Boliden Summary Report

Mineral Resources and Mineral Reserves | 2022

Tara Mine

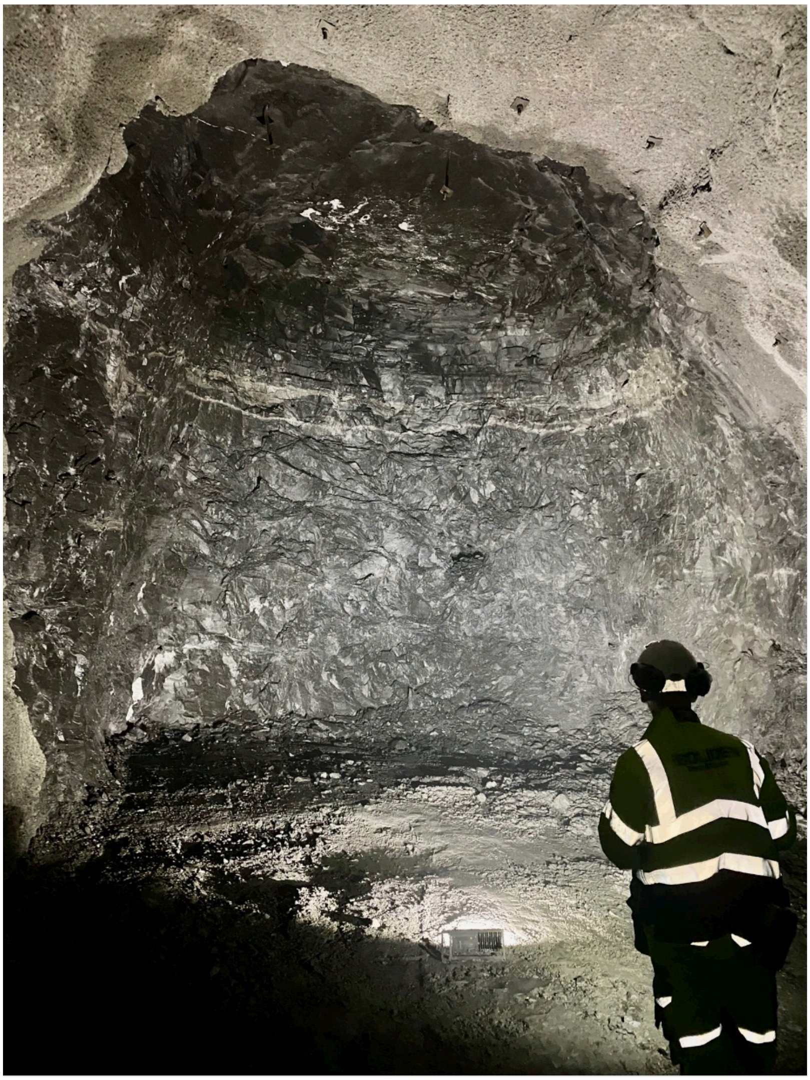

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Table of contents

1 SUMMARY

This report is issued annually to inform the public (shareholders and potential investors) of the mineral assets held by Boliden Tara Mines.

Tara Mines is located 2km northwest of the town of Navan in Co. Meath Ireland and 50 km northwest of Dublin. The mine has a production capacity of 2.6mt per year and is the largest zinc mine in Europe. The newly discovered deposit, termed 'Tara Deep' is located approximately 1km southeast of the main mine and is currently a major focus for exploration and development.

In 2021, the mine produced some 2.09mt of mineralised material grading at 5.22% Zn, and 1.03% Pb and with a development distance of 10,258m. A summary table of the calculated 2022 Mineral Resources and Mineral Reserves is presented in Table 1 below, also with the figures for 2021.

		2022			2021	
	kt	**Zn**	**Pb**	kt	Zn	Pb
Classification		**%**	**%**		%	%
Mineral Reserves						
Proved	**1,100**	**5.8**	**1.3**	600	5.6	1.1
Probable	**13,900**	**5.5**	**1.5**	15,500	5.4	1.4
Total	**15,000**	5.5	1.4	16,100	5.4	1.4
Mineral Resources						
Measured	**32**	**5.7**	**1.3**	30	5.6	1.3
Indicated	**2,100**	**4.9**	**1.8**	1,400	5.2	1.5
Total M&I	**2,200**	4.9	1.8	1,400	5.2	1.5
Inferred	**38,200**	**7.5**	**1.5**	38,400	7.6	1.5

Table 1. Mineral Resources and Mineral Reserves in Tara Mines 2022-12-31.

Notes on Mineral Resource and Mineral Reserve statement.

- Mineral Resources are reported exclusive of Mineral Reserves.
- Mineral Resources and Mineral Reserves is a summary of Resource estimations and studies made over time adjusted to mining situation of December 31.
- Mineral Resources are reported without dilution.
- To ensure Reasonable Prospect for Eventual Economic Extraction (RPEEE) of mineral resources, a grade shell tool is used to identify economic mineralisation. New resource wireframes are designed using the same mining parameters as reserves.
- Tonnes and grades are rounded which may result in apparent summation differences between tonnes, grade and contained metal content.

1.1 Competence

The 2022 Reserves and Resources were estimated and compiled by a team of geologists and engineers, outlined in Table 2 below.
Finn Oman took the role as competent person for resources for Tara mines 2022 and is a professional member of the Institute of Geologists of Ireland (IGI). Finn has over 13 years of experience with base metals deposits in Ireland with over 11 years in Tara Mines.

Sofia Höglund took the role as competent person for resources for Tara Deep 2022 and is a professional member of the Fennoscandian Association for Minerals and Metals Professionals (FAMMP). Sofia has 15 years of experience in the Exploration and Mining Industry in Sweden, Ireland and Finland.

Catarina Barreira took the role as competent person for reserves and is a Professional Member of the Institute of Materials, Minerals & Mining (IOMMM). Catarina has more than 12 years' experience globally in reserve estimation in base metal deposits, with several based at Boliden's deposits.

Table 1. Contributors and responsible competent persons for this report

Description	Contributors	Support to Competent Persons	Competent Persons
R&R Coordinator	Finn Oman		
Mineral Resources Tara Mine			Finn Oman
Mineral Resources Tara Deep		Ian McGimpsey	Sofia Höglund
Mineral Reserves			Catarina Barreira
Geology	Robert Blakeman Finn Oman	Sofia Höglund	
Mineral Processing	George Wilkinson		
Mining	Jonathan Talbot Owen Wells		Catarina Barreira
Environmental and legal permits	Paschal Walsh		

2 GENERAL INTRODUCTION

This report is issued annually to inform the public (shareholders and potential investors) of the mineral assets in Tara Mines held by Boliden. The report is a summary of internal / Competent Persons' Reports for Tara Mines. Boliden's method of reporting Mineral Resources and Mineral Reserves intends to comply with the Pan-European Reserves and Resources Reporting Committee (PERC) "PERC Reporting Standard 2021".

The PERC Reporting Standard is an international reporting standard that has been adopted by the mining associations in Sweden (SveMin), Finland (FinnMin) and Norway (Norsk Bergindustri), to be used for exploration and mining companies within the Nordic countries.

Boliden is reporting Mineral Resources exclusive of Mineral Reserves.

2.1 Pan-European Standard for Reporting of Exploration Results, Mineral Resources and Mineral Reserves – The PERC Reporting Standard

PERC is the organisation responsible for setting standards for public reporting of Exploration Results, Mineral Resources and Mineral Reserves by companies listed on markets in Europe. PERC is a member of CRIRSCO, the Committee for Mineral Reserves International Reporting Standards, and the PERC Reporting Standard is fully aligned with the CRIRSCO Reporting Template.

The PERC standard sets out minimum standards, recommendations and guidelines for Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves in Europe.

2.2 Definitions

Public Reports on Exploration Results, Mineral Resources and/or Mineral Reserves must only use terms set out in the PERC standard.

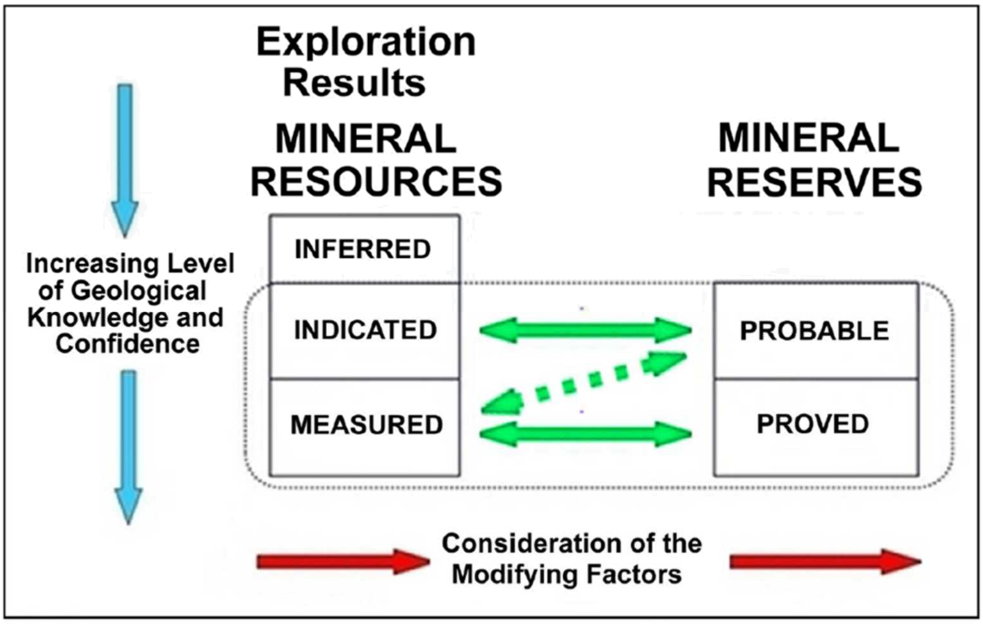


Figure 1. General relationship between Exploration Results, Mineral Resources and Mineral Reserves (PERC 2021)

2.2.1 Mineral Resource

A Mineral Resource is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction.

The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling.

2.2.2 Mineral Reserve

A Mineral Reserve is the economically mineable part of a Measured and/or Indicated Mineral Resource.

It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at Pre-Feasibility or Feasibility level as appropriate that include application of Modifying Factors. Such studies demonstrate that, at the time of reporting, extraction could reasonably be justified.

3 TARA MINES

3.1 Project Outline

Boliden Tara Mines is an underground zinc and lead mine producing 2.6 million tonnes per year with an annual development schedule of 13km and nearly 250km of active tunnels, it is classed as the biggest zinc mine in Europe and one of the largest in global comparison. Tara Mine uses Drift and Slash and Long Hole Stoping as its main mining methods and has a current depth of around 1km.

The Mineral Reserve quantity represents an equivalent amount for 7 years of full production. However, with planned conversion of Mineral Resources it has the potential to be extended further. New exploration campaigns will also continue targeting to achieve increased Inferred Mineral Resources in Tara Deep with the aim to include some conversion drilling as well.

3.2 Major changes

Continuing from the final quarter of 2021, throughout 2022, a significant exploration drilling campaign was undertaken. The wireframes created from the conversion from Eagle to Deswik generated a series of new targets and mineralisation which informed these drilling campaigns. This will continue through 2023 and the full resources realised will be calculated over this period.

Drilling continued at the Tara Deep deposit during 2022 which improved the understanding of the deposit. While the drilling confirmed known resources, structural re-interpretation led to a slight decrease in Inferred Resources by 1.1Mt to 27.0Mt grading 8.4% Zn and 1.6% Pb.

Activity in the Tara Deep Exploration Drift focused on pumping and rehabilitation works following the November 2021 inrush event. There was no new development during 2022.

3.2.1 Technical studies

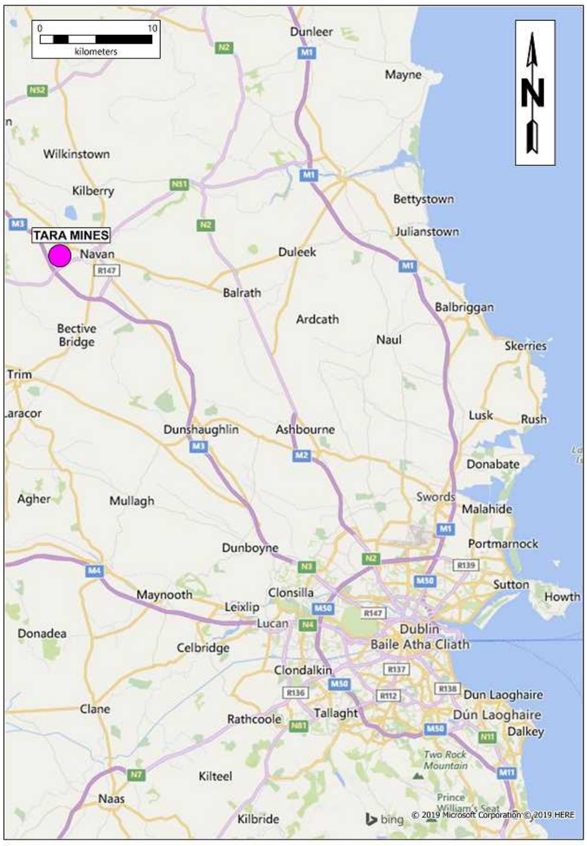
An internal study was completed in 2021 defining and measuring the impact of underperformance in production units. 2022 saw extensive project work in this scope, yielding a significantly improved stope recovery and hence a more effective production cycle. This work has been reflected in the short-term designs of reserves and increased confidence in both the modelling and execution of stope designs.

Technical work was initiated with a scope to look at stope performance and grade control. The intent here is to continue to optimise the grade control method in production units and improving the confidence in the design assumptions used. Further work will be undertaken in the stope recovery space to secure the current gains and look for areas for further improvement.

A study on QAQC procedures and analytical techniques at Tara mine was commissioned in Q4 of 2021 and continued through 2022. The purpose of this study is to ensure the methodology and techniques employed for assaying of mineralised sections in diamond drilling are in accordance and continue to be suitable for the advancements made in geological and resource estimation since 2019 and appropriate levels of QAQC sampling is carried out during this process. This work will continue through 2023 during the complete implementation of the recommendations.

3.3 Location

Boliden Tara Mines is located in Navan, Co. Meath Ireland, ca 50km NW of Dublin (Figure.



2).

Figure 2. Map of Eastern Ireland showing Navan, the Boliden Tara mine and Dublin.

The Boliden Tara Mine is located 2km NW of the town of Navan in Co Meath Ireland and 50 km northwest of Dublin (Figure. 2). The area comprises gently rolling farmland with a mild Atlantic climate. The mine is well served by motorway and rail links to Dublin airport and port. The orebody extends from near surface for ca 5km WSW to depths of nearly 1km. A satellite deposit, termed 'Tara Deep' was discovered in 2012, occurs at depths of 1-2 km below surface and is currently a major focus for exploration and development. The distribution of resources and reserves is shown in Figure 3.

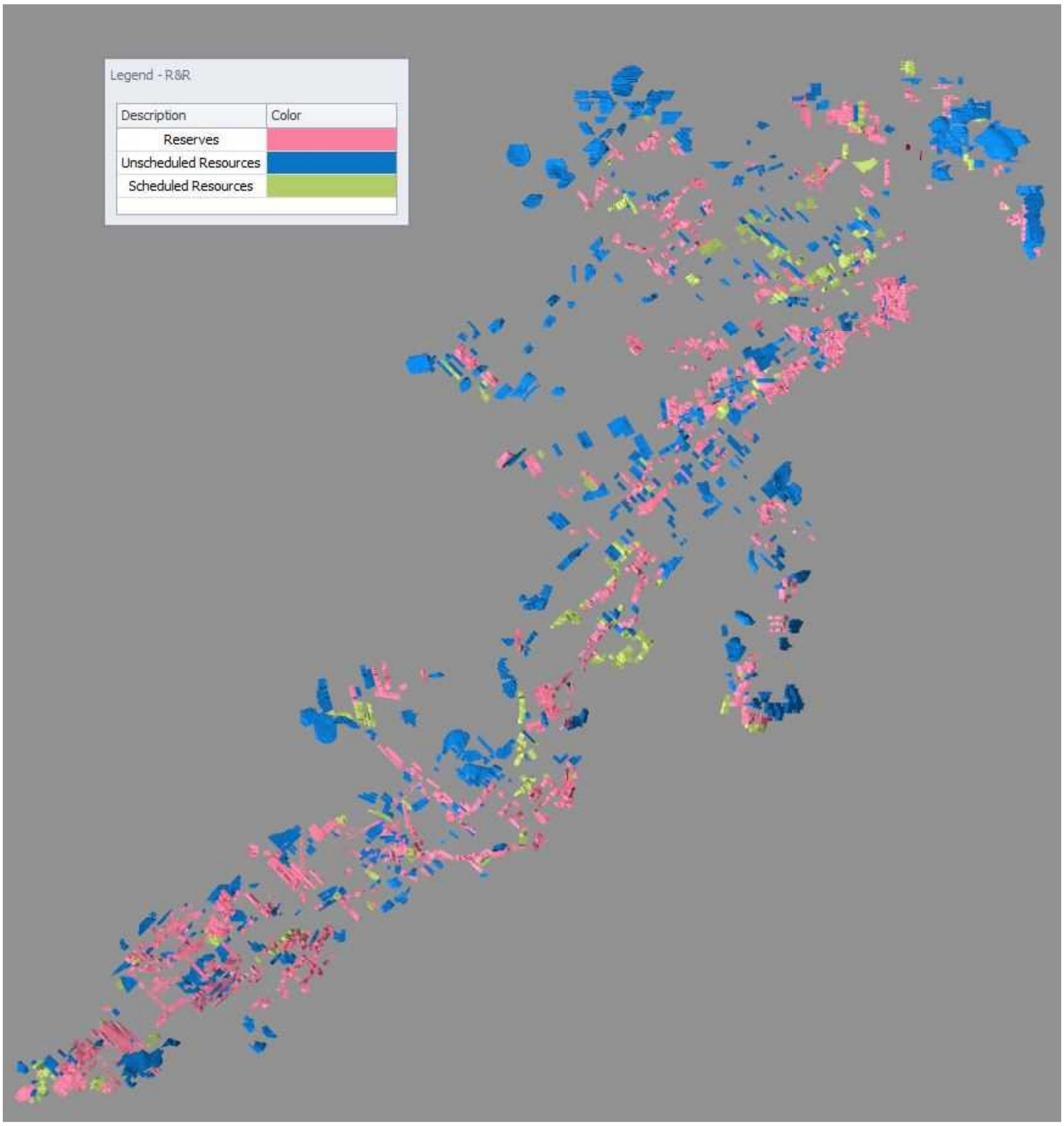


Figure 3. Resource and reserve distribution in the Navan Orebody.

3.4 History

The Navan Orebody was discovered in 1970 and production started in 1977 (see timeline below). Production has been scheduled at rates up to 2.6mt per year in recent years with the preceding 11 years production shown in Table 3.

Timeline

1968	Reports by the Irish agricultural institute highlights high concentrations of Zn and Pb in stream sediments west of Navan
1969-1973	Tara Exploration and Development company acquires prospecting licenses in the area. Shallow soil surveys show Zn, Pb anomalies north of the River Blackwater. Follow up surveys show large 900m x 400m anomaly of up to 5000ppm Zn and 2000ppm Pb, field mapping finds mineralised boulders and outcrops north of the river and induced polarization and resistivity shows anomalies north and south of the river. Diamond drilling program of 355 holes show initial resources of 69.9mt @ 10.09% Zn and 2.83% Pb
1973-1977	Underground development and production begins
1986	Acquired by Outokumpu
1990s	Exploration drilling discovers SWEX – south west extension raising the total pre-mining size of the ore body to 120mt +
2001	Nevinstown, north of the River Blackwater – purchased from Bula Ltd increasing holdings
2004	Acquired by Boliden
2012	Discovery of Tara Deep, SE of the main ore body following exploration drilling of a seismic anomaly.
2017	Development of Tara Deep Exploration access drift begun

PRODUCTION														
	TONNAGE	GRADE			ZINC CONCENTRATE				LEAD CONCENTRATE				SILVER	
YEAR	MILLED	% Zinc	% Lead	% Iron	Tonnes	% Zinc	% Rec.	Metal	Tonnes	% Lead	% Rec.	Metal	g/t	t
2012	2,502,278	7.00	1.44	2.87	305,170	54.4	94.8	166,021	40,807	55.2	62.4	22,517	41	1.67
2013	2,493,240	7.05	1.46	2.74	297,944	55.9	94.7	166,462	38,604	56.1	59.5	21,672	31	1.20
2014	2,286,701	6.92	1.55	2.69	267,242	56.0	94.5	149,646	41,940	53.1	62.8	22,262	58	2.43
2015	2,196,814	6.37	1.25	2.71	242,777	54.8	95.1	133,034	34,400	50.0	62.7	17,182	37	1.27
2016	2,602,863	5.96	1.15	2.70	267,851	55.2	95.3	147,797	37,091	52.8	65.6	19,582	29	1.08
2017	2,310,634	5.92	1.14	2.71	239,038	54.6	95.4	130,580	31,258	54.7	64.9	17,083	43	1.34
2018	2,200,154	6.28	1.20	2.72	242,264	54.4	95.3	131,742	29,299	57.0	63.3	16,712	40	1.16
2019	2,461,391	5.24	1.03	2.39	222,872	54.9	94.9	122,463	29,258	54.9	63.3	16,053	54	1.58
2020	2,316,337	5.76	1.03	2.39	229,843	55.3	95.3	127,008	27,404	52.6	60.3	14,401	34	0.92
2021	2,149,022	5.49	1.02	2.18	205,591	54.6	95.1	112,249	24,430	54.0	59.9	13,192	55	1.34
2022	2,090,073	5.22	1.03	2.14	188,949	54.7	94.6	103,264	27,354	51.8	66.1	14,181	101	2.75
Total	25,609,507	6.13	1.21	2.58	2,709,541	55.0	95.0	1,490,266	361,845	53.8	62.7	194,837	46	17

Table 3. Milled tonnages and grades from Boliden Tara Mines over the period 2012-2022.

3.5 Ownership and Royalties

Boliden Tara Mines DAC is wholly owned subsidiary of Boliden Mineral AB part of the Boliden Group, Sweden.

3.6 Environmental and Social Governance (ESG)

3.6.1 Existing Permits

The Boliden Tara Mines operation has several permits that include:

- Five Prospecting Licences granted by the Department of Environment, Climate and Communications that extend outwards from the mine for several kilometres and convey rights to explore and apply for State Mining Facilities. These are renewed every six years, subject to official review and fulfilment of licence commitment expenditures on a two-yearly basis.

- State Mining Facilities comprising three Leases and five Licences granted by the Department of Environment, Climate and Communications. These facilities will need renewal in 2023. Currently terms are variable with recent facilities being granted with royalties to the Irish State varying from 3.25% to 3.75% of Net Smelter Return. Deliberation from the Department of Environment, Climate and Communications is awaited regarding licences from few small un-licensed areas in the SW part of the deposit.

- An Industrial Emissions licence from the Environmental Protection Agency was granted in September 2018.

- Tara Deep is covered by a Prospecting Licence and the underground exploration development is exempt from Planning Permission. Tara Deep will require planning, licence review and State Mining Facilities in due course.

3.6.2 Necessary permits

- The financial calculations (that support the economic extraction of resource and reserves) include capital for a new tailings management facility, TMF7; with scoping study completed to support the viability of the tailing extension.

- Boliden Tara Mines have expectations that application for new permits and renewals of existing permits will be granted by the relevant authorities.

3.6.3 Environmental, Social and Governance considerations

3.6.3.1 ESG Commitments

Our business model set our ESG priorities, and take into consideration the risks and opportunities identified by business intelligence and risk mapping, as well as applicable requirements and expectations such as:

- Stakeholder expectations
- Current and potential legislative trends
- ISO 9001, 45001, 14001 and 50001 standards and Forest Stewardship Council (FSC® COC-000122)

- OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-affected and High-risk Areas
- GRI Standards (Global Reporting Initiative)
- UN Sustainable Development Goals (SDGs)
- UN Global Compact
- ICMM (International Council on Mining and Metals) Mining principles

We regularly consult prioritized stakeholder groups on our sustainability performance from a broader perspective. These stakeholders are asked to comment on Boliden's performance to drive further improvement.

Boliden is a member of ICMM and the national mining associations in the countries where Boliden Mines operates. These commitments imply implementing relevant international and national Environmental Management System (EMS) standards and guidelines, such as, e.g., the Global Industry Standard on Tailings Management on an international level and Mining RIDAS on a national level. In addition to this, Boliden Mines is certified according to a series of standards, such as:

- ISO 14001:2015 - Environmental management systems.
- ISO 45001:2018 - Occupational health and safety management systems.
- ISO 50001:2018 - Energy management systems.

Boliden has implemented an integrated management system (Boliden Management System, BMS) which sets a common base for all activities developed within the company.
Boliden strive to run a responsible business and expect it´s business partners to do the same. Good business ethics is essential for sustainable and successful business. Boliden has an ethics and compliance department to boost its compliance work. The department is responsible for the strategic development and coordination of Boliden's work regarding anti-money laundering, anti-corruption, competition law, sanctions, human rights, data protection, whistleblowing and Boliden's employees and management work together to create a compliance culture in which everyone knows what is expected of them - Boliden's codes of conduct. Regular risk assessments, trainings, audits and effective controls are important parts of Boliden's compliance efforts. The Group's whistle-blower channel enables all employees and external stakeholders to report suspected and actual misconduct confidentially and anonymously. If misconduct is proven, disciplinary actions must be taken. Reprisals against anyone reporting misconduct in good faith will not be tolerated. Group management and the Board of Directors receive regular reports on risks, non-compliance and the status of initiatives in progress.

Boliden's Code of Conduct provides a framework for corporate responsibility based on the company's values and ethical principles. All employees and members of the Board are subject to the Code, which is based on international standards and relevant legislation. As a complement to the Code, there are internal policies that all employees are expected to comply with. Boliden strives for a sustainable value chain and therefore applies an overarching business ethics and risk management strategy when selecting business partners. The Business Partner Code of Conduct reflects the requirements placed on Boliden's own organization and sets the lowest standard of ethical conduct required of all parties in the value chain, whether Boliden is the buyer or seller. As with the internal Code of Conduct, this code is based on international standards such as the UN's Global Compact, the ILO's standard core conventions and guidance from the OECD. Compliance and sustainability risks are assessed when selecting business partners. If there is a risk of non-compliance by a business partner, a more detailed review is made. Depending on the outcome, an action plan may be developed and agreed upon, or the business relation may be terminated or rejected.

Boliden is a member of the United Nations Global Compact and works constantly to implement its ten principles, including preventing and limiting negative impact in the own operations and those of its external business partners. Boliden runs operations in countries where the risk of human rights violations is considered low. No operations are conducted anywhere in UNESCO's World Heritage List. Boliden supports the right of indigenous peoples to consultations under Svemin's interpretation of Free, Prior and Informed Consent (FPIC). Other important aspects are fair working conditions, and the position Boliden has adopted against any form of harassment, discrimination and other behaviour that may be considered as victimisation by colleagues or related parties. In addition to this, aspects such as child and forced labour as well as the freedom to form and join trade unions are considered when evaluating business partners.

Anti-corruption forms a central part of the ethics and compliance work, and Boliden has a zero-tolerance policy regarding all types of bribery and corruption. Boliden has an anti-money laundering policy for identifying and managing risks in various parts of the business and to strengthen its anti-money laundering efforts.

3.6.3.2 Socio-economic Impact

Located in Ireland, 30 minutes from the capital Dublin, Boliden Tara Mines has co-existed with the community of Navan, Meath for over 40 years. As Europe's largest zinc mine, Tara Mines has been a significant employer in the region since the commencement of mining in 1977. Tara Mines currently provides direct employment for c. 1000 employees and contractors, the majority of which live in the locality. In addition, Tara helps to support over 1000 jobs indirectly through the supply chain.

In essence, the community around Tara develops in tandem with the mine, where the local economy in the Northeast area and beyond, benefits from its continued success. The secure employment that Tara Mines has provided to thousands of people over the past 40 years has helped the local community to thrive. Tara Mines is committed to societal development and through local partnerships with schools, colleges, charities and sporting clubs, continuously strengthening its bond with the local community and investing in its development.

3.6.3.3 Community and Landowners

Environmental management has been at the core of operations at Tara since the development of the mine. As such, Tara strives to be an active stakeholder and play a positive role in the community in which it operates. Tara has a community liaison committee in place for families resident around the mine and communication with locals is a regular and important occurrence. Tara Mines strives to create and maintain a proactive safety culture and as such, welcomes and encourages both its workforce and the external community to report risks, suggest improvements and exchange experiences.

3.7 Geology

The Navan Orebody is a world-class carbonate-hosted Zn-Pb deposit comprising complex tabular lenses within Lower Carboniferous limestones and excluding depletion, would be over 130Mt in size. Detailed descriptions of the geology are available in several publications of which Ashton et al., (2015) is the most recent. The discovery of the Tara Deep deposit and outline geology are summarized in Ashton et al., (2018).

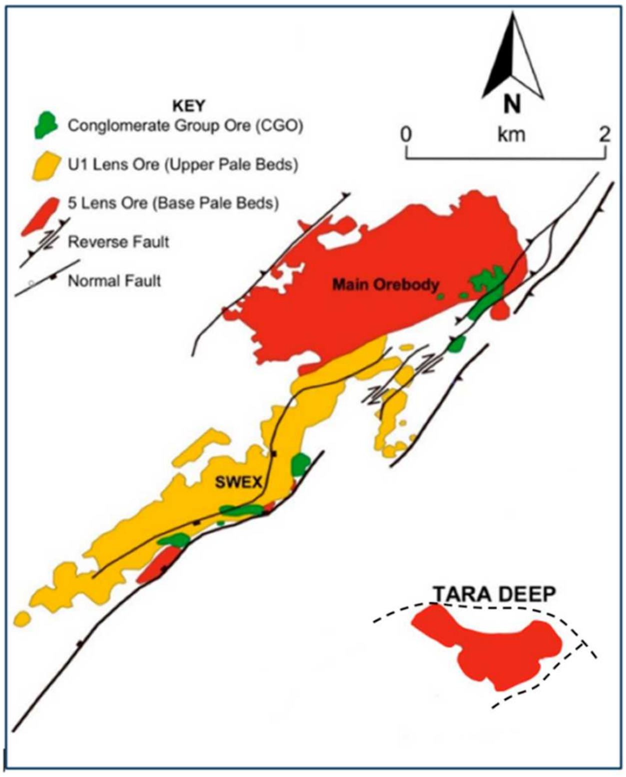


Figure 4. Plan of the Navan and Tara Deep deposits showing location of mineralised lenses

3.7.1 Regional

Central Ireland comprises generally flat lying sequences of Lower Carboniferous limestones with common inliers of sedimentary Lower Palaeozoic and Devonian rocks. The limestones are cut by numerous, locally syn-depositional NW to ENE trending major normal faults and these control the location of several carbonate hosted Zn-Pb deposits, of which Navan is by far the largest.

3.7.2 Local

In eastern Ireland, the Carboniferous Limestones are part of the Dublin Basin, a significant feature that after extensional basin-margin faulting and later Hercynian inversion, exposes some large Lower Palaeozoic inliers at its margins and exhibits some outliers of Namurian and later Permo-Triassic sediments.

3.7.3 Property

The Navan Orebody is located on the footwall (northern) side of a major south-dipping normal fault that constitutes a basin controlling feature. The orebody itself is controlled by a complex array of Lower Carboniferous normal faulting and slides on the uplifted footwall of this major fault. The Navan orebody generally dips at about 10-15 degrees to the WSW and comprises several, locally stacked, tabular stratiform to strata bound lenses, oriented in general concordance with the host limestones (Figure 5). The mineralisation ranges from a few meters to over 70m in vertical thickness. A major slide and overlying debris flow, cuts the orebody obliquely and is also mineralised. The deposits are effectively masked from surface by a thick succession of deep-water calc-turbidites that comprise the Dublin Basin infill sequence.

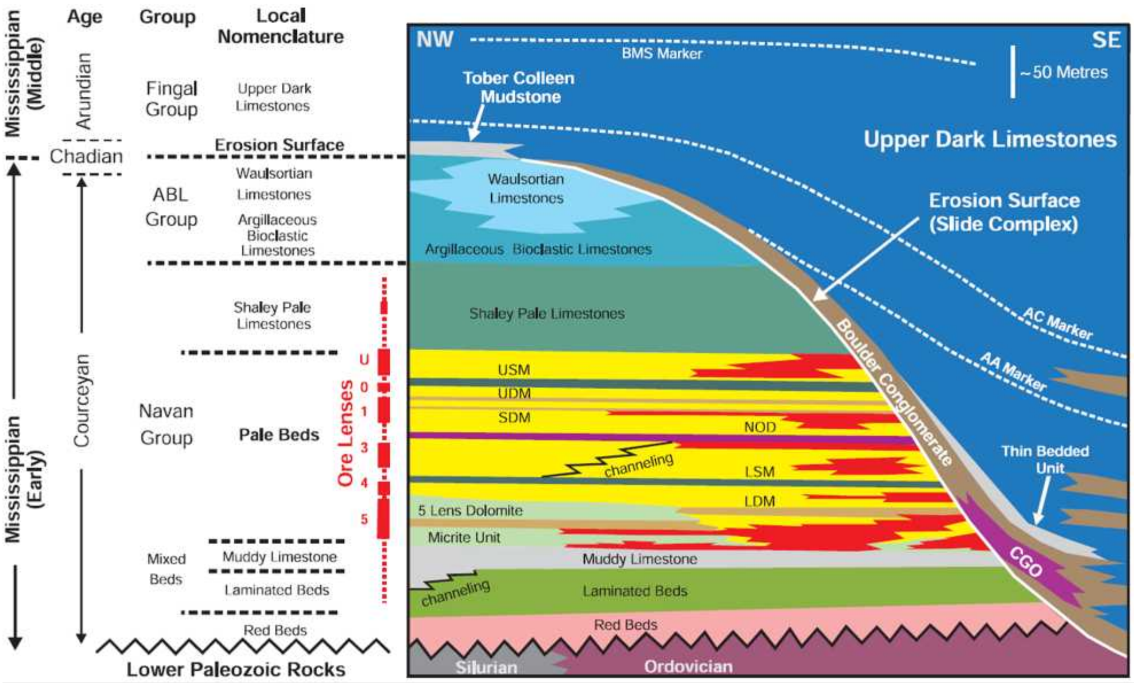


Figure 5. Geology of the Navan Orebody and position of mineralisation

3.7.4 Mineralisation

Although there are number of significant lenses and fault blocks at Navan, >95% of the mineralisation occurs as sphalerite and galena in partly dolomitized limestones as complexly textured replacements, veining and open-space infill where Zn:Pb ratios are typically around 4 or 5 to 1. Gangue mineralisation comprises subsidiary calcite, pyrite, marcasite, dolomite and barite. The remainder of the mineralisation occurs as massive pyritic lenses containing sphalerite and galena hosted by debris-flow conglomerates that overlie the deposit. This material contains often abundant fine-grained pyrite which has the potential of degrading the normally excellent metallurgy if not blended with normal run of mine ore.

3.8 Drilling procedures and data

Exploration at Navan comprises surface exploration and underground exploration. Surface exploration comprises several geochemical and geophysical techniques, with 2D and 3D seismic surveys also providing structural profiles through the host geology. The primary exploration tool is deep diamond drilling, and this extensively uses navigational drilling enabling many intersections to be drilled from a single 'mother' hole with resultant benefits to timing and reduced impact on the environment.

Underground diamond drilling is performed from specially mined hanging-wall drifts located 10s of meters above the orebody and subsequently used for ventilation, dewatering, geotechnical and backfill purposes. Most underground diamond drilling is for delineation for upgrading Inferred to Indicated resources. Subsequent in-stope drilling is used to upgrade Indicated to Measured reserves prior to production.

3.8.1 Drilling techniques

Drilling comprises wireline or conventional diamond drilling with NQ diameter core for surface holes and AQ, AQTK or BQ core for underground core. Core recovery is typically close to 100%. All drilling is completed by contractors, currently Priority Drilling Ltd with a small portion carried out by Drillcon.

3.8.2 Downhole surveying

All underground Diamond drillholes are set out using a north seeking, gyroscopic azimuth aligner tool, which in recent years has greatly increased the ability to accurately target specific structural zones seeking high grade mineralisation. Downhole surveying is accomplished either by Contractor or Exploration staff using Reflex electronic multi-shot equipment (the host rocks at Navan are not magnetic). Production holes shorter than 25m are generally not surveyed as they are frequently vertical or steeply inclined.

3.8.3 Sampling

All surface (NQ diameter) core is split prior to sampling and most core is retained for possible future examination. All underground core (AQ/ ATQK / BQ diameter) is sampled whole, and the remainder completely discarded. Sampling is governed by ore-waste zones, lithology contacts and mineralisation styles though it is noted that the mineralisation at Navan is extremely variable in its distribution and textural styles, so it is impossible to aim for strict homogeneity in material sampled. Sample length typically ranges from 0.3 to 3m and averages around 1.5m. All samples are recorded in mineral logs where textural styles and a visual estimate of Zn+Pb% recorded. Although a very large emphasis is placed on recording the geology and grades of development faces at Navan and this material is used for interpretation, it is not currently used for resource grade estimation. Core loss is minimal at Tara however, when encountered is recorded in the core tray and in logging.

3.8.4 Logging

Logging across site is electronically entered into a Tara specific database through tablets or laptops. The geology is split into lithology, structure, alteration and mineralisation with visual estimates given for any mineralisation noted in the core prior to assaying. Major faults are used as domain boundary structures and are either logged as individual intervals depending on the importance of the fault or combined into the lithology. Once the core is logged photographs are taken and stored on the network.

3.8.5 Density

Density is estimated from a set of multiple regression equations that relate density to sample Zn, Pb and Fe grades and which were created by experimental work relating measured density to assays. In general, the density of the ore is not much higher than the host rock (e.g., 2.8-3.2), unless high Pb and/or Fe grades are present and in these areas the regression curves take these variances into effect.

3.8.6 Analysis and QAQC

Samples are sent to an on-site laboratory for comminution and assay via conventional processes (crushing, milling, XRF assay etc). This laboratory is also used for environmental, mining and metallurgical work and has trained staff and full detailed QA/QC procedures, including external lab checks, standards etc. Core samples are subject to checks between estimated Zn+Pb% grades and assayed Zn+Pb% grades. In the case of disparity, samples are re-analysed and in the case of surface drill holes the split core is re-examined to check the assay estimate. In the case of Tara Deep core, all mineralized coarse rejects from the in-house lab are independently comminuted and assayed in an external laboratory (ALS Loughrea, Co Galway).

Previously only minimal QAQC was being carried out at Tara including visual vs assay checks and assays vs geology checks. During 2021 through 2022, a project with the aims of planning a more appropriate level of QAQC samples was undertaken and will continue to be implemented in 2023.

3.9 Exploration activities and infill drilling

3.9.1 Surface Drilling

In total 41 surface holes were completed or collared during 2022 (7 collared in 2021). With 7 holes still active at year end, a total in excess of 31.7km of drilling were completed, including extensive navigational drilling. The majority of surface drilling was in the area of the Tara Deep deposit (see Figure 6). This is a structurally complex area with several generations of debris flows, slide packages and extensional faulting associated with rifting in the Dublin Basin. Near Mill drilling was also undertaken at Halltown where 4 holes were completed or collared for some 2.7km.

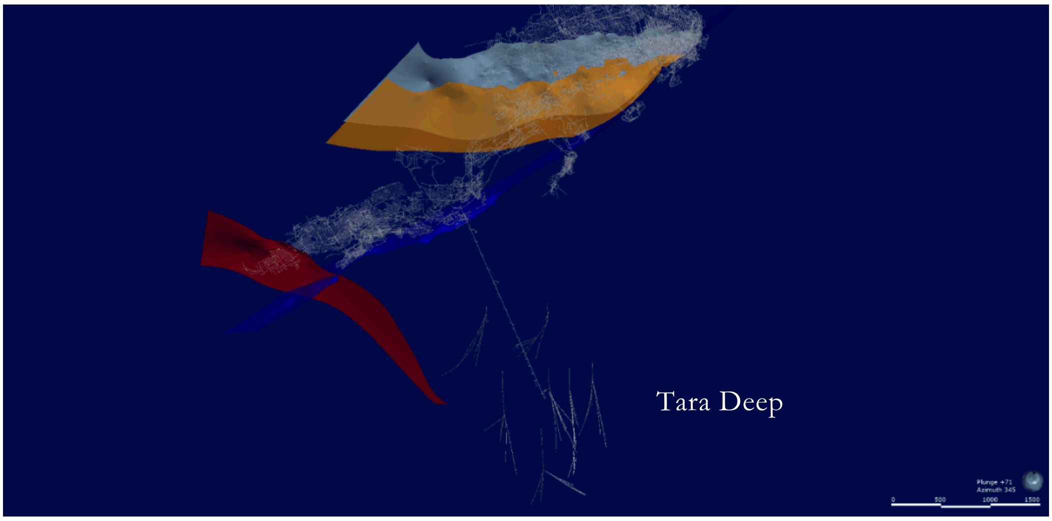


Figure 6. Surface exploration drilling 2022

3.9.2 Underground Exploration Drilling

In 2022, a total of 44,998 meters were drilled underground for the purposes of resource delineation or infill drilling conversion. Targets realised from the conversion of the final five models to Leapfrog Edge and the subsequent wireframing around different areas, formed the foundation for the drilling campaign in 2022. Drilling was completed throughout the mine with particular focus on the Upper Swex and Southwest Extension (Figure 7). Prospects have been realised from drilling all targets and further drilling will continue into 2023 with a similar investment and drill metres as 2022. Major changes were observed in Block 59 in MTroughN and Block 76 in SEHWEX geological models, where a full redesign of the block was undertaken after delineation and infill drilling was completed. The geometry of the block changed significantly while also increasing available resources and potential targets around the periphery. Another area of note is Block 66 in MTrough, where resources were delineated, and further infill drilling was completed to establish a new mining block within the main mine. Figure 7 below represents exploration drilling completed in each geological model.

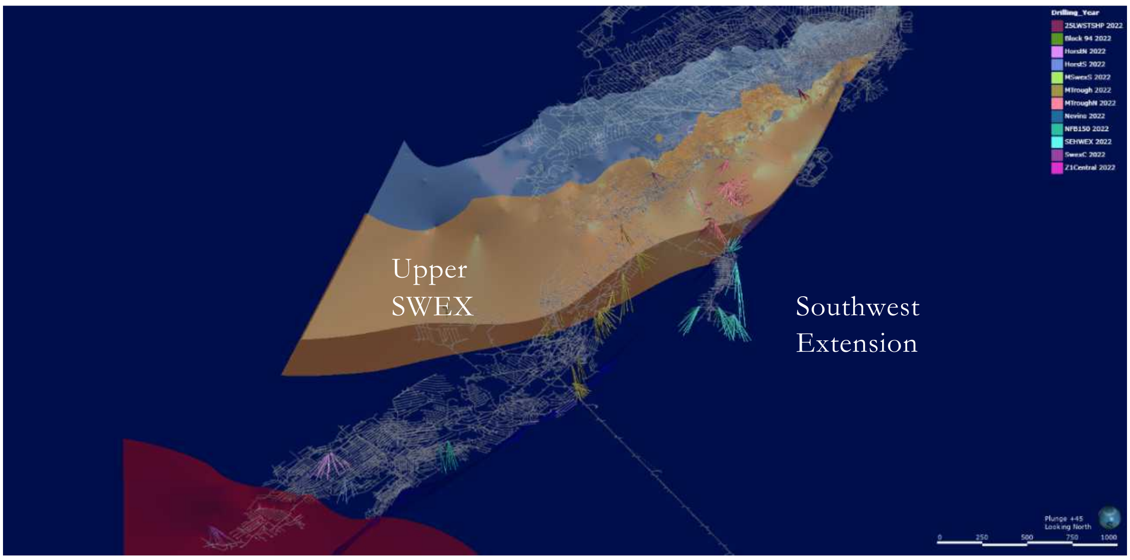


Figure 7. Underground exploration drilling 2022 – by main model areas

3.9.3 Underground Development and Production Drilling

There were 33,623m drilled in 2022 for upgrading to proven reserves and infill drilling. This drilling was carried out across the footprint of the mine; however, a greater proportion of conversion drilling was done in Upper SWEX and the Upper Mine. Small service hole and water probe programs were carried out to aid the Mine Department with ongoing mining activities. Significant drilling was carried out to increase the size of prospective and active mining blocks in Upper Swex and Nevinstown, including Blocks 71, 75, 76, 59 and the N3 area. A special emphasis was placed on upgrading resources discovered by the Life of Mine Project (LOMP) which will continue into 2023. See Figure 8 for position of drill programs across the mine footprint.

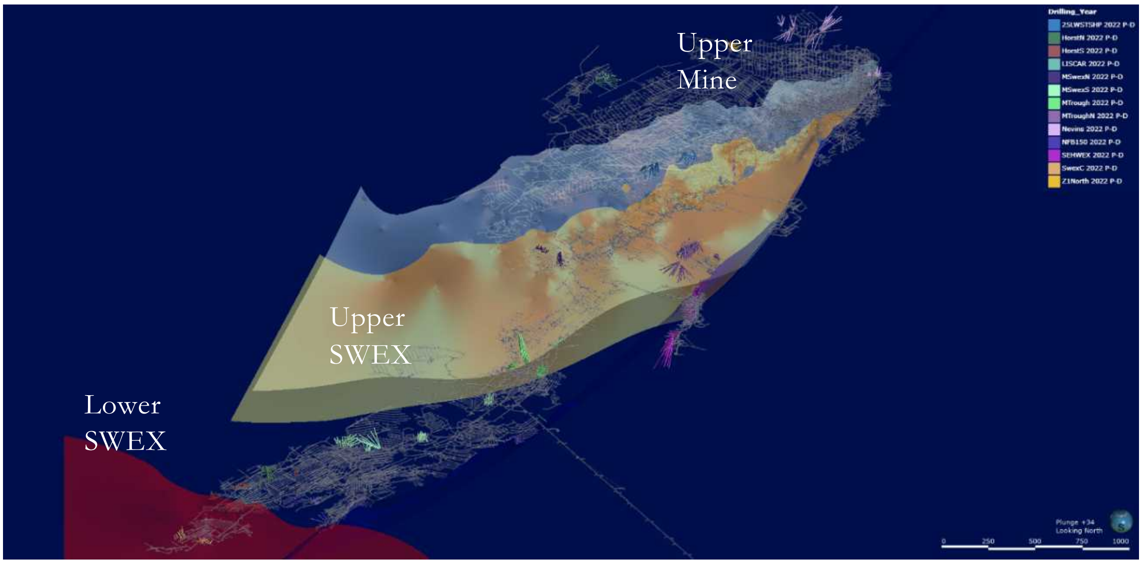


Figure 8. Underground development and production drilling 2022 – Colour coded by blockmodel

3.10 Mining methods, mineral processing and infrastructure

The Boliden Tara Mines in Navan started development in 1974 with production commencing in 1977. Over the years, the mining methods evolved from top-slice and bench to various types of open stoping. Milling is straightforward and comprises standard froth flotation to give Zn and Pb concentrates which are railed to Dublin Port and subsequently to smelters overseas. The majority of the Zn concentrate goes to Boliden smelters in Norway and Finland.

Since start-up, the mine has mined and processed over 100Mt of ore and established much confidence in the processes running from exploration and mine geology, through planning, mining and backfill to milling operations. As the mine gets deeper, increasingly thinner areas of ore are being encountered and this requires continual focus on costs, diamond drilling and optimal mining methods.

3.10.1 Mining methods

Development is advanced in a mechanical mining method utilising specialised equipment for the full development cycle. Face drilling with burn cuts are used for all lateral advance in a range of profiles, most commonly 5.5mWx5.6mH for capital access development and 5.0mWx5.0mH for operational access development.

Vertical development for ventilation or access is developed either by the production long hole or raise bore advance and a standalone project scope.

The mining methods for the production operation are split into long hole open stoping and drift and slash stoping. Long hole open stopes are production extractions at a height greater than the drift height of the development cycle (i.e., 5.0m), drift and slash stoping is at drive height. Stopes vary from 12 to 20m in width, the width section is guided by the geotechnical interpretation of the span formed.

In most areas of the mine open-stopes are designed parallel to the strike direction of the orebody such that in-stope development is sub-horizontal, whereas in the upper-near surface sections the open stopes are along dip and may necessitate slightly more complex development. In both cases, ore thicknesses up to about 20m can be mined via a single footwall drift with blast-hole drilling drilled upwards. Thicker ore sections necessitate hanging-wall drifts and hence additional development.

In both cases, development is advanced to the end of the stope, and a slot drive created from where a raise is blasted using longhole techniques to the orebody hanging wall or the vertical extent of the contact. Subsequent longhole blasting opens a slot over full stope width and creates a blasted ore muck pile in the stope which is mucked out using line of sight remote control and increasingly tele-remote operations. Areas of weak ground, often related to faulting may occur in the back and/or sidewalls of stopes. These are secured using various cable bolts patterns as dictated by the geotechnical design and past performance.

The stopes are split into primary and secondary stopes, where the primaries are mined first, and the secondary stopes act as pillars and allow the extraction of two or more primary stopes simultaneously.

Post extraction, the primary stopes are backfilled with hydraulic sandfill. The backfill will act as support for the secondary stopes when they are mined. The backfill can be partially waste fill if there is waste material available close by, otherwise the stopes will be also backfilled with hydraulic sandfill.

3.10.2 Mineral processing

In the underground mining operations, the ore is crushed in the primary crushing stations before hoisting to the surface and is transferred by a conveyor system to the coarse ore storage building. Ore processing in the mill is achieved by grinding, flotation, and dewatering. These processes are automated, monitored and controlled by a process control system. The grinding circuit, including an Autogenous mill, is designed to reduce the ore particle size to a size range suitable for separation, typically in the 10-to-75-micron range, and a maximum size less than 120 microns. The finely ground ore slurry is pumped from the grinding circuit to flotation cells where lead concentrate is recovered firstly and then followed by zinc concentrate. Following flotation, concentrates are dewatered using thickening and filtration in Metso pressure filters. The final concentrates are rail transported to Dublin and then shipped to various smelters in Europe, with the bulk of the Zn concentrate going to Boliden's smelters at Kokkola (Finland) and Odda (Norway).

For new potential mining areas laboratory test work is carried out on both the ore and waste to distinguish best performing milling techniques for the type of mineralisation that is to be mined.

3.10.3 Infrastructure

Access to underground operations is through 2 major declines, one location located in the shaft pillar area, which also contains the main production hoist. Subsidiary access-drifts then enter mining blocks that contain the stopes and are then used for truck haulage of ore to several underground crushers feeding conveyors that take the ore to the base of the main production shaft and then to surface. The coarse fraction of the mill waste product is used for backfilling while the remnant tailings are pumped 2km to a tailings management facility.

3.11 Prices, terms and costs

Boliden's planning prices, which are an expression of the anticipated future average prices for approximately 10 years, are presented in Table 4.

Currently the NSR for the mine is of the order of 88 US$/t and is based on grades, metal prices, process recoveries, penalty elements and concentrate terms (Including smelting and refinery costs).
The calculations where done based on the costs for the life of mine plan with full years of 2.6Mt production.

For the reserves, the total costs were used and the cut off corresponds to a combined grade of Zinc and Lead of 5.5%. For the resources, the capital costs were excluded and the cut-off grade for Zinc and Lead combined is 5.1%.

Planning prices, 2022	
Copper	USD 7,200/tonne
Zinc	USD 2,600/tonne
Lead	USD 2,000/tonne
Nickel	USD 17,000/tonne
Gold	USD 1,400/tr.oz
Silver	USD 20/tr.oz
Palladium	USD 1,300/tr.oz
Platinum	USD 900/tr.oz
Cobalt	USD 20/lb
USD/SEK	8
EUR/USD	1.17

Table 4. Long term planning prices currently used in Tara Mine, including exchange rates.

3.12 Mineral Resources

Mineral Resources in Tara mine are defined by mineralisation defining intersections of at least 5% Zn+Pb at thicknesses of 4m or more. Breakdown of resources into confidence intervals is based on diamond drill hole spacing, search radius and on the experience of the geologist. In brief, the confidence levels are defined as follows:

Inferred Resources:
Defined by surface and underground drilling: centres ranging from 25-35-50m.

Indicated Resources:
Defined by surface and underground drilling: centres 15-25m

Measured Resources:
Defined by surface and underground drilling: centres 15m or less.

In Tara Deep the inferred resource in defined by surface drilling on a drill pattern ranging from 50-80m.

3.13 Mineral Reserves

Mineral Reserves are the economic, diluted recoverable resources selected by the planning engineer for mining so that Measured Resources would be re-classified as Proven Reserves and Indicated Resources would be re-classified as Probable Reserves. In practical terms the Probable Reserves, having been drilled-off from hanging-wall drift exploration headings, would usually need an additional program of in-stope drilling to be classified as Proven Reserves. Dilution and recovery factors are applied to calculate financial viability during the process of conversion from resources to reserves. These factors vary depending on the unit being mined, its size, ore thickness, location etc. Tables 5 & 6 illustrates resources and reserves figures comparing 2022 and 2021.

For the 2022 resource and reserve exercise, all block models calculated across Tara and Tara Deep have been combined into four main areas - Main Mine, Upper Swex, Lower Swex and Tara Deep. Figure 9 below shows the spatial location of these four areas.

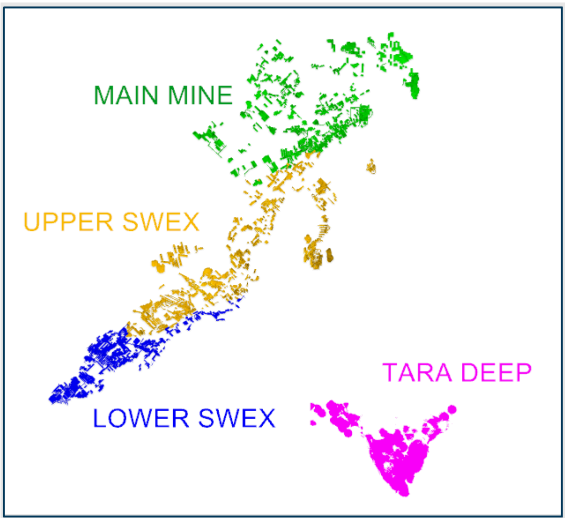


Figure 9. Mineral Resources and Reserves split by area

2022 MINERAL RESOURCES AND ORE RESERVES

MAIN MINE

Mineral Resources	MAIN MINE Tonnes (kt)	Zn %	Pb %	Ore Reserves	MAIN MINE Tonnes (kt)	Zn %	Pb %
Measured	30	5.7	1.3	Proven	240	4.1	1.6
Indicated	1540	4.8	2.1	Probable	6410	5.5	1.9
Inferred	5100	5.1	1.7				
Resources	6,670	5.0	1.8	Reserves	6,650	5.5	1.9

Upper SWEX

Mineral Resources	Upper SWEX Tonnes (kt)	Zn %	Pb %	Ore Reserves	Upper SWEX Tonnes (kt)	Zn %	Pb %
Measured	0	0.0	0.0	Proven	600	5.7	1.1
Indicated	440	5.1	1.0	Probable	4040	5.2	1.0
Inferred	4470	5.5	1.1				
Resources	4,910	5.5	1.1	Reserves	4,640	5.2	1.1

Lower SWEX

Mineral Resources	Lower SWEX Tonnes (kt)	Zn %	Pb %	Ore Reserves	Lower SWEX Tonnes (kt)	Zn %	Pb %
Measured	0	0.0	0.0	Proven	250	7.8	1.4
Indicated	140	4.9	1.0	Probable	3480	5.9	1.1
Inferred	1640	5.8	1.1				
Resources	1,780	5.7	1.1	Reserves	3,730	6.0	1.2

TARA DEEP

Mineral Resources	TARA DEEP Tonnes (kt)	Zn %	Pb %	Ore Reserves	TARA DEEP Tonnes (kt)	Zn %	Pb %
Measured				Proven			
Indicated				Probable			
Inferred	27000	8.4	1.6				
Resources	27,000	8.4	1.6	Reserves	0	0.0	0.0

ALL

Mineral Resources	GRAND TOTAL Tonnes (kt)	Zn %	Pb %	Ore Reserves	GRAND TOTAL Tonnes (kt)	Zn %	Pb %
Measured	30	5.7	1.3	Proven	1090	5.8	1.3
Indicated	2120	4.9	1.8	Probable	13930	5.5	1.5
Inferred	38210	7.5	1.5				
Resources	40,360	7.4	1.6	Reserves	15,020	5.5	1.4
				Additional Scheduled*	2,600	4.5	0.9
				Total Scheduled	17,620	5.4	1.4

Table 5. Mineral Resources and Mineral Reserves Tara Mine 2022-12-31.

		2022			2021	
	kt	Zn	Pb	kt	Zn	Pb
Classification		%	%		%	%
Mineral Reserves						
Proved	**1,100**	**5.8**	**1.3**	600	5.6	1.1
Probable	**13,900**	**5.5**	**1.5**	15,500	5.4	1.4
Total	**15,000**	5.5	1.4	16,100	5.4	1.4
Mineral Resources						
Measured	**32**	**5.7**	**1.3**	30	5.6	1.3
Indicated	**2,100**	**4.9**	**1.8**	1,400	5.2	1.5
Total M&I	**2,200**	4.9	1.8	1,400	5.2	1.5
Inferred	**38,200**	**7.5**	**1.5**	38,400	7.6	1.5

Table 6. Mineral Resources and Mineral Reserves Tara Mine 2022-12-31.

3.14 Comparison with previous year/estimation

The changes between 2021 and 2022 resources and reserves are outlined in Figures 10 and 11 below. For reserves the major areas of difference were from a combination of stope redesign and refinements and upgrading of resources through drilling. Major mine redesigns were also carried out after significant drilling campaigns increased confidence and understanding within several geological models.

The biggest increase in resources came from the extensive exploration metres drilled through 2021 and 2022, and the accompanying mine redesigns.

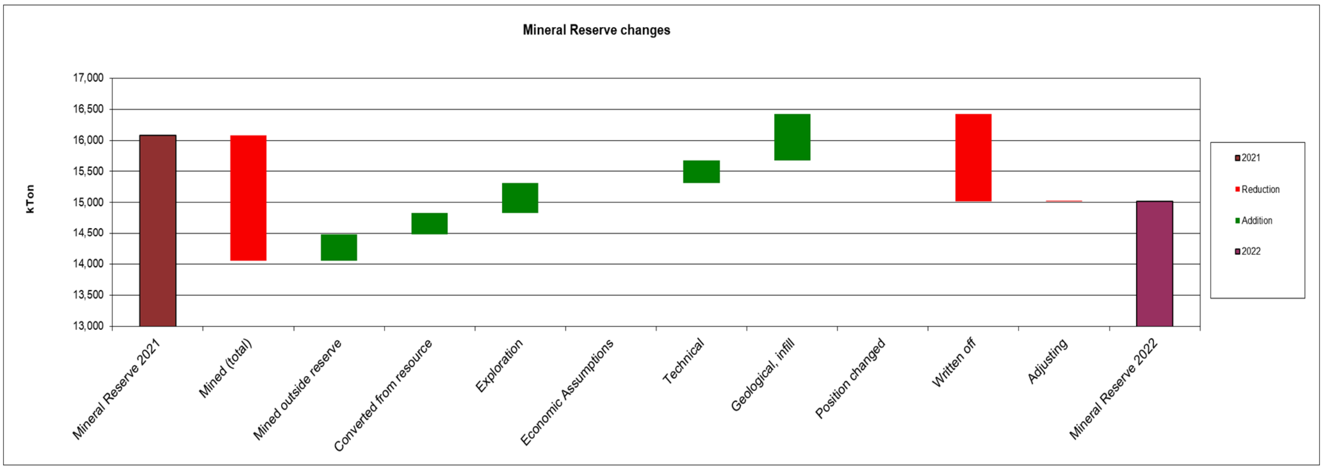


Figure 10. Changes to mineral reserve

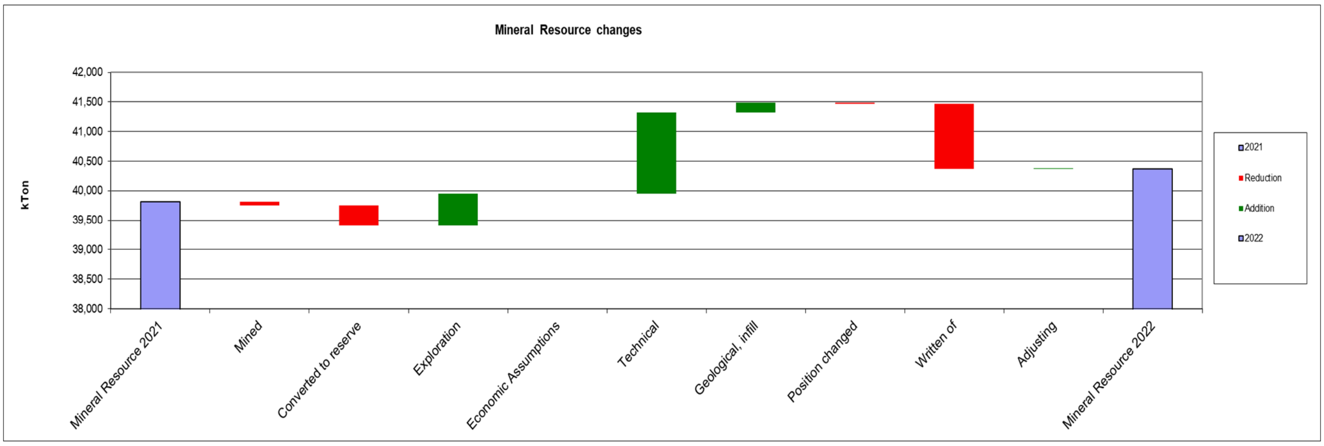


Figure 11. Changes to mineral resource

3.15 Reconciliation

A comparison between mine and mill Zn and Pb grades and tonnes is shown in Figures 7 & 8. Overall, the grades varied slightly during Q1 and Q2 however over the year showed only 0.01% different for both zinc and lead. The comparison in tonnes during the year were marginally different due to shutdowns and repairs for both conveyor systems and crushers.

	Mined according to grade models				Mill output				
	ton	Zn	Pb	Fe	ton	Zn	Pb	Fe	NSR
Month	t	%	%	%	t	%	%	%	kr/t
Jan	103,588	6.34	1.30	2.51	110127	6.29	1.29	2.53	111.47
Feb	108,777	6.23	1.11	2.30	74193	6.33	1.11	2.31	110.98
Mar	200,001	4.97	1.05	1.99	198188	5.14	1.05	2.04	90.16
Apr	194,615	5.80	1.21	2.54	219361	5.7	1.19	2.45	100.51
May	197,361	4.92	0.92	2.26	210235	4.96	0.94	2.27	85.89
June	190,012	4.93	0.81	1.95	193094	4.93	0.81	1.96	84.55
July	191,437	4.84	1.04	1.78	190665	4.83	1.04	1.78	84.99
Aug	184,841	5.17	0.87	2.09	184931	5.19	0.87	2.09	89.44
Sep	157,639	5.01	0.94	1.95	144074	4.91	0.91	1.93	85.11
Oct	202,404	5.63	0.93	2.23	215262	5.66	0.95	2.23	98.10
Nov	177,058	5.34	1.06	2.42	167263	5.37	1.06	2.41	93.81
Dec	177,845	4.27	1.24	1.84	182680	4.31	1.23	1.88	77.35
2022	**2,085,578**	**5.22**	**1.03**	**2.14**	**2,090,073**	**5.22**	**1.03**	**2.14**	**91.30**

Table 7. 2022 monthly reconciliation of mine production and mill output

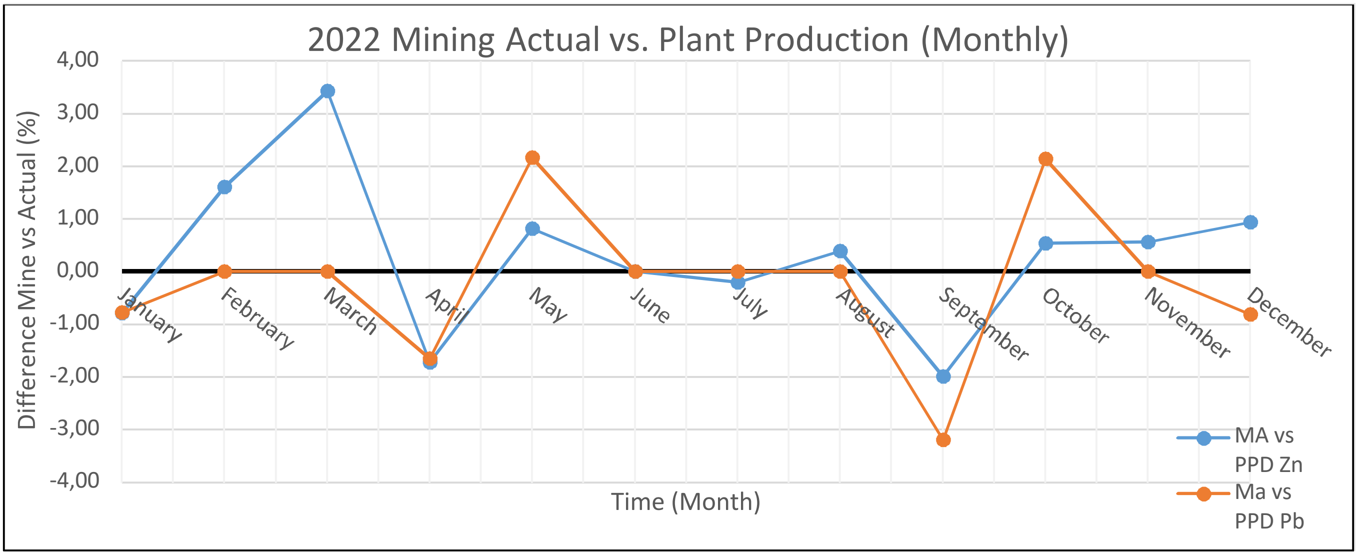


Figure 12. 2022 monthly reconciliation of mine production and mill output

	Mined according to grade models			Mill output			
	ton	Zn	Pb	ton	Zn	Pb	NSR
Year	t	%	%	t	%	%	USD/t
2011	2 530 385	6.84	1.35	2 486 357	7.04	1.36	76.7
2012	2 430 403	6.81	1.45	2 502 278	7.00	1.44	77.4
2013	2 500 569	6.93	1.46	2 493 240	7.05	1.46	71.6
2014	2 280 391	6.99	1.55	2 286 701	6.92	1.55	80.9
2015	2 198 169	6.38	1.25	2 196 814	6.37	1.25	70.7
2016	2 603 527	5.99	1.15	2 602 863	5.96	1.15	83.7
2017	2 312 988	5.91	1.14	2 310 634	5.92	1.14	119.3
2018	2 200 120	6.29	1.20	2 200 154	6.28	1.20	120.0
2019	2 480 018	5.24	1.05	2 461 391	5.24	1.03	85.1
2020	2 303 621	5.75	1.02	2 316 337	5.76	1.03	74.6
2021	2 148 262	5.50	1.03	2,149,022	5.49	1.02	137.33
2022	2 085 578	5.22	1.03	2 090 073	5.22	1.03	91.3

Table 8. Yearly reconciliation of mine production and mill output

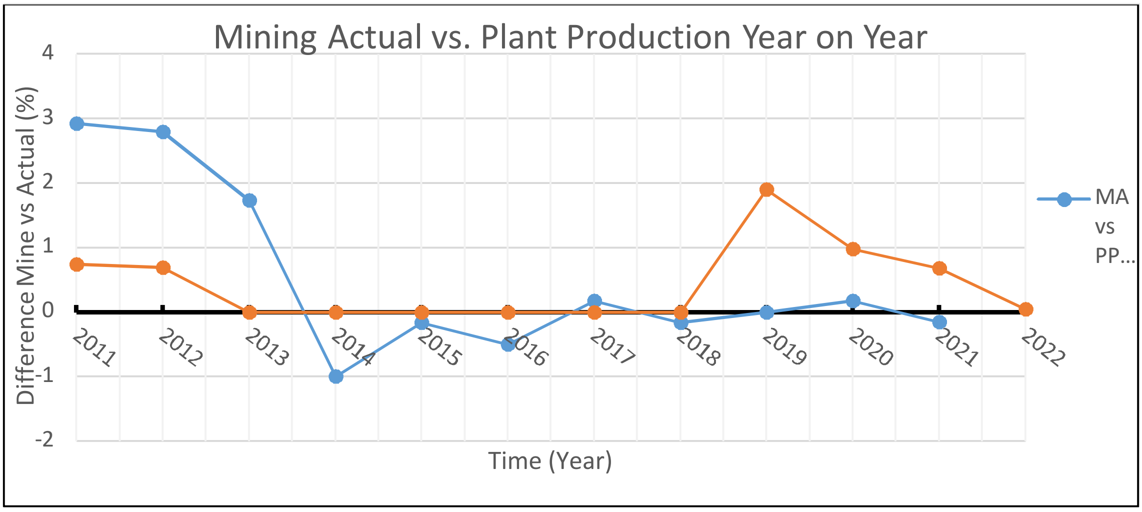


Figure 13. Yearly reconciliation of mine production and mill output

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