.

Two small embankments of 20 m and 7 m height will be constructed at the eastern extent of the cleaner facility to act as saddle dam and to direct water into the cleaner facility surface water diversion channel. The Coastal Plains Cleaner facility will be equipped with an ungated open channel spillway designed to safety pass the probable maximum flood.

The embankment will be fully instrumented with real time monitoring of pore pressures and deformations. Additional real time monitoring of surface water flows, pond volumes, seepage outflows and pond volume will be undertaken.

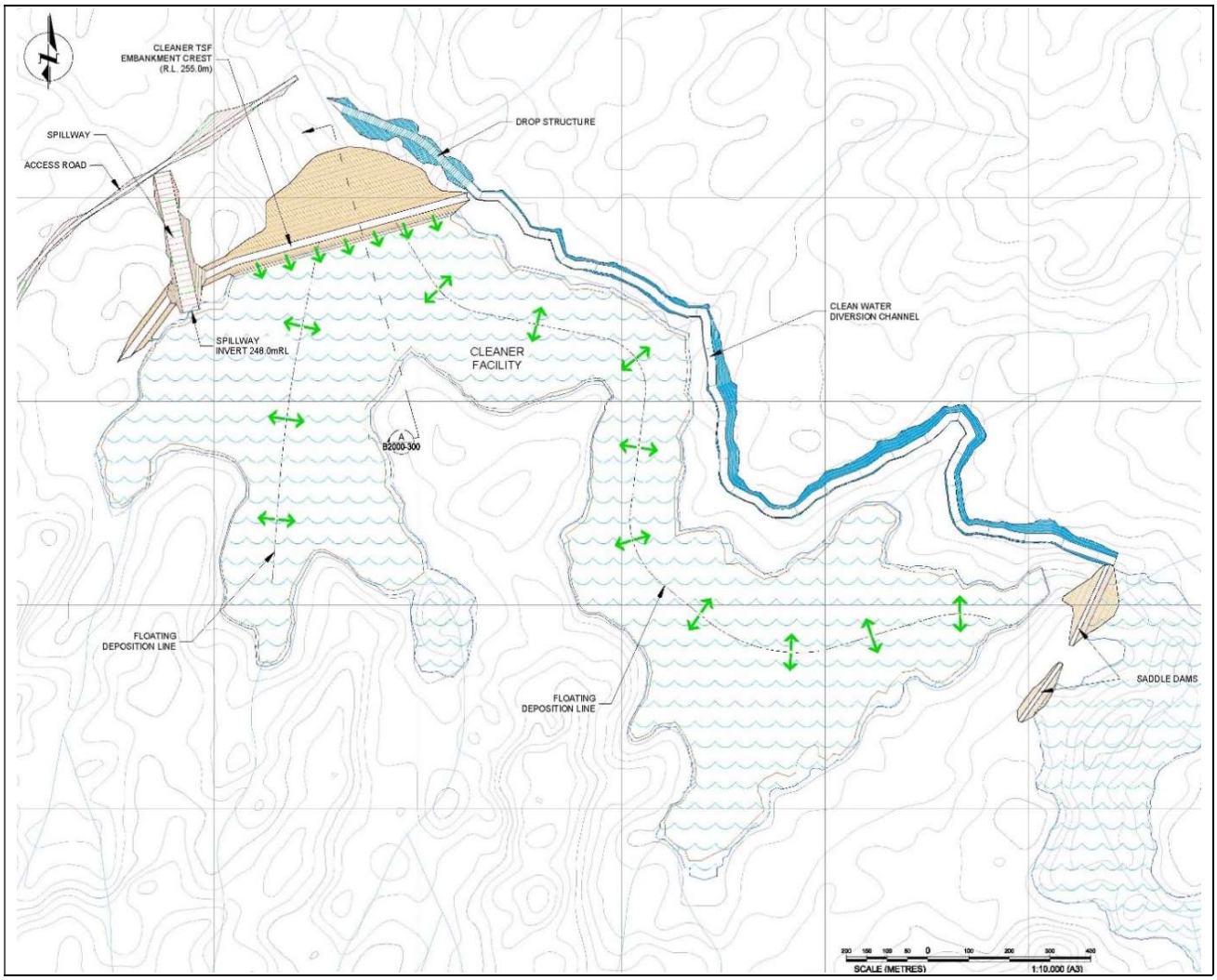


Figure 18.3 : Coastal Plains TSF Cleaner Facility General Arrangement

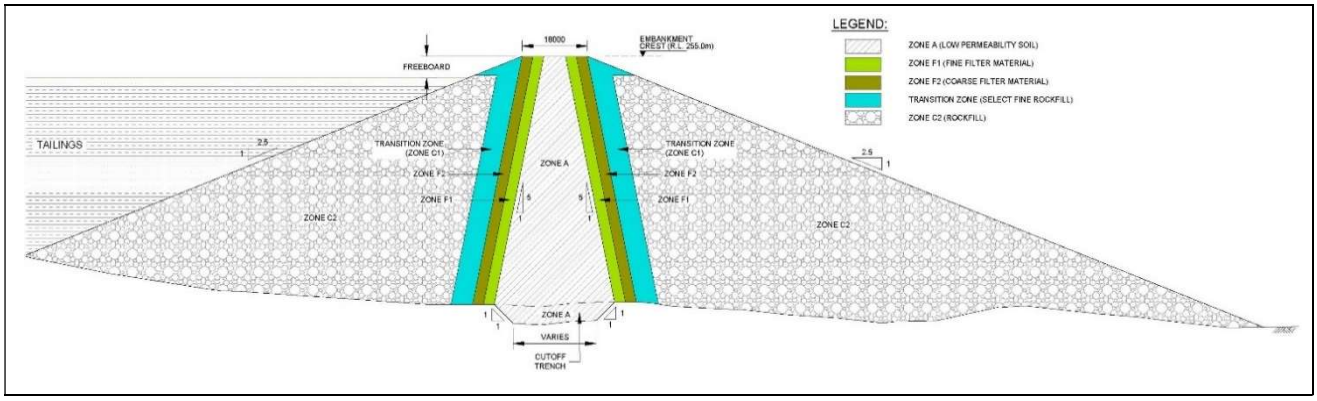


Figure 18.4 : Coastal Plains TSF Cleaner Facility Embankment Section

18.5.7.2 Main Facility

The Coastal Plains Main TSF Embankment will be a cross-valley embankment with a crest length at final height of 5050 m with a height from crest to downstream toe of 168 m. The Coastal Plains Main TSF Embankment will be constructed as a zoned earth and rockfill embankment with a sloping upstream low permeability zone, two stage filter and downstream structural zone. Stripping of low strength material from the footprint of the embankment will be undertaken prior to construction of a filter compatible basal drainage blanket below the embankment. The upstream batter will be HDPE lined to reduce seepage and protect the low permeability zone from erosion when exposed to the high intensity rainfall at the site. The facility has been designed with the downstream slope of 1V:3H and the upstream slope commencing at 1V:3H and then steepening to 1V:2.5H. The cross section of the Coastal Plains main embankment is provided in Figure 18.5.

The Coastal Plains Main TSF Embankment will be raised by downstream methods with construction of the embankment continuous over the operating life of the facility. The embankment has been designed with 26 stages of construction commencing three years before commissioning of the facility. The embankment will be raised to a height of approximately 40 m in the first stage and to 78 m prior to tailings deposition commencing. Construction materials will be sourced from the spillway excavation, foundation stripping and a large borrow pit located northeast to the embankment.

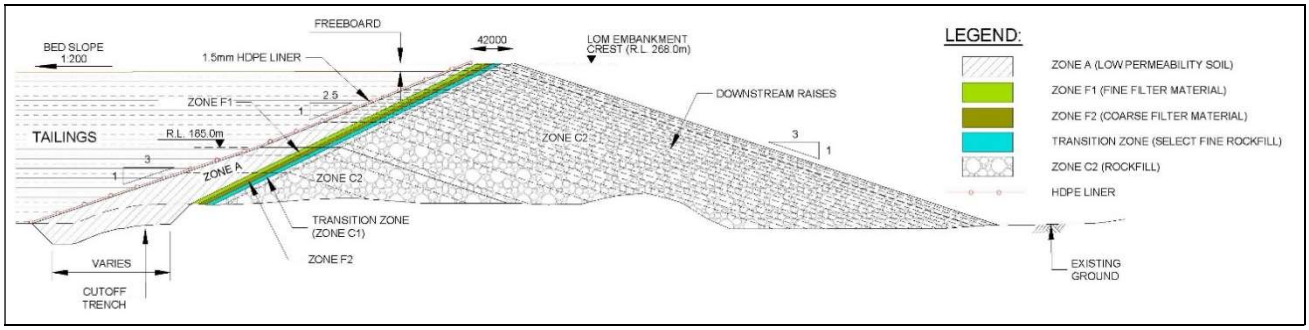


Figure 18.5 : Coastal Plains TSF Main Facility Embankment Section

The Coastal Plains Main TSF will have a spillway to the north which will be cut through the ridgeline. This spillway with then be raised as a masonry concrete dam with a reinforced concrete cascade structure. The spillway has been designed to safely pass the probable maximum flood.

The embankment will be fully instrumented with real time monitoring of pore pressures and deformations. Additional real time monitoring of surface water flows, pond volumes, seepage outflows and pond volume will be undertaken.

At closure, the majority of the tailings beach will be covered with rewon topsoil and borrow material and revegetated with the pond retained to maintain saturation of the cleaner tailings post closure.

18.5.8 Surface Water Management

To reduce the volume of surface water entering the facility, a surface water diversion channel will be constructed around the south-eastern margin of the facility which has been sized to pass 1 in 100-year ARI peak flow. This will reduce the catchment of the facility but based on the climatic conditions at the site both the cleaner and main facilities will be water positive, i.e. excess water will accumulate within the facilities which will require disposal. The cleaner facility will be operated sub aqueously, but water will be removed from the

facility in a controlled (pumped manner). Chemical analysis of the tailings supernatant and a dilution model indicates that the water should meet Ecuadorian water discharge criteria.

Design of the water management pumps required to control the volume of water within the facility has been undertaken by Fortin Pipeline. The system will comprise of pontoon mounted electrically driven pumps discharging via a continuously welded HDPE pipelines to the surface water diversion of the TSF.

No water will be returned to the processing plant from the Coastal Plains facility with water for processing will continue to be sourced from mine dewatering and the Parambas water storage facility adjacent to the processing plant.

18.5.9 Tailings Pipelines

The tailings pipelines from the processing plant to the TSF have been designed by Slurry Systems Engineering considering separate rougher and cleaner pipelines. The pipeline route to the Coastal Plains TSF will be approximately 57 km in length. The long section showing the hydraulic gradient line for normal operation (HGL-Operate), design maximum operation (HGL-design) as well as Maximum Allowable Operating Head (MAOH) of the preferred pipeline are provided in Figure 18.6.

The Slurry Systems Engineering has recommended use of carbon steel linepipe fully welded, coated, trenched and buried. The pipes are assumed to be externally coated and protected by an impressed current cathodic protection system. The pipelines are assumed to be lined with an inserted HDPE liner. Two pipelines of 559 mm OD would be required for the rougher tailings at 25 Mt/y and a single 406 mm OD would be required for the cleaner tailings at 25 Mt/y.

Under normal operating conditions both the rougher and tailings pipeline would flow by gravity from the process plant to the TSF with a single choke station installed in each line to prevent slack flow from occurring along the pipeline route. Tailings pumps would be required at the processing plants tailings hopper only for flushing of the rougher and cleaner pipelines and for tailings flow in excess of the normal operating rates.

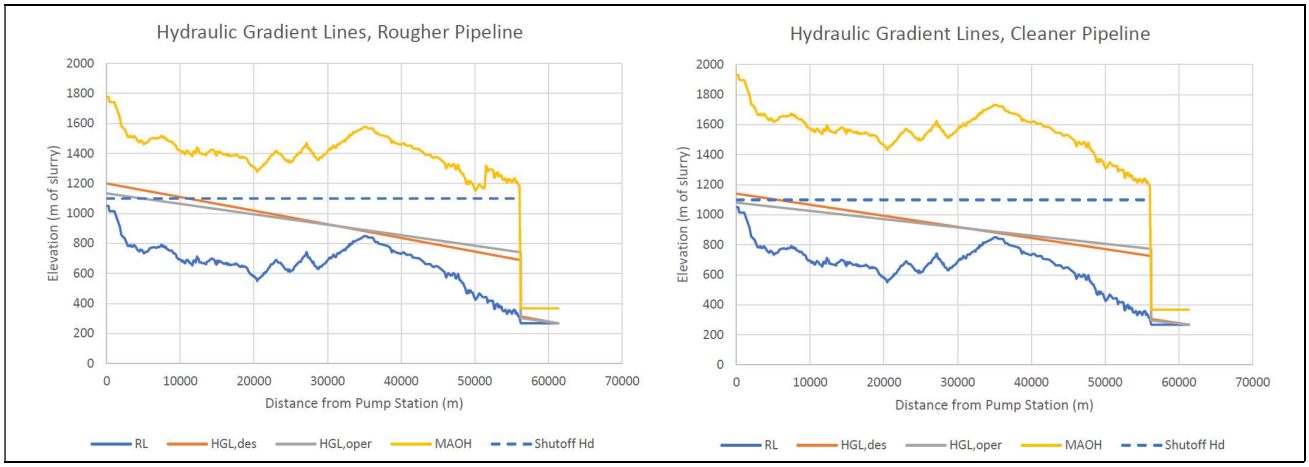


Figure 18.6 : Coastal Plains Main (Rougher) and Cleaner Tailings Pipeline Long Sections and Hydraulics

18.5.10 Decant System

The decant system from the Main and Cleaner TSF facilities was designed by Fortin Pipelines and includes:

- Main – six HDPE pipelines operating parallel each with pontoon mounted pump station
- Cleaner – one HDPE pipeline with pontoon mounted pump station.

The profile and hydraulic gradient lines for the two systems is shown in the figure below.

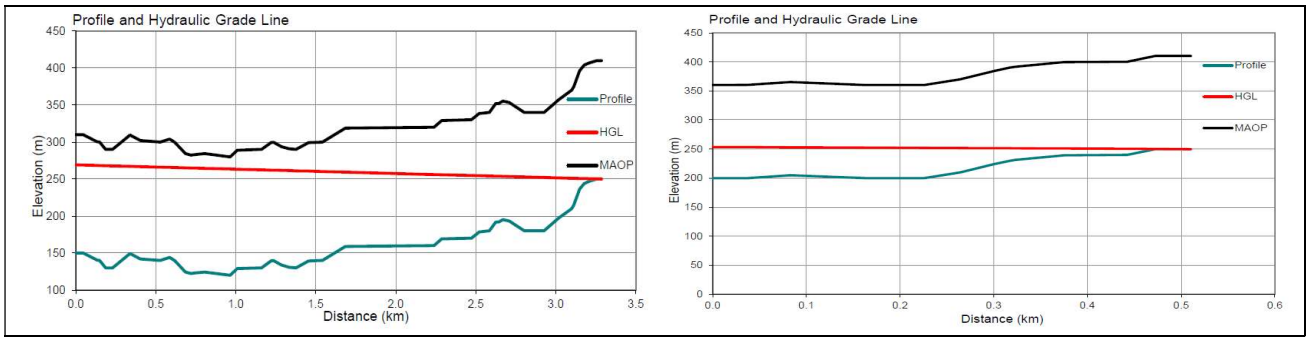


Figure 18.7 : Coastal Plains Decant Pipelines (Main and Cleaner) Long Section and Hydraulics

18.5.11 Quantities and Cost Estimates

Quantities and costs have been developed for the design for the 25 Mt/y mine plan. These have been incorporated into the overall project financial models.

18.5.12 Opportunities and Risks

During the course of the study several opportunities and risk have been identified which need to be addressed in the next phase of study. Key opportunities identified are as follows:

- Potential to steepen the embankment slopes as the designs are optimised
- Potential to steepen the spillway excavation slopes as the designs are optimised
- Cyclone sand dam construction may be a viable option for Coastal Plains Main Facility, but additional testing will be required.

Key risks identified are as follows:

- Land access and permitting has not been completed and therefore there is a risk that access to the site may not be achievable
- Minimal geotechnical data is available, and this could impact the designs
- Sterilisation drilling has not been completed at the site
- Material availability for dam construction has not been confirmed and the geotechnical properties of the construction materials could impact the designs
- Limited rainfall and stream flow data are available, and this could impact the designs
- A probabilistic water balance model should be developed at the next stage of study to assess the variability in water demands, availability of supply and water excesses over a range of probabilities

- The Ecuadorian guidelines prescribe pseudo static analysis for seismic design of the embankments. This method is not considered a preferred method in high seismic zone as it can be extremely conservative. Use of this analysis method may require flattening of the slopes or reduction in the height of the embankments to obtain permitting
- The tailings management system requires discharge of water, permits to discharge water may not be granted
- Limited tailings samples have been geochemically tested additional samples need to be tested to confirm representivity of the current data
- Volume of water discharged to the Tailings storage facility particularly with line dilution during low production rates should be evaluated for discharge from the TSF
- Security of remote tailings pump stations, chole stations and public access to tailings pipelines should be reviewed and included in the project risk register
- The project is unique to Ecuador in scale, so a limited cost database is available for projects of this size, therefore the cost estimates may be inaccurate.

18.6 Water Management

18.6.1 Water Balance Modelling

A site wide water balance model was developed for each of the production cases assessed as part of the Pre-Feasibility. The model was used to size the TSF embankment stages and to determine the amount of water which would require discharge as well as assessing the availability of water for processing operations and the required capacity of the Parambas water storage facility. At Pre-Feasibility stage this water balance has been run as a deterministic analysis to assess dry and wet conditions with a recurrence of 1 in 100 year ARI as well as average conditions. The key finding of the water balance model were as follows:

- The Coastal Plains Cleaner TSF required discharge up to 1.5 Mm^3 per month until the Coastal Plains Main Facility is fully operational and then will discharge via the spillway to the Coastal Plains Main Facility
- The Coastal Plains Main Facility requires discharge up to 8 Mm^3 per month whilst operating
- Parambas water storage facility has been sized to minimise the risk of water shortfalls during operation. The resulting volume was a capacity of 7 Mm^3.

18.6.2 Parambas Water Storage Facility

The Parambas Water Storage Facility is located in a steep valley orientated approximately south–north draining into Mira River, the facility is located immediately to the southwest of the processing plant with the embankment crest approximately 60 m below the processing plant elevation.

The Parambas facility has been designed at the Pre-Feasibility level as a robust embankment which will have flexibility to accommodate a range of construction material qualities and will allow for downstream raising of the facility if additional capacity is required at a later stage of project development. The Parambas embankment will have an embankment length of 639 m. The crest height to the downstream toe will be 125 m (a centreline height of 85 m). The general arrangement for the facility is shown on Figure 18.8.

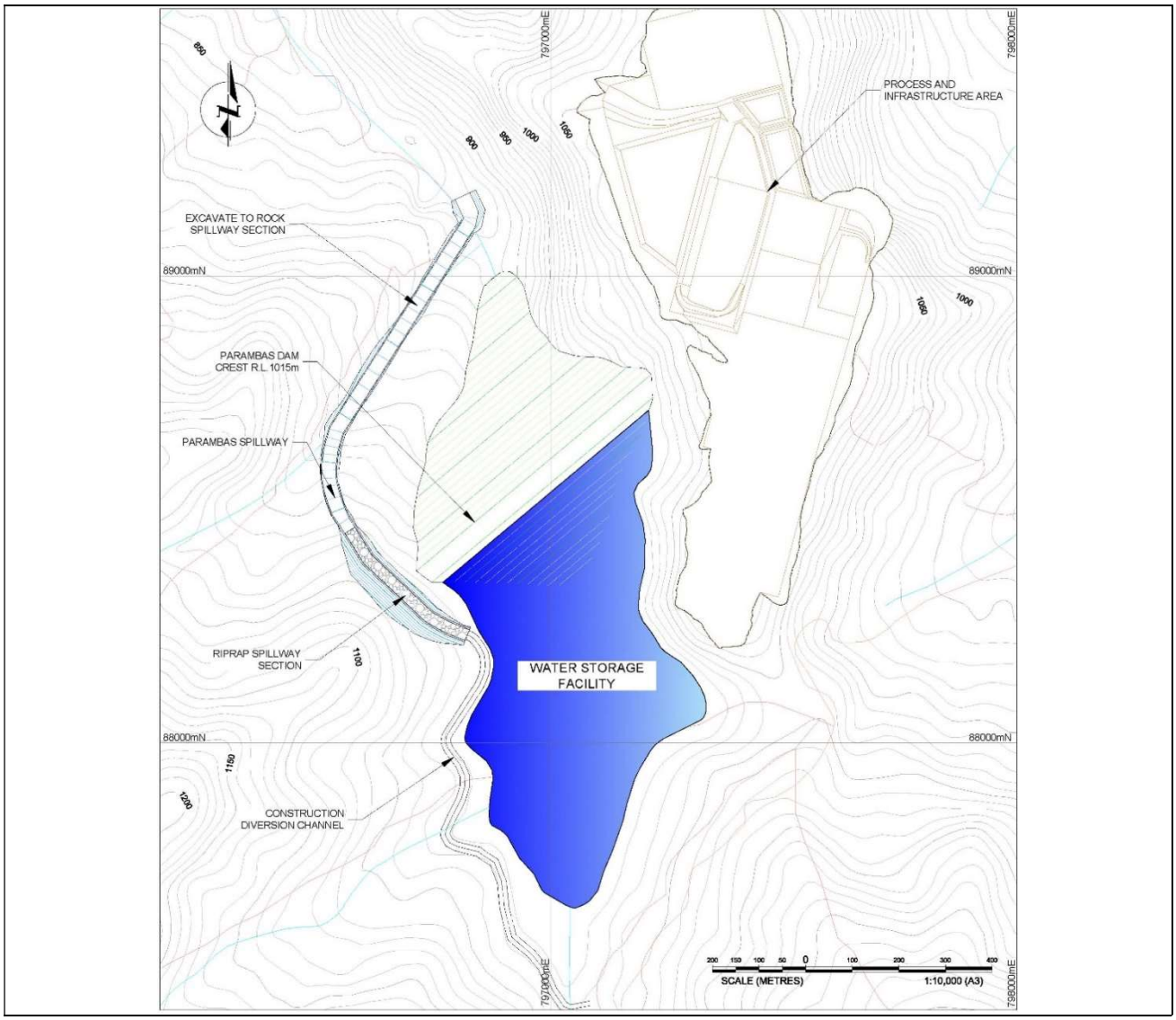


Figure 18.8 : Parambas Water Storage Facility General Arrangement

The Parambas embankment will be a cross valley, zoned embankment with an upstream core and two stage filter separating the core from the downstream structural embankment. The selection of an upstream core dam allows for raising of the facility should throughput be increased and will allow for scheduling of the rockier material sourced from the lower benches of the plant site excavation into the downstream portion of the embankment.

The upstream batter face will be lined with a HDPE liner to mitigate against cracking. The upstream core will connect to the cut-off trench and will vary in width. The cut-off trench will be excavated across the full width of the embankment, the exact geometry of the cut-off trench and requirement for any grouting will be defined once geotechnical investigation have been conducted. The upstream batter has been designed at a slope of 1V:3H. A two-stage filter has been proposed with an upstream fine filter comprising fine sand material and a downstream coarse filter comprising gravel material. A foundation drainage blanket will be installed below the embankment structural shell to reduce the risk of foundation piping. All construction materials for the embankment will be won from embankment foundation stripping, plant site earthworks or local borrow pits

and as such are expected to comprise both cohesive earthfill material from the shallow borrow and some transition material but competent rockfill is not anticipated to be available. The embankment geometry is shown on Figure 18.9.

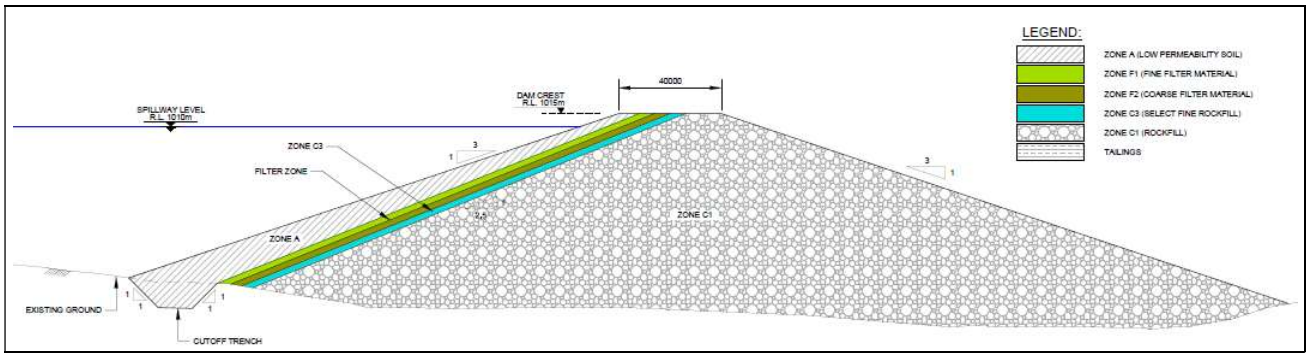


Figure 18.9 : Parambas Water Storage Facility Embankment Section

The spillway will be approximately 1,086 m long with an initial rip rap section before following the path of a natural creek which will be excavated down to rock. The spillway has been sized to pass the PMF.

The embankment will be fully instrumented with real time monitoring of pore pressures and deformations. Additional monitoring of surface water flows, pond volumes, seepage outflows and pond volume will be undertaken.

18.7 On-Site Infrastructure

18.7.1 Site Buildings

18.7.1.1 Administration

The project will include administrative and auxiliary buildings located in the proximity of the processing plant. These buildings have been specified to be constructed of concrete blocks, which is consistent with the type of structure built within the region.

The administration area will include the following buildings:

- Main administration building with offices, meeting rooms, open areas, kitchen and toilets
- Medical centre – including ambulance
- Security building – main mine entrance.

18.7.1.2 Mine Surface Infrastructure

The mine surface infrastructure area, located near the mine portal as part of the mine surface facilities for the underground area:

- Mine administration offices
- Mine control room
- Emergency response and medical facility
- Mine change rooms

- LV and HV workshops
- Mine warehousing and laydown areas
- Wash bay – HV and LV
- Tyre bay
- Fuel & lubricants storage and dispensing
- Batch plant
- Explosive stores
- Access control.

18.7.1.3 Process Plant

The following buildings will be located at the process plant:

- Security checkpoint and plant access point
- Laboratory
- Control room
- General plant offices.

18.7.1.4 Workshops

Maintenance workshops have been included in the mine surface infrastructure area, process plant and port.

A large, fixed plant maintenance workshop has been provided in the process plant, on the platform between the ball mills and the fine ore stockpile. This facility is intended for process plant equipment maintenance. The workshop includes areas for mechanical equipment repair, boilermaking and an electrical/instrumentation workshop. The facility also includes stores for consumables and specialist parts as well as a fenced laydown yard adjacent to the workshop area. The main workshop area will be fitted with an overhead crane and will have a forklift.

The port will also be provided with a workshop intended for port equipment maintenance and storage.

The mine infrastructure area (MIA) workshops include a heavy vehicle workshop, light vehicle workshop, tyre bay and an electrical workshop. Servicing of light vehicles and major rebuilds of underground heavy vehicles will be undertaken in the workshop. The area includes for the storage and dispensing of lubricants and oils for vehicles as well as storage of waste oil. The facility also includes a wash bay for vehicle cleaning and a tyre bay equipped for both light and heavy vehicle tyre changes. The vehicle bays will be equipped with an overhead crane. One bay will be fitted with a reinforced floor for use with tracked vehicles.

These facilities consist of closed steel structure shed with indoor slab on grade and will be provided with the tools and equipment necessary for maintenance tasks.

18.7.1.5 Warehouse

The project includes, among its facilities, material and spare parts storage warehouses.

The process plant will have a spare parts warehouse and spare parts yard located next to the process plant maintenance workshop. The spare parts warehouse will be a steel enclosed structure fitted out with suitable storage racking. An adjacent spare parts yard surrounded by a perimeter fence for the storage of oversize items and items not requiring covered storage. An office and front of warehouse area for inward and outward materials management are located in the warehouse.

The port will have a warehouse that is part of the maintenance workshop building.

The mine surface infrastructure warehouse is adjacent to the HV and LV workshop. The warehouse is a large, enclosed steel building fitted out with suitable racking to store mine spares in a secure area. A secure laydown open area is adjacent to the main warehouse and will be used to store oversize items.

18.7.2 Fire Protection

Each area of the mine site will be provided with an appropriate fire protection system. Fire protection systems have been included in the mine infrastructure area, process plant, port and administration areas. Each individual fire system will be for the exclusive use for that area and is not intended to have connections for use by other services, neither temporary nor permanent, or for uses not directly related to firefighting.

18.7.3 Laydown Areas

Laydown areas for construction of the process plant will be the platforms below the secondary crusher stations and on the main process plant pad. A laydown area for the construction of the mine portals and underground development will be constructed adjacent to the portal location.

Permanent laydown areas for storage of materials will be established next to the main warehouse facilities. These will be fenced and secured with an access control system.

Laydown areas for redundant equipment or waste materials will be established during start-up when operational requirements have been established.

18.8 Off-Site Infrastructure

18.8.1 Camp and Accommodation

A construction camp will be established in order for works to commence on the construction of the underground decline. The initial camp will be a 1,000-man camp.

Once construction of the process plant commences the camp will be increased in size to 3,000-man camp.

Separate camp facilities will be located at the Coastal Plains TSF due to the distance from the Cascabel concession and the focussed work area.

Facilities within the camp will include dormitories, health care facility, messing areas and recreation areas. The sizing and services of this camp will be reviewed once the project execution strategy is further defined in the Feasibility study.

18.8.2 Off-Site Surface Infrastructure

Facilities to accommodate administration, workshop and warehouse facilities will be located at a centre for services which are not required to be located on-site at the Port, Coastal Plains TSF or Cascabel Concession areas. This will include:

- Main administration building with offices, meeting rooms, open areas, kitchen and toilets
- A large, fixed plant maintenance workshop for major equipment maintenance. The workshop includes areas for mechanical equipment repair, boilermaking and an electrical/instrumentation workshop. The facility also includes stores for consumables and specialist parts as well as a fenced laydown yard adjacent to the workshop area. The main workshop area will be fitted with an overhead crane and will have a forklift
- The warehouse is a large, enclosed steel building fitted out with suitable racking to store mine spares in a secure area. A secure laydown open area is adjacent to the main warehouse and will be used to store oversize items.

18.8.3 Port

The proposed port location for the project is the Port of Esmeraldas. The Port of Esmeraldas is approximately 208 km by road from the Cascabel concession and road access is via good quality sealed roads right to the mine entrance. The port itself is located within the city of Esmeraldas and is bordered by industrial and residential areas.

The Port Authority of Esmeraldas (Autoridad Portuaria de Esmeraldas - APE) is the current owner and operator of the port facilities at Esmeraldas. The port of Esmeraldas is the only port facility in Ecuador which is still managed by the Ecuadorian government.

The proposed port operation at the Port of Esmeraldas will receive copper concentrate as a 50% to 55% w/w slurry via a concentrate pipeline from the Alpala process plant. The facility will dewater the concentrate to a nominal moisture content of 9% w/w, store the material prior to shipment and then load concentrate onto ships as required. The port operations will consist of the following facilities:

- Filter plant
- Concentrate storage shed
- Mobile ship loading
- Power supply and distribution
- Offices, control room and workshop
- Utilities – water and air systems.

Two locations for the placement of the port facilities are currently being considered as the legal status of the dewatering plant within the port concession had not been clarified at the time of writing.

18.9 Power and Electrical

18.9.1 Power Supply

The power to the site will be supplied by the expansion of the Pimampiro 230 kV substation. A dual circuit 230 kV transmission line from Pimampiro 230 kV substation will supply power to the Cascabel Project substation. The transmission line will be approximately 60 km long.

An option study to evaluate the potential sources of power for the Cascabel Project:

- On site generation using diesel or gas
- Solar generation
- Wind generation
- Hydroelectric generation.

The study found that the base case, grid connected power, was, at present based on the available data, the best option for power for the project.

It should be noted that approximately 96% of Ecuador's power is hydroelectric and grid connected power would come from public hydroelectric systems. It should also be noted that the wind and solar generation options are more feasible in the region around the Pimampiro sub-station approximately 70 km from the site. These options would still require a base load system, the acquiring of a suitable sized location and the same infrastructure as the grid connected option to supply power to the site.

18.9.2 Power Distribution

The Cascabel Project will utilise the following voltages:

- 230 kV feed to the main substations at the Alpala substation
- 23 kV for reticulation in the process areas, with transformers located in the process plant
- 23 kV for reticulation to the MIA, underground mine, explosive store and ventilation surface facilities
- 13.8 kV for emergency generation. This can also be connected to the local area distribution network
- 4.16 kV for medium voltage motors
- 480 V for process equipment and motors
- 220/480 V for general light and power.

18.9.3 Emergency Power

The emergency generators will be either diesel or heavy fuel oil (HFO). The generators will deliver the rated power at 13.8 kV and the generators will be arranged to operate in parallel to produce a maximum of 30 MW. A load shedding scheme will be implemented when the main grid connection is offline due to a fault or maintenance that will progressively shut down noncritical areas and connect power to critical drives and systems.

18.10 Communications

18.10.1 Data Systems

A fibre optic cable network will be installed to operate as a backbone data communication system for the plant, MIA, mine, port and administration areas.

This main network backbone will include redundant paths in different routes in order to ensure permanent connection between system nodes. Multi fibre optic cables will be specified to separate the dedicated fibre systems and ensure speed and reliability of data from each system.

The main paths specified for the fibre optic backbone are:

Plant/Port:	A fibre optic cable installed underground next to the concentrate pipeline.
Plant/Tailings:	An overhead fibre optic cable installed next to the 23 kV transmission line that goes to the TSF pumping system.
Plant/Primary Crushing:	An overhead fibre optic cable installed next to the 23 kV transmission line going to the mine portal then onto the main decline conveyor to the primary crushing area.
Plant/MIA:	A fibre optic cable installed next to the 23 kV transmission line going to the MIA connected into the mine control room.

The general data and telephone network will have dedicated fibre to allow all facilities to be integrated and to be able to use IP telephony. The data and telephone network will include wireless routers in the administration areas in order to provide a wireless data network (Wi-Fi).

18.10.2 CCTV

The process plant, TSF, port and mine will utilise a CCTV system to provide coverage of the operating areas of the site. A separate CCTV surveillance system will also be installed for use by the security personnel to monitor the periphery of the mine site.

The CCTV system will consist of movable PTZ cameras equipped with protective housings for outdoor industrial environments, and the dome type for indoor use.

All cameras will include native IP technology and high definition resolution transmitting over optical fibre links in a video traffic network, with security protocols allowing access to this information only to authorised personnel.

18.11 Comments on Section 18

The QPs note:

- The infrastructure design is in line with the planned process and mining rates, and is appropriate for a greenfields development in a remote area
- In order to reduce the impact of the Project footprint, some support facilities will be located off-site

- The facilities location at the Port area will continue to be evaluated
- Borrow pits will be required to provide the materials needed for construction through to mine closure
- Separate handling and disposal of rougher and cleaner tailings will occur at the Coastal Plains TSF
- Water for process demands will be sourced from the Parambas water storage facility throughout the life of operations.

19 Market Studies and Contracts

19.1 Introduction

The project will produce both copper-gold-silver containing concentrate and gold-silver containing doré.

SolGold commenced engaging with potential off-takers in 2020.

For the purposes of the Pre-Feasibility SolGold engaged Wood Mackenzie to prepare an independent market report for sale of concentrate and doré for the indicative terms applied in the financial model.

19.2 Market Studies

Metallurgical testwork provided by SolGold for the Cascabel Project concentrate indicates that it is a clean, precious metal enriched concentrate containing very low levels of deleterious elements. It can therefore be expected to be in strong demand globally. The key deleterious elements in the concentrate produced from the Cascabel Project are expected to be lower than the average of Grasberg, Oyu Tolgoi, Collahuasi and Escondida, particularly arsenic, mercury, and zinc. As such, it is expected that Cascabel Project concentrate will not incur any penalties and will be viewed as highly desirable by custom smelters, providing opportunity for SolGold to market accordingly. This puts SolGold in a strong position to negotiate with traders or smelters, as the material can be used as a diluent to blend with more complex copper concentrates.

The gold content of the Cascabel Project concentrate is likely to be attractive to smelters in Japan, Korea and Europe where recoveries are greater than payables. This is particularly the case in high gold price environments, as currently experienced, since "free units" are of much higher value than in a low gold price environment. Indian smelters can also be expected to be interested due to the duty gains on gold in concentrates versus gold in bullion. All of this will heighten demand, as high recovery smelters look to replace Grasberg's (Freeport) large volumes and high gold concentrate if removed from the custom market when its new smelter at Gresik, Indonesia is built.

The difference in payability for silver (Ag) in concentrate between European and Asian markets preference the sale of Cascabel Project concentrate to Asian markets, given the expected silver content.

Concentrate shipping costs from 2030 are estimated at between $25/t for a 30 kt parcel to $63/t for a 10 kt parcel on a long-term basis. Alternatively, with large volumes of copper concentrate regularly shipped from the west coast of Latin America, particularly Chile, there could be an opportunity to leverage freight through parcel shipments. Ten kt parcels from the Cascabel Project could be co-shipped with other exporters to make up the cargo for 20-30 kt Handysize or Handymax vessels. The geographic advantage of the Cascabel Project, located to the north of the Chilean and Peruvian copper fields, means shipping should likely be at a discount to those southern operations.

For copper concentrate, typical payabilities are shown in the table below.

Table 19.1 : Cascabel Project typical metal payabilities in copper concentrate			
Content	**China**	**Other Asia**	**Europe**
<30% Copper	-1	-1	-1
Silver			
<30 g/t	None	None	None
30-99 g/t	90%	90%	Deduct 30 g/t Pay balance
Gold			
<1 g/t	None	None	None
1-3 g/t	90%	90%	Deduct 1 g/t Pay balance
3-5 g/t	94%	95%	Deduct 1 g/t Pay balance
5-10 g/t	95%	96%	Deduct 1 g/t Pay balance
>10 g/t	96%	97-98%	Deduct 1 g/t Pay balance

Long term copper concentrate treatment and refining costs (TCRC) were analysed, and multiple scenarios investigated. In view of these scenarios, and in consideration of directional feedback provided to SolGold from market, a long-term TCRC modelling price of US$79/t & 7.9c/lb (real 2021$) is supported.

Precious metal sold as doré will receive a payability commensurate to the purity of the doré. For doré at 90% or above gold content, payability is typically 99.93-99.95% of the gold value. If the doré content is less, the payability would typically decrease 0.01% for a gold content range of 80-90%, and a further 0.01% to 70-80% gold.

For silver doré payability is typically 99%.

19.3 Commodity Price Projections

In consideration of the specific attributes of the Cascabel Project including size, geology, and a planned life of mine, and in following guidance outlined by the Canadian Institute of Mining, Metallurgy and Petroleum, an appropriate long-term copper, gold and silver price of US$3.60/lb (real 2021$) for copper, US$1,700/oz (real 2021$) gold from 2030 and US$19.9/oz (real 2021$) silver are supported as reasonable commodity prices for Cascabel Project reserve modelling.

19.4 Contracts

19.4.1 Sales and Marketing Contracts

During the 2020 fiscal year, SolGold started engaging with leading copper smelters and established commodity traders to assess the extent of interest and commercial value of the Cascabel Project concentrate which, based on metallurgical test work to date, contains:

- High copper
- High precious metals

- Low deleterious elements
- A well-balanced combination of sulphur, iron and copper.

Based on the high level of interest in this quality concentrate, SolGold subsequently invited commodity traders to submit an initial Expression of Interest, covering:

- Their intended sales and marketing strategy for Alpala concentrate
- Proposed offtake volumes and tenure
- Comprehensive commercial terms
- Ability for short- and long-term financial support.

SolGold has to date received 10 qualifying Expressions of Interest (EOI). The offtake terms, while non-binding, are sufficiently detailed to give the Company confidence that binding agreements can be reached during forthcoming negotiations. Demand for the Cascabel Project concentrate from traders was significantly in excess of planned production volumes, testament to the inherent quality and value of the material. Nevertheless, SolGold expects further improvements in the final agreed off-take terms. In particular metal payabilities, precious metal refining charges and payment terms are expected to be finalised on better terms than previous conceptual assumptions.

SolGold has also received material offers of funding in exchange for offtake from a number of traders. These include the provision of both short-term and longer-term capital with proceeds available for studies, mine construction and cost overruns as well as working capital during ramp-up. SolGold is currently ranking and selecting a short-listed group of traders with a view to finalising offtake agreements as well as funding support.

No offtake agreements have been entered into at the time of this report.

19.4.2 Other Contracts

No other contracts are currently in place for the Cascabel Project.

19.5 Comments on Section 19

The QPs have reviewed the information provided by SolGold on contracts and note that the information provided is consistent with the source documents used.

20 Environmental, Permitting and Social Considerations

20.1 Introduction

SolGold has made considerable efforts to undertake environmental studies and community engagement in order to facilitate the advancement of the project. In anticipation of entering the permitting process with an Environmental and Social Impact Assessment (ESIA) in 2022, several environmental baseline studies have been initiated. The following presents a summary of the environmental aspects, permitting and social or community impacts of the work program to date.

20.2 Project Permitting

20.2.1 Legal Framework

Mining activities in Ecuador are mainly regulated by the Ministerio de Energía y Recursos Naturales No Renovables (Ministry of Energy and Non-Renewable Resources) (MERNNR), the Agencía de Regulación y Control Minero (Mining Regulation and Control Agency) (ARCOM), and the Ministerio del Ambiente, Agua y Transición Ecológica (Ministry of Environment, Water and Ecological Transition) (MAATE). The principal environmental laws that apply to the mining industry are the Constitution, the Ley de Minería (Mining Law), the Reglamento Ambiental para Actividades Mineras, or RAAM (Environmental Regulation for Mining Activities), the Texto Unificado de la Legislación Secundaria del Ministerio del Ambiente, or TULSMA (Unified Text of Secondary Environmental Legislation), the Ley Orgánica de Recursos Hídricos, Usos y Aprovechamiento Del Agua (Water Use and Exploitation Act), and the Código Orgánico del Ambiente, or COA (Environmental Code), which entered into force in April 2018 and encompasses all the environmental legislation in one single body of law.

The MAATE issues an environmental licence and water authorisation for mining following approval of an Environmental and Social Impact Assessment (ESIA) and Environmental Management Plan. The Ministry of Mining is responsible for mine planning in Ecuador, including the negotiation of contracts for the exploitation of minerals. ARCOM is responsible for supervising mining activities. Other permits required for mining activities include those for explosives use from the Ministerio de Defensa Nacional (Ministry of National Defense), special labour shifts from the Ministerio del Trabajo (Ministry of Labour), fire department, and construction permits (from ARCOM and the municipalities). A summary of the major permits required for construction and operation of the project is provided in Table 20.1.

Table 20.1 : Schedule of Major Permits for Construction and Operation

Prior to Construction	
Certificate of Validity of Mining Rights	Mining Regulation and Control Agency
Federal Environmental License (EA) - Exploitation	Ministry of Environment, Water and Ecological Transition (Quito)
Federal Environmental License (EA) - Processing	Ministry of Environment, Water and Ecological Transition (Quito)
Provincial Environmental License (EA) - off concession infrastructure	Ministry of Environment, Water and Ecological Transition (Imbabura / Esmeraldas)
Water License - Industrial Use	Ministry of Environment, Water and Ecological Transition (Quito)
Authorisation to Install a Process Plant	Ministry of Energy and Non-Renewable Natural Resources
Authorisation to Build a Tailings Storage Facility	Ministry of Energy and Non-Renewable Natural Resources

Table 20.1 : Schedule of Major Permits for Construction and Operation	
Prior to Construction	
Explosive Transportation, Storage, and Use Permits	Armed Forces Department of Arms Control
Quarry / Borrow Permits	Local Government
Fuel Purchase Permit	Regional Hydrocarbon Regulation and Control Administration
Approval of Camp Specifications	Mining Regulation and Control Agency
Mining Operations Contract	Ministry of Energy and Non-Renewable Natural Resources
Prior to Operation	
Registration as Hazardous Waste Generator	Ministry of Environment, Water and Ecological Transition (Quito)
Possession and Use of Controlled Substances	Technical Secretariat of the National System of Professional Qualifications
Registration of Hazardous Chemical Storage and Use	Ministry of Environment, Water and Ecological Transition (Quito)

20.2.2 Environmental and Social Impact Assessment

The following sections from Chapter II and Chapter III of the Ley De Gestion Ambiental, Codificación (Law Of Environmental Management, Codification) Coding 19, Official Register Supplement 418 of 10 September 2004 are relevant to baseline studies and impact assessments:

- Art. 21: Requires that environmental management systems include baseline studies, environmental impact evaluation, risk assessment, management plans, risk management plans, monitoring; contingency and mitigation plans, environmental audits, and abandonment plans
- Art. 22: Environmental management systems may be evaluated at any time, at the request of the Ministry of the branch or of the people affected. The evaluation of compliance with approved environmental management plans will be carried out through the environmental audit, practiced by consultants previously qualified by the Ministry of the branch, in order to establish the corrections that must be made
- Art. 23: The environmental impact assessment will include:
  a) The estimation of the effects caused to the human population, biodiversity, soil, air, water, the landscape and the structure and function of the ecosystems present in the affected area
  b) Public tranquillity conditions, such as: noise, vibrations, odours, light emissions, thermal changes, and any other induced environmental changes
  c) Assessment of historical, scenic, and cultural heritage impacts.
- Art. 28: Outlines the right of people to participate in environmental management, through the mechanisms established for this purpose by the Regulation, including consultations, public hearings, and other initiatives.

In order to comply with the ESIA submission necessary to obtain mining permits, SolGold will prepare and submit an ESIA with the following components:

- Legal Framework
- Detailed description of the project, including an alternatives analysis

- Determination of the Area of Influence for all planned project infrastructure on the environmental and social landscape
- Characterisation of the physical and biological baseline condition
- Characterisation of the socio-economic baseline condition
- Characterisation of the archaeological baseline condition
- Identification, prediction, and evaluation of environmental impacts
- Risk assessment
- Forest inventory and economic evaluation
- Citizen Participation Process
- Environmental Management Plan, which includes:
  - Mitigation Plan
  - Waste Management Plan
  - Communication, Training, and Environmental Education Plan
  - Community Relations Plan
  - Contingency Plan
  - Worker Health and Safety Plan
  - Monitoring Plan
  - Rescue and Protection Plan (for species of concern that need relocation)
  - Closure and Abandonment Plan
  - Rehabilitation Plan.

The specific requirements for the Cascabel Project ESIA will be elaborated in a Terms of Reference document prepared by a qualified Environmental Consultant, following guidance from the MAATE. It is expected that the MAATE will require separate ESIAs for the mining (exploitation) and processing components of the project for infrastructure located on the concession, as well as for the tailings storage facility, the port site, concentrate pipeline, and electrical transmission line.

The public has the right to participate in environmental assessment of projects through consultations, public open houses, and other initiatives. The baseline environmental and social collection programs are "living programs" and expand along with enhanced project design. Additionally, all sampling will be conducted with transparent communications with communities, local residents and other stakeholders.

In addition to Ecuadorian requirements, SolGold will ensure that the ESIA is compliant with appropriate international standards. At minimum, these would include the Equator Principles, and the International Finance Corporation (IFC) Performance Standards and Environmental, Health, and Safety Guidelines.

20.2.3 Current Permitting

The Cascabel Project conducts exploration under a valid Environmental License for Advanced Exploration activities (including drilling). The License was granted as Resolución 0618 by the Ministry of Environment (now Ministry of Environment and Water) in August 2013 following submission of an EIA for the advanced exploration activities (Cardno Entrix, 2013). The remainder of the concession is permitted as Initial Exploration under Resolución 757, which does not include for drilling. The Environmental License remains valid for the

duration of the exploration and evaluation phases of the project, subject to fulfillment of monitoring report submissions. The Secretaría Nacional del Agua (now part of MAATE) has similarly granted authorisation for use and benefit of all the water used in exploration activities from local surface sources.

In fulfillment of the Environmental License requirements, the project submits semi-annual reports to the Ministry of Environment and Water that report on internal monitoring of water, soil, noise, air, flora, fauna, effluent, social, archaeology, training and occupational health and safety. These reports are supported by periodic environmental audits and site inspections by government authorities to demonstrate compliance.

SolGold has implemented a very strict Environmental Management Plan to conduct the exploration drill program. The construction of trails, roads, drill platforms or other infrastructure are assessed according to their potential impact on water courses and flora and fauna. Adjustments to the placement or alignment are conducted at the planning stage in order to minimise potential impacts, and where appropriate, sensitive plants and animals are relocated prior to clearing activities. Drill platform size is limited to 400 m^2 (or 480 m^2 where a single platform shares more than one drill hole) and requires enhanced controls where infrastructure is located close to water, or on a slope, including water diversion bunding, ditching, and blanketing with geomembrane. Trails are limited to a width of 1.5 m, and vehicle access roads are limited to a width of 6 m. A comprehensive monitoring plan of abiotic and biotic parameters is conducted semi-annually by qualified external consultants in order to confirm efficacy of the mitigation program.

20.3 Environmental Studies

The project is located in the biome unit of Bosque Siempreverde Piemontano de la Cordillera Occidental de los Andes (Evergreen Western Foothills Forest) (Ministerio del Ambiente del Ecuador, 2013). It is located within elevations of 300 m in the valley bottom to 2,200 m in the higher exploration zones. The topography is moderate to steep, incised by dendritic drainage complexes within the tributary watersheds of the Río Mira basin.

The ecosystem is formed by multi-strata evergreen forests, with a canopy between 25 and 30 m in height. The area is under a considerable pressure from agricultural activities, and much of the land has been cleared for farming; principally of cabuya, corn, naranjilla, citrus, guanabana, and varieties of bananas. Agricultural practices include the heavy use of pesticides, which has resulted in reduced soil capacities and effects to local drainages.

20.3.1 Meteorology

Two climate stations were installed at site in April 2019 and continue to operate: one at the lower elevation Rocafuerte Camp, and the second at the higher elevation Alpala Camp. Each station is compliant with World Meteorological Organisation (2010) standards for instrumentation and data collection including automated datalogging of temperature, relative humidity, wind speed, wind direction, and precipitation. Assessment of these stations was considered in the Knight Piésold, Cascabel Project Hydrometeorology Report, most recently updated in February 2020. Summary statistics include:

- The long-term mean annual temperature for the Rocafuerte station is estimated to be 22.8°C, with monthly mean temperatures ranging from a high of 26.0°C to a low of 19.9°C (Figure 20.1). The long-term mean annual temperature for the Alpala station is estimated to be 17.7°C, with monthly mean temperatures ranging from a high of 21.0°C to a low of 14.9°C
- The monthly mean wind speed at the Rocafuerte station ranges from a low of 0.8 m/s to a high of 1.1 m/s, and at the Alpala station it ranges from a low of 0.9 m/s to a high of 1.2 m/s. The prevailing measured

wind direction at Rocafuerte is west and northwest, whereas at Alpala it is northwest and southeast (Figure 20.2 and Figure 20.3)

- Maximum incoming solar radiation ranges from a high of 7.0 kWh/m^2 in May 2019 to a low of 4.2 kWh/m^2 in December 2019 at the Rocafuerte station, and from a high of 6.0 kWh/m^2 in September 2019 to a low of 2.4 kWh/m^2 in October 2019 at the Alpala station
- The monthly mean relative humidity at the Rocafuerte station varied between 87% in August 2019 and 95% in December 2019, while the monthly mean relative humidity at the Alpala station varied between 96% in August 2019 and 99% in December 2019. The relative humidity at the Alpala station is generally higher than at the Rocafuerte station
- The recorded monthly total precipitation ranges from a low of 50.4 mm in June 2019 to a high of 502 mm in December 2019 at the Rocafuerte station, and from a low of 138.6 mm in June 2019 to a high of 647 mm in December 2019 at the Alpala station (Figure 20.4 and Figure 20.5)
- Based on the available data, the estimated local orographic factor indicates an increase in precipitation of 4.2% per 100 m of elevation gain
- The long-term average precipitation for the Rocafuerte station is estimated to be approximately 2,610 mm, with annual totals over a 55-year period ranging from a minimum of 1,574 mm to a maximum of 4,364 mm. Precipitation is unevenly distributed throughout the year, with most of the precipitation falling during the months of October to May, and a pronounced drier season during June through September
- The 100-year 24-hour precipitation at the Rocafuerte and Alpala stations are estimated to be 148 mm and 191 mm, respectively.

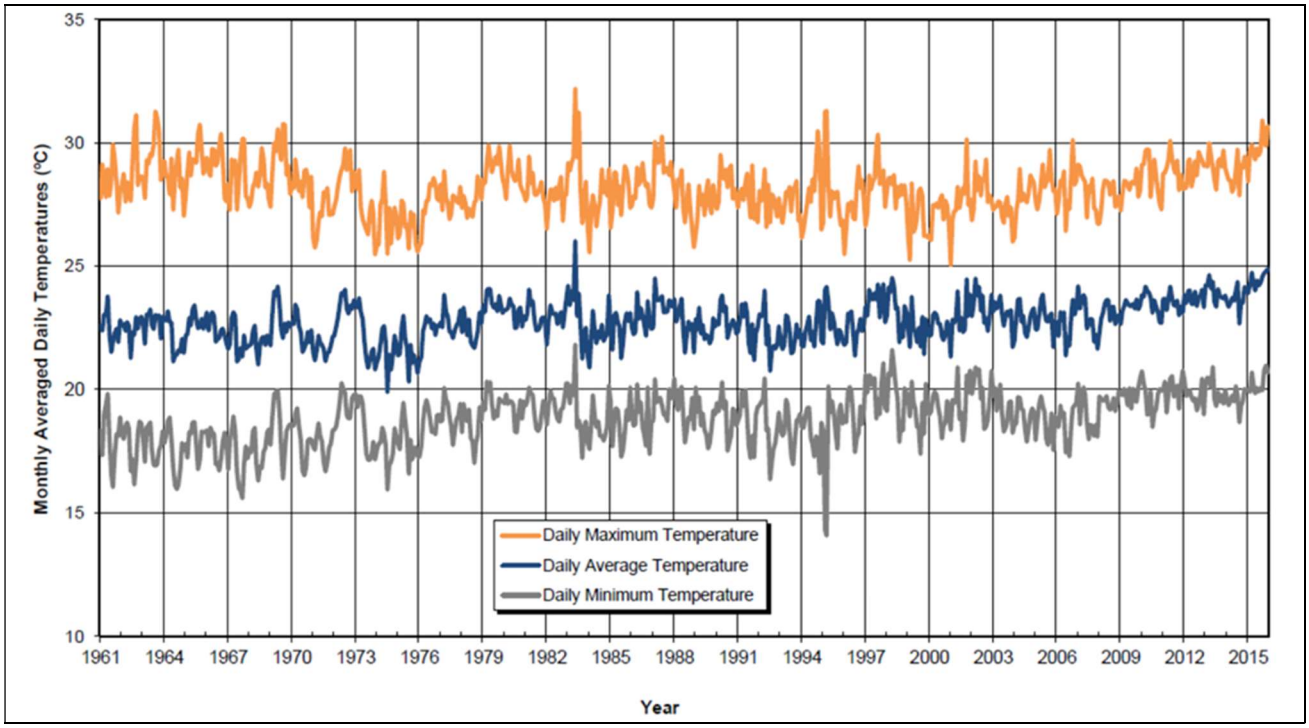


Figure 20.1 : Long-Term Synthetic Monthly Averaged Temperatures At Rocafuerte Station

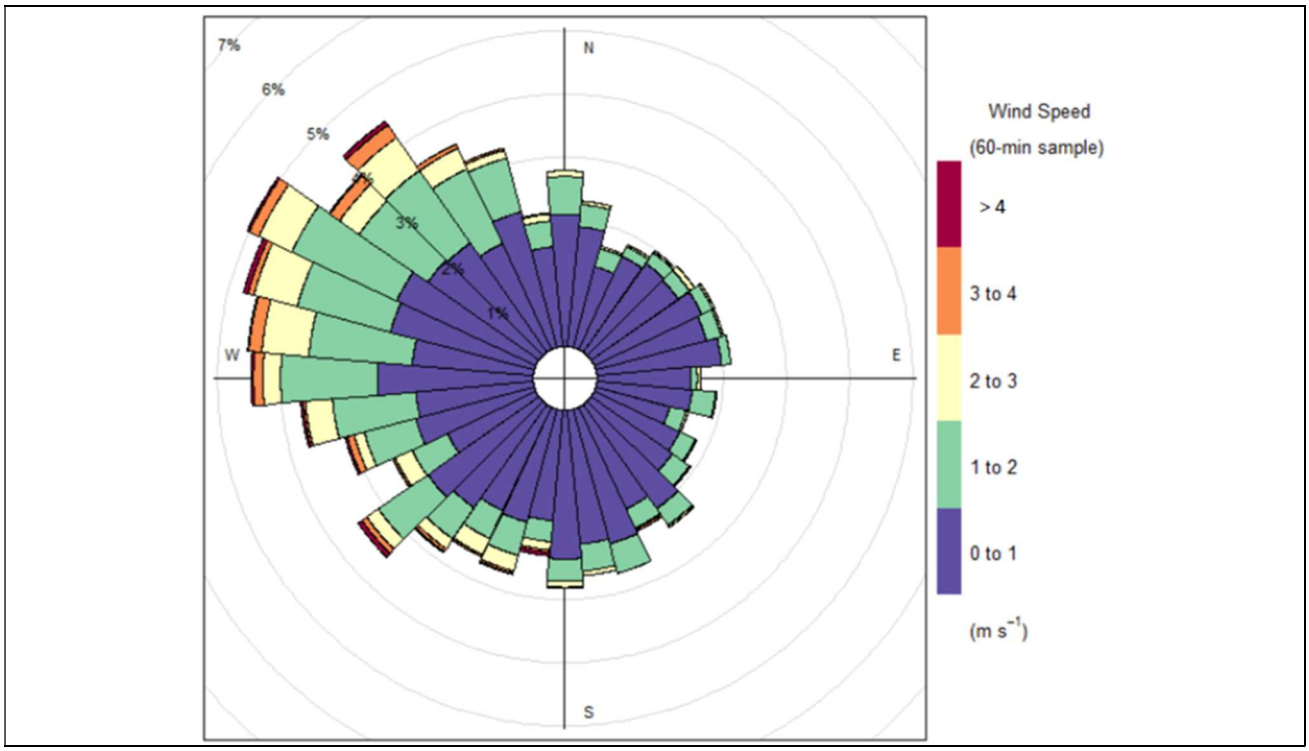


Figure 20.2 : Rocafuerte Station Wind Rose

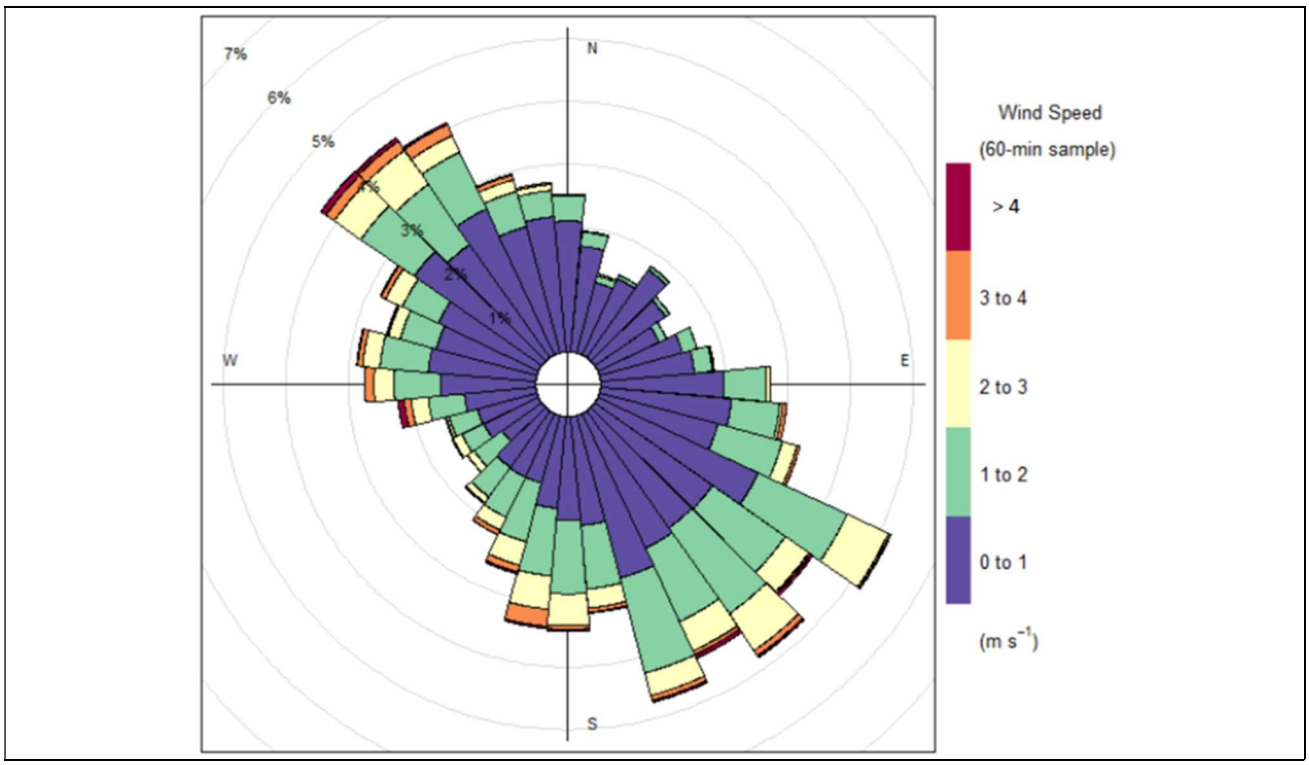


Figure 20.3 : Alpala Station Wind Rose

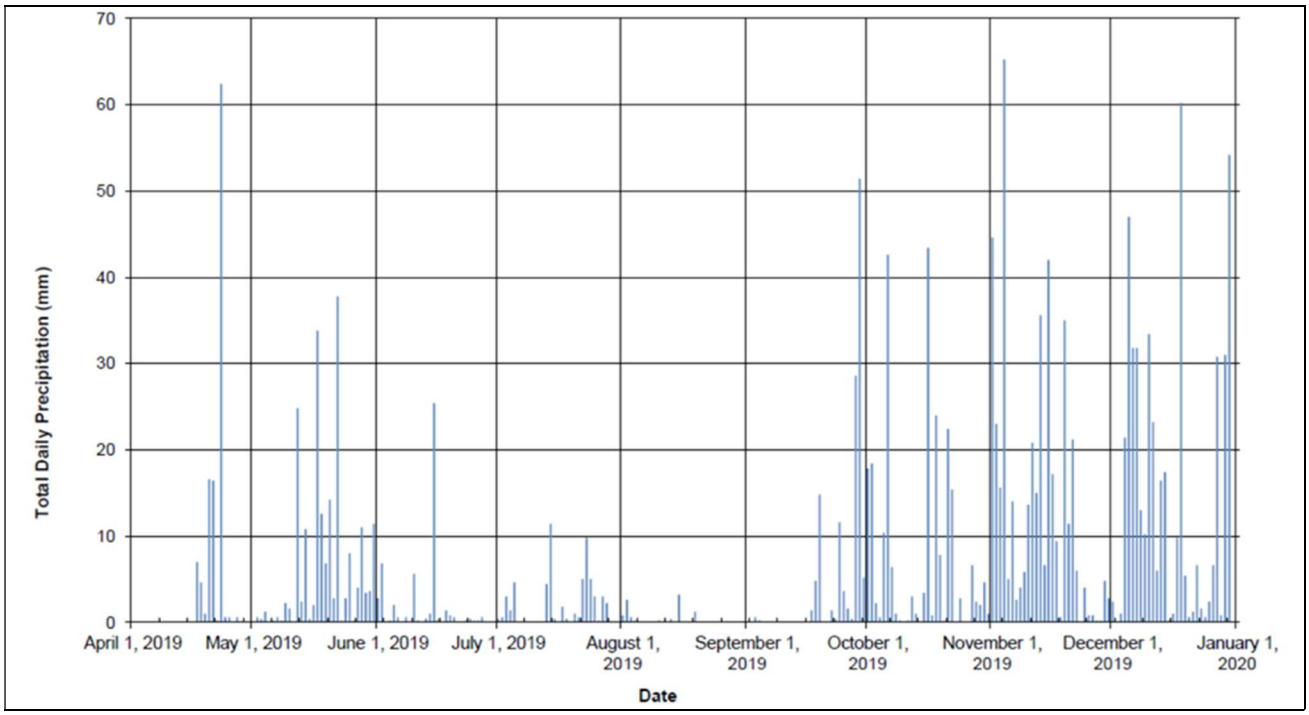


Figure 20.4 : Total Daily Precipitation Rocafuerte Station

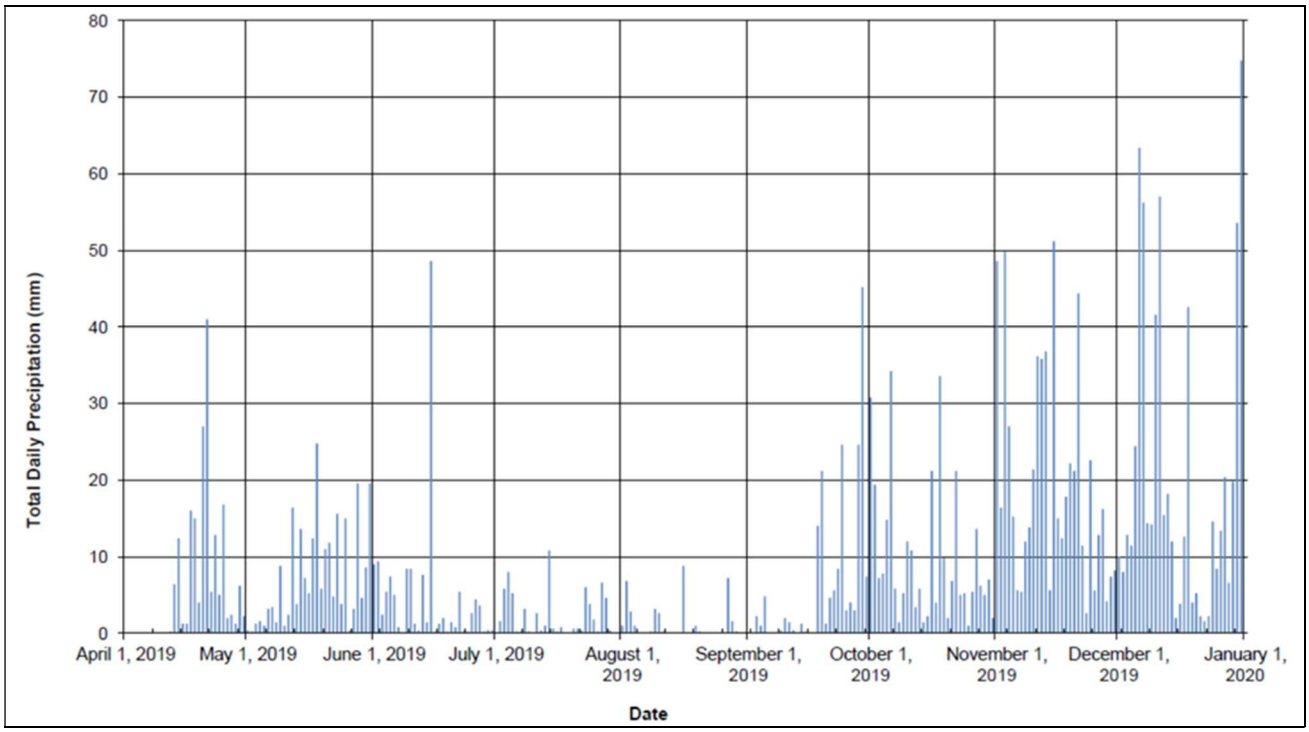


Figure 20.5 : Total Daily Precipitation Alpala Station

20.3.2 Surface Hydrology

Primary drainages to the Río Mira include the Parambas, the Río Verde, and the Río Cachaco. Several other rivers and streams also drain the area of the concession and its surrounds (Figure 20.6). Flows in these catchments are bi-modal, with peaks seen in association with the rainy seasons of December and March. Average high flows range from 1 to 3 m^3/s, and during low flow or dry seasons can become dry or almost dry. The Río Mira, as the central drainage of the area, maintains flow year-round, with an average annual flow in excess of 40 m^3/s. During storms and periods of high rainfall, flows can peak at several orders of magnitude higher than their average high flow.

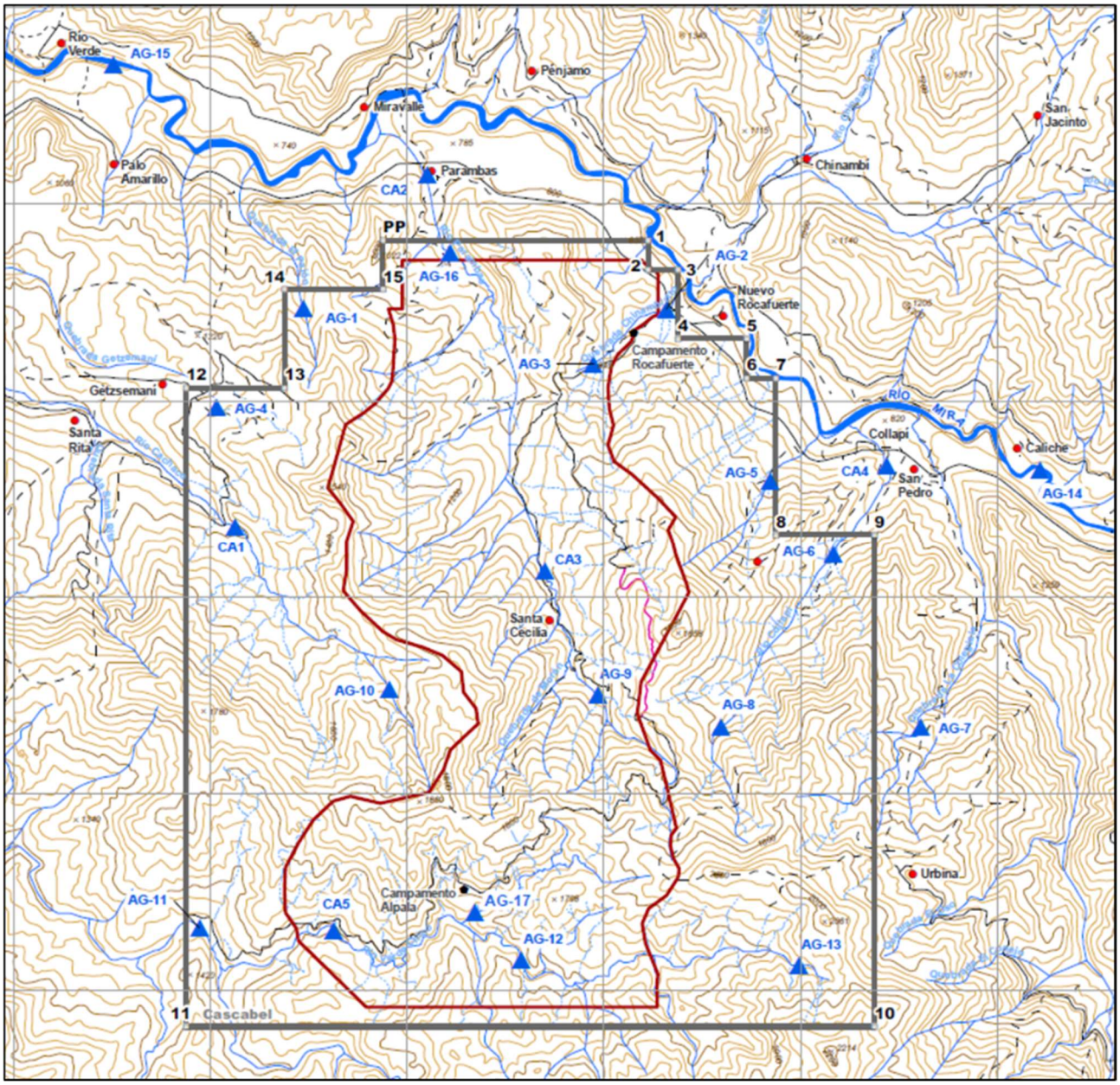


Figure 20.6 : Area Drainages and Water Quality Sampling Locations

To complement the climate data studies, an enhanced surface hydrology program was implemented to develop a fulsome hydrometeorological dataset. This included installation of automated hydrometric stations at five locations to record continuous water level data. Collection of stage level and discharge data at the hydrometric stations allows for development of rating curves, which are necessary to develop a long-term synthetic flow series. The long-term flow series support the water balance and water management design, water quality modelling, and subsequent effects assessment of the project on fish and fish habitat.

The current hydrometric monitoring network provides good spatial coverage of the concession area (Figure 20.7), including from the Rio Verde Chico watershed (Station EHA1), the Rio Parambas watershed (Station EHA2), the Rio Cachaco watershed (Station EHA3), the Rio Collapi watershed (Station EHA4), and the Quebrada Chinambicito watershed (Station EHA5). The five stations, which were constructed between 15 May and 11 July 2019, have been collecting water level data at 5-min intervals since the time of installation. Additional hydrometric monitoring will be installed at the Coastal Plains tailings facility site. Available data collected to date and regressed against longer term regional data from government sources suggest the following summary statistics:

- The mean annual unit runoff for watersheds within the Project area are estimated to be 54 L/s/km^2, which corresponds to a unit runoff depth of approximately 1,700 mm
- The effective annual runoff coefficient for the basins within the Project area is estimated to be approximately 65%.

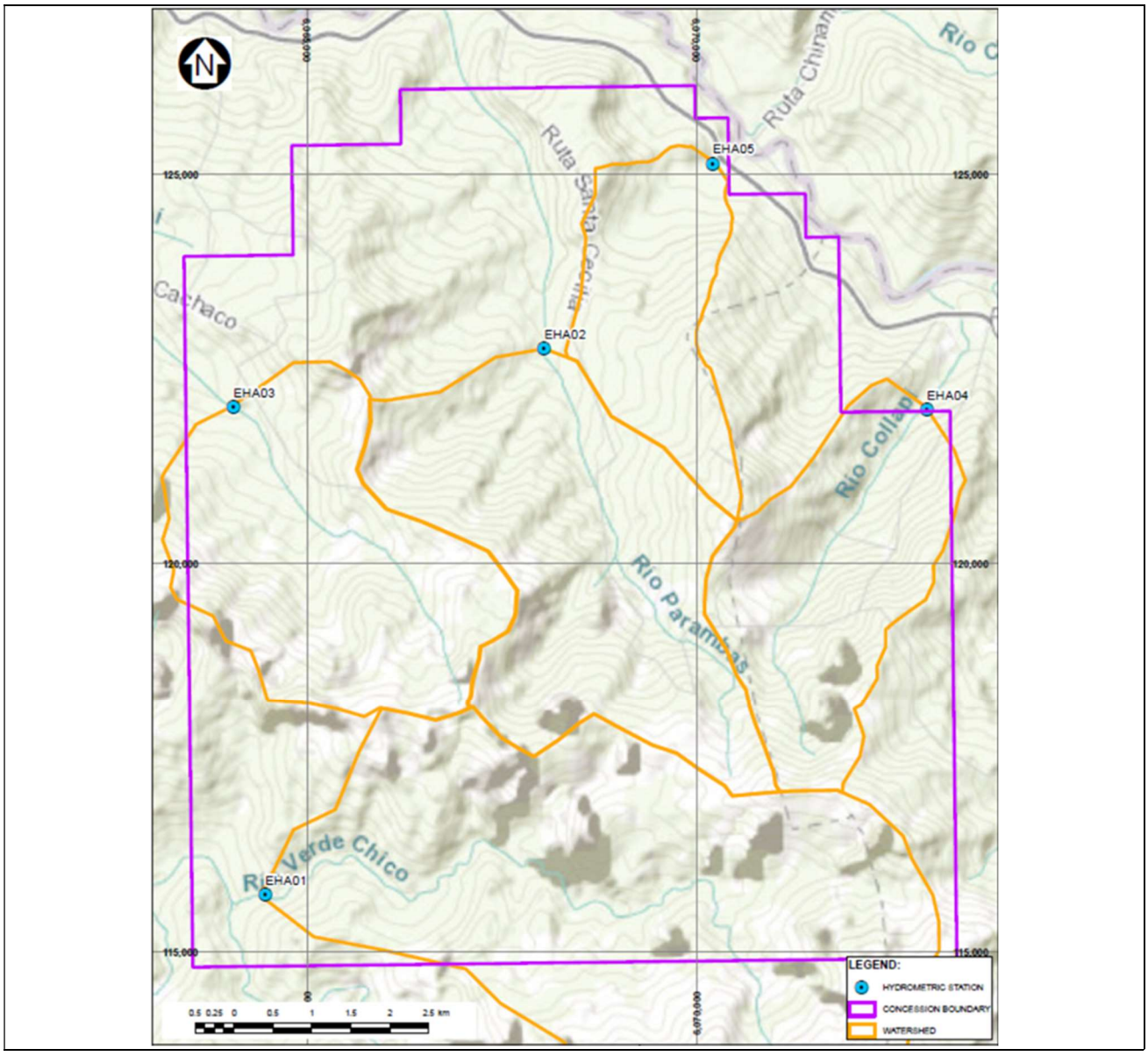


Figure 20.7 : Hydrometric Monitoring Locations

20.3.3 Surface Water Quality

As a requirement of the exploration permits, surface water quality samples were collected semi-annually at five sites (CA1 to 5) during early exploration. In anticipation of the ESIA development, surface water quality sampling was expanded in the project area, starting with the upstream control and downstream effect

sampling in and around the concession at 22 sites (Figure 20.6

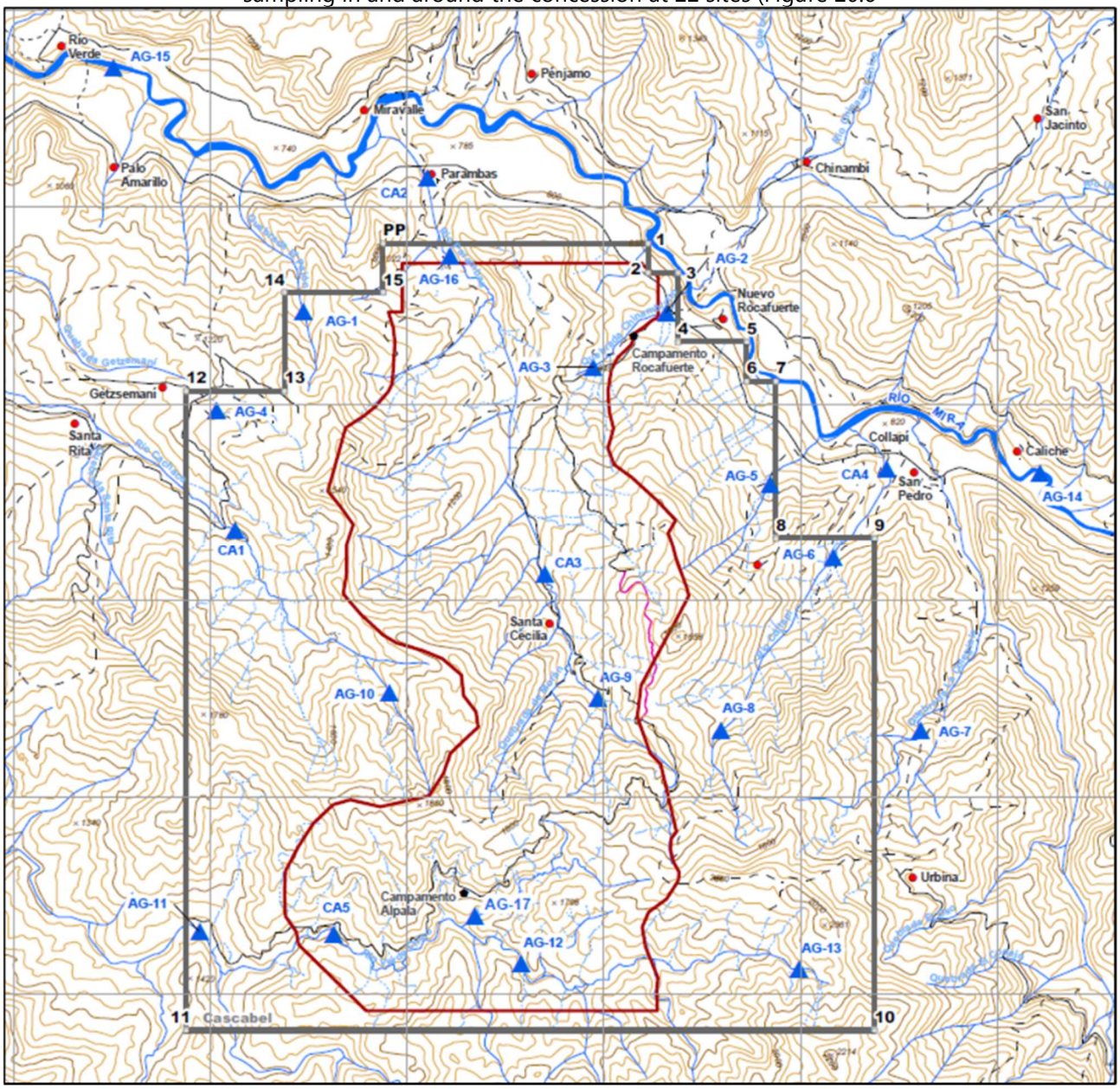


Figure 20.6). Additional sites will be required to accommodate baseline study of the off-concession infrastructure, including the Coastal Plains tailings storage facility.

Water quality parameters analysed to date are generally found in concentrations below limits specified for human consumption, domestic use, and conservation of flora and fauna, as specified in the TULSMA. Some elevated levels of faecal coliforms were noted, especially near populated areas (e.g. at CA2 and CA3), where limited sewage treatment is available. Additionally, some peak values of aluminium, copper, iron, manganese, zinc were also observed, and for specific samples, lead. It is important to note that these values are present in the baseline condition; and metals are associated with the nature of the deposit.

20.3.4 Geochemical Analysis

Geochemical analysis of representative waste rock has been planned to evaluate the potential for Acid Rock Drainage and Metal Leaching (ARD/ML). Results of these studies will aid in the development of mitigation and management plans. Test procedures will include static tests, total elements, acid-base accounting, mineralogy, and kinetic tests.

Tailings samples generated by metallurgical laboratory program have been assessed for their geochemical properties. The University of Queensland completed testing on bulk (rougher) tailings material, the key findings of which were that they were classified as low Potentially Acid Forming, with copper being the main aqueous contaminant of potential concern.

Knight Piésold built on the University of Queensland assessment using two samples provided by SolGold (one rougher tailings sample and one cleaner tailings sample). The additional sampling determined that the rougher tailings are considered to be Non-Acid Forming and no specific controls would be required with respect to acid producing potential of the rougher tailings sample. The cleaner tailings are, however, considered Potentially Acid Forming and will require controls to prevent acid generation.

20.3.5 Air Quality

Air quality and noise data were collected as part of the 2013 EIA and have subsequently been monitored as part of the exploration management plan at seven locations throughout the concession. Air quality measurements include PM_{10}, $PM_{2.5}$, and Total Settleable Particulates, as well as ozone, carbon monoxide, sulphur oxides (SOx) and nitrogen oxides (NOx). None of these parameters exceed acceptable government norms in the baseline condition.

20.3.6 Greenhouse Gas Emissions

Ecuador emits approximately 2.3 metric tons per capita of CO_2 equivalent and is shown to be increasing over the last decade (as of 2018, World Bank Data Store). The forests of the country, particularly in the Amazon basin, may act as a carbon sink, offering some buffering capacity. However, as conversion of forested land to agriculture and urban areas increase, the capacity of carbon capture of the forests is reduced. Ecuador has ratified the 2017 Paris Accord and agreed to target a 25% reduction of 2012 levels of Greenhouse Gases (GHG) by 2025.

The mining industry is an energy intensive industry and often a significant emitter of greenhouse gases. Within a mine, vehicles account for between 50 to 80% of the total direct emissions. Technology associated with cleaner fuel sources and electrification of fleets, coupled with behavioural protocols such as auto-shutoff vehicles and no idling policies, can be implemented over time to reduce emissions.

Preliminary calculations based on projected diesel consumption of 100,000 litres per day at the Cascabel Project indicate daily GHG emissions of approximately 1,000 tonnes of CO_2. This represents a conceptual assessment based on the US EPA Greenhouse Gases Equivalencies Calculator (EPA, 2021). A detailed GHG accounting will be completed as part of the ESIA and made public in due course.

20.3.7 Noise

Noise measurements collected at site at nine locations throughout the concession are compared to TULSMA limits. In the baseline condition, the primary source of noise was determined to be flowing water, rainfall, or wildlife such as birds and insects. These sources produced peak noise measurements of up to 60 dB(A).

20.3.8 Flora and Fauna

Vegetation and wildlife of the Cascabel concession was described in the Environmental Impact Assessment prepared in 2013 for the exploration phase (Cardno ENTRIX, 2013) and continues to have regular surveys conducted under that permit. Expanded transects for flora and fauna were initiated within the concession area in anticipation of support for the EIA. The concession area is characterised as having a patchwork of remnant mature tropical forest interspersed with disturbed forest and cleared/agricultural land.

A total of 293 vegetation species have been identified within the concession, of which 15 are endemic. A total of 81 species of mammals were identified (of which 38 are bat species), 295 species of birds, 51 species of amphibians, 38 species of reptiles, and 28 species of fish. Many of these are endemic to the region. The highest concentration and diversity of species are found in the remnant patches of original forest.

Ongoing monitoring of flora and fauna has identified species of conservation concern as defined nationally in the Listas Rojas De Especies De Vida Silvestre Del Ecuador (Red Lists of Ecuadorian Wildlife Species), and internationally as defined by the International Union for the Conservation of Nature (IUCN). A total of 8 vegetation species, 6 mammal species, 11 bird species, and 29 amphibian and reptile species are listed as Vulnerable or Endangered. Additionally, the following species have been identified within the concession and are listed as Critically Endangered:

- *Ocotea pachypoda* (tree)
- *Pristimantis cf. loustes* (frog)
- *Pristimantis pyrrhomerus* (frog)
- *Astroblepus aff. ubidiai* (catfish)

It will be necessary to incorporate habitat and conservation needs of these species to mitigation planning for the Project. If individuals or habitat of the Critically Endangered species are affected, compensation, in the form of preservation of habitat outside of the area of impact, may be required. Where compensation is required, international standards specify that a net gain must be demonstrated for the species of concern.

20.3.9 Environmental Program Development

20.3.9.1 Baseline Studies

Ongoing environmental studies contribute to the project database and will inform continuous planning. As the project definition increases, the environmental studies expand to ensure adequate baseline characterisation of all planned infrastructure. In preparation for the eventual ESIA and permitting requirements, SolGold expanded environmental studies in 2019.

A groundwater quality and quantity characterisation has been initiated, which includes determination of hydraulic properties of aquifer units and hydraulic head measurements, to support development of a water balance (e.g. water egress from the underground) and water management planning and identify surface water–groundwater interactions that could affect the use of water by local communities and aquatic biota.

The hydrogeological monitoring program was designed to have sufficient spatial and vertical coverage to characterise the three-dimensional groundwater flow regime at both the site and off-site in the receiving environment. Purpose-built monitoring wells were installed at 10 sites to be used for water level monitoring and pump tests as required. Sampling at wells includes:

- Hydraulic testing (packer & slug tests)
- Water level monitoring
- Water quality sampling.

The installation of the monitoring wells was initiated in early 2020 and completed later that year after an interruption during quarantine for COVID-19. Preliminary results are from wells in Sandy Silt to Clayey Silt Saprolite units. Hydraulic conductivity tests in saprolite indicate values of 10^{-6} m/s, and near surface bedrock values of 10^{-8} to 10^{-5} m/s. Water levels are near ground surface in valleys and 20 to 50 m below ground surface along topographic highs. A program to install additional water monitoring wells around other offsite infrastructure is ongoing.

The existing soil characterisation program will be expanded to include possible surface infrastructure footprint areas, such as the tailings storage facilities, processing plant, laydown areas, etc. The program will be designed to support assessment of general surface instability, erosion and/or sedimentation potential. Material characterisation of the soils will also be necessary to identify soil conservation measures (e.g. segregation, proper placement and stockpiling of clean soils and overburden material) for site remediation.

The spatial extent of the ongoing vegetation and wildlife studies will be expanded to assess natural habitats or species populations within the proposed footprint, and to help direct reclamation planning. New baseline investigations will be conducted in areas proposed for infrastructure developments such as the tailings facility, access road, concentrate pipeline, and transmission line. Fisheries and habitat surveys will be included in the faunal surveys within the rivers and creeks that will be within the footprint of the project and in areas downstream.

20.4 Social and Community Requirements

20.4.1 Local Socio-Economy

The mining concession is principally located within the Lita and La Carolina parishes, within the Ibarra Canton, Imbabura Province.

According to the 2010 census conducted by the National Institute of Statistics and Census (INEC, or Instituto Nacional de Estadísticas y Censos), the Lita parish has of a population of 3,349, the La Carolina parish has a population of 2,875, and the Jijón y Caamaño parish has 2,017 inhabitants.

The primary access to the area is by Ecuador Highway 10 (E10, Transversal Fronteriza), which runs from Salinas to San Lorenzo. At Salinas, E10 joins with all other major highway systems in the country connecting to major urban centres such as Ibarra and Quito to the south.

The communities most proximate to the project are described in Table 20.2, and are illustrated, along with more distal communities on Figure 20.8.

Table 20.2 : Communities in the Concession Area	
Community	**Characteristics**
Santa Cecilia	Located in the centre of the concession 280 people 74 families 75% family works for SolGold
Santa Rita	Located downstream of the Cachaco TSF 80 people 36 families
Getzsemani	Access road located on Concession 324 people 91 families
Santa Rosa	Located several km downstream of Cachaco TSF 140 people 42 families
Cachaco	Located near the Rio Mira at the base of the Rio Cachaco watershed 166 people 65 families
San Pedro	Located downstream in the catchment of the waste rock storage area 526 people 154 families
Parambas	Located immediately downstream of the Parambas Water Dam on E10 422 people 132 families

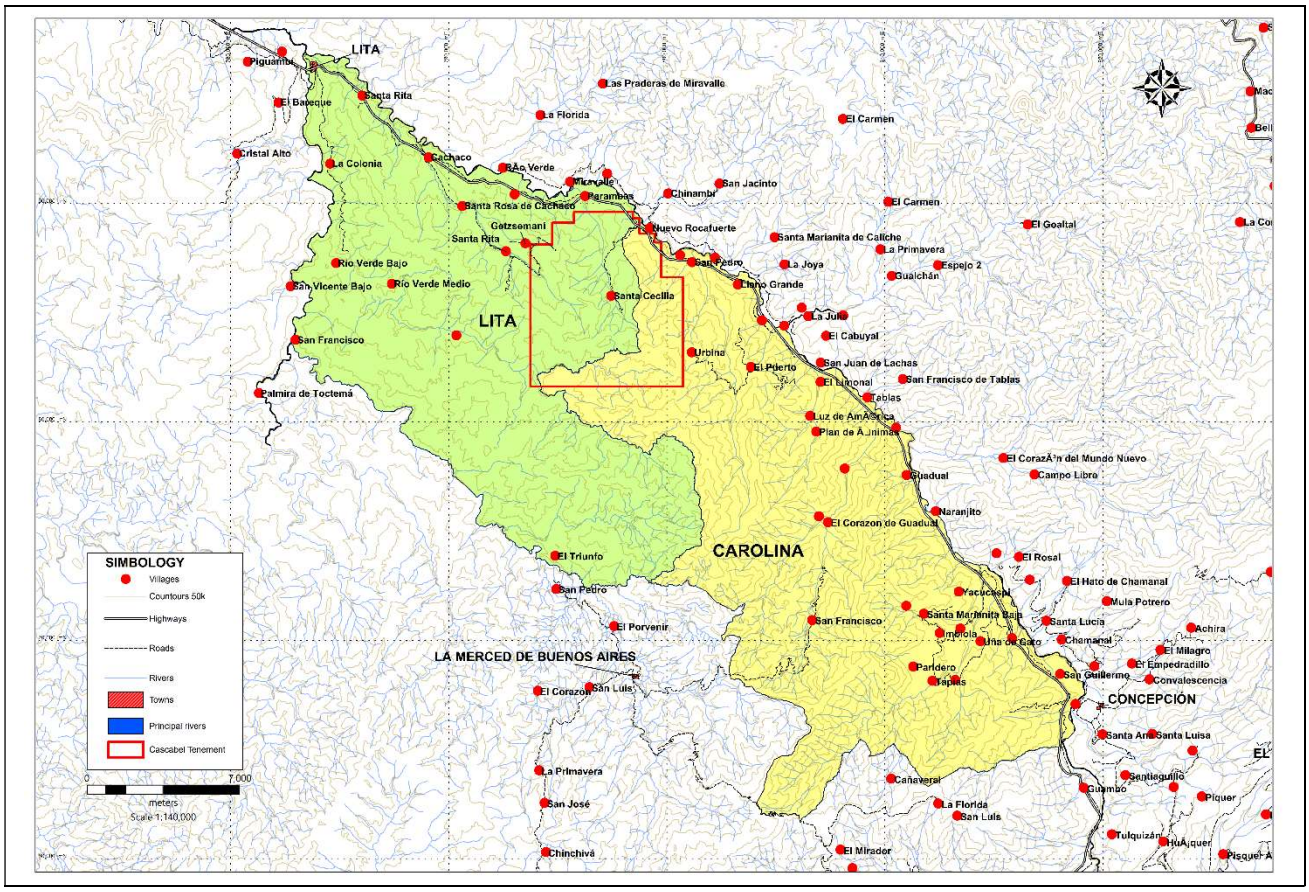


Figure 20.8 : Communities in and Around the Concession

Each community in this area is relatively young, many having been founded in the 1900s. They are populated primarily with descendants of workers brought in the 1950s to construct the now defunct Ibarra – San Lorenzo railroad. Workers settled in the areas work camps, which now form local communities. The principal economic activity of the area is farming of naranjilla, a fruit-bearing shrub, and cabuya, an agave plant grown for production of fibres used to make twine, as well as bananas and corn.

The Coastal Plains TSF is located in a remote area with minimal existing infrastructure. Residents are largely subsistence farmers, with some reliance on artisanal mining. There are no towns or villages within the Coastal Plains TSF area.

20.5 Outreach Activities

SolGold operates a robust community engagement program within the concession area, with a permanent presence at the project, and a meeting room available to the public and that is used as a base for outreach activities. Interviews with representatives of organisations, local governments, community leaders and members of the public in the local communities are conducted often to continually educate communities on the project activities. Open houses and community presentations are conducted regularly, and community members are invited and trained to participate with ongoing environmental monitoring (Figure 20.9).



Figure 20.9 : Environmental Monitoring with Community Member Involvement

SolGold has made it a priority to emphasise good Corporate Citizenship, with a number of social programs implemented. This includes preferential employment and training for local residents. Over 400 Ecuadorian nationals are employed at the project, representing approximately 97% of the total workforce. Financial support of school, health care and social events is provided, with the focus being training, capacity building, and community strengthening.

SolGold constructed an agro-forestry nursery in 2013, which is managed by qualified agrologists. The nursery produces approximately 30,000 plants of native commercial and horticultural species, which are dispersed to the community along with professional advice to farmers, education on sustainable agriculture, and assistance with planting. Community members are also employed to work at the nursery.

Other recent initiatives include:

- Enhancement of chicken farming for communities to increase food quality and security (Figure 20.10)
- Food services contracts for SolGold camps and workers
- Improvements to health services, especially for children, pregnant women, elderly and the disabled
- Training for trades such as construction, mechanical, welding, etc.
- Post-harvest training and mechanisation of coffee production and sales
- Pre-school education programming for young children
- Small business loan and mentoring program
- Transportation services of goods for sale (Figure 20.11).

These activities build on long-standing involvement in the community and successful programs developed in previous years.



Figure 20.10 : Program for Chicken Farming Enhancements



Figure 20.11 : Assistance with transportation of market goods between the Cahuasquí and Jacinto Jijón y Caamaño parishes

As the COVID-19 pandemic developed in Ecuador and in the project area, SolGold was very proactive with assistance for communities in planning and managing risk, as well as sourcing and supplying safety equipment, and enhancing sanitation (Figure 20.12 and Figure 20.13).



Figure 20.12 : Distribution of 2,600 masks to the La Carolina parish



Figure 20.13 : Construction of Sanitary Washing Stations in the Lita parish

These ongoing outreach activities will continue as part of the Environmental, Social, and Governance (ESG) activities, and to remain transparent as the project develops, in keeping with public participation requirements of the Environmental Act.

Expansion of engagement and outreach activities to the areas associated with the Coastal Plains TSF, the tailings pipelines, and the concentrate pipeline is required in the near term to ensure that supporting studies and development proceeds uninterrupted.

20.6 Indigenous Communities

There are no identified indigenous individuals or communities within the concession or the immediate surroundings.

To the west and outside of the mine concession in the Lita parish and in Esmeraldas province, there are settlements of the Awá people. The Awá are native to northern Ecuador and southern Colombia, and have largely integrated to modern agrarian society, yet still have unique customs and beliefs, and are identified as Indigenous People. Currently it is understood that the Coastal Plains TSF is not located within an area of influence for the Awá.

SolGold has planned to commission an anthropological study to examine the ability of the Indigenous People to conduct their way of life, including traditional customs, and access to culturally important sites.

Implementation of the study was delayed during restrictions related to COVID-19, but it is expected to commence in 2022. The planned study will include participatory methodology that incorporates criteria established by the Indigenous and Tribal Peoples Convention 169 of the International Labour Organisation (ILO, 1989).

20.7 Archaeology and Culture

An archaeological study was completed as part of the 2013 EIA, where sites pertaining to the pre-Incan Caranqui culture were identified in the project area (Cardno Entrix, 2013). During the study, four sites were found that contained fragments of ceramics, further supporting the theory that there is archaeological value in the region.

In 2019, an archaeological survey was conducted on the entire concession, where areas of archaeological sensitivity were outlined and assessed as high, medium, low, or null. Within this framework the company conducts exploration, monitoring and, if necessary, rescue with qualified archaeologists.

SolGold, through their community consultation program, has additionally identified culturally important sites in the region. Many of these are associated with their importance to support to the community, including water collection tanks, sports fields, and churches, but also include natural areas such as waterfalls.

All archaeological and cultural attributes will be incorporated to project planning to minimise potential impacts.

20.8 Closure Planning

20.8.1 Closure and Bonding Requirements

The Mining Law (Ley de Minería) specifies that a Closure Plan is required as part of the ESIA, and subsequently included in a Contrato de Explotación Minera (Mine Exploitation Contract) with the Ministry of Mining. The Closure Plan will include an estimated closure cost, upon which a financial guarantee or insurance policy in favour of the government will be required, which must remain in force until the final closure of operations.

The Reglamento Ambiental para Actividades Mineras (Environmental Regulation for Mining Activities, or RAAM) provides further detail on bonding requirements, specifically in Articles 35, 37, 124, and 129. The bond must be issued through an Ecuadorian financial institution and can be revised through the project life to reflect changes to the closure and reclamation costs. A final and detailed closure and reclamation plan with an updated cost must be provided within two years of the final project closure date.

The bond amount and financing mechanism will be negotiated by SolGold upon completion of the closure plan included in the ESIA, and as part of the Mine Exploitation Contract. Costs associated with the bond are not included in this report.

20.8.2 Closure Planning

The detailed Closure Plan will be developed as part of the ESIA; the approach will be designed to ensure long term stability of both physical and chemical properties of the site, and to return the landscape to its pre-mining capability where possible. Specific closure items are considered below.

Mine:

- Access will be restricted to the subsidence zone with the use of berms, road closures, and warning signs to restrict access of personnel and vehicles, and to prevent unsafe utilisation
- Decommissioning and removal of mechanical and electrical equipment
- Plugging of the main decline with reinforced concrete
- Capping vent raises with reinforced concrete
- Regrading and drainage management of the portal entrance area.

Process Plant and Surface Infrastructure:

- Reagents and supplies will be removed and will be returned to suppliers, sold to other operations, disposed of in approved waste facilities, or transported to a certified company for disposal
- All foundations will be demolished and covered to approximate as closely as possible the pre-mining landscape topography
- Decommissioning and removal of the concentrate pipeline and rehabilitation of the concentrate pipeline access road
- Parambas Water Dam will have sufficient combination of flood storage and routing capacity to safely pass flood flows.

Tailings Storage Facilities:

- The tailings facilities will have sufficient combination of flood storage and routing capacity to safely pass flood flows
- The tailings embankments will have an appropriate allowance to withstand settlement from a Maximum Credible Earthquake (MCE) event
- All Potentially Acid Generating (PAG) material will be isolated from possible oxidation, either in the underground, encapsulated in inert material, or stored sub-aqueously
- Tailings delivery pipelines will be decommissioned and removed
- Decommission and remove mechanical and electrical equipment
- Decommission and remove of the water return barges and pipelines
- Access to the tailings facilities will be restricted with the use of berms, road closures, and warning signs to prevent access of personnel and vehicles.

Port Facility:

- Decommissioning and removal of mechanical and electrical equipment, as well as re-grading and revegetation of disturbed areas.

Electrical Transmission Line:

- Equipment, conductors and other above ground facilities for the electrical supply will be dismantled and removed.

The final closure methods will incorporate community involvement to ensure that end land use objectives are socially acceptable and in keeping with the broader land use planning of the area. Some project infrastructure, such as roads, transmission lines, and port facilities may be left in operable condition and transferred to government, communities, or private companies. The current closure cost has assumed all infrastructure must be removed and rehabilitated, or left in a stable, passive configuration. Similarly, the current cost estimate does not provide an allowance for sale of equipment upon closure, or for salvage costs. These represent opportunities for future costing exercises.

Progressive rehabilitation is currently integrated to the exploration phase and will be an important aspect of concurrent programs during operations in order to minimise final disturbance areas upon cessation of mining. The current program of successfully rehabilitating drill pads and other unused disturbance areas will be used as a basis of experience for revegetation during operations. The experience gained from the ongoing monitoring of rehabilitated plots, as well as from the utility of the agro-forestry nursery, will be applied to the concurrent reclamation program.

Closure activities will include all active closure required to prepare the site for abandonment, as well as a post-closure monitoring program. It is estimated that the active closure phase will require 2 years, and the post-closure monitoring will continue for a further ten years, or until acceptable closure metrics are achieved.

Preliminary closure costs were developed and are reported in Section 21. For the Cascabel project costs are estimated to be US$ 78 M.

20.9 Comments on Section 20

20.9.1 Baseline Studies

Baseline studies have been undertaken in the Cascabel concession only to date and are yet to commence for the remaining Project areas. The baseline studies at the Cascabel concession include meteorology, surface hydrology, surface water quality, geochemical analysis, air quality, greenhouse gas emissions, noise, flora and fauna, archaeology and social surveys.

20.9.2 Closure Plan

Closure planning has been undertaken to support the Pre-Feasibility study and will continue to be updated as the Project advances.

20.9.3 Environmental Considerations

Geochemical investigations indicate the waste from tailings will be PAG, which has been considered in the design of the TSF.

Environmental and social investigations should be extended to all Project areas.

Water quality modelling should be extended to cover the likely closure scenario to confirm the flows and quality of water requiring treatment post-operations, and to predict the number of years water treatment would likely be required once rehabilitation activities have been completed.

20.9.4 Permitting

ENSA currently holds permits required for exploration, including the Advanced Exploration permit and associated ESIA for the Cascabel concession area. In order to undertake additional technical investigations, a modification to the ESIA is in process to enable decline, access shaft and waste rock facility development.

Further works are required to progress the mine exploitation contract and ESIA for the Cascabel project.

20.9.5 Social Considerations

SolGold operates a robust community engagement program within the Cascabel concession area, with a permanent presence at the project, and a meeting room available to the public and that is used as a base for outreach activities

Social activities for the wider Cascabel Project are in the very early stages and should commence in order to enable the proposed Project development plan.

21 Capital and Operating Costs

21.1 Capital Cost Estimates

21.1.1 Basis of Estimate

The capital cost estimate meets the requirements for a Pre-Feasibility study, consistent with AACE® International cost estimating guidelines for a Class 4 estimate. The estimate accuracy range of ±25% is defined by the level of project definition, amount of engineering inputs, the time available to prepare the estimate and the amount of project cost data available.

The capital cost estimate is based on Q1 2022 assumptions, in US dollars.

The estimate has been compiled by Wood with inputs from consultants for their responsible scope of work:

- Mining Plus: Mine production, mine footprint and decline development, ventilation, dewatering & underground infrastructure
- Knight Piésold: Tailings storage, surface water management and closure costs
- Wood: Process plant, port facilities, surface infrastructure, underground crushing & materials handling system, tailings pipelines, power supply & distribution, services & utilities and concentrate pipelines
- SolGold: Owners costs
- All: Indirect costs, EPCM
- Wood: Contingency, based on ranging analysis with @Risk modelling.

The table below shows the consultants and their area of estimate contribution.

Table 21.1 : Consultants' Contribution

Consultant	Scope
Mining Plus	Mining: • Decline portal through to ore transfer into Primary Crusher • Mining specific surface and underground infrastructure – heavy vehicle workshop/s, fuel/lubrication storage, ventilation, air cooling, underground dewatering, utilities • Mobile equipment • Mine roads • Waste rock dump (WRD)
Wood	Underground Infrastructure: • Primary Crusher • Underground conveyors • Decline conveyors Process Plant & Infrastructure: • Secondary crushing, stockpile, tertiary crushing, milling, flotation, thickening, tailings and concentrate pumping systems • Water (process, raw, storm, TSF decant, potable) • Power supply, switchyard, transformers, and distribution • Roads and Buildings – temporary and permanent

Table 21.1 : Consultants' Contribution	
Consultant	**Scope**
	• Mobile equipment • Camp. Port Facilities: • Concentrate thickening, filtration • Concentrate storage • Ship loading • Utilities
Knight-Piésold	• Tailings Storage Facility (TSF) • Site water management • Site water dam • Closure costs
SolGold	Owners Costs including: • Pre-production capital • Off-site workshop/warehouse/office facilities • Business readiness • Surface rights • ESIA process • Resettlement • Owners team • Security and medical services • Insurance • Currency risk

Pre-production costs are all those costs prior to ore being process through the processing plant have been assumed as upfront capital costs. Post-production are all those capital works after the commencement of ore processing have been assumed as sustaining capital costs. Due to the long mine life, it is not expected that significant salvage values will be gained.

The following items were excluded from the capital cost estimate:

- Sunk costs incurred to date, including studies
- Geotechnical inconsistencies
- Operating costs
- Changes to design criteria
- Work stoppages
- Scope changes or an accelerated schedule
- Changes in national law
- Changes in national duties
- Hydrological issues
- Environmental issues

- Hazardous waste issues.

21.1.2 Direct Costs

21.1.2.1 Mine

The capital cost for mining was undertaken by Mining Plus.

The cost model provides a first-principles estimate of the costs associated with accessing the Cascabel orebody and setting up a block caving mining operation. The cost model has been constructed based on physicals output from the project schedule.

The costs are based on the assumption that all construction phase works to access the mine and set up for a caving operation are completed by a Mining Contractor.

The basis for decline advance rate and cost/m to meet production requirements, high-speed development rates will be required for the initial access development. Critical advance rates to the 300 L will be 220 m per month. To achieve the required critical advance rates, development equipment will need to be over resourced, to maintain 100% face utilisation.

21.1.2.2 Process Plant, Port and Surface Infrastructure

The capital cost for the process plant, port and site infrastructure was undertaken by Wood and includes all costs associated with these areas.

A priced mechanical equipment list is the basis of the process plant estimate. Multiple suppliers were approached for budgetary pricing of the major process equipment. At least three suppliers for each major equipment package were issued request for quotations to evaluate market pricing and potential cost savings with alternative equipment. The budget quotations were evaluated for technical and commercial compliance. The selected suppliers have experience with major mining operations in South America and have the capability to support the Cascabel Project into operations. Equipment quoted is based on global supply to maximise project value, country of manufacture and delivery times have been carefully evaluated.

Budgetary quotations (±10%) are received for 93% of the mechanical equipment.

Single unit rates have been used for material bulks and sourced from contractors and previous cost data for works performed in the region. Database rates were used as an alternative where site data was not available.

Two projects developed by Wood, one in Ecuador during 2016, and the other in Chile during 2020 were used as reference projects to establish site material supply and installation rates.

Quantities for the estimate are taken off in the same categories as the commodity code listing. New commodities were only created for unique items or activities of significant cost. Where works were not yet engineered, quantities were factored or estimated using historical data for similar installations.

Quantities produced for the estimate are neat in place design quantities. Wastage was included in the material rates.

Growth allowances by discipline have been applied to the estimate. The growth allowances applied to the estimate cover identified but undefined or poorly defined scopes of work in the estimate that, due to the preliminary nature of the engineering and lack of completed, accurate and detailed information, are not sufficiently defined or foreseen at the time the estimate was compiled.

Common earthworks rates were established for the project and applied to all areas of the estimate, with the exception of the tailings dam construction where mining rates suitable for very large volumes were applied. Clear and grub rates are based on heavily wooded and dense vegetation, these costs are based on several factors including number and size of trees, topography and the presence of debris such as rocks.

Construction material for roads and hardstands has been assumed to be available locally from borrow pits, reducing the requirement for imported material. Excavation rates were based on stockpiling of spoil on site.

Plant civil and earthworks quantities were measured from the engineered site layouts and 3D model. Cut/fill volumes were based on the contour files - Pre-Feasibility DTM utilising models in Inroads. The majority of the earthworks is required for the establishment of roads, ponds and pads. The quantities derived include for clear and grubbing of works area, striping of topsoil (200 mm), bulk excavation for levelling of pads, drainage and erosion protection. MTOs were also produced for the main site access road (20 m wide sealed) and in plant roads (8 m wide unsealed). Process, raw water and run-off water pond excavations, sand bedding and HDPE liners have also been quantified. Limited geotechnical information was available during the Pre-Feasibility therefore common ground conditions are assumed. An allowance for rock excavation was included. The rock is presumed to be rippable with no requirement for drill and blast.

Concrete volumes were based on MTOs taken from the 3D Model. Concrete rates used were based on mobilisation, demobilisation and monthly hire charges of a mobile batch plant.

Structural Steel and platework fabrication has been assumed to be sourced domestically therefore, local steel fabrication rates have been used.

Piping quantities were derived from site layouts and pump calculations. The piping MTO includes line sizing, material specification and length assigned to a work breakdown structure plant area. Piping materials include HDPE, stainless steel, carbon steel and carbon steel rubber lined. HDPE is used where possible. Small bore piping to 25 mm NB is included in the MTO. Pipe racks are included in the structural steel MTO. A quotation was received for concentrate pipeline material.

Major manual and control valves are quantified. Control valves are listed under instrumentation. Valving and instrumentation for the concentrate pipeline was quantified and budget pricing obtained.

Major Electrical equipment for the Pimampiro switchyard, Cascabel Project main substation and 230 kV overhead transmission line has been quantified and budget pricing obtained. All other electrical and instrumentation bulks were factored on mechanical equipment installation costs. Minor electrical equipment related to vendor equipment has been included in the equipment cost. The exception to this is the dedicated electrical rooms for the mills which are separate items.

All-in labour rate were used for installation based on local sourced labour rates and include labour and contractor distributables. The rate includes travel time, R&R leave, PPE, construction equipment, tooling, supervision and management, insurances, overheads, profit, mobilisation and home office support costs. Provisional allowances for heavy lift cranes was estimated separately.

21.1.2.3 Tailings and Water Management Facilities

The capital cost for the Coastal Plains TSF and water management was undertaken by Knight Piésold and includes all costs associated with the tailing's disposal and water management.

Quantities have been measured from the 3D models generated for the embankments, spillways, diversion channels and roads. No allowance has been included for growth of the quantities (escalation in volume above the design volume) as the design is considered to be slightly conservative and some optimisation of the design is expected in the next phase of study.

Unit rates were developed by Knight Piésold based on experience in design of similar projects and provided by Wood where applicable.

21.1.3 Indirect Costs

Indirect costs include all costs needed to carry out the engineering procurement, and construction management (EPCM) services for the Project. These costs were calculated by Wood's estimating group. The main costs in this category are EPCM services, construction camp, catering, temporary facilities, third-party services, spare parts, freight, and customs.

This estimate includes Owner's indirect costs calculated by SolGold.

The construction contractors' indirect costs are included in the construction costs.

21.1.4 Sustaining Costs

Sustaining capital costs were estimated using the same estimation basis as outlined for the direct costs.

The sustaining capital is for planned future capital works for the Project, mainly the tailings dam wall raises, and mine equipment replacement.

21.1.5 Closure Costs

The closure plan was organised into the main Project areas following the project Work Breakdown Structure.

The timing of incurred expenses was estimated based on the expected reclamation and closure schedule and followed three main Project phases (Operations, Active Closure, and Post Closure).

The schedule for this closure cost estimate includes the following:

- Operations phase (portions of infrastructure related to the first tailings storage facility, to be closed prior to the end of the Life of Mine)
- Active Closure phase (closure of the remaining mine infrastructure)
- Post Closure phase (monitoring of the mine infrastructure).

Estimates of ancillary costs for Mobilisation and Demobilisation, as well as Post Closure Monitoring and Maintenance were included in the cost model. These ancillary costs were proportioned into the overall costs

for the main project areas. The cost to perform each work item was estimated based on a quantity estimate multiplied by a unit cost estimate.

21.1.6 Capital Cost Summary

Initial capital costs are estimated to be US$2,746 M as shown in the table below.

Table 21.2 : Initial Capital Cost Summary

Area	Initial Capital Cost US$M
Mine	900
Process plant	465
Tailings storage facility	309
Port facility	39
Surface infrastructure	175
Indirect costs	467
Contingency	391
Total	**2,746**

Expansion, sustaining capital and closure costs include the second process plant module, bringing the process plant capacity to 25 Mt/y, continued tailings storage facility development, equipment replacement and closure costs. Expansion, sustaining capital and closure costs are estimated to be US$2,136 M. The total capital cost is therefore US$4,882 M.

The life of mine capital cost estimate is summarised in Table 21.3.

Table 21.3 : Cascabel Project Total Capital Cost summary

Area	US$M (US$M)
Pre-Production Capital Cost	2,746
Post-Production Capital Cost [Note 1]	688
Sustaining Capital Cost	1,369
Closure Cost	78
Total Capital Cost	4,882

Note 1: Module 2 capital cost

21.2 Operating Cost Summary

21.2.1 Basis of Estimate

The overall project operating cost estimate has been broken down into the following areas:

- SolGold: General and Administration
- Mining Plus: Mine operations
- Wood: Process Plant operations

- Knight Piésold and Wood: Coastal Plains Tailings Storage Facility construction, operations
- Wood: Surface Infrastructure
- Wood: Port.

The operating cost estimate is based on Q4 2021 assumptions, in US dollars.

The operating cost was prepared on the following basis:

- All equipment and materials will be new
- The labour rate build-up will be based on the statutory laws governing benefits to workers that were in effect at the time of the estimate.

The following items were excluded from the operating cost estimate:

- Sales and marketing
- Foreign exchange, finance and interest charges
- Costs due to extraordinary currency fluctuations (e.g. materials sourced from overseas)
- Changes in Ecuadorian law
- Other duties and taxes (except as identified)
- Force majeure events
- Pre-operations training of personnel
- Transport and handling of concentrate and doré from the plant (included in the financial model)
- Freight estimates are based on vendor supplied freight quotations or in-house data
- No contingency is assumed
- No cost escalation (or de-escalation) is assumed.

21.2.2 General and Administration

The General and Administration (G&A) Costs, as compiled by SolGold, encompass the following costs:

- G&A Costs: SolGold provided the basis for estimating the G&A Costs. US$1.40 per tonne milled has been applied to the production profile on a per year basis
- Camp Costs: Wood's internal data base was used to arrive at the camp costs of US$13.50 per man-day in camp, including accommodation, messing, transport to/from Ibarra, etc. the camp costs are based on an equal split roster. Each employee will spend 183 days in camp.

21.2.3 Mining

The operating costs were developed on a first principles estimate, in US dollars, of the underground mining costs based on the mining schedule developed for the Cascabel Project.

The schedule includes:

- Capital Development of the:
  - Materials Handling System
  - Access to Extraction and Undercut levels
  - Haulage level
  - Declines to connect the production levels.
- Preparation development to access the ore
- Ore development, including Drawbells, Undercut and any wall stripping
- Vertical development
- Draw column tonnes of ore
- Transportation of the broken rock from the production areas to the haulage level
- Transportation of the broken rock along the haulage level to the materials handling system
- Hoisting the broken rock to surface during the early phases of footprint establishment.

21.2.4 Process Plant, Port and Surface Infrastructure

The physical basis for this operating cost estimate has been based on the production schedule provided by SolGold, which was based on the mine production schedule.

Core physical data used in the estimate includes the ore feed rate based on the Mine Production Plan, SMC and Bond comminution data and the metallurgical response of the ore. The metallurgical response of the ore determined the concentrate production and grade and tailings production rates along with reagent dosage rates.

Infrastructure costs such as power supply and network charges have been excluded from this estimate.

Other cost estimate information was produced from a variety of sources from within the project, including calculations performed by the Wood engineering team, test work data, benchmarked data and internal Wood databases.

Infrastructure costs such as power supply and network charges have been excluded from this estimate.

21.2.5 Operating Cost Summary

Overall operating costs are presented in Table 21.4. The process plant comprises two 12.5 Mt/y module-based concentrators, giving a combined capacity of 25 Mt/y.

Table 21.4 : Operating Cost Summary

Area	LOM Total US$M	Unit Cost US$/t	Unit Cost US$/t Cu
General and administration	884	1.58	311
Mine	2,083	3.73	734
Process plant	3,564	6.38	1,256

Table 21.4 : Operating Cost Summary			
Area	**LOM Total US$M**	**Unit Cost US$/t**	**Unit Cost US$/t Cu**
General and administration	884	1.58	311
Tailings storage facility	74	0.13	26
Port facility	163	0.29	57
Surface infrastructure	5	0.01	2
Total	**6,771**	**12.12**	**2,386**

21.3 Comments on Section 21

The initial capital cost is estimated to be US$2,746 million. The sustaining capital is estimated to be US$2,136 million, and includes post-production, sustaining and closure costs.

The overall life of mine operating cost estimate is US$12.12/t mill feed, or US$2,386/t copper produced.

22 Economic Analysis

22.1 Cautionary Statement

The results of the economic analysis represent forward-looking information that are subject to a number of known and unknown risks, uncertainties, and other factors that may cause actual results to differ materially from those presented here. Forward-looking information includes Mineral Resource and Mineral Reserve estimates; commodity prices and exchange rate; smelter terms; the proposed mine production plan; projected recovery rates; use of a process method, infrastructure construction costs and schedule; mine capital and operating costs; and assumptions that Project environmental approval and permitting will be forthcoming from Local, State and Federal authorities.

22.2 Financial Model Methodology

Financial analysis of the Cascabel Project was carried out using a discounted cash flow (DCF) approach. This method of valuation requires projecting yearly cash inflows, or revenues, and subtracting yearly cash outflows such as operating costs, capital costs, and taxes. The resulting net annual cash flows are discounted back to the date of valuation and totalled to determine the net present value (NPV) of the project at selected discount rates.

The internal rate of return (IRR) is expressed as the discount rate that yields a zero NPV.

The payback period is the time calculated from the start of production until all initial capital expenditures have been recovered.

This economic analysis includes sensitivities to variation in operating costs, capital costs, grade, and metal price. Note that grade and metal price are multiplicative; consequently, the two sensitivity lines are coincidental with one overlying the other.

It should be noted that, for the sake of discounting, cash flows are assumed to occur end of year and are discounted to the start of project Year -5, the start of construction.

All pricing is stated in constant (Real) Q1 2022 United States dollars (US$).

22.3 Financial Model Parameters

Wood prepared the financial model based on the following contributions:

- Resource model prepared by SolGold but verified by Mining Plus
- Mine schedule, mine operating costs, and mine capital costs prepared by Mining Plus
- Metal pricing provided by Wood Mackenzie
- Smelter terms and refining costs provided by Wood Mackenzie
- Process recoveries provided by SolGold
- Process operating costs and capital costs prepared by Wood
- G&A operating costs prepared by SolGold and Wood
- On-site infrastructure costs prepared by Wood

- Off-site infrastructure costs prepared by Wood
- Taxation provided by Perez, Bustamante & Ponce (PBP).

All monetary amounts are presented in US$. Where costs were quoted in alternate currencies, the alternate currency was converted to US$ according to the exchange rates shown in the table below (Table 22.1).

Table 22.1 : Exchange Rates

Country	Currency	Code	US$ per Unit
Australia	Dollar	AUD	1.44
China	Yuan	CNY	6.91
European Union	Euro	EUR	0.89
Great Britain	Pounds	GBP	0.78
United States	Dollar	US$	1.00
Canada	Dollar	CAD	1.33
Japan	Yen	JPY	109.00

The financial model has been prepared based on the assumptions outlined below.

22.3.1 Metal Prices

Copper, gold, and silver are saleable products. Metal pricing is based on a Wood Mackenzie report prepared for SolGold in April 2022. The Wood Mackenzie real Q4 2021 metal prices are shown in the table below.

Table 22.2 : Metal Selling Price

Metal	Units	Price
Gold	US$/oz	1,600 to 2029 and 1,700 thereafter
Silver	US$/oz	19.90
Copper	US$/lb	3.60

22.3.2 Commercial Terms

Because the Cascabel concentrate is clean and low in deleterious elements, it is capable of being treated globally. However, SolGold is prioritising those smelters capable of treating high gold concentrates such as Cascabel's. Therefore, it is expected that 50% of the concentrate will be shipped to Europe while the remaining 50% will be shipped to certain parts of Asia.

22.3.2.1 Concentrate Shipping Costs

Concentrate moisture is estimated at 9% and a 0.2% transportation concentrate loss is accounted for in the financial model. Ocean freight costs and port handling costs are estimated at US$56.3/wmt for both concentrate shipped to Europe and Asia (Table 22.3).

Table 22.3 : Concentrate Shipping Costs		
Item	**Units**	**Value (LOM)**
Port Handling charge	US$/wmt	12.00
Ocean freight	US$/wmt	44.30
Total	US$/wmt	56.30

22.3.2.2 European Smelter Terms

Table 22.4 shows the European smelter terms provided by Wood Mackenzie and applied within the financial model to 50% of the concentrate.

Table 22.4 : European Smelter Terms		
Europe Smelter Terms	**Units**	**Value**
Cu pay factor	%	96.6%
Cu minimum deduction	units	1.0%
Au pay factor	%	98.0%
Au minimum deduction	g/dmt	1.00
Ag pay factor	%	97.0%
Ag minimum deduction	g/dmt	30.0
Concentrate treatment charge rate	US$/dmt	79.0
Cu refining charge	US$/lb	0.079
Au refining charge	US$/oz	5.00
Ag refining charge	US$/oz	0.50

22.3.2.3 Asian Smelter Terms

Table 22.5 shows the Asian smelter terms provided by Wood Mackenzie and applied within the financial model to 50% of the concentrate.

Table 22.5 : Asian Smelter Terms				
Asian Smelter Terms	**Units**	**Value**	**lower end**	**higher end**
Cu pay factor			**Cu grade**	**%**
	%	96.50%	20.0%	30.0%
	%	96.70%	30.0%	34.0%
	%	96.75%	34.0%	
Cu minimum deduction			**Cu grade**	**%**
	units	1.0%	20.0%	34.0%
	units	0.0%	34.0%	
Au pay factor			**Au grade**	**g/dmt**
	%	0.0%		1.0
		90.0%	1.0	3.0
		95.0%	3.0	5.0
		96.0%	5.0	10.0
		96.5%	10.0	15.0
		97.0%	15.0	20.0
		97.5%	20.0	40.0
		98.0%	40.0	60.0
		98.3%	60.0	
Ag pay factor			**Ag grade**	**g/dmt**
	%	0.0%		30.0
		90.0%	30.0	
Concentrate treatment charge rate	US$/dmt	79.0		
Cu refining charge	US$/lb	0.079		
Au refining charge	US$/oz	5.00		
Ag refining charge	US$/oz	0.50		

22.3.2.4 Doré Sales

Based on the Wood Mackenzie marketing study, precious metal sold as doré' receives a payability commensurate to the purity of the doré'. For doré' at 90% or above gold content, payability is typically 99.95 – 99.93% of the gold value. If the doré' content is less, the payability typically decreases 0.01% for a gold content range of 80-90%, and a further 0.01% to 70-80% gold. For the Cascabel Project, the gold doré' payability is 99.90%.

Silver doré' payability is 99.0%.

22.3.3 Royalties

Government mining royalties applicable over sold minerals have been calculated assuming a flat 3% rate for copper, gold and silver, considering that Mining Law currently in force foresees that the royalty rates shall be established between 3% and 8%.

A 2% Net Smelter Royalty is payable to Santa Barbara Resources Limited, who were the previous owners of the Cascabel concession. These royalties can be bought out by paying a total of US$4 million. Fifty percent (50%) of the royalty can be purchased for US$1 million 90 days following the completion of a feasibility study and the remaining 50% of the royalty can be purchased for US$3 million, 90 days following a production decision. It is assumed that the Santa Barbara royalty will be bought out for US$4 million ahead of construction; therefore, the royalty is considered a sunk cost and not included in the financial analysis.

SolGold entered into Net Smelter Returns Financing Agreement with Franco-Nevada Corporation (FN) on 11 May 2020, with the following key terms (NSR Financing Agreement between FRANCO-NEVADA CORPORATION and SOLGOLD PLC, 11 May 2020):

- Royalty Terms: A perpetual 1.0% NSR against metal production within the "Concesion Minera Cascabel"
- Buyback: A 50% buy-back option exercisable at SolGold's election for 6 years from closing at a price delivering Franco-Nevada a 12% IRR
- Gold conversion: Option in favour of Franco Nevada to convert the NSR interest into a gold-only NSR interest (6 years from year 2 of operations) can be exercised in a period of 8 months following the signing of the NSR
- The funds raised from the NSR Financing are ring fenced for the continued exploration work on the Alpala asset.

Although SolGold is an 85% owner of the Cascabel Project and the Cascabel concession, the full value of the Franco-Nevada royalty (FNR) is included in the financial model because the royalty is based on 100% of the Project's metal production. The obligations under the FNR agreement are solely attributable to SolGold. Additionally, the FNR royalty stays with the Cascabel Project regardless of future SolGold ownership transfers unless FN agrees otherwise.

The FNR agreement stipulates that for the first 7 years of operations, if actual production is less than 85% of minimum metal production as stipulated in the agreement, then FN is entitled to a "top-up" payment to this level with a further permanent "top-up" to the royalty rate if production in 5, 6, 7 is less than minimum metal production. Because the Pre-Feasibility production plan does not meet the 85% minimum metal production in 5, 6, and 7, the "top-up" is triggered, and the LOM NSR increases from 1.0% to 1.27%.

Total royalties payable by the Project are estimated at $1,417 million (See Table 22.6).

Table 22.6 : Royalties Payable

Description	US$M
Franco Nevada NSR Royalty	449
Government Royalty Copper	603
Government Royalty Gold	356
Government Royalty Silver	8
Total Royalty Payments	**1,417**

22.3.4 Capital and Operating Costs

The capital and operating costs are reported in Section 21 Capital and Operating Costs.

The Total Cash Costs (TCC) average $-0.40 per lb payable copper, all in sustaining costs (AISC) average $0.06 per lb payable copper, and all in costs (AIC) average $0.41 per lb payable copper (Table 22.7).

Table 22.7 : Total Cash Cost Summary

Description	US$/lb Cu payable
Operating costs on-site	
G&A	0.15
Mine	0.35
Process plant	0.59
TSF processing	0.01
Port	0.03
Surface infrastructure	0.00
Total operating costs on-site	**1.13**
Operating costs off-site	
Concentrate treatment and refining charges	0.34
Royalty	0.24
Local Tax	0.01
Total operating costs off-site	**0.59**
By-product credits	
Au premium	(1.82)
Ag premium	(0.04)
Doré premium	(0.25)
Total by-product credits	**(2.12)**
Net direct cash cost (TCC)	**(0.40)**
Capital & Closure costs	
Sustaining costs	0.46
Capital Cost	0.35
Post Production Costs	0.01
Total sustaining, royalties, and closure costs	**0.81**
All-in sustaining cost (AISC)	**0.06**
All-in cost (AIC)	**0.41**

22.3.5 Corporate Tax Regime

The taxation modelled within the financial analysis is based on tax advice provided by Perez, Bustamante and Ponce, an in-country tax expert contracted by SolGold. PBP's Ecuadorian tax guidance is summarised below:

- The Corporate Income Tax (CIT) is calculated using the current general rate in force of 25%. For CIT purposes, capital expenditures are accumulated in tax pools that can be deducted against mine income at different prescribed rates, depending on the type and mining phase of the capital expenditures
- Pre-production, preparation and mine development expenditures are considered capitalised investments that are accumulated and deducted against taxable income in accordance with the rates and years prescribed by Ecuadorian tax and accounting regulations applicable for large mining scale concessions

- Capital costs, including mine underground, tailings storage, port facility, surface infrastructure, indirect and below the line costs, are amortised in 5 years (20% annual) under straight line method
- Mine infrastructure and mineral processing costs, as well as sustaining capital costs, are amortised under Unit of Production ("UOP") method. For UOP calculation purposes, the mineral/concentrate produced has been assumed by SolGold as the amount of production that would be reported to local authorities
- For Project modelling purposes, closure costs are not amortised or expensed until the final years of the Project, during the closure phase
- Profit sharing is calculated and deducted for CIT purposes using the current applicable rate of 15% over pre-income tax annual profits. A 12% out of the 15% will be paid to the Federal Government and local governments (GAD)
- Tax losses are calculated and amortised considering the 5 years carry forward rule and 25% limitation based on annually generated taxable profits.

Other taxes are summarised below:

- Value Added Tax 12% (VAT) is calculated over a certain portion of CAPEX and OPEX. Most input VAT is considered as tax credit eligible for refund once mine exports begin. Input VAT not eligible for refund is considered as deductible expense for CIT purposes
- Currency Outflow Tax ("ISD"), currently set at a rate of 4.5% (period April-June 2022) and generally applicable over payments to abroad (including payments for importation of goods and services) is currently assumed by SolGold as not applicable to the Project, considering that an exemption for this tax can be requested/negotiated and therefore could be legally achieved
- The abovementioned assumption was also considered by SolGold for custom duties purposes, generally applicable over imported CAPEX
- Regarding Sovereign Adjustment, the Constitution of Ecuador establishes that the State will participate in the benefits of non-renewable resource projects, in an amount that will not be less than those of the company that exploits them. The participation will be stated in the Mining Exploitation Contract (CEM).

  Based on the annual discounted free cash flow of the base case financial model, the benefits received by the Ecuadorian Government resulting from the Project would not trigger the calculation and payment of Sovereign Adjustment, given that the Government's benefits would be higher than the benefits perceived by the concessionaire.

Over the LOM, the Project pays $6,983 M in taxes. Sovereign adjustment would not be paid because the Project's benefit does not exceed the Government's benefit. The US$94 M paid in VAT is for the non recoverable VAT charges on G&A costs (Table 22.8).

Table 22.8 : Corporate Taxes

Tax Description	US$M
Profit share - government	2,316
Profit share - employees	579
Corporate tax	3,994
Sovereign adjustment	-
Capital Outflow Tax (COT)	-
VAT	94

Table 22.8 : Corporate Taxes	
Tax Description	**US$M**
Total Tax	6,983
Tax Description	**6,983**

In addition to the corporate taxes paid, US$7 M is paid for the Conservation Patent Fee and US$58 M is paid in local taxes. Following is a summary of the Conservation Patent Fee and applicable local taxes:

- Conservation Patent Fee (CPF) is paid based on a 2.5%, 5% or 10% rate (depending on the mining phase of the Project) applied to the unified basic remuneration (RBU by its Spanish initials in 2022 US$425) times the concession area (4,979 hectares). The Project calculates CPF based on the 20% rate during LOM. CPF is paid annually
- Municipal Patent Tax (MPT) is for a permit to perform economic activities in a specific municipality. It is obtained in the municipalities where a company performs activities on a permanent basis. MPT has a minimum value of US$10 and maximum value US$25,000 per year. The Project calculates the maximum value on an annual basis
- Municipal Assets Tax (MAT) is paid at a rate of 1.5 per one thousand over total assets less short-term liabilities and contingent liabilities to each of the municipalities where the company performs economic activities. The Project calculates the MAT over total property, plant and equipment assets. MAT is paid annually
- Contribution to Superintendency of Companies (CSC) is paid at a maximum rate of 0.94 per one thousand (as per the table for 2022) over the amount of "real assets", meaning the total assets less bad-debt provisions and accumulated depreciation/amortisation. The Project calculates the CSC over total property, plant, and equipment assets. CSC is paid annually according to Table 22.9.
- Until the Project completes negotiations with the Ecuadorian government, the taxation within the model is the best estimate of applicable taxes, considering the Ecuadorian tax legislation currently in force and assumptions applied by SolGold.

Table 22.9 : CSC Rate		
Property, Plant, and Equipment (US$)		**Contribution per 1000**
FROM	**TO**	
-	75,000.00	-
75,000.01	100,000.00	0.71
100,000.01	1,000,000.00	0.76
1,000,000.01	20,000,000.00	0.82
20,000,000.01	500,000,000.00	0.88
500,000,000.01	ONWARDS	0.94

22.3.6 Reclamation and Closure Costs

The Mining Law (Ley de MinerÃ-a) specifies that a Closure Plan is required as part of the environmental management plan submitted as part of the EIA. The Closure Plan is to include an estimated closure cost, upon which a financial guarantee or insurance policy in favour of the government is required, which must remain in force until the final closure of operations. SolGold recognises that a closure cost guarantee is required, but at

this stage it has not been negotiated with the Ecuadorian government. For consistency with other recently filed Ecuadorian Technical Reports, closure cost guarantees are left out of the financial model. Only LOM closure costs of $85 M are included in the model. Closure costs are not amortised or expensed until the final years of the Project during the closure phase.

22.3.7 Financing

The project is 100% equity financed. No debt is included within the financial model. This has been assessed separately.

22.3.8 Inflation

The financial analysis assumes constant Q1 2022 dollars (Real). No escalation or inflation are accounted for in the financial model.

22.3.9 Working Capital

Working capital is the capital required to fund operations prior to receiving revenue from the finished product. It is defined as the current assets minus the current liabilities. The financial model estimates working capital by subtracting 30 days of direct operating costs from 45 days of revenue. Over the project life, working capital nets to zero.

22.3.10 Salvage Value

No salvage value is included within the financial model.

22.4 Financial Model Results

Based on Wood's financial evaluation, the Cascabel Project generates positive before and after-tax financial results. After-tax IRR is 19.3% and the after-tax NPV_8 is US$2,907 million. After-tax payback is achieved 4.7 years following the start of production. Table 22.10 and Table 22.11 provide the before and after-tax financial statistics respectively and Figure 22.1 shows the distribution of after-tax cash flows. The full cash flow is shown in Table 22.12.

Table 22.10 : Before-tax Financial Results

Before-tax	Units	Value
Cash flow	US$M	19,121
NPV @ 5%	US$M	8,434
NPV @ 8%	**US$M**	**5,241**
NPV @ 10%	US$M	3,811
Payback period	years	4.2
IRR before-tax	%	25.3

Table 22.11 : After-tax Financial Results

After-tax	Units	Value
Cash flow	US$M	12,139
NPV @ 5%	US$M	5,007

NPV @ 8%	**US$M**	**2,907**
NPV @ 10%	US$M	1,976
Payback period	years	4.7
IRR after-tax	%	19.3

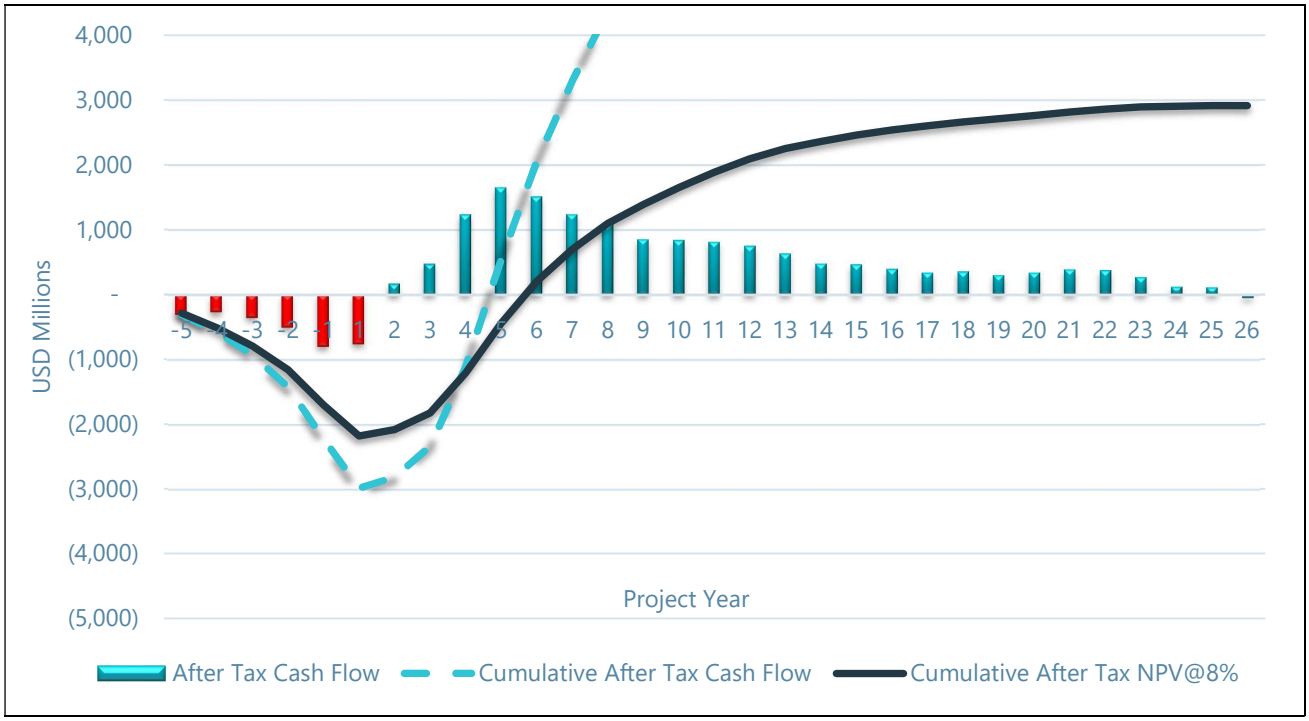


Figure 22.1 : After-tax Cash Flow Distribution

22.5 Sensitivity Analysis

A sensitivity analysis was completed over the ranges of ±30% for capital costs, operating costs, grade, and metal prices. Note that sensitivity to grade and metal price are coincidental and follow the same general trend.

The Project's NPV@8% is most sensitive to changes in copper price and grade followed by changes in gold price and grade. The Project's NPV@8% is least sensitive to changes in silver price and grade.

Spider graphs showing sensitivity to a variety of cost drivers were completed for the before and after-tax NPV@8%, and the before and after-tax IRR. The sensitivity graphs are shown in Figure 22.2 to Figure 22.5.

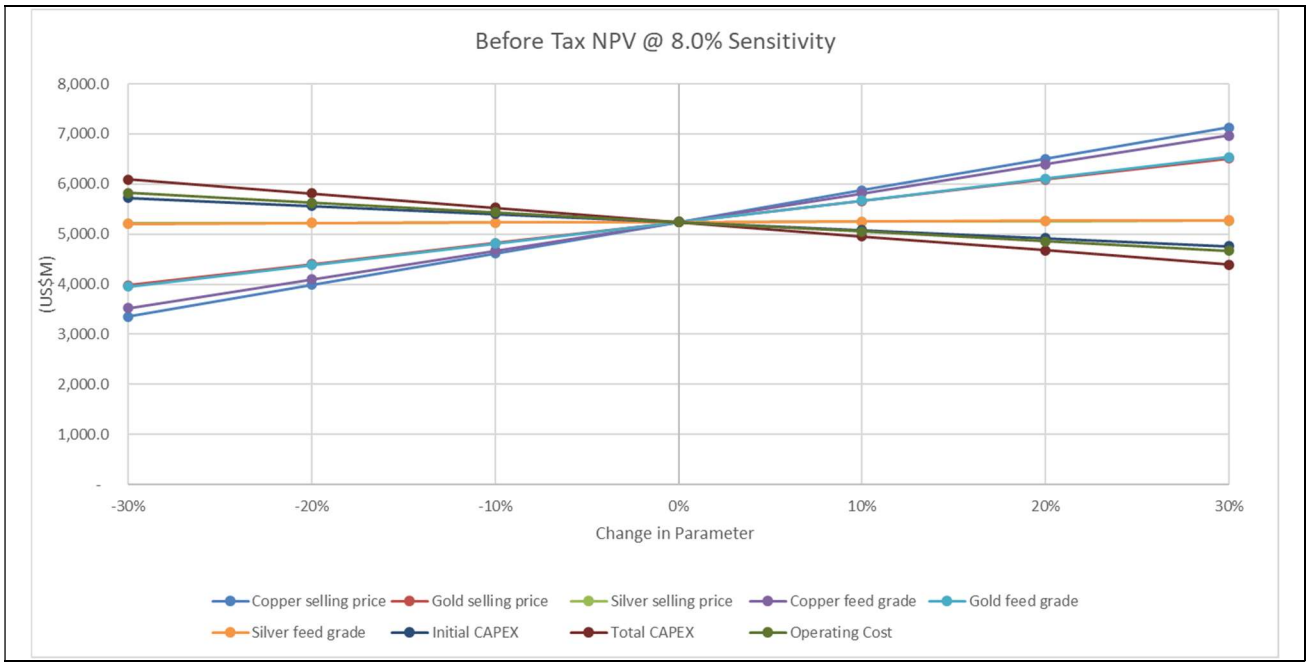


Figure 22.2 : Before-tax NPV$_8$ Sensitivity Analysis

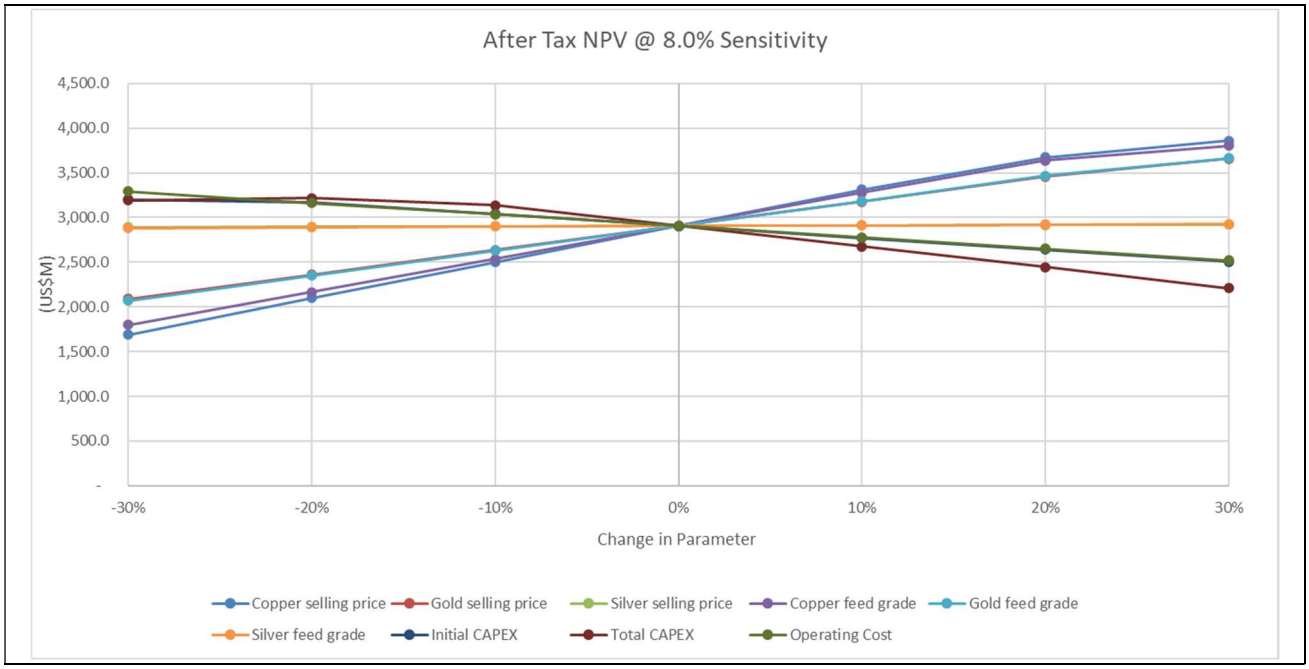


Figure 22.3 : After-tax NPV$_8$ Sensitivity Analysis

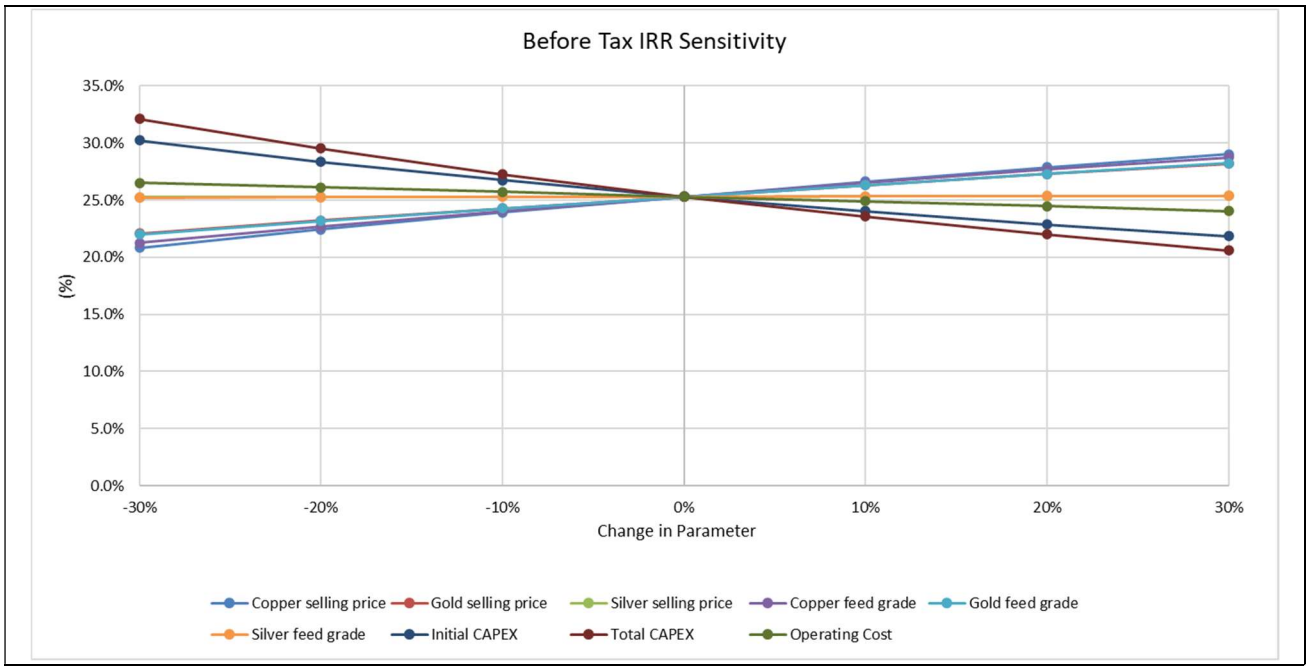


Figure 22.4 : Before-tax IRR Sensitivity Analysis

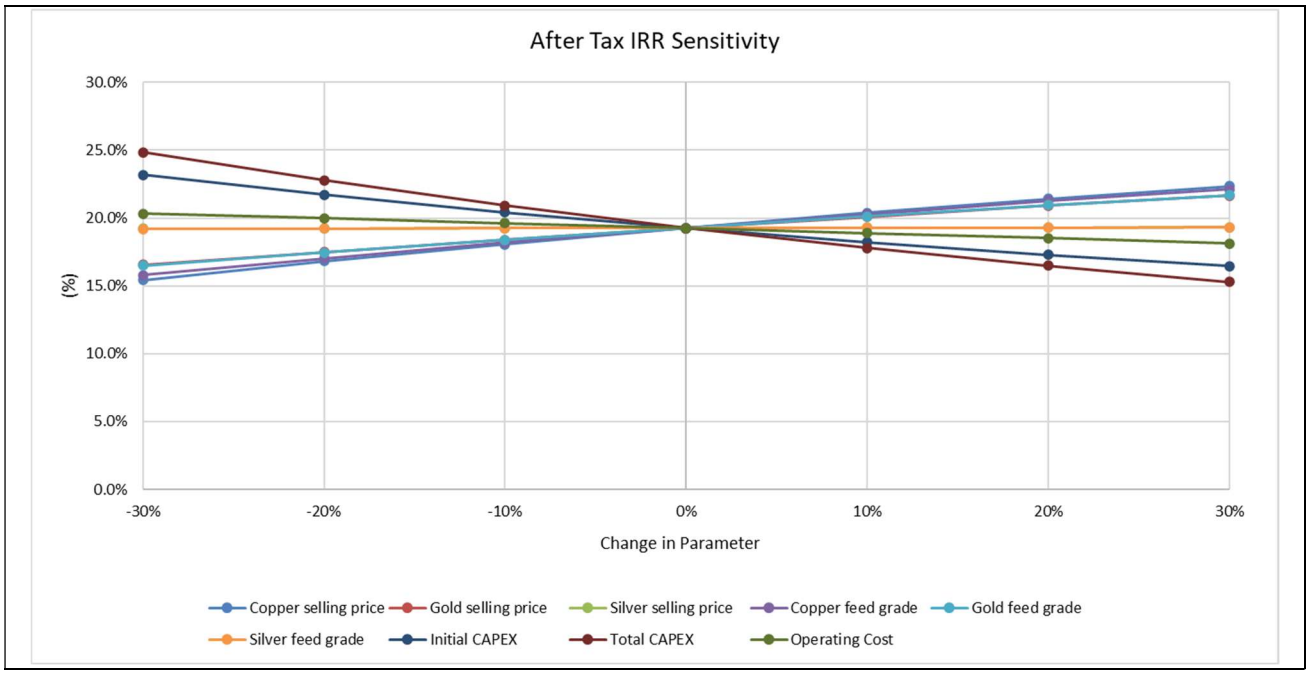


Figure 22.5 : After-tax IRR Sensitivity Analysis

22.6 Comments on Section 22

Under the assumptions presented in this Report, the Project demonstrates positive economics. The after-tax NPV at a 8% discount rate over the estimated mine life is US$2,907 M. The after-tax IRR is 19.3%. The after-tax payback of the initial capital investment is estimated to occur 4.7 years after the start of production.

The LOM AISC per pound of copper is US$0.06.

In the pre-tax and after-tax evaluations, the Project is most sensitive to changes in copper and gold grade and price, less sensitive to changes in silver grade and price.

Table 22.12 : Project Cash Flow

	Year	TOTAL	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11
NET SMELTER RETURN (NSR)																		
NSR																		
Metal payable - Europe	US$M	16,298.8	-	-	-	-	-	128.5	317.7	652.7	1,172.1	1,428.4	1,377.7	1,119.9	1,033.3	898.6	862.9	847.3
Metal payable - Asia	US$M	16,519.9	-	-	-	-	-	130.4	321.3	659.1	1,182.3	1,440.4	1,390.1	1,132.2	1,046.3	909.7	874.2	858.6
TC/RCs - Europe	US$M	(687.4)	-	-	-	-	-	(5.7)	(12.6)	(24.5)	(42.1)	(50.9)	(50.0)	(42.9)	(41.2)	(37.3)	(36.4)	(35.9)
TC/RCs - Asia	US$M	(690.0)	-	-	-	-	-	(5.7)	(12.7)	(24.5)	(42.3)	(51.1)	(50.2)	(43.0)	(41.4)	(37.5)	(36.6)	(36.1)
Transport costs to Europe	US$M	(339.1)	-	-	-	-	-	(2.8)	(6.2)	(11.9)	(20.4)	(24.6)	(24.2)	(20.9)	(20.2)	(18.4)	(17.9)	(17.7)
Transport costs to Asia	US$M	(339.1)	-	-	-	-	-	(2.8)	(6.2)	(11.9)	(20.4)	(24.6)	(24.2)	(20.9)	(20.2)	(18.4)	(17.9)	(17.7)
Au & Ag Doré payable value	US$M	1,492.4	-	-	-	-	-	13.4	31.0	59.7	102.9	120.0	116.4	100.6	92.9	82.7	79.6	78.6
Total NSR	**US$M**	**32,255.5**	**-**	**-**	**-**	**-**	**-**	**255.1**	**632.3**	**1,298.8**	**2,332.1**	**2,837.7**	**2,735.6**	**2,225.0**	**2,049.6**	**1,779.5**	**1,707.8**	**1,677.1**
NSR ROYALTY																		
Royalty																		
Franco Nevada NSR Royalty	US$M	(449)	-	-	-	-	-	(10)	(24)	(31)	(35)	(28)	(34)	(35)	(26)	(23)	(22)	(21)
Government Royalty Copper	US$M	(603)	-	-	-	-	-	(5)	(11)	(22)	(37)	(45)	(44)	(38)	(36)	(33)	(32)	(32)
Government Royalty Gold	US$M	(356)	-	-	-	-	-	(3)	(8)	(17)	(32)	(39)	(37)	(28)	(25)	(20)	(19)	(18)
Government Royalty Silver	US$M	(8)	-	-	-	-	-	(0)	(0)	(0)	(0)	(1)	(1)	(0)	(1)	(1)	(0)	(0)
Advanced Royalty	US$M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total NSR royalty	**US$M**	**(1,417)**	**-**	**-**	**-**	**-**	**-**	**(17)**	**(43)**	**(70)**	**(105)**	**(114)**	**(116)**	**(102)**	**(87)**	**(76)**	**(73)**	**(72)**
OPERATING COSTS																		
Operating costs																		
G&A	US$M	(883.7)	-	-	-	-	-	(11.9)	(17.1)	(25.1)	(36.6)	(40.0)	(40.2)	(40.0)	(39.8)	(39.4)	(39.5)	(39.8)
Mine	US$M	(2,083.1)	-	-	-	-	-	-	(130.0)	(118.1)	(122.8)	(72.9)	(73.3)	(71.6)	(90.3)	(71.4)	(90.8)	(104.6)
Process plant	US$M	(3,563.7)	-	-	-	-	-	(90.3)	(80.7)	(105.6)	(145.8)	(158.2)	(154.1)	(154.1)	(154.4)	(154.6)	(155.3)	(156.1)
TSF processing	US$M	(73.5)	-	-	-	-	-	(2.7)	(2.7)	(2.0)	(2.9)	(3.2)	(3.1)	(3.1)	(3.1)	(3.1)	(3.1)	(3.2)
TSF dam wall raising	US$M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Port	US$M	(162.6)	-	-	-	-	-	(6.1)	(4.7)	(5.5)	(6.7)	(7.1)	(6.7)	(6.7)	(6.7)	(6.7)	(6.7)	(6.7)
Surface infrastructure	US$M	(4.6)	-	-	-	-	-	(0.3)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)
Total operating costs	**US$M**	**(6,771.3)**	**-**	**-**	**-**	**-**	**-**	**(111.3)**	**(235.3)**	**(256.5)**	**(314.9)**	**(281.5)**	**(277.6)**	**(275.7)**	**(294.5)**	**(275.4)**	**(295.7)**	**(310.6)**
NET OPERATING EARNINGS																		
Net operating earnings																		
Operating revenue (NSR)	US$M	32,256	-	-	-	-	-	255	632	1,299	2,332	2,838	2,736	2,225	2,050	1,779	1,708	1,677
Total royalty	US$M	(1,417)	-	-	-	-	-	(17)	(43)	(70)	(105)	(114)	(116)	(102)	(87)	(76)	(73)	(72)
Operating cost	US$M	(6,771)	-	-	-	-	-	(111)	(235)	(256)	(315)	(281)	(278)	(276)	(294)	(275)	(296)	(311)
Conservation Patent	US$M	(7)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Local Tax	US$M	(58)	(1)	(1)	(2)	(3)	(5)	(6)	(5)	(5)	(4)	(3)	(3)	(2)	(2)	(2)	(2)	(2)
Interest Payment	US$M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net operating earnings	US$M	**24,003**	**(1)**	**(2)**	**(2)**	**(4)**	**(5)**	**120**	**348**	**967**	**1,908**	**2,440**	**2,339**	**1,845**	**1,665**	**1,426**	**1,337**	**1,293**

Table 22.12 : Project Cash Flow

		Year	TOTAL	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11
TAXES																			
Taxes																			
Profit share - government		US$M	(2,316)	-	-	-	-	-	-	-	(57)	(162)	(222)	(261)	(205)	(184)	(156)	(145)	(139)
Profit share - employees		US$M	(579)	-	-	-	-	-	-	-	(14)	(41)	(56)	(65)	(51)	(46)	(39)	(36)	(35)
Corporate tax		US$M	(3,994)	-	-	-	-	-	-	-	(76)	(216)	(384)	(462)	(362)	(326)	(275)	(256)	(246)
Total taxes		**US$M**	**(6,889)**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**(147)**	**(418)**	**(662)**	**(788)**	**(618)**	**(555)**	**(470)**	**(437)**	**(419)**
Net Income		**US$M**	**17,114**	**(1)**	**(2)**	**(2)**	**(4)**	**(5)**	**120**	**348**	**820**	**1,489**	**1,778**	**1,551**	**1,227**	**1,110**	**956**	**900**	**874**
Sovereign adjustment		**US$M**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Net Income after Sovereign adjustment		**US$M**	**17,114**	**(1)**	**(2)**	**(2)**	**(4)**	**(5)**	**120**	**348**	**820**	**1,489**	**1,778**	**1,551**	**1,227**	**1,110**	**956**	**900**	**874**
Capital Outflow Tax (COT)		**US$M**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Net Income after COT		**US$M**	**17,114**	**(1)**	**(2)**	**(2)**	**(4)**	**(5)**	**120**	**348**	**820**	**1,489**	**1,778**	**1,551**	**1,227**	**1,110**	**956**	**900**	**874**
CAPITAL COST, CLOSURE AND WORKING CAPITAL																			
Capital & Closure Cost																			
Capital costs																			
0000	Mine Open Pit	US$M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1000	Mine Underground	US$M	(1,046.9)	(156)	(112)	(120)	(124)	(154)	(176)	(61)	(31)	(6)	(1)	(0)	(0)	(0)	(30)	(16)	(16)
2000	Infrastructure - Mine Underground	US$M	(601.6)	(8)	(6)	(2)	(21)	(45)	(75)	(23)	(72)	(72)	(13)	(0)	(0)	(0)	(48)	(16)	(3)
3000	Mineral Processing	US$M	(683.7)	-	-	-	(88)	(181)	(195)	(32)	(129)	(2)	(2)	(3)	(3)	(3)	(3)	(3)	(3)
4000	Tailings Storage	US$M	(1,005.6)	-	(22)	(82)	(57)	(103)	(65)	(28)	(43)	(28)	(29)	(35)	(30)	(30)	(28)	(22)	(26)
5000	Port Facility	US$M	(54.0)	-	-	-	(8)	(15)	(15)	(2)	(9)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
6000	Surface Infrastructure	US$M	(218.9)	(8)	-	-	(48)	(70)	(50)	-	-	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
7000	Indirect Costs	US$M	(180.5)	(10)	(8)	(12)	(21)	(34)	(35)	(9)	(17)	(2)	(2)	(2)	(2)	(2)	(2)	(1)	(2)
8000	Owners Costs	US$M	(395.6)	(67)	(67)	(67)	(36)	(38)	(100)	(4)	(16)	-	-	-	-	-	-	-	-
9000	Below The Line Costs	US$M	(694.6)	(41)	(36)	(47)	(67)	(106)	(118)	(26)	(53)	(18)	(8)	(7)	(6)	(6)	(19)	(10)	(8)
Total capital cost		**US$M**	**(4,881.5)**	**(291.2)**	**(250)**	**(331)**	**(470)**	**(748)**	**(829)**	**(186)**	**(369)**	**(130)**	**(55)**	**(48)**	**(42)**	**(43)**	**(130)**	**(69)**	**(59)**
VAT Paid		**US$M**	**(93.8)**	**(17)**	**(15)**	**(20)**	**(28)**	**(45)**	**(28)**	**43**	**105**	**(4)**	**(4)**	**(4)**	**(4)**	**(4)**	**(4)**	**(4)**	**(4)**
Working Capital																			
Working capital																			
Accounts receivable yearly		US$M	32,255.5	-	-	-	-	-	255.1	632.3	1,298.8	2,332.1	2,837.7	2,735.6	2,225.0	2,049.6	1,779.5	1,707.8	1,677.1
Accounts receivable adjusted		US$M	3,974.0	-	-	-	-	-	31.5	77.7	160.1	287.5	349.9	336.3	274.3	252.7	219.4	210.0	206.8
Change in accounts receivable		US$M	(0.0)	-	-	-	-	-	31.5	46.3	82.4	127.4	62.3	(13.5)	(62.0)	(21.6)	(33.3)	(9.4)	(3.2)
Accounts payable yearly		US$M	6,771.3	-	-	-	-	-	111.3	235.3	256.5	314.9	281.5	277.6	275.7	294.5	275.4	295.7	310.6
Accounts payable adjusted		US$M	556.2	-	-	-	-	-	9.1	19.3	21.1	25.9	23.1	22.8	22.7	24.2	22.6	24.2	25.5
Change in accounts payable		US$M	-	-	-	-	-	-	9.1	10.1	1.8	4.8	(2.7)	(0.4)	(0.1)	1.5	(1.6)	1.6	1.3
Change in working capital		**US$M**	**0.0**	**-**	**-**	**-**	**-**	**-**	**(22.3)**	**(36.1)**	**(80.6)**	**(122.6)**	**(65.1)**	**13.1**	**61.9**	**23.2**	**31.7**	**11.0**	**4.5**
VALUATION INDICATORS																			
Before-tax																			
Cash flow		US$M	19,121	(292)	(252)	(333)	(473)	(754)	(730)	126	517	1,656	2,319	2,304	1,865	1,646	1,327	1,279	1,239

Table 22.12 : Project Cash Flow

	Year	TOTAL	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11
NPV 8.00%	US$M	5,241	(270)	(216)	(264)	(348)	(513)	(460)	74	279	828	1,074	988	741	605	452	403	362
Payback period	years	4.2																
IRR before-tax	%	25.3%																
After-tax																		
Cash flow	US$M	12,139	(310)	(267)	(353)	(501)	(798)	(758)	169	475	1,234	1,653	1,511	1,242	1,087	853	838	815
NPV 8.00%	US$M	2,907	(287)	(229)	(280)	(368)	(543)	(478)	99	257	617	766	648	493	400	290	264	238
Payback period	years	4.7																
IRR after-tax	%	19.3%																

	Year	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
NSR																	
Metal payable - Europe	US$M	828.8	704.8	589.6	523.2	468.8	430.6	448.3	445.5	438.7	463.7	436.0	311.3	205.2	151.6	13.5	-
Metal payable - Asia	US$M	839.6	715.0	599.1	531.9	477.3	438.8	457.0	454.8	447.4	472.9	445.0	317.7	209.8	155.1	13.8	-
TC/RCs - Europe	US$M	(34.9)	(30.6)	(26.6)	(24.5)	(22.6)	(21.2)	(22.0)	(22.4)	(22.2)	(23.4)	(21.9)	(15.9)	(10.8)	(8.1)	(0.7)	-
TC/RCs - Asia	US$M	(35.1)	(30.7)	(26.7)	(24.6)	(22.7)	(21.2)	(22.1)	(22.5)	(22.3)	(23.5)	(21.9)	(15.9)	(10.9)	(8.1)	(0.7)	-
Transport costs to Europe	US$M	(17.2)	(15.2)	(13.2)	(12.2)	(11.3)	(10.6)	(11.1)	(11.2)	(11.1)	(11.8)	(11.0)	(8.0)	(5.5)	(4.1)	(0.4)	-
Transport costs to Asia	US$M	(17.2)	(15.2)	(13.2)	(12.2)	(11.3)	(10.6)	(11.1)	(11.2)	(11.1)	(11.8)	(11.0)	(8.0)	(5.5)	(4.1)	(0.4)	-
Au & Ag Doré payable value	US$M	79.3	69.4	58.8	51.3	45.7	41.9	43.0	41.0	40.0	41.2	39.5	29.4	19.0	14.0	1.2	-
Total NSR	**US$M**	**1,643.3**	**1,397.5**	**1,167.9**	**1,032.8**	**923.8**	**847.7**	**882.1**	**873.9**	**859.3**	**907.3**	**854.8**	**610.6**	**401.4**	**296.3**	**26.3**	**-**
Royalty																	
Franco Nevada NSR Royalty	US$M	(21)	(18)	(15)	(13)	(12)	(11)	(11)	(11)	(11)	(11)	(11)	(8)	(5)	(4)	(0)	-
Government Royalty Copper	US$M	(31)	(27)	(23)	(21)	(20)	(18)	(19)	(19)	(19)	(20)	(19)	(14)	(9)	(7)	(1)	-
Government Royalty Gold	US$M	(18)	(15)	(12)	(9)	(8)	(7)	(7)	(7)	(6)	(7)	(6)	(4)	(3)	(2)	(0)	-
Government Royalty Silver	US$M	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	-
Advanced Royalty	US$M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total NSR royalty	**US$M**	**(70)**	**(60)**	**(50)**	**(44)**	**(39)**	**(36)**	**(38)**	**(37)**	**(37)**	**(39)**	**(36)**	**(26)**	**(17)**	**(13)**	**(1)**	**-**
Operating costs																	
G&A	US$M	(41.2)	(40.6)	(39.4)	(38.8)	(38.9)	(38.8)	(38.8)	(38.8)	(39.0)	(38.8)	(36.8)	(32.5)	(26.2)	(21.3)	(4.6)	-
Mine	US$M	(138.8)	(127.4)	(101.4)	(75.8)	(74.1)	(73.8)	(73.6)	(73.4)	(73.4)	(73.0)	(69.8)	(62.2)	(53.4)	(45.8)	(21.5)	-
Process plant	US$M	(160.3)	(158.3)	(154.4)	(154.0)	(154.3)	(154.0)	(154.0)	(154.0)	(154.3)	(154.0)	(146.6)	(130.6)	(107.6)	(90.5)	(27.6)	-
TSF processing	US$M	(3.2)	(3.2)	(3.1)	(3.1)	(3.1)	(3.1)	(3.1)	(3.1)	(3.1)	(3.1)	(2.9)	(2.6)	(2.1)	(1.7)	(0.5)	-
TSF dam wall raising	US$M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Port	US$M	(6.9)	(6.8)	(6.7)	(6.7)	(6.7)	(6.7)	(6.7)	(6.7)	(6.7)	(6.7)	(6.4)	(6.0)	(5.3)	(4.8)	(2.7)	-
Surface infrastructure	US$M	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	-
Total operating costs	**US$M**	**(350.6)**	**(336.4)**	**(305.1)**	**(278.5)**	**(277.3)**	**(276.5)**	**(276.3)**	**(276.2)**	**(276.6)**	**(275.7)**	**(262.8)**	**(234.0)**	**(194.8)**	**(164.3)**	**(57.2)**	**-**
Net operating earnings																	
Operating revenue (NSR)	US$M	1,643	1,398	1,168	1,033	924	848	882	874	859	907	855	611	401	296	26	-
Total royalty	US$M	(70)	(60)	(50)	(44)	(39)	(36)	(38)	(37)	(37)	(39)	(36)	(26)	(17)	(13)	(1)	-
Operating cost	US$M	(351)	(336)	(305)	(279)	(277)	(276)	(276)	(276)	(277)	(276)	(263)	(234)	(195)	(164)	(57)	-

	Year	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Conservation Patent	US$M	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	-
Local Tax	US$M	(2)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	-
Interest Payment	US$M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net operating earnings	**US$M**	**1,221**	**1,000**	**811**	**709**	**606**	**534**	**567**	**560**	**545**	**593**	**555**	**350**	**189**	**119**	**(32)**	**-**
Profit share - government	US$M	(129)	(104)	(82)	(71)	(59)	(51)	(54)	(51)	(48)	(52)	(47)	(26)	(8)	(3)	-	-
Profit share - employees	US$M	(32)	(26)	(21)	(18)	(15)	(13)	(13)	(13)	(12)	(13)	(12)	(7)	(2)	(1)	-	-
Corporate tax	US$M	(229)	(184)	(146)	(126)	(105)	(91)	(96)	(90)	(85)	(92)	(82)	(46)	(14)	(5)	-	-
Total taxes	**US$M**	**(390)**	**(314)**	**(249)**	**(215)**	**(180)**	**(155)**	**(163)**	**(154)**	**(146)**	**(156)**	**(141)**	**(79)**	**(24)**	**(9)**	**-**	**-**
Net Income	**US$M**	**831**	**686**	**563**	**494**	**426**	**379**	**404**	**406**	**400**	**436**	**415**	**272**	**165**	**110**	**(32)**	**-**
Sovereign adjustment	**US$M**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Net Income after Sovereign adjustment	**US$M**	**831**	**686**	**563**	**494**	**426**	**379**	**404**	**406**	**400**	**436**	**415**	**272**	**165**	**110**	**(32)**	**-**
Capital Outflow Tax (COT)	**US$M**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Net Income after COT	**US$M**	**831**	**686**	**563**	**494**	**426**	**379**	**404**	**406**	**400**	**436**	**415**	**272**	**165**	**110**	**(32)**	**-**
Capital & Closure Cost																	
Capital costs																	
Mine Open Pit	US$M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mine Underground	US$M	(27)	(11)	(2)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Infrastructure - Mine Underground	US$M	(11)	(29)	(54)	(2)	(0)	(0)	(0)	(52)	(1)	(0)	(0)	-	(33)	(0)	(6)	(6)
Mineral Processing	US$M	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	-	-	-	-	-
Tailings Storage	US$M	(26)	(20)	(27)	(27)	(30)	(31)	(29)	(27)	(39)	(24)	(28)	(21)	(17)	(3)	(13)	(13)
Port Facility	US$M	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	-	-	-	-	-
Surface Infrastructure	US$M	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	-	-	-	(15)	(15)
Indirect Costs	US$M	(2)	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(1)	(2)	(1)	(1)	(0)	-	-
Owners Costs	US$M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Below The Line Costs	US$M	(12)	(11)	(15)	(6)	(6)	(6)	(6)	(14)	(8)	(5)	(6)	(4)	(9)	(1)	(6)	(6)
Total capital cost	**US$M**	**(81)**	**(77)**	**(103)**	**(41)**	**(42)**	**(43)**	**(42)**	**(99)**	**(54)**	**(35)**	**(40)**	**(26)**	**(61)**	**(4)**	**(40)**	**(40)**
VAT Paid	**US$M**	**(4)**	**(4)**	**(4)**	**(4)**	**(4)**	**(4)**	**(4)**	**(4)**	**(4)**	**(4)**	**(4)**	**(3)**	**(3)**	**(2)**	**(0)**	**-**
Working capital																	
Accounts receivable yearly	US$M	1,643.3	1,397.5	1,167.9	1,032.8	923.8	847.7	882.1	873.9	859.3	907.3	854.8	610.6	401.4	296.3	26.3	-
Accounts receivable adjusted	US$M	202.6	172.3	143.6	127.3	113.9	104.5	108.5	107.7	105.9	111.9	105.1	75.3	49.5	36.5	3.2	-
Change in accounts receivable	US$M	(4.2)	(30.3)	(28.7)	(16.3)	(13.4)	(9.4)	3.9	(0.7)	(1.8)	5.9	(6.8)	(29.8)	(25.8)	(13.0)	(33.3)	(3.2)
Accounts payable yearly	US$M	350.6	336.4	305.1	278.5	277.3	276.5	276.3	276.2	276.6	275.7	262.8	234.0	194.8	164.3	57.2	-
Accounts payable adjusted	US$M	28.8	27.7	25.0	22.9	22.8	22.7	22.6	22.7	22.7	22.7	21.5	19.2	16.0	13.5	4.7	-
Change in accounts payable	US$M	3.3	(1.2)	(2.6)	(2.1)	(0.1)	(0.1)	(0.1)	0.1	0.0	(0.1)	(1.1)	(2.3)	(3.2)	(2.5)	(8.8)	(4.7)
Change in working capital	**US$M**	**7.4**	**29.1**	**26.1**	**14.1**	**13.3**	**9.3**	**(4.0)**	**0.8**	**1.8**	**(6.0)**	**5.6**	**27.5**	**22.6**	**10.5**	**23.0**	**-**
Before-tax																	
Cash flow	US$M	1,148	952	735	682	577	500	522	461	493	552	521	352	151	126	(50)	(40)
NPV 8.00%	US$M	310	238	170	146	115	92	89	73	72	75	65	41	16	13	(5)	(3)
Payback period	years																

	Year	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
IRR before-tax	%																
After-tax																	
Cash flow	US$M	753	634	482	463	393	341	354	303	343	391	377	270	124	115	(50)	(40)
NPV 8.00%	US$M	203	159	112	99	78	63	60	48	50	53	47	31	13	11	(5)	(3)
Payback period	years																
IRR after-tax	%																

23 Adjacent Properties

The authors have no information to report from adjacent properties.

24 Other Relevant Data and Information

24.1 Workforce Considerations

24.1.1 Personnel Requirements

The personnel required to construct and operate the Cascabel Project will comprise principally local personnel with the support of expatriates in key positions where expertise is required.

The peak personnel requirements will occur as the parallel construction of the second process plant module in parallel with the ongoing mine development and process plant operations, as shown in the figure below.

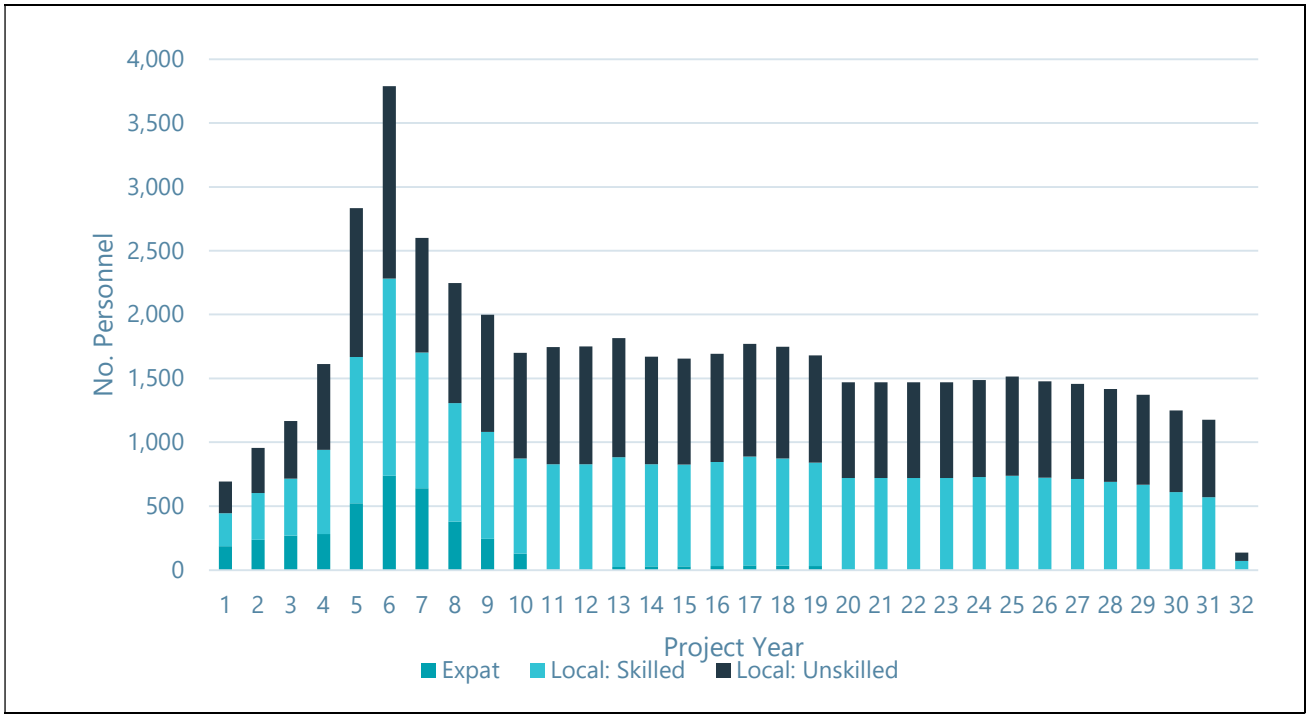


Figure 24.1 : Personnel Requirements

24.1.2 Human Resources

SolGold aims to maximise employment directly (and indirectly through local businesses contracted services) in the following order of precedence:

- Immediate area of interest
- Region
- Province
- National
- Internationally (when skills and/or experience are not readily available in the Ecuadorian market. When this happens, we will look to building skills/experience in Ecuador over the longer term and recruit with a preference to South America to secure capability in the shorter term).

SolGold will continue to work closely with government, industry, education providers and community to promote and develop professional and skilled labour capability requirements for the project.

24.1.3 Training

In Ecuador, current regulations state that no more than 20% of the workforce can be expatriate. For both the professional and skilled labour capability requirements, there is an expected minimum lead time to educate and train workforce members of 3 years. To ensure the required workforce is available for each phase when

Training will be designed around a cascading system whereby SolGold will focus on training a selected group of in-country workforce who will in turn train others (i.e. a train the trainer approach).

Block Cave specific skills and experience development for Ecuadorian workers will ideally incorporate on the job training in another block cave mining operation. Opportunities to place workforce at other operations will be limited.

24.2 Risk Management

24.2.1 Risk Management Strategy

A risk assessment of the project was undertaken as part of the Pre-Feasibility study update. The risk assessment process was used to identify key design, operational, safety, financial and environmental risks of the project, and establish potential control measures to mitigate the identified risks to acceptable levels.

The risk process adopted utilised facilitated workshop and discussions to develop the risk register for the study. The methodology followed for the risk assessment process was as follows.

The risk assessment methodology that was adopted for each identified risk considered the current risk rating including any existing controls, and then assessed the residual (target) risk rating, assuming the successful implementation of the additional proposed control measures.

The risk rating for the Project has been based on the SolGold risk matrix provided in, where 'red' is extreme or high, 'yellow' is moderate and 'green' is low. The 'likelihood' and 'consequences' rankings used the definitions and criteria from the SolGold risk assessment methodology.

Each risk in the register is assigned a current and target (residual) rating, which are defined as:

- Current risk rating: The level of risk remaining after taking into account the controls that are already in place and have had their effectiveness tested
- Target Risk Rating: The level of risk remaining after risk treatment.

The risk manager will review the risk at regular intervals to evaluate the effectiveness of the proposed mitigation strategies.

24.2.2 Risk Workshops

A series of internal risk assessment workshops were initially held with discipline-based groups to identify risks specific to the area being covered. Workshops were held for environmental & community, mine geotechnical and hydrogeological works, mining, process plant and infrastructure and tailings dams.

Preliminary risk registers were generated in each workshop and then consolidated into a single preliminary risk register.

The combined workshop was split into key areas as follows:

- Project Management Risks:
  - Project / Study Management
  - Permitting and Approvals
  - Environment
  - Community
  - Health and Safety.
- Technical Risks:
  - Mining
  - Tailings
  - Processing.

24.2.3 Risk Matrix

The Cascabel Project risk register contains one hundred (100) active items, the current and target ratings of which are displayed in Figure 24.2.

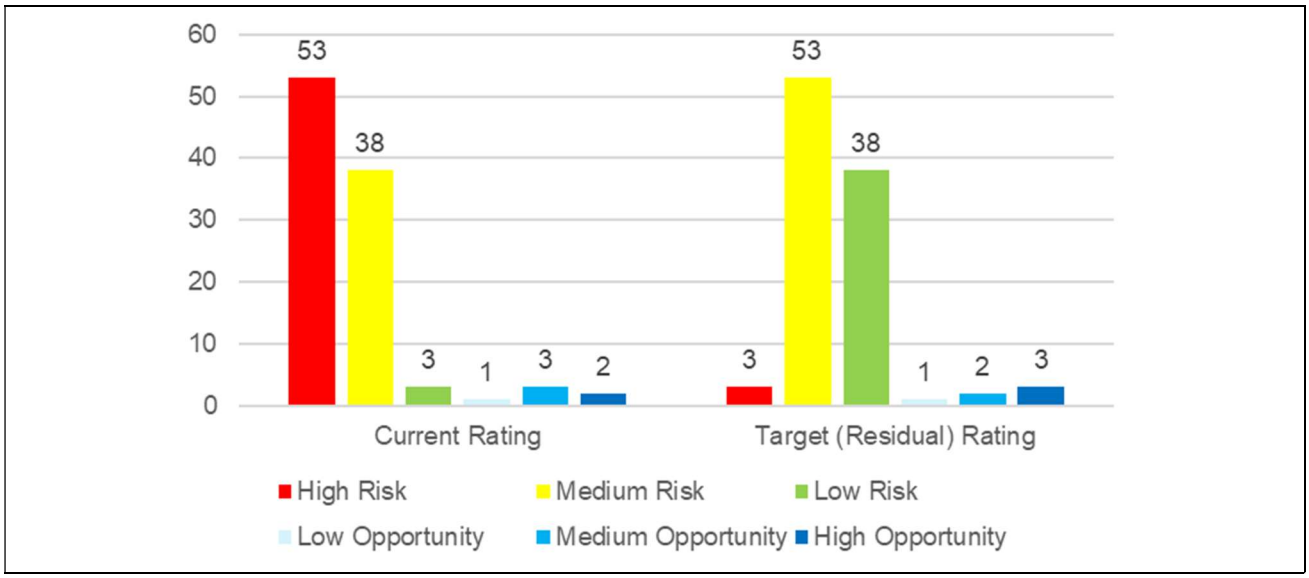


Figure 24.2 : Risk Rating Summary

The high residual risk ranked items are shown in the table below.

Table 24.1 : Project Risk Register Summary

Issue No.	Description of Threat or Opportunity	Current Risk Rating	Proposed Actions (To mitigate further, or to reduce chance of recurrence)	Residual Risk Rating
28	Negative pressure from Community or NGO once Pre-Feasibility is public if not appropriately socialised. In particular: Open Pit and new TSF location.	15	Planning for strong community engagement before public announcement of locations. Develop specific management strategies for stakeholders identified in mapping exercise. Announcement of OP must be socialised carefully by community relations team. Strategy to take community leaders, stakeholders, government representatives to Mirador OP to experience the impact. Provide appropriate level of budget to deliver social strategy. Buy all land that is required for infrastructure. Build social team and resource appropriately to allow proper public socialisation. Slow sufficient time to get appropriate information to the communities. Do not publish the location of any controversial infrastructure (e.g. Tailings, Open Pit),	12
69	Ground Falls in underground workings (seismic incident, insufficient geotech investigations/understanding of ground including in extraction drives and production levels including Footprint collapse)	15	Install appropriate monitoring equipment. Run numerical models to determine support demand and incorporate into support design requirements across the footprint. Undertake drilling and testwork through Pre-Feasibility, FS, ongoing to develop and validate geotech models. Enhanced ground control training for mine workers, evaluation of support during operations, establishment of a ground control QA/QC team during operations. Ensure structural investigation is carried out. Ensure tunnel mapping is carried out during development. Ensure that planned bore holes reflect level of confidence required for each level of study. Carry out in situ stress measurements. Develop a design undercut sequence based on geotechnical information (e.g. matches the capacity of the rock mass).	12
213	Seismic event within the mine	15	Drilling, in situ stress testing, structural model; seismic monitoring. Numerical stability modelling integrated with support design. Assess structural stability and potential for large seismic events. Ensure critical infrastructure offset from structures with seismic potential and abutment stress interactions with appropriate support design. Minimise undercut front stress/damage concentrations and potential for bursting. Investigate hydrofracturing and de-stress blasting practices to reduce seismic potential during development of the undercut.	12

25 Interpretation and Conclusions

25.1 Introduction

The QPs note the following interpretations and conclusions in their respective areas of expertise, based on a review of the data available for this report.

25.2 Mineral Tenure, Surface Rights, Royalties and Agreements

- Information from legal experts supports the validity of the mining tenure and is sufficient to support the declaration of Mineral Resources and Mineral Reserves
- SolGold, through its subsidiary ENSA has secured or is in the process of securing the surface rights necessary to support the Cascabel Project development. SolGold is aware of the avenues available to secure surface rights for the Cascabel Project and is preferentially pursuing the options which ensure benefit to all parties. The QP considers it a reasonable assumption that with continued negotiation, all necessary surface rights to support the Cascabel Project can be obtained
- The Cascabel Project proposes to secure water within the concession catchment areas
- It is expected that there may be environmental contamination in areas where artisanal workings have been undertaken within the proposed Project areas
- On 19 November 2021 SolGold plc and SolGold Finance AG (together the "Investors"), and Exploraciones Novomining S.A. and SolGold-Ecuador S.A. (together the "Receiving Companies") signed a preliminary commitment declaration with regard to an Exploration Investment Protection Agreement (IPA) with Ecuador Ministry of Production, Foreign Trade, Investments and Fisheries (MPCEIP)
- Additional permits are required for Project development, the most important being the Mine Exploitation Agreement and ESIA
- There are no outstanding operations or any other kind of agreements that may limit ENSA's right to carry out mining activities.

25.3 Geology and Mineralisation

- The Alpala and Tandayama-America deposits, at the Cascabel Project in Northern Ecuador, occur near the overlap of Eocene and Miocene Andean porphyry belts that extend from Colombia through Ecuador and Peru into Chile and Argentina
- The mineralisation observed at surface and in the drill core at the Cascabel concession is considered as a classic porphyry Cu-Au system on the basis of:
  - Porphyritic texture of causative intrusions, where feldspar, quartz and mafic phenocrysts are contained in a fine-grained to aplitic groundmass
  - Several stages of hydrothermal alteration associated with each mineralising intrusion
  - Extensive development of fracture-controlled alteration and mineralisation in both porphyritic intrusions and adjacent wall rock
  - A progression from early, discontinuous and irregular veins and veinlets (A-veins), through transitional, planar veins (B-veins) to late, through-going veins (D-veins) and breccia bodies
  - A progression in hydrothermal alteration from early, central potassium silicate and distal propylitic styles to late sericitic/phyllic, advanced and intermediate argillic alteration types

- Sulphide and oxide minerals, which vary from early bornite-magnetite through transitional chalcopyrite-pyrite to late pyrite-hematite, pyrite-enargite or pyrite-bornite.

25.4 Exploration, Drilling and Analytical Data Collection in Support of Mineral Resource Estimation

- The Cascabel Property has been the focus of intense exploration and drilling activity since the discovery of the Alpala Deposit in 2013
- World-renowned copper porphyry experts have studied the deposit, provided advice and guided exploration
- Best practices in geological data capture, storage and interpretation were implemented early in the project's development and have been maintained diligently
- Throughout the project, the QAQC results have demonstrated the reliability of the sampling and assaying procedures
- The QPs for the Alpala and Tandayama-America deposits undertook audits of the database underpinning the respective Mineral Resource Estimates and reviewed the site procedures. They both considered the geological and assay data to be robust and suitable for inclusion in a Mineral Resource Estimate.

25.5 Metallurgical Testwork

- Testwork undertaken and reported here is relevant to the Project, supporting the process recoveries and plant design
- Acceptable copper, gold and silver recoveries were achieved in the flotation process
- Using the LCT results recovery relations were developed for the flotation process for copper, gold, silver and mass to concentrate
- Further testwork to confirm gold and silver recoveries to doré through the pyrite flotation and CIP processes should be undertaken
- The products from the Process Plant, namely concentrate and doré, are saleable without major penalties.

25.6 Mineral Resource Estimates

- The Mineral Resource Estimates for Alpala and Tandayama-America were prepared following industry best practice as described in the "Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines" (CIM, 2019)
- The estimation for both deposits was completed with conventional methods including implicit modelling of geology and mineralisation and estimation of grades into a 3D block model
- Block model validation showed good agreement between the input composite grades and the estimated block grades in both Alpala and Tandayama-America
- The MREs have been classified in accordance with the CIM Definition Standards (CIM, 2014) and were both informed by a drill hole spacing study based on Alpala assumptions
- The reasonable prospects for eventual economic extraction (RPEEE) criteria were met by reporting inside optimised pit shells and/or underground optimisation shapes.

25.7 Mineral Reserve Estimates

- The mine plan is based on Measured and Indicated Mineral Resources converted to Probable Mineral Reserves. The Inferred Mineral Resources grades were set to zero for the purposes of Mineral Reserve estimation due to the proposed mining method
- The current Mineral Reserve estimates are based on the most current knowledge, permit status and feasibility-level engineering and operational constraints. Mineral Reserves have been estimated using standard practices for the industry and conform to the 2014 CIM Definition Standards
- Factors that may affect the Mineral Reserves include long-term commodity price assumptions, long-term exchange rate assumptions, and long-term consumables price assumptions. Other factors that can affect the estimates include changes to: Mineral Resources input parameters, constraining stope designs, shut-off grade assumptions, geotechnical and hydrogeological factors, metallurgical and mining recovery assumptions, and the ability to control unplanned dilution. Operations will require the grant of the exploitation licence.

25.8 Mining Plan

- The following elements were considered for the development of the mine plan:
  - In total, 62 structures were interpreted with one principal, 52 major, and 9 intermediate structures categorised
  - The faults were imported and modelled into the geotechnical studies on caveability and extraction level stability
  - The geotechnical properties for the Alpala deposit were determined from the intact lab strengths, investigation of the core logging database, rock mass statistics, and empirical databases where no information was available
  - The upper (above 650 MASL) and lower databases (below 650 MASL) were separated to account for the differences noted in rock masses. For each database, the low, middle, and high cases were determined to reflect the variation within the rock strengths and rock masses
  - Based on all available hydrogeologic data and the mine plans for underground infrastructure (including ramps, drifts, and shafts) and block caving, Itasca developed a conceptual hydrogeologic model and the three-dimensional numerical groundwater flow model
  - The numerical groundwater flow model was calibrated to the groundwater levels measured during hydraulic testing performed in boreholes drilled across the Project
  - Hydrological conditions are not considered to materially affect mining development rates or pumping costs relative to other block caving operations.
- Mining is planned to be a Block Caving mining method, whilst all horizontal development will be undertaken utilising conventional drill and blast practices
- Access to the Alpala underground mine is expected to be via twin declines commencing from a boxcut located near the surface and the first lift near the 300mRL
- The vertical development for the access shaft and main ventilation rises will be excavated using blind sinking methods
- The extraction level has a Haulage Level running underneath it which will be utilised for material handling during the production. The haul drives allow trucks to transfer the ore from ore passes to the level crushers

where the crushed ore will be transferred to the main decline conveyor via transfer conveyors. These drives also form part of the ventilation circuit for the level development

- In addition to the initial access shaft and the access and conveyor declines, the Pre-Feasibility design includes 7 shafts for ventilation (5 exhaust shafts and 2 intake shafts)
- The costs are based on the assumption that all construction phase works to access the mine and set up for a caving operation are completed by a Mining Contractor
- Although specific equipment manufacturers and equipment models are described in this Report, no final equipment selection has been made. The equipment listed is indicative of the type and size of the equipment planned and was used as the basis for the capital cost estimate. Equipment selected is conventional within the industry.

25.9 Recovery Plan

- A conventional comminution and flotation process was selected to maximise the recovery of copper and as much gold as may be recovered to a concentrate
- The grinding circuit is designed at the 80th percentile
- A pyrite flotation and carbon in pulp (CIP) process was added to maximise gold and silver recovery with the production of doré from a pyrite concentrate produced from the cleaner scavenger tailings stream
- As the underground mine ramps up over a period of years, the process plant has been configured as two modules, with the second module online 2 years after the first module commences operation
- Concentrate production in the first five years is estimated to range 92 to 795 kt/y as mine production increases. Over the initial project life concentrate production is estimated to average 422 kt/y
- Doré production in in the first five years is estimated to range 8 to 70 koz Au/y and 19-124 koz Ag/y as mine production increases. Over the initial project life doré production is estimated to average 33 koz Au/y and 88 koz Ag/y.

25.10 Infrastructure

- Primary access to the Cascabel Project process plant and mine will be via a new section of road starting from the E10 highway (two lane sealed road) that runs along the Rio Mira River valley
- Waste management facilities include sewage, solid and liquid waste and will be located at Project areas including: Cascabel concession, Coastal Plains TSF, and Port
- On-site infrastructure includes:
  - On-site buildings will include security, mine office building with change house, process plant office, electrical rooms and control rooms, workshops, warehouses, tyre bay, wash bay, canteen, first aid station and fire station, laboratory and camp
  - On-site non-process services such as the camp, greenhouse, sewage treatment plant and mobile equipment will support the operation. There will be fresh water, domestic water and process water systems and a fire detection and protection system. Mobile equipment for maintenance, operations services and transportation is included
  - The permanent camp facilities will be located close to the Cascabel concession and at the Coastal Plains TSF. The camp will accommodate personnel as required for construction and operations within

the Project areas. The camp facilities will be constructed early in Project construction phase in order to accommodate construction and operations personnel.

- Some support facilities will be located off the main Project site. These include administration offices, workshop and warehouse with laydown area
- The Coastal Plains TSF is proposed for the Project:
  - Based on the Global Industry Standard on Tailings Management the Coastal Plains TSF has been assigned an Extreme consequence category at the Pre-Feasibility stage with design criteria reflective of this consequence category adopted
  - A total of 473 Mt Rougher tailings and 75 Mt Cleaner tailings will be pumped to the TSF at 55% and 45% solids respectively
  - The facility will be located distal to the mine and processing plant being located on the edge of the Ecuadorian coastal plain approximately 40 km from the processing site. Separate handling and disposal of rougher and cleaner tailings will occur within the Coastal Plains TSF
  - The Cleaner Facility embankment will be 940 m long at crest and will be 76 m high from crest to downstream toe
  - The Coastal Plains Main TSF Embankment will be a cross-valley embankment with a crest length at final height of 5050 m with a height from crest to downstream toe of 168 m
  - A geochemical assessment has been conducted on both the cleaner and rougher tailings. The rougher tailings were classified as Non-Acid Forming with a low number of enriched elements in solids. The cleaner tailings classified as Potentially Acid Forming with a moderate number of enriched elements in solids. Assessments are proposed to continue in subsequent study phases to confirm initial conclusions
- A site wide water balance model was developed for each of the production cases assessed as part of the Pre-Feasibility. The model was used to size the TSF embankment stages and to determine the amount of water which would require discharge as well as assessing the availability of water for processing operations and the required capacity of the Parambas water storage facility
- The Port at Esmeraldas is proposed for the location of the concentrate dewatering facilities. Location options are being evaluated
- The Project includes a transmission line from Pimampiro to the Cascabel concession.

25.11 Environmental, Permitting and Social Considerations

- Baseline studies have been undertaken in the Cascabel concession only to date and are yet to commence for the remaining Project areas. The baseline studies at the Cascabel concession include meteorology, surface hydrology, surface water quality, geochemical analysis, air quality, greenhouse gas emissions, noise, flora and fauna, archaeology and social surveys
- Closure planning has been undertaken to support the Pre-Feasibility study and will continue to be updated as the Project advances
- Geochemical investigations indicate the rougher tailings will be Non-Acid Forming and the cleaner tailings will be Potentially Acid Forming, which has been considered in the design of the TSF
- Environmental and social investigations should be extended to all Project areas

- Water quality modelling should be extended to cover the likely closure scenario to confirm the flows and quality of water requiring treatment post-operations, and to predict the number of years water treatment would likely be required once rehabilitation activities have been completed
- ENSA currently holds permits required for exploration, including the Advanced Exploration permit and associated ESIA for the Cascabel concession area. In order to undertake additional technical investigations, a modification to the ESIA is in process to enable decline, access shaft and waste rock facility development
- Further works are required to progress the mine exploitation contract and ESIA for the Cascabel project
- SolGold operates a robust community engagement program within the Cascabel concession area, with a permanent presence at the project, and a meeting room available to the public and that is used as a base for outreach activities
- Social activities for the wider Cascabel Project are in the very early stages and should commence in order to enable the proposed Project development plan
- There are no currently known environmental issues that could materially impact the ability to of SolGold to extract the mineral resources or mineral reserves.

25.12 Markets and Contracts

- The Project will produce copper-gold-silver containing concentrate and gold and silver doré bars
- No contracts are currently in place for any production from the Project.

25.13 Capital Cost Estimates

- The initial capital cost is estimated to be US$2,746 million. The sustaining capital is estimated to be US$2,136 million, and includes post-production, sustaining and closure costs. The total capital cost for the Project is therefore US$4,882 million.

25.14 Operating Cost Estimates

- The overall life of mine operating cost estimate is US$12.12/t mill feed, or US$2,386/t copper produced.

25.15 Economic Analysis

- Based on Wood's financial evaluation, the Cascabel Project generates positive before and after-tax financial results. After-tax IRR is 19.3% and the after-tax NPV8 is US$2,907 million. After-tax payback is achieved 4.7 years following the start of production
- The Project's NPV@8% is most sensitive to changes in copper price and grade followed by changes in gold price and grade. The Project's NPV@8% is least sensitive to changes in silver price and grade
- It is assumed that the 2% NSR Santa Barbara royalty will be bought out for US$4 million ahead of construction and is therefore not included in the financial model
- SolGold recognises that a closure cost guarantee is required, but at this stage it has not been negotiated with the Ecuadorian government; consequently, closure assumptions within the financial model could vary from what is modelled

- Until the Project completes negotiations with the Ecuadorian government, the taxation within the model is the best estimate of applicable taxes, considering the Ecuadorian tax legislation currently in force and assumptions applied by SolGold.

25.16 Execution Plan

- The Project development schedule requires 6.5 years prior to commencing production and is constrained by the required permits and approvals in order to advance project works
- The Project schedule critical path is driven by the development of the mine decline and access shaft, hence the requirement for early works under the Advanced Exploration approvals, where the technical investigations to advance the mine will be progressed
- Construction of the TSF is also on the critical path, with both the mine and TSF works constrained by the permitting and approvals process.

25.17 Risk and Opportunities

- A project risk register was updated during the Pre-Feasibility
- The key project risks identified to date relate to the permit and approvals process, as well as mine operations in a high seismic zone.

25.18 Conclusions

- On the basis of the investigations described in this report the Cascabel Project returns a positive economic outcome. The advancement of the Cascabel Project rests with SolGold management and board and will be premised on successful permit and approvals from the Ecuador government.

26 Recommendations

26.1 Introduction

Three key technical work fronts have been proposed for the Cascabel project:

1. Additional resource investigations (Pre-Feasibility Addendum)
2. Early mine access to conduct technical investigations
3. Continued technical works and completion of a Feasibility study.

Continued activities associated with securing surface rights for the Cascabel Project and advancement of the ESIA and mine exploitation contract will also continue within Ecuador.

26.2 In-Country Works

Continued advancement of permitting associated activities include:

- Baseline studies and investigations for Advanced Exploration and Mine Exploitation
- Preparation and submission of ESIA for the Cascabel Project
- Submission for mine exploitation contract with the Ecuadorian government.

The budget for advancement of permitting activities is US$4.1 million.

It is also recommended that security of surface rights for proposed Cascabel Project mine, process plant and infrastructure continues. The budget for securing surface rights is US$22.6 million.

26.3 Technical Works

26.3.1 Pre-Feasibility Addendum

The scope of the Pre-Feasibility Addendum is to address the outstanding opportunities and threats as they relate to the definition of the preferred case for the Feasibility Study. The objectives of the Pre-Feasibility Addendum will be to:

1. Confirm the scope of the preferred case for the Feasibility study through the evaluation of threats and opportunities identified in this report, including for example:
   a. Trade off study updates and extensions
   b. Power supply options/supply contract strategy
   c. Metallurgical testwork to support phase of project
   d. Engineering design development
   e. Mining optimisation.
2. Align project development, and key permit (ESIA and Exploitation contract) schedules
3. Confirm contracting strategies for the Feasibility Study into Execution.

The budget for the supporting testwork and Pre-Feasibility Addendum is US$5 million.

26.3.2 Early Mine Access

The scope of the Early Mine Access project is to advance the development decline and access shaft in order to support technical investigations for the Feasibility study.

The Early Mine Access engineering works will also provide direct inputs to the Advanced Exploration permit ESIA modification.

The budget for the Early Mine Access project is US$410 million.

26.3.3 Feasibility

The Feasibility study will be based on the recommended take forwards case following the Pre-Feasibility Addendum.

The study will utilise the additional technical investigations to improve the capital and operating cost estimate accuracy and provide increased confidence in the financial model outcomes.

The budget for the supporting testwork and Feasibility study is US$25 million.

26.4 Additional Data Collection

26.4.1 Exploration

Minor in-fill drilling works will be undertaken to investigate the Tandayama-America deposit. The budget for the Exploration works is US$5 million.

26.4.2 Hydrogeology

Recommendations for hydrogeology include:

- Complete additional pumping tests for the underground mine
- Continue/commence collecting water flow and quality information from the catchment areas within the Cascabel Project areas
- Conduct hydraulic testing for planned geotechnical holes
- Update the surface and underground water models based on flow results
- Update surface and underground water management plans based on the results of the water models.

The budget for the hydrogeology works is US$2 M.

26.4.3 Geotechnical

Feasibility Study and Surface and UG mine geotechnical investigations include the following physical investigations:

- Diamond drilling at various lengths depending on location and sterilisation requirements
- Test pitting where drilling is not required.

The geotechnical also investigations include testwork, and reporting, as well as site visits from Knight Piésold to audit the physical investigations and logging by SolGold personnel.

Areas where geotechnical investigations are proposed include:

- Process plant and infrastructure major infrastructure areas
- Parambas valley dam wall location
- Onsite roads at Cascabel
- Mining areas:
  - Underground extensions to current model
  - Underground access locations including decline and access shaft.
- Power corridor
- Coastal Plains TSF and infrastructure locations
- Port infrastructure locations
- Pipeline corridor.

The budget for the geotechnical investigations is included in the Feasibility study budget.

26.4.4 Geochemistry

Continue sample selection and testwork across the relevant project facilities in accordance with MEND guidelines and study phase to enable commensurate run off/inflow water quality assessments. Facilities include:

- All mine areas
- Coastal Plains TSF
- Parambas water dam
- Process Plant and Infrastructure areas.

The budget for the geochemical investigations is included in the Feasibility study budget.

26.4.5 Process

Recommendations and planned further testwork is summarised below:

- Going forwards the comminution variability data set will be increased through additional sampling and testwork into Feasibility
- Pilot plant materials handling and HPGR testwork for key Alpala underground deposit samples for Feasibility
- Additional variability testwork for flotation concentrate and gold recovery to meet Feasibility requirements
- Vendor dynamic thickening tests for rougher, cleaner tailing and final concentrate, including flocculant screening and dosage
- Final vendor concentrate filtration tests

- Threshold Moisture Limit (TML) tests
- Concentrate quality
- Concentrate transport tests, including:
  - Rheological tests
  - Corrosion/erosion tests
  - Operability tests
  - Characterisation tests
  - Abrasivity tests.
- Tailings transport tests, including:
  - Rheological tests
  - Corrosion/erosion tests.

The budget for the process investigations is included in the Feasibility study budget.

26.4.6 Tailings Management

Recommendations in support of TSF design and tailings management include:

- Hydrogeological study of the TSF area to determine the baseline hydrogeological regime
- Geophysical studies to investigate the subsurface structural geology
- Geotechnical studies to investigate dam foundation and borrow materials sources
- Establish monitoring of site specific weather station within the TSF catchment area
- Establish monitoring of all major streams in the tailings area for flow rates and water chemistry.

The budget for the tailings management investigations is included in the Feasibility study budget.

26.4.7 Economic Analysis

- Complete negotiations with the Ecuadorian government to establish tax rates for the government mining royalty, currency outflow tax, sovereign adjustment tax, and other negotiable taxes
- Refine the depreciation pools between assets and between development and operations to better estimate depreciation allowances
- Complete offtake agreements or LOIs with smelters at the next level of study to better establish final product terms and potential credits for the Cascabel ore which is clean and low in deleterious elements
- Negotiate with the Ecuadorian government the Project's closure guarantees.

The budget for this work is included in the advancement of permitting activities budget.

27 References

Allman Consulting, SolGold Cascabel Project Northern Ecuador, Post Risk Workshop Report, September 2021.

ALS Metallurgy Kamloops, KM 5754, Metallurgical Testing Cascabel Copper-Gold Project, Phase 1 Report, 25 March 2019.

ALS Metallurgy Kamloops, KM 5754 Addendum, Bulk Flotation and Diagnostic Leaching of Pyrite Concentrate, 3 October 2019.

ALS Metallurgy Kamloops, KM 5922, Metallurgical Testing Cascabel Copper-Gold Project, Phase 2 Report, 18 March 2020.

ALS Metallurgy Kamloops, KM 5922, Metallurgical Testing Cascabel Copper-Gold Project, Phase 2A Report, 15 September 2020.

ALS Metallurgy Perth, A 20620, Metallurgical testwork conducted upon Batch Flotation Tails for SolGold plc, June 2021.

ANCOLD, (2019), Guidelines on Tailings Dams – Planning, Design, Construction, Operation and Closure.

Armstrong, R. (2015). SHRIMP U-Pb dating of a sample from the Alpala porphyry Cu-Au system, Ecuador.

Armstrong, R. (2016). SHRIMP U-Pb dating of two samples from the Alpala porphyry Cu-Au system, Ecuador. Australia National University, PRISE – Research School of Earth Sciences. unpublished report for SolGold Plc. Retrieved March 8, 2016.

Artica, C., & Fowler, A. (2020). Cascabel Property NI 43-101 Technical Report - Alpala Mineral Resource Estimation. Brisbane: Mining Plus.

Artica, C., & Harbort, G. J. (2021). Cascabel Property NI 43-101 Technical Report, Alpala Porphyry Copper-Gold-Silver Deposit - Mineral Resource Estimation, January 2021. Brisbane: SEDAR.

Australia National University, PRISE – Research School of Earth Sciences. unpublished report for SolGold Plc. Retrieved January 12, 2015.

Boland, M. P., Pilatasig, L. F., Ibandango, C. E., McCourt, W. J., Aspden, J. A., Hughes, R. A., & Beate, B. (2000). Geology of the Western Cordillera between 0°00-1°00N (1:200,000). Quito - Ecuador: British Geological Survey (BGS); Corporación de Desarrollo e Investigación Geológico, Minero, Metalúrgica (CODIGEM).

Brimhall, G., Dilles, J., & Proffett, J. (2006). The role of geologic mapping in mineral exploration (Vol. Special Publication 12). Society of Economic Geologists.

Bureau Veritas Commodities Canada Ltd, Inspectorate Metallurgical Division, Metallurgical Testing of Samples from the SolGold Cascabel Porphyry Cu-Au Project in Ecuador, 28 August 2014

Cardno Entrix. (2013). Estudio de Impacto Ambiental para la Fase de Exploración Avanzada de Minerales Metálicos del Área Minera Cascabel. Proyecto: 10295808.

CIM. (2014). CIM Definition Standards for Mineral Resources & Mineral Reserves. Prepared by the CIM Standing Committee on Reserve Definitions, Adopted by CIM Council May 19, 2014. West Westmount, Canada: Canadian Institute of Mining, Metallurgy and Petroleum. Retrieved from https://mrmr.cim.org/media/1128/cim-definition-standards_2014.pdf.

CIM. (2019). CIM Estimation of Mineral Resources & Mineral Reserves Best Practice Guidelines. Prepared by the CIM Mineral Resource & Mineral Reserve Committee, Adopted by CIM Council November 29, 2019. West Westmount, Canada: Canadian Institute of Mining, Metallurgy and Petroleum. Retrieved from https://mrmr.cim.org/media/1129/cim-mrmr-bp-guidelines_2019.pdf.

Cunningham, C., Zappettini, E., Vivallo S., W., Celada, C., Quispe, J., Singer, D., Schulz, K. (2008). Quantitative mineral resource assessment of copper, molybdenum, gold, and silver in undiscovered porphyry copper deposits in the Andes Mountains of South America. U.S. Geological Survey. Retrieved from https://pubs.usgs.gov/of/2008/1253/.

Codes Analytical Laboratories, P1104, Gold Contents in Pyrite in Five Samples for MODA, October 2021.

Core Metallurgy, 1189A-001, SolGold plc Cascabel Albion Process™ Amenability Testwork and Class 5 Engineering Study, May 2019.

Einaudi, M. (1982a). General features and origin of skarns associated with porphyry copper plutons: southwestern North America. Advances in Geology of the Porphyry Copper Deposits: Southwestern North America, 185-209.

Einaudi, M. (1982b). Description of skarns associated with porphyry copper plutons: southwestern North America. Advances in Geology of the Porphyry Copper Deposits: Southwestern North America, 139-183.

Federal Register (2010). Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule, page 25,330 (PDF) (407 pp).

Flores, G., & Karzulovic, A. (2003). Geotechnical guideline for a transition from open pit to underground.

Fortin Pipelines, (2022), Water Pipeline – Cascabel Project, Rougher and Cleaner Water Pipeline System Selection, Report Reference PRJ22-0012-RPT-001, March 2022.

Garwin, S. (2018). The importance of geological mapping, core-logging and 3D geoscientific data integration in the exploration of porphyry copper-(gold) deposits. In J. Verncombe (Ed.), Extended abstracts for Gold18@Perth, Australian Institute of Geoscientists Symposium organised in conjunction with Geoscientists Symposia, Perth, Western Australia, 2 – 3 August 2018 Bulletin No. 68 – 2018 (pp. 21-25). Perth, Australia: Australian Institute of Geoscientists.

Garwin, S., Whistler, B., Ward, J., Mather, N., Rohrlach, B., Vaca, S., Guachamin, A. (2017). Alpala: the discovery and geology of a world-class porphyry copper-gold deposit in the Cascabel project of northern Ecuador. NewGenGold 2017 – Case Histories of Discovery 14-15 November 2017, (pp. 237-256). Perth.

Garwin, S., Whistler, B., Ward, J., Mather, N., Rohrlach, B., Vaca, S., . . . Guachamin, A. (2017). Alpala: The discovery and geology of a world-class porphyry copper-gold deposit in the Cascabel project of northern Ecuador. NewGenGold 2017, (pp. 235-254). Perth.

Global Tailings Review, 2020, Global Industry Standard on Tailings Management.

Gribble, P. (2004). Review of the quartz-porphyry-hosted copper molybdenum mineralisation at Junin. Micon International Co Ltd. Otavalo, Ecuador: Unpublished.

Gustafson, L., & Hunt, J. (1975). The porphyry copper deposit at El Salvador, Chile. Economic Geology, 70, 857-912.

Herbert, Y. (2021). Alpala Pre-Feasibility Phase 3 Caveability and Subsidence Assessment. Blackburn: Itasca.

ILO. 1989. Indigenous and Tribal Peoples Convention 169 of the International Labour Organisation, C169.

IPCC (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 2 (Energy). Intergovernmental Panel on Climate Change, Geneva, Switzerland

Itasca Australia Pty Ltd. (07 December 2021). Numerical Assessment of Block Cave Fragmentation. Blackburn, Victora: Itasca Australia Pty Ltd.

Itasca Australia Pty Ltd. (19 November 2021). Numerical Assessment of Excavation Stability. Blackburn, Victoria: Itasca Pty Ltd.

Itasca Australia Pty Ltd. (2021). Numerical Assessment of Caveability and Subsidence. Blackburn, Victoria: Itasca Australia Pty Ltd.

Knight Piésold[1], (2020), Cascabel Project, Tailings Management Pre-Feasibility, Report Reference: BR201-000587/05 November 2020.

Knight Piésold[2], (2022), Cascabel Project, Tailings Management Pre-Feasibility, Report Reference: BR201-000587/09 April 2022.

Knight Piésold[3], (2020), Cascabel Project, Hydrometeorology Report, Report Reference: VA201-587/10-1 February 2020.

Knight Piésold[4], (2020), Cascabel Project, Geochemical characterisation of Tailings, Memo Reference: BR201-00587 EJT M20001.

Knight Piésold[5], (2020), Cascabel Project, Estimates of 24-hr Extreme Precipitation Events, Memo Reference: VA20-00514.

Knight Piésold[6], (2021), Cascabel Seismic Hazard Assessment Report, Report Reference: BR201-000587/08 April 2021.

Knight Piésold[7], (2021), Cascabel Seismic Hazard Assessment Port and Pipelines, Memo Reference: BR201-000587 TDR M21002 July 2021.

Lachenicht, R. (2021). Alpala Pre-Feasibility Optimisation Study. Perth: Itasca Australia Pty Ltd.

Lachenicht, R. (2021). SolGold Concept Shaft Design Offset Recommendations.

Laubscher, D. (2000). A Practical Manual on Block Caving. ICS Sponsors.

Lowell, J., & Gilbert, J. (1970). Lateral and vertical alteration-mineralisation zoning in porphyry ore deposits. Economic Geology, 65, 373-408.

Meyer, C., & Hemley, J. (1967). Wall rock alteration. In H. Barnes (Ed.), Geochemistry of Hydrothermal Ore Deposits (pp. 166-235). New York, United States: Holt, Rinehart and Winston.

Mills, K., SCT Operations Pty Ltd, SOL5003 Letter Report Interim Results of Overcore Measurements at Cascabel Project Alpala Deposit, February 2020.

Mining Plus Pty Ltd. (2021). SolGold Post Pre-Feasibility Phase 1 and 2. Melbourne: Mining Plus Pty Ltd.

Ministerio del Ambiente del Ecuador, Sistema de Clasificación de los Ecosistemas del Ecuador Continental, Subsecretaría de Patrimonio Natural, Quito, 2013.

Moda Microscopy, Cascabel Project Northern Ecuador Preliminary Feasibility Study Feed Composite Optical Mineralogy, August 2021.

Russo, A., SRK consulting, Memo Cascabel stress measurements review, Project 01-2783-01, April 2020.

Sillitoe, R. (1990). Gold-rich porphyry copper deposits of the Circum-Pacific region; an updated overview. In J. Foots, & T. Brennan (Ed.), 1990 Pacrim Congress (pp. 119-126). Parkville, Australia: Australasian Institute of Mining and Metallurgy.

Sillitoe, R. (1993). Gold-rich porphyry copper deposits: geological model and exploration implications. In R. Kirkham, W. Sinclair, R. Thorpe, & J. Duke (Eds.), Mineral Deposit Modeling: Geological Association of Canada Special Paper 40 (pp. 465-478). Geological Association of Canada.

Sillitoe, R. (2010). Porphyry Copper Systems. Economic Geology, 105(1), 3-41.

Slurry Systems Engineering, (2022) Tailings Pipeline – Preliminary Route Options to TSF, Hydraulic Comparison, April 2022.

SolGold plc, Información de Estaciones Hidrologicas – Proyecto Minero Cascabel, November 2019.

Titley, S., & Beane, R. (1981). Porphyry copper deposits. In B. Skinner (Ed.), Part I, Geologic settings, petrology, and tectonogenesis, Economic Geology 75th Anniversary Volume, pp. 214-235.

Tosdal, R. M. (2019). Toward a stratigraphic and structural architecture for the Cascabel exploration license, northern Ecuador. Unpublished technical report to SolGold Plc.

University of Queensland, (2020), Sustainable Minerals Institute, Geometallurgical characterisation of future mine tailings, Alpala porphyry Cu-Au Project: Final Report, October 2020.

Vallejo, C. (2007). Evolution of the Western Cordillera in The Andes of Ecuador (Late Cretaceous-Paleogene). Zurich, Switzerland: Doctoral Thesis Swiss Federal Institute of Technology (ETH) No. 17023.

Woo, S.-K., Eberhardt, E., & Stead, D. (2013). Empirical investigation and characterisation of surface subsidence related to Block Cave Mining. Vancouver: International Journal of Rock Mechanics & Mining Services.

Wood Mackenzie, Pre-Feasibility Market Report, Prepared for SolGold, April 2022.