NI 43-101 TECHNICAL REPORT ON A PRELIMINARY ECONOMIC ASSESSMENT OF THE AYAWILCA POLYMETALLIC PROJECT, PERU

Effective Date: 28 February 2024

Prepared For

Tinka Resources Limited

1305 – 1090 West Georgia Street
Vancouver, BC, Canada
V6E 3V7

Report Prepared by

srk consulting

SRK Consulting (UK) Limited
UK31961

SRK Qualified Person
Christopher Bray BEng (Mining), MAusIMM (CP)

SLR Qualified Person
Katharine M. Masun, M.Sc., MSA, P.Geo.

Transmin Qualified Person
Adam Johnston, FAusIMM (CP)

Envis Qualified Person
Donald Hickson, P.Eng.

MineFill Qualified Person
Dr. David Stone, B.Ap.Sc, Ph.D., MBA, P.Eng.(ON), P.E.(WA)

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SRK Legal Entity:		SRK Consulting (UK) Limited
SRK Address:		5th Floor Churchill House 17 Churchill Way Cardiff, CF10 2HH Wales, United Kingdom
Date:		April 2024
Project Number:		UK31961
SRK Project Director:	Neil Marshall	Corporate Consultant, Geotechnical Engineering
SRK Project Manager:	Chris Bray	Principal Consultant, Mining Engineering
Client Legal Entity:		Tinka Resources Limited
Client Address:		1305 – 1090 West Georgia Street Vancouver, V6E 3V7 BC, Canada

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SRK Consulting (UK) Limited
5th Floor Churchill House
17 Churchill Way
Cardiff CF10 2HH
Wales, United Kingdom
E-mail: enquiries@srk.co.uk
URL: www.srk.com
Tel: + 44 (0) 2920 348 150

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1 SUMMARY

1.1 Introduction

This Technical Report is a Preliminary Economic Assessment ("PEA") on the Ayawilca Polymetallic Project (the "Project"), located in central Peru, which has been prepared by a team led by SRK Consulting (UK) Limited ("SRK") for and on behalf of Tinka Resources Limited ("Tinka"), a publicly-listed company in Canada. The Technical Report includes contributions from SLR Consulting (Canada) Limited ("SLR"), Transmin Metallurgical Consultants ("Transmin"), Envis Peru S.A.C. ("Envis") and MineFill Services Incorporated ("MineFill") to disclose the results of the PEA, completed in February 2024 (the "2024 PEA"), in accordance with NI 43-101 on the Project. This report also incorporates an updated Mineral Resource estimate for the Ayawilca deposit as at January 1, 2024.

SLR was commissioned by Tinka to prepare an updated Mineral Resource estimate ("MRE") on the Ayawilca Property including for the Zinc, Silver and Tin Zones incorporating the recent drill hole information from 2022 and 2023 into the drillhole database. SLR also had responsibility for reviewing the history, geological setting and mineralization, exploration and drilling, sample preparation and analyses, and data verification in respect of the technical information compiled by Tinka.

SRK was commissioned by Tinka to prepare the mine plan, including mine geotechnical and ventilation assessment and capital and operating cost estimate. SRK reviewed the overall economic assessment prepared by Tinka to prepare the overall NI 43-101 report.

MineFill was commissioned by Tinka to prepare the paste backfill evaluation for the Project including the design criteria, paste backfill material and operations, and capital and operating cost estimation.

Transmin was commissioned by Tinka to design and manage the mineral processing and metallurgical testwork, and determine the metals recovery methods for the Project. Transmin also had responsibility for the capital and operating cost estimation for the processing plants.

Envis was commissioned by Tinka to design the surface tailings storage facility (TSF) including the site selection, conceptual design for the filtered tailings stack including operations and filter sizing selection, stack development and capital cost estimation. In addition, Envis had responsibility for hydrological studies including a conceptual hydrological and numerical model of the baseline groundwater regimen for the Project.

The effective date of this Technical Report is February 28, 2024. The Mineral Resource estimates are reported in accordance the 2014 Canadian Institute of Mining and Metallurgy definition standards for reporting Mineral Resources and Mineral Reserves (the “2014 CIM Definition Standards”), which are incorporated by reference in NI 43-101.

1.2 Property

The Project is located in central Peru (Figure 2-1), 200 km northeast of Lima within the Districts of Yanahuanca and San Pedro de Pillao, Province of Daniel Alcides Carrion, in the Department of Pasco, Peru. The Project is centred at UTM 332,400 mE 8,847,600 mN (WGS84 datum, Zone 18S) on national map sheet 21-J.

The Project consists of 59 contiguous mineral concessions covering 16,808 ha. Tinka has grouped a total of 44 claims (7,656 ha) under an operating unit denominated as the Ayawilca UEA (code: 010000120U), which covers a five-kilometre radius. The remaining 15 concessions (9,152 ha) remain as individual, contiguous mineral concessions.

The Project is held 100% by Tinka, through its wholly owned subsidiary, Tinka Resources S.A.C. The name “Tinka” is used interchangeably to refer to the parent and subsidiary companies.

1.3 Setting and Local Resources

The Project is situated on the eastern side of the Andes Mountains in central Peru. Elevations range from 3,300 metres above sea level (masl) to a maximum of about 4,459 masl at Cerro San Lorenzo near the westernmost part of the Project area. The elevation of the Ayawilca camp site is 4,200 masl, while the area covering most of the Mineral Resources is typically gently dipping and lies between 4,150 and 4,250 masl.

Vegetation is sparse above 3,800 masl. At higher elevations, there are grasses and various moss and lichens. Lower elevations are characterized by small or thorny shrubs and minor cacti, while eucalyptus trees are common.

The mean annual temperature for the Project area during daytime is 15°C; however, temperatures vary significantly with altitude and season. There is a rainy season which generally lasts from October to March, and light snow occasionally falls in the higher elevations but does not persist.

The Project is accessible by road, travelling 310 km north from Lima via the Panamerican Highway to Huaral, then by paved road to Oyón and by a well-maintained all-weather road to Yanahuanca. Cerro de Pasco, approximately 40 km from the Project, is the regional capital and an important mining supply centre. Labour in support of exploration activities can be locally sourced from the communities of San Pedro de Pillao, San Juan de Yanacocha and Huarautambo, and the town of Yanahuanca.

1.4 History

The Colquipucro area was the subject of small-scale historical mining, as evidenced by the numerous small adits, an old stone camp, and a stone chimney. Several horizontal cross-cuts, raises, and drifts, as well as a small retort used to dry silver ores, are attributed to 1920 to 1950s-era activities.

During the 1990s, Buenaventura drilled four holes in the valley area immediately to the south of Colquipucro exploring for zinc in the Pucará limestones. Gossans were also mapped, and trench sampled. In 2005, the claims lapsed and became available for staking, and Tinka staked new claims over the expired claim areas. Initially, exploration was focused on the Colquipucro silver mineralization, however focus shifted to the Ayawilca area in 2012 with the first discovery of zinc mineralization in an exploratory drill hole.

1.5 Geology and Mineralization

The Project is underlain by sedimentary and metasedimentary stratigraphy ranging from Paleozoic to Tertiary age. The entire sequence has been folded and thrusted along north-northwest trending Andean faults, while trans-Andean faults orientated northeast or east-west are interpreted as either trans-tensional or transpressional.

Upper Triassic to lower Jurassic Pucará Group limestone is the predominant host for both zinc-silver (“Zinc Zone”) and tin mineralization (“Tin Zone”) in the Project area. Pucará Group limestone is also an important host of base metal mineralization elsewhere in the region, including the mines of Cerro de Pasco and Atacocha.

Zinc-lead-silver mineralization within the Ayawilca deposit, referred to as the Zinc Zone, is predominantly hosted within limestones of the Pucará Group. The Zinc Zone mineralization is complex in form, made up of multiple lenses or “mantos”, sub-vertical “pipes”, and irregular sulphide bodies all consisting of semi-massive to massive zinc-rich sulphides. The mineralization typically consists of sphalerite-pyrite-siderite-quartz-magnetite-galena replacement of limestone and breccia matrix-infilling, with minor pyrrhotite, arsenopyrite and chalcopyrite. There are four defined areas of mineralization each modelled separately: West, South, Central, and East.

Silver-rich mineralization with accompanying lead-zinc at Ayawilca occurs on the edges of the Zinc Zone and is associated with abundant hydrothermal carbonate and quartz with minor sulphides.

Tin Zone mineralization consists of three general styles:

- Cassiterite-pyrrhotite-pyrite-marcasite-siderite mineralization hosted within a flat-dipping manto containing coarse crystalline cassiterite close to (and partly encapsulated by) the Zinc Zone mineralization at South Ayawilca.
- Cassiterite-pyrrhotite-quartz-tourmaline-chalcopyrite mineralization hosted within flat-dipping mantos typically 5 m to 10 m in thickness (up to 50 m) at or near the contact of the Pucará limestone with underlying Excelsior Formation phyllite.
- Cassiterite-pyrrhotite-quartz-chalcopyrite veinlets that intersect Excelsior Group phyllites and is a minor component of the Tin Zone mineralization.

The Colquipucro silver deposit is hosted primarily within quartz sandstones of the Middle Goyllar Formation with mineralization at or close to the surface. Silver mineralization at Colquipucro is oxidized, occurring with abundant iron oxides (goethite, jarosite) and manganese oxides in fractures and disseminations within pore spaces and fracture zones with no (or rare) sulphides.

1.6 Exploration

Tinka's work program has included geological mapping; soil, rock chip, and underground workings sampling; ground magnetic; induced polarization ("IP"); resistivity; gravity; magnetic and electromagnetic geophysical surveys; airborne geophysical surveys; core drilling; metallurgical test work; hydrological drilling; Mineral Resource estimation; preliminary mining studies; and environmental studies.

1.7 Drilling

The Project drill hole database includes 100,300 m of diamond drilling in 292 drill holes including at Ayawilca and Colquipucro. All but four holes were drilled by Tinka. Tinka used HQ (63.5 mm core diameter) and NQ (47.6 mm) sizes. All drill core from the Tinka drilling programs is stored in a gated and secured core shack facility located near the city of Huanuco, 80 km to the northeast of the Project.

During the Tinka drill programs, geologists created quick logs, logged rock quality designation ("RQD"), marked out sample intervals, and assigned sample numbers. All drill core was photographed wet on site with a digital camera before marking and transporting to the core shack for cutting and sampling. Until 2014, detailed logging of lithology, alteration, oxidization, and structure was completed by the qualified, responsible geologist on paper forms, and the paper copies were scanned and saved as digital images. Since 2015, detailed logging of lithology, alteration, oxidation and structure has been done directly into portable computers using LogChief software and uploaded into the main project dataset directly following quality control. Core recovery is generally good.

Collars were surveyed using a combination of total station and differential global positioning system ("GPS") instruments. Down hole survey methods include Reflex Maxibore II and non-magnetic gyroscope instruments. The drill hole deviation was not surveyed for the first 35 holes at the Colquipucro Silver Zone and the first 19 holes at the Zinc and Tin Zones. Given the length of these unsurveyed holes, the equipment used, drill hole spacing, and the minor deviations shown in surveyed holes, the Qualified Person ("QP") does not consider the missing downhole survey data to be an issue.

1.8 Sampling and Analysis

Tinka drill core was mostly sampled on 2 m intervals, but mineralized intervals can be shorter. Sampling was typically based on mineralization and/or geological boundaries.

Tinka has performed 7,508 density measurements in total. Samples taken prior to 2018 (1,083 in total) were sent to SGS Lima or ALS Lima for density determinations. Subsequent samples (6,425 in total) were measured by Tinka using the water immersion method on samples coated in paraffin wax. Approximately 20% of these samples (1,130 in total) were sent to ALS Lima, SGS Lima or Certimin S.A. ("Certimin") Lima for density verification.

All samples from the 2007 Colquipucro drill program and the initial drill program conducted at the Ayawilca deposit in 2011 were analyzed by Laboratorio Plenge in Lima, Peru. All samples from subsequent Ayawilca and Colquipucro deposit drill campaigns were analyzed by SGS in Lima, Peru until early in 2014.

During the 2014 drill program, all Ayawilca samples were analyzed by SGS and all Colquipucro samples were analyzed by Certimin.

All samples from the 2015 Ayawilca drill program were analyzed by SGS. Samples were analyzed by SGS and/or ALS for all subsequent Ayawilca drill programs.

All laboratories used were independent of Tinka. SGS Lima is ISO 9001:2008 and ISO 14001:2004 certified. ALS Lima is an ISO 9001:2008 certified laboratory. Certimin and Inspectorate hold ISO 9001 and ISO 17025 accreditations for selected analytical techniques. At the time of analysis, IPL held ISO 9001 accreditations. The Plenge laboratory is not certified.

Sample preparation during the Tinka programs varied slightly between laboratories and included pulverizing to 80% passing -200 mesh (Plenge), pulverizing to 95% passing -140 mesh (SGS Lima), pulverizing to 85% passing -200 mesh (Certimin and ALS Lima). Analytical methods have included multi-element inductively coupled plasma (ICP), ICP atomic emission spectroscopy (ICP-AES), mass spectrometry with ICP (ICP-MS), atomic absorption spectroscopy (AAS) and fire assay. Samples reporting values over 100 ppm Sn were sent for re-assay for tin by fusion with sodium peroxide and AAS finish (SGS) or by pressed powder technique analyzed using x-ray fluorescence (ALS).

On average, one standard or one blank was inserted by Tinka, alternately, after every 10 samples. The frequency was subsequently decreased to every 15 samples; however, after the 2017 program, Tinka reverted to inserting one control sample after every 10 samples. Samples were shipped by Tinka personnel directly to the laboratory. Tinka began submitting field duplicates as part of its quality assurance and quality control (QA/QC) program in 2015.

In the QP’s opinion, the sample preparation, analysis, and security procedures and density readings are adequate for use in the estimation of Mineral Resources.

1.9 Verification

Collars from the 2007 and 2011–2012 campaigns were originally surveyed by hand-held GPS, and then by professional surveyors in late 2011 and in 2012. Many drill holes were re-surveyed in late 2014. Since 2015 the drill collars have been survey by GPS. The QP has verified the location of several drill hole collars with a handheld GPS in 2023.

Check samples from selected pulps from the 2007 drill program were submitted to IPL, and check samples from the 2011–2013 programs were sent to ALS Lima. In 2014, Tinka re-assayed 1,220 pulp samples at Certimin that had originally been assayed at Plenge. Overall, no bias was detected from any of these programs.

Independent sampling by the QP confirms that there is significant zinc, silver and tin mineralization in the drill holes sampled. Confirmation of the zinc mineralization in the Zinc Zone was made by Ms. Masun observing numerous drill core intervals with significant sphalerite.

The QP review of the resource database included header, survey, lithology, assay, and density tables. The assay and density tables were reviewed for outliers. A visual check on the drill hole GEMS collar elevations and drill hole traces was completed. The QP compared selected assay records for silver, zinc, and lead in the resource database to the digital laboratory certificates of analysis, which were received directly from SGS Lima and Certimin. In 2016, the QP compared tin values from five SGS certificates. In 2017 and 2018, the QP compared values for the six main metals of interest to six assay certificates, three from SGS Lima and three from ALS Lima, with a focus on intervals within the resource wireframes. No discrepancies were found. In 2023, the QP reviewed the resource database in Leapfrog Geo which included header, survey, lithology, assay, and density tables. Database verification was performed using tools provided within the Leapfrog Geo software program and MS Excel to check for potential issue. No problems were identified. The QP compared the zinc, silver, tin, and lead values for all 52 assay certificates for samples taken during the 2019–2021 drilling programs. No discrepancies were identified.

1.10 Metallurgy and Processing

Processing of the zinc-rich mineralization will be through a conventional crushing and grinding circuit followed by froth flotation, concentrate thickening and filtration. Metallurgical test work indicates a zinc concentrate grading 50% zinc can be produced from Zinc and Silver Zones with 92% of the zinc in the Zinc Zone recovered to the zinc concentrate (see news release of June 5, 2019), and 87% of the zinc in the Silver Zone recovered to the zinc concentrate. The lead concentrate is expected to grade 47% lead and average 3,140 g/t silver over the LOM. Based on preliminary metallurgical test work, 45% of the silver in the Zinc Zone is expected to report to the lead concentrate and be payable, while 40% of the silver is expected to report to the zinc concentrate and not be payable. In the Silver Zone, 85% of the silver (and 85% of the lead) is expected to report as a credit to a commercial lead concentrate. The zinc concentrate is expected to be a marketable concentrate with no deleterious elements other than an iron penalty. Concentrate grade assumptions and recoveries for the principal metals in the Zinc and Silver Zones are summarized in Table 1-1 below.

Table 1-1: LOM Head Grades and Metallurgical Recoveries for the Zinc-Silver-Lead Circuit

Product	Zinc/Silver-Lead Concentrates Average Grade LOM				Metallurgical Recoveries (%)[1]		
	Zinc (%)	Lead (%)	Silver (g/t)	Av. NSR (US$/t)	Zinc	Lead	Silver
Feed grade	5.02	0.19	17.3				
Zinc Concentrate	50	0 to 0.1	0-100	99	92/87	0	40/0
Lead Concentrate	4	47	3,140[2]		0	70/85	45/85

[1] *First number relates to recovery in Zinc Zone and second number to Silver Zone*

[2] *Silver concentrate grades were calculated for the PEA and range from 897 to 5,849 g/t Ag*

The first 200,000 wmt/a of zinc concentrates are assumed to be delivered directly to a local refinery (around 90% of LOM production); the balance is assumed to be sold to refineries in east Asia. The zinc concentrate also contains high indium (around 650 ppm In) and receives a US$20/dmt credit in concentrate shipped to Asia. All of the lead-silver concentrates are assumed to be sold overseas. Off-site charges include transport costs, treatment charges, refining charges, and iron penalties at refinery are summarized below in Table 1-2.

Table 1-2: LOM Head Grades and Metallurgical Recovery for the Tin Circuit

Product	Average Grade LOM		Metallurgical Recoveries (%)	
	Tin (%)	Av. NSR (US$/t)	Tin – Coarse	Tin – Fine
Feed grade	0.92	106	90	50
Tin Concentrate	50			

Initial metallurgical testwork indicates that a tin concentrate grading 50% with 90% recovery can be produced from the high recovery (i.e., coarse tin) part of the Tin Zone, and a tin concentrate grading 50% with 50% recovery can be produced from the lower recovery (i.e., fine tin) part of the Tin Zone. The coarse tin represents 19% of the overall tin feed but is mined early in the mine plan. The tin concentrates are anticipated to have markets in Asia and therefore all of the tin concentrate produced is assumed to be shipped overseas. Off-site charges include transport, treatment charges, refining charges, and penalties at refinery and summarized below in Table 1-3.

Table 1-3: Off-Site Charges

Description	Zinc Concentrate	LeadSilver Concentrate	Tin Concentrate
Transport to Port/Local refinery	US$40/wmt	US$40/wmt	US$40/wmt
Port Charges	US$25/wmt	US$50/wmt	US$50/wmt
Shipping to overseas smelter (FOB)	US$45/wmt	US$15/wmt	US$15/wmt
Local refinery Treatment Charge (TC)	US$220/dmt	-	-
Overseas Treatment Charge (TC)	US$220/dmt	US$50/dmt	US$750/dmt
Ag Refining Charge (RC)	-	US$0.80/oz	-
Indium Credit (Overseas only)	US$20.00/dmt	-	-
Sulphur Penalty			US$75/dmt
Iron Penalty	US$7.50/dmt		0.7 units

Notes: wmt = wet metric tonne. Dmt = dry metric tonne

For lead-silver concentrates grading less than 2,500 g/t Ag, treatment charge is $150/dmt and refining charge is $1.00/oz Ag.

Approximately 60% of the tailings will be thickened and filtered for dry stack tailings disposal. The remaining 40% will be prepared as pastefill and reticulated to the underground mine to be used as structural backfill.

1.11 Mineral Resource Estimate

1.11.1 Ayawilca Deposit Mineral Resource Estimate

The updated Ayawilca Project Mineral Resource estimate for the Zinc Zone, Silver Zone, and Tin Zone is summarized in Table 1-4, Table 1-5, and Table 1-6, respectively. For the purposes of demonstrating reasonable prospects for eventual economic extraction (“RPEEE”), Mineral Resources are constrained within underground reporting shapes generated in Deswik Stope Optimizer (“Deswik.SO”) using a minimum mining width of three metres and a net smelter return (“NSR”) cut-off value (“CoV”) of $50/t for the Zinc and Silver Zones and $60/t for the Tin Zone. The CIM 2024 Definition Standards were used for classification of Mineral Resources. The Tin Zone, Zinc Zone and Silver Zone resources do not overlap.

The Zinc, Silver, and Tin Zone Mineral Resource estimates for the Ayawilca Project were updated using the drill results available to May 31, 2023. The Ayawilca drill database includes 292 drill holes totalling 100,300.4 m. An additional 35 drill holes totalling 12,216 m have been added since the previous update dated August 30, 2021. Three-dimensional (3D) wireframe models were generated using an approximate NSR cut-off value of $40/t for the Zinc Zone. For the Tin Zone, a 0.2% Sn or NSR cut-off value of $30/t was used for wireframe models. Prior to compositing to two metre lengths, high tin, silver, and lead values were capped for each zone individually. Zinc, silver, lead, tin, and indium high grade outliers were constrained during interpolation on a per domain basis. Block model grades within the wireframe models were interpolated by inverse distance cubed (“ID3”). Despite lead grades generally being low, it is assumed that lead and silver will be recovered in a lead concentrate. Density was assigned to blocks within the resource wireframes by ID3. Where density sample data was insufficient for interpolation, density values were derived from a regression equation based on the iron value of the block.

To satisfy RPEEE for an underground mining scenario, Tinka is reporting Mineral Resources within potentially mineable shapes (i.e., stopes) thereby demonstrating the spatial continuity of the mineralization. Where the potentially mineable volumes (i.e., stopes) contain smaller zones of mineralization with values below the stated cut-off, this lower grade material is included in the Mineral Resource estimate.

No Mineral Reserves have been estimated at the Project.

The Mineral Resources were classified following CIM (2014) definitions as Indicated and Inferred using drill hole spacing based criterion, mineralization continuity, and thickness. The drill hole spacing within a resource area assigned the Indicated category commonly ranges from 40 m to 70 m.

Table 1-4: Ayawilca Zinc Zone Mineral Resources as of January 1, 2024

Classification /	Tonnage	NSR	Grade				Contained Metal			
Zone	**Mt**	**US$/t**	**% Zn**	**g/t Ag**	**%Pb**	**g/t In**	**Mlb Zn**	**Moz Ag**	**Mlb Pb**	**t In**
Indicated										
South	13.8	128	6.64	19.3	0.2	120	2,020	8.6	52	1,655
West	14.5	98	5.05	13.6	0.2	64	1,618	6.3	56	927
Total Indicated	**28.3**	**113**	**5.82**	**16.4**	**0.2**	**91**	**3,638**	**14.9**	**108**	**2,582**
Inferred										
South	4.8	79	3.81	24.2	0.2	34	406	3.8	19	163
West	3.8	89	4.61	12.1	0.1	61	384	1.5	12	229
Central	9.1	85	4.39	10.6	0.2	54	878	3.1	47	486
East	13.5	81	4.13	14.4	0.2	40	1,229	6.3	55	536
Total Inferred	**31.2**	**83**	**4.21**	**14.5**	**0.2**	**45**	**2,898**	**14.6**	**133**	**1,414**

Notes:

1. *CIM (2014) definitions were followed for Mineral Resources.*
2. *The Mineral Resources have been reported within underground reporting shapes generated with Deswik Stope Optimizer using a net smelter return (NSR) cut-off value of US$50/t. For the Central Zone, Mineral Resources were reported only within underground reporting shapes that also had a Zn grade above 3%.*
3. *NSR value was based on estimated metallurgical recoveries, assumed metal prices, and smelter terms, which include payable factors, treatment charges, penalties, and refining charges. The NSR used for reporting is based on the following:*
4. *Long term metal prices of US$1.40/lb Zn, US$25/oz Ag, and US$1.10/lb Pb.*

5. *Net metallurgical recoveries of 92% Zn, 45% Ag, and 70% Pb.*
6. *The NSR value for each block was calculated using the following NSR factors: US$18.04 per % Zn, US$0.33 per gram Ag, and US$11.92 per % Pb.*
7. *The NSR value was calculated using the following formula: NSR = Zn(%)*US$18.04+Ag(g/t)*US$0.33+Pb(%)*US$11.92.*
8. *Bulk densities were assigned to blocks by interpolation and remaining blocks by regression of Fe assay data or average sample data. Averages range between 3.20 t/m^3 and 3.51 t/m^3.*
9. *Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.*
10. *Numbers may not add or multiply due to rounding.*

Table 1-5: Ayawilca Silver Zone Mineral Resources as of January 1, 2024

Classification /	Tonnage	NSR	Grade				Contained Metal			
Zone	**Mt**	**$/t**	**% Zn**	**g/t Ag**	**%Pb**	**g/t In**	**Mlb Zn**	**Moz Ag**	**Mlb Pb**	**t In**
Inferred										
Silver Zone	1.0	100	1.54	111.4	0.5	3	35	3.7	12	3

Notes:

1. *CIM (2014) definitions were followed for Mineral Resources.*
2. *The Mineral Resources have been reported within underground reporting shapes generated with Deswik Stope Optimizer using a net smelter return (NSR) cut-off value of US$50/t.*
3. *NSR value was based on estimated metallurgical recoveries, assumed metal prices, and smelter terms, which include payable factors, treatment charges, penalties, and refining charges. The NSR used for reporting is based on the following:*
4. *Long term metal prices of US$1.40/lb Zn, US$25/oz Ag, and US$1.10/lb Pb.*
5. *Net metallurgical recoveries of 77% Zn, 85% Ag, and 85% Pb.*
6. *The NSR value for each block was calculated using the following NSR factors: US$15.10 per % Zn, US$0.62 per gram Ag, and US$14.48 per % Pb.*
7. *The NSR value was calculated using the following formula: NSR = Zn(%)*US$15.10+Ag(g/t)*US$0.62+Pb(%)*US$14.48.*
8. *Bulk densities were assigned to blocks by interpolation and remaining blocks by regression of Fe assay data or average sample data. The average bulk density is 3.18 t/m3.*
9. *Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.*
10. *Numbers may not add or multiply due to rounding.*

Table 1-6: Ayawilca Tin Zone Mineral Resources as of January 1, 2024

Classification /	Tonnage	NSR	Grade	Contained Metal
Zone	**Mt**	**$/t**	**% Sn**	**Mlb Sn**
Indicated				
Tin Zone	1.4	99	0.72	22
Inferred				
Tin Zone	12.7	104	0.76	213

Notes:

1. *CIM (2014) definitions were followed for Mineral Resources.*
2. *The Mineral Resources have been reported within underground reporting shapes generated with Deswik Stope Optimizer using a net smelter return (NSR) cut-off value of US$60/t.*
3. *The NSR value was based on estimated metallurgical recoveries, assumed metal prices, and smelter terms, which include payable factors, treatment charges, penalties, and refining charges. Metal price assumption is US$12.00/lb Sn. Metal recovery assumption is 64% Sn. The NSR value for each block was calculated using the following NSR factor: US$137.30 per % Sn.*
4. *The NSR value was calculated using the following formula: US$NSR = Sn(%)*US$137.30.*
5. *Bulk densities were assigned to blocks by interpolation and remaining blocks by regression of Fe assay data or average domain sample data. The average bulk density is 3.65 t/m^3.*
6. *Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.*
7. *Numbers may not add or multiply due to rounding.*

The QP is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Ayawilca Mineral Resource estimate that are not discussed in this Report.

1.11.2 Colquipucro Mineral Resource Estimate

Colquipucro Mineral Resources are reported within a preliminary pit shell generated in Whittle software at a cut-off of 15 g/t Ag. Indicated Mineral Resources are estimated to total 7.4 Mt at an average grade of 60 g/t Ag containing 14.3 Moz Ag (Table 1-7). Inferred Mineral Resources are estimated to total 8.5 Mt at an average grade of 48 g/t Ag containing 13.2 Moz Ag. More than half the contained metal is from the high-grade lenses, at average grades greater than 100 g/t Ag. A small amount of mineralization was not captured by the Whittle shell.

Mineral Resources are contained within 10 north dipping high-grade lenses, a gently-dipping basal zone, and a low-grade halo that encompasses all high-grade lenses. Overall, the Colquipucro deposit is 550 m in the north–south direction by 380 m in the east–west direction by 75 m thick. The Colquipucro deposit is located on a topographic high and ranges between 4,160 masl to 4,360 masl elevations.

Table 1-7: Colquipucro Silver Oxide Deposit Mineral Resources – May 25, 2016

Classification/Zone	Tonnage (Mt)	Grade (g/t Ag)	Contained Metal (Moz Ag)
	Indicated		
High grade lenses	2.9	112	10.4
Low grade halo	4.5	27	3.9
Total Indicated	**7.4**	**60**	**14.3**
	Inferred		
High grade lenses	2.2	105	7.5
Low grade halo	6.2	28	5.7
Total Inferred	**8.5**	**48**	**13.2**

Notes:

1. *CIM (2014) definitions were followed for Mineral Resources.*
2. *Mineral Resources are reported within a preliminary pit shell and above a cut-off grade of 15 g/t Ag for the low grade halo and 60 g/t Ag for the high grade lenses.*
3. *The cut-off grade is based on a price of US$24/oz Ag.*
4. *Numbers may not add or multiply due to rounding.*

The QP is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Colquipucro Mineral Resource estimate that are not discussed in this Report.

1.12 Mineral Reserve Estimates

There are no Mineral Reserve estimates for the Ayawilca property.

1.13 Mining Methods

The Ayawilca deposit consists of three separate styles (“zones”) of mineralization (i.e., Zinc Zone, Tin Zone, and Silver Zone) within a square area of approximately 2 by 2 km, which commence from 150 m below the surface, to a maximum depth of around 700 meters. The Zinc Zone, consisting of sulphide-rich zinc-silver-lead mineralization comprises four separate deposits: the South, West, Central and East areas.

The upper Tin Zone comprises coarse tin mineralisation with higher process recovery and will be mined initially followed by the deeper Tin Zone which has finer tin mineralisation and a lower process recovery.

The PEA mine plan considers an owner-operator underground operation targeting a production rate of 2.0 Mtpa for the Zinc and Silver Zones, and 0.3 Mtpa for the Tin Zone for an overall run-of-mine (“ROM”) production rate of 2.3 Mtpa.

The 2024 PEA mine plan is based on the Ayawilca Mineral Resource estimate for the Zinc Zone (Table 1-4) , Silver Zone (Table 1-5) and Tin Zone (Table 1-6). The 2024 PEA mine plan includes Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be classified as Mineral Reserves, and there is no certainty that the 2024 PEA based on these Mineral Resources will be realized.

The mining method selected for the Zinc and Tin Zones is overhand longhole open stoping (“LHOS”) with paste backfill in a transverse direction which requires development across the strike of the mineralized body. This is mainly due to wider sections with a sub-vertical dip and also shallow dipping geometry of the mineralized deposits.

For the Silver Zone, longitudinal LHOS is applied due to the relative narrow width and sub-vertical dip of the mineralized body which requires development along the strike of the mineralized body.

A level spacing of 15 m is applied for the Zinc Zone (South, West and Central areas) and Tin Zone and a 20 m level spacing is applied for the Zinc Zone (East area) and Silver Zone based on the mineralized body geometries and impact of dilution. The overhand LHOS method requires working on top of (and next to in wider areas) filled stopes and between sill pillars which are recovered at a later stage on retreat.

Production is assumed to commence following 18 months of construction and commissioning. The mine plan for the Zinc and Silver Zones is based on mining a total of 41.2 million tonnes grading 5.02% Zn, 17.3 g/t Ag and 0.19% Pb over a 21-year life of mine (“LOM”) using an NSR cut-off of US$60/t. The Tin Zone is based on mining a total of 4.32 million tonnes grading 0.92% Sn over a 15-year LOM using an NSR cut-off of US$80. The mill feed will be trucked to the surface via multiple ramp systems connecting the three mine portals to the underground infrastructure and accessing production areas starting at the South and West areas of the Zinc Zone, the Silver Zone, and the high recovery area of the Tin Zone. (see Figure 16-36, Figure 16-37 and Figure 16-38).

1.14 Project Infrastructure

1.14.1 Access

There is a good existing road network from the Project to the coast of Peru. The Project lies approximately 300 km from the Port of Callao and a zinc refinery outside of Lima. The road leaving the Project is an all-weather gravel road that crosses the high central Andes for about km before joining a bitumen road to the coast and then to the Port of Callao via the Pan-American highway. The Cajamarquilla zinc refinery is situated on the eastern outskirts of the city of Lima with good access from the highway.

1.14.2 Tailings and Mine Waste Management

The tailings and mine waste concept for the Ayawilca PEA is based on a commitment to implementing best available practices and best available technologies, as described in the International Council of Mining and Metals (“ICMM”) Global Industry Standard for Tailings Management. The location of the Tailings Storage Facility (“TSF”) has been selected to minimize any potential risks for downstream areas. It is envisaged that:

- 100% of mine waste rock and 40% of tailings production will be re-used as underground mine backfill;
- On-surface tailings will be processed as filtered tailings and stacked at a secure and prepared facility. This method will reduce the environmental footprint and the risk of failure and the attendant environmental impacts, while also minimizing water consumption.
- The filtered tailings facility has been located adjacent to the process plant area, minimizing the haul distance for the tailings and reducing environmental and social impacts.

1.14.3 Power

A new electricity substation is currently under construction 4.7 km from Ayawilca by a 3rd party. The Project will include construction of a transmission line from this substation to a substation at Ayawilca. Tinka has recently received approval of a pre-operation environmental study (“EPO”) to access 220kV / 23 MW power supply through a substation at Ayawilca. Ayawilca is now planned to become connected to the national electrical grid.

1.15 Market Studies and Contracts

The expected grade of the Ayawilca zinc concentrate is 50% Zn, which is considered a medium grade zinc concentrate, and typical of concentrates from many zinc deposits in central Peru. The smelter pays for 85% of zinc content in the concentrate subject to a minimum deduction of eight units. The expected iron content of the Ayawilca deposit (~13% Fe) means that the proportion of production that can be sold to smelters in Peru and elsewhere in South America will depend on the iron content of other mines feeding those smelters at that time. Tinka has estimated that 200,000 dmt/a zinc concentrate would be sold to a local refinery in Peru, approximately 90% of the zinc production, while the rest would be shipped to Asian smelters. The Ayawilca zinc concentrate is expected to receive an iron penalty of $7.50/dmt of concentrate at the refinery. No other deleterious elements are present in the Ayawilca zinc concentrate, and no other penalties are expected.

Lead-silver concentrate from the Zinc Zone is expected to average 50% lead, while silver is expected to be in the range of 900 g/t to 5,600 g/t in the lead–silver concentrate. The smelter is assumed to pay for 95% of lead content in the concentrate subject to a minimum deduction of three units. Silver in the lead concentrate is payable at 95% silver content subject to a minimum deduction of 50 g/dmt. No penalties are expected for the lead–silver concentrate.

The Ayawilca tin concentrate is projected to average 50% tin, with 9% iron and 4.5% sulphur. Both iron and sulphur are expected to be at penalty levels. For the projected Ayawilca tin concentrate grade of 50%, 93% of the contained tin is expected to be payable.

Tinka has no current contracts for property development, mining, concentrating, smelting, refining, transportation, handling, sales and hedging, forward sales contracts or arrangements.

It is expected that when such contracts are negotiated, they would be within industry norms for similar projects in Peru.

1.16 Environmental and Social Permitting and Management

The current Ayawilca-Colquipucro-Mina Punta permit, which merges and extends the area covered by two previous permits was approved on April 24, 2023. The current EIAsd is valid for three years and eight months following Tinka's communication to DGAAM to initiate exploration activities on April 28, 2023. The expiration date is December 27, 2026. The permit can be extended.

Tinka has applied for, and received, authorizations to use surface water conduct all exploration activities to date. The current authorization was granted from January 2024 to December 2025 and can be extended for an additional two years.

Tinka has in place access and social agreements with two local communities who own surface rights at Ayawilca, and is actively negotiating a renewal of access agreements with a third community. New agreements with the communities will need to be finalised in support of any future mining operations.

The preliminary permitting strategy contemplates sequential development of engineering studies to provide sufficient information to prepare documentation required by the regulatory authorities to support mining operations. The conceptual plan assumes:

- Phase 1: Detailed Environmental Impact Assessment ("EIA") and environmental base-line assessments including water, and surveys to better understand the collective community rights; and
- Phase 2: Prior informed consent discussions with communities, application for wastewater discharge licence and beneficiation concession, and application for approval of the Mine Closure plan.

Phase 1 could take two to three years to complete, and Phase 2 could take two years to obtain all final approvals.

1.17 Capital and Operating Costs

The PEA cost estimates in this section have been completed by SRK, MineFill, Transmin, Envis and Tinka to an Association for the Advancement of Cost Engineering ("AACE") Class V estimate (-20% to -50%/+30% to +100%). The capital and operating cost estimate is based on a number of sources of data including:

- estimate of plant and equipment requirements from the technical work completed and applied to the development and mining schedule;
- estimate of consumable requirements from the technical work completed and applied to the development and mining schedule;
- benchmark data with the application of modifying factors as necessary; and
- enquiries on costs from local suppliers.

Working capital is calculated in the cashflow model and the cost for future studies, testwork and exploration activities have not been included in the estimates.

The major components of the initial capital expenditure of US$$382 million include US$89.4 million for the zinc-silver-lead processing plant, US$29.0 million for the tin processing plant, US$34.0 million for on-site infrastructure, US$56.6 million for mine equipment and underground pre-production development, US$17.8 million for site preparation of the filtered tailings storage facility and related mobile equipment, $15.5 million for the pastefill plant, $52.4 million for other surface facilities, and US$45.0 million other costs including indirects and owners costs. Contingency in the initial capital totals US$76.2 million. Total sustaining capital is $313.1 million over the 21-year mine life. The major components of sustaining capital are US$176.3 million for mining equipment (including major components and rebuilds) and materials handling, $49.8 million for mine development, ventilation and water management, US$46.0 million for tailings management. Contingency in sustaining capital totals US$40.8 million.

The estimated capital costs, over the life of the Project, are as follows in Table 1-8.

Table 1-8: Capital Cost Summary

Capital Cost Item	Units	Initial Capital	Sustaining Capital	LOM Total
Mining & mine development	US$ M	56.6	226.3	282.9
Process plant – Zn/Ag/Pb	US$ M	89.4	-	89.4
Process plant – Sn	US$ M	29.0	-	29.0
Pastefill plant	US$ M	15.5	-	15.5
Tailings	US$ M	17.8	46.0	63.7
Other surface facilities	US$ M	52.4	-	52.4
Subtotal	**US$ M**	**261.7**	**272.2**	**534.0**
Other indirects	US$ M	34.7	-	34.7
Owner’s costs	US$ M	10.3	-	10.3
Contingency	US$ M	76.2	40.8	117.0
TOTAL PROJECT	**US$ M**	**381.8**	**313.1**	**694.9**
CLOSURE COSTS	**US$ M**			**19.5**

Note: Numbers may not add due to rounding

The LOM average unit operating cost summary for the 2024 PEA is provided in Table 1-9 estimated at US$35.06/t processed for Zinc ROM and US$47.68/t processed for Tin ROM. The combined LOM average operating cost for Zinc + Tin ROM is estimated at US$36.25/t processed.

Table 1-9: Unit Operating Cost Summary for the Zinc and Tin Plants

Operating Cost Item	Units	Zinc Plant	Tin Plant	Weighted Average Zinc + Tin
Mining	US$/t processed	13.15	13.15	13.15
Backfill	US$/t processed	3.73	3.73	3.72
Sub-total (Mining+Backfill)	**US$/t processed**	**16.88**	**16.88**	**16.88**
Processing	US$/t processed	11.00	23.63	12.20
Tailings	US$/t processed	0.94	0.94	0.94
G&A	US$/t processed	6.23	6.23	6.23
TOTAL PROJECT	**US$/t processed**	**35.06**	**47.68**	**36.25**

Note: Numbers may not add due to rounding

1.18 Economic Analysis

Certain information and statements contained in this section and in the Report are “forward looking” in nature. Forward-looking statements include, but are not limited to, statements with respect to the economic and study parameters of the project; Mineral Resource estimates; the cost and timing of any development of the project; the proposed mine plan and mining methods; dilution and extraction recoveries; processing method and rates and production rates; projected metallurgical recovery rates; infrastructure requirements; capital, operating and sustaining cost estimates; product transportation costs, treatment and refining charges and penalties, the projected life of mine and other expected attributes of the project; the net present value (“NPV”) and internal rate of return (“IRR”) and payback period; financing; future metal prices; the timing of the environmental assessment process; changes to the project configuration that may be requested as a result of stakeholder or government input to the environmental assessment process; government regulations and permitting timelines; estimates of reclamation costs and obligations; environmental risks; and general business and economic conditions.

All forward-looking statements in this Report are necessarily based on opinions and estimates made as of the date such statements are made and are subject to important risk factors and uncertainties, many of which cannot be controlled or predicted.

Material assumptions regarding forward-looking statements are discussed in this Report, where applicable. In addition to, and subject to, such specific assumptions discussed in more detail elsewhere in this Report, the forward-looking statements in this Report are subject to the following assumptions:

- There being no significant disruptions affecting the development and operation of the project;
- The availability of certain consumables and services and the prices for power, diesel, and other key supplies being approximately consistent with assumptions in the Report;
- Labor and materials costs being approximately consistent with assumptions in the Report;
- The timelines for prior consultation and wet season/dry season baseline data collection being generally consistent with 2024 PEA assumptions;
- Permitting and arrangements with stakeholders being consistent with current expectations as outlined in the Report;

- All environmental approvals, required permits, licenses and authorizations will be obtained from the relevant governments and other relevant stakeholders;
- Rates of tax, royalties and other government charges, as well as amortization rates for the various capital classes, being applicable to the Project;
- The availability of financing for Tinka's planned development activities;
- The timelines for exploration and development activities on the project; and
- Assumptions made in Mineral Resource estimate and the financial analysis based on that estimate, including, but not limited to, geological interpretation, grades, commodity price assumptions, extraction and mining recovery rates, hydrological and hydrogeological assumptions, capital and operating cost estimates, product transportation costs, payables, treatment and refining costs including any penalties, and general marketing, political, business and economic conditions.

The production schedules and financial analysis annualized cash flow table are presented with conceptual years shown. Years shown in these tables are for illustrative purposes only. If additional mining, technical, and engineering studies are conducted, these may alter the project assumptions as discussed in this Report and may result in changes to the calendar timelines presented.

The 2024 PEA includes Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves, and there is no certainty that the 2024 PEA based on these Mineral Resources will be realized. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

The financial analysis was carried out using discounted cash flow ("DCF") methodology. Net annual cash flows were estimated projecting revenues, costs (such as capital and operating costs, realization costs, royalties and taxes) and changes in working capital. These annual cash flows were discounted back to the date of beginning of capital expenditure at mid-year -3 and summed to determine the NPV of the Project at selected discount rates. A discount rate of 8% was used as the base case discount rate. In addition, the IRR (the discount rate that yields an NPV of zero), the payback period (the estimated time from the start of production until initial capital expenditures have been recovered), the economic payback period (the estimated time from the start of production until the NPV at 8% reaches zero), were also estimated. All monetary amounts are presented in constant Q4-2023 US$. For discounting purposes, cash flows are assumed to occur at the end of each period. Revenue is recognized at the time of production.

It is assumed that the first 200,000 wmt of annual production of zinc concentrates will be sold to a local refinery in Peru, with the balance of the balance being sold to smelters in Asia. Lead-silver concentrates and tin concentrates are assumed to be sold on a Cost, Insurance, and Freight ("CIF") basis to smelters in Asia.

The following payable factors were applied:

- Zinc concentrate:
    - Pay 85.0% of the zinc content, subject to a minimum deduction of eight units;
- Lead-silver concentrate:
    - Lead: pay 95.0% of lead content, subject to a minimum deduction of three units;
    - Silver: pay 95.0% of silver content, subject to a minimum deduction of 50 g/dmt.
- Tin concentrate:
    - Minimum deduction of 2.5 units
    - Additional deduction for each 1% that the concentrate grade is less than 60%: 0.1 units;
    - 93% payable with a concentrate grade of 50%.

The zinc concentrate is expected to average 13% Fe and is assumed to be subject to a penalty of US$1.50 per each 1% Fe above 8.0% Fe. Due to elevated iron and sulphur content, the tin concentrate is assumed to be subject to an iron penalty equal to an additional deduction of 0.7 units and a sulphur penalty of US$75/dmt.

Transport losses were assumed to be nil for the three concentrates.

A construction period of 18 months was considered (starting in mid-Year -2) with Year 1 being the first year of production. Plant throughput in the first year of production is at 80% of design to account for ramp-up inefficiencies. It was assumed that the mine, processing facilities and site infrastructure will be owned and operated by Tinka. Operating and capital costs were applied in the financial model excluding Value Added Tax otherwise referred to as Impuesto General a las Ventas (“IGV”) but the working capital associated with IGV receivable has been considered. The 2024 PEA assumes that Tinka will exercise its option to purchase for US$1 M the 1% NSR royalty payable to Sierra, and therefore the royalty is not included in the cash flow analysis, while the US$1 M purchase price is.

Working capital has been considered in the cash flow model. Aside from IGV on closure costs incurred following cessation of operations, working capital is recovered following cessation of operations.

The calculation of Income tax, royalties, fees and assessments in the cash flow model were reviewed by EY.

Each of the following are estimated in the model:

- Modified mining royalty: a sliding scale charge on adjusted Earnings before interest and taxes (“EBIT”) with a marginal rate of 1% to 12% (maximum effective rate of 7.14%) depending on the ratio of adjusted EBIT to NSR, subject to a minimum of 1% of NSR;
- Special mining tax; a sliding scale charge on adjusted EBIT with a marginal rate of 2% to 8.4% (maximum effective rate of 5.36%) depending on the ratio of adjusted EBIT to NSR,
- Employee profit sharing: 8% of taxable income after losses carried forward;

- Complementary mining pension fund: 0.5% of taxable income after loss carry-forward and employee profit sharing;
- Corporate income tax: 29.5% of taxable income after losses carried forward, employee profit sharing and complementary mining pension fund;
- Temporary net asset tax ("ITAN"): 0.4% of applicable net assets. ITAN is a credit towards income taxes otherwise payable;
- Environmental Evaluation and Oversight Agency ("OEFA") fee: 0.7% of NSR. OEFA is an agency of the Ministry of Environment charged with monitoring compliance with applicable environmental laws and regulations;
- Supervisory Agency for Investment in Energy and Mining ("OSINERGMIN") fee: 0.12% of NSR. OSINERGMIN is charged with monitoring compliance with applicable mining laws and regulations; and
- Financial Transactions Tax: 0.005% of most payments and receipts.

Losses can either be carried forward for up to 4 years and used to reduce up to 100% of taxable income or can be carried forward indefinitely but only applied to up to 50% of taxable income. It is assumed that Tinka has elected the former.

Tax depreciation is straight line. Previous and projected general expenses and exploration costs were included in the amortization balance for tax calculation purposes only.

A provision of US$19.5 M was included for closure costs. No salvage value was considered.

The preliminary economic analysis was based on 100% equity financing. No escalation or inflation was applied. All amounts are in constant 2023 Q4 US$.

Metal price assumptions for the 2024 PEA are US$1.30/lb Zn, US$11.00/lb tin, US$22/oz Ag, and US$1.00/lb Pb.

The Project is projected to generate a pre-tax NPV of US$732 M at an 8.0% discount rate, an IRR of 34.8%, an undiscounted payback period of 2.4 years, and a discounted payback period of 2.9%. The post-tax results are an NPV at 8% of US$434 M, an IRR of 25.9%, an undiscounted payback period of 2.9 years, and a discounted payback period of 3.6 years.

Table 1-10 presents a summary of the financial analysis results. Cash costs were consolidated per pound of zinc payable, net of lead and silver credits. C1 cash costs comprise the sum of anticipated mining, processing, general and administrative costs, and selling costs less by-product credits.

A LOM all-in sustaining cash cost ("AISC") was also determined and presented in Table 1-11. The AISC, a Non-GAAP (Generally Accepted Accounting Principle), is an extension of the cash costs adding the costs to sustain production. Cash operating costs were determined per pound of payable zinc. Cash costs comprise the sum of estimated mining, processing, general and administrative costs, product transportation, and treatment and refining costs including applicable penalties, less by- product credits for tin, silver, and lead. A LOM AISC was also determined. The AISC is an extension of the cash operating costs, adding the sustaining capital costs required to sustain production as well as closure costs.

Table 1-10: Summary of Financial Results

Description	Units	Pre-tax	Post-tax
NPV at 0% (undiscounted LOM cash flow)	US$ M	1,796	1,167
NPV @ 8%	***US$ M***	***732***	***434***
NPV @ 10%	US$ M	594	340
Payback period (from start of operations)			
Undiscounted	Years	2.4	2.9
Discounted	Years	2.9	3.6
IRR	%	34.8	25.9

Note: base case NPV8% is in bold italics.

Table 1-11: Summary of LOM Cash Cost

Description	LOM (US$ M)	US$/Zn lb payable
Cash Costs		
Mining including backfill	769	0.22
Processing including tailings	599	0.17
G&A	284	0.08
Concentrate transport, treatment and refining	1,134	0.32
Sub-total	*2,785*	*0.79*
By-product credits		
Tin	(500)	(0.14)
Silver	(245)	(0.07)
Lead	(112)	(0.03)
Net Direct Cash Cost (C1)	*1,929*	*0.55*
Royalties and production taxes*	140	0.04
Sustaining capital and closure	316	0.10
AISC	***2,401***	***0.68***

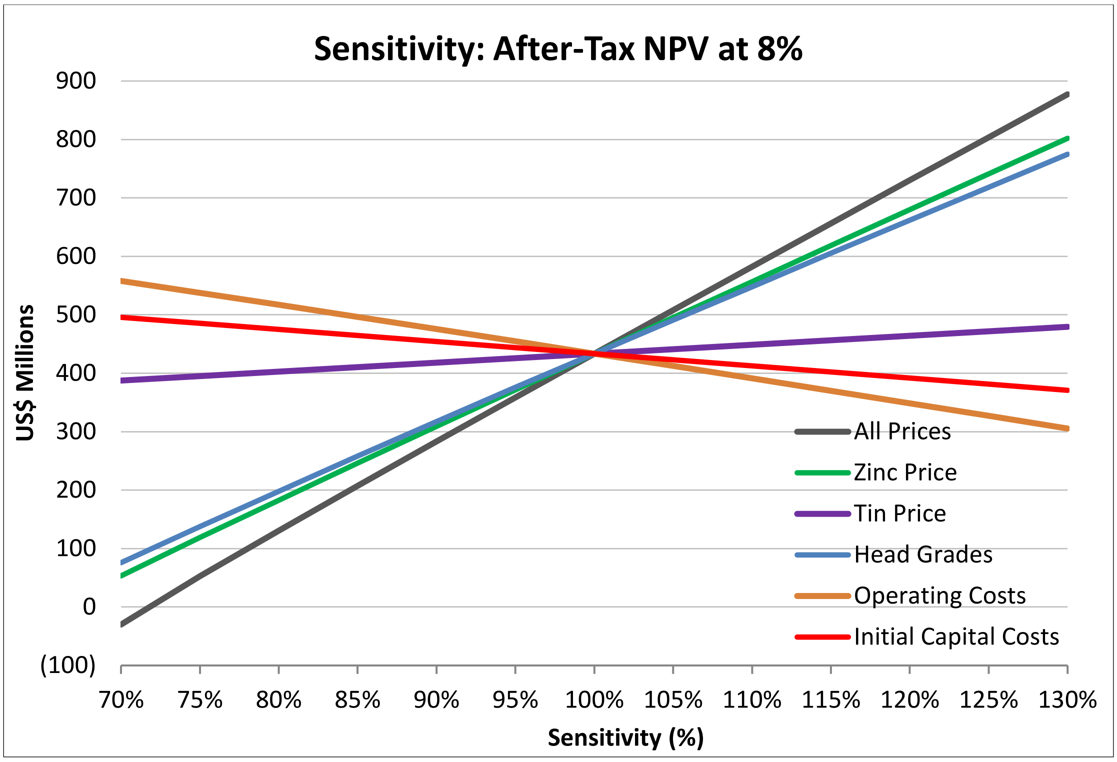
** Modified Mining Royalty, Special Mining Tax, OEFA fee, and OSINERGMIN fee.*

Totals may not sum due to rounding.

1.19 Sensitivity Analysis

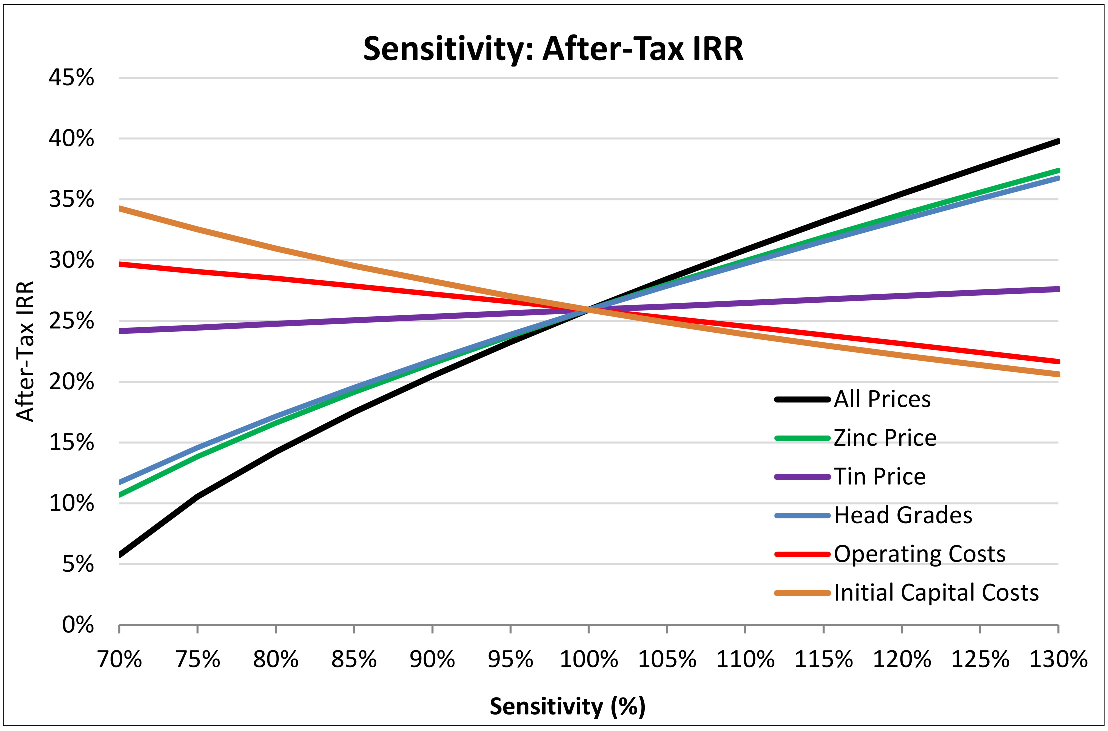
The sensitivity of after-tax NPV at 8% and IRR to variations in metal prices, head grades, initial capital costs and operating costs were analysed. The results of this analysis are presented in Figure 1-1 and Figure 1-2.

The Project is most sensitive to product prices generally, then to the zinc price, then to head grades. It is less sensitive to tin prices, then to operating costs, then initial capital costs.



Source: Tinka, 2024

Figure 1-1: Sensitivity: After-Tax NPV at 8%



Source: Tinka, 2024

Figure 1-2: Sensitivity: After-Tax IRR

1.20 Interpretation and Conclusions

The PEA economic analysis indicates that the Ayawilca Project has good economic potential and warrants continued development. The Ayawilca deposit has not been fully delineated by exploration drilling, and several of the zones remain open along strike and at depth. Opportunities for additional value at Ayawilca not captured in the 2024 PEA include, but not limited to:

- Potential to extend the Zinc Zone deposits to depth at the East and West areas with more drilling;
- Potential to extend the Tin Zone to depth at the Central area, in particular where a steeply-dipping feeder zone is interpreted and is untested by drilling;
- Potential to extend the Silver Zone along strike and at depth – only 500 m of strike length is tested to date;
- Optimization of zinc recovery to a zinc concentrate (currently 92%) and silver recovery to a lead-silver concentrate in the Zinc Zone (currently 45%) with more detailed metallurgical test work;
- Optimization of tin recovery to a tin concentrate from the low recovery domain (currently 50%) with more detailed metallurgical testwork.

Closure costs for the TSF and plant areas have been included in the project estimates. At this stage closure requirement considerations are only preliminary assumptions. The EIA and various permits may set additional requirements to the closure measures. Full assessment of closure costs will be completed when the needs are studied in future stages.

Tinka considers stakeholder engagement and collaboration to be a critical part of the potential development of the Ayawilca project, and social aspects will be a key part of the EIA preparation process.

It is the conclusion of the QPs that the 2024 PEA summarised in this technical report contains sufficient detail and accuracy to support a PEA level analysis. Standard industry practices, equipment, and design methods were used in this PEA and except for those outlined in this section, the report authors are unaware of any unusual or significant risks or uncertainties that would affect project reliability or confidence based on the data and information made available.

1.21 Recommendations

The recommended next step for the Project is to advance to a PFS and advance the environmental planning for an eventual mine development. The following work programs are recommended during the next stage to reach completion of a PFS:

- Infill and exploration drilling to support higher-confidence Mineral Resource classifications for the Zinc Zone (especially East and West areas), the Silver Zone and Tin Zone;
- Assessment of the underground hydrological conditions through the drilling of water wells;
- Engineering studies including metallurgical test work and geotechnical studies, to support a pre-feasibility study;

- Other field investigations and data collection including environmental planning to support an eventual mine development; and
- PFS document compilation.

Further investigation and technical work is required to provide sufficient confidence in the Project to advance towards eventual development. The additional work will include continuation of exploration, geotechnical and hydrogeological investigation, environmental baseline, socioeconomic and engineering studies to support environmental assessment and project evaluation. The following Table 1-12 summarizes the cost of the recommended work program for the PFS stage.

Table 1-12: Indicative PFS Budget for Ayawilca Project

Category	Cost (US$M)
Infill and exploration drilling	3.0
Metallurgical testwork	0.5
Hydrological drilling and geotechnical investigation	1.0
Technical Studies for PFS	1.5
General and Administrative costs	1.0
Environmental planning, social	0.5
Total	**7.5**

2 INTRODUCTION

This Technical Report is a Preliminary Economic Assessment (“PEA”) on the Ayawilca Polymetallic Project (the “Project”), located in central Peru (Figure 2-1), which has been prepared by a team led by SRK Consulting (UK) Limited (SRK) for and on behalf of Tinka Resources Limited (“Tinka”), a publicly-listed company in Canada. The Technical Report includes contributions from SLR Consulting (Canada) Limited (“SLR”), Transmin Metallurgical Consultants (“Transmin”), Envis Peru S.A.C (“Envis”) and MineFill Services Incorporated (“MineFill”) to disclose the results of the Preliminary Economic Assessment, completed in February 2024 (the “2024 PEA”), in accordance with National Instrument (“NI”) 43-101 on the Project. This report also incorporates an updated Mineral Resource estimate for the Ayawilca deposit as at January 1, 2024.

The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in SRK’s services, based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This report is intended for use by Tinka subject to the terms and conditions of its contract with SRK and relevant securities legislation. The contract permits Tinka to file this report as a Technical Report with Canadian securities regulatory authorities pursuant to NI 43-101, Standards of Disclosure for Mineral Projects. Except for the purposes legislated under Canadian securities law, any other uses of this Technical Report by any third party is at that party’s sole risk. The responsibility for this disclosure remains with Tinka. The user of this document should ensure that this is the most recent Technical Report for the property as it is no longer valid if a new Technical Report has been issued.

Unless otherwise stated, information, data, and illustrations contained in this Technical Report or used in its preparation have been prepared by the Qualified Persons for the purpose of this Technical Report.

The PEA is preliminary in nature. It includes Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves. There is no certainty that the PEA will be realized.

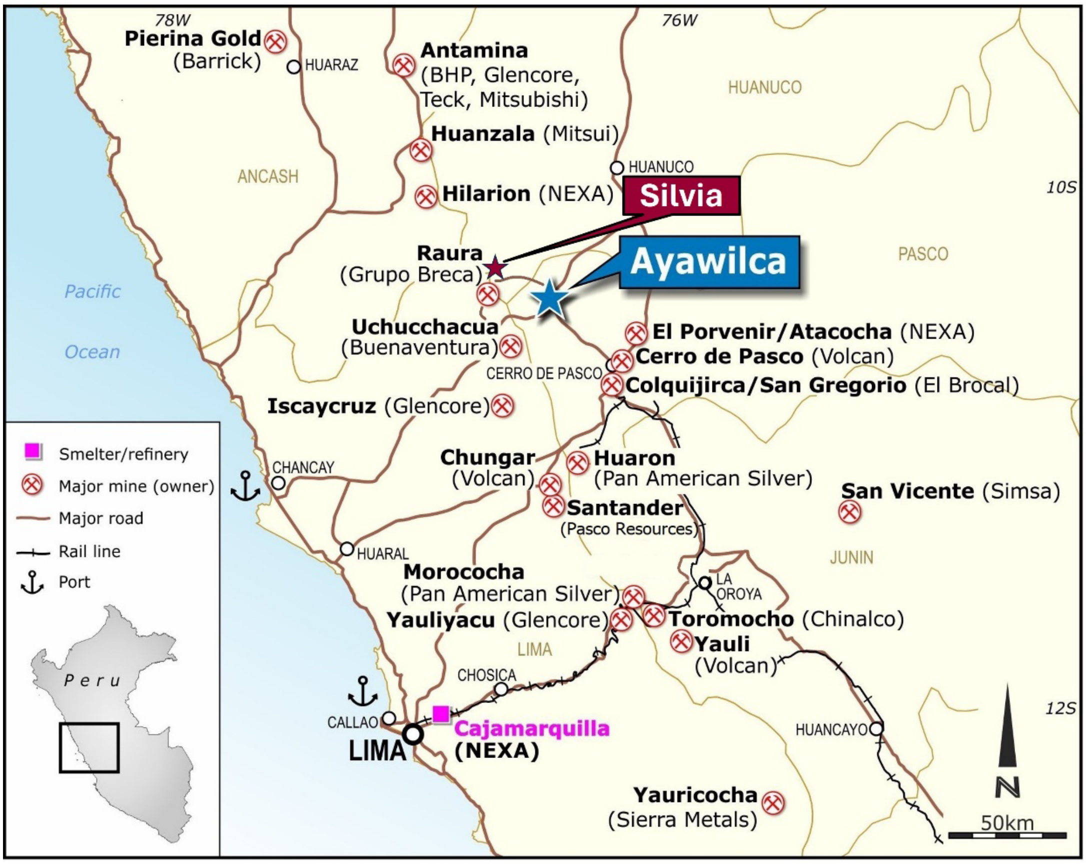
2.1 Terms of Reference

This Report was prepared to support disclosures in Tinka’s news release filed on February 28, 2024, entitled “Tinka reports updated PEA and Mineral Resource estimate for the Ayawilca polymetallic Zinc-Tin-Silver deposit”.

The term “Project” or the “Ayawilca Project” refers to the 2024 PEA. The term “Properties” is used to refer to all of the mineral tenure holdings. Unless otherwise noted, all mineralization is discussed using “zone” nomenclature. Zones are generally described by the major commodity, whereas “area” generally refers to the geographic location: Zinc Zone (subdivided into West, Central, South, and East areas), Silver Zone, Tin Zone, and Colquipucro.

Mineral Resources are reported in accordance with the Canadian Institute of Mining, Metallurgy and Petroleum (“CIM”) Definition Standards for Mineral Resources and Mineral Reserves (May 2014; the 2014 CIM Definition Standards or CIM (2014)) and the CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines (November 2019; the 2019 CIM Best Practice Guidelines or CIM (2019)).

All measurement units used in this Report are metric unless otherwise noted. Currency is expressed in United States ("US") dollars ("US$"). The Peruvian currency is the nuevo sol ("PEN"). The Report uses Canadian English.



Note: Figure prepared by Tinka, 2021. Star marks the approximate location of the Ayawilca Project and the adjacent Silvia property. Other mining projects and refineries shown are held by third parties as indicated.

Figure 2-1: Project Location Map

2.2 Qualified Persons and Details of Site Inspection

This Technical Report is a PEA on the Ayawilca polymetallic project which has been prepared by a team of SRK consultants for, and on behalf of Tinka, a publicly-listed company in Canada. This report also incorporates a statement of the Mineral Resource estimate for the Ayawilca project as at January 1, 2024.

SLR was commissioned by Tinka to prepare an updated MRE on the Ayawilca Property including for the Zinc, Silver and Tin Zones incorporating the recent drill hole information from 2022 and 2023 into the drillhole database. SLR also had responsibility for reviewing the history, geological setting and mineralization, exploration and drilling, sample preparation and analyses, and data verification in respect of the technical information compiled by Tinka.

SRK was commissioned by Tinka to prepare the mine plan, including mine geotechnical and ventilation assessment and capital and operating cost estimate. SRK reviewed the environmental, social and permitting aspects of the Project and overall economic assessment prepared by Tinka prepare the overall NI 43-101 report.

MineFill was commissioned by Tinka to prepare the paste backfill evaluation for the Project including the design criteria, paste backfill material and operations, and capital and operating cost estimation.

Transmin was commissioned by Tinka to design and manage the mineral processing and metallurgical testwork, and determine the metals recovery methods for the Project. Transmin also had responsibility for the capital and operating cost estimation for the processing plants.

Envis was commissioned by Tinka to design the surface tailings storage facility (TSF) including the site selection, conceptual design for the filtered tailings stack including operations and filter sizing selection, stack development and capital cost estimation. In addition, Envis had responsibility for hydrological studies including a conceptual hydrological and numerical model of the baseline groundwater regimen for the Project.

Tinka, SLR, Transmin, Envis and MineFill have cooperated in the preparation of this document to ensure factual content and conformity with the preparation of the Technical Report and the requirements of reporting under the NI 43-101.

These consultants have extensive experience in the mining and metals sector and are members in good standing of appropriate professional institutions. The consultants comprise specialists in the fields of geology and resource estimation; mining engineering and Mineral Reserves; mining geotechnical engineering; hydrogeology/hydrology; mineral processing; waste and dry filtered tailings engineering; geochemistry; water management; environmental and social; and financial evaluation (hereinafter the “Technical Disciplines”).

The individuals listed in Table 2-1, by virtue of their education, experience and professional association, are considered QPs as defined in the NI 43-101, Standards of Disclosure for Mineral Projects, and in compliance with Form 43-101F1 for this Technical Report, and are members in good standing of appropriate professional institutions. Table 2-1 provides a summary of the designated Qualified Persons responsible for the disclosure in this Technical Report and Table 2-2 provides details of the personal inspections undertaken. SRK was given full access to the relevant data requested and conducted discussions with Tinka technical staff and management as well as other consulting groups who contributed to the Technical Studies. QP certificates of authors are provided in Appendix A.

SRK will receive a fee for the preparation of this Technical Report in accordance with normal professional consulting practices. This fee is not dependent on the findings of this Technical Report and SRK will receive no other benefit for the preparation of this Technical Report. SRK does not have any pecuniary or other interests that could reasonably be regarded as capable of affecting its ability to provide an unbiased opinion in relation to the PEA, technical economic parameters, the LOM plan for the project and the projections and assumptions included in the various technical studies completed by Tinka, opined upon by SRK and reported herein.

Consequently, SRK and the Directors of SRK consider themselves to be independent of Tinka, their directors and senior management.

Table 2-1: Qualified Persons and Contributors to this Technical Report

<table>
<tr><th colspan="7">Qualified Persons Responsible for the Preparation of this Technical report</th></tr>
<tr><th>Qualified Person</th><th>Position</th><th>Employer</th><th>Independent of Tinka</th><th>Date of Last Site Visit</th><th>Professional Designation</th><th>Sections of the Report</th></tr>
<tr><td>Christopher Bray</td><td>Principal Consultant (Mining)</td><td>SRK</td><td>Yes</td><td>none</td><td>BEng (Mining), MAusIMM (CP)</td><td>Sections 1.1-1.3,1.12-1.21, 0-0, 12, 15, 16, 18.1-18.3, 18.5-18.9, and 19-27</td></tr>
<tr><td>Katharine M. Masun</td><td>Principal Geologist (Mining Advisory)</td><td>SLR</td><td>Yes</td><td>13 to 15 March, 2023</td><td>HBSc, M.Sc, MSA, P.Geo.</td><td>Sections 1.4-1.9, 1.11, contributions to Sections 1.20, 1.21, Sections 2.2, 6-11, 12.1.1, 14, 25.2, 26.2, 26.9.1 and contributions to Section 27</td></tr>
<tr><td>Adam Johnston</td><td>Chief Metallurgist</td><td>Transmin</td><td>Yes</td><td>15 to 16 September, 2023</td><td>FAusIMM (CP)</td><td>Sections 1.10, 2.2, 12.1.3, 13, 17, 21.2.3, 21.3.5</td></tr>
<tr><td>Donald Hickson</td><td>Managing Partner, Tailings and Mine Waste</td><td>Envis</td><td>Yes</td><td>6 to 8 September, 2022</td><td>B.A.Sc, P.Eng</td><td>Sections 1.14.2, 2.2, 12.1.4, 16.4, 18.4, 21.2.5, 21.3.6</td></tr>
<tr><td>Dr. David Stone</td><td>President</td><td>MineFill</td><td>Yes</td><td>none</td><td>B.Ap.Sc, Ph.D., MBA, P.Eng.(ON), P.E.(WA)</td><td>Sections 2.2, 12.1.5, 16.9, 21.2.4, 21.3.4, 25.6, 26.4</td></tr>
<tr><th colspan="7">Other Experts who assisted the Qualified Persons</th></tr>
<tr><th>Expert</th><th>Position</th><th>Employer</th><th>Independent of Tinka</th><th>Date of Last Site Visit</th><th>Professional Designation</th><th>Sections of the Report</th></tr>
<tr><td>Neil Marshall</td><td>Principal Consultant (Geotechnical)</td><td>SRK</td><td>Yes</td><td>none</td><td>CEng MSc (DIC) MIMMM</td><td>Section 16.3</td></tr>
<tr><td>Meiirkhan Zhalel</td><td>Consultant (Mining)</td><td>SRK</td><td>Yes</td><td>none</td><td>BSc, MSc, MIMMM</td><td>Section 16.6 and 16.7</td></tr>
<tr><td>Mikko Koivisto</td><td>Consultant (Mining)</td><td>SRK</td><td>Yes</td><td>none</td><td>MSc (Mining)</td><td>Section 16</td></tr>
<tr><td>Harold León</td><td>Consultant (Ventilation)</td><td>SRK</td><td>Yes</td><td>none</td><td>B.Asc</td><td>Section 16.10</td></tr>
<tr><td>Teresa Steele-Schober</td><td>Principal Consultant (ESG)</td><td>SRK</td><td>Yes</td><td>none</td><td>MELP, MEnvMgt, MSAIMM</td><td>Section 4 and 20</td></tr>
<tr><td>Brent Cochrane</td><td>Principal</td><td>Brent Cochrane Consulting</td><td>Yes</td><td>Oct-23</td><td>BA (Econ), MA (Econ)</td><td>Section 19 and 22</td></tr>
<tr><td>Inge Moors</td><td>Principal Consultant (Mineral Economics)</td><td>SRK</td><td>Yes</td><td>none</td><td>MSc (Mining), MIMMM</td><td>Section 19 and 22</td></tr>
</table>

Table 2-2: Details of Site Inspection by the Qualified Persons and Other Experts

Qualified Person	Company	Independent of Tinka	Expertise	Date(s) of Visit	Details of Inspection
Katharine M. Masun	SLR	Yes	Geology and Mineral Resources	13 to 15 March, 2023	Ms. Masun visited Tinka's core facility in Huánuco and the Ayawilca Project site. In Huánuco, Ms. Masun reviewed drill core from the Ayawilca and Colquipucro deposits, conducted a review of the density measuring facility and observed density measurements on drill core. Relevant intervals of core from various holes were examined, comparing the logged information to the core. At the project site, Ms. Masun observed drilling at the active drill rig, inspected the core logging facilities, and reviewed core handling, logging, sampling, and quality control ("QA/QC") procedures. In addition, Ms. Masun reviewed some collar coordinates with a handheld GPS device. Ms. Masun was accompanied by the following Tinka personnel: • Dr. Graham Carman, FAusIMM, President, CEO and Director • Mr. Jorge Gamarra, Project Manager • Mr. Luis Giraldo, Exploration Manager
Adam Johnston	Transmin	Yes	Mineral Processing	15 to 16 September, 2023	Mr. Johnston visited the site and core shed where he examined zinc and tin mineralization in key drill cores from the Ayawilca project in Peru. His visit included assessing the project's layout, reviewing proposed sites for plants, camps, and tailings facilities, and examining site access and topography.
Donald Hickson	Envis	Yes	Tailings and Mine Waste	6 to 8 September, 2022	Mr. Hickson visited the Ayawilca project site and core shed located in Huanuco. Potential areas for tailings storage were visited, as well as the mineral deposit areas and approximate locations for key site infrastructure.
Other Experts	**Company**	**Independent of Tinka**	**Expertise**	**Date(s) of Visit**	**Details of Inspection**
Brent Cochrane	Brent Cochrane Consulting	Yes	Financial modelling, financing,	25 October 2023	Mr. Cochrane visited Tinka's core facility in Huánuco and the Ayawilca Project site. In Huánuco, Mr. Cochrane reviewed drill core from the Ayawilca deposits. Mr. Cochrane toured the project site and observed the proposed location of various facilities.

2.3 Effective Dates

The Report has a number of effective dates including:

- Date of closure of database used for Ayawilca resource estimation: May 31, 2023;
- Date of closure of database used for Colquipucro resource estimation: November 17, 2014;
- Date of last drilling information for the Ayawilca resource estimation included in the Report: May 31, 2023;
- Date of last drilling information for the Colquipucro resource estimation included in the Report: November 17, 2014;
- Date of the Ayawilca Mineral Resource estimate: January 1, 2024;
- Date of the Colquipucro Mineral Resource estimate: May 25, 2016;

The overall effective date of the Report is the date of the economic analysis in the 2024 PEA, which is February 28, 2024.

2.4 Sources of Information

SRK's opinion contained herein is based on its review of the technical and scientific information provided to SRK by Tinka throughout the course of its investigations. SRK has relied upon the work of other consultants in the project areas in support of this Technical Report with major authoring contributions from SLR, Transmin, Envis and MineFill.

This report is based on technical data, documents, reports and information supplied by Tinka, including copies of Concession application and award documents; historical reports on exploration and drilling; and internal reports by Tinka staff and consultants/contractors. The specific reports referred to are listed in Section 2.5 and Section 27 of this report.

This report contains data from drilling carried out by Tinka from mid-2011 to May 2023. Preliminary metallurgical testwork commenced in 2014 (by SGS) and the most recent testwork was undertaken in 2023 on the Silver Zone mineralization (by Laboratorio Plenge).

Ongoing work, such as baseline environmental studies, community engagement and initial permitting activities are also described in this report.

2.5 Previous Technical Reports

Tinka has filed the following technical reports on the Project:

- 2021 PEA: Kirkland, K., Vilela, E., Masun, K.M., El-Rassi, D., Johnston, A., and Hickson, D., 2021: Ayawilca Polymetallic Project, Central Peru, NI 43-101 Technical Report on Updated Preliminary Economic Assessment: technical report prepared by Mining Plus Peru S.A.C., SLR Consulting Ltd, Transmin Metallurgical Consultants, and Envis E.I.R.L, for Tinka Resources Limited, effective date 14 October, 2021;
- 2019 PEA: Peralta, E., Colquhoun, W., El-Rassi, D., Johnston, A., and Searston, S., 2019: Ayawilca Polymetallic Project, Department of Pasco, Central Peru, NI 43-101 Technical Report: technical report prepared by Amec Foster Wheeler (Peru) S. A., Transmin

Metallurgical Consultants, and Roscoe Postle Associates Inc. for Tinka Resources Limited, effective date 2 July, 2019;

- RPA, 2019: Technical Report on the Mineral Resource Estimate for the Ayawilca Property, Department of Pasco, Peru: technical report prepared by Roscoe Postle Associates Inc for Tinka Resources Limited, effective date 9 January, 2019;
- RPA, 2017: Technical Report on the Mineral Resource Estimate for the Ayawilca-Colquipucro Property, Department of Pasco, Peru: technical report prepared by Roscoe Postle Associates Inc for Tinka Resources Limited, effective date 11 December, 2017;
- RPA., 2016: Technical Report on the Mineral Resource Estimate for the Ayawilca-Colquipucro Property, Department of Pasco, Peru: technical report prepared by Roscoe Postle Associates Inc for Tinka Resources Limited, effective date 29 June, 2016; and
- RPA., 2015: Technical Report on the Mineral Resource Estimate for the Ayawilca-Colquipucro Property, Department of Pasco, Peru: technical report prepared by Roscoe Postle Associates Inc for Tinka Resources Limited, effective date 25 March, 2015.

2.6 Units of Measure

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

3 RELIANCE ON OTHER EXPERTS

3.1 Introduction

The QPs have relied upon the following other expert reports, which provided information on mineral tenure, taxation and marketing assumptions.

3.2 Mineral Tenure, Surface Rights, Royalties and Agreements

The QPs have not reviewed the mineral tenure, surface rights, property ownership, royalties, nor independently verified the legal status of the Project area, underlying property agreements, or permits. The QPs have fully relied upon, and disclaim responsibility for, information derived from experts retained by Tinka through the following document:

- Dentons Gallo Barrios Pickmann, 2024: Legal Opinion of Ayawilca Mining Project: prepared for Tinka Resources, 25 March, 2024, 13 p.

This information is used in Section 4 of the Report. It is also used in support of the Mineral Resource statement in Section 14, and the preliminary economic analysis in Section 22.

3.3 Environmental, Permitting and Social and Community Impacts

The QPs have not independently verified the legal status of the historical environmental liabilities within the Project area. The QPs have fully relied upon, and disclaim responsibility for, information derived from experts retained by Tinka through the following document:

- SNC Lavalin, 2021: Modificación del Estudio de Impacto Ambiental Semidetallado del Proyecto de Exploración minera Ayawilca-Colquipucro-Mina Punta: report prepared by SNC Lavalin for Tinka, 21 July, 2021, 1,009 p..This information is used in Section 20 of the Report.

3.4 Taxation

The QPs have not independently verified the taxation considerations applied in the financial model. The QPs have fully relied upon, and disclaim responsibility for, information derived from experts retained by Tinka through the following document:

- EY, 2024a: Taxation Assumptions for the Ayawilca Project Preliminary Economic Assessment Financial Model: Report from Ernst & Young Consultores to Tinka, 30 March, 2024, 5 p.

This information is used in Section 22 of the Report.

3.5 Market Studies, Contracts and Logistics

The QPs have not independently verified marketing information on zinc, lead–silver or tin concentrates, or smelter terms information. The QPs have fully relied upon, and disclaim responsibility for, information derived from experts retained by Tinka through the following document:

- Ocean Partners, 2024: Market Summary, Tinka Resources Limited, Ayawilca Project: report prepared by Ocean Partners for Tinka Resources, 25 March, 2024, 6 p.

This information is used in Section 19 of the Report. It is also used in support of the economic analysis in Section 22.

Concentrate market terms and conditions are a specialized business requiring knowledge of supply and demand of smelter capacity and concentrate types, as well as the terms and conditions of refineries/smelters for different quality of concentrate. This requires direct communication with refineries/smelters and an extensive database that is outside of the purview of a QP. The QPs consider it reasonable to rely upon Ocean Partners for this information. Ocean Partners offers global trading services to miners, smelters, and refiners in the areas of copper, lead and zinc concentrates. The company has offices or agencies in at least 25 countries. Areas of expertise include:

- Market analysis of concentrate quality;
- Identification of “strategic” smelters;
- Statistical review of the concentrate market;
- Development of a comprehensive marketing strategy;
- Obtaining letters of intent from smelters;
- Credit risk analysis;
- Commercial presentations to banks or other financiers;
- Assistance in developing long- and short-term hedging strategies;
- Securing long term and spot off-take contracts;
- Client visits and assistance in negotiating commercial deals; and
- Open book custom/toll agency blending.

4 PROPERTY DESCRIPTION AND LOCATION

4.1 Introduction

The Ayawilca Project is located 200 km northeast of Lima within the Districts of Yanahuanca and San Pedro de Pillao, Province of Daniel Alcides Carrion, in the Department of Pasco, Peru.

The Project is centred at UTM 332,400 mE by 8,847,600 mN (WGS84 datum, Zone 18S) on national map sheet 21-J.

4.2 Property and Title in Peru

The QPs have not independently verified the following information which is in the public domain and have sourced the data from Rodrigo (2024), EY (2024b) and Dentons (2024) as well as from official Peruvian Government websites.

4.2.1 Regulatory Oversight

The right to explore, extract, process and/or produce minerals in Peru is primarily regulated by mining laws and regulations enacted by the Peruvian Congress and the executive branch of government, under the 1992 Mining Law. The law regulates nine different mining activities: reconnaissance; prospecting; exploration; exploitation (mining); general labour; beneficiation; commercialization; mineral transport; and mineral storage outside a mining facility.

The Ministry of Energy and Mines (“MINEM”) is the authority that regulates mining activities and is the environmental authority. MINEM also grants mining concessions to local or foreign individuals or legal entities, through a specialized body, the Institute of Geology, Mining and Metallurgy (“INGEMMET”).

Other relevant regulatory authorities include the Ministry of Environment (“MINAM”), the National Environmental Certification Authority (“SENACE”), National Forest and Wildlife Service (“SERFOR”) and OSINERGMIN. The OEFA monitors environmental compliance.

4.2.2 Mineral Tenure

Mining concessions can be granted separately for metallic and non-metallic minerals. The same mining concession is valid for exploration and exploitation. Concessions can range in size from a minimum of 100 ha to a maximum of 1,000 ha.

A granted mining concession will remain valid, providing the concession owner:

- Pays annual concession validity fees (*derecho de vigencia*), currently US$3/ha. Failure to pay the applicable license fees for two consecutive years will result in the cancellation of the mining concession;
- Meets minimum expenditure commitments or production levels. The minima are divided into two classes:
    - Achieve “Minimum Annual Production” by the first semester of Year 11 counted from the year after the concession was granted, or pay a penalty for non-production on a sliding scale, as defined by Legislative Decree N° 1320 which became effective on 1 January 2019. “Minimum Annual Production” is defined as one tax unit (“UIT”) per hectare per year, which was S/4,950 in 2023 (Peruvian Sol (PEN), approximately

US$1,135); and

- Alternatively, no penalty is payable if a "Minimum Annual Investment" is made of at least 10 times the amount of the penalty.

The penalty structure sets out that if a concession holder cannot reach the minimum annual production on the first semester of the 11th year from the year in which the concessions were granted, the concession holder will be required to pay a penalty equivalent to 2% of the applicable minimum production per year per hectare until the 15th year. If the concession holder cannot reach the minimum annual production on the first semester of the 16th year from the year in which the concessions were granted, the concession holder will be required to pay a penalty equivalent to 5% of the applicable minimum production per year per hectare until the 20th year. If the holder cannot reach the minimum annual production on the first semester of the 20th year from the year in which the concessions were granted, the holder will be required to pay a penalty equivalent to 10% of the applicable minimum production per year per hectare until the 30th year. Finally, if the holder cannot reach the minimum annual production during this period, the mining concession will automatically expire.

To calculate the production and investment in each mining concession, the title holder may create an operating unit (Unidad Económica Administrativa, or "UEA"), provided the mining rights are all within a radius of five, 10 or 20 kilometres, depending on the type of mineral produced.

Current legislation states that titleholders of mining concessions that were granted before December 2008 were obliged to pay the penalty from 2019 if the titleholder did not reach either the minimum annual production or make the minimum annual investment in 2018.

Mining concessions will lapse automatically if any of the following events take place:

- The annual fee is not paid for two consecutive years;
- The applicable penalty is not paid for two consecutive years; or
- The minimum annual production target is not met within 30 years following the year after the concession was granted (or 30 years following January 2009 for concessions granted before December 2008).

A separate processing concession (beneficiation concession) is required to grant the right to concentrate, smelt or refine minerals already mined. Beneficiation concessions follow the same rules as for mining concessions. A fee must be paid that reflects the nominal capacity of the processing plant or level of production. Failure to pay such processing fees or fines for two years would result in the loss of the beneficiation concession.

4.2.3 Surface Rights and Access

Exploration companies must negotiate access agreements with the surface landholders to carry out exploration drilling and have drill permits approved. Mining companies must negotiate agreements with surface landholders to acquire surface rights or establish long-term easement agreements. Where surface rights are owned by communities, all agreements must be approved by a qualified majority of at least two-thirds of the registered community members. In the case of surface lands owned by communities that are included in the indigenous community database maintained by the Ministry of Culture, or if a community owning land is deemed to be indigenous as the result of an opinion by the Ministry of Culture (following a request by the

Ministry of Mines), it may be necessary to go through a prior consultation process before administrative acts are finalized.

Easement procedures can be considered by the Government for cases in which landowners are reluctant to allow mining companies access to exploit a mineral deposit. In the event a decision has been made by the Government in favour of a mining company, the administrative decision can only be judicially appealed by the landowner based on the compensation to be paid.

4.2.4 Water Rights

Water rights are governed by Law 29338, the Law on Water Resources, and are administered by the National Water Authority (“ANA”) which is part of the Ministry of Agriculture. There are three types of water rights:

- License: this right is granted to use the water for a specific purpose in a specific place. The license is valid until the activity for which it was granted terminates, for example, a beneficiation concession;
- Permission: this temporary right is granted during periods of surplus water availability;
- Authorization: this right is granted for a specified quantity of water and for a specific purpose. The grant period is two years, which may be extended for an additional period for which the original authorization was granted, for example for drilling.

To maintain valid water rights, the grantee must:

- Make all required payments including water tariffs;
- Abide by the conditions of the water right in that water is only used for the purpose granted.

Water rights cannot be transferred or burdened. However, in the case of a change to the title holder of a mining concession, or the owner of the surface land who is also the beneficiary of a water right, the new title holder or owner can obtain the corresponding water right.

4.3 Environmental Requirements

MINAM monitors the environmental compliance of all industrial sectors through OEFA. In the mining sector, the administrative and regulatory authority for mineral exploration, exploitation, processing, general mine operations, mineral transport and storage is the Directorate of Environmental Affairs (“DGAAM”) within MINEM. The environmental regulations for mineral exploration activities were initially defined by Supreme Decree No. 020-2008-EM of 2008. This decree was repealed in 2017 and replaced by Supreme Decree No. 042-2017-EM and its amendments.

4.3.1 Environmental Approvals for Exploration

The instruments for environmental management during the exploration stage are classified into three categories:

- An Environmental Technical Report (*Ficha Técnica Ambiental* or “FTA”) is a study prepared for approval of exploration activities with non-significant environmental impacts and less than 20 drill platforms. The environmental authority has 10 working days to provide comments.

- An Environmental Impact Declaration (*Declaración de Impacto Ambiental* or “DIA”) must be lodged for Category I exploration activities that have a maximum of 40 drill platforms or disturbance of surface areas of up to 10 ha. The environmental authority has 45 working days to provide comments.
- A semi-detailed Environmental Impact Study (*Estudio de Impacto Ambiental Semi-Detallado* or “EIAsd”) is required for Category II exploration programs that have between 40–700 drill platforms or a surface disturbance of more than 10 ha. The environmental authority has 96 working days to provide comments. The total process including preparation of the study by a registered environmental consulting company can take 6–8 months.

These environmental instruments for exploration are approved by the DGAAM.

4.3.2 Environmental Approvals for Exploitation and other activities

The environmental regulations for mineral exploitation, processing, general mine operations, mineral transport and mineral storage activities are defined by Supreme Decree No.040-2014-EM.

There are two types of environmental study required:

- Semi-detailed Environmental Impact Study (EIAsd) Category II;
- Detailed Environmental Impact Study (EIAd) Category III.

Mining projects that involve exploitation activities and/or beneficiation are classified as Category III. General mining and transportation activities, or storage of minerals and/or concentrates, are classified in Category II or III within the framework of Law No. 27446, Law of the National Environmental Impact Assessment System and its Regulations approved by Supreme Decree No. 019-2009-MINAM. These environmental instruments are approved by SENACE and monitored by OEFA of MINAM.

A full EIAd that incorporates technical, environmental, and social matters, must be filed, and approved before mine construction. The preparation and authorization of such a study can take up to three years.

In addition, mining companies, must prepare, submit, and execute Closure Plans, and provide financial guarantees to secure compliance with Closure Plans during the life of the concession. The guarantee must cover the estimated amount of the Closure Plan and may be in the form of cash, trusts, or any other guarantee contemplated in the Banking Law.

4.4 Prior Consent

In April 2012, Peru’s Government approved the Consulta Previa Law (Prior Consent) and its regulations by Supreme Decree Nº 001-2012-MC. This requires prior consultation with indigenous communities as determined by the Ministry of Culture, before any infrastructure or projects, in particular mining and energy projects, are developed in their areas.

4.5 Project Ownership

The Project is held 100% by Tinka, through its wholly owned subsidiary, Tinka Resources S.A.C. The name “Tinka” is used interchangeably to refer to the parent and subsidiary companies.

4.5.1 Project Mineral Tenure

The Project consists of 59 contiguous mineral concessions covering 16,808 ha. Tinka has grouped a total of 44 claims (7,656 ha) under an operating unit denominated as the Ayawilca UEA (code: 010000120U), which covers a five-kilometre radius. The remaining 15 concessions (9,152 ha) remain as individual, contiguous mineral concessions (Table 4-1 and Figure 4-1).

Penalties will be payable for 2024, but the payments will not be due until June 2025. Tinka has retained legal counsel to confirm what the penalties for 2024 will be.

All pre-2016 claims were staked using the PSAD 1956 datum and were subsequently converted to the WGS 1984 coordinate system.

4.5.2 Surface Rights and Access

The surface rights at Ayawilca are owned by communities and not by individuals. Tinka holds access rights or is negotiating extensions to previously-granted access rights in the Project area to support exploration activities through agreements concluded with local communities (refer to Section 4.5.5).

4.5.3 Water Rights

Water rights for exploration are granted by the ANA. Water used in Tinka’s exploration programs is from approved water sources and the volumes used are also approved. Obtaining water permits is a pre-requisite in Peru prior to any drilling being undertaken.

A final license to use water must be approved by the ANA before the start of construction and exploitation. Tinka has initiated the conceptual studies to evaluate water availability in the Project. These studies will be expanded during more detailed studies to move towards an application for an exploitation water license.

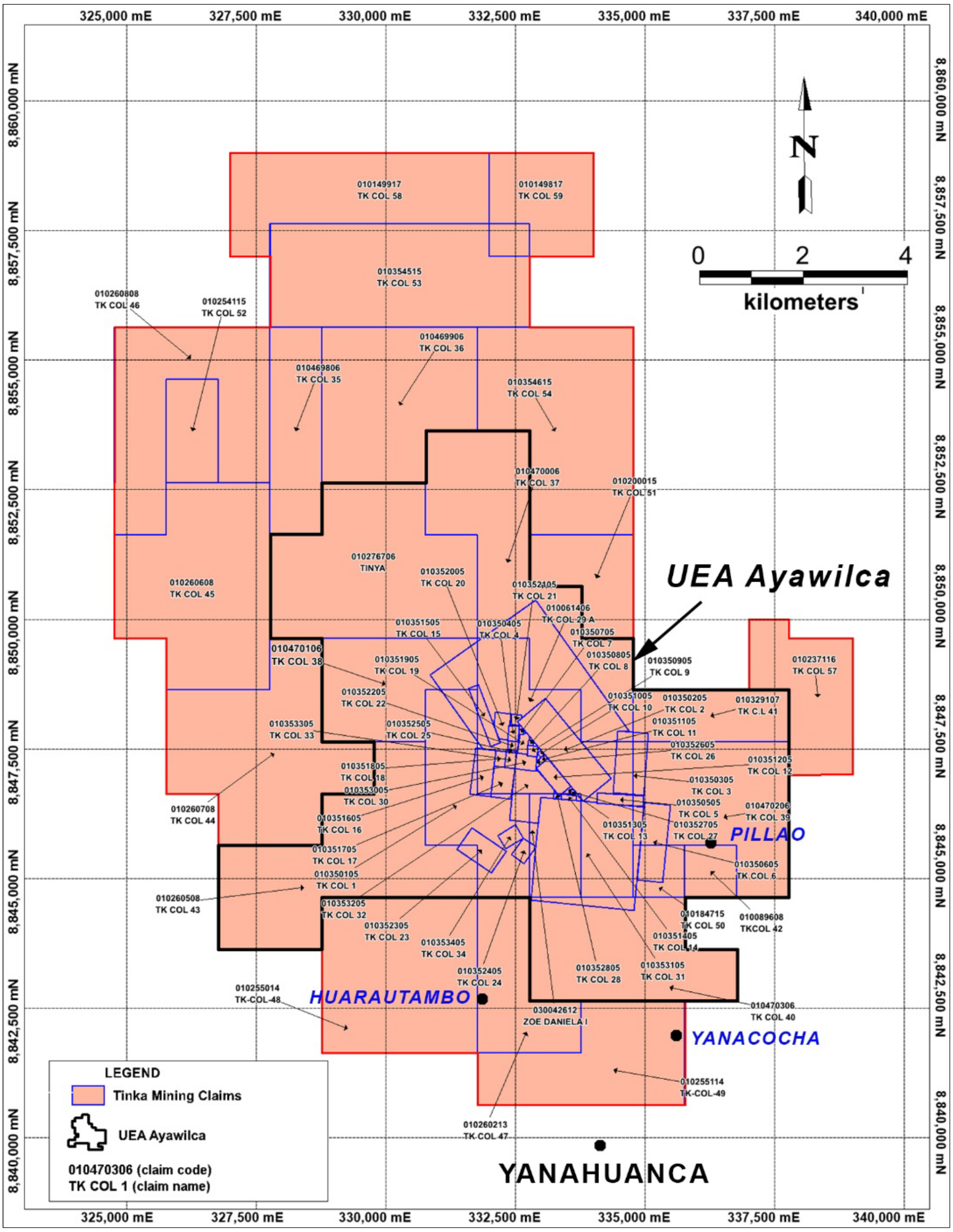
Tinka does not own any water rights in the Project area. Water rights cannot be purchased in Peru, but they are commonly granted for industrial or mining purposes.

Table 4-1: Mineral Tenure Summary

Code	Mining Right	Granted Area (ha)	Effective Area (ha)	Grant Date	District	Province	Department	Registry Card (Huancayo)	Royalty
10350105	TK COL 1	500	378.402	10.03.06	Yan and SPP	DAC	Pasco	11095515	Yes
10350205	TK COL 2	139.8185	139.8185	01.03.06	SPP	DAC	Pasco	11095514	Yes
10350305	TK COL 3	71.8975	71.8975	21.02.06	SPP	DAC	Pasco	11095521	Yes
10350405	TK COL 4	5.9914	5.9914	23.02.06	SPP	DAC	Pasco	11095477	Yes
10350505	TK COL 5	17.9747	17.9747	17.07.06	SPP	DAC	Pasco	11095522	Yes
10350605	TK COL 6	74.8932	74.8932	23.02.06	SPP	DAC	Pasco	11095480	Yes
10350705	TK COL 7	0.9354	0.9354	11.04.06	SPP	DAC	Pasco	11095523	Yes
10350805	TK COL 8	0.9973	0.9973	17.03.06	SPP	DAC	Pasco	11095481	Yes
10350905	TK COL 9	3.9931	3.9931	23.02.06	SPP	DAC	Pasco	11095482	Yes
10351005	TK COL 10	0.9343	0.9343	03.03.06	SPP	DAC	Pasco	11095476	Yes
10351105	TK COL 11	1.9525	1.9525	10.04.06	SPP	DAC	Pasco	11095485	Yes
10351205	TK COL 12	20.6575	20.6575	18.04.06	SPP	DAC	Pasco	11095506	Yes
10351305	TK COL 13	0.9895	0.9895	06.03.06	SPP	DAC	Pasco	11095507	Yes
10351405	TK COL 14	2.9956	2.9956	16.05.06	SPP	DAC	Pasco	11095509	Yes
10351505	TK COL 15	23.9654	23.9654	29.03.06	SPP	DAC	Pasco	11095483	Yes
10351605	TK COL 16	35.9489	35.9489	10.03.06	SPP	DAC	Pasco	11095484	Yes
10351705	TK COL 17	23.9659	23.9659	10.03.06	SPP	DAC	Pasco	11095511	Yes
10351805	TK COL 18	5.9916	5.9916	06.03.06	SPP	DAC	Pasco	11095512	Yes
10351905	TK COL 19	7.0627	7.0627	03.03.06	SPP	DAC	Pasco	11095513	Yes
10352005	TK COL 20	13.4187	13.4187	31.05.06	SPP	DAC	Pasco	11095488	Yes
10352105	TK COL 21	3.3943	3.3943	29.03.06	SPP	DAC	Pasco	11096126	Yes
10352205	TK COL 22	3.6568	3.6568	10.04.06	SPP	DAC	Pasco	11096115	Yes
10352305	TK COL 23	39.9432	39.9432	13.03.06	Yan	DAC	Pasco	11096125	Yes
10352405	TK COL 24	11.9829	11.9829	23.02.06	SPP and Yan	DAC	Pasco	11096124	Yes
10352505	TK COL 25	0.7507	0.7507	01.03.06	SPP	DAC	Pasco	11096113	Yes
10352605	TK COL 26	1.2949	1.2949	10.05.06	SPP	DAC	Pasco	11096123	Yes
10352705	TK COL 27	1.4376	1.4376	06.03.06	SPP	DAC	Pasco	11096121	Yes
10352805	TK COL 28	1.4662	1.4662	29.03.06	SPP	DAC	Pasco	11096119	Yes
10061406	TK COL 29A	548.0939	548.0939	06.05.06	SPP	DAC	Pasco	11096118	Yes
10353005	TK COL 30	11.5095	11.5095	10.03.06	SPP	DAC	Pasco	11096111	Yes

Code	Mining Right	Granted Area (ha)	Effective Area (ha)	Grant Date	District	Province	Department	Registry Card (Huancayo)	Royalty
10353105	TK COL 31	399.0803	399.0803	03.03.06	SPP and Yan	DAC	Pasco	11096109	Yes
10353205	TK COL 32	61.7518	61.7518	23.02.06	SPP	DAC	Pasco	11096116	Yes
10353305	TK COL 33	5.9914	5.9914	01.03.06	SPP	DAC	Pasco	11096108	Yes
10353405	TK COL 34	11.9829	11.9829	15.03.06	SPP and Yan	DAC	Pasco	11096114	Yes
10469806	TK COL 35	400	400	07.03.07	SMC and SPP	Lauricocha and DAC	Huanuco and Pasco	11118739	Yes
10469906	TK COL 36	800	800	05.03.07	SMC	Lauricocha	Huanuco	11118744	Yes
10470006	TK COL 37	1,000	770.971	19.04.07	SMC and SPP	Lauricocha and DAC	Huanuco and Pasco	11118738	Yes
10470106	TK COL 38	500	446.534	30.03.07	SPP	DAC	Pasco	11118749	Yes
10470206	TK COL 39	700	617.313	28.05.07	SPP, Tap and Yan	DAC	Pasco	11118754	Yes
10470306	TK COL 40	700	670.126	14.03.07	Yan and SPP	DAC	Pasco	11118747	Yes
10329107	TK COL 41	300	294.75	12.12.07	SPP, Tap and Yan	DAC	Pasco	11118736	Yes
10089608	TK COL 42	100	100	30.09.08	SPP	DAC	Pasco	11155443	Yes
10260508	TK COL 43	1,000	992.161	30.09.08	SPP and Yan	DAC	Pasco	11155446	Yes
10260708	TK COL 44	1,000	1,000	23.10.08	SPP and Yan	DAC	Pasco	11155442	Yes
10260608	TK COL 45	1,000	1,000	30.09.08	SMC and SPP	Lauricocha and DAC	Huánuco and Pasco	11155445	Yes
10260808	TK COL 46	800	800	30.09.08	SMC	Lauricocha	Huánuco	11155447	Yes
10276706	Tinya	1,000	1,000	14.09.06	SMC and SPP	Lauricocha and DAC	Huánuco and Pasco	11120829	—
10260213	TK COL 47	400	400	12.02.14	Yan	DAC	Pasco	11197133	—
10255014	TK COL 48	900	900	25.04.17	Yan	DAC	Pasco	11244332	—
10255114	TK COL 49	600	600	26.06.15	Yan	DAC	Pasco	11214956	—
30042612	Zoe Daniela I	200	12.6595	31.03.14	SPP and Yan	DAC	Pasco	11196701	—
10200015	TK COL 51	300	300	23.07.15	SPP	DAC	Pasco	11217508	—
10254115	TK COL 52	200	200	30.09.15	SMC	Lauricocha	Huanuco	11219714	—
10354515	TK COL 53	1,000	1,000	17.10.16	SMC	Lauricocha	Huanuco	11235788	—
10354615	TK COL 54	1,000	1,000	17.10.16	SMC and SPP	Lauricocha and DAC	Huanuco and Pasco	11235790	—
10149917	TK COL 58	1,000	732.224	08.09.17	SMC	Lauricocha	Huanuco	11253995	—
10149817	TK COL 59	400	350. 9510	17.11.17	SMC	Lauricocha	Huanuco	11255954	—
10184715	TK COL 50	100	57.2085	16.02.18	SPP	DAC	Pasco	11259087	—
10237116	TK COL 57	600	428.624	28.12.17	SPP and Tap	DAC	Pasco	11259089	—

Notes: Yan = Yanahuanca; SPP = San Pedro de Pillao; SMC = San Miguel de Cauri; Tap = Tapuc; DAC = Daniel A. Carrion. Royalty is payable to Sierra Peru Pty Ltd



Note: Figure prepared by Tinka, 2024.

Figure 4-1: Mineral Tenure Location Plan

4.5.4 Royalties and Encumbrances

A 1% NSR royalty is payable to Sierra Peru Pty Ltd ("Sierra") on mining concessions TK COL 1 to TK COL 46 (refer to Table 4-1). The royalty was recorded in the Public Registry by means of a Public Deed dated January 10, 2013, on behalf of Public Notary Dr. Jaime Alejandro Murguia Cavero.

This NSR royalty can be purchased by Tinka at any time before January 10, 2028 for US$1 million.

4.5.5 Property Agreements

Tinka has conducted exploration based on agreements allowing for exploration activities with three communities who hold surface rights in the Ayawilca Project area:

- Community of San Juan de Yanacocha;
- Community of Huarautambo; and
- Community of San Pedro de Pillao.

Tinka has current agreements with the communities of San Juan de Yanacocha and Huarautambo and is negotiating a renewal of the agreement with San Pedro de Pillao.

New agreements will be required with these communities to enable exploitation activities to be undertaken.

Community of San Juan de Yanacocha

A usufruct agreement with the community of San Juan de Yanacocha was recorded as a Public Deed on May 25, 2022, with a validity of three years. The agreement covers 316.7 ha. The community of Yanacocha holds the surface rights over a large portion of the Ayawilca deposit.

Community of Huarautambo

On May 31, 2023, an addendum to the usufruct agreement with community of Huarautambo dated December 1, 2021, was recorded as a Public Deed. The addendum modifies the term of validity of the agreement covering 150 ha, establishing a term of three years starting from October 1, 2022. The community of Huarautambo holds the surface rights over a minor portion of the Ayawilca deposit.

Community of San Pedro de Pillao

The most recent easement agreement with the community of San Pedro de Pillao dated December 20, 2016, covering 471.08 ha expired on February 9, 2021. Tinka is currently negotiating a renewal of this agreement. The community of Pillao holds surface rights over the Colquipucro area.

4.6 Permitting Considerations

Permitting considerations to enable exploitation activities as described in this PEA are discussed in Section 20.

4.7 Environmental Considerations

Environmental considerations relevant to the current exploration and proposed exploitation activities are discussed in Section 20.

There is an expectation of environmental liabilities associated with historical mining and exploration activity.

MINEM has one liability, an adit, listed in the Environmental Mining Liabilities (“PAM” in the Spanish acronym) registry for the Ayawilca Project. This site is located within the TK COL 1 and TK COL 24 concessions.

As required by local legislation, Tinka prepared a list of historical mining activity areas in 2018, and provided it to MINEM. The Tinka survey identified 178 artisan-related sites, which included adits, waste rock dumps, prospecting pits, glory holes, underground mine workings, and trenches. These sites are located within the TK COL 1, TK COL 16, TK COL 17, TK COL 18, TK COL 30, TK COL 2, TK COL 29A, TK COL 19, TK COL 25, TK COL 33, TK COL 34, ZOE DANIELA 1, TK COL 6, TK COL 50, and TK COL 24 concessions.

Under Law No. 28271, the responsibility for the remediation of environmental liabilities lies with the person or company that generated the liability. In the case of historical liabilities where the entity or person who generated the liability is unknown, the state-owned company Activos Mineros S.A.C. is charged with remediation on behalf of the Government.

4.8 Social License Considerations

Social licence considerations are discussed in Section 20.

4.9 QP Comments on Section 4

The legal opinion and additional information provided by Tinka experts supports the following:

- Tinka has a 100% ownership interest;
- Mineral concessions are valid and reported to be in good standing according to a legal opinion (Dentons, 2004);
- A 1% NSR royalty is payable to Sierra Peru Pty Ltd on mining concessions TK COL 1 to TK COL 46. This NSR royalty can be purchased by Tinka at any time before January 10, 2028 for US$1 million;
- Tinka has agreements in place to allow for exploration activities with two communities who holds surface rights in the Ayawilca Project area and is negotiating an extension with another community. New agreements will be required with these communities to enable exploitation activities.
- Water used in Tinka’s exploration programs was obtained from approved water sources and the volumes used were also approved. Obtaining water permits is a pre-requisite in Peru prior to any drilling being undertaken. Tinka does not own any water rights in the Project area. Water rights cannot be purchased in Peru, but they are commonly granted for industrial or mining purposes; and
- There is an expectation of environmental liabilities associated with historical mining and exploration activity, which in the Project area are mostly assumed by the state. MINEM has assumed responsibility for an existing liability, an adit, within TK COL 1 and TK COL 24 concessions. Tinka has identified numerous historical mining-related sites within the TK COL 1, TK COL 16, TK COL 17, TK COL 18, TK COL 30, TK COL 2, TK COL 29A, TK COL 19, TK COL 25, TK COL 33, TK COL 34, ZOE DANIELA 1, TK COL 6, TK COL 50, and TK COL 24 concessions.

The QP notes the following risks which, in the opinion of the QP, can be effectively mitigated and managed:

- Surface rights to enable exploitation activities have not yet been secured. There is a risk that these rights may take longer to secure than scheduled or may cost more than budgeted.
- There is a risk that the community agreements required as part of securing land access may not be obtained in line with schedule assumptions or may not be obtained at all. The QP however notes that, to date, Tinka’s relationships with surrounding communities appear constructive and that these communities would likely support future development of the Project.

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, AND PHYSIOGRAPHY

5.1 Accessibility

The Project is accessible by road, travelling 310 km north from Lima via the Pan American Highway to Huaral, then by paved road to Oyón and by a well-maintained all-weather road to Yanahuanca (refer to locations shown in Figure 2-1). Paving is underway from Oyón to Yanahuanca. Travel by road from Lima to Yanahuanca takes approximately seven hours. The Project area is then accessed from Yanahuanca by a well-formed graded road a further 15 km through the hamlets of San Pedro de Pillao or San Juan de Yanacocha. The section of the road from Yanahuanca to San Pedro de Pillao is paved.

Alternative access is provided by the road from Oyón to the Project via the Raura mine, which is a similar overall distance to Lima, and is the preferred route for heavy equipment to and from the Project and has fewer communities along it.

The Central Highway provides yet another alternative from Lima, 300 km east to Cerro de Pasco, then a further 65 km north–northwest by paved road to Yanahuanca.

5.2 Climate

The mean annual temperature for the Project area during daytime is 15°C; however, temperatures vary significantly with altitude and season. There is a rainy season which generally lasts from October to March, and light snow occasionally falls in the higher elevations although typically melts within a few hours. Winter typically occurs from May to September and is generally dry, with clear daytime skies and cool nights. The Project is accessible all year round.

5.3 Local Resources and Infrastructure

Cerro de Pasco, approximately 40 km from the Project, is the regional capital and an important mining supply centre. Labour in support of exploration activities can be locally sourced from the communities of San Pedro de Pillao, San Juan de Yanacocha and Huarautambo, and the town of Yanahuanca.

Permanent infrastructure on the Project includes a well maintained regional unpaved road, a network of exploration drill roads used to access drill sites, and a 30-person exploration camp located within the Project. Two high voltage (220 kV) powerlines cross the Project area. Tinka has ascertained that there is sufficient available power on these powerlines for a future mine at Ayawilca.

There is a steady source of water for exploration activities from streams, springs, and lakes. Tinka has constructed water ponds close to the camp site at the project which are permitted water sources for exploration activities, and these fill during the wet season. The water courses dry up during the winter months at the altitude of the Ayawilca camp site.

Additional discussion on infrastructure considerations is included in Section 18.

5.4 Physiography

The Project is situated on the eastern side of the Andes Mountains in central Peru. Elevations range from 3,300 masl to a maximum of about 4,459 masl at Cerro San Lorenzo near the westernmost part of the Project area. The elevation of the Ayawilca camp site is 4,200 masl, while the area covering most of the Mineral Resources is typically gently dipping and lies between 4,150 and 4,250 masl.

Vegetation is sparse above 3,800 masl. At higher elevations, there are grasses and various moss and lichens. Lower elevations are characterized by small or thorny shrubs and minor cacti, while eucalyptus trees are common.

Subsistence agriculture is spread throughout the countryside and includes potato, corn, and various other crops. Above about 3,800 masl potatoes are commonly the only crop grown.

5.5 Seismicity

According to the Peruvian Technical Regulation for Seismic Design, the Project is located within Seismic Zone 3 (Figure 5-1). This zone is considered to be highly seismic. In future stages, a site-specific seismic hazard study must be performed, and will provide spectra and accelerations corresponding to the seismic conditions affecting the Ayawilca site.

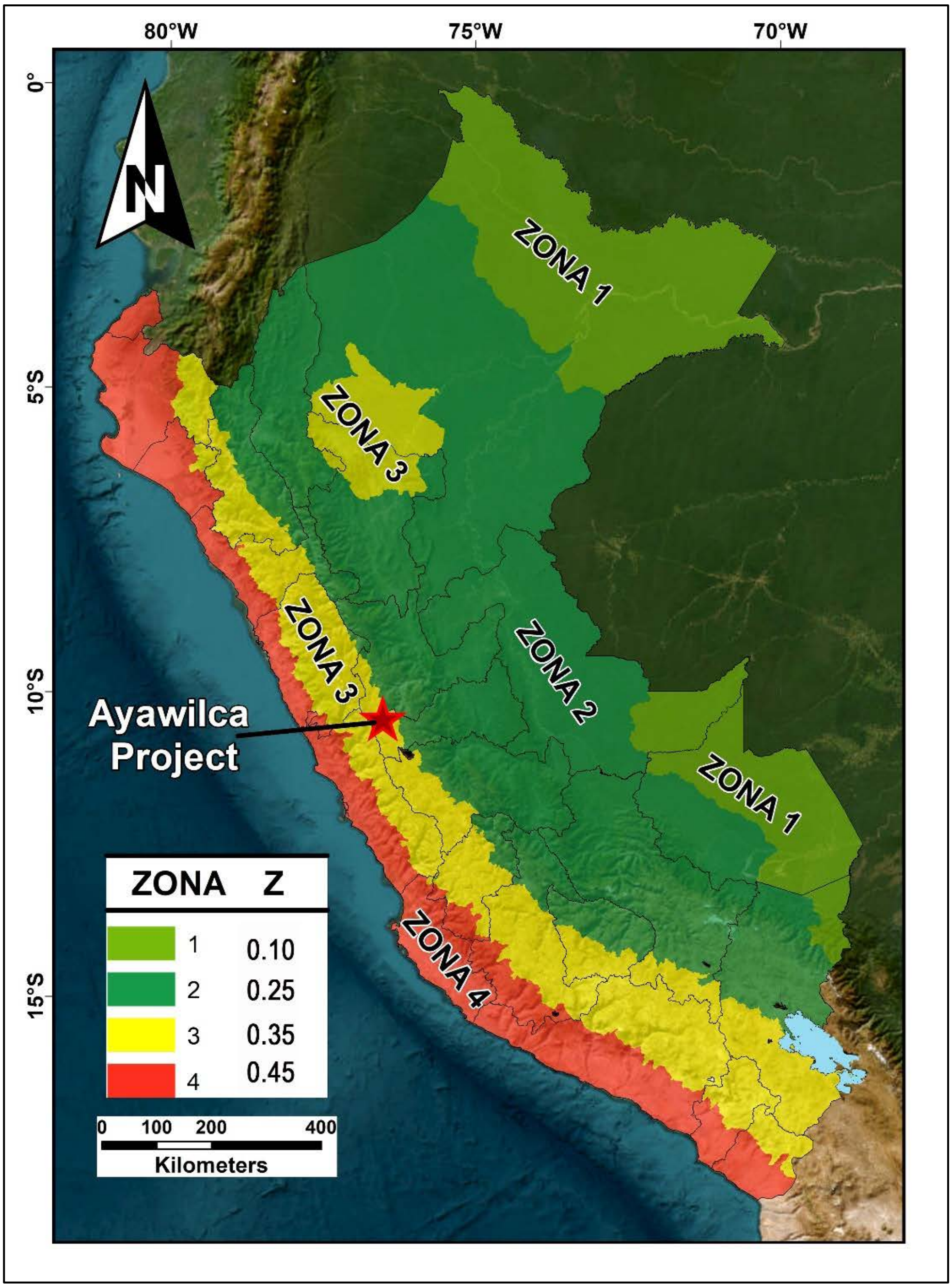
5.6 QP Comments on Section 0

The existing local infrastructure, availability of staff, and methods whereby goods could be transported to the Project to support exploration activities are well understood by Tinka, and can support the declaration of Mineral Resources and support evaluation at the 2024 PEA stage.

There is sufficient area within the tenure holdings to allow for construction of all mine- and process-related facilities.

Tinka currently has no surface rights holdings in support of mine construction or operations. Tinka holds and expects to hold surface rights in the Project area to support exploration activities through agreements concluded with local communities.

Adjacent mining operations are conducted year-round, and it is expected that any operation conducted by Tinka would also be year-round.



Note: Figure from Resolución Ministerial N°355-2018-VIVIENDA. Zona = seismic zone. Numbers to the right of each seismic zone number represent the peak ground acceleration (g) for each zone.

Figure 5-1: Peruvian Seismic Zones

6 HISTORY

6.1 Prior Ownership, Exploration and Development History

The Colquipucro area was the subject of small-scale historical mining, as evidenced by the numerous small adits, an old stone camp, and a stone chimney. Several horizontal crosscuts, raises, and drifts, as well as a small retort used to dry silver ores, are attributed to 1920–1950s-era activities.

Several exploration adits were developed into the hillside at Colquipucro from 1950–1954 to explore for silver, performed by Compañia Minera Colquipucro S.A. The site was optioned to Cerro de Pasco Corporation and to Compañia Minera Buenaventura (Buenaventura) in 1954 and 1960, respectively.

During the 1990s, Buenaventura drilled four holes in the valley area immediately to the south of Colquipucro exploring for zinc in the Pucará limestones. Gossans were also mapped, and trench sampled. In 2005, the claims lapsed and became available for staking, and Tinka staked new claims over the expired claim areas.

Tinka’s work program, discussed in more detail in Section 9, has included geological mapping; soil, rock chip, and underground workings sampling; ground magnetic; induced polarization (IP); resistivity; gravity; magnetic and electromagnetic geophysical surveys; airborne geophysical surveys; core drilling; metallurgical test work; hydrological drilling; Mineral Resource estimation; preliminary mining studies; and environmental studies. Tinka prepared a PEA in 2019 (2019 PEA) that evaluated underground mining of the Zinc Zone at a throughput of 5,000 tpd at a US$65/t cut-off. An updated PEA was prepared in 2021 (2021 PEA) that evaluated underground mining of the Zinc Zone at a throughput of 8,500 tpd at a US$65/t cut-off. This Report is an updated PEA (2024 PEA) and considers an evaluation of underground mining of the Zinc Zone at a throughput of 5,500 tpd at a US$60/t cut-off and of the Tin Zone at a throughput of 850 tpd at a US$80/t cut-off.

6.2 Historical Mineral Resource Estimates

No known Mineral Resource or Mineral Reserve estimates have been prepared by previous Project owners.

6.3 Historical Production

Available historical records reviewed by Tinka list the production from the Colquipucro deposit as:

- 1924: 1,397 kg Ag;
- 1930: 10.7 kg Au and 7,705 kg Ag; and
- 1949: 97 kg Ag.

There is no known modern production from within the Project area.

7 GEOLOGICAL SETTING AND MINERALIZATION

7.1 Regional Geology

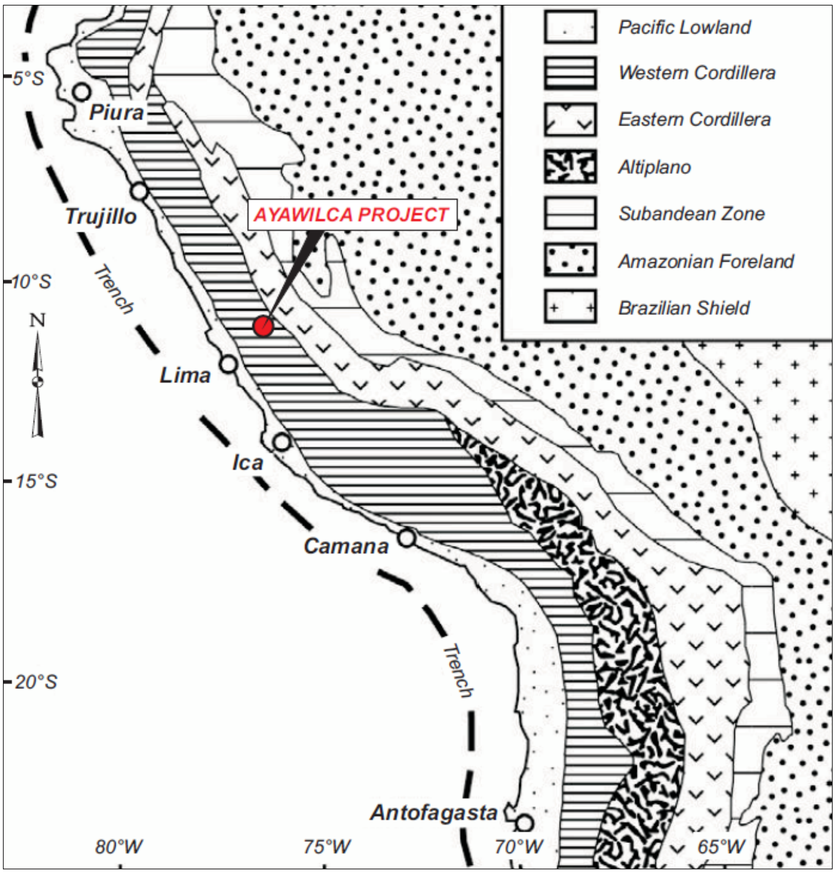
The geology of Peru, from the Peru-Chile Trench in the Pacific to the Brazilian Shield, is defined by three major parallel regions, from west to east: the Andean Forearc, the High Andes, and the Andean Foreland. All three regions were formed during Meso-Cenozoic evolution of the Central Andes. The Property lies within the High Andes region. A regional morpho-structural map is presented in Figure 7-1 and a regional geology map in Figure 7-2.The High Andes can be divided into three sections, from west to east:

- The Western Cordillera is composed of Mesozoic-Tertiary age rocks and the Coastal Batholith. The Coastal Batholith consists of multiple intrusions with ages ranging from Lower Jurassic to Upper Eocene. The Western Cordillera spans up to 65 km across and 1,600 km in length, running sub-parallel to the Pacific coast, extending into Ecuador and Chile. The Project is located in the Western Cordillera;
- The Altiplano is a high, internally drained plain situated at a mean elevation of approximately 4,000 masl, and is slightly below the average altitudes of the Western and Eastern Cordillera. The Altiplano is 150 km wide and 1,500 km long, extending from northern Argentina to central Peru;
- The Eastern Cordillera consists of a 4,000 masl mountain range that was uplifted during the Tertiary. Sedimentary rocks are Neoproterozoic, Paleozoic, and Mesozoic in age.

Stratigraphically, the High Andes region consists of, from west to east, an intra-arc trough, a deep basin, a continental shelf (within which the Project is located), and the Marañón metamorphic complex (the Marañón Complex). In general, the rock formations become progressively older from west to east, spanning from the mid-Tertiary to the Neoproterozoic-Paleozoic.

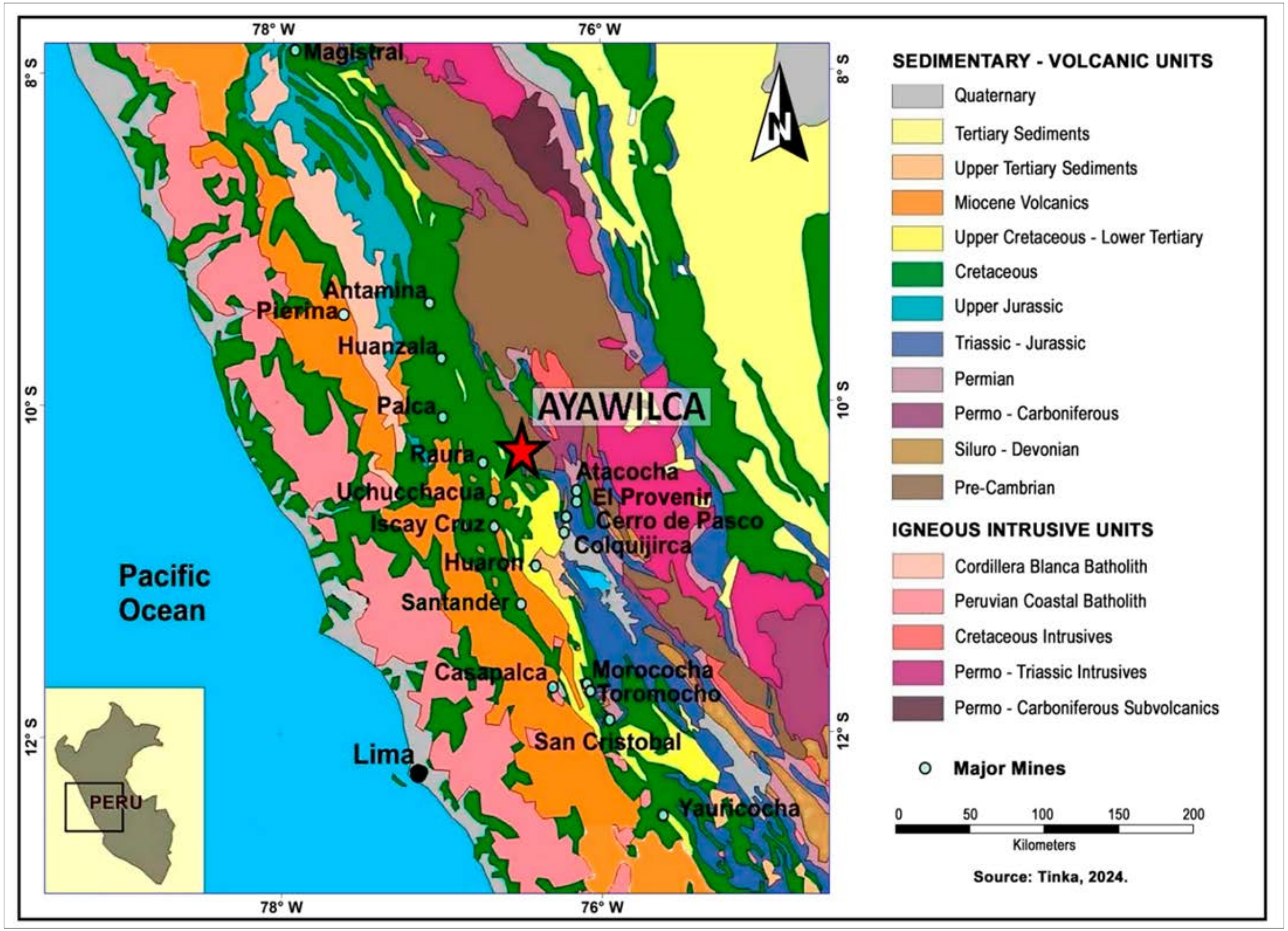
The Marañón Fold and Thrust Belt (“MFTB”) was a deformation event that formed during the Eocene epoch in response to east-northeast directed tectonic accretion and subduction in the northern half of Peru. Tight upright folds formed above a shallow detachment horizon towards the west, while more open folds formed above a deeper detachment horizon towards the east. The latter-type folds are observed at the Project. Further east, the style of deformation is different with steeply dipping reverse faults and open folds affecting the Neoproterozoic crystalline basement of the Eastern Cordillera (Pfiffner, O.A. et al, 2013).

The mineral deposits of central Peru consist of a variety of base and precious metal deposits in host rocks ranging in age from Permian (285 Ma) to late Miocene (6 Ma); however, the age of most mineral deposits is broadly related to Miocene (23 Ma to 7 Ma) intrusions. The Ayawilca tin mineralization has been dated as 23 Ma from U–Pb age dating of cassiterite (Benites et al, 2021). Deposit types in central Peru include polymetallic carbonate replacement deposits (CRD), polymetallic vein, zinc-copper skarn, copper-zinc skarn, porphyry deposits, and epithermal gold-silver deposits. The largest zinc-dominant deposit in the region is the historically mined Cerro de Pasco. The Colquijirca Mine (owned by Sociedad Minera el Brocal) and the San Gregorio project (undeveloped), located approximately 10 km south of Cerro de Pasco, are also large zinc-rich CRDs.



Note : Figure from RPA, 2019. Information after Jaillard et al., 2000, Sebrier et al., 1988, and Wipf, 2006.

Figure 7-1: Morphostructural Map



Source: Tinka, 2024

Figure 7-2: Regional Geology

7.2 Project Geology

The Project is underlain by sedimentary and metasedimentary stratigraphy ranging from Paleozoic to Tertiary age (Figure 7-3). The entire sequence has been folded and thrusted along north-northwest trending Andean faults, while trans-Andean faults orientated northeast or east-west are interpreted as either trans-tensional or transpressional.

The oldest rocks in the area belong to the Marañón Complex and consist of schist, gneiss, and meta-intrusive rocks. Phyllite outcrops in the Project area form part of the Devonian-age Excelsior Group, a component of the Marañón Complex.

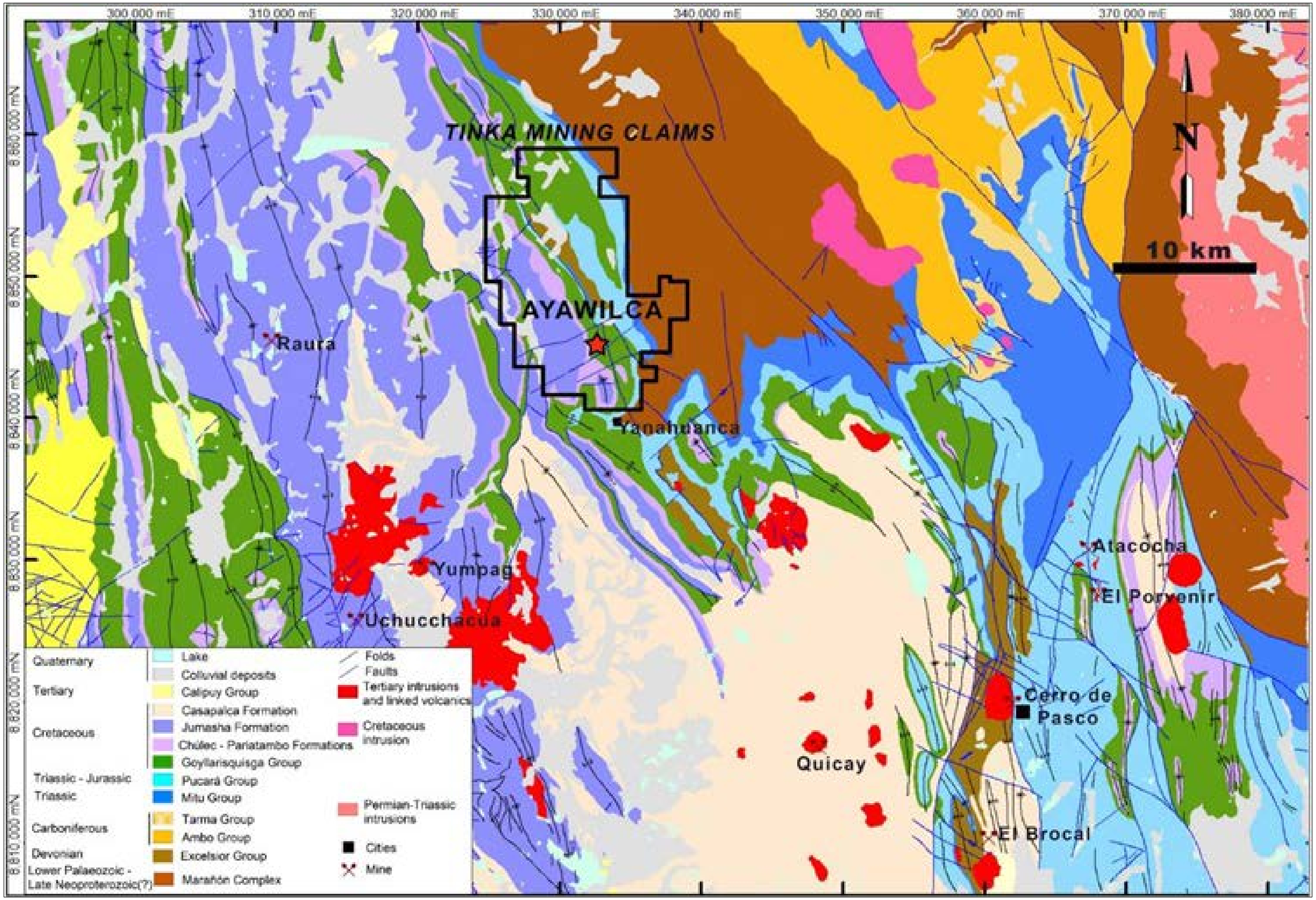
The Permian to lower Triassic Mitu Group consists of red-bed terrestrial sediments including sandstone, conglomerate, and intercalated mudstone. The Mitu Group, which can be up to 100 m thick, is observed as a sequence of conglomerate and sandstone beds in the northern part of the Project area. In the immediate area of the Ayawilca deposit, Mitu Group rocks are not observed and are believed to have been faulted out of the sequence.

Upper Triassic to lower Jurassic Pucará Group limestone is the predominant host for both zinc-silver and tin mineralization in the Project area. Pucará Group limestone is also an important host of base metal mineralization elsewhere in the region, including Cerro de Pasco and Atacocha.

The Pucará Group limestone is divided regionally into three formations: the lowermost Chambará Formation consisting of dolostone and subordinate limestone, the Aramachay Formation composed of bituminous shale, and the upper Condorsinga Formation dominated by shallow-water limestone. The Pucará Group has not been differentiated in the Project area. Studies suggest that the Pucará was formed within a north–northwest-trending, elongated, post-rift basin complex (Rosas et al., 2007).

The Lower Cretaceous Goyllarisquizga Group (Goyllar sandstone or Goyllar Group) lies disconformably above Pucará Group rocks, overlying the base metal mineralization at Ayawilca. The Goyllar Group consists of thick deltaic quartzose sandstones commonly cross-bedded with minor shale, coal, and limestone (Redwood, 2004). The Goyllar Group consists regionally of four formations, from bottom to top: Chimu, Santa, Carhuaz, and Farrat. Ingemmet has classified these rocks as undifferentiated in the Project area, however, the description of the Chimu Formation (white quartz sandstone, dark shale, and minor coal beds) best fits the lithologies found. The Goyllar sandstones are typically gently dipping at 5° to 10° to the southeast forming a flat-lying cap to the Ayawilca deposit.

Regional mapping emphasizes fold-and-thrust belt systems as the prominent structural feature in the region (Cobbing, E.J. et al, 1996). The area west of the Project consists of complexly folded and thrust-faulted Cretaceous sedimentary rocks and less deformed early to middle Tertiary andesitic volcanic rocks (Coney, Peter J., 1971).



Note: Figure prepared by Tinka, 2024.

Figure 7-3: Local Geology Map

7.3 Deposit Geology

The Project geology as mapped and interpreted by Tinka is presented in Figure 7-4 and Figure 7-5. The deposit geology is largely based on the information assembled from several drill programs from the initial 2012-2013 drill program to the most recent drill program in 2022-2023.

For the current 2024 study, Mineral Resources were estimated at the Zinc Zone, Silver Zone, and Tin Zone, and Mineral Resources were estimated in 2016 for the Colquipucro deposit (see additional discussion in Section 14). Prospects that have seen little to no drilling include Chaucha, Valley, Far South, Yanapizgo, Pucarumi, and Tambillo.

7.3.1 Sedimentary Rocks

Phyllite metamorphic rocks belonging to the Devonian Excelsior Group outcrop in the north–central and eastern portions of the Project, consist of quartz–muscovite-biotite-plagioclase phyllite and weakly metamorphosed shale which can contain graphitic horizons. Phyllite outcrops two kilometres to the north of the Ayawilca deposit are associated with a ‘basement high’ anticlinal structure approximately seven kilometres long and 1.5 km wide, striking north-northwest (Figure 7-4). The upper surface of the phyllite has a gentle plunge to the south, and at Ayawilca the phyllite is typically intersected in drilling at depths of between 300 m and 600 m from surface.

The low-angle contact between the phyllite and the limestone is interpreted as a fault, as the top of the phyllite is commonly brecciated with sub-angular to sub-rounded clasts of quartz and phyllite. Also, the Mitu Formation is missing at the Ayawilca deposit, interpreted to have been faulted out.

Triassic–Jurassic age Pucará Group limestones overlie the phyllites of the Excelsior Formation and are often brecciated with evidence of karstification and dissolution, especially in proximity to mineralization. The limestone sequence is typically 200–250 m thick, with a tendency to thicken and deepen to the east. Bedding features are often difficult to decipher in the limestone. The limestone beds can contain fossil debris (bivalves and crinoids are most common). Shale horizons form important marker beds within the limestone unit, while calcareous sandstones and thin quartz arenite beds are seen locally.

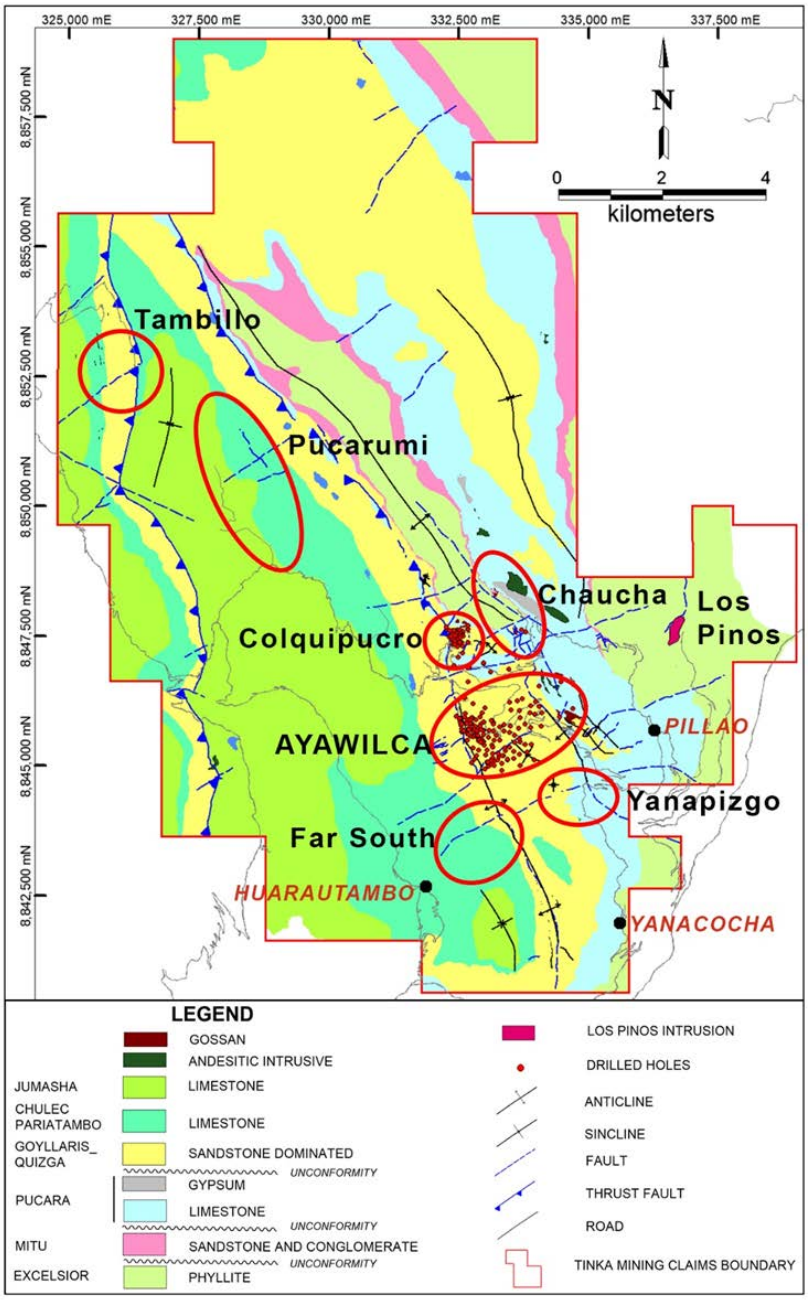
Cretaceous age Goyllar Group rocks are well-bedded quartz sandstones that overlie the carbonate rocks of the Pucará Group. The Goyllar sandstone has an average thickness of 150 m to 200 m. The Goyllar Group is subdivided by Tinka into three distinctive units based on facies types as follows: Upper Goyllar, Middle Goyllar, and Lower Goyllar.

The Lower Goyllar is dominated by interbedded sedimentary breccia, pebble conglomerate, carbonaceous shale with local thin coal seams, grit, and coarse-grained sandstone. The Lower Goyllar unit is between 10 m to 80 m thick, with significant local variations.

The Middle Goyllar unit is a sequence of cross-bedded quartz arenite between 50 m and 100 m thick. Quartz arenite of the Middle Goyllar is well sorted with rounded and interlocking grains suggesting a deltaic environment. The Middle Goyllar is believed to be similar to the Chimú Formation mapped elsewhere in central Peru.

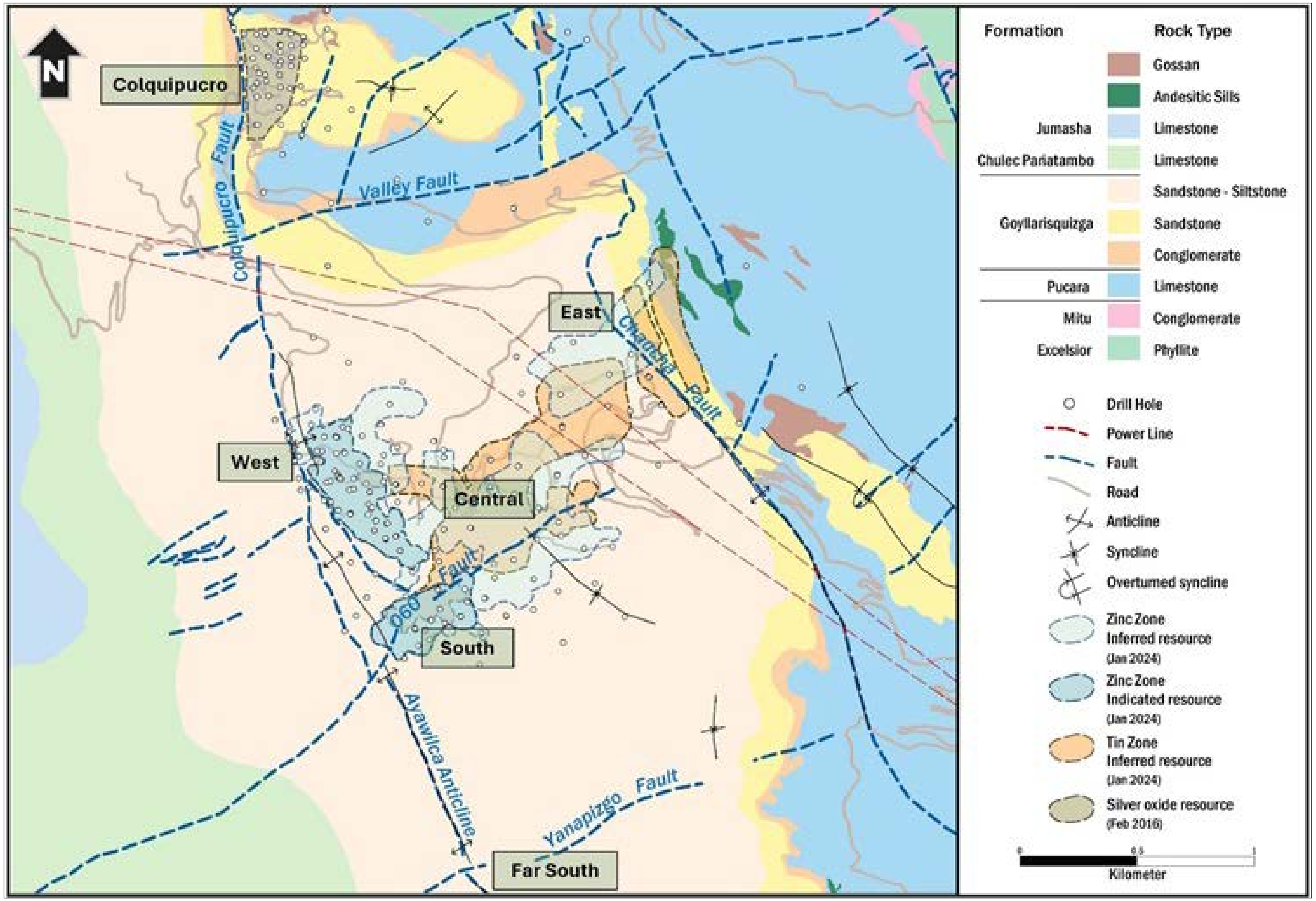
The Upper Goyllar unit is dominated by impure sandstone, siltstone, and mudstone and is typically 50 m to 150 m thick. The top of the Upper Goyllar forms the current surface above the Ayawilca resource area. These rocks are undeformed and unaltered over much of the Ayawilca deposit except for minor manganese coatings on fractures.

Lying conformably above the Goyllar Group is a series of carbonate rich formations of Middle to Upper Cretaceous age. The lowermost of these units is the Chúlec–Pariatambo Formation, which is 100 m to 200 m in thickness and consists of thinly bedded fossiliferous limestone with abundant reef fauna. The Jumasha Formation is a thickly bedded micritic limestone and can be hundreds of metres in thickness. None of these formations are encountered in drill core in the Ayawilca deposit resource area.



Source: Tinka, 2024

Figure 7-4: Project Geology Plan



Source: Tinka, 2024

Figure 7-5: Detailed Project Geology

7.3.2 Igneous Rocks

There are no known intrusions associated with the mineralization at Ayawilca. Igneous rocks found within the Project area include andesitic dykes and sills that have intruded into the Pucará carbonate sequence, however, none have been observed in drill cores. Although these subvolcanic rocks have not been dated, similar types of dykes and sills are found elsewhere in the region and are believed to be of Jurassic age (i.e., pre-Goyllar Group). An intrusive porphyry has been mapped at an area known as Los Pinos, approximately 3 km northeast of Ayawilca at an elevation of approximately 3,300 masl. The Los Pinos porphyry has a granodiorite composition, and in outcrop covers an area of 300 m x 200 m. The porphyry exhibits moderate argillic alteration with pyrite veinlets and minor molybdenite.

7.3.3 Structure

Two sub-parallel northwest-trending faults parallel to the main Andean trend are important controls to the mineralization at Ayawilca. The Colquipucro Fault defines the western limit of the known mineralization at Ayawilca, while the Chaucha Fault, approximately 1.5 km to the east, defines the eastern limit of the basement high (see Figure 7-5). Between the two major faults, the sedimentary rocks are typically gently dipping to the southeast, however, close to the faults and further to the west and east, the beds are steeply dipping. The Colquipucro Fault is steeply dipping and interpreted as a major thrust fault; however, it is possible that this fault was originally a normal fault active during the formation of the Pucará basin.

Several trans-Andean northeast-trending faults are interpreted as younger trans-tensional faults. At least one of these faults, the 060 Fault, is hypothesized to be a major conduit for the mineralization at Ayawilca. The 060 Fault is steeply north dipping and generally aligns with the trend of the Tin Zone mineralization. The Silver Zone is hosted within the western end of the 060 Fault.

The sedimentary sequence is folded on an asymmetrical anticline near the westernmost limit of the basement high. The axis of this fold is approximately parallel to the trace of the Colquipucro Fault, with the western limb displaying steep dips to the west while the eastern limb has shallow dips to the southeast (5° to 9°). At South Ayawilca, the sedimentary sequence is folded into a recumbent anticline verging to the southwest, with strongly brecciated and mineralized Pucará Group limestone at its core.

7.3.4 Oxidation

At the Ayawilca deposits, oxidation of sulphides is negligible and appears to be restricted to a few metres near the surface. None of the deposits (i.e., Zinc Zone, Tin Zone, or Silver Zone) show any evidence of oxidation.

7.4 Mineralization

The Project hosts several styles of mineralization within numerous deposits, zones, and target areas. Mineral Resource estimates for the Ayawilca Zinc Zone, Silver Zone and Tin Zone, and for the Colquipucro deposit are discussed in Section 14. Other target areas within the Project area that warrant additional exploration work, including drilling, are described in Section 7.5 and include Chaucha, Valley, Far South, Yanapizgo, Pucarumi, and Tambillo

7.4.1 Zinc-Lead-Silver Zone Mineralization

Zinc-lead-silver mineralization within the Ayawilca deposit, referred to as the Zinc Zone, is predominantly hosted within limestones of the Pucará Group. The Zinc Zone mineralization is complex in form, made up of multiple lenses or “mantos”, sub-vertical “pipes”, and irregular sulphide bodies all consisting of semi-massive to massive zinc-rich sulphides. There are four defined areas of mineralization that are modelled separately: West, South, Central, and East.

The four areas span a combined 2.1 km in the northeast–southwest direction and 1.3 km in the north–south direction. The West area is the largest and measures approximately 640 m in length in a north–south direction and 300 m to 450 m in an east–west direction. The South area measures approximately 550 m in length in the northeast–southwest direction and 250 m in the northwest–southeast direction. Most of the drilling activity at Ayawilca has occurred in the West and South areas.

At West Ayawilca, Zinc Zone mineralization appears to have been controlled by the axis of an anticline fold that parallels and lies just to the east of the Colquipucro Fault. Two subvertical breccia bodies or “pipes” host zinc mineralization within the hinge of the anticline, each with diameters of between 100 m and 150 m, and extend through the entire limestone sequence (up to 200 m vertically). Within the breccia bodies, zinc-rich sulphide mineralization occurs in the matrix of the breccias and typically forms semi-massive sulphides. Toward the base of the limestone sequence, massive sulphides have completely replaced the lower limestone unit and resulted in high-grade zinc-rich mantos-style mineralization. Similarly, at the upper limestone/lower Goyllar contact, sulphide-rich mantos have spread out on this flat-dipping lithological contact.

At South Ayawilca, continuous massive zinc-rich sulphide mineralization is concentrated within a recumbently folded (overturned) anticline that verges to the west. The South area represents the highest-grade area of zinc mineralization discovered at Ayawilca to date. Zinc mineralization takes the form of a series of stacked sulphide mantos plunging to the northeast (parallel to the 060 Fault). The mineralization is thickest and highest grade at the western end (close to the hinge of the recumbent fold) and gradually thins and deepens to the northeast. Very high-grade, massive zinc mineralization is especially concentrated along the overturned steeply-dipping contact between footwall sandstone and limestone.

Zinc occurs as various generations of sulphide impregnations, primarily composed of marmatite (a high-iron variety of sphalerite) and sphalerite (with purple to red–brown tones) and accompanied by abundant pyrite and iron carbonate (siderite). Sphalerite has commonly replaced earlier magnetite, and zones of the earlier magnetite-chlorite alteration of limestone rocks are common on the edges of the sulphide bodies. Less common sulphides accompanying sphalerite include pyrrhotite, galena, chalcopyrite, arsenopyrite, and silver sulphosalts. Multi-element geochemistry indicates that indium is correlated with the zinc mineralization. At Central and East Ayawilca, multiple zones of sulphide-rich mineralization that were intersected by the drill holes hosted in limestones are interpreted as flat-dipping mantos. Drill hole spacing at both the Central and East areas is significantly wider than at the South viand West areas, and the Mineral Resources in both areas are classified as Inferred.

Host rock alteration associated with zinc-rich mineralization is generally argillic alteration within the limestone host rocks. Disseminated clots of white clays (dickite) are common within and near the mineralization. Dickite and illite are widespread and were identified using short-wave infrared spectrometry. Higher temperature clays, such as pyrophyllite, are observed in the Central area, suggesting a possible higher temperature thermal aureole. Sandstones in the overlying Lower and Middle Goyllar above the Zinc Zone are typically silicified and brecciated up to several tens of metres from the contact.

Strong, pervasive chlorite alteration typically occurs immediately peripheral to the zinc mineralization areas and is commonly associated with pervasive magnetite alteration. Pyrite replacement bodies typically form a halo to the zinc mineralization and are intersected in holes around the fringes of the zinc mineralization at the West and South areas. Outward and upward from the zinc mineralization, manganese oxide is common in fractures and clots within the sandstone, forming an outer alteration halo.

7.4.2 Silver Zone Mineralization

Silver-rich mineralization with accompanying lead-zinc at Ayawilca occurs on the edges of the Zinc Zone and is associated with abundant hydrothermal carbonate and quartz and lesser quantities of sulphides. This zone of mineralization is referred to as the “Silver Zone”. Silver Zone mineralization consists of manganese-rich siderite, quartz, sphalerite, galena, and pyrite with silver-bearing sulphosalts such as proustite (and other “ruby silver” minerals). The Silver Zone occurs as a steeply north-dipping vein structure between three metres and 20 m wide, and hosted by the 060 Fault. The Silver Zone cuts the Zinc Zone mineralization at the South area and is interpreted as a late-stage epithermal phase of the overall Ayawilca mineralization sequence.

Silver Zone mineralization has only been drilled within the limestone host rock for approximately 500 m of strike length (along the 060 Fault) to a vertical depth of approximately 250 m. Potential exists for this style of mineralization to extend upwards into the sandstones and possibly to depth, as well as along strike where the mineralization remains open.

7.4.3 Tin Zone Mineralization

Tin mineralization at Ayawilca, referred to as the “Tin Zone”, consists of three styles:

- Cassiterite-pyrrhotite-pyrite-marcasite-siderite mineralization is hosted within a flat-dipping manto at South Ayawilca. This style of tin mineralization, which contains coarsely crystalline cassiterite, lies close to and is partly encapsulated by the Zinc Zone mineralization at South Ayawilca.
- Cassiterite-pyrrhotite-quartz-tourmaline-chalcopyrite mineralization is hosted within flat-dipping mantos at Central Ayawilca. These mantos, which are typically 5 m to 10 m in vertical thickness (but may be up to 50 m in thickness), occur at the contact of the Pucará Group limestones and the Excelsior Formation phyllite.
- Cassiterite-pyrrhotite-quartz-chalcopyrite veinlets that intersect Excelsior Group phyllites comprise the third type of tin mineralization occurring at Ayawilca. This style of mineralization is a minor component of the Tin Zone currently delineated at Ayawilca, however, the veinlets are interpreted as a stockwork zone potentially close to a feeder structure that has not yet been identified.

Mineral liberation analysis (MLA) and QEMSCAN mineralogical studies indicate that tin occurs predominantly as cassiterite, with very minor stannite. The pyrrhotite associated with the Tin Zone mineralization is strongly magnetic; the pyrrhotite itself is hypothesized to be the main source of the magnetic anomaly observed in ground and airborne datasets at Central Ayawilca.

7.4.4 Colquipucro Silver Mineralization

The Colquipucro silver deposit is hosted primarily within quartz sandstones of the Middle Goyllar Formation, with mineralization at or close to the surface. Silver mineralization at Colquipucro is oxidized, occurring with abundant iron oxides (goethite, jarosite) and manganese oxides in fractures and disseminations within pore spaces and fracture zones with no (or rare) sulphides. Historical mining for lead and silver focused on east–west-trending fracture zones that host high silver grades. The mined structures ranged from 1 m to 3 m in thickness. Mapping and sampling by Tinka of an old exploration adit that cuts across the mineralized structures demonstrated that there is lower grade disseminated silver mineralization between the fracture sets.

The Colquipucro deposit was modelled to include 10 north-dipping high-grade fracture zones, a gently dipping enriched basal zone, and a low-grade halo. Overall, the Colquipucro deposit measures 550 m in the north–south direction, 380 m in the east–west direction, and is a thickness of 75 m. Mineralization remains open down-dip to the west.

Sulphide minerals are rare, although galena is observed occasionally. The fracture-controlled mineralization is epigenetic and crosscuts the primary bedding.

7.4.5 Oxidation

At the Colquipucro deposit, oxidation generated from the breakdown of sulphides has caused deep weathering to an approximate depth of 150 m. Immediately north of the Colquipucro deposit are outcrops of brown-black ferruginous and manganiferous gossan that would have originally been sulphide in the limestone host rock.

7.5 Prospects

7.5.1 Chaucha

The Chaucha area is located one kilometre east of the Colquipucro deposit, above the village of Huachuacocha. Two drill holes were completed during 2017, targeting a discrete magnetic anomaly approximately 200 m in diameter beneath an outcrop of brecciated, manganese altered Goyllar sandstone. Drill hole A17-086 intersected 92 m of massive hematite ± magnetite ± pyrite, hosted in brecciated limestone. Hematite is replaced by magnetite. The iron oxides are later cut by massive pyrite with no other significant sulphides present. The Chaucha zone is interpreted to be a sub-vertical breccia pipe of unknown dimensions. No significant zinc mineralization was encountered in the drilling, however, the presence of significant iron oxides (hematite with magnetite) and pyrite is noteworthy and may be indicative of a more significant mineralization event.

7.5.2 Valley

The Valley area is located between the Zinc Zone and the Colquipucro deposit, approximately 700m north of the West Ayawilca resource boundary. The Valley target is defined by a broad magnetic anomaly of approximately 800 m x 150 m, oriented northeast–southwest. Five holes have been drilled by Tinka, with one drill hole intercepting anomalous zinc mineralization. Mineralization occurs with semi-massive sulphides consisting of sphalerite and pyrite, with minor galena and magnetite.

More recent geological interpretation by Tinka geologists identified potential on the footwall of the Colquipucro fault zone, interpreted to be an east-verging (west dipping) thrust fault, with Pucará limestone thrust eastward over Goyllar sandstone. The underlying limestone in the footwall of the fault is unexplored and may host feeder mineralization for the Colquipucro silver deposit.

7.5.3 Far South

The Far South area is located one kilometre south of South Ayawilca and is located in a structural position interpreted to be ‘down-plunge’ of Colquipucro and South Ayawilca mineralization along the Colquipucro Fault. The Far South area is highlighted by a zinc–lead soil anomaly in the outcropping sandstones, approximately 500 m x 200 m in dimension, at the intersection of the Colquipucro Fault and a northeast-trending structure emanating from the Yanapizgo area. The intersection of northwest and northeast structures appears to be an important control for mineralization elsewhere at Ayawilca, and exploration drilling is planned for the Far South area.

7.5.4 Yanapizgo

The Yanapizgo area is located two kilometres southeast of the Zinc Zone, where Pucará limestone is exposed at the base of a 300 m high cliff face. A series of millimetre- to centimetre-scale galena–sphalerite veinlets outcrop in Pucará limestone near the contact with Goyllar sandstone. At the contact, the veinlets are sub-horizontal, parallel to stratigraphy, and a smaller number of veinlets cut through the sandstone. Several small adits of unknown age have worked the lead–silver–zinc veinlets. Preliminary surface mapping identified sulphide mineralization over a north–south strike length of approximately 500 m. The mineralization at Yanapizgo is notably higher in lead content than the typical zinc mineralization at the Ayawilca deposit.

A magnetic anomaly with approximate dimensions of 400 m x 150 m, elongated east–west, is located approximately 300 m north of the mineralized outcrops at Yanapizgo. While the source of the anomaly is unknown, the magnetic anomaly is an excellent drill target given the association between magnetics and zinc mineralization at Ayawilca.

7.5.5 Pucarumi

The Pucarumi area, located eight kilometres northwest of the Zinc Zone, was identified by Tinka during regional prospecting and a review of magnetic anomalies. Mineralization occurs as zinc oxides in both manganese and iron gossan bodies along northeast–southwest trending structures and as disseminated zinc oxide hosted in the matrix of a chert-rich intraformational limestone breccia hosted by Chúlec-Pariatambo limestone. Two mineralized host breccias were identified, each measuring approximately two metres in thickness and traceable over a strike length of up to one kilometre. The source of the magnetic anomaly, which occurs approximately 700 m to the northeast of the mineralized outcrops, remains unexplained.

7.5.6 Tambillo

The Tambillo area, located 10 km northwest of the Zinc Zone, was identified by regional prospecting and review of magnetic anomalies. Tambillo is located near the northwestern corner of the Project area. Mineralization is dominated by massive pyrite flooding of a medium-grained quartz arenite of the Goyllar Group. Pyrite was mined in the past, evidenced by an old pit and the foundations of an abandoned camp. Soil sampling and a ground magnetic survey were carried out over the area in 2016, with no significant anomalies detected.

8 DEPOSIT TYPES

8.1 Ayawilca Zinc Zone and Tin Zone Deposits

The regional setting, geometry, and zinc mineralogy indicate that the Zinc Zone and Tin Zone of the Ayawilca deposit are CRDs, of which there are several other examples in central Peru (e.g., Cerro de Pasco, Morococha, Colquijirca, and San Gregorio). These deposits typically develop when hydrothermal fluids replace carbonate rocks proximal to an intrusive body, although in some cases the causative intrusion is distal or is not observed. CRDs are considered more distal from the source than porphyry and skarn deposits, and closer to the source than intermediate- (or low-) sulphidation epithermal precious metals deposits (Figure 8-1).

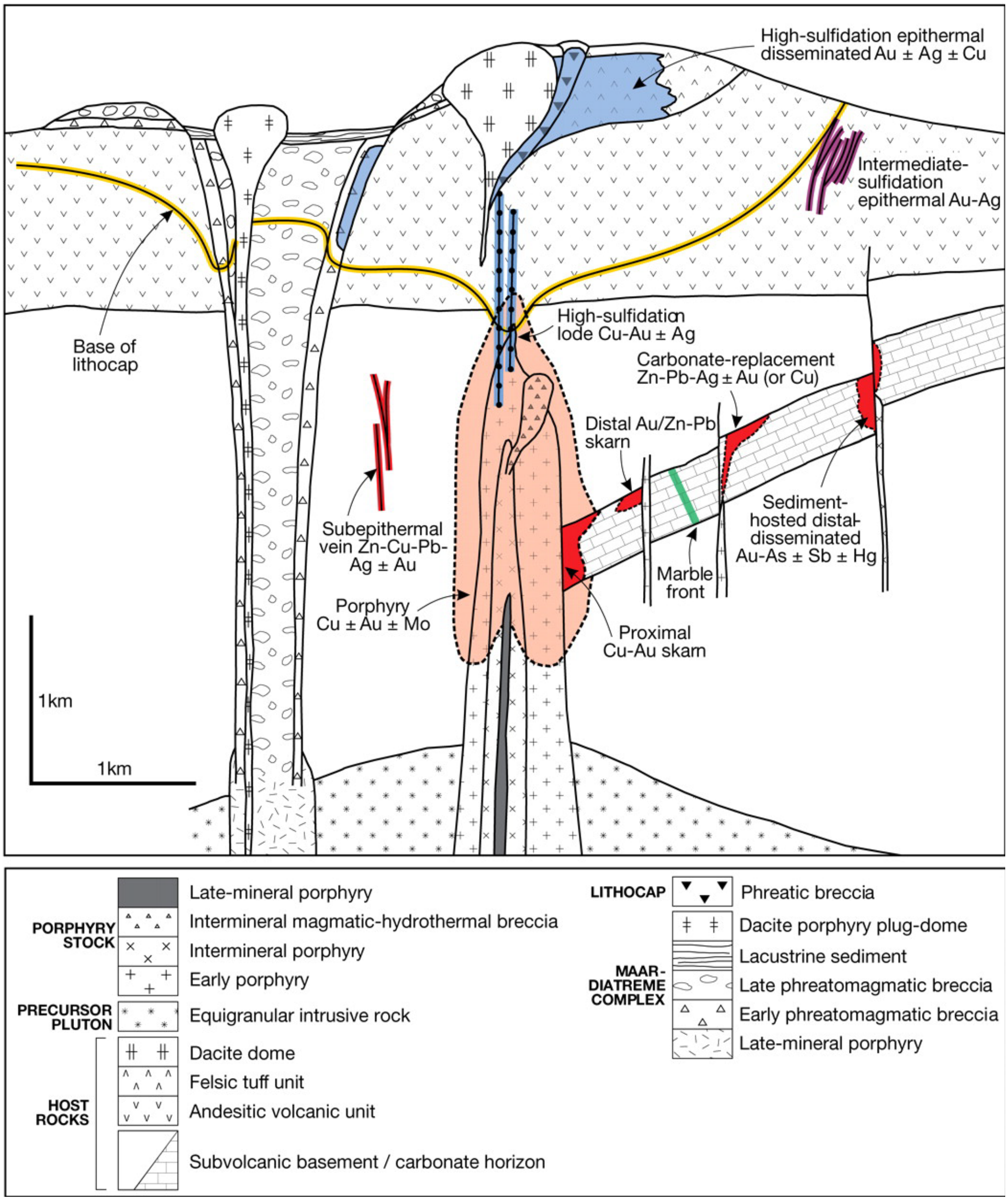
The Ayawilca deposit differs from most of the other CRDs in central Peru in that there is a documented early-stage tin (copper) mineralization event associated with pyrrhotite. The QP notes that early pyrrhotite is reported at the Cerro de Pasco deposit and contained anomalous tin; however, it was not as well developed as at Ayawilca.

Another important precursor to the mineralization at Ayawilca is the pervasive magnetite (together with chlorite and minor calc-silicates) that predates all sulphide mineralization and was extensively developed across the deposit. It presently exists only in relatively restricted lower-grade Zinc Zones at the South and West Ayawilca areas. The East Ayawilca area contains a substantial body of magnetite that appears in geophysical data as a prominent magnetic anomaly.

8.2 Ayawilca Silver Zone Deposit and Colquipucro Deposit

The Silver Zone at Ayawilca is interpreted as an intermediate sulphidation epithermal vein system that cuts both the tin mineralization (earliest) and the zinc-rich mineralization at South Ayawilca. Textures displayed by the carbonate-sulphide veins suggest banding and deposition within open space, typical of low temperature epithermal mineralization that likely formed as the hydrothermal system cooled.

The Colquipucro deposit is a sandstone-hosted disseminated silver deposit with silver hosted in fractures, faults, and veins with abundant iron oxides (goethite, jarosite) and as disseminations within the pore spaces of the sandstones. The Colquipucro deposit is tentatively classified as an intermediate sulphidation epithermal deposit that became oxidized above a paleo water table (Figure 8-1). It is interpreted that Colquipucro is an oxidized form of the Silver Zone mineralization, that is, sulphides at Colquipucro have almost completely oxidized to Fe oxides and manganese-rich iron carbonates are altered to Mn-Fe oxides.



Note: Figure from Sillitoe (2010).

Figure 8-1: Generalized Model for CRD–Porphyry Deposits

8.3 QP Comments on Section 8

In the opinion of the QP, exploration programs that use a CRD geological model are particularly applicable to the Project area. Drilling programs at the Ayawilca deposit were designed using the CRD geological model, targeting prospective carbonate geology that typically host this style of mineralization. Intermediate-sulphidation epithermal models could be employed in the Ayawilca deposit Silver Zone and Colquipucro deposit.

9 EXPLORATION

9.1 Grids and Surveys

At the beginning of 2013, Tinka contracted PRW Ingeniería y Construcción to carry out a detailed topographic survey of the Ayawilca deposit area contiguous with the survey completed on the Colquipucro deposit over the previous year. The surveying was conducted using a combination of theodolite, electronic measuring devices, and GPS instruments. The survey had a nominal five metre contour accuracy, and the area covered was 2.0 km north–south by 2.5 km east–west. In addition, 11 monuments were established and surveyed for ground control in the eastern portion of the target area.

Previously, in 2011, the contractor performed a topographic survey of the Colquipucro deposit over an area measuring 800 m east–west by 800 m north–south to the same specifications described for the 2013 survey. All existing drill hole collars and workings were surveyed simultaneously.

In 2018, Tinka commissioned Andesdrones of Lima, Peru to update the topographic survey of the Property using images taken from drones. The area covered was 5.5 km north–south by 7.0 km east–west, totalling 2,560 ha. The final products were detailed topographic maps with one metre contours and high-resolution imagery.

9.2 Geological Mapping

Initial geological mapping by Tinka at 1:25,000 scale was carried out in 2005 and early 2006, followed by more detailed mapping at 1:5,000 scale in late 2006. This early mapping identified high-grade vein mineralization in the Goyllar sandstone above the Ayawilca deposit. Additional geological mapping in 2009 examined key structural features to better understand the geological framework and controls of the mineralization. During 2015, Tinka geologists updated the geological map using the modified stratigraphy obtained from careful relogging of all previous drill holes at the Ayawilca deposit. During 2017, detailed mapping was extended north to the Pucarumi area, while in 2019 detailed mapping was extended to the south where the Far South target was identified.

Underground mapping of the Colquipucro deposit 3,870 masl exploration adit, developed by a previous owner in 1950 to 1954, was conducted at 1:500 scale.

9.3 Geochemical Sampling

9.3.1 Soil and Rock Chip Sampling

Tinka has collected 1,761rock samples and 4,733 soil samples on sampling grids located between the Colquipucro and the Ayawilca deposit zones and over the Tambillo and Pucarumi exploration targets. The Ayawilca-Colquipucro north–south soil grid lines are typically spaced 200 m apart, with additional lines spaced 100 m apart over the Ayawilca deposit and over areas with significant anomalies. The grid covers an area up to 4.8 km in an east–west direction and up to 7.1 km in a north–south direction.

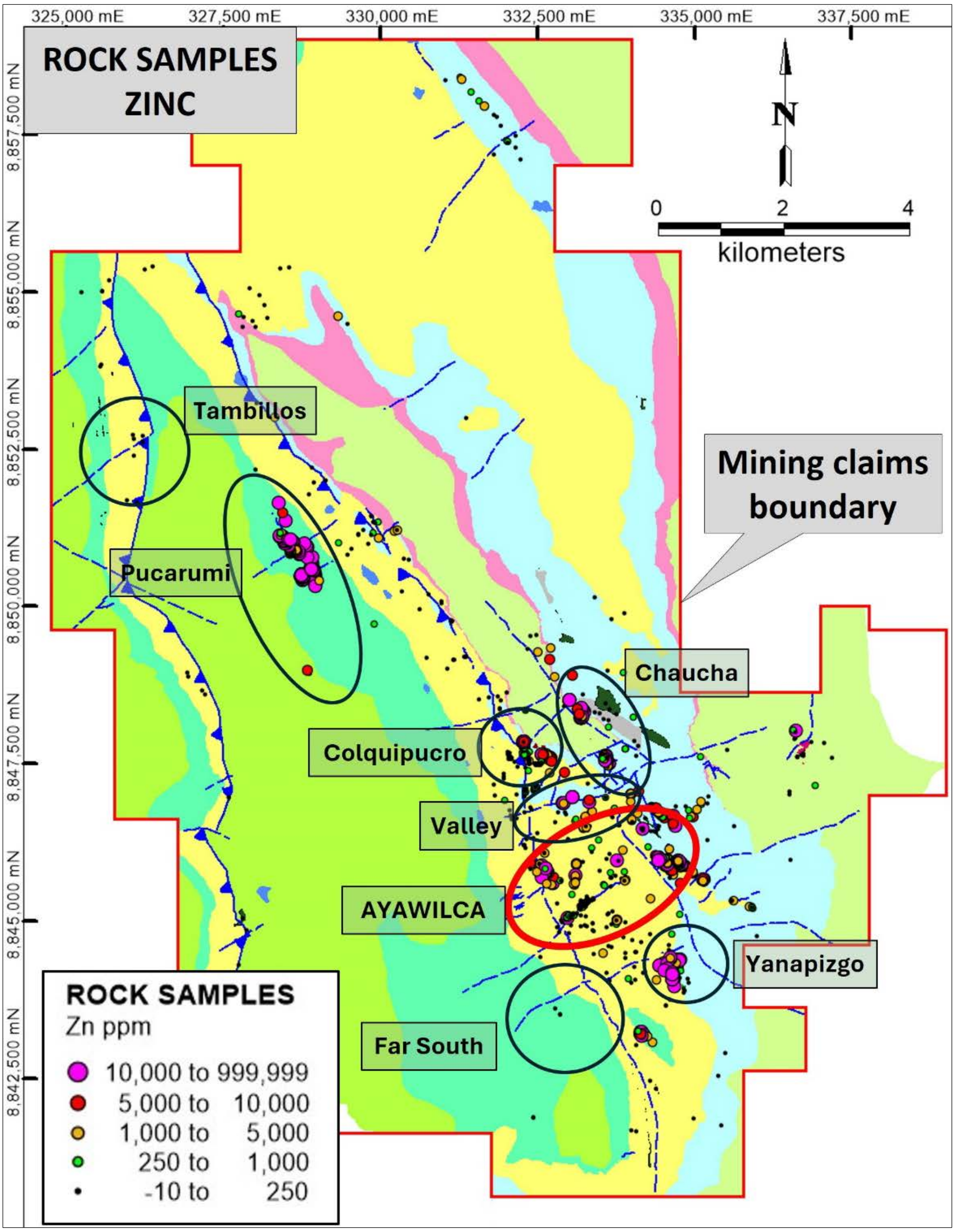
Significant anomalous zinc results were returned over the Ayawilca deposit, east and south of the Ayawilca deposit, and north and east of the Colquipucro deposit. The Far South and Yanapizgo areas are also highlighted by anomalous zinc and lead levels in soils. Surface rock sample and soil sample results on the property are illustrated in Figure 9-1 and Figure 9-2.

9.3.2 Adit and Trench Sampling

The Colquipucro deposit 3,870 m level adit was sampled by Tinka in 2006, and five surface trenches totalling 1.7 km in length were excavated and sampled. At Zone 3, a magnetic anomaly located east of the Ayawilca deposit (see Figure 9-3), 10 trenches were excavated and sampled. Colquipucro deposit trench sampling used a motorized diamond saw to cut a 10 cm wide channel to a nominal depth and width of five centimetres. A hammer and chisel were used to extract the samples only where the rock surface was irregular and not accessible to the saw.

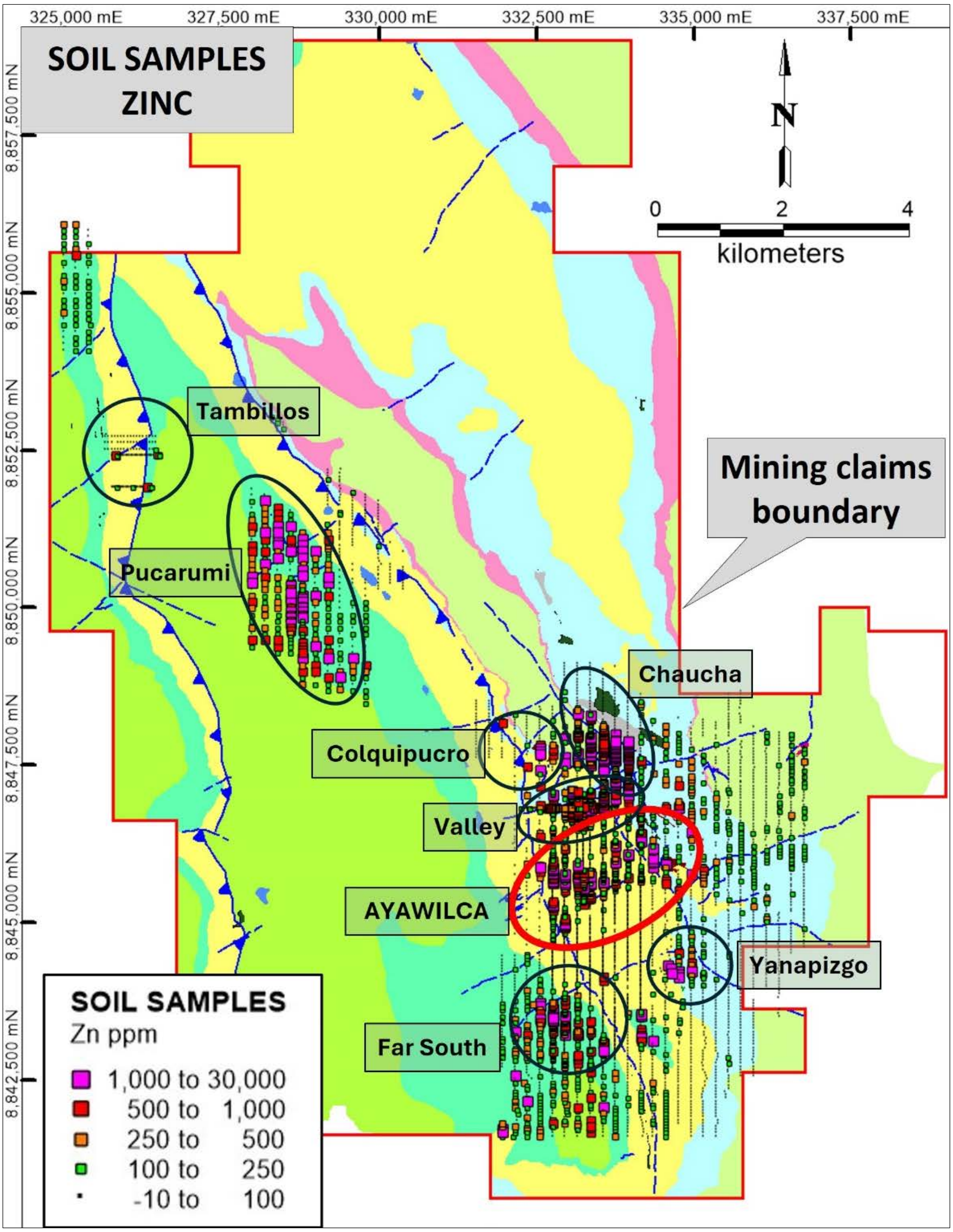
Sampling of the Colquipucro deposit 3,870 m level adit was conducted on a systematic basis along the walls between the drifts that accessed and exploited the high-grade fault/vein structures. Initial sampling was carried out at five m spacing; however, upon the receipt of highly anomalous silver values over significant widths, the adit was resampled at nominal two metre intervals.

Results from the trenching and underground sampling were used for exploration purposes and drill hole targeting. These data were not used to estimate Mineral Resources.



Source: Tinka, 2024

Figure 9-1: Surface Rock Samples Results



Source: Tinka, 2024

Figure 9-2: **Surface Soil Sample Results**

9.4 Geophysical Surveys

9.4.1 Induced Polarization Surveys

In late 2006, an initial IP survey was carried out by Fugro Geophysics Pty Ltd (Fugro) from Lima, Peru. Ten lines of pole–dipole surveying was completed, totalling eight kilometres. In 2010, Fugro extended the IP survey southward with eight pole–dipole traverse lines for 14.1 line-km. Data were collected using ten 25 m receiver dipoles with a single pole transmitter and processed using three-dimensional (3D) inversion modelling. Two target areas were identified. The southern target area coincided with the complex fault pattern extending eastward from the Ayawilca deposit surface showings. In 2012, Fugro used a set-up with a deeper penetration using 50 m receiver dipoles instead of 25 m spacing. Twelve lines were surveyed for a total of 15.5 line-km. Results of all surveys were combined, reprocessed, and interpreted using 3D modelling techniques. An additional 9.3 km were surveyed in 2013.

The IP and resistivity data sets were combined, reprocessed, and modelled using a 2D inversion modelling program (Res2DInv) and then further integrated and analyzed in a 3D model using Geosoft by Fugro. Two anomalies were identified, a shallow feature in the northwest part of the grid and a deep, larger feature in the central part. The northwestern target indicates chargeability values (27 mV/V to 40 mV/V) superimposed on an area of moderate to high resistivity.

The central anomaly has a high content of polarizable materials, ranging from 25 mV/V to 45 mV/V. The chargeability overlaps very low resistivity values over a distance of 800 m east–west.

Another IP survey was conducted over the Chaucha area, located one kilometre northeast of the Colquipucro deposit. The Chaucha IP survey consisted of 15.85 km along 14 lines oriented northeast–southwest. This survey was intended to test for conductive bodies northeast of the Chaucha Fault, along which there is a large, intermittent gypsum vein over a strike length of approximately 1.5 km. Results did not identify any high priority drill targets.

In 2015, Tinka carried out an extensive pole-dipole IP survey covering 25 line-km across the entire Ayawilca-Colquipucro area, using electrode spacings of 120 m. This survey has obtained complete and homogeneous IP coverage of the Ayawilca and Colquipucro deposits, to a penetration depth of approximately 400 m.

The 2015 IP survey was carried out by Fender Geophysics of Sydney, Australia. Lines were oriented at 60°. Several IP anomalies were identified, the largest and strongest of which is located to the east and northeast of the Colquipucro deposit. This anomaly typically shows high chargeability values of 35 mV/V and above. Several other smaller sized anomalies in the range of +20 mV/V occur across the Project area.

9.4.2 Ground Magnetic Surveys

Fugro collected ground-based magnetic data totalling 34.4 line-km in 2012. Three large magnetic features were identified over a distance of 1.5 km northeast–southwest. The central and largest anomaly trends east–southeast to west–northwest, parallel with a fault structure. Drilling in this area has identified magnetic pyrrhotite and lesser magnetite admixed with pyrite, sphalerite, and minor galena, arsenopyrite, and chalcopyrite.

In 2014, Tinka contracted Quantec Geoscience (Peru) S.A.C. to extend the ground magnetic survey. This survey included 245 line-km within an area of 4 km east-west by 7 km north–south at 100 m line spacing. The data were merged with the Fugro magnetic data. Several map products were generated including total magnetic intensity (TMI), analytical signal (AS), reduction to equator (RTE), and vertical derivative of reduction to equator (VDRE).

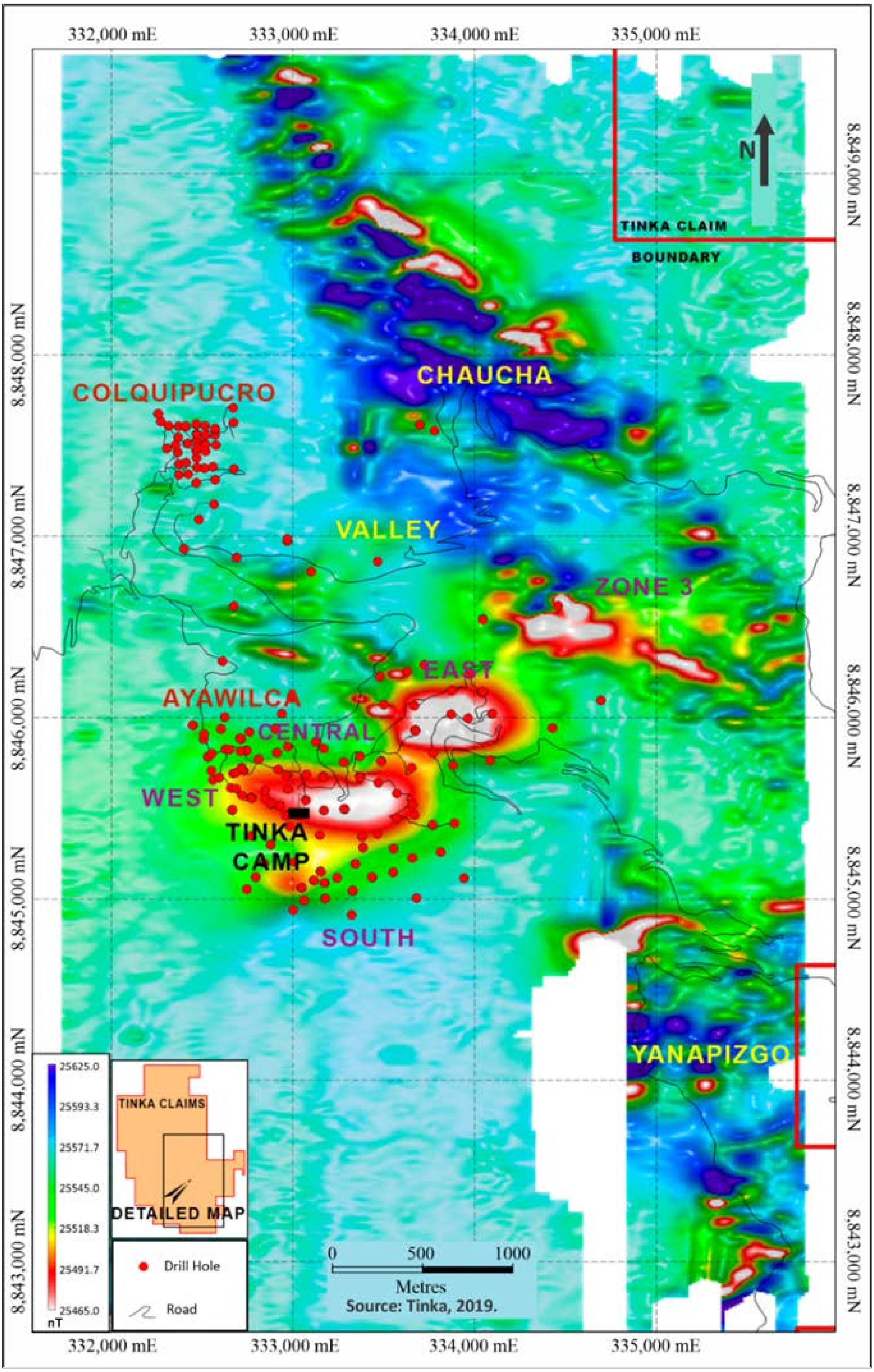
Due to the low angle of magnetic inclination in equatorial latitudes, the RTE operation was performed on the data. This operation preserves the shape of the bodies better than a reduction to pole manipulation of the data in latitudes close to the equator. The resulting anomalies are indicated by “lows” rather than “highs” (Armanti, 2014). The RTE map (Figure 9-3) indicates four ovoid, east–west-trending anomalies that align along a northeast–southwest orientation in the centre of the survey area. These anomalies may be partially explained by magnetite and magnetic pyrrhotite intersected in drill core.

In early 2016, Tinka contracted VDG del Perú S.A.C. (VDG) of Lima, Peru, to carry out an initial ground magnetic survey over the Tambillo target. A total of 25.8 line-km was surveyed over 14 east–west survey lines and one north–south tie line. Results indicated a weak magnetic response under the mineralized sandstone outcrops in the central part of the survey area.

9.4.3 Gravity Surveys

In late 2014, VDG was contracted to perform a gravity survey over the central target area at the Ayawilca deposit. The gravity survey was performed on a square grid with stations spaced 200 m apart. Internally, specific target areas were surveyed at 100 m grid spacing. A total of 513 station readings were collected within an area approximately 4 km east–west by 4 km north–south. The instrument used was a Lacoste & Romberg, model G-644, with 0.005 mGal precision. Topography data was collected with an R7 Trimble, model TSC2, base station GPS, an R8 Trimble, model GNSS, mobile GPS, and a Trupulse, model 360R, laser distance meter. An additional 5,992 GPS readings were collected for topographic control.

The survey outlined five gravity anomalies, which are interpreted to be caused by the presence of denser material, possibly associated with mineralization. The anomalies in part coincide with the known magnetic and chargeability anomalies, covering an area approximately 2.5 km northeast–southwest by 1.5 km northwest–southeast. Only a small portion (approximately 20%) of the area of the gravity anomaly has been drill tested to date.



Source: Tinka, 2024

Figure 9-3: RTE Magnetics Map

In late 2015, Tinka commissioned VDG to extend the gravity survey to the southern and northern limits of the Project area by collecting readings on 584 additional stations, all located on a square grid with stations spaced 200 m apart. All data were collected using the same instruments as the 2014 survey.

The extended gravity survey identified additional significant gravity anomalies coincident with the phyllite basement to the north, and two elongated gravity highs on the very southernmost limit of the Project area, under Goyllar sandstone (Figure 9-4). Although denser material is interpreted to lie under the Goyllar sandstone, this anomaly remains untested and poorly understood.

9.4.4 Magnetic Surveys

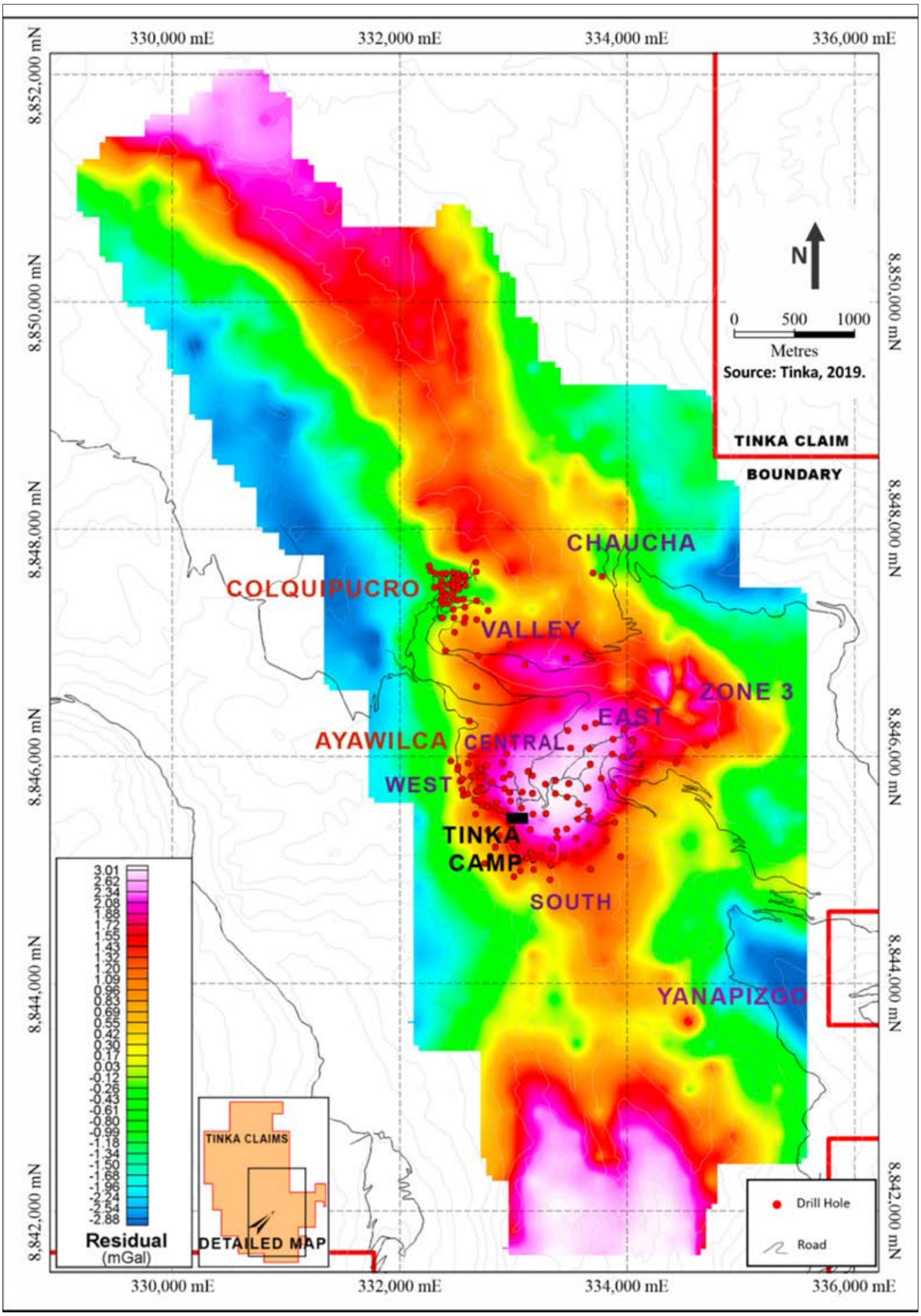
In early 2016, Tinka commissioned VDG to carry out a time domain electro-magnetic (TDEM) survey over the West Ayawilca deposit area to determine the feasibility of targeting the higher-grade zinc mineralization using such methods. Six one-kilometre long east–west lines were completed, totalling six line kilometres. A Crone PEM 2 kW transmitter and a Crone PEM digital receiver were used, with a 500 m x 500 m stationary transmitter loop to energize conductors at depth. Repeated measurements were averaged per time window at every station before plotting.

The survey identified a weak shallow conductor possibly related to the near-surface sulphide veins. No conclusive response was obtained from the Zinc Zone.

9.4.5 Airborne Magnetic Surveys

In 2016, Tinka commissioned New Sense Geophysics S.A.C. of Lima, Peru, to carry out a helicopter-based airborne magnetic survey of the entire Property. The survey comprised 1,255 km of north–south survey lines and east–west tie lines, spaced every 200 m, at an altitude of 70 m above surface.

The survey identified a strong magnetic anomaly roughly coincident with the Ayawilca deposit resource zones, along a northeasterly trend. Massive pyrrhotite replacements and magnetite, which typically pre-date the zinc mineralization, explain this response. This magnetic anomaly extends northeast into the Zone 3 area (eastern end of Ayawilca deposit resource) and southwest beyond the known limits of the South Ayawilca deposit target. Other anomalies were also identified over the Chaucha, Yanapizgo, and Valley targets. Outside of the main exploration area, the survey also identified weak to moderate magnetic anomalies that Tinka geologists have followed up on surface, including at the Pucarumi target.



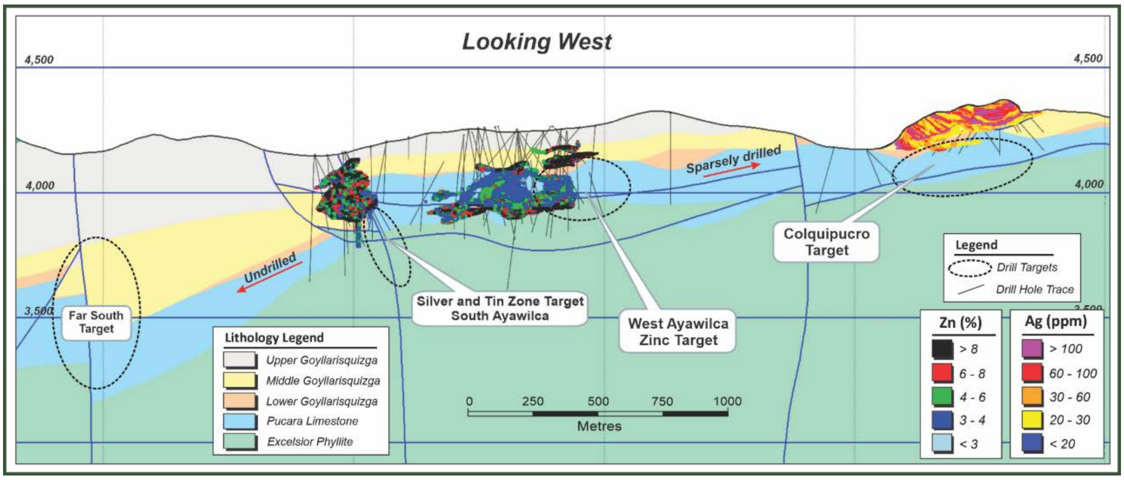
Source: Tinka, 2024

Figure 9-4: Terrain Corrected Gravity Map

9.5 Exploration Potential

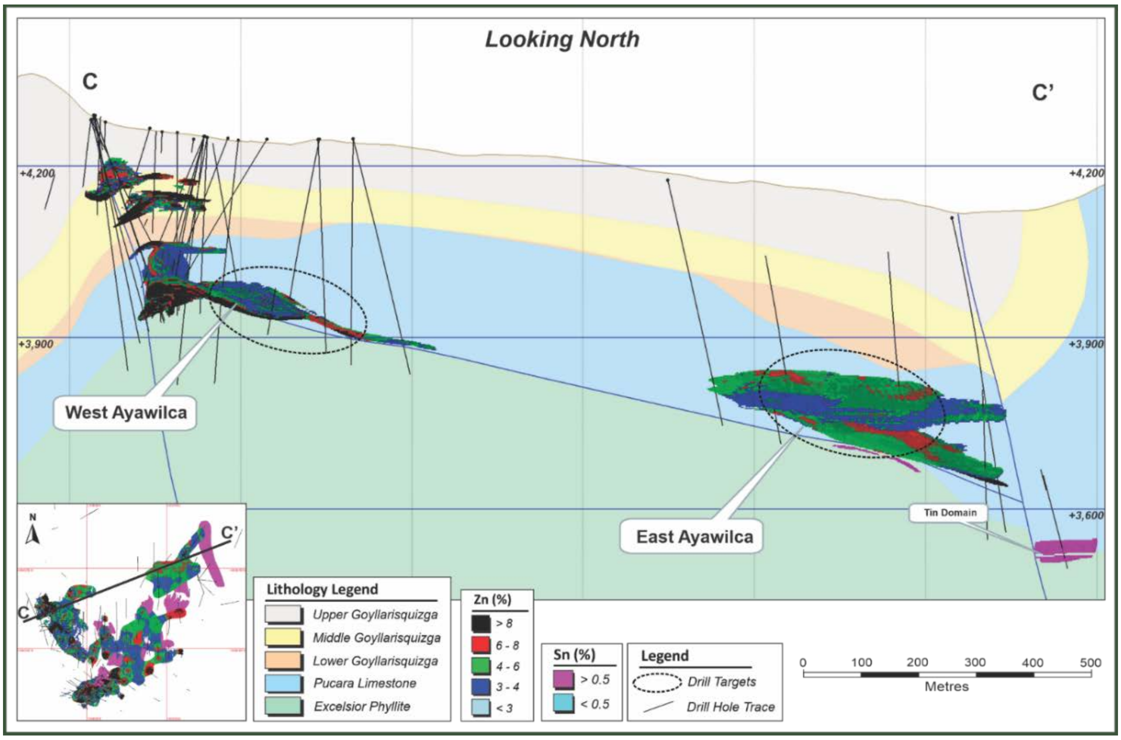
Exploration targets that have the potential to add significant discovery value at the Project and are permitted for drilling, are described below. The highest priority drill targets are illustrated in Figure 9-5 to Figure 9-7.

- West Ayawilca
  - Potential extensions to the zinc mineralization exist in this area, while existing Mineral Resources require additional drill holes to increase the level of geological confidence (Figure 9-5 and Figure 9-6).
- East Ayawilca
  - At East Ayawilca, the Zinc Zone Mineral Resources are based on drill holes spaced on lines approximately 200 m apart, and infill drilling and test extensions are required to improve the geological confidence (Figure 9-6).
- Silver Zone
  - Potential extensions of the Silver Zone lie within the footprint of the 060 Fault, as shown in Figure 9-7.
- Tin Zone
  - A high-grade tin mineralization prospect exists along the 060 Fault at depth. The target is interpreted as a potential feeder structure and is shown in Figure 9-7.
- Far South
  - Far South, shown in Figure 9-5, is an undrilled prospect lying along a southern extension of the Colquipucro Fault at the intersection of a cross-fault (similar to the 060 Fault) and associated with a lead-silver soil anomaly and a geophysical magnetic anomaly.
- Colquipucro
  - Colquipucro has the potential to host zinc-silver-lead mineralization underneath the silver oxide resource. This prospect is illustrated in Figure 9-5.
- Other targets
  - Other prospects with exploration potential occurring within the drill permitted area include Valley, Zone 3, and Chaucha.



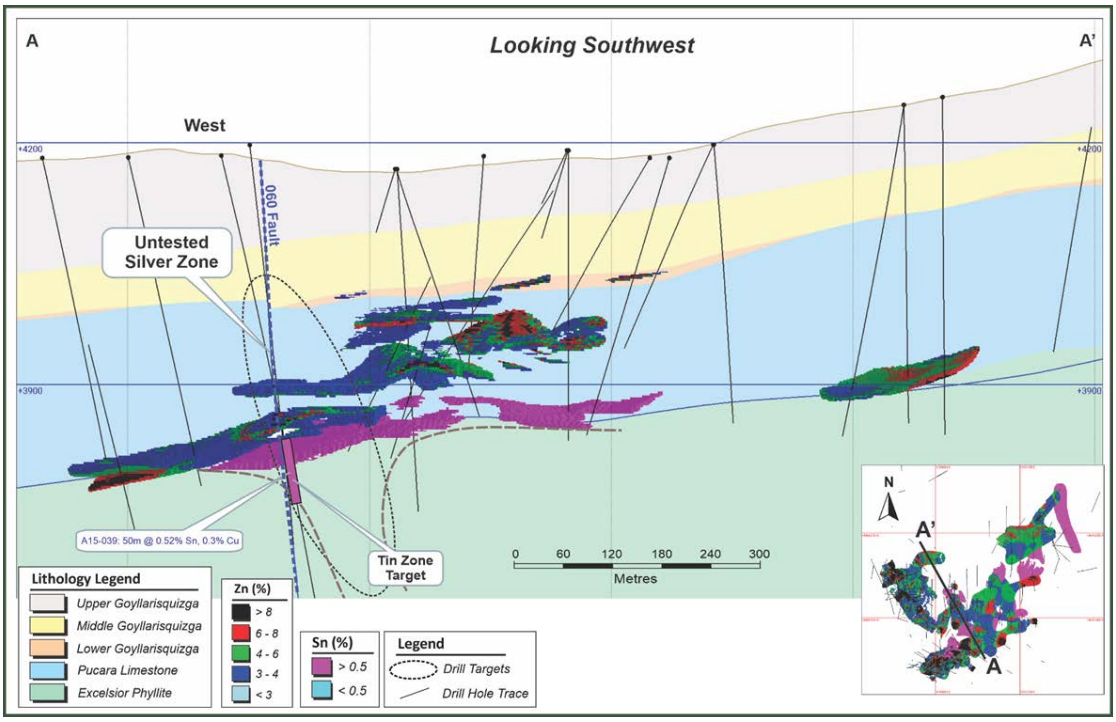
Source, Tinka, 2024

Figure 9-5: **Longitudinal Section of Ayawilca Zinc Zone Parallel to the Colquipucro Fault showing Exploration Targets**



Source: Tinka, 2024

Figure 9-6: **Cross Section of Ayawilca Deposit Zinc Zone Targets**



Source: Tinka, 2024

Figure 9-7: Cross Section of Central Ayawilca showing Tin Zone Prospect and the Silver Zone Prospect along the 060 Fault

9.6 QP Comments on Section 0

In the opinion of the QP, the sampling methods and quality are representative and acceptable, and indicative of good exploration potential on the Project.

10 DRILLING

10.1 Introduction

As of the Report effective date, the drill hole database included 100,354.7 m of drilling in 291 holes. The database included drill holes completed as at May 31, 2023.

Table 10-1 lists the holes by area and drilling program, while Figure 10-1 show the location of Project drill that support Mineral Resource estimation.

Table 10-2 and Table 10-3 list selected significant silver and zinc results from Colquipucro and Ayawilca deposits, respectively.

Table 10-4 presents selected significant tin results from the Ayawilca deposit.

10.2 Drill Methods

Tinka contracted Consorcio S & C S.A.C. (“Consorcio”) for drilling from 2012 to 2014. Consorcio used four different rigs:

- LY – Model LF-70;
- LY – Model 44;
- Atlas Copco Model CS-3000
- Sandvik Model 7-10

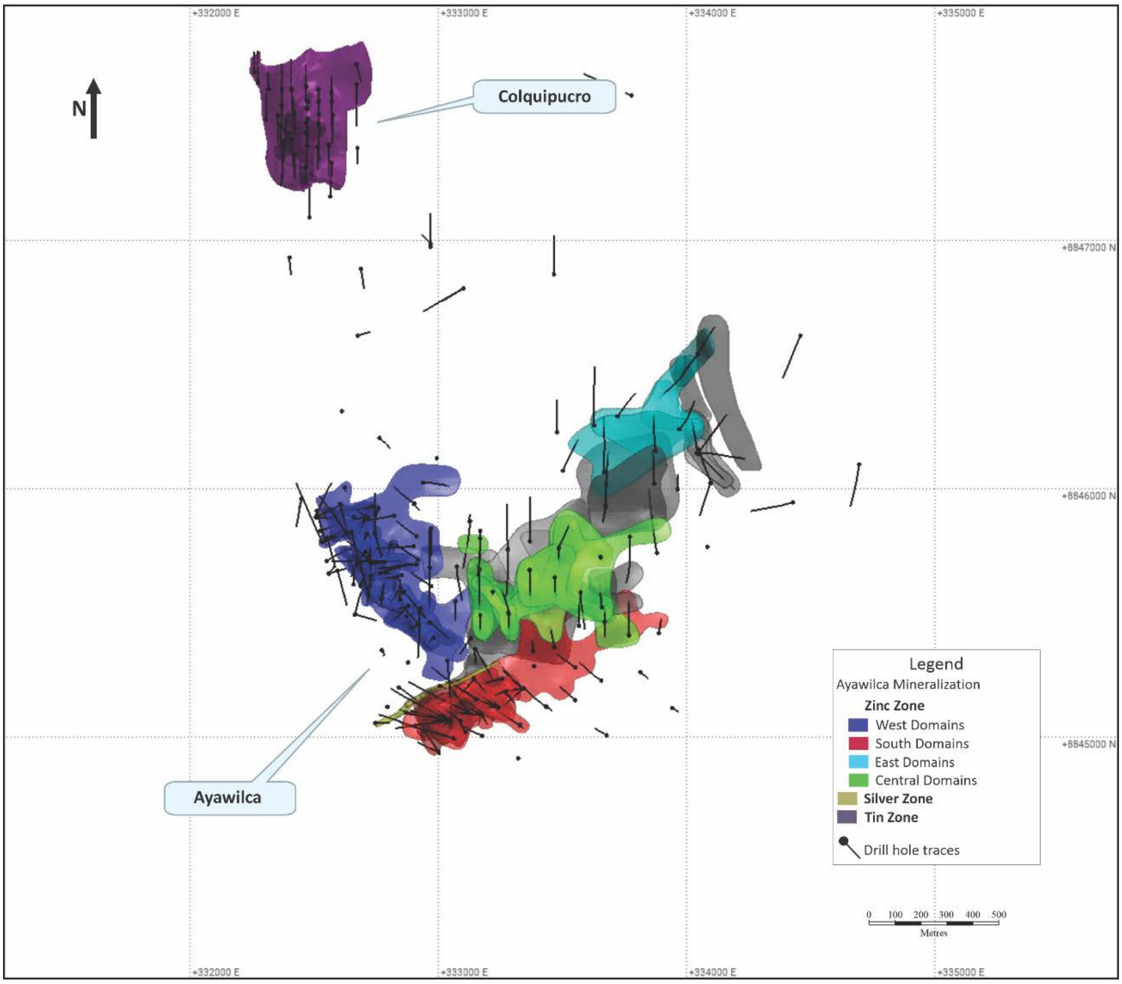
The orientation was taken at the collar using a compass and inclinometer. No downhole orientation surveys were made during 2013. In 2014, a Reflex Maxibore II downhole instrument measured hole deviation every 1.5 m. Drill hole deviation was not significant.

A Tinka geologist was present at the drill rig to end each hole. Once the hole was completed, casings were pulled, and the location was identified with a cement monument. Drill sites were rehabilitated.

Table 10-1: Drill Summary

Drill Hole ID	No. Holes	Length (m)	Campaign	Company	Drilling Contractor
Colquipucro Deposit					
DDH-1 to DDH-4	4	694.2	1996	Buenaventura	Esondi
CDD1 to CDD15	15	2,670	2007	Tinka	Esondi
CDD16 to CDD25	10	1,603.7	2011 to 2012	Tinka	Iguana Drilling
CDD26 to CDD35	10	2,151.3	2013	Tinka	Consorcio SC
CDD36 to CDD45	10	1,578.5	2014	Tinka	Consorcio SC
Sub-total	49	8,697.7			
Ayawilca Deposit					
DD52 to DD71	8	1,822	2011	Tinka	Iguana Drilling
A12-01 to A12-10 and DD52B	11	3,709.8	2012	Tinka	Consorcio SC
A13-01 to A13-17	17	6,268.3	2013	Tinka	Consorcio SC
A14-18 to A14-33	16	6,529.6	2014	Tinka	Consorcio SC
CDD-046	1	304.4	2014	Tinka	Consorcio SC
A15-34 to A15-55	22	8,917.5	2015	Tinka	Explomin
A17-56 to A17-109	54	20,528.3	2017	Tinka	AK Drilling
A18-110 to A18-158	49	20,397.2	2018	Tinka	AK Drilling
A19-159 to A19-168	10	4,325.5	2019	Tinka	AK Drilling
A20-169 to A20-183	15	5,405.2	2020	Tinka	Explomin
A21-184 to A21-189	6	1,902	2021	Tinka	Explomin
A22-190 to A22-211	22	7,545.6	2022	Tinka	AK Drilling
A23-212 to A23-223	12	3,947.3	2023	Tinka	AK Drilling
Sub-total	243	91,602.7			
Total	292	100,300.4			

Notes: Table does not include drill holes that had mechanical problems, the original target was not completed, or if the original drill hole was replaced by a re-drilled hole.



Source: SLR, 2024

Figure 10-1: Project Drill Hole Plan Map

Table 10-2: Selected Significant Drill Hole Results at Colquipucro

Drill Hole ID	Easting (x)	Northing (y)	Elevation (z)	Dip (º)	Azimuth (º)	Total Depth (m)	From (m)	To (m)	Core Length (m)	Estimated True Thickness (m)	Uncut Grade (g/t Ag)	Cut Grade (g/t Ag)	Domain
CDD006	332,467	8,847,293	4,277	180	-60	121	0	8	8	7	103	98	High-grade lens
							8	14	6	5	27	27	Low-grade halo
							14	22	8	7	67	67	High-grade lens
							22	28	6	5	39	39	Low-grade halo
							28	38	10	9	140	140	High-grade lens
							38	44	6	5	98	98	Low-grade halo
							44	52	8	7	139	139	High-grade lens
							52	60	8	7	44	44	Low-grade halo
							60	66	6	5	44	44	High-grade lens
							114	118	4	4	212	114	High-grade lens
CDD045	332422.1	8847341	4304.736	180	-50	153.7	4	6	2	2	72	72	High-grade lens
							6	16	10	9	26	26	Low-grade halo
							16	30	14	13	105	105	High-grade lens
							30	40	10	9	49	49	Low-grade halo
							40	59	19	17	167	134	High-grade lens
							59	68	9	8	24	24	Low-grade halo
							68	70	2	2	82	82	High-grade lens
							70	78	8	7	20	20	Low-grade halo
							78	86	8	7	119	119	High-grade lens
							86	92	6	5	20	20	Low grade halo
							92	96	4	4	106	106	High-grade lens
							96	114	18	16	31	31	Low-grade halo
							114	116	2	2	178	178	High-grade lens
							116	130	14	13	24	24	Low-grade halo
							130	140	10	9	132	132	High-grade lens

Note: Silver was cut to 360 g/t Ag in the high-grade lenses and 120 g/t Ag in the low-grade halo.

Table 10-3: Selected Significant Zinc Zone Drill Hole Results at the Ayawilca Deposit

Drill Hole	Easting	Northing	Elevation	Azimuth	Dip	Total Depth	From	To	Core Length	Estimated True Thickness	Grade				Domain
ID	(x)	(y)	(z)	(º)	(º)	(m)	(m)	(m)	(m)	(m)	Zn (%)	Pb (%)	Ag (g/t)	In (ppm)	
A12-004A	332,744	8,845,819	4,241	360	-90	285.6	264	278	14	14	9.58	0.03	12	172	West
A12-008	333,166	8,845,674	4,191	180	-70	344.2	195.5	232	36.5	35	6.52	0.02	5	63	Central
A12-008	333,166	8,845,674	4,191	180	-70	344.2	266	282	16	16	7.32	0.02	9	206	Central
A13-005	332,728	8,845,707	4,243	360	-90	361.5	130.3	179.5	49.2	49	10.09	0.55	32	51	West
A13-005	332,728	8,845,707	4,243	360	-90	361.5	316	343.2	27.2	27	7.49	0.05	22	320	West
A14-018	333,668	8,846,066	4,122	360	-60	448.3	375.1	408	32.9	32	6.27	0.49	10	14	East
A14-018	333,668	8,846,066	4,122	360	-60	448.3	331.2	352	20.8	20	6.08	0.23	13	33	East
A14-022	332,771	8,845,559	4,254	10	-70	355.1	211.2	242	30.8	30	7.7	0.02	10	65	West
A14-022	332,771	8,845,559	4,254	10	-70	355.1	283.5	318.5	35	33	6.31	0.35	16	121	West
A14-026	332,771	8,845,556	4,254	180	-85	321.4	288	303.8	15.8	15	11.27	0.07	18	207	West
A17-056	333,047	8,845,063	4,195	300	-75	293.9	242	293.9	51.9	50	10.06	0.1	128	233	South
A17-057	333,048	8,845,063	4,195	300	-55	477	265.75	279.3	13.55	12	22.26	2.66	111	297	South
A17-061	333,061	8,844,994	4,185	290	-67	326.9	220	233.4	13.4	13	18.73	0.87	57	463	South
A17-063	333,242	8,845,117	4,223	310	-70	416.6	302.2	349.9	47.7	45	11.3	0.01	18	312	South
A17-069	333,114	8,845,103	4,205	300	-65	374.3	271.4	300.7	29.3	28	10.36	0.06	17	278	South
A17-089	333,002	8,844,940	4,152	325	-60	330.1	218.6	229.4	10.8	10	16.71	0.05	33	681	South
A18-114	332,509	8,845,882	4,290	90	-70	385	300	319.3	19.3	19	9.2	0.2	19	2	West
A18-118	332,533	8,845,783	4,282	60	-65	363.8	237.3	343.8	106.5	103	6.8	0.2	17	48	West
A18-129	332,707	8,845,886	4,253	200	-70	437.5	339.4	351.3	11.9	11	39.6	0.8	45	761	West
A18-130	332,929	8,845,517	4,227	220	-85	378.7	294	328	34	33	6.1	0.01	4	129	South
A18-132	332,708	8,845,886	4,253	200	-80	442.4	259.6	270.1	10.5	10	14	0.01	15	207	West
A18-137	332,810	8,845,771	4,234	200	-80	443.9	279.3	292	12.7	12	10.3	0.01	18	306	West
A18-141	332,687	8,845,608	4,264	20	-78	468	288	377	89	86	5	0.01	11	97	South

Drill Hole	Easting	Northing	Elevation	Azimuth	Dip	Total Depth	From	To	Core Length	Estimated True Thickness	Grade				Domain
ID	(x)	(y)	(z)	(º)	(º)	(m)	(m)	(m)	(m)	(m)	Zn (%)	Pb (%)	Ag (g/t)	In (ppm)	
A20-183	332,982	8,845,399	4,234	220	-82	380.2	202	208	6	5	21.1	2.1	57	—	West
A21-185	333,241	8,845,119	4,223	290	-68	382.4	304.3	327.9	23.6	21	9.4	—	10	—	South
A21-187	333,144	8,845,230	4,227	222	-68	345.8	324	364	40	36	8.8	—	12	—	South
A21-187	333,144	8,845,230	4,227	222	-68	345.8	Incl. 353.30	362.4	9.1	8	20.1	—	23	—	South
A22-197	332912	8845693	4220	264	-55	412.6	271.6	351	79.4	70	5.34	0.02	7	55	West
A22-197	332912	8845693	4220	264	-55	412.6	Incl. 281.70	308	26.3	22	8.37	0.02	11	104	West
A22-198	332900	8845768	4222	265	-53	451.1	298	335	37	35	5.17	0.06	7	59	West
A22-199	333046	8845067	4195	303	-66	344.1	246.5	288.9	42.35	40	9.39	0.1	19	237	South
A22-199	333046	8845067	4195	303	-66	344.1	Incl. 279.8	288.9	9.1	8	20.8	0.35	50	525	South
A22-199	333046	8845067	4195	303	-66	344.1	170.5	205.1	34.6	32	5.28	0.17	18	185	South
A22-199	333046	8845067	4195	303	-66	344.1	Incl. 261.3	266.8	5.5	5	22.87	0.09	33	614	South
A22-200	332821	8845889	4246	260	-58	352	283.3	328.2	44.9	42	11.95	0.06	16	144	West
A22-200	332821	8845889	4246	260	-58	352	Incl. 312.1	328.2	16.1	15	22.2	0.07	26	300	West
A22-202	333046	8845066	4197	283	-52	270.15	170.45	209.3	38.85	30	20.03	0.09	31	648	South
A22-202	333046	8845066	4197	283	-52	270.15	Incl. 193.25	203.6	10.35	8	41.96	0.13	57	1257	South
A22-203	332839	8845685	4228	264	-60	350	186.8	236.6	49.8	45	8.27	0.07	16	30	West
A22-204	333090	8845061	4196	307	-60	334.3	264.5	291	26.5	25	6.22	0.03	17.1	305	South
A22-205	332839	8845685	4227	244	-72	352.7	180	314	134	110	4.75	0.09	10	132	West
A22-205	332839	8845685	4227	244	-72	352.7	Incl. 250.7	314	63.3	50	6.6	0.16	13	215	West
A22-206	333044	8845064	4197	270	-58	217.3	153.55	191.35	37.8	34	10.54	0.06	17	181	South

Drill Hole	Easting	Northing	Elevation	Azimuth	Dip	Total Depth	From	To	Core Length	Estimated True Thickness	Grade				Domain
ID	(x)	(y)	(z)	(º)	(º)	(m)	(m)	(m)	(m)	(m)	Zn (%)	Pb (%)	Ag (g/t)	In (ppm)	
A22-206	333044	8845064	4197	270	-58	217.3	Incl. 168	191.35	23.35	21	15.23	0.07	22	284	South
A22-207	332710	8845883	4252	254	-74	332	193.9	326.4	132.5	110	6.77	0.33	20.8	36	West
A22-207	332710	8845883	4252	254	-74	332	Incl. 248	293.2	45.2	40	11.48	0.57	39.3	94	West
A22-208	333044	8845064	4197	270	-70	282.55	168.8	240	71.2	65	8.75	0.51	32.8	55	South
A22-208	333044	8845064	4197	270	-70	282.55	Incl. 194	231.65	37.65	34	12.76	0.75	43.9	89	South
A22-211	332785	8845707	4236	260	-75	295	151	189.15	38.15	35	6.32	1.13	27.7	9	West
A23-212	333047	8845065	4197	228	-79	324.3	158.2	303.4	145.2	100	10.86	0.19	31.3	229	South
A23-212	333047	8845065	4197	228	-79	324.3	Incl. 158.2	187.45	29.25	20	20.17	0.04	20.8	418	South
A23-212	333047	8845065	4197	228	-79	324.3	Incl. 277.6	303.4	25.8	18	13.06	0.61	86.1	312	South
A23-213	332853	8845650	4225	258	-65	316	180	210.4	30.4	26	6	0.03	8	26	West
A23-213	332853	8845650	4225	258	-65	316	260	290.5	30.5	27	5.06	0.02	9	142	West
A23-215	333047	8845065	4197	180	-80	295.1	263.4	293.5	30.1	27	8.61	0.14	38	91	South
A23-216	332710	8845883	4252	220	-73	310	197.9	295.8	97.9	90	8.84	0.03	16	145	West
A23-216	332710	8845883	4252	220	-73	310	Incl. 260	295.8	35.8	33	19	0.03	35	387	West
A23-217	332853	8845650	4225	240	-78	300	186.1	258	71.9	62	5.52	0.04	8.5	129	West
A23-218	333109	8845020	4190	330	-75	323.7	229.05	295.9	66.85	60	6.41	0.04	10.9	199	South

Table 10-4: Selected Tin Zone Drill Hole Results at the Ayawilca Deposit

Drill Hole	Easting	Northing	Elevation	Azimuth	Dip	Total Depth	From	To	Core Length	Estimated True Thickness	Grade			Domain
ID	(m)	(m)	(m)	(°)	(°)	(m)	(m)	(m)	(m)	(m)	Sn (%)	Cu (%)	Ag (g/t)	
A13-001	333,368	8,845,670	4,146	180	-70	360	308	326	18	17	0.66	0.57	12	Central
A13-011	333,284	8,845,495	4,167	180	-70	344.2	330	336	6	6	1.98	1.19	43	Central
A13-012A	333,469	8,845,641	4,131	180	-70	356.8	326	348	22	21	0.65	0.17	6	Central
A15-039	333,467	8,845,360	4,184	360	-75	568.3	380	392	12	12	1.13	0.18	2	Central
A15-040	333,659	8,845,521	4,123	360	-75	423.1	326.2	378.5	52.3	48	1.2	0.16	15	Central
A15-040	333,659	8,845,521	4,123	360	-75	423.1	Incl. 328	341	13	11	2.94	0.25	12	Central
A15-043	333,282	8,845,497	4,167	360	-85	427.5	312	326	14	14	0.82	0.44	10	Central
A15-044	333,148	8,845,353	4,221	180	-80	392.9	350.6	365.4	14.9	15	1.1	0.36	26	Central
A15-049	333,486	8,845,759	4,135	20	-70	424.4	395.6	403.4	7.8	7	1.05	0.3	14	Central
A17-056	333,047	8,845,063	4,195	300	-75	293.9	214	225	11	10	0.67	0.03	5	South
A17-063	333,242	8,845,117	4,223	310	-70	416.6	275	286	11	10	1.8	0.04	6	South
A17-063	333,242	8,845,117	4,223	310	-70	416.6	369	374.5	5.5	5	1.22	0.21	16	South
A17-069	333,114	8,845,103	4,205	300	-65	374.3	206	230.5	24.5	23	0.45	0.04	6	South
A17-070	333,152	8,845,151	4,224	310	-75	367.8	285	301.7	16.7	15	0.5	0.04	9	South
A17-091A	334,045	8,846,140	4,088	35	-70	625.1	588.5	602	13.5	13	0.83	0.39	54	South
A21-187	333,144	8,845,230	4,227	222	-68	345.8	262	274	12	11	3.05	0.05	5	South
A21-187	333,144	8,845,230	4,227	222	-68	345.8	Incl. 266	268	2	2	5.43	0.04	7	South
A22-190	333281	8845755	4167	180	-50	498.95	398	430	32	30	0.36	0.33	13	Central
A22-199	333046	8845067	4195	303	-66	344.1	206	224	18	16	0.67	0.04	6	South
A23-219	333219	8845582	4182	180	-85	336.8	297.4	304	6.6	6	1	0.05	0	Central
A23-221	333118	8845102	4207	332	-69	400.6	234	254	20	18	1.35	0.05	1	South

10.3 Drill Programs

From 1996 to 1997, Buenaventura drilled four holes south and southeast of the Colquipucro deposit. These holes were drilled to explore the Pucará Formation carbonate stratigraphy beneath the oxidized Colquipucro mineralization. While none of the four holes intersected high-grade zinc mineralization, all intersected anomalous zinc values in limestone.

In 2007, Tinka contracted Expertos En Sondajes Diamantinos S.A. (Esondi) to complete 15 drill holes for 2,670.3 m at Colquipucro collared on 100 m spaced lines. Esondi used a Hydracore Model Gopher core drill rig with HQ (63.5 mm) size equipment, reducing to NQ (47.6 mm) when required. Most holes were angled towards the south. The drill hole orientation was taken at the collar using a compass and inclinometer. No downhole orientation surveys were made. This drilling was intended as resource drilling to define a lower grade bulk tonnage target as discovered from underground sampling in 2006.

Resource definition drilling at Colquipucro was extended northward in 2011 and 2012 with 10 additional holes by Iguana Drilling S.A.C. using a Hydracore Portable rig with HQ size equipment, reducing to NQ as required. The azimuth and dip of the collars were taken at the collar using a compass and inclinometer. No downhole orientation surveys were made.

During 2011, using the same equipment as the Colquipucro deposit campaign, a drilling program at West Ayawilca took place to test for near-surface, sandstone hosted, silver mineralization associated with a soil anomaly. The first seven angle holes within the Goyllar sandstone did not intersect significant mineralization. The eighth hole, DD53, reached the Pucará Formation contact at 172 m depth and intersected intermittent semi-massive sulphide zinc mineralization in the underlying carbonate rocks. This is considered the discovery hole for the zinc mineralization at the Ayawilca deposit.

For the 2015 drilling campaign, Tinka contracted Explomin Perforaciones S.A.C. (Explomin). Explomin used up to two Sandvik DE-710 rigs between August and November 2015. All core was oriented to obtain adequate structural readings and all holes were surveyed using a non-magnetic gyroscope. The entire 2015 drill campaign was completed with HQ sized core equipment.

For the 2017 drilling campaign, Tinka contracted AK Drilling International S.A.C. (AK Drilling). AK Drilling used up to three Sandvik DE-710 rigs and one modified Bradley-250 man portable rig between February and October 2017. One rig continued drilling between November and December 2017. All core was oriented, and all the holes were surveyed using a non-magnetic gyroscope. Five holes were not completed to target depth. Holes A17-56A and A17-91A are daughter holes wedged from drill holes A17-56 and A17-91, respectively. The 2017 drill campaign used HQ sized core equipment, with some holes being completed with NQ sized equipment and one hole with BQ (36.5 mm) sized core equipment. Drill hole A17-56 was the discovery hole for South Ayawilca.

In 2018, Tinka extended its contract with AK Drilling and up to three Sandvik DE 710 rigs were used to the end of September 2018. Two holes, A18-115A and A18-119A, were daughter holes wedged from holes A18-115 and A18-119, respectively. As with the 2017 drilling campaign, all core was oriented, and all the holes were surveyed using a gyroscope. All 2018 drilling used HQ sized core equipment, with some holes being completed with NQ sized equipment.

Drilling in 2019 was completed by AK Drilling with up to two drill rigs. All core was oriented, and all the holes were surveyed using a gyroscope. Drilling used HQ sized core equipment, with some holes being completed with NQ sized equipment. In 2020 to 2021, the focus of the drill program was resource definition and Tinka contracted Explomin Perforaciones to complete the work with up to three drill rigs. As in 2019, drilling used HQ sized core equipment, with some holes being completed with NQ sized equipment.

In 2022 to 2023 the drilling program was focused on resource recategorization (infill drilling) to convert inferred resources into indicated, mainly in the West and South Ayawilca areas. In addition to the infill drilling program, a program to install five piezometer holes in Central Ayawilca was carried out as part of a preliminary hydrogeological study. Tinka contracted AK Drilling to complete the drilling program and the installation of the piezometers with two Sandvik DE 710 drill rigs. The installation of the piezometers, permeability tests, and the hydrogeological study was supervised and completed by Envis. As in previous campaigns, drilling used HQ sized core equipment. A Televiewer tool (optic and acoustic) from Bornav SAC was used to measure oriented structures from 28 holes located in West and South Ayawilca, and to a lesser extent in Central Ayawilca. In other holes where the Televiewer was not used, IMDEX core orientation tools were used.

The drill hole deviation was not surveyed for the first 35 holes at Colquipucro and the first 19 holes at Ayawilca. Given the length of these unsurveyed holes, equipment, drill hole spacing, and the minor deviations shown in surveyed holes, the QPs do not consider the missing downhole survey data to be an issue.

Collars were surveyed by PRW Ingeniería y Construcción surveying company (2011, 2013), Lima based surveying company Proyectistas Técnicos del Peru S.A.C. (2015), PeruLand SAC surveying company (2017), Servtop S.A.C. surveying company (2018, 2019), LG & Compañía surveying company (2021), and Topografía Superficial y Minera surveying company (2023). A combination of total station and differential GPS were used.

10.4 Drill Hole Orientation

The current drill hole spacing for the Colquipucro deposit is nominally 50 m by 50 m, however, drill holes are concentrated in parts of the core deposit. Most holes were drilled towards the south and angled between -50° and -60°.

At South Ayawilca, drill sections are spaced approximately 50 m apart and oriented northwest-southeast, with holes generally angled steeply to the northwest and occasionally to the southeast (between 55° and 85°). At West, the drill spacing is variable as holes have been oriented in several directions. Prior to 2021, drill holes were mostly oriented on a north-south grid. In the 2022-2023 drill program, most of the holes at West were angled steeply to the west and west-southwest (between 55° and 80°). Typically, holes at West are spaced less than 80 m apart. At Central and East, most drill holes are oriented on a north-south grid and angled either north or south (between 60° and 85°), and drill hole spacings are mostly around 100 m but up to 200 m at East. The current drill hole spacing for the Colquipucro deposit is nominally 50 m x 50 m and is concentrated in parts of the core deposit.

On average, the true width of the mineralization is about 85-95% of the downhole drilled lengths but varies depending on the local orientation of the mineralized zones and the drill hole.

10.5 Core Recovery

Core recovery is generally good, allowing for representative samples to be taken and accurate analyses to be performed. There are intervals of low recovery, commonly associated with recent faulting. The length, location, and relationship with the mineralization was checked with respect to the resource modelling.

10.6 Core Logging

Drill core was transported by Tinka personnel once daily to a core handling facility located in the Project area. Technicians checked the depth markers and box numbers, reconstructed the core, and calculated core recoveries. Geologists created quick logs, logged RQ, marked out sample intervals, and assigned sample numbers. All drill core was then photographed wet with a digital camera before splitting. Detailed logging of lithology, alteration, oxidization, and structure was completed by a qualified, responsible geologist and paper copies were scanned and saved as digital images.

Since early 2015, all logging has been completed digitally directly into a Maxwell database, allowing for easier data compilation, data validation, quality control, and interpretation.

Geological logging was uploaded directly into Leapfrog software for modelling.

10.7 QP Comments on Section 10

The QP has not identified any drilling, sampling, or core recovery issues that could materially affect the accuracy or reliability of the core samples.

11 SAMPLE PREPARATION, ANALYSES, AND SECURITY

11.1 Sampling

Sample intervals and numbers were assigned at site by Tinka geologists. Most drill core was sampled using constant two metre intervals. Drill core was split using a diamond saw at Tinka’s core facility which was initially located in Ambo and later relocated to Huánuco. To avoid sampling bias, the left side of the cut core was bagged, and the right side was returned to the box for storage. Samples were tracked using three-part ticket booklets. One tag was stapled into the core box at the start of the appropriate sample interval, one tag was placed into the sample bag, and the final tag was retained in the sample booklet for future reference. For each sample, the date, drill hole number, property name, and sample interval depths were noted in the sample booklet.

Prior to 2017 one standard or one blank sample was inserted, alternately, after every 10 or 15 drill core samples for assay. However, since the 2017 program, Tinka reverted to inserting one control sample after every 10 samples. Samples were shipped by Tinka personnel directly to the laboratory in Lima.

11.2 Density Determinations

Tinka has performed 7,508 density measurements in total. Samples taken prior to 2018 (1,083 in total) were sent to SGS Laboratories (SGS) or ALS Laboratories (ALS) for density determinations. Subsequent samples (6,425 in total) were measured by Tinka using the water immersion method on samples coated in paraffin wax. Approximately 20% of the samples (1,130 in total) were sent to ALS, SGS or Certimin for density verification. The QP reviewed the results and is of the opinion that there is an acceptable correlation between the datasets.

Samples from the 2022 to 2023 drill program were analyzed by ALS and SGS.

All laboratories used were independent of Tinka.

11.4 Sample Preparation

Samples sent to Plenge were prepared using method S-P-2007, which involved drying in an oven at 80°C followed by jaw and roll crushing. The crushers were cleaned with compressed air between samples and with barren calcite after every 10 samples. A 250 g split, using a Jones splitter, was pulverized to 80% passing -200 mesh using a ring and puck pulverizer.

Samples sent to SGS were prepared using method PRP93, which involved drying in an oven at 100°C followed by jaw crushing. The sample was crushed to 90% passing -10 mesh size. The crusher was cleaned with compressed air between samples. A 250 g split, using a Jones splitter, was pulverized to 95% passing -140 mesh using a ring and puck pulverizer.

Samples sent to ALS were prepared using method PREP31, which involved drying in an oven at 100°C followed by jaw crushing. The sample was crushed to 70% passing -10 mesh size. The crusher was cleaned with compressed air between samples. A 250 g split, using a Jones splitter, was pulverized to 85% passing -200 mesh using a ring and puck pulverizer.

Samples sent to Certimin were prepared using method G0634, which involved drying in an oven at 100°C followed by jaw crushing and roll crushing to 90% passing -10 mesh. The crushers were cleaned with compressed air between samples. A 250 g split, using a Jones splitter, was pulverized to 85% passing -200 mesh using a ring and puck pulverizer.

Commencing in 2019, samples were sent to ALS and were prepared using method PREP31. In 2023, Tinka also sent samples to SGS, which were prepared using method PRP93.

11.5 Analysis

Sample analysis methods by drill hole are summarized in Table 11-1 and Table 11-2.

In general, silver was determined by inductively coupled plasma (ICP) following a multi-acid digestion of hydrochloric acid (HCl), nitric acid (HNO3), hydrofluoric acid (HF), and perchloric acid (HClO4). Over-limit thresholds varied by laboratory. The over-limit method for high-grade silver was a standard fire assay (FA) followed by an atomic absorption spectroscopy (AAS) finish, or at Plenge, a FA followed by a gravimetric finish. Zinc was also analyzed by ICP atomic emission spectroscopy (ICP-AES) following a multi-acid digestion.

Over-limit zinc, silver, and lead were analyzed using AAS.

Indium was analyzed by mass spectrometry with ICP (ICP-MS) using multi-acid digestion. Over-limit indium was analyzed using AAS.

Tin was analyzed by ICP-AES following a multi-acid digestion. Certain samples reporting values over 100 ppm Sn were sent for re-assay for tin by fusion with sodium peroxide and AAS finish (SGS) or by pressed powder technique analyzed using x-ray fluorescence (ALS).

Table 11-1: Analytical Methods at Colquipucro – Silver

Drill Hole IDs	No. Holes	No. Assays	Analytical Method	Over-Limit (g/t Ag)	Over-Limit Method	Laboratory
DDH-1 to DDH-4 [1]	4	156	ICP	200	AAS	Bondar Clegg
CDD1 to CDD15	15	1,333	AAS	1,000	FA-Gravity	Plenge
CDD16 to CDD35	20	1,774	ICP (ICP40B)	100	AAS	SGS
CDD36 to CDD45 [2]	10	765	ICP (G0153)	25	AAS	Certimin
Total	**49**	**4,027**				

Notes: 1. Drilled by Buenaventura. 2. Over-limit 1,000 ppm Ag (AAS), re-analysis by FA-Gravity.

Table 11-2: Analytical Methods at the Ayawilca Deposit - Zinc

Drill Hole IDs	No. Holes	No. Assays	Analytical Method	Over-Limit (%)	Over-Limit Method	Laboratory
DD52 to DD71	8	908	ICP	1	AAS	Plenge
DD52B	1	158	ICP (ICP40B)	1	AAS	SGS
CDD-046	1	107	ICP (ICP40B)	1	AAS	SGS
A12-01 to A12-10	10	1,289	ICP (ICP40B)	1	AAS	SGS
A13-01 to A13-17	17	2,511	ICP (ICP40B)	1	AAS	SGS
A14-18 to A14-25	8	1,398	ICP (ICP40B)	1	AAS	SGS
A14-26 to A14-33	8	1,331	ICP (ICM40B)	1	AAS	SGS
A15-34 to A15-55	22	3,442	ICP (ICM40B)	1	AAS	SGS
A17-56 to A17-70	15	2,074	ICP (ICM40B)	1	AAS	ALS
A17-71 to A17-109	39	5,883	ICP (ICM40B)	1	AAS	SGS
A18-110 to A18-158	49	8,963	ICP (ICM40B)	1	AAS	SGS
A19-159 to A19-168	10	1,834	ICP (ICM40B)	1	AAS	ALS
A20-169 to A20-183	15	2,320	ICP (ICM40B)	1	AAS	ALS
A21-184 to A21-189	6	688	ICP (ICM40B)	1	AAS	ALS
A22-190 to A22-194	5	943	ME-MS61	1	AAS	ALS
A22-195 to A22-211	17	2,465	ICP (ICM40B)	1	AAS	SGS
A23-212 to A23-221	10	1,321	ICP (ICM40B)	1	AAS	SGS
A23-223	1	177	ICP (ICM40B)	1	AAS	SGS
Total	***242***	***37,812***				

Notes: AAS = atomic absorption. ICP or ICP40B = optical ICP. ICM40B = four acid digestion and ICP-MS/ICP-AES. FA = fire assay. ME-MS61 = four acid digestion and ICP-MS. AA62 = ore grade four-acid digestions and AAS. No. assays includes QA/QC samples.

11.6 Quality Assurance and Quality Control

Tinka’s Quality Assurance and Quality Control (QA/QC) protocol consists of the regular insertion of blanks, standards, and field duplicates within each sample batch.

From 2019 onward, Tinka added pulp and coarse duplicates to its QA/QC program and did not continue the submission of field duplicates or monitoring indium as part of the ongoing program. ’Tinka's QA/QC program is continuously applied and monitored by geologists using the QAQCR software. For the most recent drill program in 2022 to 2023, control sample insertions included 2% coarse blanks, 2% fine blanks, 7.7% certified reference materials (CRMs), 2% pulp duplicates, and 2% coarse duplicates, totalling approximately 16% of the total samples submitted to commercial laboratories. Table 11-3 summarizes the control sample insertion rate for all samples submitted to ALS or SGS as part of the 2022 to 2023 drill program.

Table 11-3: 2022-2023 Summary of insertion Rates by Laboratory

Laboratory	Primary Assays	Fine Blank	Coarse Blank	CRM	Pulp Duplicate	Coarse Duplicate	Control Sample Insertion Rate
ALS	943	17	17	99	19	15	15%
SGS	3,963	98	98	347	102	98	16%
Total	4,906	115	115	446	121	113	16%

11.6.1 Blanks

The regular submission of blank material is used to assess contamination during sample preparation and to identify sample numbering errors. The Tinka QA/QC protocol called for blanks to be inserted in the sample stream at a rate of approximately one in 20 samples. The blanks were inserted into the sample stream prior to shipment to the laboratory. Certified blanks were obtained from CDN Resources Laboratories Ltd. (CDN), British Columbia, Canada. In addition, a sterile, barren rock was inserted alternately with the certified blank starting with the 2014 drill program.

In 2017, blanks were purposely submitted after high-grade zinc mineralization, and the procedure continued in 2019 through 2021. ALS informed Tinka that it cleaned equipment after each sample with air, however, not always with sterile quartz. As observed in 2017, the high grades intersected in drilling programs from 2019 to 2021 may have resulted in higher zinc values in the blanks. As part of Tinka’s QA/QC procedures, Tinka followed up all results that fell outside of the allowable limits with ALS. The QP reviewed internal reports documenting the follow up investigations and consider them resolved.

During the 2022 to 2023 drilling program at Ayawilca, a total of 230 blanks were inserted into the sample stream, comprising both fine and coarse materials. Of these, 34 blank samples were sent to ALS, and 196 were sent to SGS. Results are summarized in Table 11-4.

Table 11-4: Blank Results Summary for the 2022 to 2023 Drill Program

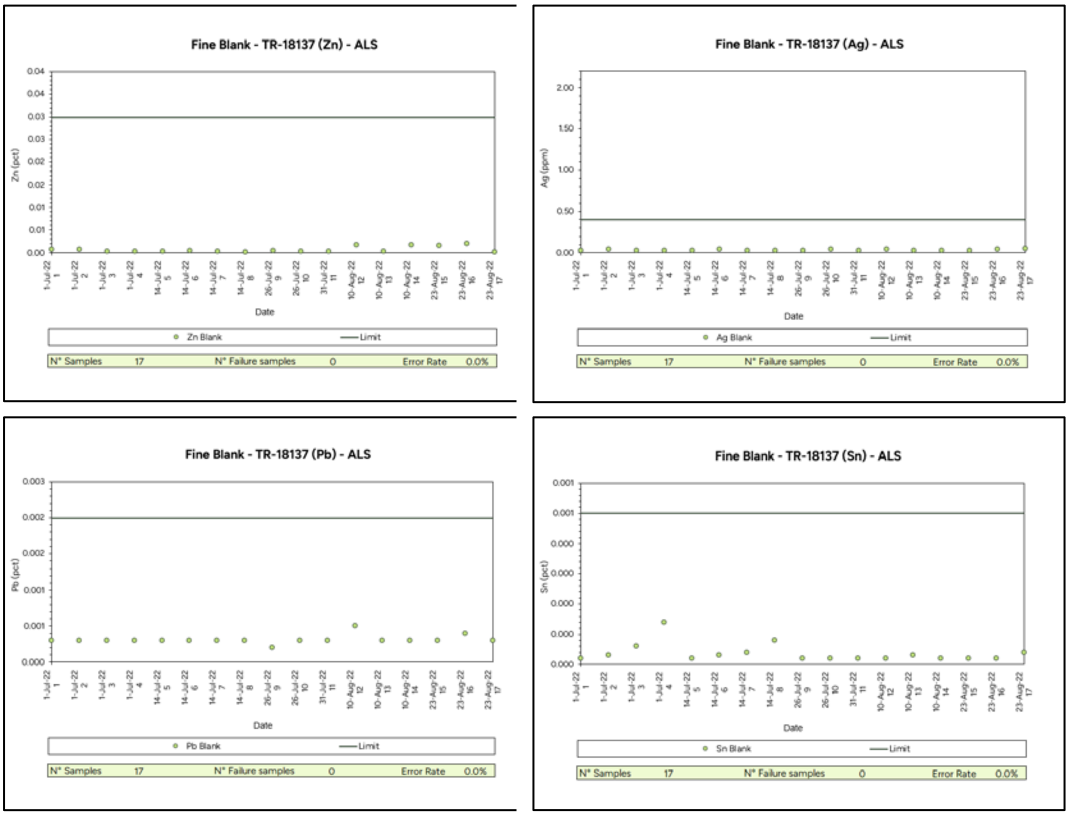
Lab	Blank ID	Blank Type	Element	Count	Failures	% Failure
ALS	TR-18136	Coarse blank	Ag (ppm)	17	0	0%
			Pb (%)	17	0	0%
			Sn (%)	17	0	0%
			Zn (%)	17	0	0%
	TR-18137	Fine blank	Ag (ppm)	17	0	0%
			Pb (%)	17	0	0%
			Sn (%)	17	0	0%
			Zn (%)	17	0	0%
SGS	TR-18136	Coarse blank	Ag (ppm)	78	0	0%
			Pb (%)	78	0	0%
			Sn (%)	78	0	0%
			Zn (%)	78	2	3%
	TR-18137	Fine blank	Ag (ppm)	73	0	0%
			Pb (%)	73	0	0%
			Sn (%)	73	1	1%
			Zn (%)	73	0	0%
	TR-22145	Fine blank	Ag (ppm)	25	0	0%
			Pb (%)	25	0	0%
			Sn (%)	25	0	0%
			Zn (%)	25	0	0%

Lab	Blank ID	Blank Type	Element	Count	Failures	% Failure
	TR-22146	Coarse blank	Ag (ppm)	20	0	0%
			Pb (%)	20	0	0%
			Sn (%)	20	0	0%
			Zn (%)	20	0	0%

Blanks were set to a failure limit of five times the practical detection limit (approximately 30 times the detection limit) for both fine blanks and coarse blanks.

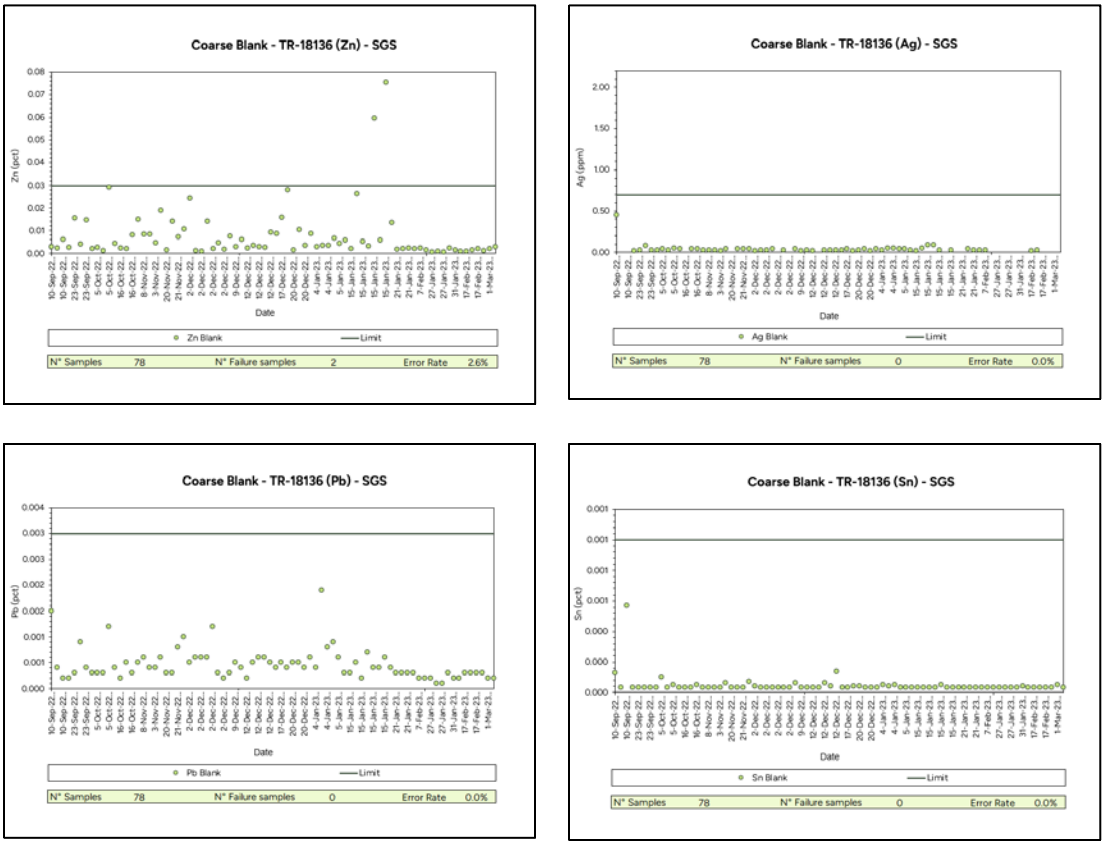
Blank control charts are illustrated in Figure 11-1 and Figure 11-2. No failures were recorded for silver and tin. Two samples of the blank material TR-18136 slightly exceeded the blank limits during zinc analysis at SGS. However, these values do not adversely affect the overall integrity of the database and reflect a typical failure rate expected within a robust QA/QC program.

The QP is of the opinion that the blank sample results are within acceptable limits.



Source: SLR, 2024

Figure 11-1: Fine Blank Control Charts: 2022 to 2023 Drill Program Results from ALS



Source: SLR, 2024

Figure 11-2: Coarse Blank Control Charts: 2022 to 2023 Drill Program Results from SGS

11.6.2 Certified Reference Materials

Results of the regular submission of CRMs, (or standards) are used to monitor analytical accuracy and to identify potential problems within specific batches. Tinka inserted CRM samples at a rate of approximately one in a batch of 10 samples, a rate which exceeds industry standards in the opinion of the QP. Tinka purchased CRMs from CDN and Ore Research & Exploration Pty Ltd (OREAS) and also generated three of its own CRMs (TK-STD-01 to -03). Table 11-5 lists the recommended values for the CRMs and the standard deviation (SD). The QP notes that prior to 2019 only zinc and tin CRMs were inserted and monitored. Silver and lead were added in 2019. The QP notes that there are no CRMs certified for lead. Tinka is monitoring lead based on its nominal values in the existing CRMs, however, a lead-specific CRM has not been incorporated into the QA/QC program.

Table 11-5: Expected Values and Ranges of CRMs

CRM	Ag Unit / 1SD	Zn Unit / 1SD	Sn Unit / 1SD
CDN-ME-14[1]	Ag (ppm) 42.3/±4.2	Zn (%) 3.100/±0.280	
CDN-ME-17	Ag (ppm) 38.2/±3.3	Zn (%) 7.340/±0.370	
CDN-ME-1211	Ag (ppm) 86.3/±8.1	Zn (%) 0.243/±0.024	
CDN-ME-1303	Ag (ppm) 152.0/±10.0	Zn (%) 0.931/±0.048	
CDN-ME-1101	Ag (ppm) 68.20/±4.60	Zn (%) 1.560/±0.090	
CDN-ME-06	Ag (ppm) 101.0/±7.1	Zn (%) 0.517/±0.040	
CDN-ME-08	Ag (ppm) 61.7/±4.7	Zn (%) 1.920/±0.080	
TK-STD-01	Ag (ppm) 12.34/±0.92	Zn (%) 2.61/±0.040	
TK-STD-02	Ag (ppm) 9.17/±0.42	Zn (%) 5.91/±0.100	
TK-STD-03	Ag (ppm) 21.22/±1.48	Zn (%) 11.61/±0.610	
TR-11210	Ag (ppm) 259.0/±13.0	Zn (%) 5.04/±0.250	
OREAS-36[2]	Ag (ppm) 10.17/±0.63	Zn (%) 4.23/±0.060	
OREAS-37	Ag (ppm) 5.19/±0.63	Zn (%) 6.26/±0.150	
OREAS-38	Ag (ppm) 5.49/±0.63	Zn (%) 10.06/±0.140	
OREAS-130	Ag (ppm) 6.57/±0.45	Zn (%) 1.710/±0.030	
OREAS-135	Ag (ppm) 55.70/±1.92	Zn (%) 2.800/±0.670	
CDN-ME-1201[1]	Ag (ppm) 37.60/±3.4	Zn (%) 4.99/±0.290	
CDN-ME-1202[1]	Ag (ppm) 10.0/±1.4	Zn (%) 1.88/±0.120	
CDN-ME-1204	Ag (ppm) 58.0/±6.0	Zn (%) 2.36/±0.120	
CDN-ME-1402[1]	Ag (ppm) 131.0/±7.0	Zn (%) 15.23/±0.670	
CDN-ME-1406	Ag (ppm) 57.1/±3.7	Zn (%) 2.27/±0.08	
CDN-ME-1802	Ag (ppm) 75/±4.4	Zn (%) 6.11/±0.29	
CDN-ME-1804[1]	Ag (ppm) 137.0/±7.0	Zn (%) 9.94/±0.440	
OREAS 138[1]	Ag (ppm) 45.2/±2.27	Zn (%) 8.19/±0.108	
OREAS 139[1]	Ag (ppm) 76.7/±3.91	Zn (%) 13.63/±0.305	
OREAS-140[1]	Ag (%) 1.58/±0.33	Zn (ppm) 1706/±369	Sn (ppm) 1777.0/±42.0
OREAS-141[1]	Ag (ppm) 3637/±534	Zn (ppm) 3637/±535	Sn (ppm) 6061.0/±339.0
OREAS-142[1]	Ag (ppm) 2436/246	Zn (ppm) 2436/±246	Sn (%) 1.04/±0.05

Notes:

1. *Inserted during 2019–2023 drilling campaigns only.*
2. *Standard use discontinued starting in 2018 due to a high rate of failure.*

Specific pass/fail criteria are determined from the SD provided for each CRM. The conventional approach for setting standard acceptance limits is to use the mean assay ± two SDs as a warning limit and ± three SDs as a failure limit. Results outside of the ± three SD failure limits must be investigated to determine the source of the erratic result, either analytical or clerical.

OREAS-36 was a zinc standard that proved to have a high rate of failure. OREAS-36 was disused by Tinka during 2018, once independent testing confirmed that precision for this standard was problematic.

The QP review indicated that the CRM grades covered a reasonable range with respect to the overall resource grades. The QP recommended to reduce the number of CRMs inserted per metal to represent three grades: a low-grade CRM similar to the mean near the cut-off, a medium-grade CRM similar to the average grade of the reported Mineral Resources, and a high-grade CRM. The QP also recommended procuring a CRM for lead that is similar to the average grade of the Ayawilca deposit. Tinka is monitoring lead based on its nominal values in the existing CRMs, however, a lead-specific CRM has not been incorporated into the QA/QC program.

Individual results for zinc, silver, and tin from the 2019 to 2021 and the 2022 to 2023 drill programs are summarized and discussed in the following two subsections.

CRM Results from the 2019 to 2021 Drill Program

The QP reviewed the CRM results from the 2019 to 2021 drill program and is of the opinion that the CRM grades cover span a reasonable range with respect to the overall resource grades and that the results are within acceptable limits.

Zinc

The zinc control charts for the 10 unique CRMs inserted during the 2019 to 2021 drilling program displayed that all zinc sample values were within three SDs of the mean, with most reported within one SD. SLR notes that despite the insertion of numerous CRMs, there were not a sufficient number of samples of a single type to definitively establish any trends.

Silver

The silver control charts for 10 unique CRMs inserted for the 2019 to 2021 drilling program displayed that all silver sample values were within three SDs of the mean, and the majority were within one SD. SLR notes that despite the insertion of many CRMs, there is an insufficient number of samples of a single type to clearly establish any trends.

Tin

The tin control charts for the three unique CRMs inserted for the 2019 to 2021 drilling program displayed that all the tin sample values were within one SD of the mean. The QP notes there may be a slight low bias in OREAS-140 values. Regardless of the potential bias in OREAS-140 values, there is an insufficient number of samples of a single type to clearly establish a trend.

Lead

The QP reviewed the CRM control charts for lead. A total of 205 results from seven CRMs were included in the 2019 to 2021 drilling program. All the lead sample values were within three SDs of the mean, and the majority were within one SD. There was no laboratory bias detected in the CRM results.

The CRM summary results for zinc, silver, and tin for the 2019 to 2021 drilling program are summarized in Table 11-6, Table 11-7, and Table 11-8 respectively.

Table 11-6: Summary of the Zinc CRM Results for the 2019–2021 Ayawilca Deposit Drilling Program

Item	CDN-ME-1201	CDN-ME-1202	CDN-ME-14	CDN-ME-1402	CDN-ME-1406[1]
No. assays	43	45	52	17	30
Expected value (%)	4.99	1.88	3.11	15.23	2.27
No. values outside 3SD	0	0	0	0	0
% Failure	0.00	0.00	0.00	0.00	0.00
Item	**CDN- ME-1802**	**CDN-ME-1804**	**OREAS-140**	**OREAS-141**	**OREAS-142**
No. assays	9	9	8	7	2
Expected value	6.11%	9.94%	1,706 ppm	3,637 ppm	2,436 ppm
No. values outside 3SD	0	0	0	0	0
% Outside 3SD	0.00	0.00	0.00	0.00	0.00

Notes:

1. *Inserted during 2019–2023 drilling campaigns only.*

Table 11-7: Summary of the Silver CRM Results for the 2019 to 2021 Ayawilca Deposit Drilling Program

Item	CDN-ME-1201	CDN-ME-1202	CDN-ME-14	CDN-ME-1402	CDN-ME-1406[1]
No. assays	43	45	52	17	30
Expected value (ppm)	37.60	10.0	42.3	131	57.1
No. values outside 3SD	0	0	0	0	0
% Failure	0.00	0.00	0.00	0.00	0.00
Item	**CDN-ME-1802[1]**	**CDN-ME-1804**	**OREAS-140**	**OREAS-141**	**OREAS-142**
No. assays	9	9	8	7	2
Expected value (ppm)	75	137	1.58	3,637	2,436
No. values outside 3SD	0	0	0	0	0
% Outside 3SD	0.00	0.00	0.00	0.00	0.00

Notes:

1. *Inserted during 2019–2023 drilling campaigns only.*

Table 11-8: Summary of the Tin CRM Results for the 2019 to 2021 Ayawilca Deposit Drilling Program

Item	OREAS-140	OREAS-141	OREAS-142
No. assays	7	5	2
Expected value	1777 ppm	6,061 ppm	1.04%
No. values outside 3SD	0	0	0
% Failure	0.00	0.00	0.00

CRM Results from the 2022 to 2023 Drill Program

To monitor zinc, silver, lead, and tin analyses Tinka inserted 10 unique CRMs for three grade ranges (low-, moderate-, and high-grade).

Specific pass/fail criteria were used based on setting the CRM acceptance limits at the expected value ±3SD as the failure limit. Results provided from ALS and SGS are summarized separately in Table 11-9 and Table 11-10. The high biases observed exceeding the 5% threshold are associated with the low number of CRMs inserted and do not necessarily reflect poor laboratory performance.

Table 11-9: Summary of CRM Results from ALS During the 2022 to 2023 Ayawilca Deposit Drilling Program

CRM	Element	Number of Assays	Mean	Standard Deviation	Number of Failures	% Bias	% Failures
CDN-ME-1201	Ag (ppm)	12	37.8	1.7	0	0.4%	0.0%
	Pb (%)	12	0.5	0.0	0	-3.5%	0.0%
	Zn (%)	12	4.9	0.2	0	-1.0%	0.0%
CDN-ME-1202	Ag (ppm)	30	10.0	0.7	0	0.3%	0.0%
	Pb (%)	30	0.1	0.0	0	-5.8%	0.0%
	Zn (%)	30	1.9	0.1	1	0.7%	3.3%
CDN-ME-1402	Ag (ppm)	6	127.8	3.5	0	-2.4%	0.0%
	Pb (%)	6	2.4	0.1	0	-3.6%	0.0%
	Zn (%)	6	15.3	0.3	0	0.4%	0.0%
CDN-ME-1406	Ag (ppm)	30	58.0	1.9	1	1.5%	3.3%
	Pb (%)	30	0.5	0.0	1	-2.3%	3.3%
	Zn (%)	30	2.2	0.0	1	-1.5%	3.3%
OREAS-140	Ag (ppm)	7	0.9	0.1	0	-10.1%	0.0%
	Pb (%)	7	0.0	0.0	1	0.0%	14.3%
	Zn (%)	7	0.2	0.0	0	-1.7%	0.0%
	Sn (%)	7	0.2	0.0	0	-5.3%	0.0%
OREAS-141	Ag (ppm)	6	1.5	0.1	0	-5.4%	0.0%
	Pb (%)	6	0.0	0.0	0	-4.0%	0.0%
	Zn (%)	6	0.3	0.0	0	-5.6%	0.0%
	Sn (%)	6	0.6	0.0	0	-1.3%	0.0%

Table 11-10: Summary of CRM Results from SGS During the 2022 to 2023 Ayawilca Deposit Drilling Program

CRM	Element	Number of Assays	Mean	Standard Deviation	Number of Failures	% Bias	% Failures
CDN-ME-1201	Ag (ppm)	66	37.7	1.7	0	0.4%	0.0%
	Pb (%)	66	0.5	0.0	0	-2.6%	0.0%
	Zn (%)	66	4.8	0.1	1	-3.1%	1.5%
CDN-ME-1202	Ag (ppm)	109	10.2	0.7	0	1.7%	0.0%
	Pb (%)	109	0.1	0.0	7	-4.5%	6.4%
	Zn (%)	109	1.9	0.1	0	-0.4%	0.0%
CDN-ME-1406	Ag (ppm)	92	56.0	1.9	0	-2.0%	0.0%
	Pb (%)	92	0.5	0.0	1	-3.6%	1.1%
	Zn (%)	92	2.2	0.0	6	-3.4%	6.5%
CDN-ME-1802	Ag (ppm)	9	71.6	2.2	1	-4.5%	11.1%
	Pb (%)	9	2.5	0.0	0	-3.2%	0.0%
	Zn (%)	9	5.9	0.1	0	-3.6%	0.0%
CDN-ME-1804	Ag (ppm)	23	133.9	3.5	0	-2.3%	0.0%
	Pb (%)	23	4.3	0.1	0	-0.8%	0.0%
	Zn (%)	23	9.7	0.2	0	-2.5%	0.0%
OREAS-138	Ag (ppm)	10	43.1	2.3	0	-4.6%	0.0%

CRM	Element	Number of Assays	Mean	Standard Deviation	Number of Failures	% Bias	% Failures
	Pb (%)	10	1.2	0.0	0	-0.7%	0.0%
	Zn (%)	10	8.1	0.1	0	-0.9%	0.0%
OREAS-139	Ag (ppm)	23	74.0	3.9	0	-3.5%	0.0%
	Pb (%)	23	2.2	0.1	0	-1.2%	0.0%
	Zn (%)	23	13.2	0.3	1	-3.4%	4.3%
OREAS-140	Ag (ppm)	8	1.0	0.1	0	-2.8%	0.0%
	Pb (%)	8	0.0	0.0	1	2.9%	12.5%
	Zn (%)	8	0.2	0.0	0	-4.0%	0.0%
	Sn (%)	8	0.2	0.0	0	-2.4%	0.0%
OREAS-141	Ag (ppm)	5	1.6	0.1	0	-0.4%	0.0%
	Pb (%)	5	0.0	0.0	0	-2.0%	0.0%
	Zn (%)	5	0.3	0.0	0	-6.1%	0.0%
	Sn (%)	5	0.6	0.0	0	-2.0%	0.0%

The QP selected three unique CRMs for a detailed review of zinc, silver, and lead, representing the low-, moderate-, and high-grade ranges: CRMs CDN-ME-1406, CDN-ME-1201, and OREAS139.

ALS control charts for zinc, silver, and lead assays are illustrated in Figure 11-3, Figure 11-4, and Figure 11-5, respectively. A good scatter pattern is observed in each chart. There is a small negative bias for zinc assays observed between July and August 2022, however, the bias remains within the acceptable limit (<5%).

SGS control charts for zinc, silver, and lead assays are illustrated in Figure 11-6, Figure 11-7, and Figure 11-8, respectively. A slightly negative bias for zinc assays is observed. Similarly, control charts for high-grade zinc ranges (OREAS-139) also reveal a slight negative bias of 3.4% from the expected value (Figure 11-9). The bias was observed until Q2 2023; however, the results obtained from SGS for zinc assays are considered accurate and within the acceptable threshold.

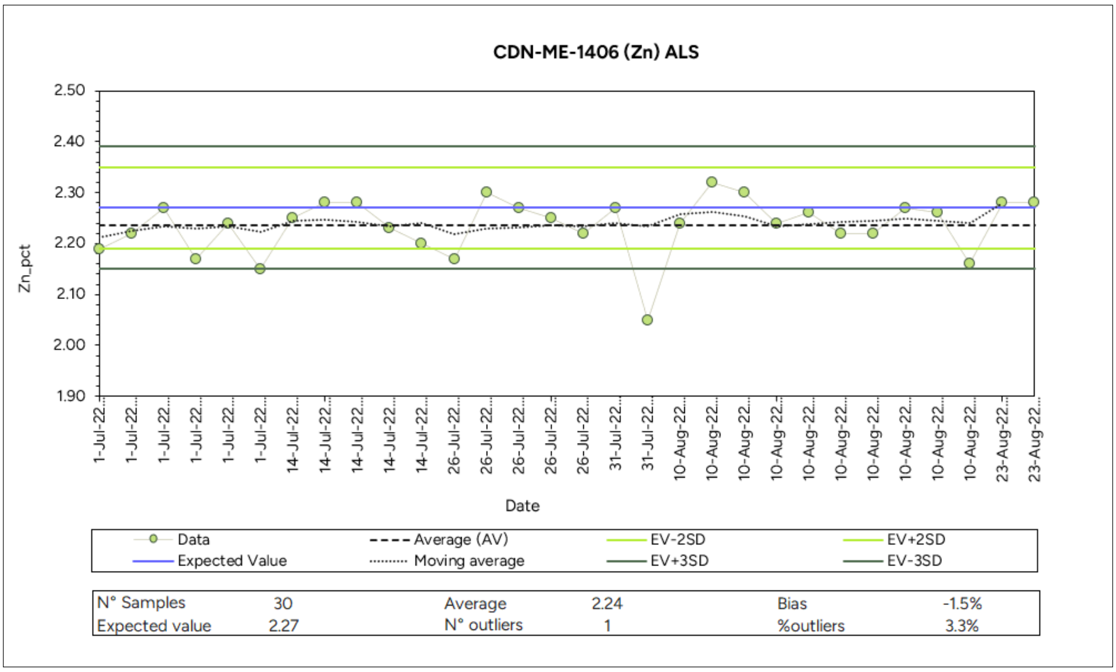
The control charts for silver and lead for SGS all show a good scatter pattern with no obvious biases and the results are within the acceptable thresholds.

The QP reviewed the CRM results for tin and no major biases were identified, and there were no failures. Results for ALS and SGS are summarized in Table 11-11. Control charts for tin were not plotted since the sample count was insufficient to be meaningful.

Table 11-11: Summary of Tin CRM Results for ALS and SGS During the 2022 to 2023 Ayawilca Deposit Drilling Program

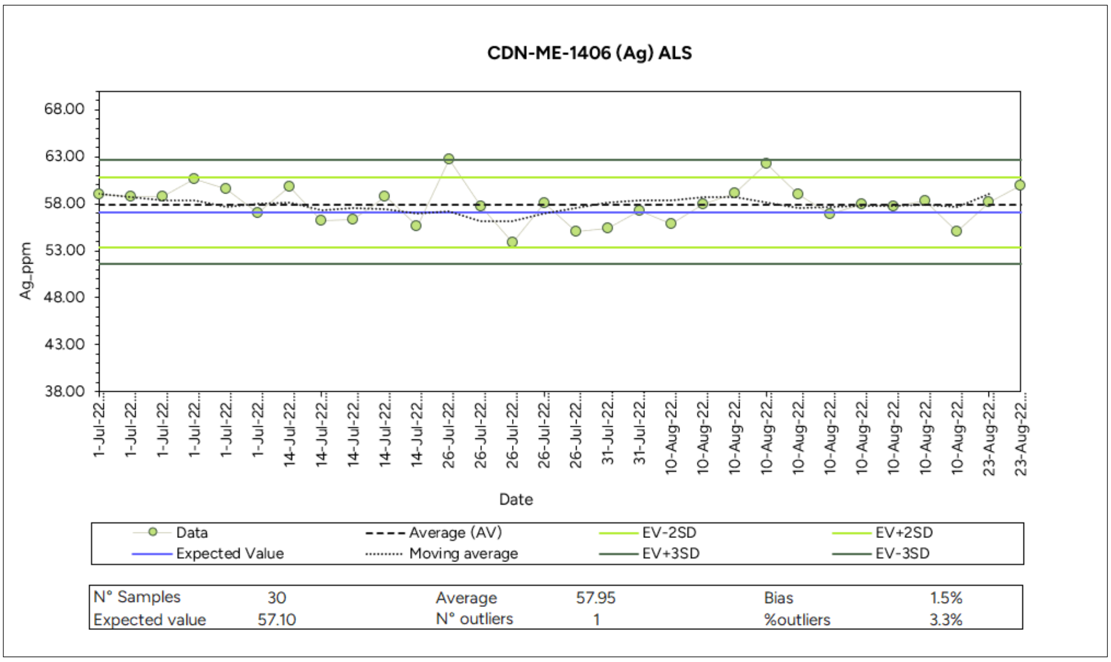
Laboratory	CRM	Element	Number of Assays	Mean	Standard Deviation	Failures	% Bias	% Failures
ALS	OREAS-140	Sn (%)	7	0.2	0.0	0	-5.3%	0.0%
	OREAS-141	Sn (%)	6	0.6	0.0	0	-1.3%	0.0%
	OREAS-142	Sn (%)	3	1.0	0.1	0	-1.0%	0.0%
SGS	OREAS-140	Sn (%)	8	0.2	0.0	0	-2.4%	0.0%
	OREAS-141	Sn (%)	5	0.6	0.0	0	-2.0%	0.0%
	OREAS-142	Sn (%)	2	1.0	0.1	0	-0.5%	0.0%

The QP notes that four out of 10 inserted CRMs for zinc, silver, and lead, and all CRMs for tin, lacked a sufficient number of samples of a single type to establish clear trends. In the opinion of the QP, the CRM grades span a reasonable range with respect to the overall resource grades. The QP recommends, that Tinka reduce the number of CRMs inserted per metal to three: a low grade CRM similar to the mean near the cut-off, a medium-grade CRM similar to the average grade of the reported Mineral Resources, and a high-grade CRM. The QP also recommends procuring a CRM for lead that is similar to the average grade of the Ayawilca deposit.



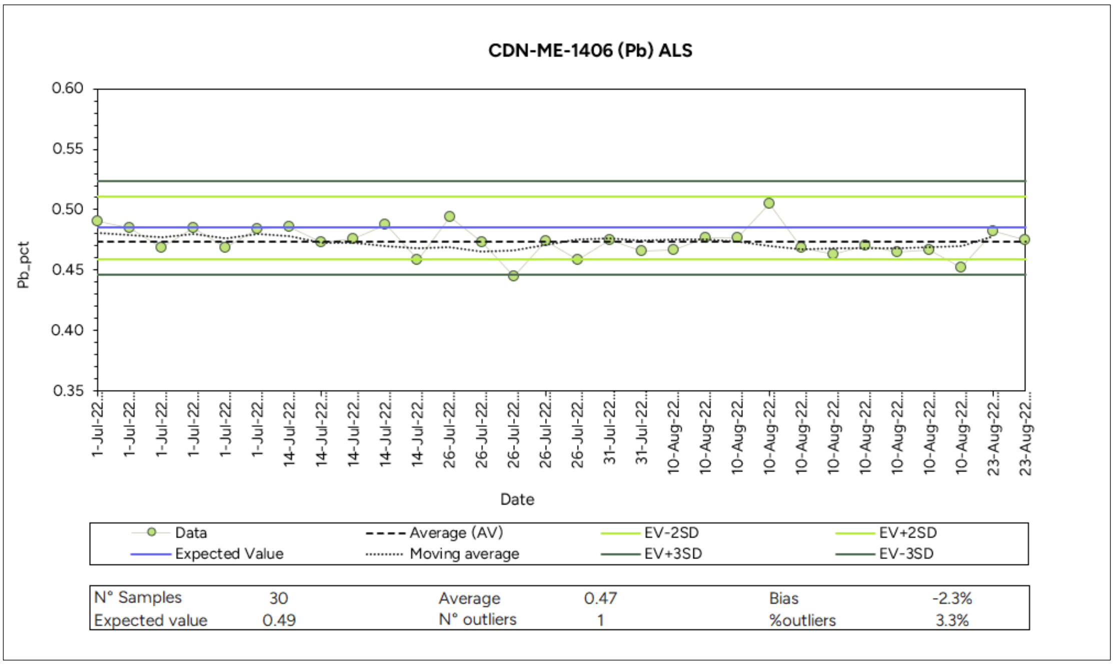
Source: SLR, 2024

Figure 11-3: Ayawilca Zn Control Chart for CDN-ME–1406 - ALS



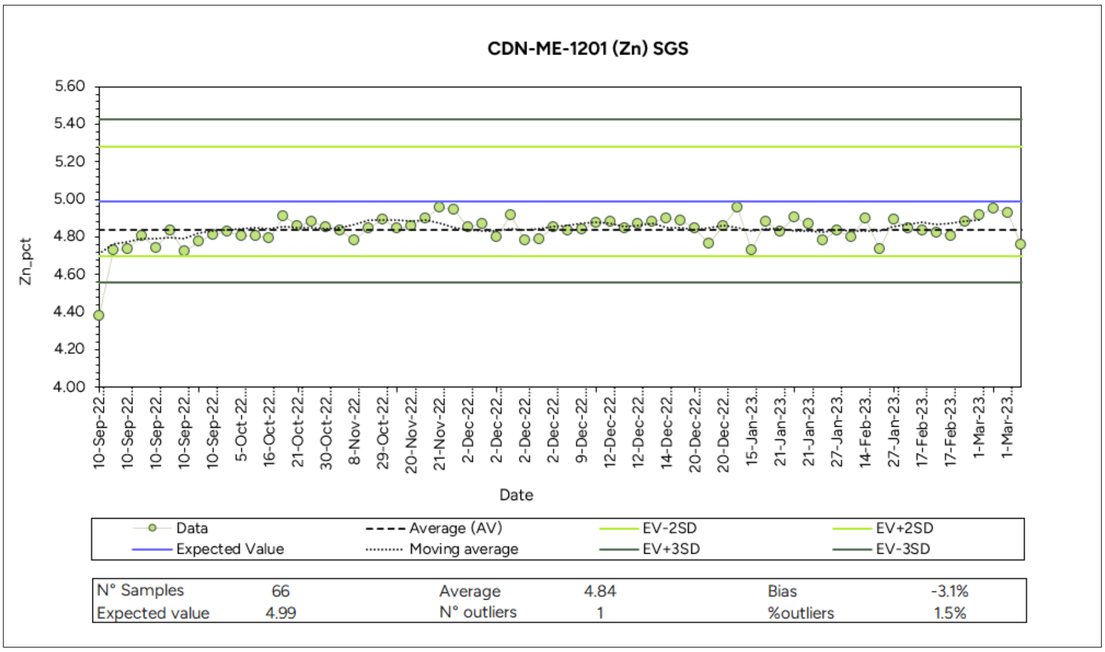
Source: SLR, 2024

Figure 11-4: Ayawilca Ag Control Chart for CDN-ME-1406 – ALS



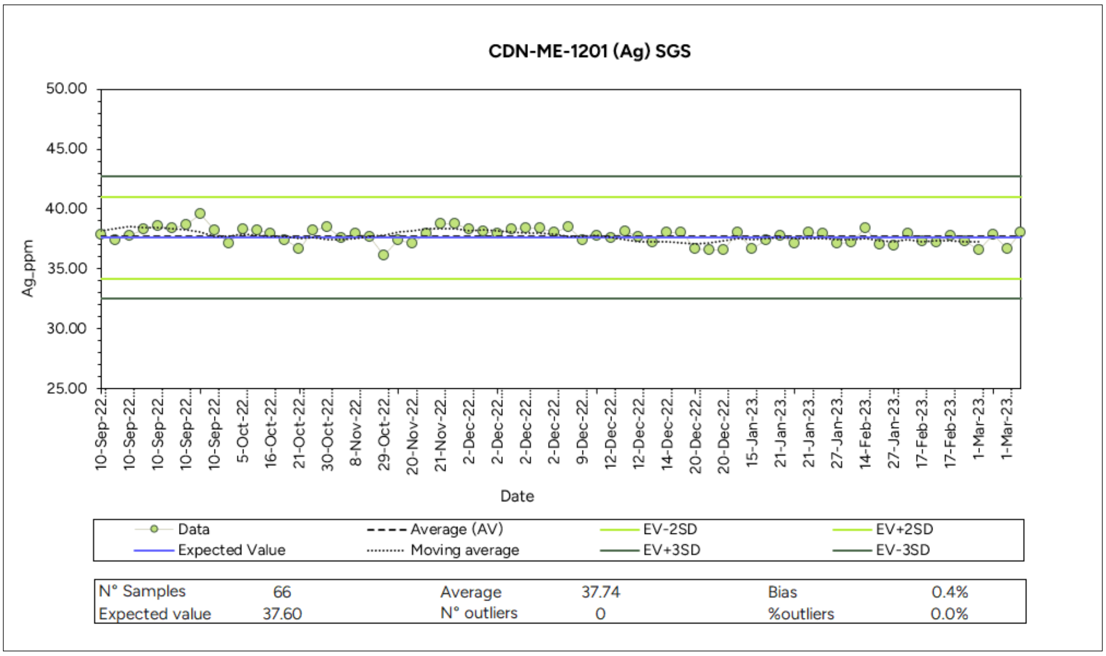
Source: SLR, 2024

Figure 11-5: Ayawilca Pb Control Chart for CDN-ME-1406 – ALS



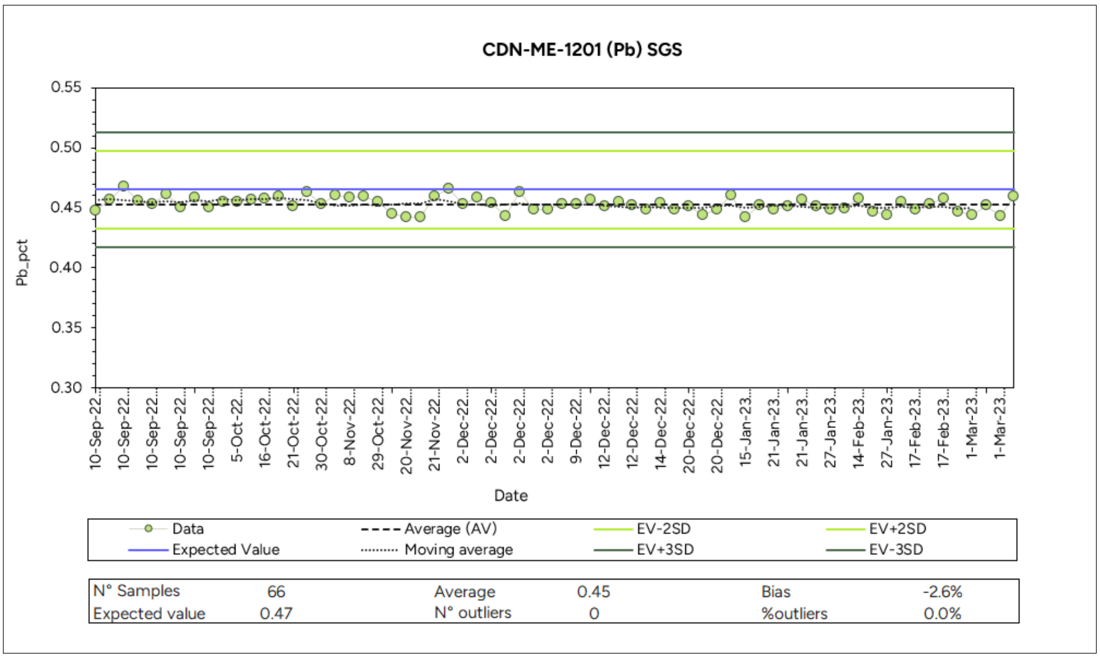
Source: SLR, 2024

Figure 11-6: Ayawilca Zn Control Chart for CDN-ME–1201 - SGS



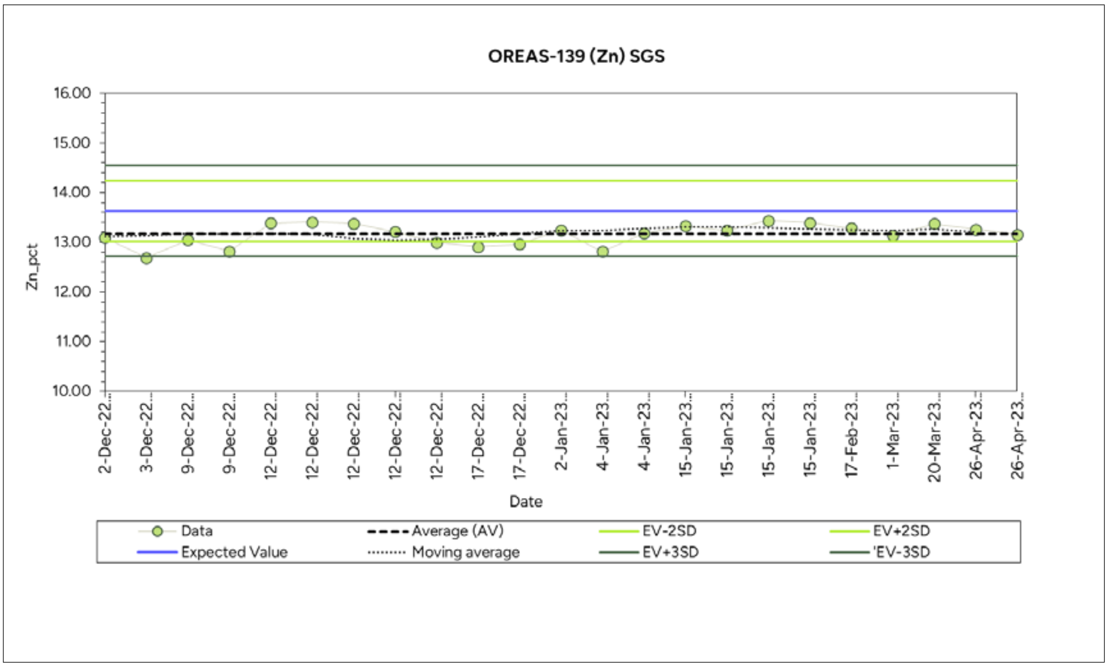
Source: SLR, 2024

Figure 11-7: Ayawilca Ag Control Chart for CDN-ME–1201 - SGS



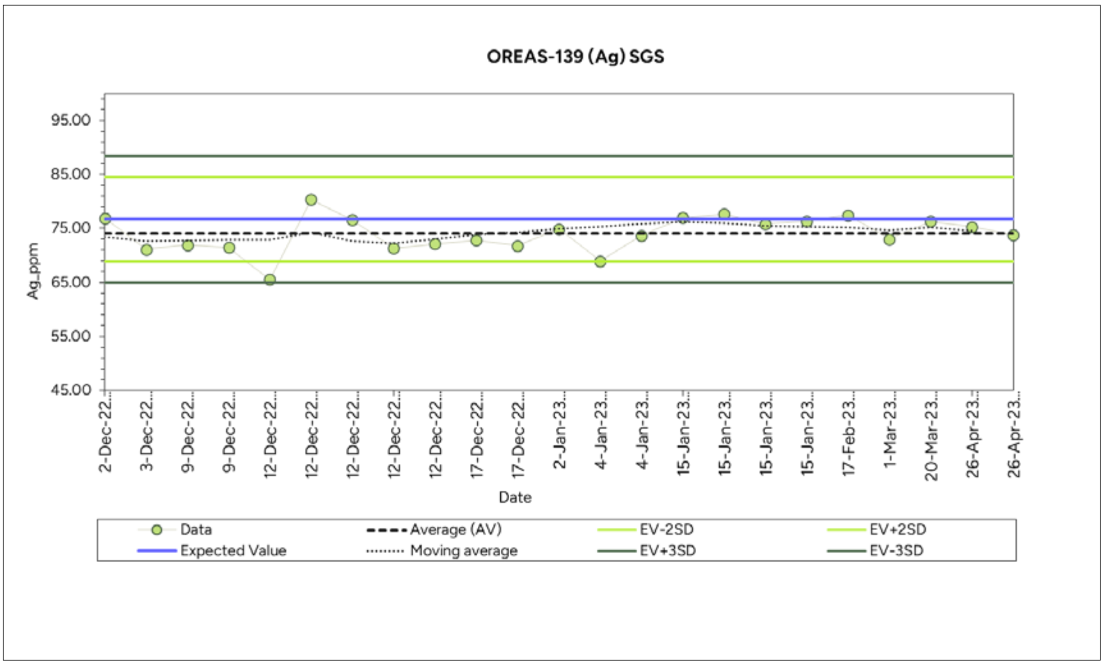
Source: SLR, 2024

Figure 11-8: Ayawilca Pb Control Chart for CDN-ME–1201 - SGS



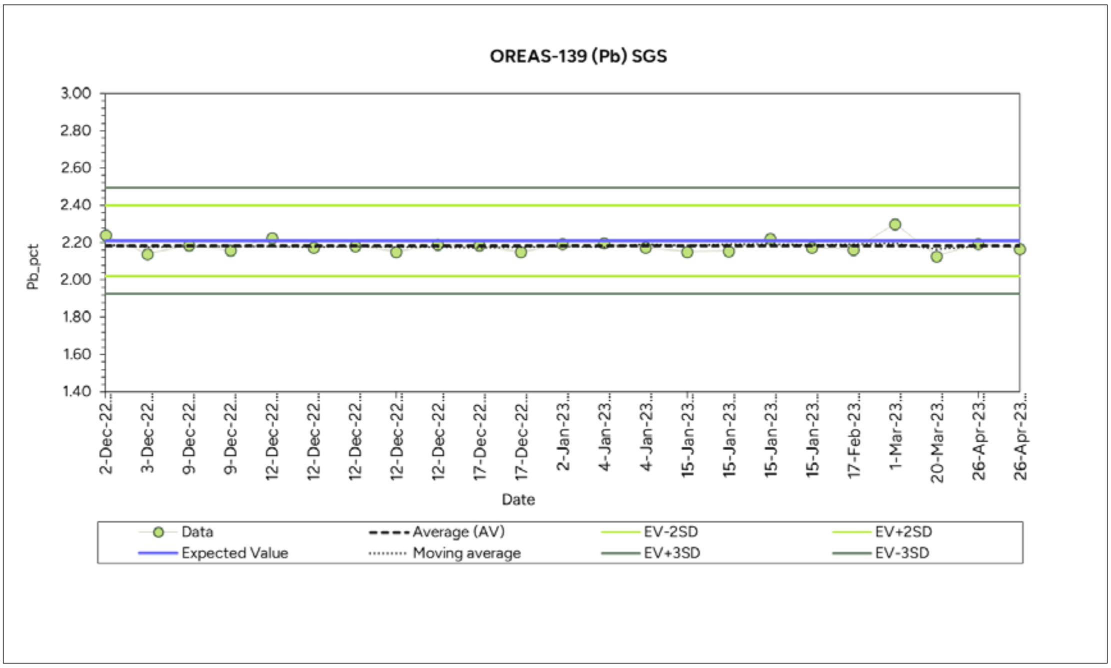
Source: SLR, 2024

Figure 11-9: Ayawilca Zn Control Chart for OREAS139 – SGS



Source: SLR, 2024

Figure 11-10: Ayawilca Ag Control Chart for OREAS139 – SGS



Source: SLR, 2024

Figure 11-11: Ayawilca Pb Control Chart for OREAS139 – SGS

11.6.3 Duplicates

Duplicate samples help monitor preparation, assay precision, and grade variability as a function of sample homogeneity and laboratory error. Field duplicates are used to evaluate the natural variability of the original core sample, as well as detect errors at all levels of preparation and analysis including core splitting, sample size reduction in the preparation laboratory, subsampling of the pulverized sample, and analytical error. Coarse reject and pulp duplicates provide a measure of the sample homogeneity at different stages of the preparation process (crushing and pulverizing).

11.6.4 Colquipucro Deposit

The QP reviewed 1,220 sample pulps from the Colquipucro deposit analyzed at Plenge and sent by Tinka to Certimin for referee check assays (pulp replicate samples). The results for silver, after the removal of eight outliers, gave a strong correlation coefficient of 0.989. Results from Certimin averaged only 1.3% higher compared to the primary laboratory. In the opinion of the QP, these results are acceptable.

11.6.5 Ayawilca Deposit

2015 to 2018 and 2019 to 2021 Drilling Programs

Pulp Replicates

A total of 516 sample pulps analyzed at SGS were sent to Inspectorate laboratory (“Inspectorate”) in Lima for check assays. The results for zinc exhibit a strong correlation. Results from Inspectorate averaged 1.9% lower than the primary laboratory, yet larger variations were not observed in either low- or high-grade samples.

Pulp Duplicates

During the 2019 to 2021 drilling program, Tinka inserted 107 pulp duplicates, or approximately 0.3% of all submitted samples. The pulps were analyzed in the same batch as the original sample with a different sample number.

Field Duplicates

Prior to the 2019 to 2021 drilling programs, Tinka inserted a field duplicate approximately every 20 regular samples. Half core was quartered by Tinka geologists and sent for analysis with the same batch as the original sample, though with a different sample number. A total of 308 field duplicate samples were used for the 2015 to 2018 drilling programs and an additional 401 field duplicate samples were used in the 2019 to 2021 drilling program.

The QP reviewed all duplicate sample results for zinc, silver, tin, and lead for the 2019 to 2021 drilling program and found the results to be acceptable.

2022 to 2023 Drilling Program

Pulp Duplicates

During the 2022 to 2023 drilling program, Tinka inserted 121 pulp duplicates, or approximately 2% of all samples submitted to ALS and SGS. The QP revaluated the duplicate sample results for silver, zinc, lead, and tin using scatter plots and Half Absolute Relative Difference (“HARD”) index plots.

Overall, pulp duplicates results were within acceptable limits. Results for zinc, silver, lead, and tin pulp duplicate pairs from ALS and SGS are summarized in Table 11-12, with ALS results illustrated in Figure 11-12 to Figure 11-15, and SGS results illustrated in Figure 11-16 to Figure 11-19.

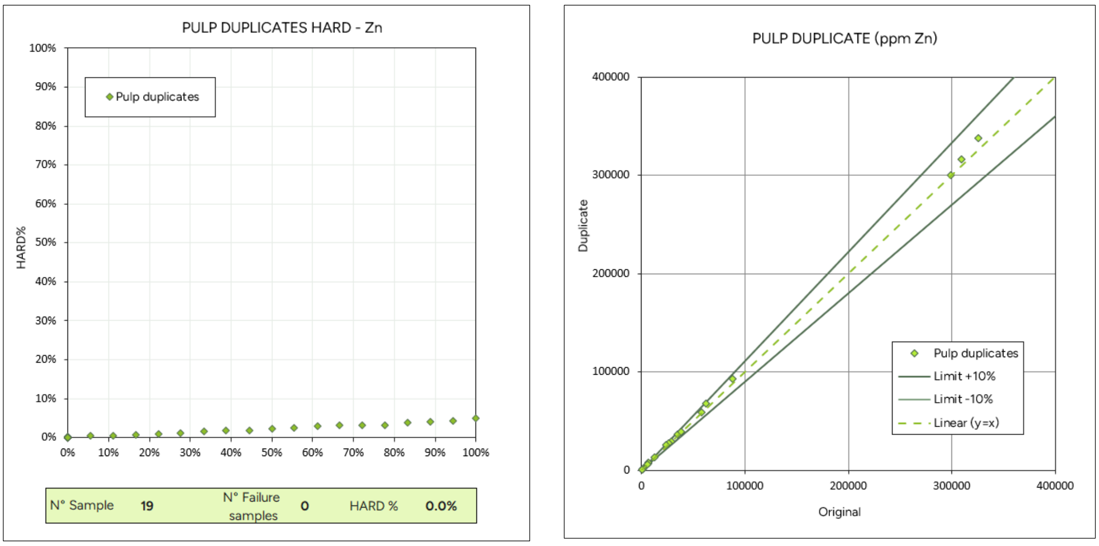
Coarse Duplicates

During the 2022 to 2023 drilling program, Tinka inserted 113 coarse duplicates, or approximately 2% of all samples submitted to ALS and SGS. The QP revaluated the duplicate sample results for silver, zinc, lead, and tin using scatter plots and HARD index plots.

Overall, coarse duplicate results were within acceptable limits. Results for zinc, silver, lead, and tin coarse duplicate pairs from ALS and SGS are summarized in Table 11-12 with ALS results illustrated in Figure 11-12 to Figure 11-15, and SGS results illustrated in Figure 11-16 to Figure 11-19.

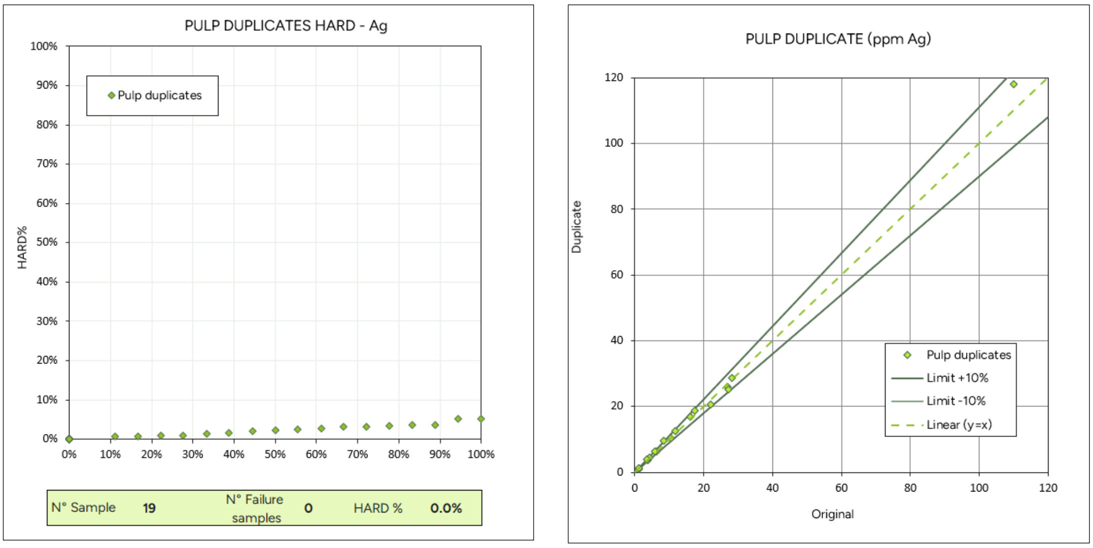
Table 11-12: Duplicate Sample Results from ALS and SGS for the 2022 to 2023 Ayawilca Deposit Drilling Program

Lab	Duplicate type	Count	Element	Failure	Duplicates passing (HARD%)
ALS	Coarse duplicate	15	Zn (%)	2	87%
		15	Ag (ppm)	2	87%
		15	Pb (%)	2	87%
		15	Sn (%)	0	100%
	Pulp duplicate	19	Zn (%)	0	100%
		19	Ag (ppm)	0	100%
		19	Pb (%)	1	95%
		19	Sn (%)	2	89%
SGS	Coarse duplicate	98	Zn (%)	7	93%
		98	Ag (ppm)	9	91%
		98	Pb (%)	8	92%
		98	Sn (%)	12	88%
	Pulp duplicate	102	Zn (%)	1	99%
		102	Ag (ppm)	1	99%
		102	Pb (%)	6	94%
		102	Sn (%)	14	86%



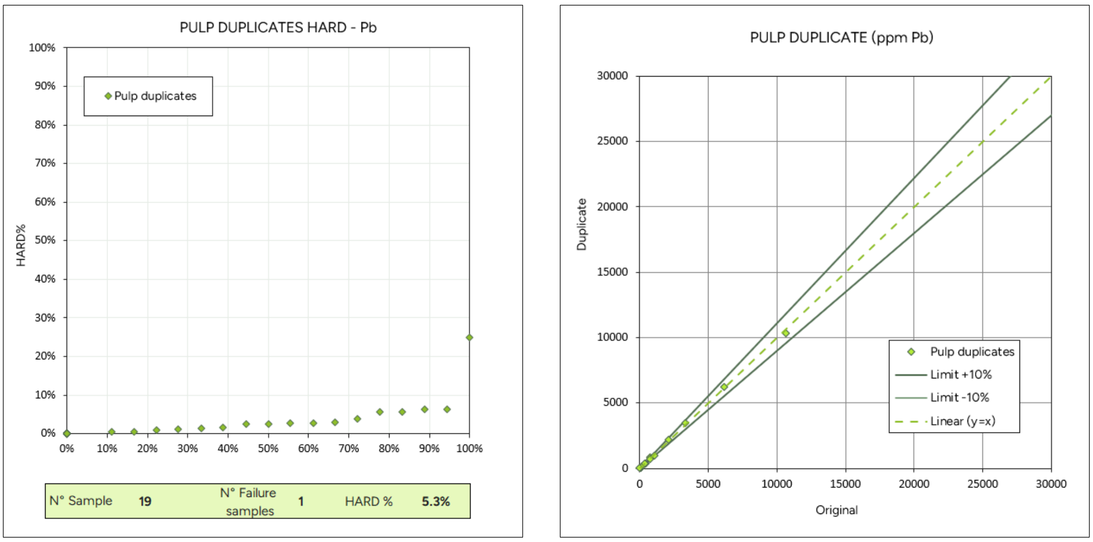
Source: SLR, 2024

Figure 11-12: Ayawilca Zn Duplicates Plot for Pulp Duplicates – ALS



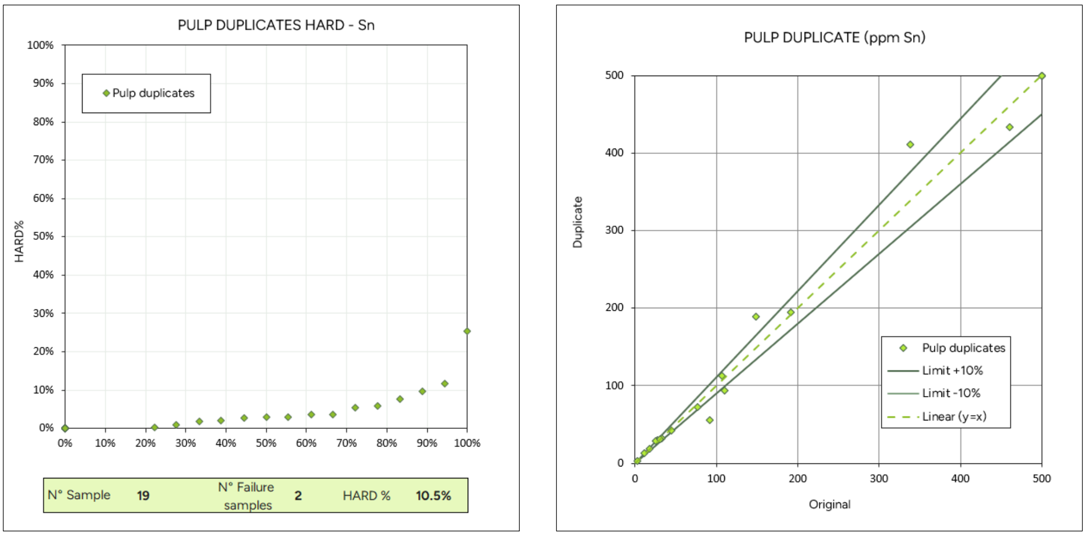
Source: SLR, 2024

Figure 11-13: Ayawilca Ag Duplicates Plot for Pulp Duplicates – ALS



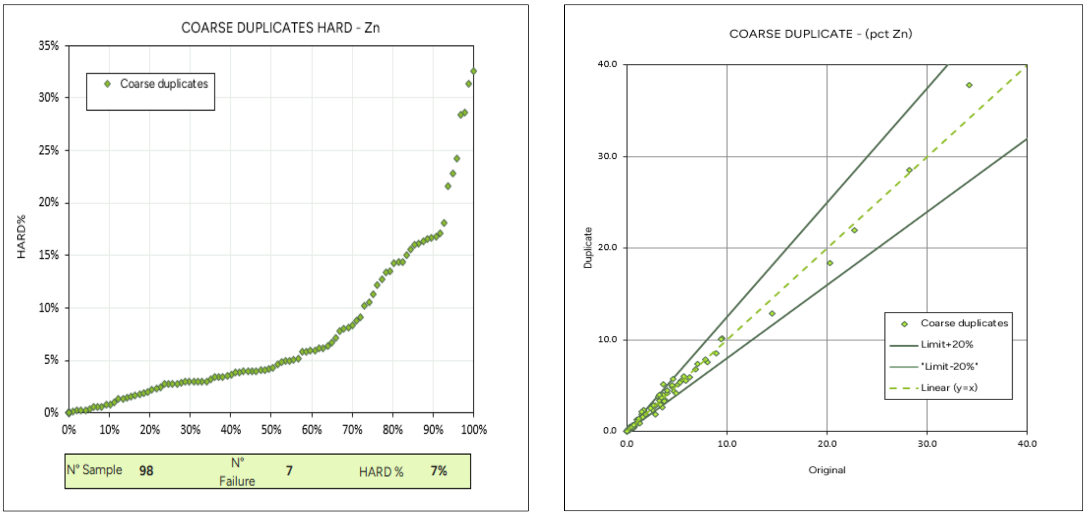
Source: SLR, 2024

Figure 11-14: Ayawilca Pb Duplicates Plot for Pulp Duplicates – ALS



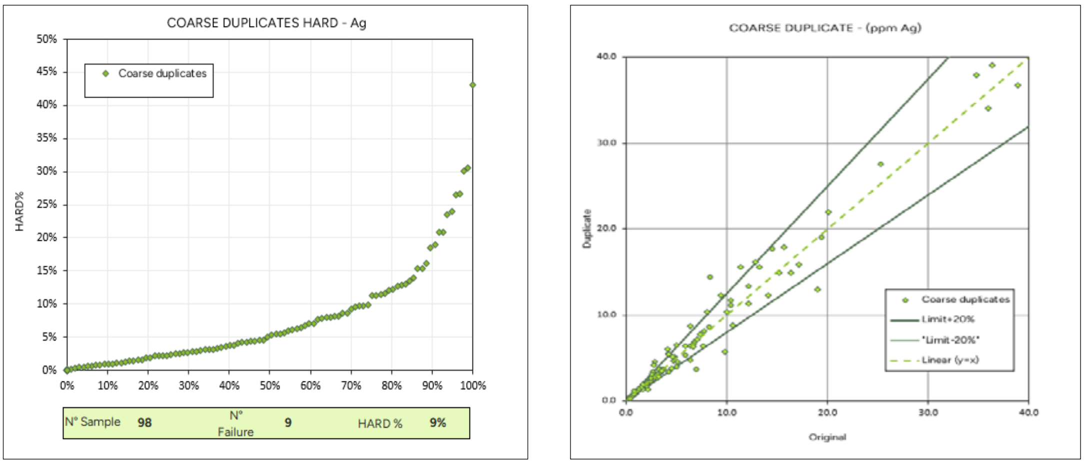
Source: SLR, 2024

Figure 11-15: Ayawilca Sn Duplicates Plot for Pulp Duplicates – ALS



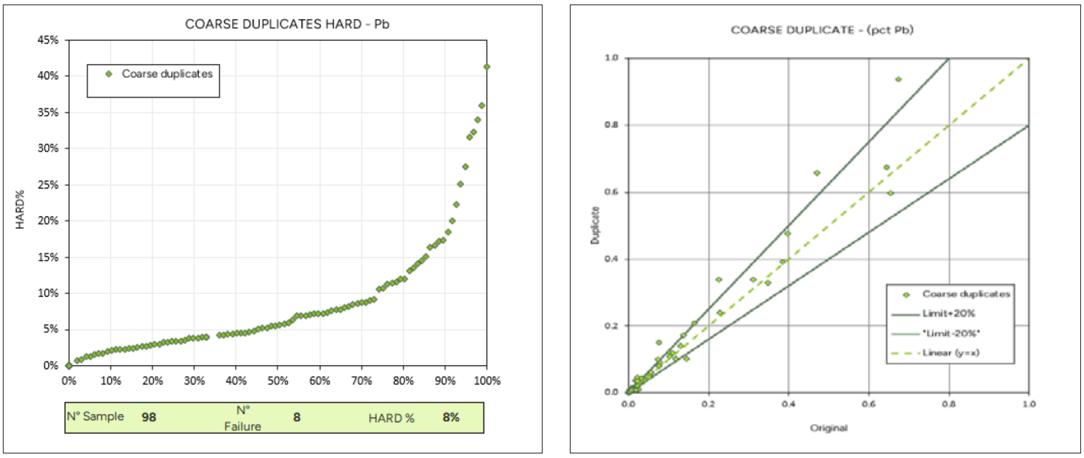
Source: SLR, 2024

Figure 11-16: Ayawilca Zn Duplicates Plot for Coarse Duplicates – SGS



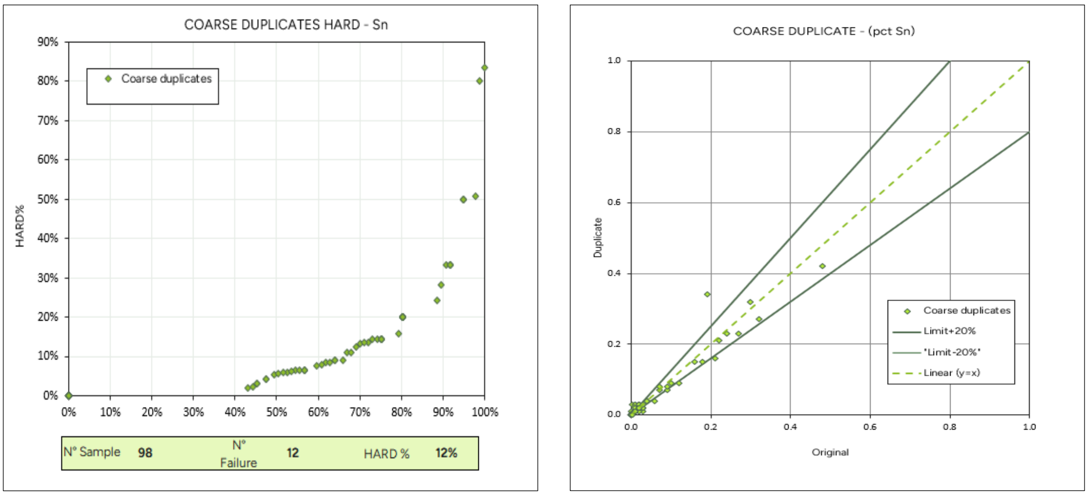
Source: SLR, 2024

Figure 11-17: Ayawilca Ag Duplicates Plot for Coarse Duplicates – SGS



Source: SLR, 2024

Figure 11-18: Ayawilca Pb Duplicates Plot for Pulp Duplicates – SGS



Source: SLR, 2024

Figure 11-19: Ayawilca Sn Duplicates Plot for Pulp Duplicates – SGS

11.7 Databases

Data verification is discussed in Section 12.1.1.

11.8 Sample Security

Core boxes are transported by company vehicle from the drill to the camp logging facility, and again by company vehicle to the gated facility located in Huánuco (moved from Ambo in late 2019). Samples are split and bagged under direct supervision of a Tinka geologist. Once bagged, and prior to transportation to Lima in a Tinka vehicle, samples are secured in a locked cage located within the gated facility at Huánuco.

Analytical data is sent using electronic transmission of the results. In the past, SGS, ALS, and Certimin sent the results to designated recipients at Tinka. The data was provided in both Microsoft (“MS”) Excel files (unprotected) and as official, encrypted, and password protected PDF files.

11.9 Sample Storage

Drill core is stored in covered storage areas within the gated facility located in Huánuco. The core boxes are labelled, and depth markers have been placed at appropriate intervals. Pulps and coarse reject materials are stored at Abil Corporacion S.A.C., a logistics operator specializing in sample storage and transport, in Lima.

11.10 QP Comments on Section 11

The drilling, sampling, and logging are carried out under the direct supervision of experienced technicians.

The security procedures employed by Tinka for drill core, samples, and data are adequate and in line with industry best practices.

In the opinion of the QP, the sample preparation, analysis, and security procedures at the Project are adequate for use in the estimation of Mineral Resources.

In the opinion of the QP, the QA/QC program as designed and implemented by Tinka is adequate, and the assay results within the database are suitable for use in a Mineral Resource estimate. The failure rates are well within acceptable limits typical of a robust QA/QC program.

In the opinion of the QP, the CRM grades cover a reasonable range with respect to the overall resource grades. The QP recommends, however, that Tinka reduce the number of CRMs inserted per metal to three: a low-grade CRM similar to the mean near the cut-off, a medium-grade CRM similar to the average grade of the reported Mineral Resources, and a high-grade CRM. This approach would allow Tinka to monitor CRMs over extended time series, preventing potential trending biases. The QP also recommends procuring a CRM for lead that is similar to the average grade of the Ayawilca deposit.

The QP recommends that Tinka submit regular external checks to a third third-party laboratory to ensure that the primary laboratory remains accurate (pulp replicates). An example of this would be re-implementing a pulp replicate program at a rate of 1 in 50 samples.

12 DATA VERIFICATION

12.1 Data Verification Performed by the QPs

12.1.1 Ms. Katharine Masun, MSA, M.Sc., P.Geo.

Site Visits

Ms. Katharine Masun, MSA, M.Sc., P.Geo, SLR Principal Geologist, visited the site as described in Section 2.2.

Manual Database Verification

For work completed on the Colquipucro deposit, the QP reviewed the project in Dassault Systèmes GEOVIA GEMS Version 6.7 software package ("GEMS"). This included reviewing the header, survey, lithology, assay, and density tables and performing visual checks on the drill hole collar elevations. The Colquipucro resource database and block model was imported into Leapfrog Geo. In addition, the QP performed spot checks on the digital laboratory certificates of analysis with the resource database. No discrepancies were noted and in the opinion of the QP, the Colquipucro project database complies with industry standards and adequate for the purposes of Mineral Resource estimation.

The QP review of the Ayawilca deposit resource database included collar, survey, lithology, assay, and density tables. Database verification was performed using tools provided within Leapfrog Geo 2023.1. Additionally, the assay and density tables were reviewed for outliers. A visual check on the drill hole collar elevations and drill hole traces was completed. No discrepancies were identified.

For drilling completed to 2018, the QP compared assay records for silver, zinc, and lead in the resource database to the digital laboratory certificates of analysis, which were received directly from SGS and Certimin. This included 12 certificates with 799 assays from the Ayawilca deposit and 14 certificates with 736 assays from Colquipucro. For data provided from 2016, the QP compared tin values from five SGS certificates. For data provided from 2017 and 2018, the QP compared values for the six main metals of interest to six assay certificates, three from SGS and three from ALS, with a focus on intervals within the resource wireframes. No discrepancies were identified.

For data provided from 2019 to 2021, the QP reviewed the resource database in Leapfrog Geo 6.0, which included header, survey, lithology, assay, and density tables. Database verification was performed using tools provided within the Leapfrog Geo software program and MS Excel to check for potential issues. No problems were identified. The QP compared all zinc, silver, tin, and lead values from all 52 assay certificates for samples collected during the 2019–2021 drilling programs. No discrepancies were identified.

For drilling completed during the 2022 to 2023 drill program, the QP compared assay records for zinc, silver, lead, and tin in the resource database to the digital laboratory certificates of analysis from ALS and SGS. No inconsistencies were identified for zinc, silver, or lead assays. Verification of tin assays returned 334 inconsistent entries within a dataset of 4,906 assays. Upon review, inconsistencies between resource database assays and certificates were related to below detection or overlimit assays. Verification of indium assays returned 10 discrepancies from 9,975 assay records. The discrepancies were related to overlimit values.

The QP compared 418 density records from a dataset of 913 Ayawilca deposit measurements taken at ALS and SGS. Four discrepancies were identified, of which one case is attributable to sample swapping.

Overall, no significant issues were identified, and the resource assay and density dataset are consistent. In opinion of the QP, the discrepancies identified in the Ayawilca resource assay results do not impact the integrity of the database and the data is of sufficient quality to support Mineral Resource estimation.

Independent Check Samples

During a site visit in 2019, the QP selected and marked out a total of six samples from the Colquipucro deposit and the Tin Zone for duplicate analysis. The specified intervals were quarter split by Tinka technicians under the supervision of the QP. The samples were bagged, tagged, sealed, and delivered to SGS Lima by the QP. Silver and tin were analyzed by atomic absorption, SGS codes AAS41B and AAS90B, respectively.

The independent sampling by the QP confirms that there is significant silver and tin mineralization in the drill holes sampled (Table 12-1 and Table 12-2, respectively). Confirmation of zinc and copper mineralization at the Ayawilca deposit was made by observing numerous intervals with significant sphalerite and chalcopyrite. During Ms. Masun’s site visit in 2023, confirmation of zinc, silver, and lead mineralization at the Ayawilca and Colquipucro deposits was made by visual inspection of numerous drill core holes at Tinka’s core facility in Huanaco and at the Project site.

Table 12-1: Check Sample Results for Silver

Drill Hole	From (m)	To (m)	Original (g/t Ag)	SLR (g/t Ag)
CDD 6	30	32	264	277
CDD 19	62	64	342	284
CDD 21	42	44	136	110
CDD 21	44	46	270	175

Table 12-2: Check Sample Results for Tin

Drill Hole	From (m)	To (m)	Original (% Sn)	SLR (% Sn)
A15-039	372	374	0.46	0.39
A15-052	358.2	359	1.28	1.41

12.1.2 Mr. Christopher Bray

Site Visits

Mr. Christopher Bray BEng (Mining), MAusIMM (CP), SRK Principal Mining Engineer has not visited site and has managed the mine planning aspects of the 2024 PEA as a desktop study.

Verification for Mine Planning

Information and data have been received from Tinka and other QP's as a basis for 2024 PEA which has been reviewed by the QP and supporting 'Other Experts'. For example, verification of the geotechnical drill data has been undertaken through review of core photos and statistical analysis for estimating geotechnical rock properties and domains. Metal prices and smelter terms have been verified against respective consensus market forecast and other reference subscriptions.

Based on the data verification performed, it is the opinion of Mr. Chris Bray that the data and information reviewed is adequate for the purposes used in this PEA-level Technical Report.

12.1.3 Mr. Adam Johnston

Site Visits

Adam Johnston, FAusIMM (CP), Transmin Chief Metallurgist, visited the site as described in Section 2.2.

Verification for Mineral Processing and Metallurgical Testwork

In preparing this report, data verification for the metallurgical testwork was generally conducted in line with best industry practice. Although not all laboratories were visited, regular discussions on test plans and results were held throughout the program.

The data verification process for tests included checking closed mass balances and comparing calculated and assayed head grades. Head assays from the metallurgical laboratories were also cross-checked against expected grades from geological assays for the same drill intervals, providing validation that the samples were authentic.

Furthermore, a site visit was made to review the mineralization in collaboration with the Tinka geology team. This visit, offered insights into the geological context, supporting the reported sample representivity.

In conclusion, Mr. Adam Johnston believes that the quality and veracity of the data, are commensurate with the conclusions drawn at the PEA level.

12.1.4 Mr. Donald Hickson

Site Visits

Mr. Donald Hickson, P.Eng, Envis Principal Tailings Engineer, visited the site as described in Section 2.2.

Verification for Tailings Planning and Hydrogeology Testwork

Based on the data verification performed, it is the opinion of Mr. Donald Hickson that the data and information reviewed is adequate for the purposes used in this PEA-level Technical Report.

12.1.5 Dr. David Stone

Site Visits

Dr. David Stone, B.Ap.Sc, Ph.D., MBA, P.Eng.(ON), P.E.(WA), President of MineFill Services has not visited site and has managed the mine backfill aspects of the 2024 PEA as a desktop study.

Verification for Backfill Assessment

Based on the data verification performed, it is the opinion of Dr. David Stone that the data and information reviewed is adequate for the purposes used in this PEA-level Technical Report.

12.2 Other Data Verification Tests

The drill collar sites were re-surveyed and verified several times since drilling began in 2007. Collars from the 2007 and 2011–2012 campaigns were originally surveyed by hand-held GPS, followed by professional surveyors in late 2011 and again in 2012 during the topographic survey. Many of the holes were re-surveyed by transit in late 2014. The results were compared and reconciled to the previous coordinates each time holes were re-surveyed.

Check samples from selected pulps from the 2007 drill program were submitted to IPL Laboratories in Richmond, British Columbia, Canada, and check samples from the 2011 to 2013 programs were sent to ALS Chemex Laboratories in Lima. In 2014, Tinka re-assayed 1,220 pulp samples at Certimin that had originally been completed at Plenge. Overall, no bias was detected by the QP.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Introduction

Several metallurgical testwork phases have been completed to evaluate the mineral processing of the Ayawilca Project. The following is a summary of the testwork phases:

- Phase 1:
    - Performed at SGS Peru in 2016.
    - Two master composites (AAFC-01 and AAFC-02).
    - Scoping tests focussed on zinc flotation (rougher and cleaner tests).
- Phase 3:
    - Performed at Plenge during 2017 to 2018.
    - Two master composites (ACFC-01 and ACFC-02).
    - Testwork focussed on zinc flotation and comminution.
- Phase 4:
    - Performed at Plenge and SGS Canada in 2018.
    - Twelve composite samples (ADS-01 to ADS-12).
    - Scoping testwork focussed on chemical and mineralogical characterization of the tin mineralization.
- Phase 5A:
    - Performed at XPS Ontario (“XPS”) in 2019.
    - Mineralogical study of 30 drill composite samples from West and South.
    - Variability study using mineralogical characteristics and rougher tests on seven geometallurgical units from above composite samples.
    - Two master composites (AEC-02 and AEC-03) were chosen and locked cycle flotation tests completed to produce good quality zinc concentrates.
- Phase 5B:
    - Performed at XPS in 2021.
    - Mineralogy assessment of 11 variability samples of lead-silver mineralization.
    - Four master composites developed for lead-silver and zinc flotation and variability testwork.
- Phase 5C:
    - Performed at XPS in 2021.
    - One master composite.
    - Testwork focussed on lead-silver flotation using a Jameson cell.
- Phase 5D:
    - Performed at XPS and Golder Associates, Ontario (“Golder”) in 2021.
    - One master composite using a combination of AEC-02 and AEC-03 composites.
    - Flotation tailings were sent to Golder for testwork to characterize the tailings.

- Phase 6:
    - Performed at PMC British Columbia ("PMC") in 2021.
    - Five composite samples were selected.
    - Testwork focussed on mineralogical characterization for tin.
- Phase 7:
    - Performed at ALS Tasmania in 2022-23.
    - Five composite samples representing Tin Zone domains were selected: coarse-grained tin domain (AGC-01), fine-grained tin domain (AGC-02 and 02A), tin stockwork phyllite domain (AGC-03 – not tested) and the tin – zinc domain (AGC-04).
    - Testwork focussed on tin recovery testwork using sulphide flotation, locked cycle gravity, acid leaching and magnetic separation.
- Phase 8:
    - Performed at Plenge in 2023.
    - One composite from the Silver Zone.
    - Testwork focussed on characterization and flotation of Silver Zone mineralization.

Phase 1, Phase 3 and Phase 4 are not summarized in this report as these tests are superseded. In this technical report, the phases summarized are zinc flotation (Phase 5A), Pb-Ag/Zn Variability (Phase 5B), solid/liquid separation for tailings (Phase 5D), tin characterization (Phase 6), tin gravity-flotation testwork (Phase 7) and Silver Zone flotation testwork (Phase 8).

13.2 Zinc Recovery

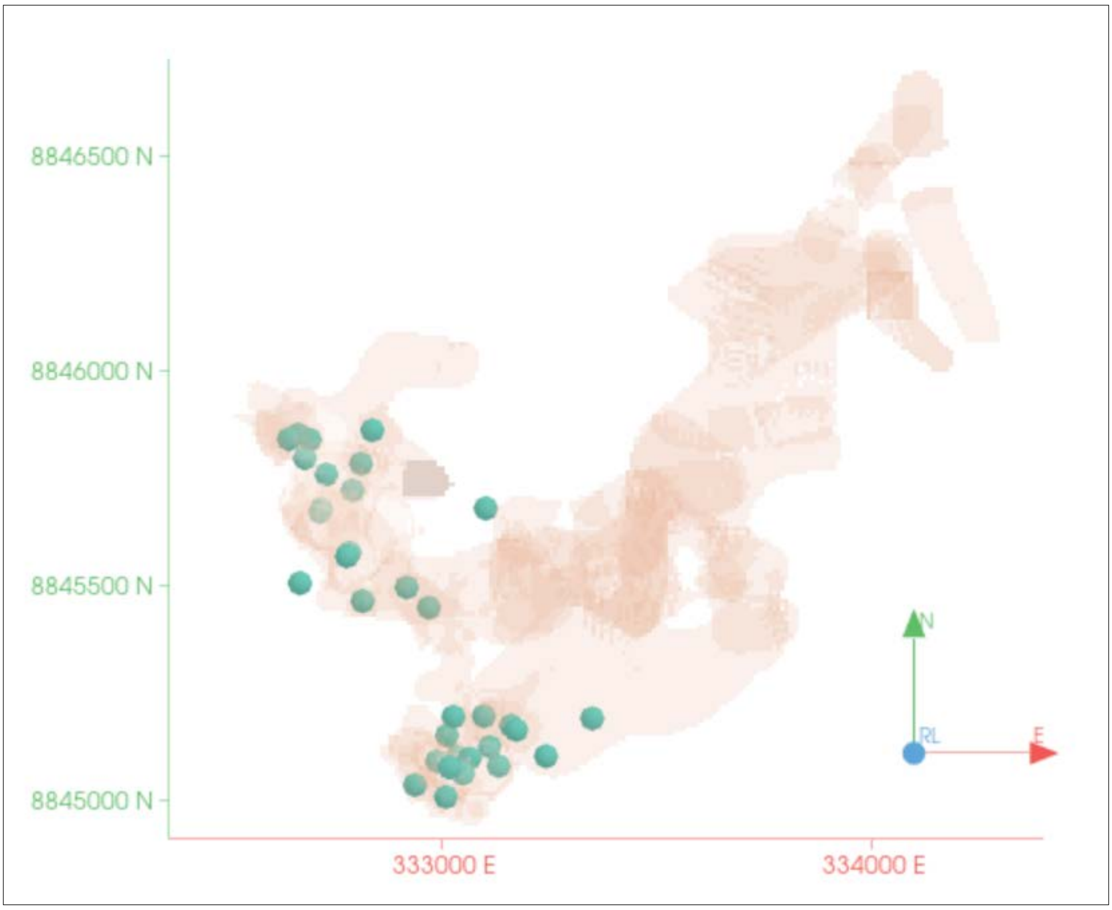
The basis for the metallurgical predictions for zinc recovery in the 2024 PEA are the same as for the 2021 PEA, that is based on locked cycle testwork results from Phase 5A. However, relatively few locked cycle tests have been carried out. The results of the Phase 5A testwork program showed that the zinc mineralization produces a zinc concentrate grading 50% Zn with a zinc recovery of 92%. Composite sampling for the flotation testwork was focused at West and South areas, which are likely to be the priority areas in a future mine development. A lead–silver concentrate is also expected to be produced from the Zinc Zone as well as from the Silver Zone. Factors such as grade, lithology, alteration, oxidation, mineralogy, and location were considered in the sample representativity evaluation.

Metallurgical samples for the Zinc Zone were concentrated in the South and West areas. The Central and East areas were under-represented. The selected composite samples were on average higher grade than the projected mill feed; however, the metallurgical recovery does not appear to be grade dependent, and so it has been assumed that these samples are sufficiently representative for a PEA-level study.

The iron that is present in the sphalerite that predominates at Ayawilca could affect the marketability and treatment costs for the zinc concentrate. Other than high iron, there are no deleterious elements expected in the zinc concentrates produced from Ayawilca.

13.2.1 Samples

The samples used for the Phase 5A testwork for zinc flotation were derived from 30 composite samples from 26 different drill holes at South and West Ayawilca. The locations of the samples are highlighted in Figure 13-1.



Note: Figure prepared by Transmin, 2021.

Figure 13-1: Phase 5A: Optimization Flotation for Zinc – Sample Locations

Three master composites were formed from the larger number of composite samples based on the mineralogical analyses of the individual samples:

- AEC-02: created by compositing 11 drill samples with a Zn:S ratio >0.5 containing relatively low iron sulphides and relatively high silica;
- AEC-03: created by compositing 17 drill samples with a Zn:S ratio <0.5 containing substantially higher iron sulphide than AEC-02;
- AEC-05: created by compositing four drill samples. This composite had a slightly lower zinc grade, more typical of the average zinc grade of the deposit.

13.2.2 Testwork

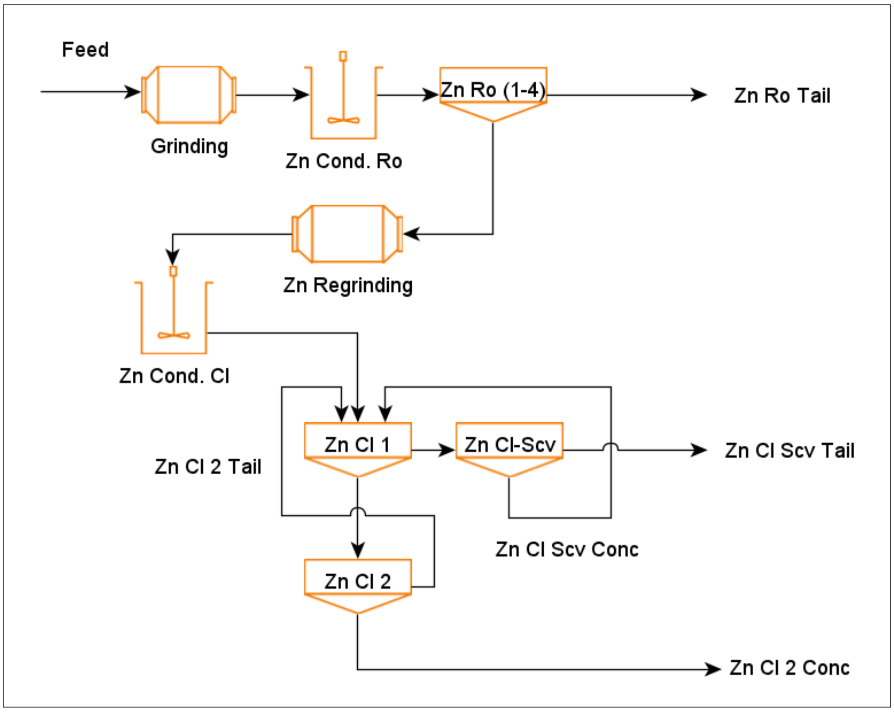
Flotation development programs were carried out at Plenge and XPS. While the resulting composites were higher grade than the average diluted mining grades, it is believed that the samples were representative of the different mineral textures that will be encountered at Ayawilca and were spatially representative of the South and West areas of the Zinc Zone, and therefore, representative with respect to flotation performance.

The objective of the testwork was to develop a flowsheet using a conventional flotation process for the zinc mineralization at West and South Ayawilca, which was successfully achieved (Figure 13-2).

Testwork results (Table 13-1) demonstrated that recoveries of 92% zinc at a concentrate grade of 50% zinc can be achieved. Two locked cycle tests were carried out on two different styles of mineralization and both tests produced similar zinc concentrates.

Potentially deleterious elements in the zinc concentrates (including silica, manganese, cadmium, mercury, and arsenic) were well below standard smelter penalty levels. A penalty is anticipated for iron content in the concentrate.

Indium in the two locked cycle zinc concentrates (719 ppm and 400 ppm) is high and potentially payable, subject to the smelter and commercial arrangements.



Note: Figure prepared by Transmin, 2024.

Figure 13-2: Phase 5: Optimization flotation; locked cycle flowsheet

13.2.3 Solid/Liquid Separation Testwork for Zinc Tailings

Golder conducted an initial assessment of the tailings through preliminary characterization, sedimentation, and filtration tests using a composite of AEC-02 and AEC-03, each contributing 50%. The composite was characterised as having a pH of 6.7, a particle size of 115 µm, a specific gravity of 3.62, and a mineralogy predominantly comprising quartz, siderite, and pyrite.

The sedimentation tests were executed in two stages. Initially, the focus was on selecting an appropriate flocculant under conditions of 15% feed percent solids and a flocculant dosage of 25 g/t, with AN 905 VHM emerging as the most effective. Subsequent tests aimed at optimizing the feed density and flocculant dosage determined the ideal parameters to be 20% solids in the feed and a 20 g/t flocculant dosage. These conditions resulted in 69.6% thickened solids in the underflow after one hour, reaching 71.7% after 24 hours, and producing clear overflow water.

Centrifugal tests on the underflow stream indicated a maximum achievable solids content of 80.8%. Filtration trials on the thickened tailings assessed various filter cloths and the impact of drying air, identifying the optimal conditions that yielded a moisture content of 14.9% at a loading rate of 407 kg/m²/h.

It was concluded that the zinc tailings were amenable to filtration.

Table 13-1: Phase 5A: Optimization Flotation; Locked Cycle Test Results

Composite	Stream	Mass (%)	Grade (%)							Recovery (%)						
			Zn	Cu	S	Fe	Si	As	Mg	Zn	Cu	S	Fe	Si	As	Mg
AEC-02 (no regrind)	Cl 2 Conc	24.0	46.4	0.2	33.9	15.4	1.0	0.7	0.3	96.1	77.7	54.2	18.3	1.5	34.3	16.1
	Cl Scv Tail	3.0	2.7	0.1	15.9	28.5	11.7	1.0	1.8	0.7	3.7	3.1	4.2	2.1	6.1	11.1
	Ro Tail	73.1	0.5	0.0	8.8	21.4	21.6	0.4	0.5	3.2	18.6	42.7	77.6	96.4	59.6	72.8
	Head Calc.	100	11.56	0.06	15	20.21	16.4	0.47	0.48	100	100	100	100	100	100	100
AEC-02 (with regrind)	Cl 2 Conc	19.6	50.9	0.2	34.8	13.0	0.5	0.05	0.19	92.5	79.5	44.8	12.6	0.5	1.9	8.4
	Cl Scv Tail	5.8	10.4	0.1	24.1	25.9	7.9	2.5	1.32	5.6	7.6	9.2	7.5	2.5	29.4	17.2
	Ro Tail	74.6	0.3	0.0	9.4	21.6	23.5	0.46	0.44	1.9	12.9	45.9	79.9	96.9	68.7	74.3
	Head Calc.	100	10.80	0.06	15.23	20.15	18.1	0.49	0.44	100	100	100	100	100	100	100
AEC-03 (with regrind)	Cl 2 Conc	19.2	50.0	0.2	34.2	13.8	0.3	0.02	0.12	94.1	66.7	28.3	8.8	0.9	1.1	2.7
	Cl Scv Tail	4.0	3.9	0.1	15.1	29.7	9.1	0.63	2.09	1.5	4.8	2.6	4.0	5.3	6.3	9.6
	Ro Tail	76.8	0.6	0.0	20.9	34.0	8.4	0.48	0.99	4.3	28.5	69.1	87.2	93.7	92.5	87.6
	Head Calc.	100	10.19	0.06	23.23	29.91	6.85	0.40	0.87	100	100	100	100	100	100	100

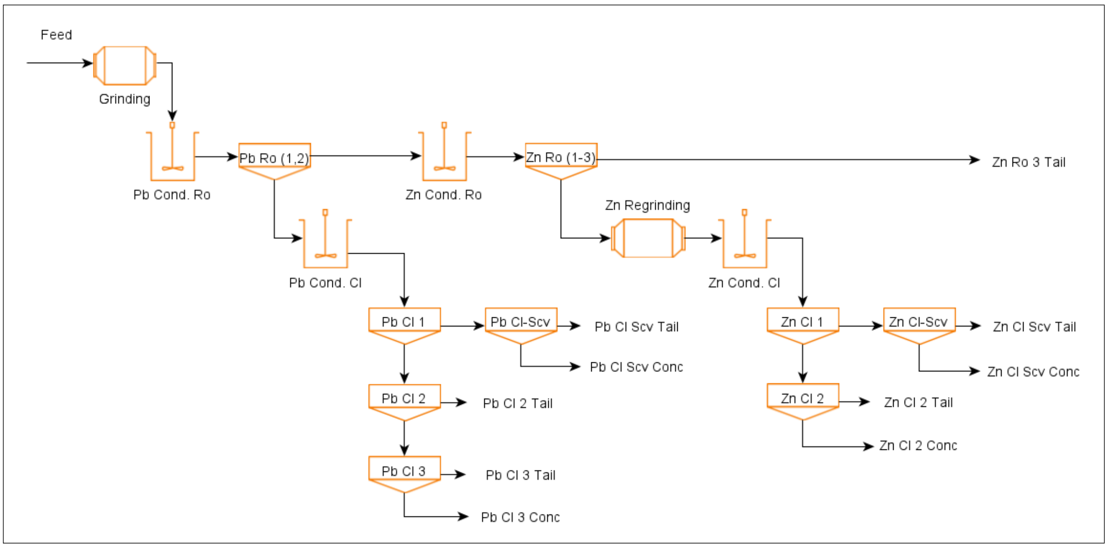
13.3 Lead-Silver Recovery

13.3.1 Phase 5B Testwork

This flotation testwork was conducted at XPS using the standard flowsheet for zinc as optimized in the 2019 testwork, modified into a sequential lead-silver then zinc flotation circuit (Figure 13-3). The four composite samples were designed to cover the range of iron mineralogy found at Ayawilca, with one sample being high in pyrrhotite (Figure 13-4). Lead-silver grades were typically above the average grades in the Zinc Zone at Ayawilca, ranging from 0.62% Pb to 2.4% Pb in the test samples, while silver in these samples graded from 63 g/t Ag to 479 g/t Ag.

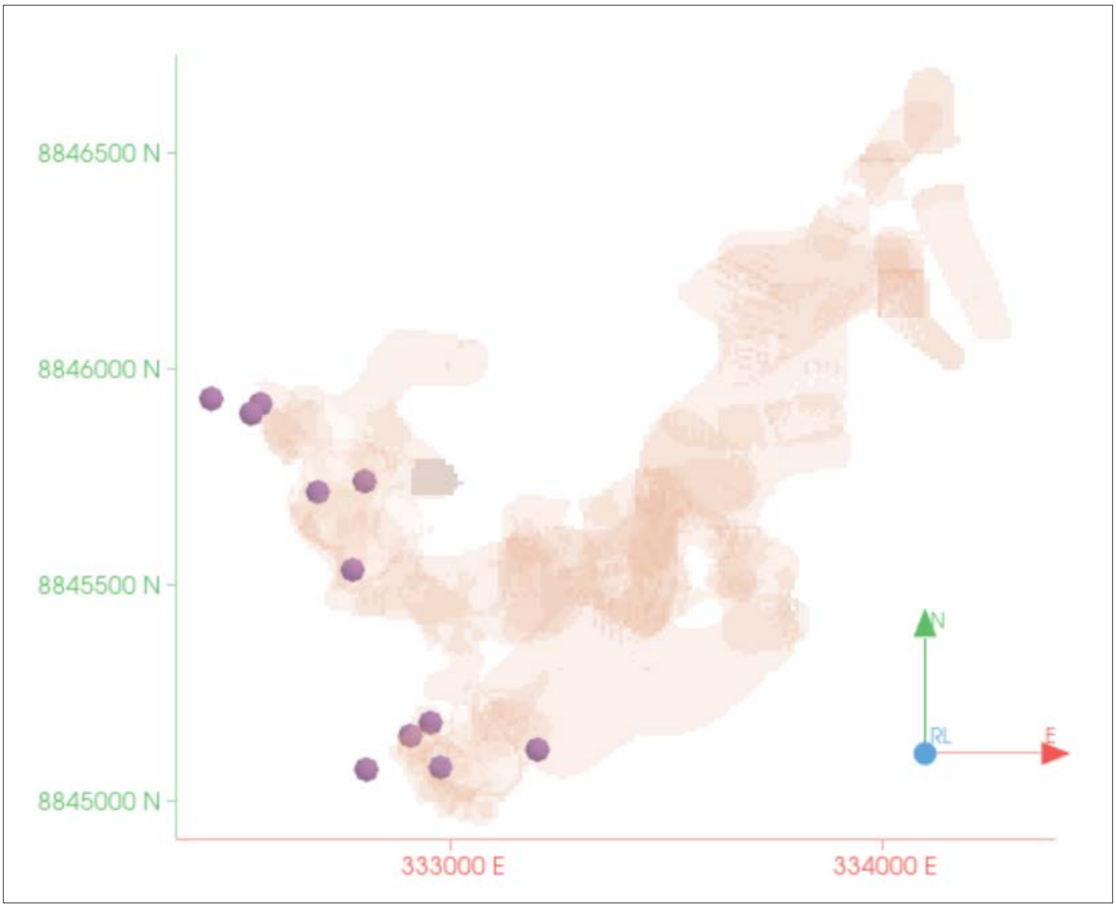
The open circuit conditions produced good quality lead-silver composites, except for one high pyrrhotite sample. The results of the three composites reported a final lead concentrate grade at a commercial level between 65-72% Pb at 74-83% recovery for lead, and silver recovery between 40-69%. Pb-Ag concentrates graded between 2,000 g/t Ag to 17,600 g/t Ag. These three composites responded well to flotation using the adopted reagent schemes.

The high pyrite–pyrrhotite sample results showed lower grade and recovery for lead, silver, and zinc in both concentrates. The high pyrrhotite material requires more investigation, however, this style of mineralization is a minor component in the overall Ayawilca deposit.



Note: Figure prepared by Transmin, 2024.

Figure 13-3: Phase 5B: Pb/Ag Variability Flotation - Cleaner - Flowsheet



Note: Figure prepared by Transmin, 2021.

Figure 13-4: Phase 5B: Lead-Silver Variability Flotation – Sample Locations

13.3.2 Phase 8 Silver Zone Testwork

A single composite sample, typical of the Silver Zone mineralization was tested by conventional flotation at Plenge in 2023. The tests associated with this metallurgical program were:

- Preparation of a composite sample typical of the Silver Zone.
- Chemical characterization.
- Mineralogical characterization.
- Flotation tests (rougher and cleaner).

Samples

Composite TJC-01 was selected from an interval of Silver Zone mineralization (Ag-Zn-Pb) from drillhole A23-200 at South Ayawilca. The head grade of composite TJC-01 was typical of the Ag-Zn-Pb grades of the Silver Zone being 189 g/t Ag, 2.2% Zn, and 0.7% Pb.

Mineralogy

Composite TJC-01 consists mostly of carbonate minerals (29% rhodochrosite, 47% siderite). The main sulphide minerals are galena, sphalerite, and chalcopyrite. The predominant silver mineral is the silver sulphosalt proustite (Ag_3AsS_3), associated with pyrite, sphalerite, rhodochrosite, and galena.

Testwork Summary

A flotation test program was developed where four different collectors were initially evaluated at the rougher stage. The collector A-3418 produced the best results, and subsequently, the sequential rough flotation scheme (lead-silver then zinc) was evaluated, achieving high recovery and high silver grades in the lead-silver concentrate at 88% silver recovery and 2,220 g/t Ag, respectively.

Rougher Flotation

Several rougher tests were performed to evaluate collectors A-3418, A3894, PAX, AP-9950. All tests included a grind stage of P80 at 106 -3418 collector was selected because it had better selectivity than the other collectors evaluated.

Evaluation of Regrinding

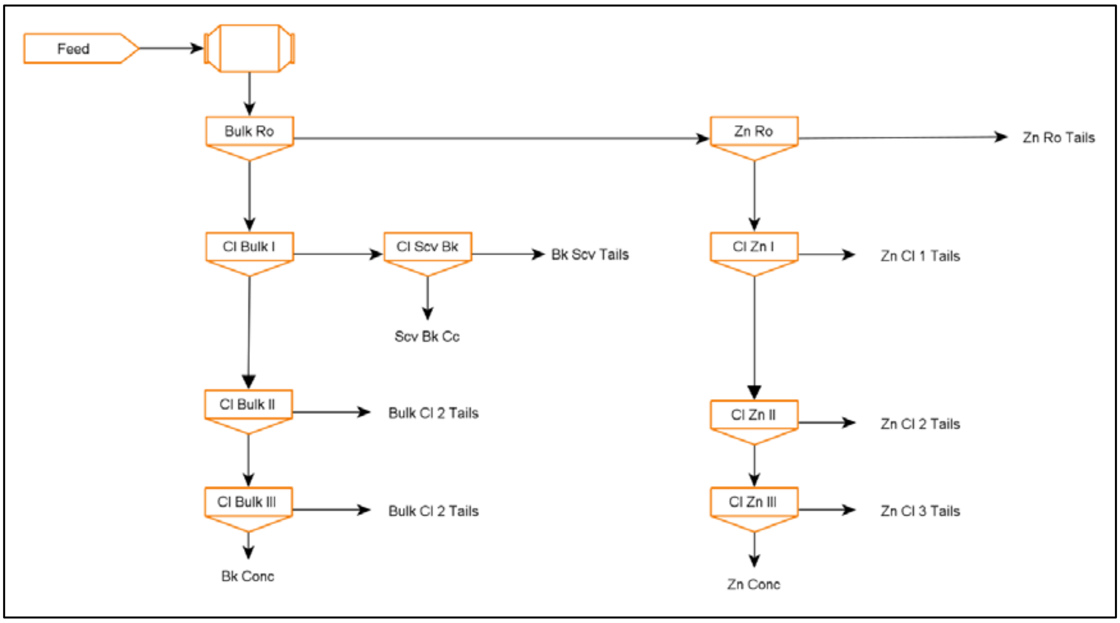
The objective of this group of tests was to evaluate the impact of regrinding on the final concentrate quality, using the open circuit flotation scheme defined in Phase 5B.

The test that included a regrinding step achieved a final concentrate grade quality of 6,538 g/t Ag with a silver recovery of 75%. However, for the purposes of the PEA it was recommended to use the scheme without regrinding, which achieves in the bulk concentrate a recovery of 72% and a grade of 6,630 g/t of Ag, without the additional energy cost for regrinding.

Cleaner Flotation

In order to increase the recovery of lead and silver in the bulk rougher circuit, a test was carried out by modifying the flotation time to 12 min in the rougher bulk stage with results shown in Table 13-2.

The second cleaner results were most suitable, achieving 84% Ag recovery to a 5,211 g/t Ag concentrate. The third cleaner results showed that higher lead and silver grades are achievable with further optimization, and a closed-circuit process.



Note: Figure prepared by Transmin, 2024.

Figure 13-5: Phase 8: Cleaner Flotation - Flowsheet

Table 13-2: Cleaner Flotation Results

Stream	Wt	Grade					Recovery (%)				
	%	Ag, g/t	Pb, %	Zn, %	Fe, %	S, %	Ag	Pb	Zn	Fe	S
Bk 3er Cl. Conc	1.39	9,302	46.9	5.23	11.2	20	76.3	81.2	3.59	0.74	8.01
Bk Cl. Conc + Cl. Scv	2.73	5,211	25.5	5.66	15.2	16.5	84	86.8	7.62	1.99	13
Bk Rougher Conc	6.72	2,220	10.8	4.69	18.1	10	88	90.2	15.5	5.79	19.3
Zn 3er Cl. Conc	3.64	198	0.34	43.7	11.2	26	4.25	1.54	78.4	1.94	27.1
Zn Cl. Conc + Cl. Scv	1.39	9,302	46.9	5.23	11.2	20	76.3	81.2	3.59	0.74	8.01
Zn Rougher Conc	1.69	8,030	40	5.56	12.3	19.3	79.9	84	4.63	0.99	9.36

13.4 Tin Recovery

Metallurgical testwork (Phase 7) was conducted on two tin composite samples from Ayawilca at ALS Tasmania: a coarse-grained tin composite from South (AGC-01), which represents a minor part of the overall Tin Zone mineralization (approximately 15%), and a finer-grained tin composite (AGC-02) thought to represent approximately 85% of the Tin Zone mineralization. The tin composites graded around 2% Sn (as cassiterite) and contained significant quantities of iron sulphides (pyrrhotite, pyrite and marcasite) with associated iron carbonate (siderite) and quartz, typical of the two styles of tin mineralization at Ayawilca. Zinc grade in these two tin composites was low (<1% Zn), typical of the zinc grade within the Tin Zone, and no attempt was made to recover the zinc from these two composites.

A process flowsheet was developed that included sulphide flotation to remove the iron sulphides, gravity concentration of the sulphide flotation tails, and tin flotation on the sulphide concentrate following a regrind. Acid leaching was employed to remove the iron carbonates, and magnetic separation was used to remove residual pyrrhotite.

Composite AGC-01 generated a concentrate grade of approximately 50% tin at an excellent recovery (approximately 90%). Composite AGC-02 produced a concentrate grade of 50% tin at a lower recovery (approximately 45%), with a projected recovery in closed circuit of 50% tin. There remain opportunities to improve the recovery and product quality with further testwork (including magnetic separation).

13.4.1 Samples (ALS)

Five Tin Zone composite samples (AGC-01, AGC-02, AGC-02A, AGC-03 and AGC-04) were compiled from Ayawilca drill cores (as quarter core samples) and shipped to ALS for gravity and flotation tin testwork. The five composites represented the following tin areas:

- AGC-01: Coarse-grained cassiterite – iron sulphide – siderite composite from South.
- AGC-02: Fine-grained cassiterite – iron sulphide – quartz composite from Central.
- AGC-02A: Same mineralogy as AGC-02 (for sequential copper flotation testwork only).
- AGC-03: Cassiterite stockwork in phyllite from Central (this composite was not used).
- AGC-04: Cassiterite – sphalerite – iron sulphide composite from South (for sequential zinc flotation testwork). This represents a small part of the overall tin and zinc mineralization at Ayawilca (<5%).

Composite samples AGC-01 and AGC-02 were the most representative of the Tin Zone mineralization at Ayawilca and were the focus of the ALS work. These composite samples were selected from a number of drill holes, and are believed to be representative of the style and grade of the mineralization in the important tin domains for a PEA level study. Table 13-3 shows the head grades and composition of these two composite samples.

Table 13-3: Head Grades – Composites

Composite	Grade					
	Sn, %	Fe, %	S, %	Cu,%	Pb,%	Zn, %
AGC-01	2.64	50.7	32.4	0.052	0.0098	0.13
AGC-02	1.7	49.1	28.8	0.39	0.0037	0.035

13.4.2 Phase 7: Mineralogy (ALS)

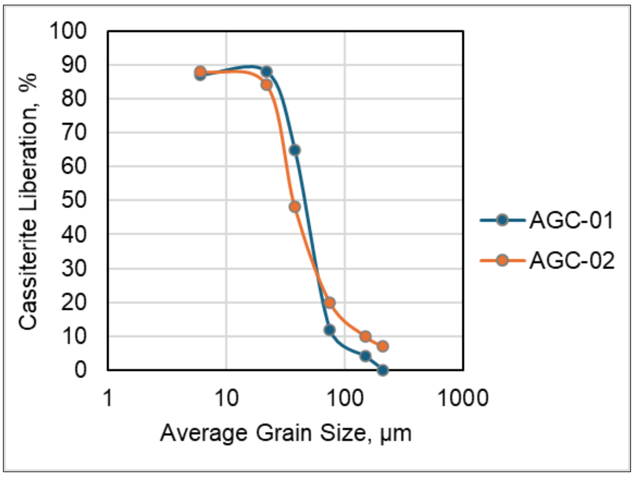
Quantitative X-Ray Diffraction

Quantitative X-Ray Diffraction ("QXRD") analyses was undertaken on the tin composites by McKnight Mineralogy of Ballarat, Australia. Tin mineralization (as cassiterite) is typically associated with high quantities (>50%) of iron sulphides, mostly pyrrhotite with lesser pyrite-marcasite. AGC-01 was characterized as a pyrrhotite-siderite-pyrite-marcasite-cassiterite domain with very low silicates (<10%). AGC-02 was characterized as a pyrrhotite-quartz-siderite-cassiterite-tourmaline domain with minor chalcopyrite and stannite.

Optical Mineralogy

AGC-01 and AGC-02 were evaluated for quantitative optical mineralogical assessment by Moda Microscopy in Burnie, Australia. The samples consisted of six size fractions: +212 µm, +150 µm, +75 µm, +38 µm, +22 µm and +6 µm.

Cassiterite liberation was generally satisfactory at +38 µm (>65% in AGC-01, >48% in AGC-02). Cassiterite became >80% liberated at +22 µm in both composites (Figure 13-6). In AGC-01, cassiterite was associated with gangue minerals (predominantly siderite) and to a lesser extent marcasite. In AGC-02, cassiterite was associated with pyrrhotite, gangue minerals (predominantly quartz) and stannite.



Source: ALS Tasmania, 2023.

Figure 13-6: Percentage of Free Cassiterite vs Grain Size based on Optical Mineralogy Study for Tin Composites AGC-01 and AGC-02

13.4.3 Phase 6: Tin Mineralogy (PMC)

PMC performed testwork in 2021 focusing on the size-by-size cassiterite mineralogy. The objective was to determine the tin-bearing mineral speciation, liberation and association.

Samples

Phase 6 included five samples identified as AFS-001 to AFS-005. The samples were characterized chemically and mineralogically.

All samples were milled to P80 of 425 µm and sized into four fractions (+300 µm, +212 µm, +106 µm and -106 µm). Each size fraction was scanned using a Tescan integrated mineral analyser equipped with a Tescan Vega scanning electron microscope. In all samples, there was a bimodal distribution with most of the tin found in the coarse size ranges +300 µm and the fine size -106 µm fraction (av. distribution 37%). Sample AFS-004 had most of the tin in the fine size fraction.

All five investigated samples had high contents of Fe-sulphides but could be grouped into pyrrhotite-dominant (AFS-001, AFS-002, and AFS-005) and pyrite/marcasite-dominant (AFS-003 and AFS-004) samples. Cassiterite was the dominant tin-bearing mineral species in all samples (94% or higher) except for sample AFS-004, where 33.6% of the tin was in the form of stannite and herzenbergite.

13.4.4 Phase 7: Tin Metallurgical Testwork (ALS)

Heavy Liquid Separation

In the heavy liquid separation process, a liquid with high specific gravity was employed to segregate particles based on their specific gravity. Sized fractions obtained from both wet and dry screening were placed into a separating flask, which contained the heavy liquid (specific gravity of 2.92). The flask was agitated to facilitate the dispersion and differentiation of light from heavy particles. Subsequently, the denser particles ("sinks") and the lighter particles ("floats") were extracted, dried, weighed and assayed.

Heavy liquid separation was carried out on four size fractions: 212 µm, 150 µm, 75 µm and 38 µm. An overall low mass rejection of floats of 3.5% and 8.8% is indicated. These mass yields would not make heavy media a viable processing option.

Sulphide Flotation

Froth flotation was employed to remove pyrrhotite, the main gangue mineral present. In the sulphide flotation process, rougher and cleaner flotation tests were carried out. Initially, the sample was ground to a P80 of 250
with xanthate collectors and pH regulation reagents, conditioned before flotation. Following this, the rougher concentrate underwent ball mill regrinding to achieve a target P80 of approximately 40 on tests were performed, yielding three concentrates and a tail. The cleaner tail was then combined with the sulphide rougher tail for further processing for tin recovery. Finally, the products were filtered, dried, and subjected to weight determination and analysis to assess the effectiveness of the sulphide removal and tin upgrading process.

Sulphide floats were performed at a P80 of 250 4,
SIBX and MIBC.

For AGC-01 the rougher/cleaner floats yielded about 76% sulphur rejection with 3% tin loss to the sulphide concentrates. For AGC-02, the rougher/cleaner floats yielded about 74% sulphur rejection with 20% tin loss to the sulphide concentrates.

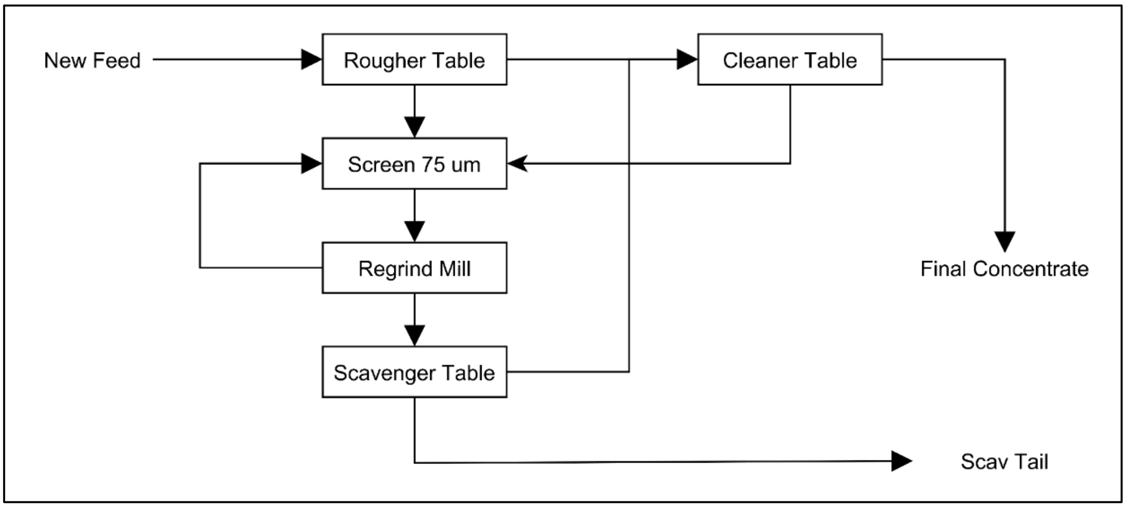
Mozley Separation

Samples for Mozley gravity separation were wet and dry size to convenient fractions for separation. Sizes used were +212 µm, +106 µm, and +17 µm.

Sulphide tails were separated by gravity into concentrate, middlings, and tails for each fraction. AGC-01 displays a flat response without a distinct break between concentrate and tails, consistent with optical mineralogy observations. AGC-02 provided a better gravity response, with a clear break occurring around 50% tin recovery.

Gravity Tabling (Gemini Locked Cycle)

Combined sulphide tails were separated in a locked cycle gravity tabling routine using the following circuit (Figure 13-7). The tabling was carried out at P80 250
cassiterite as coarse as possible. A regrind to 75
and the regrind product was subjected to scavenging gravity concentration.



Note: Figure prepared by Transmin, 2024.

Figure 13-7: Gravity Tabling - Flowsheet

An overall balance for the two composites is presented below in Table 13-4. Concentrates were diluted by pyrrhotite in the gravity concentrate. Silica was largely rejected from the gravity concentrate. Better concentration of tin was observed in the gravity concentrate for AGC-01, reaching 88% Sn recovery with a concentrate grade of 9.4% Sn. AGC-02 achieved a lower recovery of 55% Sn to the gravity concentrate and a grade of 23.1% Sn.

Table 13-4: Locked Cycle Gravity Tabling Results

Composite	Stream	Wt	Grade, %				Recovery, %			
		%	Sn	Fe	S	SiO_2	Sn	Fe	S	SiO_2
AGC-01	Feed	100	7.29	38.9	20.9	11.3				
	Grav Conc	68.4	9.42	43.1	25.8	2.51	88.5	75.7	84.4	15.1
	Grav Tail	31.6	2.66	30	10.4	30.5	11.5	24.3	15.7	84.9
AGC-02	Feed	100	3.76	35.9	21	29.5				
	Grav Conc	8.99	23.1	35.7	22.4	6.94	55.2	8.9	9.6	2.1
	Grav Tail	91	1.85	35.9	20.8	31.8	44.8	91.1	90.4	97.9

Gravity Concentrate Sulphide Dressing

Sulphide was scavenged from the gravity tin concentrate by flotation following a regrind to P80 40
concentrate while also rejecting most of the sulphide. The AGC-01 sulphide dressing tail graded 24.1% Sn with 93.8% stage recovery tin. The AGC-02 sulphide dressing tail graded 42.5% Sn with a stage recovery of 99.1% tin.

Cassiterite Flotation

Cassiterite flotation involving rougher and cleaner tests were conducted on sulphide flotation tails following a regrind of the original gravity tails. The gravity tail for AGC-01 contained about 11% of the tin and graded 2.7% Sn, while the gravity tail for AGC-02 contained about 40% of the tin grading 1.9% Sn.

Following sulphide flotation, the tails showed an increase in the tin grade in AGC-01 to 3.4% Sn (for a loss of 1% tin) and in AGC-02 to 2.5% Sn (for a loss of 9% tin). Following tin flotation and desliming of this sulphide tail, the tin flotation concentrate for AGC-01 graded 12.4% Sn for

8% total tin recovery, while for AGC-02 graded 18.4% Sn for 18% tin recovery.

These tin flotation tests included a rapid sulphide scavenger float at pH below 7 using a xanthate collector, and the addition of surface reagents. A dilute collector was then introduced, conditioning for 15 minutes before the rougher concentrate froth was sequentially removed with additional SPA. Following the rougher stage, a cleaner float on the combined rougher concentrate yielded three concentrates and a tail. All products were subsequently filtered, dried, weighed and assayed.

Acid Leach of Gravity and Sulphide Tails

The tin gravity concentrate after sulphide flotation was found to still contain iron, present as siderite (iron carbonate). For tin upgrading, acid leaching was employed to eliminate the carbonate siderite. Sulphuric acid leaching was carried out for two hours at pH 0.50 and 85°C. Acid leaching was carried out on both the gravity tin concentrate and tin flotation concentrates for both AGC-01 and AGC-02.

The acid leach tests on the gravity concentrate for AGC-01 showed a 50% mass loss of solids, leading to an increase of the tin grade in the concentrate from 28% Sn to 54% Sn with no loss of tin. The grade of the tin flotation concentrate stream increased in grade from 12.4% to 26.7% Sn with no loss of tin.

The acid leach tests on the gravity concentrate for AGC-02 showed a 15% mass loss of solids, leading to an increase of the tin grade in the concentrate from 42.5% Sn to 51% Sn with no loss of tin. The grade of the tin flotation concentrate stream increased in grade from 18.4% to 27.5% Sn with no loss of tin.

Final tin concentrate grades are shown in Table 13-5.

Table 13-5: Final Tin Concentrate Grades

Combined Concentrate	Mass (%)	Sn (%)	Fe (%)	SiO_2 (%)	S (%)
AGC-01 Combined Conc	6	49.3	9.7	12.5	7.1
AGC-02 Combined Conc	3.5	37.5	11.9	14.7	12.4

Magnetic Separation

Wet high intensity magnetic separation (“WHIMS”) was tested on intermediate products and the final concentrate. It was found that substantially more magnetic pyrrhotite could be cleaned from the material, beyond what froth flotation had achieved. While the development of this process in the overall flowsheet was not completed, and so the results have not been incorporated into the current predictions, it does indicate that there remains substantial opportunity for product quality improvement using WHIMS technology. Further testwork is recommended for the next stage of development.

The final leach residue from AGC-02 was subjected to WHIMS to determine if sulphur and iron could be reduced. AGC-02 yielded a concentrate grading 59% Sn, reducing sulphur from 6% S to <1% S, while iron was reduced to 1.5% Fe. A WHIMS test was not carried out on AGC-01 however as the residue graded 4.1% S, there remains an opportunity to further reduce the sulphur values using magnetic separation. Table 13-6 shows the WHIMS dressing results of the final gravity concentrate for AGC-02.

Table 13-6: WHIMS Dressing of Final Gravity Concentrate for AGC-02

Product	Mass	Grade				Distribution (%)				
	g	%Sn	%Fe	%S	%SiO_2	Mass	Sn	Fe	S	SiO_2
6000G Magnetics	12.7	30.1	24.4	16.55	8.74	32.56	19.8	88.5	91	18.1
6000G Non Magnetics	26.3	**59.0**	**1.53**	**0.79**	19.15	67.44	80.2	11.5	9	81.9
Calc Feed	39.0	49.59	8.98	5.92	15.76	100	100	100	100	100

Sequential Copper Flotation

Sample AGC-02A was used for the sequential copper flotation evaluation. Head analysis of the AGC-2A composite was 0.31% Cu, 0.59% Sn, 47.8% Fe and 28% S. The sample was prepared to a P80 of 250 µm, employing Dextrin as a depressant, Aeroflot as a collector, and $CuSO_4$ as an activator. The sample was subjected to rougher flotation and then reground to 40 µm. Sequential copper-pyrrhotite flotation tests were conducted and revealed a moderate to poor response in copper flotation with pyrrhotite diluted concentrates. Further evaluation is required to achieve commercial grades of concentrate.

Sequential Zinc Flotation

In this program only AGC-04 was assessed. Head analysis of the AGC-04 composite was 7.78% Zn, 0.17% Cu, 0.69%Sn, 36% Fe and 24% S.

Direct rougher flotation of zinc from the feed was evaluated, yielding a moderate grade rougher concentrate (18-25% Zn) with high recovery but elevated iron values (due to pyrrhotite) and a tin grade of 13-19% Sn. However, cleaning of the rougher concentrates faced issues with a low upgrade ratio and notable loss of zinc recovery.

A series of WHIMS magnetic separations were performed on selected zinc concentrates with the objective of removing pyrrhotite. The magnetic product was upgraded to 50.7% Zn with 58% Zn recovery in open circuit.

Further work is required on the zinc – tin mineralization to determine if the high pyrrhotite material is amenable to zinc flotation with reasonable recovery, or if blending could be an option. Pyrrhotite-rich zinc-tin mineralization is a very minor portion of the overall zinc mineralization at Ayawilca.

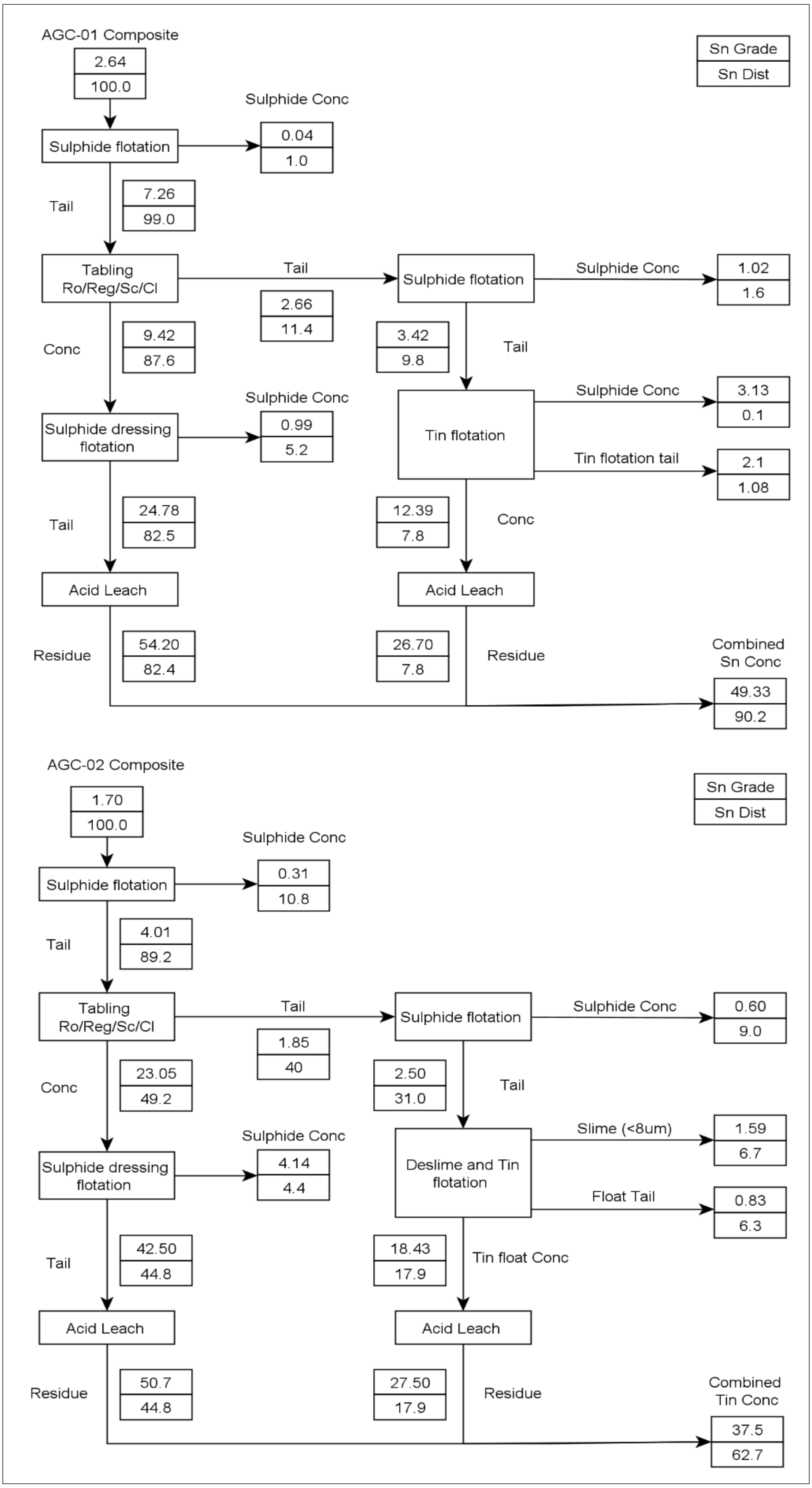
13.4.5 Conclusions on the Tin Testwork

The QP notes the following:

- Over 95% of the tin present is in cassiterite, with the remainder in stannite. Optical analyses of the cassiterite indicated poor liberation (<20%) above 75 liberation seen below 40
- Recovery of tin via conventional gravity separation is possible only in conjunction with froth flotation to first remove iron sulphides including pyrrhotite and pyrite.
- The proposed flowsheet for tin includes a preliminary froth flotation stage to remove pyrrhotite, a gravity stream at relatively coarse grind size (P80 250 m) to produce an initial gravity concentrate, and a regrind to P80 40 m and a sulphide flotation stage. Following sulphide dressing, the tail would be subjected to sulphuric acid leaching to remove siderite. Tin entrained with the sulphide flotation stream is concentrated through tin flotation.

- Both the gravity and flotation concentrates benefit from sulphuric acid leaching to improve the tin grades in the concentrates.
- The quality of the final tin concentrate results from the combination of concentration achieved through gravity, sulphide flotation, and acid leaching.
- There remains potential for improving the concentrate quality further using magnetic separation, as pyrrhotite which remains a diluent, is magnetic. One WHIMS test on a concentrate residue showed a significant improvement in tin grade and effective removal of Fe and S.
- The evaluation tests for copper flotation from AGC-02A failed to achieve suitable results. Additionally, the evaluation of direct zinc flotation from AGC-04 (a minor portion of the Tin Zone that contains high-grade zinc) achieved a poor zinc to iron selectivity, resulting in low zinc recovery in the cleaner flotation. Further testing is necessary to optimize these processes.

Figure 13-8 presents the overall balance of the proposed scheme, with calculations based on the metallurgical test results of the AGC-01 and AGC-02 composite.



Source: Transmin, 2024.

Figure 13-8: Overall Balance of the Proposed Tin Concentrate Scheme

13.5 Metallurgical Recovery Projections

13.5.1 Zinc Plant Metallurgical Projections

Metallurgical projections for zinc-lead-silver plant as proposed in the 2024 PEA are based on the metallurgical testwork performed during 2021 (Phase 5A and Phase 5B).

Table 13-7 and Table 13-8 show the Zinc and Silver Zone projections for metal recovery and grade for the lead-silver concentrate and zinc concentrate, respectively.

Table 13-7: Projected Metal Recovery by Zn and Pb-Ag Concentrates

Process Recovery	Unit	Zinc Zone Concentrates		Silver Zone Concentrates	
		Pb-Ag	Zn	Pb-Ag	Zn
Zinc	%	-	92	-	87
Lead	%	70	-	85	-
Silver	%	45	40	85	-

Table 13-8: Projected Zn and Pb-Ag Concentrate Grades

Concentrate Grade	Unit	Zinc Zone Concentrates		Silver Zone Concentrates	
		Pb-Ag	Zn	Pb-Ag	Zn
Zinc	%	4	50	-	-
Lead	%	50	-	26.5 average	50
Silver	g/t	2,698 average	-	6,000	-
Iron	%	-	13	-	10
Moisture	%	10	10	10	10

13.5.2 Tin Plant Metallurgical Projections

Metallurgical projections for the tin plant as proposed in the 2024 PEA are based on the metallurgical testwork performed during 2022-23 (Phase 7).

Table 13-9 shows the project parameters for tin metal recovery and concentrate grade for coarse (high recovery) and fine-grained (low recovery) mineral domains.

Table 13-9: Projected Tin Metal Recovery and Concentrate Grades

Element	Unit	Tin Concentrate	
		High recovery zone	Low recovery zone
Tin Grade	%	50	50
Tin Recovery	%	90	50

13.5.3 Zinc Concentrate Quality

The concentrate quality for the zinc concentrate was based on the chemical characterization of the concentrate produced in the locked cycle tests. However, relatively few composites have been subjected to locked cycle test flotation.

The iron that is present in the sphalerite that predominates at Ayawilca will affect the marketability and treatment costs for the zinc concentrate. Table 13-10 shows the projected zinc concentrate quality.

Table 13-10: Projected Zn Concentrate Quality

Element	Unit	Range	Nominal
Al	%	0–0.03	0.03
As	g/t	200–400	280
B	g/t	Low	Low
Ba	g/t	0–10	4
Be	g/t	Low	Low
Bi	g/t	20–30	24
Ca	%	0–0.1	0.05
Cd	g/t	1,000–2,000	1,700
Ce	g/t	0–1	0.9
Co	g/t	0–20	9.75
Cr	g/t	0–100	90
Cs	g/t	0–1	0.95
Cu	g/t	1,000–3,000	2,000
Dy	g/t	Low	Low
Er	g/t	Low	Low
Eu	g/t	0.1–0.1	0.1
Fe	%	11–14	13
Ga	g/t	10–20	11.15
Gd	g/t	0.1–0.1	0.1
Ge	g/t	0–2	1.2
Ho	g/t	Low	Low
Hf	g/t	Low	Low
In	g/t	0–1000	559
K	%	Low	Low
La	g/t	0–1	0.5
Li	g/t	20–30	24
Mg	%	0.1–0.2	0.13
Mn	g/t	1,000–2,000	1,445
Mo	g/t	0–10	5
Nb	g/t	Low	Low
Ni	g/t	10–20	15
S	%	30–34	32
Sb	g/t	20–40	29.5
Se	g/t	2–3	2.5
Si	%	0.2–0.4	0.32
Sm	g/t	0.1–0.2	0.15
Sn	g/t	0–1,000	400
Sr	g/t	10–30	18.5
Ta	g/t	Low	Low
Tb	g/t	Low	Low
Te	g/t	Low	Low
Th	g/t	0.1–0.2	0.15
Ti	%	Low	Low
Tl	g/t	1–3	2.1
Tm	g/t	Low	Low
U	g/t	1–2	1.15
V	g/t	Low	Low
W	g/t	0–2	0.95
Y	g/t	0–1	0.95
Yb	g/t	Low	Low
Zn	%	47–50	50
Au	ppb	20–60	40
Pd	ppb	0–0	Low
Pt	ppb	10–20	11
Ag	g/t	0–100	51.5
Hg	ppb	0 – 10,000	4,540
C-Total	%	0.1–0.3	0.18
Cl	%	0.02–0.03	0.025
F	%	0.01–0.02	0.015
LOI	%	10–20	15
Moisture	%	9–12	10

13.5.4 Deleterious Elements

The zinc concentrate does not contain any deleterious elements, with the exception of iron. A penalty for high iron is to be expected from zinc refineries.

The tin concentrate is expected to receive a penalty for high sulphur and iron. However, with further testwork it may be possible to significantly reduce the penalties for these elements given the encouraging results from the WHIMS testwork at the end of the metallurgical program.

13.6 QP Comments on Section 13

In the opinion of the QP, the zinc flotation testwork is already advanced for the PEA phase. Moving forward, the next stages will prioritize comminution testwork crucial for plant design, alongside additional flotation variability testing.

At present, the tin process has been conceptualized, and there remains significant potential for both simplifying the flowsheet and enhancing recovery rates. However, achieving a high-grade tin concentrate remains a challenge due to the texture of the cassiterite, sulfide, and carbonate gangue minerals. The QP recommends that further efforts in cleaning and dressing the concentrate be undertaken prior to finalizing the flowsheet for a PFS.

As the resource classification within the Tin Zone improves, it will be important to let the enhanced geological understanding inform a targeted geometallurgical program. This program should specifically address the complexities associated with processing mixed tin, copper, and zinc material, with additional comminution testwork also being necessary for the Tin Zone.

Given that the high-grade silver mineralization at Ayawilca is typical of that found in the Cerro de Pasco region in Peru, the processing approach selected is suitable for advancement to the next stage. However, variability testing is advisable to confirm this.

Ancillary testwork, such as thickening and filtration studies on the tin, zinc and lead concentrates and tailings, will be required for advancing to the PFS stage.

14 MINERAL RESOURCE ESTIMATES

14.1 Ayawilca Deposit Mineral Resource Estimate

Mineral Resources estimated by the QP for the Ayawilca deposit used drill results available to May 31, 2023. The deposit drill database includes 243 drill holes totalling 91,603 m. An additional 33 drill holes totalling 11,143 m have been added since the previous update in 2021. In the opinion of the QP, the thickness and spatial continuity of the resources reported at the Ayawilca deposit for an underground mining scenario satisfy the reasonable prospects for eventual economic extraction as set out in the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves, dated May 10, 2014 (CIM (2014) definitions).

The updated Ayawilca Project Mineral Resource estimate for the Zinc Zone, Silver Zone, and Tin Zone is summarized in Table 14-1, Table 14-2 and Table 14-3, respectively. For the purposes of demonstrating reasonable prospects for eventual economic extraction ("RPEEE”), Mineral Resources are constrained within underground reporting shapes generated in Deswik Stope Optimizer (“DSO”) using a minimum mining width of three metres and a net smelter return (“NSR”) cut-off value of US$50/t for the Zinc Zone and Silver Zone and US$60/t for the Tin Zone. CIM (2014) definitions are used for classification of Mineral Resources.

The Zinc Zone Mineral Resource totals 28.3 million tonnes (Mt) of Indicated Mineral Resources at an average grade of 5.82% zinc, 16.4 g/t silver, 0.2% lead, and 91 g/t indium and 31.2 Mt of Inferred Mineral Resources at an average grade of 4.21% Zn, 14.5 g/t Ag, 0.2% Pb, and 45 g/t In. Indicated Mineral Resources contain 3,638 million pounds (Mlb) zinc, 14.9 million ounces (Moz) silver, 108 Mlb lead, and 2,582 t indium. Inferred Mineral Resources contain 2,898 Mlb zinc, 14.6 Moz silver, 133 Mlb lead, and 1,414 t indium.

The Silver Zone Mineral Resource totals 1.0 Mt of Inferred Mineral Resources at an average grade of 1.54% Zn, 111.4 g/t Ag, 0.5% Pb, and 3 g/t In. Inferred Mineral Resources contain 35 Mlb zinc, 3.7 Moz silver, 12 Mlb lead, and 3 t indium.

The Tin Zone Mineral Resource estimate totals 1.4 Mt of Indicated Mineral Resources at an average grade of 0.72% tin containing 22 Mlb tin and 12.7 Mt of Inferred Mineral Resources at an average grade of 0.76% Sn containing 213 Mlb tin.

No Mineral Reserves have been estimated at the Project.

Table 14-1: Ayawilca Zinc Zone Mineral Resources as of January 1, 2024

Classification /	Tonnage	NSR	Grade				Contained Metal			
Zone	Mt	US$/t	% Zn	g/t Ag	%Pb	g/t In	Mlb Zn	Moz Ag	Mlb Pb	t In
Indicated										
South	13.8	128	6.64	19.3	0.2	120	2,020	8.6	52	1,655
West	14.5	98	5.05	13.6	0.2	64	1,618	6.3	56	927
Total Indicated	**28.3**	**113**	**5.82**	**16.4**	**0.2**	**91**	**3,638**	**14.9**	**108**	**2,582**
Inferred										
South	4.8	79	3.81	24.2	0.2	34	406	3.8	19	163
West	3.8	89	4.61	12.1	0.1	61	384	1.5	12	229
Central	9.1	85	4.39	10.6	0.2	54	878	3.1	47	486
East	13.5	81	4.13	14.4	0.2	40	1,229	6.3	55	536
Total Inferred	**31.2**	**83**	**4.21**	**14.5**	**0.2**	**45**	**2,898**	**14.6**	**133**	**1,414**

Notes:

1. *CIM (2014) definitions were followed for Mineral Resources.*
2. *The Mineral Resources have been reported within underground reporting shapes generated with Deswik Stope Optimizer using a net smelter return cut-off value of US$50/t. For the Central Zone, Mineral Resources were reported only within underground reporting shapes that also had a Zn grade above 3%.*
3. *NSR value was based on estimated metallurgical recoveries, assumed metal prices, and smelter terms, which include payable factors, treatment charges, penalties, and refining charges. The NSR used for reporting is based on the following:*
    a. *Long term metal prices of US$1.40/lb Zn, US$25/oz Ag, and US$1.10/lb Pb.*
    b. *Net metallurgical recoveries of 92% Zn, 45% Ag, and 70% Pb.*
4. *The NSR value for each block was calculated using the following NSR factors: US$18.04 per % Zn, US$0.33 per gram Ag, and US$11.92 per % Pb.*
5. *The NSR value was calculated using the following formula: NSR = Zn(%)*US$18.04+Ag(g/t)*US$0.33+Pb(%)*US$11.92.*
6. *Bulk densities were assigned to blocks by interpolation and remaining blocks by regression of Fe assay data or average sample data. Averages range between 3.20 t/m^3 and 3.51 t/m^3.*
7. *Mineral Resources have been estimated by Katharine Masun, P.Geo., Principal Geologist with SLR Consulting (Canada) Ltd., who is a Qualified Person as defined in NI 43-101.*
8. *Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.*
9. *Numbers may not add or multiply due to rounding.*

Table 14-2: Ayawilca Silver Zone Mineral Resources as of January 1, 2024

Classification /	Tonnage	NSR	Grade				Contained Metal			
Zone	Mt	US$/t	% Zn	g/t Ag	%Pb	g/t In	Mlb Zn	Moz Ag	Mlb Pb	t In
Inferred										
Silver Zone	1.0	100	1.54	111.4	0.5	3	35	3.7	12	3

Notes:

1. *CIM (2014) definitions were followed for Mineral Resources.*
2. *The Mineral Resources have been reported within underground reporting shapes generated with Deswik Stope Optimizer using a net smelter return cut-off value of US$50/t.*
3. *NSR value was based on estimated metallurgical recoveries, assumed metal prices, and smelter terms, which include payable factors, treatment charges, penalties, and refining charges. The NSR used for reporting is based on the following:*
    a. *Long term metal prices of US$1.40/lb Zn, US$25/oz Ag, and US$1.10/lb Pb.*
    b. *Net metallurgical recoveries of 77% Zn, 85% Ag, and 85% Pb.*
4. *The NSR value for each block was calculated using the following NSR factors: US$15.10 per % Zn, US$0.62 per gram Ag, and US$14.48 per % Pb.*
5. *The NSR value was calculated using the following formula: NSR = Zn(%)*US$15.10+Ag(g/t)*US$0.62+Pb(%)*US$14.48.*
6. *Bulk densities were assigned to blocks by interpolation and remaining blocks by regression of Fe assay data or average sample data. The average bulk density is 3.18 t/m^3.*
7. *Mineral Resources have been estimated by Katharine Masun, P.Geo., Principal Geologist with SLR Consulting (Canada) Ltd., who is a Qualified Person as defined in NI 43-101.*
8. *Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.*
9. *Numbers may not add or multiply due to rounding.*

Table 14-3: Ayawilca Tin Zone Mineral Resources as of January 1, 2024

Classification /	Tonnage	NSR	Grade	Contained Metal
Zone	Mt	US$/t	% Sn	Mlb Sn
Indicated				
Tin Zone	1.4	99	0.72	22
Inferred				
Tin Zone	12.7	104	0.76	213

Notes:

1. *CIM (2014) definitions were followed for Mineral Resources.*
2. *The Mineral Resources have been reported within underground reporting shapes generated with Deswik Stope Optimizer using a net smelter return cut-off value of US$60/t.*
3. *The NSR value was based on estimated metallurgical recoveries, assumed metal prices, and smelter terms, which include payable factors, treatment charges, penalties, and refining charges. Metal price assumption is US$12.00/lb Sn. Metal recovery assumption is 64% Sn. The NSR value for each block was calculated using the following NSR factor: US$137.30 per % Sn.*
4. *The NSR value was calculated using the following formula: US$NSR = Sn(%)*US$137.30.*
5. *Bulk densities were assigned to blocks by interpolation and remaining blocks by regression of Fe assay data or average domain sample data. The average bulk density is 3.65 t/m^3.*
6. *Mineral Resources have been estimated by Katharine Masun, P.Geo., Principal Geologist with SLR Consulting (Canada) Ltd., who is a Qualified Person as defined in NI 43-101.*
7. *Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.*
8. *Numbers may not add or multiply due to rounding.*

14.1.1 Mineral Resource Estimate

The Zinc Zone, Silver Zone, and Tin Zone Mineral Resource estimates for the Ayawilca deposit were updated by the QP using the drill results available to May 31, 2023. The deposit drill database includes 243 drill holes totalling 91,603 m. An additional 33 drill holes totalling 11,143 m have been added since the previous update in 2021. Drill hole (A23-222) was not sampled for assaying or density; however, the lithology log was used to inform resource domaining.

The three-dimensional wireframe models were generated using an approximate NSR cut-off value of US$40/t for the Zinc Zone, except W23-02 in the West area that was modelled using an approximate NSR cut-off value of US$20/t. For the Tin Zone, a 0.2% Sn or NSR cut-off value of US$30/t was used for wireframe models. Prior to compositing to two metre lengths, high tin, silver, and lead values were capped for each zone individually. Zinc, silver, lead, tin, and indium high grade outliers were constrained during interpolation on a per domain basis. Block model grades within the wireframe models were interpolated by inverse distance cubed ("ID3"). Despite lead grades generally being low, it is assumed that lead and silver will be recovered in a lead concentrate. Where measurements from core samples were sufficient, density was assigned to blocks within the resource wireframes by ID3. Where density sample data were insufficient for interpolation, density values were derived from a regression equation based on the iron value of the block. In domains where sample data was sparse, a single value was assigned. The Mineral Resources were classified following CIM (2014) definitions as Indicated and Inferred using drill hole spacing based criterion, mineralization continuity, and thickness. The drill hole spacing within a resource area assigned the Indicated category commonly ranges from 40 m to 70 m.

14.1.2 Resource Database

The QP received header, survey, assay, alteration, and geology data from Tinka in MS Excel format and a complete Leapfrog project containing the latest geological interpretations and 3D resource wireframes for the Ayawilca deposit zones. The QP reviewed the data and finalized a series of 3D resource wireframes for the Ayawilca deposit zones. The latest drill hole included in the resource database is A23-223. A summary of records for all drilling on the Ayawilca deposit is summarized in Table 14-4.

Table 14-4: Ayawilca Resource Database

Attribute	Units	All Drill Holes	Resource Drill Holes	Resource Domains	Buffer Zone
Number of Drill Holes	each	243	206		
Total Length (m)	m	91,603	79,378		
Number of Surveys	each	20,659	18,723		
Number of Assays	each	37,705	24,429	6,751	17,678
Number of Composites	each	22,321	22,321	5,698	16,623
Lithology Records	each	21,044	19,241	3,765	8,073
Number of Full Width Composites	each	1,307	1,307	570	737
Number of Density Measurements	each	7,479	6,946	4,226	2,720

The QP notes that within the resource drill hole database, eight are redrilled holes, totalling 3,533 m, of which one hole (A23-222) was not sampled. In addition, drill hole A15-048 was abandoned at a depth of 68.7 m and not sampled. Lithology was logged in the unsampled drill holes and used for geological modelling.

14.1.3 Geological Interpretation and 3D Solids

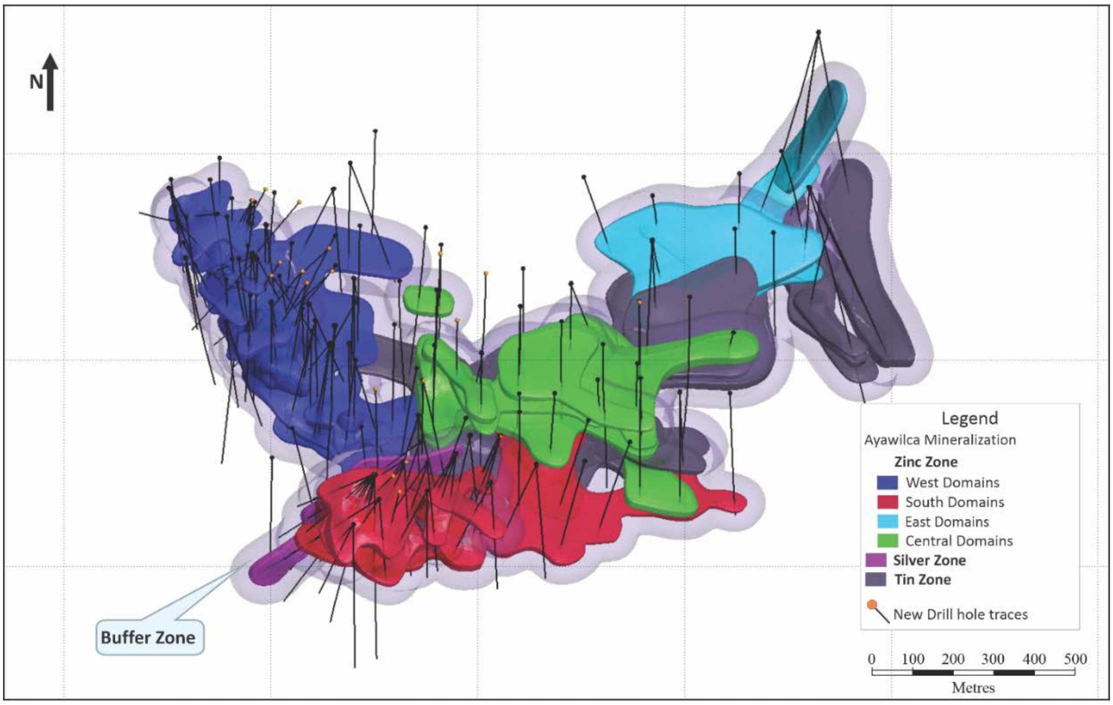
New drilling at Ayawilca in 2022 and 2023 improved the understanding of the lithological setting and faults controlling zinc, tin, and silver mineralization. The updated geological model better constrained the mineralized zones and resulted in significant updates to the Zinc Zone domains and the previously defined silver domains (now a separate Silver Zone), and minor updates to the Tin Zone domains.

The QP validated 45 domains in the Zinc Zone, Silver Zone, and Tin Zone. The Zinc Zone comprises 32 domains in four main areas: South, West, East, and Central. A single domain comprises the Silver Zone, previously included as a domain in the Zinc Zone. The Tin Zone comprises 12 domains. The QP constructed a buffer area to allow interpolation in a limited area of 50 m surrounding the mineralization wireframe models and ensure that blocks that occur within underground reporting shapes but outside of resource domains have metal grades and density values for resource reporting purposes.

Domains for each zone are listed in Table 14-5, and Figure 14-1 illustrates the wireframe models in 3D. Figure 14-2 and Figure 14-3 illustrate the wireframes and lithological model in cross section.

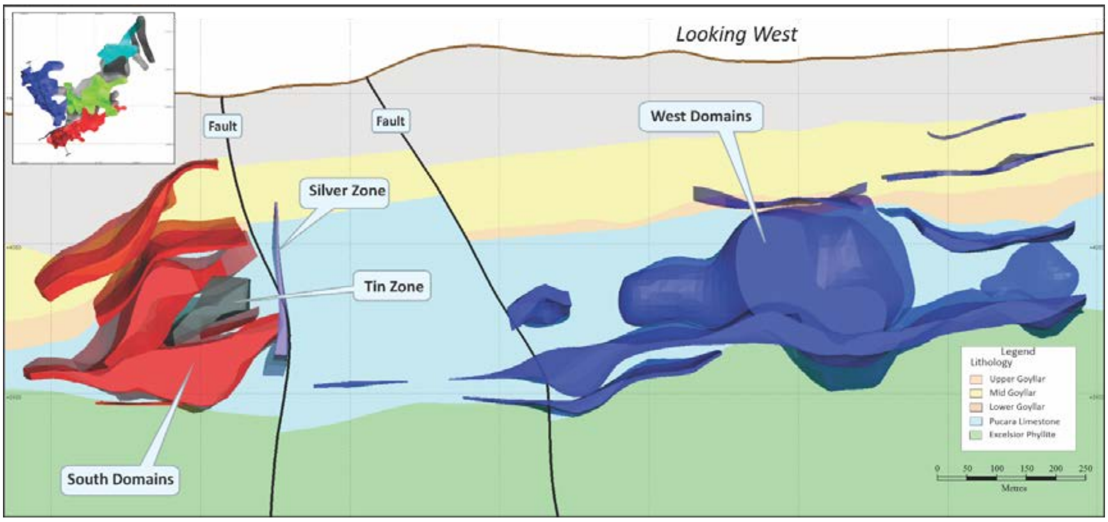
Table 14-5: Ayawilca Zinc Zone, Silver Zone, and Tin Zone Domains

Zinc Zone				Silver Zone	Tin Zone	Buffer Area
West Area	South Area	East Area	Central Area			
W23-01	S23-01	E23-01	C23-01	Ag23-01	T23-01	Buffer
W23-01A	S23-02	E23-02	C23-02	-	T23-02	-
W23-01B	S23-02A	E23-03	C23-03	-	T23-02A	-
W23-02	S23-02B	E23-04	C23-04	-	T23-02B	-
W23-03	S23-02C	-	C23-05	-	T23-03	-
W23-04	S23-03	-	C23-06	-	T23-04	-
W23-06	S23-04-NEW	-	C23-07	-	T23-05	-
W23-07	S23-05	-	-	-	T23-06	-
W23-08	S23-06	-	-	-	T23-07	-
W23-Pb-02	S23-07	-	-	-	T23-08	-
	S23-08	-	-	-	T23-09	-
					T23-10	



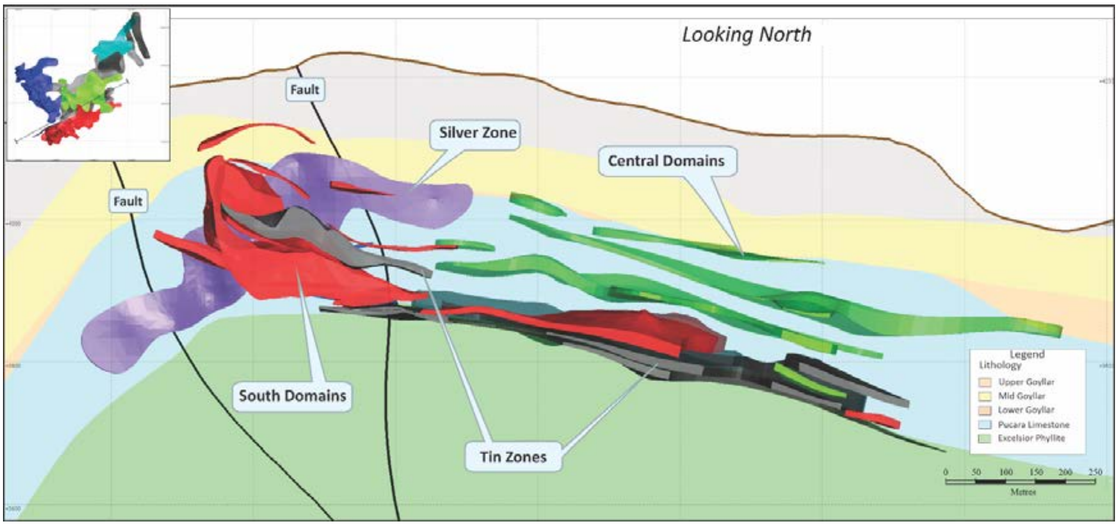
Source: SLR, 2024

Figure 14-1: Plan View of Ayawilca Resource Domains



Source: SLR, 2024

Figure 14-2: Northwest-Southeast Cross Section of the Ayawilca Resource Domains



Source: SLR, 2024

Figure 14-3: Southwest-Northeast Cross Section of the Ayawilca Resource Domains

14.1.4 Statistical Analysis of Resource Assays

Assay values located inside the wireframe models were tagged with domain identifiers and exported for statistical analysis. Results were used to help verify the modelling process. Statistics by zone are summarized in Table 14-6.

Table 14-6: Resource Assay Descriptive Statistics

Zone and Statistic	Length	Ag	Pb	Sn	Zn
	m	g/t	%	%	%
Zinc Zone					
Central Area					
Count	527	525	525	525	525
Mean	3.77	9.66	0.26	0.06	3.47
CV	2.29	1.78	3.01	1.56	0.82
Min	0.35	0	0	0	0.01
Median	2	5.1	0.02	0.03	2.83
Max	43.08	238	10.69	0.73	24.6
East Area					
Count	218	216	216	216	216
Mean	5.53	34.83	0.25	0.04	4.04
CV	1.96	5	2.19	1.61	0.86
Min	0.4	0	0	0	0.01
Median	2	5.2	0.02	0.02	3.32
Max	38.8	1,806	5.74	0.5	41.68
South Area					
Count	128	2,172	2,172	2,172	2,172
Mean	1.71	20.17	0.16	0.05	6.02
CV	0.26	7.39	4.17	3.53	1.42
Min	0.25	0.06	0	0	0
Median	1.9	8.11	0.03	0.02	2.83
Max	2.3	18,174	21.76	5.42	49.9
West Area					
Count	3,005	2,997	2,997	2,997	2,997
Mean	1.81	16.82	0.23	0.04	4.11
CV	0.23	3.88	3.34	2.58	1.41
Min	0.1	0	0	0	0
Median	2	5.9	0.03	0.02	2.35

Zone and Statistic	Length	Ag	Pb	Sn	Zn
	m	g/t	%	%	%
Zinc Zone					
Max	4.4	1,718	12.8	3.59	49.34
Silver Zone					
Count	128	128	128	128	128
Mean	1.71	124.01	0.51	0.01	1.75
CV	0.26	3.11	1.61	2.72	1.51
Min	0.25	0	0	0	0
Median	1.9	24.58	0.28	0	1.06
Max	2.3	3,167	5.72	0.17	21.7
Tin Zone					
Count	736	732	732	732	732
Mean	2.39	9.83	0.03	0.56	0.24
CV	1.28	1.72	6.36	1.61	3.68
Min	0.1	0.12	0	0	0
Median	2	5.34	0.01	0.29	0.04
Max	20.31	513	7.52	9.08	21.96
Buffer Zone					
Count	18,047	17,813	17,813	17,813	17,813
Mean	6.9	5.3	0.06	0.01	0.31
CV	2.25	3.88	5.13	4.06	3.72
Min	0.01	0	0	0	0
Median	2	1.48	0.01	0	0.05
Max	88.11	1,164	28.81	1.18	44.59

14.1.5 Capping High Grade Values

The QP completed resource assay exploratory data analysis (“EDA”) on each area, including histograms and probability plots, using the updated resource domains together with additional assay data obtained from the 2022 and 2023 drilling campaign. Table 14-7 summarizes capping levels for each element and domain and Table 14-8 lists the descriptive statistics of capped resource assay values by zone. The manto style of zinc mineralization suggests that capping of the zinc values is not necessary, as the higher zinc grades are reasonably controlled by the wireframe models. Notable updates to capping levels from the previous estimate include higher silver caps for all Zinc Zone areas and the Silver Zone domain, and the management of outliers on a domain basis within individual areas for silver and indium by restricting their influence to 25% of the first pass search radius used for block grade interpolation. Within Tin Zone domains tin and lead outliers were managed using high grade restrictions.

Table 14-7: Capping Levels for the Ayawilca Deposit

Area/Zone	Cap					High Grade Restriction				
	Zn	Ag	Pb	Sn	In	Zn	Ag	Pb	Sn	In
	%	ppm	%	%	ppm	%	ppm	%	%	ppm
Zinc Zone										
Central Area	no cap	400	no cap	no cap	no cap	-	80[1]	-	-	various
East Area	no cap	400	no cap	no cap	no cap	-	various	-	-	various
South Area	no cap	400	no cap	no cap	no cap	-	various	-	-	various
West Area	no cap	300	no cap	no cap	no cap	-	various	-	-	various
Silver Zone	no cap	550	no cap	-	no cap	-	-	-	-	40
Tin Zone	no cap	110	no cap	4	no cap	-	-	various	various	various
Buffer Area	no cap	50	no cap	-	no cap	-	-	-	-	100

Notes:

1. C23-06

Table 14-8: Capped Resource Assay Descriptive Statistics

Zone and Statistic	Ag	Pb	Sn	Zn
	g/t	%	%	%
Zinc Zone				
Central Area				
Count	525	525	525	525
Mean	9.66	0.26	0.06	3.47
CV	1.78	3.01	1.56	0.82
Min	0	0	0	0.01
Median	5.1	0.02	0.03	2.83
Max	238	10.69	0.73	24.6
East Area				
Count	216	216	216	216
Mean	20.95	0.25	0.04	4.04
CV	2.59	2.19	1.61	0.86
Min	0	0	0	0.01
Median	5.2	0.02	0.02	3.32
Max	400	5.74	0.5	41.68
South Area				
Count	2,172	2,172	2,172	2,172
Mean	17.94	0.16	0.05	6.02
CV	2.02	4.17	3.53	1.42
Min	0.06	0	0	0
Median	8.11	0.03	0.02	2.83
Max	400	21.76	5.42	49.9
West Area				
Count	2,997	2,997	2,997	2,997
Mean	14.72	0.23	0.04	4.11
CV	2.15	3.34	2.58	1.41
Min	0	0	0	0
Median	5.9	0.03	0.02	2.35
Max	300	12.8	3.59	49.34
Silver Zone				
Count	128	128	128	128
Mean	81.18	0.51	0.01	1.75
CV	1.74	1.61	2.72	1.51
Min	0	0	0	0
Median	24.58	0.28	0	1.06
Max	550	5.72	0.17	21.7
Tin Zone				
Count	732	732	732	732

Zone and Statistic	Ag	Pb	Sn	Zn
	g/t	%	%	%
Zinc Zone				
Mean	9.8	0.03	0.53	0.24
CV	1.64	6.36	1.38	3.68
Min	0.12	0	0	0
Median	5.34	0.01	0.29	0.04
Max	400	7.52	4	21.96
Buffer Area				
Count	17,813	17,813	17,813	17,813
Mean	4.43	0.06	0.01	0.31
CV	1.87	3.56	4.06	3.72
Min	0	0	0	0
Median	1.48	0.01	0	0.05
Max	50	5	1.18	44.59

14.1.6 Compositing

Sample lengths range from 0.025 m to 4.1 m within the resource domain wireframe models with approximately 92% of samples taken at two metres or less. With the inclusion of assays located within the buffer area, sample lengths range from 0.006 m to 8.6 m. Given these distributions, and considering the width of the mineralization, SLR chose to composite to two metre lengths. Assays within the wireframe domains were composited using the downhole compositing method, which commences at the first mineralized wireframe boundary from the collar and resets at each new wireframe boundary. Implicit missing intervals within the modelled domains where core was not recovered (marked “void”) were ignored during compositing. The complete list of the excluded intervals is presented in Table 14-9. Composites less than 0.5 m, located at the bottom of the mineralized intercept, were added to the previous interval. Table 14-10 lists descriptive statistics of the composites by zone.

Table 14-9: List of Implicit Missing Intervals Ignored

Hole ID	From	To	Length	Lithological	Lithological Description in
	m	m	m	Unit	Database
A13-009	326.7	331.1	4.4	Pu	Empty
A17-061	198.8	201.9	3.1	Pu	No recovery
A17-070	330.2	331.1	0.9	Pu	No recovery
A17-070	332.1	335.5	3.4	Pu	No recovery
A17-071	318.7	321.1	2.4	Pu	No recovery
A17-071	325.4	327.2	1.8	Pu	No recovery
A17-071	357.6	358.6	1	Pu	No recovery
A17-075	371.6	373.3	1.7	Pu	No recovery
A18-133	141.5	142	0.5	MGo	Void, interval with no recovery
DD52B	275.6	277.6	2	Pu	VOID
A23-222	185.8	304.7	68.7	PU	Redrilled and not sampled

Table 14-10: Composite Descriptive Statistics

Zone and Statistic	Ag	Pb	Sn	Zn
	g/t	%	%	%
Zinc Zone				
Central Area				
Count	456	456	456	456
Mean	9.66	0.26	0.06	3.47
CV	1.63	2.77	1.46	0.74
Min	0	0	0	0.01
Median	5.26	0.02	0.03	2.91
Max	238	10.69	0.73	18.11
East Area				
Count	188	188	188	188
Mean	20.95	0.25	0.04	4.04
CV	2.45	1.95	1.54	0.75
Min	0	0	0	0.01
Median	5.71	0.02	0.02	3.45
Max	400	3.18	0.5	32.15
South Area				
Count	1,763	1,763	1,763	1,763
Mean	18.14	0.16	0.05	6.04
CV	1.77	3.49	3.09	1.23
Min	0.07	0	0	0
Median	9.12	0.03	0.02	3.38
Max	400	21.76	4.44	49.82
West Area				
Count	2,533	2,533	2,533	2,533
Mean	14.7	0.23	0.04	4.11
CV	1.93	2.86	2.24	1.26
Min	0	0	0	0
Median	6.31	0.03	0.02	2.61
Max	300	10.5	2.14	48.91
Silver Zone				
Count	99	99	99	99
Mean	81.18	0.51	0.01	1.75
CV	1.55	1.33	2.35	1.1
Min	0.03	0	0	0
Median	34.37	0.34	0	1.33
Max	550	4.53	0.13	12.65
Tin Zone				
Count	659	659	659	659
Mean	9.79	0.03	0.53	0.24
CV	1.43	4.04	1.3	2.47
Min	0.3	0	0	0
Median	5.43	0.01	0.31	0.04
Max	111	1.66	4	4.65
Buffer Area				
Count	16,623	16,623	16,623	16,623
Mean	4.44	0.06	0.01	0.32
CV	1.71	2.95	3.79	2.74
Min	0	0	0	0
Median	1.66	0.01	0	0.07
Max	50	4.19	1.03	33.16

14.1.7 Interpolation Parameters

Grades were interpolated in Leapfrog Geo 2023.1.1 by ID3 with a minimum of five to a maximum of 12 composites per block estimate for the first pass, and a minimum of one to a maximum of 12 composites per block estimate in the second pass. A maximum of four composites per drill hole was applied during the first pass to ensure interpolated blocks were informed by at least two drill holes. A third pass was completed in eight resource domains and the buffer area with expanded ellipsoid ranges and a minimum of one to a maximum of 12 composites per block estimate. A fourth estimate pass was completed for indium in all domains using a large isometric search ellipse. Interpolation parameters are summarized in Table 14-11.

In general, the Ayawilca deposit mineralized zones strike northwest, with individual lenses expressing variance in orientation and dip. An exception to this is the mineralization in the South area of the Zinc Zone, which strikes northeast. To reproduce the direction of these trends, the QP employed the Variable Orientation tool in Leapfrog EDGE for all domains except W23-02 in the West area of the Zinc Zone. The tool allows the search to be locally adjusted to the orientation of the mineralization, which results in improved local grade estimates. The QP used individual veins to guide the variable direction search. In cases where the hanging wall and footwall of the vein had varying undulations, both the hanging wall and footwall meshes were used to guide the variable direction search. For the buffer area, the hanging wall and footwall surfaces of all resource wireframe vein models were used to guide local grade interpolation. Hard boundaries were used to limit the use of composites (comps) between different wireframes, with the exceptions noted in Table 14-12, where soft boundaries were used. Zinc, silver, lead, and indium were interpolated for the Ayawilca Zinc Zone and Silver Zone. Only tin was interpolated for the Ayawilca Tin Zone.

Block zinc grades within the Zinc Zone and Silver Zone are illustrated in Figure 14-4, block silver grades within the Silver Zone are illustrated in Figure 14-5, and block tin grades in the Tin Zone are illustrated in Figure 14-6.

Table 14-11: Interpolation Parameters for Payable Metals

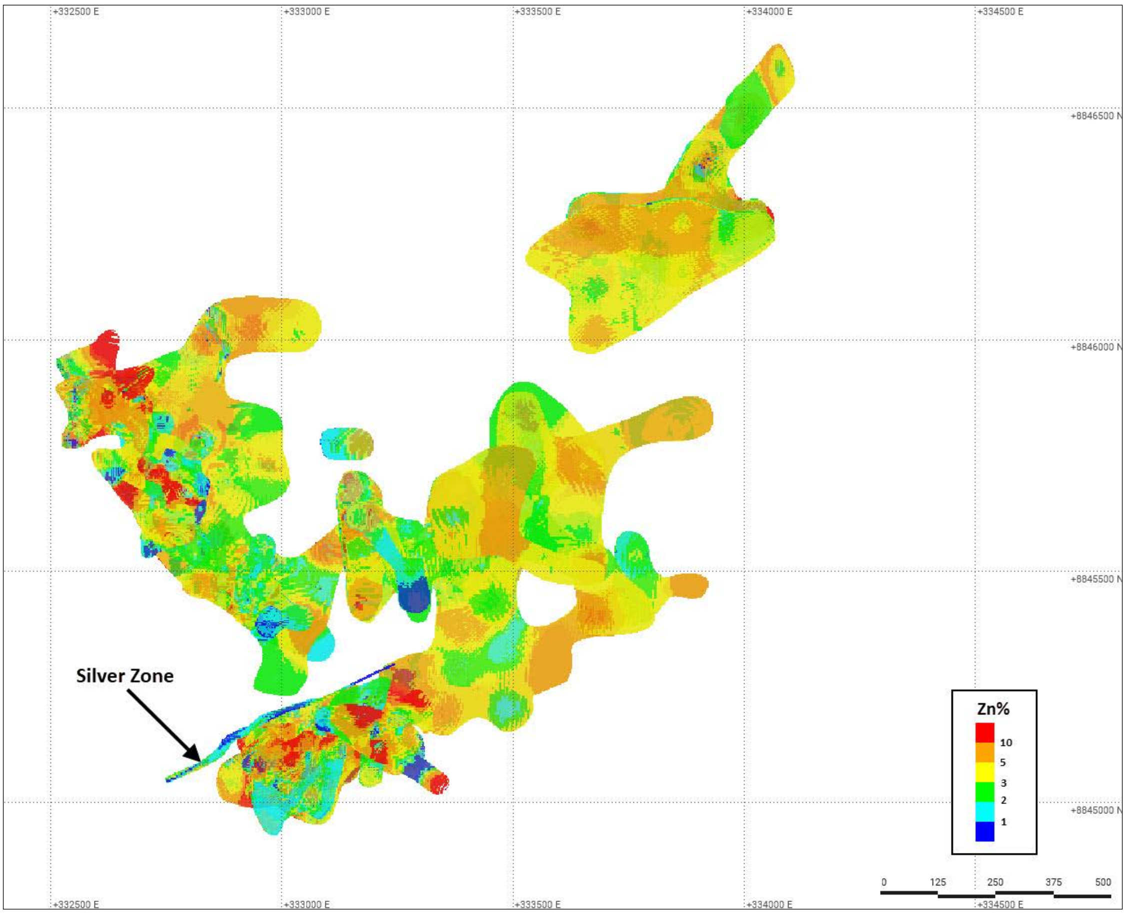
Parameter		Pass 1	Pass 2	Pass 3[1]	Pass 4[2]
Zinc Zone					
Method		ID3	ID3	ID3	ID3
Boundary type		Hard/Soft	Hard/Soft	Hard/Soft	Hard/Soft
Min no comps		5	1	1	1
Max comps		12	12	12	12
Max comps per drill hole		4	-	-	-
Search ellipse	Range X (m)	140	140	280	280
	Range Y (m)	140	140	280	280
	Range Z (m)	14	14	28	280
Zinc Zone Domain - W23-02 only					
Method		ID3			-
Boundary type		Soft			-
Min no comps		5			-
Max comps		24			-
Max comps per drill hole		-			-
Search ellipse	Range X (m)	50	100	100	-
	Range Y (m)	25	50	100	-
	Range Z (m)	25	40	100	-
Search ellipse directions	Dip	80°			-
	Dip Azimuth	75°			-
	Pitch	130°			-
Silver Zone					
Method		ID3	ID3	-	-
Boundary type		Hard/Soft	Hard/Soft	-	-
Min no comps		5	1	-	-
Max comps		12	12	-	-
Max comps per drill hole		4	-	-	-
Search ellipse	Range X (m)	140	140	-	-
	Range Y (m)	140	140	-	-
	Range Z (m)	14	14	-	-
Tin Zone					
Method		ID3	ID3	ID3	ID3
Boundary type		Hard	Hard	Hard	Hard
Min no comps		5	1	1	1
Max comps		12	12	12	12
Max comps per drill hole		4	-	-	-
Search ellipse	Range X (m)	140	140	280	280
	Range Y (m)	140	140	280	280
	Range Z (m)	7	14	28	280
Buffer Area					
Method		ID3	ID3	ID3	ID3
Boundary type		Hard	Hard	Hard	Hard
Min no comps		1	1	-	1
Max comps		12	12	-	12
Method		-	-	-	-
Search ellipse	Range X (m)	140	280	400	400
	Range Y (m)	140	280	400	400
	Range Z (m)	14	28	40	400

Notes:

1. *Three estimation passes were used to estimate Zn, Ag, Pb, and Sn in the buffer area, Zinc Zone domains E23-03, S23-01, S23-02, and Tin Zone domains T23-01, T23-02, T23-03, T23-07, and T23-08. Three estimation passes were used to estimate In in all resource domains.*
2. *Four estimation passes were used in the buffer area and Zin Zone domains E23-03, S23-01, and S23-02, and Tin Zone domains T23-01, T23-02, T23-03, T23-07, and T23-08.*

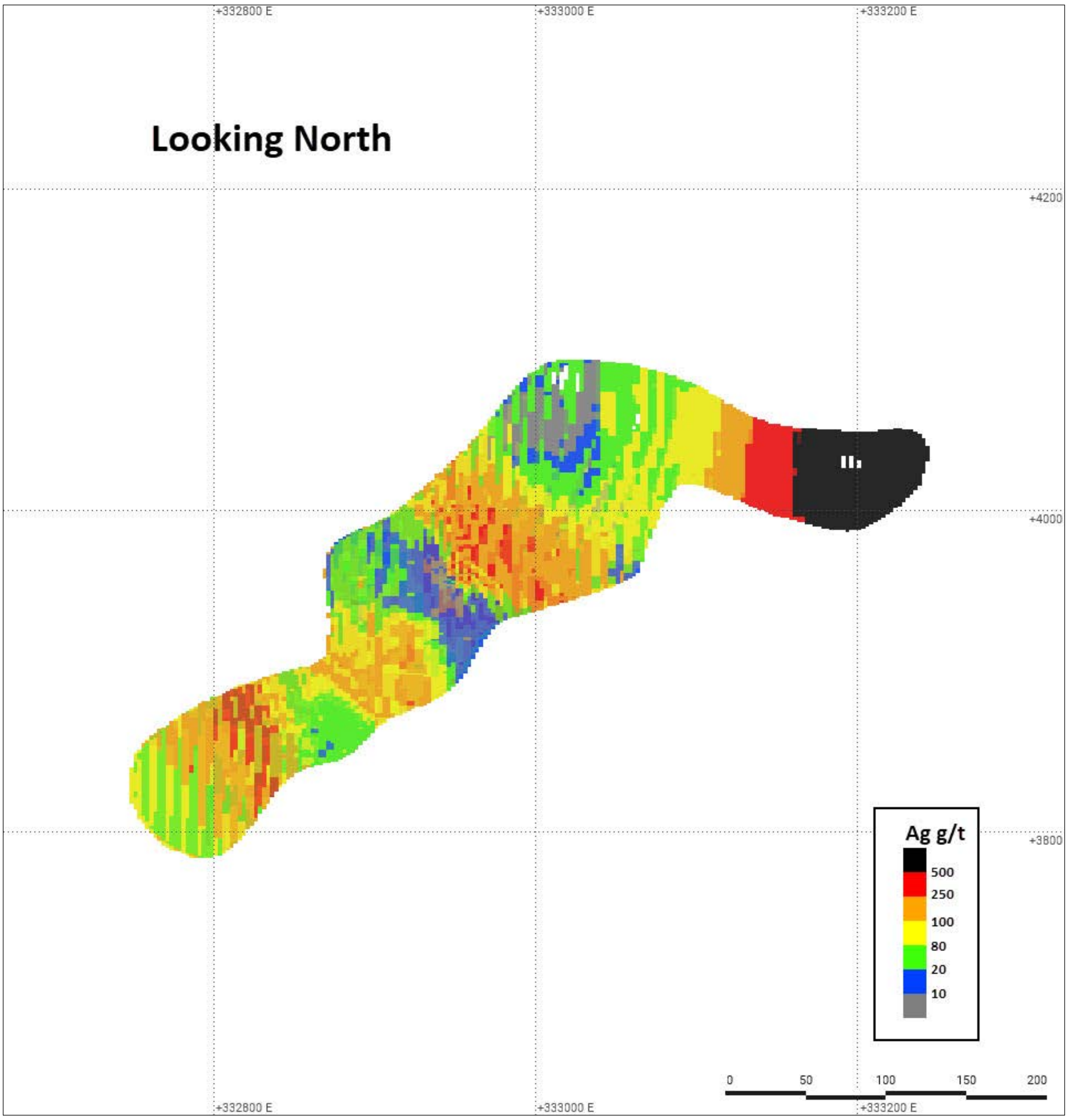
Table 14-12: Domains using Soft Boundaries for Interpolation

Domain	Shared Soft Boundary	Comment
W23-02	W23-01; W23-06; W23-04	West Zone breccia and intersecting upper and lower domains
W23-01	W23-01A; W23-02	West Zone domains that intersect
E23-02	E23-03	East Area intersecting domains
S23-01	S23-02; S23-03	South Area intersecting domains
S23-02	S23-01; S23-03	South Area intersecting domains
S23-03	S23-01; S23-03	South Area intersecting domains



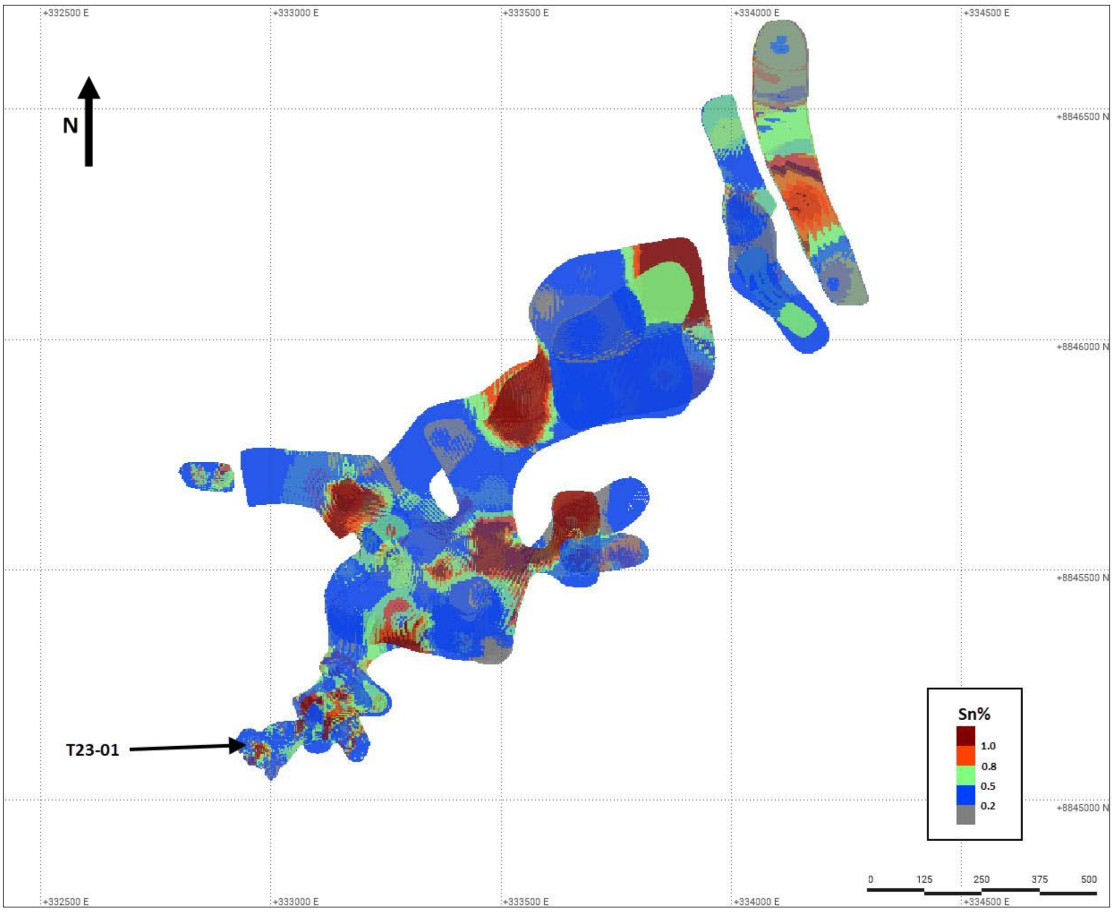
Source: SLR, 2024

Figure 14-4: Plan View of Zinc Block Grades within Zinc Zone and Silver Zone Domains



Source: SLR, 2024

Figure 14-5: Silver Block Grades within the Silver Zone Domain



Source: SLR, 2024

Figure 14-6: Plan View of Tin Block Grades within Tin Zone Domains

14.1.8 Density

Density Samples

A total of 4,226 density measurements are located within the wireframe models, of which 3,865 measurements were taken within the Zinc Zone, 59 measurements within the Silver Zone, and 302 measurements within the Tin Zone. An additional 2,719 density measurements have been taken within the buffer area. This represents a nearly five-fold increase in the number of density measurements available within the resource domains when compared to the previous estimate (4,226 vs. 860).

After top cutting the density measurements to 4.6 t/m^3, the density sample statistics are summarized in Table 14-13.

Table 14-13: Descriptive Statistics of Density Samples

Area/Zone		Count	Mean	Minimum	Median	Maximum[1]
			t/m³	t/m³	t/m³	t/m³
Zinc Zone						
	South	1,461	3.44	2.44	3.53	4.6
	West	2,163	3.28	2.48	3.27	4.6
	Central	236	3.27	2.29	3.22	4.59
	East	5	3.62	3.21	3.56	4.16
Silver Zone		59	3.3	2.51	3.4	4.39
Tin Zone		302	3.82	2.65	3.85	4.6
Buffer Zone		2,720	2.99	2.13	2.78	4.6

Note:

1. A 4.6 t/m³ density top cut was applied across all domains.

Block Density Estimation

A linear regression established between core density data and iron assays was used to assign a density value to resource blocks that were not interpolated. Assays reporting overlimit results at a detection limit of 15% Fe were ignored for this exercise. Linear regression equations were established for each area separately, and in seven domains where the correlation between density and iron was not as strong and core density sample data was sparse, a single value was assigned. Table 14-14 summarizes block density regression equations and assigned densities for the areas in the Zinc Zone, Silver Zone, and Tin Zone.

Table 14-14: Block Density Regression Formulas and Assigned Densities

Area/Zone	Domains	Density Regression Formula[1]	Assigned Density
		t/m³	t/m³
Zinc Zone			
South	All	y=0.03x + 2.717	-
West	All	y=0.0318x + 2.612	-
Central	C23-01, C23-02, C23-06, C23-07	y=0.0363x + 2.54	-
	C23-03	-	3.25
	C23-04, C23-05	-	3.1
East	All	-	3.5
Silver Zone	-	y=0.0325x + 2.69	-
Tin Zone	T23-01, T23-02, T23-03, T23-10	y=0.0302x + 2.67	-
	T23-04, T23-05, T23-06, T23-07	-	3.7
	T23-08, T23-09	-	3.5
Buffer Zone	-	y=0.0324x + 2.59	-

Note:

1. x = Fe%

Comparison with Previous Density Estimate

In the previous estimate, density values were assigned to all blocks in each area based on the average density sample value after removing outliers. Table 14-15 summarizes average block densities used in the current estimate compared to the previous estimate. In the opinion of the QP, density values were slightly overestimated in the previous estimate and the updated estimation methodology is more rigorous and better reflects local variations within the resource domains.

The QP notes, however, that using a regression equation based on iron is not without flaws. These include:

- Overlimit iron assays will underestimate the iron content and low bias the density.
- There is a negative correlation with high zinc and iron values, i.e., there is a potential to low bias Zn-rich areas.

A small proportion of blocks within the South and West areas are assigned a density value using the iron regression equation. Within the Central area, however, approximately 50% of blocks are assigned a density value using the iron regression equation and within the East area, there are not enough samples to establish a correlation between density and iron.

The QP recommends collecting additional density samples in the East and Central areas and reassaying overlimit iron analyses.

Table 14-15: Block Density Statistics – Current vs. Previous Estimate

Area/Zone	Average Block Density	Average Density of Blocks Above NSR Cut-off	2021 Assigned Block Density	Change
	t/m^3	t/m^3	t/m^3	
Zinc Zone				
South	3.46	3.53	3.7	-4.50%
West	3.28	3.34	3.5	-4.50%
Central	3.17	3.18	3.5	-9.30%
East	3.5	3.5	3.5	0.00%
Silver Zone	3.25	3.23	3.6	-10.40%
Tin Zone	3.62	3.71	3.7	0.30%
Buffer Zone	2.93	3.23	3.5	-7.70%

14.1.9 Block Model

A single block model covering the entire Ayawilca deposit was constructed using Leapfrog EDGE software. The block model was sub-celled, with a parent block size being 5.0 m long by 5.0 m wide by 2.5 m high and a minimum sub-block size being 2.5 m long by 2.5 m wide and 1.25 m high. A summary of the definition data for the block model is provided in Table 14-16.

Table 14-16: Block Model Definition Data

Description	Easting	Northing	Elevation
	(X)	(Y)	(Z)
Minimum (m)	332,440	8,844,860	3,451.25
Maximum (m)	334,350	8,846,760	4,271.25
Extents (m)	1910	1900	820
Description	**Column**	**Row**	**Level**
Block size (m)	5	5	2.5
Minimum sub-cell size (m)	2.5	2.5	1.25
Number of parent blocks	382	380	303
Number of Parent Blocks	47,612,480		
Number of Total Blocks	51,986,801		
Rotation	0°		

Notes:

1. *The origin is the highest block in the lower left of the model.*

The block model contains the following information:

- Area/Zone identifiers (Central, East, South, West, Silver, Tin, Buffer).
- Domain identifier with rock code.
- Estimated grade of payable metals zinc, lead, silver, and indium within all domains.
- Estimated grade of copper, iron, manganese, and sulphur within all domains.
- NSR for the Ayawilca Zinc Zone.
- NSR for the Ayawilca Silver Zone.
- NSR for the Ayawilca Tin Zone.
- Block density.
- The distance to the closest composite used to interpolate the block grade.
- The number of composite samples used to interpolate the block grade.
- Preliminary resource classification code.
- Final resource classification code for reporting within resource reporting shapes.
- "Final Area" for reporting within resource reporting shapes.

14.1.10 NSR Cut-off Values

NSR values for the Ayawilca Zinc Zone, Silver Zone, and Tin Zone were calculated by the QP for the purposes of geological interpretation and resource reporting. NSR is the estimated value per tonne of mineralized material after allowance for metallurgical recovery and consideration of smelter terms, including payables, treatment charges, refining charges, price participation, penalties, smelter losses, transportation, and sales charges. These assumptions are dependent on the processing scenario and will be sensitive to changes in inputs from further metallurgical test work. Metal prices used for resources are based on consensus, long term forecasts from banks, financial institutions, and other sources. Assumed recoveries are based on test work (Wood, 2019; Johnston, 2021). The QP notes the following for the Zinc Zone and Silver Zone:

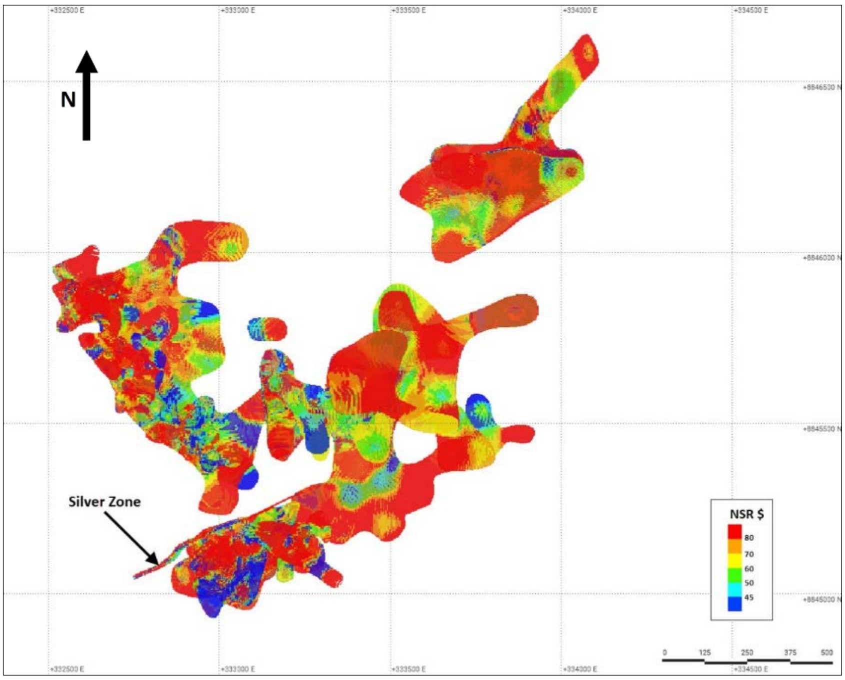
- Two concentrates will be produced: a zinc concentrate and a lead-silver concentrate.
- While silver is recovered in both the lead-silver and zinc concentrates, only the metal recovered in the lead-silver concentrate is payable.
- Indium has not been considered in the development of the NSR factors by the QP, a credit of US$20/t has been assumed for the zinc concentrate. Smelters that recover indium may offer more competitive terms for material containing the range of indium grades expected occurring in the Ayawilca deposit zinc concentrates (400 ppm to 720 ppm In). Although the exact credit will be dependent on the prevailing indium price, a reduction in the treatment charge of approximately US$20/t would represent fair value for the Asian smelters only in the opinion of the QP.

Key assumptions used to calculate block NSR values are summarized below.

- Metal prices:
  - US$1.40/lb Zn,
  - US$25/oz Ag,
  - US$1.10/lb Pb,
  - US$12.00/lb Sn;
- Recoveries:
  - Zinc Zone:
    - 92% Zn,
    - 45% Ag,
    - 70% Pb,
  - Silver Zone:
    - 77% Zn,
    - 85% Ag,
    - 85% Pb;
  - Tin Zone:
    - 64% Sn.

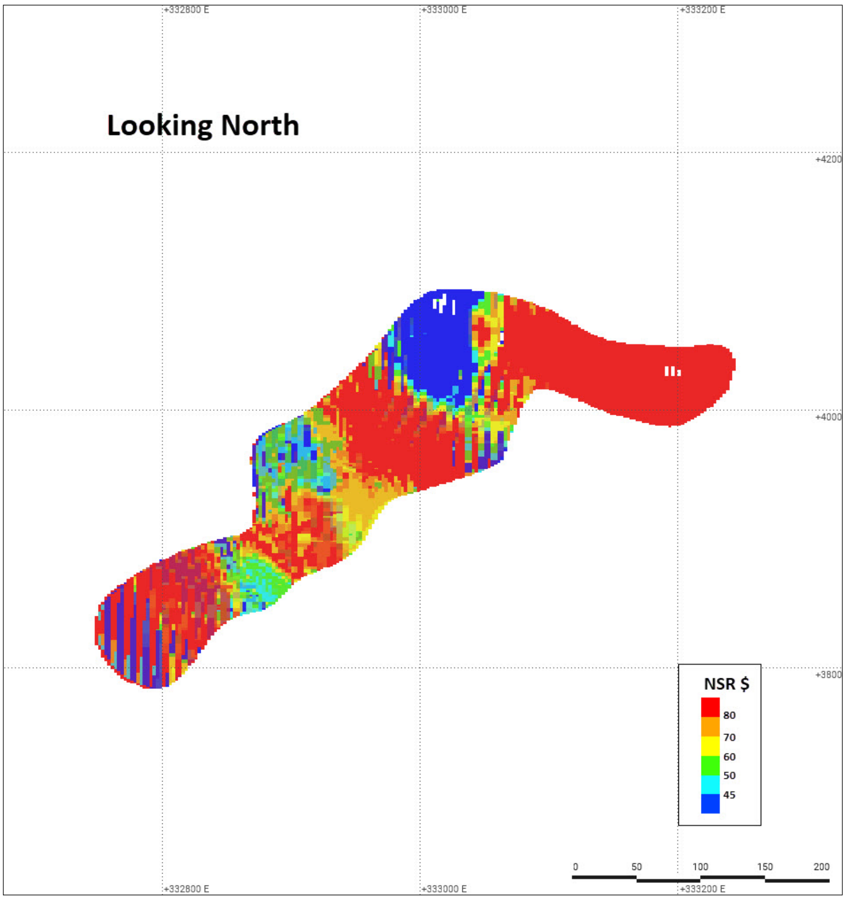
For the purposes of developing the cut-off value, a total unit operating cost of US$44/t milled was estimated for the Ayawilca Zinc Zone and Silver Zone and US$59/t milled for the Ayawilca Tin Zone, which includes mining, processing, and general and administrative ("G&A") expenses. In the opinion of the QP, a US$50/t cut-off value for the Ayawilca Zinc Zone and a US$60/t cut-off value for the Ayawilca Tin Zone are suitable for estimating Mineral Resources. The US$60/t NSR cut-off value for the Ayawilca Tin Zone is equivalent to a tin grade of approximately 0.44% Sn. Tinka has opted to apply a US$50 NSR cut-off value for the Zinc Zone resource reporting shapes and in the opinion of the QP, this is within acceptable limits.

The NSR values for zinc, silver, and tin within the Zinc Zone, Silver Zone, and Tin Zone are illustrated in Figure 14-7, Figure 14-8, and Figure 14-9 respectively.



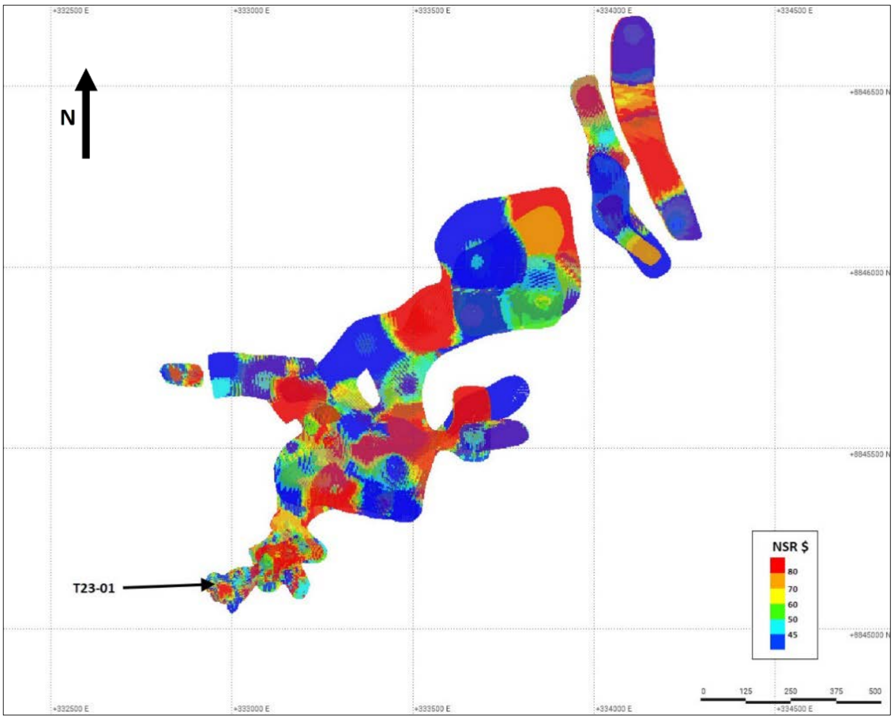
Source: SLR, 2024

Figure 14-7: Plan View of Zinc NSR Values within Zinc Zone Domains and Silver NSR Values within the Silver Zone Domain



Source: SLR, 2024

Figure 14-8: Silver NSR Values within the Silver Zone Domain



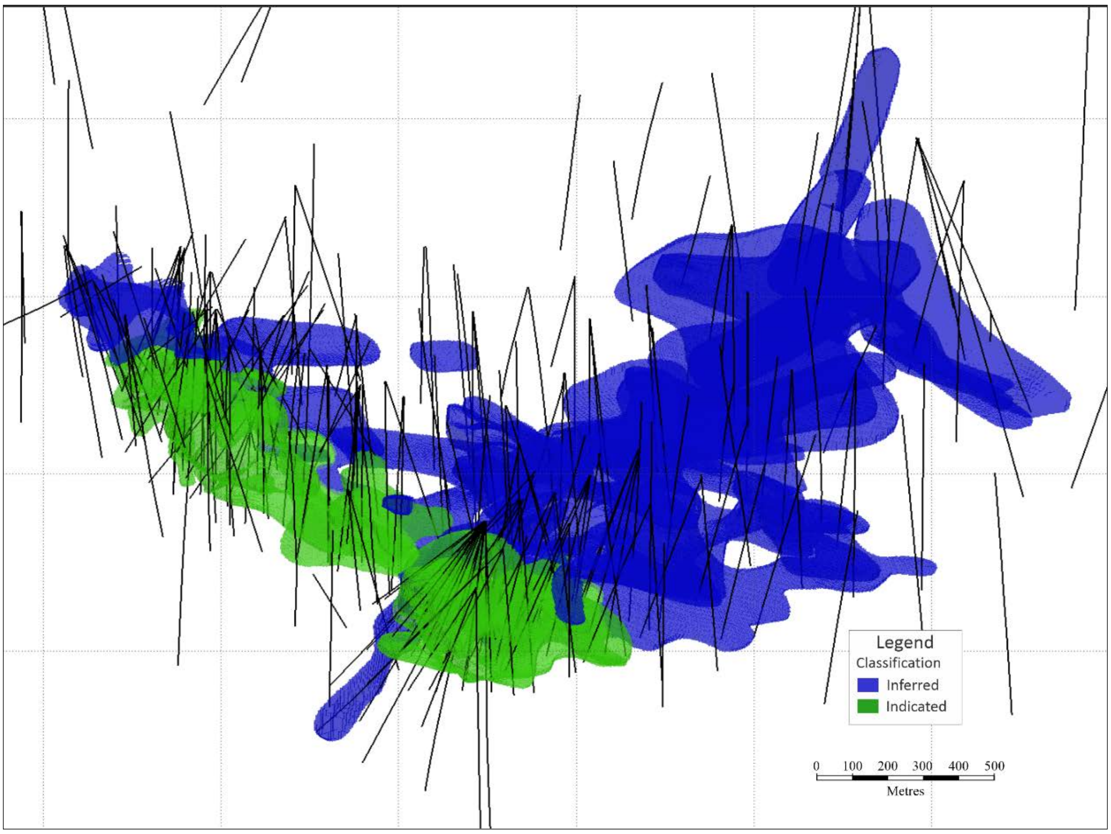
Source: SLR, 2024

Figure 14-9: Plan View of Tin NSR Values within Tin Zone Domains

14.1.11 Mineral Resource Classification

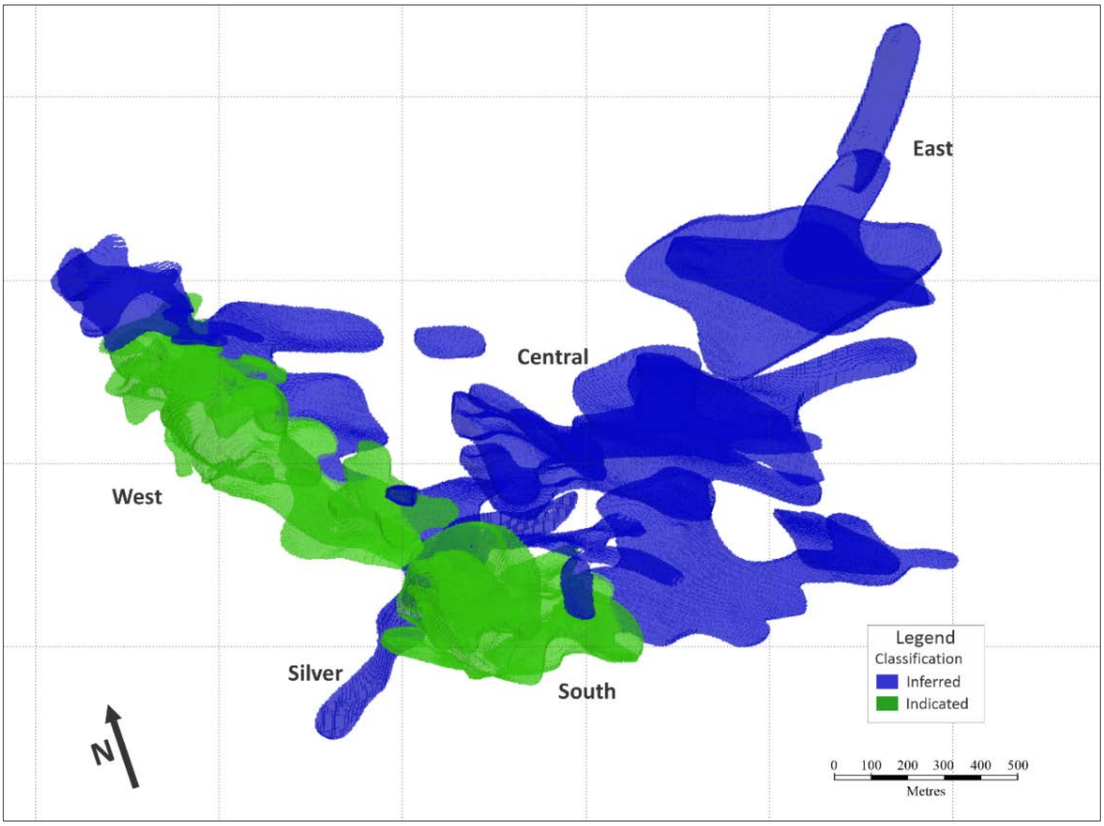
Definitions for resource categories used in this report are consistent with those defined by CIM (2014). No Measured Mineral Resources have been estimated for the Ayawilca deposit.

The classification criteria used to define the Indicated Mineral Resources are drill hole spacing, thickness, and continuity of the mineralization. The drill hole spacing within a resource area assigned the Indicated category commonly ranges from 40 m to 70 m. Figure 14-10 illustrates the Ayawilca deposit classification model and drilling. For the Zinc Zone, Indicated Mineral Resources are confined to the South and West areas (Figure 14-11). In the Tin Zone, Inferred Mineral Resources have been upgraded to Indicated for an area in the south that includes domain T23-01 and portions of domains T23-02A and T23-03 (Figure 14-12). All blocks in the Silver Zone are classified as Inferred.



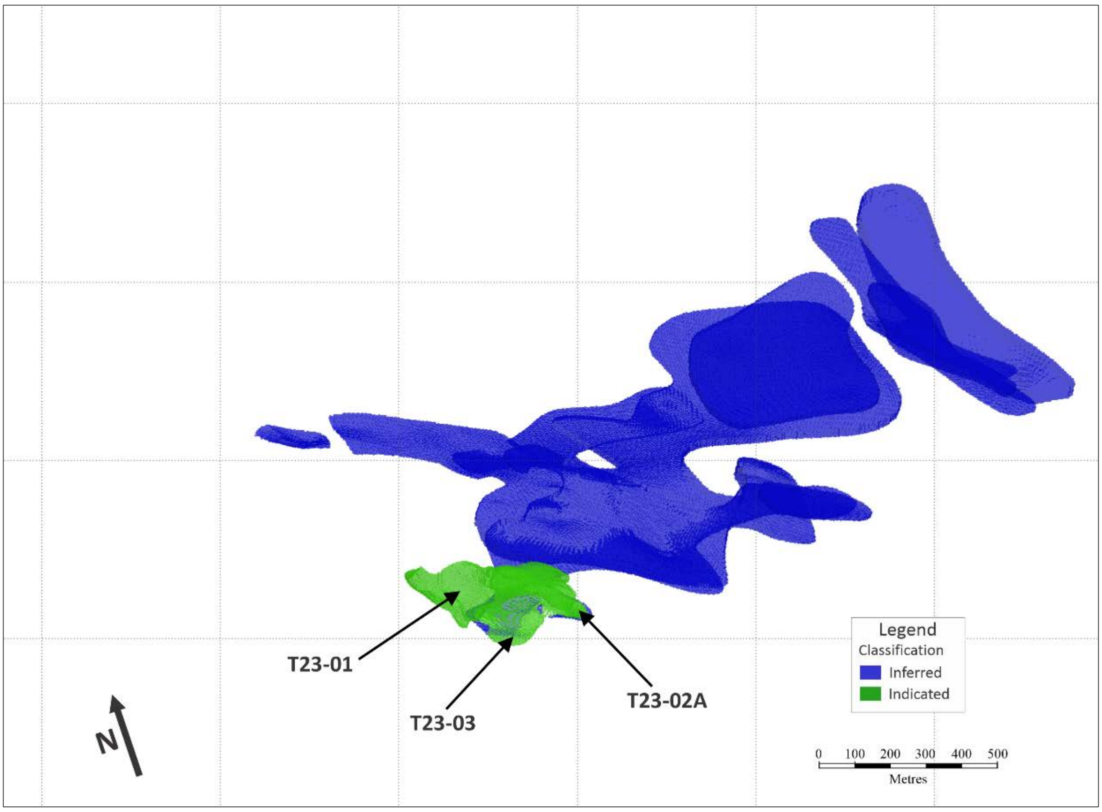
Source: SLR, 2024

Figure 14-10: Ayawilca Deposit Classification Model and Drilling



Source: SLR, 2024

Figure 14-11: Zinc Zone and Silver Zone Classification Model



Source: SLR, 2024

Figure 14-12: Tin Zone Classification Model

14.1.12 Mineral Resource Reporting

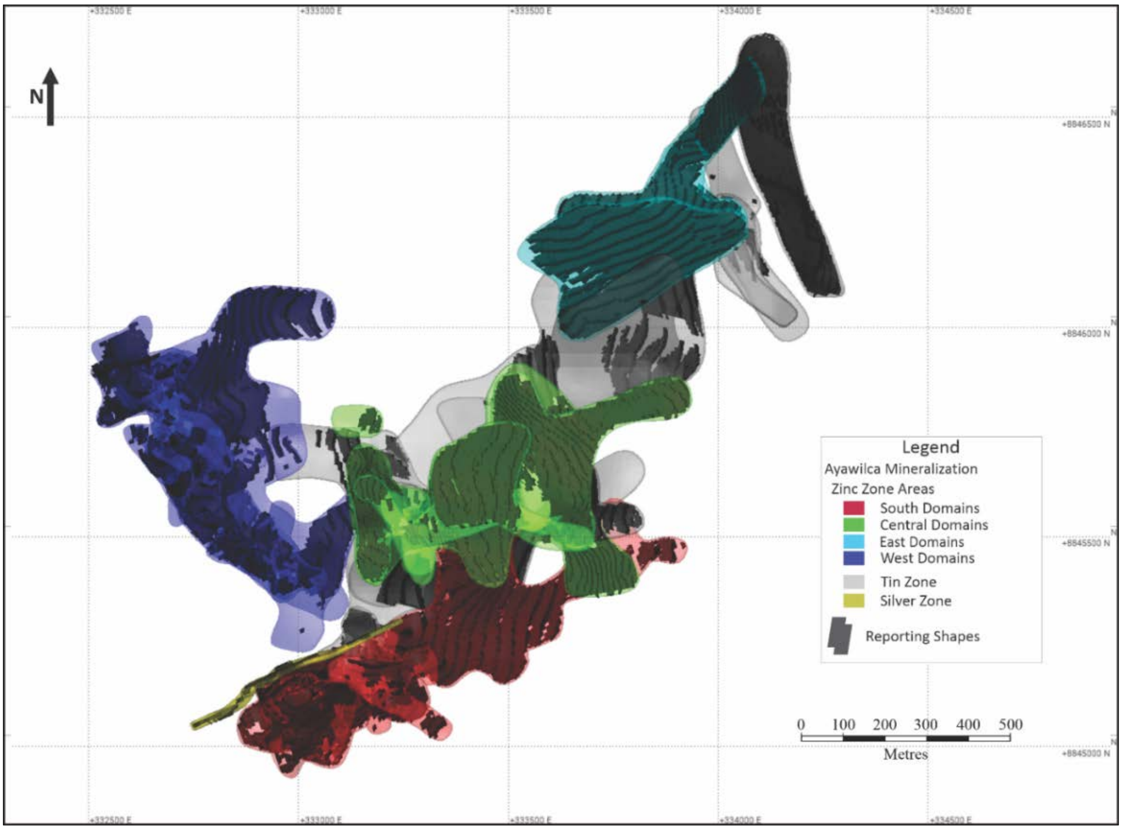
To ensure that the Mineral Resources meet the CIM (2014) RPEEE requirement, Ayawilca resources were reported within underground reporting shapes based on an NSR cut-off value of US$50/t for the Zinc Zone and the Silver Zone and US$60/t for the Tin Zone (Figure 14-13, Figure 14-14, Figure 14-15, and Figure 14-16).

The reporting shapes were optimized using DSO. During the DSO procedure, the rock adjacent to the mineralized domains (i.e., blocks within the buffer zone) were considered and the Mineral Resource statement is a summation of all the block tonnes and grade contained within the reporting shapes. The result is a more robust, albeit restrictive, resource estimate.

The parameters selected as inputs for the creation of the resource reporting shapes are consistent with the stage of the Mineral Resource estimate and are summarized in Table 14-17. The DSO parameters used a standard length of 5.0 m longitudinally, a variable height of 10.0 m or 15.0 m, and a minimum width of 3.0 m. The minimum shape measured 5.0 m by 10.0 m by 3.0 m. The strike and dip of the angles used to generate the reporting shapes were variable and subdivided by zone and area. The standard shape was optimized first and if it was not potentially economic (i.e., the average NSR value of all blocks within the shape was below the cut-off), smaller shapes were optimized until they reached the minimum reporting shape.

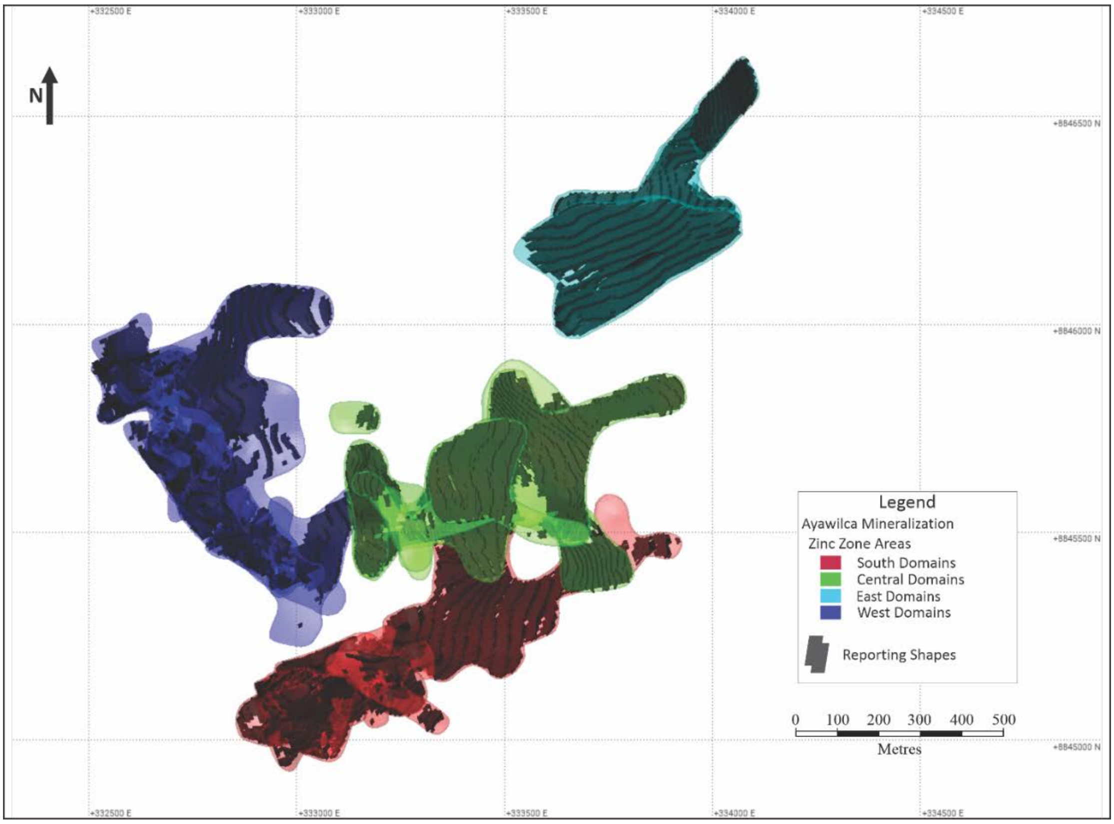
Table 14-17: Input Parameters for Underground Reporting Shapes

Input Description	Value or Criteria
NSR Cut-Off Value	Zinc Zone - US$50/t Silver Zone - US$50/t Tin Zone - US$60/t
Level (Height)	Variable 10 m or 15 m
Section (Length)	Horizontal/subhorizontal – 5.0 m
Width (Thickness)	Minimum – 3.0 m Maximum – 200 m
“Stope” Dip Angles	Variable and subdivided by zone and area
“Stope” Strike Angle	Variable and subdivided by zone and area



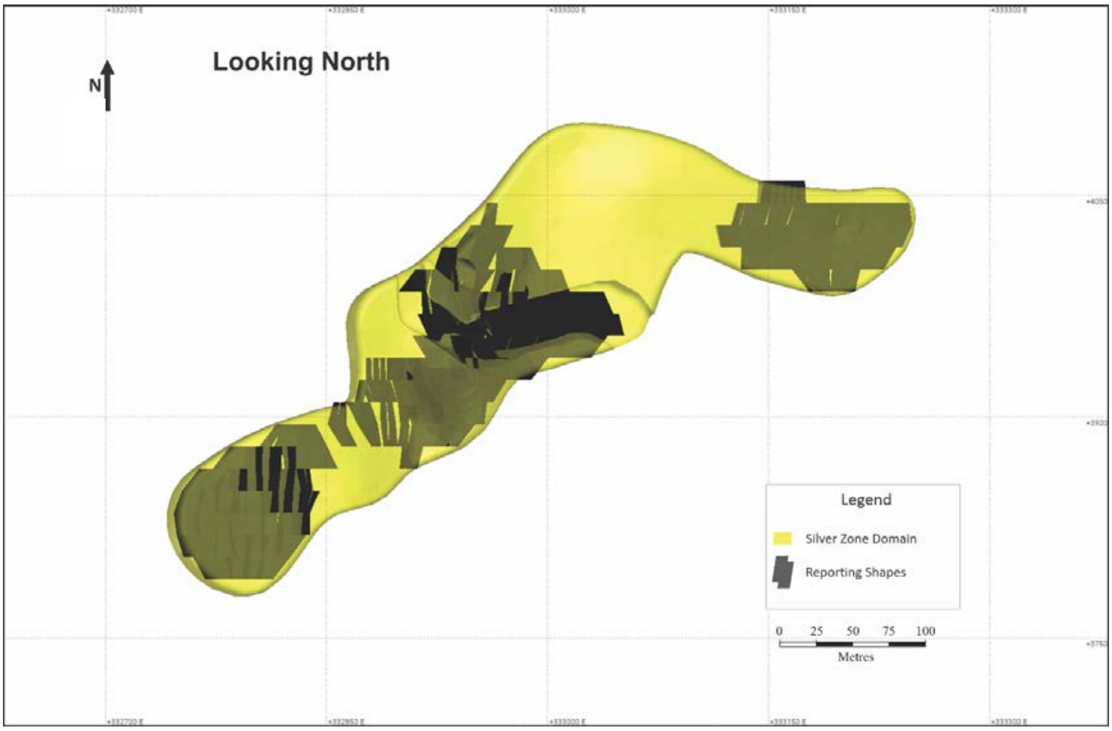
Source: SLR, 2024

Figure 14-13: Ayawilca Domains and Underground Reporting Shapes in Plan View



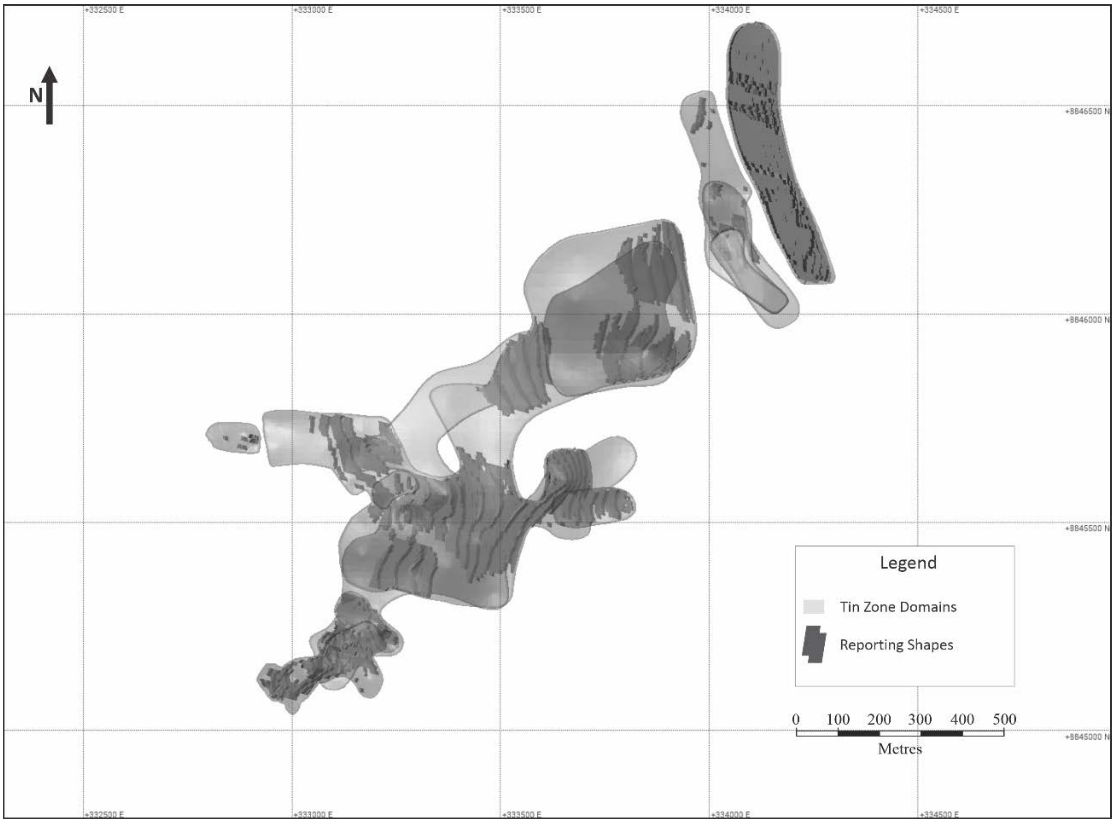
Source: SLR, 2024

Figure 14-14: Zinc Zone Domains and Underground Reporting Shapes in Plan View



Source: SLR, 2024

Figure 14-15: Silver Zone Domain and Underground Reporting Shapes in Plan View



Source: SLR, 2024

Figure 14-16: Tin Zone Domains and Underground Reporting Shapes in Plan View

14.1.13 Mineral Resource Validation

The QP validated the block model by visual inspection, volumetric comparison, and statistical comparison of block grades to assay and composite grade. Visual comparison on vertical sections and plan views, and a series of swath plots indicate good overall correlation between the block grade estimates and supporting composite grades in the Zinc Zone and the Tin Zone.

The estimated total volume of the wireframe domain models is 36,376,918 m^3, while the volume of the block model at a zero grade cut-off is 36,381,125 m^3. The volume difference is 0.01%, which the QP considers to be an acceptable result.

Histograms comparing estimated block grades versus informing data for zinc, silver, and lead in the Zinc Zone and Silver Zone are illustrated in Figure 14-17, Figure 14-18 and Figure 14-19, and for tin in the Tin Zone in Figure 14-20. Grade statistics for zinc, silver, and lead in the Zinc Zone and Silver Zone and tin in the Tin Zone are summarized in Table 14-18 and Table 14-19, respectively. The QP notes that the block average grade is higher than the composite average grade in the Silver Zone and the South and Central areas of the Zinc Zone. This is due to the clustered nature of the data set, that is, a higher density of samples in high grade areas skews the average result of composites as compared to blocks.

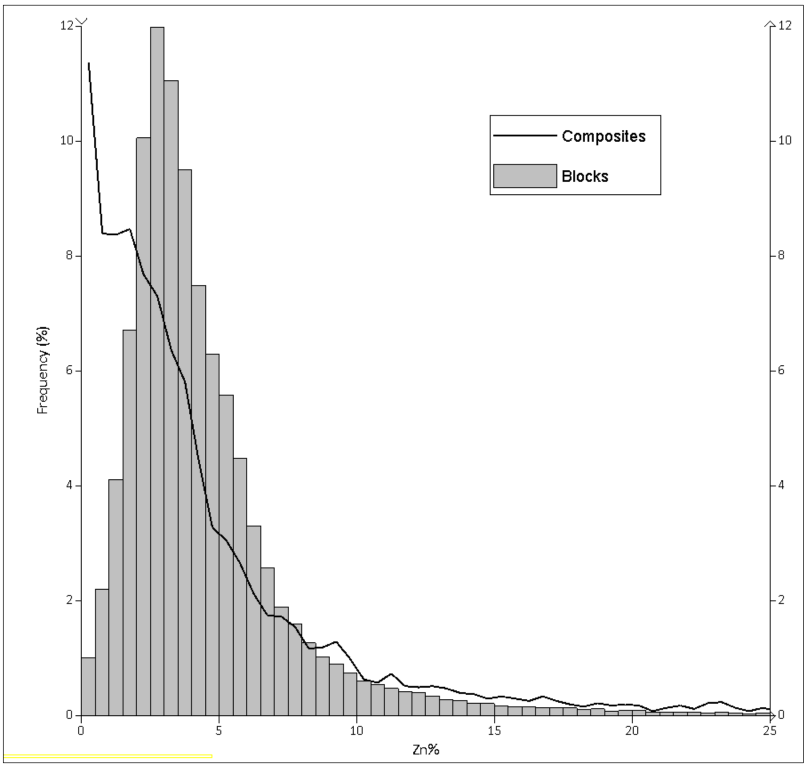


Figure 14-17: Histograms of the Estimated Block Zinc Grades – Ayawilca Zinc Zone and Silver Zone

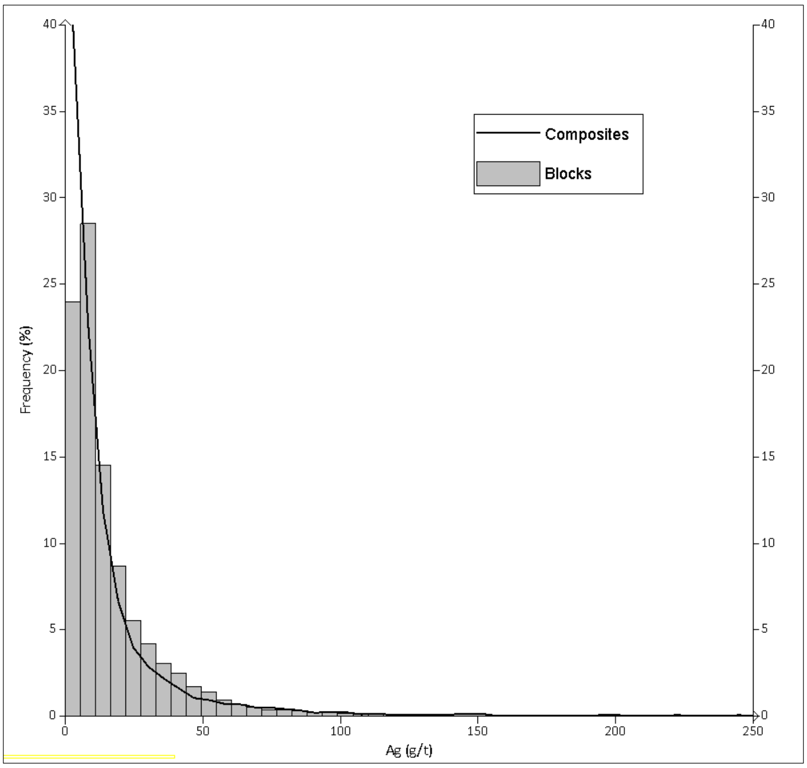


Figure 14-18: Histograms of the Estimated Block Silver Grades – Ayawilca Zinc Zone and Silver Zone

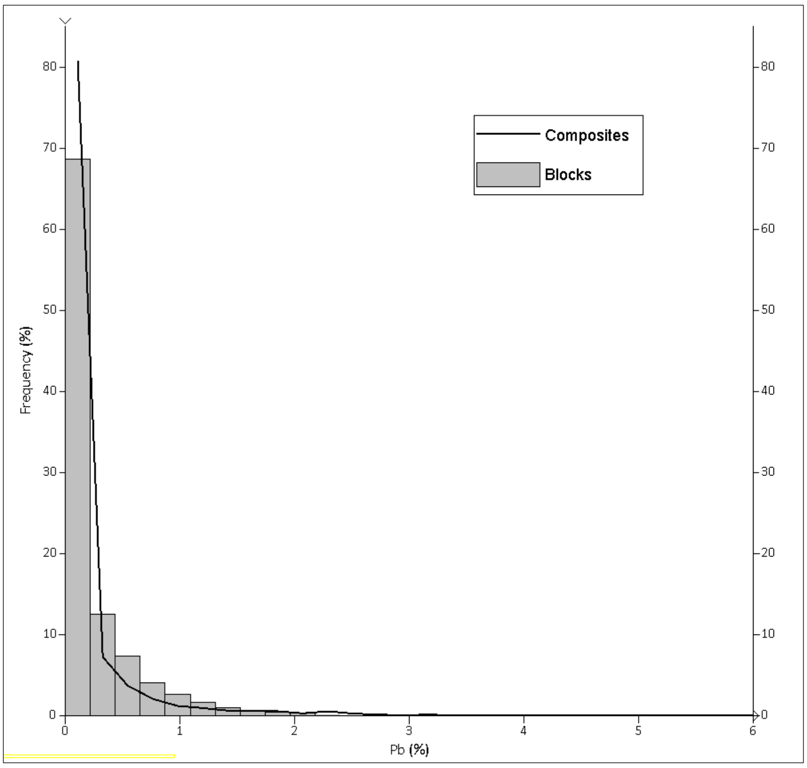


Figure 14-19: Histograms of the Estimated Block Lead Grades – Ayawilca Zinc Zone and Silver Zone

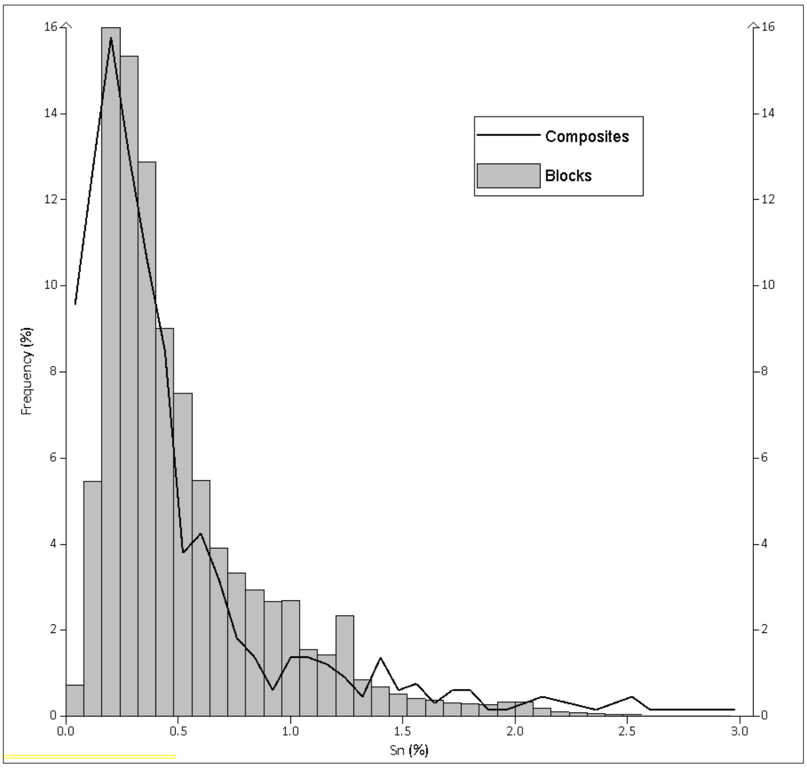


Figure 14-20: Histograms of the Estimated Block Tin Grades – Ayawilca Tin Zone

Table 14-18: Comparison of Zinc, Silver, and Lead Grade Statistics for Assays, Composites, and Blocks in the Zinc Zone and Silver Zone

Zone and Statistic	Assays			Composites			Blocks		
	Ag	Pb	Zn	Ag	Pb	Zn	Ag	Pb	Zn
	g/t	%	%	g/t	%	%	g/t	%	%
Zinc Zone									
Central Area									
Count	525	525	525	456	456	456	408,506	408,506	408,506
Mean	9.66	0.26	3.47	9.66	0.26	3.47	10.76	0.28	3.5
CV	1.78	3.01	0.82	1.63	2.77	0.74	0.9	1.7	0.47
Min	0	0	0.01	0	0	0.01	0.05	0	0.05
Median	5.1	0.02	2.83	5.26	0.02	2.91	8.26	0.07	3.15
Max	238	10.69	24.6	238	10.69	18.11	237.72	10.68	17.84
East Area									
Count	216	216	216	188	188	188	275,006	275,006	275,006
Mean	20.95	0.25	4.04	20.95	0.25	4.04	14.24	0.19	4.15
CV	2.59	2.19	0.86	2.45	1.95	0.75	1.09	1.32	0.43
Min	0	0	0.01	0	0	0.01	0.03	0	0.02
Median	5.2	0.02	3.32	5.71	0.02	3.45	7.83	0.08	3.84
Max	400	5.74	41.68	400	3.18	32.15	387.3	3.14	31.35
South Area									
Count	2,172	2,172	2,172	1,763	1,763	1,763	370,700	370,700	370,700
Mean	17.94	0.16	6.02	18.14	0.16	6.04	20.41	0.18	5.63
CV	2.02	4.17	1.42	1.77	3.49	1.23	1.26	2.44	0.84
Min	0.06	0	0	0.07	0	0	0.2	0	0
Median	8.11	0.03	2.83	9.12	0.03	3.38	13.18	0.06	4.29
Max	400	21.76	49.9	400	21.76	49.82	399.46	21.66	48.95
West Area									
Count	2,997	2,997	2,997	2,533	2,533	2,533	472,241	472,241	472,241
Mean	14.72	0.23	4.11	14.7	0.23	4.11	13.97	0.21	4.27
CV	2.15	3.34	1.41	1.93	2.86	1.26	1.42	1.86	0.84
Min	0	0	0	0	0	0	0.11	0	0.01
Median	5.9	0.03	2.35	6.31	0.03	2.61	8.03	0.07	3.34
Max	300	12.8	49.34	300	10.5	48.91	299.86	10.24	48.74
Silver Zone									
Count	128	128	128	99	99	99	34,605	34,605	34,605
Mean	81.18	0.51	1.75	81.18	0.51	1.75	123.21	0.56	1.88
CV	1.74	1.61	1.51	1.55	1.33	1.1	0.99	0.8	0.66
Min	0	0	0	0.03	0	0	0.4	0	0.03
Median	24.58	0.28	1.06	34.37	0.34	1.33	80.54	0.45	1.81
Max	550	5.72	21.7	550	4.53	12.65	550	4.36	12.02

Table 14-19: Comparison of Tin Grade Statistics for Assays, Composites, and Blocks in the Tin Zone

Statistic	Assays	Composites	Blocks
	Sn %	Sn %	Sn %
Count	732	659	495,275
Mean	0.53	0.53	0.51
CV	1.38	1.30	0.77
Min	0.00	0.00	0.00
Median	0.29	0.31	0.38
Max	4.00	4.00	3.99

14.1.14 Comparison to Previous Mineral Resource Estimate

The current Ayawilca Mineral Resource estimate supersedes the previous Mineral Resource estimate dated June 30, 2021. Changes in the Mineral Resources estimate for the Zinc Zone and Tin Zone from June 30, 2021 are due to the following factors:

- Zinc Zone
    - The result of reporting the summation of all blocks within resource reporting shapes in 2024 versus a block cut-off value used in 2021, which has slightly reduced the zinc grade in the estimate due to dilution.
    - An update to the geological model and in the resource domain interpretation due to additional drilling in 2022 and 2023, which improved vertical continuity but slightly reduced tonnage especially in the West area.
    - An increase in resources assigned to the Indicated category due to the new geological model and improved mineralization domains with additional drilling.
    - A much larger density database available for the 2024 estimate, which has slightly decreased the average block density in most areas.
    - A change to the NSR factors as a result of higher metal prices used for all payable metals (Zn, Ag, Pb) and an update of costs which have generally increased since 2021.
    - Reporting the Silver Zone as a separate zone within the Ayawilca deposit with distinct metal recoveries and NSR factors (previously the Silver Zone was included as an area within the Zinc Zone).
    - A decrease to the NSR cut-off value for the Zinc Zone from US$55/t in 2021 to US$50/t in 2024.
- Tin Zone
    - The result of reporting the summation of all blocks within resource reporting shapes in 2024 versus a block cut-off value used in 2021, which has slightly reduced the tin grade due to dilution.
    - An increase in net metal recovery of tin to 64% as the result of additional metallurgical test work.
    - Indicated Mineral Resources have been declared in the current estimate for the first time.

- An update to the geological model and in the resource domain interpretation due to additional drilling in 2022 and 2023.
- An increase to the NSR tin factor as a result of a higher metal price and update to the tin recovery.

14.1.15 QP Comments on the Ayawilca Mineral Resource Estimate

The QP is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource estimate on the Ayawilca deposit that are not discussed in this report.

There is an opportunity for discovery of additional high-grade silver mineralization: the Silver Zone is open along strike and down dip.

There is upside potential for the estimates if mineralization that is currently classified as Inferred can be upgraded to higher-confidence Mineral Resource categories.

14.2 Colquipucro Mineral Resource Estimate

14.2.1 Mineral Resource Estimate

The Mineral Resource estimate for the Colquipucro deposit used drill results available to November 17, 2014. There has been no drilling at the Colquipucro deposit since the previous Mineral Resource estimate completed in 2016 and therefore the Colquipucro Mineral Resource estimate remains unchanged.

Colquipucro Mineral Resources are reported within a preliminary pit shell generated in Whittle software at a cut-off of 15 g/t Ag. Indicated Mineral Resources are estimated to total 7.4 Mt at an average grade of 60 g/t Ag containing 14.3 Moz Ag (Table 14-20). Inferred Mineral Resources are estimated to total 8.5 Mt at an average grade of 48 g/t Ag containing 13.2 Moz Ag. More than half the contained metal is from the high-grade lenses, at average grades greater than 100 g/t Ag. A small amount of mineralization was not captured by the Whittle shell.

Mineral Resources are contained within 10 north dipping high-grade lenses, a gently dipping basal zone, and a low-grade halo that encompasses all high-grade lenses. Overall, the Colquipucro deposit is 550 m in the north–south direction by 380 m in the east–west direction by 75 m thick. The Colquipucro deposit is located on a topographic high and ranges between 4,160 masl to 4,360 masl elevations.

Table 14-20: Colquipucro Silver Oxide Deposit Mineral Resources - May 25, 2016

Classification/Zone	Tonnage (Mt)	Grade (g/t Ag)	Contained Metal (Moz Ag)
	Indicated		
High grade lenses	2.9	112	10.4
Low grade halo	4.5	27	3.9
Total Indicated	**7.4**	**60**	**14.3**
	Inferred		
High grade lenses	2.2	105	7.5
Low grade halo	6.2	28	5.7
Total Inferred	**8.5**	**48**	**13.2**

Notes:

1. *CIM (2014) definitions were followed for Mineral Resources.*
2. *Mineral Resources are reported within a preliminary pit shell and above a cut-off grade of 15 g/t Ag for the low grade halo and 60 g/t Ag for the high grade lenses.*
3. *The cut-off grade is based on a price of US$24/oz Ag.*

4. *A bulk density value of 2.48 t/m^3 was assigned to all blocks within resource wireframes.*
5. *Mineral Resources have been reviewed by Katharine Masun, P.Geo., Principal Geologist with SLR Consulting (Canada) Ltd., who is a Qualified Person as defined in NI 43-101.*
6. *Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.*
7. *Numbers may not add or multiply due to rounding.*

The Colquipucro deposit resource database includes 8,697.7 m in 49 drill holes. There has been no additional drilling at the Colquipucro deposit since the initial Mineral Resource estimate by RPA (now SLR) dated February 23, 2015 (RPA, 2015). In 2016, RPA reviewed the Mineral Resource and underlying parameters, and found these were acceptable. RPA updated the Colquipucro Mineral Resource estimate as of May 25, 2016 and prepared a NI 43-101 Technical Report (RPA, 2016). Since there is no new data and the metal price and cost assumptions remain reasonable, the Colquipucro Mineral Resource estimate remains current as of the effective date of May 25, 2016.

A set of cross-sections and level plans were interpreted to construct 3D wireframe models at a cut-off grade of 60 g/t Ag for the high-grade lenses and 15 g/t Ag for the low-grade halo mineralization. Prior to compositing to 2 m lengths, high silver values were cut to 360 g/t Ag in the high-grade lenses, and 120 g/t Ag in the low-grade halo. Block model grades within the wireframe models were interpolated by ID3. Density values were estimated from 41 measurements to be 2.48 t/m^3. Classification into the Indicated and Inferred categories was guided by the drill hole spacing and the continuity of the mineralized zones.

14.2.2 Resource Database

SLR received header, survey, assay, alteration, and geology data from Tinka in MS Excel format. Data were amalgamated and parsed as required, converted to ASCII, and imported into GEMS and ARANZ Leapfrog Geo version 2.1.2 (“Leapfrog Geo”) for Mineral Resource modelling. The latest drill hole included in the database and resource estimate is CDD46. Listed below is a summary of records for all drilling on the Colquipucro deposit:

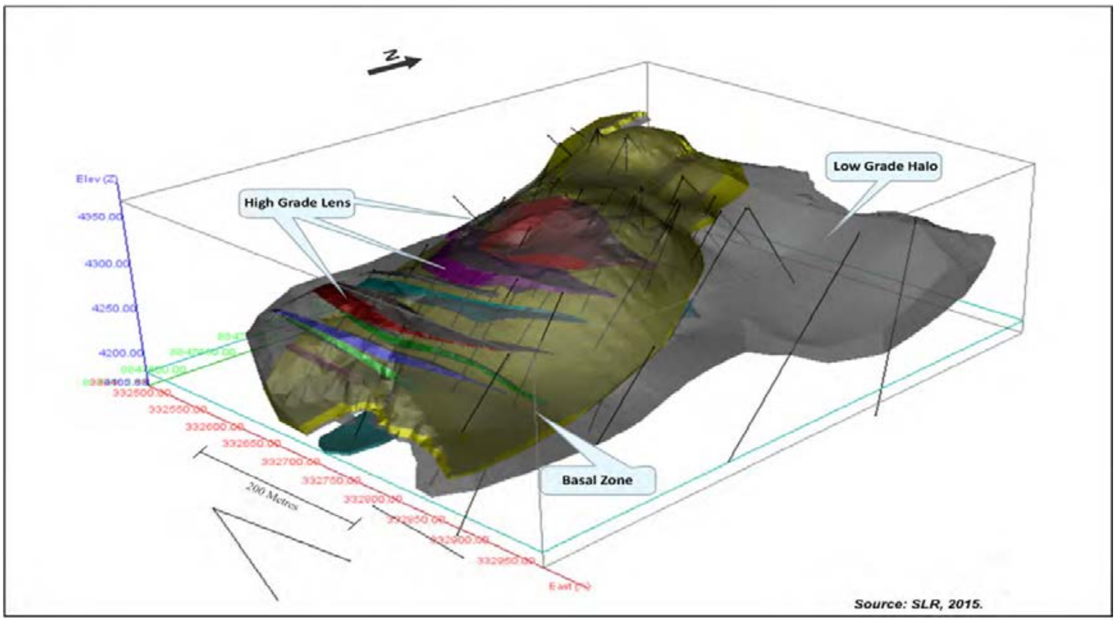
- Drill holes: 50;
- Surveys: 1,297;
- Assays: 4,227;
- Composites: 2,069;
- Lithology: 2,836;
- RQD and recovery: 4,043;
- Oxidation: 843;
- Density measurements: 90.

Section 12 describes the verification steps taken by the QP. In summary, no discrepancies were identified, and the QP is of the opinion that the drill hole database is valid and suitable to estimate Mineral Resources for the Colquipucro deposit.

14.2.3 Geological Interpretation and 3D Solids

Wireframe models of mineralized zones were used to constrain the block model grade interpolation process. SLR interpreted and constructed wireframe models using a nominal cut-off grade of 15 g/t Ag and a minimum core length two metres using Leapfrog Geo. Wireframes of the high-grade lenses were created at a minimum grade of approximately 60 g/t Ag.

SLR built two low-grade halo domains and 11 high-grade lens domains (Figure 14-21). Overall, the deposit is 550 m in the north–south direction by 380 m in the east–west direction by 75 m thick. The deposit is located on a topographic high and ranges in elevation from 4,160 masl to 4,360 masl. SLR also created wireframe models of the main lithologies including the Goyllar sandstone, the Pucará Formation, colluvium, and the Excelsior Formation. The colluvium domain was grouped with the low-grade halo as it is commonly made up of mineralized material.



Source: SLR, 2015.

Figure 14-21: 3D View of Colquipucro Wireframe Models

Brief descriptions of the domains/lenses are as follows:

- Eight parallel yet similar high-grade lenses, named 102 to 109, are located towards the south end of the Colquipucro deposit. These lenses dip between 35° to 45° towards the north. They commonly have dimensions of 200 m along strike by 100 m down dip, and range in thickness from two metres to 20 m, averaging six metres. All are hosted entirely in the Goyllar sandstone. Collectively, the eight lenses are intersected by 17 drill holes.
- Domain 110 is located immediately north of domain 105 and is also hosted in the Goyllar sandstone. It has a shallower dip than the previously described domains and measures 150 m along strike by 100 m down dip and averages 30 m in thickness. Domain 110 is intersected by seven drill holes.
- Domain 111 is a flat, thick, high-grade domain at the north end of the Colquipucro deposit. It measures 160 m north–south by 60 m east–west and averages 40 m in thickness. It is also hosted in the Goyllar sandstone. Domain 111 is intersected by seven drill holes.

- Domain 101 forms a shallow-dipping, basal, high-grade zone near the bottom of the Goyllar sandstone. It measures 500 m north–south by 300 m east–west and ranges from two metres to 20 m in thickness, averaging seven metres. Domain 101 is intersected by 39 drill holes.
- Domain 50 is a large, low-grade halo interpreted to surround the high-grade domains. It measures 550 m in the north–south direction by 380 m in the east–west direction by 75 m in thickness. Most of its volume is located within the Goyllar sandstone; however, it extends down into the Pucará Formation towards its eastern half. Parts of Domain 50 are not captured by the preliminary open pit shell used to report Mineral Resources.
- Domain 51 is a shallow-dipping, low-grade domain located entirely within the Pucará Formation. Parts of Domain 51 are not captured by the preliminary open pit shell used to report Mineral Resources.

14.2.4 Statistical Analysis

Assay values located inside the wireframe models were tagged with domain identifiers and exported for statistical analysis. Results were used to help verify the modelling process. Basic statistics by domain are summarized in Table 14-21.

Table 14-21: Descriptive Statistics of resource Assay Values - Colquipucro

Parameter	High-Grade Lenses	Low-Grade Halos
No. of cases	567	1,448
Minimum (g/t Ag)	0.4	0.1
Maximum (g/t Ag)	1,950	745
Median (g/t Ag)	84	19
Arithmetic mean (g/t Ag)	124	26
Standard deviation (g/t Ag)	160	40
Coefficient of variation	1.3	1.5

14.2.5 Capping High Grade Values

Where the assay distribution is skewed positively or approaches log-normal, erratic high grade assay values can have a disproportionate effect on the average grade of a deposit. One method of treating these outliers to reduce their influence on the average grade is to cut or cap them at a specific grade level. In the absence of production data to calibrate the cutting level, inspection of the assay distribution can be used to estimate a first pass capping level.

Review of the resource assay histograms within the wireframe domains (Figure 14-22 and Figure 14-23) and a visual inspection of high-grade values on plan and vertical sections (Figure 14-24 and Figure 14-25 respectively) suggest capping erratic values at 360 g/t Ag in the high-grade lenses, and 120 g/t Ag in the low-grade halo. The coefficient of variation values were reduced to less than 1.0 after the cutting was applied (Table 14-21).

14.2.6 Compositing

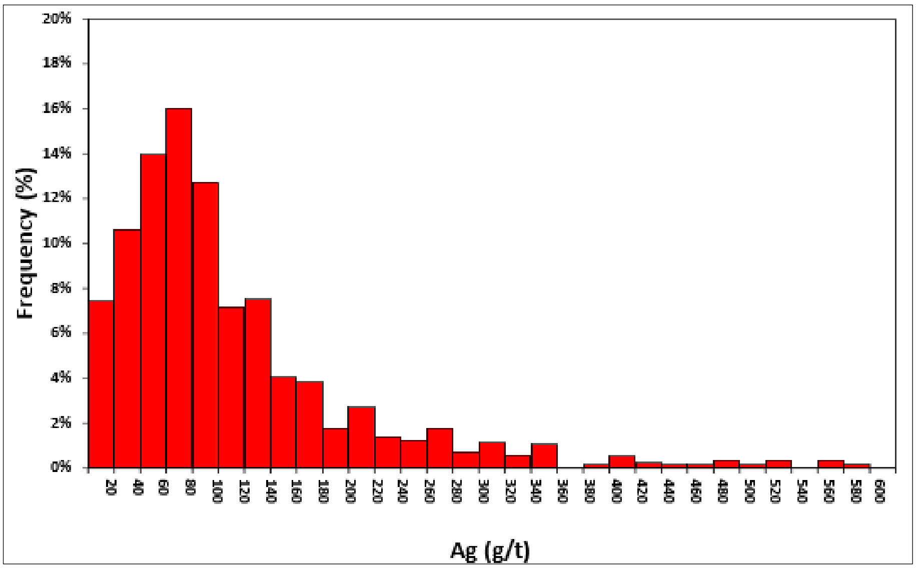
Sample lengths range from 0.6 m to 6.0 m within the wireframe models with greater than 90% taken at two metres. Given these distributions, and considering the width of the mineralization, SLR chose to composite to two metre lengths. Assays within the wireframe domains were composited commencing at the first mineralized wireframe boundary from the collar and resetting at each new wireframe boundary. Composites less than 0.5 m, located at the bottom of the mineralized intercept, were removed from the database. Table 14-22 lists descriptive statistics of the composites by zone.

Table 14-22: Descriptive Statistics of Composites - Colquipucro

Parameter	High Grade Lenses	Low Grade Halos
No. of Cases	576	1,493
Minimum (g/t Ag)	0.4	0.0
Maximum (g/t Ag)	360	120
Median (g/t Ag)	82	18
Arithmetic Mean (g/t Ag)	109	24
Standard Deviation (g/t Ag)	89	22
Coefficient of Variation	0.8	0.9

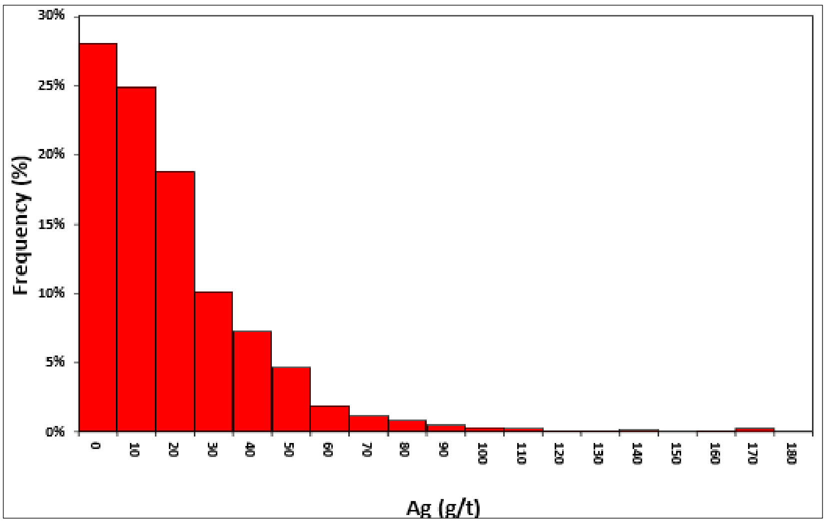
14.2.7 Interpolation Parameters

Grade interpolation for silver was estimated by ID3 using two passes for the high-grade lenses and three passes for the lower-grade halo domains, illustrated by Figure 14-22 and Figure 14-23 respectively.



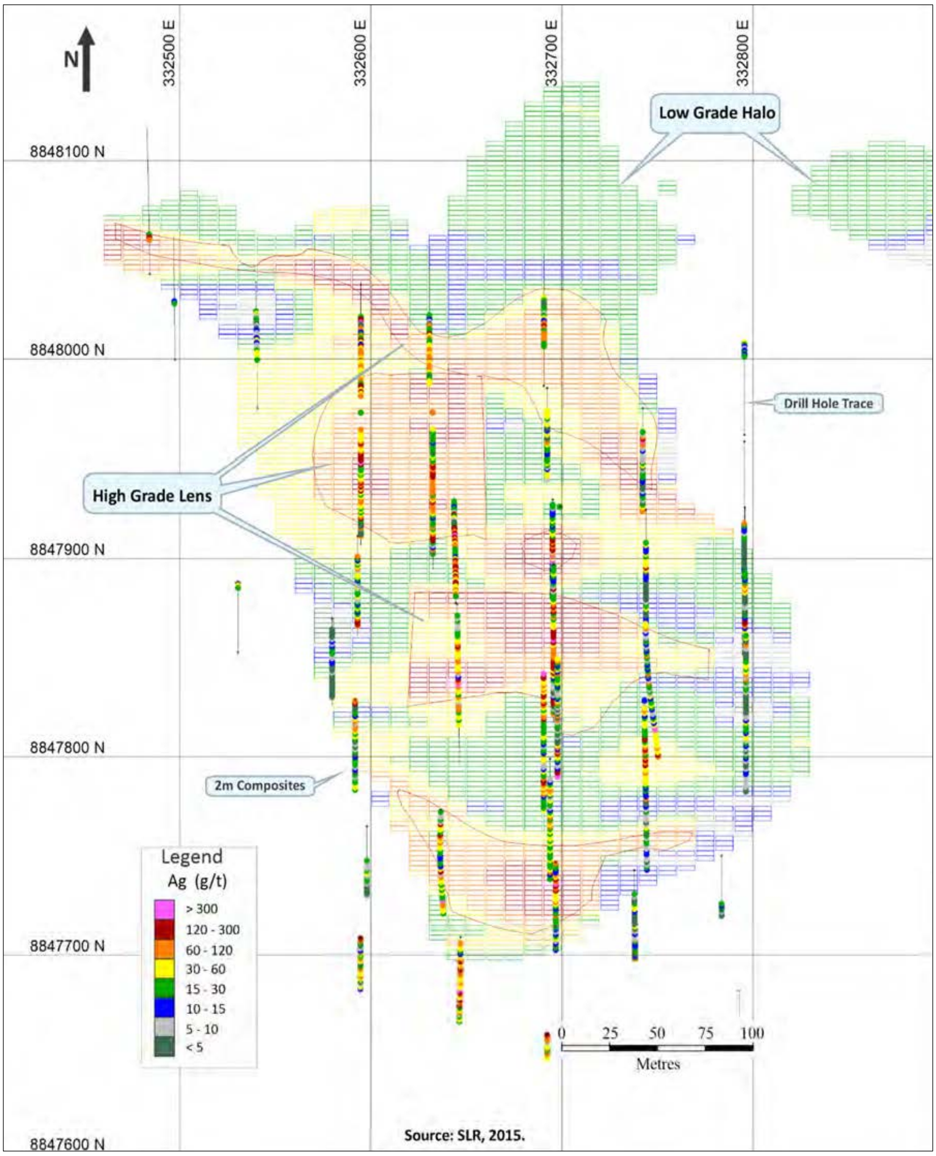
Note: Figure prepared by SLR, 2015

Figure 14-22: Histogram Assays within Colquipucro High-Grade Lenses



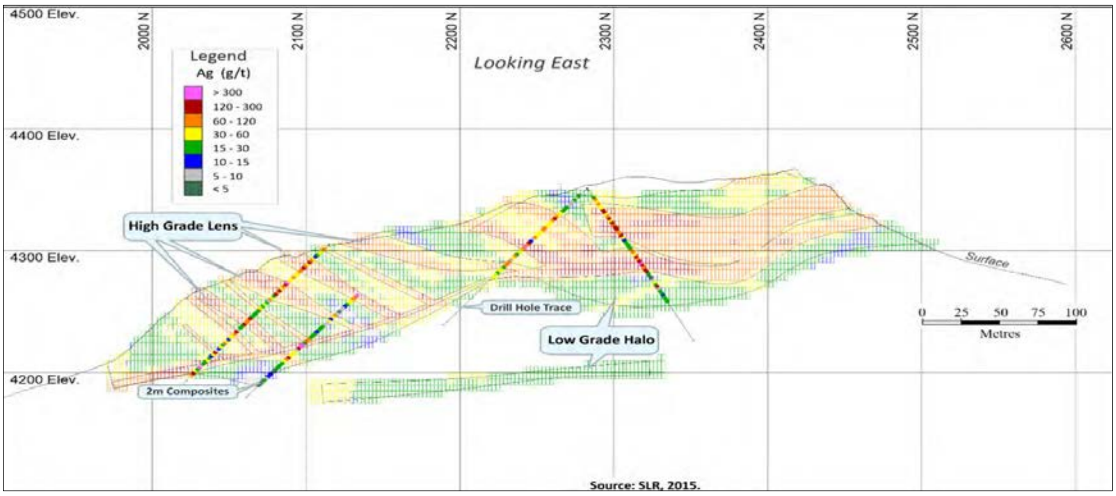
Note: Figure prepared by SLR, 2015.

Figure 14-23: Histogram Assays within Colquipucro Low-Grade Halo



Note: Figure prepared by SLR, 2015.

Figure 14-24: Colquipucro 4,300 m Level Plan



Source: SLR, 2015.

Note: Figure prepared by SLR, 2015.

Figure 14-25: Colquipucro Vertical Section 332,650E

The first pass strategy for high grade lenses required a minimum of two to a maximum of 12 composites, with a maximum of four composites per hole. The search ellipse dimensions were 50 m x 50 m x 10 m for an anisotropy ratio of 1:1:5. Search ellipse orientations were aligned in the direction of the wireframe models (Table 14-23). Pass two was similar except that the minimum required number of composites was reduced to one, there was no restriction of composites per hole, and the search ellipse dimensions were doubled to 100 m x 100 m x 20 m.

The search strategy for the first pass for low-grade halos required a minimum of two to a maximum of 12 composites, with a maximum of four composites per hole. The search ellipse was isotropic with a radius of 50 m. Pass two was similar except that the minimum required number of composites was reduced to one, there was no restriction of composites per hole, and the search ellipse radius was doubled to 100 m. A third pass was required to fill a few blocks along the fringes of the wireframe models. The parameters for the third pass were the same as those for the second pass, except that a radius of 180 m was used.

Table 14-23: Block Estimate Search Strategy - Colquipucro

Domain	Principal Azimuth (°)	Principal Dip (°)	Intermediate Azimuth (°)
101	0	05	60
102	0	-35	5
103	0	-35	-20
104	0	-30	5
105	0	-22.5	15
106	0	-30	-15
107	0	-37.5	-2.5
108	0	-45	7.5
109	0	-50	2.5
110	0	-25	0
111	0	5	0

14.2.8 Density

Tinka performed 90 density measurements from four drill holes. SLR used the average of the measurements, 2.48 t/m^3, to convert resource volumes to tonnage.

14.2.9 Block Model

The GEMS block model consisted of 76 columns, 300 rows, and 80 levels. The model origin (lower-left corner at highest elevation) was at coordinates 332,410 mE, 8,847,430 mN and 4,400 masl elevation. Each block was 10 m long by 2.5 m wide by 5 m high. A partial block model was used to manage blocks partially filled by mineralized rock types, including blocks along the edges of the Colquipucro deposit. A partial model had a parallel block model containing the percentage of mineralized rock types contained within each block. A GEMS block model folder was created for the high-grade lenses and the low-grade halo. The block model contained the following information:

- Domain identifiers with rock type;
- Estimated grades of silver inside the wireframe models;
- The percentage volume of each block within the mineralization wireframe models;
- Resource classification;
- Tonnage factors, in tonnes per cubic metre; and
- The distance to the closest composite used to interpolate the block grade.

14.2.10 Classification

Definitions for resource categories used in this Report are those defined in the 2014 CIM Definition Standards and incorporated by reference into NI 43-101.

No Measured Resources have been classified at the Colquipucro deposit. Two areas of the Colquipucro deposit were classified as Indicated: the central core, where the drill hole spacing is 50 m x 50 m or closer, and an area towards the north end of the Colquipucro deposit, where the drill hole spacing is closer and the mineralization exhibits good grade continuity. All remaining blocks within the resource domains were classified as Inferred. Classification was assigned using manually constructed wireframe solids.

14.2.11 Cut-off Grade and Preliminary Open Pit Shell

To fulfill the CIM requirement of RPEEE, SLR prepared a preliminary open pit shell to constrain the block model for resource reporting purposes. The preliminary pit shell was generated using Whittle software.

Tinka determined that the metallurgical processes would be heap leaching and agitation cyanide leaching (mill) for low-grade and high-grade silver mineralization, respectively, given the silver grade range within the Colquipucro deposit. A value trade-off gave approximately 60 g/t Ag as the mill cut-off grade, or the point at which to switch to heap leaching. The G&A costs were assumed to be paid by the mill. Iterative optimizations were run varying operating costs according to production rates assumptions in both heap leaching and milling to converge to a resource having a heap leach to mill tonnage ratio consistent with the assumptions.

The parameters used in the Whittle pit shell analysis for the resource constraint are listed in Table 14-24.

Table 14-24: Preliminary Pit Optimization Parameters

Parameter	Value
Pit slope	45°
Process recovery heap leach	50%
Process recovery mill	80%
Price	$24/oz Ag
Mining cost	$2.60/t mined
Heap leach cost	$3.74/t milled
Milling cost	$21.65/t milled
G&A	$4.48/t milled

14.2.12 Reasonable Prospects of Eventual Economic Extraction

Colquipucro Mineral Resources are reported within a preliminary pit shell generated in Whittle software at a cut-off of 15 g/t Ag. A small amount of mineralization was not captured by the Whittle shell.

The QP reviewed the input parameters used in the 2016 Colquipucro Mineral Resource estimate and is of the opinion that they remain current. However, the QP recommends reviewing and updating the input costs in the next phase of work on the Project.

14.2.13 Mineral Resource Validation

SLR validated the block model by visual inspection, volumetric comparison, and scatterplots. Visual comparison on vertical sections and plan views, and a series of swath plots found good overall correlation between the block grade estimates and supporting composite grades.

The estimated total volume of the wireframe models is 11,957,000 m^3, while the volume of the block model at a zero grade cut-off is 11,956,000 m^3.

14.2.14 QP Comments on the Colquipucro Mineral Resource Estimate

The QP is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource estimate on the Colquipucro deposit that are not discussed in this Report.

There is upside potential for the estimates if mineralization that is currently classified as Inferred can be upgraded to higher-confidence Mineral Resource categories.

15 MINERAL RESERVE ESTIMATES

There are no Mineral Reserve estimates for the Ayawilca property.

16 MINING METHODS

16.1 Introduction

The Ayawilca deposit consists of three separate styles (“Zones”) of mineralization (i.e. Zinc Zone, Tin Zone, and Silver Zone) within a square area of approximately 2 by 2 km, which commence from 150 m below the surface, to a maximum depth of around 700 m. The Zinc Zone, consisting of sulphide-rich zinc-silver-lead mineralization comprises four separate deposits: the South, West, Central and East areas.

The upper Tin Zone comprises coarse tin mineralization with higher process recovery and is mined initially followed by the deeper Tin Zone which has finer tin mineralization and a lower process recovery.

The PEA mine plan considers an owner-operator underground operation targeting a production rate of 2.0 Mtpa for the Zinc and Silver Zones, and 0.3 Mtpa for the Tin Zone for an overall ROM production rate of 2.3 Mtpa. The LOM is 21 years for the Zinc Zone (including Silver Zone) and 15 years for the Tin Zone.

The near surface Zinc Zone deposits from South and West areas are planned to be mined initially and individually accessed through decline boxcuts with truck haulage to the ROM stockpile located at the process facility. The Silver Zone and upper Tin Zone are also mined and hauled by truck to surface through these decline accesses. In the later stages of the mine life, the Central and East areas of the Zinc Zone and deeper Tin Zone will be accessed via a separate decline boxcut developed from the northern side of the mine site.

The 2024 PEA mine plan is based on the Ayawilca Mineral Resource estimate for the Zinc Zone (Table 14-1) , Silver Zone (Table 14-2) and Tin Zone (Table 14-3). The 2024 PEA mine plan includes Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be classified as Mineral Reserves, and there is no certainty that the 2024 PEA based on these Mineral Resources will be realized.

16.2 Mining Methods

The 2024 PEA considers underground mining only due to the mountainous terrain, geometry and depth below surface of the mineralized deposits and surface constraints for infrastructure and mine waste storage. A trade-off assessment was undertaken to assess the mining method approach and production rate considering (but not limited to):

- Geotechnically stable stope spans throughout the deposit and ground support requirements.
- Variable orebody width, dip and strike length.
- Impact of mining recovery and dilution.
- Possibility to backfill the stopes, minimizing surface impact and enable partial disposal of tailings underground.
- Practical level intervals to achieve sustainable schedule targets (production rate and grades).

The mining method selected for the Zinc and Tin Zones is overhand longhole open stoping ("LHOS") with paste backfill in a transverse direction (Figure 16-1) which requires development across the strike of the mineralized body. This is mainly due to wider sections with a sub-vertical dip and also shallow dipping geometry of the mineralized deposits. Level waste development is required to provide a means of access from the decline (typically in the footwall) for mining mineralized areas identified as economically mineable.

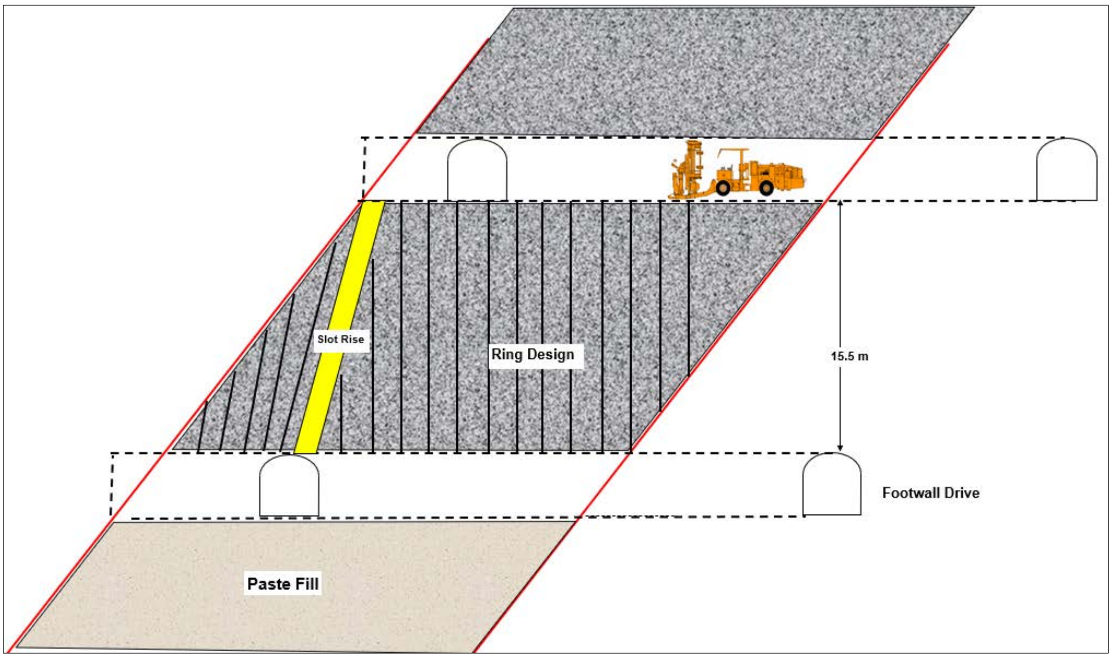
For the Silver Zone, longitudinal LHOS (Figure 16-2) is applied due to the relative narrow width and sub-vertical dip of the mineralized body which requires development along the strike of the mineralized body.

A level spacing of 15 m is applied for the Zinc Zone (South, West and Central areas) and Tin Zone and a 20 m level spacing is applied for the Zinc Zone (East area) and Silver Zone based on the mineralized body geometries and impact of dilution. The overhand LHOS method requires working on top of (and next to in wider areas) filled stopes and between sill pillars which are recovered at a later stage on retreat.

An access drive profile of 4.5 m (width) x 4.5 m (height) was applied which is sufficient in dimensions for the range of equipment types required for the narrow and wide LHOS mining. The drive profile reduces the maximum vertical drill height to 11.5 m for 15 m level spacing and 15.5 m for 20 m level spaced stoping areas.

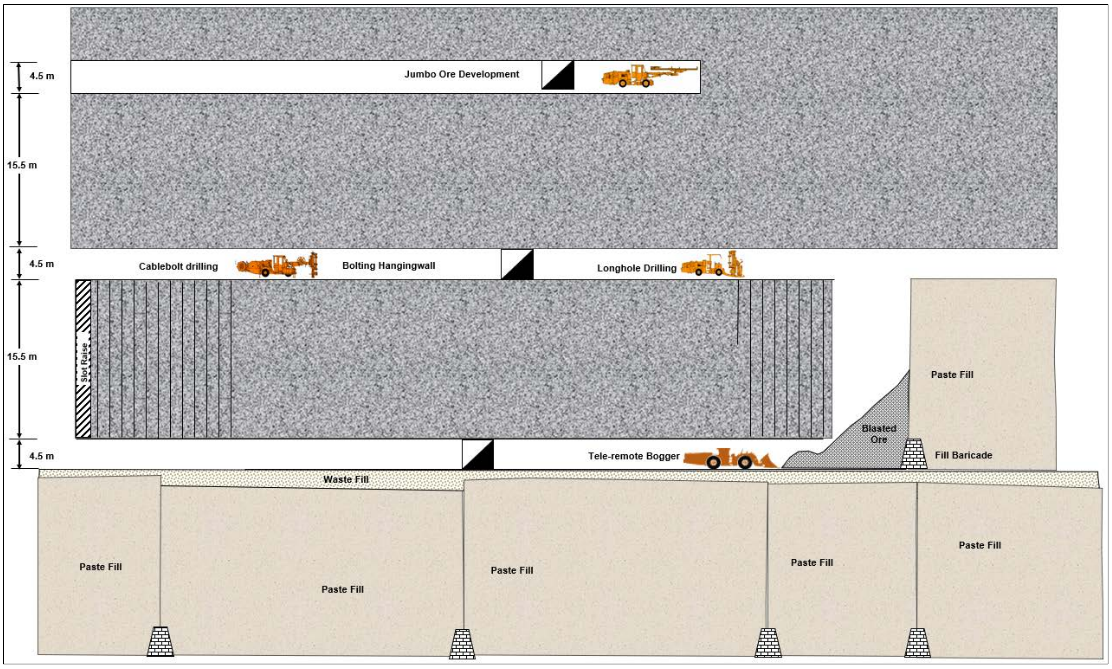
Slot raises are initially drilled followed by rings of blast holes which can be either up or down holes (depending on access). Slot raises are blasted initially followed by rings into the void created by the slot.

The blasted stope material can be removed on the lower level by tele-remote methods or limited to the stope brow if the loader is being operated manually. Once the individual stopes have been excavated to their open stope limits, a barricade is installed at the stope access and the stope void is filled with paste backfill and/or unconsolidated waste, depending on the location and sequence of mining. After the paste backfill has cured sufficiently, adjacent stopes along strike or above the previously mined stope can be mined using a similar sequence.



Source: SRK, 2024

Figure 16-1: Schematic Cross-Section of Transverse LHOS Method



Source: SRK, 2024

Figure 16-2: Schematic Long View of Longitudinal LHOS Method

16.3 Geotechnical Considerations

This section summarizes the results of the desktop geotechnical study to derive excavation size and support recommendations for the 2024 PEA. The data that was available for the purpose geotechnical analysis are outlined below:

- Mineralization wireframes;
- MSO shapes;
- Geological unit wireframes, comprising of:
  - Main geological units as volumes,
  - Fault wireframes;
- 113 geotechnically logged boreholes, comprising of:
  - 21,500 m length,
  - Values for RQD, Rock Mass Rating (Bieniawski 1989) (“RMR^{89}”) and Q-system (“Q”),
  - 5,289 oriented structures;
- 261 geologically logged boreholes, comprising of:
  - 73,500 m length,
  - RQD values.

16.3.1 Interpretation of Data

Geotechnical Domains

Statistical analysis was run to understand the ground conditions with the aim of creating geotechnical domains (areas of similar engineering properties) using the geotechnically logged borehole data. The establishment of geotechnical domains informs the design of appropriate excavation sizes and ground support for each domain to ensure safe and efficient excavation.

Though considerable geotechnically logged borehole data was available with RMR^{89} and Q values, the area covered by these boreholes is highly concentrated in the South and West of the project area. As such, analysis assessed the range and variability of the geotechnical data according to proxies with a much wider applicability, specifically, the geological units and mining domains (footwall, hangingwall and orebody). No clear distinction was found in either case, suggesting that neither geological unit nor mining domain served as a reliable proxy for geotechnical ground conditions.

RQD Model

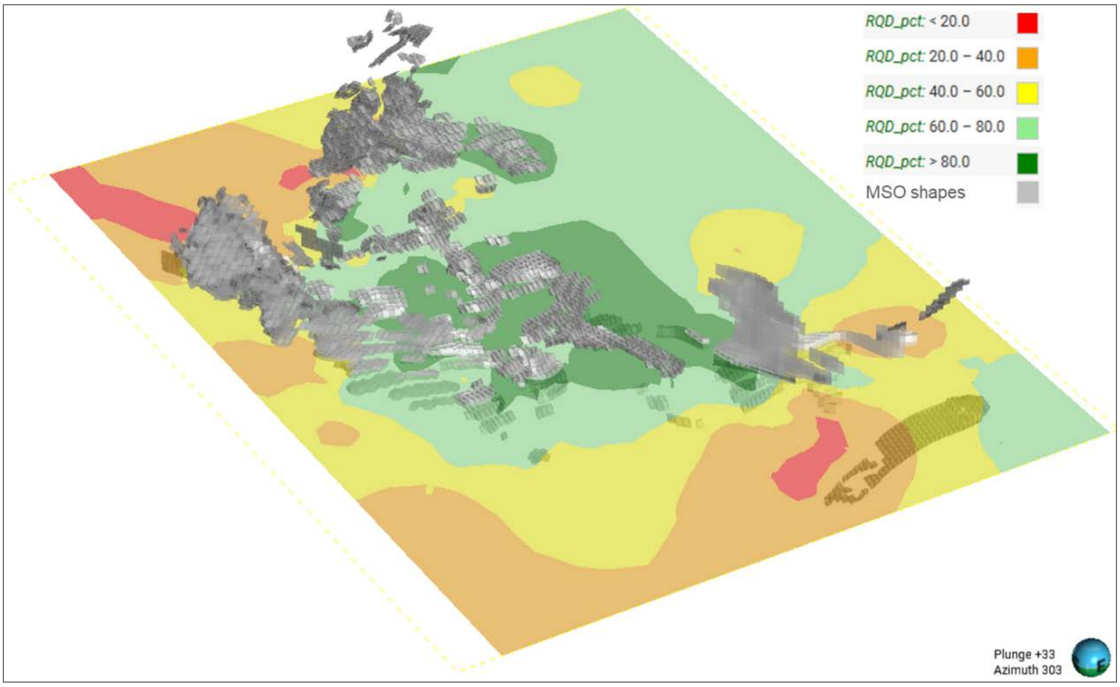
Though RQD may be considered a less reliable indicator of ground conditions than RMR^{89} or Q rating, core photo analysis was found to validate that RQD was generally a good indicator of ground conditions. RQD values were logged in both the geotechnical and geology boreholes and thereby have the greatest spatial coverage of the mining area. An interpolant model using RQD data was therefore generated to assess the variability and spatial distribution of RQD values across the wider project area. Additional core photos analysis was performed to verify the validity of the resultant model.

The RQD interpolant model is shown in 2D as a slice through the approximate middle of the DSO shapes in Figure 16-3. As this figure shows, the RQD model indicated the existence of distinct zones across the mining project area – in particular a zone of higher RQD in the centre of the mining area. Overlaying the existing fault model onto the RQD interpolant model suggests that these zones are linked to the presence and intensity of faulting – areas of lower RQD values a generally those affected by one of more major faults.

The RQD interpolant model was used to divide the mining area into three distinct RQD domains: West, Central and East, as shown in Figure 16-4, based on the variability of RQD values shown by the model.

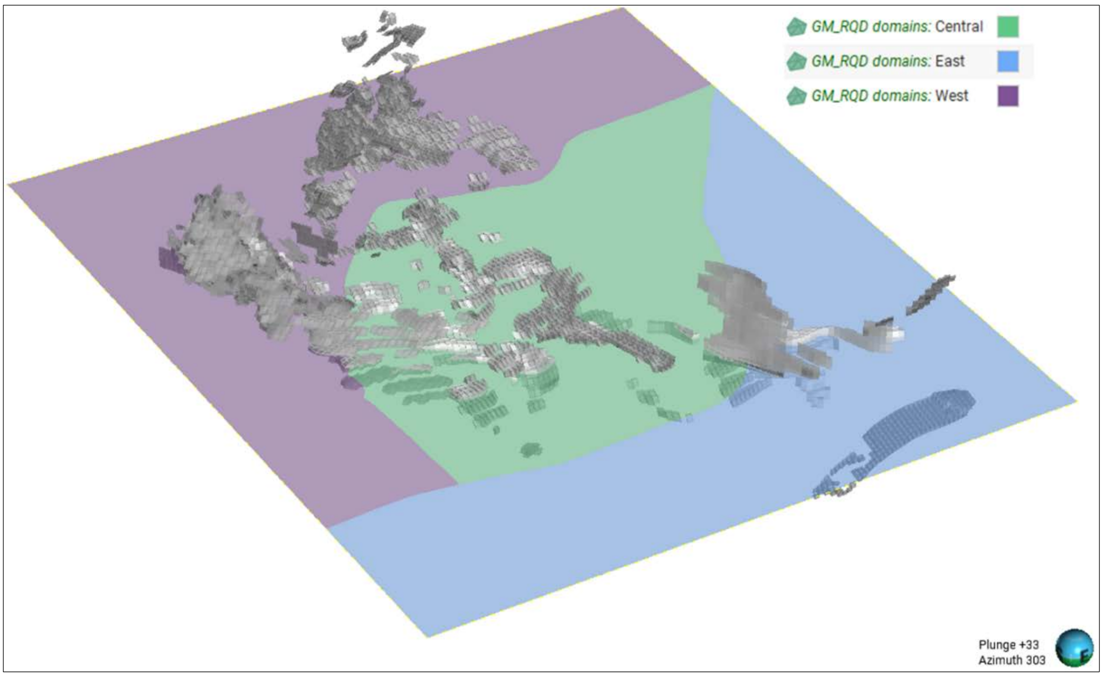
Domain Verification

To verify the accuracy of the RQD domains, statistical analysis was performed this time using the RQD domains (hereafter referred to as geotechnical domains) as proxies. This analysis showed clear distinctions in the values of in RQD, RMR^{89}, fracture frequency, Uniaxial Compressive Strength (“UCS”), and Q between the geotechnical domains. Distinctions in distribution of structure orientation were also observed, although the confidence in this data is low owing to the large splay of the orientations and uncertainty in the data collection method (SRK has had no visibility in the data collection and oriented core data can often be erroneous if not collected following correct procedures). Figure 16-5 shows histograms of the distribution of RMR^{89} data for each domain as an example.



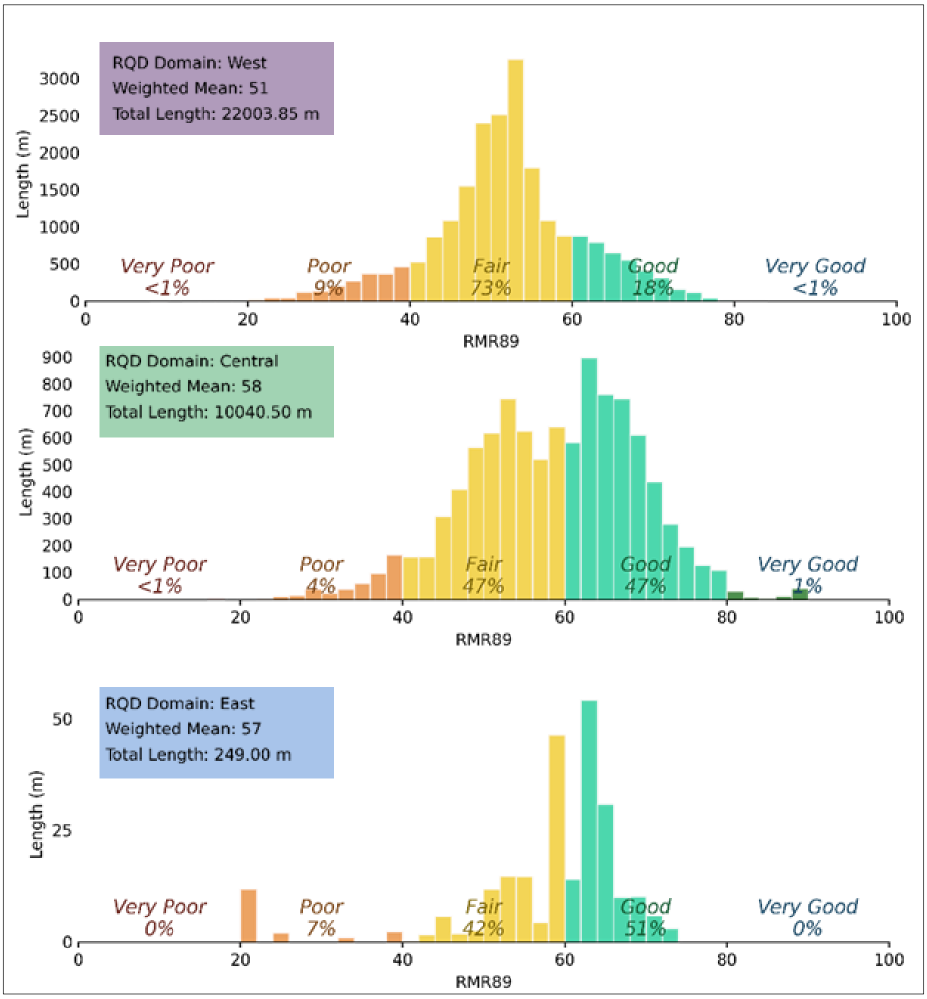
Source: SRK, 2024

Figure 16-3: Oblique View of a Slice through the RQD Interpolant Model and MSO Shapes



Source: SRK, 2024

Figure 16-4: Oblique View of a Slice through the RQD Domain Model and MSO Shapes



Source: SRK, 2024

Figure 16-5: Histograms of RMR^{89} and Structure Stereonets per RQD Domain

Derivation of Domain Parameters

For the purpose of this PEA, the available geotechnical data was assessed to determine input parameters for stope design in each domain. This involved the definition of Q values, which can be used in stope design using the Modified Stability Graph (“MSG”) method (Potvin, Y. et al, 1988).

Whilst Q value were available from the existing data, the length of intervals with these values was limited and for a signification portion of holes the values were derived through conversions of RMR^{89} values, not directly from the core parameters. Furthermore, the weaker zones were not assigned Q values, which resulted in a likely skewing of the data towards more positive values. As such, a preliminary core photography review was undertaken in conjunction with assessment of the available logged data to define appropriate Q values for each geotechnical domain. Limited data and no core photos were available for the East domain, as such some values were assumed to be similar to those observed in the West domain, which showed similarities in other parameters. The Q value inputs derived for each domain are given in Table 16-1 and example core box photographs from the West and Central domains are shown in Figure 16-6 and Figure 16-7, respectively.

Table 16-1: Derived Q Value Inputs per geotechnical Domain

Domain	RQD	Jn	Jr	Ja	Q'	Class
West	54	9	2	6	2	Poor
Central	75	4	2.5	4.5	10.4	Fair-Good
East	47	9	2	6	1.7	Poor

Source: Tinka, 2024

Figure 16-6: Example Core Box Photograph from the West Domain

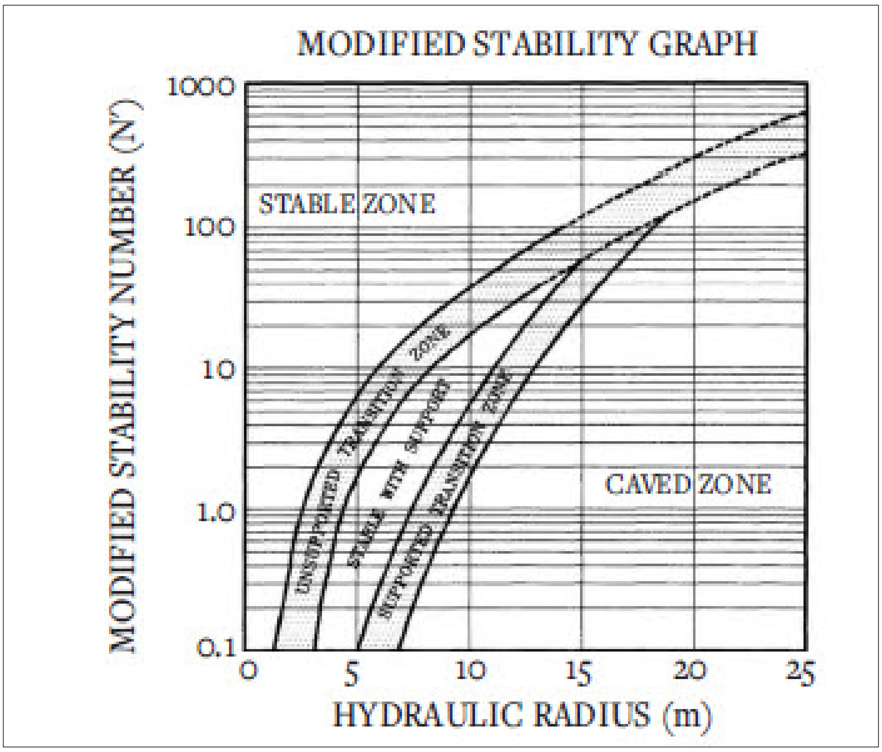
Source: Tinka, 2024

Figure 16-7: Example Core Box Photograph from the East Domain

16.3.2 Stope Design

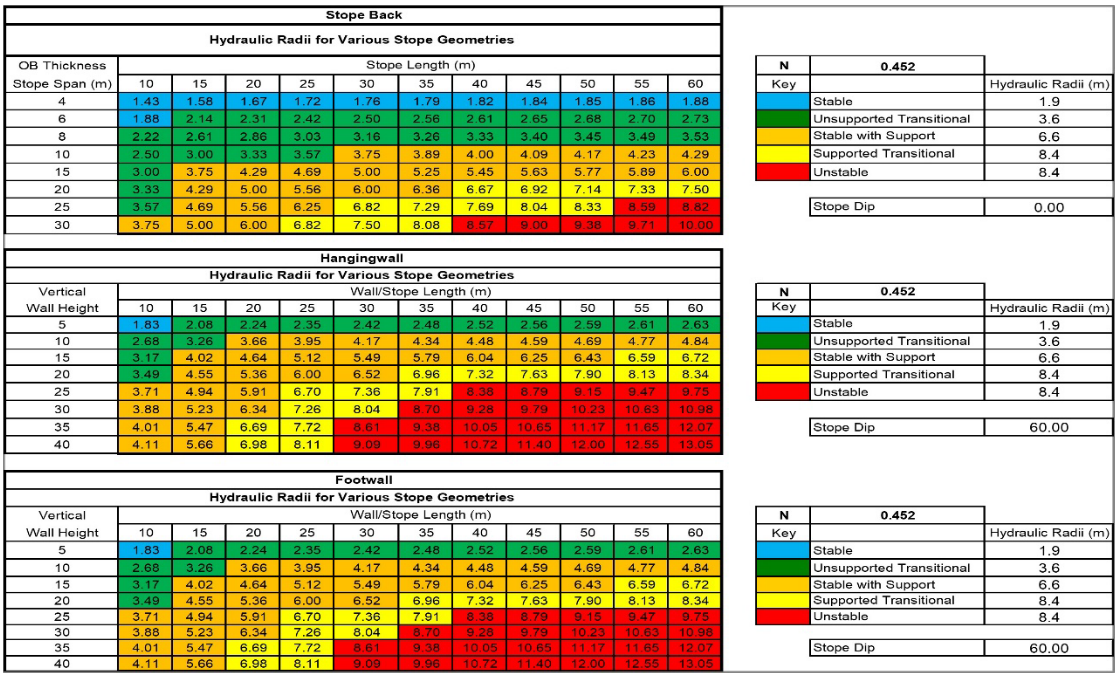
The MSG method, which is one of the most widely used approaches for predicting stope stability in underground metalliferous mines, was used to determine appropriate stope dimension recommendations. The MSG method predicts stope stability by plotting the Modified Stability Number (N'), which is derived from Q value inputs for the ground material and the orientation of critical discontinuities, against the Hydraulic Radius of the anticipated excavation, which is the ratio of the excavation surface to the perimeter of the exposed surface, on a graph derived from empirical data on stope stability. There are five zones on the graph that indicate the likely stability of the excavation, which are (1) stable, (2) unsupported transition, (3) stable with support, (4) supported transition, (5) cave (unstable). An example of the MSG is shown in Figure 16-8.

The N' is derived from three parameters: A, B and C. A accounts for rock stress relative to strength, B accounts for the angle of discontinuities and C accounts for the orientation of the stope. A conservative value for B was applied as there was low confidence in the structural orientation data. The inputs shown in Table 16-1 were used to derive the maximum possible stope dimensions in each of these zones for the stope back (roof), hangingwall and footwall for each geotechnical domain, as shown in Figure 16-9, Figure 16-10, and Figure 16-11.



Source: Nickson, 1992

Figure 16-8: Modified Stability Graph



Stope Back

Hydraulic Radii for Various Stope Geometries

OB Thickness	Stope Length (m)										
Stope Span (m)	10	15	20	25	30	35	40	45	50	55	60
4	1.43	1.58	1.67	1.72	1.76	1.79	1.82	1.84	1.85	1.86	1.88
6	1.88	2.14	2.31	2.42	2.50	2.56	2.61	2.65	2.68	2.70	2.73
8	2.22	2.61	2.86	3.03	3.16	3.26	3.33	3.40	3.45	3.49	3.53
10	2.50	3.00	3.33	3.57	3.75	3.89	4.00	4.09	4.17	4.23	4.29
15	3.00	3.75	4.29	4.69	5.00	5.25	5.45	5.63	5.77	5.89	6.00
20	3.33	4.29	5.00	5.56	6.00	6.36	6.67	6.92	7.14	7.33	7.50
25	3.57	4.69	5.56	6.25	6.82	7.29	7.69	8.04	8.33	8.59	8.82
30	3.75	5.00	6.00	6.82	7.50	8.08	8.57	9.00	9.38	9.71	10.00

N	0.452	
Key		Hydraulic Radii (m)
🟦	Stable	1.9
🟩	Unsupported Transitional	3.6
🟧	Stable with Support	6.6
🟨	Supported Transitional	8.4
🟥	Unstable	8.4
	Stope Dip	0.00

Hangingwall

Hydraulic Radii for Various Stope Geometries

Vertical	Wall/Stope Length (m)										
Wall Height	10	15	20	25	30	35	40	45	50	55	60
5	1.83	2.08	2.24	2.35	2.42	2.48	2.52	2.56	2.59	2.61	2.63
10	2.68	3.26	3.66	3.95	4.17	4.34	4.48	4.59	4.69	4.77	4.84
15	3.17	4.02	4.64	5.12	5.49	5.79	6.04	6.25	6.43	6.59	6.72
20	3.49	4.55	5.36	6.00	6.52	6.96	7.32	7.63	7.90	8.13	8.34
25	3.71	4.94	5.91	6.70	7.36	7.91	8.38	8.79	9.15	9.47	9.75
30	3.88	5.23	6.34	7.26	8.04	8.70	9.28	9.79	10.23	10.63	10.98
35	4.01	5.47	6.69	7.72	8.61	9.38	10.05	10.65	11.17	11.65	12.07
40	4.11	5.66	6.98	8.11	9.09	9.96	10.72	11.40	12.00	12.55	13.05

N	0.452	
Key		Hydraulic Radii (m)
🟦	Stable	1.9
🟩	Unsupported Transitional	3.6
🟧	Stable with Support	6.6
🟨	Supported Transitional	8.4
🟥	Unstable	8.4
	Stope Dip	60.00

Footwall

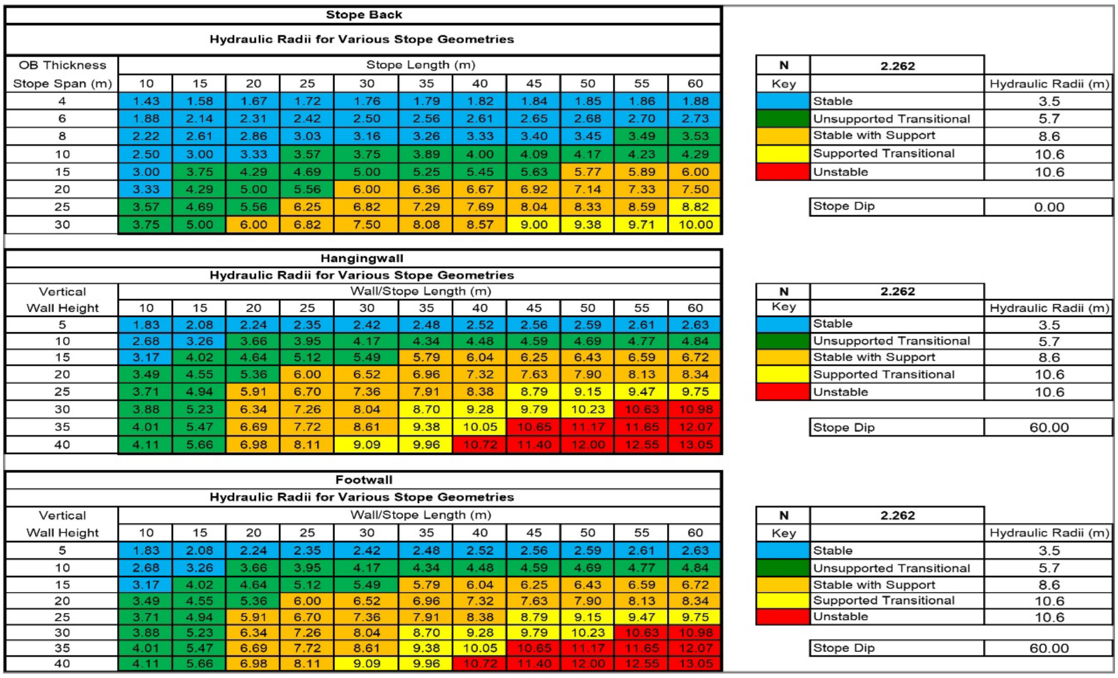
Hydraulic Radii for Various Stope Geometries

Vertical	Wall/Stope Length (m)										
Wall Height	10	15	20	25	30	35	40	45	50	55	60
5	1.83	2.08	2.24	2.35	2.42	2.48	2.52	2.56	2.59	2.61	2.63
10	2.68	3.26	3.66	3.95	4.17	4.34	4.48	4.59	4.69	4.77	4.84
15	3.17	4.02	4.64	5.12	5.49	5.79	6.04	6.25	6.43	6.59	6.72
20	3.49	4.55	5.36	6.00	6.52	6.96	7.32	7.63	7.90	8.13	8.34
25	3.71	4.94	5.91	6.70	7.36	7.91	8.38	8.79	9.15	9.47	9.75
30	3.88	5.23	6.34	7.26	8.04	8.70	9.28	9.79	10.23	10.63	10.98
35	4.01	5.47	6.69	7.72	8.61	9.38	10.05	10.65	11.17	11.65	12.07
40	4.11	5.66	6.98	8.11	9.09	9.96	10.72	11.40	12.00	12.55	13.05

N	0.452	
Key		Hydraulic Radii (m)
🟦	Stable	1.9
🟩	Unsupported Transitional	3.6
🟧	Stable with Support	6.6
🟨	Supported Transitional	8.4
🟥	Unstable	8.4
	Stope Dip	60.00

Source: SRK, 2024

Figure 16-9: Stope Dimension and Predicted Stability per Surface for the West Domain



Stope Back

Hydraulic Radii for Various Stope Geometries

OB Thickness	Stope Length (m)										
Stope Span (m)	10	15	20	25	30	35	40	45	50	55	60
4	1.43	1.58	1.67	1.72	1.76	1.79	1.82	1.84	1.85	1.86	1.88
6	1.88	2.14	2.31	2.42	2.50	2.56	2.61	2.65	2.68	2.70	2.73
8	2.22	2.61	2.86	3.03	3.16	3.26	3.33	3.40	3.45	3.49	3.53
10	2.50	3.00	3.33	3.57	3.75	3.89	4.00	4.09	4.17	4.23	4.29
15	3.00	3.75	4.29	4.69	5.00	5.25	5.45	5.63	5.77	5.89	6.00
20	3.33	4.29	5.00	5.56	6.00	6.36	6.67	6.92	7.14	7.33	7.50
25	3.57	4.69	5.56	6.25	6.82	7.29	7.69	8.04	8.33	8.59	8.82
30	3.75	5.00	6.00	6.82	7.50	8.08	8.57	9.00	9.38	9.71	10.00

N	2.262	
Key		Hydraulic Radii (m)
🟦	Stable	3.5
🟩	Unsupported Transitional	5.7
🟧	Stable with Support	8.6
🟨	Supported Transitional	10.6
🟥	Unstable	10.6
	Stope Dip	0.00

Hangingwall

Hydraulic Radii for Various Stope Geometries

Vertical	Wall/Stope Length (m)										
Wall Height	10	15	20	25	30	35	40	45	50	55	60
5	1.83	2.08	2.24	2.35	2.42	2.48	2.52	2.56	2.59	2.61	2.63
10	2.68	3.26	3.66	3.95	4.17	4.34	4.48	4.59	4.69	4.77	4.84
15	3.17	4.02	4.64	5.12	5.49	5.79	6.04	6.25	6.43	6.59	6.72
20	3.49	4.55	5.36	6.00	6.52	6.96	7.32	7.63	7.90	8.13	8.34
25	3.71	4.94	5.91	6.70	7.36	7.91	8.38	8.79	9.15	9.47	9.75
30	3.88	5.23	6.34	7.26	8.04	8.70	9.28	9.79	10.23	10.63	10.98
35	4.01	5.47	6.69	7.72	8.61	9.38	10.05	10.65	11.17	11.65	12.07
40	4.11	5.66	6.98	8.11	9.09	9.96	10.72	11.40	12.00	12.55	13.05

N	2.262	
Key		Hydraulic Radii (m)
🟦	Stable	3.5
🟩	Unsupported Transitional	5.7
🟧	Stable with Support	8.6
🟨	Supported Transitional	10.6
🟥	Unstable	10.6
	Stope Dip	60.00

Footwall

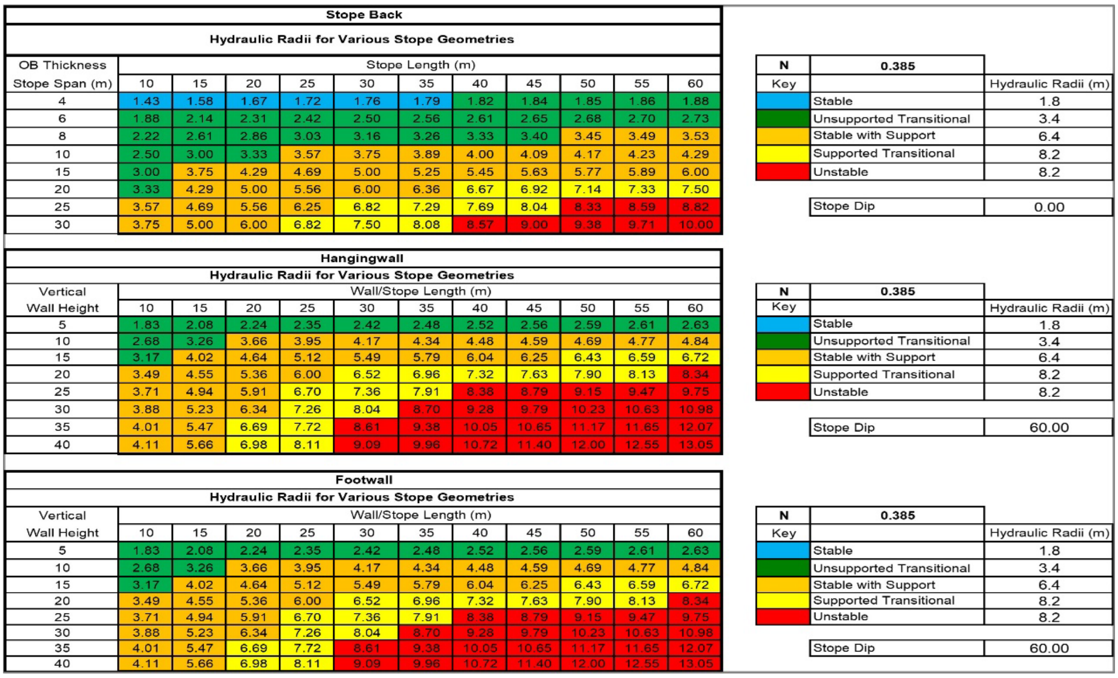
Hydraulic Radii for Various Stope Geometries

Vertical	Wall/Stope Length (m)										
Wall Height	10	15	20	25	30	35	40	45	50	55	60
5	1.83	2.08	2.24	2.35	2.42	2.48	2.52	2.56	2.59	2.61	2.63
10	2.68	3.26	3.66	3.95	4.17	4.34	4.48	4.59	4.69	4.77	4.84
15	3.17	4.02	4.64	5.12	5.49	5.79	6.04	6.25	6.43	6.59	6.72
20	3.49	4.55	5.36	6.00	6.52	6.96	7.32	7.63	7.90	8.13	8.34
25	3.71	4.94	5.91	6.70	7.36	7.91	8.38	8.79	9.15	9.47	9.75
30	3.88	5.23	6.34	7.26	8.04	8.70	9.28	9.79	10.23	10.63	10.98
35	4.01	5.47	6.69	7.72	8.61	9.38	10.05	10.65	11.17	11.65	12.07
40	4.11	5.66	6.98	8.11	9.09	9.96	10.72	11.40	12.00	12.55	13.05

N	2.262	
Key		Hydraulic Radii (m)
🟦	Stable	3.5
🟩	Unsupported Transitional	5.7
🟧	Stable with Support	8.6
🟨	Supported Transitional	10.6
🟥	Unstable	10.6
	Stope Dip	60.00

Source: SRK, 2024

Figure 16-10: Stope dimension and predicted stability per surface for the Central domain



Stope Back

Hydraulic Radii for Various Stope Geometries

OB Thickness	Stope Length (m)										
Stope Span (m)	10	15	20	25	30	35	40	45	50	55	60
4	1.43	1.58	1.67	1.72	1.76	1.79	1.82	1.84	1.85	1.86	1.88
6	1.88	2.14	2.31	2.42	2.50	2.56	2.61	2.65	2.68	2.70	2.73
8	2.22	2.61	2.86	3.03	3.16	3.26	3.33	3.40	3.45	3.49	3.53
10	2.50	3.00	3.33	3.57	3.75	3.89	4.00	4.09	4.17	4.23	4.29
15	3.00	3.75	4.29	4.69	5.00	5.25	5.45	5.63	5.77	5.89	6.00
20	3.33	4.29	5.00	5.56	6.00	6.36	6.67	6.92	7.14	7.33	7.50
25	3.57	4.69	5.56	6.25	6.82	7.29	7.69	8.04	8.33	8.59	8.82
30	3.75	5.00	6.00	6.82	7.50	8.08	8.57	9.00	9.38	9.71	10.00

N	0.385	
Key		Hydraulic Radii (m)
🟦	Stable	1.8
🟩	Unsupported Transitional	3.4
🟧	Stable with Support	6.4
🟨	Supported Transitional	8.2
🟥	Unstable	8.2
	Stope Dip	0.00

Hangingwall

Hydraulic Radii for Various Stope Geometries

Vertical	Wall/Stope Length (m)										
Wall Height	10	15	20	25	30	35	40	45	50	55	60
5	1.83	2.08	2.24	2.35	2.42	2.48	2.52	2.56	2.59	2.61	2.63
10	2.68	3.26	3.66	3.95	4.17	4.34	4.48	4.59	4.69	4.77	4.84
15	3.17	4.02	4.64	5.12	5.49	5.79	6.04	6.25	6.43	6.59	6.72
20	3.49	4.55	5.36	6.00	6.52	6.96	7.32	7.63	7.90	8.13	8.34
25	3.71	4.94	5.91	6.70	7.36	7.91	8.38	8.79	9.15	9.47	9.75
30	3.88	5.23	6.34	7.26	8.04	8.70	9.28	9.79	10.23	10.63	10.98
35	4.01	5.47	6.69	7.72	8.61	9.38	10.05	10.65	11.17	11.65	12.07
40	4.11	5.66	6.98	8.11	9.09	9.96	10.72	11.40	12.00	12.55	13.05

N	0.385	
Key		Hydraulic Radii (m)
🟦	Stable	1.8
🟩	Unsupported Transitional	3.4
🟧	Stable with Support	6.4
🟨	Supported Transitional	8.2
🟥	Unstable	8.2
	Stope Dip	60.00

Footwall

Hydraulic Radii for Various Stope Geometries

Vertical	Wall/Stope Length (m)										
Wall Height	10	15	20	25	30	35	40	45	50	55	60
5	1.83	2.08	2.24	2.35	2.42	2.48	2.52	2.56	2.59	2.61	2.63
10	2.68	3.26	3.66	3.95	4.17	4.34	4.48	4.59	4.69	4.77	4.84
15	3.17	4.02	4.64	5.12	5.49	5.79	6.04	6.25	6.43	6.59	6.72
20	3.49	4.55	5.36	6.00	6.52	6.96	7.32	7.63	7.90	8.13	8.34
25	3.71	4.94	5.91	6.70	7.36	7.91	8.38	8.79	9.15	9.47	9.75
30	3.88	5.23	6.34	7.26	8.04	8.70	9.28	9.79	10.23	10.63	10.98
35	4.01	5.47	6.69	7.72	8.61	9.38	10.05	10.65	11.17	11.65	12.07
40	4.11	5.66	6.98	8.11	9.09	9.96	10.72	11.40	12.00	12.55	13.05

N	0.385	
Key		Hydraulic Radii (m)
🟦	Stable	1.8
🟩	Unsupported Transitional	3.4
🟧	Stable with Support	6.4
🟨	Supported Transitional	8.2
🟥	Unstable	8.2
	Stope Dip	60.00

Source: SRK, 2024

Figure 16-11: Stope Dimension and Predicted Stability per Surface for the East Domain

16.3.3 Geotechnical Summary

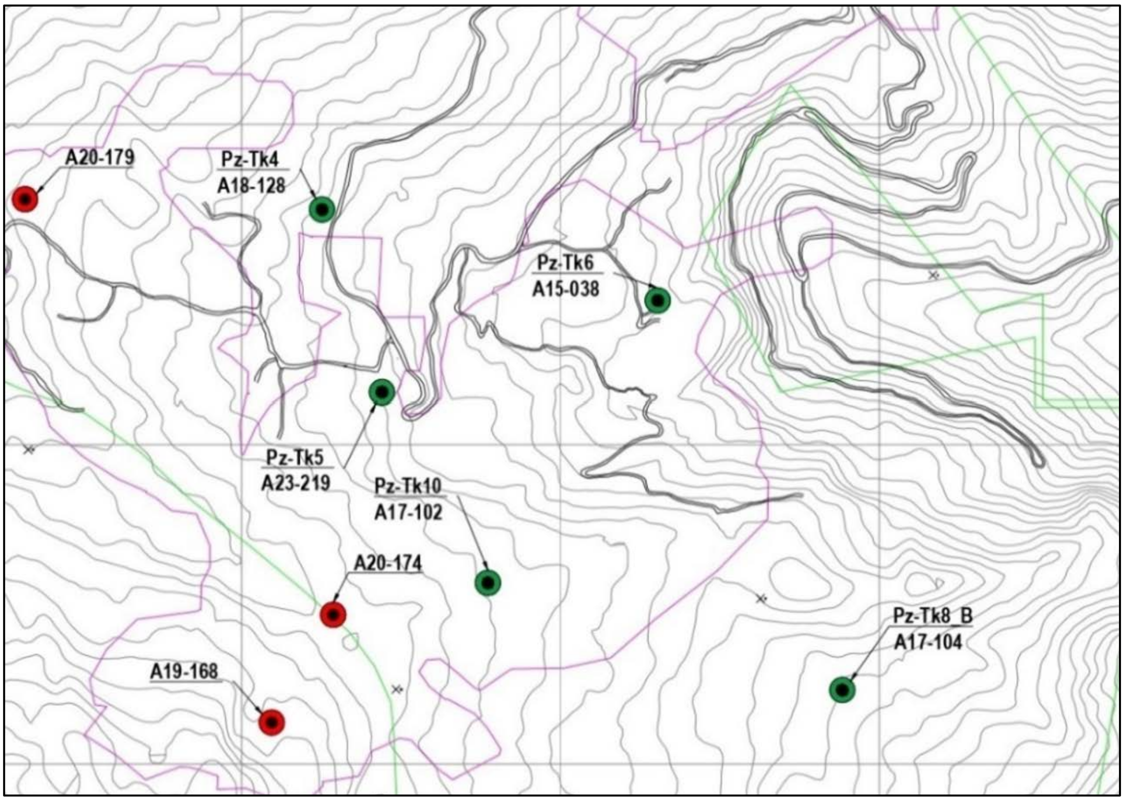
The following points summarize the findings of the geotechnical analysis and include recommendations for stope dimensions resulting from this analysis.

- RQD data has been used to create high-level geotechnical domains, which are likely linked to presence and intensity of faulting.
- These domains have been found to be broadly geotechnically distinct through verification using the available geotechnical data and borehole photos.
- The three geotechnical domains, referred to as ‘West’, ‘Central’ and ‘East’ consist generally of Poor, Fair-Good and Poor ground materials, respectively, though there is high variability of ground quality within each domain.
- Based on the stope dimension graphs derived for each geotechnical domain, stopes should not exceed 20 m strike length when supported and mined at a height of 25 m in the West and East domains, however, longer strike lengths are likely to be stable in the Central domain due to the better ground conditions in this domain.

16.4 Hydrogeological Considerations

A conceptual and numerical model of the baseline groundwater regimen and water quality in the area of the zinc mineral zones was developed during 2023. The modelling was based on investigations performed as part of the 2023 drilling program executed by Tinka, and on previous investigations completed in 2021.

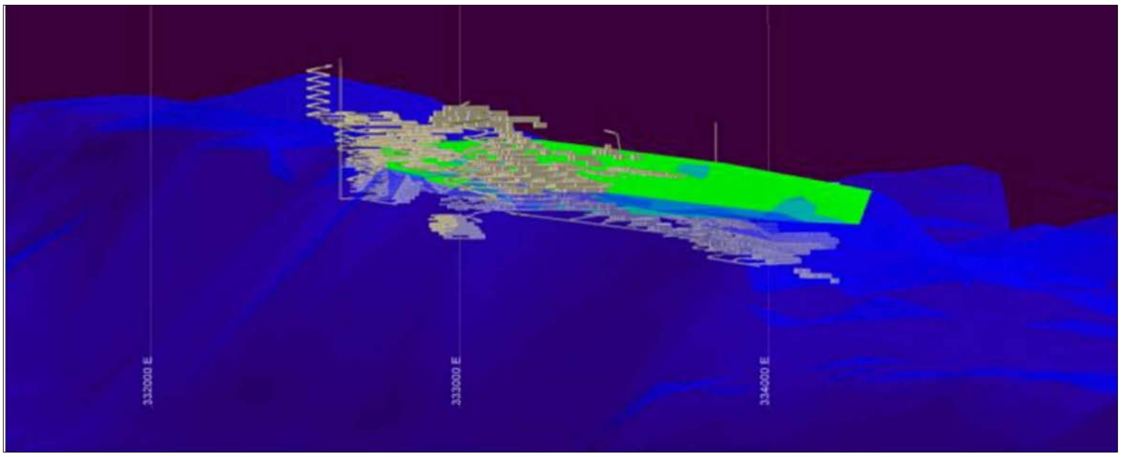
The information developed was based on information obtained from a network of Casagrande piezometers installed in 9 drillholes, over the area of the zinc mineral zones. Additionally, local permeability testing was done in the boreholes, to obtain hydraulic conductivities to characterize the hydrogeological units for numerical modelling. The investigation locations are indicated in Figure 16-12.



*Sour*ce: Envis, 2024

Figure 16-12: Plan View of Piezometer Locations for Hydrogeological Characterization – Green Piezometers were Installed during 2022-23

Figure 16-12 shows a conceptual-model section of the estimated baseline water table through the mining zones, looking to the northwest. The green shaded zone represents the range of maximum water level, given seasonal variations in surface recharge. Mine development is underlaid for preliminary comparison.



*Sourc*e: Envis, 202*4*

Figure 16-13: Conceptual-Model Section of the Estimated Baseline Water Table through the Mining Zones, looking to the Northwest

Some key conclusions and recommendations of the baseline modelling are as follows:

- Over the model domain area, the primary aquifer is located within the Pucará limestone Unit. The average thickness of the aquifer is approximately 100 m (about 50% of Pucará limestone thickness in the model domain area). The depth to the top of the aquifer from the surface ranges from approximately 120 m in the northwest to 300 m towards the south and southeast areas of the model domain. This aquifer can be characterized as unconfined to semi-confined.
- In general, the direction of underground flow is from northwest to southeast, with an overall hydraulic gradient of 0.1 to 0.13. The baseline phreatic surface is generally higher at the topographically higher areas, and descends toward the south (Huarautambo), southeast (Ayawilca) and eastern (Chinchachaca) zones.
- The phreatic surface lies below the base of the South Ayawilca Zinc Zone and rises to intersect the middle of the West Ayawilca Zinc Zone.
- The aquifer is structurally controlled by the more permeable Pucará unit. Based on the results of the study, it is not yet clear whether there is hydraulic connectivity between the northwest and southeast zones of the domain area.
- Although it is understood, in general, that the Pucará limestone could include karst features, this was not observed in the core from drillholes.
- The groundwater samples taken as part of the investigations indicate that it has a neutral to slightly alkaline pH. Metals detected at low to very low concentrations included: aluminium, barium, iron, manganese, silicium, strontium and zinc.
- Rainfall recharge to the aquifer was estimated at approximately 153 L/s. This recharge is mainly through outcropping Pucará limestone areas, within the Chinchachaca and Ayawilca catchments.

The information developed was based on information obtained from a network of Casagrande piezometers installed in 9 drillholes, over the area of the zinc mineral zones. These piezometers continue to obtain data, and will be used for modelling in future studies.

16.5 Net Smelter Return and Cut-off Approach

The NSR cut-off value (“CoV”) for the Ayawilca stope optimisation was selected at US$60/t for the Zinc and Silver Zones and US$80/t for the Tin Zone using the metal price, process recovery, concentrate costs and commercial terms summarized in Table 16-2Table 16-2.

The NSR values were estimated within each of the zones for each of the payable metals (zinc, lead, silver and tin using the NSR Factors applied to the individual grades within the block model. The Tin Zone was furthermore divided to high recovery (“HR”) and low recovery (“LR”) areas related to the coarseness of the tin mineralization and process testwork results. Additionally, an indium credit value was assigned to the NSR value of zinc concentrate exported to Asian smelters as well as a penalty for %Fe (US$7.5/dmt concentrate). Penalty and payability deductions were applied to the Tin concentrate for grades of 4.5% S and 9% Fe respectively.

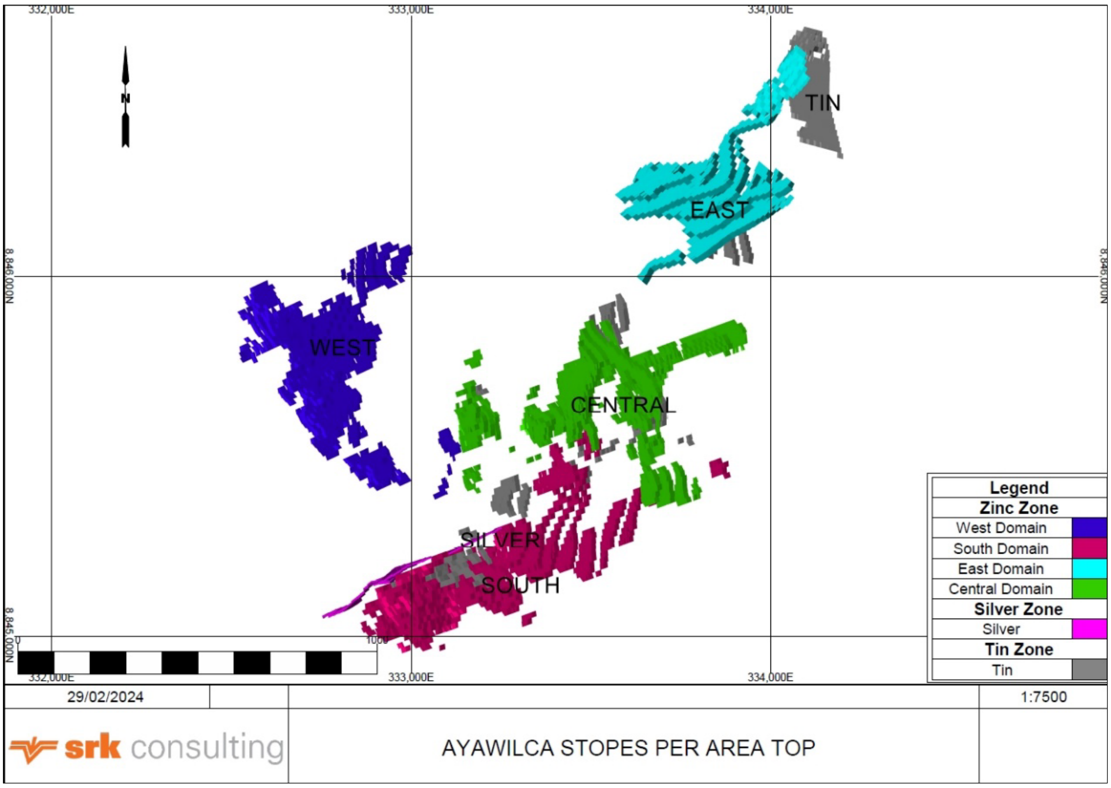
Table 16-2: NSR Parameters for Metal Price, Process Recovery, Concentrate Costs and Commercial Terms

NSR Calculations	Unit	Zinc Zones	Silver Zone	Tin Zone	
		Pb and Zn Conc	Pb and Zn Conc	(HR = 90%)	(LR = 50%)
Metal Prices					
Silver Price	US$/oz Ag	22.0	22.0	22.0	22.0
Lead Price	US$/lb Pb	1.00	1.00	1.00	1.00
Zinc Price	US$/lb Zn	1.30	1.30	1.30	1.30
Tin Price	US$/lb Sn	11.00	11.00	11.00	11.00
Concentrate Transport, Treatment and Refining Costs					
Transport					
Pb Concentrate	US$/wmt conc	105.0	105.0	105.0	105.0
Zn Concentrate within Peru	US$/wmt conc	40.0	40.0	40.0	40.0
Zn Concentrate to Asia	US$/wmt conc	110.0	110.0	110.0	110.0
Sn Concentrate	US$/wmt conc			105.0	105.0
Treatment Cost					
Pb Concentrate	US$/dmt conc	50.0	50.0		
Zn Concentrate	US$/dmt conc	220.0	220.0		
Sn Concentrate	US$/dmt conc			750.0	750.0
Refining Cost					
Ag in Pb Conc	US$/oz	0.8	0.8		
Credits and Penalties					
Zinc Concentrate					
Credit for In high content (Asia only)	US$/dmt conc	20.00	20.00		
Penalty for Fe high content	US$/dmt conc	7.50	7.50		
Tin Concentrate					
Total Sulphur penalty	US$/t conc			75	75
Fe Penalty Rate	% Sn payable			0.70%	0.70%
Royalties, Taxes and Fees	%	1.19%	1.19%	1.19%	1.19%
Metallurgical Recovery					
Lead Concentrate					
Ag	%	45%	85%		
Pb	%	70%	85%		
Zinc Concentrate					
Ag	%	40%	0%		
Zn	%	92%	87%		
Tin Concentrate					
Sn	%			90.0%	50.0%
Concentrate Grades and Moisture					
Lead Concentrate	g/t Ag		6,000		
	% Pb	50.0%			
	% Zn	4.0%			
	% moisture	10.0%	10.0%		
Zinc Concentrate	% Zn	50.0%	50.0%		
	% moisture	10.0%	10.0%		
Tin Concentrate	% Sn			50.0%	50.0%
	% moisture			9.0%	9.0%
Commercial Terms					
Lead Concentrate: Lead Payability	%	94.0%	89.9%		
Lead Concentrate: Silver Payability	%	95.0%	95.0%		
Zinc Concentrate: Zinc Payability	%	84.0%	84.0%		
Tin Concentrate: Tin Payability	%			92.3%	92.3%
Revenue per Metal Unit (NSR Factor)					
Silver	US$/g Ag	0.29	0.55		
Lead	US$/% Pb	12.17	12.08		
Zinc	US$/% Zn	17.14	16.21		
Tin	US$/% Sn			184.52	102.51

16.6 Stope Optimisation and ROM Inventory

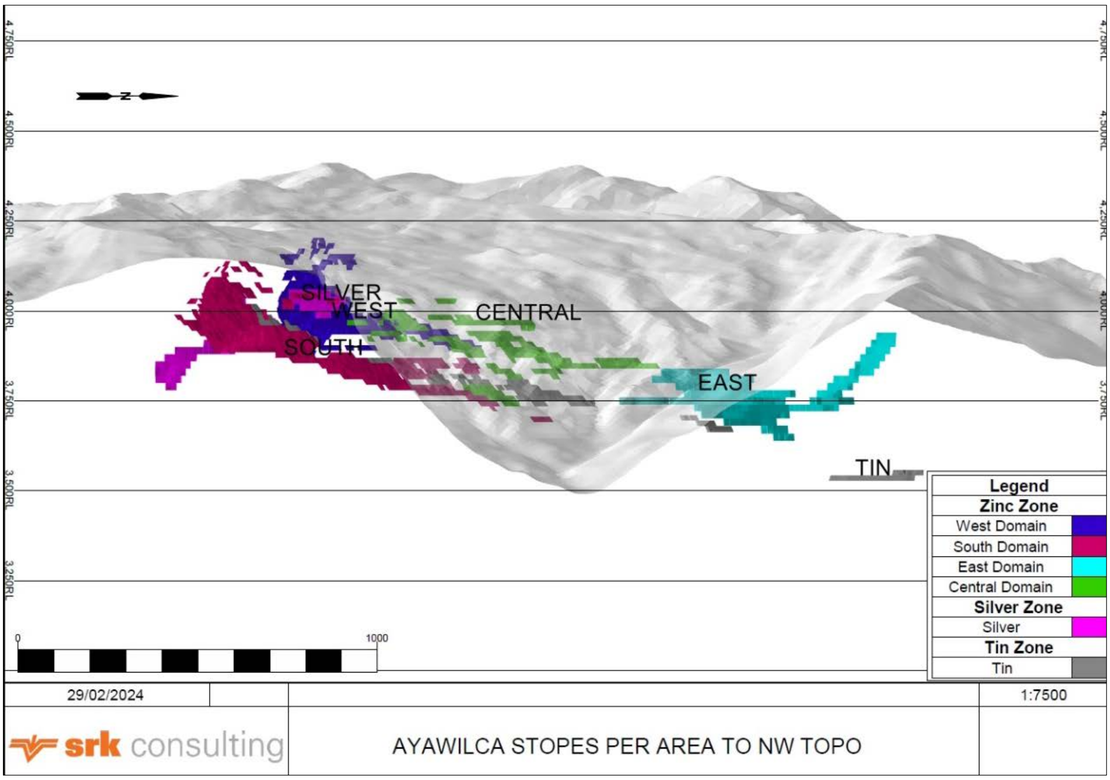
SRK used the Deswik Stope Optimizer module to generate mineable shapes and quantify the diluted tonnes and grades available for ROM inventory and schedule. For all deposit Zones, stope shapes of 15 m width and variable length between 4 to 20 m were used. For the Zinc Zone (South, West and Central area) and Tin Zone a minimum stope height of 15 m was considered and for the Zinc Zone (East area) and Silver Zone a minimum stope height of 20 m height was used. A minimum mining width (“MMW”) of 4.0 m was applied for all mining shapes.

Figure 16-14 and Figure 16-15 provide respective plan and long views of the mining stopes from the stope optimisation based on the stope shape constraints and NSR CoV applied to each Zone.



Source: SRK, 2024

Figure 16-14: Plan View of the Ayawilca Stope Optimisation Shapes



Source: SRK, 2024

Figure 16-15: Long View of the Ayawilca Stope Optimisation Shapes and Topography

16.6.1 Modifying Factors

Mine external modifying factors (dilution and losses) were assessed at a high level and applied to the stope optimizer shapes (tonnes and grade) by designated mining method for each of the deposits as summarized in Table 16-3Table 16-3 which also consider the extraction of sill pillars. All development is assumed to have 0% dilution and ore development is assumed to have 0% unplanned mining losses.

Table 16-3: Ayawilca Modifying Factors

Mining Method	Mining Dilution %	Mining Losses %
LHOS - Transverse	5	10
LHOS - Longitudinal	8	10

16.6.2 ROM Inventory

The ROM inventory presented in Table 16-6 is inclusive of dilution and losses and totals a LOM production of 45.6 Mt, based on the current Mineral Resources. The split of ROM inventory tonnage by mining method (inclusive of development) for all deposits (Table 16-5) resulted as follows:

- LHOS Transverse = 98.1%.
- LHOS Longitudinal = 1.9%.

Development contributes 17.6% to the ROM Inventory and the tonnage split by deposit (Development + Production) is as follows:

- South = 32.0%.
- West = 26.8%.
- Central = 12.5%.
- East = 17.3%.
- Silver = 1.9%.
- Tin HR = 1.8%.
- Tin LR = 7.7%

The 2024 PEA mine plan is based on the ROM Inventory as shown in Table 16-4 which comprises approximately 47.5% Indicated classified tonnes and 52.5% Inferred classified tonnes.

Table 16-4: Breakdown of ROM Tonnage by Zone and Resource Classification

Zone	Total ROM (Mt)	Inferred ROM Tonnes (Mt)	Indicated ROM Tonnes (Mt)
Zinc Zone	40.37	18.95	21.43
Silver Zone	0.86	0.86	-
Tin Zone	4.32	4.12	0.20
Total ROM	**45.55**	**23.93**	**21.62**

Table 16-5: Ayawilca ROM Inventory

Mining Inventory	Units	Total	Tin_HR	Tin_LR	South	Central	Silver	East	West
ROM Development	t	**8,039,243**	201,642	612,476	2,709,737	1,199,863	158,333	998,598	2,158,593
ROM Production	t	**37,511,806**	618,323	2,888,007	11,846,981	4,516,527	698,611	6,872,632	10,070,724
Total ROM Tonnes	**t**	**45,551,049**	**819,965**	**3,500,483**	**14,556,719**	**5,716,390**	**856,944**	**7,871,230**	**12,229,318**
ROM Grade	ppm In	**64.19**	5.43	6.52	102.21	48.60	3.76	36.98	68.42
	g/t Ag	**16.92**	6.89	15.14	19.43	10.90	127.65	14.09	12.00
	% Pb	**0.17**	0.03	0.04	0.16	0.31	0.56	0.17	0.14
	% Zn	**4.56**	0.28	0.12	5.93	3.93	1.71	4.18	5.23
	% Cu	**0.06**	0.04	0.31	0.04	0.05	0.01	0.04	0.03
	% Sn	**0.14**	0.67	0.98	0.06	0.07	0.01	0.04	0.05
ROM Metal Content	t In	**2,924**	4	23	1,488	278	3	291	837
	t Ag	**771**	6	53	283	62	109	111	147
	t Pb	**78,435**	221	1,561	23,662	17,505	4,831	13,434	17,223
	t Zn	**2,077,293**	2,286	4,265	862,812	224,576	14,628	328,939	639,787
	t Cu	**25,718**	350	10,684	5,604	2,722	81	2,839	3,438
	t Sn	**62,524**	5,519	34,344	9,257	3,960	52	3,399	5,993

Table 16-6: Ayawilca ROM Tonnes by Mining Method

Mining Method	Units	Total	Tin_HR	Tin_LR	South	Central	Silver	East	West
LHOS Transverse	t	**44,694,105**	819,965	3,500,483	14,556,719	5,716,390	-	7,871,230	12,229,318
LHOS Longitudinal	t	**856,944**	-	-	-	-	856,944	-	-
Total ROM Tonnes	**t**	**45,551,049**	**819,965**	**3,500,483**	**14,556,719**	**5,716,390**	**856,944**	**7,871,230**	**12,229,318**

16.7 Mine Design

16.7.1 Introduction

The Ayawilca mine design considers individual boxcuts and declines to access each of the zones that contributes to the ROM Inventory. LHOS open stopes are based on 15 m and 20 m level spacing and mined transverse for widths greater than 15 m. The Silver Zone is mined longitudinal to strike due to its narrow width. Transverse stopes are mined through transverse drives spaced 15 m and connected to a footwall drive, while longitudinal stopes are mined through longitudinal drives connected to the decline access through cross-cut drives.

The PEA mine development layout is designed to provide logical, timely and efficient access to the stoping blocks at minimum cost, with the following factors considered:

Profile: The profiles determined for the various types of development are based on the operating equipment selected, plus an allowance for any statutory clearance, or alternatively, internationally acceptable clearances.

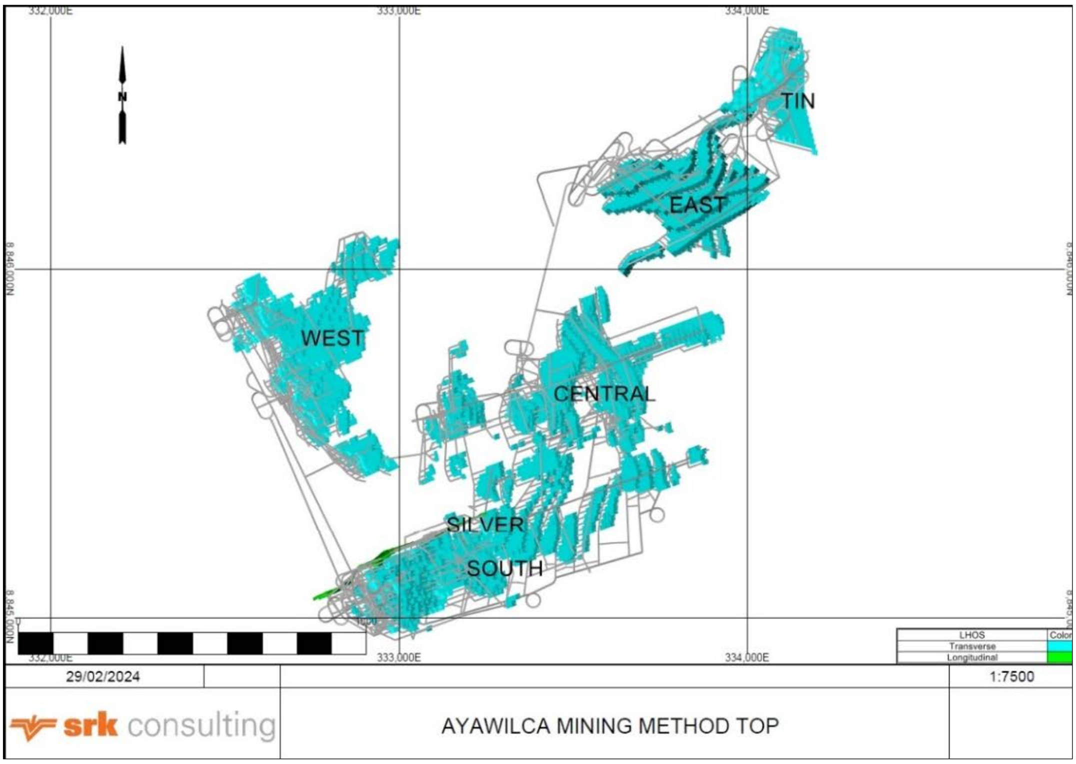
Gradient: For the purposes of the PEA, the gradient for level access, drives, and footwall drives for this conceptual level of design has been considered as 0. In practise a gradient of 1:50 is recommended for access drives to ensure effective drainage, with gradients designed to direct water to dewatering sumps. The decline gradient (1:7) is based on a trade-off between the maximum steepness to reduce the distance required to be developed between levels, and the provision of suitable operating conditions for the mobile equipment.

For stoping areas, the stockpile location and size must consider both the loader (bogger) and truck productivities. The maximum tramming distance for a loader, ranges from 150 to 300 m while still maintaining acceptable productivities.

Maintaining high truck productivity in high tonne-kilometre (tkm) operations is of primary importance. Truck productivities assume loading directly from the stockpile to minimize truck idle time. The production stockpiles have been located as close as possible to the centroid of the stoping panels wherever possible.

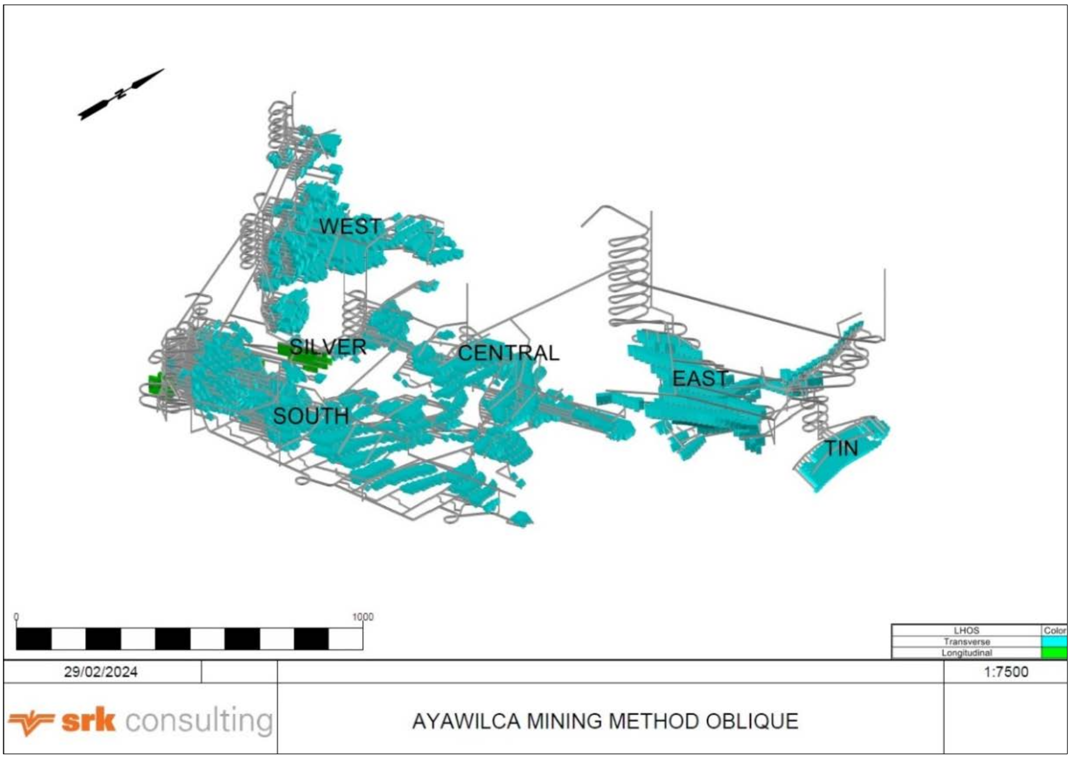
Escapeway raises are designed to have a 1.5 m cross sectional area and return air raises, a 3 m cross sectional area. Ventilation systems will be connected to the level access on each level.

Figure 16-16 to Figure 16-18 provide respective plan, oblique and long views of the Zinc (South, West, Central and East areas), Silver and Tin Zones for the Ayawilca mine design showing the main decline and development accesses and ventilation raises.



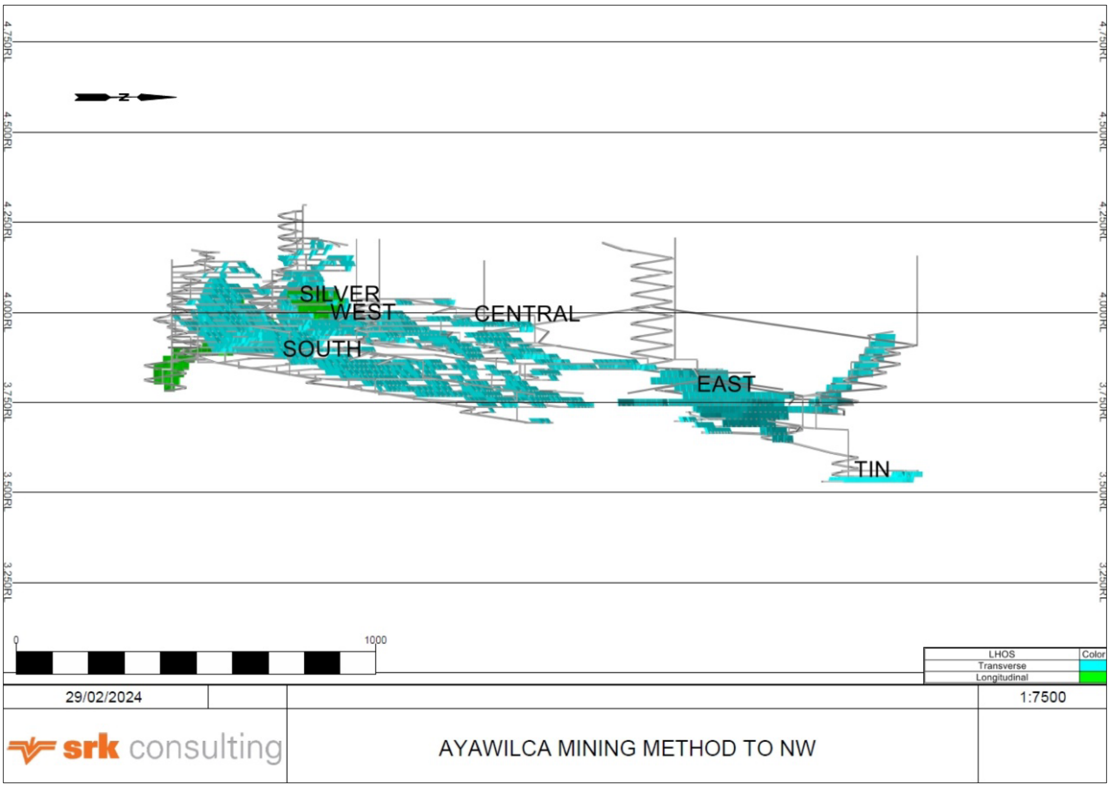
Source: SRK, 2024

Figure 16-16: Plan View of Ayawilca Areas by Mining Method



Source: SRK, 2024

Figure 16-17: Oblique View Ayawilca Areas by Mining Method



Source: SRK, 2024

Figure 16-18: Longitudinal View of Ayawilca Areas by Mining Method

16.7.2 Mine Development

The development types and dimensions used for each mine design are summarized in Table 16-7 including ventilation raises and escapeways, Table 16-8 providing a summary of the lateral and vertical development metres for each mining area.

Table 16-7: Ayawilca Development (and Airway) Profiles

Development	Unit	Type	Width	Height	Diameter
Decline	m	Arch	5.5	5.5	
Level Access	m	Arch	5.0	5.0	
Transverse Ore Drive	m	Arch	4.5	4.5	
Longitudinal Ore Drive	m	Arch	4.5	4.5	
Footwall Drive	m	Arch	5.0	5.0	
Return Air Raise	m	Circular			4.0
Return Air Drive	m	Arch	5.0	5.0	
Escapeway Raise	m	Circular			1.5
Escapeway Drive	m	Arch	4.5	4.5	

Table 16-8: Summary of Lateral and Vertical Development Metres by Mining Area

Mine Development	Units	Total	Tin_HR	Tin_LR	South	Central	Silver	East	West
Lateral Development									
Decline	m	**18,830**	-	978	3,663	2,832	836	6,444	4,078
Level X-Cut	m	**8,997**	-	1,305	1,839	1,798	1,000	1,214	1,840
FW Development	m	**29,178**	170	2,624	6,129	6,485	-	4,165	9,605
Vent Development	m	**2,688**	-	282	1,365	264	130	10	637
ROM Development	m	**115,862**	2,906	8,827	39,053	17,292	2,282	14,392	31,110
Other Dev	m	**16,200**	117	2,574	4,127	3,145	491	3,601	2,145
Total Lateral Development	**m**	**191,755**	**3,194**	**16,590**	**56,175**	**31,817**	**4,739**	**29,826**	**49,413**
Vertical Development									
Level_Vent Raise	m	**3,317**	-	372	692	1,041	40	703	469
Level_Escapeway	m	**1,381**	-	57	453	86	120	419	246
Total Vertical Development	**m**	**4,698**	**-**	**429**	**1,145**	**1,127**	**160**	**1,121**	**716**

16.8 Mine Production

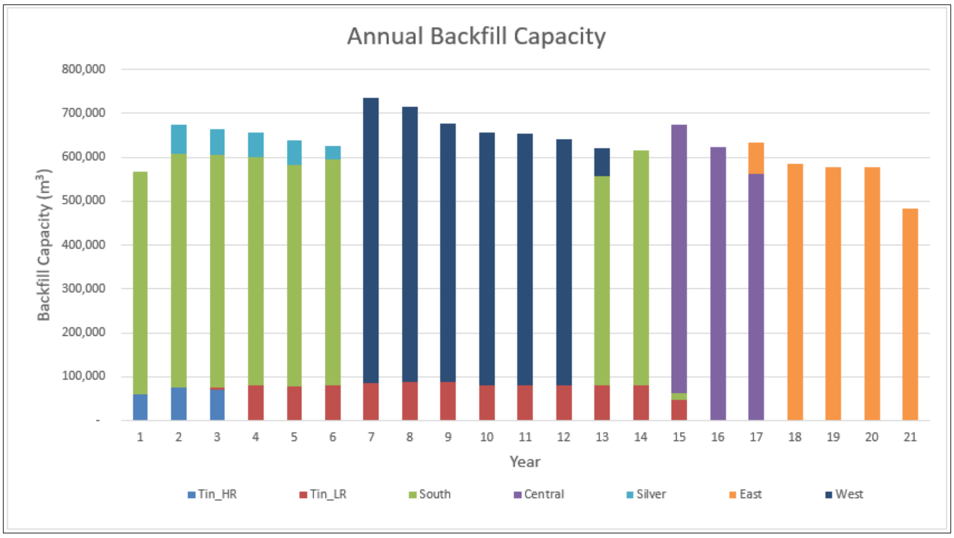
The production drill and blast design for Ayawilca has been based on standard industry practice. Twin boom jumbos will be used for development and longhole drill rigs will be used in the LHOS production areas.

Conventional diesel -powered 17 t capacity loaders and 50 t capacity haul trucks will be used to move all mine waste to the respective designated surface and underground storage and ROM to surface stockpiling areas for mineral processing.

16.9 Mine Backfill

16.9.1 Mine Backfill Requirements

The 2024 PEA makes the assumption that 80% of the stope voids are filled with paste backfill, and the remaining 20% is either filled with unconsolidated rockfill (mine waste) or left as open void. The annual backfill capacity is illustrated in Figure 16-19 with an annual maximum paste requirement of about 0.7 million m^3 (“Mm^3”) and the annual average just over 0.65 Mm^3. Hence, the nominal annual demand for paste is 80% of 0.65 Mm^3 or 0.525 Mm^3.



Source: SRK, 2024

Figure 16-19: Annual Backfill Capacity

Based on a nominal 5,500 operating hours in a year, and a demand of 525,000 m^3, MineFill proposes a nominal plant capacity of 95 m^3/h which yields a plant utilization of 62%. This capacity allows operational flexibility in the years with high demand.

The proposed mining method for Ayawilca is overhand LHOS hence the paste will be required to be stable in vertical exposures during mining of adjacent stopes. For a sublevel interval of 20 m and a nominal stope width of 50 m the required paste strengths are expected to be in the order of 500 kPa. For the purposes of the 2024 PEA, no underhand stopes are planned hence the paste is not expected to be exposed in horizontal undercuts.

16.9.2 Paste Backfill Material

The paste design is based on testwork completed by Golder Associates (Golder, 2021). Note that no paste amenability testwork has been conducted on the tin tailings which may comprise 20% of the tailings stream. As detailed below, early indications are that the mineralogy of this material may be an issue.

Minerology

The minerology of the tailings was obtained from previous reports and is summarized in Table 16-9 and Table 16-10 for zinc and tin, respectively. The zinc tailings contain a high proportion of siderite and pyrite-marcasite, resulting in a relatively high overall specific gravity of 3.62. The tin tailings will predominantly be pyrrhotite which is generally classed as highly unfavorable to the production of paste due to the long-term strength losses from sulphate reactions.

Table 16-9: Mineralogy of the Ayawilca Zinc Tailings (Source: Golder, 2021)

Mineral	Percent by Weight
Siderite – $Fe(CO_3)$	36%
Quartz – SiO_2	32%
Pyrite – FeS_2	8%
Magnetite – Fe_3O_4	6%
Marcasite – FeS_2	6%
Rhodochrosite – $Mn(CO_3)$	5%
Nacrite – $Al_2Si_2O_5(OH)_4$	4%
Kaolinite – $Al_2Si_2O_5(OH)_4$	3%
Total	**100%**

Table 16-10: Mineralogy of the Ayawilca Tin Tailings (Source: Tinka, 2024)

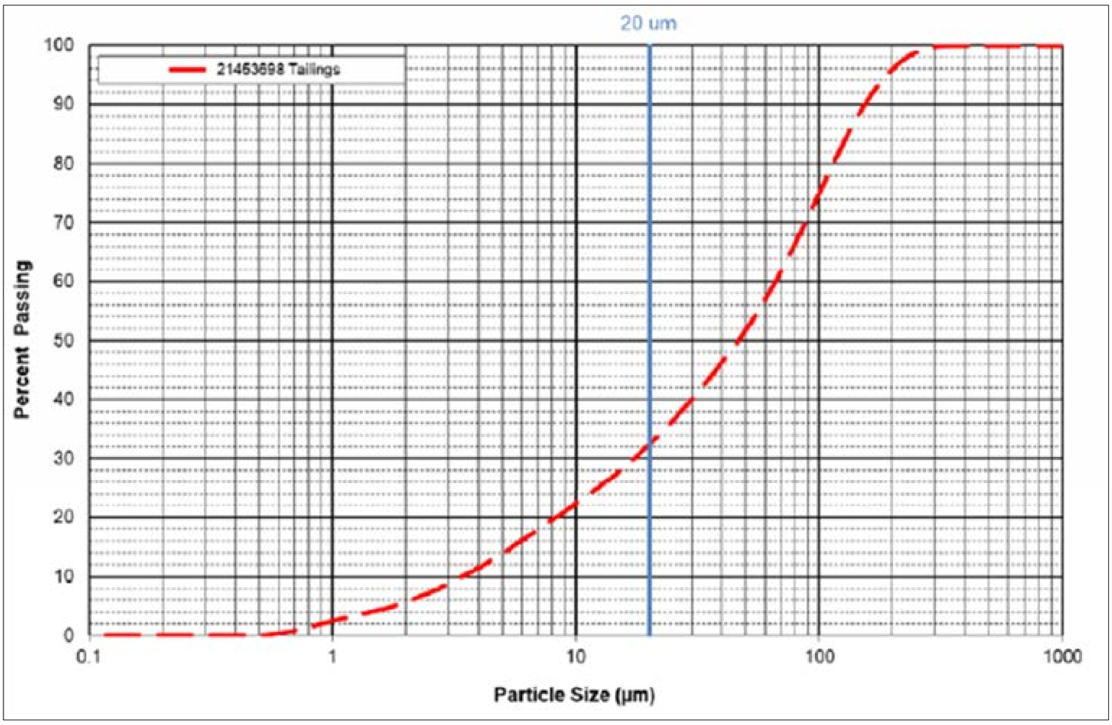
Mineral	Percent by Weight
Pyrrhotite	65%
Quartz	12%
Siderite	10%
Pyrite-marcasite	4%
Cassiterite	3%
Tourmaline	2%
Other	4%
Total	**100%**

In general, the zinc tailings mineralogy is favorable for the production of paste however the presence of a minor amount of kaolinite, and a relatively low content of pyrite and marcasite which contain sulphur, was observed. It should be noted that previous studies undertaken on other tailings that contained a high proportion of siderite were found to be susceptible to long term strength losses. The tin tailings could be problematic and will need to be strategically planned for underground and/or surface placement when future testwork is completed.

16.9.3 Particle Size Distribution (PSD)

As shown in zinc tailings particle size distribution (“PSD”) in Figure 16-20, the zinc tailings contain 32% passing 20
stable paste mix a minimum of 15-20% passing 20

content to achieve a target compressive strength. On the other hand, if the paste contains an excess of the coarse fraction (>20
bleed water. In the case of Ayawilca, the coarse and fine fractions are well balanced. This tailings material is expected to be suitable for making paste.

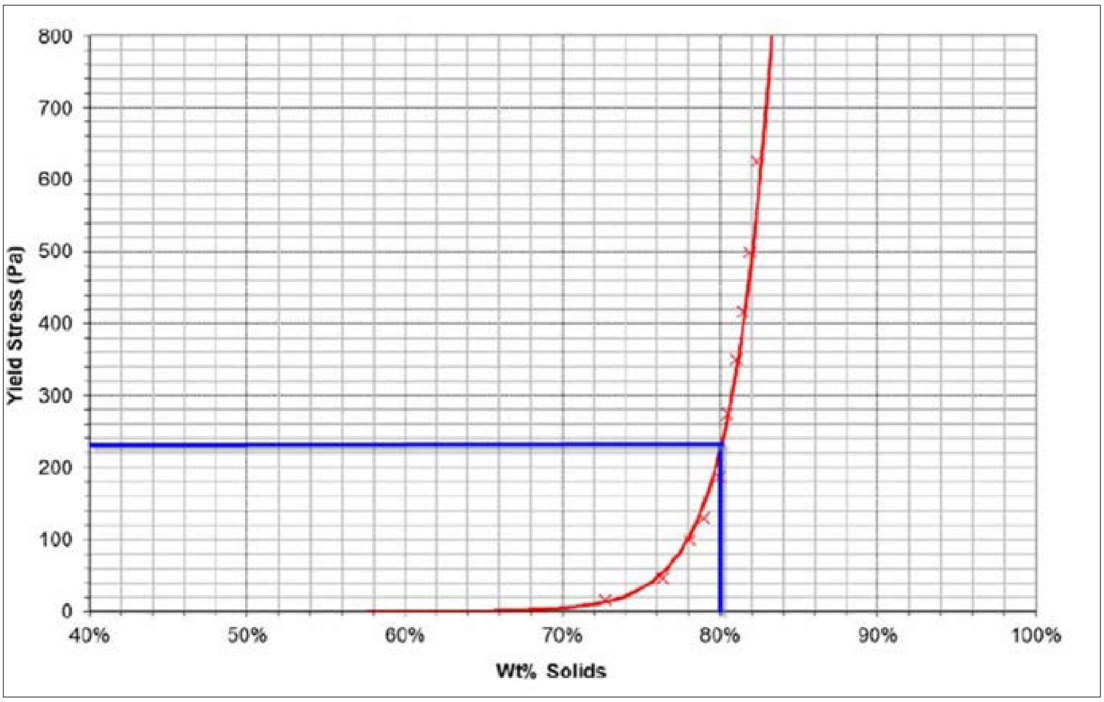


Source: Golder, 2021

Figure 16-20: Zinc Tailings PSD

16.9.4 Rheology

Yield stress is an important parameter as it is an indication of the energy needed to make the paste flow. The Ayawilca zinc tailings rheogram is shown on Figure 16-21, which indicates that at 80% solids the tailings will exhibit a yield stress of 250 Pa. Generally, the ability to maintain a relatively low yield stress at high percent solids content is a promising characteristic. This allows the use of a paste recipe with high percent solids, which typically translates to good compressive strength. Note that when cement binder is added, the yield stress is expected to increase, shifting the curve towards the left in Figure 16-21.

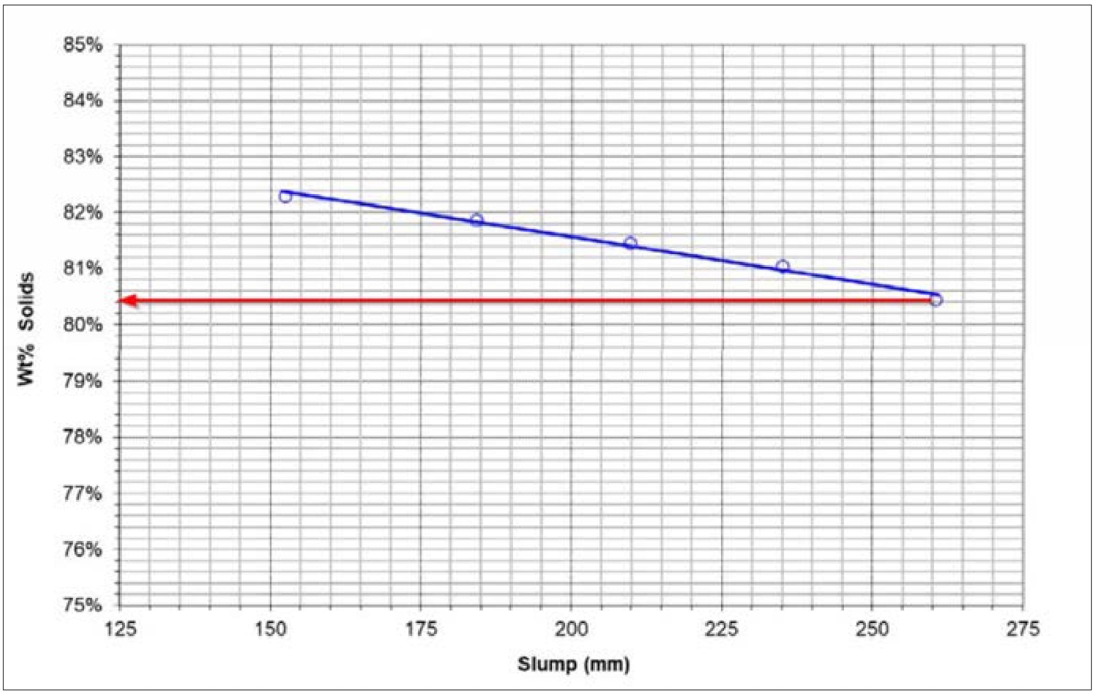


Source: Golder, 2021

Figure 16-21: Ayawilca Zinc Tailings Yield Stress as a Function of Percent Solids

Figure 16-22 shows that the uncemented tailings developed 265 mm slump (close to 10.5-inch) 80.4 wt%. Again, the slump measurements will likely decrease with cement.

Based on the preliminary characterization, the final paste recipe is expected to contain roughly 78% solids by weight to produce a yield stress between 200 to 300 Pa.



Source: Golder, 2021

Figure 16-22: Ayawilca Zinc Tailings Percent Solids as a Function of Slump Measurements

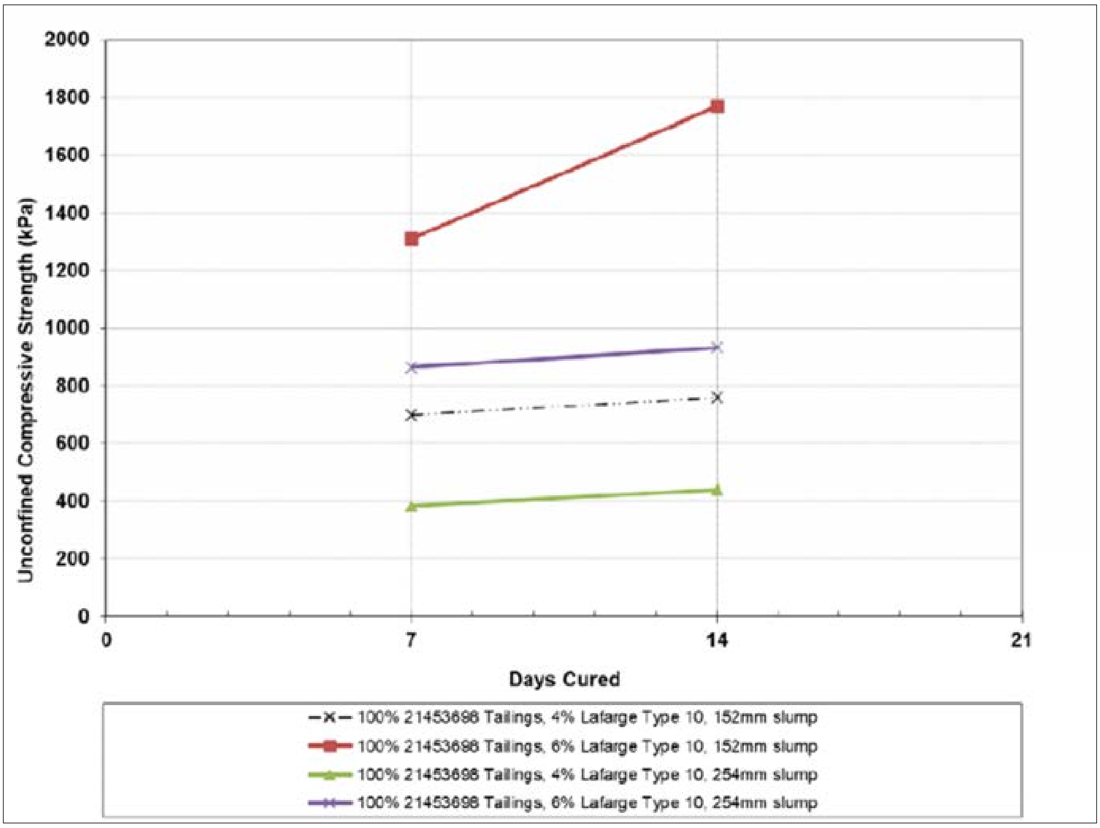
16.9.5 Paste Uniaxial Compressive Strength (UCS)

The Golder testwork also included UCS with Ordinary Portland Cement (“OPC”), and the results are included in Figure 16-23. As expected, when the slump was reduced from 254 mm to 152 mm (meaning the percent solids was increased), the overall UCS improved. At a 254 mm slump, and a binder content of 4% and 6%, the paste developed 14-day UCS of 440 and 932 kPa respectively. At a 152 mm slump, the 14-day UCS increased to 760 and 1,769 kPa for binder content of 4% and 6%, respectively. Golder only performed 7-day and 14-day UCS tests and no 28-day data is available.

One note of caution is that no long-term paste strength tests have been conducted (>56 days) hence it is not possible to determine if strength degradation is an issue or if sulphate resistant cements will be needed. These tests will be needed at more advanced studies on the Project.

Given the geometry and lateral extents of the Ayawilca deposits, it is more conservative to assume that a high slump (200 mm or higher) recipe will be used.

The Golder 28-day paste backfill strengths at 4% binder are likely to range from 400 kPa to 1 MPa. Based on these results, the cement consumption in the Ayawilca paste is expected to average 4% by weight.



Source: Golder, 2021

Figure 16-23: Ayawilca Zinc Tailings 7-day and 14- day UCS

16.9.6 Proposed Paste Mix

Based on the laboratory testing the following paste mix is proposed as shown in Table 16-11. This paste mix has a density of 2.23 t/m^3 and a solids content of 78%.

Table 16-11: Proposed paste 4% binder recipe per 1,000 m^3

Material	Weight - kg
Zinc Tailings	1,652
Cement	87
Water	491

16.9.7 Backfill System Design and Operation

Paste Plant Location

Tinka has selected a paste plant site roughly 400 m north of the mill sites at Elevation 4,240 m. Tailings will be generated by both the zinc mill and tin mill, and then dewatered to a filter cake. During paste plant operations the filter cake will be trucked to a conventional dry paste plant. When the paste plant is not running the tailings will be trucked to the adjacent dry stack.

At this stage of study, it has not been determined if the zinc and tin tailings can be blended prior to filtration or if they need to be kept separate. Additional laboratory testing needs to be conducted at the feasibility stage to determine if the tin tailings are detrimental to the production of paste. If so, the tin tailings will need to be filtered and disposed of separately.

The selected paste plant location is dependent on a series of surface lines of varying lengths to deliver paste to the various mining zones. The longest surface run is to the East zone and requires roughly 850 m of horizontal run. The South zone requires about 825 m of surface run.

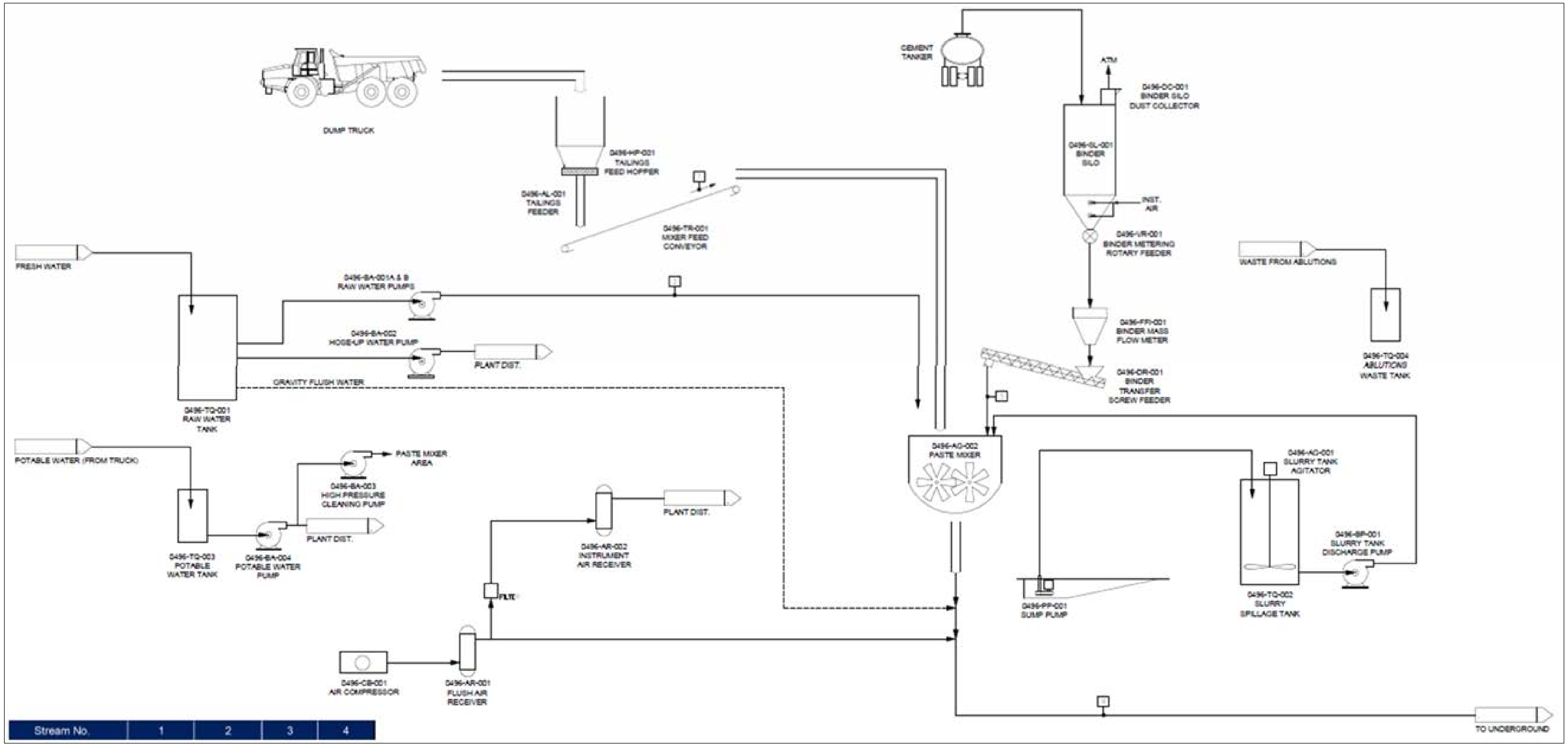
Process Flow Description

The Ayawilca process flow diagram for the paste backfill system is shown on the flowsheet in Figure 16-24. The backfill plant receives tailings filter cake delivered by truck from a plate and press tailings filter plant. A front-end loader feeds to the filter cake lump breaker, which dispenses the tailings onto the feed conveyor. Based on the paste recipe selected by the operator, the tailings are fed into a paste mixer along with mix water and cement binder.

The paste mixer discharges the paste into feed hopper that feeds a dedicated piston style paste pump. From the pump discharge the paste is directed to the proper surface line by a series of diverter valve connections.

The cement silo is re-filled by a bulk cement delivery truck, which typically is equipped with an on-board blower for transferring cement pneumatically. The backfill plant has a cleanout sump for receiving slurry from washing and cleaning the paste plant. The sump is designed to allow the front-end loader to enter and clear the accumulated solids.

Depending on the size of the stope, the backfill plant is capable of filling continuously until the fill job is complete. Depending on the mill operation schedule, a minimum of 24-hour filter cake stockpile at the backfill plant is recommended to provide operation flexibility (such as during a short mill maintenance).



Source: MineFill, 2024

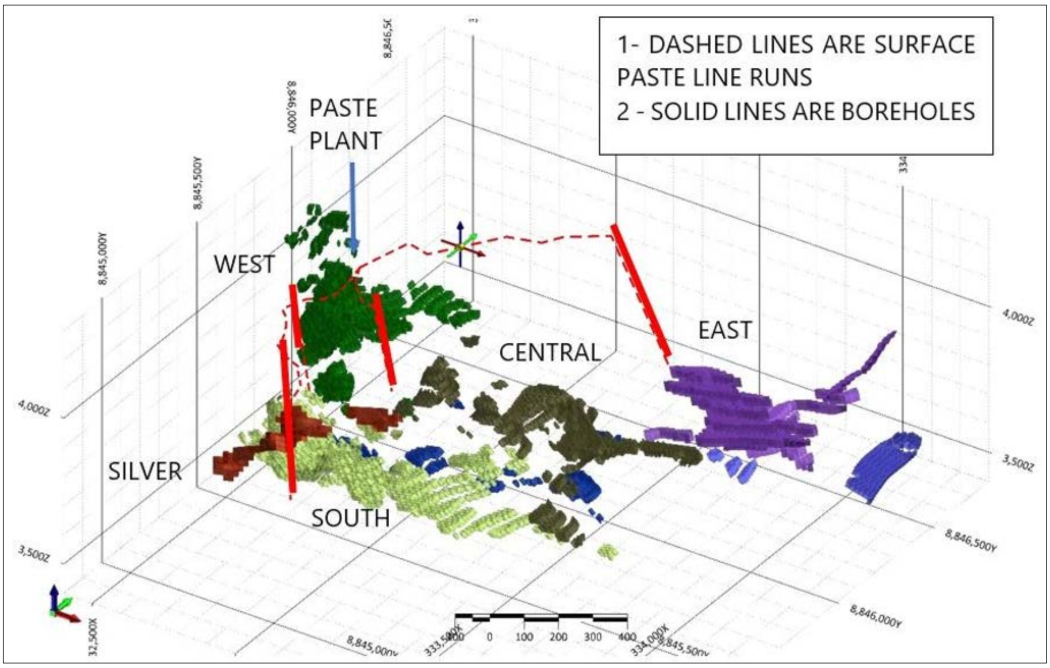
Figure 16-24: Paste Backfill Plant Flowsheet

Paste Distribution

Paste will be delivered to the Zinc Zone through a network of surface reticulation system piping, boreholes, and an underground distribution system as shown in Figure 16-25. The five areas of the Zinc Zone are served by surface lines running from the paste plant to the proximity of each deposit. The two areas of the Tin Zone are directly adjacent to the Zinc Zone and share the same paste distribution infrastructure.

In general, the paste reticulation backbone consists of 6-inch Schedule 80 carbon steel piping for the surface runs and for trunk lines in the underground distribution network. The piping is then reduced to 6-inch Schedule 40 carbon steel for transport of paste on the mine sublevels, and finally the last 200m reverts to 6-inch SDR 9 HDPE piping for stope access and in-stope delivery of paste.

The boreholes are expected to consist of 10-inch diameter bores lined with 6-inch carbon steel or abrasion resistant piping depending on the volume of paste to be delivered. Each borehole location has been selected to tie into the planned underground development infrastructure.



Source: MineFill, 2024

Figure 16-25: Isometric view of paste distribution at Ayawilca

Flow Modelling

A partial flow model has been constructed to perform an initial evaluation of the pressures and flows in the reticulation network which are focussed on preliminary sizing the paste pump for delivery to the borehole collars. The flow models suggest a pump rated at 100 bar delivering 95 m^3/h would serve this duty assuming a paste mix equivalent to a friction loss of 8 kPa/m (nominally 250 Pa yield stress).

Pressures are estimated at the bottom of the paste borehole assuming the pipe is full to the collar (Table 16-12). Given that all of the boreholes are around 300 m deep, they will generate enough gravity pressure to push the paste laterally about 500 m from the borehole. The design philosophy adopted for the 2024 PEA design is thus a surface pipe run to the vicinity of each of the five Zinc Zone areas, followed by a borehole to provide enough driving head pressure to push paste to the stopes in each of the five areas.

Table 16-12: Initial Pressure Estimates (kPa), Friction Factor = 8 kPa/m

Zone	Paste Plant kPa	Surface Run - m	Borehole Depth - m	Bottom of Borehole kPa	Collar Elev. m
South	5,750	825	330	5,200	4,185
Silver	4,000	575	320	5,000	4,195
West	2,865	320	375	5,800	4,240
Central	1,555	200	305	4,800	4,215
East	9,500	850	450	5,200	4,225

Fill Fences – Shotcrete Barricades

The preferred fill fence is a shotcrete fence which comprises an arched shotcrete barricade formed from pre-fabricated steel frames and formwork which is an engineered alternative to timber barricades for the longhole stopes. These barricades are designed to withstand 200 kPa of lateral pressure and generally exhibit excellent performance in paste applications. An arched barricade has roughly three times the strength of a flat barricade.

The barricade should be located well within the mucking drift, at least 5 m from the brow. Normally a breather tube is attached at the roof of the drift. The final design of the shotcrete barricades should consider the necessary drainage measures to ensure the barricade is never pressurized, along with breather tubes, and instrumentation.

Stope Fill Cycle

Typically paste fills do not bleed enough water to require the installation of drainage hence there are no specific requirements for stope drainage during a paste pour. Normally the barricades are sealed without the need for drain holes.

However, measures do need to be taken if there is a substantial volume of groundwater in the mine (e.g. a so-called “wet mine”). It can be catastrophic to pour paste into a stope that has a lot of water on the floor before you fill. Generally, these stopes will need some form of drainage to push the water towards the barricade so it will not mix with the paste. This may require placing a thick veneer (typically 1 m or more) of drain rock on the floor of the stope, and a drain line through the barricade.

Another issue that can arise is groundwater actively discharging into a stope from either a fault or shear zone, or even an old diamond drill hole that was not plugged. Paste and water should never be allowed to mix as you can severely compromise the quality of the paste if it is discharged into a stope with running water. Again, measures will be needed to collect and redirect this water.

Sill plug pours are needed to protect the integrity of the paste fill fence or barricade, and to ensure the maximum hydrostatic loading from the fluid paste is less than 200 kPa.

Typically, the stope fill cycle is achieved in two pours:

- The first pour results in a paste level roughly 2 m above the drawpoint at the fill fence.
- The sill pour is then left to rest until the paste achieves a uniaxial compressive strength of 150 kPa (generally about 24 to 48 hours).
- Once the sill has cured adequately, the remaining bulk stope pour can commence. This pour should be continuous until the stope is filled.

The required rest time for curing of the plug is determined from uniaxial compression testing of paste samples at 0.5-day curing, 1.0-day curing and 3-day curing. Samples of each paste recipe need to be tested.

Instrumentation

Pipeline instrumentation will be key to monitoring and troubleshooting issues with the underground distribution system. Typically, pressure transducers are placed at key points such as the bottom of boreholes, at critical valves, and other key reference points in the system such as the transfer stations. The instruments are connected to the mine leaky feeder system to provide real-time feedback to the operator in the control room. Automated recording of the readings in the system allows the operator to see trends in the data that may indicate a pending problem and to respond to upset conditions like a pipe blockage.

Cameras connected to a leaky feeder can allow the operator to monitor key locations where man entry is considered too dangerous. Typical camera sites include dump valves or burst disk locations, stope drawpoints and barricades, and monitoring of the paste discharge into stopes.

Flushing

The backfill system sends a small quantity of water as a pre-flush to ensure the reticulation system is configured correctly to direct the flow to the target stope. When a backfill program is complete, a post-flush is used to clear the line. Typically, the volume of flush water is only a small percentage of the overall paste placed.

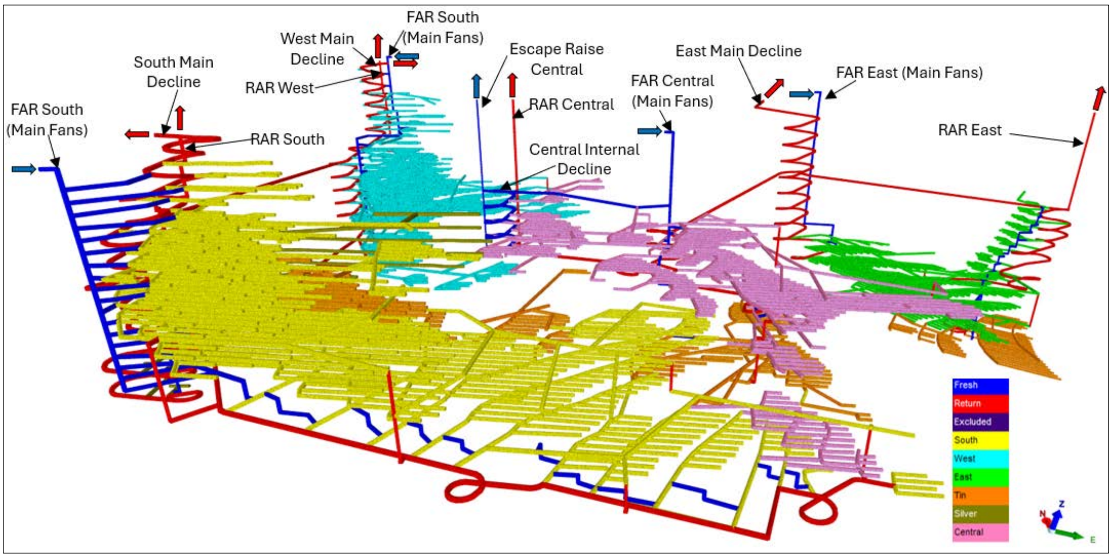
16.10 Ventilation

The ventilation system required to support development and production activities for the mine will be designed based upon local health and safety regulations and general industry best practices. For the 2024 PEA ventilation design criteria, the principles are based on Occupational Health and Safety Mining Regulations (D.S. N° 024-2016-EM) from the Peruvian Energy and Mining Ministry.

16.10.1 General Ventilation Layout

As shown in Figure 16-26, the general ventilation design for the Ayawilca Project considers four major areas: South, Central, West, and East which will represent the highest productions areas and therefore the highest airflow requirements. Tin-HR, Tin-LR and Silver Zone (minor areas) will represent low airflow requirements and due to their locations, the major area ventilation infrastructure will be used to supply the airflows required into the minor zones.

The mine ventilation system considers the use of Fresh Air Raises (“FAR”) to supply fresh air by main intake fans into each active level of the mine thus providing good environmental conditions for the mine develop and production. The declines located on each zone are used as a return airway. Return Air Raises (“RAR”) will be considered on each zone to avoid high air velocities into the main declines.



Source: SRK, 2024

Figure 16-26: General Ventilation Layout

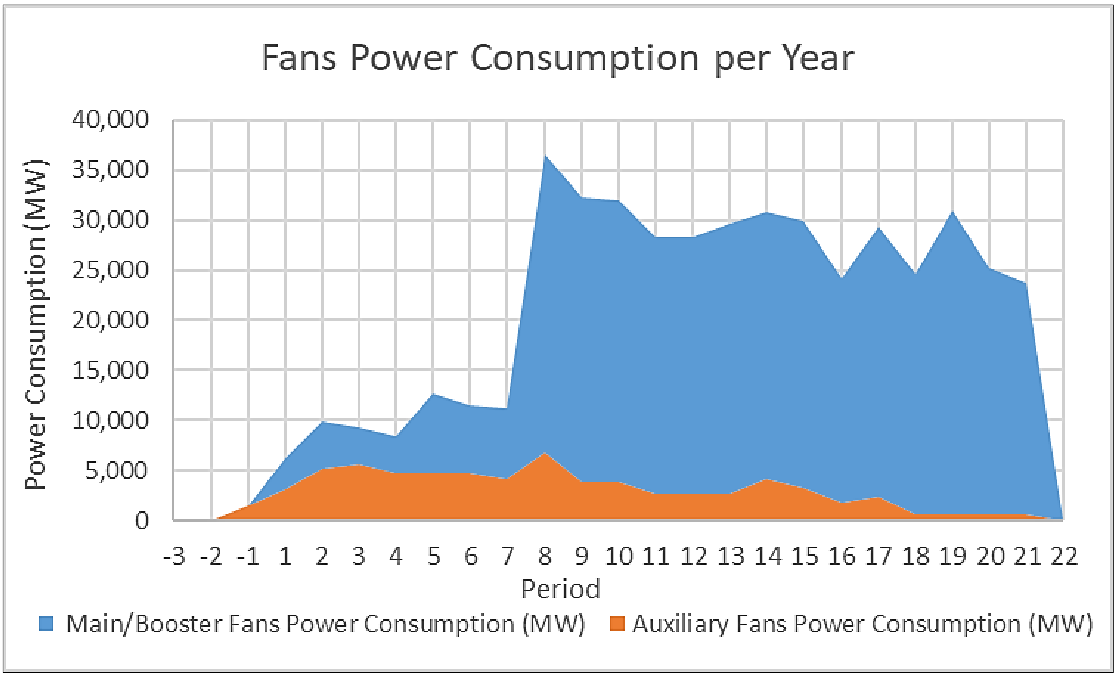
The FARs will be used also as escape routes for emergency, and enclosed ladders will be installed into them to isolate the emergency route from possible high air velocities into the intake raises.

A bulkhead with man doors will be installed in each level intake drift connection to avoid short circuits while giving access to the escape route. From this bulkhead, open areas shall be considered to install the auxiliary intake fans required on each level for development and production.

A regulator shall be installed on each level exhaust drift connection to force the contaminated air produced on the level goes to the surface mainly through the RAR, thus reducing the re-entry times. Also, this infrastructure will be helpful to isolated fumes produced by a fire in the level or down at the decline.

The Ayawilca Project considers a maximum of 14 auxiliary fans working at the same time into the mine during the LOM and three auxiliary ventilation arrangements have been defined.

Figure 16-27 represents the power consumption estimated for all the main, booster and auxiliary fans for each year.

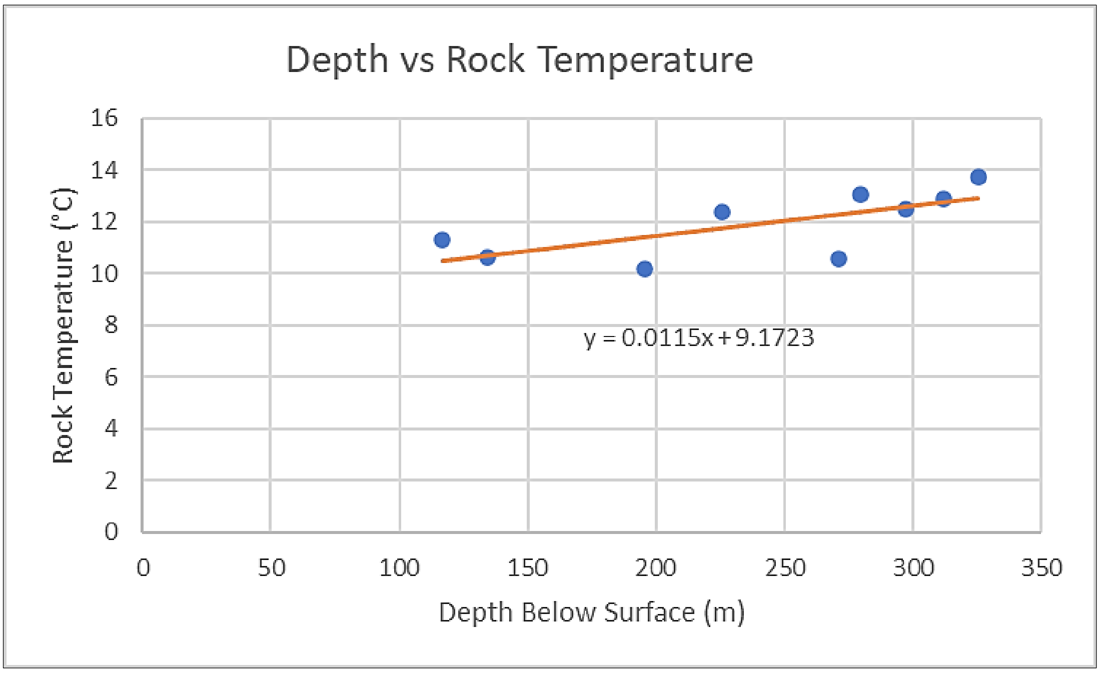


Source: SRK, 2024

Figure 16-27: Graph Fans Power Consumption Per year

16.10.2 Air Heating/Cooling Assessment

According to the water level sensors installed in the piezometers at Ayawilca, a chart was obtained to show how the temperatures rises as the mine gets deeper. Figure 16-28 below shows that the rock temperature is expected to increase 1.215°C for every 100 m vertical. This could mean observed rock temperatures of around 20°C could be encountered at the deepest parts of the mine.



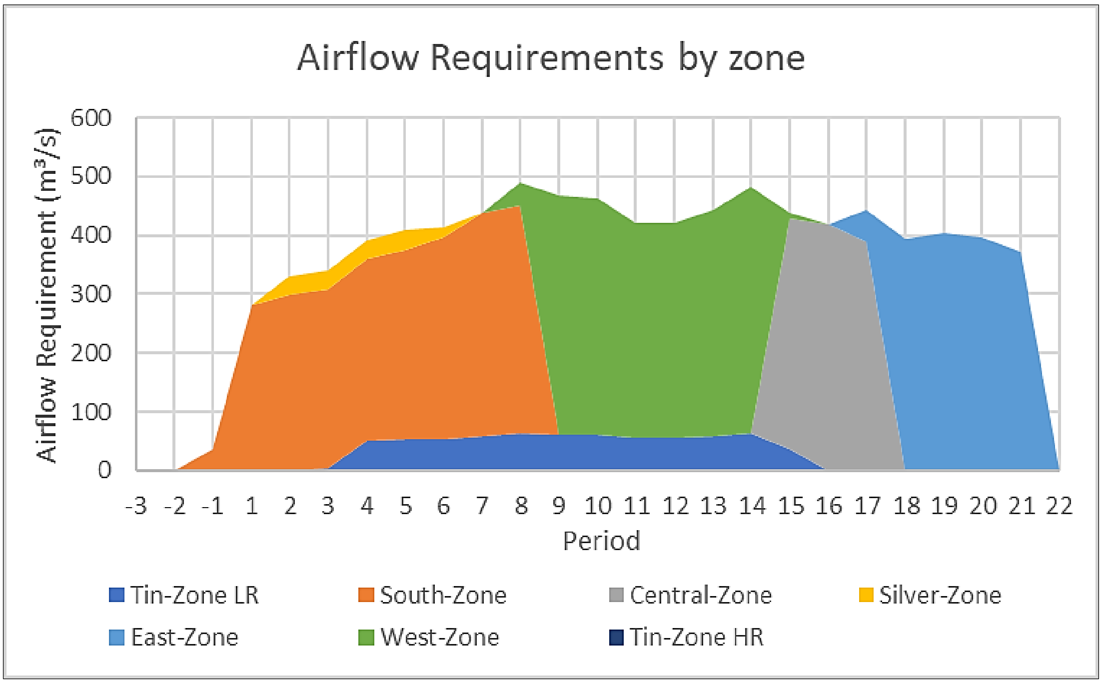
Source: SRK, 2024

Figure 16-28: Graph Depth (m) vs. Rock Temperature (°C)

Considering the geothermal gradient estimated, it is concluded that neither heating nor cooling will be required. As a recommendation, to mitigate the temperature effects from the rock to the air during summer, it is recommended to keep declines and ramp airways as dry as possible using pumping systems in wet areas at the bottom of the tunnels, and it is also recommended to use elevated air velocities in these drifts to reduce the heat exchange between the rock and the airflow. This will require focusing the ventilation system in these areas.

16.10.3 Ventilation Requirements

The air requirement is based upon achieving a minimum airflow per kilowatt (kW) of motor power (0.05 $m^3/s/kW$) and a minimum airflow by person (0.08 $m^3/s/person$) for projects located between 3,000 and 4,000 masl. The following graph represents the airflow requirement by area and zone each year.



Source: SRK, 2024

Figure 16-29: Graph Airflow Requirements by Zone

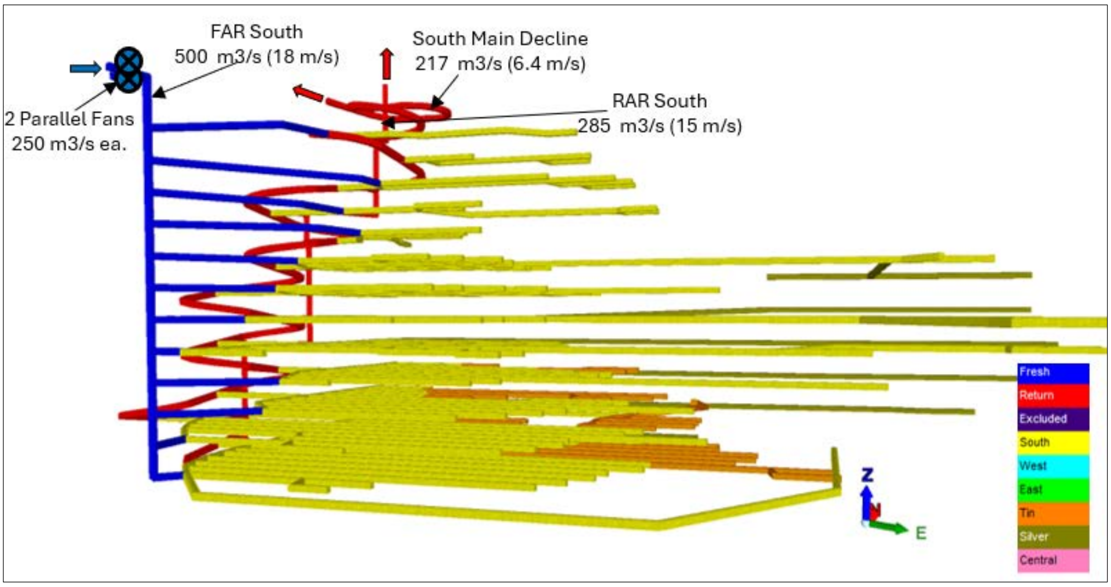
16.10.4 Ventilation Strategy

The ventilation strategy has been separated in 6 stages, based on the maximum airflow requirement for each zone. All the stages are described below.

Stage 1: Year 2

Year 2 will be the period when Tin HR zone will have its highest ventilation requirement (49.5 m^3/s), at the same time South and Silver zone will be active and the airflow requirements will be 298.7 m^3/s and 31.4 m^3/s, respectively. The South Ventilation Infrastructure will be used to supply fresh air to each active area through the South FAR and then, the contaminated air produced by the production and development will be evacuated through the South RAR and South Main Decline as shown in Figure 16-30.

During this period, two parallel fans shall be installed at the top of the South FAR, supplying each an airflow quantity of 250 m^3/s and delivering a Collar pressure of 0.8 kPa, resulting in a power installed required of 275 kW each.



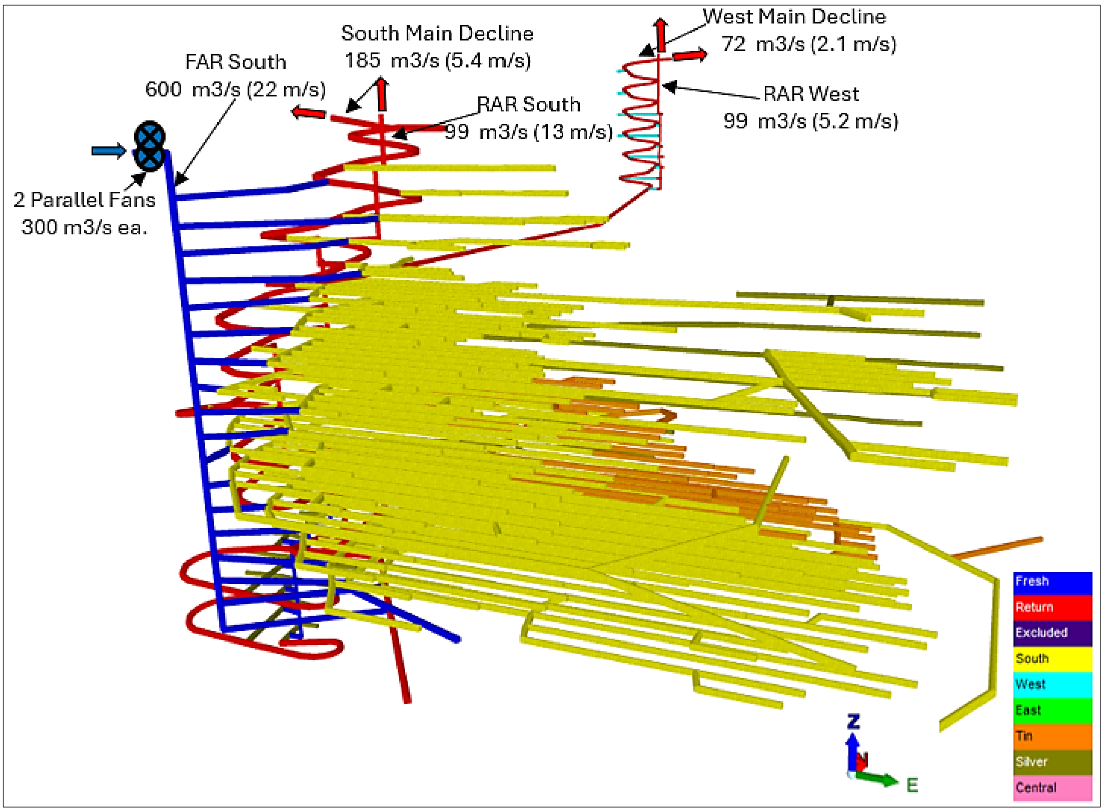
Source: SRK, 2024

Figure 16-30: Stage 1, Ventilation Layout

Stage 2: Year 5

Year 5 will be the period when the Silver Zone will have its highest ventilation requirement, 33.7 m^3/s, at the same time the South area and Tin LR zone will be active and their airflow requirements will be 321.2 m^3/s and 53.2 m^3/s, respectively. The South Ventilation Infrastructure will be used to supply with fresh air to each active areas through the South FAR. For this stage, the upper connection between West and South areas is already in place and therefore, the contaminated air produced by the production in the South area and the development in both areas will be exhausted through the South RAR, South Main Decline and West Main Decline as shown in Figure 16-31.

During this period, the two parallel fans installed at the top of the South FAR will supply each an airflow quantity of 300 m^3/s and delivering a Collar pressure of 1.1 kPa, resulting in a power installed required of 475 kW each.



Source: SRK, 2024

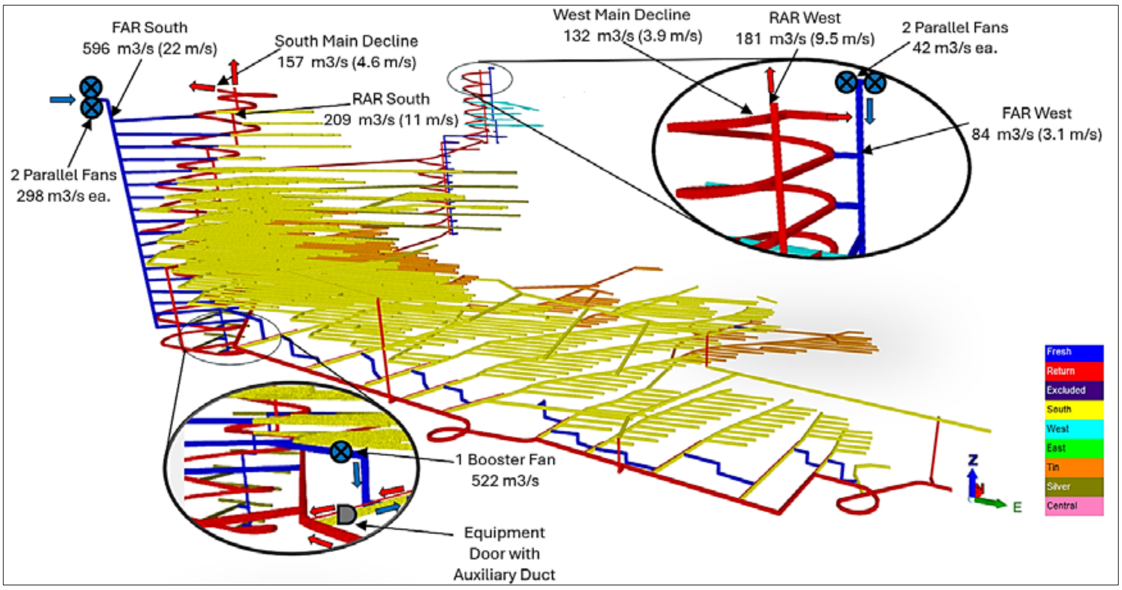
Figure 16-31: Stage 2, Ventilation Layout

Stage 3: Year 8

During Year 8, the South area and Tin LR Zone will have their highest airflow requirements (386.8 m^3/s and 64 m^3/s respectively), additionally, West area will be in production also, with an initial airflow requirement of 39.7 m^3/s. South FAR will supply the airflow required by South and Tin LR Zone while West FAR will supply the airflow required by the West area. The contaminated air produced by the production and development activities in both areas will be exhausted through the South and West RAR's, and through the Main Declines located at South and West Zones as shown in Figure 16-32. This period is also the highest airflow requirement during the LOM.

During this period, the two parallel fans installed at the top of the South FAR will supply each an airflow quantity of 298 m^3/s and delivering a Collar pressure of 2.9 kPa, resulting in a power installed required of 1,175 kW each. Due to the sub-horizontal disposition of the South area deepest levels, the mine resistance increases significantly, and a booster fan is required to deliver extra pressure to the system and reach the airflow required at the last levels of South Mine. This fan booster will move 522 m^3/s of air at a delivered pressure of 1.5 kPa and will require a power installed of 1075 kW.

The two fans located at the top of the West FAR will supply 42 m^3/s each and delivering a Collar pressure of 0.2 kPa, resulting in a power installed requirement of 15 kW each.

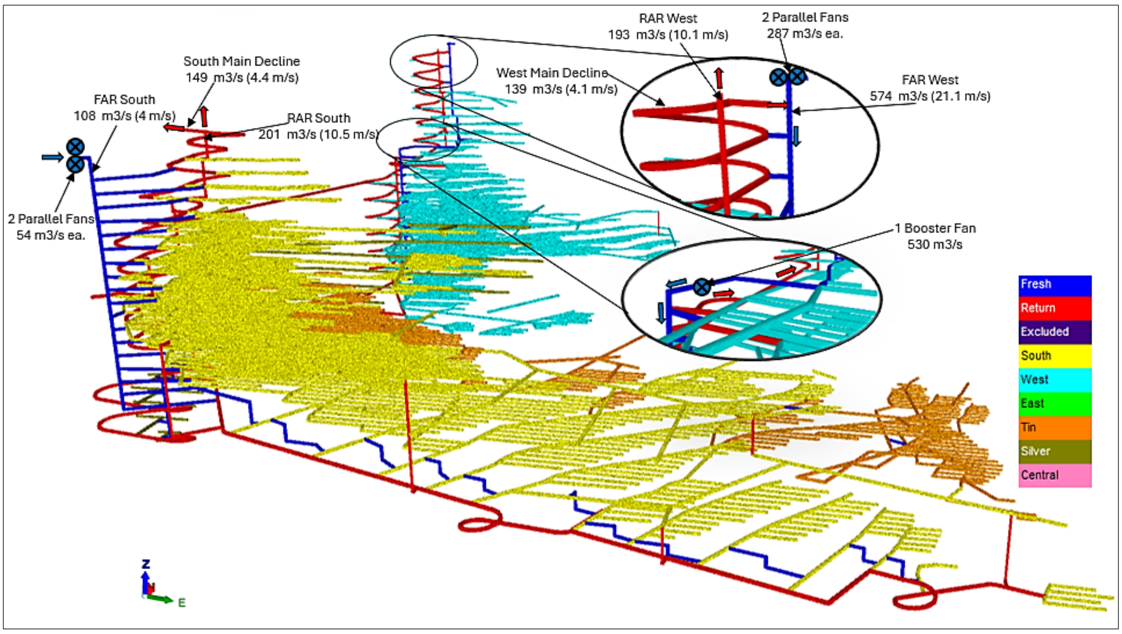


Source: SRK, 2024

Figure 16-32: Stage 3, Ventilation Layout

Stage 4: Year 14

During this period, the West area will have its highest airflow requirements (420.3 m^3/s), additionally, Tin LR zone will still be active and require 63 m^3/s which will be supplied through South FAR. The contaminated air produced by the production and development activities in both zones will be exhausted through the South and West RARs, and through the Main Declines located at South and West Zones as shown in Figure 16-33.



Source: SRK, 2024

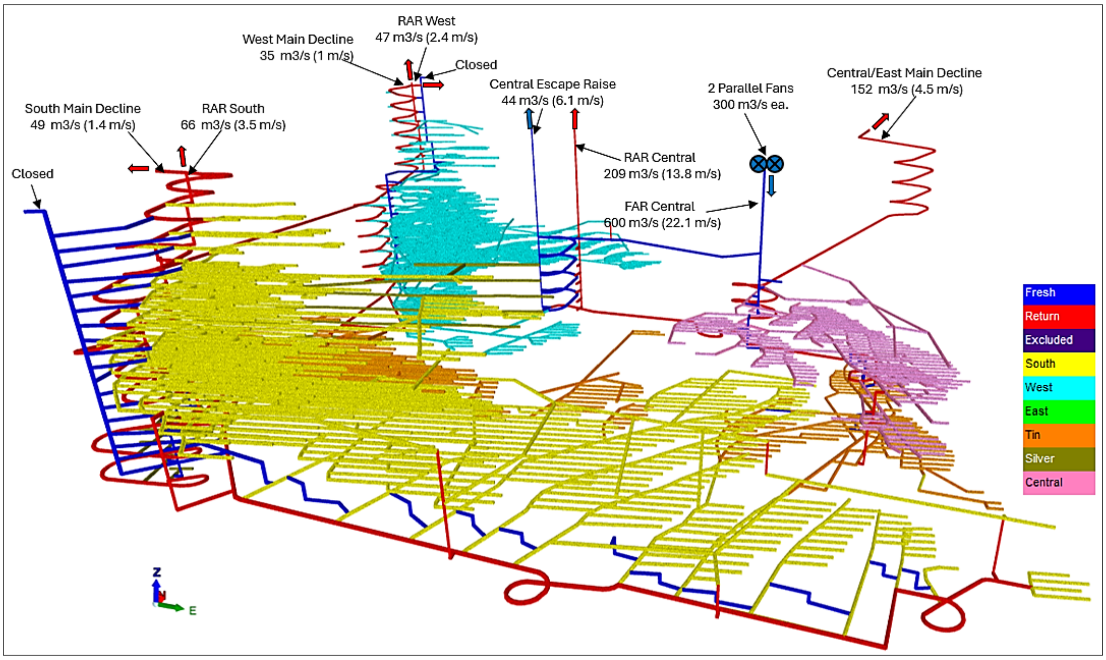
Figure 16-33: Stage 4, Ventilation Layout

During this period, the two parallel fans installed at the top of the South FAR will supply each an airflow quantity of 54 m^3/s and deliver a Collar pressure of 0.4 kPa, resulting in a power installed requirement of 30 kW each.

The two fans located at the top of the West FAR will supply 287 m^3/s each and deliver a Collar pressure of 2.6 kPa, resulting in a power installed requirement of 1,010 kW each. The booster fan previously used at South Zone, will be used for this period at the West zone to deliver extra pressure to the system and reach the airflow required at the final levels of West area. This fan booster will move 530 m^3/s of air at a delivered pressure of 1.4 kPa and will require a power installed of 990 kW.

Stage 5: Year 16

During this period, the West area is completely mined, and the Central area has its higher airflow requirement (418.7 m^3/s) which will be supplied through Central FAR. The contaminated air produced by the production and development activities in this area can be exhausted through all the declines and RARs available at South, West and Central areas as shown in Figure 16-34.



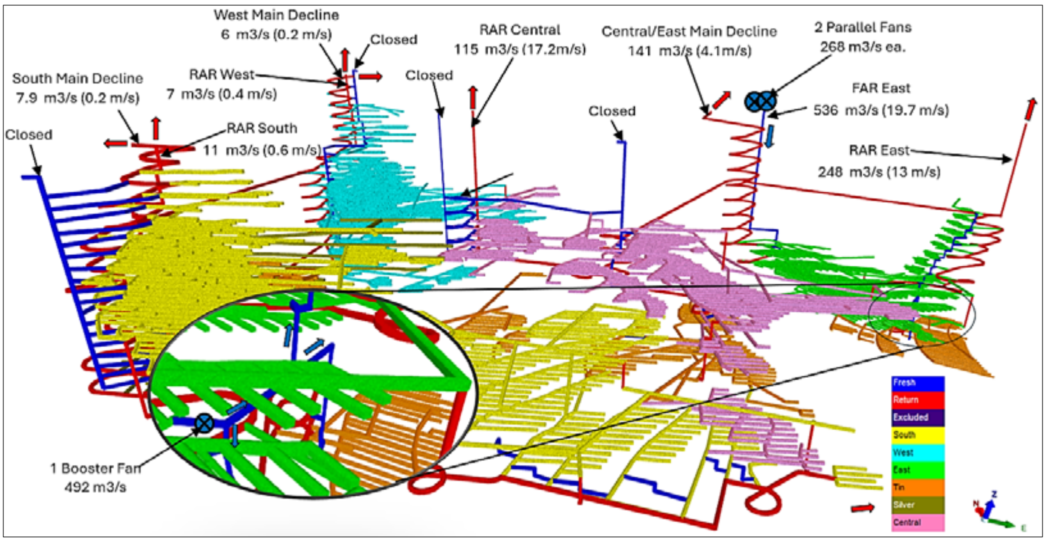
Source: SRK, 2024

Figure 16-34: Stage 5, Ventilation Layout

By Year 16, the South and West areas are planned to be completely mined out and the ventilation equipment and mine infrastructure can be used to drive contaminated air and thus reduce the declines velocities and fan duties at the fans located in other areas. During this period, the two parallel fans installed at the top of the Central FAR will supply each an airflow quantity of 300 m^3/s and deliver a Collar pressure of 3.1 kPa, resulting in a power installed requirement of 1,300 kW each.

Stage 6: Year 19

During this period, only the East area is active, and the other zones/areas are already mined out. East area requires an airflow quantity of 405.3 m^3/s which will be supplied through the East FAR. The contaminated air produced by the production and development activities in this zone can be evacuated through all the declines and RAR's available in the mine as shown in Figure 16-35.



Source: SRK, 2024

Figure 16-35: Stage 6, Ventilation Layout

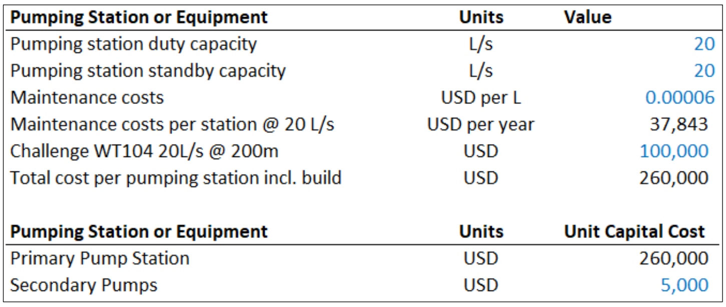
By Year 19, the two parallel fans installed at the top of the Central FAR will supply each an airflow quantity of 268 m^3/s and delivering a Collar pressure of 3.4 kPa, resulting in a power installed requirement of 1,250 kW each. The booster fans previously used in other zones, will be used for this period in East area to deliver extra pressure to the system and reach the airflow required at the last levels of East area. This fan booster will move 492 m^3/s of air at a delivered pressure of 1.5 kPa and will require a power installed of 125 kW.

16.11 Mine Water Management

The dewatering system has been assessed to provide an early-stage approach for preliminary cost estimates for mine water management using the high-level assumptions shown in Table 16-13. Future exploration will need to collect additional geotechnical and hydrogeological data for groundwater modelling which will be used to define the approach mine water management in future detailed studies.

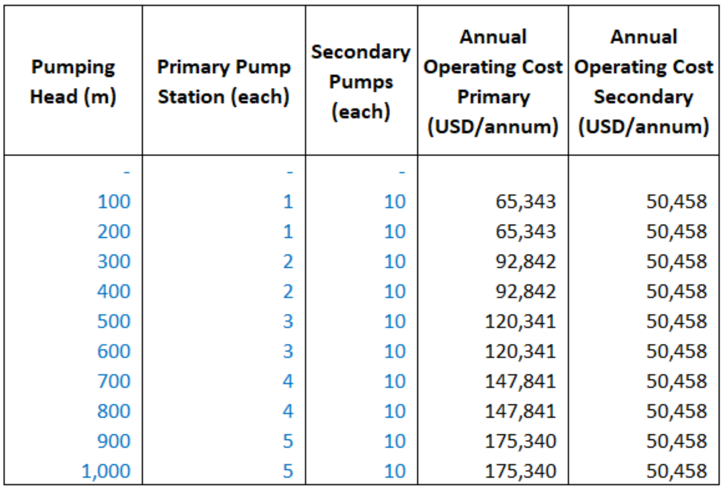
Further investigation and test work is required to establish the most appropriate dewatering system design; however, this study broadly outlines a practical solution based on the known parameters and comparison with similar operating mines. The pumped mine water will be contact water and will likely require some form of water treatment prior to discharge.

Table 16-13: Mine Dewatering Assumptions



Pumping Station or Equipment	Units	Value
Pumping station duty capacity	L/s	20
Pumping station standby capacity	L/s	20
Maintenance costs	USD per L	0.00006
Maintenance costs per station @ 20 L/s	USD per year	37,843
Challenge WT104 20L/s @ 200m	USD	100,000
Total cost per pumping station incl. build	USD	260,000

Pumping Station or Equipment	Units	Unit Capital Cost
Primary Pump Station	USD	260,000
Secondary Pumps	USD	5,000



Pumping Head (m)	Primary Pump Station (each)	Secondary Pumps (each)	Annual Operating Cost Primary (USD/annum)	Annual Operating Cost Secondary (USD/annum)
-	-	-		
100	1	10	65,343	50,458
200	1	10	65,343	50,458
300	2	10	92,842	50,458
400	2	10	92,842	50,458
500	3	10	120,341	50,458
600	3	10	120,341	50,458
700	4	10	147,841	50,458
800	4	10	147,841	50,458
900	5	10	175,340	50,458
1,000	5	10	175,340	50,458

16.12 Mining Equipment

The equipment required to undertake mining activities at the Ayawilca mine was selected based on practical experience of working in similar underground mining operations.

Table 16-14 provides a list of the primary and secondary support equipment considered in the mine plan and unit productivities used to determine equipment requirements over the LOM. The equipment operating factors used to estimate operating costs throughout the LOM are shown in Table 16-15. Table 16-16 shows the truck productivity parameters applied over the LOM. The trucking requirements (50 t capacity) have been assessed based on estimates of the haul distances by level and material type, provided in Table 16-17. It is assumed that development waste is temporarily stored in the surface mine waste pads close to surface portals and majority will be permanently placed in the underground mine.

Table 16-14: Mine Equipment and Productivity Assumptions

Fleet	Units	Productivity	
		Per annum	Notes
Lateral Development			
Twin Boom Jumbo	dev m adv	2,640	Based on Twin Boom Jumbo development metres
Development Loader - 17t	tpa	403,920	Based on Loader tonnes
Production LHOS			
Production Loader - 17t	tpa	403,920	Based on Loader tonnes
Longhole Drill	drill m	85,000	Based on LH drill metres
Chargeup			
Chargeup wagon	tpa	800,000	Based on production Rate
Auxiliary Equipment			
Grader	tpa	1,650,000	Based on production rate
Service (Fuel/Lube) Truck	Drills	2	1 x Service Truck for every 2 Drills
Integrated Toolcarrier	tpa	500,000	Based on production rate
Grade Control/Probe Drill	drill m	15,000	Based on grade control metres (production rate based)
Backfill			
Agitator Truck	each	2.0	2 machines
Shotcrete Sprayer	each	1	1 machine

Table 16-15: Mine Equipment Operating Factors

Fleet	Availability (%)	Use of Availability (%)	Effective Utilisation (%)	Direct Operating Hours (DOH)	
				per year	per shift
Lateral Development					
Twin Boom Jumbo	85%	44%	37%	3,200	4.4
Development Loader - 17t	85%	55%	47%	4,039	5.6
Production LHOS	85%	50%	43%	3,672	5.1
Production Loader - 17t	85%	55%	47%	4,039	5.6
Longhole Drill	85%	50%	43%	3,672	5.1
Truck - 50t capacity	85%	65%	55%	4,774	6.6
Chargeup wagon	83%	50%	42%	3,586	5.0
Grader	82%	55%	45%	3,897	5.412
Service (Fuel/Lube) Truck	80%	50%	40%	3,456	4.8
Integrated Toolcarrier	80%	50%	40%	3,456	4.8
Grade Control/Probe Drill	80%	50%	40%	3,456	4.8
Light Vehicle	80%	20%	16%	1,382	1.92
Personnel carrier	80%	30%	24%	2,074	2.88

Table 16-16: Truck Productivity Parameters

Trucking TKM Cycle	Units	Value
Truck Capacity	m^3	27
Loader Capacity	m^3	8
Speed up Ramp	km/hr	10
Speed down Ramp	km/hr	12
Loading time $8m^3$ LHD	hrs	0.1
Dumping time	hrs	0.1
Capacity @ 95% Tray Fill	m^3	25.7
SG loose	t/m^3	2.0
Tonnage Capacity - Maximum Rated	t	50

Table 16-17: Average Truck Haulage Distances for each Zone/Area

Tin-Zone UG			South-Area UG			Central-Area UG			Silver-Zone UG			East-Area UG			West-Area UG		
TKMs Average Haul	**Average Haul Waste (km)**	**Average Haul ROM (km)**	**TKMs Average Haul**	**Average Haul Waste (km)**	**Average Haul ROM (km)**	**TKMs Average Haul**	**Average Haul Waste (km)**	**Average Haul ROM (km)**	**TKMs Average Haul**	**Average Haul Waste (km)**	**Average Haul ROM (km)**	**TKMs Average Haul**	**Average Haul Waste (km)**	**Average Haul ROM (km)**	**TKMs Average Haul**	**Average Haul Waste (km)**	**Average Haul ROM (km)**
Portal to Plant/WRD	0.50	1.50	Portal to Plant/WRD	0.50	1.00	Portal to Plant/WRD	0.50	1.50	Portal to Plant/WRD	0.50	1.00	Portal to Plant/WRD	0.50	1.50	Portal to Plant/WRD	0.50	1.00
Decline to Portal			Decline to Portal			Decline to Portal			Decline to Portal			Decline to Portal			Decline to Portal		
Surface	0.00	0.00	Surface	0.00	0.00	Surface	0.00	0.00	Surface	0.00	0.00	Surface	0.00	0.00	Surface	0.00	0.00
Level 435	1.60	2.60	Level 585	0.60	1.10	Level 585	1.25	2.25	Level 580	0.56	1.06	Level 580	0.56	1.56	Level 600	1.13	1.63
Level 420	1.72	2.72	Level 570	0.52	1.02	Level 570	1.37	2.37	Level 560	0.60	1.10	Level 560	0.60	1.60	Level 585	1.25	1.75
Level 405	1.84	2.84	Level 555	0.64	1.14	Level 555	1.49	2.49	Level 540	0.76	1.26	Level 540	0.76	1.76	Level 570	1.37	1.87
Level 390	1.96	2.96	Level 540	0.76	1.26	Level 540	1.61	2.61	Level 520	0.92	1.42	Level 520	0.92	1.92	Level 555	1.49	1.99
Level 375	2.08	3.08	Level 525	0.88	1.38	Level 525	1.73	2.73	Level 500	1.08	1.58	Level 500	1.08	2.08	Level 540	1.61	2.11
Level 360	2.20	3.20	Level 510	1.00	1.50	Level 510	1.85	2.85	Level 480	1.24	1.74	Level 480	1.24	2.24	Level 525	1.73	2.23
Level 345	2.32	3.32	Level 495	1.12	1.62	Level 495	1.97	2.97	Level 460	1.40	1.90	Level 460	1.40	2.40	Level 510	1.85	2.35
Level 330	2.44	3.44	Level 480	1.24	1.74	Level 480	2.09	3.09	Level 440	1.56	2.06	Level 440	1.56	2.56	Level 495	1.97	2.47
Level 315	2.56	3.56	Level 465	1.36	1.86	Level 465	2.21	3.21	Level 420	1.72	2.22	Level 420	1.72	2.72	Level 480	2.09	2.59
Level 300	2.68	3.68	Level 450	1.48	1.98	Level 450	2.33	3.33	Level 400	1.88	2.38	Level 400	1.88	2.88	Level 465	2.21	2.71
Level 285	2.80	3.80	Level 435	1.60	2.10	Level 435	2.45	3.45	Level 380	2.04	2.54	Level 380	2.04	3.04	Level 450	2.33	2.83
Level 270	2.92	3.92	Level 420	1.72	2.22	Level 420	2.57	3.57	Level 360	2.20	2.70	Level 360	2.20	3.20	Level 435	2.45	2.95
Level 255	3.04	4.04	Level 405	1.84	2.34	Level 405	2.69	3.69	Level 340	2.36	2.86	Level 340	2.36	3.36	Level 420	2.57	3.07
Level 240	3.16	4.16	Level 390	1.96	2.46	Level 390	2.81	3.81	Level 320	2.52	3.02	Level 320	2.52	3.52	Level 405	2.69	3.19
Level 225	3.28	4.28	Level 375	2.08	2.58	Level 375	2.93	3.93	Level 300	2.68	3.18	Level 300	2.68	3.68	Level 390	2.81	3.31
Level 210	3.40	4.40	Level 360	2.20	2.70	Level 360	3.05	4.05	Level 280	2.84	3.34	Level 280	2.84	3.84	Level 375	2.93	3.43
Level 195	3.52	4.52	Level 345	2.32	2.82	Level 345	3.17	4.17	Level 260	3.00	3.50	Level 260	3.00	4.00	Level 360	3.05	3.55
Level 180	3.64	4.64	Level 330	2.44	2.94	Level 330	3.29	4.29	Level 240	3.16	3.66	Level 240	3.16	4.16	Level 345	3.17	3.67
Level 165	3.76	4.76	Level 315	2.56	3.06	Level 315	3.41	4.41	Level 220	3.32	3.82	Level 220	3.32	4.32	Level 330	3.29	3.79
Level 150	3.88	4.88	Level 300	2.68	3.18	Level 300	3.53	4.53	Level 200	3.48	3.98	Level 200	3.48	4.48	Level 315	3.41	3.91
Level 135	4.00	5.00	Level 285	2.80	3.30	Level 285	3.65	4.65	Level 180	3.64	4.14	Level 180	3.64	4.64	Level 300	3.53	4.03
Level 120	4.12	5.12	Level 270	2.92	3.42	Level 270	3.77	4.77	Level 160	3.80	4.30	Level 160	3.80	4.80	Level 285	3.65	4.15
Level 105	4.24	5.24	Level 255	3.04	3.54	Level 255	3.89	4.89	Level 140	3.96	4.46	Level 140	3.96	4.96	Level 270	3.77	4.27
Level 90	4.36	5.36	Level 240	3.16	3.66	Level 240	4.01	5.01	Level 120	4.12	4.62	Level 120	4.12	5.12	Level 255	3.89	4.39
Level 75	4.48	5.48	Level 225	3.28	3.78	Level 225	4.13	5.13	Level 100	4.28	4.78	Level 100	4.28	5.28	Level 240	4.01	4.51
Level 60	4.60	5.60	Level 210	3.40	3.90	Level 210	4.25	5.25	Level 80	4.44	4.94	Level 80	4.44	5.44	Level 225	4.13	4.63
Level 45	4.72	5.72	Level 195	3.52	4.02	Level 195	4.37	5.37	Level 60	4.60	5.10	Level 60	4.60	5.60	Level 210	4.25	4.75
Level 30	4.84	5.84	Level 180	3.64	4.14	Level 180	4.49	5.49	Level 40	4.76	5.26	Level 40	4.76	5.76	Level 195	4.37	4.87
Level 15	4.96	5.96	Level 165	3.76	4.26	Level 165	4.61	5.61	Level 20	4.92	5.42	Level 20	4.92	5.92	Level 180	4.49	4.99
Level 0	5.08	6.08	Level 150	3.88	4.38	Level 150	4.73	5.73	Level 0	5.08	5.58	Level 0	5.08	6.08	Level 165	4.61	5.11
Level -15	5.20	6.20	Level 135	4.00	4.50	Level 135	4.85	5.85	Level -20	5.24	5.74	Level -20	5.24	6.24	Level 150	4.73	5.23
Level -30	5.32	6.32	Level 120	4.12	4.62	Level 120	4.97	5.97	Level -40	5.40	5.90	Level -40	5.40	6.40	Level 135	4.85	5.35
Level -45	5.44	6.44	Level 105	4.24	4.74	Level 105	5.09	6.09	Level -60	5.56	6.06	Level -60	5.56	6.56	Level 120	4.97	5.47
Level -60	5.56	6.56	Level 90	4.36	4.86	Level 90	5.21	6.21	Level -80	5.72	6.22	Level -80	5.72	6.72	Level 105	5.09	5.59
Level -75	5.68	6.68	Level 75	4.48	4.98	Level 75	5.33	6.33	Level -100	5.88	6.38	Level -100	5.88	6.88	Level 90	5.21	5.71
Level -90	5.80	6.80	Level 60	4.60	5.10	Level 60	5.45	6.45	Level -120	6.04	6.54	Level -120	6.04	7.04	Level 75	5.33	5.83

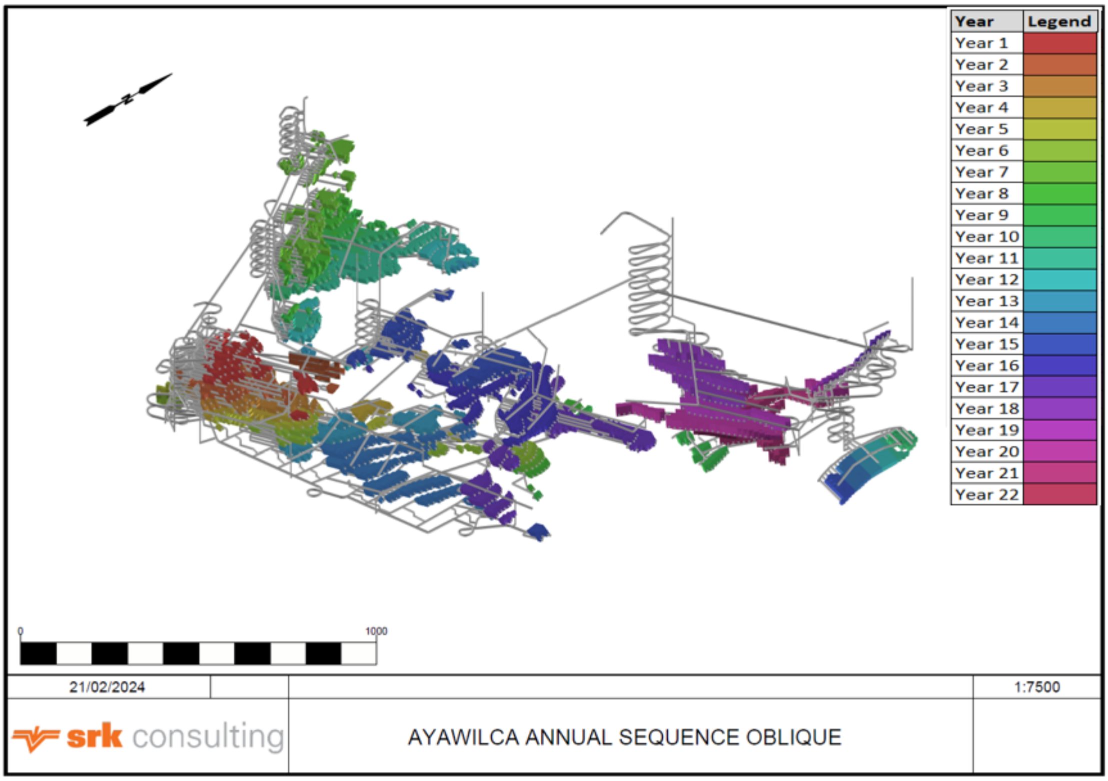
16.13 Mine Schedule

16.13.1 Introduction

The ROM inventory available for scheduling is presented in Table 16-5 and a summary of the required lateral and vertical development for each mine area is provided in Table 16-8.The production rate potential for each of the deposits was determined through an assessment of the tonnes per vertical metre and typical annual decline advance rates.

The development and production schedule (Figure 16-36) are based on the ROM inventory as summarized in Table 16-18. SRK prepared a simplified semi--automated spreadsheet approach for scheduling the required production and development for each level of each orebody. The mine inventory was scheduled for each level in an ordered sequence based on development access targeting a production rate of 2.0 Mtpa for the Zinc and Silver Zones, and 0.3 Mtpa for the Tin Zone for an overall ROM production rate of 2.3 Mtpa.

The annual production schedule is used to derive an equipment fleet schedule including commissioning and replacement periods for the duration of the operation. Labour requirements for each period are also estimated based on the development, production and equipment estimates.



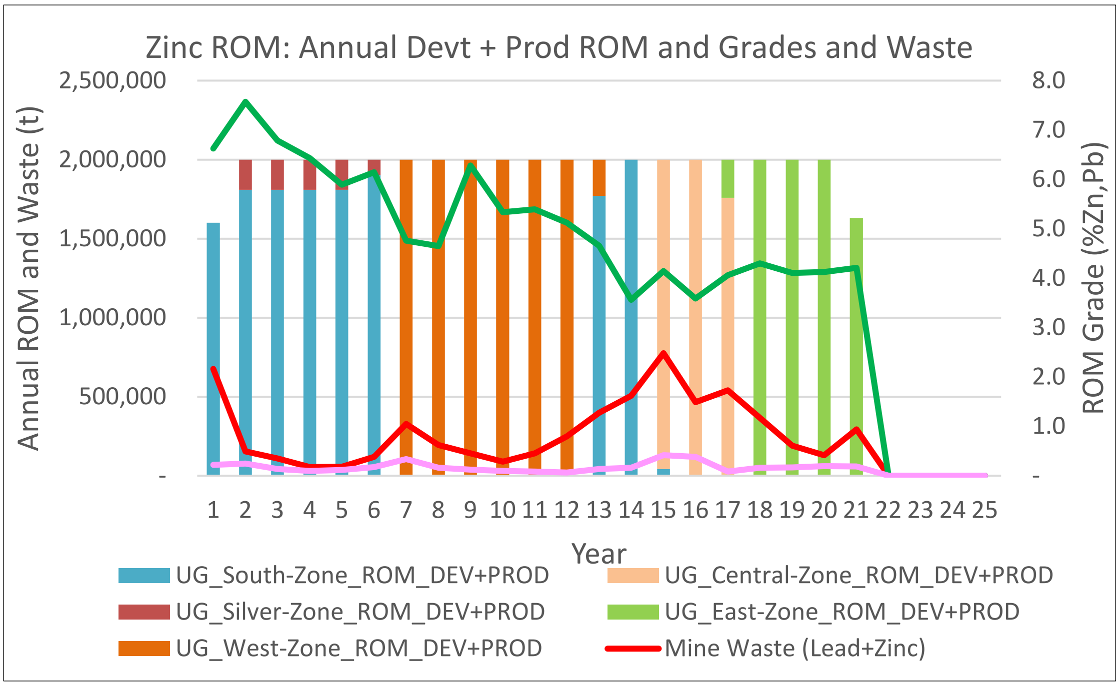
Source: SRK, 2024

Figure 16-36: Oblique View of Ayawilca Mine Design and Stopes Showing LOM Schedule

16.13.2 Schedule Results

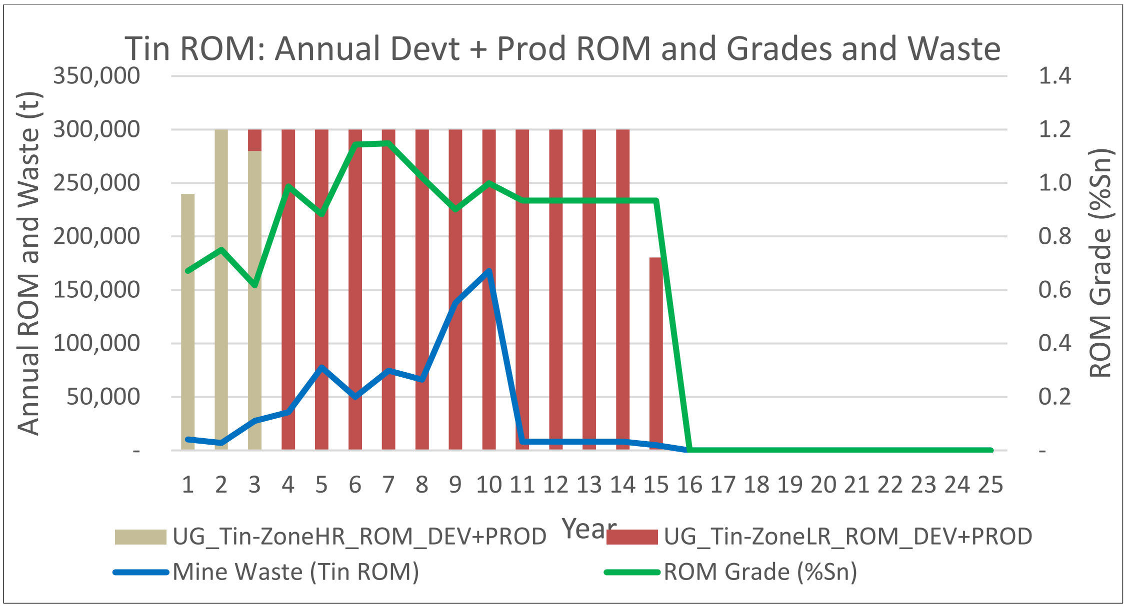
Figure 16-37 shows the Zinc Zone (including Silver Zone) annual development and production ROM tonnes and grade schedule achieving a sustainable production rate of 2.0 Mtpa till Year 21 and Figure 16-38 shows the Tin Zone (HR and LR) ROM production till Year 15. The annual mine schedule physicals and key performance indicators ("KPI") for the 2024 PEA are presented as follows:

- Overall ROM production and grades by Zone/Area in Table 16-18.
- Lateral and vertical development in Table 16-19.
- Mine equipment in Table 16-20.
- Mine personnel requirements for the underground operation in Table 16-21.
- Provision for mine water management equipment for primary pumping stations and secondary pumps in Table 16-22.



Source: SRK, 2024

Figure 16-37: Annual Development and Production Zinc ROM and Grade for Ayawilca



Source: SRK, 2024

Figure 16-38: Annual Development and Production Tin ROM and Grade for Ayawilca

Table 16-18: Overall ROM Schedule Production and Grades

Mining Schedule Physicals	Units	Total	Year 01	Year 02	Year 03	Year 04	Year 05	Year 06	Year 07	Year 08	Year 09	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21
Total Waste	**kt**	**6,892**	**687**	**216**	**154**	**120**	**199**	**230**	**403**	**260**	**279**	**257**	**149**	**256**	**407**	**515**	**780**	**465**	**539**	**365**	**190**	**128**	**294**
			-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Development ROM																							
South	kt	**2,710**	408	397	324	253	247	299	-	-	-	-	-	-	387	384	10	-	-	-	-	-	-
Silver	kt	**158**	-	71	28	18	28	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
West	kt	**2,159**	-	-	-	-	-	-	464	341	303	289	323	331	108	-	-	-	-	-	-	-	-
Central	kt	**1,200**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	385	449	366	-	-	-	-
East	kt	**999**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47	257	229	225	241
Tin HR	kt	**202**	45	79	78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin LR	kt	**612**	**-**	**-**	**3**	**52**	**71**	**80**	**65**	**69**	**61**	**46**	**36**	**36**	**36**	**36**	**22**	**-**	**-**	**-**	**-**	**-**	**-**
Production ROM																							
South	kt	**11,847**	**1,192**	**1,413**	**1,486**	**1,557**	**1,563**	**1,604**	**-**	**-**	**-**	**-**	**-**	**-**	**1,383**	**1,616**	**33**	**-**	**-**	**-**	**-**	**-**	**-**
Silver	kt	**699**	**0**	**119**	**162**	**172**	**162**	**83**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
West	kt	**10,071**	**0**	**-**	**-**	**-**	**-**	**-**	**1,536**	**1,659**	**1,697**	**1,711**	**1,677**	**1,669**	**121**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Central	kt	**4,517**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**0**	**1,572**	**1,551**	**1,394**	**-**	**-**	**-**	**-**
East	kt	**6,873**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**0**	**-**	**194**	**1,743**	**1,771**	**1,775**	**1,390**
Tin HR	kt	**618**	**195**	**221**	**202**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Tin LR	kt	**2,888**	**-**	**0**	**17**	**248**	**229**	**220**	**235**	**231**	**239**	**254**	**264**	**264**	**264**	**264**	**159**	**-**	**-**	**-**	**-**	**-**	**-**
Total ROM	**kt**	**45,551**	**1,840**	**2,300**	**2,300**	**2,300**	**2,300**	**2,300**	**2,300**	**2,300**	**2,300**	**2,300**	**2,300**	**2,300**	**2,300**	**2,300**	**2,180**	**2,000**	**2,000**	**2,000**	**2,000**	**2,000**	**1,631**
ROM Grade																							
Ilmenite	ppm In		104	91	108	117	102	85	14	29	69	73	87	86	53	25	29	47	60	33	51	40	26
Silver	g/t Ag		20.92	31.91	25.54	25.02	25.59	20.80	19.14	11.61	12.55	9.29	10.81	10.57	16.08	22.43	13.59	10.70	12.39	10.67	13.49	16.65	12.14
Lead	% Pb		0.20	0.23	0.19	0.13	0.12	0.16	0.29	0.14	0.11	0.08	0.09	0.07	0.13	0.15	0.39	0.38	0.09	0.16	0.17	0.19	0.18
Zinc	% Zn		5.81	6.07	5.54	5.22	4.79	5.20	4.17	4.07	5.48	4.65	4.71	4.47	4.06	3.11	3.81	3.59	4.06	4.30	4.11	4.13	4.21
Copper	% Cu		0.02	0.02	0.03	0.09	0.06	0.05	0.06	0.05	0.08	0.06	0.06	0.07	0.08	0.13	0.07	0.04	0.07	0.03	0.03	0.03	0.04
Tin	% Sn		0.10	0.13	0.11	0.18	0.18	0.21	0.18	0.17	0.16	0.18	0.17	0.17	0.19	0.23	0.14	0.07	0.07	0.03	0.04	0.05	0.06

Table 16-19: Mine Schedule Development Metres

Mine Development	Unit	Totals	Year 01	Year 02	Year 03	Year 04	Year 05	Year 06	Year 07	Year 08	Year 09	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21
Lateral Development																							
Decline	m	**18,830**	3,468	435	194	228	409	533	311	384	321	577	143	257	1,048	1,192	3,129	935	2,319	1,067	474	265	1,142
Level_X-Cut	m	**8,997**	215	579	274	221	219	227	838	489	389	593	108	421	502	905	639	523	848	405	264	64	273
FW Dev	m	**29,178**	1,397	852	442	617	797	677	2,593	1,672	1,439	803	1,251	2,070	1,862	1,988	2,606	2,538	1,724	960	780	898	1,211
Vent Dev	m	**2,688**	1,048	147	60	64	181	157	20	46	210	103	26	47	203	91	235	42	10	-	-	-	-
Ore Dev	m	**115,862**	6,523	7,879	6,250	4,640	4,974	5,678	7,610	5,906	5,241	4,838	5,168	5,293	7,662	6,052	6,016	6,466	5,942	3,707	3,302	3,243	3,468
Other Dev	m	**16,200**	734	400	897	194	604	1,001	1,011	390	873	846	187	104	957	1,256	1,435	1,321	750	1,815	661	218	547
Total Level Development	**m**	**191,755**	**13,384**	**10,293**	**8,117**	**5,964**	**7,185**	**8,273**	**12,384**	**8,887**	**8,473**	**7,759**	**6,883**	**8,193**	**12,234**	**11,484**	**14,061**	**11,824**	**11,593**	**7,953**	**5,482**	**4,689**	**6,641**
Vertical Development																							
Level_Vert_Raise	m	**3,317**	388	56	48	59	106	129	67	67	116	155	32	36	129	590	820	125	287	-	17	23	67
Level_Escapeway	m	**1,381**	332	56	29	30	72	80	-	-	45	1	14	36	54	127	41	30	91	173	62	23	83
Total Vertical Development	**m**	**4,698**	**720**	**112**	**77**	**89**	**178**	**209**	**67**	**67**	**160**	**157**	**46**	**72**	**183**	**717**	**861**	**155**	**378**	**174**	**79**	**47**	**151**

Table 16-20: Mine Equipment Schedule

Mine Equipment	Unit	Max LOM	Year -01	Year 01	Year 02	Year 03	Year 04	Year 05	Year 06	Year 07	Year 08	Year 09	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21
Twin Boom Jumbo	each	**6**	0	6	4	4	3	3	4	5	4	4	3	3	4	5	5	6	5	5	4	3	2	3
Development Loader - 17t	each	**5**	0	5	3	3	2	3	3	4	3	3	3	2	3	4	4	5	4	4	3	2	2	2
Production Loader - 17t	each	**8**	1	6	7	7	8	8	8	7	8	8	8	8	8	7	7	7	6	6	7	7	7	6
Longhole Drill	each	**3**	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2
Truck - 50t capacity	each	**15**	1	8	9	10	10	11	12	11	12	13	14	13	14	14	15	15	14	15	13	13	13	12
Chargeup wagon	each	**4**	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3
Grader	each	**2**	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Service (Fuel/Lube) Truck	each	**5**	1	5	4	4	3	3	4	4	4	4	3	3	4	4	4	5	4	4	4	3	3	3
Integrated Toolcarrier	each	**6**	1	6	6	5	5	5	6	6	6	6	6	5	6	6	6	6	5	6	5	5	5	4
Grade Control/Probe Drill	each	**4**	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3
Light Vehicle	each	**35**	3	30	29	30	29	30	31	31	31	32	31	30	33	33	34	35	33	33	30	29	28	26
Personnel carrier	each	**12**	1	10	10	10	10	10	11	11	11	11	11	10	11	11	12	12	11	11	10	10	10	9
Agitator Truck	each	**2**	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Shotcrete Sprayer	each	**1**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Wheel Loaders (ROM & Backfill)	each	**2**	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Table 16-21: Mine Personnel Schedule

Mine Personnel	Units	Year -01	Year 01	Year 02	Year 03	Year 04	Year 05	Year 06	Year 07	Year 08	Year 09	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21
Management	each	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Technical Support	each	9	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Mine Operations	each	-	143	137	140	134	140	149	149	149	152	149	143	155	158	161	167	155	158	143	134	125	119
Maintenance	each	-	91	88	88	85	88	93	93	93	100	93	88	100	103	103	106	100	103	88	88	85	75
Administration	each	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Total Mine Personnel	**each**	**17**	**260**	**251**	**254**	**245**	**254**	**268**	**268**	**268**	**278**	**268**	**257**	**281**	**287**	**290**	**299**	**281**	**287**	**257**	**248**	**236**	**220**

Table 16-22: Mine Water Management

Mine Dewatering Pumps and Equipment	Unit	Year -01	Year 01	Year 02	Year 03	Year 04	Year 05	Year 06	Year 07	Year 08	Year 09	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21
Primary Pump Stations																							
South	each	-	1	1	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3
Silver	each	-	-	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
West	each	-	-	-	-	-	-	-	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
Central	each	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	3	3	3	3	3
East	each	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	3	3	3
Tin	each	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Total	**each**	**1**	**2**	**4**	**6**	**6**	**6**	**6**	**7**	**7**	**7**	**8**	**8**	**8**	**8**	**9**	**11**	**11**	**14**	**14**	**15**	**15**	**15**
Secondary Pumps																							
South	each	0	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Silver	each	0	-	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
West	each	0	-	-	-	-	-	-	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Central	each	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	10	10	10	10	10	10
East	each	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	10	10	10	10
Tin	each	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Total	**each**	**10**	**20**	**30**	**30**	**30**	**30**	**30**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**50**	**50**	**60**	**60**	**60**	**60**	**60**

17 RECOVERY METHODS

17.1 Introduction

This section outlines the recovery methods for zinc, lead, silver, and tin from the Ayawilca deposit. The zinc, lead, and silver processing involves conventional crushing, grinding, flotation, and dewatering to produce zinc and lead-silver concentrates, with tailings used for backfill or disposed of in a tailings storage facility. The tin processing parallels this approach, focusing on maximised recovery through comminution, concentration, and leaching, with similar attention to environmental considerations.

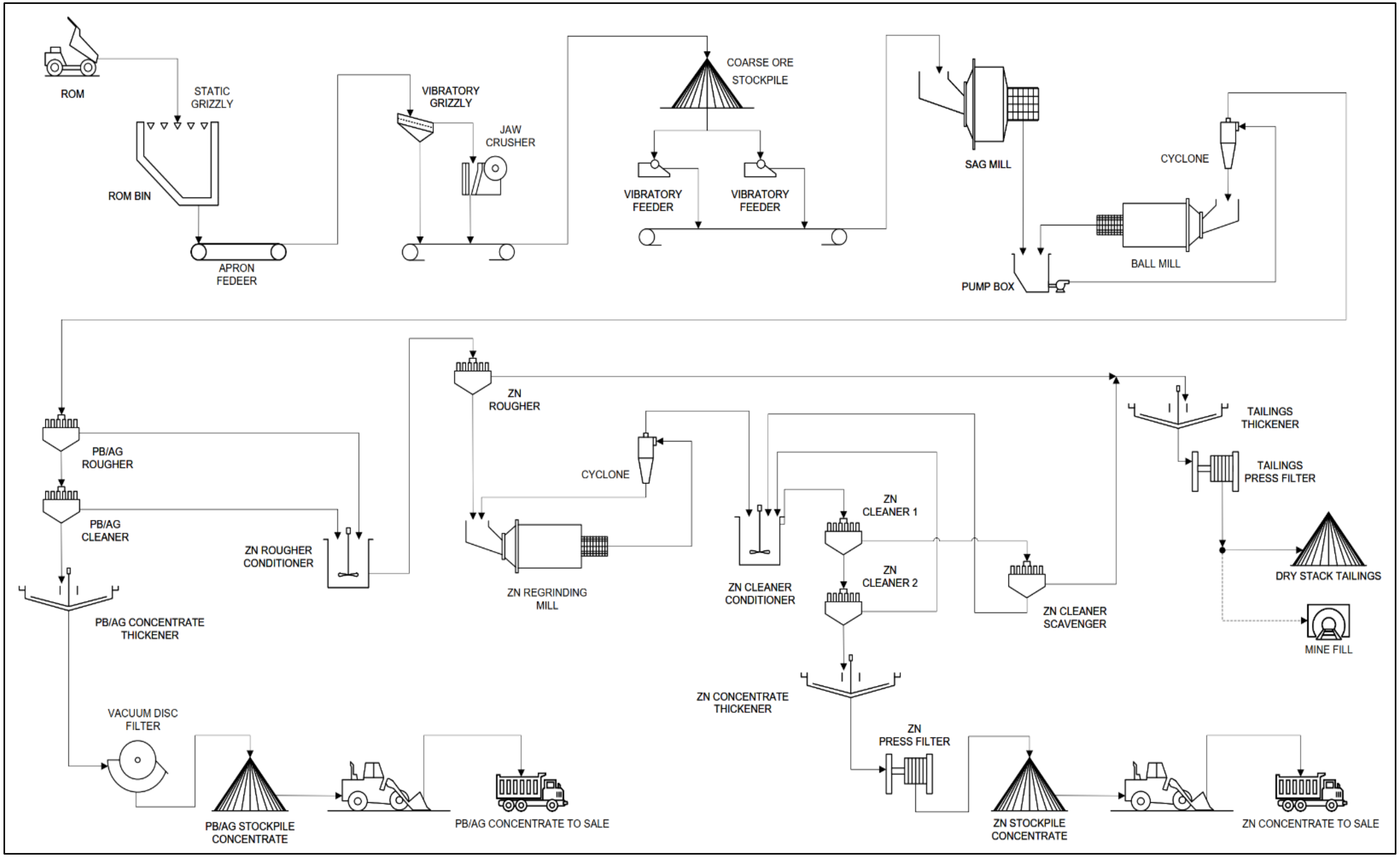
Each plant's design, based on metallurgical testwork, is intended to ensure a lean, efficient operation with a throughput rate set for both zinc/lead-silver (5,500 t/d) and tin (850 t/d) processing, aiming for high recovery rates and high environmental standards.

17.2 Zinc, Lead and Silver Processing

17.2.1 Zinc Process Flowsheet

The zinc, lead and silver (zinc mineralization) processing flowsheet is based on metallurgical testwork results described in Section 13. Processing of the zinc mineralization will be through a conventional primary crushing, semi-autogenous grinding (“SAG”), secondary ball mill grinding, lead and silver flotation, zinc flotation, concentrate thickening and filtration. The concentrator plant will produce two concentrates: a zinc concentrate and a lead–silver concentrate. A portion of the tailings will be mixed with cement and used as structural mine backfill material in the underground operations, while the remainder will be thickened and filtered, then disposed of on a dry stacked surface TSF. Process water will be recycled as much as possible to minimize water usage.

Figure 17-1 shows the general process block diagram.



Source: Transmin, 2024

Figure 17-1: Block Process Diagram – Zinc, Lead and Silver

17.2.2 Process Design Basis

The selection of a conventional zinc and lead–silver flotation processing circuit for and the associated flowsheet is based on metallurgical testwork results (refer to Section 13) and Transmin’s experience with operations treating similar mineralization, and of the same scale as proposed for the Ayawilca Project.

Metallurgical testwork has shown that the Ayawilca Zinc Zone and Silver Zone mineralized material is amenable to froth flotation, achieving commercial zinc and lead-silver concentrate grades and recoveries. A dedicated lead-silver flotation circuit (rougher/cleaner cells) is included to maximize net revenue from silver production. To recover the lead-silver content, a flotation stage comprising of pneumatic cells in a rougher–cleaner–scavenger arrangement is planned.

17.2.3 Process Design Criteria

A 5,500 t/d throughput rate was selected as the basis for the 2024 PEA.

Key process design criteria used for plant design are summarized in Table 17-1.

A lean, fit for purpose plant design standard was used, to cover the required duty for the projected 21-year mine life. The design will accommodate nominal operation with a small degree of capacity flexibility for interruptions and variability, but has no consideration or allowance for any expansion.

17.2.4 Process Overview

The zinc processing plant will consist of the following unit operations:

- Primary jaw crushing;
- Crushed ROM handling;
- SAG milling;
- Ball mill secondary grinding in a closed circuit with hydrocyclone classification;
- Lead circuit, including rougher flotation, cleaner flotation;
- Zinc circuit, including rougher flotation, regrind, cleaner flotation;
- Concentrate dewatering (zinc and lead–silver concentrates);
- Flotation tailings thickening, filtration and stacking onto a filtered TSF;
- Tailings backfill plant;
- Fresh and reclaim water supply; and
- Reagent preparation and distribution.

Table 17-1: Process Design Criteria - Zinc, Lead, and Silver

Parameter	Nominal	Unit	Source
Nominal plant capacity	5,500	t/d	Process calculation
Plant availability	92	%	Recommended by Transmin
Mill Feed Characteristics			
Specific gravity	3.6	-	Tinka
Apparent density (bulk)	2.74	t/m³	Metallurgical testwork
Moisture	2	% w/w	Assumption
ROM granulometry			
P100	310	mm	Assumption
P80	302	mm	Assumption
Comminution properties			
Crushing work index	11	kW*h/t	Assumption
Ball mill work index	13	kW-h/t	Assumption
Abrasion index	0.12	-	Assumption
Primary Crushing			
Operating hours	16	h/d	Recommended by Transmin
Throughput	531	t/h	Process calculation
Product Particle Size (P80)	118	mm	Process calculation
Grinding and Classification			
Operating hours	24	h/d	Recommended by Transmin
Throughput	385	t/h	Process calculation
Product particle size (P80) – Zinc Zone	106	µm	Metallurgical testwork
Product particle size (P80) – Silver Zone	65	µm	Metallurgical testwork
Zinc Concentrate			
% Moisture	10	%	Recommended by Transmin
Lead–Silver Concentrate			
% Moisture	10	%	Recommended by Transmin
Pb grade – Zinc Zone	50	%	Recommended by Transmin
Ag grade – Silver Zone	6,000	g/t Ag	Recommended by Transmin
Dewatered Tailings			
TSF: Backfill plant, split	60:40	-	Calculated

17.2.5 Primary Crushing

ROM material will be hauled by dump trucks from the underground mine to the crushing area on surface where the mill feed material will be discharged into a ROM bin.

The bin will be installed with a static grizzly and a hydraulic rock breaker to fracture the oversize rocks.

An apron feeder will recover material from the bin, feeding the vibrating grizzly where first coarse classification occurs. The oversize mill feed material will be sent to a primary jaw crusher, while both the crushed and undersize passing material will be transported by conveyor belts to the coarse stockpile. The belt conveyor will be equipped with an electromagnet to remove metallic objects that could damage the equipment downstream.

The coarse stockpile will act as surge protection to ensure the concentrator continues to operate while the mine or crushing plant are not producing. From the coarse stockpile, vibratory feeders will reclaim coarse mill feed material to feed into the grinding circuit.

17.2.6 Grinding and Classification

SAG mill discharge will be screened by a trommel. The coarse scat material will be placed by conveyors onto a scat stockpile, which will be periodically removed by front end loader to either the SAG feed, or else to waste storage. The trommel undersize will report to a pump box along with the tailings from the lead-silver flotation rougher flotation cells. At the pump box, a centrifugal pump will feed a hydrocyclone cluster which will classify the material so that it is suitable for zinc flotation.

The fine hydrocyclone overflow material will be transported by gravity to the zinc rougher conditioning stage prior to being sent to the dedicated zinc flotation circuit. The coarse hydrocyclone underflow material will report back to the ball mill for further grinding.

17.2.7 Lead–Silver Flotation

The ball mill discharge will feed the lead–silver flotation Jameson flotation cells. This circuit will comprise of rougher and cleaner flotation stages.

17.2.8 Zinc Flotation

The zinc flotation circuit will consist of rougher, regrind, cleaner and cleaner–scavenger stages. Jameson pneumatic flotation cells will be used in the zinc flotation circuit to produce a zinc concentrate.

Jameson-type cells were selected because of the capacity for fine air bubble generation, intense mixing, high bubble loading, and efficient froth washing which promote higher grade concentrates when compared to conventional mechanical cells.

17.2.9 Zinc Concentrate Dewatering

The zinc concentrate high-rate thickener underflow will be pumped to a press filter to produce a final concentrate cake. Concentrate cake will be trucked to either a local refinery for sale, or to a port of export for sale.

17.2.10 Lead–Silver Concentrate Dewatering

The lead flotation concentrate will be pumped to a concentrate tank, and then pumped to a vacuum disc filter. Final concentrate cake will be transported by truck to a port for sale.

17.2.11 Tailings Dewatering Process and Disposal

A conventional high-rate thickener is proposed for tailings thickening. Tailings will be dewatered and the underflow will report to a filter press where it will be further dewatered to produce a filter cake.

Part of the filtered tailings will be stored on the surface in compacted piles in a dedicated filtered TSF. The remainder will report to a mine backfill plant where it will be mixed with cement and transported underground to be deposited in mine voids for permanent storage. The thickener overflow water will be returned to the processing plant as process water.

17.2.12 Zinc and Lead-Silver Processing Discussion

The recovery process will be based on conventional coarse lead and fine zinc flotation recovery methods. Mineralization is expected to respond reasonably to this flowsheet and metallurgical testing of samples from the Zinc Zone indicate that a zinc concentrate grading 50% Zn can be produced with 92% of the zinc recovered to the concentrate. Metallurgical testing of a sample from the Silver Zone indicates that a zinc concentrate can be produced grading 50% Zn with 87% of the zinc recovered to the concentrate. (Section 13.5.1). The zinc concentrate is expected to be a marketable concentrate with no deleterious elements other than iron which is expected to be at penalty levels.

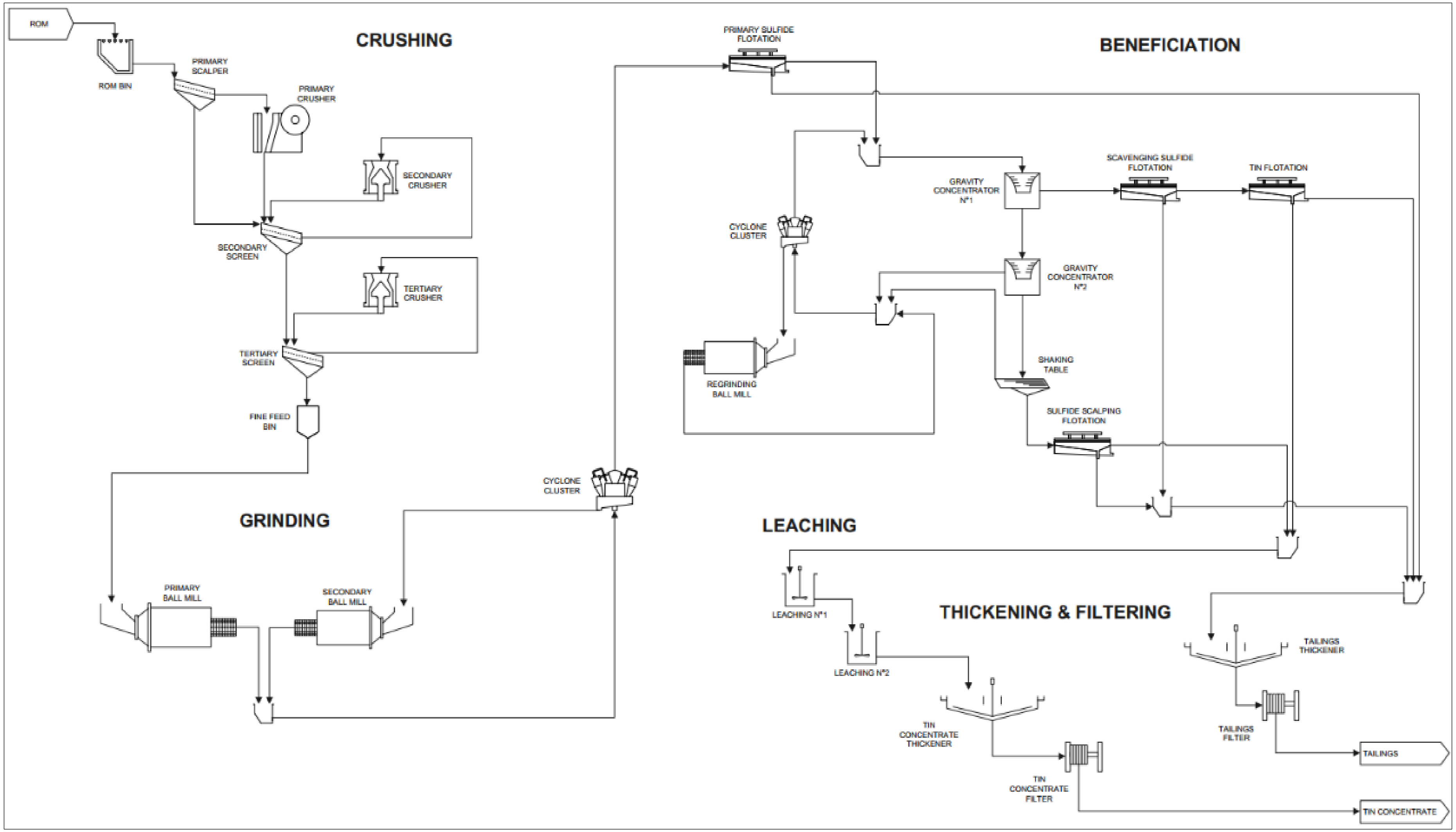
The lead metallurgy has been projected based on limited information and sampling, and has yet to be optimized. The silver that reports to the lead–silver concentrate is expected to be payable, while silver that reports to the zinc concentrate is not expected to be payable. Metallurgical testing of samples from the Zinc Zone indicates a lead concentrate can be produced grading 50% Pb (with 70% lead recovery) and grading 2,698 g/t Ag (with 45% silver recovery). Testing of a sample from the Silver Zone indicates a lead concentrate can be produced grading 26.5% Pb (with 85% recovery) and grading 6,000 g/t Ag (with 85% recovery).

No significant variability has been noted in the limited number of metallurgical samples to date; however, a geometallurgical variability program should be conducted in future testing on a broader set of samples including, lower-grade zinc and lead/silver samples, collected across the zones to refine the process design criteria assumed in this study. Further definition will also de-risk projected zinc and lead/silver recoveries, process operating costs, and metal production.

17.3 Tin Processing

17.3.1 Overview

The tin mineralization processing flowsheet (Figure 17-2) is based on metallurgical testwork results described in Section 13. This section outlines the comprehensive processing methodology proposed for the extraction and concentration of tin from the Ayawilca deposit, designed to handle an estimated throughput of 850 tonnes per day (t/d) of tin mineralization. The process plant leverages proven advanced technologies to maximize tin recovery and produce a mid -grade concentrate, suitable for sale to third-party refineries. The outlined recovery process is segmented into distinct phases: comminution, concentration via flotation and gravity methods, and purification through sulfuric acid leaching.



Note: Figure prepared by Transmin, 2024.

Figure 17-2: Block Process Diagram - Tin

17.3.2 Process Design Criteria

A 850 t/d throughput rate was selected as the basis for the PEA.

Key process design criteria used for plant design are summarized in Table 17-2.

A lean, fit for purpose plant design standard was used, to cover the required duty for the projected 15-year mine life. The design will accommodate nominal operation with a small degree of capacity flexibility for upsets and variability, but has no consideration or allowance for any expansion.

17.3.3 Process Overview

The tin processing plant will consist of the following unit operations:

- Primary jaw crushing;
- Secondary and tertiary cone crushing;
- Ball mill primary grinding in an open circuit;
- Ball mill secondary grinding in a closed circuit with hydrocyclone classification;
- Sulfide flotation;
- Gravimetric concentration;
- Ball mill regrinding in a closed circuit with hydrocyclone classification;
- Tin flotation;
- Leaching;
- Tin concentrate dewatering;
- Flotation tailings thickening and filtration;
- Fresh and reclaim water supply; and
- Reagent preparation and distribution.

Table 17-2: Process Design Criteria - Tin

Parameter	Nominal	Unit	Source
Nominal plant capacity	850	t/d	Tinka
Plant availability	92	%	Recommended by Transmin
Mill Feed Characteristics			
Specific gravity	4.2	-	Tinka
Apparent density (bulk)	2.52	t/m³	Assumption
Moisture	3.5	% w/w	Assumption
ROM granulometry			
P100	300	mm	Assumption
P80	159	mm	Assumption
Comminution properties			
Crushing work index	17	kW-h/t	Assumption
Ball mill work index	14	kW-h/t	Assumption
Abrasion index	0.2	-	Assumption
Primary Crushing			

Parameter	Nominal	Unit	Source
Operating hours	18	h/d	Recommended by Transmin
Throughput	47.2	t/h	Process calculation
Product Particle Size (P80)	34	mm	Process calculation
Grinding and Classification			
Operating hours	22	h/d	Recommended by Transmin
Throughput	38.5	t/h	Process calculation
Product particle size (P80)	180	µm	Assumption
Tin Concentrate			
% Moisture	9	%	Recommended by Transmin
Dewatered Tailings			
% Moisture	9	%	Recommended by Transmin

17.3.4 Tin Plant Design

The selection of a bespoke tin processing circuit for Ayawilca and associated flowsheet is based on metallurgical development testwork described in Section 13.

Metallurgical tests show that the Ayawilca Tin Zone can be processed using methods similar to those at Tasmania's Renison Mine, due to both having similar iron sulfide and cassiterite contents. This means the proven techniques at Renison could be adapted for Ayawilca, potentially leading to efficient tin extraction. The comparison between these two deposits highlights the possibility of using existing, effective processes at Ayawilca with some adjustments. This approach aims to achieve high tin recovery while maintaining environmental standards.

17.3.5 Comminution

The initial phase of the processing involves three stages of crushing to reduce the material to a size suitable for the subsequent grinding process. The primary jaw crusher will reduce the feed size, which is then further reduced in a secondary cone crusher and tertiary cone crusher. Between each stage of crushing, the material is screened of fines. The fine material product reports to the fine feed bin, and subsequently to the grinding mills.

Fine feed material undergoes a two-stage grinding process involving primary and secondary ball milling. This phase aims to achieve optimal liberation of the tin-bearing mineral phases. The finely ground material is then subject to hydrocyclone classification, segregating the fine and coarse fractions, with the fines proceeding to the concentration phase, and the coarse returning to the secondary ball mill.

17.3.6 Beneficiation

The beneficiation process begins with sulfide flotation, where pyrite and pyrrhotite are selectively separated and directed to tailings, achieving the recovery of non-sulfide tin mineralization. The resultant non-sulfide stream is then processed through a series of centrifugal bowl gravity concentrators. These concentrators are designed to capture the denser tin particles, while lighter material is removed as tailings.

The concentrate from the gravity concentrators undergoes sulfide scalping flotation to remove residual sulfides, enhancing the tin concentrate's purity. Middlings from this process are re-ground and recycled back to the gravity concentrators, ensuring maximal tin recovery. Tailings from the gravity circuit, prior to tin flotation, are subjected to scavenging sulfide flotation to eliminate residual sulfides, then, tailings from this flotation are subjected to tin flotation to recover any remaining tin values, minimizing losses.

17.3.7 Leaching

To further enhance concentrate quality, the combined product from gravity concentration and scavenging flotation undergoes a sulfuric acid leaching process. This step is useful for removing siderite (iron carbonates), thus improving the grade of the tin concentrate.

Following leaching, the slurry is thickened. The thickened slurry is then filtered to produce a tin concentrate, which is dispatched by truck for sale to third party refineries.

17.3.8 Tin Concentrate Dewatering

The tin concentrate conventional thickener underflow will be pumped to a press filter to produce a final concentrate cake. Concentrate cake will be trucked to a port of export for sale.

17.3.9 Tailings Dewatering Process and Disposal

A conventional thickener is proposed for tailings thickening. Tailings will be dewatered and the underflow will report to a filter press where it will be further dewatered to produce a filter cake.

The filtered tailings may be stored on the surface in compacted piles in a dedicated tailings storage facility or go to a mine backfill plant. The thickener overflow water will be returned to the processing plant as process water.

It has been recognized, at a conceptual stage, that the tin-zone tailings will have a high sulphide content and the future testwork and management of these tailings for storage underground as paste backfill and on the surface in the dry stack TSF is discussed in Section 16.9 and Section 18.4.6 respectively.

17.3.10 Tin Processing Discussion

The proposed recovery methods for the Ayawilca tin deposit employ a combination of mechanical and chemical processes tailored to the specific characteristics of the mineralization. By integrating crushing, grinding, classification, flotation, gravity concentration, and leaching processes, the plant is designed to maximize tin recovery and produce a concentrate of marketable quality. The process flowsheet has been developed to be environmentally conscious, with water recycling and tailings management integrated into the design.

17.4 Energy, Water, and Process Materials Requirements

17.4.1 Energy

Process plant and site infrastructure energy requirements (excluding underground mine) and expected installed power for these facilities is shown for the Zinc Plant in Table 17-3 and the Tin Plant in Table 17-4.

Table 17-3: Zinc Plant Forecast Energy Consumption

Area	Shaft Power, kW	Installed Power, kW	Maximum Power Demand, kW	Energy Consumption, MW-h/y	Cost, US$/y
Processing Plant - Zinc	***6,480***	***7,248***	***5,427***	***31,694***	***2,218,548***
Crushing	199	221	166	968	67,785
Handling and Stockpile	73	81	60	353	24,725
Comminution and Flotation	4,935	5,483	4,112	24,015	1,681,073
Reagents	47	52	39	227	15,871
Tailings Thickening	191	212	159	928	64,961
Tailings Filtration	747	859	635	3,710	259,666
Plant Services	290	341	256	1,492	104,466
Site Infrastructure	***50***	***62***	***47***	***273***	***19,130***
Plant Offices	2	3	2	13	916
Plant Maintenance	13	17	12	72	5,074
Laboratories	34	43	32	188	13,139
TOTAL	**6,530**	**7,311**	**5,474**	**31,967**	**2,237,678**

Table 17-4: Tin Plant Forecast Energy Consumption

Area	Shaft Power, kW	Installed Power, kW	Maximum Power Demand, kW	Energy Consumption, MW-h/y	Cost, US$/y
Processing Plant - Tin	***2,081***	***2,319***	***1,739***	***11,425***	***685,509***
Crushing	286	318	239	1,568	94,090
Handling and Stockpile	13	14	11	70	4,226
Beneficiation and Dressing	1,276	1,418	1,063	6,985	419,118
Reagents	67	75	56	367	22,047
Tailings Thickening and Filtration	334	371	278	1,827	109,621
Plant Services	105	123	92	607	36,407
TOTAL	**2,081**	**2,319**	**1,739**	**11,425**	**685,509**

17.4.2 Water

The conceptual water management plan and balance for the project is discussed in Section 18.5. On the basis of this and the projected process water requirements, the zinc plant will require around 48 m³/hr as make-up water, and the tin plant require 8 m³/hr as make-up water. This make up water is expected to be supplied by a combination of:

- Mine dewatering water;
- Site surface runoff capture;
- Raw water wells.

17.4.3 Consumables

Reagent requirement estimates for the Zinc Plant and Tin Plant are provided in Table 17-5 and Table 17-6 respectively.

Table 17-5: Zinc Plant Reagent requirements

Reagent	Purpose	Consumption (g/t)
Lime	pH control in flotation	775
Sodium metabisulphite	Modifier used in flotation	100
Aero 3894	Zinc collector used in flotation	25
3418A	Pb/Ag collector used in flotation	15
MIBC	Frother used in flotation	20
D250 frother	Frother used in flotation	20
Copper sulphate	Sphalerite activation.	350
Flocculant	Used for dewatering concentrates and tailings	45

Table 17-6: Tin Plant Reagent requirements

Reagent	Purpose	Consumption (g/t)
Sulfuric Acid	Dressing of tin concentrate	1,500
Potassium Amyl Xanthate	Collector used in flotation	100
Styryl Sulfonyl Fluoride	Modifier used in flotation	400
Ferrous Sulphate/Sodium Silicate	Modifier used in flotation	400
Styrene Phosphonic Acid	Collector used in flotation	200
Acidified Sodium Silicate	Modifier used in flotation	1,500
Copper sulfate	Sulfide activation.	146
Sodium Isobutyl Xanthate	Collector used in flotation	300
Methyl Isobutyl Carbinol	Frother used in flotation	50

17.5 QP Comments on Section 17

Both the zinc and tin process plant designs are based on conventional technologies.

In the opinion of the QP, the zinc mineralization is expected to respond reasonably to this flowsheet and metallurgical testing of samples from the Zinc Zone indicate that a zinc concentrate grading 50% Zn can be produced with 92% of the zinc recovered to the concentrate.

In the opinion of the QP, more Tin Zone flowsheet development and variability testwork is required before starting a PFS. While the current flowsheet would likely meet the current predictions, there remains opportunities to reduce the process complexity, capital costs, and operating costs by mineralogical, geometallurgical and mineral processing investigations.

The silver metallurgy was projected based on limited information and sampling, and has yet to be optimized. The silver that reports to the lead–silver concentrate is expected to be payable, while silver that reports to the zinc concentrate is not expected to be payable. The zinc concentrate is expected to be a marketable concentrate with no deleterious elements other than an iron penalty.

Other option studies that should be investigated at the PFS stage include plant location, site layout, comminution design, reagent optimization, concentrate dispatch, and tailings management.

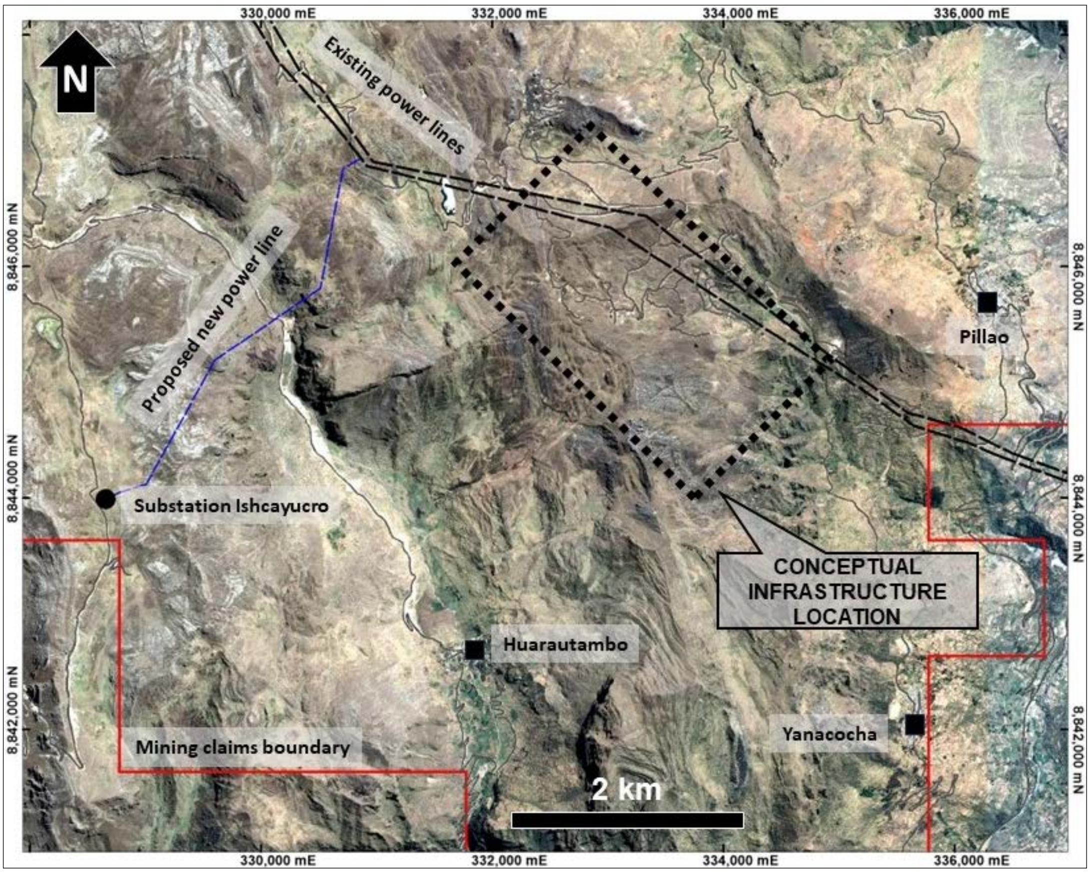
18 PROJECT INFRASTRUCTURE

18.1 Introduction

Project infrastructure components required to support the 2024 PEA include mine and process plant supporting infrastructure, site accommodation facilities, TSF, external and internal access roads, power supply and distribution, fresh water supply and distribution, and water treatment plant. The infrastructure is likely to be situated within the locations shown in Figure 18-1. As the planned operations will be underground, minimal waste will be generated, hence no permanent waste rock facilities are included in the infrastructure assessments.

New connecting infrastructure consists of a new substation and power line at Ishcayucro 3.5 km to the southwest (Figure 18-1). Site infrastructure includes camp, electrical yard, water ponds, workshops & stores, laydown area, office, plant residues impoundment (dry-stack TSF) and ancillary supporting infrastructure.

The Project is located in a remote mountainous river valley area and is a greenfields site. Due to site limitations imposed by topography and potential geological hazards, site development earthworks will be a major project consideration.



Source: Tinka, 2024

Figure 18-1: Plan View of the Ayawilca Deposit and Conceptual Site Layout

18.2 Road and Logistics

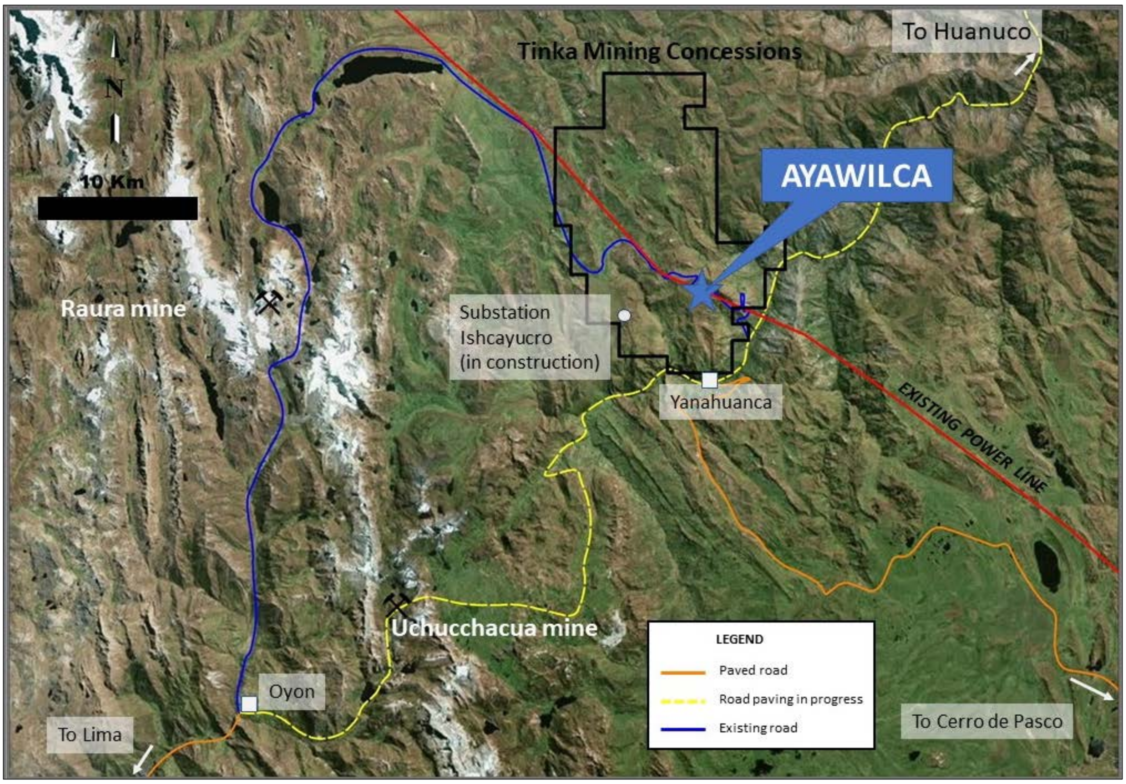
The best existing access to the Project by road from Lima is via the Panamericana Norte highway north to Chancay (94 km) then northeast on the Huaura–Oyón road (138 km), and the final segment from Oyon to Yanahuanca (70 km). From Yanahuanca to site (15 km) the road passes through either of the communities of San Pedro de Pillao or San Juan de Yanacocha. The segment from Huaura to Oyón is a two-lane road and is paved. The road from Oyón to Yanahuanca is single lane and is partially paved. The Yanahuanca-site road is single-lane gravel road and is currently not suitable for large trucks.

An alternative road is the Oyon to site road via the Raura mine, see Figure 18-2. This road is a similar total distance from Oyon to site (85 km) but travels past the Raura mine and unlike the other road remains at a high elevation (above 4,000 masl).

Proposed Access Route

The preferred from the Project for concentrate trucks and equipment for the 2024 PEA is the road that leads northwest from Ayawilca via the Raura mine that joins the paved road near to Oyon. This road retains high elevations (above 4,000 masl) and passes over the Raura mountain range at about 4,900 masl. There are few communities living along this road.

The road network would be used to transport consumables to site and concentrates to either a local smelter or to the Callao port for the other concentrates. The Port of Callao in Lima (see Figure 2-1) is the closest port which currently handles metal concentrates (approximately 320 km from site), For the purposes of the 2024 PEA, a minor portion of the zinc concentrate and all of the lead–silver and tin concentrates would be trucked to Callao and sent to smelters in Asia. For the purposes of the 2024 PEA the majority of the zinc concentrate would be trucked to the local zinc refinery at Cajamarquilla near Lima.



Source: Tinka, 02024

Figure 18-2: Access roads From Oyon to Site

18.3 Waste Rock Storage Facilities

The mine plan for Ayawilca includes provision for a three temporary surface mine waste pads with a working storage capacity up to 200 kt each. These pads are in vicinity of the underground access portals. Mine waste will be generated through the portal boxcut, decline and access development for each of the mining areas. A portion of the mine waste generated is likely to be suitable for construction (such as roads and civil works) and a potential need of Cemented Rock Fill (“CRF”). There are opportunities to use a portion of development waste within the underground mine for unconsolidated rockfill and road sheeting on top of paste filled stopes which will reduce the materials handling requirements and reduce costs.

18.4 Tailings Storage Facility

The current mine plan estimates a total of 45.6 Mt of ROM feed, and a full processing rate of 2.3 Mtpa, which consists of 2.0 Mtpa of Zinc-zone feed and 0.3 Mtpa of Tin-zone feed. This results in a total of 41.6 Mt of tailings, once concentrate tonnages are subtracted. Approximately 16.8 Mt of tailings (40%) will be utilised as underground paste backfill, leaving approximately 24.8 Mt of tailings (60%) that will require storage in an engineered TSF on surface.

The storage distribution of surface versus underground distribution on an annual basis, as derived from the mine plan, is shown in Figure 18-3. The distribution was developed in order to maintain a relatively equal balance, which will allow for maintaining required equipment at a stable level during the LOM. Volumes of stopes to be filled were obtained from the 2024 PEA mine plan, and paste filling plan. Densities for the paste backfill product were estimated from results of testwork by Golder–WSP in Sudbury, Ontario, Canada, on samples supplied by Tinka, with technical support and direction by Envis.

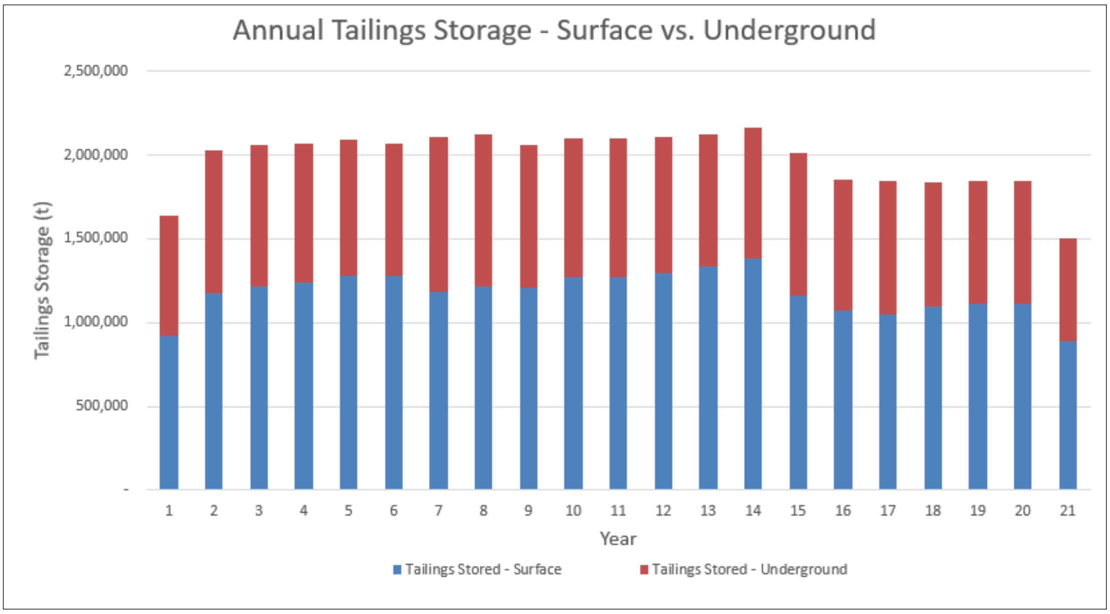


Figure 18-3: Annual Tailings Storage – Surface vs. Underground

18.4.1 Evaluation of Surface Storage Options

Previous studies included comprehensive, wide-area selection studies, evaluating based on several key factors, including:

- 9 sites;
- 3 tailings dewatering/classification mechanical treatment technologies;
- Potential technical risks – civil, geotechnical, hydrogeological, environmental; and
- Hazards/risks to downstream populations; areas of cultural and/or archeological significance; major infrastructure.

Each of the 27 combinations was subjected to an initial evaluation of the risk factors, and preliminary costing was also carried out at a conceptual level. The initial evaluation was based on a total surface storage tonnage of 20 Mt.

For the 2024 PEA, studies were carried out to identify a potential site closer to the mining zones and process plant area, based solely on the use of filtered tailings stacking. Three potential sites were identified, and a preferred site was selected that can accommodate the full 24.8 Mt of surface tailings; this site is denominated ‘TSF-10C’.

Primary drivers for selecting TSF-10C site, and the stacked filtered tailings were:

- TSF-10C site is close to the process plant, thus minimizing the project footprint, while also reducing costs for transportation of tailings;
- Dry-stacking represents the “best available technology” for tailings dewatering, assisting in minimizing risk;
- Filtering and stacking in similar operational, geographic and climatic conditions is proven and precedented;
- Minimal hazards/risks to downstream populations and critical areas;
- Risks related to permitting and social license could be lowered significantly; and
- Filtering will result in higher efficiency in terms of water usage.

Cost estimate comparisons indicate that filtering and stacking represent a marginally higher initial project cost; however, it was deemed that the slightly higher initial investment would be worthwhile, given the lower overall risk profile of this technology. As compared to the previous PEA, costs for hauling the tailings to the TSF have been significantly reduced, given the shorter transport distance to the TSF.

18.4.2 Conceptual Design – Filtered Tailings Stack

The conceptual design of the filtered tailings stack was, as stated previously, done for a total tailings production of 24.8 Mt. Based on tailings testwork at the Golder-WSP laboratory, the in-stack, average dry density of the tailings was assumed to be between 90–95% of the maximum dry density, or 2,300 kg/t. The optimum geotechnical moisture content, based on the testing, was approximately 8%. This moisture content is low, based on benchmarking of similar projects, which exhibit an optimum moisture content in the range of 10-12%; additional testwork will be performed in future stages of the project to define the correct value.

Given the total tonnage on surface, and the assumed dry density, the final volume stored in the stack was estimated at 10.8 Mm3.

Geometric parameters used to design the stack at a conceptual level included:

- Overall slope of 3.5H:1V;
- 10 m inter-bench height;
- 5 m-wide benches; and
- 3.0H:1V inter-bench angle.

These values were estimated based on similar projects, and are considered reasonable for a conceptual-level design. In future design stages, the stability and deformation characteristics should be confirmed.

18.4.3 Considerations for Operation of Filtered Tailings Stack

While the 2024 PEA is limited to conceptual evaluations, consideration was given to the operational precedent and feasibility of the filtered dry stack in the site-specific conditions to be anticipated at Ayawilca. In particular, these will include: high seismicity; moderate rainfall in the four-month Andean rainy season; and commissioning and upset conditions at the filtering plant. To address these aspects, a benchmarking exercise was done, and at least a dozen similar drystack operations were identified as precedents, some of which are located in Peru. Additionally, measures were identified that should be incorporated into future design stages, and into operation of the facility:

Additional testing on tailings samples must be done, and appropriate contingency built into the filtering capacity (also see Section 18.5.4), in order to maximize filtering efficiency. During the four-month rainy season, tailings should be directed to the paste backfill plant as much as possible.

Contingency must be made to handle the non-complying, wet-of-optimum tailings that might result from upset of the filter plant. This could include an emergency storage pond, with capacity to hold 7–10 days of throughput. The wetter tailings also could be placed and spread out within the non-structural zone of the stack, and left to air-dry, in the dry months.

Alternatively, the contingency elements could include innovative use of containment cells such as geotubes, located within the stack itself, in order to minimize handling of the wetter tailings. The filtered stack design includes suitable channels to direct non-contact surface runoff around the facility. Additionally, the surface of the in-progress stack should be protected from direct rainfall by ‘sealing’ the active surface; and by covering inactive areas with ‘raincoats’, commonly applied to heap leach pads and to other, similarly operated stacked tailings facilities.

Within the stack, tailings that might be slightly high of optimum moisture content can be placed in a ‘non-structural’ zone; this zone is usually located to the inside of the stack, away from potential failure surface paths. Tailings placed to the outside of the stack would be densely-compacted at or near optimum moisture content, to form the structural zone.

The exposed slope of the stack should be covered with a coarse-fill, erosion-resistant material. Intermediate, contact-water channels should be built into the benches, in order to capture and direct runoff away from the surface of the stack.

18.4.4 Filter Sizing and Selection

Sizing and preliminary section of the filtered tailings system was based on results of laboratory testing done by Golder-WSP on tailings samples for:

- Feed solids rate;
- Filter cloth;
- Flocculant;
- Filter loading rate; and
- Turbidity of filtered effluent.

Key conclusions from the testing, as incorporated into the selection and sizing of the filters were:

- Preferred feed solids content to the filters was in the range of 69–72%;
- For the tested filter cloths, turbidities were all higher than a desired maximum. As such, a conservative loading rate of 200 kg/m2/hour was selected. Additionally, it is recommended that future testing be done limiting to a lower turbidity in the filtered effluent;
- Cracking of the filtered tailings material was observed at around 12%; this value represents the value at which the tailings will not ‘stick to’ a transportation system, such as a haul truck bed or a conveyor belt.

The above interpretations resulted in the conceptual-level selection of a vertical press filter system consisting of two units of 100 chambers each, with plates of 2.1 x 2.1 m, in order to filter the maximum nominal throughput of 2.3 Mtpa.

18.4.5 Development of Filtered Tailings Facility

The conceptual design of the TSF has been developed on a staged basis, based on the anticipated surface tailings storage requirements. The staged development is shown in Figure . As shown, the filtered stack will be progressively developed from bottom up, likely in lifts of around 300 mm thickness to optimize compaction and placement productivity.

The development of the TSF will require staged access roads for hauling the tailings to the stack, as well as perimeter drainage channels to divert surface runoff water. The conceptual design of these features is shown in Figure 18-5.

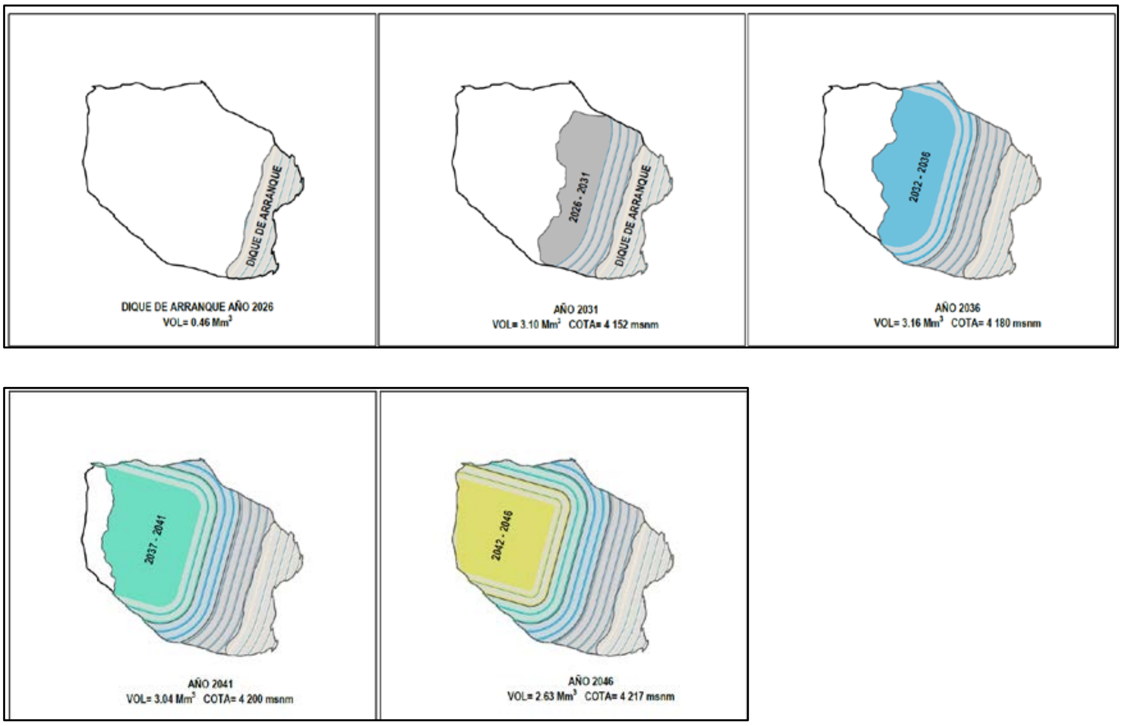


Figure 18-4: Staged Development of the Filtered Stack TSF

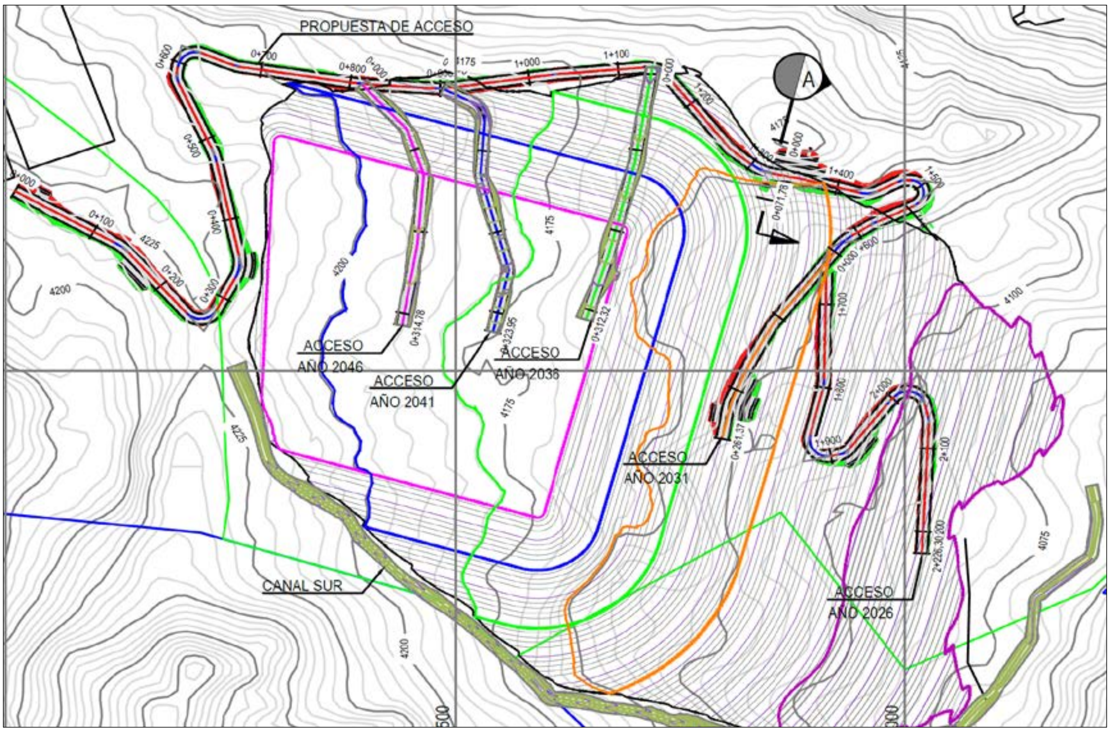


Figure 18-5: Staged Accesses and Perimeter Drainage

18.4.6 Management of High-Sulphide Tailings

It has been recognized, at a conceptual stage, that the Tin Zone tailings will have a high sulphide content, based primarily on the presence of significant concentrations of pyrrhotite in the tin ROM. This will likely classify these tailings geochemically as Potentially Acid Generating (“PAG”). Management strategies for this material will be required in order to ensure that unacceptable acidic and/or metals-laden seepage does not exfiltrate to the surrounding environment, either as surface drainage or into the groundwater system.

At this stage, detailed geochemical studies have not been done; however, possible strategies for minimizing the impacts of the high-sulphide tin tailings have been identified, as indicated below:

- Tin tailings could be blended with high-alkaline zinc tailings at the process plant, which could generate a net-neutral total tailings mixture. It is important to note that the ratio of high-sulphide to high-alkaline tailings is approximately 1:10, which could allow for significant neutralization potential.
- Tin tailings could be preferentially placed underground as paste backfill, below the baseline groundwater level. This would inhibit the ingress of oxygen into the tin tailings mass, and is an established method of minimizing potential acid mine drainage (“AMD”). It is noted that this method would not be applicable to the early years of mine development, which would likely be located above the baseline groundwater level.
- Encapsulation of high-sulphide tailings within the high-alkaline tailings in the filtered stack TSF is another alternative. This method would limit the contact with water and, subsequently, the generation of AMD. This method would be more challenging to operate during the 4-month rainy season each year, but is nonetheless considered viable, potentially in combination with other methods. Additionally, this method could require a geomembrane liner and foundation seepage capture system to be placed under the area of the filtered stack, discharging to a containment pond at the toe of the stack. Any seepage collected would be tested for compliance with acceptable discharge limits, and then either recirculated to the operation, or treated to be within the limits and discharged.
- Sulphide flotation of the tin tailings could be evaluated as an additional step in the tin plant processing circuit. This would involve removing a significant portion of the sulphides, and disposing of them in a designated storage and encapsulation facility.
- The optimum solution could also be a combination of one or more of the methods indicated above.

It will be necessary in future stages of the project to carry out adequate geochemical sampling, testing and characterization of the high-sulphide tailings, as well as water quality impact assessments, and develop predictive models to ensure that any discharged water will be within required water quality limits. This will be required during all stages of construction, operation, closure, and post-closure.

18.5 Water Management

A water management plan was developed based on a conceptual water balance. Mine water is planned to be recycled as much as possible. Runoff water from the temporary waste rock piles adjacent to the portals and recycled water from the filtered TSF are to be used for plant operations. The water management system will include diversion channels for non-contact surface water runoff around the temporary waste rock piles and the filtered TSF, as well as including ditches in the perimeter of infrastructure platforms and roads and pipes or culvert concrete boxes for stream crossings. This non-contact water will be discharged to creeks located downstream of the planned operations.

The zinc plant will require around 48 m^3/hr as make-up water, and the tin plant require 8 m^3/hr as make-up water. Potential make-water sources include water ponds to be constructed within the site layout. Fresh water will be required to complement make-up water for the plant. The Project will require a water license for use of fresh water and may also require an authorization to discharge liquid effluents.

There is a possibility of acid rock drainage (“ARD”) in the underground mine workings, TSF and mine waste based on the presence of significant sulphide content in the mineralized rock. A water treatment plant is included in the Project design. Excess water from the TSF and mine contact water would be diverted to the water treatment plant prior to any discharge to the environment.

18.6 Camps and Accommodation

An on-site camp for 500 personnel was assumed for the 2024 PEA purposes, and will include dormitories, administrative offices, a medical centre, laundry area, change house, canteen and kitchen, recreational area, potable water and wastewater treatment plants, and parking.

18.7 Power and Electrical

18.7.1 Electrical Transmission Lines

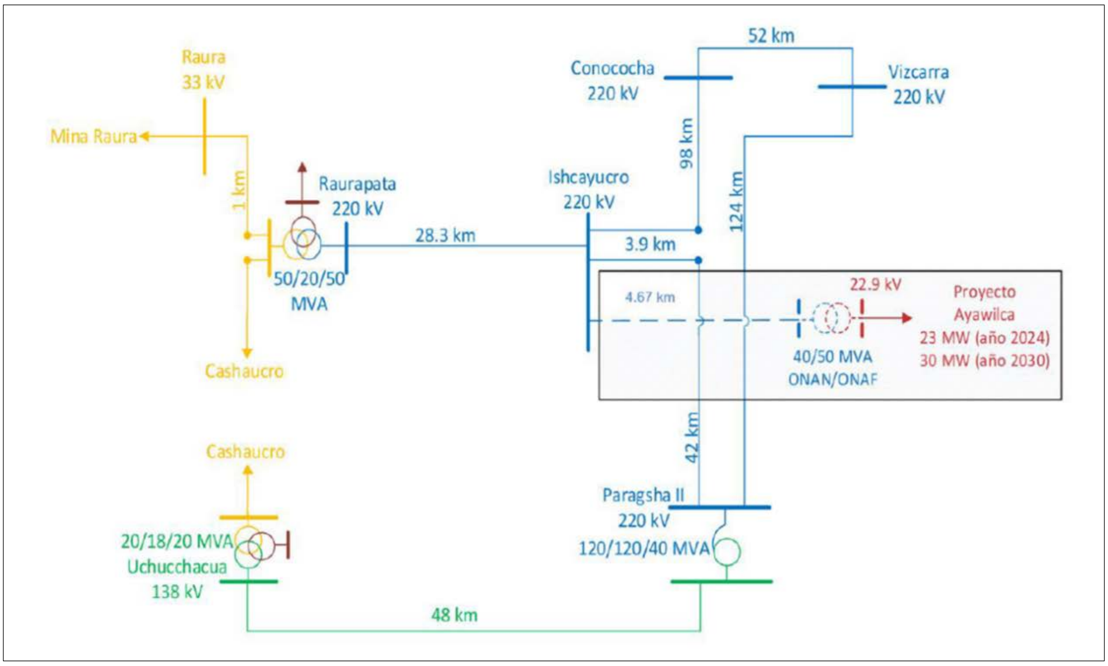
Two 220kV transmission lines cross the Project area, within 100m and parallel to each other:

- L-2254, Paragsha 2 – Vizcarra, owned by ISA Colombia (“REP”); and
- L-2264, Paragsha 2 – Conococha, owned by Abengoa Transmision Norte (“ATN”).

These lines are subject to the guaranteed system of transmission which is part of Peru’s national interconnection power system.

Power for the Ayawilca Project site will be provided via a L-2264 which has extra capacity available. A new substation (Ishcayucro) is currently under construction to accommodate an expansion of the Raura mine located to the west. The Ishcayucro 220 kV substation will be equipped with a tie-in at the sectioning point (Figure 18-6).

Tinka has set up a 100% owned subsidiary company in Peru, Compania Electrica Chaupihuaranga (“Chaupihuaranga”) specifically to manage the electricity permitting and future power contracts for the Project. Chaupihuaranga filed for a pre-operations study in 2023 (EPO) for a proposed 220kV / 23 MW Ayawilca electrical substation to connect to Ishcayucro substation which will start operating in 2025. The EPO was approved in February 2024, by the relavent Peruvian government body (COES) and remains valid until 2028. Tinka will be required to build a transmission line to connect Ayawilca substation to Ishcayucro, a distance of 4.7 km (Figure 18-4). Prior to building the transmission line and to commencing operations, the Ayawilca substation must be approved via an Environmental Impact Declaration (DIA) by 2027.



Source: Tinka, 2024

Figure 18-6: Proposed Design for the Power Supply at Ayawilca

18.7.2 Site Power Distribution

The site power distribution network will be 20 kV. A site substation will step down the power supply from 220 kV and to local sub-switch stations where the voltage is transformed to operating voltages (1,000, 690, 400 and 220 V). Three sub-stations are expected: concentrator plant, tailings and water treatment, and mining.

18.8 Surface Infrastructure

The PEA site plan contains general mine and process surface facilities including two Concentrator Plants – one for Zinc and one for Tin, ROM stockpile and a Backfill Plant. Other general mine facilities are a carpark, electrical yard, main office, workshop & stores, onsite mine camp (capacity for 500 people) and laydown yard.

The following outlines the general design and construction approach to earthworks, as generally employed for processing buildings and structures, backfill plant, power supply, and water treatment area.

No plant or infrastructure site specific geotechnical evaluation has been undertaken. SRK highlights that limitations in mine footprint and the mine area having challenging topography will introduce potential limitations for site development. Additionally, Ayawilca being in seismically active area might impose stricter requirements for buildings and structures.

Footings estimated to be on the crushed stone layer and ground supported (no piling). Below the crushed stone layer.

18.9 Underground Mine Infrastructure

18.9.1 Introduction

The South and West areas of the Zinc Zone are near surface and planned to be individually accessed through decline boxcuts with truck haulage to the ROM stockpile located at the process facility. In the later stages, Central, East, and deep Tin areas will be accessed via decline boxcuts developed from the northern side of the mine site.

The mine infrastructure will need to align with the production strategy, with permanent infrastructure over the LOM for all mining areas. Consideration is also given to locate, where possible, mine infrastructure inside the anticipated land acquisition area and therefore avoiding placement of any infrastructure inside the community area. Later in the LOM there is possibility that one exhaust raise will be placed in the north side of the East zone inside the community area to facilitate efficient mine ventilation. The main mine infrastructure considerations include:

- mine backfill
- mine ventilation
- mine dewatering system
- electrical reticulation infrastructure
- service and fresh water supply
- other working facilities for lunchrooms and storage of spares/consumables and magazines (explosives and detonators).

The surface plant infrastructure, mine office and mine camp will include combined facilities to accommodate mine administration, technical offices and change house facilities for the underground mine and maintenance crews. This also includes provision for a central mining/mobile and fixed plant workshop with major overhaul work to be undertaken in offsite facilities.

18.9.2 Underground Power supply

Power will be supplied to all three of the mine portal areas at a high voltage (“HV”) supply of 20 kV. From the portal, power will initially be delivered to support decline development at the low voltage (“LV"), typically at 1,000 V. When development has progressed far enough to reach the first substation location underground, a HV line will be installed.

Power will be reticulated by armoured HV cable suspended from the development backs to substations where it will be stepped down to LV and distributed to working areas for use by mining equipment. The maximum LV run is approximately 450 m and this determines the requirements for substation relocations.

18.9.3 Mine communications

Communications for the underground mine are assumed to be a combination of fibre-optic cable and radio-based communications system for all voice, date and remote-control communications within the mine. The system will be commissioned in stages and be progressively installed through decline development based on the LOM plan.

18.9.4 Fuel Bays

Surface fuelling facilities will be located close to the mine workshops, the laydown area and process facilities. Underground fuel bays should be considered when mining advances to the Central area and deeper parts of the South area to increase productive working time of mobile equipment.

18.9.5 Explosives and Detonator Magazines

Secured and separate underground explosives magazines will be required where detonators and primers/bulk explosives will be stored separate. The storage should be sized to a capacity that enables disturbance free supply of detonators, primers, bulk explosives and blasting accessories.

It is expected that emulsion explosives will be required for underground development and production activities. The explosives magazines will require an inventory log and the necessary suppression equipment in the event of a fire. The explosives magazines will typically be located away from main accesses and working areas and linked to the return airway circuit.

Magazine storage and handling of explosives will following Peruvian regulations.

19 MARKET STUDIES AND CONTRACTS

19.1 Market Studies

The information summarized in this subsection is derived from a report prepared by Ocean Partners, a third-party concentrate trading and marketing specialist company, who were contracted by Tinka to prepare a market study to support the 2024 PEA (Ocean Partners, 2024).

19.1.1 Zinc Concentrate

Zinc Market Overview

A subdued macroeconomic environment combined with a surplus in the refined zinc market exerted downward pressure on zinc prices during 2023. This scenario resulted in several higher cost mines including Tara in Ireland, Aljustrel in Portugal and the Gordonsville and Cumberland underground mines in Tennessee being placed on care and maintenance. These closures, combined with a strike at the Penasquito mine in Mexico saw buyers become increasingly nervous about the availability of zinc concentrates with the result that spot treatment charges (“TC”) plummeted from US$275/t at the start of 2024 to below US$100/t by the end of the year.

Although production has resumed at Penasquito the zinc concentrate market has remained tight during the early months of 2024. Production difficulties at the Gamsberg mine in South Africa and the impact of adverse weather on deliveries from some Australian mines have continued to constrain supply. Wood Mackenzie and CRU both reported monthly average spot terms for zinc concentrate of US$85/t during February, with reports of lower terms being achieved in some recent tenders. At the time of writing, the annual benchmark for zinc concentrates supplied under long-term contracts during 2024 has not been confirmed. However, it is expected that a settlement in the region US$160/t to US$170/t will be reached compared with a level of US$274/t during 2023.

After declining during 2023, global zinc mine production is forecast to return to growth in 2024. Initial concentrate production was reported at the new Vares mine in Bosnia and the Buenavista mine in Mexico during Q1 2024. Commissioning of the new Kipushi project in DRC is expected during Q2 2024. The timing of first production from the Ozernoye project in Russia, where commissioning was delayed by a fire at the end of 2023, is less certain. Prevailing low TCs are putting zinc smelter economics under pressure. It is understood that some smelters in China and elsewhere in Asia are currently considering reductions in utilization rates. It is also unlikely that European smelters which cut production due to high power prices following the Russian invasion of Ukraine will resume full output until treatment charges increase to some extent. Overall, the balance of probability is that the zinc concentrate market will remain in deficit during 2024 before returning to slight surplus in 2025.

In a surplus zinc concentrate market, smelters will be more particular about the quality of material they will accept. In these circumstances the acceptability threshold for minor and penalty elements will be lower. Smelters will also pay increased attention to the Zn content of purchased concentrates. Concentrates with a Zn content significantly below 48% will be at increased risk of being rejected. Increased scrutiny of the environmental impact of residue disposal at zinc smelters and the costs associated with dealing with hazardous waste mean that concentrates with a higher ratio of zinc to residue-forming elements such as SiO_2 and Fe will be viewed more favourably.

After accounting for US CPI inflation, the base benchmark TC for zinc concentrates has averaged just under US$260/dmt over the past decade. It is expected that reserve depletion and declining head grades at major mines including Antamina and Red Dog will see the zinc concentrate market tend towards tightness during the second half of this decade. An average benchmark somewhat lower than the inflation-adjusted historical figure referred to above should therefore be used for financial modelling of the Ayawilca project. It is suggested that a figure of US$220/dmt would be a reasonable figure. This would satisfy the requirements of financing banks who are likely to want to see financial modelling based on long-term sales contracts. In practice a portion of the Ayawilca zinc concentrate could be sold through into the spot market allowing lower terms to be realised.

Potential Zinc Concentrate Marketing Strategy

The expected grade of the Ayawilca zinc concentrate is 50% zinc, which is considered a medium grade zinc concentrate, and typical of concentrates from many zinc deposits in central Peru. The smelter pays for 85% of zinc content in the concentrate subject to a minimum deduction of 8 units.

The expected iron content of the Ayawilca deposit (approximately 13% Fe) means that the proportion of production that can be sold to smelters in Peru and elsewhere in South America will depend on the iron content of other mines feeding those smelters at that time. Tinka expects that the first 200,000 wmt per annum of zinc concentrate production will be sold to the Cajamarquilla refinery east of Lima, with the balance being sold to smelters in East Asia.

The Ayawilca zinc concentrate is expected to receive an Fe penalty of US$7.50 per dmt of concentrate at the smelter (at a standard penalty rate of US$1.50 per % Fe above 8% Fe). No other deleterious elements are present in the Ayawilca zinc concentrate, and no other penalties are expected.

Smelters that recover indium may offer more competitive terms for material containing the stated range for Ayawilca zinc concentrates of 400 to 720 ppm indium (av. 550 ppm). The exact figure will be dependent on the prevailing indium price. Tinka considers that the high indium content would result in a US$20/dmt reduction in treatment charges for the zinc concentrate to the extent placed with offshore smelters that recover indium.

Based on current exchange rates, a figure of US$40 per wet metric tonne (wmt) is regarded as an appropriate figure to cover the inland freight costs of transporting concentrate produced at Ayawilca to the port of Callao or the Cajamarquilla smelter located close to Lima. If any material is exported, then an average sea freight cost of around US$45 per wmt is regarded as a reasonable assumption for financial modelling purposes. It is assumed that by the time that Ayawilca comes into production the high freight costs prevailing during 2021 will have reverted to more typical long-term averages. Port costs will be in the range of US$25t per wmt.

19.1.2 Potential Lead-Silver Concentrate Marketing Strategy

Lead-silver concentrate from the Zinc Zone is expected to average 50% lead, with the annual silver grade ranging from 900 g/t to 5,600 g/t. Lead-Silver concentrate from the Silver Zone is expected to average 6 kg/t silver, with the lead content ranging from 13% to 38%. A single lead-silver concentrate will be produced, averaging 47% lead and 3,140 g/t silver. The smelter is assumed to pay for 95% of lead content in the concentrate subject to a minimum deduction of 3 units. Silver in the lead concentrate is payable at 95% silver content subject to a minimum deduction of 50 g/dmt.

No penalties are expected on the lead-silver concentrate.

Land transport costs are the same as those for the zinc concentrates. No lead smelter is currently operational in Peru, so the concentrates are presumed for this study to be shipped to Asia. Overseas transport is expected to be by container. Port costs for containers will be in the range of US$50/wmt, with ocean freight at US$15/wmt. For silver/lead concentrates with a silver content greater than or equal to 2,500 g/t, the treatment charge is expected to be US$50/dmt, and the silver refining charge US$0.80 per payable ounce. For concentrates with a silver content of less than 2,500 g/t, the treatment charge is expected to be US$150/dmt, and the silver refining charge US$1.00 per payable ounce.

19.1.3 Potential Tin Concentrate Marketing Strategy

The tin concentrate produced by Ayawilca is projected to average 50% tin, with 9% iron and 4.5% sulphur, both at penalty levels. The sulphur content makes the concentrate unsuitable for the one tin smelter in Peru, so the tin concentrates are assumed to be sold to customers in Asia. Due to the relatively low volumes, the tin concentrates are expected to be shipped by container. Land transport, port charges and ocean freight are expected to be the same as for Ayawilca lead-silver concentrate.

Payables are expected to be based on a minimum deduction of 2.5 units, with an additional deduction of 0.1 units for each 1% that the content is less than 60%. For the projected Ayawilca tin concentrate grade of 50%, 93% of the contained tin is expected to be payable.

A long-term average treatment charge of US$750/dmt is expected. The sulphur penalty is assumed to be US$10/dmt for each 1% S from 0% to 2%, US$20/dmt for each 1% S from 2% to 4%, and US$30/dmt for each 1% S over 4%. At the projected sulphur content of 4.5%, the sulphur penalty would be US$75/dmt. The relatively high iron content is expected to result in a penalty as well. The iron penalty takes the form of an increase in the deduction, which is assumed to be 10% of the iron content in excess of 2%. At the projected iron content of 9%, the additional deduction is 0.7% of the tin content.

19.1.4 Commodity Price Projections

Project economics were estimated based on a long-term metal price of US$1.30/lb for zinc, US$1.00/lb for lead and US$22.00/oz for silver, and US$11.00/lb for tin. The prices for zinc, lead and silver were established by Tinka. The tin price was selected within the range of industry consensus prices and feedback from potential offtakers

19.2 Contracts

Tinka has no current contracts for project development, construction, mining, concentrating, smelting, refining, transportation, handling, sales and hedging, or forward sales contracts or arrangements.

It is expected that when such contracts are negotiated, they would be within industry norms for similar projects in Peru.

19.3 QP Comments on Section 19

The QP has reviewed the information summarized in this section and notes the following:

Marketable zinc and lead-silver concentrates would be produced from the Zinc Zone and the Silver Zone. The zinc concentrate will have zinc as the payable element. Payable elements in the lead-silver concentrate will be lead and silver. Marketable tin concentrates would be produced from the Tin Zone, with tin being the only payable element.

High indium grades in the zinc concentrate represent a potential value-add. For that portion of the zinc concentrates sold offshore, a US$20/dmt reduction in treatment charges was assumed to apply as a result of the high indium grades. Further technical and marketing studies should be carried out to evaluate how additional value may be derived from indium.

The zinc concentrate is expected to receive an iron penalty of US$7.50/dmt of concentrate at the smelter, at a standard penalty rate of US$1.50 per 1% Fe above 8% Fe. No penalties are expected on the lead–silver concentrate. The tin concentrate is expected to receive a sulphur penalty of US$75/dmt and an iron penalty in the form of an additional deduction of 0.7 units.

The tin concentrate is expected to receive penalties for relatively high iron and sulphur contents. Opportunities exist to reduce the sulphur and iron in the tin concentrate, and to improve the tin concentrate grade, with more metallurgical test work.

The QP notes that the prices for zinc, lead and silver are reasonably aligned with SRK’s survey of consensus prices.

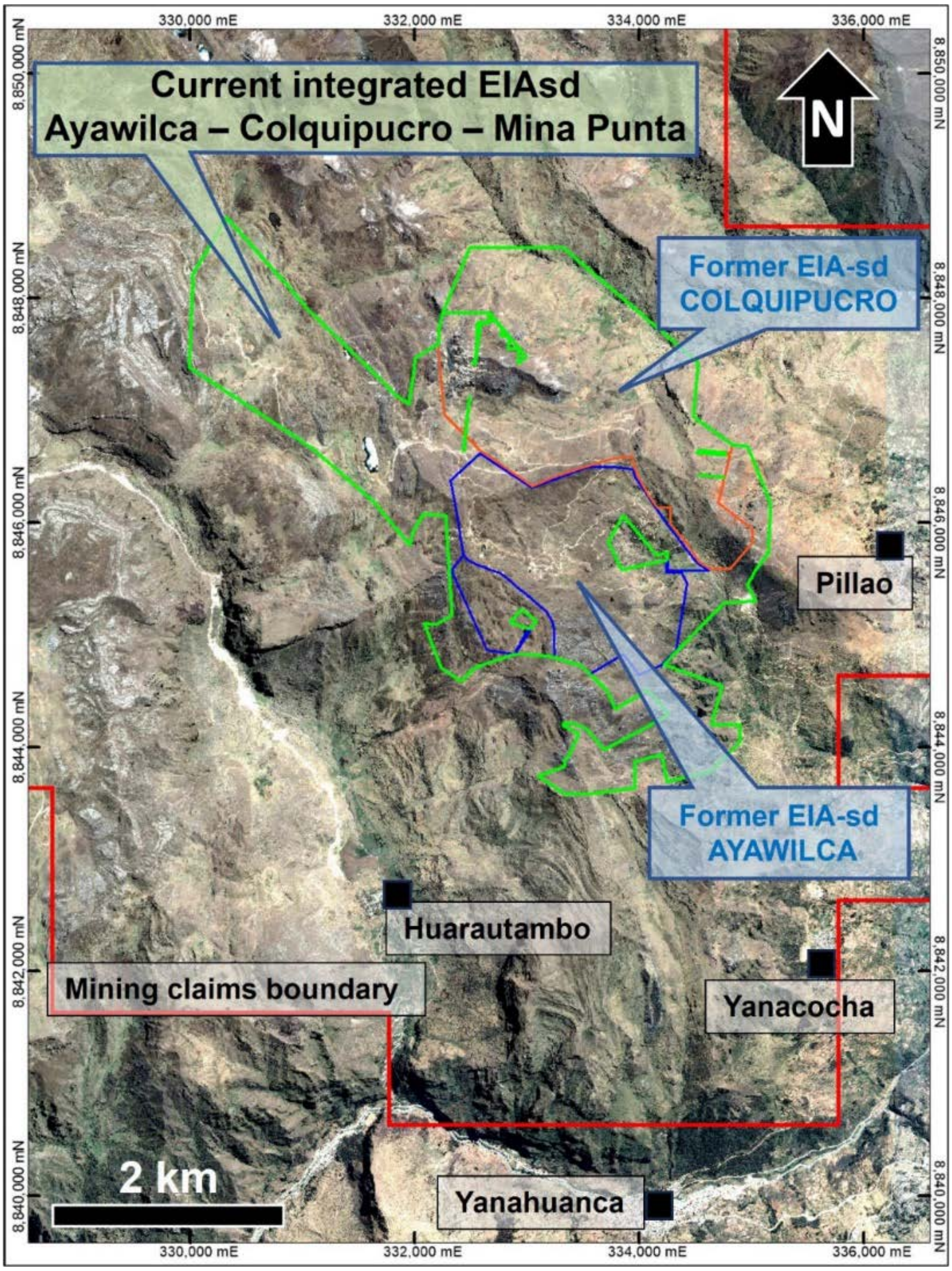
No commercial contracts have yet been agreed, but there is reasonable expectation that terms and conditions will be within industry norms.

The QP considers that the information is suitable to be used in the economic analysis in Section 22, and can support the 2024 PEA.

20 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

20.1 Introduction

The current Ayawilca-Colquipucro-Mina Punta permit, which merges and extends the area covered by two previous permits (Figure 20-1), was approved on April 24, 2023. The current EIAsd is valid for three years and eight months following Tinka's communication to DGAAM to initiate exploration activities on April 28, 2023. The expiration date is December 27, 2026. The permit can be extended.



Note: Figure prepared by Tinka, 2024.

Figure 20-1: Integrated EIAsd for Ayawilca Project and Tinka Mining Concessions

20.2 Baseline and Supporting Studies

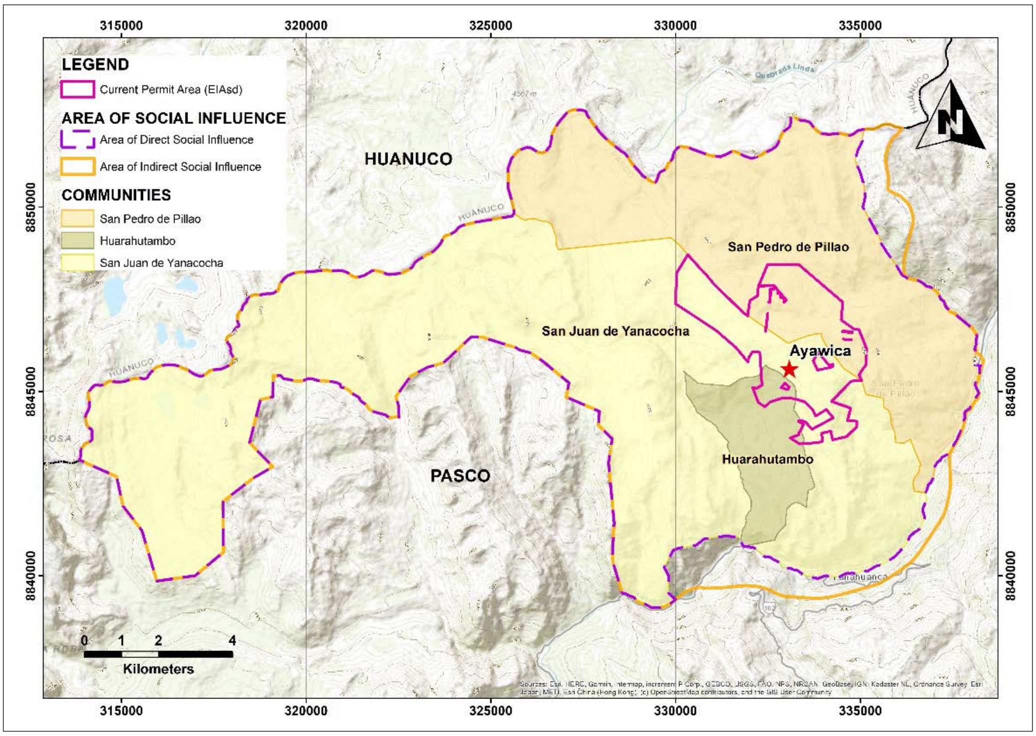
Tinka has completed 17 environmental studies in support of drill program permitting during the period 2007–2023. Key findings from these surveys are summarized in Table 20-1.

Table 20-1: Key Findings Baseline Surveys

Study Area	Note
Hydrography	There are four regional hydrographic sub-basins separated by drainage. The Ayawilca deposit is situated within a relatively small area of the Ayawilca and Huarautambo sub-basins. Streams in the Ayawilca sub-basin are intermittent, whereas the Huarautambo sub-basin contains permanent watercourses.
Water use	An inventory of water sources, water usage, and water-related infrastructure was completed, and indicated the primary water use in the area is for farming. Infrastructure typically consisted of water intake systems, channels, and hoses.
Ecosystems of significance	There are wetlands (bofedales) and two high-altitude lakes, Laguna Chaquicocha (located at 331612.0 E/8846597.5 N) and an unnamed lake (331394.8 E/8847501.9 N) in the Project area.
Flora	Vegetative units identified include Andean grassland, puna grass, wetlands (bofedales), bush, rocky vegetation, and anthropic vegetation. Floral species of conservation significance have been identified in the area.
Fauna	Mammals, birds, frogs and arthropods have been identified. Aquatic species are known to live in the streams and rivers including trout. Mammal, bird and amphibian species of conservation significance have been identified in the area.

Ten Certificates of Non-Existence of Archaeological Remains (“CIRA”) have been granted. All the current exploration areas fall within the approved CIRA granted areas.

Tinka completed social baseline surveys that covered the area of direct Project influence shown in Figure 20-2 which included the communities of San Juan de Yanacocha, San Pedro de Pillao and Huarautambo.



Note: Figure prepared by Tinka, 2024.

Figure 20-2: Areas of Direct and Indirect Social Influence with the Project EIAsd Outline

These local communities have approximately 2,547 residents in 873 homes. Communities are typically focused on agriculture (potatoes, corn, barley, and yellow pumpkin) and livestock rearing (sheep) as the key economic activities. Minor economic activities include teaching, local commerce, construction, and transportation.

20.3 Environmental Considerations

Biannual monitoring has been a part of all EIAsd permits, and the monitoring programs remain ongoing. The EIAsd monitoring programs collect data on water quality, air quality and environmental noise.

20.3.1 Air Quality

Air quality surveys have established that levels of particulate matter, lead concentrations, combustion gases (CO, NO_2, SO_2, H_2S) and mercury (gas) are below the current lower limits established by the Peruvian Environmental Quality Standards (“ECA”) included in D.S. N° 003-2017-MINAM.

20.3.2 Environmental Noise

Surveys indicate that registered noise levels in the Project area during the day and night are below the maximum parameters stablished by the Peruvian Environmental Quality Standards (ECA) included in D.S. N° 085-2003-PCM for industrial (80-70 dBA) and residential (60-50 dBA) areas.

20.3.3 Wetlands

The proposed infrastructure sites for the 2024 PEA were selected with consideration of proximity to bofedales and high-altitude lakes. In future more detailed studies, infrastructure sites will be the subject of additional environmental evaluation. Peruvian legislation (Ministerial Resolution N° 398-2014-MINAM Guidelines for Environmental Compensation, MINAM 2014) requires implementation of mitigation measures if ecosystems of significance are impacted and can require compensation measures.

20.4 Closure Plan

Under the current environmental permit (for exploration), the Closure Plan is based on the requirements in Law No. 28090 and its associated regulations and amendments, which regulate mine closure.

The current Exploration Closure Plan objective is to restore the area to its initial condition or similar.

The closure measures include consideration of:

- Drill platforms;
- Mud sumps;
- Access roads;
- Auxiliary components (e.g., camp, water reservoirs, warehouses).

For any future mine construction and operations, a detailed EIA must include a conceptual closure plan. A detailed mine closure plan must be submitted within one year after the approval of the detailed EIA, which will be required before a construction decision. Posting of the corresponding financial assurance for closure must also be completed before the start of production and within the first 20 business days of the following year during which the Beneficiation Concession or Start of Activities is approved. A final closure plan must be submitted two years prior to closure of operations.

Section 21.2.9 describes the basis of the financial provision for mine closure that has been included in the economic model.

20.5 Permitting

20.5.1 Exploration

Tinka has applied for, and received, environmental permit approvals to conduct all exploration activities to date.

20.5.2 Water Rights

Tinka has applied for, and received, authorizations to use surface water to conduct all exploration activities to date. The current authorization was granted from January 2024 to December 2025 and can be extended for an additional two years.

To start mine construction, a license to use water must be obtained, which consists of a four-stage permitting process:

- **Stage 1:** Authorization to carry out water availability studies. This stage can start before the approval of the detailed EIA;
- **Stage 2:** Accreditation of water availability. This stage can start before the approval of the detailed EIA;
- **Stage 3:** Authorization to start construction of water management infrastructure. This stage can start after the approval of the detailed EIA and after the approval of the authorization to start exploitation; and
- **Stage 4:** Once construction of water management infrastructure is finished, a field inspection is required by the water authority. A final license to use water is approved by the water authority.

Tinka has started working on stages 1 and 2. Stage 2 will continue during pre-feasibility studies. Stages 3 and 4 could take four to six months after the approval of an exploitation authorization.

20.5.3 Construction and Operations

The approval of a detailed EIA will be needed for Tinka to obtain the necessary permits from SENACE for construction, operations, and closure. This assessment will be conducted in compliance with Peruvian regulations, including the following key regulations:

- Ley N° 27446, Ley del Sistema Nacional de Evaluación de Impacto Ambiental and the modifications detailed in the Decretos Legislativos N° 1078 and N° 1394;

- D.S. N° 019-2009-MINAM, Reglamento de la Ley del Sistema Nacional de Evaluación de Impacto Ambiental;
- D.S. N° 040-2014-EM, Reglamento de Proteccion y Gestion Ambiental para las Actividades de Explotacion, Beneficio, Labor General, Transporte y Almacenamiento Minero and its modification detailed in D.S. N° 005-2020-EM;
- D.S. N° 020-2020-EM, Reglamento de Procedimientos Mineros;
- Ley N° 28090, Ley que regula el Cierre de Minas and its modification in Ley N° 31347;
- D.S. N° 033-2005-EM, Reglamento para el Cierre de Minas and its modifications detailed in D.S. N° 045-2006-EM, D.S. N° 054-2008-EM, D.S. N° 036-2016-EM and D.S. N° 013-2019-EM;
- D.S. N° 028-2008-EM, Reglamento de Participación Ciudadana en el Subsector Minero;
- R.M. N° 304-2008-MEM/DM, Normas que regulan el Proceso de Participación Ciudadana en el Subsector Minero.

Once the detailed EIA is approved by Peruvian authorities, a variety of permits, licenses, and authorizations will be required to proceed with Project construction and operations. The main permitting requirements include:

- Definitive Mine Closure Plan approval;
- CIRAs;
- Water use authorizations and final licence;
- Sanitary authorization, approving wastewater treatment system and discharge;
- Sanitary authorization for drinking water treatment system;
- Authorization to start exploitation;
- Authorization to start construction;
- Registration as a direct consumer of liquid fuels (fixed or mobile facilities);
- Authorization for acquisition and use of explosives (annual);
- Explosive storing authorization (annual);
- User’s certificate for controlled chemical substances and products;
- Beneficiation concession; and
- Start of activities (includes exploitation of construction materials and mining exploitation).

The current, granted CIRAs cover most but not all the infrastructure areas envisaged in the 2024 PEA. Areas that are known to require additional CIRAs include the power lines, access road and filtered TSF location. Review of the final Project footprint will be required to ensure that all the planned operational areas have a CIRA.

20.5.4 Permitting Strategy

The preliminary permitting strategy contemplates sequential development of engineering studies to provide sufficient information to prepare documentation required by the regulatory authorities to support mining operations.

The conceptual plan assumes:

- **Phase 1:** detailed EIA, CIRAs, environmental baseline assessment in conjunction with SENACE, assessment of the availability of water, and surveys to better understand the collective community rights; and
- **Phase 2:** prior informed consent discussions, application for wastewater discharge license, application for Stage A of the beneficiation concession, and application for approval of the Mine Closure plan.

Phase 1 could take two to three years to complete, and Phase 2 could take two years to obtain all of the final approvals.

20.6 Social Considerations

20.6.1 Land Access

As noted in Section 4.5.2, Tinka has in place, or is actively negotiating a renewal of, access agreements with local communities that support exploration-stage activities.

New agreements with the communities will need to be concluded in support of any future mining operations.

There are various alternatives to secure land access, including:

- **Land purchase:** purchase contract is agreed with the community with registered rights ownership. This requires an accompanying formal social agreement;
- **Usufruct, surface, and easement contract:** grants use of the land, but does not confer ownership rights. Typically has a 30-year term. This requires an accompanying formal social agreement;
- **Lease contract:** not common in Peru, but allows a community to temporarily transfer the use of an asset to a lessee for a certain agreed rent. Contract cannot be longer than a 10-year term. This requires an accompanying formal social agreement.

Tinka has evaluated the different alternatives and is currently considering land purchase to be the best option. Obtaining land ownership should help expedite the permitting process from the detailed EIA to construction.

20.6.2 Social and Community Impact Assessments

In support of grant of exploration permits Tinka has conducted several town-hall meetings with local communities, including virtual meetings that were widely broadcast on local radio and on social media.

Tinka maintains community relations offices in San Juan de Yanacocha, San Pedro de Pillao, and Huarautambo, and the Tinka team endeavours to meet with as many local stakeholders as possible, as often as possible.

The Project will affect at least one community included in the list of indigenous communities maintained by the Ministry of Culture and will be subject to prior consultation requirements and considerations.

Mining Plus conducted a review of potential social and community impacts as part of the 2021 PEA, based on available information provided by Tinka, and was updated by a socio-economic baseline study performed by JSZ consultants in 2023.

The key risks identified included:

- Potential for conflicts over freshwater usage;
- Potential impact on existing wetlands;
- Presence of archaeological sites in areas proposed for infrastructure; and
- Ability to obtain land access and social agreements.

20.7 QP comments on Section 20

For the planned future mining project, mitigation measures to avoid, reduce, or compensate for potential project effects will need to be developed based on robust baseline assessments and impact evaluations. Environmental and social considerations will need to be evaluated as an integral part of engineering and mine design studies. The proposed use of filtered tailings technology will be one mechanism to contribute to the reduction of the Project footprint and mitigate some environmental risk.

The 2024 PEA has made certain assumptions as to the timelines needed to file and get approval for permits required for construction, complete a prior consultation, and collect the necessary wet season/dry season baseline data to allow the EIA report to be completed and lodged with the relevant regulatory authorities. There is a risk that these timeline assumptions are optimistic and may need to be refined during the EIA application process.

21 CAPITAL AND OPERATING COSTS

21.1 Introduction

The PEA cost estimates in this section have been completed by SRK, MineFill, Transmin, Envis and Tinka. Table 21-1 provides a summary of responsibilities of each contributor to the cost estimates. All capital and operating costs have been estimated in US$ real terms and are valid as at the effective date of this report.

Table 21-1: Responsibility for Capital and Operating Cost Estimates

Description	Responsibility
Mining (including Materials Handling, Ventilation, Dewatering, Underground Infrastructure)	SRK
Backfill Plant	MineFill
Process Facilities	Transmin
Surface Infrastructure	Tinka / SRK
Tailings Storage Facilities	Envis
Product Transport and Treatment	Tinka (supported by Brent Cochrane)
Labour, Fuel and Energy Rates	Tinka
Owner Costs and G&A	Tinka
Rehabilitation/Closure Costs	SRK

The process facility costs are covered to the production of filtered tailings at the filter plant. From this battery limit point, filtered tailings are then rehandled to trucks for transport to either the tailings storage facility or to the backfill plant for preparation of pastefill to reticulate underground.

A construction period of 18 months was considered for the overall project implementation with Year 1 as the first year of production.

21.1.1 Exchange Rates

The following US$ exchange rates used in the PEA for the various cost estimates are as follows:

- 1 US$ = 3.70 Peruvian nuevo sol (PEN)
- 1 US$ = 1.35 Canadian dollar (C$)

21.2 Capital Cost Estimate

21.2.1 Basis of Capital Cost Estimate

The capital cost estimate was based on a number of sources of data including:

- benchmark data with the application of modifying factors as necessary;
- enquiries on costs from local suppliers;
- estimate of plant and equipment requirements from the technical work completed and applied to the development and mining schedule; and
- working capital is calculated in the cashflow model and summarized in Section 22.3.8.

The cost for future studies, testwork and exploration activities have not been included in the estimates.

The capital costs for the Project have been estimated to an AACE Class V estimate (-20% to -50%/+30% to +100%) in US$ and are summarized in Table 21-2. The total project capital cost for Ayawilca is estimated at US$694.9 million, comprising initial capital of US$381.8M and sustaining capital of US$313.1M over the 21-year mine life with an additional provision of US$19.5M for closure costs.

Table 21-2: Capital Cost Summary

Capital Cost Item	Units	Initial Capital	Sustaining Capital	LOM Total
Mining & mine development	US$ M	56.6	226.3	282.9
Process plant – Zn/Ag/Pb	US$ M	89.4	-	89.4
Process plant – Sn	US$ M	29.0	-	29.0
Pastefill plant	US$ M	15.5	-	15.5
Tailings	US$ M	17.8	46.0	63.7
Other surface facilities	US$ M	52.4	-	52.4
Subtotal	**US$ M**	**261.7**	**272.2**	**534.0**
Other indirects	US$ M	34.7	-	34.7
Owner's costs	US$ M	10.3	-	10.3
Contingency	US$ M	76.2	40.8	117.0
TOTAL PROJECT	**US$ M**	**381.8**	**313.1**	**694.9**
CLOSURE COSTS	**US$ M**			**19.5**

21.2.2 Mining

An annual mining cost model has been set up from first principles, using the life of mine physicals for the various underground operations combined with database, benchmark and, where available, vendor quotes to derive capital expenditure and operating cost estimates. The model assumes the project will be owner mined.

Capital expenditures include the costs of the capital development (main headings which are used throughout the life of mine, with costs such as equipment running costs, drilling consumables, explosives, ground support and labour allocated), underground infrastructure and equipment purchase. Capital development occurs throughout the mine life, and sustaining capital requirements are therefor for ongoing capital development and equipment replacement. Capital expenditure as they occur during the two-year construction period are considered initial/project capital, with all capital to be spend during production labelled as sustaining capital.

Operating costs include the costs of excavating the operating development headings, and production costs (drilling, blasting, mucking, transport of stope material). As operational development does occur prior to production starting, operating costs are estimated during the construction period, which are capitalised for economic assessment purposes herein.

The initial equipment fleet is purchased as initial capital and any replacement equipment is bought as and when required and is treated as capital expenditure.

Table 21-3 summarizes the LOM capital expenditure for the underground mining operations and Figure 21-1 shows the annual capital costs.

Table 21-3: Mine Capital Expenditure (including capitalised operating costs)

Capital Cost – Mining	**Capital Cost (US$ M)**
Contract Development (Ventilation Raise)	20.0
Mine Equipment & Material Handling	150.5
Mine Equipment Overhaul	70.4
Development Ground Support	5.5
Development Services	3.4
Development Drill & Blast	8.6
Mine Water Management	4.2
Technical Equipment & Software	1.6
Ventilation	18.7
Total Capital Cost	**282.9**

Note: Numbers may not add due to rounding

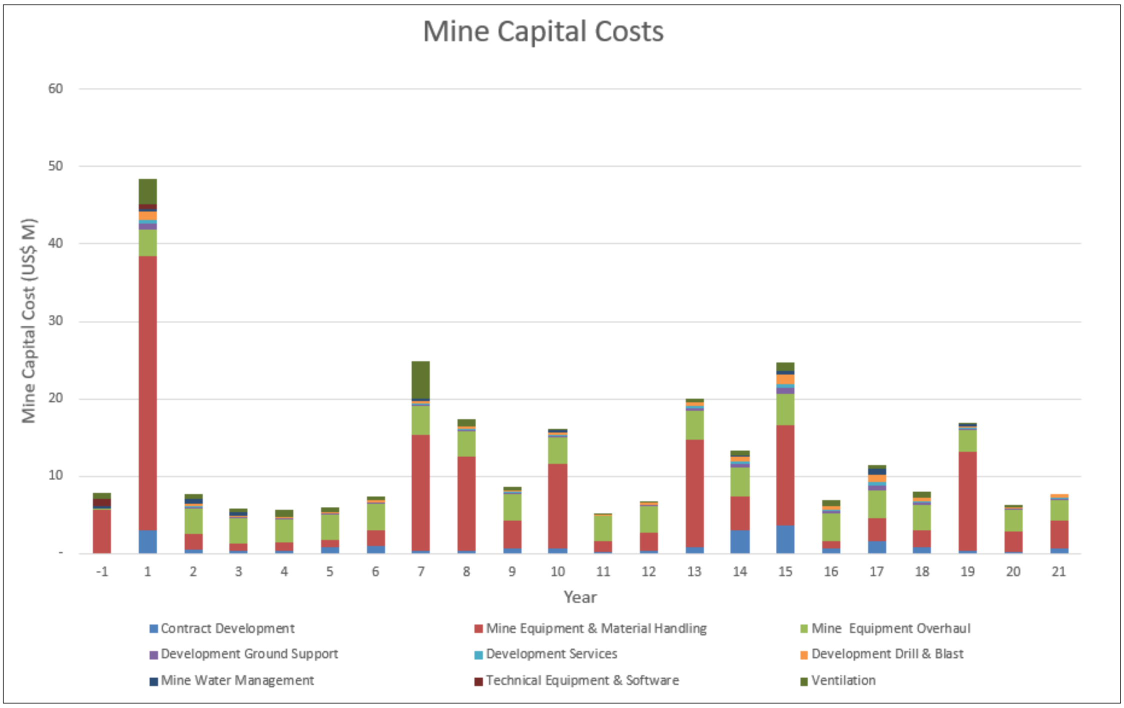


Figure 21-1: Annual Mine Capital Costs

21.2.3 Process Facilities

The capital cost estimate, by Transmin, for the 2024 PEA Zinc Plant and Tin Plant is summarized in Table 21-4 and Table 21-5 respectively.

An average process plant throughput capacity of 2.0 Mtpa was used for Zinc Plant and 0.3 Mtpa for the Tin Plant estimate. The battery limits for the process plant capital cost estimates were as follows:

- receipt of crushed ROM into the ROM surge bin;
- discharge of separate zinc, lead-silver and tin concentrates to a load-out shed; and
- discharge of filtered tailings for the TSF and Paste backfill plant.

Equipment requirements and sizing were defined by the process design criteria and process flow diagrams prepared for the Project based on the preliminary metallurgical test program completed in 2023.

The capital cost estimate was prepared with separate spreadsheets for each unit operation associated with the process, plus separate sheets for reagents and consumables, utilities, process buildings and first fills. The installed cost of each piece of equipment or material was then estimated with the installation labour, unit cost and cost of field materials being included in the total installed mechanical cost. Line items in the capital cost estimates were costed based on budget quotes or on benchmark data.

For each unit operation, the costs of process piping, electrical and instrumentation were estimated as a percentage of total mechanical equipment cost. The sum of these costs and the total installed mechanical cost, with an estimate for freight, were the total direct costs for each unit operation.

Indirect costs were estimated at 35% of total direct costs for contractor indirects and engineering, procurement and construction management. A 15% contingency was added to the estimate to yield the total capital cost estimate.

Table 21-4: Capital Cost – Zinc Plant

Capital Cost Estimate Item – Zinc Plant	Capital Cost (US$ M)
Total direct cost of major equipment	22.9
Installation costs	
Localized earthworks	9.4
Concrete works	7.1
Piping	7.1
Electrical	7.1
Instrumentation and control	2.9
Spares	1.4
First-fill	0.9
Architectural and auxiliary buildings; minor infrastructure	7.1
Total direct cost for the plant	**65.9**
Indirect costs	
Owners’ costs	4.4
Freight and taxes	3.1
Engineering, procurement & construction management (“EPCM”)	10.2
Construction camp, temporary facilities, catering, etc	5.2
Total indirect cost for the plant	**22.9**
Contingency (on direct and indirect)	13.3
Total installed capital cost for the Zinc plant	**102.1**

Note: Numbers may not add due to rounding

Table 21-5: Capital Cost – Tin Plant

Capital Cost Estimate Item – Tin Plant	Capital Cost (US$ M)
Total direct cost of major equipment	6.6
Installation costs	
Localized earthworks	2.7
Concrete works	2.1
Piping	2.1
Electrical	2.1
Instrumentation and control	0.9
Spares	0.4
First-fill	0.3
Architectural and auxiliary buildings; minor infrastructure	2.1
Total direct cost for the plant	**19.2**
Indirect costs	
Owners' costs	1.3
Freight and taxes	0.9
EPCM	3.0
Construction camp, temporary facilities, catering, etc	1.5
Total indirect cost for the plant	**6.7**
Contingency (on direct and indirect)	3.9
Total installed capital cost for the Tin plant	**29.7**

Note: Numbers may not add due to rounding

21.2.4 Backfill Facilities

A summary of Ayawilca paste backfill system capital cost estimate is shown in Table 21-6 below. The capital estimate includes all the major process equipment including the mechanical equipment, air and water services, electrical, piping, automation, and the startup costs for backfill delivery.

The estimate also includes the capital budget for paste reticulation to the underground for the first two years of operations. The budget is based on MineFill experience and typical paste backfill system startup. The estimate covers the paste piping/couplers, boreholes, bracing and pipe supports, valving, instrumentation, burst pipes and installation.

Detailed engineering, freight, commissioning, first fluid fills, 12-month operating spares, and EPC fees are included.

The equipment and construction costs in the capital estimate were largely derived from vendor quotations. Some smaller items were costed on the basis of previous estimates in the MineFill files. Preliminary quantities from design documents have been undertaken for the concrete, steel, piping and electrical.

Table 21-6: Capital Cost – Backfill System

Capital Cost Estimate Item – Backfill	Capital Cost (US$ M)
Detailed Engineering	0.8
EPCM	1.1
Procurement	
* Paste Mixing Plant	1.5
* Cement Handlng	0.4
* Auxiliaries	1.8
* Paste Pump and Flush Pump	1.8
Surface Construction	3.5
Total Surface Plant Costs	**10.8**
Underground Reticulation System	2.7
Underground Construction	0.5
Barricades – 2 years	1.6
Total Underground Costs	**4.7**
Total installed capital cost	**15.5**

Note: Numbers may not add due to rounding

21.2.5 Tailings Storage Facilities

For TSF-related capital costing, the following assumptions and criteria have been applied:

- Capital costing includes for purchasing a separate fleet of equipment for loading, hauling, placing, and compacting the filtered tailings at the TSF. This has been applied as initial direct capital cost.
- Construction capital costing for the TSF has been estimated using unit price build-ups based on benchmarked costing for similar, recent projects in Peru, for major civil earthworks.
- An allowance has been made in the costing of the TSF surface area to allow for the possible placement of a geomembrane containment system. In future stages, analysis, design, and stakeholder perception considerations would be used to determine whether a geomembrane system is required.
- Minor civil design features have not been included in the capital cost estimates for the TSF; this is considered to be within the PEA accuracy level.
- Hauling of filtered tailings from the Filter Plant to the TSF has been assigned to operating costs.

A summary of the Capital split by Initial Capital and Annual Sustaining Capital is provided in Table 21-7.

Table 21-7: Capital Cost – Tailings Surface Facility

Capital Cost Item	Units	Initial Capital	Annual Sustaining Capital
<u>Initial Stage TSF Site Capex</u>			
Toe Berm Cut-to-Fill	US$M	4.5	
1st Stage Site Preparation	US$M	1.0	
Channels, Ponds	US$M	0.2	
Total Initial Stage TSF Site Capex	**US$M**	**5.7**	
<u>Initial Road Access Capex</u>			
Filter Plant to TSF – 1st km	US$M	0.5	
Total Capital_Initial – Structures	**US$M**	**6.2**	
Total Capital_Initial - Fleet	**US$M**	**9.3**	
<u>Sustaining TSF Site Capex</u>			
Slope Protection	US$M/annum		0.30
Ongoing Site Preparation	US$M/annum		0.10
Channels, Pond Relocation	US$M/annum		0.02
Total Annual Sustaining Stage TSF Site Capex	**US$M/annum**		**0.42**
<u>Sustaining Road Access Capex</u>			
Filter Plant to TSF – 1st km	US$M/annum		0.02
Total Capital_Sustaining – Structures	**US$M/annum**		**0.44**
Total Capital_Sustaining – Fleet	**US$M/annum**		**1.86**

21.2.6 Other Surface Facilities

The summary cost estimate for other surface infrastructure is shown in Table 21-8 below which included a revision of previous estimates from the 2021 PEA which have been increased for cost inflation.

Table 21-8: Capital Cost – Other Surface Facilities

Capital Cost – Other Surface Facilities	Capital Cost (US$ M)
Site preparation and topsoil stockpile	2.4
Access and internal roads	16.2
Operations camp and facilities	8.9
Water supply and water treatment	8.6
Other general facilities	1.6
Mine site preparation and haul roads	1.8
Mine infrastructure	0.4
Ventilation	1.9
Electrical distribution	1.5
Substation	9.0
Total Capital Cost	**52.4**

Note: Numbers may not add due to rounding

21.2.7 Other Indirects

Indirect costs assume that:

- The project will be executed through an EPCM contract.
- Contractor and construction indirect costs are included in the direct cost estimates.
- Start up and commissioning will be executed by the Owner’s staff team.

21.2.8 Owners Costs

The Owner’s costs include pre-operations personnel and training, the Owner’s project team during project development and execution, insurance, and permitting.

21.2.9 Closure Cost provision

The 2024 PEA includes a provision for conceptual closure costs of US$19.5M in the 2 years following completion of mining activities for the following rehabilitation and closure activities:

- Infrastructure
  - Termination of Services and Demolition Works
  - Contaminated Materials
  - Vents, Shafts and Boreholes
  - Roads and Tracks
  - Earthworks / Structural Works
  - Land Preparation and Revegetation
- Tailings & Rejects
  - Contaminated Materials
  - Mine Waste
  - Land Preparation and Revegetation
- Subsidence and Management
  - Development of an ‘Unplanned’ Project Closure Plan
  - Site security during closure
  - Mobilisation + Demobilisation

Capital cost allowances are also included for site preparation and topsoil stripping in Year -1. At this PEA stage, closure requirement considerations are only preliminary assumptions. The EIA and various permits may set additional requirements to the closure measures. Full assessment of closure costs will be completed when the needs are studied in future stages of the project development.

21.3 Operating Cost Estimate

21.3.1 Basis of Operating Cost Estimate

The operating cost estimate is based on a number of sources of data including:

- benchmark data with the application of modifying factors as necessary;
- enquiries on costs from local suppliers; and
- estimate of consumable requirements from the technical work completed and applied to the development and mining schedule.

The LOM average unit operating cost summary for the 2024 PEA is provided in Table 21-9 estimated at US$35.06/t processed for Zinc ROM and US$47.68/t processed for Tin ROM. The combined LOM average operating cost for Zinc + Tin ROM is estimated at US$36.25/t processed.

Table 21-9: Unit Operating Cost Summary for the Zinc and Tin Plants

Operating Cost Item	Units	Zinc Plant	Tin Plant	Weighted Average Zinc + Tin
Mining	US$/t processed	13.15	13.15	13.15
Backfill	US$/t processed	3.73	3.73	3.72
Sub-total	**US$/t processed**	**16.88**	**16.88**	**16.88**
Processing	US$/t processed	11.00	23.63	12.20
Tailings	US$/t processed	0.94	0.94	0.94
G&A	US$/t processed	6.23	6.23	6.23
TOTAL PROJECT	**US$/t processed**	**35.06**	**47.68**	**36.25**

Note: Numbers may not add due to rounding

21.3.2 Labour, Fuel and Energy Rates

Tinka sourced the Peruvian mining salary and wage rates for staff and workers from a recent PricewaterhouseCoopers salary survey (PwC, 2023) which has been applied with a salary burden factor of 24.12% in the operating cost estimate. These rates have been applied to the estimates of personnel requirements on an annual basis in line with the mining schedule.

The following fuel and energy costs were based on local enquiries and used for operating cost estimates:

- Diesel Fuel = US$ 1.13 /L; and
- Electricity = US$ 0.06 /kWh.

21.3.3 Mining

Mine operating costs are based on first principles, using benchmark data as cost drivers. Table 21-10 summarizes the LOM operating expenditure for the underground mining operations and Figure 21-2 shows the annual operating costs.

Table 21-10: Mine Operating Expenditure (Excluding Capitalised Operating Costs)

Operating Cost – Mining	**LOM Cost (US$ M)**
Mine Equipment & Materials Handling	291.3
Development Ground Support	23.9
Development Services	13.1
Development Drill & Blast	43.8
Production Drill & Blast	27.0
Grade Control & Assaying	56.9
Mine Personnel	104.4
Mine Water Management	4.6
Ventilation	31.8
Total Mine Operating Cost	**596.7**

Note: Numbers may not add due to rounding

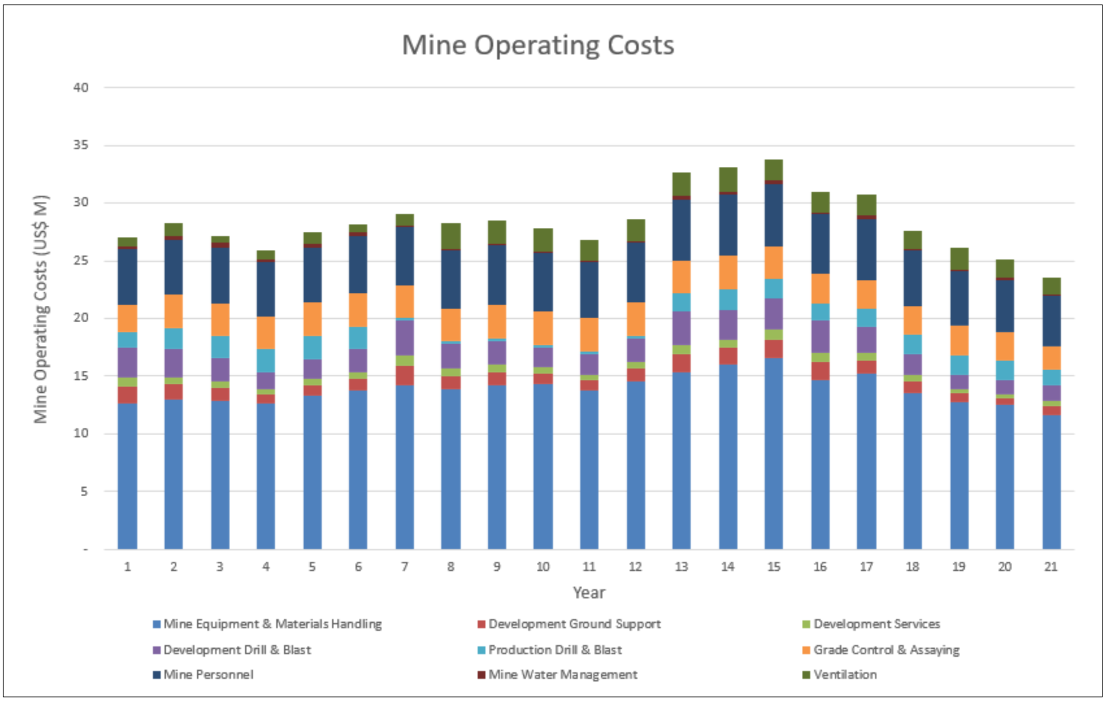


Figure 21-2: Annual Mine Operating Costs

21.3.4 Backfill Cost

Operating costs for the Ayawilca paste backfill system are calculated based on the nominal backfill rate (525,000 m^3 per year) and the figures are summarized in Table 21-11.

Table 21-11: Operating Costs – Backfill

Operating Cost	Units	Operating Cost
Surface		
Fixed Cost	US$ M	0.1
Variable Cost	US$ M	6.6
Total Surface Plant Costs	**US$ M**	**6.7**
Underground		
Fixed Cost	US$ M	0.4
Variable Cost	US$ M	1.2
Total Underground Costs	**US$ M**	**1.6**
Annual OPEX (525,000 m^3)	**US$ M**	**8.3**
Cost per m^3 of paste	**US$/m^3 paste**	**15.89**

21.3.5 Processing Cost

The process operating cost estimate accounts for the operating and maintenance costs associated with the 5.500 t/d zinc-lead-silver process plant and 850 t/d tin process plant operation, supporting services infrastructure, and tailings filtering.

Process plant operating costs were estimated using the following cost categories: power, labour, reagents and consumables, maintenance supplies and services. The process operating cost for the zinc-lead-silver ROM is US$11.0/t milled and the tin ROM is US$23.63/t milled.

21.3.6 Tailings Cost

For TSF-related operating costing, the following assumptions and criteria have been applied:

- Loading, hauling, placement, and compaction of filtered tailings from the Filter Plant to the TSF has been assigned to ongoing operating costs. The costs have been estimated based on benchmarked costs from similar, recent projects in Peru, based on current pricing for fuel and manpower.

Operating costs for Ayawilca dry stack tailings management (Table 21-12) are calculated based on the mobile fleet capacity of 175 m^3/hr and the hourly operating costs (labour and equipment) including a 30% overhead for Contractor support which results in a unit rate of US$3.45/m^3 placed.

Table 21-12: Operating Costs – Tailings Management

Equipment / Personnel	Qty	US$/hr
Front end loader @ 175 m3 / hour	1	66
40-ton Haul Trucks	5	123.75
Cat D8 Bulldozer	1	49.5
20-ton Compactor	1	38.5
Grader	1	55
Water Truck	1	30.25
Supervisor	1	12
Assistants	3	18
Light Vehicle	1	4.5
Sub-Total - Cost per hour @ 175m3/hr ($/175m3/hr)		**397.5**
Cost per m^3 ($/m^3)		**2.27**
Typical Contractor OH @ 30%	30%	0.68
Technical Supervision and Construction Quality Control ($/m^3)		0.50
Unit Rate for Owner Haul and Place ($/m^3)		**3.45**

21.3.7 General & Administrative Costs

The G&A operating cost of US$6.23/t of mill feed processed is based on an average benchmark cost for similar operations in Peru.

22 ECONOMIC ANALYSIS

22.1 Cautionary Statement

Certain information and statements contained in this section and in the Report are “forward looking” in nature. Forward-looking statements include, but are not limited to, statements with respect to the economic and study parameters of the project; Mineral Resource estimates; the cost and timing of any development of the project; the proposed mine plan and mining methods; dilution and extraction recoveries; processing method and rates and production rates; projected metallurgical recovery rates; infrastructure requirements; initial capital, operating, and sustaining capital cost estimates; product marketing and marketing costs; the projected life of mine and other expected attributes of the project; the net present value (NPV) and internal rate of return (IRR) and payback period of capital; capital; future metal prices; the timing of the environmental assessment process; changes to the project configuration that may be requested as a result of stakeholder or government input to the environmental assessment process; government regulations and permitting timelines; estimates of closure costs and reclamation obligations; requirements for additional capital; environmental, social and political risks; and general business and economic conditions.

All forward-looking statements in this Report are necessarily based on opinions and estimates made as of the date such statements are made and are subject to important risk factors and uncertainties, many of which cannot be controlled or predicted. Material assumptions regarding forward-looking statements are discussed in this Report, where applicable. In addition to, and subject to, such specific assumptions discussed in more detail elsewhere in this Report, the forward-looking statements in this Report are subject to the following assumptions:

- There being no signification disruptions affecting the development and operation of the Project;
- The availability of certain consumables and services and the prices for power and other key supplies being approximately consistent with assumptions in the Report;
- Labor and materials costs being approximately consistent with assumptions in the Report;
- The timelines for prior consultation and wet season/dry season baseline data collection being generally consistent with the 2024 PEA assumptions, and permitting and arrangements with stakeholders being consistent with current expectations as outlined in the Report;
- All environmental approvals, required permits, licenses and authorizations will be obtained from the relevant governments and other relevant stakeholders;
- Certain tax rates, including the allocation of certain tax attributes, being applicable to the Project;
- The availability of financing for Tinka’s planned development activities;
- The timelines for exploration and development activities on the Project; and
- Assumptions made in the Mineral Resource estimate and the financial analysis based on that estimate, including, but not limited to, geological interpretation, grades, commodity price assumptions, extraction and mining recovery rates, geotechnical, hydrological and hydrogeological assumptions, capital, operating, and closure cost estimates, and general marketing, political, business and economic conditions.

The production schedules and financial analysis annualized cash flow table are presented with conceptual years shown. Years shown in these tables are for illustrative purposes only. If additional mining, technical, and engineering studies are conducted, these may alter the project assumptions as discussed in this Report and may result in changes to the calendar timelines presented.

The preliminary economic analysis includes Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves, and there is no certainty that the 2024 PEA based on these Mineral Resources will be realized. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

22.2 Methodology Used

The financial analysis was carried out using a DCF methodology to calculate the NPV, IRR and payback period on both an undiscounted and discounted basis, in each case on a pre-tax and after-tax basis. Cash flows are estimated at the level of Tinka Resources SAC, the Peruvian subsidiary of Tinka Resources Limited.

Annual net cash flows were estimated projecting annual cash inflows from the sale of project production less projected annual cash outflows (such as capital and operating costs, royalties and taxes) and changes in working capital. These annual net cash flows were discounted back to the date of beginning of capital expenditure at mid-year -2 and totalled to determine the NPV of the project net cash flows at selected discount rates. The base discount rate used is 8% per annum.

The sensitivity of these measures to variations in product prices, grades, initial capital costs, life-of-mine capital costs, and operating costs was analysed.

All monetary amounts are presented in constant Q4 2023 US$. For discounting purposes, cash flows are assumed to occur at the end of each period. Revenue is recognized in the year of production.

22.3 Financial Model Parameters

22.3.1 Mineral Resource, Mineral Reserve, and Mine Life

The 2024 PEA mine plan is based on the ROM inventory (Table 16-5) which comprises approximately 47.5% Indicated classified tonnes and 52.5% Inferred classified tonnes (Table 16-4). The mine inventory was scheduled for each level in an ordered sequence based on development access targeting a production rate of 2.0 Mtpa for the Zinc and Silver Zones, and 0.3 Mtpa for the Tin Zone for an overall ROM production rate of 2.3 Mtpa. Plant throughput in the first year of production is at 80% of design to account for ramp-up inefficiencies. The overall ROM schedule is provided in Table 16-18 and mine development schedule in Table 16-19.

22.3.2 Metallurgical Recoveries

Metallurgical recoveries and concentrate grades used for the financial analysis are summarized in Table 22-1 and Table 22-2 respectively. Moisture content is assumed to be 10% for the zinc and lead–silver concentrates, and 9% for the tin concentrate.

Table 22-1: Forecast Metallurgical Recoveries to Concentrates

Item	**Recovery to concentrate (%)**			
Zone	**Zinc Zone**	**Silver Zone**	**Tin – HR Zone**	**Tin – LR Zone**
Zn concentrate				
Zn recovery	92.0	87.0	-	-
Pb–Ag concentrate				
Pb recovery	70.0	85.0	-	-
Ag recovery	45.0	85.0	-	-
Sn concentrate				
Sn recovery	-	-	90.0	50.0

Table 22-2: Forecast Concentrate Grades

Item	**Concentrate grades**			
Zone	**Zinc Zone**	**Silver Zone**	**Tin – HR Zone**	**Tin – LR Zone**
Zinc Concentrate				
Zn grade (%Zn)	50.0	50.0	-	-
Fe grade (%Fe)	13	13	-	-
Pb–Ag concentrate				
Pb grade (%Pb)	50.0	Calculated	-	-
Ag grade (g/t Ag)	Calculated	6,000	-	-
Sn Concentrate				
Sn grade (%Sn)	-	-	50.0	50.0
Fe grade (%Fe)	-	-	9.0	9.0
S grade (%S)	-	-	4.5	4.5

22.3.3 Smelting and Refining Terms

It is assumed that up to 200,000 wmt per annum of zinc concentrate will be sold to the Cajamarquilla refinery east of Lima, with the balance being sold on a CIF basis to markets in east Asia. Lead–silver concentrates are assumed to be sold on a CIF basis to smelters in east Asia. Tin concentrates are assumed to be sold on a CIF basis to smelters in east and/or southeast Asia.

The following payables were applied:

- Zinc concentrate:
  - pay for 85.0% of the zinc content, subject to a minimum deduction of eight units; and
  - payability reduces to 84% of the zinc content at a concentrate grade of 50% Zn.
- Lead–silver concentrate:
  - Lead: pay for 95.0% of lead content, subject to a minimum deduction of three units; and
  - Silver: pay for 95.0% of silver content, subject to a minimum deduction of 50 g/dmt.
- Tin concentrate
  - Minimum deduction of 2.5 units;
  - Additional deduction for each 1% that the concentrate grade is less than 60%: 0.1 units;

- 93% payable with a concentrate grade of 50%.

Table 22-3 summarizes the concentrate treatment and refining charges applied in the economic assessment. Price participation is assumed not to be applicable.

The zinc concentrate is assumed to be subject to a penalty of US$1.50 per each 1% Fe above 8.0% Fe. The zinc concentrate contains minor amounts of indium. Concentrates sold offshore are assumed to receive an indium credit of $20/dmt. The Cajamarquilla smelter does not recover indium so no credit applies to domestic sales.

The tin concentrate is assumed to be subject to penalties for sulphur content and iron content, as follows:

The sulphur penalty is assumed to be $10/dmt for each 1% S from 0% to 2%, $20/dmt for each 1% S from 2% to 4%, and $30/dmt for each 1% S over 4%. At the projected sulphur content of 4.5%, the sulphur penalty is US$75/dmt.

The iron penalty takes the form of an increase in the deduction, which is assumed to be 10% of the iron content in excess of 2%. At the projected iron content of 9%, the additional deduction is 0.7% of the tin content.

Table 22-3: Concentrate Treatment and Refining Charges

Item	Units	Cost
Zn concentrate		
Treatment charge, domestic	US$/dmt	220
Treatment charge, export	US$/dmt	220
Pb–Ag concentrate		
Treatment charge, Ag<2,500 g/t	US$/dmt	150
Treatment charge, Ag>=2,500 g/t	US$/dmt	50
Ag refining charge, Ag<2,500 g/t	US$/oz	1.00
Ag refining charge, Ag>=2,500 g/t	US$/oz	0.80
Sn concentrate		
Treatment charge	US$/dmt	750

Table 22-4 presents the concentrate transport costs applied. Concentrate losses during transport are assumed to be nil. Zinc concentrate exports are assumed to be shipped bulk, whereas lead-silver and tin concentrates are assumed to be shipped by container.

Table 22-4: Concentrate Transport Costs

Item	US$/wmt
Land transport (all concentrates)	40
Port charges, Zn concentrate	25
Port charges, Sn and Pb-Ag concentrate	50
Ocean freight, Zn concentrate	45
Ocean freight, Sn and Pb-Ag concentrate	15

22.3.4 Metal Prices

Project economics were estimated based on long-term metal prices of US$1.30/lb for zinc, US$1.00/lb for lead, US$22.00/oz for silver, and $11.00/lb for tin. Zinc, lead and silver prices were established by Tinka. The tin price was selected within the range of industry consensus prices and feedback from potential offtakers.

22.3.5 Capital Costs

Capital cost assumptions are outlined in Section 21.2. A construction period of 18 months was considered (starting in mid-year -2), with Year 1 being the first year of production. Capital costs were applied in the financial model excluding IGV, which is recoverable as discussed in Section 22.3.9.

22.3.6 Operating Costs

Operating cost assumptions are outlined in Section 21.3. Operating costs are generally on an owner operated basis. Operating costs were applied in the financial model excluding IGV, which is recoverable as discussed in Section 22.3.9.

22.3.7 Royalties

Royalties are discussed in Section 4.5.4. The 2024 PEA assumes that Tinka will exercise its option to repurchase the 1% NSR royalty payable to Sierra, and therefore the royalty is not included in the cashflow analysis. The US$1 million cost of exercising the repurchase option is included in project capital.

22.3.8 Working Capital

Working capital is calculated in the cash flow model, considering trade accounts receivable, IGV payable/receivable, income taxes payable/receivable, employee profit sharing payable, and trade accounts payable:

- Trade accounts receivable: 60 days of net revenue (net smelter return less product transportation and handling costs);
- IGV payable/receivable: It is assumed that Tinka will sign an investment contract entitling it to the early recovery of IGV paid on capital costs during the construction period. It is assumed that 85% of such IGV will be eligible for early recovery, with an average lag from payment to recovery of 4 months. IGV paid during the construction period which is not eligible for early recovery is assumed to be recovered during the operating period in the normal course with operating period IGV, which can be recovered against 18% of exports (zero rated) or be treated as credits towards IGV paid on domestic sales. Operating period IGV is assumed to be recovered with a one month lag on average. IGV paid on closure costs incurred following the cessation of sales is not recoverable.
- Income tax payable/receivable: income tax instalments including the temporary net asset tax (ITAN, discussed in Section 22.3.9) are calculated and the resulting income tax payable or receivable is determined. Scheduled income tax instalments are paid monthly based on a percentage of net smelter return equal to the greater of (i) the tax liability of the previous year as a percentage of net smelter return in such year and (ii) 1.5%. Scheduled instalments are adjusted for ITAN and credits for overpayments in the prior year.

- Trade accounts payable: 30 days of site operating costs, initial capital, sustaining capital and closure costs.

Except for IGV on closure costs incurred after Working capital is assumed to be recovered at project completion. Thus, the sum of all working capital over mine life is zero.

22.3.9 Taxes

The calculation of Income tax, royalties, fees and assessments in the cash flow model were reviewed by EY.

Each of the following are estimated in the model:

- Modified mining royalty: a sliding scale charge on adjusted EBIT with a marginal rate of 1% to 12% (maximum effective rate of 7.14%) depending on the ratio of adjusted EBIT to NSR, subject to a minimum of 1% of NSR;
- Special mining tax; a sliding scale charge on adjusted EBIT with a marginal rate of 2% to 8.4% (maximum effective rate of 5.36%) depending on the ratio of adjusted EBIT to NSR,
- Employee profit sharing: 8% of taxable income after losses carried forward;
- Complementary mining pension fund: 0.5% of taxable income after loss carry-forward and employee profit sharing;
- Corporate income tax: 29.5% of taxable income after losses carried forward, employee profit sharing and complementary mining pension fund;
- Temporary net asset tax (ITAN): 0.4% of applicable net assets. ITAN is a credit towards income taxes otherwise payable.
- OEFA fee: 0.7% of NSR. OEFA is an agency of the Ministry of Environment charged with monitoring compliance with applicable environmental laws and regulations;
- Osinergmin fee: 0.12% of NSR. Osinergmin is an agency of the Ministry of Energy and Mines charged with monitoring compliance with applicable mining laws and regulations; and
- Financial Transactions Tax: 0.005% of most payments and receipts.

Losses can either be carried forward for up to 4 years and used to reduce up to 100% of taxable income or can be carried forward indefinitely but only applied to up to 50% of taxable income. It is assumed that Tinka has elected the former.

In calculating taxable income, applicable capital is amortized on the following bases:

- Pre-operational expense (amortized over 1 to 3 years);
- Development: 1 year (expensed when incurred);
- Mining and processing equipment: 5 years (20% per year);
- Other equipment: 10 years (10% per year);
- Structures: 20 years (5% per year);
- Capitalized exploration costs: Life-of-mine, 21 years in the PEA mine plan

At the option of the taxpayer, exploration costs can be expensed (potentially creating a loss that can be carried forward for up to 4 years) or capitalized. Prior to 2023, Tinka capitalized exploration costs. It is assumed that 2023 exploration costs will be expensed.

Closing tax balances as at 31 December 2023 have been included in the cash flow model as follows:

- Pre-operational expense: US$8.4 million
- Losses carried forward: US$5.0 million
- Capitalized exploration: US$28.9 million

Table 22-5 presents the distribution of capital among the various tax depreciation categories.

Table 22-5: Capital Distribution Among Depreciation Categories

Depreciation Category	Initial Capital (%)	Sustaining Capital (%)	LOM Capital (%)
POE	26	0	14
3 years	6	21	13
5 years	29	70	47
10 years	1	6	3
20 years	37	3	22
21 years	0	0	1
Total	100	100	100

Note: Totals may not sum due to rounding.

22.3.10 Closure Costs, Closure Guarantees and Salvage Value

Closure Costs

Closure costs applied in the cash flow model totalling US$19.5 million are described in Section 21.2.9. Closure costs are assumed to be incurred in the two years following cessation of operations in equal amounts.

Closure Guarantees

Applicable environmental law requires closure guarantees to be provided in the form of cash, bank guarantee, letter of credit, or closure bond. In keeping with the assumption of 100% equity financing, it is assumed that the guarantee is satisfied with cash collateral. The required cash collateral is provided on a straight-line basis over the 21-year mine life so that upon cessation of operations the amount of the closure guarantee is equal to the estimated closure costs. The cash collateral is assumed to be released to Tinka as closure costs are incurred.

Salvage Value

Salvage value is not considered.

22.3.11 Financing

The PEA was based on 100% equity financing.

22.3.12 Inflation

No escalation or inflation was applied. All amounts are in real (constant) Q4 2023 terms.

22.4 Economic Analysis

The economic analysis was conducted on both a pre-tax and after-tax basis (see Table 22-9). Income tax, employee profit sharing and complimentary mining pension fund contributions, all based on taxable income, are deducted in the after-tax analysis. All other government charges are deducted in both the pre-tax and after-tax analysis.

On a pre-tax basis, the Project is anticipated to generate a pre-tax NPV of US$1,796 M at a discount rate of 8.0%, an IRR of 34.8 %, an undiscounted payback period of 2.4 years, and a discounted payback period of 2.9 years. On a post-tax basis, the Project is anticipated to generate a pre-tax NPV of US$434 M at a discount rate of 8.0%, an IRR of 25.9%, an undiscounted payback period of 2.9 years, and a discounted payback period of 3.6 years. The summary of financial results for the 2024 PEA is presented in Table 22-6.

Table 22-6: Summary of Financial Results

Description	Units	Pre-tax	Post-tax
NPV at 0% (undiscounted LOM cash flow)	US$ M	1,796	1,167
NPV @ 8%	***US$ M***	***732***	***434***
NPV @ 10%	US$ M	594	340
Payback period (from start of operations)			
Undiscounted	Years	2.4	2.9
Discounted	Years	2.9	3.6
IRR	%	34.8	25.9

Note: base case NPV8% is in bold italics.

Cash operating costs were determined per pound of payable zinc. C1 cash costs comprise the sum of estimated mining, processing, general and administrative costs, product transportation, and treatment and refining costs including applicable penalties, less by- product credits for tin, silver, and lead. A LOM AISC was also determined. The AISC is an extension of the cash operating costs, adding the sustaining capital costs required to sustain production as well as closure costs. A summary of the key results for the project and LOM cash cost is provided in Table 22-7 and Table 22-8 respectively.

Table 22-7: Summary of Key Results

Description	Units	Value
Zn payable	M lb	3,527
Sn payable	M lb	45
Ag payable	M oz	11
Pb payable	M lb	112
Zn payable equivalent	M lb	4,305
Initial capital	US$ M	381.8
Sustaining capital	US$ M	313.1
LOM capital	US$ M	694.9
Closure costs	US$ M	19.5

Table 22-8: Summary of LOM Cash Cost

	LOM (US$M)	US$/Zn lb payable
Cash Costs		
Mining including backfill	769	0.22
Processing including tailings	599	0.17
G&A	284	0.08
Concentrate transport, treatment and refining	1,134	0.32
Sub-total	2,785	0.79
By-product credits		
Tin	(500)	(0.14)
Silver	(245)	(0.07)
Lead	(112)	(0.03)
Net Direct Cash Cost (C1)	1,929	0.55
Royalties and production taxes*	140	0.04
Sustaining capital and closure	316	0.10
AISC	2,401	0.68

Figure 22-1 shows the annual zinc concentrate production estimated over the LOM by zone and area. Figure 22-2 presents the main NPV@8% value drivers. Figure 22-3 shows the cumulative undiscounted and discounted cash flows forecast for the Project. Table 22-9 presents the summary annual cash flow.

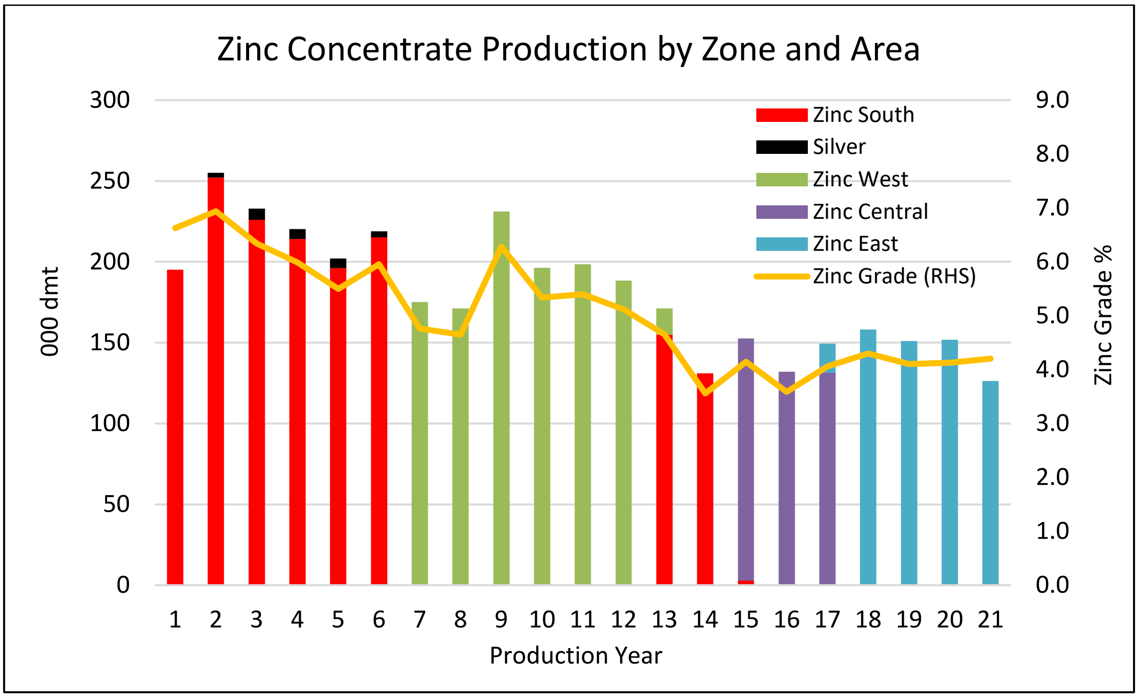


Figure 22-1: LOM Zinc Concentrate Production

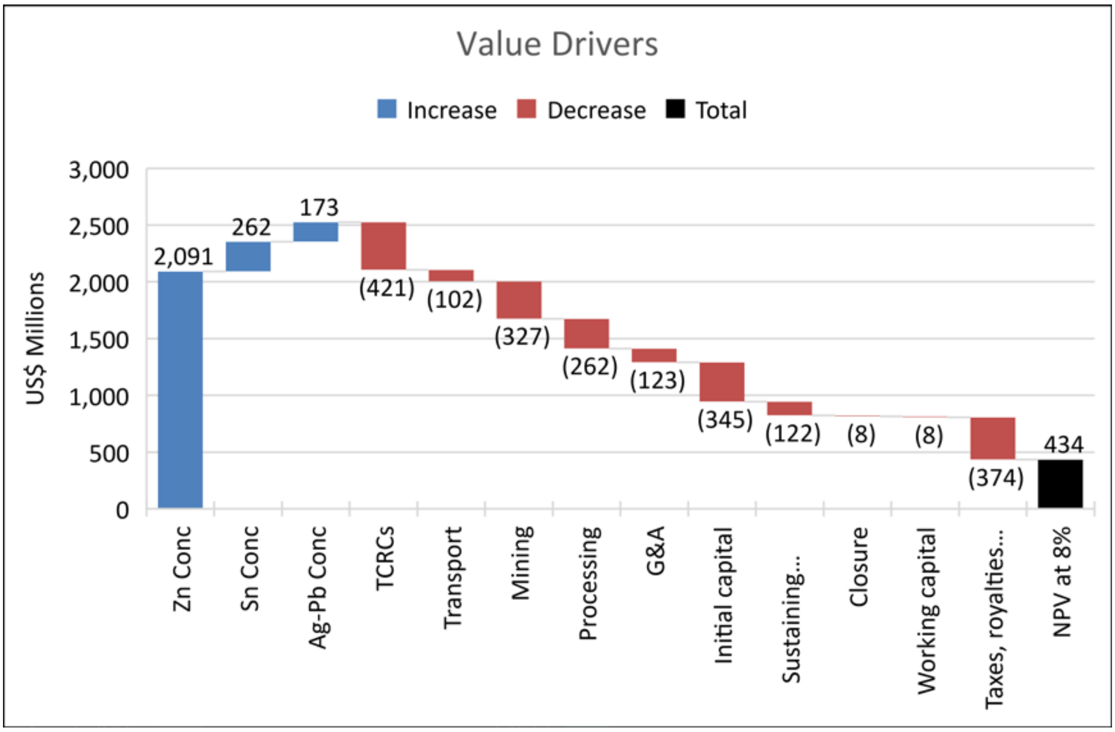


Figure 22-2: Value Drivers

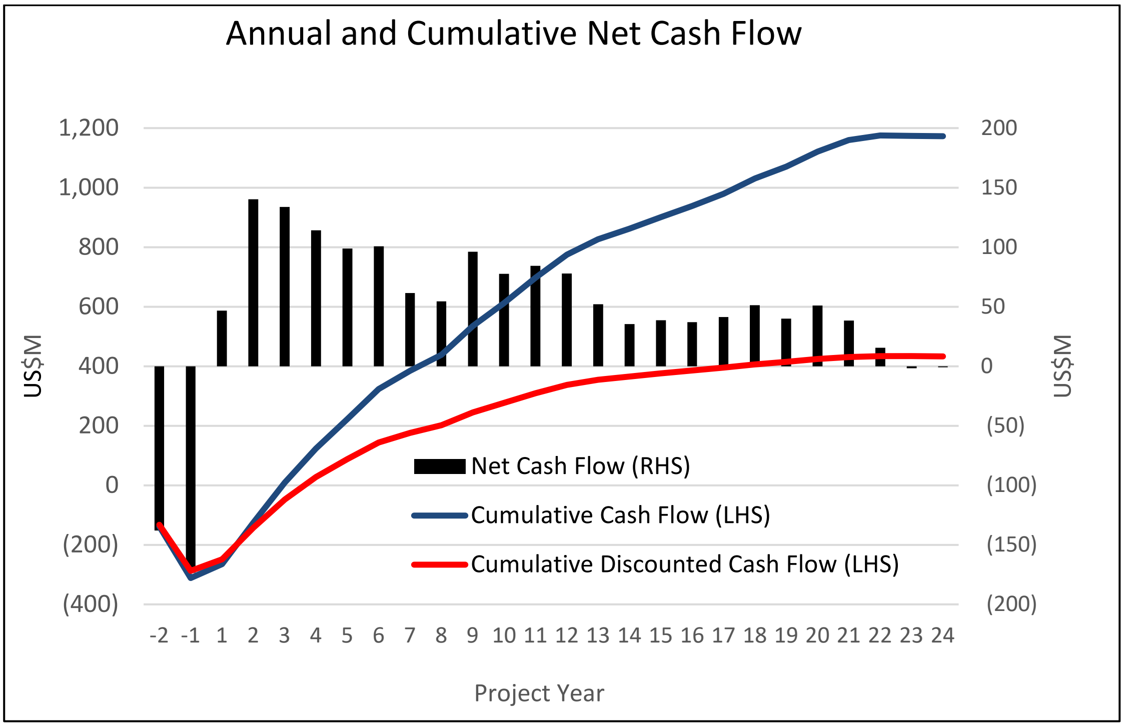


Figure 22-3: Cumulative Discounted Cash Flow

Figure 22-3 illustrates the tilt of production towards the early years of operation. While production extends to project year 21, and closure and working capital changes extend cash flows to project year 24, the cumulative discounted cash flow reaches 90% of the final value of US$434 million 16.5 years after start of production.

Table 22-9: 2024 PEA Annual Net Cashflow (Year -2 to Year 24)

Description	Units	LOM	YEAR											
			-2	-1	1	2	3	4	5	6	7	8	9	10
Production (Feed to Mill)														
Zinc Plant Feed	kt	41,231	-	-	1,600	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Zn grade	%	5.02	-	-	6.63	6.94	6.34	5.99	5.50	5.95	4.76	4.65	6.28	5.34
Pb grade	%	0.19	-	-	0.22	0.26	0.21	0.15	0.14	0.18	0.34	0.16	0.12	0.09
Ag grade	g/t	17.27	-	-	23.01	35.71	28.18	25.88	28.00	22.77	20.84	11.54	11.75	9.36
Tin Plant Feed	kt	4,320	-	-	240	300	300	300	300	300	300	300	300	300
Sn grade	%	0.92	-	-	0.67	0.75	0.62	0.99	0.88	1.14	1.15	1.02	0.90	1.00
Total Plant Feed	kt	45,551	-	-	1,840	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300
Metal Recovered		*1,904.35*												
Zn recovered to Zn concentrate	klb	4,198,371	-	-	215,056	281,253	256,681	242,725	222,771	241,300	193,139	188,663	254,773	216,508
Pb recovered to Ag-Pb concentrate	klb	119,892	-	-	5,454	8,208	7,090	5,057	4,642	5,773	10,432	4,935	3,663	2,884
Ag recovered to Ag-Pb concentrate	koz	11,711	-	-	533	1,452	1,181	1,022	1,055	763	603	334	340	271
Sn recovered to Sn concentrate	klb	48,873	-	-	3,197	4,467	3,569	3,263	2,920	3,782	3,798	3,376	2,979	3,305
Concentrate Production														
Zn concentrate	kdmt	3,809	-	-	195	255	233	220	202	219	175	171	231	196
Zn grade	%	50	-	-	50	50	50	50	50	50	50	50	50	50
Pb–Ag concentrate	kdmt	116	-	-	5	11	7	5	6	6	9	4	3	3
Pb grade	%	47	-	-	50	34	43	42	37	45	50	50	50	50
Ag grade	g/t	3,139	-	-	3,348	4,152	4,953	5,849	5,770	4,107	1,982	2,320	3,182	3,219
Sn concentrate	kdmt	44.3	-	-	2.9	4.1	3.2	3.0	2.6	3.4	3.4	3.1	2.7	3.0
Sn grade	%	50	-	-	50	50	50	50	50	50	50	50	50	50
Payable Metals														
Zn payable	klb	3,526,631	-	-	180,647	236,253	215,612	203,889	187,128	202,692	162,236	158,477	214,009	181,867
Pb payable	klb	112,217	-	-	5,127	7,489	6,600	4,697	4,265	5,391	9,806	4,638	3,443	2,711
Ag payable	koz	11,124	-	-	506	1,380	1,122	971	1,002	725	573	317	323	257
Sn payable	klb	45,452	-	-	2,973	4,154	3,319	3,034	2,716	3,518	3,532	3,139	2,770	3,074
Zn Equivalent	klb	4,305,161	-	-	225,345	313,657	278,442	258,894	238,878	257,926	216,524	199,716	251,731	220,292
Gross revenue	***US$ 000***	5,441,532	-	-	283,808	390,670	348,085	324,498	299,456	323,530	272,167	252,170	319,234	278,610
Zn	US$ 000	4,584,621	-	-	234,841	307,128	280,296	265,056	243,266	263,500	210,907	206,021	278,212	236,427
Pb	US$ 000	112,217	-	-	5,127	7,489	6,600	4,697	4,265	5,391	9,806	4,638	3,443	2,711
Ag	US$ 000	244,720	-	-	11,133	30,354	24,679	21,367	22,048	15,945	12,602	6,979	7,105	5,658
Sn	US$ 000	499,974	-	-	32,707	45,699	36,511	33,379	29,876	38,694	38,851	34,532	30,473	33,814
TC&RC and Penalties	***US$ 000***	***(919,673)***	**-**	**-**	***(47,374)***	***(61,879)***	***(56,132)***	***(53,033)***	***(49,031)***	***(53,013)***	***(44,988)***	***(42,712)***	***(54,442)***	***(47,421)***
Zn concentrate TC	US$ 000	(837,915)	-	-	(42,921)	(56,133)	(51,229)	(48,443)	(44,461)	(48,159)	(38,547)	(37,654)	(50,848)	(43,211)
Zn concentrate iron penalty	US$ 000	(28,565)	-	-	(1,463)	(1,914)	(1,746)	(1,651)	(1,516)	(1,642)	(1,314)	(1,284)	(1,733)	(1,473)
Zn concentrate indium credit	US$ 000	6,777	-	-	302	1,503	1,057	804	442	778	-	-	1,023	328

Description	Units	LOM	YEAR											
			-2	-1	1	2	3	4	5	6	7	8	9	10
Pb–Ag concentrate TC	US$ 000	(10,309)	-	-	(247)	(544)	(371)	(272)	(284)	(289)	(1,420)	(671)	(166)	(131)
Ag refining	US$ 000	(9,320)	-	-	(405)	(1,104)	(897)	(777)	(802)	(580)	(573)	(317)	(258)	(206)
Sn concentrate TC	US$ 000	(33,253)	-	-	(2,175)	(3,039)	(2,428)	(2,220)	(1,987)	(2,573)	(2,584)	(2,297)	(2,027)	(2,249)
Sn concentrate penalties	US$ 000	(7,089)	-	-	(464)	(648)	(518)	(473)	(424)	(549)	(551)	(490)	(432)	(479)
Net Smelter Returns	***US$ 000***	***4,521,859***	***-***	***-***	***236,435***	***328,791***	***291,953***	***271,465***	***250,424***	***270,516***	***227,178***	***209,457***	***264,792***	***231,189***
Zn concentrates	US$ 000	3,724,918	-	-	190,759	250,585	228,378	215,765	197,731	214,477	171,046	167,083	226,653	192,071
Ag-Pb concentrates	US$ 000	337,308	-	-	15,607	36,195	30,010	25,015	25,227	20,467	20,416	10,629	10,124	8,032
Sn concentrates	US$ 000	459,632	-	-	30,068	42,012	33,565	30,686	27,466	35,572	35,716	31,746	28,015	31,085
Transport Costs	***US$ 000***	***(214,286)***	***-***	***-***	***(10,757)***	***(18,922)***	***(15,699)***	***(13,889)***	***(11,670)***	***(13,825)***	***(9,289)***	***(8,482)***	***(14,948)***	***(10,657)***
Zn concentrate transport	US$ 000	(195,631)	-	-	(9,845)	(17,185)	(14,460)	(12,913)	(10,700)	(12,755)	(7,787)	(7,607)	(14,249)	(10,006)
Pb–Ag concentrate transport	US$ 000	(13,539)	-	-	(577)	(1,269)	(865)	(634)	(663)	(674)	(1,104)	(522)	(388)	(305)
Sn concentrate transport	US$ 000	(5,116)	-	-	(335)	(468)	(374)	(342)	(306)	(396)	(398)	(353)	(312)	(346)
Net Revenue	***US$ 000***	***4,307,573***	***-***	***-***	***225,678***	***309,870***	***276,254***	***257,577***	***238,755***	***256,691***	***217,890***	***200,975***	***249,844***	***220,532***
Zn concentrate	US$ 000	3,529,287	-	-	180,914	233,400	213,918	202,852	187,031	201,722	163,259	159,476	212,405	182,065
Pb–Ag concentrate	US$ 000	323,769	-	-	15,030	34,926	29,145	24,381	24,564	19,793	19,312	10,106	9,736	7,727
Sn concentrate	US$ 000	454,516	-	-	29,734	41,544	33,191	30,344	27,160	35,176	35,318	31,392	27,703	30,739
Operating Costs	***US$ 000***	***(1,651,445)***	***-***	***-***	***(70,609)***	***(82,300)***	***(81,181)***	***(79,837)***	***(81,238)***	***(81,819)***	***(83,908)***	***(82,880)***	***(82,701)***	***(81,836)***
Mining	US$ 000	(599,163)	-	-	(27,028)	(28,233)	(27,177)	(25,881)	(27,430)	(28,181)	(29,041)	(28,227)	(28,541)	(27,838)
Processing - Zn concentrator	US$ 000	(453,696)	-	-	(17,606)	(22,008)	(22,008)	(22,008)	(22,008)	(22,008)	(22,008)	(22,008)	(22,008)	(22,008)
Processing - Sn concentrator	US$ 000	(102,074)	-	-	(5,670)	(7,088)	(7,088)	(7,088)	(7,088)	(7,088)	(7,088)	(7,088)	(7,088)	(7,088)
Backfill	US$ 000	(169,817)	-	-	(7,247)	(8,600)	(8,469)	(8,381)	(8,165)	(7,996)	(9,395)	(9,117)	(8,643)	(8,375)
Tailings	US$ 000	(42,815)	-	-	(1,590)	(2,037)	(2,105)	(2,146)	(2,215)	(2,213)	(2,043)	(2,107)	(2,087)	(2,193)
G&A	US$ 000	(283,880)	-	-	(11,467)	(14,334)	(14,334)	(14,334)	(14,334)	(14,334)	(14,334)	(14,334)	(14,334)	(14,334)
Government royalties, etc.	***US$ 000***	***(140,265)***	***-***	***-***	***(11,625)***	***(16,621)***	***(13,298)***	***(11,615)***	***(9,630)***	***(10,913)***	***(6,983)***	***(5,498)***	***(9,551)***	***(6,917)***
Modified mining royalty	US$ 000	(71,705)	-	-	(5,956)	(8,551)	(6,737)	(5,827)	(4,745)	(5,422)	(3,299)	(2,510)	(4,653)	(3,250)
Special mining tax	US$ 000	(59,577)	-	-	(5,199)	(7,419)	(5,983)	(5,251)	(4,389)	(4,955)	(3,233)	(2,572)	(4,372)	(3,208)
OEFA fee	US$ 000	(3,165)	-	-	(166)	(230)	(204)	(190)	(175)	(189)	(159)	(147)	(185)	(162)
Osinergmin fee	US$ 000	(5,426)	-	-	(284)	(395)	(350)	(326)	(301)	(325)	(273)	(251)	(318)	(277)
Financial transactions tax	US$ 000	(391)	-	-	(20)	(26)	(23)	(22)	(20)	(22)	(20)	(18)	(22)	(20)
Net Operating Earnings	***US$ 000***	***2,515,862***	***-***	***-***	***143,444***	***210,949***	***181,775***	***166,124***	***147,887***	***163,959***	***126,998***	***112,596***	***157,592***	***131,778***
Taxes	***US$ 000***	***(629,132)***	***-***	***-***	***-***	***(55,141)***	***(50,085)***	***(45,377)***	***(38,582)***	***(51,551)***	***(36,924)***	***(30,808)***	***(46,536)***	***(36,753)***
Employee profit share	US$ 000	(141,919)	-	-	-	(12,439)	(11,298)	(10,236)	(8,703)	(11,629)	(8,329)	(6,950)	(10,498)	(8,291)
Complementary mining pension	US$ 000	(8,160)	-	-	-	(715)	(650)	(589)	(500)	(669)	(479)	(400)	(604)	(477)
Income tax	US$ 000	(479,053)	-	-	-	(41,987)	(38,137)	(34,553)	(29,378)	(39,253)	(28,115)	(23,459)	(35,435)	(27,985)
Capital and Closure Costs	***US$ 000***	***(714,028)***	***(137,971)***	***(171,059)***	***(96,828)***	***(15,583)***	***2,019***	***(6,486)***	***(10,514)***	***(11,619)***	***(28,505)***	***(27,408)***	***(14,901)***	***(17,294)***
Initial capital	US$ 000	(381,843)	(138,473)	(167,196)	(76,174)	-	-	-	-	-	-	-	-	-
Sustaining capital	US$ 000	(313,084)	-	-	-	(11,458)	(9,387)	(9,083)	(9,483)	(11,104)	(31,217)	(22,545)	(12,621)	(21,179)

Description	**Units**	**LOM**	**YEAR**											
			-2	**-1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Decrease (increase) in closure	US$ 000	0	-	-	(929)	(929)	(929)	(929)	(929)	(929)	(929)	(929)	(929)	(929)
Closure cost	US$ 000	(19,505)	-	-	-	-	-	-	-	-	-	-	-	-
Decrease (inc.) in working capital	US$ 000	404	502	(3,863)	(19,726)	(3,197)	12,335	3,526	(103)	414	3,640	(3,934)	(1,352)	4,814
Net Cash Flow		-												
Before tax	***US$ 000***	***1,801,835***	***(137,971)***	***(173,569)***	***46,616***	***195,365***	***183,794***	***159,639***	***137,373***	***152,341***	***98,493***	***85,189***	***142,691***	***114,485***
After tax	***US$ 000***	***1,172,703***	***(137,971)***	***(173,569)***	***46,616***	***140,224***	***133,709***	***114,261***	***98,791***	***100,790***	***61,569***	***54,381***	***96,155***	***77,732***

Note: Totals may not add due to rounding.

Description	**Units**	**YEAR**													
		11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Production (Feed to Mill)															
Zinc Plant Feed	kt	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	1,631	-	-	-
Zn grade	%	5.40	5.12	4.65	3.56	4.15	3.59	4.06	4.30	4.11	4.13	4.21	-	-	-
Pb grade	%	0.09	0.06	0.14	0.16	0.41	0.38	0.09	0.16	0.17	0.19	0.18	-	-	-
Ag grade	g/t	9.43	9.15	15.49	22.78	13.01	10.70	12.39	10.67	13.49	16.65	12.14	-	-	-
Tin Plant Feed	kt	300	300	300	300	180	-	-	-	-	-	-	-	-	-
Sn grade	%	0.93	0.93	0.93	0.93	0.93	-	-	-	-	-	-	-	-	-
Total Plant Feed	kt	2,300	2,300	2,300	2,300	2,180	2,000	2,000	2,000	2,000	2,000	1,631	-	-	-
Metal Recovered															
Zn recovered to Zn concentrate	klb	218,888	207,729	188,738	144,362	168,156	145,564	164,697	174,293	166,553	167,398	139,122	-	-	-
Pb recovered to Ag-Pb concentrate	klb	2,647	1,885	4,184	5,029	12,804	11,836	2,656	5,022	5,163	5,879	4,650	-	-	-
Ag recovered to Ag-Pb concentrate	koz	273	265	448	659	377	310	359	309	390	482	286	-	-	-
Sn recovered to Sn concentrate	klb	3,090	3,090	3,090	3,090	1,858	-	-	-	-	-	-	-	-	-
Concentrate Production															
Zn concentrate	kdmt	199	188	171	131	153	132	149	158	151	152	126	-	-	-
Zn grade	%	50	50	50	50	50	50	50	50	50	50	50	-	-	-
Pb–Ag concentrate	kdmt	2	2	4	5	12	11	2	5	5	5	4	-	-	-
Pb grade	%	50	50	50	50	50	50	50	50	50	50	50	-	-	-
Ag grade	g/t	3,533	4,818	3,672	4,495	1,008	897	4,629	2,108	2,593	2,810	2,112	-	-	-
Sn concentrate	kdmt	2.8	2.8	2.8	2.8	1.7	-	-	-	-	-	-	-	-	-
Sn grade	%	50	50	50	50	50	-	-	-	-	-	-	-	-	-
Payable Metals															
Zn payable	klb	183,866	174,492	158,540	121,264	141,251	122,274	138,345	146,406	139,905	140,615	116,863	-	-	-
Pb payable	klb	2,489	1,772	3,933	4,727	12,036	11,125	2,497	4,721	4,853	5,526	4,371	-	-	-
Ag payable	koz	259	252	426	626	358	292	341	293	371	458	272	-	-	-
Sn payable	klb	2,873	2,873	2,873	2,873	1,728	-	-	-	-	-	-	-	-	-
Zn Equivalent	klb	220,164	209,923	199,341	166,954	174,773	136,587	147,605	156,011	151,766	154,867	125,767			
Gross revenue	***US$ 000***	278,822	265,755	251,007	207,756	222,543	176,515	189,841	201,502	194,889	198,396	162,279	-	-	-
Zn	US$ 000	239,025	226,840	206,102	157,644	183,627	158,956	179,849	190,328	181,876	182,799	151,921	-	-	-
Pb	US$ 000	2,489	1,772	3,933	4,727	12,036	11,125	2,497	4,721	4,853	5,526	4,371	-	-	-
Ag	US$ 000	5,701	5,536	9,366	13,779	7,869	6,434	7,495	6,453	8,160	10,071	5,986	-	-	-
Sn	US$ 000	31,607	31,607	31,607	31,607	19,011	-	-	-	-	-	-	-	-	-
TC&RC and Penalties	***US$ 000***	***(47,681)***	***(45,540)***	***(42,033)***	***(33,074)***	***(38,339)***	***(31,945)***	***(34,384)***	***(36,948)***	***(34,905)***	***(35,181)***	***(29,618)***	**-**	**-**	**-**
Zn concentrate TC	US$ 000	(43,686)	(41,459)	(37,668)	(28,812)	(33,561)	(29,052)	(32,870)	(34,786)	(33,241)	(33,409)	(27,766)	-	-	-
Zn concentrate iron penalty	US$ 000	(1,489)	(1,413)	(1,284)	(982)	(1,144)	(990)	(1,121)	(1,186)	(1,133)	(1,139)	(947)	-	-	-
Zn concentrate indium credit	US$ 000	371	169	-	-	-	-	-	-	-	-	-	-	-	-
Pb–Ag concentrate TC	US$ 000	(120)	(86)	(190)	(228)	(1,742)	(1,611)	(120)	(683)	(234)	(267)	(633)	-	-	-

Description	**Units**	**YEAR**													
		11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Ag refining	US$ 000	(207)	(201)	(341)	(501)	(358)	(292)	(273)	(293)	(297)	(366)	(272)	-	-	-
Sn concentrate TC	US$ 000	(2,102)	(2,102)	(2,102)	(2,102)	(1,264)	-	-	-	-	-	-	-	-	-
Sn concentrate penalties	US$ 000	(448)	(448)	(448)	(448)	(270)	-	-	-	-	-	-	-	-	-
Net Smelter Returns	***US$ 000***	***231,141***	***220,215***	***208,974***	***174,682***	***184,204***	***144,570***	***155,457***	***164,553***	***159,984***	***163,215***	***132,662***	***-***	***-***	***-***
Zn concentrates	US$ 000	194,222	184,137	167,149	127,849	148,922	128,914	145,858	154,357	147,502	148,250	123,209	-	-	-
Ag-Pb concentrates	US$ 000	7,863	7,021	12,768	17,776	17,805	15,656	9,599	10,197	12,482	14,965	9,453	-	-	-
Sn concentrates	US$ 000	29,057	29,057	29,057	29,057	17,477	-	-	-	-	-	-	-	-	-
Transport Costs	***US$ 000***	***(10,873)***	***(9,556)***	***(8,376)***	***(6,676)***	***(8,330)***	***(7,122)***	***(6,922)***	***(7,559)***	***(7,262)***	***(7,372)***	***(6,102)***	***-***	***-***	***-***
Zn concentrate transport	US$ 000	(10,270)	(9,033)	(7,610)	(5,821)	(6,780)	(5,869)	(6,640)	(7,027)	(6,715)	(6,749)	(5,609)	-	-	-
Pb–Ag concentrate transport	US$ 000	(280)	(200)	(443)	(532)	(1,355)	(1,253)	(281)	(532)	(546)	(622)	(492)	-	-	-
Sn concentrate transport	US$ 000	(323)	(323)	(323)	(323)	(195)	-	-	-	-	-	-	-	-	-
Net Revenue	***US$ 000***	***220,267***	***210,659***	***200,598***	***168,006***	***175,874***	***137,448***	***148,535***	***156,994***	***152,722***	***155,843***	***126,560***	***-***	***-***	***-***
Zn concentrate	US$ 000	183,952	175,104	159,539	122,029	142,142	123,045	139,217	147,329	140,787	141,501	117,599	-	-	-
Pb–Ag concentrate	US$ 000	7,582	6,822	12,325	17,244	16,450	14,404	9,318	9,665	11,935	14,342	8,961	-	-	-
Sn concentrate	US$ 000	28,733	28,733	28,733	28,733	17,283	-	-	-	-	-	-	-	-	-
Operating Costs	***US$ 000***	***(80,839)***	***(82,428)***	***(86,359)***	***(86,780)***	***(84,282)***	***(75,306)***	***(75,118)***	***(71,412)***	***(69,920)***	***(68,851)***	***(59,340)***	***-***	***-***	***-***
Mining	US$ 000	(26,855)	(28,564)	(32,685)	(33,088)	(33,812)	(31,020)	(30,733)	(27,572)	(26,138)	(25,086)	(23,531)	-	-	-
Processing - Zn concentrator	US$ 000	(22,008)	(22,008)	(22,008)	(22,008)	(22,008)	(22,008)	(22,008)	(22,008)	(22,008)	(22,008)	(17,943)	-	-	-
Processing - Sn concentrator	US$ 000	(7,088)	(7,088)	(7,088)	(7,088)	(4,263)	-	-	-	-	-	-	-	-	-
Backfill	US$ 000	(8,363)	(8,195)	(7,935)	(7,875)	(8,600)	(7,967)	(8,105)	(7,471)	(7,386)	(7,369)	(6,165)	-	-	-
Tailings	US$ 000	(2,192)	(2,240)	(2,310)	(2,388)	(2,011)	(1,847)	(1,808)	(1,897)	(1,924)	(1,924)	(1,538)	-	-	-
G&A	US$ 000	(14,334)	(14,334)	(14,334)	(14,334)	(13,589)	(12,464)	(12,464)	(12,464)	(12,464)	(12,464)	(10,162)	-	-	-
Government royalties, etc.	***US$ 000***	***(6,889)***	***(5,778)***	***(4,556)***	***(3,029)***	***(3,346)***	***(2,154)***	***(2,467)***	***(2,797)***	***(2,452)***	***(2,442)***	***(1,695)***	-	-	***-***
Modified mining royalty	US$ 000	(3,235)	(2,637)	(2,090)	(1,747)	(1,842)	(1,446)	(1,555)	(1,646)	(1,600)	(1,632)	(1,327)	-	-	-
Special mining tax	US$ 000	(3,196)	(2,704)	(2,051)	(935)	(1,137)	(421)	(604)	(825)	(534)	(486)	(105)	-	-	-
OEFA fee	US$ 000	(162)	(154)	(146)	(122)	(129)	(101)	(109)	(115)	(112)	(114)	(93)	-	-	-
Osinergmin fee	US$ 000	(277)	(264)	(251)	(210)	(221)	(173)	(187)	(197)	(192)	(196)	(159)	-	-	-
Financial transactions tax	US$ 000	(19)	(18)	(18)	(16)	(17)	(13)	(14)	(14)	(14)	(14)	(11)	-	-	-
Net Operating Earnings	***US$ 000***	***132,539***	***122,453***	***109,682***	***78,197***	***88,246***	***59,989***	***70,950***	***82,786***	***80,351***	***84,550***	***65,526***	***-***	***-***	***-***
Taxes	***US$ 000***	***(37,524)***	***(34,973)***	***(30,190)***	***(18,317)***	***(20,693)***	***(10,912)***	***(15,000)***	***(20,874)***	***(19,389)***	***(22,159)***	***(7,345)***	-	-	***-***
Employee profit share	US$ 000	(8,465)	(7,889)	(6,810)	(4,132)	(4,668)	(2,462)	(3,384)	(4,709)	(4,374)	(4,999)	(1,657)	-	-	-
Complementary mining pension	US$ 000	(487)	(454)	(392)	(238)	(268)	(142)	(195)	(271)	(251)	(287)	(95)	-	-	-
Income tax	US$ 000	(28,573)	(26,630)	(22,988)	(13,948)	(15,756)	(8,309)	(11,421)	(15,894)	(14,764)	(16,873)	(5,593)	-	-	-
Capital and Closure Costs	***US$ 000***	***(10,643)***	***(9,690)***	***(27,391)***	***(24,443)***	***(29,005)***	***(11,942)***	***(14,695)***	***(10,777)***	***(21,055)***	***(11,395)***	***(19,763)***	***15,478***	***(1,755)***	***(802)***
Initial capital	US$ 000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sustaining capital	US$ 000	(8,589)	(10,411)	(25,596)	(18,021)	(30,973)	(10,511)	(15,712)	(11,835)	(21,943)	(9,888)	(11,530)	-	-	-
Decrease (increase) in closure	US$ 000	(929)	(929)	(929)	(929)	(929)	(929)	(929)	(929)	(929)	(929)	(929)	9,753	9,753	-

Description	**Units**	**YEAR**													
		11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Closure cost	US$ 000	-	-	-	-	-	-	-	-	-	-	-	(9,753)	(9,753)	-
Decrease (inc.) in working capital	US$ 000	(1,125)	1,650	(866)	(5,493)	2,896	(503)	1,945	1,987	1,816	(578)	(7,303)	15,478	(1,755)	(802)
Net Cash Flow															
Before tax	***US$ 000***	***121,896***	***112,763***	***82,292***	***53,754***	***59,241***	***48,046***	***56,255***	***72,009***	***59,295***	***73,156***	***45,763***	***15,478***	***(1,756)***	***(802)***
After tax	***US$ 000***	***84,372***	***77,790***	***52,102***	***35,437***	***38,549***	***37,134***	***41,255***	***51,135***	***39,906***	***50,996***	***38,418***	***15,478***	***(1,756)***	***(802)***
Note: Totals may not add due to rounding.															

22.5 Sensitivity Analysis

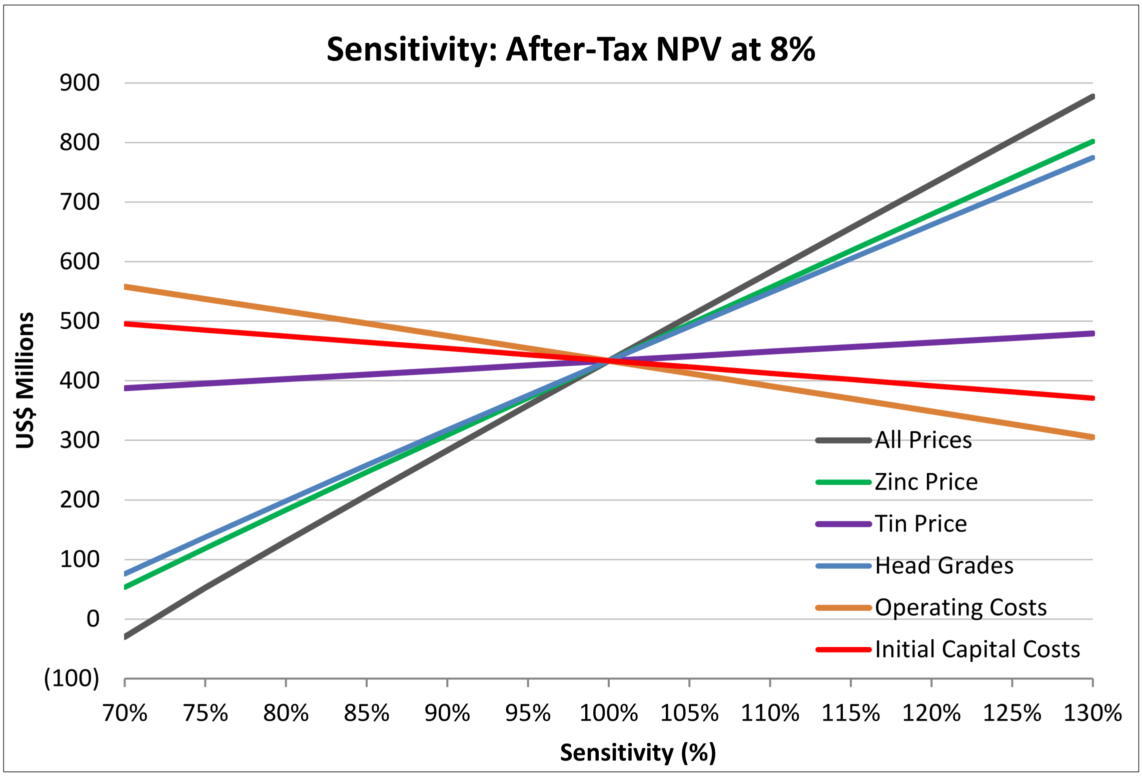
The sensitivity of after-tax NPV at 8% and IRR to variations in metal prices, head grades, initial capital costs and operating costs were analysed. The results of this analysis are presented in Figure 22-4 and Figure 22-5.

The Project is most sensitive to product prices generally, then to the zinc price, then to head grades. It is less sensitive to tin prices, then to operating costs, then initial capital costs.

Table 22-10 presents the Project NPV at a range of discount rates from 5% to 15%. The base case NPV at 8% is bolded in the table.

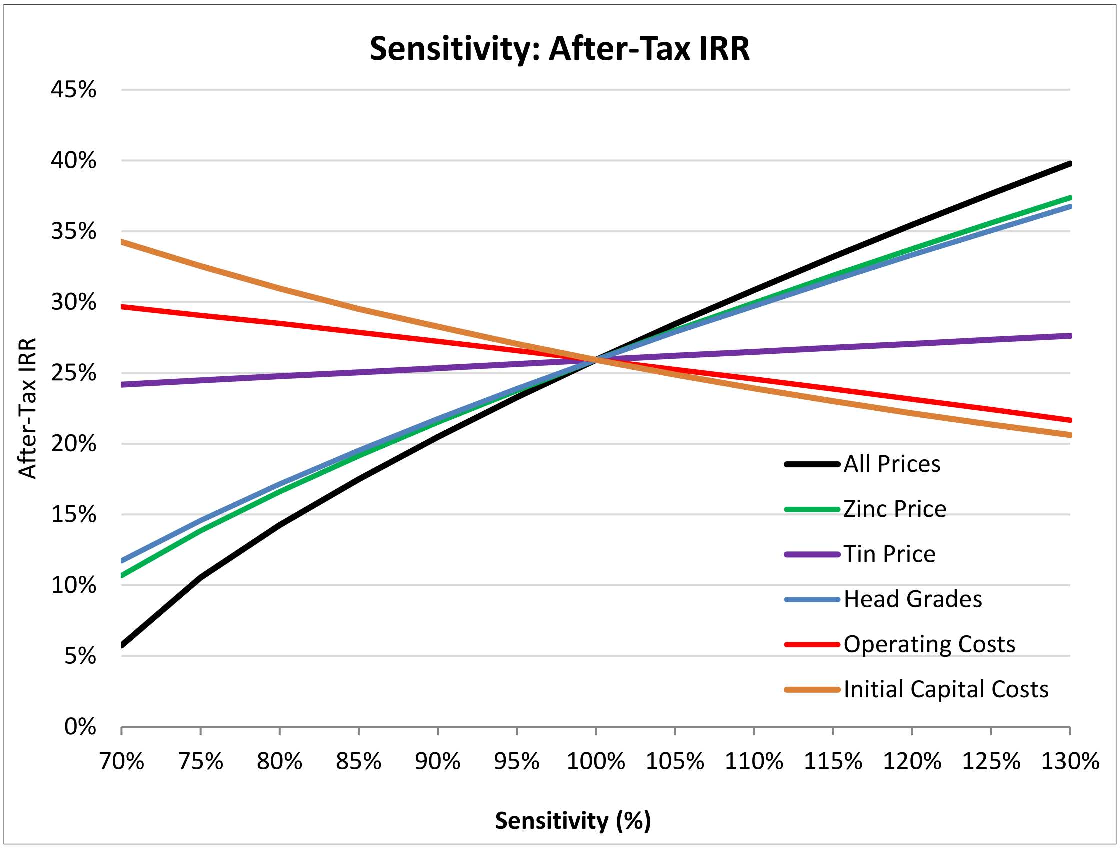
Table 22-10: NPV at Different Discount Rates (Base Case is Bolded)

Discount Rate	Pre-Tax (US$ M)	After Tax (US$ M)
NPV 5%	1,010	624
NPV 7%	813	490
NPV 8%	732	434
NPV 10%	594	340
NPV 12%	484	265
NPV 15%	356	178



Source: Tinka, 2024

Figure 22-4: Sensitivity: After-Tax NPV at 8%



Source: Tinka, 2024

Figure 22-5: Sensitivity: After-Tax IRR

22.6 Comments on Section 22

Under the assumptions in this Report, and based on the available data, the Project shows positive economics. Using an 8% discount rate, the project has an after-tax NPV of US$434 M, an IRR of 25.9% and a payback period of 2.9 years. There is upside potential for the project if the zinc prices increase from the assumptions used in the Report, since the sensitivity analysis shows that the project is quite sensitive to zinc price changes. A base case zinc price of US$1.30/lb was used. During 2023, the LME 3-month zinc price varied between US$1.00/lb and US$1.59/lb.

Recommendations for improvements during the Pre-Feasibility Study (“PFS”) phase are as follows:

- Add detail on supplies and spares inventory, both first fills and operational;
- Improved modelling of accounts receivable based on a more developed marketing plan and estimated contract terms;
- Modelling of concentrate inventories;
- Consider fiscal alternatives available under a mining stability agreement;
- Model progressive closure of the filtered tailings storage facility which will have income tax and IGV benefits.

23 ADJACENT PROPERTIES

This section is not relevant to this Report.

24 OTHER RELEVANT DATA AND INFORMATION

This section is not relevant to this Report.

25 INTERPRETATION AND CONCLUSIONS

25.1 Introduction

The individual QP's note the following interpretations and conclusions in their respective areas of expertise and responsibility, based on the reviews and interpretations of data available for this Report.

25.2 Mineral Resources and Exploration Potential

The Project hosts several styles of mineralization within numerous deposits, zones, and target areas. Mineral Resources have been estimated at the Ayawilca deposit and the Colquipucro deposit. Other target areas on the Property include Chaucha, Valley, Far South, Yanapizgo, Pucarumi, and Tambillo.

The Property is located in the Central Peru polymetallic belt and is at the exploration stage. While the Ayawilca and Colquipucro deposits are situated 1.5 km apart, they are hosted in different stratigraphic units and will potentially be mined by different methods, underground for the Ayawilca deposit and open pit for the Colquipucro deposit.

Zinc-lead-silver mineralization within the Ayawilca deposit, referred to as the "Zinc Zone", is predominantly hosted within limestones of the Pucará Group. The Zinc Zone mineralization is complex in form, made up of multiple lenses or "mantos", vertical "pipes", and irregular sulphide bodies, all consisting of semi-massive to massive zinc-rich sulphides. There are four defined areas of mineralization each modelled separately: West, South, Central, and East.

Silver-rich mineralization at Ayawilca, referred to as the "Silver Zone", typically occurs on the edges of the Zinc Zone and is associated with abundant hydrothermal carbonate and quartz with lesser quantities of sulphides.

Tin mineralization at Ayawilca, referred to as the "Tin Zone", predominantly occurs within flat to shallow dipping mantos in South and Central Ayawilca as veinlets interpreted as a stockwork zone. The latter style of mineralization is a minor component of the Tin Zone.

The regional setting, geometry, and mineralogy suggest that the Ayawilca deposit forms a carbonate replacement deposit (CRD), similar to several other deposits in the central Peru polymetallic belt, including Cerro de Pasco. Mineralization is believed to be Miocene in age, possibly associated with an intrusion at depth that has not been identified.

The Colquipucro deposit, which is hosted primarily within the Goyllarisquizga Formation quartz sandstone of Cretaceous age, has not been drilled since 2014. Historical mining focused on a series of en-echelon east-west trending, steeply north dipping faults and veins. In 2006, mapping and sampling by Tinka identified lower grade mineralization in narrow fractures between the high-grade veins. The Colquipucro deposit has been modelled to include10 north dipping high-grade zones, a gently dipping basal zone, and a low-grade halo that encompasses all high-grade zones. Overall, the Colquipucro deposit is 550 m in the north-south direction by 380 m in the east-west direction by 75 m thick. Weathering at the Colquipucro deposit is extensive. Preliminary metallurgical test work suggests that the mineralization is amenable to heap leach recovery methods. The Colquipucro deposit is the only known and documented sandstone-hosted oxide silver deposit in Peru. The Colquipucro deposit is tentatively classified as a disseminated, intermediate sulphidation epithermal deposit (now oxidized) lying above and on the margin of the deeper, sulphide-rich deposit.

Tinka’s protocols for drilling, sampling, analysis, security, and database management meet industry standard practices. The drill hole database was verified by the QP and is suitable for Mineral Resource estimation work.

Mineral Resources estimated by SLR for the Ayawilca deposit used drill results available to May 31, 2023. For the purposes of demonstrating RPEEE, Mineral Resources are constrained within underground reporting shapes generated in Deswik.SO using a minimum mining width of three metres and a NSR CoV of $50/t for the Zinc Zone and Silver Zone and $60/t for the Tin Zone. CIM (2014) definitions are used for classification of Mineral Resources.

The Zinc Zone Mineral Resource totals 28.3 million tonnes (Mt) of Indicated Mineral Resources at an average grade of 5.82% zinc (Zn), 16.4 g/t silver (Ag), 0.2% lead (Pb), and 91 g/t indium (In) and 31.2 Mt of Inferred Mineral Resources at an average grade of 4.21% Zn, 14.5 g/t Ag, 0.2% Pb, and 45 g/t In. Indicated Mineral Resources contain 3,638 million pounds (Mlb) zinc, 14.9 million ounces (Moz) silver, 108 Mlb lead, and 2,582 t indium. Inferred Mineral Resources contain 2,898 Mlb zinc, 14.6 Moz silver, 133 Mlb lead, and 1,414 t indium.

The Silver Zone Mineral Resource totals 1.0 Mt of Inferred Mineral Resources at an average grade of 1.54% Zn, 111.4 g/t Ag, 0.5% Pb, and 3 g/t In. Inferred Mineral Resources contain 35 Mlb zinc, 3.7 Moz silver, 12 Mlb lead, and 3 t indium.

The Tin Zone Mineral Resource estimate totals 1.4 Mt of Indicated Mineral Resources at an average grade of 0.72% tin (Sn) containing 22 Mlb tin and 12.7 Mt of Inferred Mineral Resources at an average grade of 0.76% Sn containing 213 Mlb tin.

There has been no drilling at the Colquipucro deposit since the May 25, 2016 Mineral Resource estimate. Colquipucro deposit Mineral Resources are reported within a preliminary pit shell generated in Whittle software at a cut-off grade of 15 g/t Ag. Indicated Mineral Resources at the Colquipucro deposit are estimated to total 7.4 Mt at an average grade of 60 g/t Ag containing 14.3 million ounces (Moz) Ag. Colquipucro deposit Inferred Mineral Resources are estimated to total 8.5 Mt at an average grade of 48 g/t Ag containing 13.2 Moz Ag. More than half of the contained metal is hosted in the high-grade lenses, at average grades greater than 100 g/t Ag. SLR notes that a small amount of mineralization was not captured by the Whittle shell.

No Mineral Reserves have been estimated at the Project.

Drill hole A17-086, located at the Chaucha area, one kilometre east of the Colquipucro deposit, intersected approximately 92 m of massive hematite ± magnetite ± pyrite hosted in brecciated limestone. While no significant zinc mineralization was encountered, the presence of significant massive iron oxides and sulphides is a new style of mineralization at the Property. Exploration, Drilling and Analytical Data Collection in Support of Mineral Resource Estimation

Exploration work by Tinka has included geological mapping, soil, trench and underground sampling, geophysical surveys, and drilling. As of the Report effective date, the drill hole database included 100,354.7 m of drilling in 291 holes. The database included drill holes completed as at April 26, 2023 at both the Ayawilca and Colquipucro deposits. Further exploration is planned to continue to expand the resources as the Ayawilca and Colquipucro deposits remains open in several directions.

Tinka's protocols for drilling, sampling, analysis, security, and database management meet industry standard practices. The drill hole database was verified by the QP and is suitable for Mineral Resource estimation work.

25.3 Mining

The Ayawilca deposit is a significant resource target for future underground mining. Due to the range of mineralized deposit geometries, there are likely to be challenges for maximising extraction in wider areas of weaker rock conditions and further geotechnical and hydrogeological investigation is required to increase confidence in the mining method (including backfill) and design approach. The flatter dipping areas will require additional development to enable efficient backfilling and sufficient ventilation in working areas. There is a future opportunity for targeting a higher overall production rate target than the 2.3 Mtpa used as a basis for the 2024 PEA.

Targeting higher grade (or NSR value) production is a priority for the Project economics along with a high production rate in order to reduce unit operating costs. The mineralised deposit geometry has shown to be a limiting factor to increasing level spacing and stope dimensions.

The Ayawilca deposits commence close to surface which enables early commencement and ramp-up to full production with limited upfront development and conventional mining approach.

25.4 Mineral Processing and Metallurgical Testwork

Both the zinc and tin process plant designs are based on conventional technologies and in the opinion of the QP, the zinc mineralization is expected to respond reasonably to this flowsheet and metallurgical testing of samples from the Zinc Zone indicate that a zinc concentrate grading 50% Zn can be produced with 92% of the zinc recovered to the concentrate.

More Tin Zone flowsheet development and variability testwork is required before starting a PFS and while the current flowsheet would likely meet the current predictions, there remains opportunities to reduce the process complexity, capital costs, and operating costs by mineralogical, geometallurgical and mineral processing investigations.

The silver metallurgy was projected based on limited information and sampling, and has yet to be optimized.

Other option studies that should be investigated at the PFS stage include plant location, site layout, comminution design, reagent optimization, concentrate dispatch, and tailings management.

25.5 Tailings Management

The 2024 PEA estimates approximately 24.8 Mt of tailings (60% of the overall tailings of 45.6 Mt) that will require storage in an engineered TSF on surface. Three potential sites were identified, and a preferred site was selected that can accommodate the full 24.8 Mt of surface tailings. Cost estimate comparisons indicate that filtering and stacking represent a marginally higher initial project cost; however, it was deemed that the slightly higher initial investment would be worthwhile, given the lower overall risk profile of this technology.

While the 2024 PEA is limited to conceptual evaluations, consideration was given to the operational precedent and feasibility of the filtered dry stack in the site-specific conditions to be anticipated at Ayawilca. In particular, these will include: high seismicity; moderate rainfall in the four-month Andean rainy season; and commissioning and upset conditions at the filtering plant.

The conceptual design of the TSF has been developed on a staged basis, based on the anticipated surface tailings storage requirements. The development of the TSF will require staged access roads for hauling the tailings to the stack, as well as perimeter drainage channels to divert surface runoff water.

It has been recognized, at a conceptual stage, that the tin-zone tailings will have a high sulphide content, based primarily on the presence of significant concentrations of pyrrhotite in the tin ROM. This will likely classify these tailings geochemically as PAG. Management strategies for this material will be required in order to ensure that unacceptable acidic and/or metals-laden seepage does not exfiltrate to the surrounding environment, either as surface drainage or into the groundwater system.

At this stage, detailed geochemical studies have not been done; however, possible strategies for minimizing the impacts of the high-sulphide tin tailings have been identified.

25.6 Mine Backfill

The 2024 PEA outlines a preliminary design for a proposed paste backfill system to support mining at the Ayawilca Project. The designs herein consist of a conventional dry paste plant supplying 95 m^3/h of paste to the Zinc, Silver and Tin Zones. The plant will be fed with filtered tailings from a plate and press filter plant designed to dewater tailings for dry stacking. When the paste plant is not running the tailings report to the dry stack.

Tinka envision two separate metallurgical plants for Ayawilca, producing two tailings products – one for the zinc tailings and one for the tin tailings. At the time of writing this report it was not clear if the tin tailings could be used for the production of paste at Ayawilca. The principal concern is the very high pyrrhotite content.

The proposed utilization of the Ayawilca paste plant is about 5,000 hrs annually or about 60 percent. The expected backfill demand is 13.3 million m^3 over a 21-year mine life or roughly 0.75 million m^3 per year. The total backfill demand consists of 80% filling with paste and 20% filling with uncemented rockfill, for an annual paste demand of 0.65 million m3 per year.

The proposed plant flowsheet consists of a twin shaft mixer feeding a paste pump serving 3 surface distribution lines radiating out to each the five mining areas. The surface runs range from 200 to 850 m – the longest runs being the East area and the South area. The paste then travels down a borehole at each mining area to tie into the existing mine infrastructure for paste distribution to stopes.

25.7 Environmental Studies, Permitting and Social or Community Impact

The Project holds all necessary permits to enable continuation of exploration activities. New and additional permits will be required prior to the commencement of mining activities. Agreements are in place (or being renewed) to allow access to land owned by communities within the Project area. Studies completed to date in support of the exploration permits have informed Tinka’s understanding of baseline conditions at the Project site and provide a valuable resource to inform future project designs and development studies.

Climate change vulnerability assessments have not yet been undertaken. These are considered important to inform project design and risk mitigation. Such studies can be completed in future phases. The current 2024 PEA design is based on conventional fossil fuel-based energy sources however an estimation of greenhouse gas (“GHG”) emissions has not yet been undertaken. Peru is a signatory to the Paris Agreement however the roadmap for the country’s decarbonisation has yet to be developed.

Tinka appears to have established constructive relationships with surrounding communities as evidenced by the community agreements that are in place and currently being renewed. The communities surrounding the Project are understood to be supportive of the exploration and potential future exploitation activities.

Potential environmental and social risks have been identified and will require further assessment in future study phases. These include:

- Disturbance or removal of habitats and species of conservation significance;
- Changes to surface water and groundwater quality, particularly in respect of possible AMD associated with mineral waste streams and facilities;
- Geochemical attributes of ore and mineral waste streams;
- Competition for freshwater resources with local communities;
- Changes to air quality associated with surface infrastructure and access roads;
- Generation of GHG emissions and contributions to climate change;
- Potential exposure to climate change-related risks;
    - Presence of archaeological sites in areas proposed for infrastructure;
- Ability to obtain land access and social agreements;
- Possible economic displacement of existing land uses;
- Positive contributions to the local and regional economy in the form of job creation, skills upliftment, payment of salaries and taxes.

25.8 Economic Analysis

The preliminary economic analysis is partly based on Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves, and there is no certainty that the PEA based on these Mineral Resources will be realized. This is particularly the case with respect to the Tin Zone.

The financial analysis uses a DCF methodology and an NPV8% as the base case. All monetary amounts are presented in constant Q4 2023 US$. For discounting purposes, cash flows are assumed to occur at the end of each period. Revenue is recognized at the time of production. The economic preliminary analysis is based on 100% equity financing. No escalation or inflation was applied. All amounts are in real terms.

Up to 200,000 wmt per annum of the zinc concentrate will be sold to a local smelter in Peru. The balance of the zinc concentrate, as well as the lead-silver concentrate and tin concentrate will be sold on a CIF basis, likely to smelters in Asia, although there are options for selling the tin concentrate to smelters in Europe or South America.

A construction period of 18 months starting in mid-year -2 was considered, with Year 1 being the first year of production. Plant throughput in the first year of production is at 80% of design to account for ramp-up inefficiencies. Year 1 capital costs were applied in the financial model excluding IGV. For the purpose of the 2024 PEA, it has been assumed that the mine, plant and related facilities will be operated by the Owner. Capital and operating costs were applied in the financial model excluding IGV; however, IGV payable/receivable is recognized as a working capital item.

The 2024 PEA assumes that Tinka will exercise its option to purchase the 1% NSR royalty payable to Sierra for US$1 M, accordingly, the royalty is not included in the cashflow analysis, but the US$1 M purchase price is.

Working capital is assumed to be recovered at project completion, other than IGV on closure costs incurred after cessation of production since IGV is only recoverable against sales.

Tax and royalty calculations in the financial model have been reviewed by EY. Tax balances at 31 December 2023 were included for tax calculation purposes only.

A provision of US$19.5 M was included to account for closure costs. No salvage value was considered.

The Project is anticipated to generate a pre-tax NPV of US$732 M at an 8.0% discount rate, an IRR of 34.8% and a payback period of 2.4 years. On an after-tax basis, the NPV at 8% is US$434 M, the IRR is 25.9%, and the undiscounted payback period is 2.9 years.

The Project is most sensitive to product prices generally, then to the zinc price, then to head grades. It is less sensitive to tin prices, then to operating costs, then initial capital costs.

There is upside potential for the Project if the zinc prices increase from the assumptions used in the Report, since the sensitivity analysis shows that the project is quite sensitive to zinc price changes. A base case zinc price of US$1.30/lb was used. During 2023, the LME 3-month zinc price varied between US$1.00/lb and US$1.59/lb.

25.9 Risks and Opportunities

The main risks identified for the Ayawilca Project include, but are not limited to:

- Operating costs (e.g., for diesel and electricity) and capital costs could vary, impacting the economics of the PEA;
- Permitting delays could delay the start of construction;
- Land acquisition delays could delay the start of construction;
- Resource modelling – The 2024 PEA mine plan is based on the ROM Inventory as which comprises approximately 52.5% Inferred classified tonnes although most of the Zinc Zone Inferred Resources are in lower-grade areas;

- Geotechnical assumptions could be different to those assumed in the PEA, and more detailed studies are required;
- Backfill assumptions could vary, and more detailed study is required at the next stage;
- Tailings challenges which could slow mining operations if risks are not adequately mitigated (e.g., severe weather event, filtration problems, acid mine drainage, etc).
- Water concerns could delay operations (e.g., too much or too little water) or water treatment plant cost assumptions are too low (or too high) – further work is required at the next stage.

The main opportunities identified for the Ayawilca Project include, but are not limited to:

- Potential to extend the Zinc Zone deposits to depth at the East and West areas with more drilling;
- Potential to extend the Tin Zone to depth at the Central area, in particular where a steeply-dipping feeder zone is interpreted and is untested by drilling;
- Potential to extend the Silver Zone along strike and at depth – only 500 m of strike length is tested to date;
- Optimization of zinc recovery to a zinc concentrate (currently 92%) and silver recovery to a lead-silver concentrate (currently 47%) with more detailed metallurgical test work;
- Optimization of tin recovery to a tin concentrate from the low recovery domain (currently 50%) and an improved concentrate grade (currently 50%) with more detailed testwork.
- Indium could become payable at an Asian zinc smelter in the future, and that would provide alternatives in marketing zinc concentrates and potentially, add significant value to the Project.

25.10 Conclusions

The 2024 PEA mine plan for the Zinc and Silver Zones is based on mining a total of 41.2 million tonnes grading 5.02% Zn, 17.3 g/t silver and 0.19% lead over a 21-year life of mine (“LOM”) using an NSR cut-off of US$60/t. The Tin Zone is based on mining a total of 4.32 million tonnes grading 0.92% tin over a 15-year LOM using an NSR cut-off of US$80.

Based on the PEA economic analysis, the project has positive operating margins with pre-tax NPV of US$732 M at an 8.0% discount rate, an IRR of 34.8% and a payback period of 2.4 years. On an after-tax basis, the NPV at 8% is US$434 M, the IRR is 25.9%, and the undiscounted payback period is 2.9 years. These financial metrics indicate that the Ayawilca Project has good economic potential and warrants continued development.

It is the conclusion of the QPs that the 2024 PEA summarised in this technical report contains sufficient detail and accuracy to support a PEA level analysis. Standard industry practices, equipment and design methods were used in this PEA and except for those outlined in this section, the report authors are unaware of any unusual or significant risks or uncertainties that would affect project reliability or confidence based on the data and information made available.

26 RECOMMENDATIONS

26.1 Introduction

The recommended next step for the Project is to advance to a PFS and advance the environmental planning for an eventual mine development. The following work programs are recommended during the next stage to reach completion of a PFS:

- Infill and exploration drilling to support higher-confidence Mineral Resource classifications for the Zinc Zone (especially East and West areas), the Silver Zone and the Tin Zone;
- Assessment of the underground hydrological conditions through the drilling of water wells;
- Engineering studies including metallurgical test work and geotechnical studies, to support a pre-feasibility study;
- Other field investigations and data collection including environmental planning to support an eventual mine development; and
- PFS document compilation.

Further investigation and technical work, as summarised in the following sections, is required to provide sufficient confidence in the Project to advance towards eventual development. The additional work will include continuation of exploration, geotechnical and hydrogeological investigation, environmental baseline, socioeconomic and engineering studies to support environmental assessment and project evaluation.

26.2 Geology and Mineral Resources

The SLR QP has the following recommendations related to the geology and Mineral Resources on the Project:

- Reduce the number of CRMs inserted per metal to three: a low-grade CRM similar to the mean near the cut-off, a medium-grade CRM similar to the average grade of the reported Mineral Resources, and a high-grade CRM. This approach would allow Tinka to monitor CRMs over extended time series, preventing potential trending biases. The QP also recommends procuring a CRM for lead that is similar to the average grade of the Ayawilca deposit.
- Submit regular external checks to a third third-party laboratory to ensure that the primary laboratory remains accurate (pulp replicates). An example of this would be re-implementing a pulp replicate program at a rate of 1 in 50 samples.
- Collect additional density samples in the East and Central areas of the Ayawilca deposit and reassaying overlimit iron analyses.
- Conduct infill drilling to support higher confidence Mineral Resource classifications for the Tin Zone in the South Ayawilca area where tin grades are higher.
- Conduct exploration and step out drilling in the East and West areas of the Zinc Zone. The East Zone geological model is based on wide drill hole spacing (approximately 200 m) and there exists significant potential to both expand the zinc mineralization and upgrade Inferred Mineral Resources to Indicated. At the West Zone, there exists potential to extend the known mineralization to the northwest.

- Perform additional drilling at the Silver Zone at South Ayawilca to support the estimation of additional Mineral Resources and increase the understanding of the geological and mineralization controls. The controls and extent of mineralization within the Silver Zone are not well constrained and there is significant upside potential to expand this zone along strike and down dip.
- Perform exploration and infill drilling at the Colquipucro deposit to expand current Mineral Resources and upgrade Inferred Mineral Resource to Indicated. Update the preliminary pit optimization parameters and cut-off grade.

26.3 Mining

The following aspects should be considered or investigated in further detail for advancing the mining aspects of Ayawilca Project:

- Improvement in the geotechnical information (including structural data) confidence could lead to optimization of stoping dimensions in line with varying stope orientations. Further refinement of the geotechnical domains should be targeted as part of the next level of study
- Materials handling trade-off studies considering the potential for BEV and trolley-assist technologies to reduce reliance on fossil fuels and also to reduce greenhouse gas and carbon emissions.
- Ground treatment requirements for boxcut/portal, underground access and ventilation raise requirements.
- Once more information is available on the geotechnical and hydrogeological aspects of the Project then further detailed mine planning work can take place to identify opportunities for increasing the stope extraction ratios.

The mine design and schedule should be completed in line with the increased confidence of future Mineral Resources classification and in sufficient detail to provide accurate mine production rate estimates. Future more detailed planning is undertaken with consultation with equipment suppliers to understand the requirements (and costs) of reducing diesel-powered mobile equipment and practically implementing developing battery-electric and trolley assist technologies in the individual mining areas.

SRK recommends that future detailed geotechnical and hydrogeological investigation is undertaken on the location of ventilation raises to get a clearer understanding of the ground control requirements and costs.

26.4 Mine Backfill

Advancement of the Ayawilca paste system designs to a PFS level will require the following future work items:

- The 2021 Golder testing does not include any rheological testwork with cement. The PFS level designs require rheology with cement binder. Further it was noted the Ayawilca zinc tailings were extremely sensitive to solids content - going from 200 Pa to 500 Pa in just one percent solids. This is likely a result of the high siderite content and needs to be investigated further.

- The Golder paste strength testing is based on 7-day and 14-day curing. The PFS designs require 28-day curing over a range of binder contents and solids contents.
- Long term strength testing has been suggested herein to determine if the siderite leads to strength degradation. The long-term tests need to run at least 90 days.
- Short term paste strengths (24h, 48h, 72h) are needed for design of the sill plugs during operations.
- There has been no paste amenity testing on the tin tailings (PSD, SG, rheology and UCS). Future testing should investigate the rheology of the tin tailings alone as well as blends of zinc and tin tailings. The program needs to include the UCS of paste mixes batched with just tin tailings as well as blends with zinc tailings.

26.5 Mineral Processing

The following process related recommendations should be considered as the Project advances to the next stage of study:

- Geological Analysis and Block Modeling: Integrate features or derived features in geological drilling and block modelling to classify zones by varying iron content levels in sphalerite and to include ratios between Pyrite and Pyrrhotite. This is crucial for identifying potential geometallurgical zones prior to metallurgical evaluation.
- Comprehensive Metallurgical Testwork for Pb-Ag/Zn Circuit: Expand the metallurgical testwork beyond the previous open cleaner tests for the Pb-Ag circuit. This includes a focused evaluation on enhancing silver recovery and establishing a more confident flotation scheme for the Zn circuit. The testwork should encompass a wider range of samples across different geometallurgical domains to ensure thorough coverage.
- Effect of Pyrite/Pyrrhotite Ratio: Investigate the impact of the Pyrite/Pyrrhotite ratio on the Pb-Ag/Zn flotation circuit’s performance. Preliminary findings indicate that higher ratios may detrimentally affect flotation efficiency.
- Zn Concentrate Characterization: While no deleterious elements besides Fe were detected in Zn concentrates from two composites, future programs should extend to more composites and include a full chemical characterization to confirm these findings.
- Material Handling, Crushing, and Comminution Testwork: Address the gap in data regarding material handling, crushing, and comminution with targeted metallurgical testwork, as current information is insufficient for feasibility level plant design.
- Solid-Liquid Separation Testwork: Conduct specialized metallurgical testwork focused on the solid-liquid separation for Pb-Ag concentrate, Zn concentrate, Sn concentrate, zinc and tin tailings, expanding beyond the single referential testwork currently available.
- Variability Flotation Testwork: Implement variability flotation testwork for the Pb-Ag/Zn flotation circuit, utilizing samples that reflect diverse geological and metallurgical characteristics. This testwork should be supported by full chemical and mineralogical analyses.
- Geometallurgical Modelling: Develop a geometallurgical model based on variability testwork to mitigate risks associated with ore types exhibiting different flotation responses. This model will aid in identifying geometallurgical zones and refining metallurgical

projections.

- Enhanced Metallurgical Projections: Broaden the scope of locked cycle tests to include a greater number of composites representing various geometallurgical domains, improving the reliability of metallurgical projections.

26.6 Water Management and Treatment

Further work is recommended on the water management and treatments aspects of the Ayawilca Project considering:

- Geochemical investigation, analysis and modelling to estimate dewatering water quality and treatment requirements prior to discharge.
- Investigation into water quality of non-contact and potential contact waters as these will dictate the necessity for water treatment.
- A dewatering strategy to promote the recovery of non-contact water and thereby minimise contact waters.
- Advance the hydrogeological analysis for Project and complete a suitably detailed water balance covering all aspects related to mining, processing, tailings and backfill.

26.7 Closure Planning

A detailed closure plan and associated cost estimate should be compiled as part of the PFS which allows for a higher level of accuracy in the TEM and a more detailed understanding of the Project to be communicated to stakeholders. The following aspects of the Project need to be investigated further to inform future mine closure planning:

- Representative sampling of waste rock (such as underground mine water, waste rock and TSF seepage, etc) for post-closure assessment.
- Representative testwork on tailings and backfill for Zinc and Tin Zones to understand geochemistry, waste management requirements and backfill strength.
- Site-specific conditions (including seismicity and rainfall) for design of surface dry stack TSF to ensure long term stability and water management at closure.
- Hydrogeological testing and dewatering drawdown assessment are recommended to increase understanding on the risk of drawdown impacts on habitats/flora/fauna, and also the rate of reflooding of the mine after closure to assess post-closure effects to ground and surface waters.

26.8 Environmental Studies, Permitting and Social or Community Impact

In respect of environmental, permitting, social and community aspects, the following activities are recommended for subsequent phases of development studies and to inform Mineral Reserve declarations:

- Undertake geochemical analyses for all lithologies and waste streams to inform project designs including measures to avoid or minimise potential impacts to soils, surface water and groundwater;
- Commission climate vulnerability assessments and use the outcomes to inform project

designs and emergency response planning;

- Prepare an inventory of base-case GHG emissions. Identify opportunities to decarbonise the Project as part of trade-off studies and mine design processes;
- Develop a permitting schedule that is integrated into the overall project schedule to identify dependencies and the critical path for project commencement;
- Ensure environmental and social knowledge informs the identification and evaluation of project alternatives across all lifecycle phases;
- Evaluate and adopt responsible mining standards that are aligned with international best practice. Ensure the requirements of these are integrated into project designs, organisational structures, budgets, management systems and governance of environmental and social considerations;
- Prepare budgets to an appropriate level of detail that ensure that compliance with legal and constructive obligations can be achieved throughout the life of mine.

26.9 Recommended Work Program

26.9.1 Mineral Resources

Drilling is recommended to further increase confidence in the Mineral Resource estimate, particularly to convert Inferred Mineral Resources to the Indicated category within the Zinc Zone and to achieve an optimal resource tonnage for a long mine life at PFS stage. The East and West areas contain most of the higher-grade Zinc Zone Inferred Resources and these areas should be the focus for the infill drilling. The Silver Zone remains open along strike in both directions, and further drilling is required to expand and upgrade the classification of the Silver Zone Inferred Mineral Resources. Upgrading the classification of the Tin Zone Inferred Mineral Resources is required to achieve sufficient Indicated Mineral Resources for a sufficient mine life of the Tin Zone at the PFS stage. Drill hole spacing and orientation will be optimized to support data collection for engineering studies (including metallurgy and geotechnical studies). The QP recommends a drill program of approximately 12,000 m to complete these objectives.

26.9.2 Hydrogeology

Drilling of water well(s) to assess the underground hydrological conditions through pumping tests is planned for the next stage of work on the Project.

26.9.3 Metallurgy

Metallurgical testwork is required for all three zones (Zinc, Silver, Tin). Variability flotation tests are planned for the Zinc Zone together with comminution tests. Flotation tests are also required for the Silver Zone. For the Tin Zone, additional metallurgical tests are required to optimise the gravitational flowsheet for the two tin domains.

26.9.4 Cost of the Recommendations

The following Table 26-1 summarizes the cost of the recommended work program for the PFS stage.

Table 26-1: Indicative PFS budget for Ayawilca project

Category	Cost (US$M)
Infill and exploration drilling	3.0
Metallurgical testwork	0.5
Hydrological drilling and geotechnical investigation	1.0
Technical Studies for PFS	1.5
General and Administrative costs	1.0
Environmental planning, social	0.5
Total	**7.5**

27 REFERENCES

Source	Reference
2019 PEA	2019 PEA. Peralta, E., Colquhoun, W., El-Rassi, D., Johnston, A., and Searston, S., 2019: Ayawilca Polymetallic Project, Department of Pasco, Central Peru, NI 43-101 Technical Report: technical report prepared by Amec Foster Wheeler (Peru) S. A., Transmin Metallurgical Consultants, and Roscoe Postle Associates Inc. for Tinka Resources Limited, effective date 2 July, 2019
2021 PEA	2021 PEA. Kirkland, K., Vilela, E., Masun, K.M., El-Rassi, D., Johnston, A., and Hickson, D., 2021: Ayawilca Polymetallic Project, Central Peru, NI 43-101 Technical Report on Updated Preliminary Economic Assessment: technical report prepared by Mining Plus Peru S.A.C., SLR Consulting Ltd, Transmin Metallurgical Consultants, and Envis E.I.R.L, for Tinka Resources Limited, effective date 14 October, 2021
Armenti, M., 2014	Armenti, M., 2014. Total Magnetic Field Survey Geophysical Report, Ayawilca Project, Pasco Department, Peru, on Behalf of Tinka Resources, S.A.C.: Quantec Geosciences (Peru) S.A.C.
Benites, D. et al, 2021	Benites, D., Torró, L., Vallance, J. et al., 2021. Geology, mineralogy, and cassiterite geochronology of the Ayawilca Zn-Pb-Ag-In-Sn-Cu deposit, Pasco, Peru. Miner Deposita 57, 481–507 (2022).
Cobbing, E.J. et al, 1996	Cobbing, E.J., Sánchez, A., Martínez, W. & Zárate, H., 1996. Geología de los cuadrángulos de Huaraz, Recuay, La Unión, Chiquián y Yanahuanca. Hojas: 20-h, 20-i, 20-j, 21-i, 21-j. INGEMMET, Boletín, Serie A: Carta Geológica Nacional, 76, 297 p.
Coney, Peter J., 1971	Coney, Peter J., 1971. Structural evolution of the Cordillera Huayhuash, Andes of Peru - Boulder, CO Geological Society of America July 1971 - pp. 1863-1864
Dentons, 2024	Dentons Gallo Barrios Pickmann, 2024. Letter: Legal Opinion - Ayawilca Mining Project on the mineral tenure, surface rights, property ownership, royalties and the legal status of the Project area, underlying property agreements and permits date March 25, 2024.
Rodrigo, 2024	Rodrigo, Elias & Medrano abogados, 2024. Noticias (www.estudiorodrigo.com/noticias/)
EY, 2021	Ernst & Young Asesores, 2021. Taxation Assumptions for the Ayawilca Project Preliminary Economic Assessment Financial Model: report from Ernst and Young to Mining Plus Tinka, 13 October, 2021, 3 p.
EY, 2024a	Ernst & Young Consultores, 2024. Letter: opinion on the taxation assumptions on the financial model for the Ayawilca Project of Tinka Resources S.A.C., 30 March 2024
EY, 2024b	Ernst & Young Consultores, 2024) Peru's Mining & Metals Investment Guide 2024/2025. First Edition, 120p. Available in https://www.ey.com/es_pe/peru-business-investment-guide . Legal deposit made at The National Library of Peru N°2024-00364, ISBN: 978-612-5043-55-9.
Golder, 2021	Golder Associates, 2021. Ayawilca Tailings Preliminary Characterization, NI 43-101 Report
Heidbach, O. et al, 2016	Heidbach, O., Rajabi, M., Reiter, K., Ziegler, M., 2016. World Stress Map 2016, GFZ Data Service, doi:10.5880/WSM.2016.002
Jaillard, E. et al, 2000	Jaillard, E., Hérail, G., Díaz-Martínez, E., Baby., Lavenu, A., Dumont, J.F., 2000. Tectonic evolution of the Andes of Ecuador, Peru, Bolivia and northernmost Chile. In: Cordani, U.G., Milani, E.J., Thomas Filho, A., Campos, D.A. (eds.), "Tectonic Evolution of South America", Rio de Janeiro, p. 481-559
Johnston, 2021	Johnston, A., 2021. PEA Update Ayawilca metallurgical parameters. Transmin internal memo, 19 July, 2021
MineFill, 2021	MineFill Services report 21042-RPT-0001, “Ayawilca Paste Backfill Pre-Feasibility Study" dated July 26, 2021
Nickson, 1992	Nickson S.D., 1992. Cable support guidelines for underground hard rock mine operations. M.A.Sc.thesis, University of British Columbia, Vancouver.
Ocean Partners, 2024	Ocean Partners, 2024. Marketing Study, Tinka Resources Limited, Ayawilca Project: report prepared by Ocean Partners for Tinka, 25 March 2024
Parades, R.Y., 2013	Parades, R.Y., 2013. Project Ayawilca, Re-processing & Data Integration Report, 3D Data Integration and Re-processing of Induced Polarisation for Tinka Resources S.A.C.: Fugro Ground Geophysics Pty Ltd.
Pfiffner, O.A. et al, 2013	Pfiffner, O.A. and Gonzalez, L., 2013. Mesozoic-Cenozoic Evolution of the Western Margin of South America: Case Study of the Peruvian Andes. Geosciences, 3, 262-310.
Plenge, 2023	Plenge, G.J.C., 2023. Investigación Metalúrgica No. 18732 - Tinka Resources SAC - Proyecto Ayawilca - Flotación. Plenge internal report, 22 December, 2023.
Potvin, Y. et al, 1988	Potvin, Y., Hudyma, M., Miller, H.D.M.S., 1988. 'The stability graph for open stope design', 90th CIM AGM, Edmonton.
Potvin, Y. et al, 2016	Potvin, Y., Hadjigeorgiou, J., 2016. Selection of ground support for mining drives based on the Q-System. Ground Support 2016 — E. Nordlund, T.H. Jones and A. Eitzenberger (eds)

Source	**Reference**
PwC, 2023	PriceWaterhouseCooper, 2023. PricewaterhouseCoopers salary mining survey dated July 31, 2023 (PwC Mining Salary Data EN.xlsx)
Redwood, Stewart D., 2004	Redwood, Stewart D., 2004. Geology and development history of the Antamina copper-zinc skarn deposit, Peru - Littleton, Colorado Society of Economic Geologists 2004 - pp. 259-277 ilus. - Society of Economic Geologists. Special Publication n.11 .
Rosas, S. et al, 2007	Rosas, S., Fontbote, L. y Tankard, A., 2007. Tectonic evolution and paleogeography of the Mesozoic Pucará Basin, central Peru. Journal of South American Earth Sciences 24, 1–24.
RPA, 2015	RPA, 2015. Technical Report on the Mineral Resource Estimate for the Ayawilca-Colquipucro Property, Department of Pasco, Peru: technical report prepared by Roscoe Postle Associates Inc for Tinka Resources Limited, effective date 25 March, 2015
RPA, 2016	RPA, 2016. Technical Report on the Mineral Resource Estimate for the Ayawilca-Colquipucro Property, Department of Pasco, Peru: technical report prepared by Roscoe Postle Associates Inc for Tinka Resources Limited, effective date 29 June, 2016
RPA, 2017	RPA, 2017: Technical Report on the Mineral Resource Estimate for the Ayawilca-Colquipucro Property, Department of Pasco, Peru: technical report prepared by Roscoe Postle Associates Inc for Tinka Resources Limited, effective date 11 December, 2017
RPA, 2019	RPA, 2019: Technical Report on the Mineral Resource Estimate for the Ayawilca Property, Department of Pasco, Peru: technical report prepared by Roscoe Postle Associates Inc for Tinka Resources Limited, effective date 9 January, 2019
Sébrier, M. et al, 1988	Sébrier, M., Lavenu, A., Fornari, M. & Soulas, J.-P., 1988. Tectonics and uplift in Central Andes (Peru, Bolivia and Northern Chile) from Eocene to present. Géodynamigue, 3: 85-106, Paris.
Sheory, P.R., 1994	Sheory, P.R., 1994. A theory for in situ stresses in isotropic and transversely isotropic rock, Int. J. Rock Mech. Min. Sci. & Geomech. Abstr. 31(1), 23-34.
Sillitoe, Richard D., 2010	Sillitoe, Richard D., 2010. Porphyry Copper Systems. Economic Geology, v. 105, pp 3-41
SNC, 2021	SNC-Lavalin, 2021. Modificación del Estudio de Impacto Ambiental Semidetallado del Proyecto de Exploración minera Ayawilca-Colquipucro-Mina Punta: report prepared by SNC Lavalin for Tinka, 21 July, 2021, 1,009 p.
Tinka, 2021	Tinka Resources, 2021. Ayawilca – Tinka FC 13072021 v3
Wipf, M., 2006	Wipf, M., 2006. Evolution of the Western Cordillera and Coastal Margin of Peru: Evidence from low-temperature Thermochronology and Geomorphology. Thesis Doc. Swiss Federal Institute of Technology Zürich, 163p.
Wood, 2019	Wood, 2019, High Level Assessment of Tin Recovery for Ayawilca: report prepared by Wood for Tinka, 3 April, 2019, 10 p.

ABBREVIATIONS

2019 PEA	Ayawilca PEA and NI 43-101 report with an effective date 2 July 2019
2021 PEA	Ayawilca PEA and NI 43-101 report with an effective date 14 October 2021
2024 PEA	Ayawilca PEA and NI 43-101 report with an effective date 28 February 2024
3D	Three dimensional
AACE	Association for the Advancement of Cost Engineering
AAS	atomic absorption spectroscopy
AISC	All-In sustaining costs
AK Drilling	AK Drilling International S.A.C.
ALS	ALS Laboratories
ANA	National Water Authority, part of the Ministry of Agriculture
ARD	Acid Rock Drainage
AS	analytical signal
ATN	Abengoa Transmision Norte
BAT	Best Available Techniques
BWi	Bond ball mill work index
CDA	Canadian Dam Association
CDN	CDN Resources Laboratories Ltd
CEO	Chief Executive Officer
Certimin	Certimin S.A.
Chaupihuaranga	Compania Electrica Chaupihuaranga. Tinka has set up a 100% owned subsidiary company in Peru specifically to manage the electricity permitting and future power contracts for the Project
CIF	Cost, insurance, and freight (CIF) is a method of exporting goods where the seller pays expenses until the product is completely loaded on a ship
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
CIM (2014)	2014 Canadian Institute of Mining and Metallurgy definition standards for reporting Mineral Resources and Mineral Reserves
CIM (2019)	CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines (November 2019)
CIRA	Certificates of Non-Existence of Archaeological Remains
Consorcio	Consorcio S & C S.A.C.
CoV	Cut-off Value
CPI	Consumer Price Index
CRD	carbonate replacement deposits
CRF	Cemented Rock Fill
CRM	Certified reference material
CRU	Commodity Resource Unit
CSA	Canadian Securities Administrators
CSR	Corporate Social Responsibility
DAC	Daniel A. Carrion
Deswik.SO or DSO	Deswik software Stope Optimiser module
DGAAM	Directorate of Environmental Affairs
DIA	Environmental Impact Declaration (Declaración de Impacto Ambiental)
EBIT	Earnings before interest and taxes
ECA	Peruvian Environmental Quality Standards
EDA	exploratory data analysis
EIA	Environmental Impact Assessment
EIAd	Detailed Environmental Impact Study (Estudio de Impacto Ambiental detallado)
EIAsd	Semi-detailed Environmental Impact Study (Estudio de Impacto Ambiental Semi-Detallado)
Envis	Envis E.I.R.L
EPCM	engineering, procurement, construction management
EPO	pre-operation environmental study

ESG	Environmental, Social and Governance
ESIA	Environmental and Social Impact Assessment
Esondi	Expertos En Sondajes Diamantinos S.A.
Explomin	Explomin Perforaciones S.A.C.
FA	Fire assay
FA-AA	Fire assay with AA finish
FA-GRA	Fire assay with Gravimetric analysis
FAR	Fresh Air Raise
FEM	Finite Element Modelling
FF	Fracture Frequency
FOS	Factor of Safety
FTA	Environmental Technical Report (Ficha Técnica Ambiental)
G&A	General and Administrative
Ga, Ma	Abbreviations for billion year and million years respectively.
GAAP	Generally Accepted Accounting Principle
GEMS	Dassault Systèmes GEOVIA GEMS Version 6.7
GHG	Greenhouse Gas
GIIP	good international industry practice
GISTM	Global Industry Standard on Tailings Management
GPS	Global Positioning System
HARD	Half absolute relative difference
HDPE	High Density Polyethylene
HR	High Recovery tin mineralisation
HV	High voltage
HVAC	heating, ventilation, and air conditioning
HW	Hangingwall
ICMM	International Council of Mining and Metals
ICP	inductively coupled plasma
ICP-AES	Inductively coupled plasma atomic emission spectroscopy
ICP-MS	mass spectrometry with ICP
ID3	Inverse distance cubed
IGV	Value Added Tax otherwise referred to as Impuesto General a las Ventas
INGEMET	Institute of Geology, Mining and Metallurgy
IP	Induced polarization
IRR	Internal Rate of Return
ITAN	Temporary net asset tax
KPI	Key performance indicator
LCT	Locked cycle testing
Leapfrog	May refer to Leapfrog Edge or Leapfrog Geo, part of the geological and modelling suite owed by Seequent Limited.
Leapfrog Geo	ARANZ Leapfrog Geo version 2.1.2
LHOS	Longhole Open Stoping mining method
LIDAR	Light Detection and Ranging (survey)
LIMS	Laboratory Information Management System
LME	London Metal Exchange
LOM	Life of Mine
LR	Low Recovery tin mineralisation
LV	Low voltage
MINAM	Ministry of Environment
MineFill	MineFill Services Incorporated
MINEM	Ministry of Energy and Mines
MMW	Minimum Mining Width
MRE	Mineral Resource Estimate

MRT	Mineral Royalty Tax
MS	Microsoft
MSG	Modified Stability Graph
MTFB	Marañón Fold and Thrust Belt
MTO	material take-off
N’	Modified Stability Number
NI 43-101	National Instrument 43-101 Report
NPV	Net Present Value
NSR	Net Smelter Return
NTU	nephelometric turbidity units
Ocean Partners	third-party concentrate trading and marketing specialist company
OEFA	Environmental Evaluation and Oversight Agency
OPC	Ordinary Portland Cement
OREAS	Ore Research & Exploration Pty Ltd
OSINERGMIN	Supervisory Agency for Investment in Energy and Mining
PAG	Potentially Acid Generating
PAM	Environmental Mining Liability
PEA	Preliminary Economic Assessment
PFS	Pre-Feasibility Study
PLC	Programmable Logic Controller
Plenge	Laboratorio Plenge - C.H. Plenge & Cia. S.A
PLT	Point Load Test
Project	Ayawilca Polymetallic Project and 2024 PEA
Properties	all of the mineral tenure holdings
PSAD	Provisional South American Datum coordinate system
PSD	Particle Size Distribution
Q	Q-system
QA	Quality Assurance
QA/QC	Quality Assurance Quality Control
QC	Quality Control
QEMSCAN	Quantitative evaluation of minerals by scanning electron microscopy
QP	Qualified Person
QXRD	Quantitative x-ray diffraction
RAR	Return Air Raise
RC	Refining Charge
REP	ISA Colombia
Res2DInv	2D inversion modelling program
RMR	Rock Mass Rating
RMR^{89}	Rock Mass Rating (Bieniawski 1989)
ROM	Run of Mine
ROPO	Recognised Overseas Professional Organisation
RPA	Roscoe Postle Associates, now part of SLR (since 2019)
RPEEE	Reasonable prospects for eventual economic extraction
RQD	Rock Quality Designation
RTE	reduction to equator
SAG	semi-autogenous grinding
SD	Standard Deviation
SDR	Pipe Grade for Backfill
SEM	Scanning electron microscopy
SENACE	National Environmental Certification Authority
Senamhi	Servicio Nacional de Meteorología e Hidrología
SGS	SGS Laboratory

Sierra	Sierra Peru Pty Ltd
SLR	SLR Consulting (Canada) Limited
SMBS	Sodium Metabisulphite
SMC	San Miguel de Caur
SMU	Selective Mining Unit (used in the pit optimization process)
SO	Stope Optimiser
SPP	San Pedro de Pillao
SRK	SRK Consulting (UK) Limited
SRK Group	SRK Consulting (Global) Limited
Tap	Tapuc
TC	Treatment Charge
TDEM	time domain electro-magnetic
TIMA	Tescan integrated mineral analyser
Tinka	Tinka Resources Limited, a publicly-listed company in Canada
TMI	total magnetic intensity
Transmin	Transmin Metallurgical Consultants
TSF	Tailings Storage Facility
UCS	Uniaxial Compressive Strength
UEA	Unidad Económica Administrativa
UIT	la Unidad Impositiva Tributaria or tax unit
US	United States
UTM	Universal Transverse Mercator coordinate system
VDG	VDG del Perú S.A.C.
VDRE	vertical derivative of reduction to equator
WGS	World Geodetic System coordinate system
WHIMS	Wet high intensity magnetic separation
XRF	X-ray fluorescence
Yan	Yanahuanca
Zones	Style of mineralisation

UNITS

°C	Degrees centigrade
µm	Micrometre
bar	unit of pressure
C$	Canadian Dollars
cm	centimetre
dBA	A-weighted decibel
dmt	dry metric tonne
g	gram
g/t	grams per tonne
ha	hectare (10,000 m^2)
HP	horsepower
hr	hour
kg	kilogram
km	kilometre
koz	thousand ounces (troy)
ktpa	thousand tonnes per annum
kV	kilovolt
kW	Actual Power in kilo-watts
kWh	kilo-watt hour
L/s	litres per second
lb	pound (weight)
m	metre
m/s	metres per second
m^2	square metre (area)
m^3	cubic metre (volume)
m^3/d	cubic metres per day
m^3/s	cubic metres per second
Ma	Mega-annum, million years (geology)
masl	metres above sea level
mGal	Milligal
mH	metres height
mL	metres length
mm	millimetre
Mm^3	million cubic metres
Moz	million ounces
MPa	Mega Pascals
Mt	million tonnes
Mtpa	million tonnes per annum
mV/V	millivolts per volt
MVA	Mega Volt-Ampere
MW	Mega Watt
mW	metres width
Ns^2/m^8	Ventilation Resistance
oz	troy ounce
P_{80}	80% passing size of the circuit product
Pa	Pascal
PEN	Peruvian Sol
pH	potential of hydrogen, measure of acidity/basicity of an aqueous solution
ppm	Parts per million
s	second

t	tonne
t/d	tonnes per day
t/m^3	tonnes per cubic metre (density)
TKM	tonne-kilometre
tph	tonnes per hour
US$	United States Dollar
wmt	wet metric tonne
wt%	percent solids

APPENDIX

A CERTIFICATES