

# Boliden Summary Report

Mineral Resources and Mineral Reserves | 2023

## Tara Mine



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Prepared by  
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## 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 2 km 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 1 km southeast of the main mine and is currently a major focus for exploration and development.

In 2023, the mine produced some 1.09mt of mineralised material grading at 5.16% Zn, and 0.98% Pb and with a development distance of 5,255m. A summary table of the calculated 2023 Mineral Resources and Mineral Reserves is presented in Table 1 below, also with the figures for 2022. Due to a combination of factors, mining activities have temporarily ceased, and the mine has been placed into a period of care and maintenance. This action is believed to be temporary, and the mine will reopen after alleviation of some of the factors for the closure.

Classification	2023			2022		
	Kt	Zn %	Pb %	Kt	Zn %	Pb %
<b>Mineral Reserves</b>						
Proved	700	6.5	1.4	1,100	5.8	1.3
Probable	13,300	5.5	1.5	13,900	5.5	1.5
<b>Total</b>	<b>14,000</b>	<b>5.5</b>	<b>1.5</b>	<b>15,000</b>	<b>5.5</b>	<b>1.4</b>
<b>Mineral Resources</b>						
Measured	32	5.7	1.3	32	5.7	1.3
Indicated	2,100	4.9	1.8	2,100	4.9	1.8
<b>Total M&amp;I</b>	<b>2,200</b>	<b>4.9</b>	<b>1.8</b>	<b>2,200</b>	<b>4.9</b>	<b>1.8</b>
Inferred	38,100	7.5	1.5	38,200	7.5	1.5

Table 1. Mineral Resources and Mineral Reserves in Tara Mines 2023-12-31.

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 2023 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 2023 and is a professional member of the Institute of Geologists of Ireland (IGI). Finn has over 14 years of experience with base metals deposits in Ireland with over 12 years in Tara Mines.

Sofia Höglund took the role as competent person for resources for Tara Deep 2023 and is a professional member of the Fennoscandian Association for Minerals and Metals Professionals (FAMMP). Sofia has 16 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 13 years' experience globally in reserve estimation in base metal deposits, with several based at Boliden's deposits.

Description	Contributors	Support to Competent Persons	Competent Persons
<b>R&amp;R Coordinator</b>	Finn Oman		
<b>Mineral Resources Tara Mine</b>			Finn Oman
<b>Mineral Resources Tara Deep</b>		Ian McGimpsey	Sofia Höglund
<b>Mineral Reserves</b>			Catarina Barreira
Geology	Finn Oman	Sofia Höglund	
Mineral Processing	George Wilkinson		
Mining	Jonathan Talbot		Catarina Barreira
Environmental and legal permits	Paschal Walsh		

Table 2. Contributors and responsible competent persons for this report

## 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.

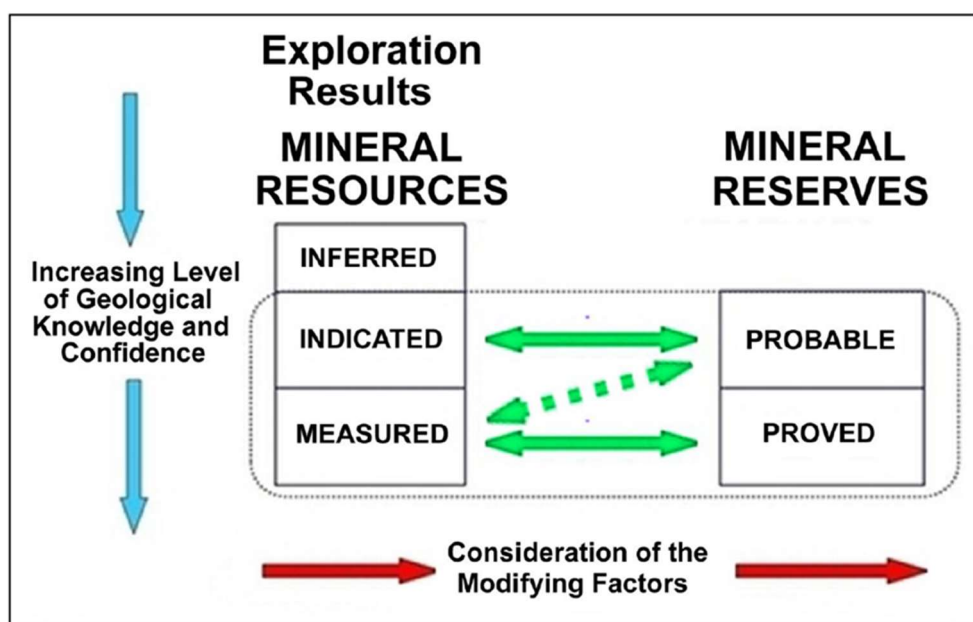


Figure 1. General relationship between Exploration Results, Mineral Resources and Mineral Reserves (PERC 2021)

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### **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 with a production capacity of 2.6 million tonnes per year, 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 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. This campaign was extended into 2023 with the intent of completing a comparable number of meters as 2022, throughout the year. The wireframes created from the conversion from Eagle to Deswik and subsequent mine redesign from 2019-2021, generated a series of new targets and mineralisation which informed these drilling campaigns. The full resources realised were to be calculated in 2023. This work is scheduled to be performed in advance and continued through the mine reopening.

There were limited results during 2023 for the Tara Deep exploration project to justify a recalculation of the block model due to the reissuing of exploration licenses and the mine going into a period of care and maintenance. The dewatering of the Tara Deep drift was completed along with the majority of refurbishment required. Several drill cubbies were also commissioned for future underground drilling campaigns.

### 3.2.1 Technical studies

A study on QAQC procedures and analytical techniques at Tara mines 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. Implementation of enhanced QAQC sampling was achieved in 2023 with further recommendations to be included periodically in the future.

### 3.3 Location

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

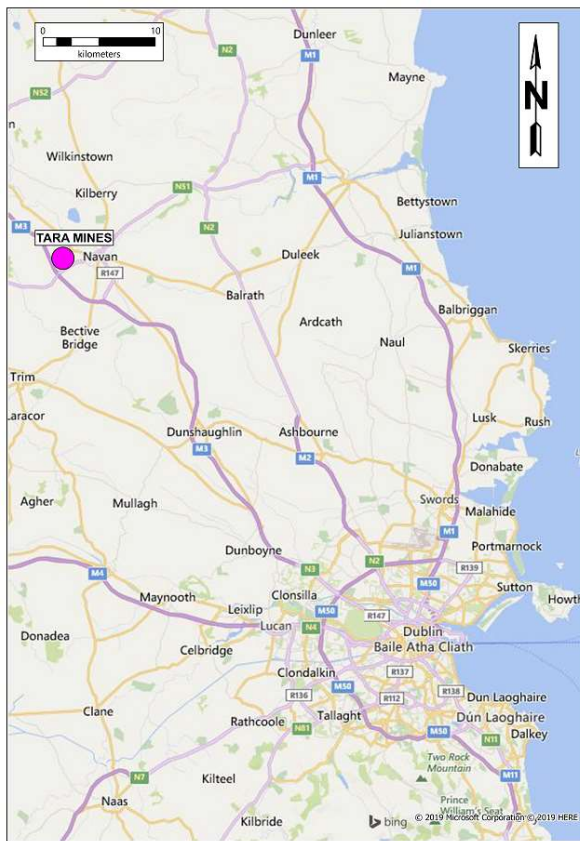


Figure 2. Map of Eastern Ireland showing Navan, the Boliden Tara mine and Dublin.

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.

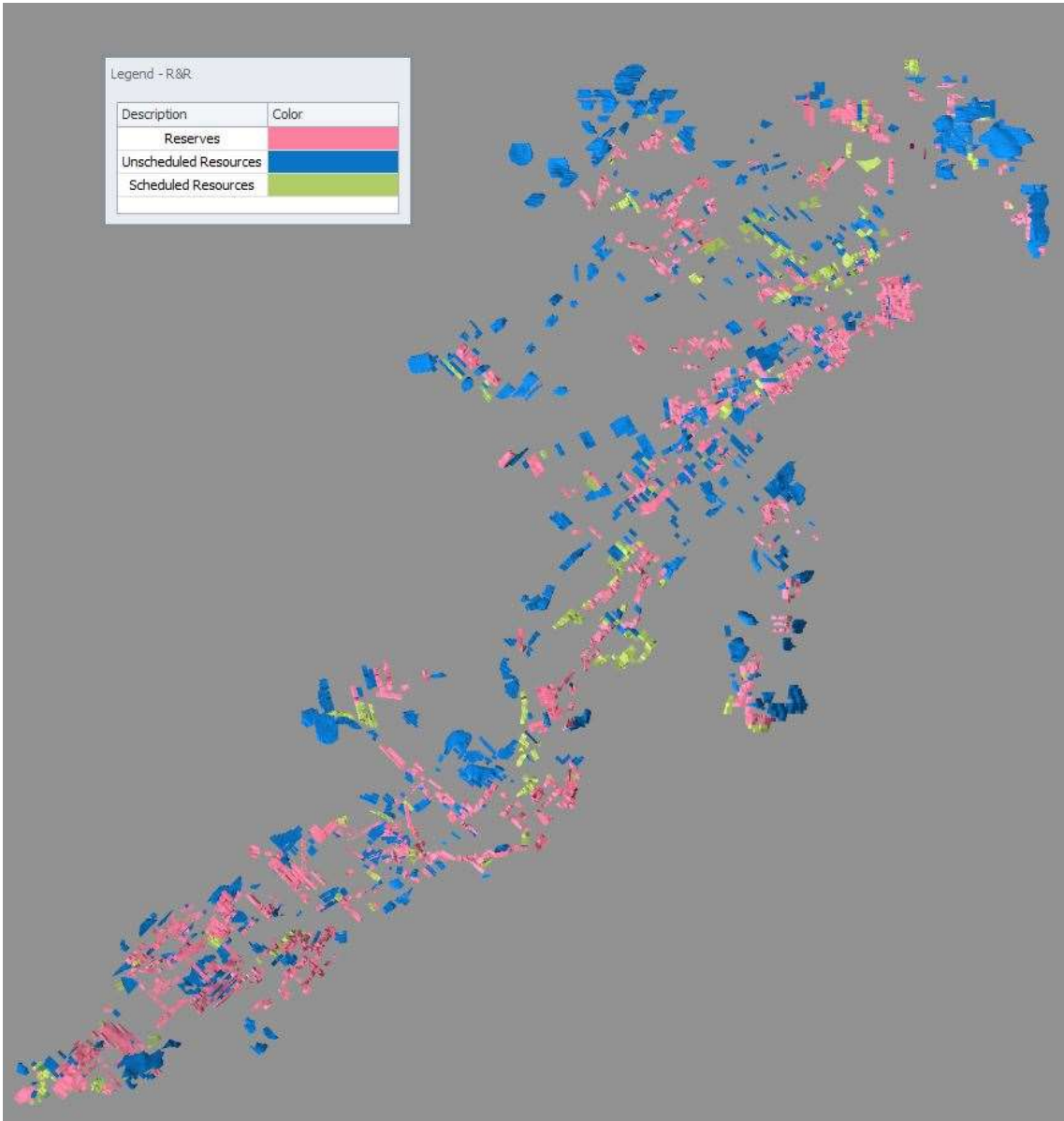


Figure 3. Resource and reserve distribution in the Navan Orebody.



### 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

YEAR	PRODUCTION													
	TONNAGE MILLED	GRADE			ZINC CONCENTRATE				LEAD CONCENTRATE				SILVER	
		% 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
2023	1,092,620	5.16	0.98	1.94	101,685	52.4	94.7	53,327	12,845	54.7	65.3	7,019	78	1.00
Total	26,702,127	6.09	1.20	2.55	2,811,226	54.9	95.0	1,543,593	374,690	53.9	62.8	201,856	47	17.7

Table 3. Milled tonnages and grades from Boliden Tara Mines over the period 2012-2023.

### 3.5 Ownership and Royalties

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

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## 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 are in the process of renewal. 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

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- 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 its 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

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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. During normal operations, Tara mines 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).

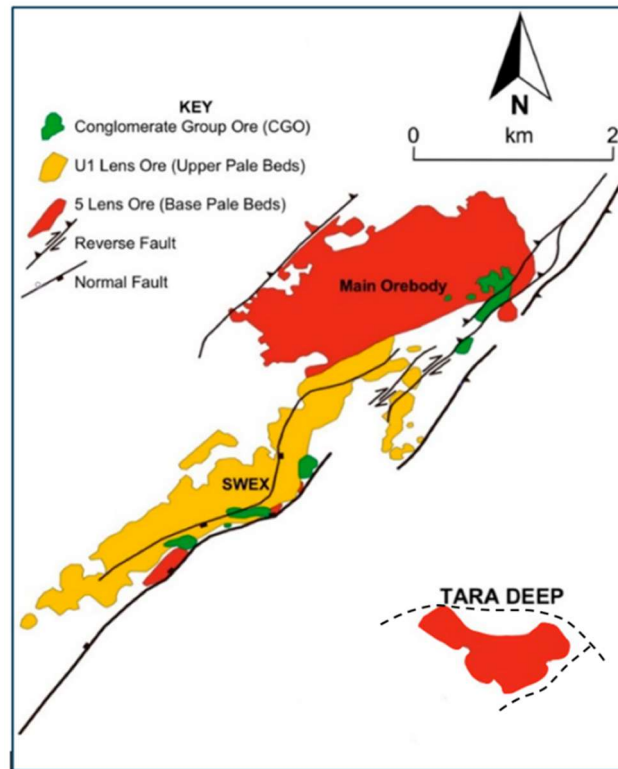


Figure 4. Plan of the Navan and Tara Deep deposits showing location of mineralised lenses

#### 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.

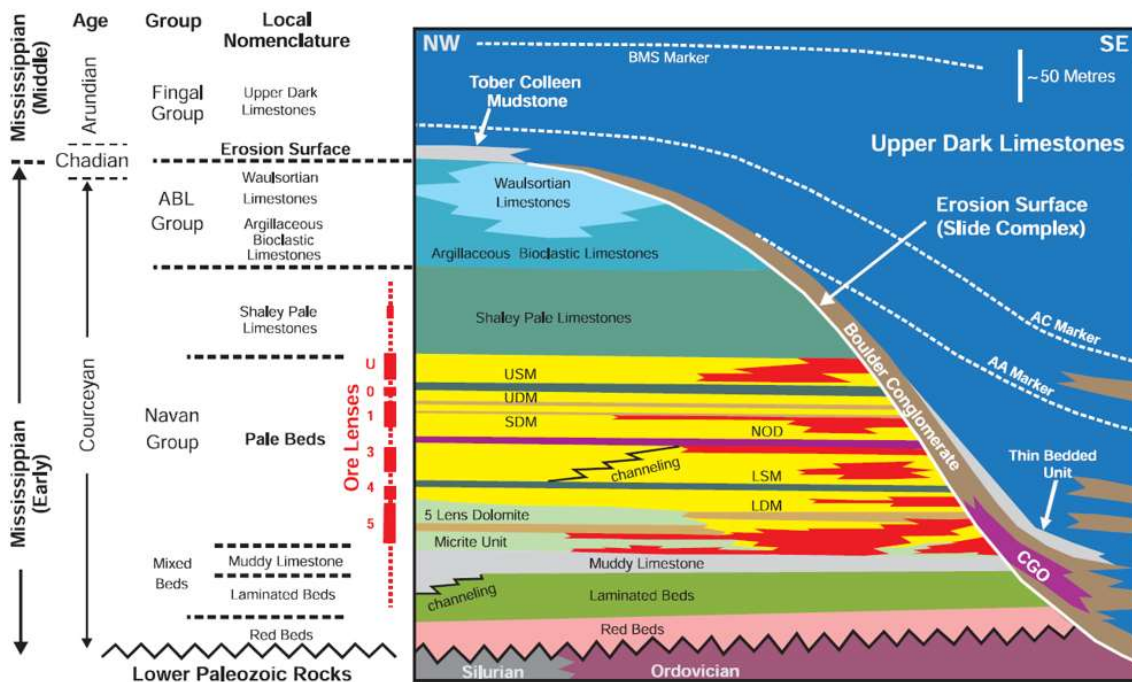


Figure 5. Geology of the Navan Orebody and position of mineralisation

### 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.

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### **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

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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, and through 2022, a project with the aims of planning a more appropriate level of QAQC samples was undertaken. Implementation of enhanced QAQC sampling was achieved in 2023 with further recommendations to be included periodically in the future.

## **3.9 Exploration activities and infill drilling**

### **3.9.1 Surface Drilling**

In total 9 surface holes were completed or collared during 2023 (8 collared in 2022). Delays in issuance of the exploration licence on PL 4502 and suspension of drilling operations in the second half of 2023 resulted in a reduced total of 4.1km of drilling completed, including 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 1 hole was completed for some 0.9km.



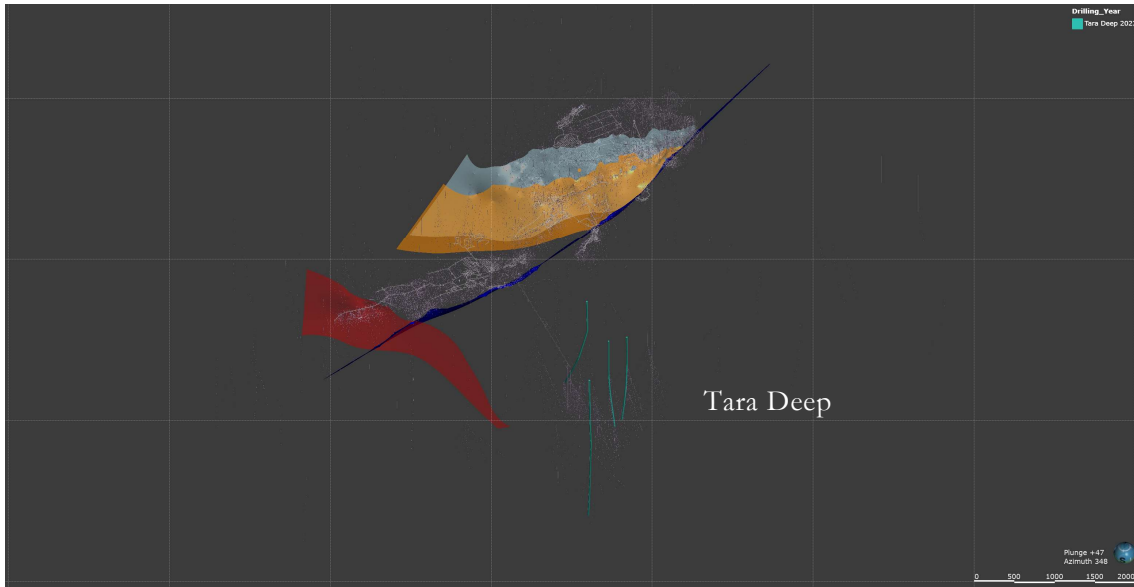


Figure 6. Surface exploration drilling 2023

### 3.9.2 Underground Exploration Drilling

In 2023, a total of 17,518 meters were drilled underground for the purposes of resource delineation or infill drilling conversion. The strategy for drilling is a continuation from late 2021 and 2022 where 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 campaigns. Drilling was completed throughout the mine with particular focus on the Upper Swex and Southwest Extension (Figure 7). Major changes were observed in Block 59 in MTroughN and Block 76 in SEHWEX during 2022. The focus for 2023 was to drill off the periphery of these delineated areas where the extent of mineralisation was confirmed. There is significant work remaining to fully realise the extent of the resources drilled off between 2022 and 2023. Figure 7 below represents exploration drilling completed in each geological model.

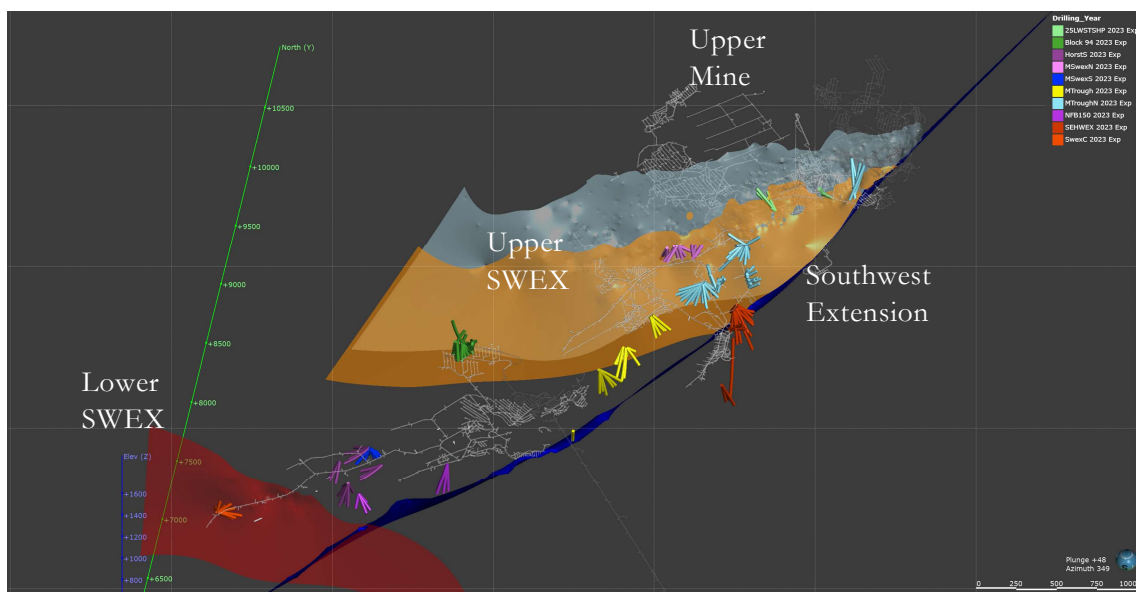


Figure 7. Underground exploration drilling 2023 – Colour coded by Geological Model.

### 3.9.3 Underground Development and Production Drilling

A total of 321 drillholes, amounting to 23,543m, were drilled in 2023 for the purpose of upgrading to proven reserves and conducting 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 59, 71, 76, 195 and the N3 area. A special emphasis was placed on upgrading resources discovered by the Life of Mine Project (LOMP) which is a continuation of drilling in 2022. See Figure 8 for position of drill programs across the mine footprint.

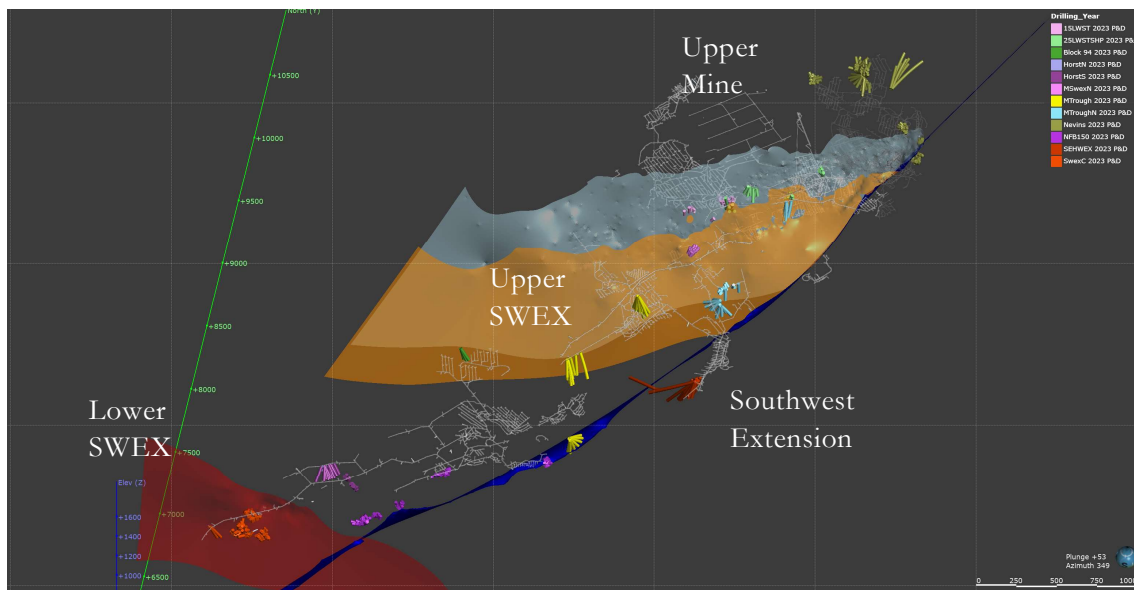


Figure 8. Underground development and production drilling 2023 – Colour coded by Geological Model.

### 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,

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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-stopos 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 stopos 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 were 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%.

<b>Planning prices, 2023</b>	
Copper	USD 7,800/tonne
Zinc	USD 2,800/tonne
Lead	USD 2,000/tonne
Nickel	USD 20,000/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	9
EUR/USD	1.10

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

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### 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 is 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 2023 and 2022.

For the 2023 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.

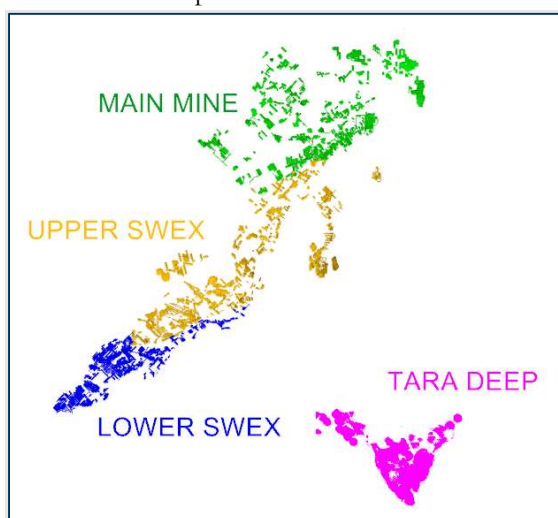


Figure 9. Mineral Resources and Reserves split by area

2023 MINERAL RESOURCES AND ORE RESERVES								
<b>MAIN MINE</b>	<b>Mineral Resources</b>	<b>MAIN MINE</b>			<b>Ore Reserves</b>	<b>MAIN MINE</b>		
		Tonnes (kt)	Zn %	Pb %		Tonnes (kt)	Zn %	Pb %
	Measured	32	5.7	1.3	Proven	172	4.6	1.5
	Indicated	1540	4.8	2.1	Probable	6193	5.5	1.9
	Resources	6652	5.0	1.8	Reserves	6365	5.4	1.9
<b>Upper SWEX</b>	<b>Mineral Resources</b>	<b>Upper SWEX</b>			<b>Ore Reserves</b>	<b>Upper SWEX</b>		
		Tonnes (kt)	Zn %	Pb %		Tonnes (kt)	Zn %	Pb %
	Measured	0	0.0	0.0	Proven	374	7.1	1.4
	Indicated	444	5.1	1.0	Probable	3763	5.0	1.0
	Resources	4858	5.5	1.1	Reserves	4137	5.2	1.1
<b>Lower SWEX</b>	<b>Mineral Resources</b>	<b>Lower SWEX</b>			<b>Ore Reserves</b>	<b>Lower SWEX</b>		
		Tonnes (kt)	Zn %	Pb %		Tonnes (kt)	Zn %	Pb %
	Measured	0	0.0	0.0	Proven	179	6.9	1.3
	Indicated	141	4.9	1.0	Probable	3365	5.9	1.1
	Resources	1772	5.7	1.1	Reserves	3544	5.9	1.1
<b>TARA DEEP</b>	<b>Mineral Resources</b>	<b>TARA DEEP</b>			<b>Ore Reserves</b>	<b>TARA DEEP</b>		
		Tonnes (kt)	Zn %	Pb %		Tonnes (kt)	Zn %	Pb %
	Measured				Proven			
	Indicated				Probable			
	Resources	27000	8.4	1.6	Reserves	0.0	0.0	0.0
<b>ALL</b>	<b>Mineral Resources</b>	<b>GRAND TOTAL</b>			<b>Ore Reserves</b>	<b>GRAND TOTAL</b>		
		Tonnes (kt)	Zn %	Pb %		Tonnes (kt)	Zn %	Pb %
	Measured	32	5.7	1.3	Proven	725	6.5	1.4
	Indicated	2125	4.9	1.8	Probable	13321	5.5	1.5
	Inferred	38125	7.5	1.5				
	Resources	40282	7.4	1.6	Reserves	14046	5.5	1.5
					Additional Scheduled*	2593	4.5	0.9
				Total Scheduled	16639	5.3	1.4	

\* Includes Scheduled Inferred Resources

Table 5. Mineral Resources and Mineral Reserves Tara Mine 2023-12-31.

Classification	2023			2022		
	Kt	Zn %	Pb %	Kt	Zn %	Pb %
<b>Mineral Reserves</b>						
Proved	700	6.5	1.4	1,100	5.8	1.3
Probable	13,300	5.5	1.5	13,900	5.5	1.5
<b>Total</b>	<b>14,000</b>	5.5	1.5	15,000	5.5	1.4
<b>Mineral Resources</b>						
Measured	32	5.7	1.3	32	5.7	1.3
Indicated	2,100	4.9	1.8	2,100	4.9	1.8
<b>Total M&amp;I</b>	<b>2,200</b>	4.9	1.8	2,200	4.9	1.8
Inferred	38,100	7.5	1.5	38,200	7.5	1.5

Table 6. Mineral Resources and Mineral Reserves Tara Mine 2023-12-31.

### 3.14 Comparison with previous year/estimation

Due to the mine entering a temporary period of care and maintenance, the full review of additions to the reserves and resources was not finalised. This process will be completed at an appropriate time in the future. Figures reported in Table 1 and Table 6 represent the subtraction of mined out during 2023 from the reserves and resources in comparison to 2022.

### 3.15 Reconciliation

A comparison between mine and mill, Zinc and Lead grades, and tonnes is shown in Figures 7 & 8.

Overall, the grades varied slightly during Q1 and Q2 however over the year showed only 0.02% Zn difference for Zinc and 0.05% lead. The comparison in tonnes during the year were marginally different due to shutdowns and repairs along with periodic waste hoists which result in lag time between blasting and processing.

Month	Mined according to grade models			Mill output			
	ton t	Zn %	Pb %	ton t	Zn %	Pb %	NSR USD/t
Jan	223,087	5.54	1.26	216965	5.29	1.22	97.5
Feb	174,477	5.32	0.97	147090	5.33	0.96	101.0
Mar	158,976	4.40	0.82	159777	5.38	0.9	92.3
Apr	185,643	4.93	0.94	211077	4.79	0.75	84.5
May	210,419	5.27	1.05	208085	4.32	0.9	81.4
June	135,017	5.46	1.08	116907	6.53	1.28	121.8
July	16,590	5.34	1.13	32719	5.37	0.93	100.9
Aug							
Sep							
Oct							
Nov							
Dec							
<b>2021</b>	<b>1,104,209</b>	<b>5.18</b>	<b>1.03</b>	<b>1,092,620</b>	<b>5.16</b>	<b>0.98</b>	<b>94.4</b>

Table 7. 2023 monthly reconciliation of mine production and mill output

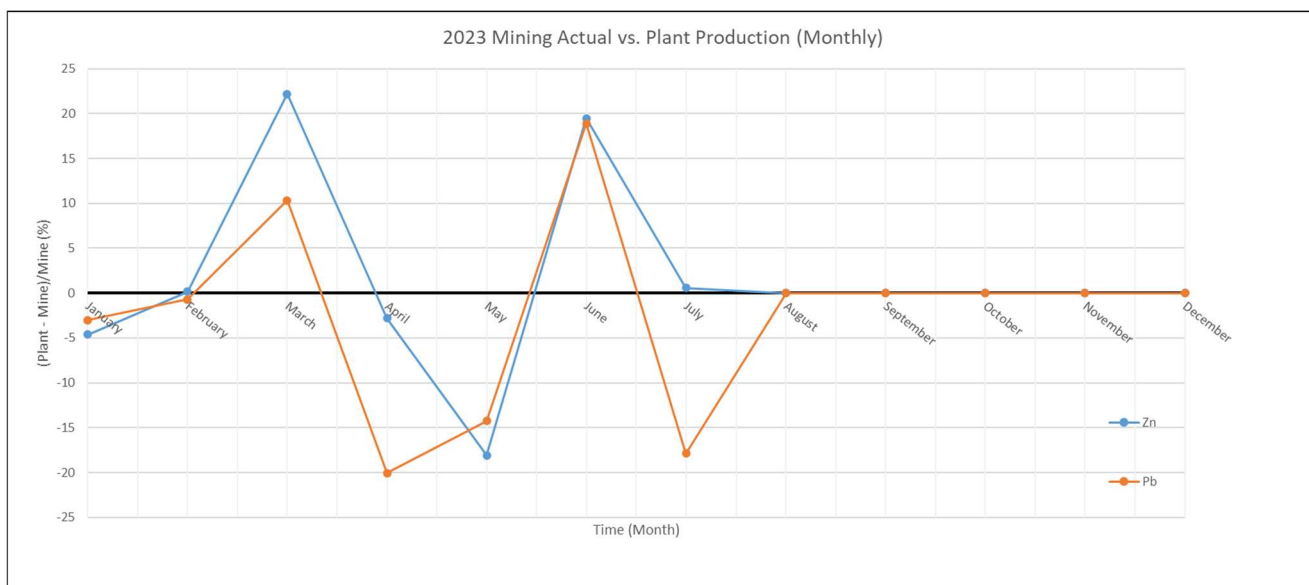


Figure 10. 2022 monthly reconciliation of mine production and mill output

Year	Mined according to grade models			Mill output			
	ton t	Zn %	Pb %	ton t	Zn %	Pb %	NSR kr/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	0.02	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
2023	1,104,209	5.18	1.03	1,092,620	5.16	0.98	87.1

Table 8. Yearly reconciliation of mine production and mill output



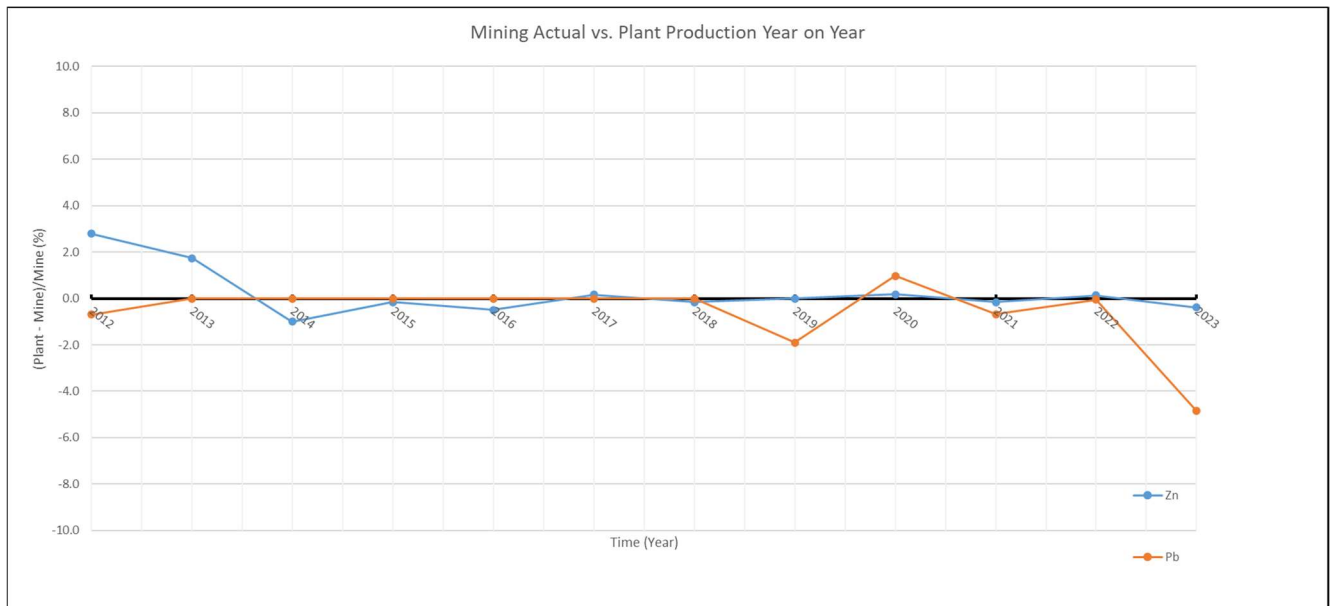


Figure 11. Yearly reconciliation of mine production and mill output

#### 4 REFERENCES

Pan-European Standard for reporting of Exploration results, Mineral Resources and Mineral Reserves (The PERC Reporting standard 2021.) [www.percstandard.eu](http://www.percstandard.eu)

Ashton, J.H., Blakeman, R.J., Geraghty, J.F., Beach, A., Coller, D. and Philcox, M.E., 2015, The Giant Navan Carbonate-Hosted Zn-Pb Deposit – A Review: in Archibald, S.M. and Piercey, S.J., eds., Current Perspectives on Zinc Deposits, Dublin, Irish Association for Economic Geology, Special Publication, p. 85-122.

Ashton, J.H., Beach, A., Blakeman, R.J., Coller, D., Henry, P., Lee, R., Hitzman, M., Hope, C., Huleatt-James, S., O'Donovan, B. and Philcox, M.E., 2018, Discovery of the Tara Deep Zn-Pb Mineralisation at the Boliden Tara Mine, Navan, Ireland: Success with Modern Seismic Surveys. SEG Special Publications, 21, 365-381.

Cover image courtesy of Joshua Smiles, Senior Mine Geologist Tara Mines 2023.