

FINAL REPORT 2019/2020
EL17/2015 BOCO CREEK
WESTERN TASMANIA



Exploration Licence held by: **Australian Mineral Resources**
4/88 Cumberland St
The Rocks, NSW 2000

Report compiled by: **Dean Delaney, March 2021**

Image: Glacial flats looking west towards Sawmill Creek escarpment

EXECUTIVE SUMMARY

AMR has held Exploration Licence 17/2015 over the Boco Creek area since 4 March 2016. There has been little on-ground exploration of the Licence to report, and the tenement no longer remains part of AMR's regional gold exploration strategy.

This report addresses tenement relinquishment compliance requirements under the Tasmanian *MRD Act 1995*, and includes detailed discussion arising from AMR's review of previous exploration in EL17/2015 to assist future explorers in the search for new mineral deposits in Tasmania.

Historically, altered zones in the Licence area have been explored for zinc, lead and copper VHMS ore bodies with discouraging results. The elsewhere-productive upper Central Volcanics Complex (CVC) of the Mt Read Volcanics and adjacent strata have been found to be relatively barren in the area, despite the presence of the same stratigraphic succession as, and similar geological structure to, the major VHMS ore deposits at Rosebery (10 km to the south) and Que River / Hellyer (10 km north).

AMR has undertaken a comprehensive desktop assessment of the tenement to determine if the likelihood of economic sulphide and precious metal concentrations warrants expenditure on exploration drilling. AMR's assessment suggests the following.

1. A thickness of up to 100 m of Pleistocene glacial sediments overlying the CVC in the accessible east of the tenement, has been postulated as potentially masking a blind metallic sulphide deposit. This was tested by the previous licence-holder Yunnan Tin Australia TDK Resources Pty Ltd, using a high-penetration aerial electromagnetic survey technique (VTEM). AMR's assessment supports their conclusion that there is no evidence of an economic massive sulphide deposit beneath the glacial sediments, or elsewhere on the Licence area. Whereas there is evidence that the Boco alteration zone persists along-strike beneath the Pleistocene gravels, that alteration zone was tested by then EZ Company Rosebery in 6223 metres over 25 drill holes (12 x average 60m; 13 x average 425m) without any result of economic interest. An oxygen isotope study of aqueous inclusions suggested that the depositional environment of the CVC in this area lacked the chemical and physical conditions that enabled the VHMS deposits at Rosebery, Hellyer, Que River and Mount Lyell to be concentrated and preserved. The alteration in the Boco zone was deemed magmatic hydrothermal rather than seafloor volcanic exhalative following a sulphur-in-pyrite isotopic analysis at nearby Chester. Lack of VHMS primary ore potential negates the prospects of secondary ore concentration by any favourable structural trends that might intersect the alteration zone deeper beneath the glacial sediments. There is no evidence of such structural trends regardless, in mapping or aerial photography or airborne geophysics. The alteration zone / bedding trend is north east at Boco, unlike the northerly strike found at the large MRV-hosted mines where it was orthogonal to Tyennan orogenic stress fields. AMR considers that there is to date insufficient evidence to justify drilling to targets overlain by thick unconsolidated sediment.
2. The ore deposit at the Henty Gold Mine (15 km south of Boco) is considered to be orogenically remobilised from a distal VHMS deposit (Callaghan, 2001) and is concentrated in the confluence of the two most significant deep-crustal faults in the Mt Read Volcanics province – the Great Lyell (GLF) and Henty faults (Lorrigan, 2016, pers comm). At Boco, the Henty Fault trace is not present and would pass 5 kilometres to the east of EL17/2015. MRT mapping shows geological boundaries of similar orientation to the Henty trend in the far west of EL17/2015 - separating the Owen Group from the Tyndall Group in the Huskisson Syncline, and on the western boundary of the same Owen occurrence with the Luina Group further west. These trends could intersect a projection of the north-south trending Bobadil Fault from Burns Peak through the western part of the licence. Ore potential is negated, again,

by the distance of such intersections from the VHMS-forming Cambrian terrane boundary. The GLF strike appears to deviate at Rosebery along the north-easterly trend of the Central Volcanics Complex (CVC) beds. A Henty-style gold deposit thus appears less likely with this change in structural relationships and a paucity of strongly silicified rock types.

3. Devonian orogenic quartz veins are not common across the Boco tenement compared to other areas in which they might become prospective for small-scale mining of high grade / low volume quartz reef hosted gold shoots. The Tasmania Reef at Beaconsfield is an anomalously large version of this type. Historical stream sampling shows no gold concentration beyond background levels, except the catchment of Strong Creek draining the Burns Peak mineralisation. AMR intended a work program involving reassessment of gold concentrations in stream sediments that could lead to location of sites for a series of shallow drill holes to assess vein gold potential in the tenement. The review of MRT stream gold assay data lowered the priority of the program compared to other AMR tenements.
4. The extension of the Pinnacles Rhyolite from Burns Peak prospect (1 km south of EL17/2015) to 'North Pinnacles' in EL17/2015 offers marginally economic shallow dispersed gold potential that could be up to 20,000 oz troy.
5. In the west of the Licence area the Bobadil and Rosebery fault trend can be projected towards the John Lynch's, Just in Time and Silver Falls prospects, however, exploration by previous licence-holders has not yielded encouraging results. AMR's interpretation is that these deposits are again too distal from volcanic sources for VHMS-based ore deposits. Previous explorers have recommended stream sampling for gold in this western area (Pemberton et al,1995).

Economic targets

AMR has not found sufficient evidence to justify further expenditure on exploration in EL17/2015, but regardless is not sufficiently confident to declare the area barren of economic ore deposits. Over a 60 km² area, only 2 km² has been drilled at a density that would enable inferred resource calculation, and extension of that Boco zone is overlain by thick glacial deposits. An intersecting secondary ore concentration trend, say, along the NNW Devonian gold trend, has not been excluded from lying beneath the glacials.

Otherwise, a future explorer might do well to:

- drill the VTEM anomalies ascribed to groundwater concentrations in the north east of the tenement area;
- investigate structures bounding the North Pinnacles rhyolite to define gold concentration and extent;
- investigate the presence of and structure within the Black Harry Beds and Que shale beneath the CVC for economic alteration;
- map the Luina/Oonah shear zone for signs of veining or alteration minerals.

Expenditure

Expenditure on EL 17/2015 4 March 2019 to 2 June 2020 was \$8,584, bringing the total expenditure on the licence since inception to \$71,087. Most of this expenditure was incurred in preparation as part of a regional gold exploration drilling program that has since been pared down and concentrated on other tenements; and the desktop research, assessment and re-interpretation of available geological and geophysical records and reports.



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1. INTRODUCTION and BACKGROUND

Report brief

Tasmanian Mineral Exploration Licence (EL) 17/2015 'Boco Creek' was held in entirety by Australian Mineral Resources Pty Ltd (AMR) throughout the period 4 March 2016 to 1 June 2020, at which date the tenement was relinquished in entirety.

To satisfy Section 204A of the *Mineral Resources Development Act, 1995* (MRDA), AMR submits this document to report on mineral exploration investigations and expenditure undertaken in EL17/2015, including the following information:

- A map showing the surrendered and (where appropriate) retained areas of the licence or lease (Figure 1.2)
- A résumé of the exploration philosophy (Section 4)
- Conclusions as to the nature and distribution mineralisation in the area being surrendered (Section 4)
- Summary of Exploration undertaken during the full period of the Licence (Section 5).
- Full details of work undertaken during the final reporting period (Section 5)
- Details of environmental management activities undertaken (Section 6)
- A complete bibliography of all reports on the surrendered area (Section 8)
- Any digital datasets generated during the life of the licence (Not applicable).

Location

The area covered by EL17/2015 is an irregularly-shaped 60 km² block located about 5 km north and west of Tullah on Tasmania's north west coast, 85 km south of Burnie (see Figure 1.1). Significantly, EL17/2015 straddles the middle 8 km of the 30km local strike length between the Rosebery and Hellyer mines. The Murchison Highway and Emu Bay Railway line run through the east of the tenement area, with the Boco Siding presenting as the only additional infrastructure.

Map conventions

Coordinates in this report and in digital data associated with this report are recorded as GDA94: UTM Zone 55.

Geographical setting

Topographically, EL17/2015 consists of:

- marshy flats in the east, trending approximately north-south, 1 to 2 km wide, perched at about 400 m AHD and underlain by glacial deposits;
- rising steeply either side to the West Coast Range to the east, and a moderately incised north-south plateau about 500m ASL to the west. In the northern half this plateau is 2 km wide going west, before rising sharply again to the 'Sawmill' escarpment that peaks at 700m. In the southern half the plateau is 4 km wide westerly, before rising sharply to the 'Burns Pinnacles' escarpment that peaks at 640m;
- further west of these two north-south escarpments the peneplain terrain is around 500m high for another 4 to 6 km with more steeply incised drainage down to 200m AHD in Ross Creek gorge.

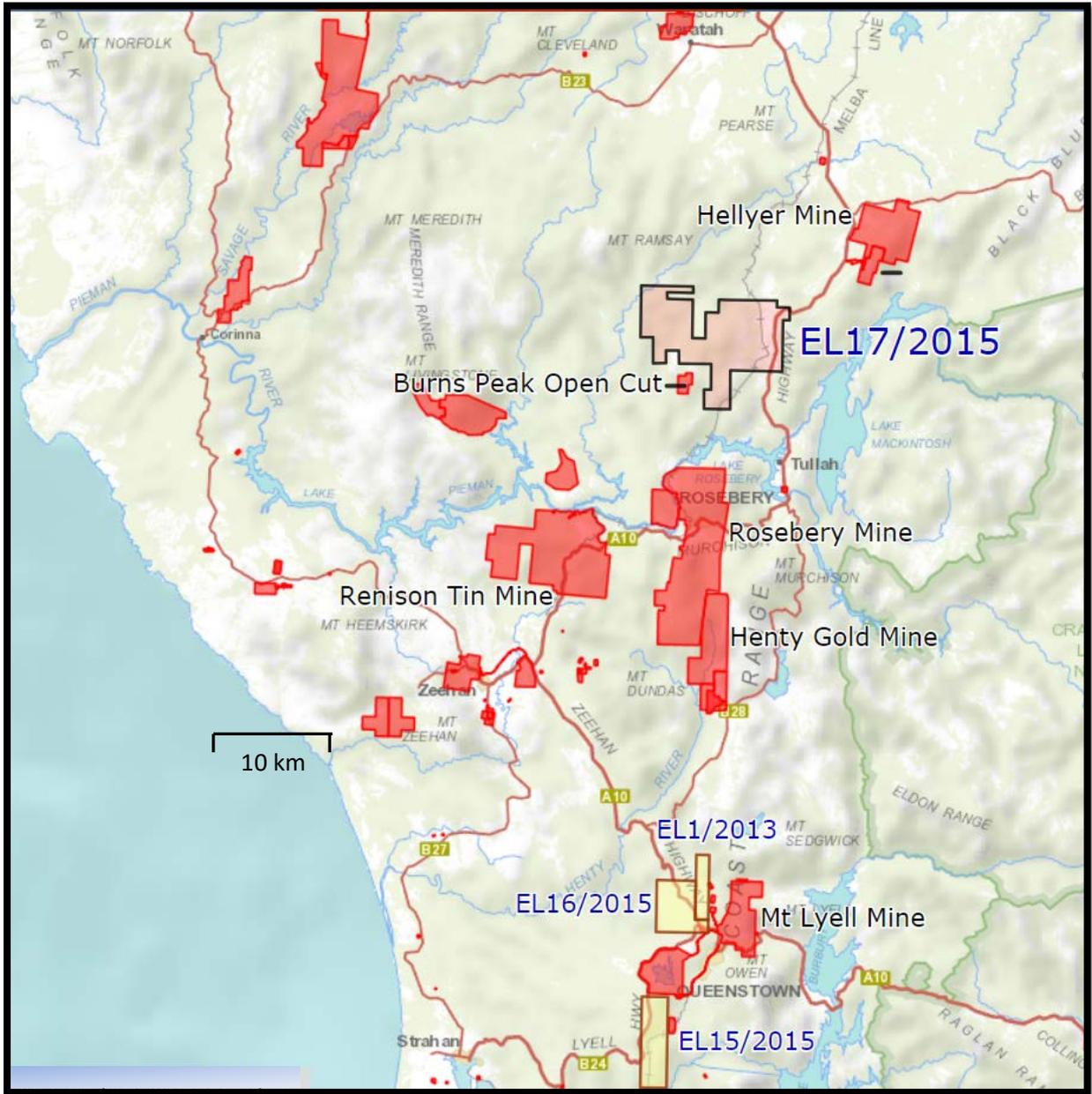
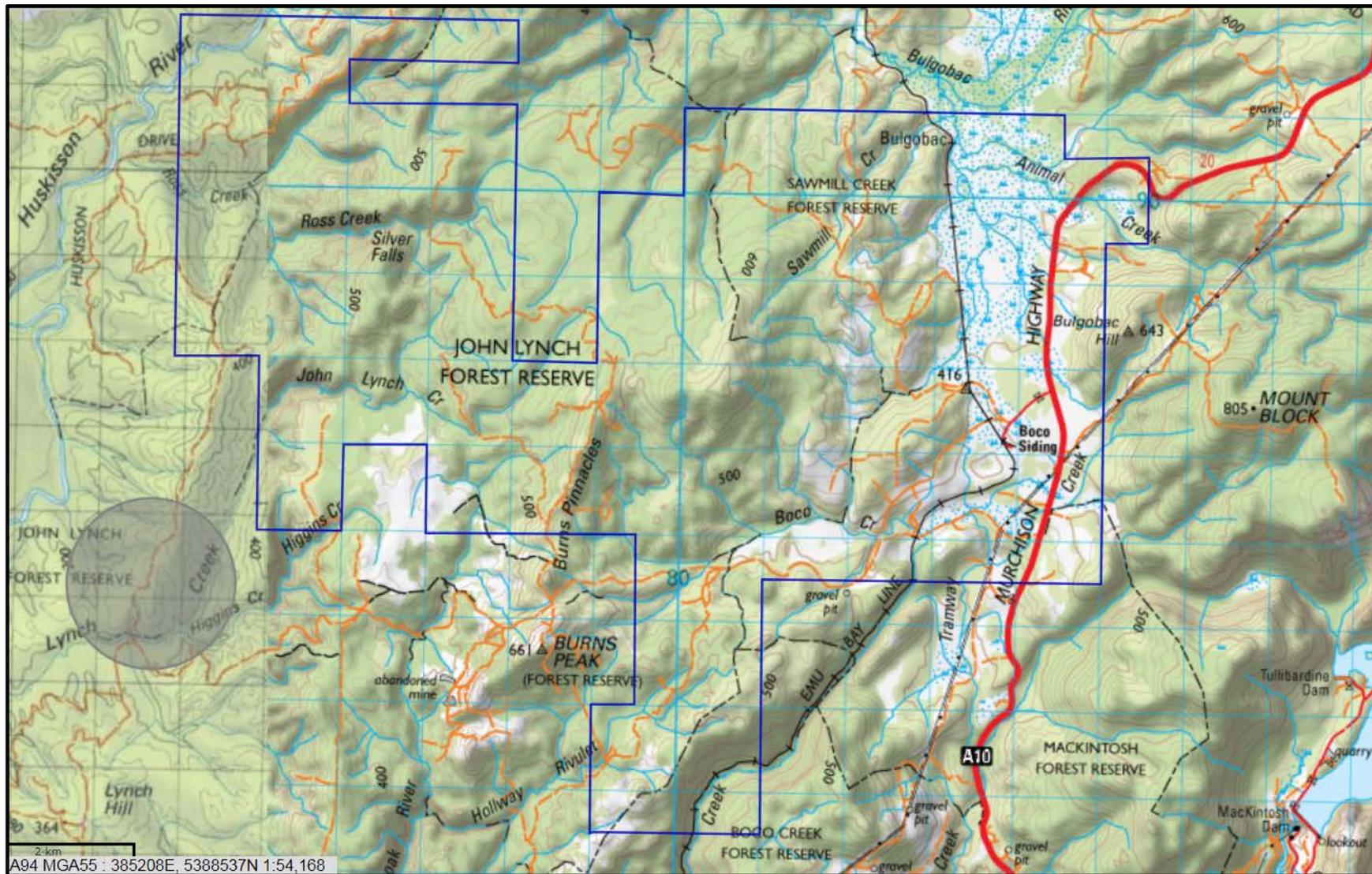


Figure 1.2: EL 17/2015 Map showing the total Licence Area as surrendered.



Three-quarters of the catchment areas on EL17/2015 drain either north into the Bulgobac Creek / Que River / Huskisson system, or directly westward into the Huskisson River itself (see Figure 1.3). These catchments contain Sawmill, John Lynch, Animal and Ross creeks, and Silver Falls. The remaining catchments including Boco Creek and Hollway Rivulet drain south into Lakes Pieman and Rosebery. The drainage pattern appears dendritic, although it is probably mostly controlled by a complex underlying geological structure.

The bedrock is siliceous. Topsoil is clayey, shallow on the ridges, and boggy and peaty on flats. Vegetation is temperate rainforest, wet sclerophyll woodland with open to dense understorey, logging regrowth or open button grass flats. The valleys and ravines are densely vegetated with temperate rain forest, including bauera and horizontal scrub in the west. The ridges and plateaus are thick with tea-tree dominated regrowth. Above the plains, the density and height of vegetation necessitates track cutting to reach most target areas.

The climate is cool temperate. Over the ten years to 1993, the Rosebery BOM/HEC weather station site recorded an annual average rainfall of 1950 mm, with 190 days per year >1mm rainfall, and a maximum daily temperature range of 11 to 21 degrees C.

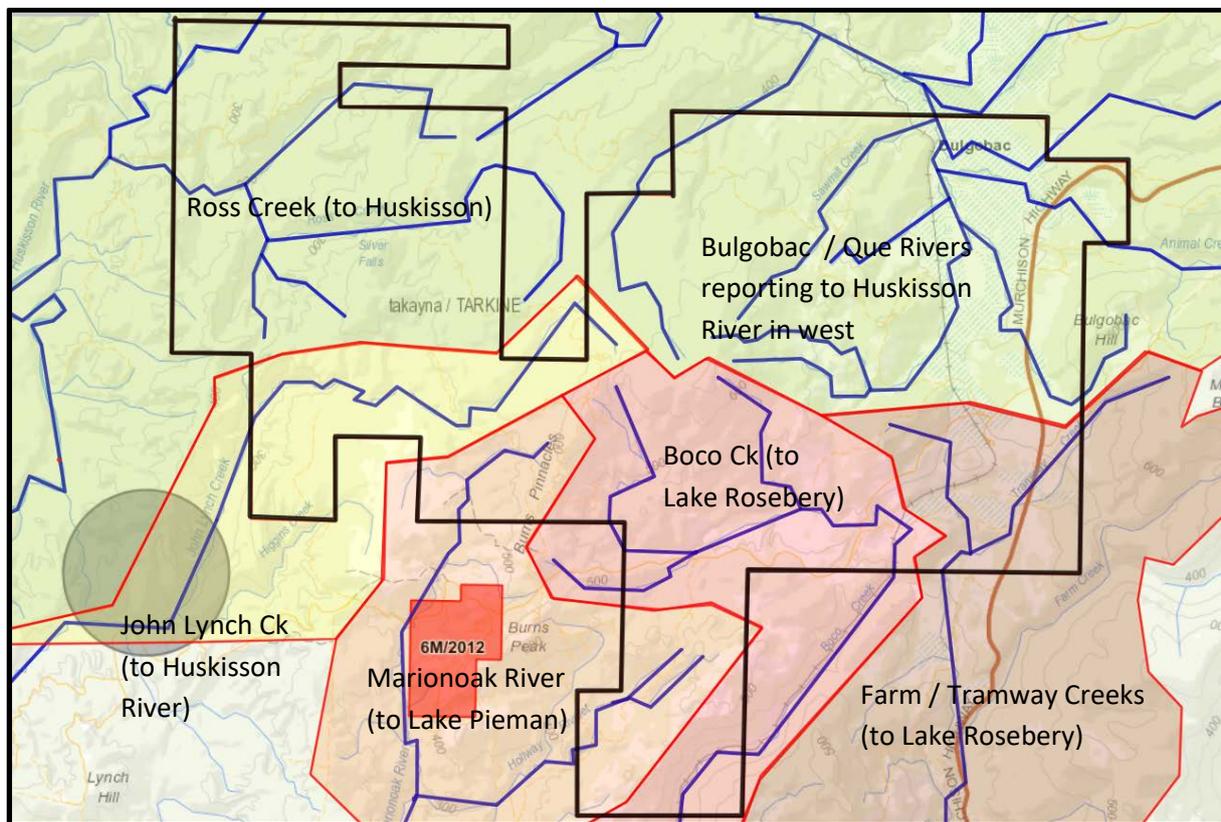


Figure 1.3: EL 17/2015 Drainage pattern.

Access

From Rosebery (25 km) or Burnie (85 km) the tenement is accessed by the Murchison Highway. Access into the east and central areas of the tenement from the highway is via the gravel Boco Forestry Road and 4WD tracks to Silver Falls, John Lynch Creek and Sawmill Creek, now in poor repair, used historically for logging and mineral exploration. The north-western portion of the tenement is not tenable for vehicular access.

Current land tenure and Environmental Aspects

All land covered by EL17/2015 is Crown land (see Figure 1.4).

- The 'John Lynch' and 'Sawmill Creek' Regional Forestry Reserves, established under the *Nature Conservation Act, 2002* (NCA), comprise the central 70% of the tenement. Exploration programs involving groundworks or clearing in Regional Reserves are to be sanctioned under the Regional Forest Agreements Act, 2002 by the Mineral Exploration Working Group (MEWG) (see Bacon & Pemberton, 2012) on condition of being carried out 'while protecting and maintaining the natural and cultural values of that area of land' (NCA, 2002).
- Another 26% of the tenement in the east and west is designated on the DPIPWE Central Plan Register as 'Future potential production forest area,' plus minor parts of two more Regional Reserves, all accessible for mineral exploration and development under the MRDA, 1995.
- The remaining 4% of the land shown in red in Figure 1.3 is the Reynolds Falls Nature Recreation Area, also classified under the NCA to be sensitively treated according to the objectives of the Reserve, but still to 'provide for exploration activities and utilisation of mineral resources'.
- There are three small areas managed by State-owned businesses, a 0.5 km² Hydro Tasmania-managed area on the east side of Murchison Highway, a Transend transmission corridor that crosses the south east corner, and the Emu Bay Railway easement. All remain accessible for exploration within the MRDA. Authorisation from state-owned TasRail would be required to explore or use the Railway as an access route to target areas.
- There are no Nature Reserves, State Reserves or National Parks that would exclude exploration and mining within the tenement, and no Local Government Reserves, Conservation Covenants, or Private Reserves. There are no residential blocks under private freehold in the Licence area. There are no mine leases and no exploration licences under MRDA (1995) categories other than EL17/2015 (Category 1).
- It is noted that the area covered by EL17/2015 lies on the south eastern margin of the undefined Tarkine wilderness area, being north of the Pieman River and west of the Murchison Highway. It is one of 38 Exploration Licence areas in the Tarkine area.

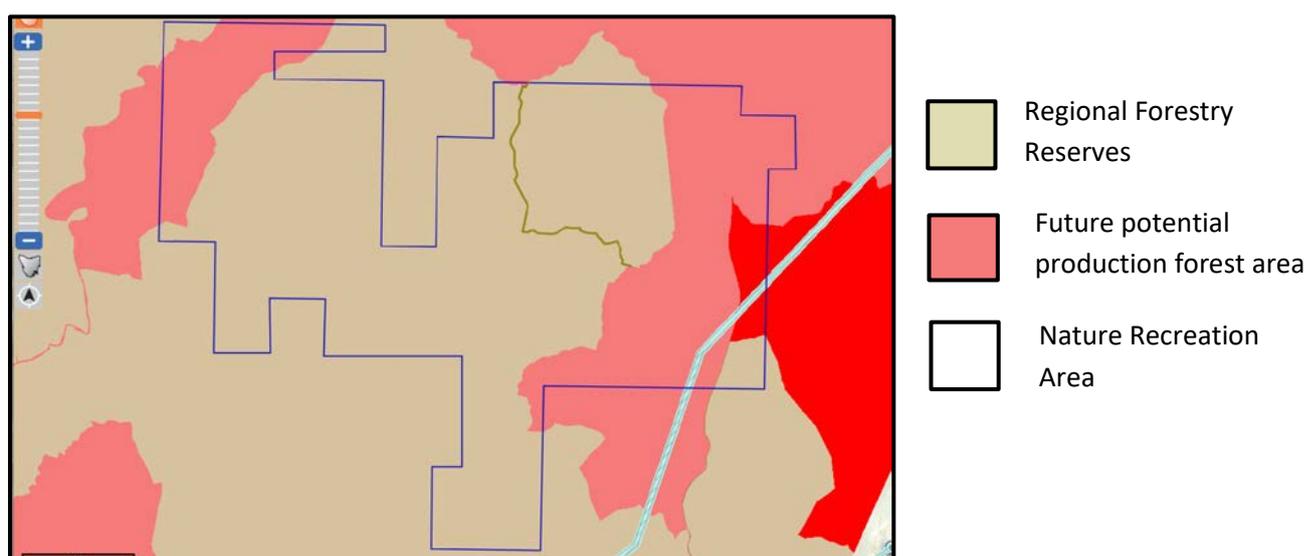


Figure 1.4: EL17/2015 Land tenure (Source MapList, via DPIPWE)

Natural Values:

Within EL17/2015, there are no restricted areas on the Heritage Register, nor is there registered Aboriginal land. There are no identified threatened native vegetation communities or individual flora points, and no registered weed infestations.

John Lynch Ck has been listed as having been a possible habitat for the extinct *Thylacine*, as well as the Endangered Eastern Quoll. Sightings of the endangered Tasmanian Devil have been recorded on the Boco Creek Forestry Road and at five roadside recordings along the Murchison Highway in the area.

There are no recorded raptor nests on the Licence area and no RAMSAR Wetlands.

Figure 1.6 shows locations of Geoconservation sites. The glacial flats represent a notable example of listed Western Tasmania Blanket Bogs, the most extensive organosol terrain in the Southern Hemisphere. The southern half of the 'Que-Bulgobac Glacial Diversion' is in the north east corner of EL17/2015.

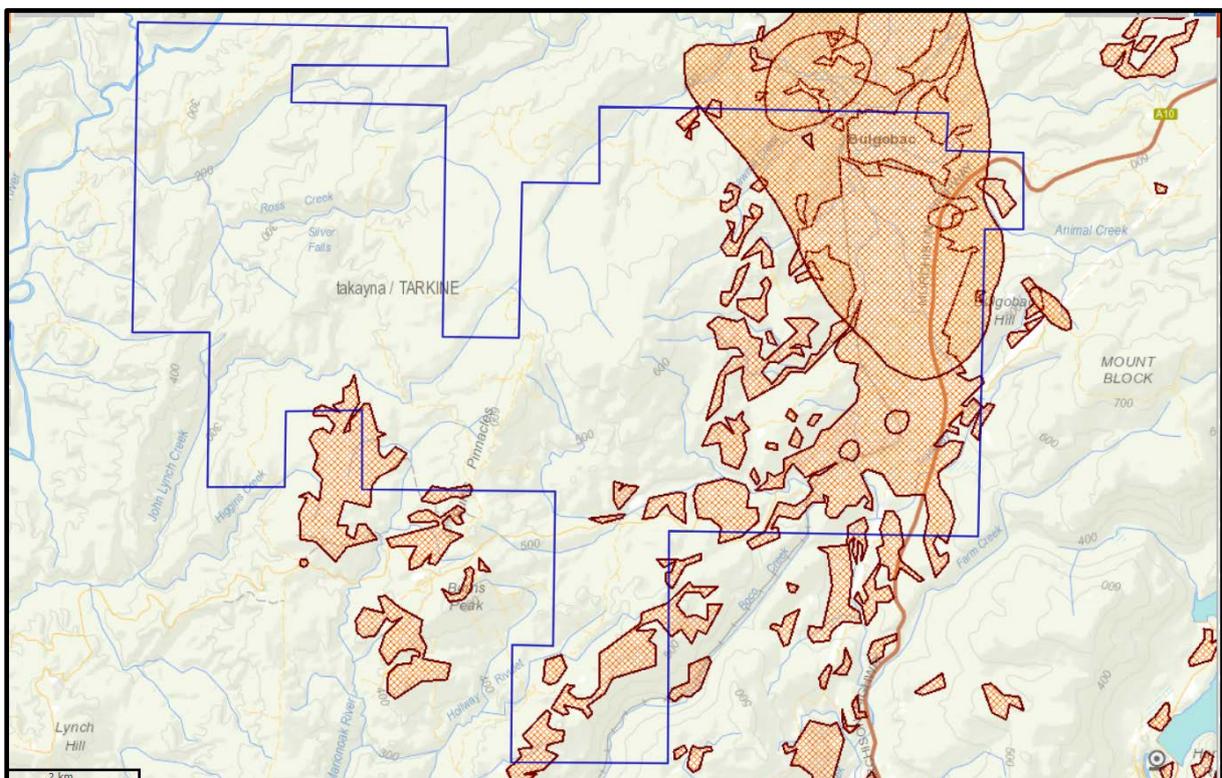


Figure 1.6: EL17/2015 Geoconservation sites (Source MapList)

Historical setting

It is possible that people of the Peterindic regional language group (Ref: Ryan, 1996 in Huys, 2010, see Appendix B) ranged from territory at the mouth of the Pieman River up the river and inland, to access trade/annual migration routes and hunting grounds. The glacial flats of Boco might have provided such, however, no evidence of habitation or tool finds have been recorded on the area covered by EL17/2015. Nevertheless, AMR acknowledges the ancestral first people inhabitants of the land and their descendants and undertakes exploration activities with due observance and respect for Country and to elders both past and present.

In 1824, James Hobbs was directed by the Colonial Government to track the Pieman River inland in whaleboats in search of agricultural land. Eighteen miles in he despatched James Garrets and two other men overland to Cape Grim. These three appear to be the earliest recorded Europeans who may have trodden the Boco Flats. Between 1826 and the 1860s the Van Diemens Land Company explored inland of the north west coast, assigning names of explorers/surveyors like Fossey, Hellyer and Wedge to local posterity.

The north American and NSW/Victorian gold rushes in the second half of the 19th Century inspired prospecting in north west Tasmania including metal discoveries by James 'Philosopher' Smith (Mt Bischoff, 1871) and Charles Sprent (Mt Heemskirk, Savage and Whyte rivers), as well as modest gold rushes around Queenstown and the Long Plains south area of Savage River.

In 1890, amateur prospector John (Jack) Lynch working on a Waratah to Zeehan pack-track along the Huskisson River discovered galena/barite/pyrite in Ross Creek (Silver Falls) but there was no follow up (Montgomery, 1891). In 1893, Tom McDonald discovered alluvial gold and zinc-lead sulphides on the slopes of Mount Black near Rosebery leading to development of that mine over several decades. In 1896 copper and alluvial gold (Strong's Creek) were found south of Boco at the Pinnacles Hills / Burns Peak, followed almost immediately by the discovery of the Chester lead-zinc deposit by Kershaw and Saunderson (Sandison?).

Between 1897 and 1900, the former Emu Bay to Mount Bischoff Railway was extended to Zeehan including the section along Boco Creek, providing access and exposing some encouraging but sub-economic sulphide shows in its cuttings, including the 5 km Samuel Smith's Lode in EL17/2015 (A.M. Reid, 1918). During his competent geological assessment of the area including EL17/2015 in 1918 (Geological Survey Bulletin No.28.) Government geologist A. McIntosh Reid discovered the galena/barite/pyrite prospect immediately west of the current Licence area on John Lynch Creek.

The Murchison Highway between Burnie and Zeehan / Queenstown was constructed in 1963 opening the west coast hinterland for exploration, mining and the construction of the Pieman hydro-electric scheme in the late 1970s. In 1963 Comstaff took up exploration ground around Boco area and recent exploration history commenced (see Section 3).

Regional geological setting and its relevance to the Boco area

The following notes can be referenced to the 1:250 000 South West Tasmania sheet (Brown et al, 2005), and 1:25 000 map series in which EL17/2015 straddles the Charter, Block, Parsons and Ramsay map sheets compiled by Mineral Resources Tasmania (see Figure 1.7 and Section 8).

Exploration Licence 17/2015 Boco Creek is situated in the north of the Dundas Trough geological element where the trough deviates from a northerly to a north-easterly trend as it flexes about the Tyennan strato-tectonic element (Seymour and Calver, 1995). This flexing is reflected by north north-easterly bedding strikes and fold axes in the eastern half of the Licence area.

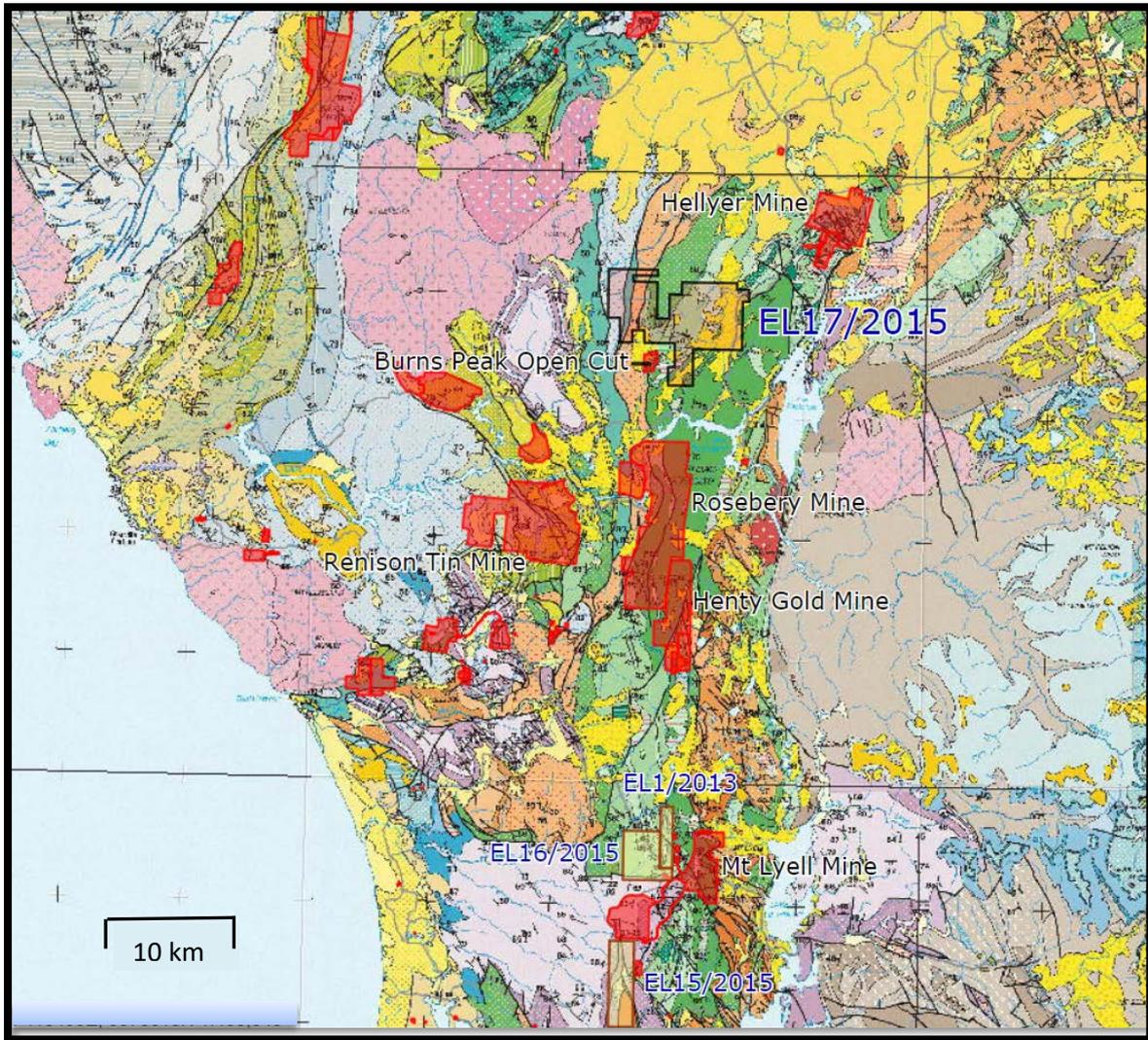


Figure 1.7: Regional geological setting of EL17/2015 (Brown et al, 1995)

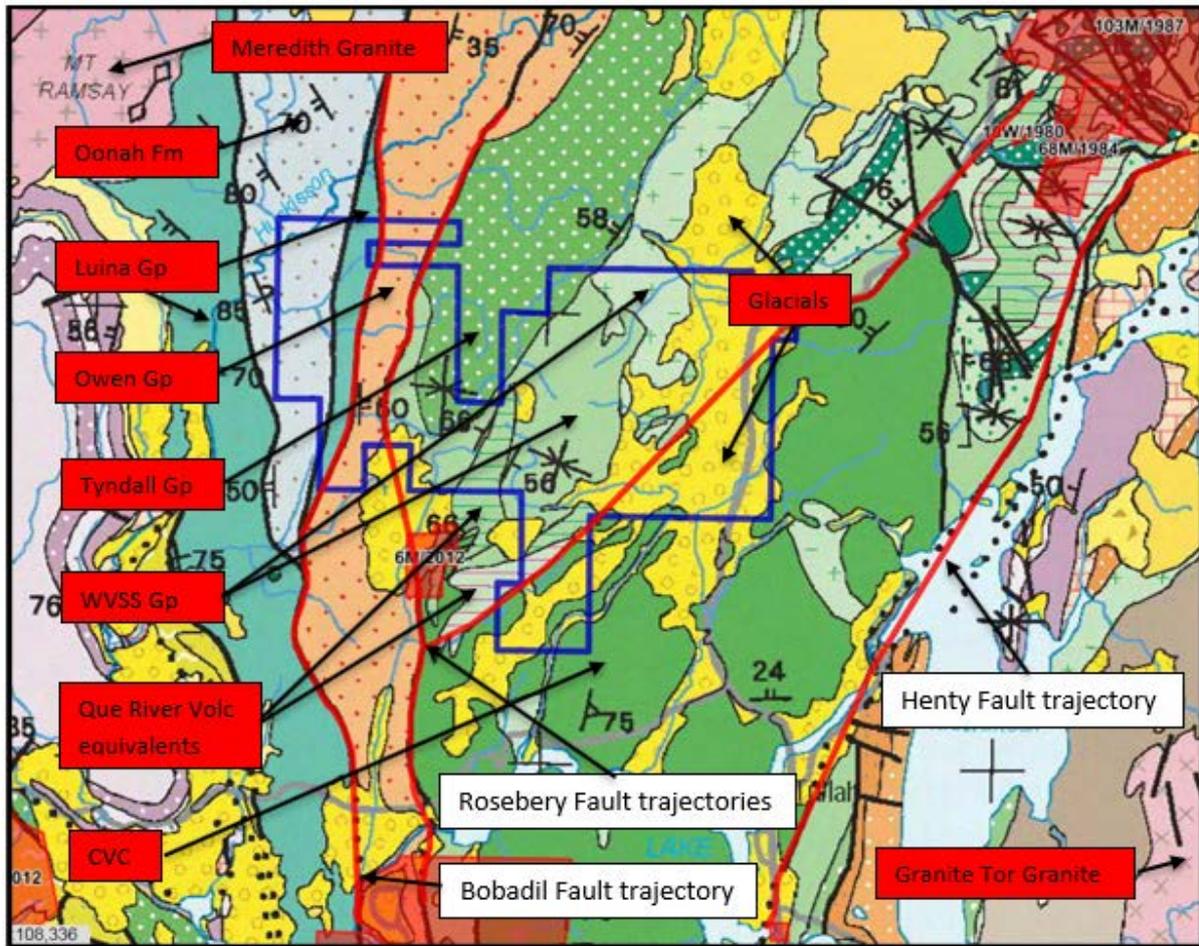


Figure 1.8: Regional Geology of EL 15/2015 (Excerpt from Brown et al, 2005)

Stratigraphy

The basement in western Tasmania is predominantly greenschist Neoproterozoic meta-sediments with minor basalts and dolerites (Corbett et al, 2014). Quartzites of this age, possibly Oonah formation (Basford, 1997) are exposed on the far western boundary of EL17/2015 (Figure 1.8).

Tholeiitic volcanism during the Early Cambrian deposited the Crimson Creek Formation (CCF) on this basement (Brown, 1986) but CCF strata do not appear to outcrop in EL17/2015.

An island arc collision in the mid Cambrian (Crawford and Berry, 1991) caused ultramafic cumulates and volcanic equivalents (Brown, 1986) to be thrust onto the CCF as the Huskisson River Ultramafic Complex. These rocks generate strong magnetic anomalies and outcrop north west of the licence, from where they have been interpreted to persist, folded but with an easterly dip, into EL17/2015 at depth between North Pinnacles and Silver Falls (Leaman, 1992).

A sliver of the early to mid-Cambrian Luina Group, postdating the ultramafic incursion (Corbett 2002b in Corbett et al, 2014) is exposed in faulted contact with the Proterozoic basement rocks to the west, the contact “often forming a wide shear or thrust zone in the west” (Lorrigan, 1992).

In the mid to late Cambrian, basaltic through to rhyolitic calc-alkaline volcanism along the eastern margin of the Dundas Trough, and related pyroclastic and volcanoclastic sedimentation within the rift, deposited the rocks of the *Mount Read Volcanics* (MRVs) previously 'Dundas Group' (Skirka and McNeill, 2005). Rocks representing the entire sequence of the MRVs are present across the EL17/2015 Licence area. 'Unfolding and unroofing' of the MRVs would reveal an east-west facies transition from proximal sub volcanic intrusive and extrusive "rhyolites" through interbedded volcanoclastic flows and muds, to eventually turbiditic sandstones and more pelitic epiclastic sedimentary rocks in the west. This simplification would nonetheless have been complicated by localised episodic deposition, autochthonous debris flows, soft sediment post-depositional intrusion, syn-depositional topography, tectonic structure and structural disturbances.

Regionally, the MRVs consist of a spine of predominantly calc-alkaline felsic lavas, subvolcanic porphyries and proximal volcanoclastics (the CVC) that on the westerly side, grades and interfingers laterally into micaceous greywackes and shales of the shallow marine / intruded *Black Harry* and *Animal Creek* formations, then the distal sedimentary Que shales and *Southwell Group*, (combined here as the *Western Volcano-Sedimentary Sequence* equivalents). In the northern part of the Trough, the *Que-Hellyer Volcanics* sequence appears to have been extruded intermittently and intermediately with the transitional sediments between the CVC and *Southwell Group* (reference stratigraphic key from 1:250 000 sheet – MRT, Brown et al, 1995).

As the ultimate phase of the Mount Read volcanism, the late Cambrian *Tyndall Group* unconformably overlies the other MRV units. Tyndall rocks have been identified in the Licence in a northerly plunging NNE (Henty trend) trending synform (Silver Hills Syncline of Poltock, 1993) dominating the excised part of the northern boundary (see Figure 1.8).

A northerly-trending 500 to 1000 metre strip of the Cambro-Ordovician Owen Group (validated via fossil evidence, sourced Xie, 2012) outcrops between the MRV and the Luina Group in the western part of EL17/2015. It is comprised by carbonate siltstones, wackes, quartz muscovite sandstone and polymictic conglomerates derived from Precambrian metasediments, but with some material from felsic volcanics and ultramafics.

Neither the Ordovician-Silurian Wurawina Supergroup, nor any Mesozoic Tasmania Basin strata are present in EL17/2015. Devonian hydrothermal quartz/carbonate veins and late Mesozoic 'diabase' or dolerite dykes are present in the area.

The most recent lithology to occur is the Pleistocene fluvio-glacial clays and gravels as glacial tills and moraine deposits that are present beneath the Boco flats, and in patches near Sawmill and John Lynch creeks.

Structure

The structure of the Dundas Trough from Mt Darwin through to Hellyer is generally expressed by complexly-faulted northerly trending sub-vertical beds of Mount Read Volcanics either side of a subsurface Cambrian granite spine and located immediately west of the Tyennan Block stratotectonic element. In EL17/2015, these steeply-dipping stacks appear to swing to the NE around the Tyennan Block but remain approximately north-south where they are distal from the terrane contact.

The beds were folded and tilted by the later stages of the Tyennan Orogeny but the degree of tilting and fracturing attributable to the Cambrian compared to the compressive phases of the later, Devonian/Carboniferous Tabberabberan Orogeny (Keele, 1991 in Corbett et al, 2014) is unclear. Both events resulted in hydrothermal siliceous fluid injection and deposition of quartz/carbonate veins and moderate alteration of country rock throughout the MRVs, although to a lesser extent in the Boco area between Rosebery and Que River.

The late Tabberabberan orogeny also introduced its own granite bodies, including the nearby Meredith (5-10 km west) and Granite Tor (5-10 km southeast) batholiths. If granite is present at depth in EL17/2015, however, it is likely deeper than 6 km (Richardson and Leaman, 1992). It is noted that Devonian granites are associated with the Pb-Zn-Ag vein deposits of Zeehan and possibly the Tullah Fields, similar associations to the smaller Silver Falls, John Lynch and Just-in-time prospects on EL17/2015.

Two of the feature faults of the Dundas Trough diverge at Boco.

1. The Rosebery Fault, which is regarded in the Dundas Trough as bounding the CVC on its west side, tracks north from Rosebery Mine to Burns Peak, where it either:
 - continues its northerly trend into the Boco Creek Licence and mid-way veers NNE in sympathy with the local grain (in this case it becomes the eastern boundary of the Owen Group against the WVSS); or
 - continues to bound the CVC and diverts to the NNE along the Boco 'line'; or
 - bifurcates along the above trends, exposing a wedge of Western Volcanic equivalents and Tyndall Group that underlies the bulk of the Boco Licence.
2. The Henty Fault is projected to continue its NNE track from the Henty Gold Mine along the western shore of Lake Macintosh (5 km west of the Boco Licence).

Other structures inferred regionally and locally to Boco include multiple NW and NE shears associated with the Devonian orogeny and mapped in the Hellyer, Rosebery and Mt Lyell pits and related exploration.

Mineralisation

Six major economic volcanogenic massive sulphide (VHMS) deposits in the Mount Read Volcanics have been mined, all associated with acid/intermediate volcanics near the top of the CVC (see Figure 1.7). Stratigraphically, the neighbouring Rosebery deposit is at the top of the CVC in a pumice-rich breccia like one that appears to lense out along with the Hollway Andesite in EL17/2015. The Que River and Hellyer massive sulphides were deposited in dacitic to andesitic rocks of the Que-Hellyer Volcanics thought to equate with the Hollway Andesite position (Lorrigan, 1992) or immediately above it (Corbett, 2002).

The Devonian granites are associated with carbonate replacement tin mineralisation at Renison Bell and Mount Bischoff and the Pb Zn Ag vein deposits of Zeehan and possibly Tullah Fields (Poltock, 1993).

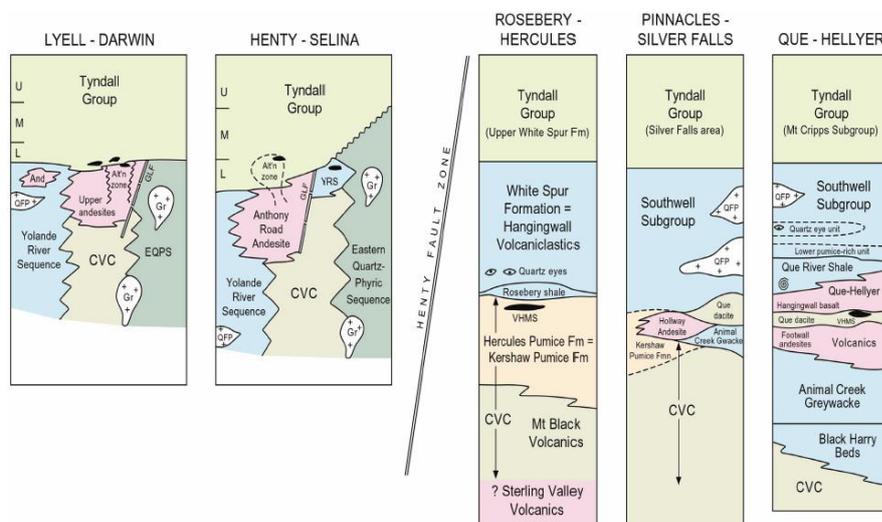


Fig. 1.7: Regional stratigraphic correlations (Adopted from Corbett, 2002)

2. SUMMARY OF TENEMENT GEOLOGY

The most significant exploration effort during the term of AMR's Licence over EL17/2015 has been a comprehensive review of the stratigraphy, lithology, structure and mineralisation of the area, which is discussed here in detail.

As with most other settings in the Dundas Trough, a clear picture of the geology of EL17/2015 is obscured by remoteness and inaccessibility, dense vegetation and lack of good outcrop and marker horizons; and volcano-sedimentary facies variation about eruptive centres, complicated by a complex tectonic history and subsequent weathering. The following notes have been summarised from an investigation of source literature and 2017/18 targeted field mapping. Figure 2.1 shows the distribution of rock types and broad stratigraphy on EL 17/2015, sourced from TheLIST on the MRT website.

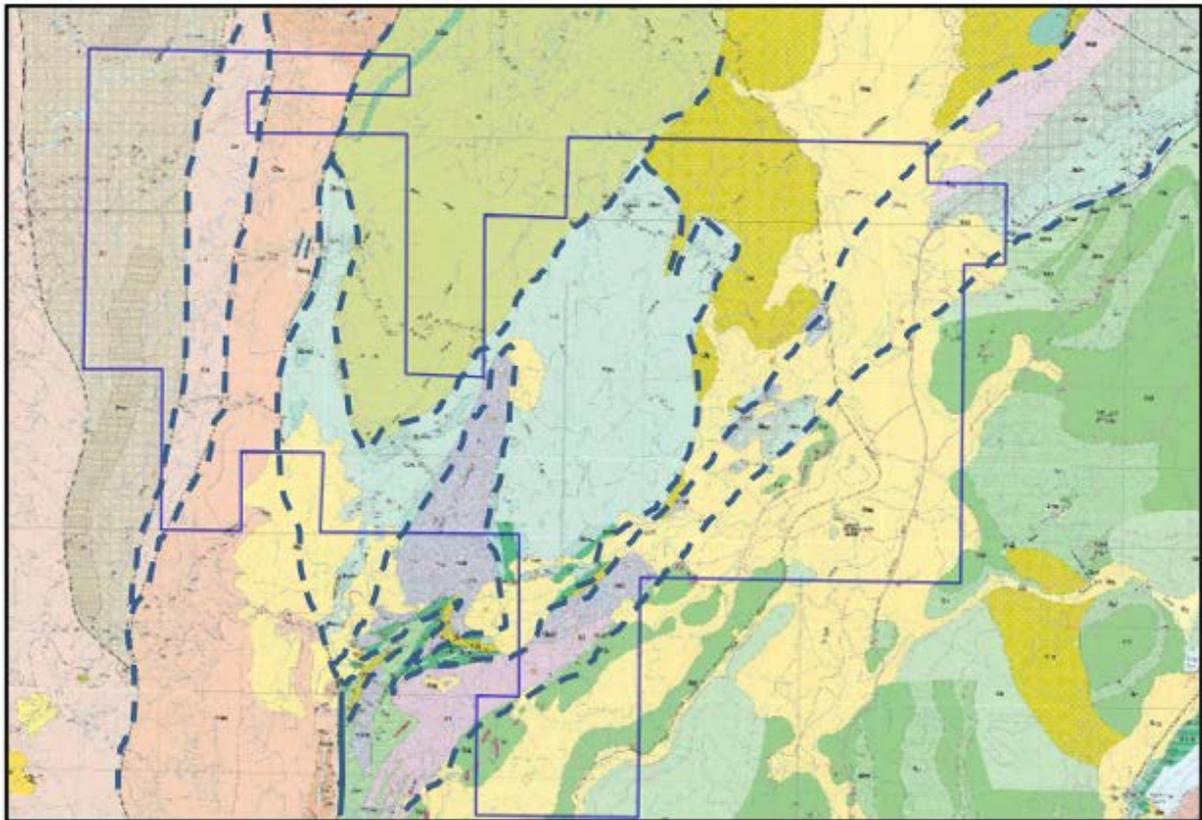
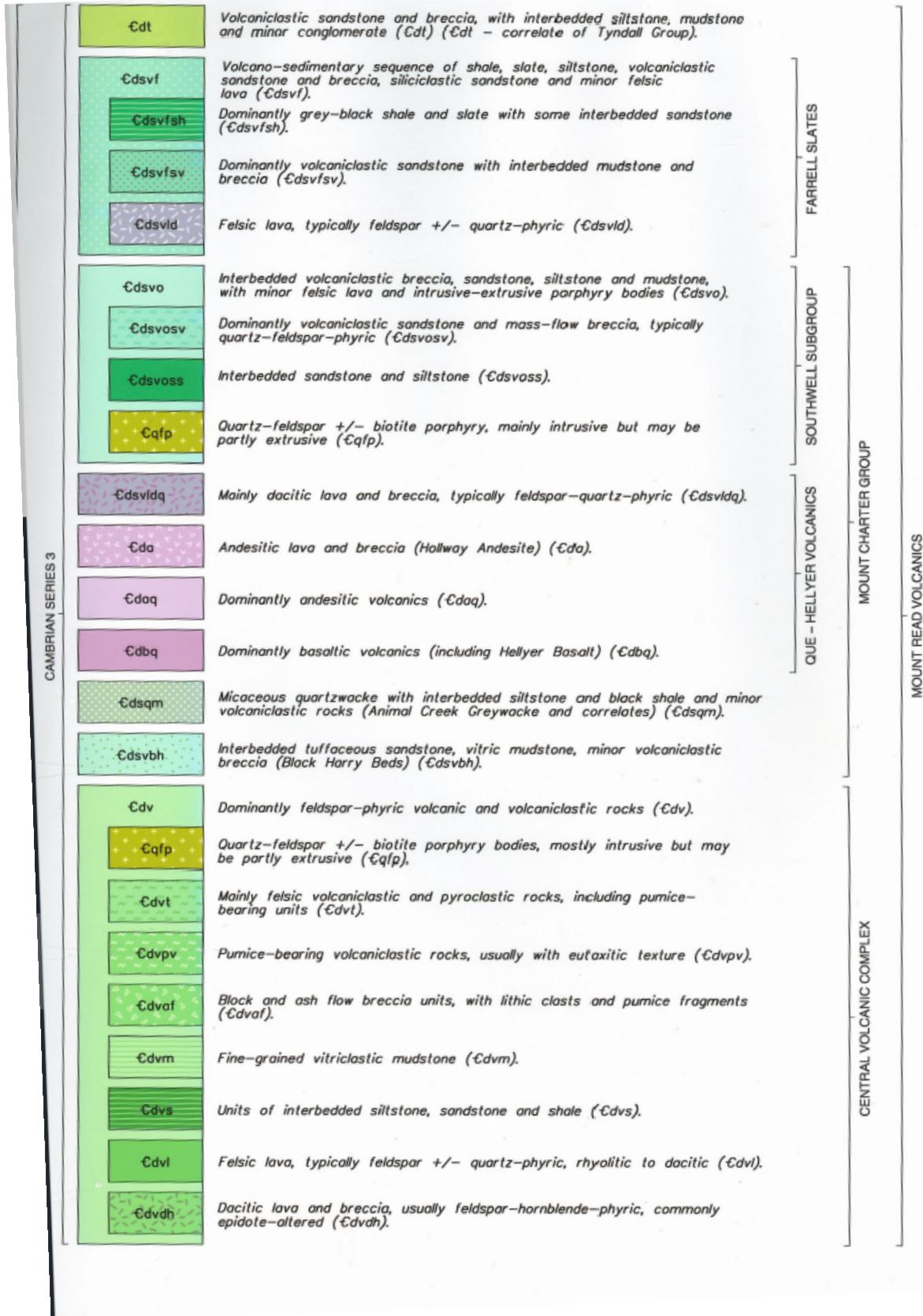


Figure 2.1 - 1: 25,000 mapped geology (Pemberton et al, 1995. Sourced TheList – MRT)



Stratigraphy and lithology

The following summary refers to Figure 2.1 that shows Mineral Resources Tasmania's interpretation of compiled geodata to 2004 for the area (hardcopies of the MRT 1:25 000 sheets, of Pemberton et al, offer a clearer image). Boundaries between the lithologies identified in mapping or drilling have been interpolated due to scarcity of outcrop. Unreferenced statements are sourced from Skirka and McNeill (2005, 2006).

In chronological order, the rocks known to be present at outcrop are listed below.

The **Oonah Formation** straddles the western boundary of EL17/2015, consisting of deep water turbidites, now predominantly quartzite and slates with minor basalts.

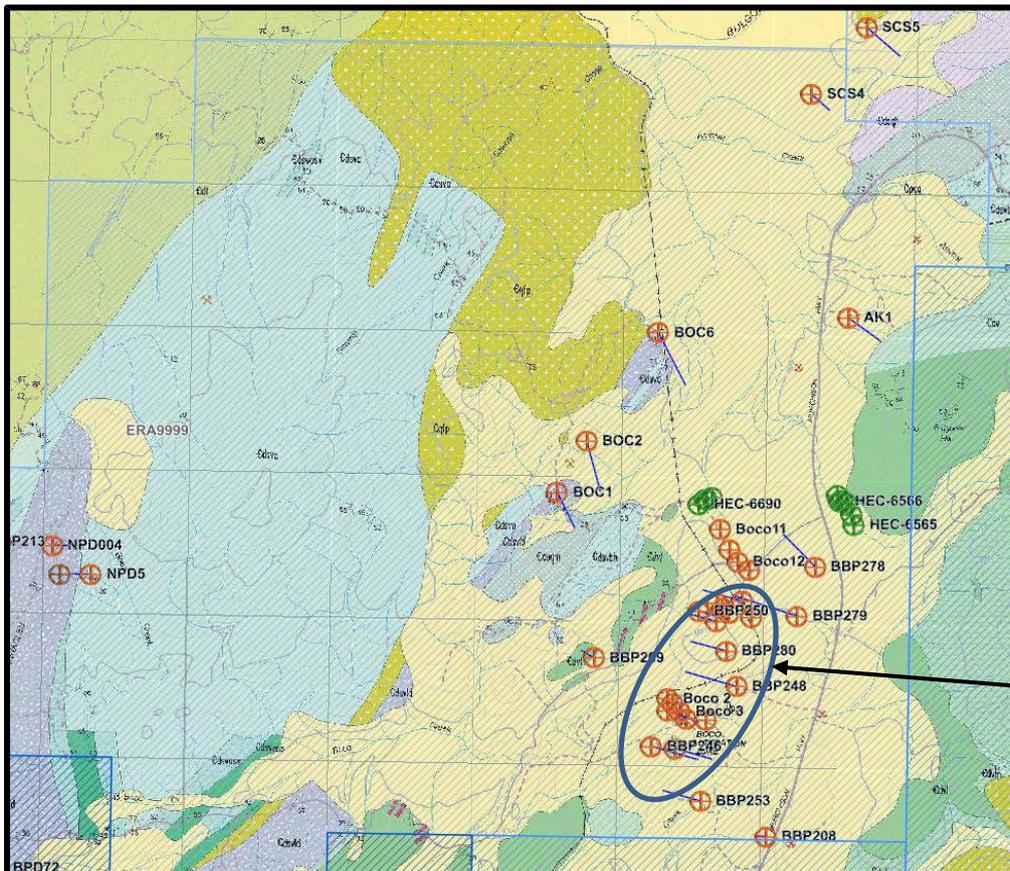
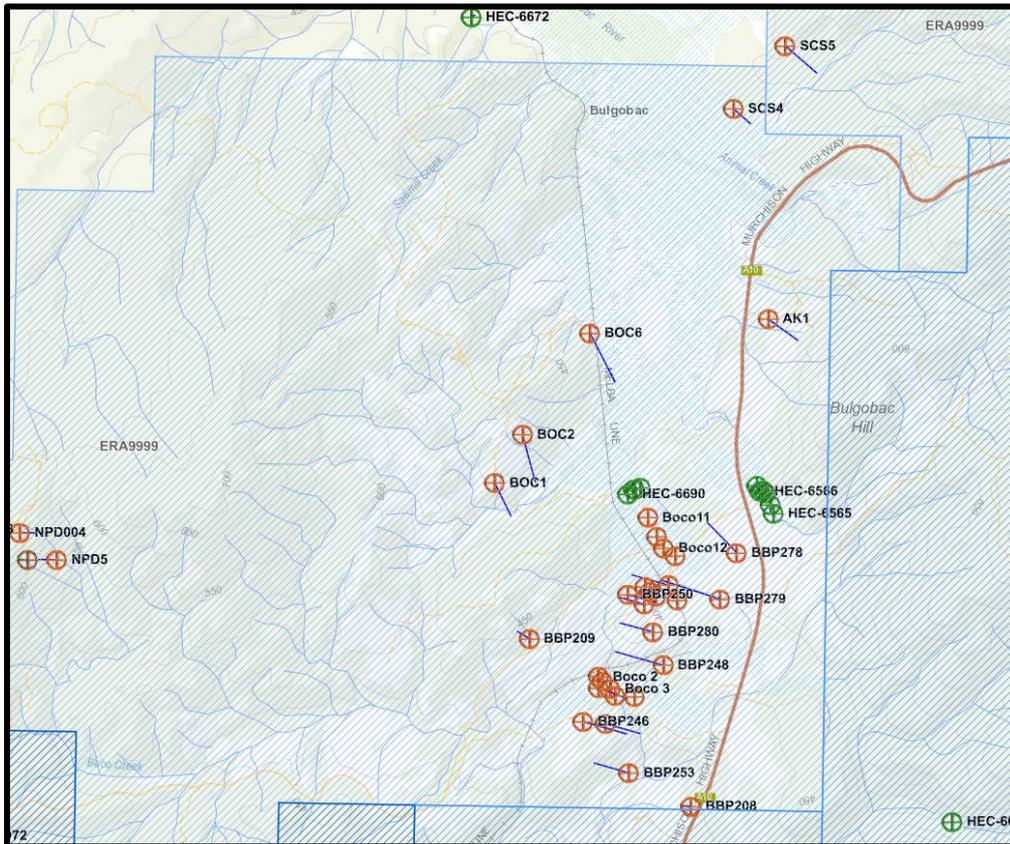
The early Cambrian **Luina beds** are mapped either side of the Oonah Formation. The Luina beds are interbedded, occasionally dolomitic, siltstone, greywacke sandstones, polymictic conglomerate and basic lavas. Based on clast provenance, the unit predates Mt Read volcanism. Where present in EL17/2015 the Luina Group units dip steeply, and young, east.

The middle to late Cambrian **Central Volcanics Complex** (CVC) of the Mount Read Volcanics (MRV) occurs in the south-eastern quarter of EL17/2015 (shown in green in Figure 2.1). Most of the CVC outcrop in the Boco area is masked by Pleistocene glacial deposits up to 100 m thick (light yellow). The CVC in the Boco area consists broadly of an eastern sequence of mostly dacitic lavas and/or intrusives (pale pastel green on Figure 2.1); and west of the lavas, a predominantly pyroclastic sequence, consisting mostly of fine to medium grained felsic crystal to vitric, ash flow tuff, which is intruded by dacitic feldspar porphyries, rhyolitic quartz-phyric lava pods and thin basalt flows. Distinctive agglomerate and lithic tuff units have been recorded near Boco Creek and the Emu Bay Railway that can be correlated, giving a north-easterly strike to the sequence with easterly dip and facing. Geophysics suggests that the CVC is about 300 m thick near Boco Siding (Leaman, 1992, Appendix III).

Stratigraphically above, or perhaps coeval with the CVC in the Boco area is an intruded volcano-sedimentary '**Transition Sequence**' (Lorrigan, 1992) or basal Mount Charter Group (Pemberton et al, 1995) that outcrops in another north-easterly strip 500 m – 700 m wide, between the CVC and the Southwell Subgroup strata. These rocks have been correlated with the host rocks at Hellyer-Que River and Rosebery.

- **Black Harry Beds** Dark-grey fine-grained massive quartz-lithic sandstone thickly interbedded with coarse-grained volcanoclastic mass flow deposits towards the base.
- **Animal Creek Greywacke** Grey/black siltstone and micaceous, feldspathic wackes.
- Amygdaloidal basalt and basaltic hyaloclastite.
- **Que/Hellyer Volcanics** Thin dacitic and rhyolitic lavas, and vesicular andesites
- **Que River Shale** Grey siltstone and sericitized quartz crystal rich volcanoclastic sandstone.
- **(Rhyolitic quartz feldspar porphyry)** Late stage MRV calc-alkaline rhyolite QFP sills, probably relatively unconsolidated sediments.

The **Black Harry Beds** footprint is obscured by Pleistocene glacial sediments in the tenement, except in the north-easternmost corner (600 m wide) and a medial 1 km strike strip (300 m wide) between Sawmill Creek and Boco Siding. The Black Harry Beds have not been identified where their stratigraphic horizon emerges in the south of EL17/2015 from beneath the glacial cover. This pattern suggests that the Black Harry Beds progressively lens out southward. Beyond the southern boundary of EL17/2015, at Southern Trenches and Rosebery, there are rocks correlated with the Black Harry Beds associated with a basal dacitic pumice that hosts mineralisation (possibly uppermost CVC). This prospective basal bed has not been intersected in any Boco drill holes.



Boco
Alteration
Zone

Figure 2.2 Borehole location plan (topography and geology) of middle and eastern EL17/2015 (TheLIST, MRT)

The **Animal Creek Greywacke** exhibits a similar surface thickness shape to the Black Harry Beds, apparently up to 400 m thick to the north of Boco Siding, before thinning to less than 100 metres when it emerges from beneath glacial sediments 2 km south-easterly along strike. As with the adjacent, underlying Black Harry Beds, it is unclear whether the Animal Creek Greywacke lenses out, is faulted out or is intruded or replaced by felspathic acid volcanic bodies. The greywackes show minor alteration in bore core but do not appear to host significant mineralisation in EL17/2015, nor elsewhere in the Mt Read Volcanics.

Equivalents of the **Que-Hellyer Volcanics** intrusive, and possibly extrusive, phyrlic lavas host the Que and Hellyer ore bodies north of EL17/2015. Regionally, the volcanics appear to be strata-bound between the Animal Creek Greywacke and the overlying Que River Shales which together may comprise the same depositional episode intervened by the volcanics. In other areas of the MRVs, similar andesites, dacites and other volcanic units have been dated to considerably post-date their volcano-sedimentary host units. To AMR's knowledge, the lava units within this Transition Group have not been dated(?). In the Boco area, the volcanics are represented by:

- a) The Hollway Andesite (feldspar-phyric dacitic to basaltic lavas and hyaloclastic lava breccias). The Hollway Andesite lenses out within 1.5 km after entering the tenement in the far south (see Fig. 2.1). One km south west of EL17/2015, the southern extension of this andesite is highly altered, contains disseminated pyrite and chalcopyrite and is host to Pb Ag Au mineralisation.
- b) The Que Dacite (feldspar phenocrysts in a grey, massive aphanitic groundmass) On the Boco Road at North Pinnacles (Figure 2.1), the dacite is 10-20% sericitised / carbonate altered. It appears to be shallow intrusive/extrusive or, less likely, could be a massive dacitic vitric crystal tuff (Hanson, 1977). Minimum unit thickness is 200 metres.
- c) The Pinnacles Rhyolite sparsely quartz-feldspar phyrlic coherent, flow-banded and massive rhyolite lava flows, hyaloclastites (sub-seafloor intrusive bodies) and autobreccias. The Rhyolite is exposed on both limbs of the Silver Falls Syncline, outcropping on the Boco Road on the Pinnacles axis, forming a topographic high along the Pinnacles Ridge. Here it is sericitically-altered with quartz-carbonate veins with minor pyrite, galena and sphalerite (western limb) or silicified and sericitic in shear zones (eastern limb). It is 200 metres thick. The Pinnacles Rhyolite has been correlated with the Rosebery / Hercules ore-bearing horizon where it hosts mineralisation at its upper contact with the Southwell Subgroup (WVSS).

At Burns Peak Pinnacles 1 km south of EL17/2015, the Pinnacles Rhyolite overlies the altered, ore-bearing Brown's Tunnel sequence.

Overlying the Pinnacles Rhyolite is an interval of interbedded medium to coarse grained quartz-feldspar crystal volcanoclastic and arkosic sandstone with rhyolite fragments, with dark grey laminated micaceous siltstones and graded pumiceous tuff beds that has been correlated with the uppermost unit of the **Que River Shales**. In the far south of EL17/2015 near Burns Peak, the Que River Shales appear to be less than 100 metres thick. If present in the west, at Silver Falls, they are only 5 metres and 31 metres thick respectively in DDH HRD1 and SFD1. In other parts of the Licence area the Shales are not identified and the Pinnacles Rhyolite is directly overlain by the Southwell Group.

The Que River Shales are commonly associated with **rhyolitic quartz feldspar porphyries** (QFP) in EL17/2015, Burns Peak and Hellyer / Que River that are again probably later, sub-seafloor intrusions into partially-consolidated wet sediments. A porphyry outcrop between the Pinnacles Rhyolite and overlying Southwell rocks occurs on both limbs of the Silver Falls syncline and the Pinnacles anticline. Thickness of the sills mostly ranges from 1m - 100m, however, one QFP is mapped as dominating the north-eastern quarter of EL17/2015.

Elsewhere in the MRV, similar porphyries have been dated as approximately coeval with Tyndall Group deposition.

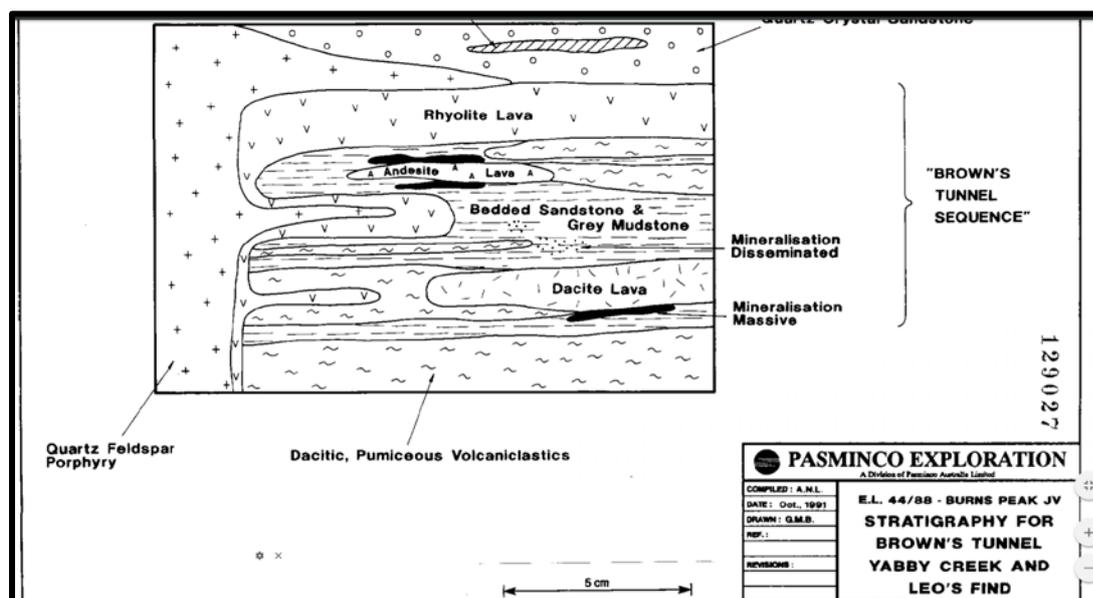


Figure 2.3 Nearby stratigraphic section (Browns Tunnel) modelling non-persistent nature of volcanic bodies (Pasminco Exploration).

Overlying the Pinnacles Rhyolite / Que River Shales, the **Southwell Subgroup**, a volcano-sedimentary sequence, derived from a felsic volcanic source, is a correlate of the Western Volcanics Sedimentary Sequence (WVSS) and White Spur Formation. As with all other occurrences, the WVSS internal stratigraphy and structure are shrouded due to obscure sedimentary characters, bedding repetition, faulting, weathering and poor exposure. The Group's thickness in the area is in the order of 500 - 750 metres. The Southwell Group and Lower Tyndall Group form the core of a syncline (Silver Falls Syncline) in the north and centre of the tenement. Mineralisation at Burns Peak immediately south of the licence is associated with these rocks (Southern Trenches, North Pinnacles). Exposures occur mainly on the eastern limb of the Silver Falls syncline and the headwaters of John Lynch Creek, in the centre of EL17/2015. The sequence comprises grey / black / khaki siltstone (outcrops on the Silver Falls track from Boco Road) with felsic mass debris flows that are frequently graded from a coarse crystal lithic base to a vitric siltstone top. The mass flows occur within siltstones as units up to 75m thick. A debris flow unit on the Sawmill Creek track contains carbonate-silica-pyrite altered felsic clasts and ragged massive pyrite fragments, and DDH BOC1 encountered minor Zn / Pb / Fe sulphide blebs and veinlets associated with quartz veining towards the top of the sequence.

As elsewhere in the MRVs, the Southwell Group and correlates are host to rhyolitic and dacitic QFP sills of possible Tyndall age.

Transition of the Southwell to the **Tyndall Group** correlates is marked by a 50-metre thick strongly magnetic correlate to the "Lynchford Tuff" (distinctive detrital magnetite) on the eastern limb of the NNE-trending Silver Falls Syncline (McNeill & Richardson, 1997). Tyndall lithology in the Boco area is crystal-rich rhyolitic and andesitic sandstone and breccia with interbedded siltstone, mudstone and minor volcanoclastic conglomerate (Pemberton et al, 1995; Collins et al, 1981). The sandstones are coarse grained, composed of lithic (detrital) and crystal (generally pyroclastic) components. The sequence represents the first appearance of mafic volcanic detritus and magnetite in the MRV that becomes common to all lithologies above this stratigraphic level, indicating a new cycle of volcanism and sedimentation after deposition of the Southwell Group (Berry et al, 1997) following intrusion and eruption of hornblende andesites in the MRV, and coeval with significant hydrothermal

activity (e.g. Mt Lyell, Henty ore bodies) and intrusion of quartz-feldspar porphyries into underlying sediment packages. Crawford and Berry(1992) interpret the provenance as being Que/Hellyer Footwall type andesites, however the abundance of magnetite doesn't support this (Poltock, 1994).

The Tyndall Group rocks are typically exposed on the Silver Falls track and in the Que River 1 km north of EL17/2015 (Poltock in Sheppard, 1987). Contacts with the units above and below have not been observed but the bedding attitude is conformable. The magnetic trends conform with fold trends in the enclosing sediments.

Time equivalents of the Late Cambrian / Early Ordovician **Owen Conglomerate** occupy the core of the Silver Falls Syncline at John Lynch Creek in the central neck and in the central northern part of the EL and in a fault-bound northerly-trending 1 km wide strip in the west. The dominant rock type is a well bedded quartzose muscovite sandstone with grey siltstone partings and occasional quartz cobble conglomerate horizons. These beds also include dolomitic siltstones (Poltock, 1994).

A large Pleistocene body of **glacial valley fill** overlies much of the eastern part of the licence and is up to 100 m thick. It has inhibited exploration, as electrical geophysical techniques are attenuated to varying degrees through the clay-rich sequence. Magnetics and gravity should remain unaffected (Leaman 1991). Two layers within the fill itself have, however, been identified on resistivity - an upper resistive layer 8 - 20 metres thick interpreted as terminal moraine till, then a less resistive layer to a depth of 70 - 100 metres interpreted as compacted fluvio-glacial gravels, sands and silts (Hanson, 1977).

Structure

Apart from the geophysical data analysis of Leaman 1991, the existing literature offers little structural analysis at the tenement level. By interpreting such data that is available from bore log records, mapping of prospects, and regional mapping and geophysics AMR has developed a draft geological model with a structure consistent with Leaman's interpretation (see figures 2.8 to 2.13).

Tectonic background model

The geological setting in EL17/2015 is dominated by north-easterly trending steep bedding (but northerly trending in the west of the area), in two north-northeasterly broad synclines and an anticline, all probably now fault-bound. Genesis of these features was initiated by the tectonic setting during early to mid-Cambrian deposition in an extensional trough rimmed to the East by several volcanic centres. The proposed local palaeo-environment for the MRV deposition is one of lateral coeval facies progression from proximal lavas and pyroclastics (pumice, vitric ash flow and crystal tuffs and autoclastic breccias of the CVC) through volcanoclastic submarine flows into shallow marine muds (CVC volcano-sedimentary sequence) to epiclastic volcano-sedimentary turbidites in deeper water (Southwell / WVSS) - into a relatively narrow trough-shaped back-arc basin floored by extensionally-faulted lithified pre-Cambrian basement slabs. The Henty fault and associated structures are thought to have been active at this time (Corbett et al, 2014).

As time progressed and eruptive activity quietened, younger sedimentary packages were overlaid on this volcanoclastic assemblage – proposed as the Transition sequence of Black Harry Beds, Animal Creek Greywackes and Que Shales. During deposition, these ductile sediments and basement were exposed to extensional stresses, resulting in short wavelength folds and extensional collapse of the Precambrian basement slabs, causing slumped gentle folds in the ductile Cambrian sediments.

The later volcanic episode during mid-Cambrian Tyndall (Furongian) time exposed the incompletely consolidated sediments to uplift and erosion, after which the Tyndall volcano-

sedimentary sequence was unconformably deposited on them. Tyndall volcanism also resulted in the injection/eruption of shallow rhyolite and dacite sills into the sedimentary stack.

The last phase of the Tyennan orogeny (Late-Cambrian) resulted in uplift of the Tyennan block - accentuating the north east trend of the trough rim east of what is now the Boco area. Related compression and fault reversals in the Precambrian basement exposed the Cambrian sediments and the more competent intrusive bodies to hydrothermal alteration, further slumping and moderate compressional folding along north east axes (compared to northerly fold axes in the entire MRVs south of Burns Peak).

Two to three stages of the Devonian Tabberabberan Orogeny further compressed the Cambrian folds, from at least the ENE, to near-vertical dips and caused thrust faulting along the fold limbs, complicated by later (D2) NE and NW shearing.

Lineations

Evidence for the model is drawn from geological mapping (TheList MRT), sub-surface lithologies and boundaries (32 boreholes in 5 locations), near-surface lithological discontinuities (and K-rich lithologies) from radiometric images, dip declination and direction of some bedding, and veins and cleavage from mapping. Horizontal lineations have been interpreted from:

Orientation ->	WNW	NW	NNW	N	NNE	NE	ENE	EW
Magnetics		X	X	X		X		
Total Mag Intensity		X	X	X	X	X		X
Geology Mapping	X		X	X	X	X		X
Radiometric	X	X	X	X	X	X		X
Topographic		?	X	X	X	X	X	X
Aerial photography		X	X	X	X	X	X	X

Bold indicates obvious trends; grey font indicates probable trends.

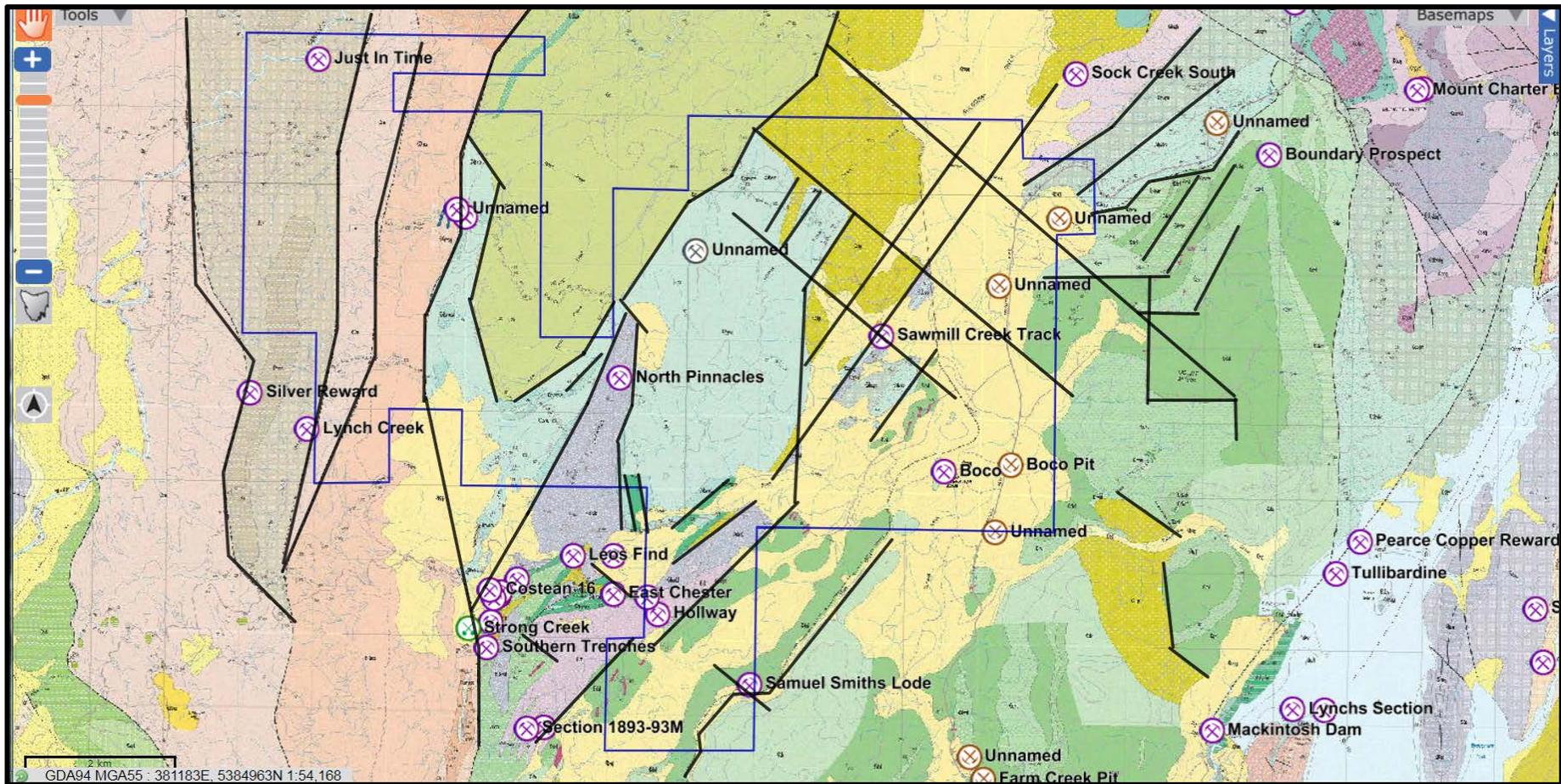


Figure 2.4 Geological (mapped and interpreted) trends over geology (base map: TheLIST, MRT)

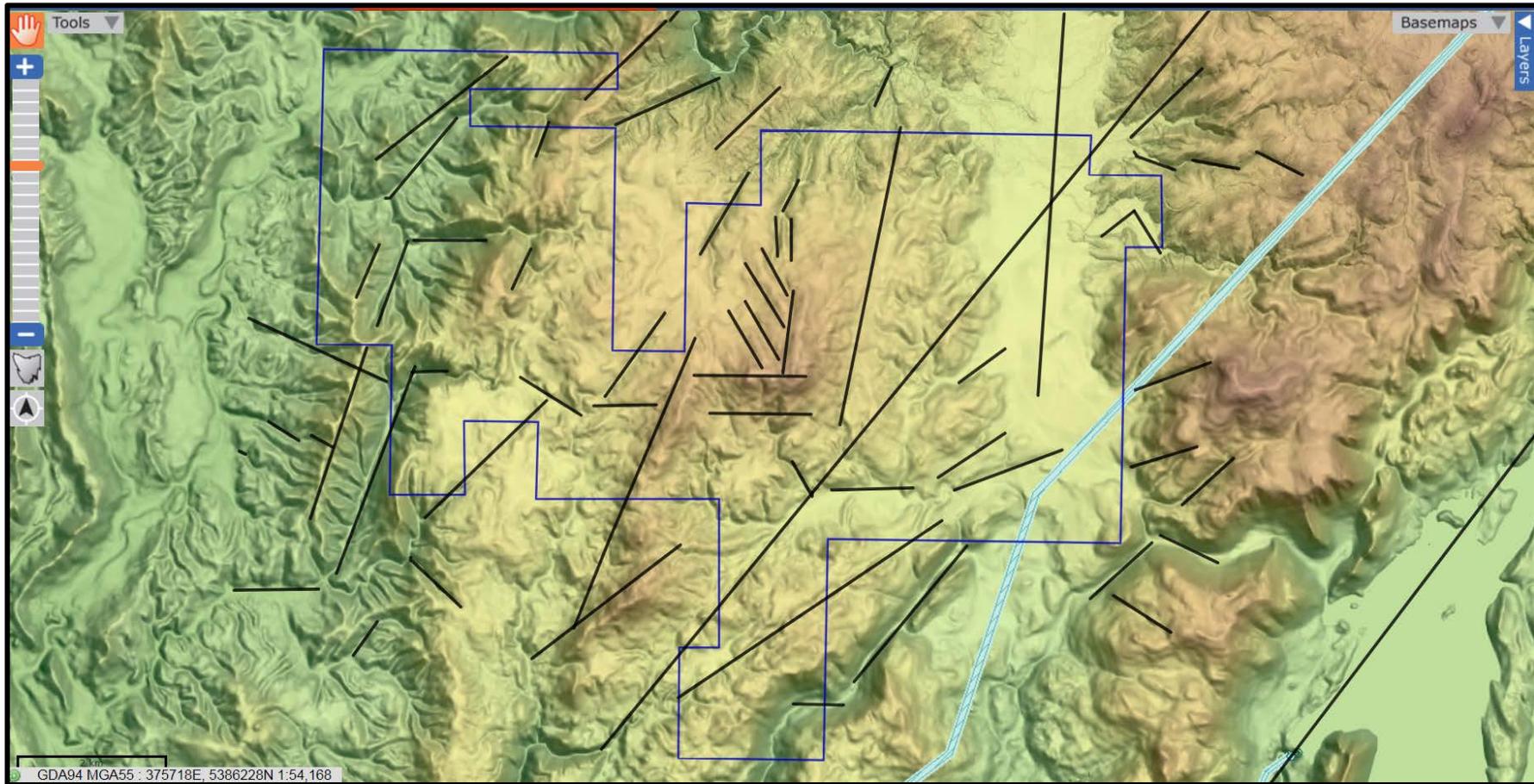


Figure 2.5 Topographical trends over hillshade topography (base map: TheLIST, MRT)

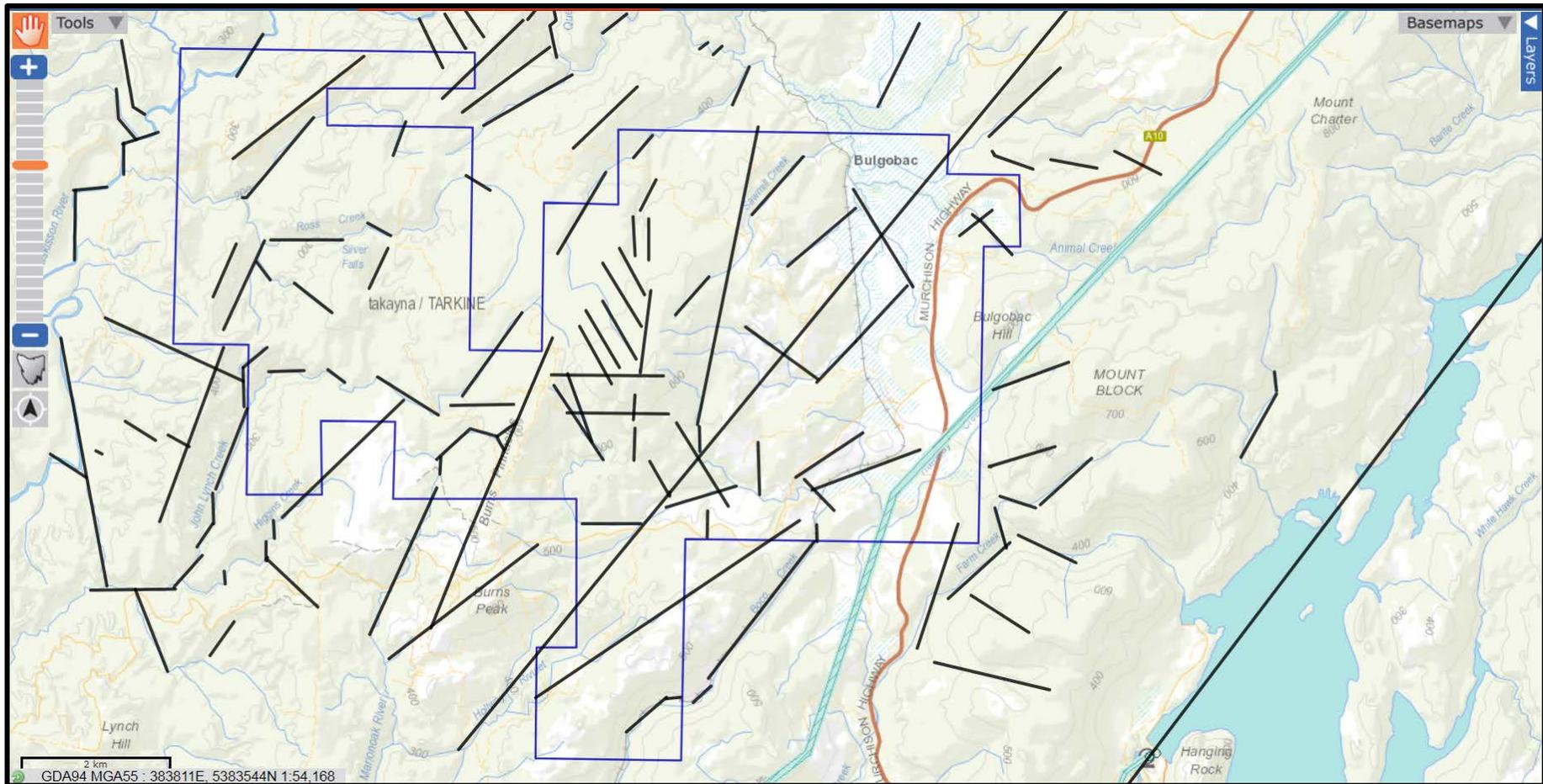


Figure 2.6 Topographical trends over topography base map (TheLIST, MRT)

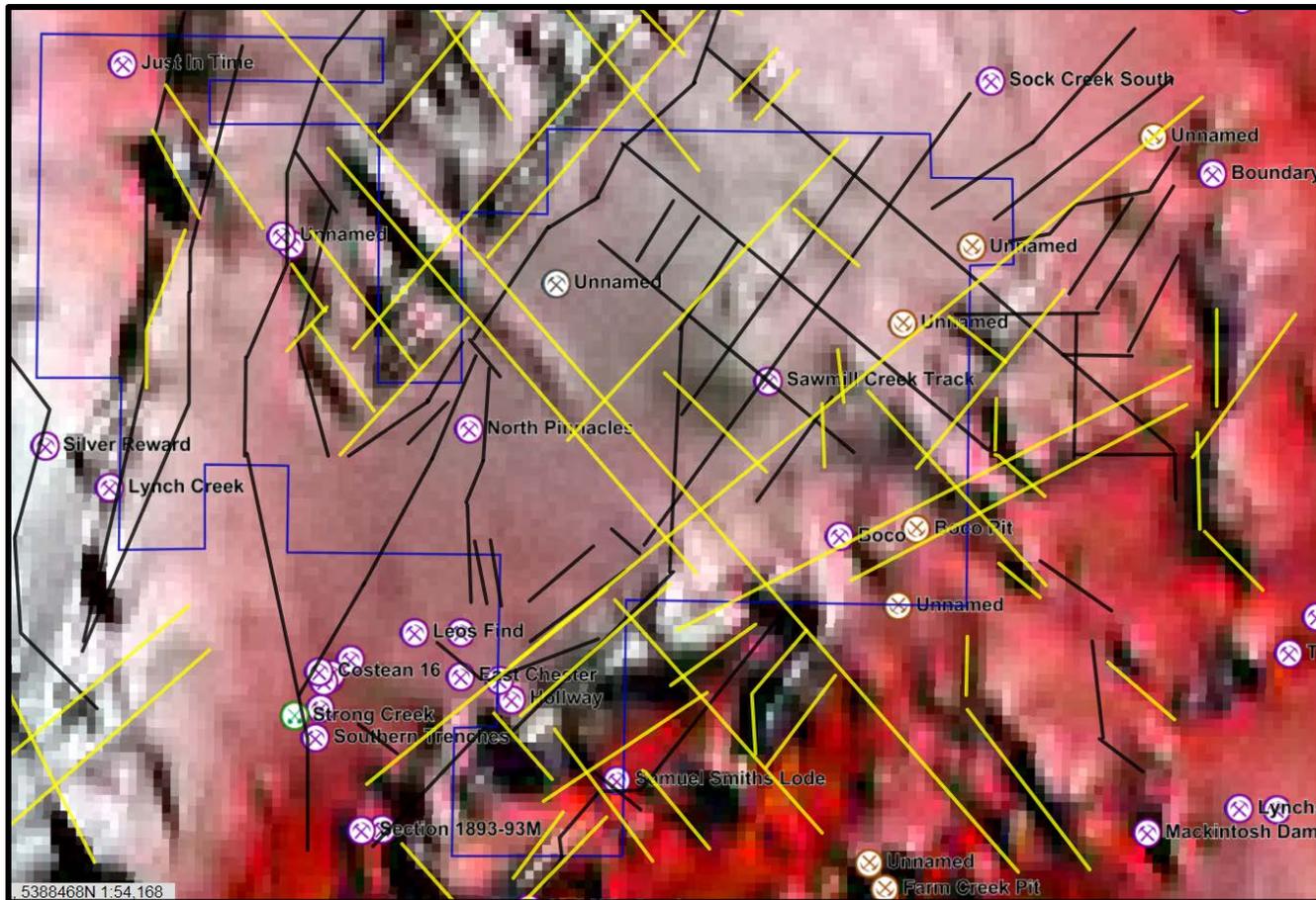


Figure 2.7 Aerial magnetic (yellow) and geological (black) trends (base map: TheLIST, MRT)

The aerial magnetic map interpreted by Leaman, (1992) in Figure 24 and MRT mapping show that 90 % of EL17/2015 is magnetically, gravitationally, and resistively quiet. This lack of comparative anomalies suggests that faults of economic significance are not present, other than those two NNE boundaries separating the quiet zone from the eastern and western anomalous zones, and the Boco alteration zone.

The **Boco Alteration Zone** shows areas of inferred pervasive alteration can be projected along a NNE-trending structure, along the valley used by the Emu Bay Railway. Leaman interpreted the trend to overlie a parallel older basin margin structure. At Boco Siding it crosses a presumably Devonian ENE feature that raises the possibility of remobilisation and reconcentration of mineralisation in the altered Cambrian rocks. This sequence of events inferred from the geophysical and structural patterns could imply that the known alteration and sulphides (predominantly pyrite) are associated with Devonian activity and fluids, and disruption of the CVC by faulting.

This concept would restrict prospectivity since the base metal ores sought are volcanogenic, and any mineralisation in volcanics because of the above process would not be primary. Similarly, local NW-SE dextral shearing (late Devonian) is impressed on older structures and are likely to postdate ore deposition. Where these structures intersect with pre-existing mineral concentrations, the effect would have been to dislocate any ore bodies, rather than to concentrate them.

Leaman postulated a Cambrian structure 'near 386500 mN', suggesting that any Cambrian mineralisation would lie near this axis, which is 500 metres outside EL17/2015 and that near 384 000 mE, 5386-5387 000 mN (in the Boco Alteration Zone) three volcanic compositional patterns merge. A borehole drilled some 100 metres away from this lineation (CSR BBP DDH 279) encountered 'distinctly' uneconomic alteration (see next Section).

The other area of interest related to intersecting structures is the possible intersection of the projected alteration zone and the CVC / Transition contact, which is possibly faulted. In 1992, Pasminco/Billiton drilled DDH AK1 to within 200 metres of this location to test the extension of the Boco Alteration Zone, finding only weak to moderate sericite-pyrite-silica alteration with no base metal mineralisation (Kirsner, 1992b).

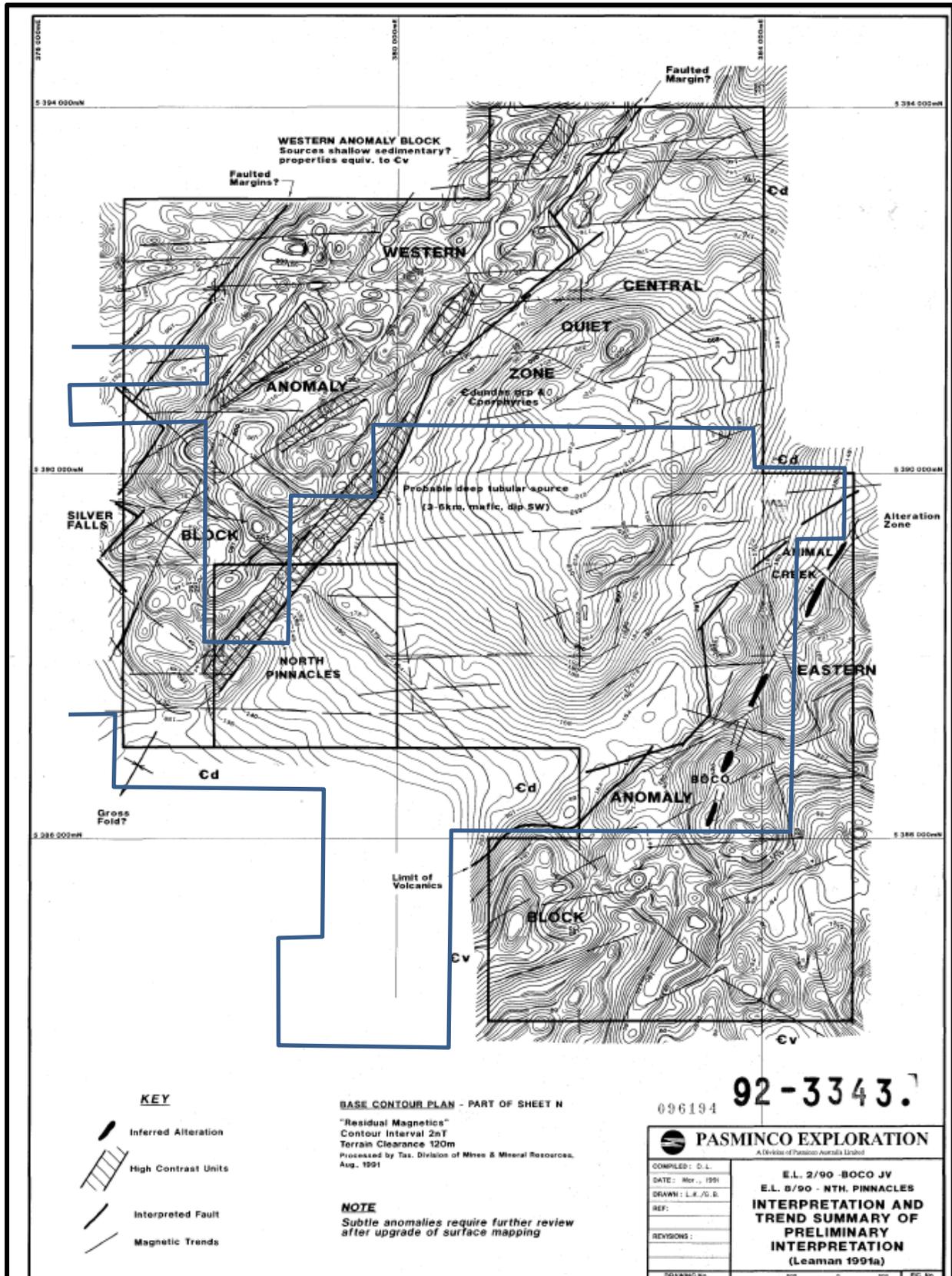


Figure 2.8

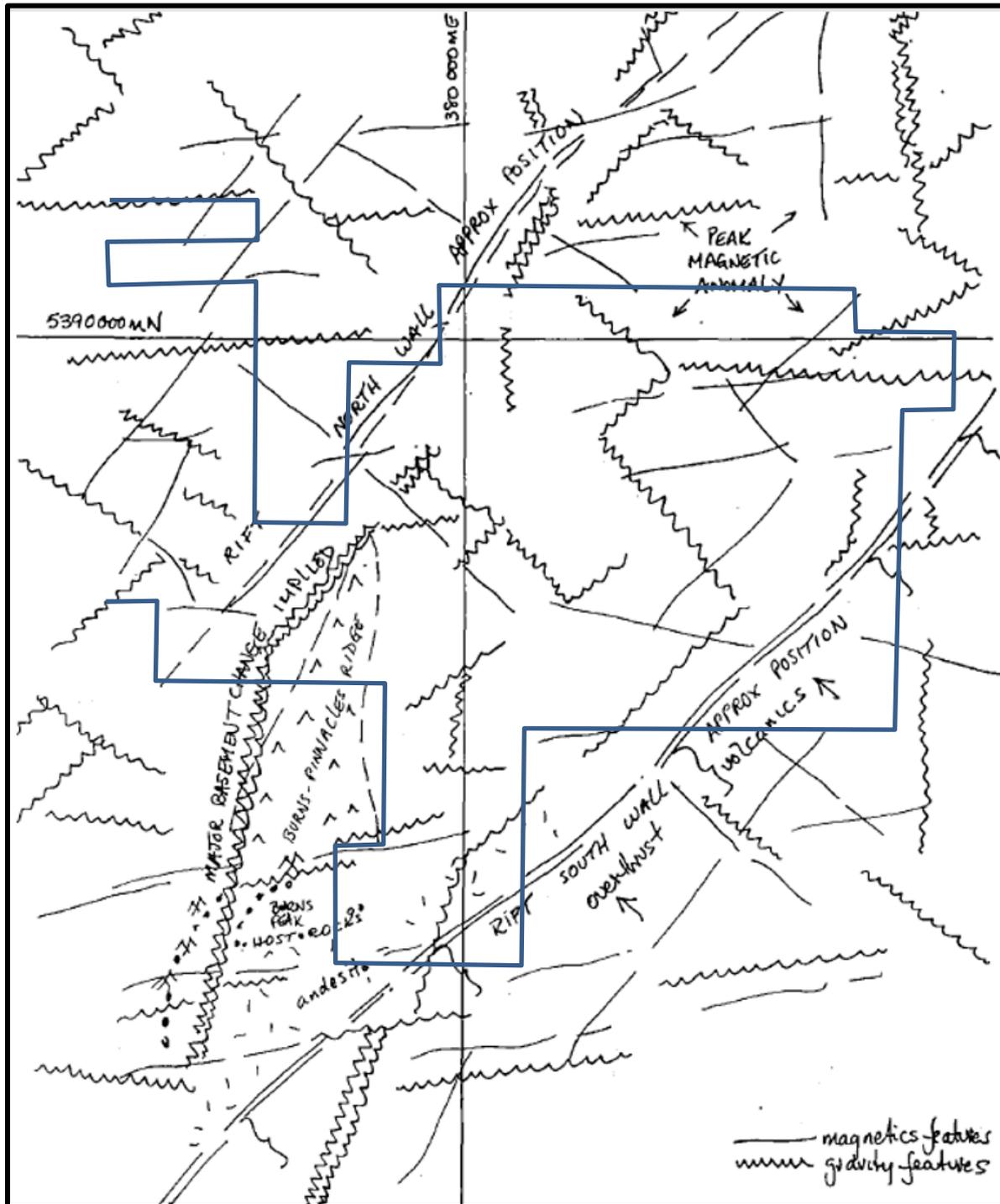


Figure 2.9

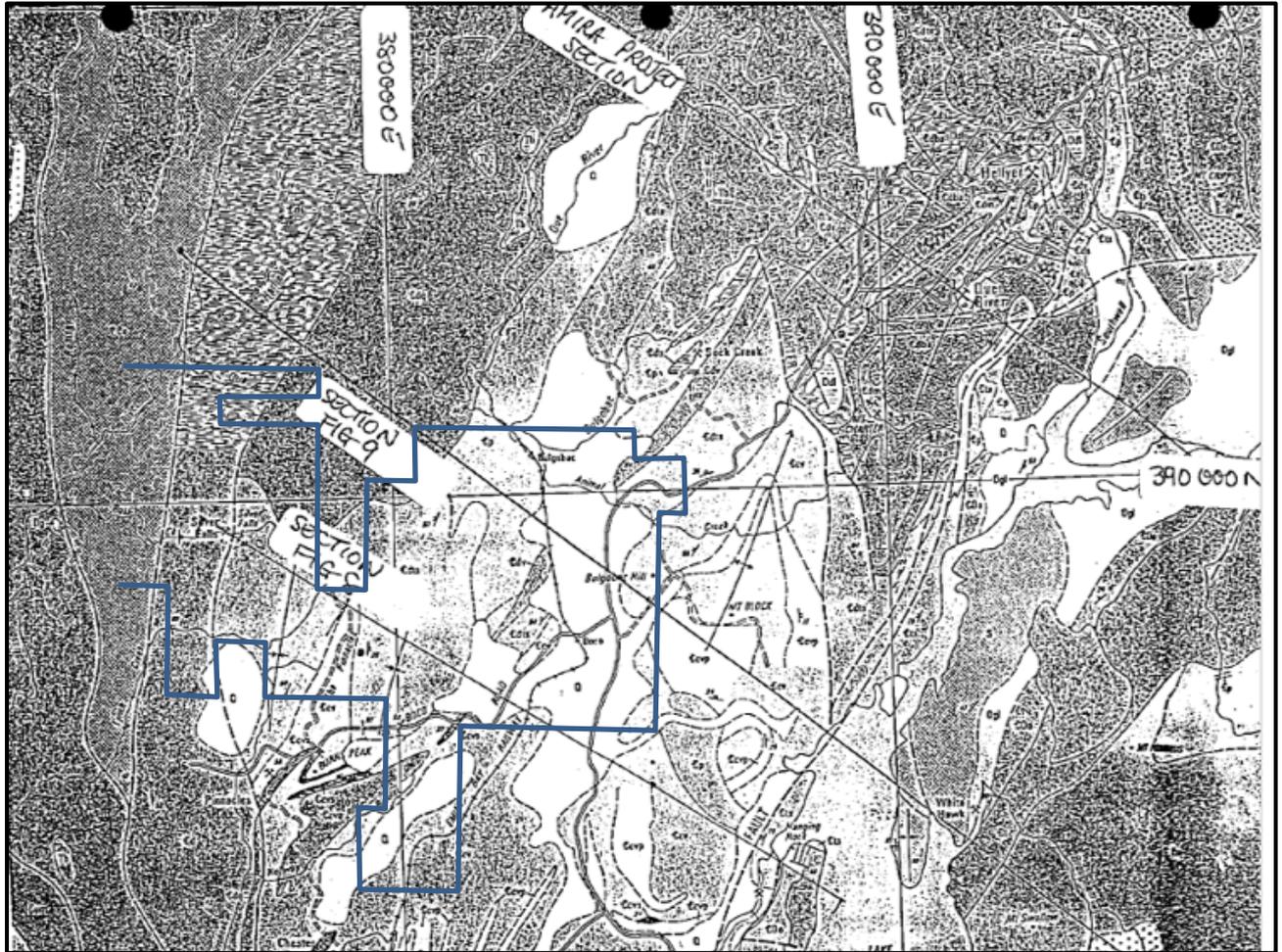


Figure 2.10 Cross section location plan (Leaman <->)

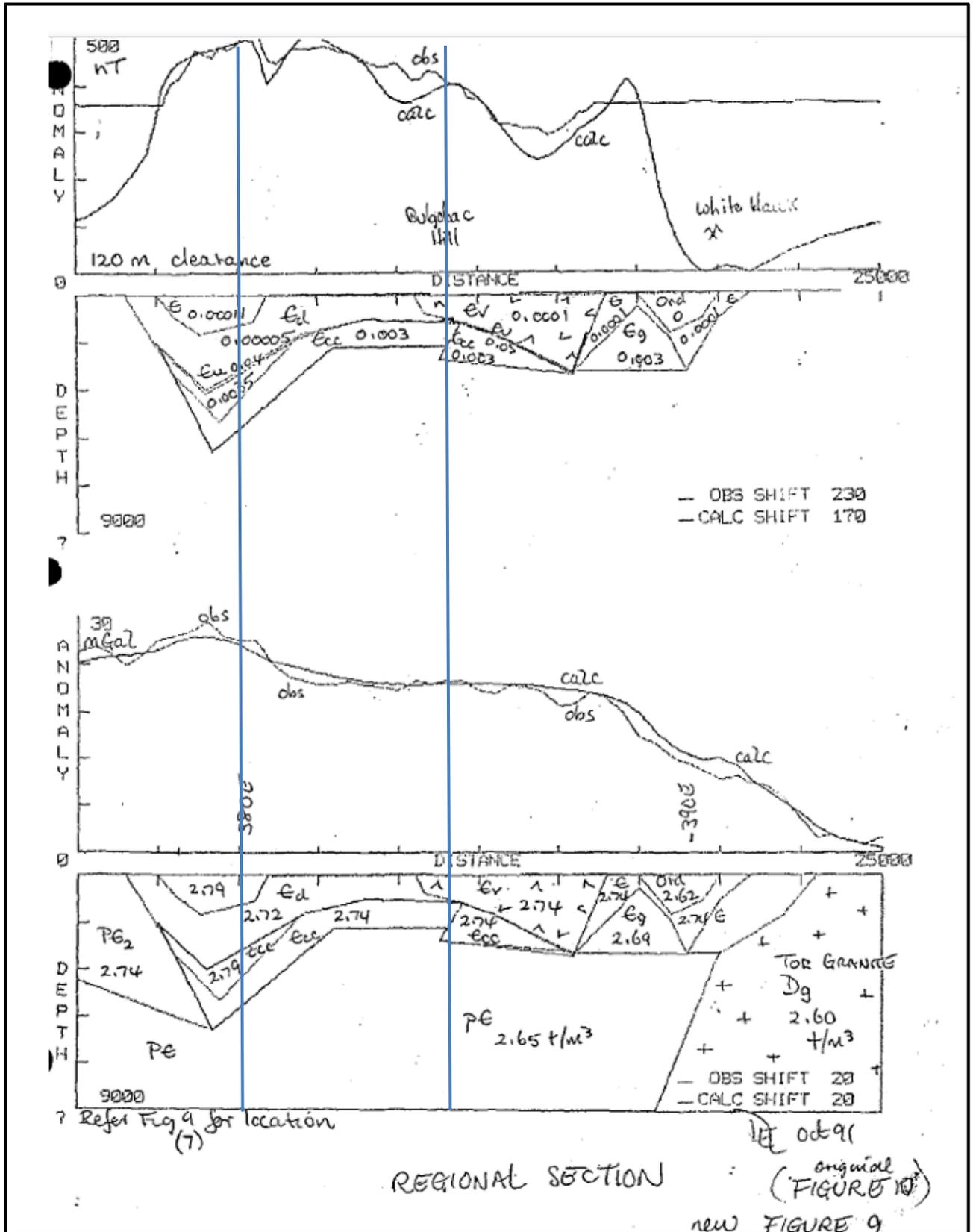
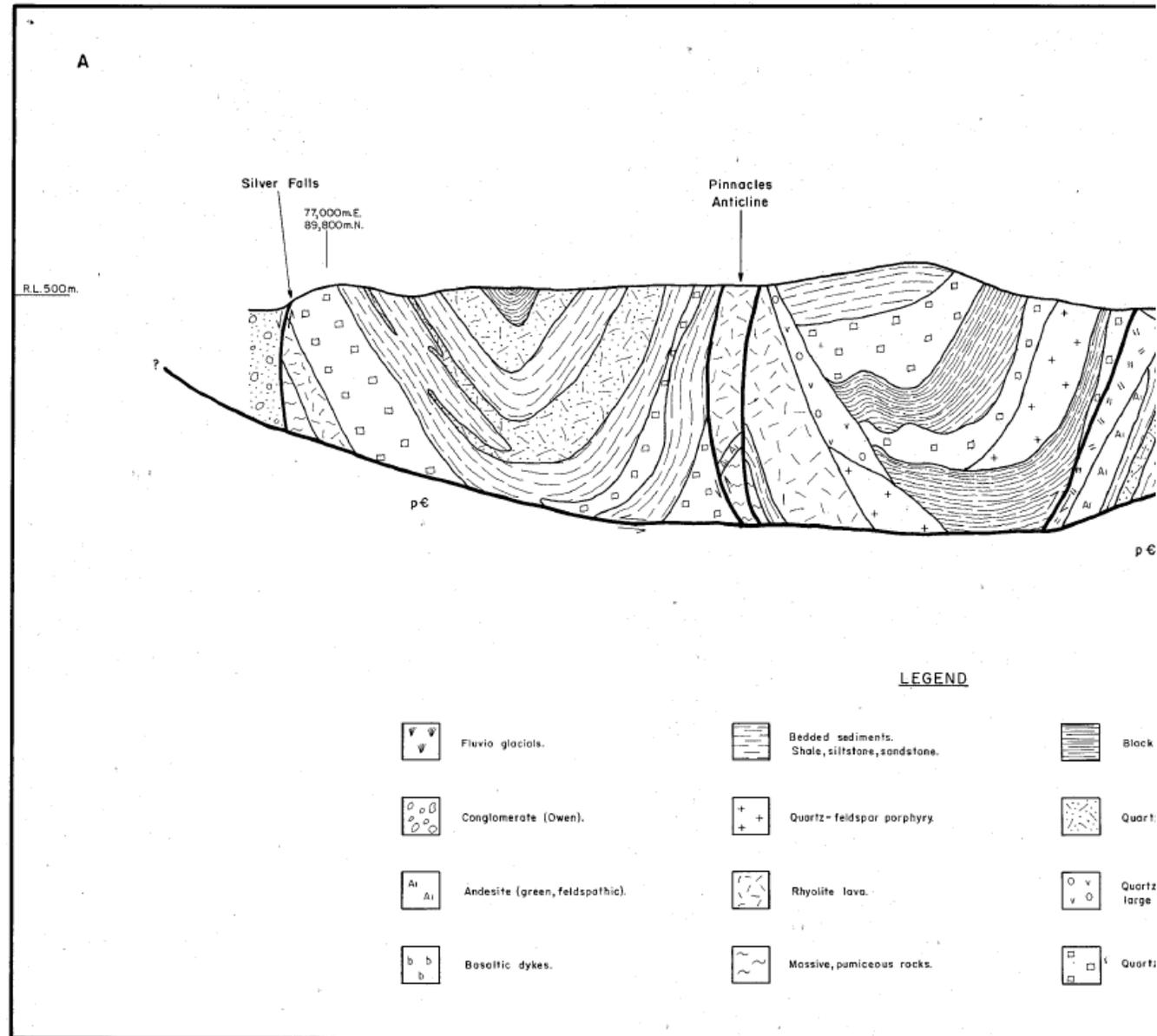
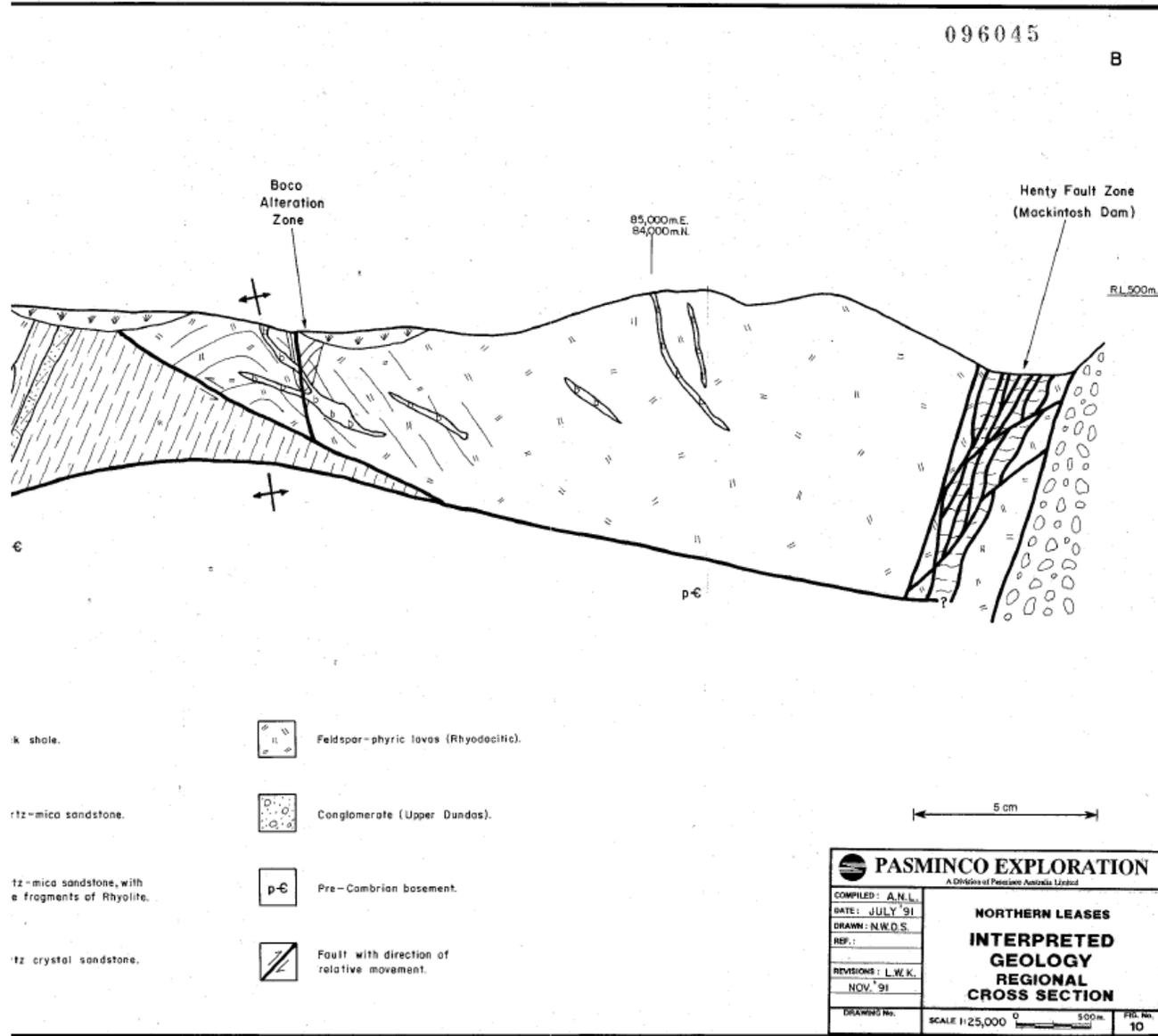


Figure 2.12







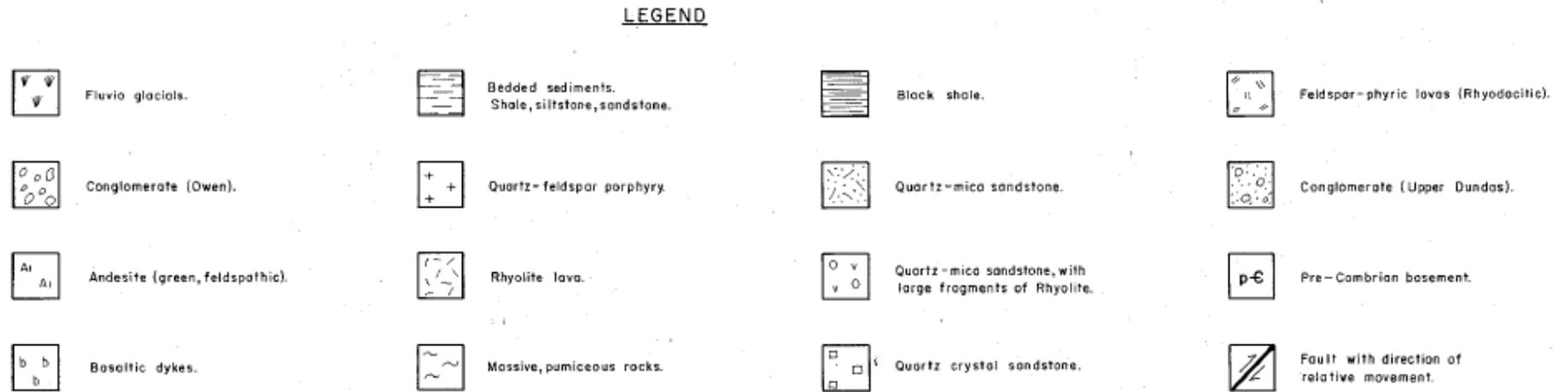


Figure 2.13 (combined) Regional cross section (Lorrigan, 1991)

Mineralisation

Economically significant VHMS mineralisation regionally remains bound to alteration zones within 2 km either side of the axial CVC spine of the MRVs. The crustal conduit for mineralising hydrothermal fluids would appear to be the Great Lyell Fault, which parallels the Tyennan terrane boundary at about 7 km to the west. This model should place EL17/2015 in a prospective position, however, so far there is no evidence of economically significant mineralisation in the Boco Creek licence area.

The north-easterly trending pyroclastic CVC rocks at Boco have been considered prospective throughout the area's exploration history, because they represent the same period of active acid volcanism and associated sedimentation that gave rise to the primary concentrations of mineralisation at the five major mine sites along the 200 km MRV strip. Batt's interpretation (in Hanson, 1977) of the region shows four possible eruptive centres, one of which is inferred near Boco Creek (and another south of the Chester-Pinnacles track).

The tenement area has also been subjected to the same tectonic history since the middle Cambrian as the rest of the MRVs, so again economic mineralisation or remobilisation could be expected.

The likelihood of a prospective large volcanic metallic sulphide deposit at greater depth in the MRVs is lessened given the interpretation of gravity data (Leaman, 1992) that suggests that the MRVs 'form shallow cover on the Precambrian basement with as little as 300m thickness in the vicinity of Boco Siding'.

Sulphides

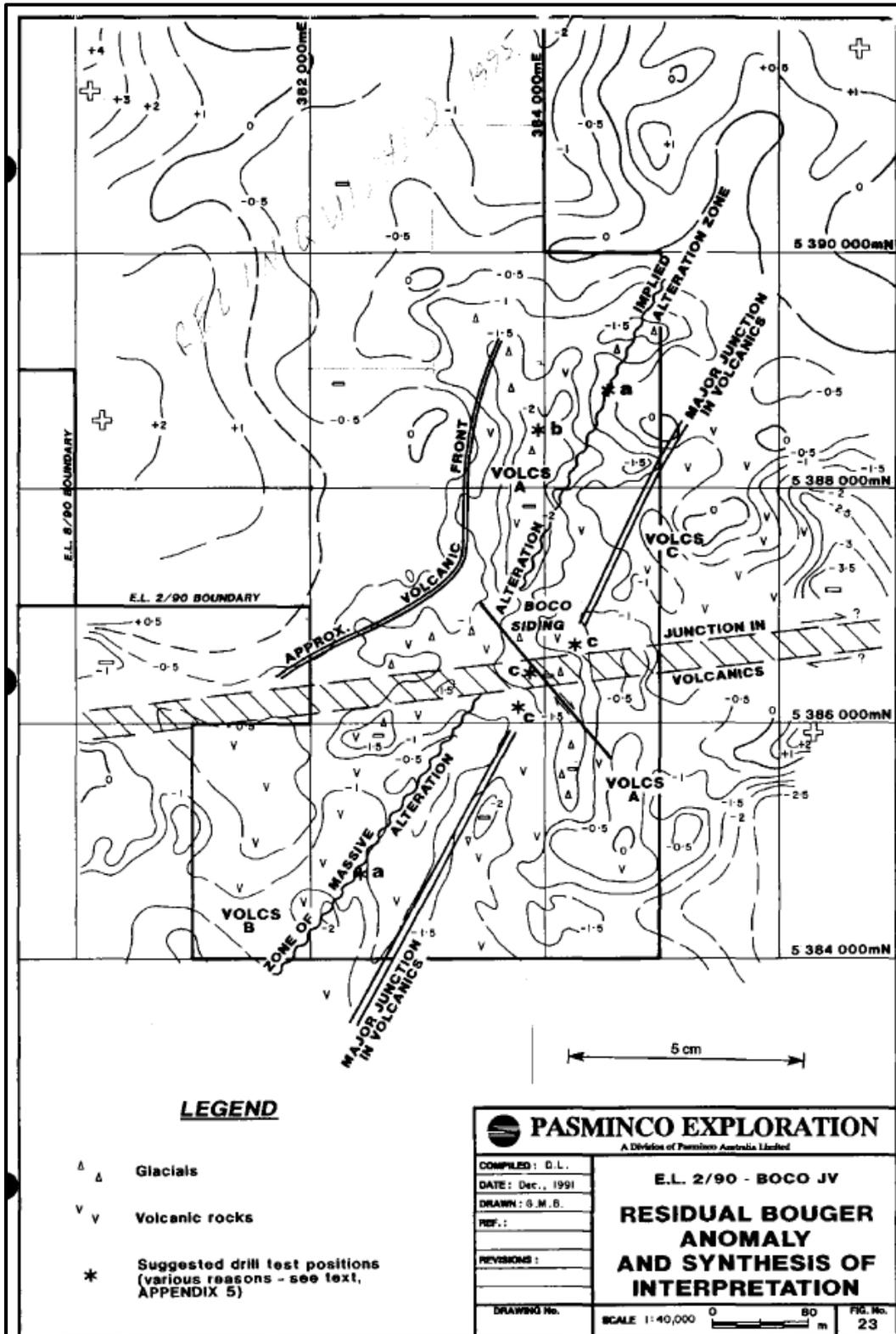
Boco Alteration Zone

Of greatest exploration interest has been the zone of strong alteration (mostly silicification, with sericite, pyrite and chlorite development) that appears to track a boundary between the volcano-sedimentary CVC unit and the volcanic CVC unit (see Figure 2.2). The zone straddles the railway at Boco Siding and probably extends north east towards Sock Creek prospect beyond the tenement boundary. Alternatively, the zone itself might depart from the mapped CVC contact boundary, heading more NNE. On the surface the alteration zone is discontinuous and masked by glacial sediments up to 100 metres deep. On the aerial magnetic map (Figure 2.7) the Boco Alteration Zone can be projected along a NNE-trending structure, along the valley used by the Emu Bay Railway. Leaman (1991, 1992) interpreted the trend to overlie an older basin margin structure and at Boco Siding it crosses a (presumably Devonian) ENE feature that raises the possibility of remobilisation and reconcentration of Cambrian mineralisation.

From 1975 to 1985 the Boco silica-sericite-pyrite alteration zone was drilled and sampled by then Pasminco / EZ Company Rosebery and various JV partners in 6223 metres over 25 drill holes (12 x average 60m; 13 x average 425m) establishing existence of weak alteration and weak base metal mineralisation, so no result of economic significance. Geophysical anomalies in and around the alteration zone were investigated by geochemical soil surveys: Downhole SIROTEM – no anomalies; UTEM – 3 subtle anomalies, no significant mineralisation in follow-up drilling; UTEM – no significant anomalies; RMIP – 5 anomalies with gravity - no results warranting further follow-up; Single loop ground EM – soil sampling revealed no significant geochemical anomalies.

Three of the deeper drill holes (BBP 207, 208 and 209) tested 'sub-glacials' IP anomalies, intersecting:

- i. disseminated pyrite and trace base metals; and
- ii. gossanous Mn and Fe oxides, in the acid volcanics, corresponding to the geophysical anomalies.



The mineralisation intersected in the alteration zone consisted of minor base metal values associated with the alteration, and also occurring associated with 'later' silicification in quartz (and carbonate?) veins.

Geological analysis and local isotopic studies established that the Boco alteration zone was not developed in an exhalative environment. Isotopic studies of sulphur in pyrite (and

oxygen in fluid inclusions?) in the same CVC rocks, similarly altered, at nearby Chester (5 km south along strike) suggest that the alteration 'source' is significantly unlike that for Cambrian VHMS ore concentration at Rosebery, Hercules, Que River and Hellyer (CSR, Williams, 1985). The sulphur values in the pyrite, and thus by association the quartz-sericite alteration, are interpreted to be magmatic in origin, as opposed to a Cambrian sea water source for the sulphur at the VHMS sites. Oxygen isotope values at Chester range from 7.9 to 10.4 per mil., indicating a possible fluid temperature range of 199°-240°C. One explanation is that the temperatures of alteration fluids were too low to allow inorganic reduction of sea water sulphate (~230°C). This temperature is also too low for the fluid to carry any significant base metals. Another explanation is that the hydrothermal system was dominated by contemporary meteoric waters. AMR notes that the VHMS model is not the only model for base metal mineralisation in the Mt Read Volcanics (e.g. Burns Peak), but it is the only model associated with primary ore deposition leading to major mines.

Hollway Andesite

The Hollway Andesite is present at southern margin of EL17/2015 where pyrite occurs in altered sericite-silica-carbonate andesite, but only the northern kilometre of the andesite is located inside the tenement. Due to its mineralised nature at Rosebery, a significant amount of exploration has gone into the upper stratigraphic position of the Andesite. Drilling was initiated on a linear 700m long partial leach soil geochemical anomaly (Cu, Pb, Bi, As +/- Zn). Between 1976 and 1998, the BPD series of holes drilled by Electrolytic Zinc (EZ) Co intersected only weak Pb-Zn mineralisation. Ground based Spontaneous Potential and Electromagnetic surveys, airborne DIGHEM (1983); UTEM (1987), Gravity (1990) and VTEM (2013) did not identify significant targets.

Drilling below the andesite in BOC DDH5 and BOC DDH3 intersected narrow weak alteration containing veins of massive Pb-Zn sulphides in the CVC volcanoclastics, but of limited extent, not at the Hollway target horizon, and not as exhalative sulphides (Skirka and McNeill, 2006). The most prospective intersection, BOC3 which returned 4.1m @ 11.3% Zn, 4.5% Pb at 465 m associated with massive sulphide veining within altered felsic volcanics, is on the boundary adjacent to the Chester/Burns Peak tenement.

In 2006, BOC4 and BOC7 intersected minor base metal mineralisation within the lower parts of the Hollway Andesite and upper part of the CVC.

North Pinnacles

The North Pinnacles area is an extension of the geology at Burns Peak Pinnacles, to the south of EL17/2015. The geological setting of North Pinnacles consists of feldspar-phyric rhyolitic lavas (Burns Peak Rhyolite) as the core of a NNE-plunging anticline flanked by a graded sequence of sandstone, greywacke, siltstone and shale on either limb to the west and east (Hermann, 1987).

In EL17/2015 there is evidence for a small hydrothermal alteration system associated with low grade Zn, Pb mineralisation and geochemically anomalous gold, both possibly restricted to one particular brecciated rhyolitic lava unit within the Pinnacles Rhyolite (NPD DDH 4). Hydrothermal brecciation and fracturing associated with a long history of hydrothermal fluid flow manifests as quartz carbonate veins, breccias and stringers, and is occasionally disseminated in association with silica-sericite-carbonate alteration with minor pyrite (Hermann). Zones within NPD DDH 5 core show minor to moderate sericitization, and quartz and carbonate filled fractures occur irregularly throughout.

A large loop size 1987 EM survey (Wilson, N. R. 1987) did not detect any conductors that might represent a massive sulphide orebody at North Pinnacles.

This horizon is the upper section of Lorrigan's (1992) "Transition sequence" and thus correlated with the Rosebery / Hercules horizon. The greatest potential for economic mineralisation is considered to exist where the Pinnacles Rhyolite / White Spur equivalent

horizon is intersected by tectonic structures similar to those associated with mineralisation at Burns Peak. Randell (1990b) On the Silver Falls track near the North Pinnacles axis, limonite manganese pyrite joints/veins are exposed in a structurally complex zone on the contact between the rhyolite and White Spur Formation. Rock chips from the track location assay 0.27% Pb, 15g/t Ag and 0.1g/l Au. Lorrigan (1992) believes that considering the location of known mineral prospects west of Boco Creek, the Transition Rocks are the most prospective and the most likely to exhibit hydrothermal alteration. The change in volcanic composition that they represent has been observed worldwide to accompany base metal mineralisation (eg. Hellyer, Kuroko, Noranda). Ore bodies in the Mt Read Volcanics are also most likely to occur alongside major structures (eg. Hercules-Rosebery-Chester-Pinnacles Line).

At Burns Peak, predominantly lead/zinc and occasionally gold and silver mineralisation is found strata-bound towards the top of the Pinnacles Rhyolite (or the basal section of the overlying White Spur / WVSS Formation) within a hydrothermal alteration system. Intense siliceous and pyrite alteration surrounds massive sulphide lenses, while chlorite, carbonate and sericite alteration (+/- pyrite) is found throughout the host units. Alteration of the Pinnacles Rhyolite includes silicification and irregular, disseminated pyrite veining associated with minor sphalerite and galena. Alteration extends into the overlying White Spur Formation in the form of irregular, disseminated, moderately coarse pyrite. <Reference uncertain, associated with a report on EL8/90>.

Sawmill Creek

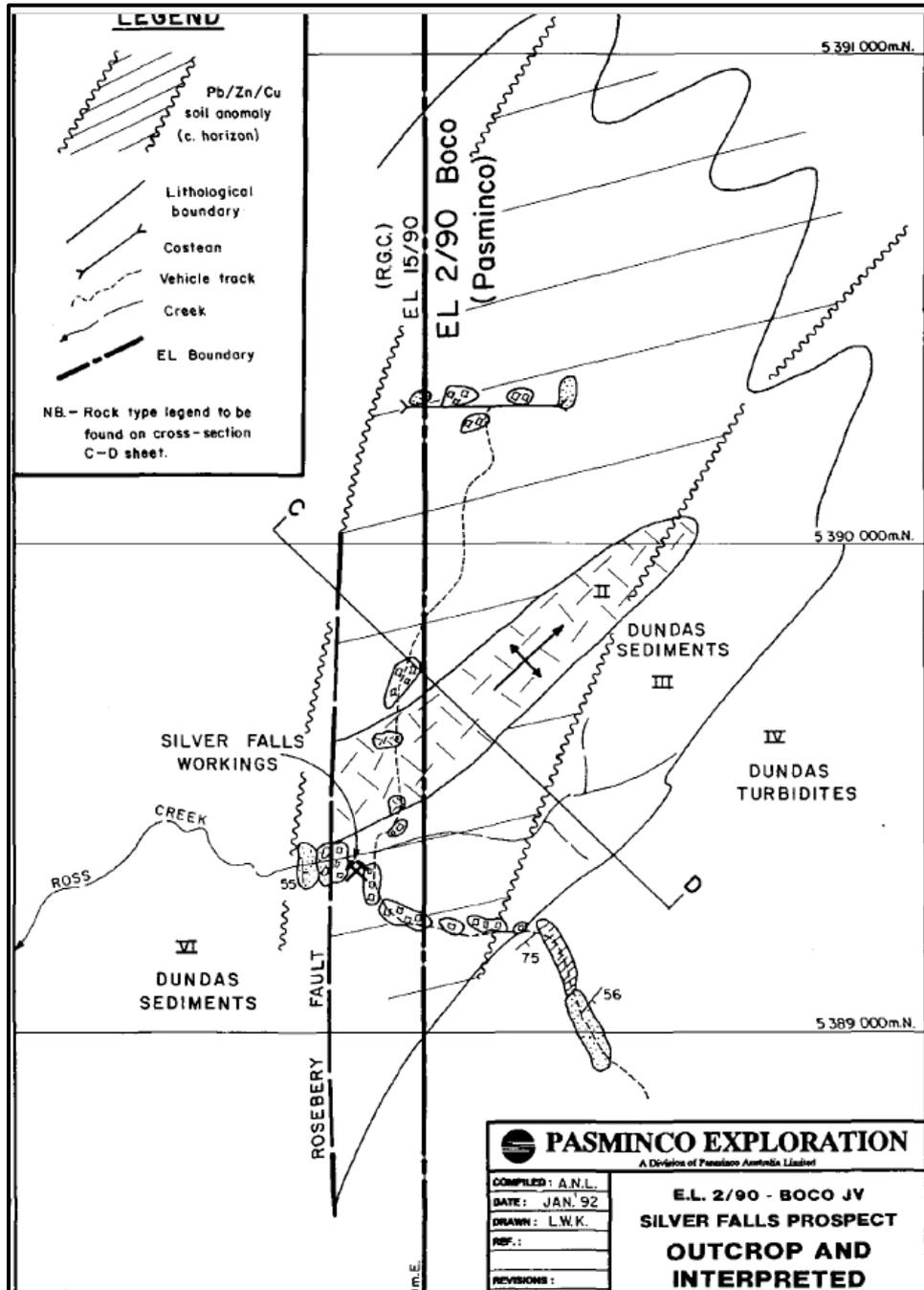
On the Sawmill Creek track, the interpreted base of the White Spur Formation crops as a coarse felsic mass flow with selective to pervasive silica-carbonate alteration and stringers and "clasts" of fine-grained pyrite. Rock chip samples were found to be not anomalous in ore or path finder elements (Randell (1990b)). The interpreted northern continuation of this horizon has been located by Poltock (in Sheppard, 1987) in the Bulgobac River where the lithological description is identical. Here the alteration is siliceous and sericitic and associated with strong cleavage development, but only locally slightly elevated in zinc.

Zinifex tested the Rosebery horizon at Sawmill Ck without significant result. After a 800+ sample soil geochemical program in 2004 and 2005, diamond drilling and DHEM surveys of BOC1 and BOC2 at Sawmill Creek anomaly intersected trace to minor base metal mineralisation associated with black shale and tuffaceous siltstones correlated with the lower Southwell Subgroup and trace to minor sphalerite associated with weakly altered quartz-lithic sandstones correlated with the Black Harry Beds (Skirka and McNeill, 2006).

Silver Falls

The Silver Falls site identified by MacIntosh Reid (p.97) occurs in the far west of EL17/2015. The lode is composed of galena and sphalerite and 'is exposed in the face of a waterfall 110 feet high', hosted in a highly resistant 'dolomite' in contact with a quartz-feldspar-porphry. "This dolomite-porphry contact belt is the host of all the important lodes of the district. It stands out prominently above the more easily corroded sedimentary rocks". The ore-body strikes about 10° east of north (Henty Fault trend?) and dips to the east beneath EL17/2015, at 65° to 75°. This reported occurrence reads like a vein/skarn deposit, however, from later descriptions the host rock is likely to be a sericite silica carbonate altered rhyolite. There is no subsequent report of dolomite.

Sampling to date at Silver Falls has not been representative and there is no estimation of grade or metal zonation. The Silver Falls mineralisation was tested by EZ in 1949 by drilling 4 small diameter (18mm) diamond drill holes from 22 - 50m deep into the outcrop. A negligible amount of the core was assayed.



Exploration by Aberfoyle and Shell Metals between 1975 and 1985 identified Zn-Pb-Cu anomalies in stream sediment and soil sampling in the western part of the Boco tenement area near Silver Falls. This mineralisation appeared related to minor quartz veins, and sphalerite and gossan in silicified black mudstones near major faults and fault-bound wedges of the Oonah Formation (Freytag, 1978; Smyth, 1982).

The Silver Falls area was tested by Pasminco/Zinifex between 2000 and 2005 for concealed (<150m) mineralisation with soil geochemistry. No significant results were obtained:

The waterfall, shallow pits and gouges at the old Silver Falls prospect presented as the best exposure and mineralisation located on the (Tyndall-cored Silver Falls) syncline. Mineralisation here is disseminated - veinlet style, hosted in rhyolite and quartz feldspar porphyry, with typical assays from rock chips being 65ppm Cu, 2.05% Pb, 0.09% Zn. Sainty (1984) reported values of 40ppm Cu, 3.35% Pb, 0.69% Zn from the EZ costean.

Variably sericite-silica-carbonate altered rhyolite and quartz feldspar crystal rocks are exposed for a 3km strike at Silver Falls (Poltock 1993). The best intercept in HRD DDH 1 (some 200m SE of the prospect) was 6m @ 1.12% Pb with the highest Zn interval 2m @ 0.70%.

McNeill, 2002: *The style of mineralisation (galena-sphalerite with carbonate-quartz gangue) and alteration (pervasive sericite-carbonate with patchy silica) intersected by DDH SFD1 is similar to that in HRD1 but, is less well developed.*

The Stitt Quartzite also contains minor mineralisation and alteration near Silver Falls, although the quartzite might be the mineralised footwall to the felsic volcanic hosted mineralisation Randell (1990b).

The Just in Time vein is hosted by thinly interbedded carbonaceous shale and fine-grained dolostones (Bansford, 1993). Qtz-Ba-Pb veins were sampled from 1915 workings.

Poltock, 1994: *The shale beds are very finely laminated, and contain 10-20% probable syngenetic pyrite (Everett, 1985) ... The Just in Time workings expose a less than 1m wide quartz-barite galena breccia vein, striking 140, dipping subvertically ... Lead isotope studies carried out by Comstaff shows vein and wallrock Pb to be isotopically equivalent, and of a probable Precambrian origin.*

Gold

With primary focus on VHMS lead and zinc in the Boco Creek area, and no historical discoveries or excavations, any analysis for gold during exploration programs has been of limited interest. Gold is associated with both major styles of base metal mineralisation in the Rosebery area, that is with the Cambrian VHMS and Devonian vein (intrusion-related) deposits. Vein-hosted mineralisation is associated with long-lived, north to northeast-trending regional structures, as with the intersecting Henty and Great Lyell structures at Henty Gold Mine, 15 km to the south-southeast of EL17/2015. There, gold mineralisation is hosted by Tyndall Group volcaniclastic rocks adjacent to uneconomic massive sulphides and a large sericite-pyrite alteration zone, interpreted as a possible VHMS deposit (McNeill and Corbett, 1992). None of these conditions have been reported in the EL17/2015 tenement.

Small Devonian vein-hosted gold deposits were mined elsewhere in western Tasmania between 1880 and 1920, but none would be regarded as economic today. It is noted, however, that the Tasmania Reef at Beaconsfield (115 km to the ENE) is a Devonian quartz vein-hosted deposit.

Traditionally, the first evidence of gold mineralisation is in stream sands and gravels. AMR has reviewed MRT stream sediment data for the Boco and Sawmill creek catchments, finding that stream sediment surveys in the area have rarely assayed for gold. Those that have been, have not found gold above background concentrations. Occasionally elevated arsenic has been found, which is an indicator for gold mineralisation at Henty, but not at levels worthy of follow up. Borehole SFD1 at Silver Falls (McNeill, 2002) recorded no gold sample concentrations above 0.005 ppm.

At North Pinnacles DDH BBP004 (Poltock, 1993) intersected weakly anomalous gold values over the last 9m suggesting that “there may be a zone of gold mineralization above and to the east of the drill hole. Such a zone could be ~20m thick and dip eastwards at 60 – 70 degrees. DDH NPP215 had intersected a 20m true thickness interval averaging 0.25 g/t Au associated with weak base metal mineralisation and quartz-carbonate veining within altered rhyolite with ‘patchy siliceous stockwork veining’. A surface gold zone was indicated in quartz-veined brecciated rhyolite 200 metres north of NPP215 by chip sampling and a (maximum) 3.1 g/t Au wacker sample. (Hermann 1987). The anomalous zone was estimated at over 400m of strike length and up to 120m width.

South of EL17/2015 in the Pinnacles zone at Burns Peak the Southern Trenches, Thomas's Tunnel and Brown's Tunnel prospects were small lead and zinc holdings that contained significant gold grades. The best intersection was at Brown's Tunnel in EAF DDH 09 intersecting 11.1 m @ 0.96% CU, 8.01 % Pb, 18.92% Zn, 93 ppm Ag and 4.74g/t Au, with Comstaff estimating the ore reserves there to be 109 055t @ 1.26% Cu, 6.58% Pb, 18.83% Zn, 122ppm Ag, and 4.69g/t Au (from Roberts, 1985). This exploration implied that the ore is associated with areas of strong deformation in the Brown's Tunnel sequence. The gold at Pinnacles registers a few grains per ton in the brecciated silica near the ore shoot to over 6 oz. per ton in the selvedge on the footwall. At parts of the northern workings the sphalerite ore contains up to 2 oz of gold and 10 oz silver per ton. It is noteworthy that neither the silver nor the gold content varies in proportion to the galena and sphalerite present; but the high values seem to be contained in the sulphide ore (McIntosh Reid, <>).

Gold occurs in sediments at Strong's Creek where there is a historical alluvial prospect, and where it might be drainage from gold in the hydrothermal breccia Pb-Zn ore at the Pinnacles Mine. Au values become more prevalent at Burns Peak in low permeability brittle host rocks (such as rhyolite), suggesting a possible Devonian quartz vein secondary concentration source. Further exploration of the anomaly at North Pinnacles in EL17/2015 area should try to define the controlling fracture system and the extent of the alteration zone.

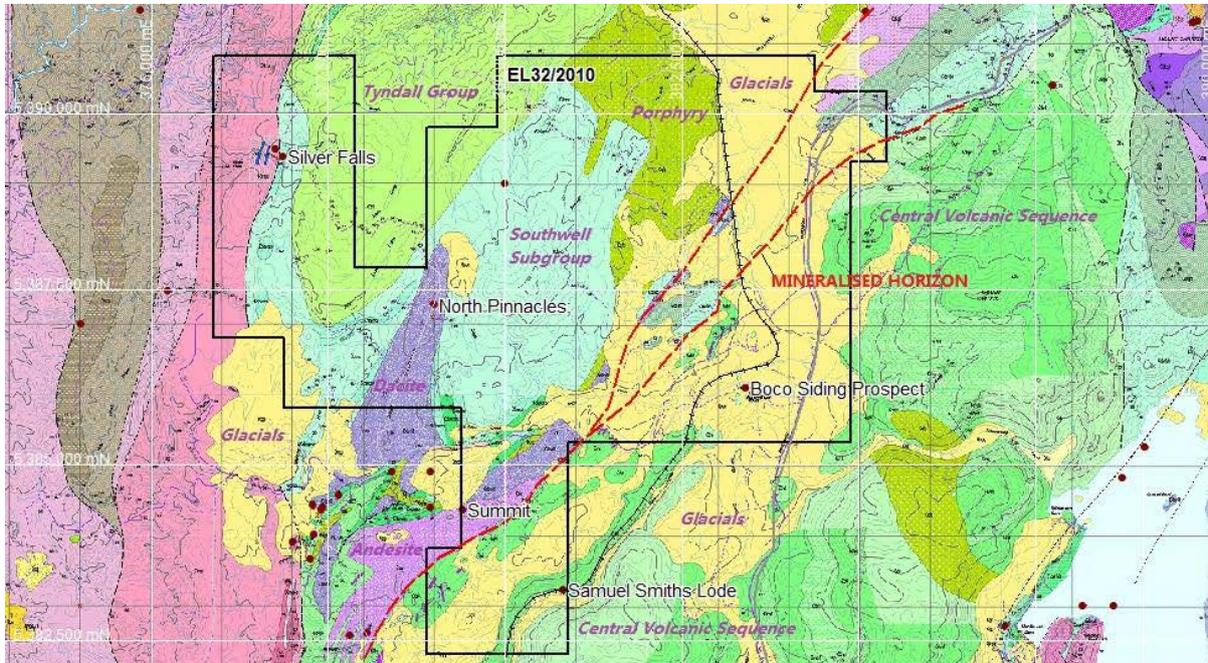


Fig. 2.15: mineralised horizons interpretation (adopted from Zinifex).

3. PREVIOUS EXPLORATION

Historically, the area covered by EL17/2015 has been explored with focus on the Central Volcanic Complex (CVC) of the MRVs, and the 'Transition Sequence' between the CVC and the overlying Southwell Sub-Group (Lower Tyndall Group), the hosts for the Rosebery and Hellyer deposits respectively. Substantial exploration has been carried out by previous tenement holders under several Licences held by the Rosebery Mine owners in search of a volcanic-hosted massive sulphide deposit between Rosebery and Hellyer.

Company exploration work in the past has concentrated on the Boco alteration zone in the centre and east of the area, the Hollway Andesite, North Pinnacles, Sawmill Creek and Silver Falls prospect in western part of the tenement.

Extensive historical exploration has been summarised by Simpson and McNeil (2001, 2005), as presented in Tables 1 to 4 below.

Table 1: Previous Exploration over the Hollway Andesite Prospect

Year & Reference	Activities
1975 Butt et al. (1975)	Completion of an Airborne EM survey (INPUT); no significant anomalies.
1977-1978 Hall (1978)	Establishment of the EAB grid (two lines of which extend onto the area of EL4/2000); geological mapping, A0 soil sampling, SP and ground magnetics.
1978 Beamish (1978)	Orientation –80# stream sediment survey over the EAA grid area.
1978-1979 Hall (1979)	The EAA grid was cut (22.8km) north of the Boco Road. Mapping, rock-chip sampling, A0 horizon total digest soil sampling (1024 samples) and a ground magnetic survey were completed; no significant anomalies were located.
1980 Hall and Pigott (1980)	Extend EAB grid east by three lines; geological mapping, ground magnetics, SP and IP, A0 soil sampling (listed as planned work, so assume completed).
1981-1982 Anderson (1982a)	EAB grid extended further to NW (ECE extension Grid), soil sampling (C-Horizon), and geological mapping.
1983 Shaw (1983)	Drilling of DDH EAB4 (178.0m); results not reported in detail.
1983 Dvorak (1983)	Completion of DIGHEM III survey over area. No outstanding EM responses were located (Trussell, 1984)
1985-1986 Anon (1986)	Line cutting preparatory to UTEM survey, stream sediment sampling, minor rock chip sampling.
1986-1987 Anon (1987)	Review of previous soil geochemical coverage; line cutting, UTEM III survey (no significant anomalies) and interpretation of stream sediment sampling (BCL & -80#).
1987-1988 Anon (1988)	Completion of UTEM III survey – no significant anomalies
1988-1989 Rosenhain and Mathison (1989)	“limited field observations”; re-logging DDH EAB4; description of geophysical and geochemical anomaly tested by EAB4.

1989-1990 Lorrigan (1990)	Regional aeromagnetic and gravity surveys and preliminary interpretation; collection of magnetic susceptibility data from drill core; rock-chip sampling along the Boco Road and other tracks; two lines of wacker sampling (and 65.5m of DDH) over glacials south of the Boco Road
1990 Coutts (1990), Reid (1990)	BSc (Hons) theses completed on the Hollway Andesite (Coutts) and the Burns Peak – Boco Road areas (Reid). Work included geological mapping, petrography and whole-rock geochemistry; results indicate the Hollway andesite has geochemical affinities with the Hellyer Basalt.
1990-1991 Kirsner et al. (1991)	Photogrammetry and production of new base maps; re-processing of the 1990 aeromagnetic survey; digitisation of previous IP data; “brief” reconnaissance mapping.
1991-1992 Kirsner (1992)	Re-logging and sampling of DDH EAB4, geological mapping, compilation of soil data, construction of semi-regional cross sections, reprocessing of UTEM data.
1992-1993 Poltock et al. (1993)	Drilling BPD77 472.3m (collared just outside current EL); intersected volcanoclastic with massive sulphide clasts (to 36% Pb, 16.5% Zn); DHEM completed. Review of previous IP data.
1993-1994 Poltock and Saxon (1994)	Geological mapping, rock-chip sampling whole-rock geochemistry and petrology (largely outside the area of EL 4/2000). Drilling of BPD80 (469.7m) to test down-dip extension of sequence in BPD77; best intersection 6m @ 0.9% Zn, 0.2% Pb; DHEM completed. Review of UTEM and IP data.
1994-1995 Saxon (1995)	Geological mapping, rock-chip sampling and petrology (largely outside the area of EL 4/2000). Interpretation of regional gravity and magnetic data.
1995-1996 Quayle and Dibben (1996)	The EAB grid was refurbished and additional lines (1220E-1600E) cut to the east. Dipole-dipole IP and ground magnetic data collected. Compilation of existing mapping and further 1:5,000 scale mapping. A combined IP/soil target defined at the upper contact of the Hollway Andesite (Summit Prospect).
1996-1997 Weber et al. (1997)	Prospectivity Review; compilation of previous exploration data.
1997-1998 Murphy and Denwer (1998)	Diamond drilling (2xDDH for 410.2m) to test Pb-Zn soil (DDH BPD88; 199.8m) and IP (DDH BPD89; 210.3m) anomalies at the ‘Summit’ Prospect; weak Pb-Zn mineralisation was intersected.

Table 2: Previous Exploration over the Boco Prospect

Year & Reference	Activities
1990 Coutts (1990), Reid (1990)	BSc (Hons) theses completed on the Hollway Andesite (Coutts) and the Burns Peak – Boco Road areas (Reid). Work included geological mapping, petrography and whole-rock geochemistry; results indicate the Hollway andesite has geochemical affinities with the Hellyer Basalt.
1990-1991 Kirsner et al. (1991)	Photogrammetry and production of new base maps; re-processing of the 1990 aeromagnetic survey; digitisation of previous IP data; “brief” reconnaissance mapping.
1991-1992 Kirsner (1992)	Re-logging and sampling of DDH EAB4, geological mapping, compilation of soil data, construction of semi-regional cross sections, reprocessing of UTEM data.
1992-1993 Poltock et al.	(1993)Drilling BPD77 472.3m (collared just outside current EL); intersected volcanoclastic with massive sulphide clasts (to 36% Pb, 16.5% Zn); DHEM completed. Review of previous IP data.

1993-1994 Poltock and Saxon (1994)	Geological mapping, rock-chip sampling whole-rock geochemistry and petrology (largely outside the area of EL 4/2000). Drilling of BPD80 (469.7m) to test down-dip extension of sequence in BPD77; best intersection 6m @ 0.9% Zn, 0.2% Pb; DHEM completed. Review of UTEM and IP data.
1994-1995 Saxon (1995)	Geological mapping, rock-chip sampling and petrology (largely outside the area of EL 4/2000). Interpretation of regional gravity and magnetic data.
1995-1996 Quayle and Dibben (1996)	The EAB grid was refurbished and additional lines (1220E-1600E) cut to the east. Dipole-dipole IP and ground magnetic data collected. Compilation of existing mapping and further 1:5,000 scale mapping. A combined IP/soil target defined at the upper contact of the Hollway Andesite (Summit Prospect).
1996-1997 Weber et al. (1997)	Prospectivity Review; compilation of previous exploration data.
1997-1998 Murphy and Denwer (1998)	Diamond drilling (2xDDH for 410.2m) to test Pb-Zn soil (DDH BPD88; 199.8m) and IP (DDH BPD89; 210.3m) anomalies at the 'Summit' Prospect; weak Pb-Zn mineralisation was intersected.
1972-1977 Hanson (1977)	INPUT AEM survey (1975); gridding (57.5 line km), gradient array IP, ground magnetics, grid based mapping and regional mapping, soil sampling (no significant anomalies); diamond drilling (BBP207-209; 475m) to test IP anomalies; alteration and weak base metal mineralisation intersected.
1977-1978 Mill (1978)	New access track and cutting of the Boco Extension grid, regional 1:10,000 scale mapping, gradient array IP (no significant anomalies), and ground magnetics.
1978-1979 Mill (1979)	Minor infill gridding and geological mapping, dipole-dipole IP, and soil sampling on the infill lines.
1979-1980	No work.
1980-1981 Mill (1981)	Review of geophysics and geology.
1981-1982 Sainty and McDonald (1982a, 1982b)	Boco extension grid pegged (35.76 line km), geologically mapped, soil sampled and covered with Dipole-Dipole IP and ground magnetics.
1982 Sainty (1982)	Geological mapping, trial percussion drilling program (7 holes for 226.0m).
1982-1983 Sainty (1983a)	Completion of three percussion holes (305.8m); petrology on samples from percussion drilling.
1983 Sainty (1983b)	Completion of four DDH (BBP242 and 246-248; 1899.7m) and two percussion holes (180.2m); core and chip geochemistry and some petrology; commencement of UTEM III survey.
1984 Sainty (1984a, 1984b)	Downhole SIROTEM completed – no anomalies; UTEM survey completed – 3 subtle anomalies; diamond drilling of four holes (BBP250-251, 253-254; 1689.5m) – two holes testing UTEM features – no significant mineralisation intersected.
1985 Williams (1985)	CSR farmed in to EL. Diamond Drilling (BBP278-280; 1601m) – no significant mineralisation intersected; petrology, drill core geochemistry and some sulphur Isotopes done; magnetic susceptibility data collected from drill core.
1986-1987 Taylor (1987)	CSR withdraw from JV; Pancontinental farm-in; review previous exploration and geology; petrological and geochemical study; UTEM survey over the extended Boco grid – no significant anomalies; Pancontinental withdraw from JV and tenement is relinquished.
1988-1989 Howland-Rose (1989)	Re-establish grid, RMIP and follow-up of 5 RMIP anomalies with gravity; no results warranting further follow-up. Tenement relinquished.
1990 Randell (1991)	Review of previous exploration, including stable isotopes and litho-geochemistry.
1990-1992 Kirsner (1992b)	Pasminco farm-in; Photogrammetry to produce base maps, high resolution helimagnetic survey, infill gravity survey and interpretation, regional scale geological mapping.
1997-1998 Elliston (1998a)	Review of previous exploration, re-interpretation of helimagnetic data, minor 1:5,000 scale geological mapping, rock-chip sampling and a detailed evaluation of the volcanic facies and hydrothermal alteration at the Boco Prospect. No significant targets worthy of follow-up and the tenement was relinquished (Elliston, 1998b).

Pasminco / Zinifex work at Boco has been summarised in table below by Gregory (2009).

Table 3: Previous Exploration by Pasminco/Zinifex in EL 4/2000 (Gregory, 2009)

Year & Reference	Activities
2000-2001 Simpson and McNeill (2001)	Previous exploration reviewed and digital data compiled. 20.8 line km of grid cut and(or) rehabilitated and surveyed with DGPS; 12 line km of this grid geologically mapped, 751 'B' and 'C' horizon soil samples collected and submitted for analysis (including duplicates and standards) and 7 rock chip samples analysed. This work has defined two partial leach soil anomalies, one on the glacially covered Boco Plains and the second at the base of the Hollway andesite, adjacent to a total digest soil anomaly located by previous explorers.
2001-2002 McNeill (2002)	The work completed comprised a review of previous UTEM data, 4.2 line km of grid cut and (or) rehabilitated and surveyed with DGPS; geological mapping of the grid, vehicular tracks and selected creeks and collection and analysis of 567 (including duplicates and standards) 'B' horizon soil samples. Work to date has identified three partial leach soil anomalies and a UTEM anomaly that are worthy of further follow-up.
2002-2003 McNeill (2003)	The work completed comprised a review of previous UTEM data and completion of a single loop ground EM survey. 4.1 line km of grid was cut, surveyed with DGPS and geologically mapped. These lines and 3.4 line km of uncut, DGPS located lines on Boco Plains were also partial leach (PL) soil sampled (322 samples including duplicates and standards submitted for analysis). 82 samples over the Sawmill Creek anomaly, previously analysed by PL methods, were re-submitted for total digest analysis to follow-up the PL soil anomaly.
2003-2004 McNeill (2004)	Work completed comprised 2.5 line km of gridding, surveying with DGPS and geologically mapping. These lines and 6.6 line km of uncut, DGPS located lines on Boco Plains were also partial leach (PL) soil sampled (373 samples including duplicates and standards submitted for analysis). Two anomalies worthy of further work remain on EL 4/2000 – The base of the Hollway andesite and at Sawmill Creek.
2004-2005 Skirka and McNeill (2005)	Work completed comprised partial leach (PL) soil sampling over the Hollway area and the central part of the tenement (404 samples), infill geological mapping on the Hollway grid and between the Hollway area and the Sawmill Creek anomaly and diamond drilling at Sawmill Creek (BOC1 and BOC2) and Hollway (BOC3). A surface EM survey between the Hollway area and the Sawmill Creek anomaly was also completed in addition to DHEM surveys at the Sawmill Creek anomaly (BOC1 and BOC2). Drill hole BOC3 returned 4.1m @ 11.3%Zn, 4.5% Pb associated with massive sulphide veining within altered felsic volcanics at the Hollway Prospect.
2006 Skirka and McNeill (2006)	Diamond drilling at Sawmill Creek (hole BOC6) and Hollway (BOC4, 5, 7). At the Hollway prospect, drill holes BOC4 and BOC7 intersected minor base metal mineralisation within the lower parts of the Hollway andesite and upper part of the CVC. Drilling at the Sawmill Creek anomaly intersected trace to minor base metal mineralisation associated with black shale and tuffaceous siltstones correlated with the lower Southwell Subgroup and trace to minor sphalerite associated with weakly altered qtz-lithic sandstones correlated with the Black Harry Beds. DHEM surveys at Sawmill Creek and Hollway (no anomalies), Pb isotope analysis of BOC3 samples and whole rock geochemistry on selected samples. Infill partial leach soil sampling was also completed Burns Peak to Animal Ck in the northern part of the licence.

The Silver Falls area has been the focus of intermittent exploration activity since the discovery of outcropping Pb-Ag mineralisation by Jack Lynch in 1890. Modern exploration commenced in the area in the 1960's and is summarised in Table 3, which is largely based on a summary by Briggs (2001). The most recent exploration at Silver Falls was conducted by Pasminco/Zinifex under EL23/2000, between 2001 and 2005, targeting a Rosebery-Hercules style deposit at a depth >150m.

Table 4: Previous Exploration at Silver Falls prospect

PERIOD	EL	COMPANY	WORK COMPLETED	REFERENCE
1890	-	-	Ag-Pb mineralisation discovered in Ross Creek by Jack Lynch, named Silver Falls	Belstead, 1892
1949	-	EZ	Diamond Drilling – PP61, PP62, PP63, PP73, with minimal assaying	EZ Drill Logs, 1949
1954	-	EZ	Progress Report on the North Pieman Mineral Field – Review	Taylor, 1954
1968-1972	EL5/63	Comstaff	Geological Mapping Regional Stream Sediment Sampling	Cornwall, 1968; Fitch, 1968
1977 – 1984	EL12/72	EZ	4WD Access Track; Gridding; Geological Mapping; Soil Sampling (C-Horizon); Stream Sediment Sampling; Dipole-Dipole IP; Costeaining & Rock Chip Sampling	Mill, 1978-80-81; Mollison, 1980; Sainty & McDonald, 1982; Sainty, 1984; Taylor, 1986
1976 – 1982	EL22/74	Aberfoyle /Billiton	Gridding; Geological Mapping; Soil Sampling (C-Horizon); Stream Sediment Sampling; Dipole-Dipole IP; DIGEM II airborne EM / Resistivity / Mag	Freytag, 1976; Taylor, 1979; Smyth, 1982
1990 - 1995	EL2/90	Pasminco	Gridding; Geological Mapping; Photogrammetry; Soil Sampling (B/C-Horizon); Gravity & Heliag & Pole-Dipole IP; Magnetic Susceptibility of Rock Samples	Kirsner, 1992; Poltock, 1993-94; Saxon, 1995
1990 – 1993	EL15/90	RGC	Geological Mapping; Soil Sampling (B/C-Horizon); Diamond Drilling - HRD1 (295.7m); Metallogenic Modelling	Poltock & Saxon, 1994; Saxon & Basford, 1995; Basford, 1996; Hollamby, 1998
1996 – 1998	EL24/95	Aberfoyle	Geological Mapping; Soil Sampling; Lead Isotope Analysis	McNeill & Richardson, 1997; Richardson, 1998
2000-2005	EL23/00	Pasminco/ Zinifex	Gridding, geological mapping, partial leach soil, sampling, rockchip sampling, petrology, Pb-isotope analysis and relogging of historical drill hole	Briggs, 2001; Skirka 2005

Yunnan Tin

Yunnan Tin Australia held the whole tenement area in 2011/2013 and commissioned a regional VTEM airborne geophysical survey over all its tenements in the west coast of Tasmania including the whole area of Boco Creek (then EL32/2010). Several TEM anomalous zones were identified across the block. A broad comparatively weak anomalous zone is in the north-eastern part of the tenement. It is orientated in North-South direction and was interpreted as possibly conductive overburden or near surface conductive rocks. A 20 m deep NE-trending weak conductive zone in the east was interpreted as cultural. A NE-trending weak conductive zone near Samuel Smiths Lode in the south of the tenement is about 200 meters deep and thus might be a target of further investigation. A couple of small weak anomalous zones are detected in the western part of the property, which are close to Silver Falls prospect.

Refer to Appendix B for a summary of the survey results.

4. AMR RELINQUISHMENT RATIONALE

Philosophy

The objective of mineral exploration is to enable estimation of the quantity, quality and spatial dimensions of a resource to a defined level of confidence, prior to consideration for extraction. AMR believes that the most rigorous way to economically explore for mineral resources at regional, local and deposit/prospect scales is a scientific approach to mitigate uncertainty around the investment decision. There are three steps.

1. Integrate all accessible existing information and relevant evidence into a hypothesis and a preferred geological model(s).
2. Establish a resource estimate and likelihood, sufficient to justify investment in further exploration.
3. Design and implement the exploration program itself, to test the premises of the hypothesis and fill information gaps in the draft geological model. The results of the exploration program prove, reinforce, adjust or discard the hypothesis and model.
4. If the premises can be assumed to be sufficiently true, then the hypothesis is supported, and the third stage is to apply the preferred model to the specific deposit(s) to reach a JORC-compliant quantitative estimate of overall resources and economics (which might entail further proof by drilling).

AMR could not proceed beyond Stage 2 in the Licence term, being unable to determine a resource estimate, and likelihood, sufficient to justify investment in further exploration.

Decision to relinquish

AMR completed the first stage of its anticipated exploration program for EL17/2015 and was unable to proceed to a resource estimate or targeting and implementation of a drilling project due to lack of capital support and company prioritisation of resources toward gold exploration tenements elsewhere in the MRVs. These constraints were caused mainly by the lack of evidence for VHMS or significant gold deposits in EL17/2015, and the size and complexity of the area in the search for evidence of gold potential, with limited resources.

Status

In the first two years of the Licence, AMR's principal target of exploration on EL17/2015 was evidence of a volcanic hosted lead-zinc massive sulphide body, like those at Rosebery, Hellyer and Hercules. In the event of a lack of evidence, the alternative was to try to establish why the 20km of the generally prospective Mt Read Volcanics between Rosebery and Hellyer could be relatively sulphide-barren compared to its neighbours. Most of the geophysical and geochemical anomalies that have been located to date have been drilled in the targeted Rosebery-style and Hellyer-style host rock horizons. In drill hole intersections sampled, the horizons have been found to be non-commercial in EL17/2015.

There are three discrete zones of diffuse mineralisation on the Licence.

1. The Boco shear zone is an extension of a fault and alteration axis that extends south-south-westerly through Samuel Smith's Lode to Chester, 4 km south of the Licence, probably terminating at the Rosebery Fault. The trend is parallel to the local strike of bedding and folding and most likely tracks a faulted boundary between the CVC volcanoclastics and the CVC lavas. Modelling of recent gravity and magnetics implies that the NNE structure is of early Devonian age, and is thus an unfavourable target for Cambrian age mineralisation. All known alteration along it is sericite-silica-pyrite barren of massive sulphides with unfavourable isotopic signatures for exhalative primary deposition (both Oxygen & Sulphur). This result poses the question of whether any part of the NNE trending structure holds potential for base metal mineralisation.

The Boco alteration not being exhalative isn't to say that there are no exhalative locations elsewhere in the tenement. Untested, primary-mineralised zones intersected by remobilising later shear structures conceivably exist under the glacial cover along the CVC horizon, or at depth in Black Harry host rocks.

There is no evidence for such potential, however, there is evidence against it. The resolution of the VTEM flown by Yunnan Tin would be sufficient to show a significant metallic deposit beneath the clay-rich glacial sediments. Signal attenuation seems to progress as the gravels and sands thicken, revealing a pattern where the uneconomic Boco-style alteration persists beneath the cover. The Black Harry equivalent sediments in the area taper out, as part of the general thinning of prospective Mount Charter Group in the Boco area, as interpreted by Leaman (1992) where the MRVs are less than 300m in entire thickness, again reducing the prospect of major mineralisation at depth. The paleo-environmental interpretation would be a locally shallower depositional basin for the volcanics that wouldn't support deep pile seafloor exhalative deposition.

2. North Pinnacles: Another prominent NNE trending gravity feature coincides with the Pinnacles Shear Zone (and the Burns Peak Shear Zone) on the western flank of the Pinnacles Ridge - again associated with changes in the basement that could have been a focus for mineralising fluids (Leaman, 1992). The most prospective horizon is at the base of the White Spur Formation which is equated with the Rosebery/Hercules host and hanging wall sequences (Skirka and McNeill, 2006). The greatest exploration potential is considered to exist at the intersection of this horizon with structures associated with mineralisation at Burns Peak and trend north into the Boco JV area.

The recognition of discontinuous anomalous gold mineralisation at North Pinnacles may present potential for a low grade-high tonnage gold deposit. Assuming a 180 m strike and 10m width of the anomaly, if 2.3 g/t Au, Hermann (1987) suggests a possible 30,000 oz Au body to 50 metres depth.

3. Western limb of the Silver Falls Syncline: The only concentrated ore occurrence appears to be at the original Silver Falls site. The best intercept of two boreholes was 6m @ 1.12% Pb; Zn 2m @ 0.70%.

Recommended exploration opportunities

AMR has not found sufficient evidence to justify further expenditure on exploration in EL17/2015, but regardless is not sufficiently confident to declare the area barren of economic ore deposits. Over a 60 km² area, only 2 km² has been drilled at a density that would enable inferred resource calculation, and extension of that Boco zone is overlain by thick glacial deposits. An intersecting secondary ore concentration trend, say, along the NNW Devonian gold trend, has not been excluded from lying beneath the glacials.

Otherwise, a future explorer might:

- drill the VTEM anomalies ascribed to groundwater concentrations in the north east of the tenement area;
- investigate structures bounding the North Pinnacles rhyolite to define gold concentration and extent; The anomalous gold zone (described above and in Section 2 of this report) at North Pinnacles could reward those seeking a modest-sized deposit for low-cost extraction.
- Possible mineralisation at the Rosebery/Pinnacles fault intersection, shown by 'leakage' mineralisation and alteration at North Pinnacles and Silver falls (this would be expected to be deep and better to be tracked from Burns Peak
- investigate the presence of and structure within the Black Harry Beds and Que shale beneath the CVC for economic alteration;

- The area between Silver Falls and the Sawmill Creek Track (including the Tyndall/WVSS boundary on either side of the Silver Falls syncline) was considered a prospective area in 1991 (Lorrigan, 1991);
- *a significant mineralisation may still exist in CVC and its overlaying package. There are a few untested Zinifex anomalies that have not been fully tested, especially for these probably representing Que-Hellyer horizons (Gregory, 2009).*
- map the Luina/Oonah shear zone for signs of veining or alteration minerals.

5. EXPLORATION RESULTS – Work completed by AMR in EL17/2015 2016-2020

The compilation of available literature is the most productive result of AMR's tenure in EL17/2015, representing the first stage of the exploration program:

- Acquire, copy, review and analyse all available reports, maps, sections and geodata associated with the area;
- Where possible obtain any existing information and experience (documented and personal) from previous exploration;
- Research potential ore deposit types and like prospects and developments; then
- Identify information gaps in existing knowledge and determine actions to close them.
- Even if geological models exist and are available. Develop a range of draft alternative stratigraphic/structural models specific to the area, testing each against all knowns including geotectonic history and setting.
- Develop geological models
- Determine the preferred model
- Fieldwork: Panning and rock chip sampling on 2 field trips yielded no sign of mineralisation, being designed only to enable geological familiarisation with the ground.

6. ENVIRONMENTAL, CULTURAL HERITAGE

No works as specified by the *Mineral Exploration Code of Practice* (Bacon & Pemberton, 2012) or 'controlled actions' (*EPBCA*, 1999) were undertaken during the period of the tenure.

Field work on public land consisted of outcrop recording and chip sampling, and stream sediment panning only.

Access was by two persons by foot during Summer months only from roadside or fire trails, with minimal damage to regrown common native species (predominantly manuka, bauera and cutting grass). No track cutting, or gridding was undertaken, nor was there any risk to the registered listings of Geographical or Conservation Significance as identified on the Land Information System Tasmania.

Both the geologist and field assistant searched and viewed images of plants of conservational significance for familiarity prior to the program. Movement through scrub and swampy areas was undertaken to alert fauna including frogs, lizards and snakes.

7. EXPENDITURE 2016/17 to 2019/20

Exploration Expenditure EL17/2015	April to March 2016/2017	April to March 2017/2018	April to March 2018/2019	April to March 2019/2020
Field program	\$3,753	\$897	-	-
Geology	\$5,477	\$8,144	\$12,100	\$6,600
Exploration Equipment	\$7,726	\$11,173	\$1,031	-
Tenement Administration	\$6,171	\$1,033	\$4,998	\$1,984
Services	-	-	-	-
TOTAL EXPENDITURE	\$23,128	\$21,246	\$18,129	\$8,584

Total Exploration Expenditure: \$71,087

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9. APPENDICES

Appendix A: Yunnan Tin Boco VTEM Results

Survey Results

Yunnan 2013:

During 2013, a VTEM airborne geophysical survey was conducted over the tenement area by Yunnan Tin Group. The most significant conductor identified is located in the south of the tenement near Samuel Smiths Lode prospect, with a targeted depth of 200m. Conductors close to Silver Falls Prospect located at western part will be followed up. However, conductors located at eastern and northern parts of the tenement are shallow in nature and were considered to be associated with ground water in weathering zones.

VTEM found no significant conductors underneath Quaternary cover (100m glacials).

Other VTEM targets in the south (the most significant conductor located at Samuel Smiths Lode prospect, with a target depth of 200m) and at Silver Falls prospect area, were accepted to be explained by previous exploration. Conductors in the east and north of the tenement are shallow and probably related to ground water bodies within weathering zones.

Based on the geophysical results obtained, several TEM anomalous zones are identified by Geotech across the block EL32/2010. They can be seen overlapping the dB/dt Calculated Time Constant (TAU) decay parameter image presented with the calculated vertical magnetic gradient (CVG) contours (Fig. 6). A higher resolution version of this plan is included as Appendix X.

The broad comparatively weak anomalous zone is located in the north-eastern part of the tenement. It is orientated in North-South direction and associated with magnetic gradient feature. According to corresponded apparent resistivity depth sections, it is considered as a near surface layer similar conductors which are possibly conductive overburden or near surface conductive rocks.

The weak conductive zone in the eastern part of the property is orientated in northeast direction and interfered with cultural. The estimated depth of the anomalous zone is about 20 metres.

The weak conductive zone near Samuel Smiths Lode in the southern part of the property is orientated in northeast direction and surrounded by higher magnetic gradient. The estimated depth of the potential targets is about 200 meters. This may present as a significant target to warrant further investigation.

In addition, a couple of small weak anomalous zones are detected in the western part of the property, which are close to Silver Falls prospect

5. Discussion

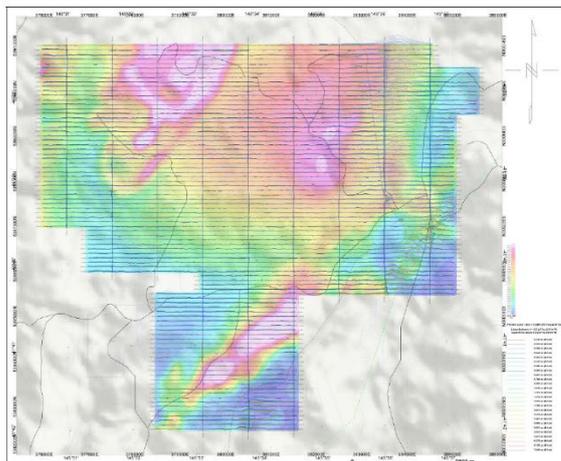
Preliminary interpretation of VTEM survey data has provided some valuable information for further exploration. However, detailed reprocessing and interpretation of the survey data is required.

The VTEM results have indicated that those conductors in the east and northern parts of tenement are due to shallow sources, probably shallow groundwater bodies within weathering zone.

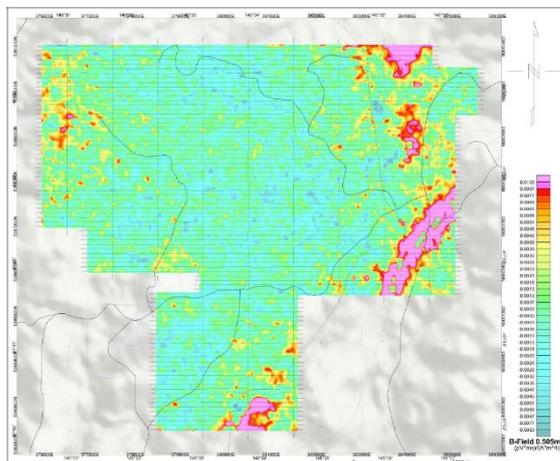
The deep conductor located at southern part will be the focus of further exploration. Proposed initial exploration includes ground geological and Niton X-ray geochemical reconnaissances

Silver Falls prospect will also be ground checked where some conductors were identified by current VTEM survey.

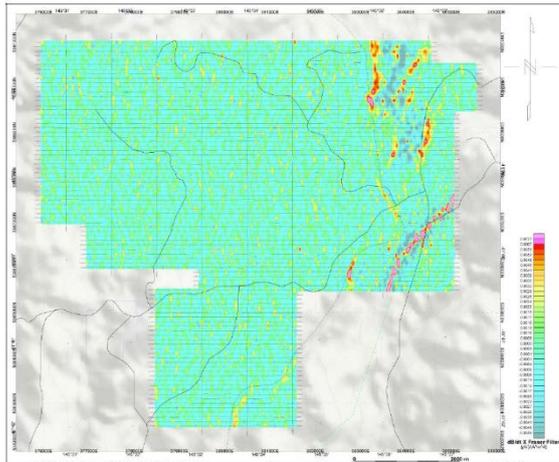
APPENDIX C
GEOPHYSICAL MAPS¹



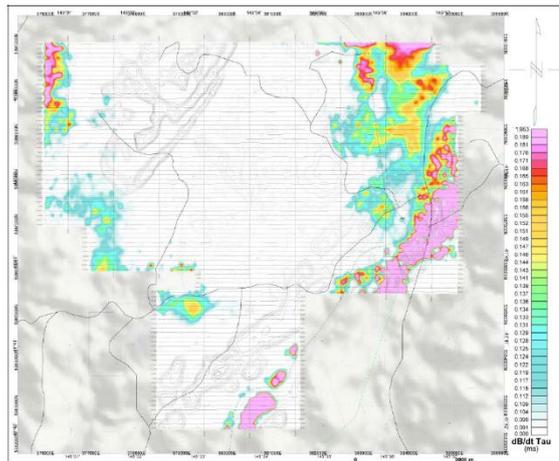
EL32/2010 - VTEM B-Field Z Component Profiles, Time Gates 0.220 to 7.036 ms



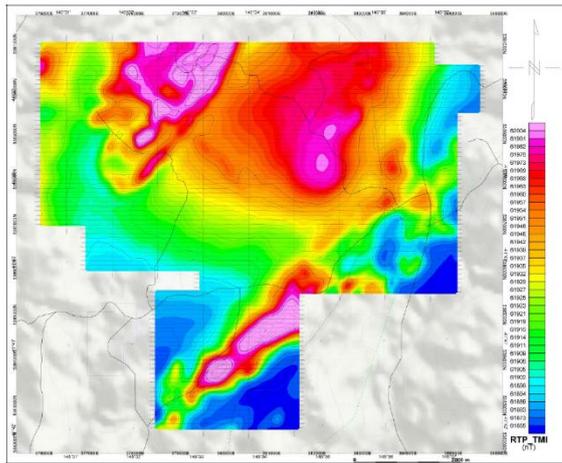
EL32/2010 - VTEM B-Field Z Component Channel 26, Time Gate 0.505 ms



EL32/2010 - VTEM dB/dt X Component Fraser Filter Channel 23, Time Gate 0.333 ms



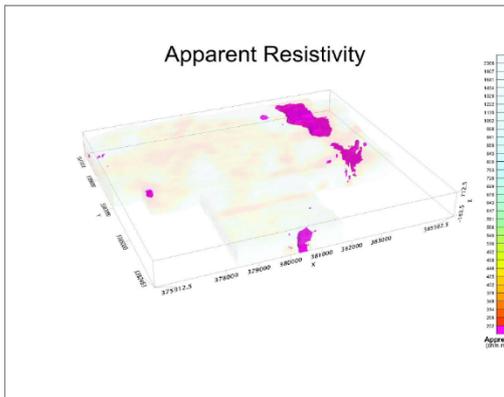
EL32/2010 - dB/dt Calculated Time Constant (Tau) with contours of anomaly areas of the Calculated Vertical Derivative of Reduced to Pole TMI



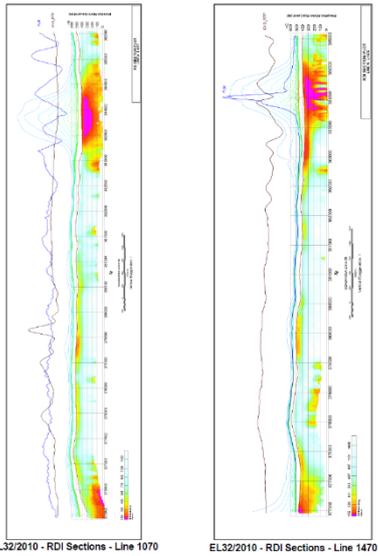
EL32/2010 - Reduced To Pole Total Magnetic Intensity (RTP)

RESISTIVITY DEPTH IMAGE (RDI) MAPS

3D Resistivity Depth Images (RDI)

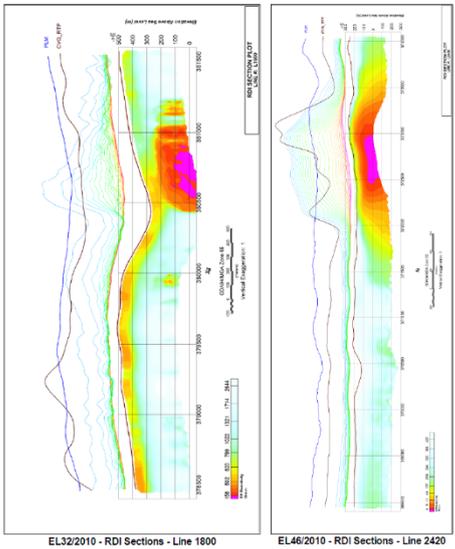


EL32/2010



EL32/2010 - RDI Sections - Line 1070

EL32/2010 - RDI Sections - Line 1470



EL32/2010 - RDI Sections - Line 1800

EL46/2010 - RDI Sections - Line 2420

Appendix B: Excerpt from a heritage assessment of the Arthur Pieman Conservation Area

Source: Huys, Stuart. (2010). *An Aboriginal Cultural Heritage Assessment of Designated Vehicle Tracks Within the Arthur Pieman Conservation Area*. Cultural Heritage Management Australia.

Sourced from <http://www.parks.tas.gov.au/file.aspx?id=25109>

“Dense vegetation, rugged terrain and huge annual rainfalls are believed to have restricted the movement of the North West tribe to the coastal fringes....Within the Queen River Valley, Corbett (1980) documented 30 sites, the majority of which represent a few artefacts scattered over a small area. Artefact scatters were found to typically occur on small flats close to water, low flat ridges and saddles, while on the upper valley slopes and low-lying button grass plains, cultural material was rarely encountered.... Within the King River valley region the largest and most numerous scatters are located on low ridges or rises on the buttongrass plains. In contrast to previous assessments of Holocene land use of the region, which depict fleeting visits using the rivers as highways, the evidence from the King River valley indicates more regular use of the area by Aboriginal people who used the sedgelands as highways as opposed to the rivers (Freslov 1993). ... the general pattern of Aboriginal occupation of forests throughout Tasmania indicates limited occupation of the forest zone, with small artefact scatters resulting from transient camping by small mobile groups (Cosgrove 1990)”.

Appendix C: Boco Siding (images)



Looking south



Looking west



Looking north