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# EL15/2014

# VALENTINES ROAD

# ANNUAL REPORT

# NW TASMANIA

**Prepared for: Tasmania Mines Limited**

**Tim Callaghan, November 2015**

## EXECUTIVE SUMMARY

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

During the past year Tasmania Mines completed a compilation and review of the historic exploration data, particularly geological mapping, stream sediment samples and C-horizon auger soil samples. Stream sediment W anomalies exist on streams draining the margins of the Ringwood and Kara Granite Batholiths. Four areas were historically identified for follow up gridding and soil sampling, L9, L10, L11 and L12. Only L11 occurs on EL15/2014, L9 and L10 are located on the western margin of the Kara Mine Lease 1934P/M and L12 is located on EL18/2017 held by Lotta Mining.

L10, L11 and L12 are associated with or nearby aeromagnetic total magnetic intensity highs.

L9 and L10 have strong, consistent coincident W and Sn soil anomalies associated with the Kara Granite margin. L11 and L12 do contain anomalous zones of C-horizon anomalous Sn but W is generally low with only a few sporadic elevated samples. The L11 anomaly contains coherent Sn C-horizon Soil anomalies that remain open to the south along the trend of the aeromagnetic anomaly.

Reconnaissance geological mapping indicates the L11 anomaly is hosted in volcanoclastic siltstone and breccia that has been hornfelsed and metasomatised by the later Granite intrusion. Disseminated pyrrhotite, pyrite and magnetite are associated with the alteration system and are probably responsible for the increased magnetic intensity. Strong tourmaline-silica alteration is present in vitric siltstones in the south of the EL associated with the pyrrhotite-pyrite-magnetite alteration. The L11 grid occurs on the same linear magnetic anomaly along strike from the identified silica-tourmaline-sulphide alteration. The coincident L11 Sn soil anomaly, silica-tourmaline sulphide alteration and linear magnetic high are considered to be prospective for Sn mineralisation and require additional exploration.

There is also the possibility of Sn or W mineralisation associated with the sulphide mineralisation in the proximity of the granite margins, particularly the L9 and L10 areas on the Kara Mine Lease which requires further investigation.

The following work program is recommended for 2016

- Detailed mapping and sampling of the L11-eastern magnetic anomaly
- Extension of the L11 grid and infill C-horizon sampling
- Reconnaisance follow up of the western magnetic anomaly
- Investigation of the L9 and L10 anomalies on the Kara Mine Lease.

## 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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# 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 Housetop 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 volcaniclastics of the Western Volcano-sedimentary sequence and the Tyndall Group quartz-feldspar phyric volcaniclastics.

*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.

*Housetop Granite*

The Housetop granite outcrops in much of the Kara District and is believed to extend below much of the area (Leaman, 1993). Leaman concludes that the Housetop 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-$WO_3$ mineralisation of the Kara District. The association of Tasmanian Devonian granites with Magnetite, Sn-$WO_3$, 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.

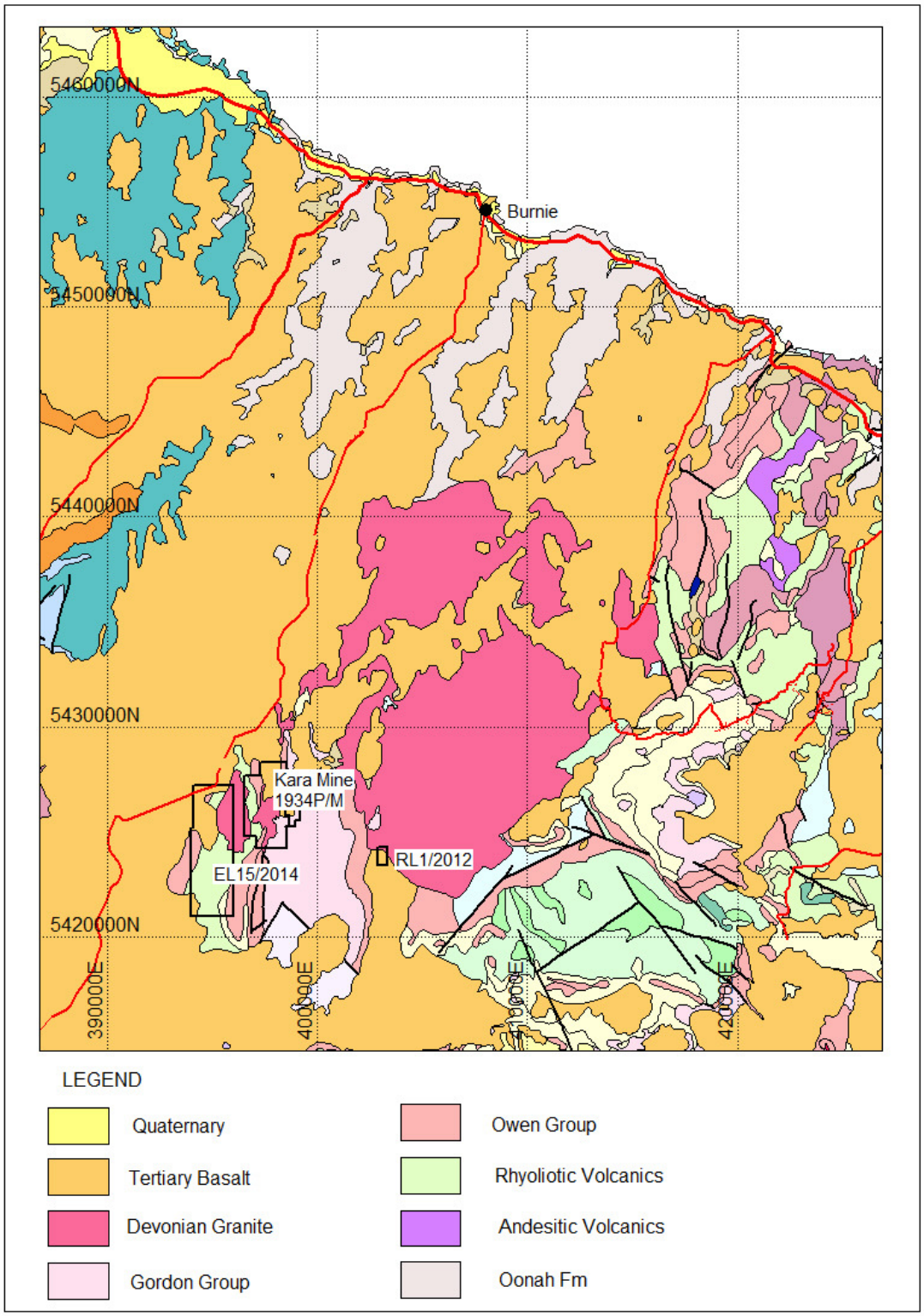


**Figure 1. EL15/2014, Kara Mine Lease location and MRT 250k Geology.**

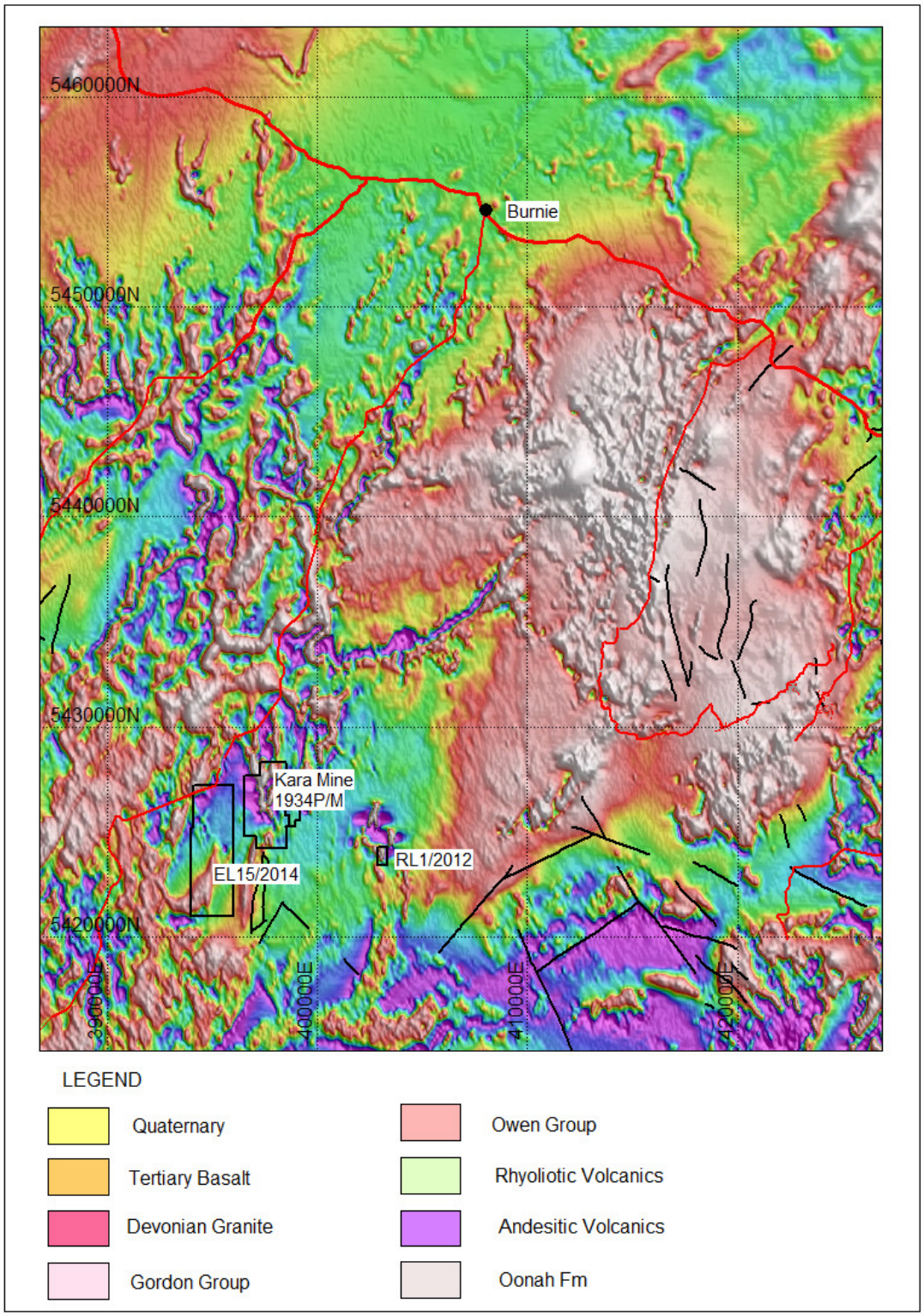


**Figure 2. EL15/2014, Kara Mine Lease location and TMI image.**

## 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 pyrometasomatic 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.

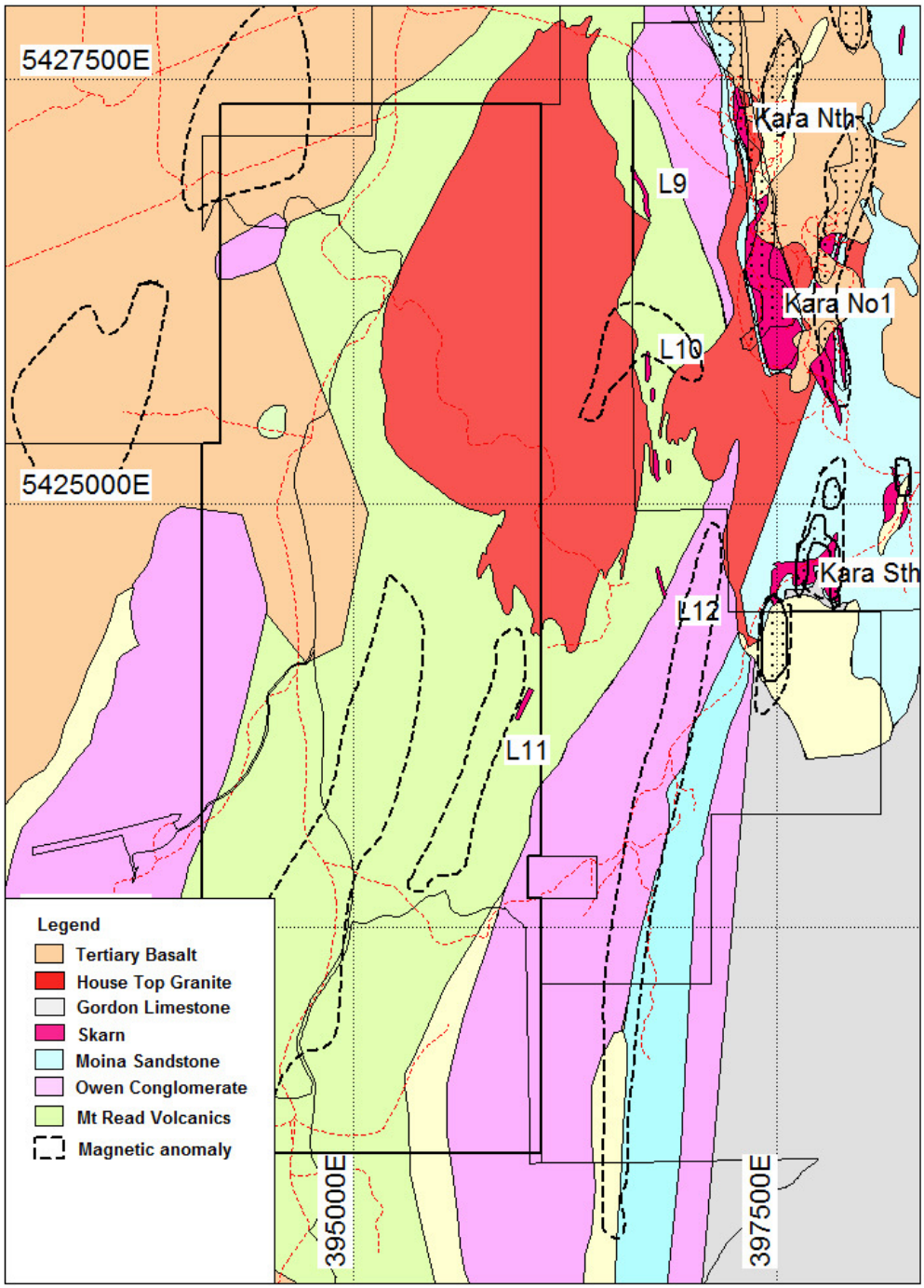


**Figure 3. EL15/2014 Geology and prospect locations.**

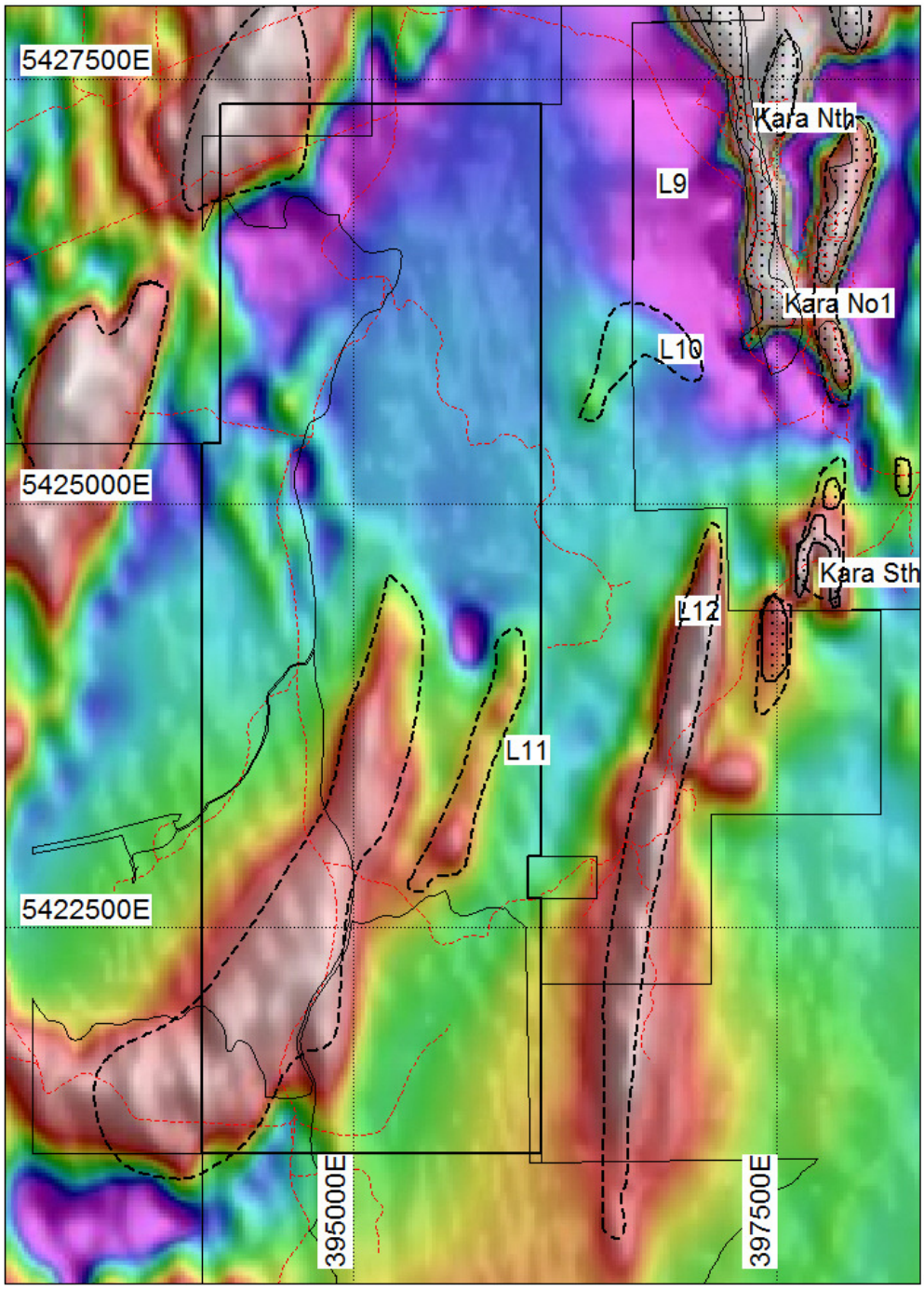


**Figure 4. EL15/2014 prospect locations and TMI.**

## 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 11 on the Kara No 2 deposit. Some early Mines department magnetometer surveys were followed up with limited drilling campaigns, mainly at the Kara No2 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 ANZECO and MacIntyre Mines followed by Tasminex and later Tasmania Mines Ltd.

### *1968 – 1974 ANZECO*

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 - $WO_3$ 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 @ o.4% $WO_3$ was estimated for Kara South and 43Kt @ 0.4% $WO_3$ 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.

# 4 WORK COMPLETED BY TASMINES, 2014 – 2015

Tasmania Mines commenced the first year of exploration on EL15/2014 with a literature review, compilation of historic stream sediment sampling data, infill stream sediment sampling, compilation of historic soil sampling data, reconnaissance mapping, rock chip sampling and geological interpretation.

## 4.1 STREAM SEDIMENT SAMPLING

Historic stream sediment data was digitized from historic reports (Brandt, 1973a and b). Stream sediments were comprised of panned concentrates collected above stream intersections with upstream follow up sampling. Brandt (1973) noted the inconsistency in the repeatability of samples due to the nature of the scheelite in stream sediments. Historic stream sediment sampling was limited to the extents of the former EL 17/1968. The entire historic stream sediment sampling data set was captured as it covers much of the Kara Mine lease ML1934P/M as well as EL15/2014.

Historic sampling stopped on the boundaries of the former EL17/1968. Extra samples were taken from the western side of EL15/2014 and was designed to extend the coverage over the entire EL. Additional stream sediment sampling was completed in March 2015.

A total of 33 panned concentrate samples were taken. All samples were submitted to ALS Laboratories in Burnie for multi element analysis by ICP. Sample locations and results are listed in Table 1.

The new stream sediment samples were merged with the historic data and are presented in Figures 5, 6 and 7. No significant drainage anomalies were identified beyond the coverage of the historic sampling. Much of the areas sampled in the recent infill program drain the Owen Conglomerate and Cambrian Volcanics in the southwest of EL15/2014. These lithologies are considered to be less prospective for Sn and W mineralisation due to their distance from the outcropping granite.

Streams draining the eastern margin of the Ringwood Granite and the entire Kara Granite are anomalous in W (Figure 5). The L9, L10, L11 and L12 drainage anomalies were identified by MacIntyre Mines in 1974 (Brandt, 1974) and have subsequently been followed up by gridding and soil sampling programs (see section 4.2).

No new anomalies were identified from the infill sampling program. Investigations on EL15/2014 should focus on the eastern margin of the Ringwood granite, L11 anomaly and the eastern Aeromagnetic anomaly, all of which have anomalous W in pancon stream sediment samples.. The drainage anomalies associated with the L10 and L9 areas on the Kara ML should also be investigated.

**Table 1. 2015 Panned Concentrate Stream Sediment Results.**

| SAMPLE | x_GDA | y_GDA | Ag_ppm | Al_% | As_ppm | Ba_ppm | Bi_ppm | Ca_% | Cd_ppm | Co_ppm | Cr_ppm | Cu_ppm | Fe_% | K_% | La_ppm | Mg_ppm | Mn_ppm | Mo_ppm | Ni_ppm | P_ppm | Pb_ppm | S_% | Sc_ppm | Sr_ppm | Th_ppm | Ti_% | V_ppm | W_ppm | Zn_ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VP001 | 394427 | 5421476 | -0.5 | 2.96 | -5 | 210 | 2 | 1.18 | -0.5 | 16 | 327 | 20 | 4.38 | 0.68 | 10 | 1.5 | 462 | -1 | 75 | 440 | 26 | 0.08 | 8 | 95 | -20 | 0.35 | 73 | 10 | 101 |
| VP002 | 394365 | 5421402 | -0.5 | 3.21 | -5 | 200 | 3 | 0.04 | -0.5 | 2 | 220 | 23 | 1.48 | 0.87 | 10 | 0.17 | 177 | -1 | 10 | 90 | 37 | 0.09 | 8 | 15 | -20 | 0.23 | 51 | 10 | 34 |
| VP003 | 394526 | 5421216 | -0.5 | 1.04 | -5 | 90 | 2 | 0.03 | -0.5 | 1 | 56 | 11 | 0.96 | 0.44 | 10 | 0.09 | 104 | -1 | 3 | 70 | 27 | 0.01 | 3 | 12 | -20 | 0.09 | 19 | -10 | 17 |
| VP004 | 394402 | 5422134 | -0.5 | 1.86 | -5 | 130 | -2 | 0.05 | -0.5 | 1 | 80 | 5 | 0.86 | 0.62 | 10 | 0.16 | 89 | -1 | -1 | 50 | 16 | 0.01 | 3 | 13 | -20 | 0.11 | 21 | 30 | 15 |
| VP005 | 394241 | 5422420 | -0.5 | 0.79 | -5 | 40 | 3 | 0.34 | -0.5 | 2 | 292 | 3 | 1.23 | 0.18 | -10 | 0.07 | 222 | -1 | 1 | 40 | 19 | 0.01 | 2 | 14 | -20 | 0.09 | 20 | -10 | 28 |
| VP006 | 394601 | 5422556 | -0.5 | 2.01 | -5 | 120 | 2 | 0.85 | -0.5 | 2 | 87 | 4 | 1.55 | 0.49 | 10 | 0.18 | 295 | -1 | 1 | 60 | 16 | 0.01 | 4 | 36 | -20 | 0.12 | 31 | -10 | 21 |
| VP007 | 394911 | 5422283 | -0.5 | 1.61 | -5 | 110 | 2 | 0.5 | -0.5 | 1 | 110 | 5 | 1.01 | 0.46 | 10 | 0.11 | 187 | -1 | -1 | 50 | 13 | 0.01 | 2 | 25 | -20 | 0.09 | 20 | -10 | 18 |
| VP008 | 395011 | 5422382 | -0.5 | 2.96 | -5 | 160 | -2 | 1 | -0.5 | 2 | 63 | 5 | 1.65 | 0.74 | 10 | 0.26 | 323 | -1 | 3 | 70 | 14 | 0.01 | 6 | 42 | -20 | 0.16 | 47 | 10 | 21 |
| VP009 | 396033 | 5423287 | -0.5 | 6.6 | 8 | 220 | 5 | 0.44 | -0.5 | 5 | 94 | 8 | 3.26 | 0.89 | 20 | 0.97 | 353 | -1 | 13 | 100 | 12 | 0.03 | 16 | 59 | -20 | 0.39 | 120 | 290 | 31 |
| VP010 | 394787 | 5423909 | -0.5 | 7.26 | 16 | 160 | 3 | 0.92 | -0.5 | 8 | 120 | 15 | 3.39 | 0.67 | 20 | 0.22 | 651 | 1 | 23 | 350 | 37 | 0.04 | 6 | 28 | -20 | 0.22 | 81 | 10 | 99 |
| VP011 | 394477 | 5424319 | -0.5 | 1.8 | -5 | 60 | -2 | 0.04 | -0.5 | 3 | 179 | 4 | 0.72 | 0.21 | 10 | 0.05 | 233 | -1 | 4 | 90 | 12 | 0.01 | 2 | 11 | -20 | 0.1 | 16 | -10 | 32 |
| VP012 | 394390 | 5424207 | -0.5 | 4.74 | 8 | 80 | -2 | 0.1 | -0.5 | 9 | 578 | 9 | 4.27 | 0.17 | 10 | 0.14 | 181 | 1 | 27 | 510 | 13 | 0.03 | 4 | 15 | -20 | 0.29 | 111 | -10 | 60 |
| VP013 | 394390 | 5424604 | -0.5 | 1.22 | -5 | 40 | -2 | 0.02 | -0.5 | 1 | 189 | 2 | 0.74 | 0.18 | 10 | 0.04 | 122 | -1 | 3 | 60 | 10 | 0.01 | 1 | 10 | -20 | 0.1 | 11 | -10 | 20 |
| VP014 | 394229 | 5424778 | -0.5 | 1.42 | -5 | 60 | -2 | 0.03 | -0.5 | 3 | 1010 | 3 | 1.11 | 0.32 | 10 | 0.08 | 165 | -1 | 10 | 130 | 8 | 0.01 | 2 | 12 | -20 | 0.12 | 27 | -10 | 66 |
| VP015 | 395085 | 5425399 | -0.5 | 3.85 | -5 | 40 | 2 | 0.25 | -0.5 | 6 | 214 | 9 | 3.62 | 0.86 | 440 | 0.29 | 485 | 3 | 27 | 620 | 18 | 0.01 | 6 | 35 | 150 | 0.35 | 59 | 20 | 46 |
| VP016 | 395718 | 5425672 | -0.5 | 1.77 | -5 | 110 | -2 | 0.01 | -0.5 | 1 | 11 | 4 | 0.87 | 1.78 | 10 | 0.01 | 216 | -1 | -1 | 20 | 6 | -0.01 | 1 | 10 | -20 | 0.22 | 4 | -10 | 18 |
| VP017 | 395681 | 5425771 | -0.5 | 1.68 | -5 | 60 | 4 | 0.02 | -0.5 | 1 | 14 | 4 | 1.48 | 1.35 | 20 | 0.02 | 346 | 1 | -1 | 50 | 11 | -0.01 | 3 | 7 | 20 | 0.64 | 8 | -10 | 35 |
| VP018 | 395805 | 5425808 | -0.5 | 1.71 | -5 | 80 | 3 | 0.02 | -0.5 | 2 | 9 | 4 | 2.46 | 1.39 | 10 | 0.02 | 1110 | 1 | -1 | 40 | 16 | -0.01 | 9 | 8 | 20 | 1.82 | 16 | -10 | 50 |
| VP019 | 394924 | 5426305 | -0.5 | 9.47 | 23 | 200 | 7 | 0.31 | -0.5 | 9 | 116 | 14 | 5.22 | 0.51 | 20 | 0.25 | 440 | 2 | 45 | 570 | 61 | 0.03 | 8 | 40 | -20 | 0.29 | 109 | -10 | 131 |
| VP020 | 394824 | 5426355 | -0.5 | 6.72 | 10 | 80 | 4 | 0.23 | -0.5 | 22 | 289 | 15 | 7.56 | 0.28 | 10 | 0.39 | 506 | 1 | 72 | 800 | 13 | 0.02 | 10 | 36 | -20 | 0.35 | 134 | -10 | 100 |
| VP021 | 396059 | 5424703 | -0.5 | 1.9 | -5 | 50 | 4 | 0.03 | -0.5 | 2 | 16 | 3 | 1.16 | 0.78 | 40 | 0.09 | 202 | -1 | 3 | 80 | 7 | 0.01 | 3 | 8 | 20 | 0.22 | 16 | 20 | 15 |
| VP022 | 395948 | 5424875 | -0.5 | 2.61 | -5 | 90 | 5 | 0.06 | -0.5 | 4 | 52 | 6 | 2.31 | 0.62 | 130 | 0.23 | 431 | 1 | 11 | 220 | 6 | 0.01 | 6 | 22 | 40 | 0.49 | 41 | 40 | 22 |
| VP023 | 395746 | 5424864 | -0.5 | 4.41 | -5 | 200 | 3 | 0.14 | -0.5 | 3 | 59 | 6 | 2.25 | 1.11 | 60 | 0.4 | 264 | 1 | 8 | 150 | 9 | 0.02 | 7 | 27 | 20 | 0.27 | 54 | 10 | 24 |
| VP024 | 395726 | 5425039 | -0.5 | 1.43 | -5 | 40 | -2 | 0.01 | -0.5 | 1 | 15 | 4 | 1.28 | 1.34 | 30 | 0.02 | 207 | -1 | 1 | 60 | 6 | -0.01 | 1 | 7 | 20 | 0.19 | 4 | -10 | 14 |
| VP025 | 395979 | 5423301 | -0.5 | 1.88 | -5 | 90 | 3 | 1.15 | -0.5 | 7 | 118 | 5 | 1.88 | 0.36 | 10 | 0.15 | 467 | -1 | 3 | 100 | 13 | 0.01 | 3 | 29 | -20 | 0.12 | 29 | 10 | 22 |
| VP026 | 395201 | 5425907 | -0.5 | 7.66 | 8 | 240 | -2 | 0.6 | -0.5 | 13 | 160 | 21 | 5.42 | 0.74 | 10 | 0.22 | 436 | 1 | 69 | 400 | 25 | 0.02 | 10 | 39 | -20 | 0.34 | 113 | -10 | 141 |
| VP027 | 395222 | 5425933 | -0.5 | 2.81 | -5 | 70 | 2 | 0.02 | -0.5 | 1 | 12 | 4 | 1.11 | 2.9 | 10 | 0.01 | 153 | -1 | -1 | 30 | 8 | -0.01 | 1 | 12 | 20 | 0.12 | 2 | -10 | 13 |
| VP028 | 395321 | 5425920 | -0.5 | 3.9 | 9 | 40 | 2 | 0.46 | -0.5 | 9 | 305 | 10 | 6.76 | 0.88 | 120 | 0.26 | 494 | 3 | 27 | 540 | 19 | 0.01 | 8 | 29 | 130 | 0.49 | 83 | 10 | 61 |
| VP029 | 394266 | 5426404 | -0.5 | 6.65 | 5 | 90 | 2 | 0.21 | -0.5 | 60 | 377 | 27 | 15.85 | 0.08 | -10 | 0.27 | 1245 | 2 | 141 | 1120 | 5 | 0.02 | 10 | 24 | -20 | 0.42 | 202 | -10 | 202 |
| VP030 | 395048 | 5426652 | -0.5 | 6.93 | 11 | 160 | 2 | 0.61 | -0.5 | 37 | 191 | 26 | 8.02 | 0.52 | 20 | 0.5 | 946 | 1 | 103 | 1010 | 17 | 0.02 | 11 | 66 | -20 | 0.49 | 134 | 10 | 131 |
| VP031 | 395519 | 5426652 | -0.5 | 3.19 | -5 | 60 | 3 | 0.28 | -0.5 | 7 | 89 | 9 | 3.74 | 1.24 | 30 | 0.16 | 400 | 1 | 16 | 270 | 18 | 0.01 | 5 | 22 | 30 | 0.32 | 51 | 10 | 51 |
| VP032 | 395395 | 5424617 | -0.5 | 6.81 | 8 | 340 | 3 | 0.24 | -0.5 | 9 | 102 | 10 | 3.7 | 1.3 | 40 | 0.56 | 432 | 1 | 21 | 330 | 11 | 0.03 | 9 | 37 | -20 | 0.33 | 94 | 10 | 54 |
| VP033 | 395594 | 5424629 | -0.5 | 3.88 | -5 | 80 | -2 | 0.09 | -0.5 | 4 | 60 | 7 | 2.37 | 0.7 | 230 | 0.36 | 468 | 2 | 13 | 290 | 10 | 0.01 | 8 | 32 | 40 | 0.44 | 47 | 70 | 34 |

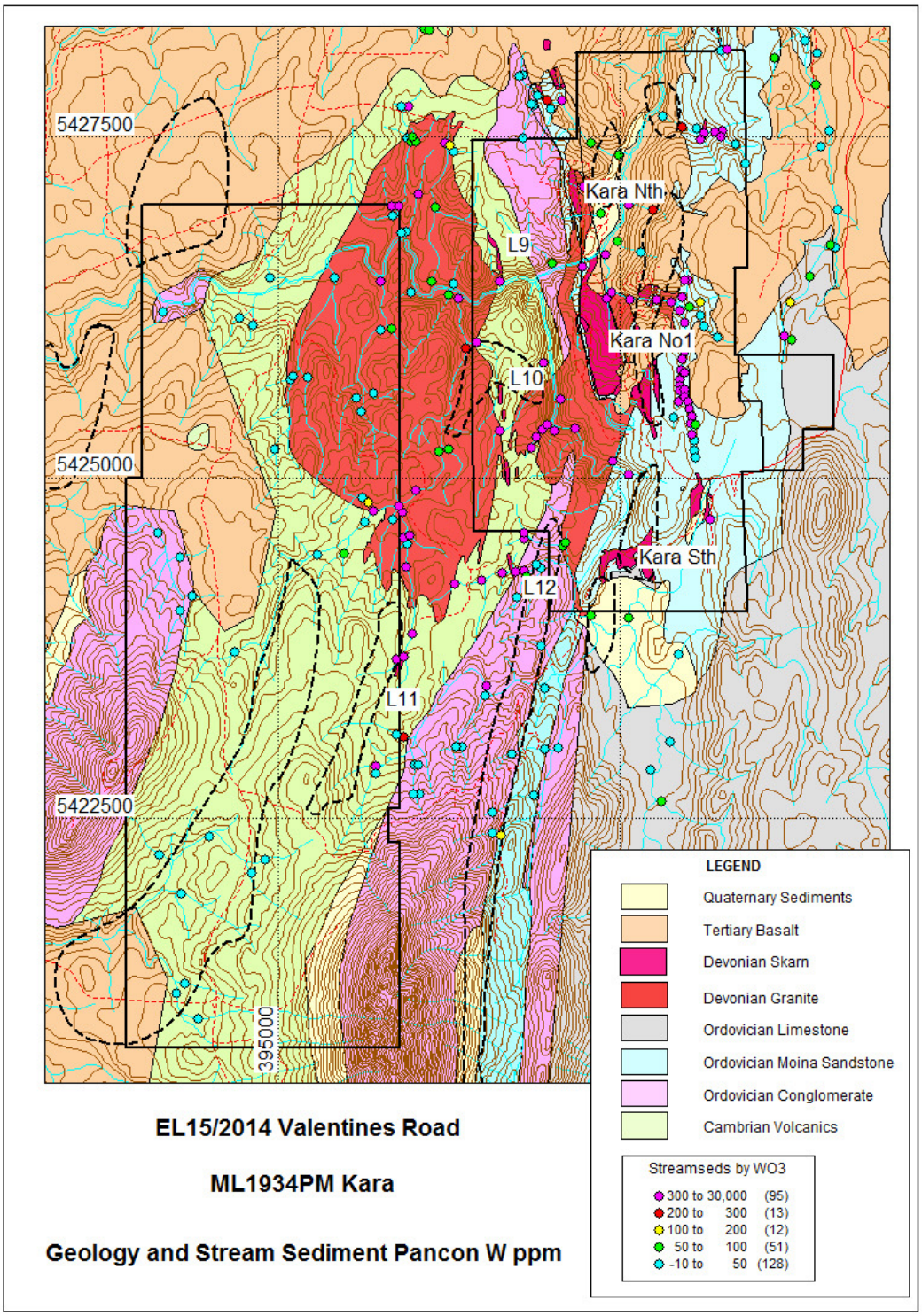


**Figure 5. Kara District Stream Sediment Panned Concentrate W ppm and Geology.**

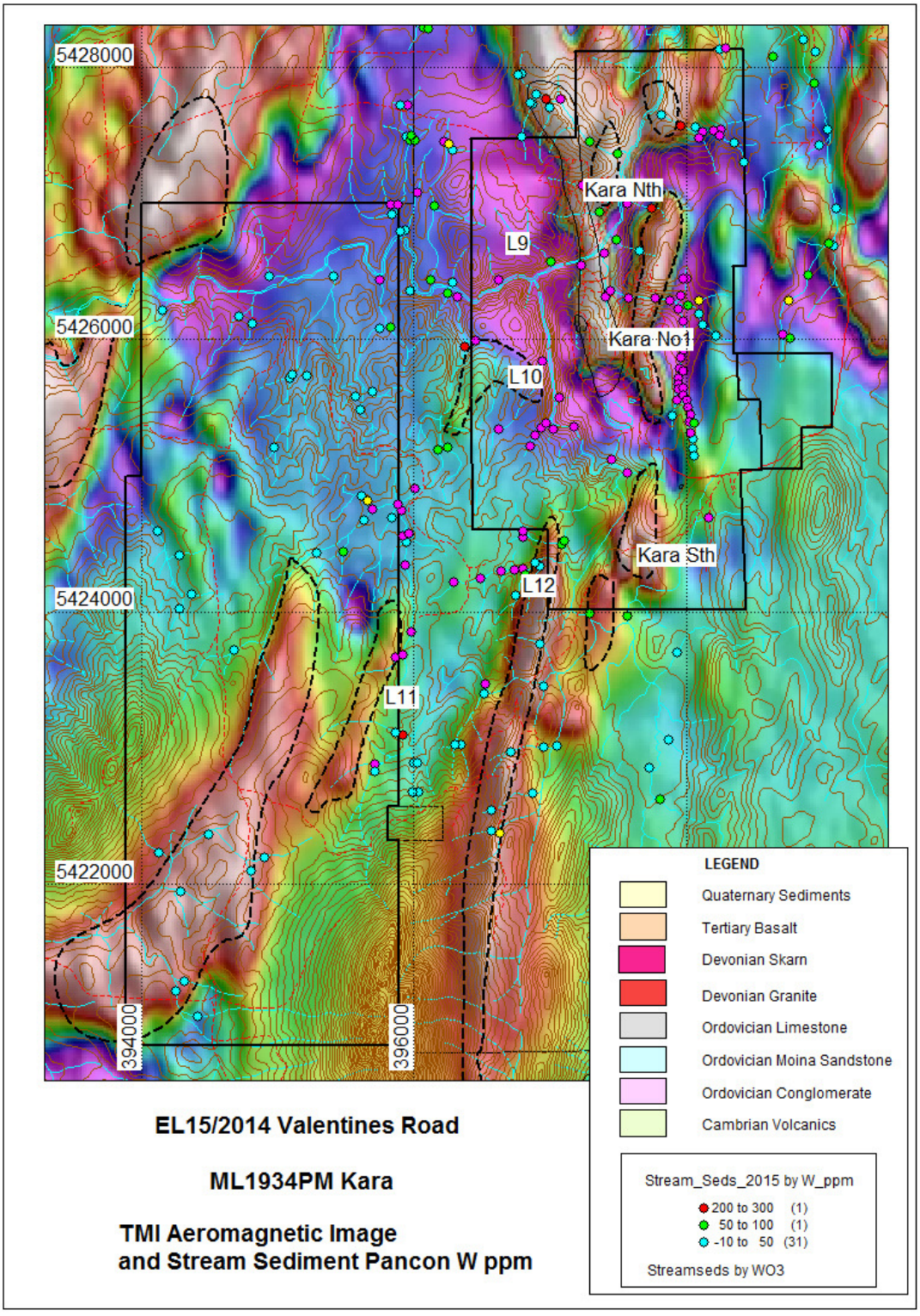


**Figure 6. Kara District Stream Sediment Panned Concentrate W ppm and Aeromagnetic Total Magnetic Intensity Image.**

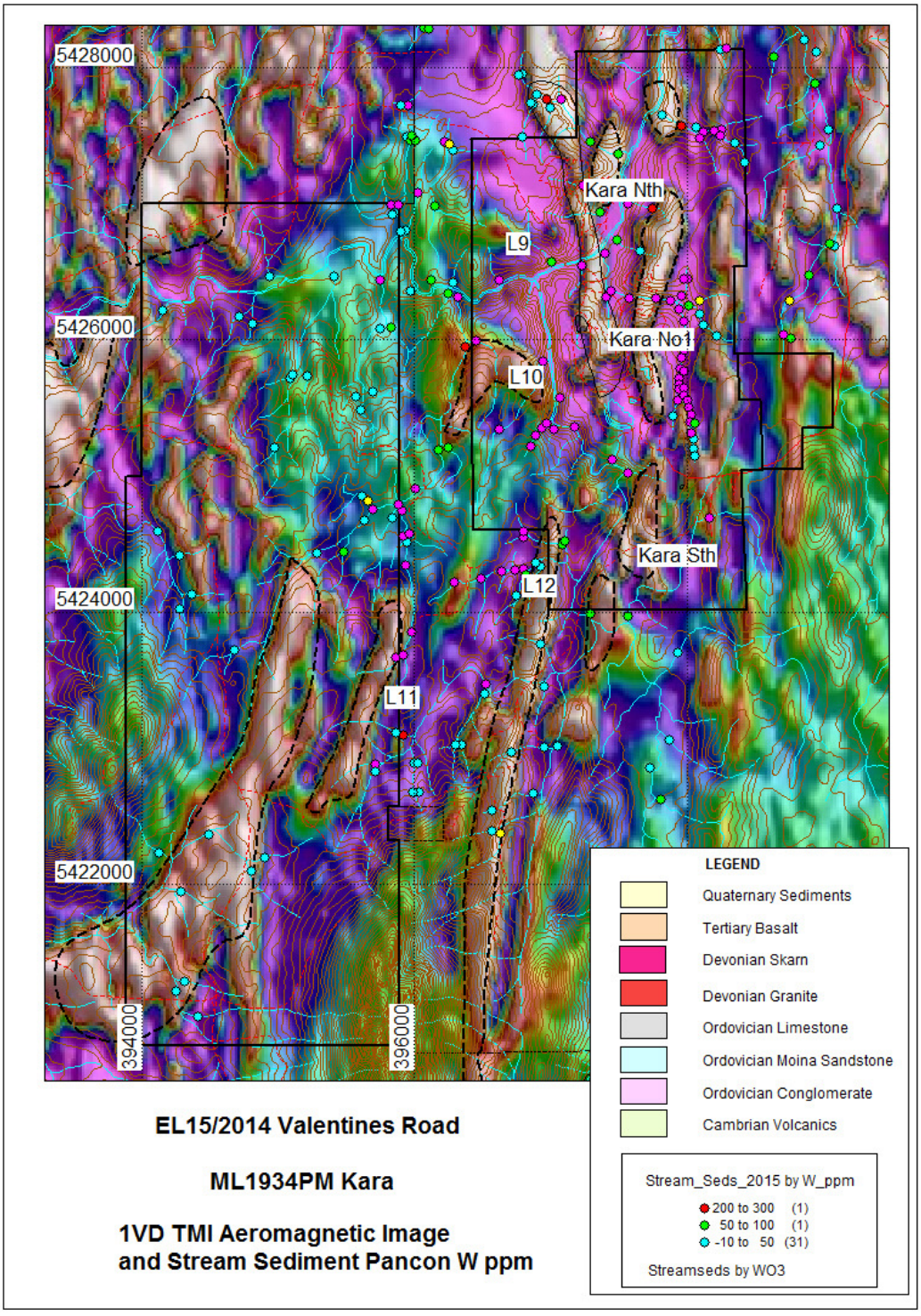


**Figure 7. Kara District Stream Sediment Panned Concentrate W ppm and Aeromagnetic First Vertical Derivative Total Magnetic Intensity Image.**

## 4.2 COMPILATION OF HISTORIC SOIL SAMPLING DATA

MacIntyre Mines completed systematic gridding and C-horizon auger soil sampling of the L9, L10, L11 and L12 drainage anomalies (Atkinson, 1978). L11 is located on EL15/2014, L9 and L10 are located on the Kara Mine Lease and L12 is located between the two on EL18/2007 held by Blythe River Iron Pty Ltd. The historic data was captured in Mapinfo/excel and is presented in Figures 8-10.

No coherent elevated C-horizon soil W anomalies were observed at the L11 prospect with only a few isolated samples recording values above 40ppm (Figure 8).

The L11 grid does contain coherent C-horizon Sn anomalies associated with the Ringwood granite margin and coincident with the eastern aeromagnetic high. High Sn C-horizon soil values are particularly prominent on the southern-most line of the L11 grid which remains open to the south along the strike of the aeromagnetic anomaly (Figure 9). It is probable that the magnetic high is associated with disseminated pyrrhotite-pyrite-magnetite mineralisation associated with silica-tourmaline alteration identified further south along the magnetic lineament. Further investigation is warranted.

The L10 and L9 prospects on the Kara Mine Lease require further geological investigation. The L10 grid on the Kara Mine Lease has consistently anomalous C-horizon soil W and Sn zones associated with the margin of the Kara Granite (Figures 8 and 9).

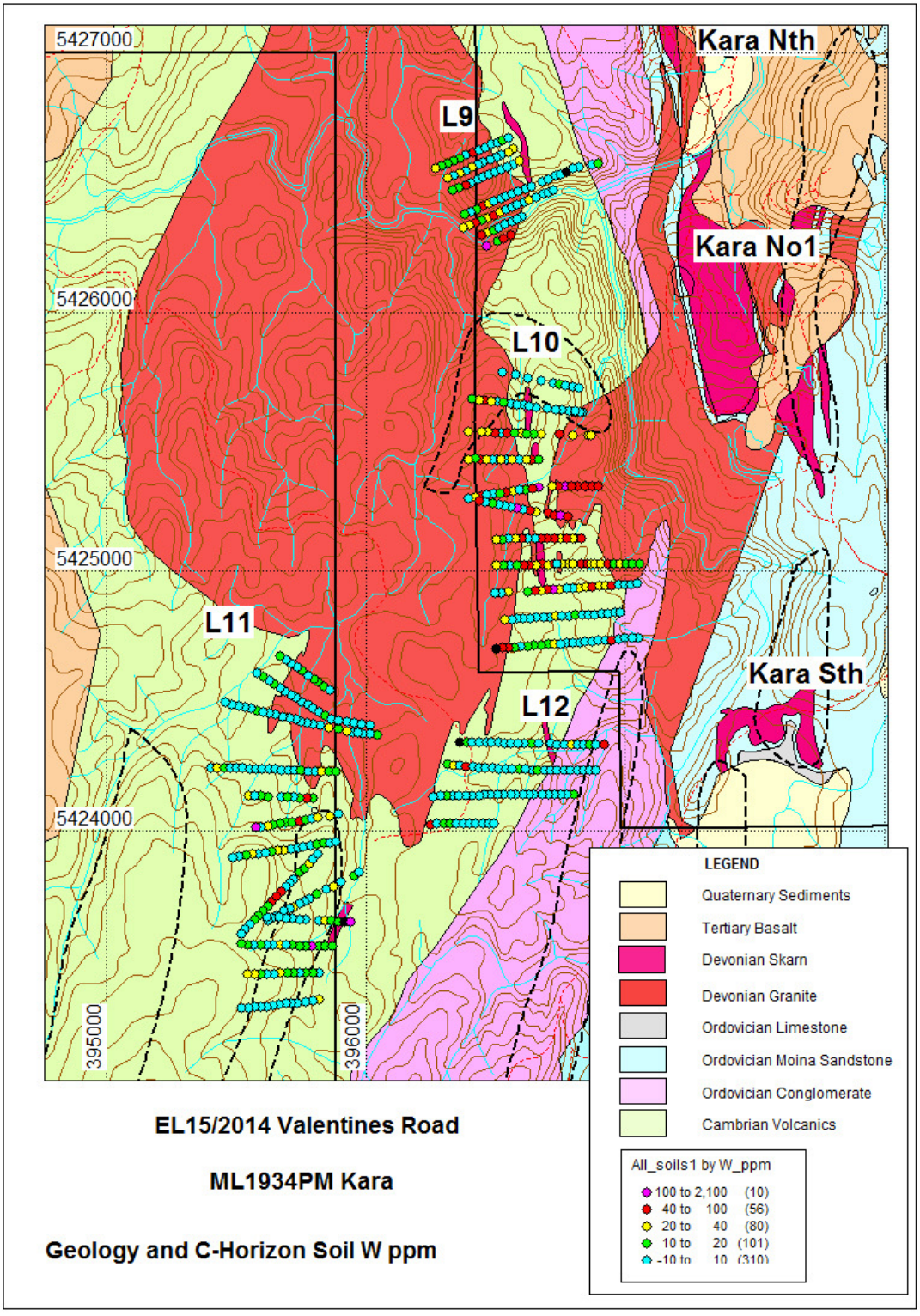


**Figure 8. Historic C-Horizon Soil Samples W ppm and Geology**

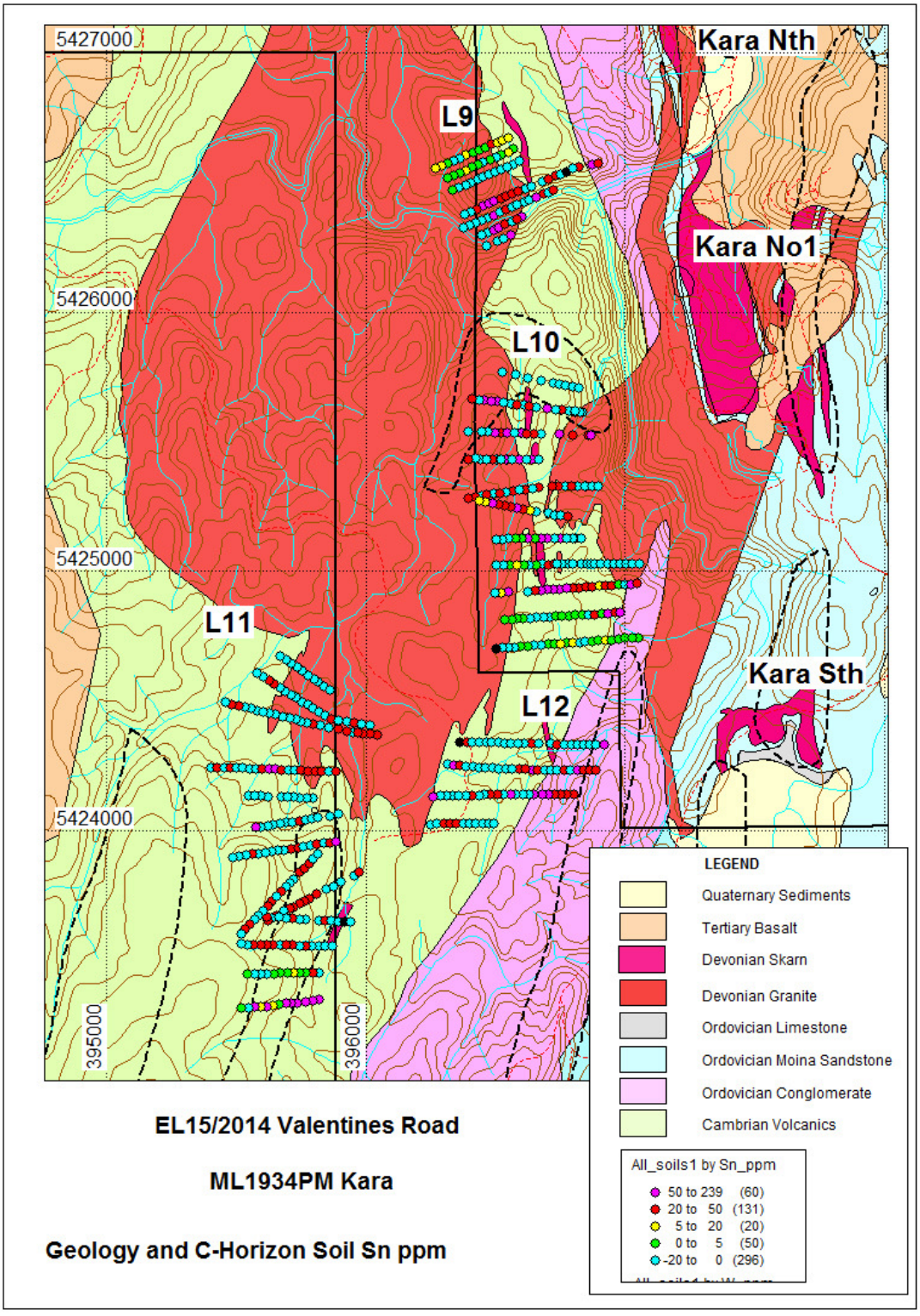


**Figure 9. Historic C-Horizon Soil Samples Sn ppm and Geology**

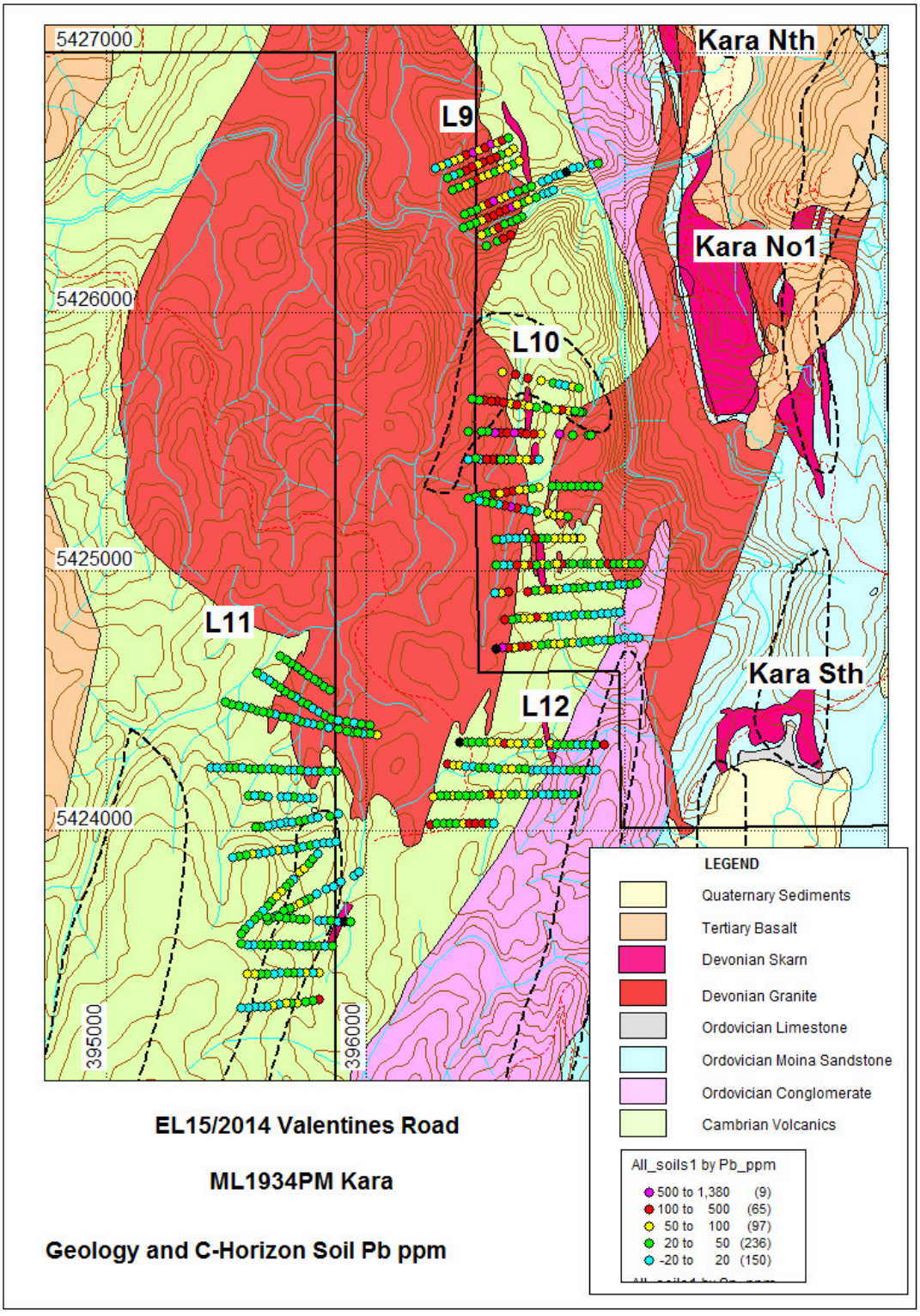


**Figure 10. Historic C-Horizon Soil Samples Pb ppm and Geology**

## 4.3 RECONNAISSANCE MAPPING AND SAMPLING

Following on from the stream sediment sampling program, several days were spent in the field completing reconnaissance geological mapping. Mapping focused primarily around the northern, southern and eastern edges of the Devonian granite. Outcrop and interpretive maps are located in Figures 11-12.

A total of four rock chip samples of proximal skarns were taken primarily for whole rock analysis and mineragraphy. Sample descriptions include:

44001 396393E, 5424266N. 1-2cm, rhythmically bedded, pale grey intensely hornfelsed volcaniclastic sediment. Intense Kfeldspar-pyroxene-anorthite hornfels with sparse fine grained disseminated pyrrhotite. Possibly diopside or wollastonite after rhyolitic vitric siltstone. Dark hedenbergite bands and veins. Very hard.

44002 396271E, 5424125N. Massive, mottled dark brown and grey, garnet-pyroxene skarn?

44003 395280E, 544267N Massive, dark grey, intensely silicified and tourmalinised vitric siltstone/quartzite. Laminated bedding. Trace disseminated pyrite and pyrrhotite.

44004 395120E, 5426005N. 1-2cm, rhythmically bedded, pale grey intensely hornfelsed vitric siltstone. Kfeldspar-pyroxene-anorthite hornfels with sparse fine grained disseminated pyrrhotite. Dark hedenbergite bands and veins. Very hard.

All samples were submitted to ALS Laboratories in Burnie for whole rock geochemistry (ME-XRF06) and trace element geochemistry (ME-MS81). Semi-quantitative XRD mineragraphy was also requested for each sample (Table 2). Geochemical results were not available at the time of reporting.

**Table 2. Semi-quantitative XRD Results**

| Phase | 44001 | 44002 | 44003 | 44004 |
|---|---|---|---|---|
| Actinolite | 0 | 0 | 0 | 0.6 |
| Andradite-Al | 0.1 | 63.2 | 0.1 | 0.3 |
| Anorthite (Ca-plagioclase) | 31.2 | 17.2 | 0 | 32 |
| Apatite | tr | tr | tr | tr |
| Chlorite | 0.8 | 0.3 | 1.9 | 0 |
| Diopside-hedenbergite | 24.3 | 15 | 0.8 | 21.9 |
| Magnetite | 1.2 | 1.2 | 1.4 | 0.8 |
| Orthoclase | 26.6 | 1.4 | 0 | 41.7 |
| Pyrite | 0.1 | 0.2 | 2 | 0.2 |
| Quartz | 15.1 | 0.2 | 47.1 | 2.5 |
| Tourmaline (schorl) | 0.6 | 1.3 | 46.7 | 0 |

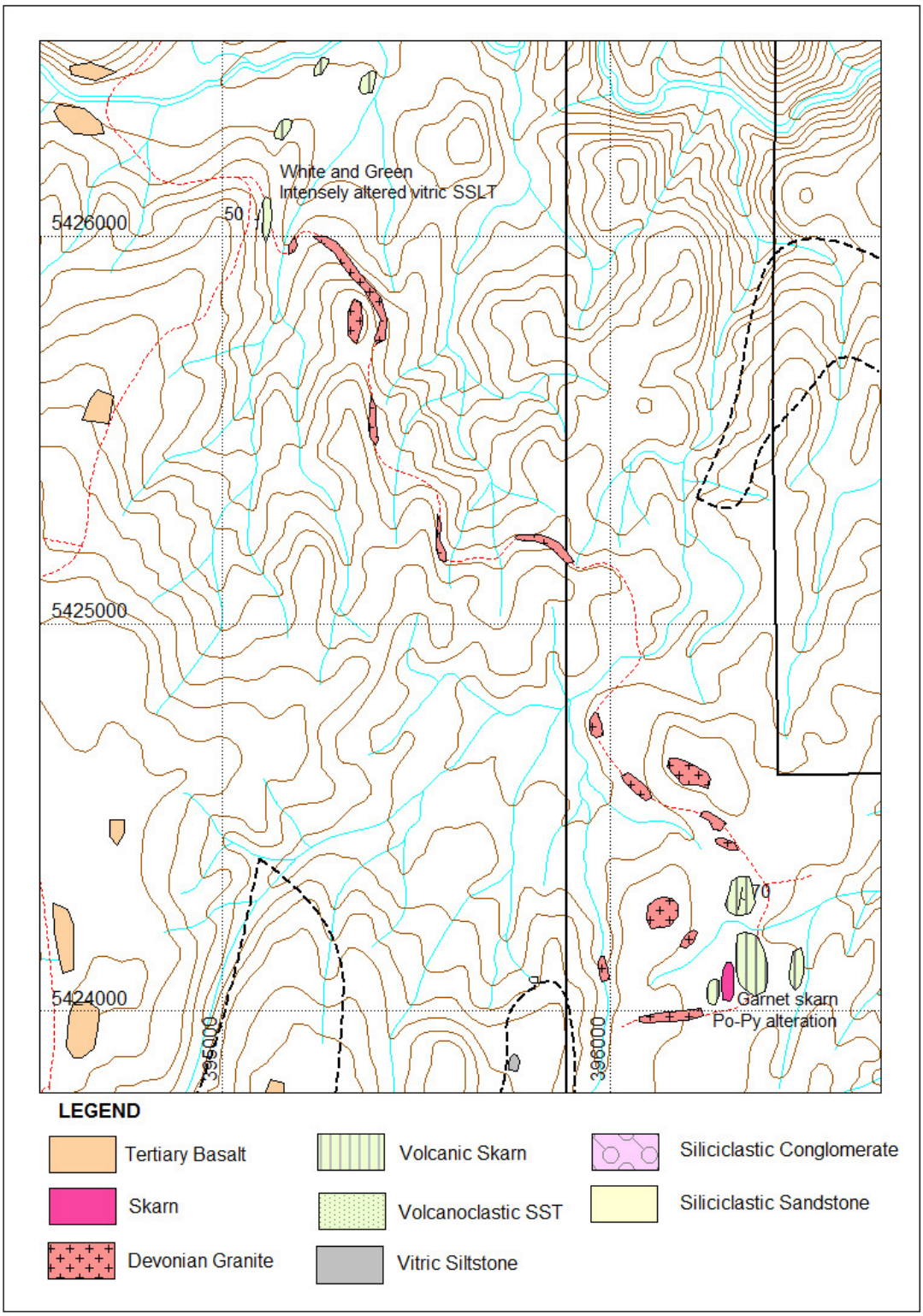


**Figure 11. EL15/2014 Outcrop Geology Nth**

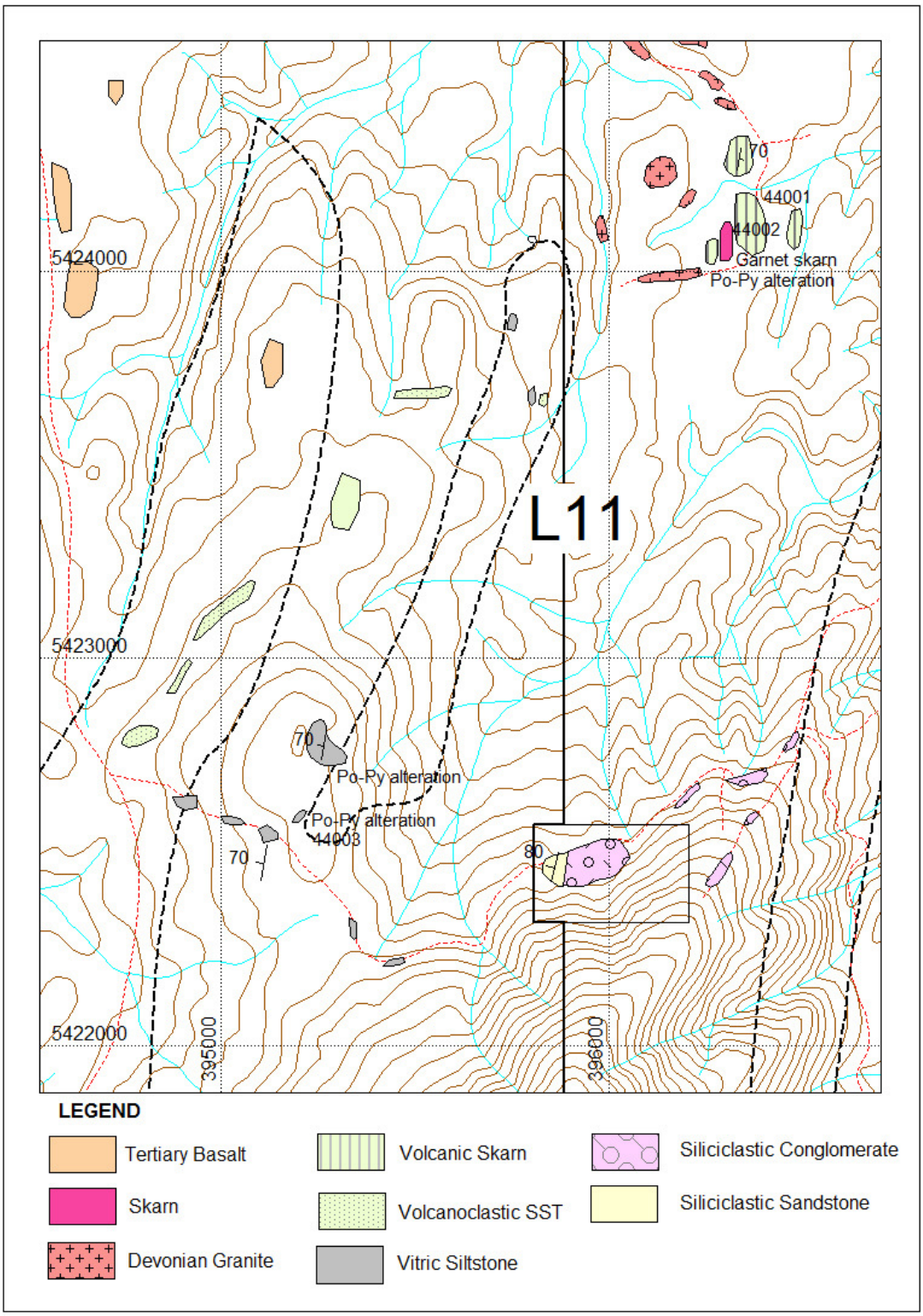


**Figure 11. EL15/2014 Outcrop Geology South**

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 Ordovican 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-hedenburgite 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, Luina and Waratah. Further work is warranted.

## 5 DISCUSSION AND RECOMMENDATIONS

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 silica-tourmaline-sulphide hydrothermal alteration and therefore is considered to be prospective for stockwork Sn-W mineralisation similar to parts of the Waratah and Heemskirk Fields.

The linear eastern aeromagnetic anomaly trending south from the granite intrusive is associated with disseminated pyrrhotite-pyrite and magnetite and associated silica-tourmaline alteration. This style of alteration is associated with granite related Sn-W deposits.

Additional exploration including detailed mapping and rock chip sampling around the eastern magnetic anomaly is recommended to determine the extent of the silica-tourmaline-sulphide alteration zone. The L11 grid should be extended to the south on 100m lines and C-horizon soil sampling extended along the magnetic anomaly towards the identified silica-tourmaline alteration zone.

If Sn and W mineralisation is identified, drilling of selected targets may be warranted.

The likely cause of the western magnetic anomaly remains unexplained and warrants minor follow up geological assessment.

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 is recommended.

## 5 PROPOSED WORK 2016

The following work program is recommended for 2016:

- Detailed mapping and sampling of the L11-eastern magnetic anomaly
- Extension of the L11 grid and infill C-horizon sampling
- Limited follow up of the western anomaly
- Investigation of the L9 and L10 anomalies on the Kara Mine Lease.

## 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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