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Ayawilca Polymetallic Project

Central Peru

NI 43-101 Technical Report on Updated Preliminary Economic Assessment

Report Prepared for:

Tinka Resources Ltd.

Qualified Persons:

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Effective Date: 14 October 2021

Report Date: 10 November, 2021

CERTIFICATE OF QUALIFIED PERSON

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I, Kim Kirkland, FAusIMM, am employed as a Principal Mining Engineer with Mining Plus Peru S.A.C. (Mining Plus), with an office address at Avenida Jose Pardo 513, Office 1001, Miraflores, Lima Peru.

This certificate applies to the technical report titled “Ayawilca Polymetallic Project, Central Peru, NI 43-101 Technical Report on Updated Preliminary Economic Assessment” that has an effective date of 14 October, 2021 (the “technical report”).

I am a Fellow of AusIMM #309585. I graduated with a BS Geological Engineering from University of Utah 1987.

I have practiced my profession for 35 years. I have been directly involved in precious and base metal production, studies and management in North and South America during that timeframe.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 *Standards of Disclosure for Mineral Projects* (NI 43–101) for those sections of the technical report that I am responsible for preparing.

I have not visited the Ayawilca Polymetallic Project.

I am responsible for Sections 1.1, 1.2, 1.17, 1.20, 1.21, 1.22.1, 1.22.2, 1.23, 1.24; Sections 2.1, 2.2, 2.3, 2.5, 2.6; Section 3; Section 19; Section 22; Sections 25.1, 25.11, 25.14, 25.15.1, 25.15.2, 25.16; Sections 26.1, 26.2.9, 26.2.10, 26.3; and Section 27 of the technical report.

I am independent of Tinka Resources Limited, as independence is described by Section 1.5 of NI 43–101.

I have been involved with the Ayawilca Project since March 2021.

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

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

Dated: 10 November, 2021

“signed”

Kim Kirkland, FAusIMM

CERTIFICATE OF QUALIFIED PERSON

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I, Edgard Vilela, MAusIMM (CP), am employed as a Principal Mining Consultant with Mining Plus Peru S.A.C. (Mining Plus), with an office address at Avenida Jose Pardo 513, Office 1001, Miraflores, Lima, Peru.

This certificate applies to the technical report titled “Ayawilca Polymetallic Project, Central Peru, NI 43-101 Technical Report on Updated Preliminary Economic Assessment ” that has an effective date of 14 October, 2021 (the “technical report”).

I am a Chartered Professional with the Australasian Institute of Mining and Metallurgy (MAusIMM(CP) #992615),. I graduated from the Pontificia Universidad Católica del Perú with a degree in Mining Engineering in the year 2000.

I have practiced my profession for 22 years. I have been directly involved in multiple underground projects both as the corporate manager of technical services for Fortuna Silver Mines, and the corporate Manager of Reserves for Volcan.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 *Standards of Disclosure for Mineral Projects* (NI 43–101) for those sections of the technical report that I am responsible for preparing.

I have visited the Ayawilca Polymetallic Project from 8–9 July, 2021.

I am responsible for Sections 1.1, 1.2, 1.3, 1.4, 1.13, 1.15.1, 1.15.2, 1.15.3, 1.15.5, 1.15.6, 1.15.7, 1.16, 1.18, 1.19, 1.22.1, 1.22.2, 1.24; Sections 2.1 to 2.6; Section 3; Section 4; Section 5; Section 15; Section 16; Section 18.1 to 18.4, 18.6 to 18.12; Section 20; Sections 21.1.1, 21.1.2, 21.1.3, 21.1.5 to 21.1.10, 21.2.1, 21.2.2, 21.2.4, 21.2.5; Section 23; Section 24; Sections 25.1, 25.2, 25.7, 25.9, 25.10, 25.12, 25.13, 25.15.1, 25.15.2; Sections 26.1, 26.2.3, 26.2.6 to 26.2.10, 26.3; and Section 27 of the technical report.

I am independent of Tinka Resources, as independence is described by Section 1.5 of NI 43–101.

I have been involved with the Ayawilca Project since June 2019 having previously provided review and subsequent optimisation of the 2019 PEA.

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

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

Dated: 10 November, 2021

“signed”

Edgard Vilela, MAusIMM (CP)



CERTIFICATE OF QUALIFIED PERSON

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I, Katharine M. Masun, P.Geo., am employed as a Consultant Geologist with SLR Consulting (Canada) Ltd., with an office address at Suite 501, 55 University Ave., Toronto, ON M5J 2H7.

This certificate applies to the technical report titled "Ayawilca Polymetallic Project, Central Peru, NI 43-101 Technical Report on Updated Preliminary Economic Assessment" that has an effective date of 14 October, 2021 (the "technical report").

I am a graduate of Lakehead University, Thunder Bay, Ontario, Canada, in 1997 with an Honours Bachelor of Science degree in Geology and in 1999 with a Master of Science degree in Geology. I am also a graduate of Ryerson University in Toronto, Ontario, Canada, in 2010 with a Master of Spatial Analysis.

I am registered as a Professional Geologist in the Province of Ontario (Reg. #1583). I have worked as a geologist for a total of 24 years since my graduation. My relevant experience for the purpose of the technical report is:

- Review and report as a professional geologist on many mining and exploration projects around the world for due diligence and regulatory requirements.
- Mineral Resource estimates on a variety of commodities including zinc, copper, nickel, silver, gold, REE, tin, graphite, and diamonds.
- Project Geologist on numerous field and drilling programs in North America, South America, Asia, and Australia.
- Experienced user of geological and resource modelling software including Leapfrog and GEMS.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43-101 *Standards of Disclosure for Mineral Projects* (NI 43-101) for those sections of the technical report that I am responsible for preparing.

I have not visited the Ayawilca Polymetallic Project.

I am responsible for Sections 1.1, 1.2, 1.5, 1.6, 1.7, 1.8, 1.9, 1.11, 1.12, 1.22.1, 1.22.2, 1.24; Sections 2.1, 2.2, 2.3, 2.5, 2.6, 2.7; Sections 3.1, 3.2, 3.5; Section 6; Section 7; Section 8; Section 9; Section 10; Section 11; Section 12; Section 14; Sections 25.1, 25.3, 25.4, 25.6, 25.15.1, 25.15.2, Sections 26.1, 26.2.1, 26.2.2, 26.2.9, 26.2.10, 26.3; and Section 27 of the technical report.

I am independent of Tinka Resources Limited, as independence is described by Section 1.5 of NI 43-101.

I have no prior involvement with the property that is the subject of the technical report.

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

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

Dated: 10 November, 2021

“signed and sealed”

Katharine M. Masun, P.Geo.

CERTIFICATE OF QUALIFIED PERSON

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I, Dorota El-Rassi, P.Eng., am employed as a Consultant Geologist with SLR Consulting (Canada) Ltd., with an office address at Suite 501, 55 University Ave., Toronto, ON M5J 2H7.

This certificate applies to the technical report titled "Ayawilca Polymetallic Project, Central Peru, NI 43-101 Technical Report on Updated Preliminary Economic Assessment" that has an effective date of 14 October, 2021 (the "technical report").

I am registered as a Professional Geological Engineer In the Province of Ontario (Reg.# 100012348). I graduated from the University of Toronto in 1997 with a B.A.Sc. (Hons.) degree in Geological and Mining Engineering and in 2000 with a M.Sc. degree in Geology.

I have worked as a geologist for a total of 21 years since my graduation. My relevant experience for the purpose of the technical report is:

- Review and report as a professional engineer on many mining and exploration projects around the world for due diligence and regulatory requirements.
- Mineral Resource estimates on a variety of commodities including gold, silver, copper, nickel, zinc, PGE, and industrial mineral deposits
- Experienced user of Gemcom, Leapfrog, Phinar's x10-Geo, and Gslib software.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43-101 *Standards of Disclosure for Mineral Projects* (NI 43-101) for those sections of the technical report that I am responsible for preparing.

I visited the Ayawilca Polymetallic Project from September 17-19, 2018.

I am responsible for Sections 1.1, 1.2, 1.5, 1.6, 1.7, 1.8, 1.9, 1.11, 1.12, 1.22.1, 1.22.2, 1.24; Sections 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7; Sections 3.1, 3.2, 3.5; Section 6; Section 7; Section 8; Section 9; Section 10; Section 11; Section 12; Section 14; Sections 25.1, 25.3, 25.4, 25.6, 25.15.1, 25.15.2, Sections 26.1, 26.2.1, 26.2.2, 26.2.9, 26.2.10, 26.3; and Section 27 of the technical report.

I am independent of Tinka Resources Limited, as independence is described by Section 1.5 of NI 43-101.

I have been involved with the Ayawilca Polymetallic Project since 2018. I have previously co-authored the following technical reports on the project:

- 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;

- El-Rassi, D., and Ross, D., 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.

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

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

Dated: 10 November, 2021

“signed and sealed”

Dorota El-Rassi, P.Eng.

CERTIFICATE OF QUALIFIED PERSON

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This certificate applies to the technical report titled “Ayawilca Polymetallic Project, Central Peru, NI 43-101 Technical Report on Updated Preliminary Economic Assessment” that has an effective date of 14 October, 2021 (the “technical report”).

I am a Chartered Professional (CP) in Metallurgy and a Fellow of the Australasian Institute of Mining and Metallurgy (FAusIMM). I graduated from the Western Australian School of Mines with a BEng Minerals in 1995.

I have worked as a precious and base metal metallurgist since my graduation. My relevant experience for the purpose of the Technical Report is:

- As a metallurgical consultant on numerous base metal mining and exploration projects around the world
- 25 years experience in metallurgical flowsheet development, testwork and engineering, principally in Australia, Canada, and Peru.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 *Standards of Disclosure for Mineral Projects* (NI 43–101) for those sections of the technical report that I am responsible for preparing.

I have not visited the Ayawilca Polymetallic Project.

I am responsible for Sections 1.1, 1.2, 1.10, 1.14, 1.18, 1.19, 1.22.1, 1.22.2, 1.24; Sections 2.1, 2.2, 2.3, 2.6; Sections 3.1, 3.2, 3.5; Section 13; Section 17; Sections 21.1.1, 21.1.4, 21.2.1, 21.2.3; Sections 25.1, 25.5, 25.8, 25.12, 25.13, 25.15.1, 25.25.2; Sections 26.1, 26.2.4, 26.2.5, 26.2.9, 26.2.10, 26.3; and Section 27 of the technical report.

I am independent of Tinka Resources Limited, as independence is described by Section 1.5 of NI 43–101.

I have been involved with the Ayawilca Project since 2015. I have previously co-authored the following technical report on the Ayawilca Project:

- 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.

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

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

Dated: 10 November, 2021

“signed”

Adam Johnston, FAusIMM (CP Met)

CERTIFICATE OF QUALIFIED PERSON

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Envis E.I.R.L

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This certificate applies to the technical report titled “Ayawilca Polymetallic Project, Central Peru, NI 43-101 Technical Report on Updated Preliminary Economic Assessment ” that has an effective date of 14 October, 2021 (the “technical report”).

I am a Professional Engineer of Alberta, Canada. I graduated from the University of Waterloo (Canada) with a B.A.Sc. in 1991.

I have practiced my profession for 30 years. I have been directly involved in tailings and infrastructure-related aspects of the project.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 *Standards of Disclosure for Mineral Projects* (NI 43–101) for those sections of the technical report that I am responsible for preparing.

I have not visited the Ayawilca Polymetallic Project.

I am responsible for Sections 1.1, 1.2, 1.15.4, 1.18, 1.19, 1.22.1, 1.22.2, 1.24; Sections 2.1, 2.2, 2.3, 2.6; Sections 3.1, 3.3; Section 18.5, 18.6; Sections 21.1.1, 21.1.5, 21.1.8, 21.1.10, 21.2.1; Sections 25.1, 25.9, 25.12, 25.13, 25.15.1, 25.15.2; Sections 26.1, 26.2.7, 26.2.9, 26.2.10, 26.3; and Section 27 of the technical report.

I am independent of Tinka Resources, as independence is described by Section 1.5 of NI 43–101.

I have been involved with the Ayawilca Project since April, 2021 during preparation of the updated 2021 preliminary economic assessment.

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

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

Dated: 10 November, 2021

“signed and sealed”

Donald Hickson, P.Eng.

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1 SUMMARY

1.1 Introduction

Tinka Resources Limited (Tinka) requested that Mining Plus Peru S.A.C. (Mining Plus), SLR Consulting Ltd (SLR), Transmin Metallurgical Consultants (Transmin), and Envis E.I.R.L (Envis), compile a technical report (the Report) on an updated preliminary economic assessment (PEA) study (the 2021 PEA) for the Ayawilca polymetallic project (the Project), located in central Peru.

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.

1.2 Terms of Reference

This Report supports the disclosure in Tinka’s news release dated 14 October, 2021, entitled “Tinka Reports Updated PEA for Ayawilca Project: Highlights Potential to Become Top-10 Global Zinc Producer”.

The term “Project” is used to refer to all of the mineral tenure holdings; the term “project” refers to the 2021 PEA study. Unless otherwise noted, all mineralization is discussed using “zone” nomenclature. Zones are generally described by the major commodity, but may be further broken down by geographic location: Ayawilca Zinc Zone (subdivided into West, Central, South, East, Silver and Zone 3 areas), Ayawilca Tin Zone, and Colquipucro Silver Zone.

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. The Report uses US English.

Mineral Resources and Mineral Reserves 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) and the CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines (November 2019; 2019 CIM Best Practice Guidelines).

1.3 Project Setting

The Ayawilca Project is located 200 km north–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 accessible by road, travelling 310 km north from Lima via the Panamerican Highway to Huaral, then by paved road to Oyón and then by well maintained all-weather graded road to Yanahuanca. An alternative road from the coast is via the Central Highway east from Lima for 300 km to Cerro de Pasco, then a further 65 km north–northwest by paved road to Yanahuanca. The Project area is accessed from Yanahuanca by unpaved road, a further 15 km, through the small communities of San Pedro de Pillao and/or San Juan de Yanacocha. A section of the road through San Pedro de Pillao is paved. A road bypass can also be taken at Oyón via the Raura mine direct to the Project. The nearest commercial airport is in Huanuco (some three hours east of the Project by road), the capital of the Huanuco Region.

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. Winter typically occurs from May to September. Exploration can be performed year-round. Any future mining activities would also be conducted year-round.

The city of 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. A small 30-person exploration camp is located in the Project area. Two parallel powerlines cross the Project area. There is a steady source of water for exploration activities from streams, springs, and lakes.

The Project is situated in the Andes Mountains of west–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. At higher elevations, there are grasses and various moss and lichens. Lower elevations are characterized by small or thorny shrubs and minor cacti.

1.4 Mineral Tenure, Surface Rights, Water Rights, Royalties and Agreements

The Project consists of 59 contiguous mining concessions covering 16,548 ha. The concessions are in good standing. The mining concessions will remain valid as long as Tinka pays the annual concession tax and, where applicable, any penalty relating to lack of production, or make a minimum annual investment for each concession.

Tinka holds surface rights or is negotiating extensions to expired surface rights in the Project area to support exploration activities through agreements with three local communities, the Community of San Juan de Yanacocha, the Community of Huarautambo, and the Community of San Pedro de Pillao.

The water used in Tinka’s exploration programs was from approved water sources and the volumes used were also approved. Tinka holds no water rights in the Project area. Water

rights cannot be purchased in Peru, but they are granted by the national water authority for industrial or mining purposes as part of the permitting process for exploration programs.

There is an expectation of environmental liabilities associated with historical mining and exploration activity. The Ministry of Mines and Energy (MINEM) has the liability for mine adits, listed in its Environmental Mining Liabilities (PAM in the Spanish acronym) registry for the Ayawilca Project. As required by local legislation, Tinka prepared a list of historical mining activity areas in 2018. The Tinka survey identified 178 artisan-related sites which included adits, waste rock dumps, prospecting pits, glory holes, underground mine workings, and trenches.

There is a 1% net smelter return (NSR) royalty 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 2028 for US\$1 million.

1.5 Geology and Mineralization

The geological setting, deposit geometry, and style of mineralization indicates that Ayawilca is a carbonate replacement deposit (CRD), of which there are several type examples in central Peru, including several producing mines.

The Project is located within the High Andes geological zone, which consists of an intra-arc trough, a deep basin, a continental shelf, and the Marañón metamorphic complex (the Marañón Complex). The regional geology of the Project consists of sedimentary and metasedimentary stratigraphy ranging from late Proterozoic to Tertiary in age. The oldest documented rocks belong to the Devonian-age Excelsior Group, overlying the Marañón Complex, consisting of phyllite, schist and other meta-sedimentary rocks. Overlying the Devonian sediments are red-bed terrestrial sediments including sandstone, conglomerate, and intercalated mudstone of the Permian to lower Triassic Mitu Group. Upper Triassic to Lower Jurassic Pucará Group limestone overlies the Mitu Group, and is the predominant host for both zinc and tin mineralization at the Project. Goyllarisquizga (Goyllar) Group rocks are well-bedded sandstone, siltstone and mudstone units which overlie the carbonate rocks of the Pucará Group.

The entire sequence has been folded and thrust along north to north–northwest-trending Andean faults and fold axes (east–west compression), with subsequent trans-tensional faults oriented northeast–southwest or east–west.

The Zinc and Tin Zones are hosted mostly within a sequence of limestone, dolomite and calcareous siltstone of the Pucará Group.

The Zinc Zone is made up of multiple, gently-dipping, sulphide lenses or “mantos”, generally with vertical thicknesses of between 10–30 m (locally thicker) within four areas (West, South,

Central, and East). At the West and South Ayawilca areas the mantos are stacked on top of each other to form thick almost continuous zones with vertical thicknesses of up to 150 m. The four structural zones span 2.1 km in the northeast–southwest direction and 1.3 km in the north–south direction. Zinc mineralization occurs as massive to semi-massive sulphide replacements of the carbonate rocks and is thought to be controlled by multiple, sub-parallel, east–west-, and northeast–southwest-trending structures, as well as low-angle east-dipping thrust faults. The zinc occurs as various generations of sulphide impregnations consisting of marmatite (a high-iron variety of sphalerite also known as “black-jack”) and sphalerite (with purple to red–brown tones) accompanied by pyrite, pyrrhotite, chlorite, iron carbonate (siderite), and magnetite. Less common sulphides include galena, arsenopyrite, and chalcopyrite.

Tin mineralization in the Tin Zone pre-dates and is cross-cut by the zinc mineralization. Tin is hosted in massive to semi-massive pyrrhotite mantos typically 5–10 m in vertical thickness (up to a maximum of 50 m) at or near the contact of the Pucará Group carbonate rocks and the underlying Excelsior Group phyllite. Quartz–tin–copper stockwork mineralization also occurs within the phyllite in some areas beneath the pyrrhotite mantos. Tin occurs predominantly as cassiterite, with very minor stannite, in association with pyrrhotite and pyrite, and lesser chalcopyrite, arsenopyrite, and galena. The pyrrhotite is magnetic, and is believed to be the main cause of several magnetic anomalies at the Project.

The Colquipucro Silver Zone is hosted primarily within oxidized Goyllar Group sandstone with mineralization at or close to the surface. The Colquipucro Silver Zone is believed to be the only known sandstone-hosted disseminated silver occurrence in Peru. Overall, the Colquipucro Silver Zone is about 550 m in the north–south direction by 380 m in the east–west direction and can reach 75 m in vertical thickness. Silver mineralization is hosted in quartz sandstones and occurs together with iron oxides (goethite, jarosite) and manganese oxides in fractures and disseminations within the pore spaces of the sandstones. Traces of sulphides (mostly galena) are observed sporadically.

Tinka has identified a number of areas within the Project area that have exploration potential, including the Far South, Silver, Zone 3, Chaucha, Valley, Yanapizgo, Pucarumi, and Tambillo zones. Several magnetic anomalies remain untested outside of the Zinc and Tin Zones, many of which are considered high-priority exploration targets. Exploration potential also exists underneath the known Mineral Resources estimated for the Zinc Zone and Tin Zone at depths >400 m, and on the perimeter of some of the known sulphide bodies including South. Repetitions of the favourable limestone have been intersected in several drill holes underneath thrust faults at South and West Ayawilca.

Carbonate–sphalerite–galena–ruby silver replacements of limestone at the Silver area can host very high grade silver mineralization, and are believed to be open in most directions. In addition, vein-style carbonate–sphalerite–galena–ruby silver mineralization intersected at

West Ayawilca within sandstone host rocks has not been modelled as part of the Mineral Resource estimate, offering further exploration potential.

1.6 History

Companies that conducted exploration in the Project area prior to Tinka include Compañía Minera Colquipucro S.A., Cerro de Pasco Corporation and Compañía Minera Buenaventura (Buenaventura). These companies undertook adit construction exploring for silver, mapping, rock chip sampling, trenching, and limited drilling (only in the Colquipucro area).

In 2005, the claims that were held by Buenaventura lapsed, and Tinka staked new claims. Tinka's work program has included geological mapping, soil, rock chip and underground workings sampling, ground magnetics, induced polarization (IP), gravity, electromagnetics, airborne magnetics, drone topographical surveying, core drilling, metallurgical testwork, and Mineral Resource estimation. Significant zinc mineralization was first discovered by Tinka in a 2012 drill program. An initial PEA was completed in 2019 (2019 PEA).

1.7 Drilling

The Project drill hole database includes 88,807.6 m of drilling in 258 holes. All but four core 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 facility located on the main road 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 then photographed wet with a digital camera before splitting. 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 QPs do not consider the missing downhole survey data to be an issue.

1.8 Sampling

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 993 density measurements in total. Sample spacing ranged from 10–60 m down hole, but on average was 20–30 m. Samples were taken from a variety of lithological and mineralogical types. Photographs and brief descriptions were taken before sending to SGS Laboratories in Lima (SGS Lima) or ALS Laboratories in Lima (ALS Lima) for density determinations.

All samples from the Tinka 2015, 2017 and 2018 Zinc and Tin Zone drill programs were analyzed by SGS Lima. Some samples were sent to ALS Lima.

All samples from the Zinc Zone and Colquipucro Silver Zone from subsequent Tinka drill campaigns were analyzed by SGS Lima until early in 2014. During the 2014 drill program, all Zinc and Tin Zone samples were analyzed by SGS Lima, and all Colquipucro Silver Zone samples were analyzed by the Certimin S.A. (Certimin) laboratory in Lima.

All samples from the Tinka 2015 Zinc and Tin Zone drill program were analyzed by SGS Lima. Samples from the 2017 Zinc and Tin Zone drill program were analyzed by SGS Lima. Some samples were sent to ALS Lima.

Samples from the Tinka 2018 Zinc and Tin Zone drill program were analyzed by SGS Lima. Check assays were performed by the Inspectorate laboratory (Inspectorate) in Lima.

Samples from the 2019 to 2021 drill programs were analyzed by ALS Lima.

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), atomic absorption spectroscopy (AAS) and fire assay.

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 QPs' opinion:

- The results of the blanks are within acceptable limits, and the data can be used for resource estimation purposes;
- The standard grades cover a reasonable range with respect to the overall resource grades;
- Field duplicate results are acceptable.

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

1.9 Data Verification

The drill collar sites have been 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, and then by professional surveyors in late 2011 and in 2012 during the topographic survey. Many of the drill holes were re-surveyed again in late 2014. The results were compared and reconciled to the previous coordinates each time a drill hole was re-surveyed.

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 Ms. El-Rassi confirms that there is significant silver and tin mineralization in the drill holes sampled. Confirmation of the zinc mineralization in the Zinc Zone was made by Ms. El-Rassi observing numerous drill core intervals with significant sphalerite.

The QPs' 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 QPs 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 2021, the QPs 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 issue. No problems were identified. The QPs 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 Metallurgical Testwork

Several metallurgical testwork phases have been completed to evaluate the mineral processing of the mineralization at Ayawilca, as follows:

- Phase 1, 2016: zinc flotation (rougher and cleaner scoping test):
- Phase 3, 2017–2018: zinc flotation and comminution:
- Phase 4, 2018: Mineralogical characterization of tin:
- Phase 5A, 2019: zinc flotation and optimization (rougher, cleaner) including lock cycle and mineralogical tests:
- Phase 5B, 2021: lead–silver and zinc flotation and mineralogical tests:
- Phase 5C, 2021: Jamieson cell test on lead–silver/zinc mineralization:
- Phase 5D, 2021: Ayawilca zinc tailings preliminary characterization:
- Phase 6, 2021: Mineralogical characterization of tin mineralization:

The results of the Phase 5A testwork program showed that the Zinc Zone mineralization produces a good quality zinc concentrate grading 50% Zn with a zinc recovery of 92%, based on locked cycle flotation tests as well as mineralogical tests. 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.

Metallurgical projections were updated for the 2012 PEA using the metallurgical testwork performed during 2021, and the forecast recoveries are provided in Table 1-1.

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 iron, there are no deleterious elements expected in the zinc concentrates produced from Ayawilca.

Table 1-1: Projected Metal Recovery

Element	Unit	Concentrate	
		Pb-Ag	Zn
Zinc	%	—	92
Lead	%	70	—
Silver	%	45	40
Iron	%	—	—

1.11 Mineral Resource Estimation

Mineral Resources estimated by SLR for the Ayawilca deposit used drill results available to February 16, 2021. There has been no drilling at the Colquipucro deposit since the previous Mineral Resource estimate completed in 2016 and the Colquipucro Mineral Resource estimate remains unchanged.

1.11.1 Ayawilca

Wireframe models of mineralized zones were used to constrain the block grade interpolation process at a nominal cut-off NSR value of US\$50/t for the Zinc and Tin zones. A minimum thickness of 3 m was generally applied. SLR modified and validated 50 domains in five main areas, consisting of the Central, South, West, and East areas (collectively referred to as the Zinc Zone), and the Tin Zone. SLR constructed a buffer zone to allow interpolation in a limited area of 50 m surrounding the mineralization wireframe models.

Statistical analyses of the analytical and geological data were performed, and results used to help verify the modelling process. The management of tin and lead outliers in the Zinc Zone, and zinc and lead in the Buffer Zone was completed using high-grade restrictions applied during the interpolation process. Compositing was done on 2 m intervals, based on sample interval ranges of 0.2–8.6 m and mineralization widths.

Grades were interpolated by inverse distance weighting to the third power (ID^3) with a minimum of five to a maximum of 12 composites per block estimate for first pass, and a minimum of one to a maximum of 12 composites per block estimate in the second pass. A third pass was completed in five domains with expanded ellipsoid ranges and a minimum of one to a maximum of 12 composites per block estimate. 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. SLR used individual veins to guide the variable direction search. Hard boundaries were used to limit the use of composites between different wireframes. The influence of higher-grade composites for some metals within the Zinc, Tin, and Buffer Zones was spatially restricted.

SLR used the average of available density measurements for each of the Zinc Zone and Tin Zone.

One single block model covering the entire Ayawilca deposit was constructed. 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.

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. For the purposes of developing the cut-off value, a total unit operating cost of US\$47/t milled was estimated for the Zinc Zone and US\$63/t milled for the Tin Zone, which includes mining, processing, and general and administrative (G&A) expenses. In the QPs' opinion, a US\$55/t cut-off value for the Zinc Zone and a US\$60/t cut-off value for the Tin Zone are acceptable for estimating Mineral Resources. The US\$60/t NSR cut-off value for the Tin Zone is approximately equivalent to 0.74% Sn when the tin-to-copper ratio is less than five and 0.42% Sn cut-off grade when the ratio is five or greater.

No Measured Resources were classified for the Ayawilca deposit. Support for the Indicated Mineral Resources included spatial analysis, drill hole spacing (within 40–70 m), and continuity of the mineralization. Indicated Mineral Resources are confined to the South and West areas of the Zinc Zone. All remaining blocks within the resource domains were classified as Inferred.

Mineral Resources at the Ayawilca deposit are reported based on a possible underground mining scenario. Approximately 22.5 Mt of material within the wireframes of the Zinc Zone and 13.4 Mt within the wireframes of the Tin Zone (i.e., Buffer Zone excluded) is below the cut-off grade and was not reported as part of the Mineral Resource. SLR reviewed the location of this material and determined that it was relatively contiguous and could be avoided in the case of underground mining. In the QPs' opinion the Mineral Resource estimate at the Ayawilca deposit meets the test of reasonable prospects of eventual economic extraction.

SLR 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.

1.11.2 Colquipucro

SLR interpreted and constructed wireframe models using a nominal cut-off grade of 15 g/t Ag and a minimum core length of 2 m using Leapfrog Geo. Wireframes of the high-grade lenses were created at a minimum grade of approximately 60 g/t Ag. SLR also created wireframe

models of the main lithologies including the Goyllar Formation sandstone, the Pucará Formation limestone, colluvium, and the Excelsior Formation phyllite.

Statistical analyses of the analytical and geological data were performed, and results used to help verify the modelling process. Review of the resource assay histograms within the wireframe domains and a visual inspection of high-grade values on vertical sections suggest capping erratic values at 360 g/t Ag in the high-grade lenses, and 120 g/t Ag in the low-grade halo. Compositing was done on 2 m intervals, based on sample interval ranges of 0.6–6.0 m and mineralization widths.

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. 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, and a search ellipse of 50 x 50 x 10 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 dimensions were doubled to 100 x 100 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.

An average density of 2.48 t/m³ was used to convert resource volumes to tonnage.

Each block within the block model 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.

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 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. Classification was assigned using manually-constructed wireframe solids. All remaining blocks within the resource domains were classified as Inferred.

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. SLR prepared a preliminary open pit shell to

constrain the block model for resource reporting purposes. The preliminary pit shell at a cut-off of 15 g/t Ag was generated using Whittle software.

1.12 Mineral Resource Statement

The estimates for the Zinc Zone and Tin Zone have an effective date of 30 August, 2021; the estimate for the Colquipucro silver oxide deposit has an effective date of 25 May, 2016. The Qualified Persons for the estimates are Ms. Katharine Masun, P.Geo., and Ms. Dorota El-Rassi, P.Eng., employees of SLR, and independent of Tinka.

Mineral resource estimates are tabulated in Table 1-2 to Table 1-4. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

1.13 Mine Plan

The 2021 PEA mine plan 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 2021 PEA based on these Mineral Resources will be realized.

The Ayawilca deposit is planned to be mined using underground mining methods. A review of applicable mining methods resulted in selection of:

- OCF with pillars: Central and East areas;
- SLS: West, South areas and Silver Zones.

A high-level review of the geotechnical information for Ayawilca was carried out for the purposes of the 2021 PEA. Based on the review of available geotechnical information, the rock mass conditions appear to be generally favourable. The QP considers that the geotechnical parameters applied at this stage of the study are representative of the average rock mass conditions and appropriate for the level of study.

A mining recovery of 95% was assumed for the SLS method and a 100% mining recovery was used for the OCF with pillars method. A recovery of 70% was assumed for these pillars, because the rock conditions may not be entirely favorable due to the initial mining within the zone. A variable mining dilution assumption (% dilution) was applied, depending on the mining method, and consisted of internal and design dilution based on the defined stope sizes. No external unplanned dilution was included in 2021 PEA since the stopes are generally continuous in nature.

Table 1-2: Ayawilca Zinc Zone Mineral Resources (effective date August 30, 2021)

Classification/ Zone	Tonnage (Mt)	NSR (US\$/t)	Grade			Contained Metal		
			(% Zn)	(g/t Ag)	(% Pb)	(Mlb Zn)	(Moz Ag)	(Mlb Pb)
Indicated								
West	11.6	108	6.26	15.9	0.25	1,607	6.0	65
South	7.3	145	8.56	18.3	0.13	1,383	4.3	22
Total Indicated	19.0	123	7.15	16.8	0.21	2,990	10.3	87
Inferred								
West	5.5	106	5.90	20.8	0.42	719	3.7	52
South	9.0	134	7.45	34.4	0.33	1,477	10.0	65
Central	17.4	81	4.55	13.8	0.34	1,747	7.7	132
East	10.6	88	5.04	14.4	0.20	1,177	4.9	46
Silver	0.4	93	3.58	106.7	0.65	33	1.4	6
Buffer	4.9	87	4.66	19.2	0.63	504	3.0	69
Total Inferred	47.9	96	5.36	20.0	0.35	5,657	30.7	370

Notes:

1. The Qualified Persons for the estimate are Ms. Katharine Masun, P.Geo., and Ms. Dorota El-Rassi, P.Eng., employees of SLR, and independent of Tinka.
2. The 2014 CIM Definition Standards were followed for Mineral Resource classifications. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
3. Mineral Resources are reported above a cut-off NSR value of US\$55/t.
4. The requirement of a reasonable prospect of eventual economic extraction is met by having a minimum modelling width for mineralized zones of three metres, a cut-off based on reasonable input parameters, and continuity of mineralization consistent with a potential underground mining scenario.
5. The US\$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 assumptions were, US\$1.20/lb Zn, US\$22/oz Ag, and US\$0.95/lb Pb. Metal recovery assumptions were 92% Zn, 85% Ag, and 70% Pb. The US\$NSR value for each block was calculated using the following NSR factors; US\$16.23/% Zn, US\$0.27/ g Ag, and US\$10.20/% Pb.
6. Payability is as follows; Zn 84%, Pb 94% and Ag 47%.
7. The US\$NSR value was calculated using the following formula:

$$\text{US\$NSR} = \text{Zn}(\%) * \text{US\$16.23} + \text{Ag}(\text{g/t}) * \text{US\$0.27} + \text{Pb}(\%) * \text{US\$10.20}$$
8. Numbers may not add due to rounding.

Table 1-3: Ayawilca Tin Zone Mineral Resources (effective date August 30, 2021)

Classification	Tonnage (Mt)	NSR (US\$/t)	Grade (% Sn)	Contained Metal (Mlb Sn)
Inferred	8.4	103	1.02	189

Notes:

- The Qualified Persons for the estimate are Ms. Katharine Masun, P.Geo., and Ms. Dorota El-Rassi, P.Eng., employees of SLR, and independent of Tinka.
- The 2014 CIM Definition Standards were followed for Mineral Resource classifications. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
- Mineral Resources are reported above a cut-off grade NSR value of US\$60/t.
- The requirement of a reasonable prospect of eventual economic extraction is met by having a minimum modelling width for mineralized zones of three metres, a cut-off based on reasonable input parameters, and continuity of mineralization consistent with a potential underground mining scenario.
- The US\$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 assumptions were US\$11.00/lb Sn. Metal recovery assumptions were, 70% Sn for blocks with Sn:Cu $\geq$ 5 and 40% for Sn:Cu < 5. The NSR value for each block was calculated using the following NSR factors, US\$141.64 per % Sn for blocks with Sn:Cu $\geq$ 5 and US\$80.94 for blocks with Sn:Cu < 5.
- The US\$NSR value was calculated using the following formulae:
If Sn:Cu $\geq$ 5: US\$NSR = Sn(%) * US\$141.64
If Sn:Cu < 5: US\$NSR = Sn(%) * US\$80.94
- Numbers may not add due to rounding.

Table 1-4: Colquipucro Silver Oxide Deposit Mineral Resources (effective date 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:

- The Qualified Persons for the estimate are Ms. Katharine Masun, P.Geo., and Ms. Dorota El-Rassi, P.Eng., employees of SLR, and independent of Tinka.
- The 2014 CIM Definition Standards were followed for Mineral Resource classifications. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
- 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.
- The cut-off grade is based on a price of US\$24/oz Ag.
- Numbers may not add due to rounding.

The production rate was set at 8,500 t/d after considering the sustainable rate achievable from the multiple mining areas. Optimizations were completed using the mineable shape optimiser (MSO) unit within Datamine software. The Mineral Resource estimate for the Zinc Zone only is incorporated into the 2021 PEA mine plan.

A number of optimizations were completed at varying NSR cut-offs in order to determine the nominated NSR cut-off to be applied. The NSR cut-off was defined at US\$65/t, as it was determined to be a reasonable balance considering the margin per tonne of material mined while still having a reasonable resource extraction and mine life.

A subset of the Mineral Resource was defined at a >US\$65/t cut off for mining in the 2021 PEA as follows:

- Indicated Mineral Resources: 16.884 Mt grading 6.05% Zn, 0.13% Pb, and 12.3 g/t Ag;
- Inferred Mineral Resources: 26.642 Mt grading 5.25% Zn, 0.25% Pb, and 15.9 g/t Ag.

Subsequently the operating mining cut-off for each area was estimated by applying a cost scale based on the estimated production rate for that area. Only those stopes that had an NSR value >US\$65/t were included in the 2021 PEA mine plan. This NSR value is higher than the estimated total operating cost of US\$48/t, and, in the case of sublevel stopes, is higher than the US\$25/t weighted average mining cost.

In all areas, mining will be completed in an ascending manner. For the areas to be mined using SLS, exploitation levels of up to 45 m were assumed, grouping up to four levels, always honouring the geotechnical and SMU constraints. The mine is planned to access the mineralization through a system of three main ramps, which will access the five proposed mining zones.

Support required for the excavations will consist of standard bolt-and-mesh in the advance work and reinforcement with shotcrete in the intersections.

A combination of rock fill and paste backfill is proposed:

- SLS stopes: will require paste fill; mining methods assume continuous mining in a retreat fashion;
- OCF: will require rock fill and paste fill; mining methods assume primary stopes filled with paste and secondary stopes use rock fill.

The LOM design assumed that 12.46 Mm³ of backfill material would be required. Waste rock generated during underground development would be used as stope rock fill where conditions permit.

The design assumption for the ventilation circuit for each mining area is to inject fresh air through the access ramps, bring the fresh air to the stopes using auxiliary fans and extract the vitiated air through the main ventilation raise using the main fans that will be located on the

surface. The estimated air flow required for the West and South areas, which are planned to be mined during the first seven years, is 826 kcfm; the remainder of the LOM will require 880 kcfm, based on the mining assumptions for the Central, East and Silver areas.

The development and construction of the underground infrastructure is planned to start one year prior to first production. The mine schedule will begin with the South and West areas; the Central area will commence development in the seventh year. The main ramps will be developed using conventional drill-and-blast methods. The ventilation shafts will be developed using raise bore machines. The annual 8,500 t/d production rate will be reached in Year 2 of operations. Production is limited by the number of stopes that can be simultaneously mined. The number of active stopes drives the equipment count, and the backfill ratio and paste fill needs to achieve the daily production target. The mine plan assumes that pillars in the Central and East areas will be extracted at the end of the mine life. The mineralized material will be removed from production levels using scoops, sent to truck loading stations, and then surface transported via truck to the process plant. The plant will initially be fed by the West and South areas, and then the Central and East areas, with the objective of focusing production and reducing investment expenses in the first operating years.

Drilling for both production stopes and development will be carried out using industry-standard underground equipment. Grade control will be achieved by strict drilling control of the stopes and sampling of the drilled material. Mining equipment will be conventional for underground operations, and will include: scoops, Simbas, Jumbos, bolters, trucks, ANFO loaders as primary equipment, and fuel trucks, pick-up trucks, motor graders, rock breakers, scalers, and water trucks as auxiliary equipment.

1.14 Recovery Methods

The selection of a conventional zinc and lead–silver flotation processing circuit for Ayawilca was based on metallurgical testwork including locked cycle tests for zinc and open cycle tests for lead–silver.

Metallurgical testwork showed that the Zinc Zone mineralized material is amenable to froth flotation, achieving commercial zinc concentrate grades and recoveries. Processing of the zinc–lead–silver 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 dedicated lead–silver flotation circuit (rougher–cleaner cells) was included to maximize net revenue from silver production. To recover the lead–silver mineralization, a flotation stage comprising pneumatic cells in a rougher–cleaner–scavenger arrangement is proposed.

A lean, fit-for-purpose plant design standard was used, to cover the required duty for the projected 14-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.

The processing plant will consist of the following unit operations:

- Primary jaw crushing;
- Crushed ore 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 filtered tailings storage facility (TSF);
- Tailings backfill plant;
- Fresh and reclaim water supply;
- Reagent preparation and distribution.

A portion of the tailings (39%) will be mixed with cement and used as structural mine backfill material in the underground operations, while the remainder (61%) will be thickened and filtered, then disposed of in a filtered TSF. Process water will be recycled as much as possible to minimize water usage.

1.15 Infrastructure

1.15.1 Infrastructure Requirements

The main Project infrastructure components will include mine and process plant supporting infrastructure, site accommodation facilities, filtered TSF, external and internal access roads, power supply and distribution, fresh water supply and distribution, and water treatment plant. As the planned operations will be underground, minimal waste will be generated, hence no permanent waste rock facilities were included in the infrastructure assessments.

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.

1.15.2 Access and Logistics

The Project is located 310 km by road north of Lima, along a paved (or soon to be paved) road from the coast to Huánuco via Yanahuanca, the nearest town to the Project. Due to the

difficulties associated with improving the existing site access from Yanahuanca, a new road is proposed to the site from the town of Chinche, some 10 km west of Yanahuanca. A new 20 km long road would be constructed, leading to a mine control gate to be established at the Project boundary. Alternative roads also exist, and will be assessed in more detail at a later stage.

The 2019 PEA assumes that all of the zinc concentrates will be trucked to the Cajamarquilla refinery near Lima. The lead–silver concentrate is to be trucked to the Port of Callao, Lima, for export to Asia.

1.15.3 Stockpiles and Waste Rock Management

No permanent stockpiles will be required. No permanent waste rock storage facilities are planned. Waste generated from decline construction and development activities will be temporarily stored adjacent the mine portals, and will be used during the mine life as backfill material.

1.15.4 Filtered Tailings Storage Facility

In the 2021 PEA, the tailings management concept is a combined surface and underground storage. In total, 39% (16.9 Mt) of the LOM tailings production is planned to be used as cemented paste backfill, and the remaining 61% (26.6 Mt) is planned to be stored on surface. A comprehensive selection study was done for the location of the filtered TSF, and the disposal method for the tailings. 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 final evaluation resulted in the selection of stacked, filtered tailings at the site referred to as TSF-1. The final volume to be stored in the filtered TSF was estimated at 11.6 Mm³.

While this level of study was 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 dry-stack filtered TSF operations were identified as precedents. Additionally, measures were identified that should be incorporated into future design stages.

1.15.5 Water Management and Supply

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 contact 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 process plant will require around 41 m³/hr as make-up water. Potential make-water sources include nearby creeks; if these sources are used, water licences will be required.

The 2021 PEA assumed that water from a nearby creek is available for operations use.

There is a possibility of acid rock drainage (ARD) in the underground mine workings, based on the presence of significant sulphides content in the rock in the Zinc Zone. A water treatment plant is included in the Project design, in the event that it would be necessary to discharge excess water from dewatering of the underground operations.

1.15.6 Camps and Facilities

The 2021 PEA assumptions are that the general mine and process surface facilities will include a mine truckshop, a plant maintenance workshop, a laboratory, an explosives storage magazine, water ponds, a general warehouse, an administrative office building, and a core shed. In total approximately 3,100 m² of general buildings have been accounted for in the capital cost estimate. An on-site camp for 500 personnel was assumed for 2021 PEA purposes, and will include dormitories, administrative offices, a medical center, laundry area, change house, canteen and kitchen, recreational area, potable water and wastewater treatment plants, and parking.

1.15.7 Power and Fuel

Based on benchmarking on a scenario of up to 10,000 t/d, the forecast for overall Project power demand is up to 30 MW, taking into consideration the total site wide power requirements for the process plant, tailings and general infrastructure (12 MW), as well as the underground mine facilities (12 MW) plus an allowance (6 MW). Actual requirements will be determined as part of future more detailed studies.

Several power supply alternatives were assessed. The selected option for the 2021 PEA is to access the 220KV Paragsha 2 – Vizcarra L-2254 line owned by ISA Colombia (REP) which crosses the Project area. This power line is subject to a guaranteed system of transmission, which is part of Peru's national interconnection power system (SEIN). A detailed review of line capacity showed that the line has ample spare capacity. A change in regulations allows for substations to be built no less than 30 km from the nearest existing substation, which is located 40 km to the south of the Project area, allowing Tinka to build its own substation without additional permitting. The power supply scheme will consist of a tie-in at the sectioning point, and a new 220 kV sub-station and transformer.

The 2021 PEA assumes that fuel supply will be contracted out and delivered by road transport. Fuel storage tanks and the project gas station are assumed to be located close to the mine services facilities area.

1.16 Environmental, Permitting and Social Considerations

1.16.1 Environmental Considerations

Tinka has completed eight environmental studies in support of drill program permitting in the period 2013–2021. Tinka received an Authorization to Initiate Mining Activities (Resolution N° 0170-2017-MEM/DGM) on 10 February, 2017. Eight Certificates of Non-Existence of Archaeological Remains (CIRA) have been granted.

The initial EIAsd for Ayawilca was compiled in 2012, and included baseline information on physical, biological and social conditions, and an archaeological clearance. The EIAsd was approved in July 2013. A modified EIAsd (MEIAsd) report was compiled in 2015, and approved in 2016. A second MEIAsd report was compiled in 2018 and was approved in November 2019.

The initial environmental permit for Colquipucro was approved in 2007. A first MEIAsd for Colquipucro was compiled and approved in 2009. Three modifications containing updated baseline information were approved in 2011, 2014 and 2016.

Monitoring was initiated as part of the EIAsd and MEIAsd approvals, is ongoing, and is conducted on a bi-annual basis. The initial EIAsd program collected data on water quality, air quality and environmental noise. The MEIAsd program was expanded to increase the number of monitoring points, and included monitoring of flora, fauna, and soils.

There are wetlands (bofedales) and two high-altitude lakes in the general project area. The proposed infrastructure sites were selected with consideration for bofedales and high-altitude lake proximity. The closest infrastructure is anticipated to be sited about 100 m from a high-altitude lake shore. During more detailed studies, infrastructure sites must be the subject of additional environmental evaluation.

Initial baseline studies have identified a number of flora and fauna species in the general project area that have been listed as either critically endangered, endangered or vulnerable, under Peruvian legislation (S.D. N° 043-2006-AG and S.D. N° 004-2014-MINAGRI) or are listed in the Appendices of the Convention on International Trade in Endangered Species (CITES) or the Red List of the International Union for Conservation of Nature (IUCN). Additional studies will be required to better document species of concern, determine the likelihood of project impact on the species, and to develop appropriate mitigation measures where required.

1.16.2 Closure and Reclamation Planning

The environmental impact assessment (EIA) for the project will include a conceptual closure plan to obtain the environmental approval. A detailed Mine Closure Plan must be submitted within one year after EIA approval. 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, as stated by the Regulaciones para el Cierre de Minas or Mine Closure Regulations. The final closure plan must be submitted two years prior to closure of operations.

A provision of US\$15.2 M, equivalent to 75% of the 5% of the total capital cost based on benchmark for filtered tailings options, was included in the capital costs to account for closure costs.

1.16.3 Permitting Considerations

Tinka has applied for, and received, environmental permit approvals to conduct all exploration activities to date.

A comprehensive environmental and social impact assessment will be necessary for the project in order to obtain necessary permits for construction, operations, and closure. This assessment will be conducted in compliance with Peruvian regulations. Once the environmental and social impact assessment is approved by Peruvian authorities, a variety of permits, licenses, and authorizations will be required to proceed with the project construction and operations.

The main permitting requirements include:

- 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
- 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
- Start of activities (includes exploitation of construction materials and mining exploitation).

The granted CIRAs cover most but not all of the infrastructure areas envisaged in the 2021 PEA. Areas that are known to require additional CIRAs include power lines, access road and filtered TSF. Review of the final project footprint will be required to ensure that all of the planned operational areas have a CIRA.

The 2021 PEA has made certain assumptions as to the timelines needed to complete 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.

1.16.4 Social Considerations

Tinka has in place or is actively negotiating extensions to property agreements with local communities that support exploration-stage activities.

In support of obtaining the permits to allow exploration activities, Tinka has conducted a number of town-hall meetings, including virtual ones widely broadcast on local radio and on social media, with local communities. Tinka also maintains community relations offices in all three communities 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. Tinka has completed annual social compliance reports since 2017, and files monthly reports on safety indicators including social conflicts (2015–2021 and ongoing) to relevant regulatory authorities. The key risks identified included:

- Potential for conflicts over freshwater usage;
- Potential impact on existing wetlands and high-altitude lakes;
- Proposed infrastructure locations overlap with existing infrastructure such as roads;
- Presence of archeological material in areas proposed to host infrastructure;
- Ability to obtain land agreements to support project access, development, construction and operations;
- Clear understanding of the project area of influence, including communities that may be potentially impacted, the types of impacts;
- The ability of the project and company to meet community expectations.

1.17 Markets and Contracts

The information summarized in this subsection relating to concentrate marketing is derived from Ocean Partners, a third-party concentrate trading and marketing specialist company, who were contracted by Tinka to prepare a market study to support the 2021 PEA.

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. However, based on advice from Tinka, Ocean Partners estimated that all of the zinc concentrate would be sold to a local refinery in Peru. The Ayawilca zinc concentrate is expected to receive an iron penalty of \$7.50/dmt of concentrate at the refinery (at a standard penalty rate of US\$1.50 per 1% Fe above 8% Fe). No other deleterious elements are present in the Ayawilca zinc concentrate, and no other penalties are expected.

Based on current exchange rates, a figure of US\$35/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 refinery located close to Lima. For the lead concentrate to be exported, an average sea freight cost of around US\$50/wmt is regarded as a reasonable assumption for financial modelling purposes. Port costs will be in the range of US\$15–\$20 per wmt.

Details of the expected Ayawilca lead–silver concentrate are not as well constrained as those for the zinc concentrate, due to fewer metallurgical testwork results. The expected grade of the lead–silver concentrate is 50% Pb, while silver is expected to be in the range of 2,320–5,880 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. For silver in the lead–silver concentrate, the smelter typically pays for 95% subject to a minimum deduction of 50 g/dmt. No penalties are expected on the lead–silver concentrate.

For the purpose of the 2021 PEA, the project economics were estimated based on long-term metal prices of US\$1.20/lb for zinc, established by Tinka, and US\$0.95/lb for lead and US\$22.00/oz for silver

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.

1.18 Capital Cost Estimates

The capital cost estimate for the 2021 PEA had an expected accuracy range of $\pm 35\%$. The capital cost estimate was developed to be at the level of an AACE Class 4 Estimate, with a target accuracy of -30% to -15% and +20% to +50%. The cost estimate was expressed in Q2-2021 US\$, used an exchange rate of 1.00 US\$ = 3.88 PEN, and did not include allowances for escalation or exchange rate fluctuations.

Mine initial capital costs are associated with the underground mine development, mining equipment fleet, mine backfill plant, haul roads and support mine infrastructure and services. Mine sustaining capital costs include the underground mine development, mining equipment, mining equipment auxiliary fleet, backfill plant, haul roads, vertical development, ventilation, ramps, and the filtered TSF.

Process capital costs cover the costs associated with crushing, grinding, flotation, concentrate preparation, tailings preparation, the filtered TSF, reagents, and utilities and services.

Infrastructure-related capital costs include: the filtered TSF and water management system; water sourcing, treatment and onsite distribution; site electrical sub-station and distribution; internal access roads; on-site camp and other general facilities; fresh water supply; power supply (including the relocation of a section of the two existing power lines on site); and the external access road.

Indirect costs assume that:

- The project will be executed through an engineering, procurement, and construction management (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.

The Owner's cost was estimated as the 5% of the total project direct cost. This cost is considered to include pre-operations personnel and training, the Owner's project team during project development and execution, insurance, and permitting.

The contingency was established deterministically applying the following percentage factors associated with a PEA-level estimate.

- 10% on site preparation, haul roads, underground mine electrical distribution, mine backfill plant and supporting infrastructure direct costs;
- 25% on the process plant, filtered TSF, and on-site and off-site infrastructure direct costs, and on the indirect and Owner's costs.

No contingency was considered on the mine development and equipment capital cost.

The capital cost estimate is provided in Table 1-5. Initial capital costs are estimated at US\$264 M. Sustaining capital costs are estimated at US\$187 M. Closure costs total an estimated US\$15.2 M.

1.19 Operating Cost Estimates

The operating cost estimate has an expected accuracy range of $\pm 35\%$ and is expressed in Q3-2021 US\$. The estimate includes the underground mining, processing and G&A operating costs. It excludes escalation, currency fluctuations, off-site costs, interest charges and taxes. No contingency has been included in the operating costs.

The mine operating cost estimate included the costs associated with stope preparation, drilling, blasting, ground support, backfill, underground loading and hauling and material transport to the primary crusher on surface, as well as support and ancillary equipment operations and maintenance, power, direct labour and mine operations supervision staff. Operating costs associated with the backfill plant are included in the mine operating cost estimate. The overall average underground mine operating cost was estimated as US\$32.79/t of material mined (which equals the mill feed processed), and the total LOM mining cost is US\$1,427 M, excluding pre-development costs (capitalized mine development costs during the pre-operational period).

The process operating cost estimate accounts for the operating and maintenance costs associated with the 8,500 t/d 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. Power consumption was estimated based on the power requirements by the major processing plant equipment, and adjusted using benchmark factors to account for auxiliary and minor equipment power demand. A unit power cost of US\$0.07/kWh was assumed. Process costs are estimated at US\$22.7 M/a or US\$7.10/t processed, and the LOM processing cost is US\$309 M.

The G&A operating cost was estimated at a total LOM of US\$186 M or an equivalent of US\$4.27/t of mill feed processed, based on an average benchmark cost of US\$13 M per year from similar operations in Peru. General on-site infrastructure operating costs are included in the G&A operating costs.

The LOM operating cost estimate is \$1,922 M. The estimate per tonne of mill feed processed over the LOM is \$48.57/t.

Table 1-5: Initial Capital Cost Estimate Summary

Capital Cost Item	Initial (US\$ M)	Sustaining (US\$ M)	Total (US\$ M)
Mining & mine development	47.2	95.3	142.5
Process plant	83.5	—	83.5
On-site infrastructure	34	—	34
Off-site infrastructure	9.1	—	9.1
Filtered tailings storage facility	3.6	91.6	95.2
Indirect + Owner costs	42.7	—	42.7
Contingencies	43.8	—	43.8
Total Project	263.9	186.9	450.8
Closure Costs	—	—	15.2

1.20 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; 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 reclamation obligations; requirements for additional capital; 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 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 2021 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;
- 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;
- 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, 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 2021 PEA 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 2021 PEA based on these Mineral Resources will be realized.

The financial analysis was carried out using a discounted cash flow (DCF) methodology. Net annual cash flows were estimated projecting yearly cash inflows (or revenues) and subtracting projected yearly cash outflows (such as capital and operating costs, royalties and taxes). These annual cash flows were discounted back to the date of beginning of capital expenditure at mid-year 2022 (mid-year -3) and totalled to determine the NPV of the project at selected discount rates. A discount rate of 8% was used as the base discounting rate. In addition, the internal rate of return (IRR), expressed as the discount rate that yields an NPV of zero, and the payback period, expressed as the estimated time from the start of production until all initial capital expenditures have been recovered, were also estimated. All monetary amounts

are presented in constant Q3-2021 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 estimated that all of the zinc concentrate will be sold to a local refinery in Peru. Lead-silver concentrate production will be sold free-on-board (FOB) to Asia.

The following payability factors were applied:

- Zinc concentrate:
 - Zinc: pay for 85.0% of the zinc content, subject to a minimum deduction of eight units;
- Lead-silver concentrate:
 - Lead: pay for 95.0% of lead content, subject to a minimum deduction of three units;
 - Silver: pay for 95.0% of silver content, subject to a minimum deduction of 50 g/dmt.

The zinc concentrate is assumed to be subject to a penalty of US\$1.50 per each 1% Fe above 8.0% Fe. A concentrate transport loss of 0.2% was assumed for both concentrates.

A construction period of 18 months was considered (starting in mid-year 2023) for the overall project implementation. Year 2025 corresponds to the first year of production. Capital costs were applied in the financial model excluding the Peruvian value-added tax (Impuesto General a las Ventas or IGV in the Spanish acronym). For the purpose of the 2021 PEA, it was assumed that the mine will be run by the Owner. Operating costs were applied in the financial model excluding IGV. The 2021 PEA assumes that the 1% NSR royalty payable to Sierra will be bought out and therefore the royalty is not included in the cashflow analysis.

A working capital allocation was included in the cash flow model. Working capital is assumed to be recovered at project completion. Thus, the sum of all working capital over the mine life is zero.

The taxation and royalties modelled within the financial analysis are based on the tax rates and taxation schemes that were validated by Ernst & Young Asesores (EY). The following tax considerations were applied:

- Modified mining royalty (Law N° 29788);
- Special mining tax (Law N° 29789);
- Employee profit sharing of 8% of taxable income after loss carry-forward;
- Complementary mining pension fund as 0.5% of taxable income after loss carry-forward and employee profit sharing;
- Corporate income tax rate of 29.5%;

- Tax loss carried forward to a maximum of four consecutive years after the year of the loss.

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\$15.2 M, equivalent to the 5.8% of the total capital build cost based on benchmarking, was included to account 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 real (constant) terms.

Metal price assumptions for the 2021 PEA are: US\$1.20/lb Zn; US\$0.95/lb Pb; and US\$22/oz Ag.

The Zinc Zone is anticipated to generate a pre-tax NPV of US\$720 M at an 8.0% discount rate, an IRR of 42.6% and a payback period of 2.0 years. The financial analysis results showed an after-tax NPV of US\$433 M at an 8.0% discount rate, an IRR of 31.9% and a payback period of 2.6 years. Table 1-6 presents a summary of the financial analysis results. Cash costs were consolidated per pound of zinc payable, net of lead and silver credits. Cash costs comprise the sum of anticipated mining, processing, general and administrative costs, and selling costs plus by product credits. A LOM all-in sustaining cash cost (AISC) was also consolidated. The AISC is an extension of the cash costs adding the costs to sustain production. These are presented in Table 1-7.

1.21 Sensitivity Analysis

A sensitivity analysis was performed considering variations in metal prices, feed metal grades, initial capital and operating costs on the after-tax NPV8% and on IRR. The results are shown in Figure 1-1 and Figure 1-2.

The project is most sensitive to fluctuations in the zinc price, then to feed grades. It is less sensitive to changes in operating costs, then initial capital costs. It is least sensitive to changes in silver and lead prices.

Table 1-6: Summary of Financial Results

Description	Units	Value
Zn payable	klb	4,111,818
Pb payable	klb	129,125
Ag payable	koz	8,649
Zn payable equivalent	klb	4,372,606
<i>After-Tax Valuation Indicators</i>		
Undiscounted cumulative cash flow	US\$ M	1,068
NPV @ 8%	US\$ M	433
NPV @ 10%	US\$ M	347
Payback period (from start of operations)	years	2.6
IRR	%	31.9
Initial capital	US\$ M	264
LOM capital	US\$ M	451
Closure costs	US\$ M	15.2

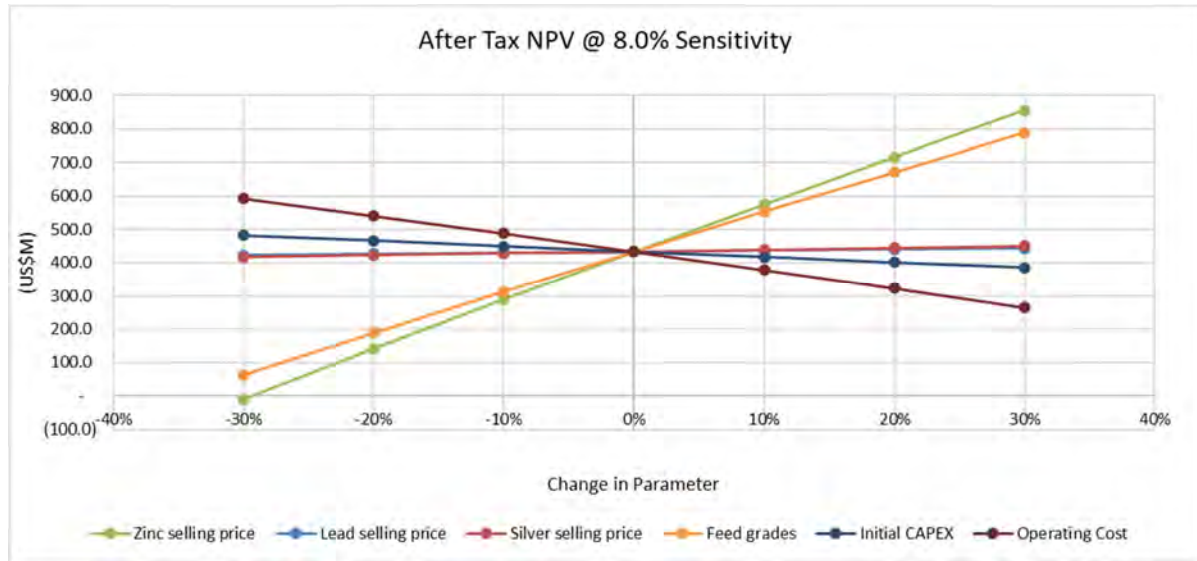
Note: base case at NPV8% is bolded.

Table 1-7: Summary of LOM Cash Costs

Cash Cost	LOM (US\$ M)	US\$/Zn lb payable
<i>Cash Costs</i>		
Mining	1,427	0.35
Process	309	0.08
G&A	186	0.05
Concentrates transport, treatment and refining	1,091	0.27
<i>Sub-total</i>	<i>3,013</i>	<i>0.74</i>
<i>By-product credits</i>		
Pb and Ag premium	(313)	(0.08)
<i>Net Direct Cash Cost (C1)</i>	<i>2,700</i>	<i>0.66</i>
Sustaining capital, royalties* and closure	316	0.08
AISC	3,016	0.73

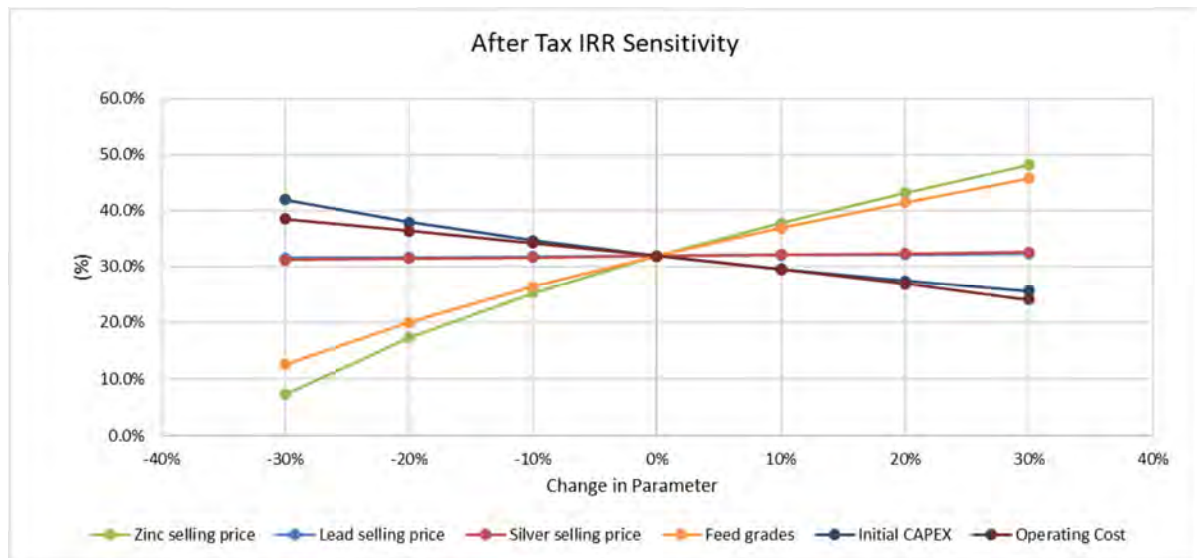
Note: * includes Modified Mining Royalty and Special Mining Tax. Cash costs comprise the sum of anticipated mining, processing, general and administrative costs, and selling costs plus by product credits. All-in sustaining costs (AISC) are an extension of the cash costs adding the costs to sustain production. Totals may not sum due to rounding.

Figure 1-1: Sensitivity of After-Tax NPV Discounted at 8.0%



Note: Figure prepared by Mining Plus, 2021. Capex = capital cost estimate.

Figure 1-2: Sensitivity of After-Tax IRR



Note: Figure prepared by Mining Plus, 2021. Capex = capital cost estimate.

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 most sensitive to zinc price changes. A base case zinc price of \$1.20/lb has been used. Zinc prices during 2021 have varied between US\$1.16/lb and US\$1.73/lb.

1.22 Risks and Opportunities

A high-level risk analysis was undertaken for the project as envisaged in the 2021 PEA. Risks were rated according to probability and likely impact, and assigned a risk rating. No action plans were developed for each risk as it is expected that the outcome of the risk workshop will be used as the basis for the preparation of the overall work plan for the next project stage.

1.22.1 Risks

Of a total of 37 risks identified, 26 are considered medium-to-high, while 11 are considered low risk. The high and medium-rated risks sorted by discipline are summarized in Table 1-8.

1.22.2 Opportunities

Opportunities were identified by Mining Plus, and reviewed by Tinka. A total of 15 opportunities were recognized, of which 11 are considered medium-to-high opportunities, while four are considered low. The high and medium-rated opportunities sorted by discipline are summarized in Table 1-9.

1.23 Interpretation and Conclusions

Under the assumptions in this Report, the project evaluated shows a positive cash flow over the life-of-mine. The 2021 PEA mine plan is achievable under the set of assumptions and parameters used.

1.24 Recommendations

A two-phase work program is recommended. The first work phase would consist of:

- Exploration and step-out drilling to potentially support the estimation of additional Mineral Resources at extensions of South Ayawilca, Silver and Tin Zone;
- Infill drilling to support higher confidence Mineral Resource classifications for the Zinc Zone and Tin Zone;
- Assessment of the underground hydrological conditions through the installation of piezometers and drilling of several water wells;
- Field investigations and data collection to support a pre-feasibility study, including environmental and permitting requirements;

Table 1-8: 2021 PEA Stage Risk Register (High and Medium Risks)

Discipline	Risk	Comment
Commercial	Local zinc refinery does not take all zinc production	Important to establish a market for zinc concentrate offshore, potentially increasing the transportation costs.
General	Supply constraints	Lack of equipment, or the high cost of equipment (for example, during a mining boom) could materially impact the timeline and economics of the project.
	Permitting and public consultation	Delays in the permitting processes, including prior consultation, could delay the start of construction.
	Political uncertainty/instability; including increased taxes	Changes in government or legislation that could result in changes to project assumptions, permitting requirements, construction and operational activities, and capital and operating costs.
	Capital and operating cost estimates	If operating costs increase, then NSR cut off would increase. Higher capital cost estimates could impact economics. More detailed cost estimations are required at next level
Geology	Resource modelling	More than 50% of the resource in the mine plan is classified as Inferred, although most of the Inferred resources are in lower-grade areas mined later in the LOM.
Infrastructure	New access road	The impact of the construction of the new road to access the project site on the stakeholders or environment has not yet been evaluated and as such could provide impediments to execution. Construction costs included in the capital cost estimate are based on costs from similar projects for earthworks and civil works. Consider an alternative route at a pre-feasibility study (PFS) stage.
	Right of way access to power	The 2021 PEA assumes that the power lines crossing the project will be accessible, and a substation for Ayawilca will be permitted
Mining	Geotechnical and hydrological assumptions	Different geotechnical and hydrogeological conditions than assumed could have either a negative or positive impact on the project cost and schedule. Specific contingencies were not applied to account for these uncertainties. To be addressed at PFS level.
	Dilution higher than expected	Impacts project economics. A well planned and executed grade control plan is necessary immediately upon commencement of mining
	Unable to reach production target of 8,500 t/d	The production target from the start of the mine is 8,500 t/d. If that production rate is unable to be reached early in the mine plan, or is not sustained, then it would have a material impact on metal production and cash flow.
	High flow of drainage and pumping of the mine	Appropriate studies needed to understand the underground water flow and define the pumping design and capital required.

Discipline	Risk	Comment
	Backfill challenges; e.g., higher or lower cement cost, delivery challenges.	More studies by specialists groups which will include implantation of systems and training when the time comes.
Processing	Dewatering assumptions for process plant design	Conservative dewatering assumptions were used in process plant design. Dewatering testwork will be required on representative samples. Variations from design assumptions could lead to variations in capital and operating cost estimates for the concentrate and tailings dewatering circuits.
	Production of a separate lead–silver concentrate	Further work is required to determine if a lead–silver concentrate would be able to be produced during the full cycle of the operating plant due to the relatively low Pb head grade.
	Zinc metallurgical recoveries	The final metallurgical performance may be reduced or improved by further investigations. The factors that present the highest risks to metallurgical performance include sample representivity, water recirculation, pyrrhotite mineralization, grinding chemistry and flotation hydrodynamic efficiency.
	Comminution of ores not as expected	The ball mill work index test work was carried out on a limited number of samples. Different comminution parameters to those assumed could have either a negative or positive impact on the project cost.
	Lead–silver metallurgical recovery parameters overstated	More test work is required to determine if silver recoveries are higher or lower than used for the 2021 PEA. A limited number of samples only were used to determine the silver recovery to a lead concentrate
	Zinc grade in concentrate	The Zinc Zone mineralization contains a high percentage of high iron marmatite, that could limit the refineries the zinc concentrate could be sold to
Social	Land acquisition delays	Delays in the land acquisition process could potentially delay the project schedule and impose higher acquisition costs as the project progresses.
	Social licence to operate	There is uncertainty related to the potential impact on communities, water bodies, sensitive species, and archaeological material, and with the time required collect the necessary wet season/dry season baseline data to allow the EIA report to be completed and lodged with the relevant regulatory authorities that could potentially delay the permitting process, and delay obtaining the social license to operate.
Tailings	Adverse weather and/or filter plant upset could impact filtered tailings operations	High rainfall and surface run off could impede stacking of filter cake during parts of the year. This would be mitigated by design controls – perimeter diversion ditches + raincoats to limit infiltration due to direct precipitation. Additionally, during the 4 wet-season months, tailings

Discipline	Risk	Comment
		would be preferentially directed to use as underground paste backfill. Upset conditions at the filtering circuit could result in the production of wetter-than-optimum tailings. These tailings can be preferentially placed as underground paste backfill. If placed at the filtered TSF, they can be placed within the non-structural zone of the stack; within containment-cell units such as geotubes; or otherwise discharge to a temporary holding pond, where they could be left to dry to optimum moisture content.
	Haul to filtered TSF	Sustaining capital cost estimates for the filtered TSF are highly dependent on the cost of haulage from the process plant area to the filtered TSF; the haul cost, in turn, is highly dependent on the cost of fuel. If fuel prices vary significantly, either upward or downward, this could represent a cost risk or opportunity for the project.
	Filtration capacity underestimated for tailings	More test work at PFS stage, specifically on filtering cycle time and turbidity of effluent.
Water	Water treatment plant assumptions	Although a water treatment plant was included in the capital cost estimate, higher than planned water treatment requirements could potentially increase capital and operating costs.
	Fresh water supply assumptions	Hydrogeological and hydrological information currently available is limited and no inventory or water quality monitoring of potential water sources for the project are currently available. Prioritize use of groundwater generated from underground mining development.

Table 1-9: 2021 PEA Stage Opportunities Register (High and Medium Ratings)

Discipline	Opportunity	Comment
Commercial	Indium becomes payable in the future	Indium may become a payable metal, depending on market conditions, providing opportunities for marketing the zinc concentrate offshore.
Geology	Discovery of additional high grade (Zn, Ag-Pb) mineralization	Discovery of high grade mineralization, that can support Mineral Resource estimates, which can be accessed early in the mine plan has a big impact on cash flow and could create substantial additional value.
	Discovery of additional high grade tin mineralization	A larger tin mineralized zone increases the likelihood of a tin circuit being incorporated into the mine plan.
	Mining at Colquipucro silver oxide through discovery of more mineralization	Allows for the possibility of an open pit silver mine at Colquipucro

Infrastructure	Consider conveyors and stackers from filter plant to filtered TSF	To be considered at PFS level
Mining	Optimization of mining rate and cut off grades (hill-of-values analysis)	To be considered at PFS level
	Opportunity for lower tonnage, high-grade start-up mine	To be considered at PFS level
Processing	Improved silver recoveries in the lead concentrate	Metallurgical test work needed at PFS
	Improved tin recoveries	Impacts the potential economic viability of the Tin Zone
	Improved zinc recovery	Can get a higher zinc recovery by dropping the concentrate grade
Marketing	Treatment charges	Current treatment charges provided by Ocean Partners are much lower than used in the 2021 PEA.
Water	Use water generated from underground mine as water supply	Could reduce capital costs, and risks associated with sourcing fresh water. Would significantly reduce treatment plant capital and operating costs if available.

Contingent on positive results from the first work phase, the second work phase would consist of the completion of a pre-feasibility study (PFS). Phase 2 work could include:

- Desktop engineering and mining studies;
- PFS document compilation.

Phase 1 is estimated at \$US\$7 M, divided between exploration drilling (US\$1.5 M), infill drilling for support of higher-confidence resource classification (US\$3.0 M) and other field investigations, including hydrological studies (US\$2.5 M). Phase 2 is estimated at US\$2 M for the detailed engineering and mining studies and PFS document compilation.

2 INTRODUCTION

2.1 Introduction

Tinka Resources Limited (Tinka) requested that Mining Plus Peru S.A.C. (Mining Plus), SLR Consulting Ltd (SLR), Transmin Metallurgical Consultants (Transmin), and Envis E.I.R.L (Envis), compile a technical report (the Report) on an updated preliminary economic assessment (PEA) study (the 2021 PEA) for the Ayawilca polymetallic project (the Project), located in central Peru (Figure 2-1).

2.2 Terms of Reference

This Report supports the disclosure in Tinka’s news release dated 14 October, 2021, entitled “Tinka Reports Updated PEA for Ayawilca Project: Highlights Potential to Become Top-10 Global Zinc Producer”.

The term “Project” is used to refer to all of the mineral tenure holdings; the term “project” refers to the 2021 PEA study. Unless otherwise noted, all mineralization is discussed using “zone” nomenclature. Zones are generally described by the major commodity, but may be further broken down by geographic location: Ayawilca Zinc Zone (subdivided into West, Central, South, and East Ayawilca areas and Zone 3), Ayawilca Tin Zone, and Colquipucro Silver Zone.

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. The Report uses Canadian English.

Mineral Resources and Mineral Reserves 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) and the CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines (November 2019; 2019 CIM Best Practice Guidelines).

Figure 2-1: Project Location Map



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

2.3 Qualified Persons

The served as the Qualified Person (QP) as defined in National Instrument 43-101, Standards of Disclosure for Mineral Projects, and in compliance with Form 43-101F1:

- Mr. Kim Kirkland, FAusIMM; Principal Mining Engineer, Mining Plus;
- Mr. Edgard Vilela, MAusIMM (CP), Principal Mining Consultant, Mining Plus;
- Ms. Katharine M. Masun, P.Geo., Consultant Geologist, SLR;
- Ms. Dorota El-Rassi, P.Eng, Consultant Geologist, SLR;
- Mr. Adam Johnston, FAusIMM (CP), Chief Metallurgist, Transmin;
- Mr. Don Hickson, P.Eng., Managing Partner, Tailings and Mine Waste, Envis.

2.4 Site Visits and Scope of Personal Inspection

Ms. Dorota El-Rassi visited the Project area from September 17–19, 2018. During the site visit, Ms. El-Rassi inspected core samples, and outcrops in the Ayawilca deposit area, interviewed Tinka personnel, reviewed quality assurance and quality control (QA/QC) procedures, and gathered other information for the completion of this Report. Tinka provided full access during all parts of the site visit. Ms. El-Rassi was accompanied by Mr. Alvaro Fernandez-Baca, Tinka’s Vice President of Exploration. Ms. El-Rassi held discussions with the following Tinka personnel during and after her September 2018 site visit as follows:

- Dr. Graham Carman, FAusIMM, President, CEO and Director;
- Mr. Alvaro Fernandez-Baca, P.Geo., V.P. Exploration;
- Mr. Luis Giraldo, Senior Geologist;
- Mr. Richard Chaiña, Senior Project Geologist.

Mr. Edgard Vilela visited the Project site from 8–9 July, 2021. While on site, he inspected proposed infrastructure locations, including the planned sites of the South, West, and North area portals, the proposed process plant site, the location for the paste backfill plant, the site of the planned filtered tailings storage facility (TSF); potential locations for waste rock storage facilities (WRSFs), proposed accommodations camp locations, and potential power line routes. Mr. Vilela was accompanied by Mr. Fernandez-Baca.

2.5 Effective Dates

The Report has a number of effective dates as follows:

- Date of supply of last information on mineral tenure, surface rights or agreements: 11 August, 2021;
- Mineral Resource estimate, Zinc and Tin Zones: 30 August, 2021;
- Mineral Resource estimate, Colquipucro Silver Zone: 25 May, 2016;
- Date of 2021 PEA financial analysis: 14 October, 2021.

The overall effective date of this Report is the effective date of the financial analysis which is 14 October, 2021.

2.6 Information Sources

The Report is primarily based on a preliminary economic assessment prepared for Tinka in 2021, and supporting memoranda and trade-off studies. This Report is also based in part on internal company reports, maps, published government reports, and public information, as listed in Section 27 of this Report. It is also based on the information cited in Section 2.7 and Section 3.

Additional information was sought from Tinka employees in their areas of expertise as required.

2.7 Previous Technical Reports

Tinka has previously filed the following technical reports on the Project:

- 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;
- El-Rossi, D., and Ross, D., 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;
- Ross, D., 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;
- Ross, D., 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;
- Ross, D., 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.

3 RELIANCE ON OTHER EXPERTS

3.1 Introduction

The QPs relied upon the following other expert reports, which provided information regarding mineral rights, surface rights, royalties, property agreements, environmental liabilities, market conditions and contracts for this Report as noted below.

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, 2021: Legal Opinion of Ayawilca Mining Project: prepared for Tinka Resources, 11 August, 2021, 9 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

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, 2019: Segunda Modificación del Estudio de Impacto Ambiental Semidetallado del Proyecto de Exploración Minera Ayawilca”: report prepared by SNC Lavalin for Tinka, 19 February, 2019, 1,599 p.

This information is used in Section 4 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:

- 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.

This information is used in Section 22 of the Report.

3.5 Markets and Contracts

The QPs have not independently verified marketing information on zinc–indium and lead–silver 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, 2021: Market Summary, Tinka Resources Limited, Ayawilca Project: report prepared by Ocean Partners for Tinka Resources, 4 November, 2021, 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
- 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 Elias (2019), Ernst and Young (2017), KPMG (2016), and Dentons (2021) 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 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. MINEM also grants mining concessions to local or foreign individuals or legal entities, through a specialized body called The Institute of Geology, Mining and Metallurgy (Ingemmet).

Other relevant regulatory authorities include the Ministry of Environment (MINAM), the National Environmental Certification Authority (SENACE), and the Supervisory Agency for Investment in Energy and Mining (Osinergmin). The Environmental Evaluation and Oversight Agency (OEFA) monitors environmental compliance.

4.2.2 Mineral Tenure

Mining concessions can be granted separately for metallic and non-metallic minerals. 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 taxes or 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 is S/4,400 in 2021 (about US\$1,135);
 - 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 concessions will be automatically expired.

Current legislation states that title-holders of mining concessions that were granted before December 2008 were obliged to pay the penalty from 2019 if the title-holder 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;
- The Minimum Annual Production Target is not met within 30 years following the year after the concession was granted.

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

Mining companies must negotiate agreements with surface landholders or establish easements. Where surface rights are held by communities, such easements must be approved by a qualified majority of at least two thirds of 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 is necessary to go through a prior consultation process before administrative acts are finalized (such as the granting of environmental permits, approval to initiate activities, etc.). For the purchase of surface lands owned by the government, an acquisition process with the Peruvian state must be followed through the Superintendence of National Properties.

Expropriation procedures have been considered for cases in which landowners are reluctant to allow mining companies to have access to a mineral deposit. Once a decision has been made by the Government, the administrative decision can only be judicially appealed by the original landowner as to the amount of 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 in order 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 beneficiary 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 year, for example for drilling.

In order 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 mortgaged. However, in the case of the change of 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.

4.2.5 Environmental Considerations

MINAM is the environmental authority, although the administrative authority for mineral exploration is the Directorate of Environmental Affairs (DGAAM) of MINEM. The environmental regulations for mineral exploration activities were defined by Supreme Decree No. 020-2008-EM of 2008. New regulations for exploration were defined in 2017 by Supreme Decree No. 042-2017-EM.

An Environmental Technical Report (Ficha Técnica Ambiental or FTA) is a study prepared for approval of exploration activities with non-significative environmental impacts and less than 20 drilling platforms. The environmental authority has 10 working days to make observations.

An Environmental Impact Declaration (Declaración de Impacto Ambiental or DIA) has to be presented for Category I exploration activities which have a maximum of 40 drilling platforms or disturbance of surface areas of up to 10 ha. The environmental authority has 45 working days to make observations.

A semi-detailed Environmental Impact Study (Estudio de Impacto Ambiental Semi-Detallado or EIAsd) is required for Category II exploration programs which have between 40–700 drilling platforms or a surface disturbance of more than 10 ha. The environmental authority has 96 working days to make observations. The total process including preparation of the study by a registered environmental consulting company can take 6–8 months.

A full detailed Environmental Impact Study (Estudio de Impacto Ambiental Detallado or EIAd) must be presented for mine construction. The preparation and authorization of such a study can take two years.

4.2.6 Permits

In order to start mineral exploration activities, a company is required to comply with the following requirements and obtain a resolution of approval from MINEM, as defined by Supreme Decree No. 020-2012-EM of 6 June 2012:

- Resolution of approval of the Environmental Impact Declaration;
- Work program;
- A statement from the concession holder indicating that it is owner of the surface land, or if not, that it has authorization from the owners of the surface land to perform exploration activities;

- Water License, Permission or Authorization to use water;
- Mining concession titles;
- A certificate of non-existence of archaeological remains (CIRA) whereby the Ministry of Culture certifies that there are no monuments or remains within a project area. However, even with a CIRA, exploration companies can only undertake earth movement under the direct supervision of an onsite archaeologist.

4.2.7 Other Considerations

Producing mining companies must submit, and receive approval for, an environmental impact study that includes a social relations plan, certification that there are no archaeological remains in the area, and a draft mine closure plan. Closure plans must be accompanied by payment of a monetary guarantee.

In April 2012, Peru's Government approved the Consulta Previa Law (prior consultation) and its regulations approved by Supreme Decree N° 001-2012-MC. This requires prior consultation with any 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.

Mining companies also have to separately obtain water rights from the National Water Authority and surface lands rights from individual landowners.

4.2.8 Fraser Institute Survey

The QP used the Investment Attractiveness Index from the 2020 Fraser Institute Annual Survey of Mining Companies report (the Fraser Institute survey) as a credible source for the assessment of the overall political risk facing an exploration or mining project in Peru. The Fraser Institute annual survey is an attempt to assess how mineral endowments and public policy factors such as taxation and regulatory uncertainty affect exploration investment.

The QP used the Fraser Institute survey because it is globally regarded as an independent report-card style assessment to governments on how attractive their policies are from the point of view of an exploration manager or mining company senior management, and forms a proxy for the assessment by the mining industry of the political risk in Peru.

In 2020, the rankings were from the most attractive (1) to the least attractive (77) jurisdiction, of the 77 jurisdictions included in the survey. Peru ranked 34 out of 77 jurisdictions in the attractiveness index survey in 2020; 42 out of 77 in the policy perception index; and 30 out of 77 in the best practices mineral potential index.

4.3 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.

4.4 Mineral Tenure

The Project consists of 59 contiguous mineral concessions covering 16,548 ha (Table 4-1; Figure 4-1).

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

4.5 Surface Rights

Tinka holds surface rights or is negotiating extensions to expired surface rights in the Project area to support exploration activities through agreements concluded with local communities (refer to Section 4.8).

4.6 Water Rights

Water rights for exploration are granted by the National Water Authority. Water used in Tinka’s exploration programs was 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.

4.7 Royalties and Encumbrances

A 1% net smelter return (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 Murguía Caveró.

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

Table 4-1: Mineral Tenure Summary Table

Code	Mining Right	Granted Area (ha)	Effective Area (ha)	Grant Date	District	Province	Department	Registry Card (Huancayo)	2021 Penalty Amount (US\$)	Royalty
10103501051	TK COL 1	500	378.4020	10.03.06	Yan and SPP	DAC	Pasco	11095515	8,408.93	Yes
0103502051	TK COL 2	139.8185	139.8185	01.03.06	SPP	DAC	Pasco	11095514	3,107.08	Yes
1010350305	TK COL 3	71.8975	71.8975	21.02.06	SPP	DAC	Pasco	11095521	1,597.72	Yes
1010350405	TK COL 4	5.9914	5.9914	23.02.06	SPP	DAC	Pasco	11095477	133.14	Yes
1010350505	TK COL 5	17.9747	17.9747	17.07.06	SPP	DAC	Pasco	11095522	399.44	Yes
1010350605	TK COL 6	74.8932	74.8932	23.02.06	SPP	DAC	Pasco	11095480	1,664.29	Yes
010350705	TK COL 7	0.9354	0.9354	11.04.06	SPP	DAC	Pasco	11095523	20.79	Yes
010350805	TK COL 8	0.9973	0.9973	17.03.06	SPP	DAC	Pasco	11095481	22.16	Yes
010350905	TK COL 9	3.9931	3.9931	23.02.06	SPP	DAC	Pasco	11095482	88.74	Yes
010351005	TK COL 10	0.9343	0.9343	03.03.06	SPP	DAC	Pasco	11095476	20.76	Yes
010351105	TK COL 11	1.9525	1.9525	10.04.06	SPP	DAC	Pasco	11095485	43.39	Yes
010351205	TK COL 12	20.6575	20.6575	18.04.06	SPP	DAC	Pasco	11095506	459.06	Yes
010351305	TK COL 13	0.9895	0.9895	06.03.06	SPP	DAC	Pasco	11095507	21.99	Yes
010351405	TK COL 14	2.9956	2.9956	16.05.06	SPP	DAC	Pasco	11095509	66.57	Yes
010351505	TK COL 15	23.9654	23.9654	29.03.06	SPP	DAC	Pasco	11095483	532.56	Yes
010351605	TK COL 16	35.9489	35.9489	10.03.06	SPP	DAC	Pasco	11095484	798.87	Yes
010351705	TK COL 17	23.9659	23.9659	10.03.06	SPP	DAC	Pasco	11095511	532.58	Yes
010351805	TK COL 18	5.9916	5.9916	06.03.06	SPP	DAC	Pasco	11095512	133.15	Yes
010351905	TK COL 19	7.0627	7.0627	03.03.06	SPP	DAC	Pasco	11095513	156.95	Yes
010352005	TK COL 20	13.4187	13.4187	31.05.06	SPP	DAC	Pasco	11095488	298.19	Yes

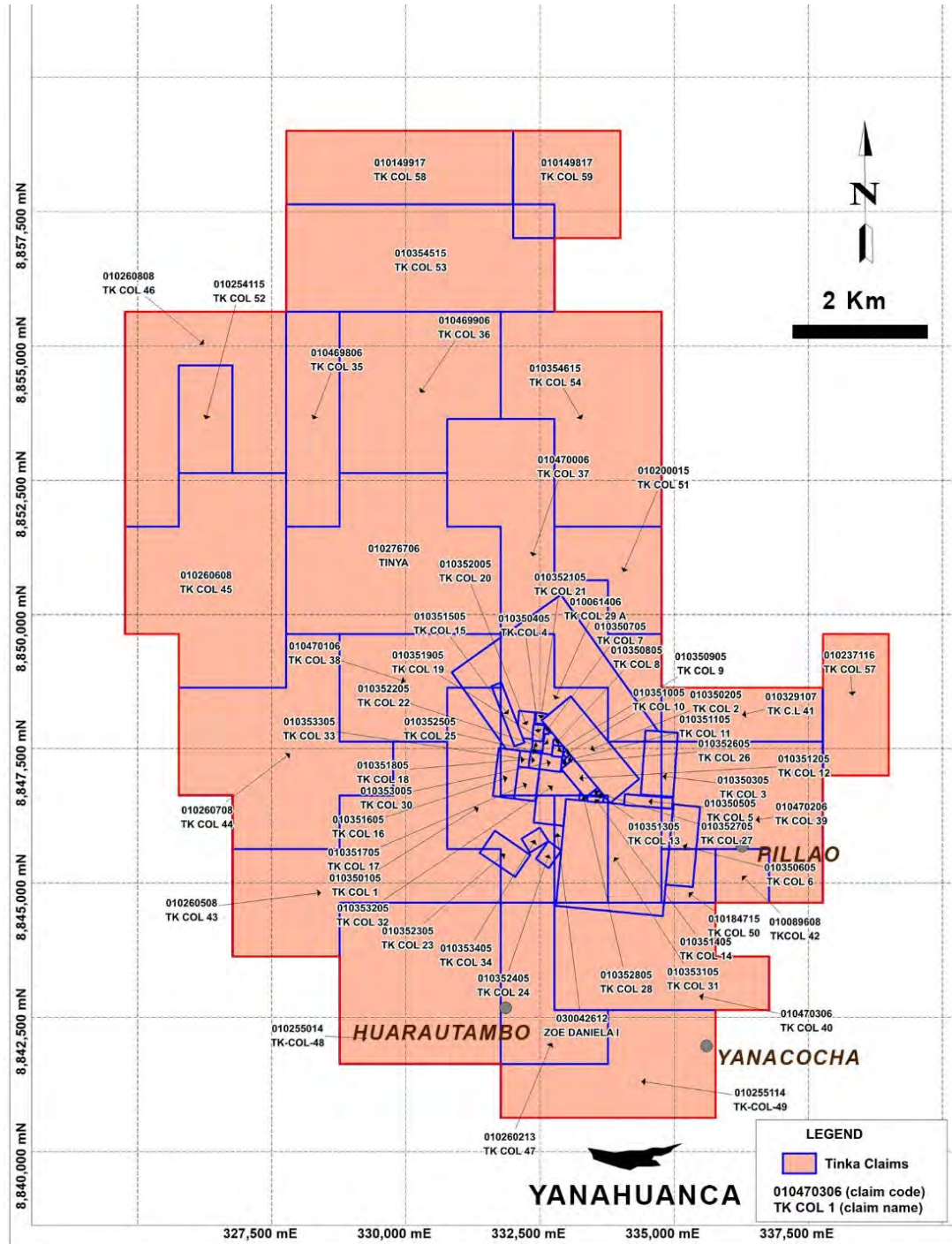
Code	Mining Right	Granted Area (ha)	Effective Area (ha)	Grant Date	District	Province	Department	Registry Card (Huancayo)	2021 Penalty Amount (US\$)	Royalty
010352105	TK COL 21	3.3943	3.3943	29.03.06	SPP	DAC	Pasco	11096126	75.43	Yes
010352205	TK COL 22	3.6568	3.6568	10.04.06	SPP	DAC	Pasco	11096115	81.26	Yes
010352305	TK COL 23	39.9432	39.9432	13.03.06	Yan	DAC	Pasco	11096125	887.62	Yes
010352405	TK COL 24	11.9829	11.9829	23.02.06	SPP and Yan	DAC	Pasco	11096124	266.29	Yes
010352505	TK COL 25	0.7507	0.7507	01.03.06	SPP	DAC	Pasco	11096113	16.68	Yes
010352605	TK COL 26	1.2949	1.2949	10.05.06	SPP	DAC	Pasco	11096123	28.78	Yes
010352705	TK COL 27	1.4376	1.4376	06.03.06	SPP	DAC	Pasco	11096121	31.95	Yes
010352805	TK COL 28	1.4662	1.4662	29.03.06	SPP	DAC	Pasco	11096119	32.58	Yes
010061406	TK COL 29A	548.0939	548.0939	06.05.06	SPP	DAC	Pasco	11096118	12,179.87	Yes
010353005	TK COL 30	11.5095	11.5095	10.03.06	SPP	DAC	Pasco	11096111	255.77	Yes
010353105	TK COL 31	399.0803	399.0803	03.03.06	SPP and Yan	DAC	Pasco	11096109	8,868.45	Yes
010353205	TK COL 32	61.7518	61.7518	23.02.06	SPP	DAC	Pasco	11096116	1,372.26	Yes
010353305	TK COL 33	5.9914	5.9914	01.03.06	SPP	DAC	Pasco	11096108	133.14	Yes
010353405	TK COL 34	11.9829	11.9829	15.03.06	SPP and Yan	DAC	Pasco	11096114	266.29	Yes
010469806	TK COL 35	400	400	07.03.07	SMC and SPP	Lauricocha and DAC	Huanuco and Pasco	11118739	8,888.89	Yes
010469906	TK COL 36	800	800	05.03.07	SMC	Lauricocha	Huanuco	11118744	17,777.78	Yes
010470006	TK COL 37	1,000	770.9710	19.04.07	SMC and SPP	Lauricocha and DAC	Huanuco and Pasco	11118738	17,132.69	Yes
010470106	TK COL 38	500	446.5340	30.03.07	SPP	DAC	Pasco	11118749	9,922.98	Yes

Code	Mining Right	Granted Area (ha)	Effective Area (ha)	Grant Date	District	Province	Department	Registry Card (Huancayo)	2021 Penalty Amount (US\$)	Royalty
010470206	TK COL 39	700	617.3130	28.05.07	SPP, Tap and Yan	DAC	Pasco	11118754	13,718.07	Yes
010470306	TK COL 40	700	670.1260	14.03.07	Yan and SPP	DAC	Pasco	11118747	14,891.69	Yes
010329107	TK COL 41	300	294.7500	12.12.07	SPP, Tap and Yan	DAC	Pasco	11118736	6,550	Yes
010089608	TK COL 42	1000	1000	30.09.08	SPP	DAC	Pasco	11155443	2,222.22	Yes
010260508	TK COL 43	1,000	1,000	30.09.08	SPP and Yan	DAC	Pasco	11155446	22,048.02	Yes
010260708	TK COL 44	1,000	1,000	23.10.08	SPP and Yan	DAC	Pasco	11155442	22,222.22	Yes
010260608	TK COL 45	1,000	1,000	30.09.08	SMC and SPP	Lauricocha and DAC	Huánuco and Pasco	11155445	22,222.22	Yes
010260808	TK COL 46	800	800	30.09.08	SMC	Lauricocha	Huánuco	11155447	17,777.78	Yes
010276706	Tinya	1,000	1,000	14.09.06	SMC and SPP	Lauricocha and DAC	Huánuco and Pasco	11120829	22,222.22	—
010260213	TK COL 47	400	400	12.02.14	Yan	DAC	Pasco	11197133	—	—
010255014	TK COL 48	900	900	25.04.17	Yan	DAC	Pasco	11244332	—	—
010255114	TK COL 49	600	600	26.06.15	Yan	DAC	Pasco	11214956	—	—
030042612	Zoe Daniela I	200	12.6595	31.03.14	SPP and Yan	DAC	Pasco	11196701	281.32	—
010200015	TK COL 51	300	300	23.07.15	SPP	DAC	Pasco	11217508	—	—
010254115	TK COL 52	200	200	30.09.15	SMC	Lauricocha	Huanuco	11219714	—	—
010354515	TK COL 53	1,000	1,000	17.10.16	SMC	Lauricocha	Huanuco	11235788	—	—
010354615	TK COL 54	1,000	1,000.0000	17.10.16	SMC and SPP	Lauricocha and DAC	Huanuco and Pasco	11235790	—	—

Code	Mining Right	Granted Area (ha)	Effective Area (ha)	Grant Date	District	Province	Department	Registry Card (Huancayo)	2021 Penalty Amount (US\$)	Royalty
010149917	TK COL 58	1,000	577.4110	08.09.17	SMC	Lauricocha	a Huanuco	11253995	—	—
010149817	TK COL 59	400	350.9510	17.11.17	SMC	Lauricocha	Huanuco	11255954	—	—
010184715	TK COL 50	100	57.2085	16.02.18	SPP	DAC	Pasco	11259087	1,271.30	—
010237116	TK COL 57	600	322.8520	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

Figure 4-1: Mineral Tenure Location Plan



Note: Figure prepared by Tinka, 2021.

4.8 Property Agreements

Tinka 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
- Community of San Pedro de Pillao.

Tinka has signed a new agreement with the community of Huarautambo and is currently negotiating extensions with the San Juan de Yanacocha and San Pedro de Pillao communities.

4.8.1 Community of San Juan de Yanacocha

A usufruct agreement with the community of San Juan de Yanacocha was registered as a Public Deed on December 20, 2016, and had a four-year term from February 10, 2017, the date at which Tinka received an Authorization to Initiate Mining Activities (Resolution N° 0170-2017-MEM/DGM). The agreement covered 316.7 ha. Tinka is currently negotiating an extension of this agreement. The community has allowed Tinka to continue its activities during these negotiations.

4.8.2 Community of Huarautambo

Tinka signed a new usufruct agreement with community of Huarautambo on August 10, 2021. The agreement covers 150 ha, of which 101.9 ha have a term of three years from signing of a public deed, and 49.1 ha have a term of two years from the date of receipt of the Authorization to Initiate Mining Activities for a new EIAsd. Registration with the local public recordkeeper is pending.

4.8.3 Community of San Pedro de Pillao

An easement agreement with the community of San Pedro de Pillao was registered as a Public Deed on December 20, 2016 and had a four-year term, that ran from February 10, 2017 (the date

of receipt of the Authorization to Initiate Mining Activities). The agreement covered 471.08 ha. Tinka is currently negotiating an extension of this agreement.

4.9 Permitting Considerations

Permitting considerations are discussed in Section 20.

4.10 Environmental Considerations

Environmental considerations are discussed in Section 20.

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

The Ministry of Mines and Energy (MINEM) have one liability, an adit, listed in its Environmental Mining Liabilities (PAM in the Spanish acronym) registry for the Ayawilca Project. This site is located within TK-COL1 and TK-COL24 concessions.

As required by local legislation, Tinka prepared a list of historical mining activity areas in 2018, and provided that list 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-COL1, TK-COL16, TK-COL17, TK-COL18, TK-COL30, TK-COL2, TK-COL29A, TK-COL19, TK-COL25, TK-COL33, TK-COL34, ZOE DANIELA 1, TK-COL6, TK-COL50, and TK-COL24 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 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.

Tinka committed in 2013 to remediation of three of the historical waste rock dumps once Tinka has completed its exploration activities.

4.11 Social License Considerations

Social licence considerations are discussed in Section 20.

4.12 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 in good standing;
- 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 for US\$1 million;
- Tinka has agreements in place to allow for exploration activities with one community who holds surface rights in the Ayawilca Project area and is negotiating extensions with the other two communities;
- Water used in Tinka's exploration programs was 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;
- 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-COL1 and TK-COL24 concessions. Tinka has identified numerous historical mining-related sites within the TK-COL1, TK-COL16, TK-COL17, TK-COL18, TK-COL30, TK-COL2, TK-COL29A, TK-COL19, TK-COL25, TK-COL33, TK-COL34, ZOE DANIELA 1, TK-COL6, TK-COL50, and TK-COL24 concessions.

The legal opinion provided indicates to the QP that to the extent known, there are no other significant factors and risks that may affect access, title or right or ability to perform work on 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 Panamerican Highway to Huaral, then by paved road to Oyón and then by well maintained all-weather graded road to Yanahuanca (refer to locations shown in Figure 2-1). Paving is underway from Oyón to Yanahuanca and the town of Ambo.

Travel by road from Lima to Yanahuanca takes approximately seven hours. An alternative road is via the Central Highway travelling 300 km east of Lima by highway to Cerro de Pasco, then a further 65 km north–northwest by paved road to Yanahuanca. A second alternative to the Project is the road from Oyón to Yanahuanca via the Raura mine, which is approximately 20 km further.

The Project area is accessed from Yanahuanca by gravel road, a further 15 km, through the small communities of San Pedro de Pillao and/or San Juan de Yanacocha. A section of the road through San Pedro de Pillao is paved.

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 sometimes falls in the higher elevations. Winter typically occurs from May to September and is generally dry, with clear daytime skies and cool nights.

Exploration can be performed year-round. Any future mining activities would also be conducted 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 small 30-person exploration camp located within the Ayawilca Project area. Two powerlines cross the Project area.

There is a steady source of water for exploration activities from streams, springs, and lakes. Small water courses dry up during the winter months.

Additional discussion on infrastructure considerations is included in Section 18.

5.4 Physiography

The Project is situated in the Andes Mountains of west–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.

Vegetation is sparse above 3,800 m elevation. At higher elevations, there are grasses and various moss and lichens. Lower elevations are characterized by small or thorny shrubs and minor cacti. Eucalyptus trees are farmed in the valley and lower slopes below 3,800 m elevation.

Subsistence agriculture is spread throughout the countryside, and includes potato, corn, and various other ground crops, including alfalfa.

5.5 Seismicity

According to the E.030 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; the peak ground acceleration at the bedrock surface corresponding to a 10% probability of occurrence in 50 years is recommended as 0.35g. In future stages, a site-specific seismic hazard study must be performed, and will provide spectra and accelerations corresponding to the conditions affecting the Ayawilca site.

5.6 Comments on Section 5

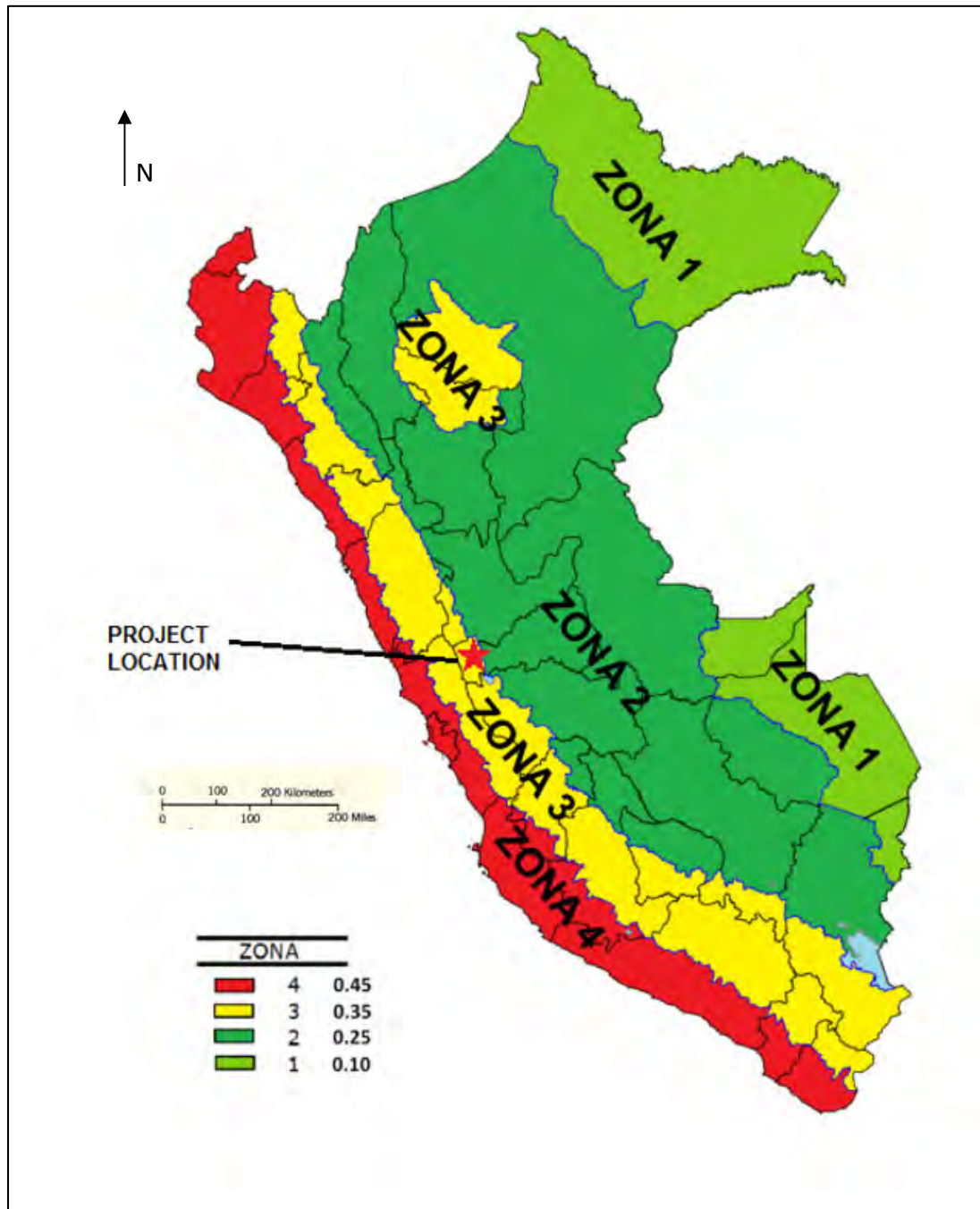
The existing local infrastructure, availability of staff, and methods whereby goods could be transported to the Project to support exploration activities are well understood by Tinka, and can support the declaration of Mineral Resources and support evaluation at the 2021 PEA stage.

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.

Figure 5-1: Peruvian Seismic Zones



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.

6 HISTORY

6.1 Exploration History

The Colquipucro Silver Zone 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 1920–1950s-era activities.

Mining at the Colquipucro Silver Zone from 1950–1954 was performed by Compañía Minera Colquipucro S.A., during which time tunnels were developed into the hillside to explore for silver. The site was optioned to Cerro de Pasco Corporation and to Compañía Minera Buenaventura (Buenaventura) in 1954 and 1960, respectively, and both companies undertook intermittent exploration activities in the area.

Between 1970 and 2005, sporadic exploration activities continued. Buenaventura drilled four holes in the Colquipucro Silver Zone area, mapped and rock chip sampled outcropping gossans, and undertook trenching work. In 2005, the claims lapsed and became available for staking. Sierra recommended the area to Tinka, and Tinka staked new claims over the expired claim areas in 2005.

Tinka’s work program, discussed in more detail in Section 9, 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 testwork, Mineral Resource estimation, preliminary mining studies, and environmental studies. Tinka discovered significant zinc mineralization in 2012.

Tinka prepared a PEA in 2019 (the 2019 PEA), which evaluated underground mining methods. This Report is an update to the 2019 PEA.

6.2 Production

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

- 1924: 1,397 kg Ag;

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

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

7 GEOLOGICAL SETTING AND MINERALISATION

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 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.

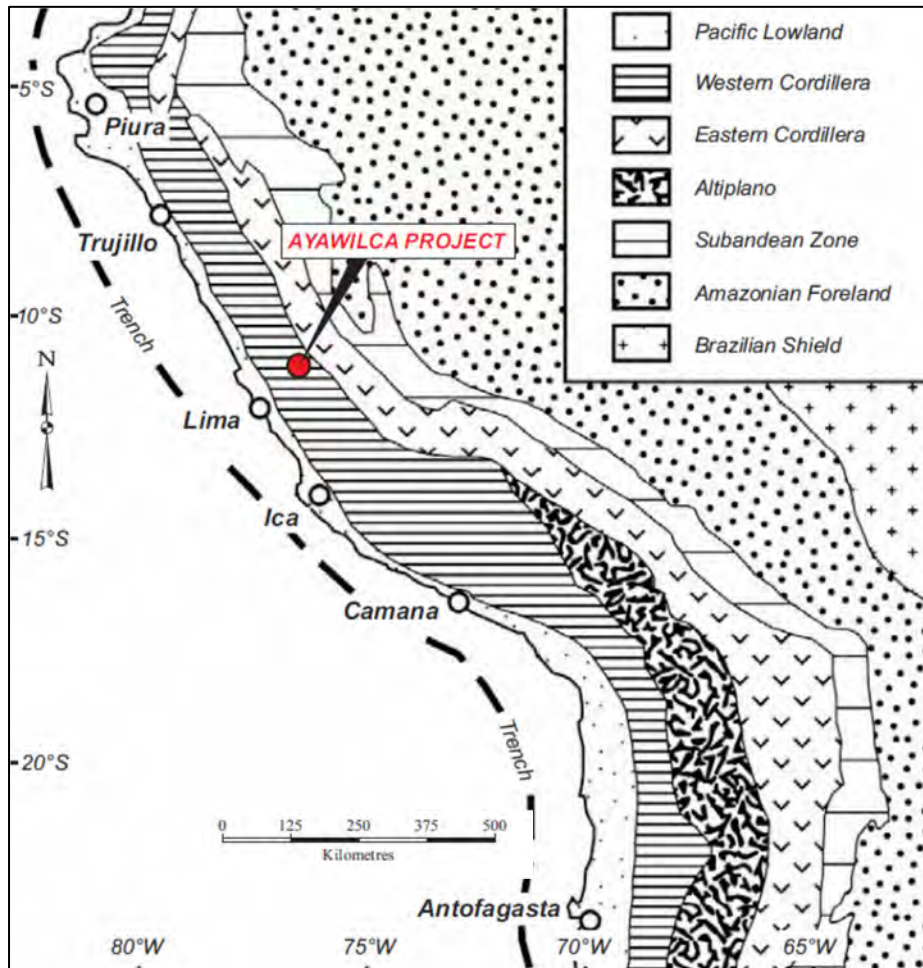
The High Andes can be divided into three sections, from west to east:

- The Western Cordillera, which is composed of Mesozoic-Tertiary age rocks, dominated by the Coastal Batholith which consists of multiple intrusions with ages ranging from Lower Jurassic to Upper Eocene. The Western Cordillera is up to 65 km across by 1,600 km long, running sub-parallel to the Pacific coast, extending into Ecuador and Chile;
- The Altiplano is a high internally drained plain situated at a mean elevation of approximately 4,000 masl, 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 southern Peru;
- The Eastern Cordillera forms a 4,000 m high and 150 km wide plateau. During the Cenozoic era the linear belt was uplifted forming the Eastern Cordillera.

Stratigraphically, the High Andes zone 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.

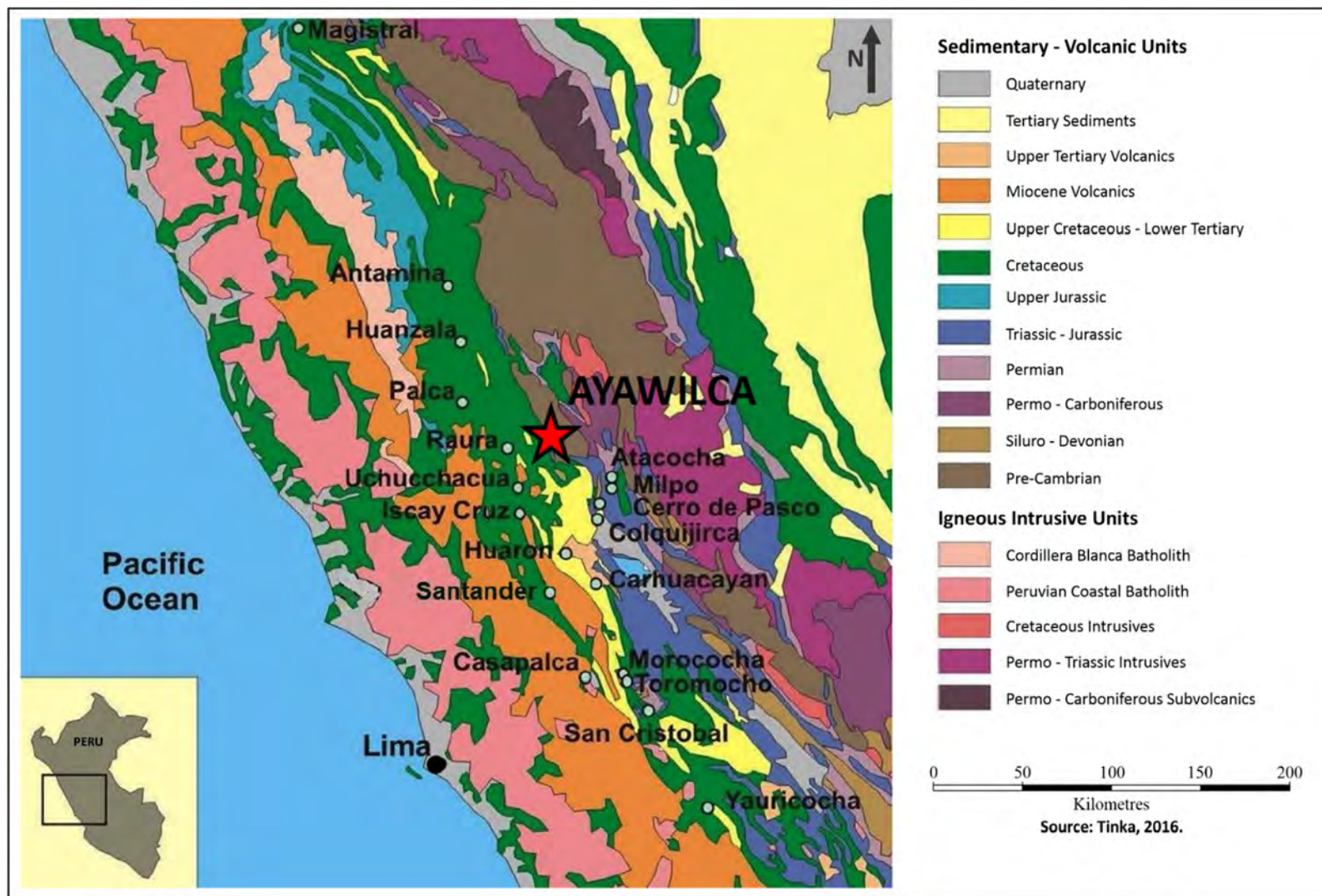
The Marañón Fold and Thrust Belt (MFTB) was formed during the Eocene epoch in response to east-northeast directed tectonic accretion and subduction. Tight upright folds formed above a shallow detachment horizon towards the west, while more open folds formed above a deeper detachment horizon towards the east. The latter-type folds are observed on 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, 2013).

Figure 7-1: Morphostructural Map



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

Figure 7-2: Regional Geology Map



The MFTB has been mapped within the northern half of Peru over a distance of at least 600 km northwest–southeast by at least 200 km northeast–southwest.

The mineral deposits of central Peru consist of a variety of base 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 (7 Ma to 23 Ma) intrusions. The Ayawilca tin mineralization has been dated as 23 Ma from U–Pb age dating of cassiterite (Benites et al., in prep). Deposit types include polymetallic carbonate replacement deposits (CRD), polymetallic vein, zinc-copper skarn, copper–zinc skarn, and porphyry deposits. All the large zinc deposits are hosted by Mesozoic carbonate rocks.

The largest zinc-dominant deposit in the region is Cerro de Pasco. The Colquijirca and San Gregorio zinc deposits, located approximately 10 km south of Cerro de Pasco, are also large zinc- and copper-rich CRDs. These deposits are held by third parties.

7.2 Local Geology

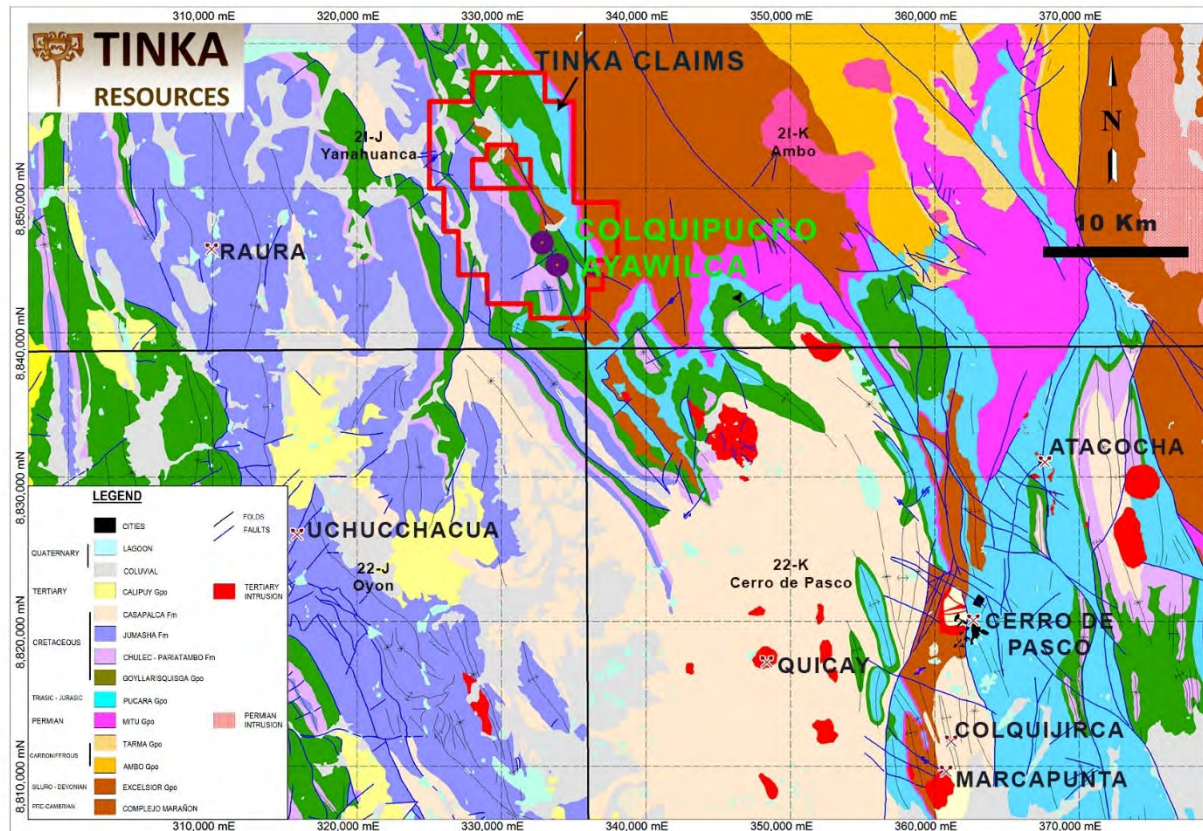
The local geology map demonstrates that the Project is underlain by sedimentary and metasedimentary stratigraphy ranging from Paleozoic to Tertiary age (Figure 7-3). The entire sequence has been folded and thrust along north to north-northwest trending Andean faults, with subsequent trans-tensional faults orientated northeast or east-west.

The oldest documented rocks in the area belong to the Marañón Complex and consist of schist, gneiss, and meta-intrusive rocks. Phyllite outcrops on the Property 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. Some occurrences of volcanic rocks are identified in the upper parts of the Mitu Group. The Mitu Group may be over 100 m thick in places, however, thicknesses vary, and it is observed as a sequence of conglomerate and sandstone beds in the northern part of the Project area.

Upper Triassic to lower Jurassic Pucará Group limestone is the predominant host for both zinc and tin mineralization in the Project area, and is an important host of zinc elsewhere in the regional belt.

Figure 7-3: Local Geology Map



Note: Figure prepared by Tinka, 2019.

The Pucará Group limestone is divided regionally into three main units: the Chambará Formation consisting of dolostone and subordinate limestone, the Aramachay Formation of bituminous shale, and the 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 (commonly abbreviated to Goyllar sandstone or Goyllar Group) lies disconformably above Pucará Group rocks. The Goyllar Group consists of thick deltaic quartzose sandstones 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 this area, however, the description of the Chimu Formation (white quartz sandstone, dark shale and minor coal beds) best fits the lithologies found in the Project area. In general, the Goyllar Group sandstones are gently dipping to the southeast at $<10^\circ$. Close to the northwest-trending regional faults, the dips of the sandstones typically increase and can reach sub-vertical.

Regional mapping emphasizes fold-and-thrust belt systems as the prominent structural feature in the region (Cobbing and Sanchez, 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, 1971).

7.3 Deposit Geology

The Project geology as mapped and interpreted by Tinka is presented in Figure 7-4 and Figure 7-5. In 2017, Tinka began a new geological interpretation based on the information from drilling from the South Ayawilca area, further complemented with information gathered during drill programs from 2018–2021 at both South and West Ayawilca deposit areas.

Mineral Resources were estimated at the Zinc and Tin Zones, and the Colquipucro silver oxide deposit (see additional discussion in Section 14). Prospects include Chaucha, Valley, Yanapizgo, Pucarumi, and Tambillo.

7.3.1 Sedimentary Rocks

The oldest rocks mapped on the Property are phyllite metamorphic rocks which belong to the Devonian Excelsior Group. These outcrop in the north–central and eastern portions of the Project area, and consist of light coloured quartz–sericite–chlorite phyllite and minor graphitic schist. Foliations strike generally northwest–southeast with gentle to moderate dips to the southwest and northeast. The large phyllite outcrop is interpreted to be the core of an anticline (basement high) bounded by two sub-parallel northwest-trending Andean faults approximately 2 km apart, and crosscut by several northeast-trending trans-tensional faults.

Figure 7-4: Project Geology Plan

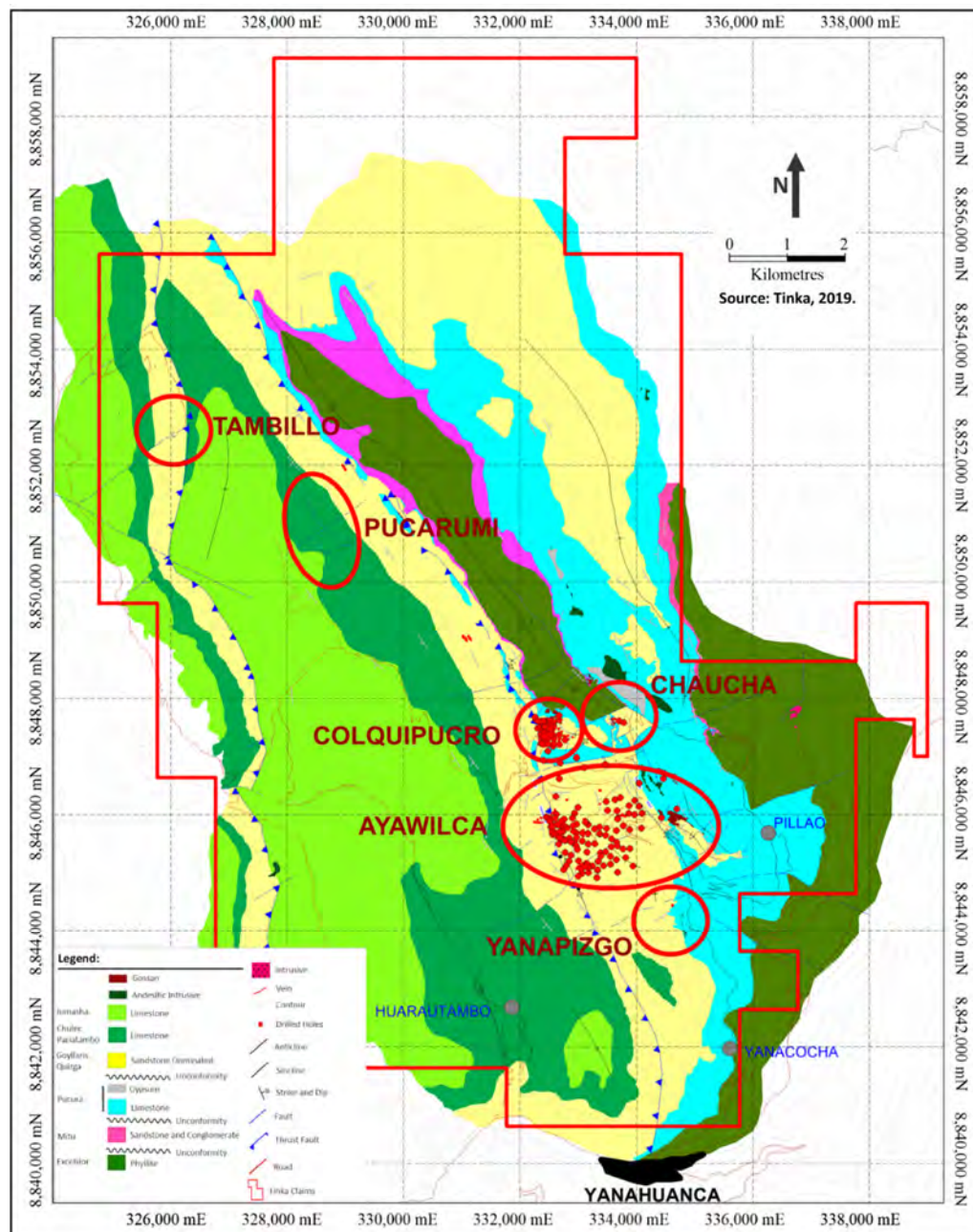
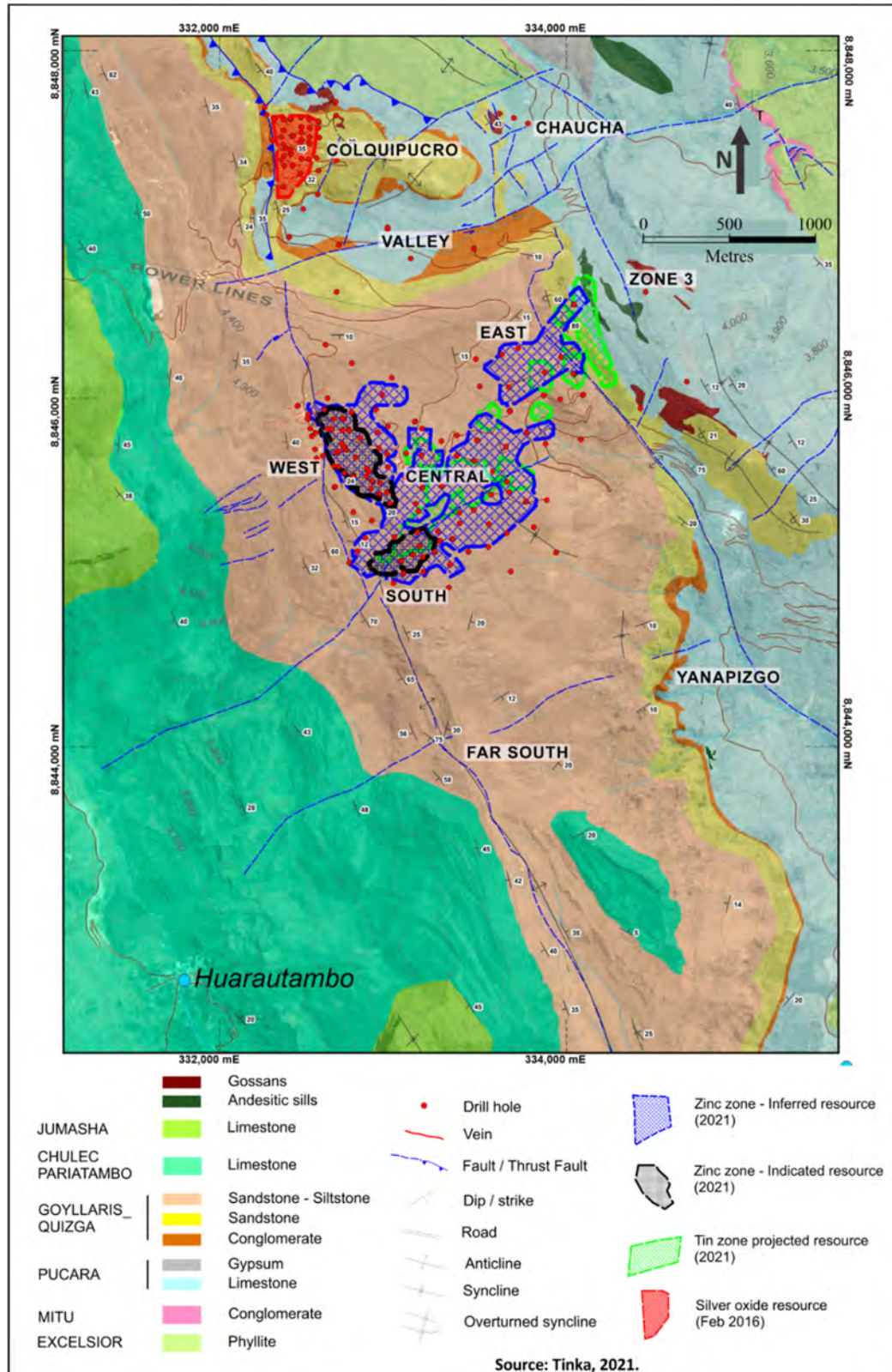


Figure 7-5: Detailed Project Geology



The anticline plunges gently to the south, so that the phyllite is observed near the base of drill holes 350–500 m below surface approximately 2 km south of the outcropping phyllite near the Chaucha area.

In drill holes at the Ayawilca deposit, the top of the Excelsior Group occurs as a tectonic breccia with sub-angular to sub-rounded clasts of quartz and phyllite derived from the Excelsior Group rocks. The Excelsior Group cannot currently be differentiated by the formal formation names. This surface is interpreted as a major low angle shear zone which appears to ramp upwards into the overlying Pucará and Goyllar Group rocks at South and West Ayawilca deposit areas.

Triassic–Jurassic age Pucará Group carbonate rocks overlie the Excelsior Formation, and are often brecciated, with evidence of karstification and dissolution. The carbonate sequence in drill holes is 200–250 m thick, with a tendency to thicken to the east. The younger limestone beds contain fossil debris (bivalves and crinoids are the most common classes), becoming more massive and less brecciated towards the base. Thin shale horizons and calcareous sandstone also occur near the base. Greywacke towards the top coincides with a general thickening of the carbonate sequence to the east. White quartz arenite beds are found locally within this carbonate sequence. The base of the Pucará carbonate rocks is truncated by a low angle shear zone at the Zinc and Tin Zones, thus making the true thickness of the Pucará Group difficult to determine in this area.

Cretaceous age Goyllar Group rocks are well-bedded sandstone units which overly the carbonate rocks of the Pucará Group. Goyllar sandstone occurs as a cap above the Ayawilca zones, with an average thickness of 150–200 m. The Goyllar Group is subdivided by Tinka geologists into three distinctive units based on facies types as follows, Upper Goyllar, Middle Goyllar, and Lower Goyllar. Lower Goyllar is dominated by interbedded sedimentary breccia, pebble conglomerate, carbonaceous shale, and local thin coal seams, grit, and medium grained sandstone. On the eastern side of the Colquipucro deposit, the Lower Goyllar is composed almost exclusively of quartz pebble conglomerate, while on the western side, coal beds and red shale occurring with the conglomerate suggest facies changes during deposition. The Lower Goyllar member is between 10–80 m thick, with significant local variations.

The Middle Goyllar unit is a sequence of cross-bedded quartz arenite. These beds are typically massive and host the main Colquipucro deposit silver mineralization. Arenite in the Middle Goyllar is well sorted with rounded and interlocking grains suggesting a deltaic environment. Minor amounts of clay are observed locally. The Middle Goyllar is similar to the Chimú Formation mapped elsewhere in central Peru and is typically between 50 m and 100 m thick over the Property. Quartz arenite and sedimentary breccia like those in the Lower and Middle Goyllar sequences are found underlying the Pucará limestone in a small area in the South Ayawilca zone. Tinka geologists interpret this occurrence as a repetition of part of the folded

Goyllar sandstones caused by a series of ramping low-angle thrusts near the base of the Pucará Group.

The Upper Goyllar unit is dominated by impure sandstone, siltstone, and mudstone. These rocks are undeformed and unaltered over much of the Ayawilca deposit area, however they, and the older rocks below, are folded into a recumbent anticline in the South Ayawilca deposit area. Mapping indicates that the Upper Goyllar unit can be up to 250 m thick but is typically 50–150 m thick in drill core within the resource area.

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 100–200 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.

7.3.2 Igneous Rocks

Igneous rocks found within the Project boundaries include andesitic dykes and sills that have intruded into the Pucará carbonate sequence. 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 the Zinc Zone at an elevation of approximately 3,300 masl. The Los Pinos porphyry has a granodiorite composition, and in outcrop covers an area of 300 x 200 m. The porphyry exhibits argillic alteration with pyrite veinlets. No intrusive rocks were intersected in drill core.

7.3.3 Structure

Two parallel northwest-trending faults cut the Project area. The westernmost of these, the Colquipucro Fault, is a steeply-dipping structure that has ramped Pucará limestone over Goyllar sandstone and appears to limit high-grade zinc mineralization at West and South Ayawilca. The Chaucha Fault is a sub-parallel, east dipping fault approximately two kilometres to the east of the Colquipucro Fault, which defines the eastern limit of the basement high. East of the Chaucha Fault (including the Zone 3 area), the sequence is folded into an overturned syncline.

Northeast-trending faults crosscut the northwest-oriented fault systems, and generally align with the trend of the Tin Zone. Northeast-trending faults crop out especially at South Ayawilca and are interpreted from satellite and drone imagery. Low-angle thrust faults are observed in drill core, which repeat and slice the lower portion of the Pucará Group especially at South and West Ayawilca. The low-angle faults dip at shallow angle to the east. Both the

northeast faults, and the low-angle faults, are interpreted to have been important feeders for the mineralization.

The sedimentary sequence is folded on an asymmetrical anticline near the westernmost limit of the basement high block. 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 (or possibly steep east dips) while the eastern limb has shallow dips to the southeast (5°–7°). At South Ayawilca, the sedimentary sequence is folded into a recumbent anticline, with strongly brecciated and mineralized Pucará Group limestone at its core.

7.3.4 Oxidation

Oxidation by acid waters generated from the breakdown of sulphides has caused deep weathering of the Colquipucro deposit to an approximate depth of 150 m. Immediately north of the Colquipucro deposit are outcrops of the Clinker zone, which is a brown–black ferruginous and manganiferous gossan beneath the sandstone that would have originally been sulphide in the limestone.

At the Zinc Zone, oxidation of sulphides is negligible and appears to be restricted to just a few metres near the surface.

7.4 Mineralization

The Project hosts several styles of mineralization within numerous deposits, zones, and target areas. Mineral Resources have been estimated at the Ayawilca deposit within the Zinc and Tin Zones, and the Colquipucro deposit and are discussed in detail in Section 14, Mineral Resources, of this Technical Report. Other target areas on the Property that warrant additional exploration work, including drilling, are also described below and include Chaucha, Zone 3, Valley, Far South, Yanapizgo, Pucarumi, and Tambillo.

7.4.1 Ayawilca Zinc–Lead–Silver Mineralization

Zinc mineralization within the Ayawilca deposit is predominantly hosted within a sequence of limestone breccia, limestone, dolomite, calcareous siltstone, arenite, and greywacke, of the Pucará Group. The Zinc Zone is made up of multiple, gently-dipping, sulphide lenses or “mantos”, generally with vertical thicknesses of between 10–30 m (locally thicker) within four areas (West, South, Central, and East). At the West and South areas the mantos are stacked on top of each other to form almost continuous zone with vertical thicknesses up to 150 m, comprising several flat-dipping mantos each up to 70 m thick. A detailed description of the dimensions of the mantos as modelled is provided in Section 14 of this Report.

The four structural zones span 2.1 km in the northeast–southwest direction and 1.3 km in the north–south direction. Each zone has been modelled separately. The West area measures

approximately 640 m in length in the north–south direction and 300–450 m in the east–west direction, while the South area measures approximately 550 m in length in the northeast–southwest direction and 250 m in the northwest–southeast direction. Multiple mantos were intersected at Central and East areas; however, only those exhibiting sufficient continuity between drill sections were modelled as part of the Mineral Resource.

Zinc mineralization occurs as massive to semi-massive sulphide replacements of the carbonate rocks and is thought to be controlled by multiple, sub-parallel, east–west-, and northeast–southwest-trending structures, as well as low angle thrust faults. The mineralized zones are interpreted to be generally gently dipping, replacing favourable sedimentary units. Zinc occurs as various generations of sulphide impregnations (mostly marmatite, a high-iron variety of sphalerite also known as “black jack”) and sphalerite (with purple to red–brown tones) accompanied by abundant pyrite, pyrrhotite, chlorite, iron carbonate (siderite), and magnetite. Less common sulphides include galena, chalcopryite, arsenopyrite, and silver sulphosalts. Multi-element geochemistry indicates that indium is correlated with the zinc mineralization.

Narrow, high grade marmatite-sphalerite veins and mantos cut through the Goyllar sandstone, and occasionally have broken through to the surface (e.g., in the West and South areas). Veins are typically 0.2–1.0 m in width. At Pucarumi, zinc oxide mineralization is hosted by favourable bedforms in Chulec Formation limestone.

During 2018, high-grade zinc mantos of massive sphalerite were discovered within repetitions of Pucará carbonate rocks underneath a faulted wedge of phyllite at the West area. The phyllite is interpreted as a narrow wedge of Paleozoic basement thrust onto limestone by a low-angle fault. In 2019, close-spaced drilling at the South area identified that the thickest and highest-grade zinc mineralization was located in limestone within the core of a recumbent anticline at the South area.

Late carbonate–sphalerite–galena–proustite veins within the South and West areas are interpreted to be steeply-dipping, exhibit epithermal textures, and are interpreted to be the last mineralization event. This style of vein mineralization has not been modelled as part of the Mineral Resource; however, these veins can have very high silver grades and offer further potential for later exploration.

At the South area, pervasive carbonate alteration of limestone accompanied by galena and silver sulphide minerals, including polybasite and freibergite, was intercepted in the southwestern-most drill holes peripheral to the Zinc Zone at the Silver area, and remains open in all directions.

Zinc mineralization is generally associated with argillic alteration within the carbonate 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 thermal aureole centred on this zone.

Strong, pervasive chlorite alteration typically occurs immediately peripheral to the zinc mineralization areas, surrounding the argillic alteration. Pyrite replacement bodies typically forms a halo to the zinc mineralization and are intersected in holes around the fringes of the West and South areas. Paragenetic studies indicate that the main pyrite precipitation occurred after the main zinc mineralization (Benites et al., in prep). Outward and upward from the zinc mineralization, manganese oxide is common in fractures and clots within the sandstone, forming a wider alteration halo.

7.4.2 Ayawilca Tin–Copper Mineralization

Tin mineralization was discovered at Ayawilca in 2014, when a review of the multi-element data from the deposit identified anomalously high tin values and the subsequent re-assay of pulps for tin. The tin mineralization pre-dates and is crosscut by the zinc mineralization described previously. The tin mineralization (Tin Zone), which occurs with minor copper as chalcopyrite, is hosted in massive to semi-massive pyrrhotite mantos typically 5–10 m in vertical thickness (up to 50 m) typically at, or near, the contact of the Pucará Group carbonate rocks and the Excelsior Formation phyllite, although tin bearing mantos also occur higher in the limestone sequence especially at the South area. Quartz–tin–copper stockwork mineralization also occurs within the phyllite in some areas beneath the pyrrhotite mantos.

Mineral liberation analysis (MLA) and QEMSCAN mineralogical studies of eleven drill core samples indicate that tin occurs predominantly as cassiterite, with very minor stannite. Almost half of the cassiterite in these samples is coarse grained (<0.3 mm). Common sulphides occurring with tin are pyrrhotite with lesser chalcopyrite, pyrite, arsenopyrite, stannite and rare galena. Cassiterite veins are locally observed to cut the massive pyrrhotite lenses.

Drill hole A15-039 cut a network of tin–copper–pyrrhotite bearing millimetre to centimetre scale veinlets over a vertical thickness of approximately 40 m that may represent part of a feeder system to the pyrrhotite lenses. The thickest vein measures 10 cm and contains chalcopyrite and arsenopyrite. No conclusive deep-seated feeder fault system for the tin mineralization has been identified to date. The tin mineralization is interpreted to have been controlled by steeply-dipping structures, oriented east–northeast–west–southwest, defined by a prominent magnetic anomaly. The pyrrhotite is strongly magnetic and is believed to be the main source of a large magnetic anomaly (3.0 x 0.8 km) centred on Central Ayawilca, and possibly much of the coincident gravity anomaly (see Section 9). The underlying magnetic anomaly also continues to the northeast of the known mineralization into the area referred to as Zone 3.

7.4.3 Colquipucro Silver Mineralization

The Colquipucro deposit is hosted primarily within oxidized Goyllar sandstone with mineralization at or close to the surface. The Colquipucro deposit is the only documented sandstone-hosted, disseminated, silver deposit in Peru. Historical mining for lead and silver focused on a series of en-echelon east–west-trending, steeply north-dipping faults and veins which hosted high silver grades. The mined structures ranged from 1–3 m in thickness. In 2006, mapping and sampling by Tinka of an old exploration adit that cuts across several of the mineralized structures that remain open demonstrated that there was lower grade silver mineralization between the veins.

The Colquipucro deposit was modelled to include 10 north-dipping, high-grade zones, a gently-dipping basal zone, and a low-grade halo that encompasses all of the high-grade zones. Overall, the deposit measures 550 m in the north–south direction by 380 m in the east–west direction by 75 m thick.

The silver mineralization is hosted in quartz sandstones and occurs with abundant iron oxides (goethite, jarosite) and manganese oxides in fractures and disseminations within the pore spaces of the sandstones. Sulphide minerals are rare, though galena is observed occasionally. The fracture-controlled mineralization is epigenetic and crosscuts the primary bedding. Mineralized fractures are highly limonitic, locally manganiferous, and can also contain friable gouge and sand. Fracture spacing ranges from a few to many tens of centimetres apart.

7.4.4 Prospects

7.4.4.1 Chaucha

The Chaucha area is located 1 km 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 $\pm$ magnetite $\pm$ pyrite, hosted in brecciated limestone. Hematite is early and is replaced by magnetite. These iron oxides are later cut by massive pyrite, with no other significant sulphides present. The Chaucha zone is interpreted to be shaped as a near vertical breccia pipe of unknown dimensions. No significant zinc mineralization was encountered in the Chaucha zone; however, the presence of significant iron oxides (hematite with magnetite) is noteworthy and is a new style of mineralization at the Property.

7.4.4.2 Valley

The Valley area is located between the Zinc Zone and the Colquipucro deposit, approximately 700 m north of the West Ayawilca resource boundary. The Valley target is defined by a broad magnetic anomaly of approximately 800 x 150 m, orientated northeast–southwest. Five holes

were 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. Pucará limestone is 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.

7.4.4.3 Far South

The Far South area is located 1 km 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 x 200 m in size, 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 at Far South to test for mineralization at depth.

7.4.4.4 Yanapizgo

The Yanapizgo area is located 2 km 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 vertical veinlets are common in the Pucará limestone near the contact with Goyllar sandstone. At the contact, the veinlets are sub-horizontal, parallel to stratigraphy, while a smaller number of veinlets cut through the sandstone. Several very 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 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.

7.4.4.5 Pucarumi

The Pucarumi zone, located 8 km northwest of the Zinc Zone, was identified in late 2016 by regional prospecting and a follow-up of magnetic anomalies identified in an airborne survey carried out in 2016. Goyllar sandstone, Chúlec–Pariatambo, and Jumasha Formation

limestone crop out in this area. 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 2 m in thickness and traceable over a strike length of up to 1 km. The source of the magnetic anomaly, which occurs approximately 700 m to the northeast of the mineralized outcrops, remains unexplained.

7.4.4.6 Tambillo

The Tambillo zone, located 10 km northwest of the Zinc Zone, was identified by regional prospecting and was mapped in detail in 2016. It is located near the northwestern corner of the Project area, in an area covered with Goyllar sandstone and Chúlec–Pariatambo limestone. Mineralization is dominated by massive pyrite flooding of a medium-grained quartz arenite of the Goyllar Group. The pyrite was mined in the past 20 years, leaving 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 Deposit Zinc and Tin Zones

The regional setting, geometry, and zinc mineralogy indicates that the Zinc and Tin Zones of the Ayawilca deposit are CRDs, of which there are several other type 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 intrusive body is not observed. CRDs are considered more distal from the source than porphyry and skarn deposits, but closer to the source than intermediate- (or low-) sulphidation epithermal precious metals deposits (Figure 8-1).

The Ayawilca deposit differs from most other CRDs in central Peru in that there is an early tin–copper mineralization event associated with pyrrhotite. The QPs note that early pyrrhotite tin–copper mineralization is reported at the Cerro de Pasco deposit, although apparently it is not so well developed as at Ayawilca.

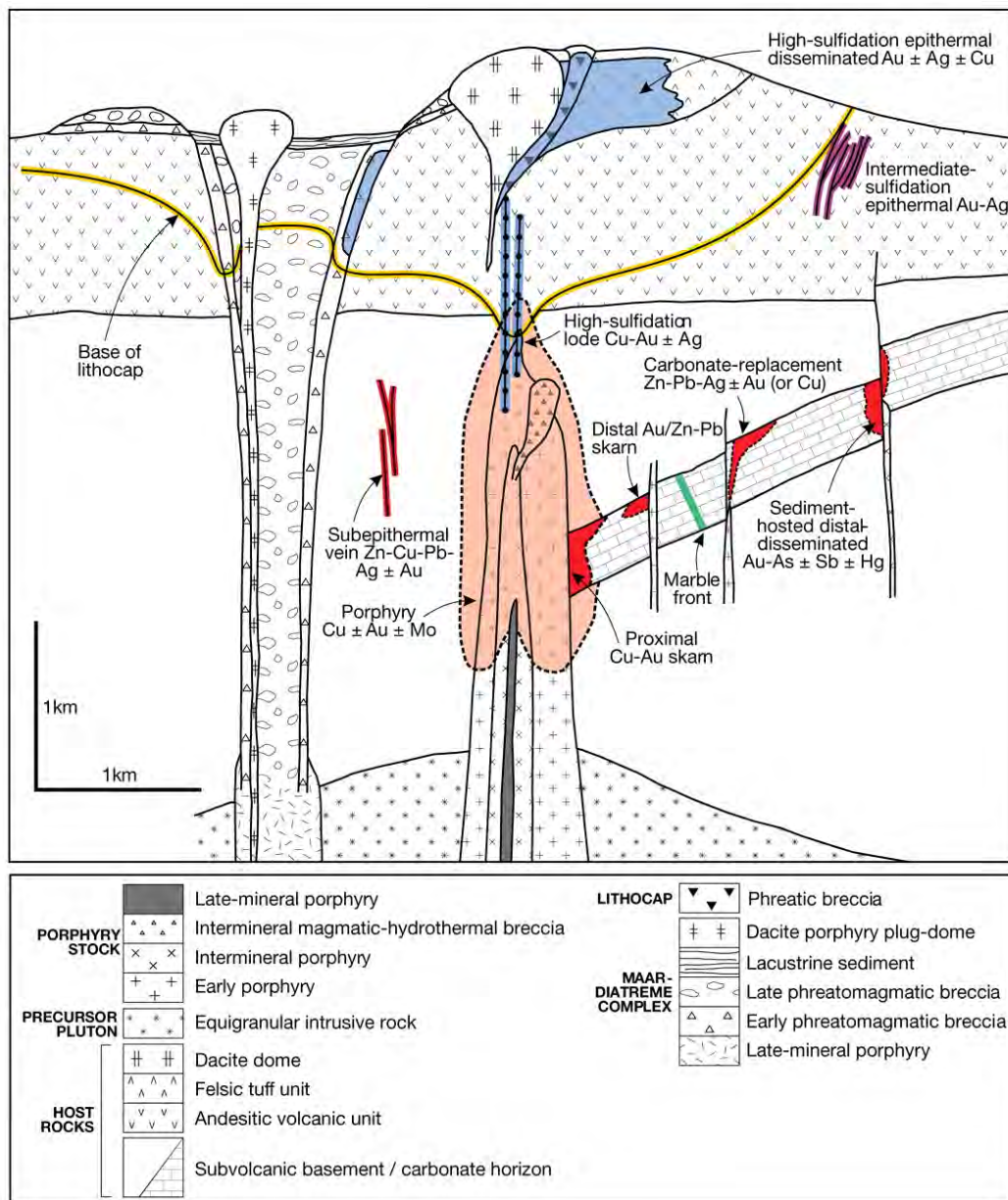
8.2 Colquipucro Silver Deposit

The Colquipucro deposit is the only known and documented sandstone hosted oxide silver deposit in Peru. Silver is hosted in fractures, faults, and veins with abundant iron oxides (goethite, jarosite) in fractures and disseminations within the pore spaces of the sandstones. The Colquipucro deposit is tentatively classified as a disseminated, intermediate sulphidation epithermal deposit which has become oxidized above a paleo water table (Figure 8-1). Limited work has been conducted on the alteration styles of the Colquipucro deposit mineralized rocks, as such the genetic mineralization model remains as a working hypothesis.

8.3 Comments on Section 8

Exploration programs that use a CRD geological model are considered to be particularly applicable to the Project area. Drilling programs at Ayawilca were designed using the CRD geological model, targeting prospective carbonate geology which typically host this style of mineralization. Intermediate-sulphidation epithermal models could be employed in the Colquipucro area, where drilling programs took into account the disseminated nature of the silver mineralization.

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



Note: Figure from Sillitoe (2010).

9 EXPLORATION

9.1 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.

9.2 Soil, Trench, and Underground Sampling

Since acquiring the Property in 2005, Tinka has collected 1,612 rock samples and 4,481 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.

The Colquipucro deposit 3,870 masl adit was sampled by Tinka in 2006, and five surface trenches totalling 1.7 km in length were excavated and sampled. At Zone 3, located east of the Ayawilca deposit, 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 5 cm. A hammer and chisel were used to extract the sample. Samples were taken by hammer and chisel only where the rock surface was irregular and not accessible to the saw.

Figure 9-1: Surface Rock Samples Results

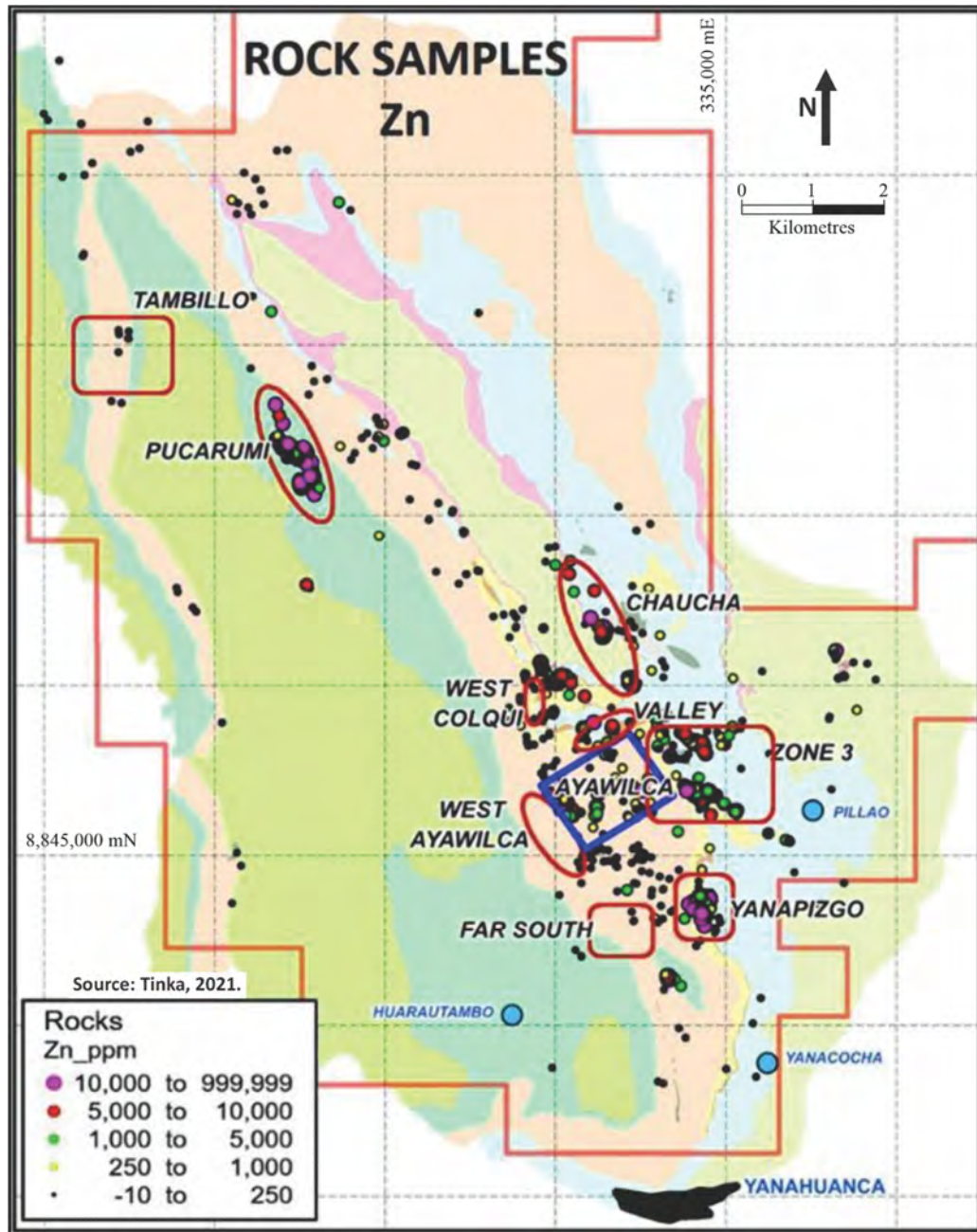
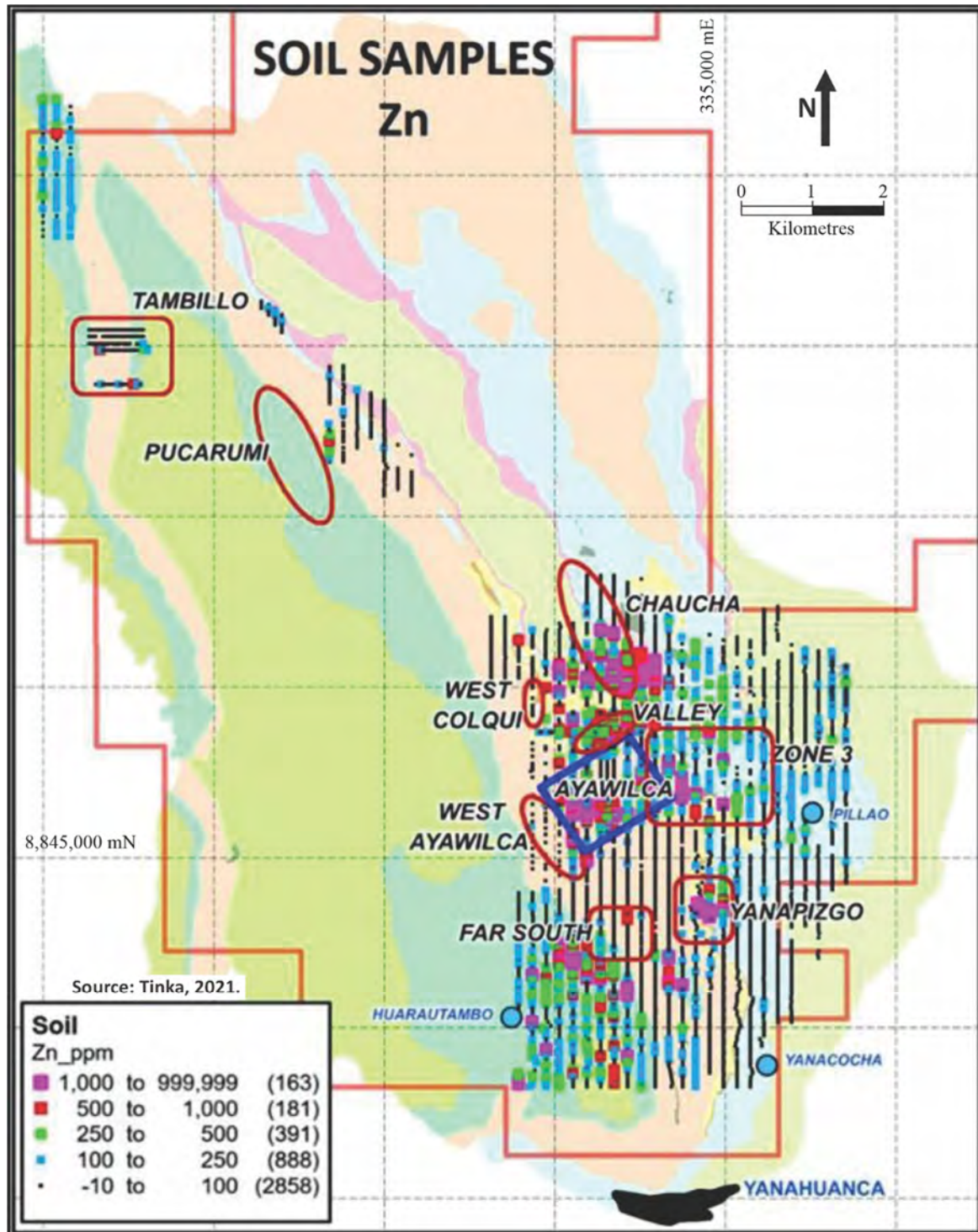


Figure 9-2: Surface Soil Sample Results



Sampling of the Colquipucro deposit 3,870 masl 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 5 m spacing; however, upon the receipt of highly anomalous silver values over significant widths, the adit was resampled at nominal 2 m 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.

9.3 Induced Polarization Surveys

In late 2006, an initial induced polarization (IP) survey was carried out by Fugro Geophysics Pty Ltd (Fugro) from Lima, Peru. Ten lines of pole–dipole surveying were completed, totalling eight kilometres. In 2010, Fugro extended the IP survey southward with eight pole–dipole traverse lines for 14.1 line-km. Data was collected using ten 25 m receiver dipoles with a single pole transmitter and processed using three-dimensional (3D) inversion modelling and identified two target areas. The southern target area coincided with the complex fault pattern extending eastward from the Ayawilca deposit surface showings. In 2012, Fugro returned to the property but 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 (Paredes, 2013). 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 25–45 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 zone (500 m north of the Huahuacocha zone), located 1 km 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 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 very high chargeability values of 35 mV/V and above. Several other smaller sized anomalies in the +20 mV/V range occur across the property.

9.4 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 chalcopryite.

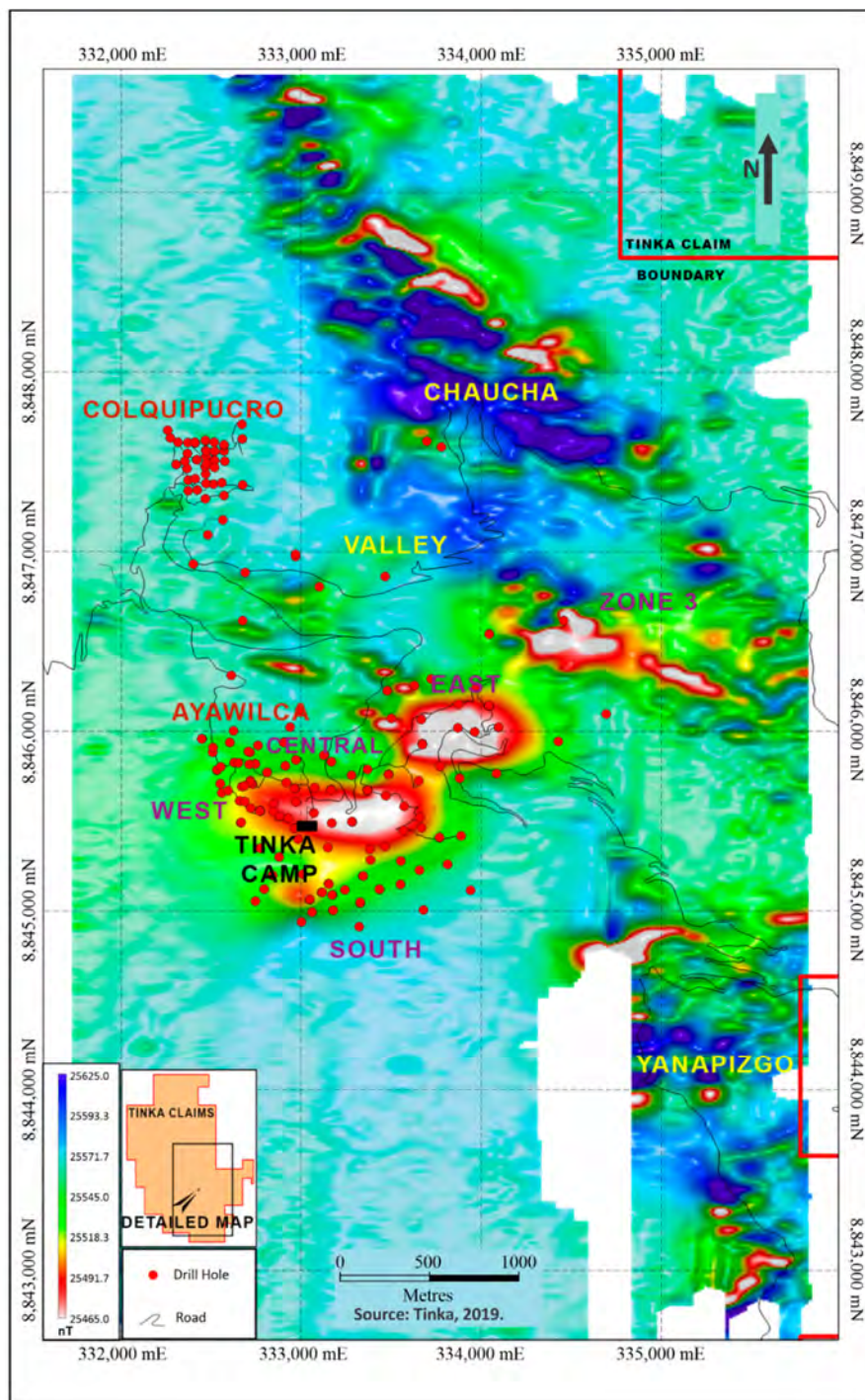
In 2014, Tinka contracted Quantec Geoscience (Peru) S.A.C. to extend the ground magnetic survey. This survey included 245 line-km within an area of 4 km east–west by 7 km north–south at a 100 m line spacing. The data were merged with the Fugro magnetic data. Several map products were generated including 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 preserves the shape of the bodies better than a Reduction to Pole manipulation of the data does in these latitudes, however the resulting anomalies are “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 have been at least partly explained from 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.

Figure 9-3: RTE Magnetis Map



9.5 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.

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.

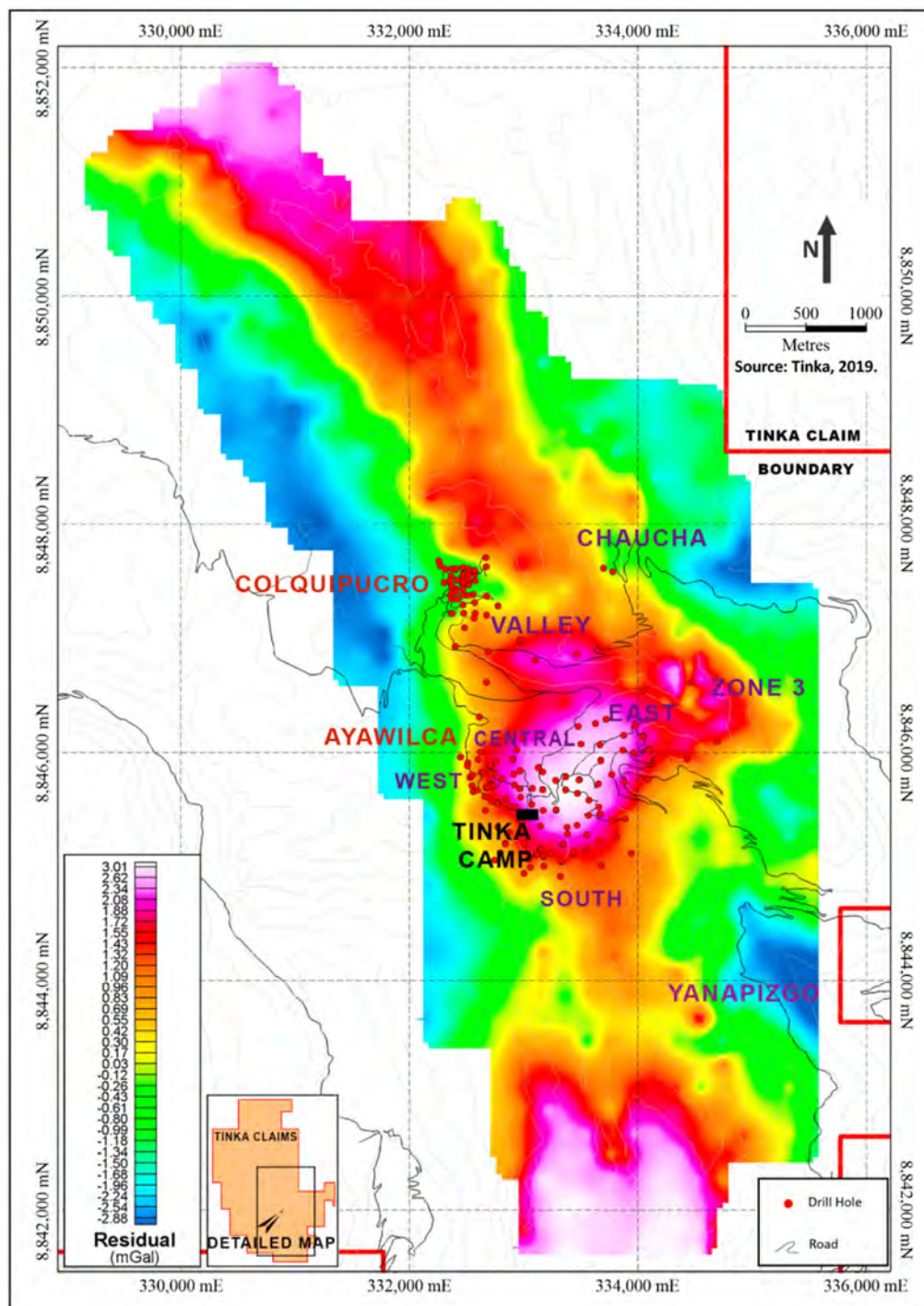
The extended gravity survey identified additional significant gravity anomalies coincident with the phyllite basement to the north, and two elongated gravity highs on the very southernmost limit of the Project area, under Goyllar sandstone (Figure 9-4). Although denser material is interpreted to lie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

9.6 Electro-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 whether the higher-grade zinc mineralization could be targeted using such methods. Six 1 km long east–west lines were completed, totalling 6 line-km. A Crone PEM 2 kW transmitter and a Crone PEM digital receiver were used, with a 500 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.

Figure 9-4: Terrain Corrected Gravity Map



9.7 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.

9.8 Topographic Surveys

Early in 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 5 m contour accuracy, and the area covered was 2 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, late in 2011, the contractor performed a topographic survey of the Colquipucro deposit over an 800 m east–west by 800 m north–south area 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 its topographic survey of the Property using images taken from drones. The area covered was 5.5 km north–south by 7 km east–west, totalling 2,560 ha. The final products were detailed topographic maps with 1 m contours and high-resolution imagery.

9.9 Exploration Potential

Prospects that retain exploration potential are discussed in Section 7.4.4.

Tinka's priorities for exploration are the following:

- Drill for additional high grade zinc replacement mineralization at the South area and Zone 3 areas, where mineralization remains open at both areas;
- Extend the Silver Zone mineralization along strike and at depth;
- Drill test other targets as highlighted and described in Section 7.4.4, prioritizing the Yanapizgo and Far South areas (subject to permitting) where geochemical and geophysical anomalies, similar to those seen at the Zinc Zone, have been delineated.

9.10 Comment on Section 9

In the QPs' opinion, 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 effective date of this Technical Report, the drill hole database includes 88,807.6 m of drilling in 258 holes. The database includes drill holes completed up to February 16, 2021.

Table 10-1 lists the holes by area and drilling program, while Figure 10-1 illustrates the collar locations of the drill holes 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–copper results from the Ayawilca deposit.

10.2 Drill Methods

Tinka contracted Consorcio S & C S.A.C. (Consorcio) for drilling from 2012 to 201. Consorcio used four different rigs:

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

All rigs used HQ size equipment, reducing to NQ as required. 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.

All drill core from the Tinka drilling programs is stored in a gated and secured facility located on the main road near the city of Huánuco, 80 km to the northeast of the Project.

10.3 Drill Programs

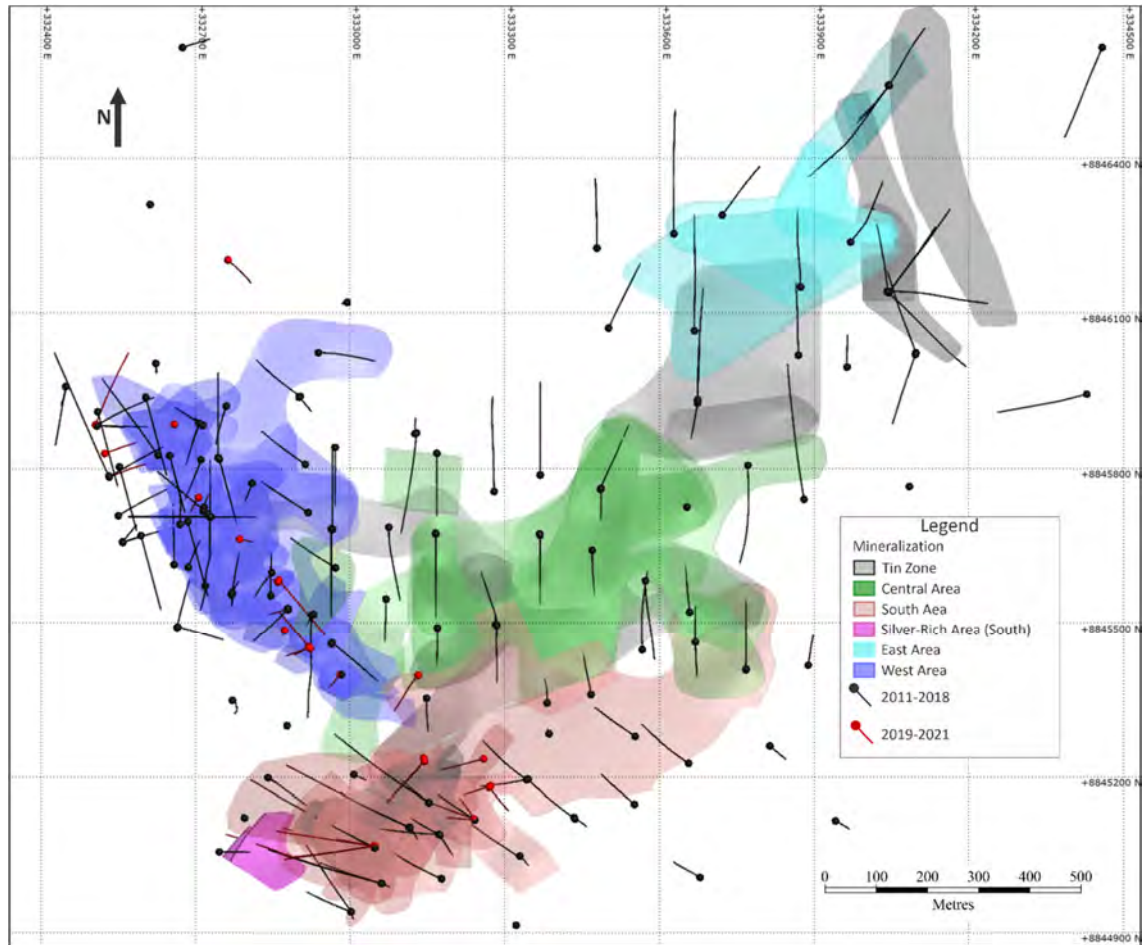
From 1996 to 1997, Buenaventura drilled four holes south and southeast of the Colquipucro deposit. These holes were drilled to explore the Pucará Formation carbonate stratigraphy beneath the oxidized Colquipucro mineralization. While none of the four holes intersected high-grade zinc mineralization,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

Table 10-1: Drill Summary Table

Drill Hole IDs	No. Holes	Length (m)	Campaign	Company	Driller
<i>Colquipucro Deposit</i>					
DDH-1 to DDH-4	4	694.2	1996	Buenaventura	Esondi
CDD1 to CDD15	15	2,670.0	2007	Tinka	Esondi
CDD16 to CDD25	10	1,603.7	2011–2012	Tinka	Iguana Drilling
CDD26 to CDD35	10	2,151.3	2013	Tinka	Consortio SC
CDD36 to CDD46	10	1,578.5	2014	Tinka	Consortio SC
Sub-total	49	8,697.7			
<i>Ayawilca Deposit</i>					
DD52 to DD71	8	1,822.1	2011	Tinka	Iguana Drilling
A12-01 to A12-10 and DD52B	11	3,709.8	2012	Tinka	Consortio SC
A13-01 to A13-17	17	6,268.4	2013	Tinka	Consortio SC
A14-18 to A14-33	16	6,529.6	2014	Tinka	Consortio SC
CDD-046	1	304.40	2014	Tinka	Consortio 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
A17-110 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	1,902.0	2021	Tinka	Explomin
Sub-total	209	80,110.0			
Total	258	88,807.6			

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

Figure 10-1: Drill Collar Location Map



Note: Figure prepared by SLR, 2021.

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

Drill Hole ID	Easting (x)	Northing (y)	Elevation (z)	Dip (°)	Azimuth (°)	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

Drill Hole ID	Easting (x)	Northing (y)	Elevation (z)	Dip (°)	Azimuth (°)	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
							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

Notes: Silver was cut to 360 g/t Ag in the high grade lenses and 120 g/t Ag in the low-grade halo. True thicknesses of the silver intersections above are estimated to be at least 90% of the downhole thicknesses.

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

Drill Hole ID	Easting (x)	Northing (y)	Elevation (z)	Dip (°)	Azimuth (°)	Total Depth (m)	From (m)	To (m)	Core Length (m)	Estimated True Thickness (m)	Grade				Domain
											(% Zn)	(ppm In)	(g/t Ag)	(% Pb)	
A12-004A	332,744	8,845,819	4,241	360	-90	285.6	264	278	14	14	9.58	172	12	0.03	West
A13-005	332,728	8,845,707	4,243	360	-90	361.5	130.3	179.5	49.2	49	10.09	51	32	0.55	West
A13-005	332,728	8,845,707	4,243	360	-90	361.5	316	343.2	27.2	27	7.49	320	22	0.05	West
A14-020	332,659	8,845,613	4,267	360	-70	362.7	179.9	184	4.2	4	24.79	205	58	1.04	West
A14-022	332,771	8,845,559	4,254	10	-70	355.1	211.2	242	30.8	30	7.7	65	10	0.02	West
A14-022	332,771	8,845,559	4,254	10	-70	355.1	283.5	318.5	35	33	6.31	121	16	0.35	West
A14-026	332,771	8,845,556	4,254	180	-85	321.4	288	303.8	15.8	15	11.27	207	18	0.07	West
A14-033	332,711	8,845,816	4,247	200	-75	356.3	270.9	279.7	8.8	8	13.49	8	11	0.13	West
A12-008	333,166	8,845,674	4,191	180	-70	344.2	195.5	232	36.5	36	6.52	63	5	0.02	Cent
A12-008	333,166	8,845,674	4,191	180	-70	344.2	266	282	16	16	7.32	206	9	0.02	Cent
A12-008	333,166	8,845,674	4,191	180	-70	344.2	318.9	322.8	3.9	3	6.93	45	4	0.01	Cent
A12-009	333,166	8,845,675	4,191	360	-90	360.8	236	244	8	7	6.34	154	8	0.02	Cent
A13-001	333,368	8,845,670	4,146	180	-70	359.95	228	235.2	7.2	7	8.54	241	6	0.01	Cent
A13-004	333,368	8,845,672	4,146	180	-60	380.1	190	198	8	7	8.36	109	6	0.02	Cent
A14-018	333,668	8,846,066	4,122	360	-60	448.3	331.2	352	20.8	21	6.08	33	13	0.23	East
A14-018	333,668	8,846,066	4,122	360	-60	448.3	375.1	408	32.9	33	6.27	14	10	0.49	East
A14-029	333,874	8,846,151	4,119	360	-70	457.5	322	329.8	7.8	8	6.15	13	7	0.06	East
A14-029	333,874	8,846,151	4,119	360	-70	457.5	400	412	12	12	7.03	10	4	0.02	East
A15-038	333,653	8,845,724	4,119	360	-90	441.1	268	280	12	12	5.41	114	14	0.02	Cent

Drill Hole ID	Easting (x)	Northing (y)	Elevation (z)	Dip (°)	Azimuth (°)	Total Depth (m)	From (m)	To (m)	Core Length (m)	Estimated True Thickness (m)	Grade				Domain
											(% Zn)	(ppm In)	(g/t Ag)	(% Pb)	
A15-052	333,670	8,845,462	4,137	360	-80	450.3	312	324.7	12.7	12	5.31	119	6	0.04	Cent
A15-053	333,670	8,845,462	4,137	180	-80	412.5	346	360.7	14.7	14	5.99	103	12	0.02	Cent
A17-056	333,047	8,845,063	4,195	300	-75	293.9	242	293.9	51.9	50	10.06	233	128	0.1	South
A17-057	333,048	8,845,063	4,195	300	-55	477	265.75	279.3	13.55	12	22.26	297	111	2.66	South
A17-061	333,061	8,844,994	4,185	290	-67	326.9	220	233.4	13.4	13	18.73	463	57	0.87	South
A17-063	333,242	8,845,117	4,223	310	-70	416.6	302.2	349.9	47.7	45	11.3	312	18	0.01	South
A17-066	333,342	8,845,195	4,208	310	-70	371.6	345	350	5	5	11.28	270	37	0.06	South
A17-069	333,114	8,845,103	4,205	300	-65	374.3	271.4	300.7	29.3	28	10.36	278	17	0.06	South
A17-089	333,002	8,844,940	4,152	325	-60	330.1	218.6	229.4	10.8	10	16.71	681	33	0.05	South
A18-114	332,509	8,845,882	4,290	90	-70	385	300	319.3	19.3	19	9.2	2	19	0.2	West
A18-118	332,533	8,845,783	4,282	60	-65	363.8	237.3	343.8	106.5	103	6.8	48	17	0.2	West
A18-129	332,707	8,845,886	4,253	200	-70	437.5	339.4	351.3	11.9	11	39.6	761	45	0.8	West
A18-130	332,929	8,845,517	4,227	220	-85	378.7	294	328	34	33	6.1	129	4	0.01	South
A18-132	332,708	8,845,886	4,253	200	-80	442.4	259.6	270.1	10.5	10	14	207	15	0.01	West
A18-137	332,810	8,845,771	4,234	200	-80	443.9	279.3	292	12.7	12	10.3	306	18	0.01	West
A18-141	332,687	8,845,608	4,264	20	-78	468	288	377	89	86	5	97	11	0.01	South
A21-187	333,144	8,845,230	4,227	222	-68	345.8	302.9	307	4.1	4	17.7	—	34	—	South
							324	364	40	36	8.8	—	12	—	
<i>including</i>							353.3	362.4	9.1	8	20.1	—	23	—	
A21-185	333,241	8,845,119	4,223	290	-68	382.4	133.3	135	1.7	2	23.4	—	97	—	South
							289.6	294.6	5	5	6.9	—	13	—	

Drill Hole ID	Easting (x)	Northing (y)	Elevation (z)	Dip (°)	Azimuth (°)	Total Depth (m)	From (m)	To (m)	Core Length (m)	Estimated True Thickness (m)	Grade				Domain
											(% Zn)	(ppm In)	(g/t Ag)	(% Pb)	
							304.3	327.9	23.6	21	9.4	—	10	—	
<i>including</i>							316.4	326	9.6	9	12.5	—	14	—	
A21-184	333,273	8,845,183	4,219	253	-78	325.2	281.8	298.4	16.6	15	5	—	12	—	South
A20-180	333,132	8,845,397	4,214	220	-75	358.9	89	90.3	1.3	1	34.6	—	190	0.9	West
A20-181	332,919	8,845,451	4,232	245	-82	317.7	225.2	231.1	5.9	5	11.4	—	39	1.9	West
A20-181A	332,919	8,845,452	4,232	245	-82	371.3	240	256	16	14	4.1	—	10	—	West
A20-182	332,860	8,845,579	4,226	0	-90	317.4	191.5	196.3	4.8	4	4.1	—	93	3	West
							301.8	305.7	3.9	4	3.8	—	33	—	
A20-183	332,982	8,845,399	4,234	220	-82	380.2	202	208	6	5	21.1	—	57	2.1	West

Notes: True thicknesses of the zinc intersections above are estimated to be at least 90% of the downhole thicknesses.

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

Drill Hole ID	Easting (x)	Northing	Elevation	Dip (°)	Azimuth (°)	Total Depth (m)	From (m)	To (m)	Core Length (m)	Estimated True Thickness (m)	Grade		
											(% Sn)	(% Cu)	(g/t Ag)
A13-001	333,368	8,845,670	4,146	-70	180	360.0	308	326	18	18	0.66	0.57	12
A13-004	333,368	8,845,672	4,146	-60	180	380.1	344	358	14	14	0.33	0.9	39
A13-011	333,284	8,845,495	4,167	-70	180	344.2	330	336	6	6	1.98	1.19	43
A13-012A	333,469	8,845,641	4,131	-70	180	356.8	326	348	22	22	0.65	0.17	6
A14-021	333,880	8,845,739	4,002	-60	350	514.0	310	318	8	8	0.44	0.07	23
A15-035	333,487	8,845,761	4,135	-75	180	385.7	340	352	12	12	0.4	0.15	1
A15-036	333,674	8,845,926	4,113	-80	180	425.8	366.3	373	6.8	7	0.4	0.15	14
A15-039	333,467	8,845,360	4,184	-75	360	568.3	380	392	12	12	1.13	0.18	2
A15-040	333,659	8,845,521	4,123	-75	360	423.1	328	378.5	50.5	50	0.96	0.16	15
A15-043	333,282	8,845,497	4,167	-85	360	427.5	312	326	14	14	0.82	0.44	10
A15-044	333,148	8,845,353	4,221	-80	180	392.9	350.6	365.4	14.9	15	1.1	0.36	26
A15-045	333,567	8,845,447	4,140	-65	360	404.2	377.6	400.4	22.8	22	0.02	0.03	2
A15-049	333,486	8,845,759	4,135	-70	20	424.4	395.6	403.4	7.8	7	1.05	0.3	14
A15-052	333,670	8,845,462	4,137	-80	360	450.3	388.5	392	3.5	3	0.42	0.06	8
A17-056	333,047	8,845,063	4,195	-75	300	293.9	214	225	11	10	0.67	0.03	5
A17-063	333,242	8,845,117	4,223	-70	310	416.6	369	374.5	5.5	5	1.22	0.21	16
A17-063	333,242	8,845,117	4,223	-70	310	416.6	275	286	11	10	1.8	0.04	6
A17-069	333,114	8,845,103	4,205	-65	300	374.3	206	230.5	24.5	23	0.45	0.04	6
A17-070	333,152	8,845,151	4,224	-75	310	367.8	356.8	364	7.2	7	0.78	0.25	33
A17-070	333,152	8,845,151	4,224	-75	310	367.8	285	301.7	16.7	15	0.5	0.04	9
A17-091A	334,045	8,846,140	4,088	-70	35	625.1	588.5	602	13.5	13	0.83	0.39	54
A21-187	333,144	8,845,230	4,227	-68	222	345.8	262	274	12	11	3.05	0.05	5
including							266	268	2	2	5.43	0.04	7-

Drill Hole ID	Easting (x)	Northing	Elevation	Dip (°)	Azimuth (°)	Total Depth (m)	From (m)	To (m)	Core Length (m)	Estimated True Thickness (m)	Grade		
											(% Sn)	(% Cu)	(g/t Ag)
A21-185	333,241	8,845,119	4,223	-68	290	382.4	332	334	2	2	1.25	0.05-	7
							373	380	7	6	0.78	0.25	31
A21-184	333,273	8,845,183	4,219	-78	253	325.2	286.4	290.9	4.5	4	0.54	0.04-	15
A20-177	332,873	8,845,485	4,236	-88	200	383.0	317	319.2	2.2	2	0.63	0.06	6
A20-176	333,259	8,845,235	4,222	-75	255	368.6	300	304	4	4	0.66	0.05	8
A20-174	333,143	8,845,236	4,226	-90	0	395.9	348	352	4	4	1.09	0.2	17
A20-173	332,786	8,845,662	4,233	-83	100	306.9	252.1	256	3.9	4	0.96	0.03	12

Notes: True thicknesses of the tin intersections above are estimated to be at least 90% of the downhole thicknesses.

In 2007, Tinka contracted Expertos En Sondajes Diamantinos S.A. (Esondi) to complete 15 holes for 2,670.3 m at Colquipucro collared on 100 m spaced lines. Esondi used a Hydracore Model Gopher diamond 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 ten 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. All 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.

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 in 2011 and 2013 by PRW Ingeniería y Construcción surveying company, in 2015 by Lima based surveying company Proyectistas Técnicos del Peru S.A.C., and in 2017 and 2018 by Lima based PeruLand SAC and Servtop S.A.C. using a combination of total station and differential GPS.

10.4 Drill Hole Spacing

The current drill hole spacing for the Colquipucro deposit is nominally 50 m by 50 m but is concentrated in parts of the core deposit. Most holes were drilled towards the south and angled between -50° and -60°. Drill sections at Central are approximately 100 m apart and oriented north-south. Holes are commonly angled steeply to either the north or south (between 60° and 85°). At South, drill sections are spaced approximately 100 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 since discovery in 2011. Typically, holes at West are spaced less than 80 m apart.

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 rock quality designation (RQD), 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 Comments on Section 10

The QPs have 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 Introduction

All samples from the 2007 Colquipucro drill program and the initial drill program conducted at the Ayawilca deposit in 2011 were prepared and analyzed by Laboratorio Plenge - C.H. Plenge & Cia. S.A. (Plenge) in Lima, Peru. All samples from subsequent Ayawilca and Colquipucro deposit drill campaigns were analyzed by SGS Laboratories (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 S.A. (Certimin). All samples from the 2015 Ayawilca drill program were analyzed by SGS. SGS is ISO 9001 and ISO 14001 certified. Certimin is ISO 9001, ISO 14001, and ISO 45001 certified. Samples from the 2017 Ayawilca drill program were analyzed by SGS and/or ALS laboratories in Lima. ALS Lima is an ISO 9001 certified laboratory. Samples from the 2018 Ayawilca drill program were analyzed by SGS. Samples from the 2019 to 2021 drill programs were analyzed by ALS. All laboratories used were independent of Tinka.

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

11.2 Sample Preparation

Sample intervals and numbers were assigned at site by Tinka geologists. Most drill core was sampled using constant 2 m intervals. Drill core was split using a diamond saw at Tinka's core facility which was initially located in Ambo (later moved in 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.

On average, one standard or one blank was inserted, alternately, after every 10 samples. The frequency was subsequently decreased to every 15 samples, however since the 2017 program, Tinka reverted to inserting one control sample after every ten samples. Samples were shipped by Tinka personnel directly to the laboratory in Lima.

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 (2 mm). The crushers were cleaned with compressed air between samples. A 250 g split, using a Jones splitter, was pulverized to 85% passing -200 mesh (75 µm using a ring and puck pulverizer).

Commencing in 2019, samples were sent to ALS and were prepared using method PREP31.

11.3 Sample Analyses

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 XRF (ALS).

11.4 Density Measurements

Tinka has performed 2,333 density measurements in total. Sample spacing ranged from 10–60 m down hole, but on average was 20–30 m. Samples were taken from a variety of lithological and mineralogical types. Each sample was sawn core and from 10–20 cm long. Photographs and brief descriptions were recorded prior to sending the core to SGS or ALS for density determinations. Samples were coated in paraffin wax to preserve the porosity.

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	04	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
CDD46	01	107	ICP (ICM40B)	10	AAS	SGS
Total	50	4,135				

Notes: 1. Drilled by Buenaventura. 2. Over-limit 1,000 ppm Ag (AAS), re-analysis by FA-Gravity. 3. 2019 to 2021 Sn assays analyzed by fusion XRF (ME-XRF15b).

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 A14-18	18	2,699	ICP (ICP40B)	1	AAS	SGS
A14-19 to A14-25	7	1,210	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	8	688	ICP (ICM40B)	1	AAS	ALS
Total	211	32,906				

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

A total of 2,038 density measurements are located within the wireframe models, of which 923 are within the Buffer Zone. A total of 1,062 density measurements were located within the Zinc Zone (of which 96% are within the South and West areas), nine within the silver-rich domains of the South area, and a total of 44 density measurements are located within the Tin Zone. Results of the analysis are provided in Section 14.

A total of 90 samples were selected for the Colquipucro deposit. Sample spacing averaged 10–15 m. Most samples were from the Goyllar sandstone. The samples were also documented, as described above. SGS measured the density using the weight in air and weight in water method. Samples were coated in paraffin wax to preserve the porosity.

11.5 Quality Assurance and Quality Control

The laboratories are assessed by a review of assays of certified reference material (CRM), or standards, and by check assaying at outside accredited laboratories. Assay precision is assessed by reprocessing duplicate samples from each stage of the analytical process from the primary stage of sample splitting, through sample preparation stages of crushing/splitting, pulverizing/splitting, and assaying.

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. Tinka submitted field duplicates as part of its QA/QC program in 2015. In the 2019–2021 work programs, 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. Table 11-3 summarizes the samples submitted to ALS Peru (Lima) as part of the 2019–2021 work programs. Table 11-4 summarizes the number of QC samples and results submitted to ALS Lima, Certimin, and SGS to the Report effective date.

In the QPs' opinion, 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.

11.5.1 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 twenty 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. The barren rock was certified as part of the 2019–2021 work programs. Blank control charts are illustrated in Figure 11-1 to Figure 11-3. No failures were recorded for silver and tin. Eleven failures for zinc were recorded (Figure 11-2).

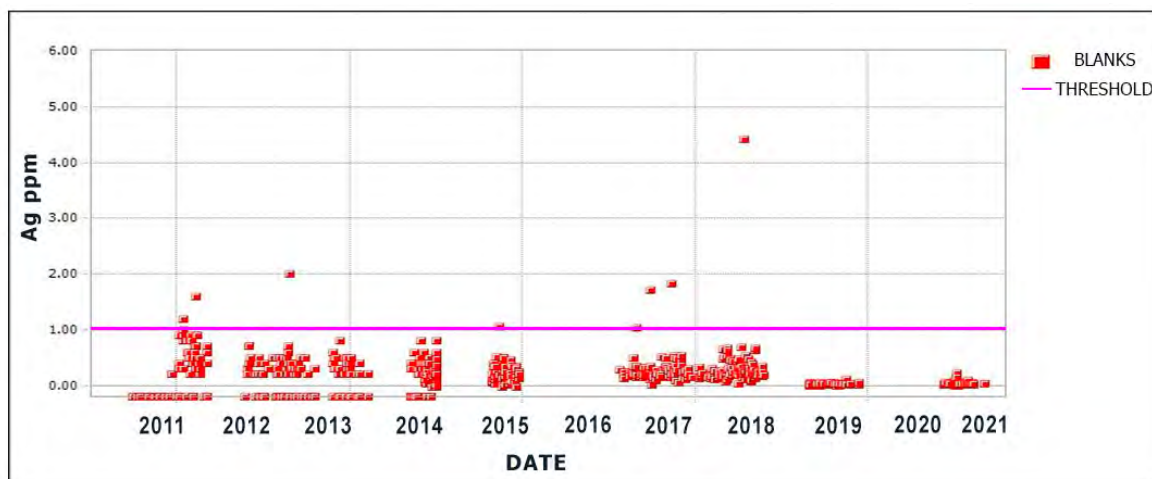
Table 11-3: 2019 to 2021 QA/QC Sample Count and Results Summary

Metal	Coarse Blanks (chips)		Fine Blanks (pulp)		Standards CRMs		Field Duplicates (1/4 core)		Fine Duplicates (pulp)	
	No.	Failure No. or %	No.	Failure No. or %	No.	Values outside 3SD or %	No.	Failure No. or %	No.	Failure No. or %
Zn	96	9 or 9%	101	—	488	1 or <1%	93	3 or 3%	107	5 or 5%
In	96	—	101	—	32	—	93	2 or 2%	107	7 or 7%
Pb	96	—	101	—	488	—	93	2 or 2%	107	5 or 5%
Ag	96	—	101	—	488	—	93	2 or 2%	107	6 or 6%
Sn	96	—	101	—	30	—	93	—	107	4 or 4%
Cu	96	—	101	—	488	—	93	—	107	1 or <1%

Table 11-4: QA/QC Summary

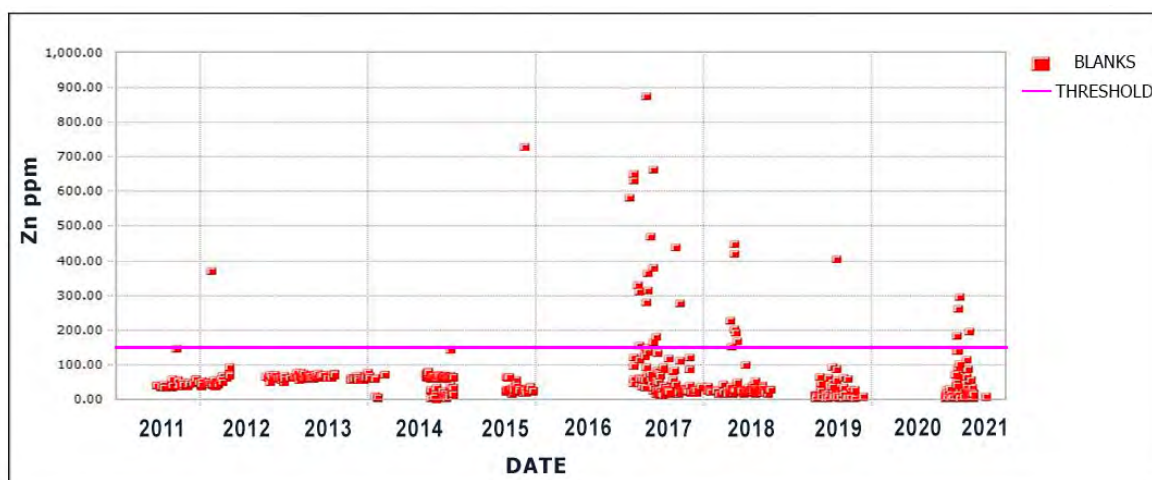
Metal	Coarse Blanks (chips)		Fine Blanks (pulp)		Standards (CMR)		Field Duplicates (¼ core)		Fine Duplicates (pulp)	
	No.	Failure No. or %	No.	Failure No. or %	No.	Values outside 3SD or %	No.	Failure No. or %	No.	Failure No. or %
Zn	531	32 or 6%	325	4 or 1%	2,227	26 or 1%	401	7 or 2%	107	5 or 5%
In	516	3 or 1%	143	—	1,056	43 or 4%	401	5 or 1%	107	7 or 7%
Pb	531	3 or 1%	325	—	2,151	35 or 2%	401	11 or 3%	107	5 or 5%
Ag	531	5 or <2%	325	3 or 1%	2,227	5 or <1%	401	7 or 2%	107	6 or 6%
Sn	531	9 or 2%	325	—	102	—	401	4 or 1%	107	4 or 4%
Cu	531	—	325	1 or <1%	1,625	12 or 1%	401	9 or 2%	107	1 or <1%

Figure 11-1: Ayawilca Deposit Blanks – Silver Results



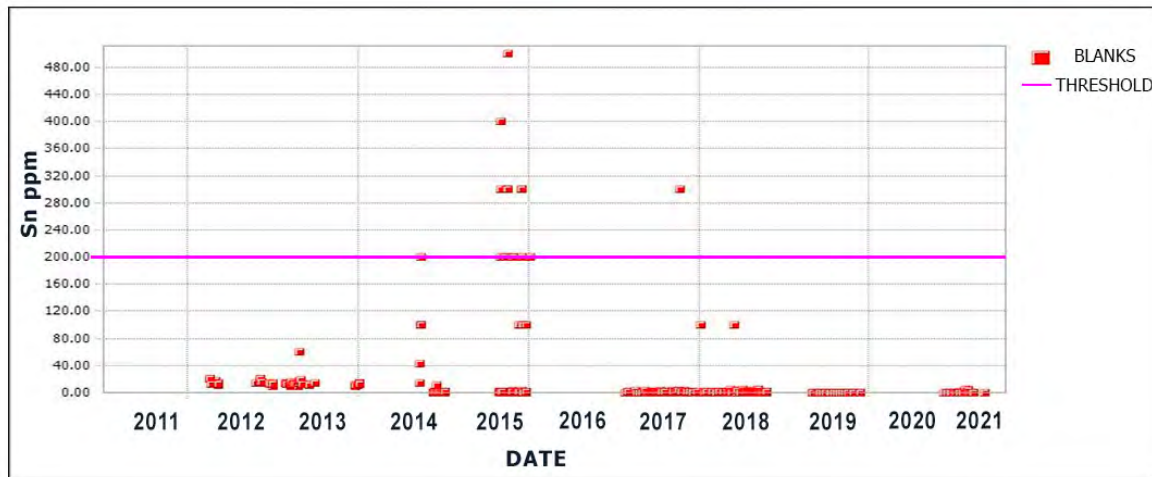
Note: Figure prepared by SLR, 2021.

Figure 11-2: Ayawilca Deposit Blanks – Zinc Results



Note: Figure prepared by SLR, 2021.

Figure 11-3: Ayawilca Deposit Blanks – Tin Results



Note: Figure prepared by SLR, 2021.

Blanks in 2017 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 the most recent drilling programs in 2019–2021 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 QPs reviewed internal reports documenting the follow up investigations and consider them resolved.

The impact of these failures is considered to be of no consequence due to the low grades reported. In the QPs’ opinion, the results of the blanks are within acceptable limits, and the data can be used for resource estimation purposes.

The QPs reviewed results for lead in the blank samples. All results were within acceptable limits.

11.5.2 Certified Reference Material (Standards)

Results of the regular submission of CRMs are used to monitor analytical accuracy and to identify potential problems with specific batches. Tinka inserts CRM samples at a rate of approximately one in a batch of 10 samples. The QPs are of the opinion that the CRM insertion rate exceeds industry standards. Tinka purchased CRMs from CDN and Ore Research & Exploration Pty Ltd (OREAS) and has also generated three of its own CRMs (TK-STD-01 to -03). Table 11-5 lists the recommended values for the CRMs. The QPs note that prior to 2019 only zinc and tin CRMs were inserted and monitored. Silver and lead were added beginning in 2019.

Table 11-5: Expected Values and Ranges of CRMs

CRM	Metal Unit / 1SD	Metal Unit / 1SD	Metal 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	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-140 ¹²	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 2019–2021 drilling campaigns only.

The CRM summary results for zinc, silver, and tin for the 2019–2021 drill programs are summarized in Table 11-6, Table 11-7, and Table 11-8 respectively. The CRM results for zinc and tin to date are summarized in Table 11-9 and Table 11-10.

OREAS-36 was a zinc standard that proved to have a higher rate of failure outside of the normal deviations. OREAS-36 was disused by Tinka during 2018, once independent testing confirmed that precision for this standard was an issue.

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

	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
	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 to 2021 drilling campaigns only.

Table 11-7: *Summary of the Silver CRM Results for the 2019 to 2021 Ayawilca Deposit Drill Programs*

	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
	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 2019–2021 drilling campaigns only.

Table 11-8: *Summary of the Tin CRM Results for the 2019 to 2021 Ayawilca Deposit Drill Programs*

	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

Table 11-9: Summary of All Zinc CRM Results

	CDN-ME-14	CDN-ME-17	CDN-ME-1211	CDN-ME-1303	CDN-ME-1101	CDN-ME-06	CDN-ME-08
No. assays	194	58	54	51	97	44	85
Expected value (%)	3.1	7.3	0.2	0.9	1.6	0.5	1.9
No. values outside 3SD	0	0	0	0	0	1	0
% outside 3SD	0.0	0.0	0.0	0.0	0.0	2.3	0.0
	TK-STD-01	TK-STD-02	TK-STD-03	TR-11210	OREAS-36	OREAS-37	OREAS-38
No. assays	334	278	160	33	80	39	33
Expected value (%)	2.6	5.9	12	5	4.2	6.3	10
No. values outside 3SD	6	3	0	0	14	0	0
% outside 3SD	1.8	1.1	0.0	0.0	17.5	0.0	0.0
	OREAS-130	OREAS-135	CDN-ME-1201	CDN-ME-1202	CDN-ME-1204	CDN-ME-1402	CDN-ME-1804
No. assays	26	11	88	150	58	50	27
Expected value (%)	1.7	2.8	5.0	1.9	2.4	15.0	9.9
No. values outside 3SD	0	0	0	0	0	0	0
% outside 3SD	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CDN-ME-1406	CDN-ME-1802	OREAS-140	OREAS-141	OREAS-142		
No. assays	88	45	66	56	22		
Expected value (%)	2.3	6.1	0.171	0.364	0.244		
No. values outside 3SD	0	0	0	2	0		
% outside 3SD	0.0	0.0	0.0	3.6	0.0		

Table 11-10: Summary of All Silver CRM Results

	CDN-ME-14	CDN-ME-17	CDN-ME-1211	CDN-ME-1303	CDN-ME-1101	CDN-ME-06	CDN-ME-08
No. assays	194	58	54	51	97	44	85
Expected value (ppm)	42.3	38.2	86.3	152	68.2	101	61.7
No. values outside 3SD	0	0	0	0	0	0	0
% outside 3SD	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TK-STD-01	TK-STD-02	TK-STD-03	TR11210	OREAS-36	OREAS-37	OREAS-38
No. assays	334	278	160	33	80	39	33
Expected value (ppm)	12.34	9.17	21.22	259	10.17	5.19	5.49
No. values outside 3SD	2	2	0	0	0	0	0
% outside 3SD	0.6	0.7	0.0	0.0	0.0	0.0	0.0
	OREAS-130	OREAS-135	CDN-ME-1201	CDN-ME-1202	CDN-ME-1204	CDN-ME-1402	CDN-ME-1804
No. assays	26	11	88	150	58	50	27
Expected value (ppm)	6.57	55.7	37.6	10.0	58	131	137
No. values outside 3SD	0	0	0	0	0	0	0
% outside 3SD	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CDN-ME-1406	CDN-ME-1802	OREAS-140	OREAS-141	OREAS-142		
No. assays	88	45	66	56	22		
Expected value (ppm)	57.1	75	1.03	1.58	1.22		
No. values outside 3SD	0	0	0	1	0		
% outside 3SD	0.0	0.0	0.0	1.8	0.0		

In the QPs' opinion, the CRM grades cover a reasonable range with respect to the overall resource grades. The QPs recommend, 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. The QPs also recommend procuring a CRM for lead that is similar to the average grade of the Ayawilca deposit.

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

The QPs reviewed the CRM data, including all data from previous drilling campaigns, and are of the opinion that the analysis and conclusions remain relevant. Individual control charts for zinc, silver, and tin from the 2019–2021 work programs are presented and discussed in subsequent subsection.

11.5.2.1 Zinc

Twenty-six unique CRMs were used at the Project to monitor analytical precision and accuracy of zinc. From 2019–2021, the number was reduced to 10, and expected values range from 1,706 ppm Zn to 15.23% Zn.

The zinc control charts for all CRMs inserted for the 2019–2021 drilling programs are presented in Figure 11-4 to Figure 11-13. All zinc sample values are reported within three standard deviations, with the majority reported within one standard deviation.

Although many CRMs were inserted, there are an insufficient number of samples of a single type to clearly establish any trends.

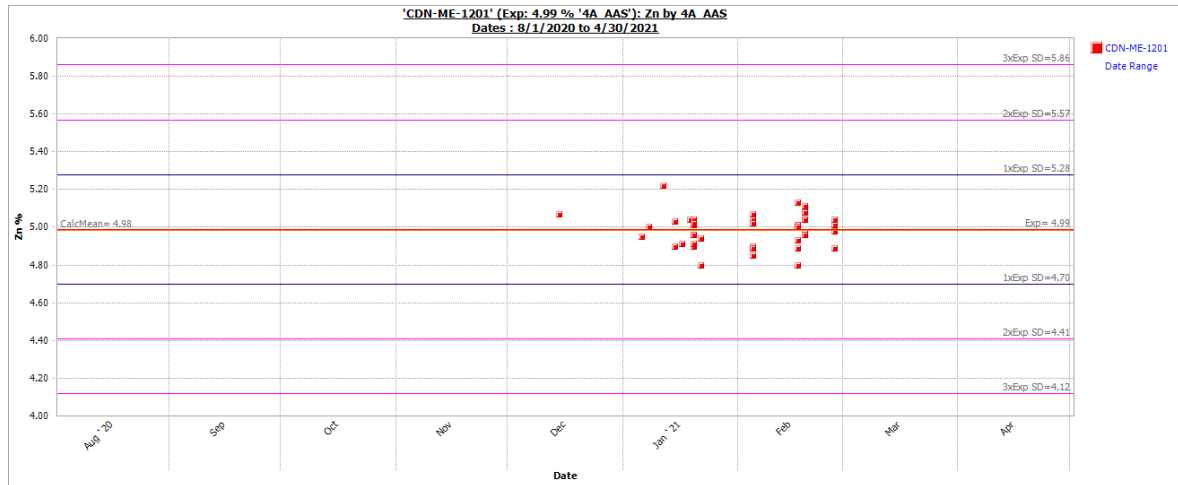
11.5.2.2 Silver

The silver control charts for all CRMs inserted for the 2019–2021 drilling programs are presented in Figure 11-14 to Figure 11-23. All silver sample values are reported within three standard deviations, the majority reported within one standard deviation. Although many CRMs were inserted, there are an insufficient number of samples of a single type to clearly establish any trends.

11.5.2.3 Tin

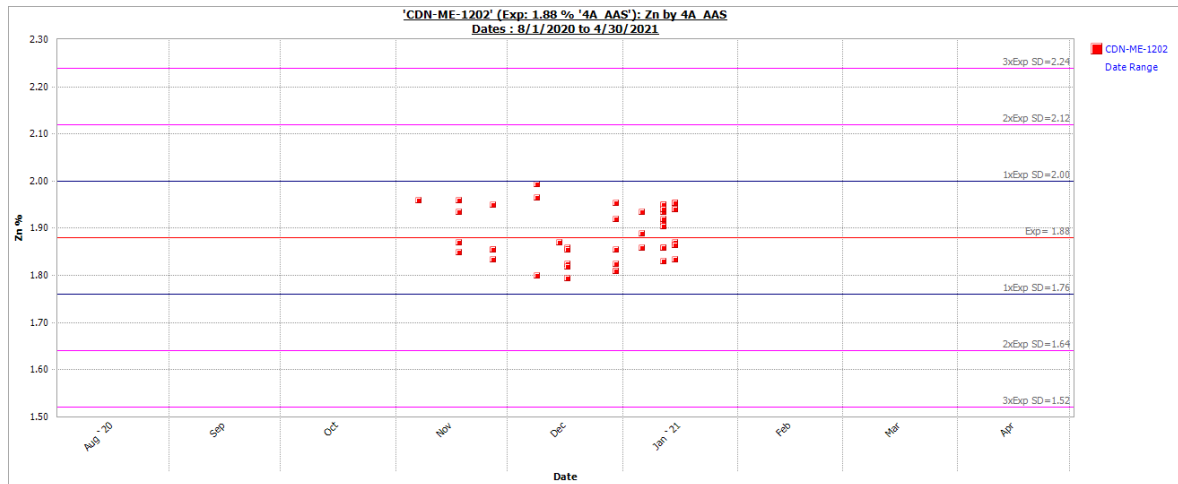
The tin control charts for all CRMs inserted for the 2019–2021 drilling programs are presented in Figure 11-24 to Figure 11-26. All the tin sample values are reported within one standard deviation. It is unclear whether there is a slight low bias in OREAS-140, however, there are an insufficient number of samples to clearly establish a trend.

Figure 11-4: CDN-ME-1201 – Zinc



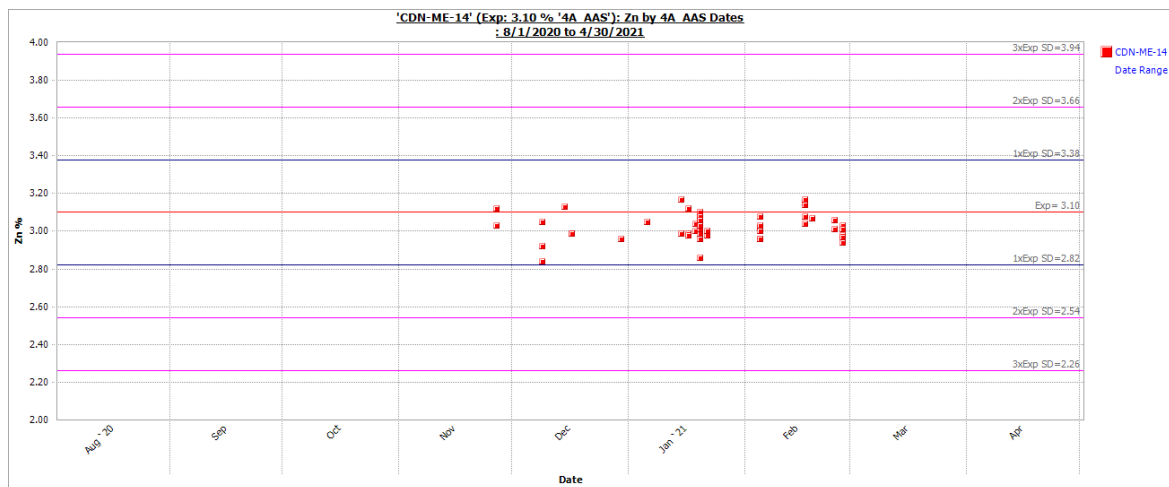
Note: Figure prepared by SLR, 2021.

Figure 11-5: CDN-ME-1202 – Zinc



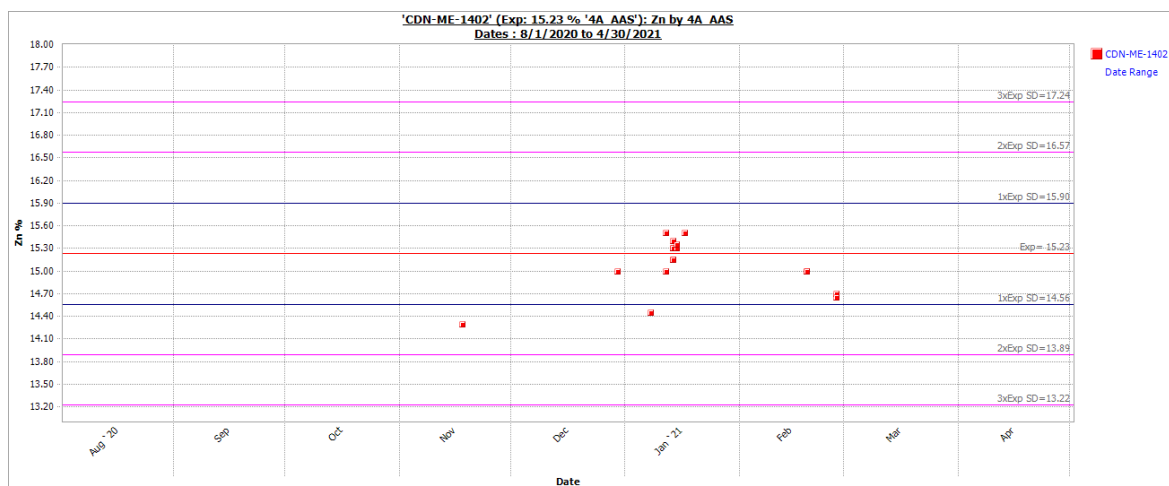
Note: Figure prepared by SLR, 2021.

Figure 11-6: CDN-ME-14 – Zinc



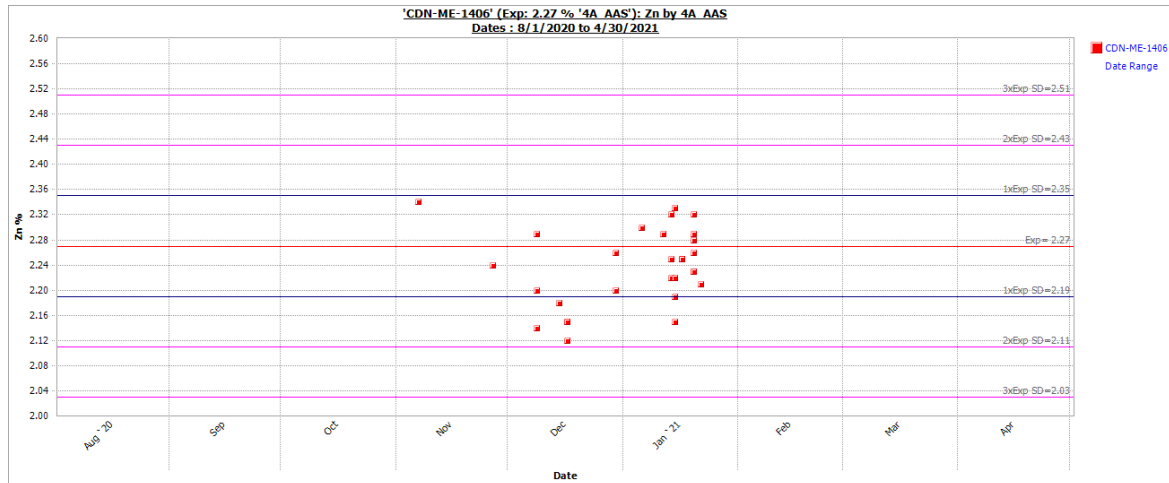
Note: Figure prepared by SLR, 2021.

Figure 11-7: CDN-ME-1402 – Zinc



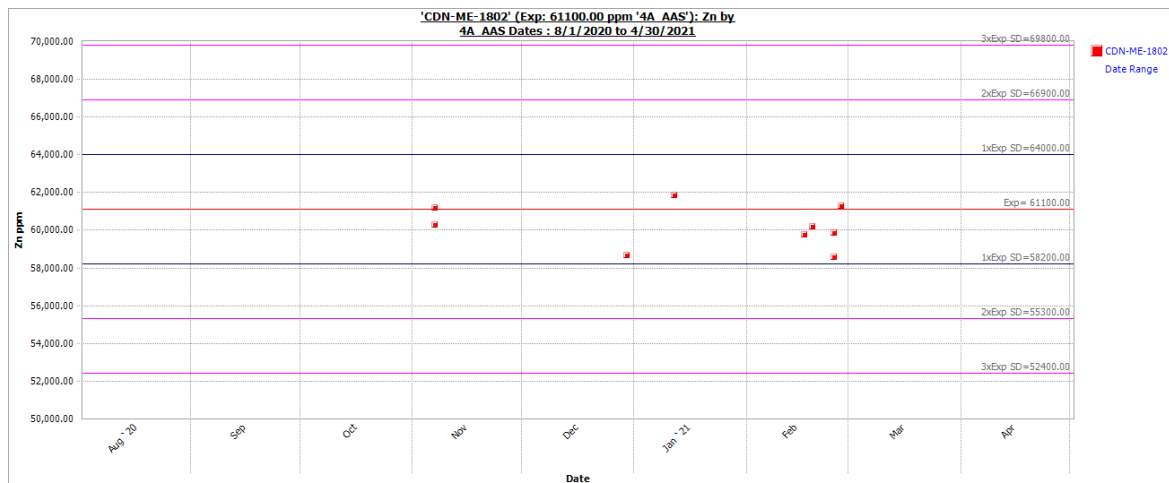
Note: Figure prepared by SLR, 2021.

Figure 11-8: CDN-ME-1406 – Zinc



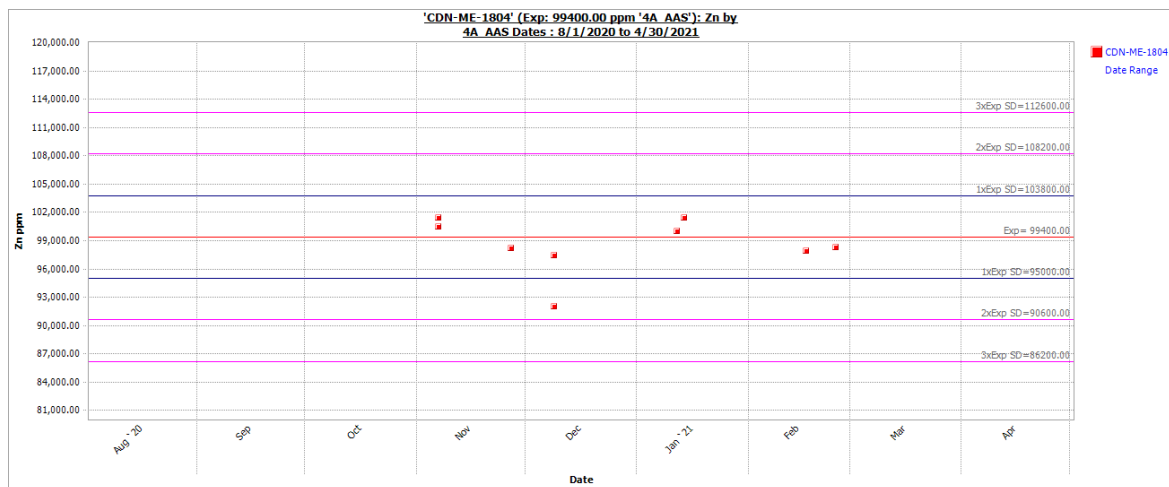
Note: Figure prepared by SLR, 2021.

Figure 11-9: CDN-ME-1802– Zinc



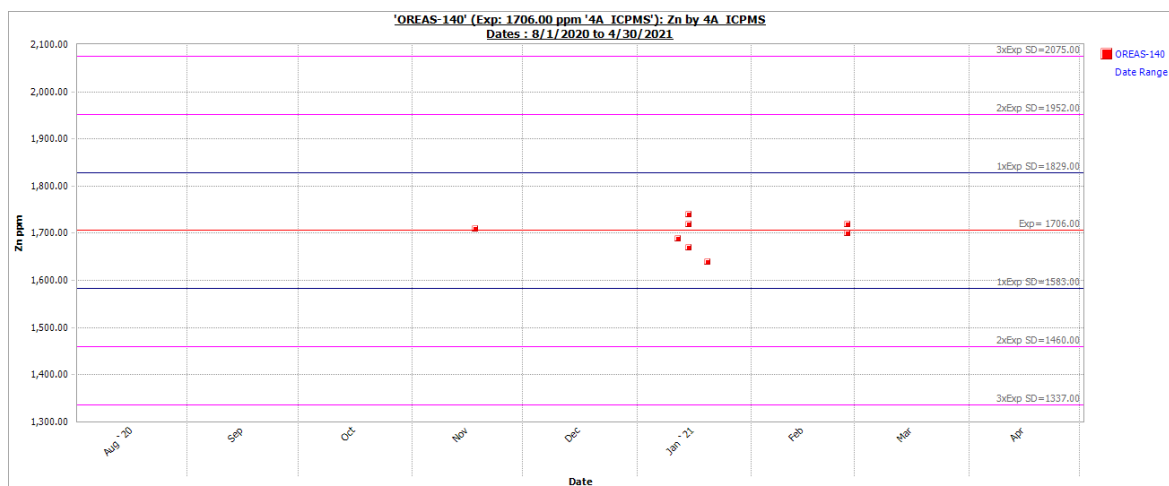
Note: Figure prepared by SLR, 2021.

Figure 11-10: CDN-ME-1804 – Zinc



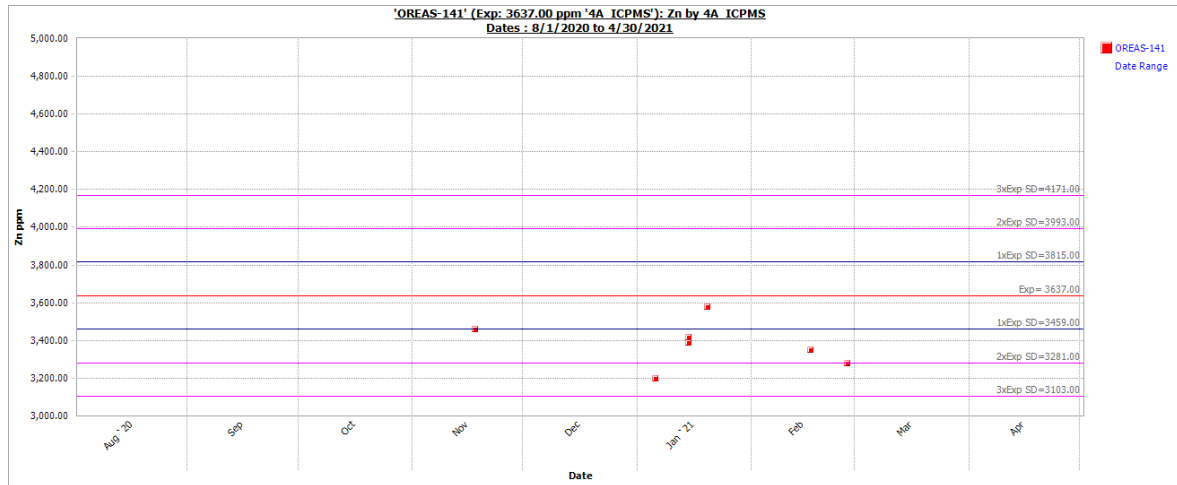
Note: Figure prepared by SLR, 2021.

Figure 11-11: OREAS-140 – Zinc



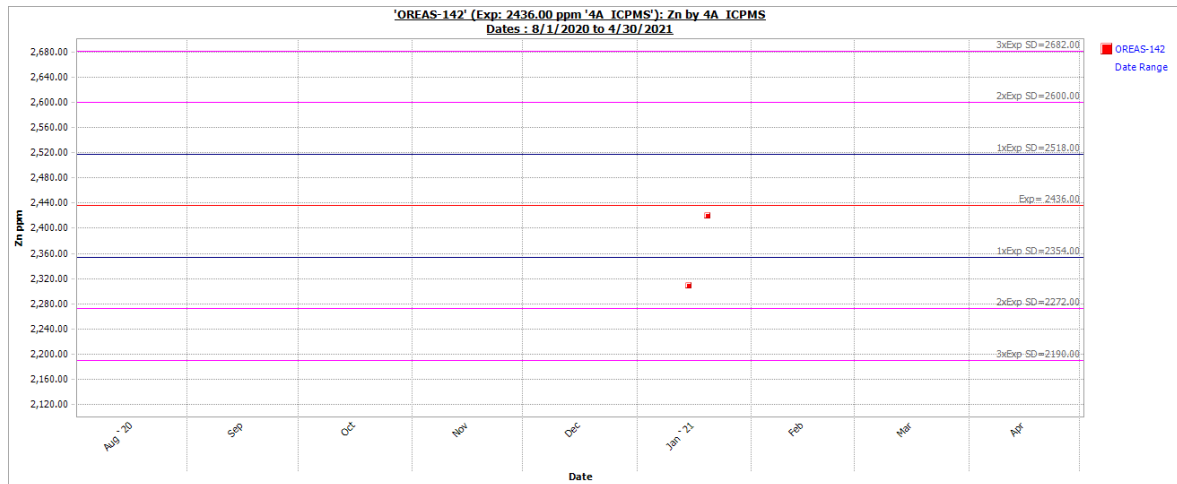
Note: Figure prepared by SLR, 2021.

Figure 11-12: OREAS-141 – Zinc



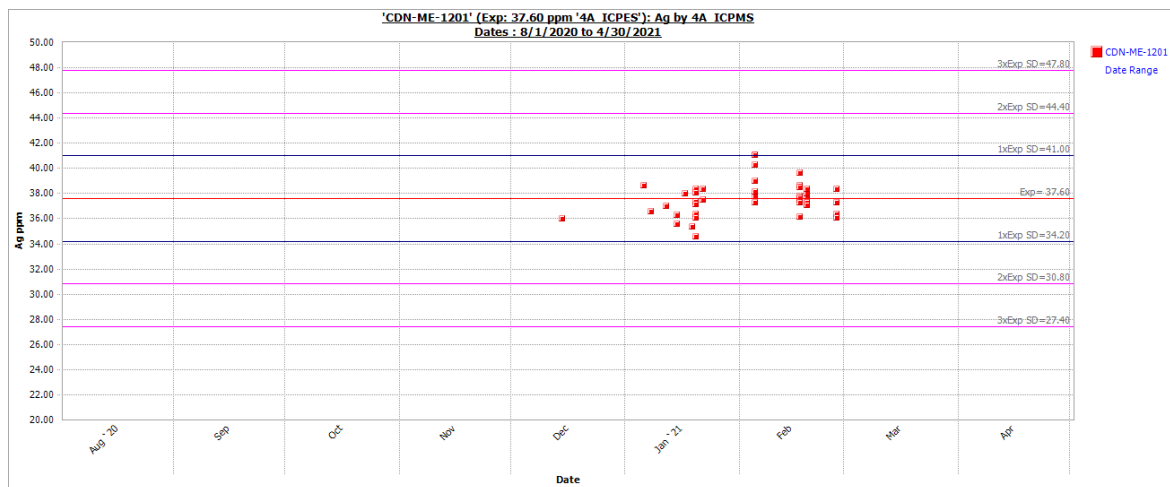
Note: Figure prepared by SLR, 2021.

Figure 11-13: OREAS-142 – Zinc



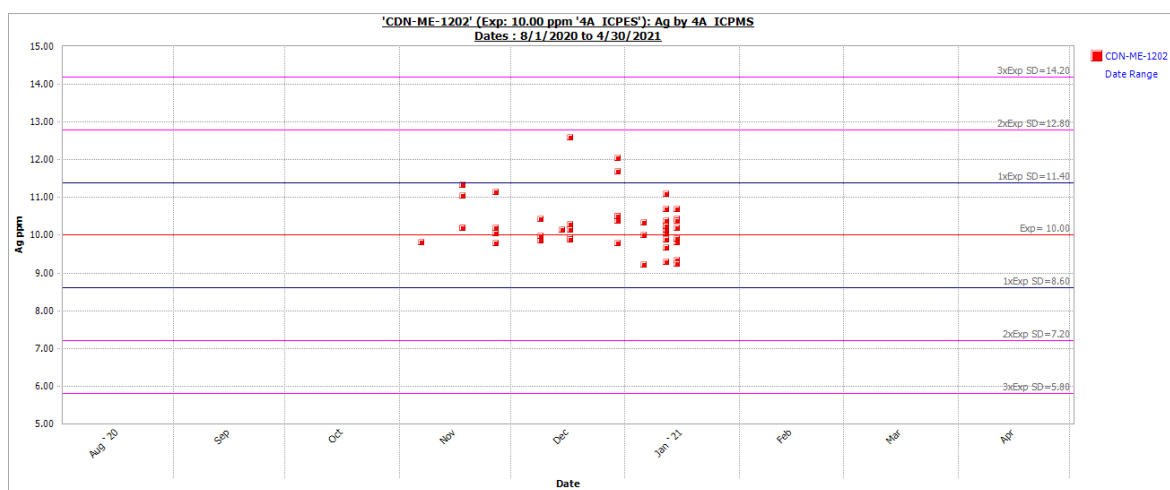
Note: Figure prepared by SLR, 2021.

Figure 11-14: CDN-ME-1201 – Silver



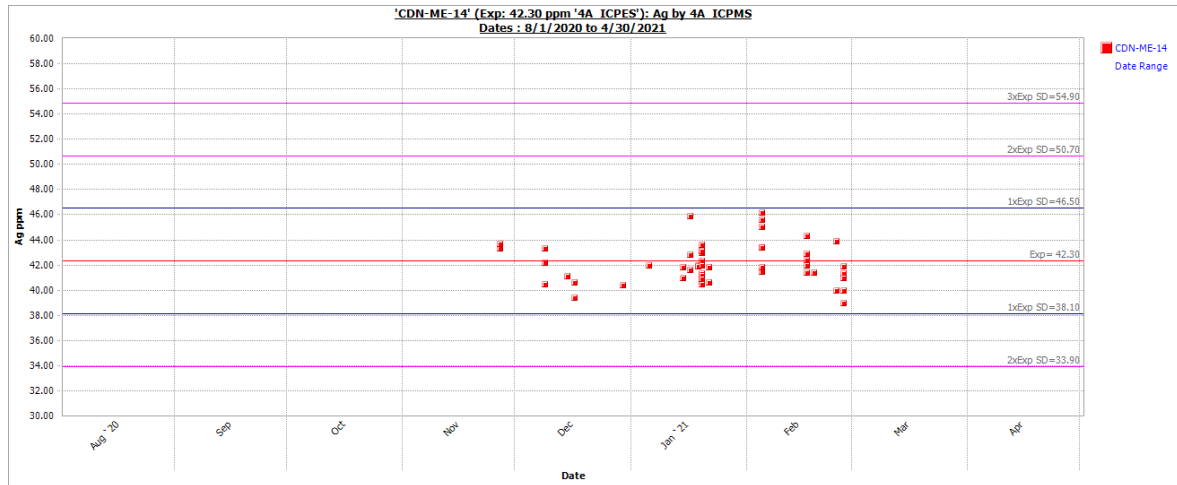
Note: Figure prepared by SLR, 2021.

Figure 11-15: CDN-ME-1202 – Silver



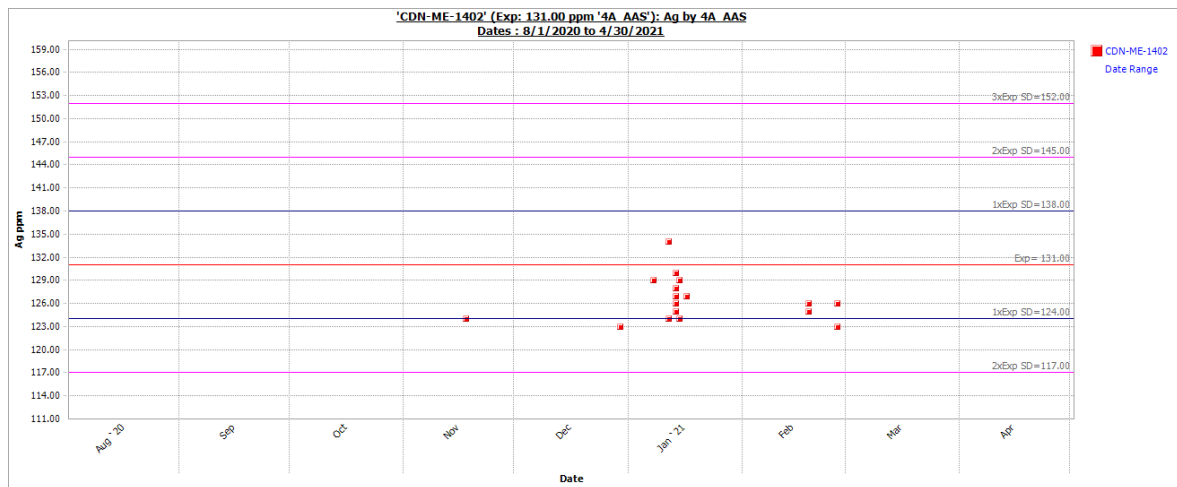
Note: Figure prepared by SLR, 2021.

Figure 11-16: CDN-ME-14 – Silver



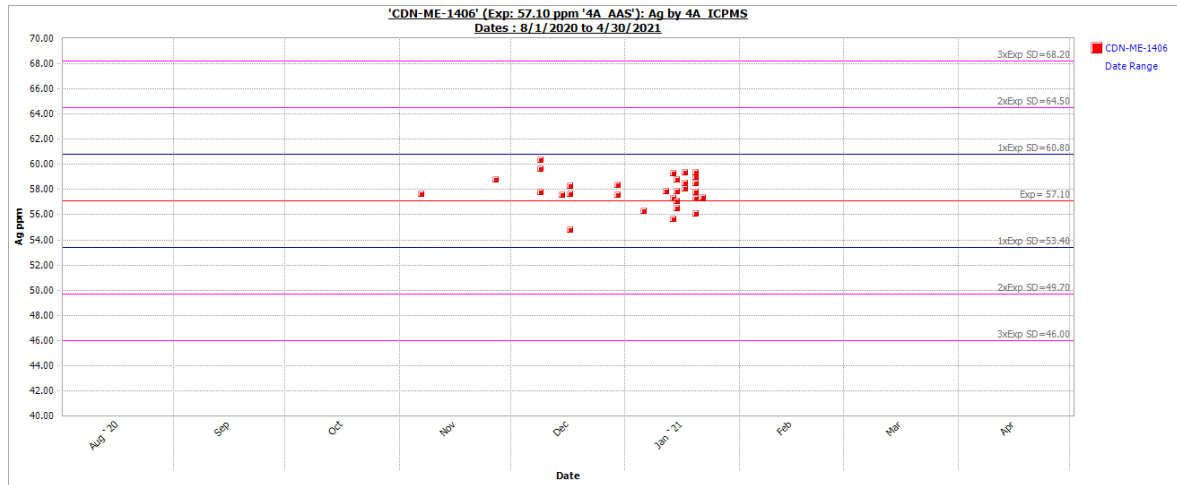
Note: Figure prepared by SLR, 2021.

Figure 11-17: CDN-ME-1402 – Silver



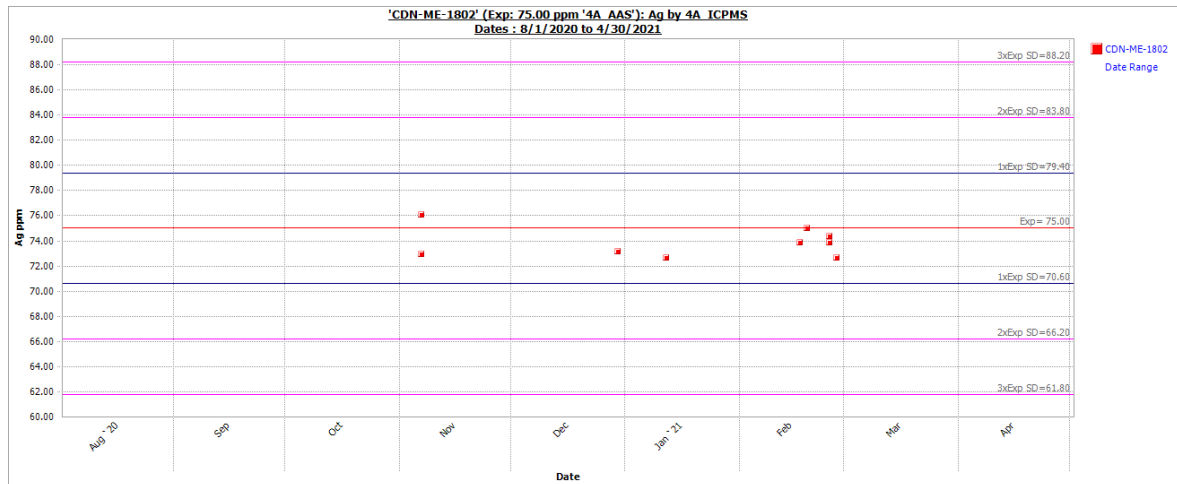
Note: Figure prepared by SLR, 2021.

Figure 11-18: CDN-ME-1406 – Silver



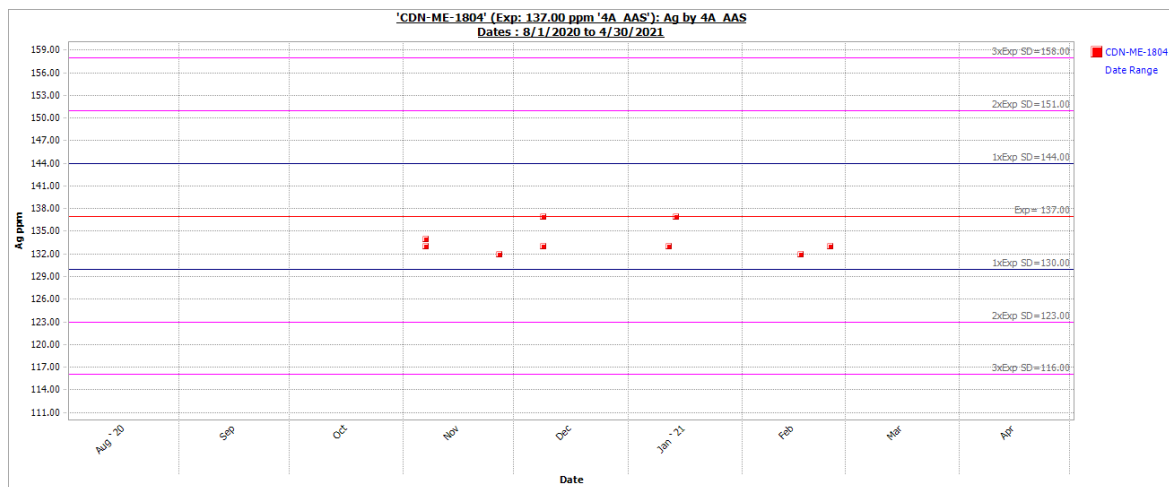
Note: Figure prepared by SLR, 2021.

Figure 11-19: CDN-ME-1802– Silver



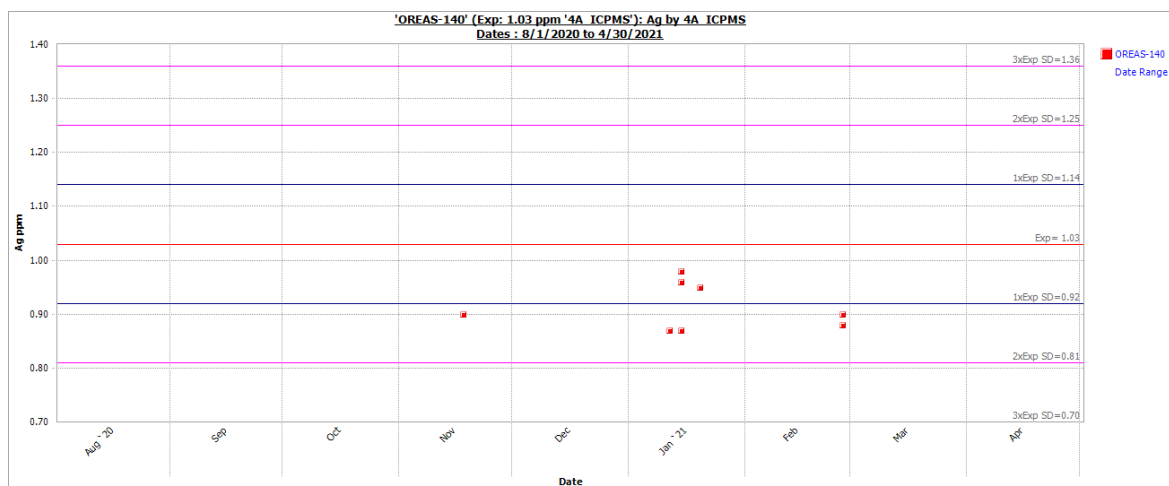
Note: Figure prepared by SLR, 2021.

Figure 11-20: CDN-ME-1804 – Silver



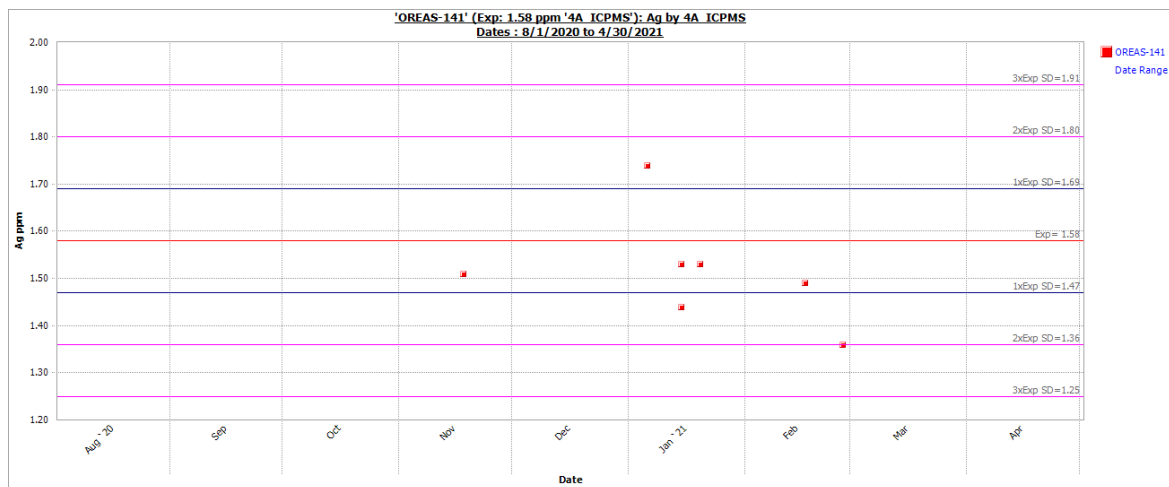
Note: Figure prepared by SLR, 2021.

Figure 11-21: OREAS-140 – Silver



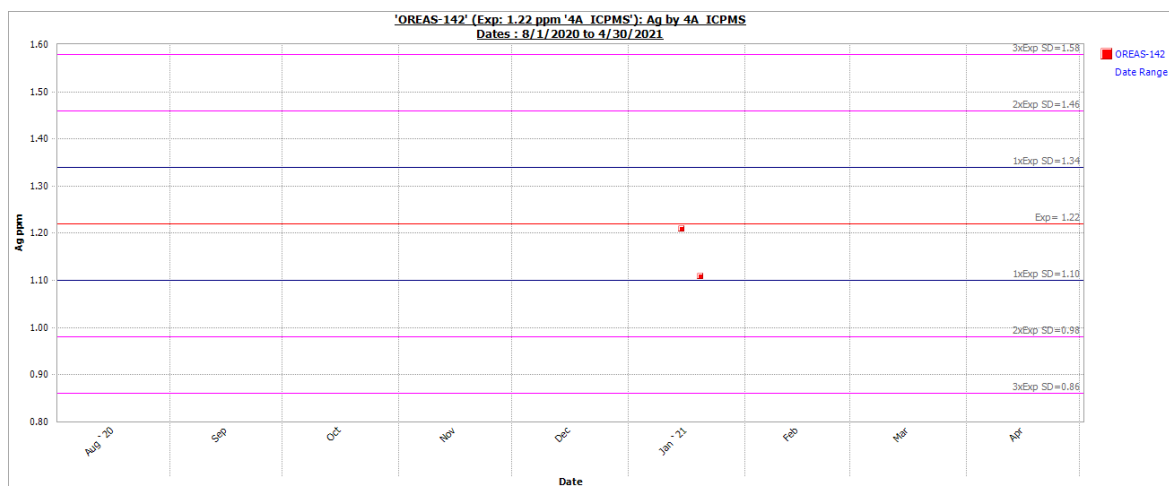
Note: Figure prepared by SLR, 2021.

Figure 11-22: OREAS-141 – Silver



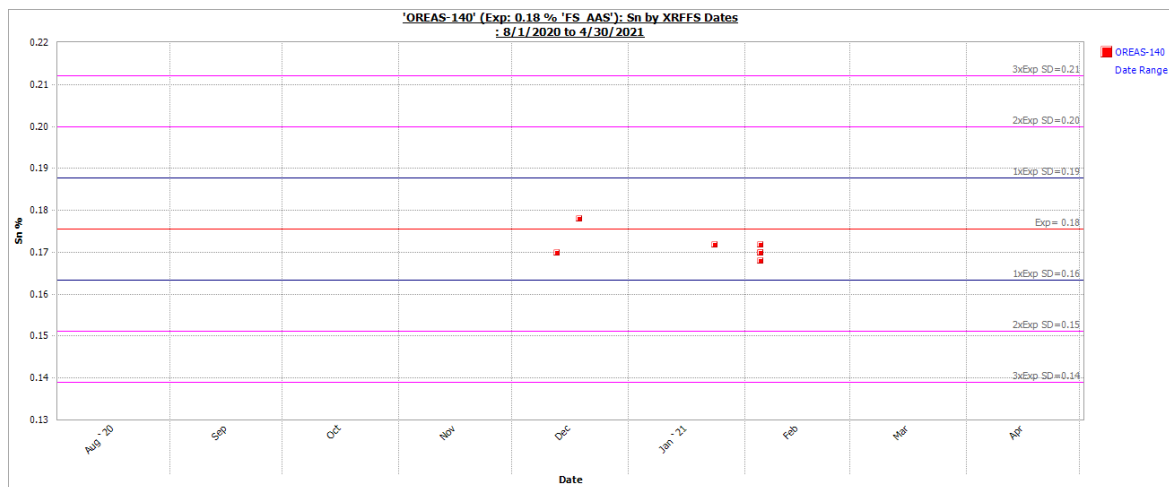
Note: Figure prepared by SLR, 2021.

Figure 11-23: OREAS-142 - Silver



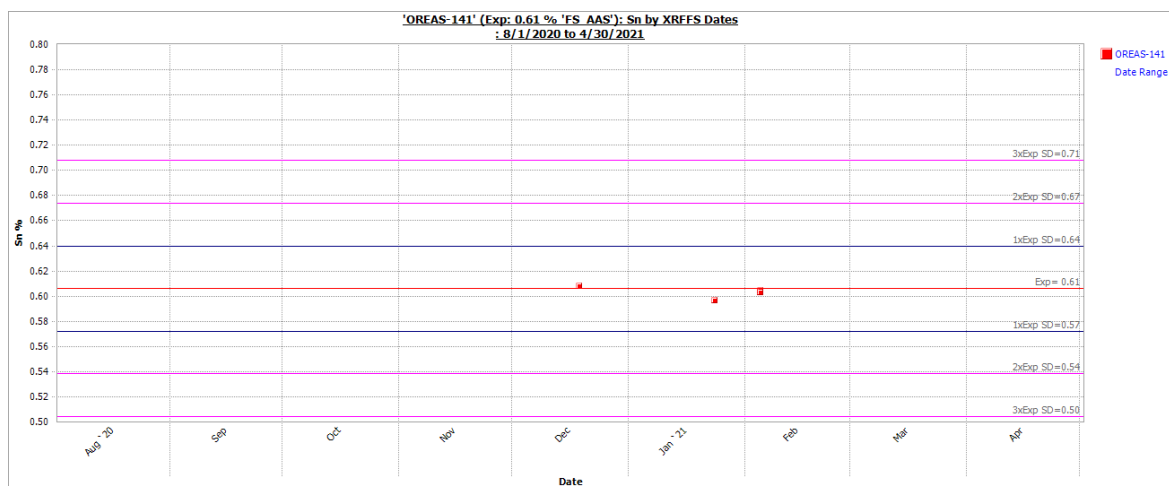
Note: Figure prepared by SLR, 2021.

Figure 11-24: OREAS-140 – Tin



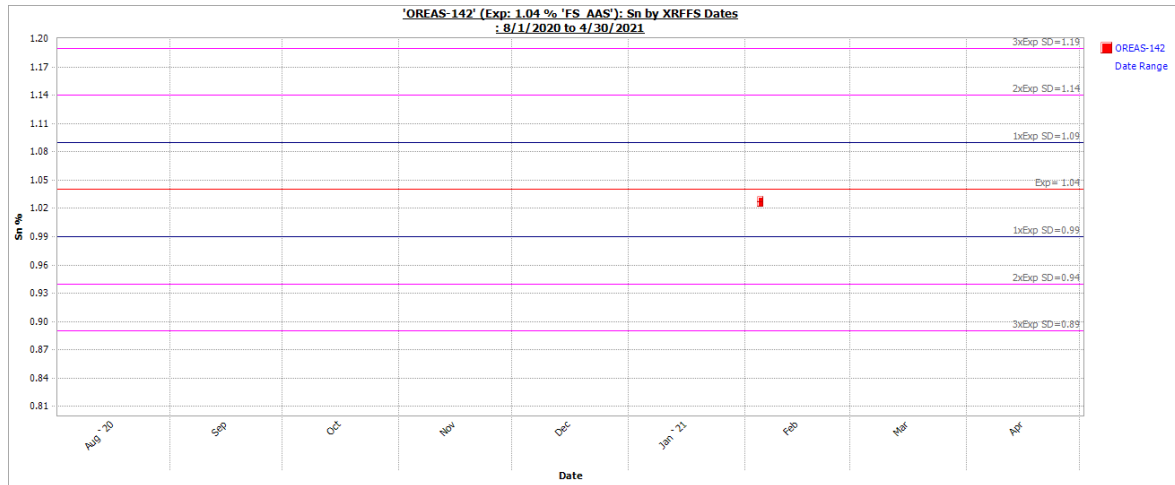
Note: Figure prepared by SLR, 2021.

Figure 11-25: OREAS-141 – Tin



Note: Figure prepared by SLR, 2021.

Figure 11-26: OREAS-142 - Tin



Note: Figure prepared by SLR, 2021.

11.5.2.4 Lead

The QPs reviewed the CRM control charts for lead. A total of 205 results from seven CRMs were included in the 2019 to 2021 drilling programs. All the lead sample values are reported within three standard deviations, with the majority within one standard deviation. There was no laboratory bias detected in the CRM results.

11.5.3 Pulp Replicates

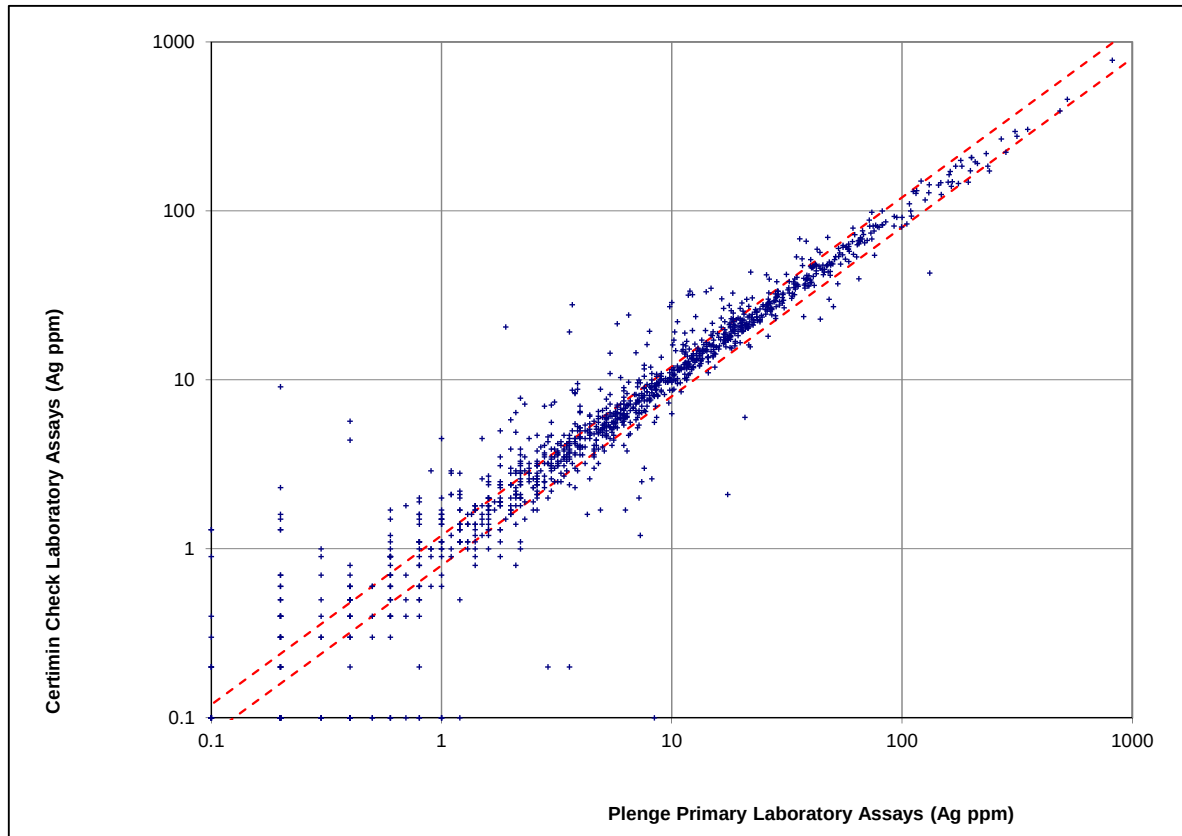
As no new work occurred at the Colquipucro deposit, there is no additional QC data. In 2018, the QPs reviewed 1,220 sample pulps from the Colquipucro deposit analyzed at Plenge and sent by Tinka to Certimin for referee check assays. The results for silver, after the removal of eight outliers, gave a strong correlation coefficient of 0.989. Results from Certimin averaged only 1.3% higher than the primary laboratory. Wider differences are expressed at grades less than 60 g/t Ag (Figure 11-27).

At the Ayawilca deposit, 516 sample pulps analyzed at SGS were sent to Inspectorate laboratory (Inspectorate) in Lima for check assay. 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 (Figure 11-28).

11.5.4 Pulp Duplicates

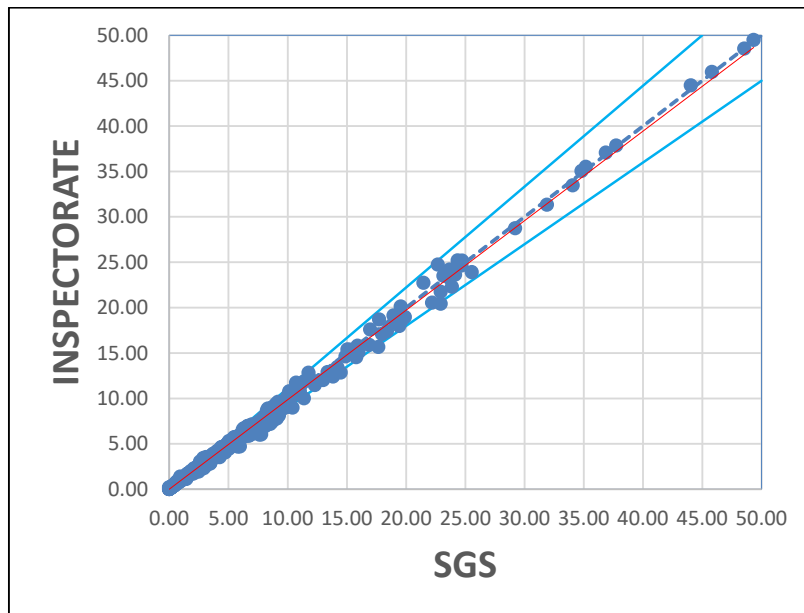
During the 2019–2021 drilling programs, Tinka inserted 107 pulp duplicates, or approximately 0.3% of all submitted samples. The pulps were analyzed in the same batch as the original sample with a different sample number. The QPs reviewed the results for zinc, silver, tin, and lead, and determine the results to be acceptable.

Figure 11-27: Colquipucro Deposit Check Assays – Silver



Note: Figure prepared by SLR, 2021.

Figure 11-28: Check Assays – Zinc



Note: Figure prepared by SLR, 2021.

11.5.5 Field Duplicates

Prior to the 2019–2021 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 2015–2018 campaign and an additional 401 field duplicate samples were used in the 2019–2021 drilling programs. The QPs reviewed the results for zinc, silver, tin, and lead and found the results to be acceptable.

11.6 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 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 were secured in a locked cage located within the gated facility at Huánuco.

Analytical data was sent using electronic transmission of the results. 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

Drill core is stored in covered storage areas within the fenced and access-controlled property located on the main road just outside the city of 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. The drilling, sampling, and logging are carried out under the direct supervision of experienced technical people.

In the opinion of the QPs, the security procedures employed by Tinka for drill core, samples, and data is adequate and in line with industry best practices.

12 DATA VERIFICATION

12.1 Introduction

Data verification of the drill hole database included manual verification against hardcopy and original digital sources, a series of digital queries, and a review of Tinka's QA/QC procedures and results described in Section 11 of this Report. The QPs are of the opinion that database verification procedures are adequate for the purposes of Mineral Resource estimation.

Dorota El-Rassi, M.Sc., P.Eng., SLR Consultant Geologist and independent QP, visited the Project on September 19, 2018. Ms. El-Rassi visited the core shacks, examined drill core and outcrops, and held discussions with Tinka geological and technical staff. In 2018, Ms. El-Rassi was able to observe the drilling in progress at the Ayawilca deposit and noted that the work was being carried out in a competent fashion, using modern equipment that appeared to be in good repair and appropriate for the job.

12.2 Manual Database Verification

The QPs' review of the resource database included header, survey, lithology, assay, and density tables. Database verification was performed using tools provided within the Dassault Systèmes GEOVIA GEMS Version 6.8.2 software package (GEMS). Additionally, 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. No discrepancies were identified.

The QPs 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. 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 and three from ALS, with a focus on intervals within the resource wireframes. No discrepancies were identified.

In 2021, the QPs 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 issue. No problems were identified. The QPs compared all zinc, silver, tin, and lead values for all 52 assay certificates for samples taken during the 2019–2021 drilling programs. No discrepancies were identified.

12.3 Independent Check Samples

During the site visits, Ms. El-Rassi 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). Confirmation of zinc and copper mineralization at the Ayawilca deposit was made by observing numerous intervals with significant sphalerite and chalcopyrite.

12.4 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 QPs.

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

13 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Introduction

Several metallurgical testwork phases have been completed to evaluate the mineral processing of the zinc and tin mineralization at Ayawilca, as follows:

- Phase 1, 2016: zinc flotation (rougher and cleaner scoping test):
 - Performed at SGS Lima on two master composites (AAFC-01 and AAFC-02);
- Phase 3, 2017–2018: zinc flotation and comminution:
 - Performed at Plenge laboratory in Lima (Plenge) on two master composites (ACFC-01 and ACFC-02);
- Phase 4, 2018: Mineralogical characterization of tin:
 - Performed at SGS Canada on 12 samples (ADS-01 to ADS-12);
- Phase 5A, 2019: zinc flotation and optimization (rougher, cleaner) including lock cycle and mineralogical tests:
 - Performed at Expert Process Solution in Sudbury (XPS Sudbury) on several composite samples and two lock cycle master composites (AEC-02 and AEC-03);
- Phase 5B, 2021: lead–silver and zinc flotation and mineralogical tests:
 - Performed at XPS Sudbury on four master composites;
- Phase 5C, 2021: Jamieson cell test on lead–silver/zinc mineralization:
 - Performed at XPS Sudbury on one master composite;
- Phase 5D, 2021: Ayawilca zinc tailings preliminary characterization:
 - Performed at Golder & Associates Sudbury laboratory (Golder Sudbury) on one master tailings composite sample from Ayawilca;
- Phase 6, 2021: Mineralogical characterization of tin mineralization:
 - Performed at the PMC laboratory in Vancouver (PMC) on five composite tin-bearing samples from Ayawilca.

Phases 3, 5 and 6 are considered the most relevant for the purposes of the 2021 PEA, and testwork and results are summarized in Section 13.2.

The main objectives for the testing of Zinc Zone mineralization were to:

- Develop a recovery process focused on the South and West zones which are primarily planned to be mined during the first half of the proposed LOM;

- Determine if there are any significant process issues or fatal flaws;
- Maximize recovery of zinc to a concentrate grading 50% Zn;
- Maximize recovery of silver to a lead concentrate;
- Minimize penalty element grades in concentrates;
- Develop a robust metallurgical flowsheet with low operating and capital cost requirements, and;
- Characterize the tailings to ascertain suitability for filtration of surface tailings.

The main objective for the testing of the Tin Zone mineralization was to:

- Characterize the tin mineralization and determine its suitability for potential gravitation separation.

13.2 Metallurgical Testwork

13.2.1 Phase 3: Comminution

Plenge laboratory in Peru performed a comminution test in 2017. This is part of the Phase 3 metallurgical testwork which also included zinc and lead–zinc flotation.

13.2.1.1 Samples

Drill core samples (quarter core) from exploration drilling were used for forming a composite (ACCC-01). These samples belong to the South area. Table 13-1 details the samples source and Figure 13-1 shows the location of the samples in the deposit.

13.2.1.2 Comminution Testwork

A single comminution test was completed using composite sample ACCC-01.

A Bond ball mill work index (BWi) test was done with a reference screen of 125 µm, resulting in a P80 of 103 µm. The composite reported a BWi of 10.6 kW-h/t, which is considered a moderate hardness for grinding.

13.2.2 Phase 5A: Optimization Flotation

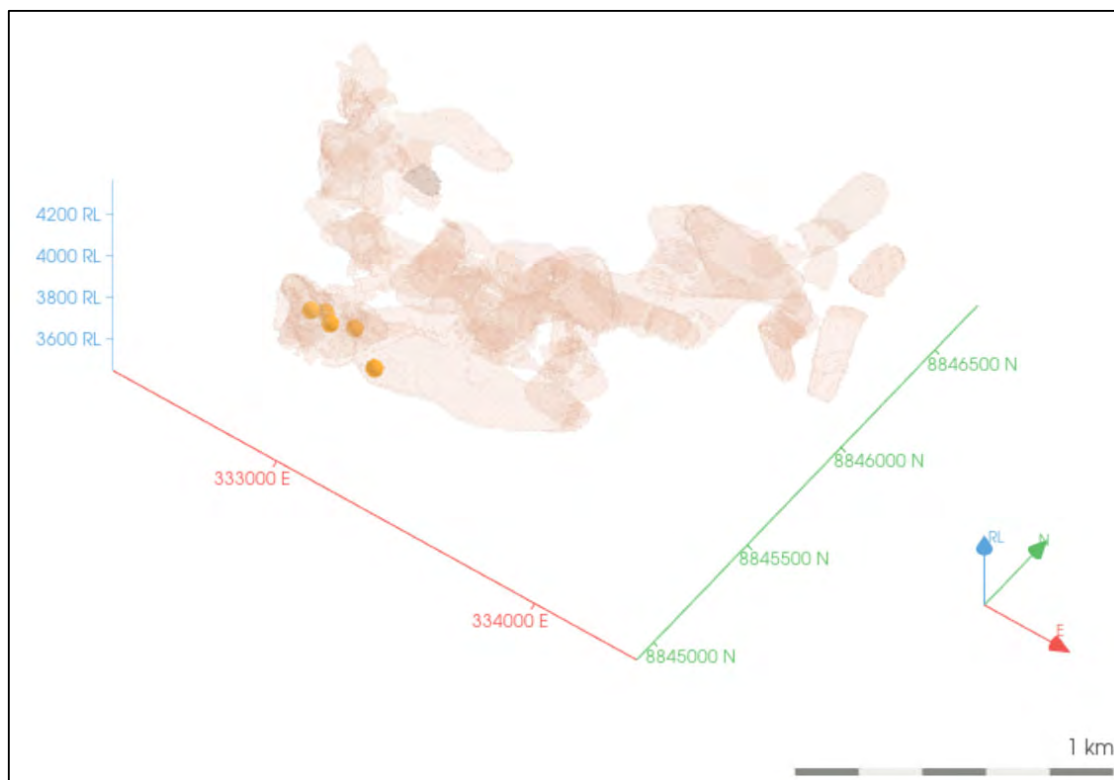
XPS Sudbury performed the metallurgical testwork during 2019 focusing on the optimization of the preliminary zinc flotation conditions determined in the Phase 3 metallurgical testwork.

The scheme selected in Phase 3 was only slightly modified to include a polishing regrind of the zinc rougher concentrate to P80 65 µm. Other than that, the flowsheet and reagents remained the same, however higher zinc concentrates grades were achieved in Phase 5 compared to Phase 3.

Table 13-1: Phase 3: Comminution; Composite ACCC-01

Composite	Drill	From (m)	To (m)	Length (m)
ACCC-01	A17-056	174.8	184	9.2
	A17-069	273.8	280.8	7
	A17-070	350	356.8	6.8
	A17-071	345	350	5
	A17-096	252.5	258	5.5

Figure 13-1: Phase 3: Comminution; Composite Locations in 3D



Note: Figure prepared by Transmin, 2021.

It is thought that the difference is due to the higher selectivity of the slow mechanical paddle froth removal employed in Phase 5a, compared to the more aggressive manual froth paddling in Phase 3. Consequently, it is recommended that selective flotation equipment, such as pneumatic cells with froth washing be employed to maximize zinc concentrate grade.

13.2.2.1 Samples

Samples AES-01 to AES-30 were subjected to quantitative evaluation of minerals by scanning electron microscopy (QEMSCAN) mineralogy. The samples belong to the South and West areas of the Zinc Zone. Table 13-2 shows the sourced of the samples and their chemical characterization.

Figure 13-2 is a map showing the sample locations.

13.2.2.2 Composites

Three composites were formed based on the mineralogical analysis of the individual samples:

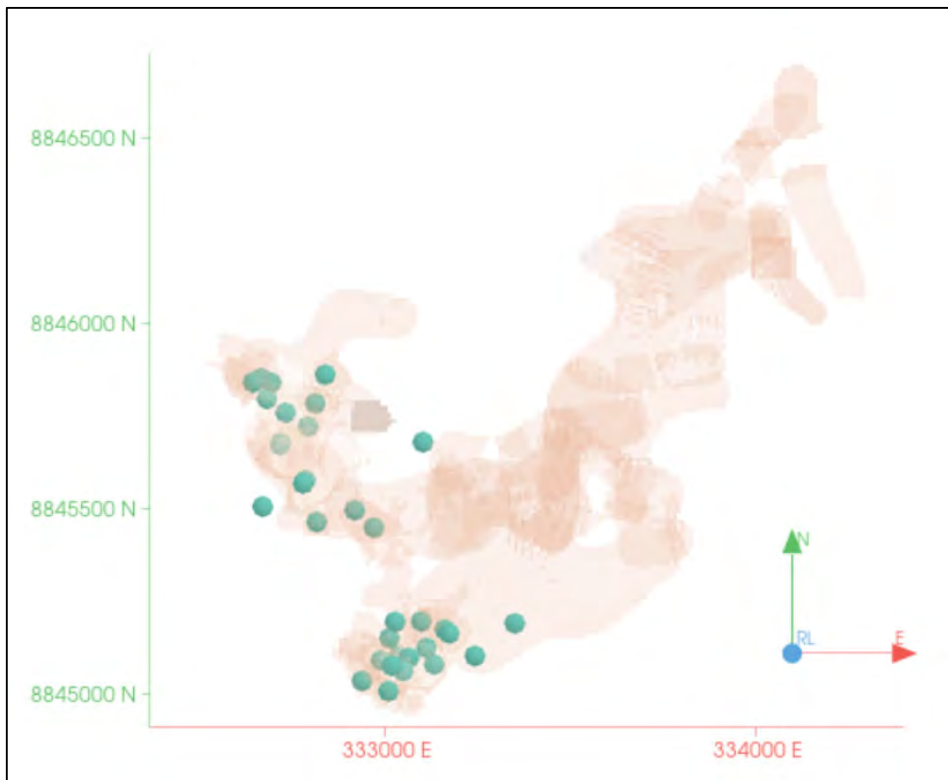
- AEC-02 was created from 11 samples using 5 kg each of AES-03, AES-04, AES-05, AES-06, AES-16, AES-17, AES-25, AES-28 and AES-29, 4 kg of AES-02 and 3 kg of AES-10, totalling 52 kg. This composite was formed using samples with a Zn:S ratio >0.5 containing lower iron sulphides and higher silicate content than AEC-03;
- AEC-03 was created from 17 samples using 4 kg each of AES-01, AES-07, AES-11, AES-12, AES-13, AES-14, AES-15, AES-18, AES-19, AES-20, AES-22, AES-24, AES-26, ASE-27 and AES-30 and 2 kg of AES-09 and AES-21, totalling 64 kg. This composite was formed using samples with a Zn:S ratio <0.5 and contained substantially higher iron sulphide content than AEC-02;
- AEC-05 was created from four samples using 2 kg each of AES-12, AES-20, AES-27, and AES-30, totalling 8 kg. This composite was lower grade, and more typical of the average zinc grade of the Zinc Zone mineralization.

Table 13-3 shows the chemical characterization of all three composites.

Table 13-2: Phase 5A: Optimization Flotation; Chemical Characterization of Samples

Sample	Hole	From (m)	To (m)	Zone	Ag (g/t)	As (%)	Cu (%)	Fe (%)	Mn (%)	Pb (%)	S, (%)	Si (%)	Sn (%)	Zn (%)
AES 01	A17-056	140.15	145.4	South	19	0.5	<0.03	21.6	0.7	0.2	17.6	11.3	<0.06	11.4
AES 02	A17-056A	286.5	294.25	South	17	0.1	<0.03	33.9	4.8	0.1	15.9	6.0	0.1	9.8
AES 03	A17-061	144	152	South	15	0.0	<0.03	5.2	0.1	<0.03	10.3	36.5	<0.06	10.3
AES 04	A17-063	329	338	South	14	1.2	<0.03	24.7	0.2	<0.03	26.6	10.3	0.2	20.0
AES 05	A17-065	310.7	319.45	South	9	0.7	<0.03	35.8	0.8	0.0	14.2	11.7	0.1	5.0
AES 06	A17-069	284.4	295.1	South	19	0.5	<0.03	29.1	3.9	0.1	20.8	4.7	0.1	12.8
AES 07	A17-070	321.7	328.6	South	9	0.4	<0.03	33.2	3.7	0.1	6.3	5.2	<0.06	5.1
AES 08	A17-071	330.4	336.4	South	31	1.6	<0.03	37.9	0.4	0.3	33.3	5.8	<0.06	8.9
AES 09	A17-075	375.3	379.8	South	14	0.1	<0.03	37.3	0.9	0.1	47.5	1.0	1.0	7.1
AES 10	A17-089	241	250.2	South	25	0.8	<0.03	5.3	0.3	0.0	8.7	37.8	<0.06	9.6
AES 11	A17-096	343.4	348.7	South	20	0.5	<0.03	32.0	0.8	0.1	35.8	1.1	<0.06	18.7
AES 12	A17-096	269	282	South	9	1.4	<0.03	38.6	0.4	<0.03	8.0	10.1	<0.06	6.9
AES 13	A18-133	200	209.5	South	17	1.0	<0.03	38.4	1.3	0.6	11.8	7.6	<0.06	10.1
AES 14	A18-139	311.9	317.9	South	33	0.4	<0.03	28.9	0.9	0.7	35.3	7.5	<0.06	12.7
AES 15	A18-142	236	245.7	South	19	0.5	0.04	37.1	0.5	0.1	35.9	3.8	<0.06	8.1
AES 16	A17-074	70	78	West	22	0.4	0.03	4.0	0.1	<0.03	6.7	38.9	<0.06	5.2
AES 17	A17-079	304	309.5	West	9	0.6	0.03	27.1	0.8	0.0	31.6	10.7	0.2	13.0
AES 18	A17-080	300	306.5	West	12	0.8	0.03	29.4	3.3	0.1	22.8	4.6	0.2	9.9
AES 19	A18-118	272.4	281.3	West	21	0.1	0.04	23.6	1.9	0.1	25.8	11.8	0.1	11.9
AES 20	A18-118	324	334	West	12	0.1	0.03	33.2	1.7	0.1	33.1	7.7	0.1	8.1
AES 21	A18-120	349.4	353.7	West	86	0.0	0.03	40.3	0.6	0.1	51.3	2.7	<0.06	3.6
AES 22	A18-129	273	281.2	West	19	0.4	0.03	33.8	0.6	0.2	38.9	3.7	0.1	13.4
AES 23	A18-130	302	310	West	12	1.4	0.05	36.1	<0.06	0.1	26.4	11.8	0.1	9.4
AES 24	A18-132	260.2	268	West	22	0.2	0.04	28.5	0.4	0.1	38.5	6.2	0.1	17.0
AES 25	A18-137	279.3	290.1	West	19	0.6	0.04	35.1	0.6	0.1	16.4	6.5	0.1	12.8
AES 26	A18-140	283.6	290.9	West	9	0.7	0.03	30.2	1.1	0.1	30.8	6.3	<0.06	11.8
AES 27	A18-141	336	345.9	West	10	0.4	0.03	18.9	2.4	0.1	4.6	13.8	<0.06	5.2
AES 28	A18-141	372.4	378	West	28	0.6	0.1	16.7	4.3	0.1	14.4	10.5	0.1	17.2
AES 29	A18-143	151.8	160	West	18	1.3	0.1	13.5	0.9	0.1	18.4	24.3	<0.06	13.8
AES 30	A18-143	262.3	268.9	West	22	0.0	0.1	17.5	2.8	0.1	7.9	11.0	0.1	7.9

Figure 13-2: Phase 5A: Optimization Flotation; Sample Locations in 3D



Note: Figure prepared by Transmin, 2021.

Table 13-3: Phase 5A: Optimization Flotation; Composite Chemical Characterization

Composite	Al (%)	As (%)	Ca (%)	Cu (%)	Fe (%)	Mg (%)	Pb (%)	S (%)	Si (%)	Zn (%)
AEC-02	0.58	0.60	0.31	0.04	21.3	0.45	0.04	15.3	16.2	11.3
AEC-03	0.89	0.46	0.49	0.04	30.4	0.87	0.14	23.9	6.9	10.3
AEC-05	2.00	0.49	0.31	0.05	27.1	1.59	0.06	13.38	10.7	7.02

13.2.2.3 Flotation

13.2.2.3.1 Rougher Flotation

Several rougher tests were performed to evaluate the optimum conditions:

- Dosage of copper sulfate activator for zinc;
- Collector type:
 - o Isopropyl ethyl thionocarbamate;
 - o Sodium isopropyl xanthate;

- Collector dosage.

All tests included a grind stage of P80 at 106 μm .

The same conditions were selected for both composites (shown in blue in Figure 13-3 and Figure 13-4).

13.2.2.3.2 Cleaner Flotation

The evaluation of a cleaner test was performed as an open cleaner test with a standard flowsheet (CI 01, CI Scv and CI 02). A total of three open circuits cleaner tests were conducted on AEC-02, four open circuits tests were conducted on AEC-03, and one test on AEC-05.

Parameters that were varied were:

- Copper sulfate activator addition;
- Collector dosage;
- Regrind size.

All three concentrates reported high recoveries to a zinc concentrate grade of ~50% Zn. The conditions selected are given in Table 13-3.

13.2.2.3.3 Locked Cycle Testing

Locked cycle testing (LCT) was conducted on composites AEC-02 and AEC-03 at XPS. Two tests were conducted on AEC-02, the first was done without regrinding and the second was done with regrinding of the rougher concentrate to P80 65 μm . The test that was conducted for AEC-03 included a regrind.

Figure 13-5 shows the LCT flowsheet and Table 13-4 showed the LCT flotation conditions. The mass balance for the last three cycles for each composite is shown in Table 13-5.

A polishing regrind of P80 65 μm was selected to maximize concentrate zinc grade, but further work is still required to define the optimal configuration.

13.2.2.4 Concentrate Characterization

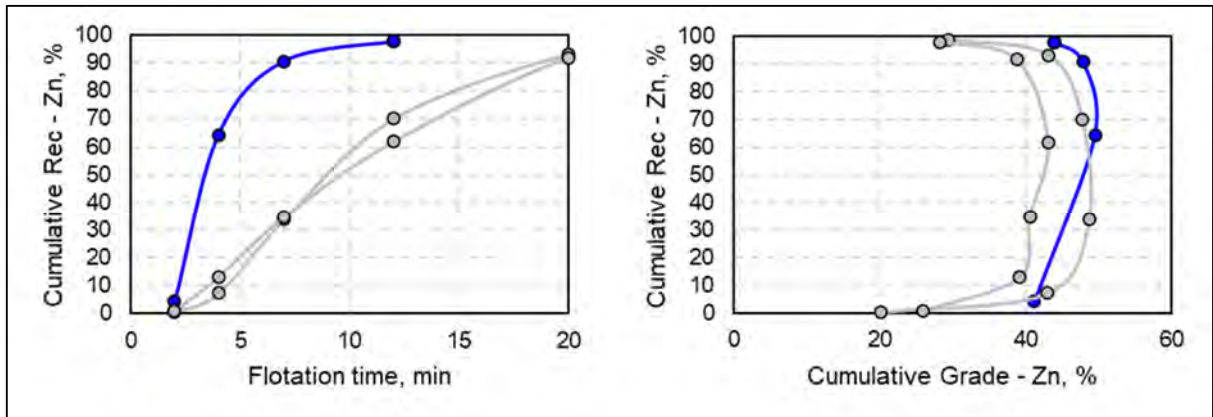
The final zinc concentrates (combination from cycle 4 and 5) produced from locked cycle tests were analyzed for typical penalty and credit species. The results are shown in Table 13-6.

13.2.2.5 Mineralogy

Mineralogy QEMSCAN analysis was completed on all 30 drill core primary composite samples at XPS on material crushed to 10 mesh.

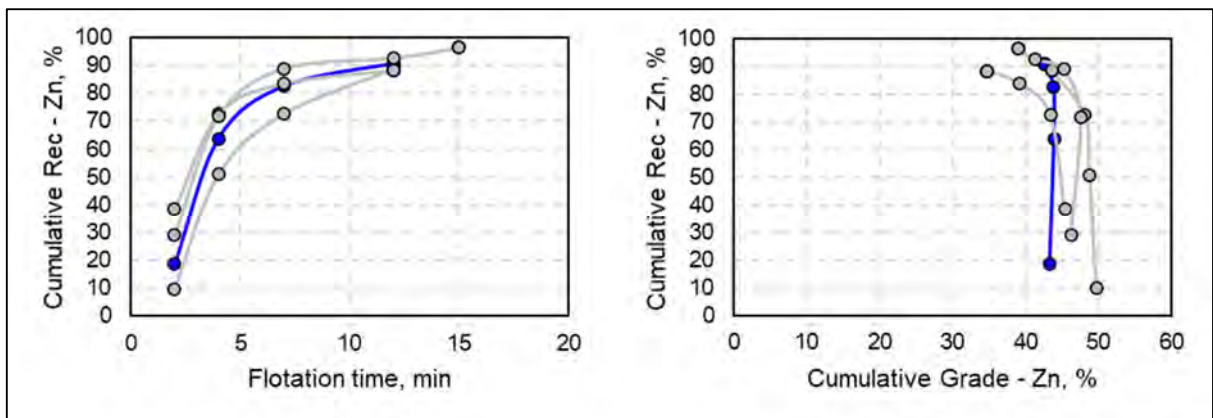
Based on the mineralogy, a 100–150 μm grind size would be suitable to liberate the zinc in most of the samples.

Figure 13-3: Phase 5A: Optimization Flotation Results for composite AEC-02



Note: Figure prepared by Transmin, 2021.

Figure 13-4: Phase 5A: Optimization Flotation Results for composite AEC-03



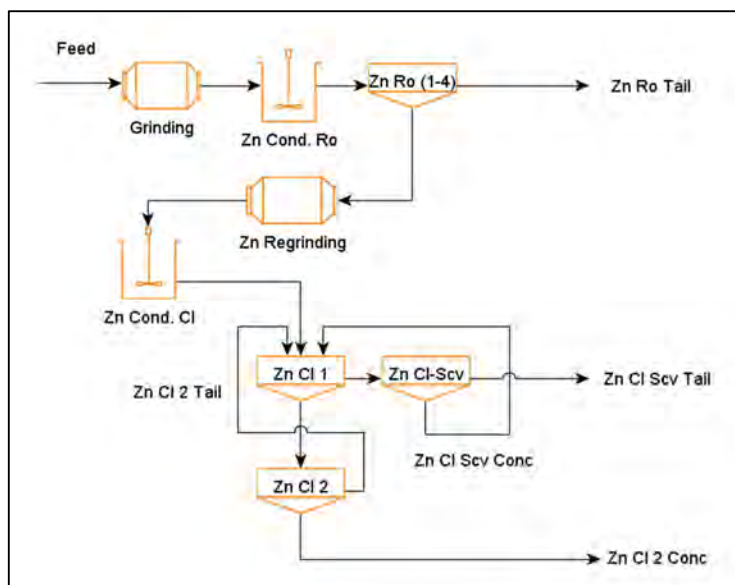
Note: Figure prepared by Transmin, 2021.

Table 13-4: Phase 5A: Optimization Flotation; Locked Cycle Test Conditions

Stage	Reagents (g/t)				P80 (μ m)	Solids (%)	Time (min)	pH
	CaO	CuSO	A3894	MIBC/D250				
Grind	1,500				106	60		
Cond.		300				35	3	9
Cond.			20	2.5			2	9
Rougher 1							2	
Cond.			10	2.5			2	9
Rougher 2							2	
Cond.			10				1	9

Stage	Reagents (g/t)				P80 (μ m)	Solids (%)	Time (min)	pH
	CaO	CuSO	A3894	MIBC/D250				
Rougher 3							3	
Cond.			5				1	9
Rougher 4							5	
Regrind					65		3	
Cond		75				15	3	9
Cond.			10	2.5			1	
Cleaner 01							10	
Cleaner Scv			10	2.5			4	
Cleaner 02							10	9

Figure 13-5: Phase 5: Optimization Flotation; Locked Cycle Flowsheet



Note: Figure prepared by Transmin, 2021.

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

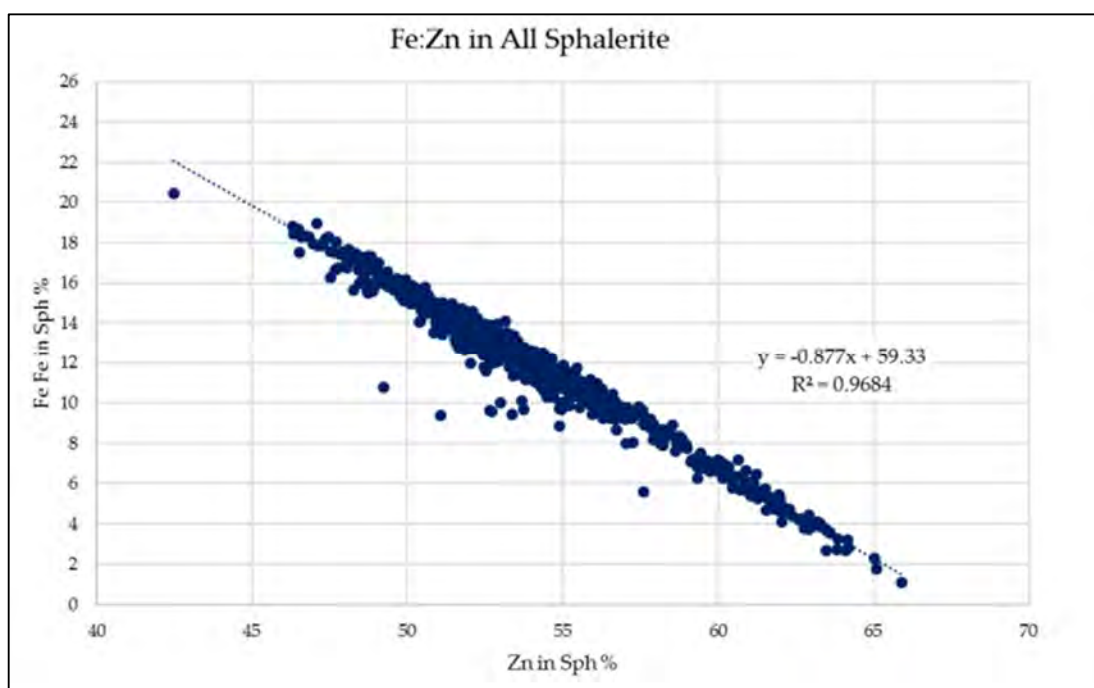
Composite	Stream	Mass (%)	Grade (%)							Recovery (%)						
			Zn	Cu	S	Fe	Si	As	Mg	Zn	Cu	S	Fe	Si	As	Mg
AEC-02 (no regrind)	Cl 2 Conc	24.0	46.4	0.2	33.9	15.4	1.0	0.7	0.3	96.1	77.7	54.2	18.3	1.5	34.3	16.1
	Cl Scv Tail	3.0	2.7	0.1	15.9	28.5	11.7	1.0	1.8	0.7	3.7	3.1	4.2	2.1	6.1	11.1
	Ro Tail	73.1	0.5	0.0	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

Table 13-6: Phase 5A: Optimization Flotation; Zn Concentrate Chemical Assay Results

Analyte	Unit	AEC-02	AEC-03	Detection Limit	Analyte	Unit	AEC-02	AEC-03	Detection Limit
Al	%	0.030	0.030	0.010	Ta	g/t	<0.2	<0.2	0.20
As	g/t	319	242	5.00	Tb	g/t	<0.1	<0.1	0.10
B	g/t	<10	<10	10.0	Te	g/t	<6	<6	6.00
Ba	g/t	4.00	4.00	3.00	Th	g/t	0.20	0.10	0.10
Be	g/t	<3	<3	3.00	Ti	%	<0.01	<0.01	0.010
Bi	g/t	26.0	22.0	2.00	Tl	g/t	1.50	2.70	0.10
Ca	%	0.050	0.050	0.010	Tm	g/t	<0.1	<0.1	0.10
Cd	g/t	1,800	1,650	2.00	U	g/t	1.10	1.20	0.10
Ce	g/t	0.90	<0.8	0.80	V	g/t	<5	<5	5.00
Co	g/t	8.50	11.0	0.20	W	g/t	1.10	0.80	0.70
Cr	g/t	90.0	90.0	30.0	Y	g/t	1.00	0.90	0.10
Cs	g/t	1.00	0.90	0.10	Yb	g/t	<0.1	<0.1	0.10
Cu	g/t	2,280	1,880	2.00	Zn	g/t	>10,000	>10,000	30.0
Dy	g/t	<0.3	<0.3	0.30	Zn	%	50.9	50.5	0.010
Er	g/t	<0.1	<0.1	0.10	Au	g/t	0.060	0.021	0.002
Eu	g/t	0.10	<0.1	0.10	Pd	g/t	<0.005	<0.006	0.005
Fe	%	13.1	14.0	0.050	Pt	g/t	<0.006	0.0	0.005
Ga	g/t	11.7	10.6	0.20	Ag	g/t	52.0	51.0	3.00
Gd	g/t	0.10	0.10	0.10	Hg	g/t	4.57	4.51	0.005
Ge	g/t	0.90	1.50	0.70	C-Total	%	0.15	0.21	0.010
Ho	g/t	<0.2	<0.2	0.20	S-Total	%	33.9	34.1	0.010
Hf	g/t	<10	<10	10.0	Co ₃ O ₄	%	<0.005	<0.005	0.0050
In	g/t	719	399	0.20	CuO	%	0.30	0.25	0.0050
K	%	<0.1	<0.1	0.10	NiO	%	0.0080	0.0060	0.0030
La	g/t	0.50	<0.4	0.40	SiO ₂	%	0.74	0.46	0.010
Li	g/t	24.0	24.0	3.00	Al ₂ O ₃	%	0.080	0.10	0.010
Mg	%	0.16	0.10	0.010	Fe ₂ O ₃ (T)	%	16.9	18.3	0.010
Mn	g/t	1,190	1,700	3.00	MnO	%	0.14	0.21	0.0010
Mo	g/t	5.00	5.00	1.00	MgO	%	<0.01	<0.01	0.010
Nb	g/t	<2.4	<2.4	2.40	CaO	%	<0.01	<0.01	0.010
Nd	g/t	<0.4	0.40	0.40	Na ₂ O	%	<0.01	<0.01	0.010
Ni	g/t	20.0	10.0	10.0	K ₂ O	%	0.010	0.010	0.010
Pb	g/t	821	4,830	0.80	TiO ₂	%	0.010	0.010	0.010
Pr	g/t	0.10	0.10	0.10	P ₂ O ₅	%	0.010	0.010	0.010
Rb	g/t	0.70	0.40	0.40	Cr ₂ O ₃	%	0.010	0.010	0.010

Analyte	Unit	AEC-02	AEC-03	Detection Limit	Analyte	Unit	AEC-02	AEC-03	Detection Limit
S	%	>25.0	>25.0	0.010	V ₂ O ₅	%	<0.003	<0.003	0.0030
Sb	g/t	25.0	34.0	2.00	Total	%	33.5	34.9	0.010
Se	g/t	2.60	2.40	0.80	Cl	%	0.030	0.020	0.010
Si	%	0.39	0.26	0.010	F	%	0.020	0.010	0.010
Sm	g/t	0.10	0.20	0.10	CO ₃ (calc)	%	0.25	0.59	0.010
Sn	g/t	378	413	0.50	LOI	%	15.3	15.5	
Sr	g/t	16.0	21.0	3.00					

Figure 13-6: Phase 5A: Optimization Flotation ; Sample Mineralogy, Fe–Zn in Sphalerite



Note: Figure prepared by XPS, 2019.

13.2.3 Phase 5B: Lead–Silver Flotation

XPS Sudbury performed the Phase 5B metallurgical testwork to characterize the lead–silver mineralization at Ayawilca. The program consisted of an initial mineralogical assessment of 11 variability samples, which led to the creation of three composites for further metallurgical testing.

13.2.3.1 Samples

Phase 5B samples were selected by Tinka, focusing on variable lead–silver grades.

The samples were typically in the top 10% of silver and lead grades in the resource, and so are not considered to be representative of the typical material to be processed.

Table 13-7 shows the drill hole sample source and chemical characterization. Figure 13-7 shows the sample locations.

13.2.3.2 Composites

Four composites were formed based on the mineralogical analysis of the individual samples:

- Silicate-rich– low iron composite was created from four samples (Pb-Ag Comp 01, Pb-Ag Comp 02, Pb-Ag Comp 07 and Pb-Ag Comp 08) using the same mass proportion for each;
- Siderite rich–high iron composite was created from three samples (Pb-Ag Comp 03, Pb-Ag Comp 04 and Pb-Ag Comp 06) using the same mass proportion for each;
- Low lead–high zinc composite was created from two samples (74% of Pb-Ag Comp 09 and 26% of Pb-Ag Comp 10);
- High pyrite–pyrrhotite (py–po) composite was created using only one sample (Pb-Ag Comp 11).

Table 13-8 shows the chemical characterization for the main composites.

13.2.3.3 Lead–Silver Flotation Testwork

This flotation testwork was conducted using the standard flowsheet for zinc as optimized in the 2019 testwork, modified into a sequential lead then zinc flotation circuit. Table 13-9 shows the Pb/Ag flotation conditions and Figure 13-8 the flowsheet.

Table 13-10 shows the cleaner results for the lead concentrate and zinc concentrate. Figure 13-9 and Figure 13-10 show the grade/recovery curves for the lead and zinc circuits, respectively.

The open circuit conditions were suitable for all of the composites (except for the High Py-Po sample). The results of 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%. These three composites responded well to flotation using the adopted reagent schemes.

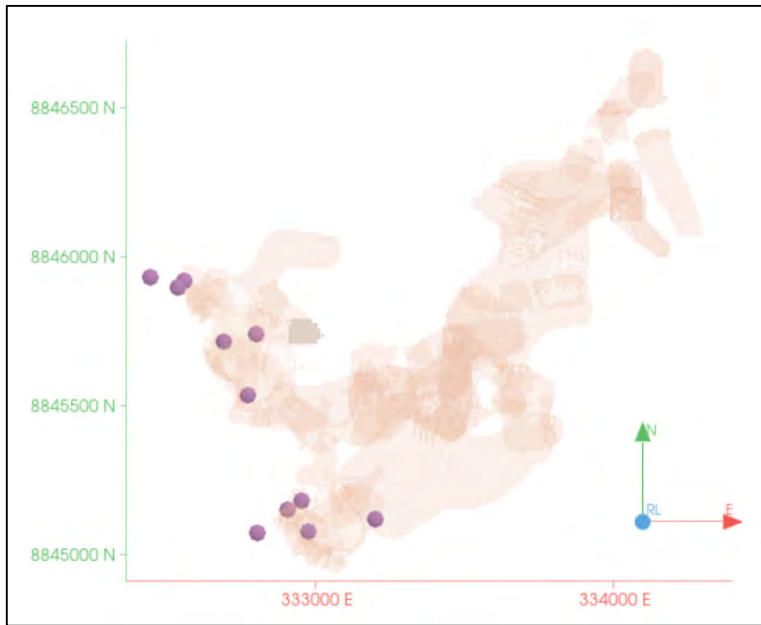
The high pyrite–pyrrhotite sample results showed lower grade and recovery for lead, silver, and zinc in both concentrates. The high pyrrhotite material requires more investigation; however, this style of mineralization is a minor component in the overall Ayawilca deposit.

Table 13-7: Phase 5B: Pb/Ag Variability Flotation; Sample Chemical Characterization

Sample	Drill	From (m)	To (m)	Ag (g/t)	Al (%)	Ca (%)	Cu (%)	Fe (%)	Mg (%)	Mn (%)	Pb (%)	S (%)	Si (%)	Zn (%)
Pb-Ag Comp 01	A14-026	207.5	230.0	64	3.96	0.65	0.09	14.5	3.67	4.21	1.99	6.56	15.4	2.86
Pb-Ag Comp 02	A15-054	168.9	173.0	152	0.12	0.09	0.02	9.23	0.15	6.4	1.97	5.36	28.2	2.97
Pb-Ag Comp 03	A17-072	294.5	308.0	360	0.17	0.65	< 0.005	19.9	2.91	16.5	1.81	3.26	2.22	2.41
Pb-Ag Comp 04	A17-095	307.3	316	171	0.29	0.46	0.01	18.5	2.26	15.9	0.67	3.21	6.65	1.36
Pb-Ag Comp 05	A18-117	94	103	219	2.11	0.13	0.05	9.69	0.29	0.56	6.06	9.24	24.9	8.89
Pb-Ag Comp 06	A18-131	266	274	989	0.05	0.33	0.02	19.5	0.36	22.3	3.1	3.11	0.65	1.65
Pb-Ag Comp 07	A18-137	170	182.1*	123	2.59	5.32	0.1	15.4	3.64	3.99	2.91	11.6	8.58	2.87
Pb-Ag Comp 08	A19-159	171.6	181.7	48	2.02	0.82	0.08	16.8	3.23	3.45	1.6	4.43	15.9	3.44
Pb-Ag Comp 09	A19-165	149.9	156.8	24	1.02	0.29	0.01	20	1.58	9.19	0.6	5.32	10.9	5.07
Pb-Ag Comp 10	A19-167	434.5	442.3	159	0.07	0.5	0.03	12.1	0.54	5.31	0.65	7.5	22.5	7.82
Pb-Ag Comp 11	A20-170	200.4	215	68	0.74	0.26	0.03	32.8	0.25	0.92	1.17	26.1	8.55	4.08

Note: (*) The interval from 175–178 m was not available for this sample

Figure 13-7: Phase 5B: Pb/Ag Variability Flotation; Sample Locations in 3D



Note: Figure prepared by Transmin, 2021.

Table 13-8: Phase 5B: Pb/Ag Variability Flotation; Composite Chemical Characterization

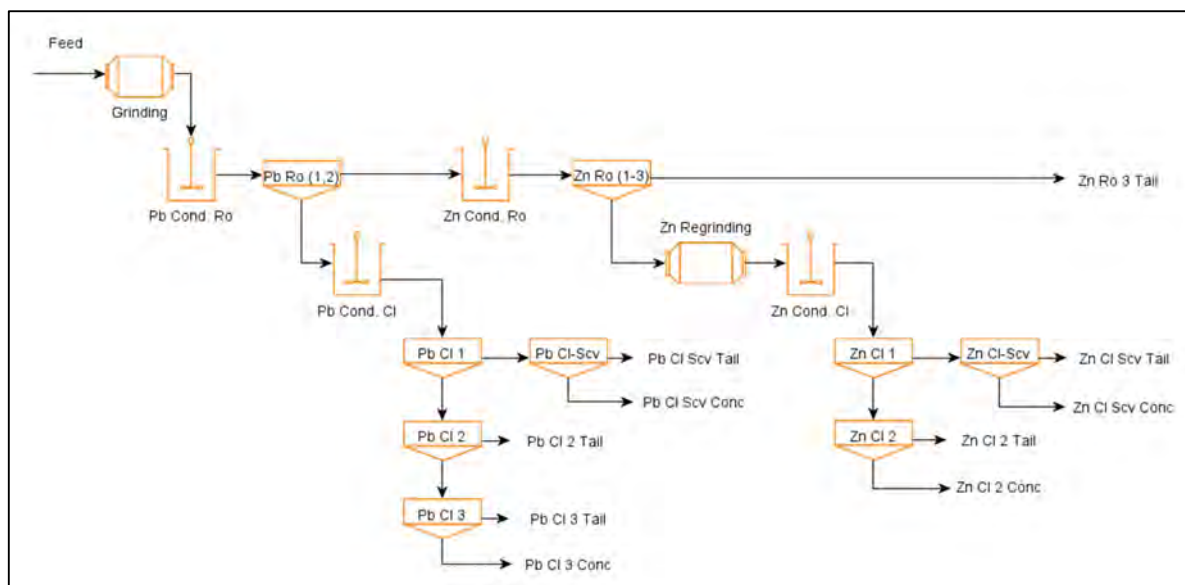
Composite	Ag, g/t	Fe, %	Pb, %	S, %	Zn, %	SiO ₂ , %	MgO, %
Silicate Rich Low Fe	107	13.77	2.44	7.25	3.2	35.95	4.35
Siderite Rich, High Fe	479	18.83	1.9	3.33	1.85	6.66	3
Low Pb, High Zn	63	17.37	0.62	5.95	5.76	30.06	2.17
High Py-Po	68	32.8	1.17	26.1	4.08	18.29	0.41

Table 13-9: Phase 5B: Lead–Silver Variability Flotation; Cleaner Conditions

Stage	Reagent				p80 (μm)	Time, min		pH
	SMBS	3418A	CuSO ₄	A3894		Cond.	Float	
Grinding					106			
Pb Conditioning 1	600 g/t					2		Natural (below 8 with H ₂ SO ₄)
		10 g/t				2		
Pb Ro 01							2	Natural (below 8 with H ₂ SO ₄)
Pb Ro 02		5 g/t				1	3	Natural (below 8 with H ₂ SO ₄)
Pb Cl 01	as req.	3 g/t					2	5.5 (maintain with SMBS)
Pb Cl Scv	as req.	5 g/t					3	5.5 (maintain with SMBS)
Pb Cl 02	as req.						2	5.5 (maintain with SMBS)

Stage	Reagent				P80 (μ m)	Time, min		pH
	SMBS	3418A	CuSO ₄	A3894		Cond.	Float	
Pb Cl 03	as req.						2	5.5 (maintain with SMBS)
Zn Conditioning 1			50 g/t/% Zn			3		9 (maintain with lime)
Zn Ro 01				20 g/t		2	2	9 (maintain with lime)
Zn Ro 02				10 g/t		2	3	9 (maintain with lime)
Zn Ro 03				10 g/t		2	5	9 (maintain with lime)
Regrinding					60			
Zn Cl 01			7.5 g/t/%Zn	6 g/t			10	9 (maintain with lime)
Zn Cl Scv							5	9 (maintain with lime)
Zn Cl 02							7	9 (maintain with lime)

Figure 13-8: Phase 5B: Pb/Ag Variability Flotation - Cleaner - Flowsheet



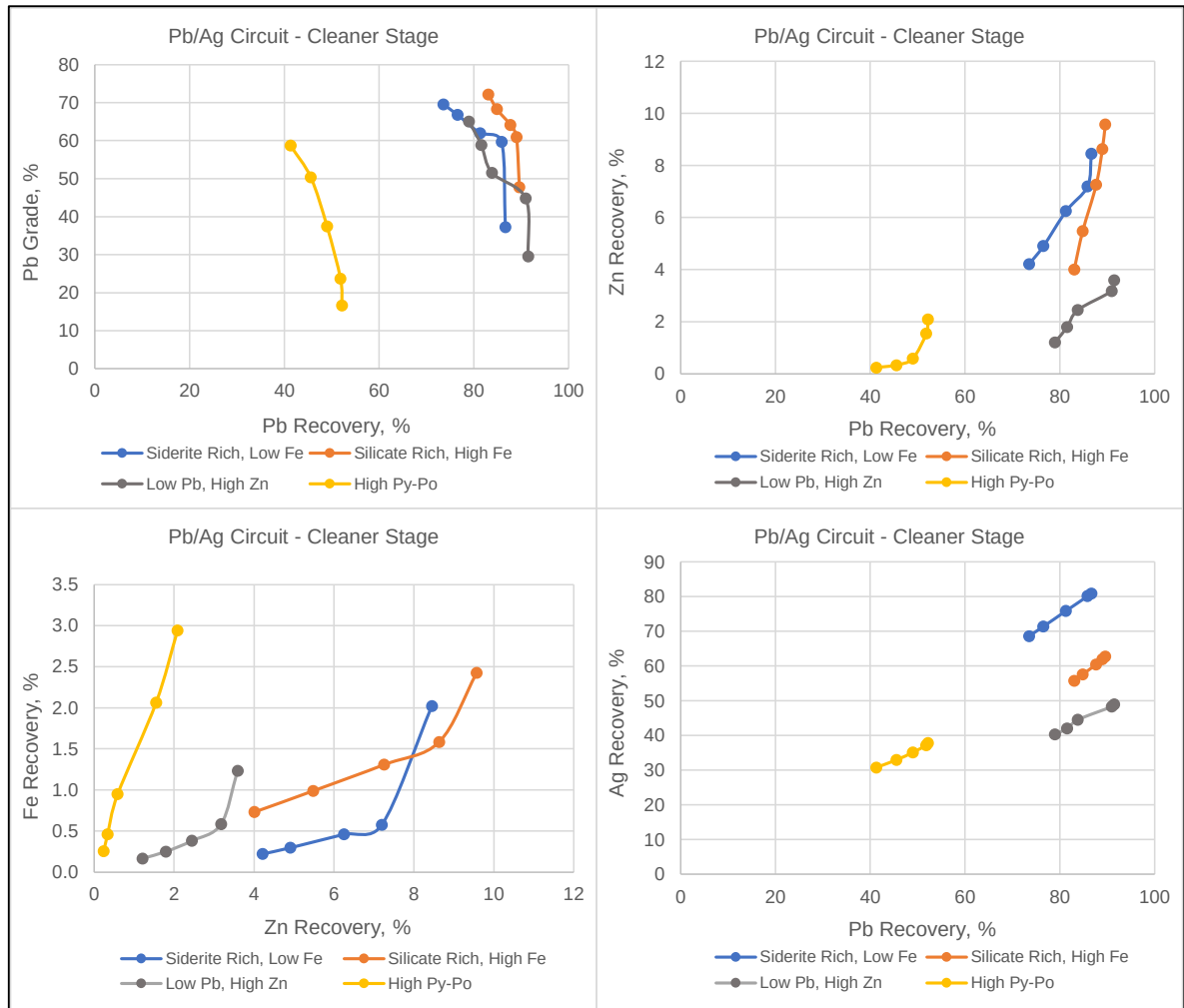
Note: Figure prepared by Transmin, 2021.

Table 13-10: Phase 5B: Pb/Ag Variability Flotation; Cleaner Results

Composite	Stream	Mass, (%)	Grade						Recovery (%)					
			Ag (g/t)	Pb (%)	Zn (%)	Fe (%)	S (%)	SiO ₂ (%)	Ag	Pb	Zn	Fe	S	SiO ₂
Siderite Rich, Low Fe	Pb Cl 03 Conc	1.7	17,663	69.6	4.4	2.46	15.1	0.42	68.6	73.5	4.2	0.2	8.7	0.1
	Zn Cl 02 Conc	2.5	1,320	2.72	55.9	6.48	31.0	0.83	7.4	4.1	77.4	0.8	25.8	0.3
Silicate Rich, High Fe	Pb Cl 03 Conc	2.4	2,056	72.2	5.3	4.09	16.9	0.38	55.8	83.0	4.0	0.7	6.4	0.03
	Zn Cl 02 Conc	5.7	336	2.05	49.6	13.7	31.8	1.89	21.3	5.5	86.9	5.7	27.9	0.3

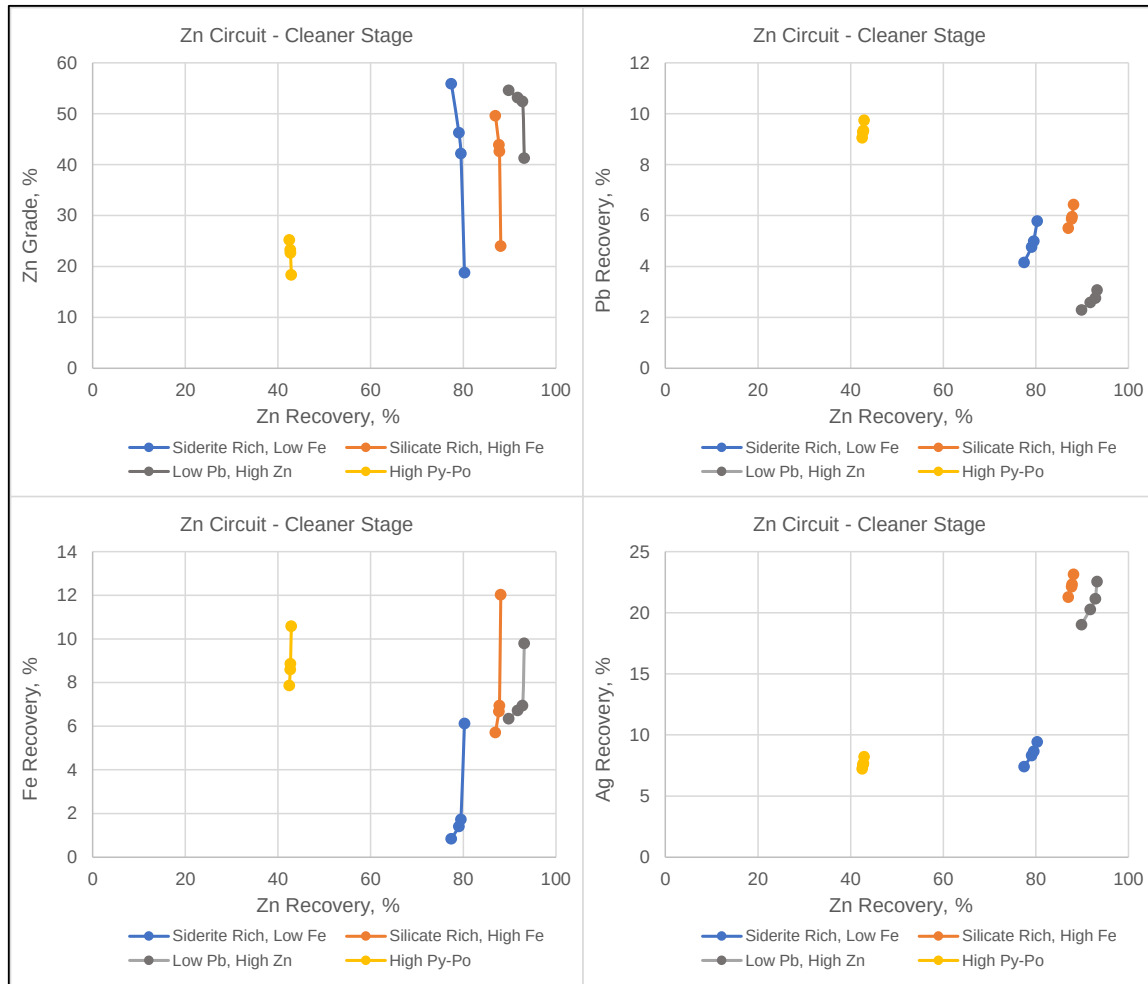
Low Pb, High Zn	Pb Cl 03 Conc	0.8	3,178	65.1	9.27	3.98	17.6	0.80	40.3	79.0	1.2	0.2	2.2	0.02
	Zn Cl 02 Conc	9.5	119	0.15	54.6	12.1	34.5	0.33	19.0	2.3	89.8	6.4	55.4	0.1
High Py-Po	Pb Cl 03 Conc	0.6	2,782	58.7	1.5	12.0	19.7	0.51	30.8	41.3	0.2	0.3	0.5	0.02
	Zn Cl 02 Conc	6.4	62.0	1.22	25.2	35.2	38.2	0.47	7.24	9.1	42.5	7.9	11.0	0.16

Figure 13-9: Phase 5B: Pb/Ag Variability Flotation: Cleaner Pb/Ag Circuit



Note: Figure prepared by Transmin, 2021.

Figure 13-10: Phase 5B: Pb/Ag Variability Flotation; Cleaner, Zn Circuit



Note: Figure prepared by Transmin, 2021.

Zinc recovery was not the focus of the investigation, and it is expected that the displacement of 1 to 4% of zinc recovery to the Pb/Ag concentrate would be reduced in the next stage of testwork.

13.2.3.4 Mineralogy

Mineralogy analysis was completed on the 11 samples by QemSCAN analysis on material crushed to 100% passing -10 mesh.

The main gangue minerals are silicate gangue (quartz, kaolinite or chlorite) and siderite minerals (with variability in iron–manganese–magnesium content). The main sulphides are sphalerite, pyrite/marcasite, galena and some arsenopyrite. The sphalerite and galena liberation are very good at the target grind. A total of 71% of sphalerite is free or liberated and an additional 11% occurs as high grade middlings. Galena shows a similar degree of liberation with 64.4% of the galena free or liberated and an additional 11.5% occurring as high

grade middlings. The mineralogy analysis reported a maximal theoretical zinc grade for all the samples between 53–60% Zn.

Additionally, three samples (Pb-Ag Comp 05, Pb-Ag Comp 10 and Pb-Ag Comp 11) were selected for laser ablation testwork to identify the silver minerals in solid solution within sulphides. The analysis showed that most of the silver occurs in discrete silver minerals including silver-rich sphalerite, freibergite (Ag, Cu, Sb sulphide), and AgSb (polybasite). A minor amount of silver (12.5%) occurs in solid solution in galena. With the expectation that liberated silver minerals will float to the lead concentrate, the combination of liberation and association as well as solid solution in galena would indicate a theoretical silver recovery to the lead concentrate of 68%.

13.2.4 Phase 5C: Lead–Silver Jameson Cell

13.2.4.1 Samples

Based on the results of previous flotation testwork, the Jameson cell composite was created using a 50/50 blend of the Siderite Rich, Low Fe and Silicate Rich, High Fe composites. Table 13-11 shows the chemical characterization of the composite.

13.2.4.2 Jameson Cell Test

A total of 10 kg of feed was used to perform the flotation test which was conducted using the standard Tinka flowsheet for lead–zinc. A Jameson cell (L150) was used to float the lead and at the end of the lead flotation, a subsample of lead rougher tailings was taken for bench scale flotation of the zinc circuit.

Table 13-12 shows the Jameson cell testwork conditions and Table 13-13 the results of the testwork.

During the Jameson cell test, the SMBS dosage was increased to maintain the same pH (a pH of 6), this was needed due to the lower the feed percent solids (i.e., more water) to the rougher flotation circuit. It was difficult to achieve a suitable froth depth, which resulted in a slightly shifted down grade/recovery curve than expected, see Figure 13-11.

The Jameson Cell test was successful in metallurgical performance for the lead–silver circuit. The lead–silver concentrate is believed to be marketable considering the high silver content.

13.2.5 Phase 5D: Tailings Characterization testwork

XPS Sudbury performed metallurgical testwork to produce a typical zinc flotation tailings sample from the zinc circuit. The tailings sample was then sent to Golder Sudbury for tailings preliminary characterization tests.

Table 13-11: Pb/Ag Jameson Cell Test; Composite Chemical Characterization

Composite	Ag (g/t)	Al (%)	Fe (%)	Pb (%)	S (%)	Zn (%)	SiO ₂ (%)	MgO (%)
Jameson cell	209	1.15	16.8	1.53	4.79	2.20	21.3	3.87

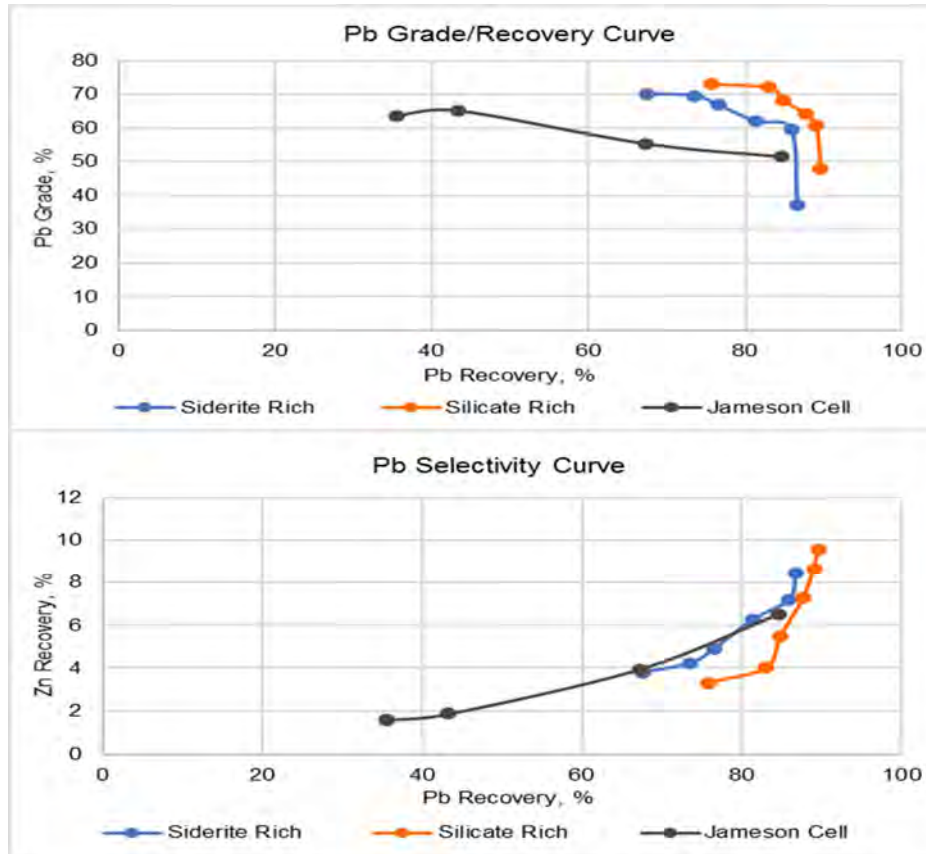
Table 13-12: Pb/Ag Jameson Cell Test; Flotation Conditions

Stage	Reagent					P80 (µm)	Solids (%)	Time (min)		pH
	SMBS	3418A	CuSO ₄	A3894	MIBC			Cond.	Float	
Grind						106	60			
Pb Cond. 1	840 g/t						18	2		Natural (maintain 6 with SMBS)
		10 g/t						2		
Pb Ro 01					120 g/t				1	
Pb Ro 02		5 g/t			250 g/t				3	
Pb Ro 03									5	
Pb Ro 04									10	
Zn Cond. 1			50 g/t/% Zn				16.5	3		9 (maintain with lime)
Zn Ro 01				20 g/t	20 g/t			2	2	9 (maintain with lime)
Zn Ro 02				10 g/t				2	3	9 (maintain with lime)
Zn Ro 03				10 g/t				2	5	9 (maintain with lime)

Table 13-13: Pb/Ag Jameson Cell Test; Flotation Results

Stream	Mass (%)	Grade						Recovery (%)					
		Ag (g/t)	Pb (%)	Zn (%)	Fe (%)	S (%)	SiO ₂ (%)	Ag	Pb	Zn	Fe	S	SiO ₂
Pb Ro Conc 1-2	0.87	9,001	65.1	4.8	4.7	14.8	2.7	43.4	43.3	1.9	0.3	3.5	0.1
Pb Ro Conc 1-4	2.15	6,779	51.6	6.8	7.0	14.3	5.5	80.8	84.7	6.5	1.0	8.3	0.4
Zn Ro Conc 1-3	4.87	444	2.02	39.5	12.6	25.2	4.9	12.0	7.5	85.6	4.2	33.2	0.8
Zn Ro Tail	93.0	14	0.11	0.2	15.0	2.3	30.4	7.2	7.8	7.9	94.8	58.6	98.8
Head Calculated	100.0	180	1.31	2.2	14.7	3.7	28.7	100.0	100.0	100.0	100.0	100.0	100.0

Figure 13-11: Phase 5B: Pb/Ag Jameson Cell Test; Comparison Grade–Recovery Curve



Note: Figure prepared by XPS, 2021.

13.2.5.1 Composite

Fifteen kilograms of AEC-02 and 15 kg of AEC-03 was combined to be used for tailings generation.

13.2.5.2 Tailings Generation

Tailings samples for solid-liquid testwork were generated by locked cycle flotation (LCT). Rougher tailings and cleaner scavenger tailings were collected together as one combined tailings product.

The combined tailings were delivered to Golder Sudbury as slurry samples.

13.2.5.3 Tailings Characterization

Golder Sudbury performed a preliminary characterization, sedimentation and filtration test on the tailings. Table 13-14 shows the main characteristics of the tailings used.

Table 13-14: Phase 5D: Tailings; Solid/Liquid Separation Composite Characterization

Item	Value
Composite	AEC-02 (50%) & AEC-03 (50%)
pH	6.7
Particle size, μm	115
Specific gravity	3.62
Mineralogy	Mainly siderite, quartz and pyrite–marcasite

Settling tests were carried out in two stages. In the first stage, tests focused on selecting the appropriate flocculant. AN 905 VHM was chosen as the best flocculant tested.

The second stage included the determination of the percentage of solids in the feed and the flocculant dosage. The optimal parameters observed were of 20% of solids in the feed and 20 g/t of flocculant which resulted in a 69.6% of thickened solids in the underflow after one hour, and 71.7% after 24 hours, and water in the overflow with a turbidity of 42 nephelometric turbidity units (NTU) after 45 min.

Centrifugal tests were performed on the underflow stream to determinate the maximum percent of solids that could obtained. It was found that 80.8% w/w solids was achieved.

Filtration tests were performed on the thickened tailings, using a bench-scale testing unit with different filter cloths and the effect of adding a drying cyclone. The results are presented in Table 13-15.

The final moisture in the filtered cake was 9.0% under optimal conditions.

13.2.6 Phase 6: Tin Mineralogy Characterization

PMC performed size-by-size mineralogical characterization on samples from the Tin Zone. The objective was to characterize the tin-bearing mineral content, including speciation, liberation, size and mineral associations.

13.2.6.1 Samples

Phase 6 included five samples identified as AFS-001 to AFS-005. The samples were characterized chemically and mineralogically. Table 13-16 shows the samples' source and their chemical characterization, Figure 13-12 shows the sample locations.

The samples were taken from the highest-grade tin intercepts and are not thought to be representative of any resource at this preliminary stage. Further resource and process definition would be required before sample representivity could be assessed.

Table 13-15: Phase 5D: Tailings Separation Solid/Liquid – Filtration test – Results

Process Parameter	Filter Media			Spacer/Pressing/Feed Pressure				Drying/Press					Feed Density Change			
	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Test 8	Test 9	Test 10	Test 11	Test 12	Test 13	Test 14	Test 15	Test 16
Filter cloth	85x	855x/3	855x/3	85x	85x	85x	85x	85x	85x	85x	85x	85x	85x	85x	85x	85x
Feed solids, %	72	71	71	71	71	72	72	73	73	72	73	67	67	67	68	68
Chamber thickness	32	32	32	25	32	32	32	32	32	32	32	32	32	32	32	25
Feed pressure	6	6	6	6	6	6	12	6	6	6	6	6	6	6	6	6
Drying pressure	0	0	0	0	0	0	0	6	6	6	6	0	6	0	6	0
Filtering cycle time	6.50	6.50	6.50	5.75	5.75	6.33	5.75	7.75	9.75	13.75	10.33	5.75	13.75	6.00	10.00	5.75
Feed time	1.5	1.5	1.5	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1	1	0.75
Drying time	0	0	0	0	0	0	0	2	4	8	4	0	8	0	4	0
Pressing time	0	0	0	0	0	0.58	0	0	0	0	0.58	0	0	0	0	0
Cake moisture, %	15.3	15.6	15.6	16	15.6	14.8	14.9	11.8	9.7	9	9.9	15.5	9.4	15.7	10.9	16
Loading rate	356	351	354	305	387	357	407	295	228	162	218	396	161	376	221	304

13.2.6.2 Mineralogy

All samples were milled to a target of P80 of 425 μm and sized into four fractions (+300 μm , +212 μm , +106 μm and -106 μm). Each size section was systematically scanned using the Tescan integrated mineral analyser (TIMA) equipped on the Tescan Vega scanning electron microscope.

All five investigated samples had relatively high iron sulphide contents, but can be grouped in pyrrhotite-dominant (AFS-001, AFS-002, and AFS-005) and pyrite/marcasite-dominant (AFS-003 and AFS-004) samples. Cassiterite was the dominant tin mineral species in all samples except for sample AFS-004, where 33.6% of the tin was deported as Sn-(Cu)-sulphides. The modal analysis is shown in Figure 13-12.

In all samples, the higher reported tin distribution (average distribution 37.1%) is found in the +300 μm and -106 μm size fractions, except for sample AFS-004, where 52.6 % of the tin is deported in the -106 μm size fraction. The distribution of tin, iron and sulphur is summarized in Table 13-17.

Cassiterite liberation by volume (%) is shown in Figure 13-13.

In four of the five samples, tin deportment was 94% or higher as cassiterite with the exception of AFS-004 which was 66.4% cassiterite, 20.9% stannite and 12.7% herzenbergite. The tin deportment size-by-size is shown in Figure 13-14.

13.2.6.3 Metallurgical Considerations, Tin Zone Mineralization

Although no metallurgical testing was completed on these tin samples, it is possible to make inferences based on the mineralogical results. With a target grind size P80 425 μm , high density and liberation of cassiterite at this grind size suggests that the tin should be amenable to gravity concentration. The mineralogically limited mass yield vs. recovery, and grade vs. recovery charts for all samples are shown in Figure 13-15.

The samples show potentially high amenability to gravity concentration through the results of this mineralogical analysis, but metallurgical tests are required to confirm this.

13.3 Lead–Silver and Zinc Metallurgical Projections

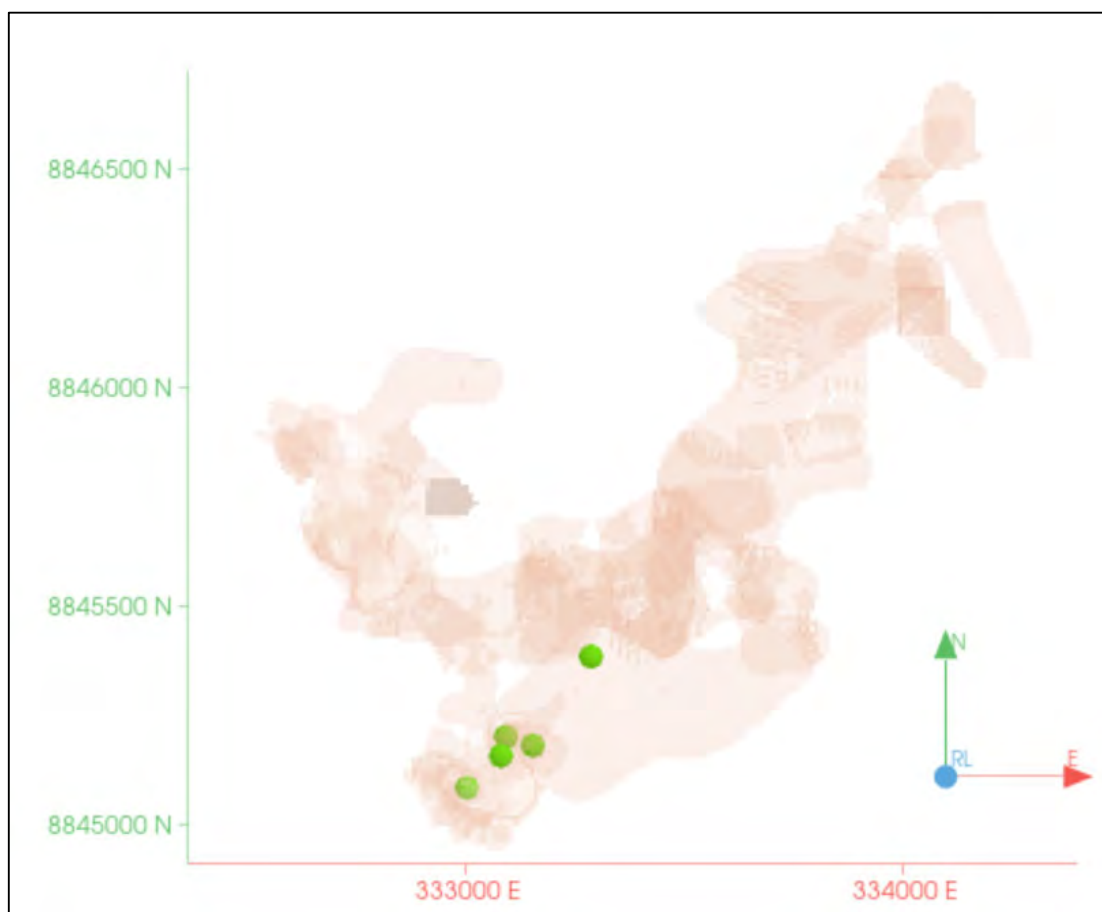
Metallurgical projections were updated for the 2021 PEA using the metallurgical testwork performed during 2021 (Phase 5A and Phase 5B), which has been analyzed, and incorporated into a new lead–silver recovery estimate.

Table 13-18 and Table 13-19 shows the project parameter assumptions for metal recovery and concentrate grade for a lead–silver concentrate and zinc concentrate, respectively.

Table 13-16: Phase 6: Tin Mineralogy Characterization: Sample Chemical Characterization

Sample	Hole	From (m)	To (m)	Sn (%)	Cu (%)	Ag (g/t)	Zn (%)
AFS-001	A21-187B	268	270	4.06	0.05	4	0.02
AFS-002	A17-063	369	370.4	1.33	0.11	28	0.12
AFS-003	A17-056	217.35	219	1.42	0.03	8	0.04
AFS-004	A17-070	362	364	1.42	0.56	75	0.22
AFS-005	A13-011	330	332	4.81	2.07	77	0.05

Figure 13-12: Phase 6: Tin Mineralogy Characterization; Sample Locations in 3D

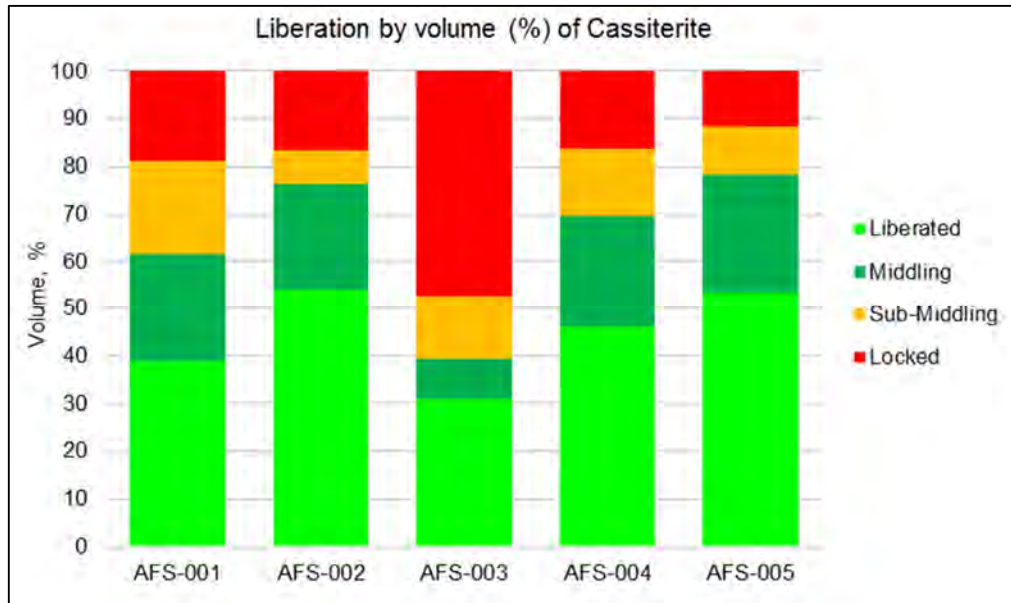


Note: Figure prepared by Transmin, 2021.

Table 13-17: Tin Mineralogy Characterization; Samples Distribution

Sample	Size Fraction	Mass (%)	Grade (%)			Distribution (%)		
			Sn	Fe	S	Sn	Fe	S
AFS-001	+300 µm	26.3	5.1	47.4	31.8	35.4	24.9	24.9
	+212 µm	13.2	3.32	50.7	34.2	11.5	13.3	13.5
	+106 µm	20.5	2.48	52.2	35.2	13.4	21.4	21.6
	-106 µm	40	3.77	50.8	33.6	39.7	40.5	40
	Head (Calc)	100	3.80	50.18	33.53	100	100	100
AFS-002	+300 µm	26.4	1.64	41.3	33.2	29.5	23.9	26
	+212 µm	13	1.29	45.5	34.6	11.4	13	13.3
	+106 µm	19.6	1.29	46.8	34.5	17.2	20.1	20
	-106 µm	41	1.5	47.8	33.4	41.9	43	40.6
	Head (Calc)	100	1.47	45.6	33.7	100	100	100
AFS-003	+300 µm	35	1.7	30.8	27.5	32.9	35.2	40.5
	+212 µm	13.3	1.62	29.4	23.1	11.9	12.7	12.9
	+106 µm	18	1.42	30.2	22.5	14.1	17.7	17
	-106 µm	33.7	2.21	31.3	20.8	41.2	34.4	29.5
	Head (Calc)	100	1.81	30.7	23.8	100	100	100
AFS-004	+300 µm	27.1	0.69	21.5	16.5	17.1	32.4	37.8
	+212 µm	11.8	1.08	19	12.9	11.7	12.5	12.9
	+106 µm	15.6	1.29	18.7	12.3	18.5	16.3	16.3
	-106 µm	45.5	1.26	15.3	8.55	52.6	38.8	33
	Head (Calc)	100	1.09	17.9	11.8	100	100	100
AFS-005	+300 µm	29.3	9.92	42.5	31.6	47.9	26.8	27.6
	+212 µm	11.6	5.55	46.7	33.9	10.6	11.6	11.7
	+106 µm	17.8	4.52	48.1	34.7	13.3	18.4	18.4
	-106 µm	41.3	4.15	48.7	34.2	28.3	43.2	42.2
	Head (Calc)	100	6.07	46.5	33.5	100	100	100

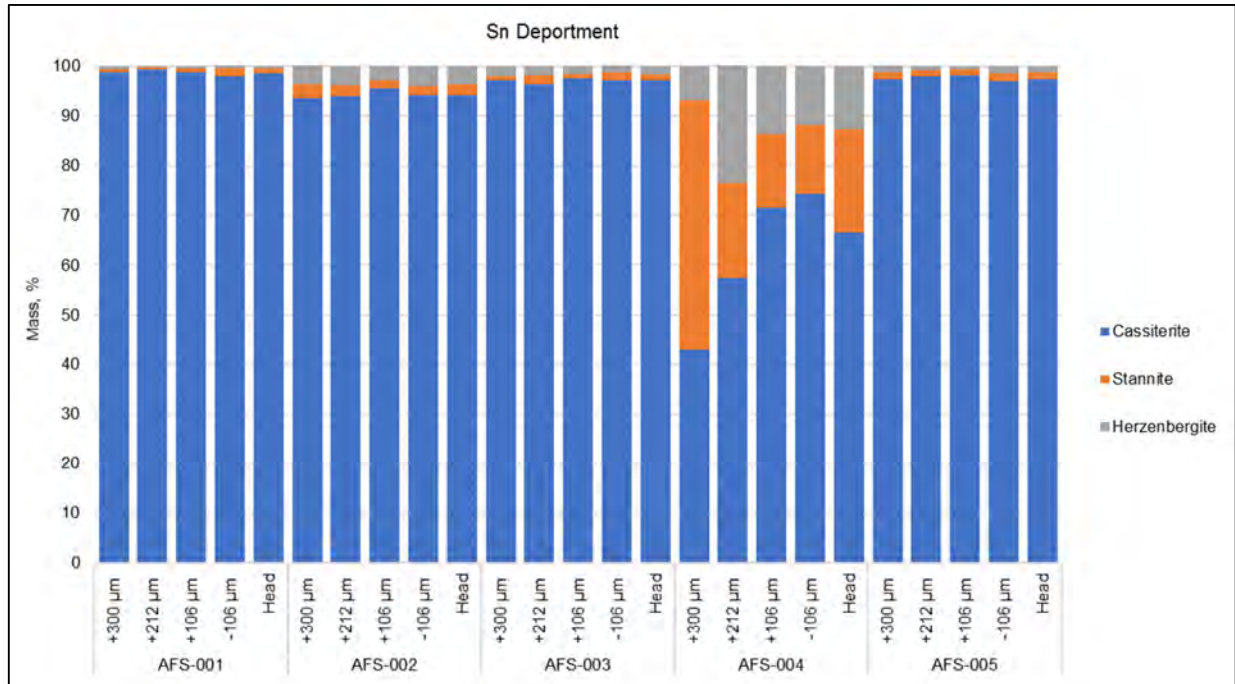
Figure 13-13: Phase 6: Tin Mineralogy Characterization: Sample Cassiterite Liberation



Note: Figure

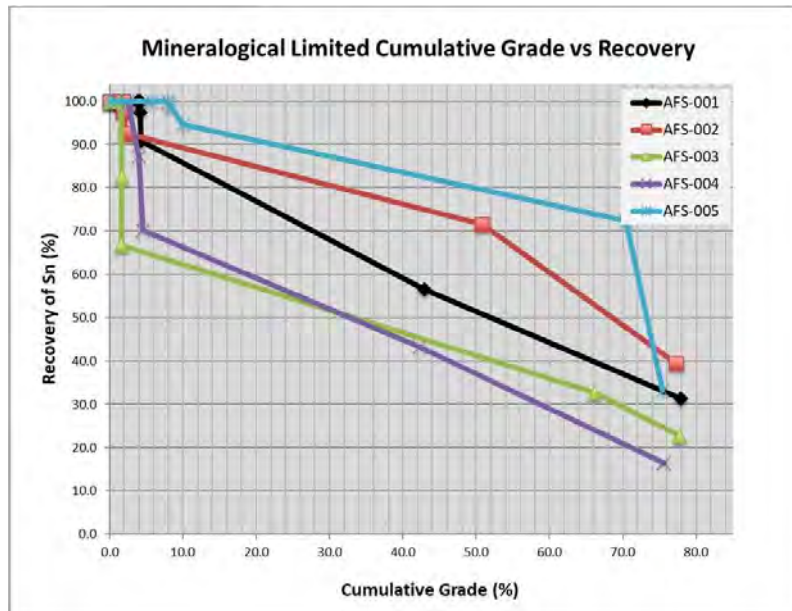
prepared by PMC, 2021

Figure 13-14: Phase 6: Tin Mineralogy Characterization; Sample Tin Department



Note: Figure prepared by PMC, 2021

Figure 13-15: Phase 6: Tin Mineralogy Characterization; Theoretical Grade vs. Recovery



Note: Figure prepared by PMC, 2021

Table 13-18: Projected Metal Recovery

Element	Unit	Concentrate	
		Pb-Ag	Zn
Zinc	%	—	92
Lead	%	70	—
Silver	%	45	40
Iron	%	—	—

Table 13-19: Projected Concentrate Grade

Element	Unit	Concentrate	
		Pb-Ag	Zn
Zinc	%	4	50
Lead	%	50	
Silver	%	Calculate	Calculate
Iron	%		13
Moisture	%	10	10

13.4 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 could affect the marketability and treatment costs for the zinc concentrate. Other than high iron, based on the testwork to date, there are no deleterious elements expected in the zinc concentrates produced from Ayawilca.

Table 13-20 shows the projected zinc concentrate quality.

Table 13-20: Projected Zinc Concentrate Quality

Element	Unit	Range	Nominal	Element	Unit	Range	Nominal
Al	%	0–0.03	0.03	S	%	30–34	32
As	g/t	200–400	280	Sb	g/t	20–40	29.5
B	g/t	Low	Low	Se	g/t	2–3	2.5
Ba	g/t	0–10	4	Si	%	0.2–0.4	0.32
Be	g/t	Low	Low	Sm	g/t	0.1–0.2	0.15
Bi	g/t	20–30	24	Sn	g/t	0–1,000	400
Ca	%	0–0.1	0.05	Sr	g/t	10–30	18.5
Cd	g/t	1,000–2,000	1,700	Ta	g/t	Low	Low
Ce	g/t	0–1	0.9	Tb	g/t	Low	Low
Co	g/t	0–20	9.75	Te	g/t	Low	Low
Cr	g/t	0–100	90	Th	g/t	0.1–0.2	0.15
Cs	g/t	0–1	0.95	Ti	%	Low	Low
Cu	g/t	1,000–3,000	2,000	Tl	g/t	1–3	2.1
Dy	g/t	Low	Low	Tm	g/t	Low	Low
Er	g/t	Low	Low	U	g/t	1–2	1.15
Eu	g/t	0.1–0.1	0.1	V	g/t	Low	Low
Fe	%	11–14	13	W	g/t	0–2	0.95
Ga	g/t	10–20	11.15	Y	g/t	0–1	0.95
Gd	g/t	0.1–0.1	0.1	Yb	g/t	Low	Low
Ge	g/t	0–2	1.2	Zn	%	47–50	50
Ho	g/t	Low	Low	Au	ppb	20–60	40
Hf	g/t	Low	Low	Pd	ppb	0–0	Low
In	g/t	0–1000	559	Pt	ppb	10–20	11
K	%	Low	Low	Ag	g/t	0–100	51.5
La	g/t	0–1	0.5	Hg	ppb	0 – 10,000	4,540
Li	g/t	20–30	24	C-Total	%	0.1–0.3	0.18
Mg	%	0.1–0.2	0.13	Cl	%	0.02–0.03	0.025
Mn	g/t	1,000–2,000	1,445	F	%	0.01–0.02	0.015
Mo	g/t	0–10	5	LOI	%	10–20	15
Nb	g/t	Low	Low	Moisture	%	9–12	10
Nd	g/t	0–1	0.4				
Ni	g/t	10–20	15				
Pb	g/t	0–1,000	825				
Pr	g/t	0.1–0.1	0.1				
Rb	g/t	0–1	0.55				

14 MINERAL RESOURCE ESTIMATES

14.1 Introduction

Mineral Resources estimated by SLR for the Ayawilca deposit used drill results available to February 16, 2021. 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. In the QPs' opinion, 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 2014 CIM Definition Standards

Mineral Resources at the Ayawilca deposit are reported based on a possible underground mining scenario using a US\$55/t net smelter return (NSR) cut-off value for the Zinc Zone and a US\$60/t NSR cut-off value for the Tin Zone. Mineral Resources within the Zinc Zone are hosted in a brecciated carbonate sequence located beneath the sandstone unit that hosts the Colquipucro deposit, located 1.5 km to the north. The Zinc Zone is made up of multiple, gently-dipping lenses, or mantos, in the Central and East areas and as massive replacement bodies within structural zones in the West and South areas. The Tin Zone mineralization is primarily disseminated cassiterite and chalcopyrite in massive to semi-massive pyrrhotite lenses at the contact between the Pucará Group and underlying phyllite of the Devonian Excelsior Group and can also occur as quartz sulphide stockwork veinlets hosted within the phyllite. The Tin Zone resources lie spatially beneath the Zinc Zone and typically do not overlap.

Mineral Resources for the Colquipucro deposit are reported within a preliminary pit shell generated in Whittle software at a reporting cut-off grade of 15 g/t Ag. Mineral Resources are contained within 10 north-dipping, high-grade lenses, a gently-dipping basal zone, and a low-grade halo that encompasses the high-grade lenses. Overall, the Colquipucro deposit is 550 m in the north–south direction, 380 m in the east–west direction and 75 m thick. The Colquipucro deposit is located on a topographic high between 4,160–4,360 masl in elevation.

14.2 Mineral Resource Summary Tables

Mineral resource estimates are tabulated in Table 14-1 to Table 14-3. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability. The Qualified Persons for the estimates are Ms. Katharine Masun, P.Geo., and Ms. Dorota El-Rassi, P.Eng., employees of SLR, and independent of Tinka.

The estimates for the Zinc Zone and Tin Zone have an effective date of 30 August, 2021; the estimate for the Colquipucro silver oxide deposit has an effective date of 25 May, 2016.

Table 14-1: Ayawilca Zinc Zone Mineral Resources (effective date August 30, 2021)

Classification/ Zone	Tonnage (Mt)	NSR (US\$/t)	Grade			Contained Metal		
			(% Zn)	(g/t Ag)	(% Pb)	(Mlb Zn)	(Moz Ag)	(Mlb Pb)
Indicated								
West	11.6	108	6.26	15.9	0.25	1,607	6.0	65
South	7.3	145	8.56	18.3	0.13	1,383	4.3	22
Total Indicated	19.0	123	7.15	16.8	0.21	2,990	10.3	87
Inferred								
West	5.5	106	5.90	20.8	0.42	719	3.7	52
South	9.0	134	7.45	34.4	0.33	1,477	10.0	65
Central	17.4	81	4.55	13.8	0.34	1,747	7.7	132
East	10.6	88	5.04	14.4	0.20	1,177	4.9	46
Silver	0.4	93	3.58	106.7	0.65	33	1.4	6
Buffer	4.9	87	4.66	19.2	0.63	504	3.0	69
Total Inferred	47.9	96	5.36	20.0	0.35	5,657	30.7	370

Notes:

1. The Qualified Persons for the estimate are Ms. Katharine Masun, P.Geo., and Ms. Dorota El-Rassi, P.Eng., employees of SLR, and independent of Tinka.
2. The 2014 CIM Definition Standards were followed for Mineral Resource classifications. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
3. Mineral Resources are reported above a cut-off NSR value of US\$55/t.
4. The requirement of a reasonable prospect of eventual economic extraction is met by having a minimum modelling width for mineralized zones of three metres, a cut-off based on reasonable input parameters, and continuity of mineralization consistent with a potential underground mining scenario.
5. The US\$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 assumptions were, US\$1.20/lb Zn, US\$22/oz Ag, and US\$0.95/lb Pb. Metal recovery assumptions were, 92% Zn, 85% Ag, and 70% Pb. The US\$NSR value for each block was calculated using the following NSR factors; US\$16.23/% Zn, US\$0.27/ g Ag, and US\$10.20/% Pb.
6. Payability is as follows; Zn 84%, Pb 94% and Ag 47%.
7. The US\$NSR value was calculated using the following formula:

$$\text{US\$NSR} = \text{Zn}(\%) * \text{US\$16.23} + \text{Ag}(\text{g/t}) * \text{US\$0.27} + \text{Pb}(\%) * \text{US\$10.20}$$
8. Numbers may not add due to rounding.

Table 14-2: Ayawilca Tin Zone Mineral Resources (effective date August 30, 2021)

Classification	Tonnage (Mt)	NSR (US\$/t)	Grade (% Sn)	Contained Metal (Mlb Sn)
Inferred	8.4	103	1.02	189

Notes:

1. The Qualified Persons for the estimate are Ms. Katharine Masun, P.Geo., and Ms. Dorota El-Rassi, P.Eng., employees of SLR, and independent of Tinka.
2. The 2014 CIM Definition Standards were followed for Mineral Resource classifications. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
3. Mineral Resources are reported above a cut-off NSR value of US\$60/t.
4. The requirement of a reasonable prospect of eventual economic extraction is met by having a minimum modelling width for mineralized zones of three metres, a cut-off based on reasonable input parameters, and continuity of mineralization consistent with a potential underground mining scenario.
5. The US\$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 assumptions were US\$11.00/lb Sn. Metal recovery assumptions were, 70% Sn for blocks with Sn:Cu $\geq$ 5 and 40% for Sn:Cu < 5. The US\$NSR value for each block was calculated using the following NSR factors, US\$141.64 per % Sn for blocks with Sn:Cu $\geq$ 5 and US\$80.94 for blocks with Sn:Cu < 5.
6. The US\$NSR value was calculated using the following formulae:
If Sn:Cu $\geq$ 5: US\$NSR = Sn(%)*US\$141.64
If Sn:Cu < 5: US\$NSR = Sn(%)*US\$80.94
7. Numbers may not add due to rounding.

Table 14-3: Colquipucro Silver Oxide Deposit Mineral Resources (effective date 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. The Qualified Persons for the estimate are Ms. Katharine Masun, P.Geo., and Ms. Dorota El-Rassi, P.Eng., employees of SLR, and independent of Tinka.
2. The 2014 CIM Definition Standards were followed for Mineral Resource classifications. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
3. 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.
4. The cut-off grade is based on a price of US\$24/oz Ag.
5. Numbers may not add due to rounding.

The QPs are not aware of any environmental, permitting, legal, title, taxation, socio-political, marketing, and other relevant factors that would affect the Ayawilca deposit and Colquipucro deposit Mineral Resource estimates.

14.3 Ayawilca Deposit Mineral Resource Estimate

14.3.1 Overview

The Ayawilca deposit drill database includes 209 drill holes totalling 80,110 m, with a February 16, 2021 cut-off date. An additional 31 drill holes totalling 11,632.7 m were added since the previous update, with an effective date of November 26, 2018. The 3D wireframe models were generated using an approximate NSR cut-off value of \$50/t for the Ayawilca deposit Zinc and Tin Zones. Prior to compositing to 2 m lengths, high tin, indium, and silver values were capped for each zone individually. 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 values of 3.5 t/m³ or 3.7 t/m³ were assigned to the Zinc Zone wireframes, 3.6 t/m³ for silver rich domains in the Zinc Zone, and 3.9 t/m³ for the Tin Zone based on density measurements from core samples. The Buffer Zone area outside the resource wireframes was assigned a density value of 3.5 t/m³. The Mineral Resources were assigned Indicated and

Inferred category in the Zinc Zone and Inferred only in the Tin Zone due to the widely-spaced drilling.

Indium was previously included in the Zinc Zone resource but is no longer reported. Copper and silver were reported in the Tin Zone previously but are no longer reported because they are not expected to contribute materially to the economics of the Project.

14.3.2 Resource Database

SLR 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. SLR 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 A21-189. A summary of records for all drilling, on the Ayawilca deposit includes:

- Number of drill holes: 209;
- Surveys: 16,405;
- Assays: 32,799 (one drill hole, A15-048, without assays);
- Composites: 20,669 (17,507 in Buffer Zone);
- Lithology: 17,577;
- Full width composites: 1,185 (681 in Buffer Zone);
- Density measurements: 2,052 (923 in Buffer Zone).

The QPs note that this total does not include seven re-drilled holes. In the case of re-drilled holes, the original and re-drilled hole are considered to be a single drill hole.

Data verification of the drill hole database included manual verification against hardcopy and original digital sources, a series of digital queries, and a review of Tinka's QA/QC procedures and results. No discrepancies were identified, and the QPs are of the opinion that the drill hole database is valid and suitable to estimate Mineral Resources for the Ayawilca deposit.

14.3.3 Geological Interpretation and 3D Solids

With recent drilling, Tinka continues to improve the understanding of the lithological setting of the zinc and tin mineralization. The updated geological model was used to better constrain the mineralized zones in the hosting Pucará carbonate formation and overlying Goyllar Group bedded sandstone units (Figure 14-1 and Figure 14-2).

Figure 14-1: North-South Cross Section Through the Ayawilca Deposit

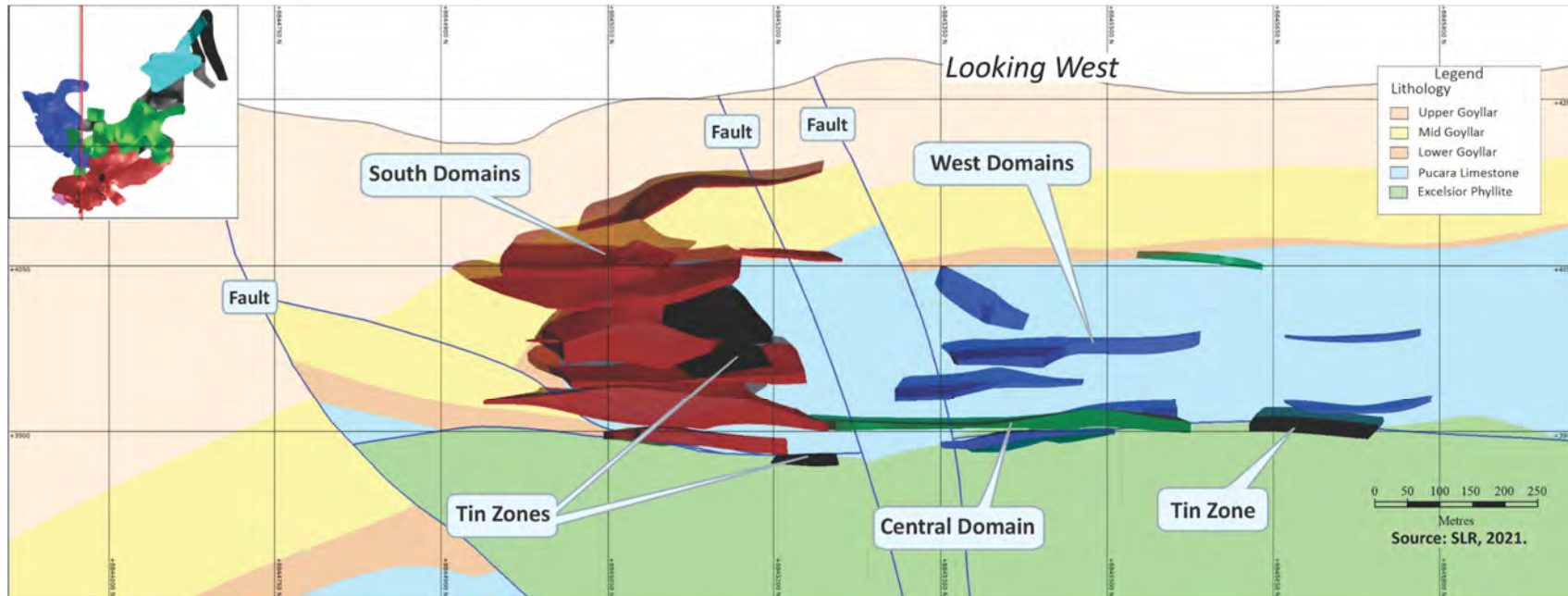
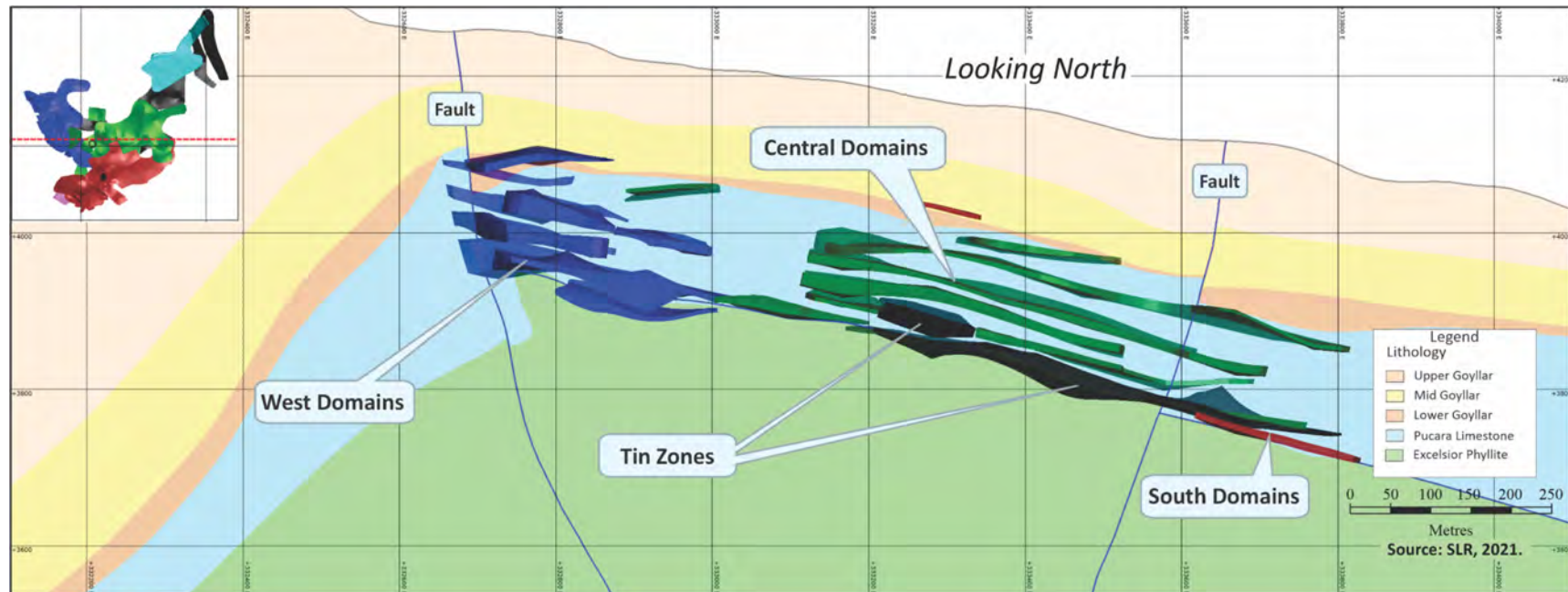


Figure 14-2: East-West Cross Section Through the Ayawilca Deposit



Wireframe models of mineralized zones were used to constrain the block grade interpolation process. A Leapfrog Geo 6.0 vein system modelling tool was used to generate interpretation of the mineralization at a nominal cut-off NSR value of US\$50/t for both Ayawilca deposit zones. A minimum thickness of 3 m was applied, with some exceptions where <3 m was used to allow for a better continuity of the modelled domain. Occasionally, lower-grade intersections were included to maintain continuity. At model extremities, the wireframe models were extrapolated up to 50 m beyond the last drill hole section; however, when a thin intersection was at the edge of the wireframe, the domain was extended to only 25 m.

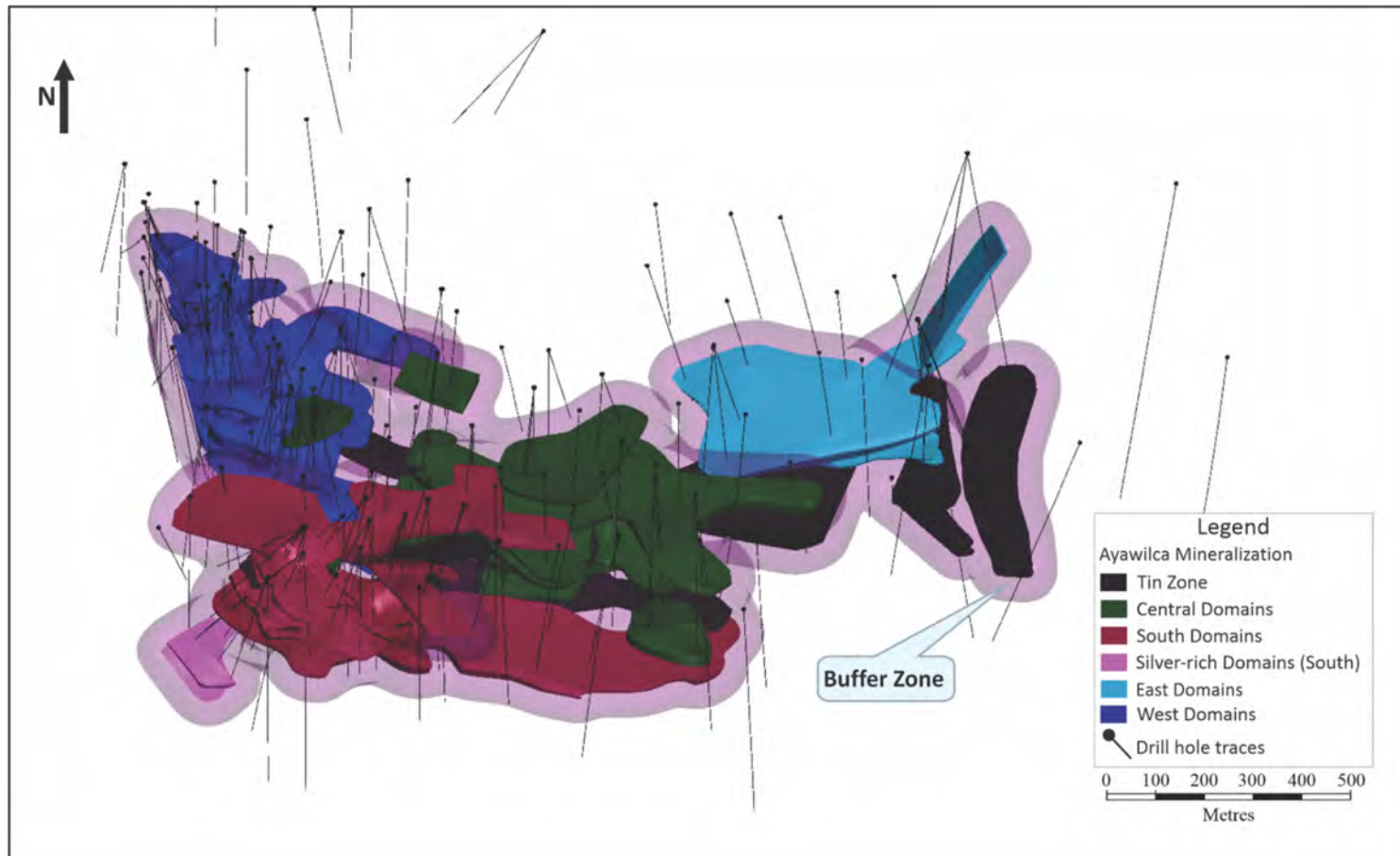
SLR modified and validated 50 domains in five main areas (Figure 14-3): Central, South, West, and East areas, collectively referred to as the Zinc Zone, and the Tin Zone. SLR constructed a buffer zone to allow interpolation in a limited area of 50 m surrounding the mineralization wireframe models. The Buffer Zone captures local high-grade mineralization, in particular a post-zinc lead mineralization, for which controls are not yet well constrained. A description of each modelled domain is provided in the following subsections.

The Central area is the largest area in the Zinc Zone. It is made up of 10 stacked domains, ranging from 160–340 m below surface, one of which has three parts and one which is vertical. The Central area extends for 1,230 m east–west and 580 m north–south. The thickness of individual domains ranges from 3–27 m and averages 11 m. All domains dip shallowly to the southeast. The Central area is intersected by 31 drill holes. One additional domain has been added to the Central area in this update.

The South area is currently the highest-grade zinc area and the second largest area in the Zinc Zone. It consists of 10 stacked domains ranging from 60–430 m below surface, extending for 1,000 m in the northeast–southwest direction and 300 m in the northwest–southeast direction. The thickness of individual domains ranges from 2–47 m and averages 14 m. All domains dip shallowly to the northeast. The South area is intersected by 58 drill holes. The South area has had the largest increase in drill hole density and an additional four domains have been modelled. Two domains enriched in silver, located in the west of the South area, but treated separately for statistical analysis, have been included in the Mineral Resource estimate for the Zinc Zone. The thickness of each silver domain varies from 3–14 m and averages 8 m. The silver domains were intersected by three drill holes and are referred to in this Report as the Silver Zone or silver-rich domains.

The West area is the second highest-grade zinc area in the Zinc Zone. It comprises 13 stacked domains ranging from 120–350 m below surface, extending for 630 m east–west and 640 m north–south. The thickness of individual domains ranges from 2–60 m and averages 13 m. All domains dip shallowly to the southeast. The West area is intersected by 62 drill holes. Two new domains were modelled.

Figure 14-3: 3D View of Ayawilca Deposit Wireframe Models



Note: Figure prepared by SRL, 2021.

The East area consists of four domains ranging from 250–450 m below surface, extending for 520 m east–west and 700 m north–south. The thickness of individual domains ranges from 2–33 m and averages 14.5 m. All domains dip shallowly to the south and southeast. The East area is intersected by 11 drill holes. There have been no material changes to the domain in the East area.

The main Tin Zone is located beneath the Central and South areas at the unconformity with the Devonian Excelsior Group. The other smaller domains are interlayered with the South area zinc domains. There are 11 individual zones ranging from 150–640 m below surface. The main area extends for 1,900 m northeast–southwest and 380 m northwest–southeast, and dips shallowly to the northeast. The thickness of individual domains ranges from 2–46 m and averages 10 m. The Tin Zone is intersected by 50 drill holes. Three new domains were modelled.

The rock codes assigned to each wireframe are summarized in Table 14-4.

14.3.4 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. Statistics by zone are summarized in Table 14-5.

14.3.5 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 the outliers at a specific grade level. In the absence of production data to calibrate the capping level, inspection of the assay distribution can be used to estimate a first-pass capping level.

The management of tin and lead outliers in the Zinc Zone, and zinc and lead in the Buffer Zone was completed using high-grade restrictions applied during the interpolation process.

Review of the resource assay exploratory data analysis (EDA) including histograms and probability plots within the wireframe domains in each zone, and a visual inspection of high grade values on vertical sections suggest that cutting of erratic values is warranted and appropriate for the Ayawilca deposit. Table 14-6 summarizes capping levels for each element and domain and Table 14-7 lists the descriptive statistics of capped resource assay values by zone.

Table 14-4: Rock Codes

West Area	South Area	Silver Zone (South Area)	East Area	Central Area	Tin Zone	Buffer Zone
West1(101)	SouthA (401)	Ag_1 (2001)	East1 (301)	Central1 (201)	Tin1 (1001)	Buffer (3001)
West2 (102)	SouthA 2 (411)	Ag_2 (2002)	East2 (302)	Central2 (202)	Tin2 (1002)	—
West3 (103)	SouthB (402)	—	East3 (303)	Central3 (203)	Tin3 (1003)	—
West3A (113)	SouthC (403)	—	East4 (304)	Central4 (204)	Tin4 (1004)	—
West4 (104)	SouthD (404)	—	—	Central4A (214)	Tin5 (1005)	—
West4A (114)	SouthD 1 (414)	—	—	Central4B (224)	Tin5A (1010)	—
West5 (105)	SouthD 2 (424)	—	—	Central5 (205)	Tin6 (1006)	—
West6 (106)	SouthD 3 (434)	—	—	Central6 (206)	Tin7 (1007)	—
West10 (110)	SouthD 4 (444)	—	—	Central9 (209)	Tin8 (1008)	—
Pb_West3 (123)	SouthD 5 (454)	—	—	Central10 (210)	Tin9 (1009)	—
Pb_West7 (107)	—	—	—	—	Tin9A (1019)	—
Pb_West9 (109)	—	—	—	—	—	—
Central 5A_2021 (215)	—	—	—	—	—	—

Table 14-5: Resource Assay Descriptive Statistics

Zone and Statistic	Length (m)	Ag (g/t)	Pb (%)	Sn (%)	Zn (%)
<i>Central Area</i>					
Count	439	439	439	439	439
Mean	1.63	13.30	0.32	0.08	4.09
St Dev	0.50	21.79	0.87	0.10	3.39
CV	0.30	1.64	2.68	1.31	0.83
Min	0.50	0.00	0.00	0.00	0.01
Median	2.00	6.20	0.02	0.04	3.34
Max	3.10	238.00	10.69	0.73	24.60
<i>East Area</i>					
Count	187	187	187	187	187
Mean	1.71	25.33	0.27	0.04	4.77
St Dev	0.47	110.00	0.62	0.06	4.43
CV	0.27	4.34	2.25	1.52	0.93
Min	0.40	0.00	0.00	0.00	0.06
Median	2.00	5.57	0.02	0.02	3.77
Max	2.50	1,419.00	5.74	0.50	41.68
<i>South Area</i>					

Zone and Statistic	Length (m)	Ag (g/t)	Pb (%)	Sn (%)	Zn (%)
Count	1,091	1,091	1,091	1,091	1,091
Mean	1.53	48.35	0.24	0.05	8.20
St Dev	0.55	563.26	1.02	0.22	9.36
CV	0.36	11.65	4.33	4.11	1.14
Min	0.20	0.18	0.00	0.00	0.00
Median	1.60	12.16	0.03	0.01	4.44
Max	3.80	18,174.00	21.76	5.42	48.45
<i>West Area</i>					
Count	1,422	1,422	1,422	1,422	1,422
Mean	1.70	21.54	0.33	0.04	5.45
St Dev	0.47	45.62	0.92	0.13	6.47
CV	0.28	2.12	2.78	3.68	1.19
Min	0.30	0.00	0.00	0.00	0.00
Median	2.00	8.26	0.03	0.01	3.53
Max	2.90	837.00	12.12	3.59	49.34
<i>Silver Zone (South Area)</i>					
Count	30	30	30	30	30
Mean	1.30	206.61	0.66	0.01	3.77
St Dev	0.52	312.24	0.83	0.01	5.24
CV	0.40	1.51	1.25	1.51	1.39
Min	0.25	1.95	0.02	0.00	0.06
Median	1.20	88.00	0.40	0.00	1.93
Max	2.00	1,435.00	3.45	0.04	21.70
<i>Tin Zone</i>					
Count	452	452	452	452	452
Mean	1.73	14.05	0.06	0.75	0.38
St Dev	0.45	31.15	0.47	1.12	1.69
CV	0.26	2.22	7.40	1.49	4.39
Min	0.30	0.12	0.00	0.00	0.00
Median	2.00	6.16	0.01	0.38	0.04
Max	2.50	513.00	7.52	9.08	21.96
<i>Buffer Zone</i>					
Count	17,074	17,074	17,074	17,074	17,074
Mean	1.86	6.61	0.08	0.01	0.45
St Dev	0.36	32.35	0.38	0.06	1.83
CV	0.20	4.90	4.82	6.64	4.05

Zone and Statistic	Length (m)	Ag (g/t)	Pb (%)	Sn (%)	Zn (%)
Min	0.20	0.00	0.00	0.00	0.00
Median	2.00	1.67	0.01	0.00	0.06
Max	8.60	1,806.00	28.81	5.26	46.45

Note: CV = coefficient of variation

Table 14-6: Ayawilca Deposit Capping Levels

Zone and Statistic	Zn (%)	Pb (%)	Ag (g/t)	Sn (%)
Central	No cap	No cap	100	2
East	No cap	No cap	100	2
South	No cap	No cap	175	2
West	No cap	No cap	100	2
Silver	No cap	No cap	200	2
Tin	No cap	No cap	100	4
Buffer	No cap	No cap	50	2

Notes: Tin was not considered for Mineral Resources in the Zinc Zone. Zinc, silver, and lead were not considered for Mineral Resources in the Tin Zone.

Table 14-7: Capped Resource Assay Descriptive Statistics

Zone and Statistic	Ag (g/t)	Pb (%)	Sn (%)	Zn (%)
<i>Central Area</i>				
Count	439	439	439	439
Mean	12.57	0.33	0.08	3.98
St Dev	18.17	0.93	0.10	3.09
CV	1.45	2.84	1.33	0.78
Min	0.00	0.00	0.00	0.01
Median	6.11	0.02	0.04	3.31
Max	100.00	10.69	0.73	24.60
<i>East Area</i>				
Count	187	187	187	187
Mean	15.18	0.24	0.04	4.36
St Dev	22.12	0.52	0.06	3.58
CV	1.46	2.15	1.60	0.82
Min	0.00	0.00	0.00	0.06

Zone and Statistic	Ag (g/t)	Pb (%)	Sn (%)	Zn (%)
Median	5.30	0.02	0.02	3.71
Max	100.00	5.74	0.50	41.68
<i>South Area</i>				
Count	1,091	1,091	1,091	1,091
Mean	22.18	0.20	0.05	7.47
St Dev	32.48	0.78	0.14	8.72
CV	1.46	4.00	2.90	1.17
Min	0.18	0.00	0.00	0.00
Median	11.10	0.03	0.01	4.15
Max	175.00	21.76	2.00	48.45
<i>West Area</i>				
Count	1,422	1,422	1,422	1,422
Mean	16.45	0.30	0.03	5.13
St Dev	21.89	0.86	0.09	6.02
CV	1.33	2.84	2.86	1.17
Min	0.00	0.00	0.00	0.00
Median	8.05	0.03	0.01	3.46
Max	100.00	12.12	2.00	49.34
<i>Silver Zone (South Area)</i>				
Count	30	30	30	30
Mean	96.96	0.57	0.00	2.92
St Dev	63.23	0.65	0.01	4.47
CV	0.65	1.12	1.87	1.53
Min	1.95	0.02	0.00	0.06
Median	78.20	0.40	0.00	1.26
Max	200.00	3.45	0.04	21.70
<i>Tin Zone</i>				
Count	452	452	452	452
Mean	12.52	0.04	0.68	0.27
St Dev	17.39	0.24	0.84	1.07
CV	1.39	6.03	1.25	3.95
Min	0.12	0.00	0.00	0.00
Median	6.12	0.01	0.37	0.04
Max	100.00	7.52	4.00	21.96
<i>Buffer Zone</i>				
Count	17,074	17,074	17,074	17,074

Zone and Statistic	Ag (g/t)	Pb (%)	Sn (%)	Zn (%)
Mean	4.68	0.07	0.01	0.37
St Dev	8.59	0.29	0.05	1.32
CV	1.83	4.37	5.35	3.56
Min	0.00	0.00	0.00	0.00
Median	1.58	0.01	0.00	0.05
Max	50.00	28.81	2.00	46.45

Notes: St Dev = standard deviation; CV = coefficient of variation

The updated geological model together with additional assay data obtained from the 2019 to 2021 drilling campaign confirmed that capping values applied to SLR's previous estimate. 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. There is a significantly higher silver content in the South area, which warranted the increase of the assay capping from 100 g/t Ag to 175 g/t Ag, and 200 g/t Ag in the Silver Zone.

14.3.6 Compositing

Sample lengths range from 0.5–3.1 m within the resource domain wireframe models with >92% of samples taken at 2m or less. With the inclusion of assays located within the Buffer Zone, sample lengths range from 0.2–8.6 m. Given these distributions, and considering the width of the mineralization, the QPs chose to composite to 2 m 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 14-8. Composites <0.5 m, located at the bottom of the mineralized intercept, were added to the previous interval. Table 14-9 lists descriptive statistics of the composites by zone.

14.3.7 Interpolation Parameters

Grades were interpolated by ID³ with a minimum of five to a maximum of 12 composites per block estimate for first pass, and a minimum of one to a maximum of 12 composites per block estimate in the second pass. A third pass was completed in five domains with expanded ellipsoid ranges and a minimum of one to a maximum of 12 composites per block estimate. 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.

Table 14-8: List of Implicit Missing Intervals Ignored

Hole ID	From (m)	To (m)	Length (m)	Lithological Unit	Lithological Description in 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	Zero recuperation
A17-071	325.4	327.2	1.8	Pu	Zero recuperation
A17-071	357.6	358.6	1.0	Pu	No recovery
A17-075	371.6	373.3	1.7	Pu	Zero recuperation
A18-133	141.5	142	0.5	MGo	Void, interval with no recovery
DD52B	275.6	277.6	2.0	Pu	VOID

Table 14-9: Composite Descriptive Statistics

Area/Zone and Statistic	Ag (g/t)	Pb (%)	Sn (%)	Zn (%)
<i>Central Area</i>				
Count	286	286	286	286
Mean	12.71	0.31	0.08	3.92
St Dev	17.27	0.88	0.10	2.57
CV	1.36	2.81	1.25	0.65
Min	0.00	0.00	0.00	0.04
Median	6.48	0.02	0.06	3.34
Max	100.00	10.69	0.73	18.96
<i>East Area</i>				
Count	190	190	190	190
Mean	13.13	0.21	0.03	3.77
St Dev	18.92	0.45	0.06	3.15
CV	1.44	2.14	1.69	0.83
Min	0.00	0.00	0.00	0.00
Median	4.41	0.01	0.01	3.49
Max	89.17	3.72	0.50	32.15
<i>South Area</i>				
Count	959	959	959	959
Mean	20.14	0.18	0.04	6.79
St Dev	28.93	0.63	0.13	7.53

Area/Zone and Statistic	Ag (g/t)	Pb (%)	Sn (%)	Zn (%)
CV	1.44	3.57	2.88	1.11
Min	0.00	0.00	0.00	0.00
Median	10.44	0.03	0.01	4.16
Max	175.00	21.76	2.00	44.12
<i>West Area</i>				
Count	1,238	1,238	1,238	1,238
Mean	16.41	0.30	0.03	5.12
St Dev	20.44	0.76	0.08	5.38
CV	1.25	2.51	2.58	1.05
Min	0.00	0.00	0.00	0.00
Median	8.40	0.03	0.01	3.68
Max	100.00	9.42	1.45	48.91
<i>Silver Zone (South Area)</i>				
Count	20	20	20	20
Mean	96.96	0.57	0.00	2.92
St Dev	46.91	0.49	0.01	3.47
CV	0.48	0.85	1.36	1.19
Min	24.73	0.11	0.00	0.30
Median	90.25	0.40	0.00	1.64
Max	198.05	2.03	0.02	12.65
<i>Tin Zone</i>				
Count	414	414	414	414
Mean	12.28	0.04	0.66	0.27
St Dev	16.47	0.16	0.79	0.70
CV	1.34	3.97	1.19	2.63
Min	0.00	0.00	0.00	0.00
Median	6.29	0.01	0.38	0.04
Max	100.00	2.16	4.00	6.85
<i>Buffer Zone</i>				
Count	17,507	17,507	17,507	17,507
Mean	4.26	0.06	0.01	0.34
St Dev	7.59	0.21	0.04	0.98
CV	1.78	3.44	5.24	2.93
Min	0.00	0.00	0.00	0.00
Median	1.45	0.01	0.00	0.05
Max	50.00	11.65	1.82	34.82

In general, the Ayawilca deposit mineralized zones strike northwest, with individual lenses expressing variance in orientation and dip. To reproduce the direction of these trends, SLR employed the variable orientation tool in Leapfrog EDGE. The tool allows the search to be locally adjusted to the orientation of the mineralization, which results in improved local grade estimates. SLR 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 Zone, 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 between different wireframes. The interpolation and search parameters are summarized in Table 14-10. Zinc, silver, and lead were interpolated for the Zinc Zone. Only tin was interpolated for the Tin Zone. Results are illustrated in Figure 14-3 to Figure 14-11 in plan and in long section view.

The influence of higher-grade composites for some metals within the Zinc, Tin, and Buffer Zones was spatially restricted. SLR used the Leapfrog restrictive search tool clamp that reduces a high value to a threshold value once the maximum distance is reached rather than discarding the-high grade composite. High-grade search restriction criteria are summarized in Table 14-11.

14.3.8 Density

A total of 826 density measurements are located within the wireframe models representing the Zinc Zone (five measurements within silver-enriched domain) and a total of 34 density measurements are located within the Tin Zone. An additional 332 density measurements have been taken within the Buffer Zone. After removing outliers from the low and high ends of the distribution (below 3.0 t/m³ and above 4.2 t/m³), SLR used the average of these measurements for each area (Table 14-12).

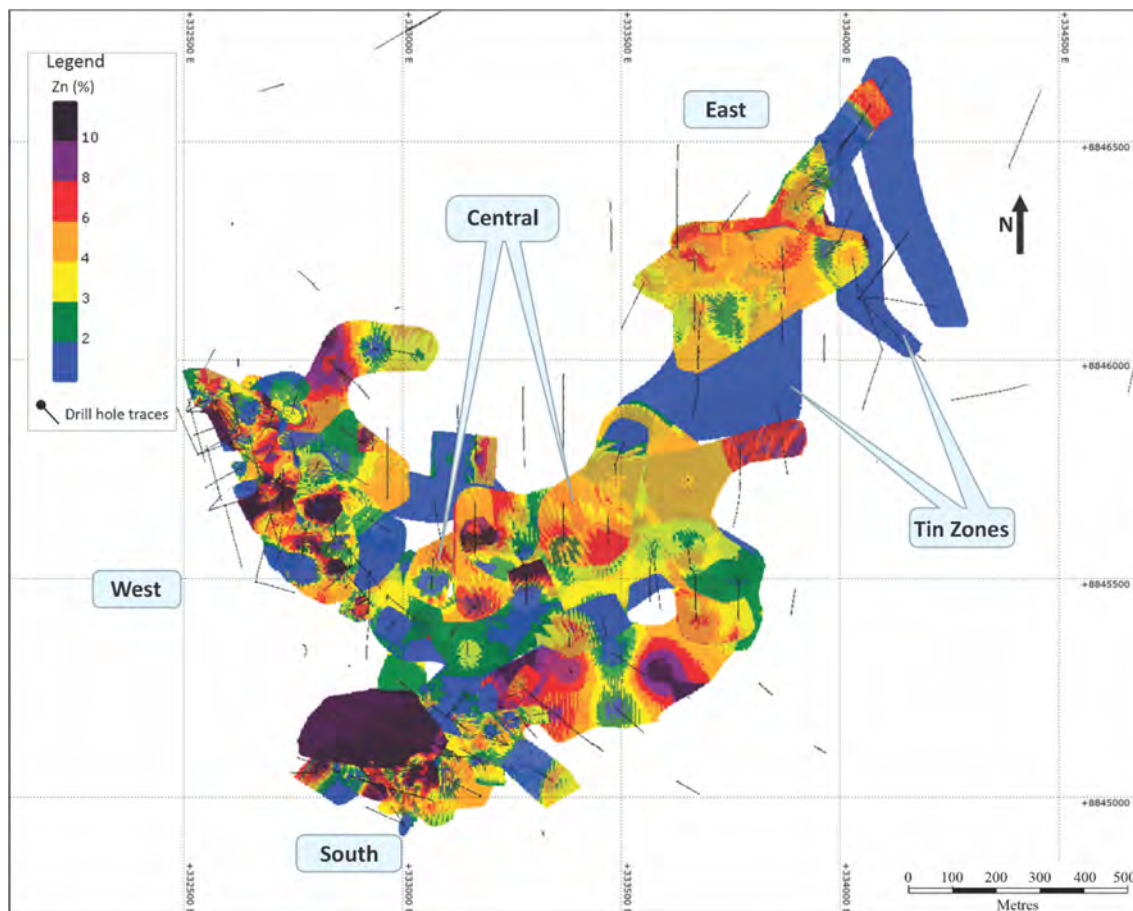
While Tinka has collected many density measurements, the samples are clustered in the South and West areas of the Zinc Zone. SLR reviewed the correlation of density and assay data. In the QPs' opinion a multi regression formula could potentially be used to predict density values if assay values were available for overlimit analyses, in particular iron. The QPs recommend re-testing overlimit iron analyses, collating iron for the drill core assays, and carrying out additional density measurements in the Tin Zone and the East and Central areas of the Zinc Zone.

Table 14-10: Block Estimate Search Strategy

Parameter		Pass 1	Pass 2	Pass 3
<i>Zinc Zone</i>				
Method		ID ³	ID ³	ID ³
Boundary type		Hard	Hard	Hard
Min no comps.		5	1	1
Max comps		12	12	12
Max comps per drill hole		4	-	-
Search ellipse	Range X (m)	140	140	280
	Range Y (m)	140	140	280
	Range Z (m)	14	14	14/28
<i>Tin Zone</i>				
Method		ID ³	ID ³	ID ³
Boundary type		Hard	Hard	Hard
Min no comps.		5	1	1
Max comps		12	12	12
Max comps per drill hole		4	—	—
Search ellipse	Range X (m)	140	140	280
	Range Y (m)	140	140	280
	Range Z (m)	7	14	14
<i>Buffer Zone</i>				
Method		ID ³	ID ³	—
Boundary type		Hard	Hard	—
Min no comps.		1	1	—
Max comps		12	12	—
Max comps per drill hole		—	—	—
Search ellipse	Range X (m)	140	—	—
	Range Y (m)	140	280	—
	Range Z (m)	14	28	—

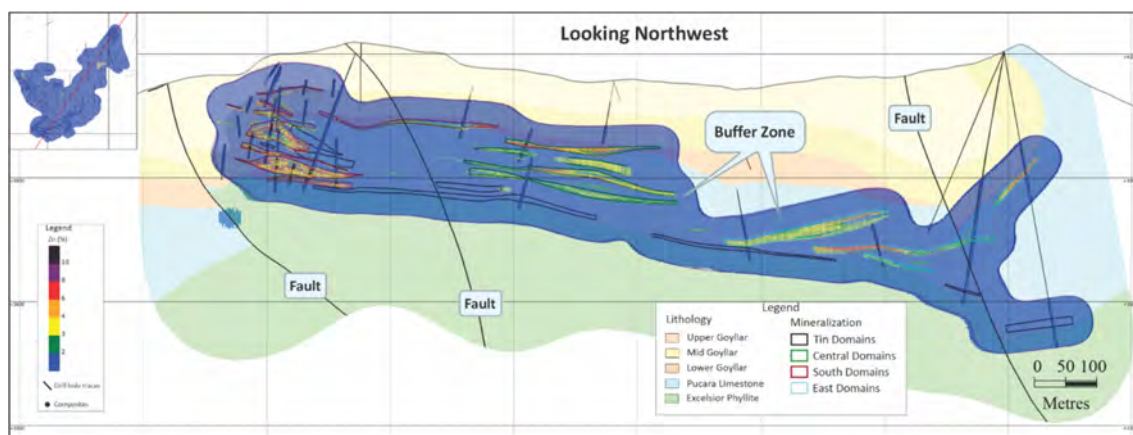
Notes: Zinc Zone Pass 3 for domains East2 and West3. Range in the Z direction is 14 m for West3 and 28 m for East2. Tin Zone Pass 3 for domains Tin2, Tin9, and Tin9A

Figure 14-4: Plan View of Zinc Grades, Ayawilca



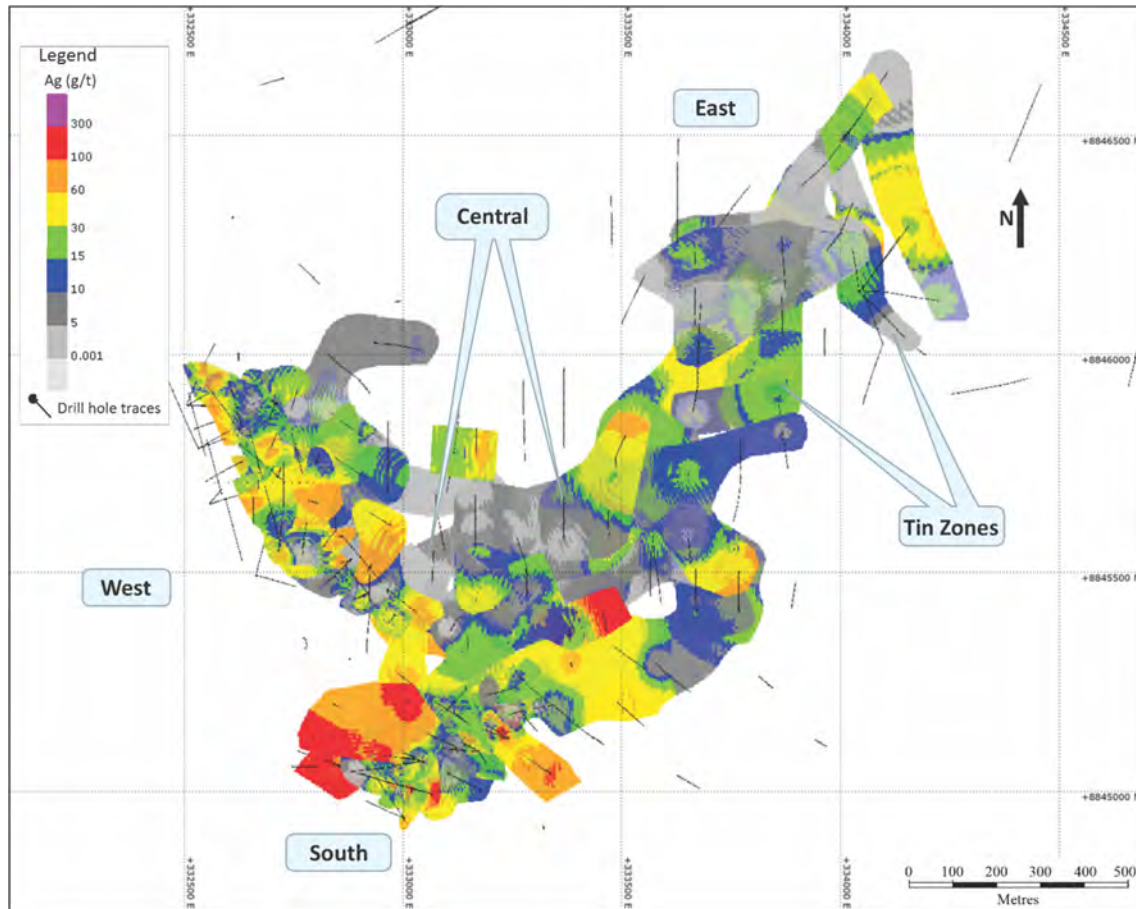
Note: Figure prepared by SLR, 2021.

Figure 14-5: Long Section View of Zinc Grades, Ayawilca Deposit



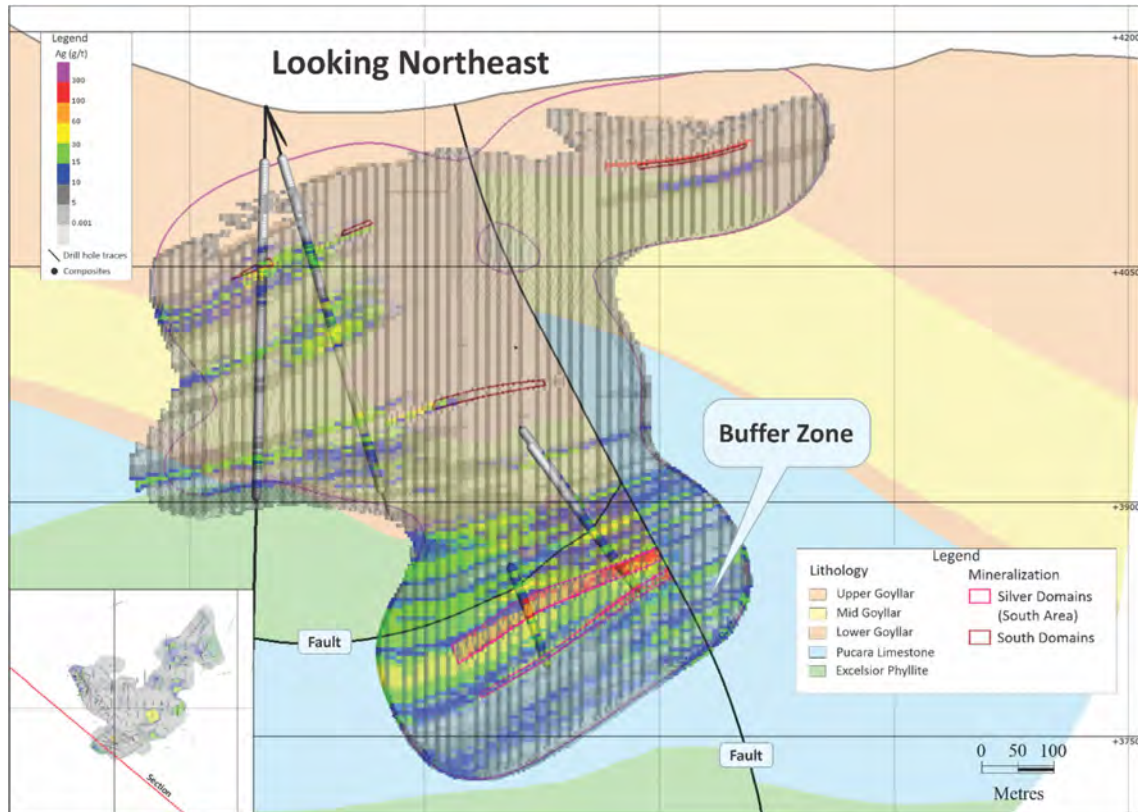
Note: Figure prepared by SLR, 2021.

Figure 14-6: Plan View of Silver Grades, Ayawilca Deposit



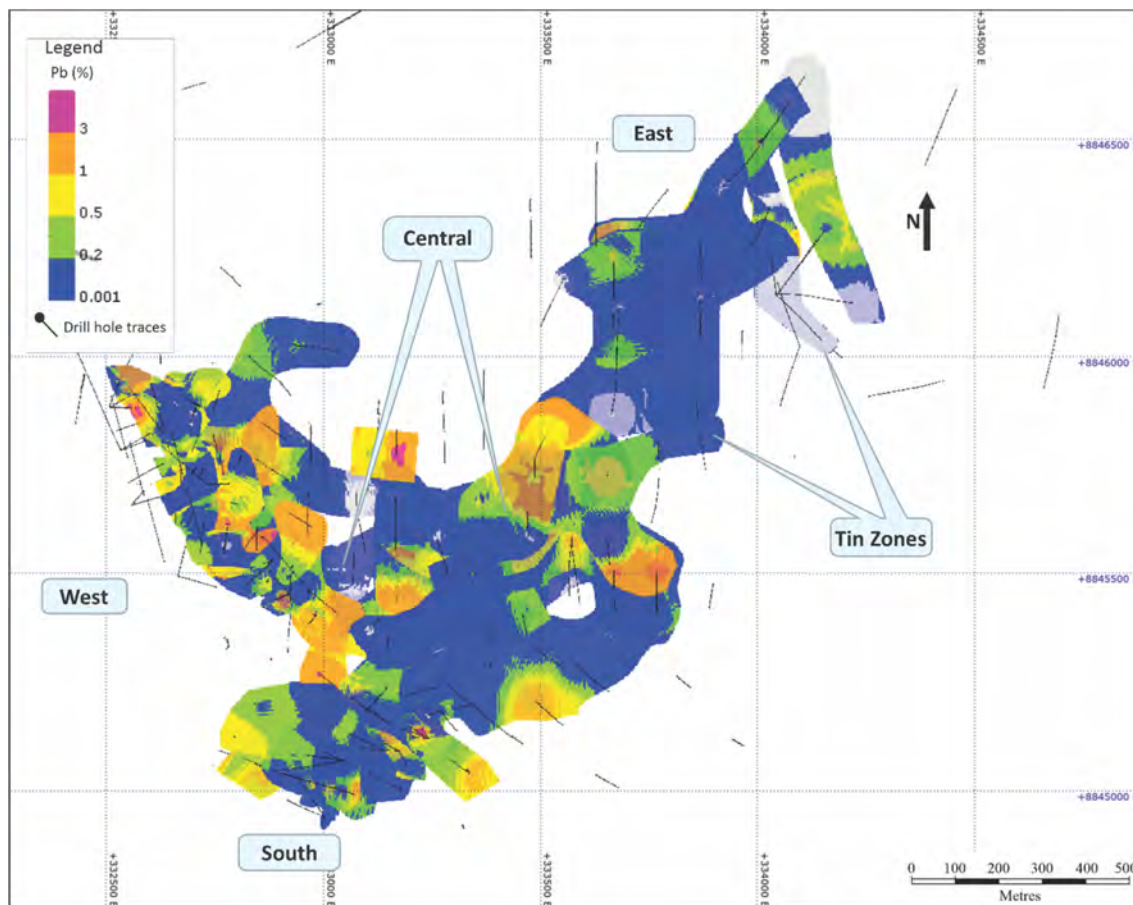
Note: Figure prepared by SLR, 2021.

Figure 14-7: Long Section View of Silver Grades, Ayawilca Deposit



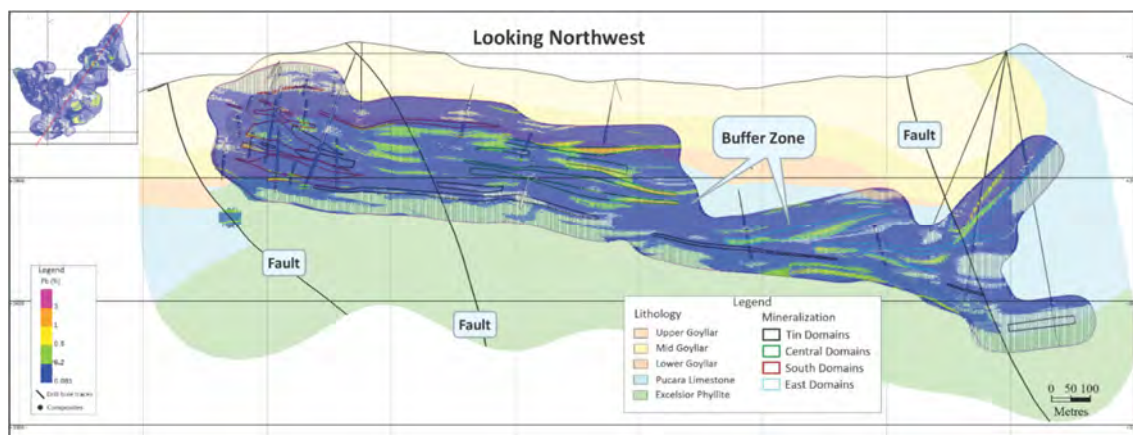
Note: Figure prepared by SLR, 2021.

Figure 14-8: Plan View of Lead Grades, Ayawilca Deposit



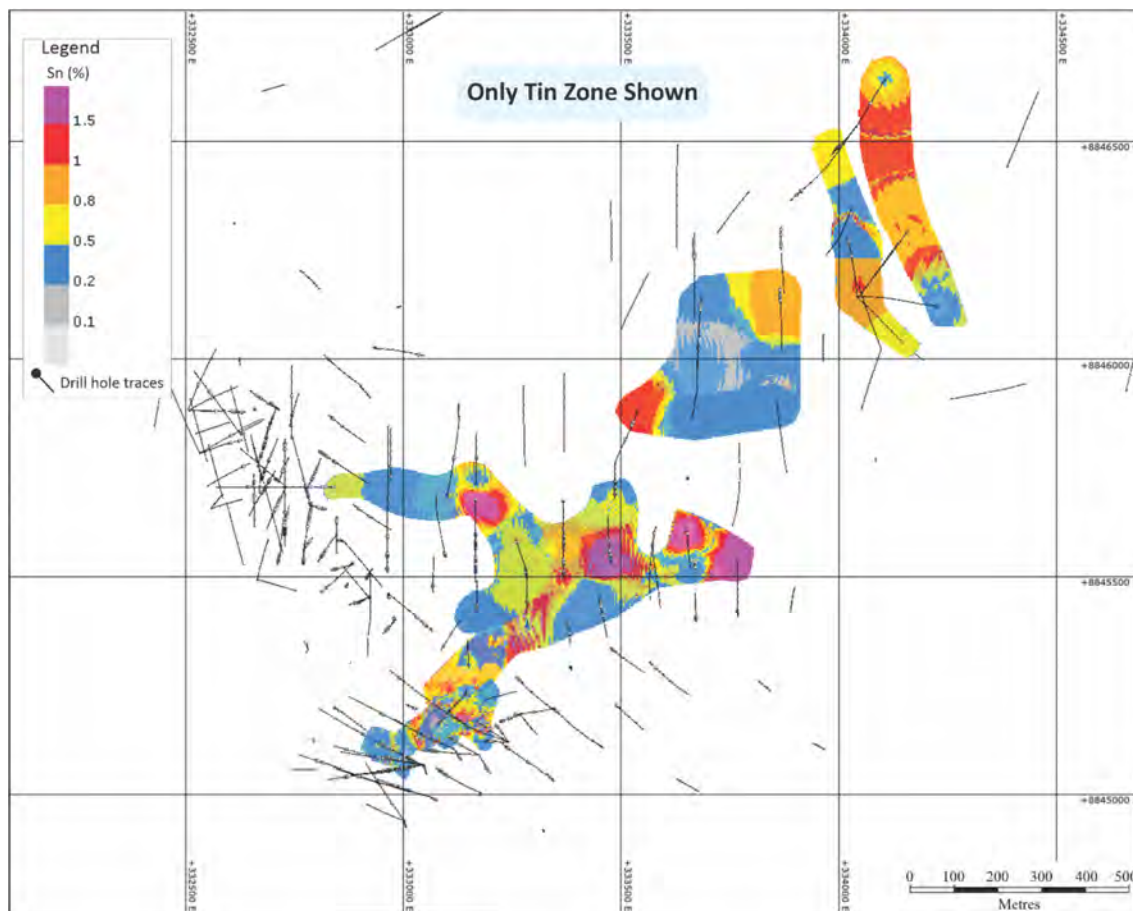
Note: Figure prepared by SLR, 2021.

Figure 14-9: Long Section View of Lead Grades, Ayawilca Deposit



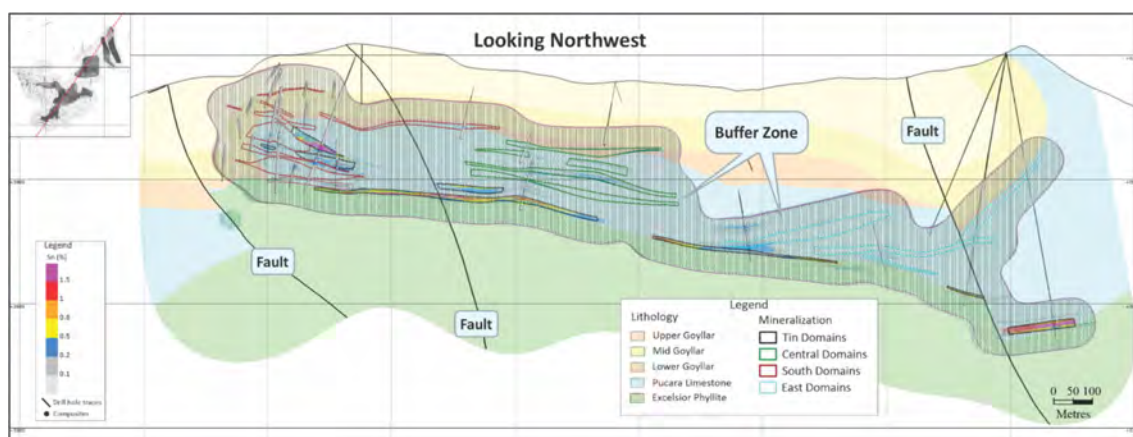
Note: Figure prepared by SLR, 2021.

Figure 14-10: Plan View of Tin Grades, Ayawilca Deposit



Note: Figure prepared by SLR, 2021.

Figure 14-11: Long Section View of Tin Grades, Ayawilca Deposit



Note: Figure prepared by SLR, 2021.

Table 14-11: High Grade Search Restrictions

Domain	High Grade Restriction Threshold	X Range (m)	Y Range (m)	Z Range (m)
AG_2	2% Pb	31	31	1.5
Central1	2% Pb	31	31	1.5
Pb Central10	1.3% Pb	31	31	1.5
Central2	2% Pb	31	31	1.5
Central3	2% Pb	31	31	1.5
Central5	1.1% Pb	31	31	1.5
Central6	2% Pb	31	31	1.5
Pb Central9	2% Pb	31	31	1.5
East2	2% Pb	31	31	1.5
Pb_West7	2% Pb	31	31	1.5
SouthA 2	2% Pb	31	31	1.5
South B	2% Pb	31	31	1.5
West1	2% Pb	31	31	1.5
West10	2% Pb	31	31	1.5
West4 A	2% Pb	31	31	1.5
Tin5	2% Sn	56	56	3
Tin8	2% Sn	56	56	3
Tin9	2% Sn	56	56	3
Tin9A	2% Sn	56	56	3
Buffer	5% Pb	35	35	2
	20% Zn	35	35	2

Table 14-12: Descriptive Statistics of Density Samples (t/m³)

Domain	Count	Minimum	Maximum	Mean	Mean (outliers removed)	Assigned
Central area	42	3.02	4.08	3.37	3.47	3.5
East area	4	3.21	3.72	3.49	3.49	3.5
South area	325	3	4.2	3.61	3.65	3.7
West area	450	3	4.2	3.36	3.51	3.5
Silver Zone	5	3.29	3.87	3.2	3.6	3.6
Tin Zone	34	3	4.19	3.81	3.7	3.7
Buffer Zone	332	3	4.2	2.98	3.48	3.5

14.3.9 Block Model

One single block model covering the entire Ayawilca deposit was constructed in 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 14-13.

The block model contains the following information:

- Area identifiers (Central, East, South, West, Silver, Tin, Buffer);
- Domain identifier with rock code;
- Estimated grade of zinc, lead, silver, copper, and indium within all domains;
- US\$NSR for the Zinc Zone;
- US\$NSR for the Tin Zone based on the block tin-to-copper ratio;
- 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;
- Resource classification code.

14.3.10 NSR Cut-off Values

US\$NSR values for the Ayawilca deposit were calculated by SLR for the purposes of geological interpretation and resource reporting. The 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 reserves are based on consensus, long term forecasts from banks, financial institutions, and other sources. For resources, metal prices used are slightly higher than those for reserves. Assumed process recoveries are based on metallurgical testwork (Wood, 2019a; Johnston, 2021). Copper was previously reported as part of the Tin Zone and indium was previously reported as part of the Zinc Zone. Neither metal is payable in the mine plan nor have been considered in the development of the NSR factors by SLR.

Table 14-13: Block Model Definition Data

Description	Easting (X)	Northing (Y)	Elevation (Z)
Minimum (m)	332,440	8,844,860	3,453.754
Maximum (m)	334,350	8,846,760	4,211.254
Extents (m)	1910	1900	757.5
	Column	Row	Level
Block size (m)	5.0	5.0	2.5
Minimum sub-cell size	2.5	2.5	1.25
Number of parent blocks	382	380	303
Number of parent blocks	43,983,480		
Number of total blocks	48,102,441		
Rotation	0°		

Notes: The origin is the highest block in lower left of the model.

Key assumptions used to calculate block NSR values include:

- Metal prices:
 - o US\$1.20/lb Zn;
 - o US\$22/oz Ag;
 - o US\$0.95/Pb;
 - o US\$11.00/lb Sn;
- Recoveries:
 - o 92% Zn;
 - o 85% Ag;
 - o 70% Pb;
 - o 70% Sn when Sn:Cu $\geq$ 5; 40% tin when Sn:Cu < 5
- Payability:
 - o 84% Zn;
 - o 47% Ag;
 - o 94% Pb;
 - o 90% Sn.

The NSR factors represent revenue (US\$) per metal unit (per % Zn, for example), and are independent of resource grade. SLR used the following factors to calculate the NSR:

- Zinc Zone

- o Zn: US\$16.23 per %;
- o Ag: US\$0.27 per g/t;
- o Pb: US\$10.20 per %;
- Tin Zone
 - o Sn: US\$141.64 per % when tin-to-copper ratio is ≥ 5 ;
 - o Sn: US\$80.94 per % when the tin-to-copper ratio is < 5 .

For the purposes of developing the cut-off value, a total unit operating cost of US\$47/t milled was estimated for the Zinc Zone and US\$63/t milled for the Tin Zone, which includes mining, processing, and general and administrative (G&A) expenses. In the QPs' opinion, a US\$55/t cut-off value for the Zinc Zone and a US\$60/t cut-off value for the Tin Zone are acceptable for estimating Mineral Resources. The US\$60/t NSR cut-off value for the Tin Zone is approximately equivalent to a 0.74% Sn when the tin-to-copper ratio is less than five and 0.42% Sn cut-off grade when the ratio is five or greater.

14.3.11 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 for the Ayawilca deposit. The classification criteria used to define the Indicated Mineral Resources included spatial analysis, drill hole spacing, and continuity of the mineralization. The drill hole spacing within a resource area assigned the Indicated category is commonly ranges from 40–70 m. Indicated Mineral Resources are confined to the South and West areas of the Zinc Zone. All remaining blocks within the resource domains were classified as Inferred. The limits of the Mineral Resource remain open in several directions. Figure 14-12 illustrates the Ayawilca deposit classification model.

14.3.12 Reasonable Prospects of Eventual Economic Extraction

Mineral Resources at the Ayawilca deposit are reported based on a possible underground mining scenario. Approximately 22.5 Mt of material within the wireframes of the Zinc Zone and 13.4 Mt within the wireframes of the Tin Zone (i.e., Buffer Zone excluded) is below the cut-off grade and was not reported as part of the Mineral Resource. SLR reviewed the location of this material and determined that it was relatively contiguous and could be avoided in the case of underground mining. In the QPs' opinion the Mineral Resource estimate at the Ayawilca deposit meets the test of reasonable prospects of eventual economic extraction.

The Mineral Resources within the Zinc Zone are reported at a US\$55/t NSR cut-off value. Indicated Mineral Resources are estimated to total 19.0 Mt at average grades of 7.15% Zn, 16.8 g/t Ag, and 0.21% Pb and Inferred Mineral Resources are reported at 47.9 Mt at average

grades of 5.36% Zn, 20.0 g/t Ag, and 0.35% Pb. Inferred Mineral Resources within the Tin Zone, reported at an NSR cut-off value of \$60/t, are estimated to total 8.4 Mt at average grades of 1.02% Sn. The Ayawilca deposit zone resources are reported separately as they host different metals and are spatially separated.

14.3.13 Mineral Resource Validation

SLR 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.

The estimated total volume of the wireframe domain models is 29,711,252 m³, while the volume of the block model at a zero grade cut-off is 29,708,578 m³. The estimated total volume of the Buffer Zone is 288,768,461 m³, while the volume of the block model at a zero grade cut-off is 288,770,000 m³. The volume difference is 0.001%, which the QPs consider to be an acceptable result. Domain volumes are listed by zone in Table 14-14.

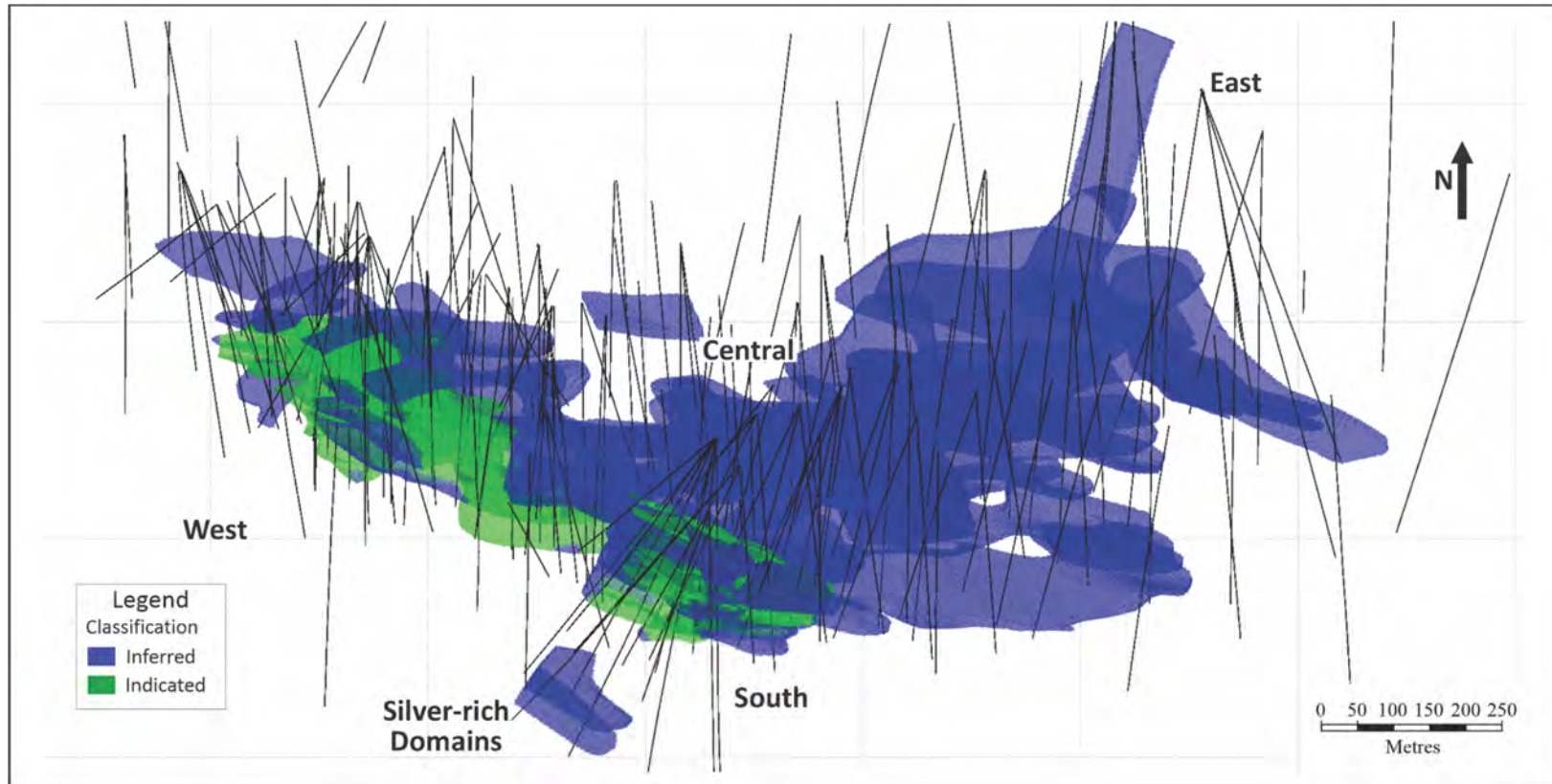
Statistical analysis comparing estimated block grades versus informing data is illustrated in histograms presented in Figure 14-13 to Figure 14-16 for the Zinc Zone and Tin Zone, respectively. The QPs note that the average grade of the silver blocks is slightly higher than the average composite grades in some areas of the Zinc Zone. This is attributed to a larger influence of some higher grade drill holes in parts of these zones due to their relative location and spacing locally.

14.3.14 Comparison to Previous Mineral Resource Estimate

The current Mineral Resource estimate supersedes the previous Mineral Resource estimate dated November 26, 2018. The current model incorporates additional drilling (11,632.7 m) completed from 2019–2021 and an updated 3D geological model. Table 14-15 (excluding the Buffer Zone) and Table 14-16 (including the Buffer Zone) present direct comparisons between the November 26, 2018, and the current Mineral Resource estimates for the Zinc Zone at the same \$55/t cut off. Table 14-17 presents a direct comparison between the November 26, 2018, and the current Mineral Resource estimates for the Tin Zone at a higher cut off in the update (\$60/t compared with \$55/t).

Both the 2018 and 2021 mineralization wireframes were constructed considering geological models prepared by Tinka. Due to the additional drilling from 2019 to 2021, the current model benefited from a significant increase in understanding of the litho-structural setting. SLR refined the resource domains to align with the stratigraphy and limited their extent to the Pucará and Lower and Mid-Goyllar Formations. Similarly, the domains were constrained by the faults that are known to limit the mineralization.

Figure 14-12: Ayawilca Deposit Classification Model

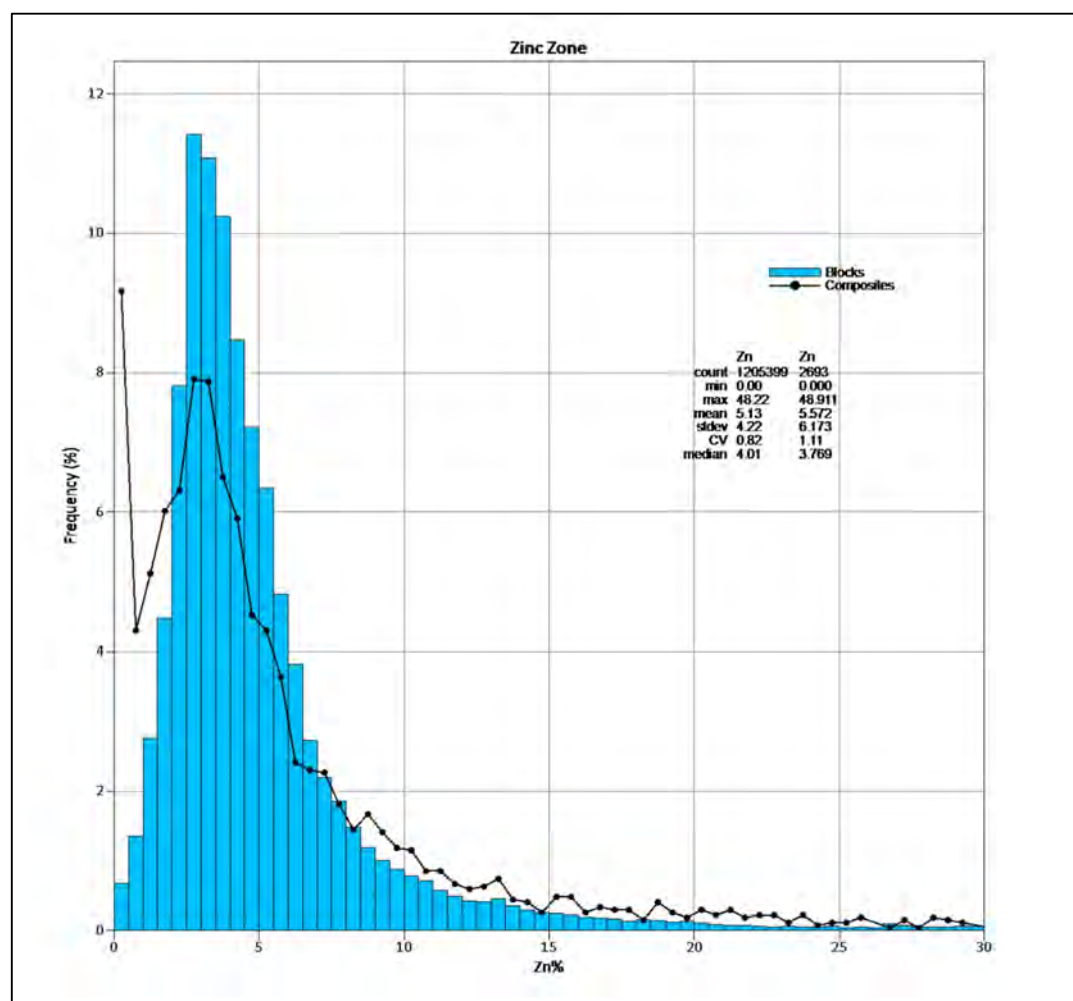


Note: Figure prepared by SLR, 2021.

Table 14-14: Volume Comparison – Ayawilca Deposit

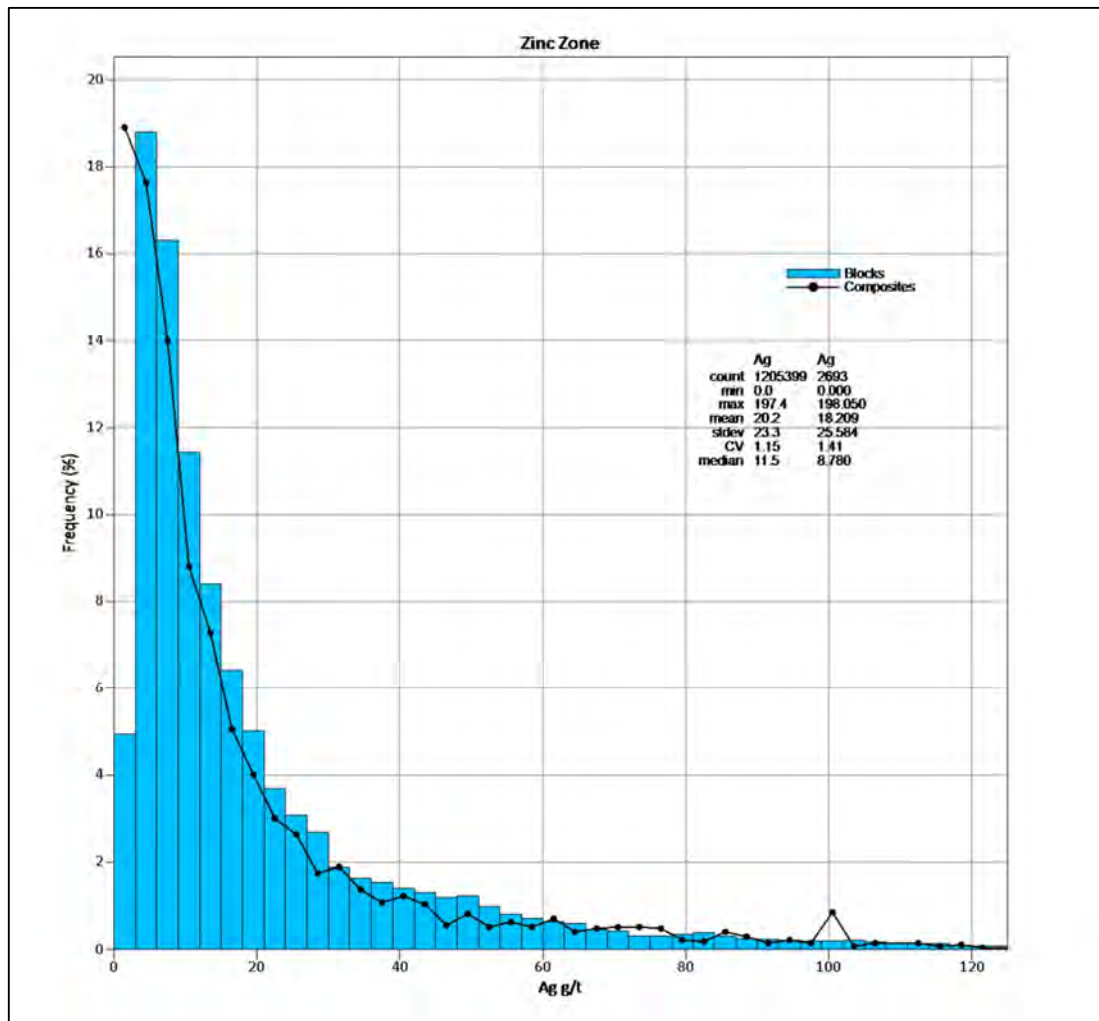
Domain	Block Volume (m)	Wireframe Volume (m)	Difference (%)
Silver Zone (South Area)	176,352	176,196	0.09
West Area	6,589,953	6,591,133	-0.02
Central Area	7,286,133	7,286,817	-0.01
East Area	4,169,109	4,169,630	-0.01
South Area	5,595,078	5,594,960	0.00
Tin Zone	5,891,953	5,892,516	-0.01
<i>Sub Total</i>	<i>29,708,578</i>	<i>29,711,252</i>	<i>-0.01</i>
Buffer Zone	288,768,461	288,770,000	0.00
Total	318,477,039	318,481,252	0.00

Figure 14-13: Histograms of the Estimated Block Zinc Grades – Ayawilca Zinc Zone



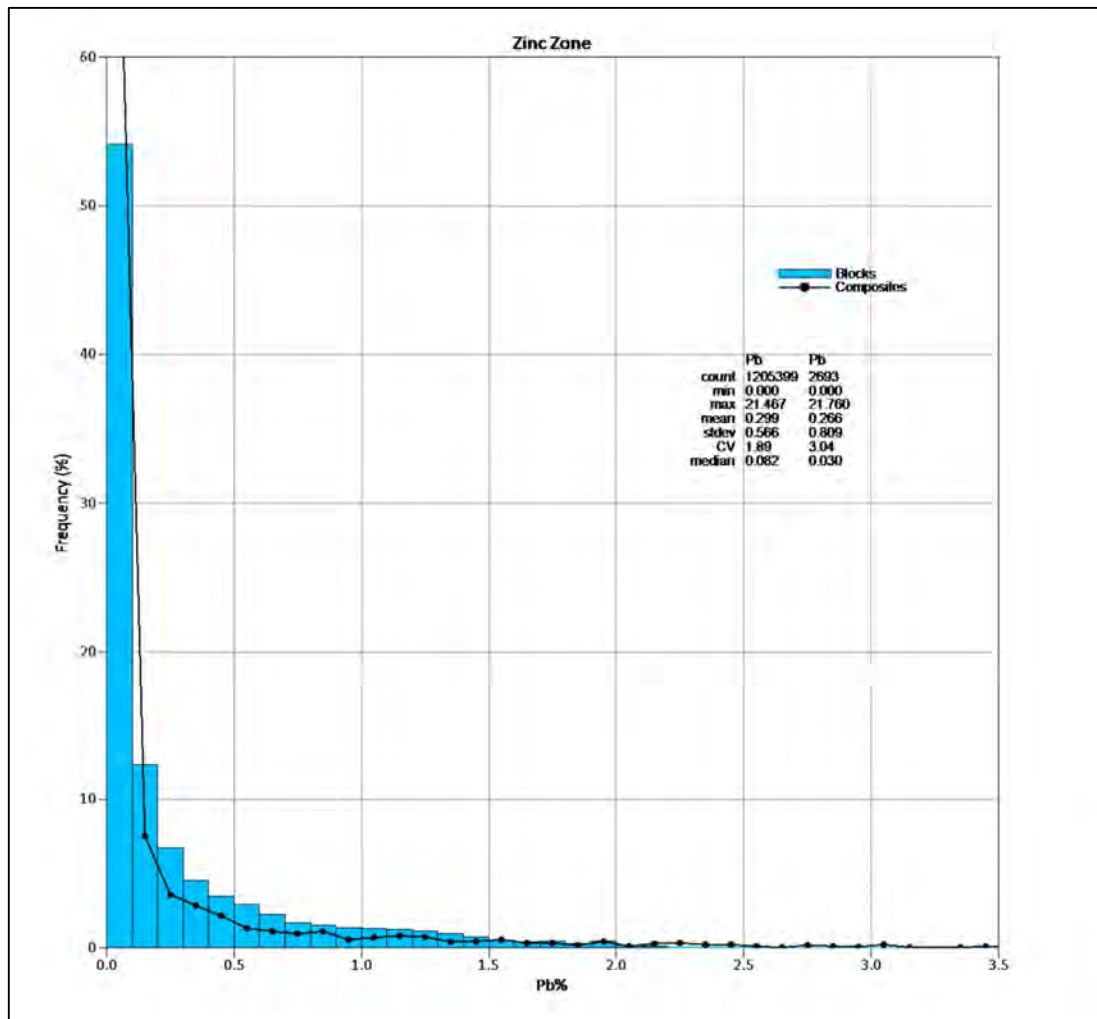
Note: Figure prepared by SLR, 2021.

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



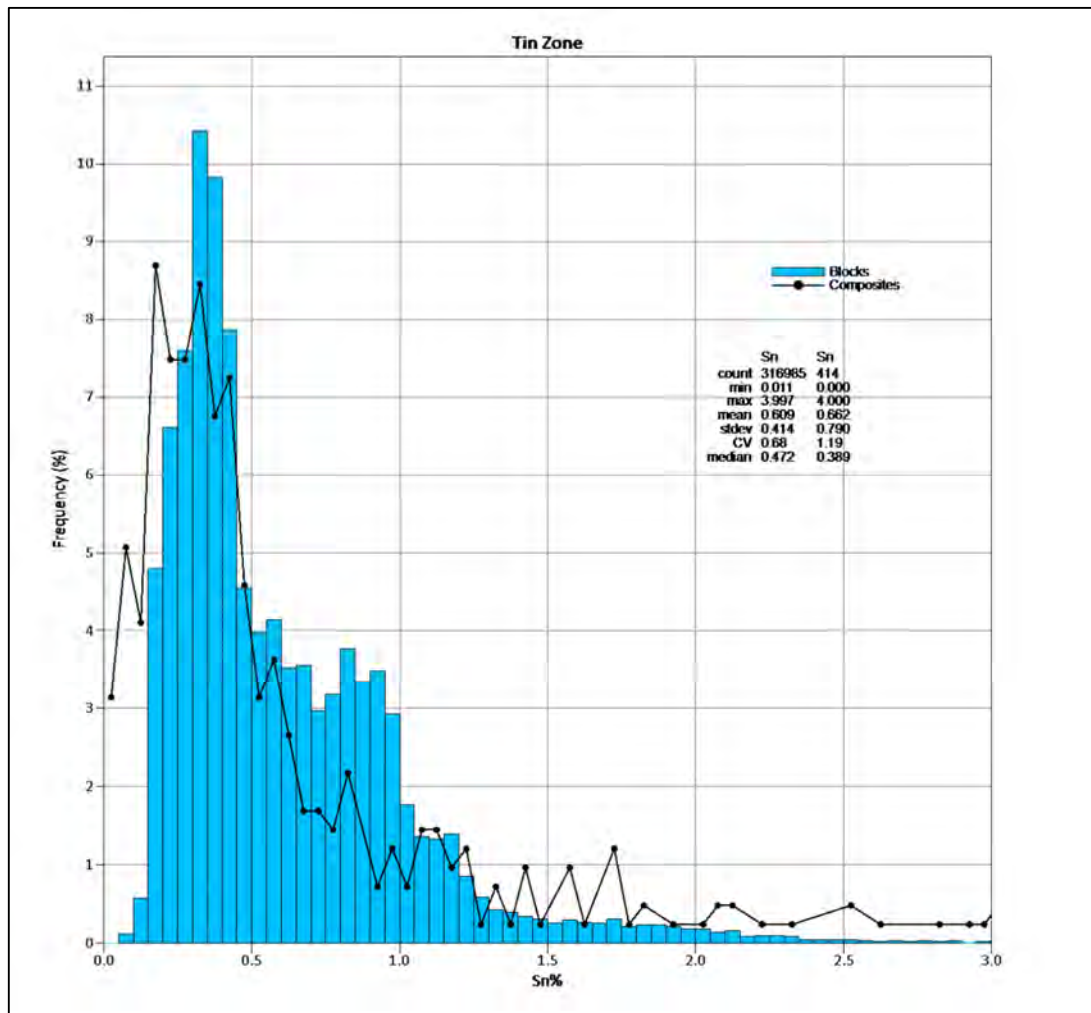
Note: Figure prepared by SLR, 2021.

Figure 14-15: Histograms of the Estimated Block Lead Grades – Ayawilca Zinc Zone



Note: Figure prepared by SLR, 2021.

Figure 14-16: Histograms of the Estimated Block Tin Grades – Ayawilca Tin Zone



Note: Figure prepared by SLR, 2021.

Table 14-15: Comparison Between 2018 and 2021 Mineral Resources for the Ayawilca Zinc Zone - Excluding Buffer Zone

2018 Model Prepared by RPA at an NSR Cut-Off of US\$55/t							
Class	Tonnage (Mt)	Grade			Contained Metal		
		(% Zn)	(g/t Ag)	(% Pb)	(Mlb Zn)	(Moz Ag)	(Mlb Pb)
Indicated	11.7	6.9	15.0	0.16	1,778	5.8	42
Inferred	45.0	5.6	17.0	0.23	5,585	25.2	230
2021 Model Prepared by SLR at an NSR Cut-Off of US\$55/t (Excluding Buffer)							
Class	Tonnage (Mt)	Grade			Contained Metal		
		(% Zn)	(g/t Ag)	(% Pb)	(Mlb Zn)	(Moz Ag)	(Mlb Pb)
Indicated	19.0	7.1	16.8	0.21	2,990	10.3	87
Inferred	43.2	5.4	20.3	0.32	5,164	28.2	306

Percent Difference							
Class	Tonnage (Mt)	Grade			Contained Metal		
		(% Zn)	(g/t Ag)	(% Pb)	(Mlb Zn)	(Moz Ag)	(Mlb Pb)
Indicated	62%	4%	12%	30%	68%	77%	107%
Inferred	-4%	-3%	19%	39%	-8%	12%	33%

Table 14-16: Comparison Between 2018 and 2021 Mineral Resources for the Ayawilca Zinc Zone - Including Buffer Zone

2018 Model Prepared by RPA at an NSR Cut-Off of US\$55/t							
Class	Tonnage (Mt)	Grade			Contained Metal		
		(% Zn)	(g/t Ag)	(% Pb)	(Mlb Zn)	(Moz Ag)	(Mlb Pb)
Indicated	11.7	6.9	15	0.16	1,778	5.8	42
Inferred	45.0	5.6	17	0.23	5,585	25.2	230
2021 Model Prepared by SLR at an NSR Cut-Off of US\$55/t (Including Buffer)							
Class	Tonnage (Mt)	Grade			Contained Metal		
		(% Zn)	(g/t Ag)	(% Pb)	(Mlb Zn)	(Moz Ag)	(Mlb Pb)
Indicated	19.0	7.1	16.8	0.21	2,990	10.3	87
Inferred	47.9	5.4	20.0	0.35	5,657	30.7	370
Percent Difference (%)							
Class	Tonnage (Mt)	Grade			Contained Metal		
		(% Zn)	(g/t Ag)	(% Pb)	(Mlb Zn)	(Moz Ag)	(Mlb Pb)
Indicated	62	4	12	30	68	77	107
Inferred	6	-4	17	52	1	22	61

Table 14-17: Comparison Between 2018 and 2021 Mineral Resources for the Ayawilca Tin Zone

2018 Model Prepared by RPA at an NSR Cut-Off of US\$55/t			
Class	Tonnage (Mt)	Grade (% Sn)	Contained Metal (Mlb Sn)
Inferred	14.5	0.6	201
2021 Model Prepared by SLR at an NSR Cut-Off of US\$60/t			
Class	Tonnage (Mt)	Grade (% Sn)	Contained Metal (Mlb Sn)
Inferred	8.4	1.0	189
Percent Difference			
Class	Tonnage (Mt)	Grade (% Sn)	Contained Metal (Mlb Sn)
Inferred	-42	62	-6

The new geological model, improved mineralization domains, as well as the new infill drilling led to an increase in resources assigned to the Indicated category.

Increased average grades of lead and silver in the Zinc Zone resource are due to the inclusion of new resource areas high in lead and silver (i.e., silver rich domains in the South area) but low in zinc relative to most zones estimated in 2018. These new areas are now included in the resource estimate due to higher NSR factors for both lead and zinc. The removal of indium and copper from the 2018 NSR value calculation for the Zinc Zone has slightly improved the average zinc grade by narrowing the resource wireframes to better represent the zinc mineralization. In addition, although the NSR cut-off value is the same as in 2018, the NSR factors used to calculate the value of a block have all increased.

While the mineralization domains were expanded for the Tin Zone in the current estimation, there was nevertheless a decrease in tonnage. The decrease in tonnage was accompanied by a significant increase in tin grade. The increase in average grade of the Tin Zone is due several factors including:

- The discovery of high-grade tin mineralization in 2020–2021;
- A higher effective NSR cut-off value applied to the Mineral Resource;
- The removal of copper and silver from consideration.

A decrease in the tin factor in the NSR value calculation.

14.4 Colquipucro Mineral Resource Estimate

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/m³. Classification into the Indicated and Inferred categories was guided by the drill hole spacing and the continuity of the mineralized zones.

14.4.1 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 Dassault Systèmes GEOVIA GEMS Version 6.7 (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: 2836;
- RQD and recovery: 4,043;
- Oxidation: 843;
- Density measurements: 90.

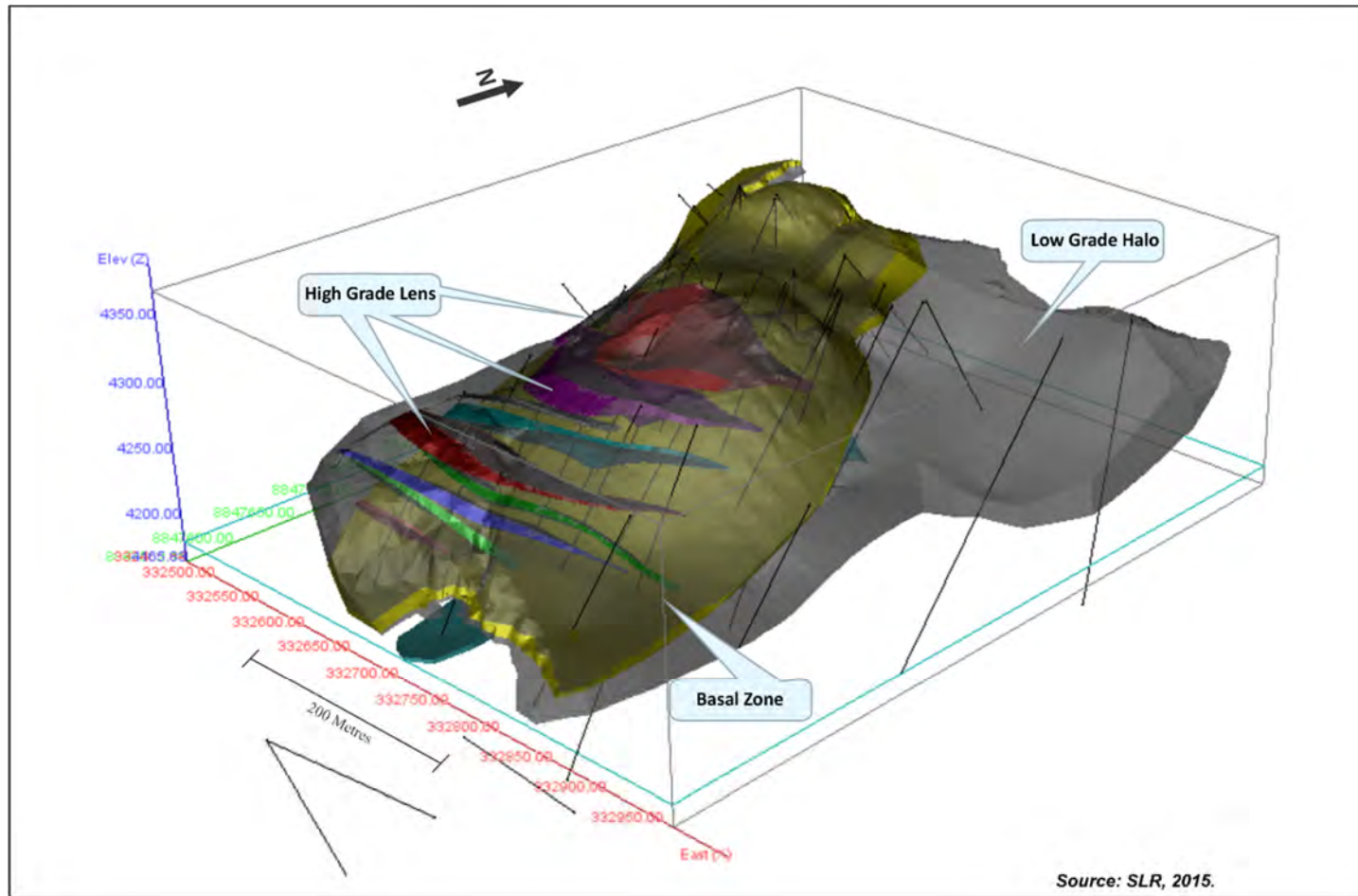
Section 12 describes the verification steps taken by SLR. In summary, no discrepancies were identified, and the QPs are of the opinion that the drill hole database is valid and suitable to estimate Mineral Resources for the Colquipucro deposit.

14.4.2 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 of 2 m 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 14-17). 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 4,160–4,360 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.

Figure 14-17: 3D View of Colquipucro Wireframe Models



Brief descriptions of the domains/lenses are provided below:

- 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°–45° towards the north. They commonly have dimensions of 200 m along strike by 100 m down dip, and range in thickness from 2–20 m, averaging 6 m. All are hosted entirely in the Goyllar sandstone. Collectively, the eight zones 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 2–20 m in thickness, averaging 7 m. 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.

14.4.3 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 14-18.

14.4.4 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.

Table 14-18: 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

Review of the resource assay histograms within the wireframe domains (Figure 14-18 and Figure 14-19) and a visual inspection of high-grade values on vertical sections 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 <1 after the cutting was applied (Table 14-19).

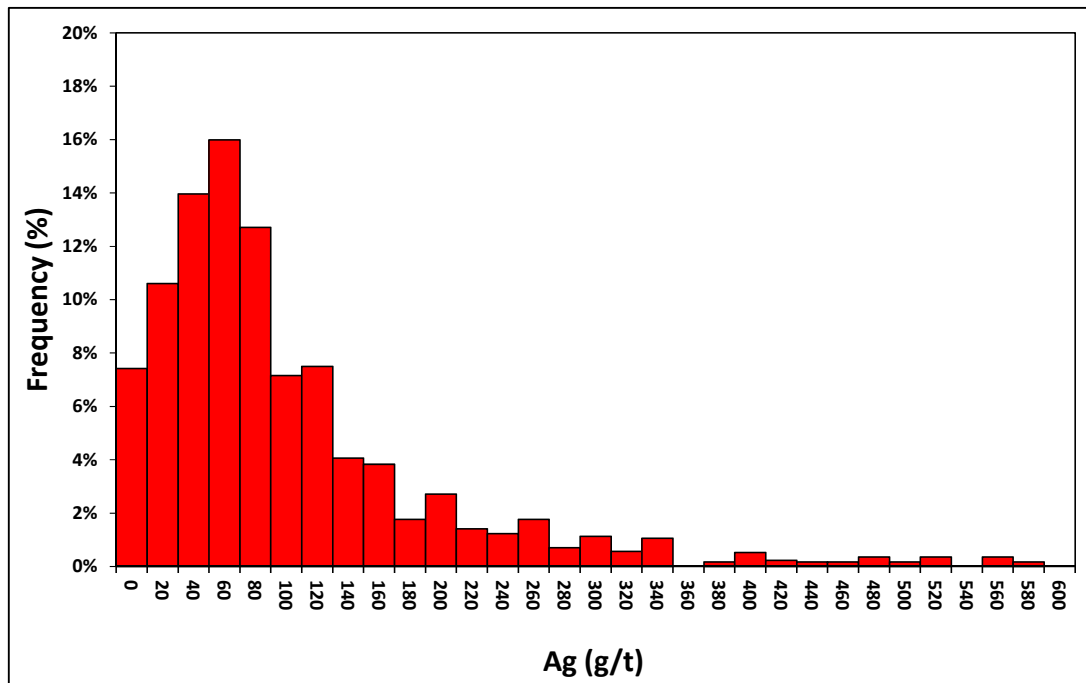
14.4.5 Compositing

Sample lengths range from 0.6–6.0 m within the wireframe models with >90% taken at 2 m. Given these distributions, and considering the width of the mineralization, SLR chose to composite to 2 m 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 <0.5 m, located at the bottom of the mineralized intercept, were removed from the database. Table 14-20 lists descriptive statistics of the composites by zone.

14.4.6 Interpolation Parameters

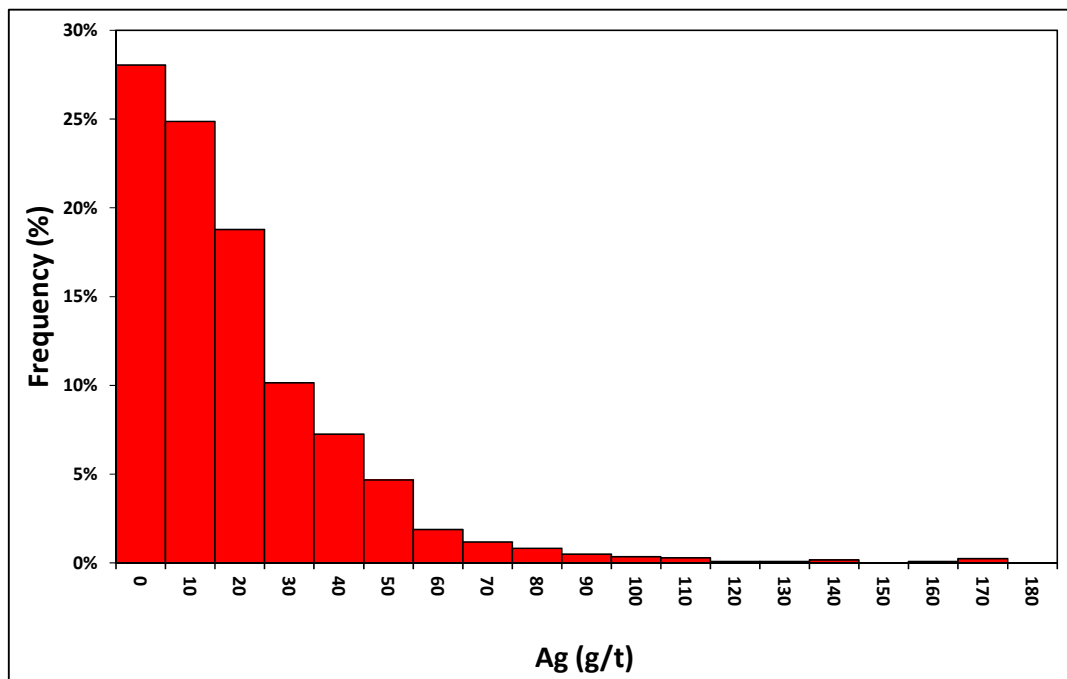
Grade interpolation for silver was estimated by ID³ using two passes for the high-grade lenses and three passes for the lower-grade halo domains. Figure 14-20 and Figure 14-21 illustrate the results.

Figure 14-18: Histogram Assays within Colquipucro High-Grade Lenses



Note: Figure prepared by SLR, 2015.

Figure 14-19: Histogram Assays within Colquipucro Low-Grade Halo



Note: Figure prepared by SLR, 2015.

Table 14-19: Descriptive Statistics of Capped Resource Assays - 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)	360	120
Median (g/t Ag)	84	19
Arithmetic Mean (g/t Ag)	110	24
Standard Deviation (g/t Ag)	89	22
Coefficient of Variation	0.8	0.9

Table 14-20: 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

Figure 14-20: Colquipucro Vertical Section 332,650E

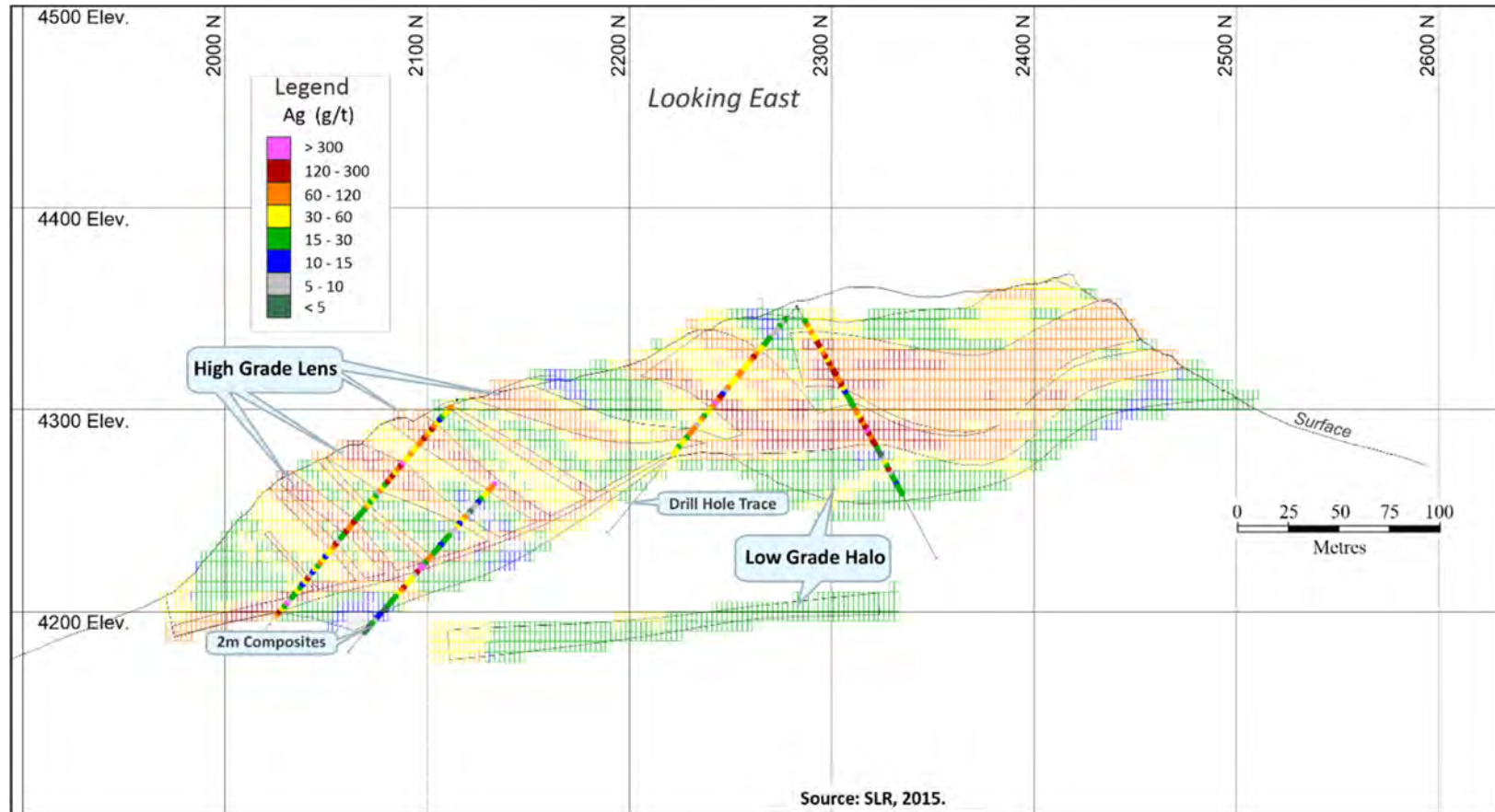
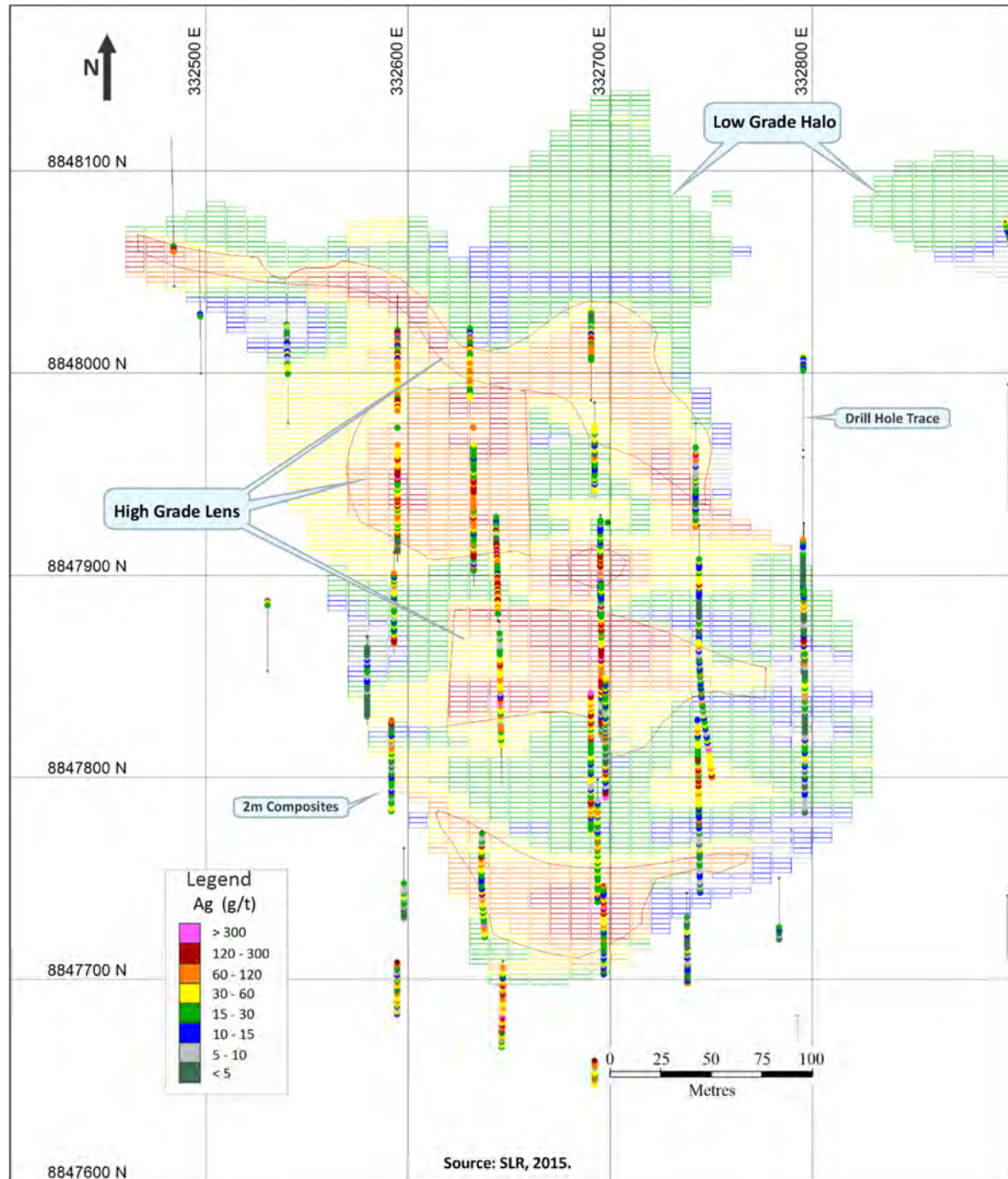


Figure 14-21: Colquipucro 4,300 m Level Plan



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 x 50 x 10 m for an anisotropy ratio of 1:1:5. Search ellipse orientations were aligned in the direction of the wireframe models (Table 14-21). 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 x 100 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.

14.4.7 Density

Tinka performed 90 density measurements from four drill holes. SLR used the average of the measurements, 2.48 t/m³, to convert resource volumes to tonnage.

14.4.8 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;
- The distance to the closest composite used to interpolate the block grade.

Table 14-21: 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

14.4.9 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 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.

14.4.10 Cut-off Grade and Preliminary Open Pit Shell

To fulfill the CIM requirement of “reasonable prospects for eventual economic extraction”, 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 14-22.

14.4.11 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. 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 14-23). 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 4,160–4,360 masl elevations.

14.4.12 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 m³, while the volume of the block model at a zero grade cut-off is 11,956,000 m³. Results are listed by vein in Table 14-24.

Table 14-22: 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

Table 14-23: 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 due to rounding.

Table 14-24: Volume Comparison - Colquipucro

Zone	Block Volume (000 m ³)	Wireframe Volume (000 m ³)
High grade lenses	2,220	2,221
Low grade halo	9,736	9,736
Total	11,956	11,957

15 MINERAL RESERVE ESTIMATES

This section is not relevant to this Report.

16 MINING METHODS

16.1 Introduction

The 2021 PEA mine plan 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 2021 PEA based on these Mineral Resources will be realized.

Following a review of potential mining methods, and discussions with Tinka based on environmental considerations and prevailing metal prices, open pit mining was not considered to be a suitable mining method for the purposes of the 2021 PEA. The Ayawilca deposit is planned to be mined using underground mining methods.

To define the mining method, the University of British Columbia (UBC) mining method selection system was applied, together with consideration of aspects such as safety, the geometry of the resources, the distribution of grades, the scale of production and mining costs. Based on this analyses, two suitable mining methods were selected:

- Overhand cut-and-fill (OCF) with pillars;
- Sub-level stoping (SLS).

The mining strategy involves dividing the deposit into five zones by spatial location and by mining method:

- OCF with pillars: Central and East areas;
- SLS: West, South areas and Silver Zones.

The net smelter return cut-off was defined at US\$65/t, as it covers mining, processing, general and administrative costs and sustaining capital costs, and was determined to be a reasonable balance considering the margin per tonne of material mined while still having a reasonable resource extraction and mine life. The production rate was set at 8,500 t/d after considering the sustainable rate achievable from the multiple mining areas.

Optimizations were completed using the mineable shape optimiser (MSO) unit within Datamine software. The selective mining unit (SMU) selected for each mining zone was defined as set out in Table 16-1.

The SMU length and height were fixed values, whereas the width varied by zone and mineralized structure, from 5–45 m. Sections of 5 x 5 m were defined for the development drives and the Central area pillars.

Table 16-1: Selective Mining Unit Dimensions by Zone and Mining Method

Area/Zone	Method	Length (m)	Height (m)	Width (m)
South	SLS	15	15	10
West	SLS	20	10	10
Central	OCF	10	5	10
East	OCF	10	5	10
Silver	SLS	10	10	10

16.2 Geotechnical Considerations

The QP considers that the geotechnical parameters applied at this stage of the study are representative of the average rock mass conditions and appropriate for the level of study.

16.2.1 Rock Mass Characterization – Q System

The Q-system (rock mass quality index) according to Barton and Grimstad (1993) was used to assess the rock mass quality of mineralization and host rock and to give an estimate of stope/development stability and support requirements. The Q-system quantitatively describes three aspects of rock mass based on six geotechnical parameters, to arrive at a Q value.

$$Q = \left(\frac{RQD}{J_n} \right) * \left(\frac{J_r}{J_a} \right) * \left(\frac{J_w}{SRF} \right)$$

According to Barton et al., (1974) Q values can range from 0.001 (very poor rock conditions), to 1,000 (excellent rock conditions).

16.2.2 Rock Mass Characterization Using Rock Mass Rating

The following six parameters are used to classify a rock mass using the rock mass rating (RMR) system.

- Uniaxial compressive strength of rock material;
- RQD;
- Spacing of discontinuities;
- Condition of discontinuities;
- Groundwater conditions;
- Orientation of discontinuities.

Each of the six parameters was assigned a value corresponding to the rock characteristics, which were derived from field surveys and laboratory tests. The sum of the six parameters is the "RMR value", which lies between 0–100.

16.2.2.1 Stope Sizing

Based on the review of available geotechnical information, the rock mass conditions appear to be generally favourable. An assessment on the stopes was undertaken using the modified stability number (N') proposed by Potvin (1988) and based initially on Q' , where:

$$N' = Q' \times A \times B \times C$$

Where:

- Q' is the modified Q Tunnelling Quality Index (after Barton et al., 1974)
- A is the rock stress factor
- B is the joint orientation factor
- C is the gravity adjustment factor.

The N' value can then be used to calculate the maximum stable surface area of the backs and the walls of the stopes, otherwise known as the hydraulic radius. The results are shown in Table 16-2.

16.3 Mining Method Selection

The UBC methodology was used to select the most suitable mining method for the Ayawilca deposit, considering the form of mineralization, review of geotechnical information (RMR and characteristics of the hanging wall and footwall rock), the distribution of grades and the general deposit characteristics (e.g., width, dip angle and depth).

16.3.1 UBC Mining Method Selection System

The UBC method is a modification of the approach of Nicholas (1981). According to Nicholas, each mining method is classified according to the geometry distribution parameters, mineralization grade, location (distance to surface), and hanging wall and footwall geomechanical characteristics.

The steps in the selection process consider the following:

- Description of the deposit geometry;
- Geomechanical characteristics of mineralization, hanging wall and footwall as shown in Table 16-3.

The mining methods likely to be applicable at Ayawilca through the UBC assessment were:

- Sublevel stoping;
- Cut-and-fill;
- Open pit;
- Sublevel caving;
- Shrinkage stoping;
- Block caving;
- Room-and-pillar;
- Longwall mining.

According to the UBC method, an open-pit could be mined. However, this option was ruled out in a preliminary analysis of the project based on a review of the potential for an open-pit operation (Wood, 2019b), which showed that the mining of this deposit is unlikely to be economically viable due to the excessive waste stripping required.

A ranking of the UBC methodology for potential underground methods is set out in Table 16-4. In this table, green highlighted cells indicate the most prospective mining methods, yellow highlighted cells are the next best options, and orange and red highlighted cells indicate the method is not suitable for the Ayawilca deposit. Caving alternatives were ruled out due to the geometry of the deposit, which is massive, sub-horizontal, and not continuous towards the surface.

As a result, Mining Plus selected the OHF and SLS methods for the 2021 PEA. Schematics of the mining methods are shown in Figure 16-1 and Figure 16-2.

Table 16-2: Maximum Hydraulic Radius (footwall/hanging wall/back)

Area/Zone	Material Type	Area	Hydraulic Radius
Silver	Mineralized material	Footwall/hanging wall	2.15
Central	Mineralized material	Footwall/hanging wall	4.60
East	Mineralized material	Footwall/hanging wall	4.20
West	Mineralized material	Footwall/hanging wall	3.20
South	Mineralized material	Footwall/hanging wall	3.65
All	Waste	Footwall/hanging wall	3.65
Silver	Mineralized material	Backs	1.75
Central	Mineralized material	Backs	2.70
East	Mineralized material	Backs	2.70
West	Mineralized material	Backs	2.15
South	Mineralized material	Backs	2.15
Waste		Backs	2.15

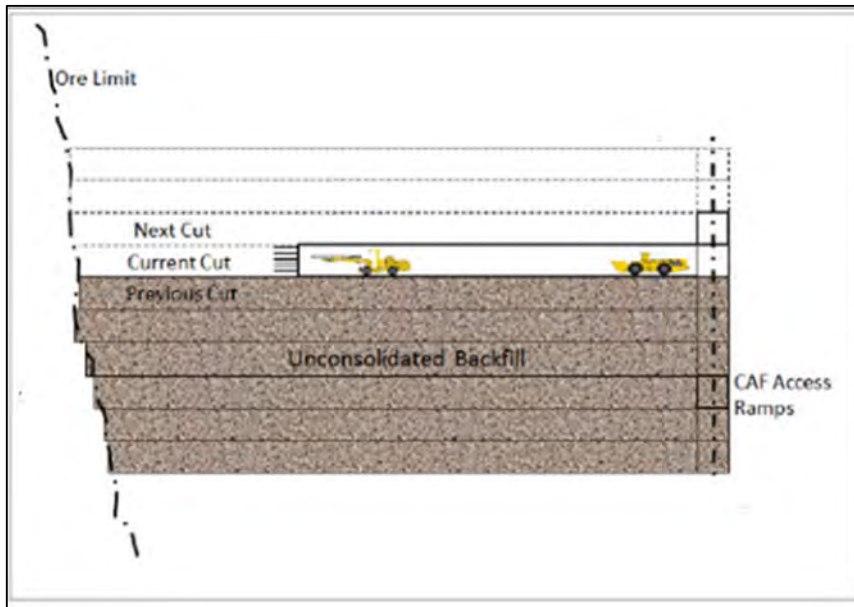
Table 16-3: Geomechanical Parameters for the UBC Methodology

Item	Area	Value	Unit
Waste density		2.6	t/m ³
K ratio		1.3	—
Rock matrix strength	Footwall/hanging wall	35	MPa
	Mineralized material	40	MPa
RMR	Footwall/hanging wall	45	%
	Mineralized material	50	%

Table 16-4: UBC Comparative Table by Underground Mining Method

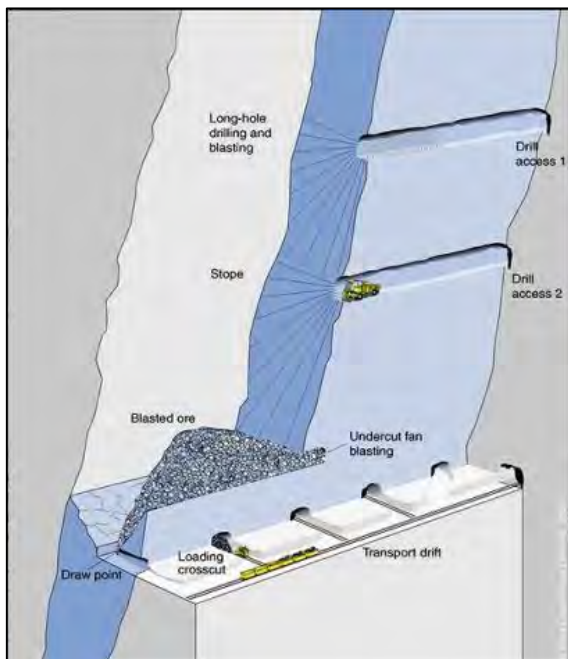
Mining Method	Central Area	East Area	South Area	West Area	Silver Zone	Tin Zone
Sublevel stoping	36	36	36	34	36	36
Overhand cut-and-fill	33	33	33	33	33	33
Shrinkage stoping	27	27	27	31	27	27
Room and pillar	26	26	26	28	26	26
Longwall mining	23	23	23	20	23	23
Square set stoping	17	17	17	13	17	17
Sublevel caving	13	13	13	-26	13	13
Block caving	12	12	12	-31	12	12

Figure 16-1: OCF with Pillars Method, View Plan



Note: Figure prepared by Wilton Resources Corporation Limited, 2014.

Figure 16-2: Sub-Level Stopping Schematic



Note: Figure prepared by Atlas Copco, 2007.

16.4 Mining Recovery and Dilution

A mining recovery of 95% was assumed for the SLS method and a 100% mining recovery was used for the OCF with pillars method. In the areas to be mined by OCF with pillars, it was assumed that pillars will be recovered in the last years of the mine plan. A recovery of 70% was assumed for these pillars, because the rock conditions may not be entirely favorable due to the initial mining within the zone.

A variable mining dilution assumption (% dilution) was applied, depending on the mining method, and consisted of internal dilution based on the defined stope sizes. No external unplanned dilution was included in the 2021 PEA since the stopes are generally continuous in nature. Future studies may result in the stope shapes being refined to potentially consider less internal dilution. Table 16-5 and Table 16-6 show the assumed recovery and mine dilution parameters applied for each area/zone of the mine.

Table 16-5: Projected Area/Zone Recovery by Mining Method

Area/Zone	Method	Recovery (%)
Central	OCF	100
East	OCF	
Silver	SLS	95
South	SLS	
West	SLS	

Table 16-6: Projected Dilution by Area/Zone and Mining Method

Area/Zone	Method	Dilution (%)
Central	OCF	19
East	OCF	19
Silver	SLS	10
South	SLS	12
West	SLS	12

16.5 Selection of Throughput Rate

A conceptual evaluation was carried out to select the optimal production rate by applying Taylor's rule, using stopes optimized above the NSR cut-off of US\$65/t that were operationally viable for exploitation.

Taylor's rule is based on the equation:

- $Tons_{day} = cp_{Taylor} = 0.014 \times res_{exp}^{0.75}$

In this formula, $Tons_{day}$ are the daily capacity, cp and $resexp$ the expected reserves, originally in short tons; however, the formula can also be applied using metric tonnes and to mineral resources as well as mineral reserves.

This gave a variable extraction rate for the different areas/zones of Ayawilca as shown in Table 16-7.

In line with Table 16-7, the production scales were targeted by zone that were later used in the consolidated mine plan as shown in Table 16-8.

Based on the Taylor's rule analysis, an 8,500 t/d rate was considered to be a sustainable and appropriate throughput rate for the proposed operation. The 8,500 t/d is based on the initial areas below:

- The South area providing 4,500 t/d.
- The West area providing 3,500 t/d.
- Development drives providing 500 t/d.

Table 16-7: Conceptual Daily Production Scale Defined by Area/Zone

Area/Zone	Mining Method	NSR Cut-off $\geq$ \$65	Production Scale Range		
		Mt	Min (t/d)	Max (t/d)	Average (t/d)
Central	OCF	7.4	2,504	3,756	3,130
South	SLS	12.1	3,605	5,407	4,506
West	SLS	9.9	3,092	4,638	3,865
East	OCF	4.3	1,668	2,502	2,085
Silver	SLS	0.2	139	209	174
Total		33.9	11,008	16,513	13,760

Table 16-8: Daily Production Scale Defined by Zone

Area/Zone	Method	Tonnes per day
Central	OCF	3,000
South	SLS	4,500
West	SLS	3,500
East	OCF	2,000
Silver	SLS	200
Drives in mineral	—	500

The South and West areas will then be supplemented by the remaining areas later in the mine life. These areas will have independent accesses and ventilation systems, and will be capable of sustaining the defined 8,500 t/d throughput.

16.6 Optimization Cut-off

A number of optimizations were completed at varying NSR cut-offs in order to determine the nominated NSR cut-off to be applied. Some areas of the deposit hold together well as the cut-off increases, while others are less continuous as cut-off increases. Tonnes and revenue reduced in a linear fashion with increased cut-off.

The Central and East areas became less continuous more quickly with a 19% reduction in tonnes and a 15% reduction in revenue for every \$5 increase in NSR cut-off. The South and West areas reduced as expected, but exhibited more robust continuity with an 11% reduction in tonnes and a 7% reduction in revenue. These areas will therefore be mined first in the mining sequence.

An NSR cut-off of US\$65 was considered to be a reasonable balance between achievable margin, resource recovery, ability to support the production rate with volume per area, continuity and potential mine life (>10 year mine life at 8,500 t/d).

Future studies could consider increased or reduced NSR cut-offs by specific area, and/or throughout the mine life. For example, a higher NSR cut-off could be used in the West and South areas, and a lower NSR cut-off could be used in the Central and East areas. Trade-off studies would need to be performed to understand the ultimate effect of such changes on potential Project economics.

16.7 Subset of the Mineral Resource Estimate Within the 2021 PEA Mine Plan

An NSR cut-off of US\$ 65/t was applied to define the subset of the Mineral Resource estimate within the 2021 PEA mine plan summarized in Table 16-9. This NSR value is higher than the estimated total operating cost of US\$48/t, and, in the case of sublevel stopes, is higher than the US\$25/t weighted average mining cost.

Mining Plus used information compiled from similar projects in the region, and from a reference database to support the determination of the cut-off by area/zone summarized in Table 16-10. Unit activities contributing to the mining cost estimate are shown in Table 16-11.

16.8 Design Assumptions and Design Criteria

16.8.1 Selective Mining Unit

Table 16-12 indicates the selective mining unit (SMU) values defined for each area/zone of the proposed mine. The width is variable based on the mineralization width.

16.8.2 Production Levels

In all areas, mining will be completed in an ascending manner.

For the areas/zones to be mined using SLS, exploitation levels of up to 45 m were assumed, grouping up to four levels, always honoring the geotechnical and SMU constraints.

Table 16-9: Subset of the Mineral Resource Estimate Within the 2021 PEA Mine Plan

Mineral Resource Confidence Category	Tonnes (t x 1,000)	Ag (g/t)	Pb (%)	Zn (%)	NSR_Zn (US\$/t)
Indicated	16,884	12.30	0.13	6.05	105.89
Inferred	26,642	15.87	0.25	5.25	90.04

Table 16-10: Mining NSR Cut-off by Area/Zone

Proposed Mining Method	Area/Zone	Production Range (t/d)	Mining NSR Cut-Off (US\$/t)
OCF	Central	3,000	20.51
SLS	Silver	200	60.27
OCF	East	2,000	28.75
SLS	West	3,500	27.05
SLS	South	4,500	23.54

Table 16-11: Projected Mining Cost by Area/Zone

Area/Zone	Item	Item (US\$/t)	Total (US\$/t)
3,000 OCF Central area	Mining supervision	1.26	20.51
	Preparation	2.64	
	Exploitation	4.36	
	Load and haulage to pass	0.55	
	Support	1.67	
	Fill	4.54	
	Haulage to plant	2.77	
	Auxiliary services	2.02	
	Energy	0.69	
200 SLS Silver Zone	Mining supervision	4.09	60.27
	Preparation	8.57	
	Exploitation	14.13	
	Load and haulage to pass	1.79	
	Support	5.40	
	Fill	14.71	
	Haulage to plant	2.77	
	Auxiliary services	6.55	
	Energy	2.24	
2,000 SLS East area	Mining supervision	1.85	28.75

Area/Zone	Item	Item (US\$/t)	Total (US\$/t)
	Preparation	3.87	
	Exploitation	6.38	
	Load and haulage to pass	0.81	
	Support	2.44	
	Fill	6.65	
	Haulage to plant	2.77	
	Auxiliary services	2.96	
	Energy	1.01	
3,500 SLS West area	Mining supervision	1.73	27.05
	Preparation	3.62	
	Exploitation	5.97	
	Load and haulage to pass	0.76	
	Support	2.28	
	Fill	6.21	
	Haulage to plant	2.77	
	Auxiliary services	2.77	
	Energy	0.95	
4,500 SLS South area	Mining supervision	1.48	23.54
	Preparation	3.10	
	Exploitation	5.11	
	Load and haulage to pass	0.65	
	Support	1.95	
	Fill	5.32	
	Haulage to plant	2.77	
	Auxiliary services	2.37	
	Energy	0.81	
Pillars	Mining supervision	1.16	18.83
	Preparation	2.43	
	Exploitation	4.00	
	Load and haulage to pass	0.51	
	Support	1.53	
	Fill	—	
	Haulage to plant	2.54	
	Auxiliary services	1.86	
	Energy		

Table 16-12: SMU Dimensions by Proposed Mining Method

Area/Zone	Length (m)	Height (m)	Proposed Mining Method
West	20	10	SLS
South	15	15	SLS
East	10	5	OCF
Silver	10	10	SLS
Central	10	5	OCF

16.8.3 Access

The mine is planned to access the mineralization through a system of three main ramps, which will access the five proposed main mining zones.

The ramp system will have variable gradients, including:

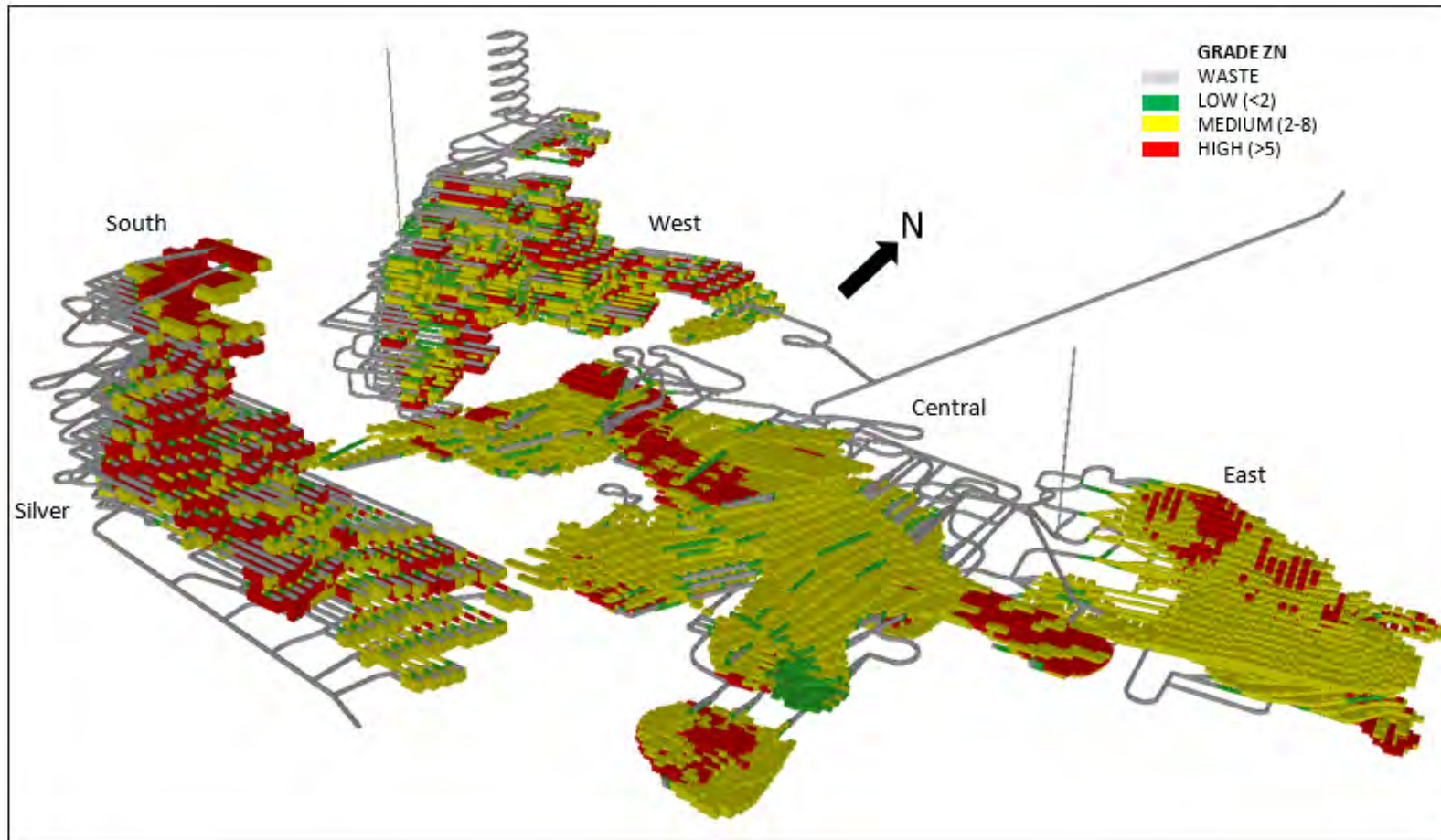
- Maximum gradients of $\pm 13\%$;
- Gradients on curves of $\pm 8\text{--}10\%$;
- Gradients on the sublevels, accesses and chambers of $\pm 0.5\text{--}1\%$.

A schematic showing the proposed mine design is included in Figure 16-3.

The mine plan assumes the following:

- A 2,815 m ramp will be developed from level 4,170 to access the South area. This area will be later accessed by the second ramp that will be developed for the Silver area from level 3,880. This ramp will be 713 m long;
- The West area will have an independent ramp access of 3,430 m length. The portal will be located at an elevation of 4,280 masl;
- During Year 7, a 2,995 m ramp will be constructed from elevation 4,095 masl to access the Central area. A 199 m cross-cut will be developed on level 3,845, and will connect to the East area. The East area will have a 1,964 m long ramp to support mining activities;
- A 377 m long connection ramp will join the Central and West areas to provide haulage flexibility and alleviate congestion. This will allow either the Central or the West area ramps to be used.

Figure 16-3: Mining Design – OCF with Pillars and SLS, Isometric View



Note: Figure prepared by Mining Plus, 2021.

The location of the main accesses incorporates consideration of the following factors:

- Opportunity costs, such that the higher-grade areas are accessed first;
- Sustained production rate of 8,500 t/d;
- Proximity to the process plant and infrastructure locations required for the proposed production rate.

Support required for the mine development will consist of standard bolt-and-mesh in the advance work and reinforcement with shotcrete in the intersections.

16.9 Backfill

Backfill will be required to support the proposed mining methods. A combination of rock fill and paste backfill is proposed:

- SLS stopes: will require paste fill; the mining method assumes continuous mining in a retreat fashion;
- OCF: will require rock and paste fill; the mining method assumes primary stopes filled with paste, and secondary stopes are filled with rock fill.

The stope fill volume required was provisionally estimated at 15.8 Mm³. Consideration of inputs such as the rock geomechanical properties and the mine design and stoping sequence indicated that there was a stope volume of about 3.34 Mm³ that did not require any fill materials. The LOM design assumed that 12.46 Mm³ of backfill material would be required, consisting of (Table 16-13):

- Rock fill: 3.3 Mm³;
- Paste fill: 9.2 Mm³.

16.10 Ventilation

The design assumption for the ventilation circuit for each mining area is to inject fresh air through the access ramps, bring the fresh air to the stopes using auxiliary fans and extract the vitiated air through the main ventilation raise using the main fans that will be located on the surface.

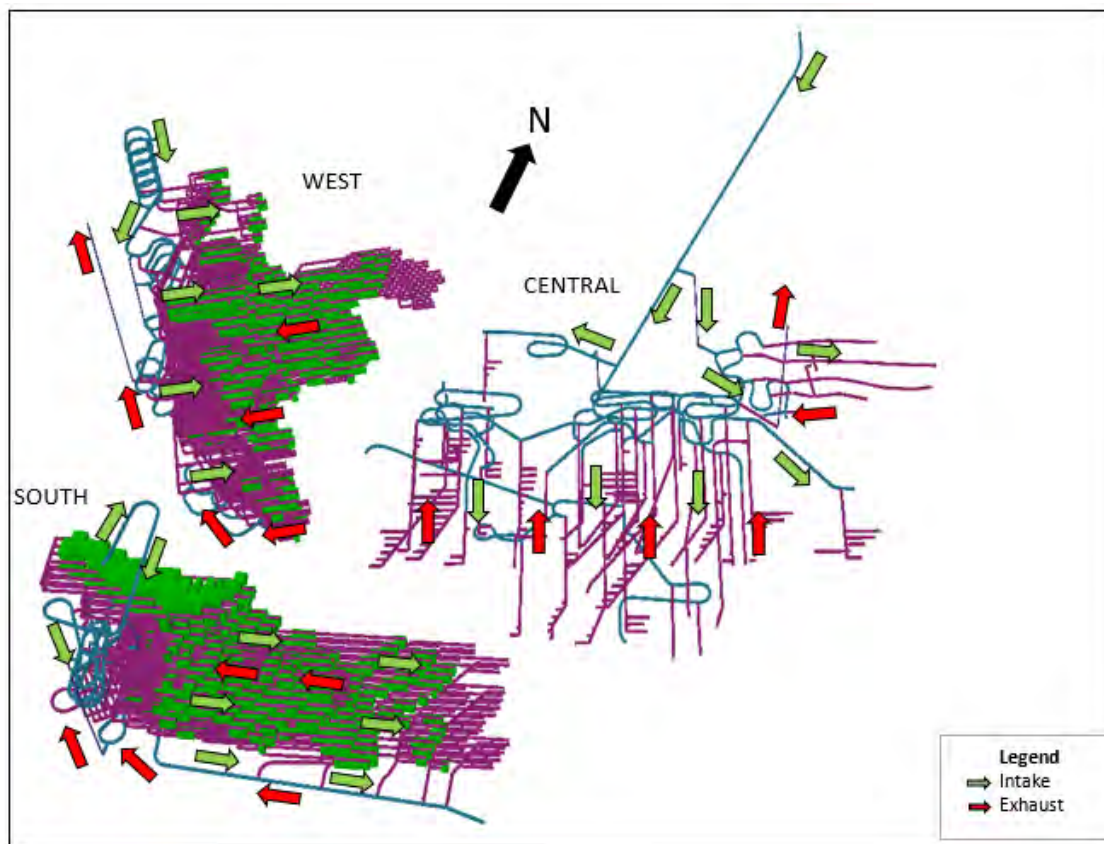
Figure 16-4 to Figure 16-6 show the proposed airflow for each area/zone.

Table 16-13: Annual Fill Requirements

Fill	Unit	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Fill	m ³	—	832,000	1,141,000	1,228,000	947,000	822,000	669,000	675,000
Rock	m ³	—	200,000	292,000	279,000	264,000	243,000	237,000	246,000
Paste	m ³	—	632,000	848,000	949,000	683,000	579,000	432,000	429,000

Fill	Unit	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Total
Fill	m ³	739,000	839,000	1,022,000	858,000	817,000	821,000	1,050,000	12,458,000
Rock	m ³	223,000	210,000	228,000	204,000	214,000	196,000	221,000	3,257,000
Paste	m ³	516,000	628,000	794,000	654,000	603,000	625,000	828,000	9,201,000

Figure 16-4: Ayawilca Ventilation System Flow (Years 0–8)



Note: Figure prepared by Mining Plus, 2021.

Figure 16-5: Ayawilca Ventilation System Flow (LOM)

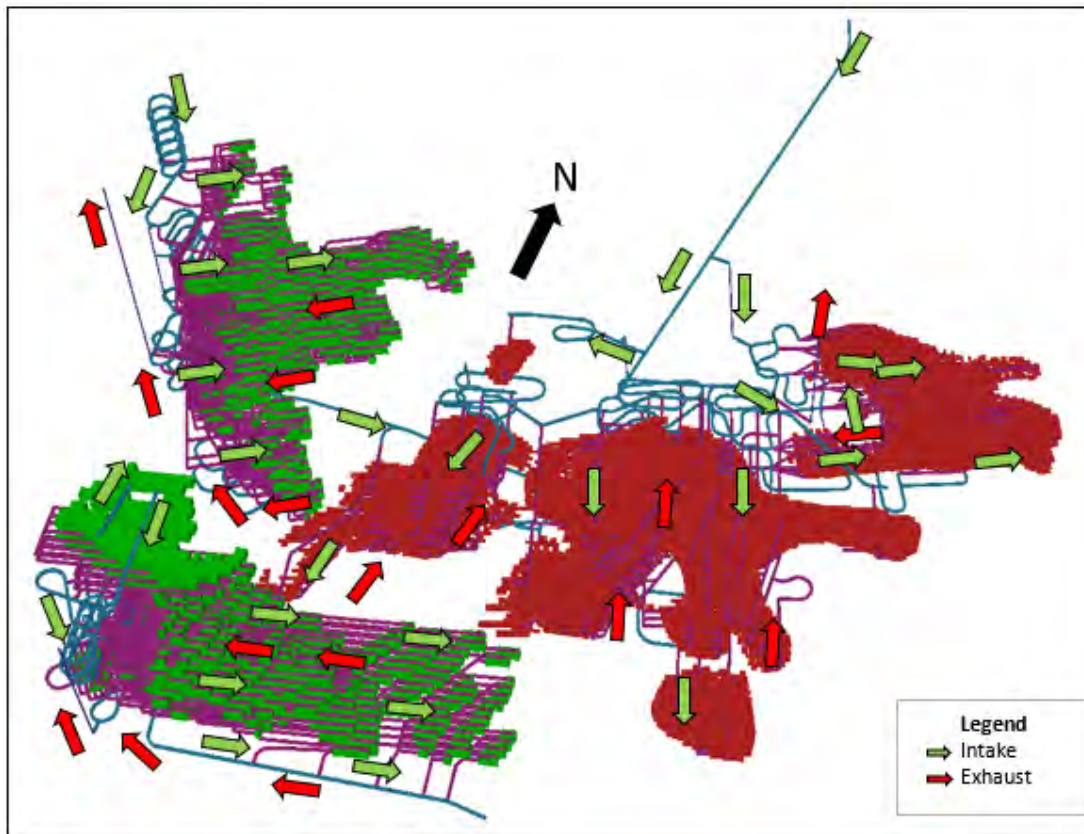
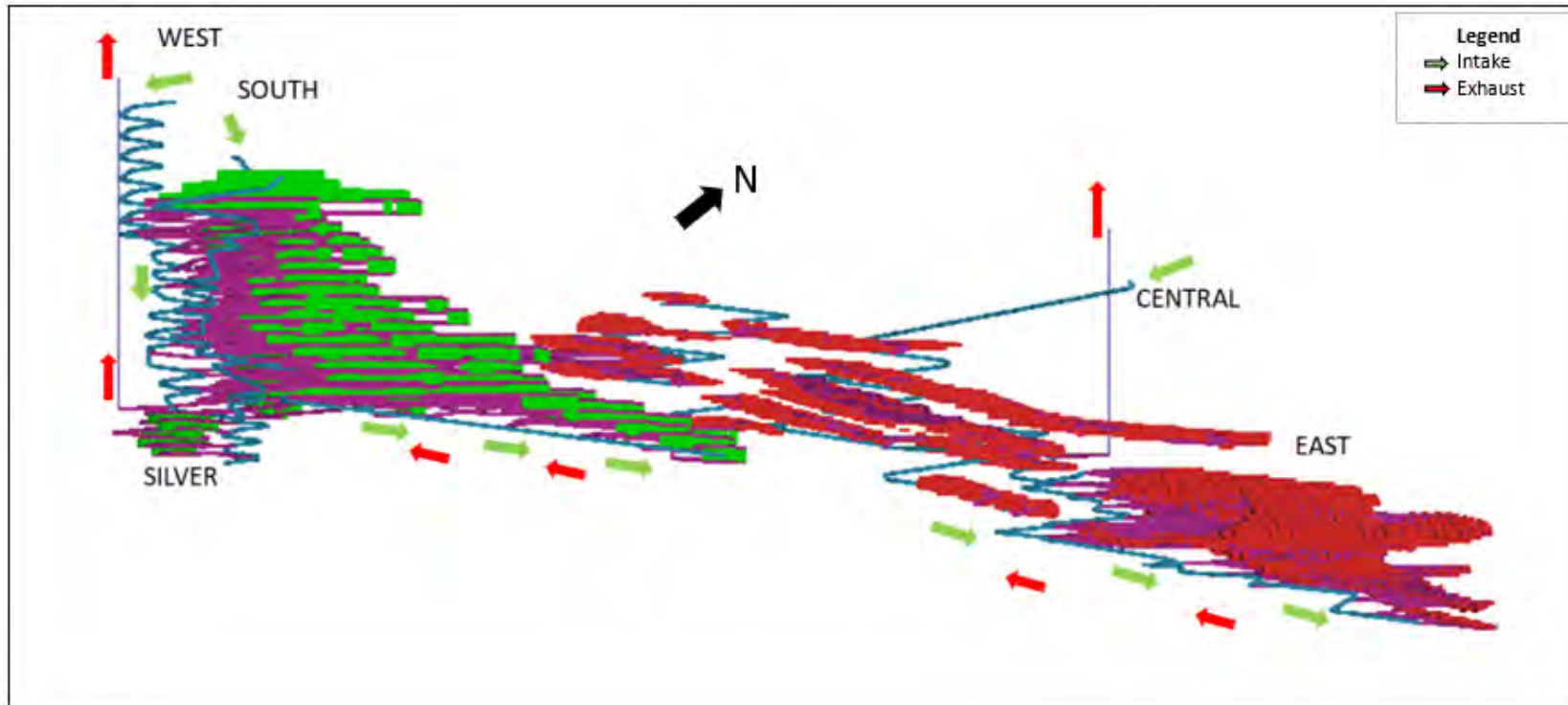


Figure 16-6: Ayawilca Ventilation System Flow (Isometric View)



Note: Figure prepared by Mining Plus, 2021.

The estimated air flow required for the West and South areas, which are planned to be mined during the first seven years, is 826 kcfm; the remainder of the LOM will require 880 kcfm, based on the mining assumptions for the Central and East areas and the Silver Zone (Table 16-14).

The airflow velocity assumptions included personnel counts and equipment requirements scaled to the assumptions as to types and air quality requirements (Table 16-15).

16.11 Mine Infrastructure Facilities

The mining surface infrastructure facilities will include haulage routes, mining truck workshop, fuel storage facilities, explosives warehouse, offices, paste fill plants, water distribution, energy and communications.

16.12 Development and Production Schedule

16.12.1 Development Schedule

The development and construction of the underground infrastructure is planned to start one year prior to first production. The mine schedule will begin with the South and West areas; the Central area will commence development later in the seventh year. The main ramps will be developed using conventional drill-and-blast methods. The ventilation shafts will be developed using raise bore machines.

The mining rates assumed by type of work are indicated in Table 16-16. The proposed mining rates support an 8,500 t/d mining sequence that will require the annual development set out in Table 16-17.

16.12.2 Production Schedule

The annual 8,500 t/d production rate will be reached in Year 2 of operations. Production is limited by the number of stopes that can be simultaneously mined (Table 16-18).

The number of active stopes required drives the equipment count, and the backfill ratio and paste fill needs to achieve the daily production target.

The mine plan assumes that pillars in the Central and East areas will be extracted at the end of the mine life, with an assumption of 70% recoverability in the pillars.

The mineralized material will be removed from production levels using scoops, sent to truck loading stations, and then surface transported to the process plant. The plant will initially be fed by the West and South areas, and then from the Central and East areas, with the objective of focusing production and reducing investment expenses in the first operating years.

Table 16-14: Ventilation Flow By Stages

Area/Zone	Stage 1 (kcfm)	Stage 2 (kcfm)
South	472	—
West	354	—
Central	—	471
East	—	275
Silver	—	134
Total	826	880

Table 16-15: Air Flow Requirement

		Central Area (kcfm)	East Area (kcfm)	South Area (kcfm)	West Area (kcfm)	Silver Zone (kcfm)
<i>Flow Requirement for Production Concept</i>						
Staff	Staff	1	1	1	1	1
Stope blasting gases	Blasting	471	235	471	353	59
Diesel equipment	Equipment	458	269	281	232	128
Total flow by production	Total	472	270	472	354	129
<i>Flow Requirement for Development Concept</i>						
Staff	Staff	1	1	1	1	1
Development blasting gases	Blasting	85	85	85	85	85
Diesel equipment	Equipment	467	274	290	241	133
Total Flow by development	Total	468	275	291	242	134
Total airflow required		472	275	472	354	134

Table 16-16: Ayawilca Zinc Zone Mining Rate Forecasts

Description	Unit	Rate
Access	Metres per month	80
By pass	Metres per month	100
Vent access	Metres per month	60
Raise borer	Metres per month	120
Main ramps	Metres per month	80
Secondary ramps	Metres per month	80
Sublevels	Metres per month	85
Rooms	Metres per month	85

Table 16-17: Mine Development Forecast

Years	Units	0	1	2	3	4	5	6	7	8
Development	m	6,186	18,373	31,503	32,733	23,819	11,559	9,468	15,761	6,214
Ramps	m	1,919	1,918	1,384	643	372	985	1,760	1,044	1,112
Horizontal	m	4,202	16,251	30,119	31,567	23,367	10,204	7,521	14,203	5,032
Vertical	m	65	204	—	523	80	370	187	514	70
Years	Units	9	10	11	12	13	14	15	Total	
Development	m	4,611	8,346	9,565	7,581	3,782	780	—	190,281	
Ramps	m	633	—	—	—	—	—	—	11,800	
Horizontal	m	3,948	8,346	9,565	7,581	3,782	780	—	176,468	
Vertical	m	—	—	—	—	—	—	—	2,013	

Table 16-18: Number of Stopes per Zone

Method	Area/Zone	Production	No. Stopes
SLS	South	4,500	4
	West	3,500	3
	Silver	200	1
OCF	Central	3,000	7
	East	2,000	5

The mine plan is based on 39% Indicated Mineral Resources, with the remainder in the Inferred category (Figure 16-7).

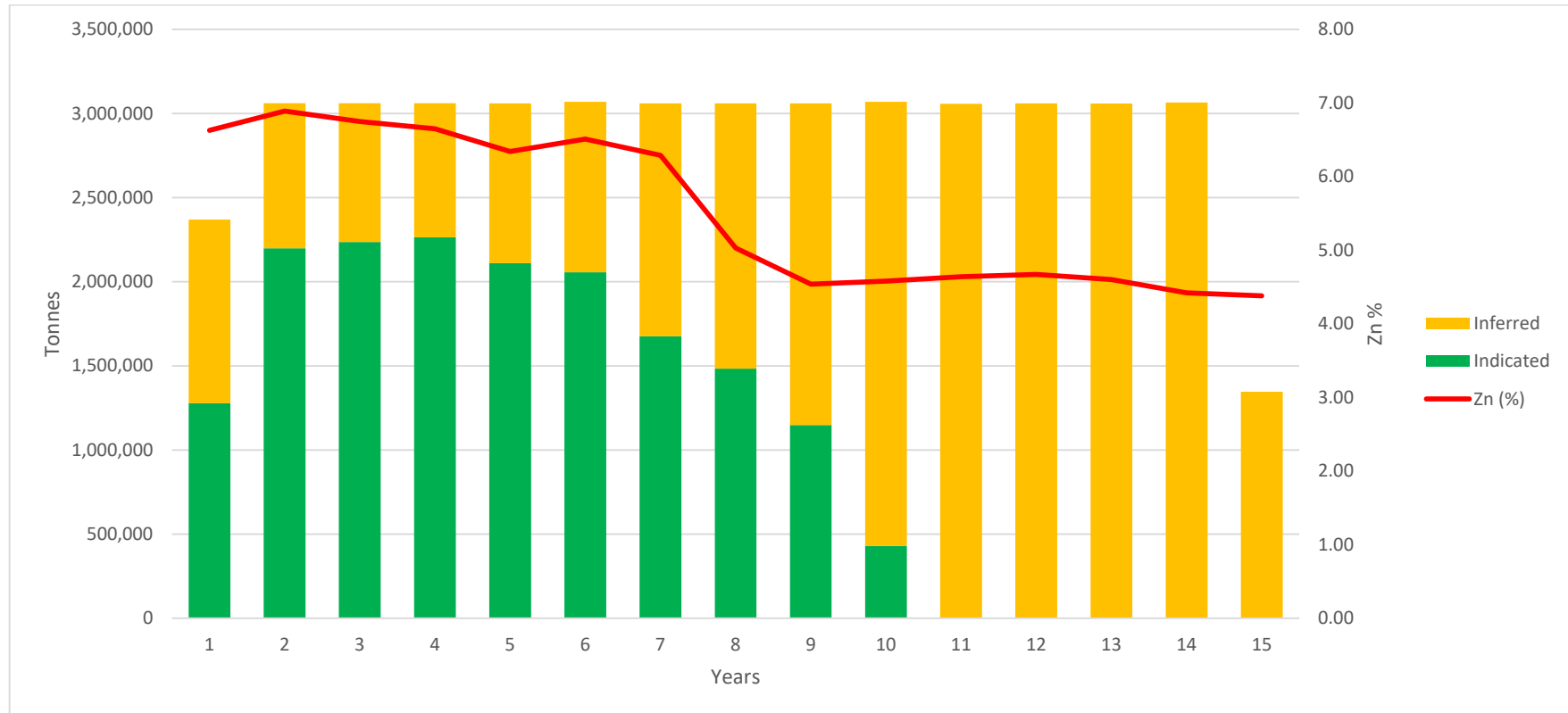
The proposed annual production schedule is provided in Table 16-19 and Table 16-20. The annualized schedule showing the average NSR over the LOM is included as Figure 16-8.

16.13 Blasting and Explosives

Drilling for both production stopes and development will be carried out using industry-standard underground equipment. Jumbos will be used when drilling the areas planned for the OCF with pillars mining method, and Simbas will be used in areas that will be mined by SLS.

ANFO will be used for blasting.

Figure 16-7: Subset of Mineral Resource Estimate in the 2021 PEA Mine Plan



Note: Figure prepared by Mining Plus, 2021.

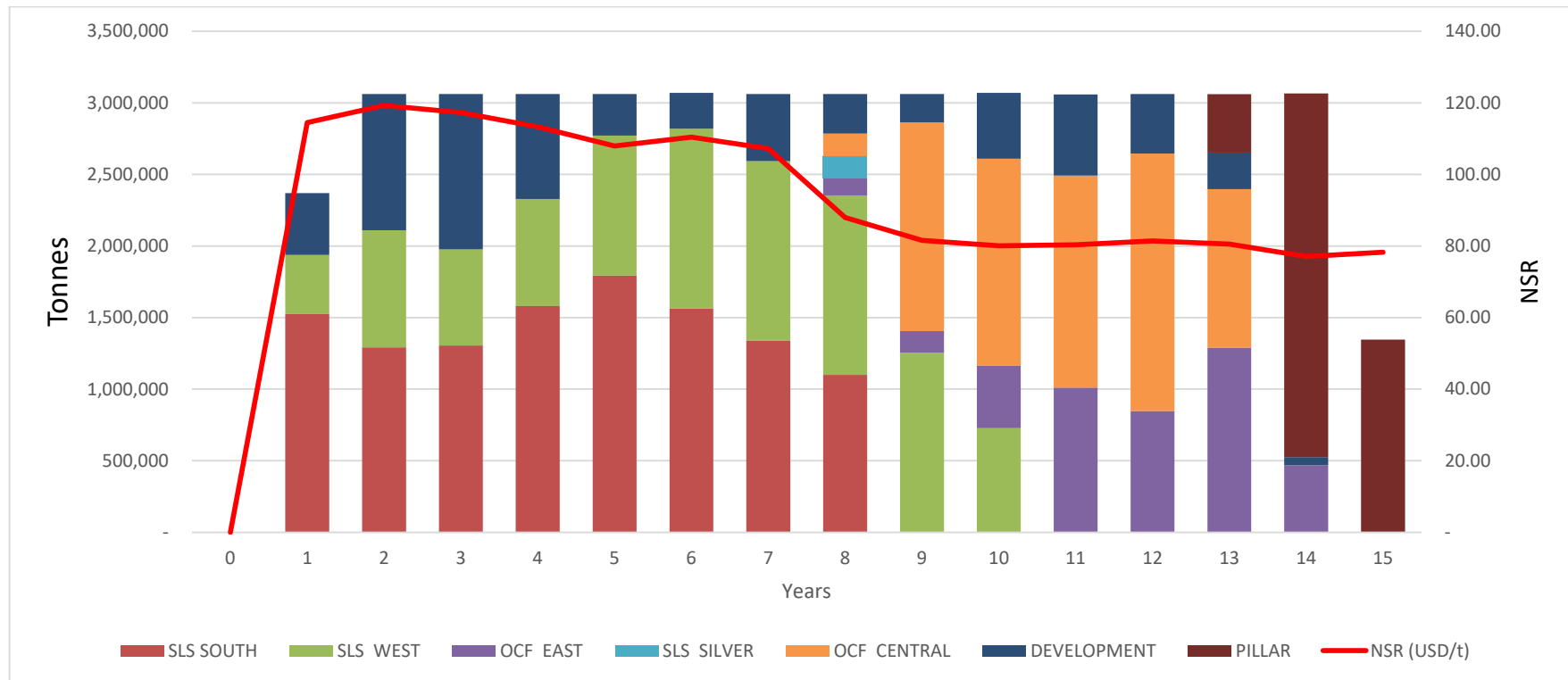
Table 16-19: Production Forecast (Years 0 to 8)

	Units	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Production (total)	kt	—	2,369	3,061	3,062	3,062	3,061	3,069	3,061	3,061
South	kt	—	1,525	1,292	1,306	1,580	1,793	1,562	1,340	1,100
West	kt	—	413	818	671	748	978	1,257	1,253	1,253
East	kt	—	—	—	—	—	—	—	—	123
Silver	kt	—	—	—	—	—	—	—	—	150
Central	kt	—	—	—	—	—	—	—	—	158
Development	kt	—	432	951	1,085	734	290	250	468	276
Pillars	kt	—	—	—	—	—	—	—	—	—
Ag	g/t	—	18.46	17.67	18.3	14.96	14.28	13.33	13.56	18.16
Pb	%	—	0.18	0.26	0.26	0.13	0.11	0.12	0.13	0.14
Zn	%	—	6.63	6.89	6.75	6.65	6.34	6.51	6.29	5.03

Table 16-20: Production Forecast (Years 9 to 15)

	Units	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Total
Production (total)	kt	3,061	3,069	3,058	3,061	3,060	3,065	1,346	43,526
South	kt	—	—	—	—	—	—	—	11,498
West	kt	1,253	727	—	—	—	—	—	9,371
East	kt	153	438	1,011	848	1,290	468	—	4,330
Silver	kt	—	—	—	—	—	—	—	150
Central	kt	1,457	1,444	1,481	1,797	1,107	—	—	7,445
Development	kt	198	460	566	416	255	58	—	6,439
Pillars	kt	—	—	—	—	407	2,539	1,346	4,292
Ag	g/t	14.83	11.41	11.35	12.23	13.23	11.88	14.65	14.49
Pb	%	0.39	0.26	0.19	0.22	0.22	0.21	0.31	0.2
Zn	%	4.54	4.58	4.64	4.67	4.6	4.42	4.38	5.56

Figure 16-8: Annual Production Forecast by Area/Zone and NSR



Note: Figure prepared by Mining Plus, 2021.

16.14 Grade Control

The mining methods selected and the subsequent design for all production zones were developed to minimise possible dilution and allow for grade control systems to be applied by using appropriate SMUs.

Grade control will be achieved by strict drilling control of the stopes and sampling of the drilled material.

16.15 Mining Equipment

The mining and mine auxiliary equipment that will be required for the LOM on an annualized basis are summarized in Table 16-21 and Table 16-22, respectively.

Table 16-21: Forecast Mine Production Equipment List

Mine Production Equipment	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Scoop	3	—	—	—	3	—	3	—	—	3	—	—	—	3	—	—	15
Simba	3	—	—	3	—	—	3	—	—	1	—	—	—	1	—	—	11
Jumbo	—	—	—	—	—	—	—	2	—	—	—	2	—	—	—	—	4
Bolter	—	—	—	—	—	—	—	2	—	—	—	2	—	—	—	—	4
Trucks	17	—	—	17	—	—	17	—	—	17	—	—	—	17	—	—	85
ANFO loader	5	—	—	5	—	—	5	—	—	—	5	—	—	5	—	—	25

Table 16-22: Forecast Mine Auxiliary Equipment List

Mine Auxiliary Equipment	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Fuel truck	2	—	—	2	—	—	2	—	—	—	2	—	—	—	—	—	8
Pick-up truck	5	—	—	5	—	—	5	—	—	—	5	—	—	—	—	—	20
Motor grader	2	—	—	2	—	—	2	—	—	—	2	—	—	—	—	—	8
Rock breaker	1	—	—	1	—	—	1	—	—	—	1	—	—	—	—	—	4
Scaler	2	—	—	2	—	—	2	—	—	—	2	—	—	—	—	—	8
Water truck	1	—	—	1	—	—	1	—	—	—	1	—	—	—	—	—	4

17 RECOVERY METHODS

17.1 Process Flow Sheet

The 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 filtered tailings storage facility (TSF). Process water will be recycled as much as possible to minimize water usage.

Figure 17-1 shows the general process block diagram.

17.2 Plant Design

17.2.1 Process Design Basis

The selection of a conventional lead–silver and zinc flotation processing circuit for Ayawilca 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 Ayawilca.

The selection of a conventional lead–silver and zinc flotation processing circuit for Ayawilca and 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 Ayawilca.

Metallurgical testwork has shown that the Zinc Zone mineralized material is amenable to froth flotation, achieving commercial zinc concentrate grades and recoveries. A dedicated lead-silver flotation circuit (rougher/cleaner cells) was 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.

[illegible]

DEFINE | PLAN | OPERATE 17-2

17.2.2 Process Design Criteria

An 8,500 t/d throughput rate was selected as the basis for the 2021 PEA (refer to Section 16.5).

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 14 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.

17.2.3 Process Overview

The 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;
- Reagent preparation and distribution.

17.2.4 Primary Crushing

Run-of-mine (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.

Table 17-1: Process Design Criteria

Parameter	Nominal	Unit	Source
Nominal plant capacity	8,5000	t/d	Process calculation
Plant availability	92	%	Recommended by Transmin
<i>Mill Feed Characteristics</i>			
Specific gravity	3.6	—	Tinka
Apparent density (bulk)	2.74	t/m ³	Metallurgical testwork
Moisture	2	% w/w	Assumption
<i>ROM granulometry</i>			
P100	310	mm	Assumption
P80	302	mm	Assumption
<i>Comminution properties</i>			
Crushing work index	11	kW*hr/t	Assumption
Ball mill work index	13	kW*hr/t	Assumption
Abrasion index	0.12	—	Assumption
<i>Primary Crushing</i>			
Operating hours	16	hr/d	Recommended by Transmin
Throughput	531	t/hr	Process calculation
Product Particle Size (P80)	118	mm	Process calculation
<i>Grinding and Classification</i>			
Operating hours	24	hr/d	Recommended by Transmin
Throughput	385	t/hr	Process calculation
Product particle size (P80)	106	µm	Metallurgical testwork
<i>Lead-Silver Flotation</i>			
<i>Rougher</i>			
Cell type	Jameson		Recommended by Transmin
Model	B5400/18		Process calculation
<i>Cleaner</i>			
Cell type	Jameson		Recommended by Transmin
Model	Z1200/1		Process calculation
<i>Zinc Flotation</i>			
Cell type	Jameson		Recommended by Transmin
Model	B5400/18		Process calculation
<i>Zinc regrind</i>			
Product particle size (P80)	65	µm	Metallurgical testwork
<i>Cleaner</i>			
Cell type	Jameson		Recommended by Transmin
Model	B5400/18		Process calculation

Parameter	Nominal	Unit	Source
<i>Cleaner Scavenger</i>			
Cell type	Jameson		Recommended by Transmin
Model	B5400/18		Process calculation
<i>Zinc Concentrate</i>			
% Moisture	10	%	Recommended by Transmin
Zn recovery	92	%	Recommended by Transmin
Zn grade	50	%	Recommended by Transmin
<i>Lead–Silver Concentrate</i>			
% Moisture	10	%	Recommended by Transmin
Ag recovery	45	%	Recommended by Transmin
Pb recovery	70	%	Recommended by Transmin
Pb grade	50	%	Recommended by Transmin
<i>Dewatered Tailings</i>			
TSF: Backfill plant, split	60:40	—	Assumption

17.2.5 Coarse Stockpile and Crushed Ore Handling

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, 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 Circuit

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 Process

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 Concentrate Dewatering

17.2.9.1 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 a local refinery for sale.

17.2.9.2 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.

17.2.10 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 mine voids for permanent storage. The thickener overflow water will be returned to the processing plant as process water.

17.3 Energy, Water, and Process Materials Requirements

17.3.1 Energy

Process plant and site infrastructure energy requirements (excluding underground mine) and expected installed power for these facilities is shown in Table 17-2.

Table 17-2: Forecast Energy Consumption

Area	Installed Power, kW-h	Maximum Power Demand, kW-h	Energy Consumption, MW/y
Processing Plant	10,538	7,896	46,114
Crushing	342	256	1,497
Handling crushed mill feed material	125	93	546
Comminution and flotation	8,474	6,355	37,115
Reagents	80	60	350
Tailings thickening	327	246	1,434
Tailings filtration	664	491	2,866
Plant services	527	395	2,306
Site Infrastructure	96	72	422
Plant offices	5	3	20
Plant maintenance	26	19	112
Laboratories	66	50	290

17.3.2 Water

The conceptual water management plan and balance for the project is discussed in Section 18.3. On the basis of this and the projected process water requirements, the plant will require around 48 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,

17.3.3 Reagents

Reagent requirement estimates are provided in Table 17-3.

17.4 Comments on Section 17

The recovery process will be based on conventional lead and fine 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.

Table 17-3: 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

The lead 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.

No significant variability was 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 in order to refine the process design criteria assumed in the 2021 PEA. Further definition will also potentially de-risk projected zinc and lead–silver recoveries, process operating costs, and metal production.

18 PROJECT INFRASTRUCTURE

18.1 Introduction

The Ayawilca Project is best accessed by road, traveling north and northeast from Lima along an existing trans-Andean road from Chancay on the coast to the inland town of Huánuco (Figure 18-1). This road is currently being paved by a government-funded infrastructure program.

Project infrastructure components will include mine and process plant supporting infrastructure, site accommodation facilities, filtered TSF, external and internal access roads, power supply and distribution, fresh water supply and distribution, and a water treatment plant. As the planned mine operations will be underground, minimal waste will be generated, hence no permanent waste rock facilities were included in the infrastructure assessments.

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. Provisional locations for the infrastructure are shown on Figure 18-2.

18.2 Road and Logistics

18.2.1 Road

18.2.1.1 Current Access

The most direct access road to the Project is travelling 94 km north of Lima via the Panamericana Norte highway (PE-20) to Chancay, then inland 138 km northeast along a paved road towards Uchucchacua mine to Oyón (PE-18), and an 82 km segment travelling northeast to Yanahuanca. From Yanahuanca, the Project is a further 15 km to the north, via the communities of San Pedro de Pillao and San Juan de Yanacocha (Figure 18-3).

The Yanahuanca to site access road is a single-lane road and is currently not suitable for large trucks. The road is paved from Yanahuanca to the village of San Pedro de Pillao.

18.2.1.2 Proposed Access Route

The current access to site from Yanahuanca would require upgrading to provide sufficient truck maneuvering room, including minimum turning radius and maximum slopes.

Due to the difficulties associated with improving the existing site access, a new road is proposed to the site from near the town of Chinche approximately 10 km west of Yanahuanca (Figure 18-3). This road would commence near Chinche, using an existing 8 km stretch of

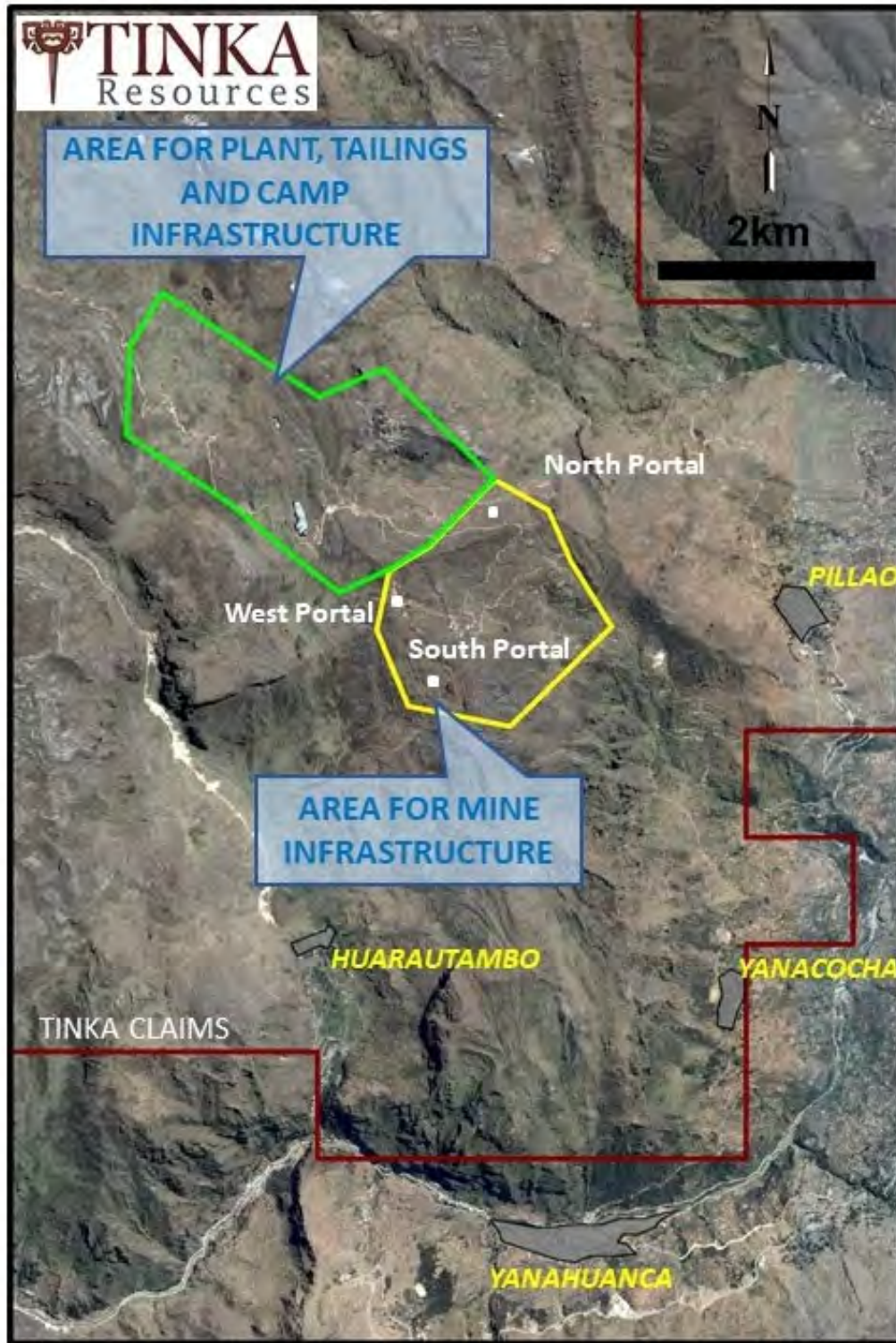
road. At km 8, a new, 20 km-long road will be constructed, which will lead to a mine control gate to be established at the boundary of Tinka's concession holdings.

Figure 18-1: Regional Location of Project showing Major Roads, Ports, and Zinc Refinery



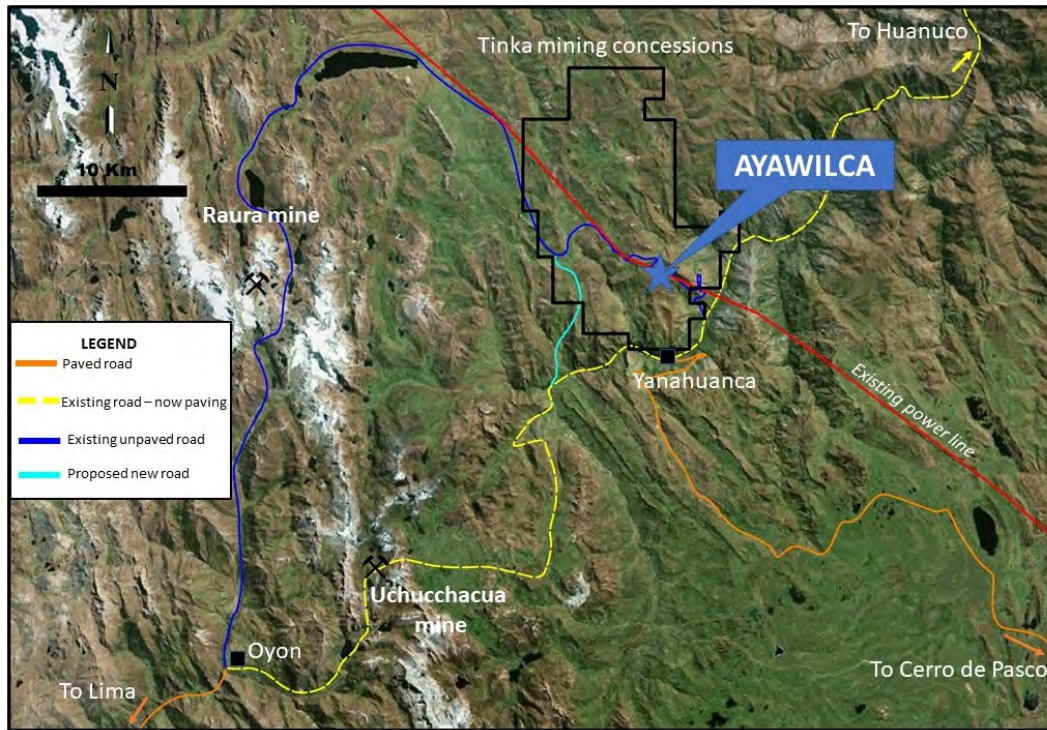
Note: Figure prepared by Tinka, 2021.

Figure 18-2: Map of General Areas for Project Infrastructure



Note: Figure prepared by Tinka, 2021. The image uses a Google Earth backdrop.

Figure 18-3: Existing and Potential Access Routes



Note: Figure prepared by Tinka, 2021. The image uses a Google Earth backdrop.

For cost estimation purposes, it was assumed that the mine portal would be about 12 km from the mine control gate, the process plant 11 km, and the accommodations camp 11 km from the mine control gate.

The road network would be used to transport consumables to the site, and zinc concentrate from site to the Cajamarquilla refinery near Lima, and the lead–silver concentrate to the port of Callao for export (see Section 18.2.2).

As an alternative, an existing unpaved access road also exists to the Project via the Raura mine (Figure 18-3).

18.2.2 Port

The port of Callao in Lima is the closest major port to the site (approximately 310 km by road), and has significant existing port facilities including storing and handling of mineral concentrates. For the 2021 PEA it is assumed that all of the lead–silver concentrate would be trucked from site to the port of Callao (refer to location in Figure 18-1) for shipping to smelters in Asia or elsewhere.

18.3 Stockpiles

No permanent stockpiles will be required.

18.4 Waste Storage Facilities

No permanent waste rock storage facilities are planned. Waste generated from decline construction and development activities will be temporarily stored adjacent the mine portals, and will be used during the mine life as backfill material.

18.5 Tailings Storage Facilities

18.5.1 Underground Paste Backfill vs. Surface Storage

In the 2021 PEA, the tailings management concept is a combined surface and underground storage. In total, 39% (16.9 Mt) of the LOM tailings production is planned to be used as cemented paste backfill, and the remaining 61% (26.6 Mt) is planned to be stored on surface.

The total storage distribution, as derived from the mine plan, is shown in Figure 18-4.

The total LOM tailings production is forecast at 43.5 Mt, and the nominal daily throughput is estimated at 8,500 t/d. Volumes of stopes to be filled were obtained from the mine plan. Densities for the paste backfill product were estimated from results of testing done by Golder–WSP in Sudbury, Ontario, Canada, on samples supplied by Tinka, with technical support and direction by Envis.

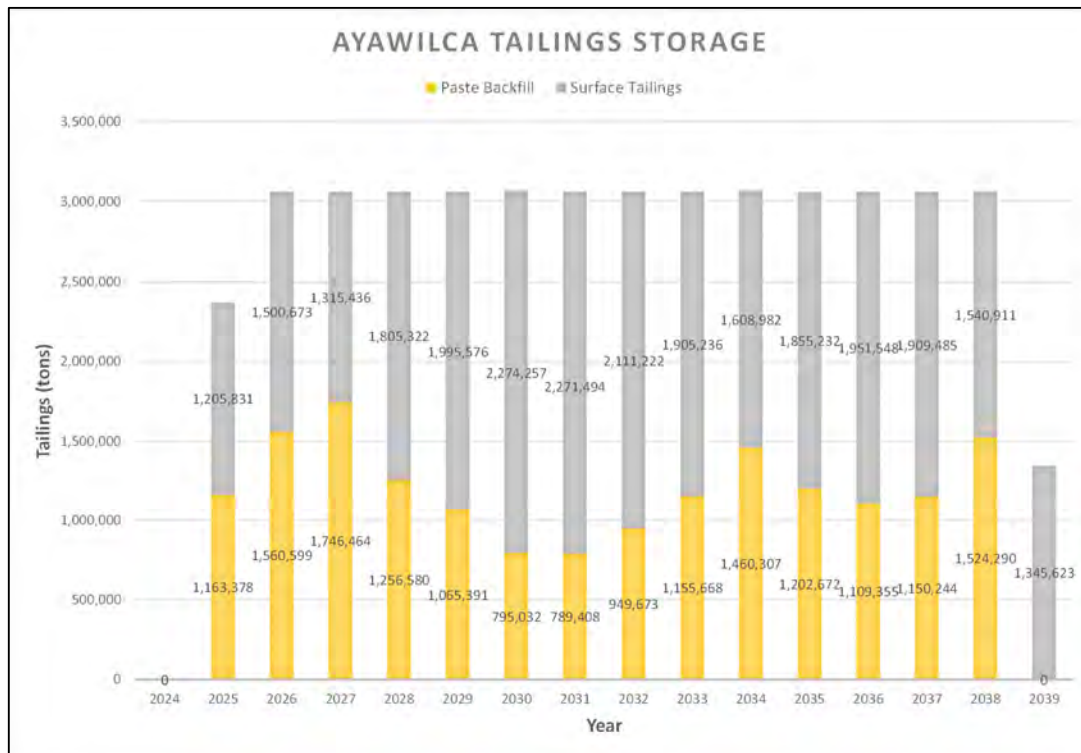
18.5.2 Evaluation of Surface Storage Options

A comprehensive selection study was done, evaluating based on several key factors, including:

- 9 sites;
- 3 tailings dewatering/classification mechanical treatment technologies;
- Potential technical risks – civil, geotechnical, hydrogeological, environmental;
- 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 (Anddes, 2020a to 2020m; 2021a to 2021b). The initial evaluation was based on a nominal throughput of 5,000 t/d, and a total surface storage tonnage of 20 Mt.

Figure 18-4: LOM Tailings Production – Underground Paste Backfill vs. Surface Storage



Note: Figure prepared by Envis, 2021.

Subsequently, a final conceptual evaluation was carried out by Envis, using the updated mine plan; throughput; and total surface storage. Conceptual-level costing was updated, and the final evaluation resulted in the selection of stacked, filtered tailings at the TSF-1 site, located approximately 1.5 km north of the proposed process plant location.

18.5.3 Estimation of Tailings Filtering and Transportation Parameters

Primary drivers for selecting TSF-1 site, and the stacked tailings were:

- TSF-1 site is the closest site to the process plant, thus minimizing the project footprint; and 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;
- Filtering will result in higher efficiency in terms of water usage.

Cost estimates indicated that filtering and stacking represented a slightly higher overall project cost; however, it was deemed that the marginal additional investment would be worthwhile, given the lower overall risk profile of this technology.

18.5.4 Conceptual Design—Filtered Tailings Stack

The conceptual design of the filtered tailings stack was, as stated previously, done for a total tailings production of 26.6 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%. Given the total tonnage on surface, and the assumed dry density, the final volume stored in the stack was estimated at 11.6 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;
- 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.

18.5.5 Considerations for Operation of Filtered Tailings Stack

While this level of study was 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 dry-stack operations were identified as precedents. 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 18.5.6), 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 must include 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.

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.

18.5.6 Filter Sizing and Selection

Sizing and preliminary section of the filtered tailings system was based on results of laboratory testing done by Golder-WSP. Golder-WSP tested tailings samples for:

- Feed solids rate;
- Filter cloth;
- Flocculant;
- Filter loading rate;
- 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 8,500 t/d.

18.6 Water Management

A water management plan was developed based on a conceptual water balance. Rainfall and evaporation data were obtained from the Cerro de Pasco meteorological station.

Mine water is planned to be recycled as much as possible. Evaporation and seepage losses will be minimized in order to reduce fresh-water requirements and discharge to the environment. Likewise, runoff water from the temporary waste rock piles adjacent to the portals and contact water from the filtered TSF will be used for plant operations.

The water balance assumes that recirculated water from the tailings filtering circuit will be the largest water source for the process plant.

There is a possibility of acid rock drainage (ARD) from the underground mine workings, based on the presence of significant sulphides content in the rock in the Zinc Zone. A water treatment plant has been included in the Project design, in the event that it would be necessary to discharge excess water from dewatering of the underground operations.

In the unlikely event that significant contact water effluents are generated from the filtered TSF, this would be diverted to the water treatment plant, prior to any discharge to the environment.

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.

A water balance is required to determine if sufficient water for operational needs will be generated from mine dewatering. If the water balance shows a sufficient supply, then fresh water will only be needed for human consumption. If the mine dewatering supply is insufficient, the project would then require a water license for use of fresh water and may also require an authorization to discharge liquid effluents, if applicable.

18.7 Camps and Accommodation

An on-site camp for 500 personnel was assumed for 2021 PEA purposes, and will include dormitories, administrative offices, a medical center, laundry area, change house, canteen and kitchen, recreational area, potable water and wastewater treatment plants, and parking.

18.8 Buildings and Built Infrastructure

The 2021 PEA assumptions are that the general mine and process surface facilities will include a mine truckshop, a plant maintenance workshop, a laboratory, an explosives storage magazine, water ponds, a general warehouse, an administrative office building, and a core shed. In total approximately 3,100 m² of general buildings have been accounted for in the capital cost estimate.

18.9 Power and Electrical

18.9.1 Existing Transmission Lines

Two transmission lines cross the project area (refer to locations shown in Figure 18-3):

- L-2254, Paragsha 2 – Vizcarra, owned by ISA Colombia (REP);
- L-2264, Paragsha 2 – Conococha, owned by Abengoa Transmisión Norte (ATN).

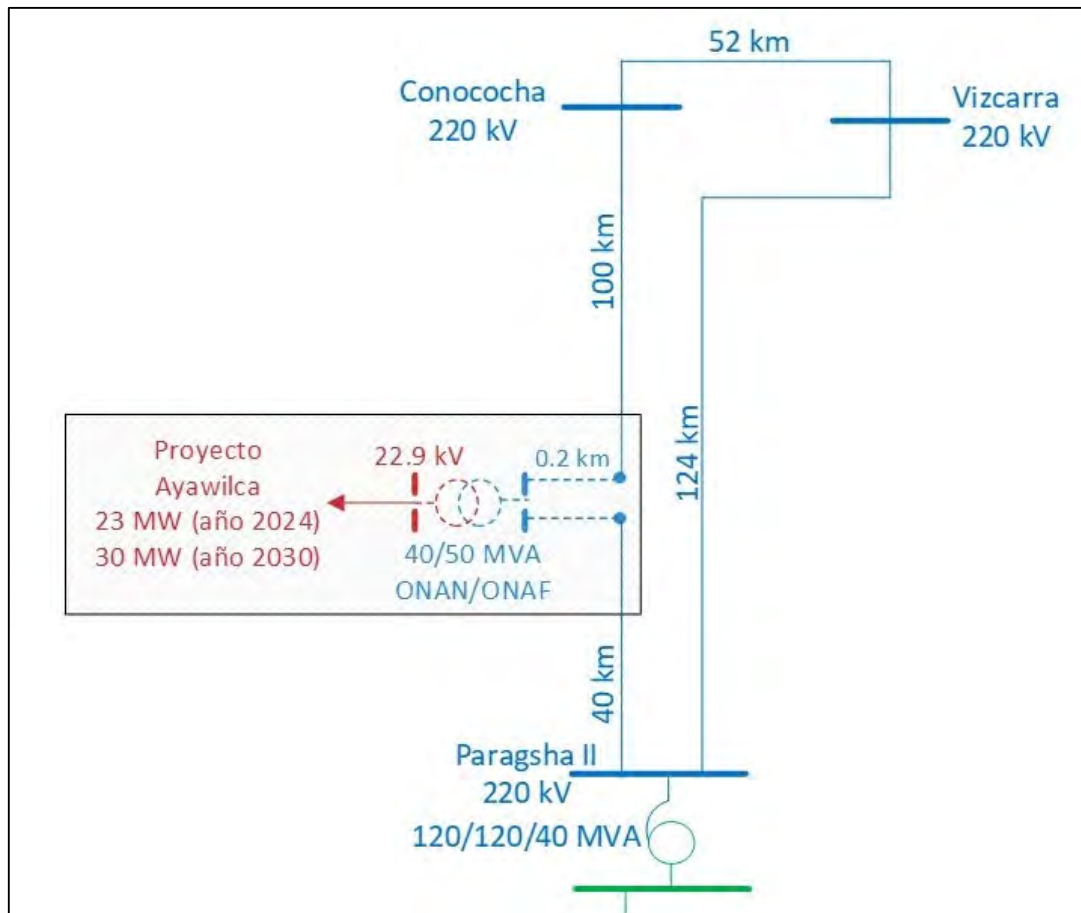
These lines are subject to the guaranteed system of transmission (SGT), which is part of Peru's national interconnection power system (SEIN).

18.9.2 Project Power Requirements

Based on benchmarking on a scenario of up to 10,000 t/d, the forecast for overall Project power demand is up to 30 MW, taking into consideration the total site wide power requirements for the process plant, tailings and general infrastructure (12 MW), as well as the underground mine facilities (12 MW) plus an allowance (6 MW). Actual requirements will be determined as part of future more detailed studies.

Several power supply alternatives were assessed. Use of the L-2254 line was selected for 2021 PEA purposes as it had no negative impacts on SEIN operation. A detailed review of line capacity showed that the line has ample spare capacity. A change in regulations now allows for substations to be built no less than 30 km from the nearest existing substation, allowing Ayawilca to build its substation without additional permitting. The closest existing substation from Ayawilca is 40 km to the south at Paragsha 2 (Figure 18-5).

Figure 18-5: Proposed new Power Substation Tie-In Point at Ayawilca on Existing L-2254 Power Line



Note: Figure prepared by Tinka, 2021.

Project power supply assumes the following:

- The Project power tie-in point (using a π -type configuration at sectioning point) will be within the project area and will tap into the existing L-2254 power line;
- Existing regulations state that substations have to be at least 30 km away. The closest sub-station to the project, Paragsha 2, is 40 km to the south.

The power supply scheme will consist of the following:

- Tie-in (at sectioning point);
- New 220 kV sub-station, equipped with a 220/22.9 kV transformer.

In support of more detailed studies, an evaluation of power line rights-of-way requirements should be undertaken.

18.10 Fuel

The 2021 PEA assumes that fuel supply will be contracted out and delivered by road transport. Fuel storage tanks and the project gas station are assumed to be located close to the mine services facilities area.

Fuel would be stored in two 12 m³ tanks; this capacity approximately represents the forecast monthly consumption rate.

18.11 Water Supply

The process plant will require around 41 m³/hr as make-up water. The primary potential make-up water source would be from mine dewatering. Other potential sources include nearby creeks; if these sources are used, water licences will be required.

The 2021 PEA assumed that water from a nearby creek is available for operations use. Fresh water would be pumped from the creek at a rate of 41 m³/hr to a 5,000 m³ capacity storage pond. This design capacity is based on a five-day emergency supply. Water would be pumped as required from the storage pond to the process plant.

18.12 Comments on Section 18

The 2021 PEA design assumes conventional infrastructure and conceptual infrastructure locations.

A new project access road from near the Chinche community is planned to be constructed, as the current access road would require significant upgrading to support truck traffic. There are, however, alternative existing roads that could be used for transportation purposes but further studies are needed to confirm suitability.

Water management and water supplies will be important to Project operations; in particular, agreement must be reached with regulatory authorities and stakeholders as to fresh-water usage.

A water treatment plan will be required for contact water treatment prior to any discharge to the environment.

19 MARKET STUDIES AND CONTRACTS

19.1 Market Studies

The information summarized in this subsection is derived from Ocean Partners, a third-party concentrate trading and marketing specialist company, who were contracted by Tinka to prepare a market study to support the 2021 PEA (Ocean Partners, 2021).

19.1.1 Zinc Concentrate

19.1.1.1 Zinc Market Overview

During 2020 and 2021 zinc benefitted from good supply/demand fundamentals and positive investor sentiment towards the commodities and base metal sectors. The monthly average LME cash price rose from US\$0.86/lb during April 2020 to US\$1.38/lb by September 2021. Reports that several major European smelters planned to curtail production due to high power costs caused the price to reach US\$1.73/lb during October 2021. Although the price fell back to US\$1.57/lb by the end of the month, the monthly average figure of US\$1.53/lb was still the highest since February 2018.

Covid-related disruptions to mine production together with closure of some higher-cost capacity and project delays saw the global zinc concentrate market move into deficit during 2020. Typical spot treatment charges (TCs) for standard concentrate fell from over US\$300/t during Q1 2020 to just US\$70/t by the start of 2021. Tightening in the global zinc concentrate market was also reflected in the annual benchmark which was set at US\$159/t for 2021 compared to US\$299.75/t in 2020.

Spot TCs stabilised during 2021 with typical terms in China in the range US\$75–US\$85/t over the year to October. It is expected that as countries in Latin America and elsewhere recover from the pandemic mine supply will slowly improve and the global zinc concentrate market will be close to being in balance over the medium-term, leading to TCs trending slowly upwards. The timing of a more significant cyclical zinc concentrate surplus may depend on the pace of the development of the Ozeroye project in eastern Siberia which could potentially start ramping up to a design capacity of 800 kdm/t/a of zinc concentrate production from 2023.

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 zinc content of purchased concentrates. Concentrates with a zinc 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 silica and iron will be viewed more favourably.

Growth in global zinc smelting capacity has been modest in recent years as low TCs over the period 2015–2018 failed to incentivise the construction of new facilities. The recently-announced expansion of the Odda smelter in Norway and a potential reactivation and expansion at Skorpion in Namibia will add some volume from 2024 onwards. However, it is expected that utilisation rates at existing Chinese smelters will continue to be limited by environmental regulation. It is therefore unlikely that spot TCs will consistently return to the levels below \$50/t seen during 2017 and 2018. It is assumed that the power issues affecting zinc smelter utilisation rates during Q4 2021 will be resolved over the medium to long term.

Over the long term, an average TC in the region of US\$190/t is regarded as a reasonable figure for budgeting purposes. This figure includes any price participation that may be applicable.

Increased awareness and regulation of environmental matters will mean that the comments made above regarding concentrate quality will continue to be relevant over the longer term.

19.1.1.2 Potential Zinc Concentrate Marketing Strategy

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. However, based on advice from Tinka, Ocean Partners estimated that all of the zinc concentrate would be sold to the Cajamarquilla zinc refinery in Peru. This is the preferred option to avoid the cost of sea freight.

The Ayawilca zinc concentrate is expected to receive an iron penalty of US\$7.50/dmt of concentrate at the refinery (at a standard penalty rate of US\$1.50 per 1% Fe above 8% Fe). No other deleterious elements are present in the Ayawilca zinc concentrate, and no other penalties are expected.

Based on current exchange rates, a figure of US\$35/wmt is regarded as an appropriate figure to cover the inland freight costs of transporting concentrate produced at Ayawilca to the Cajamarquilla refinery located close to Lima, or to the port of Callao. For the lead concentrate to be exported, an average sea freight cost of around US\$50/wmt is regarded as a reasonable assumption for financial modelling purposes. Port costs will be in the range of US\$15–\$20 per wmt.

19.1.2 Potential Lead–Silver Concentrate Marketing Strategy

Details of the expected Ayawilca lead–silver concentrate is less known due to a lack of rigorous metallurgical test work. The expected grade of the lead concentrate is 50% Pb, while silver is expected to be in the range of 2,320–5,880 g/t Ag. 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 assumed to be payable at 95% silver content subject to a minimum deduction of 50 g/dmt.

No penalties are expected on the lead concentrate.

Transport and shipping costs are the same as those for the zinc concentrates. No lead smelter is currently operational in Peru, so the concentrates are presumed for 2021 PEA purposes to be shipped to Asia.

19.2 Commodity Price Projections

Project economics were estimated based on a long-term metal price of US\$1.20/lb for zinc, which was established by Tinka. The long-term metal prices of US\$0.95/lb for lead and US\$22.00/oz for silver were based on Mining Plus’ survey of industry-consensus prices.

The QP notes that Tinka’s zinc pricing, used in the cashflow analysis, is reasonably aligned with Mining Plus’ internal guidelines.

19.3 Contracts

Tinka has no current contracts for project 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.

19.4 Comments on Section 19

Marketable zinc and lead–silver concentrates would be produced from the Zinc Zone.

The zinc concentrate will have zinc as the payable element. Payable elements in the lead–silver concentrate will be lead and silver.

High indium grades in the zinc concentrate represent a potential value-add, although no value was applied in the 2021 PEA for indium as it was not reported in the Mineral Resource estimate. Further technical and marketing studies should be carried out to evaluate how additional value may be derived from indium as part of a future mining operation.

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.

20 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

20.1 Introduction

Tinka's environmental permitting for the Ayawilca Project is currently split between the Colquipucro and Ayawilca areas. The two areas are adjacent and are separated by the community boundary between San Juan de Yanacocha (Ayawilca) and San Pedro de Pillao (Colquipucro). Tinka has completed eight environmental studies in support of drill program permitting in both Ayawilca and Colquipucro in the period 2007–2021. Two permits are currently valid:

- Ayawilca: Second Modification of Ayawilca EIA sd (Resolution N° 201-2019-MINEM/DGAAM), approved on 19 November, 2019. The initiation of activities was filed on 15 September, 2020 and certified by Report 095-2021-MINEM-DGM;
- Colquipucro: Second ITS (Informe Técnico Sustentatorio – or supporting technical report) for the third modification of the Colquipucro EIA sd (Resolution N° 154-2020/MINEM-DGAAM), approved on 13 November, 2020. The initiation of activities was filed on 17 March, 2021 and certified by Report 091-2021-MINEM-DGM.

Eight Certificates of Non-Existence of Archaeological Remains (CIRA) have been granted.

20.2 Baseline Studies

The initial EIA sd for Ayawilca was compiled in 2012, and included baseline information on physical, biological and social conditions, and an archaeological clearance. The EIA sd was approved in July 2013.

A modified EIA sd (MEIA sd) report was compiled in 2015, and approved in 2016.

A second MEIA sd report was compiled in 2018 and was approved in November 2019.

The initial environmental permit for Colquipucro was approved in 2007. A first MEIA sd for Colquipucro was compiled and approved in 2009. Three modifications containing updated baseline information were approved in 2011, 2014 and 2016.

Figure 20-1 shows the areas covered by the current Colquipucro and Ayawilca permits.

20.3 Environmental Considerations/Monitoring Programs

20.3.1 Wetlands

Peruvian legislation (Law 28611-2005, General Law of the Environment and Ministerial Resolution N° 092-2014-MEM/DM) identifies wetlands (bofedales) and high-altitude lakes as

ecosystems of significance. There are 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.

The proposed infrastructure sites were selected with consideration for bofedales and high-altitude lake proximity. The closest infrastructure is anticipated to be sited about 100 m from a high-altitude lake shore. During more detailed studies, infrastructure sites must 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.

20.3.2 Species of Conservation Concern

Initial baseline studies have identified a number of flora and fauna species in the general project area that have been listed as either critically endangered (CR), endangered (EN) or vulnerable (VU), under Peruvian legislation (S.D. N° 043-2006-AG and S.D. N° 004-2014-MINAGRI) or are listed in the Appendices of the Convention on International Trade in Endangered Species (CITES) or the Red List of the International Union for Conservation of Nature (IUCN). Additional studies will be required to better document species of concern, determine the likelihood of project impact on the species, and to develop appropriate mitigation measures where required.

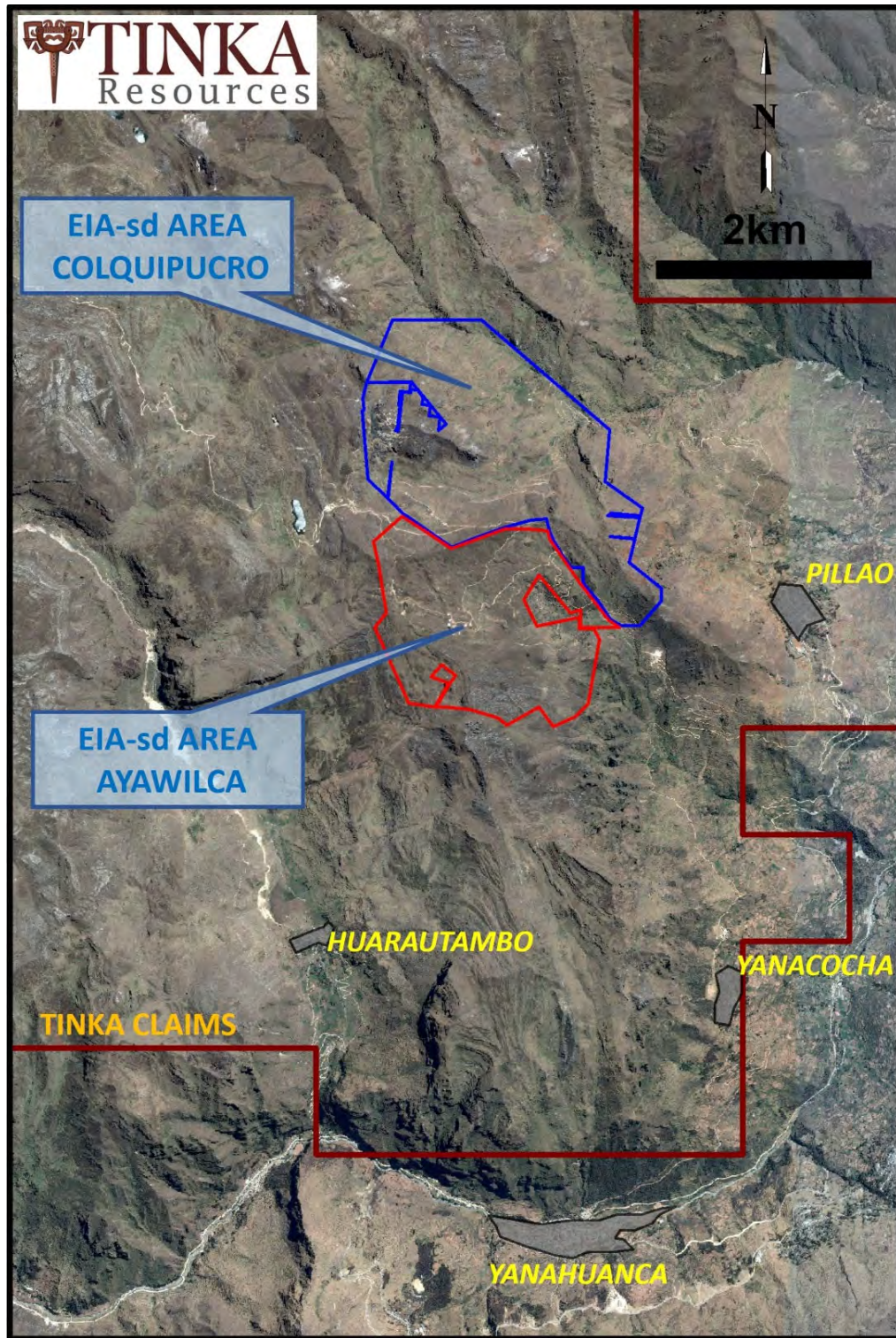
20.3.3 Monitoring Programs

Monitoring was initiated as part of the EIAsd and MEIAsd approvals, is ongoing, and is conducted on a semi-annual basis. The initial EIAsd program collected data on water quality, air quality and environmental noise. As the permitted area has grown, the MEIAsd program was expanded to increase the number of monitoring points, and included monitoring of flora, fauna, and soils.

20.4 Closure Plan

The EIA for the project will include a conceptual closure plan to obtain the environmental approval. A detailed Mine Closure Plan must be submitted within one year after EIA approval. 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, as stated by the Regulaciones para el Cierre de Minas or Mine Closure Regulations. The final closure plan must be submitted two years prior to closure of operations.

Figure 20-1: Areas Covered By Environmental Permits



Note: Figure prepared by Tinka, 2021.

A provision of US\$15.2 M, equivalent to 75% of the 5% of the total capital cost based on benchmark for filtered tailings options, was included in the capital costs to account for closure costs.

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 Development

A comprehensive environmental and social impact assessment will be necessary for the project in order to obtain necessary permits 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 Protección y Gestión Ambiental para las Actividades de Explotación, 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.

20.5.3 Construction and Operations

Once the environmental and social impact assessment is approved by Peruvian authorities, a variety of permits, licenses, and authorizations will be required to proceed with the project construction and operations. The main permitting requirements include:

- 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;
- 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;
- Start of activities (includes exploitation of construction materials and mining exploitation).

The granted CIRAs cover most but not all of the infrastructure areas envisaged in the 2021 PEA. Areas that are known to require additional CIRAs include power lines, access road and filtered TSF. Review of the final project footprint will be required to ensure that all of the planned operational areas have a CIRA.

20.6 Considerations of Social and Community Impacts

As noted in Section 4.8, Tinka has in place, or is actively negotiating extensions, for property agreements with local communities that support exploration-stage activities.

In support of obtaining the permits to allow exploration activities, Tinka has conducted a number of town-hall meetings, including virtual ones widely broadcast on local radio and on social media, with local communities. Tinka also maintains community relations offices in all three communities and the Tinka team endeavours to meet with as many local stakeholders as possible, as often as possible.

As noted in Section 4.2.7, 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. Tinka has completed annual social compliance reports since 2017, and files monthly reports on safety indicators including social conflicts (2015–2021 and ongoing) to relevant regulatory authorities. The key risks identified included:

- Potential for conflicts over freshwater usage;
- Potential impact on existing wetlands and high-altitude lakes;
- Proposed infrastructure locations overlap with existing infrastructure such as roads;
- Presence of archeological material in areas proposed to host infrastructure;

- Ability to obtain land agreements to support project access, development, construction and operations;
- Clear understanding of the project area of influence, including communities that may be potentially impacted, the types of impacts;
- The ability of the project and company to meet community expectations.

20.7 Comments on Section 20

Mitigation measures to avoid, reduce, or compensate for potential project effects will need to be developed and supported by comprehensive environmental and social baseline investigations and engineering studies. Using filtered tailings technology will help reduce the Project footprint and mitigate environmental risk.

The 2021 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 Capital Cost Estimates

21.1.1 Basis of Estimate

The capital cost estimate was prepared by Mining Plus, with process area costs input by Transmin and tailings area cost input by Envis. All costs are exclusive of the Peruvian value-added tax (Impuesto General a las Ventas or IGV in the Spanish acronym).

The capital cost estimate for the 2021 PEA had an expected accuracy range of $\pm 35\%$. The capital cost estimate was developed to be at the level of an AACE Class 4 Estimate, with a target accuracy of -30% to -15% and +20% to +50%. The cost estimate was expressed in Q2-2021 US\$, used an exchange rate of 1.00 US\$ = 3.88 PEN, and did not include allowances for escalation or exchange rate fluctuations.

The following areas were included in the estimate:

- Mine (underground mine development, equipment fleet, backfill plant, and supporting infrastructure and services);
- Process plant (zinc and lead–silver concentrates, conventional 8,500 t/d concentrator flotation plant with supporting plant infrastructure and services);
- Filtered TSF;
- On-site infrastructure (water treatment and distribution, electrical sub-station and distribution, internal accesses, camp and other general facilities);
- Off-site infrastructure (water and power supply, and new external access).

A small amount of engineering work, being in the range of 1–2% of total engineering for the project, was carried out to support the estimate.

21.1.2 Mine Capital Costs

21.1.2.1 Initial Capital Costs

This item accounted for the capital costs associated with the underground mine development, mining equipment fleet mine backfill plant, haul roads and support mine infrastructure and services.

The mine capital costs are summarized in Table 21-1.

Table 21-1: Initial Mine Capital Costs

Item	Cost (US\$ x 1,000)
Site preparation and haul roads	1,767
Pre-production development	12,673
Mining equipment fleet	14,202
Mine auxiliary equipment	2,553
Underground ventilation	1,886
Underground electrical	1,492
Mine supporting infrastructure	419
Paste plant	12,260
Total Mining Initial Capital Costs	47,252

21.1.2.2 Site Preparation and Haul Roads

The site preparation and haul roads costs were based on massive earthworks quantities estimated from the preliminary general site layout and sketched sections and unit costs. This estimate remains unchanged from the 2019 PEA, this estimate was reviewed and is considered to remain a reasonable estimate for the purposes of the 2021 PEA.

21.1.2.3 Pre-Production Development

The underground mine development costs were estimated based on the development quantities obtained from a preliminary conceptual mine design and schedule and costs estimated by Mining Plus. It is proposed that the development and infrastructure of the mine will be carried out by a mining contractor. Costs will include all labour, materials and equipment acquisition, thus the capital cost allocated in this line item does not include any capital equipment, only capital development.

21.1.2.4 Mining Equipment Fleet

Mine equipment costs were estimated based on a preliminary sizing of the mining equipment fleet and costs based on previous budgetary quotations sourced from Mining Plus' internal database. For estimating purposes, it was assumed that the mine will be run by the Owner.

Equipment included in the initial capital cost estimate is detailed in Table 16-21.

21.1.2.5 Auxiliary Mine Equipment

Auxiliary mine equipment costs were estimated based on a preliminary sizing of the mining equipment fleet and costs based on previous budgetary quotations sourced from Mining Plus' internal database.

Equipment included in the initial capital cost estimate is detailed in Table 16-22.

21.1.2.6 Underground Ventilation, Electrical, and Mine Supporting Infrastructure

The underground mine ventilation and electrical capital cost was estimated based on a preliminary sizing of the ventilation system composed of drifts, raises and ventilation.

21.1.2.7 Paste Plant

The cost associated with the mine backfill (paste) plant was estimated based study work completed by MineFill Services Inc in August 2021.

21.1.3 Sustaining Capital Costs

This item accounts for the sustaining capital costs associated with the underground mine development, mining equipment fleet mine backfill plant, haul roads and mine support infrastructure and services. The mining sustaining capital costs are summarized in Table 21-2.

21.1.3.1 Sustaining Mining Equipment Fleet Production

For estimating purposes, it was assumed that the mine will be run by the Owner. It is envisaged that the mining fleet will be replaced every four years. The mining sustaining capital costs are shown in Table 21-2.

21.1.3.2 Sustaining Mining Equipment Fleet Auxiliary

It is envisaged that the mining fleet will be replaced every four years.

21.1.3.3 Vertical Development, Ventilation, and Ramps

Ramps and vertical development and the associated ventilation infrastructure are allocated to sustaining capital; however, all of the horizontal development was allocated to operating costs.

21.1.4 Process Capital Costs

The process area capital cost was developed using a major equipment factored method, based on benchmarking of similar projects. Major equipment was quoted by reputable suppliers, and factors for earthworks, structure, concrete, electrical, etc. were used by area to estimate the cost of installation and sundry equipment.

Table 21-2: Mining Sustaining Capital Costs

Item	Cost (US\$ x 1,000)
Mining equipment fleet	58,609
Mine auxiliary equipment	7,659
Vertical development, ventilation, ramps	28,963
Total	95,231

The following assumptions were considered:

- All equipment and materials will be new;
- The main equipment will be purchased and manufactured in appropriate sizes to be transported by the existing main roads from Lima to the project site;
- The execution work will be continuous without interruptions or stoppages;
- Concrete will be produced at the construction site;
- Local contractors will be contracted under unit price contracts.

The process capital cost estimate is summarized in Table 21-3.

21.1.5 Infrastructure Capital Costs

Infrastructure-related capital costs included:

- Filtered TSF and water management system;
- Water sourcing, treatment and onsite distribution;
- Site electrical sub-station and distribution;
- Internal access roads;
- On-site camp and other general facilities;
- Fresh water supply;
- Power supply (including the relocation of a section of the two existing power lines on site);
- External access road.

The filtered TSF costs were estimated based on quantities obtained from a conceptual design and sketches of the filtered TSF unit costs obtained from Envis' internal database. No liner was considered for the filtered TSF at this stage.

Table 21-3: Process Plant Capital Costs

Description	Cost (US\$ x 1,000)	Installation (US\$ x 1,000)	Total Direct (US\$ x 1,000)	Cost (%)
Crushing	3,870	2,980	6,800	7.7
Grinding	12,110	9,320	21,400	23.9
Flotation	9,030	6,960	16,000	17.9
Concentrate preparation	3,430	2,640	6,100	6.8
Tailings preparation	15,650	12,050	27,700	30.9
Tailings storage facility	3,400	230	3,600	6.7
Reagents	1,300	1,000	2,300	2.6
Utilities and services	1,780	1,370	3,100	3.5
Total	50,600	36,500	87,100	100.0

Due to the possibility of acid rock-derived runoff and seepage, an effluent water treatment plant has been included in the 2021 PEA. The cost associated with this plant was estimated based on a benchmark estimate adjusted using the 6/10 factor method. The requirement for the plant will be determined in future stages.

The cost associated with the site electrical sub-station and on-site distribution was estimated based on a conceptual system design completed by LGQ Consulting in September 2021.

The costs associated with the internal access roads were based on massive earthworks quantities estimated from the preliminary general site layout and sketched sections and unit costs carried forward from the 2019 PEA and considered still sufficiently accurate.

The camp cost accounts for the costs associated with the camp buildings and site preparation in this area. Site preparation costs were based on massive earthworks quantities estimated from the preliminary general site layout and sketched sections and unit costs sourced from the 2019 PEA and scaled up by 20% and are in line with Mining Plus' benchmarking database.

The other general facilities cost accounts for the costs associated with items such as the general office building, and warehouses. These costs were carried forward from the 2019 PEA and align with Mining Plus' benchmarks for similar projects in Peru.

The water supply cost accounts for the costs associated with the freshwater catchment system, storage pond, pipeline and freshwater storage tanks in the project area. These costs were carried forward from the 2019 PEA and align with Mining Plus' benchmarks for similar projects.

The cost associated with the external access road carried forward from the 2019 PEA and based on massive earthworks quantities estimated from the preliminary general 'site layout

and sketched sections and unit costs. This cost aligns with Mining Plus' benchmarks for similar projects in Peru.

Table 21-4 provides the infrastructure cost estimate.

21.1.6 Indirect costs

Indirect costs assume that:

- The project will be executed through an engineering, procurement, and construction management (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.

21.1.7 Owner Capital Costs

The Owner's cost was estimated as the 5% of the total project direct cost. This cost is considered to include pre-operations personnel and training, the Owner's project team during project development and execution, insurance, and permitting.

21.1.8 Sustaining Capital

The sustaining capital cost estimate to account for underground mine development, mine equipment and filtered TSF expansion capital costs through the LOM, by applying the same estimating methodology.

The sustaining capital cost estimate by year for the mine fleet and tailings are summarized in Table 21-5. Table 21-6 summarizes the sustaining capital cost estimate over the LOM.

Table 21-4: Infrastructure Capital Summary

Item	Cost (US\$ x1,000)
<i>On-site Infrastructure</i>	
Water treatment and on-site distribution	5,854
Site electrical sub-station and on-site distribution	8,745
Site access roads	9,200
Operations camp	8,640
Other general facilities	1,600
<i>Off-Site Infrastructure</i>	
Water supply	2,500
External access roads	6,600
Total Infrastructure	43,139

Table 21-5: Annualized Sustaining Capital Cost Estimate (mine fleet and tailings)

Year	Units	Total	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Mine fleet	US\$ x 1,000	65,800	—	—	—	13,000	3,600	—	16,600	3,400
Tailings	US\$ x 1,000	91,600	4,300	5,300	4,700	6,200	6,800	7,700	7,700	7,200

Year	Units	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Mine fleet	US\$ x 1,000	—	8,500	5,6	3,4	—	11,7	—
Tailings	US\$ x 1,000	6,500	5,600	6,400	6,7	6,5	5,4	4,8

Table 21-6: Sustaining Capital Cost Estimate Summary

Description	US\$ x 1,000
Mine equipment fleet	58,600
Mining equipment auxiliary	7,600
Vertical development, ventilation, ramps	29,000
Filtered TSF	91,600
Total Sustaining Capital Cost Estimate	186,800

21.1.9 Contingency

The contingency was established deterministically applying the following percentage factors associated with a PEA-level estimate.

- 10% on site preparation, haul roads, underground mine electrical distribution, mine backfill plant and supporting infrastructure direct costs;
- 25% on the process plant, filtered TSF, and on-site and off-site infrastructure direct costs, and on the indirect and Owner's costs.

No contingency was considered on the mine development and equipment capital cost.

21.1.10 Capital Cost Summary

The initial capital cost estimate is presented in Table 21-7.

Indirect project capital costs include EPCM, third-party consultants, construction facilities and services, equipment freight, vendor support, first fill and spares (for the first year of operation).

No indirect costs other than the backfill plant were considered within the mining capital cost.

21.2 Operating Cost Estimates

21.2.1 Basis of Estimate

The operating cost estimate has an expected accuracy range of $\pm 35\%$ and is expressed in Q3-2021 US\$.

The estimate includes the underground mining, processing and G&A operating costs. It excludes escalation, currency fluctuations, off-site costs, interest charges and taxes. No contingency has been included in the operating costs.

21.2.2 Mine Operating Costs

Based on preliminary mine plan analysis including resource geometry, the scale of the deposit and grade distribution, SLS and overhand cut-and-fill with pillars OCF methods were selected. The mining strategy involves dividing the deposit into five zones by spatial location and by mining method:

- SLS: West and South areas and Silver Zones, which will produce 48.3% of mined tonnes for processing
- OCF: Central and East areas, which will produce 36.9% of mined tonnes for processing;
- Development in mineralization will represent 14.8% of the processed material.

A portion of the tailings will be thickened and filtered for filtered tailings disposal. The remaining tailings will be mixed with cement and used as structural backfill in the underground operations.

Table 21-7: Initial Capital Cost Estimate Summary

Capital Cost Item	Initial (US\$ M)	Sustaining (US\$ M)	Total (US\$ M)
Mining & mine development	47.2	95.3	142.5
Process plant	83.5	—	83.5
On-site infrastructure	34	—	34
Off-site infrastructure	9.1	—	9.1
Filtered tailings storage facility	3.6	91.6	95.2
Indirect + Owner costs	42.7	—	42.7
Contingencies	43.8	—	43.8
Total Project	263.9	186.9	450.8
Closure Costs	—	—	15.2

Note: Totals may not sum due to rounding.

21.2.2.1 Development Cost

Table 21-8 shows the detail of the estimated unit prices for mine development.

21.2.2.2 Mining Cost

The mine operating costs were developed by Mining Plus, based on assumptions of SLS and OCF mining methods. Costs were benchmarked from similar projects for the specific production rate per area and mining method. All costs assume Owner mining.

The mine operating cost estimate included the costs associated with stope preparation, drilling, blasting, ground support, backfill, underground loading and hauling and material transport to the primary crusher on surface, as well as support and ancillary equipment operations and maintenance, power, direct labour and mine operations supervision staff.

Table 21-9 shows the detail of the estimated unit mine costs for each project area.

Within the operating costs of the mine, the cost of recovery of pillars has been estimated because in both the Central and East areas, 70% of the pillars will be recovered. The tonnage from these pillars has been included in the LOM.

Operating costs associated with the backfill plant are included in the mine operating cost estimate.

Table 21-10 presents the underground mine operating cost summary.

Table 21-8: Development Type and Cost per Meter

Development Type	Unit Price (US\$/m)
Horizontal ($\pm 2\%$) 5.0 mW x 5.0 mH	2,017
Inclined (-16%) 5.0 mW x 5.0 mH	2,115
Vertical	2,084

Table 21-9: Breakdown of Production Cost per Area

Area	Daily Production Activity	3,000 OCF Central Area		200 SLS Silver Zone		2,000 OCF East Area	
		(US\$/t)	(US\$/t)	(US\$/t)	(US\$/t)	(US\$/t)	(US\$/t)
Mine	1.1 Mine supervision	1.26	20.51	4.09	60.27	1.85	28.75
	1.2 Preparation	2.64		8.57		3.87	
	1.3 Exploitation	4.36		14.13		6.38	
	1.4 Loading and hauling to ore pass	0.55		1.79		0.81	
	1.5 Support	1.67		5.40		2.44	
	1.6 Fill	4.54		14.71		6.65	
	1.7 Transportation with tipper to plant	2.77		2.77		2.77	
	1.8 Auxiliary services	2.02		6.55		2.96	
	1.9 Energy	0.69		2.24		1.01	
Area	Daily Production Activity	3,500 SLS West Area		4,500 SLS South Area		Pillar	
		(US\$/t)	(US\$/t)	(US\$/t)	(US\$/t)	(US\$/t)	(US\$/t)
Mine	1.1 Mine supervision	1.73	27.05	1.48	23.54	1.16	18.83
	1.2 Preparation	3.62		3.10		2.43	
	1.3 Exploitation	5.97		5.11		4.00	
	1.4 Loading and hauling to ore pass	0.76		0.65		0.51	
	1.5 Support	2.28		1.95		1.53	
	1.6 Fill	6.21		5.32			
	1.7 Transportation with tipper to plant	2.77		2.77		2.54	
	1.8 Auxiliary services	2.77		2.37		1.86	
	1.9 Energy	0.95		0.81		0.64	

Table 21-10: Total Mining Operating Cost Breakdown

Item	Cost (US\$ M)
Mining operating cost - stope operating costs	891.3
Mining operating cost - development operating costs	347.6
Mining operating cost paste backfill only (\$19.27/m ³)	177.3
Mining operating cost waste backfill placement (\$2*1.7 t/m ³)	11.1
Total LOM Mining Operating Cost	1,427.2

Note: Totals may not sum due to rounding.

The total mineralized material processed is 43.525 Mt.

The overall average underground mine operating cost was estimated US\$32.79/t of material mined (which equals the mill feed processed), and the total LOM mine operating cost is US\$1,427 M, excluding pre-development costs (capitalized mine development costs during the pre-operational period).

21.2.3 Process Operating Costs

The process operating cost estimate accounts for the operating and maintenance costs associated with the 8,500 t/d process plant operation, supporting services infrastructure, and tailings filtering.

Operating costs associated with the backfill plant are included in the mine operating cost estimate.

Process plant operating costs were estimated using the following cost categories: power, labour, reagents and consumables, maintenance supplies and services. The cost estimates are provided in Table 21-11.

21.2.3.1 Power

A unit power cost of US\$0.07/kWh was assumed.

Power consumption was estimated based on the power requirements by the major processing plant equipment, and adjusted using benchmark factors to account for auxiliary and minor equipment power demand.

21.2.3.2 Reagents and Consumables

Reagent consumptions were estimated based on the results of metallurgical testwork.

Steel consumption was estimated using empirical equations, and abrasion index test work results.

Table 21-11: Process Plant Operating Cost Estimate Summary

Area	Cost (US\$ x 1,000/a)	Operating Costs (US\$/t processed)
Reagents	5,218	1.68
Consumables	5,309	1.71
Power	3,458	1.21
Labor	2,265	0.73
Maintenance	3,036	0.98
Services	3,411	0.79
Total	22,698	7.10

The consumables and reagents costs were based on budgetary quotations from reputable suppliers.

21.2.3.3 Labour

Labour costs were estimated based on a preliminary staffing plan estimate for the operation and maintenance of the process plant based on costs for local management, technical and operating staff at similar operations in Peru.

21.2.3.4 Maintenance Supplies

The process plant maintenance cost per year was estimated as a factor of the mechanical equipment direct capital cost and is assumed to account for preventive maintenance, repairs and major equipment maintenance costs for the process plant.

21.2.3.5 Services

Services costs include the following areas: chemical assays, maintenance services by contractors, personnel mobilization, as well as water and compressed air supply and distribution and other general services.

21.2.4 Infrastructure Operating Costs

General on-site infrastructure operating costs are included in the G&A operating costs.

21.2.5 General and Administrative Operating Costs

The G&A operating cost was estimated at a total LOM of US\$186 M or an equivalent of US\$4.27/t of mill feed processed, based on an average benchmark cost of US\$13 M per year from similar operations in Peru.

22 ECONOMIC ANALYSIS

22.1 Forward Looking Information Caution

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; 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 reclamation obligations; requirements for additional capital; 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 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 2021 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;
- 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, geotechnical, hydrological and hydrogeological assumptions, capital and operating 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 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 2021 PEA based on these Mineral Resources will be realized.

22.2 Methodology Used

The financial analysis was carried out using a discounted cash flow (DCF) methodology. Net annual cash flows were estimated projecting yearly cash inflows (or revenues) and subtracting projected yearly cash outflows (such as capital and operating costs, royalties and taxes). These annual cash flows were discounted back to the date of beginning of capital expenditure at mid-year 2022 (mid-year -3) and totalled to determine the NPV of the project at selected discount rates. A discount rate of 8% was used as the base discounting rate.

In addition, the internal rate of return (IRR), expressed as the discount rate that yields an NPV of zero, and the payback period, expressed as the estimated time from the start of production until all initial capital expenditures have been recovered, were also estimated.

Sensitivities to variations in commodity prices, grades, initial capital costs and operating costs were carried out to identify potential impacts on NPV and IRR.

All monetary amounts are presented in constant Q3-2021 US\$. For discounting purposes, cash flows are assumed to occur at the end of each period. Revenue is recognized at the time of production.

22.3 Financial Model Parameters

22.3.1 Mineral Resource, Mineral Reserve, and Mine Life

The 2021 PEA mine plan is based on the subset of Mineral Resources in Table 16-9. Indicated Mineral Resources account for 39% of total mill feed and Inferred Mineral Resources for 61% of total mill feed.

The forecast mine schedules were included as Table 16-19 and Table 16-20.

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. A 10% moisture content assumption was used for both the zinc and lead–silver concentrates.

22.3.3 Smelting and Refining Terms

It is estimated that all of the zinc concentrate will be sold to a local smelter in Peru. Lead–silver concentrate production will be sold FOB to Asia.

The following payability factors were applied:

- Zinc concentrate:
 - Zinc: pay for 85.0% of the zinc content, subject to a minimum deduction of eight units;
- Lead–silver concentrate:
 - Lead: pay for 95.0% of lead content, subject to a minimum deduction of three units;
 - Silver: pay for 95.0% of silver content, subject to a minimum deduction of 50 g/dmt.

Table 22-1: Forecast Metallurgical Recoveries

Item	Recovery Rate (%)
<i>Zn concentrate</i>	
Zn recovery	92.0
<i>Pb–Ag concentrate</i>	
Pb recovery	85.0
Ag recovery	45.0

Table 22-2: Forecast Concentrate Grades

Item	Concentrate Grade (%)
<i>Zn concentrate</i>	
Zn grade	50
Fe grade	13
<i>Pb–Ag concentrate</i>	
Pb grade	50

Table 22-3 outlines the concentrate treatment and refining charges applied in the economic assessment. These figures include any price participation that may 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.

Table 22-4 presents the concentrate transport costs applied. A concentrate transport loss of 0.2% was assumed for both concentrates.

22.1.1 Metal Prices

The metal prices used in the cashflow model are provided in Section 19.2.

Table 22-3: Concentrate Treatment and Refining Charges

Item	Units	Cost
<i>Zn concentrate</i>		
Portion sold to local Peru market		
Treatment charge – base rate	US\$/dmt	190
Treatment charge – net rate	US\$/dmt	190
<i>Pb–Ag concentrate</i>		
Treatment charge	US\$/dmt	150
Ag refining charge	US\$/oz	1.00

Table 22-4: Concentrate Transport Costs

Item	Units	Cost
Land transport to local refinery or Callao port	US\$/wmt	35.0
Port charges (Callao)	US\$/wmt	17.5
Ocean freight to Asia	US\$/wmt	45.0

22.1.2 Capital Costs

Capital cost assumptions are outlined in Section 21.2. A construction period of 18 months was considered (starting in mid-year 2023) for the overall project implementation. Year 2025 corresponds to the first year of production. Capital costs were applied in the financial model excluding IGTV.

22.1.3 Operating Costs

Operating cost assumptions are outlined in Section 21.3. For the purpose of the 2021 PEA, it has been assumed that the mine will be run by the Owner. Operating costs were applied in the financial model excluding IGTV.

22.1.4 Royalties

Royalties are discussed in Section 4.7. The 2021 PEA assumes that the 1% NSR royalty payable to Sierra will be bought out and therefore the royalty is not included in the cashflow analysis.

22.1.5 Working Capital

A working capital allocation was included in the cash flow model. The following payment terms were assumed:

- 60 days in accounts receivable, including NSR;
- 30 days in accounts payable, including 100% operating costs, special mining tax, modified mining royalty and sustaining capital.

Working capital is assumed to be recovered at project completion. Thus, the sum of all working capital over mine life is zero.

22.1.6 Taxes

The taxation and royalties modelled within the financial analysis are based on the tax rates and taxation schemes that were validated by Ernst & Young Asesores (EY).

The following tax considerations were applied:

- Modified mining royalty (Law N° 29788);
- Special mining tax (Law N° 29789);
- Employee profit sharing of 8% of taxable income after loss carry-forward;
- Complementary mining pension fund as 0.5% of taxable income after loss carry-forward and employee profit sharing;
- Corporate income tax rate of 29.5%;
- Tax loss carried forward to a maximum of four consecutive years after the year of the loss.

Tax depreciation is straight line and was split into the following categories:

- Pre-operational expense (depreciated in the first year of production);
- 1 year (expensed when incurred);
- 5 years (or 20% per year);
- 10 years (or 10% per year);
- 20 years (5% per year).

Table 22-5 presents the capital distribution among the different depreciation categories applied.

Table 22-5: Capital Distribution Among Depreciation Categories

Depreciation Category	Initial Capital (%)	Sustaining Capital (%)	Total LOM Capital (%)
Pre-operational expense	36	—	21
1 year	2		1
5 years (20%/year)	16	100	51
10 years (10%/year)	33	—	19
20 years (5%/year)	13		8
Total	100	100	100

Note: Totals may not sum due to rounding.

The following previous and projected general expenses and explorations costs were included in the amortization balance for tax calculation purposes only:

- Previous exploration costs of US\$20.5 M and projected exploration costs of US\$11.5 M. These are amortized over the LOM;
- Previous preoperative general expenses of US\$7.4 M and projected pre-operative general expenses (Owner's costs) of US\$8.9 M. These are amortized in the first production year.

22.1.7 Closure Costs and Salvage Value

A provision of US\$15.2 M, equivalent to the 5.8% of the total capital build cost based on benchmarking, was included to account for closure costs.

No salvage value was considered.

22.1.8 Financing

The preliminary economic analysis was based on 100% equity financing.

22.1.9 Inflation

No escalation or inflation was applied. All amounts are in real (constant) terms.

22.2 Economic Analysis

The Project is anticipated to generate a pre-tax NPV of US\$720 M at an 8.0% discount rate, an IRR of 42.6% and a payback period of 2.0 years. The financial analysis results showed an after-tax NPV of US\$433 M at an 8.0% discount rate, an IRR of 31.9% and a payback period of 2.6 years.

Table 22-6 presents a summary of the financial analysis results.

Cash costs were consolidated per pound of zinc payable, net of lead and silver credits. Cash costs comprise the sum of anticipated mining, processing, general and administrative costs, and selling costs plus by product credits. A LOM all-in sustaining cash cost (AISC) was also consolidated. The AISC is an extension of the cash costs adding the costs to sustain production. These are presented in Table 22-7.

Figure 22-1 shows the annual zinc concentrate production that is forecast over the LOM by area. Figure 22-2 presents the main cost value drivers at 8% discount rate. Figure 22-3 and show the cumulative undiscounted and discounted cash flows forecast for the project. Table 22-8 presents the cash flow summarized on an annual basis.

22.3 Sensitivity Analysis

A sensitivity analysis was performed considering variations in metal prices, feed metal grades, initial capital and operating costs on the after-tax NPV8% and on IRR. The results of this analysis are presented in Figure 22-4 and Figure 22-5.

The Project is most sensitive to fluctuations in the zinc price, then to feed grades. It is less sensitive to changes in operating costs, then initial capital costs. It is least sensitive to changes in silver and lead prices.

Table 22-9 presents the project NPV at a range of discount rates from 5% to 15%. The NPV8%, which is the base case, is bolded in the table.

Table 22-6: Summary of Financial Results

Description	Units	Value
Zn payable	klb	4,111,818
Pb payable	klb	129,125
Ag payable	koz	8,649
Zn payable equivalent	klb	4,372,606
<i>After-Tax Valuation Indicators</i>		
Undiscounted cumulative cash flow	US\$ M	1,068
NPV @ 8%	US\$ M	433
NPV @ 10%	US\$ M	347
Payback period (from start of operations)	years	2.6
IRR	%	31.9
Initial capital	US\$ M	264
LOM capital	US\$ M	451
Closure costs	US\$ M	15.2

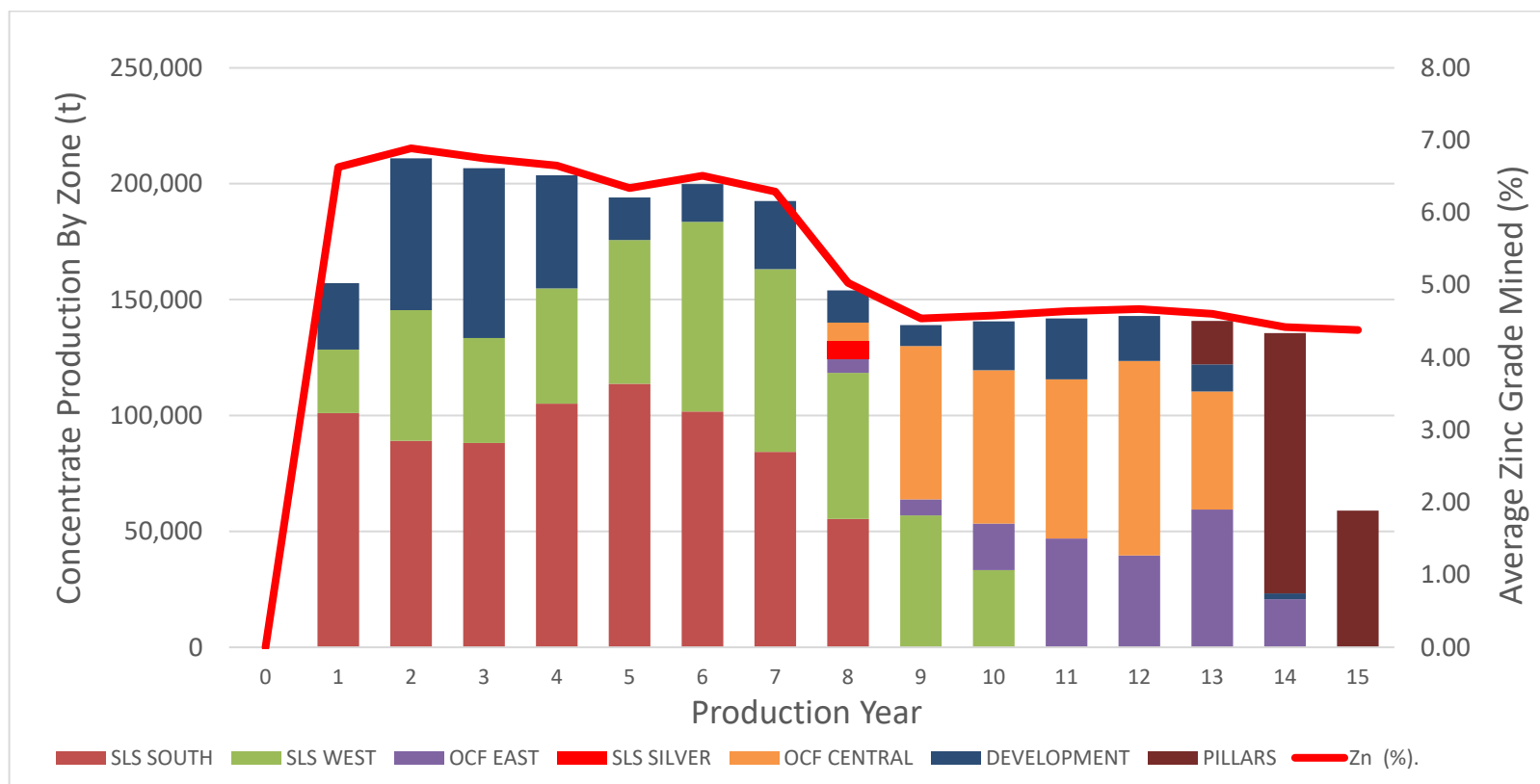
Note: base case at NPV8% is bolded. Totals may not sum due to rounding.

Table 22-7: Summary of LOM Cash Costs

Cash Cost	LOM (US\$ M)	US\$/Zn lb payable
<i>Cash Costs</i>		
Mining	1,427	0.35
Process	309	0.08
G&A	186	0.05
Concentrates transport, treatment and refining	1,091	0.27
<i>Sub-total</i>	<i>3,013</i>	<i>0.74</i>
<i>By-product credits</i>		
Pb and Ag premium	(313)	(0.08)
<i>Net Direct Cash Cost (C1)</i>	<i>2,700</i>	<i>0.66</i>
Sustaining capital, royalties* and closure	316	0.08
AISC	3,016	0.73

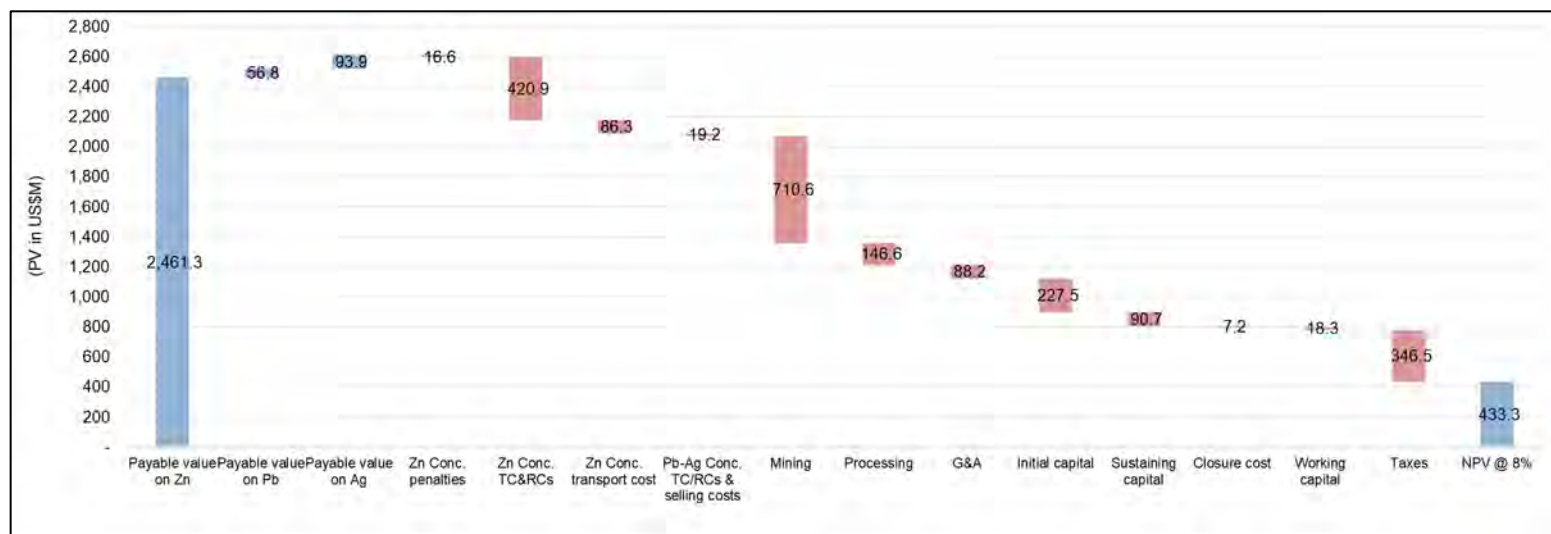
Note: * includes Modified Mining Royalty and Special Mining Tax. Cash costs comprise the sum of anticipated mining, processing, general and administrative costs, and selling costs plus by product credits. All-in sustaining costs (AISC) are an extension of the cash costs adding the costs to sustain production. Totals may not sum due to rounding.

Figure 22-1: LOM Annual Zinc Production Forecast by Zone



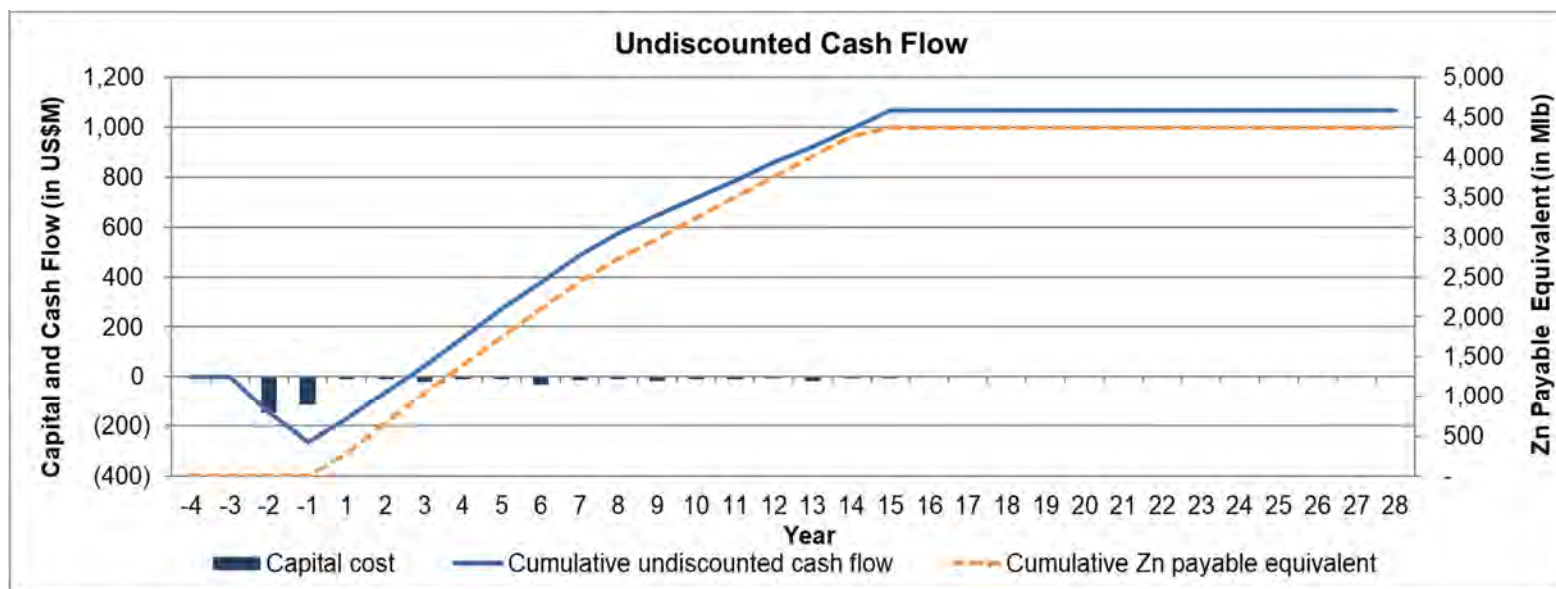
Note: Figure prepared by Mining Plus, 2021.

Figure 22-2: Main Cost Value Drivers (Discounted at 8%)



Note: Figure prepared by Mining Plus, 2021.

Figure 22-3: Cumulative Undiscounted Cash Flow



Note: Figure prepared by Mining Plus, 2021

Table 22-8: Cash Flow Forecast on an Annual Basis

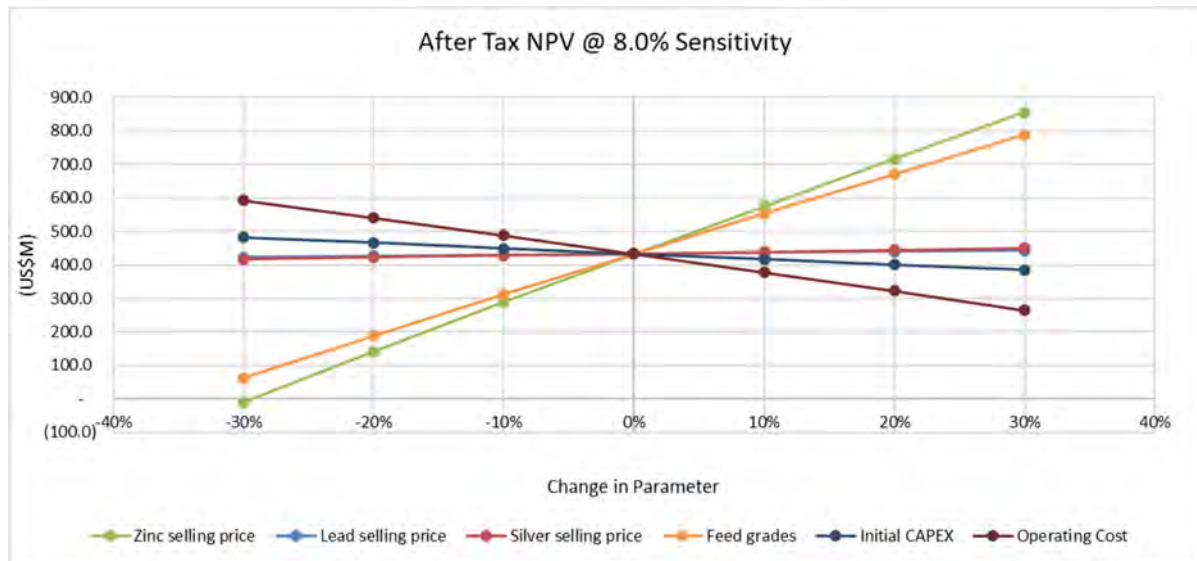
Description	Units	LOM	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
			2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Production (Feed to Mill)																			
Material processed	kt	43,526	—	—	2,369	3,061	3,062	3,062	3,061	3,069	3,061	3,061	3,061	3,069	3,058	3,061	3,060	3,065	1,346
Zn grade	%	5.56	—	—	6.63	6.89	6.75	6.65	6.34	6.51	6.29	5.03	4.54	4.58	4.64	4.67	4.60	4.42	4.38
Pb grade	%	0.20	—	—	0.18	0.26	0.26	0.13	0.11	0.12	0.13	0.14	0.39	0.26	0.19	0.22	0.22	0.21	0.31
Ag grade	g/t	14.49	—	—	18.46	17.67	18.30	14.96	14.28	13.33	13.56	18.16	14.83	11.41	11.35	12.23	13.23	11.88	14.65
Metal Recovered																			
Zn recovered	klb	4,904,831	—	—	318,544	427,798	419,191	412,982	393,609	405,262	390,497	312,273	281,853	285,116	287,779	289,924	285,600	274,862	119,541
Pb recovered	klb	137,642	—	—	6,560	12,283	12,285	6,143	5,196	5,684	6,141	6,613	18,422	12,315	8,966	10,392	10,419	9,785	6,437
Ag recovered	koz	9,122	—	—	633	783	811	663	632	592	600	804	657	507	502	542	585	527	285
Concentrate Production																			
Zn concentrate produced	kdmt	4,450	—	—	289	388	380	375	357	368	354	283	256	259	261	263	259	249	108
Zn grade	%	50	—	—	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Pb–Ag concentrate produced	kdmt	125	—	—	6	11	11	6	5	5	6	6	17	11	8	9	9	9	6
Pb grade	%	50	—	—	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Ag grade	g/dmt	2,272	—	—	3,308	2,184	2,262	3,699	4,173	3,571	3,353	4,169	1,222	1,411	1,920	1,787	1,927	1,845	1,519
Payable Metals																			
Zn payable	klb	4,111,818	—	—	267,042	358,632	351,417	346,211	329,971	339,740	327,361	261,784	236,283	239,018	241,251	243,049	239,424	230,422	100,213
Pb payable	klb	129,125	—	—	6,154	11,523	11,525	5,763	4,875	5,332	5,761	6,204	17,282	11,553	8,411	9,749	9,774	9,180	6,039
Ag payable	koz	8,649	—	—	600	742	769	628	600	561	569	762	623	480	476	513	555	499	270
Metal Value	US\$ 000	5,247,128	—	—	339,497	457,628	449,558	434,750	413,786	425,100	410,832	336,809	313,656	308,365	307,966	312,217	308,806	296,213	131,942
Zn payable value	US\$ 000	4,934,182	—	—	320,450	430,358	421,700	415,453	395,965	407,687	392,834	314,141	283,540	286,822	289,501	291,659	287,309	276,507	120,256
Pb payable value	US\$ 000	122,668	—	—	5,846	10,947	10,949	5,475	4,631	5,066	5,473	5,894	16,418	10,975	7,991	9,262	9,285	8,721	5,737
Ag payable value	US\$ 000	190,278	—	—	13,201	16,324	16,909	13,823	13,191	12,347	12,525	16,774	13,698	10,568	10,474	11,297	12,212	10,986	5,949
TC&RC and Penalties	US\$ 000	(904,387)	—	—	(58,451)	(78,906)	(77,394)	(75,309)	(71,688)	(73,799)	(71,229)	(57,499)	(53,523)	(53,135)	(53,152)	(53,767)	(53,039)	(50,977)	(22,520)
Zn concentrate TC	US\$ 000	(843,740)	—	—	(54,797)	(73,591)	(72,110)	(71,042)	(67,710)	(69,714)	(67,174)	(53,718)	(48,485)	(49,046)	(49,504)	(49,873)	(49,130)	(47,282)	(20,564)
Zn concentrate penalties	US\$ 000	(33,306)	—	—	(2,163)	(2,905)	(2,846)	(2,804)	(2,673)	(2,752)	(2,652)	(2,120)	(1,914)	(1,936)	(1,954)	(1,969)	(1,939)	(1,866)	(812)
Pb–Ag concentrate TC	US\$ 000	(18,693)	—	—	(891)	(1,668)	(1,668)	(834)	(706)	(772)	(834)	(898)	(2,502)	(1,672)	(1,218)	(1,411)	(1,415)	(1,329)	(874)
Pb refining	US\$ 000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ag refining	US\$ 000	(8,649)	—	—	(600)	(742)	(769)	(628)	(600)	(561)	(569)	(762)	(623)	(480)	(476)	(513)	(555)	(499)	(270)
Transport Costs	US\$ 000	(186,569)	—	—	(11,883)	(16,300)	(15,996)	(15,174)	(14,397)	(14,856)	(14,380)	(11,667)	(11,754)	(11,269)	(11,034)	(11,250)	(11,100)	(10,659)	(4,850)
Zn concentrate transport	US\$ 000	(173,041)	—	—	(11,238)	(15,093)	(14,789)	(14,570)	(13,886)	(14,298)	(13,777)	(11,017)	(9,944)	(10,059)	(10,153)	(10,228)	(10,076)	(9,697)	(4,217)
Pb–Ag concentrate transport	US\$ 000	(13,527)	—	—	(645)	(1,207)	(1,207)	(604)	(511)	(559)	(604)	(650)	(1,811)	(1,210)	(881)	(1,021)	(1,024)	(962)	(633)
Net Smelter Return	US\$ 000	4,156,172	—	—	269,164	362,423	356,168	344,268	327,702	336,444	325,223	267,644	248,379	243,961	243,780	247,201	244,668	234,578	104,572
NSR from Zn concentrate	US\$ 000	3,578,584	—	—	252,252	338,770	331,954	327,037	311,696	320,924	309,231	247,286	223,197	225,781	227,890	229,588	226,164	217,661	94,663



Description	Units	LOM	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
			2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
NSR from Pb–Ag concentrate	US\$ 000	423,622	—	—	16,911	23,653	24,214	17,231	16,006	15,520	15,991	20,357	25,182	18,180	15,890	17,612	18,503	16,917	9,909
Production Costs	US\$ 000	(1,922,077)	—	—	(119,647)	(165,475)	(166,626)	(153,448)	(136,037)	(129,980)	(138,007)	(131,301)	(123,754)	(129,685)	(126,786)	(123,672)	(122,609)	(114,411)	(40,637)
Mining	US\$ 000	(1,427,187)	—	—	(92,709)	(130,668)	(131,812)	(118,635)	(101,233)	(95,082)	(103,205)	(96,499)	(88,952)	(94,788)	(92,018)	(88,870)	(87,820)	(79,560)	(25,338)
Process	US\$ 000	(309,034)	—	—	(16,821)	(21,735)	(21,739)	(21,740)	(21,733)	(21,792)	(21,732)	(21,732)	(21,732)	(21,792)	(21,711)	(21,732)	(21,724)	(21,763)	(9,554)
G&A	US\$ 000	(185,856)	—	—	(10,117)	(13,072)	(13,074)	(13,074)	(13,070)	(13,106)	(13,070)	(13,070)	(13,070)	(13,106)	(13,057)	(13,070)	(13,065)	(13,088)	(5,746)
Royalties	US\$ 000	(113,954)	—	—	(9,106)	(11,756)	(10,838)	(11,182)	(11,613)	(12,804)	(10,531)	(5,990)	(5,163)	(4,632)	(4,655)	(4,860)	(4,498)	(4,217)	(2,109)
Modified mining royalty	US\$ 000	(59,151)	—	—	(4,668)	(5,994)	(5,482)	(5,703)	(5,984)	(6,651)	(5,369)	(2,909)	(2,601)	(2,552)	(2,548)	(2,585)	(2,558)	(2,452)	(1,094)
Special mining tax	US\$ 000	(54,804)	—	—	(4,439)	(5,762)	(5,356)	(5,479)	(5,628)	(6,152)	(5,162)	(3,081)	(2,561)	(2,079)	(2,107)	(2,275)	(1,941)	(1,764)	(1,014)
Net Operating Earnings	US\$ 000	2,120,141	—	—	140,410	185,192	178,704	179,637	180,053	193,660	176,684	130,352	119,462	109,644	112,338	118,669	117,560	115,950	61,826
Taxes	US\$ 000	(585,938)	—	—	(4,102)	(57,715)	(53,925)	(53,443)	(52,855)	(59,046)	(52,538)	(36,668)	(32,357)	(28,701)	(34,169)	(36,908)	(35,998)	(36,157)	(11,356)
Employee profit share	US\$ 000	(132,175)	—	—	(925)	(13,019)	(12,164)	(12,056)	(11,923)	(13,320)	(11,852)	(8,271)	(7,299)	(6,474)	(7,708)	(8,326)	(8,120)	(8,156)	(2,562)
Complementary pension fund	US\$ 000	(7,600)	—	—	(53)	(749)	(699)	(693)	(686)	(766)	(681)	(476)	(420)	(372)	(443)	(479)	(467)	(469)	(147)
Income tax	US\$ 000	(446,163)	—	—	(3,123)	(43,947)	(41,061)	(40,694)	(40,246)	(44,961)	(40,005)	(27,921)	(24,638)	(21,855)	(26,018)	(28,104)	(27,411)	(27,531)	(8,647)
Capital Costs	US\$ 000	(465,977)	(148,088)	(115,863)	(9,830)	(9,196)	(21,295)	(11,774)	(10,670)	(31,554)	(15,357)	(12,675)	(17,387)	(12,410)	(10,776)	(7,677)	(19,248)	(6,394)	(5,784)
Initial capital	US\$ 000	(263,951)	(148,088)	(115,863)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sustaining capital	US\$ 000	(186,784)	—	—	(8,813)	(8,180)	(20,279)	(10,758)	(9,654)	(30,538)	(14,341)	(11,658)	(16,371)	(11,394)	(9,760)	(6,661)	(18,232)	(5,378)	(4,768)
Closure cost	US\$ 000	(15,242)	—	—	(1,016)	(1,016)	(1,016)	(1,016)	(1,016)	(1,016)	(1,016)	(1,016)	(1,016)	(1,016)	(1,016)	(1,016)	(1,016)	(1,016)	(1,016)
Working Capital																			
Change in working capital	US\$ 000	0	—	—	(32,939)	(11,398)	2,042	119	1,237	(121)	986	8,320	2,866	761	(341)	(1,056)	1,250	(95)	28,368
Net Cash Flow																			
Before tax	US\$ 000	1,654,164	(148,088)	(115,863)	97,641	164,598	159,451	167,982	170,620	161,986	162,314	125,998	104,940	97,995	101,221	109,935	99,562	109,461	84,411
After tax	US\$ 000	1,068,226	(148,088)	(115,863)	93,539	106,883	105,526	114,539	117,765	102,940	109,776	89,330	72,583	69,294	67,052	73,027	63,564	73,305	73,055

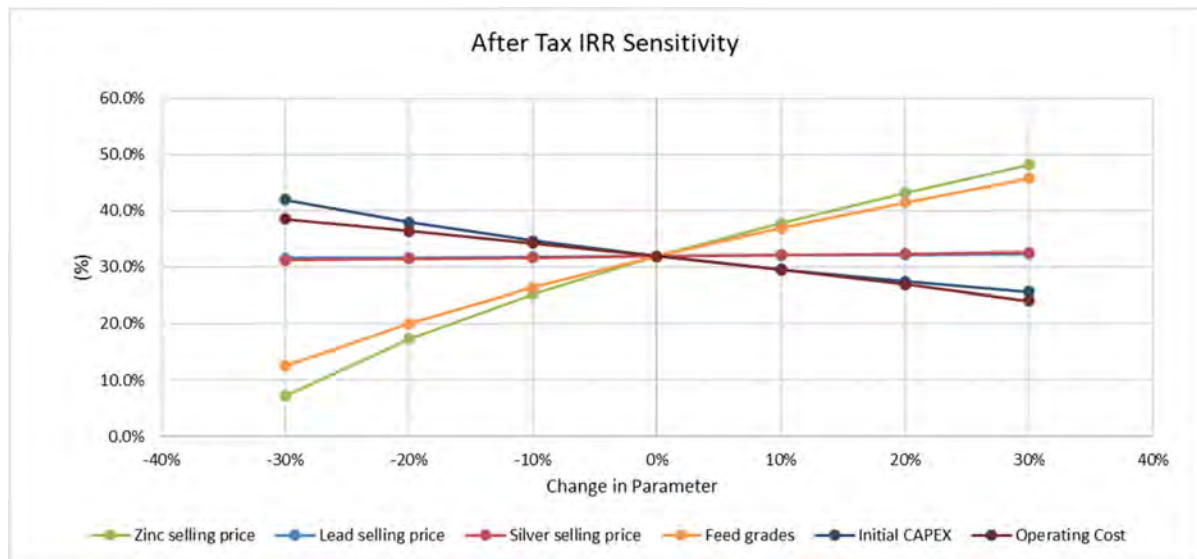
Note: TC& RC = treatment and refining charges. Totals may not sum due to rounding.

Figure 22-4: Sensitivity of After-Tax NPV Discounted at 8.0%



Note: Figure prepared by Mining Plus, 2021. Capex = capital cost estimate.

Figure 22-5: Sensitivity of After-Tax IRR



Note: Figure prepared by Mining Plus, 2021. Capex = capital cost estimate.

Table 22-9: NPV at Different Discount Rates (base case is bolded)

Discount Rate	After Tax (US\$ M)
NPV 5%	604
NPV 7%	484
NPV 8%	433
NPV 10%	347
NPV 12%	278
NPV 15%	197

22.4 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\$433 M, an IRR of 31.9% and a payback period of 2.6 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 most sensitive to zinc price changes. A base case zinc price of US\$1.20/lb was used. Zinc prices during 2021 have varied between US\$1.16/lb and US\$1.73/lb.

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 QPs note the following interpretations and conclusions within their areas of expertise, based on the review of data available for this Report.

25.2 Mineral Tenure, Surface Rights, Water Rights, Royalties and Agreements

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

- Tinka has a 100% ownership interest of 59 contiguous mineral concessions covering 16,548 ha;
- Mineral concessions are valid and in good standing;
- 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 up to 2028 for US\$1 million;
- Tinka has concluded agreements, or is currently negotiating extensions to agreements, to allow for exploration activities with three communities who hold surface rights in the Ayawilca Project area;
- Water used in Tinka's exploration programs was from approved water sources and the volumes used were also approved;
- Tinka owns no water rights in the Project area. Water rights cannot be purchased in Peru, but they are commonly granted for industrial or mining purposes;
- There is an expectation of environmental liabilities associated with historical mining and exploration activity. Most historic environmental liabilities lie with the State. As required by local legislation, Tinka prepared a list of historical mining activity areas in 2018, and provided that list 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-COL1, TK-COL16, TK-COL17, TK-COL18, TK-COL30, TK-COL2, TK-COL29A, TK-COL19, TK-COL25, TK-COL33, TK-COL34, ZOE DANIELA 1, TK-COL6, TK-COL50, and TK-COL24 concessions.

To the extent known to the QPs, there are no other significant factors and risks that may affect access, title or right or ability to perform work on the Project.

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

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

25.3 Geology and Mineralization

The Zinc Zone is an example of a CRD, of which there are several other type examples in central Peru (e.g., Cerro de Pasco, Morococha, Colquijirca, and San Gregorio).

The geological understanding of the settings, lithologies, and structural and alteration controls on mineralization is sufficient to support estimation of Mineral Resources.

Thrusts and limestone repetitions have potential for deeper massive sulphide mineralization to be discovered in the Zinc Zone vicinity. Late-stage epithermal veins may have potential for silver mineralization in the Zinc Zone vicinity.

Tinka has identified a number of areas that have exploration potential, including the South, Far South, Zone 3, Chaucha, Valley, Yanapizgo, Pucarumi, and Tambillo zones. Several magnetic anomalies remain untested outside of the Zinc and Tin Zones, all of which are considered high priority exploration targets.

25.4 Exploration, Drilling and Analytical Data Collection in Support of Mineral Resource Estimation

The exploration programs completed by Tinka to date are appropriate for the mineralization styles.

The quantity and quality of the lithological, collar and down-hole survey data collected in the exploration program completed are sufficient to support Mineral Resource estimation. No drilling, sampling, or core recovery issues that could materially affect the accuracy or reliability of the core samples have been identified.

The collected sample data adequately reflect deposit dimensions, true widths of mineralization, and the deposit style.

Sampling is representative of the zinc, lead, and silver values, reflecting areas of higher and lower grades.

The independent analytical laboratories used by Tinka are accredited for selected analytical techniques.

Sample preparation has used procedures and protocols that are/were standard in the industry and has been adequate throughout the history of the Project. Sample analysis uses procedures that are standard in the industry.

The QA/QC programs adequately address issues of precision, accuracy and contamination, and indicate that the analytical results are adequately accurate, precise, and contamination free to support Mineral Resource estimation.

The sample preparation, analysis, and security procedures are adequate for use in the estimation of Mineral Resources.

The data verification programs concluded that the data collected from the Project adequately support the geological interpretations and constitute a database of sufficient quality to support the use of the data in Mineral Resource estimation.

25.5 Metallurgical Testwork

Metallurgical testwork phases 3, 5 and 6 are considered the most relevant for the purposes of the 2021 PEA.

A standard flotation process can be used to generate zinc and lead–silver concentrates.

Projected metallurgical recoveries are 92% for zinc and 42% for silver into a zinc concentrate, and 70% for lead and 45% for silver into a lead–silver concentrate.

The concentrate quality for the zinc concentrate was based on the chemical characterization of the concentrate produced in locked cycle tests.

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 the Zinc Zone.

The Jameson Cell test was successful in metallurgical performance for the lead–silver circuit. The lead–silver concentrate is believed to be marketable considering the high silver content.

25.6 Mineral Resource Estimates

The Mineral Resource estimate conforms to industry best practices and is reported using the 2014 CIM Definition Standards.

Mineral Resources estimated by SLR for the Ayawilca deposit used drill results available to 16 February, 2021. 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.

Mineral Resources at the Ayawilca deposit are reported based on a possible underground mining scenario using a US\$55/t NSR cut-off value for the Zinc Zone and a US\$60/t NSR cut-off value for the Tin Zone.

Mineral Resources within the Zinc Zone are hosted in a brecciated carbonate sequence located beneath the sandstone unit that hosts the Colquipucro deposit, located 1.5 km to the north. The Zinc Zone is made up of multiple, gently-dipping lenses, or mantos, in the Central and East areas and as massive replacement bodies within structural zones in the West and South areas.

The Tin Zone mineralization is primarily disseminated cassiterite and chalcopyrite in massive to semi-massive pyrrhotite lenses at the contact between the Pucará Group and underlying phyllite of the Devonian Excelsior Group and can also occur as quartz sulphide stockwork veinlets hosted within the phyllite. The Tin Zone resources lie spatially beneath the Zinc Zone and typically do not overlap.

Mineral Resources for the Colquipucro deposit are reported within a preliminary pit shell generated in Whittle software at a reporting cut-off grade of 15 g/t Ag. Mineral Resources are contained within 10 north-dipping, high-grade lenses, a gently-dipping basal zone, and a low-grade halo that encompasses the high-grade lenses. Overall, the Colquipucro deposit is 550 m in the north–south direction, 380 m in the east–west direction and 75 m thick. The Colquipucro deposit is located on a topographic high between 4,160–4,360 masl in elevation.

25.7 Mine Plan

The 2021 PEA mine plan is based on a subset of the Mineral Resources estimated for the Zinc Zone. No other Mineral Resource estimates inform the 2021 PEA mine plan.

Limited geotechnical information is currently available. The QP considers that the geotechnical parameters applied at this stage of the study are representative of the average rock mass conditions and appropriate for the level of study.

The hydrogeological information currently available is limited and not conclusive.

Two suitable mining methods were selected:

- OCF with pillars;
- SLS.

An NSR cut-off of US\$ 65/t of mineralized material was applied to define the subset of the Mineral Resource estimate within the 2021 PEA mine plan. This NSR value is higher than the estimated total operating cost of US\$48/t, and, in the case of sublevel stopes, is higher than the US\$25/t weighted average mining cost.

A subset of the Mineral Resource was defined for mining in the 2021 PEA as follows:

- Indicated Mineral Resources: 16.884 Mt grading 6.05% Zn, 0.13% Pb, and 12.3 g/t Ag;
- Inferred Mineral Resources: 26.642 Mt grading 5.25% Zn, 0.25% Pb, and 15.9 g/t Ag.

The mine is planned to access the mineralization through a system of three main ramps, which will access the five proposed mining zones. The mining rate is an assumed 8,500 t/d, based on a Taylor's rule analysis.

Backfill will be required to support the proposed mining methods; a combination of rock fill and paste backfill is proposed.

The design assumption for the ventilation circuit for each mining area is to inject fresh air through the access ramps, bring the fresh air to the stopes using auxiliary fans and extract the vitiated air through the main ventilation raise using the main fans that will be located on the surface.

The mine plan assumes use of conventional underground and auxiliary equipment.

25.8 Recovery Plan

The planned flotation process flowsheet is based on metallurgical testwork results. The comminution and concentrate handling flowsheets are assumed, based on similar operations.

Processing of the polymetallic sulphide mineralization will be through conventional primary crushing, 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 filtered TSF.

Process water will be recycled as much as possible to minimize water usage.

25.9 Infrastructure

Infrastructure requirements will include mine and process plant supporting infrastructure, site accommodation facilities, filtered TSF, site and internal access roads, power supply and distribution, fresh water supply and distribution, and water treatment plant. No permanent stockpiles will be required, and no permanent waste rock storage facility is envisioned.

Due to site limitations imposed by topography and potential geological hazards, site development earthworks will be a major project consideration.

As there are difficulties associated with improving the existing site access, a new road is proposed to the site from the town of Chinche. Alternative roads do exist, and will be further assessed in future studies.

In the 2021 PEA, it is assumed that all of the zinc concentrate from the Project will be trucked to the Cajamarquilla refinery located on the outskirts of Lima. The Port of Callao, Lima, was selected as the concentrate export facility for all of the lead–silver concentrate.

In the 2021 PEA, the tailings management concept is a combined surface and underground storage. In total, 39% (16.9 Mt) of the LOM tailings production is planned to be used as cemented paste backfill, and the remaining 61% (26.6 Mt) is planned to be stored on surface.

A filtered TSF will be located about 1.5 km northeast of the proposed process plant location.

While this level of study was 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.

Mine water is planned to be recycled as much as practicable. Runoff water from the temporary waste rock piles adjacent to the portals and contact water from the filtered TSF will be used for plant operations.

The 2021 PEA assumption is that the fresh water requirements for operations can be met from local creeks. Water management and water supplies will be important to operations; in particular, agreement must be reached with regulatory authorities and stakeholders as to fresh water usage.

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.

A 500-person accommodations camp was assumed. General mine and process surface facilities will include a mine truckshop, a plant maintenance workshop, a laboratory, an explosives storage magazine, water ponds, a general warehouse, an administrative office building, and a core shed.

The forecast for overall Project power demand is up to 30 MW. Power is assumed to be supplied via the L-2254, Paragsha 2–Vizcarra transmission line which crosses the Project. The 2021 PEA assumption is that the project power tie-in at the sectioning point will be within the

Project area, and will tap into the existing L-2264 power line. A new 220 kV sub-station, equipped with a 220/22.9 kV transformer, will be required at the mine site. In support of more detailed studies, an evaluation of power line rights-of-way requirements should be undertaken.

25.10 Environmental, Permitting and Social Considerations

25.10.1 Environmental

Tinka has completed eight environmental studies in support of drill program permitting in the period 2013–2021, and has eight CIRA certificates.

There are bofedales and two high-altitude lakes in the general project area. The closest infrastructure is anticipated to be sited about 100 m from a high-altitude lake shore. During more detailed studies, infrastructure sites must be the subject of additional environmental evaluation. As a result, infrastructure site areas selected in the PEA may not be the sites that are used in more detailed studies.

Initial baseline studies identified a number of flora and fauna species in the general project area that have been listed as either critically endangered, endangered or vulnerable. Additional studies will be required to better document species of concern, determine the likelihood of project impact on the species, and to develop appropriate mitigation measures where required.

25.10.2 Closure

No closure plan has been prepared, as conceptual closure planning is only required when presenting an EIAd. A provision of US\$15.2 M, equivalent to 75% of the 5% of the total capital cost based on benchmark for filtered tailings options, was included in the capital costs to account for closure costs.

25.10.3 Permitting

A comprehensive environmental and social impact assessment will be necessary for the project in order to obtain necessary permits for construction, operations, and closure. This assessment will be conducted in compliance with Peruvian regulations. Once the environmental and social impact assessment is approved by Peruvian authorities, a variety of permits, licenses, and authorizations will be required to proceed with project construction and operations.

The granted CIRAs do not cover all of the infrastructure areas envisaged in the 2021 PEA. Review of the final project footprint will be required to ensure that all of the planned operational areas have a CIRA.

25.10.4 Social

Tinka has in place, or is actively negotiating extensions, for property agreements with local communities that support exploration-stage activities.

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. Tinka has completed annual social compliance reports since 2017, and files monthly reports on safety indicators including social conflicts (2015–2021 and ongoing) to relevant regulatory authorities. The key risks identified included:

- Potential for conflicts over freshwater usage;
- Potential impact on existing wetlands and high-altitude lakes;
- Proposed infrastructure locations overlap with existing infrastructure such as roads;
- Presence of archeological material in areas proposed to host infrastructure;
- Ability to obtain land agreements to support project access, development, construction and operations;
- Clear understanding of the project area of influence, including communities that may be potentially impacted, the types of impacts;
- The ability of the project and company to meet community expectations.

Mitigation measures to avoid, reduce, or compensate for potential project effects will need to be developed and supported by comprehensive environmental and social baseline investigations and engineering studies.

The 2021 PEA has made certain assumptions as to the timelines needed to complete 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.

25.11 Markets

The payable element in the zinc concentrate is expected to be zinc. Payable elements in the lead–silver concentrate will be lead and silver.

The zinc concentrate is expected to be a medium-grade zinc concentrate, and typical of concentrates from many zinc deposits in central Peru. The clean nature of the Ayawilca zinc concentrate should make it attractive to those traders that blend concentrates.

The zinc concentrate is expected to receive an iron penalty of US\$7.50 per dmt of concentrate at the smelter (at a standard penalty rate of US\$1.50 per each 1% Fe above 8% Fe). No other deleterious elements are thought to be present in the zinc concentrate, and no other penalties are expected.

Details of the expected Ayawilca lead–silver concentrate are not as well constrained as those for the zinc concentrate, due to fewer metallurgical testwork results. The smelter is assumed to pay for 95% of lead content in the concentrate subject to a minimum deduction of three units. For silver in the lead–silver concentrate, the smelter typically pays for 95% subject to a minimum deduction of 50 g/dmt. No penalties are expected on the lead–silver concentrate.

Project economics were estimated based on long-term metal prices of US\$1.20/lb for zinc, US\$0.95/lb for lead, and US\$22.00/oz for silver.

Tinka has no current contracts for project 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.

25.12 Capital Cost Estimates

The capital cost estimate is exclusive of the IGV. The capital cost estimate for the 2021 PEA has an expected accuracy range of $\pm 35\%$.

The estimate includes direct and indirect costs (such as engineering, procurement, construction and start-up of facilities), as well as Owner's costs and contingency associated with mine and process facilities, and on-site and off-site infrastructure.

Initial capital costs are estimated at US\$264 M. Sustaining capital costs are estimated at US\$187 M. The total project capital costs are estimated to be US\$451 M.

Closure costs total an estimated US\$15.2 M.

25.13 Operating Cost Estimates

The operating cost estimate has an expected accuracy range of $\pm 35\%$ and is expressed in Q3-2021 US\$.

The estimate includes the underground mining, processing and G&A operating costs. It excludes costs associated with escalation beyond Q3-2021 US\$, currency fluctuations, off-site costs, interest charges and taxes. No contingency has been included in the operating costs.

The LOM operating cost estimate is US\$1,922 M. The estimate per tonne of mill feed processed over the LOM is US\$48.57/t.

25.14 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.

The financial analysis uses a DCF methodology and an NPV8% as the base case. All monetary amounts are presented in constant Q3-2021 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.

Indicated Mineral Resources account for 39% of total mill feed and Inferred Mineral Resources for 61% of total mill feed. All of the zinc concentrate will be sold to a local smelter in Peru. Lead–silver concentrate production will be sold FOB to Asia.

A construction period of 18 months was considered (starting in mid-year 2023) for the overall project implementation. Year 2025 corresponds to the first year of production. Capital costs were applied in the financial model excluding IGV. For the purpose of the 2021 PEA, it has been assumed that the mine will be run by the Owner. Operating costs were applied in the financial model excluding IGV.

The 2021 PEA assumes that the 1% NSR royalty payable to Sierra will be bought out and therefore the royalty is not included in the cashflow analysis.

Working capital will be recovered at project completion.

Taxation and royalties modeled within the financial analysis are based on the tax rates and taxation schemes that were validated by EY. Previous and projected general expenses and

explorations costs were included in the amortization balance for tax calculation purposes only.

A provision of US\$15.2 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\$720 M at an 8.0% discount rate, an IRR of 42.6% and a payback period of 2.0 years. The financial analysis results showed an after-tax NPV of US\$433 M at an 8.0% discount rate, an IRR of 31.9% and a payback period of 2.6 years.

A sensitivity analysis was performed considering variations in commodity prices, grades, initial capital and operating costs on the after-tax NPV8% and on IRR. The Project is most sensitive to fluctuations in the zinc price, then to feed grades. It is less sensitive to changes in operating costs, then initial capital costs. It is least sensitive to changes in silver and lead prices.

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 most sensitive to zinc price changes. A base case zinc price of US\$1.20/lb was used. Zinc prices during 2021 have varied between US\$1.16/lb and US\$1.73/lb.

25.15 Risks and Opportunities

25.15.1 Risks

A high-level risk analysis was undertaken for the project as envisaged in the 2021 PEA. Risks were rated according to probability and likely impact, and assigned a risk rating. No action plans were developed for each risk as it is expected that the outcome of the risk workshop will be used as the basis for the preparation of the overall work plan for the next project stage.

Of a total of 37 risks identified, 26 are considered medium-to-high, while 11 are considered low risk. The high and medium-rated risks sorted by discipline are summarized in Table 25-1.

25.15.2 Opportunities

Opportunities were identified by Mining Plus, and reviewed by Tinka. A total of 15 opportunities were recognized, of which 11 are considered medium-to-high opportunities, while four are considered low.

The high and medium-rated opportunities sorted by discipline are summarized in Table 25-2.

Table 25-1: 2021 PEA Stage Risk Register (High and Medium Risks)

Discipline	Risk	Comment
Commercial	Local zinc refinery does not take all zinc production	Important to establish a market for zinc concentrate offshore, potentially increasing the transportation costs.
General	Supply constraints	Lack of equipment, or the high cost of equipment (for example, during a mining boom) could materially impact the timeline and economics of the project.
	Permitting and public consultation	Delays in the permitting processes, including prior consultation, could delay the start of construction.
	Political uncertainty/instability; including increased taxes	Changes in government or legislation that could result in changes to project assumptions, permitting requirements, construction and operational activities, and capital and operating costs.
	Capital and operating cost estimates	If operating costs increase, then NSR cut off would increase. Higher capital cost estimates could impact economics. More detailed cost estimations are required at next level
Geology	Resource modelling	More than 50% of the resource in the mine plan is classified as Inferred, although most of the Inferred resources are in lower-grade areas mined later in the LOM.
Infrastructure	New access road	The impact of the construction of the new road to access the project site on the stakeholders or environment has not yet been evaluated and as such could provide impediments to execution. Construction costs included in the capital cost estimate are based on costs from similar projects for earthworks and civil works. Consider an alternative route at pre-feasibility study (PFS) stage.
	Right of way access to power	The 2021 PEA assumes that the power lines crossing the project will be accessible, and a substation for Ayawilca will be permitted
Mining	Geotechnical and hydrological assumptions	Different geotechnical and hydrogeological conditions than assumed could have either a negative or positive impact on the project cost and schedule. Specific contingencies were not applied to account for these uncertainties. To be addressed at PFS level.
	Dilution higher than expected	Impacts project economics. A well planned and executed grade control plan is necessary immediately upon commencement of mining
	Unable to reach production target of 8,500 t/d	The production target from the start of the mine is 8,500 t/d. If that production rate is unable to be reached early in the mine plan, or is not sustained, then it would have a material impact on metal production and cash flow.

Discipline	Risk	Comment
	High flow of drainage and pumping of the mine	Appropriate studies needed to understand the underground water flow and define the pumping design and capital required.
	Backfill challenges; e.g., higher or lower cement cost, delivery challenges.	More studies by specialists groups which will include implantation of systems and training when the time comes.
Processing	Dewatering assumptions for process plant design	Conservative dewatering assumptions were used in process plant design. Dewatering testwork will be required on representative samples. Variations from design assumptions could lead to variations in capital and operating cost estimates for the concentrate and tailings dewatering circuits.
	Production of a separate lead–silver concentrate	Further work is required to determine if a lead–silver concentrate would be able to be produced during the full cycle of the operating plant due to the relatively low Pb head grade.
	Zinc metallurgical recoveries	The final metallurgical performance may be reduced or improved by further investigations. The factors that present the highest risks to metallurgical performance include sample representivity, water recirculation, pyrrhotite mineralization, grinding chemistry and flotation hydrodynamic efficiency.
	Comminution of ores not as expected	The ball mill work index test work was carried out on a limited number of samples. Different comminution parameters to those assumed could have either a negative or positive impact on the project cost.
	Lead–silver metallurgical recovery parameters overstated	More test work is required to determine if silver recoveries are higher or lower than used for the 2021 PEA. A limited number of samples only were used to determine the silver recovery to a lead concentrate
	Zinc grade in concentrate	The Zinc Zone mineralization contains a high percentage of high iron marmatite, that could limit the refineries the zinc concentrate could be sold to
Social	Land acquisition delays	Delays in the land acquisition process could potentially delay the project schedule and impose higher acquisition costs as the project progresses.
	Social licence to operate	There is uncertainty related to the potential impact on communities, water bodies, sensitive species, and archaeological material, and with the time required collect the necessary wet season/dry season baseline data to allow the EIA report to be completed and lodged with the relevant regulatory authorities that could potentially delay the permitting process, and delay obtaining the social license to operate.

Discipline	Risk	Comment
Tailings	Adverse weather and/or filter plant upset could impact filtered tailings operations	High rainfall and surface run off could impede stacking of filter cake during parts of the year. This would be mitigated by design controls – perimeter diversion ditches + raincoats to limit infiltration due to direct precipitation. Additionally, during the four wet-season months, tailings would be preferentially directed to use as underground paste backfill. Upset conditions at the filtering circuit could result in the production of wetter-than-optimum tailings. These tailings can be preferentially placed as underground paste backfill. If placed at the filtered TSF, they can be placed within the non-structural zone of the stack; within containment-cell units such as geotubes; or otherwise discharge to a temporary holding pond, where they could be left to dry to optimum moisture content.
	Haul to filtered TSF	Sustaining capital cost estimates for the filtered TSF are highly dependent on the cost of haulage from the process plant area to the filtered TSF; the haul cost, in turn, is highly dependent on the cost of fuel. If fuel prices vary significantly, either upward or downward, this could represent a cost risk or opportunity for the project.
	Filtration capacity underestimated for tailings	More test work at PFS, specifically on filtering cycle time and turbidity of effluent.
Water	Water treatment plant assumptions	Although a water treatment plant has been included in the capital cost estimate, higher than planned water treatment requirements could potentially increase capital and operating costs.
	Fresh water supply assumptions	Hydrogeological and hydrological information currently available is limited and no inventory or water quality monitoring of potential water sources for the project are currently available. Prioritize use of groundwater generated from underground mining development.

Table 25-2: 2021 PEA Stage Opportunities Register (High and Medium Ratings)

Discipline	Opportunity	Comment
Commercial	Indium becomes payable in the future	Indium may become a payable metal, depending on market conditions, providing opportunities for marketing the zinc concentrate offshore.
Geology	Discovery of additional high grade (Zn, Ag-Pb) mineralization	Discovery of high grade mineralization, that can support Mineral Resource estimates, which can be accessed early in the mine plan has a big impact on cash flow and could create substantial additional value.
	Discovery of additional high grade tin mineralization	A larger tin mineralized zone increases the likelihood of a tin circuit being incorporated into the mine plan.
	Mining at Colquipucro silver oxide through discovery of more mineralization	Allows for the possibility of an open pit silver mine at Colquipucro
Infrastructure	Consider conveyors and stackers from filter plant to filtered TSF	To be considered at PFS level
Mining	Optimization of mining rate and cut off grades (hill-of-values analysis)	To be considered at PFS level
	Opportunity for lower tonnage, high-grade start-up mine	To be considered at PFS level
Processing	Improved silver recoveries in the lead concentrate	Metallurgical test work needed at PFS
	Improved tin recoveries	Impacts the potential economic viability of the Tin Zone
	Improved zinc recovery	Can get a higher zinc recovery by dropping the concentrate grade
Marketing	Treatment charges	Current treatment charges provided by Ocean Partners are much lower than used in the 2021 PEA.
Water	Use water generated from underground mine as water supply	Could reduce capital costs, and risks associated with sourcing fresh water. Would significantly reduce treatment plant capital and operating costs if available.

25.16 Interpretation and Conclusions

Under the assumptions in this Report, the project evaluated shows a positive cash flow over the life-of-mine. The 2021 PEA mine plan is achievable under the set of assumptions and parameters used.

26 RECOMMENDATIONS

26.1 Introduction

A two-phase work program is recommended. The first work phase would consist of:

- Exploration and step-out drilling to potentially support the estimation of additional Mineral Resources at extensions of the South and Silver areas and the Tin Zone;
- Infill drilling to support higher-confidence Mineral Resource classifications for the Zinc Zone and Tin Zone;
- Assessment of the underground hydrological conditions through the installation of piezometers and drilling of several water wells;
- Field investigations and data collection to support a pre-feasibility study, including environmental and permitting requirements.

Contingent on positive results from the first work phase, the second work phase would consist of the completion of a pre-feasibility study. Phase 2 work could include:

- Desktop engineering and mining studies;
- PFS document compilation.

Phase 1 is estimated at \$US\$7 M, divided between exploration drilling (US\$1.5 M), infill drilling for higher confidence resource classification (US\$3.5 M) and other field investigations including hydrological studies (US\$2 M). Phase 2 is estimated at US\$2 M for the detailed engineering and mining studies and PFS document compilation.

26.2 Phase 1

26.2.1 Exploration and Infill Drill Programs

Exploration and step-out drilling is recommended to potentially support estimation of additional Mineral Resources of high-grade mineralization at the South and Silver areas and the Tin Zone.

Mineralization outlined at the South area contains the thickest and highest-grade portions of the Zinc Zone, and the mineralization remain open. The Silver area, which lies adjacent to South area, incorporates a zone of high-grade silver that is open in most directions. Drill testing of the Far South area is recommended (subject to permitting), as this area lies some 500 m along the same structure from the South area, highlighted by a large zinc-in-soil anomaly with associated adjacent magnetic anomalies. A total of 5,000 m is proposed for the exploration and step-out drill program.

Infill drilling is required to increase the confidence of the Zinc Zone and Tin Zone Mineral Resource estimations within the highest-grade areas of South and West, in particular in support of potential conversion of Inferred to Indicated Mineral Resources. A drill hole spacing study is recommended to determine the optimal drill spacings to support Mineral Resource confidence category classifications. A drill program of approximately 10,000 m is proposed, subject to the results of the drill hole spacing study.

A portion of the drill core from the infill drill program should be used to gather additional density information, and, where required, support further metallurgical tests. Drilling should also be used to obtain sufficient geotechnical information to support underground mine designs.

26.2.2 Mineral Resource Estimate Update

The Mineral Resource estimates should be updated with the results of the planned drill programs with the aim of supporting pre-feasibility-level assessments, including estimation of Mineral Reserves.

26.2.3 Mine Planning

A program of geotechnical drilling is recommended to support mine designs at the pre-feasibility level. These drill holes will be completed as part of the infill drill program described in Section 26.2.1.

A study should be undertaken to review potential alternatives for a lower throughput, higher-grade mine targeting South, West and Central Ayawilca only.

26.2.4 Metallurgical Testwork

The zinc mineralization responded well to conventional treatment by milling and flotation; however, a comprehensive testwork and development program will be required before completing detailed mining studies, including the following items:

- A geometallurgical variability program to test a broader set of metallurgical samples including lower-grade zinc and lead/silver samples, collected across the deposit to be evaluated at PFS;
- Additional metallurgical tests on the Tin Zone mineralization focusing on increasing recoveries;
- Additional metallurgical tests for the lead–silver concentrates, targeting higher silver recoveries;
- Evaluation of treatment alternatives for pyrrhotite-rich zones, including blending tests;

- Semi-autogenous grind (SAG) and ball mill grinding design tests, BWi, abrasion index, JK drop weight, SMC tests, and grinding variability tests;
- Flotation optimisation and variability testwork ;
- Locked cycle flotation testwork including pneumatic cell tests;
- Tests on water quality and effect on flotation;
- Tests for viability of lead and silver flotation performance;
- Concentrate thickening and filtration tests.

26.2.5 Process Design

Trade-off studies should be conducted to define the preferred process flow sheet and to select the process plant facility location.

An evaluation should be carried out of the Tin Zone to determine if this mineralization could be mined and processed in parallel with the Zinc Zone. Evaluation of the potential for equipment synergies should be conducted.

26.2.6 Water Management

A hydrogeological and hydrological study should be completed to understand surface and underground water conditions and behaviours that can support engineering studies, development of a project water balance, and creation of a robust and dynamic conceptual model that can be used to derive additional numerical and prediction models for use in operational water management. Aspects that will need to be included in the work program include:

- Development of hydrogeochemical models to understand the underground aquifer and water budgets;
- Inventorying water sources in the project area of influence, focusing on the two micro-basins in which the project is located;
- Implementation of water monitoring activities to provide baseline data.

26.2.7 Infrastructure

A geotechnical field investigation should be completed to support the project facility locations and infrastructure design. Once geotechnical data are available, trade-off studies should be conducted to determine optimal infrastructure location sites.

A filtered tailings (dry stack) system has been chosen for this study. Detailed studies for Ayawilca tailings characterization are required at PFS stage. A cycloned tailings could be considered, which will include assessment of whether sufficient sandy materials would be

available. Instead of truck transport of concentrate to the filter stack, a system of conveyors and stackers could be considered from the filter plant.

An evaluation to quantify the number and nature of karstiform features should be undertaken.

A detailed road access study to determine the preferred internal and external access will be required for the project.

A detailed market study for the Ayawilca zinc and lead–silver concentrates will be needed at PFS stage.

A review is needed to confirm port facilities which may be available, and to determine likely concentrate handling costs at the preferred port option.

26.2.8 Environmental, Social and Permitting

Sufficient baseline studies are in place to support the proposed Phase 1 work program.

Archaeological and environmental information required to support the pre-feasibility study that still remains to be collected will include:

- Completion of archaeological and heritage searches if selected infrastructure locations fall outside of current archeological permit areas;
- Cross-check of the selected infrastructure sites, and other areas that are planned to be disturbed against protected areas such as lagoons, wetlands, protected flora sites, and registered archaeological sites to ensure selected sites will have the minimal disturbance possible

Stakeholder consultations and community awareness campaigns should be conducted to ensure stakeholders are aware of the project scope and likely impacts. This should be completed before the project moves to the “prior consultation” phase required under Peruvian law as part of the application for any Initiation of Activities approval.

Tinka should determine surface rights strategies to obtain long-term surface leases with local communities. As soon as practicable, Tinka should enter into negotiations with applicable stakeholders for land usage rights, and conclude signed agreements.

The 2021 PEA assumes that power will be sourced via one of the two 220 KV transmission lines which crosses the property. It is recommended that the power needs for a future mine at Ayawilca be registered with COES (the Peruvian government power authority).

26.2.9 Report

When sufficient data are to hand, a pre-feasibility study document should be completed to support estimation of Mineral Reserves and updated Mineral Resources for the project.

26.2.10 Budget Estimate

Phase 1 is estimated to cost approximately US\$7 M for the work programs which will include exploration drilling, infill drilling and engineering, as set out in the following subsections.

26.2.10.1 Exploration and Step-Out Drill Program

Assuming an all-in drilling cost of US\$300/m, about 5,000 m of drilling is contemplated, at an overall cost of US\$1.5 M.

26.2.10.2 Infill Drill Program

Assuming an all-in drilling cost of US\$300/m, about 10,000 m of drilling is contemplated, at an overall cost of US\$3.0 M. Infill drilling is recommended to be focused at South and West area, which both have high-grade Inferred Mineral Resources.

26.2.10.3 Other Programs

A cost projection of about US\$2.5 M is required to complete all the other Phase 1 programs. This estimate covers metallurgical testwork, geotechnical investigations, hydrological studies including drilling, TSF design considerations, engineering studies, report compilation, and permitting, social and general and administrative expenses.

26.3 Phase 2

If the results of the phase 1 work program indicate positive project economics and a project that Tinka considers warrants further evaluation, a pre-feasibility study should be compiled and completed.

26.3.1 Other Programs

Engineering and mining studies to support pre-feasibility-level designs are likely to include mine planning, processing and tailings planning, infrastructure design considerations, engineering studies, PFS document compilation, and permitting, social and general and administrative expenses.

26.3.2 Budget Estimate

Phase 2 is estimated at US\$2 M for the detailed engineering and mining studies and PFS document compilation.

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