

Review of exploration potential of the Mount Farrell Mining Field and EL 47/2003

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Summary

A brief review of previous exploration reports suggests the Mt Farrell mining field still has moderate to high prospectivity for small tonnage, narrow, fissure-lode type deposits, up to about 200,000 t @ ~10% Pb+Zn and ~200 g/t Ag. However, the prospectivity is offset by a low findability factor, related to the mineralogy and morphology of potential lodes, and the significant strike extent of favourable but untested zones.

The known lodes are dominantly structurally controlled, in a narrow corridor adjacent to the Henty Fault Zone forming the western boundary of the Farrell Slate host unit, and to a lesser-known degree adjacent to the Farrell Fault at the eastern boundary. The smaller deposit-scale structural controls are poorly understood, and impossible to apply with any confidence in a predictive exploratory approach. The deposits are not amenable to targeting by geophysical or geochemical methods. Accordingly, a blind drilling program, stepping-out from known resources and/or testing large gaps in the long projection, seems the only feasible systematic exploration approach. This would require some luck and great persistence, because the lodes are likely to be small, discontinuous, and highly variable in grade and thickness.

The southern part of EL 47/200, south of the Murchison River, has been well and extensively explored by expert exploration groups for over 30 years, for a variety of deposits including volcanic hosted massive sulfides, Henty Fault-related Au ± As-Sn deposits, and Devonian Farrell-style lodes. The results have not been re-examined in detail in this review but it is confidently assumed that no outstanding near surface targets remain, and that future exploration will require new concepts and/or a commitment to systematic deep drilling.

Introduction

Bass Metals Ltd. holds EL 47/2003 between Mackintosh Dam and Moxon's Saddle, covering the Mt Farrell mining field and Sterling Valley (Figure 1). The license expires or is due for renewal on 11th June 2009.

This area is peppered with small mineral prospects but the only significant historic ore production was from the Mount Farrell mining field, dominantly from the North Mt Farrell and New North Mt Farrell mines, which produced a total of about 731,000 tonnes @ 12.8% Pb, 2.0% Zn and 425 g/t Ag between 1899 and 1973 (Turner, 2008). At today's metal prices¹ that ore would be worth A\$446/t, with an in situ deposit value of about A\$326 million, and about 48% of the value in the silver.

Bass Metals' reviews of Mount Farrell's exploration potential over the past couple of years, which were mainly document-based with only cursory reconnaissance fieldwork, resulted in recommendations for further exploratory drilling. Blake (2007c) proposed an ambitious two-stage diamond drilling program (involving a total of 48 holes for 13,775 metres budgeted at ~\$3 million) to test the Mount Farrell line of lodes over 2½ km

of strike, down to depths of about 400 m below surface – essentially step-out drilling to test gaps in the long projection at approximately 100-150 m centres. Turner (2008) suggested a more modest diamond drilling program to 'increase the tonnage and certainty' of potential open-pittable resources adjacent to the New North Mt Farrell deposit at shallow depths to about 40 m, as previously partially defined by Pasminco (Lorrigan, 1996). Turner considered that the previous Pasminco 'potential resources' totaling 99,750 t @ 6.3% Pb, 1.6% Zn and 199 g/t Ag 'could be expected to increase' to about 142,250 t, at similar grades².

Bass Metals' Exploration Manager, Kim Denwer, is reluctant to embark on Blake's ambitious blue-sky program and dissatisfied with Turner's incremental potential resource increases, which are too close to Tullah township for consideration of an open-pit-mine. Accordingly, he requested me to undertake yet another brief review and reconnaissance, with the particular objective of determining the structural and/or litho-stratigraphic controls on locations of the known Mount Farrell deposits, to improve predictability and exploration targeting of additional mineralized zones of the order of at least a few hundred thousand tonnes size.

¹ London Metals Exchange 11th December 2008,: Cu 3232, Pb 1031, Zn 1084 (US\$/t), Ag 0.33 (US\$/g). US\$/A\$ = 1.51976.

² This estimate infers existence of potential shallow resources worth approximately A\$225/t with an in situ value of ~\$32 million.

Previous exploration

In addition to Bass Metals' recent internal reviews (Blake, 2007c; Turner, 2008) the potential of the Farrell field has been repeatedly evaluated over the past two decades by several mineral exploration companies, principally connected with EZ-Pasminco. Those companies held mining leases over the Farrell field until 1995 (Lorrigan, 1996). McNeill & Simpson (2000) briefly tabulated Farrell-specific reviews and/or data compilations conducted semi-continuously in 1986-87, 1991, 1993-95, 1996-97, and 1998-99.

Of those, Angela Lorrigan (1991; 1996) carried out perhaps the most comprehensive work in recent times, insofar as it extended over several years and included a review of historic data, drill core re-logging, and 1:2500 scale surface geological mapping, which culminated in a drilling program that tested the shallow ore potential around New North Mount Farrell. She recognized the potential for mineralized zones outside the previously mined narrow shears, and paid particular attention to determining the structural controls on mineralized zones and the distribution of a black shale unit that hosted most of the known lodes (Lorrigan, 1991).

Mount Farrell deposit style and geologic setting

The deposits of the Mount Farrell field are typically steeply dipping, NNW to NNE-trending narrow lenticular fissure lodes of argentiferous galena, sphalerite and minor chalcocopyrite, pyrite, tetrahedrite, arsenopyrite, jamesonite, argentite and pyrargyrite³ in quartz + siderite gangue (McKibben, 1968).

They consist of numerous sub-parallel 'lode channels', semi-continuous for up to a few hundred metres along strike and down dip, with individual lodes ranging from <0.2 to 9 m width spaced over a 100-m-wide zone (Purvis, 1995; Lorrigan, 1996). The average mined width at North Mt Farrell and New North Mt Farrell was 1.6 m (Lorrigan, 1996).

McNeill & Simpson (2000) reported Pb-isotope data from two samples of galena veins in Murchison Volcanics near Thomas Blocks and Donoghues workings (near Anthony Road just east of the Farrell Slate unit), which 'indicate that the Pb is of Devonian age and therefore not related to re-mobilization of Cambrian VHMS mineralization'.

The Farrell lodes are hosted by the 'Farrell Slate' member of the Tyndall Group, comprising a tightly folded and faulted but generally west-dipping and west-facing sequence of 'grey to black siltstone with abundant thin to thick bedded feldspar-quartz-mica sandstone in the upper part, and abundant very thick pumiceous to crystal rich

rhyolitic mass flow units interbedded in the lower part' (Allen, 1995).

The Farrell Slate unit crops out in a NNE-trending zone up to about 1 km wide and 20 km strike length, from Sterling Valley to the northwestern shore of Lake Mackintosh. Ore bodies of similar grades occurred 'in both slate and volcanic sandstone although the lodes in the sandstone appear wider and more continuous than those in the slate....shearing produced continuous discrete fractures in these [sandstone] horizons in contrast to a series of small anastomosing fractures in the slate' (Groves and Noldart, 1965).

The Farrell Slate unit is bounded to the west by the west-dipping Henty Fault 'comprising 3-13 m of intensely broken, brittle-ductile sheared quartz veined rock within a broader zone of moderate shearing and silicification', which is slightly discordant to and truncates bedding in the Farrell Slate, probably with major displacement (Allen, 1995).

The Farrell Fault marks the eastern boundary of the Farrell, Slate unit. Its character varies from a narrow zone of intense ductile mylonitic foliation at Sterling Valley, to a 13 m wide zone of 'moderate to strong brittle-ductile shearing overprinted by brittle faults' at the Murchison River mine (Allen, 1995), to 'conformable and unbroken although marked by a 1.5 m wide zone of strong ductile shearing' further north near the North Mt Farrell mine (Purvis, 1995). Purvis (1995) considered this northern part of the contact between the Farrell Slate and underlying Murchison Volcanics to be essentially conformable and stratigraphically continuous. That is consistent with Allen's (1995) interpretation that the Farrell Slate represents the post-eruptive volcanoclastic closing stage of the Murchison Volcanics rhyolitic eruptive sequence. Allen was uncertain of the 'amount of stratigraphy missing from the contact zone' due to faulting at Murchison River but he suspected it 'could be small, in the order of hundreds of metres'. That view was supported by Murphy's (1995) structural interpretation of a west-side-up reverse movement on the Farrell Fault, envisaged to have displacement of only about 300-500 m.

Most of the known mineralized lodes lie within a couple of hundred metres of the western boundary of the Farrell Slate unit (Figure 1), in 'zones of structural disruption marked by kink folding adjacent to planar faults' (Lorrigan, 1996). A few small deposits in the southern part of the field (Central Farrell to Murchison Mine) lie near the eastern margin of the Farrell Slate, adjacent to the Farrell Fault. In both cases the distribution implies dominant fault-related structural (not lithostratigraphic) controls on mineralization.

At the district scale, Lorrigan (1991) described three main structural elements, in approximate sequential order:

1. NNE-trending anastomosing faults defining the Henty Fault Zone; generally dipping steeply west (although some dip steeply east), with fault striae pitching steeply north, usually >60°. These faults are associated with tight drag folds and widespread cleavage.

³ Kim Denwer (pers. comm., 2008) noted minor anomalous tin (~0.1% ?) in some samples from the northern end of the Mt Farrell field. Samples from the Murchison mine at the southern end reportedly contain up to 500 ppm Sn and 660 ppm Bi (Purvis, 1993).

2. Two sets of NE and NW-striking faults generally dipping north at 40-70° locally associated with chevron style folds with axes parallel to the faults.
3. E-trending faults with near vertical dips and small dextral displacements, which are most apparent in the Owen Group on the Farrell Range to the east. Groves & Noldart (1965) also noted 'extremely common' W to NW-trending faults offsetting the Owen Group sandstones.

The E, NE and NW-trending fault sets are prominent in the orthophoto image, particularly across the Owen Group on Farrell Range, but also faintly expressed as subtle photo-linear features (alignments of large trees, creeks etc.) on the more densely vegetated (felsic) Murchison Volcanics and volcano-sedimentary Farrell Slates. My crude photo-structural interpretation (Figure 2 & Figure 3) indicates a great profusion of small to medium scale E, NE and NW-trending faults and lineaments, but paradoxically the major NNE-trending boundary structures (Henty and Farrell Faults) are barely visible⁴.

A simplistic examination of that photo-linear structural pattern (Figure 2) indicates that the most productive deposits, North and New North Mt Farrell, lie in a corridor of prominent through-going NW-trending features⁵, which may somehow have produced favourable dilation in the NNE-trending fractures that host the lodes. The zone south of Dutton's workings is in an analogous setting adjacent to the HFZ and was partly tested by EZ's 1949-50 shallow to moderate depth drilling program up to 500 m south of Dutton's workings (Randell et al., 1986). The eastern side, adjacent to the Farrell Fault between the Central Farrell and North Murchison Extended workings, is apparently untested by drilling. This highly speculative photo-interpreted structural association would at best provide a broad, kilometre-scale, zone of prospectivity - not precise exploration targets.

Deposit scale structure as an exploration targeting method

There is a dearth of detail on the deposit-scale structural set up. McKibben's abstract (1968) briefly mentioned that 'the lodes fill NNW to NNE trending fractures' but the single page (p.20) he devoted to structural description is missing from Bass Metals' .pdf copy of his thesis.

Angela Lorrigan's preliminary geologic interpretation (1991) cited earlier work by Groves & Noldart (1965) indicating that better ore tonnages came from areas of intersecting shear zones.

Lorrigan (1996) subsequently reported that: 'The lodes are found in zones of structural disruption marked by kink folding adjacent to planar faults filled with graphitic pug and quartz carbonate (predominantly siderite) veining.

⁴ This photo-linear interpretation is available in MapInfo; in files named: 'farrell WHv3.wor' and 'MiscPhotoLinearsWH.TAB', which are stored in 'DATA on mainserver' (Z:\EL47_2003_Tullah_Farrell\Mapinfo) at Bass Metals' Hellyer exploration office.

⁵ Not necessarily faults.

The ore is found within the fault zones and in quartz-carbonate stringers next to them. ...it appears that the kink folding post dated ore deposition'.

However, in testing the shallow resource potential at New North Mt Farrell, Lorrigan (1996) experienced difficulty 'in correlating between outcrop and drill holes and between drill holes', reflecting 'the highly faulted and deformed nature of the geology. In most cases the main lodes could be matched up but subsidiary mineralized structures appear to be very discontinuous'.

Pasminco's 1996 cross sections, presumably adapted from original mine sections, illustrate the general distribution, extent and discontinuity of the mineralized lodes (Figures 4, 5 & 6). The two or three main lodes at New North Mt Farrell existed in a 'lode channel' of about 10 to 30 metres wide (Figures 4 & 5), whereas at North Mount Farrell there were five major lodes spread across an 80-metre-wide zone (Figure 6). The cross-sections depict the lodes as thin planar bodies, semi-continuous down dip, but they do not show any obvious thickening and enrichment associated with fault splays or intersections, or slight changes in dip (Figures 4, 5, 6).

The geologic level plans of North and New North Mt Farrell Mines, existing in Bass Metals' collection, generally display only the mine drives, a few strike and dip symbols and black lines marking non-differentiated shears and 'shears carrying galena'. However, they are uniformly deficient in showing lode and stope outlines and geologic 'interpretation'. Nevertheless, Mike Blake in 2007 has made a fair attempt at interpreting those skeletal data (e.g. Figure 7) to suggest that wider or richer mineralized zones and broader stopes were partly controlled or limited by intersections of NNE and NNW trending faults (Blake, 2007b). Even so, it is clear that not all fault intersections are associated with productive lodes (e.g. Figure 7).

Furthermore, the obvious complexity of brittle-ductile structures in the Farrell Slates adjacent to the Henty Fault Zone, and the understandable lack of knowledge of the precise locations of such faults, makes that interpreted structural control impractical as a predictive exploration targeting technique - those small faults and shears would be more difficult to detect than the mineralized lodes themselves.

Mike Blake (2007a) observed a 'mineralized' (presumably galena-rich) vein on the western limb of a small anticlinal fold (plunging 30° to 210°) in the North Farrell open cut workings. That appears to be analogous to Purvis' (1995) interpretation of a non-sulfide-mineralized siderite lode intercepted by drill hole TF1 in an anticlinal axial zone about 500 m further south⁶. This concept also fails as an

⁶ TF1 is an 813 m diamond core hole drilled through the entire Farrell Slate sequence at 5378500N. Pasminco (Purvis, 1995) considered the Farrell Slates to be the waning stage of the Murchison Volcanic cycle, and the hole was designed around that conceptual target, to test 'the VHMS potential at depth on the Farrell Slates-Murchison Volcanics contact in the poorly known area east of the Farrell Mines.' Ninety metres east of the HFZ it intersected a 10-m-wide strongly foliated shale interval with non-mineralized siderite veins, which Purvis (1995) reasonably interpreted as the southward projection of the Farrell Lode position. Numerous facings and oriented cores contributed to a

exploration targeting method: poor outcrop makes it difficult to map the folds, the impersistence of lodes suggests that not all anticlinal zones are mineralized, and Purvis' TF1 experience demonstrated that at least some anticline-hosted lodes are barren.

Owen Parfrey re-mapped outcrops in the Farrell area as part of Pasmenco's 1999-2000 grid based partial leach soil geochemical program, and compiled 'all other mapping completed by Pasmenco' at 1:5000 scale (McNeill and Simpson, 2000). The resultant 'outcrop geology' map is essentially a lithologic map with little structural data, and no litho-stratigraphic or structural interpretation.

However, my impressions from a traverse between New North and North Mt Farrell mines are that the outcrops are sparse and inscrutable. Given the small-scale complexity revealed by the near-perfect outcrops of Farrell Slates in the Mackintosh Dam spillway, I believe it would be delusional to suppose that the structural controls on the Farrell lodes can be unraveled by further surface mapping.

In summary: although the district scale distribution of deposits indicates dominantly structural controls adjacent to the major bounding faults, the individual lode-scale structural controls are poorly known, apparently complex, and difficult to apply in a predictive sense for targeting exploratory drilling.

Existing inferred resource estimates

Lorrigan (1996) noted that a 'measured resource' of 71,000 t @ 12.3 % Pb, 4.8% Zn, 0.24% Cu and 378 g/t Ag exists 250 m below surface, and within about 75 m below level 9 in the New North Mt Farrell Mine workings (Figure 10). This estimate is apparently based on about 23 holes drilled down-dip of three lodes stoped on level 9, and apparently reported in a May 1985 EZ Company memorandum cited by Lorrigan (1996). Lorrigan commented that the intercepts were typical of the Farrell area and that they represented the variability of the mineralised zones. However, (probably because the data was reported internally as a company memorandum) Bass Metals does not have the data to confirm the estimate.

Saracen, however, attempted to confirm and extend this deep resource with an eight hole surface drilling program totalling 2,450 m in 2005-06 (Habets, 2006). Figure 11 shows the distribution of those holes in long projection⁷ and Table 1 lists assays of the lode zone intercepts in the four deepest holes. Although only one hole intersected the deep inferred resource, the results were generally

structural reconstruction that indicates the lode position is in the 70° west dipping axial zone of an overturned anticline. A minor mineralized zone (2 m @ 0.1 Pb, 0.3 Zn) exists in black shale, downhole about 20 m east of that barren lode position. However, the best intercept in TF1 was at 667 m (1 m @ 2% Pb, 50 g/t Ag) in a quartz-siderite vein in pumiceous quartz crystal-rich sandstone near the eastern margin of Farrell Slates. Purvis interpreted it to be the same unit that hosts the lode at Murchison mine, which however is 2 km further south and 600 m up dip.

⁷ Turner (2008) noted that Saracen had problems relating the old Farrell grid and mine data to AMG but I assume that they eventually resolved them, and that the intercepts shown on Figure 11 are in approximately correct spatial relationship to the lodes and previously inferred resources.

disappointing, suggesting that EZ's 1985 approximation may have overestimated both tonnage and grade of this zone.

Table 1 Saracen drill hole intercepts of the lode zone beneath New North Mt Farrell mine.

Hole	From (m)	To (m)	Int. (m)	Width (m)	Pb %	Zn %	Ag g/t
FDD02	313.5	321.0	7.5	4.8	0.52	0.15	11
FDD04A	343.1	347.5	4.4	3.1	0.02	1.08	2
FDD06	364.0	365.7	1.5	1.5	1.25	6.46	53
FDD07	377.7	378.25	0.55	0.5	0.03	2.55	5

Purvis (1995) emphasized that mining at Mt Farrell had very selectively extracted Pb-Ag ore and avoided Zn-rich lodes – purportedly because Zn was less valuable and it reduced Pb recovery. He speculated that the 'mined' grade of 2% Zn understated the actual average zinc grades, which may have been up to 4-8% Zn. Purvis excitedly pointed to several non-mined and inadequately tested Zn-bearing drill intercepts from Level 6 in the New North Mt Farrell mine (1.5-5.3 m @ 3-20% Zn; weighted average ~6%) as exemplifying the potential for remnant Zn-lodes. If that exemplary Zn-zone extends for 100 m along strike and down dip at an average 3 m width, it might contain about \$8million worth of Zn.

Saracen targeted that zone with their hole FDD05, which apparently lifted more than planned and inconclusively intersected the lode at about Level 5 (Habets, 2006). The lode zone intersected by FDD05 returned generally low Zn values and two separate narrow intercepts of 1.5 m @ 1.8% Pb, 0.04% Zn, 46 g/t Ag and 0.2 m @ 7.03% Pb, 0.01% Zn, 100 g/t Ag. Although FDD05 was an inadequate test of the Level 6 Zn-rich zone, it again underlined the variability of this deposit.

Likewise, Lorrigan's (1996) preliminary evaluation of the shallow resource potential also indicated narrow widths and discontinuity between the North Mt Farrell and New North Mt Farrell mines, and metal grades roughly about half of the historical production from those deposits⁸.

The Saracen deep drilling and Pasmenco's shallow drilling data at New North Mt Farrell all emphasize the long-recognized grade-variability and discontinuity of the Farrell deposits - and the consequent unpredictability of exploration by 'step out' drilling on this field.

⁸ Turner (2008, p.9) enigmatically concluded that 'There is limited evidence to suggest that the grades of future drill hole targets would be higher than the grades recorded during production from the...mines.' However, I think she meant the converse – her own discussion of the drilling data noted the intersected grades were lower than production.

Geophysical and Geochemical approaches

Pasminco carried out an extensive 25 x 200 m spaced 'partial leach' (MMI) geochemical soil-sampling program that covered 9 kilometres of strike of the Farrell Slates and Murchison Volcanics from the north end of the Farrell mining field to Sterling Valley mine (McNeill and Simpson, 2000). Most of the resultant anomalies were attributed to 'significant cultural contamination' related to the Farrell mines (e.g. Figure 12) so all data from samples within 100 m of roads and mine workings were eliminated from the interpretation. The only other significant 'Pasminco-sized' anomaly, located near Turleys prospect at the Farrell Slate-Murchison Volcanics contact 2 km SSW of the Murchison River Bridge, was named Tullah Bluffs. Pasminco carried out infill soil sampling on this anomaly and found continuity of the partial leach anomaly but low metal values in total digest soil analytical data, which were interpreted to indicate that the partial leach anomaly was related to a buried source rather than a surface mineralized zone. They tested it with drill hole TBD2 (collared at AGD66 384714E 5373591N, 443 m, inclined at -50° to 098°), which intersected only a few scattered short intervals of <0.5% Pb+Zn, mainly in Murchison Volcanics.

That partial leach geochemical program appears to be the only extensive soil sampling survey carried out over the Farrell area in the past 25 years. McNeill & Simpson (2000) briefly tabulated soil geochemical surveys by EZ Co. in EL 1/62 during 1979-80, which may have been largely focused along the Henty Fault Zone and Sterling Valley, but I have not attempted to review those data.

In my opinion, shallow dispersive soil geochemical techniques would be ineffective in the Farrell area, firstly because of contamination from mining, and secondly because of the narrow nature of the lodes, thin soils and shallow weathering profiles. Pasminco's partial leach program highlighted the contamination problem (Figure 12). Power-auger sampling of C-horizon bedrock might overcome that contamination but the narrow fissure-lodes, generally without disseminated-mineralized haloes, can be expected to have very narrow primary geochemical haloes, probably less than metre-scale. This bedrock sampling geochemical approach, analogous to surface rock chip sampling, would probably generate numerous spotty anomalies, bearing no relationship to widths, tonnages and grades of potential sub-surface lodes. Hence, it would produce exploration 'red herrings' rather than positive drilling targets.

Likewise, the thin, fissure-related, discontinuous character of the vein-lodes, the apparently irregular distribution of sulfides in them, and the general lack of disseminated-altered haloes combine to make them difficult to detect by geophysical means. Their lack of magnetic contrast and narrow steeply-dipping configuration makes the lodes unattainable by magnetic and gravity surveys. Although locally electrically conductive, the Farrell Pb-Zn-Ag lodes would not be expected to have high 'conductance' or chargeability, therefore not amenable to EM, IP, or resistivity surveys. The conductivity and possibly chargeability of the locally graphitic-pyritic Farrell Slate

host rocks further obscures their electrical geophysical responses and complicates interpretation. Self-potential (SP), although not much used in modern times, might detect some shallow partly weathered sulfide rich lodes, but it would also be ineffective on small lodes of poor electrical continuity.

In an 11-page section of their annual exploration report for Pasminco, Weber et al. (1997) comprehensively reviewed previous geophysical data from the Tullah-Farrell area. They intricately, described EM, IP, and SP surveys dating from the early 1950s, magnetic surveys in the 1980s, and gravity in the 1990s.

I have not undertaken the laborious research to re-evaluate the extents and results of those many surveys, but I believe it is safe to assume that EZ and Pasminco would have followed up untested anomalies (if there were any) in any settings favourable for Farrell-type lodes.

Two combined Turam and SP surveys in the 1950s designed to locate extensions to lodes at the North Farrell mines defined 'two strike extensive conductors'. Weber et al. (1997) noted that anomalous SP responses were coincident with the EM features. One of these coincident anomalies was tested by holes TP133 and TP134 (~400 m north of the New North Mt Farrell deposit), which intersected 'lode shear and black slates with pyrite'. Subsequent Max-Min EM, UTEM and SIROTEM surveys in the Murchison Mine, Tullah Flats and Lakeside areas during the 1980s, mainly carried out by Billiton, generated several anomalies, which were mostly attributed to conductive shales.

However, there was apparently some disagreement over the conductivity of the Farrell Slates in general. Weber et al. (1997) criticized Billiton's statement that 'the Farrell Sequence are [sic] not graphitic and therefore should only be conductive if sulfides are present' as being 'very unrealistic' because the 'Farrell slates are graphitic'. However, they did concede the cause of the conductivity was unresolved, because petrophysical studies of cores from drill hole SR2 (Sterling Valley) had shown that 'only intensely deformed Farrell slates have low resistivity'.

The empirical association between Farrell lodes and 'zones of structural disruption' has been noted elsewhere. Even so, I do not consider that Weber et al.'s observation of low resistivity in deformed slate points to a reliable EM-based targeting method by detecting conductive deformed zones as proxies or hosts for Pb-Zn-Ag lodes – the zone of deformation along the western edge of the Farrell Slates adjacent to the Henty Fault extends for kilometres.

Previous drilling

Figures 8 and 9 show the plan-view distribution of existing drill hole collars and traces over the Farrell mining field north of Murchison River. Figure 1 shows the distribution of drill hole collars southwards to Sterling Valley Mine. There is a high density of drill holes that tested the Farrell line of lodes over about 2.5 kilometres of strike from the North Mackintosh prospect south to about 0.5 kilometres south of Dutton's prospect. Most of them are shallow, generally intercepting the favourable Farrell zone less than 50 or 100 metres below surface. Apart from Saracen's seven holes, the only other exception is Purvis' (1995) hole TF1, which was designed to test the *eastern* contact of Farrell Slates and passed through the Farrell line of lode about 200 m below surface.

There are only half a dozen holes in the 2 kilometres of strike between Dutton's and the more intensively drilled Lakeside prospect, and most of them were targeted on the Henty Fault Zone rather than Farrell lode-type targets. There is a patchy distribution of many holes between Lakeside and Sterling Valley Mine, but these again were drilled on various HFZ or other geophysical and geochemical targets, not specifically for Farrell-style lodes.

The eastern line of lodes, along Farrell Fault over the 2 kilometres of strike between Central Farrell and South Murchison prospects, is virtually untested other than four holes at the Murchison River Mine. Apart from the deposit at Murchison River, the Farrell type lode intersected in Purvis' TF1 (1.8 km to the north; 1 m @ 2.2% Pb 50 g/t Ag) points toward lode-type prospectivity along the eastern edge of the Farrell Slates.

Clearly, there are many gaps in potentially favourable lithostratigraphic-structural settings along both margins of the Farrell Slate north of the Murchison River. I subjectively rate these zones as having moderate to high prospectivity for *small* Farrell type deposits, say up to about 200,000 t @ ~10% Pb+Zn and ~200 g/t Ag. However, in the absence of reliable structural or geophysical targeting methods, their findability factor is only low to moderate – even given plenty of drilling persistence. That low findability factor is based on the known discontinuity and grade and thickness variability of the target lodes, and the observation that the previous shallow but fairly close-spaced drilling did not apparently lead to economic discoveries.

Blake's (2007b) proposed \$3 million drilling program aimed to test some of the gaps in the long projection of the (western) Mount Farrell line of lodes, over 2½ km of strike down to depths of about 400 m below surface. His proposed holes were mostly spaced at 50 to 100 metre centres, which I think is not excessively close, considering the discontinuities in stoped ore at New North and North Mt Farrell Mines, where there are non-economic zones up to 150 m wide (e.g. Figure 11). A 'step-out' blind drilling campaign would require great persistence for 'technical' exploration success, and even greater persistence to prove reserves. Whilst I consider that a Blake-style drilling program has very high likelihood of

snagging a few new lodes, there is also much opportunity for near misses. Furthermore, it would not be straightforward exploration: low-grade or narrow lode intercepts could not be confidently dismissed (because of the inherent variability), and more promising fortuitous intercepts may prove to have short extents and low tonnage potential.

Exploration potential of the southern part of EL 47/2003

The southern part of EL 47/2003, south of the Murchison River extends from the Mt Black and Sterling Valley Volcanics east across the Henty Fault over the Murchison Volcanics and the (Cambrian) Murchison Granite. This area has also been the subject of extensive and intensive exploration programs, semi-continuously over the past 30 years for a variety of deposits mainly including volcanic hosted massive sulfides, Devonian Farrell-style lodes, and Henty Fault-related Au ± As-Sn deposits. There was 'technical success' in discovery of the (sub-economic) Lakeside Au-Sn deposit.

In this review, I have not re-examined the results of those programs in detail. However, they were carried out by well-established expert exploration groups mostly connected with Rosebery Mine; initially by EZ Co. under EL 1/62, subsequently by Getty and Billiton in joint venture with EZ, and finally by Pasmenco. The programs benefited from significant experience and continuity amongst some of the exploration personnel; e.g. Gerald Purvis who revisited the area in several incarnations as a geologist for Getty, Billiton and Pasmenco.

The area has been virtually blanketed by TEM, numerous airborne geophysical surveys, and various soil and rock chip geochemical surveys. The explorers developed and boldly tested geological-conceptual targets as well as conventional geophysical-geochemical anomalies. For example: Purvis' (1995) drill hole TF1 was designed to test the concept that the Farrell Slate-Murchison Volcanic contact represented a favourable horizon for VHMS deposits; the hole was drilled to 813 metres and tested the conceptual target zone 600-700 m below surface. Pasmenco were mindful of alteration mapping and routinely used major element alteration indices in recognition of favourable zones.

In their final report on Pasmenco's work, McNeill and Simpson (2000) concluded that: 'Pasmenco have completed a 10 year exploration program over the Tullah (EL 22/90) tenement⁹ on more than 10 prospects, with a total expenditure of approximately \$2.03 million. This program has included reviews of previous exploration, relogging and resampling of old drill core, geological mapping, rock chip and soil sampling, Pb-isotope studies, Heli-borne magnetics and electro-magnetics, gravity, IP, MALM and ground EM surveys, and 5,315m of diamond and 567m of percussion drilling. The work has targeted both Devonian vein style and

⁹ EL22/90 occupied essentially the same area as the current EL47/2003.

Cambrian VHMS mineralisation and has included detailed assessments of known resources (e.g. Lakeside, Murchison Mine, New North Mt Farrell).

During the last year a regional partial leach soil sampling program was completed over the volcanics in the western and northern part of the licence and located several short (<300m) strike length anomalies and one "Pasminco" sized anomaly. The larger anomaly was followed-up with little success and the tenement is now considered to be largely explored, to a depth of 300-400m, for Pasminco sized targets and no further work can be recommended.'

I am inclined to accept that as a valid conclusion. Of course, the area remains moderately prospective. However, at face value, it has been well and thoroughly explored. Future exploration will require a different approach, possibly a new geophysical method, and probably commitment to systematic deep drilling.

Conclusions

Despite three-quarters of a century of production and intermittent exploration over the subsequent 35 years, the Mt Farrell mining field still has moderate to high prospectivity for small tonnage, narrow, fissure-lode type deposits, up to about 200,000 t @ ~10% Pb+Zn and ~200 g/t Ag.

The known lodes are/were dominantly structurally controlled, in a narrow corridor adjacent to the Henty Fault Zone forming the western boundary of the Farrell Slate host unit, and to a lesser-known degree adjacent to the Farrell Fault at the eastern boundary. Unfortunately, the smaller deposit-scale structural controls are poorly understood, and impossible to apply with any confidence in a predictive exploratory approach. The deposits are not amenable to targeting by geophysical or geochemical methods. Accordingly, a blind drilling program, stepping-out from known resources and/or testing large gaps in the long projection, seems the only feasible exploration approach. This would require some luck and great persistence, because the lodes are likely to be small, discontinuous, and highly variable in grade and thickness. Consequently, the findability factor is low.

The southern part of the area has been well explored by expert exploration groups for over 30 years, for a range of deposits including volcanic hosted massive sulfides, Henty Fault-related Au ± As-Sn deposits, and Devonian Farrell-style lodes. It is confidently assumed that no outstanding near surface targets remain, and that future exploration will require new concepts and/or a commitment to systematic deep drilling.

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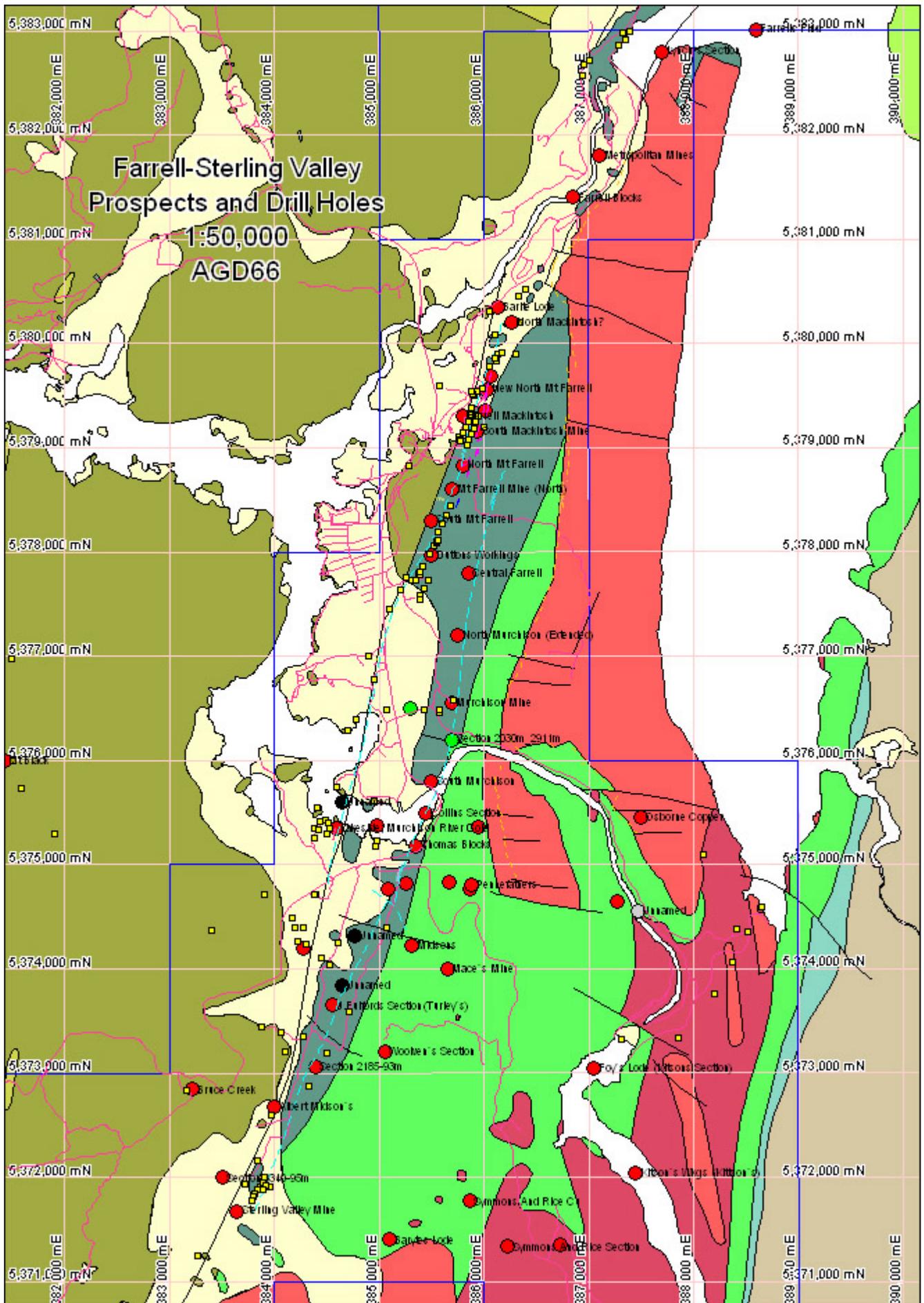


Figure 1 Distribution of major geologic units, mineral prospects, and drill hole collars between Mackintosh Dam and Sterling Valley; 1:50,000 scale. The blue line delineates EL 47/2003.

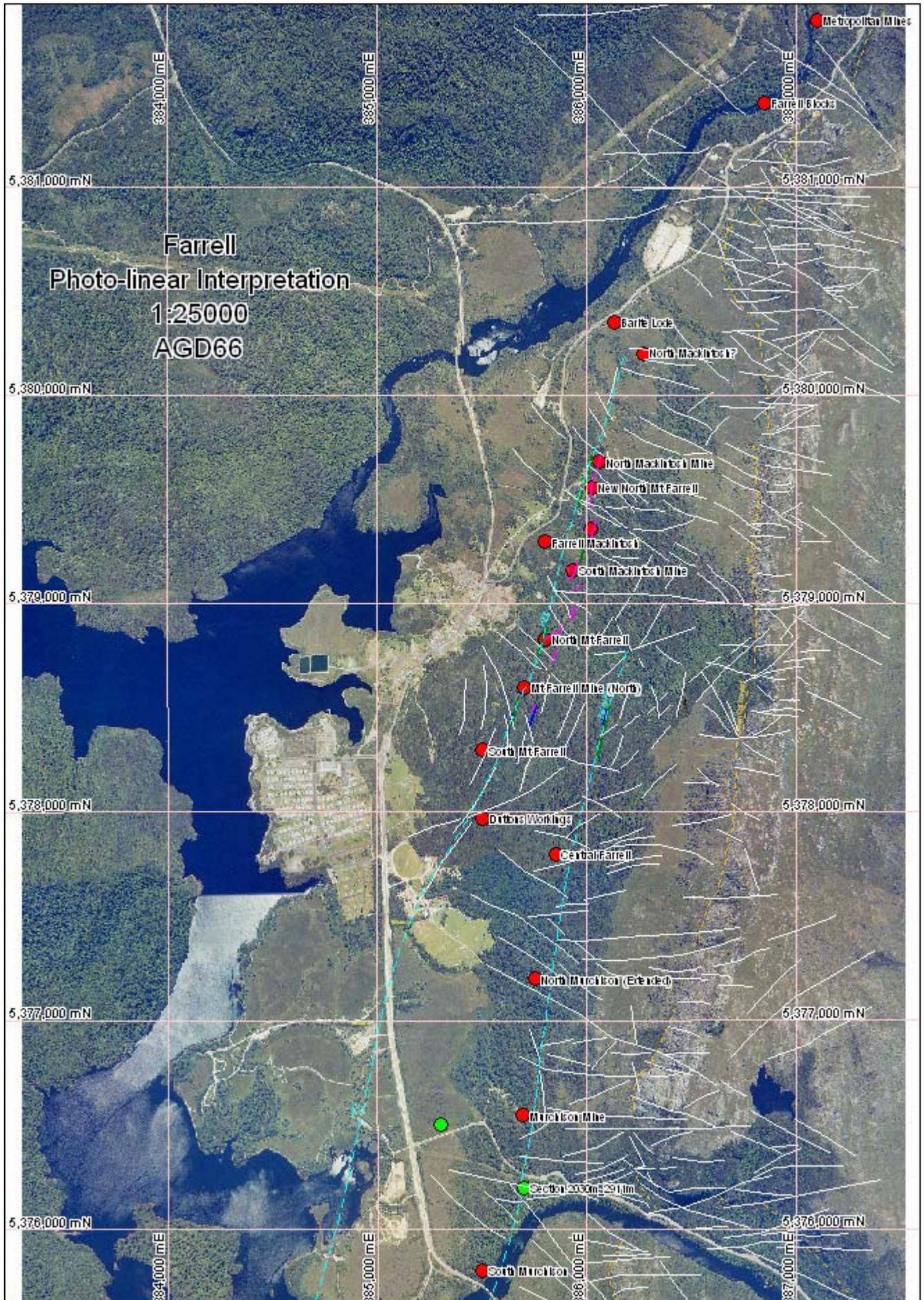


Figure 2 1:25,000 scale orthophotomap of Farrell area showing mineral prospects, surface lodes (pink) and interpreted photolines including faults (white), and the western contact of the Owen Group siliciclastic rocks (orange, dashed).

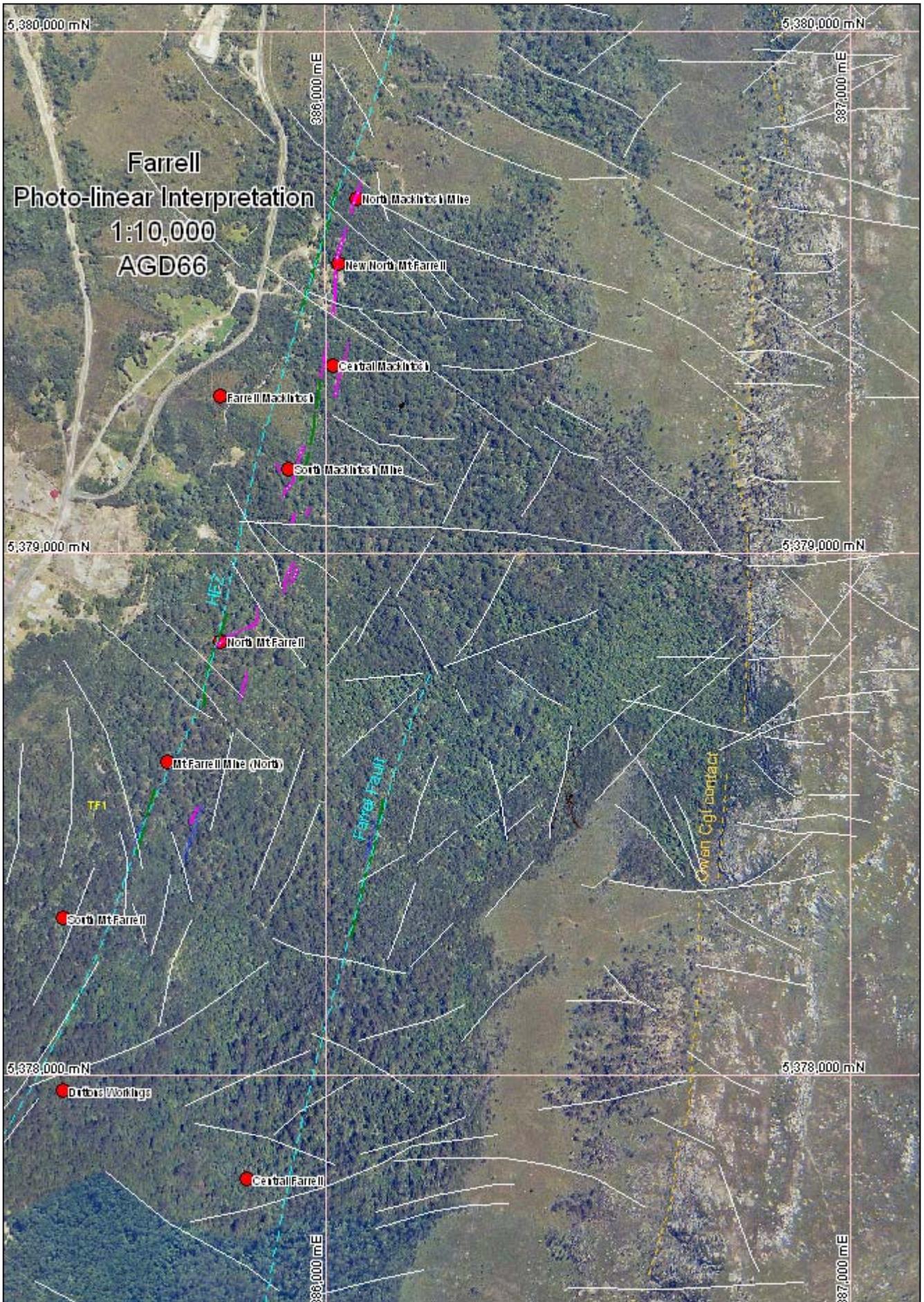


Figure 3 1:10,000 scale orthophotomap of Farrell area showing mineral prospects, surface lodes (pink) and interpreted photolines including faults (white), and the western contact of the Owen Group siliciclastic rocks (orange, dashed).

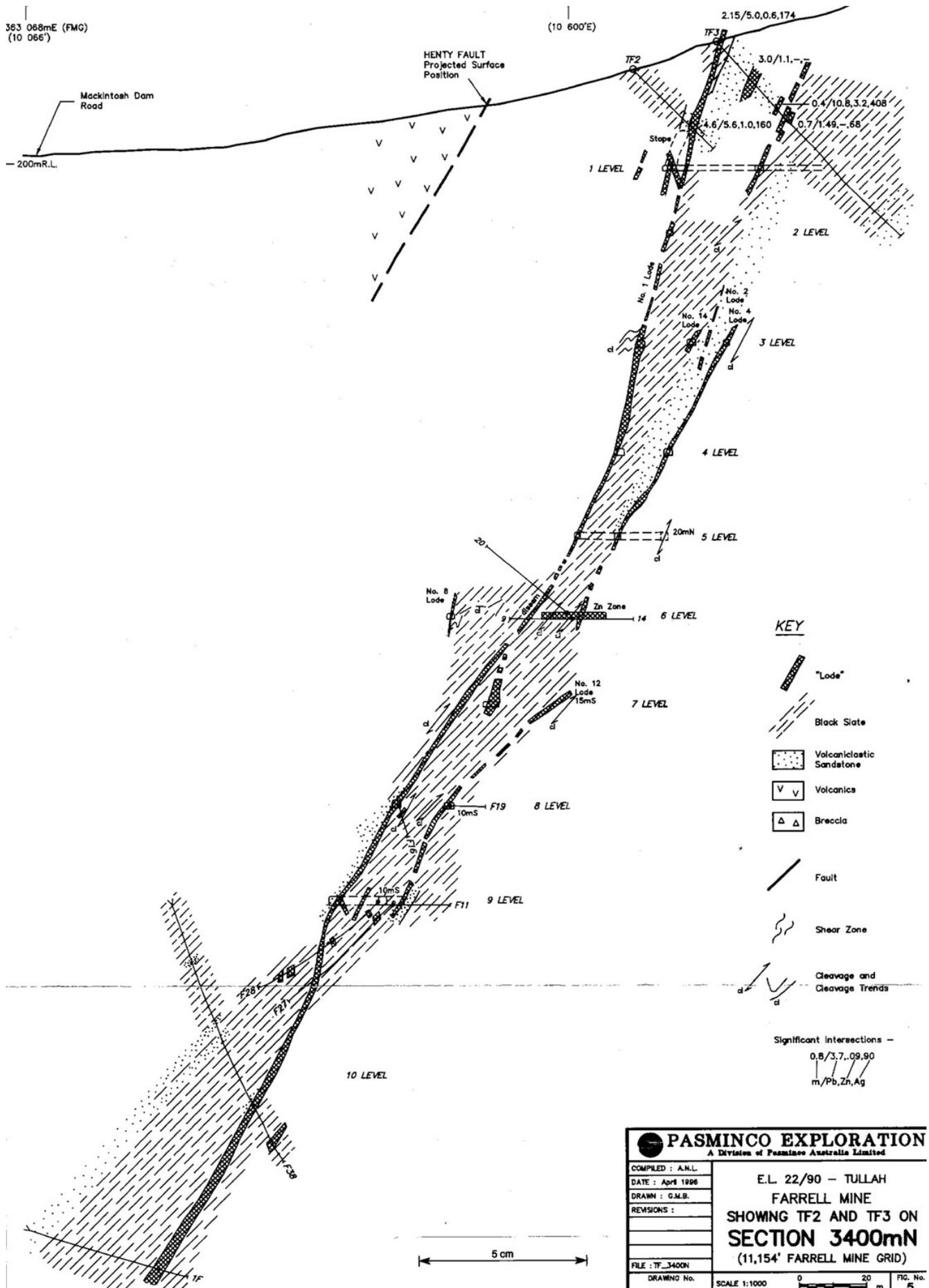
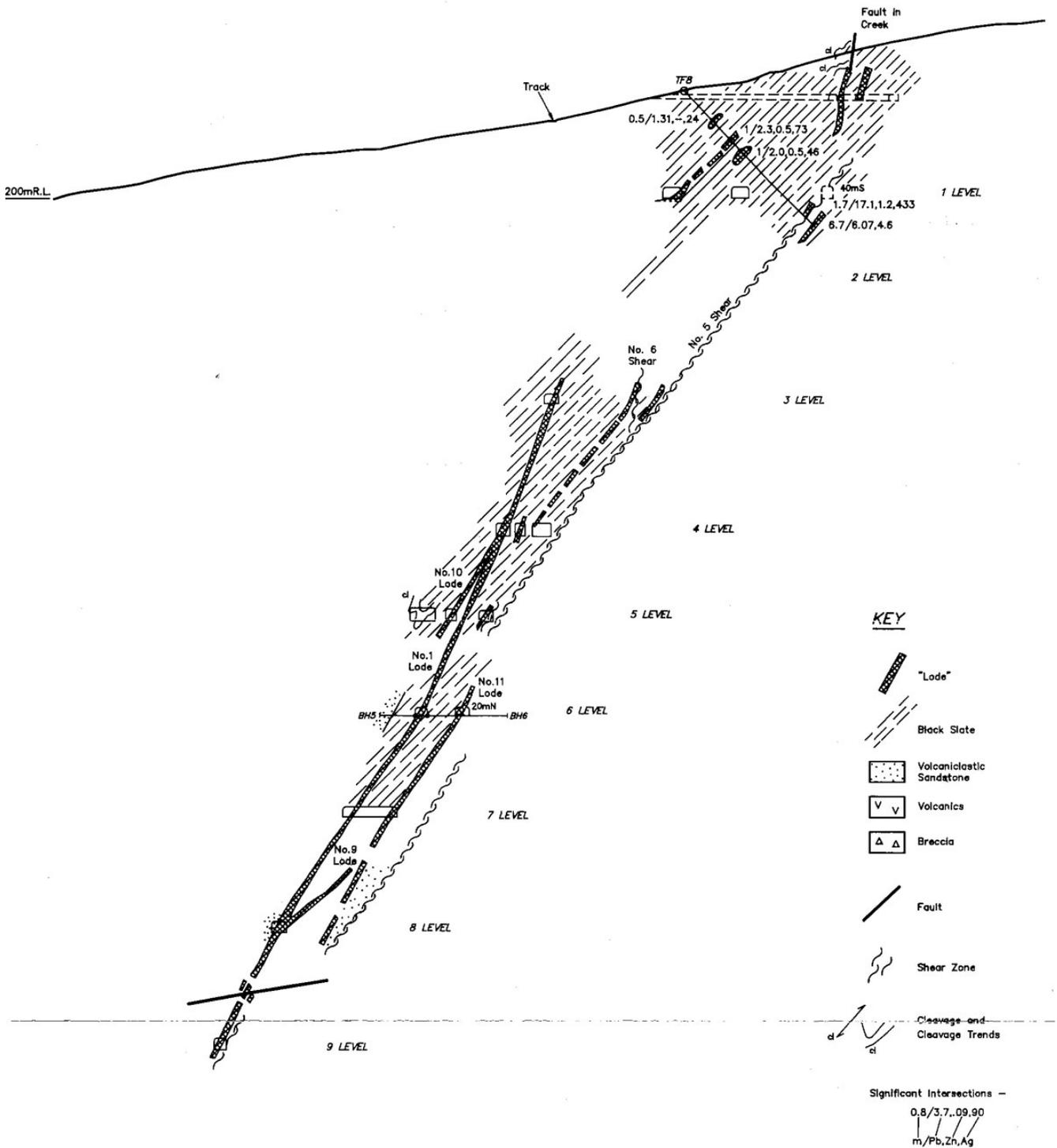


Figure 4 Cross section 3400N through the northern part of the New North Mount Farrell mine (from Lorrigan, 1996).

363 068mE (FMG)
(10 066')

(10 600')



PASMINCO EXPLORATION A Division of Pasminco Australia Limited			
COMPILED : A.N.L.	E.L. 22/90 - TULLAH FARRELL MINE SHOWING DDH TF8 ON SECTION 3200mN (10 498' FARRELL MINE GRID)		
DATE : April 1998			
DRAWN : C.M.B.			
REVISIONS :			
FILE : TF_3200N			
DRAWING No.	SCALE 1:1000	0 20 m	FIG. No. B

Figure 5 Cross section 3200N through the southern part of the New North Mount Farrell mine (from Lorrigan, 1996).

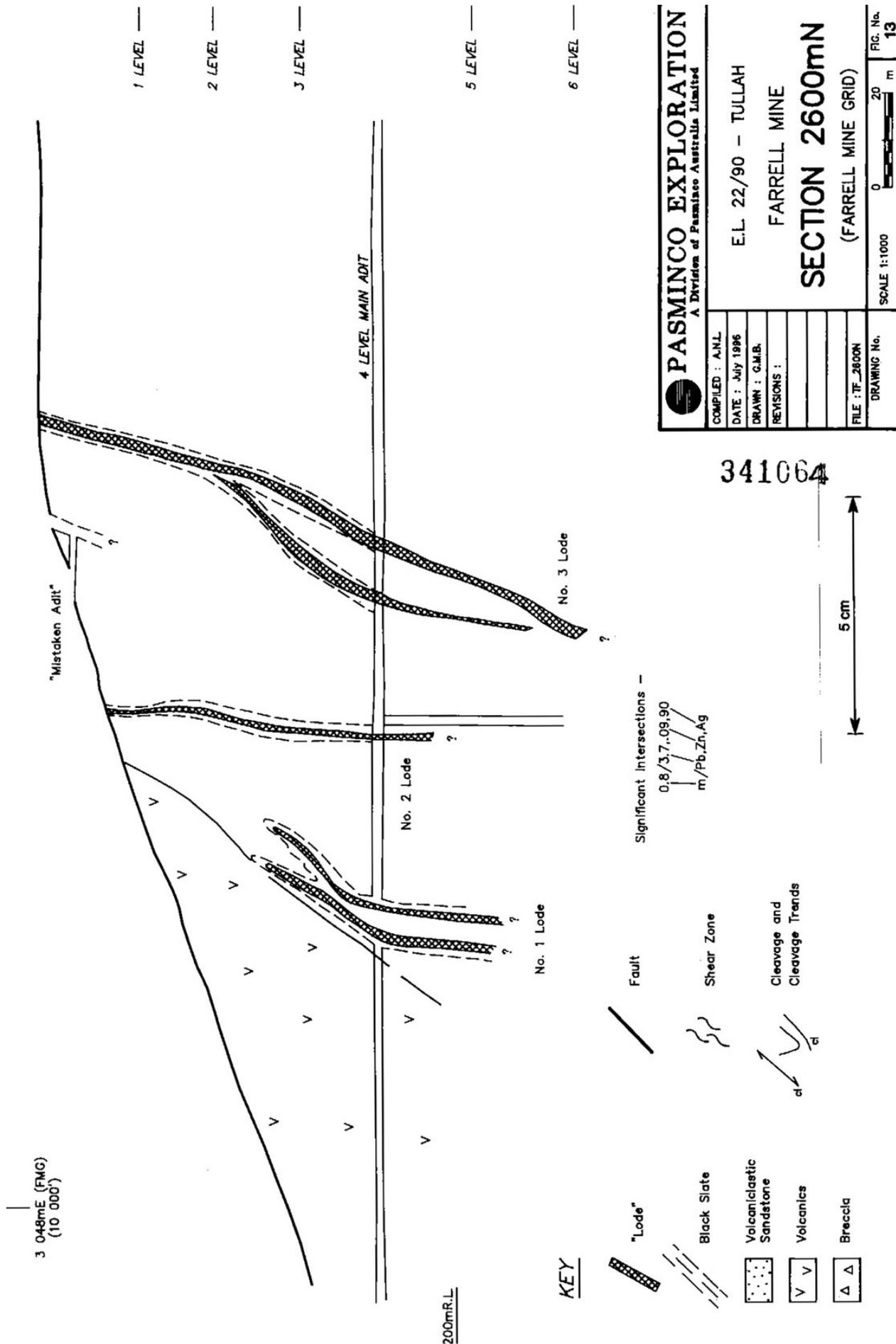


Figure 6 Cross section 2600N through the central zone of the North Mount Farrell mine (from Lorrigan, 1996).

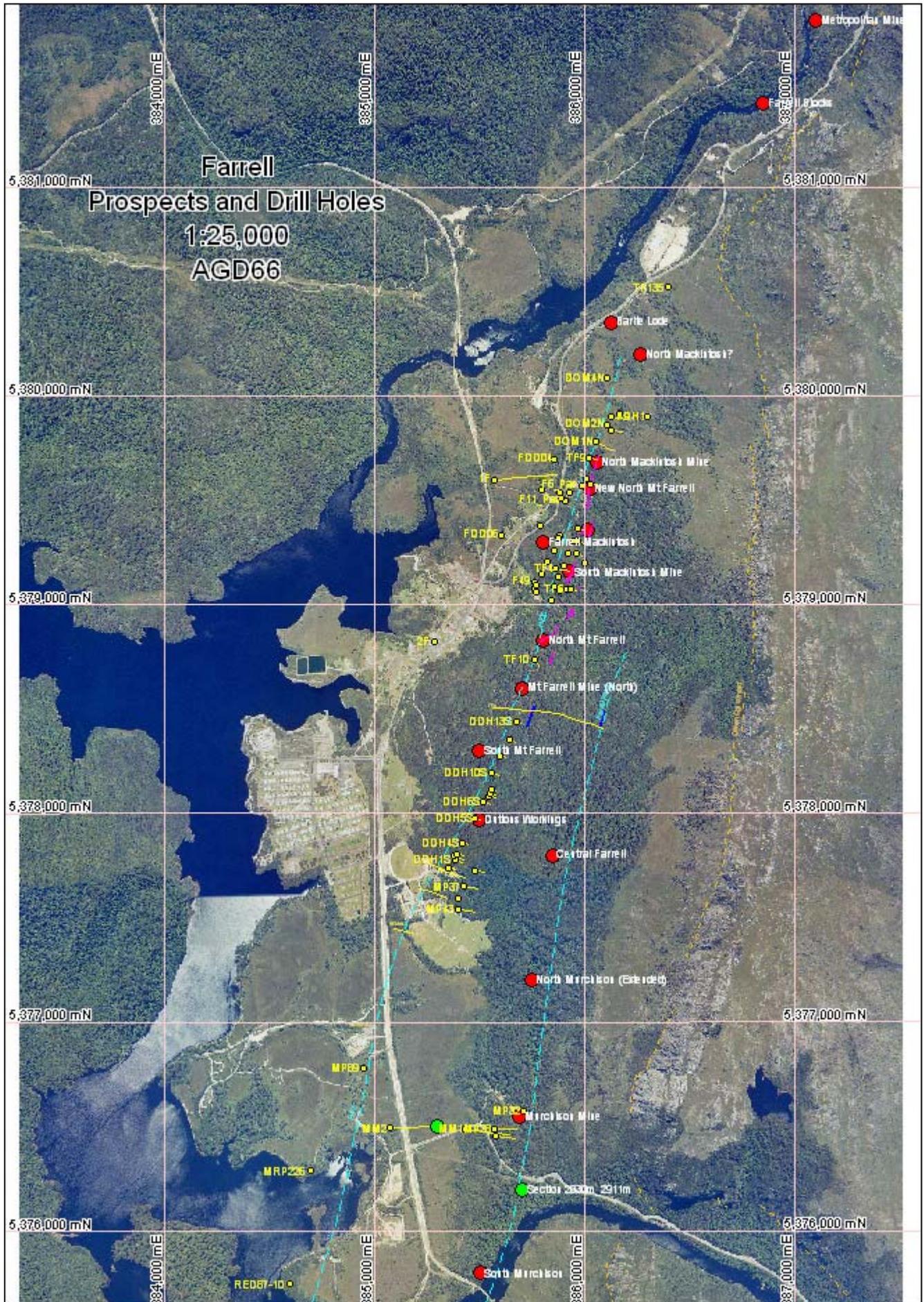


Figure 8 1:25,000 scale orthophotomap of the Farrell mining field showing mineral prospects, surface lodes (pink) and traces of existing exploration drill holes (yellow).

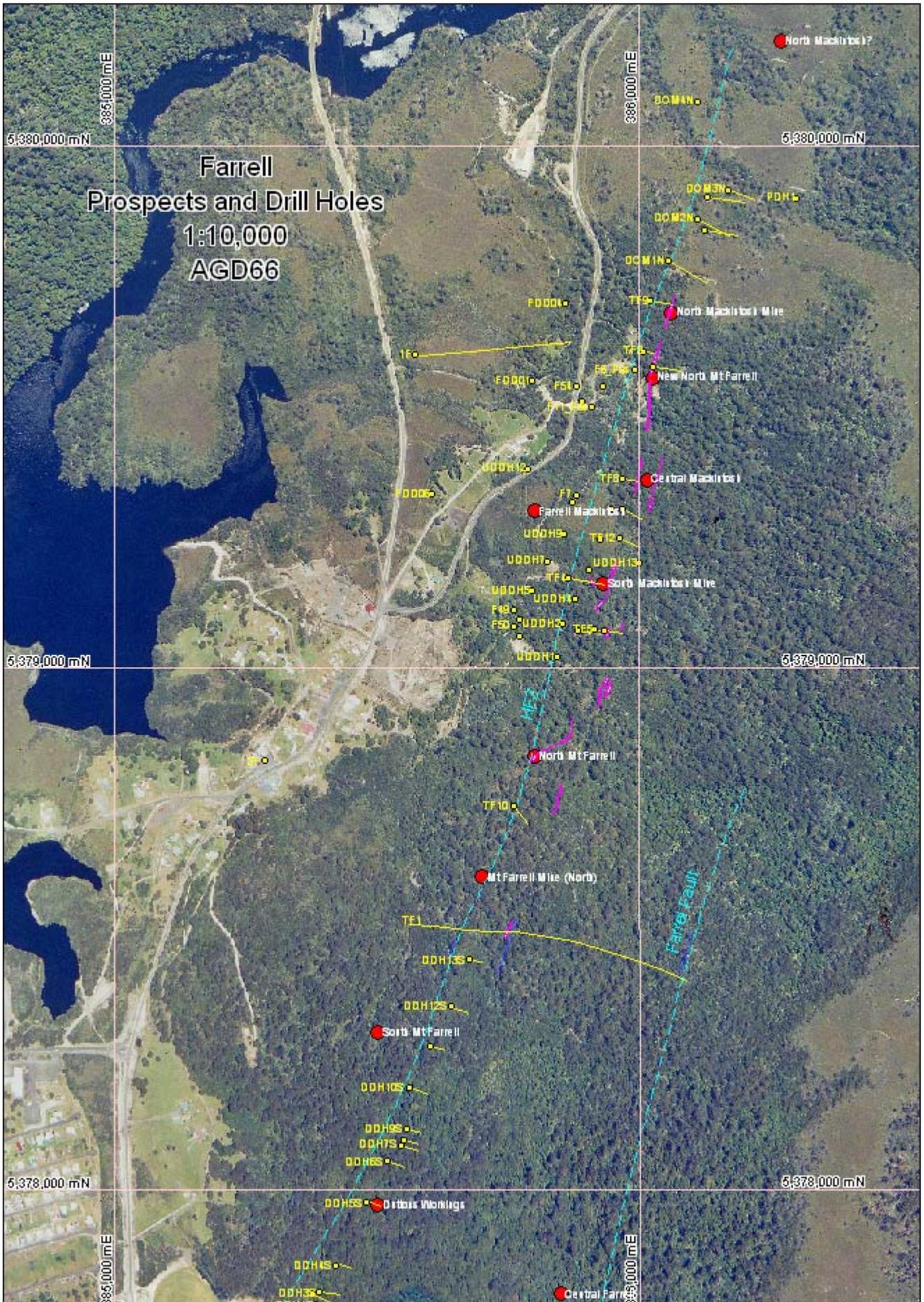


Figure 9 1:10,000 scale orthophotomap of the main mineralized part of the Farrell area showing mineral prospects, surface lodes (pink) and traces of existing exploration drill holes (yellow).

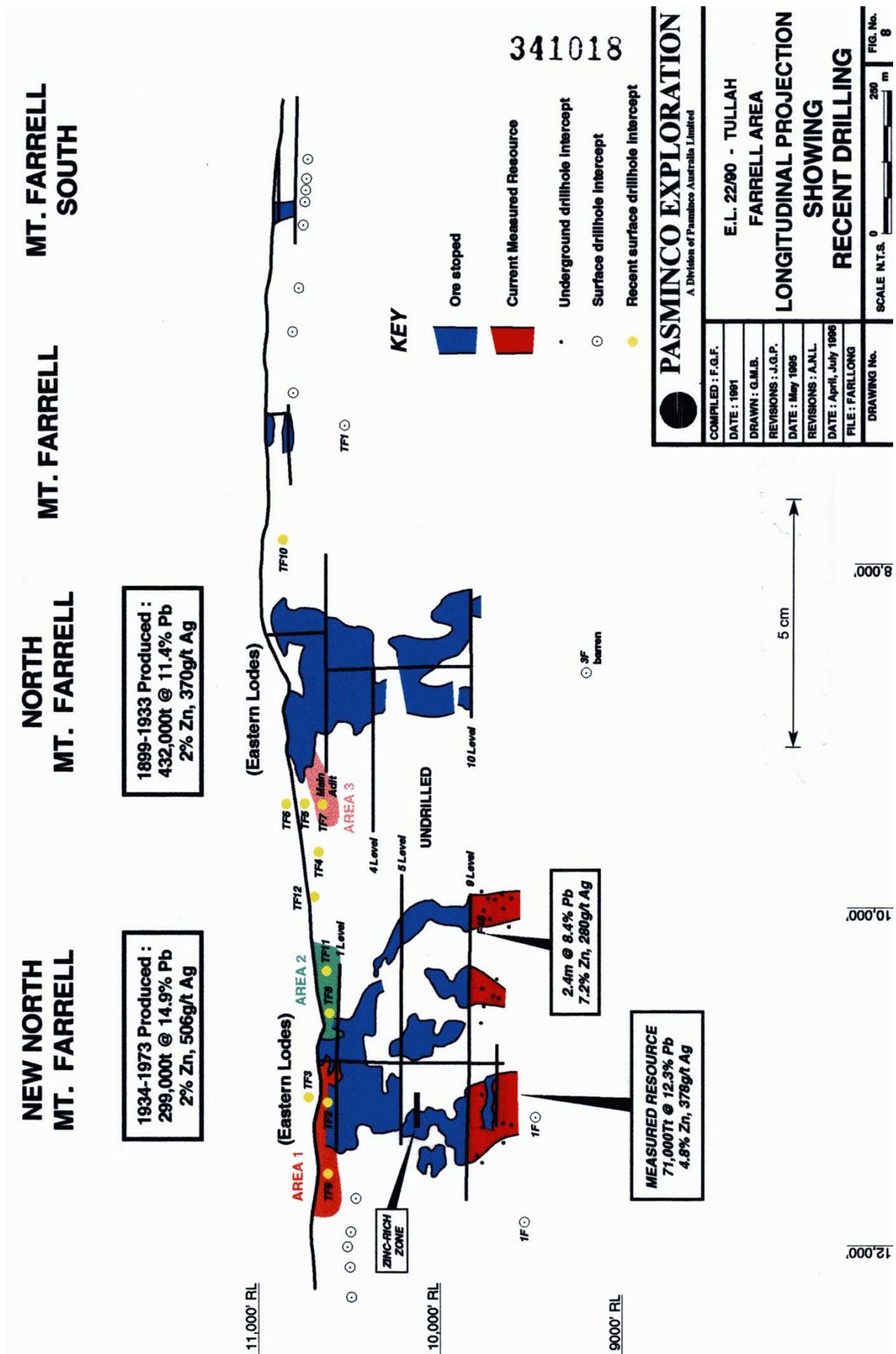


Figure 10 Longitudinal projection showing EZ Co.'s inferred resources and drill hole intercepts at depth below New North Mt Farrell; from Lorrigan, 1996.

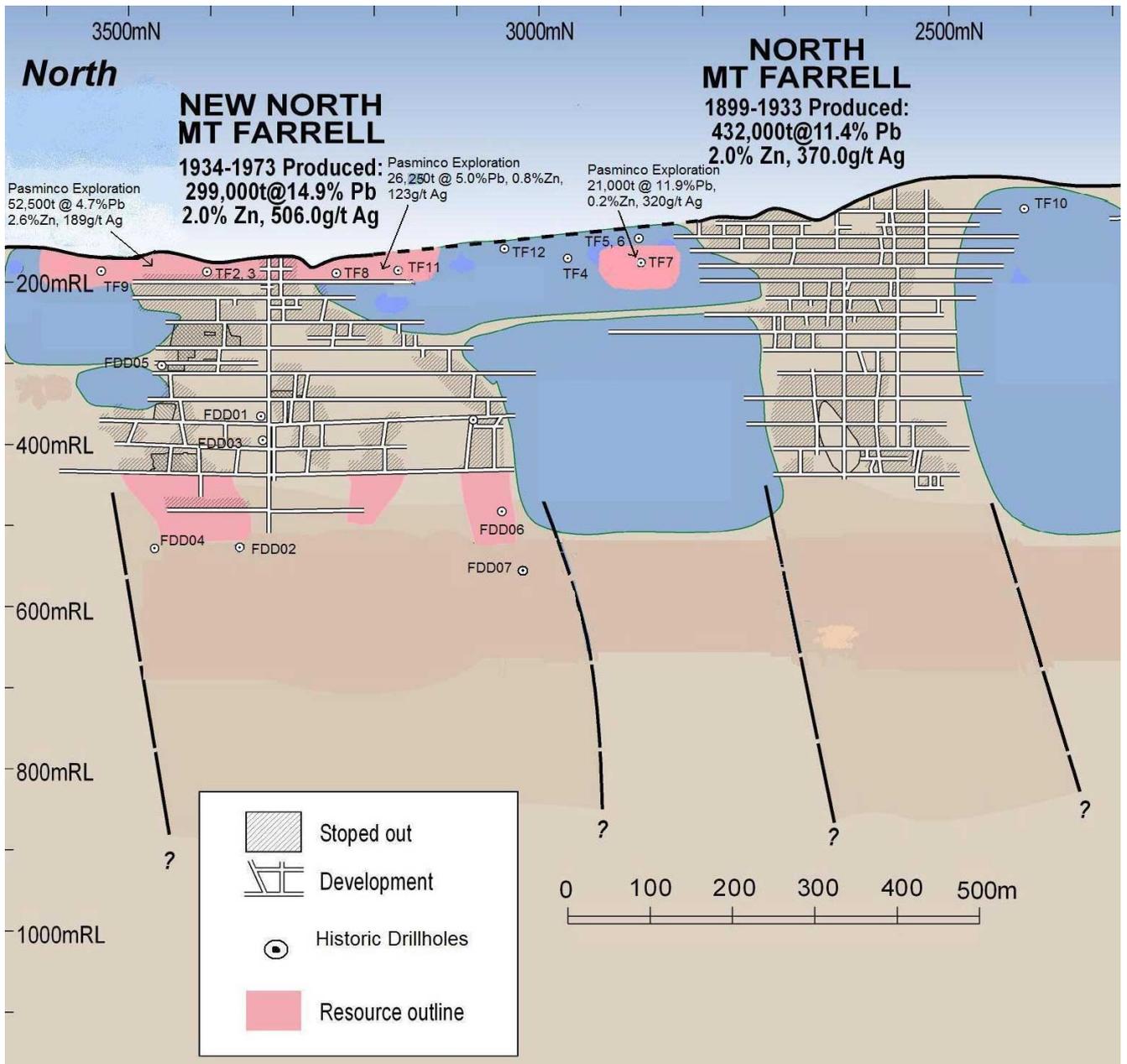


Figure 11 Longitudinal projection of North Farrell mines showing EZ Co.'s inferred resources, Pasmaenco's shallow drill intercepts (TF) and Saracen's 2005-06 deep intercepts (FDD); modified from Turner, 2008.

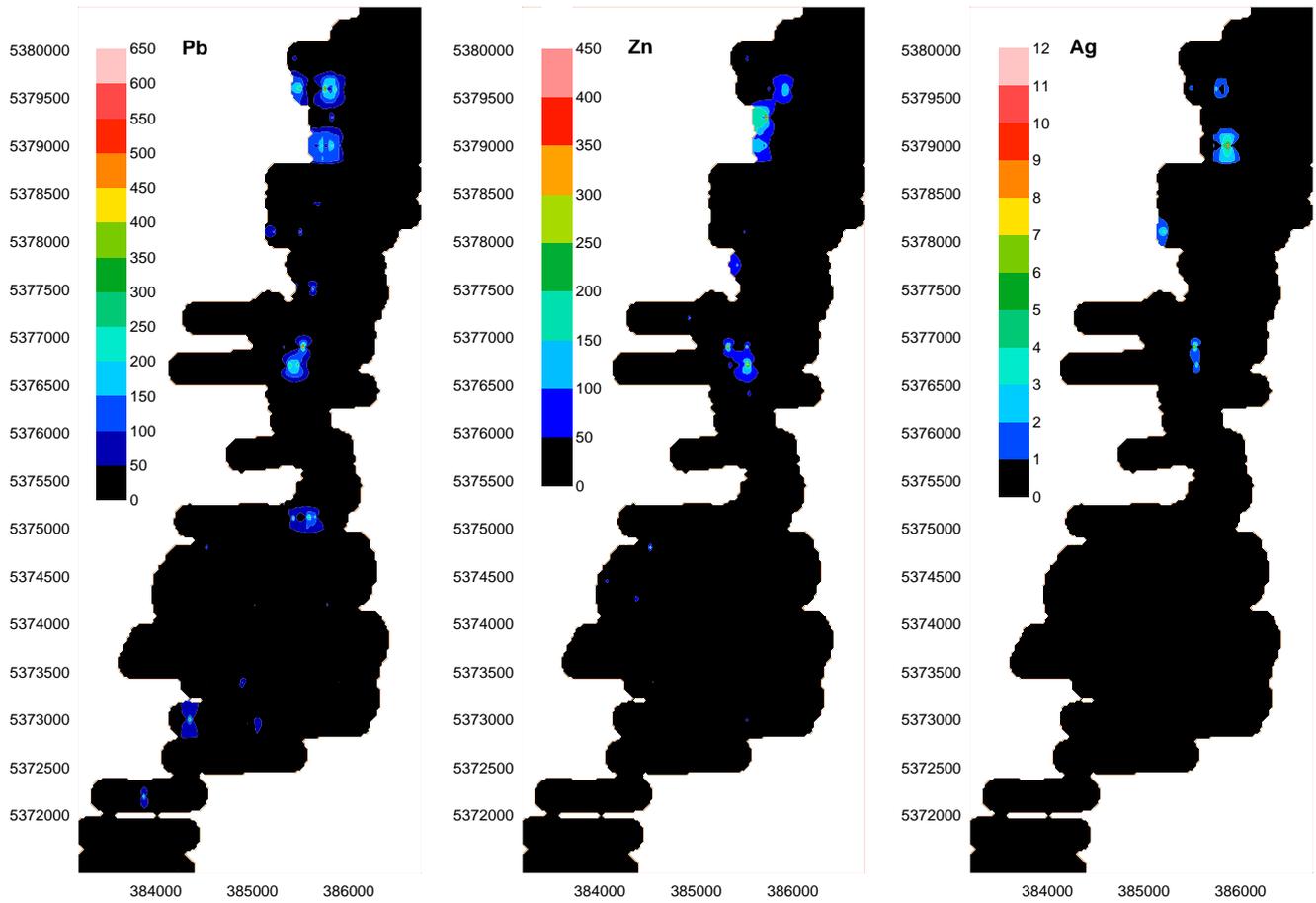


Figure 12 Contour plots of Pb, Zn, and Ag data from Pasmenco's partial leach (MMI) soil geochemical survey over the Farrell Slate and Murchison Volcanics. The prominent Pb (\pm Zn & Ag) anomalies in the northern part of the survey correlate with locations of New North Mt Farrell, North Mt Farrell, Murchison River, and Donoghues mines and were reasonably attributed to 'cultural' contamination. The southern anomaly near 384500E 5373000N was designated the Tullah Bluffs prospect. This was tested with hole TBD2 (443 m), which intersected only several short intervals of <0.5% Pb+Zn scattered throughout the hole; DHEM survey detected a broad response related to conductive Farrell Slates west of the hole.