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**EL15/2014**  
**VALENTINES ROAD**  
**ANNUAL AND FINAL REPORT**  
**NW TASMANIA**

**Prepared for: Tasmania Mines Limited**

**Tim Callaghan, March 2020**

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## **EXECUTIVE SUMMARY**

EL15/2014 Valentines Road was acquired by Tasmania Mines Limited in November 2014 as vacant ground. The western part of the EL has been explored previously by ANZECO, MacIntyre Mines, Tasminex and Iron Mountain Pty Ltd.

The EL is considered to be prospective for stockwork Sn-W mineralisation adjacent to the Ringwood Granite.

Tasmania Mines completed a compilation and assessment of historic data in 2015. This was followed up with additional stream sediment sampling and field reconnaissance mapping in 2015. It was recommended that the L11 grid and soil sampling be extended south to cover anomalous stream sediments and mapped tourmaline-pyrite alteration.

Soil sampling was completed in 2018. A bias was noted in the historic v recent data and reanalysis of the samples was recommended using either 4 acid digestion followed by ICP-MS or a fused disc XRF rather than the recommended aqua regia digest. This was not completed.

No further work was completed and the EL was allowed to expire after its 5 year term in December 2019.

## **MAP CONVENTIONS**

Coordinates in this report and in digital data associated with this report are recorded as GDA 94 Zone 55

## EXECUTIVE SUMMARY

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## File listing

Exploration Work Type	Filename	File format
Report	EL152014_201912_01_Annual and Final Report.pdf	pdf
Drilling		
Surface sampling		
Other (specify)		
File Verification Listing ( <i>this file</i> )	eg. EL152014_201912_FileListing.xls	xls

## 1 INTRODUCTION

Tasmania Mines Limited hold EL15/2014 Valentines Road located south of Hampshire, 30km South of Burnie in NW Tasmania (Figure 1 and 2).

EL15/2014 was acquired as vacant land after partial relinquishment of the western margin of EL18/2007 by Iron Mountain Pty Ltd. The EL was granted for a period of 5 years and is due to expire on the 16/11/2019.

The area around EL15/2014 is currently held as EL18/2007 and EL35/2006 by Blythe River Mining Pty Ltd (formerly Iron Mountain Mining Ltd) and the Kara Mine Lease 1934P/M held by Tasmania Mines Pty Ltd.

Access to the RL is via all-weather unsealed forestry roads, principally the Companion Road which is accessed off the Murchison Highway. The EL lies 1-2km west and southwest of the Kara magnetite-scheelite mine located on mine lease 1934P/M.

The topography of the EL consists of an elevated plateau incised by several steep N-S trending streams and rivers. Much of the EL is private forestry plantation managed by Forico Pty Ltd and access requires permission from Forico. The Companion Forest Reserve is located on the western margin of the EL. Exploration is permitted within the forest reserve.

The magnetite-scheelite deposits in the Kara District have been known for many years e.g. Reid (1924). Modern exploration began in the late 1960's by ANZECO and McIntyre Mines Ltd who delineated the major magnetite-scheelite skarns through a program of aero-magnetics, ground magnetics, stream sediment sampling and geological mapping. Exploration has been sporadic since the early 1970's with most work concentrated on the Hampshire, Kara No1 and Kara No2 magnetite skarns.

## 2 GEOLOGY

### 2.1 REGIONAL GEOLOGY

The Kara Mine region is located on the western margin of the Dial Range Trough and is underlain by lithologies of the Late Proterozoic Oonah Formation, Owen Group Siliciclastics, Gordon Group Limestone, Devonian Granites and Tertiary Basalt (Figure 1). The Dial Trough is a structurally interesting basin that includes a possible Northern Extension of the Hellyer Fault, and significant basin bounding faults on the western and eastern sides. The Devonian post orogenic Husetop Granite dominates the geology to the south of the project area and is considered to underlie much of the southern dial trough. The Dial Trough has been poorly mapped and stratigraphic correlations are uncertain for many units.

#### *Oonah Formation*

The oldest rocks in the district are the Proterozoic Oonah formation, consisting of poly-deformed quartzwacke, siltstone and pelite with lesser dolerite intrusives. These are overlain by a sequence of pelite-carbonate with minor mafic volcanics and conglomerate. This association is host to replacement deposits at Mt Bischoff and near Zeehan and consequently represents a potential host for similar styles of skarn mineralisation.

#### *Mt Read Volcanics*

Mt Read Volcanic associations have been correlated with the felsic volcanoclastics of the Western Volcano-sedimentary sequence and the Tyndall Group quartz-feldspar phyrlic volcanoclastics.

#### *Owen Group*

The Late Cambrian to Ordovician Owen Group overlies the Mt Read Volcanics and is comprised dominantly of siliciclastic conglomerate and sandstone. Locally volcanic derived conglomerates are associated with basal members. The Moina Sandstone, comprised of coarse to fine siliciclastic sandstone with minor intercalated conglomerate is the uppermost siliciclastic unit of the Owen Group and has a gradational contact with the overlying Gordon Group.

#### *Gordon Group Limestone*

Conformably overlying the Owen Group is the Gordon Group limestone and dolomite sequence which is the host of the Kara district magnetite skarns. The stratigraphic thickness of the limestone is regionally variable ranging between 50-1000m.

#### *Husetop Granite*

The Husetop granite outcrops in much of the Kara District and is believed to extend below much of the area (Leaman, 1993). Leaman concludes that the Husetop granite is anomalously dense and highly magnetic, which may explain the abundance of iron metasomatism in the district. The granite is responsible for massive Magnetite-Sn-WO<sub>3</sub> mineralisation of the Kara District. The association of Tasmanian Devonian granites with Magnetite, Sn-WO<sub>3</sub>, Pb-Zn-Ag and Au mineralisation is well documented.

### *Tertiary Basalt*

Basaltic flows are widespread throughout the area, flooding Tertiary palaeo-topographic lows. The basalts vary widely in thickness and frequently have a high magnetic susceptibility creating difficulties for magnetite exploration below basaltic cover. Resource and exploration drilling at the Kara Mine indicates that the magnetite skarn extends below basalt cover at Eastern Ridge, Location 5 and the Northern Magnetite Anomaly.

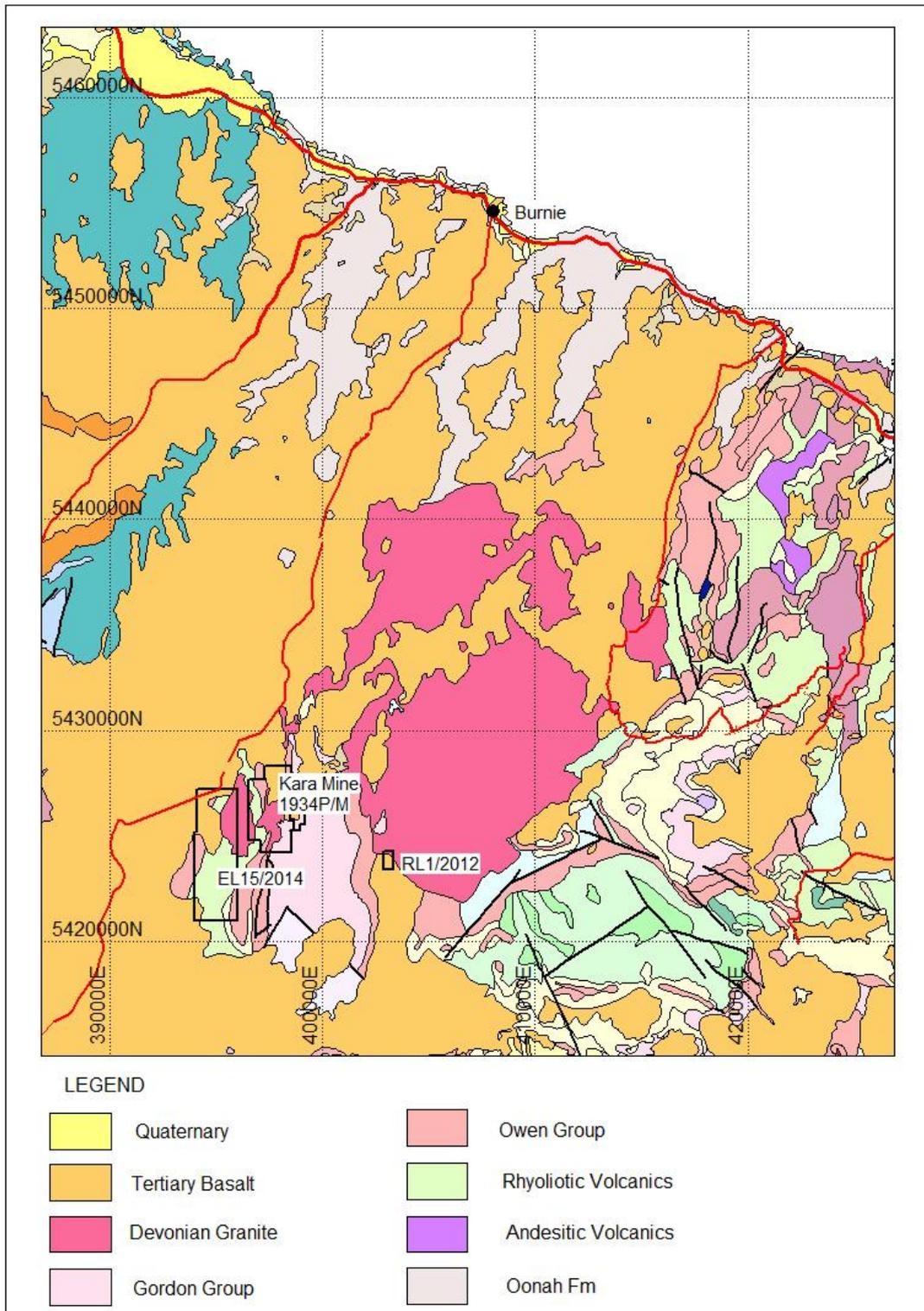
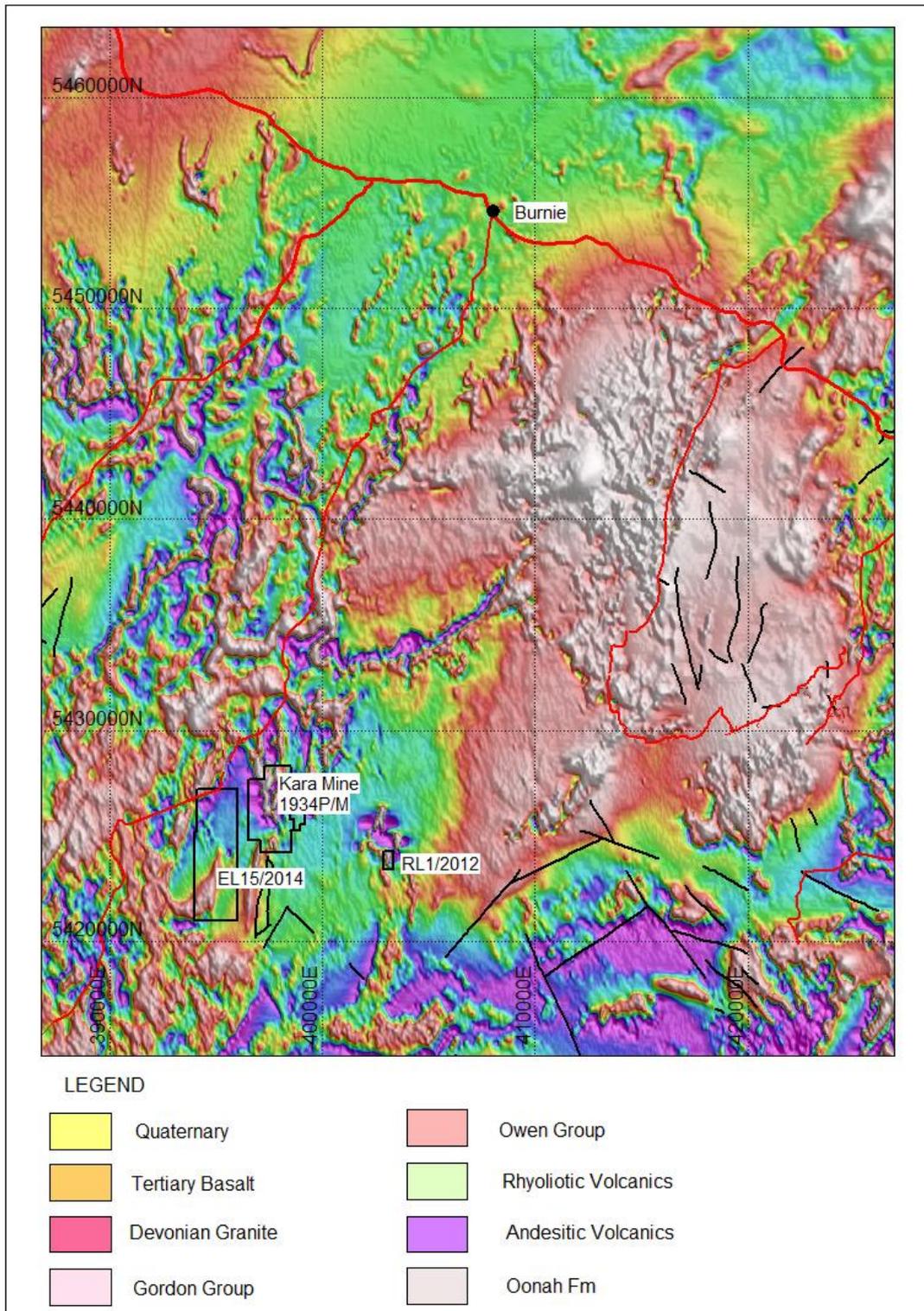


Figure 1. EL15/2014, Kara Mine Lease location and MRT 250k Geology.



**Figure 2. EL15/2014, Kara Mine Lease location and TMI image.**

## 2.2 LOCAL GEOLOGY.

The geology of the Valentines Rd EL is dominated by the Devonian Ringwood Granite intrusion in the central and northeast area. The southern area is dominated by rhyolitic to intermediate volcanic sediments of the Cambrian Mt Read volcanics. Prominent ridges of Ordovician Owen Group siliciclastic conglomerates are located in the far southwestern and southeastern corners of the EL (Figure 3). A plateau of Tertiary basalt is located on the eastern boundary.

The EL occupies an essentially north-south striking anticlinal structure bounded by prominent ridges of Ordovician siliciclastic conglomerate with a core of Cambrian volcanics. The Devonian Ringwood Granite has intruded an interpreted anticlinal hinge zone in the north.

The Ringwood Granite is a post orogenic Devonian quartz-feldspar-Kfeldspar-biotite porphyritic granite. The granite, and particularly the granite margins are the source of the magnetite-tungsten skarn mineralisation located in the Kara district. Skarn mineralisation is generally hosted in calcareous sediments of the upper Moina sandstone known as the Transition Beds and grades up into the overlying Ordovician Gordon Limestone. The stratigraphy of the area is well documented and is displayed in the Legend of Figure 3. Proximal pyrometamorphic skarn mineralisation has occurred where the host sediments are in direct contact with the granite intrusions. Most skarns occur as roof pendants in synclinal structures on the top and margins of the Ringwood and Kara intrusions. Skarn mineralogy consists of massive magnetite, magnetite-diopside/wollastonite, magnetite-garnet, diopside-actinolite and epidote skarn. Tungsten mineralisation occurs with the magnetite-diopside and magnetite-garnet skarn. Elevated Sn values are associated with the skarns but most Sn on the Kara ML occurs within garnet and sphene minerals and is not recoverable.

The Ordovician Moina Sandstone calcareous sediments of the Kara host sequence have not been confirmed on EL15/2014. It is possible that some limestone associated with the Cambrian Volcanics may occur on the eastern and northeastern part of the tenement.

Rhyolitic to Intermediate volcanoclastic sediments dominate the southern and central part of the EL. The volcanoclastics consist mainly of well bedded vitric siltstones with lesser volcanoclastic breccia. The volcanics have been variably hornfelsed in close proximity to the intrusions. Kfeldspar-diopside and silica alteration appear to be associated with the thermal alteration. Disseminated pyrrhotite-pyrite and magnetite are associated with the alteration zones, particularly tourmaline-silica alteration.

The magnetite skarns of the Kara district exhibit very strong total magnetic intensity anomalies on aeromagnetic surveys of the region (Figure 4). Three linear anomalies extend south and west of the Kara Mine Lease. Two are located on EL15/2014 and the other just east of the EL. The anomalies have a lower intensity than the outcropping magnetite skarns on the Kara Mine Lease.

Reconnaissance mapping confirms the presence of Mt Read Volcanic acid-intermediate sedimentary facies rocks in the vicinity of the Ringwood Granite. The volcanics include laminated vitric siltstones, volcanoclastic sandstones and polymict volcanoclastic breccia.

EL15/2014 does not host the Moina Sandstone transition series rocks between the Ordovician siliciclastics and the Gordon Limestone that host skarn mineralisation in the Hampshire area. Consequently, the EL is unlikely to host massive magnetite skarn mineralisation.

Structurally the lithologies strike NNE and dip steeply west suggesting the EL covers the western limb of a broad north plunging syncline. However, facing criteria were not observed and the easterly dip of the volcanics on the eastern side of the Ringwood Granite suggest the Granite may occupy an anticlinal structure locally.

The volcanics in the vicinity of the intrusion are strongly hornfelsed and metasomatised with strong potassic alteration proximal to the granite. A mottled garnet-pyroxene skarn was located adjacent to the granite identifying the presence of calcic skarn formation. The most common rock adjacent to the granite is a very hard laminated vitreous rock composed of anorthite-orthoclase-diopside-hedenbergite skarn. Trace magnetite and pyrite are associated with the alteration.

In the south of the EL vitric siltstone with intense silica-tourmaline-pyrrhotite-pyrite alteration is located on the ridge top associated with the eastern magnetic anomaly. The eastern magnetic lineament extends northward to the L11 grid where C-horizon soil samples are consistently anomalous in Sn. The margin of the Ringwood Granite is considered to be prospective for Sn-W mineralisation with clear evidence of granite related hydrothermal alteration. The area has the potential to host stockwork style Sn mineralisation similar to that occurring at Queen Hill, Cleveland and Waratah.

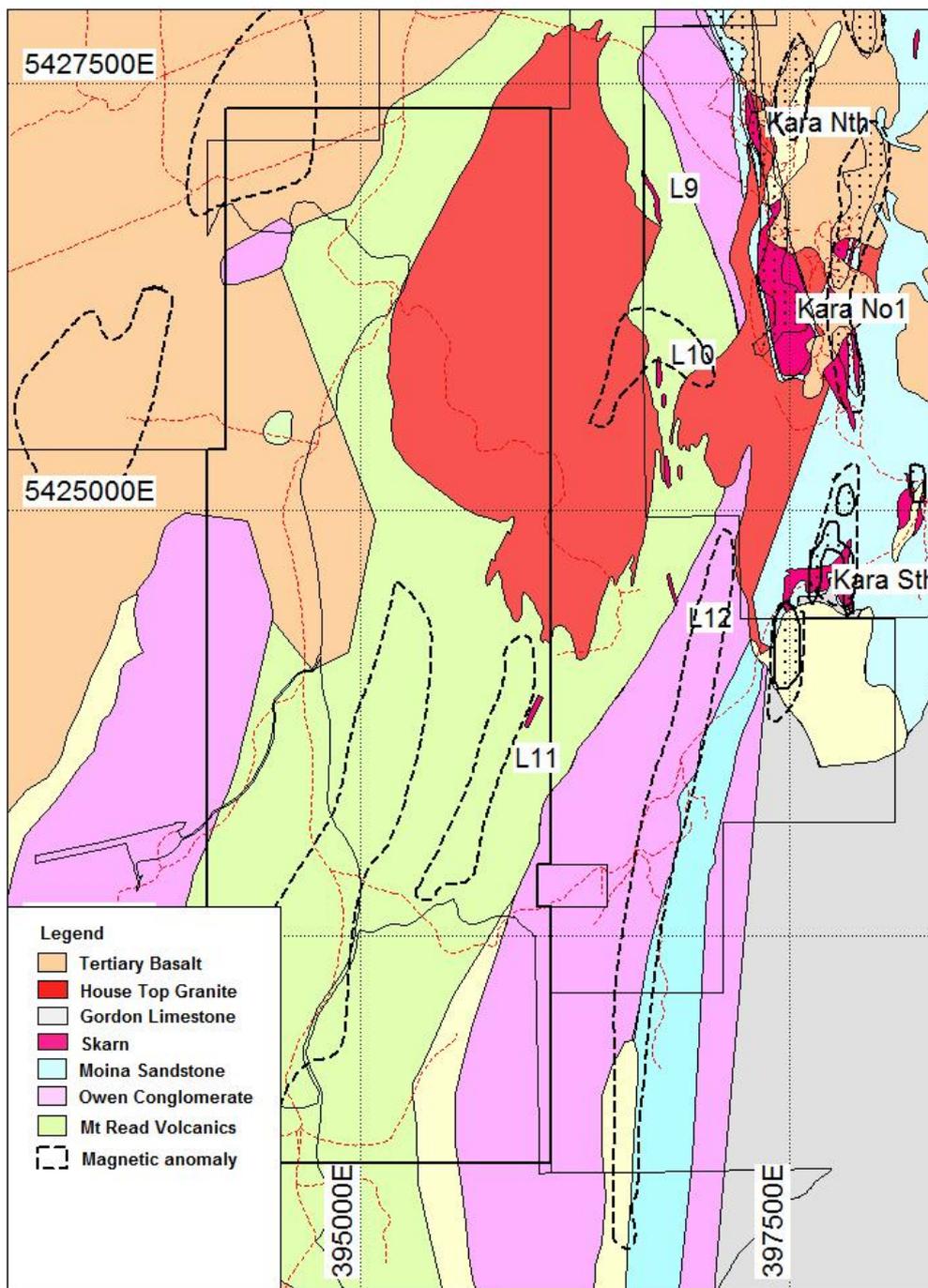


Figure 3. EL15/2014 Geology and prospect locations.

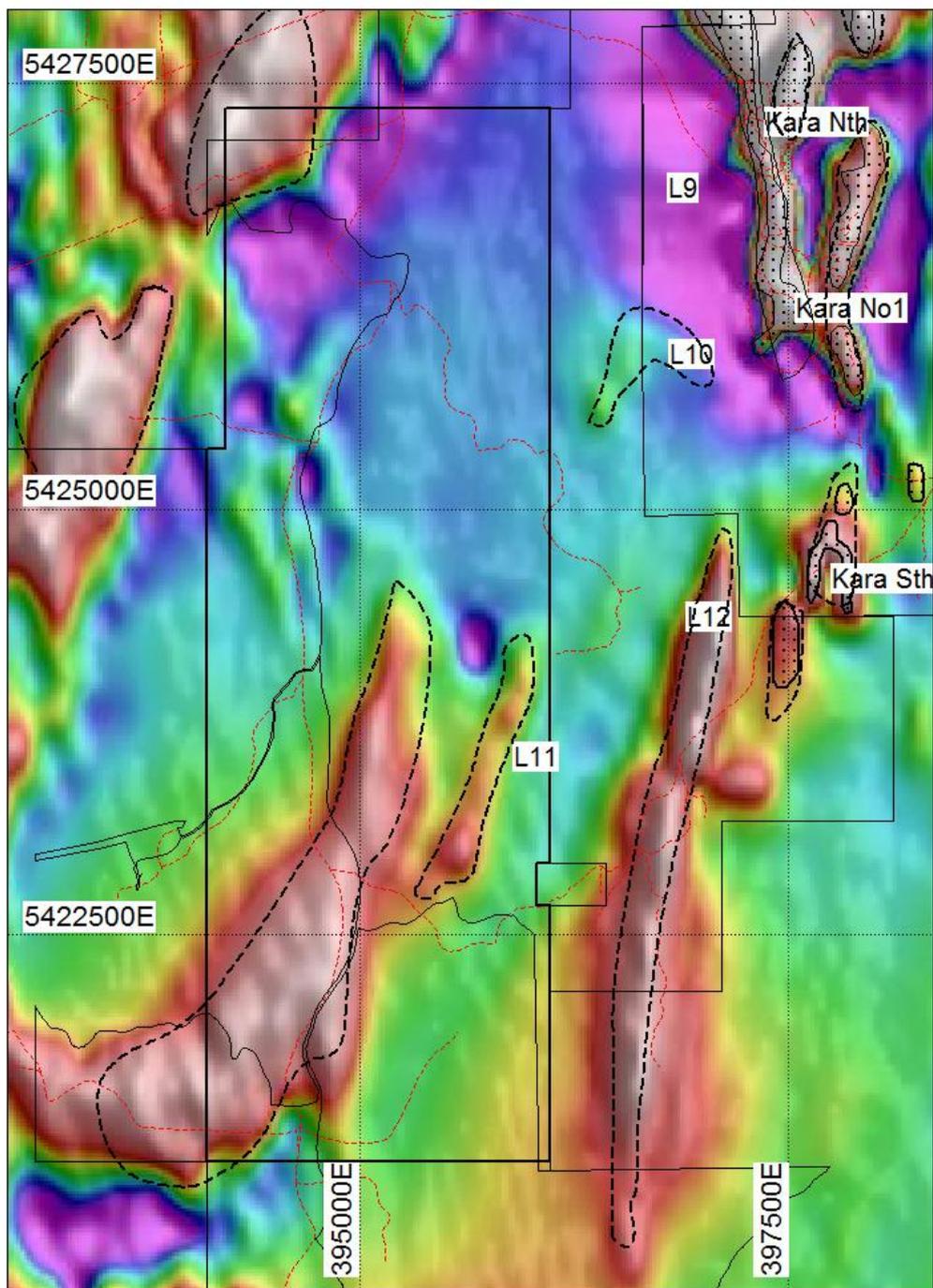


Figure 4. EL15/2014 prospect locations and TMI.

### **3 PREVIOUS WORK**

The magnetite Iron deposits of the Valentines Peak – Hampshire area have been known since the late 1800's with minor iron ore mining occurring prior to World War 2 on the Kara No 2 deposit. Some early Mines department magnetometer surveys were followed up with limited drilling campaigns, mainly at the Kara No 2 skarns to the east of EL15/2014 (Jack, 1963, Jack 1964). Minor alluvial tin mining has occurred since the late 1880's.

Modern exploration of the EL15/2015 locality began in 1968 with the granting of EL17/1968 to Tasminex Ltd. Early exploration was completed by ANZECCO and MacIntyre Mines followed by Tasminex and later Tasmania Mines Ltd.

#### **1968 – 1974 ANZECCO**

The Black Bluff Mining Company completed early reconnaissance work and provided a technical report assessing the potential of providing magnetite for processing at Port Latta or Savage River. The report focused on the Kara No 2 skarns to the east of EL15/2014 and the Kara Mine.

The Australian New Zealand Exploration Company acquired EL17/1968 to explore for Tin-Tungsten skarns and Iron Ore (principally magnetite) surrounding the Housetop Granite. The high-grade Tungsten mineralisation in the Kara No1, Kara North and Eastern Ridge deposits was identified and extensively explored with early metallurgical testwork commencing in the 1970 – 1973 period.

Regional Stream sediment sampling was completed in 1972 (Brandt, 1973) on a broad pattern with generally negative results. Detailed sampling around Kara demonstrated the inconsistent and short range of  $WO_3$  in stream sediments. A second program was completed in 1973 (Brant, 1973). All stream sediment samples were panned and the concentrates were examined for scheelite before being sent for tungsten analysis. Many of the samples from the eastern part of the E.L. were analysed for other metals as well, as they were collected from streams draining what was thought to be Cambrian volcanic terrain. Statistical study of the 1972 work suggests values less than 85 ppm were not regarded as anomalous. Values higher than 85 ppm were regarded as possibly significant, provided they were consistent and reproducible. A total of 593 panned stream-sediment and rock samples were collected and analysed for tungsten. Of these, 157 were analysed in addition for tin, copper, lead, zinc and gold.

In 1974 further regional work was conducted in conjunction with ongoing technical studies at the Kara No1 deposit (Brandt, 1974). A total of seventeen anomalous areas outside of the Kara No1, Kara North and Kara South deposits were identified which consist of the series of anomalies L1 to L17. L11 lies within EL15/2014, all the others are located further east.

#### **1978 MacIntyre Mines**

MacIntyre Mines commissioned an aerial photographic survey followed by a detailed, high resolution low level helimagnetic survey over the entire EL17/1968 lease. Ground follow up of earlier stream sediment samples on anomalies L9, L10, L11 and L12 was completed including cutting baselines, C-horizon auger soil sampling with samples

analysed for W, Sn, Bi and Pb. Further geological mapping included updating earlier maps with additional data from auger rock chip samples.

### ***1981 MacIntyre Mines Pty Ltd***

The majority of exploration work concentrated on the Kara No1, Kara Nth 266 and Eastern Ridge Deposits. Work outside of these areas was conducted on the Kara No2, Kara South (Diamond Drilling) and Hampshire Silver Mine.

Regional geological mapping in the western section of EL17/1968 (Whitehead, 1981) in the vicinity of the Ringwood Granite stock identified surface exposed iron gossan over a small area, approx 200 x 75m in size. This appeared related to sequences at the Ordovician - Cambrian contact adjacent to granite. Random surface sampling of the gossan, and base metal analysis, showed no strong Sn - WO<sub>3</sub> anomalism.

Follow up systematic soil sampling was completed at L10 where previous sampling at 25 metre spacing had recorded anomalous tungsten values. This detailed sampling showed no large development of tungsten anomalism, the latter interpreted as being associated with a minor greisen alteration zone in granite.

### ***1982 MacIntyre Mines Pty Ltd***

Most work during 1982 focussed on feasibility studies on the Kara No1 magnetite-scheelite skarn including infill diamond drilling, engineering, baseline environmental studies, market studies and metallurgical studies. Exploration reviews were completed on the Kara Nth, Hampshire silver Mine, L5 Companion, L1 and Limestone Creek areas. Exploration diamond holes were completed at Bob's Bonanza, Kara South Eastern Ridge and Kara Nth 266.

### ***1983 MacIntyre Mines Pty Ltd***

Feasibility studies on the Kara 1 and Kara Nth266 deposits continued in 1983. Exploration work included ground magnetic surveys of the Eastern Ridge, L5 areas, Loudwater Creek and Hampshire skarns. Exploration drilling was completed at L5 (Whitehead, 1983).

### ***1984 MacIntyre Mines Pty Ltd***

Feasibility studies on the Kara 1 and Kara Nth266 deposits continued in 1984. Exploration work included infill ground magnetic surveys of the Loudwater Creek and Hampshire skarns. Exploration drilling was completed at Kara South, Companion Skarn, Kara Nth 266 (Whitehead, 1984).

### ***1986 Tasmania Mines***

Work completed included continued infill drilling on the Mine Leases. Exploration work on EL28/1978 included intensive exploration on the Kara No2 skarn including gridding, geological mapping, trenching, ground magnetics, topographic studies and diamond drilling. The Kara No 2 skarns were considered to have no Scheelite potential. Continued exploration including gridding and diamond drilling occurred between Bob's

Bonanza and Eastern Ridge and at Kara South. A resource of 59kt @ 0.4% WO<sub>3</sub> was estimated for Kara South and 43Kt @ 0.4% WO<sub>3</sub> for Eastern Ridge (White Head, 1986).

Regional surveys were completed near Valentines Peak and Wollastonite Creek. Technical studies into the viability of producing a magnetite product commenced.

### **1988 Tasmania Mines**

Exploration work involved extension drilling at Kara Nth 266, L5 and the Companion Skarn. Investigative studies were completed on Wollastonite Creek including market studies, trenching and diamond drilling (Whitehead, 1988). The Exploration team was disbanded during 1988.

### **1991-1992 Tasmania Mines Ltd.**

EL17/1968 was relinquished. East of the Kara Mine was picked up by Tasmania Mines as EL 39/1989 with limited exploration continuing on the Kara No2 skarn.

### **1994 Tasmania Mines Ltd.**

A review of the geology of the Kara Area was completed by McKeown (1994).

### **2007-2014 Iron Mountain Pty Ltd**

Iron Mountain Pty Ltd acquired EL18/2007 covering a large area west and north of Valentines Peak. They held EL18/2007 from 2007 until 2013. The majority of their work focused on the drill out of the Kara No2 Magnetite skarns, principally the Kara Nth, Kara East, Kara South and Button Grass prospects, which have been renamed Rogetta Nth etc. (Kusander et al 2009).

In 2010 Iron Mountain drilled 4 RC holes east of Valentines Peak in the Owen Conglomerate with poor results.

### **2014 – 2019 Tasmania Mines Ltd.**

EL15/2014 acquired as vacant ground. Literature review and compilation of historic stream sediment and soil sampling was completed in 2014.

2015 – Stream sediment sampling, rock chip sampling and reconnaissance mapping (Callaghan, 2015).

2016 – Collation and assessment of 2015 data including QXRD on four rock chip samples, no additional fieldwork completed.

2017 – No fieldwork completed

2018 – Soil sampling of 7 by 100m spaced lines for a total of 1875 line km (Callaghan, 2018). A total of 83 samples were taken at 25m increments on each line. W and Sn as well as Pb and Bi suggest incomplete dissolution of aqua regia digest. Recommended re-assay with 4 acid digest (not completed).

2019 - No fieldwork completed

#### **4 WORK COMPLETED BY TASMINES, 2018 – 2019**

During September 2018 Tasmania Mines completed a C horizon soil sampling survey on the southern extension of the L11 Grid. Samples were delivered to ALS Laboratories in Burnie for analysis by Induced Coupled Plasma Mass Spectrometry (ICP-MS) after aqua regia digestion (ALS method ME-MS41L). No significantly anomalous Sn or W was returned from the soil sampling survey. It was noted that there is an obvious difference in the range of the Sn and W analyses between the historic data and the recent results. It is possible that the aqua regia digest was insufficient for analyzing Sn and W in soils. However, the bias extends to more soluble elements Pb and Bi suggesting incomplete digestion prior to analysis.

It was recommended in the 2018 annual report (Callaghan, 2018) that the soils be reanalyzed using a 4 acid digestion or XRF technique. This was never completed. No further work was completed on the EL.

## 5 DISCUSSION

The soil samples taken in 2018 need to be reanalyzed with either 4 acid digestion followed by ICP-MS or fused disc XRF as there is a bias between the 2018 data and historic data. The historic data, although less precise has a much greater range compared to the homogenous low-level metal analyses returned from the recent program analysed using the recommended aqua regia digest.

The EL has limited potential to hosted Kara Style magnetite-scheelite skarn due to the lack of the favorable calcareous Moina Sandstone host rocks. However, the Ringwood granite is clearly the source of Sn-W drainage and Sn soil anomalies and has the potential to host other styles of Sn or W mineralisation.

The intense silica-tourmaline-sulphide hydrothermal alteration to the south of the L11 grid is considered to be prospective for stockwork Sn-W mineralisation similar to parts of the Waratah and Heemskirk Fields. The single rock chip sample taken in 2015 (Callaghan, 2015) was anomalous in Sn (32ppm and tungsten, 50ppm).

The L11 prospect contains anomalous soil W and Sn geochemistry and lies along the linear eastern aeromagnetic anomaly trending south from the granite intrusive.

The likely cause of the western magnetic anomaly remains unexplained and warrants follow up work including geological mapping and targeting.

The L9 and L10 anomalies on the Kara Mine lease are strongly anomalous in Sn and W. These anomalies should be further investigated with reconnaissance mapping.

## **6 PROPOSED WORK 2019 - 2020**

No further work was planned for 2020 and the EL was not renewed beyond its expiry date in December 2019.

## **ADDITIONAL NOTES**

### ***LIMITATIONS AND CONSENT***

This report is provided to Tasmania Mines Ltd in the context of a Geological Review and should not be used or relied upon for any other purpose.

This report has been prepared using information available to the Author at the time of writing. The opinions stated herein are given in good faith and with the belief that the basic assumptions are factual and correct and the interpretations reasonable.

This report is not intended for use as a public document nor, in whole or in part, in a public document without written consent to the form and context in which it appears.

### ***COMPETENT PERSON AND JORC CODE***

This report was prepared by Tim Callaghan, who is a Member of The Australian Institute of Mining and Metallurgy ("AusIMM"), has a minimum of five years experience in the assessment of Mineral Prospects and Resources of this style and is a competent Person as defined in the 2012 edition of the JORC Code.

### ***STATEMENT OF INDEPENDENCE***

Tim Callaghan has no material interest or entitlement in the securities or assets of Tasmania Mines Ltd or any associated companies.

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