NI43-101 INDEPENDENT REPORT ON A BASE METAL EXPLORATION PROJECT AT BALLINALACK, CO. WESTMEATH, IRELAND

Group Eleven Resources Corp.
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Mining Industry Consultants

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1.0 Summary

In January 2018, SLR Consulting Ireland ("SLR") was requested by the directors of Group Eleven Resources Corporation ("GERC"), registered in British Columbia with offices at 2200-885 West Georgia Street, Vancouver, BC, Canada, to update an earlier independent National Instrument 43-101 technical report ("the 2017 Report") on the Ballinalack Zinc Project ("the Project") in Ireland. This updated report (The "Independent Report" or "this Report") was prepared by Paul Gordon and Dr John Kelly and ("the Authors") of SLR who are "qualified persons" and independent of GERC and all its subsidiaries within the meaning of National Instrument 43-101 – Standards of Disclosure for Mineral Projects ("NI43-101"). Section 14 (Resource Estimates) was prepared by Dr Belinda van Lente (Qualified Person for Mineral Resources) and Nerys Walters of CSA Global.

1.1 Introduction and Terms of Reference

CSA Global (UK) Ltd ("CSA Global") was engaged by SLR Consulting Ireland ("SLR", on behalf of Group Eleven Resources Corporation "GERC") to generate a Mineral Resource estimate ("MRE") for the Ballinalack Zinc-Lead Project ("Ballinalack"), in County Westmeath, Ireland, in February 2018 and, with SLR, to prepare this Technical Report (the "Report") in accordance with National Instrument 43-101 of the Canadian Securities Administration ("NI 43-101") to support GERC's public disclosure about the Property.

On June 30, 2017, GERC completed a transaction with Teck Ireland Ltd. ("TIL", a wholly owned subsidiary of Teck Resources Limited, "Teck Resources") to purchase TIL's 60% equity interest in Ballinalack Resources Limited ("BLK JV"), a joint venture company which wholly owns eleven prospecting licences ("PLs") covering the Project, located in Counties Westmeath and Longford, Ireland. The remaining 40% equity interest in the BLK JV is held by Zhongjin Lingnan Mining (HK) Company Limited ("Nonfemet"), a China based company engaged in the mining and processing of lead, zinc and other non-ferrous metals.

Consideration payable by GERC to Teck Resources for the acquisition is summarised below:

- CA$2,500,000 in cash payable on closing (completed)
- CA$1,000,000 in equity (3,333,333 shares at a deemed value of CA$0.30 per share) on closing (completed)
  - Represents 8.2% interest in GERC (6.9% fully diluted)
- Net smelter return (NSR) royalty of 1.5% (on 60% of production)
- GERC can buy-back 1/3 of the above NSR royalty (0.5%) for CA$2,000,000
- 20% "Flip" provision – if GERC sells any portion of its equity interest in the BLK JV within three (3) years, TIL will be entitled to 20% of GERC profit on the sale (i.e. after deducting certain costs).

As independent geologists and Qualified Persons (QPs), the Authors were requested to review the available exploration data for the Project and to prepare a Mineral Resource estimate ("MRE") for the Ballinalack deposit on the Property. The Authors have been requested to review and assess the exploration programme (to be implemented by the BLK JV), set out in this report. This report outlines the previous work carried out on the Project and particularly by TIL from 2005 to the date of this report.

A site visit to the Project was carried out on behalf of SLR and CSA Global by Qualified Persons ("QPs"), Paul Gordon and Dr Belinda van Lente on 12 April 2018, including a visit to GERC's core storage facility and to a drill site. The visit was in addition to previous visits by Dr John Kelly on 28 February 2017 and 17 May 2017.

1.2 Property Description and Location

The Project consists of eleven contiguous Prospecting Licences ('PLs') covering a total of 312.29 km^2; nine are located in Co. Westmeath and two in Co. Longford in central Ireland. The Project is located mid-way between the two large towns of Mullingar and Longford, on national road N4. The Property has excellent access and infrastructure, with a mild climate permitting work all year round.

Three of the 11 licences were initially awarded to TIL in November 2005. Subsequently TIL bolstered its ground position by adding four more PLs in 2006 and a further four PLs in 2011. Licences are valid for six years, but renewable once PLs have been kept in good standing by meeting work and expenditure commitments.

1.3 Accessibility, Climate, Local Resources, Infrastructure and Physiography

Ballinalack is on the N4 national arterial route between Dublin on the east coast and Sligo on the west coast. The Project is conveniently located between the two large towns of Longford and Mullingar. The Dublin-Sligo railway line also runs through the central part of the Property. There is a dense network of local roads in the Project area providing year-round access. A 110 kV electricity transmission line runs through the Property.

The regional climate is mild and temperate. The average monthly rainfall is 80 mm. Exploration can be conducted year-round. The Project area is typical of the Irish Midlands with low-lying topography and lowland glacial geomorphology with farmland and areas of lowland peat-bog and lakes. The primary economic activity in the Project area is agriculture, carried out primarily through a system of family-owned smallholdings.

1.4 History

The Ballinalack zinc-lead prospect in County Westmeath was discovered during an exploration programme by Ron Syngenore Exploration Limited (Syngenore, a subsidiary of Noranda Mines Ltd) in 1970 by testing soil geochemical anomalies supported by IP anomalism.

The southern area was drilled first, with four holes completed for a total of 790 m. Drilling confirmed low-grade sphalerite and pyrite mineralisation in bedrock. Sandy basal beds intersected in drillholes 2 and 4 were the first evidence of the presence of an inlier under glacial cover. The target was downgraded because of the consistent low-grade mineralisation. Five additional drillholes which were drilled further east only confirmed this view. A single drillhole (No. 5) was drilled into a chargeability high under the bog about 1.5 km north of drillhole No. 3. The chargeability was attributed to widely disseminated pyrite in a dark-grey to black Calp limestone with sub-horizontal bedding.

The focus then shifted to the northern zinc high. The first hole drilled on this target (drillhole No. 6) intersected significant mineralisation from 16.7m down to 32m, averaging 5% Zn and 1% Pb in the Waulsortian limestones beneath barren Calp limestone cover.

In 1970, after the drilling of 13 drillholes in the northern zinc high, Holman, Edwards and Penstone resigned from Syngenore Explorations. In 1971, Edward & Associates passed its shareholding in Syngenore to Barymin and Noranda continued as the operator (Robertson Group, 1991). Syngenore later became a joint venture company, with Noranda owning 81% and Edward & Associates 19%. Noranda operated the project until a farm-in by Billiton the mid-1980s. In the late 1980s, Oliver Resources plc, a junior Irish explorer, acquired Noranda's interest in the project to become sole owner.

In 1991, the Robertson Group, undertook a Feasibility Study on the Ballinalack deposit; by this time, drilling had reached 126 diamond drillholes in and surrounding the Ballinalack property. Robertson executive summary were as follows reported an Indicated Mineral Resource of 7.71 million tonnes averaging 6.33% Zn and 0.95% Pb, at a cut-off grade of 4.0% Zn, Note that the resource was classified using the definitions of the then Institute of Mining and Metallurgy (IMM). CSA Global cautions that the Qualified Person has not done sufficient work to classify this historical estimate as Mineral Resources in accordance with CIM and NI 43.101 guidelines and notes that the historical estimate is superseded by the updated Mineral Resource estimate documented in this report. GERC is not treating the historical estimates as current resources.

In 1995, Oliver Minerals was purchased by Celtic Resources Holdings Plc, which then proceed to option the property to MIM and Navan Resources. Drilling was completed but results were not sufficiently encouraging the option was dropped. In 1998, Ivernia West acquired Oliver Minerals from Celtic Resources. Drilling tested base of Waulsortian and Navan Beds targets on the Property. Ivernia surrendered the licences in 2002.

TIL acquired the Property under competitive bid in 2005. TIL recovered 16,000 m of historical drill core from storage and re-logged and sampled a number of historical drillholes. This work led to a major reinterpretation of the geology. Between 2006 and 2013, TIL completed orientation surveys over the prospect and then extended them outward. Geophysical surveys included Induced Polarisation, gravity, UTEM, and eleven seismic profiles across the Project area. TIL drilled 30,000m of diamond drilling with the focus on making new discoveries within a radius of 10 km west and north of the prospect.

In 2007, Chlumsky Armbrust & Meyer in Denver completed an internal scoping-level resource estimate for TIL of 5.24 million tonnes averaging 7.5% Zn and 1.2% Pb with a 4.0% Zn and 0.5% Pb cut-off grade and a minimum three-metre mining height. CSA Global cautions that the Qualified Person has not done sufficient work to classify this historical estimate as Mineral Resources in accordance with CIM and NI 43.101 guidelines and notes that the historical estimate is superseded by the updated Mineral Resource estimate documented in this report. GERC is not treating the historical estimates as current resources.

1.5 Geological Setting and Mineralisation

The Ballinalack Project lies in the north-central part of the “Irish Midlands Orefield”, a zinc-lead mineralized province within Lower Carboniferous (Mississippian) platform limestones which extends across central Ireland and which constitutes one of world’s major districts for zinc and lead mineralisation. Within the Lower Carboniferous carbonate sequence, two stratigraphic intervals host the bulk of known zinc-lead deposits the Pale Beds of the Navan Group in the northern part of the Irish Midlands and the Waulsortian Limestone in central and southern Ireland. The predominant stratigraphic control appears to be the occurrence of favourable reactive host rocks, especially micritic and oolitic limestone.

All Irish deposits show a close control by faults and occur along major northeast structural trends are controlled by pre-existing basement structures. Several distinct linear mineralisation trends such as the Tynagh-Ballinalack Trend, Rathdowney Trend, and the Navan-Silvermines Trend follow this Caledonide grain. Deposits are localised along segments of fault zones where fractured-rock connectivity created ideal plumbing systems for ascending hydrothermal mineralising fluids, especially related to offset relay zones and transform structures.

Ballinalack lies along the Ballinalack Fault lies towards the northeastern termination of a basement horst which extends southwards for several tens of kilometres. The Tynagh – Ballinalack Trend coincides with a regional gravity lineament which represents a major basement controlling structure and a focus for mineralising fluids.

Zinc-lead mineralisation at Ballinalack is concentrated in a series of pods within knolls of Waulsortian (mudbank) Limestones aligned parallel to the Ballinalack Fault. Minor but significant mineralisation also occurs in the older

Pale Beds stratigraphy, mainly in the footwall of the fault, but also in the hanging wall which is very poorly tested at depth. The Pale Beds host the world-class Navan zinc-lead deposit, located 50 km to the east.

1.6 Deposit Types

The Ballinalack prospect fits into the carbonate-hosted zinc-lead deposits sub-type known as 'Irish Type', a distinct class of carbonate-hosted zinc-lead mineralisation with some similarities to Mississippi Valley Type deposits but dominated by replacement mineralisation and formed generally at higher temperature during diagenesis. These deposits are well understood in Ireland as a result of almost six decades of mineral exploration and the sequential discovery of five economic zinc-lead deposits – Tynagh, Silvermines, Navan, Galmoy and Lisheen.

The following summary from Hitzman and Beaty (1996) provides a brief description of the main characteristics of this deposit type:

- The deposits occur preferentially in the stratigraphically lowest, non-argillaceous carbonate unit, (i.e., the first permeable, reactive unit encountered by the ascending fluids);
- They occur along, or immediately adjacent to, steeply-dipping normal fault systems which provided conduits for ascending hydrothermal fluids, i.e., typically, in the downthrown blocks of the faults;
- The deposits are stratabound and many display generally stratiform morphologies;
- Most deposits display pre-mineralisation, diagenetic or hydrothermal dolomite alteration of the carbonate host rocks (i.e. mineralisation post-dates the dolomite which post-dates lithification);
- Sphalerite and galena are the principal sulphides. Iron sulphides occur in variable amounts; some deposits are dominated by iron sulphides, while others contain very minor amounts. Barite is present in all the deposits, ranging from a dominant phase to a minor constituent. Many deposits contain minor tennantite, chalcopyrite, and/or Pb-Cu-Ag-As sulphosalt minerals;
- They display complex sulphide textures ranging from replacement of host rock by fine-grained, anhedral and colloform sulphides to infill of solution cavities by fine-grained, colloform and medium- to coarse-grained crystalline sulphides. Layered sulphide textures, other than colloform banding, are restricted to geopetal cavity fillings. Sulphides replace sedimentary, diagenetic, and hydrothermal wall rock, as well as previously deposited sulphides adjacent to feeder faults;
- The deposits display a general textural zonation with massive sulphide adjacent to "feeder faults" grading outward to veinlet-controlled and/or disseminated sulphides on the periphery of wedge-shaped sulphide lenses. Metals are also laterally and horizontally zoned, typically Pb-rich closest to feeder structures and the base of the orebody, then Zn-rich, with high Fe to Zn+Pb ratios in the distal parts of the orebodies.
- The deposits share the following generalised paragenesis: early carbonates → early diagenetic dolomitisation → "iron formation" (silica + iron oxides ± siderite) → barite → hydrothermal dolomitisation → Fe sulphides → sphalerite (becoming increasingly coarse-grained) → mixed sulphides (sphalerite, galena, Fe sulphides, Cu sulphides, As sulphides etc.) ± barite → late carbonates.

The most favourable horizon in the southern half of the Irish Midlands is the base of Waulsortian. In the northern half of the district, the Pale or Navan Beds sequence is the preferred host for a number of deposits, notably Navan.

1.7 Exploration

GERC has completed limited work at Ballialack since its acquisition, mainly data compilation and interpretation and a limited drill programme. The bulk of the work completed at Ballinalack was under previous operators and is summarised under History (above).

1.8 Drilling

A total of 513 drillholes for 93,350 m have been completed on the Property. Of these, 59 drillholes for 14,822 m have been drilled at the Ballinalack deposit. Data for this historical drilling was compiled by Roberston Group in 1991 while completing a Feasibility Study at Ballinalack. Drillhole location and geological and analytical data are available from drill logs, but little or no information is available for collar and down-hole survey methods and accuracy; core size, quality and recovery; core handling and security. Pre-1991 drilling constitutes 95% of the data for the Ballinalack Mineral Resource estimate.

Post-1991 drilling totals 141 drillholes for 44,921 m on the Property and was completed by Ivernia West, TIL, and GERC. Drilling methods, recoveries, and procedures are documented and have been reviewed by the Authors and are considered to be of good industry standard.

GERC has completed two drillholes designed to test targets identified from GERC's review and reinterpretation of the Ballinalack data. Drillhole G11-1344-01 was designed to intersect the Ballinalack fault immediately below the area of the historical estimate; it did not intersect significant mineralisation and was not assayed. Drillhole G11-1344-02 was designed to test for mineralisation within the Navan Beds and intersected significant mineralisation.

1.9 Sample Preparation, Analyses and Security

As for Drilling, sampling and analyses can be divided into pre- and post-1991 periods. For pre-1991 data, little or no information is available for sampling and analytical method and QAQC and no laboratory reports for analytical data are available. Pre-1991 sample data constitutes 94% of the data for the Ballinalack Mineral Resource estimate.

Post-1991 sampling and analytical method and QAQC are documented and have been reviewed by the Authors and are considered to be of good industry standard.

1.10 Data Verification

Pre-1991 data has been sourced from the 1991 Roberston Feasibility Study documentation. The Authors have used the EMD's open file system to check randomly chosen drill logs and drill log summaries against the data in the GERC database, which was acquired from TIL. Analysis results are handwritten into the typed drill logs and a selection of these have been checked. Only minor errors have been noted and the Authors conclude that the data in the GERC database reflects the data compliled by Roberston. Validation against original laboratory certificates has not been possible as these do not exist. TIL reportedly conducted check-sampling of available historical drill core. These data have not been reviewed and should be for any subsequent Mineral Resource estimate.

Original drill data including laboratory analytical certificates are available for drilling by Ivernia West. These have been used to verify the GERC database using a random selection of drillholes. No errors were observed.

The data gathered by TIL were verified by visually check drillhole depths, numbers, and assay results between drill core, TIL drill logs and the data provided by GERC. Drillhole location maps were also compared against the reported coordinates in licence reports submitted by TIL to EMD, for a random selection of drillholes. No significant errors were observed.

A site visit to the Project was carried out by Qualified Persons on 12 April 2018. CSA Global and SLR were given full access to the relevant tenements and drill core. Discussions were held with GERC personnel to obtain information on the previous, as well as the planned, exploration work.

The Authors are satisfied that the drillhole database acquired from TIL and being used by GERC is as clean and robust a database as is possible considering the historic nature of much of the drill data and the absence of original historic data and the absence of QAQC procedures and data. The Authors consider the database appropriate for estimation of a Mineral Resource in Inferred classification but additional validation would be required for higher classification of the Mineral Resource. It is considered suitable for the purposes of reporting on the project and as a basis for the proposed exploration programme.

1.11 Mineral Processing and Metallurgical Testing

Metallurgical testwork has not yet been carried out by GERC. Historical testwork was conducted as part of the 1991 Robertson study on a single composite sample. Dense media separation testwork indicated that approximately 40% by weight of the material could be rejected, for a loss of just 2% of the metal content. Prelimary flotation tests, using conventional techniques, suggested that favourable recoveries and concentrate grades should be achievable. The Author's note that metallurgical performance for all the Zn-Pb deposits in the Irish Orefield has been good, producing clean concentrates with high recoveries using standard differential flotation processing.

1.12 Mineral Resource Estimate

Mineral Resources were estimated using Ordinary Kriging ("OK"), within mineralized volumes created around a 3% Zn+Pb grade envelope (derived from an assessment of the natural grade cut-off), with a minimum true thickness of two metres, and which honoured stratigraphical and geological controls (derived from drillhole logging and cross-sectional interpretation).

The MRE compiled by CSA Global has been classified and is reported as Inferred Mineral Resources based on the Canadian Institute for Mining ("CIM") guidelines, adopted for Technical reports which adhere to the regulations defined in Canadian National Instrument 43-101 ("NI 43-101").

The MRE for Ballinalack as at 30 August 2018 (Table 1.1), comprised 5.4 Mt at grades of 7.6% Zn, 1.1% Pb, and 9.0 g/t Ag. Inferred Mineral Resources were reported using a zinc equivalent ("ZnEq") cut-off grade of 5.2%, based on Net Smelter Return ("NSR") calculations of conceptual operating costs and metal revenue, in support of "reasonable chances of eventual economic extraction".

Conceptual costs and assumptions were made based on costs of nearby and similar mines, as well as an Economic Feasibility Study for the Ballinalack deposit completed by The Robertson Group plc ("Robertson") in February 1991 (Robertson, 1991). The following parameters were incorporated: Life of Mine ("LOM"), mining methodology (including mining cost), flotation and plant recovery (including processing/treatment and refinery costs) and selling cost.

However, no mining optimisation or Economic Study has been completed on the current MRE, and the reported Inferred Mineral Resources do not have proven economic viability and are not Mineral Reserves. The consideration of conceptual costs and assumptions are presented simply to address the requirement under CIM guidelines, that Mineral Resources have "reasonable chances of eventual economic extraction".

Table 1.1 Mineral Resource Estimate – Ballinalack Zinc-Lead Project - as at 30 August 2018

Group Eleven Resources Corporation Ballinalack Mineral Resource Estimate as at 30 August, 2018									
Resource Category	Tonnes ('000)	Grades				Metal Content			
		Zn (%)	Pb (%)	Zn+Pb (%)	Ag (g/t)	Zn lb ('000)	Pb lb ('000)	Zn+Pb lb ('000)	Ag Oz ('000)
Inferred	5,400	7.6	1.1	8.7	9.0	898,300	135,700	1,034,000	1,600

Notes:

- Classification of the MRE was completed based on the guidelines presented by Canadian Institute for Mining (CIM), adopted for Technical reports which adhere to the regulations defined in Canadian National Instrument 43-101 (NI 43-101).
- Inferred Mineral Resources are at 5.2% zinc equivalent cut-off grade.
- Zinc Equivalent (ZnEq%) = (NSRPb + NSRZn + NSRAg in Pb + NSRAg in Zn)*100/(RZn*PZn*(PrZn-ScZn) - RZn*PZn*PrZn*(RoyZn/100))
- ZnEq cut-off grade (calculated from Net Smelter Return) using the following parameters:
  - RZn: Metallurgical recovery of Zn, PZn: Zn price, ScZn: Selling cost for Zn, RoyZn: Royalty.
  - Mining recovery of 95%; Mining dilution of 10%
  - Mining cost of US$60.00/t; Processing cost of US$13.63/t
  - Treatment charges of US$400/t of Zn concentrate and US$270/t of Pb concentrate; Refining charges of US$1.00/oz for Ag
  - Concentrate transport to smelter: US$100/t of wet concentrate.
  - Processing recovery 92.7% Zn; 54.1% Pb; 82.6% Ag in Zn; 9.4% Ag in Pb.
  - Zinc price of US$2,954/t; Lead price of US$2,325/t; Silver price of US$15.79/oz
  - Concentrate grade 64.4% Zn, 45% Pb, 98 g/t Ag in Zn, 104 g/t Ag in Pb; Concentrate moisture of 9%
  - Payable Zn 85%, Pb 93%, Ag in Zn 49%, Ag in Pb 51.9%, with selling cost Zn US$1,259/t metal, Pb US$1,026/t metal, Ag in Zn US$6.73/t metal, and Ag in Pb US$6.97/t metal.
  - Royalty of 4.5%.
- The Inferred Mineral Resource classification is based on geology, trends in mineralisation, drilling spacing, sampling QA/QC, estimation search pass number and number of samples, zinc equivalent grade, and density data.
- Tonnages and metal are rounded to the nearest 100,000 to reflect this as an estimate.
- Assumed average in situ dry bulk density for mineralized material is 3.05 t/m^3.
- Mineralisation wireframes were constructed using a minimum true thickness of 2.0 m, at 3% Zn+Pb natural cut-off.
- CSA Global is not aware of any known environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the MRE.

1.13 Interpretation and Conclusions

The Project contains the Ballinalack zinc-lead deposit which holds the updated Inferred Mineral Resource estimate documented in this report. On this basis, Ballinalack represents the second largest undeveloped zinc-lead Mineral Resource in Ireland after Glencore's Pallas Green deposit, in terms of contained zinc and lead metal. This Mineral Resource estimate highlights the economic potential of the Project and the additional known mineralized occurrences and large scale of the hydrothermal system supports the potential to add significantly to the resource base.

The Ballinalack deposit is located in the base of the Waulsortian, within the hanging wall of a significant normal fault. Such a stratigraphic and structural setting is typical of Irish Type zinc deposits. The Project is considered to be highly prospective for additional Irish-type zinc-lead mineralisation within the Lower Carboniferous sedimentary package. It includes additional highly prospective ground with mineralized drillholes that have not been properly followed-up. Bedrock exposure is very limited in the Ballinalack area, due to laterally extensive glacial cover and the many bogs and lakes and has hampered past exploration which has not always been effective.

All modern-era, economically viable zinc-lead deposits in the Irish Carboniferous orefield occur in either the Waulsortian "Reef" Limestones (e.g. Lisheen, Silvermines, Tynagh etc.) or the Navan Beds (e.g. Navan, 50 km to the east of Ballinalack). Both the Waulsortian and the Navan Beds are well-developed in the Project area and are considered to be at an economically viable depth.

The known deposit at Ballinalack is hosted within Waulsortian mudbanks in the hanging wall of the Ballinalack Fault. The stratigraphically deeper Pale Beds in the fault hanging wall are very poorly tested and represent a high-priority target, especially considering similarities to the giant Navan Deposit. In addition, an extension of the Ballinalack fault system remains untested to the northeast and there is considered to be ample room for a new discovery in the Waulsortian on this trend. Drilling by TIL into the Pale Beds elsewhere on the Project has intersected significant zinc-lead mineralisation but has not been followed-up.

GERC has acquired a large and well organised exploration database from TIL who compiled all historical data and information on the Project and included re-logging of 16,000m of surviving drill core of the almost 63,000m of historical delineation diamond drilling of the prospect. TIL's historical database compilation together with extensive new work including 30,000m of diamond drilling and eleven seismic profiles across the Project provides a highly valuable foundation for future exploration. Seismic surveying has in recent years lead to a significantly better geological understanding and new discovery around the giant Navan zinc deposit; GERC is optimistic that TIL's seismic profiling, supplemented by newly commissioned seismic surveys, will highlight prospective corridors along deep-seated structures that might control shallower conduit systems for mineralising fluids.

In summary, the Project has a number of key elements which together make it one of the most attractive exploration properties in the Irish Orefield. These attributes are:

- It contains the Ballinalack prospect;
- Two prospective horizons are present as targets, both known to host economic deposits elsewhere in Ireland (Pale Beds and Waulsortian Reef);
- Structural complexity within a regional structural trend is present and known mineralisation is believed to be related to a major basement structure;
- There are untested targets both beneath the prospect at Ballinalack and regionally within the Project area; and
- There is a large database of geological and geophysical data.
- Work done by TIL in the past decade has added enormously to the understanding of the Project, particularly with the addition of seismic profiles to assist with the interpretation of the structural geology.

1.13.1 Mineral Resource Estimate Conclusions

CSA Global considers that there is potential Mineral Resource upside at the project, assuming that geological and structural controls on mineralisation can be better constrained. There are resource risks, which resulted in the classification of Inferred Mineral Resources. These risks are largely attributed to wide drill spacing, limited validation of the historical drillholes by more recent drilling, the lack of QAQC information for historical drilling, and the lack of in situ dry bulk density ("BD") data.

1.14 Recommendations

Recommendations have been made regarding additional exploration drilling on the Property, especially to test the Pale Beds target in the hanging wall of the Ballinalack Fault, as well as the footwall. Additional infill drilling would be needed to upgrade classification of the Mineral Resource and test extensions.

Specific recommendations arising from the Mineral Resource estimate include:

- Complete additional infill drilling to a drill spacing of about 25 x 25 m to provide validation of the historical drilling, to increase the current level of understanding of mineralisation and geological controls, and to potentially upgrade Inferred Mineral Resources to Indicated Mineral Resources. Drilling should additionally be planned to investigate mineralisation to the northeast of the resource area and to the south of the Ballinalack fault.
- Complete additional step-out drilling to a drill spacing of about 100 x 100 m to potentially augment the Mineral Resource estimate, guided by integrated structural, lithostratigraphic and alteration interpretation and supported by additional geophysics for direct targeting and structural interpretation.
- Complete angled oriented holes to allow better modelling of structures and of steep mineralisation zones.
- Further investigation of the timing of the Cappagh fault with relation to mineralisation should be undertaken, with a view to linking mineralisation either side if timing is syn-mineralisation.
- Acquire enough additional bulk density data from DD core to support a bulk density regression related to Zn, Pb and Fe grade. The methodology and measurements should be verified and standardised in future MRE updates.
- Continue to improve the 3D geological, alteration and structural models by logging new holes, incorporating with TIL relogging data, and geophysical models and inversions. These 3D models should be used in defining along and across strike targets in Waulsortian and Pale Beds; in particular, it is critical to understand the fault and fault splay geometry relative to lithostratigraphy and determine the best position to test the Pale Beds target in the fault hanging wall.
- Undertake metallurgical testwork to refine the Zn%, Pb% and Ag g/t plant feed grades and recoveries, for use in the ZnEq cut-off grade and NSR calculations of conceptual operating costs and metal revenue, in support of “reasonable chances of eventual economic extraction”.
- Acquire missing data including ground magnetic data and collation into a complete dataset, as well as the collection of new magnetic and seismic data on a project scale for use in modelling of structural trends and to assist in future drill planning and MRE updates. The Ballinalack Project is of sufficient technical merit to warrant the recommendation of a robust, two phase exploration programme.

2.0 Introduction and Terms of Reference

At the request of the directors of Group Eleven Resources Corp. ("GERC") and SLR Consulting ("SLR"), CSA Global completed a Mineral Resource estimate for the Ballinalack Zinc-Lead Project located in Counties Westmeath and Longford, Ireland (Figure 2.1).

On June 29, 2017, GERC acquired from Teck Ireland Ltd. ("TIL") a 60% equity interest in Ballinalack Resources Limited ("BLK JV"), a joint venture company which wholly owns the Ballinalack Project. GERC is registered in British Columbia, Canada and its wholly-owned subsidiary, Dublin-based, Group Eleven Resources Limited ("GERL") wholly owns Irish-registered Group Eleven Mining & Exploration Limited ("GEM"). GEM has separately built up a very large zinc exploration portfolio in Ireland, covering over 3,000 square km (km^2) of prospective ground along known mineralized trends within Ireland. Group Eleven (as GEM, GERL and GERC) was formed in early 2015 to identify superior exploration opportunities in the world-class Irish zinc district, at a time when there is a widely acknowledged, global lack of quality development zinc projects. It is noted that Irish-based founders of GERC have deep experience and knowledge of Irish-type zinc projects.

TIL is a wholly owned subsidiary of Teck Resources Limited ("Teck Resources"), a large diversified mining company based in Vancouver, Canada. The BLK JV wholly owns eleven (11) contiguous prospecting licences ("PLs") covering the Project, located in Counties Westmeath and Longford, Ireland. The remaining 40% equity interest in the BLK JV is held by Zhongjin Lingnan Mining (HK) Company Limited ("Nonfemet"), a China-based company engaged in the mining and processing of lead, zinc and other non-ferrous metals.

Consideration payable by GERC to Teck Resources for the acquisition is summarised below:

- CA$2,500,000 in cash payable on closing (completed)
- CA$1,000,000 in equity (3,333,333 shares at a deemed value of CA$0.30 per share) on closing (completed)
  - Represents 8.2% interest in GERC (7.1% fully diluted)
- Net smelter return (NSR) royalty of 1.5% (on 60% of production)
- GERC can buy-back 1/3 of the above NSR royalty (0.5%) for C$2,000,000
- 20% "Flip" provision – if GERC sells any portion of its equity interest in the BLK JV within three (3) years, TIL will be entitled to 20% of GERC's profit on the sale after deducting certain costs

The Project area covers approximately 312.29 km^2, centred on the historic (non NI 43-101 compliant) Ballinalack zinc-lead historical estimate totalling 7.7 million tonnes grading 7.3% combined zinc-lead (6.3% zinc and 1.0% lead). The prospect is thought to represent the second largest undeveloped zinc-lead occurrence in Ireland, after Glencore's Pallas Green deposit.

CSA Global cautions that the Qualified Person has not done sufficient work to classify this historical estimate as Mineral Resources in accordance with CIM and NI 43.101 guidelines and notes that the historical estimate is superseded by the updated Mineral Resource estimate documented in this report.

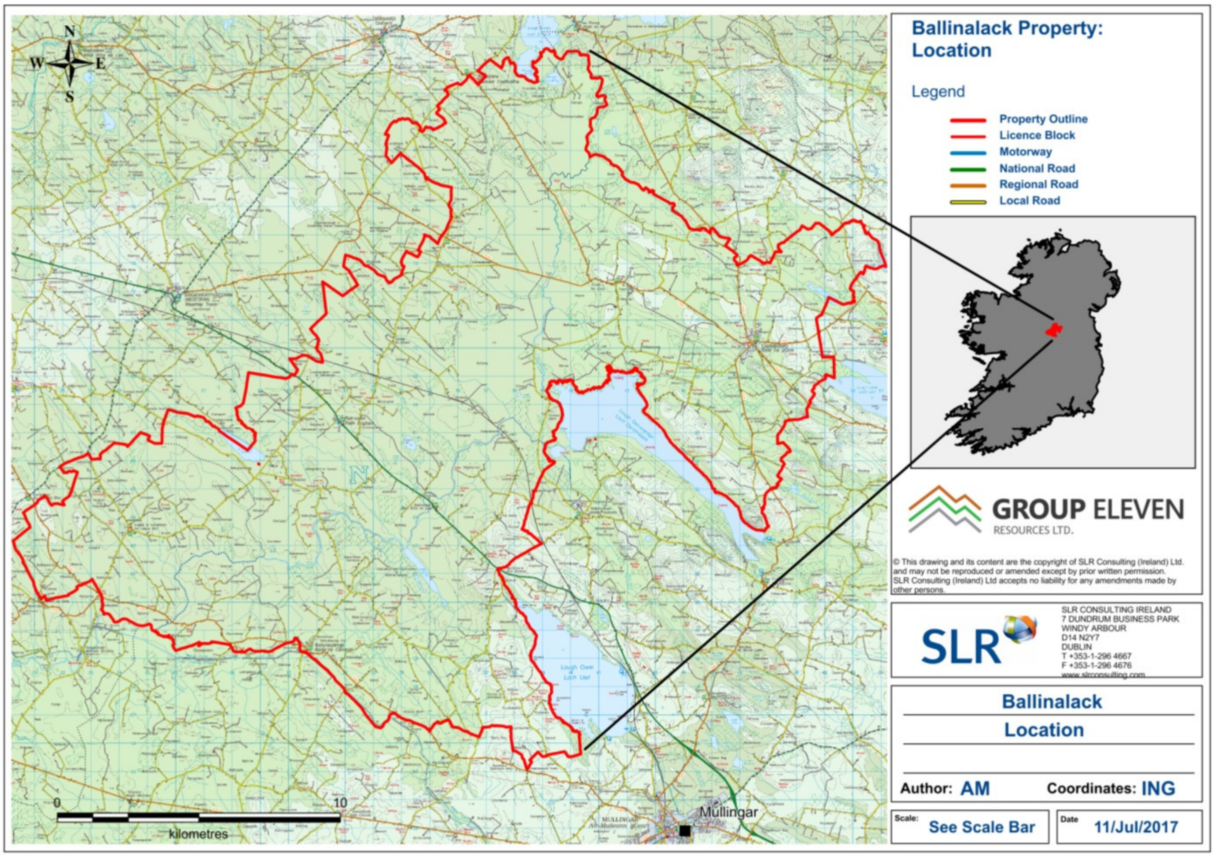


Figure 2.1 Ballinalack Project Location

The eleven exploration licences were granted to TIL by the Minister of Communications, Climate Action and Environment, Republic of Ireland, for a period of six years (see Section 4).

2.1 Terms of Reference

SLR and CSA Global were requested by the directors of GERC, registered in British Columbia, Canada with offices at 2200-885 West Georgia Street, Vancouver, BC, Canada, to complete an independent technical report (the "Independent Report"; this "Report") on the Ballinalack Project specific to the standards dictated by National Instrument 43-101 ("NI 43-101"), companion policy NI43-101CP and Form 43-101F1 (Standards of Disclosure for Mineral Projects).

The Report focuses on the completion by CSA Global of a Mineral Resource estimate for the Project and is intended to enable the Issuer and potential partners and investors to reach informed decisions with respect to the Project. Given that the generation of an updated Mineral Resource estimate is material to the underlying value of the asset, an updated Independent Report was deemed necessary.

2.2 Sources of Information

The Independent Report is based on:

- Technical data, documents, reports and information from provided by TIL to GERC;

- Archive of historic reports obtained from the Geological Survey of Ireland ('GSI') archive and copies of exploration permit documents;
- Published papers on the geology and mineral deposits of the region;
- Site visits and review meeting undertaken by the Authors in February 17, 2017 and May 16, 2017 to the Ballinalack Project, and by Dr. Belinda van Lente (CSA Global) on 12 April 2018;
- Reports and data in the public domain;
- Previous extensive SLR and CSA Global experience with base metal exploration and mining projects in Ireland and the region.

2.3 Data Gathering and Site Visit by SLR and CSA Global

A site visit to the Project was carried out on behalf of SLR and CSA Global by Qualified Persons ("QPs"), Paul Gordon and Dr Belinda van Lente on 12 April 2018, including a visit to GERC's core storage facility and to a drill site. The visit was in addition to previous visits by Paul Gordon and Dr John Kelly on 28 February 2017 and 17 May 2017, which also comprised a visit to the Ballinalack project area and GERC's core storage facility in Mullingar, Co. Westmeath, to examine key drillholes and mineralized intersections. The authors were accompanied by David Furlong, Chief Operating Officer of GERC. GERC provided the Authors with hard and electronic copies of documentation pertinent to the Project and maps showing geology, geochemical anomalies, past drilling, and the results of geophysical surveys.

By reason of their education, experience and affiliation with the Institute of Geologists of Ireland and South African Council for Natural Scientific Professions, respectively, Mr. Paul Gordon and Dr Belinda van Lente fulfil the requirements for conducting a technical review for the purpose of NI 43-101.

2.4 Units and Abbreviations

For the purpose of this report, all measurements are given in metric units. All tonnages are in metric tonnes (t) of 1,000 kilograms, and silver values are given in grams per metric tonne (g/t).

The following is a list of abbreviations used in this report:

Table 2.1 List of Units and Abbreviations Used.

Abb.	Description	Abb.	Description
%	Percent	**ITM**	Irish Transverse Mercator Grid (2001)
<	Less than	**Kg**	Kilogram
>	Greater than	**kg/m^2**	Kilograms per square metre
°	Degree	**kg/t**	Kilograms per tonne
°C	degrees Celsius	**km**	kilometre(s)
µm	Micrometre (micron)	**km^2**	Square kilometre
1 gram	0.3215 troy oz.	**lb**	Pound (weight)
1 oz./Ton	28.22 g/tonne	**Kt**	Thousand tonnes
1 troy oz.	31.104 g	**M**	Metre
A	Year (annum)	**M**	Million
Ag	Silver	**m^2**	Square metre
ASL	above sea level	**Ma**	Million years ago
Ba	Barite	**MASL**	Metres above sea level
$BaSO_4$	Barium sulfate	**Mm**	millimetre(s)
c.	circa (approximately)	**Mt**	Million tonnes
Cm	Centimetre	**n.a.**	not available/applicable
Cu	Copper	**NI 43-101**	Canadian National Instrument 43-101
DDH	Diamond drillhole	**oz.**	troy ounce
DEM	digital elevation model	**PGeo.**	Professional Geoscientist
EMD	Exploration and Mining Division of Ireland	**Pb**	Lead
Fn, Fmn	Formation	**PL**	Prospecting Licence
g or gm	gram(s)	**PLA ("PL")**	Prospecting Licence Area: the pre-defined area of a prospecting licence.
g/t	grams per metric tonne	**ppb**	parts per billion
GPS	Global Positioning System	**ppm**	parts per million
GSI	Geological Survey of Ireland	**Project**	Ballinalack base metal exploration project
H	Hour	**PrSciNat**	Professional Natural Scientist
Ha	hectare(s)	**QA**	quality assurance
ICP-MS	Inductively Coupled Plasma - Mass Spectrometry	**QC**	quality control
In	Inch(es)	**QP**	Qualified Person
ING	Irish National Grid	**TSX**	Toronto Stock Exchange
IP	Induced Polarisation	**Zn**	Zinc

3.0 Reliance on Other Experts

The Authors did not rely on any other experts in the compilation of this report.

4.0 Project Location and Description

The Project is located in Counties Westmeath and Longford, in the Irish midlands. The region is typically low-lying, with lakes, rivers and bogs a common feature of the landscape.

4.1 Project Location

The Project is made up of eleven contiguous prospecting licences ("PLs") which form a single strategic block of exploration ground (see Figure 4.1; map centred on the Ballinalack zinc-lead prospect). Ballinalack is 85 km WNW of Dublin, capital of the Republic of Ireland. Greater Dublin has a population of two million and an international airport which is one of the busiest in Europe. The Ballinalack prospect is in County Westmeath and lies just north of the small village of Ballinalack (population 137) on the N4 national primary road, and approximately 14.5 km NW of Mullingar (population 20,000) and some 23 km southeast of Longford Town (population 41,000). The village of Ballinalack is on the border between PL 1346 and PL 1344 with coordinates: 234923E, 264644N ING; 637202E, 76529N ITM; 7° 22.3' 51" W', 53° 37' 50.2"N).

Ballinalack village is on the Inny River which gently meanders for five kilometres through low-lying, boggy ground between nearby Lough Derravaragh and Lough Iron. The Inny River flows to the southwest and into Lough Ree along the Shannon River. Lough Owel is about four kilometres to southeast. The regions around Ballinalack can be described as lake-land and boggy in parts and generally devoid of outcrop, with elevations below 120m MASL.

The Project extends from Lough Kinale in the north, to the southern tip of PL1346 in the south; from the western extent of PL 622 in the west, to the eastern edge of PL 1346 on the southern shore of Lough Owel.

Table 1.1, below, shows the furthest extents of the property in each cardinal direction.

Table 4.1 Property bounding coordinates

Area Boundaries	ITM
North	780620 (northing)
South	755141 (northing)
East	640291 (easting)
West	620182 (easting)

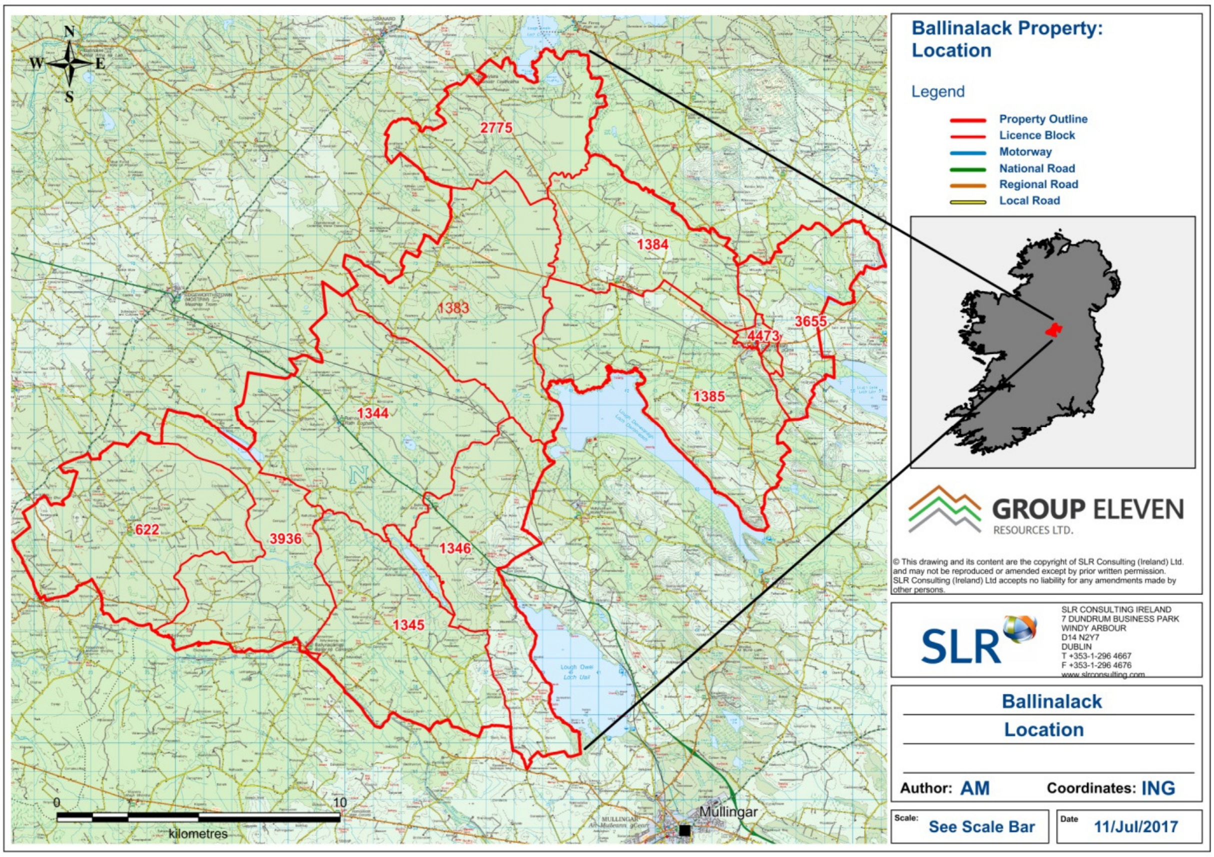


Figure 4.1 Ballinalack Project Prospecting Licences

4.2 Project Description

The Ballinalack Project consists of 11 PLs issued to Ballinalack Resources Ltd. The PLs are listed in Table 4.2 below.

The boundaries of the exploration licences correspond to official, pre-defined, administrative boundaries as outlined by the Exploration and Mining Division (EMD) of the Department of Communications, Climate Action and Environment, Republic of Ireland. The licence outlines are irregular, based on river and stream courses and townland boundaries. It is common practice to refer to the PLA number rather than the PL number.

Table 4.2 PL summary information

Licence No.	Area No.	County	Area (km^2)	Metals
67492698	PLA 1344	Westmeath	45.95	Base Metals, Ba, Ag, Au
69195089	PLA 1346	Westmeath	29.63	Base Metals, Ba, Ag, Au
69193373	PLA 1345	Westmeath	31.98	Base Metals, Ba, Ag, Au
31107470	PLA 3936	Westmeath	24.5	Base Metals, Ba, Ag, Au
137956206	PLA 622	Longford	36.95	Base Metals, Ba, Ag, Au
137656283	PLA 1383	Westmeath	37.28	Base Metals, Ba, Ag, Au
31109119	PLA 1385	Westmeath	39	Base Metals, Ba, Ag, Au
256057399	PLA 3655	Westmeath	16.83	Base Metals, Ba, Ag, Au
256057356	PLA 1384	Westmeath	23.56	Base Metals, Ba, Ag, Au
256057313	PLA 2775	Longford	25	Base Metals, Ba, Ag, Au
261393515	PLA 4473	Westmeath	1.61	Base Metals, Ba, Ag, Au
Total:			**313.95**	

Note that PLA 4473 is an anomalously small PLA; for administrative purposes it is reported with PLA 3655, but in a strict legal sense it is a separate licence.

4.3 Prospecting Licence Regulations in Ireland

The right to explore and the associated access rights are inherent in the terms of a valid prospecting licence. In practice, access rights are negotiated with individual landowners without the need to invoke the terms of a prospecting licence. GERC management has extensive experience with exploration in Ireland. To date, GERC, and previously, TIL, have not had any difficulty in gaining access for the purposes of either drilling or geophysical surveying, nor are difficulties anticipated. The Authors also have extensive experience with exploration in Ireland, and are in agreement with GERC that it should not be necessary to invoke the terms of the prospecting licences in order to gain access to land.

Mineral ownership in Ireland is, in most cases, vested in the State, although some landowners hold private mineral rights. Mineral exploration is carried out entirely by the private sector, using a permitting system governed by several Minerals Development Acts dating from 1940 to 2017. The Exploration and Mining Division ("EMD") acts as the agency responsible for the administration of regulatory aspects, including the issuing of PLs.

In Ireland, PLs average approximately 35 km^2 and are issued for a six-year period either on a 'first come, first served' or competitive basis, subject to certain conditions. Under the regulations, a licence holder is committed to progressively increasing minimum exploration work programmes and expenditures for each of the three 2-year terms of the 6-year period. These minimum expenditures relating to the Ballinalack PLs are set out in Table 4.3 below (as per the fixed fees for standard ground). In addition, the licence holder is required to provide written work reports every two years to the Minister of the Department, one calendar month before the end of period. These work reports are held confidential for six years after submission or until expiry or surrender of the relevant licence.

PLs can be renewed beyond the initial six-year period, with increased minimum work programme and expenditure commitments. Licences can be relinquished at the end of any two-year period.

Table 4.3 PL Minimum Expenditure Requirements

Area No.	County	Initially Granted	End Current Term	Status within term	Expenditure Commitment*
PL 1344	Westmeath	30/11/2005	30/11/2023	2nd year	€50,000
PL1345	Westmeath	30/11/2005	30/11/2023	2nd year	€50,000
PL 1346	Westmeath	30/11/2005	30/11/2023	2nd year	€50,000
PL 1384	Westmeath	19/12/2011	19/12/2023	2nd year	€30,000
PL 2775	Longford	19/12/2011	19/12/2023	2nd year	€30,000
PL 3655**	Westmeath	19/12/2011	19/12/2023	2nd year	€30,000
PL1383	Westmeath	20/02/2006	20/2/2024	1st year	€50,000
PL1385	Westmeath	20/02/2006	20/2/2024	1st year	€50,000
PL3936	Westmeath	20/02/2016	20/2/2024	1st year	€50,000
PL622	Longford	20/02/2016	20/2/2024	1st year	€50,000
Totals					**€440,000**

***** *There are also consideration fees to be paid for each property at each bi-annual reporting date increasing from €190 to a maximum of €2,500 for each property*
****** *Includes PL 4473*

In the event of a commercial discovery, award of a Mining Licence is normally granted exclusively to the PL holder, subject to the holder complying with certain terms and conditions. Land access for exploration and mining development is negotiated with landowners with payment of agreed compensation for access and land/mineral use where minerals are privately owned. The State takes no shareholding in mines, but will require a royalty to be paid. Mining-Licence terms are currently on a project specific basis and generally on a phased schedule.

Applicants for a Mining Licence are required to obtain planning permission and an Integrated Pollution Prevention and Control (IPPC) Licence. From discovery of Lisheen in 1990 to mine production in 1999, it took nine years to delineate a resource with sufficient critical mass to complete feasibility studies, acquire the necessary permits and construct the new mine.

4.4 Prospecting Licence Terms

The exploration rights to the 11 PLs comprising the Project are wholly owned by Ballinalack Resources Ltd ("BLK JV"). GERC owns a 60% equity interest in BLK JV, with the remaining 40% interest owned by Nonfemet. The licences, details of which are presented in Table 4.2, allow BLK JV to prospect for base metals, barite, silver and gold within the limits of the licence area, and are valid for a period of six years from the issue date, and may be renewed for a further six years, providing the terms of the licence have been met. At the end of the second six-year period, renewals occur every two years; there is no limit on the number of times a licence may be renewed. The Licences are subject to the standard work and expenditure commitments, as set out in Table 4.3, above.

Under the terms of the PLs, BLK JV is required to comply with Local Government (Planning and Development) Acts, 1963 -1999; Local Government (Planning and Development) Regulations 1994 – 2004; Local Government (Water Pollution) Acts, 1977 and 1990; Wildlife Act, 1976 and 2000 and Ministerial Orders under these various Acts, Regulations; National Monuments Acts, 1930-2004; European Communities (Natural Habitats) Regulations, 1997; Planning and Development Act 2000 and 2002, and Planning and Development Regulations 2001 and 2004.

The Authors have reviewed the PLs through the Minerals Ireland – Exploration and Mining Division website to identify the detailed spatial locations of the PLs that are the subject of this report. The results are consistent with information provided by GEM to the Authors.

4.5 Environmental Liabilities

The Authors are not aware of any outstanding environmental liabilities related to the Ballinalack Project as defined. No obvious environmental issues were observed during the site visit.

The Authors are not aware of any significant risk-factors that may affect access, title, or the right or ability to perform work on the property.

The Authors are not aware of, nor has GEM communicated to the Authors, any material risks or issues that might impact title or the access or ability to undertake work on the Project. There are no permits on the licences nor is any required for the recommended work programme. Appropriate assessments to establish that exploration work will not impact designated areas will be undertaken prior to any invasive exploration.

4.6 Protected Areas

Environmentally protected sites within Ireland are designated by the National Parks and Wildlife Service (NPWS) and are categorised as Natural Heritage Areas (NHA), Special Areas of Conservation (SAC) under the EU Habitats Directive, and Special Protection Areas (SPA) under the EU Birds Directive (see maps below).

NHA is a fundamental national designation for wildlife. These are areas considered important for particular species of plants and animals whose habitats need protection. Proposed (pNHAs) were published on a non-statutory basis in 1995 but have not yet been statutorily proposed or designated.

SACs are the prime wildlife and habitat conservation areas in the country as part of the European Natura 2000 network and are considered to be important on a European as well as Irish level.

SPAs are prime protected areas for birds at their breeding, feeding, roosting and wintering areas, as part of the European Natura 2000 network. Particular protection is given to those species identified, which are rare, in danger of extinction (such as the curlew) or vulnerable to changes in habitat.

Screening for appropriate assessment (AA) is required before work can be carried out, and is carried out, with particular consideration given for SACs and SPAs, as sites of European importance. These environmentally-protected areas are not excluded from exploration and underground mining provided that impact to fauna, flora and hydrology is at an acceptable level and balanced with the economic benefits to the local community and national economy.

4.6.1 Special Areas of Conservation

There is one SAC within the Project area and there are three SACs which border the Project (see Table 4.4 andFigure 4.2). Garriskil Bog is both an SAC and an SPA (see Figure 4.2). The bog is classified as an 'active raised bog' and is therefore considered to be an important site. Significant mitigation measures would need to be in place to allow higher impact activities such as drilling, but it is the Authors' opinion that it would be possible to carry out exploration on the bog. Garriskil Bog is entirely within the Project.

The southeastern edge of PLA 1346 is defined by the western shore of Lough Owel (see Figure 4.2); the entire lough is an SAC. The lough is a hard water lake, with fringing fens and mires. The main threats to the conservation interests of the lake are water abstraction, overfishing, agricultural pollution and leisure. It is not thought that exploration activities would present a significant threat, and permission to carry out any exploration in the vicinity of the lake would not be withheld, providing EMD guidelines were adhered to.

The southeastern edge of PLA 3655 is defined by the northern shore of Lough Lene (see Figure 4.2); the entire lough is an SAC. The lough is a naturally oligotrophic marl lake, and supports wintering waterfowl. The main threats to the conservation interests of the lake are infrastructure & transport, and the effects of agriculture. It is not thought that exploration activities would present a significant threat, and permission to carry out any exploration in the vicinity of the lake would not be withheld, providing EMD guidelines were adhered to.

The northeastern edge of PLA 3655 is defined by the NWern shore of White Lough (see Figure 4.2); the entire lough is part of the larger White Lough, Ben Lough and Doo Lough SAC. The lough is a hard water lake, with fringing marshes, swamps and grassland. The main threats to the conservation interests of the lake are agricultural activities and changes in hydrological regime. It is not thought that exploration activities would present a significant threat, and permission to carry out any exploration in the vicinity of the lake would not be withheld, providing EMD guidelines were adhered to.

Table 4.4 List of Special Areas of Conservation within and bordering the Project

Site Code	Site Name	Area (Ha)	Site Webpage
000679	Garriskil Bog	112	http://www.npws.ie/protected-sites/sac/0000679
000688	Lough Owel	1,123	https://www.npws.ie/protected-sites/sac/000688
002121	Lough Lene	490	https://www.npws.ie/protected-sites/sac/002121
001810	White, Ben & Doo Lough	116	https://www.npws.ie/protected-sites/sac/001810

4.6.2 Special Protection Areas

There are three SPAs within the Project and three bordering the Project (see

Table 4.5 and Figure 4.3). Garriskil Bog is one of the SPAs within the Project, and has been covered in Section 4.6.1, above (see Figure 4.3). Lough Iron is also completely within the Project (see Figure 4.3) and is classified as being of international importance for a number of wetland and waterbird species. The main threats are grazing, spreading of fertiliser and forestry activities. It is not thought that exploration activities would present a significant threat, and permission to carry out any exploration in the vicinity of the lake would not be withheld, providing EMD guidelines were adhered to. It is likely that the required mitigation measures in the vicinity of the SPA would vary by season, due to the migratory habits of the most important species associated with the lough.

Glen Lough is within the Project (see Figure 4.3). The lough was partially drained in the past and now consists primarily of freshwater marsh. The SPA is an important site for one species of swan and one species of goose. The main threats are spreading of fertiliser and forest planting. It is not thought that exploration activities would present a significant threat, and permission to carry out any exploration in the vicinity of the lake would not be withheld, providing EMD guidelines were adhered to. It is likely that the required mitigation measures in the vicinity of the SPA would vary by season, due to the migratory habits of the most important species associated with the lough.

Lough Iron is wholly within the Project (see Figure 4.3). It is an important site for a variety of water birds and wintering waterfowl. The main threats are spreading of fertiliser, grazing and forestry. It is not thought that exploration activities would present a significant threat, and permission to carry out any exploration in the vicinity of the lake would not be withheld, providing EMD guidelines were adhered to. It is likely that the required mitigation measures in the vicinity of the SPA would vary by season, due to the migratory habits of the most important species associated with the lough.

The northeastern edge of PLA 2755 is defined by the southern shore of Lough Kinale (Figure 4.3), while Derragh Lough is wholly within the PLA. Both loughs are combined within one SPA, which is an important site for a number of waterbird and waterfowl species. The main threats are spreading of fertiliser, fishing & aquaculture, forestry activities, livestock farming, hunting and forest planting. It is not thought that exploration activities would present a significant threat, and permission to carry out any exploration in the vicinity of the lake would not be withheld, providing EMD guidelines were adhered to.

PLAs 1346, 1383 and 1385 all adjoin the Lough Derravaragh SPA (see Figure 4.3). The SPA is an important site for a number of waterbird and waterfowl species. The main threats are livestock farming, spreading of fertiliser, forestry, fishing and hunting. It is not thought that exploration activities would present a significant threat, and permission to carry out any exploration in the vicinity of the lake would not be withheld, providing EMD guidelines were adhered to. It is likely that the required mitigation measures in the vicinity of the SPA would vary by season, due to the migratory habits of the most important species associated with the lough.

The southeastern edge of PL 1346 is defined by the NWern shore of Lough Owel SPA (see Figure 4.3). It is an important site for wintering waterfowl. The main threats are spreading of fertiliser, fishing, and forestry. It is not thought that exploration activities would present a significant threat, and permission to carry out any exploration in the vicinity of the lake would not be withheld, providing EMD guidelines were adhered to. It is likely that the required mitigation measures in the vicinity of the SPA would vary by season, due to the migratory habits of the most important species associated with the lough.

Table 4.5 List of Special Protection Areas within the Project

Site Code	Site Name	Area (Ha)	Site Webpage
004102	Garriskil Bog	112	http://www.npws.ie/protected-sites/spa/004102
004045	Glen Lough	82	https://www.npws.ie/protected-sites/spa/004045
004046	Lough Iron	933	https://www.npws.ie/protected-sites/spa/004046
004061	Lough Kinale & Lough Derragh	288	https://www.npws.ie/protected-sites/spa/004061
004043	Lough Derravaragh	1,131	https://www.npws.ie/protected-sites/spa/004043
004047	Lough Owel	1,119	https://www.npws.ie/protected-sites/spa/004047

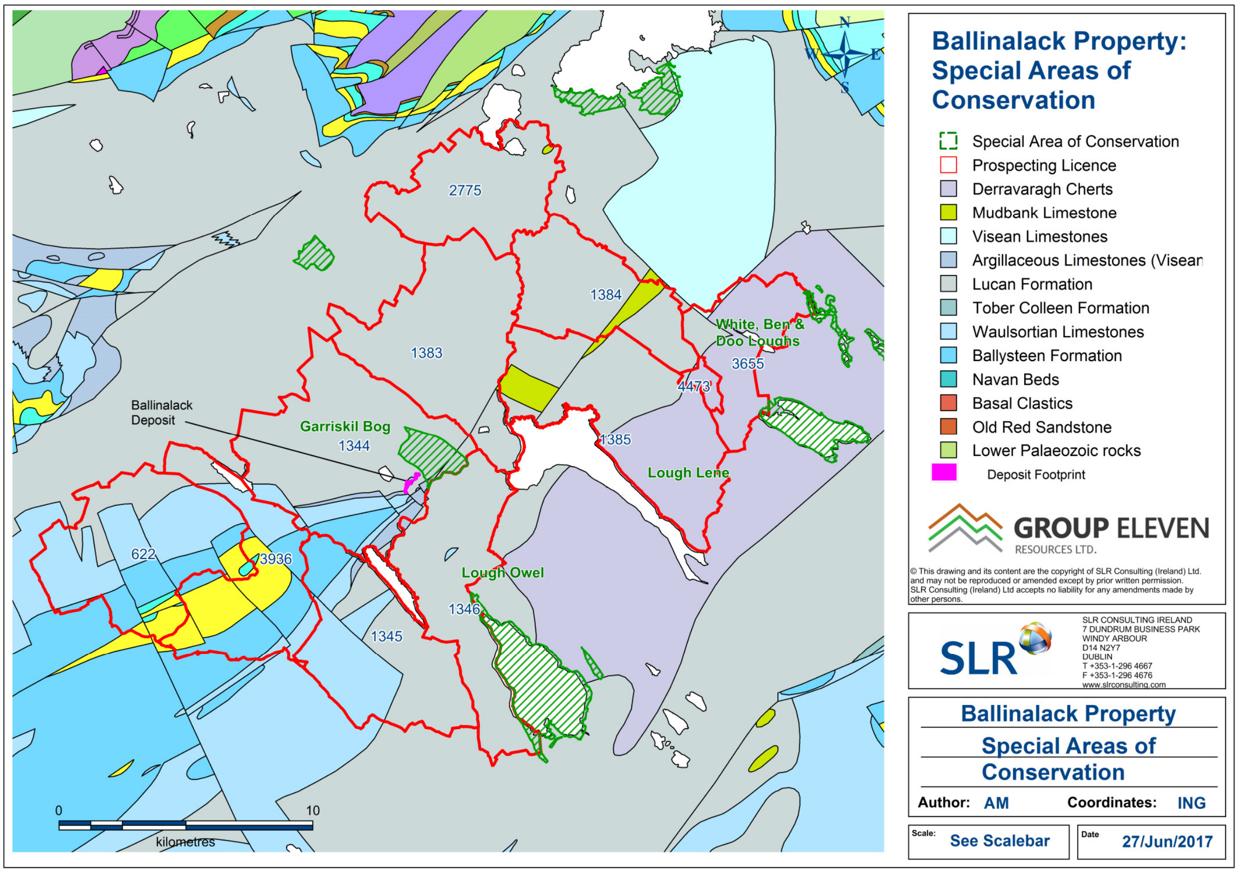


Figure 4.2 Ballinalack Project: Special Areas of Conservation

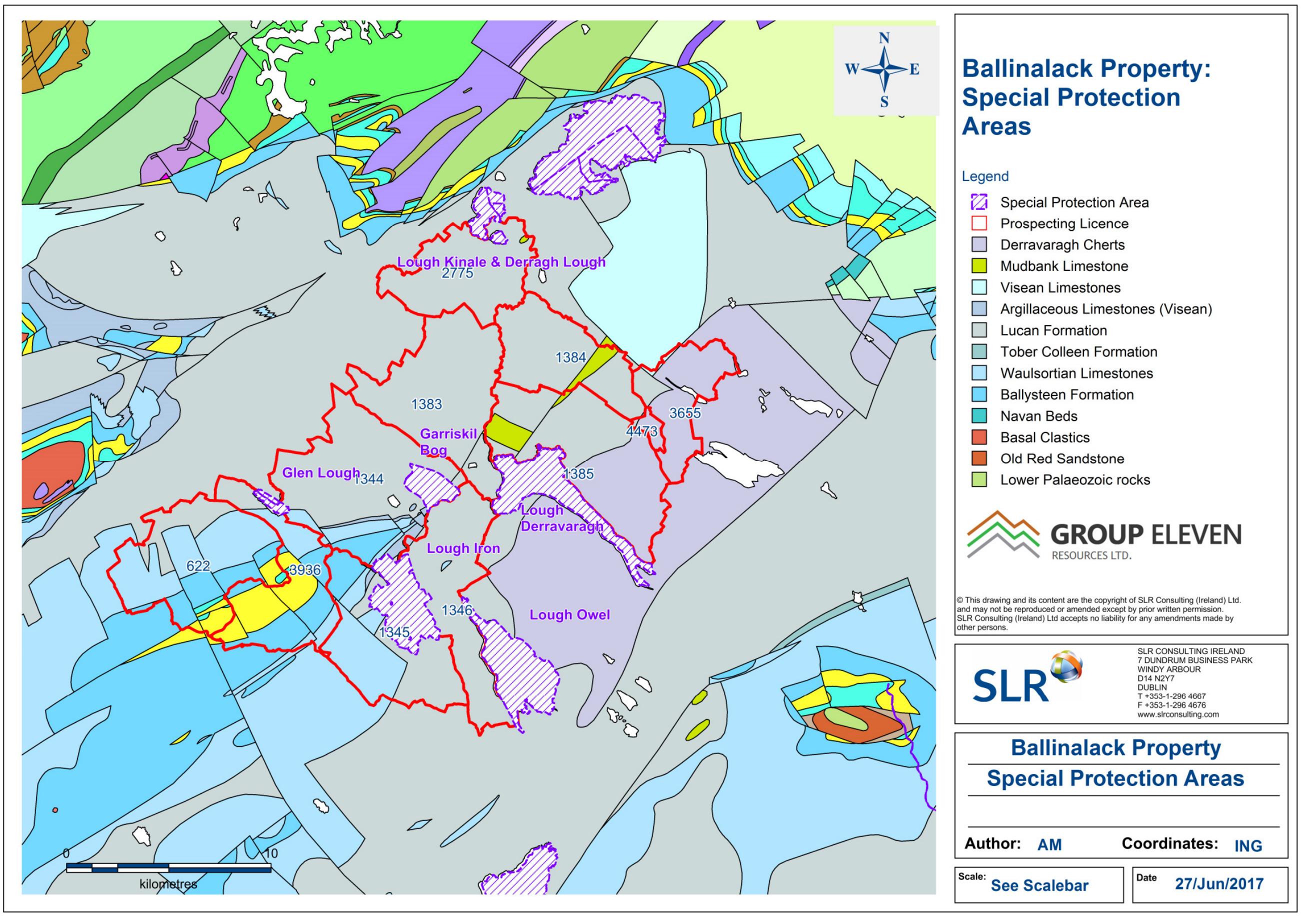


Figure 4.3 Ballinalack Project: Special Protection Areas

5.0 Accessibility, Climate, Local Resources, Infrastructure and Physiography

The Project is well located, with access to local and national infrastructure. Ireland has a mild climate and allows year-round exploration.

5.1 Project Access

Ballinalack is on the N4 national route, which is an arterial route between Dublin on the east coast and Sligo on the west coast. The N4 divides the property into two almost equal portions. The Dublin-Sligo railway line also runs through the central part of the property. The regional R395 runs through Castlepollard (pop. 1,107) and crosses the northern third of the property. The R393 road skirts the southern boundary of the property. There is a dense network of local roads on both sides of the N4, except for an area of about 50 km^2 of peat land, extending north of Ballinalack village and the prospect footprint.

5.2 Climate

The regional climate is mild and temperate even at these high latitudes, due to the modifying influence of the Gulf Stream, which gives the area cool summers and generally mild winters, when temperatures rarely fall below freezing. The climate graph for Ballinalack is also shown in Figure 5.1, below. Generally, the least amount of rainfall occurs in April with the maximum in December. The average monthly rainfall is 80 mm. It should be noted that depending on oscillations in the jet stream and the migration of the front between humid warmer air and cold dry air, both precipitation and to a much lesser extent temperatures can vary greatly from month to month. Indeed, Ireland's climate is best characterised as "weather" rather than according to any distinct climatic seasons. The temperature on any given day in winter can be close to the temperature on any given day in summer, depending on where the jet stream lies.

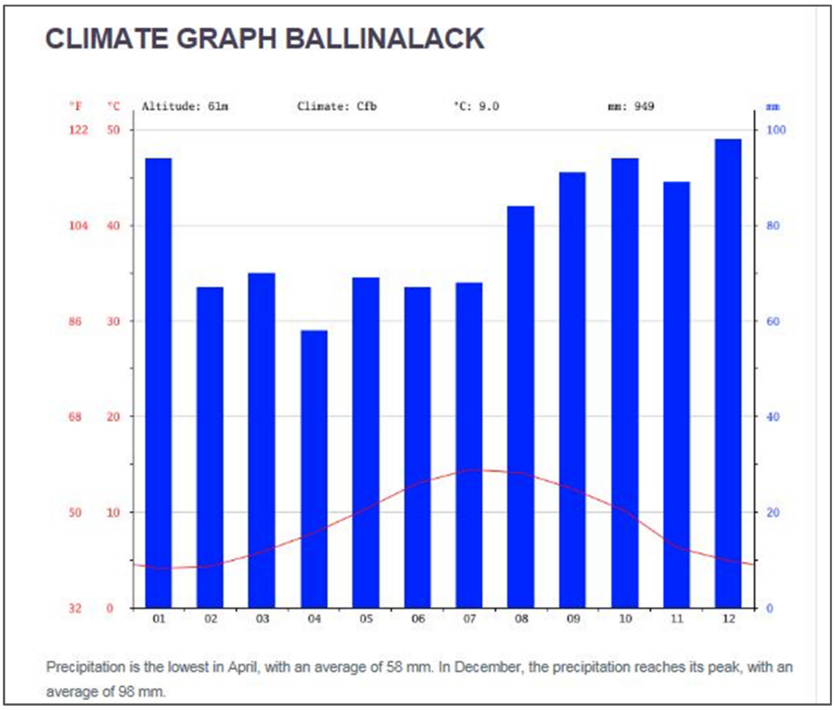


Figure 5.1 Climate graph for Ballinalack

Source: https://en.climate-data.org/europe/ireland/ballinalack/ballinalack-107369/

Apart from the weather, field work is only constrained by short days of daylight in winter (minimum 8 hours) at these high latitudes (see Figure 5.2).

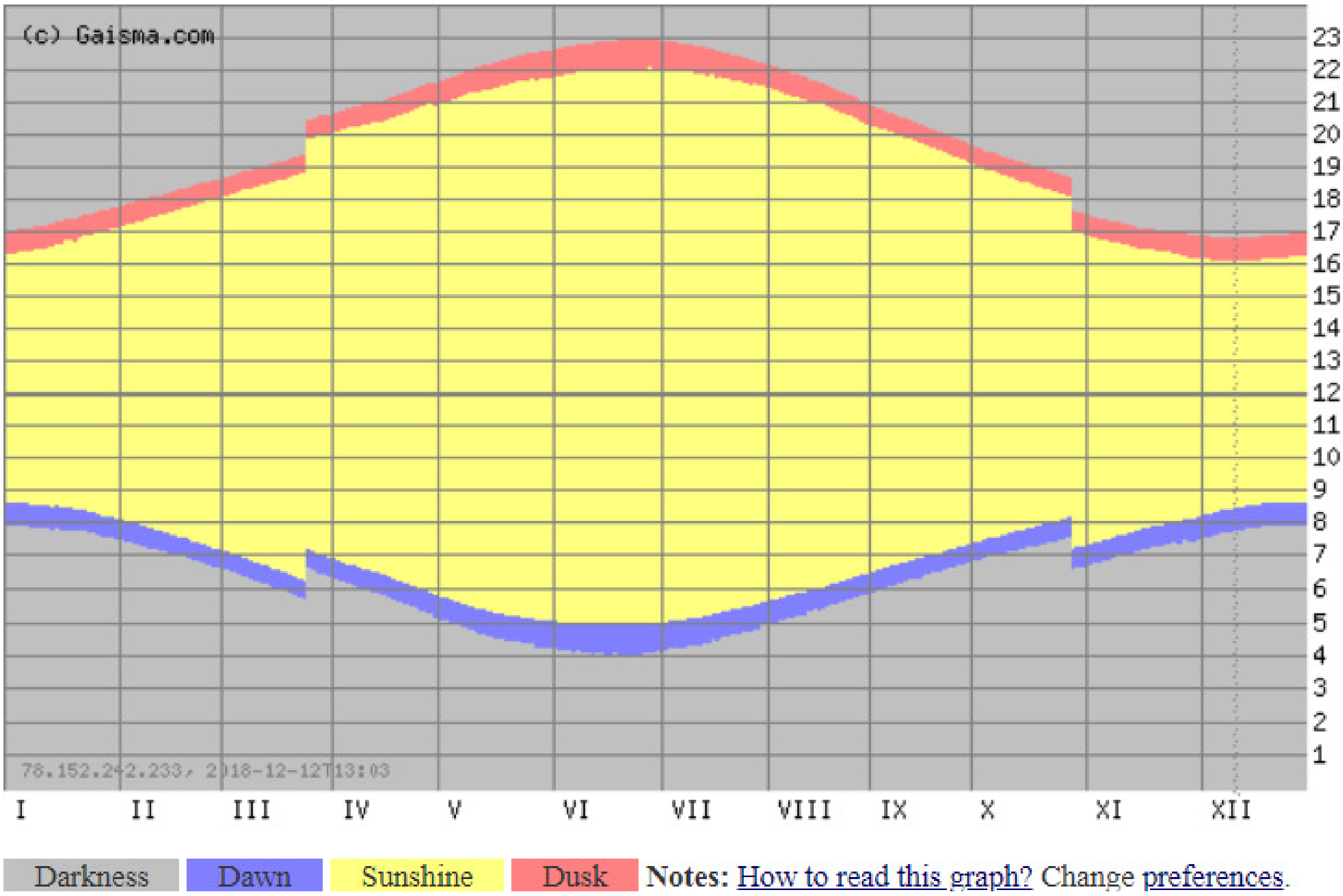


Figure 5.2 Ballinalack graph of sunrise, sunset

Source: https://www.gaisma.com/en/location/mullingar.html

5.3 Physiography and Vegetation

The Ballinalack zinc-lead prospect is in the southeastern part of PLA 1344. It is located 1 km north of the bridge which crosses the River Inny along national road N4. The prospect is west of the Inny River and south of the River Riffey tributary. This land is typical of the Irish midlands along the margins of the Shannon River Basin. It is an area of lowland peat-bog and lakes where a thin veneer of glacial drift is absent. The River Inny is a major tributary of the River Shannon, the longest river in Ireland. The valley of the Inny is eight to 10 km wide, trending northeast-southwest.

The topography of the River Inny catchment is lowland valley with elevations between 65 m to 70 m above MASL. There are low hills with elevations from 150 m to 200 m MASL circling the river valley. Upstream of Ballinalack, the River Inny catchment has an area of 666 km^2 and consists of typical lowland glacial geomorphology, including drumlin hills to the NW and eskers, kames and moraines to the south. A line of crags, tail hills and ice-gouged lakes lie to the east. Overall the catchment drains to the southwest, with the channel-flow of the River Inny widening out in places to form lakes such as Sheelin, Derravaragh and Iron before flowing into the Shannon River. These lakes are a substantial water resource and part of the flow-regulating system.

A large part of the catchment has a thin cover of glacial-drift deposits. Glacial till predominates; it is derived from limestone or shale bedrock. The flat lowland valley has extensive areas of peat bogs. In the past, peat extraction was commonplace both on a small scale privately and on a large commercial scale. Due to increasing pressure from the European Union (EU Habitats Directive), harvesting of peat ceased in SACs. The Irish Government introduced the "Cessation of Turf Cutting Scheme" in 1999. A series of compensation packages was offered to private harvesters but this has remained a politically sensitive issue. Post-extraction, conifer afforestation has been the preferred land use in previously exploited bog areas.

Historically the lower reaches of the River Inny were subject to significant flooding. The river system underwent substantial dredging during the 1960's and 1970's which improved drainage through large areas of the river valley. These public works greatly benefitted agriculture in these marginal lands. Spoil heads can be seen from dredging works undertaken to improve channel drainage capacity and efficiency. Today *Waterways Ireland* manages maintenance and monitoring of the drainage system.

The primary economic activity in the Project area is agriculture, carried out primarily through a system of family-owned smallholdings.

5.4 Infrastructure

Excellent road and rail connectivity have been described above. The project is conveniently located between the two large towns of Longford and Mullingar.

A 110 kV electricity transmission line runs through the property from the Mullingar power station in the southeast to Lanesboro Thermal Generation station in the northeast. Three phase power is readily available throughout the Project.

6.0 History

The Ballinalack prospect was discovered in 1970 and the surrounding area has been explored more or less continuously since then. Remarkably, despite the discovery of the giant zinc-lead deposit at Navan in 1979, there has been little or no exploration of the Navan Beds, the host to mineralisation at Navan, with drill testing having been confined almost exclusively to the shallower Waulsortian Limestone target horizon.

6.1 Discovery History

The Ballinalack zinc-lead prospect in County Westmeath was discovered during an exploration programme led by Ron Holman, of Syngenore Exploration Limited (Syngenore), and his team in 1970 (Bradfer, 1982). Syngenore had become a subsidiary of Noranda Mines Ltd and was set up in 1965 by R.C.J Edwards and M.E. Penstone with a brief to explore globally and not just in Ireland (Holman, pers. comm.). It was Edwards who appreciated the high potential for economic zinc-lead deposits after the success of Northgate's Tynagh discovery in 1960 and Mogul's Silvermines discovery in 1963. Ron Holman had graduated with Edwards and Penstone from the Royal School of Mines in 1952 and consequently he was invited to join Syngenore and manage the Irish regional exploration effort.

Due to the exploration success in the south of the country, there was much less interest in the zinc potential in the north of the Midlands district. There was very little exploration north of a line between Dublin and Galway except for the Keel zinc-lead prospect, which was being explored by Rio Tinto.

Syngenore undertook a stream-sediment sampling programme which extended south-eastward from Strokestown in County Roscommon, where its field office and laboratory was located. This regional survey by Syngenore was very much concentrated in the northern part of the Irish Carboniferous basin. Early in the programme a discontinuous, broadly linear zinc anomaly was detected trending east of Strokestown from Dromod through Longford and Edgeworthstown to Mullingar.

Five anomalous soil samples were identified, clustered in an area between Rathowen in the NW and Bunbrosna in the SE. The Geological Survey of Ireland map showed the area to be largely covered by glacial till varying in thickness between 3 and 20 m deep with an isolated outcrop mapped at Ballinalack Bridge midway along the "zinc trend". Prospecting and mapping focused on an area centred on this key outcrop. The only indication of mineralisation was the presence of limestone boulders containing pyrite which were excavated from drainage ditches.

Prospecting identified blebs of pyrite and some minute specks and threads of yellow sphalerite in scattered Waulsortian "reef" boulders. At Ballinalack, 12 pits were dug over a distance of 213 m across a northern "zinc high" and 13 pits along 244 m over a southern "zinc high". Higher zinc values were detected in shallow overburden, decreasing with depth. Several reef fragments gave zinc and lead values of several percent in samples taken from under the southern area. The distance between the centres of the northern and southern zinc highs was about 600 m. Drilling indicated an inlier of Waulsortian Reef limestone surrounded by the basinal-facies limestone known as Calp.

An IP/Resistivity survey was conducted over an area approximately 900 m by 1200 m. Resistivity plots showed nothing much of note except that resistivity increased toward the centre of the survey area by a factor of two and this broadly correlated with the reef limestone subcrop. Chargeability indicated a NE-SW linear high, which narrowed to a well-defined tongue, interpreted as an indication of possible sulphide mineralisation.

The southern area was drilled first, with four holes completed for a total of 790 m. Drilling confirmed low-grade sphalerite and pyrite mineralisation in bedrock. Sandy basal beds intersected in drillholes 2 and 4 were the first evidence of the presence of an inlier under glacial cover. The target was downgraded because of the consistent low-grade mineralisation. Five additional drillholes which were drilled further east only confirmed this view. A single drillhole (No. 5) was drilled into a chargeability high under the bog about 1.5 km north of drillhole No. 3. The chargeability was attributed to widely disseminated pyrite in a dark-grey to black Calp limestone with sub-horizontal bedding.

The focus then shifted to the northern zinc high. The first hole drilled on this target (drillhole No. 6) intersected significant mineralisation from 16.7m down to 32m, averaging 5% Zn and 1% Pb in the Waulsortian limestones beneath barren Calp limestone cover.

In 1970, after the drilling of 13 drillholes in the northern zinc high, Holman, Edwards and Penstone resigned from Syngenore Explorations. In 1971, Edward & Associates passed its shareholding in Syngenore to Barymin and Noranda continued as the operator (Robertson Group, 1991). Syngenore later became a joint venture company, with Noranda owning 81% and Edward & Associates 19%.

Since the initial discovery and resulting definition drilling, during the intervening 47 years, there have been seven exploration groups who have conducted exploration on the project (to a greater or much lesser degree), sometimes in combination within joint venture structures.

All drilling has been diamond drilling with core recovery ranging in size from AQ to NQ.

Robertson (1991) carried out a resource estimate; the most significant intercepts in each drillhole included in the Robertson Report historic estimate are included in Table 6.1, below. These intercepts are of particular significance as they define the prospect as it is understood today, as described in Section 7.3.

Table 6.1 List of intercepts in drillholes used by Robertson (1991)

Hole No.	From (m)	Interval (m)	Zn+Pb (%)	Ag (g/t)	m%*	Dip^	Azimuth
B6	16.09	4.78	13.5	66.5	65	50-47	304
B7	13.32	5.76	7.4	21.6	43	50-48	304
and	23.04	1.80	14.8	34.3	27	50-48	304
and	28.18	6.70	15.8	42.7	106	50-48	304
and	40.53	3.35	8.9	11.8	30	50-48	304
B12	22.85	9.14	8.2	8.6	75	50-?	304
B14	111.83	1.68	2.6	n/a	4	50-?	304
B15	50.06	10.67	13.1	28.2	140	50-?	304
B21	38.09	1.52	6.0	0	9	90-?	0
B30	128.89	3.05	9.0	33.3	28	90-?	0
and	144.12	1.52	0.2	385.7	0	90-?	0
B33	121.39	3.05	5.9	43.9	18	90-?	0
and	142.26	4.57	7.3	27.4	33	90-?	0
incl	142.26	1.52	9.6	51.4	15	90-?	0
B34	109.8	6.1	7.7	5.1	47	90-?	0
and	129.3	12.0	7.4	3.0	89	90-?	0
and	198.6	1.5	17.4	10.3	26	90-?	0
B35	118.99	6.09	6.1	6.9	37	90-?	0
B36	126.15	2.99	8.6	8.2	26	90-?	0
B37	146.13	1.28	9.8	n/a	13	90-?	0

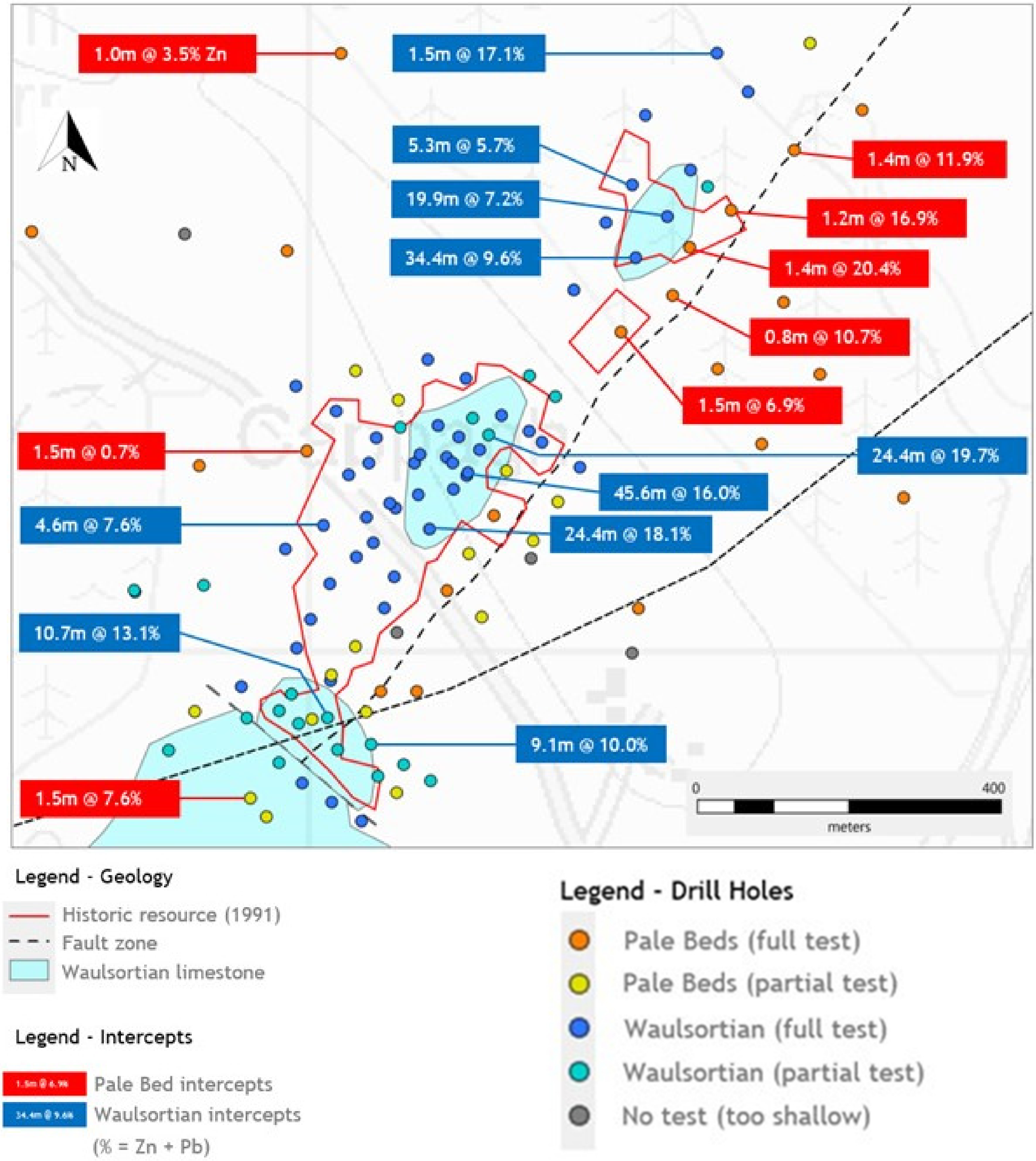
Hole No.	From (m)	Interval (m)	Zn+Pb (%)	Ag (g/t)	m%*	Dip^	Azimuth
and	175.45	3.14	4.5	n/a	14	90-?	0
B38	119.75	1.55	16.5	8.9	26	90-?	0
and	199.88	10.67	9.6	6.5	103	90-?	0
and	216.64	3.05	11.4	23.7	35	90-?	0
and	237.97	1.52	11.8	n/a	18	90-?	0
B39	132.4	4.6	7.6	5.9	35	90-?	0
B40	152.8	16.8	3.4	9.3	58	90-?	0
incl.	152.8	1.5	8.4	20.6	13	90-?	0
B42	234.62	18.28	4.7	n/a	87	90-?	0
Incl	234.62	3.05	15.9	n/a	48	90-?	0
B43	161.34	65.51	2.5	4.2	164	90-?	0
Incl	190.29	3.05	7.8	11.3	24	90-?	0
B44	257.17	6.09	4.7	1.8	29	90-?	0
B46	164.57	16.73	5.5	4.0	92	90-?	0
Incl	164.57	4.54	9.5	4.5	43	90-?	0
B46	164.57	16.73	5.5	4.0	92	90-?	0
Incl	164.57	4.54	9.5	4.5	43	90-?	0
B51	164.84	24.38	5.38	n/a	131	90-?	0
and	222.13	6.09	9.13	9.0	56	90-?	0
and	249.55	21.33	19.6	25.8	418	90-?	0
B55	267.10	10.03	22.1	10.1	222	90-80	0
B56	240.71	9.14	13.3	2.0	121	90-70	0
and	252.90	3.05	8.6	0.8	26	90-70	0
and	262.04	2.29	7.8	10.0	18	90-70	0
and	280.78	1.77	13.2	13.0	23	90-70	0
B57	163.32	3.05	9.7	8.5	30	90-76	0
and	175.51	3.05	17.3	13	53	90-76	0
and	230.20	4.72	13.8	29.6	65	90-76	0
and	250.16	24.38	19.7	16.3	481	90-76	0
B58	195.92	24.38	18.1	50.5	441	90-84	0
B59	223.13	45.62	16.0	21.3	730	90-89	0
B60	168.65	1.46	7.1	3.5	10	90-76	0
and	243.70	1.68	19.3	2.9	32	90-76	0
and	283.98	2.59	25.3	7.2	65	90-76	0
and	287.21	2.50	7.1	9.7	18	90-76	0
B61	180.47	5.48	3.5	0.7	19	90-?	0
incl	180.47	1.19	9.6	3.3	11	90-?	0
B62	201.53	43.33	9.4	9.9	407	90-72	0
B63	163.78	6.70	5.6	4.5	37	90-72	0
and	262.47	4.30	6.0	18.1	26	90-72	0
B65	123.13	5.76	5.1	7.3	29	90-75	0
incl	123.13	0.61	13.6	17.0	8	90-75	0
B66	173.22	25.14	3.9	8.3	97	90-81	0

Hole No.	From (m)	Interval (m)	Zn+Pb (%)	Ag (g/t)	m%*	Dip^	Azimuth
incl	173.22	1.46	14.7	86.0	22	90-81	0
incl	188.49	1.43	14.6	20.5	21	90-81	0
B78	208.87	6.40	4.1	n/a	26	90-80	0
and	221.67	1.52	6.9	n/a	10	90-80	0
B81	295.71	1.40	20.4	n/a	29	90-83	0
B82	215.73	5.33	5.7	n/a	30	90-75	0
B83	227.00	19.81	7.2	n/a	142	90-70	0
incl	234.62	4.57	13.0	n/a	59	90-70	0
B87	189.83	6.09	6.4	n/a	39	90-88	0
and	205.06	4.57	5.9	n/a	27	90-89	0
and	205.06	4.57	5.9	n/a	27	90-88	0
B88	110.0	22.85	8.3	n/a	189	87-90	0
incl	119.1	3.047	20.6	n/a	63	87-90	0
and	142.0	19.81	5.3	n/a	106	87-90	0
and	188.0	30.47	4.3	n/a	132	87-90	0
B89	219.69	34.43	9.6	n/a	331	90-76	0
B94	296.78	3.96	8.4	n/a	33	90-78	0
incl	296.78	1.22	16.9	n/a	21	90-78	0
B123	143.9	6.7	2.9	n/a	20	67-?	0
B124	99.52	16.00	12.5	n/a	200	88-90	0
incl	99.52	6.10	18.7	n/a	114	88-90	0
B125	117.35	3.96	7.7	n/a	30	67-74	0
and	131.06	3.05	11.1	n/a	34	67-74	0
and	152.25	5.03	8.7	n/a	44	67-74	0
and	193.55	4.27	5.6	n/a	24	67-74	0
and	229.21	4.88	5.5	n/a	27	67-74	0
B126	-	-	-	-	-	55-68	0

Note: ^ Dip (degrees from horizontal, from collar dip to largest deviation from collar dip, if known)
It should be noted that the mineralisation varies in morphology across the prospect, with a strong sub-vertical element close to the Ballinalack Fault, therefore to calculate true thickness it is necessary to multiply the intervals given above by between 0.60 and 0.95. Detailed modelling of the mineralisation, using 3D software, will be necessary to accurately estimate true thickness for each individual intercept.

6.2 Subsequent Exploration Groups (pre 2005)

However, in 1979, it was recommended that further study of Ballinalack was warranted to investigate the potential for major extensions to the known existing resource and for exploration of the four adjoining exploration licences (De Graaf, 1980). Noranda completed an internal technical study around 1979 which contained a recommendation to develop the project into a mine. In October 1979, Billiton International was informed that Noranda was seeking a JV partner for Ballinalack.



Drawn: B. Jaworski, November 2017

Figure 6.1 Plan map of drillhole intercepts with key intercepts labelled.

Note that Pale Beds intercepts are in the footwall of the Ballinalack Fault

Up to 1981, a total of only 110 drillholes had been drilled (Bradfer, 1982) at which time Noranda Exploration Ireland Limited was still drill-testing as the operator.

Later, Billiton Exploration Ireland Limited (BEIL) farmed into the project but did very little work on the project as its exploration effort in Ireland quickly focused on the very encouraging drilling results from its Harberton Bridge project. Billiton opted out of the joint venture in 1986 with full ownership reverting to Noranda. Stuart Brand of Prospex Ireland Ltd and consultant Gareth V. Jones published a paper on Ballinalack in the IAEG "Green Book" published in 1986 (Andrew, 1986), presumably as a result of their collaborative consulting work for the JV on Ballinalack.

Oliver Resources plc, a junior Irish explorer became the operator of the property in the late 1980s and acquired Noranda's interest in the project to become sole owner. In 1991, the Robertson Group, based in Wales, undertook a Feasibility Study (138 pages, 504 pages including appendices) on the Ballinalack zinc-lead deposit; by this time, drilling had reached 126 diamond drillholes in and surrounding the Ballinalack property (Robertson, 1991).

Highlights of the Robertson executive summary were as follows:

- An Indicated Mineral Resource of 7.71 million tonnes averaging 6.33% Zn and 0.95% Pb, at a cut-off grade of 4.0% Zn (i.e. cut-off excluded Pb), extending over an area of 1600m by 650m (from surface to a maximum depth of 260m, dipping 15 degrees to the north and with a maximum thickness of 100m).
- Mine plan envisioned both open pit and underground operation.
- Maximum thickness of the resource was estimated at 100m, located in the deepest, northern-most part of the resource.
- Grade generally increases with depth, ranging from 5.1% Zn and 0.5% Pb in the upper horizons, to 11.2% Zn and 2.3% Pb in the lowest horizons.

Note that various categories of resources and reserves in the Robertson Report were estimated by a highly regarded professional consultancy of that time. The resource was classified using the definitions of the then Institute of Mining and Metallurgy (IMM). The definitions used in the Robertson Report are not the same as the definitions now used by CIM. CSA Global cautions that the Qualified Person has not done sufficient work to classify this historical estimate as Mineral Resources in accordance with CIM and NI 43.101 guidelines and notes that the historical estimate is superseded by the updated Mineral Resource estimate documented in this report. GERC is not treating the historical estimates as current resources.

Historic drilling at Ballinalack can be broken into two phases – pre- and post-Robertson's study in 1991. Prior to the Robertson report study, 126 drillholes were completed, largely by Syngenore, with the remainder then drilled by Noranda. The later drilling was also focussed on the footprint of the historical estimate, underpinning the historical estimates.

In the early to mid 1990s, following the Robertson study, a number of cored and percussion drillholes were completed by Oliver Resources. Of particular note was a mineralized intersection in Pale Beds (3.2m at 7.21% Zn and 0.64% Pb in drillhole 92-BL-1) in the footwall of the Ballinalack Fault and 0.75 km southeast of the known prospect. Historical drill results have not been verified as the samples forming the basis of such results are not available and accordingly no quality assurance programs or quality control measures were applied. In addition, in the Ballycorkey area (located 4 km southwest of the prospect), Oliver intersected zinc mineralisation in the Middle Pale Beds and Birds Eye Micrite (drillhole 93-BB-1). See Table 7.1 for explanation of stratigraphy in the Ballinalack region.

In 1995, Oliver Minerals was purchased by Celtic Resources Holdings Plc, which then proceed to option the property to MIM and Navan Resources. Later that year, MIM/Navan drilled two fences of four drillholes (95-1344-01 to 04, 95-1345-01 to 03 and 95-1346-01) collaring mostly in the sub-Waulsortian to the southwest of the prospect and primarily targeting Navan Beds mineralisation. This drilling intersected low-grade mineralisation in the Upper Pale Beds (Pale Beds Sandstone) in a number of holes and intersected some extensive dolomitisation in the Middle Pale

Beds. However, overall results were not deemed sufficiently encouraging to continue the option (Earls and Kelly, 1999). Navan Resources dropped its option shortly thereafter, citing financial reasons.

In February 1998, Ivernia West announced an agreement with Celtic Resources to acquire Oliver Minerals and the Ballinalack prospect. At that time the Project consisted of three licences, PLs 1344, 1345, and 1346 (Earls and Kelly, 1999). The transaction involved Ivernia West spending IR£300,000 on exploration over the following three years and a $3m payment to Celtic Resources contingent on a production decision. Once all payments had been made, Celtic would be entitled to 3 per cent of all net profits (NPI) made from the prospect.

Crowe Schaffalitzky and Associates Limited (‘CSA’, now CSA Global) were Ivernia’s exploration consultants in Ireland. John Kelly, co-author of this report, then working with CSA, undertook the first major data review and digital project data compilation in the late 1990s and supervised a range of exploration work on the Ballinalack Project between 1998 and 2002.

The Pale (Navan) Beds host the world-class Navan (Tara) deposit some 50 km east of Ballinalack. Drilling by Ivernia West was directed to testing both base of Waulsortian and Navan (Pale) Beds targets, in areas which had not been previously targeted or adequately tested. While existing data relating to the known mineral occurrence were compiled and reviewed, this work was directed more towards understanding the controls on mineralisation and structure in the prospect area and little attention was directed to further assessment of the known occurrence.

Prior to CSA’s review of exploration in 1999, all project information held at the EMD had been examined and indexed. All historical project data not already in digital format were captured and compiled using *MapInfo©*. All digitally available geology, drilling, geochemistry and geophysical data were also captured and compiled into *MapInfo©* software package. Helimagnetic digital data from Navan Resources were purchased and reprocessed. Due to challenges in reprocessing, target definition relied on geological interpretation of existing aeromagnetic plots which resulted in the identification of 14 “Navan Bed” targets.

Available regional gravity data highlight the NW margin of the Slieve Aughty – Ballinalack block which may also be the surface projection of the Ballinalack Fault. Of interest was the presence of strike parallel gravity features to the NW and southeast suggesting that these may be more fundamental basin or sub-basin controlling structures, and as such, may be more prospective (Earls and Kelly, 1999).

In October 1999, Ivernia tested three Navan Beds targets (at Carrick, Johnstown and Glebe) with a total of 1,526m of drilling. One hole from a previous drilling campaign at Carrick (Celtic Resources 97-1346-02) was deepened to test the Navan Beds and intersected fine grained disseminated sphalerite and pyrite with minor galena within carbonate-rich horizons in the Upper Pale Beds. Larger crystals of sphalerite are present at 540.2 m (in water escape structures in siltstones in the Middle Pale Beds) and a 2 cm band of sphalerite and galena is present in the Bird’s Eye Micrite (within the Lower Pale Beds). Drillholes 99-1344-06, 99-1346-03 and 99-1346-04, however, did not intersect any zinc-lead mineralisation in the Pale Beds (Earls and Kelly, 1999).

Subsequent drilling by Ivernia tested the base of Waulsortian limestones and the Navan Beds along a magnetic linear (identified from heliborne-magnetics) trending west-southwest from the Ballinalack prospect and interpreted as a possible extension of the Ballinalack Fault (or an associated structure). An initial drillhole (99-1344-06) was collared with the intention of intersecting the base of Waulsortian on the hangingwall of the interpreted structure and the Navan Beds in the immediate footwall of the structure (given significant Navan Beds mineralisation is present in the immediate footwall of the Ballinalack fault). The drillhole successfully intersected the base of Waulsortian, the interpreted fault, and the Navan Beds in the immediate footwall of the fault. The Waulsortian was significantly dolomitised with minor sphalerite, minor galena and common pyrite. The Navan Beds were extensively dolomitised.

Following the confirmation of the presence of the fault and the presence of dolomitisation and weak mineralisation in the Waulsortian and Navan Beds, a series of drillholes (99/00-1344-07 to 10) were completed along the identified strike length of the structure. All drillholes successfully intersected base of Waulsortian, the fault and the Navan Beds in the fault footwall. Drillholes 99-1344-06, 00-1344-08 and 00-1344-09 intersected dolomitisation and weak sulphides in the Waulsortian and 99-1344-06, 99-1344-07, 00-1344-09 and 00-1344-10 intersected dolomitisation and weak sulphides in the Middle and Lower Pale Beds.

At that time, Ivernia were heavily committed to the development of the Lisheen Mine in Co. Tipperary and no funds were available for further work at Ballinalack. Ivernia surrendered the licences in 2002.

See Table 6.4 for a summary of previous exploration on the Ballinalack project.

6.3 Teck (2005 – Present)

In 2005, EMD compiled all the Ballinalack project documentation and data into a GIS database for distribution to interested parties and offered the Project to companies which might have been interested under a competitive process. Teck Ireland Ltd. ("TIL", a subsidiary of Teck Resources) was successful in acquiring the project as part of a larger regional prospecting licence acquisition.

The following section covers TIL's work on the project and is largely summarised from an internal Company *PowerPoint©* presentation created toward the end of 2008.

TIL recovered 16,000 m of historical drill core from storage and re-logged and sampled a number of historical drillholes. This work led to a major reinterpretation of the regional geology (including the stratigraphy) based on re-logged drill core and review of old drill logs.

Between 2006 and 2008, TIL carried out extensive orientation work over the prospect with the intention of identifying target zones distal from the known occurrence. This involved digitally capturing a large volume of historical data which included shallow soil geochemical data, VLF-EM, gradient array IP, and gravity surveys. A multi-element lithogeochemistry study of short-hole diamond core was completed. The short-hole drill programme consisted of 23 diamond drillholes, drilled to depths of 10-37m, with an average of 21m. In terms of geophysics, an emphasis was placed on UTEM. Later, a regional atomic dielectric resonance ("ADROK") subsurface survey was conducted on the property. A short seismic line over the prospect was undertaken for TIL in 2010 (see Figure 6.4 for detail of seismic profile locations).

In 2007, TIL commissioned Chlumsky Armbrust & Meyer in Denver to complete a scoping-level resource estimate to verify the Robertson estimate and to support an internal economic analysis. The estimate applied a 4.0% Zn and 0.5% Pb cut-off grade with a minimum three-metre mining height and a more conservative shell than the Robertson model. The estimated tonnage and grade was purported to be 5.24 million tonnes averaging 7.5% Zn and 1.2% Pb; however, no report was ever filed. CSA Global cautions that the Qualified Person has not done sufficient work to classify this historical estimate as Mineral Resources in accordance with CIM and NI 43.101 guidelines and notes that the historical estimate is superseded by the updated Mineral Resource estimate documented in this report. GERC is not treating the historical estimates as current resources.

TIL's drilling was overwhelmingly focused on the larger regional potential for a big company-scale zinc deposit at the base of the Waulsortian. Consequently, TIL drilled only two confirmation drillholes (TC1344-26 and TC1344-36, see Figure 6.2) in the heart of the Ballinalack prospect during its tenure, both designed to twin a thick high-grade intersection cut by Noranda (drillhole B59, which intersected 45.6 m averaging 13.6% Zn and 2.4% Pb).

6.3.1 TIL Drilling

TIL conducted a small, preliminary diamond drilling programme in 2008 (totalling 2,700m), before the global financial crisis struck in September of that year. The drillholes were c. 2.5 km north and NW of the prospect. A key outcome of this programme was the realisation that, in this area, the Calp was much thinner than previously thought and consequently the underlying Waulsortian Limestone was shallower than previously expected. Extensive pyrite-dominated mineralisation encountered in the limestone was similar in style to the mineralisation in the heart of the prospect. A new fault was identified, similar in trend to the Ballinalack Fault. Most significantly, the deeper Pale Beds target position below the targeted base of Waulsortian Limestone was tested, 5 km south of Ballinalack. The drillhole intersected 7.6 m averaging 0.4% Zn, from 239.4 m, including 2.8 m averaging 1.2% Zn.

In 2009, there was no drilling due to severe budget cut backs, arising from financial challenges in the midst of the global financial crisis. On November 12, 2009, China-based base metal mining and processing entity, Nonfemet, acquired a 40% equity interest in Ballinalack Resources Ltd.

In 2010, TIL conducted 17,857 m of diamond drilling, largely to test the base of Waulsortian Reef Limestone and to a lesser extent, the Pale Beds (see Table 6.2). No significant mineralisation was intersected. A NE-SW normal fault was intersected in drillhole TC1346-003 with an interpreted throw of 350 m and alteration intensity indicating significant hydrothermal flow. Other work during 2010 involved 60 line km of gradient array IP, conducted southwest of the Ballinalack prospect, as well as seismic reflection lines (see Figure 6.5) and ground gravity surveys. TIL also completed some shallow soil sampling.

Figure 6.2 Core photographs showing semi-massive to massive sulphides, interpreted to display both open-space and breccia-replacement textures. Drillhole TC-1344-036 is in the north-central part of the Resource Estimate

Table 6.2 Summary of TIL's 2010 drill programme

PLA	Prospect/Area	Drill metres
1344	Ballinalack	8,798
622	Ballynacarrigy	3,954
3936	Ballynacarrigy	2,159
1345	Ballinalack/Sonna	562
1346	East of Ballinalack	2,384
TOTAL		17,857

A technical review of the project concluded that the Ballinalack Fault sits in a right-stepping relay ramp setting and is more complex and fragmented than previously interpreted. Importantly, it was considered highly likely that there is another right-step of the Ballinalack Fault to the north and east of the prospect. The Ballynacarrigy Fault system was also considered more complex than previously interpreted (see Figure 7.3).

In 2011, TIL reduced the quantum of drilling substantially, to a total of 5,658 m (Table 6.3). The focus of the 2011 drill programme shifted NE of Ballinalack and the Ballynacarrigy prospect, about 5 km from the resource area. Several drillholes were deep enough to penetrate the Pale Beds and cut traces of sphalerite. In the first half of 2011, the focus was on geophysical and technical studies. TIL commissioned an FTG airborne gravity survey, completed seismic surveys (Figure 6.4), and continued with ground gravity and sampling of peat bog; Teck had previously identified a weak geochemical signature in peat bog overlying Ballinalack. Other initiatives in 2011 included:

- lithogeochemical studies of the Tober Colleen formation;
- a stratigraphic study of the Pale Beds;
- mapping of dolomite distribution;
- downhole surveying, incorporating gamma, sonic and density; and
- structural model and resource model updates.

Table 6.3 Summary of TIL's 2011 drill programme

PLA	Drill metres
1385	1,084
1383	2,910
3936	460
1344	723
1346	481
TOTAL	5,658

In 2012, TIL drilled 3,131 m on PLA 1383, PLA 1384 and PLA 1385. Two holes, TC-1385-004 and TC-1384-001, were designed to test Pale Beds targets 10 km and 9 km northeast of the Ballinalack prospect. The former drillhole was abandoned after only 100 m and the second did not intersect any significant mineralisation. TC-1385-005 was another attempt at the TC-1385-004 target and intersected trace sphalerite and barite in Bird's Eye Micrite at a depth of 840m. TC-1385-003 tested a gravity anomaly and interesting structural setting interpreted from a seismic survey. The drillhole was sited near Lough Derravaragh and intersected weak mineralisation in the Bird's Eye Micrite in the lower Pale Beds.

Also in 2012, a structural and seismic review by Dr. Dave Coller (a very experienced specialist on seismic surveys and structural analysis in Ireland) was conducted and two new targets at Abbeylara and Coole were identified.

In 2013, drilling was not conducted, however, desk-work included interpretation of the Ballinalack structural model, a project technical review, a study of intrusives at Ballinalack, roadside gravity extending over three PLs and some ADROK virtual drilling.

Prior to GERC's acquisition of the Project, there had been a total of 93,305m of drilling, of which TIL has drilled 29,400m(see
Figure 6.3). See Chapter 10 for details of drilling by GERC.

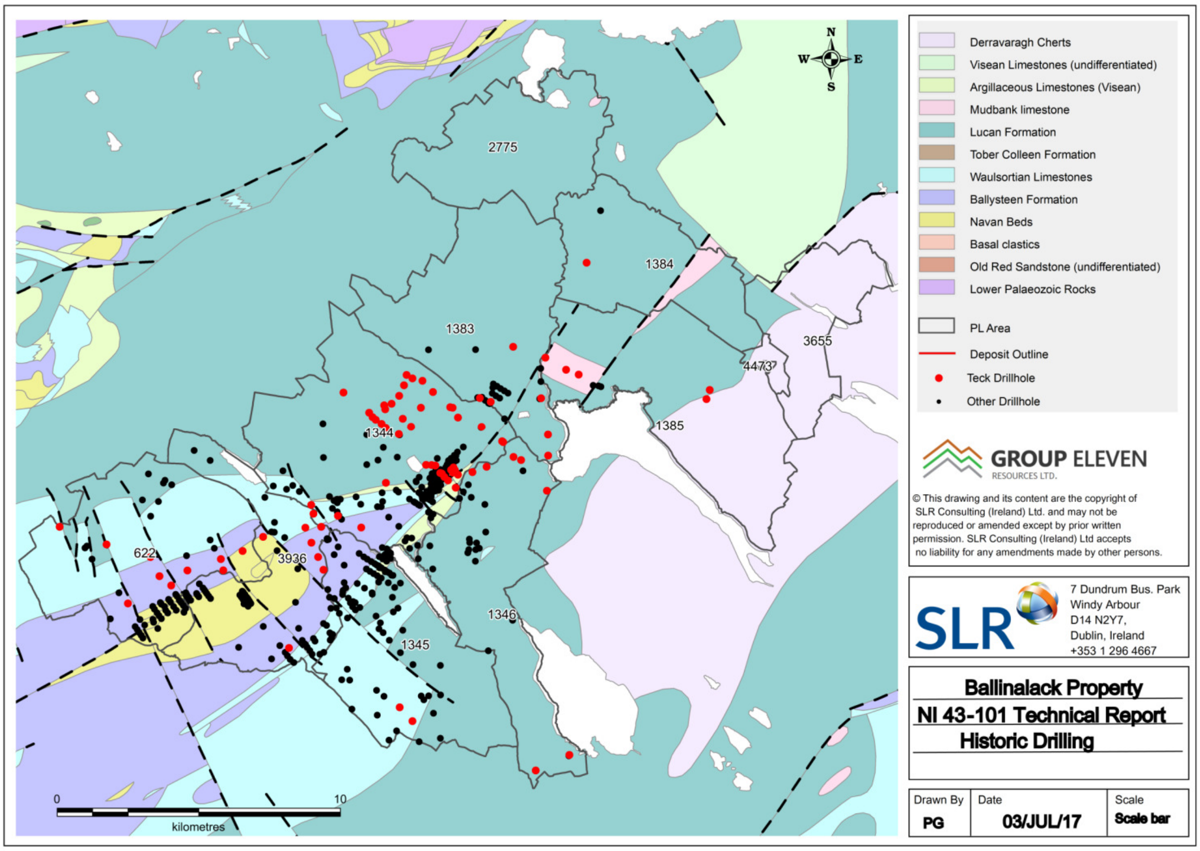


Figure 6.3 Previous drilling on Ballinalack group of PLs.

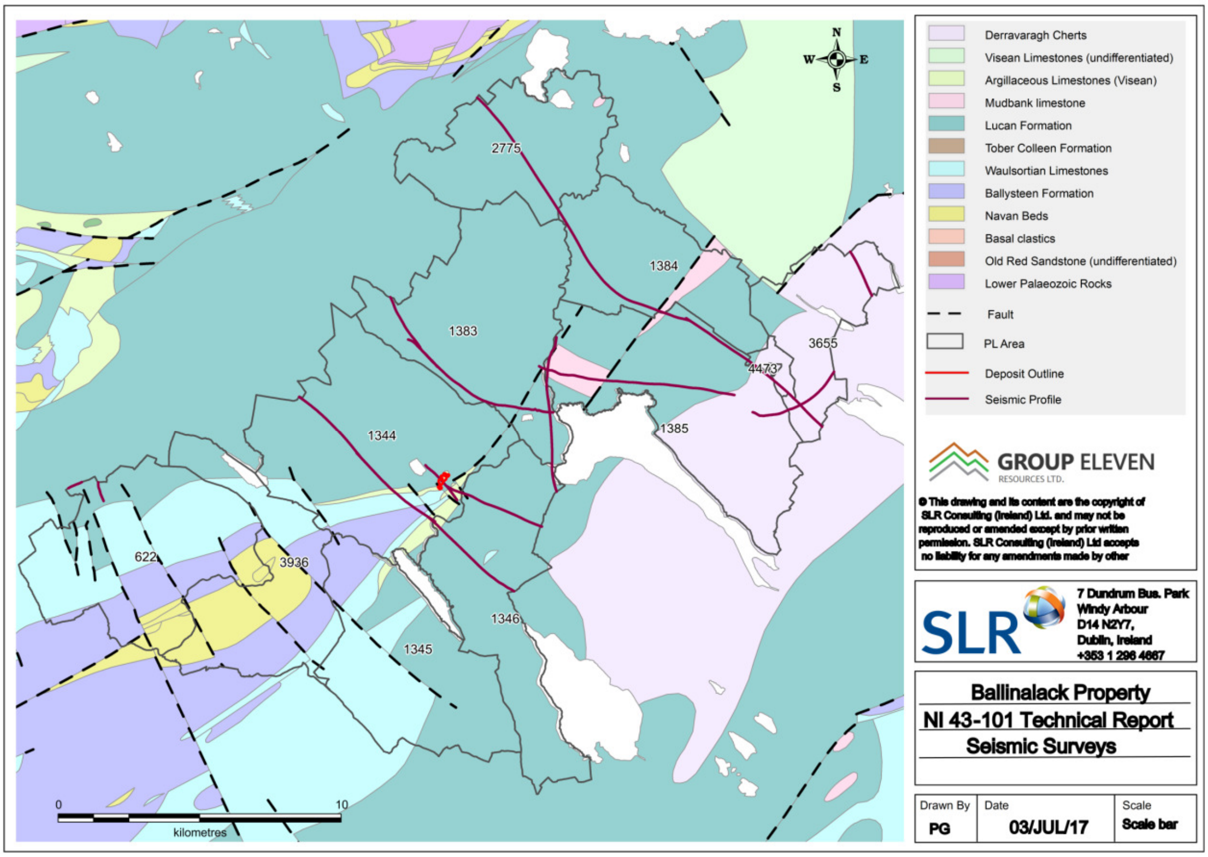


Figure 6.4 Seismic surveying completed by TIL

Table 6.4 Summary of Previous Exploration

Period	Company	Activity
1965-1969	Syngenore	Shallow soils + stream sediment
1970	Syngenore	Discovery
1971 - 1982	Noranda	Drill discovery of K-Zone
1979	Billiton	Noranda seeks JV partner – review by Billiton
1981	Noranda	110 holes drilled since discovery
1982 - 1986	Billiton	Very little work – focus on Harberton bridge Deposit, 1986 Billiton opts out of the JV
1987 - 1991	Oliver Resources plc	Culminates in Robertson Report
1995 – 1998	Celtic Resources Holdings	Acquires Oliver Resources and options to MIM & Navan Resources, who conduct sporadic exploration
1998 - 2002	Ivernia West plc	Buys Oliver Resources from Celtic, sporadic exploration
2002- 2005	Open ground	Ends with EMD competition for the property
2005 - 2017	Teck Ireland Ltd.	Focus on regional exploration; relatively few deep (>50m) holes distal from the prospect; only two holes drilled within prospect footprint; Nonfemet acquires 40% for US$6 million in November 2012

Table 6.5 PL number history

Current PL Number	Previous PL Numbers
PL 622	n/a
PL 1344	n/a

Current PL Number	Previous PL Numbers
PL 1345	n/a
PL 1346	n/a
PL 1383	n/a
PL 1384	n/a
PL 1385	n/a
PL 2775	PL 1590
PL 3655	PL 1386
PL 3936	PL 619
PL 4473	n/a

7.0 Geological Setting and Mineralisation

The Ballinalack prospect is hosted in the Lower Carboniferous carbonate sequence of the Irish Midlands, and lies in the hanging wall of a normal fault, downthrown to the NW.

7.1 Regional Geology and Mineralisation

Ireland was affected by Caledonian orogeny and uplift in the Silurian to Devonian, with the suture of the Iapetus Ocean running northeast-southwest through the Irish Midlands. Molasse sedimentation in the Devonian occurred on the 'Old Red Sandstone continent'. The Rheic Ocean lying south of Ireland was progressively closed through the late Palaeozoic as sliver terranes splintering away from the northern margin of Gondwana drifted north and docked with Laurentian, Avalonian and Baltic plates, while the Palaeotethys Ocean opened further to the south. The complex closure of the Rheic and Palaeotethys oceans led to development of the Variscan orogen and assembly of the supercontinent of Pangea.

In the Carboniferous, Ireland lay on the outer northern margin of the Variscan orogenic belt in a distal back-arc setting north of the Ligerian arc, which runs through southern Brittany. In the latest Devonian, a marine transgression commenced in the south and continued northward through the Tournaisian and Viséan so that by the Serpukhovian (latest Mississippian) most of the island was submerged beneath the sea. During the Tournaisian and Viséan, Ireland lay in tropical latitudes and marine sedimentation was dominated by carbonate sediments formed in marginal marine to shallow water carbonate shelf settings in the Tournaisian and Viséan. In the extreme south of the country, flysch sedimentation occurred in the South Munster Basin. In the north, mixed terrigenous and carbonate sediments accumulated along the margins of the shrunken remnant of the Old Red Sandstone continent (Holland and Saunders, 2009).

At the beginning of the Visean, the Irish Midlands platform was affected by a major extensional rifting event that led to break-up of the shelf into fault-bounded shallow-water shelf areas and intervening deeper water basins were calciturbidite sedimentation was dominant. Following the rift event, shallower shelf sedimentation reasserted during the later Visean.

The transgression and extension history resulted in development of diachronous stratigraphy across the country. Multiple informal and formal stratigraphic terms are in use. The following is a broad summary.

Old Red Sandstone red-beds are best developed in the south of the country and thin to the north. The marginal- to shallow-marine sequences are better developed in the northern part of the Midlands where they are termed the Navan Group (or Navan Beds). The overlying deep shelf carbonates of the Ballysteen Formation (or Argillaceous Bioclastic Limestone, ABL) are overlain by the deep water Waulsortian Mudbank Complex ('Reef; or Feltrim Formation) which is very variably developed across the country, with a thick sequence of overlapping mudbanks in the south and isolated mudbanks in ABL-facies limestone in the north Midlands. Lucan Formation (or Calp) dark basinal calciturbiditic limestones succeeded the Waulsortian complex, with shallower-water platform facies limestones on intra-basin highs.

The sub-Waulsortian sequences in the region north of the South Munster Basin have been sub-divided by Philcox, 1984, into the Limerick Province, North Midlands Province and sub Dunmore Province, extending into the Northern Province and the Kildare Province.

Stratigraphically, the Ballinalack prospect and Project lies within the North Midlands Province which extends westward from the Kildare province to an arbitrary boundary with the Dunmore Province. Its northern boundary is the Longford-Down Inlier, except in the east where it is drawn to include the Kingscourt outlier (Holland and

Saunders, 2009). Red beds are thin or absent except in the south of the province. Widely varying basal successions are overlain by shallow-marine Navan Beds rocks, informally termed the Micrite Unit, overlying Pale Beds, followed by the Upper Sandstone and Shaley Pale Beds. Younger beds of Argillaceous Bioclastic Limestone are not stratigraphically diagnostic (Philcox, 1984).

The Irish Midlands is transected by numerous regional fault zones which predominantly strike east-northeast. This anastomosing trend of regional faults parallel several inliers of Lower Palaeozoic sediments and follows a pre-existing Caledonide grain. This Caledonide trend, manifested by the long axes of inliers, shows up clearly as elongated anomalies on Bouger gravity maps of the region. This fault set developed during the early Visean rifting event, typically forming left-stepping arrays of faults clockwise of the Caledonian grain with linking relays. The faults suffered significant inversion during Variscan compression.

The Ballinalack Project lies in the north-central part of the "Irish Midlands Ore Field" which extends across central Ireland and which constitutes one of world's major districts for zinc and lead mineralisation (see Figure 7.1). Within the Lower Carboniferous carbonate sequence, two stratigraphic intervals host the bulk of known zinc-lead deposits the Navan Group in the northern part of the Irish Midlands and the Waulsortian Limestone in central and southern Ireland (see Figure 8.1). The predominant stratigraphic control appears to be the occurrence of favourable reactive host rocks, especially micritic and oolitic limestone.

All Irish deposits show a close control by faults and occur along major northeast structural trends. Deposits are localised along segments of these fault zones where fractured-rock connectivity created ideal plumbing systems for ascending hydrothermal mineralising fluids, especially related to offset relay zones and transform structures. Many of the deposits also show local scale north-south or NW trending faulting that appears to play a role in "bleeding" hydrothermal fluids away from the main east-northeast feeders. Several distinct linear mineralisation trends such as the Tynagh-Ballinalack Trend, Rathdowney Trend, and the Navan-Silvermines Trend follow this Caledonide grain.

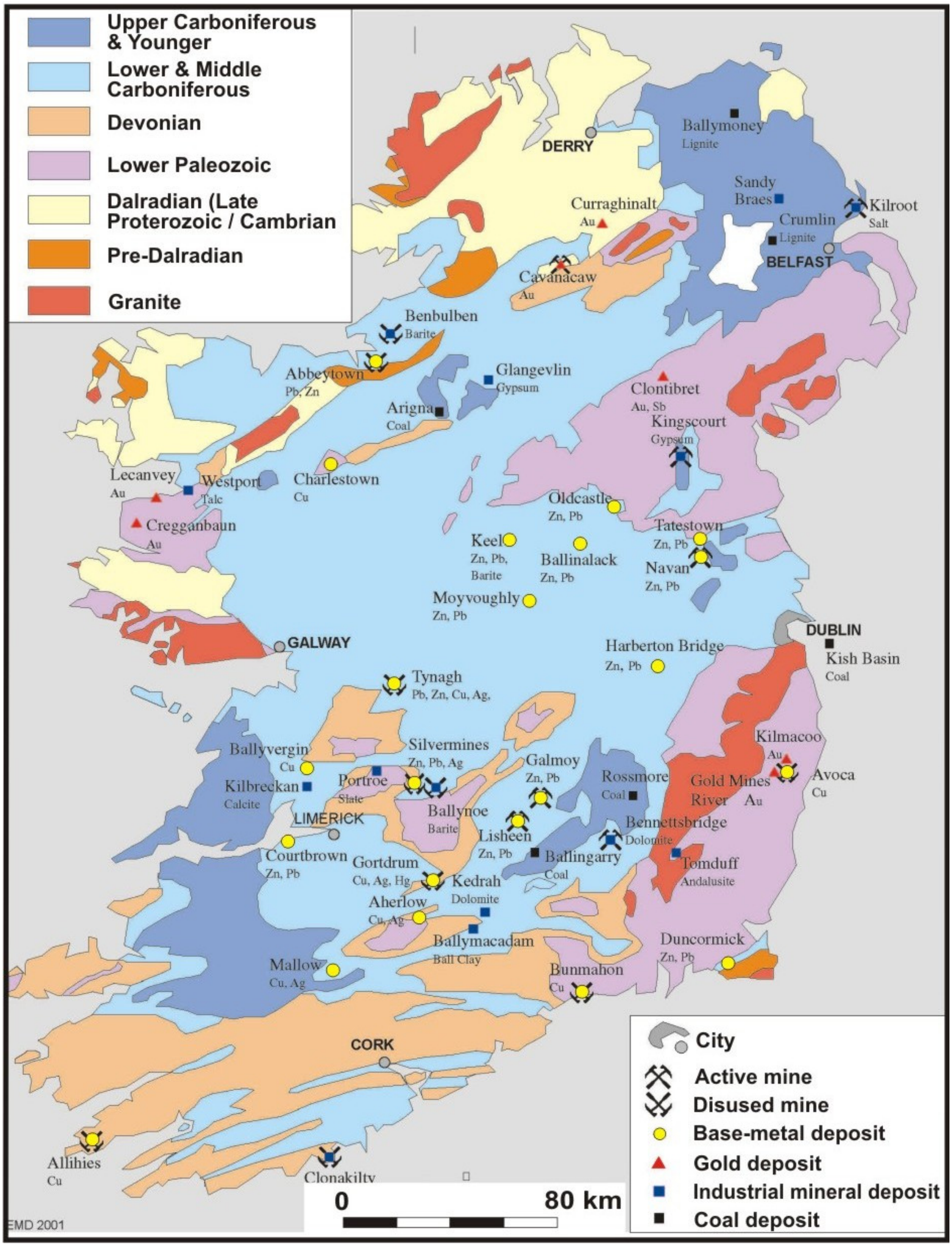


Figure 7.1 Geological Map of Ireland showing the location of Zn-Pb-Ag mines and significant prospects.

7.2 Local and Project Geology

The local basement underneath the Midlands region consists of Lower-Middle Ordovician volcanic and sedimentary rocks, with a thin veneer of Silurian and Devonian sediments which form a series of narrow, elongated fault-controlled blocks and basins. Ballinalack lies towards the northeastern termination of one such horst which extends southwards for several tens of kilometres.

Ballinalack lies along the eponymous Ballinalack Fault which is at the northern end of the Tynagh – Ballinalack Trend. The trend coincides with a regional gravity lineament which undoubtedly represents a major basement controlling structure and most probably a major focus for mineralising fluids that gave rise to the Tynagh and Ballinalack deposits.

The Ballinalack Fault has a northeastern strike, with a down-throw to the NW. The Waulsortian Reef mudbanks thicken significantly across the fault to form an alignment of knolls parallel to, and in the hanging wall of, the fault. There is a second major fault which trends NW and which separates high-grade mineralisation at its northern downthrown side from weaker mineralisation to the south. Whether this fault post-dates mineralisation and may have a strike slip component which offsets the prospective corridor remains to be determined (see Figure 7.3).

The bulk of the zinc-lead mineralisation which forms the prospect is concentrated in a series of pods within knolls of Waulsortian (Mudbank) Limestones aligned parallel to the Ballinalack Fault (Jones and Brand, 1986). Although only tested with a few peripheral holes, there is also known to be weaker mineralisation deeper in the stratigraphy, within the Pale Beds (Navan Formation).

The Pale Beds host the world-class Navan zinc-lead deposit, located 50 km to the east. The Authors agree with GERC management that the Pale Beds directly underneath the Waulsortian-hosted mineralisation is significantly under-explored (i.e. most drillholes targeted only Waulsortian limestones). From Ballinalack, as well as the smaller Keel zinc deposit nearby (located 20km to the NW), it is well recognised that zinc mineralisation exists in the Pale Beds. The key question that remains, however, is whether sufficient mineralisation has occurred to form an economic deposit in this part of the Irish Orefield.

7.2.1 Comparison between Navan and Ballinalack

At Ballinalack, about 1,000m of Lower Carboniferous, Dinantian (Mississippian, in North America) and older beds have been intersected in drill core. The oldest beds are well cleaved, steeply dipping Silurian grey-green shales and siltstones, below a faulted unconformity. Above this unconformity the strata are Lower Carboniferous in age. A thin development of probably lower Carboniferous (Courceyan) clastic rocks rests on Lower Palaeozoic (Silurian) rocks and is overlain by flaser-bedded sandstones similar to the Liscarton Formation at Navan (Table 7.1, Figure 7.3). No Old Red Sandstone or other Red Beds have been intersected by drilling at Ballinalack.

The overlying peritidal micrites (Birdseye Micrite Unit) are equivalent to the Stackallan Member of the Meath Formation at Navan. Fluctuating environments represented by the upper part of the Meath Formation were more frequently inter- or supra-tidal at Ballinalack than at Navan. The Rockfield Sandstone Member of the Moathill Formation, which follows, must have formed a complex of shallow water, generally subtidal, sand bars, at a time of major influx of terrigenous sediment from the west and NW (Phillips and Sevastopulo, 1986). The upper part of the Moathill Formation at Ballinalack is less sandy than at Navan (Holland and Saunders, 2009).

There are two distinct marker beds within the upper Argillaceous Bioclastic Limestone. These are green silty shales presumed to be tuffs. The lower marker is more regionally persistent. The contact between the Argillaceous Bioclastic Limestone and the Calp Limestone is especially sharp and marks the sudden onset of a deeper water depositional environment. Most other contacts are gradational.

Table 7.1 Summary stratigraphic column for Ballinalack area. Based on Jones and Brand (1986), Philcox (1984) and GSI (1996)

<table>
<tr><th>Age</th><th>"General" Term</th><th>Ballinalack Area Stratigraphy (Jones & Brand 1986)</th><th>Thickness (Jones & Brand 1986, GSI 2003)</th><th>Formal Stratigraphy (GSI 2003)</th></tr>
<tr><td rowspan="2">Chadian - Arundian</td><td rowspan="2">Supra-"Reef"</td><td rowspan="2">Calp Limestone</td><td>200m +</td><td>Lucan Formation</td></tr>
<tr><td>60m</td><td>Tober Colleen Formation</td></tr>
<tr><td rowspan="2">Courceyan – Chadian</td><td>Upper ABL</td><td>Upper Argillaceous Bioclastic Limestone</td><td>125m</td><td>Argillaceous Limestones</td></tr>
<tr><td>"Reef"</td><td>Waulsortian Mudbank Limestones</td><td>20 - 180m</td><td>Waulsortian Mudbank Formation</td></tr>
<tr><td rowspan="7">Courceyan</td><td>Lower ABL</td><td>Lower Argillaceous Bioclastic Limestone</td><td>100-180m</td><td>Ballysteen Formation</td></tr>
<tr><td rowspan="2">Navan Beds - Shaley Pales</td><td>Bryozoan Shales</td><td>5 - 10m</td><td rowspan="2">Moathill Formation</td></tr>
<tr><td>Argillaceous Biosparites</td><td>40m</td></tr>
<tr><td rowspan="4">Navan Beds - Pale Beds</td><td>Pale Limestone</td><td>30m</td><td rowspan="2">Meath Formation</td></tr>
<tr><td>Upper Calcareous Sandstone</td><td>80m</td></tr>
<tr><td>Birds Eye Micrite</td><td>25m</td><td>Meath Formation Stackallan Member</td></tr>
<tr><td>Lower Pale Sandstone</td><td>50m+</td><td>Basal Clastics</td></tr>
<tr><td>Ordovician - Silurian</td><td>Lower Palaeozoics</td><td>Lower Palaeozoics</td><td>?</td><td>Lower Palaeozoics</td></tr>
</table>

7.2.2 Waulsortian Mudbank Limestones “Reef”

This formation of late Courceyan to early Chadian age hosts a large number of Irish base-metal deposits, including the Ballinalack zinc-lead prospect, and is therefore of great exploration importance. The unit is a generally massive to poorly bedded distinctive pale grey limestone composed mainly of individual or coalesced mounds or banks of carbonate muds as biomicrite with fibrous and blocky spar infilled cavities (stromatactis). The Waulsortian mudbank complex is frequently referred to as “the Reef”. The Waulsortian forms a discontinuous unit several hundred metres thick overlying the Upper Ballysteen and Argillaceous Bioclastic Limestones in the Limerick Province (Philcox, 1984). The base of the Waulsortian is visibly diachronous on a local scale and inferred to be diachronous on a larger scale based on various thicknesses of sub-reef beds containing probably off-reef tongues.

These mudbank limestones at Ballinalack form complex accumulations of mounds or knolls. As rocks, they consist of calcite mudstones with coarser, sparry calcite mosaics containing bioclasts of bryozoan, crinoids and occasional brachiopods. The diagnostic textural feature is in the form of stromatactis cavities, once interconnected, and now filled with a succession of sediments and calcite cements. Waulsortian mudbanks are interpreted as having been deposited in a range of water depths, from sub-photic to supra-wave base, many complexes starting to form in deeper water and growing into shallower environments (Lees, Hallet and Hibo, 1985; Lees and Miller 1985, 1995). Bradfer (1984) identified three microfacies within the Waulsortian at Ballinalack:

I. Biomicrite wackestone with stromatactis,
II. Biomicrite wackestone with bryozoan-bounded spar-filled cavities,
III. Mottled limestones.

Shales are more abundant in the upper parts of the mounds. Bradfer (1984) identified three forms of stromatactis and Bathurst (1982) identified four generations of calcite cement.

At Ballinalack, the Waulsortian changes rapidly in thickness and form. In the footwall of the Ballinalack Fault the formation consists of two or three sheets of typical lithologies ranging from 4 to 7 m thick, with partings of argillaceous limestones and shales from 50 cm to 3.5 m in thickness. This description of the Waulsortian persists at least over a distance of 5 km north of the prospect (Jones et al., 1986).

Across the Ballinalack Fault, the thickness and form of the Waulsortian increases dramatically to a maximum of 190 m. The reef mudstones form knolls elongated and aligned with the Fault Zone. There are three knolls numbered 1 to 3, two in the northern and one in the southern half of the prospect area (Jones et al., 1986). The distance between the culminations of the two northerly knolls (1 and 2) is about 300 m (see Figure 7.2) and they are about 150 m in diameter (plus, at least 190 m in maximum thickness). Knoll 3 was interpreted by Jones and Brand (1986) to be on the northeastern, downthrown side of a normal fault, but this is now in doubt.

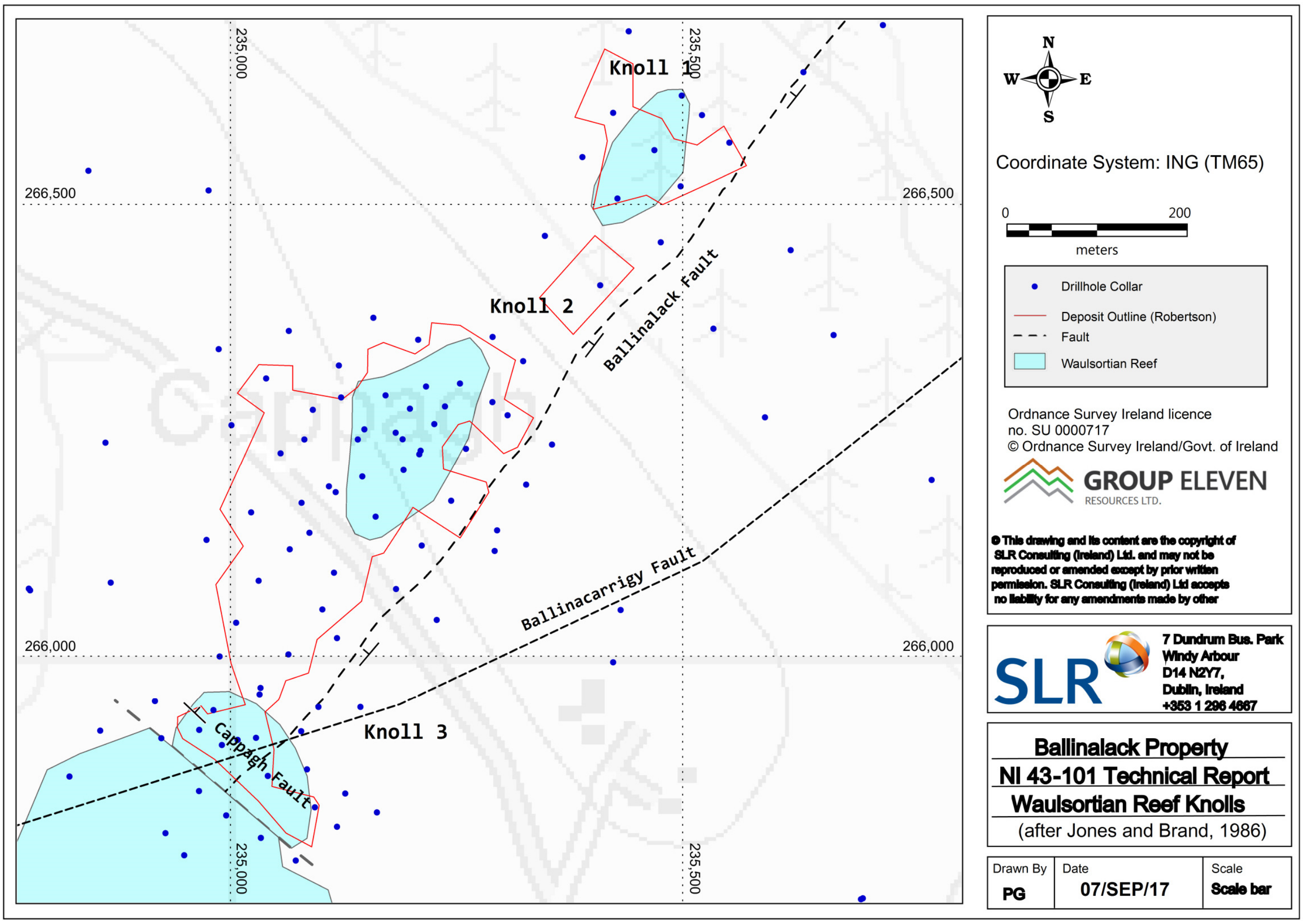


Figure 7.2 Waulsortian knolls at Ballinalack, modified from Jones and Brand (1986)

The distance between the two southerly knolls 3 and 4 is greater than knolls 1 and 2. Between knolls, the sequence is attenuated to 30 m of interbedded Waulsortian shales and argillaceous limestones. There is no suggestion of draping of overlying sediments over the mounds which suggests little or no topographic relief during formation. This also suggests that deposition kept pace with subsidence along the Ballinalack Fault (Jones et al., 1986). What was described as Knoll 4 forms the main part of the Waulsortian in the core of the Ballinalack Inlier and is not believed to be a separate knoll in the same sense as knolls 1 to3.

7.2.3 Argillaceous Bioclastic Limestone

The Waulsortian immediately overlies a thick sequence (c. 100-180 m) of varied, thin-bedded, commonly nodular limestone with varying shale content. The ABL is generally more shale rich in the upper half, with cleaner, limestones and interbedded siltstones at the base. *Syringopora sp*. is common in the lower half. The bottom contact is given as the lowermost thick black shale. The top contact is a transitional unit to the Waulsortian with nodules of pale grey micrite, similar to that of the Waulsortian but without the diagnostic textures, draped with wispy shales. The transitional unit is commonly referred to as the Nodular Micrite Unit and it is generally taken as part of the ABL.

7.2.4 Shaley Pale Beds

A sequence of shale, sandstone and limestone beds sharply overlies the Pale Beds. Three main sub-divisions have been recognised. The Lower Shaley Pales includes three rhythmic units about 9 m thick each consisting of a basal sandstone, overlain by interbedded argillaceous limestone and skeletal shale and on top a black unfossiliferous siltstone-laminated shale up to 1 m thick. The base of the Shaley Pales is placed at the bottom of the lowest shale.

At Ballinalack, the distinction between Lower and Middle Shaley Pales is less clear than typical of the region. Just above the Upper Sandstone, siltstone-banded shale beds up to 1.5 m thick, typical of the Lower Shaley Pales, are scattered through a sequence of burrowed silty calcarenite and calcareous siltstone beds (which at Navan is a Middle Shaley Pale facies). The fading distinction between Lower and Middle Shaley Pales reflects the regional northward facies change at this level.

The Middle Shaley Pales unit is composed of a variety of lithologies. Stick-bryozoan calcarenite and shale and limestone with a rich and varied bryozoan fauna are distinctive in the lower half of the Middle Shaley Pales. At one horizon, thick encrusting colonies can be logged with distinct bryozoa-rich shale (7.6 m) thick. The upper half of the MSP is a widely distributed facies across the North Midland Province and is largely composed of burrowed fine sandstone, siltstones and fine silty calcarenite, some of it argillaceous. This compares with a 3 m thick fine sandstone at Navan (Philcox , 1984).

The Upper Shaley Pales unit consists of interbedded crinoidal calcarenite and shale with some laminated calcareous siltstone and silty calcarenite near the bottom. West of Navan, a group of relatively thick shales within this member can be traced from hole to hole across most of the North Midlands Province (NMP; (Philcox, 1984). The top of these shales provides a distinct horizon which can be correlated across the sub-region. The highest shale is not always thick and a minimum thickness of 30 cm has been taken to define the top.

7.2.5 Mixed Beds or Pale Beds

West of the Navan zinc-lead mine, successions similar in a general way to the Pale Beds can be traced across the NMP. They have been called the “Mixed Beds” by exploration companies (Philcox, 1984). The base of the Pale Beds at both Navan and Ballinalack is fairly sharp at the base of a micritic sequence. Across the NMP, the top of the Pale Beds is generally considered to be the base of the Upper Sandstone, a unit which interestingly is not present at Navan. The Upper Sandstone separates Pale Beds from Shaley Pale Beds. At Ballinalack, thick micrite units are also present high in the succession. Oolites occur as thin beds near the top of the package.

An exceptional feature at Ballinalack is a thick sequence (c.22m) of dark burrowed siltstone and sandstone, intersected in drillhole B-109, from a depth of 444 m (Philcox, 1984). The Bird’s Eye Micrite is 25 m thick at Ballinalack and is stratigraphically equivalent to the same lowest Pale Beds unit at Navan. There is evidence that WNW trending tectonism controlled local thickness variations in these units with thickening on the more rapidly subsiding north side of faults.

7.2.6 Basal Transition Beds

At Ballinalack, the Basal Transition Beds are a c. 9 m thick sequence of shale-dominant heterolithic beds with rare bands of argillaceous micrite. The shale-dominant beds are overlain at the top by a one metre thick calcareous sandstone with a faulted upper contact. The thickness of the Basal Transition Beds overlying the Basal Sandstone varies systematically across the region suggesting a drape-like relationship with the underlying Basal Sandstone on a broad scale.

7.2.7 Basal Sandstones or Basal Clastics

In the central part of the North Midlands, including the Ballinalack area, the Lower Palaeozoics are unconformably overlain by thick sections of Basal Sandstones (56 m). This unit consists of pale yellow-grey sandstone, mainly medium to coarse-grained and non-calcareous. Subordinate interbeds up to 1.5 m thick of both light green-grey and dark grey mudstone can be present; and rarely also burrowed dark silty sandstone (Philcox, 1983).

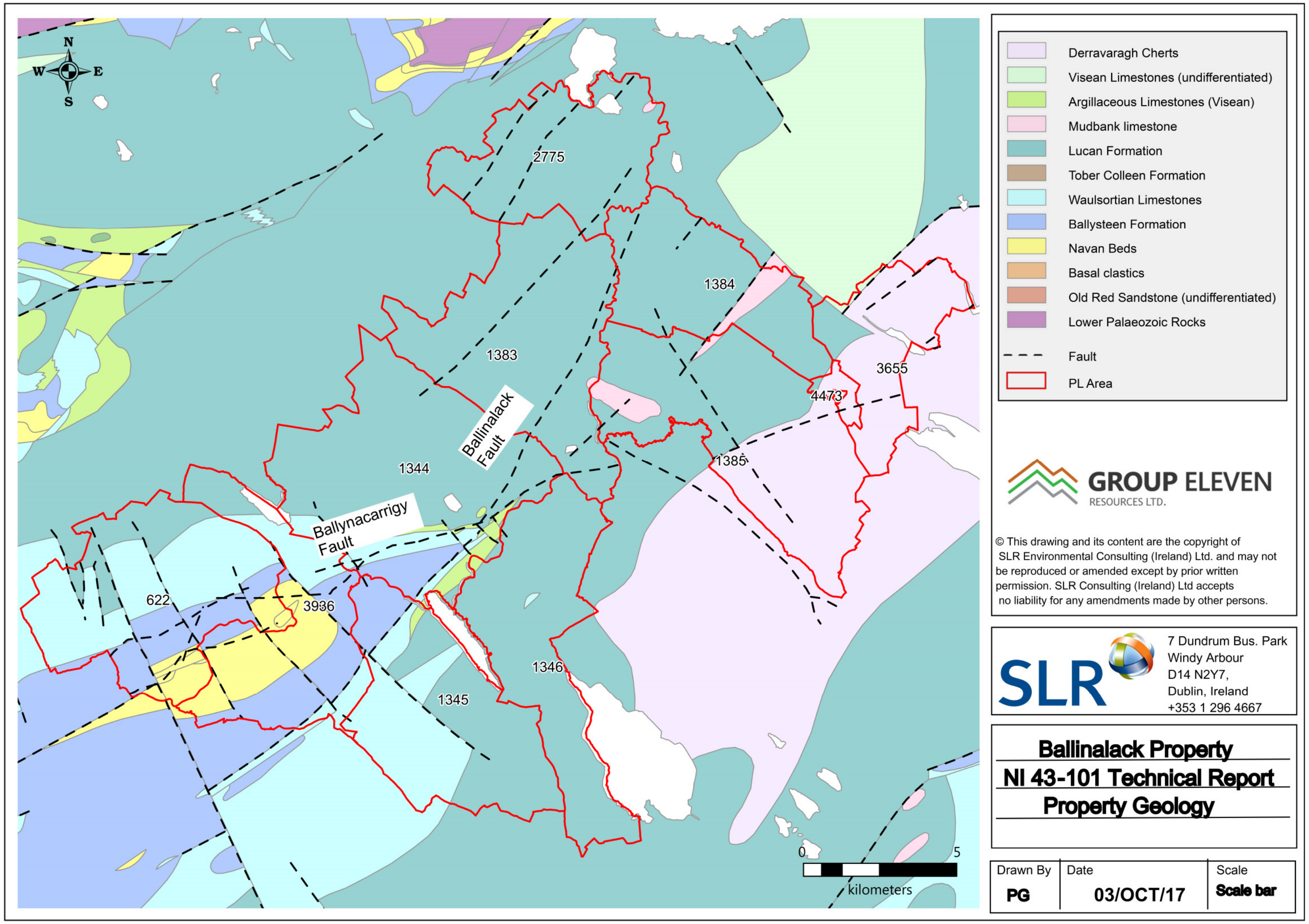


Figure 7.3 Ballinalack Project Geology

7.3 Structure

TIL put significant effort into re-interpretive work on the Ballinalack structural model in 2012. The objective was to comprehensively review previous structural models for the Ballinalack exploration area and identify zones of structural complexity.

TIL proposed that the Ballinalack prospect occurs at the apex of a structurally controlled paleotopographic high, generated by the convergence of two important fault systems. The two faults intersect in a "step-over" zone. This "Ballinalack high" was a zone of increased fracture density and enhanced porosity for upwelling mineralising fluids. Other cross-cutting fault zones in the Project area are thought to be prospective for this reason (see Figure 7.3).

The Ballynacarrigy Fault Zone strikes NE to the Ballinalack prospect and extends to the NE intersecting seismic lines IM-11-11 and IM-11-10 at oblique angles. Also a second fault system trends NNE along the eastern margin of the Ballynacarrigy Inlier. This fault was inferred by interpretation of drill cross sections. The hanging wall is downthrown to the E and the maximum throw is 200 m. The interpretation is that this fault propagates NNE to the Ballinalack prospect where displacement is transferred to a linked structure. The transfer results in a change in downthrow direction or "reversed polarity".

In summary, at Ballinalack, an east dipping structure bounding the inlier gradually transfers to a west dipping structure before continuing northwards to Ruth Hall and Coole (Cross, 2012). It had been long recognised that the Ballinalack prospect lies near the termination zone of a major NE-trending structure (Jones and Brand, 1986).

In addition to the controlling Ballinalack Fault, there is also a set of cross-faults, orthogonal to the Ballinalack Fault and with a vertical to sub-vertical dip. Faults of this nature are common in the Irish Midlands and usually have a vertical displacement of a few tens of metres. The horizontal displacement of the faults is harder to determine, but is not thought to be significant. The steeply-dipping fault to the NW of the Ballinalack Fault, seen in Figure 9.2, is believed one such fault.

7.4 Mineralisation

The known mineralisation at Ballinalack lies in the hanging wall of the controlling fault, as is expected in the Irish Zn-Pb orefield. The Pale Beds on the hanging wall are largely untested and a significant target exists in that structural and stratigraphic setting.

Pale Beds mineralisation is known in the Ballinalack area, at several different stratigraphic levels within the Pale Beds. It is best developed in the Bird's Eye Micrite and Upper (Calcareous) Sandstone. The best mineralized intersections in the Pale Beds are in the footwall of the Ballinalack Fault; importantly, the Pale Beds of the immediate hanging wall have not been tested. TIL intersected low-grade sphalerite-dominated mineralisation in the Pale Beds Bird's Eye Micrite – 7.6m averaging 0.4% Zn including 2.8m averaging 1.2% Zn (Teck, 2008) a meaningful distance away from the Ballinalack Fault.

A study of the Waulsortian-hosted mineralisation by Robertson Research in 1991 reported a historical estimate according to the then IMM standards and guidelines of 7.7 million tonnes averaging 6.3% Zn and 1% Pb. The best drillhole (B59) cut 45m averaging 13.6% Zn and 2.4% Pb from 223m depth. In 2007, Chlumsky Armbrust & Meyer completed an internal, scoping-level, historical estimate using a 4% Zn and 0.5% Pb cut-off grade with a minimum three-metre mining height and a more conservative shell than the Robertson model. The estimated tonnage and grade was purported to be 5.24 million tonnes averaging 7.5% Zn and 1.2% Pb; however, no report was ever filed.

CSA Global cautions that the Qualified Person has not done sufficient work to classify these historical estimates as Mineral Resources in accordance with CIM and NI 43.101 guidelines and notes that the historical estimates are superseded by the updated Mineral Resource estimate documented in this report. GERC is not treating the historical estimates as current resources.

Robertson Group's study summarises the mineralisation at Ballinalack as follows:

- The resource extends over an area of 1600 m by 650 m, interpreted to sub-crop (near-surface) on the southern end and dip to the north at 15 degrees reaching a maximum depth of 260 m;
- Maximum thickness of the resource is estimated at 100 m, located in the deepest, northern-most part of the resource;
- Grade generally increases with depth, ranging from 5.1% Zn and 0.5% Pb in the upper horizons, to 11.2% Zn and 2.3% Pb in the lowest horizons;
- Mineralisation is mildly affected by folding and faulting;
- Sulphide mineralisation appears to be related to low temperature hydrothermal processes and which infills stromatactis cavities and has undergone subsequent brecciation;
- It is argued that mineralising processes were related in time to a regional igneous vent, evidenced by tuff bands overlying the mudbank sediments;
- Mineralogy consists of a conventional mixed sulphide assemblage containing pyrite and sphalerite with minor galena and other sulphide minerals;
- Metallurgical testwork indicated that the mineralisation would respond well to a conventional froth flotation separation treatment and was also amenable to pre-concentration by dense medium separation;

7.4.1 General Observations

The Authors note that the Ballinalack prospect occurs at the junction of two structures; the Ballinalack Fault and the Ballinacarrigy Fault (see Figure 7.3). It is the opinion of the Authors that other fault intersections on the property warrant closer inspection.

Mineralisation extends over a distance of at least 1.5 km on a north-easterly trend and trace mineralisation is observed up to 600 m north-westerly from the Ballinalack Fault. Mineralisation extends through the full thickness of the Waulsortian, but distribution of potentially economic grade mineralisation is limited. The mineralisation occurs as a series of quite narrow, elongate pods each associated with Knolls 1 to 3. Knoll 4, the most southerly, contains only weak mineralisation.

The highest grade mineralisation is found between the 50-metre and 120-metre Waulsortian Reef isopachs and no more than 100 m from the Ballinalack Fault. Interestingly, mineralisation neither extends into the fault zone, nor does it terminate against it. In plan-view, typical mineralized footprints are no more than 200 m along strike and 100 m across. Importantly, weaker mineralisation wanes into thicker parts of the Waulsortian and is more widespread at higher levels.

In Knoll 1, furthest to the north, the mineralisation is concentrated in the upper half of the Reef; in Knoll 2 it occurs at the base. In Knoll 3 the preferred level for the mineralisation is not clear and may be related to the intersection of the Ballinalack and Cappagh Faults and also because, for some unexplained reason, *the full thickness of the mudbank has not been drilled in critical areas* (Jones and Brand, 1986). However high-grade intercepts in Knoll 3 suggest it may be similar to Knoll 1.

In Knoll 4, the best grades are found near the base of Waulsortian (Jones and Brand, 1986). mineralisation is concentrated just above impermeable lithological barriers, such as inter-mudbank shales at the base of a given section. The intensity and complexity of the mineralisation decreases vertically upwards and away from the Ballinalack Fault.

7.4.2 Styles of Mineralisation

The following is a extract from Robertson Report (1991).

'The Robertson Group examined a total of 34 mineralized samples and the sulphide percentage content, relative abundance of sulphide minerals and texture were presented in Table 8.1 of the Feasibility Report. Sulphide Mineralisation occurs with a partially recrystallised biomicrite country rock, occasionally with stromatactis cavities. Relative sulphide abundance from greater to lesser is generally as follows: Pyrite > Sphalerite >> Galena>> Marcasite + Melnikiovite >> Chalcopyrite >Boulangerite.

Pyrite is the most abundant sulphide mineral and is commonly the only one present. Concentric coliform texture is widespread and successive bands show subtle variations in colour with reflective light. Pyrite represents the earliest sulphide phase although some sections exhibit more than one generation. Sphalerite is usually present enclosing earlier pyrite and in some cases replaces the latter. Up to three separate generations are present. Variations in iron content result in strong colour variations in transmitted plane polarised light. Red colouration intensifies with increasing iron content. Galena occurs in relatively small amounts, typically less than 5% of section area and usually forms inclusions within that mineral. The gangue mineralogy comprises barite, calcite and ankerite-dolomite. Barite forms radial aggregates of bladed crystals which mantle the sulphides and infill cavities. Blocky carbonate is usually the last gangue phase. Bulk X-ray diffraction analysis (XRD) of selected samples indicates this carbonate to be intermediate in composition between ankerite and ferroan dolomite.

On the hand specimen scale three primary styles of mineralisation are apparent:

- *Pervasive*
- *Cavity fill*
- *Brecciated*

There is gradation between these principal styles. Pervasive involves the almost complete replacement of host-rock to form massive sulphide and is not common. Cavity-fill style can be brecciated and concentration of sulphides around irregular cavities is very widespread. Cavities can be up to 8 cm in length connected by mineralized fractures. The biomicrite host rock around these fractures and cavities is barren.

7.4.3 Mineralisation in the Pale Beds

The following is a extract from Robertson Report (1991).

Mineralisation in the Pale Beds occurs throughout the Pale Beds sequence over the same strike length as the shallower-level main mineralisation. The lateral extent is not known because mineralisation has only been intersected in a narrow strip along the footwall of the Ballinalack Fault Zone. The mineralogy at the Pale Beds level is similar to the Reef mineralisation except that barite is much more abundant and iron sulphides much less. Sphalerite is usually massive and paler in colour than in the Waulsortian. Banding is less defined. Galena tends to occur in large blebs. Mineralisation is cross cutting as fracture fill or along stylolites. Contact with wallrock is sharp although no-selective replacement creating an irregular contact with wall rock has been observed.'

The comments on mineralisation in the Robertrson Report are consistent with observations made by the authors and GERC geologists.

8.0 Deposit Types

The Ballinalack prospect fits into the carbonate-hosted zinc-lead deposits sub-type known as 'Irish Type'.

8.1 General Description of Irish Type Deposits

Lower Carboniferous carbonate rocks of Ireland contain many significant concentrations of base metals ranging from small-tonnage pods of zinc-lead mineralisation to the giant Navan orebody 55 km NW of Dublin. Zinc-lead mineralisation is primarily in the host rocks of the Waulsortian Reef limestone Formation and the Navan Group.

Almost six decades of mineral exploration has resulted in the sequential discovery of five economic zinc-lead deposits – Tynagh, Silvermines, Navan, Galmoy and Lisheen, as well as one copper deposit at Gortdrum. There are more than 20 other sub-economic deposits and prospects such as Ballinalack and Keel (Figure 7.1) and anomalous zinc-lead concentrations are widespread throughout the Irish Orefield (> 35,000 km^2). The intensity of zinc r within the Irish Orefield is impressive given its area, which is only a little larger than Vancouver Island.

GERC is focused on the discovery of Irish-type zinc-lead deposits. These deposits belong to a distinct class of carbonate-hosted zinc-lead Mineralisation which has a number of characteristic features. The following summary from Hitzman and Beaty (1996) provides a brief description of the main characteristics of this deposit type:

- The deposits occur preferentially in the stratigraphically lowest, non-argillaceous carbonate unit, (i.e., the first permeable, reactive unit encountered by the ascending fluids);
- They occur along, or immediately adjacent to, steeply-dipping normal fault systems which provided conduits for ascending hydrothermal fluids, i.e., typically, in the downthrown blocks of the faults;
- The deposits are stratabound and many display generally stratiform morphologies;
- Most deposits display pre-Mineralisation, diagenetic or hydrothermal dolomite alteration of the carbonate host rocks (i.e. Mineralisation post-dates the dolomite which post-dates lithification);
- Sphalerite and galena are the principal sulphides. Iron sulphides occur in variable amounts; some deposits are dominated by iron sulphides, while others contain very minor amounts. Barite is present in all the deposits, ranging from a dominant phase to a minor constituent. Many deposits contain minor tennantite, chalcopyrite, and/or Pb-Cu-Ag-As sulphosalt minerals;
- They display complex sulphide textures ranging from replacement of host rock by fine-grained, anhedral and colloform sulphides to infill of solution cavities by fine-grained, colloform and medium- to coarse-grained crystalline sulphides. Layered sulphide textures, other than colloform banding, are restricted to geopetal cavity fillings. Sulphides replace sedimentary, diagenetic, and hydrothermal wall rock, as well as previously deposited sulphides adjacent to feeder faults;
- The deposits display a general textural zonation with massive sulphide adjacent to "feeder faults" grading outward to veinlet-controlled and/or disseminated sulphides on the periphery of wedge-shaped sulphide lenses. Metals are also laterally and horizontally zoned, typically Pb-rich closest to feeder structures and the base of the orebody, then Zn-rich, with high Fe to Zn+Pb ratios in the distal parts of the orebodies.
- The deposits share the following generalised paragenesis: early carbonates → early diagenetic dolomitisation → "iron formation" (silica + iron oxides ± siderite) → barite → hydrothermal dolomitisation → Fe sulphides → sphalerite (becoming increasingly coarse-grained) → mixed sulphides (sphalerite, galena, Fe sulphides, Cu sulphides, As sulphides etc.) ± barite → late carbonates.

In the Irish Midlands, the most favourable horizon in the southern half of the Irish Midlands zinc district is the base of Waulsortian Reef. In the northern half of the district, the Pale or Navan Beds sequence is the preferred host for a number of deposits, notably Navan. These observations are explained by the Mineralisation typically forming in the first "clean" carbonate horizon above the base of the Carboniferous sequence. Southward in the basin, the Pale Beds give way to the Lower Limestone Shales which do not provide a suitable host rock. The Silvermines, Lisheen and Galmoy zinc-lead deposits lie along the Rathdowney Trend and are considered to be typical of the Waulsortian-hosted Irish-type zinc-lead deposits (see Figure 8.1, below).

At Ballinalack, GERC is focused on both the Waulsortian-hosted and the Pale Bed-hosted sub-sets of the Irish-type deposits. Previously operated mines (Tynagh, Silvermines, Lisheen, and Galmoy) exploited fault-controlled clusters of mineral "pods", occurring along structural trends, ranging from a few million tonnes up c. 20 million tonnes. Deposits are relevantly "compact" and, as an example, a 22 Mt orebody with several zones can fit within a 6 km^2 area such as Silvermines, Lisheen and Galmoy.

The Ballinalack prospect is intriguing and compelling from an exploration perspective, as it does not fit the regional exploration conceptual mould. Given Ballinalack's location so far north in the Irish Orefield, on the same latitude as Navan, one would expect the Pale Beds deeper in the stratigraphy to be the primary host-rock. Instead the historical zinc resource delineated at Ballinalack are concentrated within the Waulsortian Reef. The overwhelming number of drillholes have not tested the Pale Beds.

The Waulsortian Limestones at Ballinalack are not dolomitised and, in this respect, Ballinalack is more similar to Silvermines than the Rathdowney Trend deposits. Silvermines is well recognised to host replacement and dissolution, open space fill Mineralisation, associated with dissolution collapse breccias, cemented by hydrothermal dolomite and sulphides in the form of Black Matric Breccias ('BMB'). There does seem to be a strong vertical component to Mineralisation at Ballinalack with concentration close to the main feeder faults. This is similar in some respects to Tynagh.

Some geologists consider the Irish-type deposits to be Mississippi Valley Type (Leach et al., 2010) but most now agree that the Irish-type deposits are higher temperature, with higher silver concentrations and formed by replacement of carbonates and dissolution open space fill after early diagenesis, rather than cavity fill-dominated Mineralisation which occurs a significant period post lithification in 'typical' MVT systems such as Silesia, Pine Point, or the Mid-Continent US districts.

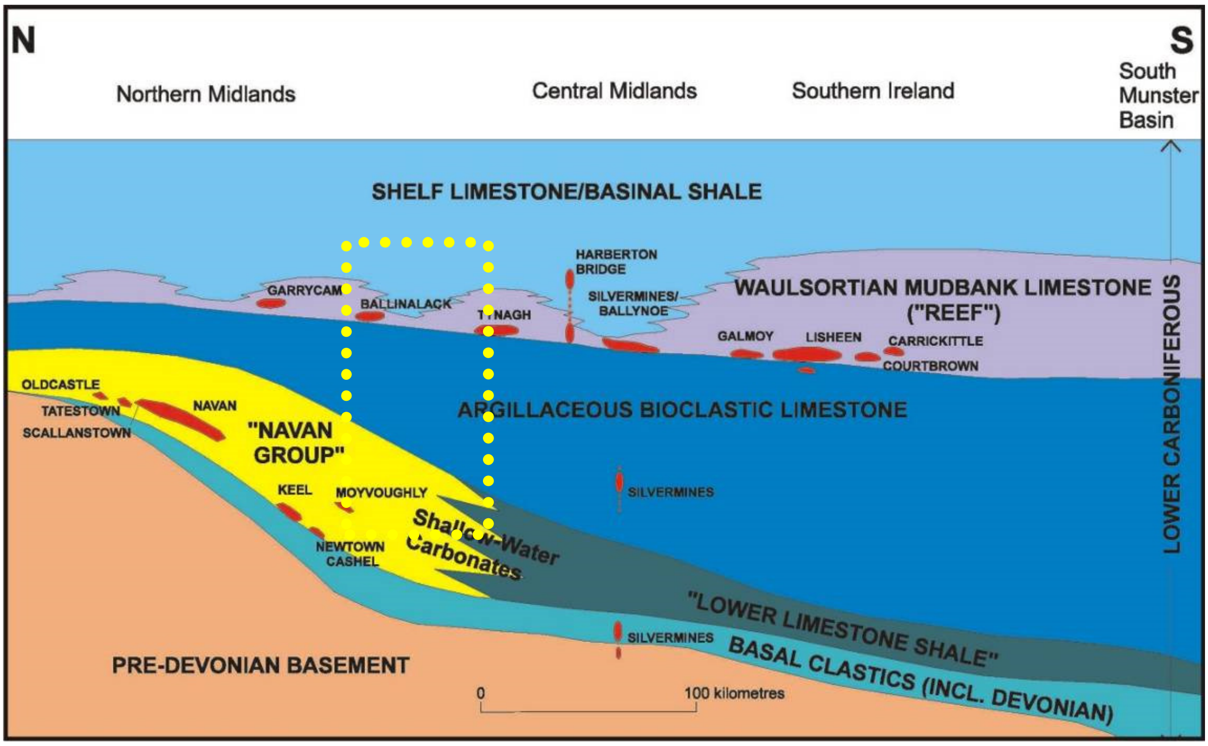


Figure 8.1 Stratigraphic location of Carboniferous-hosted Mineralisation in Ireland. Ballinalack area highlighted

8.2 Variability within Irish-type Deposits

There are a number of features that are common to all Irish-type deposits, while each individual deposit may exhibit unique or differing characteristics compared to other superficially very similar deposits.

8.2.1 Common Features

All Irish-type deposits show the following characteristics:

- Hosted on the hanging wall of normal fault zones, frequently overlying transtensional basement shear zones.
- Faults were syn-depositionally active during late Courceyan to Chadian - Arundian rifting.
- Faults control margins of intra-platform basins, marked by significant carbonate facies and thickness variations.
- Host rocks are typically the first major clean carbonate unit in the sequence.
- Host rocks are more permeable or reactive than other lithologies in the sequence.

8.2.2 Host Rock Variation

- Ballinalack, Silvermines and Tynagh - host rock is a limestone
- Lisheen and Galmoy have dolostone as a host rock, indicating lithification and diagenetic alteration to dolomite prior to the mineralising event

8.2.3 Alteration Variation

- Silvermines has extensive hydrothermal dissolution breccias (termed reef or dolomite breccias, but texturally very similar to the Rathdowney Trend BMBs) overlying, and distal to, the sulphide Mineralisation.
- Lisheen has remnant ironstone fragments at the edges of the orebodies/alteration halo, suggesting that an initial ironstone body was present, but was overprinted and reduced during the sulphide phase.
- The Rathdowney Trend deposits (Lisheen and Galmoy) have extensive hydrothermal dissolution breccias (BMBs) and white dolomite cemented crackle breccias (White Matrix Breccias) overlying, and distal to, the sulphide Mineralisation.
- Tynagh has an extensive ironstone extending for some considerable distance beyond the sulphide bodies, but has no recorded hydrothermal breccia halo.
- Tynagh has extensive evidence of breccia formation within the orebodies.
- In all cases above, alteration systems associated with the sulphide orebodies are present and significantly increase the exploration footprint, assisting in finding hydrothermal sulphide-bearing parts of the systems.

9.0 Exploration

The majority of the work in recent years has been carried out by TIL; since acquiring the project, GERC has drilled two drillholes.

9.1 Summary

GERC acquired the Ballinalack property from TIL in June 2017. TIL's comprehensive project database is now owned by GERC. Under the Irish prospecting licence system, exploration data which is more than six years old are made available by the GSI and EMD. Additionally, once ground has been relinquished, the data are made available, although it may take some time for that to happen. TIL has held the Ballinalack Licence block for 12 years since 2005. GERC, with the assistance of its consultants, has extensively researched, compiled and integrated all exploration information and date available in GSI archives and integrated to fill any gaps and supplement the information and reports available from the project database (2005-2017) acquired from TIL.

It is quite understandable given TIL's deposit-size hurdle that the main thrust of exploration was property-wide to establish the potential for a cluster of deposits within the Waulsortian. This was at the expense of more obvious targets proximal to the Ballinalack prospect. This was also despite the fact that the Navan deposit Mineralisation, 50 km east, is hosted in the Pale Beds, lower in the stratigraphy than the Waulsortian target. Detail on TIL's drilling year by year is described in Section 6. TIL drilled only two confirmation drillholes within the footprint of the prospect and, it appears, largely discounted the potential of an economic zinc deposit deeper in the stratigraphy within the Pale (Navan) Beds.

TIL's broad exploration approach has provided an excellent regional structural model for the Ballinalack prospect, bounded by the eponymous fault and the Ballynacarrigy Fault Zone trending NE-SW over at least 15 km. The bulk of all previous drilling in the Ballinalack region has been in the southern half of the Project area. The main focus of such exploration has been to test, very sporadically, Pale Bed targets in the footwall and also southeast of the prospect along the strike of the Ballinalack Fault, toward the inlier where the base of Waulsortian is shallower (see Figure 6.3).

A more recent cluster of drilling by TIL is centred about 2 km north of the prospect. There has been very little drilling in the five PLs which extend north-eastward from the occurrence, over predominantly younger sub-cropping Calp limestone. These five PLs represent about half of the total Project area. GERC has identified five separate broad target zones, ranging in size from about 4 to 16 km^2 in area, which are associated with gravity anomalies. These target zones warrant further interrogation by reprocessing and reinterpreting the seismic profiles shot by TIL (see Figure 6-2).

Generally, clear opportunities emerge where there are major gaps in the testing of prospective exploration targets. Re-interpretation of TIL's seismic profiles (see Figure 6.4) to identify deep penetrating faults and determine how these relate to gravity anomalies would be a good initial step in identifying attractive target zones. There is clearly room for a major discovery. As an example, there is a gap in drilling extending northeast of the prospect along an immediate hanging wall corridor (2.5 km x 0.6 km) to the Ballinalack Fault (see Figure 6.3) where the target depth to base of Waulsortian is about 380 m and base of Pale Beds 700 m. Apart from three fences of drillholes just north of the southern boundary of PL 1383, this target zone extends for another 6 km where there is no drilling within a kilometre of the interpreted surface trace of the Ballinalack Fault. Careful scrutiny of reprocessed and reinterpreted seismic data could be the key to target reduction in these undrilled but highly prospective zones. A previously unrecognised fault has been identified by TIL from seismic surveys separate from the Ballinalack Fault and striking NW through PL 1383.

9.2 Base of Waulsortian Targets

The Ballinalack prospect is hosted within the Waulsortian and consequently this has been the focus of most previous exploration on the Property. The Southern Zinc High (SZH, see Section 6.0) was the first zinc-in-soil anomaly to be tested in 1970. Subsequently, the focus of drilling migrated northwards some 600 m to test the Northern Zinc High. This led to the discovery and delineation of the Ballinalack prospect. Not surprisingly, old targets are forgotten as exploration thinking on a particular project evolves and the SZH zone and particularly the nearby bog (which blankets any surface geochemical signature and presented a logistical challenge for drilling), certainly warrants re-examination. It is also believed that modern exploration techniques may prove more capable of delineating targets than was the case in the 1970s and 1980s.

It is also clear from a review of drillhole TC-1344-36 that there is a strong vertical component to the Ballinalack Mineralisation (see Figure 9.1), with the prospect appearing to take the form of a steep mineralized wedge, sub-parallel to the Ballinalack Fault, with thinner horizontal “lobes” of Mineralisation extending from this “wedge” at certain levels (probably partly or wholly controlled by argillaceous horizons within the Waulsortian complex). In light of this interpreted morphology of the prospect, it is apparent that the widely-spaced vertical drilling undertaken to date may underestimate tonnage and potentially the grade of this prospect (Kelly, 2017). A more detailed, closer spaced drill pattern and the use of appropriately angled drillholes would be required. See Figure 10.1 for proposed targets.

It is very helpful to recognise that some Waulsortian-hosted deposits, such as Tynagh and Kilbricken, are steep, fault-associated, sub-vertical mineral wedges. Ballinalack certainly falls into this group. TIL’s seismic profiles across the Ballinalack fault show that the structure is sub-vertical in general, although core angles as shallow as 55 degrees measured in drill-core indicate possible, more complex steep-shears, connected by shallower dipping links.

Other Waulsortian-hosted deposits such as Silvermines, Lisheen, Galmoy and Pallas Green are predominantly flat-lying, predominantly stratiform sulphide slabs extending away from feeder faults. For these deposits, the norm is (and has been) to delineate these deposits by vertical drilling. From recent examination of TIL’s two confirmation drillholes in the heart of the Ballinalack prospect it is clear, that the Mineralisation has a strong sub-vertical component (TC-1344-036). Trying to “shoe-horn” a steeply dipping mineralized body to fit a stratiform model relying solely on vertical drilling is likely to underestimate tonnage and average grade. Drillhole density at Ballinalack is also relatively low, on 60 m centres compared to 30 m at Lisheen (15 m in complex high-grade areas) and 25 m at Navan.

At 150 m from the surface trace of the Ballinalack Fault, the intensity of the Mineralisation wanes abruptly and thickness tapers sharply. The Pale Beds target in this corridor next to the fault remains untested (Figure 9.2).

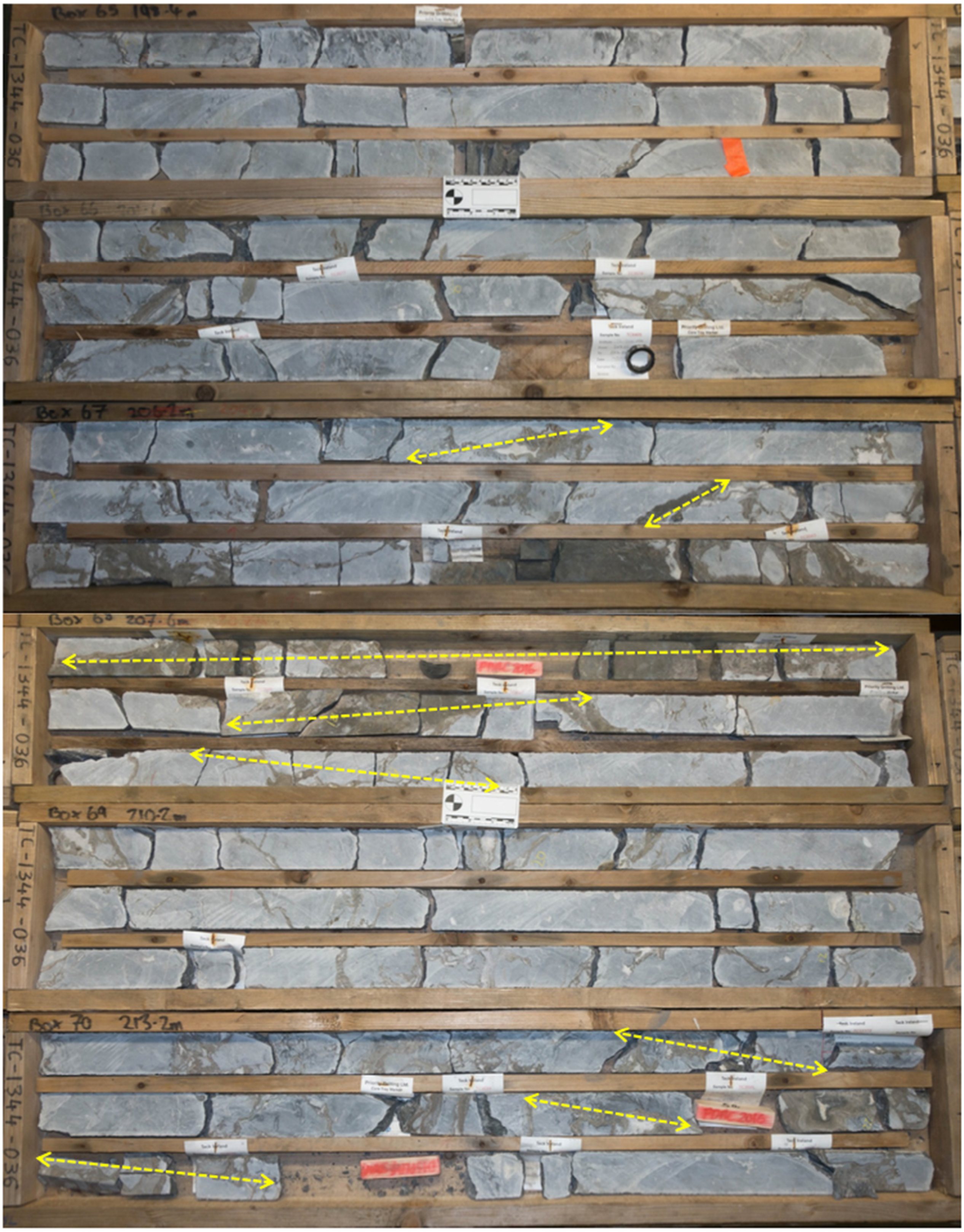


Figure 9.1 Picture of core from drillhole TC-1344-036, showing steep component to Mineralisation likely to be fractal on a larger scale (Photo courtesy of John Kelly SLR Consulting, February, 2017). Drill core is NQ in size.

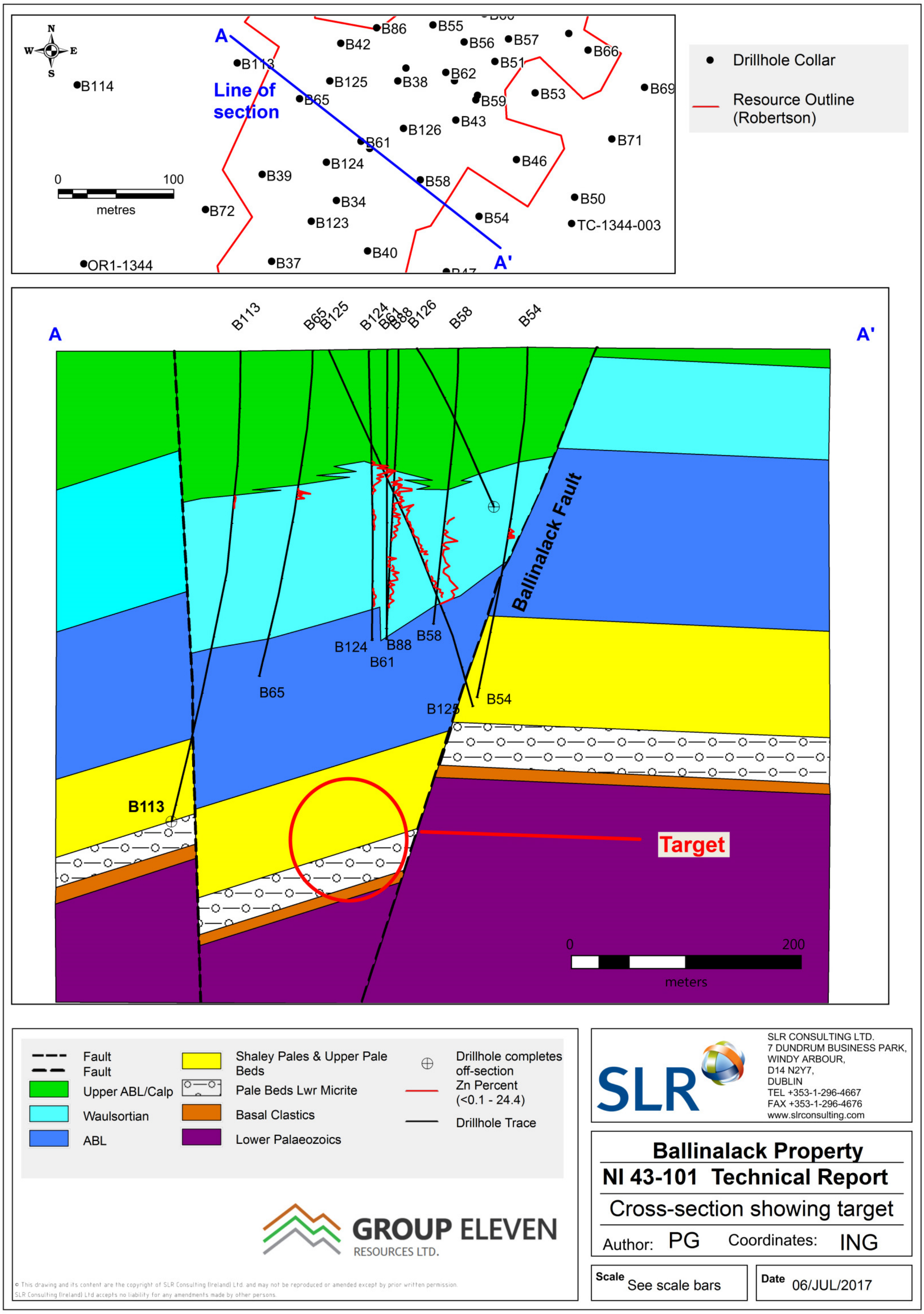


Figure 9.2 Pale Beds target underneath existing shallower prospect within the Waulsortian

9.3 Pale Beds Targets

At Ballinalack, the potential for significant zinc-lead Mineralisation in the Pale Beds in the Ballinalack Fault hanging wall immediately below the Waulsortian-hosted Mineralisation has been largely ignored by previous explorers. Historical drilling overwhelmingly focused on the potential for Waulsortian-hosted Mineralisation. There has also been very little follow-up drilling of the Pale Beds in the immediate footwall zone of the fault, despite these being significantly mineralized. Prospectivity of the Pale Beds at Ballinalack was first highlighted in a technical report by De Graff (then working for Billiton) in 1980.

The Pale Beds in the immediate hanging wall (within 150 m) of the Ballinalack Fault and, most importantly, beneath the prospect, remain untested. An accurate model of the Ballinalack Fault is crucial in planning drillhole location to test the Pale Beds in the hanging wall. The closest (mostly partial) tests of the Pale Beds in the hanging wall of the fault include:

- Drillhole B70, about 340 m from the interpreted fault plane. Only 8.5m of the Pale Bed sequence was intersected before the fault was intersected and the drillhole passed into basement rocks. The Waulsortian is well-mineralized, no significant mineralisation was intersected in the Pale Beds.
- Drillhole B115, about 320 m from the main fault plane, also intersected only a minor part of the Pale Bed sequence, again because the drillhole passed through the fault before intersecting the base of the Pale Beds. No significant mineralisation was intersected.
- Drillhole B113, also 320 m from the fault plane, did intersect what appeared to be a full Pale Bed sequence, as did TIL's drillhole TC-1344-039, which was the only other hole to cut the entire Pale Beds sequence in the hanging wall. The Waulsortian contains trace mineralisation (<1%) and there is one intercept of 8.0% Zn+Pb over 1.5m in the Pale Beds.

These results indicate that the structural architecture and kinematics within a few hundred metres of the fault are quite complex. Furthermore, these estimated distances from the fault plane are probably conservative because seismic profiling indicates a much steeper dip to the Ballinalack Fault than previously interpreted, therefore the lower part of the fault is further to the southeast.

There is also evidence for significant targets further away from the Ballinalack Fault:

- Historic hole (B121) intersected 3.5% Zn over 1.0 m in the hanging wall Pale Beds, collared over 600 m away from the surface trace of the Ballinalack fault.
- In 2008, borehole TC-3936-001, located 7.7 km south of the Ballinalack prospect intersected 7.6 m averaging 0.4% Zn from 239.4m depth, including 2.8 m averaging 1.2% Zn in the Birdseye Micrite Unit of the Pale Beds (the host of the largest lens at Navan).
- TIL drilled two holes (TC-1344-037 and TC-1344-039) through the hangingwall Pale Beds down-dip from the prospect, albeit, relatively distal to the Ballinalack fault. Only spot XRF analysis was conducted, however some kicks (up to 833 ppm Zn+Pb) were detected in the Pale Beds. The above drillholes were not followed-up; it is the Authors' opinion that the drillholes are extremely significant and warrant further investigation as a priority.

High grade sulphide Mineralisation intersected in footwall Pale Beds at Ballinalack (see Figure 6.1) indicate that this package is potentially a good host for Navan-type deposits. The obvious places to initially test would be close to the Ballinalack Fault where high-grade Mineralisation has been intersected higher up in the Waulsortian. The notable difference between the Navan deposit and Ballinalack is that the Waulsortian at Navan contains only minor iron sulphide Mineralisation, which is believed to post-date the main mineralising event, but this does not negate the validity of the Pale Beds target at Ballinalack. The model for Irish-type zinc deposits is that mineralising fluids preferentially concentrate in the first clean carbonate within the Lower Carboniferous sequence. The Pale Beds in this part of the Irish Orefield clearly make an excellent host for major zinc deposits and it is the Authors' opinion that there remains significant potential for a Pale Beds-hosted deposit of economic grade on the Ballinalack Property

Earls and Kelly (1999) succinctly presented the exploration rationale for testing the deeper Pale Beds horizon:

- *The Navan deposit lies some 50 km to the east of Ballinalack, in the same basin;*
- *Interesting grades are present in the Navan Beds in the general Ballinalack area and especially close to the Ballinalack Fault;*
- *The style of Mineralisation in the Waulsortian is predominantly open space fill, with the amount of Mineralisation controlled by the permeability and porosity present in the Waulsortian. No breccias similar in character to those at Lisheen, Galmoy or Silvermines, have been discovered to date at Ballinalack and a good host for base of Waulsortian Mineralisation may not be present; and*
- *The style of Mineralisation encountered in the Pale Beds is of similar character to that present at Navan and therefore suggests that it is possible to develop a large tonnage.*

9.4 Seismic Surveying

Over the last few years, seismic profiling has been the main tool for target reduction and refinement in Ireland, attributed to the great success in the discovery and delineation of the SWEX SE "deeps" at Navan. This latest chapter in the evolving exploration story at Navan, centred around the use of seismic surveying, has radically changed the understanding of the controls and anatomy of the deposit-complex.

The developments at Navan should serve as a template for exploration at Ballinalack. It is possible that the known deposit is not in the core of the main hydrothermal system but at its periphery. Seismic profiling and effective interpretation is key to determine whether the Ballinalack Fault is in fact the main plumbing system along the Ballinalack – Tynagh corridor for metal bearing hydrothermal fluids.

Similar to other geophysical exploration methods, the processing and interpretation is key. TIL relied on in-house teams to process and interpret seismic data, supplemented at times with external consultants. GERC will be using the same consultants who pioneered the seismic approach at Navan to assist in unlocking the deeper potential of Ballinalack in the context of basin tectono-stratigraphic evolution.

9.5 Geological and Geochemical compilation

GERC is fortunate to inherit a very high quality and extensive exploration database from TIL. Geological maps have been generated to integrate and compare all these features. Structures have been digitised into *MapInfo/Discover©*. A composite map has been created for all structural measurements and an electronic spreadsheet recording the source reference for each structure. This provides an excellent platform to build on and generate new targets.

9.6 Gravimetric Surveying

TIL carried out a comprehensive ground gravity survey of the property over a number of different campaigns. TIL used a Lacoste & Romberg G28 gravimeter. Topographic surveying was carried out with a Trimble RTK differential GPS system. Where possible, data acquisition was conducted along the existing local and regional road network at 100 m station spacing but, in order to provide sufficient continuity and density of sampling, a significant proportion of the survey was conducted by traversing private farmland. The data were compiled and reported to EMD.

The most striking feature of the gravimetric survey map presented by TIL (and reproduced here as Figure 9.3) is the strong correlation between anomalously high gravity and the location of the Ballinalack deposit. The Authors interpret this as being due to higher density basement rocks at relatively shallow depths, probably due to the presence of a deep basement structure which ultimately controls the Ballinalack Fault.

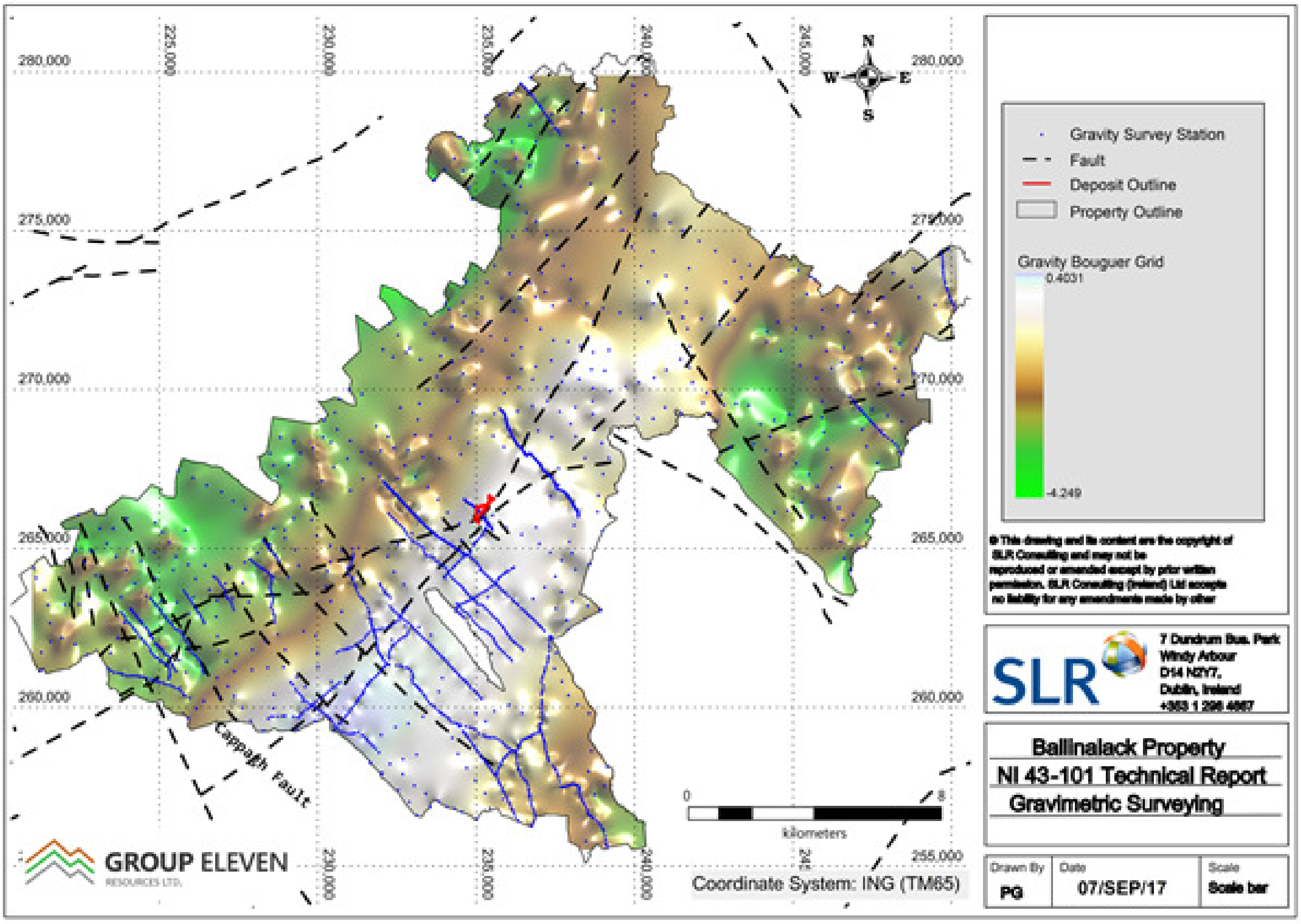


Figure 9.3 Gravity anomalism (based on ground surveys) on the Ballinalack Project, Ireland

9.7 Exploration Opportunity and Priorities

Since the initial discovery of sub-cropping and relatively shallow Mineralisation at Navan, almost 50 years ago, discovery of new resources has continued to the present day. The SWEX portion of the Navan Deposit was discovered 25 years after the initial discovery, and the Tara Deeps discovery has been made in the last two years. The continued success of exploration in the vicinity of the Navan deposit is due in no small part to the advances in exploration technology. Exploration success is very episodic, with long interludes of systematic exploration before significant breakthroughs are made, in the most recent case, using seismic profiling taken from the oil and gas exploration. The new deep ore zones are 3.5 kilometers along strike from the sub-surface outcrop in the northeast.

The Authors agree with GERC's opinion that the potential exists to successfully apply the same exploration approach at Ballinalack.

For all pre-TIL explorers at Ballinalack, the Pale Beds were considered far too deep to drill-delineate or to host Mineralisation which could be extracted economically. When Lisheen was discovered in 1990, its depth of 200 m was considered deeper than normal. It appears that TIL's focus was regional, and primarily focused on the base of Waulsortian, apparently discounting the Mineralisation intersected in the much deeper Pale Beds.

TIL's last concerted exploration effort at Ballinalack was in 2013, when there was no drilling on the Ballinalack Project.

TIL proposed to generate a three dimensional structural model which would honour all drill data and seismic interpretations available. This was not completed and would now aid greatly in the development of new targets across the project property.

A number of broad gravity lows were identified across three roadside gravity-survey lines. These were interpreted to represent broad zones of karst related to large-scale structures. The plan was to integrate the roadside gravity with the seismics to assist target generation. This work was also not completed and integrated gravity and seismic processing and interpretation is a priority.

10.0 Drilling

There have been numerous separate drill campaigns, carried out by a variety of companies. The general aspects of historical, TIL and GERC drilling are described below. The majority of drilling has been diamond drilling, apart from c. 30 reverse circulation (RC) drillholes which were drilled solely for geological purposes and were not over the deposit.

10.1 Historical Drilling

10.1.1 Drilling Methods

Drilling was primarily in BQ. Drill core was stored in wooden trays and stored at either Ballinalack or Harberton Bridge. Drilling on the Mineral Resource was at c. 50m spacing. C. 30 RC drillholes were also drilled.

10.1.2 Collar Surveying

The earliest drillholes were not surveyed, but following the discovery of mineralisation, a local grid was established and collar coordinates were recorded using that grid (Robertson 1991). Drill collars were not permanently pegged and it was therefore not possible for Robertson to re-survey.

10.1.3 Down-hole Surveying

Downhole surveying was not carried in the earlier drillholes, due to the shallow depth of drilling. Later drillholes were surveyed, using either acid tests or borehole cameras.

10.1.4 Core Quality and Recovery

Core recovery is generally very good at Ballinalack. Significant core loss is noted in drill logs, but this is relatively rare.

10.1.5 Drill Site Security and Drill Core Handling

There are no records regarding drill site security and core handling.

10.1.6 Drill-core Logging

Logging was carried out by a large number of geologists, with some inconsistencies in interpretation. Robertson carried out an extensive re-logging programme to improve consistency.

10.2 TIL Drilling

10.2.1 Drilling Methods

All drilling was in NQ. Drilling was widely-spaced and primarily focussed on exploration distal from the deposit.

10.2.2 Collar Surveying

Collars were surveyed using differential GPS, using Irish National Grid coordinates.

10.2.3 Down-hole Surveying

Downhole surveying was by single-shot downhole survey tools, at intervals of 10-15m. Some shallow holes (<30m deep) were not surveyed.

10.2.4 Core Orientation

Core orientation was not carried out.

10.2.5 Core Quality and Recovery

Core recovery was excellent, but was not logged.

10.2.6 Drill Site Security and Drill Core Handling

Drill core was collected daily and the remaining drill core at the end of a shift was locked in the drillers' shack. Core was transported to Teck's secure core store.

10.2.7 Drill-core Logging

Core logging was all digital, using tablets/laptops and AcQuire software.

10.3 GERC Drilling

10.3.1 Drilling Methods

All drilling has been in NQ, with only two drillholes drilled by GERC, no drill spacing has been defined.

10.3.2 Collar Surveying

Collars were surveyed using differential GPS, using Irish National Grid coordinates.

10.3.3 Down-hole Surveying

Downhole surveying was by single-shot downhole survey tools, at intervals of 30-50m.

10.3.4 Core Orientation

Drill-core is oriented using a mark on the drill core to indicate the 'top' of the hole.

10.3.5 Core Quality and Recovery

Core recovery is good and is recorded in drill logs.

10.3.6 Drill Site Security and Drill Core Handling

10.3.7 Drill-core Logging

Drill-core logging is carried out on paper logs and then summarised digitally.

10.4 GERC Drill Results

GERC has completed two drillholes on the Project, see Figure 10.1 for drillhole locations. The drillholes were designed to test targets identified from GERC's review and reinterpretation of the Ballinalack data.

Drillhole G11-1344-01 was designed to intersect the Ballinalack fault immediately below the area of the historical estimate. The drillhole was drilled at an azimuth of 145° and dip of -65°, to a depth of 625.1 m and drill core was oriented, allowing for the accurate collection of structural data relating to the Ballinalack fault. The drillhole was also designed to intersect an interpreted cross-fault (see Figure 10.1 and Figure 10.2). The drillhole did not intersect significant Mineralisation and was not assayed.

Drillhole G11-1344-02 was designed to test for Mineralisation within the Navan Beds and in an area interpreted to be structurally complex. The drillhole was drilled at an azimuth of 170° and dip of -50°, to a depth of 389.1m. Drill core was oriented. The drillhole intersected significant Mineralisation (see Figure 10.3 and Table 10.1)

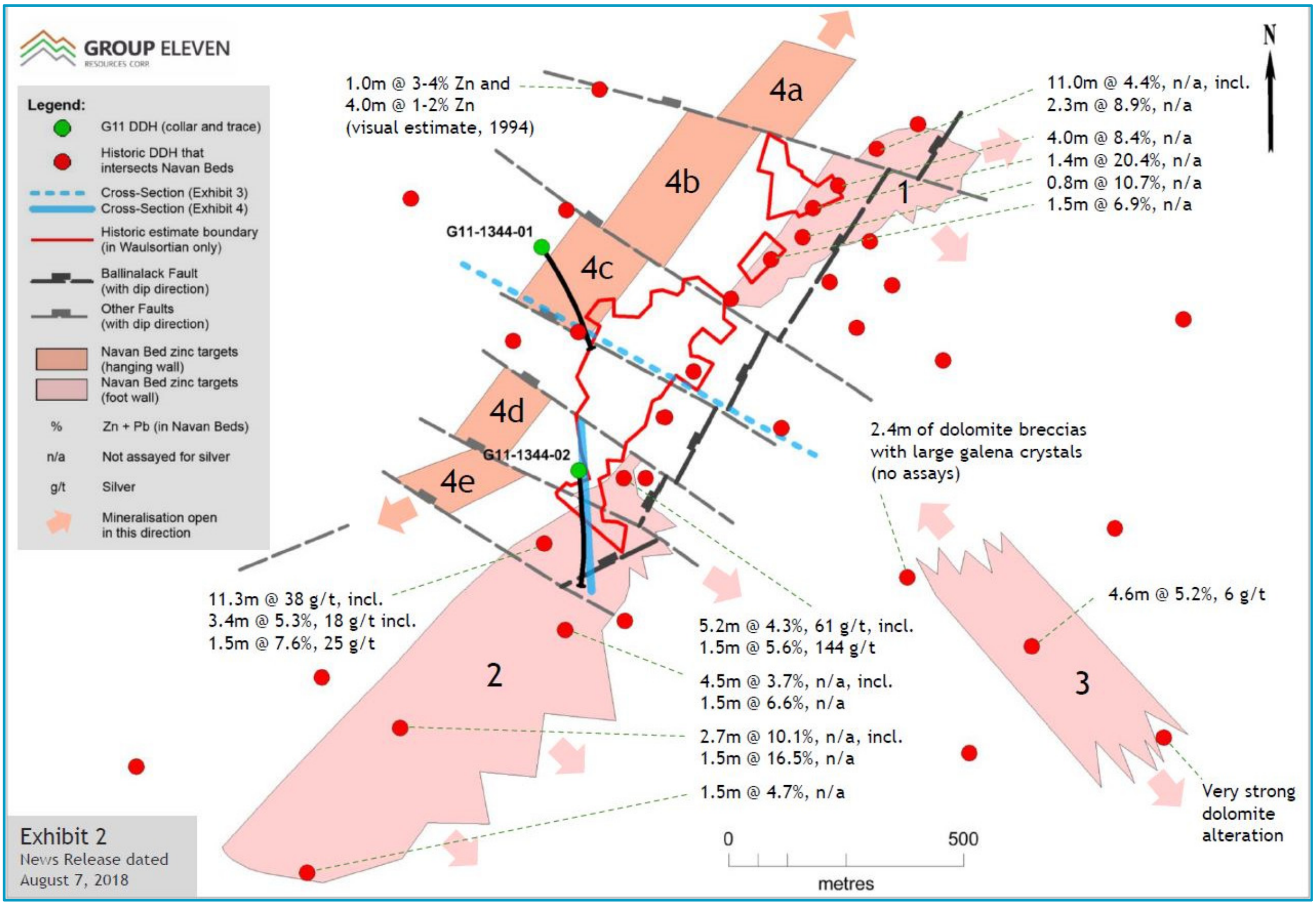


Figure 10.1 Location of target areas and recent drillholes on the Project.

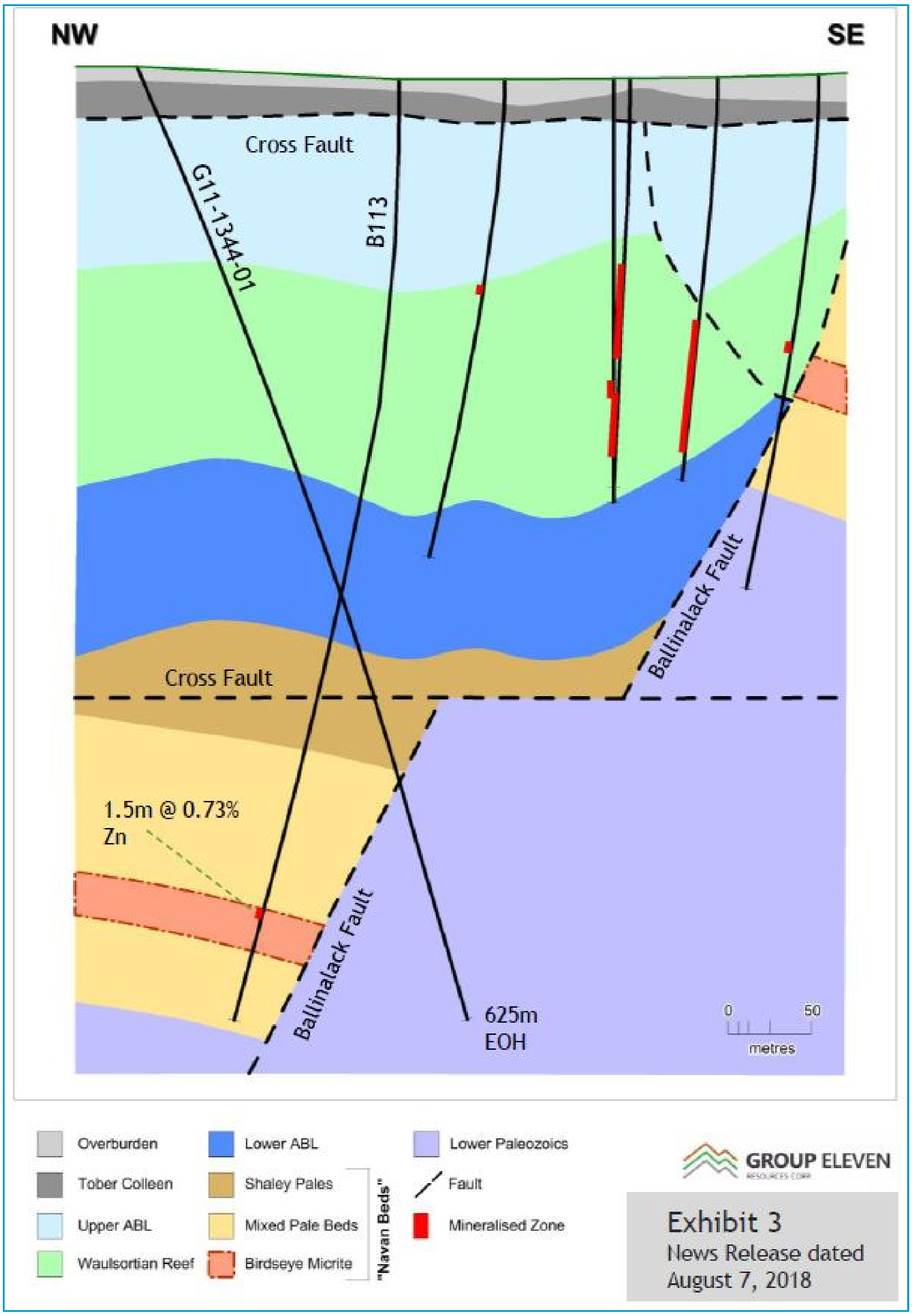


Figure 10.2 Cross section through drillhole G11-1344-01

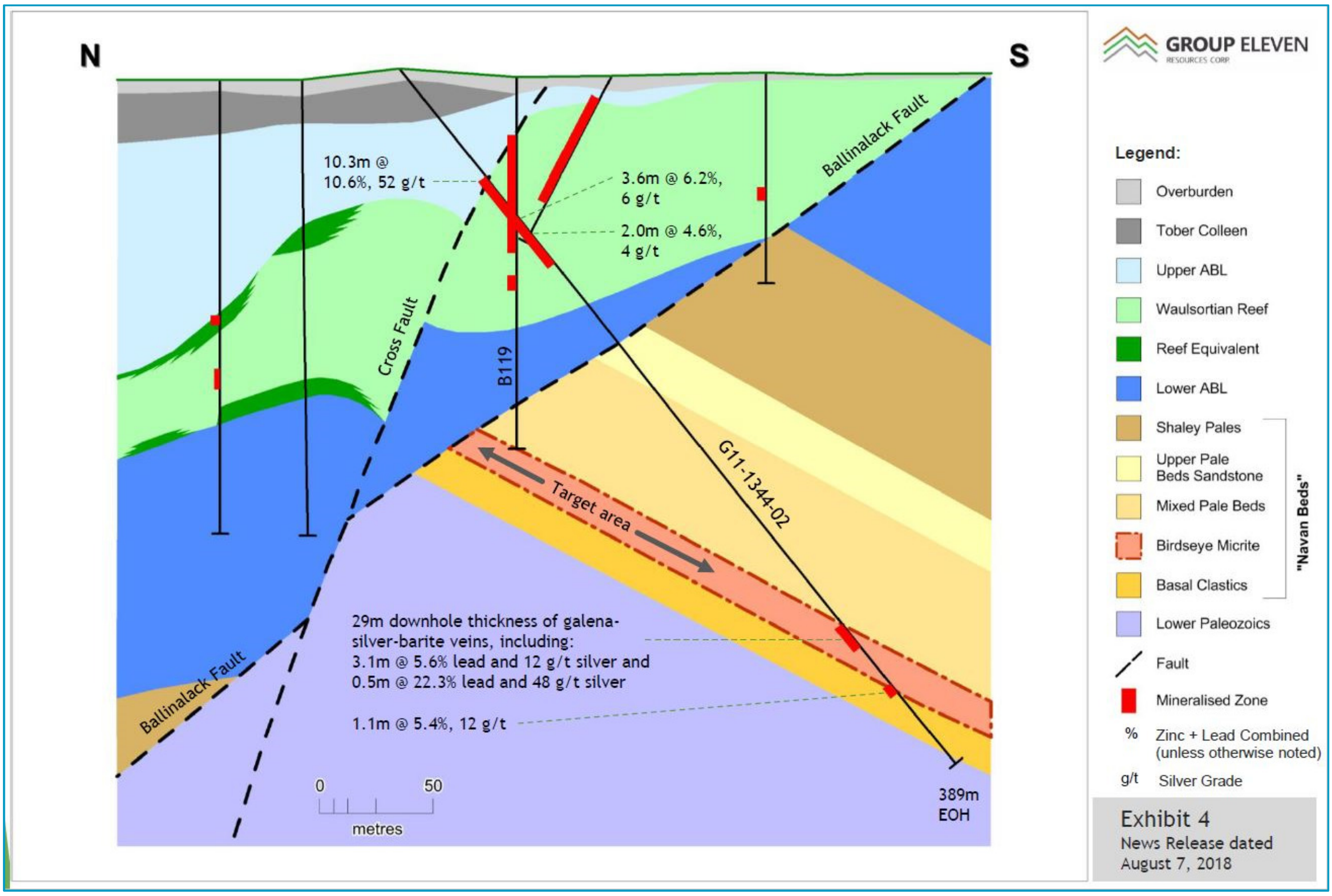


Figure 10.3 Cross section through drillhole G11-1344-02

Table 10.1 Mineralized intercepts in drillhole G11-1344-02

From (m)	To (m)	Interval (m)	Zinc %	Lead %	Zinc+Lead %	Silver g/t
60.1	70.43	10.33^	8.88	1.7	10.58	51.8
including						
65.0	65.7	0.70^	20.1	3.59	23.69	170
80.4	84.0	3.60^	5.54	0.61	6.16	5.7
88.9	90.87	1.97^	4.45	0.17	4.62	3.7
284.85	287.95	3.10*	0.08	5.56	5.65	12.4
including						
287.6	287.95	0.35*	0.18	11.7	11.88	25.1
312.75	313.2	0.45*	0.08	22.3	22.38	48.1
345.6	346.65	1.05*	4.56	0.79	5.35	12.3

Note: ^ True widths are estimated at >90% of downhole intervals
* True widths are estimated at c.30% of downhole intervals

11.0 Sample Preparation, Analyses and Security

GERC has completed some sampling on the Project. Numerous samples have been taken by previous operators, including TIL. There is scant information available on the sample preparation, analyses and protocols carried out by previous operators, other than TIL.

11.1 Historical Sampling

As far as the Authors are aware, Ivernia West did not carry out any sampling. According to the Robertson Report (Robertson, 1991), it is believed that analysis up to the time of the report took place in-house at Syngenore's facilities, with check assays from commercial laboratories. Robertson also carried out check assays (see Chapter 12). Core was split using a hand-splitter, as sampling and analysis were primarily carried out in-house, sample security was relatively straightforward. Robertson measured specific gravity in some samples, as well as calculating a theoretical specific gravity from assay results, results from both methods were comparable, with results varying from 2.7 to 4.4. No commentary is made regarding Quality Assurance and Quality Control.

11.2 TIL Sampling

TIL is the only holder to have carried out sampling and analysis using modern techniques and observing the current standards required. The Authors have ascertained that TIL's sampling and security procedures were as follows:

11.2.1 Core Sampling

The samples were split with a core saw. The core saw was cleaned regularly and between high and low grade samples. Core samples were submitted as half core. The minimum sample length was 30 cm and the maximum 1.5m for mineralized samples and 5m for lithogeochemistry samples.

Samples were recorded in a ticket book which was completed by the geologist. The ticket book records the details of the interval in duplicate with a third tear off tab with the sample number only which is included with the sample submitted to the lab. The duplicate copy is stapled into the core tray and the original ticket book is stored in TIL's field office when the book is completed.

11.2.2 Sample Handling and Security

A record of each batch of samples submitted to the laboratory was kept using the Teck Ireland despatch sheet in duplicate. This sheet includes:
1) Unique batch number;
2) the details of the geologist submitting the samples;
3) the number of samples;
4) the sample numbers;
5) the sample type;
6) the preparation required; and
7) the analytical method required.

A copy of the despatch sheet is submitted with the samples and a duplicate is kept in the Irish head office for reference.

11.2.3 Bulk Dry Density Determinations

TIL did not measure bulk density or specific gravity.

11.2.4 Sample Preparation and Analysis

Samples were analysed at ALS's laboratory in Loughrea, Co. Galway. ALS is accredited by the Irish National Accreditation Board (INAB) to undertake testing as detailed in the Schedule bearing the Registration Number 173T, in compliance with the International Standard ISO/IEC 17025:2005 2nd Edition "General Requirements for the Competence of Testing and Calibration Laboratories". The laboratory is entirely independent of GERC.

Upon receipt, the samples were checked by ALS personnel and a dispatch sheet confirming safe receipt of the samples was signed by an authorised ALS employee.

The analysis methods used by TIL were ICP ORE, ICP AES/MS and ME-MS61.

ICP ORE is a proprietary analytical method at ALS Loughrea for the analysis of high sulphide samples. ICP ORE was used for all samples which contained more than approximately 2% visual sphalerite. The second method, ICP AES/MS MA/UT was used for all samples submitted for lithogeochemistry as it provided lower detection limits. ICP AES/MS MA/UT was not suitable for samples with Pb>2%. Any intervals which returned Pb>2% were rerun using the pulps for ICP ORE.

ICP-ORE requires 0.200 g of material and uses a digestion that OMAC laboratory calls strong oxidising digestion. The digestion mixture includes nitric acid, hydrochloric acid, hydrobromic acid and potassium chlorate which completely oxidises sulphide minerals. The samples are digested for a certain amount of time, cooled, and made to volume so that their final matrix is equivalent to 10% aqua regia. Analysis is by atomic emission spectroscopy.

ICP AES/MS MA/UT is a four acid digest carried out in open PTFE beakers provides effective dissolution of silicates, with Si volatilised as the fluoride. It is a near total solution for rock forming elements. Analysis is by mass spectroscopy.

ME-MS61 is a four-acid digestion requiring a minimum sample size of 1g. GERC has retained this method for all samples taken to date. Analysis is by mass spectroscopy.

Table 11.1 Summary of detection limits for analytical techniques used by TIL

	ICPORE	MAUT	ME-MS61
Ag range	5 – 1500 ppm	5 – 100 ppm	0.01 – 100 ppm
Pb range	0.01 – 30.0%	0.2 – 20,000 ppm	0.5 – 10,000 ppm
Zn range	0.01 – 100%	0.2 -10,000 ppm	2 – 10,000 ppm

The Authors are satisfied that the digest and analytical methods chosen by TIL were appropriate for the project.

11.2.5 Quality Assurance/Quality Control

Standards

TIL inserted standards into each batch at a rate of one in every twenty samples. Standards were inserted at the discretion of the geologist. For example, instead of inserting them systematically every 20 samples, the geologist could choose to adjust the placement to coincide with a particularly high grade sample.

A standard was considered a failure if its returned value for Fe, Pb or Zn lay outside of the given +/- three times standard deviation (3SD) control limits calculated for the standard. When there is a standard failure all of the samples from one sample after the previous passing standard to one sample before the following passing standard are rerun.

TIL used a variety of standards in its QAQC programme, summarised in Table 11.2,below. The main standards used were GS-1, MVT-2 and MVT-6, all of which are proprietary Teck standards. The Teck standards were prepared by CDN laboratories and verified by five umpire laboratories. The standards are considered by the Authors to be of suitable quality for the purposes of this report.

Table 11.2 Summary of standards used by TIL

Standard	No of samples
GS-1	38
MVT-12	4
MVT-2	29
MVT-6	23
OREAS-42P	13
BAL-1	8
TILL-1	2
TILL-2	7
TILL-3	4
TILL-4	2
UNK-STANDARD	2

Most of the standards were used in low quantities, however, GS-1, MVT-2 and MVT-6 account for c. 68% of the standards used and are discussed below.

11.2.6 GS-1

GS-1 is a trace standard and is suitable for lithogeochemistry. All 38 of the GS-1 samples were analysed using ALS's highly sensitive ME-MS61 method, which is appropriate for lithogeochemical analysis. There is an obvious low bias for both lead and zinc, with most of the samples plotting below the certified mean value. All samples plotted within 3 standard deviations of the certified mean value for lead and zinc.

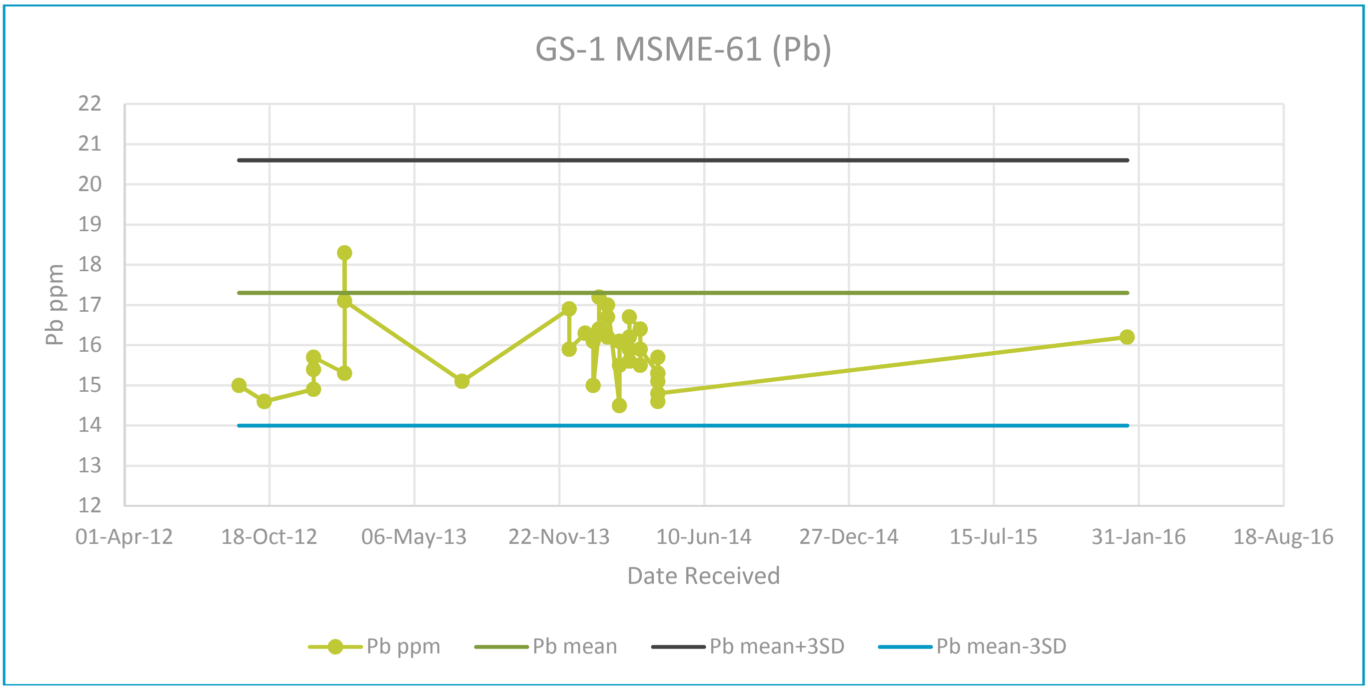


Figure 11.1 Chart showing results for GS-1, using ME-MS61 (Pb).

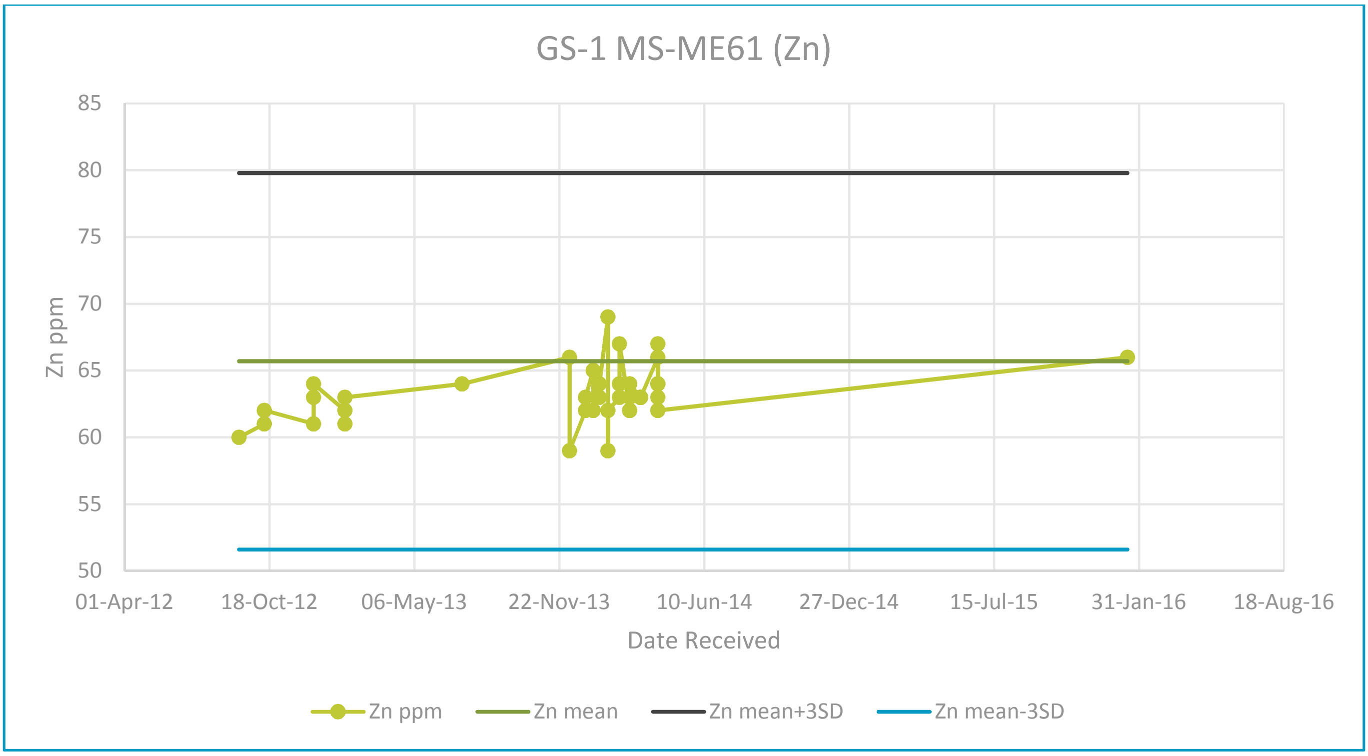


Figure 11.2 Chart showing results for GS-1 using ME-MS61 (Zn).

11.2.7 MVT-2

MVT-2 is a low-grade Zn-Pb standard (see Table 11.2), and is suitable for use as a standard close to the expected cut-off grade for many Zn-Pb deposits. Two different analysis suites from ALS were used; ICPORE and MAUT. ICPORE has higher detection limits than MAUT and is suitable for material that is expected to return significant values of

Pb and Zn. ICPORE results are reported as percentages, MAUT results are reported as parts per million (ppm). The mean and standard deviation for Pb and Zn are given in Table 11.2, the standard is not certified for Ag. Of the 29 MVT-2 samples sent for analysis, 5 were analysed using ICPORE and 24 analysed using MAUT.

MAUT

No samples exceeded the +/- 3SD threshold for either Zn or Pb (see Figure 11.3 and Figure 11.4). There is a distinct low bias for Pb, with all results plotting below the certified value. There is no obvious trend for Zn. There is an increase in variability of returned values in the more recently-taken samples, although that trend may be exaggerated by a clustering effect. With only 24 samples it is difficult to see an overall trend, other than the low bias for Pb.

ICPORE

No samples exceeded the +/- 3SD threshold for either Zn or Pb (see Figure 11.5 and Figure 11.6). There is a distinct low bias for Pb and Zn, with all results plotting below the certified values. Pb results are highly consistent and there is more variability in the Zn results. With only five samples there is little point in attempting to identify further trends.

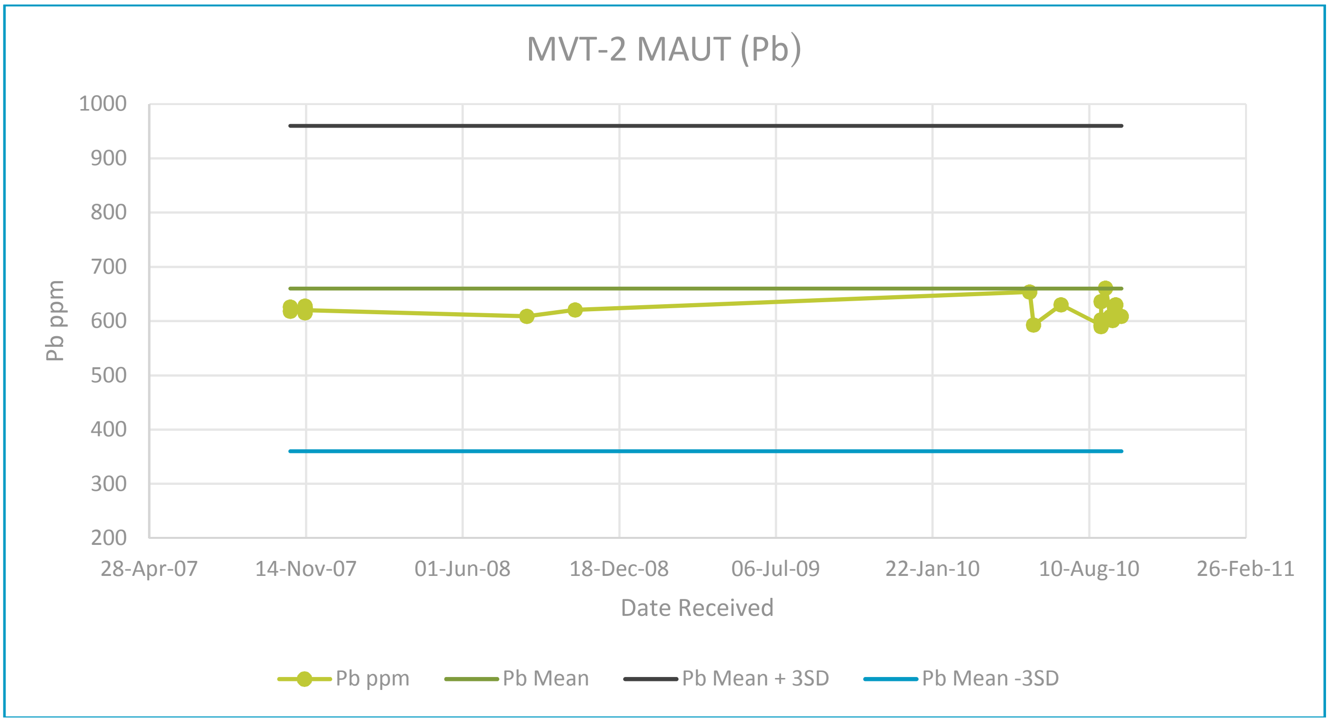


Figure 11.3 Chart showing MAUT (Pb) results for MVT-2

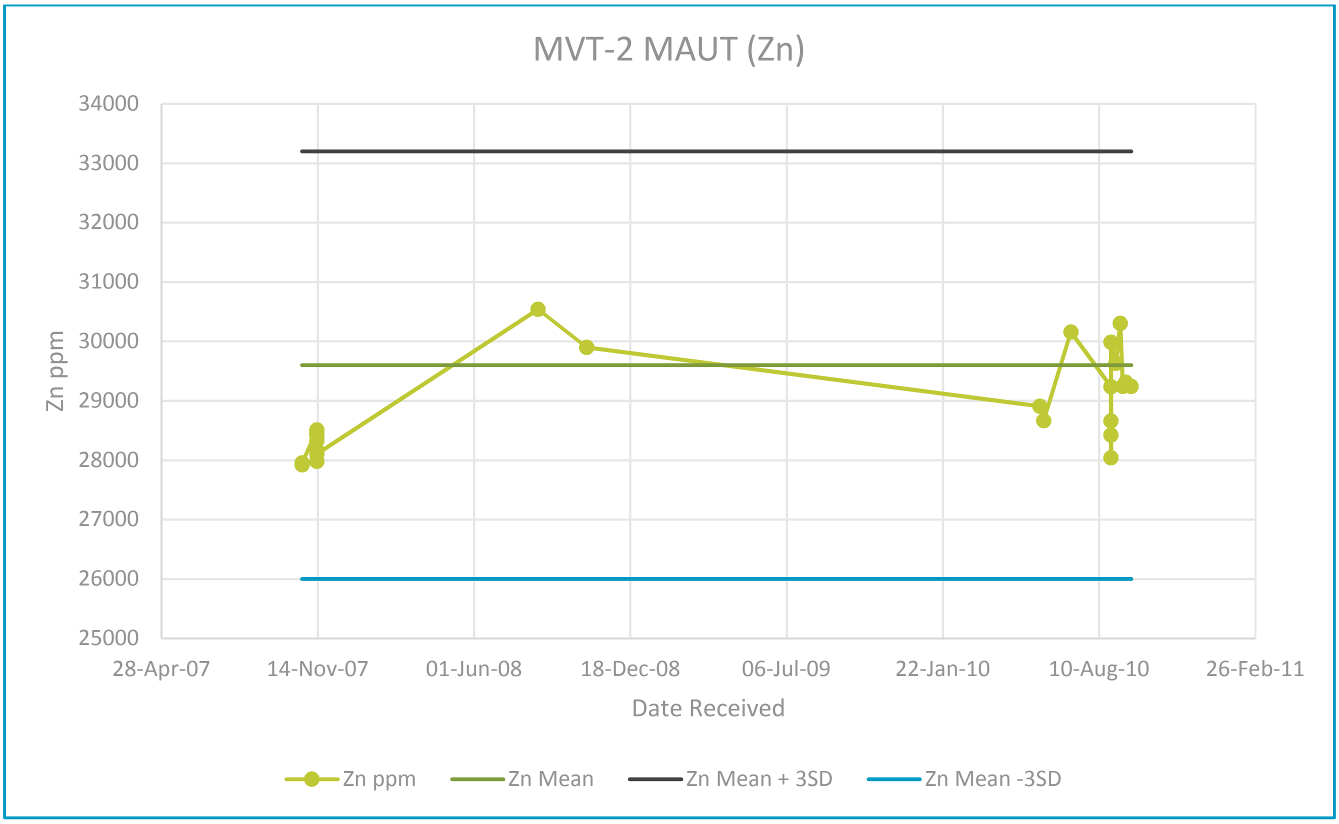


Figure 11.4 Chart showing MAUT (Pb) results for MVT-2

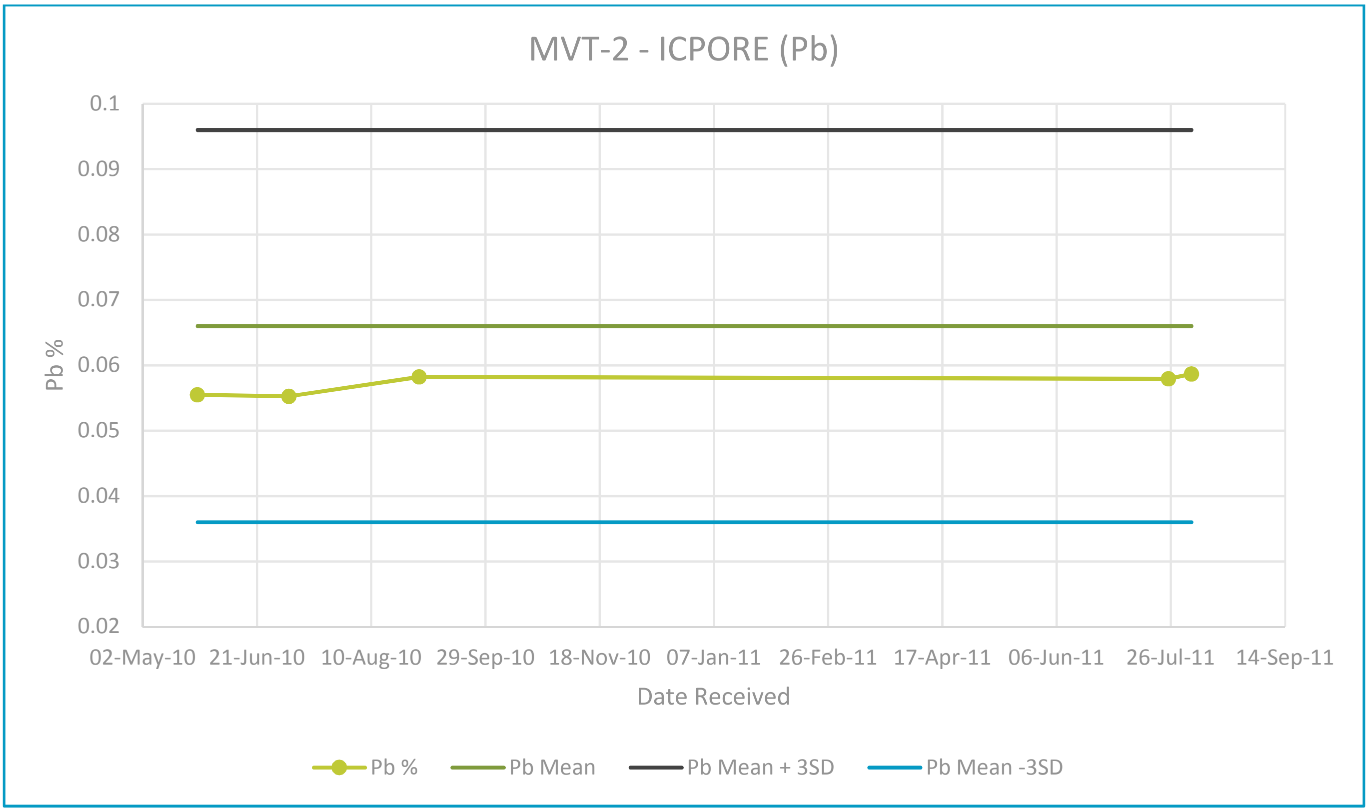


Figure 11.5 Chart showing ICPORE (Pb) results for MVT-2

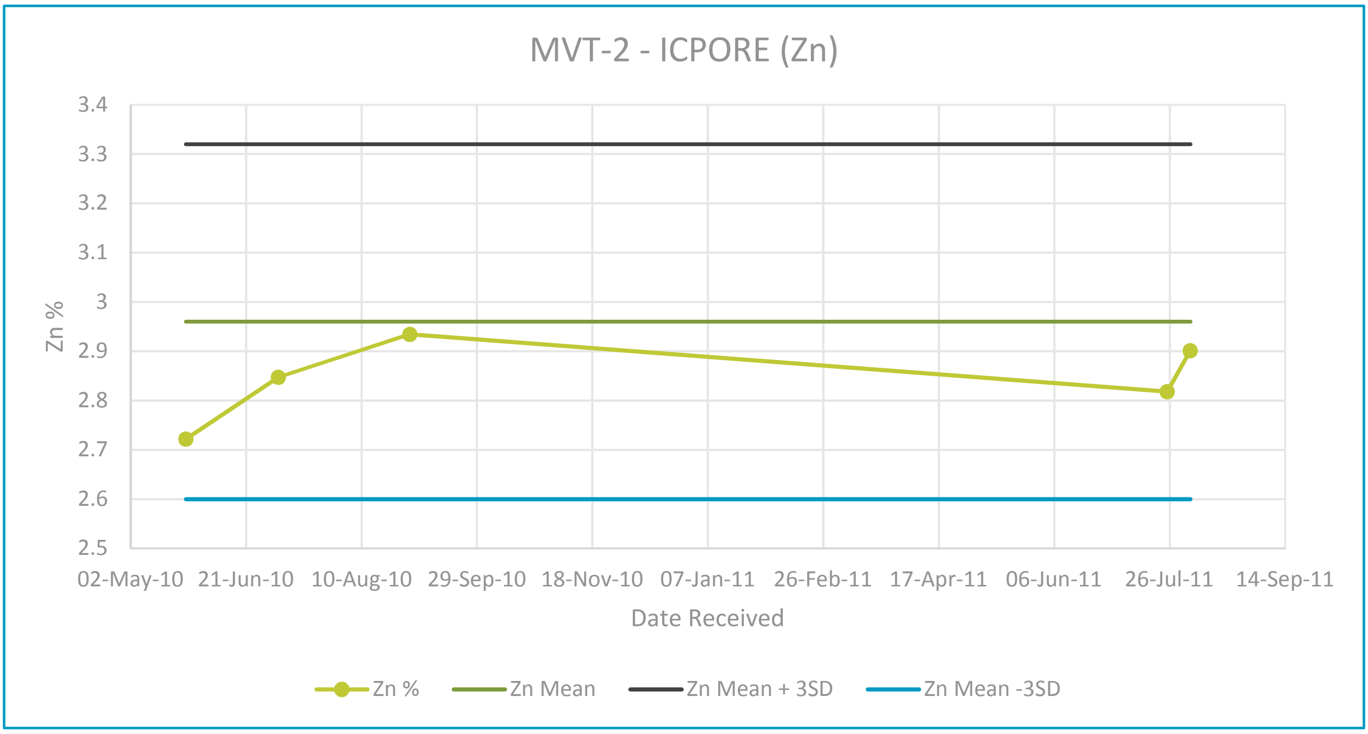


Figure 11.6 Chart showing ICPORE (Zn) results for MVT-2

11.2.8 MVT-6

MVT-6 is a medium-grade Zn-Pb standard (see Table 11.2), and is reasonably close to the overall grade at Ballinalack. Two different analysis suites from ALS were used; ICPORE and MAUT. ICPORE has higher detection limits than MAUT and is suitable for material that is expected to return significant values of Pb and Zn. ICPORE results are reported as percentages, MAUT results are reported as parts per million (ppm). The mean and standard deviation for Pb and Zn are given in Table 11.2, the standard is not certified for Ag. Of the 23 MVT-6 samples sent for analysis, 10 were analysed using ICPORE and 13 analysed using MAUT.

MAUT

No samples exceeded the +/- 3SD threshold for either Zn or Pb (see Figure 11.7 and Figure 11.8. There is no obvious bias or trend for either element. There is an increase in variability of returned values in the more recently-taken samples, although that trend may be exaggerated by a clustering effect. With only 13 samples it is difficult to see an overall trend.

ICPORE

No samples exceeded the +/- 3SD threshold for either Zn or Pb (see Figure 11.9 and Figure 11.10). There is an obvious low bias for both elements, with all results plotting below the certified mean. With only 10 samples it is difficult to see any other overall trend.

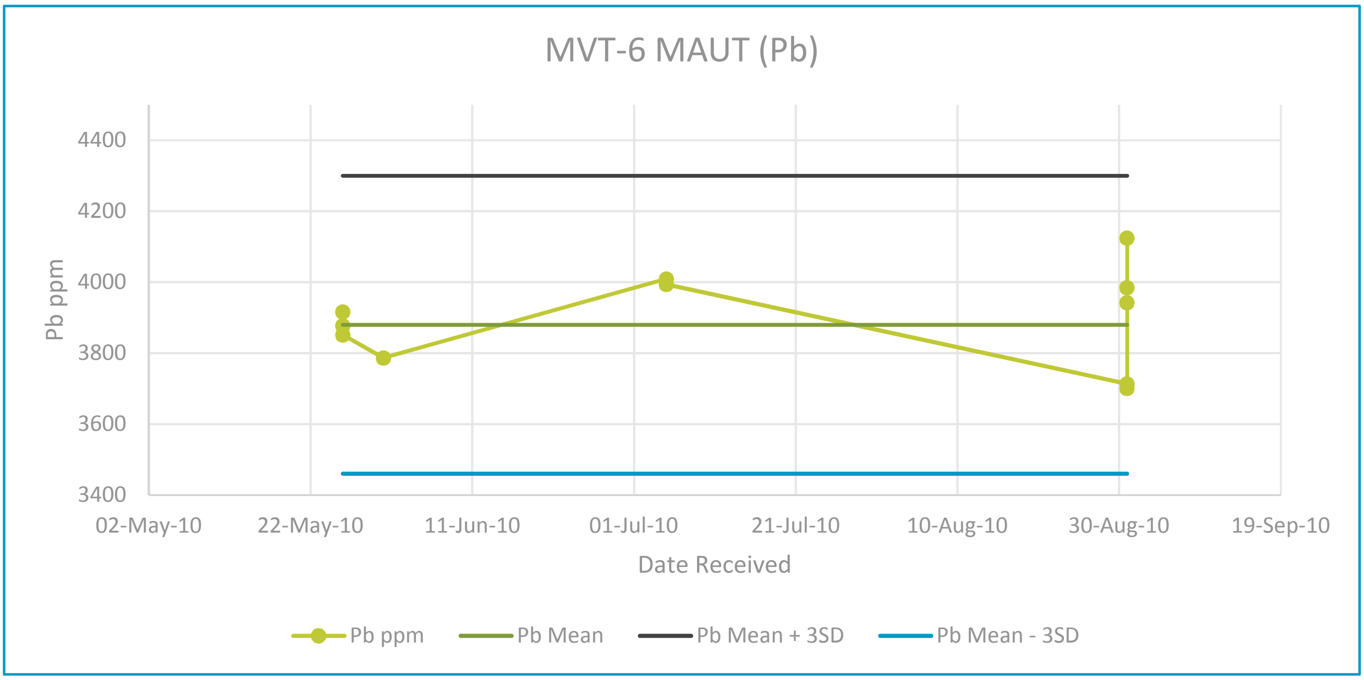


Figure 11.7 Chart showing MAUT (Pb) results for MVT-6

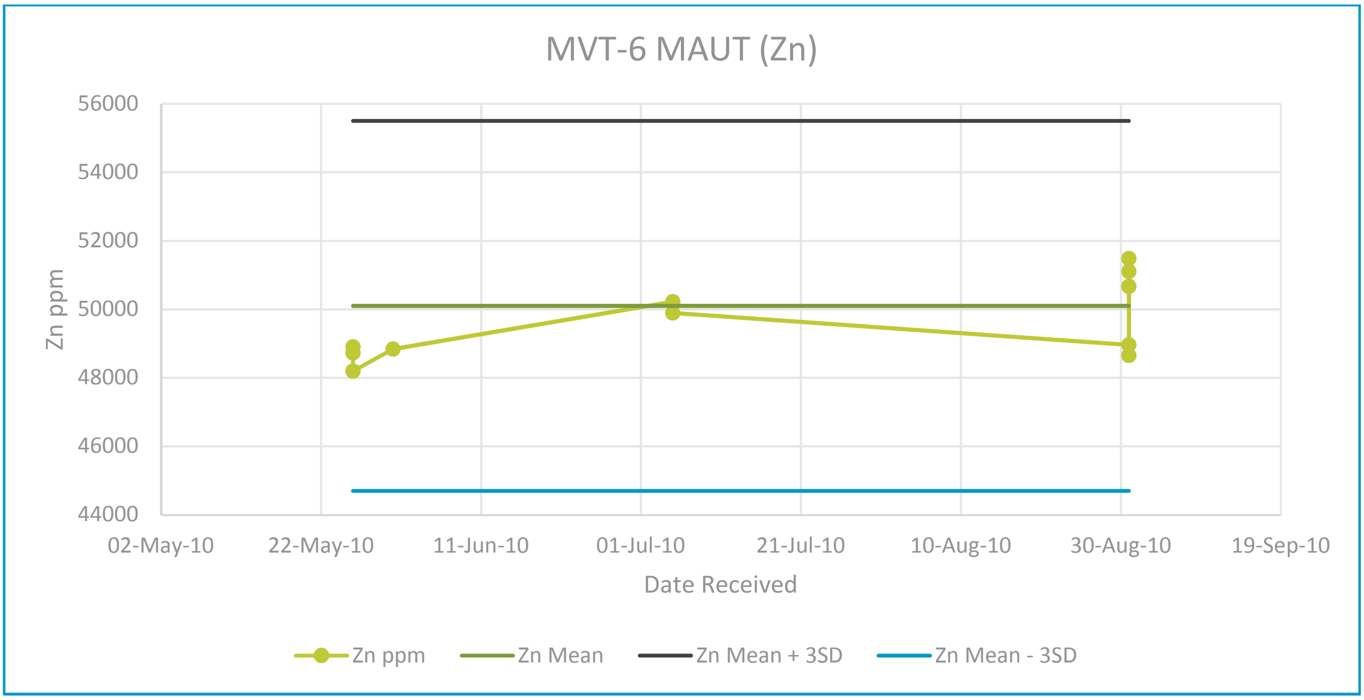


Figure 11.8 Chart showing MAUT (Zn) results for MVT-6

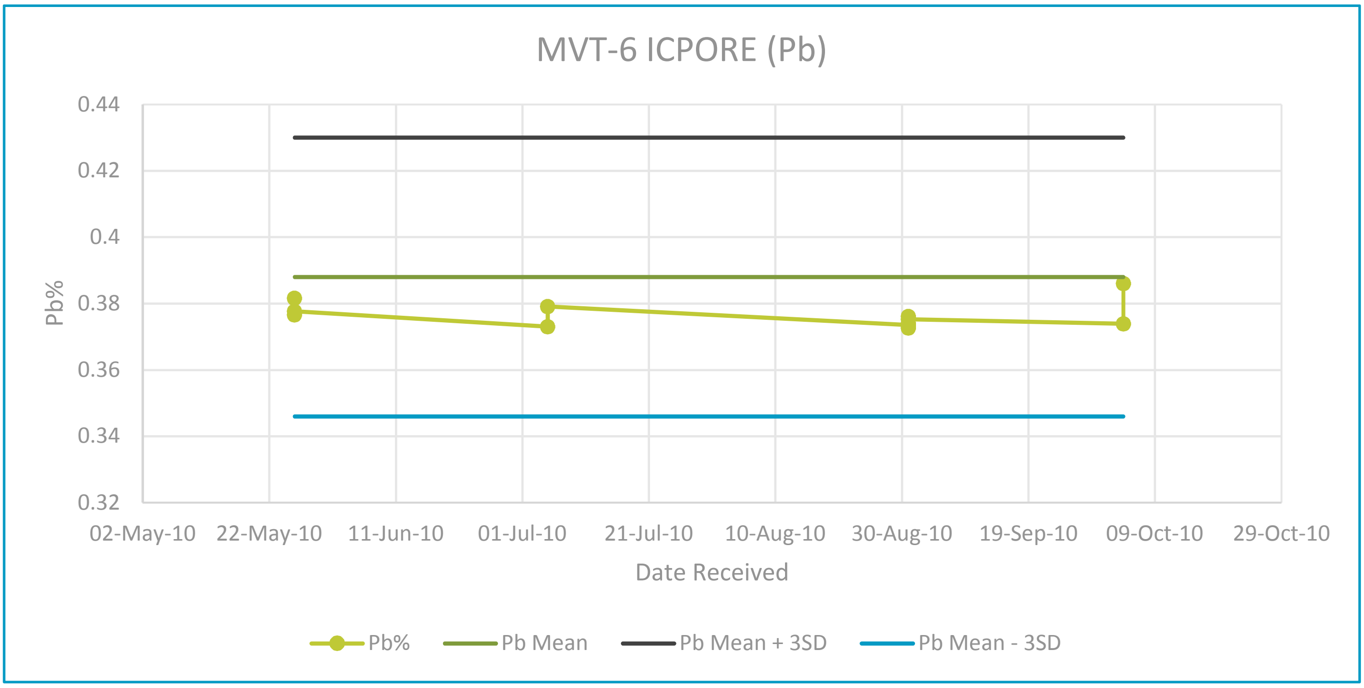


Figure 11.9 Chart showing ICPORE (Pb) results for MVT-6

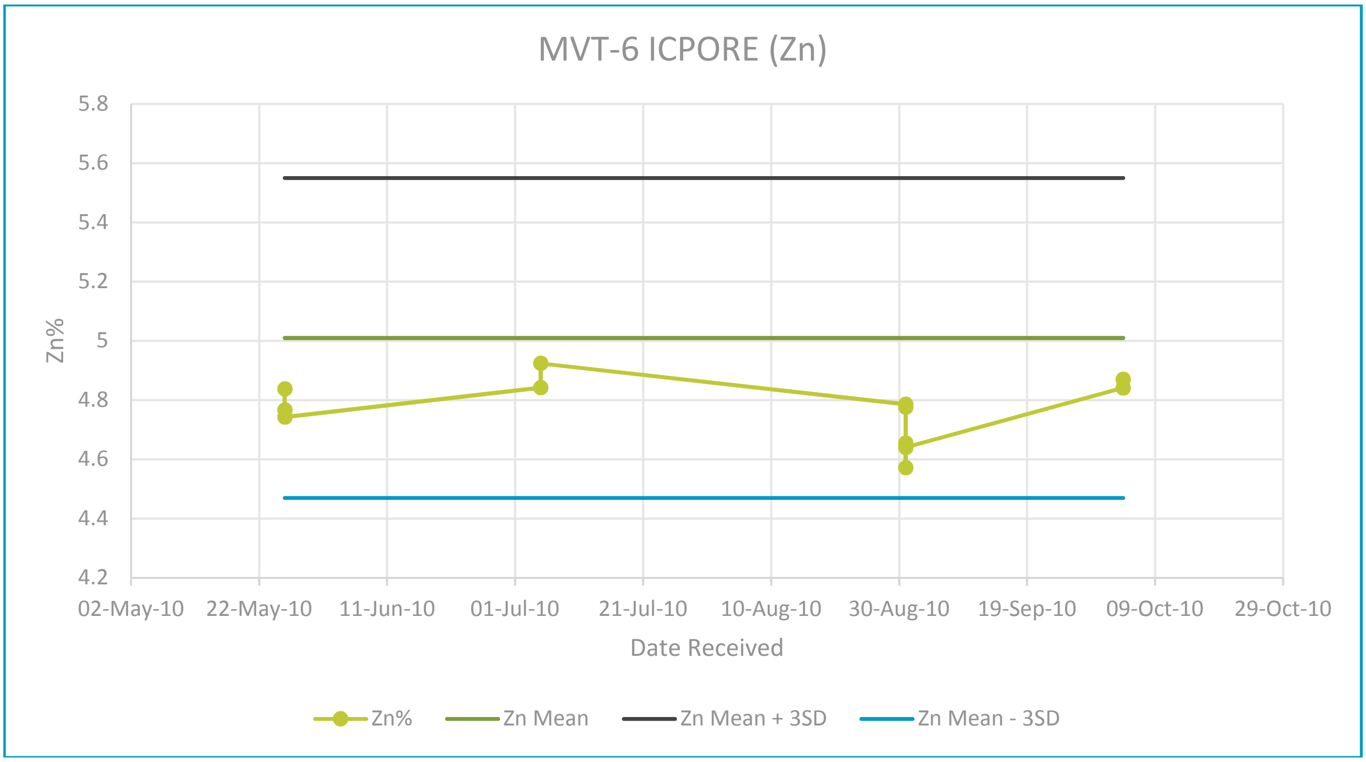


Figure 11.10 Chart showing ICPORE (Zn) results for MVT-6

Table 11.3 Certified values and standard deviations for MVT-2 & MVT-6

	Certified Values			Standard Deviation		
	Ag	Pb	Zn	Ag	Pb	Zn
MVT-2	n/a	0.07%	2.96%	n/a	0.01%	0.12%
MVT-2 + 3SD	n/a	0.10%	3.32%	n/a	n/a	n/a
MVT-2 - 3SD	n/a	0.03	2.60%	n/a	n/a	n/a
MVT-6	n/a	0.39%	5.01%	n/a	0.01%	0.18%
MVT-6 + 3SD	n/a	0.43%	5.55%	n/a	n/a	n/a
MVT-6 - 3SD	n/a	0.35%	4.47%	n/a	n/a	n/a

Blanks

Field blanks were inserted after high grade samples to assess cross contamination during preparation. The blanks were Waulsortian Limestone sourced from barren holes drilled by TIL. If a field blank returned anomalous values, then the pulp was rerun to confirm the anomaly. If the pulp again returned anomalous values then the remaining half core of the same interval is split and the quarter core was submitted. If the corresponding quarter core confirms the anomalous values then the blank was considered to have passed. If the quarter core does not confirm the anomalous values then the blank is considered to have failed and the batch is rerun using the coarse rejects. If this again fails, then quarter core was submitted. This situation has not occurred. The Authors have not ascertained what TIL defined as anomalous, but ten times the lower detection limit is considered good practice in the wider industry.

For the 5 sample blanks sent for ICPORE analysis, the returned values are summarised as follows:

- all Ag values below the detection limit of 5ppm;

- all Pb values below ten times the detection limit of 0.01%; and
- all Zn values below ten times the detection limit of 0.01%

For the 14 sample blanks sent for MAUT analysis, the returned values are summarised as follows:

- all Ag values below the detection limit of 0.5 ppm;
- one Pb value below ten times the detection limit of 0.2 ppm; and
- no Zn values below ten times the detection limit of 0.2 ppm.

While the majority of the values returned are below 100 ppm for both Zn and Pb, and therefore not significantly anomalous, if using a protocol of ten times the detection limit, almost all of the samples failed. It is therefore the opinion of the Authors that either the choice of sample blank from within the Project was not appropriate, or that the detection limit is so low that it would be difficult to source any material suitably low in Zn and Pb to be used as a blank. From the Authors' experience, the values returned for Zn and Pb are in line with typical values in the Waulsortian Limestone across the Irish Orefield, for all but four samples. One of the four samples follows a relatively high grade sample and the remaining three do not. It is the Authors' opinion that for the MAUT analysis, sample blanks from other drill programmes are not appropriate, and that commercially-sourced blanks should be used.

For the 44 sample blanks sent for ME-MS61 analysis (see Figure 11.11 to Figure 11.13) , the returned values are summarised as follows:

- all Ag values below the detection limit of 0.5ppm;
- 13 Pb values above ten times the detection limit of 0.5ppm; and
- 13 Zn values above ten times the detection limit of 2.0ppm.

All of the returned values for blank samples are, in the opinions of the Authors, in line with what would be expected from the Waulsortian limestone in the Irish Zn-Pb Orefield.

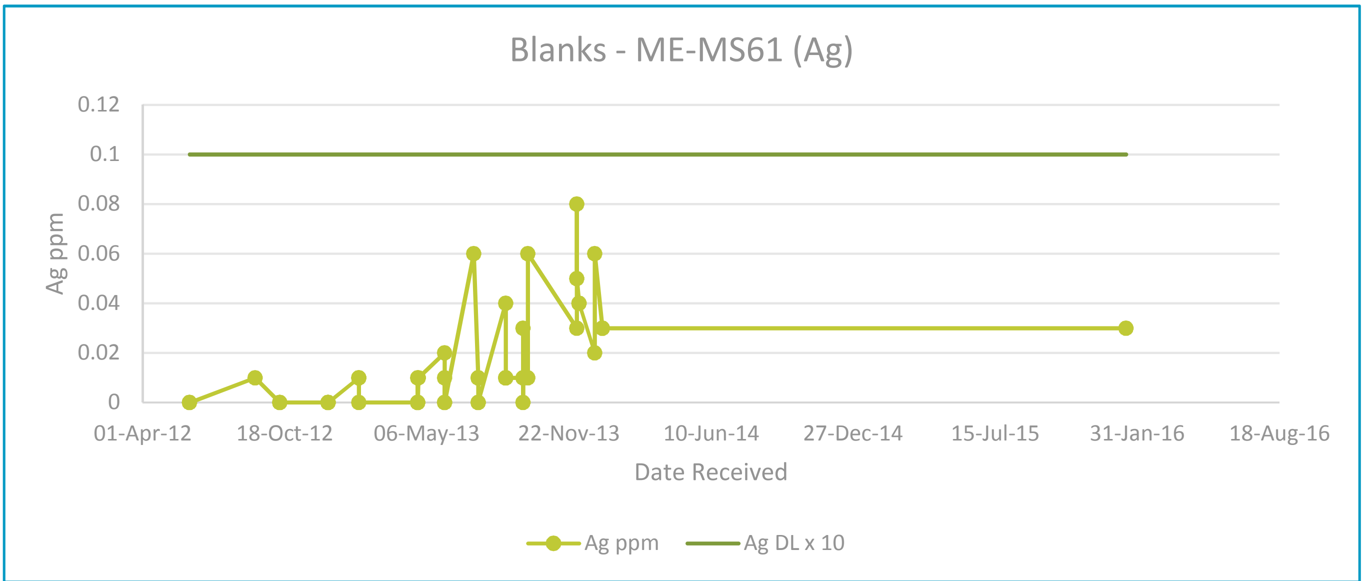


Figure 11.11 Chart showing Ag results for blank samples using ME-MS61

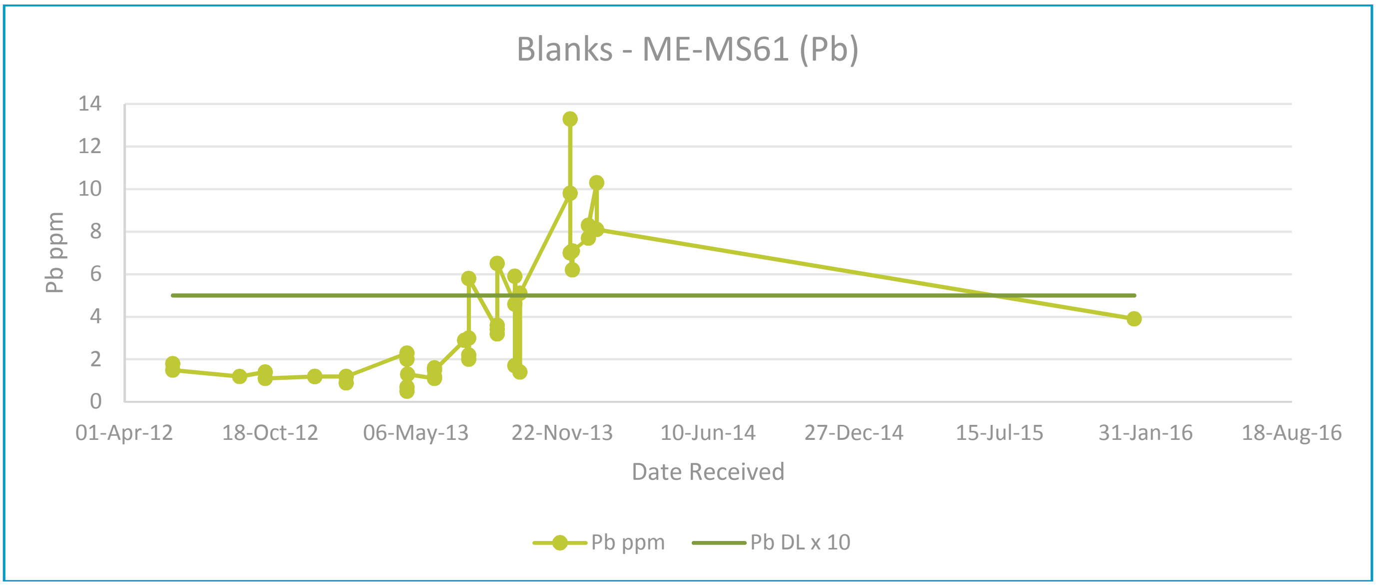


Figure 11.12 Chart showing Pb results for blank samples, using ME-MS61

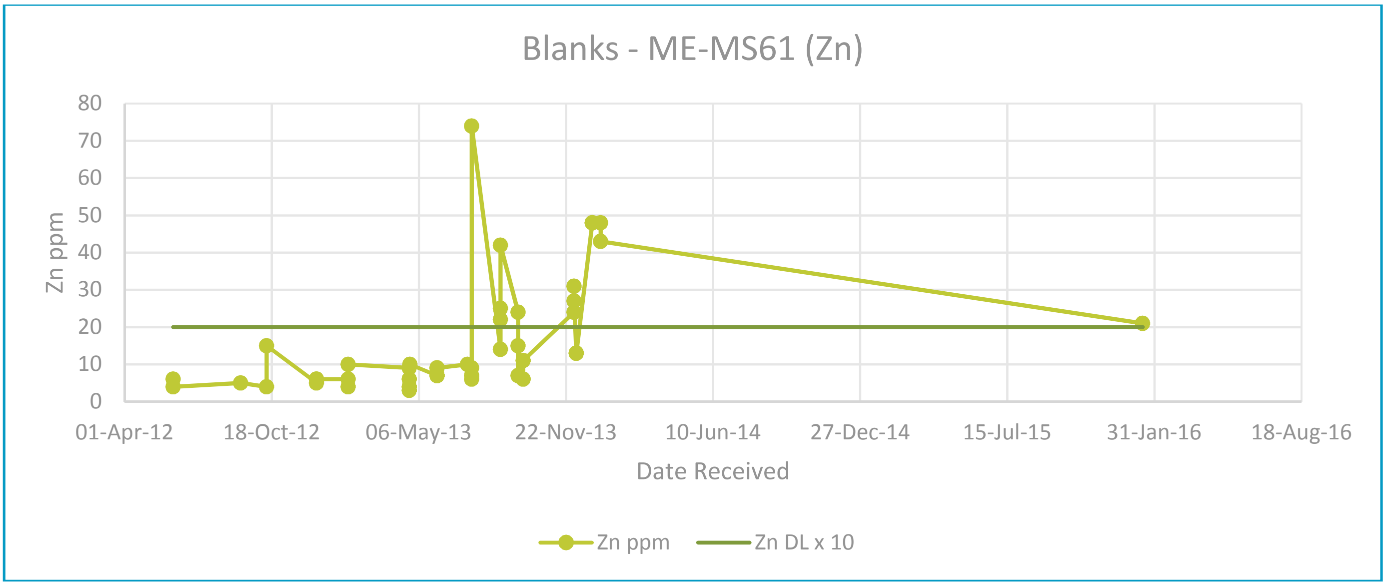


Figure 11.13 Chart showing Zn results for blank samples, using ME-MS61

Duplicates

Duplicate samples were not collected by TIL.

11.2.9 Data Management and Database

The following is an extract from TIL's documented procedures:

'Each batch of results returned from the laboratory was first checked for QAQC before the results were entered into the assay database and made available for interpretation. For QAQC, the standards and blanks in each batch are compared against the known expected results. If a batch fails then the results were kept in quarantine until the issue was resolved.

The Assay results that have passed QAQC were stored in a Microsoft Access database. This database was subsequently migrated to acQuire. The database has set permissions that allow only the database administrator to make changes. All other uses have access to queries of the results only and do not have the ability to write changes. This protects the validity of the data. The laboratory also previously provided hard copies of the results which were filed in the Irish head office.

The pulps and coarse rejects were returned by the lab and stored in the core shed for future reference.'

The Authors are of the opinion that TIL's procedure is robust and in line with expected industry standards.

11.3 GERC Sampling

GERC has retained the same procedures as those used by TIL. To date, GERC has received results from one batch of assays, for drillhole G11-1344-02. Four samples of standard GBM913-12 (supplied by Geostats pty, of Australia) were assayed, with all results plotting within the defined limits of the certified value ±3SD.

The Authors are of the opinion that the procedures are robust and in line with expected industry standards.

11.3.1 Core Sampling

Core sampling is carried out at GERC's core store in Crecora, Co. Limerick. Drill-core is marked up and tagged by a geologist. Drill-core is split with a core saw.

11.3.2 Sample Handling and Security

Drill-core is logged in GERC's core store in Mullingar and is then packed and transported by GERC personnel to their sampling and storage facility in Crecora, Co. Limerick. Samples are bagged and tagged with a uniquely-numbered security seal by GERC, and transported to ALS, where security is verified and signed off.

11.3.3 Bulk Dry Density Determinations

GERC does not currently carry out routine bulk density or specific gravity measurements, although it has plans to do so in future drill campaigns.

11.3.4 Sample Preparation and Analysis

GERC uses the same laboratory (ALS) as TIL, see Section 11.2.4 for detail.

11.3.5 Quality Assurance/Quality Control

GERC uses a commercially-sourced standard, GBM 913-12 and has retained the same protocols as those outlined in Section 11.2.5.

11.3.6 Data Management and Database

Data are currently stored in a master MS Excel spreadsheet. GERC is migrating its data to a MS Access database, but that has not been completed at the time of writing this report.

12.0 Data Verification

The majority of data available are historic and the Authors have used a number of methods of verifying the data used by GERC. The detail available is easily divided in rough chronological order:

1. The period up to (and including) the 1991 Robertson Report;
2. Ivernia Wests' tenure;
3. TIL's tenure; and
4. GERC's tenure

12.1 Up to Robertson Report

There are no original drill analysis data (laboratory reports or certificates) available for this period. Normal practice at the time was for laboratory analysis by aqua regia digest and Atomic Absorption analysis to be provided to the company on types sheets, commonly with analysis for Zn, Pb, and Ag only. Companies typically transcribed the analytical results onto manually drawn drill log forms. This was the case for most of the drilling prior to 1991.

In 1991, Roberston in the course of the Feasibility Study compiled all of the previous drill data and created a database from which the historical estimate was calculated.

In the past, Dr. Kelly conducted a digital capture of data from the Robertson Report for Ivernia West and is confident that GERC has properly captured the same data. As part of the review procedure for this report, the Authors have also used the EMD's open file system to check randomly chosen drill logs and drill log summaries in order to verify the data in the GERC database, which was acquired from TIL. No certificates of analysis are available, however analysis results are handwritten into the typed drill logs and a selection of these has also been checked.

Depths were recorded in feet, and there are some very minor discrepancies arising from rounding of decimal places, but none are significant. There were some errors noted regarding the recording of drillhole azimuths, where the recorded azimuth did not match the drill logs, however, all of these were on vertical drillholes, so they are not considered to be material. That being said, the Authors would strongly recommend that GERC check every single historic drill log to ensure that no azimuth errors have occurred on angled holes, as that is potentially a significant problem.

The Robertson (1991) study reported that extensive re-logging of drill core had occurred, to ensure consistency in the generation of the historic estimate. Analysis of drill core was carried out at Syngenore's laboratory, with check assays being sent to commercial laboratories. Robertson carried out eight check assays of its own and they are presented in , below. Samples were split using a hand-splitter. Considering the technical limitations of the time, there is reasonable correlation between the two sets of assay data.

Table 12.1 Results of check assays reproduced from Robertson report

Sample No	Original Zn%	Re-assay Zn%	Original Pb%	Re-assay Pb%
1	-	8.70	-	1.00
2	4.56	5.10	0.57	0.71
3	18.00	14.60	2.44	2.40
4	2.10	3.20	0.08	0.14
5	9.25	8.40	0.37	0.42
6	8.00	13.90	1.60	2.70

Sample No	Original Zn%	Re-assay Zn%	Original Pb%	Re-assay Pb%
7	6.68	1.50	0.32	0.01
8	11.50	15.10	0.84	0.86

Prior to work carried out by the authors, TIL carried out an extensive review of borehole information, re-logging drill core and checking digitally captured data against copies of the original drill logs and maps. In 2006, six drillholes on the project were re-logged by Dereck Rhodes, a TECK employee, with extensive carbonate-hosted Zn-Pb experience (Rhodes, 2007). Included in the re-logging exercise were three drillholes in the core of the deposit (drillholes B124, B125 & B126). Those drill logs have been compared with the drill database used to generate the MRE and the only differences are minor variations in regarding the depths of gradational lithological boundaries. Visual estimates of mineralisation correspond reasonably to very well with the assay database. The report by Rhodes (2007) was used by TIL as a basis for a re-logging programme. Further reports on the re-logging programme are not available. However, Mr. Gordon is personally aware of the programme, having for a time supervised two of the geologists carrying out the re-logging.

12.2 Ivernia West

Drilling was managed by CSA personnel (prior to the acquisition of CSA Group in Ireland by SLR), including Dr. Kelly, on behalf of Ivernia West. SLR therefore has copies of the original drill data including laboratory analytical certificates provided to Ivernia West and drill logs and has been able to use those to verify the GERC database, using a random selection of drillholes. No errors were observed.

12.3 TIL

The data gathered by TIL were verified in a number of ways. Dr. Kelly visited the core shed and was able to visually check drillhole depths, numbers, and assay results against both the TIL drill logs and the data provided by GERC. Drillhole location maps were also compared against the reported coordinates in licence reports submitted by TIL to EMD, for a random selection of drillholes. No significant errors were observed.

12.4 Site Visit

A site visit to the Project was carried out by Qualified Persons Paul Gordon (SLR) and Dr Belinda van Lente (CSA Global) on 12 April 2018. This visit was undertaken for the purposes of inspection, ground truthing, review of activities, and collection of information and data and to satisfy NI 43-101 “personal inspection” requirements. The visit was in addition to previous visits by Paul Gordon and Dr John Kelly on 28 February 2017 and 17 May 2017.

CSA Global and SLR were given full access to the relevant tenements and drill core. Discussions were held with GERC personnel to obtain information on the previous, as well as the planned, exploration work.

The following conclusions were made from the site visit:

- Local GERC geologists associated with the project are familiar with the geology, deposit type and mineralisation within the tenements.
- Access to the Ballinalack project is good, with the deposit located close to power, water and road infrastructure. The town of Mullingar is approximately 14.5 km to the southeast of the project. Several roads, which includes farm tracks, are present and can be readily negotiated by 2WD vehicle.
- The position of one drillhole used in the MRE, TC-1344-036, was verified by means of handheld GPS (Table 12.2). It was not possible to view the collars of any other drillholes, which had been capped and rehabilitated due to location on cultivated farmland.

- Current sampling and logging procedures were reviewed and found to be suited to the deposit type and style of mineralisation, as currently understood.
- No density data is available for the Ballinalack deposit and no density determination procedures were reviewed.
- Sample storage and security is considered good.
- The mineralisation at Ballinalack contains elevated zinc and lead grades over reasonable strike lengths.
- The Ballinalack deposit is near-surface and occurs at depths ranging from 10 to 300 m below surface (dipping 15° to the north).
- Drill core was inspected for selected drillholes (TC-1344-036, G11-1344-02, B59 and 92-BL-1) that are representative of the stratigraphic sequence and mineralisation in the Ballinalack deposit. The geology and mineralisation conformed to reported descriptions. Photographs for G11-1344-02 and 92-BL-1 showing mineralisation styles and host lithologies are presented in Figure 12.1 and Figure 12.2.
- The sulphide mineralisation appears to be related to hydrothermal processes at low temperatures, where cavities were infilled by calcite, followed by brecciation. The mineralogical assemblage typically consists of pyrite (most abundant) and sphalerite, with minor galena. The gangue mineralogy comprises barite, calcite and dolomite. This was visually confirmed.
- The mineralisation is mildly affected by folding and faulting.
- The Ballinalack deposit does not outcrop at surface and it was thus not possible to review any surface rock exposure.

The Authors are satisfied that the drillhole database acquired from TIL and being used by GERC is as clean and robust a database as is possible considering the historic nature of much of the drill data and the absence of original historic data and the absence of QAQC procedures and data. The Authors consider the database appropriate for estimation of a Mineral Resource in Inferred classification but additional validation would be required for higher classification of the Mineral Resource. It is considered suitable for the purposes of reporting on the project and as a basis for the proposed exploration programme.

Table 12.2 GPS and database collar surveys verified during the site visit (ITM Grid)

BHID	GERC Database			CSA Global GPS			Difference		
	Easting	Northing	Elevation	Easting	Northing	Elevation	Easting	Northing	Elevation
TC-1344-036	235,190	266,240	69.84	5,192	266,242	73.75	+2	+2	+4

Figure 12.1 Drillhole G11-1344-02: Core trays showing interval ~64.8 to ~70.5 m, with mineralogical assemblage consisting of pyrite, sphalerite and minor galena

(Source: CSA Global, 2018)

Figure 12.2 Drillhole 92-BL-1: Core trays showing interval 572.30 to 577.8 m, with high-grade interval 576.20 to 580.80 m (Zn = 4.48%, Pb = 0.73% and Ag = 6.18 g/t)

(Source: CSA Global, 2018)

13.0 Mineral Processing and Metallurgical Testing

Metallurgical testwork has not yet been carried out by GERC. Historical testwork was conducted as part of the 1991 Robertson study (summarised in the Robertson report, 1991) and is summarised below.

A composite sample was used by Robertson to conduct metallurgical testing. The composite contained samples, 1.5 m in length, from holes B7, B33, B36, B38, B51, B66 and two samples from B88. Robertson first carried out sink/float testwork using heavy liquids to determine whether pre-concentration by dense medium separation would be potentially beneficial to the project. The sink/float testwork indicated that approximately 40% by weight of the material could be rejected, for a loss of just 2% of the metal content. The Authors believe that if the project does progress to the point where metallurgical testwork is warranted, it would be worthwhile repeating such testwork, as a 40% reduction of the material would likely lead to significant cost savings in any future operation.

Robertson also carried out flotation tests, using conventional techniques. Some variation was introduced to the tests by using lime or sodium carbonate as pH modifying reagents. The results of the flotation tests are summarised in

Table 13.1, below. Robertson also carried out combined testwork, using screens, and a shaking table to pre-concentrate the material, and flotation to produce a final concentration. It is not evident to the Authors that the results of this work could be accurately 'scaled up' for operational purposes, so those results are not summarised here.

The Author's note that metallurgical performance for all the Zn-Pb deposits in the Irish Orefield has been good, producing clean concentrates with high recoveries using standard differential flotation processing.

Table 13.1 Summary of flotation testwork carried out by Robertson

TEST	Weight		Grade			Recovery		
OR1 (differential flotation)	**Wt (g)**	**Wt %**	**Pb%**	**Zn%**	**Ag ppm**	**Pb**	**Zn**	**Ag**
Pb flotation concentrate	14.02	1.42	34.1	22.6	104	54.08	3.48	9.37
Zn Flotation concentrate	131.39	13.29	1.7	64.4	98	25.21	92.97	82.57
Clean tails	34.52	3.49	1.8	4.8	13	7.01	1.81	2.88
Final tails	808.45	81.79	0.15	0.23	1	13.69	2.04	5.18
OR2 (bulk flotation with lime)								
Bulk concentrate	143.2	14.58	4.9	56.2	102	76.82	95.84	91.57
Clean tails	42.12	4.29	2	4.5	13	9.22	2.26	3.43
Final tails	797.08	81.14	0.16	0.2	1	13.96	1.9	5
OR3 (bulk flotation with sodium carbonate)								
Bulk concentrate	139.13	14.2	5.4	55.1	97	70.17	91.38	84.26
Final tails	840.4	85.8	0.38	0.86	3	29.83	8.62	15.74

The Authors note that the recoveries reported for OR1 do not sum up to 100. The reason for this is not reported by Robertson but the Authors assume that it is due to rounding of decimals.

14.0 Resource Estimates

CSA Global (UK) Ltd ("CSA Global") was engaged by SLR Consulting Ireland ("SLR", on behalf of Group Eleven Resources Corporation ("GERC") to generate a Mineral Resource estimate ("MRE") for the Ballinalack Zinc-Lead Project ("Ballinalack"), in Counties Westmeath and Longford, Ireland, in January 2018.

14.1 Software

- CSA Global utilised the following software suites during the course of the MRE:
- Microsoft Office™
- Microsoft SQL™ – Database imports, validations and exports.
- Leapfrog Geo™ – Topography, geology, alteration and structural modelling.
- Micromine™ – mineralisation modelling.
- Datamine StudioRM™ – Drillhole flagging, block model build, compositing, grade estimation, Mineral Resource reporting.
- Snowden Supervisor™ – Variography and Kriging Neighbourhood Analysis ("KNA").
- GeoAccess Professional™ – Statistical analysis.

14.2 Drillhole Database Loading

CSA Global was initially provided with Microsoft Excel worksheets from SLR, exported from Mapinfo™, for the Ballinalack deposit containing collar, downhole survey, assay and lithology data. The drill data was imported into SQL and Datamine StudioRM™ software for validation.

14.3 Database Validation

Data was loaded into a SQL database which has constraints and triggers, ensuring that only validated data was included in the database. During the validation process issues were highlighted and corrected where possible. Exports of the clean, verified data were generated for the MRE.

The list below includes the validation and checks completed:

- Collar table: Incorrect coordinates (not within known range), duplicate holes.
- Survey table: Duplicate entries, survey intervals past the specified maximum depth in the collar table, overlapping intervals, abnormal dips and azimuths.
- Geology, Sample and Assay tables: Duplicate entries, lithological intervals past the specified maximum depth in the collar table, overlapping intervals, negative widths, missing collar data, missing intervals, correct logging codes, duplicated sample ID's, missing samples (assay results received, but no samples in database), missing analyses (incomplete or missing assay results).

Data for the MRE were provided at a cut-off date of the 30th August 2018. In summary the database consisted of a total of:

- 513 diamond drillholes
- The drilling totals 93,350 m
- 2,582 downhole surveys
- 4,211 diamond drill core assay samples

- 4,671 logged lithology intervals

Within the raw assay file, absent grade intervals were left absent, whereas negative values and values below detection limit, were reset to half detection limit, 0.1 ppm for both Zn and Pb, 0.25 ppm for Ag and 1 ppm for $BaSO_4$.

The CSA Global data load validations showed the following:

- 96 collars with no logged lithology
- 337 collars with no assays.

The Ballinalack MRE area was restricted by a boundary string, and data was selected within this boundary. In summary the data within the boundary, as used in the geological modelling and grade estimation, consisted of a total of:

- 102 diamond drillholes, totalling 26,042 m
- 648 downhole surveys
- 2,190 diamond drill core assay samples
- 1,451 logged lithology intervals

Following desurveying, 43 missing intervals were identified in the assays intersecting the modelled mineralisation wireframes, totalling 35.66 m. Following discussions with SLR, as well as observations made during the site visit, unsampled drill core intervals are unmineralized or very weakly mineralized. As such, it was deemed reasonable to reset these gap intervals with values of half detection limit, relative to Zn, Pb, Ag and $BaSO_4$. The proportion of sample lengths represented by inserted dummy samples for absent values within the modelled mineralisation wireframes is 3%.

The appropriateness of data to be used in the MRE were reviewed. A summary of drill data removed prior to estimation is shown in Table 14.1 below.

Table 14.1 Excluded drillholes

BHID (excluded)	Reason for exclusion
B61	Close spaced drillhole to B88. Poor fit to surrounding mineralized drillholes and grade continuity.
TC-1344-026	Close spaced drillhole to B59. Poor fit to surrounding mineralized drillholes and grade continuity.

Two drillholes, B61 and TC-1344-026, have been excluded from the MRE due to proximity to adjacent drillholes, B88 and B59, and poor fit to the surrounding mineralized drillholes. Drillholes B88 and B59 were retained, as they show a better fit to the observed grade continuity. It is uncertain why B61 and TC-1344-026 show significant grade variability from the rest of the surrounding data, and without further available information, the decision was made to remove these to limit potential bias.

All subsequent mineralisation modelling, data analysis, statistics and estimation are limited to the validated and selected dataset as used in the MRE.

14.4 Geological Interpretation

A 3D geology, alteration and structural model was built for the Ballinalack area in Leapfrog Geo™. Mineralisation wireframes were built in Micromine™ software.

14.4.1 Structure

The 3D structural model was built using Leapfrog Geo Software™ with reference of the faults in Figure 14.1. Two faults were modelled, The Ballinalack Fault and the Cappagh Fault, down dip extensions were inferred from drillhole interpretation and from inferred dip at surface. The Ballinalack fault terminates against the Cappagh Fault towards the southern edge of the project area. Mineralisation is believed to occur contemporaneously with the Ballinalack fault, resulting in mineralisation occurring in the fault's footwall and hanging wall. This was supported by one drillhole in the hanging wall and provides a focus for future exploration. Less in known about the timing of the Cappagh fault, it has been assumed to be post mineralisation.

14.4.2 Lithology

Within this structural framework a 3D stratigraphic model was generated from drillhole lithology logging. Solids were generated for Overburden ("OB"), Calp Limestone ("CALP"), Upper Argillaceous Bioclastic Limestone ("S"), Waulsortian Limestone ("WA"), Lower Argillaceous Bioclastic Limestone ("LABL"), and the Lower Palaeozoic basement.

Leapfrog Geo™ solids were exported into Micromine™ software as DXF's.

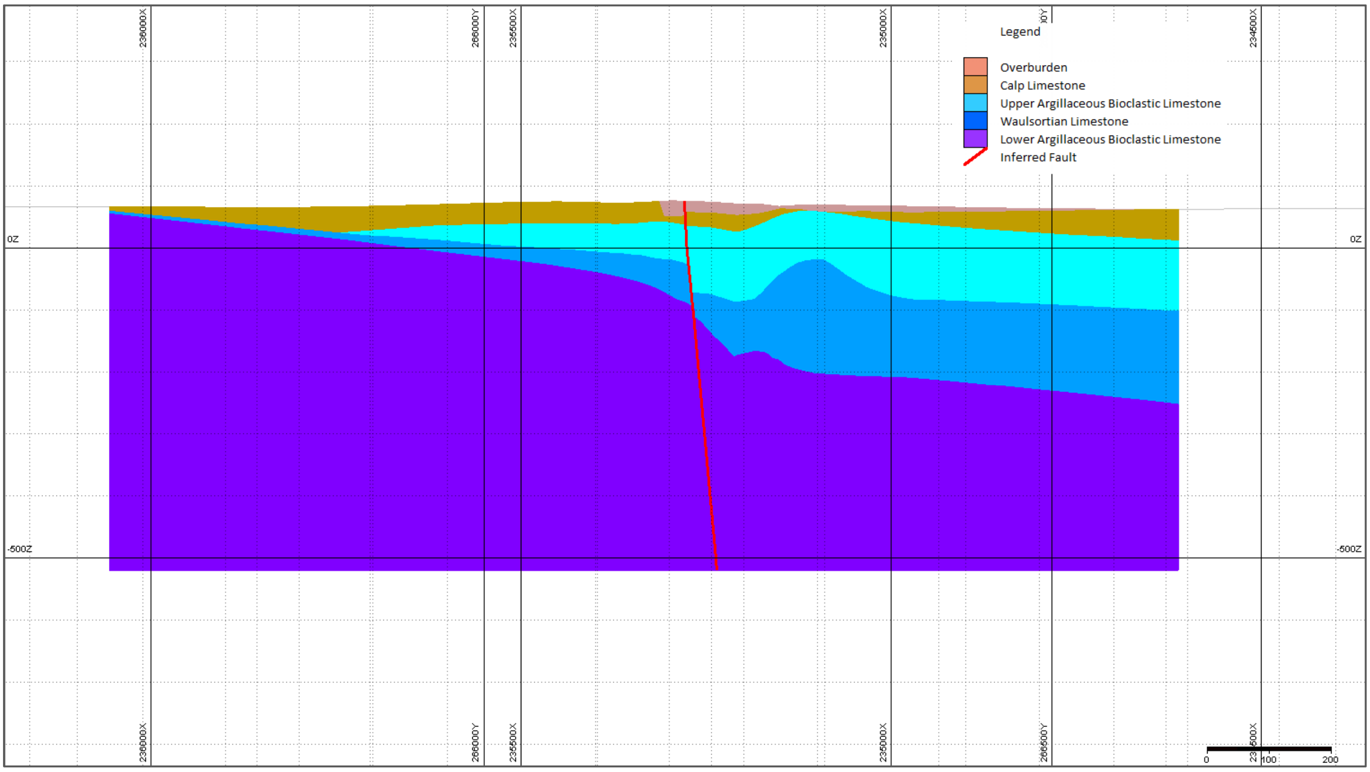


Figure 14.1 Type cross section showing general stratigraphy

(Source: CSA Global, 2018)

14.4.3 Weathering and Alteration

No weathering or alteration surfaces were produced; weathering and alteration data was not provided. It is understood that the entire rock mass is unweathered and that no significant alteration halo exists that can be modelled.

14.4.4 Mineralisation

Mineralisation is dominantly hosted within the WA unit.

14.4.5 Topography

Topography was generated from drillhole collars. Collars were surveyed by GPS and accuracy is considered adequate for use in the MRE.

14.5 Wireframes

Mineralisation was wireframed using CompSE composites of 3% Zn+Pb, with a true minimum thickness of 2 m and internal dilution included.

The process of CompSE in Datamine StudioRM™ composites drillhole sample data to honour a defined minimum interval length at a defined minimum grade. The true thickness is calculated from the dip of the mineralisation and the dip of the hole intersecting it.

The parameters used in the CompSE calculations were a true thickness of 2 m, a minimum grade of 3% Zn+Pb, with a mineralisation dip of 20°.

The minimum mining width is based on the practicality to mine with conventional underground methods since the mineralisation lies within 300 m from surface. The modelling cut-off grade is based on the determined natural cut-off grade of Zn+Pb, following review of log probability plots and histograms.

Mineralisation is assumed to be stratigraphically constrained, so only mineralisation on the same stratigraphic horizon was considered to be continuous.

Wireframes were constructed where continuous mineralisation was defined in two or more drillholes within a single fault block. mineralisation within single drillholes was not modelled.

Mineralized wireframes were extended as follows:

- Half way between drilling (to a maximum distance of 50 m), along strike and down dip, at the termination of mineralisation, or 50 m past the last mineralized drillhole at wider spacings.
- Where mineralisation met the edge of the Cappagh fault it was extended approximately 5 m past the fault trace, as the fault trace is indicative of the expected fault position, so a buffer has been applied to account for this.
- Where mineralisation occurred across the Ballinalack fault, mineralisation wireframes were extended across. Otherwise mineralisation was extended 5 m past the fault trace; a buffer was applied to account for the fact that the fault traces is only indicative of the expected fault position.

Eighteen separate mineralisation wireframes were created, one mineralized wireframe was located south of the Cappagh fault, the remaining 17 were located north of the Ballinalack and Cappagh faults (Figure 14.2).

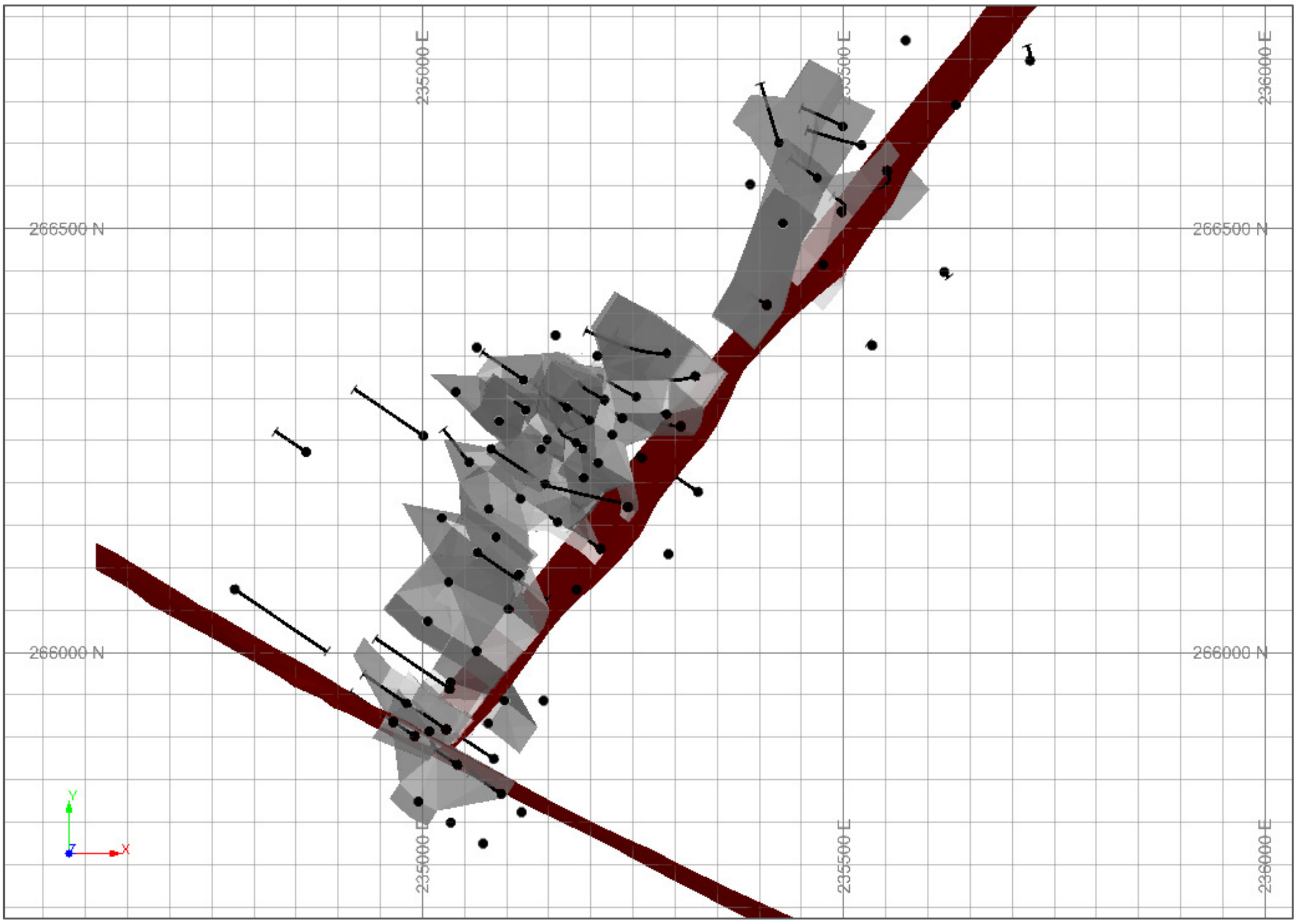


Figure 14.2 Plan view of mineralized wireframes (grey), inferred faults (red) with drillholes

(Source: CSA Global, 2018)

14.6 Statistical Analysis

Before undertaking the estimate, the data were first analysed to understand how the estimate should be accomplished. The statistical analysis was carried out by CSA Global using Datamine StudioRM™, Snowden Supervisor™ and GeoAccess Professional™ software packages.

14.6.1 Boundary Analysis

Boundaries are either classified as 'hard' or 'soft'. Hard boundaries are abrupt and may represent a sharp geological contact such as the edge of a quartz vein on its host rocks and where the boundary marks the margin of metal grade. A soft boundary is a gradational one, and represents a gradual reduction in grade, for example as one would find in the alteration zone of a copper porphyry system.

It is important to understand the nature of the boundaries between domains. If domain boundaries are gradational, then data from the adjacent domains should be used during estimation (soft boundary). If there are distinct grade boundaries, then estimation should be restricted to only use the data within that domain (hard boundary).

Contact analysis for Zn+Pb % between the modelled mineralisation and waste was carried out to assess the nature of the domain boundaries by graphing the average grade with increasing distance from the domain boundary. The average grades can be calculated by incrementally expanding the wireframes or manually by coding the samples based on distance from the domain contact, as was done in this instance. The contact analysis result for the Ballinalack deposit is shown Figure 14.3. Based on the results of the boundary analysis between mineralisation and waste, the boundary was interpreted to be hard.

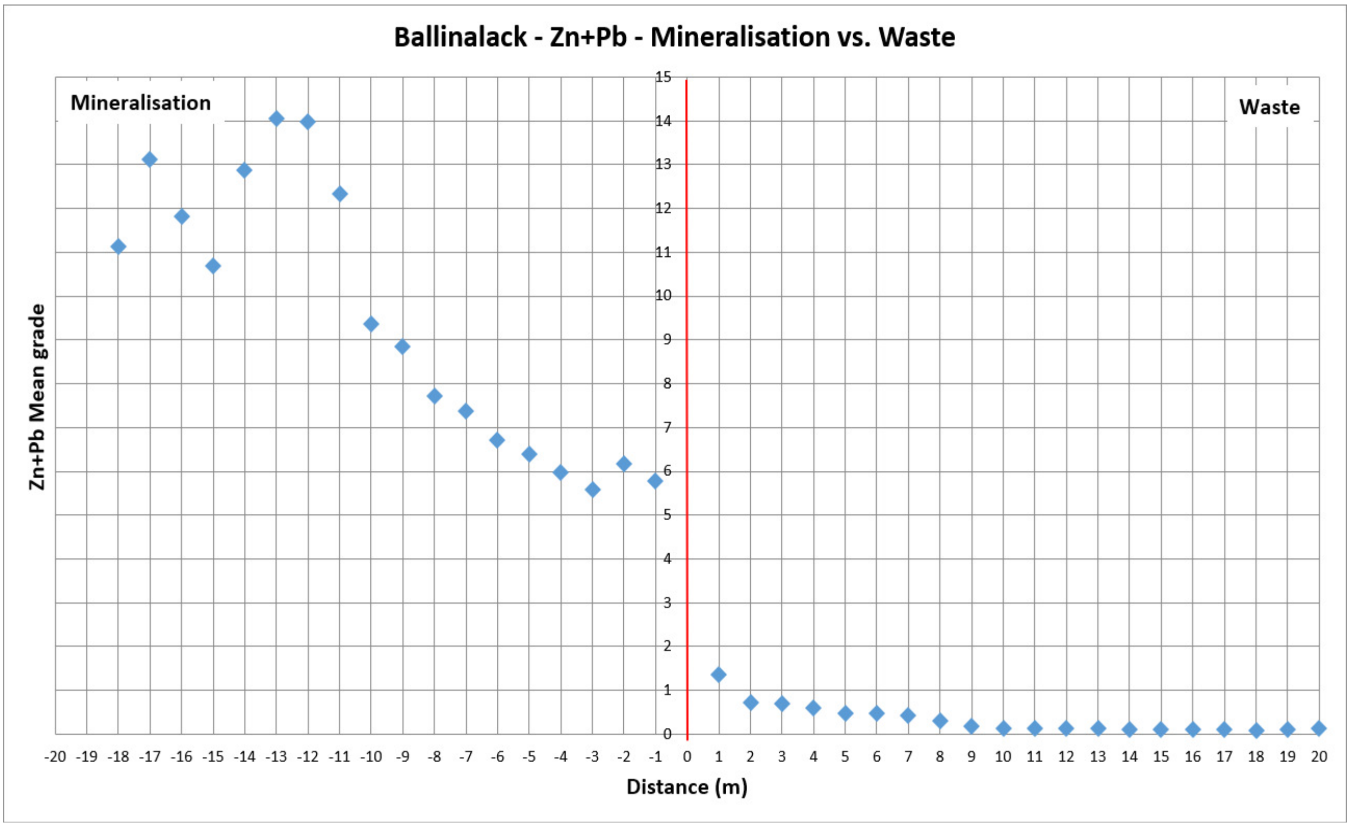


Figure 14.3 Boundary test graph for Ballinalack – Zn+Pb% mineralisation versus Waste.

(Source: CSA Global, 2018)

14.7 Sample Domaining

Drillhole coding is a standard procedure which ensures that the correct samples are used in statistical and geostatistical analyses, and grade interpolation. The mineralized envelopes were used to select drillhole samples. The samples were coded by geological and mineralisation domains.

14.7.1 Domain Coding

Domains were coded based on five geology units (GEOL = 100 – 500) and 18 modelled mineralisation envelopes (MINZON = 1 – 18; DOMAIN = 1).

A summary of the domain codes, used to distinguish the data during geostatistical analysis and estimation, is shown in Table 14.2, below.

Table 14.2 Data field flagging and description

Field	Code	Description
GEOL	100	Overburden
	200	Calp Limestone

Field	Code	Description
	300	Upper Argillaceous Bioclastic Limestone
	400	Waulsortian (Mudbank) Limestones
	500	Lower Argillaceous Bioclastic Limestone
MINZON	1 to 18	Mineralized
	9999	Waste
DOMAIN	1	Mineralized
	9999	Waste

14.7.2 Naïve Statistics

The naïve statistics, per MINZON, are given in Table 14.3 and shown in Figure 14.4 to Figure 14.7. There are some isolated high values within the waste domain, however, the sample populations within the MINZONs are distinct.

The number of assay values available for Ag and $BaSO_4$ are less than that of Pb and Zn, upon which the mineralisation modelling is based. There are no Ag assay values above detection limit within MINZONs 12 to 18, and no $BaSO_4$ values above detection limit within MINZONs 5 to 13, 16 and 17.

Table 14.3 Naïve Statistics per MINZON

Variable	MINZON	Number	Minimum	Maximum	Mean	Median	Std. Dev.	CV
Zn%	1	183	0.00	30.00	**6.52**	3.90	6.44	0.99
	2	210	0.00	22.50	**5.92**	4.46	5.12	0.86
	3	37	0.04	17.00	**5.24**	4.23	4.29	0.82
	4	134	0.00	25.60	**5.15**	4.36	4.49	0.87
	5	57	0.00	24.40	**6.32**	5.07	5.39	0.85
	6	6	1.33	11.20	**4.61**	3.40	3.44	0.75
	7	41	0.00	19.90	**5.13**	4.53	4.76	0.93
	8	29	0.00	19.00	**5.37**	4.08	5.36	1.00
	9	37	0.00	18.50	**6.21**	4.78	4.80	0.77
	10	4	2.60	5.22	**4.14**	3.80	1.20	0.29
	11	3	4.90	14.20	**8.73**	6.00	4.86	0.56
	12	4	2.13	4.52	**3.25**	3.11	0.98	0.30
	13	3	3.49	6.72	**4.80**	3.84	1.70	0.35
	14	10	0.51	8.19	**2.92**	3.10	2.34	0.80
	15	27	0.52	22.90	**7.26**	5.87	4.88	0.67
	16	6	3.35	21.20	**13.08**	7.40	8.36	0.64
	17	5	5.17	10.40	**6.90**	6.12	2.05	0.30
	18	6	0.31	18.90	**8.76**	7.92	7.52	0.86
	9999	18,686	0.00	23.00	**0.06**	0.00	0.38	6.86
Pb%	1	183	0.00	8.30	**1.25**	0.69	1.52	1.21
	2	210	0.00	8.58	**0.97**	0.54	1.18	1.21
	3	37	0.01	4.00	**0.88**	0.71	0.92	1.05

Variable	MINZON	Number	Minimum	Maximum	Mean	Median	Std. Dev.	CV
	4	134	0.00	5.28	**0.63**	0.42	0.79	1.24
	5	57	0.00	4.10	**0.88**	0.57	0.88	1.00
	6	6	0.06	1.46	**0.54**	0.25	0.53	0.99
	7	41	0.00	7.80	**0.67**	0.30	1.30	1.93
	8	29	0.00	2.75	**0.73**	0.49	0.76	1.04
	9	37	0.00	3.84	**0.95**	0.65	1.02	1.07
	10	4	0.58	1.82	**1.06**	0.72	0.56	0.53
	11	3	1.40	2.25	**1.68**	1.40	0.49	0.29
	12	4	0.13	0.42	**0.25**	0.19	0.12	0.49
	13	3	0.19	1.45	**0.61**	0.19	0.73	1.19
	14	10	0.16	6.19	**1.89**	0.51	2.18	1.15
	15	27	0.04	5.90	**1.09**	0.73	1.11	1.01
	16	6	0.66	3.43	**1.97**	1.21	1.17	0.59
	17	5	0.09	1.08	**0.70**	0.76	0.37	0.52
	18	6	0.06	1.63	**1.02**	1.36	0.71	0.70
	9999	18,686	0.00	8.10	**0.01**	0.00	0.12	11.07
Ag g/t	1	183	0.25	144.00	**10.58**	2.78	17.67	1.67
	2	210	0.25	86.45	**10.39**	4.85	15.41	1.48
	3	37	0.25	54.39	**9.75**	5.30	12.38	1.27
	4	134	0.25	86.00	**6.80**	0.25	14.45	2.13
	5	57	0.25	20.84	**1.93**	0.25	4.40	2.29
	6	6	0.25	13.03	**3.48**	0.25	5.37	1.54
	7	41	0.25	81.60	**3.16**	0.25	12.90	4.08
	8	29	0.25	42.51	**8.09**	0.25	12.62	1.56
	9	37	0.25	83.66	**19.12**	11.66	22.26	1.16
	10	4	0.25	13.03	**6.64**	0.25	7.38	1.11
	11	3	0.25	8.91	**3.14**	0.25	5.00	1.59
	9999	18,676	0.25	385.72	**0.32**	0.25	2.92	9.22
$BaSO_4$%	1	183	0	48.00	2.60	0.00	8.62	3.32
	2	210	0	15.70	0.26	0.00	1.40	5.41
	3	37	0	2.36	**0.16**	0.01	0.52	3.28
	4	134	0	1.52	**0.03**	0.00	0.18	5.80
	14	10	0	0.46	**0.05**	0.00	0.15	3.16
	15	27	0	1.77	**0.08**	0.00	0.34	4.45
	18	6	0	51.00	**22.17**	18.80	16.92	0.76
	9999	18,686	0	85.40	**0.03**	0.00	1.14	39.28

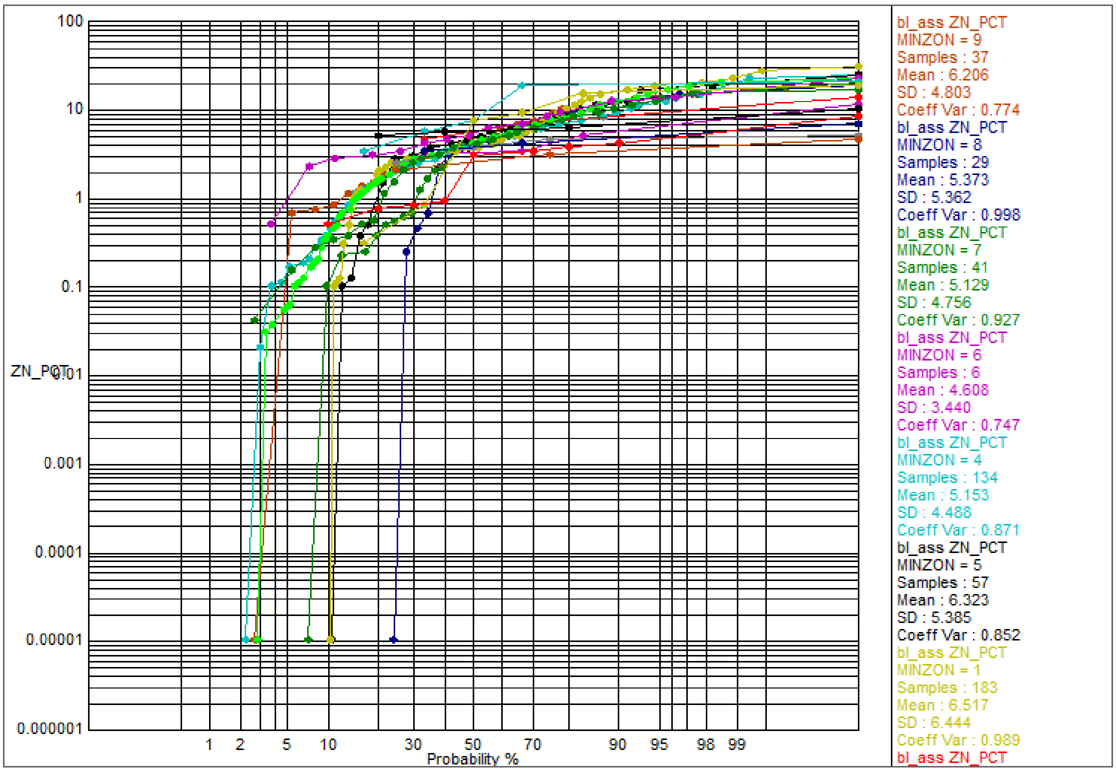


Figure 14.4 Naïve Zn% - Log probability plot overlays of mineralisation per MINZON

(Source: CSA Global, 2018)

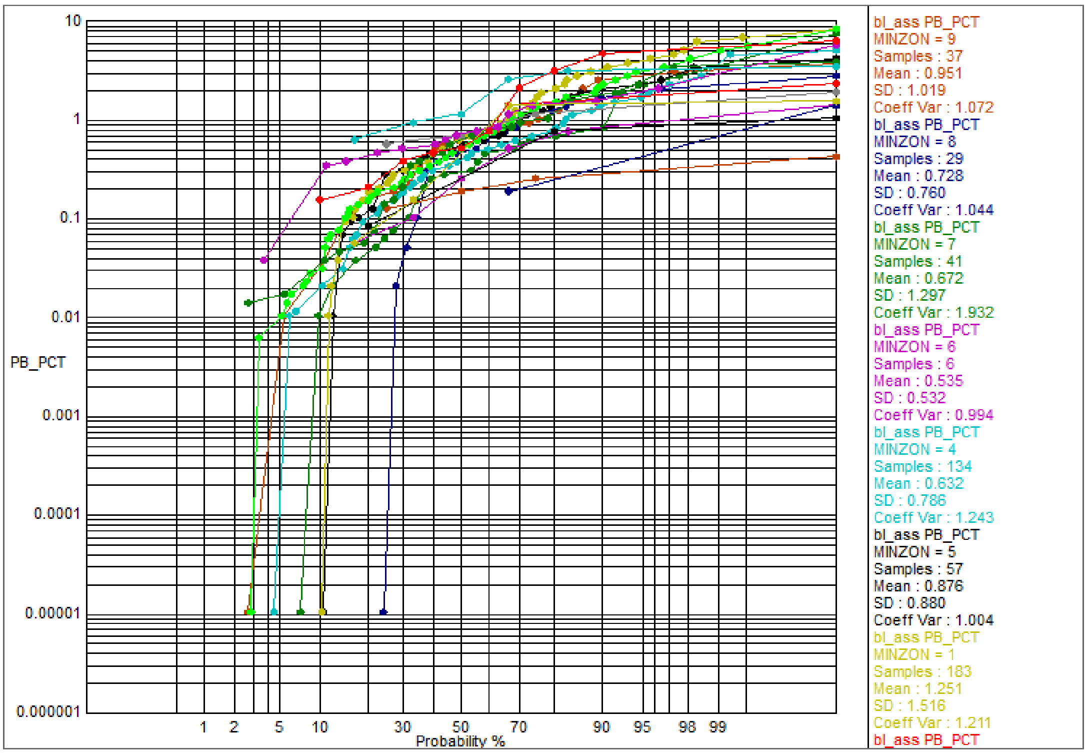


Figure 14.5 Naïve Pb% - Log probability plot overlays of mineralisation per MINZON (Source: CSA Global, 2018)

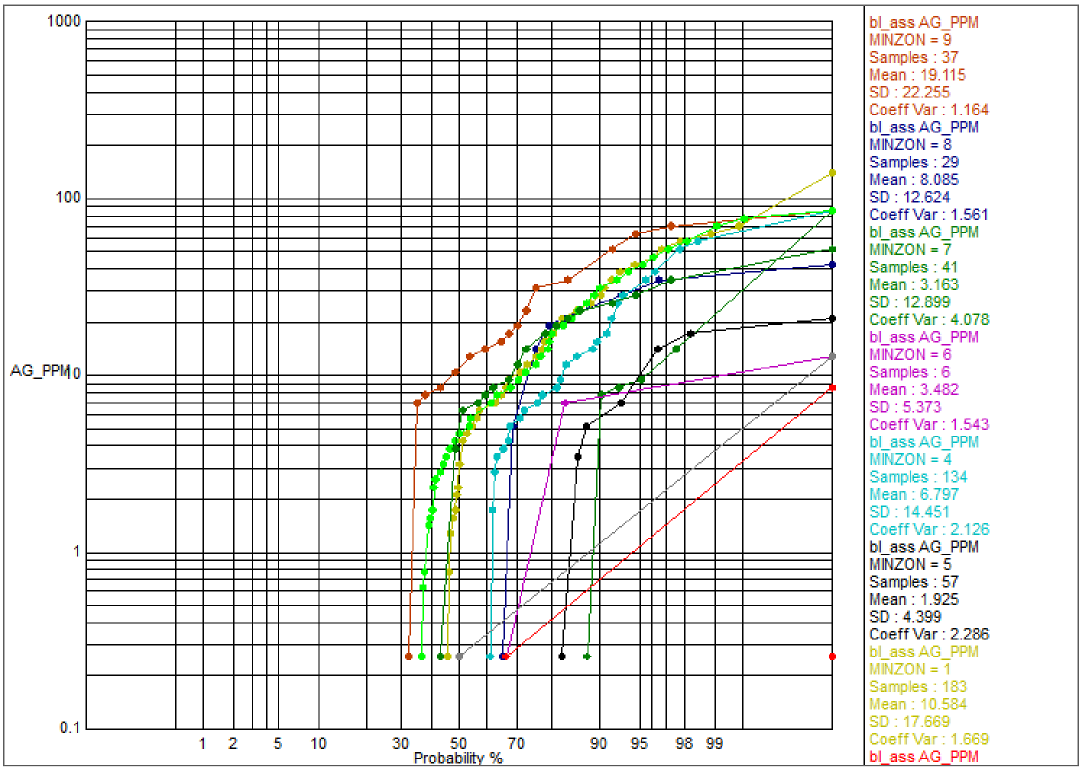


Figure 14.6 Naïve Ag g/t - Log probability plot overlays of mineralisation per MINZON (Source: CSA Global, 2018)

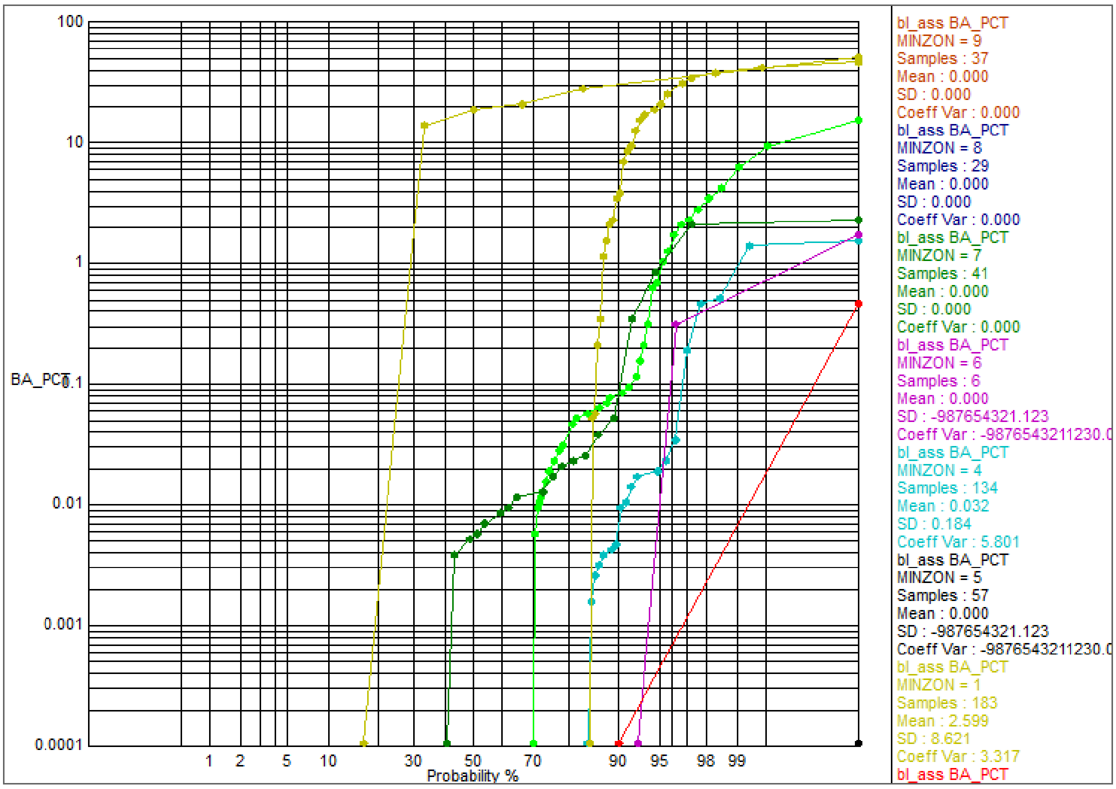


Figure 14.7 Naïve $BaSO_4$% - Log probability plot overlays of mineralisation per MINZON (Source: CSA Global, 2018)

14.7.3 Sample Length Analyses

The Ballinalack MRE area was restricted by a boundary string; data were selected, and mineralisation modelled within this boundary. Assays that fall within the modelled mineralisation envelopes were down-hole composited to 1.5 m prior to statistical review, top-cutting, variography and grade estimation.

The dominant sampling length within the MRE area (mainly waste) was 1 m. The dominant sampling length within the modelled mineralisation wireframes was 1.5 m, followed by 3 m and 1 m. The median length within the mineralisation envelopes is 1.52 m, with a mean length of 1.63 m (Figure 14.8).

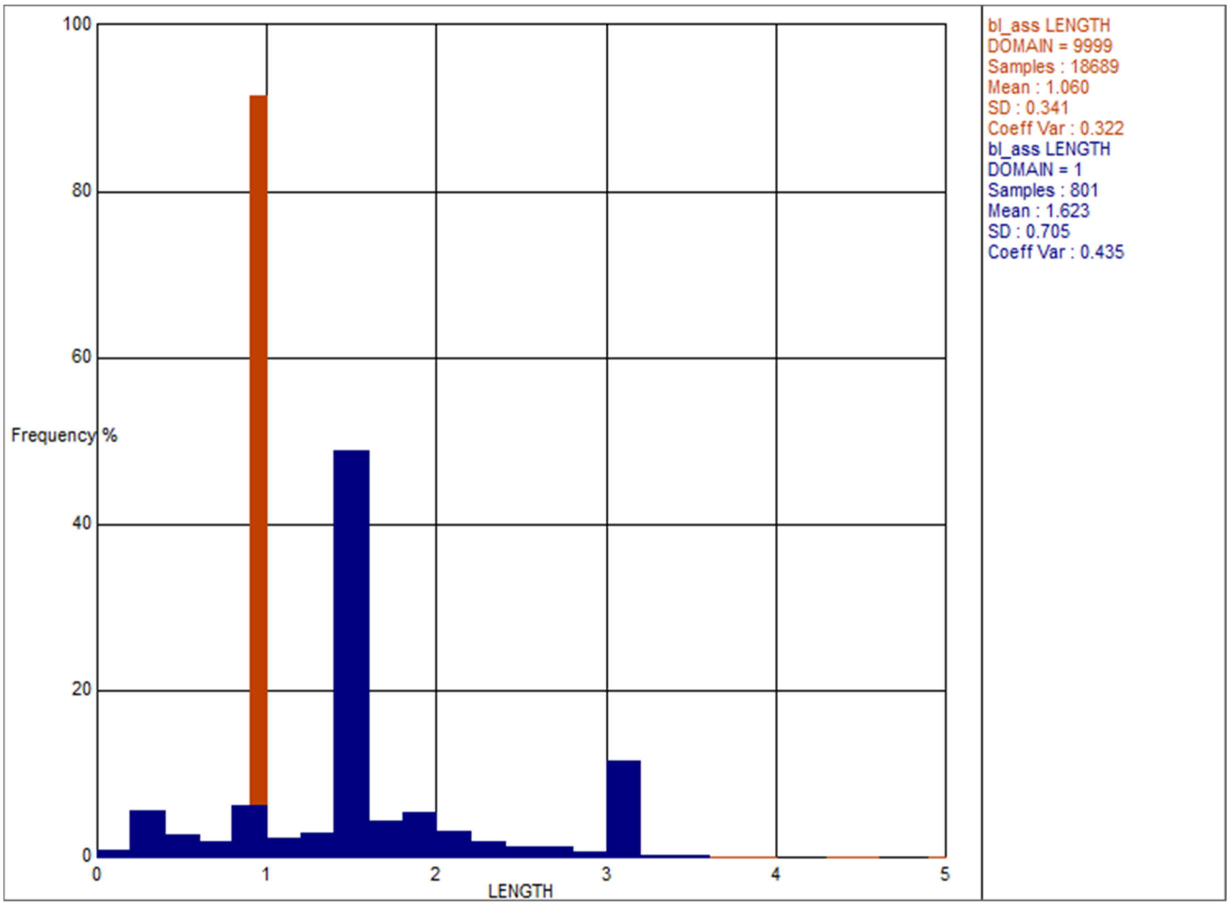


Figure 14.8 Histogram overlay of sample lengths for mineralisation (Blue; DOMAIN = 1) versus Waste (Red; DOMAIN = 9999)

(Source: CSA Global, 2018)

14.8 Sample Compositing

Statistical analysis to ascertain the effect of compositing to either 1 m or 1.5 m was carried out for samples within DOMAIN = 1 (MINZON 1 to 18). Compositing was on individual MINZON domains, starting at the top of the hole, and was carried out using Datamine StudioRM^{TM}.

During the compositing process, the interval can be adjusted with the parameter MODE. The default setting is MODE = 0, where the composite length is forced to equal the selected interval and part of samples may be excluded. Setting MODE = 1 forces all samples to be included in one of the composites by adjusting the composite length.

The sum of metal within the drillholes was calculated as GRADE*LENGTH. Taking potential metal loss (defined as GRADE*LENGTH in this context) into account, as well as the least potential splitting of samples, the most appropriate method selected was compositing to 1.5 m, with MODE = 1. The results are presented in Table 14.4 below. The resultant range of composite lengths within the mineralisation envelopes are shown in Figure 14.9. No residual samples were removed.

Table 14.4 Percentage difference in sum of metal (GRADE*LENGTH) of Naïve vs 1.5 m Composites (MODE = 0 vs MODE = 1) (DOMAIN = 1)

Composite Length	MINZON	Zn Metal Difference to Naive	Pb Metal Difference to Naive	Ag Metal Difference to Naive	$BaSO_4$ Metal Difference to Naive
1.5 m (MODE = 0; excluding residuals <0.75 m)	1	-1%	-1%	-1%	0%
	2	-2%	-2%	-1%	-2%
	3	-6%	-4%	-10%	-4%
	4	-2%	-3%	-4%	-7%
	5	-2%	-2%	-2%	-
	6	0%	0%	0%	-
	7	-1%	-2%	-2%	-
	8	-4%	-4%	-2%	-
	9	-1%	-1%	-1%	-
	10	-2%	-1%	-2%	-
	11	-1%	-2%	-3%	-
	12	-1%	-2%	-	-
	13	-1%	-3%	-	-
	14	-1%	-1%	-	0%
	15	-10%	-6%	-	0%
	16	0%	0%	-	-
	17	-1%	-1%	-	-
	18	0%	0%	-	0%
1.5 m (MODE = 1; including residuals and where minimum LENGTH = 0.85 m)	1	0%	0%	0%	0%
	2	0%	0%	0%	0%
	3	0%	0%	0%	0%
	4	0%	0%	0%	0%
	5	0%	0%	0%	-
	6	0%	0%	0%	-
	7	0%	0%	0%	-
	8	0%	0%	0%	-
	9	0%	0%	0%	-
	10	0%	0%	0%	-
	11	0%	0%	0%	-
	12	0%	0%	-	-
	13	0%	0%	-	-
	14	0%	0%	-	0%
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	17	0%	0%	-	-
	18	0%	0%	-	0%

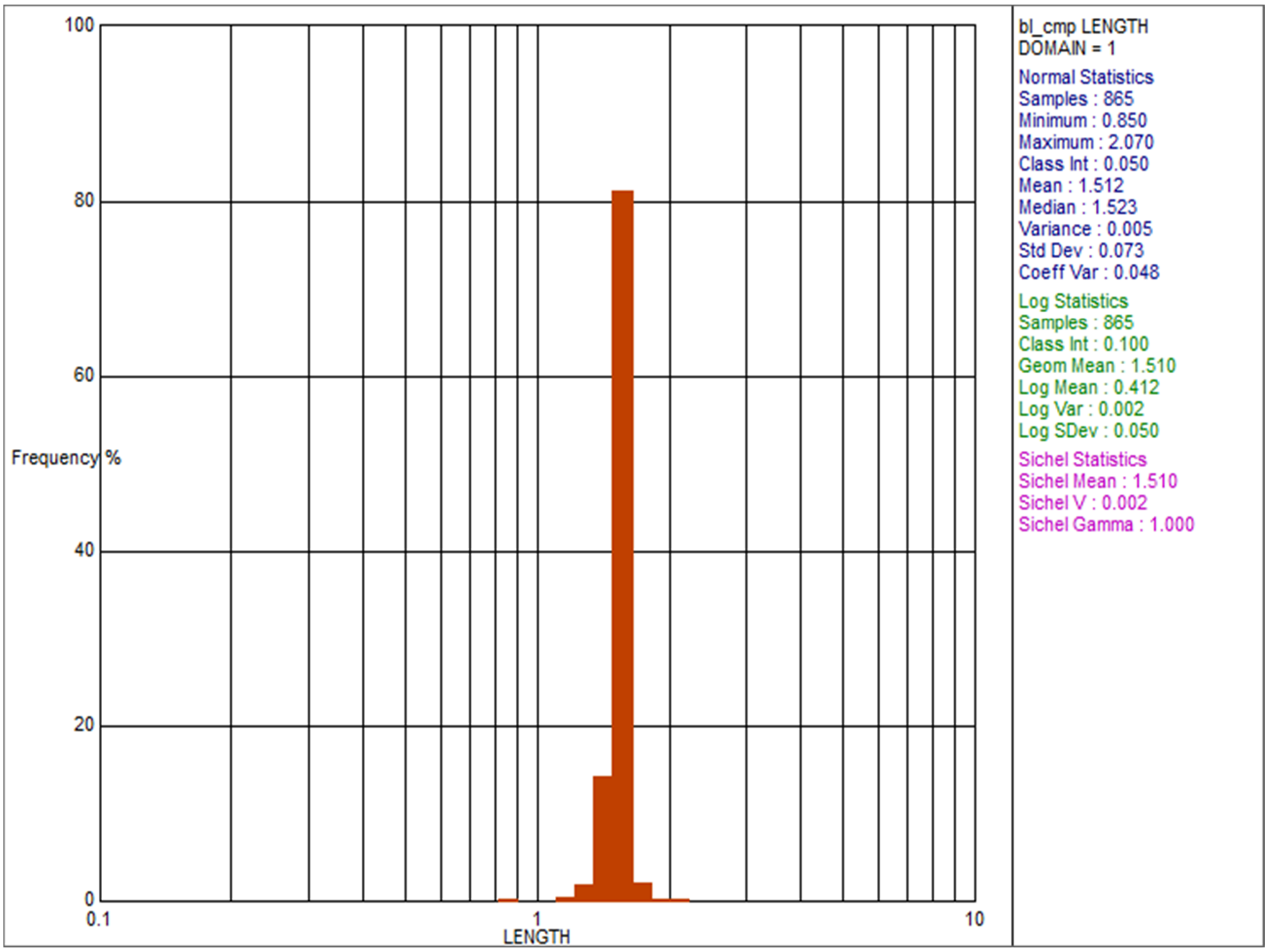

Figure 14.9 Log Normal Histogram of composite lengths for mineralisation (DOMAIN = 1)

(Source: CSA Global, 2018)

14.9 Geostatistical Analysis

14.9.1 Summary Statistics – Sample Assays

A total of 865 composites were used in the statistical analysis and resource estimation. The descriptive analyses for the estimation domains, MINZON = 1 to 18, are given in Table 14.5 and shown in Figure 14.10 to Figure 14.13. The sample populations within the MINZONs are distinct, and as such, the decision was made to use hard boundaries between these domains during estimation.

Table 14.5 Composite statistics per MINZON

Variable	MINZON	Number	Minimum	Maximum	Mean	Median	Std. Dev.	CV
Zn%	1	230	0.00	29.45	**8.09**	5.00	6.65	0.82
	2	203	0.00	20.90	**5.97**	4.63	4.38	0.73
	3	35	1.75	8.18	**4.27**	3.98	1.42	0.33
	4	156	0.10	15.70	**4.60**	4.20	3.21	0.70
	5	57	0.00	23.49	**6.57**	5.75	4.96	0.76

Variable	MINZON	Number	Minimum	Maximum	Mean	Median	Std. Dev.	CV
	6	6	1.52	10.67	**4.73**	3.58	3.13	0.66
	7	40	0.00	19.88	**5.34**	4.56	4.70	0.88
	8	27	0.00	18.98	**5.95**	4.66	4.95	0.83
	9	40	0.88	18.50	**6.26**	4.56	4.34	0.69
	10	5	2.60	5.22	**3.83**	3.20	1.24	0.33
	11	4	4.90	14.20	**8.24**	6.77	4.09	0.50
	12	4	2.13	4.52	**3.25**	3.11	0.98	0.30
	13	3	3.49	6.71	**4.80**	3.84	1.69	0.35
	14	12	0.51	8.19	**3.25**	3.10	2.38	0.73
	15	26	1.19	18.68	**6.94**	5.16	4.25	0.61
	16	6	3.35	21.20	**13.42**	9.34	8.16	0.61
	17	5	5.17	10.39	**6.90**	6.12	2.04	0.30
	18	6	0.31	18.90	**8.00**	6.14	7.40	0.93
Pb%	1	230	0.00	8.20	**1.60**	0.87	1.63	1.02
	2	203	0.00	4.94	**0.89**	0.59	0.87	0.98
	3	35	0.33	1.90	**0.72**	0.73	0.34	0.47
	4	156	0.00	2.75	**0.55**	0.43	0.49	0.91
	5	57	0.00	4.10	**0.91**	0.62	0.84	0.92
	6	6	0.08	1.38	**0.56**	0.33	0.47	0.84
	7	40	0.00	7.78	**0.70**	0.30	1.31	1.86
	8	27	0.00	2.75	**0.81**	0.61	0.71	0.88
	9	40	0.04	3.84	**0.96**	0.78	0.83	0.87
	10	5	0.58	1.82	**0.96**	0.65	0.53	0.55
	11	4	1.40	2.25	**1.61**	1.40	0.43	0.26
	12	4	0.13	0.42	**0.25**	0.19	0.12	0.49
	13	3	0.19	1.45	**0.61**	0.19	0.72	1.19
	14	12	0.19	6.17	**1.65**	0.49	2.05	1.24
	15	26	0.08	4.09	**1.01**	0.72	0.82	0.81
	16	6	0.66	3.43	**2.02**	1.49	1.14	0.56
	17	5	0.09	1.08	**0.70**	0.76	0.37	0.52
	18	6	0.06	1.51	**0.91**	1.14	0.63	0.69
Ag g/t	1	230	0.25	110.15	**13.30**	6.86	17.35	1.30
	2	203	0.25	59.35	**9.57**	4.50	13.29	1.39
	3	35	0.25	54.39	**7.97**	6.60	9.41	1.18
	4	156	0.25	82.71	**5.37**	0.25	10.32	1.92
	5	57	0.25	20.84	**1.81**	0.25	3.98	2.20
	6	6	0.25	12.50	**3.76**	0.25	4.99	1.33

Variable	MINZON	Number	Minimum	Maximum	Mean	Median	Std. Dev.	CV
	7	40	0.25	81.43	**3.23**	0.25	13.03	4.03
	8	27	0.25	42.47	**9.16**	0.25	12.67	1.38
	9	40	0.25	83.66	**19.75**	13.94	20.42	1.03
	10	5	0.25	13.03	**5.36**	0.25	7.00	1.31
	11	4	0.25	8.91	**2.42**	0.25	4.33	1.79
$BaSO_4$%	1	230	0.00	29.45	**8.09**	5.00	6.65	0.82
	2	203	0.00	20.90	**5.97**	4.63	4.38	0.73
	3	35	1.75	8.18	**4.27**	3.98	1.42	0.33
	4	156	0.10	15.70	**4.60**	4.20	3.21	0.70
	14	12	0.51	8.19	**3.25**	3.10	2.38	0.73
	15	26	1.19	18.68	**6.94**	5.16	4.25	0.61
	18	6	0.31	18.90	**8.00**	6.14	7.40	0.93

Std. Dev.: Standard Deviation
CV: Coefficient of Variation

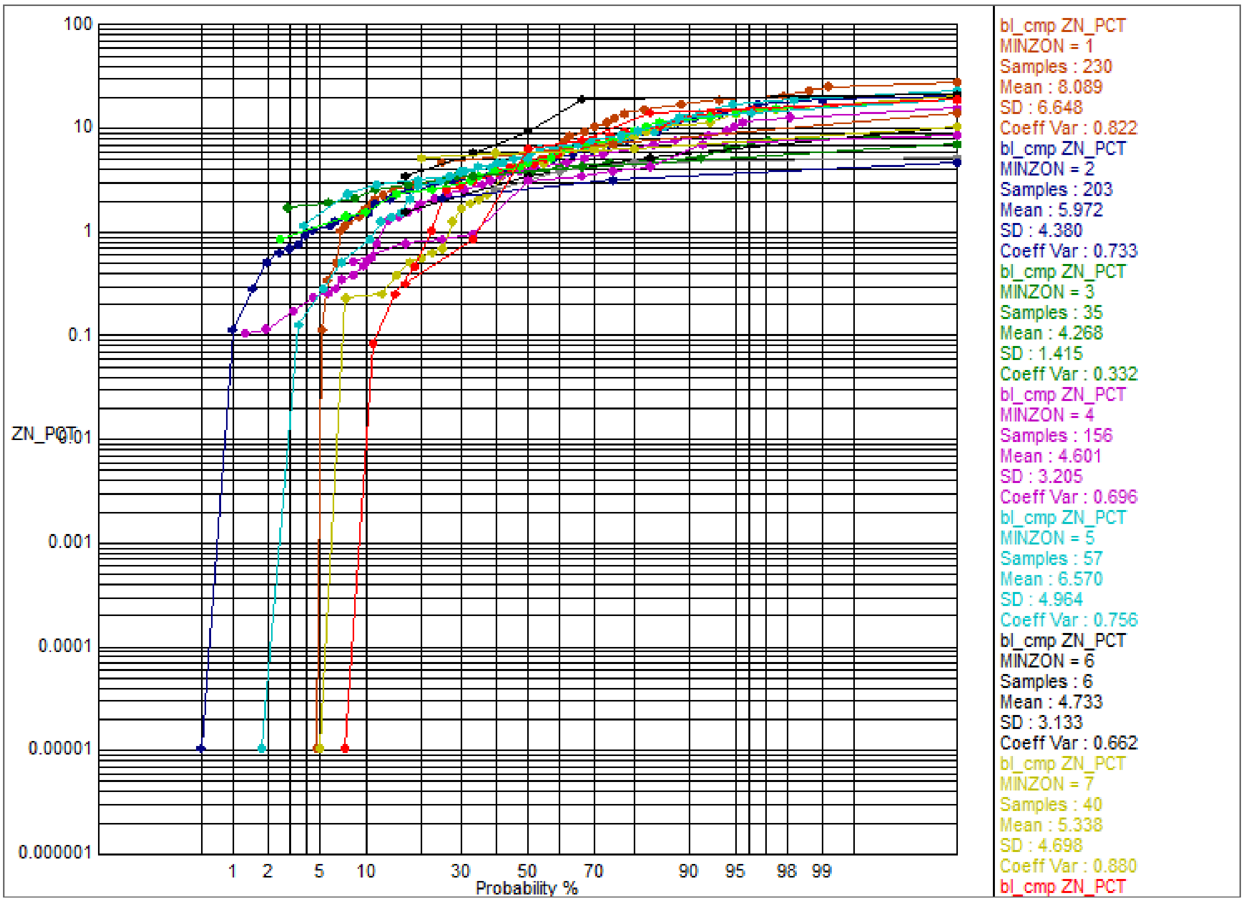

Figure 14.10 Composite Zn% - Log probability plot overlays of mineralisation per MINZON

(Source: CSA Global, 2018)

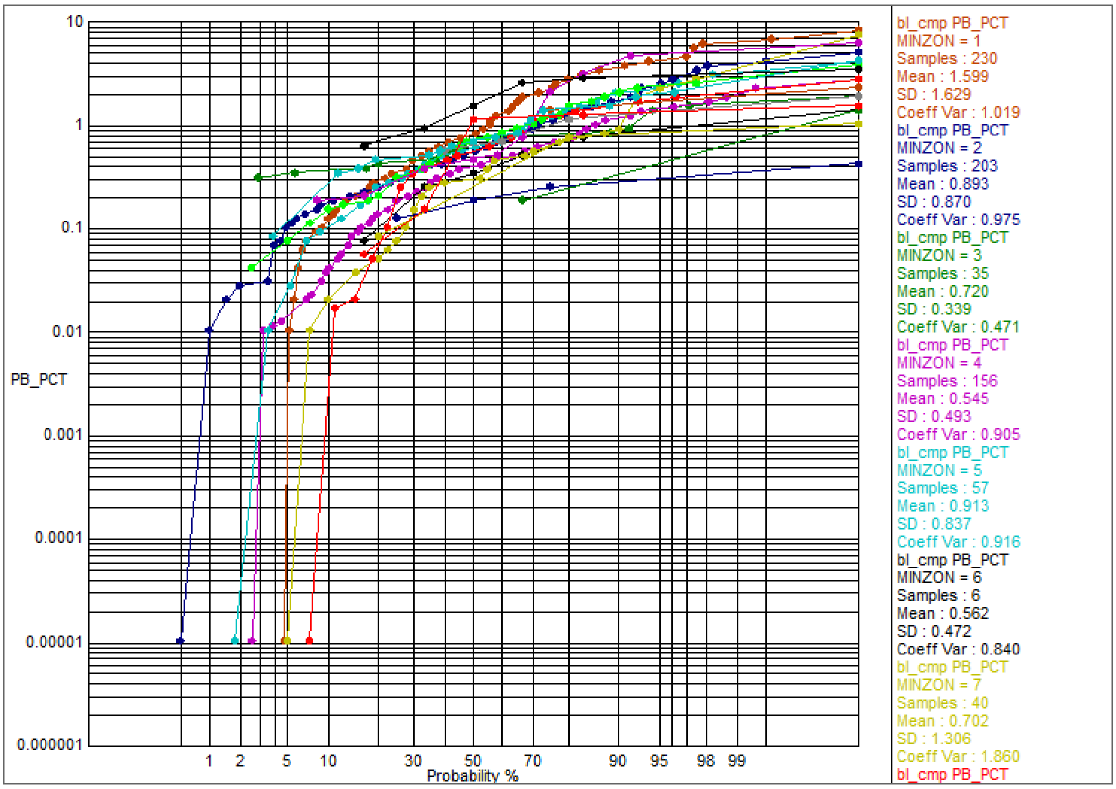

Figure 14.11 Composite Pb% - Log probability plot overlays of mineralisation per MINZON

(Source: CSA Global, 2018)

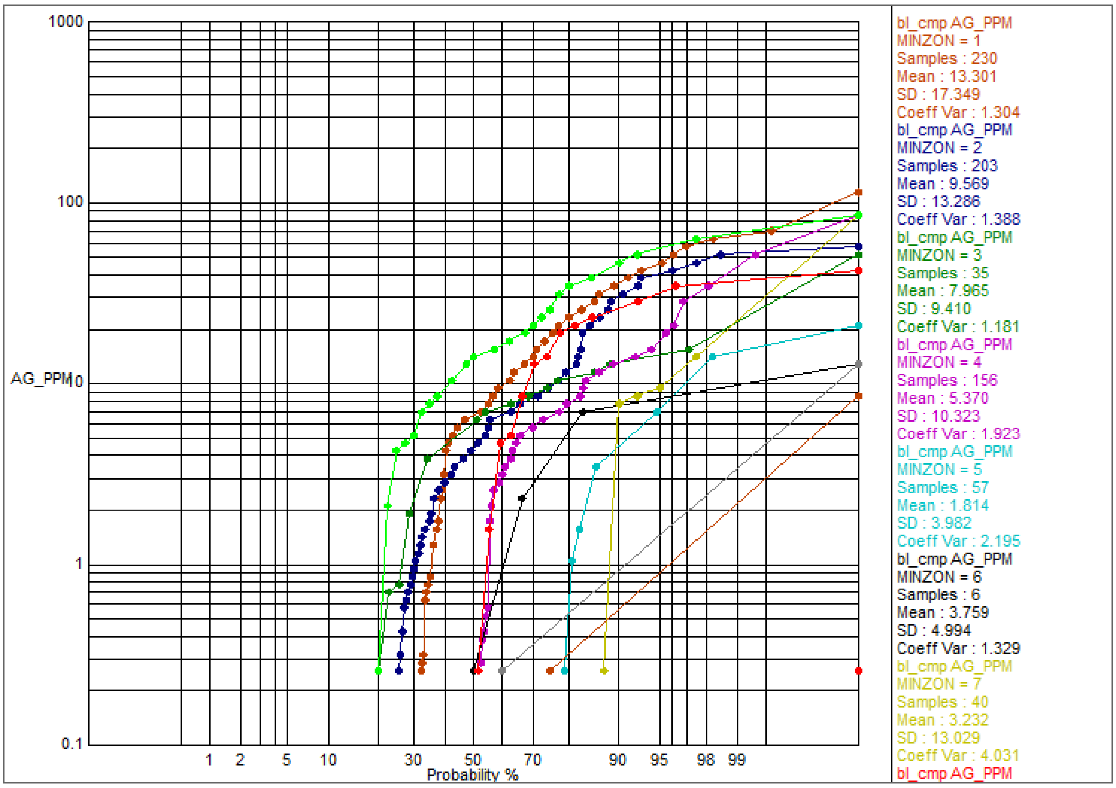

Figure 14.12 Composite Ag g/t - Log probability plot overlays of mineralisation per MINZON

(Source: CSA Global, 2018)

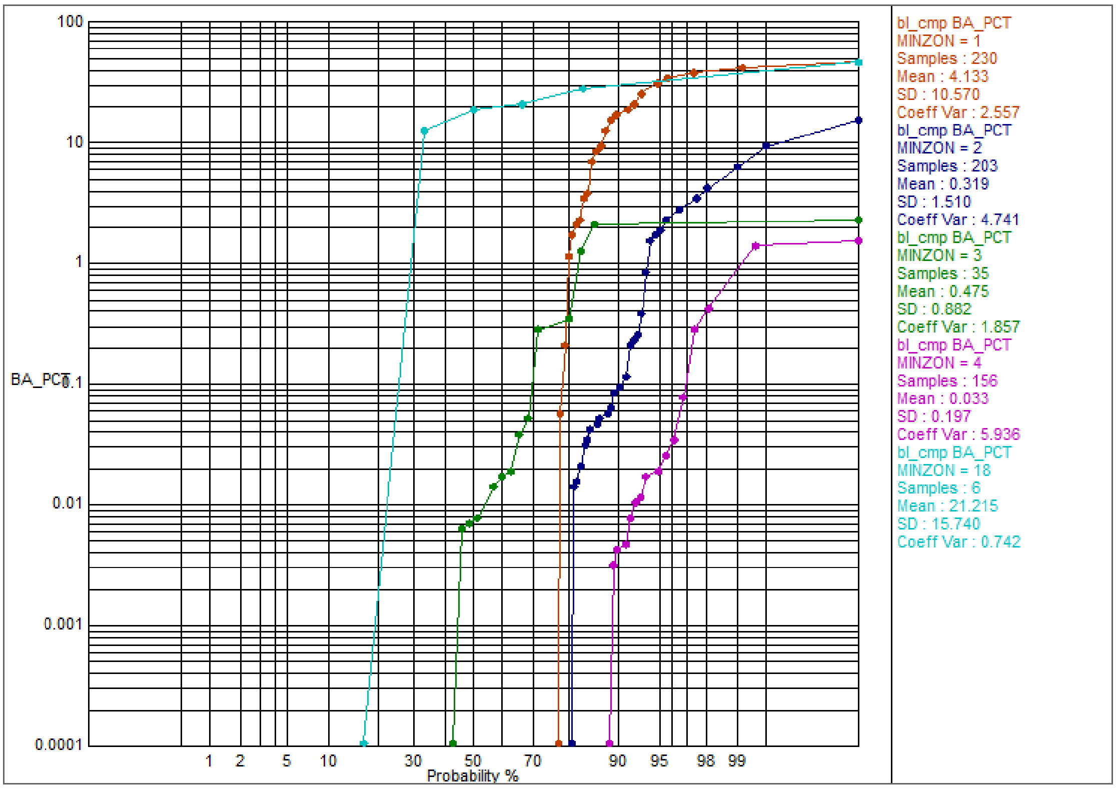

Figure 14.13 Composite $BaSO_4$% - Log probability plot overlays of mineralisation per MINZON

(Source: CSA Global, 2018)

14.9.2 Grade Cutting

Grade cutting (top-cutting) is generally applied to data used for grade estimation in order to reduce the local influence of anomalous high-grade samples in the grade estimate. In cases where individual samples would unduly influence the values of surrounding model cells, without the support of other high-grade samples, top-cuts are applied. These top-cuts are quantified according to the statistical distribution of the sample population.

Cutting strategy was applied based on the following:

- Skewness of the data.
- Probability plots.
- Spatial position of extreme grades.

Histograms and probability plots were reviewed for Zn%, Pb%, Ag g/t and $BaSO_4$% within the estimation domains to determine the top-cuts. Top cuts were applied to Zn% within MINZON 6 (Table 14.6), Pb% within MINZONs 7 and 15 (Table 14.7), Ag g/t within MINZONs 1, 3, 4, 5 and 7 (Table 14.8), and $BaSO_4$% within MINZON 2 (Table 14.9). Samples greater than the top-cut values for each of these variables, were reset to their respective top-cut values.

Table 14.6 Top-cut statistics for Zn% within MINZON = 6

Variable	Parameter	6
Zn%	Number	6
	Top Cut Value	5.50
	# Samples cut	1
	Minimum	1.52

Variable	Parameter	6
	Maximum	10.67
	Mean (uncut)	4.73
	Mean (top-cut)	3.87
	%Difference from Uncut Mean	-18%

Table 14.7 Top-cut statistics for Pb% within MINZONs = 7 and 15

Variable	Parameter	7	15
Pb%	Number	40	26
	Top Cut Value	3.00	2.00
	# Samples cut	1	2
	Minimum	0.00	1.19
	Maximum	19.88	18.68
	Mean (uncut)	0.70	1.01
	Mean (top-cut)	0.58	0.93
	%Difference from Uncut Mean	-17%	-8%

Table 14.8 Top-cut statistics for Ag g/t within MINZONs = 1, 3, 4, 5 and 7

Variable	Parameter	1	3	4	5	7
Ag g/t	Number	230	35	156	57	40
	Top Cut Value	70.00	15.00	35.00	10.00	15.00
	# Samples cut	1	3	3	3	1
	Minimum	0.25	0.25	0.25	0.25	0.25
	Maximum	110.15	54.39	82.71	20.84	81.43
	Mean (uncut)	13.30	7.97	5.37	1.81	3.23
	Mean (top-cut)	13.13	6.79	4.85	1.50	1.57
	%Difference from Uncut Mean	-1%	-15%	-10%	-17%	-51%

Table 14.9 Top-cut statistics for $BaSO_4$% within MINZON = 2

Variable	Parameter	2
$BaSO_4$%	Number	203
	Top Cut Value	10.00
	# Samples cut	1
	Minimum	0.00
	Maximum	15.68
	Mean (uncut)	0.32
	Mean (top-cut)	0.29
	%Difference from Uncut Mean	-9%

Examples of the associated log probability plots for the uncut and top-cut Zn% within MINZON = 6, Pb% within MINZON = 7, Ag g/t within MINZON = 4, and $BaSO_4$% within MINZON = 2, are shown in Figure 14.14 to Figure 14.17.

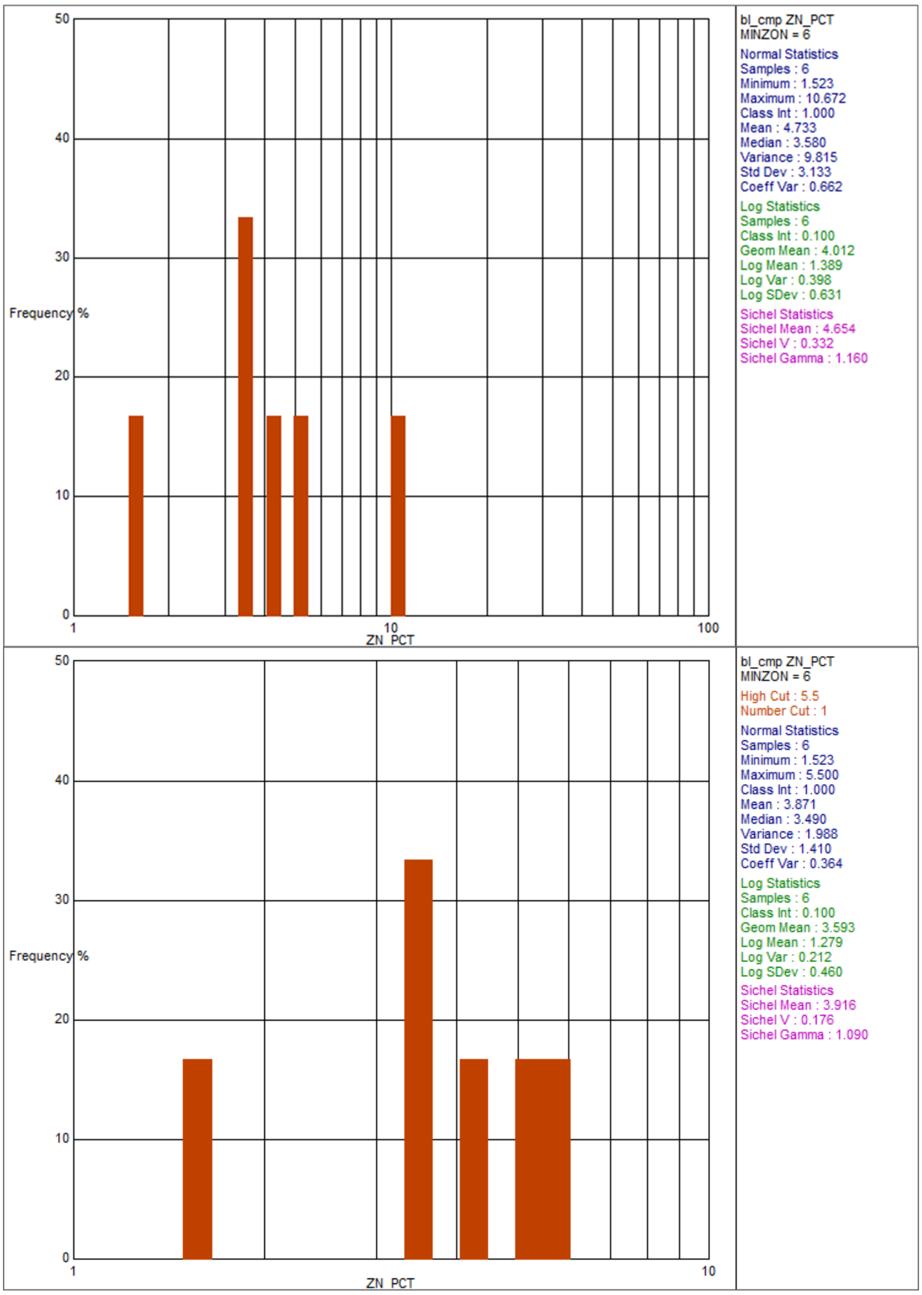

Figure 14.14 Zn% (MINZON = 6) - Log Histogram Plots Uncut (top) and Top-Cut (bottom)

(Source: CSA Global, 2018)

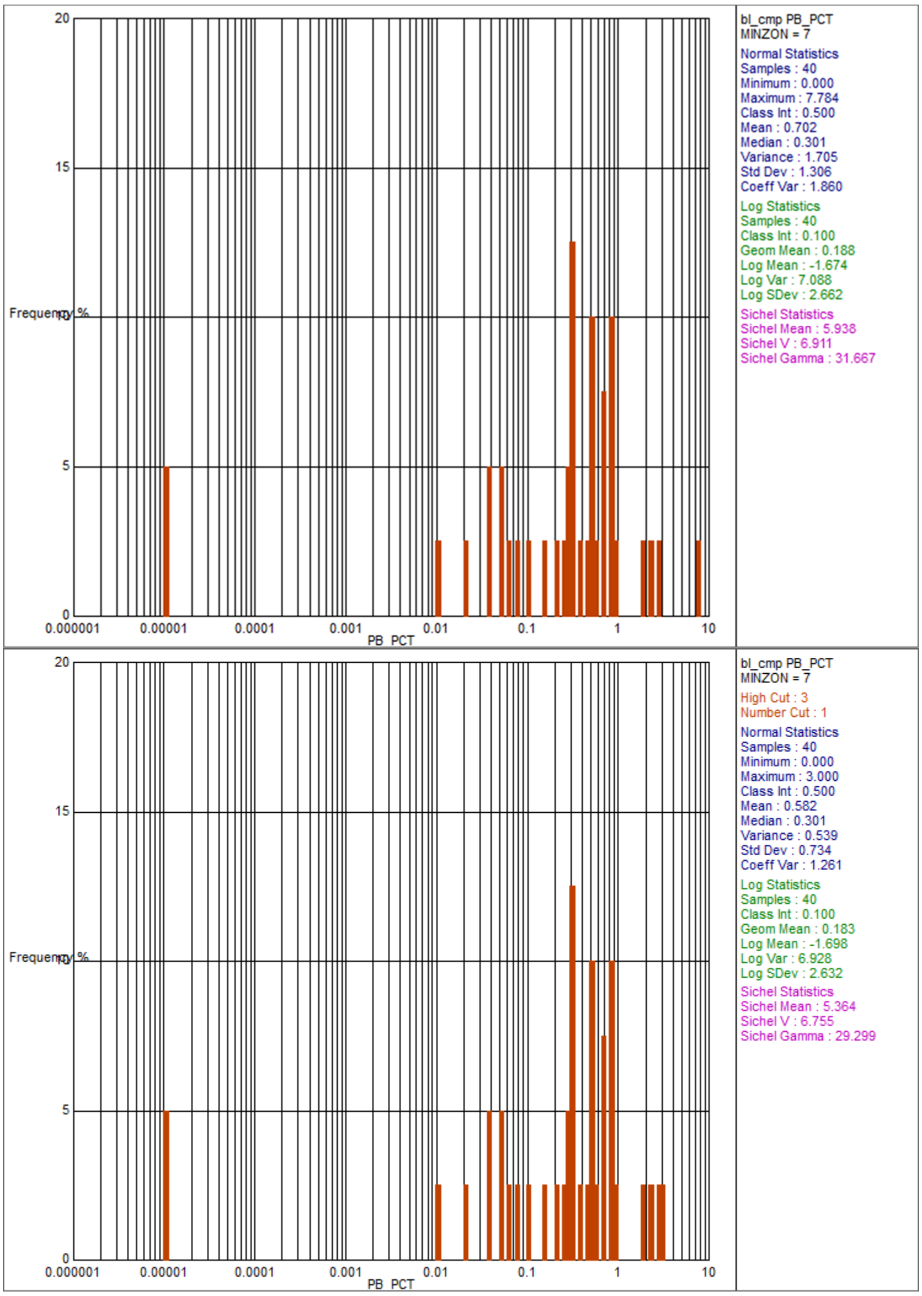

Figure 14.15 Pb% (MINZON = 7) - Log Histogram Plots Uncut (top) and Top-Cut (bottom)

(Source: CSA Global, 2018)

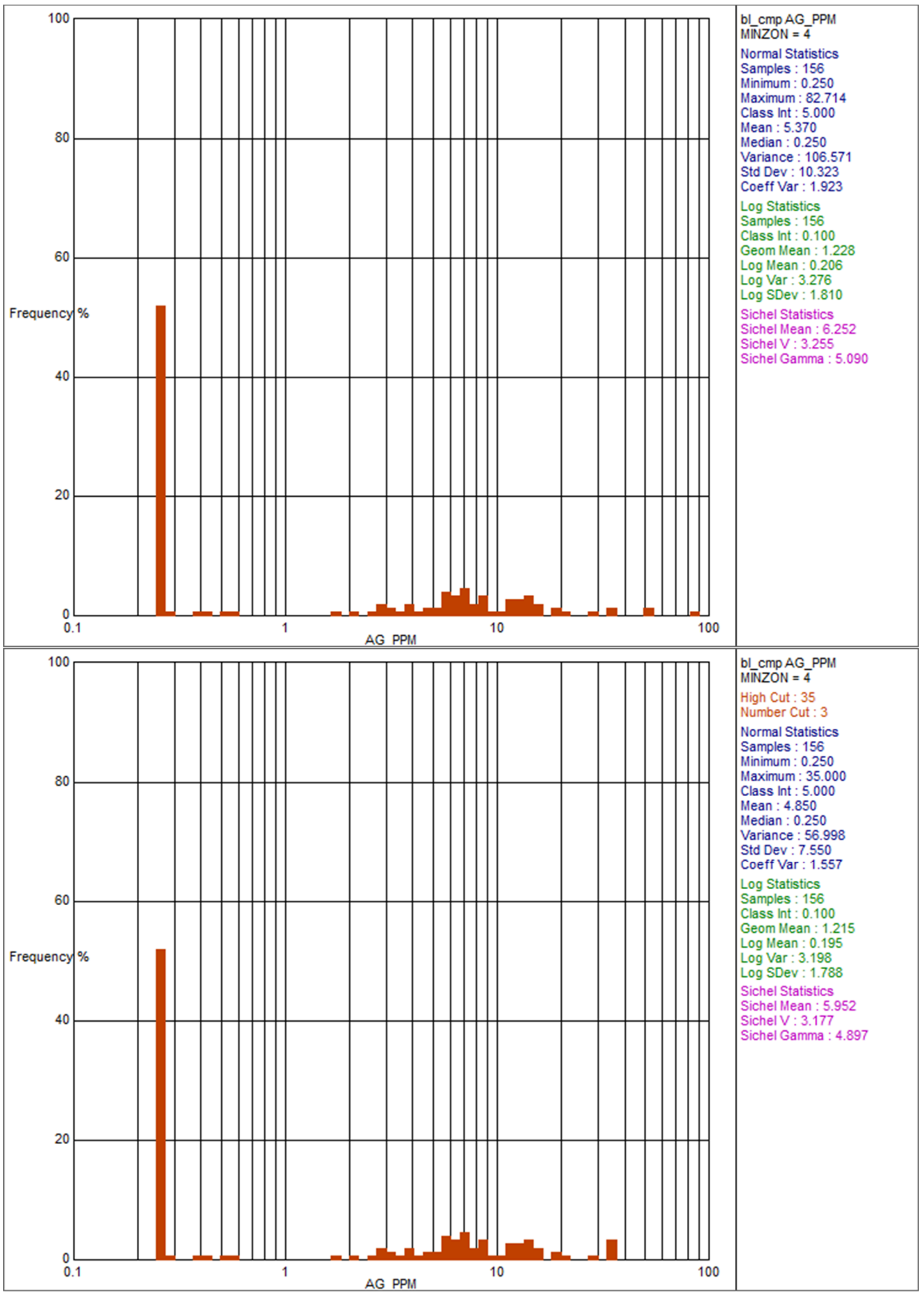

Figure 14.16 Ag g/t (MINZON = 4) - Log Histogram Plots Uncut (top) and Top-Cut (bottom)

(Source: CSA Global, 2018)

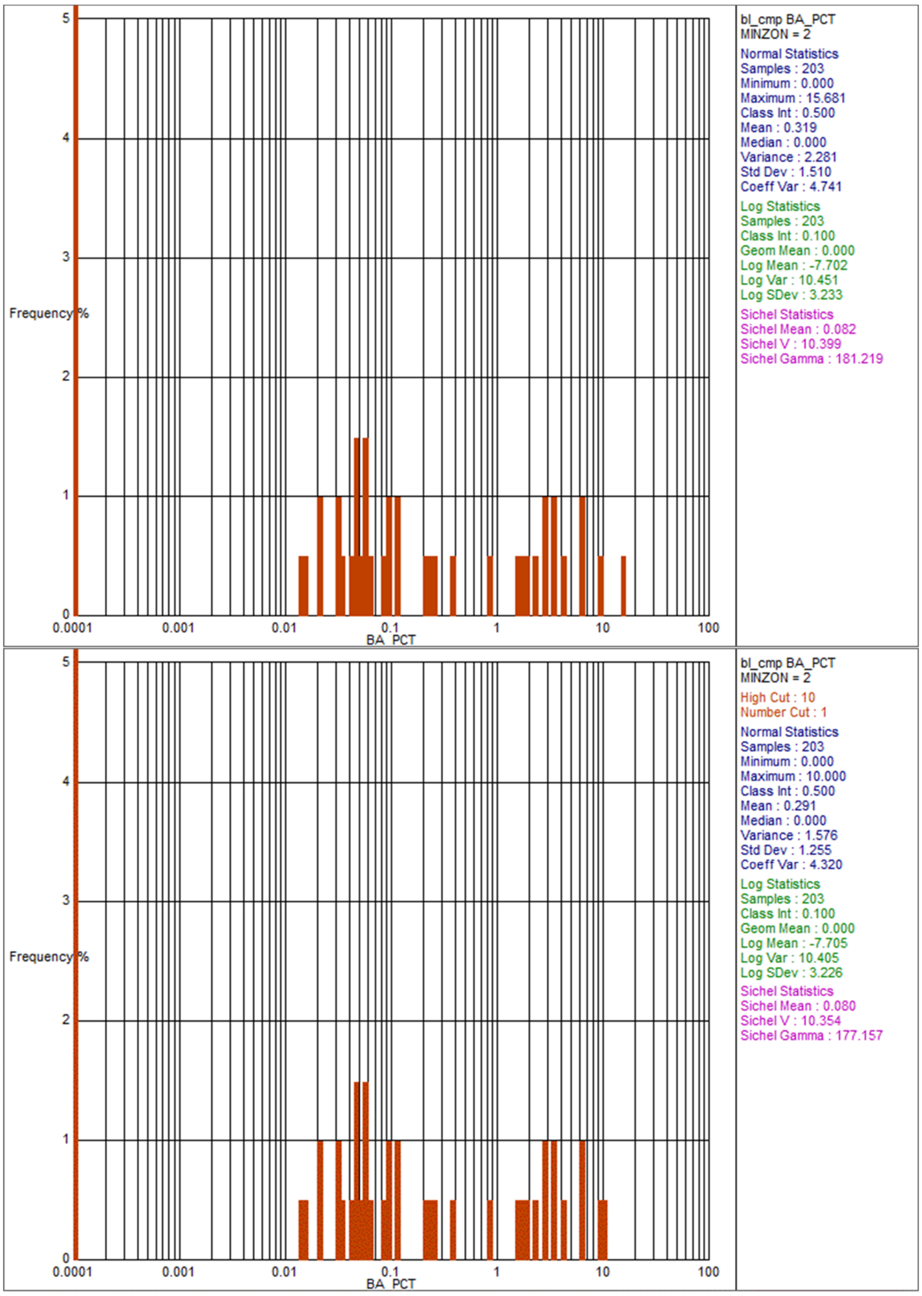

Figure 14.17 $BaSO_4$% (MINZON = 2) - Log Histogram Plots Uncut (top) and Top-Cut (bottom) (Source: CSA Global, 2018)

14.9.3 Density

No density data were available to CSA Global. An assumed average in situ dry bulk density ("BD") of 3.05 t/m3 was applied to the mineralized material, after Teck (2007), which is considered reasonable based on similar deposits nearby, e.g. the Kildare deposit (ZMI, 2017).

The BD for the material outside the mineralisation domains (GEOL = 100 to 500) was assigned a value of 2.70 t/m^3 (Table 14.10). A BD of 2.00 t/m^3 is considered reasonable for the overburden in the deposit location. There is no mineralisation within the overburden and as such it is not material to the MRE.

Table 14.10 Ballinalack MRE - In situ dry bulk densities

DOMAIN	Description	In Situ Dry Bulk Density (t/m3)
DOMAIN = 1	Mineralized domain	3.05
GEOL = 100	Overburden	2.00
GEOL = 200	Calp Limestone	2.70
GEOL = 300	Upper Argillaceous Bioclastic Limestone	2.70
GEOL = 400	Waulsortian Mudbank Limestones	2.70
GEOL = 500	Lower Argillaceous Bioclastic Limestone	2.70

BD data should be collected from available drill core as a priority, as well as routinely during future drilling campaigns and reviewed to build up a useful bulk density database of values that can be used to improve the confidence of the tonnage factors for the Ballinalack deposit. The methodology and measurements should be verified and standardised in future MRE updates.

14.10 Variography

14.10.1 Definitions

Variography (spatial analysis) is carried out in order to understand how sample values relate to each other in space, and thus reflects the average spatial continuity for a local variable. The variogram is used to determine the weight to apply to each sample during kriging estimation and takes into consideration the average spatial characteristics of the underlying grade distribution. It can help to infer possible similarities between known samples and points that have not been sampled.

14.10.2 Methodology

The variograms for Zn%, Pb%, Ag g/t and $BaSO_4$% were modelled on top-cut 1.5 m composites within MINZON = 1, based on the sample population (largest of the mineralized domains) and best observed grade continuity. Nuggets were obtained from the downhole variograms, where the lag was set equal to the composite length of 1.5 m. Normal scores transform was used for modelling the variograms. Variograms were well structured downhole and along strike for Zn%, Pb% and Ag g/t. Additional infill drilling and data is needed for more robust structures across strike and down dip, as well as for more robust $BaSO_4$% variograms. The modelled variograms are adequate for the current MRE.

The variograms were back transformed prior to estimation. Variogram parameters are detailed in Table 14.11 and variogram models for Zn%, Pb%, Ag g/t and $BaSO_4$% are shown in Figure 14.18 to Figure 14.21. Dynamic anisotropy was used during estimation to allow the rotation angles for variograms to be defined individually for each cell in the models, so that the variogram orientation is aligned with the axes of mineralisation.

Table 14.11 Variogram parameters

Variable	Datamine Orientation (ZXZ)	Nugget	Structure 1		Structure 2	
			Partial Sill	Range	Partial Sill	Range
Zn%	-60˚	0.12	0.30	85	0.59	115
	20˚			50		80
	-60˚			10		20
Pb%	-60˚	0.12	0.36	70	0.53	120
	20˚			50		85
	-60˚			10		20
Ag g/t	-60˚	0.05	0.60	60	0.35	100
	20˚			50		75
	-60˚			10		20
$BaSO_4$%	-60˚	0.02	0.72	50	0.26	100
	20˚			50		100
	-60˚			10		20

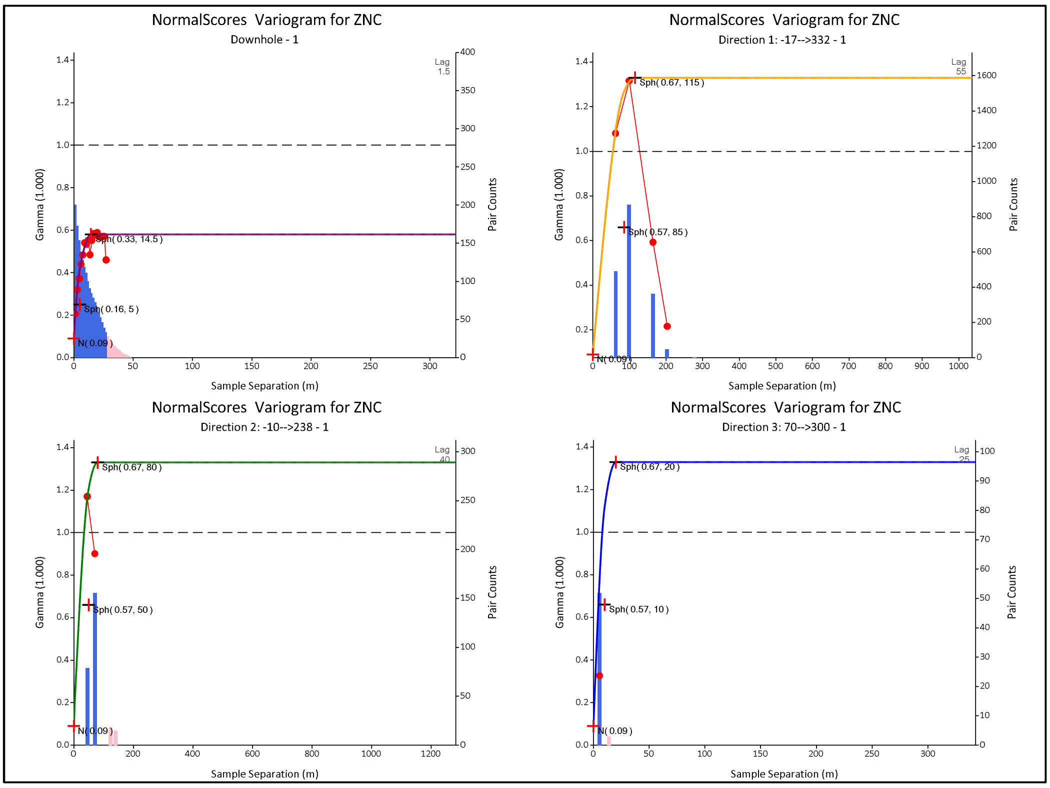

Figure 14.18 Variogram used for Zn% estimation

(Source: CSA Global, 2018)

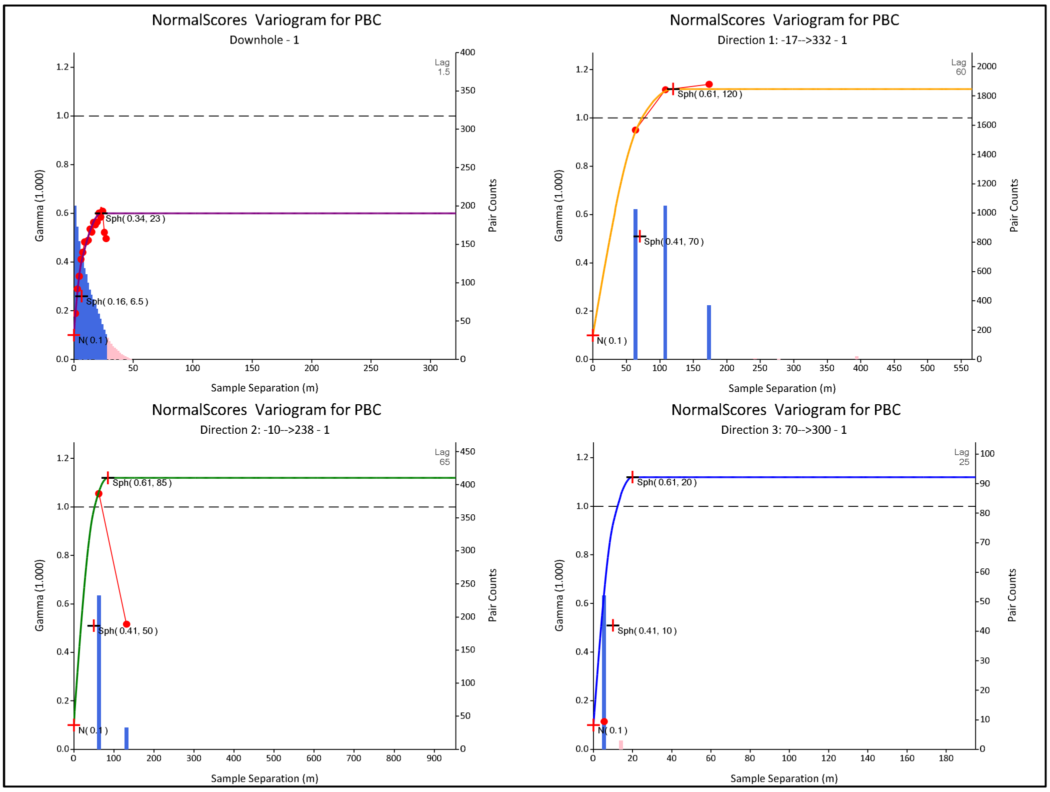

Figure 14.19 Variogram used for Pb% estimation

(Source: CSA Global, 2018)

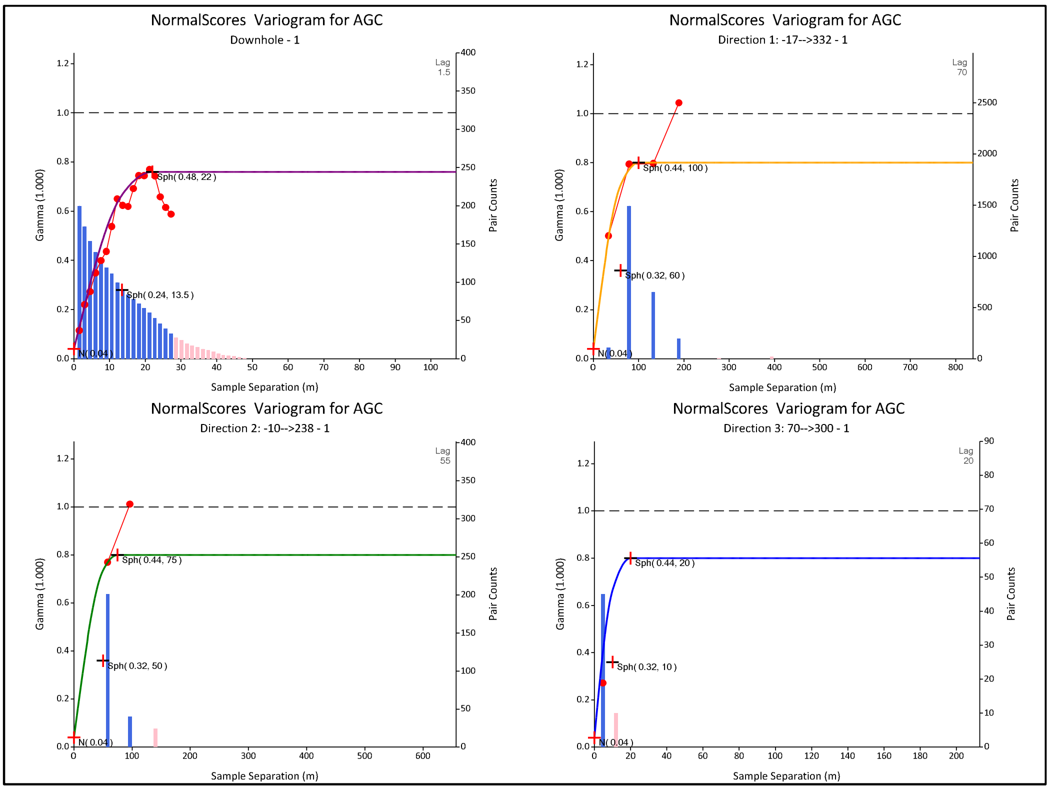

Figure 14.20 Variogram used for Ag g/t estimation

(Source: CSA Global, 2018)

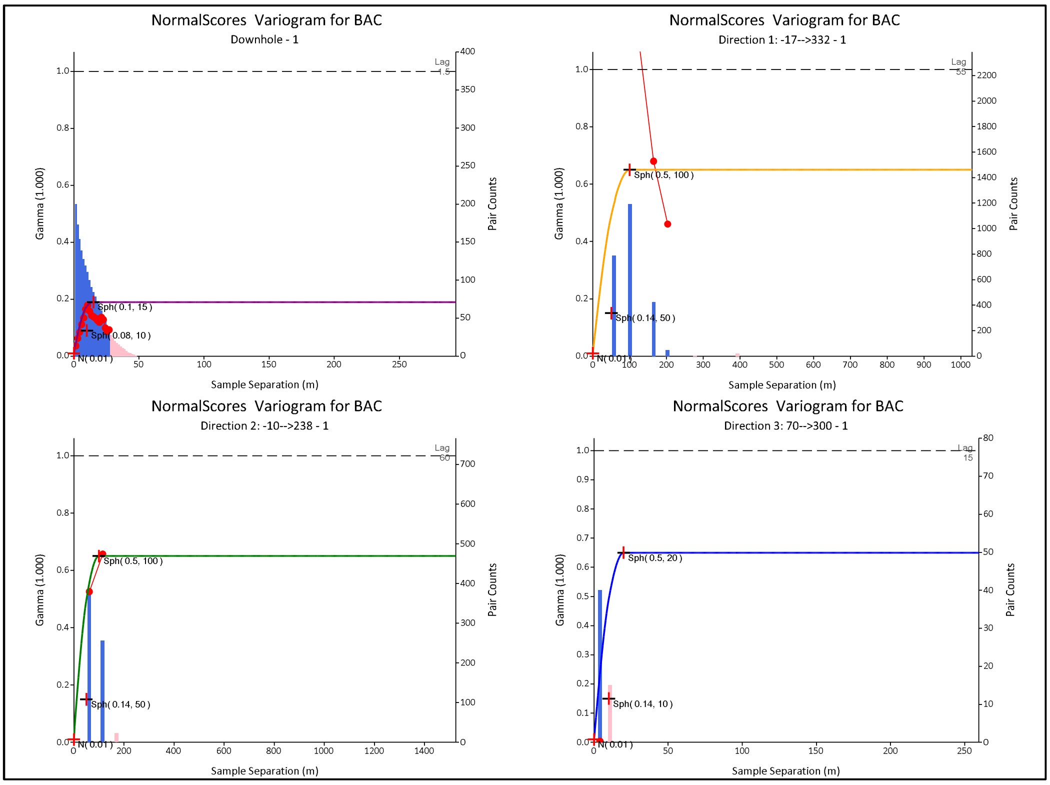

Figure 14.21 Variogram used for $BaSO_4$% estimation

(Source: CSA Global, 2018)

14.11 Block Model

The MRE was completed by CSA Global using the Datamine StudioRM™ software package.

14.11.1 Block Model Extents and Block Size

The model was cut to below the topographic surface and a model prototype with parent cells of 25 mN by 25 mE by 5 mRL, with sub-celling to 2.5 mN by 2.5 mE by 1 mRL, was created. The model prototypes parameters, including cell dimensions and model extents, are shown in Table 14.12.

Panel sizes for grade estimation (25 mN by 25 mE by 5 mRL) were based on the following:

- Results of Kriging Neighbourhood Analysis (“KNA”)
- The density of the drilling grids
- The geometry of the mineralisation.

Table 14.12 Ballinalack – Block model dimensions

Axis	Origin	Model Extent (m)	# Blocks	Parent Block dimension (m)	Sub-cell dimension (m)
Easting (X)	234,800	900	36	25	2.5
Northing (Y)	265,700	1,100	44	25	2.5
Elevation (Z)	-300	400	80	5	1

mineralisation wireframes were filled with model cells and the block model volume was compared to the mineralisation volume, per MINZON (Table 14.13). The volumes compare to within 2%, showing good resolution on mineralisation boundaries.

Table 14.13 mineralisation volumes - Wireframe vs block model

MINZON	Wireframe Volume (m^3)	Block Model Volume (m^3)	%Difference
1	725,738	725,881	0%
2	623,596	623,675	0%
3	132,283	132,388	0%
4	471,683	471,725	0%
5	237,656	237,363	0%
6	18,162	18,525	2%
7	79,331	79,475	0%
8	41,362	41,456	0%
9	102,066	101,906	0%
10	14,802	14,769	0%
11	11,440	11,388	0%
12	10,245	10,313	1%
13	9,086	9,050	0%
14	65,506	65,569	0%
15	184,404	184,744	0%
16	48,996	48,988	0%
17	43,178	43,144	0%
18	39,052	38,725	-1%
Total	2,858,585	2,859,081	0%

14.12 Grade Estimation

14.12.1 Data Used

Estimation of Zn%, Pb%, Ag g/t and $BaSO_4$% grades were carried out using Ordinary Kriging ("OK") into parent cell panels. Grade was estimated into all estimation domain blocks for Zn% and Pb% (MINZONs 1 - 18). Ag g/t was estimated into domain blocks within MINZONs 1-10, and $BaSO_4$% into domain blocks within MINZONs 1-4, and 18. Hard boundaries were applied between all estimation domains, and all available data within the respective mineralisation domains were used.

The parameters used for grade estimation are summarised in Table 14.14. These are discussed in the sections below.

Table 14.14 Ballinalack estimation parameters summary

Attribute	Description
Parent cells (block sizes X, Y, Z)	25 mN x 25 mE x 5 mRL
Minimum number of samples	8 (3 on search pass 3)
Maximum number of samples	21 (9 on search pass 3)
Search ranges (pass 1)	Zn%: 115m x 80m x 15m
	Pb%: 120m x 85m x 15m
	Ag g/t: 100m x 75m x 15m
	$BaSO_4$%: 100m x 100m x 15m
Search Range multiplier	Pass 2 – 2x; Pass 3 – 4x
Discretisation	5 x 5 x 5
Maxkey	3

Estimation method	Ordinary Kriging

14.13 Kriging Neighbourhood Analysis ("KNA")

KNA on the top-cut 1.5 m composites was used to optimise the parent cell sizes and to determine the optimal theoretical estimation and search parameters during kriging. The variograms for Zn%, Pb%, Ag g/t and $BaSO_4$% within MINZON 1 were used for KNA.

The following points were reviewed:

- Slope and Kriging Efficiency ("KE") statistics for a well-informed block for different block sizes.
- On choosing a block size (25 m x 25 m x 5 m, X x Y x Z), optimum minimum and maximum samples were chosen. The maximum was set at the lowest number of samples from which consistently good slopes and KE could be derived. The minimum was defined as the lowest minimum from which moderate to good statistics could be derived.
- On choosing the minimum/maximum samples, search ellipse ranges were defined. The quality of the statistics was least sensitive to this parameter. The ranges chosen approximated the range of the second structure of the variograms.
- Negative weights were reviewed at each stage to ensure the parameters chosen were not leading to excessive negative weights.
- Discretisation was defined at 5 x 5 x 5 (X x Y x Z).
- Maximum number of samples allowed per each individual drillhole, per estimate, was set to 3.

The KNA results show that the search parameters and block size selected are suitable for use in the MRE and adequately take drill spacing, geology and practicality into account. An example plot with the selected estimation parameters for Zn% is shown in Figure 14.22.

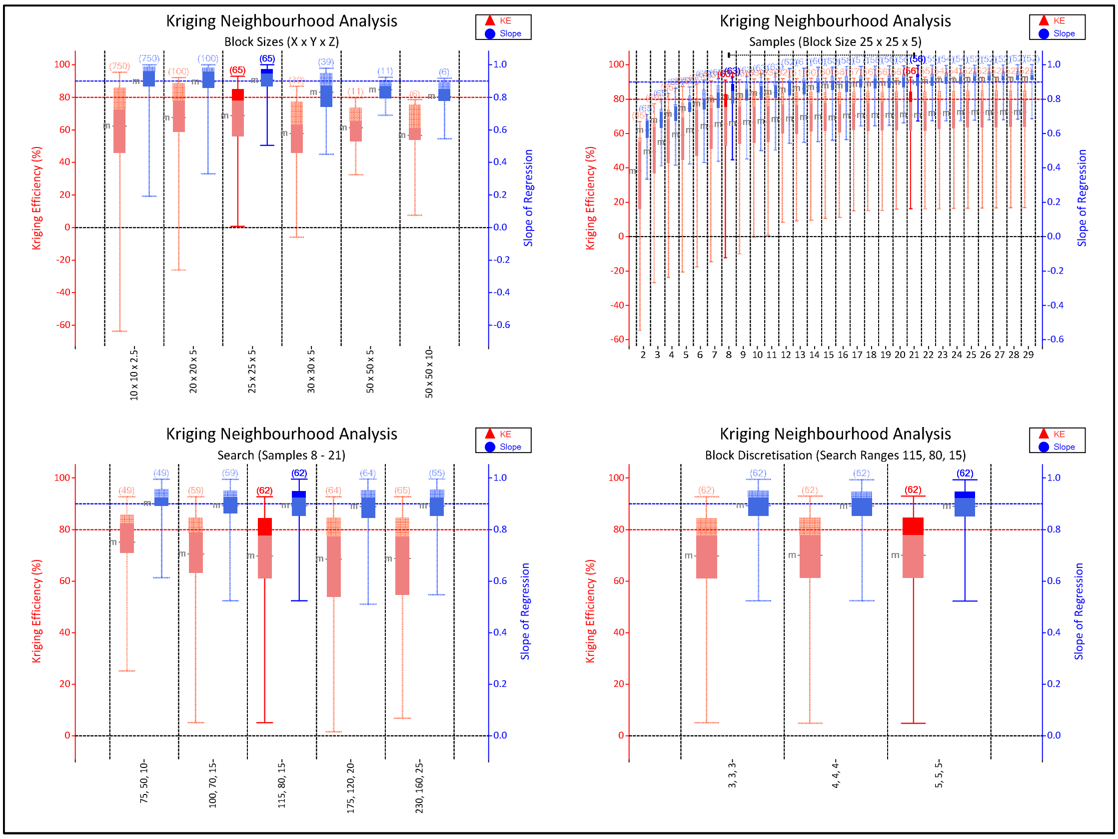

Figure 14.22 KNA block size, samples, search and discretisation results for Zn% estimation

(Source: CSA Global, 2018)

The number of composites and search parameters used for the grade estimations is presented in Table 14.15.

Table 14.15 Search neighbourhood parameters for grade estimation

Variable	Search Pass	Search Distance			Minimum Number Composites	Maximum Number Composites	Maximum samples per hole
		Major	Semi	Minor			
Zn%	1	115	80	15	8	21	3
	2	230	160	30	8	21	3
	3	460	320	60	3	9	3
Pb%	1	120	85	15	8	21	3
	2	240	170	30	8	21	3
	3	480	340	60	3	9	3
Ag g/t	1	100	75	15	8	21	3
	2	200	150	30	8	21	3
	3	400	300	60	3	9	3
$BaSO_4$%	1	100	100	15	8	21	3
	2	200	200	30	8	21	3
	3	400	400	60	3	9	3

14.13.1 Methodology

Estimation of Zn%, Pb%, Ag g/t and $BaSO_4$% grades was carried out using OK into parent cell panels. Zonal control with a hard boundary between mineralisation and waste, as well as between individual mineralisation domains, was used during the grade estimation. The estimation domains were assigned a unique MINZON number, corresponding to the MINZON field in the input composite data. The grade estimation domains for the Ballinalack estimate are MINZONs 1 to 18.

The mineralized areas were estimated using dynamic anisotropy. This process allows the rotation angles for the search ellipsoid to be defined individually for each cell in the models, so that the search ellipsoid is aligned with the axes of mineralisation. This therefore requires the rotation angles to be interpolated into the model cells, which in turn requires a set of angles as the input data file for interpolation. The dip and dip direction of the major axis of anisotropy were defined by digitising strings in section perpendicular to the strike of the mineralisation. These strings were converted to points that contained the true dip and dip direction of the mineralisation and stratigraphy (fields SANGLE1_F and SANGLE2_F in the search parameter files).

A three-phased search pass was applied, which involves the estimation being performed three times, where two expansion factors are used. During each individual estimation run, this factor increases the size of the search ellipse used to select samples. This method ensures that blocks which are not estimated and populated with a grade value in the first run, are populated during one of the subsequent runs. The proportion of blocks estimated during each consecutive run, per variable, are as follows:

- Zn% (MINZONs 1-18): Pass 1 = 67%, Pass 2 = 19%, Pass 3 = 13%
- Pb% (MINZONs 1-18): Pass 1 = 69%, Pass 2 = 18%, Pass 3 = 13%
- Ag g/t (MINZONs 1-10): Pass 1 = 76%, Pass 2 = 21%, Pass 3 = 3%
- $BaSO_4$% (MINZONs 1-4, 18): Pass 1 = 84%, Pass 2 = 13%, Pass 3 = 3%

The domains that were not estimated for Ag g/t and Ba% were reset to background values. These were 0.005 g/t for Ag, and 0.0001% for $BaSO_4$.

14.13.2 Model Validation

Validation of the block model was completed by comparing input and output means. Several techniques were used for the validation. These included visual validation of block grades, global grade comparisons and swath plots.

Visual Validation

The block model was visually reviewed section by section to ensure that the grade tenor of the input data was reflected in the block model (examples shown in Figure 14.23 to Figure 14.26). Generally, the estimates compare well with the input data. The grades in the composites align with the corresponding grades in the block models.

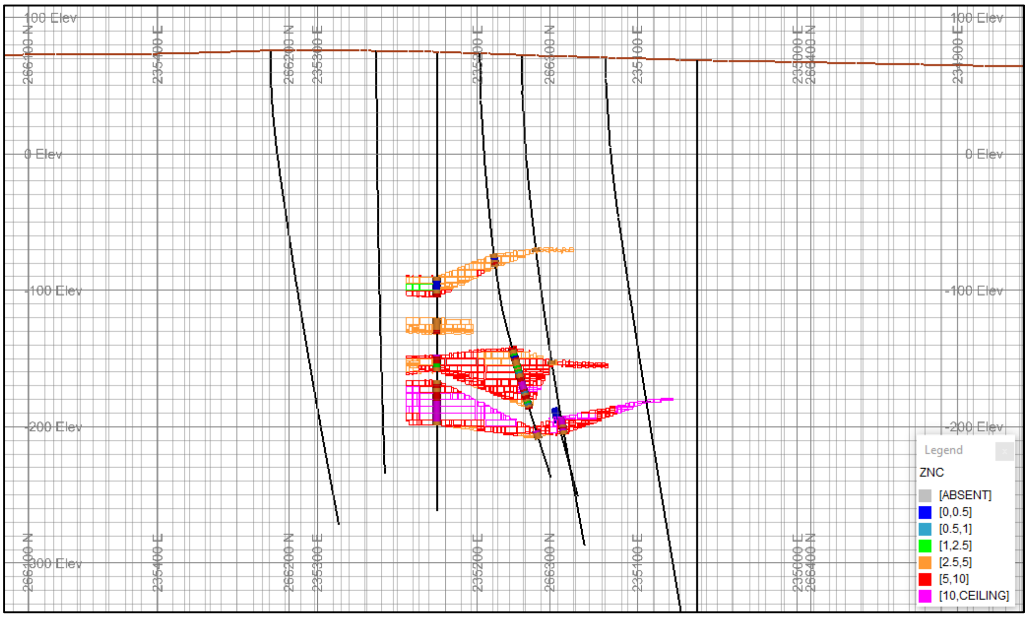

Figure 14.23 Section view – Zn% Grade Model and composites

(Source: CSA Global, 2018)

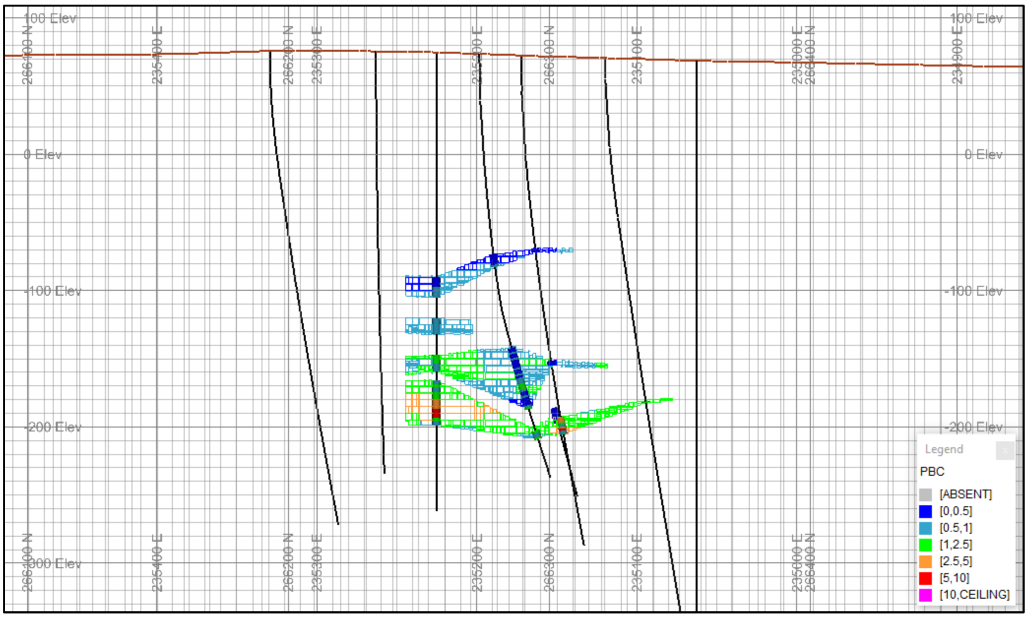

Figure 14.24 Section view – Pb% Grade Model and composites

(Source: CSA Global, 2018)

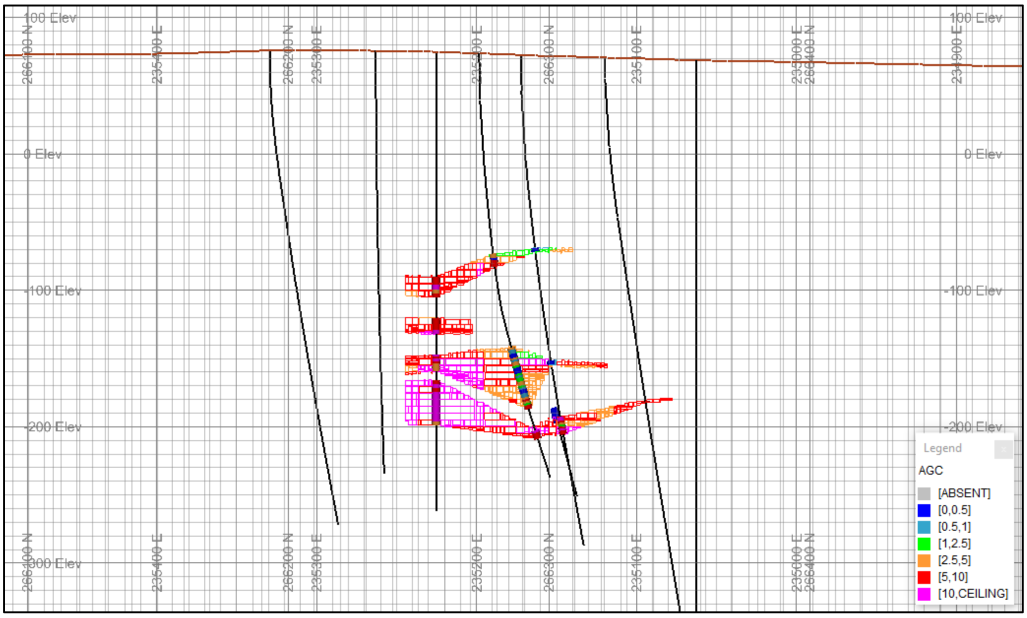

Figure 14.25 Section view – Ag g/t Grade Model and composites

(Source: CSA Global, 2018)

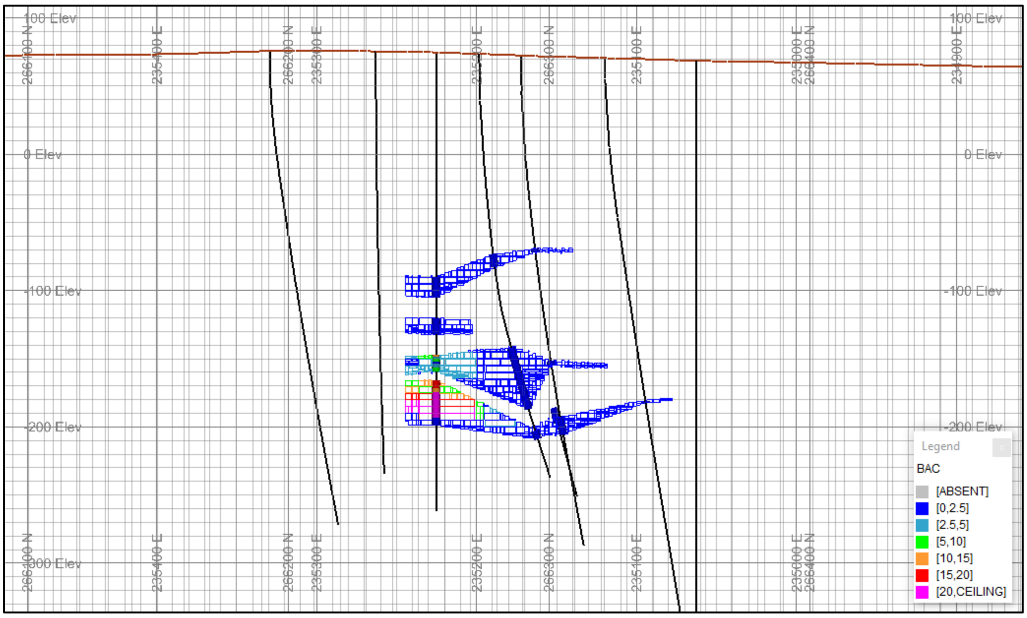

Figure 14.26 Section view – $BaSO_4$% Grade Model and composites

(Source: CSA Global, 2018)

Statistical Validation

Declustering

Irregular sampling of a deposit, most commonly through infill drilling or drilling in multiple orientations, causes clustering. Clustering results in a disproportionate distribution of grades (usually high grades from the infill drilling) in the dataset used for statistical analysis. Mixed populations in the histogram can create a bias when comparing the drillhole sample distribution with the block model distribution (which is declustered) and distort the calculated mean grades and variance.

Different ways of declustering data each give different results. These include interactive filtering, polygonal declustering, nearest neighbour declustering and cell-weighted declustering.

The method used for geostatistical analysis and validation for the MRE is cell-weighted declustering, since all samples are considered when determining the average. This method involves placing a grid of cells over the data. Each cell that contains at least one sample is assigned a weight of one. That weight of one is distributed evenly between the samples within each cell.

The OK grade estimation process if a very efficient way of data clustering, therefore declustering before grade estimation is not necessary. Declustering of the input data does give a good indication of the global mean. It is used in the validation of the estimate (comparison of the means). Declustering was applied to remove any bias due to drill spacing prior to validation. The declustering parameters are presented in Table 14.16.

Table 14.16 Declustering parameters

Average drillhole spacing (m)				Block model origin		
X	Y	Z		X	Y	Z
40	40	5		234,800	265,700	-300

Results

The global statistics of the estimated domains for Zn%, Pb%, Ag g/t and $BaSO_4$% were reviewed, and the results are reported in Table 14.17, below. All estimated block grades are included. The mean grades in the estimated model block parent cells were compared to the raw, as well as the declustered, top-cut composite data.

Generally, the model validates well, showing 2% difference for Zn%, 1% difference for Pb%, 2% difference for Ag g/t, and 10% difference for $BaSO_4$%, between the declustered composites and the block estimates. This is within expected parameters.

Table 14.17 Declustered mean grade global comparisons for Zn%, Pb%, Ag g/t and $BaSO_4$%

	Variable	Count	Minimum	Maximum	Mean	Std. Dev.	CV
Composites Naïve	ZNC	865	0	29.45	6.28	5.10	0.81
Composites Declustered	ZNC	865	0	29.45	6.06	4.79	0.79
Model	ZN	69,460	0.53	24.82	6.15	3.06	0.50
Difference [(Composite Declustered Grade – Model Grade)/Model Grade]					**+2%**		
Composites Naïve	PBC	865	0	8.20	1.01	1.14	1.12
Composites Declustered	PBC	865	0	8.20	0.96	1.04	1.08
Model	PB	69,460	0.06	4.91	0.95	0.67	0.71
Difference [(Composite Declustered Grade – Model Grade)/Model Grade]					**-1%**		
Composites Naïve	AGC	799	0	83.66	9.00	13.57	1.51
Composites Declustered	AGC	799	0	83.66	8.50	13.00	1.53
Model	AG	59,059	0.25	56.08	8.71	7.78	0.89
Difference [(Composite Declustered Grade – Model Grade)/Model Grade]					**+2%**		
Composites Naïve	BAC	630	0	47.99	1.84	7.10	3.86
Composites Declustered	BAC	630	0	47.99	1.66	6.58	3.95

Model	BA	48,697	0	30.88	1.83	4.83	2.64
Difference [(Composite Declustered Grade – Model Grade)/Model Grade]					**+10%**		

ZNC: Composite Zn% (not top-cut); PBC: Composite Pb% (top-cut); AGC: Composite Ag g/t (top-cut); BAC: Composite $BaSO_4$% (top-cut)
Std. Dev.: Standard Deviation
CV: Coefficient of Variation

Trend Plots

Swath plots were created as part of the validation process, by comparing the model parent block grades and input composites (declustered and top-cut) in spatial increments. These plots display northing, easting and elevation slices throughout the deposit for Zn% (Figure 14.27), Pb% (Figure 14.28), Ag g/t (Figure 14.29) and $BaSO_4$% (Figure 14.30).

The plots show that the distribution of block grades for Zn%, Pb%, Ag g/t and $BaSO_4$% honours the distribution of the associated input composite grades. There is a minor degree of smoothing evident, which is to be expected from the drill spacing and the estimation method used, with block grades showing lower overall variance. The general trend of the Zn%, Pb%, Ag g/t and $BaSO_4$% composite grades are reflected in the block model.

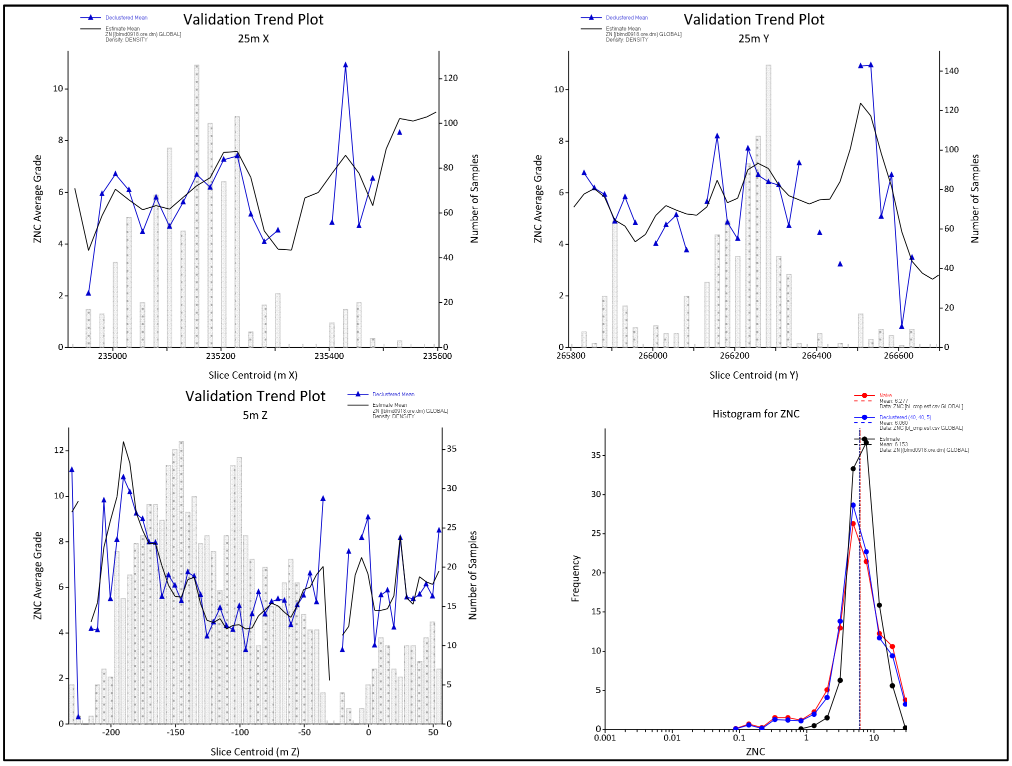

Figure 14.27 Zn% Swath plots and histogram, block model (black) vs. declustered composites (blue) (MINZONs 1-18)
(Source: CSA Global, 2018)

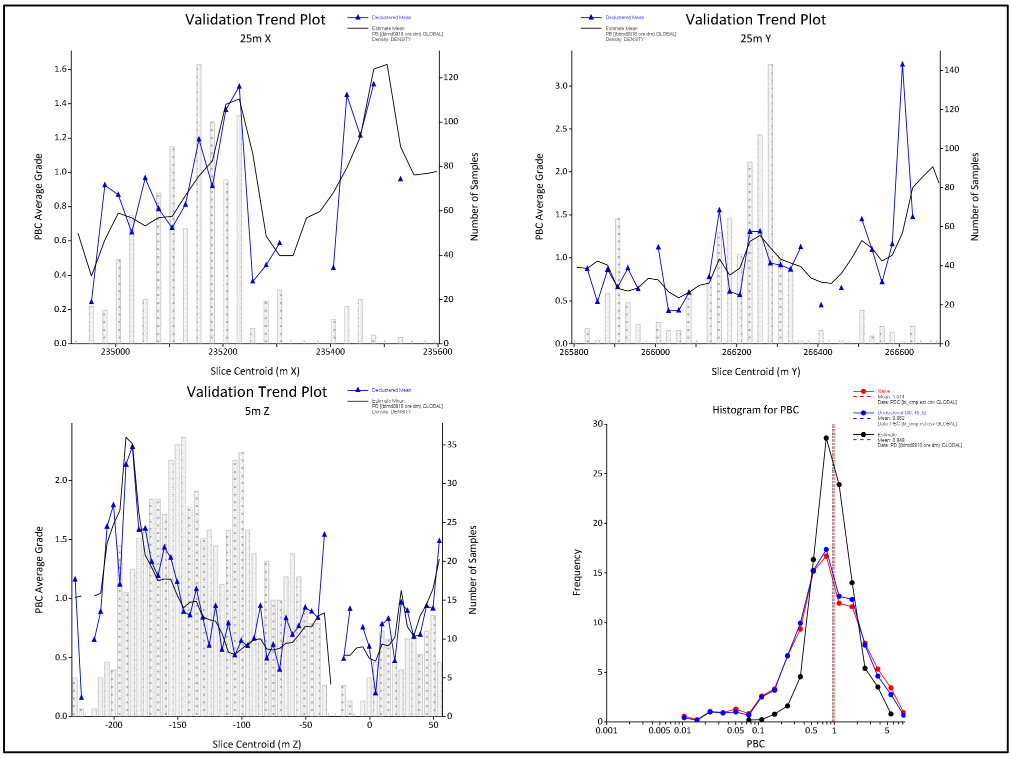

Figure 14.28 Pb% Swath plots and histogram, block model (black) vs. declustered composites (blue) (MINZONs 1-18)

(Source: CSA Global, 2018)

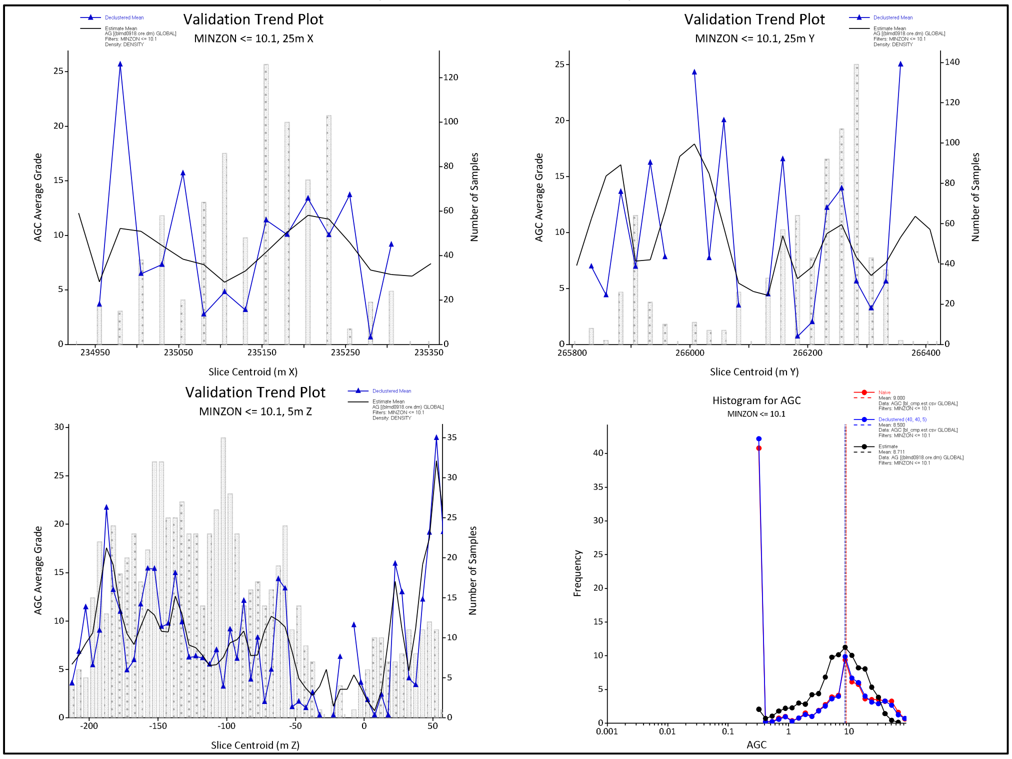

Figure 14.29 Ag g/t Swath plots and histogram, block model (black) vs. declustered composites (blue) (MINZONs 1-10)

(Source: CSA Global, 2018)

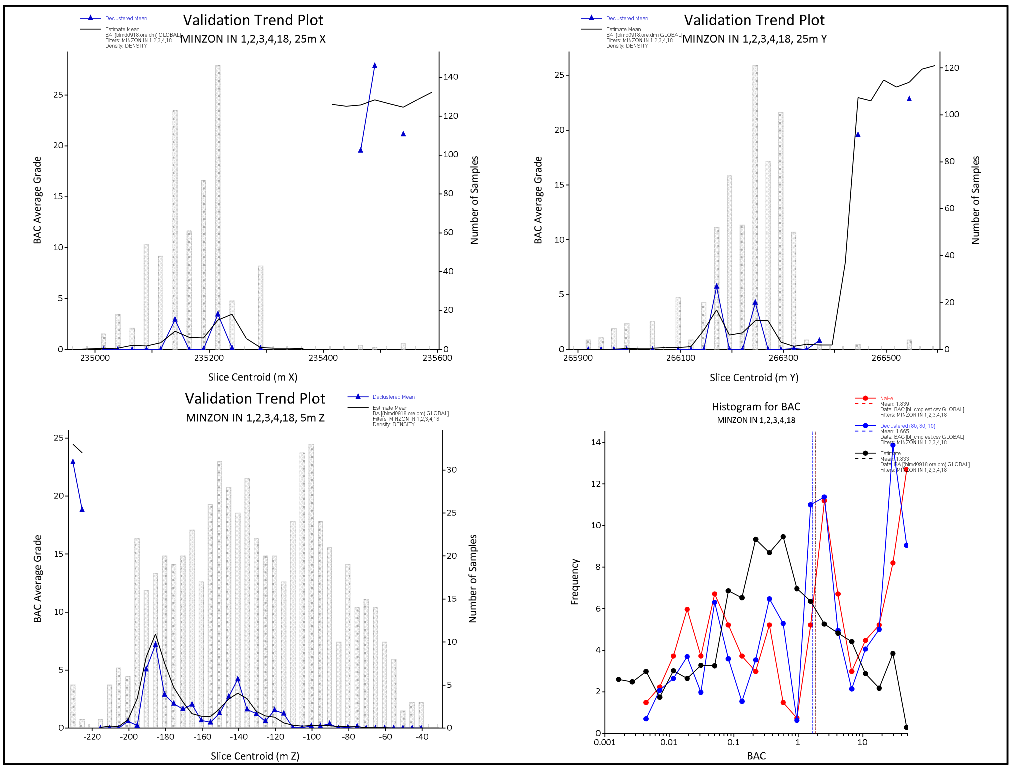

Figure 14.30 BaSO$_4$% Swath plots and histogram, block model (black) vs. declustered composites (blue) (MINZONs 1-4, 18)
(Source: CSA Global, 2018)

14.14 Mineral Resource Classification

The Mineral Resource has been classified as Inferred Mineral Resources based on CIM guidelines. The classification level is based upon an assessment of geological understanding of the deposit, geological and mineralisation continuity, drillhole spacing, nature of historical drill data and lack of original data, quality control results (and lack of for historical drilling), and search and interpolation parameters.

The Ballinalack deposit shows reasonable continuity of mineralisation within well-defined geological constraints. Drillholes are located at a nominal spacing of 25 m on 50 m sections extending out to 50 on 75 m sections. The average drill spacing is 40 x 40 m. The drill spacing is sufficient to allow the geology and mineralisation zones to be modelled into coherent wireframes for each domain. Reasonable consistency is evident in the orientations, thickness and grades of the mineralized zones.

Limited validation of the historical drillholes by more recent drilling and the lack of QAQC information for historical drilling allows for the classification of Inferred Mineral Resources. The Authors note that higher classification will not be achievable without a significant amount of validation drilling within the mineralized zones. The absence of bulk density data will also need to be addressed for classification to be improved.

Three of the domains (MINZONs 12, 13 and 18) were reset to “Exploration Potential”, due to the limited number of samples within these domains that the estimated blocks are based on, as well as the wide spaced drillhole spacing. Material classified as Exploration Potential has not been reported as part of the MRE.

Reasonable chances of eventual economic extraction are derived from using a zinc equivalent (“ZnEq”) cut-off grade of 5.2%, based on Net Smelter Return (“NSR”) calculations of conceptual operating costs and metal revenue. These are further discussed in Section 14.15.

A summary of the classification codes applied in the model are shown in Table 14.18.

Table 14.18 CLASS field and description

CLASS	Description
3	Inferred Mineral Resource
4	Exploration Potential (not reported)
9	Unclassified – All waste material not estimated

14.15 Mineral Resource Reporting

The MRE for Ballinalack as at 30 August 2018 (Table 14.19), comprised 5.4 Mt at grades of 7.6% Zn, 1.1% Pb, and 9.0 g/t Ag. Inferred Mineral Resources were reported using a ZnEq cut-off grade of 5.2%, based on NSR calculations of conceptual operating costs and metal revenue, in support of "reasonable chances of eventual economic extraction". CSA Global did not report $BaSO_4$% as part of the MRE, since it is not considered to make a material contribution due to the limited dataset.

No mining optimisation or Economic Study has been completed for the current MRE, and the reported Inferred Mineral Resource does not have proven economic viability and are not Mineral Reserves. The consideration of conceptual costs and assumptions are presented simply to address the requirement under CIM guidelines, that Mineral Resources have "reasonable chances of eventual economic extraction".

CSA Global is not aware of any known environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the MRE.

Table 14.19 Mineral Resource Estimate – Ballinalack Zinc-Lead Project - as at 30 August 2018

Group Eleven Resources Corporation Ballinalack Mineral Resource Estimate as at 30 August, 2018									
Resource Category	Tonnes ('000)	Grades				Metal Content			
		Zn (%)	Pb (%)	Zn+Pb (%)	Ag (g/t)	Zn lb ('000)	Pb lb ('000)	Zn+Pb lb ('000)	Ag Oz ('000)
Inferred	5,400	7.6	1.1	8.7	9.0	898,300	135,700	1,034,000	1,600

Notes:

- Classification of the MRE was completed based on the guidelines presented by Canadian Institute for Mining (CIM), adopted for Technical reports which adhere to the regulations defined in Canadian National Instrument 43-101 (NI 43-101).
- Inferred Mineral Resources are at 5.2% zinc equivalent cut-off grade.
- Zinc Equivalent (ZnEq%) = (NSRPb + NSRZn + NSRAg in Pb + NSRAg in Zn)*100/(RZn*PZn*(PrZn-ScZn) - RZn*PZn*PrZn*(RoyZn/100))
- ZnEq cut-off grade (calculated from Net Smelter Return) using the following parameters:
  - RZn: Metallurgical recovery of Zn, PZn: Zn price, ScZn: Selling cost for Zn, RoyZn: Royalty.
  - Mining recovery of 95%; Mining dilution of 10%
  - Mining cost of US$60.00/t; Processing cost of US$13.63/t
  - Treatment charges of US$400/t of Zn concentrate and US$270/t of Pb concentrate; Refining charges of US$1.00/oz for Ag
  - Concentrate transport to smelter: US$100/t of wet concentrate.
  - Processing recovery 92.7% Zn; 54.1% Pb; 82.6% Ag in Zn; 9.4% Ag in Pb.
  - Zinc price of US$2,954/t; Lead price of US$2,325/t; Silver price of US$15.79/oz

  - Concentrate grade 64.4% Zn, 45% Pb, 98 g/t Ag in Zn, 104 g/t Ag in Pb; Concentrate moisture of 9%
  - Payable Zn 85%, Pb 93%, Ag in Zn 49%, Ag in Pb 51.9%, with selling cost Zn US$1,259/t metal, Pb US$1,026/t metal, Ag in Zn US$6.73/t metal, and Ag in Pb US$6.97/t metal.
  - Royalty of 4.5%.
- The Inferred Mineral Resource classification is based on geology, trends in mineralisation, drilling spacing, sampling QA/QC, estimation search pass number and number of samples, zinc equivalent grade, and density data.
- Tonnages and metal are rounded to the nearest 100,000 to reflect this as an estimate.
- Assumed average in situ dry bulk density for mineralized material is 3.05 t/m^3.
- Mineralisation wireframes were constructed using a minimum true thickness of 2.0 m, at 3% Zn+Pb natural cut-off.
- CSA Global is not aware of any known environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the MRE.

A ZnEq grade is used at Ballinalack to generate a single value based on the zinc, lead and silver grades within the Mineral Resource where

ZnEq% = (NSRPb + NSRZn + NSRAg in Pb + NSRAg in Zn)*100/(RZn*PZn*(PrZn-ScZn) - RZn*PZn*PrZn*(RoyZn/100))

The following cost have been estimated based on costs of similar mines and other sources. These should be considered as a starting point for further calculations:

- Life of Mine ("LOM").
  - Using the Brian Mackenzie rule (1982), the LOM could be considered as:
    - LOM = 4.22*(Resources)$^{0.756}$
    - Calculated annual tonnage = 8,543,030
- Mining method.
  - The deposit consists of sub-horizontal, stratiform (5 to >30 m thick) lenses of massive and semi-massive sphalerite, galena with a minor presence of Ag and Ba.
  - The methodology selected is sub-level stopping and undercut and fill stopping (Robertson, 1991 escalated considering an increase of 4.5%/year; other worldwide mines with the same mining method), where:
    - Mining cost: US$60.00/t considering the administration cost.
    - Mining recovery = 95%
    - Mining dilution = 10%
- Processing cost and parameters.
  - A differential float for Pb-Ag and Zn was considered to give the maximum benefit, based on the testwork results reported by Robertson (1991) and similar projects. Table 14.20 shows the metallurgical parameters, derived from Test 5 – Differential Float (Roberson, 1991), as shown in Table 14.21.
    - A processing cost of US$13.63/t ore has been assumed.

Table 14.20 Metallurgical parameters

	Pb	Zn	Ag in Zn	Ag in Pb
In situ concentrate	0.94%	6.15%	7.45%	7.45%
Plant recovery	54.08%	92.67%	82.57%	9.37%
Grades in concentrate	45.00%	64.40%	98 g/t	104 g/t
Concentrate moisture	9%	9%	9%	9%

Table 14.21 Test 5 – Differential Float (Roberson, 1991)

Product	Conc.Mass	Concentrate Grade			Recovery, %		
Stream	% Wt.	%Pb	%Zn	Ag g/t	Pb	Zn	Ag
Pb Cl 2 Conc.	1.42	34.10	22.60	104	54.08	3.48	9.37
Zn Cl 2 Conc.	13.29	1.70	64.40	98	25.21	92.67	82.57
Cleaner 1-2 Tails	3.49	1.80	4.80	13	7.01	1.81	2.88
Final Tail	81.79	0.13	0.23	1	13.69	2.04	5.18
Feed	100.00	0.90	9.24	16	99.99	100.00	100.00

- Selling cost
  - Selling cost has been estimated as follows:
    - Payability: Zn = 85%, Pb = 93%, Ag in Zn = 49%, Ag in Pb = 51.9%
    - Treatment charges: US$400/t of Zn concentrate and US$270/t of Pb concentrate
    - Refining charges of US$1.00/oz for Ag
    - Concentrate transport to smelter: US$100/t of wet concentrate
    - Selling cost:
      - Zn = US$1,259/t metal
      - Pb = US$1,026/t metal
      - Ag in Zn = US$6.73/t metal
      - Ag in Pb = US$6.97/t metal
      - Royalty: 4.5%
    - Prices (based on average of the lowest and highest week prices of past 6 months - March to August 2018):
      - Zn: US$2,954/t
      - Pb: US$2,325/t
      - Ag: US$15.79/oz

The ZnEq formula has incorporated the following criteria:

- Mc: Mining cost
- Pc: Processing cost

NSRPb = (Pb%/100)*RPb*PPb*(PrPb-ScPb) - (Pb%/100)*RPb*PPb*PrPb*(RoyPb/100)
NSRAg in Pb = (Ag)*RAg*PAg*((PrAg-ScAg)/31.1035) - (Ag)*RAg*PAg*Prag*(RoyAg/100)/31.1035
Where:

- Pb: Pb grade in % in the block model
- RPb: Processing recovery for Pb
- PPb: Payability for Pb metal
- PrPb: Pb price
- ScPb: Selling cost for Pb
- RoyPb: Royalty in %
- Ag: Ag grade in g/t in the block model
- RAg: Processing recovery for Ag
- PAg: Payability for Ag metal
- PrAg: Ag price in US$/oz
- ScAg: Selling cost for Ag in US$/oz
- RoyAg: Royalty in %

NSRZn = (Zn%/100)*RZn*PZn*(PrZn-ScZn) - (Zn%/100) *RZn*PZn*PrZn*(RoyZn/100)
NSRAg in Zn = (Ag)*RAg*PAg*((PrAg-ScAg)/31.1035) - (Ag)*RAg*PAg*Prag*(RoyAg/100)/31.1035
Where:

- Zn: Zn grade in % in the block model
- RZn: Processing recovery for Zn
- PZn: Payability for Zn metal
- PrZn: Zn price
- ScZn: Selling cost for Zn
- RoyZn: Royalty in %
- Ag: Ag grade in g/t in the block model
- RAg: Processing recovery for Ag
- PAg: Payability for Ag metal
- PrAg: Ag price in US$/oz
- ScAg: Selling cost for Ag in US$/oz
- RoyAg: Royalty in %

14.16 Previous Mineral Resource Estimates

No previous Mineral Resource estimates were available to CSA Global for review or verification. Previous estimates were completed but were not in accordance with CIM guidelines and are considered as historical.

The following was taken from and modified after Robertson (1991):

- A succession of estimates has been made of the base metal Mineral Resources and Reserves at Ballinalack, dating from the early 1970s. Not all of these were accompanied by the parameters and calculations on which they were based, and several of the estimates have unspecified tonnage units. In such cases, Robertson (1991) assumed the short ton.
  - September 1971 (Noranda)
    - The cut-off grade used is not given.
    - Based on 10% dilution and a tonnage factor of 10 cu ft/ton.
    - Estimated 'drill indicated' tonnage and grade of 2.02 Mt at 8.20% Zn and 1.37% Pb.
  - November 1972 (Noranda)
    - Recalculation of 'Reserves' based on a cut-off grade of 5.0% Zn and a minimum mining width of 8.0 ft.
    - Sectional east-west estimation, where 'Indicated Reserves' were extrapolated to a distance of 50 ft of data along section, and 'Inferred Reserves' were extrapolated to a distance of 100 ft of data along section.
    - Bulk density was estimated according to both the Zn and Pb content.
    - 'Indicated Reserve' reported as 988,000 short tons at 11.3% Zn and 2.0% Pb. 'Inferred Reserve' reported as 1,537,000 short tons at 10.1% Zn and 1.75% Pb.
    - 'Total Reserve' reported as 2,525,000 short tons at 10.6% Zn and 1.9% Pb.
  - September 1973 (Noranda)
    - Reinterpretation and estimation following additional drilling and changes in metal prices, based on a cut-off grade of 4% Zn equivalent (Zn% + Pb%) and a minimum mining width of 8.0 ft.
    - Sectional east-west estimation, where 'Indicated Reserves' were extrapolated to a distance of 50 ft of data along section, and 'Inferred Reserves' were extrapolated to a distance of 100 ft of data along section.
    - Bulk density was estimated according to both the Zn and Pb content.
    - 'Indicated Reserve' reported as 1,852,000 short tons at 8.4% Zn and 1.5% Pb. 'Inferred Reserve' reported as 2,325,000 short tons at 8.1% Zn and 1.4% Pb.
    - 'Total Reserve' reported as 4,180,000 short tons at 8.2% Zn and 1.4% Pb.
  - October 1973 (Noranda)
    - 'Geological Reserve' as 3.55 Mt averaging 7.17% Zn and 1.26% Pb.

        - No further information.
    - November 1974 (Noranda)
        - Figures from October 1973 modified to take into account 10% mining dilution using actual intersection grades, and 90% mining recovery (mineral extraction).
        - East-west sectional interpretation and estimation, where mineral zones were projected up and down dip a distance halfway between holes, or to 50 ft if there was no adjacent hole. A range of influence 50 ft north and south was applied, with a tonnage factor of 10.5 cu ft/ton.
        - Revised 'Reserve' of 3.425 Mt at 6.69% Zn and 1.17% Pb. An estimated Ag content of 0.84 oz/ton was added (not all samples had been assayed for Ag).
    - March 1978 (Noranda)
        - Following additional drilling during 1977, the 'Reserve' was modified in March 1978.
        - 'Recoverable ore Reserve' of 3.686 Mt at 6.73% Zn, 1.16% Pb and 0.84 oz/ton Ag.
        - A more optimistic approach, using an extrapolation distance of 100 ft for drillholes 83, 88 and 89, gave figures of 4.125 Mt at 6.79% Zn and 1.14% Pb.
    - April 1980 (Billiton)
        - Reviewed the prospect and quoted the above 'Reserve' with the addition of an estimate for barite content in the gangue at 14% $BaSO_4$.
    - October 1983 (Syngenore)
        - Estimation following additional drilling, based on a cut-off grade of 4% combined Zn + Pb, with a 10 ft minimum thickness.
        - Sectional estimation, with extrapolation of data up to a distance of 100 ft along section.
        - A tonnage factor of 10.0 cu ft/ton, equivalent to a Specific Gravity ("SG") of 3.2, was used.
        - 'Possible and Probable Reserve' of 5.1 Mt at 6.6% Zn and 1.1% Pb for the main central section of the deposit and a 'Potential Reserve' of 0.66 Mt at 7.7% Zn and 1.0% Pb for the northern zone.
    - 1987/1988 (Oliver Resources plc)
        - Quoted the above Syngenore figures, with a further estimate of 5.1 M short tons at 8.2% combined Zn and Pb, carried out by BEIL.
        - Annual Reports as 5 Mtons at 8% combined Zn and Pb.

As part of the Economic Feasibility Study as carried out by Robertson (1991), Indicated Mineral Resources were reported at a 4% Zn cut-off as 7.71 Mt at 6.33% Zn and 0.95% Pb. The following parameters were used:

- Cut-off grades were based on Zn content only. An initial cut-off grade of 4% Zn was used to enable comparison with previous estimates. Cut-off grades of 2% and 6% Zn were also used for estimates to cover a range of potential economic cut-off grades.
- Vertical thickness of 10 ft or more, representing the minimum mining thickness.
- Interpretation of mineralisation on both north-south and east-west sections, where the area of influence assigned to each drillhole was defined as follows (Roberson, 1991):
    - Extension along section to the mid-point between adjacent drillholes, with a nominal maximum range of influence of 30 m (100 ft);
    - Extrapolation 15 m (50 ft) along section where no adjacent mineralisation intersection existed;
    - Extension 15 m (50 ft) on either side of the section line; and
    - Interpolation of thickness and grade from adjacent sections where no intersection existed on the intermediate section, representing a range of influence of 30 m (100 ft) perpendicular to the section line.
- Samples of mineralisation within the drill core, showing a range of metal content, were selected for SG determination. The following calculation was used to determine bulk density, for all conversions from volume to tonnage in these estimates:
    - cubic foot/short ton = 11.54 – (2.4047 * Zn%)

- No provision was made for external dilution or mining recovery.
- Both manual and computer assisted methods were used in the estimations.

An MRE was completed for Teck in 2007, as shown in Table 14.22. This estimate was not made public as it was not consider material to market. The following parameters were used:

- Mineralisation wireframes were constructed at 4% ZnEq cut-off, where ZnEq = Zn% + 0.5*Pb%, with a minimum mining thickness of 3.0 m, and a 5 m minimum waste thickness.
- Assays were top-cut at 25% Zn and 9% Pb and composited to 1 m (0.5 m minimum length).
- The estimation method used was Inverse Distance Weighting to the Power of 3 ("IDW^3"), with a 100 m spherical search. A minimum of 1 composite and a maximum of 3 composites were used.
- Classification of the MRE was based on the nearest composite within 15 m for Measured Mineral Resources, 15 to 30 m for Indicated Mineral Resources, and more than 30 m for Inferred Mineral Resources
- In Situ Dry Bulk Density of 3.05 t/m3 was used.

Teck (2007) made the following cautionary statements:

- The MRE is only suitable for determining if additional work is justified.
- The database used for the MRE has not been vetted but is internally consistent.
- The wireframe to block model conversion requires minor additional work.
- The modelling was completed using a 4% ZnEq cut-off and only gives one point on a grade-tonnage curve.
- The only contact dilution is that introduced by 3 m minimum mining.

Table 14.22 Internal Mineral Resource Estimate – Ballinalack Zinc-Lead Project – Teck (2007)

Resource Category	ZnEq Cut-off (%)	Tonnes	ZnEq (%)	Zn (%)	Pb (%)
Measured	4.0	1,562,290	8.81	8.16	1.32
Indicated		2,474,383	8.33	7.72	1.23
Measured and Indicated		4,036,673	8.52	7.89	1.26
Inferred		904,220	7.85	7.27	1.16

Notes: ZnEq = Zn% + 0.5*Pb%

23.0 Adjacent Properties

The Ballinalack Zinc-Lead prospect is 20 km from the Keel Deposit on PLA 186, adjacent to Ballinalack PLA 622.

On 7th March 2017, ASX-listed Longford Resources released an Inferred Mineral Resource estimate for the Keel deposit, totalling 6.9 million tonnes averaging 5.6% Zn and 0.8% Pb reported in accordance with the JORC Code 2012 Edition. This estimate was completed by CSA Global in Perth; the details of the estimate were not available to the Authors due to internal confidentiality requirements. GERC is not treating the estimate at Keel as indicative of mineralisation that may be present at the Ballinalack Project. The Keel property is currently held by Diversified Asset Holdings, in joint venture with Clement Resources.

The Garrycam occurrence, less than a kilometre from Keel, hosts a historical estimate of 1.35 million tonnes grading 36% $BaSO_4$, 2.7% Zn and 0.2% Pb (Slowey, 1986). Significant compilation of data, re-drilling and re-sampling and data verification would need to be carried out at Garrycam by a Qualified Person before the historical estimate could be classified as a current resource. A Qualified Person has not done sufficient work to classify the historical estimate as a current resource. GERC is not treating the historical estimate at Garrycam as indicative of mineralisation that may be present at the Ballinalack Project.

The Ballinalack – Keel sub-basin of the Dublin Basin is somewhat unusual in having base-metal and barite mineralisation at two distinct stratigraphic locations (Navan Beds and Waulsortian limestone).

At the Keel-Garrycam mineralising system, significant sub-vertical and stratiform mineralisation is present in the Navan Beds and significant barite mineralisation is present at the base of Waulsortian. mineralisation at Keel is hosted in the Navan Beds and underlying Basal Clastics. Keel is unusual for Irish-type deposits, as it is hosted in a series of steeply to moderately south-dipping fault strands, constituting the main normal Keel Fault and footwall and hanging wall splays. mineralisation occurs in fault breccias and veins and as associated zones of replacement, best developed in favourable Pale Beds horizons and including carbonate matrix replacement in the Basal Clastics. mineralisation at Garrycam is at the base of the Waulsortian, in the hanging wall of the Keel fault. Sphalerite at Keel is more coarsely crystalline, whereas Garrycam exhibits low grade fine grained and disseminated sphalerite.

The Moyvoughly Zn-Pb occurrence, some 25 km to the southwest of Ballinalack and currently held by Vedanta Exploration Ireland, has an historical estimate of 125,000 tonnes averaging 8% Zn+Pb (Poustie and Kucha, 1986). The mineralisation is hosted within the Moyvoughly Beds which are stratigraphically equivalent to the Lower Pale Beds of Navan (Andrew et al, 1986). The Moyvoughly occurrence is not located within the Project. The assumptions, parameters and methods of calculating the resource are not known. Significant compilation of data, re-drilling and re-sampling and data verification would need to be carried out by a Qualified Person before the historical estimates can be verified and upgraded to current, classified resources. A Qualified Person has not done sufficient work to classify the historical estimates as current resources. GERC is not treating the historical estimates as indicative of resources occurring on the Project.

Normal fault-associated mineralisation in both the Waulsortian and the Pale Beds at Keel-Garrycam and in the Pale Beds at Moyvoughly is further evidence that both horizons are prospective for mineral deposition.

25.0 Interpretation and Conclusions

The Mineral Resource estimate for Ballinalack highlights the economic potential of the Project and the additional known mineralized occurrences and large scale of the hydrothermal system supports the potential to add significantly to the resource base. The Project also includes additional highly prospective ground with mineralized drillholes that have not been properly followed-up.

The Ballinalack Project represents the second largest undeveloped base metal prospect in Ireland. The prospect is located in the base of the Waulsortian, within the hanging wall of a significant normal fault. Such a stratigraphic and structural setting is typical of Irish Type zinc deposits.

The Project has a number of key elements which together make it one of the most attractive exploration properties in the Irish Orefield. These attributes are:

- It contains the Ballinalack prospect;
- Two prospective horizons are present as targets, both known to host economic deposits elsewhere in Ireland (Pale Beds and Waulsortian Reef);
- Structural complexity within a regional structural trend is present and known mineralisation is believed to be related to a major basement structure;
- There are untested targets both beneath the prospect at Ballinalack and regionally within the Project area; and
- There is a large database of geological and geophysical data.
- Work done by TIL in the past decade has added enormously to the understanding of the Project, particularly with the addition of seismic profiles to assist with the interpretation of the structural geology.

Despite the knowledge that the Pale Beds host the giant Navan Deposit, this target has not been properly tested in the immediate hanging wall of the Ballinalack Fault, stratigraphically below the known mineralisation. Drilling by TIL into the Pale Beds elsewhere on the Project has intersected significant zinc-lead mineralisation but has not been followed-up.

GERC will prioritise those targets which were either ignored by previous operators or not thought to be economically attractive at the time.

25.1 Mineral Resource Estimate

CSA Global has completed a Mineral Resource estimate for GERC's Ballinalack Project based on diamond drill data acquired by TIL. CSA Global considers that data collection techniques by Ivernia, Teck and GERC were consistent with industry good practice and suitable for use in the preparation of a Mineral Resource estimate to be reported in accordance with NI 43-101. However the bulk of the data used in the estimate were from historical drilling pre 1991 for which no information is available on survey, core quality and recovery, sampling and analytical method, or QAQC, and for which no laboratory analytical data are available.

The geological understanding of the deposit is adequate to support modelling of the mineralisation, which CSA Global completed in Leapfrog Geo™ and Micromine™ software. However, CSA Global notes that the 3D modelling was limited to close spaced drilling in the Ballinalack area; wider spaced drilling indicates mineralisation present to the north east of the resource area and to the south east of the Ballinalack fault.

The total drilling available for the geological model and MRE was 102 DD holes for 26,042 m, consisting of 2,190 assay samples and 1,451 logged lithology intervals. Drill spacing in the mineralized zones was approximately 50 m. Following contact and domain analysis, 18 mineralisation domains were used for all geostatistical analysis. Variograms were modelled on 1.5 m top-cut composites, for Zn%, Pb%, Ag g/t and $BaSO_4$% within the largest domain, MINZON 1. Grade was estimated into parent blocks of 25 m by 25 m by 5 m (X by Y by Z) using OK, controlled by DA.

Grade estimates were validated against drill data. There is good correlation between the input composites and output model for the estimated Zn%, Pb%, Ag g/t and $BaSO_4$% grades. Generally, the model grade trends follow the pattern of the drill samples grades, with reasonable levels of smoothing of the higher and lower grades.

No density data was available to CSA Global. An assumed average BD of 3.05 t/m^3 was applied to the mineralized material, after Robertson (1991) and Teck (2007), which is considered reasonable based on similar deposits nearby, e.g. the Kildare deposit (ZMI, 2017). The BD for the material outside the mineralisation domains was assigned a value of 2.70 t/m^3. A BD of 2.00 t/m^3 is considered reasonable for the overburden in the deposit location. There is no mineralisation within the overburden and as such it is not material to the MRE. BD data for mineralisation should be prioritised to inform updated MREs.

The MRE for Ballinalack as at 30 August 2018, is reported at a ZnEq cut-off grade of 5.2%, based on NSR calculations of conceptual operating costs and metal revenue, and indicates reasonable prospects for eventual economic extraction. The Ballinalack MRE satisfies the requirements for the Inferred Mineral Resource category as embodied in the NI 43-101 Canadian National Instrument for the reporting of Mineral Resources and Reserves.

The Mineral Resource estimate was classified as Inferred Mineral Resources based upon an assessment of geological understanding of the deposit, geological and mineralisation continuity, drillhole spacing, nature of historical drill data and lack of original data, quality control results (and lack of for historical drilling), and search and interpolation parameters

Additional work required to potentially upgrade Inferred Mineral Resources to Indicated Mineral Resources include:

- Infill drilling to a drill spacing of about 25 x 25 m to provide validation of historical drilling and to increase the current level of understanding of the Zn, Pb and Ag distribution and geological controls.
- Improve the 3D geological, alteration and structural models by logging new holes and integrating with historical data and geophysical models. These 3D models should be used in defining along and across strike mineralisation intersection targets.
- Collection of BD data from available DD core.

26.0 Recommendations

The Ballinalack Project area contains both classified Mineral Resources and greenfields exploration ground with significant potential for further discovery. Recommendations are made regarding the resources and the future exploration of the entire property.

The Ballinalack Project represents a compelling opportunity to conduct resource definition exploration within the existing Ballinalack prospect and to finally and conclusively test the deeper potential within the highly prospective underlying Pale Beds. There is also an opportunity to test sub-cover targets further away from the prospect. The project presents the opportunity to leverage an extensive database of seismic data and a large high-quality historical exploration database. TIL's work on Ballinalack has substantially expanded the area with mineral potential. It is now generally accepted that these Irish-style zinc deposits are not isolated, but form in structurally controlled clusters. A fractal approach to exploration is believed to be the best way to proceed.

26.1 Mineral Resources

CSA Global recommends the following actions are completed prior to future MRE updates:

- Complete additional infill drilling to a drill spacing of about 25 x 25 m to provide validation of the historical drilling, to increase the current level of understanding of the Zn, Pb, Ag and $BaSO_4$ distribution and geological controls, and to potentially upgrade Inferred Mineral Resources to Indicated Mineral Resources. Drilling should additionally be planned to investigate mineralisation to the northeast of the resource area and to the south of the Ballinalack fault.
- The Mineral Resource is open along and across strike. CSA Global recommends additional step-out drilling to a drill spacing of about 100 x 100 m to potentially augment the Mineral Resource estimate, guided by integrated structural, lithostratigraphic and alteration interpretation and supported by additional geophysics for direct targeting and structural interpretation.
- Complete angled oriented holes to allow better modelling of structures and of steep mineralisation zones.
- Further investigation of the timing of the Cappagh fault with relation to mineralisation should be undertaken, with a view to linking mineralisation either side if timing is syn-mineralisation.
- Acquire additional bulk density data from DD core (existing or new drilling) focused on mineralisation to build up a useful bulk density database that can potentially be used to develop a BD regression related to Zn, Pb and Fe grade. This would also improve the confidence of the tonnage factors for the Ballinalack deposit. The methodology and measurements should be verified and standardised in future MRE updates.
- Continue to improve the 3D geological, alteration and structural models by logging new holes, incorporating with TIL relogging data, and geophysical models and inversions. These 3D models should be used in defining along and across strike targets in Waulsortian and Pale Beds; in particular, it is critical to understand the fault and fault splay geometry relative to lithostratigraphy and determine the best position to test the Pale Beds target in the fault hanging wall.
- Undertake metallurgical testwork to refine the Zn%, Pb% and Ag g/t plant feed grades and recoveries, for use in the ZnEq cut-off grade and NSR calculations of conceptual operating costs and metal revenue, in support of "reasonable chances of eventual economic extraction".
- The database is incomplete, with outstanding data comprising geophysical survey data including ground magnetic data collected by previous tenement holders. CSA Global recommends sourcing and collation of missing data into a complete dataset, as well as the collection of new magnetic and seismic data on a project scale, for use in modelling of structural trends, and to assist in future drill planning and MRE updates. The

Ballinalack Project is of sufficient technical merit to warrant the recommendation of a robust, two phase exploration programme.

26.2 Drilling

Phase 1 should focus on confirmatory drilling of the Ballinalack prospect, as well as some regional drilling, while Phase 2 should follow on from Phase 1 and focus on expanding any mineralisation intersected in Phase 1 and testing the footwall Pale Bed target. The Authors have been informed that Phases 1 and 2 are expected to each be completed within consecutive 12-month periods (i.e. 24 months in total). Phase 2 will be conditional on satisfactory outcomes from Phase 1, although it is thought that sufficient work has already been done to establish the very prospective nature of the Property.

26.2.1 Phase 1 – Confirmatory Drilling of Prospect

Phase 1 should focus on confirmatory drilling of the Ballinalack prospect, with a view to determine the full extent of vertical (and/or sub-vertical) mineralized structures within the deposit, as well as true widths of currently known mineralized zones. Six holes consisting of two holes along three fences are recommended within the footprint of the prospect, whereas two holes are recommended moderate step-outs and gap infills. This is the minimum recommended program, additional drilling would be required to better validate historical drilling and to upgrade the classification of the Mineral Resource estimate.

Importantly, drilling should be conducted with *inclined* (e.g. -60 or -70 degrees) holes, as opposed to the vertical holes which have been used historically. A secondary benefit of inclined holes is that the Pale Beds (located adjacent to the Waulsortian-hosted Ballinalack mineralisation) will likely be intersected in holes closest to the Ballinalack fault in the fault footwall. The best footwall Pale Bed intercepts (e.g. B110 with 11.9% over 1.4 m; B94 with 16.9% over 1.2 m; B81 with 20.4% over 1.4 m; and B95 with 10.7% over 0.8 m) define a continuous strike length of over 400 m at the northern-most part of the Ballinalack prospect, an area which was excluded from the 1991 historis estimate. A concerted effort should be made to drill this zone from the NW through the main deposit to test for thicker potentially economic mineralisation which may 'back-bleed' into the footwall away from the Ballinalack fault.

Concurrent with the above, at least some drilling should be conducted on regional targets, especially in areas recently tested with seismic surveys. Three holes are recommended.

26.2.2 Phase 2 – Exploration Drilling

Phase 2 should focus on exploring the hangingwall Pale Beds target under the Ballinalack prospect, based on information obtained from drilling in Phase 1. This drilling should include at least six holes, consisting of two holes drilled along three fences, likely focused on the northernmost section of the prospect area.

Moderate step-outs (e.g. 25-50 m) should be drilled along strike from the northern end of the prospect. Drilling should also infill the c. 300 m gap in drilling between the main prospect and the isolated pod of mineralisation at the northern-end of the resource area. Three holes are recommended (two step-out holes and one infill hole). Additionally, two holes are recommended to test the footwall Pale Beds on the northern end of the prospect area (holes to be inclined, with an azimuth towards the NW).

26.3 Budget (Phase 1 and 2)

Phase 1 and 2 of exploration of the Ballinalack Project is expected to cost C$779,496 and C$1,178,297, respectively, or C$1,957,793 in total (excluding VAT; see Table 26.1, below).

Table 26.1 Ballinalack Project – Proposed Expenditure Budget

Ballinalack	Phase 1			Phase 2			Total		
Drilling	**Holes**	**Metres**	**C$**	**Holes**	**Metres**	**C$**	**Holes**	**Metres**	**C$**
Ballinalack resource area									
Confirm/explore existing deposit	6	1,800	252,000	-	-	-	6	1,800	252,000
Moderate step-outs and gap infill	2	600	84,000	3	900	126,000	5	1,500	210,000
Footwall Pale Bed testing	-	-	-	2	600	84,000	2	600	84,000
Hangingwall Pale Bed testing	-	-	-	6	4,500	630,000	6	4,500	630,000
Ballinalack regional									
Regional testing (seismic, etc)	3	1,013	141,820	-	-	-	3	1,013	141,820
Sum	**11**	**3,413**	**477,820**	**11**	**6,000**	**840,000**	**22**	**9,413**	**1,317,820**
Drilling related	**Unit**	**Rate**	**C$**	**Unit**	**Rate**	**C$**	**Unit**	**Rate**	**C$**
Assays	680	49	33,320	1,200	49	58,800	1,880	49	92,120
Logging (oversight)	-	-	4,000	-	-	4,000	-	-	8,000
Landowner compensation	-	-	9,300	-	-	10,500	-	-	19,800
Hydrology or other studies	-	-	1,500	-	-	1,500	-	-	3,000
CR / permissions	-	-	3,850	-	-	3,850	-	-	7,700
Splitter, storage, equipment	-	-	3,000	-	-	3,000	-	-	6,000
Sum	-	-	**54,970**	-	-	**81,650**	-	-	**136,620**
Geophysics	**Unit**	**Rate**	**C$**	**Unit**	**Rate**	**C$**	**Unit**	**Rate**	**C$**
Re-processing historic	-	-	-	-	-	-	-	-	-
Interpretation	-	-	-	-	-	-	-	-	-
Ground Mag	-	-	-	-	-	-	-	-	-
Ground Gravity	-	-	-	-	-	-	-	-	-
Seismic	-	19,600	-	-	19,600	-	-	-	-
ADR	-	-	-	-	-	-	-	-	-
Contingency	-	-	-	-	-	-	-	-	-
Sum	-	-	**-**	-	-	**-**	-	-	**-**
Other			**C$**			**C$**			**C$**
Tectono-stratigraphic analysis	-	-	-	-	-	-	-	-	-
Data compilation & management	-	-	126,344	-	-	177,647	-	-	303,991
Fixed costs	-	-	59,986	-	-	79,001	-	-	138,987
Misc	-	-	60,375	-	-	0	-	-	60,375
Sum	-	-	**246,706**	-	-	**256,647**	-	-	**503,353**
Total			**779,496**			**1,178,297**			**1,957,793**

Phase 1 is projected to cost 40% of the budget (with Phase 2 to be 60%; see Table 26.2, below). Of the total two-phase budget, drilling will consist of 74% of the costs, with fixed and other costs representing 26%.

Table 26.2 Ballinalack Project – Expenditures by Exploration Method

Summary	Phase 1	Phase 2	Total	%
Drilling	532,790	921,650	1,454,440	74%
Geophysics	0	0	0	0%
Fixed & other	246,706	256,647	503,353	26%
Total	**779,496**	**1,178,297**	**1,957,793**	100%
%	40%	60%	100%	

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APPENDICES

APPENDIX A – QUALIFIED PERSON CERTIFICATION

Certificate of Qualified Person

I, ***Dr John George Kelly of SLR Consulting Ltd., 7 Dundrum Business Park, Windy Arbour, Dublin***, as the author of the technical report entitled: "*NI43-101 Independent report on a base metal exploration project at Ballinalack, Co. Westmeath, Ireland*" prepared for Group Eleven Resources Corp. and dated effective **11th January**, 2019 (the "**Technical Report**") do hereby certify that:

1. I am a ***Principal Geologist*** working at **SLR Consulting Ltd., 7 Dundrum Business Park, Windy Arbour, Dublin.**
2. I have received the following degrees:

   a. **BSc (Hons) 2.1 Geology, Queens University of Belfast, United Kingdom, 1986**

   b. **Ph.D. Geology, National University of Ireland, Dublin, 1989.**

3. I am a registered Professional Geologist (PGeo) with the Institute of Geologists of Ireland and a registered European Geologist (EurGeol) with the European Federation of Geologists. I have been practicing my profession continuously since 1991.

4. As a result of my experience and qualifications, I am a "Qualified Person" as defined in National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101). The majority of my career has focussed on base metal exploration in Ireland and abroad, with a particular focus on carbonate-hosted mineralisation. I have worked on, *inter alia,* the Lisheen, Silvermines, Ballinalack, Abbeytown and Crinkill deposits/prospects. In addition to near-mine exploration, I have worked on and project-managed exploration across the entire Irish lower Carboniferous for a wide variety of companies, from junior, to mid-tier, to major.

5. I have been directly involved with the project that is the subject of the Technical Report since 17th February 2017. I have written sections 1-3, 7, 8, and 14, and have co-written sections 25 – 27.

6. I performed a personal inspection of the project site on 17th February, 2017 and 16th May 2017.

7. I am independent of Group Eleven Resources Corp. as described in Section 1.5 of NI 43-101.

8. I have read NI 43-101 and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

9. At the effective date of the Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Dublin, Ireland this 11th January 2019

EurGeol Dr John G Kelly PGeo, MIMMM

Certificate of Qualified Person

I, ***Paul Gordon, 7 Glendine Woods, Kilkenny*** as the author of the technical report entitled: "*NI 43-101 Independent Report on a Base Metal Exploration Project at Ballinalack, County Westmeath, Ireland*" prepared for Group Eleven Resources Corp. and dated effective **11th January, 2019** (the "**Technical Report**") do hereby certify that:

10. I am a **Principal *Geologist*** working at ***SLR Consulting Ltd, 7 Dundrum Business Park, Windy Arbour D14 N2Y7, Dublin, Ireland***.

11. I have received the following degrees:

    c. ***Bachelor of Science, National University of Ireland, Galway***

    d. Master of Science, Lancaster University, UK

12. I am a Professional Geologist registered in Ireland with the Institute of Geologists of Ireland (PGeo) and in Europe with the European Federation of Geologists (EurGeol). I have been practicing my profession continuously from ***October 1995* to April 2002** and since **July 2006**.

13. As a result of my experience and qualifications, I am a "Qualified Person" as defined in National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101). I have worked for a significant portion of my career in the Irish base metals exploration sector. My experience has included work on the Navan (Tara Mines), Galmoy, Kilbricken, Keel & Harberton Bridge deposits/prospects in various roles, ranging from technician to country manager, as well as numerous other earlier stage projects across the country.

14. I have been directly involved with the project that is the subject of the Technical Report since ***20th March 2017***. I have generated all of the figures for the report, as well as writing sections 4, 5, 6, 9, 10, 11, 12, 13 & 23, sections 25 - 27 in conjunction with my co-author, and editing and amending the entire document twice.

15. I have not performed a personal inspection of the site; all details in the report requiring a personal inspection have been carried out by my colleague, Dr. John G. Kelly.

16. I am independent of Group Eleven Resources Corp. as described in Section 1.5 of NI 43-101.

17. I have read NI 43-101 and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

18. At the effective date of the Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Dublin, Ireland this 11th January 2019.

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EurGeol Paul Gordon MSc PGeo

Certificate of Qualified Person

I, ***Belinda van Lente, of CSA Global (UK) Ltd, Suite 2, First Floor, Springfield House, Horsham,*** as a Qualified Person of the technical report entitled: "*NI 43-101 Independent Report on a base metal exploration project at Ballinalack, Co. Westmeath, Ireland*" prepared for Group Eleven Resources Corp. and dated effective 11 January, 2019 (the "**Technical Report**") do hereby certify that:

1. I am a ***Principal Resource Geologist*** working at **CSA Global (UK) Ltd, Suite 2, First Floor, Springfield House, Horsham, West Sussex, RH12 2RG, United Kingdom**.
2. I have received the following degrees:
    a. **MSc Geology, Rand Afrikaans University, South Africa, 2001**
    b. **PhD Geology, University of Stellenbosch, South Africa, 2004**
3. I am a registered Professional Natural Scientist (Pr.Sci.Nat, 400119/10) in good standing of the South African Council for Natural Scientific Professions. I have been practicing my profession continuously since **2005**.
4. I am familiar with NI 43-101 and, by reason of education, experience in evaluation of base metal deposits, and professional registration; I fulfil the requirements of a "Qualified Person" as defined in as defined in National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101). My experience includes over 13 years in the consulting and production environment.
5. I am responsible for the following sections of this Technical Report; Sections 1.12, 1.13.1, 1.14, 12.4, 14, 25.1 and 26.1.
6. I visited the project that is the subject of this Technical Report on 12 April, 2018.
7. I am independent of the issuer as described in Section 1.5 of NI 43-101.
8. I have read NI 43-101 and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
9. At the effective date of the Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Horsham, United Kingdom this 11th January 2019.

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