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NI 43-101 Technical Report on the Star Mountains Porphyry Cu-Au Project, Sandaun Province, Papua New Guinea

Prepared for **Quidum Resources Inc**

by

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Report date: 23 June 2020

Effective date: 20 February 2018

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Certificate of Authorship

I, Simon Tear, PGEO, MIOM3, EurGeol, as co-author of the technical report entitled “NI 43-101 Technical Report: Star Mountains Porphyry Cu-Au Project, Sandaun Province, Papua New Guinea dated 23rd June 2020 with the effective date of 20th February 2018 and prepared for Quidum Resources Inc (“Issuer”), do hereby certify that:

- 1) I am currently employed as a Principal Geological Consultant and Director of H&S Consultants Pty Ltd. with offices at Level 4, 46 Edward St., Brisbane, QLD, Australia.
- 2) I graduated from the Royal School of Mines, Imperial College, London, UK in 1983 with a BSc (Hons) degree in Mining Geology.
- 3) I am registered as a Professional Geologist with the Institute of Geologists of Ireland (registration number 17) and as a European Geologist with the European Federation of Geologists (registration number 26). I have worked as a geologist in the mining industry for over 36 years. My relevant experience for the purpose of this Technical Report is:
 - a. I have extensive experience with a variety of different commodities and types of mineral deposits in Europe, Africa, South America, Asia and Australia.
 - b. I have over 21 years experience with the resource estimation process including 3.5 years minesite experience (open pit and underground) and have worked on feasibility studies. I have also been engaged to undertake property assessments for >20 deposits/projects.
 - c. I have completed over 130 resource estimations on a variety of deposit types including various hard rock deposits for a range of precious and base metals.
 - d. I have completed over 45 reports that are in accordance with either NI43-101 or the 2004 and 2012 JORC Code and Guidelines.
- 4) 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 fulfil the requirements to be a “qualified person” for the purposes of NI 43-101.
- 5) I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.
- 6) I have not visited the Olgal project site.
- 7) I am responsible for chapters 1, 2, 3, 4, 5, 23, 24 and 25 of the technical report entitled “NI 43-101 Technical Report Star Mountains Porphyry Cu-Au Project, Sandaun Province, Papua New Guinea dated 23rd June 2020.
- 8) As of the effective date of the certificate, to the best of my knowledge, information, and belief, the Technical Report herein contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
- 9) I have no personal knowledge, as of the date of this certificate, of any material fact or material change which is not reflected in this Technical Report.
- 10) I am independent of the Issuer Quidum Resources Inc., and of the Vendor, Conic Metals Corp., applying all the tests in section 1.5 of the NI 43-101 instrument.

11) I have had prior involvement with the Olgal Project. The nature of my prior involvement was limited to conducting an independent assessment of the drilling data before the undertaking of a Mineral Resource Estimate by H&SC for the Olgal Project in February 2017.

Dated on 23rd June 2020

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Principal Consultant and Director at H&SC

I, Arnold van der Heyden, MAIG, as co-author of the technical report entitled “NI 43-101 Technical Report: Star Mountains Porphyry Cu-Au Project, Sandaun Province, Papua New Guinea dated 23rd June 2020 with the effective date of 20th February 2018 and prepared for Quidum Resources Inc (“Issuer”), do hereby certify that:

1. I am a Principal Consultant and Managing Director of H&S Consultants Pty Ltd, 3/6 Trelawney Street, Eastwood, NSW, 2122, AUSTRALIA.
2. I graduated with a Bachelor of Science degree (majoring in Geology) from University of Melbourne, Australia, in 1980
3. I have worked as a professional geologist for over 35 years since graduation. I am a Member and Chartered Professional (Geology) of The Australasian Institute of Mining and Metallurgy and a Member of the Australian Institute of Geoscientists.
4. I have read the definition of “qualified person” set out in National Instrument 43-101 (NI 43-101) 2011 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 purposes of NI 43-101.
5. I have read NI 43-101 and Form 43-101F1 and the sections of the Technical Report for which I am responsible and have ensured that these have been prepared in compliance with that instrument and form.
6. I have not visited the Olgal project site.
7. I am responsible for the preparation of Chapter 14 of this report.
8. As of the aforementioned Effective Date, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading
9. I have no personal knowledge, as of the date of this certificate, of any material fact or material change which is not reflected in this Technical Report
10. I am independent of the Issuer Quidum Resources Inc., and of the Vendor, Conic Metals Corp, applying all the tests in section 1.5 of the NI 43-101 instrument
11. I have had prior involvement with the Olgal Project. The nature of my prior involvement was limited to conducting an independent Mineral Resource Estimate for the Olgal Project in February 2017.

Dated 23rd June, 2020.

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I, Lawrence D Queen, MAIG, as co-author of the technical report entitled “NI 43-101 Technical Report: Star Mountains Porphyry Cu-Au Project, Sandaun Province, Papua New Guinea dated 23rd June 2020 with the effective date of 20th February 2018 and prepared for Quidum Resources Inc (“Issuer”), do hereby certify that:

- 1) I am currently employed as a Principal Geological Consultant and Director of Queen & Associates with offices at Level 9, 167 Eagle St Brisbane, QLD, Australia.
- 2) I graduated from the New Mexico Institute of Mining and Geology in 1982 with a BSc (Hons) degree in Geology. I received a MSc in Geology in 1989 from the University of Alaska, Fairbanks.
- 3) I am a member of the Member of the Australian Institute of Geoscientists (Mem No 7649). I have worked as a geologist in the mining industry for over 38 years. My relevant experience for the purpose of this Technical Report is:
 - a. I have extensive experience with porphyry copper, skarn and epithermal deposits throughout Papua New Guinea, the southwest Pacific and North America.
 - b. I have over 24 years experience with the resource estimation process.
 - c. I have been the lead geologist for five pre-feasibility or feasibility studies.
 - d. I have completed over 50 resource and exploration results reports that are in accordance with the 2004 and 2012 JORC Code and Guidelines.
- 4) 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 fulfil the requirements to be a “qualified person” for the purposes of NI 43 101.
- 5) I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.
- 6) I have visited the Olgal project site.
- 7) I am responsible for Chapters 6, 7, 8, 9, 10, 11, 12, 13 and 26 of the technical report entitled “NI 43-101 Technical Report Star Mountains Porphyry Cu-Au Project, Sandaun Province, Papua New Guinea dated 23rd June 2020
- 8) As of the effective date of the certificate, to the best of my knowledge, information, and belief, the Technical Report herein contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
- 9) I have no personal knowledge, as of the date of this certificate, of any material fact or material change which is not reflected in this Technical Report.
- 10) I am independent of the Issuer Quidum Resources Inc., and of the Vendor, Conic Metals Corp., applying all the tests in section 1.5 of the NI 43-101 instrument.
- 11) I was Chief Geologist for Highlands Pacific for the period 2005 – 2019. I was extensively involved with the Star Mountains Project during the period 2009 to 2018.

Dated on 23rd June 2020

LD Queen

BSc, MSc Consulting Geologist

Principal Consultant and Director at Queen & Associates

TABLE OF CONTENTS

Date and Signature Page	i
Certificate of Authorship	ii
1 Summary	1
1.1 Property Description, Location, Ownership and Access	1
1.2 History and Source of Data	2
1.3 Exploration Rights.....	2
1.4 Geology and Mineralisation.....	2
1.5 Exploration, Drilling, Data Verification and Quality Assurance and Control.....	2
1.6 Mineral Resource Estimation	3
1.7 Interpretation and Conclusions	4
1.8 Recommendations	5
2 Introduction	6
3 Reliance on Other Experts	7
4 Property Description and Location	8
4.1 Property Location	8
4.2 Tenure	8
4.3 Royalties & Other Payments	10
4.4 Environmental Liabilities	10
4.5 Mining Permits.....	11
4.6 Significant Factors to Mining Operations	11
5 Accessibility, Climate, Local Resources, Infrastructure and Physiography	12
5.1 Physiography	12
5.2 Accessibility.....	12
5.3 Local Resources.....	13
5.4 Climate	13
5.5 Infrastructure.....	13
5.6 Cultural Heritage.....	13
6 History	14
6.1 Sources of Historical Exploration Data.....	14
6.2 Previous exploration	14
6.2.1 Kennecott 1969-1972.....	14
6.2.2 GSPNG/ Ok Tedi Development Company Pty. Ltd 1975-1977.....	14

6.2.3	CRA 1986-1987	14
6.2.4	Newcrest-OTML JV 1992-1999.....	14
6.2.5	HPL-Xstrata JV 2002-2013.....	15
6.2.6	HPL-Anglo American JV 2014-2018.....	15
7	Geological Setting and Mineralisation	18
7.1	Regional Geology.....	18
7.2	Local Geology & Mineralisation.....	19
8	Deposit Type	21
9	Exploration.....	23
9.1	Geophysical Surveys	23
9.1.1	Aeromagnetics and Radiometric Surveys.....	23
9.1.1.1	2005 Survey.....	23
9.1.1.2	2015 HPL Survey.....	23
9.1.1.3	2015 MRA regional survey	23
9.1.2	ZTEM Survey	24
9.1.3	Ground AMT Survey	25
9.1.4	Ground IP and AMT Survey.....	25
9.2	Geochemical Surveys	25
9.3	Geological Mapping.....	27
9.3.1	Olgal	27
9.3.2	Kum Kom.....	28
9.3.3	Unfin.....	30
9.3.4	Fune	31
9.3.5	Futik.....	32
9.3.6	Bumtin.....	34
9.4	Petrological Studies	34
10	Drilling.....	35
10.1	Kennecott Drilling	35
10.1.1	Sampling Protocol	35
10.1.2	Utility.....	36
10.2	HPL & HPL-Anglo American JV Drilling.....	36
10.2.1	Sampling Protocol	36
10.2.2	Collar surveys	37
10.2.3	Downhole Survey	37
10.2.4	Core Recovery	37
10.2.5	Prospect Drilling.....	38

10.2.5.1	Olgal	38
10.2.5.2	Kum Kom.....	41
10.2.5.3	Unfin.....	43
10.2.5.4	Fune	45
10.2.5.5	Futik.....	48
10.2.5.6	Tuk	49
10.2.5.7	Rattatat	50
11	Sample Preparation, Analyses and Security.....	52
11.1	Kennecott Drilling	52
11.2	HPL & HPL-Anglo American JV Drilling.....	52
11.3	Sample Security.....	53
11.4	QAQC.....	53
11.4.1	Blanks	53
11.4.2	Standards	55
11.4.3	Duplicates	58
12	Data Verification.....	61
13	Mineral Processing and Metallurgical Testing.....	61
14	Mineral Resource Estimates.....	62
14.1	Database.....	62
14.2	Domaining.....	63
14.3	Data Analysis	64
14.3.1	Core Recovery	64
14.3.2	Sample Length.....	65
14.3.3	Summary Statistics	65
14.3.4	Variography.....	67
14.3.5	Density	70
14.4	Estimation.....	70
14.4.1	Block Model.....	70
14.4.2	Estimation Parameters	71
14.4.3	Validation.....	71
14.4.4	Results	73
14.4.5	Classification	74
14.4.6	Previous Estimates.....	75
14.4.7	Other Factors	75
15	Mineral Reserve Estimates.....	76

16	Mining Methods.....	76
17	Recovery Methods	76
18	Project Infrastructure.....	76
19	Market Studies and Contracts	76
20	Environmental Studies, Permitting and Social or Community Impact	77
21	Capital and Operating Costs.....	77
22	Economic Analysis.....	77
23	Adjacent Properties	77
24	Other Relevant Data and Information	77
25	Interpretation and Conclusions	78
26	Recommendations.....	80
26.1	Regional	80
26.2	Olgal	80
26.3	Futik.....	80
26.4	Bumtin.....	80
26.5	Unfin South.....	81
26.6	Awen-Fune	81
27	References & Glossary	82
27.1	References.....	82
27.2	Measurement Units	85
27.3	Glossary.....	86

LIST OF TABLES

Table 1: Exploration Licence Tenure Details	9
Table 2: Summary of mineral exploration work in the Star Mountains area	16
Table 3: Local Stratigraphy	19
Table 4: Summary of assays from Futik and Olgal drill holes (CRA rpt 1988/012)	35
Table 5: Summary of additional gold assays from Futik & Olgal drill holes (CRA rpt 1988/012)	35
Table 6: Olgal drill hole collars, orientation and depth	38
Table 7: Kum Kom drill hole collars, orientation and depth	42
Table 8: Unfin drill hole collars, orientation and depth	43
Table 9: Unfin drilling significant results	44
Table 10: Fune drill hole collars, orientation and depth	45
Table 11: Futik drill hole collars, orientation and depth	48
Table 12: Tuk drill hole collars, orientation and depth	49
Table 13: Rattatat drill hole collars, orientation and depth	50
Table 14: Database Summary	62
Table 15: Summary Statistics	66
Table 16: Correlation Matrix – Zone 2	67
Table 17: Variogram Model Parameters	70
Table 18: Summary Statistics of Density Data – Zone 2	70
Table 19: Olgal Model Dimensions	71
Table 20: Estimation Search Parameters	71
Table 21: Comparison of Average Drill Hole and Model Grades	72
Table 22: Olgal Estimates by Copper Cut-off Grades	73
Table 23: Olgal Estimates by Gold Cut-off Grades	74
Table 24: Olgal Estimates by Equivalent Copper Cut-off Grades	74
Table 25: Mineral Resource Estimate at 0.3% Cu Cut-off Grade	74
Table 26: Olgal Mineral Resource Estimate	79
Table 27: Estimated Summary of Proposed Programme Costs	81

LIST OF FIGURES

Figure 1: Location Map	8
Figure 2: Location Map showing HPL Exploration Licences	10
Figure 3: The Hindenburg Wall Escarpment	12
Figure 4: Regional Geology Map and Section through Ok Tedi (van Dongan et. al., 2010)	18
Figure 5: Geology of the Star Mountains Tenements (Mason, 1994)	20
Figure 6: Anatomy of a Telescoped Porphyry Cu - Skarn - Epithermal system (Sillitoe, 2010)	22
Figure 7: Star Mountains Prospects on 2015 Regional Magnetic Survey	24
Figure 8: ZTEM Coverage and Prospects	25
Figure 9: Stream Sediment and/or BLEG sampling (green dots) in the Star Mountains	26
Figure 10: Combined stream sediment results for copper on Ok Tedi 1:100,000 geology map	27
Figure 11: Olgal Prospect Geology	28

Figure 12: Kum Kom Prospect Geology	29
Figure 13: Unfin Prospect Geology	31
Figure 14: Fune Prospect Geology.....	32
Figure 15: Futik Prospect Geology	33
Figure 16: Interpreted Lithology and Alteration Map of Bumtin Prospect.....	34
Figure 19: Prospect and Drilling Locations on Shaded LiDAR Topographic Base	36
Figure 20: Core Recovery by Sample	38
Figure 21: Olgal Drillhole Plan on Shaded Topography.....	39
Figure 22: Simplified Olgal Section A-A' on Figure 22 (after Sillitoe, 2015)	41
Figure 23: Olgal Regional cross section A-A' extended showing thrusts and inferred offset of the Olgal porphyry	41
Figure 24: Kum Kom Drill Hole Plan on Shaded Topography	42
Figure 25: Unfin Drill Hole Plan on Shaded Topography	44
Figure 26: Fune Drill Hole Plan on Shaded Topography.....	46
Figure 27: Fune Cross Section	47
Figure 28: Futik Drill Hole Plan on Shaded Topography	48
Figure 29: Tuk Prospect - Drill Plan on Shaded Topography	50
Figure 30: Rattatat Drill Plan on Shaded Topography	51
Figure 31: Geneva Limestone Blank Standard	54
Figure 32: Tifalmin Limestone Blank Standard.....	55
Figure 33: Copper Standard OREAS 153a.....	56
Figure 34: Copper Standard OREAS 503.....	56
Figure 35: Copper Standard OREAS 151a.....	57
Figure 36: Copper Standard OREAS 501.....	58
Figure 37: Field Duplicates Copper.....	59
Figure 38: Field Duplicates Gold	60
Figure 39: 3D View of Olgal, looking North.....	63
Figure 40: Grade versus Core Recovery	64
Figure 41: Histogram of Sample Length for Olgal.....	65
Figure 42: Histogram of Cu Grade – Zone 2.....	66
Figure 43: Variogram Maps for Copper – Zone 2	68
Figure 44: Variogram Maps for Au and Mo – Zones 1&2.....	68
Figure 45: Variogram for Copper – Zone 2	69
Figure 46: Swath Plots for Copper – Zone 2	73
Figure 47: Grade-Tonnage Curves for 2018 and 2017 Models	75
Figure 48: ZTEM Coverage showing Previously Identified Prospects and Targets.	80

1 Summary

1.1 Property Description, Location, Ownership and Access

The Star Mountains Property consists of 500.98 sq km (147 sub-blocks) of contiguous exploration licenses which cover a Late Miocene to Pliocene copper-gold porphyry and skarn district, located in Papua New Guinea near the border with Indonesia.

This independent Technical Report has been prepared by H & S Consultants Pty Ltd (“H&SC”), an independent geological consultancy based in Sydney, NSW, Australia, at the request of Quidum Resources Inc (“QR”), in connection with its acquisition of Highlands Pacific Resources Limited (“HPL”). QR is intending in the immediate future to complete the purchase of the Star Mountains property through the acquisition of HPL from Conic Metals Corp (“Conic”). The property comprises a suite of exploration licences which were assembled between 2002 and 2017 by HPL prior to its takeover by Conic in 2019.

The potential for discovery of porphyry copper gold deposits within the project area was initially recognized by Kennecott in the late 1960’s and the Property has been the focus of intermittent exploration work programs carried out by a range of companies with the last phase completed in 2017 by HPL in joint venture with Anglo American Plc. The total cost of all historic exploration work to date including 21,415 metres of drilling in 51 holes is estimated at USD \$43m. This work has identified multiple porphyry copper-gold and skarn-type copper gold prospects and defined several target areas which warrant continued evaluation.

The Olgal Prospect was recognized by Kennecott as a high priority target and has been the focus of approximately half of the historic drill testing. Some of the better intercepts from Olgal include:

- 596m @ 0.61% Cu & 0.85g/t Au from 24 m down hole (014OLG12)
- 183 metres @ 0.53% Cu and 0.58 g/t Au from 168m downhole (019OLG16)
- 430 metres @ 0.39% Cu and 0.24 g/t Au from 168m downhole (020OLG16)
- 434.9 metres @ 0.52% copper and 0.72 g/t gold (Including 100 metres @ 0.82% copper and 1.39 g/t gold from 76m downhole) (017OLG16)
- 82 metres @ 0.48% Cu and 0.27 g/t Au (013OLG11)

H&SC completed a Mineral Resource Estimate for Olgal during 2017 and 2018 based on 23 diamond core holes totalling 8,949m that was filed with the ASX on the 20th February 2018 (HPL, 2018). This technical report confirms that the 2018 Mineral Resource Estimate is reported in accordance with the 2014 CIM Definition Standards for Mineral Resources & Mineral Reserves, and confirms that no material exploration work has been carried out since the 2018 Report. This report also outlines recommendations for continued exploration work on the Property.

The Star Mountains lie at the headwaters of the Sepik River. The terrain is mountainous and extremely rugged with high altitude limestone karst plateaus, homoclinal ridges and cuestas bounded by deeply incised valleys. Access to the area is via fixed wing aircraft or helicopter from Tabubil, the township for the Ok Tedi Mine with access to the various prospects either by walking

track or helicopter. Vegetation is typical tropical rainforest with average annual rainfall of 3800mm per year. Temperatures in the valleys average around 20°C all year with maximum daytime temperatures of 25°C, and minimum night temperatures of 15°C.

1.2 History and Source of Data

This report is based on a review of the 2018 Olgal resource estimation report and the historical and currently available data concerning the Star Mountains tenements obtained from Conic.

The resource estimation section for the Olgal porphyry copper deposit was completed by Mr. Arnold van der Heyden of H&SC.

1.3 Exploration Rights

The area is covered by four (4) Exploration Licences (“EL”) issued by the Papua New Guinea Mineral Resources Authority and held by HPL. Three (3) of the licences are current, while the fourth is subject to a renewal application.

1.4 Geology and Mineralisation

The Star Mountains form the spine of the New Guinea Highlands and lie at the transition between the stable craton of the Fly Platform and the New Guinea Mobile Belt. The geology of the Star Mountains can be approximately divided into an eastern portion characterized by large exposures of Darai Limestone in stacked north-verging thrust sheets and a western portion dominated by andesitic volcanics and porphyritic dioritic intrusives of the Antares Complex and the co-magmatic Scorpion Volcanics. In the Tifalmin area (part of the property), the Darai thrust sheets are intruded by a number of diorite/quartz diorite intrusives. Several of the intrusives are altered and mineralised with locally significant occurrences of copper and gold mineralisation. The contacts between the intrusives and the limestones typically display some development of skarn. The altered Cu-Au mineralised diorite/quartz diorite intrusives and the associated skarns are the porphyry copper/skarn deposits targeted by exploration in the Star Mountains area.

Porphyry copper deposits are a major world source of copper. They comprise large volumes of rock containing low-grade copper mineralisation typically extracted by bulk mining methods.

1.5 Exploration, Drilling, Data Verification and Quality Assurance and Control

The Star Mountains property has been extensively explored since the late 1960s- Kennecott (1969-1972), GSPNG/Ok Tedi Development Company (1975-1977), CRA (1986-1988), Newcrest-OTML JV (1992-1999), HPL-Noranda JV (2002-2005), HPL-Xstrata (2006-2009), HPL (2010-2014) and HPL-Anglo American JV (2015-2018). Exploration work included stream sediment geochemistry, regional and prospect mapping and sampling, airborne magnetic and radiometric surveys, a LiDAR survey, a ZTEM survey, ground geophysics including ATM, structural studies and diamond drilling of seven prospects.

The Star Mountains Project drill hole database comprises data from three separate drilling campaigns namely 1970-Kennecott (5 holes), 2010-2013 HPL (32 holes including 1 wedge hole) and 2015-2017 HPL-Anglo American Joint Venture (19 holes including 4 wedge holes). The documentation for the

Kennecott drilling is sparse and the drill data is used only as indicative of the geology. The drilling by HPL and the HPL-Anglo American JV forms the primary dataset for the Olgal Mineral Resource Estimate and sub-surface exploration data for a range of other prospects in the property. This database includes geological and geotechnical logs, density measurements and geochemical assays. The geochemistry was carried out with QAQC procedures including the use of standards, blanks and quarter-core duplicates.

Data verification of the drilling data consisted of random checks on the drillhole database with original digital or hardcopy files/certificates. Other database checks included checking for duplicate intervals, overlapping samples, consistency of hole deviations etc. No site visit was possible due to the travel bans associated with the COVID-19 pandemic.

1.6 Mineral Resource Estimation

The Mineral Resources for the Olgal deposit were publicly reported by HPL to the ASX in 2018 in accordance with the 2012 JORC Code and Guidelines (Highlands Pacific ASX release 20 February 2018). The effective date of the Mineral Resource Estimate (“MRE”) is February 2nd 2018, which was the date that the final database was received by H&SC. Drill hole spacing at Olgal is irregular due to the rugged terrain. Drilling is limited to a small number of accessible sites, often with two or three holes drilled in different directions from each site. Nominal drill hole spacing is around 200m. The MRE is based on 23 diamond core holes with geology and assays, totalling 8,949m.

The geological interpretation of Olgal is based on the available geological logging and assays. A basal thrust dipping around 33° to 60° (dip > direction) has been identified in a number of holes (7), which separates the upper mineralised sequence from barren basement. A zone of oxidation has been identified on the basis of geological logging and depletion in sulphur and copper assays with the zone averaging 20m thick. The Olgal deposit was divided into 3 zones for data analysis and resource estimation namely an oxide zone, a main porphyry mineral zone and a basal thrust unit.

Four elements (Cu, Au, Ag, Mo) were estimated by Ordinary Kriging. This is considered appropriate because the coefficients of variation ($CV = SD/mean$) are generally low and the grades appear well structured spatially. No grade cutting was applied because no extreme values were identified.

Samples were composited to nominal 4m intervals for data analysis and estimation.

The resource model block size is 50x50x20m. A block size one half to one quarter the hole spacing is considered appropriate for this type of deposit.

Variogram maps for Cu in the primary zone show slightly stronger continuity in the north-south direction in plan view and fairly isotropic continuity in the other planes. Au and Ag show similar continuity to Cu. Mo tends to form a halo around a Cu, Au and Ag core for the mineralised system.

Density was assigned to the model by applying the average value for the primary zone; a value of 2.18 t/m³. A nominal density of 2.00 t/m³ was applied to the oxide zone.

The entire MRE is classified as Inferred, based on the Qualified Person’s experience with similar porphyry copper deposits elsewhere. This scheme takes account a number of other factors, including data distribution and the continuity of geology and grades. The MRE is reported at a 0.3% Cu cut-off grade. The MRE comprises primary zone mineralisation only above the thrust zone; the oxide zone is depleted in copper and none of this is above cut-off grade. The MRE is presented below:

CLASS	Mt	% Cu	g/t Au	g/t Ag	ppm Mo	%EqCu	Mt Cu
Inferred	210	0.40	0.43	0.47	19	0.65	0.84

The MRE stated in this Technical Report have been estimated and reported in accordance with the 2014 CIM Definition Standards for Mineral Resources & Mineral Reserves.

The copper equivalent is based on metal prices of US\$ 3.00 /lb for copper and US\$ 1,200 /oz for gold, giving a formula of EqCu = % Cu + g/t Au x 0.5833. No metallurgical recoveries were available or assumed in this analysis.

1.7 Interpretation and Conclusions

A substantial amount of geoscientific data exists for the Star Mountains project. Historic drilling has confirmed the presence of porphyry and skarn styles of copper and gold mineralisation at several of the known prospects within the property. The available exploration datasets indicate that the Property is prospective for economic quantities of porphyry and skarn style, bulk tonnage copper gold mineralisation.

The Target Areas that have been identified by previous exploration work within the Property include the Olgal, Kum Kom, Unfin, Bumtin, Fune, Futik, Tuk and Rattatat. At Olgal, drilling and geological mapping has allowed for the definition of an Inferred Resource. While drilling has largely closed off the resource potential to the north, east, south and at depth, to the west, toward Futik, there is some potential for an extension of the resource below and to the south of the current western line of drill holes.

In addition to the potential for extensions of the Olgal Prospect several of the known target areas clearly warrant additional exploration.

At Futik there is strong evidence that there is potential for porphyry-style mineralisation at depth.

The Unfin prospect has the largest area of surface-exposed alteration of any of the prospects in the Tifalmin area. To date drilling has been limited to the northern portion of the prospect.

Drilling at Fune has demonstrated the presence of copper skarn mineralisation, developed at the contact between the Darai Limestone and the Ieru Formation. There are untested skarn targets between Fune and Awen, based on airborne geophysics (ZTEM) and geological interpretation from the 2017 drilling of the Darai-Ieru contact in the area.

The Bumtin prospect shows geological (phyllitic altered diorite intrusion), geochemical (700 x 600m), and geophysical (~30 Ohm-m conductive response) indications of a porphyry copper system. Its location near Unfin suggests it may be part of that larger system.

In addition to the known target areas a detailed review of the ZTEM airborne survey data (survey completed in 2016) integrated with all geoscientific datasets may identify additional skarn and deeper porphyry targets.

1.8 Recommendations

The existing database (GIS, surface and sub-surface geochemistry, drilling, geophysics) should be audited and reviewed. Staged exploration recommendations should be prepared for each of the known target areas that warrant additional exploration work.

The ZTEM survey should be further reviewed to identify additional skarn targets and to assess the potential for deeper porphyry targets.

Delineation of skarn targets at the contact between the Darai Limestone and Ieru Formation should be undertaken. This would require some ground geophysics (ATM) follow up and is likely to yield drill targets.

These programmes are estimated to cost C\$480,000

During the period 2010 -2017 HPL provided rotating work contracts for local residents, funded or supported a number of community projects and began the process of landowner identification. This work should be continued when exploration work on the Property resumes.

2 Introduction

H&S Consultants Pty Ltd (“H&SC”), a geological consultancy based in Sydney, NSW, Australia was requested by Quidum Resources Inc (“QR”), to generate an exploration report for the Star Mountains project in the Central Highlands of Papua New Guinea in accordance with the NI43-101 rules.

QR is intending to complete in the immediate future the purchase of the Star Mountains property through the acquisition of Highlands Pacific Resources Limited (“HPL”) from Conic Metals Corp (“Conic”). The property comprises a suite of exploration licences which was originally assembled by HPL prior to its takeover by Conic. The property has had previous exploration work carried by a range of companies with the last phase completed in 2017 by Highlands in joint venture with Anglo American Plc. This work included a significant target generation exercise along with definition of Mineral Resources for the Olgal porphyry copper prospect.

This Technical Report confirms the Mineral Resources for the Olgal porphyry copper prospect in accordance with the 2014 CIM Definition Standards for Mineral Resources and Mineral Reserves, and summarizes the exploration prospectivity of the property.

This Technical Report is prepared in accordance with the format specified in Form 43-101F1 Technical Report dated 24th June 2011. The Mineral Resources stated in this Technical Report have been estimated and reported in accordance with the 2014 CIM Definition Standards for Mineral Resources and Reserves 2014.

H&SC understands that this Technical Report will be published on or around 23rd June 2020.

All measurement units used in this Technical Report are metric; units and abbreviations are summarised in Section 27. The spellings used are Australian English conventions.

H&SC has used the following sources of information in preparing this Technical Report:

- Reports and digital files supplied by Conic
- Reports of work done by previous explorers
- Public domain information obtained from Internet searches and other sources

Reference to the main sources of information used are provided in Section 27.1

Larry Queen (an independent geological consultant with PNG expertise) was Chief Geologist for Highlands and completed many site visits to the Star Mountains property, with the last being in February 2017. H&SC have been assured by Larry Queen and Conic that no further exploration fieldwork has been completed since February 2017. Larry Queen is in the unique position of being the most senior person with complete knowledge of the property and has provided a substantial contribution to this report.

Simon Tear is a director and consulting geologist for H&SC with over 35 years experience in exploration and mineral resource estimation. He has visited PNG on 3 occasions to various other properties and has recently completed updated Mineral Resources for TSX-listed K92’s Kainantu gold mine. He has not made a site visit to the Star Mountains property, but has flown over the terrain in a helicopter.

Arnold van der Heyden is Managing Director and consulting geologist for H&SC with over 35 years experience in exploration and mineral resource estimation. He has not made a site visit to the Star Mountains property.

Due to the current COVID-19 pandemic and its associated travels bans no site visit can be completed in the foreseeable future. The effective date of this report is 20th February 2018 as this is when the resource estimation report for Olgal was completed and publicly announced. No additional drilling, sampling or assaying has been completed since that date.

3 Reliance on Other Experts

The Authors have not relied on a report, opinion or statement of another expert who is not a qualified person, or on information provided by the issuer, concerning legal, political, environmental, or tax matters relevant to the technical report.

4 Property Description and Location

4.1 Property Location

The Star Mountains tenement package is in the Star Mountains, West Sepik Province, Papua New Guinea near the western border with Indonesia and approximately 25 km due north of Tabubil and the Ok Tedi Mine. The tenement package is approximately centred at 5°4’S and 141°23’E or 542500mE and 9439950mN using the WGS84 Zone 54 grid projection (Figure 1). Previous exploration work has been done in either the Australian National Grid of AGD66 Zone 54 (1970 - 2013) or WGS84 Zone 54 (2015 - 2017).



Figure 1: Location Map

(Lat/Long projection; supplied by Conic)(zoom in on image for better resolution)

4.2 Tenure

Prior to undertaking any minerals exploration in Papua New Guinea an Exploration Licence (“EL”) must be obtained. Under the Papua New Guinea Mining Act 1992, minerals tenements are issued by the Mining Minister on recommendation from the Mining Advisory Council (MAC).

An EL may be granted for a term not exceeding two years, which may be extended for periods not exceeding 2 years. The area of land in respect of which an EL may be granted shall be no more than 750 sub-blocks (One Sub block = 3.41 km²).

Four (4) Exploration Licences issued by the Papua New Guinea Mineral Resources Authority, held by HPL, make up the Star Mountains group of tenements. HPL is a fully owned subsidiary of Conic and it is Conic's intention to sell HPL to QR. The latter company is in the process of completing the acquisition for and in consideration of the payment by the Purchaser to Conic of the sum of up to US\$5 million, payable in cash and/or Purchaser Shares (such ratio of cash and Purchaser Shares at the sole election of the Purchaser given at such time), as follows:

- (i) as to US\$2 million, within 10 days of receipt by the Purchaser of a mining license in PNG in respect of the Star Mountains project and/or Property; and
- (ii) as to US\$3 million, within 10 days of first commercial production from the Star Mountains project and/or Property.

Details of the ELs are given in Table 1.

Table 1: Exploration Licence Tenure Details

EL Number	Name	Date of 1 st Application	Date of 1 st Grant	Date Expires	Status	Area (sub-blocks)	Area (sq. km)
1312	Nong River	24-Jan-01	20-Sep-02	19-Sep-20	Current	73	248.48
1781	Munbil	16-Feb-10	12-Mar-12	11-Mar-20	Wardens Hearing set for 14/04/20	21	71.5
2001	Benstead	06-Jun-11	20-Dec-12	19-Dec-20	Current	27	92
2467	Mt Abemh	27-Jul-16	02-Dec-16	01-Dec-20	Current	26	89
					Total	147	500.98

EL Number	Name	Previous Expenditure from 20 Sept 2002 to 31 Dec 2019 (US dollars)	1 st year exploration commitment (kina)	2 nd year exploration commitment (kina)	Annual rental (kina)
1312	Nong River	35,027,579	250,000	250,000	34,310
1781	Munbil	4,052,063	100,000	100,000	9,870
2001	Benstead	4,057,542	60,000	60,000	12,690
2467	Mt Abemh	241,257	60,000	60,000	4,680

Additional points of interest are noted below:

- ELs 1781, 2001 and 2467 are below minimum size for reduction
- EL 1781 has received exemption from further reduction on the basis of past expenditure.
- Total expenditure for the Star Mountains project from 20 September 2002 to 31 December 2019 is USD 43,378,441.

A representative map of the ELs as per the PNG MRA website “PNG Mining Cadastre Portal” <https://portal.mra.gov.pg/Map/> last checked 20th March 2020 is included as Figure 2.

The names of the licences are EL 1781 “Munbil”, EL 1312 “Nong”, EL 2001 “Benstead”, EL 2467 “Mt Abemh”.

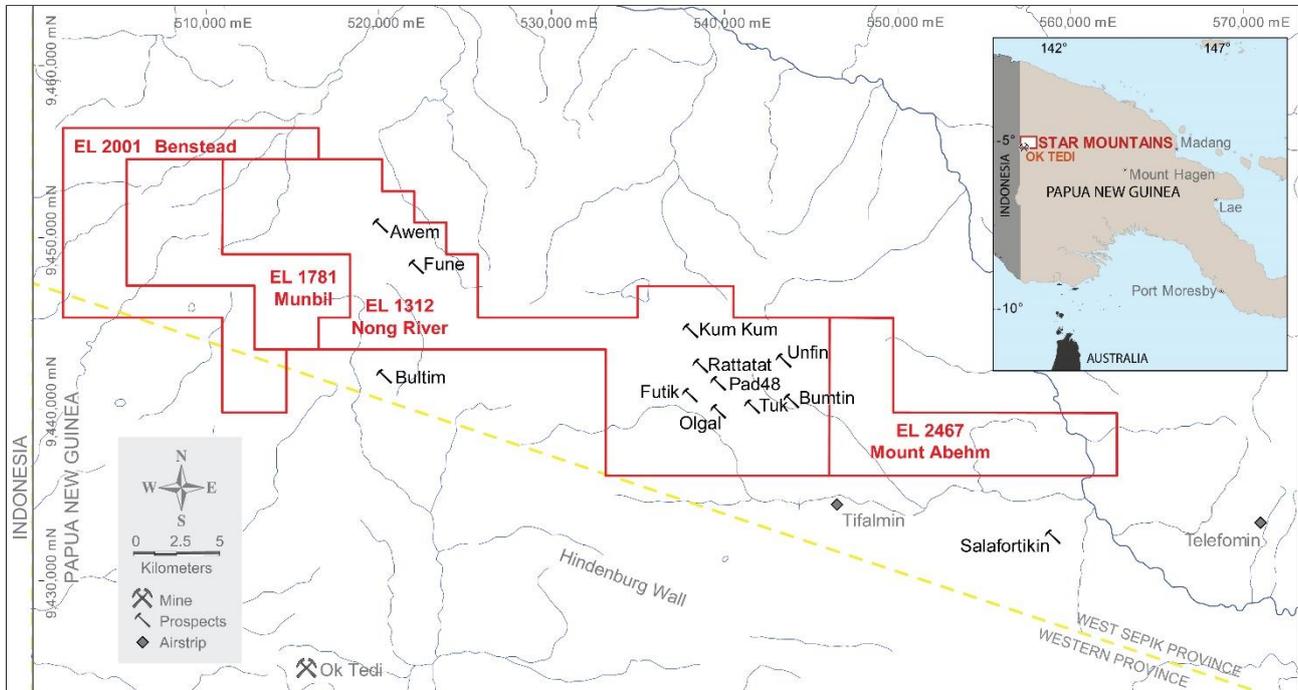


Figure 2: Location Map showing HPL Exploration Licences.

(supplied by Conic)

4.3 Royalties & Other Payments

The only royalties that currently apply to project is the 2% NSR royalty paid to the Papua New Guinea national government.

The property lies on ground belonging to a number of traditional landowner groups for which a compensation amount has been agreed and compensation for past work has been paid in full. Compensation rates are based on rates published in the PNG *Valuer-General Compensation Schedule for Trees and Plants, All Regions* (August, 2013) and the *Papua New Guinea Chamber of Mines Compensation Schedule for Land Use and Land Damage and Man-Made Structures in the Mining and Petroleum Sectors* (2008).

4.4 Environmental Liabilities

There are no environmental liabilities associated with the project based on past activities.

During the period 2010 – 2017 the Star Mountains JV held appropriate Waste Discharge and Water Use permits from the Papua New Guinea Conservation & Environment Protection Authority. These have now lapsed.

4.5 Mining Permits

There are no past or current mining leases covering the tenement area and none have been applied for at this stage of exploration.

4.6 Significant Factors to Mining Operations

Activities on the Star Mountains leases are still at the exploration stage. Hence it is not possible to undertake any mining operation until a Mining Lease or Special Mining Lease has been granted by the PNG government. This typically requires the submission of a Feasibility Study.

No planning or applications have been made with regards to mining operations.

5 Accessibility, Climate, Local Resources, Infrastructure and Physiography

5.1 Physiography

The Star Mountains lie at the headwaters of the Sepik River. The terrain is mountainous, high altitude limestone karst plateaus, homoclinal ridges and cuestas bounded by deeply incised valleys. The elevation for the area ranges from 2,000m above sea level in the valleys to 3,864m at Mount Kusiwigasi (Mount Scorpion) in the Antares Mountains near the Papua New Guinea/Indonesian border. Vegetation is dense tropical rainforest transitioning to moss or cloud forest above about 2,500m which in turn gives way to alpine grassland above 3,000 m.

The Hindenburg Range and the Hindenburg Wall escarpment lies to the south of the Star Mountains tenements (Figure 3). The range separates the Star Mountains from the Fly River headwaters to the south.



Figure 3: The Hindenburg Wall Escarpment

5.2 Accessibility

There are no roads within the tenements. The closest road is to the south near the mining community of Tabubil some 30 km away. Access to the property is limited to helicopter, short take-off and landing fixed-wing aircraft like a Twin Otter into the airstrip at Tifalmin and a few walking tracks from Tabubil and Tifalmin.

5.3 Local Resources

The area of the tenements is lightly populated. The local people mostly live in small (<50 people) villages scattered along the valleys at the base of the steep mountains. The majority are subsistence farmers with limited opportunities for employment in the cash economy.

The closest significant town is Tabubil, the mining service township for the Ok Tedi porphyry copper/gold mine. Tabubil is a well serviced town with an international airport, and road access to the port at Kiunga. While Tabubil is a company town and exists to service the Ok Tedi Mine it is served by several stores, fuel suppliers, a hospital and light engineering enterprises that can be accessed by the general community.

There are several poorly maintained airstrips serving the area, the closest at Tifalmin. The district headquarters is Telefomin, located approximately 20km east of the centre of the tenements. Aircraft and especially helicopter movement is restricted by frequent inclement weather, especially between June and August.

5.4 Climate

The climate has the Köppen classification of Af (tropical rainforest). It is characterized by warm (19.8°C) near constant year-round temperatures and by high rainfall (3800mm/year). The following summary is based on information from the district headquarters at Telefomin:

- Annual mean maximum temperature of 25°C with temperatures ranging between 25.5°C in November and 23.6°C in July.
- Annual mean minimum temperature of 15°C with temperatures ranging between 15.2°C in January to 14.7°C in June.
- Rainfall averages 3800mm per year. Precipitation is generally distributed evenly throughout the year. Greatest rainfall tends to be August- September and lowest in November-December.

While it is possible to operate all year round in the area, heavy cloud cover often restrict aircraft operations during the period May to September.

5.5 Infrastructure

The tenements are situated in a remote and rugged part of Papua New Guinea. Despite only being roughly 30km from Tabubil, the physical barrier of the Hindenburg Wall has limited access to the area from the south. There are no roads into the tenement area. There is an airstrip at Tifalmin suitable for short take-off and landing aircraft such as a Twin Otter and a longer WWII era airstrip at Telefomin.

Telefomin is the district headquarters for the region. Services based there include the police station, hospital, administrative offices and primary, secondary and elementary schools.

5.6 Cultural Heritage

Habitation and gardens are mainly restricted to the broad valleys such as the Ilam River. To date no sacred or taboo sites have been identified on the property that have affected exploration activities.

6 History

6.1 Sources of Historical Exploration Data

The information in this report is based on annual technical reports submitted by the tenement holders (Kennecott, CRA, Newmont-Ok Tedi Mining Limited JV and HPL) and reports published by the Geological Survey of Papua New Guinea (“GSPNG”).

6.2 Previous exploration

6.2.1 Kennecott 1969-1972

The Star Mountains has been prospected since the late 1960’s. In 1969, Kennecott Exploration Australia (Kennecott) geologists carried out a regional exploration program which located the Mt. Fubilan deposit (OK Tedi mine). At this same time, mineralized float was discovered along the Ilam River in the Tifalmin area. This led to a comprehensive mapping and geochemical sampling program that outlined a number of prospects.

Amongst the prospects that were identified, Olgal, and Nong River (Fune) were categorised as priority projects. In 1971, five diamond drill holes were completed by Kennecott at Olgal-Futik prospects totaling 1,065m. The geology of these prospects is late Miocene to Pleistocene intrusive stocks hosted by Miocene sedimentary package of Darai Limestone unconformably overlying Cretaceous sediments (Ieru siltstones).

6.2.2 GSPNG/ Ok Tedi Development Company Pty. Ltd 1975-1977

Following Kennecott withdrawal from the Ok Tedi project, the GSPNG on behalf of the Ok Tedi Development Company Pty. Ltd completed a re-appraisal of the Tifalmin prospects (including Tuk, Kum Kom, Unfin, Bumtin and Rattatat) in mid 1975 and at Nong River in 1976 (Lowenstein. 1976; McGee, 1976).

A major outcome from this work was the conclusion that the Tifalmin area has been subjected to significant post-intrusive north over south thrusting. This has limited the depth extent of the mineralization at Olgal and Futik prospects i.e. porphyry intrusions have been cut-off by thrust faults at depth.

6.2.3 CRA 1986-1987

CRA investigated the area for large low-grade gold targets in the late 1980s. Their work included a regional stream sediment sampling program focusing on gold and re-sampling of Kennecott’s Olgal and Futik drill core for gold. The ground was subsequently dropped after they concluded the area was not prospective for gold targets.

6.2.4 Newcrest-OTML JV 1992-1999

Newcrest with its JV partner BHP reviewed all existing data and conducted a first pass geochemical drainage sampling program. Seven years prior to Highlands’s involvement in the area, Ok Tedi Mining Limited (“OTML”) completed another data review and followed up on the geochemical drainage sampling results obtained by BHP and Newcrest between 1994 and 1999.

6.2.5 HPL-Xstrata JV 2002-2013

HPL acquired the ground under EL 1312 in 2002 and conducted exploration from 2003 to 2005 with Joint Venture partner Noranda Pacific and in 2006 with JV partner Xstrata Copper. As the tenement was reduced in size in accordance the Mining Act 1992, part of the dropped ground was taken up as ELs 1781 and 2001. Additional tenement was taken up but has since been relinquished.

HPL conducted geological mapping, geochemical sampling and flew a 200m line-spaced UTS HeliMag survey over the bulk of the project area. The 2006 program concentrated on the Tifalmin area targets and new targets in the south of the project area defined by the HeliMag survey.

In 2009 HPL elected to sole-fund exploration in the Star Mountains. In 2010 it began a drill program at Olgal that later extended to four other prospects (Futik, Kum Kom, Pad48, Unnamed). In total 30 holes were drilled in this period. In addition to the drill program, HPL flew a LiDAR survey over the main portion the tenement area.

6.2.6 HPL-Anglo American JV 2014-2018

From 2015 to 2017, a total of 16 holes for 9,141.6m were drilled by the SMJV in the Star Mountains at Olgal, Kum Kom, Fune (Nong) and Unfin. Concurrent with this, several other exploration work programs were undertaken to better understand the tenement-wide geological potential with the aim of assessing the porphyry copper potential of the entire SMJV tenure. Anglo American has no retained interest. The area of work covered a larger area than that which is referred to in this report.

Exploration Work Programs carried out over the term of the JV included:

2015

- Tenement-wide Aeromag survey at 100m spacing and inversion modelling
- Tenement-wide LiDAR survey
- IP surveys at Olgal / Futik and Kum Kom
- Geological mapping (Olgal, Kum Kom, Rattatat, Futik)
- Drilling at Olgal and Kum Kom

2016

- ZTEM survey at 200m spacing
- Geological mapping program (Kamum, Kalwam, Bumtin, Unfin, Tuk, Fune, Nong, Bultem, Awen, Antares)
- Structural study
- Drilling at Unfin, Fune

2017

- Drilling Fune, Olgal
- AMT survey at Olgal - Futik, Unfin - Bumtin and Fune

Table 2 contains a summary of all exploration work completed in the Star Mountains area.

Table 2: Summary of mineral exploration work in the Star Mountains area

Period	Company	Tenement	Work Undertaken	Results / Conclusion
1960's	Kennecott	PA's 28 & 35	Regional reconnaissance with extensive stream sediment sampling	Identified numerous copper anomalies
1969 – 1972	Kennecott	PA's 85 & 102	Drilled 3 DDH at Futik and 2 DDH at Olgal	Encountered encouraging Cu and Au results in nearly all holes drilled.
1975 - 1977	GSPNG then Ok Tedi Development Company	PA 415	Stream sediment, Panned concentrate, Rock chip sampling, pit sampling and ground magnetic survey	Discovered and outlined the Nong River porphyry and skarn copper and gold prospect.
1986 – 1988	CRA	PA's 653 & 709	Widely spaced low-density sampling program plus re-sampling of Kennecott's drill core	Concluded that Tifalmin area offered no potential for a large tonnage low grade gold deposit
1992 – 1999	Newcrest – OTML JV	PA 972	Regional stream sediment sampling and review of Futik and Olgal prospects	Identified several areas outside the previously defined Nong River and Tifalmin porphyry Cu-Au prospects with anomalous Cu & Au concentration. From the review it was concluded that a post mineralisation thrust cut the intrusive at shallow depth thus limiting the size potential at Olgal and Futik prospects
2002 – 2005	HPL- Noranda JV	EL 1312	<ul style="list-style-type: none"> 200m lined-spaced Helicopter Magnetic survey. Reconnaissance geological mapping and sampling 	Definition of several magnetic anomalies
2006 – 2009	HPL – Xstrata JV	EL 1312	<ul style="list-style-type: none"> Follow up and investigate magnetic anomalies prospected, mapped and sampled. 	All magnetic anomalies were attributed to magnetic diorites with no associated copper. Only samples taken from Bultem prospect returned low copper ranging from 5-600ppm. No further work was recommended.
2010 - 2014	Highlands Pacific	EL 1312, 1781 and 2001	<ul style="list-style-type: none"> LiDAR survey Drilled 30 DDH since 2010 	<ul style="list-style-type: none"> Provided detail terrain data Significant drill intercepts;

			Structural geology review	<ul style="list-style-type: none"> ○ 210 metres averaging 0.5% Cu and 0.37 g/t Au in hole 001OLG10 ○ 474 metres averaging 0.4% Cu and 0.24 g/t Au in hole 002OLG10 ○ 47 metres averaging 0.4% Cu and 0.38 g/t Au in hole 006OLG10 ○ 596 meters averaging 0.61% Cu and 0.85 g/t Au in hole 014OLG11 ○ 82 meters averaging 0.48% Cu and 0.27 g/t Au in hole 013OLG11 ○ 153 meters averaging 0.16% Cu and 0.13 g/t Au in hole 001FUT12 ○ 22 meters averaging 1.42% Cu and 0.57 g/t Au then 10 meters averaging 0.68% Cu and 0.21 g/t Au then 68 meters averaging 0.97% Cu and 0.37 g/t Au in hole 001KUM12.
2015-2018	HPL-Anglo American JV	EL 1312, 1781, 2001 and 2467	<ul style="list-style-type: none"> • 100m lined-spaced Helicopter Magnetic survey. • Extended LDAR of Antares • Prospect scale mapping and sampling over 23 targets • ZTEM Survey • AMT survey over Tifalmin and Fune targets • Drilled 18 holes (10910m) 	<ul style="list-style-type: none"> • Mapped and sampled 23 targets/prospects • Significant intercepts <ul style="list-style-type: none"> ○ 183m @ 0.53% Cu and 0.58 g/t Au from 168m downhole (016OLG16) ○ 430m @ 0.39% Cu and 0.24 g/t Au from 168m downhole (020OLG16) ○ 434.9m @ 0.52% copper and 0.72 g/t gold (Including 100 metres @ 0.82% copper and 1.39 g/t gold from 76m downhole) (017OLG16) ○ 47.0m @ 0.33% Cu, 0.09g/t Au, from surface (004FUN17) ○ 26.8m @ 0.97% Cu, 0.34g/t Au, from 136m (004FUN17) ○ 13.0m @ 0.88% Cu, 0.25g/t Au, from 268m (004FUN17)
2018	Highlands Pacific	EL 1312, 1781, 2001 and 2467	Published Olgal Inferred Resource	At 0.3% Cu cut-off 210 million tonnes at 0.4% Cu and 0.4 g/t Au for 840,000 tonnes of contained copper and 2.9 Moz contained gold

7 Geological Setting and Mineralisation

7.1 Regional Geology

The Star Mountains form the spine of the New Guinea Highlands at the Papua New Guinea and Indonesia border. The mountains are formed from a series of south-vergent thrust sheets of Mesozoic to Quaternary shelf and platform sediments, arc volcanics and associated intrusive rocks. The Star Mountains lie at the transition between the stable craton of the Fly Platform and the New Guinea Mobile Belt. The Star Mountains lie to the north of the Muller Anticline while Ok Tedi lies just to the south (Figure 4).

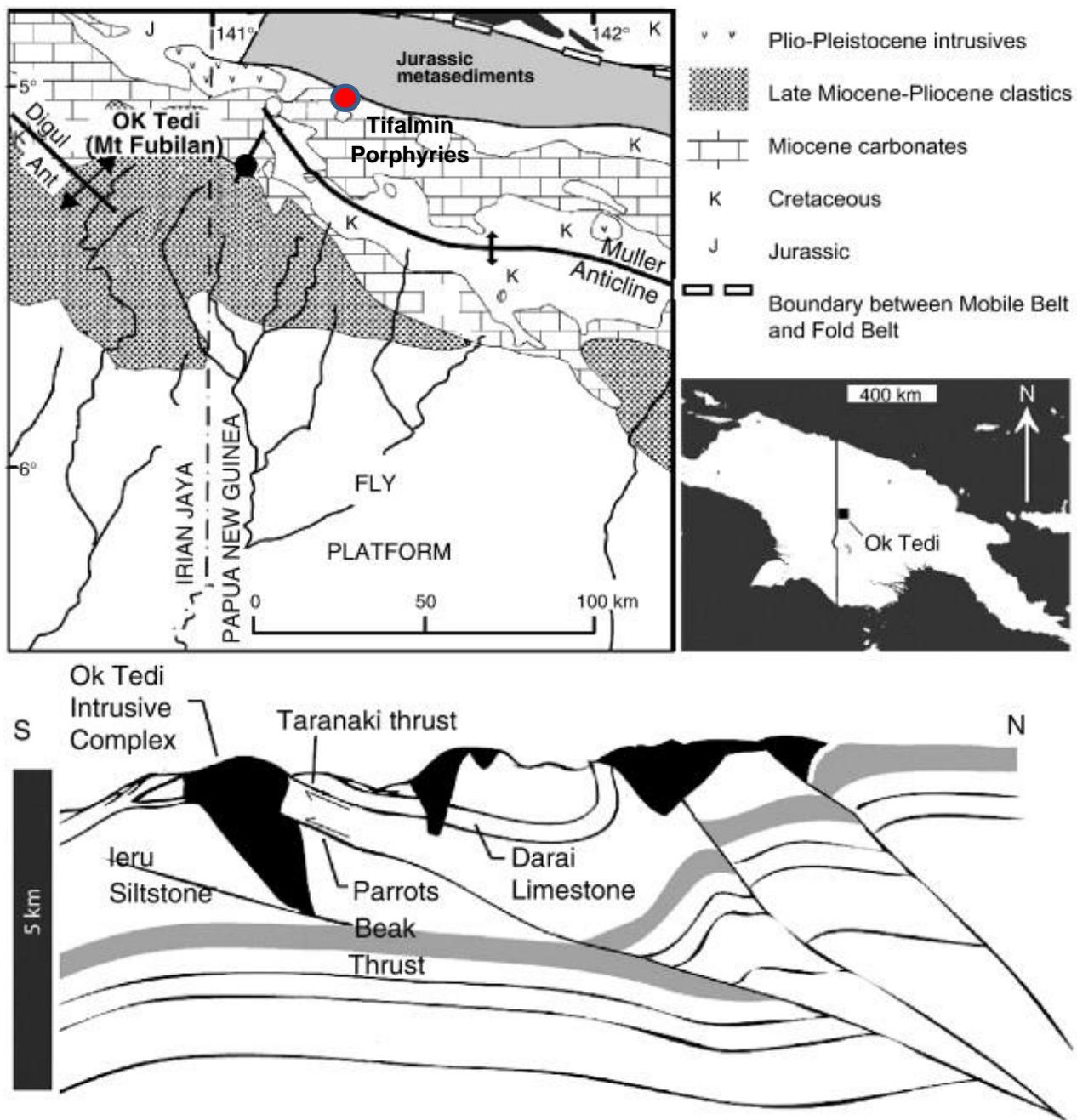


Figure 4: Regional Geology Map and Section through Ok Tedi (van Dongan et. al., 2010)

7.2 Local Geology & Mineralisation

Table 3 presents the combined stratigraphic sequence for the Star Mountains area (adopted from Chapple et al, 1993 and McGee, 1976).

Table 3: Local Stratigraphy

Age	Name	Lithology
Quaternary	Elam Formation	River and lake deposits moraines, conglomerates, lignite, mudstone/siltstone & arkose
Late Miocene to Pleistocene	Star Mountain Intrusives	Antares Batholith, Tifalmin intrusives & stocks of basic to intermediate composition
Late Miocene to Late Pliocene	Scorpion Volcanics	Andesite and dacite volcanics and associated porphyries
Mid to Upper Miocene	Pnyang Formation	Calcareous mudstone, siltstone/sandstone & lignite.
Late Eocene to Mid Miocene	Darai Limestone	Massive limestone – platform carbonates
Upper Jurassic to Upper Cretaceous	Feing Group	Shallow marine glauconite, mudstone/siltstone, quartz & lithic sandstone
Early to Late Jurassic	Kuabgen Group	Marine arkosic sandstone, mudstone & conglomerate
Mid to Late Jurassic	Waghi Group or Om Beds	Marine & carbonaceous siltstone/black mudstone & regionally metamorphosed equivalents.

The geology of the Star Mountains can be approximately divided into an eastern portion characterized by large exposures of Darai Limestone in stacked north-verging thrust sheets and a western portion dominated by andesitic volcanics and porphyritic dioritic intrusives of the Antares Complex and the co-magmatic Scorpion Volcanics (Figure 5). *(Note zooming in on figures will result in improved resolution).*

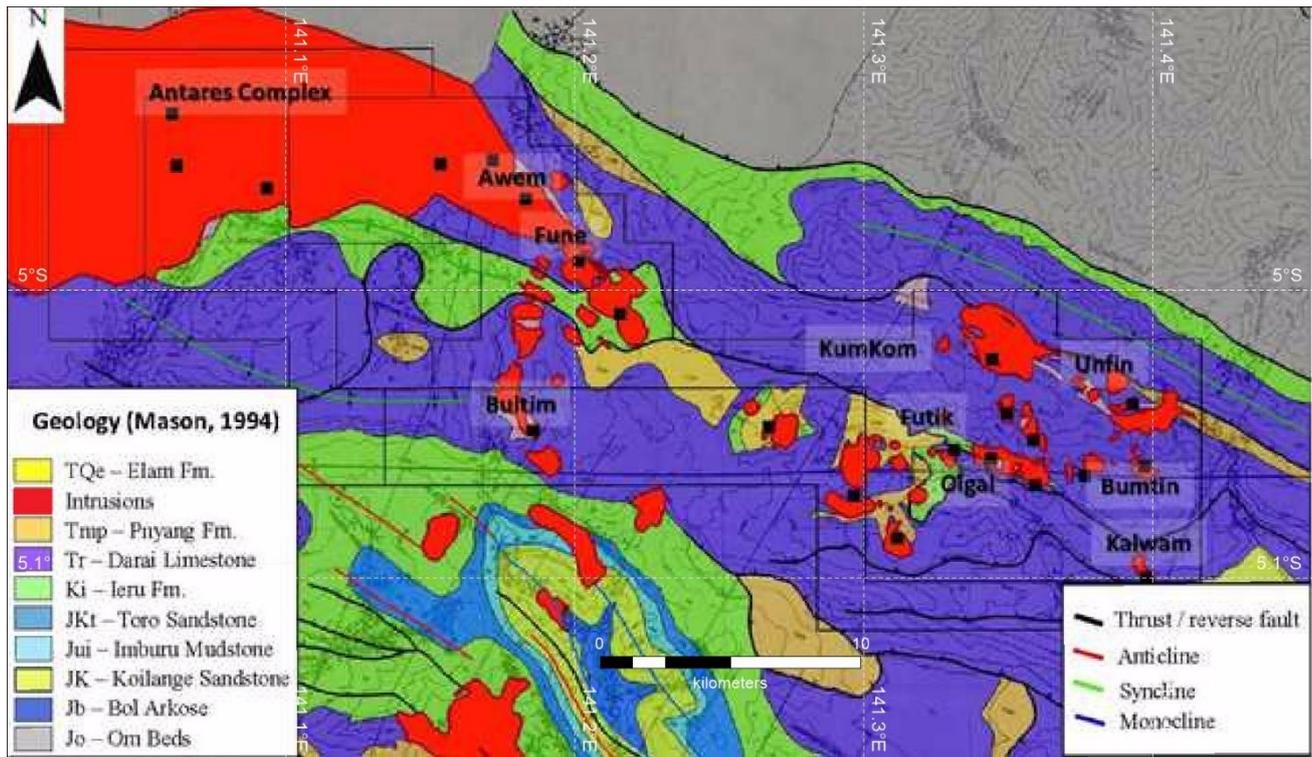


Figure 5: Geology of the Star Mountains Tenements (Mason, 1994)

The north-verging thrust faults are associated with the Digiam Thrust Zone. In the project area the thrusts can be difficult to trace as they thrust Darai Limestone on top of Darai Limestone with only a few exposures of the underlying Feing Group sediments.

In the Tifalmin area, the Darai thrust sheets are intruded by a number of diorite/quartz diorite intrusives. Several of the intrusives are altered and mineralised with locally significant occurrences of copper and gold. The contacts between the intrusives and the limestones typically display some development of skarn.

The intrusives and the associated copper and gold mineralisation appear to both pre-date some thrusting and be cut by later thrust events. The best example of this is the 3.1 ma Olgal intrusive and porphyry copper-style mineralisation that is cut at depth by the Futik-Olgal thrust.

The calc-alkaline intrusives of the Antares Complex intrude the sediments of the Waghi Group and Darai Limestone and the co-magmatic Scorpion Volcanics. The intrusive rocks range from granodiorite to quartz diorite to quartz monzonite. The Scorpion Volcanics rocks are andesitic-dacitic volcanics, volcanoclastic sediments and porphyries. The rocks of the Antares Complex and Scorpion Volcanics typically show a regional propylitic chlorite and epidote alteration.

The intrusive rocks of the Antares Complex give slightly older (6.7 ± 0.2 Ma to 4.6 ± 0.66 Ma) U-Pb zircon dates than the Tifalmin Intrusives (6.41 ± 0.22 Ma to 2.37 ± 0.18 Ma). Based on age and general similarities in rock types the Star Mountain Intrusives are believed to represent the youngest part of the Maramuni Arc (Rogerson et al., 1987).

8 Deposit Type

Known mineralisation in the Star Mountains consists of porphyry copper-gold deposits and associated skarns. Porphyry copper deposits are a major world source of copper (also molybdenum, silver and gold) with the best-known examples being concentrated around the Pacific Rim, in North America, South America, and areas such as the Philippines, Papua New Guinea and Indonesia. New Guinea and the surrounding islands host several significant porphyry copper and skarn deposits (Panguna, Golpu, Frieda River, Ok Tedi, Grasberg/Erztberg). Most of these deposits are relatively young, of Tertiary or Cretaceous age.

Mineral deposits of the porphyry-epithermal mineral system are associated with magmatism that generally, although not exclusively, is associated with magmatic arcs within convergent geodynamic settings. This mineral system involves mainly magmatic-hydrothermal and meteoric fluids that form porphyry Cu-Au-Mo deposits, epithermal Au-Ag, Ag-Zn-Pb and Au-Cu deposits, and Cu-Au and Zn-Pb-Ag skarn deposits.

Mineral deposits that form in the porphyry-epithermal mineral system generally have a spatial and temporal association with intermediate to felsic sub-aerial volcanic rocks and related sub-volcanic intrusions (Figure 6). Geologically recent porphyry-epithermal mineral systems are mostly thought to form in magmatic arcs (both continental and oceanic) associated with convergent plate margins (Seedorff et al., 2005; Simmons et al., 2005). The deposits are believed to have formed at shallow crustal levels (<1.5 km for epithermal and <6 km for porphyry deposits: Seedorff et al., 2005; Simmons et al., 2005). This very shallow depth of emplacement and consequent low preservation potential account for the fact that geologically old (Paleozoic or older) porphyry deposits are uncommon (Seedorff et al., 2005; Simmons et al., 2005).

Porphyry copper deposits commonly are centered around small cylindrical porphyry stocks or swarms of dikes that in some cases are demonstrably cupolas of larger underlying plutons or batholiths. Plan areas of ore-related intrusions typically range from 0.2 to 0.5 km².

In cross section, ore zones vary from cylindrical shells with altered, but low-grade, interiors referred to as “barren” cores, to inverted cups around barren cores, to multiple domes or inverted cups, and to vertically elongate, elliptical shapes. The vertical extent of hypogene copper mineralisation in porphyry copper deposits is generally less than or equal to 1 to 1.5 km. Because copper-mineralized rock can continue several kilometres deeper, the base of ore is dependent on copper grade, the price of copper, mining costs, and mine design. In some deposits, the base of ore represents the limits of drilling.

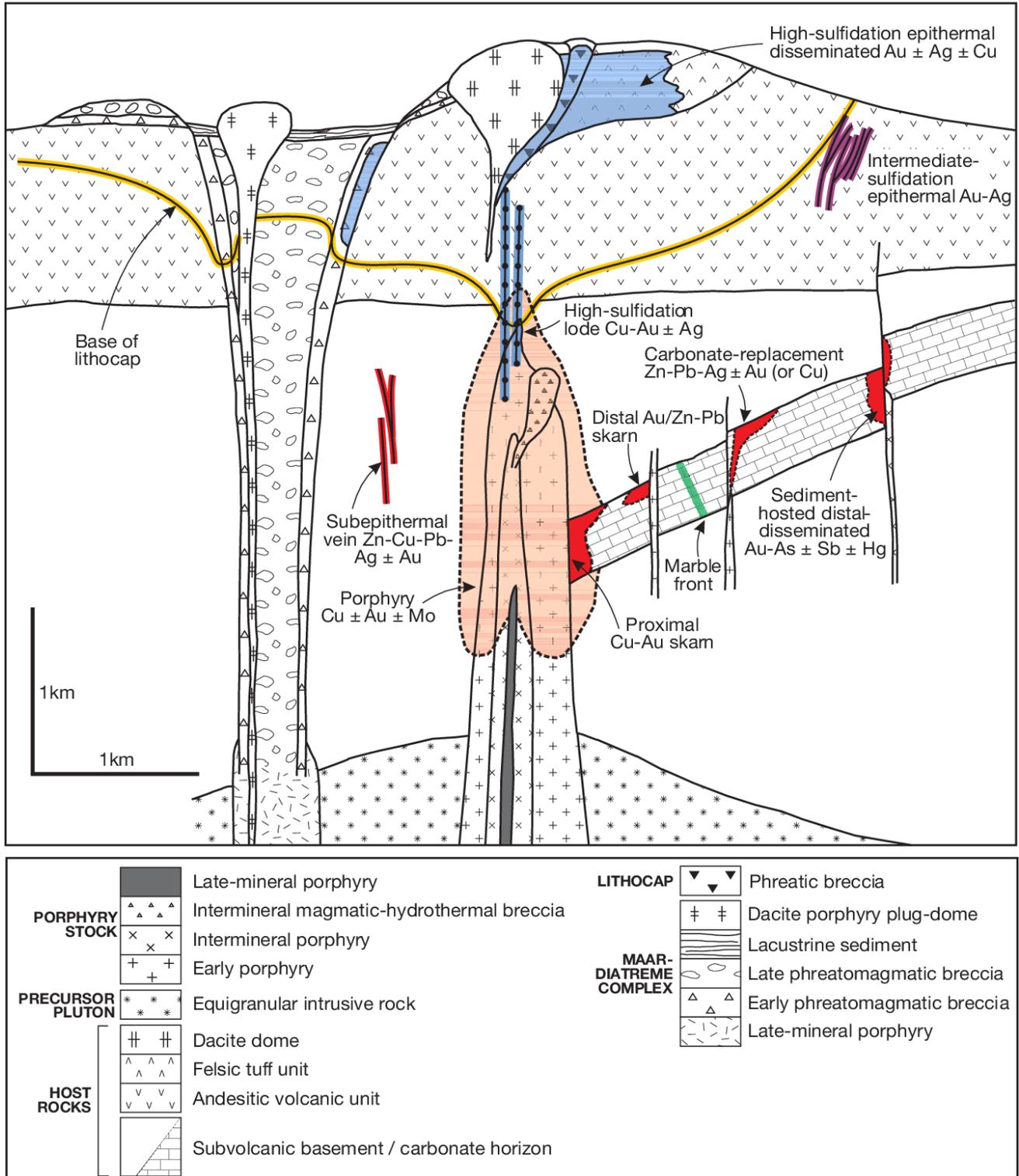


Figure 6: Anatomy of a Telescoped Porphyry Cu - Skarn - Epithermal system (Sillitoe, 2010)

9 Exploration

(All maps supplied by Conic)

All exploration work to date was completed by previous explorers. QR as the issuer of the report has not completed any exploration work to date. Their intention is to compile the data from the exploration surveys described below, review the data and generate new targets for follow up work. The work completed to date has indicated the existence, within the property, of significant porphyry copper and skarn-style mineralisation.

The relevant data sets include ground and regional airborne geophysical surveys (all from relatively recent times), regional and local geochemical sampling (mainly regional stream sediment sampling data and localised bedrock sampling programmes) and surface mapping. The surface work in general has covered most of the property. In addition drilling has tested a range of targets across several of the prospects with encouraging results. More detailed drilling has been completed at the Olgal prospect where an Inferred Resource has been delineated.

9.1 Geophysical Surveys

9.1.1 Aeromagnetics and Radiometric Surveys

The Star Mountains tenements are covered in parts by three magnetic/radiometric surveys. Two of the surveys were flown as part of exploration work carried by the Star Mountains JVs (2005 and 2016) and the third by the PNG Mineral Resources Authority as part of a regional prospectivity mapping program.

9.1.1.1 2005 Survey

The oldest of the regional geophysical surveys is a 2005 200m line-spacing helicopter-borne magnetic/radiometric survey flown by HPL. While generally too widely spaced to allow detailed prospect-scale target generation, the porphyry intrusions in the Tifalmin area and the intrusive and volcanic rocks of the Antares Complex and Scorpion Volcanics show up clearly in this survey.

9.1.1.2 2015 HPL Survey

GPX Surveys Pty Ltd (Perth, Australia) carried out an aeromagnetic and radiometric survey with a 100m line spacing over the original Star Mountains project area in two stints between December 2014 and July 2015. This was due to the impact of bad weather on the ability to fly the survey. The geophysical survey was carried out to improve the resolution of the existing aeromagnetic and radiometric data flown previously by HPL (with a 200m line spacing). An AS 350 B3 helicopter was utilised flying at a nominal flight height of 80m over the full tenement area for a total of 5,800 line-km.

9.1.1.3 2015 MRA regional survey

Compared to the 2005 and 2015 Star Mountains JV surveys this survey is relatively low resolution at 400m line-spacing. It does however cover a much broader area, covering the region from Ok Tedi in the south to Frieda River in the northwest (Figure 7).

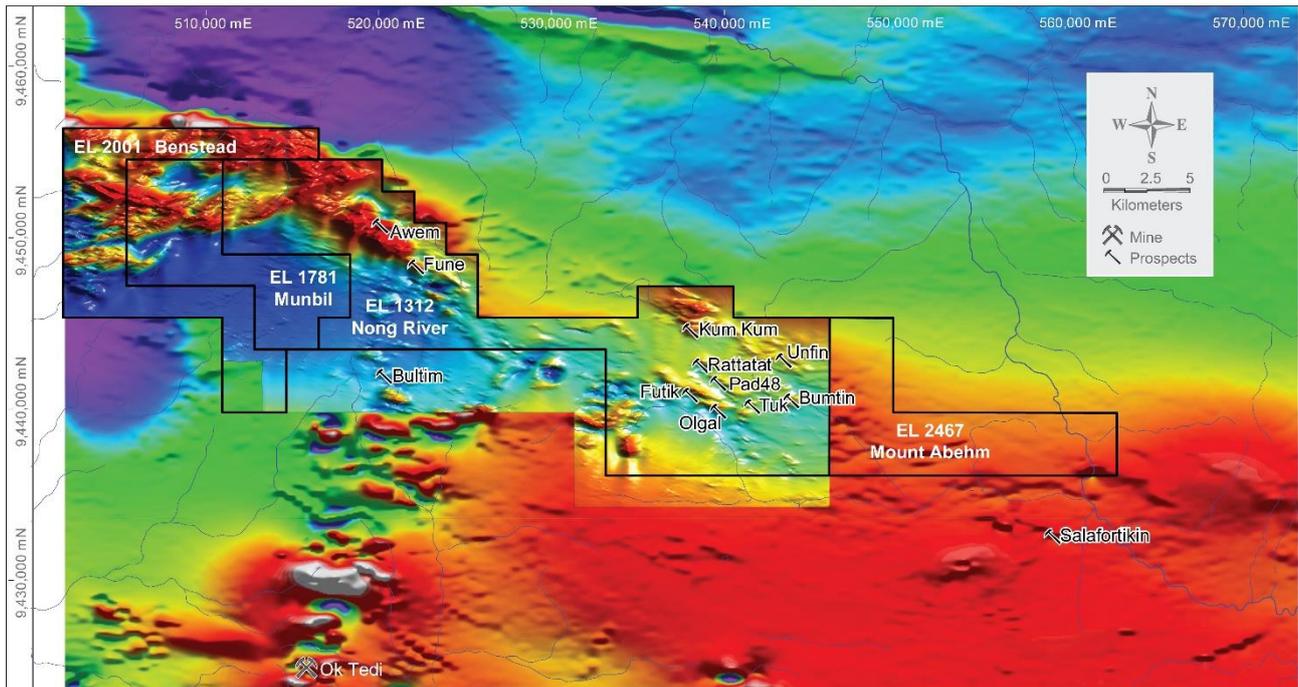


Figure 7: Star Mountains Prospects on 2015 Regional Magnetic Survey

9.1.2 ZTEM Survey

Geotech Limited was engaged to conduct a helicopter-borne Z-Axis Tipper Electromagnetic (“ZTEM”) Survey over the Star Mountains tenements along with portions of the OTML-held tenements running south from the Star Mountains tenements to the Ok Tedi mine (Figure 8). The survey commenced on 28th December 2015 and was completed on March 27th 2016. The survey was flown with N-S traverse lines spaced 200m apart and a total of three widely-spaced E-W tie-lines. Over 3,268 line-km were flown over the Star Mountains tenement package plus the Ok Tedi licence block.

The ZTEM survey was a key component of the exploration program, which was the first time a survey such as this had been flown in the western highlands region of PNG.

ZTEM data was processed with 3D inversions carried out by Anglo American and conductive anomalies were defined/identified for follow up field mapping and sampling in 2016. The survey was successful in highlighting through-going structures and a number of conductive anomalies identified for follow up work.

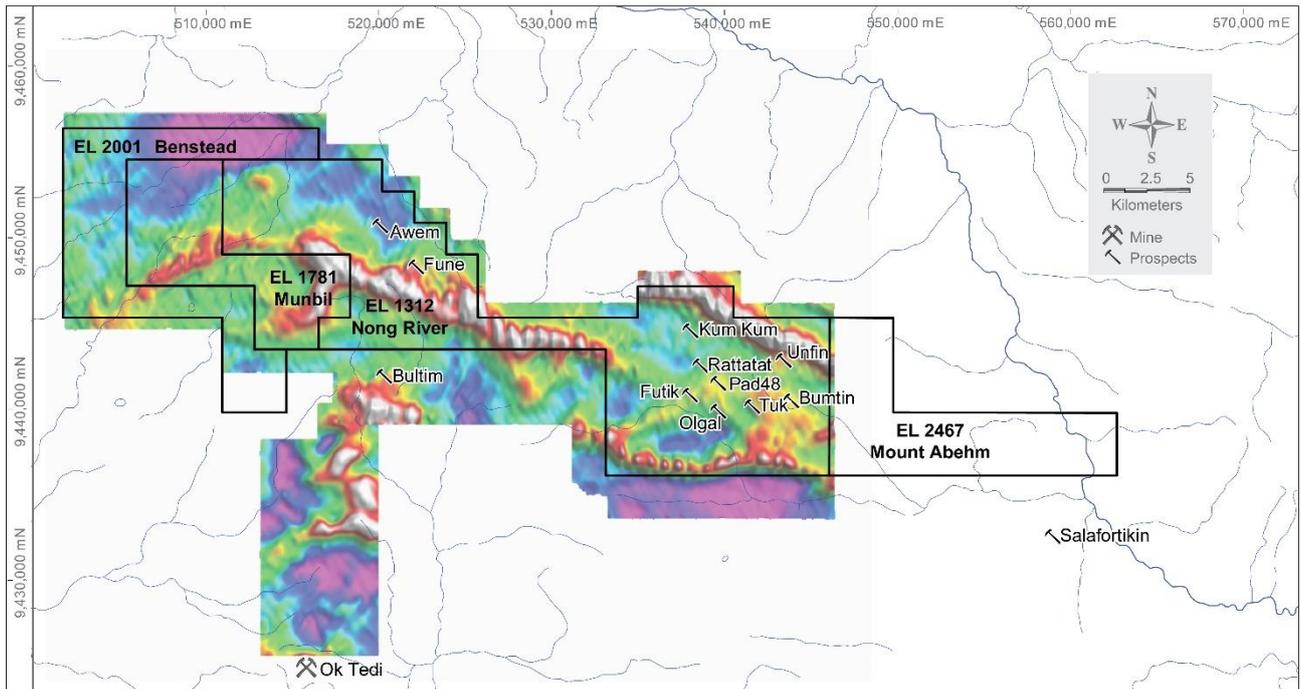


Figure 8: ZTEM Coverage and Prospects

9.1.3 Ground AMT Survey

In 2017, Moombarriga Geoscience Pty Ltd (Moombarriga) was contracted to acquire ground AMT data at selected prospects that yielded encouraging ZTEM results. The AMT survey was completed in three phases at the following prospects; Unfin, Bumtin, Tuk, Rattatat (Futik North), Olgal, Futik, Kum Kom and Fune.

The results of the survey were used in the planning of drill hole locations at Fune and Olgal, targeting conductive bodies.

9.1.4 Ground IP and AMT Survey

From May to September 2015, Zonge Engineering and Research Organization (Zonge) was contracted to conduct a limited Induced Polarization (“IP”) and audio magneto-telluric (“AMT”) survey at Kum Kom and Olgal prospects. A total of 56 scalar and 45 vector AMT soundings were collected over 9.8 line-kilometers. Approximately 12 kilometers of Pole-Dipole surveying was conducted over both prospects.

9.2 Geochemical Surveys

The Star Mountains have been subject to multiple generations of stream sediment sampling programs since the 1960s. While many of these surveys were assayed for only a limited number of elements and/or were poorly controlled for size fraction, these surveys have proven to be very effective in identifying target drainages with near surface mineralisation. A total of 1997 stream sediment sample sites, from 5 different company sources cover the Star Mountains (Figure 9). These samples were collected in 1968 and 1971 (Kennecott), 1976 (GSPNG), 1988 and 1989 (CRA), 1996 and 1998 (Newcrest-OTML) and 2004 (Noranda-HPL).

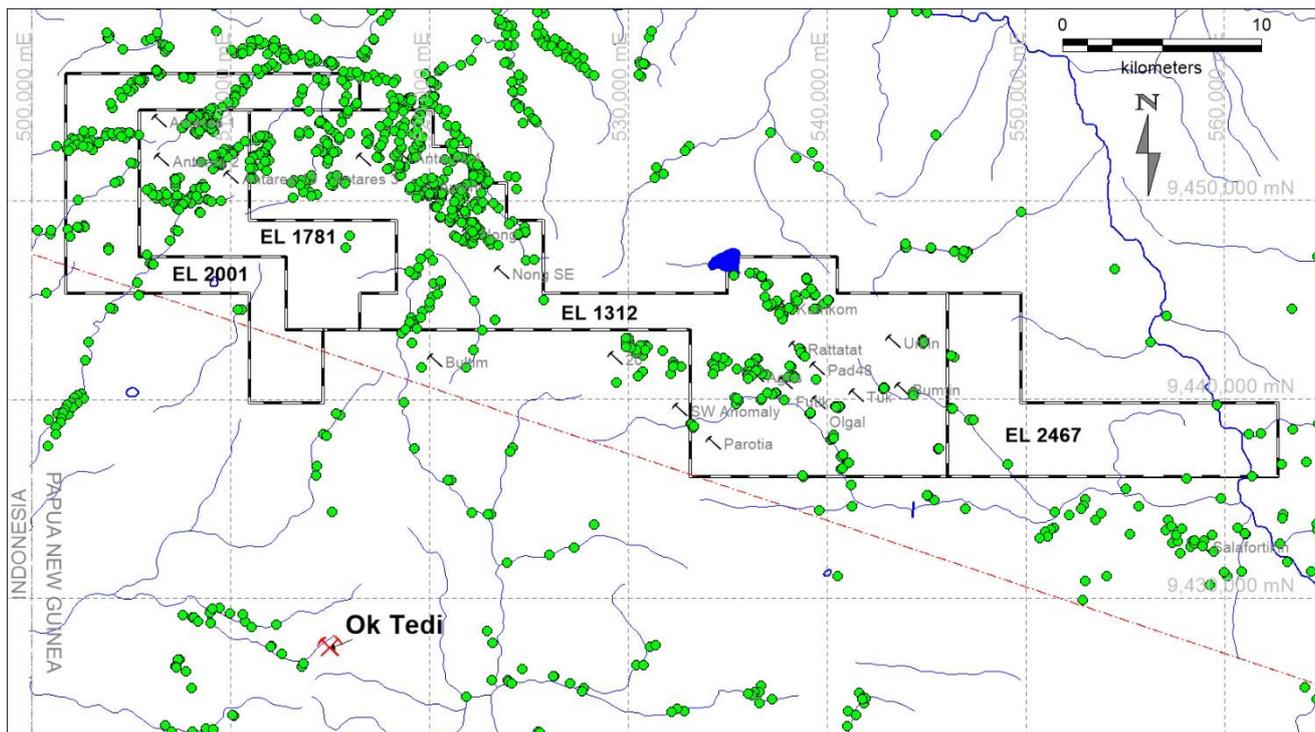


Figure 9: Stream Sediment and/or BLEG sampling (green dots) in the Star Mountains

An example of the combined stream sediments results for copper for the OK Tedi mapsheet is shown in Figure 10. The pale yellow colour represents late cover with the orange colour representing intrusive bodies. Many of these bodies are anomalous for copper indicating a very large and prospective area for economic porphyry copper mineralisation (the whole area is within EL1312).

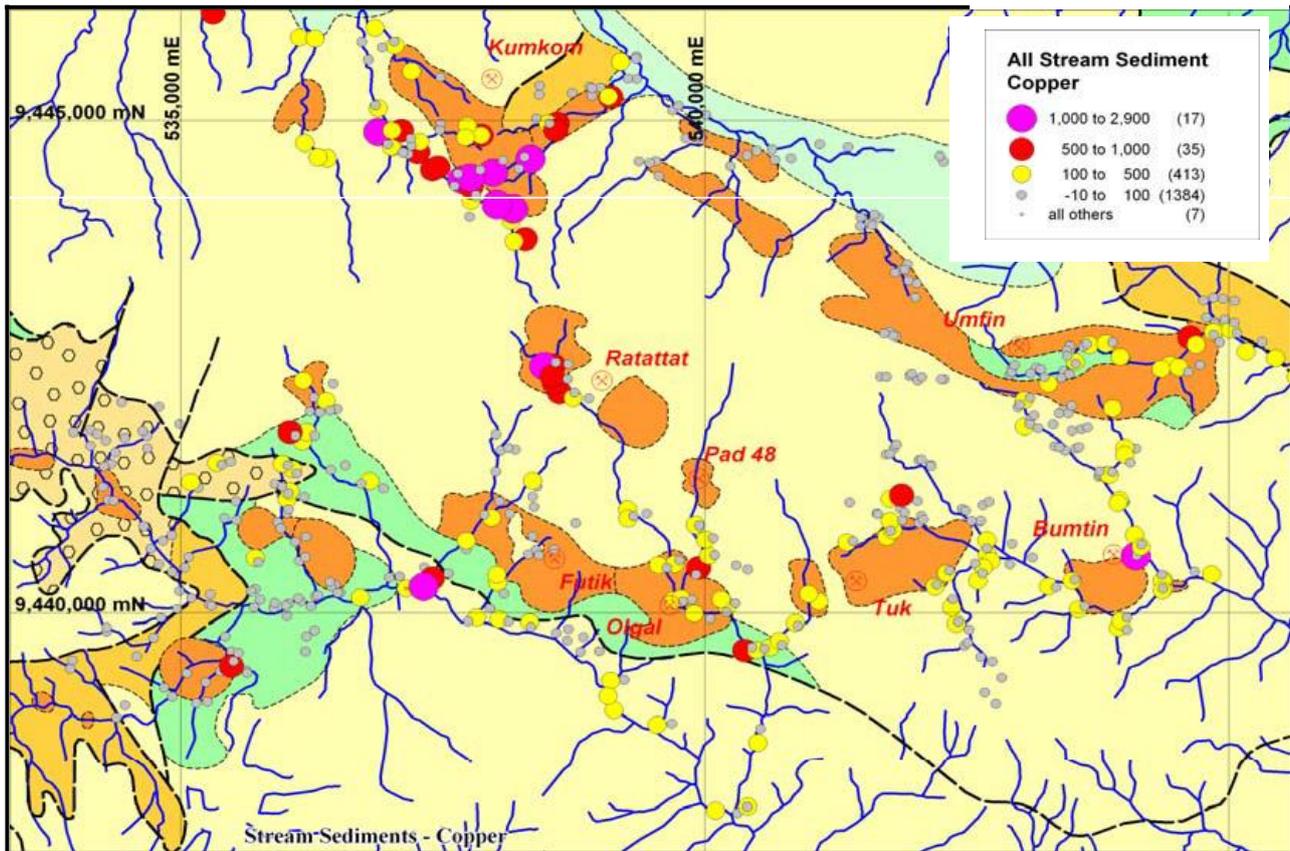


Figure 10: Combined stream sediment results for copper on Ok Tedi 1:100,000 geology map

9.3 Geological Mapping

(All maps supplied by Conic)

9.3.1 Olgal

The Olgal is the main copper-copper prospect in the Tifalmin District. In 1971, Kennecott described the Olgal granodiorite as an altered hornblende granodiorite body containing ubiquitous disseminated sulfides. Olgal has a surface footprint of 1200m x 400m (Figure 11).

Based largely on drilling, three families of hornblende diorite porphyry intrusions have been identified at Olgal: early, inter-mineral and late-mineral phases. The early and inter-mineral phases are texturally similar and distinguished on the basis of the presence of A-type quartz ± magnetite veinlets in the former and the near absence of quartz veinlets in the latter. The inter-mineral phases also contain quartz-veinlet xenoliths derived from nearby early porphyries. Pyritic D-type veinlets occur in all the early and inter-mineral porphyries and are consistently later than the A-veinlets. The late-mineral porphyries are devoid of both A- and D-type veinlets and can also contain quartz-veinlet xenoliths near their contacts (Sillitoe, 2015)

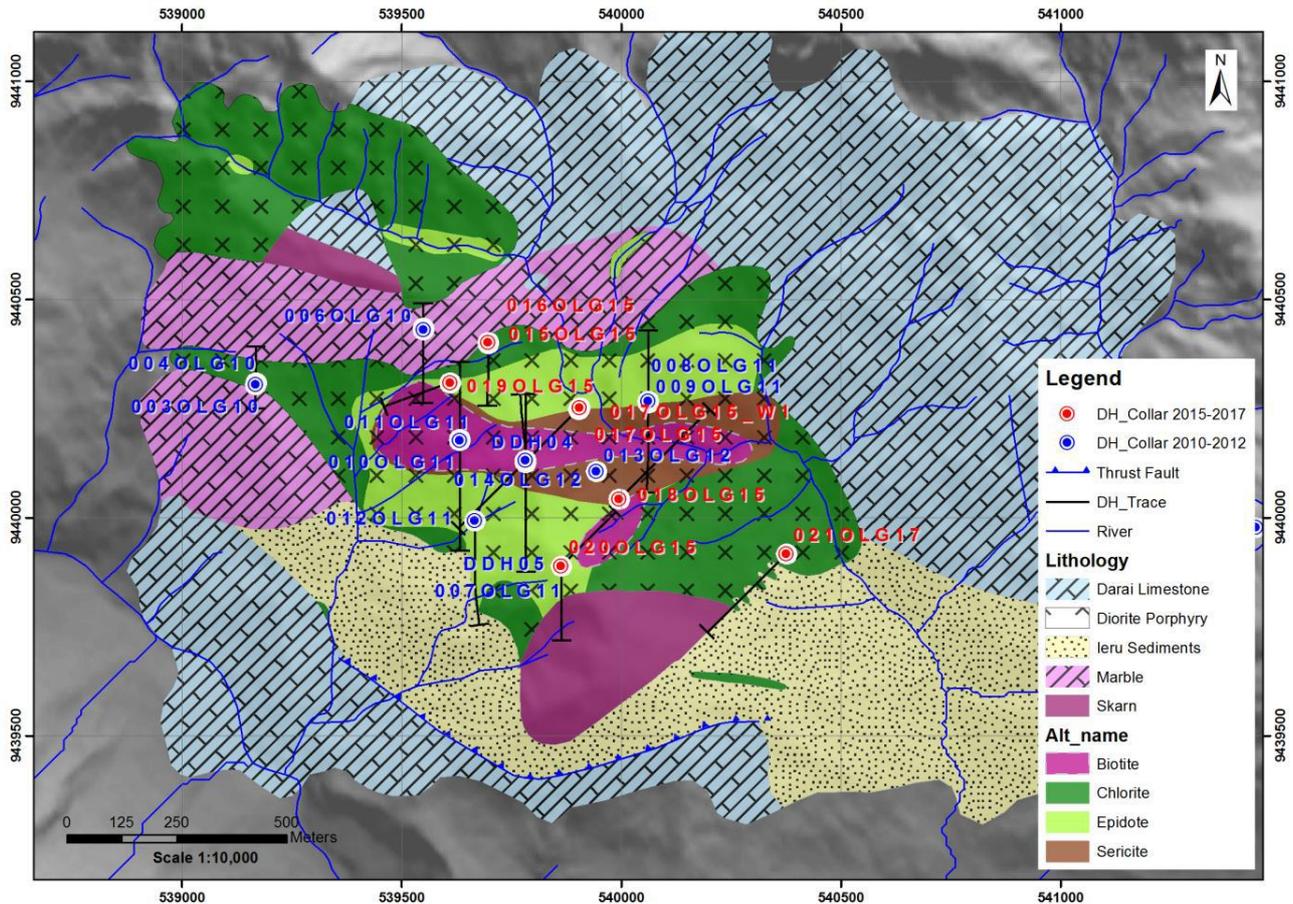


Figure 11: Olgal Prospect Geology

Copper mineralisation (e.g. chalcopyrite and covellite) occurs mainly along fractures and was observed in some samples to be hosted by porphyritic diorite with secondary magnetite alteration.

Two east-west trending sub-vertical structures (i.e., strong to massive silicified dioritic outcrops) were mapped but thrust faulting was not observed in any of the outcrops mapped.

In general, Olgal is a mineralized intrusive complex interpreted to be bounded below and in the south by a shallow, north dipping thrust fault at ~600m below surface. This interpretation is based on the drilling, which has shown the displacement of the remainder of the Olgal intrusions likely to be deep towards the north of Olgal.

9.3.2 Kum Kom

The Kum Kom prospect is located 5 kilometres north of Olgal at an altitude of 2,900m. Kennecott describes Kum Kom as a zoned porphyry copper system in quartz dacite porphyry and quartz microdiorite porphyry (Figure 12). A 15m by 25m skarn was mapped by HPL in 2005 and was extended to 125 meters in 2006 by further mapping. The skarn comprises sooty magnetite-hematite-limonite-malachite-chlorite-epidote with covellite and malachite. It is at a diorite limestone contact that trends north-south and dips 70° towards the west.

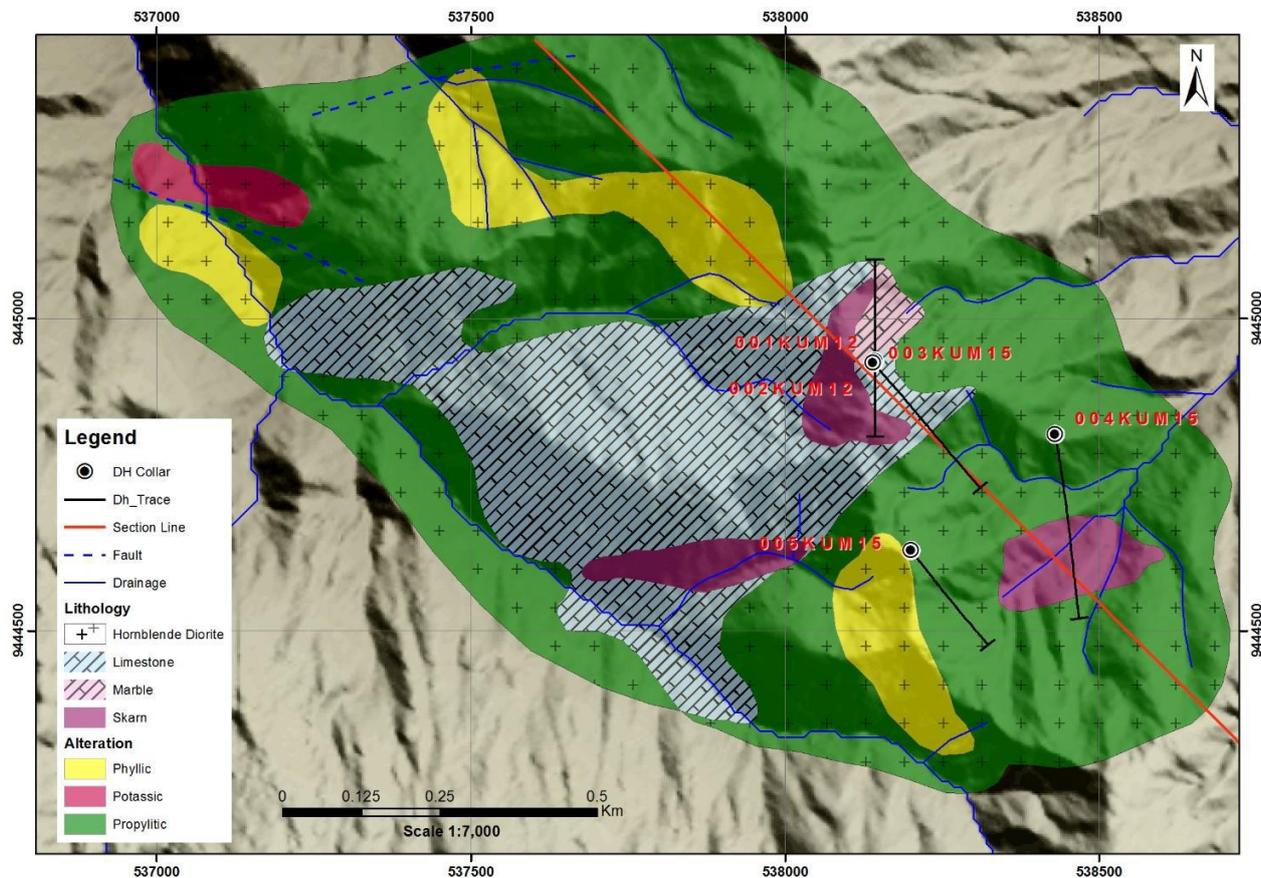


Figure 12: Kum Kom Prospect Geology

Six diorite intrusions were mapped in the area in the 2015 mapping program. However, no lithological cross-cutting relationship was observed in the field. Below are descriptions of the intrusions mapped in Kum Kom.

1. Hornblende-bearing diorites – relatively fresh and unaltered with moderate to strong clay weathering. Pockets of weakly chloritic (after hornblende) diorites were also observed. The grain size varies from fine to medium-grained hornblende laths and plagioclases but the texture is porphyritic and crowded-equigranular. In general, most outcrops are not copper mineralized except for traces of chalcopyrite in some samples.
2. Equigranular diorites – fine to medium-grained and mostly altered to clay+quartz+pyrite with some chloritic windows towards the west. These diorites are also mapped on the NW tip of the limestone-diorite contact and has anillite+chlorite+pyrite alteration with bluish lamellar copper mineral (covellite?). Some outcrops have brown garnet veins/veinlets and in fractures.
3. Porphyritic Diorite1 - medium to coarser-grained (megacrystic) with plagioclases and hornblende mostly moderate to strongly altered to epidote and chlorite respectively with some fracture-controlled bluish lamellar copper mineral (covellite?).
4. Porphyritic Diorite2 - fine to medium-grained with plagioclases mostly moderately replaced by clay whilst pyrite is disseminated.

5. Hornblende and plagioclase bearing diorites – medium-grained and the plagioclases are conspicuously noticeable compared to the hornblende-bearing diorites. Most of the outcrops mapped are clay weathered but one outcrop in the NW tip of the limestone-diorite contact has a strong secondary biotite alteration (after hornblende) + magnetite with fresh bornite (?). This outcrop is in structural contact with the illite+chlorite+pyrite altered diorite.

6. Crowded to equigranular diorites – medium-grained with distinct plagioclases and a groundmass of <10%. It contains primary biotite, which are mostly altered to chlorite and magnetite.

A window of skarn (magnetite+epidote+pyrite) outcropping in one creek, massive limestone and small dark grey marble outcrops were mapped in the area. No stream floats with porphyry signature (e.g. quartz-veined/stockworks, potassic/phyllitic altered, leached capping, mineralize/alterd porphyry xenoliths in diorites etc.) were mapped.

Hydrothermal alteration dominantly consists of chlorite+magnetite with clay+quartz+pyrite with erosional windows of hypogene advanced argillic(?) clay alteration. One outcrop has an illite+chlorite+pyrite in structural contact with strongly biotitized hornblende+magnetite diorite, which are both with copper mineralization. Some of the hornblende-bearing porphyritic to equigranular diorites are weakly chloritized (after hornblende) but relatively fresh and unaltered with moderate to strong clay weathering.

A porphyry alteration footprint of sericitic-illite+chlorite, potassic / secondary biotite+magnetite - both with hypogene copper mineralization and chlorite+magnetite - with sporadic quartz veining observed on the NW tip of the limestone-diorite contact is estimated to be 700m x 600m in plan-view including a phyllic (clay+quartz+pyrite) altered diorite.

9.3.3 Unfin

Previous explorers had documented porphyry-type alteration and mineralization in Unfin Creek.

Following a detailed surface/stream mapping program that identified Unfin as a good target for a porphyry system, two diamond holes were drilled at Unfin prospect with a total of 2,008.8m.

Unfin is a sub-economic porphyry-skarn prospect measuring 1000m x 800m. It has multi-phase intrusions with porphyry-type alteration and quartz veining (Figure 13). Hydrothermal alteration consists of secondary biotite, clays/illites, chlorite and magnetite. Copper mineralization occurs mainly as chalcopyrite and covellite in disseminations and fracture-controlled veinlets in intrusive and in minor skarn.

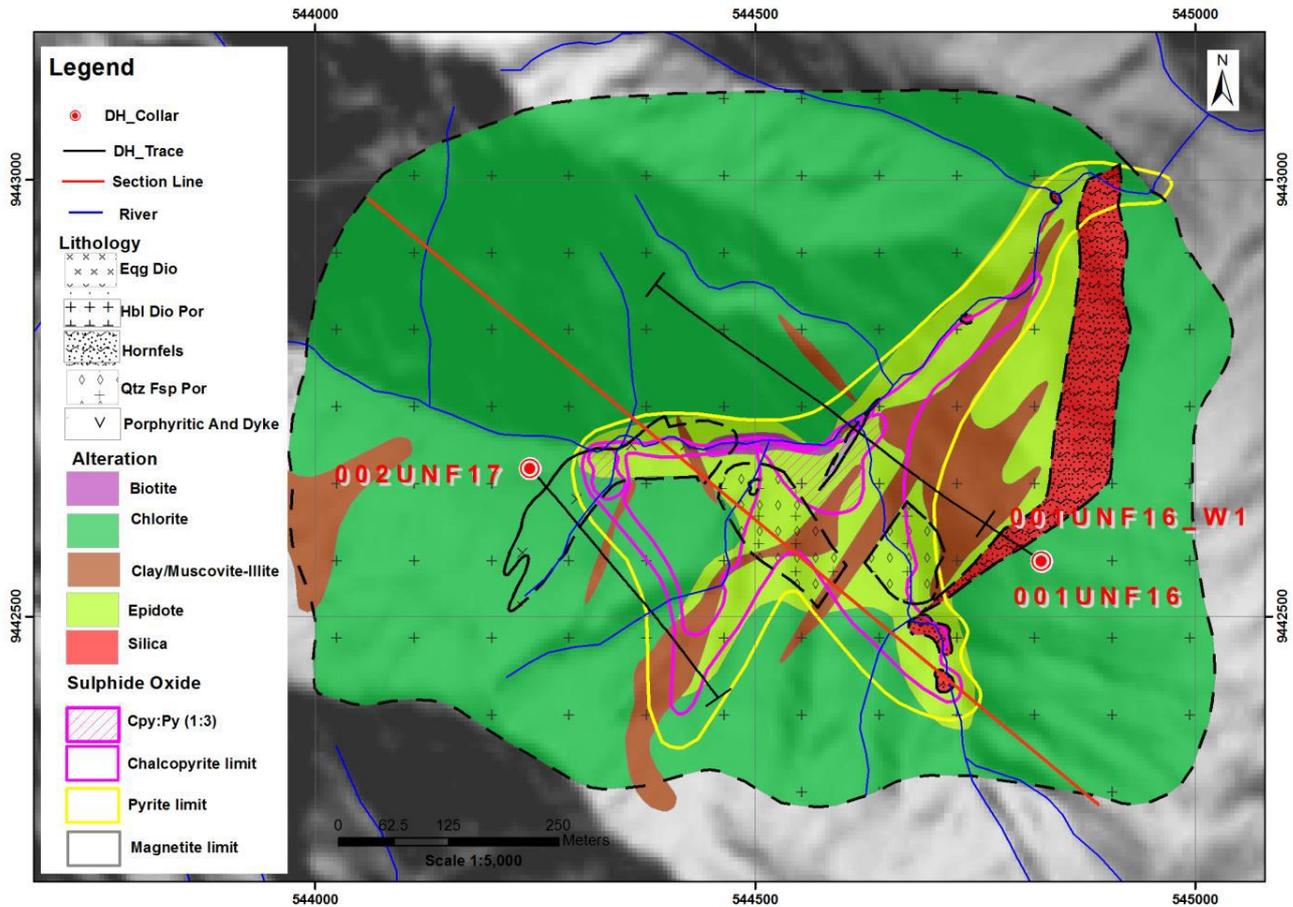


Figure 13: Unfin Prospect Geology

9.3.4 Fune

The Fune or Nong River Prospect was first documented by P. Lowenstein in 1975. Fune is situated on the northwestern part of the Star Mountains project area and proximal to the Antares Mountains. It is ~20 km NW from Olgal and the size of the mapped system is 800km x 1200m.

It has multi-phase intrusions with porphyry-type alteration and quartz veining. Hydrothermal alteration consists of secondary biotite, clays/illite chlorite, epidote and magnetite. Copper mineralization occurs mainly as chalcopyrite disseminations and fracture-controlled veinlets. Zones of massive sulphides occur in the skarn material with local pyrrhotite mineralisation.

The prospect comprises several diorite intrusions of varying textures composed mainly of feldspars and hornblendes with primary biotite (Figure 14). Subsequent alteration has produced quartz, chlorite, biotite and illite, along with the wall rock alteration (hornfelsed clastics). Intense biotite alteration, skarn and propylitic alteration is dominant in medium-grained diorite whilst the fine-grained diorite is mainly propylitically altered. Both diorite types have a phyllic overprint as well as the hornfelsed clastics.

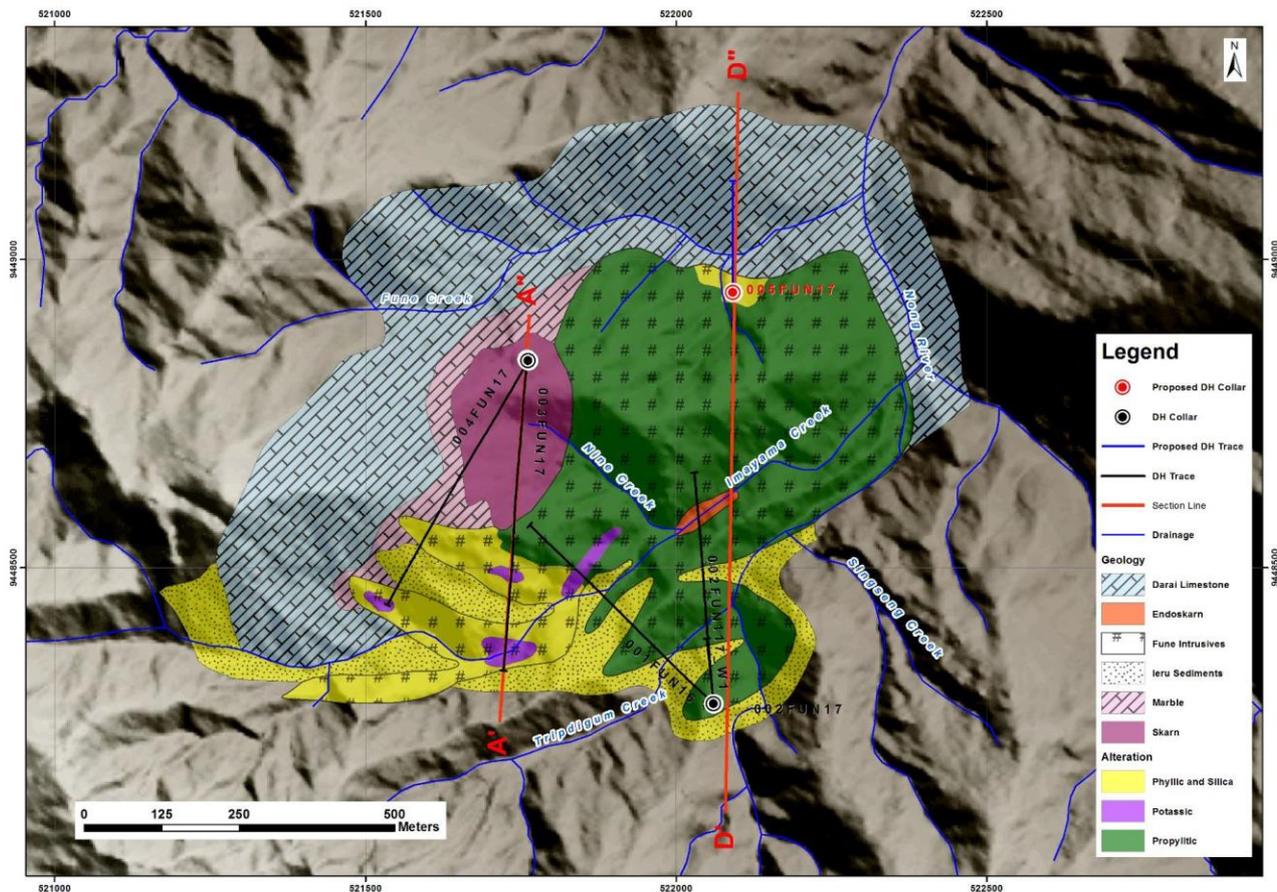


Figure 14: Fune Prospect Geology

The porphyry system is located along the N-S structural zone that runs northeast from OK Tedi. It is positioned stratigraphically along the unconformable contacts between the Ieru Formation (lower) and the Darai Limestone (upper). The skarn is mostly hosted in the Darai Limestone and the proximal intrusion is a medium-grained diorite.

The porphyry intrusive exhibits typical porphyry-style alteration and veining, it has low copper content. The skarn has an average grade of 0.5% Cu and 0.2 g/t Au (from drill hole assay results). Additional skarns may occur towards the NE part of the prospect based on highly conductive ZTEM anomalies, favourable mapped geology and encouraging results from soil geochemistry.

9.3.5 Futik

Futik lies ~3km northwest of the Olgal prospect. In 1971, Kennecott observed that Futik is comprised of a 1800m x 1800m hornblende diorite intrusive, including a 730m x 900m breccia zone, at the southern contact of the intrusion (Figure 15). The breccia is characterized by clasts of highly broken diorite with siltstone, quartzite and magnetite skarn, overlain by a silicified cap.

Recent mapping by the SMJV shows that three intrusive stocks are present in the Futik prospect namely a microdiorite, an equigranular diorite and an andesite. The microdiorite appears to be a pre-mineral intrusive whilst the equigranular diorite appears to be an inter-mineral intrusive. The

andesite crops out east of the prospect and is controlled by an E-W structure, possibly occurring as a post-mineral dyke.

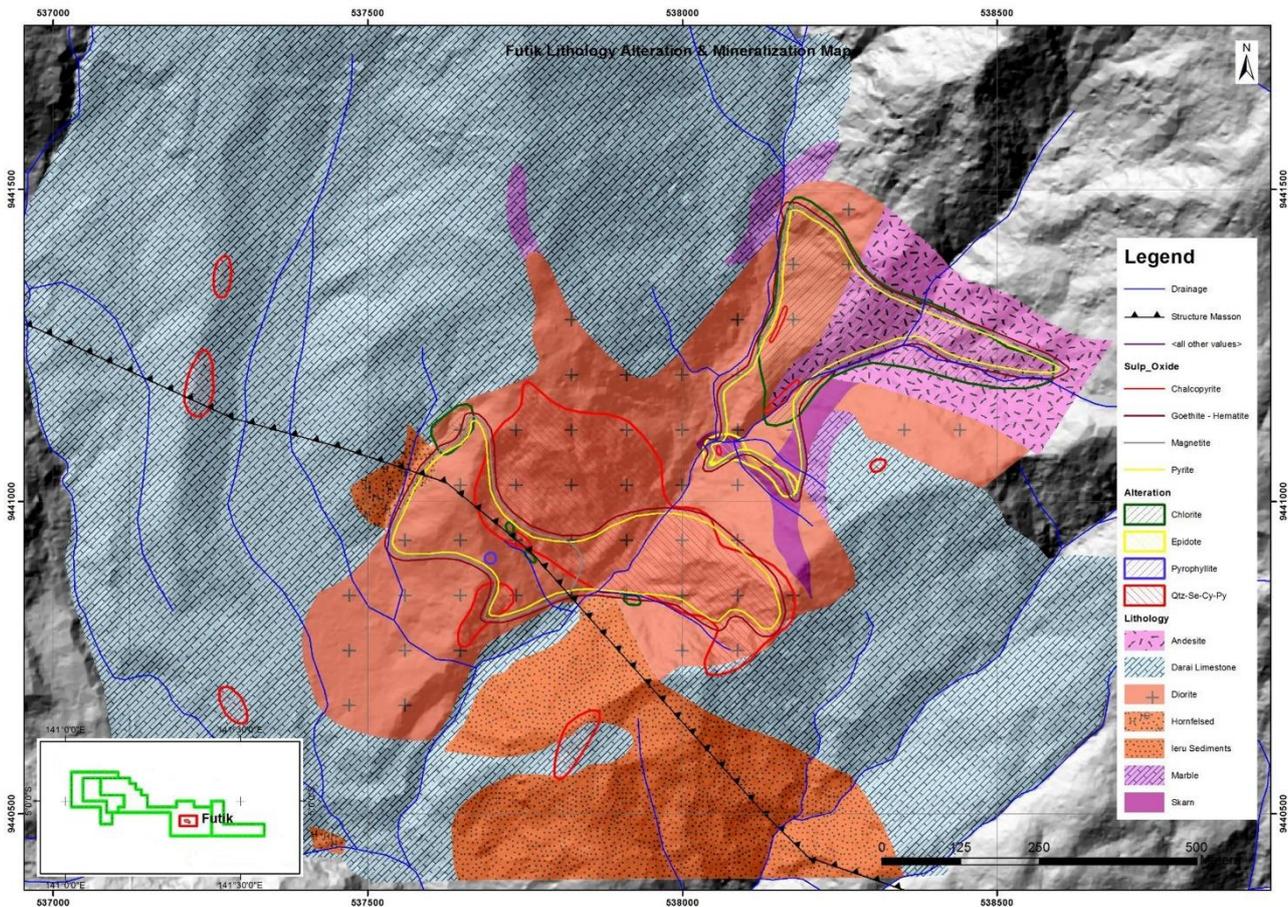


Figure 15: Futik Prospect Geology

Stratigraphically, the Darai limestone covers the north and eastern areas of the prospect whilst hornfelsed siltstone (Ieru siltstone) covers the west and southwest areas of the prospect.

Propylitic alteration is observed towards the northern and eastern parts of Futik and phyllic alteration covers the central part of the prospect. Calc-silicate alteration occurs where limestone (marble) is in contact with the intrusion and hornfelsing is observed in clastic sequences.

Based on the recent mapping, Futik may have some potential for porphyry-style mineralization with a likely footprint of ~1km x 0.6km. Patchy remnants of advanced argillic alteration (pyrophyllite) are suggestive of a deep erosional, high-sulfidation epithermal level. A 300 x 150m endoskarn bounded by limestone both from the north and south suggest that there is also potential for skarn mineralization in the area.

Quartz + chalcopyrite + pyrite veins, veinlets and fractures in the mapped porphyry diorite contained an estimated 0.5-1% copper. The favorable geochemistry and geophysics (AMT anomaly) support further investigation.

9.3.6 Bumtin

Bumtin is situated ~5 km NE from Olgal and ~2km south from Unfin. The Bumtin prospect is defined by a high magnetic response. A hornblende diorite with phyllic alteration covers a footprint of 1000m x500m and oriented east-west (Figure 16). Copper mineralization occurs dominantly as chalcopyrite grains in fractures and as disseminations.

Phyllic (quartz+sericite+pyrite) and chlorite-epidote alteration zones dominate the area. Two intrusive suites were mapped in the area, namely a hornblende quartz feldspar diorite/porphyry and a medium to coarse grained equigranular quartz diorite to diorite intruding into Ieru siltstones. The Darai Limestone bounds the equigranular diorite in the north and west whilst the Ieru clastics bound the intrusion in the east.

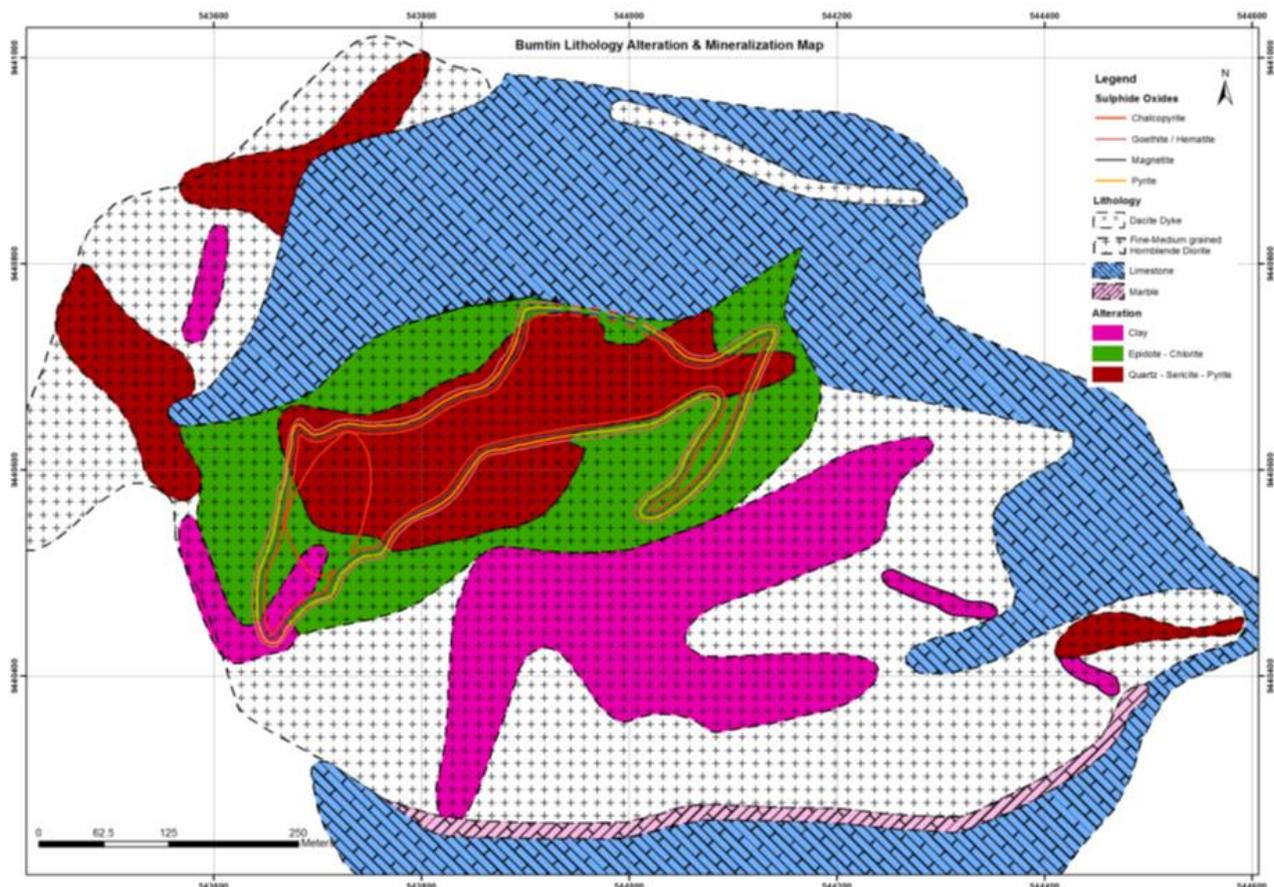


Figure 16: Interpreted Lithology and Alteration Map of Bumtin Prospect

9.4 Petrological Studies

Mineralogical investigations have been limited to petrographic studies carried out on core samples from the Olgal deposit.

Work by Taylor (2011) and Mason (2011) determined the main copper bearing mineral is chalcopyrite with very minor occurrence of covellite and bornite. The copper-bearing minerals occurred as grains typically ranging in size from 2 to 200 microns and averaging around 50 microns.

10 Drilling

10.1 Kennecott Drilling

In 1971 Kennecott drilled three diamond core holes at Futik and two at Olgal. Widths and grades for the copper mineralisation are inconsistently reported in the early documentation. The most reliable information is believed to be from the early Kennecott and GSPNG reports (Table 4). CRA Exploration re-sampled and assayed the drill core for gold in 1988 (Table 5).

Table 4: Summary of assays from Futik and Olgal drill holes (CRA rpt 1988/012)

Hole	From (m)	To (m)	Width (m)	Cu %	Au g/t
DDH01	77.72	146.30	68.58	0.28	
DDH01	77.27	90.10	12.8	0.31	0.22
DDH02	19.89	42.60	22.71	0.21	
DDH03	54.86	200.86	146.0	0.36	0.29
DDH04	23.77	30.48	6.71	1.86	
DDH04	30.48	106.68 (EOH)	76.2	0.56	
DDH04	0	106.68 (EOH)	106.68		0.35
DDH05	27.13	60.05	39.92	0.25	
DDH05	73.76	89.92	16.15	0.29	
DDH05	161.24	176.78	15.54	0.28	

Table 5: Summary of additional gold assays from Futik & Olgal drill holes (CRA rpt 1988/012)

Hole	From (m)	To (m)	Width (m)	Au g/t
DDH01	78	100	22	0.30
DDH02	66	72	6	0.6
including	66	68	2	1.05
	96	102	6	0.5
DDH03	94	166	72	0.6
including	140	150	10	1.14
	170	190	20	0.6
DDH04	16	28	12	0.3
	48	105	57	0.5
	54	56	2	1.0
DDH05	Occasional up to 0.35 over 2 metres			

10.1.1 Sampling Protocol

There is only limited documentation regarding the Kennecott drilling at Futik and Olgal. The holes were logged for lithology, alteration, mineralisation and structure. Core from the period was typically sampled in ~2 metre intervals. Based on observation of Ok Tedi cores from the same period,

the cores were likely split in half for sampling using a percussion splitter. Early reports indicate the core was only assayed for copper and it is H&SC’s presumption that the analysis was by aqua regia with an AA finish, typical of the times.

10.1.2 Utility

The documentation for the Kennecott drilling is typical for drilling of this period. However, it does not meet the current standards for resource drilling. The five Kennecott holes should be considered as a general guide to the geology and mineral tenor rather than a reliable measure.

10.2 HPL & HPL-Anglo American JV Drilling

HPL and the HPL – Anglo American JV drilled 51 diamond core holes, including 4 wedge holes, totalling 21,415 meters on seven prospects in the Star Mountains (Figure 17). All holes were triple tube diamond core. Holes were collared in PQ and reduced to HQ and NQ as required. The core was not oriented.

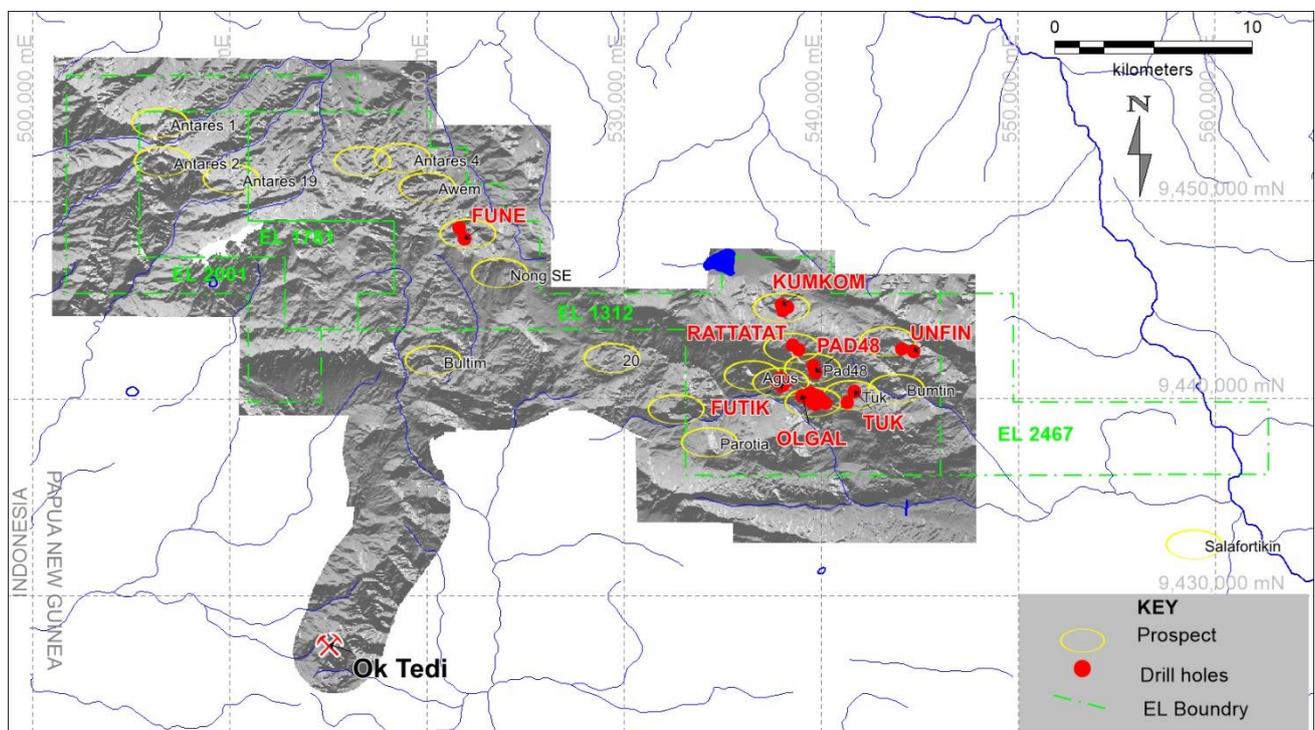


Figure 17: Prospect and Drilling Locations on Shaded LiDAR Topographic Base

10.2.1 Sampling Protocol

Diamond drill core for the HPL (2010-2013) and the HPL-Anglo American JV (2015-2018) was logged and sampled following a detailed protocol. The following is a summary version of the protocol:

1. Cores were logged on site to record geotechnical properties- fracture spacing, fracture angle, roughness,
2. Each box of core was photographed along with a board that showed the hole name, start and end depth of the core tray, tray number and date. The core was photographed both wet and dry.

3. Once photographed the core was geologically logged and marked with sample intervals. Typical sample interval was 2 meters unless the sample cut a significant mineralization boundary. The geological logs record recovery, weathering, lithology, alteration (type and intensity), mineralisation, structure and estimates of type and amount of sulfide/oxide mineralisation.
4. Core was split in half using a diamond saw. One half was sent for assay and the other half returned to the core tray for reference.
5. The half core was bagged labelled with a unique sample number and dispatched to ALS Laboratories in Townsville (2010-2017) or the Intertek prep lab in Lae (hole 021OLG17 only).
6. At the lab the samples were dried, crushed to 2mm and split with a riffle splitter to yield a 2kg sample. The 2kg sub-sample is pulverised in a Labtech Essa LM2 or LM5 to a nominal 85% passing minus 75 microns. The minus 75 micron pulps are sub-sampled for the base metal acid digest assay and gold fire assay.
7. Samples were assayed using a HF-HNO₃-HClO₄ acid digest with HCl leach and ICP-AES finish. Gold was determined by 50g fire assay with an AAS finish.

10.2.2 Collar surveys

Drill hole collars are located by hand-held GPS. Elevations were extracted from a LiDAR DEM that HPL had generated over the prospect areas. Expected accuracy is +/- 5 m for northing and easting and +/- 5 m for elevation coordinates.

Grid system used is WGS84, Zone 54. Topographic control is from a LiDAR survey flown over the area in 2010. A 2m grid was prepared from the LiDAR to create the project's digital elevation model.

10.2.3 Downhole Survey

Downhole surveys for drilling from 2010 to 2013 were carried out by the drill contractor (Downer EDI) using a Ranger downhole survey system. Where possible surveys were carried out every 50m.

Downhole surveys for drilling from 2015 to 2017 were carried out by the drill contractor (Downer EDI) using a Reflex Gyro downhole survey system. Surveys were carried out every 10m.

10.2.4 Core Recovery

Core recovery was measured before the core was disturbed. Recovered lengths were measured by run and the per cent recovery estimated for each sample.

Figure 18 shows the distribution of recoveries by sample. Over 60% of the samples had over 95% recovery and over 70% had greater than 90% recovery. Zones of poor recovery typically occur in weathered zones or structural zones with broken core.

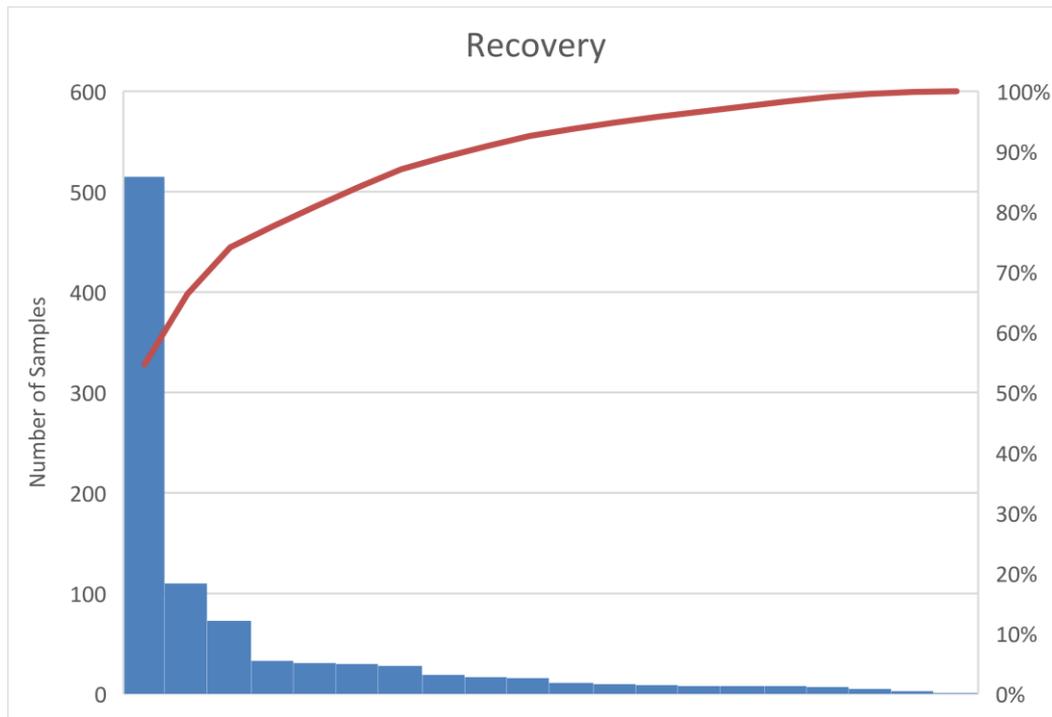


Figure 18: Core Recovery by Sample

10.2.5 Prospect Drilling

10.2.5.1 Olgal

A total of 23 holes (21 primary holes and 2 wedged holes) totaling 8,949.3m of core were drilled at Olgal in the period 2010-2017 (Table 6).

Table 6: Olgal drill hole collars, orientation and depth

Hole Name	WGS84 Easting	WGS84 Northing	Elevation	Hole start (m)	Hole end (m)	Dip	Azimuth (true)
001OLG10	539780	9440142	2201	0	302.9	-60	360
002OLG10	539780	9440136	2201	0	500.6	-60	180
003OLG10	539166	9440319	2193	0	162.9	-60	360
004OLG10	539165	9440315	2195	0	112.7	-60	180
005OLG10	539547	9440444	2224	0	110.7	-60	360
006OLG10	539547	9440440	2225	0	337.2	-60	180
007OLG11	539866	9439861	2224	0	341.7	-60	180
008OLG11	540058	9440273	2123	0	500.1	-60	180
009OLG11	540058	9440277	2123	0	321.6	-60	360
010OLG11	539630	9440189	2171	0	268.3	-60	360
010AOLG11	539630	9440189	2171	96	353.5	-60	360
011OLG11	539630	9440186	2171	0	502.9	-60	180
012OLG11	539664	9440003	2131	0	500.1	-60	180
013OLG12	539940	9440116	2111	0	82.5	-90	360

014OLG12	539780	9440136	2201	0	638.4	-90	360
015OLG15	539696	9440400	2210	0	466.9	-70	180
016OLG15	539696	9440405	2212	0	30.4	-70	180
017OLG15	539902	9440249	2116	0	487.8	-60	225
017OLG15_W1	539902	9440249	2116	478.4	782.2	-70	225
018OLG15	539995	9440043	2121	0	848.4	-70	45
019OLG15	539613	9440311	2196	0	630.7	-75	250
020OLG15	539864	9439855	2224	0	800	-75	45
021OLG17	540375	9439918	2068	0	441.2	-55	225

A map showing the drill collars and downhole traces is included as Figure 19.

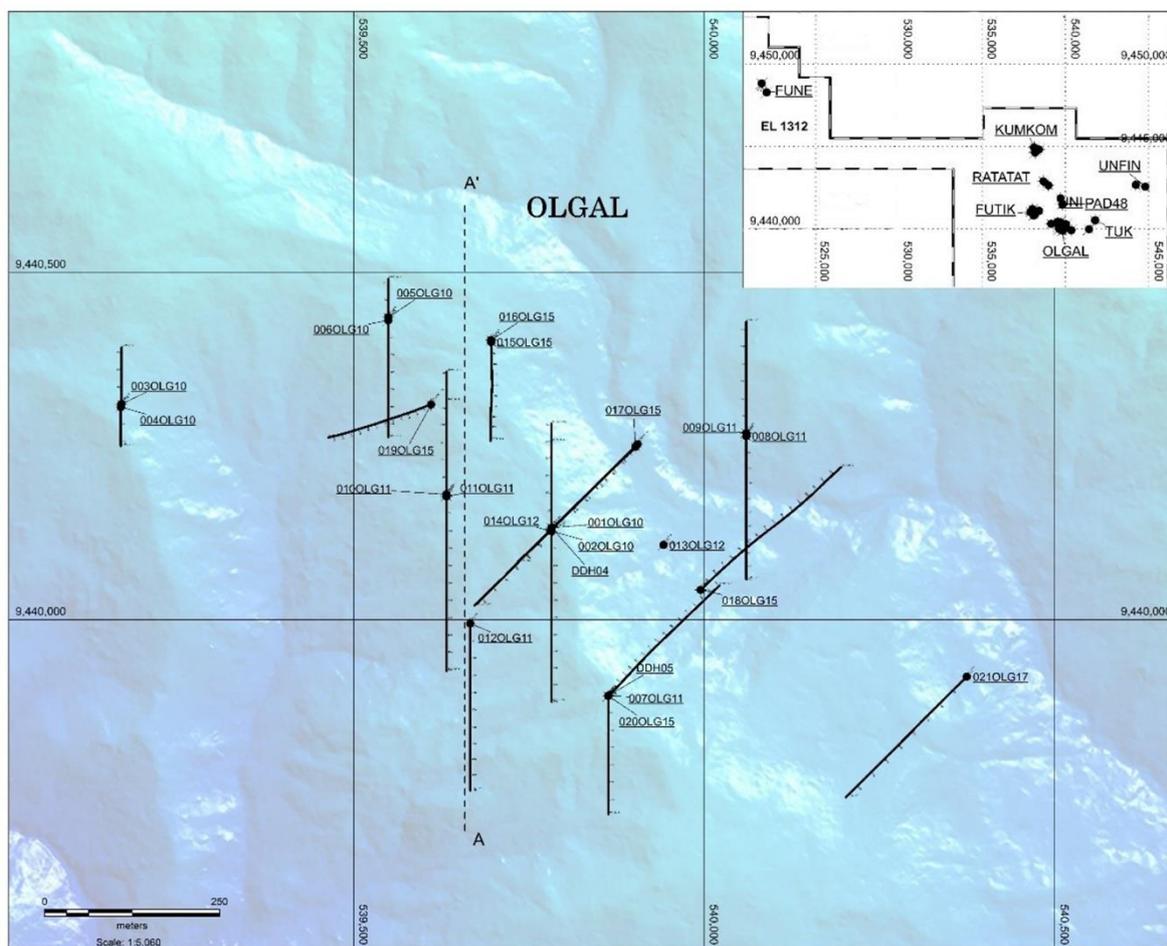


Figure 19: Olgal Drillhole Plan on Shaded Topography

Significant porphyry copper mineralisation (>0.2% Cu) was intercepted in all the Olgal holes with the exception of hole 004OLG10 and 005OLG10. Some of the better intercepts include:

- 596m @ 0.61% Cu & 0.85g/t Au from 24 m down hole (014OLG12)
- 183 metres @ 0.53% Cu and 0.58 g/t Au from 168m downhole (019OLG16)
- 430 metres @ 0.39% Cu and 0.24 g/t Au from 168m downhole (020OLG16)

- 434.9 metres @ 0.52% copper and 0.72 g/t gold (Including 100 metres @ 0.82% copper and 1.39 g/t gold from 76m downhole) (017OLG16)
- 82 metres @ 0.48% Cu and 0.27 g/t Au (013OLG11)

Olgal is characterised by high gold and copper tenors in a narrow, dyke-like, early diorite porphyry intrusion characterised by quartz veining. The early porphyry intrusion is flanked outwards by lower-grade, inter-mineral and barren, late porphyries.

The early and inter-mineral porphyries display biotite-magnetite alteration, with only minor observed K-feldspar. There is a close association between hydrothermal magnetite, some of it replacing hornblende phenocrysts, and finely disseminated chalcopyrite and accompanying pyrite. The late porphyries display either weak biotite-magnetite or epidote alteration. Although the shallow parts of the early and inter-mineral porphyries display chloritisation of mafics and sericitisation of plagioclase, much of the original magnetite content is retained. Moreover, there seems to be little change in metal tenors as a result of the chlorite-sericite overprint. Hence, the intensity of hydrolytic alteration is demonstrably low.

The porphyry copper-gold mineralization is truncated at a depth of ~550 m by a post-mineral fault with an indeterminate offset (Figure 20 and Figure 21). Alteration and mineralization are strictly confined to the hanging wall of the fault. Sedimentary rocks in the footwall are unmetamorphosed, unaltered and essentially devoid of sulphides. If this fault is a thrust, as generally assumed, an important phase of fault displacement was clearly post-mineral. The amount of fault offset is impossible to determine but could be appreciable, at least several hundred metres, given the juxtaposition of copper-gold mineralization with unaltered rocks as well as the appreciable thickness of mineralized clast-rich cataclasite marking the fault.

A total of 164 samples were selected from the Olgal drill core by HPL/HPL JV in order to estimate the bulk density. Measurements were done on whole, unbroken pieces of drill core prior to sampling using the "Water-in-Water Method". Because drill core from the project was judged by the site geologists as generally competent and non-porous a simple buoyancy protocol was adopted:

- Dry the sample.
- Weigh the sample to determine the dry mass (M_s).
- Place the specimen in a basket and weigh it, suspended from a balance, in water. Subtract the weight of the basket in water, to determine the weight of the sample in water (M_s in water).
- The Dry Bulk Density is calculated using the Archimedes formula. Hence:

$$\rho_d = \frac{M_s}{M_s - M_{s \text{ in water}}}$$

It should be noted this approach tends to over estimate the bulk density since the measurements are from the most unbroken and least clay-altered or weathered material.

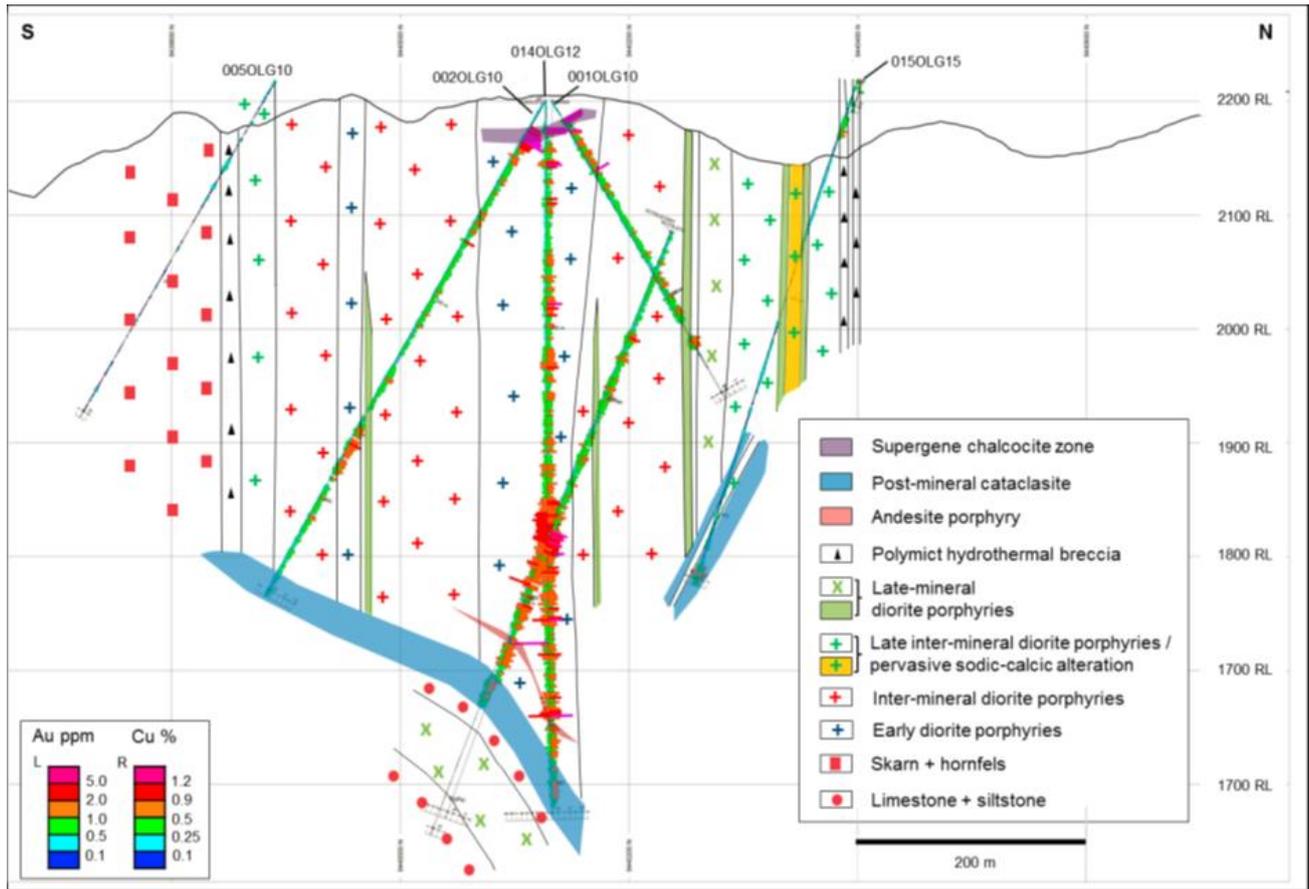


Figure 20: Simplified Olgal Section A-A' on Figure 22 (after Sillitoe, 2015)

(supplied by Conic)

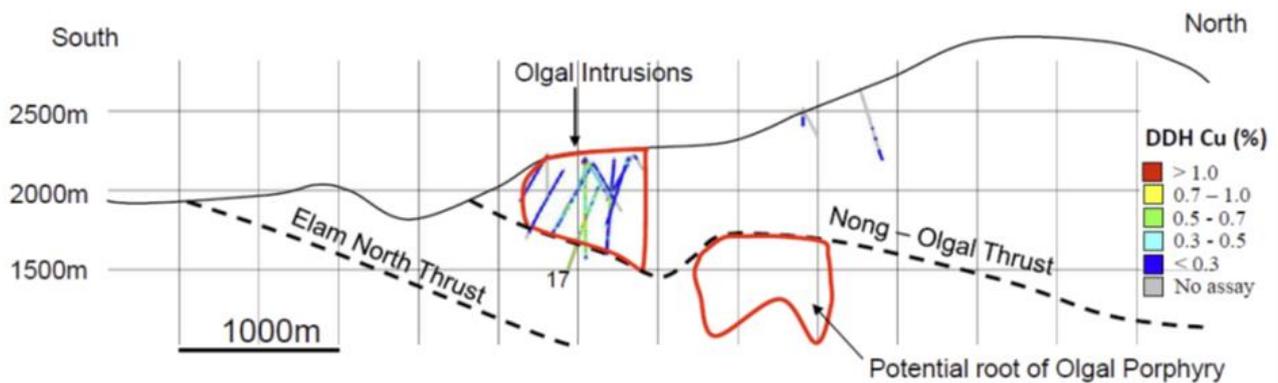


Figure 21: Olgal Regional cross section A-A' extended showing thrusts and inferred offset of the Olgal porphyry

10.2.5.2 Kum Kom

Five holes were drilled in Kum Kom prospect for a total of 2,772.5m (Table 7). The initial target of this drilling was a magnetic high associated with mapped skarn in outcrop.

Table 7: Kum Kom drill hole collars, orientation and depth

Hole Name	WGS84 Easting	WGS84 Northing	RL	Hole start (m)	Hole end (m)	Dip	Azimuth (True)
001KUM12	538143	9444932	2891	0	354.3	-70	180
002KUM12	538143	9444932	2891	0	475.7	-70	360
003KUM15	538140	9444930	2894	0	614.2	-60	140
004KUM15	538430	9444815	2784	0	676.7	-60	170
001KUM12	538143	9444932	2891	0	651.6	-70	140

A map showing the drill collars and downhole traces is included as Figure 22.

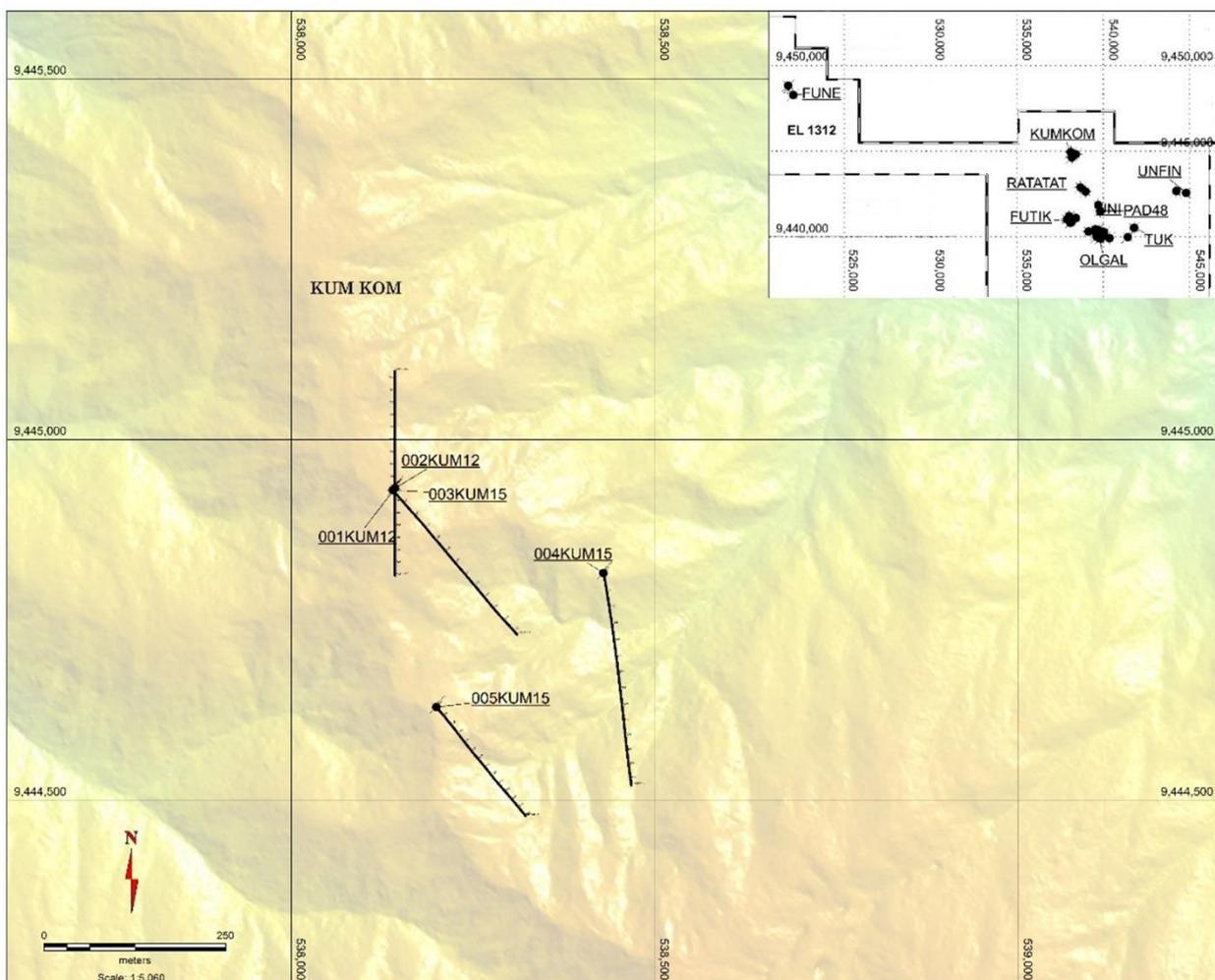


Figure 22: Kum Kom Drill Hole Plan on Shaded Topography

Skarn mineralisation was intercepted in three holes (001KUM12, 003KUM15 and 004KUM15) and low grade porphyry copper porphyry mineralisation was intercepted in holes 002KUM12 and 005KUM15.

Hole 001KUM12 -22m @ 1.42% Copper & 0.57g/t Gold from 146m down hole
 10m @ 0.68% Copper & 0.21g/t Gold from 220m down hole
 68m @ 0.97% Copper & 0.37g/t Gold from 280m down hole

Hole 003KUM15 - 30.6 metres @ 0.61% copper and 0.54 g/t gold
 Including 12.1 metres @ 0.94% copper and 0.72 g/t gold from 292.9m downhole

Hole 004KUM15 13metres @ 1.3% copper and 0.53 g/t gold from 107m downhole
 26.5 metres @ 0.89% copper and 1.4 g/t gold from 282m downhole
 30 metres @ 1.0% copper and 0.23 g/t gold from 515m downhole

Hole 005KUM15 – 32m @ 0.27% copper and 0.11 g/t gold from 246m downhole

The skarn developments at Kum Kom are associated with a series of texturally distinct hornblende diorite porphyry intrusions, some pre- and others post-dating the alteration and mineralization. In common with Olgal, the various intrusive phases appear to be steep because observed contacts are consistently at low angles to the core axis.

The calcic skarn bodies are of two main mineralogical types: red-brown garnet variably retrograded to chlorite and actinolite and massive magnetite plus pyrite. The skarn bodies intercepted in holes 002KUM12 and 003KUM12 are either bounded on both sides in the drill core by porphyry or occur at porphyry-marble contacts, which constrains their likely geometries.

Drilling, along with surface mapping confirmed that skarn in Kum Kom appear to be of relatively restricted volume because of the limited amount of carbonate material bounded by multiple porphyry phases.

10.2.5.3 Unfin

Two holes were drilled at the Unfin prospect for a total of 2,008m (Table 8 and Figure 23).

Table 8: Unfin drill hole collars, orientation and depth

Hole Name	WGS84 Easting	WGS84 Northing	RL	Hole start (m)	Hole end (m)	Dip	Azimuth (True)
001UNF16	544825	9442564	2511	0	157.6	-60	305
001UNF16_W1	544825	9442564	2366	144.4	1061.5	-60	305
002UNF17	544244	9442670	2243	0	789.7	-60	140

Previous explorers had documented porphyry-type alteration and mineralization in Unfin Creek.

Unfin is a 1km x 0.8km size low grade porphyry-skarn prospect. It has multi-phase intrusions with porphyry-type alteration and quartz veining. Hydrothermal alteration consists of secondary biotite, clays/illites, chlorite and magnetite. Copper mineralization occurs mainly as chalcopyrite and covellite in disseminations and fracture-controlled veinlets in intrusive and in minor skarn.

Details of the main copper intercepts for Unfin are included as Table 9.

Table 9: Unfin drilling significant results

Hole	From	To	Meters	Dominant Rock Type	Cu %	Au (ppm)
001UNF16	346	362	16	Porphyry	0.21	0.005
001UNF16	666	674.7	8.7	Skarn	0.22	0.005
001UNF16	777.9	786.6	8.7	Breccia	0.54	0.004
002UNF17	43.5	60.2	16.7	Limestone	0.19	0.004
002UNF17	155.9	163	7.1	Limestone	0.20	0.080

Hydrothermal alteration consists mainly of phyllic-potassic-intermediate argillic and minor skarn mineralization with stoped out early phase porphyry intrusive and quartz vein fragments. This was truncated by barren late quartz feldspar porphyry and andesite dykes.

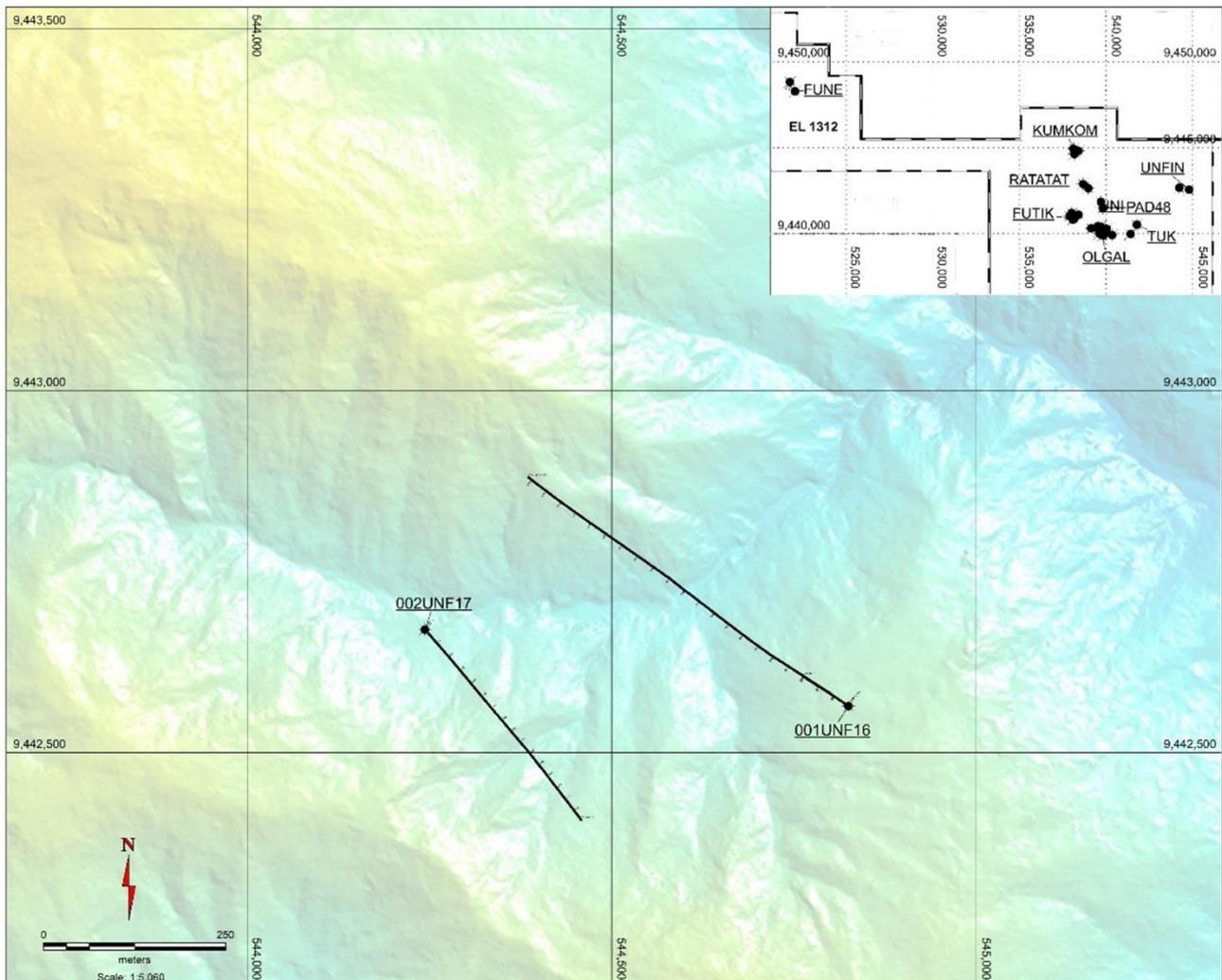


Figure 23: Unfin Drill Hole Plan on Shaded Topography

It is believed that the system is still open to the north from the first drill hole intercept with an interpreted extended potassic (secondary biotite) footprint exemplified by a 400x600m mapped

biotite zone at surface. The exploration upside of Unfin is that the hydrothermal system is larger than mapped from the surface and the higher-grade core of the system might be present at depth but the downside is it has minimal copper content. Another explanation for a low copper grade is that the overprinting phyllic alteration might have re-mobilised the copper resulting in lower copper grades relative to the K-silicate altered core of the system.

10.2.5.4 Fune

Fune (headwaters of the Nong River) is situated on the northwestern part of the Star Mountains proximal to the Antares Mountains. Fune is a small skarn-porphyry prospect with mapped surface dimensions of ~200m x 300m.

The Nong River Prospect was documented by P. Lowenstein in 1976 (Lowenstein, 1976). Several work programs have been undertaken in the area by a number of companies since the early 1970's, but no drilling was carried out prior to the Star Mountain JV. Four holes were drilled in the Fune prospect for a total of 3,318.4m (Table 10).

Table 10: Fune drill hole collars, orientation and depth

Hole Name	WGS84 Easting	WGS84 Northing	RL	Hole start (m)	Hole end (m)	Dip	Azimuth (True)
001FUN16	522060	9448280	2316	0	750.6	-60	315
002FUN17	522060	9448280	2316	0	143.4	-55	355
002FUN17_W1	522060	9448280	2316	80.3	665.5	-55	355
003FUN17	521760	9448838	2442	0	851.1	-55	185
004FUN17	521762	9448836	2442	0	907.8	-55	210

A plan of the drillhole collars and traces is included as Figure 24.

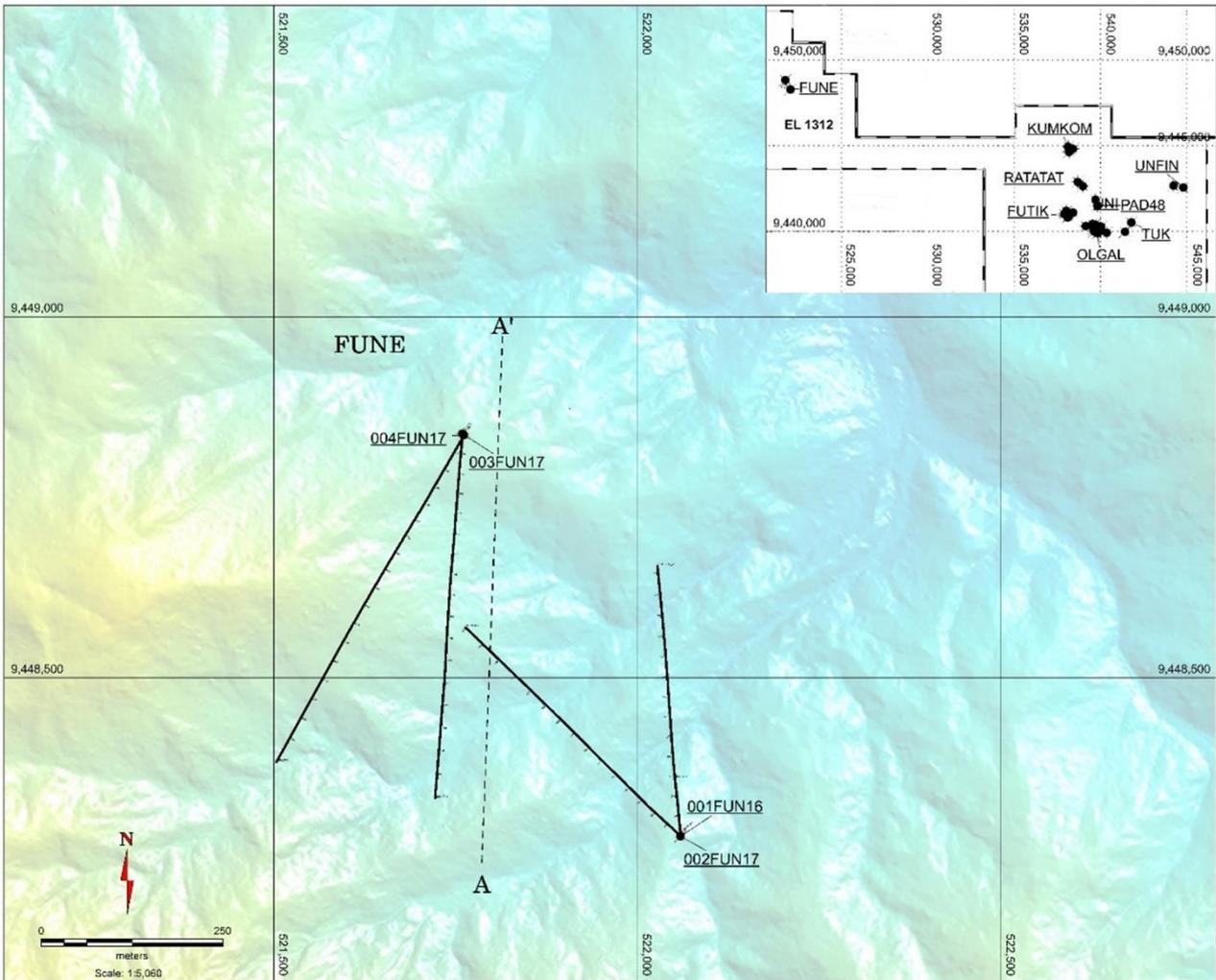


Figure 24: Fune Drill Hole Plan on Shaded Topography

A typical cross section of the deposit is included as Figure 25.

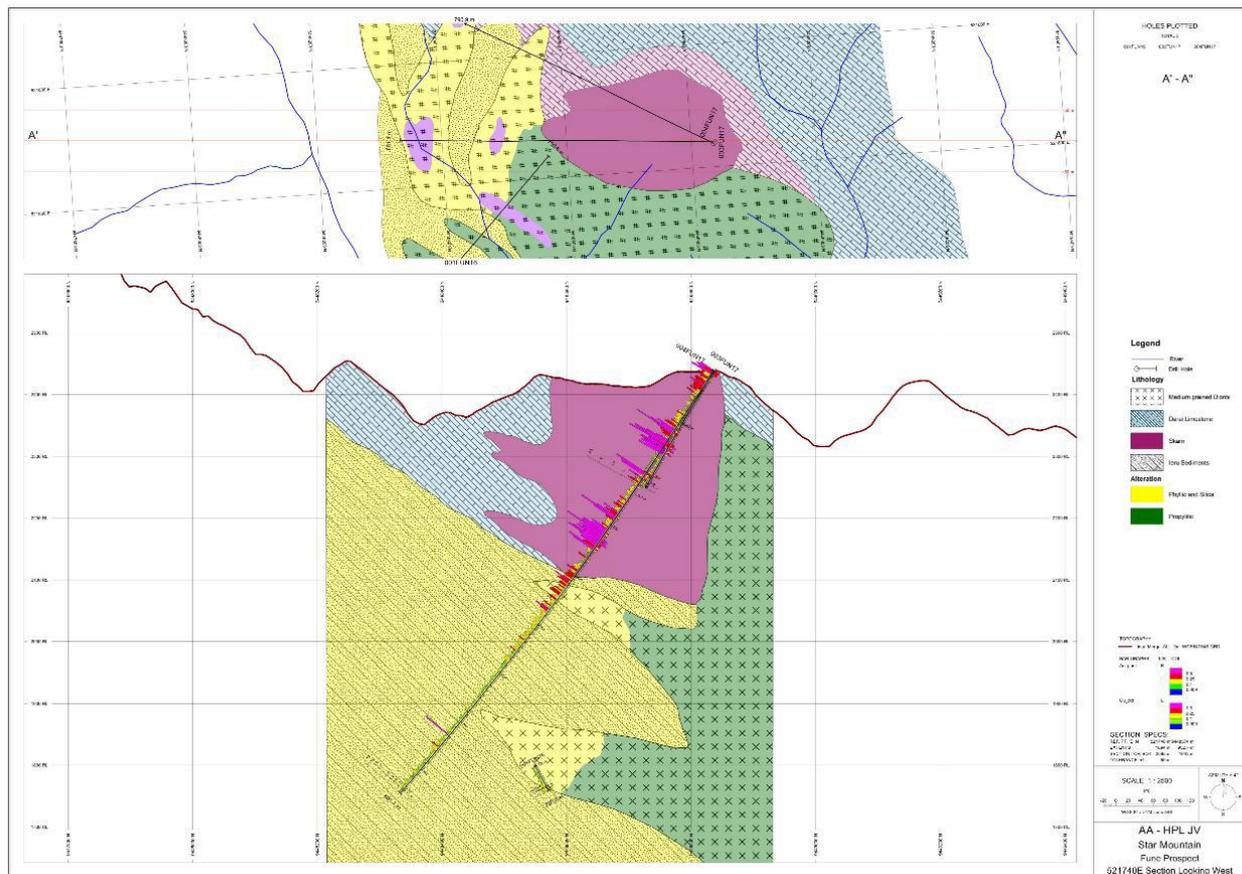


Figure 25: Fune Cross Section
(zoom in on image for better resolution)

Fune drilling highlights are listed below:

- 003FUN17: 50.0m @ 0.32% Cu, 0.09g/t Au, from surface
67.0m @ 0.41% Cu, 0.13g/t Au, from 82m
158m @ 0.45% Cu, 0.13g/t Au, from 198m
- 004FUN17: 47.0m @ 0.33% Cu, 0.09g/t Au, from surface
26.8m @ 0.97% Cu, 0.34g/t Au, from 136m
24.9m @ 0.59% Cu, 0.17g/t Au, from 258m
48.0m @ 0.44% Cu, 0.23g/t Au, from 339m

The mineralisation encountered by the Fune drilling was largely restricted to skarn developed at the contact between the Darai Limestone and the underlying sandstones and siltstone of the Ieru Formation. The equigranular to porphyritic diorite seen in outcrop and in drill holes is only weakly altered and mineralized. It is not clear if the intrusives in the drill holes are the source of the copper mineralization seen in the skarn.

10.2.5.5 Futik

Futik lies approximately 1.5km to the west of Olgal. Like Olgal the prospect is a porphyritic diorite-tonalite, the dominant alteration is propylitic (Epidote-Chlorite). The prospect has been tested by seven holes, three Kennecott holes and four HPL holes (Table 11).

Table 11: Futik drill hole collars, orientation and depth

Hole Name	WGS84 Easting	WGS84 Northing	RL	Hole start (m)	Hole end (m)	Dip	Azimuth (True)
001FUT11	538183	9440871	2197	0	501	-60	360
002FUT12	538183	9440868	2197	0	152.9	-60	180
003FUT12	538013	9441131	2085	0	65.5	-60	270
004FUT12	538431	9441099	2274	0	422.7	-60	90

A plan of the drillhole collars and traces is included as Figure 26.

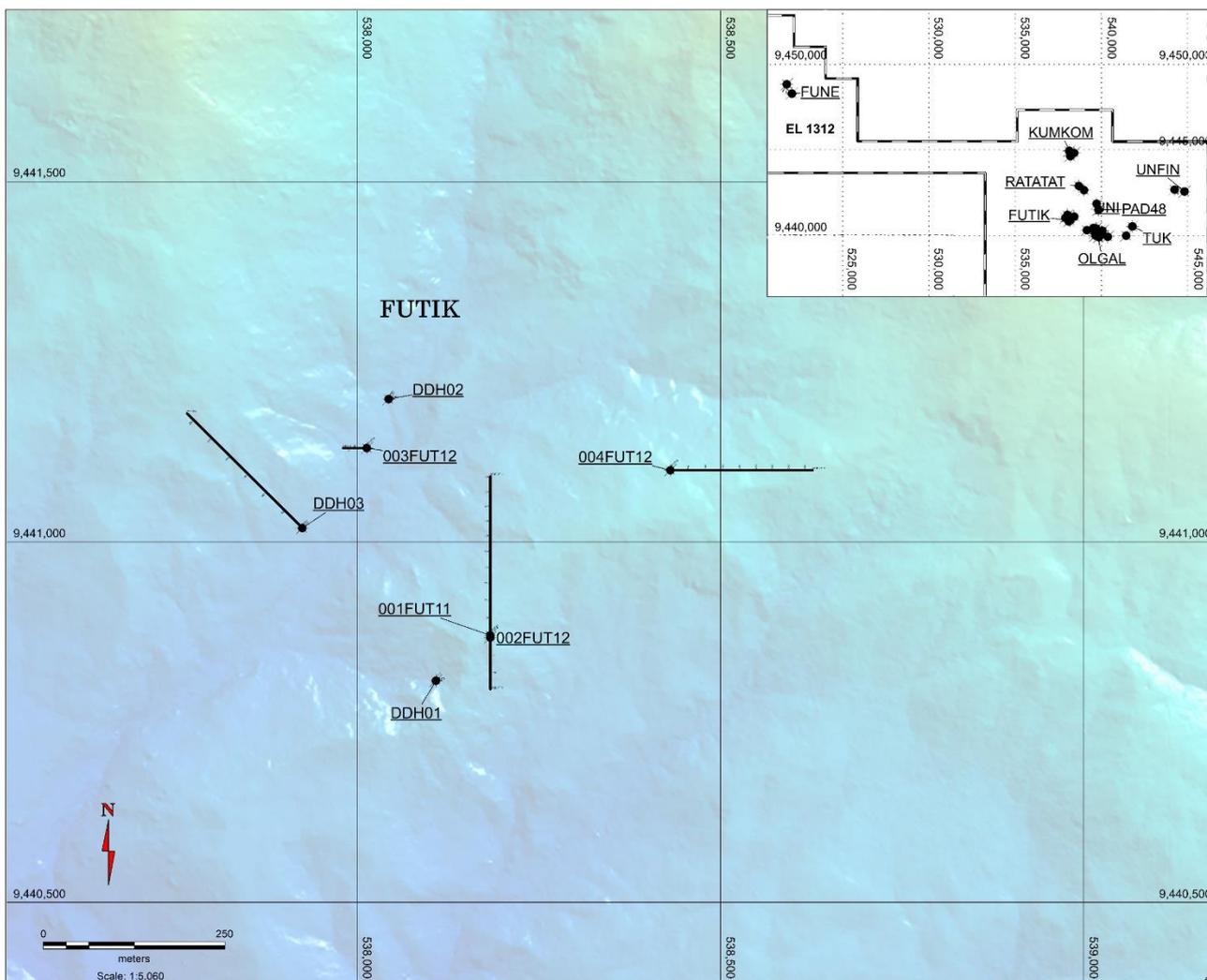


Figure 26: Futik Drill Hole Plan on Shaded Topography

The best results from the drilling are listed below

- DDH03 (Kennecott) 146m @ 0.36% Cu from 54m downhole
- 002FUT11 (HPL) 46m @ 0.29%Cu & 0.29g/t Au from 60m downhole

The uppermost part of hole 001FUT11 intersected weak biotite-magnetite-altered diorite porphyry that underwent later hydrothermal kaolinisation and accompanying pyritisation; however, potassic remnants still exist in places. Traces of native sulphur are also present in the core. In several places, the porphyry contains quartz-veinlet xenoliths derived from an unidentified earlier porphyry phase. The deeper parts of the hole, from 258 m onwards, are dominated by a totally barren, late-mineral diorite porphyry intrusion displaying epidote alteration. Within it, a 3m xenolith of earlier porphyry (365–368 m) contains a few quartz-magnetite veinlets and an average of ~0.1% Cu and ~0.1 g/t Au. The lower part of the kaolinised porphyry, beneath a well-defined sulphate front at a down-hole depth of 228 m is cut by abundant gypsum veins.

The kaolinite alteration at Futik is interpreted as part of an advanced argillic lithocap. The lithocap overprints diorite porphyry intrusions that contain evidence, in the form of the xenoliths, for the existence of earlier, better-mineralized and presumably nearby porphyry phases. To date there is no evidence that these earlier phases contain potentially economic mineralization.

10.2.5.6 Tuk

Four drill holes (001TUK12, 002TUK12, 003TUK12 and 004TUK12) were completed at Tuk prospect for a total of 868.7m (Table 12). The two targets were discrete airborne magnetic anomalies but none of the holes drilled intersected significant mineralization.

All the holes intersected fresh to weak propylitic hornblende porphyry and grey-black to white, slightly bleached unaltered limestone.

Table 12: Tuk drill hole collars, orientation and depth

Hole Name	WGS84 Easting	WGS84 Northing	RL	Hole start (m)	Hole end (m)	Dip	Azimuth (True)
001TUK12	541803	9440524	2440	0	72.4	-70	180
002TUK12	541803	9440524	2440	0	273.5	-60	180
003TUK12	541803	9440524	2440	0	407.8	-70	360
004TUK12	541444	9439979	2355	0	115	-70	230

Figure 27 shows the drillhole collars and traces against a backdrop of shaded relief.

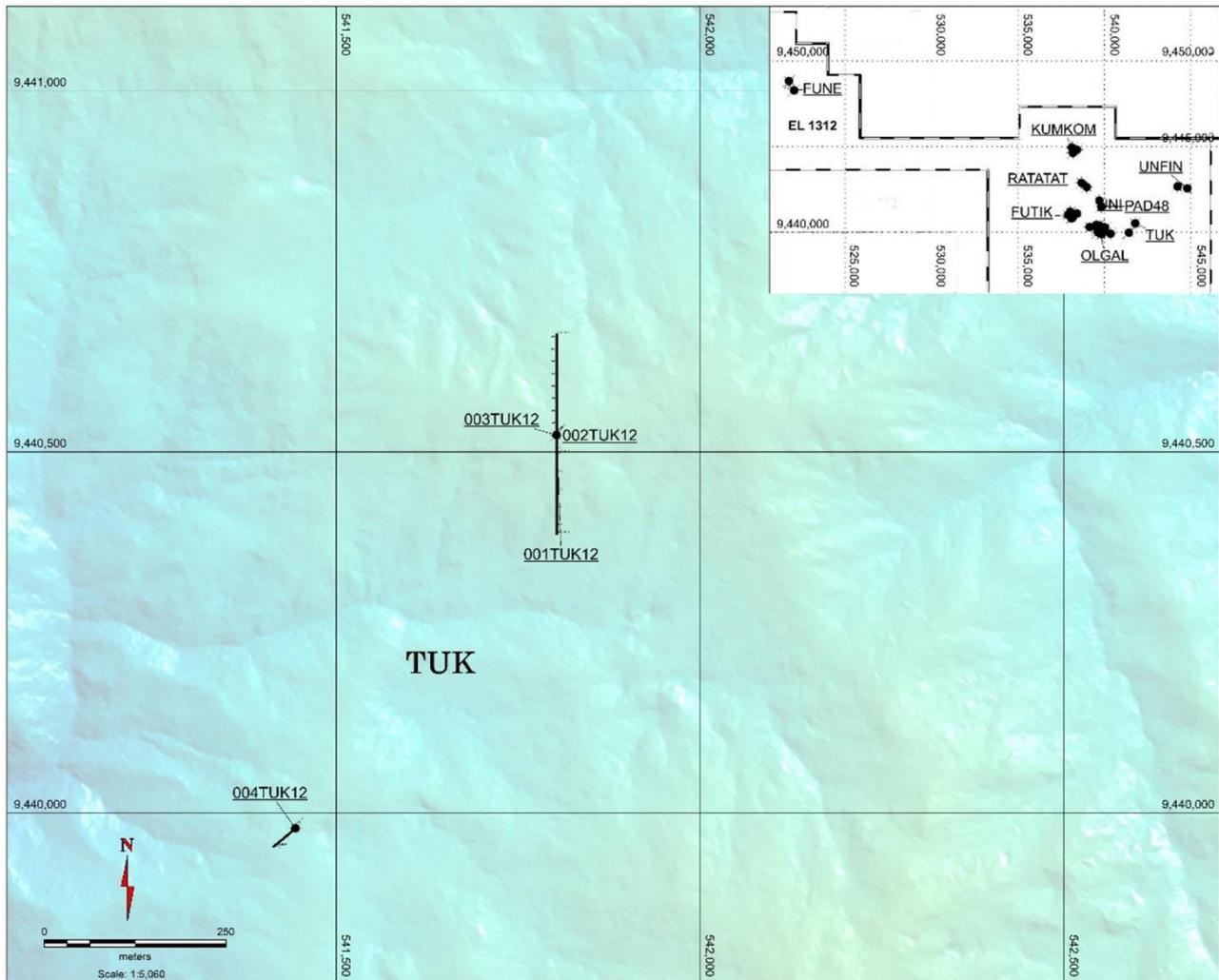


Figure 27: Tuk Prospect - Drill Plan on Shaded Topography

Based on drilling, surface mapping and geochemistry the Tuk prospect is believed to have limited potential for significant porphyry copper mineralisation.

10.2.5.7 Rattatat

Two holes have been drilled at the Rattatat prospect (Table 13). The target was a discrete airborne magnetic anomaly.

Table 13: Rattatat drill hole collars, orientation and depth

Hole Name	WGS84 Easting	WGS84 Northing	RL	Hole start (m)	Hole end (m)	Dip	Azimuth (True)
001RAT12	538696	9442891	2866	0	550	-75	90
002RAT12	538993	9442642	2872	0	556.4	-75	270

The holes at Rattatat encountered limestone, marble, unaltered undifferentiated intrusive dykes and weakly propylitic (chlorite-epidote±magnetite) altered diorite/porphyry. Carbonate and pyrite occur as veining / fracture fills. Both holes were weakly mineralised.

The exception was a 2m zone in 002RAT12 from 380–382m that returned 2m @ 0.63% copper and 0.33 g/t gold. This zone is within a 4m wide structural zone with skarn (epidote-garnet) alteration and disseminated to aggregate chalcocite-chalcopyrite±covellite(?) mineralization.

Figure 28 shows the drillhole collars and traces against a backdrop of shaded relief.

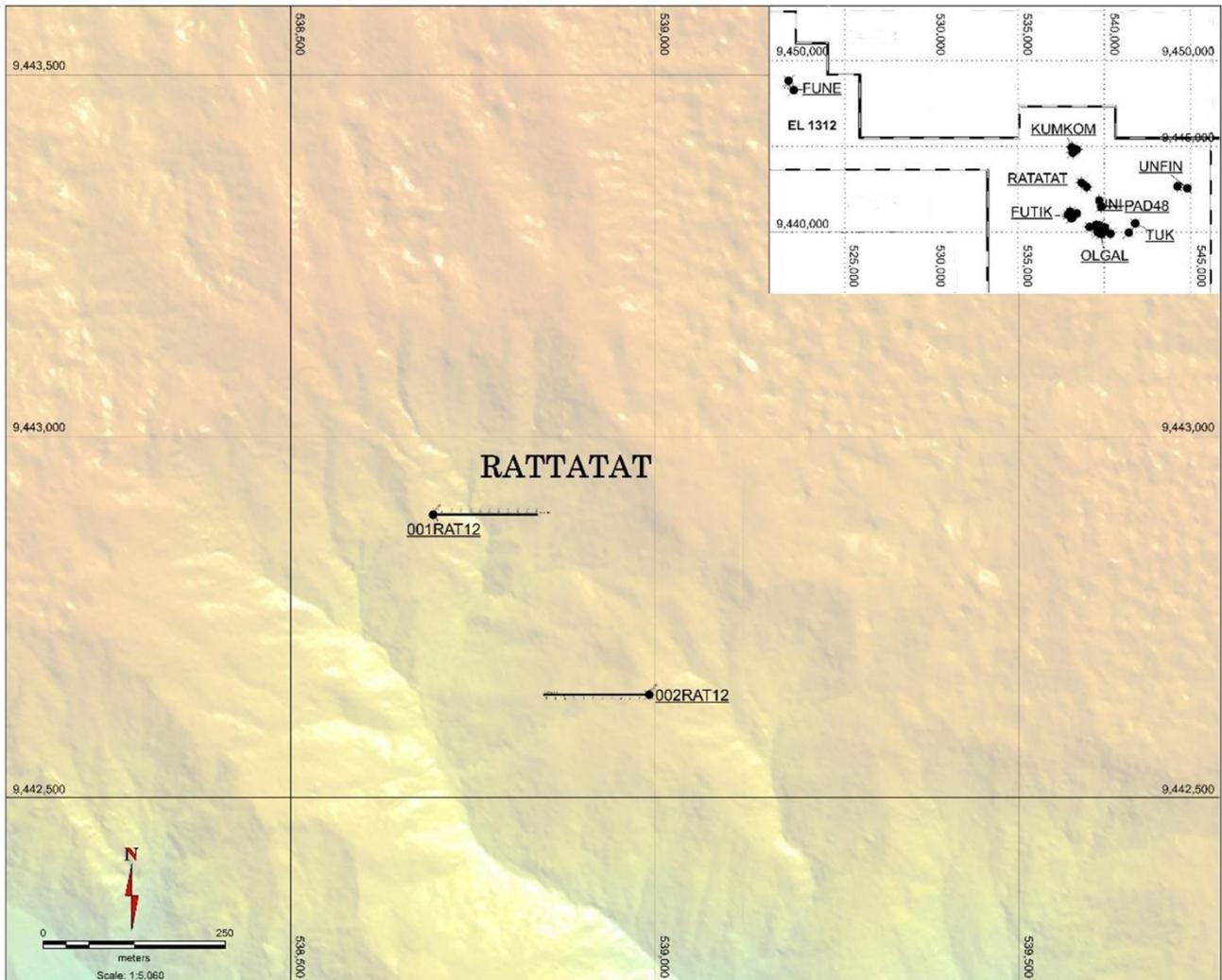


Figure 28: Rattatat Drill Plan on Shaded Topography

11 Sample Preparation, Analyses and Security

All work described in this section was completed by previous explorers. No work has been undertaken by QR.

11.1 Kennecott Drilling

Details for the Kennecott drilling are generally lacking. Description of the drilling and sampling is largely limited to details of the geology and reporting of assay results. Discussion by McGee (1976) does indicate that the core was split, half being sent for assay and the other half returned to the core tray. As mentioned previously it is assumed that analysis was done using an aqua regia digest with an AA finish, typical of the times.

11.2 HPL & HPL-Anglo American JV Drilling

A summary of the sampling protocol is given in section 10.2.1.

Samples were sent to ALS, an independent commercial laboratory, for sample prep and analysis.

The following QAQC programme was used:

1. Certified Reference Materials (“CRM” or standard) were used to monitor analytical accuracy, inserted in the core-shed on a 1 in 20 basis.
2. A field blank sample to monitor carry-over contamination at the crusher, inserted in the core-shed on a 1 in 20 basis.
3. A core duplicate sample to monitor geological, preparation and analysis variation, inserted in the core-shed on a 1 in 20 basis.
4. A lab duplicate (2nd pulp) sample on a 1 in 20 basis to assess combined preparation and analytical variation.

Standards (OREAS 151a, OREAS 153a, OREAS 501 and OREAS 503) were sourced from *Ore Research and Exploration* (ORE) in Australia. ORE are a well-known supplier of CRMs for the mining industry. Certificates detailing the source and accepted assay values and standard deviation of the material supplied are available online from the ORE website (Ore.com.au).

All drillholes were sampled from the start to end of hole; the core was cut in half using a water lubricated diamond saw blade. Core samples were bagged in calico bags to avoid contamination or loss of fine material during transport. Sequential sample numbers were assigned and recorded on the paper drill log sheet. All the hole’s survey, logging and sampling data were captured and stored in a secure database system (Excel) on a laptop in the field and backed up by transfer to a central Access database system. All data was subject to routine validation during capture and storage. Drill log sheets, survey records and drill assay certificates are all securely filed in HPL’s (Conic) office in Brisbane.

Sample preparation at the independent laboratory consisted of the entire sample being dried, crushed and check screened to ensure that at least 80% of the crushed material passes through a 2mm screen; the entire crushed sample is riffle split to approximately 1Kg and this is pulverized in a LM2 or LM5 as a single charge with testing of the pulp to ensure that a minimum 80% is <75 microns. All the sizing tests are recorded to ensure compliance. Samples that do not pass the sizing tests are re-

crushed or re-milled until a pass is obtained. The preparation laboratory removes a 100g pulp sample directly from the LM2 which is bagged in a kraft paper envelope. The entire remaining crushed and pulped sample is retained and stored at the lab so that umpire samples may be taken if required.

The drill core assays routinely included gold by 50g fire assay and copper and 32 additional elements all determined by the ICP-MS technique. The base metal assay was by the ALS method ME-ICP61 which is a “near total” digestion using perchloric, nitric, hydrochloric and hydrofluoric acids.

Samples containing more than 0.5% copper and/or 1% zinc were re-assayed for copper and/or zinc by ALS methods CuOG46 and ZnOG46. These methods use an aqua regia digest with a conventional ICP-AES analysis.

QA for ALS is provided by replicate analysis, the insertion of control samples, the submission of samples to independent laboratories in Australia and the participation in independent proficiency testing schemes

11.3 Sample Security

Chain of custody was managed by the Star Mountains Project JV. Samples are collected and stored by the project geologists. After cutting samples were sealed into calico bags and then bulked into polyweave bags sealed with tape. The polyweave bags were shipped by air cargo to the lab. The core yard is located inside the fenced Tifalmin camp which is surrounded by 2m fencing. The gate to the camp was manned 24/7 by a watchman. Half core samples are shipped directly to ALS or Intertek Townsville by freight courier. Tracking sheets were used to track the progress of sample batches.

11.4 QAQC

No QAQC exists for the Kennecott drilling.

QAQC data exists for the HPL_AA JV and has been extracted from a Microsoft Access database ([Star Mountain_Master_DHLogging_HLP_AA_JV_10302017.accdb](#)). The standards and blanks were monitored on an ongoing basis and an annual summary was reported yearly in the EL 1312 Annual Technical Reports.

HPL’s guidelines for assay verification were as follows:

- The guideline for Standard failure is: Any Standard sample which falls outside of the mean +/- 10% range for copper or gold should be queried. If the investigation does not find a problem with Standard (i.e. wrong Standard recorded in sample log) then re-analysis should be considered.
- Re-analysis is at the discretion of the geologist, but the guideline is that any failure should trigger re-assay of all samples from the first sample after the previous passing Standard sample to the sample previous to the next passing Standard.

11.4.1 Blanks

Two different limestone blanks were used in for the Star Mountains drilling program. The Geneva Ridge limestone blank was used for the 2010–2013 drilling with the blank sourced from a quarry on the Ok Tedi mine lease. This material was chosen as it was also was being used as a blank at the Ok

Tedi mine during this period. For the drilling 2015-2017 a limestone blank was sourced from a hillside quarry hillside quarry, near Ama village in the Ilam River valley (near Tifalmin.). Neither of these materials were certified or tested prior to their being used as a blank sample but analytical results have indicated that they are ‘barren’ samples.

The copper and gold results shown in Figure 29 and Figure 30 generally show acceptable low assay results with the notable exception of one +500 ppm Cu spike and two +0.1ppm gold spikes. In all three cases the preceding samples were not notably high in copper or gold so it is unclear if those results represent carryover contamination from the previous sample or contamination of the original blank material.

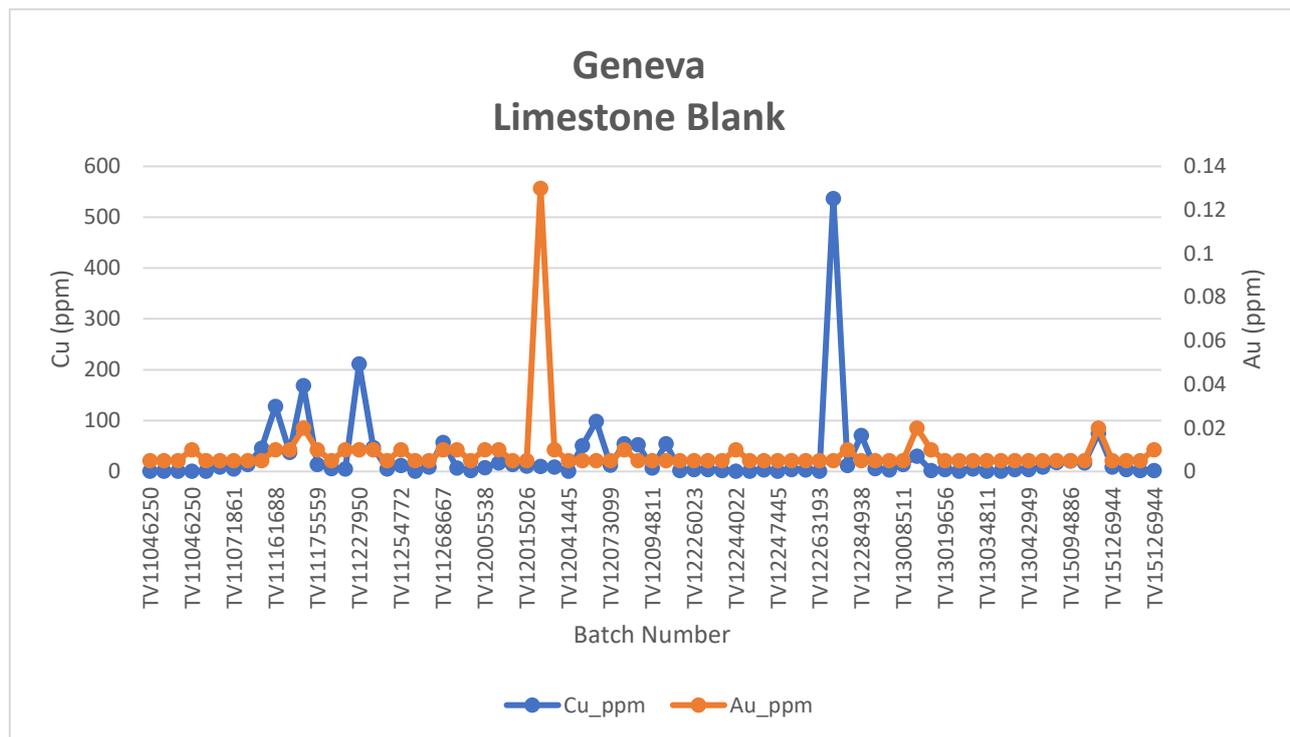


Figure 29: Geneva Limestone Blank Standard

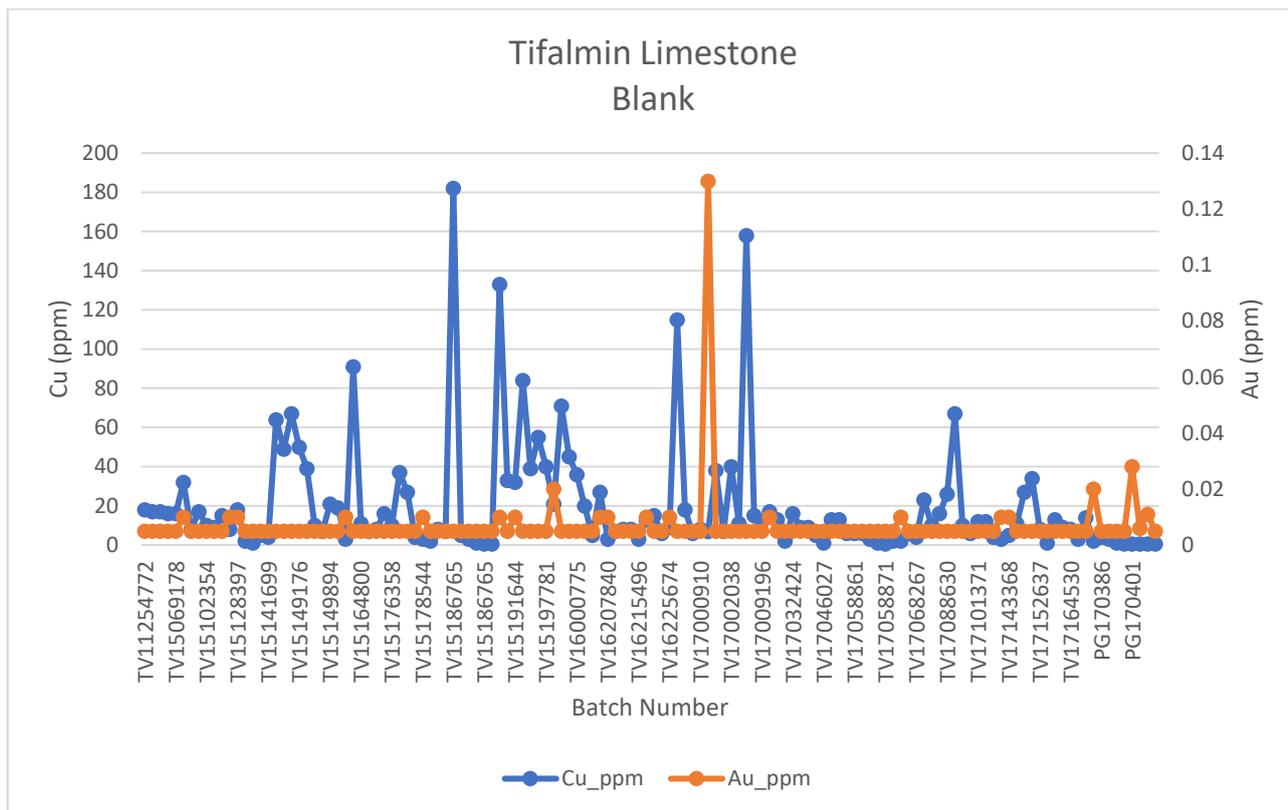


Figure 30: Tifalmin Limestone Blank Standard

11.4.2 Standards

Four different standards were employed over the course of the Star Mountains drilling programs 2010-2017. Standards OREAS 151a and OREAS 153a were used during the period 2010 to 2013 and OREAS 501 and OREAS 503 during the period 2013 to 2017.

The control graphs show the copper results for OREAS 153a and OREAS 503 generally stay within $\pm 5\%$ and always stay with the $\pm 10\%$ of the accepted standard value (Figure 31 and Figure 32).

For standard OREAS 153a, the gold assays were generally good with the exception of one failure that exceeded the -10% limit. OREAS 503 recorded two failures.

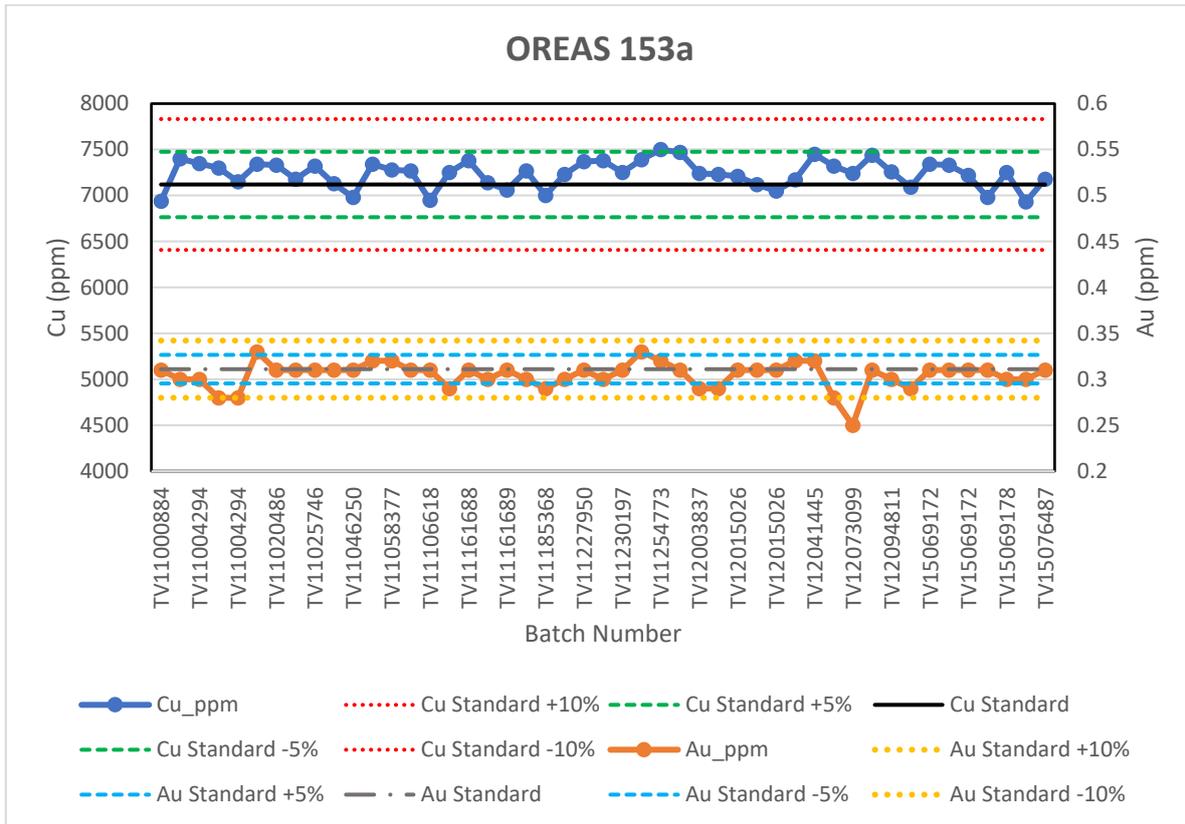


Figure 31: Copper Standard OREAS 153a

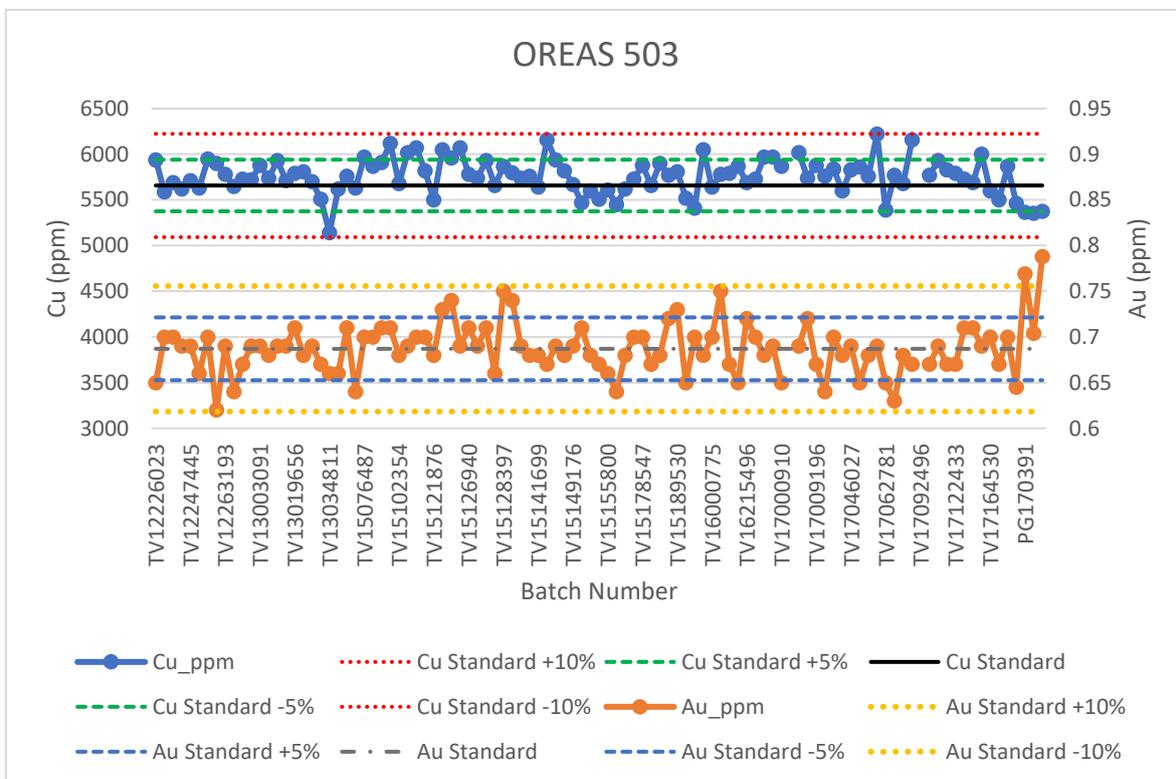


Figure 32: Copper Standard OREAS 503

Both OREAS 151a and OREAS 501 show two instances of failures where the lab assay exceeded the $\pm 10\%$ of the accepted standard value (Figure 33 and Figure 34). The Annual Reports do not indicate what if any action was taken regarding these failures.

For gold, the standard value for OREAS 151a is so low, 0.043 ppm Au, that it is close to detection limit for the 50g fire assay method used for the gold analysis.

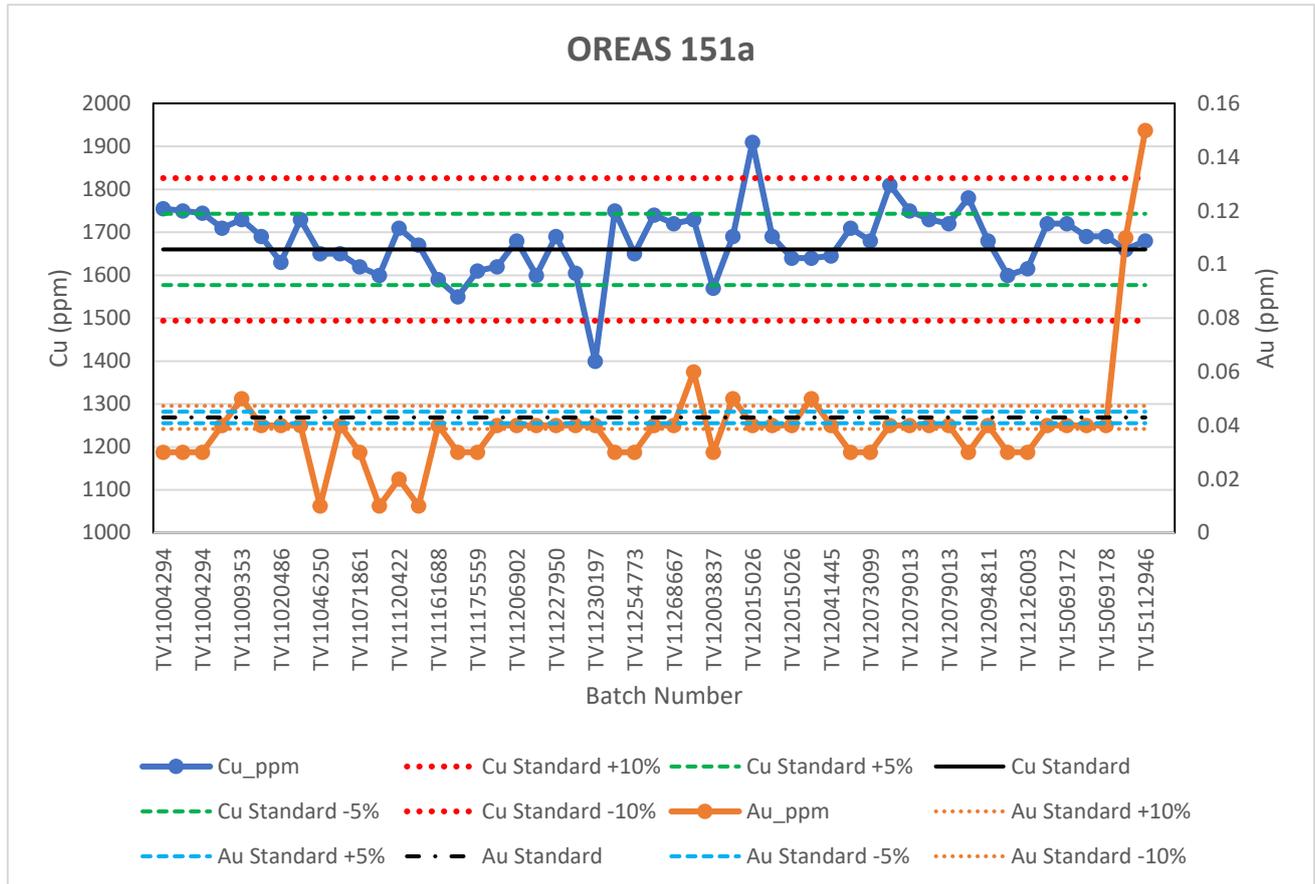


Figure 33: Copper Standard OREAS 151a

The control graph for OREAS 501 gold assays shows number of assays outside the $\pm 10\%$ limit. However, nine (9) of the values at just below the -10% are all the same value likely result from a rounding issue as the Au values (ppm) are only reported to two decimal places. The other three values represent assay failures.

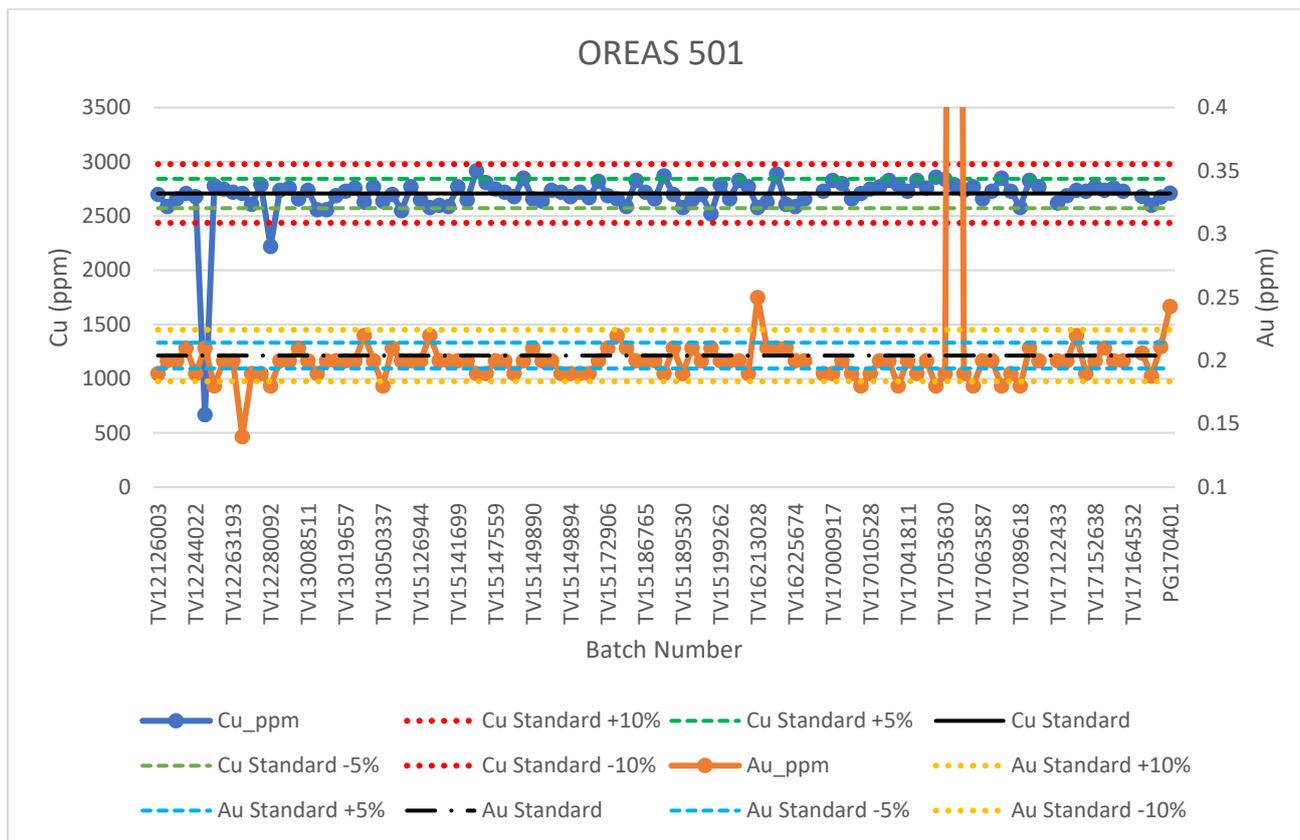


Figure 34: Copper Standard OREAS 501

The standard assay “failures” are noted in the annual technical reports but there is no report as to what if any action was taken.

11.4.3 Duplicates

Duplicate sampling consisted of collecting field duplicates from the drillcore. There is no record of any lab duplicates or second lab checks having been completed.

Duplicate samples were prepared by splitting the retained half core samples. The resulting quarter core samples were typically assayed in the same batch as the original quarter core sample. Figure 35 shows the comparison of the original half core versus the quarter core sample for copper and Figure 36 shows the comparison for gold.

As would be expected the duplicates for the copper assay show a much higher correlation than the gold assays. The 1:1 plot (black line in the figures below) indicates no strong bias in the assaying but possibly a weak positive bias for the half core samples at copper grades >7000ppm.

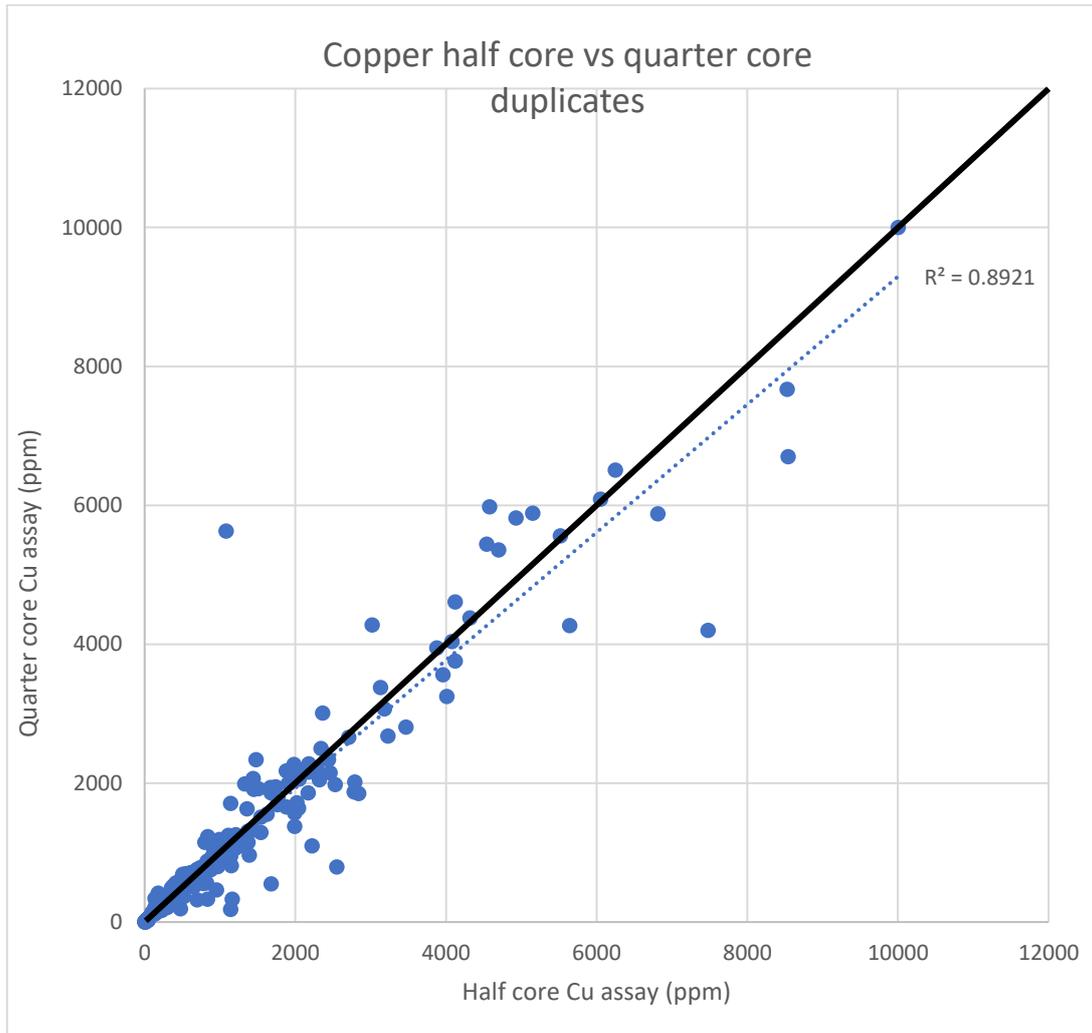


Figure 35: Field Duplicates Copper

The R^2 for gold is heavily influenced by the most extreme pair (0.14 ppm Au original vs 3.75 ppm Au quarter core). If that sample pair is removed the R^2 goes from 0.1504 to 0.649. A better plot is the 1:1 line which tends to moderate any particular bias especially if the obvious outlier sample is removed.

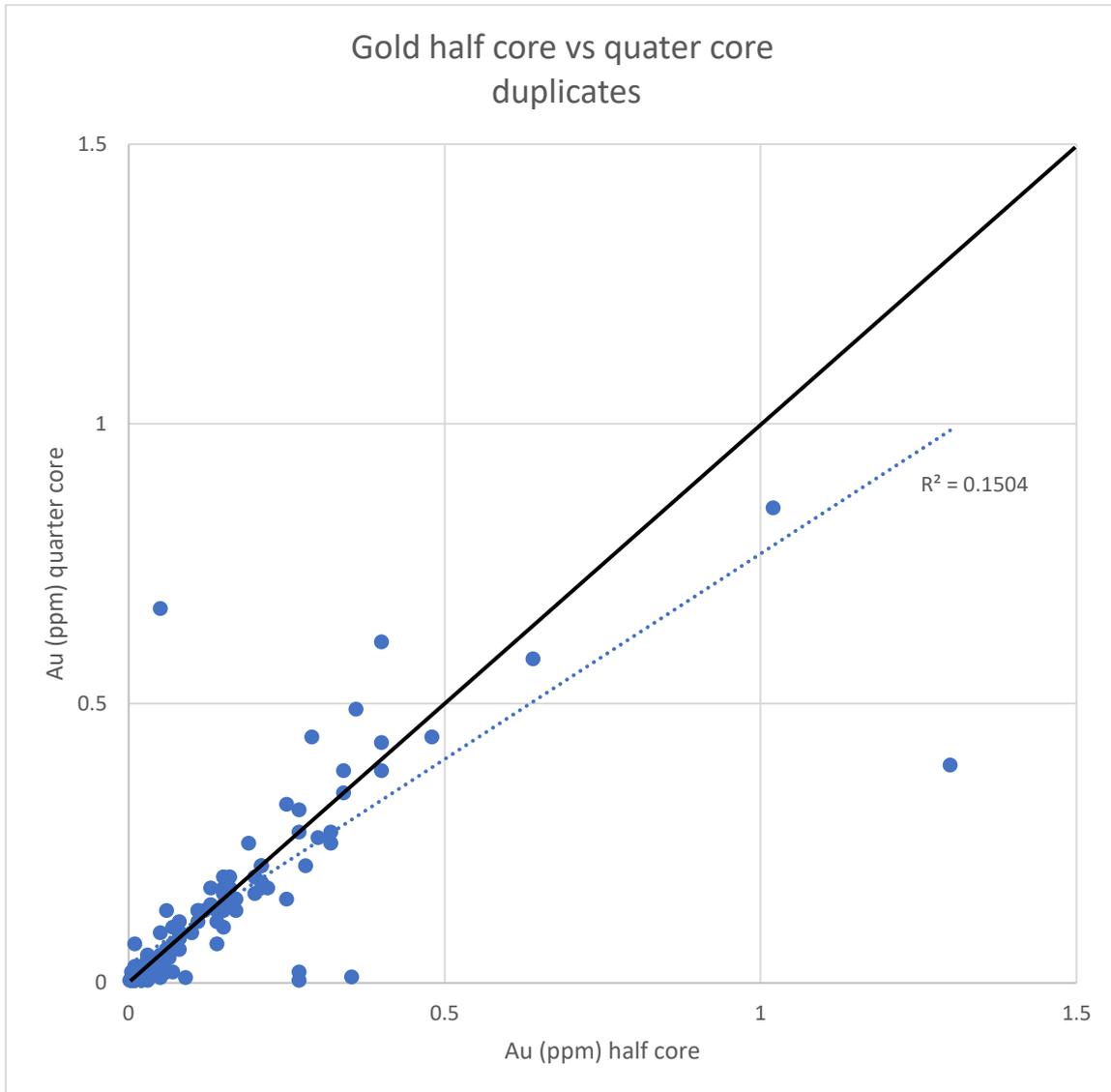


Figure 36: Field Duplicates Gold

The limited QAQC programme indicates no issues with the recent HPL-AA JV drilling.

12 Data Verification

Larry Queen completed numerous site visits to the property during the course of the drill program in his capacity as Exploration Manager for HPL. The last of these visits took place in June 2017 coinciding with the last phase of drilling.

The data supplied by Conic is suitable for geological interpretation and resource estimation detailed in this report.

Verification of the entire Star Mountains drillhole database was conducted by Simon Tear to ensure that the database is internally consistent. The data was supplied as CSV file spreadsheets ([Star Mountain Drill Hole Collar.csv](#), [Star Mountain Drill Hole Survey.csv](#), [Star Mountain Drill Hole Assay.csv](#) and [Star Mountain Drill Hole LogSheet.csv](#) dated 11-Mar-20). These were loaded into an Access database ([Star_Mts_2020.mdb](#)) with indexed fields.

A random selection of 5 drillholes from the drillhole database was made by Simon Tear (10% of total). The downhole surveys, assays and geology data for these holes were compared to original individual downhole survey files, original laboratory assay certificates and original logging digital files. A minor issue with the digital downhole surveys having some of the original dip angles as positive had been appropriately corrected in the database. A review of the assays with the hard copy assay certificates indicated no issues, and was able to confirm the standards and blank insertion rates and results.

In 2017 Simon Tear completed a data validation exercise of the Olgal drillhole subset. Minor inconsistencies were noted and repaired by HPL. The validation included checking the drill collar coordinates in relation to supplied topography, alignment of downhole surveys, the presence of duplicate sample intervals, overlapping samples, that no assays or geological logs occur beyond the end of hole and that all drilled intervals have been geologically logged. The minimum and maximum values of assays and density measurements were checked to ensure values are within expected ranges.

In 2018 this process was repeated by Arnold van der Heyden as part of the Olgal resource estimation process.

H&SC QPs have assumed that all supplied drilling data is a fair and accurate record of work completed on the deposit. Additional information on the drillhole database is included in Chapter 14.

13 Mineral Processing and Metallurgical Testing

No metallurgical testwork has been undertaken.

14 Mineral Resource Estimates

Mineral Resource estimates were generated by Arnold van der Heyden, a director and Consulting Geologist of H&SC, based in Sydney, NSW, Australia. The Mineral Resources were publicly reported by HPL to the ASX in 2018 in accordance with the 2012 JORC Code and Guidelines.

The Mineral Resources reported in this section have been classified under the 2014 CIM Definition Standards for Mineral Resources and Mineral Reserves.

14.1 Database

The effective date of the Mineral Resource Estimate (“MRE”) is February 2nd 2018, which was the date that the final database was received.

Drill hole spacing at Olgal is irregular due to the rugged terrain. Therefore, drilling is limited to a small number of accessible sites, often with two or three holes drilled in different directions from each site. Nominal drill hole spacing is around 200m.

The MRE is based on 23 diamond core holes with geology and assays, totalling 8,949m. A database summary is presented in Table 14, showing the data provided for a range of items.

Table 14: Database Summary

Item	Holes	Records
Collar	23	8,949m
Survey	23	441
Cu %	23	4,246
Au g/t	23	4,246
Ag g/t	23	4,246
Mo ppm	23	4,246
S %	23	4,246
Zn %	10	2,342
LITH1	17	1,488
LITH2	21	2,151
OXID	5	285
Density	6	164

All drill hole collars were located by hand held GPS. Due to discrepancies between collar elevations and the LiDAR survey, it was decided to assign collar elevations from the LiDAR survey.

A check of down hole surveys identified a number of readings with potentially excessive deviation (>1m in 10m) in a few holes. These intervals were flagged in the database as having dubious azimuths, so were excluded for resource estimation.

Assay data was checked for extreme or unusual values. Assays below the lower detection limit (<LDL) were set to half the detection limit. A number of samples were identified with assays above the upper detection limit (>UDL), and these were set to the upper detection limit; there were 152

sulphur assays >10%, 12 Fe assays >50% and 1 Ag assay >100ppm. No other extreme or unusual assay values were identified.

In most holes, geological logging consists of a major and minor lithology. Only five holes have logging of oxidation, although some additional information is available in the mineral (e.g. limonite and clay) and comments columns. Depleted copper and sulphur assays are also useful in identifying oxidation.

The resulting drill hole database was considered suitable for defining Mineral Resources.

14.2 Domaining

The geological interpretation of Olgal is based on the available geological logging and assays.

A basal thrust has been identified in a number of holes (7), which separates the upper mineralised sequence from barren basement. This planar feature dips at around 33°>060° (dip>direction).

A zone of oxidation has been identified on the basis of geological logging and depletion in sulphur and copper assays. The oxide zone is around 20m thick on average, and in areas without drill hole data, the topography was simply dropped by 20m vertically.

The various intrusive phases and breccias have not been separated because of uncertainties in the logging and in the relationships between the different lithologies.

Figure 37 shows a 3D view of the deposit with the major geological features and drill holes.

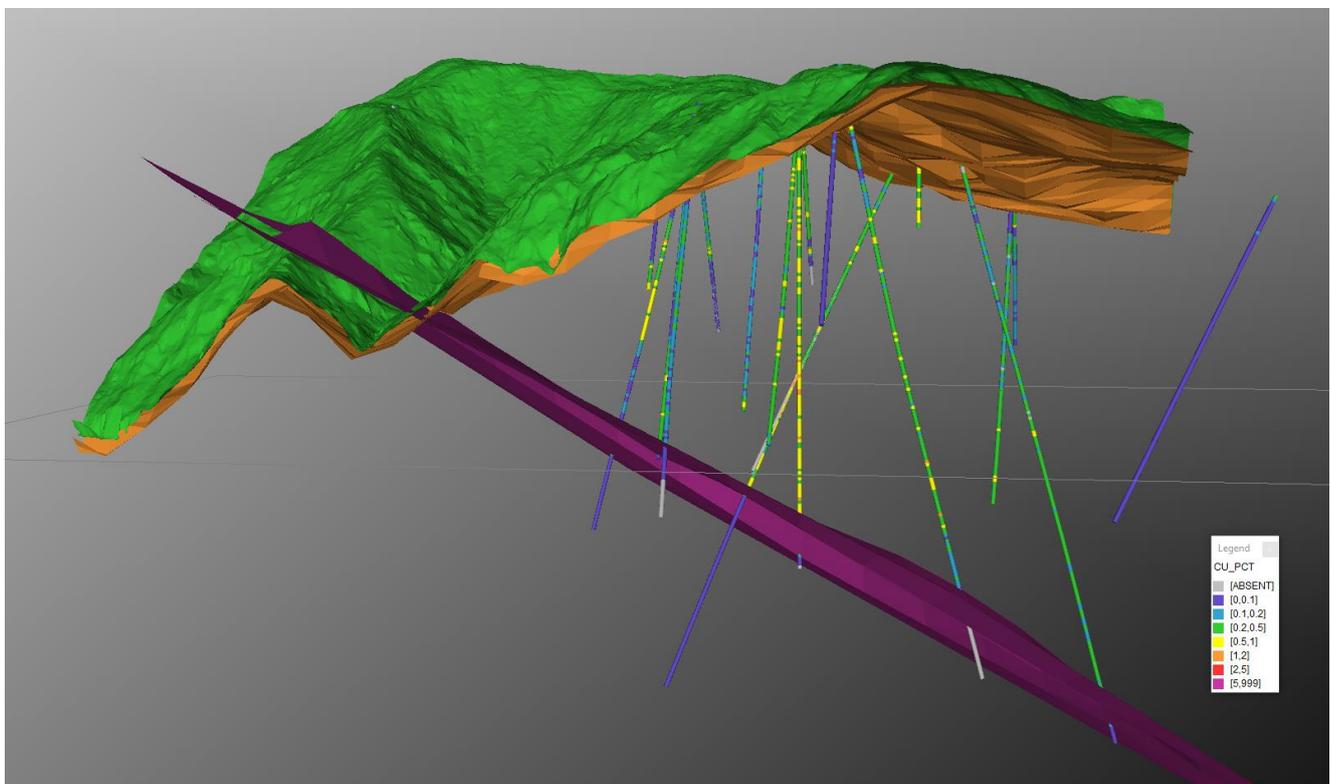


Figure 37: 3D View of Olgal, looking North

(Drill Holes coloured by Cu Grade; Topography in green; Base of Oxidation in orange; Basal Thrust in magenta)

The Olgal deposit was divided into 3 zones for data analysis and resource estimation:

- Zone 1 is the oxide zone,
- Zone 2 is the primary zone above the thrust, including both intrusives and sediments,
- Zone 3 is the sequence below the thrust, primarily sediments.

14.3 Data Analysis

Data analysis included summary statistics and variography for the estimated domains, as well as analysis of grade versus sample recovery data.

14.3.1 Core Recovery

Core recovery data is available for 99.5% of intervals with Cu assays and average core recovery is 91.3%. Sample recovery is important to ensure that there is no grade bias due to low sample recovery.

Figure 38 shows one way of approaching this type of analysis. The first graph compares average sample recovery (REC_M) and Cu grade (CU_PCT) for a range of 20 Cu grade intervals – each bin represents an equal number of samples. This graph shows that the highest recoveries are associated with the lowest grades, while higher grades are associated with lower recoveries.

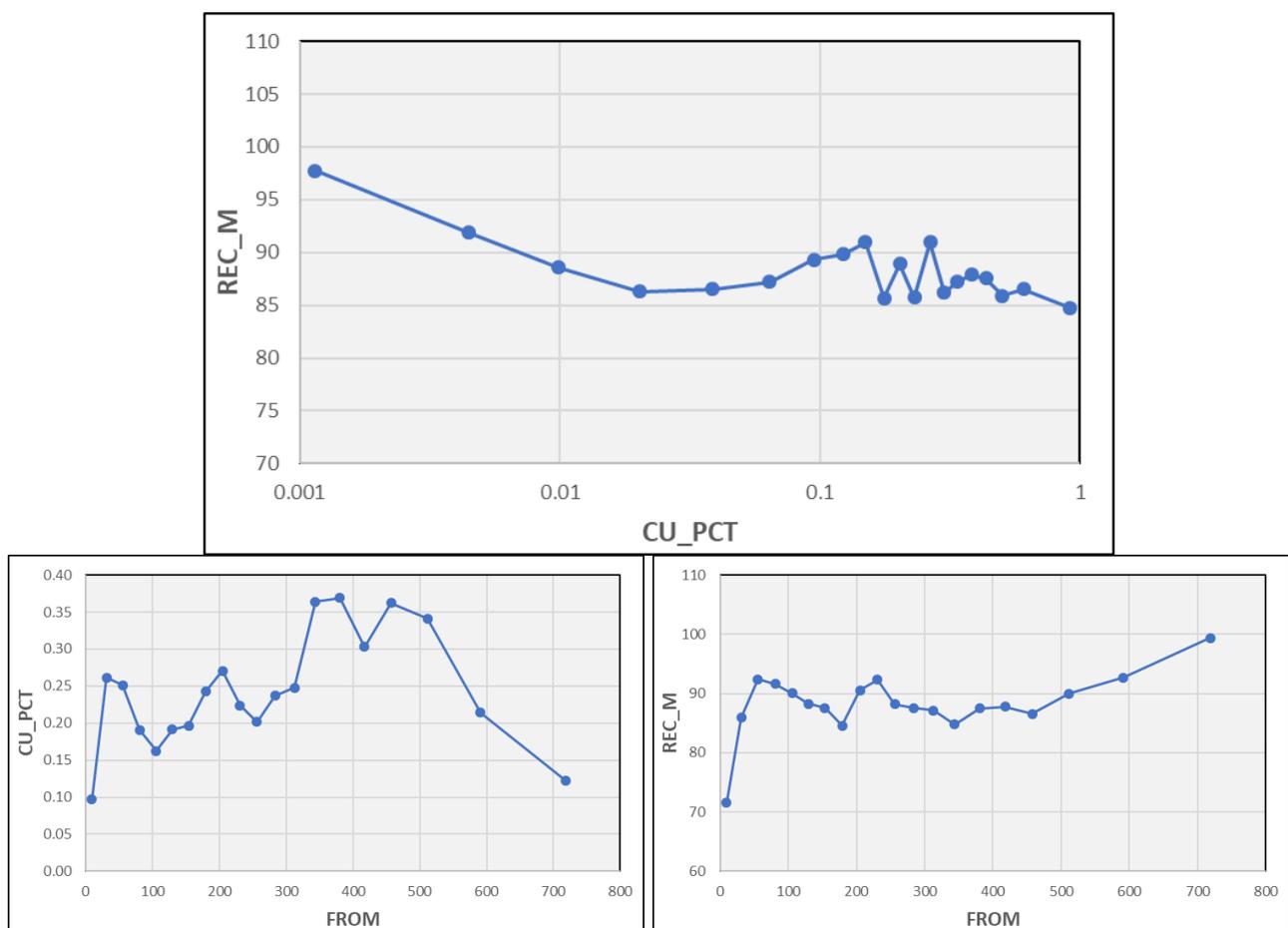


Figure 38: Grade versus Core Recovery
 (Grade versus Depth (lower left) and Recovery versus Depth (lower right))

The second and third graphs show the relationship of grade and recovery with depth (FROM). These graphs clearly show that higher recoveries and lower grades occur at depths below ~500m, which explains the trend at lower grade in the first graph.

There is no obvious relationship between recovery and grade for the remainder of the grade range, so it can be concluded that there is no obvious unexplained bias in copper grade due to low sample recovery. The same analysis for gold also shows no obvious bias.

14.3.2 Sample Length

A histogram of sample length (Figure 39) shows that the predominant sample length is 2m, so a composite length of 4m is considered appropriate given the model block size and the scale of the deposit. Samples were composited to nominal 4m intervals for analysis and estimation, within the fault-bound primary and oxide domains.

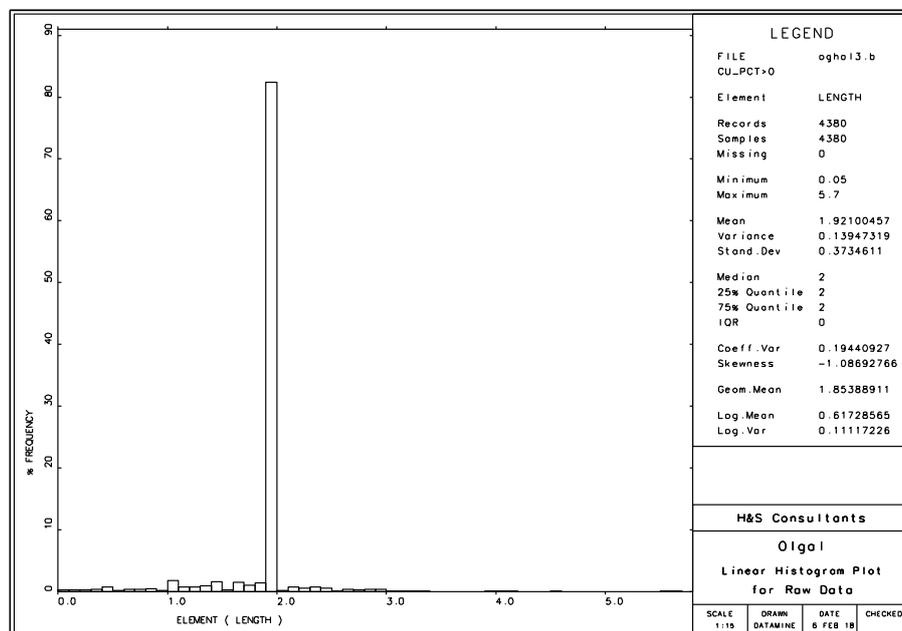


Figure 39: Histogram of Sample Length for Olgal

14.3.3 Summary Statistics

Summary statistics (Table 15) show that Cu is depleted in the oxide zone (1), while the other elements are essentially unaffected. The coefficients of variation (CV=SD/mean) are all quite low, generally below 2, which indicates that Ordinary Kriging is an appropriate estimation method.

Table 15: Summary Statistics

FIELD	ZONE	Samples	Min	Max	Mean	SD	CV
CU_PCT	1	111	0.0011	0.39	0.053	0.06	1.21
CU_PCT	2	1,896	0.0011	2.37	0.266	0.24	0.89
CU_PCT	3	119	0.0001	0.04	0.004	0.01	1.67
AU_PPM	1	111	0.005	0.52	0.111	0.11	1.01
AU_PPM	2	1,896	0.0025	5.15	0.255	0.34	1.35
AU_PPM	3	119	0.005	0.06	0.010	0.01	0.97
AG_PPM	1	111	0.10	18.1	0.884	1.91	2.16
AG_PPM	2	1,896	0.05	27.0	0.410	0.72	1.75
AG_PPM	3	119	0.25	2.4	0.276	0.20	0.71
MO_PPM	1	111	0.50	64.5	11.0	13.6	1.23
MO_PPM	2	1,896	0.30	543.0	13.4	28.1	2.10
MO_PPM	3	119	0.50	6.8	1.1	1.0	0.93

A histogram of composite Cu grades for Zone 2 (Figure 40) shows a bimodal population, with a major peak at 0.3% Cu and a smaller distribution around 0.01% Cu. However, the two populations show considerable overlap and the drill hole grades generally show a smooth gradation from low to high grades. There may be scope to further sub-divide the primary zone when the geology of the deposit is better understood.

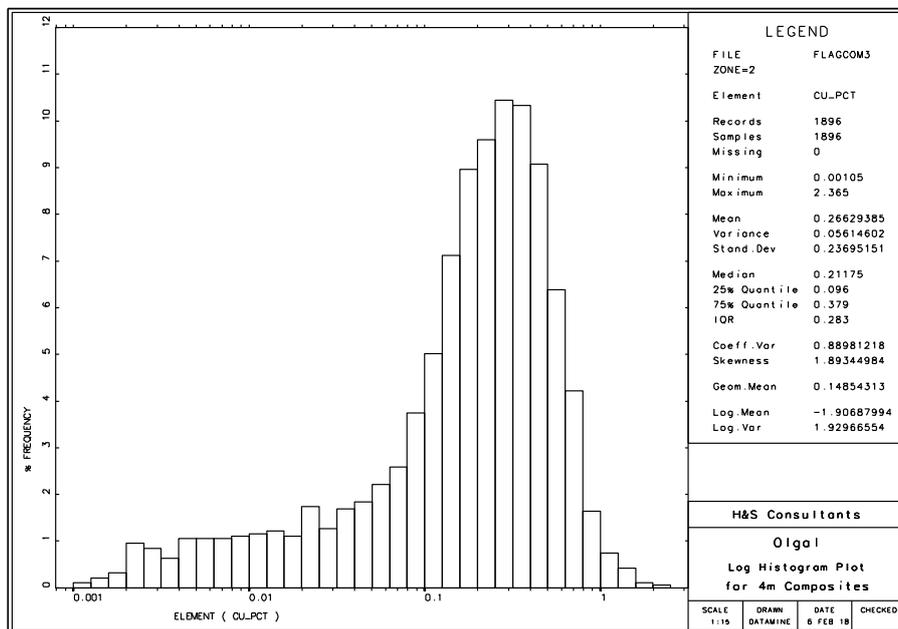


Figure 40: Histogram of Cu Grade – Zone 2

A correlation matrix (Table 16) of selected elements for the primary zone (2) shows significant correlation for a few pairs of elements (Cu-Au and Fe-S) and weak correlation for some others.

Table 16: Correlation Matrix – Zone 2

	CU_PCT	AU_PPM	AG_PPM	MO_PPM	AS_PPM	S_PCT	FE_PCT	PB_PPM	ZN_PCT
CU_PCT	1.000								
AU_PPM	0.756	1.000							
AG_PPM	0.146	0.155	1.000						
MO_PPM	0.175	0.039	0.037	1.000					
AS_PPM	-0.030	0.013	0.161	0.010	1.000				
S_PCT	0.095	0.065	0.008	0.080	0.101	1.000			
FE_PCT	0.101	0.154	0.112	-0.008	0.133	0.680	1.000		
PB_PPM	-0.060	-0.015	0.247	-0.009	0.450	-0.021	0.058	1.000	
ZN_PCT	0.004	-0.029	0.193	0.011	0.086	0.244	0.295	0.179	1.000

No potentially deleterious elements were estimated as part of this exercise. An inspection of drill holes grades shows that arsenic is low, averaging 5ppm for the deposit; Sb, Bi and Cd also appear to be very low. There is significant sulphur in the primary zone, averaging 2.4%, which could be acid-producing.

14.3.4 Variography

Variograms were generated for the elements of interest (Cu, Au, Ag and Mo). Variogram maps for Cu in Zone 2 (Figure 41) show slightly stronger continuity in the north-south direction in plan view and fairly isotropic continuity in the other planes.

Au and Ag show similar continuity to Cu, while Mo appears quite different – see Figure 42. Cu, Au and Ag are concentrated in the core of the mineralised system, while Mo tends to form a halo around the core.

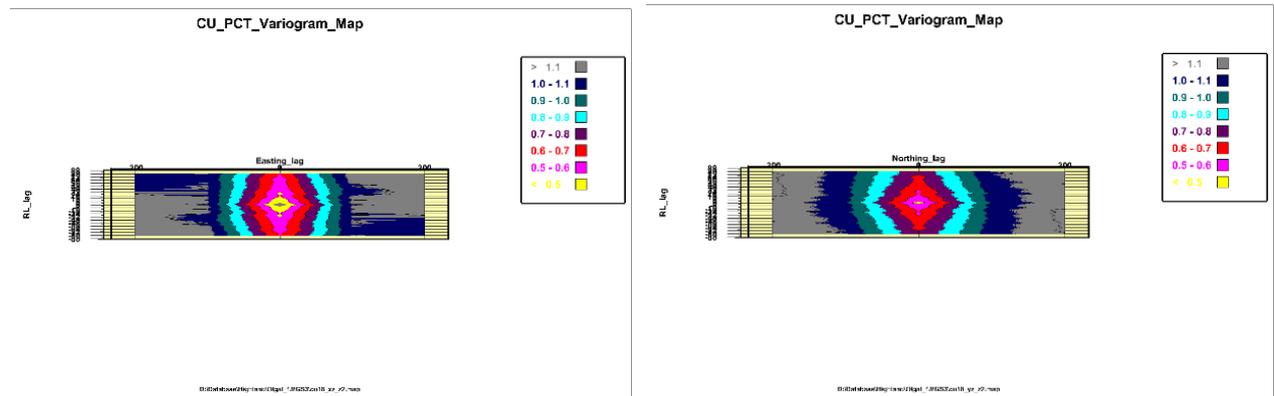
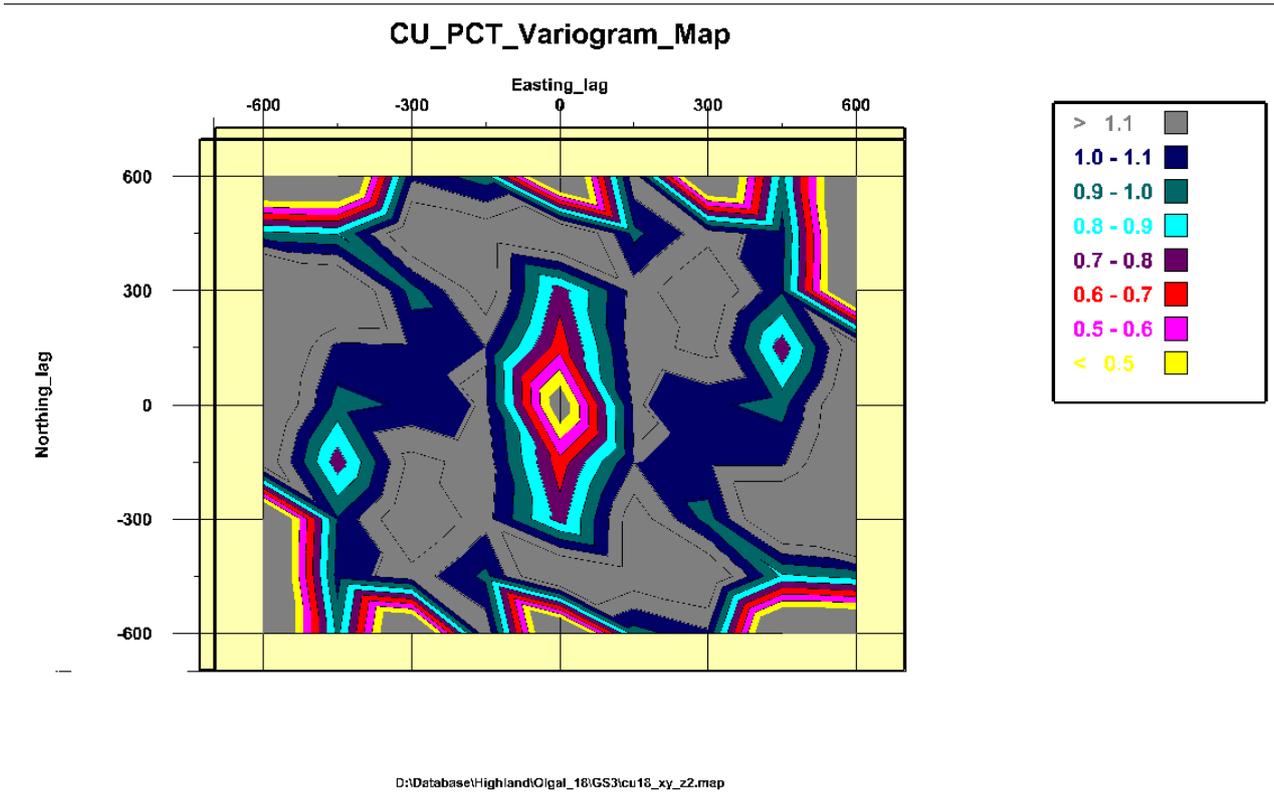


Figure 41: Variogram Maps for Copper – Zone 2

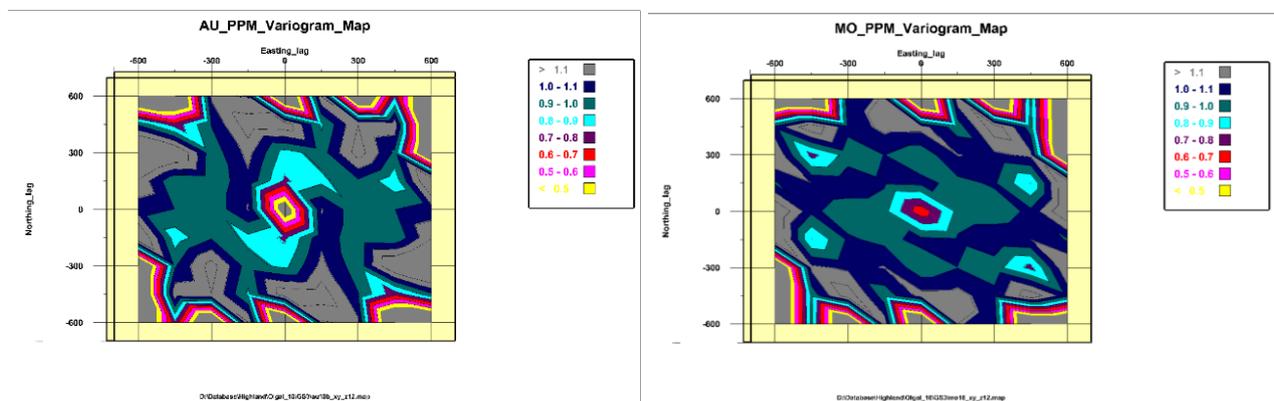


Figure 42: Variogram Maps for Au and Mo – Zones 1&2

Directional variograms were generated for each element – variograms for Cu and Au suggested a southerly plunge (dip>direction: 70°>190°), which was adopted in the variogram modelling. Figure 43 shows the directional variograms and models for Cu in Zone 2, while Table 17 shows the variogram model parameters for all four elements examined.

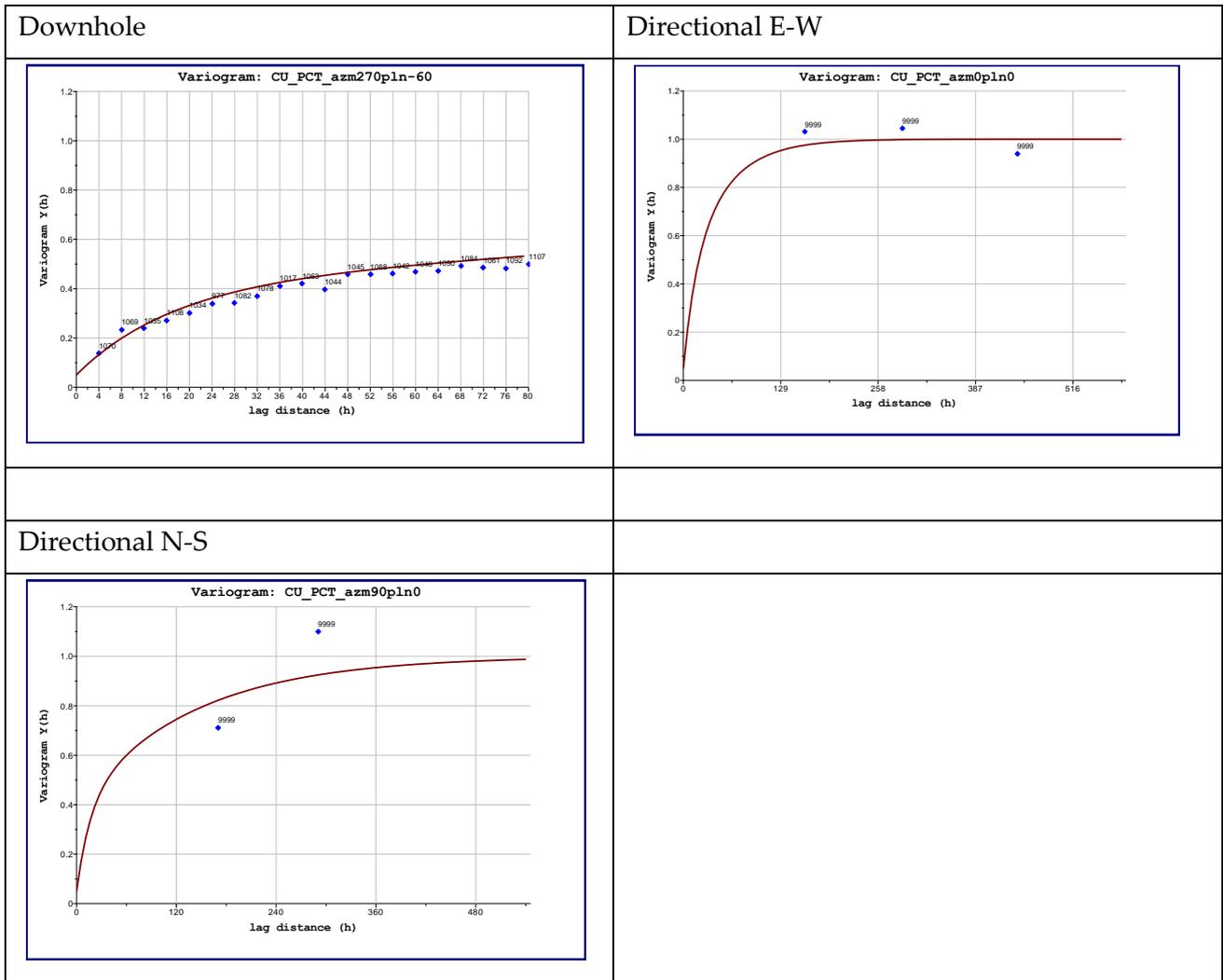


Figure 43: Variogram for Copper – Zone 2

Table 17: Variogram Model Parameters

Element	Structure	Variance	X range	Y Range	Z Range
Cu	Nugget	0.05	-	-	-
	Exp1	0.35	50	50	50
	Exp2	0.40	150	450	1200
	Exp3	0.20	150	450	1200
Au	Nugget	0.10	-	-	-
	Exp1	0.20	40	40	20
	Exp2	0.20	120	300	700
	Exp3	0.50	120	300	700
Ag	Nugget	0.20	-	-	-
	Exp1	0.50	50	50	10
	Exp2	0.20	50	120	10
	Exp3	0.10	150	300	300
Mo	Nugget	0.20	-	-	-
	Exp1	0.50	60	60	10
	Exp2	0.20	360	180	600
	Exp3	0.10	360	180	600

14.3.5 Density

Available density samples were flagged with the zone wireframes. Samples from one hole were rejected as unrepresentative of the porphyry mineralisation because it intersects peripheral sediments. A summary of density statistics for Zone 2 is presented in Table 18.

Table 18: Summary Statistics of Density Data – Zone 2

Samples	Minimum	Maximum	Mean	Median	Std.Dev
115	1.84	2.63	2.17	2.19	0.15

14.4 Estimation

14.4.1 Block Model

The Olgal block model dimensions are shown in Table 19 and the resource model block size is 50x50x20m. A block size one half to one quarter the hole spacing is considered appropriate for this type of deposit.

Table 19: Olgal Model Dimensions

Olgal 2018	X	Y	Z
Origin	539,000	9,439,700	1,300
Maximum	540,250	9,440,500	2,260
Block Size	50	50	20
Number of blocks	25	16	48
Length	1250	800	960

14.4.2 Estimation Parameters

All elements (Cu, Au, Ag, Mo) were estimated by Ordinary Kriging. This is considered appropriate because the coefficients of variation ($CV = SD/mean$) are generally low and the grades appear well structured spatially. No grade cutting was applied because no extreme values were identified.

Estimation search parameters are provided in Table 20; a three pass search strategy was used to allow classification of the resources into different confidence categories. An isotropic search was used because the variogram maps suggested that this was appropriate.

Table 20: Estimation Search Parameters

Pass	X Radius	Y Radius	Z Radius	Minimum Samples	Maximum Samples	Minimum Octants
1	120	120	120	12	32	4
2	240	240	240	12	32	4
3	240	240	240	6	32	2

The primary and oxide domains were estimated separately for Cu, but together for Au, Ag and Mo because these latter elements appear unaffected by oxidation. The oxide domain was estimated using a dynamic search parallel to the base of oxidation. The basement (zone 3) was not estimated.

No assumptions were made regarding the correlation of variables during estimation as each element is estimated independently. Some elements show some correlation in the drill hole samples, and the similarity in variogram models effectively guarantees that this correlation is preserved in the estimates.

Density was assigned to the model by applying the average value for the primary zone (Table 18); a value of 2.18 t/m³ was used, being the average of the mean and median. A nominal density of 2.00 t/m³ was applied to the oxide zone.

14.4.3 Validation

The new model was validated in a number of ways – visual comparison of block and drill hole grades, statistical analysis, examination of grade-tonnage data, and comparison with the previous model.

A visual comparison of block and drill hole grades showed good agreement in all areas examined and no obvious evidence of smearing of high grade assays into low grade areas.

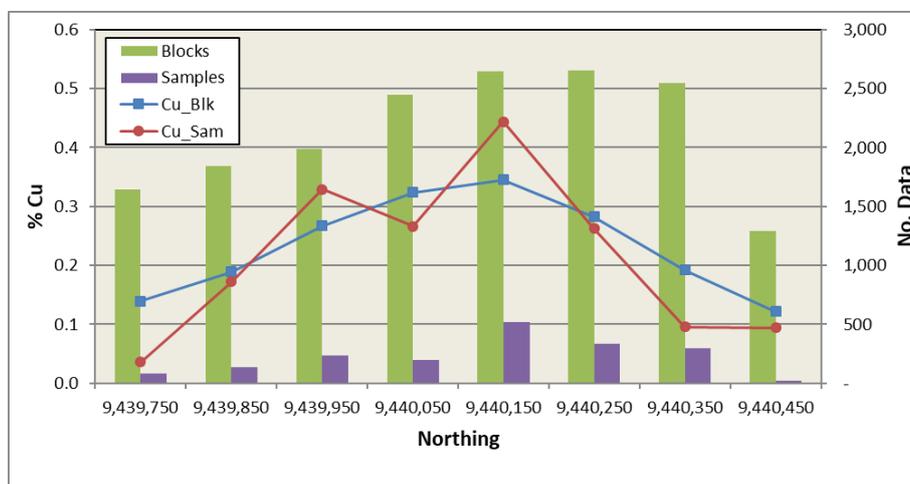
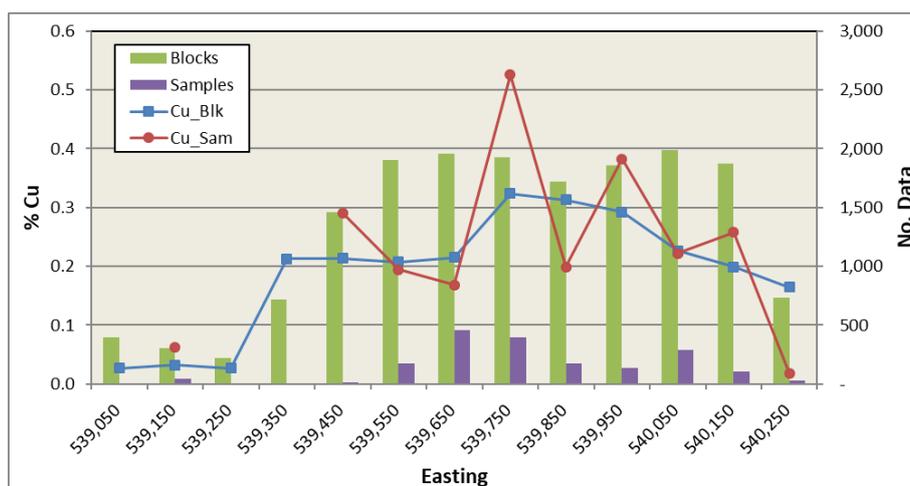
Average drill hole and model block grades for the primary zone compare well, particularly if drill hole clustering is taken into account (Table 21). Block grades are lower on average for Cu and Au because drilling is clustered in the higher grade part of the deposit; conversely, Mo grades are higher

in the model because this element is more concentrated in a broad halo surrounding the core, which is less well drilled. It would appear that Ag is more evenly distributed, with a substantial number of samples at or below the lower detection limit of 0.5ppm.

Table 21: Comparison of Average Drill Hole and Model Grades

Element	Drill Holes		Resource Model		Block/ Sample
	Samples	Grade	Blocks	Grade	
CU_PCT	1,896	0.266	16,984	0.236	89%
AU_PPM	1,896	0.255	17,084	0.224	88%
AG_PPM	1,896	0.410	17,084	0.406	99%
MO_PPM	1,896	13.4	17,084	14.5	108%

Swath plots for copper in Zone 2 are presented in Figure 44 by Easting, Northing and elevation. The sample and blocks grades show similar spatial trends and average values are comparable, allowing for smoothing in the model, clustering in the drill hole data and the generally larger volume represented by the model. The clustering of the drill holes is evident as shown by the relative differences between the numbers of samples and blocks for each increment in coordinates. The spikes in the drill hole grades are due occasional high individual sample values.



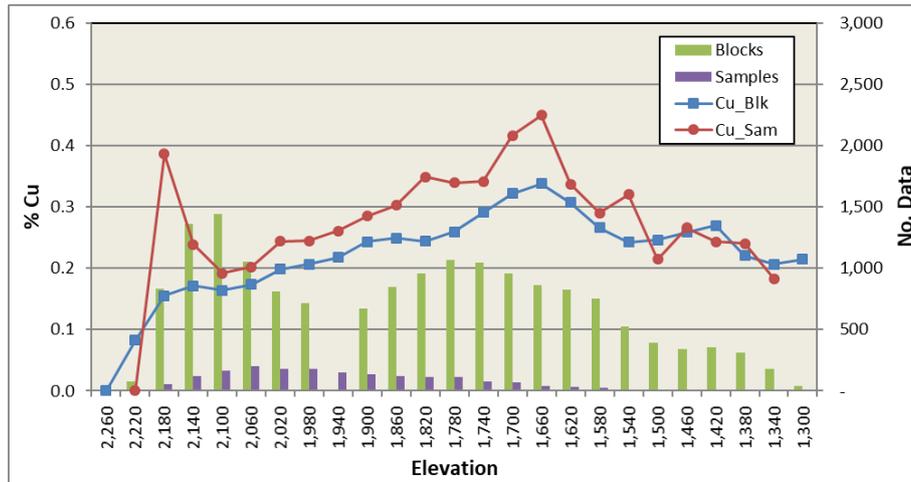


Figure 44: Swath Plots for Copper – Zone 2

14.4.4 Results

The new estimates are reported at a range of different cut-off grades by copper only, gold only and copper equivalent (Table 22, Table 23, Table 24 respectively).

The copper equivalent is based on metal prices of US\$ 3.00 /lb for copper and US\$ 1,200 /oz for gold, giving a formula of $EqCu = \% Cu + g/t Au \times 0.5833$. No metallurgical recoveries were available or assumed in this analysis. Metal equivalents are reported here to give a better indication of potential project value.

Table 22: Olgal Estimates by Copper Cut-off Grades

Cu COG	Mt	% Cu	g/t Au	g/t Ag	ppm Mo	%EqCu	Mt Cu
0.00	782	0.23	0.22	0.41	14.3	0.36	1.79
0.05	708	0.25	0.24	0.41	15.5	0.39	1.78
0.10	639	0.27	0.25	0.41	16.2	0.42	1.73
0.15	554	0.29	0.28	0.42	17.0	0.45	1.62
0.20	449	0.32	0.31	0.43	17.5	0.50	1.44
0.25	329	0.35	0.36	0.44	18.2	0.56	1.16
0.30	211	0.40	0.43	0.47	19.0	0.65	0.84
0.35	132	0.44	0.52	0.49	18.1	0.74	0.59
0.40	81	0.49	0.61	0.51	16.6	0.85	0.40
0.45	49	0.53	0.72	0.54	14.9	0.95	0.26
0.50	26	0.58	0.85	0.56	13.8	1.08	0.15

Table 23: Olgal Estimates by Gold Cut-off Grades

Au COG	Mt	g/t Au	% Cu	g/t Ag	ppm Mo	%EqCu	Moz Au
0.00	784	0.22	0.23	0.41	14.3	0.36	5.56
0.05	718	0.24	0.25	0.43	15.4	0.39	5.50
0.10	605	0.27	0.27	0.43	16.5	0.43	5.23
0.15	461	0.31	0.31	0.44	17.1	0.49	4.65
0.20	309	0.38	0.34	0.47	16.9	0.57	3.78
0.25	207	0.46	0.38	0.50	15.2	0.64	3.06
0.30	159	0.52	0.40	0.52	13.6	0.70	2.63
0.35	124	0.57	0.42	0.51	13.2	0.75	2.27
0.40	101	0.62	0.44	0.52	13.3	0.80	1.99
0.45	80	0.67	0.46	0.52	13.4	0.85	1.71
0.50	63	0.72	0.49	0.53	13.7	0.90	1.45

Table 24: Olgal Estimates by Equivalent Copper Cut-off Grades

EqCu COG	Mt	%EqCu	% Cu	g/t Au	g/t Ag	ppm Mo	Mt EqCu
0.00	782	0.36	0.23	0.22	0.4	14.3	2.80
0.10	704	0.39	0.25	0.24	0.4	15.7	2.76
0.20	579	0.44	0.29	0.27	0.4	16.8	2.58
0.30	432	0.51	0.32	0.32	0.4	17.5	2.20
0.40	275	0.60	0.37	0.40	0.5	18.0	1.65
0.50	158	0.72	0.42	0.50	0.5	16.6	1.13
0.60	101	0.81	0.46	0.60	0.5	14.5	0.82
0.70	63	0.91	0.50	0.70	0.5	14.2	0.58
0.80	39	1.02	0.54	0.82	0.5	13.9	0.40
0.90	24	1.12	0.58	0.93	0.6	14.0	0.27
1.00	17	1.20	0.61	1.01	0.6	13.9	0.20

14.4.5 Classification

The entire MRE is classified as Inferred, based on the Qualified Person's experience with similar porphyry copper deposits elsewhere. This scheme takes account a number of factors, including data distribution and the continuity of geology and grades. The MRE stated in this Technical Report have been estimated and reported in accordance with the 2014 CIM Definition Standards for Mineral Resources & Mineral Reserves.

The MRE at 0.3% Cu cut-off grade is shown in Table 25, which is the base case or preferred scenario. This comprises primary zone mineralisation only above the thrust zone; the oxide zone is depleted in copper and none of this is above cut-off grade.

Table 25: Mineral Resource Estimate at 0.3% Cu Cut-off Grade

CLASS	Mt	% Cu	g/t Au	g/t Ag	ppm Mo	%EqCu	Mt Cu
Inferred	210	0.40	0.43	0.47	19	0.65	0.84

14.4.6 Previous Estimates

H&SC had previously completed an MRE for Olgal in February 2017, which was not reported publicly. Grade-tonnage data for both the 2017 and 2018 Olgal models show similar curves (Figure 45), consistent with the smooth transition of grades in a diffuse mineralising system.

The two models are very similar, the main differences being:

- One extra low grade hole near the edge of the new model,
- A larger volume for the new model, evident in higher tonnage at low cut-off grades,
- A plunge of 70°>190° in the new variograms, while the earlier variograms were vertical.

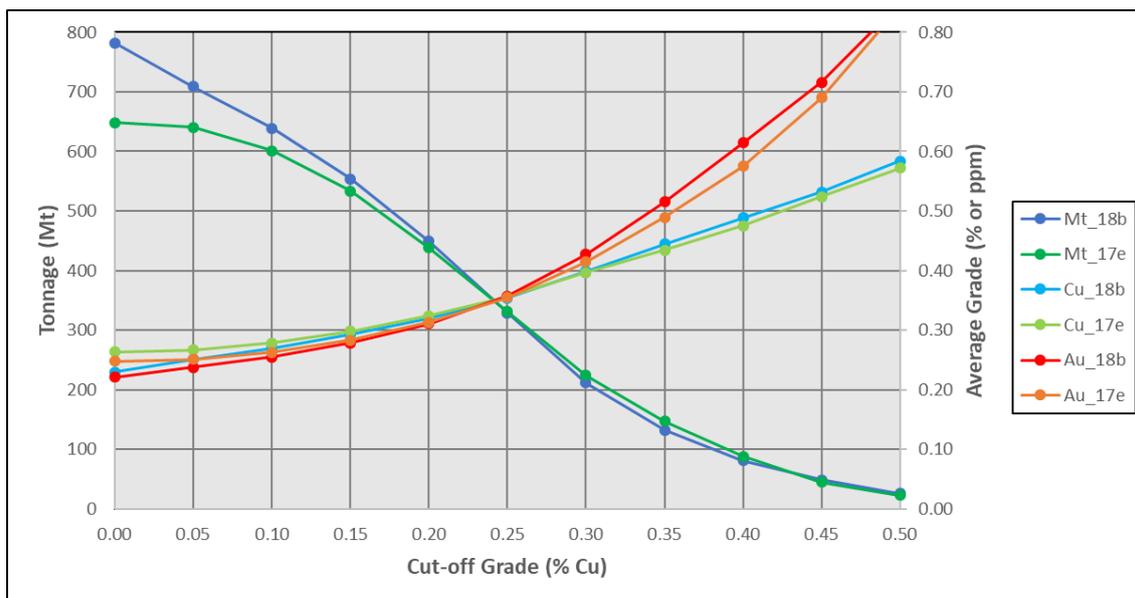


Figure 45: Grade-Tonnage Curves for 2018 and 2017 Models (2018 = 18b, 2017 = 17e)

14.4.7 Other Factors

The Qualified Person is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the potential development of the Mineral Resource Estimate.

15 Mineral Reserve Estimates

No Mineral Reserves have been generated.

16 Mining Methods

This item is not relevant to the project at this stage.

17 Recovery Methods

This item is not relevant to the project at this stage.

18 Project Infrastructure

No mining reserves have been delineated on any of the prospects and thus no project-specific infrastructure exists.

The tenements are situated in a remote and rugged part of Papua New Guinea. The Star Mountains lie at the headwaters of the Sepik River. The terrain is mountainous, high altitude limestone karst plateaus, homoclinal ridges and cuestas bounded by deeply incised valleys. Despite only being roughly 30km from the mining community of Tabubil, the physical barrier of the Hindenburg Wall has limited access to the area from the south. The closest road is to the south near Tabubil some 30 km away. There are no roads into the tenement area or within it. Access is limited to helicopter, short take-off and landing fixed-wing aircraft like a Twin Otter into the airstrip at Tifalmin and a few walking tracks from Tabubil and Tifalmin.

Telefomin is the district headquarters for the region. Services based there include the police station, hospital, administrative offices and primary, secondary and elementary schools.

The area of the tenements is lightly populated with the majority being subsistence farmers. The local people mostly live in small (<50 people) villages scattered along the valleys at the base of the steep mountains.

19 Market Studies and Contracts

This item is not relevant to the project at this stage

20 Environmental Studies, Permitting and Social or Community Impact

This item is not relevant to the project at this stage.

21 Capital and Operating Costs

This item is not relevant to the project at this stage.

22 Economic Analysis

This item is not relevant to the project at this stage.

23 Adjacent Properties

The Ok Tedi porphyry copper-gold deposit lies roughly 25km to the south of the Star Mountains tenements. Larry Queen has visited the mine many times and can confirm the copper-gold mineralisation mined at Ok Tedi is very similar to the porphyry and skarn mineralisation seen in the Star Mountains project. At the start of production in 1984, the Mineral Resource for OK Tedi was estimated at 700 Mt @ 0.63% Cu and 0.63 g/t Au (source : <http://www.portergeo.com.au/database/mineinfo.asp?mineid=mn194>). In 2018 after 34 years of production the total resource was estimated to have been 776 Mt at 0.44% and 0.52g/t Au ("*Ok Tedi Mining Limited Annual Review 2019*" which can be found at <https://oktedi.com/wp-content/uploads/2019/05/OK-Tedi-Annual-Review-2018-Web.pdf>)

24 Other Relevant Data and Information

No other information is considered relevant at this stage.

25 Interpretation and Conclusions

A substantial amount of geoscientific data exists for the Star Mountains project. Recent drilling has confirmed the presence of porphyry and skarn styles of mineralisation could exist in commercial quantities. The area is considered prospective for porphyry-style bulk tonnage mineralisation.

The large data sets seem to be substantially complete but in some cases the data is spread out over several different file versions and file formats. The GIS data in particular needs to be merged into a single format to improve integration.

The ZTEM data was interpreted in-house by Anglo American personnel. As this data offers the potential to show areas of alteration/mineralisation at depth, it would be worthwhile to have another integrated review of the ZTEM data by geophysicists familiar with this technique.

It is quite likely that a series of drill targets will emerge from this data compilation work.

At Olgal, drilling and geological mapping has allowed an estimate of an Inferred Resource. While drilling has largely closed off the resource potential to the north, east, south and at depth, to the west, toward Futik, there is some potential for an extension of the resource below and to the south of the current western line of drill holes.

At Futik there is strong evidence that there is a potential for porphyry-style mineralisation. The mineralised porphyry (equigranular diorite) has samples containing up to 3% chalcopyrite and should be targeted. HPL's previous drill holes have not adequately tested this potential.

The Unfin prospect has the largest area of surface exposed alteration of any of the prospects in the Tifalmin area. To date drilling has been limited to the northern portion of the prospect.

Drilling at Fune has demonstrated the presence of copper skarn mineralisation, developed at the contact between the Darai Limestone and the Ieru Formation. There are untested skarn targets based on ZTEM and geological interpretation from the 2017 drilling of the Darai-Ieru contact in the area between Fune and Awen. A porphyry source has not yet been identified for the skarn. Quartz vein bearing xenoliths observed in the Fune intrusives suggest the presence of an as yet untested porphyry in the area.

Mineralisation at Kum Kom appears to be concentrated in skarns formed in metasomatized limestone roof pendants surrounded by low-grade (0.1-0.2% Cu) mineralised porphyry. On this basis the potential for economic mineralisation is judged as limited. However, one untested possibility is that the skarns have locally preferentially taken up the copper mineralisation depleting the proximate porphyry as van Dongan et al. (2013) suggests occurs at Ok Tedi.

The Bumtin prospect shows geological (phyllic altered diorite intrusion), geochemical (700 x 600m), and geophysical (~30 Ohm-m conductive response) indications of a porphyry copper system. Its location near Unfin suggests it may be part of that larger system.

Mineral Resource Estimates for Olgal were generated by Arnold van der Heyden, a director and Consulting Geologist of H&SC, based in Sydney, NSW, Australia. The Mineral Resources were publicly reported by HPL to the ASX in 2018 in accordance with the 2012 JORC Code and Guidelines.

The style of mineralisation at Olgal is of the porphyry copper-type and the drill spacing and the drilling results are suitable for use in resource estimation. The entire MRE is classified as Inferred, based on the Qualified Person's experience with similar porphyry copper deposits elsewhere. This

scheme takes account a number of factors, including data distribution and data quality and the continuity of geology and copper and gold grades.

The MRE at 0.3% Cu cut-off grade is shown in Table 26. This comprises primary zone mineralisation only above the thrust zone; the oxide zone is depleted in copper and none of this is above cut-off grade. The MRE stated in this Technical Report have been estimated and reported in accordance with the 2014 CIM Definition Standards for Mineral Resources & Mineral Reserves.

Table 26: OIgal Mineral Resource Estimate

CLASS	Mt	% Cu	g/t Au	g/t Ag	ppm Mo	%EqCu	Mt Cu
Inferred	210	0.40	0.43	0.47	19	0.65	0.84

The copper equivalent is based on metal prices of US\$ 3.00 /lb for copper and US\$ 1,200 /oz for gold, giving a formula of EqCu = % Cu + g/t Au x 0.5833. No metallurgical recoveries were available or assumed in this analysis.

26 Recommendations

26.1 Regional

The existing database (GIS, Geochem, drilling, geophysics) should be audited and reviewed. Some additional compilation may be required to bring all geoscientific datasets into a manageable database and in a single appropriate coordinate system. This work may need some selective geochemical and geophysical field testing

The ZTEM survey should be further reviewed to assess potential deeper targets (Figure 46).

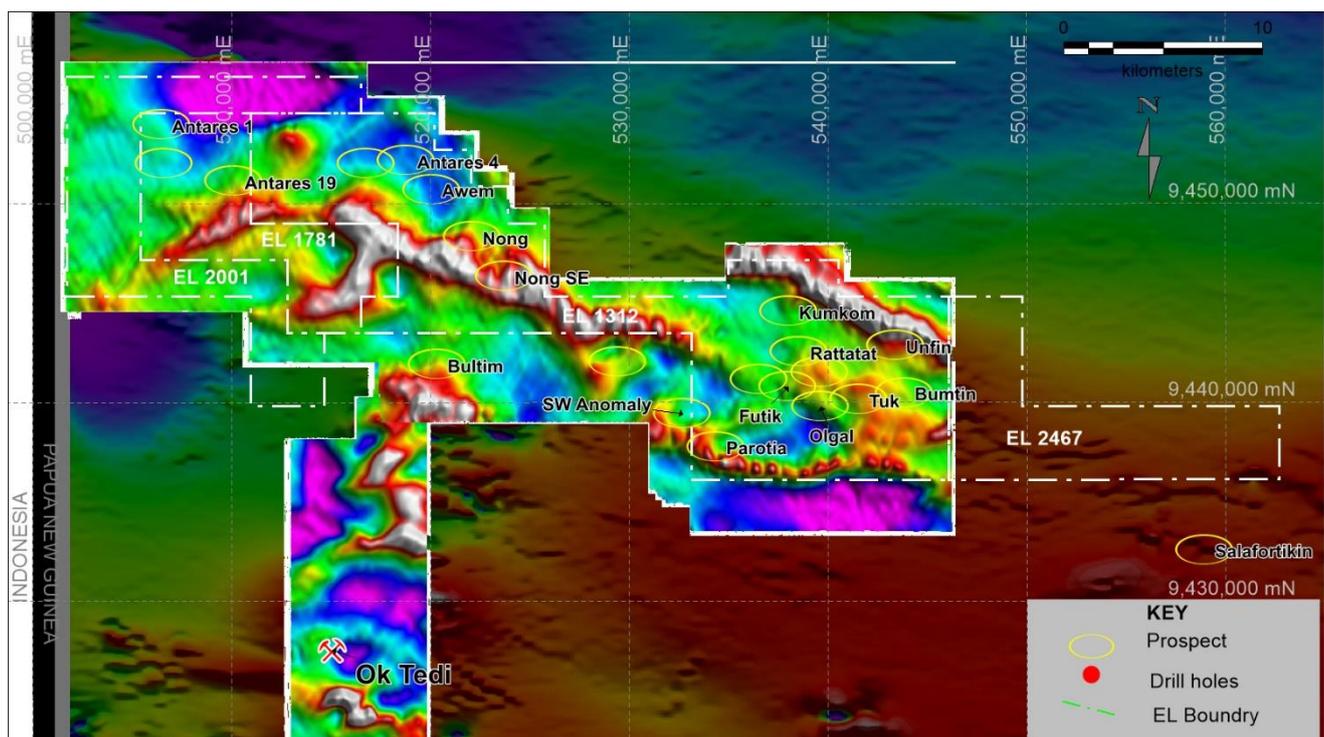


Figure 46: ZTEM Coverage showing Previously Identified Prospects and Targets.

26.2 Olgal

An assessment of the exploration potential between Olgal and Futik should be carried out with a view to define drill targets for testing the western extent of Olgal and to assess for potential skarn mineralisation.

26.3 Futik

A review of the previous drilling should look at the potential in the mineralized equigranular diorite west of hole 004FUT12. This likely to lead to a diamond drillhole target

26.4 Bumtin

A review of the data, especially the copper and gold surface geochemistry, should be undertaken in order to assess potential drill targets.

26.5 Unfin South

The two holes drilled at Unfin North demonstrated the presence of porphyry copper mineralisation. Further evaluation of this drilling may indicate possible drill targets at Unfin South where there may be a higher-grade portion of the system.

26.6 Awen-Fune

Delineation of skarn targets at the contact between the Darai Limestone and Ieru Formation needs to be undertaken. This should require some ground geophysics (ATM) follow up and is likely to yield drill targets.

A supporting budget for the above work is included at Table 27.

Table 27: Estimated Summary of Proposed Programme Costs

ITEM	COST (C\$)
Audit and review of existing data (GIS, Geochem, drilling, geophysics) aiming for target definition	30,000
ZTEM review and target assessment in conjunction with Item 1	50,000
Eight (8) week field program to map and sample Salafortikin	200,000
Four (4) week ATM program at Awen-Fune	200,000
Total	C\$480,000

27 References & Glossary

27.1 References

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27.2 Measurement Units

Symbol	Description	Symbol	Description
AUD or A\$	Australian dollars	m ³	cubic metre
'	seconds (geographic)	m ³ /hr	cubic metres per hour
"	minutes (geographic)	Mm	million metres
#	number	mm	millimetre/millimetres
%	percent	M	million
wt%	weight percent	t	metric tonne
/	per	Mt	Million tonnes
>	greater than	Kt	Kilotonnes
<	less than	t/m ³	Tonnes per cubic metre
g	gramme	t/d	tonnes per day
ppb	parts per billion	t/h	tonnes per hour
ppm	parts per million	Mt/a	million tonnes per annum
°C	degrees Celsius	t/a	tonnes per annum (tonnes per year)
ha	hectares	Ma	million years ago
km	kilometre	Ga	billion years ago
km ²	square kilometres	asl	above sea level
g/cm ³	Grams per cubic centimetre	c.	circa
kg/m ³	kilograms per cubic metre	kW	kilowatt
m	metre	pH	measure of the acidity or alkalinity of a solution

27.3 Glossary

Some of the terms given in the below are specifically defined by NI 43-101 (2011) and CIM Definition Standards (2010); where this is the case this is indicated by the source given in the right hand column. Other terms are based on definitions obtained from public domain sources and industry standard usage.

Term	Definition	Source
AAS	Atomic absorption spectrometry	Other
acceptable foreign code	The JORC Code, the PERC Code, the SAMREC Code, SEC Industry Guide 7, the Certification Code, or any other code, generally accepted in a foreign jurisdiction, that defines mineral resources and mineral reserves in a manner that is consistent with mineral resource and mineral reserve definitions and categories as defined under NI 43-101	NI 43-101
adjacent property	A property in which the issuer does not have an interest; that has a boundary reasonably proximate to the property being reported on; and that has geological characteristics similar to those of the property being reported on (NI 43-101)	NI 43-101
advanced property	A property that has mineral reserves or mineral resources for which the potential economic viability is supported by a preliminary economic assessment, a pre-feasibility study or a feasibility study	NI 43-101
AeroMag	Abbreviated term for an aeromagnetic geophysical survey. Measures variations in total magnetic field. Transport method can be fixed wing aircraft or helicopter.	Other
alluvial	Of, relating to, or found in alluvium	Other
alluvium	Unconsolidated terrestrial sediment composed of sorted or unsorted sand, gravel, and clay that has been deposited by water	Other
AMT Survey	Audio-MagnetoTellurics (AMT). An electromagnetic geophysical method for inferring the earth's subsurface electrical conductivity from measurements of natural geomagnetic and geoelectric field variation at the Earth's surface	Other
annual report	A statutory report required by national government detailing exploration work completed on a licence or licence block for a specific year.	Other
aquifer	A geologic formation capable of transmitting significant quantities of groundwater under normal hydraulic gradients	Other
auger drill	A type of drill which uses a corkscrew type bit to recover samples from unconsolidated materials	Other

argillic	A form of alteration of rocks and minerals, typically generating clay minerals; often a characteristic zone associated with porphyry style mineralisation	Other
azimuth	The direction of one object from another, usually expressed as an angle in degrees relative to true north. Azimuths are usually measured in the clockwise direction, thus an azimuth of 90 degrees indicates that the second object is due east of the first	Other
batholith	A large intrusive mass of igneous rock	Other
beneficiation	Physical treatment of crude ore to improve its quality for some specific purpose. Also called mineral processing	Other
block model	Refers to the process of creating a 3D spatial array of estimations. The parameter that is being estimated may be the thickness of the ore, the grade of the ore, or some other property that is useful for the evaluation of the resource. These estimations are based on a weighted average of the values associated with the surrounding control points. A variety of interpolation methods or “algorithms” are available for performing these estimations. A popular technique is ordinary Kriging.	Other
bulk density	is the mass per unit volume of a solid, including the voids in a bulk sample of the material	Other
calc-alkaline	Igneous rock with dominant calcium-rich feldspar	Other
chalcocite	Copper iron sulphide mineral approx 80% Cu	Other
chalcopyrite	Copper iron sulphide mineral approx 33% Cu	Other
coefficient of variation	A statistical term defined as the ratio of the standard deviation to the mean; also referred to as relative standard deviation. This provides a measure of the degree of skewness of a distribution of sample values.	Other
core recovery	Amount of rock recovered when diamond core drilling usually expressed as a percentage	Other
covellite	Copper iron sulphide mineral generally an oxidation product	Other
Cretaceous	Geological epoch from 64 to 136 million years ago	Other
cut-off grade	A grade level below which the material is not of economic interest and considered to be uneconomical to mine and process. The minimum grade of mineralisation used to establish reserves	Other
data verification	The process of confirming that data has been generated with proper procedures, has been accurately transcribed from the original source and is suitable to be used	NI 43-101
density	The mass per unit volume of a substance, commonly expressed in grams/cubic centimetre	Other

development	Often refers to the construction of a new mine or; Is the underground work carried out for the purpose of reaching and opening up a mineral deposit includes shaft sinking, cross-cutting, drifting and raising	Other
diamond drillhole	A drillhole which is drilled used a diamond impregnated bit so that a cylindrical sample of solid rock (drill core) can be recovered.	Other
dilution	Waste of low-grade rock which is unavoidably removed along with the ore in the mining process	Other
diorite	An intrusive igneous rock composed principally of the silicate minerals plagioclase feldspar (typically andesine), biotite, hornblende, and/or pyroxene.	Other
disclosure	any oral statement or written disclosure made by or on behalf of an issuer and intended to be, or reasonably likely to be, made available to the public in a jurisdiction of Canada, whether or not filed under securities legislation, but does not include written disclosure that is made available to the public only by reason of having been filed with a government or agency of government pursuant to a requirement of law other than securities legislation;	NI 43-101
drill core	The cylinder of material, normally solid rock, recovered from a diamond drillhole	Other
early stage exploration property	Under NI 43-101 this means a property for which the technical report being filed has no current mineral resources or mineral reserves defined; and no drilling or trenching proposed	NI 43-101
effective date	With reference to a technical report, this means the date of the most recent scientific or technical information included in the technical report. The effective date can precede the date of signing the technical report but if there is too long a period between these dates, the issuer is exposed to the risk that new material information could become available and the technical report would then not be current	NI 43-101& Companion Policy
encumbrance	This is a legal term covering anything that affects or limits the title of a property, such as mortgages, leases, easements, liens, or restrictions. An encumbrance may diminish the value of ownership, but does not prevent the transfer of ownership. Mortgages, taxes and judgements are encumbrances known as liens. Restrictions, easements, and reservations are also encumbrances, although not liens	Other
epithermal deposit	A mineral deposit deposited from warm waters at rather shallow depth under conditions in the lower ranges of temperature and pressure. Typically associated with surface and sub-surface volcanic activity	Other

erosion	Removal of surface material from the Earth’s crust, primarily soil and rock debris, and the transportation of the eroded materials by natural agencies from the point of removal.	Other
exploration information	Geological, geophysical, geochemical, sampling, drilling, trenching, analytical testing, assaying, mineralogical, metallurgical and other similar information concerning a particular property that is derived from activities undertaken to locate, investigate, define or delineate a mineral prospect or mineral deposit.	CIM (2010)
footwall	The wall or rock on the underside of a vein or other mineralised structure	Other
Global Positioning System GPS	A space-based global navigation satellite system that provides location and time information in all weather, anywhere on or near the Earth, where there is an unobstructed line of sight to four or more GPS satellites	Other
Differential Global Positioning System DGPS	A space-based global navigation satellite system that provides location and time information in all weather, anywhere on or near the Earth, where there is an unobstructed line of sight to four or more GPS satellites	Other
granodiorite	A granular-textured intrusive igneous rock similar to granite, but containing more plagioclase feldspar than orthoclase feldspar. Typically has less free quartz than diorite	Other
ground IP	A ground-based geophysical survey method, Induced Polarization, which measures the conductivity properties of sub-surface rock masses	Other
hanging wall	The wall or rock on the upper or top side of a vein or other mineralised structure.	Other
HeliMag	Airborne magnetic survey undertaken by using a helicopter	Other
historical estimate	An estimate of the quantity, grade, or metal or mineral content of a deposit that an issuer has not verified as a current mineral resource or mineral reserve, and which was prepared before the issuer acquiring, or entering into an agreement to acquire, an interest in the property that contains the deposit;	NI 43-101
hornfels	A fine-grained metamorphic rock composed of quartz, feldspar, mica, and other minerals, formed by the action of intrusive rock upon sedimentary rock, especially shale.	Other
hydrothermal	of or relating to hot water – used especially of the formation of minerals by hot solutions rising from a cooling magma	Other
Indicated Mineral Resource	That part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics, can be estimated with a level of confidence sufficient to allow the appropriate application of technical and economic parameters, to support mine planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and	CIM (2010)

	reliable exploration and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough for geological and grade continuity to be reasonably assumed	
Inferred Mineral Resource	That part of a Mineral Resource for which quantity and grade or quality can be estimated on the basis of geological evidence and limited sampling and reasonably assumed, but not verified, geological and grade continuity. The estimate is based on limited information and sampling gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes	CIM (2010)
initial public offering (IPO)	A corporation's first offering of stock to the public, usually by subscription from a group of investment dealers	Other
JORC Code & Guidelines	Means the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves prepared by the Joint Ore Reserves Committee of the Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia, as amended; the 2012 Code has superseded the 2004 code	NI 43-101
Jurassic	Geological epoch from 137 to 195 million years ago	Other
liberation	Freeing, by comminution, of particles of specific mineral from their interlock with other constituents of the ore	Other
lithology	The lithology of a rock unit is a description of its physical characteristics visible at outcrop, in hand or core samples or with low magnification microscopy, such as colour, texture, grain size, or composition.	Other
Measured Mineral Resource	That part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are so well established that they can be estimated with confidence sufficient to allow the appropriate application of technical and economic parameters, to support production planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough to confirm both geological and grade continuity.	CIM (2010)
mill	Includes any ore mill, sampling works, concentration, and any crushing, grinding, or screening plant used at, and in connection with, an excavation or mine	Other
mineral project	Any exploration, development or production activity, including a royalty or similar interest in these activities, in respect of diamonds, natural solid inorganic material, or natural solid	NI 43-101

	fossilized organic material including base and precious metals, coal, and industrial minerals	
Mineral Reserve	The economically mineable part of a Measured or Indicated Mineral Resource demonstrated by at least a Preliminary Feasibility Study. This Study must include adequate information on mining, processing, metallurgical, economic and other relevant factors that demonstrate, at the time of reporting, that economic extraction can be justified. A Mineral Reserve includes diluting materials and allowances for losses that may occur when the material is mined	CIM (2010)
Mineral Resource	A concentration or occurrence of diamonds, natural solid inorganic material, or natural solid fossilized organic material including base and precious metals, coal, and industrial minerals in or on the Earth’s crust in such form and quantity and of such a grade or quality that it has reasonable prospects for economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge	CIM (2010)
mineral resource estimation	see resource estimation	Other
Miocene	Geological epoch from 5.3 to 26 million years ago	Other
monzonite	A granular igneous rock containing approximately equal amounts of orthoclase and plagioclase; with less than 5% quartz by weight	Other
National Instrument 43-101	Canadian National Instrument 43-101 “Standards of Disclosure for Mineral Projects”.	NI 43-101
open pit	A mine that is entirely on the surface. Also referred to as open-cut or opencast mine	Other
Ordinary Kriging	A geostatistical approach to geological modelling. Instead of weighting nearby data points by some power of their inverted distance, ordinary kriging relies on the spatial correlation structure of the data to determine the weighting values of each sample.	Other
ore mineral	A mineral of value containing economic elements of interest. Mineral processing is aimed as separating the ore and gangue minerals contained in mineralisation	Other
overburden	Material of any nature, consolidated or unconsolidated, that overlies a deposit of ore that is to be mined	Other
oxidation	A chemical reaction in which substances combine with oxygen for form an oxide. For example, the combination of iron with oxygen to form an iron oxide (rust) or copper and oxygen produce copper oxide; the green coating on old pennies. The opposite of oxidation is reduction.	Other

PC	Panned concentrate	Other
Pliocene	Geological epoch from 2.6 to 5.3 million years ago	Other
Porphyry copper	Porphyry copper (Cu) deposits bodies of diffuse copper mineralisation that are formed from hydrothermal fluids that originate from a voluminous magma chamber several kilometres below the deposit itself. Predating or associated with those fluids are vertical insertions of porphyritic intrusive rocks.	Other
porphyritic	A textural term to describe igneous intrusive rocks where there are distinct crystals within a matrix of finer compact crystals	Other
phyllitic alteration	a hydrothermal alteration zone in a permeable rock that has been affected by circulation of hydrothermal fluids. It is commonly seen in copper porphyry ore deposits in calc-alkaline rocks; commonly expressed as a quartz-sericite-pyrite assemblage that replaces original feldspars and mafic silicates; by the removal of sodium, calcium, and magnesium usually destroying the original rock texture	Other
potassic alteration	a hydrothermal alteration zone that is commonly seen in porphyry copper deposits in calc-alkaline rocks; commonly seen as micaceous, potassic minerals such as biotite in iron-rich rocks, muscovite mica or sericite in felsic rocks, and orthoclase (adularia) alteration, often quite pervasive and producing distinct salmon-pink alteration veins.	Other
preliminary economic assessment	A study, other than a pre-feasibility or feasibility study, that includes an economic analysis of the potential viability of mineral resources. A preliminary economic assessment might be based on measured, indicated, or inferred mineral resources, or a combination of any of these. We consider these types of economic analyses to include disclosure of forecast mine production rates that might contain capital costs to develop and sustain the mining operation, operating costs, and projected cash flows	NI 43-101 & Companion Policy
preliminary feasibility study, pre-feasibility study (PFS)	A comprehensive study of a range of options for the technical and economic viability of a mineral project that has advanced to a stage where a preferred mining method, in the case of underground mining, or the pit configuration, in the case of an open pit, is established and an effective method of mineral processing is determined. It includes a financial analysis based on reasonable assumptions on mining, processing, metallurgical, economic, marketing, legal, environmental, social and governmental considerations and the evaluation of any other relevant factors which are sufficient for a Qualified Person, acting reasonably, to determine if all or part of the Mineral Resource may be classified as a Mineral Reserve	CIM (2010)

Probable Mineral Reserve	The economically mineable part of an Indicated and, in some circumstances, a Measured Mineral Resource demonstrated by at least a Preliminary Feasibility Study. This Study must include adequate information on mining, processing, metallurgical, economic, and other relevant factors that demonstrate, at the time of reporting, that economic extraction can be justified	CIM (2010)
producing issuer	An issuer with annual audited financial statements that disclose (a) gross revenue, derived from mining operations, of at least \$30 million Canadian for the issuer’s most recently completed financial year; and (b) gross revenue, derived from mining operations, of at least \$90 million Canadian in the aggregate for the issuer’s three most recently completed financial years;	NI 43-101
Professional Association	A self-regulatory organization of engineers, geoscientists or both engineers and geoscientists that fulfils certain criteria as defined in NI 43-101. The NI43-101 Companion Policy provides a list of currently recognised professional associations	NI 43-101 & Companion Policy
property	This is considered to include multiple mineral claims or other documents of title that are contiguous or in such close proximity that any underlying mineral deposits would likely be developed using common infrastructure. NI 43-101 defines two different types of properties (early stage exploration, advanced) and requires a technical report to summarize material information about the subject property.	NI 43-101 Companion Policy
propylitic alteration	a hydrothermal alteration zone that is the result of low-pressure- low-medium temperature alteration around many hydrothermal orebodies. The chemical alteration of a rock, caused by iron and magnesium bearing hydrothermal fluids removing potassium, altering biotite or amphibole within the rock groundmass. The propylitic assemblage usually consists of epidote, chlorite, Mg-Fe-Ca carbonates, quartz, pyrite and albite, altering feldspars, biotite and amphibole within the rock groundmass. It typically includes veining and breccia/fracture filling.	Other
Proven Mineral Reserve	The economically mineable part of a Measured Mineral Resource demonstrated by at least a Preliminary Feasibility Study. This Study must include adequate information on mining, processing, metallurgical, economic, and other relevant factors that demonstrate, at the time of reporting, that economic extraction is justified.	CIM (2010)
pyrrhotite	Iron sulphide mineral with the formula $Fe(1-x)S$ ($x = 0$ to 0.2). Similar in colour to pyrite but weakly magnetic.	Other
QAQC	Quality assurance and Quality control of the geological sample database.	Other
Qualified Person (QP)	Refers to a qualified person as defined under NI 43-101. In summary this means an individual who is an engineer or geoscientist with at least five years of experience in mineral	CIM (2010) & NI 43-101

	exploration, mine development or operation or mineral project assessment, or any combination of these; has experience relevant to the subject matter of the mineral project and the technical report; and is a member or licensee in good standing of a recognised professional association. A qualified person must also meet the specific requirements laid down in the more extensive definition which forms part of NI 43-101	
quantity	Either tonnage or volume, depending on which term is the standard in the mining industry for the type of mineral;	NI 43-101
Reconciliation (mine)	The process of making the block model from the resource estimate consistent or compatible with mine/mill production.	Other
resource estimation	The process of using exploration data to generate models (usually three-dimensional) of a mineral resource for use in mine planning and in quantifying the tonnage and grades of mineral resources present	Other
Reverse Circulation RC drilling	A percussion drilling technique that produces chip samples that are removed from the drillhole by compressed air pushing the sample up the inside of the drill rods. Considered superior to aircore drilling; generating better quality samples	Other
royalty	An amount of money paid at regular intervals by the lessee or operator of an exploration or mining property to the owner of the ground. Generally based on a specific amount per tonne or a percentage of the total production or profits. Also, the fee paid for the right to use a patented process	Other
run-of-mine (ROM)	A term used to describe ore of average grade for the deposit	Other
skarn	An old Swedish mining term now used to describe rocks formed around the edges of a magma body that intrudes a nearby rock mass. Rocks are formed/altered by a process of metasomatism whereby the interaction of magma, country rock and hydrothermal fluids produces hard, coarse-grained metamorphic rocks. Skarns tend to be rich in calcium-magnesium-iron-manganese-aluminium silicate minerals	Other
specific gravity	The weight of a substance compared with the weight of an equal volume of pure water at 4°C	Other
SS	Stream sediment sample	Other
Certified Reference Material (CRM)	Homogenised finely ground sample material which has been analysed at a group of different laboratories in order to provide agreed ('true') values for the grades of the certified values. Such materials can be purchased commercially and are used to provide control samples for monitoring the accuracy of analyses during evaluation sampling	Other
strike length	The horizontal distance along the long axis of a structural surface, rock unit, mineral deposit or geochemical anomaly.	Other

tailings	Material rejected from a mill after the recoverable valuable minerals have been extracted	Other
technical report	A report prepared and filed in accordance with NI 43-101 and Form 43-101F1 Technical Report that includes, in summary form, all material scientific and technical information in respect of the subject property as of the effective date of the technical report. A report may constitute a “technical report” as defined in the Instrument, even if prepared considerably before the date the technical report is required to be filed, provided the information in the technical report remains accurate and complete as at the required filing date. The qualified person is responsible for preparing the technical report. The qualified person, not the issuer, has the responsibility of determining the materiality of the scientific or technical information to be included in the technical report	Other
Tertiary	A Geological Age within the Cainozoic Era 2.6 to 65 million years ago	Other
magnetite	A hard mineral containing oxides of iron.	Other
Universal Transverse Mercator (UTM)	The Universal Transverse Mercator projection is a map projection used to define horizontal positions world-wide by dividing the surface of the Earth into 6 degree zones, each mapped by the Transverse Mercator projection with a central meridian in the centre of the zone. UTM zone numbers designate 6 degree longitudinal strips extending from 80 degrees South latitude to 84 degrees North latitude. UTM zone characters designate 8 degree zones extending north and south from the equator	Other
variogram	A function of the distance and direction separating two locations that is used to quantify dependence. The variogram is defined as the variance of the difference between two variables at two locations. The variogram generally increases with distance and is described by nugget, sill, and range parameters. If the data is stationary, then the variogram and the covariance are theoretically related to each other.	Other
variogram model	A model that is the sum of two or more component models, such as nugget, spherical, etc. Adding a nugget component to one of the other models is the most common nested model, but more complex combinations are occasionally used.	Other
wacker	A semi-mechanised deep overburden soil sampling method commonly used in PNG	Other
WGS 84	an Earth-centred, Earth-fixed terrestrial reference system and geodetic datum. Used as a universal system for geographical coordinates	Other
weathering	Disintegration or alteration of rock in its natural or original position at or near the Earth’s surface through physical,	Other

	chemical, and biological processes induced or modified by wind, water, and climate.	
wedge hole	A drillhole that is collared down a pre-existing drillhole using a drill wedging technique to deviate the drilling rods into a new, preferred direction, sometimes known as a daughter hole.	Other
written disclosure	Includes any writing, picture, map, or other printed representation whether produced, stored or disseminated on paper or electronically, including websites.	NI 43-101
ZTEM	Z-Tipper Axis Electromagnetic (ZTEM) is an airborne electromagnetic survey system which detects anomalies in the earth's natural magnetic field. These disruptions are caused by zones of rock that conduct or resist electrical current more than the surrounding rock, like ore deposits.	Other