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Shining Tree Geophysical Review

Prepared for

Battery Mineral Resources

by

Geoscience North

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Mar 2020

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1 Acronyms

Mag	Magnetic/Magnetics
TMI	Total magnetic intensity
CVG	Calculated vertical gradient
1VD (may be used interchangeably with above term)	First vertical derivative
AS	Analytic signal
OGS	Ontario Geologic Survey
EM	electromagnetic
AEM	Airborne electromagnetic

2 Introduction

The following was taken from BMR's Corporate Presentation Oct 2019.

The Shining Tree project area is located on a north trending Nipissing Diabase sill, with "basin" geometry along the contact between Archean rocks and overlying Huronian sediments.

The Archean rocks have favorable geology for massive sulfide deposits and therefore may have been a sulfur source and there are a number of Cobalt occurrences along the eastern contact of the Nipissing Diabase.

The property area is considered prospective for both Archean rock-hosted and contact-style five element vein type deposits as well as VMS deposits.

3 Coordinate system

NAD83 17N

4 Background

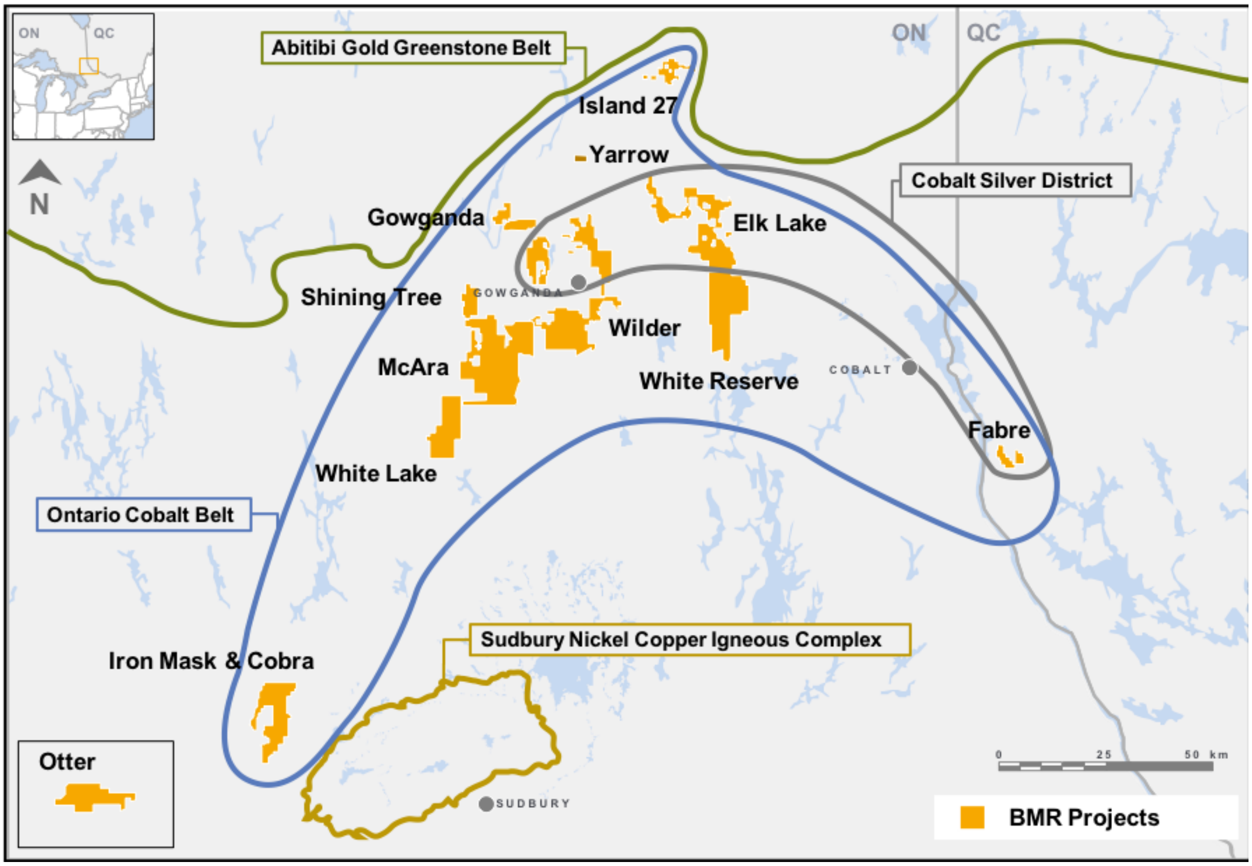

Figure 1. BMR projects, Cobalt and Co-Ag belts (https://www.batterymineralresources.com/projects/cobalt/canada-cobalt/other-ontario).

The following sections, shown in italics, are taken from SRK Battery Mineral Resources Ltd. 43-101-3CB026.005. This is an excellent introduction and summary of the history, property geology and mineralization. These are considered critical to understanding the exploration targets and how geophysics can be used in regional and local targeting.

Shining Tree Project

The Shining Tree Property is composed of one group of purchased claims and staked claims. The Shining Tree Property is located in the Leonard and Tyrrell townships of eastern Ontario, approximately 112 kilometres north of Sudbury, 12 kilometres southwest of Gowganda, and 17 kilometres east of Shining Tree.

The Shining Tree Project comprises 143 mining claims in 3,117 hectares (31.2 square kilometres) of in a single block.

Discovery and Early work in the area

- *Early exploration efforts in the Shining Tree Project area started in 1908, focusing mainly on silver. Several discoveries were made between 1909 and 1912, spurring exploration on until an eventual decline during the Depression that lasted till the mid 1950s (Carter, 1977).*

- *In 1909, approximately 1.5 kilometres south of Fournier Lake, stripping and trenching by the Saville Exploration Syndicate outlined a number of quartz-calcite veins within diabase which reportedly contained cobalt bloom, smaltite, chalcopyrite and traces of bismuth. Exploration efforts continued from 1909 to 1927. Interest declined until the mid-1950's (Carter, 1977). This mineral occurrence, located at the southeastern corner of the Shining Tree claim block, was initially named the Saville Showing, but is now listed as Sullivan, M.J. in the Ontario Mineral Deposits Inventory (MDI41P11SE00062),*

- *Several significant mineral occurrences were discovered in 1912:*

- *The Archibald showing (MDI41P11SE00032)0, located 250 metres northwest of the Saville showing. Three quartz-calcite veins, up to 15 centimetres wide, contained minor galena, chalcopyrite and copper bloom. A shaft was sunk and in 1927, Langford reported that silver flakes occurred over a depth of eighteen feet (5.5 metres) and widths of six to eight inches (15 to 20 centimetres) within calcite veins and in cracks in the diabase (Carter, 1977).*

- *The Caswell-Eplett prospect, located approximately 1.2 kilometres west of Fournier Lake, in the southern half of the Shining Tree claim block, consisted of many silver-bearing veins with cobalt bloom within the diabase. A vertical shaft was sunk to 100 feet (30.5 metres) with 100-foot (30.5 metres) crosscuts excavated east and west of the shaft (Carter, 1977). The Neelands prospect, immediately to the north of the Caswell-Eplett prospect was also discovered in 1912. Stripping and trenching exposed several quartz-calcite veins within the Nipissing diabase, containing chalcopyrite and smaltite. Together these occurrences form the Caswell-Eplett-Neelands showing (MDI41P11SE00071) and Abandoned Mine Inventory System (AMIS) record 03582 (Caswell-Eplett-Neela).*

- *The Greave occurrence (MDI41P11SE00068), located approximately 1.8 kilometres south of Caswell-Eplett prospect and at the southern boundary of the Shining Tree claim block, consists of three quartz-calcite veins, 3 to 6 inches (7.6-15 centimetres) wide, hosted in diabase with minor chalcopyrite, galena and smaltite.*

- *Further north, also in 1912, many more mineralized quartz-calcite veins in diabase were found in a corridor following Smyth Lake (now called Bing Lake) up to Spike Lake (now Mullen Lake).*

- *A summary of historical exploration drilling on the Shining Tree Property is provided in Table 19, whereas a concise record of all filed historical Assessment Reports for the Shining Tree Property is tabulated in Table 20.*

- *At the northern end of the claim block, the AMIS record 10165, named Mullen Lake, does not correspond to an official MDI record. A vertical shaft, 65 feet (20 metres) deep intersected a* *quartz-calcite vein six to eight inches (15 to 20 metres) wide with considerable chalcopyrite and cobalt bloom. A similar vein was uncovered immediately east of the initial discovery, varying from a thin crack to 5 feet (1.5 metres) wide, also hosting chalcopyrite, cobalt bloom and niccolite (Carter, 1977).*

Table 1. Shining Tree Historical Drill Program (SRK 2019).

Table 1: Shining Tree Historical Drill Programs

Year	Operator	No. Drillholes	Total Metres
1955	Newnorth Gold Mines*	5	51.2
1957	Newnorth Gold Mines*	5	308
1965	Silver Pack Mines*	5	306
1971	United Reef Petroleum	6	128.4
1975	United Reef Petroleum	3	461
	Total:	**24**	**1,254.6**

* Not in Ontario Drillhole Database (ODHD) but mentioned in Carter (1977)

Table 20: Shining Tree Historical Assessment Reports

Year	Township	Assessment File Number (AFRI_FID)	Company	Work Description
1956	Leonard	41P10SW0112	Newnorth Gold Mines Ltd	Electromagnetic
1958	Leonard	41P10SW0111	Temiskaming Pro Syndicate	Geological Survey / Mapping
1963	Leonard	41P10SW0109	Coulee Lead & Zinc Mines	Geological Survey / Mapping
1965	Leonard	41P10SW0110	Silver Pack Mines Ltd	Geological Survey / Mapping
1971	Leonard	41P10SW0114	United Reef Petroleum	Assaying and Analyses, Diamond Drilling
1973	Leonard	41P10SW0108	United Reef Petroleum	Geochemical
1974	Leonard	41P10SW0104	G E Waddington	Magnetic / Magnetometer Survey
1974	Leonard	41P10SW0106	United Reef Petroleum	Geological Survey / Mapping
1974	Leonard	41P10SW0107	G E Waddington	Magnetic / Magnetometer Survey
1975	Leonard	41P10SW0101	G E Waddington	Geological Survey / Mapping
1975	Leonard	41P10SW0113	United Reef Petroleum	Assaying and Analyses, Diamond Drilling
1976	Leonard	41P10SW0102	Alamo Petroleum Ltd	Electromagnetic Very Low Frequency, Geochemical, Geological Survey / Mapping
1976	Leonard	41P10SW0105	Alamo Petroleum Ltd	Electromagnetic Very Low Frequency, Geochemical, Geological Survey / Mapping
1992	Leonard	41P10SW9028	P Donovan	Electromagnetic Very Low Frequency, Geochemical, Geological Survey / Mapping, Magnetic / Magnetometer Survey, Open Cutting
1992	Leonard	41P11SE0083	P Donovan	Electromagnetic Very Low Frequency, Geochemical, Geological Survey / Mapping, Magnetic / Magnetometer Survey, Open Cutting
1993	Leonard	41P11SE0049	G J Mullan	Assaying and Analyses, Geological Survey / Mapping, Mechanical, Overburden Stripping
1993	Leonard	41P11SE0076	P Donovan	Geochemical, Geological Survey / Mapping, Overburden Stripping, Prospecting By Licence Holder
1997	Leonard	41P11SE0089	Archie Lacarte	Mechanical, Overburden Stripping
1997	Leonard	41P11SE0094	Archie Lacarte	Mechanical, Overburden Stripping
1997	Leonard	41P11SE2002	Archie Lacarte	Mechanical, Overburden Stripping
1998	Leonard	41P11SE2010	OroGrande Resources Inc	Electromagnetic Very Low Frequency, Geochemical, Magnetic / Magnetometer Survey, Open Cutting
1999	Tyrrell	41P11SE2023	Roy Earl Lacarte	Geological Survey / Mapping, Mechanical, Overburden Stripping
1999	Tyrrell	41P11SE2024	Walter Hanych	Geochemical, Open Cutting
2003	Knight	41P11NE2048	Intl KRL Res Corp	Assaying and Analyses, Geological Survey / Mapping, Prospecting by Licence Holder
2004	Tyrrell	41P10SW2024	Intl KRL Res Corp	Assaying and Analyses, Geological Survey / Mapping
2006	Leonard	20000002099	SL Res Inc	Assaying and Analyses, Overburden Stripping
1973 - 1974	Leonard	41P11SE8519	United Reef Petroleum	Geological Survey / Mapping, Other
1974 - 1975	Leonard	41P10SW0103	United Reef Petroleum	Diamond Drilling, Geological Survey / Mapping, Other
1996 - 1997	Leonard	41P11SE0092	Archie Lacarte, Eric Kneiss	Mechanical, Overburden Stripping
2007 - 2009	Leonard	20000004141	True North Minerals Lab	Linecutting, Magnetic / Magnetometer Survey

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1974	Leonard	41P10SW0104	G E Waddington	Magnetic / Magnetometer Survey
1974	Leonard	41P10SW0106	United Reef Petroleum	Geological Survey / Mapping
1974	Leonard	41P10SW0107	G E Waddington	Magnetic / Magnetometer Survey
1975	Leonard	41P10SW0101	G E Waddington	Geological Survey / Mapping
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1996 - 1997	Leonard	41P11SE0092	Archie Lacarte, Eric Kneiss	Mechanical, Overburden Stripping
2007 - 2009	Leonard	20000004141	True North Minerals Lab	Linecutting, Magnetic / Magnetometer Survey

Figure 2. Shining Tree Historical Assessment Reports with Geophysical reports highlighted.in red.

Recent Exploration History

- *In 1955, Newnorth Gold Mines Limited drilled five diamond drillholes approximately 1.6 kilometres west of Fournier Lake (and about 400 metres west of the Caswell-Eplett Prospect), intersecting carbonate veins with specks of chalcopyrite and pyrite. In 1956, Newnorth contracted a ground electromagnetic survey between Mullen and Fournier Lakes. Two conductors and six semi-conductors were outlined. In 1957, five diamond drillholes, not documented in the Ontario drillhole database, tested the area between Fournier Lake and Bing Lake, intersecting calcite stringers (Carter, 1977).*

- *In 1958–1959, Temiskaming Project Syndicate established a grid and carried out geological mapping covering the Bobtail Lake area extending south past Mullen Lake. No assays were reported.*

- *In 1963, Coulee Lead and Zinc Mines Ltd carried out detailed geological mapping program covering the area around Horseshoe (now Herron) Lake and Nellie (now Taylor) Lake, targeting the Nipissing diabase–Keewatin contact, focussing on structural features to locate new quartz-calcite veins. No assays were reported (OAFD No. 41P10SW0109).*

- *In 1965, Silver Pack Mines Ltd carried out geological mapping around the southern part of Taylor Lake. On a claim block further north, Carter (1977) reported that 5 diamond drillholes were drilled for a total of 1,004 feet (306 metres) by Barron Diamond Drilling Limited. This data is not included in the Ontario drillhole database and the assessment report is not online. Banded iron formation, chalcopyrite, pyrite, cobalt minerals, sphalerite, specular hematite, lead minerals and narrow carbonate veins up to 25 centimetres were reported. The best silver assay was 0.14 oz/ton over 0.5 feet (4.8 g/t silver over 15.2 centimetres). Drilling was followed up by a geochemical survey in 1966 (Sergiades, 1968, p. 416), but no results were reported.*

- *United Reef Petroleum conducted several programs in the early 1970s:*

- *1971: drilling of 5 X-ray type drillholes, totaling 128.4 metres, in the vicinity of the Sullivan, M.J. Showing, in the southeast corner of the BMR Shining Tree Project area gave the following significant results:*

  - *URX-71-2: 257.1 g/t silver and 0.38% cobalt over 0.15 metres.*

  - *URX-71-3: 68.6 g/t silver and 0.25% cobalt over 0.15 metres.*

- *973–1974: line cutting, geological mapping and geochemical surveying (330 soil samples) to test for the extension of the zone targeted by drilling in 1971. A ground mag survey was conducted in 1974.*

- *1975: three diamond drillholes at the Archibald/Sullivan M.J. (Saville) prospect, targeting the down dip extension of the mineralized veins intersected during the 1971 drilling.*

- *In 1992, P. Donovan completed line cutting, round magnetometer, and VLF-EM surveys in the area of known mineralization of the Caswell-Eplett Prospect. The VLF-EM survey outlined a* *number of anomalies. The magnetometer survey was considered useful in distinguishing the strong magnetic diabase and the moderately magnetic mafic volcanic rocks from the non-magnetic Huronian sediments. A total of 12 rock grab samples from mineralized veins in diabase were collected from old pits and trenches. Assays up 7.04% cobalt (180187), 4.32% copper (180200) and 0.59% nickel (180187) are reported.*

- *Donovan continued the mechanical stripping and rock sampling in 1993. Two areas were stripped with the best results coming from Zone L 4+50 North where series of carbonate and/or quartz-carbonate veins in shears and fractures host smaltite and/or chalcopyrite. Channel sampling across the vein produced high cobalt values along a strike length of about 50 metres (Table 21).*

- *From 1997 to 1998, OroGrande Resources Inc. carried out line cutting, VLF-EM and magnetometer surveys over two separate areas, totalling 29.2 line-kilometres. Twenty-two rock samples were sent for analysis*

- *In 1999, stripping of a large area, 200 metres by 15 metres, of the LaCarte Property, at the south end of Tyrell Township, exposed Nipissing gabbro with sericite and hematite alteration accompanied by minor chalcopyrite mineralization proximal to the contact with Archean volcanic and sedimentary rocks. The outcrop was mapped, but no samples were reported.*

- *During 1999, F. Racicot and W. Hanych carried out a geochemical survey along the western arm of Spider Lake, in the north-centre area of Leonard Township and into the south portion of Tyrrell Township. A total of 276 humus samples were collected over 8.7 kilometres of lines spaced 200 metres apart. Thirteen rocks were collected during the survey.*

- *In late fall of 2004, International KLR Resources Corp carried out a reconnaissance geological mapping and rock sampling program in the area now covered by BMR's Shining Tree Project. The area extended from Fournier-Eliza Lake, north to Taylor Lake, Herron Lake, Mullen Lake and east to Spider Lake. Fifty-three rock samples were collected.*

- *In 1976, Alamo Petroleum, who controlled the historical Caswell-Eplett Prospect conducted line cutting, an EM-16 survey, and soil geochemical survey (714 samples). One of the weak conductors appears to be related to the historic Caswell-Eplett Showing.*

Geologic Setting and Mineralization

Regional Geology

- *The project area is located in and on the margin of the Proterozoic Huronian basin that overlies the Archean Abitibi terrane of the Superior Province*

- *The Superior Craton or Superior Province is an Archean craton that forms the core of the Canadian Shield and of the North American continent. Comprised of assemblages of greenstone belts and sedimentary basins cored by granitic terranes, it represents the collision and* *amalgamation of microcontinents throughout the Archean. The Superior Province is subdivided into subprovinces that are generally defined by their igneous, sedimentary, or metamorphic nature. The project area lies in (and is located at the boundary of) the Southern Subprovince, a Proterozoic to Paleozoic (2500-2200 Ma) cover sequence of siliciclastic rocks that uncomformably overlies the Archean basement rocks of the Pontiac/Abitibi subprovinces. The Southern Subprovince corresponds in this area to the Huronian Supergroup, an extensive Early Proterozoic siliciclastic cover sequence that outlines an irregular paleobasin, also known as the Cobalt Embayment.*

- *The Shiningtree property is located in the central and eastern portion of the Southern Subprovince, near its southern contact with the Grenville Province.*
- *The geology of the target areas consists of Early Proterozoic (2450 Ma and 2220 Ma) sedimentary rocks of the Huronian Supergroup which rest unconformably on older Archean granitic, metavolcanic, and metasedimentary rocks of the Abitibi and/or Pontiac Subprovince(s). The Proterozoic Nipissing diabase intrudes all the other lithologies except the youngest mafic dykes or sills.*
- *A plan displaying the regional geological setting of the documented properties in relation to the main mining areas in Ontario is provided in Figure 3 (Figures have been renumbered from the SRK 2019 report to fit in this report) , and the geology of the Cobalt Embayment in shown in Figure 5.*

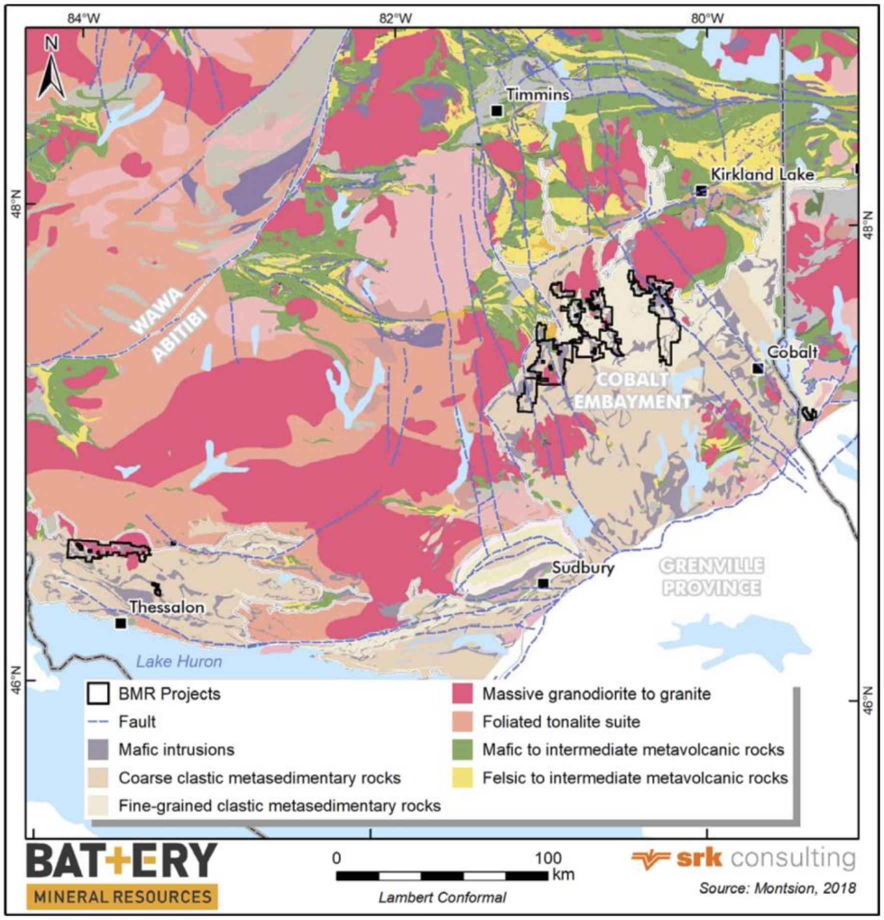

Figure 17: Regional Geological Setting and Main Mining Districts

Figure 3. Regional Geologic Setting with BMR project areas.

The lithologies are summarized as follows, from oldest to youngest below. Items of particular interest to this review are highlighted in red.

Archean Basement

The Archean basement rocks consist mainly of intermediate to mafic, massive and pillowed volcanic rocks intercalated with pyroclastic and sedimentary rocks. Locally, these rocks were intruded by Archean felsic dykes, quartz-feldspar porphyries, and granites, followed by minor mafic, ultramafic and lamprophyre dykes and sills. The rocks were isoclinally folded by Archean deformation, and are now steeply dipping and metamorphosed to greenschist facies.

Huronian Supergroup – Cobalt Group

The Huronian Supergroup consists of an assemblage of Proterozoic (middle Precambrian) metasedimentary sequences that lies unconformably above the Archean basement, forming a gently undulating cover to the steeply dipping basement rocks. The Huronian Supergroup, also known as the Cobalt Group or Cobalt Embayment, is distributed in a roughly circular pattern, thought to reflect the original configuration of the depositional basin, hence the description of these rocks as an "embayment" (Kerrich et al., 1986). Highly variable thicknesses suggest a highly irregular (Archean) basement *topography (Andrews et al., 1996). Many of the deposits are spatially related to the Archean-Huronian unconformity.*

- *The Huronian Supergroup consists of a variety of coarse- to fine-grained clastic sedimentary rocks that represent deposition in fluviatile, marine, and glacial paleoenvironments (Debicki, 1990). Metavolcanic sequences are also present. The Huronian Supergroup/ Cobalt group is subdivided as follows, from oldest to youngest:*

  Gowganda Formation, itself composed of two members:

  -(lower) Coleman member: thick massive conglomerate, quartzite, arkose, argillite and greywacke; the main sedimentary host to the mineralization.

  (upper) Firstbrook member: argillite, siltstone, wacke.

  Lorrain Formation: basal red wacke grading upwards into a fine-grained arkose.

Nipissing Diabase

Regionally extensive sills and dikes of Nipissing diabase emplaced circa 2219 Ma, possibly along pre-Huronian faults, occur throughout the Embayment and preferentially host the silver sulpharsenide veins. With an overall composition of olivine tholeiite, the diabase intrudes both the Archean basement and the Huronian sequence and occurs both as extensive sills and steeply dipping dykes and plugs. Kerrich et al. (1986) propose that the sills were emplaced as part of basin development. They consist of hypersthene quartz diabase grading upward into a mesocratic variedtextured diabase and a granophyre upper zone. The sills are horizontal to gently dipping with an average uniform thickness of 300 metres to 335 metres. All significant deposits are associated with the Nipissing diabase, either in the diabase itself or within 200 metres of its upper or lower contact (Andrews et al, 1986).

Late Diabase Dykes

Late Precambrian diabase occurs as narrow dykes cutting all older rock types (Sudbury Dykes).

Structure

Regional-scale faults crosscut all units of the Cobalt Embayment. Two sets are recognized: a strong NNW-trending set that extends for hundreds of kilometres across the embayment, crosscutting the Grenville Front to the south and Archean basement to the north, and a less pronounced NE-trending set recognized over a similar area. Post-diabase faulting has been proposed as a possible mechanism for the formation of structures now hosting the silver-sulpharsenide mineralization (Andrews et al, 1986), although other authors state that no relationship has been established between the mineralized veins and these regional-scale faults.

Table 32: Simplified Stratigraphy of the Cobalt Mining District

Eon		Formation	Lithology
Quaternary			Till, sand, gravel, clay
~ ~ ~ unconformity			
Paleozoic (Silurian and Ordovician)		Wabi Group Liskeard Group	Dolomite, limestone, shale
~ ~ ~ unconformity			
Neoproterozoic	1145 Ma	Diabase dykes	Olivine and quartz diabase
	— — — intrusive contact		
Paleoproterozoic	2219 Ma	Nipissing Diabase	Quartz diabase sills and dykes
	— — — intrusive contact		
	2219.4 Ma	Huronian Supergroup Cobalt Group	Lorrain Fm: Basal red wacke to fine grained. arkose
			Gowganda Fm – Firstbrook Member: Argillite, siltstone, wacke
	2450 Ma		Gowganda Fm – Coleman Member: Conglomerate, quartzite, arkose, greywacke
~ ~ ~ unconformity			
Archean craton			Diabase and lamprophyre
	— — — intrusive contact		
			Granite
	— — — intrusive contact		
			Mafic rocks, lamprophyre, serpentinite
	— — — intrusive contact		
			Greywacke and conglomerate
	~ ~ ~ unconformity		
	2720 Ma	Keewatin	Volcanic rocks, iron formations

Modified from Ruzicka and Thorpe (2016).

Figure 4. Simplified stratigraphy of the Cobalt Mining District.

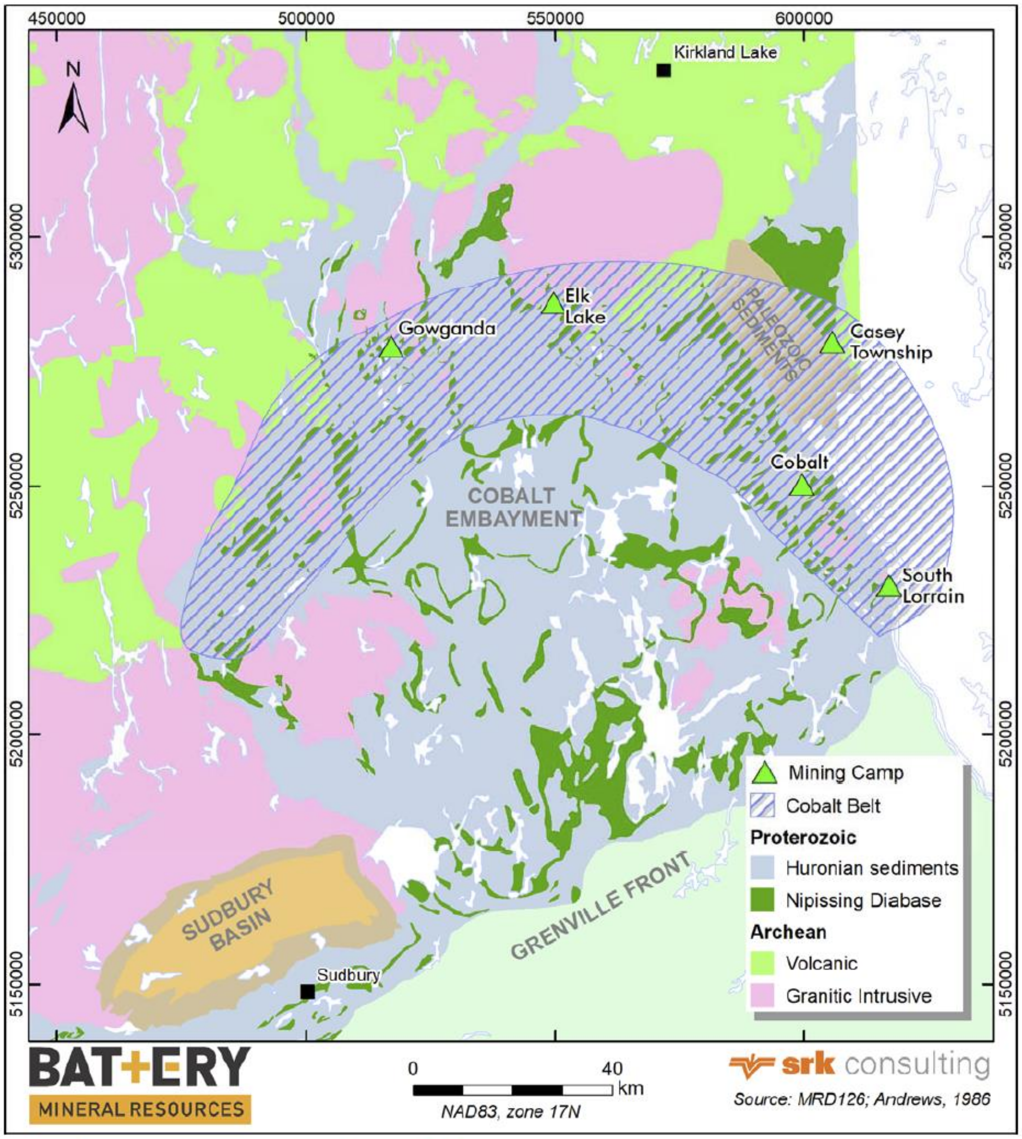

Figure 18: Geology of the Cobalt Embayment

Figure 5. Geology of the Cobalt Embayment. Note overall N trend in Nipissing diabase intrusives.

Regional Mineralization

- *The silver sulpharsenide mineralization of the Cobalt - Gowganda Camp has been described in numerous publications. A comprehensive study is contained in a special volume of The Canadian Mineralogist entitled The Silver-Arsenide Deposits of the Cobalt-Gowganda Region, Ontario (Petruk and Jambor ,1971). The following characteristics of the Cobalt - Gowganda Camp mineralization is taken from more recent summaries: Ruzicka and Thorpe (1996), and Andrews et al. (1986).*
- *The Cobalt District was for a long time the largest silver producing area in Canada. The arsenidebearing veins were important sources of silver but also contained cobalt, copper, nickel, arsenic, and bismuth.*

- *The deposits are associated with the contact between the Nipissing diabase and the Coleman Member of the Gowganda Formation, or with its contact with the underlying Archean mafic to intermediate lavas, intercalated pyroclastic and sedimentary rocks. Mineralization is commonly hosted in steeply-dipping veins in the Nipissing diabase, or within 200 metres of its upper or lower contact (Andrews et al, 1986). Strong and continuous veins are observed where the Nipissing diabase intrudes the Huronian sediments slightly above the unconformity, leaving a thin layer of Coleman Member sediments sandwiched between the sill and the steeply dipping Archean basement. Veins are more discontinuous where the sill intrudes the Archean basement at or below the unconformity, but they are concentrated at the upper and lower contacts of the sill.*
- *Most of the productive deposits occur near the Archean-Huronian unconformity. This unconformity and the lithologies that define it are exposed around the periphery of the embayment, yet the known deposits remain restricted to the northern and northeastern margin of the Cobalt Embayment.*
- *Mineralization is also spatially associated with regional-scale faults that cross-cut the contact with the Archean basement. Nipissing diabase sills located in well-developed sub-basins are targeted by BMR as these areas may represent favourable environments for paleo fluid flow and mineralization.*

The deposits of the Cobalt - Gowganda Camp contain three principal mineral assemblages:
· A base metal sulphide assemblage, confined to Archean metasedimentary and metavolcanics rocks
· The arsenide silver-cobalt assemblage, occurring mainly near and at the contact between the Nipissing diabase and the sedimentary rocks of the Cobalt Group, and less so at the contact between the diabase and the Archean rocks and
· A late-stage sulphide assemblage occupying the margins of arsenide-rich veins where they have reopened.

- *The age of the arsenide mineralization is dated at between 2.22 and 1.45 Ga, between the age of emplacement of the diabase sills (2.22 Ga) but before the intrusion of the quartz diabase dykes and contemporaneous reverse faults that displace the mineralization.*

Veining

- *The arsenide veins generally occur in the Nipissing diabase and within 200 metres of its contact with the sedimentary rocks of the Cobalt Formation. The veins are steeply dipping, up to 1.2 metres wide, and can extend 1 kilometre horizontally and 120 metres vertically. A typical deposit consists of a few short anastomosing centimetre- to multi-decimetre-scale veins.*
- *The mineralization occurs in irregular high-grade lenses surrounded by aureoles of low-grade material and can also occur in masses, veinlets, and disseminations with or without associated gangue minerals. Mineralization consists of arsenides, sulpharsenides, and antimonides of nickel, cobalt, iron, and large amounts of native silver. Individual mineral species include: dyscrasite, acanthite, rammselbergite, skutterudite, arsenopyrite, gersdorffite, cobaltite, glaucodot, nickeline, breithauptite, chalcopyrite, tetrahedrite, and native bismuth.*
- *Ruzicka and Thorpe (1996) list the following mineral assemblages for the Cobalt -Gowganda Camp:*
- *Nickel arsenide assemblage, at the periphery of major veins but also in small veins*
- *Nickel-cobalt arsenide assemblage, associated with the best silver grades*
- *Cobalt arsenide assemblage, occurring in the main parts of the veins*
- *Cobalt-iron arsenide assemblage, less common than the previous ones, it occurs as intergrowths, disseminations, dendrites, rosettes and crystals.*
- *· Iron arsenide assemblage, concentrated within veins and occurs with native bismuth, galena, and marcasite.*

- *· Sulphide assemblage*
- *· Oxide assemblage*
- *The best silver grade is associated with the nickel-cobalt arsenide assemblage. Dolomite, calcite, quartz and chlorite are the principal gangue minerals; oxide minerals are commonly associated with the carbonate gangue.*
- *Most veins are related to shear zones, fault gouges, and breccia, with evidence of multiple veins generations and multiple faulting episodes.*
- *High-grade samples from historical occurrences grade up to 8% cobalt, several thousands of ppm silver, and multi-gram gold, along with bismuth, lead, zinc and copper in the percent range.*

Alteration

- *Alteration associated with the mineralized veins is prominent but limited in extent; it varies depending on the host rocks. Alteration haloes are developed in the wall rocks along the veins as zones, typically a few centimetres-wide, of calcite, chlorite, epidote, K-feldspar, muscovite and anatase. A characteristic spotted chlorite alteration occurs locally within the Cobalt - Gowganda Camp.*

Property Geology and Mineralization

- *The Shining Tree Property is predominantly underlain by Proterozoic sedimentary and intrusive rocks with lesser amounts of Archean basement occurring in the north east corner of the claims (Figure 26). Proterozoic units include argillite and polymictic conglomerates of the Gowganda Formation and gabbros, granophyres, and mafic dykes of the Nipissing diabase. The Gowganda Formation unconformably overlies Archean basement. Archean rocks occur in the vicinity of Spider Lake and consist of intercalated mafic-intermediate metavolcanic rocks ranging in composition from andesite to dacite. Minor interbeds of banded iron formation, quartz arenite, chert, greywacke, siltstone and conglomerate occur within the metavolcanic sequences (Carter, 1977). Archean and Proterozoic units are cut by late diabase dykes that trend north-northwest, north-northeast and northeast.*
- *Northwest- to north-northwest-trending tight folds are present within the Archean metavolcanic rocks (Carter, 1977). In the Gowganda Formation, a curvilinear northeast- to north-trending synclinal axis occurs between Bobtail and Mullen lakes, located at the northern end of the claim block (Carter, 1977). Two main faults are located in the Project area: the Michiwakenda Lake Fault and the Jess Lake Fault. Both are considered to be sinistral strike-slip faults (Carter, 1977). Recent aeromagnetic data flown by BMR demonstrates the presence of pervasive north-northwest- and north-northeast-trending linear features. Silver-cobalt mineralization often occurs at locations where these features are most well developed.*
- *Three types of mineralization are recognized within the Shining Tree claim block including quartz vein and shear-hosted gold mineralization, Algoma-type iron formation, and silver-cobalt veining (Carter, 1977). Seven mineral occurrences are recorded throughout the Property (Table 35).*
- *Silver-cobalt veining that occurs in the Shining Tree Project area is spatially associated with the Nipissing diabase. The veins are vertical and oriented predominantly northeast-southwest. Veining ranges from a few centimetres to over 2 metres in width. Quartz and calcite represent main gangue minerals and mineralization is associated with native silver, chalcopyrite, smaltite, niccolite, native bismuth and cobalt bloom (Stewart 1931b).*
- *The host diabase is magnetic in character as seen in the airborne magnetic maps. The deposits may be associated with the intersection of north-northwest- and northeast-trending structures. Carter (1977) noted a spatial relationship between veining and feldspathic diabase or granophyre. Granophyre units are more competent and prone to fracturing and to stockwork*

vein development than the massive dolerite. It is also reported that the granophyric phase carries disseminated chalcopyrite (Middleton, 1976).

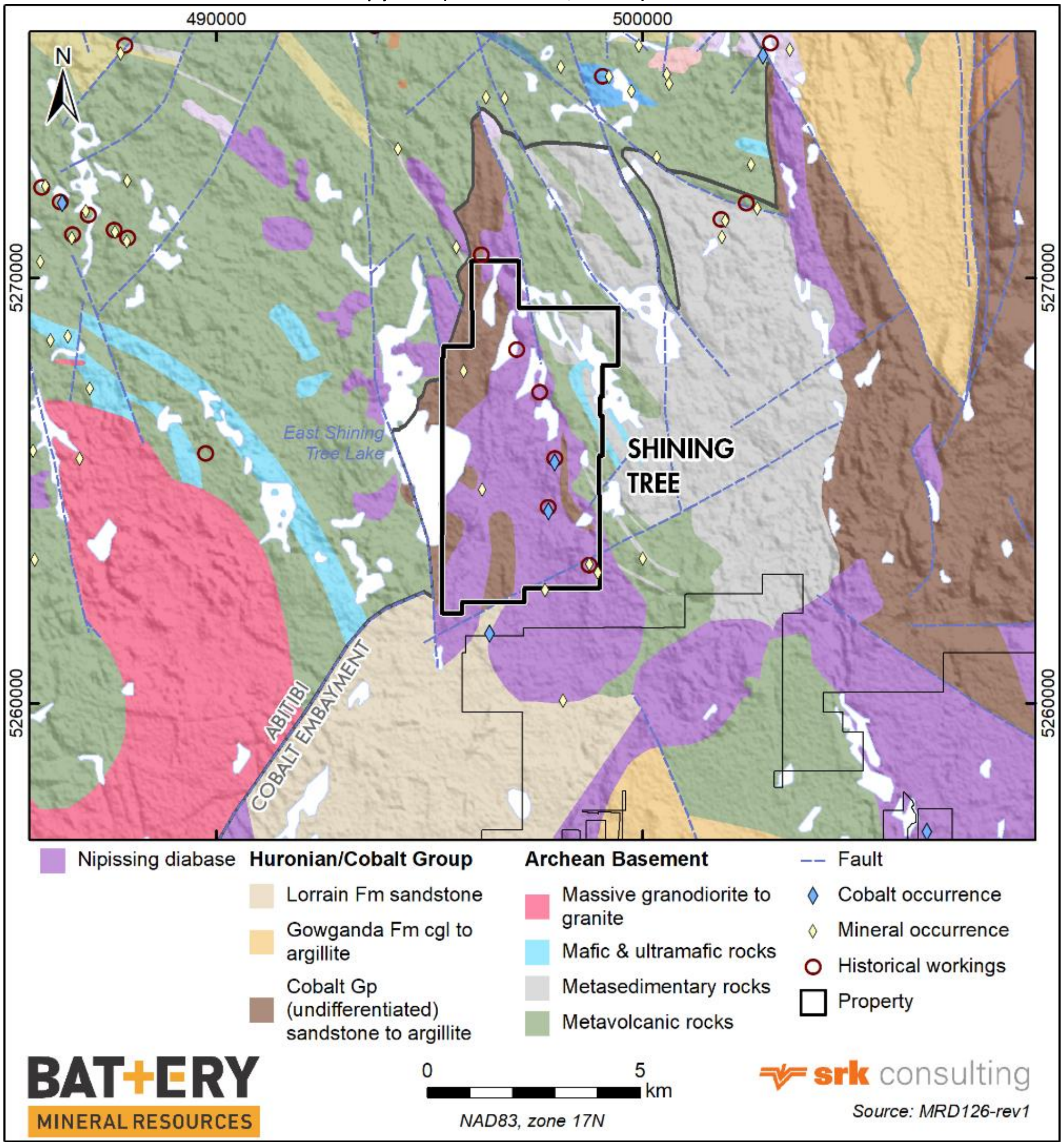

Figure 6. Geology of the Shining Tree project.

Table 2. Mineral occurrences on the Shining Tree property.

Township	MDI Number	Name	UTM_E	UTM_N	Commodity
Leonard	MDI41P11SE00032	Archibald	498756	5263264	Au
Leonard	MDI41P11SE00062	Sullivan, M.J.	498955	5263071	Ag
Leonard	MDI41P11SE00068	Greave	497716	5262665	Ag

Leonard	MDI41P11SE00069	Silver Pack	497941	5265649	Co
Leonard	MDI41P11SE00070	Temiskaming Project Syndicate	495798	5267798	Ag
Leonard	MDI41P11SE00071	Caswell-Eplett-Neelands	497793	5264511	Ag, Ni, Cu, Co
Leonard	MDI41P11SE00081	OroGrande Res – Shining Tree Showing	496234	5265026	Zn

Deposit Types

- *Cobalt mineralization occurs in a wide variety of geological and metallogenic settings. In Canada, current cobalt production comes from magmatic nickel-copper deposits such as Raglan (QC), Sudbury (ON), and Voisey's Bay (NL); these provided 6% of the world's cobalt producion in 2017. Other worldwide significant sources of cobalt include the sedimentary-hosted copper deposits of the Central African Copperbelt (which supplies most of the world's cobalt) and nickel laterite deposits.*
- *The Cobalt and Gowganda Districts of northern Ontario define the Canadian type-locality for silvercobalt vein deposits, which are also known as arsenide silver-cobalt veins, nickel-cobalt-native silver veins, five-element vein deposit or Ag-Ni-Co-As-Bi vein deposits, even though not all five elements are always present, and even though some of these deposits can also be associated with uranium.*
- *Other synonyms for this deposit type include cobalt-type silver-sulpharsenide veins, Ni-Co-Bi-Ag-U (As) association, Ag-As (Ni-Co-Bi) veins, and Schneeberg-Joachimsthal-type deposits. The BMR properties described in this report target this type of deposit.*
- *The following description of the five-element vein deposit is summarized from the BCGS Mineral Deposit Profile no. I14 (Lefebure, 1996), Kissin (1993), and USGS Open File 2017-1155 (Hitzman et al., 2017).*

Type Examples

- *Deposits of the Cobalt-Gowganda district, such as the Keeley-Frontier mine, are world-famous for this type of mineralization. Other Canadian examples include the Thunder Bay, Beaver and Temiskaming camps, and the Eldorado and Echo Bay deposits. International examples include the historic silver mines of Europe (Erzebirge or Joachimsthal in Czechoslovakia/Germany, Schwarzwald in Germany, and Kongsberg-Modum in Norway), the Wickenberg (Arizona) and Black Hawk (New Mexico) in the US, and the Batolipas district of Mexico. All these deposits produced silver, some produced uranium, and some produced cobalt. Recent Mineral Deposit research work indicates these deposits could be re-classified into IOCG, Skarn or Replacement style deposits.*

Deposit Geology

Mineralization

- *The deposits typically consist of native silver hosted in carbonate and quartz veins associated with a variety of mineral assemblages that are rare in other settings, such as nickel-cobalt-iron (Ni-Co-Fe) arsenides, nickel-cobalt-iron-antimony (Ni-Co-Fe-Sb) sulpharsenides and bismuth minerals. In many cases, only some of these minerals are present, although the best examples of this deposit type typically contain significant silver-nickel-cobalt (Ag-Ni-Co) open-space-filling veins up to several metres in width that pinch and swell.*

- *Ore minerals can include native silver associated with nickel-cobalt arsenide minerals (rammelsbergite, safflorite, niccolite, cloanthite, maucherite), sulpharsenides of cobalt, nickel, iron and antimony, native bismuth, bismuthinite, argentite, ruby silver, pyrite and uraninite (pitchblende). Chalcopyrite, bornite and chalcocite are common, but minor constituents. Minor to trace galena, tetrahedrite, jamesonite, cosalite, sphalerite, arsenopyrite and rare pyrrhotite can be present. In many deposits only a partial mineral assemblage occurs containing a subset of the many elements which may occur in these veins. These veins are usually characterized by the absence of gold, but gold grades are reported in the Cobalt – Gowganda Camp.*
- *Native silver is usually associated with calcite and dolomite, which are common in the core of some veins. Quartz, jasper, barite and fluorite are less common.*

Five sequential stages of mineral deposition are generally recognized:

1. *Early quartz with minor amounts of pyrite, sphalerite, galena.*
2. *Uraninite-quartz (this stage may be absent)*
3. *Native silver with nickel-cobalt arsenide minerals and sometimes native bismuth with calcite or dolomite.*
4. *Pyrite, sphalerite, galena, chalcopyrite with native silver and argentite and calcite, and minor amounts of quartz, fluorite, and barite*
5. *Late-stage calcite, sometimes with barite or fluorite*

- *Repeated cycles are documented. Thickness can vary from centimetre- to decimetre-scale within distances of less than tens of metres. Veins occur as single veins or as vein sets ranging widely in size and grade, sometimes extending up to 500 metres deep. In some districts, the veins are barren at depth.*

Alteration

- *Wallrock alteration is not very conspicuous, and where present, consists of a 2 to 5 centimetres halo of calcite and chlorite alteration. The low sulphide content doesn't produce gossans at surface, but weathering can locally produce the distinctive pink erythrite coating (cobalt bloom). In the Cobalt District, chlorite alteration is evident in a distinctively spotted texture.*

Depositional/Tectonic Environment

- *These deposits occur in areas underlain by continental crust and, in some cases, appear related to basinal subsidence and continental rifting. Deposits are associated mafic and post-orogenic environments. Veins are believed to be emplaced at shallow depths in a continental setting along high-angle fault systems.*
- *Vein deposition was initially high temperature (450° C) from highly saline solutions which decreased in temperature and became more reducing through the depositional sequence. Intermittent boiling is thought to have occurred at shallow depths.*

Summary

In the Cobalt district, the distribution of the silver-cobalt veins is controlled by the contact between the Nipissing diabase sill and the metasedimentary rocks of the Cobalt Group (Gowganda Formation). The veins occur in the sill, at its contact, or in the host metasedimentary rocks within a few hundred metres from the contact. Mineralization postdates the intrusion and cooling of the diabase sills. According to Andrews et al. (1986), the sills are interpreted to provide a favourable structural host as fractures resulting from regional faulting would localize mineralizing fluids associated with deformation. Figure 7 shows a simplified geological model taken from Andrews et al. (1986).

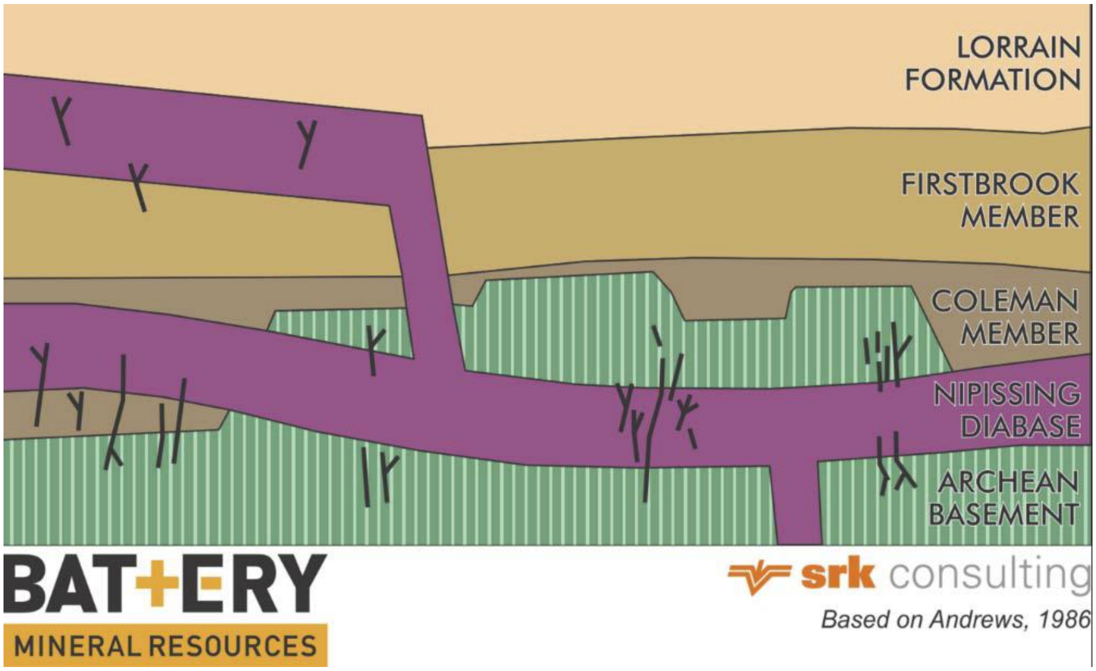

Figure 7. Simplified geological setting of silver-cobalt vein deposits. Black lines denote silver-sulpharsenide veins. The Firstbrook and Coleman members comprise the Gowganda Formation.

5 Regional Geophysics

The regional geology, magnetics and gravity for the Shiningtree Property area are shown in Figures 8,9 and 10 respectively.

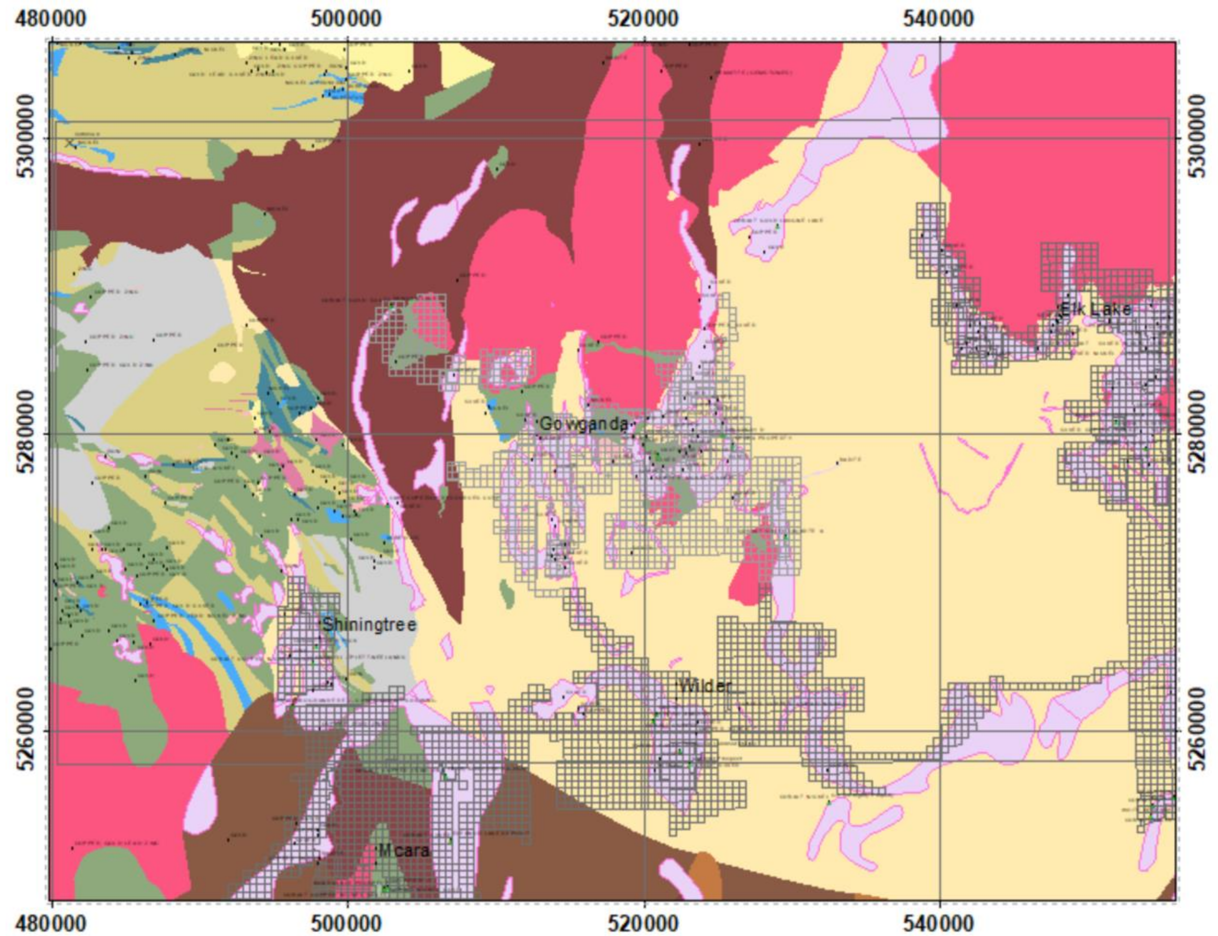

Figure 8. BMR Property Areas over OGS regional Geology with Nippissing Diabase (ND) outlined in pink.

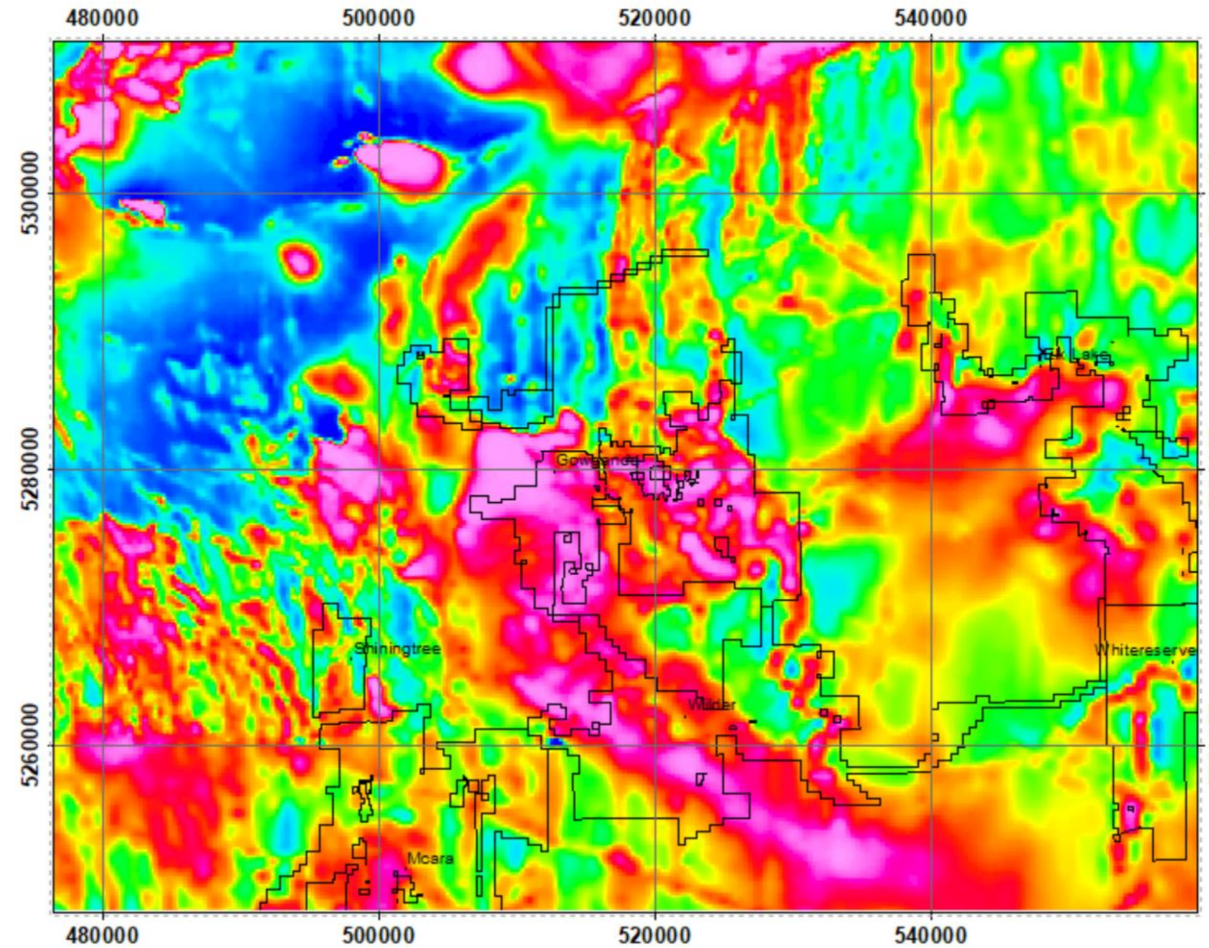

Figure 9. BMR Property Areas over OGS regional Magnetic TMI (Total Magnetic Intensity) colour grid.

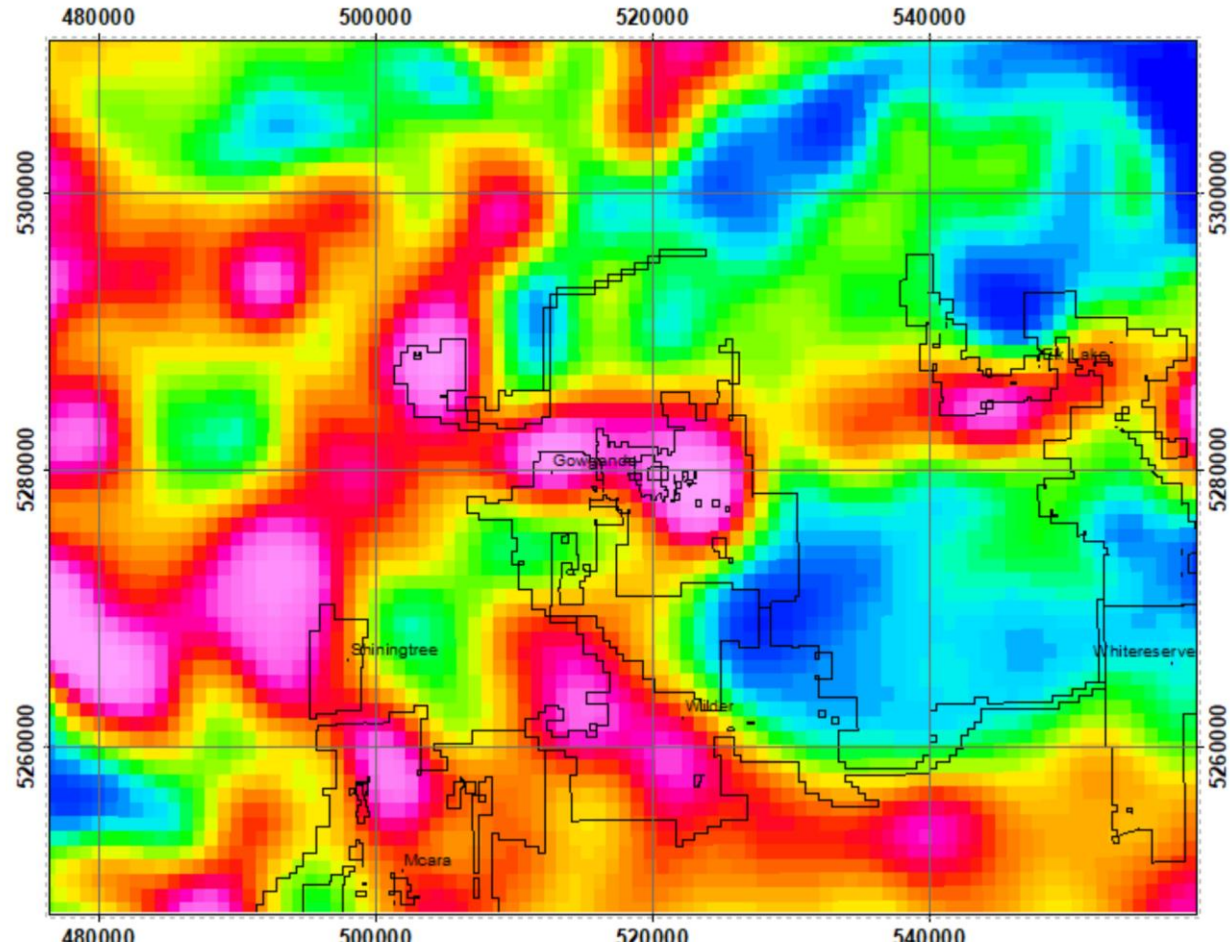

Figure 10. BMR Property Areas over OGS regional Bouger Gravity colour grid.

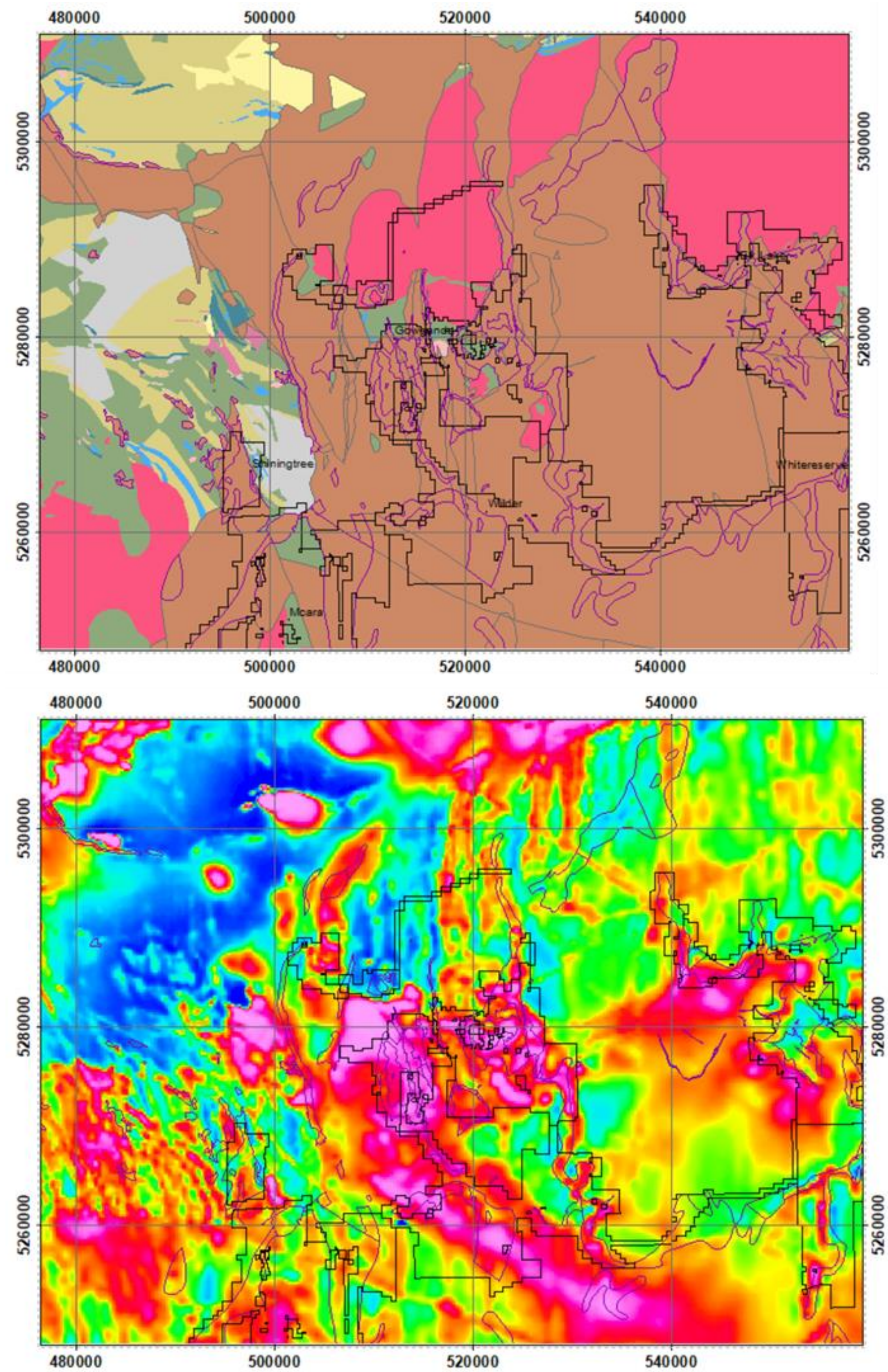

Figure 11. Property Areas with OGS regional Geology (ND outlined in purple in top figure)
Southern Province/Cobalt Embayment (brown in top figure) compare to regional TMI Magnetics (bottom).

Figure11 shows strong magnetic responses over the Cobalt Embayment. Since the sedimentary rocks of the embayment are generally non- magnetic the magnetics responses are likely from some combination of mafic dykes, Nippissing sills and dykes, and Archean basement rocks.

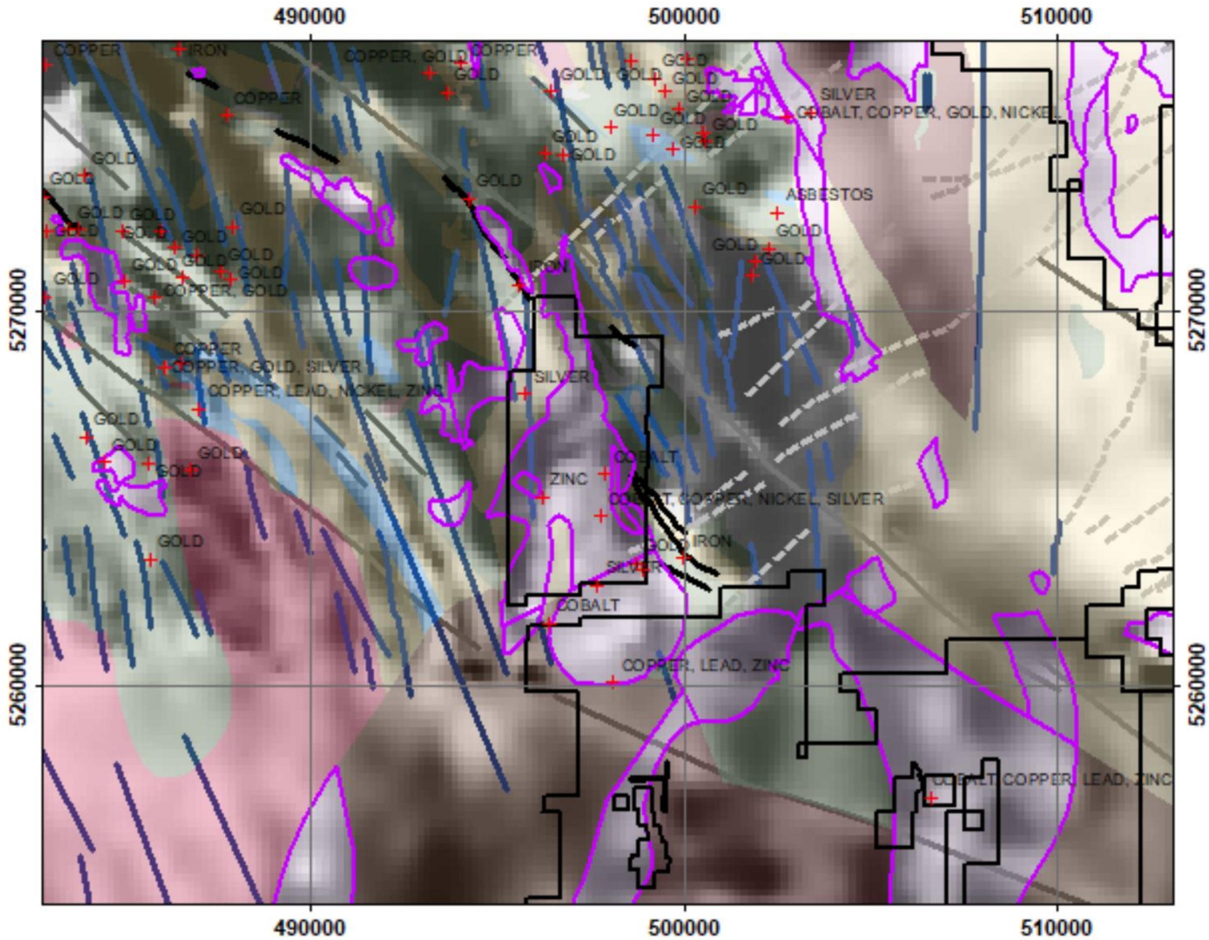

Figure 12. Shining Tree Area OGS regional Geology with dykes and ND shown overlying OGS TMI Mag greyscale.

As shown in more detail in Figure 12, in this area the ND shows up fairly well even in the regional data as higher mag (white areas) although there are numerous similar anomalies from other magnetic rock units. Non-ND dykes and dyke swarms are prominent in some of the low mag background/felsic intrusives. Note that there are significant features in the magnetic data that is not well matched in the regional geology at this scale.

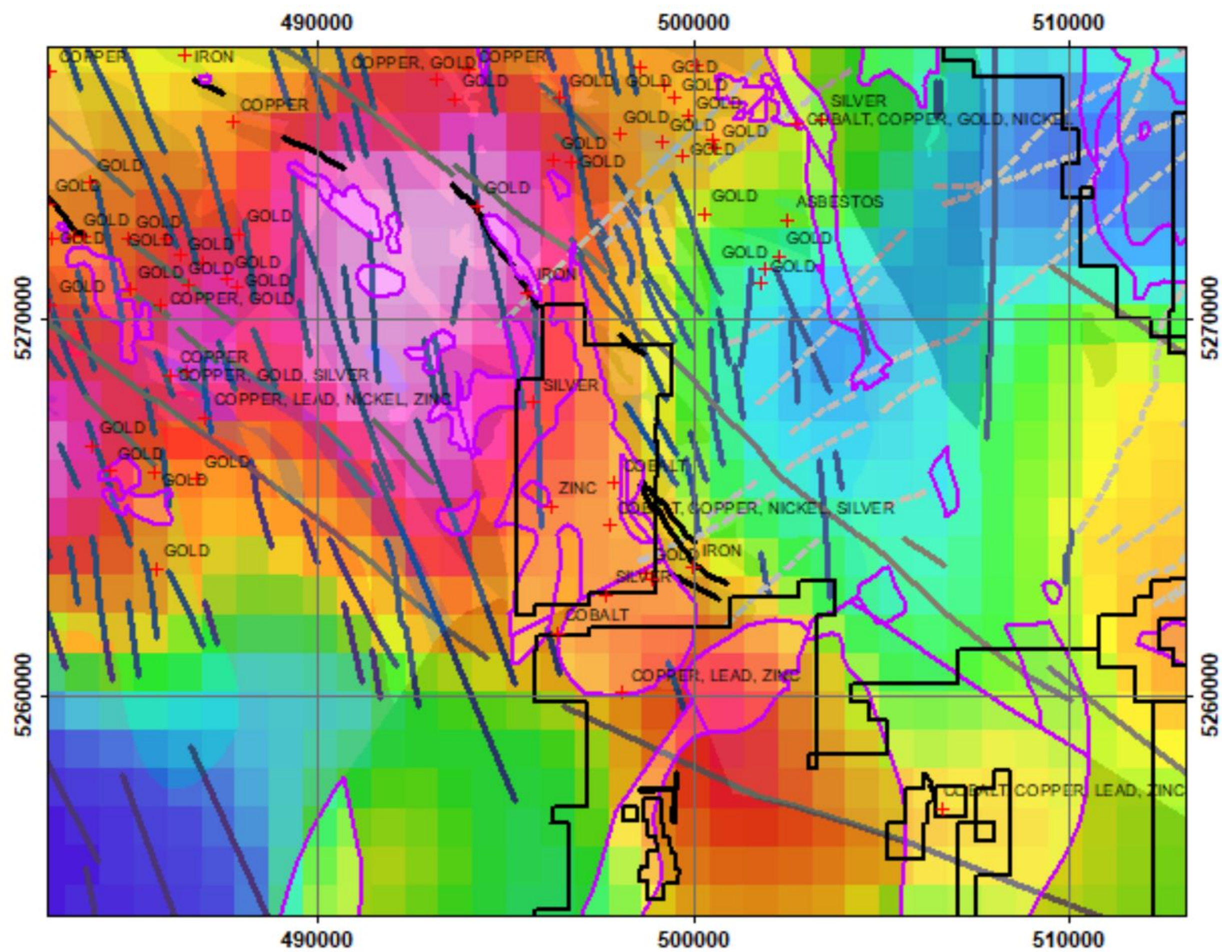

Figure 13. Shining Tree Area OGS regional Gravity colour grid with OGS 2011 MDI mineral occurrences, ND outline ad OGS dykes.

As has been observed throughout the Cobalt embayment there is an association between Silver/Cobalt occurrences and areas of higher gravity. As can be seen by comparing Figure 13 gravity with the previous geology maps, higher regional gravity values appear to be associated in general with greenstone belts in Archean basement There may also be some higher gravity effects from possible deep feeders to the ND, or from variations in depth to denser Archean basement.

A key observation from the regional data is that the mapped five element Ag-Co/Co-Ag veins seem to be associated with the regional gravity anomalies which in turn appear to be due mainly to Archean greenstone belts both exposed at surface and buried under the Huronian. This suggests that the presence of 5 element Ag-Co/Co-Ag veins in the Huronian is somehow associated with underlying Archean greenstone belts. This makes the regional gravity a valuable regional exploration guide and also may contribute to a better understanding of the genesis of this poorly understood deposit type.

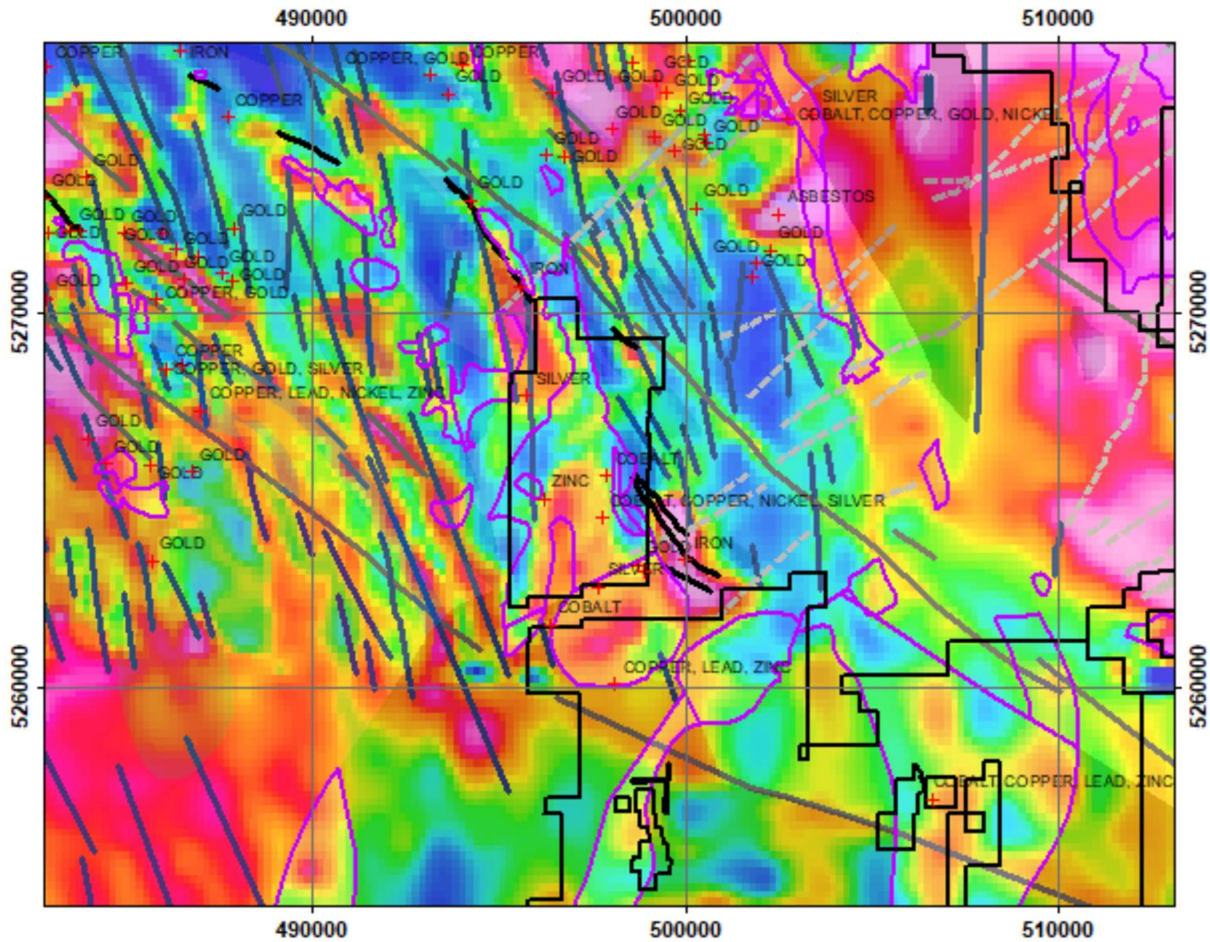

Figure 14. Shining Tree Area OGS regional Magnetic colour grid with OGS 2011 MDI mineral occurrences (symbolized by +), ND outline and OGS dykes.

In the regional magnetic data, there are broader areas of higher magnetic values over the generally non-magnetic Huronian rock. This could be due to magnetic ND as well as probable greenstone belts or other mafic/UM rocks in the Archean basement underlying the Huronian sediments. The numerous mafic dykes that crosscut the area show up as prominent magnetic linear features.

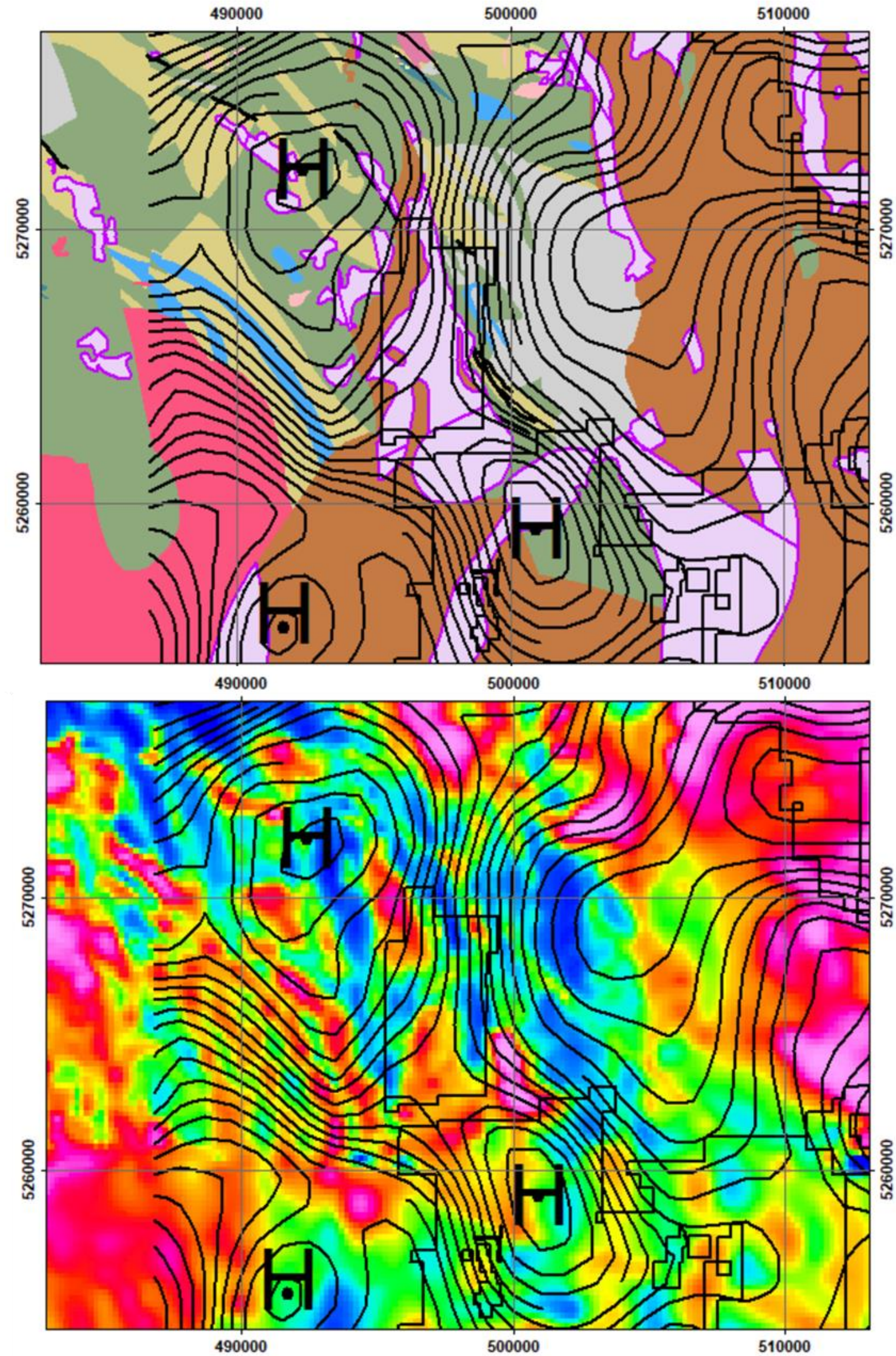

Figure 15. Shining Tree Area Gravity contours over geology (top) and Mag TMI (bottom).

The general large-scale correlation between large mag highs and gravity highs shown in Figure 15 suggest large volumes of magnetic and dense rocks (M/UM rocks) under the Huronian. These are likely Archean Greenstone (GS) belts or mafic intrusions with possibly some contribution from feeders to the ND. The ND sills themselves, are not usually thick enough to have large response in the regional magnetic or gravity data.

5.1 Available OGS AEM/Mag Surveys

The Shining Tree Property is covered by the 1990 Shining Tree (ST) Area Geotem AEM/Magnetic survey. Specifications for this survey were as follows:

GDS1003 Shining Tree Area. Survey Completed 1990 and Published 06/01/2003

Surveyed for the OGS and Released by the OGS

EM Survey Type: Geotem II TDEM

Mag Type: total field

Line km: 20805

Line Spacing: 200m

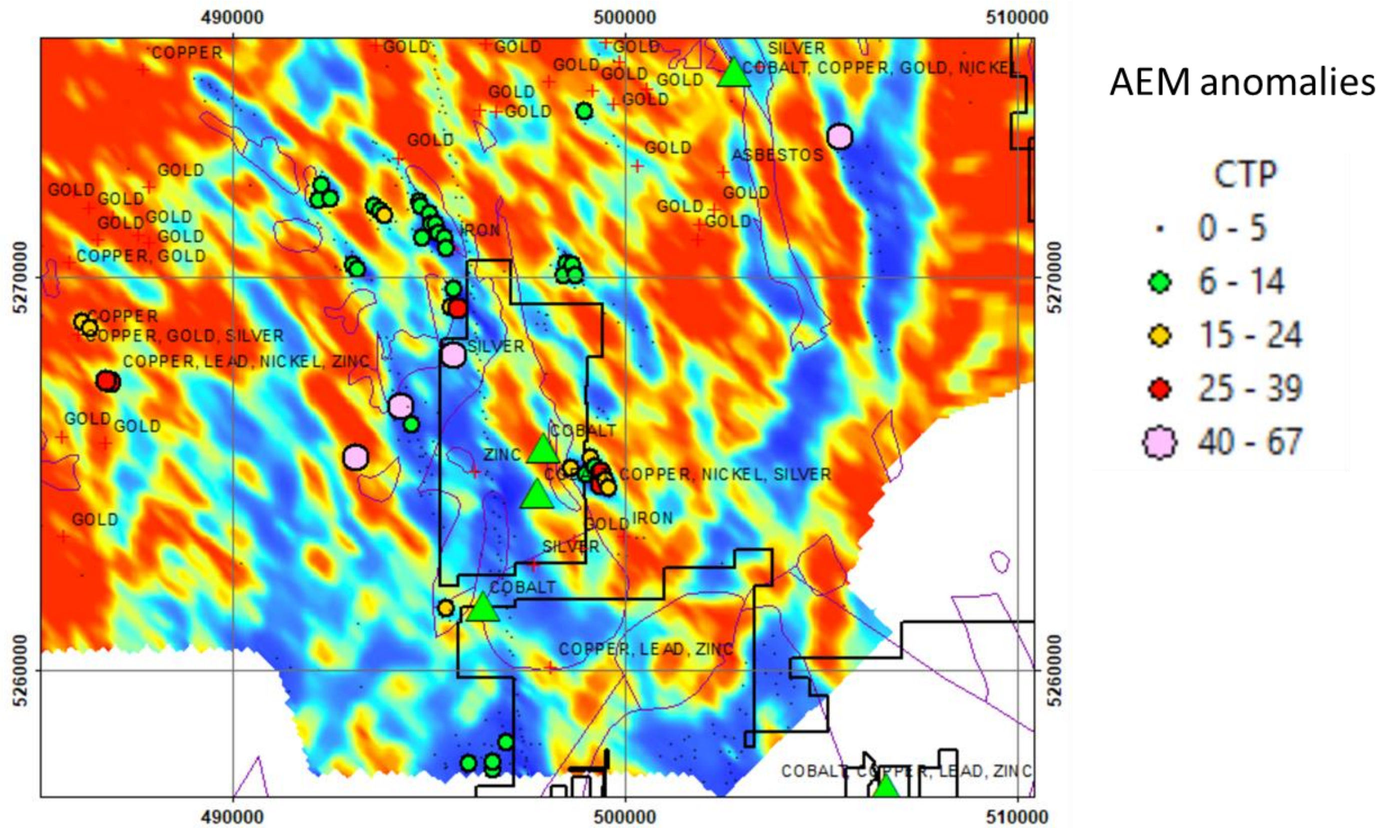

Figure 16. BMR Shining Tree property area - ST Geotem AEM anomalies over Geotem Resistivity (Blue is low Res) with outline of ND in purple.

The Geotem AEM anomalies and Resistivity image shown in Figure 16. Large low resistivity (blue) areas are likely mostly due to surficial features such as lakes, swamps and conductive overburden, although some more linear resistivity lows may be due to formational bedrock conductors. The discrete AEM anomalies are likely to be discrete bedrock conductors.

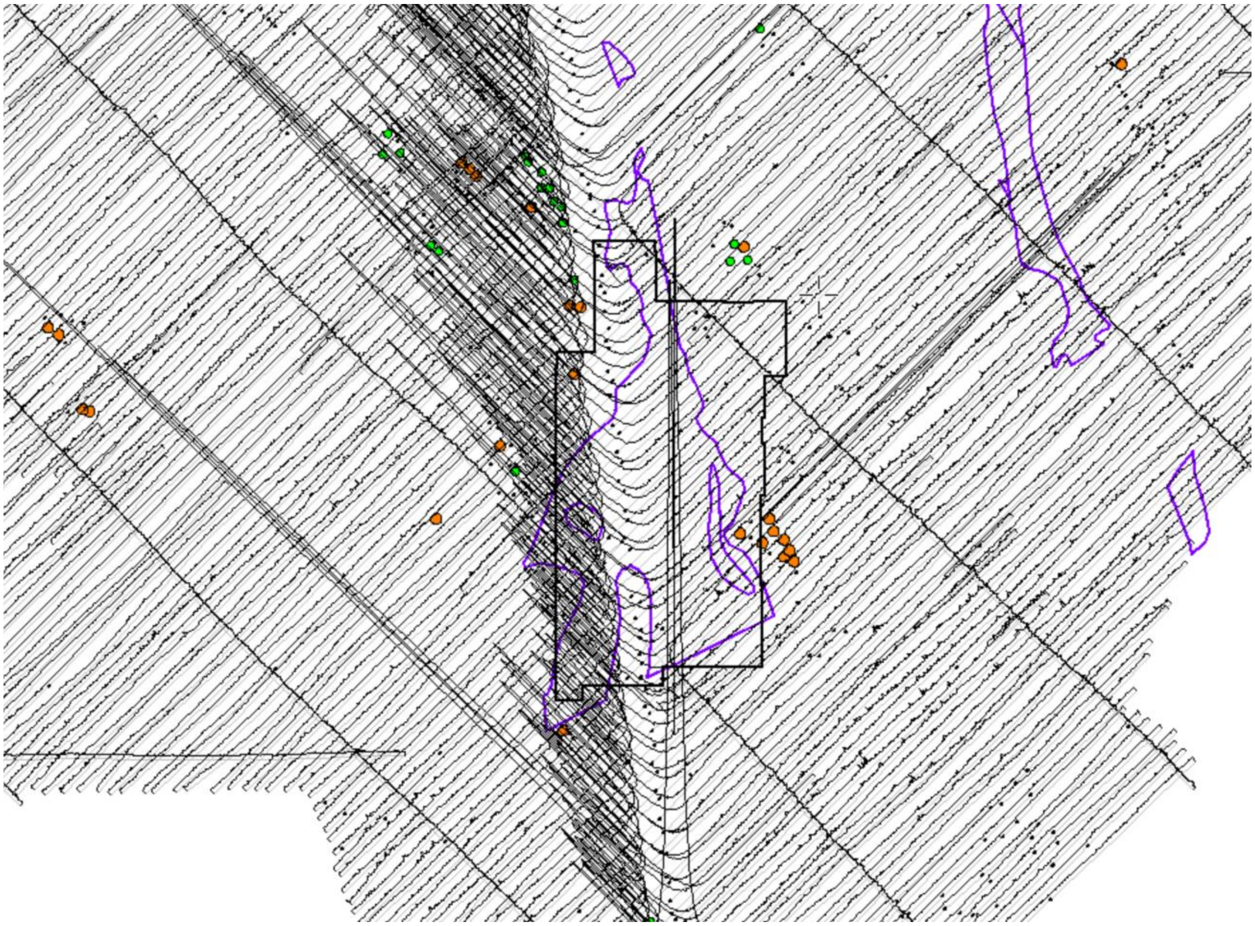

Figure 17. Shining Tree Area ST Geotem AEM anomalies with profiles of 60Hz power line monitor.

As shown in figure 17 The Geotem AEM response is dominated by powerline noise on the west side of the Shining Tree property and so is not capable of detecting geological conductors in this area.

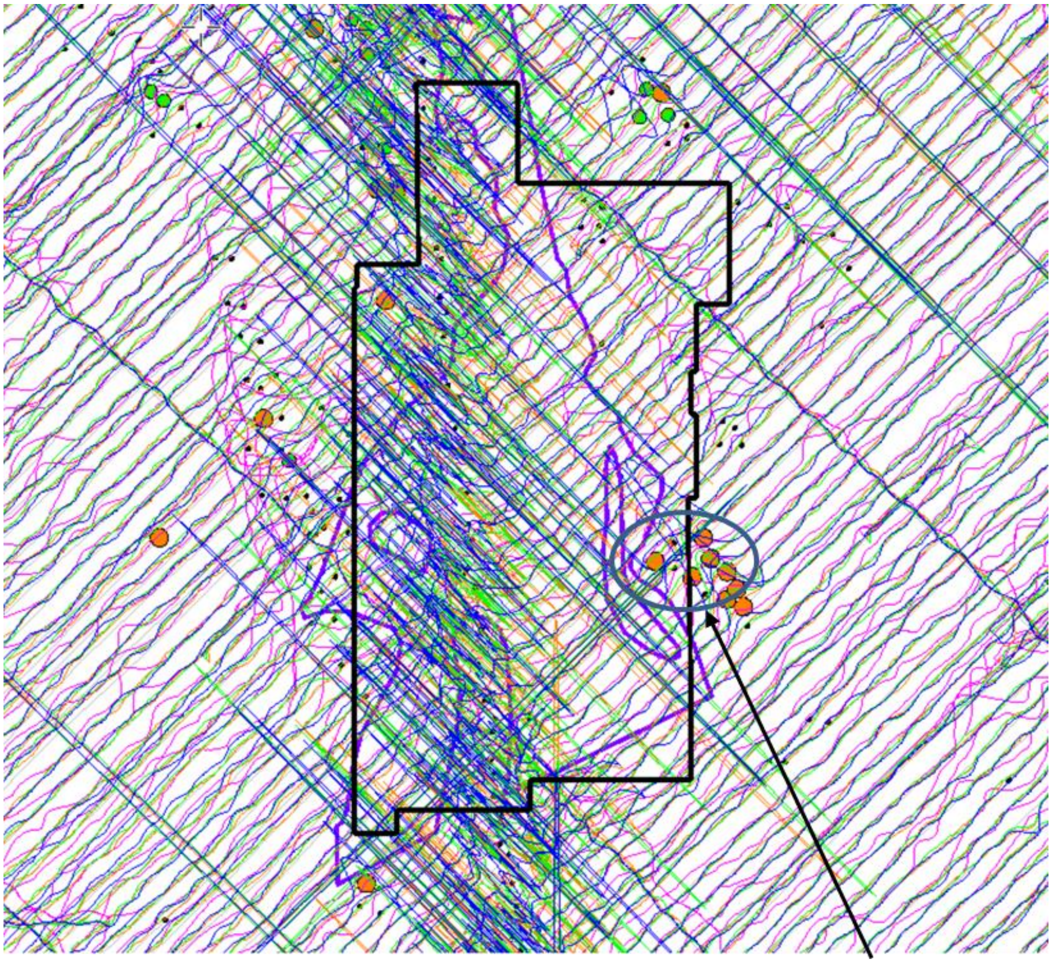

Figure 18. Shining Tree Property Area ST Geotem AEM anomalies with Geotem Channel 4,8,12and 20 profiles with ND outline in purple. The arrow points to an AEM anomaly group on the flank of the powerline anomaly.

A few small. discrete anomalies or anomaly groups on or near the property are apparent in the Geotem profile data as shown in Figure 18 but, the signal in the immediate vicinity of the powerline is dominated by noise.

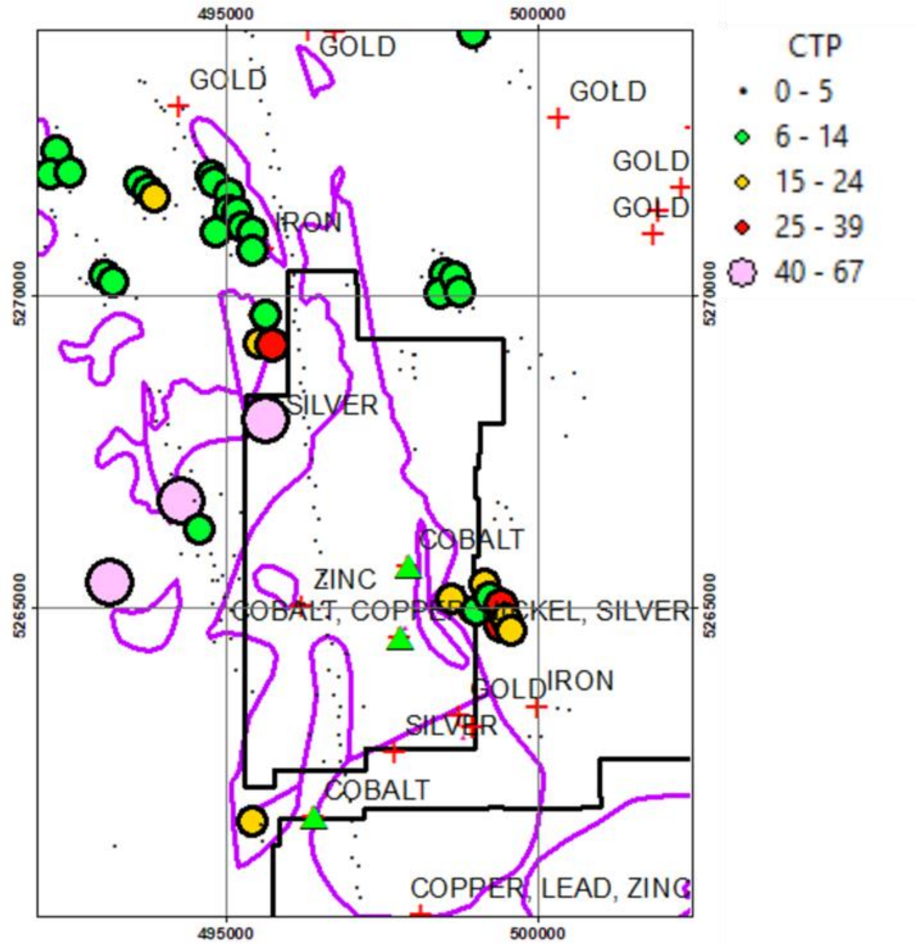

Figure 19. OGS ST Geotem AEM anomalies over BMR Shining Tree Property with OGS MDI occurrences (all MDI locations indicated by +) and OGS MDI Cobalt location indicated by green triangles.

Figure 19 shows significant (coloured = CTP >5 S) AEM anomalies which should be associated with bedrock conductors. AEM anomalies near known Ag or Co occurrences will be of particular interest.

Regional Geophysical Work by BMR (from SRK 2019)

- *BMR has conducted exploration work since 2017 on properties located in the Cobalt district of eastern Ontario and western Quebec (including some properties not included in this report). A general summary of the regional work done was given in Table 42 in the* SRK 2019 report which is shown in Figure 20.

- *In late 2016, BMR contracted Precision GeoSurvey Inc. of Langley, BC, to conduct a detailed airborne magnetic and radiometrics survey of all the BMR properties, including Shining Tree. The overall survey comprised 10 separate blocks.*

- *Magnetic data was collected using a cesium vapour magnetometer and radiometrics data was collected using a 21-litre crystal gamma ray spectrometer. All survey blocks were flown at 100-metre spacing, with tie lines at 1000-metre spacing flown perpendicular to the survey lines. Line* *orientation varied by project. In general, lines were flown at approximately 40 metres elevation, unless cultural features did not allow. (Precision GeoSurvey, 2016).*

- *In 2018, a LiDAR survey of all claim blocks was contracted to Airborne Imaging of Calgary, Alberta.*

Table 42: Summary of Regional-scale BMR Geophysical Surveys

Property	Survey Year	Survey Type	Contractor	Coverage	Specifications
McAra, Gowganda, Fabre, Shining Tree, Elk Lake, Wilder, White Reserve, White Lake	2016	Airborne Mag & radiometrics	Precision GeoSurveys	For claims blocks included in this report: 10,242 line-km	MAG: Scintrex CS-3 Cesium magnetometer; Configuration Stringer with 3 axis compensation; Sample Rate 10 Hz; Sensitivity: 0.0006 nT vHz rms. SPECTROMETER: Pico Envirotec GRS-10 Gamma Spectrometer. Downward-Looking Crystals: 16.8 litres of NaI(Tl) crystals; Upward-Looking Crystals: 4.2 litres of NaI(TL) crystals; Sample Rate: 1 Hz. Line spacing: 100m. Tie line spacing: 1000 m. Survey height: ~40 m (except 166 m for the Fabre).
McAra, Gowganda, Elk Lake, Otter, Wilder, White Reserve, White Lake	2018	Airborne Mag and radiometrics	Precision GeoSurveys	13,893 line-km	MAG: Scintrex CS-3 Cesium magnetometer Configuration Stringer with 3 axis compensation; Sample Rate 20 Hz; Sensitivity: 0.0006 nT vHz rms; SPECTROMETER: Pico Envirotec GRS-10 Gamma Spectrometer. Line spacing: 100m. Tie line spacing: 1000 m.
All Properties	2018	LiDAR	Airborne Imaging	1,266.54 sq km	LiDAR System: Leica ALS70; Flight Height: 1200 m; Flying Speed: 150 Knots; Pulse Rate Rep: 400 kHz; Scan Frequency: 47 Hz; Scan Angle: 50 degree; Side Lap: 50%; Point Density: 8.3 pts/m2; Number of Returns Recorded: Max 4.

Property-scale ground magnetometer, spectrometer, 2D IP, and 3D IP were contracted to Canadian Exploration Services Limited (CXS) of Larder Lake, Ontario, and are described for each property in the relevant sections. The general survey parameters are outlined below in Table 43.

Table 43: Ground Geophysical Survey Specifications

Survey Type	Specifications
Ground magnetometer	GSM-19 v7 Overhauser magnetometer with a second GSM-19 magnetometer as base station mode for diurnal correction. Samples taken at 12.5 m intervals
2D IP	Pole-Dipole,
3D IP	50 m current injection interval. Twenty 2-channel Full Waver IP receivers were employed for the 3D IP survey. The transmitter consisted of a GDDII (5kW) with a Honda 6500 as a power plant. Two current monitors were connected to the transmitter to record the current transmitted; one to record each 90s transmit and the second to continuously record throughout the day, as a backup.

Figure 20. BMR Geophysical surveys from Battery Mineral Resources Ltd. Technical Report (SRK 2019).

6 Shining Tree Property Scale Exploration and Geophysics

(from SRK 2019)

Pre-BMR Exploration

Many occurrences were found all along the eastern portion of the Nipissing diabase and several shafts and pits were sunk. A shaft was sunk at the Caswell-Eplett-Neelands and extensive *stripping and trenching continued in the area. Drilling took place there in the 1950s. At the Sullivan (Saville) showing, drilling took place in the 1970s along with geological, geochemical, and geophysical surveying. Work continued in the 1990s on the Caswell-Eplett-Neelands occurrence with mechanical stripping and rock sampling.*

BMR Exploration

BMR's geophysical work focused on covering three grids over known mineral occurrences with 3D IP. Specifications for these surveys are provided. in Table 43 from the SRK 2019 report which is shown in Figure 20 above. Rock samples were taken to ground-truth the mineral occurrences and sample results are given in Table 5.

Additional specifications on the geophysical surveys on the property are provided in Table 4 below.

Table 3. BMR Shining Tree Exploration Activities.

Survey Type	**Total**	**Significant Results**
Prospecting, mapping, and ground truthing of geophysical anomalies	41 traverses for 133.1 line-km	location of historical workings and occurrences: mineralization commonly hosted in Nipissing diabase, spatially associated with Huronian/Archean unconformity
Rock sampling	21 samples	max 0.55% Co (R0630)
Reprocessing and interpretation of historical geophysical surveys		target generation

- *From July 2 to August 17, 2018, BMR geologists prospected some of the known mineral occurrences, AMIS features, electromagnetic anomalies, and geological areas of interest. The objective of the work was to locate cobalt occurrences, ground truth geophysical features, and verify the regional geological maps. The data was used to plan the follow-up surveys and drilling.*
- *The known mineral occurrences were observed and locally sampled, OGS Abandoned Mines Information System-AMIS sites were checked for mineralized zones, airborne electromagnetic (AEM) anomalies were ground checked, and the geological map was verified. As the historic records indicate, a significant amount of cobalt was noted in veins in the Nipissing diabase. Many of the AMIS features were trenches or pits near the Archean contact.*
- *In 2018 historic airborne electromagnetic (AEM) data were reprocessed and interpreted by Geoscience North Ltd. of Sudbury, Ontario. These electromagnetic data were ranked and*

exported as shape files. The high-ranking AEM anomalies were checked in the field to determine if their sources were outcropping and represented rock features or were cultural anomalies.

- *The electromagnetic anomalies in Archean rocks were confirmed to be iron formations with graphite and/or massive sulphides.*
- *Many of the known cobalt occurrences were located and some of the electromagnetic anomalies were verified as non-formational and non-cultural and hence of possible interest. The LiDAR data effectively outlined outcrops and some larger historic trenches and pits. The existing geological maps were confirmed to be mostly accurate.*
- *In the winter of 2019 three 3D Distributed Array Induced Polarization Surveys were completed over the eastern portion of the Shining Tree block as shown in Figure 21..*

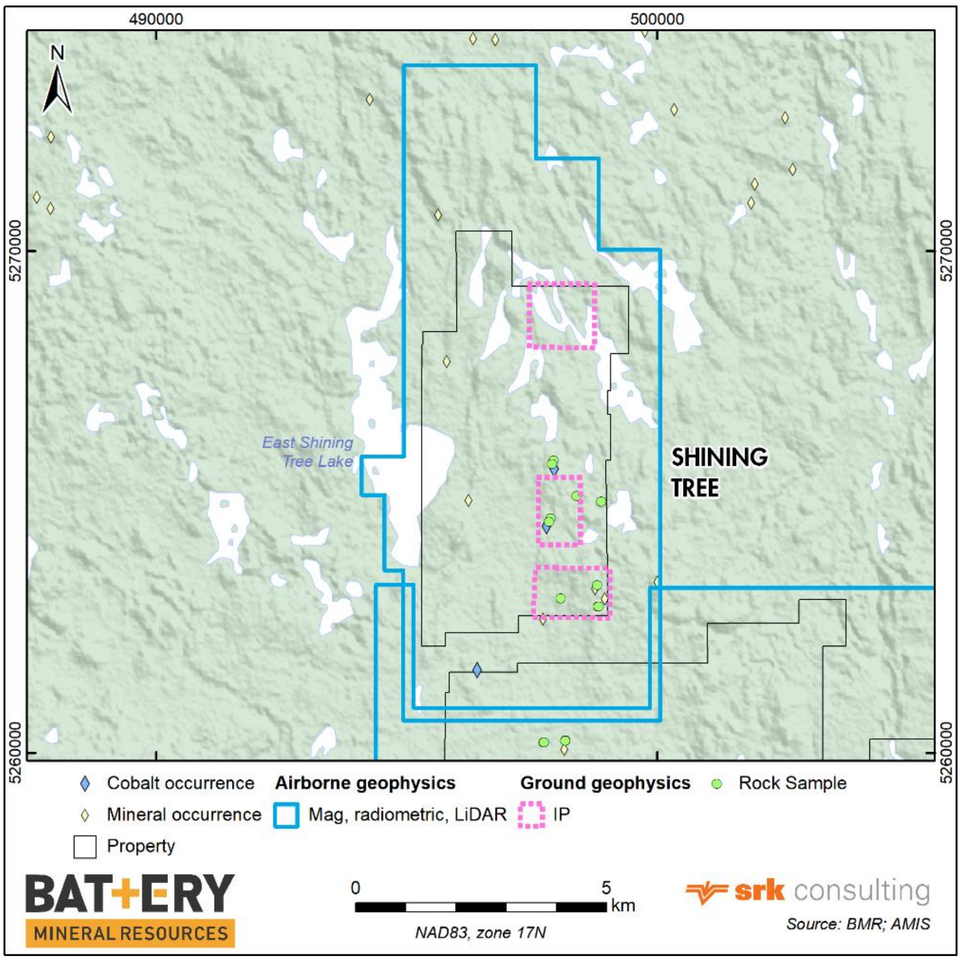

Figure 21. BMR Exploration Activities on Shining Tree Project.

Table 4. Summary of BMR Geophysical Surveys on the Shining Tree Project.

Property/ Zone	Survey Date	Survey Type	Contractor	Project File number	Coverage	Survey-specific Parameters
Shining Tree	2016 & 2018	Airborne Mag & radiometrics	Precision GeoSurveys			Mean Flight Height: 41.29 m; Survey Line Direction 090°/270°; Tie-Line Direction: 000°/180°.
Shining Tree	2018	LiDAR	Airborne Imaging Inc.		25.5 sq km	
Saville	Jan-19	3D IP	CXS	Q2582	footprint 1.26 sq km; 11.4 line-km	inversion model up to a depth of 480 m
Shining Tree Central	Jan-19	3D IP	CXS	Q2593	39.25 line-km	injection interval of 50 or 100 m. Inversion model up to a depth of 410 m
Shining Tree North Grid	Feb-19	3D IP	CXS	Q2594	Footprint 1.38 sq km; 12.9 line-km	inversion model up to a depth of 410 m

Table 5. Shining Tree Significant BMR Grab Sample Results.

Sample	Easting	Northing	Rock Description	Ag ppm	As ppm	Bi ppm	Co ppm	Cu ppm	Ni ppm
R0710			**Calcite vein (with minor quartz) mineralized with chalcopyrite cutting through the Nipissing diabase**	**12.75**	**305**	**4.51**	**84.2**	**9.60%**	**162**
R0049	**498809**	**5262912**	**Carbonate vein in diabase mineralized with erythrite**	**148**	**5500**	**441**	**2900**	**51.6**	**1160**
R0616	**498078**	**5263075**	**Quartz-carbonate vein with pink mineral along vein margins (possibly erythrite).**	**1.36**	**3420**	**12.6**	**2500**	**158**	**411**
R0630	**497875**	**5264671**	**Erythrite-bearing carbonate vein 5-10 cm wide) along pit wall.**	**7.37**	**9490**	**107.5**	**5490**	**36.2**	**2770**

7 Shining Tree Project Drilling

From SRK 2019

- *A location map showing the Shining Tree drill collar positions, all from historical drilling, is presented in Figure 22.*

Pre-BMR Drilling

- *United Reef and Petroleum drilled six shallow holes in 1971 and three in 1975. These holes are located at the southeastern corner of the Shining Tree claim block, near the Archibald/ Sullivan showing and gave the following significant results (from Shining Tree Assessment file 41P10SW0113 and 114):*
- *URX-71-2: 257.1 g/t silver and 0.38% cobalt over 0.15 m*
- *URX-71-3: 68.6 g/t silver and 0.25% cobalt over 0.15 m*
- *There has been no drilling by BMR on the Shining Tree Property to date.*

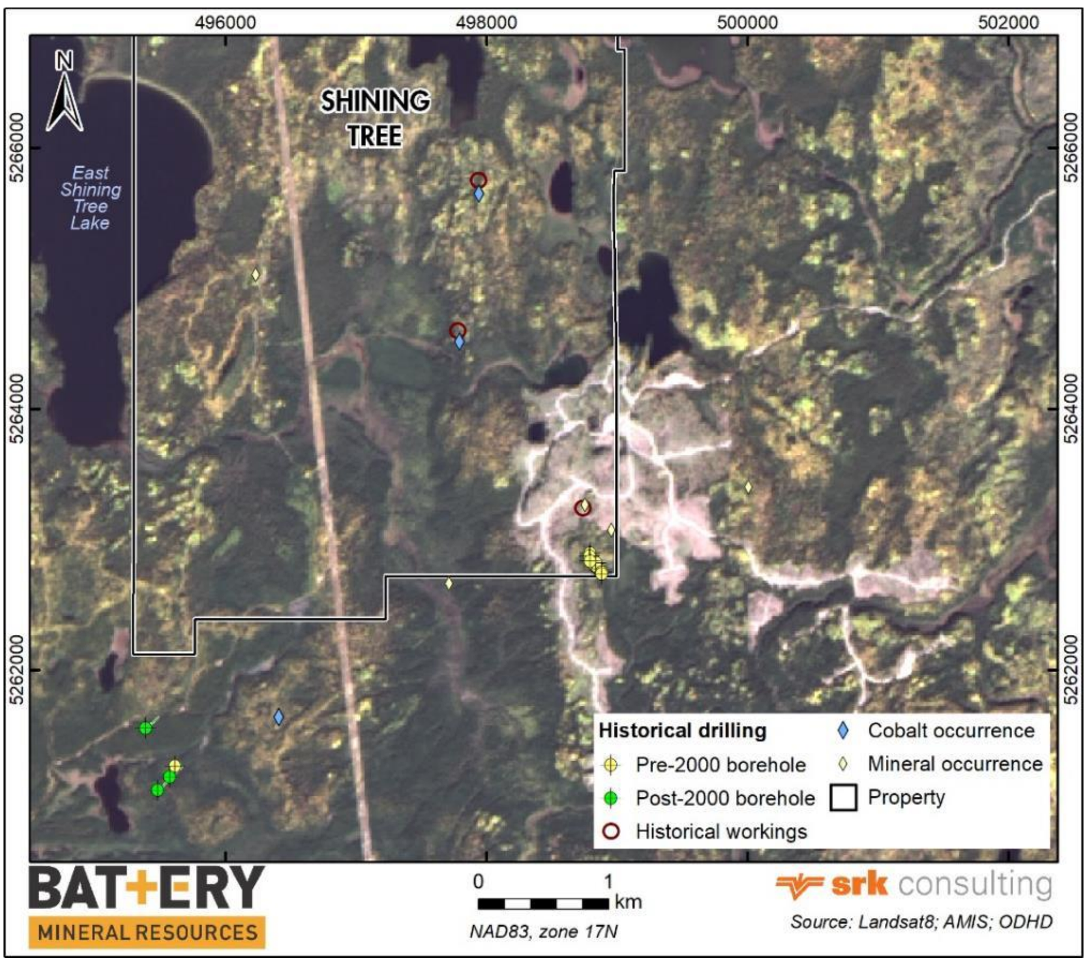

Figure 22. Shining Tree project drillhole location map.

8 Property Area BMR Geophysical surveys

8.1 Magnetic surveys

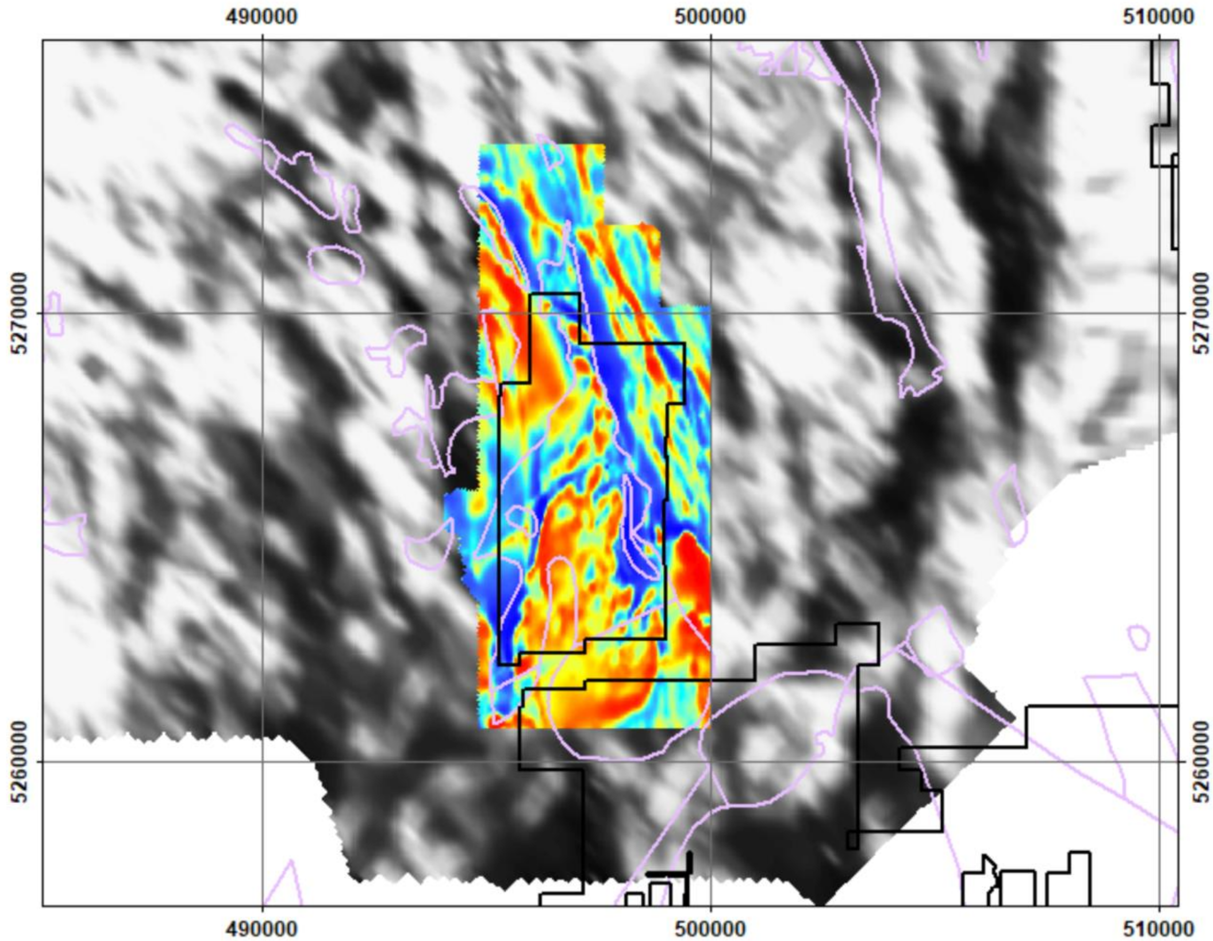

Figure 23. Shining Tree Property Area Mag TMI surveys consisting of OGS Shining Tree Area Geotem/Mag Survey, Line Spacing - 200m (greyscale) and 2016 TMI Mag survey by Precision (inset colour image).

As shown in Figure 23 the magnetic response of the Nippissing sills/dykes are clearer in the detailed aeromag data over this property

In order to do more advanced processing and modeling of the property scale aeromagnetic data it is necessary to determine if there is any strong remanent magnetization in the survey area. This is done by comparing the Total Magnetic Intensity (TMI) mag and the Mag Analytic Signal (Mag AS) results is shown in Figure 24.

Remanent magnetization is magnetization that is “frozen” into the rock when it cools below the Curie point and is fixed in strength and direction with respect to the rock. The more common induced magnetization is caused by the current earth’s magnetic field inducing a magnetic response in magnetically susceptible rocks. Induced magnetization is in the direction of the current earth’s magnetic field and is proportional to the magnetic susceptibility of the rock. Strong remanent magnetization is more common in younger rocks but can occur in older mafic intrusive rocks as well and requires special processing to produce some more advanced products such as Reduced to the Pole (RTP) maps and 2D or 3D models. Also we know from the paleomagnetic literature that we can expect some remanent magnetization in the ND intrusives.

The Mag AS processing compensates for all variations in magnetization direction such as variations due to latitude and remanent magnetization. However, it also emphasizes shallow magnetic features at the expense of deeper features. The Mag AS data was generated mainly to check if there were any strong remanent magnetic effects in any of the rocks.

Since the Mag AS values are +ve (red-pink) for any direction of higher magnetization, any areas where there are strong mag lows (blue) in the TMI mag and highs in the Mag AS are indicators of possible strong reversed mag remanence, or any zones with a mag remanence direction strongly divergent from the current direction of the earth's magnetic field. There can be strong +ve mag remanence as well but this will mostly just add to the induced magnetic signal and show up as a higher magnetic susceptibly. Remanent magnetism can be a useful indicator of particular rock units, but strong remanence can also make some mag processing, such as reduction to the pole and the usual mag susceptibility inversion methods, problematic unless taken into account explicitly.

The Mag AS product is relatively independent of changes in direction of the magnetic field due to remanent magnetism or latitude. Hence all areas of strong magnetization show up as positive (red) anomalies in the Mag AS image. Comparing the TMI mag and the Mag AS in Figure 23 it is apparent that there are areas of strong remanent magnetism. This is expected as the ND sills have a well documented moderate to strong remanent magnetization. For 3D modeling the presence of remanent magnetization. requires us to use methods that specifically handle remanent magnetization such as the Geosoft MVI 3D magnetization inversion software as opposed to the usual mag susceptibility inversion methods.

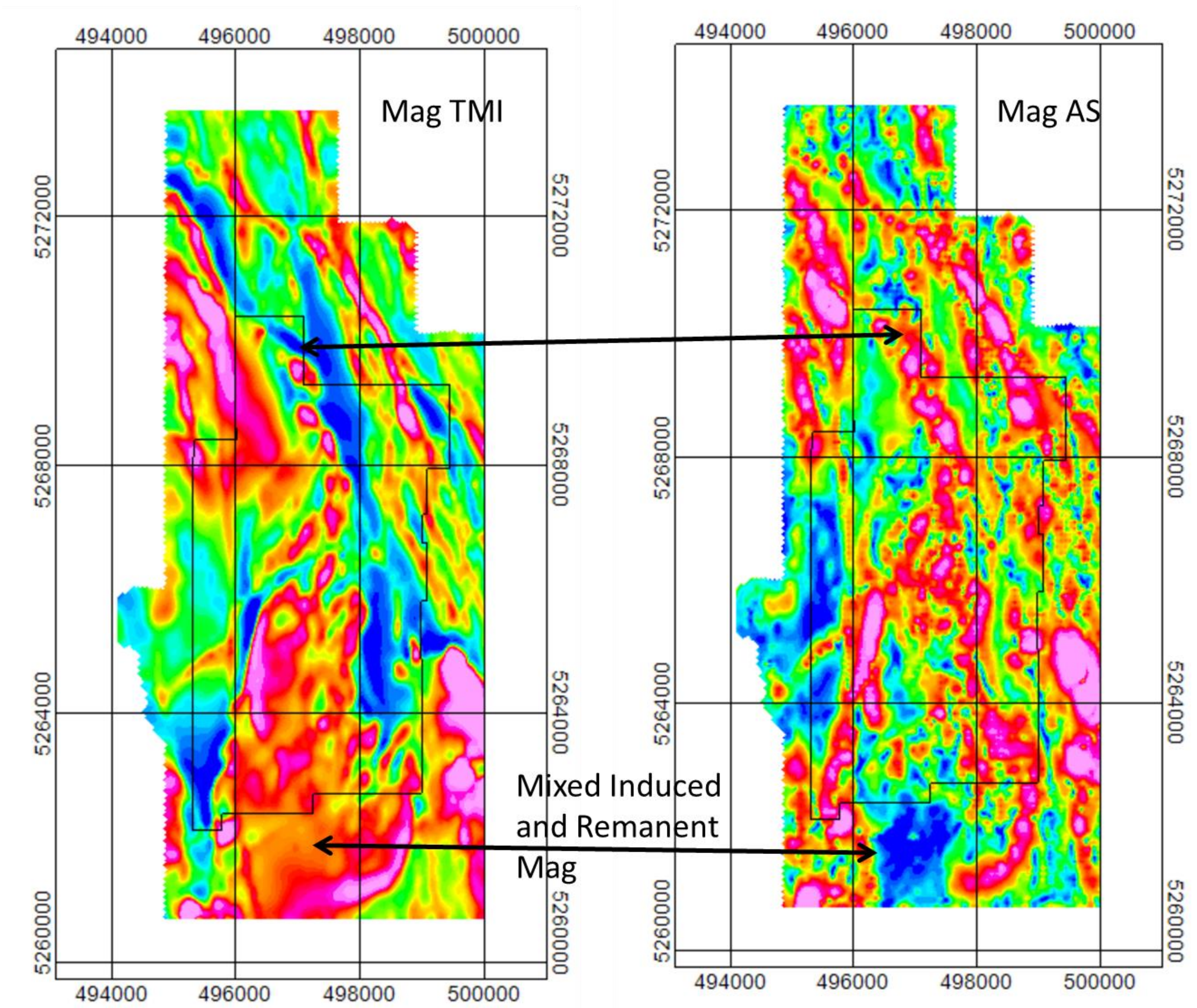

Figure 24. Mag TMI and Mag AS products that can be used to locate strong remanent magnetism. Black arrows show areas of probable strong remanent magnetism.

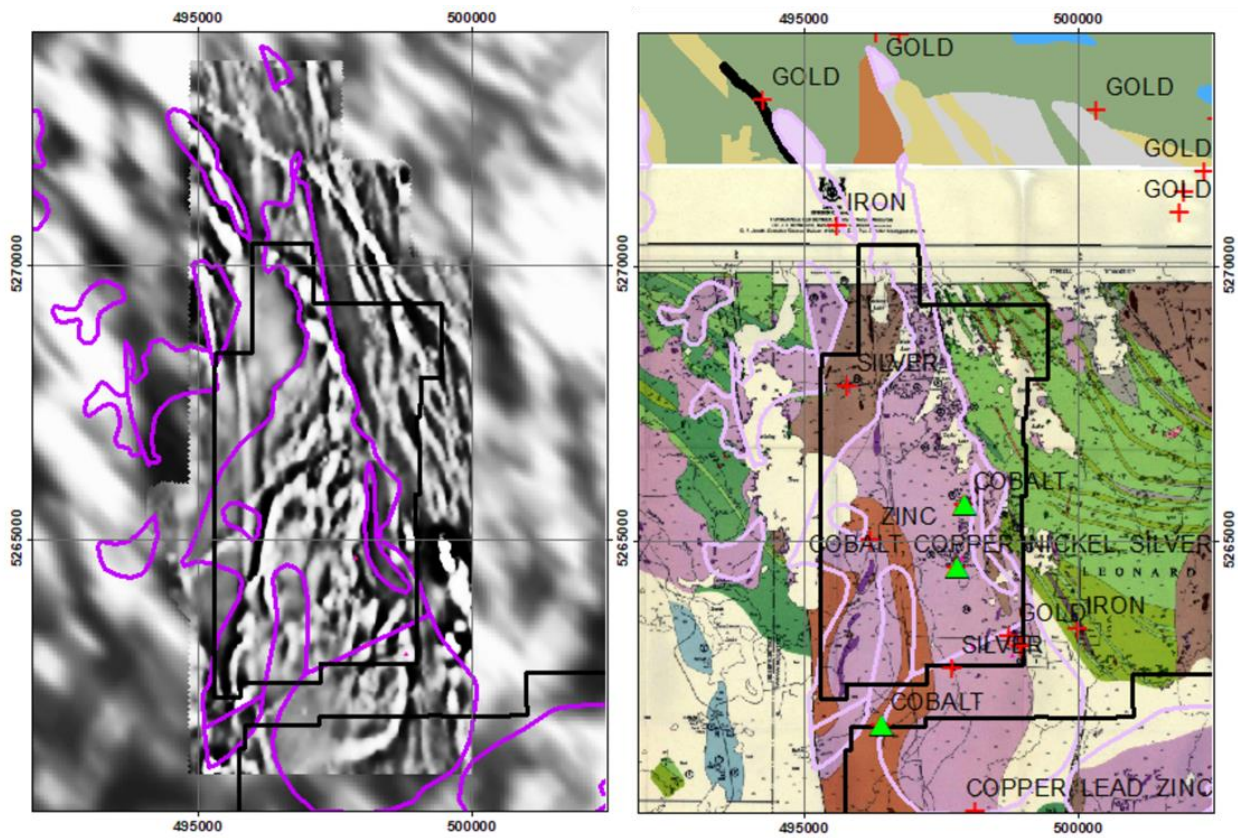

Figure 25. Mag CVG (greyscale, left) Precision Mag data inset into regional CVG Mag data and OGS Regional Geology (right).

The magnetic image that most directly maps the distribution of the ND is the Mag Calculated Vertical Gradient (CVG) as shown in Figure 25, where the ND sills and dykes usually show up as strong linear edge anomalies and variations in texture over the flat lying sills. However, the magnetic signature of the ND is not unique and geological control is important in fully delineating the distribution of the ND.

3D magnetic inversions were done with to the usual mag susceptibility inversion methods to get the best resolution in the majority of the background lithologies which have only induced magnetisation and then with the Geosoft MVI 3D magnetization inversion software to handle the magnetic remanence In the ND rocks. The results are shown in Figure 26.

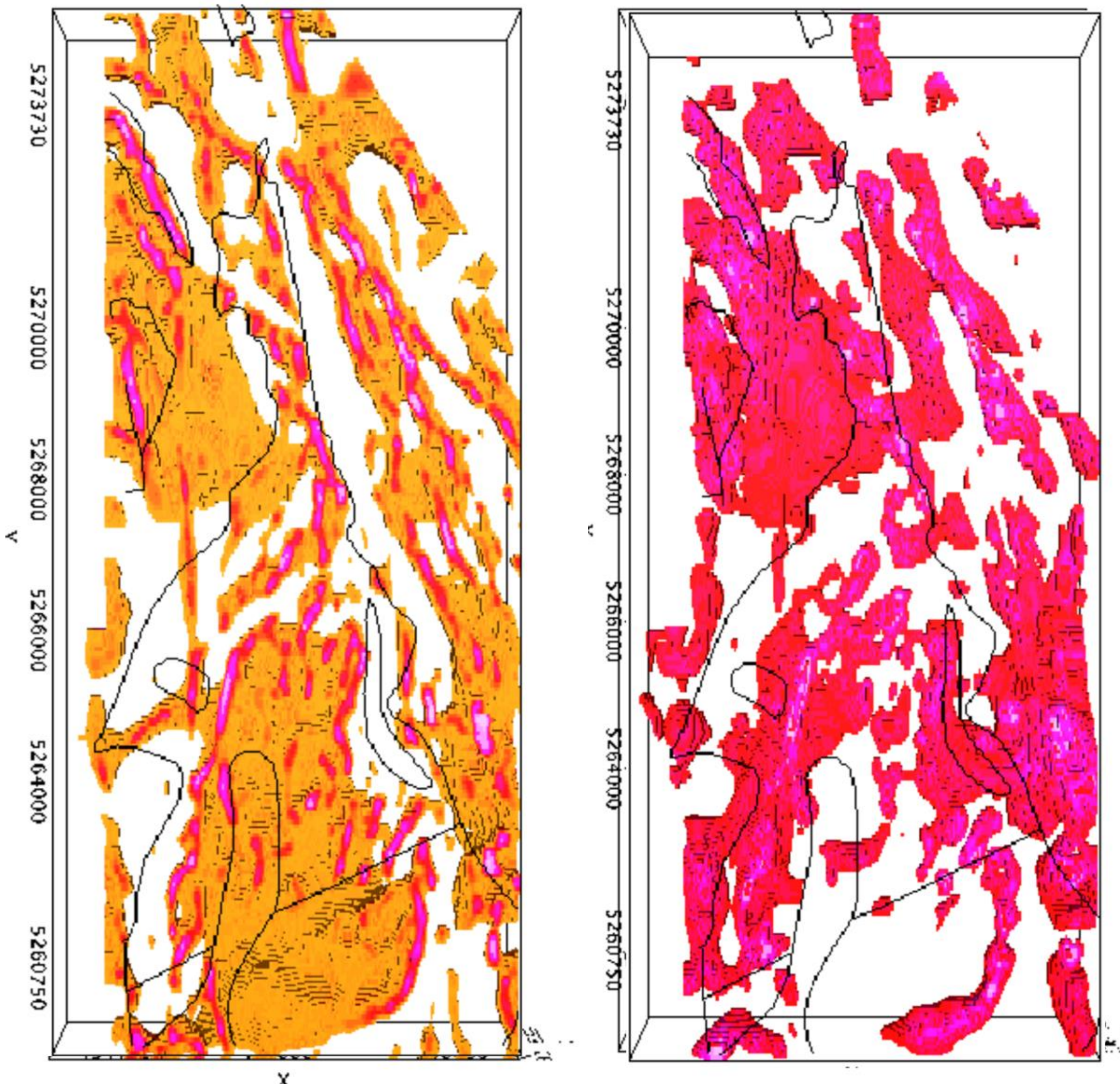

Figure 26. Left – Voxi Mag susceptibility (Susc.) inversions of 2016 Precision Mag survey, with low cutoff at 0.001 SI shown. Right – Voxi MVI Magnetization inversion, with low cutoff 0.005 Magnetization units shown.

It was hoped that the 3D inversions would help image the ND sills and dykes but high background magnetic responses and a lack of uniqueness in the ND magnetic response prevents us from unequivocally imaging the ND intrusions in either the Mag Susc or MVI inversions. This is also partly due to the ND intrusives being only moderately magnetic and the sills being relatively thin.

8.2 Radiometric surveys

As shown in Figures 27 to 30 the total radiometric response correlates with large scale geological units, but is strongly affected by topography and lakes as well. This is due to the fact that gamma radiation from the ground only penetrates about 0.5 to one meter of material and hence is strongly affected by near surface conditions. In particular, lakes and swamps will block most gamma radiation and the gamma response of transported overburden will often dominate over that of underlying bedrock.

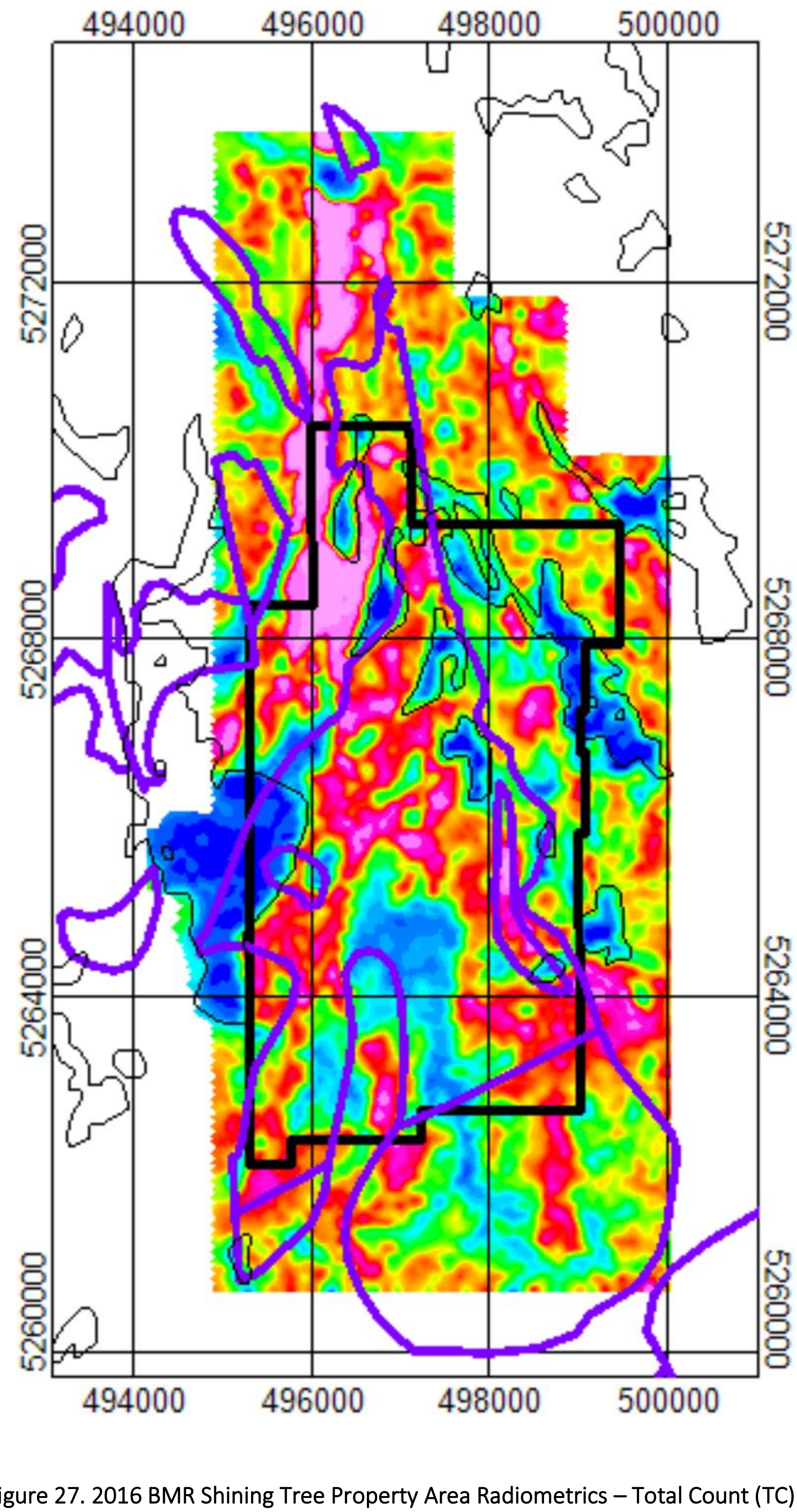

Figure 27. 2016 BMR Shining Tree Property Area Radiometrics – Total Count (TC) TCcor_25m with lakes (thin black outlines) and ND (purple outlines).

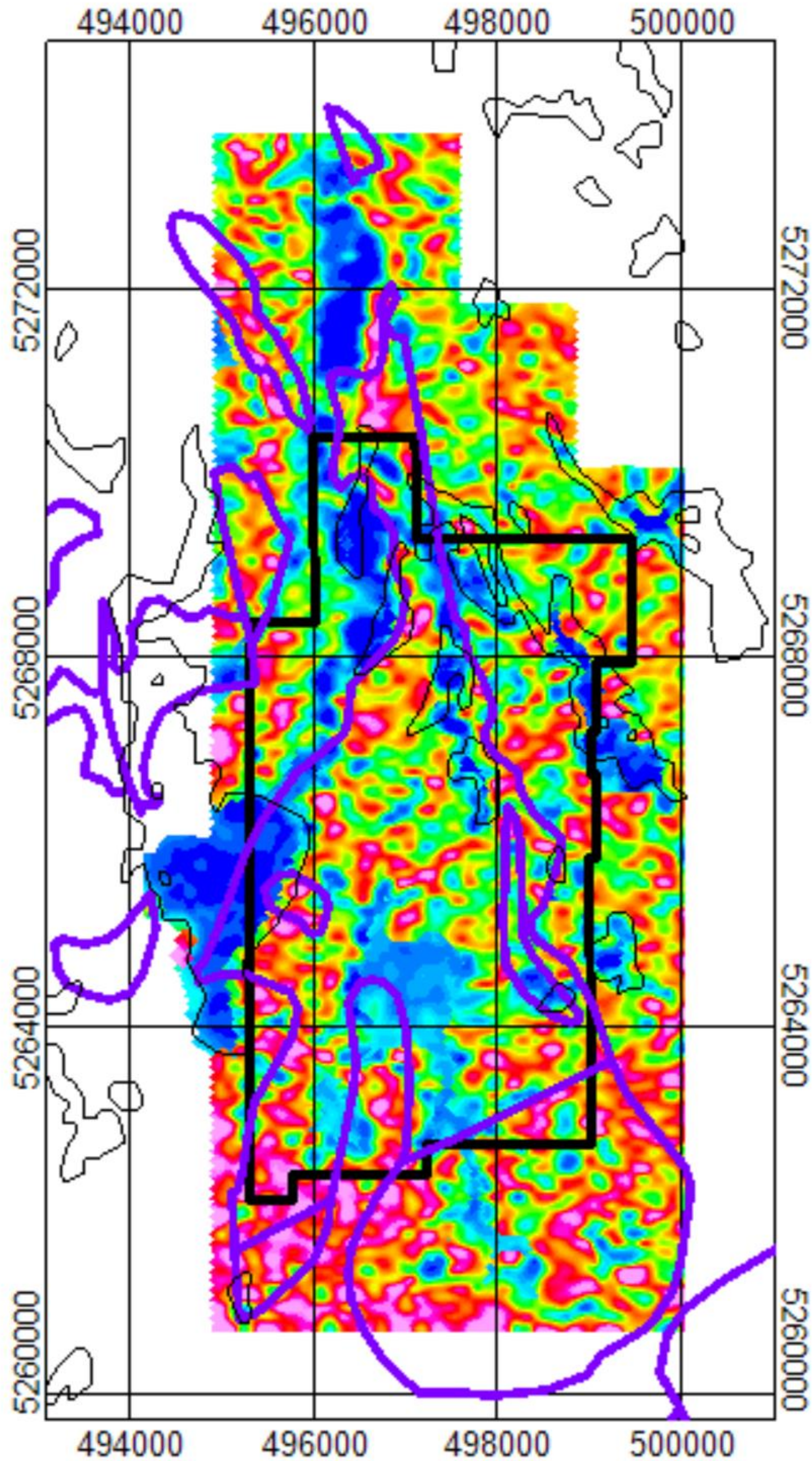

Figure 28. BMR Shining Tree Property Area Radiometrics - K/Th ratio.

Taking ratios of the different radiometric data channels can reduce some of the topographic effects and higher K/Th ratios (pink) can be an indicator of hydrothermal activity/alteration with K enrichment.

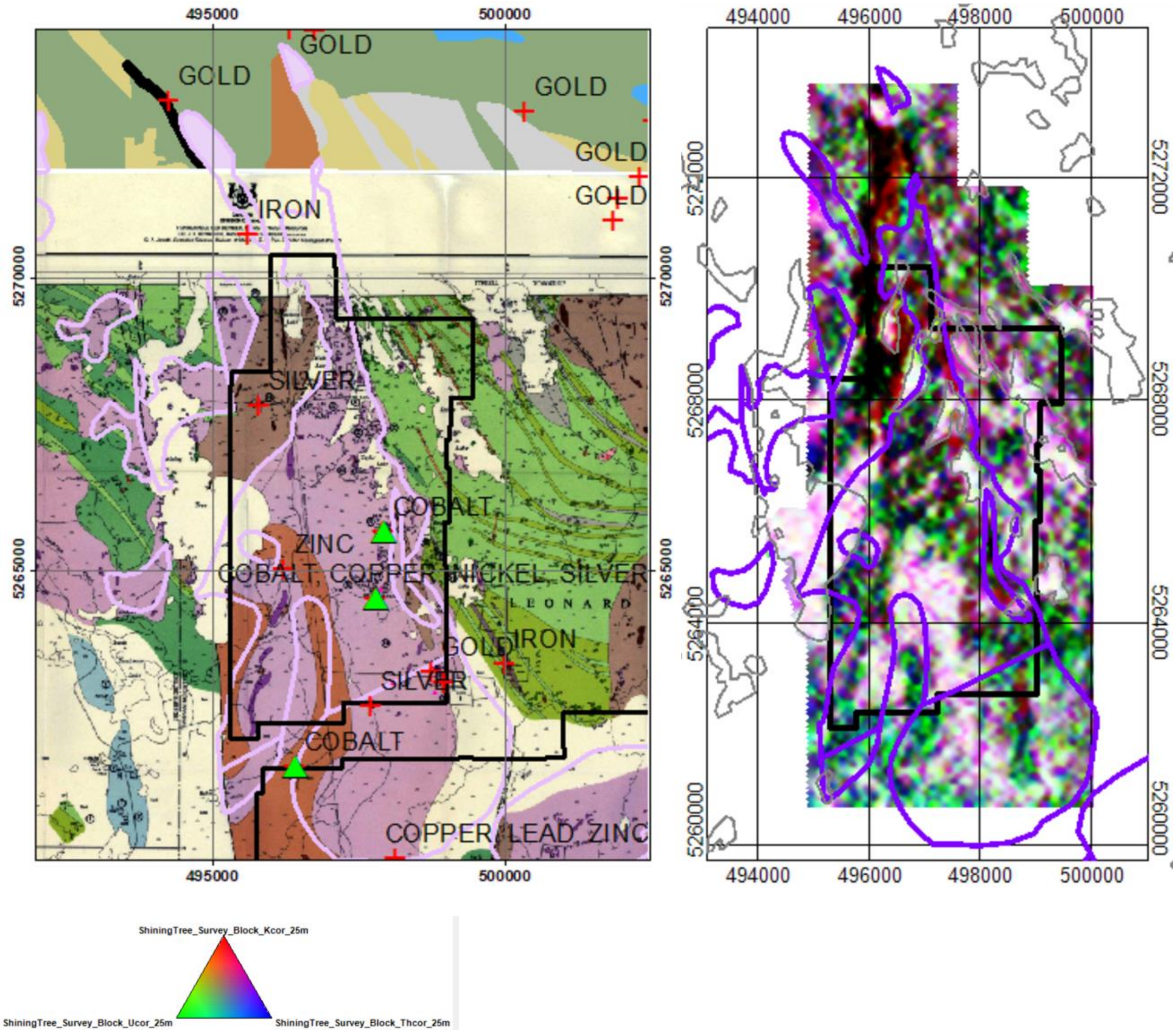

Figure 29. OGS Geology (left) and Nippissing sills (pink left, purple right) with Ternary Radiometrics RGB= K-U-Th (right).

As shown in figure 29 and 30, full ternary plots of K, U and Th are usually the best radiometric product for mapping geology. In the ternary plots, white and pink are likely to be granites and higher K granites respectively. Green is likely to sediments with higher U content. Higher K (red) can be an indicator of hydrothermal activity/alteration with K enrichment. Wet areas and M/UM rocks are black (little to no spec response). Ternary plots, like all radiometric data, are strongly affected by overburden and wet areas. In this case there are some unusual light white to pink coloured areas over some of the lakes which could indicate possible radon effects.

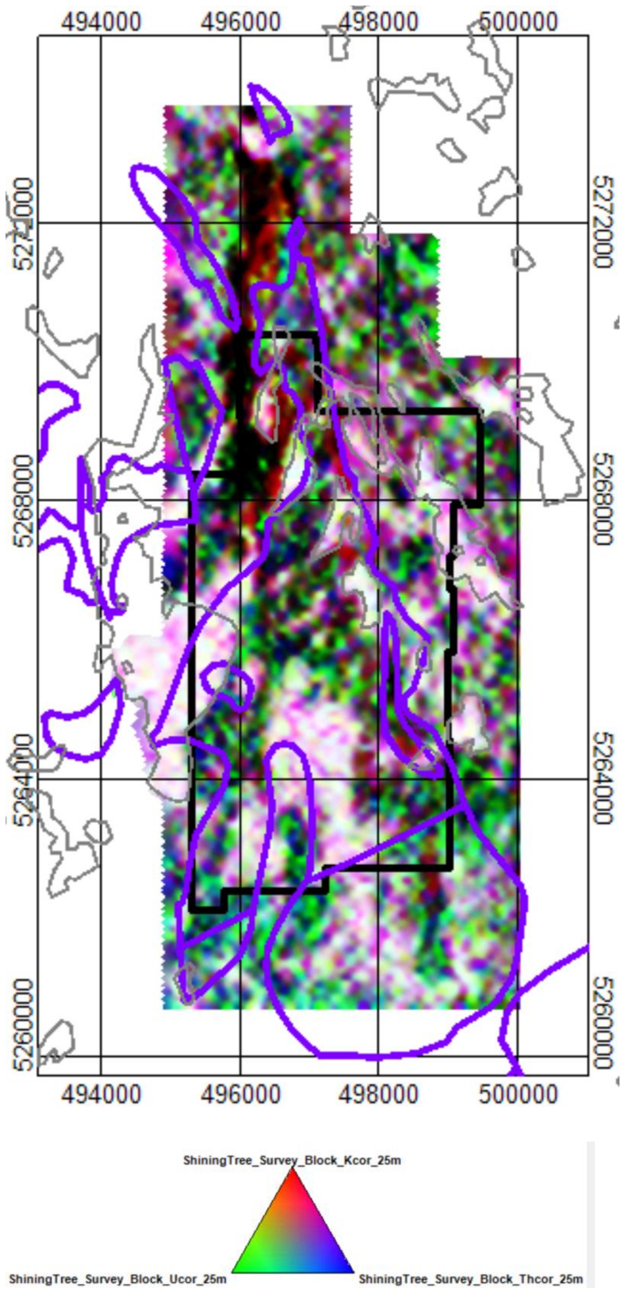

Figure 30. Ternary Radiometrics with Nippissing sills (purple) and lakes (light black outline).

9 BMR new Ground Geophysics

9.1 Induced Polarization/Resistivity

The following images and notes in italics are summaries of the Induced Polarization/Resistivity work and results from the contractor Canadian Exploration Services Limited (CXS). My comments are in regular font.

Shining Tree Saville (Q2582) 3D IP/Resistivity

The Saville 3D IP survey highlighted multiple chargeability anomalies; however, no significant low resistivity anomalies were generated. This indicates a low probability of a massive sulphide or strong silver system existing on the property. The chargeability anomalies do, however, indicate that there is a strong probability of mineralized systems existing in the surveyed area (Ploeger and Postman 2019, Q2582).

The absence of coincident IP highs and resistivity is confirmed in the merged 3D IP and resistivity volumes shown below (Figure 35).

The observed moderate Chargeability anomalies up to 20 msec. with no strong associated resistivity lows. are likely to correlate with disseminated sulphides. Where these occur with ND and near structural lineaments could be favorable targets areas for veins systems where conductive minerals are discontinuous or weakly connected, as is often the case in 5 element vein type deposits. The N- S trending anomalies would be of particular interest as this is the preferred trend direction of the ND in this area.

The grid area has historical mine workings, mineral occurrences, and drill holes so it is likely that some of this chargeability is related to these workings and some to mineralization. It is recommended that the historical work be compiled in detail in 3D to determine if the IP anomalies are due to known mineralization, extensions to known mineralization, or new occurrences.

IP anomalies can also be caused by barren sulphides, graphite or abundant magnetite. The last two are less likely in this environment as there are no strong resistivity lows that would indicate extensive graphite and no very strong magnetic anomalies that would indicate a high concentration of magnetite. Moderate amounts of barren sulphides are expected in Archean volcanics so these anomalies should be correlated with geology and geochemistry to establish their priority.

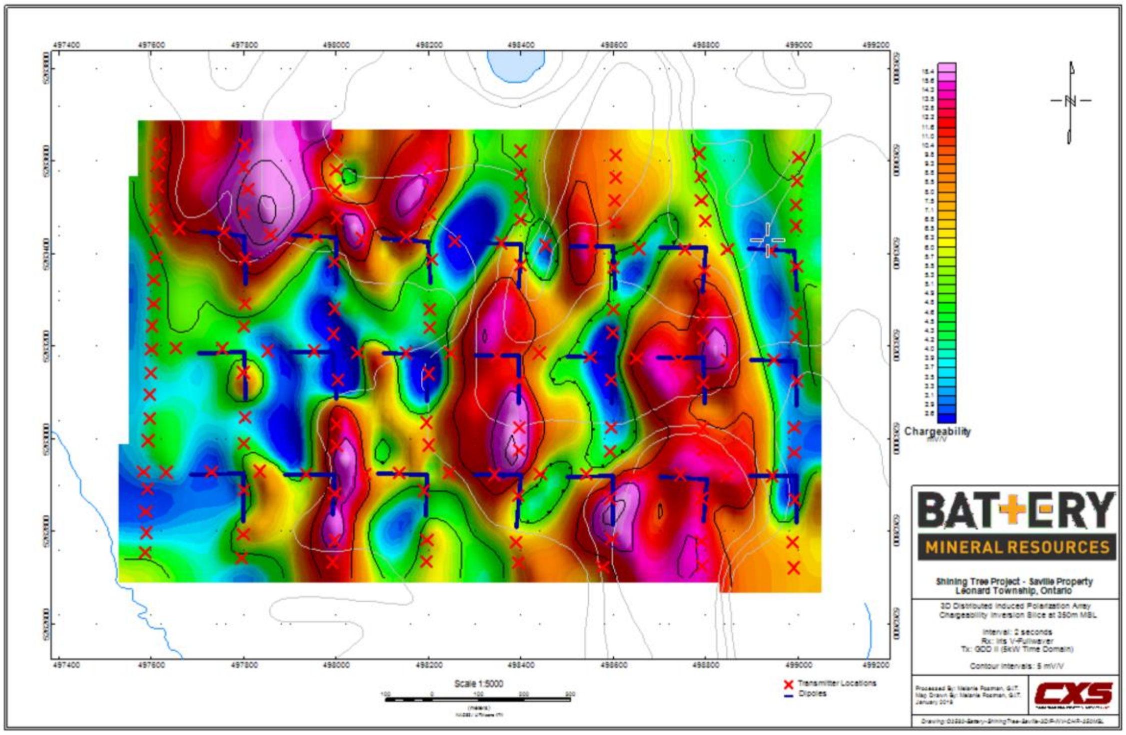

Figure 31. Shining Tree Saville 3D IP Chargeability 350 MSL about 50m depth below surface (Q2582).

Shining Tree Central (Q2593) 3D IP/Resistivity

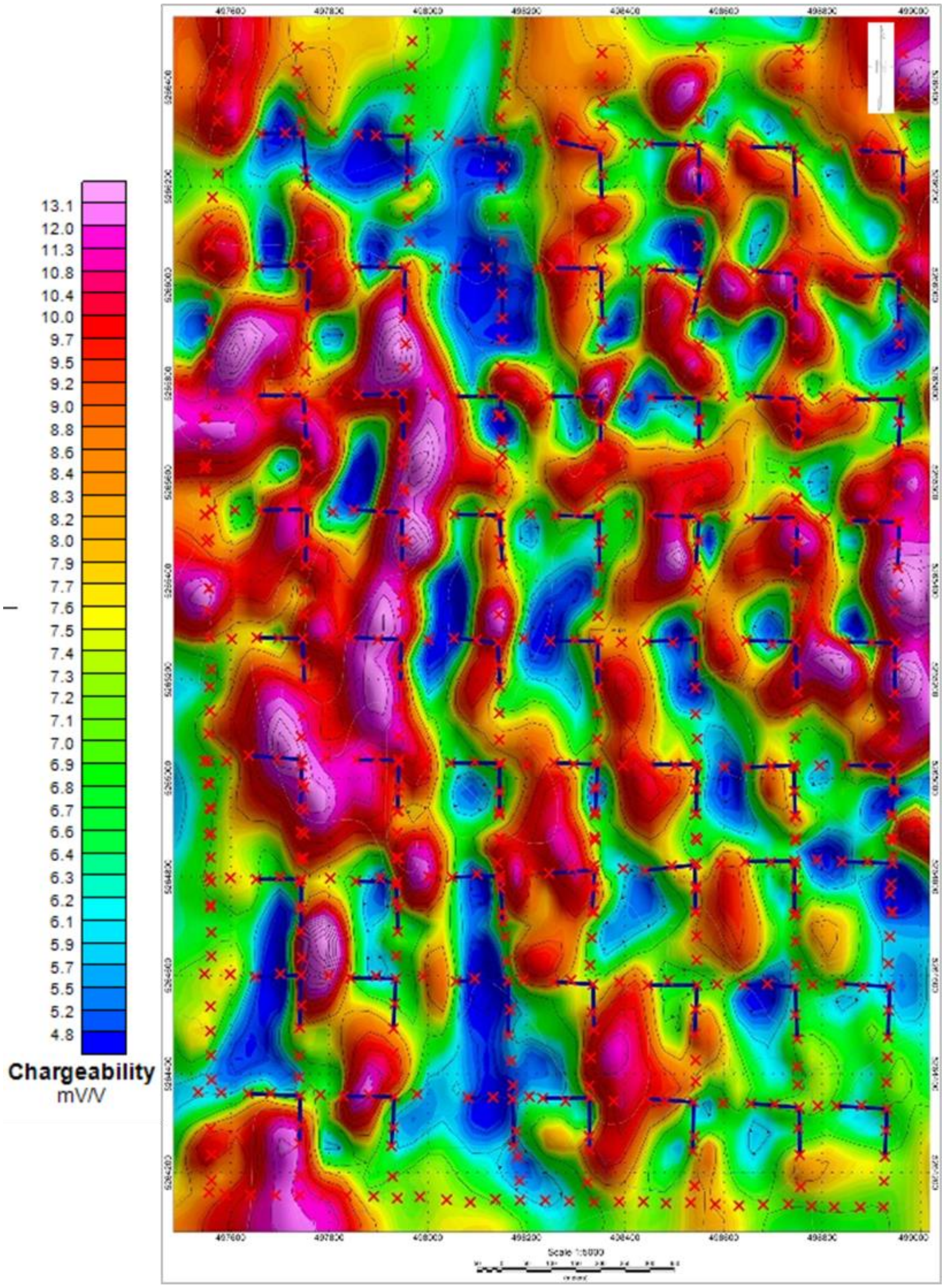

Figure 32. Shining Tree Central 3D IP Chargeability 350 MSL about 50m depth below surface (Q2593).

The objective of the Shining Tree Central 3D distributed IP survey was to perform a detailed multidirectional reconnaissance survey of the area. The survey specifically targeted the Shining Tree Central Project area and a series of pits, trenches and showings that were noted in previous ground traverses.

The chargeability and low resistivity were compared, and a correlation is observed with the east chargeability and low resistivity anomalies. These anomalous features indicate that a possible 330° to 340° mineralized system containing two anomalies exist. This system is most likely is faulted to the south and is truncated to the north by an intrusive. A chargeable and resistivity low contact anomaly exists at the intersection between the north-south and 330° parallel high chargeability features. (Ploeger and Postman 2019, Q2593)

There appears to be a slight electrode overprint in the shallow Chargeability (350 MSL) image shown above. This likely becomes less pronounced with increasing depth.

The coincident IP highs and resistivity is confirmed in the merged 3D IP and resistivity volumes shown below (Figure 36). None of the IP anomalies in the 350 MSL plot are above low to moderate but there is a good correlation with low resistivity values in a N-S anomalous trend along the east side of the survey grid. This anomaly is also coincident with a moderate Geotem AEM anomaly. This coincidence of anomalies makes this a significant geophysical target.

There is historical drilling indicated in the center of this grid as shown the Figure 22 Shining Tree project drillhole location map, however not on this anomalous area on the east side of the grid. It is recommended that historical work over this area be compiled in a GIS to see if there has been any other work on this particular anomaly. If not, this would be a high priority target for follow-up which should include a thorough geological evaluation.

Shining Tree North (Q 2594) IP/Resistivity

The purpose of the survey was to investigate the Contact Zone with Archean Rocks in the northeast part of the Shining Tree Project. The 3D IP survey highlighted multiple chargeability and low resistivity anomalies, which may be related to a structural source. Numerous shallow, smaller, and constrained chargeability anomalies were also identified by the survey (Ploeger and Postman 2019, Q2594).

A source of culture in the area is power line running approximately north-northwest about 1.5 kilometres from the southwest edge of the grid. This may impact the background noise slightly but is likely far enough away that it is insignificant to the data.

The chargeability and low resistivity were compared; a correlation is observed with the east chargeability and low resistivity anomalies. These anomalous features indicate that a possible 330° to 340° mineralized system containing two anomalies exist. This system is most likely is faulted to the south and is truncated to the north by an intrusion. A chargeable and resistivity-low contact anomaly exists at the intersection between the north-south and the 330°-parallel high-chargeability features.

These approximately N-S. coincident. IP and resistivity low trends are confirmed in the 3D plot in Figure 37 with support for the resistivity lows from a number of weak but N trending Geotem anomalies.

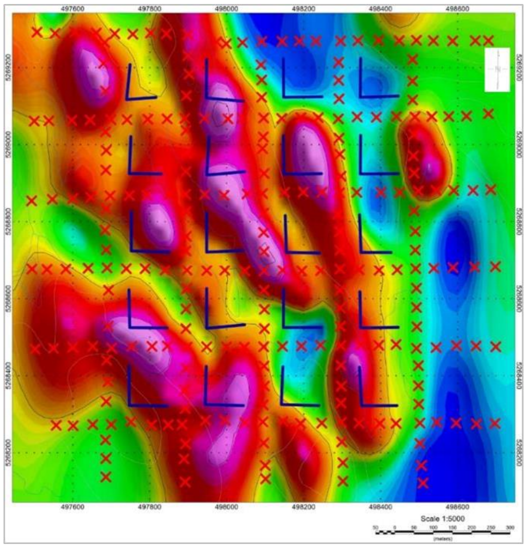

Figure 33. Shining Tree North IP Chargeability 300 MSL (Q2594).

There are no locations of historical drilling on this grid as it is located north of the area of Figure 22 (Shining Tree project drillhole location map) which shows known drillholes in the area and there are no drillholes indicated in the Ontario Drill Hole Database (ODHD) in this area. Given the positive geological location near the Archean contact, it is recommended that historical work over this area be compiled in a GIS to see if there has been any other work on this grid. In any case the coincident IP, resistivity and Geotem anomalies flag this area for additional follow-up, which should include geological follow-up/compilation and, if that is positive, drilling on the geophysical targets.

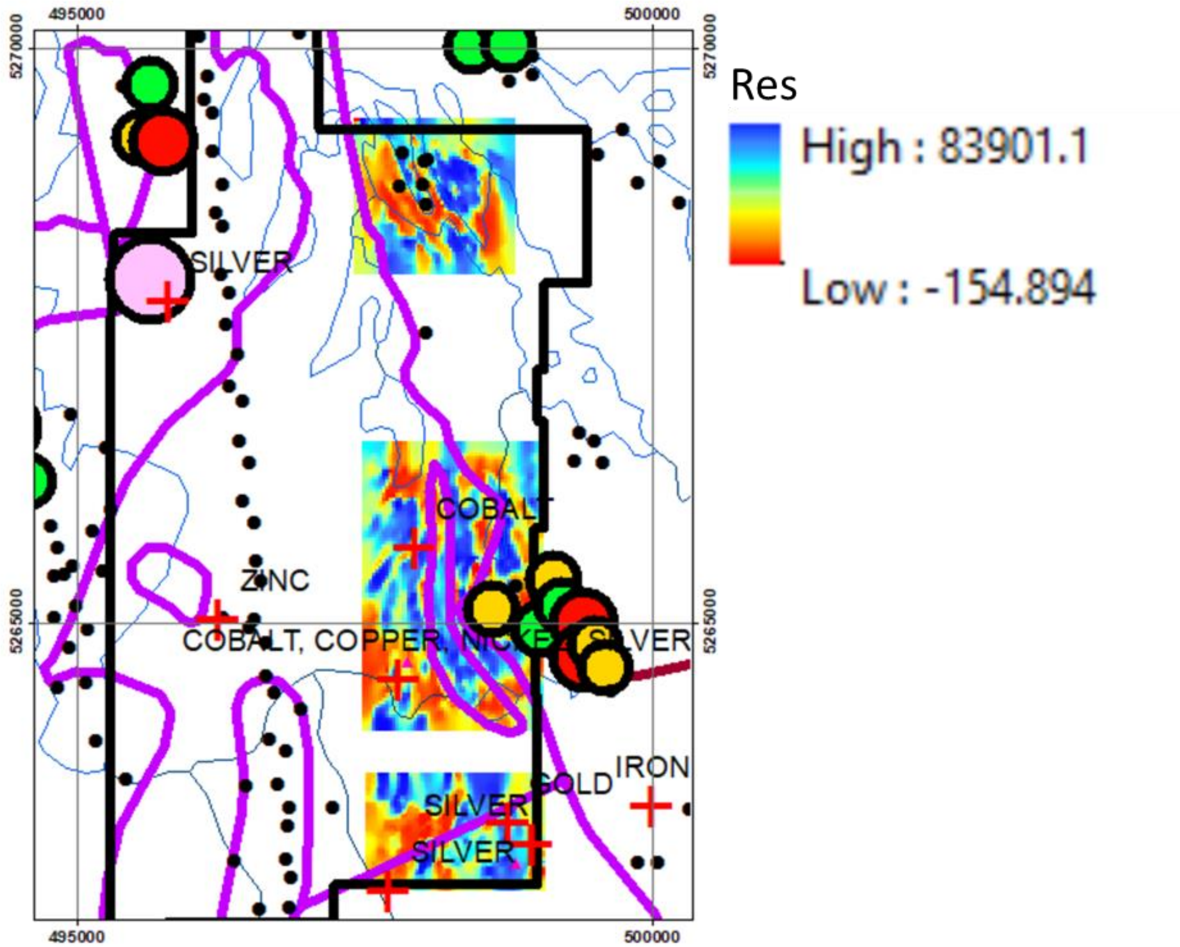

Figure 34. OGS MDI 2011 mineral occurences with Resistivity 350m asl depth slice (about -50m) with ST Geotem AEM anomalies.

Figure 34 shows a plan view of the Resistivity 350m asl depth slices for all 3 IP/Res survey grids along with all discrete Geotem anomalies. There a reasonable correlation of Geotem conductivity anomalies, including the weak (black dots 1S or less) with Resistivity lows. The ground resistivity surveys are much more sensitive to variation in resistivity but the correlation with AEM anomalies suggests that even weak Geotem conductivity anomalies may be of interest.

Plots of 3D inverted IP and resistivity volumes

To evaluate the relationship of the of the IP and resistivity results the 3D inverted volumes were plotted together in 3D. Plan views of the merged 3D volumes are shown below.

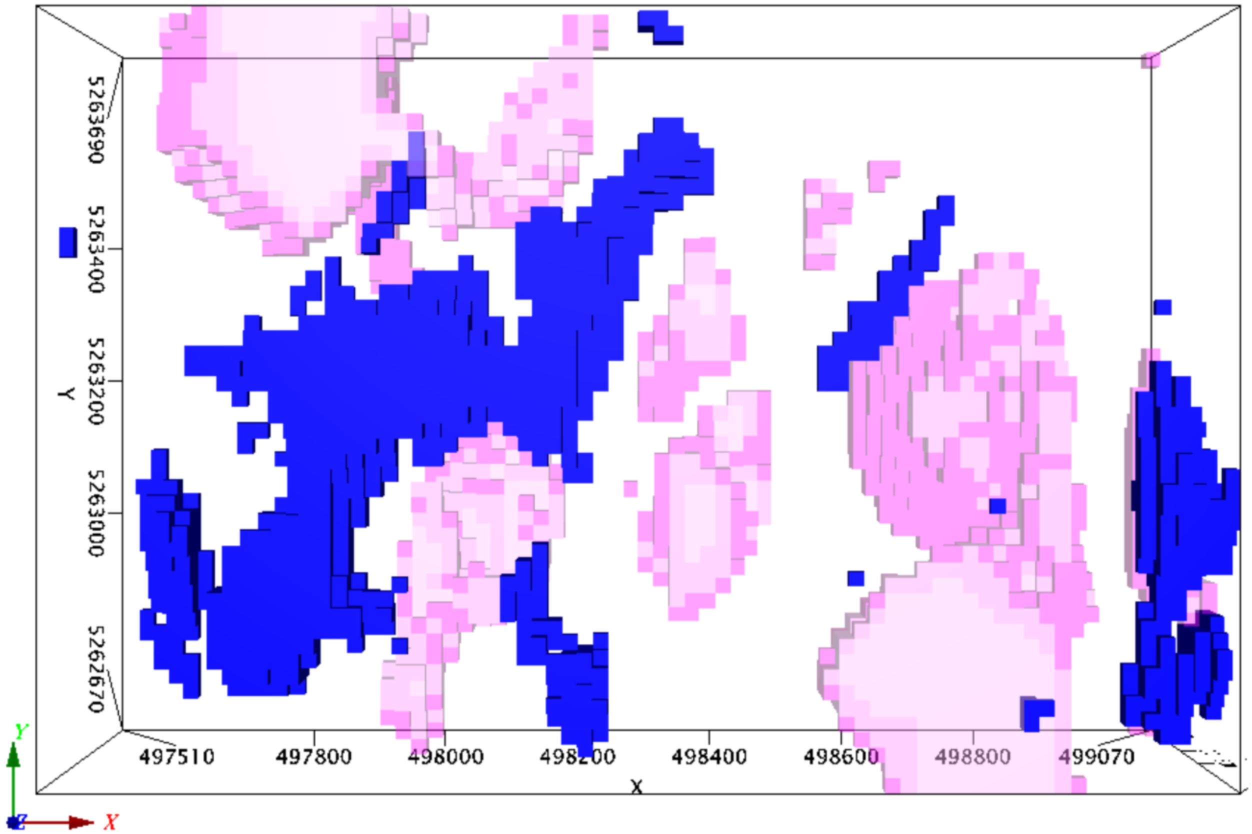

Figure 35. Q2582-Saville-3D IP (pink >12 msec. and Res (blue <500 ohm-m). No ST Geotem AEM anomalies.

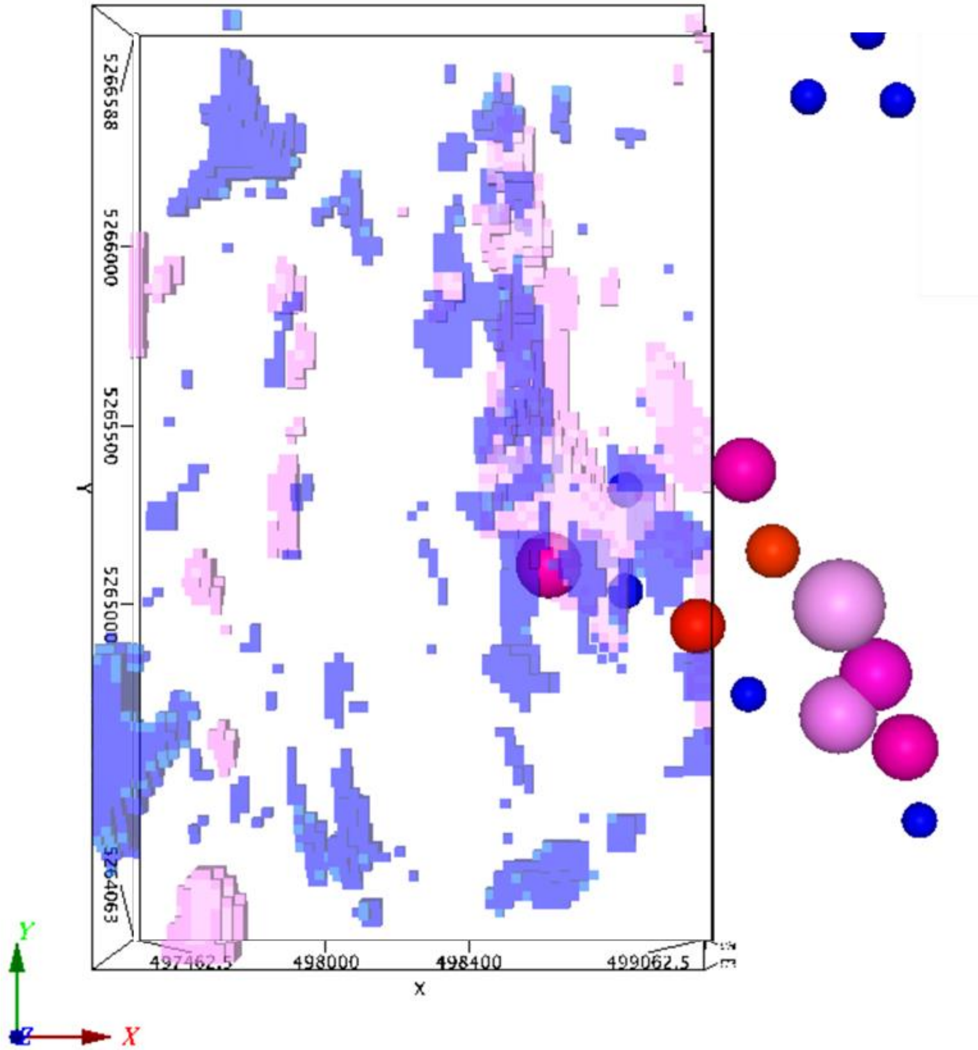

Figure 36. ShiningTree-Central-3D IP (pink >15 msec. and Res (blue <500 ohm-m) with ST Geotem AEM anomalies (pink= high conductance).

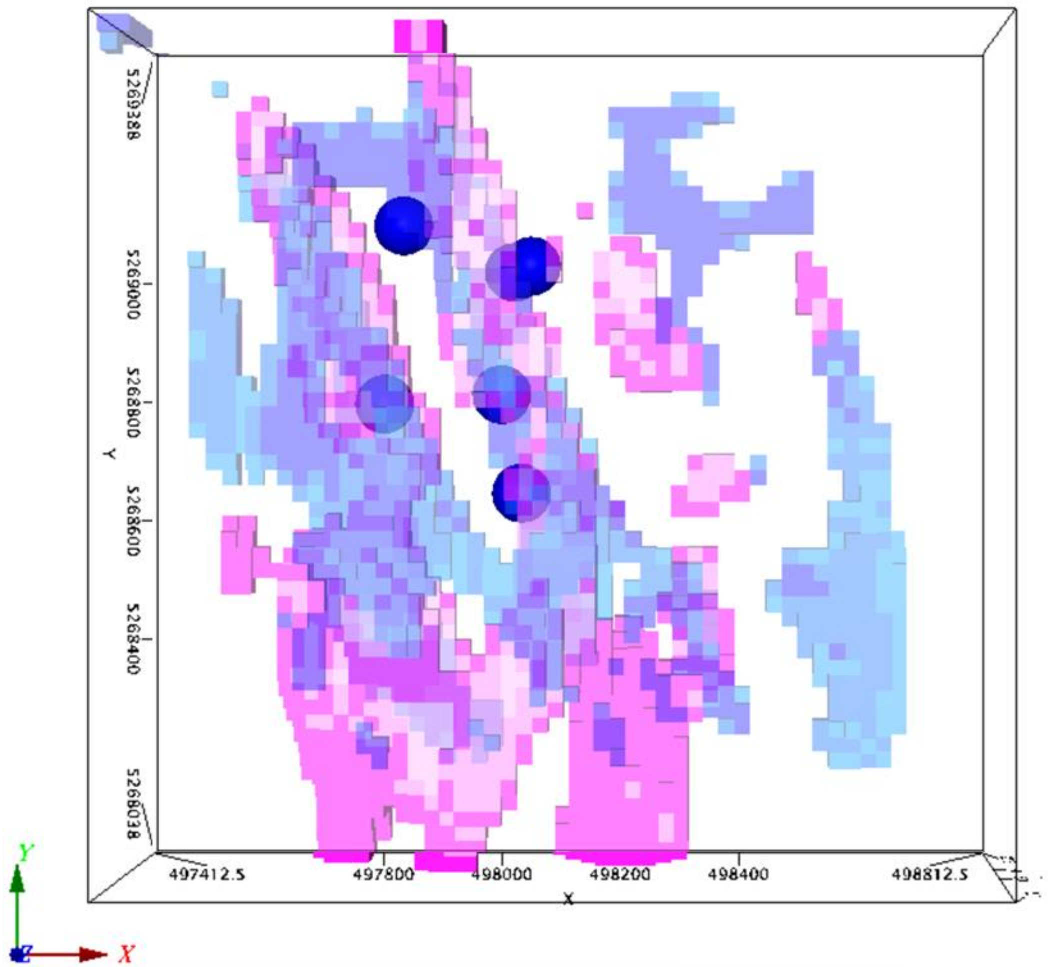

Figure 37. Shining Tree-North-3D IP (pink >25 msec. and Res (blue <500 ohm-m) with ST Geotem AEM anomalies (pink= high conductance).

10 3D IP/Resistivity Comments

- The Geotem AEM conductivity anomalies match 3D Res Resistivity lows fairly well indicating that the Geotem data, though older, can be used for reconnaissance mapping of even weak conductors that may be associated with 5 element vein systems and/or associated sulphides in adjacent Archean rocks.

- Due the often discontinuous nature of five element vein type mineralization, ground IP/Res anomalies may be the best direct indicator of mineralization, with AEM conductivity anomalies to assist in property to regional scale targeting.

11 Property Scale Targets

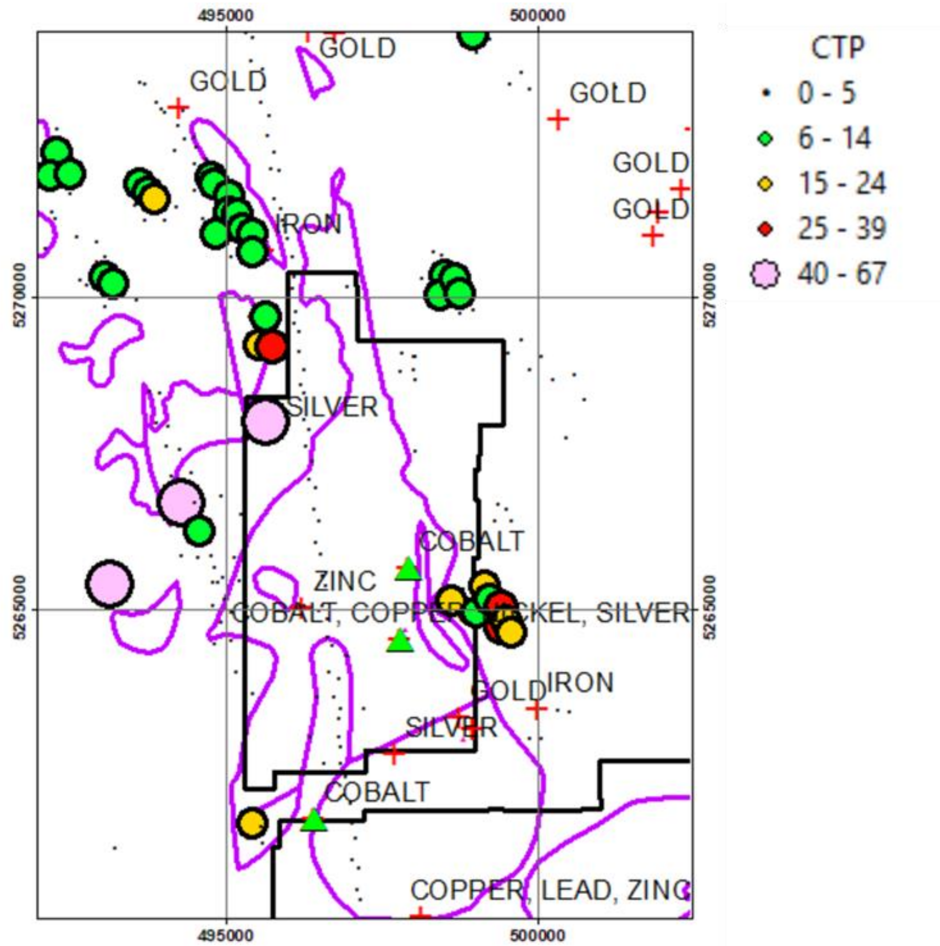

Figure 38. OGS ST Geotem AEM anomalies over BMR Shining Tree Property with OGS MDI (Location indicated by +), and OGS MDI Cobalt occurrences indicated by green triangles.

At the property and regional scale, the Geotem anomalies shown in Figure 38 are likely the best direct indicator of mineralization. The more conductive anomalies (coloured dots = CTP >5 S) AEM anomalies near Ag or Co occurrences will be of most interest but even the weakest discrete anomalies shown by the small black dots, where they are not obviously due to conductive overburden, may be of interest.

Detailed structural/lineament interpretation of the new aeromag data could assist in mapping significant structures that may be associated with mineralization and the areas of higher K/Th ratios in the radiometric data could be used as an indicator of possible hydrothermal alteration to upgrade the potential of certain areas.

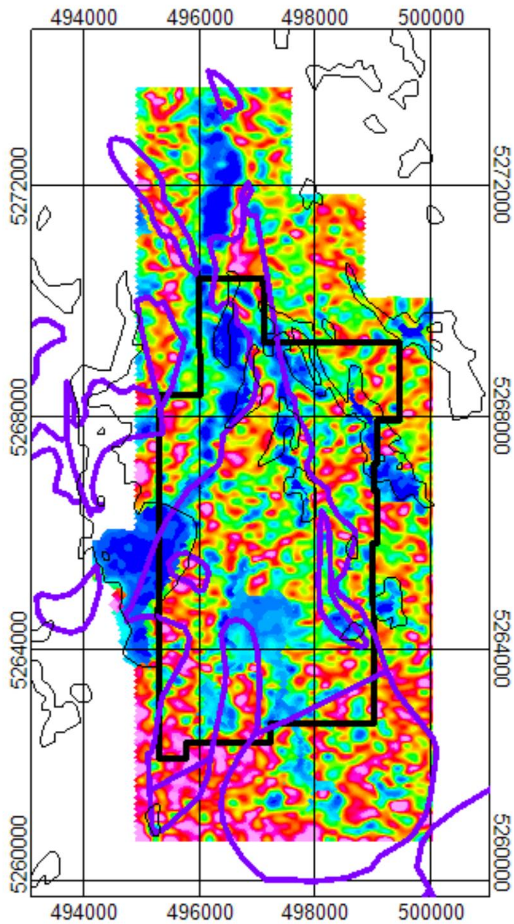

Figure 39. BMR Shining Tree Property Area Gamma Spec K/Th ratio.

12 Significant anomalies from BMR IP surveys

Both the Shining Tree Central and North IP/Resistivity surveys showed coincident IP and resistivity low trends, with support from coincident Geotem AEM anomalies. These are significant targets and could be drilled based on the IP/Resistivity surveys, if geological review confirms them as valid new targets.

IP only anomalies on the southern Saville 3D IP/Resistivity survey indicated the presence of conductive disseminated material and the association with known historical mine workings, mineral occurrences, and drill holes so it is likely that some of this chargeability is related to mineralization. The IP anomalies on this grid should be considered as targets for disseminated mineralization.

13 Conclusions

- The ND sills and dykes on this property show up fairly well in the new high-resolution magnetic data but the magnetic signature is not unique and geological correlation is essential.

- There is well known structural control on five element type deposits and the new high-resolution magnetic data is a valuable new resource for mapping structure/lineaments that may be associated with mineralization.
- At the property and regional scale, the Geotem anomalies are likely the best direct indicator of mineralization and correlation with ground resistivity lows shows that even the weakest discrete anomalies, where they are not obviously due to conductive overburden, may be of interest.
- Due the often-discontinuous nature of five element vein type mineralization, ground IP/Res anomalies may be the best direct indicator of mineralization
- K/Th anomalies could assist in highlighting areas where hydrothermal alteration has resulted in increased K.

14 Recommendations

- For the IP/resistivity targets it is recommended that detailed compilation of historical work over anomaly areas be done in a GIS to see if there has been any other work on these targets and geological compilation of all available data. If this additional work yields positive results then the targets could be drilled directly off the IP/resistivity results.
- VLF surveys (ground or airborne) and/or older style, higher frequency, airborne Frequency Domain EM (DIGHEM style), together with detailed aeromagnetic products could be good surveys to map the local structures that may host mineralization. If new data was acquired these data could be used with all other data to map significant structures over the whole property Some local VLF surveys are available in the historical data.
- Reconnaissance IP/Res could be run along structures of interest and anomalies at structural intersections could be drill tested.
- Coverage with more detailed modern helicopter TEM/Mag or older DIGHEM style AEM surveys is recommended as Geotem may not see smaller conductive targets that may be of interest. More detailed AEM surveys including DIGHEM, VTEM and SKYTEM on other BMR properties in the area have demonstrated that additional conductive targets are likely to be found with more detailed AEM surveys.
- BHIP +/- BHEM is suggested in all drill holes into target areas to expand the radius of exploration away from the drillhole.
- Look in more detail in the extensive historical geophysical work for any available magnetics, IP/Res, VLF and any available small footprint AEM surveys (VTEM type or older DIGHEM style surveys) that may have covered smaller ground grids or airborne survey areas on the property,
- It is suggested the more physical property measurements be done on five element vein style mineralization and associated alteration be done on core or with in-situ downhole logs. Some of this may be available in the historical or current literature.

Suggestions

• Follow-up research work on the unconformity and oxidation/reduction mineralization models. The Northern Saskatchewan Uranium deposits are similar in many ways to five element vein style deposits and in some cases contain significant Ni and Co.

References

BMR Corporate Presentation October, 2019

Ploeger and Postman 2019, Q2582-ShiningTree-Saville-3DIP-Report-FINAL

Ploeger and Postman 2019, Q2593-Battery-ShiningTree-Central-3DIP-Report

Ploeger and Postman 2019, Q2594-Battery-ShiningTree-North-3DIP-Report

Precision GeoSurvey, 18122_BatteryMineralResourcesPtyLtd 2016 Logistics Reports

SRK 2019, Battery Mineral Resources Ltd. 43-101- 3CB026.005

Statement of Qualifications

I, Alan R. King, B.Sc, M.Sc, P.Geo, declare that:

1) I am a Consulting Geophysicist with residence in Sudbury, Ontario and am presently employed in this capacity with Geoscience North Ltd., Sudbury, Ontario;

2) I obtained a Bachelor of Science Degree (B.Sc.), in Geology from the University of Toronto in 1976, and a Master of Science Degree (M.Sc.), in Geophysics from Macquarie University in 1989;

3) I am a registered geophysicist with a license to practice in the Province of Ontario (APGO member # 1178);

4) I have practiced my profession continuously since 1976 in North and South America, Australasia, etc.;

5) I am a member of the Society of Exploration Geophysicists, and the Australian Society of Exploration Geophysicists;

6) I have no interest, nor do I expect to receive any interest in the properties or securities of the company, its subsidiaries or its joint-venture partners;

7) I am the Professional Geologist/(Geophysicist) and a member in good standing of APGO who has coauthored this Report;

8) The statements made in this report represent my professional opinion in consideration of the information available to me at the time of reviewing this report.

Dated this 20th Day of March, 2020.

Signature

Alan King

Geophysicist

Geoscience North Ltd.

1. 1. When existing data is reprocessed, provide details of the processing software, methods and input parameters

Additional processing was done on magnetic data. This included one or both of the following processing on the various projects:

- Tilt Derivative (TDR) of the Total Magnetic Intensity (TMI)
  Reference - Miller, H. G., and V. Singh, 1994, Potential field tilt —A new concept for location of potential field sources: Journal of Applied Geophysics, 32,

- Analytic Signal (AS) of the Total Magnetic Intensity (TMI)
  Reference - The Analytic Signal Of Two-Dimensional Magnetic Bodies With Polygonal Cross-Section: Its Properties And Use For Automated Anomaly Interpretation, Misac N. Nabighian, Geophysics 1972

The processing was done in the Geosoft Oasis Montaj software. Input to the processing was the TMI grids provided by the contractor and new grids were created from the process data using Geosoft Oasis Montaj using the minimum curvature method with appropriate grid cell sizes.

2. When a computer generated model was created as part of the interpretation, provide details of the modelling software, method and input parameters

3D Modeling was done on the magnetic data using the Geosoft VOXI inversion facility in Oasis Montaj. Input to the processing was the TMI data in the grids or the binary databases provided by the contractor. In all the cases the models were created using unconstrained inversion of the TMI data based on the methods developed at the UBC-GIF facility and adapted by Geosoft in to their VOXI software.
Reference - https://gif.eos.ubc.ca/about

GEOSOFT

Oasis montaj How-To Guide

VOXI Earth Modelling - Running an Inversion

Manual release date: November-18-13.

Please send comments or questions to info@geosoft.com

Data used in this document:
Ontario Geological Survey 2000. Reid-Mahaffy airborne geophysical test site survey; Ontario Geological Survey, Miscellaneous Release – Data 55. © Queen's Printer for Ontario, 2000. Reproduced with permission.

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Running an Inversion

Overview

This document describes how to run a simple inversion in VOXI Earth Modelling. It focuses solely on the functionality in the VOXI Earth Modelling interface and assumes that you are familiar with the Oasis montaj environment.

We strongly recommend that you properly prepare your data prior to inversion. Please refer to the Best Practice Guide - Preparing Data for Inversion document, which describes the files required for an inversion and guidelines on how to create them.

In this example, you will:

- Create a new VOXI session from a polygon
- Add data to the model
- Run an inversion
- Export the VOXI model

The data used in this example is airborne magnetic data, sourced from the Ontario Geological Survey (OGS). It was acquired over the Reid-Mahaffy property at a nominal 200 m line spacing and 60 m terrain clearance.

The Reid-Mahaffy property in Ontario, Canada, has been designated by the OGS as a test site and was flown by a number of airborne companies. The airborne Reid-Mahaffy magnetic data was flown in 1999 by Dighem as part of an airborne EM survey, commissioned by the OGS, under the project number MRD-55. The coinciding SRTM elevation grid was downloaded from the Oasis montaj DAP server using Seeker.

⚠ *The outcome of this document should not be interpreted as the actual sub-surface structure.*

The data used in this guide can be downloaded here. Please refer to the *README.txt* file for a description of the files and where to save them to.

The folder includes the following:

- An outline of the area to be modelled.
- A database containing potential field measurements. The data has a projected coordinate system defined.
- A Digital Elevation Model grid covering the area of interest.

You will begin by creating a new project and loading the VOXI menu.

To load the VOXI menu:

1. Start Oasis montaj and create a new project in the **VOXI Run Inversion Data** folder named **VOXI.gpf**.
2. From the **GX** menu, select **Load Menu**.

   The Load Menu window opens.
3. Select **voxi.omn** and click **Open**.

   The VOXI menu is added to your menu bar.

New VOXI from Polygon

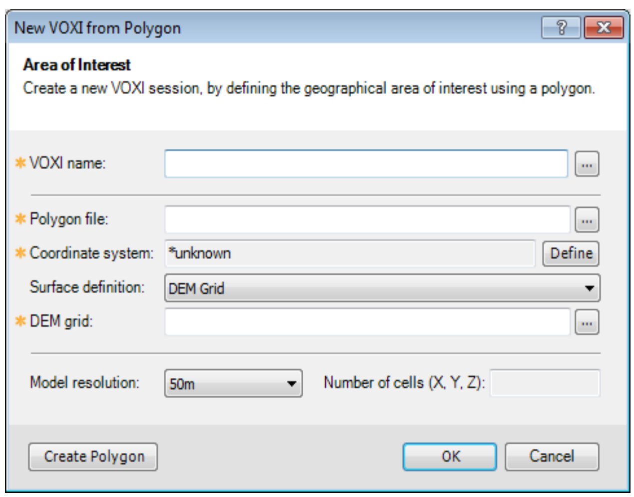
VOXI offers two approaches for defining the area of interest (AOI): you can either use a polygon file that defines the outline of your area, or you can supply a georeferenced voxel model compiled from other sources, the outline of which will be automatically calculated. In this example, you will use a supplied polygon file.

To create a new VOXI session from a polygon:

1. From the **VOXI** menu, select **New VOXI from Polygon**.

   The New VOXI from Polygon dialog box opens.

   Figure 1.1 New VOXI from Polygon dialog box



2. For **VOXI name**, enter **Mahaffy**.
3. For the **Polygon file**, click the **Browse** button [...].
4. From the **VOXI Run Inversion Data** folder, select **Mahaffy.ply** and click **Open**.

   This is the polygon file that defines your area of interest (AOI). By default, the coordinate system information for this VOXI document is based on the defined coordinate system of the selected file. If the selected polygon file does not have a coordinate system defined, then the **Define** button becomes active and can be used to define the coordinate system for the VOXI document.

*You can click the **Create Polygon** button to interactively create a new polygon to define your area of interest from an existing map. If the existing map is not already in your project, you will be prompted to load it.*

If you are working with data located on a geographic (longitude, latitude) coordinate system, use Geosoft tools to create a projected coordinate system map from which to define a polygon.

5. For the **DEM grid**, click the **Browse** button [...].
6. From the **VOXI Run Inversion Data** folder, select **DEM.grd** and click **Open**.

   This is the grid of the Earth's surface elevation (DEM) that covers the area defined by the supplied polygon. You can also choose to define the surface using a constant elevation value.

7. For **Model resolution**, use the default value of **50m**.

   By default, VOXI calculates the model resolution to generate the smallest appropriate model based upon the input data resolution. Generally, this will be less than 100 cells in the x and y directions.

   The Reid-Mahaffy data used in this example was flown at 200 metre nominal line spacing and 60 metre terrain clearance. The default model resolution of 50 metres is appropriate because it is roughly equivalent to the flying altitude and a quarter of the line spacing.

   It is good practice to use the default voxel resolution when running the first inversion for a project area. To begin with, you may even want to define a coarser mesh than the default. As your knowledge of the area increases, you can refine the voxel resolution as required.

8. Click **OK**.

   The VOXI Viewer opens and displays the voxel mesh to be inverted, the area-defining polygon, and the DEM; at this point, the Add Data to VOXI message window opens asking if you would like to run the Add Data wizard.

Figure 1.2 VOXI Viewer

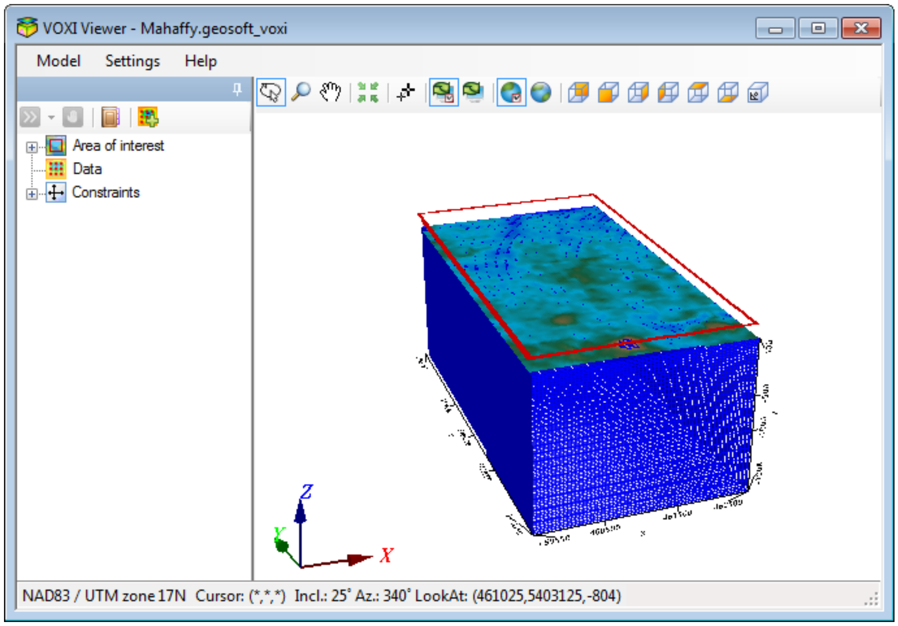
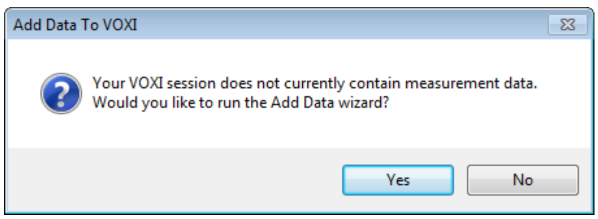


Figure 1.3 Add Data To VOXI window



9. For this example, click **No**.

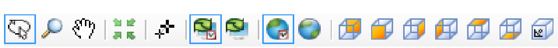
   You will add data after you visually inspect your model.

   *If you are satisfied with the model you have defined, you can click **Yes** to directly run the Add Data wizard.*

The 3D view of the constructed model provides the opportunity to visually inspect the model. If it is not properly defined, for example if the mesh is too coarse or too fine, if the terrain does not register correctly or if the AOI polygon is not the correct one, you can modify the model prior to adding data and proceeding with inversion.

The standard Oasis montaj 3D visualisation tools are available in the VOXI Viewer.

Figure 1.4 3D visualisation tools



You may notice an "interference" between the mesh and the terrain colour image. This is an expected effect that will occur if your DEM is of a higher resolution than the voxel mesh. In such a case, the program will average the elevation measurements over the horizontal extent of each voxel element.

*To modify the Area of interest settings, right-click the Area of interest item in the tree list and select **Modify**.*

Adding Data

Now that you have created the voxel mesh defining your area of interest, you will add data by selecting a measurements database containing the data to be modelled.

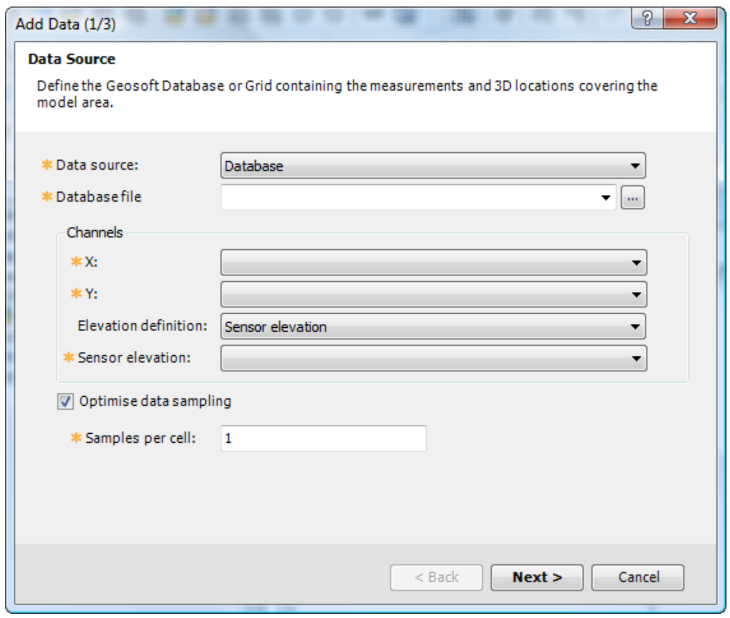
Note that you can also use gridded data (Geosoft Grid format) as an input for inversion.

To add data:

1. In the VOXI Viewer tree list, right-click **Data** and click **Add Data** or click the **Add Data** button on the VOXI toolbar.

   The Add Data (1/3) dialog box opens.

   Figure 1.5 Add Data (1/3) dialog box

2. From the **Data Source** list, select **Database**. For the **Database file**, click the **Browse** button.

3. From the **VOXI Run Inversion Data** folder, select **ReidMahaffy_DIG.gdb** and click **Open**.

   Because the coordinate channels in this database are already defined, the X and Y channels are automatically set. If you have an alternate pair of X and Y channels, you can select them as long as they have a defined projected coordinate system.

4. From the **Elevation definition** list, select **Sensor elevation**. From the **Sensor elevation** list, select **gps_z_final**.

   The sensor elevation should be in the same units as the coordinate system of the DEM.

5. Ensure the **Optimise data sampling** option is selected.

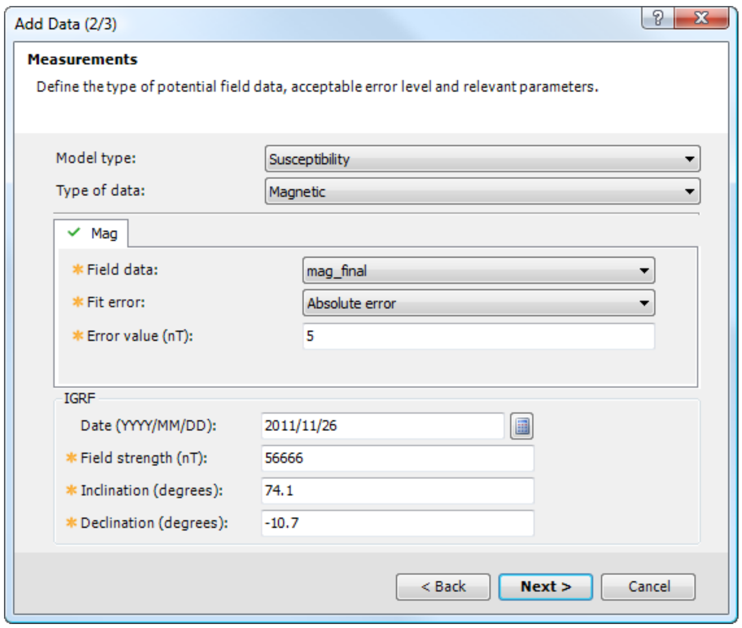
With this option, you can decimate the data if it is too highly sampled relative to the size of the voxel model element. By default, a decimation factor is chosen that will provide roughly one sample per surface voxel element.

It is highly recommended that you decimate the observed data to one sample per cell. All observed measurements that fall within the same element are appropriately averaged. Not decimating the data increases the computation time without any corresponding gain in the resolution of the output model.

6. Click **Next**.

   The Add Data (2/3) dialog box opens. Here you will select the type of model you want. You have the choice of Susceptibility, Density or Vector magnetization model. When you select the **Model type**, the **Type of data** field will update according to your choice.

Figure 1.6 Add Data (2/3) dialog box



7. From the **Model type** list, select **Susceptibility**.

   The Type of data automatically changes to **Magnetic** and additional options are now available in the dialog box.

8. From the **Field data** list, select **mag_final**.

9. For the Absolute **Error value (nT)**, enter **5**.

   By default, an Absolute error value is calculated to 5% of the standard deviation of the data, which in this example is a calculated Error value of approximately 6 nT. A VOXI Inversion will attempt to fit your data until the difference between the model prediction (the fit) and the measured data is on average less than the Fit error. In general, this default error calculation allows for a reasonable fit; however, you may opt to modify it to better suit your dataset. If you wish, you can specify an alternative means by which to calculate the fit error. The other options are: Relative Error, Fraction of Standard Deviation or Data Error Channel

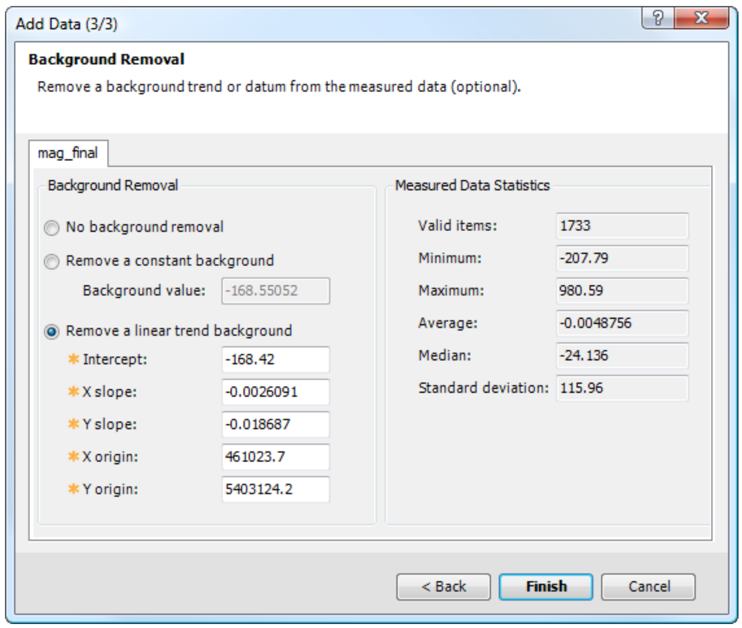
Click the Help button [?] to learn more about alternate approaches to setting the error level.

In the case of a susceptibility model, you can specify or modify the IGRF parameters. If the survey date is stored as a property of the lines in the database, then the IGRF parameters are calculated automatically. Otherwise, you have to supply the survey date in order for the IGRF parameters to be calculated.

10. Click **Next**.

    The Add Data (3/3) dialog box opens.

Figure 1.7 Add Data (3/3) dialog box



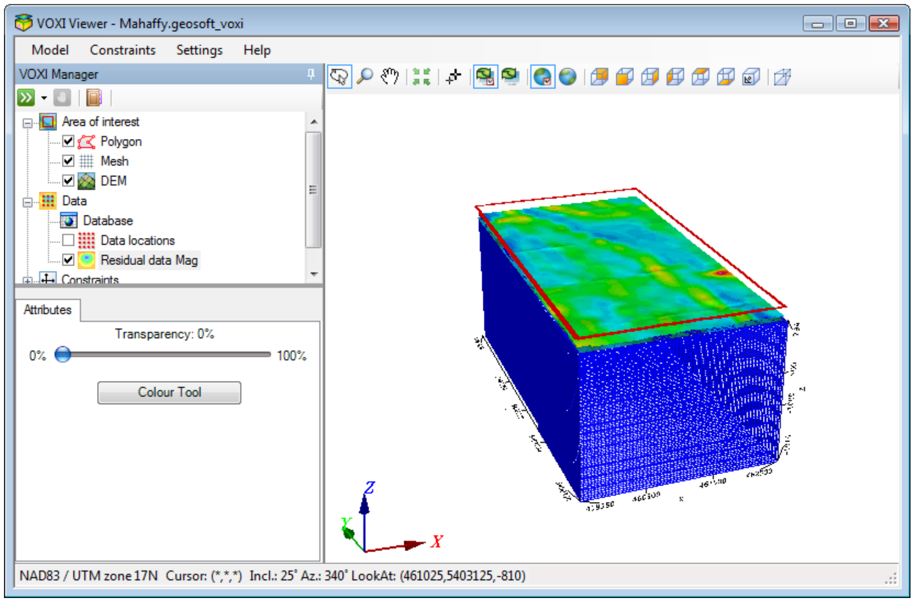
This dialog gives you options by which to remove the regional component of the potential field data, so that the inversion can focus on localised anomalies. The default option, **Remove a linear trend background**, will remove the linear trend plane from the observed data in an attempt to eliminate the long wavelength (regional) component of the field. The best-fit linear trend parameters of the observed data are automatically calculated.

The Measured Data Statistics are dynamically updated to reflect the statistics of the observed data after the removal of the suggested linear trend background. You would expect that the Average of the data would be around zero. If you have removed the background in the data preparation stage and are confident in the method applied, you are encouraged not to remove it again here.

11. For this example, select **Remove a linear trend background** and click **Finish**.

The selected data is added to the VOXI document and displayed in the VOXI Viewer. This data is placed at the observation elevation. Note that the Run Inversion button on the VOXI toolbar is now active.

Figure 1.8 VOXI Viewer with data added to model



The Database, Data locations and Residual data items are now listed under Data in the VOXI Manager. You can turn the Residual data item on and off to display the input field data. All data displays are coloured based on a linear colour scheme.

Running the Inversion

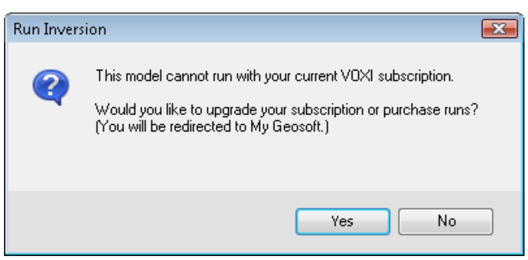
At this point, you have defined your area of interest, created a voxel mesh, and have added the data to be modelled. You will now run the inversion.

To run the inversion:

1. From the **Model** menu, select **Run Inversion** or click the **Run Inversion** button on the VOXI toolbar.

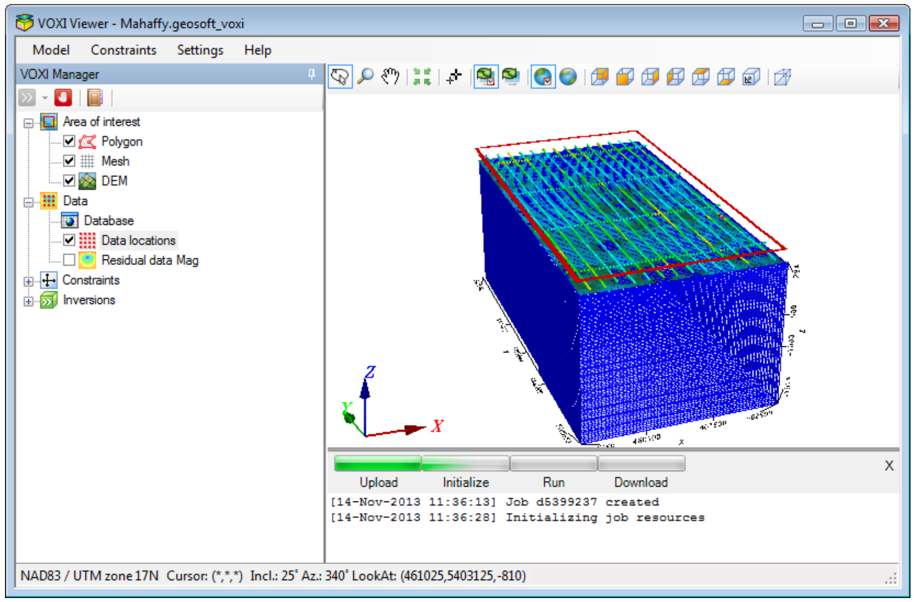
   If your subscription does not support running a forward model or your number of runs have expired, a warning dialog prompts you to upgrade or purchase new runs from My Geosoft.

Figure 1.9 VOXI Subscription warning



After you start the inversion process, the Inversion item is added to the VOXI Manager and the progress of the inversion is reported in the Progress log pane in the lower-right of the VOXI Viewer.

Figure 1.10 VOXI Viewer with inversion in progress



After the data has been uploaded, you can safely close the window without stopping the inversion. You can revisit the session at a later time, check the progress and ultimately the results of the inversion.

If you decide to edit your input data further while the inversion is running, you can stop the process by clicking the Stop Process button. The inversion will terminate immediately.

2. In the VOXI Manager, expand **Inversions** to see the item representing the model you are inverting.

   The name of the item is composed of the type of model, and suffixed by the current date and time stamp. All subsequent trials will appear under Inversions with their unique date and time stamp.

   The Input data item contains a copy of the input data used for this inversion process. In subsequent trials you may modify some of the model parameters; the snapshot of the input parameters together with the output modelled voxel allows you to review your settings for each inversion.

   Using the VOXI Journal on the VOXI toolbar, you can enter comments to describe the specifics of individual inversion sessions and notes on the differences between different inversion results.

   At the successful completion of the inversion, a check box is added in front of the session name and the inversion results are displayed. This check box can be used to turn the display of the resulting voxel model off and on in the VOXI Viewer. The Process log is also saved in the tree list and can be viewed and saved at any time.

For more descriptive clarity in the 3D Viewer pane, you may want to turn off some elements. You can try the following:

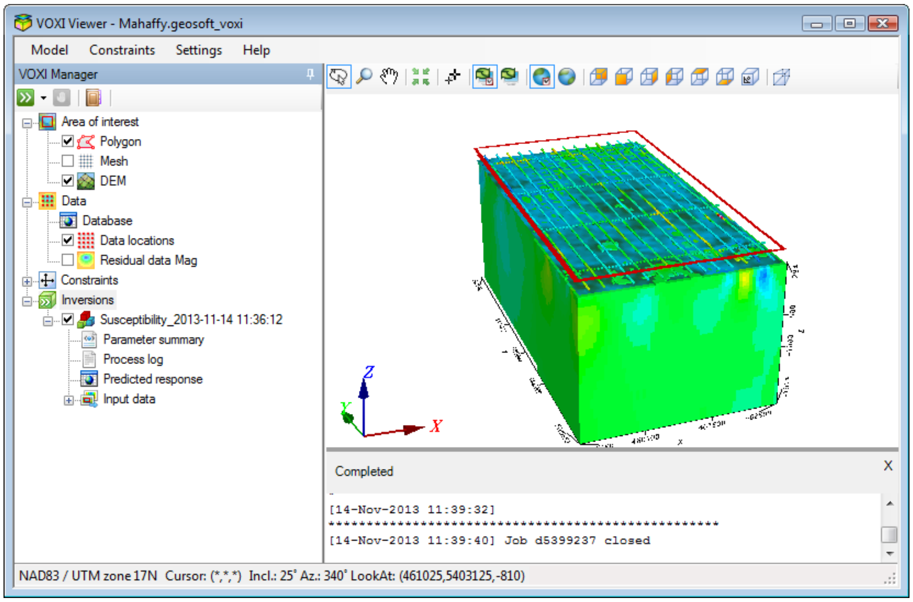
- You may wish to turn off the display of the model mesh.

  In the VOXI Manager, expand **Area of interest** and clear the check box beside **Mesh**.

- You may also wish to turn off the display of the data locations.

  Within the **Data** item list in the VOXI Manager, clear the check box beside **Data locations**.

Figure 1.11 VOXI Viewer with completed inversion model



As in the Oasis montaj 3D Viewer, you can select an item in the tree list and adjust its Attributes, Clipping and Colours. For example, you can clip the extents of the output voxel model by selecting it and adjusting the Clipping parameters.

Exporting a VOXI Model

Once you have created your VOXI model, you can export it as a Geosoft Voxel file to share with others or to integrate with other data in the 3D Viewer. Alternatively, you can also display the results in a 3D map.

To export a VOXI model:

1. Under Inversions in the VOXI Viewer tree list, right-click the **Susceptibility** modelling session item and select **Export**.

   The Save As window opens.

2. Use the default File name or enter a new name and click **Save**.

   The VOXI model is saved as a Geosoft Voxel file (*.geosoft_voxel) and can be further analysed using the 3D tools in Oasis montaj.

To see a comparison of inversion results with and without constraints, please refer to the Best Practice Guide - Comparing Upper Bound Constrained and Unconstrained Inversion Results document.

To display results in a 3D map

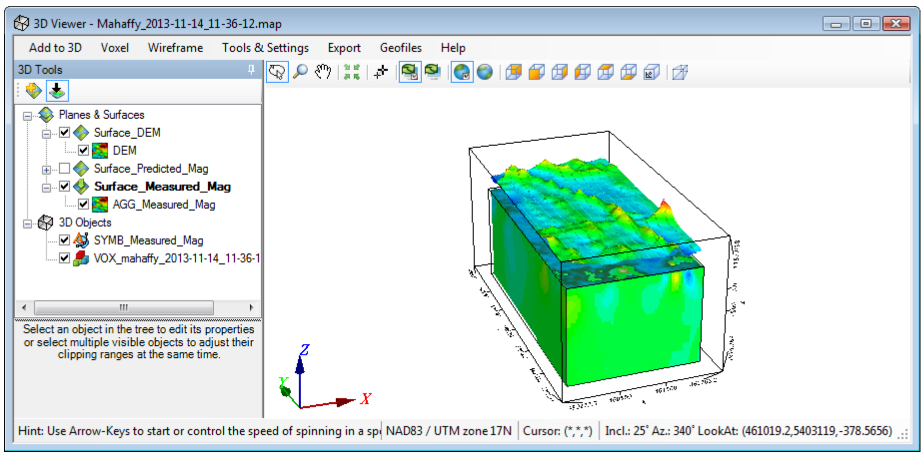
1. Under Inversions in the VOXI Viewer tree list, right-click the **Susceptibility** modelling session item and select **Display Results in 3D Map**.

   The Display Results in 3D Map window opens.

2. A unique default file name will be generated, however you can specify a more descriptive name. Click **OK**.

   The VOXI model is saved as a Geosoft Map file (*.map). The observed and modelled data are gridded displayed along with the DEM grid.

Figure 1.12 VOXI model displayed in 3D Viewer



Exporting the Predicted Response (Forward Calculation) Database

At the completion of the inversion calculation, the input as well as the predicted data are saved in the predicted database, under the current inversion model. You can export this content to a Geosoft Database file (*.gdb).

To export the predicted response (forward calculation) database:

1. Under Inversions in the VOXI Viewer tree list, expand the **Susceptibility** modelling session item.

2. Right-click **Predicted response** and select **Export**.

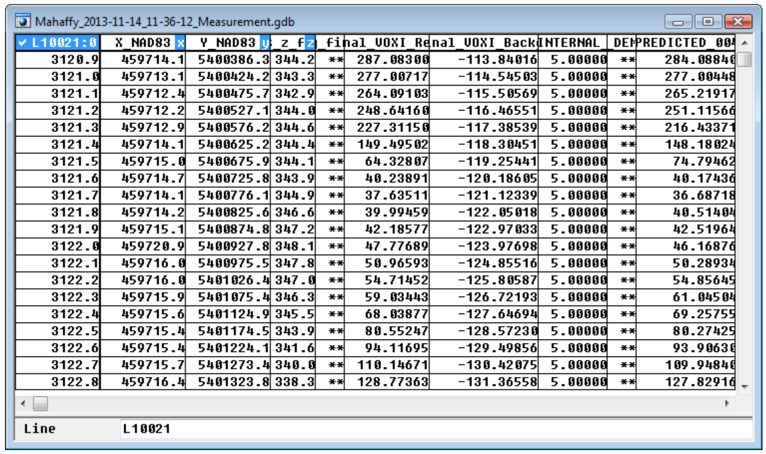
   The Save As window opens.

3. A unique default file name will be generated, however you can specify a more descriptive name. Click **Save**.

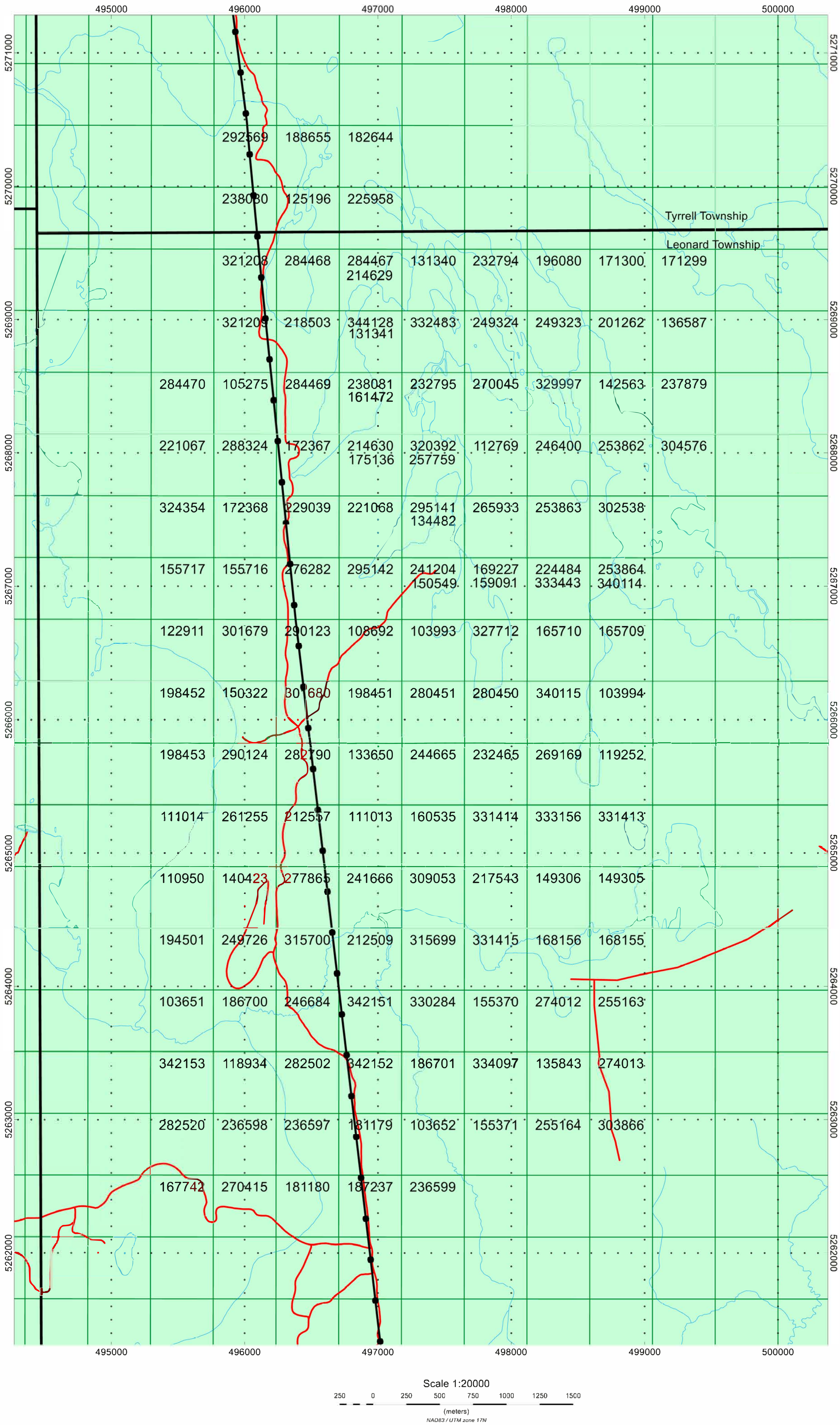
   The predicted response (forward calculation) database opens and is saved as a Geosoft Database file (*.gdb). This data can be further analysed in Oasis montaj or used to grid the predicted response. The predicted channel is named

PREDICTED_###, where ### indicates the number of iterations conducted to obtain the inversion result.

Figure 1.13 Predicted response (forward calculation) database



L10021:0	X_NAD83 x	Y_NAD83 y	z_f z	fi	nal_VOXI_Re	nal_VOXI_Back	INTERNAL_	DE	PREDICTED_00
3120.9	459714.1	5400386.3	344.2	**	287.08300	-113.84016	5.00000	**	284.08840
3121.0	459713.1	5400424.2	343.3	**	277.00717	-114.54503	5.00000	**	277.00448
3121.1	459712.4	5400475.7	342.9	**	264.09103	-115.50569	5.00000	**	265.21917
3121.2	459712.2	5400527.1	344.0	**	248.64160	-116.46551	5.00000	**	251.11566
3121.3	459712.9	5400576.2	344.6	**	227.31150	-117.38539	5.00000	**	216.43371
3121.4	459714.1	5400625.2	344.4	**	149.49502	-118.30451	5.00000	**	148.18024
3121.5	459715.0	5400675.9	344.1	**	64.32807	-119.25441	5.00000	**	74.79462
3121.6	459714.7	5400725.8	343.9	**	40.23891	-120.18605	5.00000	**	40.17436
3121.7	459714.1	5400776.1	344.9	**	37.63511	-121.12339	5.00000	**	36.68718
3121.8	459714.2	5400825.6	346.6	**	39.99459	-122.05018	5.00000	**	40.51404
3121.9	459715.1	5400874.8	347.2	**	42.18577	-122.97033	5.00000	**	42.51964
3122.0	459720.9	5400927.8	348.1	**	47.77689	-123.97698	5.00000	**	46.16876
3122.1	459716.0	5400975.5	347.8	**	50.96593	-124.85516	5.00000	**	50.28934
3122.2	459716.0	5401026.4	347.0	**	54.71452	-125.80587	5.00000	**	54.85645
3122.3	459715.9	5401075.4	346.3	**	59.03443	-126.72193	5.00000	**	61.04504
3122.4	459715.6	5401124.9	345.5	**	68.03877	-127.64694	5.00000	**	69.25755
3122.5	459715.4	5401174.5	343.9	**	80.55247	-128.57230	5.00000	**	80.27425
3122.6	459715.4	5401224.1	341.6	**	94.11695	-129.49856	5.00000	**	93.90630
3122.7	459715.7	5401273.4	340.0	**	110.14671	-130.42075	5.00000	**	109.94840
3122.8	459716.4	5401323.8	338.3	**	128.77363	-131.36558	5.00000	**	127.82916



BATTERY MINERAL RESOURCES

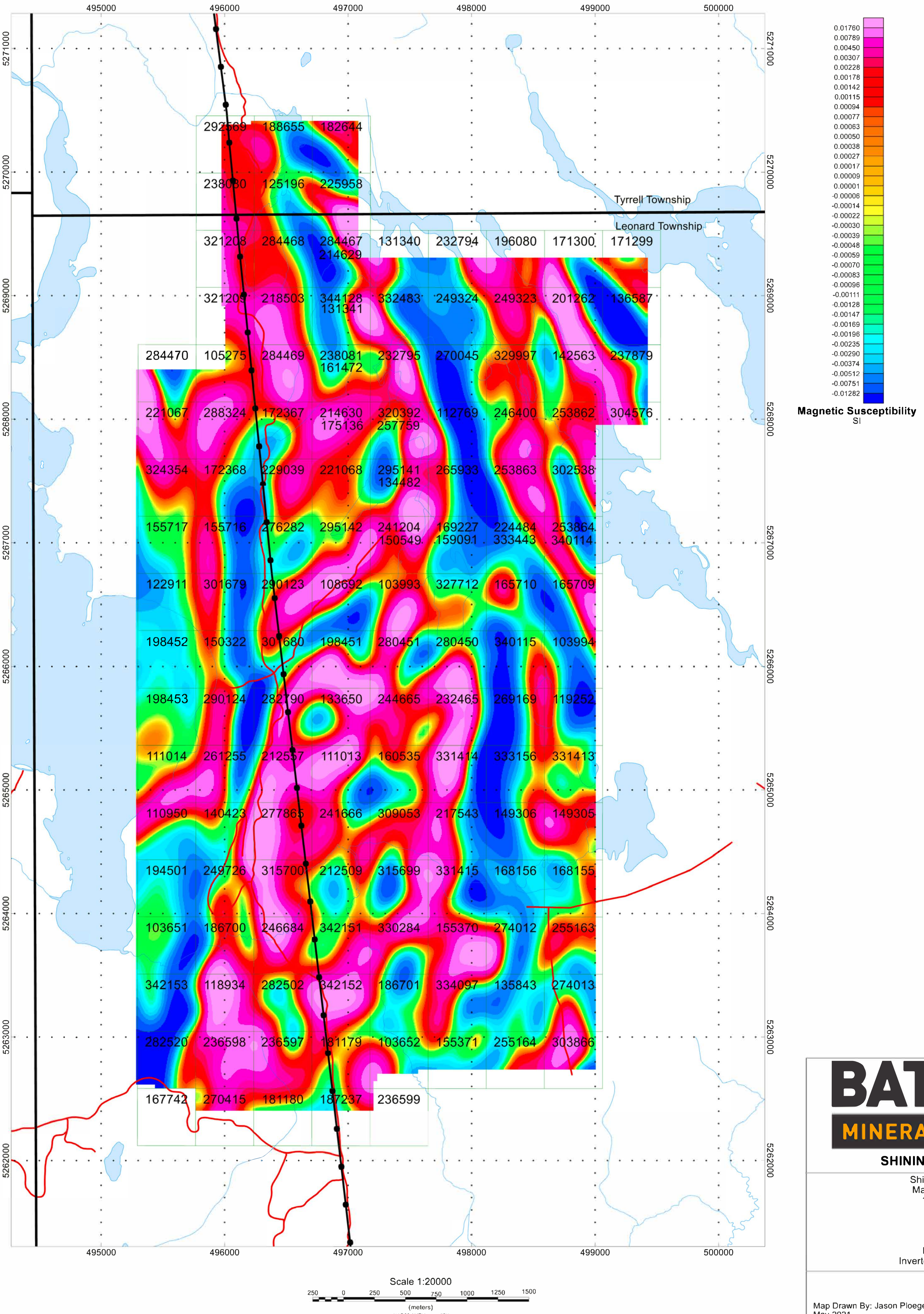
SHINING TREE PROJECT

Shining Tree Claim Cells Location Plan Map

Map Drawn By: Jason Ploeger, P.Geo.
May 2021

CXS CANADIAN EXPLORATION SERVICES LTD

Drawing: BMR-ShiningTree-Cells



BATTERY MINERAL RESOURCES

SHINING TREE PROJECT

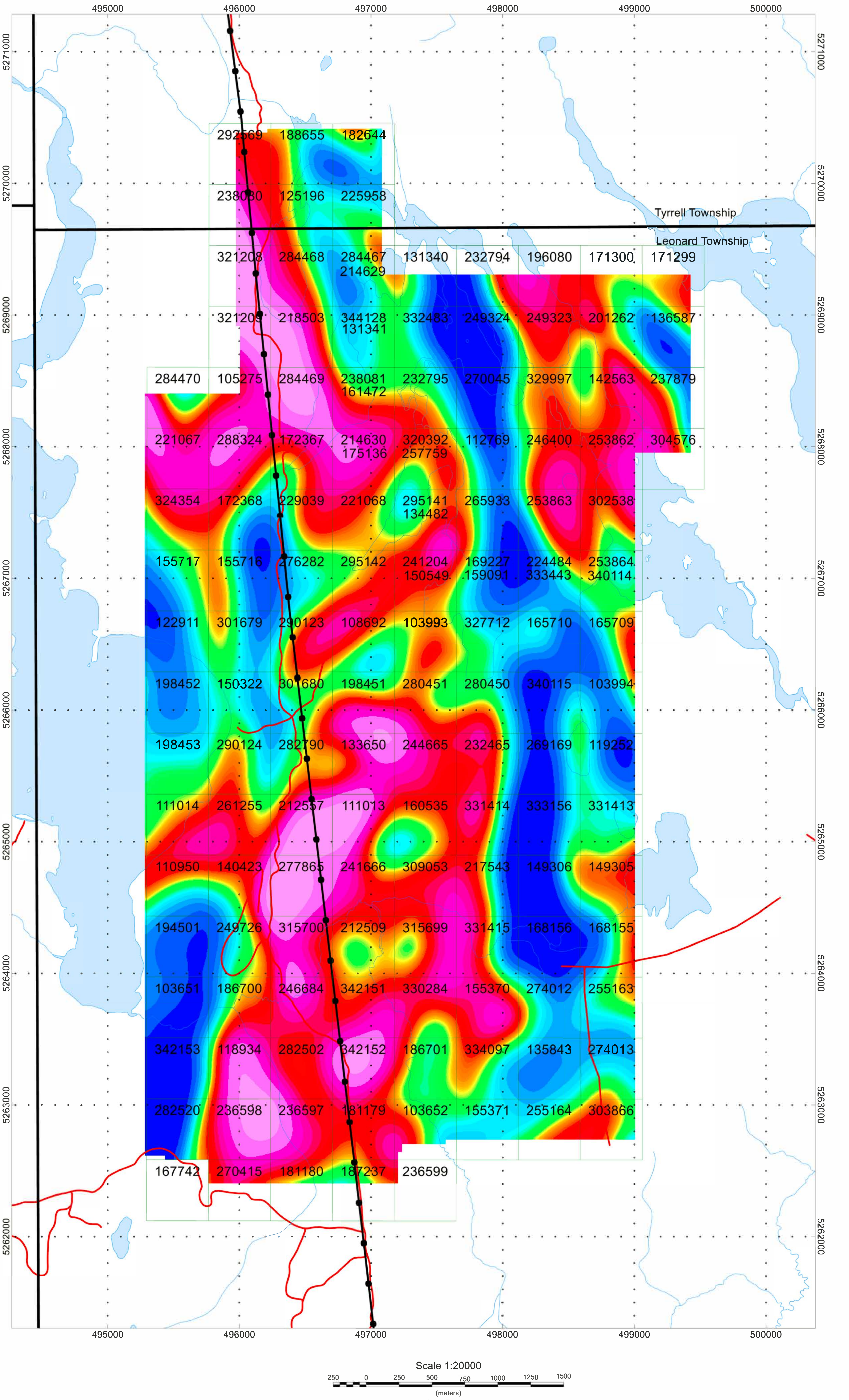
Shining Tree Claim Cells
Magnetic Susceptibility
100 MSL Plan Map

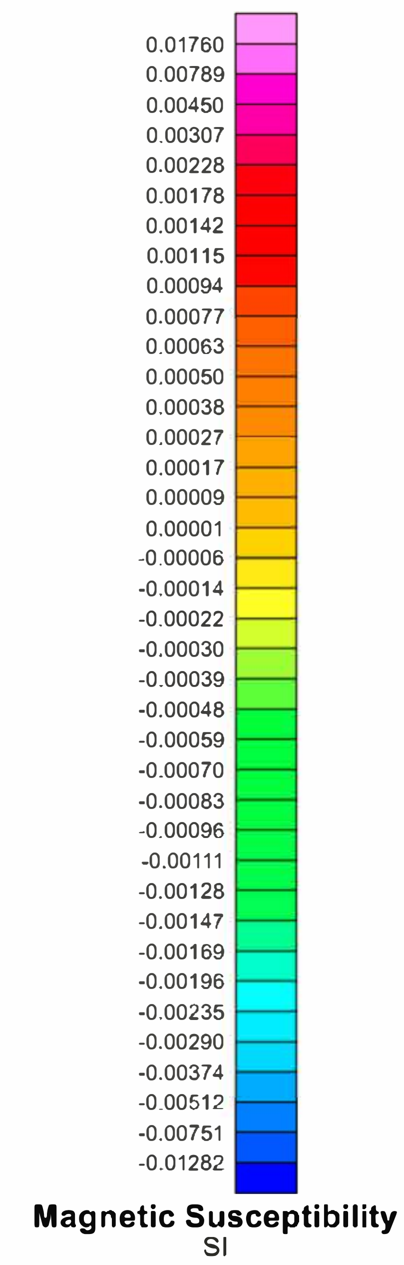
Magnetic Inversion
Inverted through Geosoft Voxi

Map Drawn By: Jason Ploeger, P.Geo.
May 2021

CXS CANADIAN EXPLORATION SERVICES LTD

Drawing: BMR-ShiningTree-Mag-Inv-100MSL





BATTERY MINERAL RESOURCES

SHINING TREE PROJECT

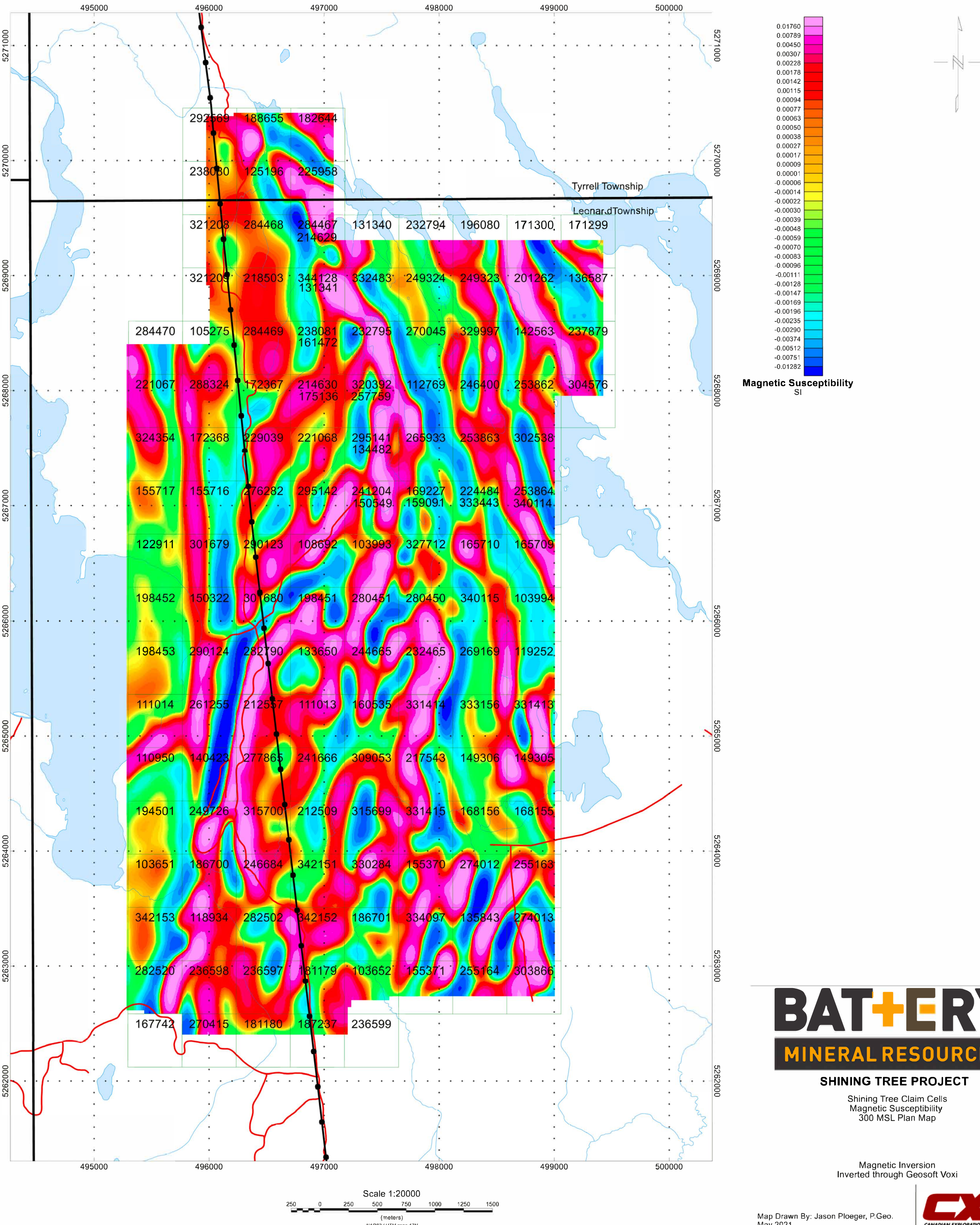
Shining Tree Claim Cells
Magnetic Susceptibility
-100 MSL Plan Map

Magnetic Inversion
Inverted through Geosoft Voxi

Map Drawn By: Jason Ploeger, P.Geo.
May 2021

CXS CANADIAN EXPLORATION SERVICES LTD

Drawing: BMR-ShiningTree-Mag-Inv--100MSL



BATTERY MINERAL RESOURCES

SHINING TREE PROJECT

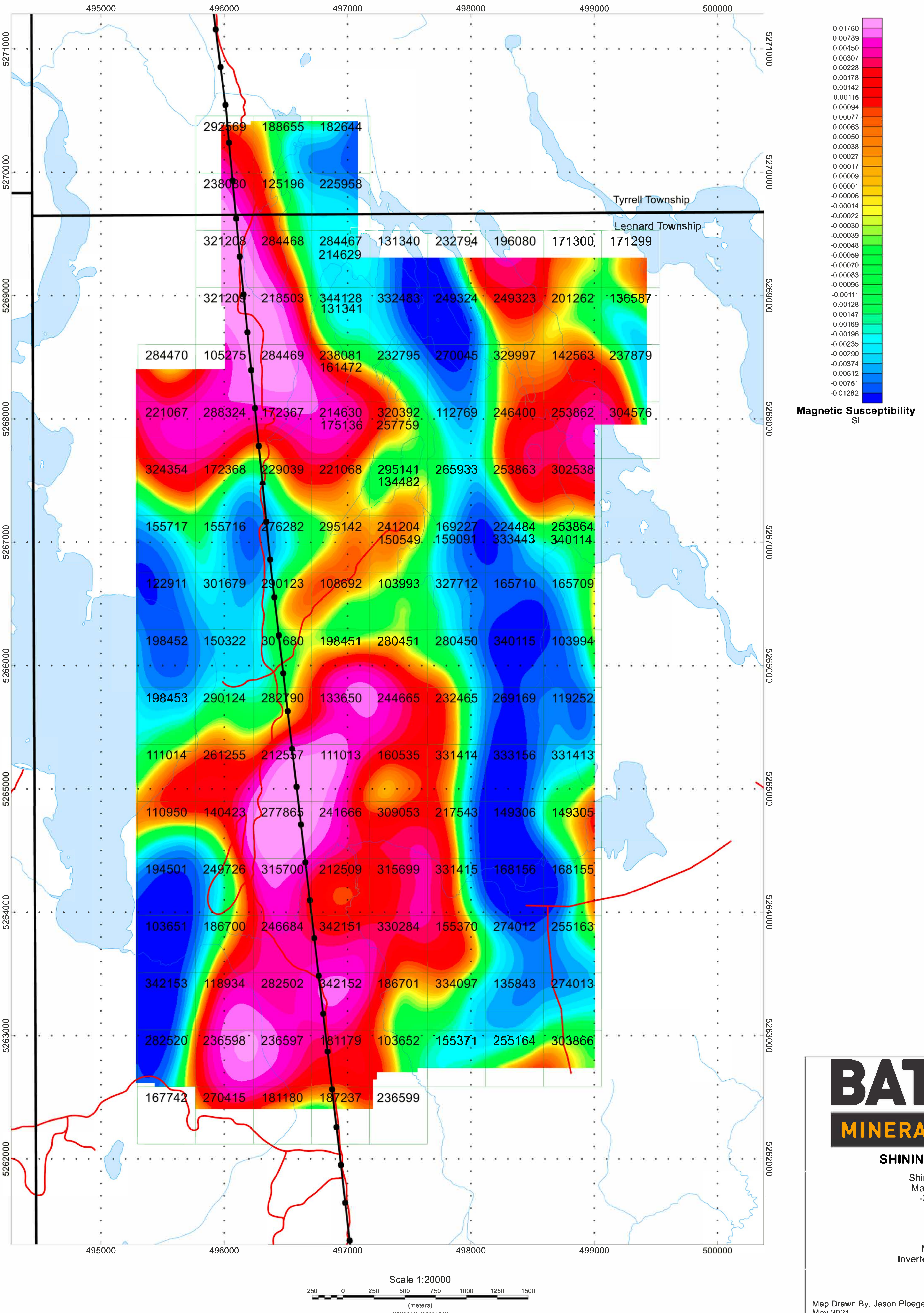
Shining Tree Claim Cells
Magnetic Susceptibility
300 MSL Plan Map

Magnetic Inversion
Inverted through Geosoft Voxi

Map Drawn By: Jason Ploeger, P.Geo.
May 2021

CXS CANADIAN EXPLORATION SERVICES LTD

Drawing: BMR-ShiningTree-Mag-Inv-300MSL



BATTERY MINERAL RESOURCES

SHINING TREE PROJECT

Shining Tree Claim Cells
Magnetic Susceptibility
-300 MSL Plan Map

Magnetic Inversion
Inverted through Geosoft Voxi

Map Drawn By: Jason Ploeger, P.Geo.
May 2021

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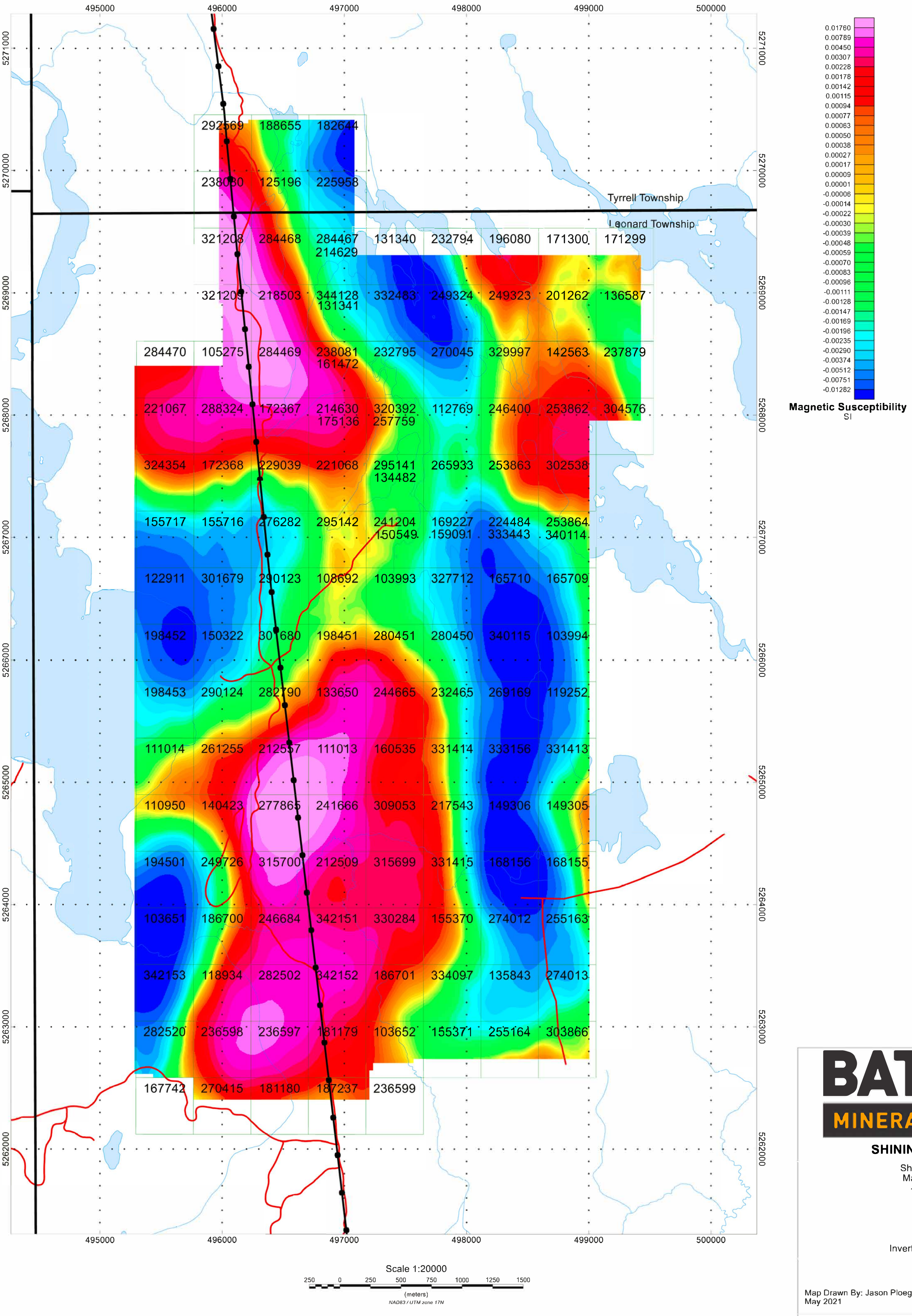
Drawing: BMR-ShiningTree-Mag-Inv--300MSL



BATTERY MINERAL RESOURCES

SHINING TREE PROJECT

Shining Tree Claim Cells
Magnetic Susceptibility
-500 MSL Plan Map

Magnetic Inversion
Inverted through Geosoft Voxi

Map Drawn By: Jason Ploeger, P.Geo.
May 2021

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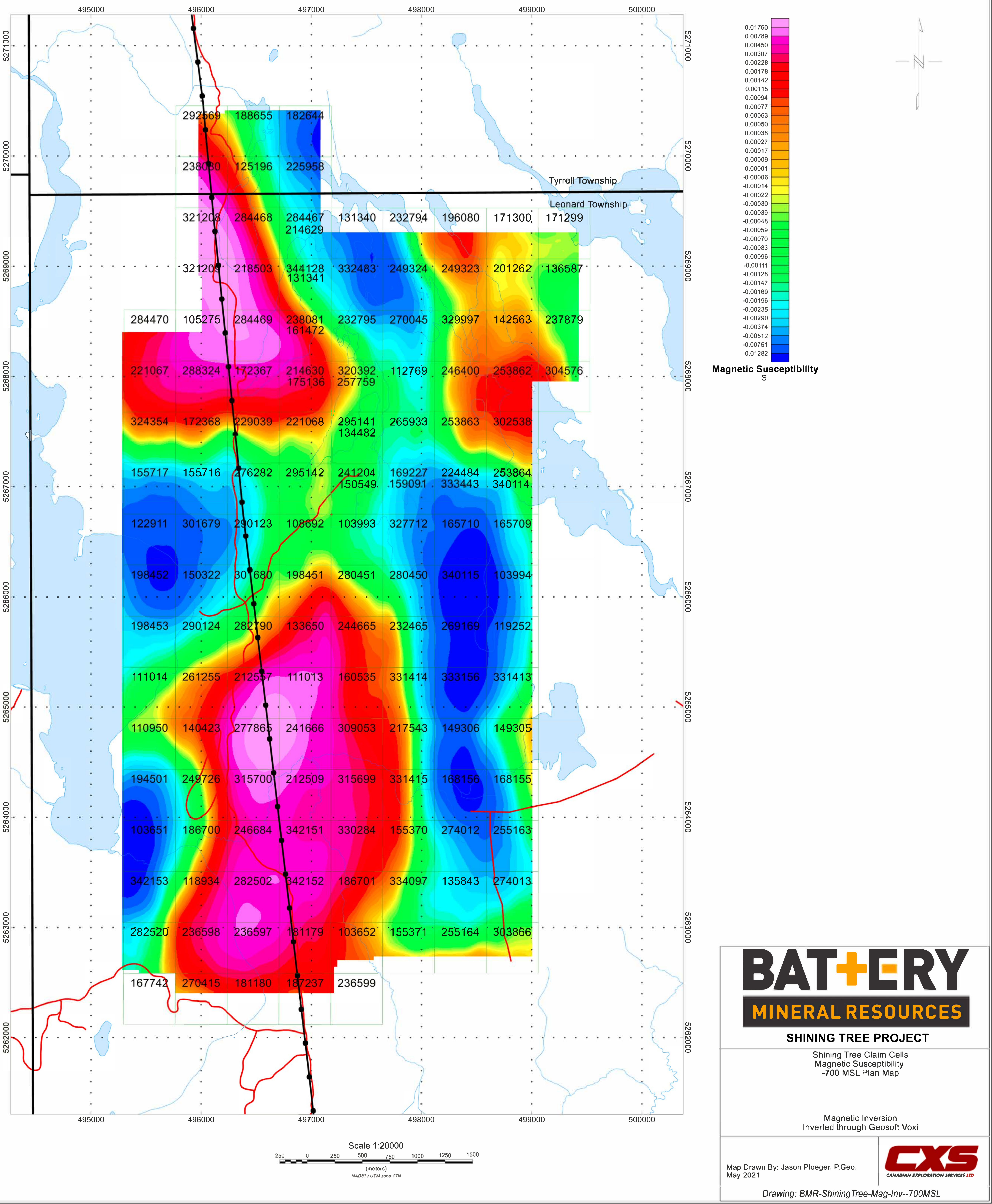
Drawing: BMR-ShiningTree-Mag-Inv--500MSL



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Magnetic Susceptibility
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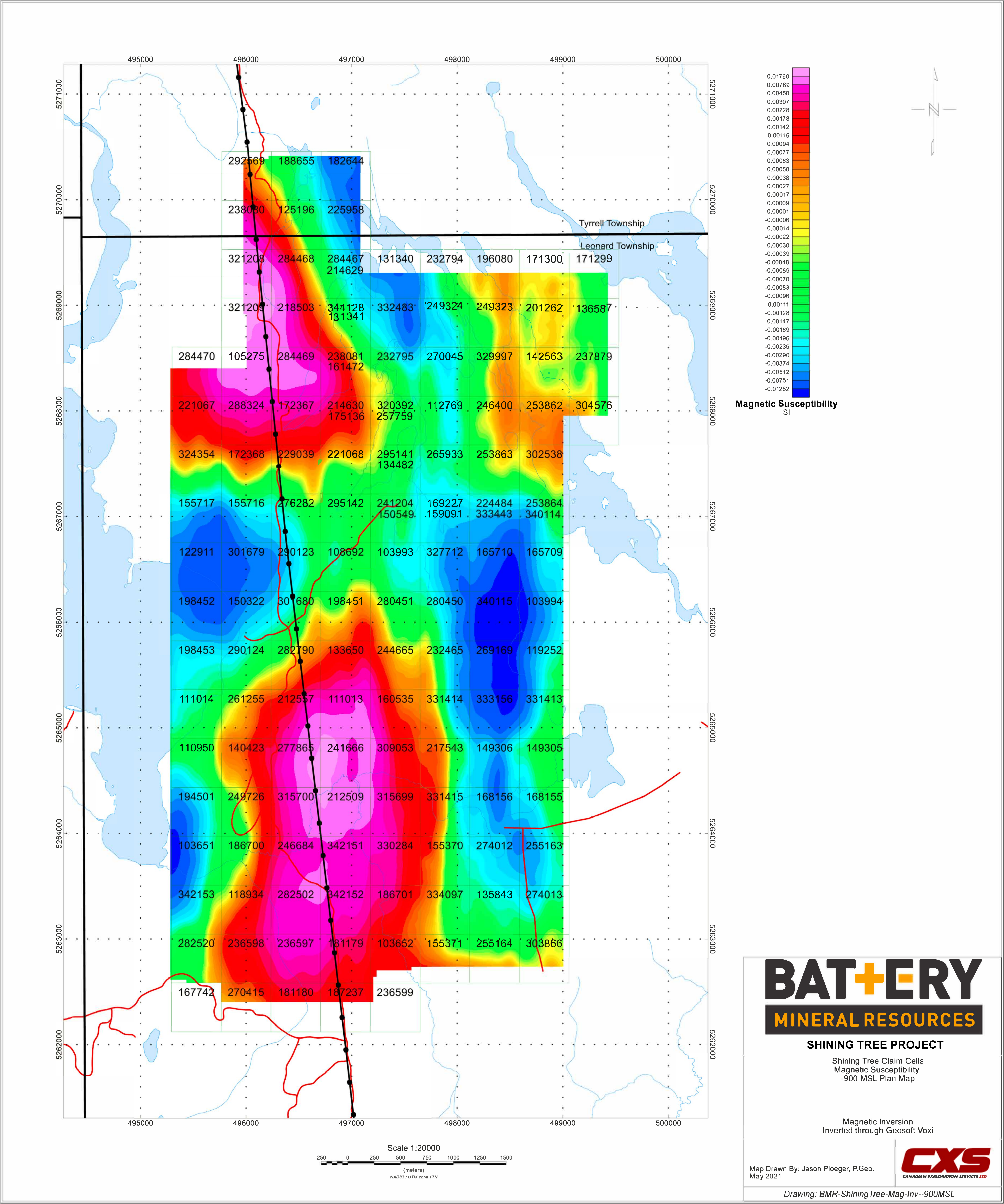
BATTERY
MINERAL RESOURCES
SHINING TREE PROJECT
Shining Tree Claim Cells
Magnetic Susceptibility
-700 MSL Plan Map
Magnetic Inversion
Inverted through Geosoft Voxi
Map Drawn By: Jason Ploeger, P.Geo.
May 2021
CXS
CANADIAN EXPLORATION SERVICES LTD
Drawing: BMR-ShiningTree-Mag-Inv--700MSL



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Leonard Township
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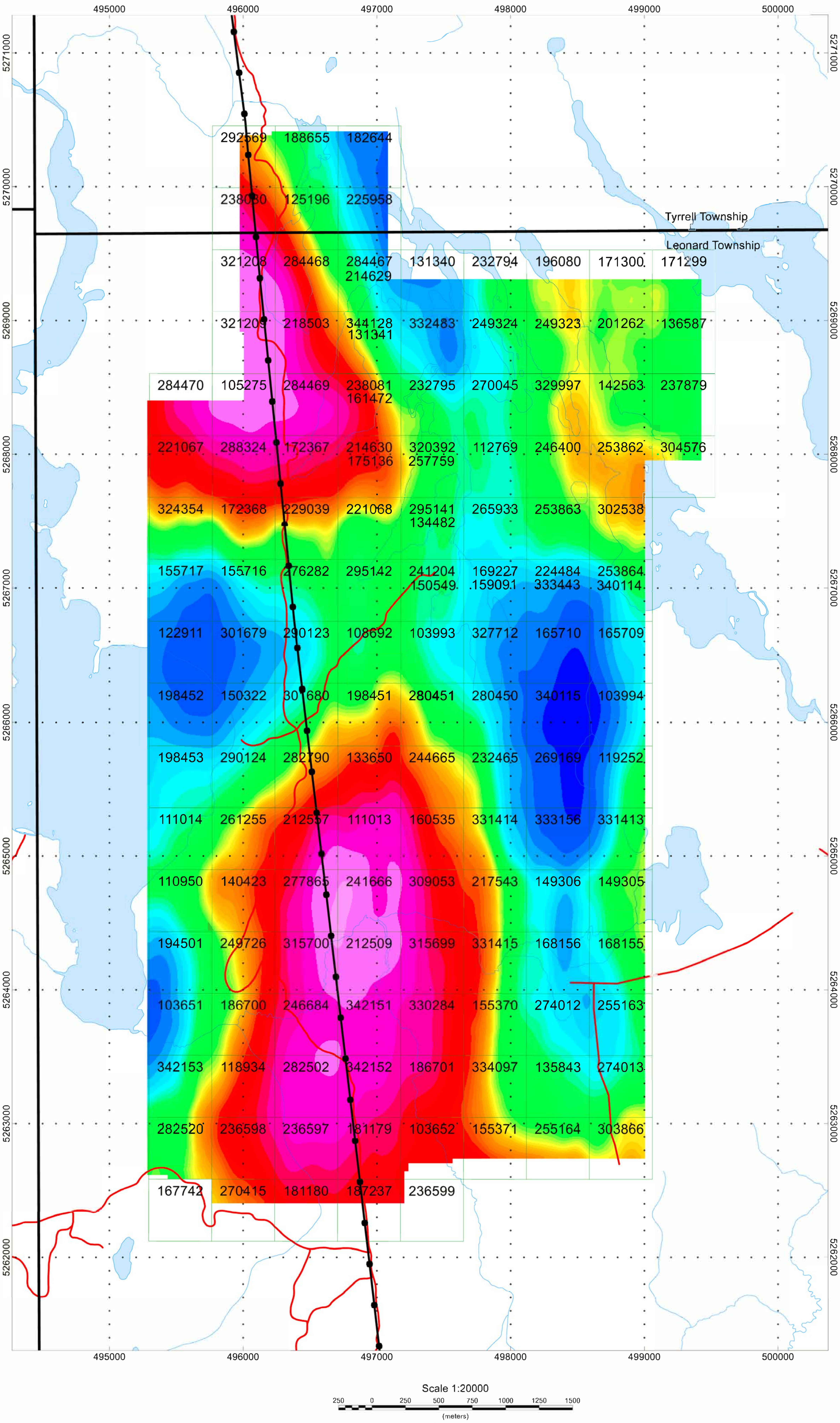
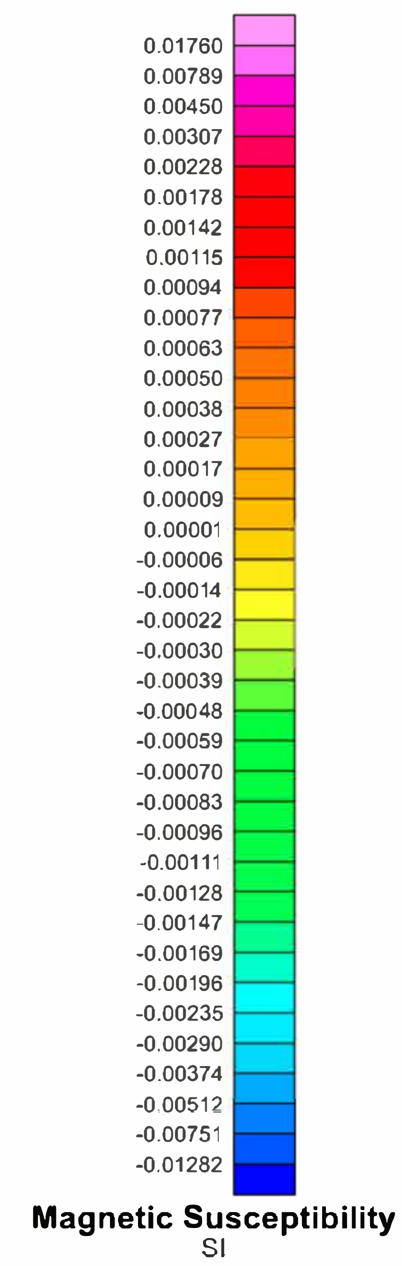
-0.00374
-0.00512
-0.00751
-0.01282
Magnetic Susceptibility
SI
N
Scale 1:20000
250 0 250 500 750 1000 1250 1500
(meters)
BATTERY
MINERAL RESOURCES
SHINING TREE PROJECT
Shining Tree Claim Cells
Magnetic Susceptibility
-900 MSL Plan Map
Magnetic Inversion
Inverted through Geosoft Voxi
Map Drawn By: Jason Ploeger, P.Geo.
May 2021
CXS
CANADIAN EXPLORATION SERVICES LTD
Drawing: BMR-ShiningTree-Mag-Inv--900MSL





BATTERY MINERAL RESOURCES

SHINING TREE PROJECT

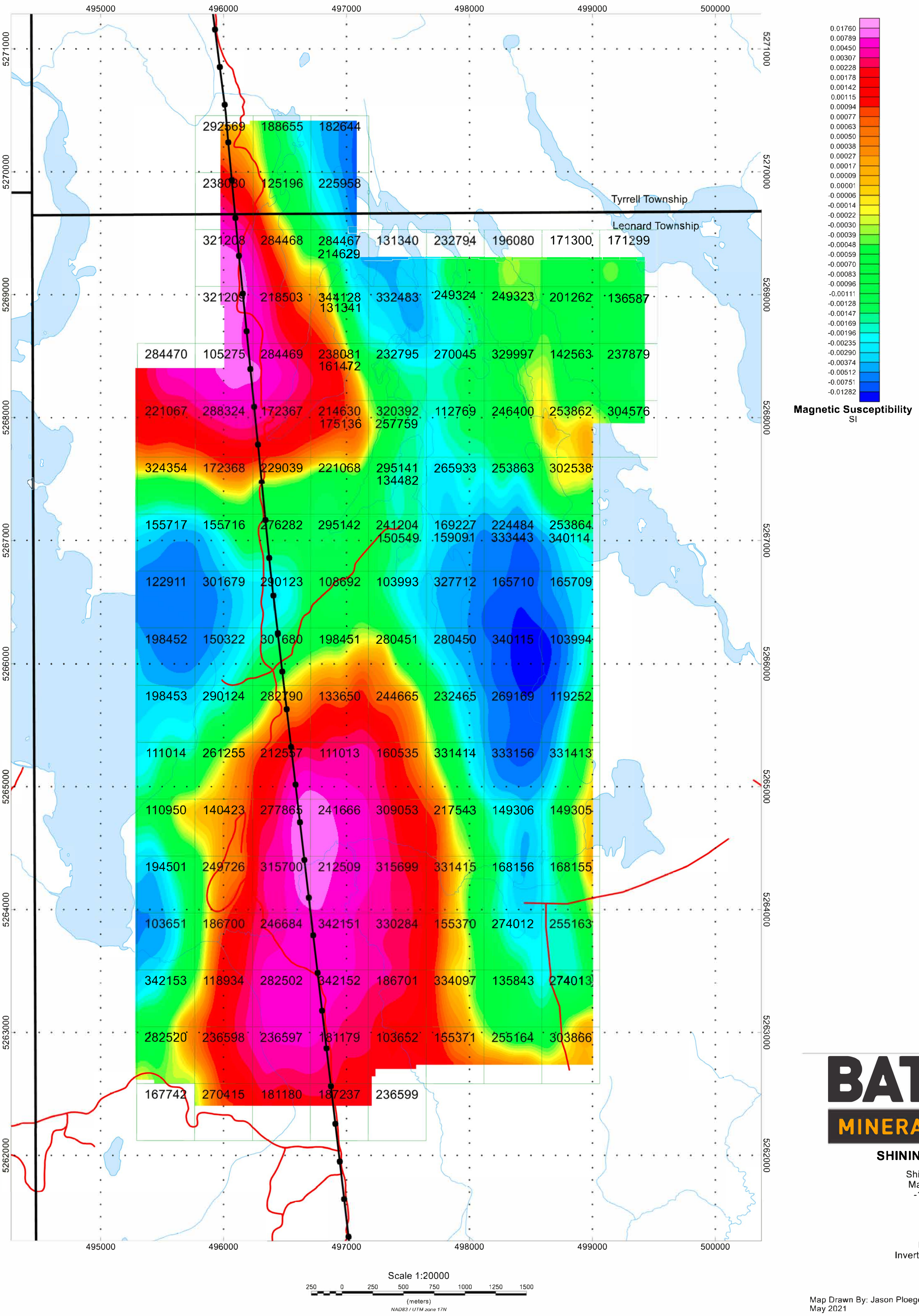
Shining Tree Claim Cells
Magnetic Susceptibility
-1100 MSL Plan Map

Magnetic Inversion
Inverted through Geosoft Voxi

Map Drawn By: Jason Ploeger, P.Geo.
May 2021

CXS CANADIAN EXPLORATION SERVICES LTD

Drawing: BMR-ShiningTree-Mag-Inv--1100MSL



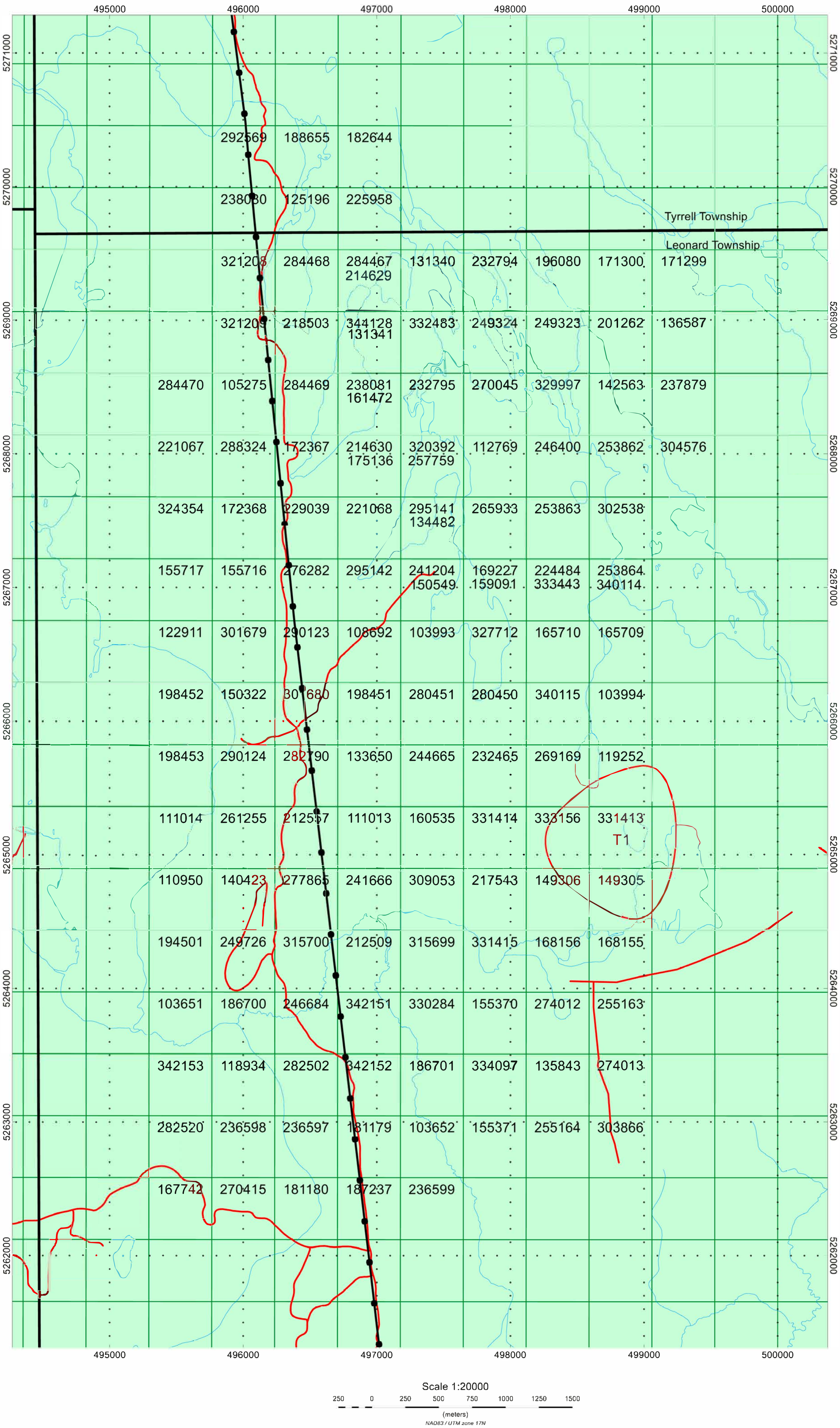
SHINING TREE PROJECT

Shining Tree Claim Cells
Magnetic Susceptibility
-1300 MSL Plan Map

Magnetic Inversion
Inverted through Geosoft Voxi

Map Drawn By: Jason Ploeger, P.Geo.
May 2021

Drawing: BMR-ShiningTree-Mag-Inv--1300MSL



BATTERY MINERAL RESOURCES

SHINING TREE PROJECT

Shining Tree Claim Cells
with Targets Plan Map

Map Drawn By: Jason Ploeger, P.Geo.
May 2021

CXS CANADIAN EXPLORATION SERVICES LTD

Drawing: BMR-ShiningTree-Targets