Moina Gold Pty Ltd

Moina Gold Pty Ltd
Annual Report on Exploration
EL 29/2009 – "Cethana"
September 2016 to September 2017

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Abstract

No fieldwork was carried out on the licence in the reporting year and there are no new results to report.

- Further consideration of the source of the gold at the Bell Mount goldfield
- 3D modelling of the 3D IP data from the Frontier Resources NL survey in the Bell Mount – Higgs area

All historical geological reports (text and plans) describing the source of the gold in the Bell Mount goldfield have been compiled and summarised.

A series of sections at 300m spacings and plans at various depths below surface have been generated to display the 3D IP chargeability and resistivity data superimposed on the known geology.

The conclusions from these two bodies of work is that the most likely source of the gold in the Bell Mount goldfield is from Higgs style gold+semi-massive base metal sulphides which are represented in the 3D IP as anomalous conductivity trends.

Work herein has enhanced the Bell Mount goldfield conductivity anomalies as a high priority drill targets.

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1.0 Introduction

1.1 Exploration Rationale

Moina Gold Pty Ltd is aware of the polymetallic potential of the Moina area, largely a product of the highly fertile Dolcoath Granite, and is exploring for any and all commodities.

In particular the area has proven potential for Au, Ag, Cu, Pb, Zn, Sn, W, Bi, Mo, F and Fe. More conceptually the area may have potential for Y, Nb and rare earths (La, Ce, Nd, Pr and Sm).

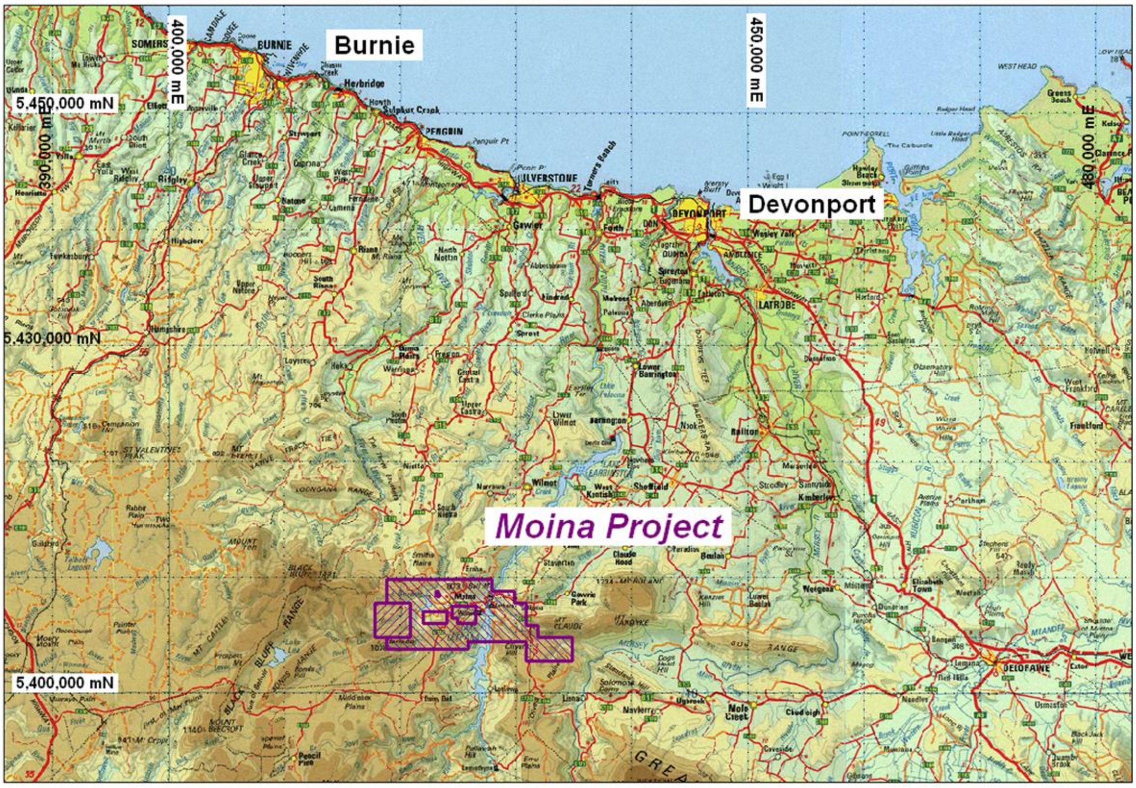

Figure 1.1: Moina Project location in Tasmania's central north.

1.2 Geology

Cambrian quartz+feldspar+biotite porphyry of the Mt. Read Volcanics, Ordovician siliciclastic sediments of the Denison Group and the Devonian Dolcoath Granite form the basement geology to the licence area and are the host and/or source of all potential (hard-rock) mineralisation. A veneer of Tertiary basalt covers this basement geology over much of the licence area.

In the central south of the licence the Cambrian rocks consist of quartz+feldspar+biotite porphyry and felsic volcaniclastics of the Bull Creek Formation. In the northern part of the licence, i.e. north of Machinery Creek Fault and near Mt Jacob, the Cambrian volcanics are from the upper part of the CVC and lowermost Tyndall Group and consist of felsic (commonly quartz phyric) volcanics and volcaniclastics with minor mafic volcanics.

These volcanics are unconformably(?) overlain by the lowermost unit of the Ordovician sequence, the Roland Conglomerate, a siliciclastic quartz pebble conglomerate of 10-20m thickness. The Roland conglomerate is conformably overlain by the quartzose Moina Sandstone which is up to 250m thick. The uppermost (approximately 40m thick) part of the Moina Sandstone is a sequence of interbedded calcareous siltstones with lesser calcareous sandstones and limestone and is known informally as the "Transition Beds". These two units constitute the upper units of the Denison Group. The "Transition Beds" are conformably overlain by the Gordon Limestone which is approximately 400m thick.

The Cambrian-Ordovician sequence has been intruded by the Middle-Devonian Dolcoath I-type Granite with formation of a number of discrete skarn type ore bodies within the "Transition Beds". The granite outcrops on either side of Lake Cethana. Subsurface the granite is known to extend as a spine extending westerly from the area of outcrop as far at least as Stormont.

The Cambrian-Ordovician sequence lies in a broad (~10km wavelength) open east-west trending F1 syncline. This folding occurred early in the Middle Devonian Tabberabberan Orogeny. Superimposed on this F1 fold are west-northwest trending shorter wavelength F2 folds with wavelengths. These folds formed later in the orogeny and are associated with southwest verging thrust faulting. The folded sequence is faulted by a number of known faults also of Middle Devonian age. The recent 3D IP has also suggested the presence of further brittle faults. Late in the orogeny the Dolcoath Granite intruded into this faulted and folded terrain.

Mineralisation in the district occurs in a range of forms and settings with the Higgs workings chasing disseminated to semi-massive Au+Ag+Pb+Zn with commonly a pyrrhotite gangue in biotite hornfelsed sediments and/or gold+pyrite in sandstone. The Round Hill workings targeted Au+Ag+Pb mineralisation reportedly in anticlinal fold hinges. On Tin Spur mining of surface concentrations of Sn and Au occurred at a small scale. Discrete quartz+/-W+/-Mo+/-Bi+/-Sn northwest to west-northwest striking veins have been exploited in old workings (e.g. All Nations, Shepard and Murphy) and have potential in both the discrete form or as a zone of smaller veinlets. Elsewhere in the district the Transition Beds have been shown to host skarns with concentrations of F (Shepard and Murphy), Au+Bi (Stormont, Fletchers Adit) and Au+Zn+Sn (Hugo Skarn).

1.3 Location and access

EL 29/2009 "Cethana" lies in Tasmania's central north and is accessed by a number of bitumen roads including the Cradle Mountain Link Road, Claude Road and Olivers Road (see figure 1.1).

The current licence extends from Mt Claude in the east to Stormont in the west (see figure 1.2).

Access within the licence is by a number of bitumen and gravel roads.

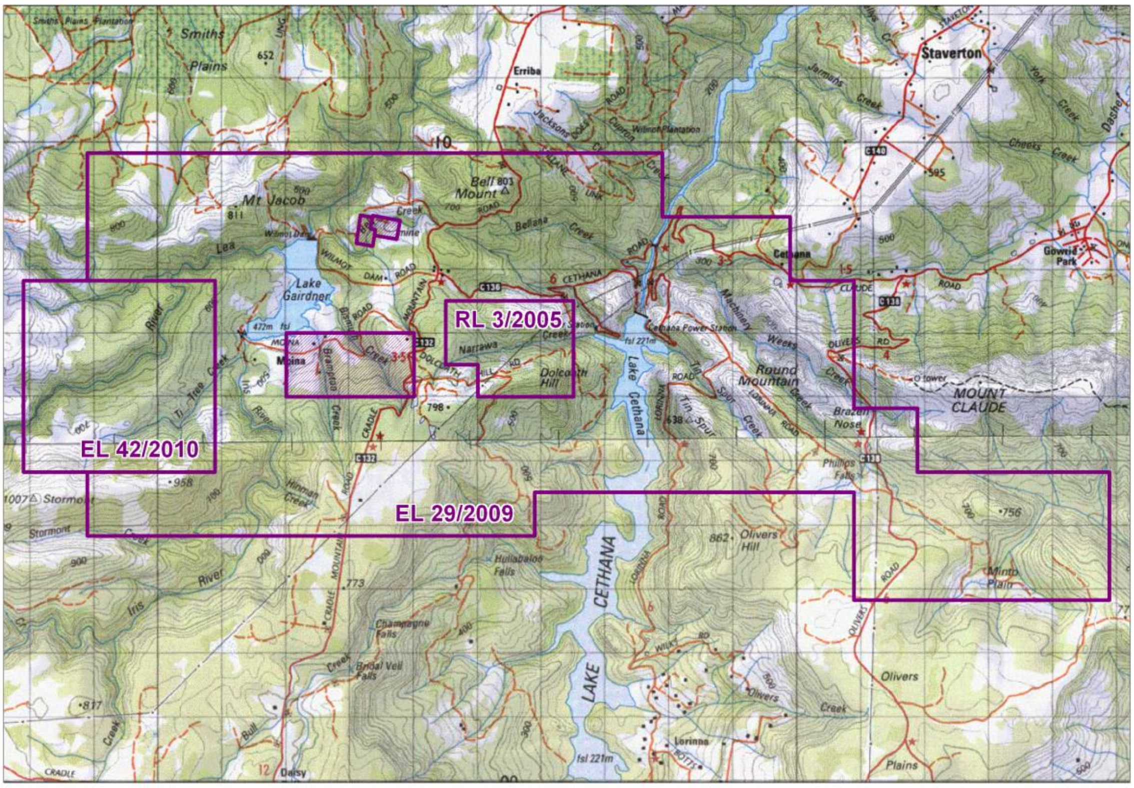

Figure 1.2: EL 29/2009 location plan. Background is Tasmap 1:100,000 mapsheet, datum AGD66.

1.4 Land status and usage

The licence area is used for a range of purposes. Much of the area is Crown Land with forestry activities in part and some land around the lakes vested to the H.E.C. The remaining land is privately owned bushland with limited farming around Lake Gairdner.

1.5 Tenure

EL 29/2009 was won by tender by Frontier Resources Ltd. and was granted on 13th September, 2009. In early 2012 the licence was transferred to Torque Mining Ltd., a spin-off from Frontier Resources Ltd.

The licence was reduced in size in September 2012 with the relinquishment of the eastern end of the licence over Mt Roland.

In early 2016 the licence was transferred to Moina Gold Pty. Ltd..

2.0 Review of Previous Work

2.1 Prior to current tenement

The area covered by EL 29/2009 was explored like the rest of western and northern Tasmania in the latter part of the 19th century but with more significant flourishes in the early and mid 20th centuries. The Stormont deposit was found in the mid 1920's, the Higgs deposit was discovered inthe mid 1930's, the Shepard and Murphy mine was working into the 1950's and the All Nations mine until the 1960's.

The western, prospective and retained portion of the tenement has been held under a range of exploration licences since the 1960's with principal companies CRAE, Comalco, Mt Lyell M&R Co/Renison Goldfields/Goldfields Exploration, Mincor, Billiton/Shell, Noranda, Jervois, Titan, Goldstream, Tasgold, Frontier and now Torque Mining Ltd.

Previous work has consisted of regional geochemical and geophysical surveys with grids established over essentially all prospective rocks (other than the Dolcoath Granite itself). That work has led to the discovery and definition of the Shepard and Murphy fluorine deposit.

Historical drilling has been carried out at the Stormont, Fletchers Adit, Ti Tree Creek, Mt Jacob, All Nations, Hugo Skarn, Shepard and Murphy skarn/lodes, Higgs, West Higgs, Narrawa Reward, Three Sisters, Round Mountain and Tin Spur.

2.2 During current tenement

The Moina Project was a principal focus of exploration by Torque Mining Ltd with much of the project area within EL 29/2009 "Cethana".

In the 2010/2011 reporting period exploration consisted of two bodies of work.

- Existing high resolution geophysics, aeromagnetics, gravity and radiometrics was processed and imaged. Magnetics is of particular use given the association between mineralisation and magnetite.
- 1057 soil samples were collected on a nominally 100m x 50m grid (1271 samples in total including sampling on adjacent RL 3/2005) around the Dolcoath Granite margin on both sides of Lake Cethana.
  The compiled soil geochemical data set (including this data) reveals a number of coherent zones of anomalous Au, Sn, W, Mo and Bi around the margin of the Dolcoath Granite and extending into EL 29/2009. Within EL 29/2009 anomalies are also defined at Tin Spur, Round Hill, Ti Tree Creek and Mt. Jacob (Pb). Figures 2.1 to 2.5 show results for Au, Bi, W, Sn and Mo in the area of the 2010/2011 survey respectively.

In the 2011/2012 reporting period exploration consisted of

- Inclusion in an ambitious regional scale 3D IP survey over ~24 square kilometres of Frontier's Moina Project, extending from Round Mountain east of Lake Cethana to Stormont, west of Lake Gairdner.
  The survey was highly successful in defining a number of anomalous features with both discrete chargeability highs in a number of favourable locations and discrete conductivity anomalies either representing mineralisation or indicating the presence of favourable rocks in favourable structural settings. Figures 2.6 to 2.12 summarise the extent and results of this survey.
- Drilling two holes at the Bulls chargeability anomaly on the western slopes of Lake Cethana.
  BSD1 (117m) and BSD2 (66.85m) intersected a quartz+feldspar+biotite+/-hornblende porphyry with narrow zones of pyrite alteration with weakly anomalous Cu, Pb and Zn associated.
- Soil sampling around the Bell Mount alluvial field and the Bulls IP anomaly

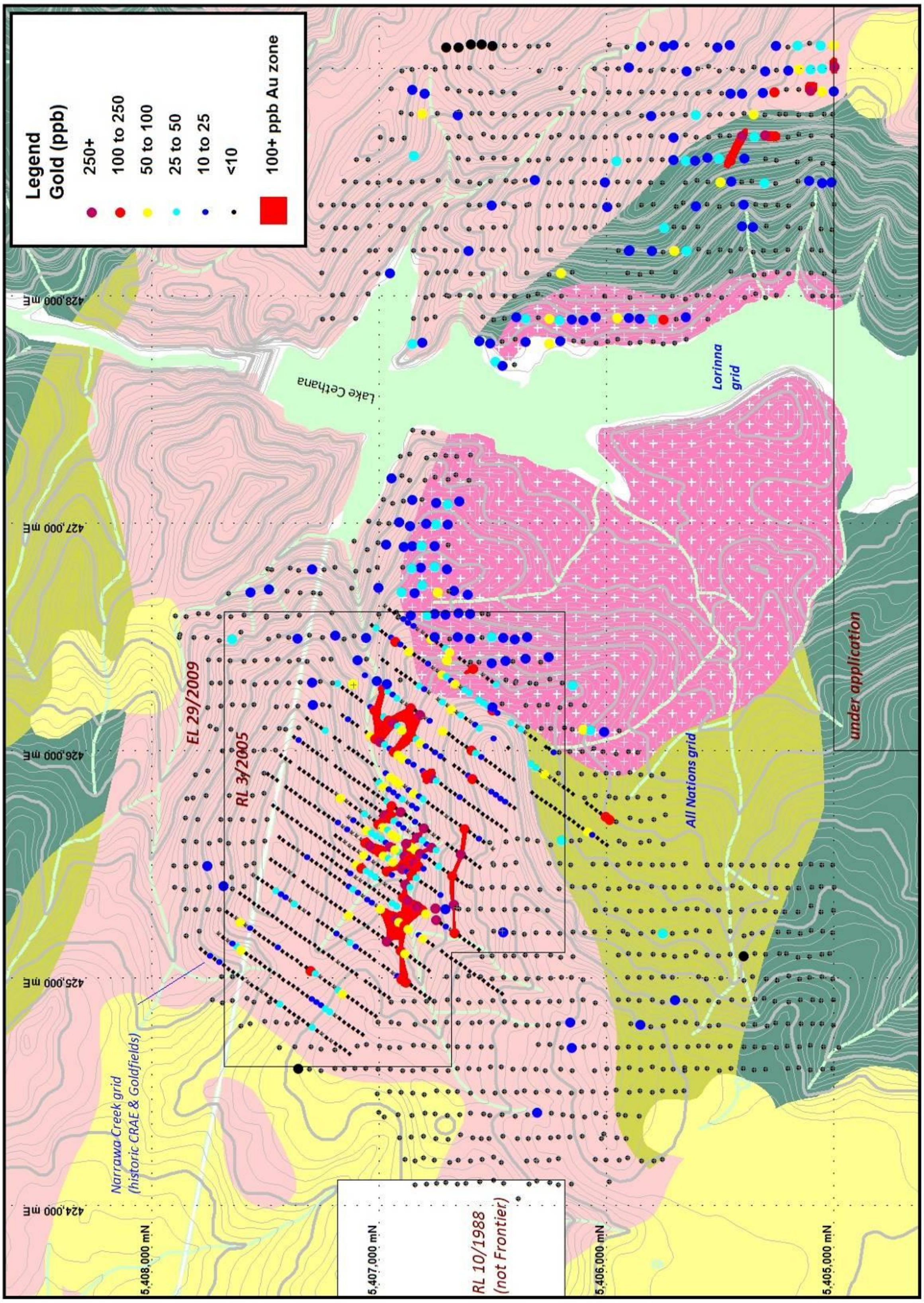

Figure 2.1. Au soil results, 1987 GFEL survey and 2010/2011 Frontier sampling.

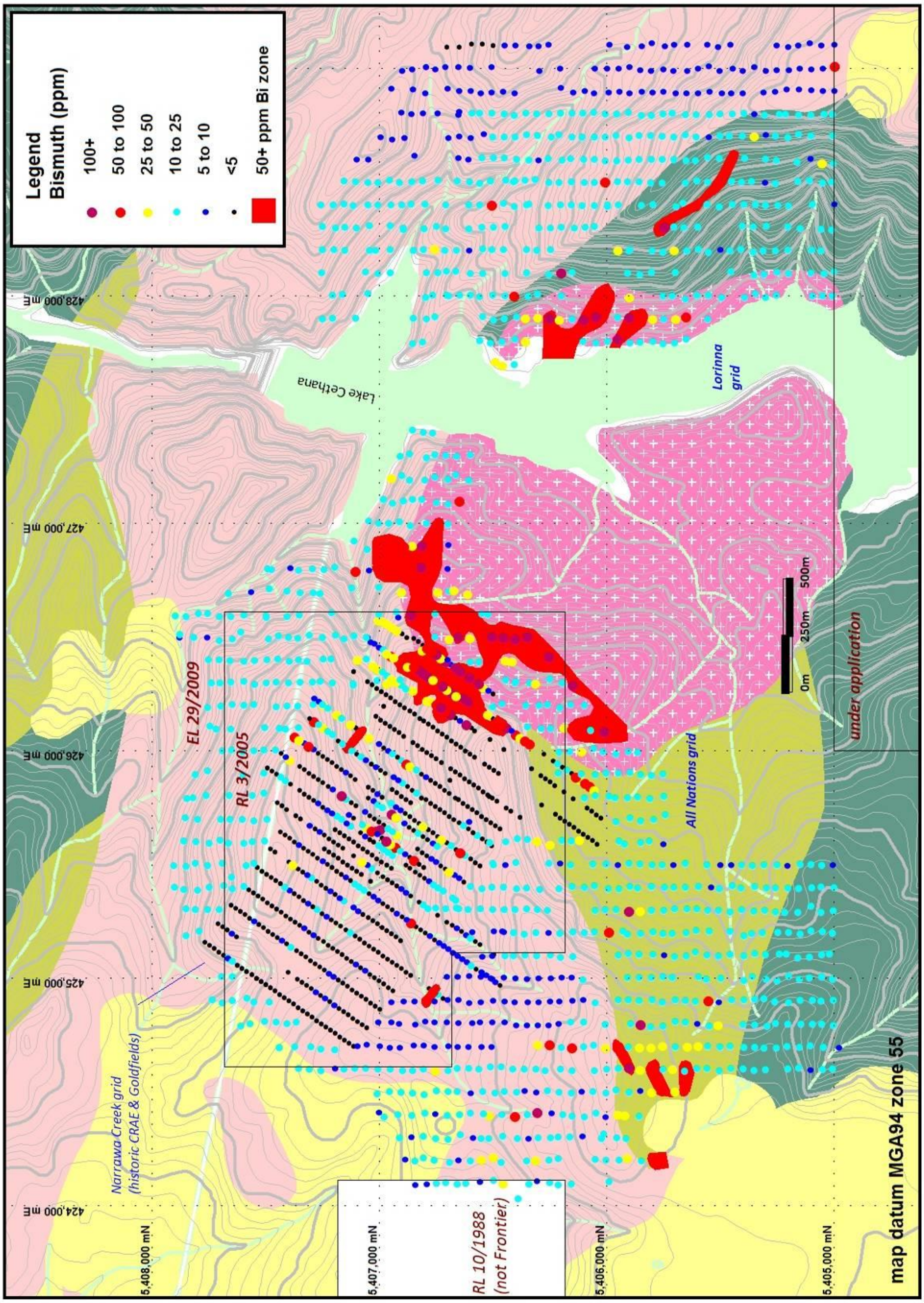

Figure 2.2. Bi soil results, 1982/1983 CRAE and 2010/2011 Frontier sampling.

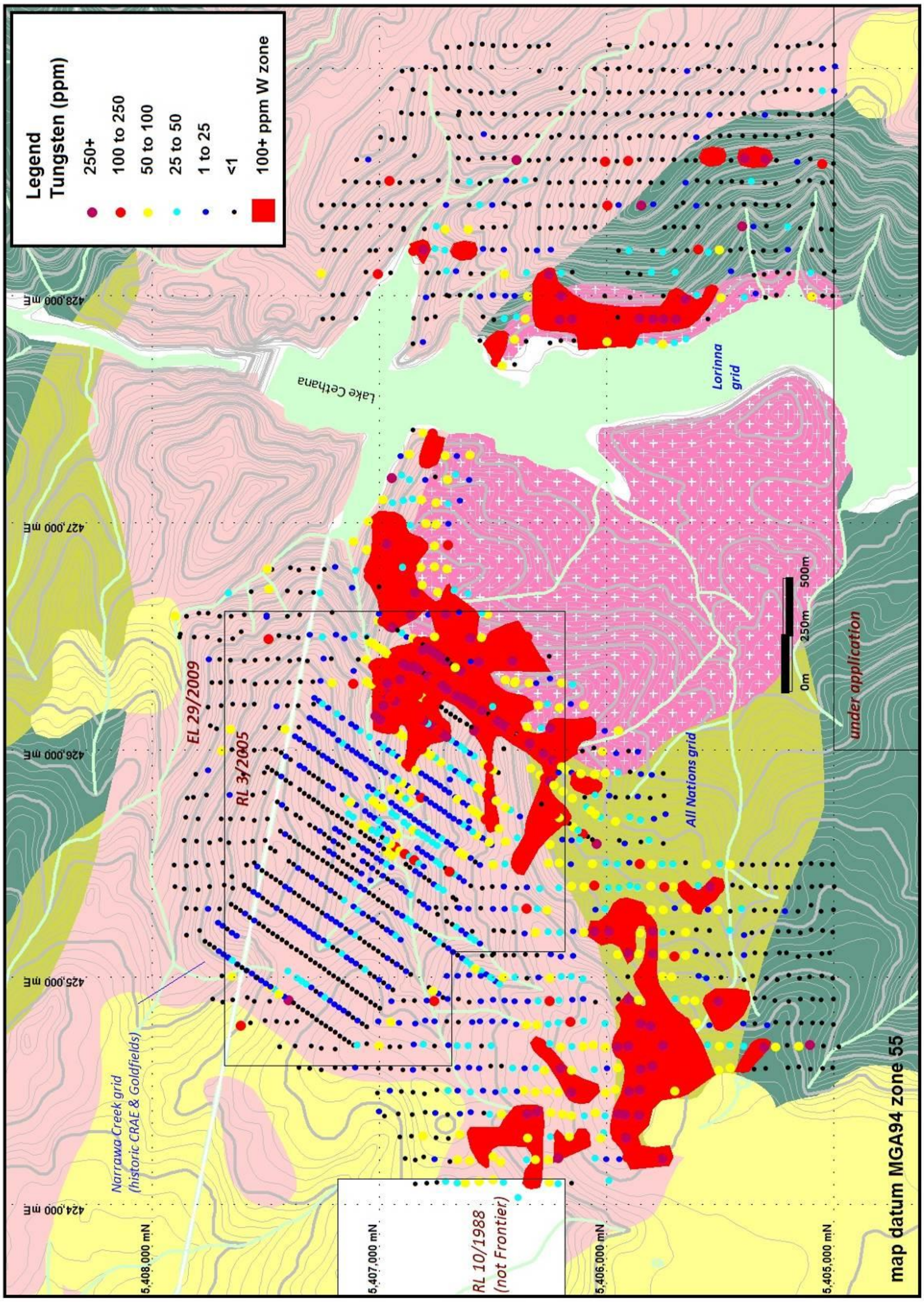

Figure 2.3. W soil results, 1982/1983 CRAE and 2010/2011 Frontier sampling.

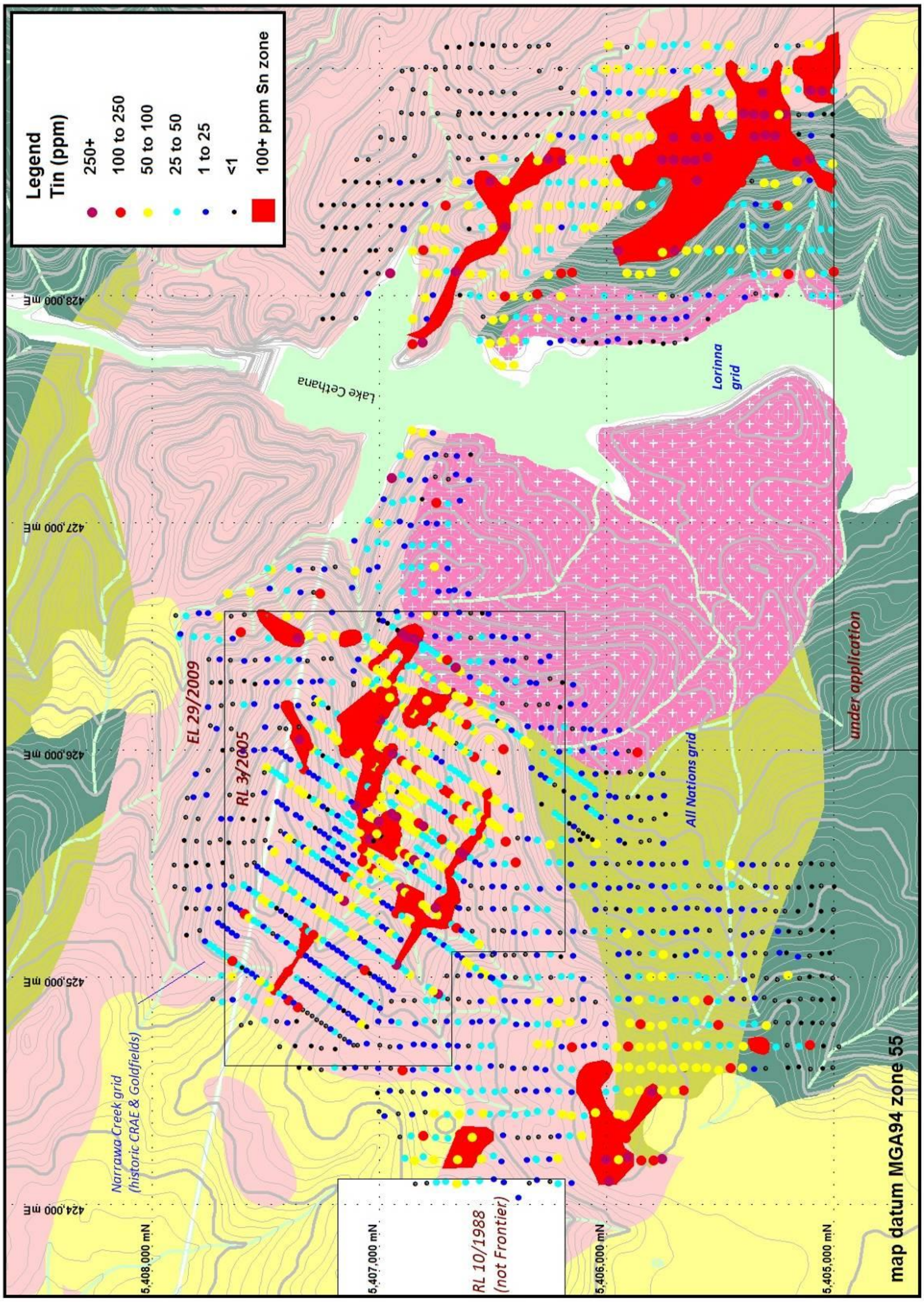

Figure 2.4. Sn soil results, 1982/1983 CRAE and 2010/2011 Frontier sampling.

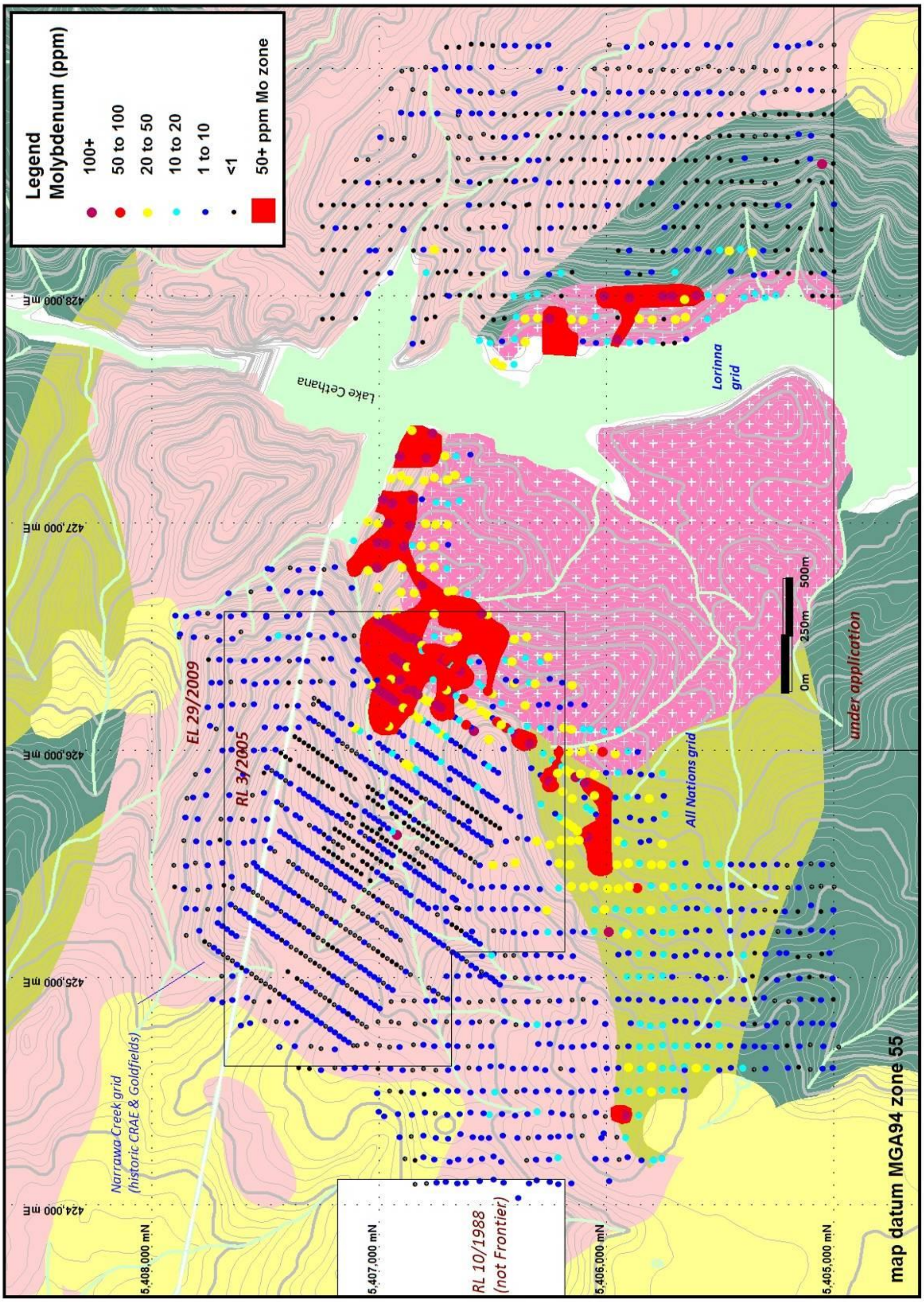

Figure 2.5. Mo soil results, 1982/1983 CRAE and 2010/2011 Frontier sampling

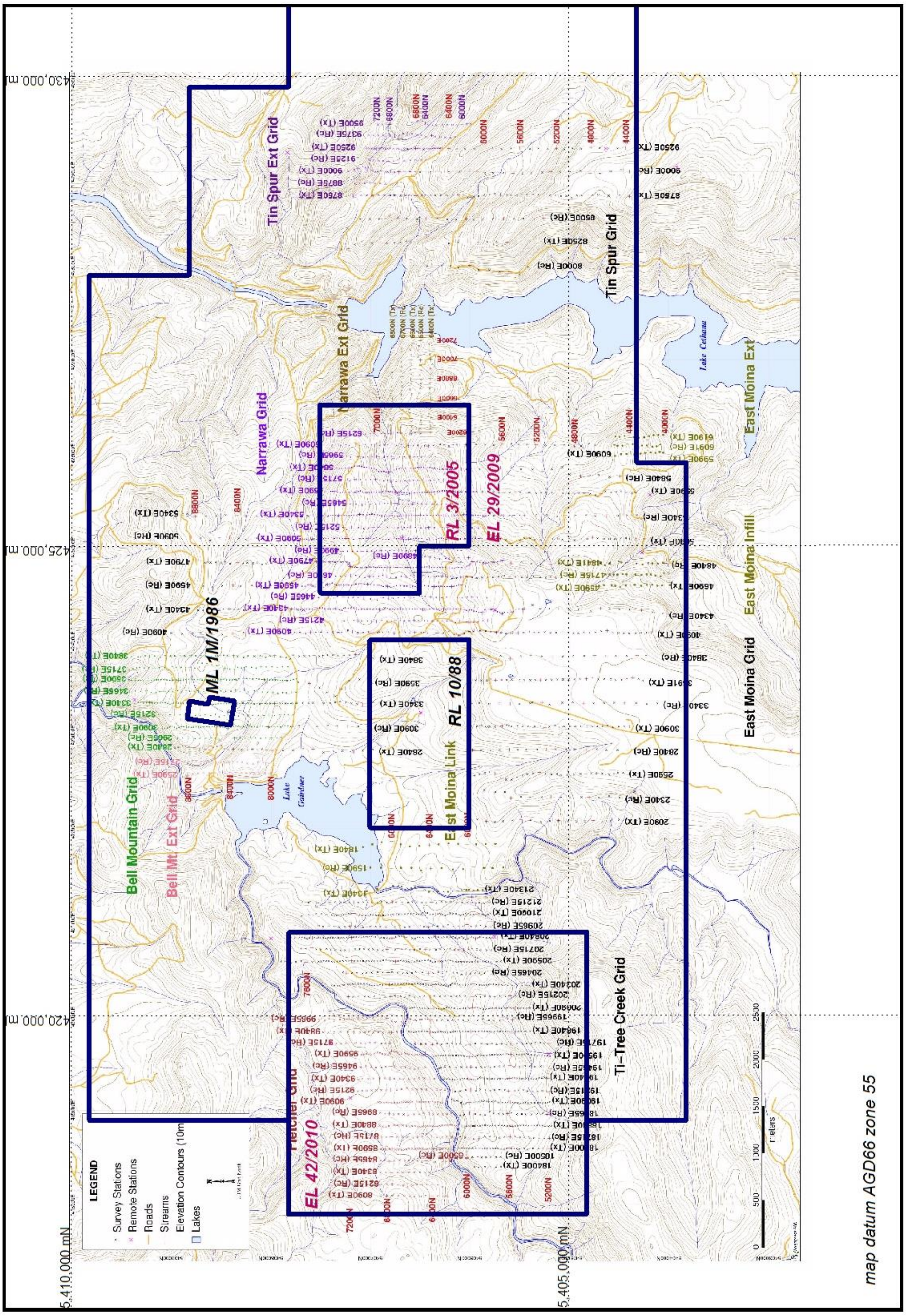

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Figure 2.6: Moina Project 3D IP survey grids and tenements

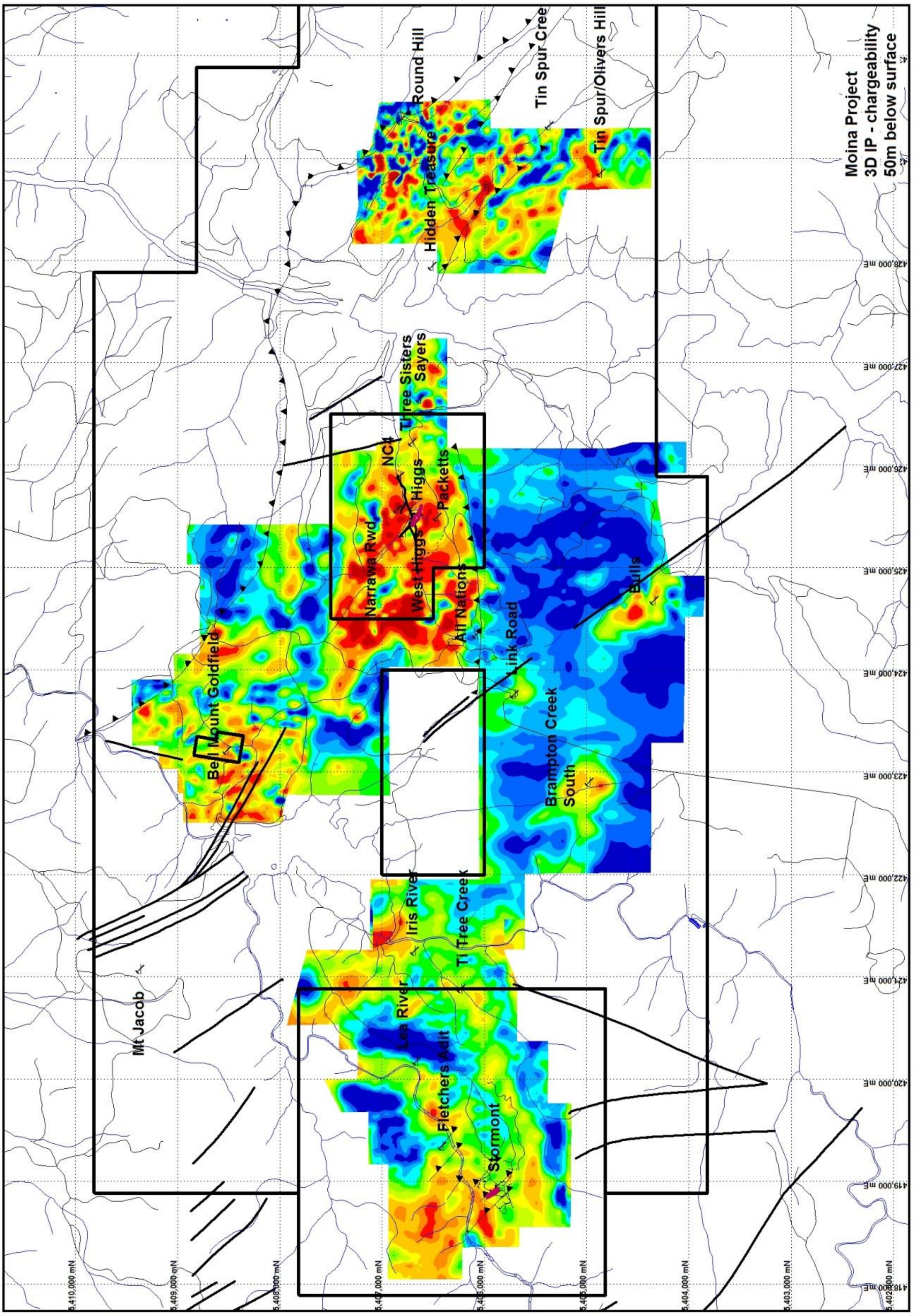

Figure 2.7: Regional 3D IP chargeability at 50m depth

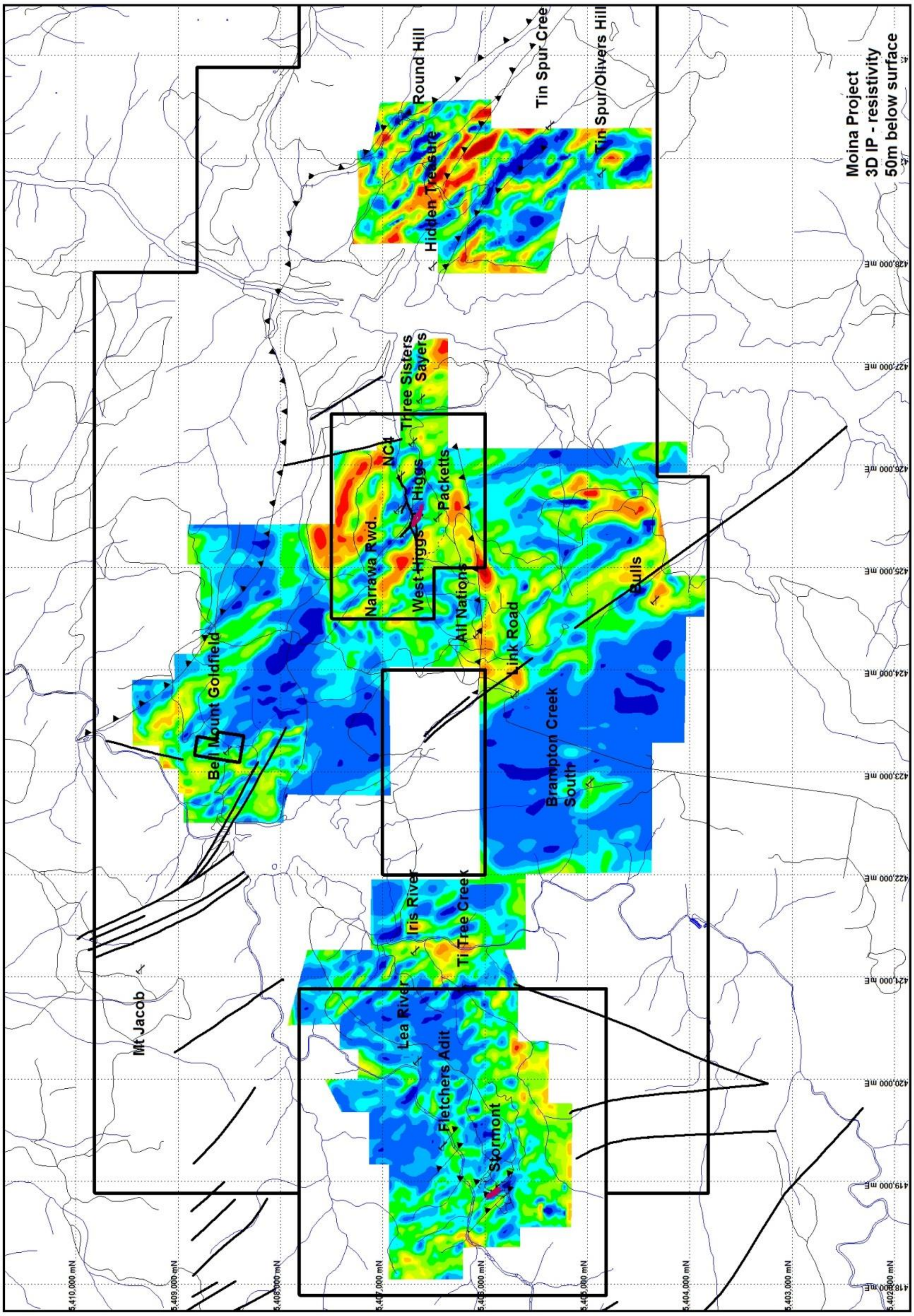

Figure 2.8: Regional 3D IP resistivity at 50m depth

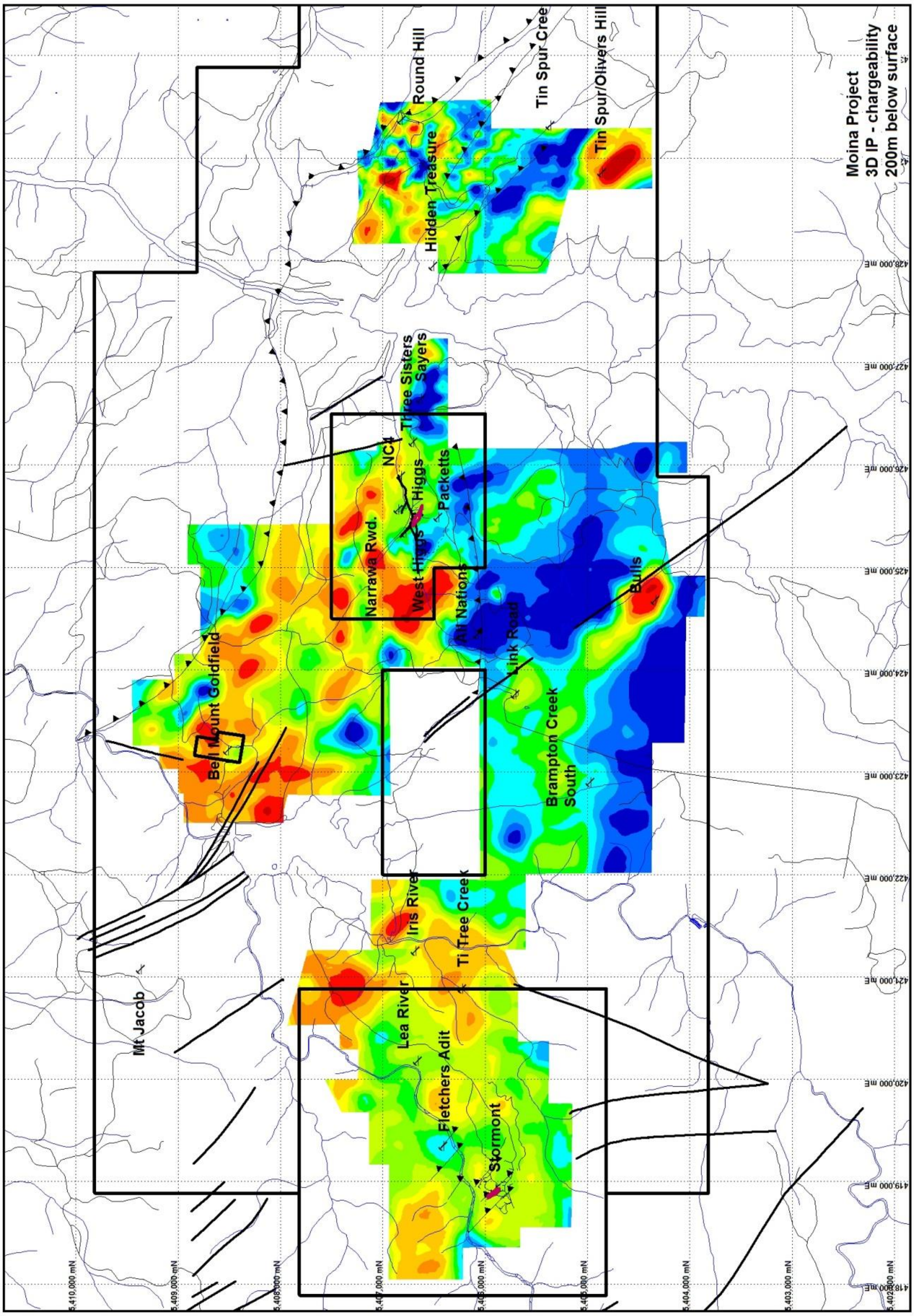

Figure 2.9: Regional 3D IP chargeability at 200m depth

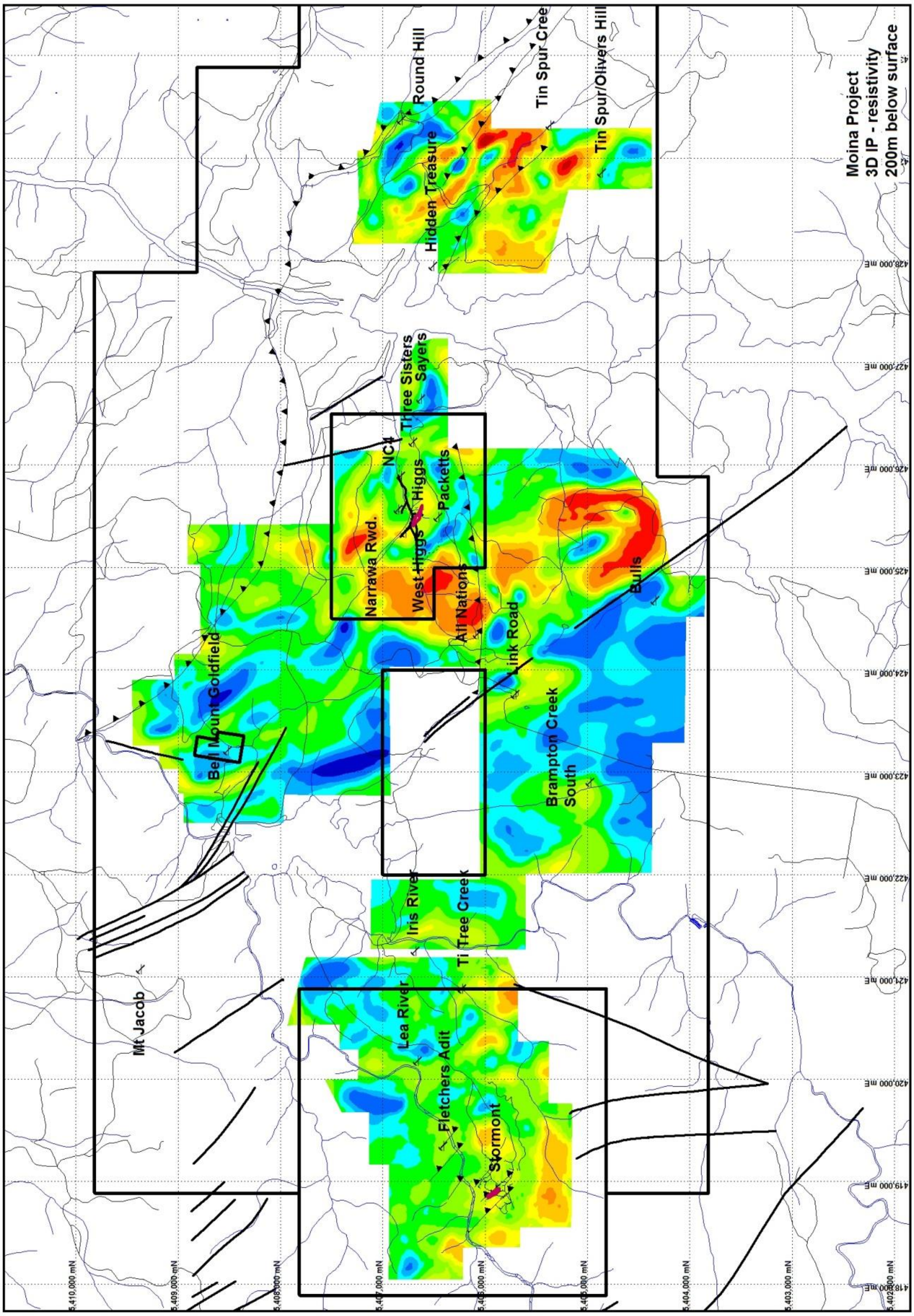

Figure 2.10: Regional 3D IP resistivity at 200m depth

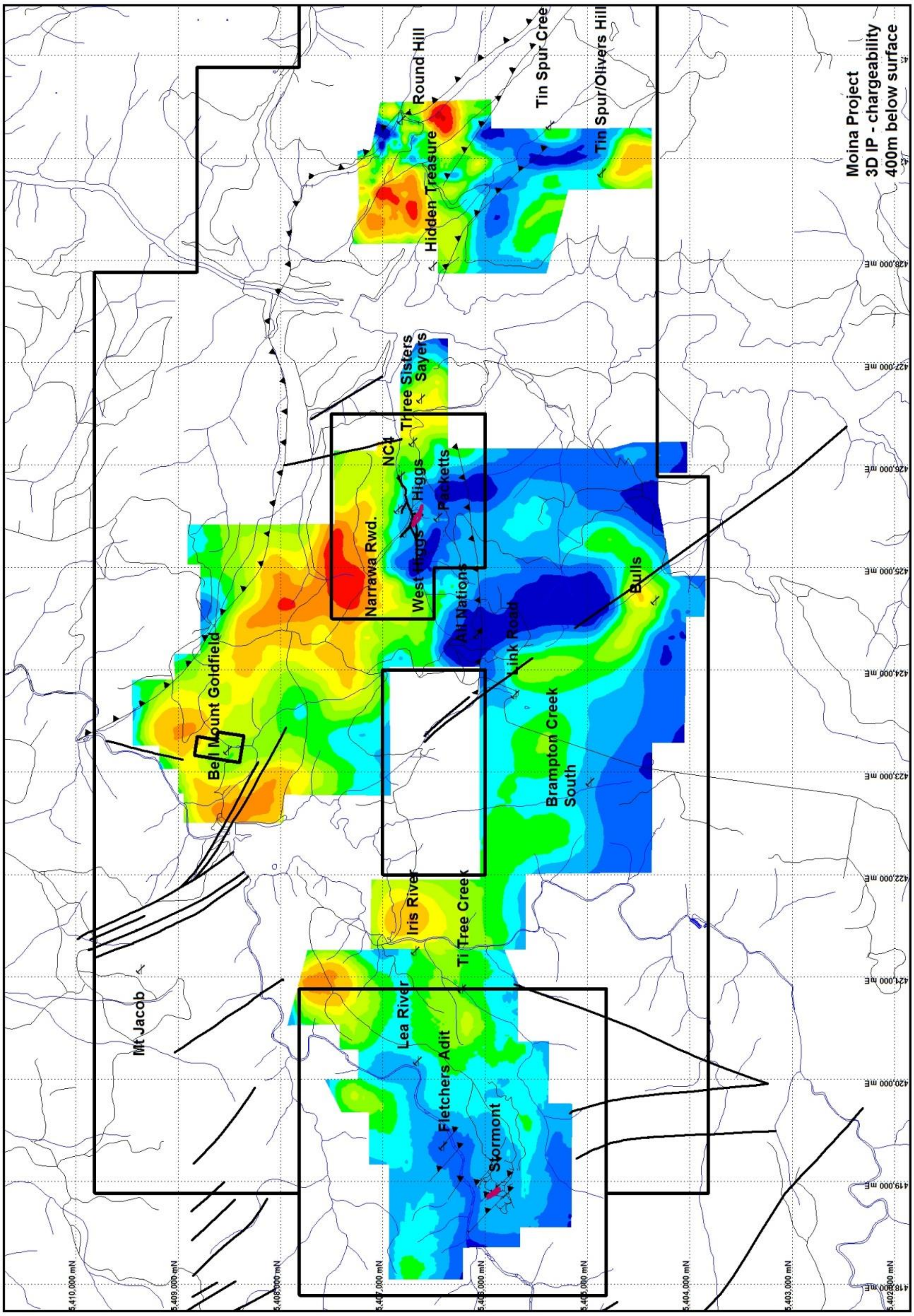

Figure 2.11: Regional 3D IP chargeability at 400m depth

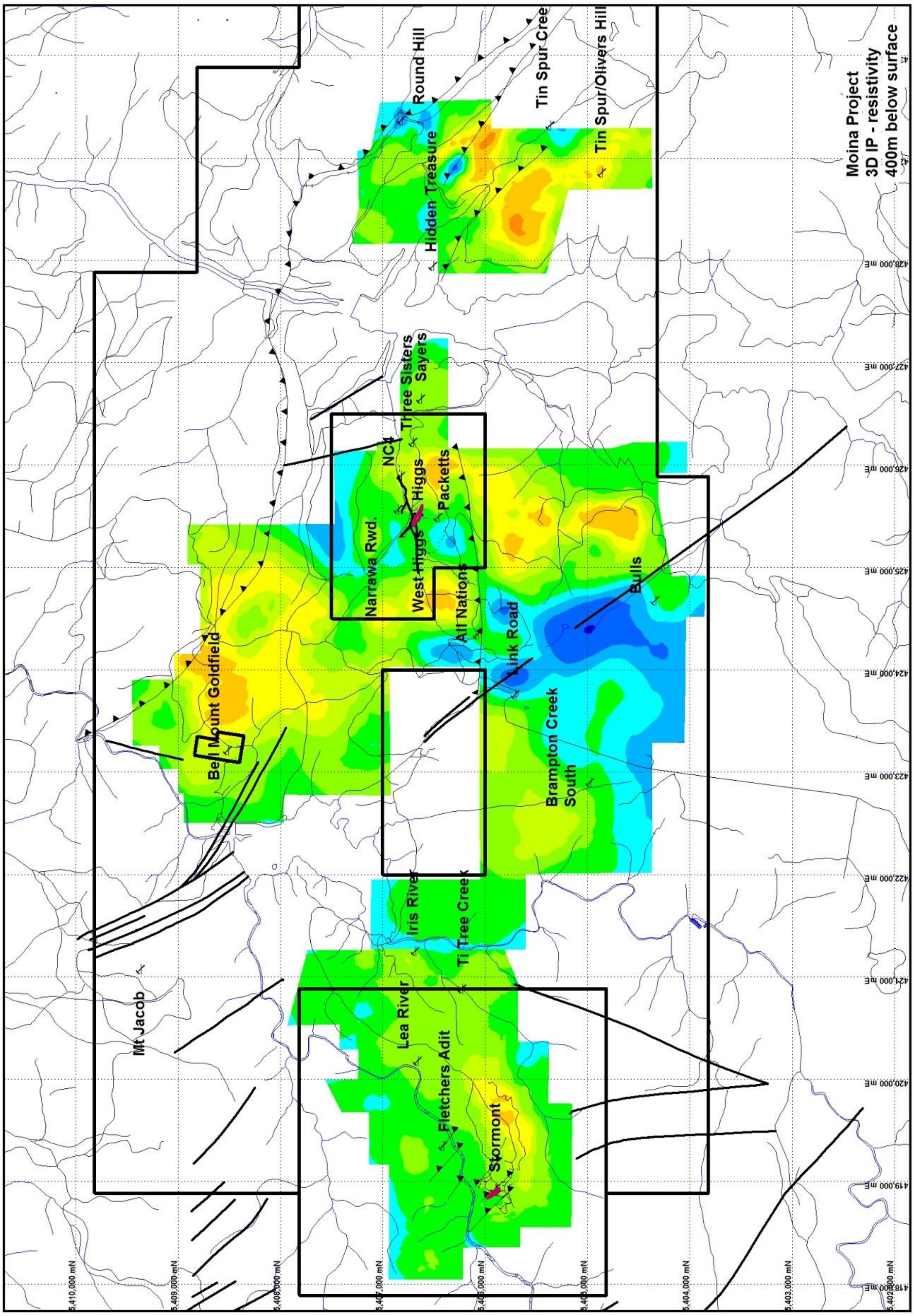

Figure 2.12: Regional 3D IP resistivity at 400m depth

In the 2012/2014 reporting period exploration consisted of

- the submission of a number of samples of galena from prospects in the Moina region for lead isotope dating as part of a CSIRO project.

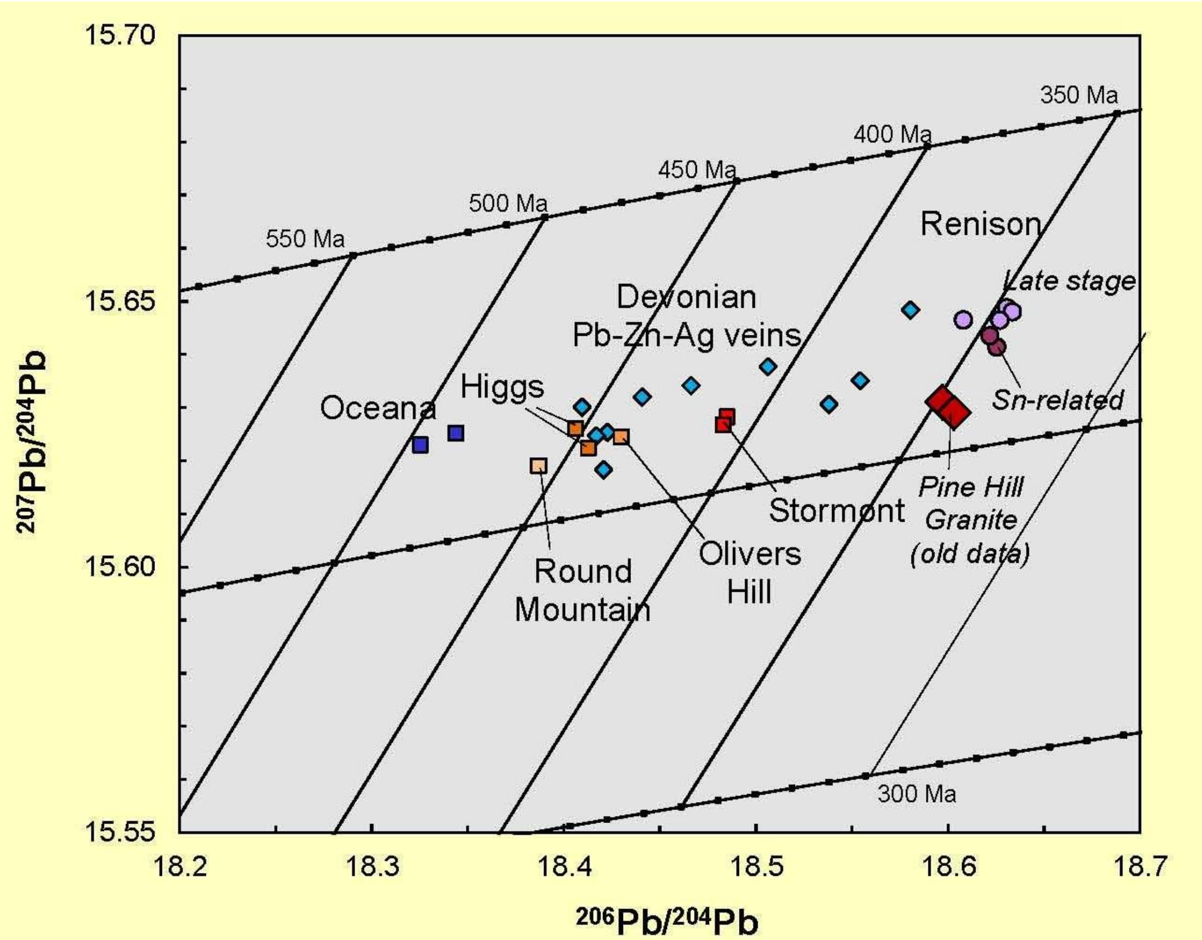

Figure 2.13: Age and lead isotope ratios for Moina project samples.

No work was carried out from 2014 to 2016.

EL 29/2009 was transferred to Moina Gold Pty Ltd in early January 2016. Both prior to the transfer and subsequent reconnaissance field visits were made to a number of prospects within the tenement.

Work done in the 2015/16 year consisted of some desktop research into lithium with the Catalogue of Tasmanian Minerals (Bottrill and Baker, 2008) referring to Reid (1919) and Petterd in Twelvetrees (1908) reporting occurrences of spodumene and lepidolite (and possibly Zinnwaldite) in a number of workings on the Moina field i.e. Squib, Shepard and Murphy, Sayers/Blacks, Dolcoath, Princess, Hidden Treasure and Premier.

Field visits to the Squib and Sayers Mines conducted in preparation for a programme of rock sampling.

3.0 Exploration completed during the report period

In the 2016/17 reporting year work has focussed on

- Further consideration of the source of the gold at the Bell Mount goldfield
- 3D modelling of the 3D IP data from the Frontier Resources NL survey

All historical geological reports (text and plans) on the source of the gold in the Bell Mount goldfield have been compiled into a summary report. That report is included herein in section 4.1.

The 3D modelling of the 3D IP data is ongoing. To date that work has been completed for the Bell Mt-Higgs trend in EL 29/2009 (extending into RL 3/2005 as well as in EL 42/2010).

A series of sections at 300m spacings and plans at various depths below surface have been generated to display the 3D IP chargeability and resistivity data superimposed on the known geology. These sections and plans are included in section 4.2.

The conclusions from these two bodies of work is included in section 4.3.

4.0 Results

4.1 Summary of Reports on the Source of the Gold in the Bell Mount alluvial goldfield

4.1.1 Introduction

The Bell Mount field was visited on a number of times in the late 19th/early 20th centuries by eminent government geologists Montgomery, Twelvetrees, Reid and Broadhurst. The following summarises their opinions of the source of the gold.

A search of Mineral Resources Tasmania's online database of mineral deposits in Tasmania lists the following under Bell Mount Alluvial.

Name:	Bell Mount Alluvial
Parent Deposit:	N/A
Type:	Mine or Prospect
Operational Status:	Abandoned
Status Date:	Unknown
Main Commodity Type:	Metals/elements
Description:	Unknown
Locality:	Bell Creek
Location:	"423413, 5408584 (GDA94 - MGA Zone 55) "
Deposit Size:	Not determined
Host Rock Ages:	Cenozoic
Mineralisation Ages:	Cenozoic
Uses:	Unknown
Form:	Placer
Rock Type:	Unknown
Commodities:	Gold
Gangue :	Topaz
Exploration:	Prospecting

References (modified slightly to include authors names and year):

Jennings, I.B. (1979), Geological Survey Explanatory Report, Geological Atlas 1 Mile Series, zone 7 sheet 37 (8115S) Sheffield - **MRT Document ER8115S0**

Montgomery, A. (1893), Report on the mineral discoveries in the neighbourhood of Bell Mount - **MRT Document OS_111**

Twelvetrees, W.H. (1907), Report on the Bell Mount and Middlesex district – **MRT Documant OS237**

Twelvetrees, W.H. (1913), The Middlesex and Mount Claude Mining Field - **MRT Document GSB14**

Waller, G.A. (1901), Report on the mineral districts of Bell Mount, Dove River, Five-Mile Rise, Mount Pelion and Barn Bluff - **MRT Document OS_167**

Reid, A.M. (1919), The mining fields of Moina, Mt Claude, and Lorinna - **MRT Document GSB29**

Broadhurst, E. (1934), Report on the Stormont, Bell Mount and Black Bluff district - **MRT Document UR1934_032_45**

4.1.2 Summarised Reports

Montgomery, A. (1893), Report on the mineral discoveries in the neighbourhood of Bell Mount - OS111

Montgomery visited the Bell Mount alluvial field as part of a larger survey of the Moina district with Bell Mount alluvial constituting 1 of 10 pages in his report.

Montgomery produced the following map of the area.

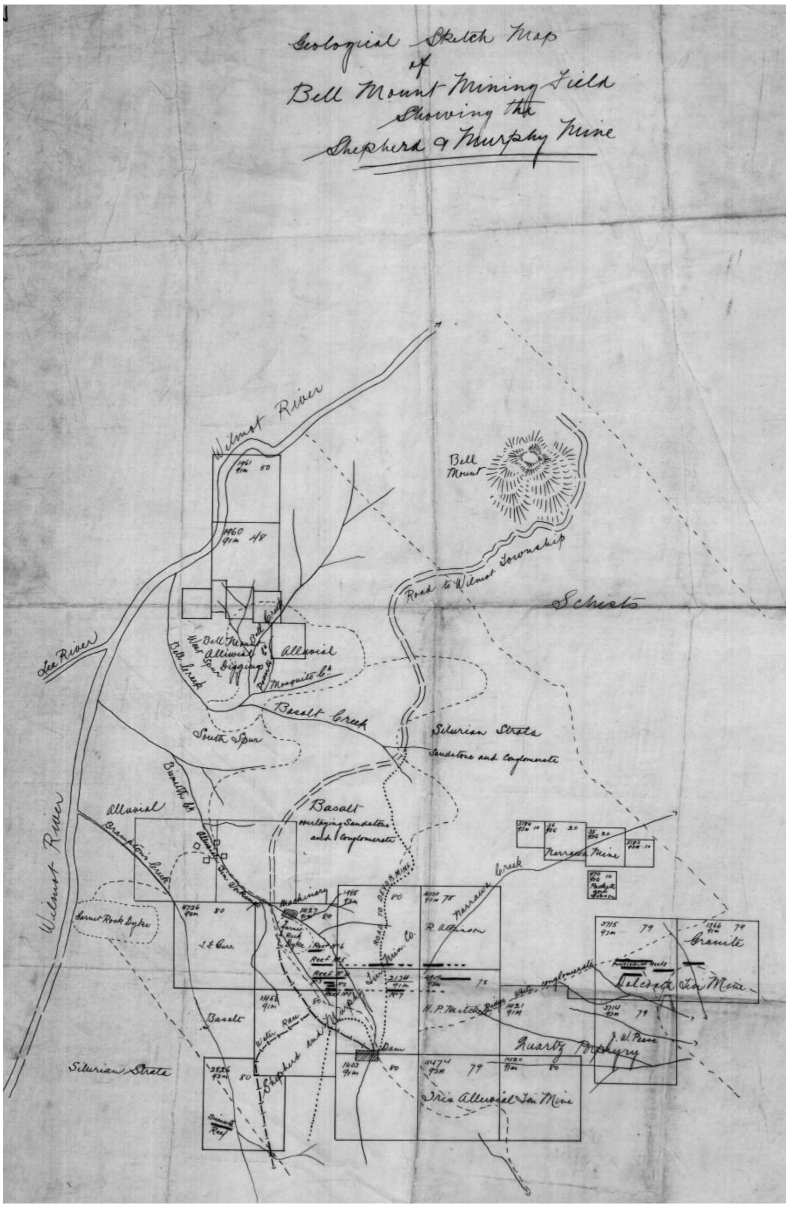

Figure 4.1: Geological sketch map of the Bell Mount Mining Filed showing the Shephard and Murphy mine – Montgomery 1893, MRT plan No. 316.

Regarding the source of the gold he states:

"The source of the gold is as yet quite a mystery, but light will probably be thrown on it as work progresses. It would seem to come from the slopes of Bell Mount, but it may also possibly be derived from the re-washing of older gravels belonging to the river system obliterated by the basaltic flows. Much work will be required to solve the problem. 0n Section 990-87G there is an outcrop of ferruginous gossan which requires prospecting. It can be traced some distance on a line running N.

30° W. or thereabouts, and crosses the head of the leads, and has been suspected of being the lode from which the gold is derived. While I do not think this is the case, I should nevertheless advise that some shafts be sunk along this outcrop to ascertain what sort of a lode. It is. As the scrub gets burnt off other lodes may be found, and in the dry weather when alluvial work is stopped the search for these might be more systematically carried on. The amount of gold obtained from the small area 'worked quite warrants strenuous efforts being made to discover the source from which it has come."

Regarding the Middlesex goldfield to the south hosted in the same Moina Sandstone, Montgomery states "though reefs from which the gold has been shed have been persistently looked for for many years, only a few small gold-bearing veins have been found, and **it seems more probable that the metal is coming from minute veins in the country rock itself than from definite reefs.**"

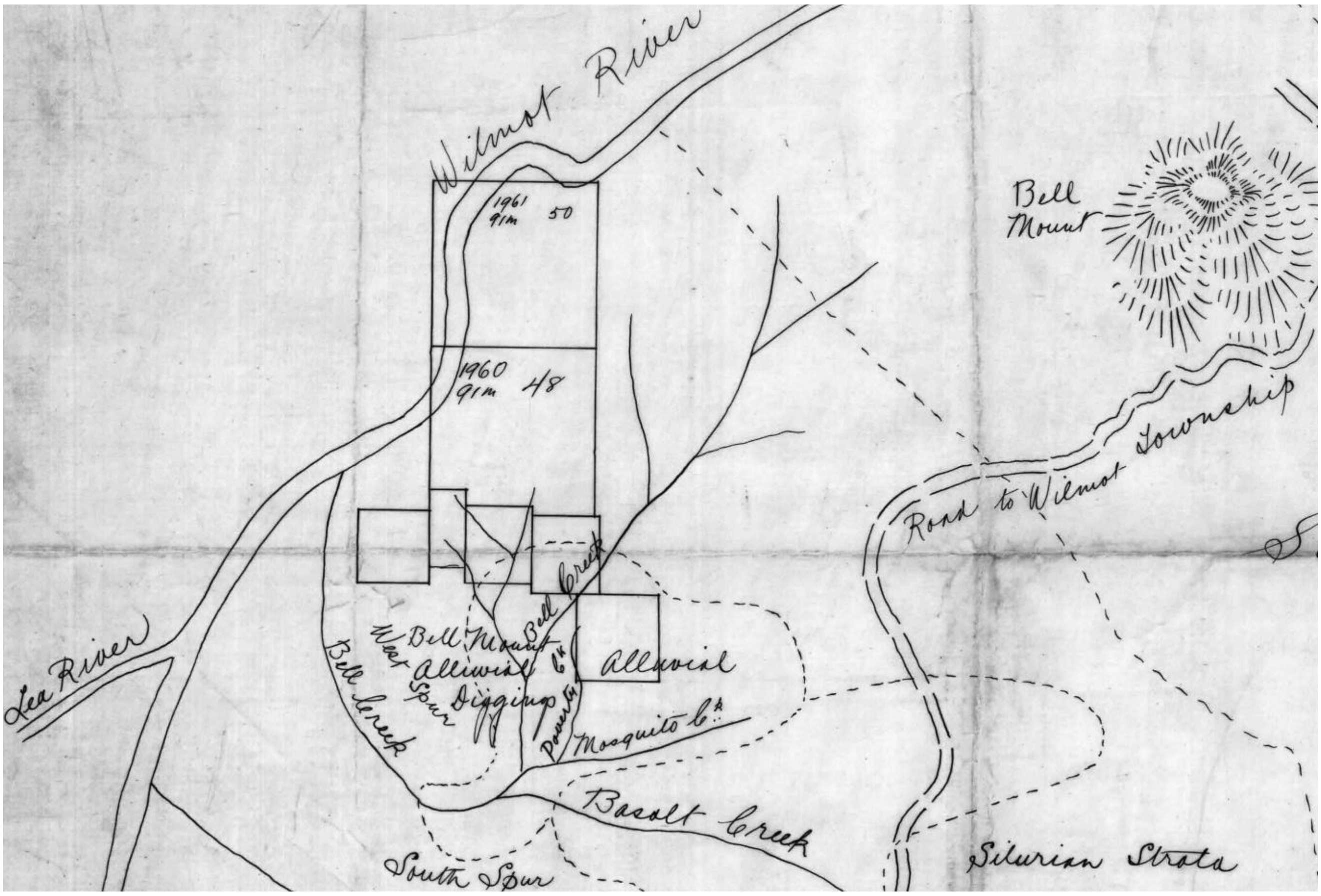

Figure 4.2: Close-up of Bell Mount alluvial area from figure 1, Montgomery, 1893.

Waller, G.A. (1901), Report on the mineral districts of Bell Mount, Dove River, Five-Mile Rise, Mount Pelion and Barn Bluff - OS_167

Geo. Waller visited the Moina area in 1901 with the Bell Mount alluvials constituting 3 of 45 pages in his report. He made the following observations regarding the source of the gold:

"The source of the gold in the Bell Mount field is a question of considerable importance to prospectors in the district, and some discussion on the question will not be out of place in the present report. It has been suggested that the gold may have come from a deep lead under the basalt, but I think this is very unlikely, because, apart from Basalt Creek, the wash is quite free from particles of this rock. Moreover, the only basalt in the vicinity of the deposit lies at a lower level than the greater part of the payable wash.

The angular character of both the wash and gold, and the presence of quartz in the gold, makes it more probable that the gold has been derived from reefs or veins in the country-rock, and in seeking these we must endeavour to find out from which direction the wash has come. The wash is bounded on the south and west by narrow spurs of sandstone too small to afford such a mass of alluvial as we have here, and making it impossible for the wash to have come from either of these directions. To ·the east the country is low-lying, and is largely covered by basalt. We are, therefore, compelled to assume that the wash has come from the north, and probably followed the general course of the Bell Creek. A somewhat hurried examination of the country went far to confirm this view.

In several places along the creeks I noticed deposits of similar wash to that contained in the Bell Mount diggings. The country is composed almost entirely of sandstone, until far up near the source of the creek, where a belt of conglomerate occurs. Beyond this, porphyry and schist country is met with. All these rocks are found in the Bell Mount alluvial, the porphyry, schist, and conglomerate, however, being, as one might expect, greatly subordinate to the sandstone.

I think, therefore, that **the most probable source of the gold is to be found on the southern and south-western slopes of Bell Mount**, more probably in the sandstone than in the schists. When discovered, the reefs or veins will probably be, like others known in the district, small, rich, and patchy, but considering the large amount of gold derived !rom their disintegration they are surely worth looking for, and when found should be worthy of systematic exploitation."

He produced the following map of the district.

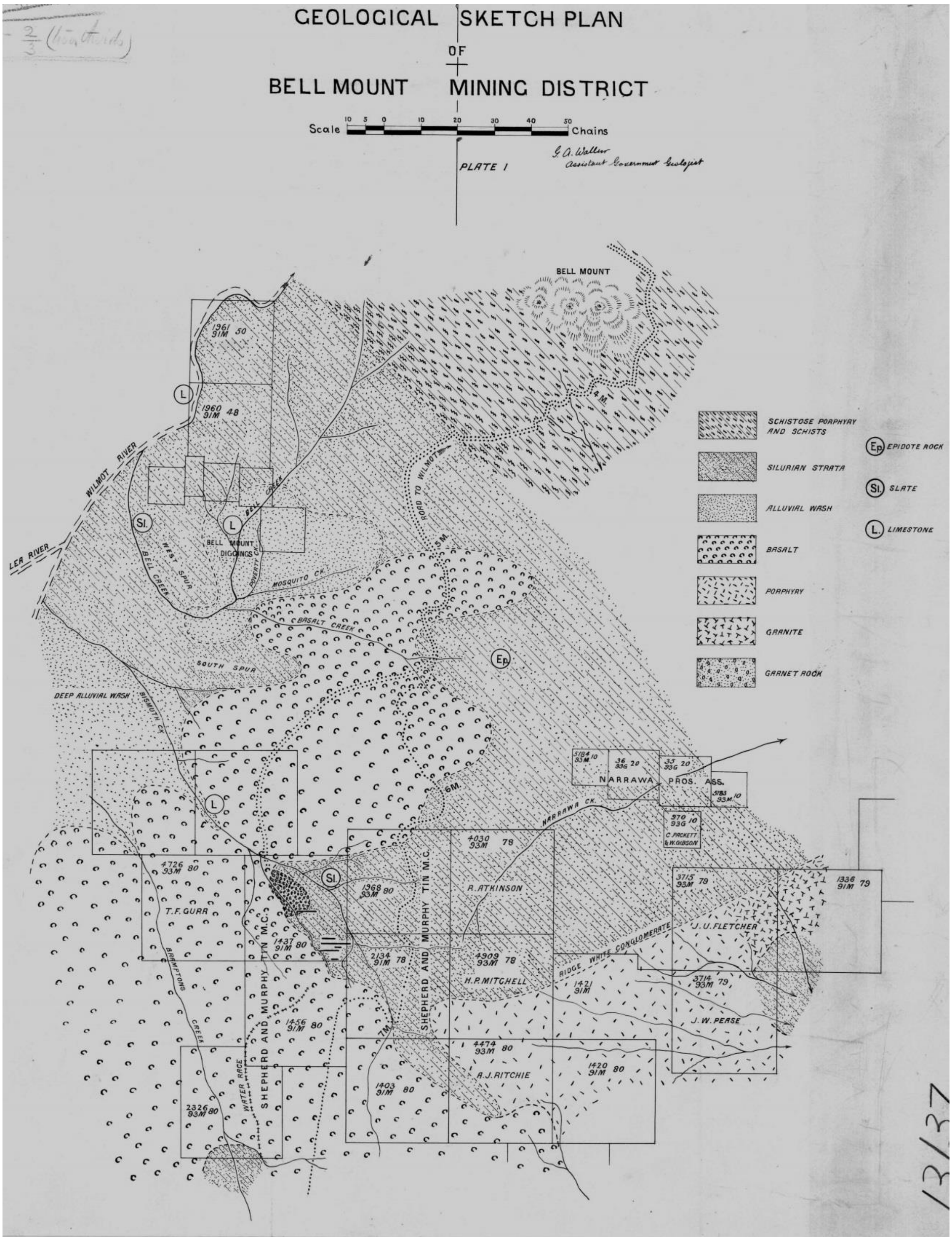

Figure 4.3: Geological sketch map of the Bell Mount Mining District, Waller, 1901. MRT plan No. 13.

Figure 4.4: Close-up of Bell Mount alluvial area from figure 3, Waller, 1901.

Twelvetrees, W.H. (1913), The Middlesex and Mount Claude Mining Field - GSB14

W.H. Twelvetrees visited the area in 1907 (1 of 32 pages in his report) and again in 1913 (3 pages out of 130). The following is from his 1913 report which includes his 1907 observations.

"Prospectors have invariably been baffled in their search for the source of the gold. Numerous possible sources have been suggested from time to time, but it cannot be said that the arguments in favour of any of them are convincing.

The present writer, in his report of June 17, 1907, was inclined to refer the gold to veins in the sandstones and conglomerates of the country. It was thought possible that there was here a large swamp or lake which was fed by streams coming from various directions. The country to the north and west, especially west, would be the source of the metal. That to the direct south and south east would be excluded, as it is tin bearing country, and would have shed tin and wolfram ore into the basin. On one of the sections there is a ferruginous gossan outcrop, with a northwesterly strike, and as it traverses the country at the head of the leads it has been named as a possible source. The angular forms of the gold and the splintery specimens of auriferous quartz make this derivation unlikely. …"

"The writer thinks that, as far as the quartz specimens are concerned, they must have come from veins close at hand. The schistose porphyroids of Bell Mount apparently do not contain auriferous quartz veins: the fragments of these rocks occurring in the drift are not very abundant. If the gold originated in the Moina tin and wolfram area to the south, it is surprising that those ores are not more abundant in the gravel. Very little tin ore has ever been found in it (one piece certainly is said to have weighed a pound), and wolfram ore is absent. If the drift had been derived from the Moina sub-basaltic gravels, these ores would undoubtedly have been plentiful. **On the whole, the specimens have most probably**

come from veins quite near- in sandstone and conglomerate. The indications are that they have been derived from the conglomerate belt which extends across the field from the crags west of the road at Bell Mount to the other side of the Iris River."

Reid, A.M. (1919), The mining fields of Moina, Mt Claude, and Lorinna - GSB29

A.M. Reid visited and reported on the combined Moina, Mt Claude (Round Hill) and Lorinna mining fields with the Bell Mount alluvial constituting

"**It is probable that the greater quantity of the gold distributed in this area has been derived from veinlets containing sulphidic minerals**, and concentrated during the process of oxidation by the solution and precipitation of the gold in the presence of manganese. Certainly all the large concentratIons of gold have been effected in this way. As the gold has not been transported far from its source it should not be difficult to locate the veinlets in the tubicolar sandstone. These veinlets, which are probably only from ½ inches to 2 inches wide, were composed of sulphidic minerals, pyrite predominating. Following the oxidation of the pyrite and associated sulphides, the gold was dissolved, carried in solution to a lower leveI of the same vein and reprecipitated. Rapid erosion may remove the upper part of the deposit before it has been completely leached, and under favourable conditions the detrital material accumulated from the debris of the outcrop would, bv the disintegration of the rock particles, set free some fine-grained gold.

Possibly some gold has been derived from sulphidic ores occurring in the mineral belt which contains the Wilmot ore-body, and which extends eastwards towards Round Hill. In this event the solutions must have migrated some distance from their source.

Reviewing the evidence set forth in the foregoing pages the conclusion is arrived at that the bulk of the gold has been concentrated from pyritic veins contained in sandstone near the present workings. The coarse gold is not placer gold, but occurs here in association with the alluvial by accident of position. The gold bearing veins therefore, will be looked for with equal likelihood of success outside the confines of the basin. The secondarily enriched veins will prove to be very narrow and irregular in value. Probablv the unenriched material from which the gold has been concentrated will prove to be unpayable to exploit." …

"The amount of gold obtainable from this small area is remarkable and certainly warrants the further attention of prospectors in an endeavour to locate the secondarily enriched veins from which the coarse gold has been derived."

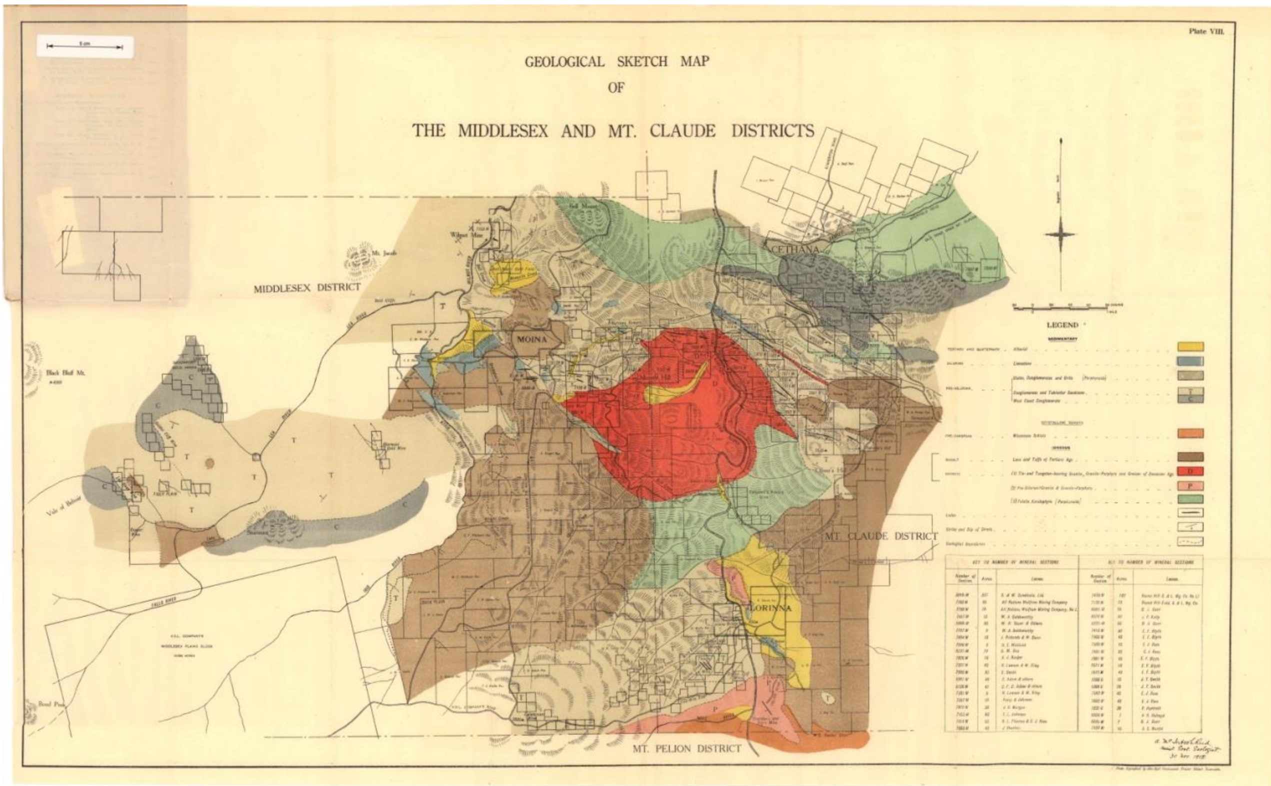

Figure 4.5: Geological sketch map of the Middlesex and Mt Claude districts, Reid, 1919.

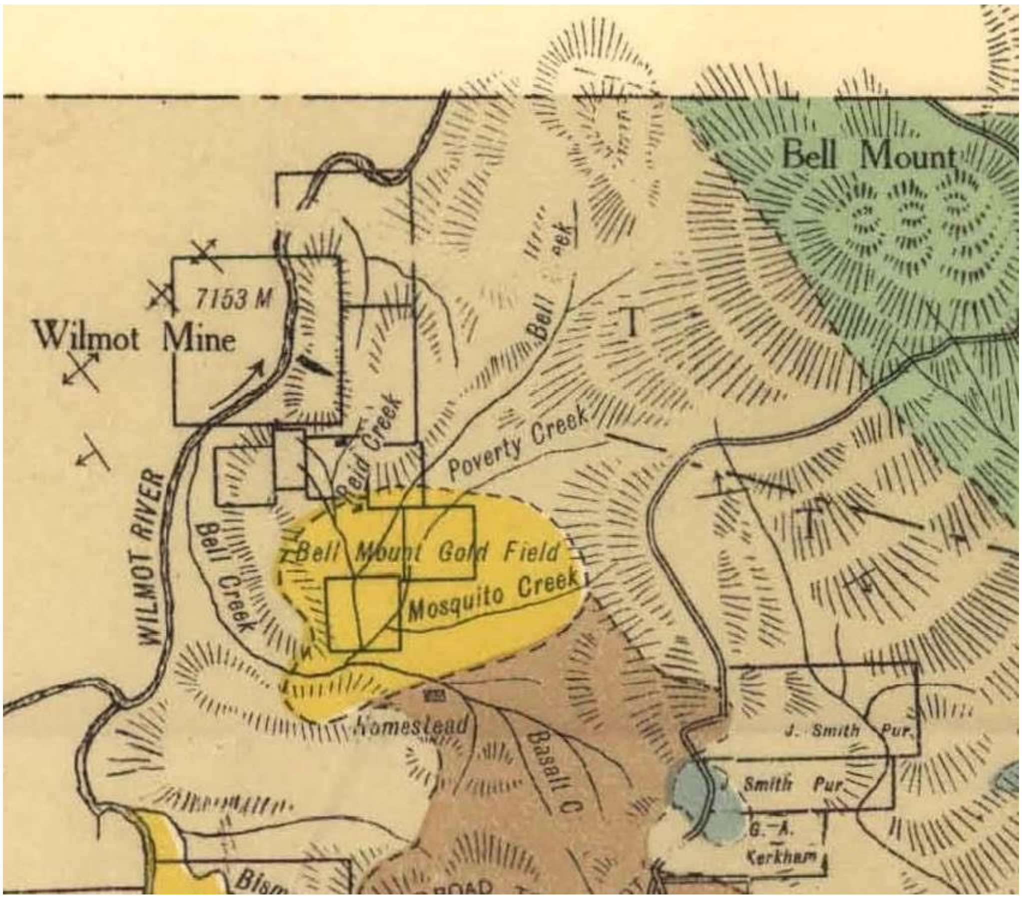

Figure 4.6: Close-up of Bell Mount alluvial area from figure 5.

Broadhurst, E. (1934), Report on the Stormont, Bell Mount and Black Bluff district - UR1934_032_45

In 1934 E, Broadhurst visited and wrote a report on the gold and bismuth deposits of the Moina/Black Bluff area including the Bell Mount alluvial goldfield. It is his map which gives the best detail of the field as it was at the time.

Regarding the origin of the gold, in his report he stated the following:

"Origin of the gold: The problem of the origin of the gold on this field is one which many have attempted to solve, but so far with no success.

The mounds of detrital material show that originally, before the stream began to cut down into their beds, the whole area was covered by it. Twelvetrees considered that the basin was a swamp or lake at the time of the collection of the material, and that the gold has been reconcentrated in the stream courses. This seems to be a very reasonable explanation. He also considered that the country to the north and west, especially the west, would be the source of the metal. This is also probable, since the coarse gold has been found entirely on the west side of the basin, which suggests that the gold came from the west, the coarse gold being dropped soon after it entered the basin, and the finer gold being carried over to the east to the Poverty Creek workings.

The shape of the nuggets is an interesting fact to be considered when discussing the origin of the gold. In connection with this, Mr. Sweeney supplied me with some interesting information about an occurrence of gold at Black Bluff about which he had been told. Here a reef narrowed down to a blade-like thread of gold, but sometimes it widened out suddenly into bulbs (see sketch shown with plan). This gives a shape remarkably like the nuggets, being flat and smooth on one side and rounded and rough on the other. While this is only hearsay evidence, it is recorded because it provides a good illustration of a possible manner in which nuggets of such a shape could be formed.

The most probable explanation seems to be, therefore, that the original occurrence of the gold was **in small veinlets in sandstone or conglomerate**. The gold then came, both free and included in the detrital material, from the west and north and collected in the basin. The gold was then reconcentrated in the stream courses where it was found and worked."

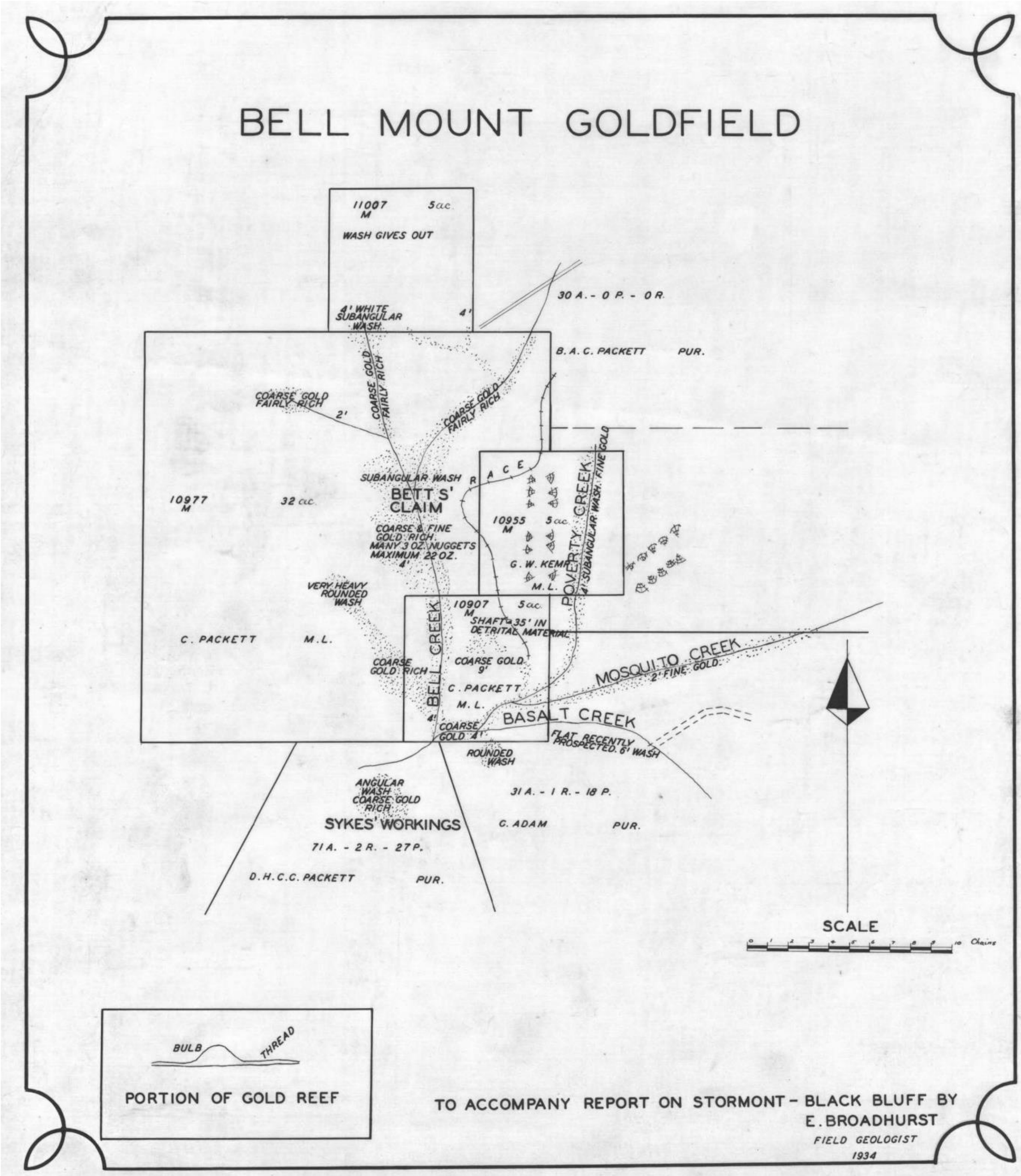

Figure 4.7: Bell Mount Goldfield, Broadhurst, 1934.

Jennings, I.B. (1979), Geological Survey Explanatory Report, Geological Atlas 1 Mile Series, zone 7 sheet 37 (8115S) Sheffield - ER8115S0

Ian Jennings mapped the Sheffield quadrangle and summarised all old workings in the region. Regarding the source of the gold to the alluvial filed he summarised these preceding government geologists's reports as follows:

"The Bell Mount alluvial goldfield is situated approximately one kilometre south-west of Bell Mount in the headwaters of Bell Creek. Gold was discovered in the area in 1892 and the field was almost worked out within two years. Since then the field has received intermittent attention from prospectors. Twelvetrees (1913) estimated 113.4 kg of gold was recovered during the first two years.

The first report on the Bell Mount goldfield is by Montgomery (1894), who suggested that the gold originated either from the slopes of Bell Mount to the north, or from rewashing of older gravel belonging to the river system obliterated by the Tertiary basalt. The general consensus of opinion in later reports such as those by Waller (1901), Twelvetrees (1913), Reid (1919) and Broadhurst (1934) is that the gold is close to its source, and that the gold and alluvium probably originated from the south and south-west slopes of Bell Mount. Twelvetrees (1913) notes that had the gold originated from the south or south-east of the field, then cassiterite and wolframite would also be present in the wash.

The main workings are in Bell Creek (Broadhurst, 1934) where recent alluvium covers Ordovician Gordon Limestone and Moina Sandstone. Most of the gold reportedly was recovered from the basal 150 cm of the alluvium. The gold occurs as flat nuggets commonly weighing 85 g, with the largest nugget weighing 624 g. The shape of the nuggets, flat and smooth on one side and rounded or bulbous on the other side, suggests the gold originally occupied joint planes or small veinlets in the host rock (Broadhurst ,1934)."

4.1.3 Conclusion

The opinions expressed in each of the six reports concur on one aspect, that the gold is close to its source. All argue for the source of the gold being pyritic veins in sandstone and conglomerate (though reef (lode) style is also a possible alternative. Reid also recognises that the Wilmot mine style (which we recognise as the same as Higgs mineralisation which extends for km's along strike) may be a source.

The pyritic vein in sandstone and conglomerate style should generate chargeability anomalies in the 3D IP data. The Wilmot mine style (i.e. that which we call Higgs/West Higgs style) should show as conductivity anomalies in the 3D IP data.

4.2 3D IP Modelling – Bell Mount Goldfield

4.2.1 Introduction

The 3D IP data from the 2011/2012 survey has been modelled as a series of isosurfaces in SURPAC and 3D DTM's generated. These DTM's have been sectioned in SURPAC and exported as .dxf's into Mapinfo/Discover and sections generated.

4.2.2 3D IP Bell Mount Goldfield Area Section and Plans

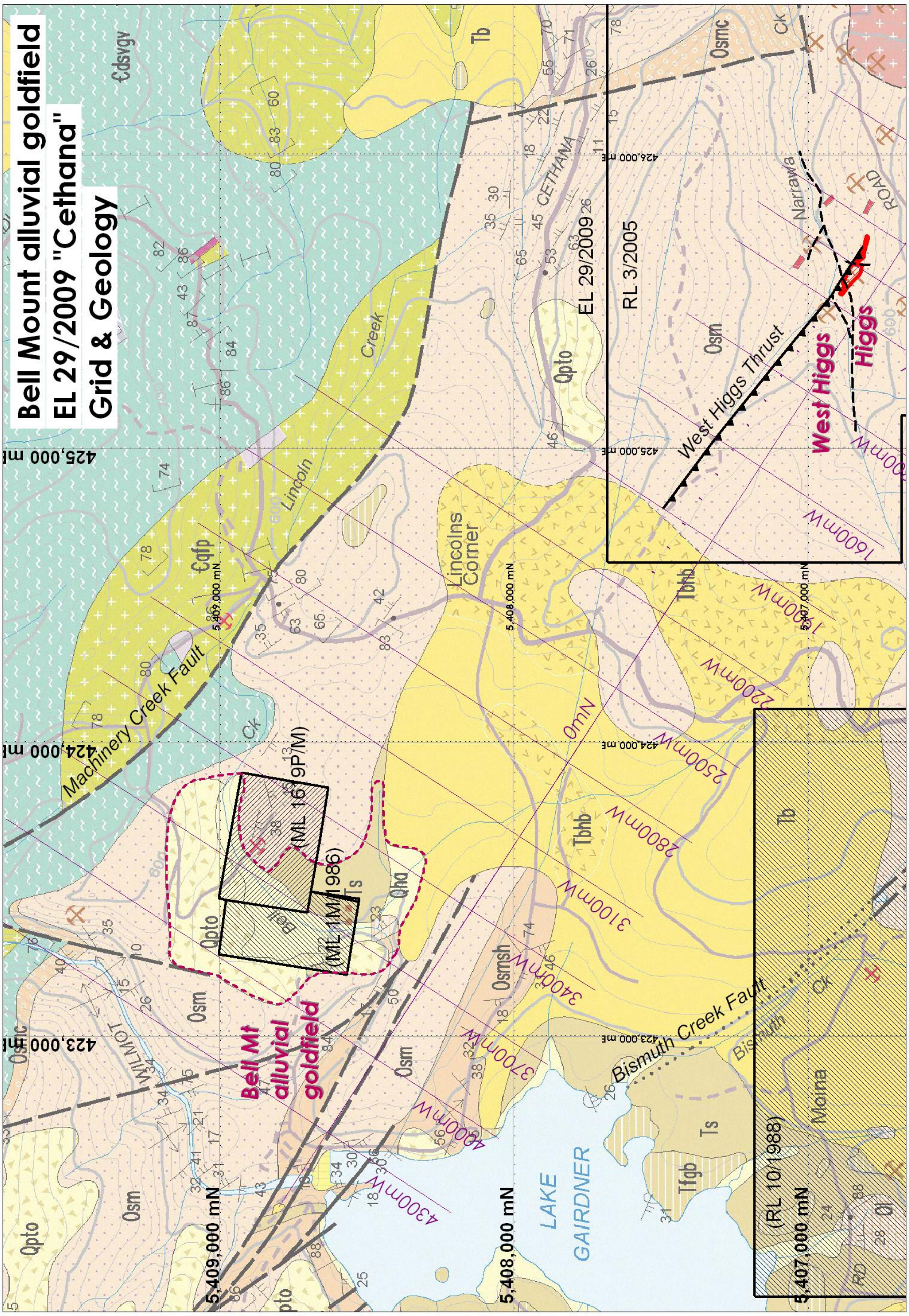

Figure 4.8: Bell Mount Goldfield Geology and Sections Grid

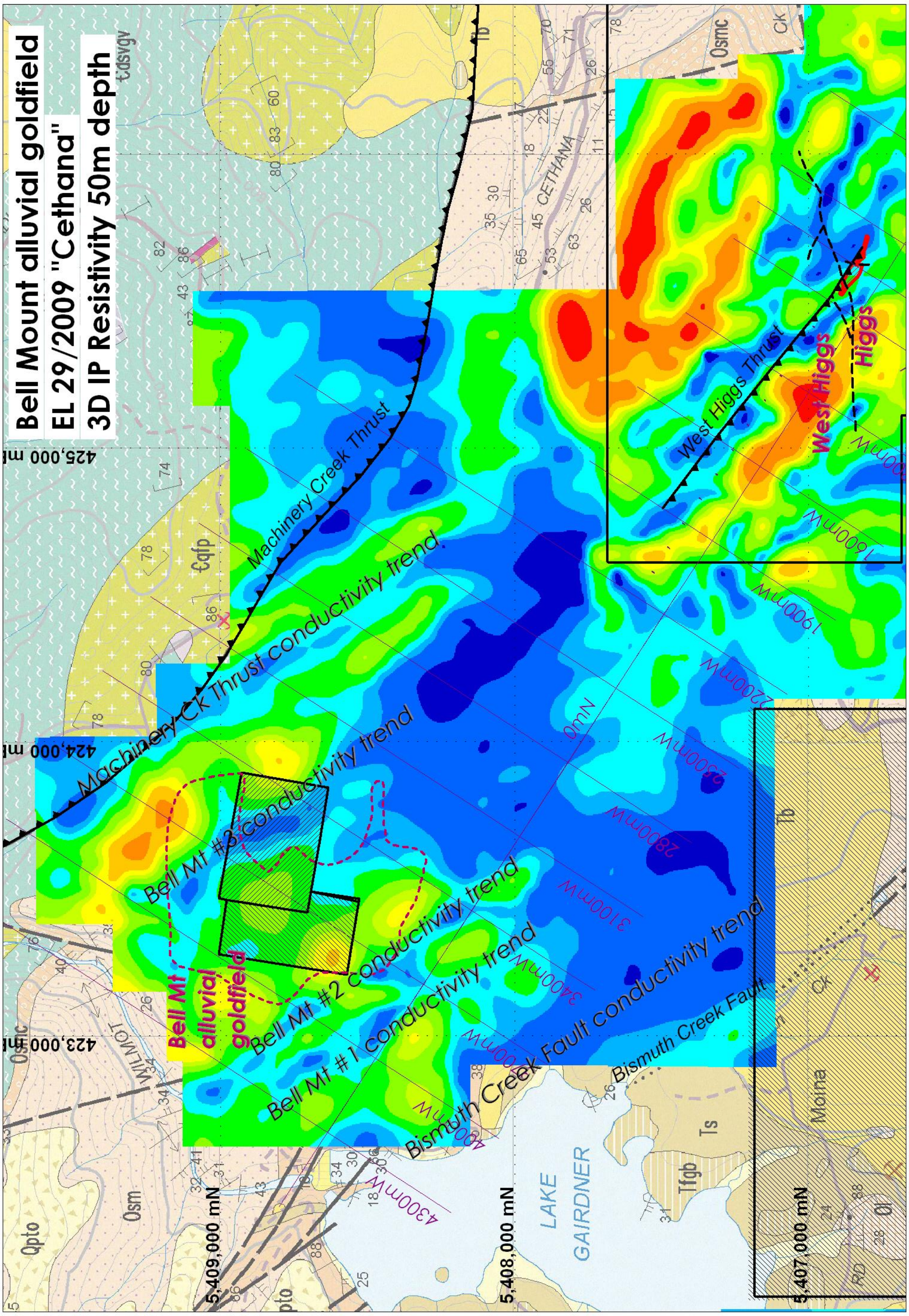

Figure 4.9: Bell Mount Goldfield – 3D IP Resistivity at 50m depth showing conductivity trends (dark blue).

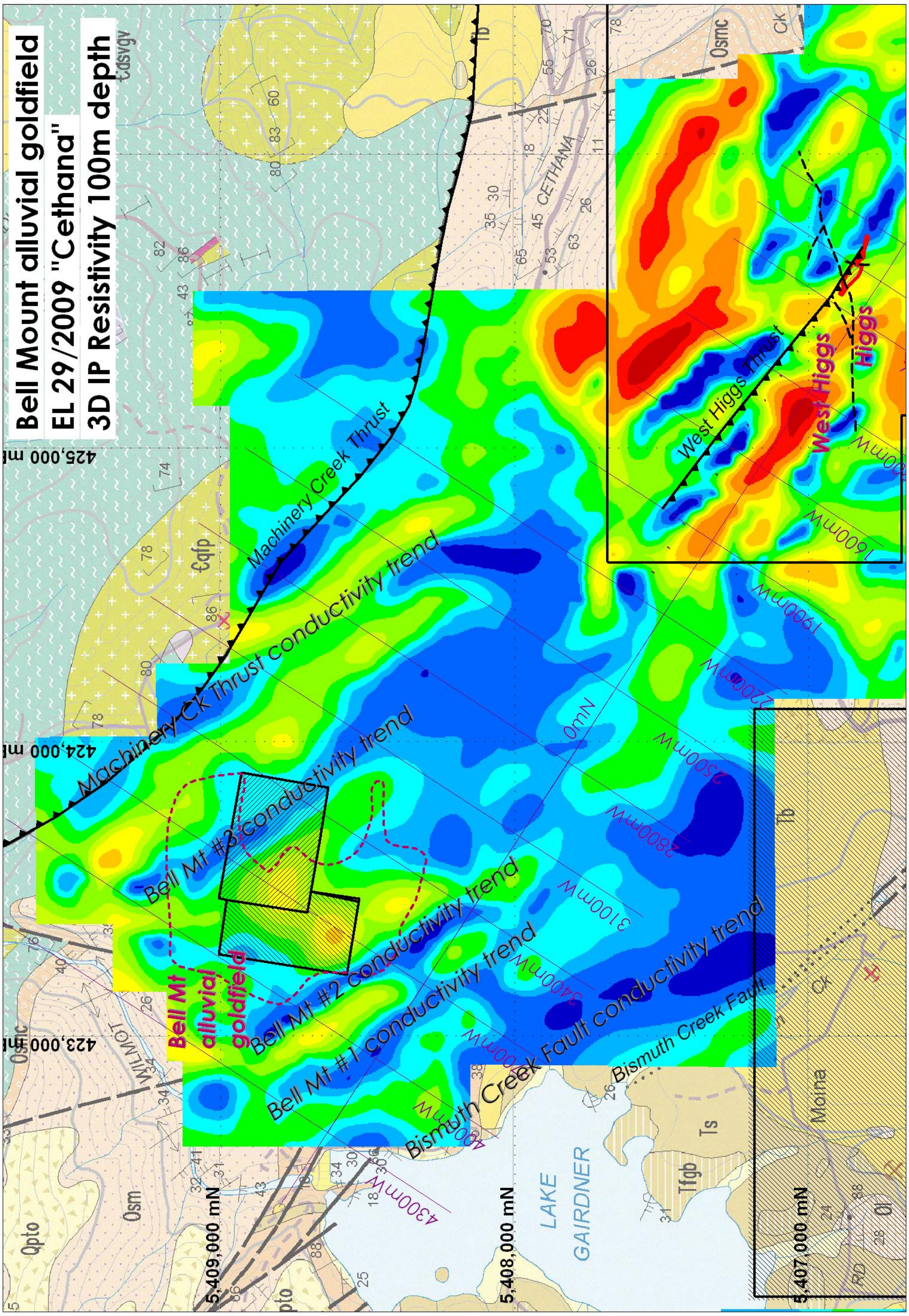

Figure 4.10: Bell Mount Goldfield – 3D IP Resistivity at 100m depth showing conductivity trends (dark blue).

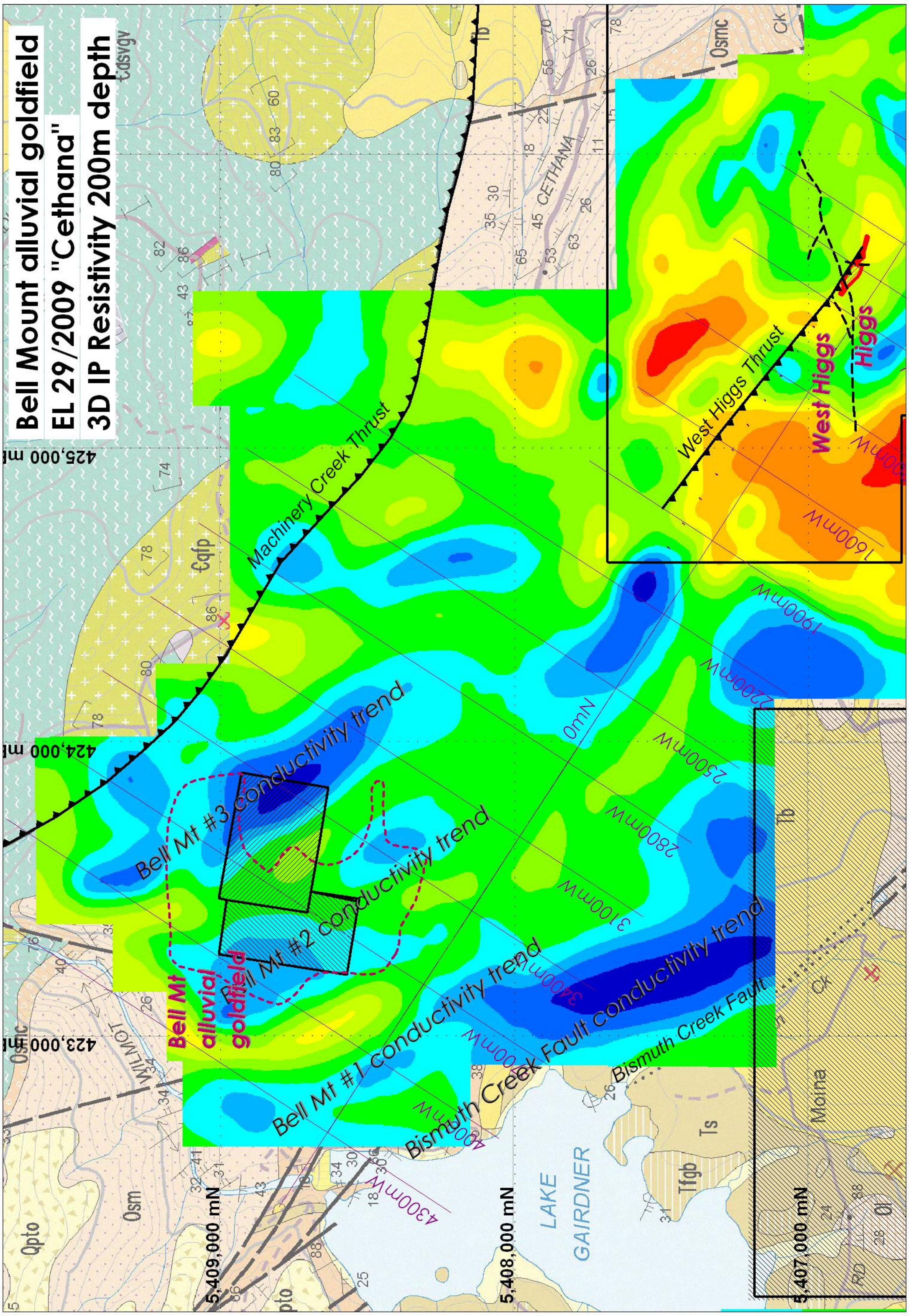

Figure 4.11: Bell Mount Goldfield – 3D IP Resistivity at 200m depth showing conductivity trends (dark blue).

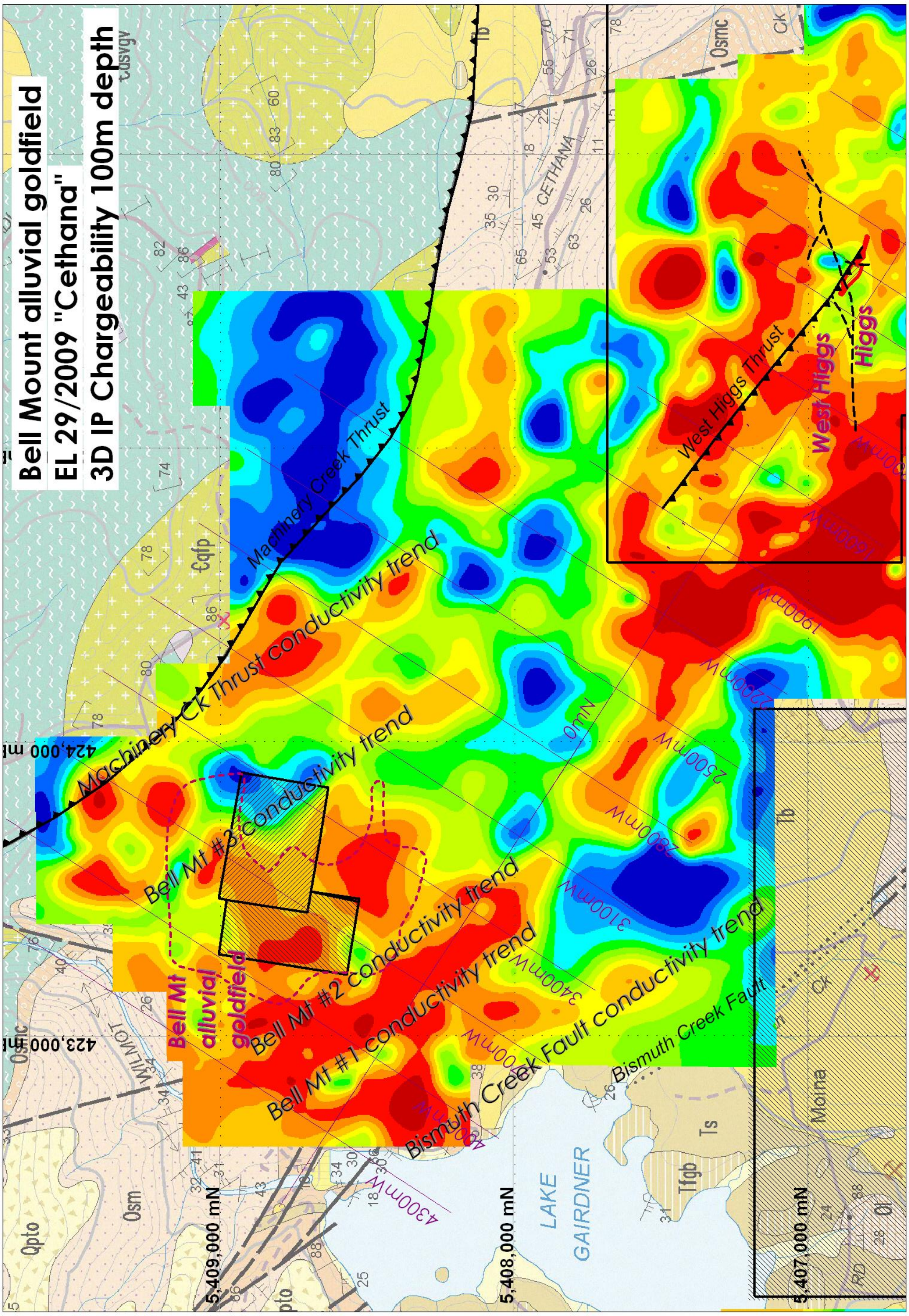

Figure 4.12: Bell Mount Goldfield – 3D IP Chargeability at 100m depth showing conductivity trends (dark blue).

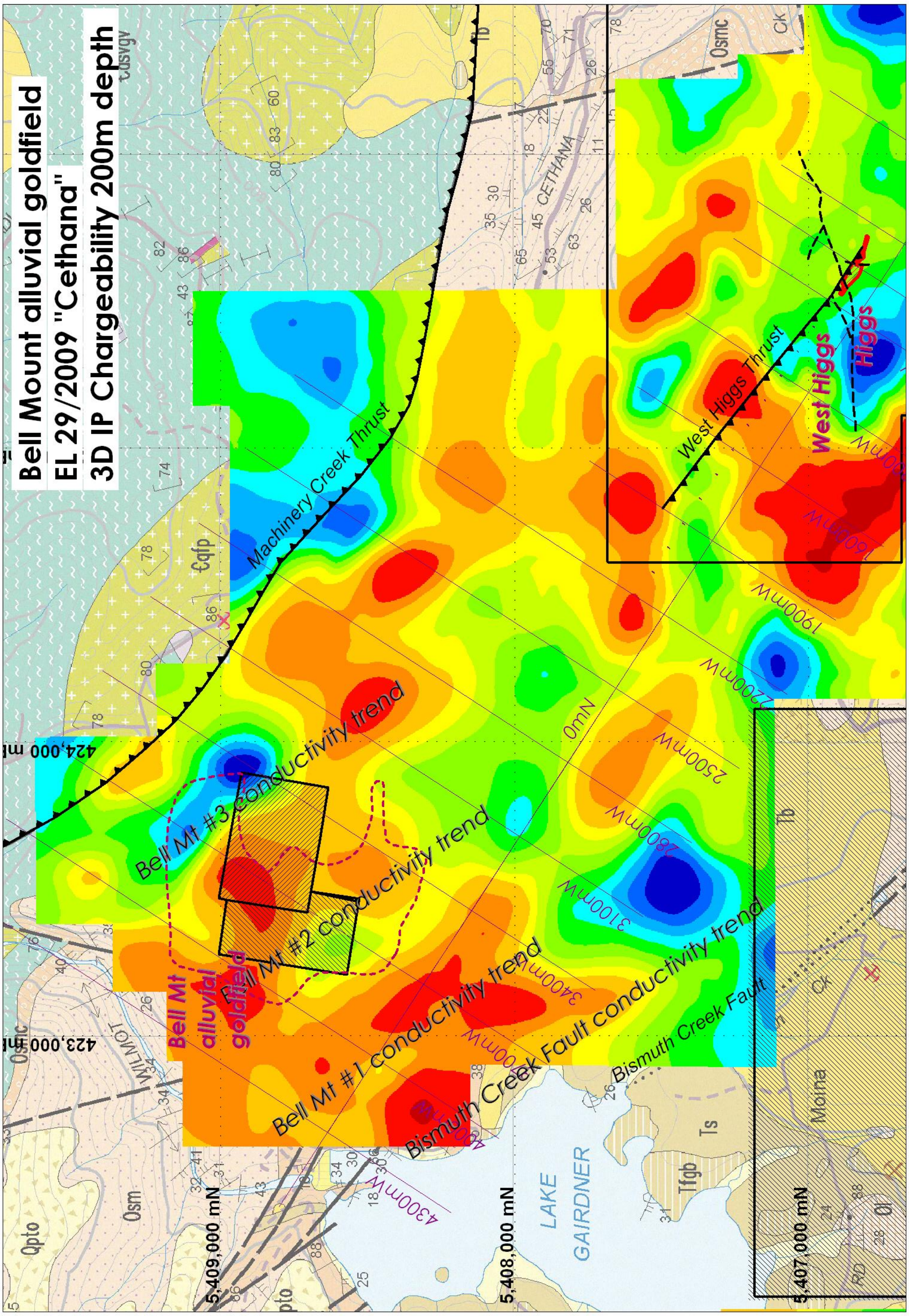

Figure 4.13: Bell Mount Goldfield – 3D IP Chargeability at 200m depth showing conductivity trends (dark blue).

Figure 4.14: Legend for figures 4.15 to 4.22.

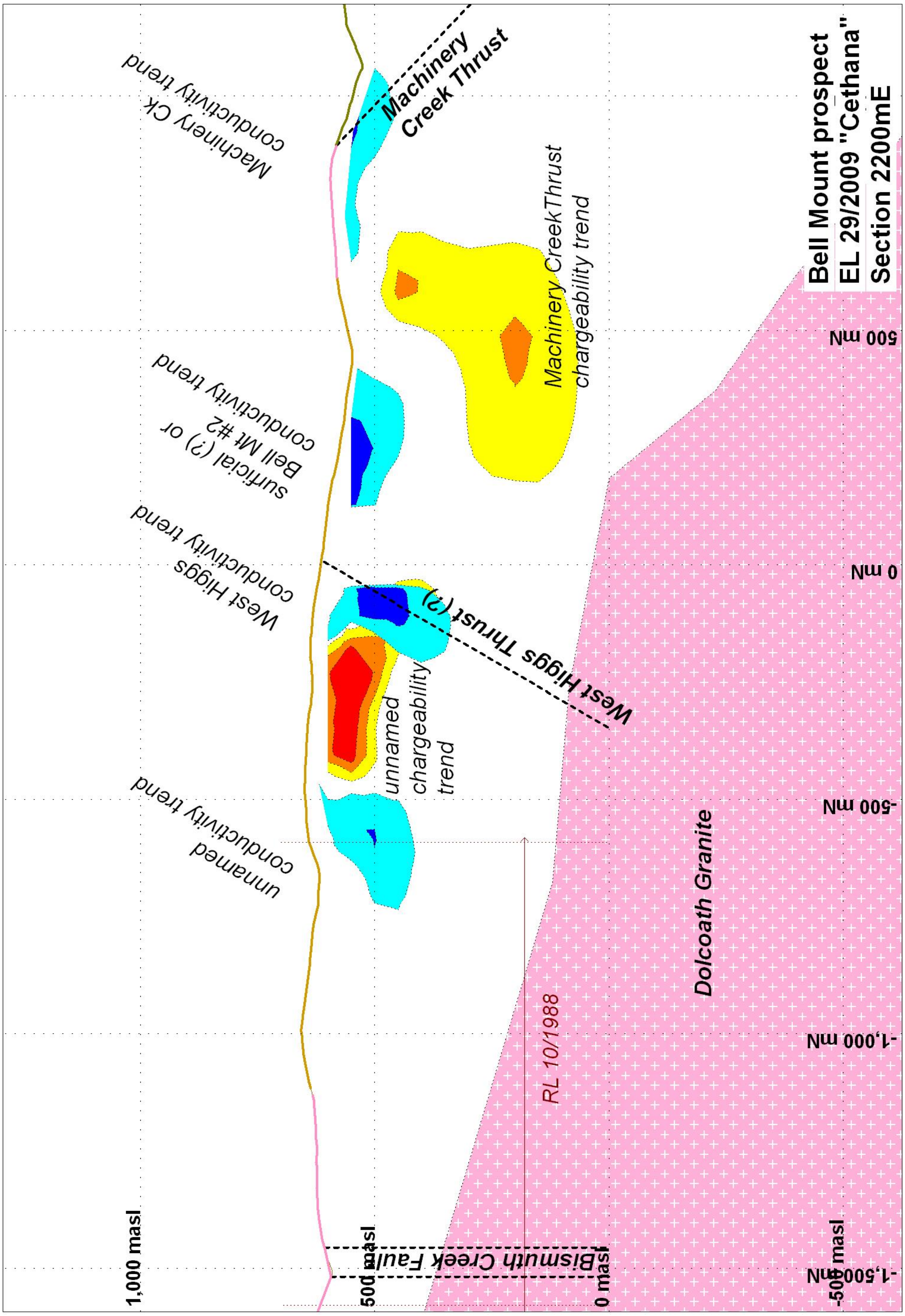

Figure 4.15: Bell Mount goldfield Section 2200mW showing 3D IP conductivity and chargeability anomalies superimposed on known geology.

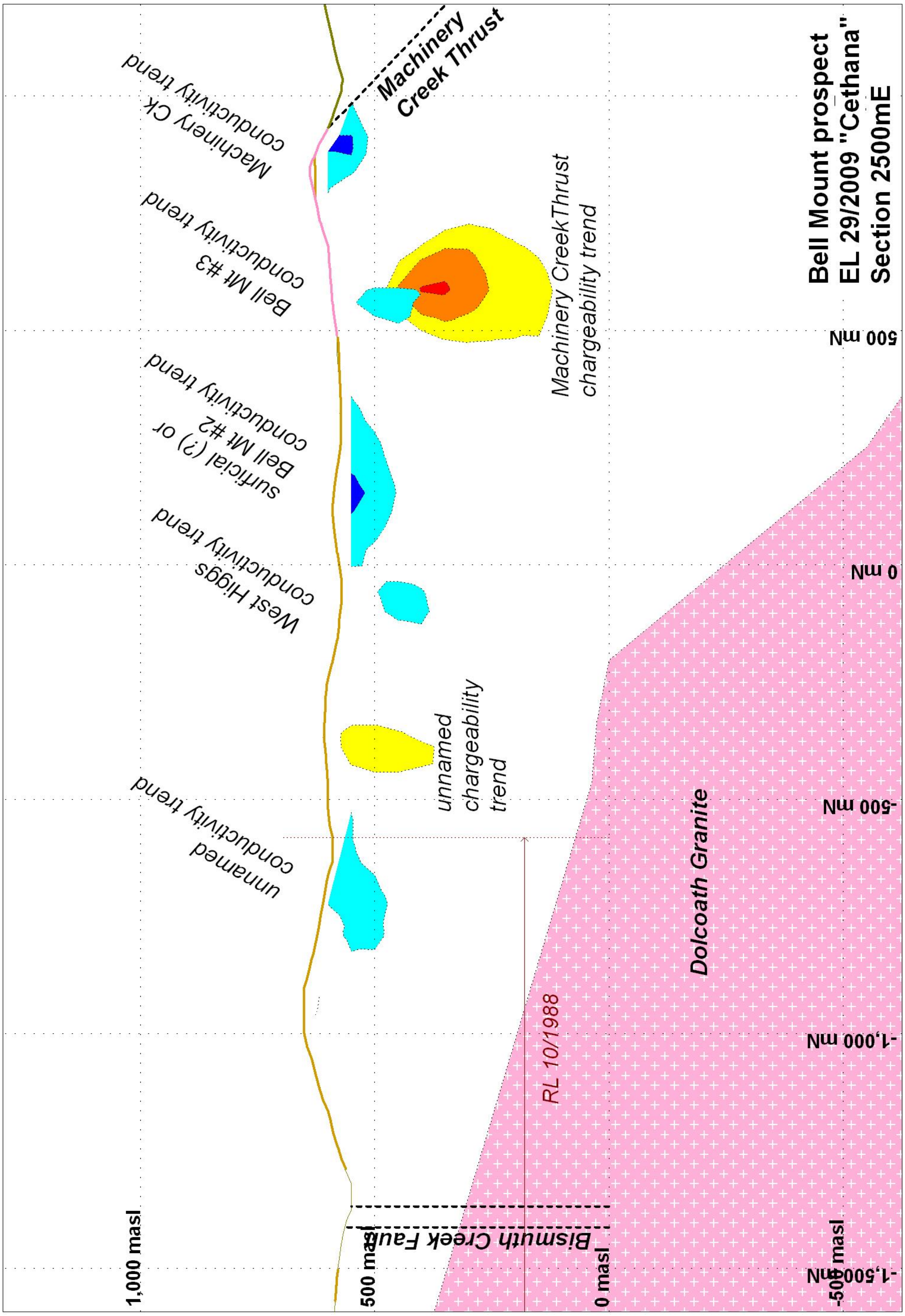

Figure 4.16: Bell Mount goldfield Section 2500mW showing 3D IP conductivity and chargeability anomalies superimposed on known geology.

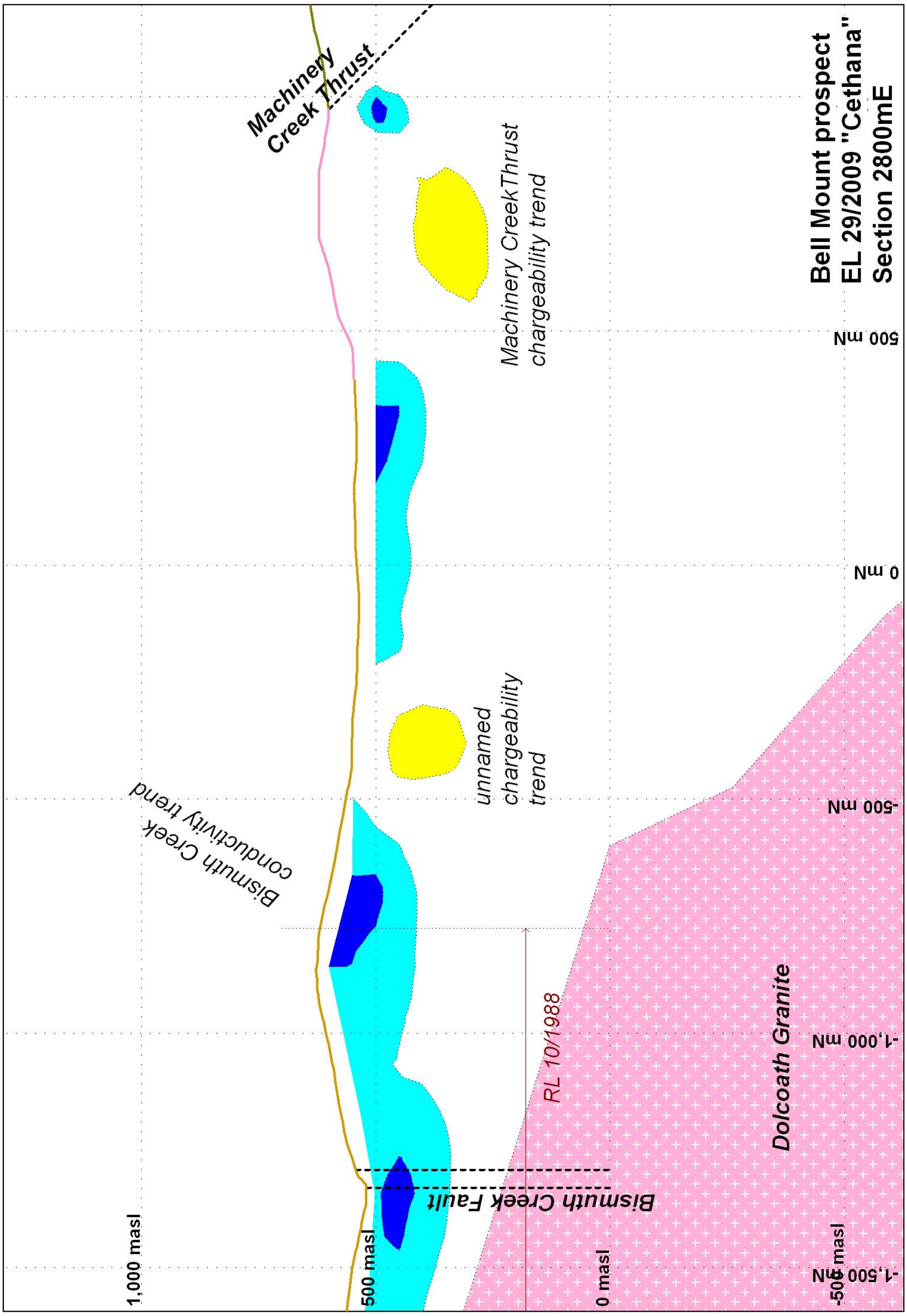

Figure 4.17: Bell Mount goldfield Section 2800mW showing 3D IP conductivity and chargeability anomalies superimposed on known geology.

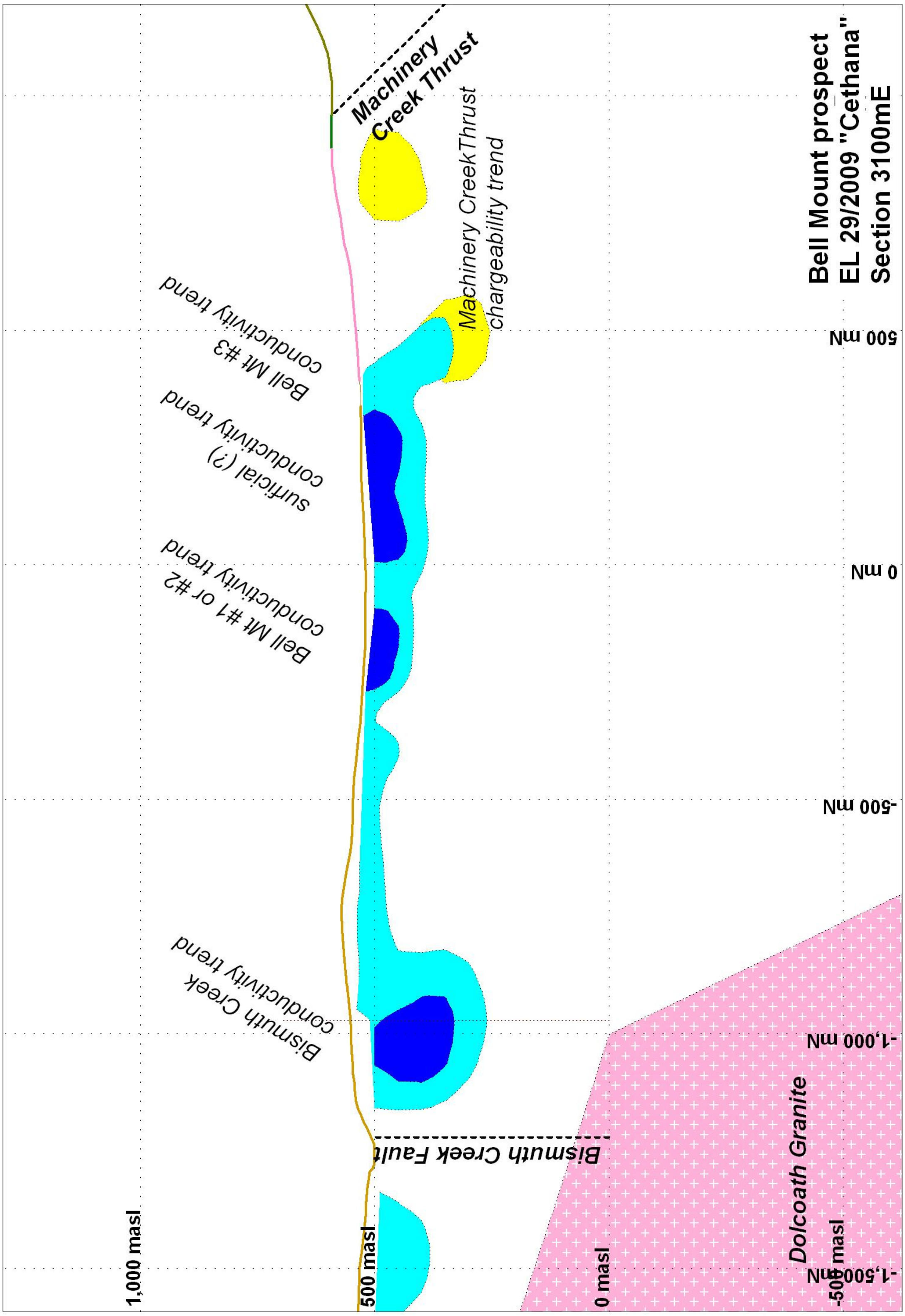

Figure 4.18: Bell Mount goldfield Section 3100mW showing 3D IP conductivity and chargeability anomalies superimposed on known geology.

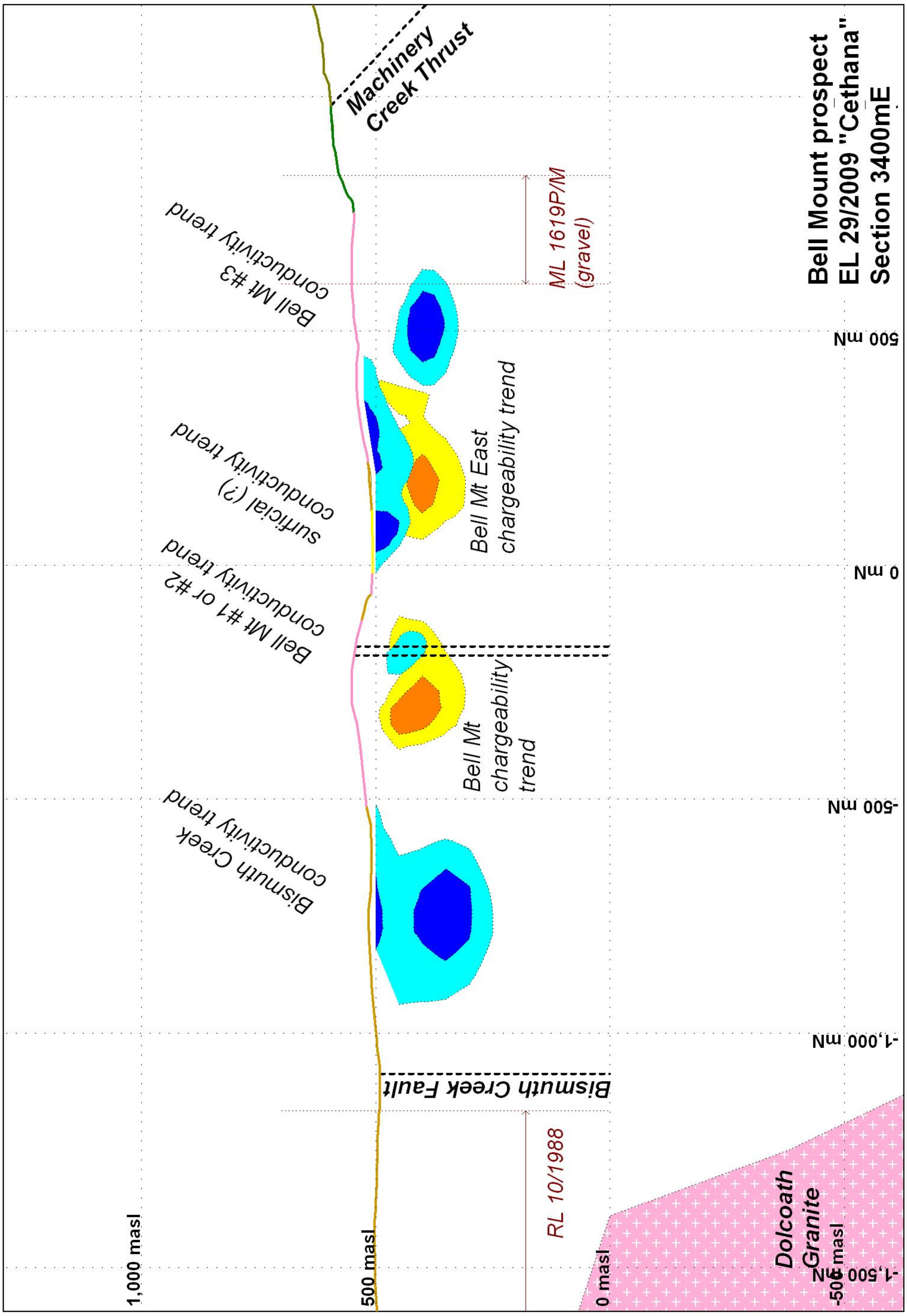

Figure 4.19: Bell Mount goldfield Section 3400mW showing 3D IP conductivity and chargeability anomalies superimposed on known geology.

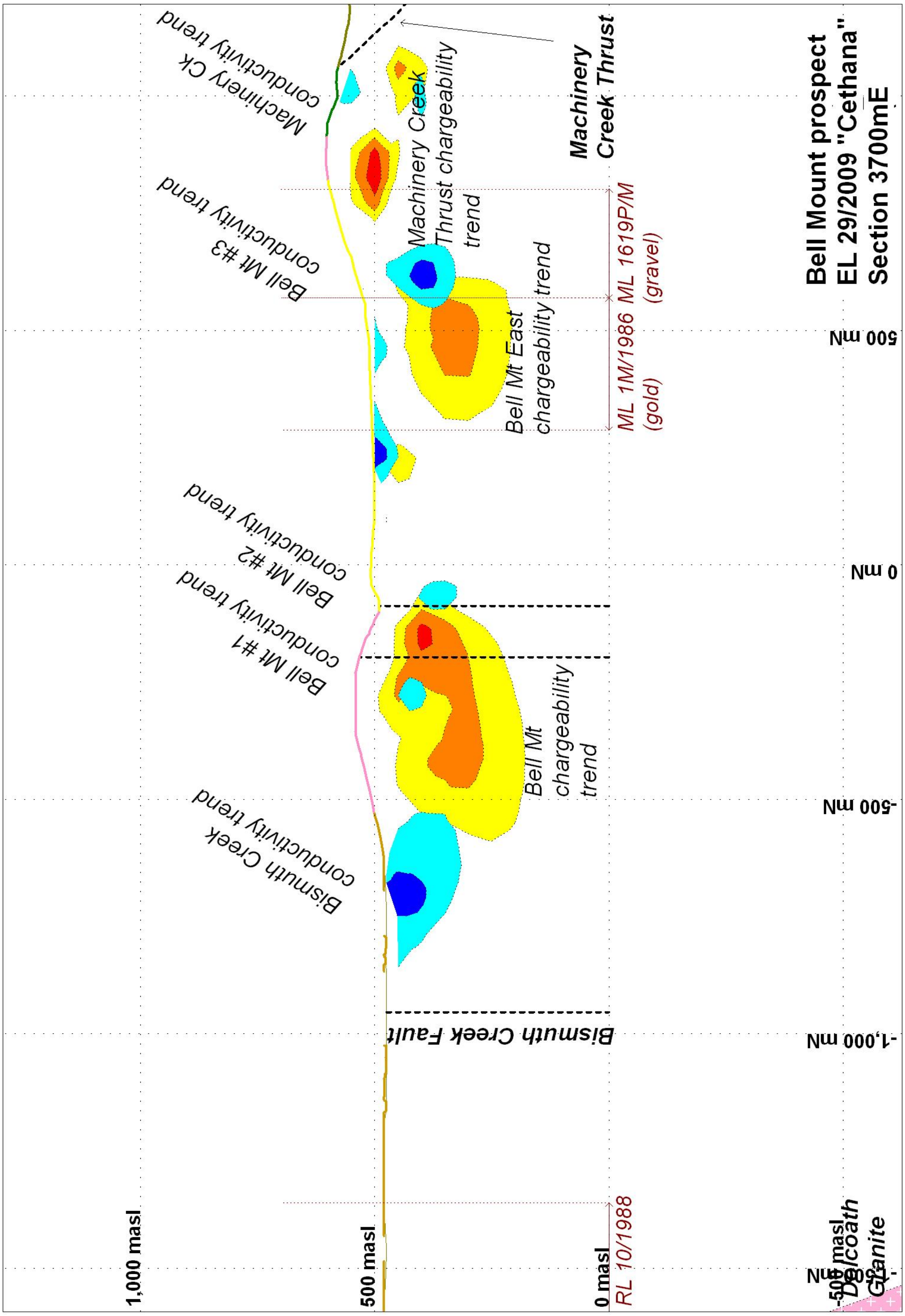

Figure 4.20: Bell Mount goldfield Section 3700mW showing 3D IP conductivity and chargeability anomalies superimposed on known geology.

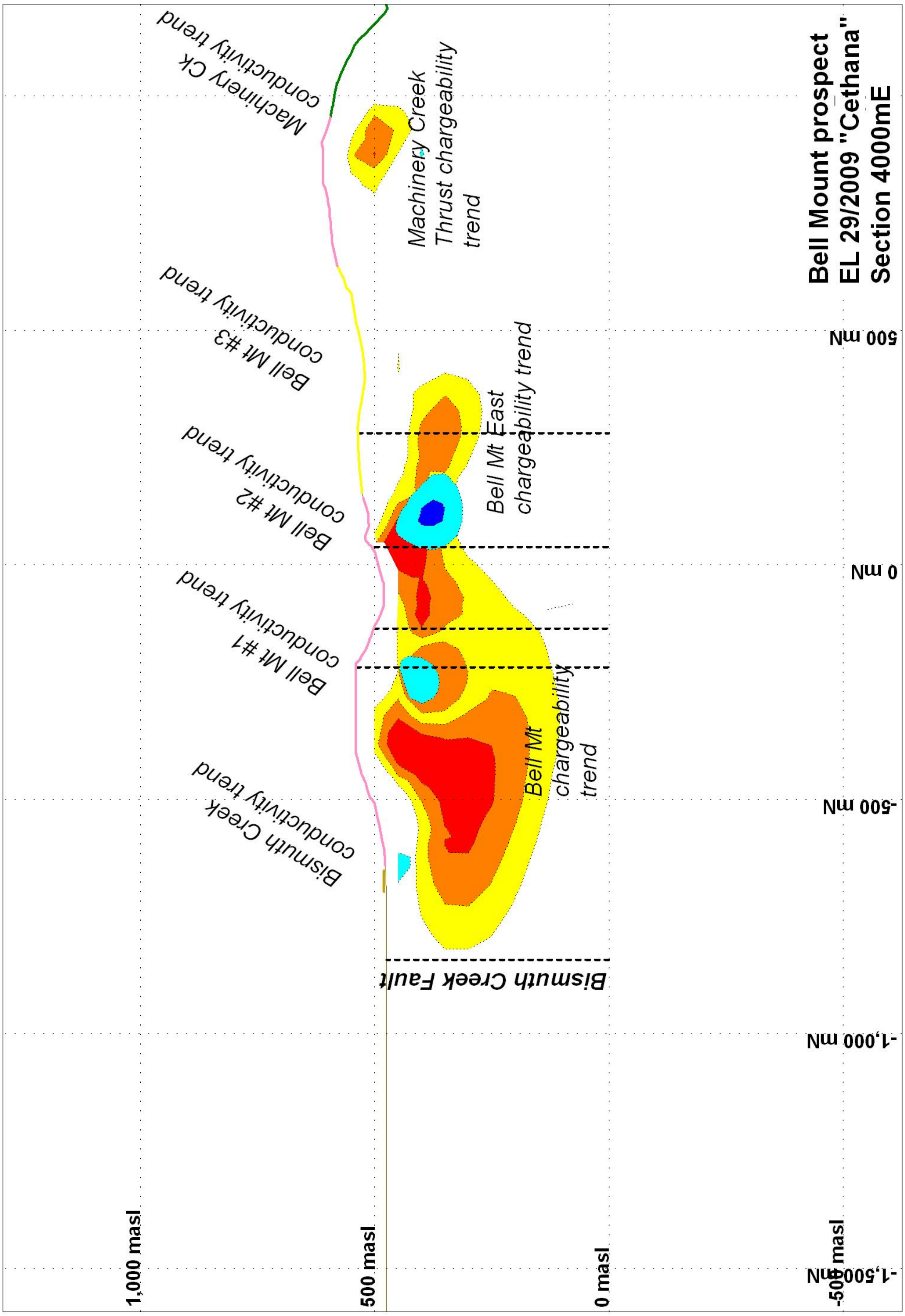

Figure 4.21: Bell Mount goldfield Section 4000mW showing 3D IP conductivity and chargeability anomalies superimposed on known geology.

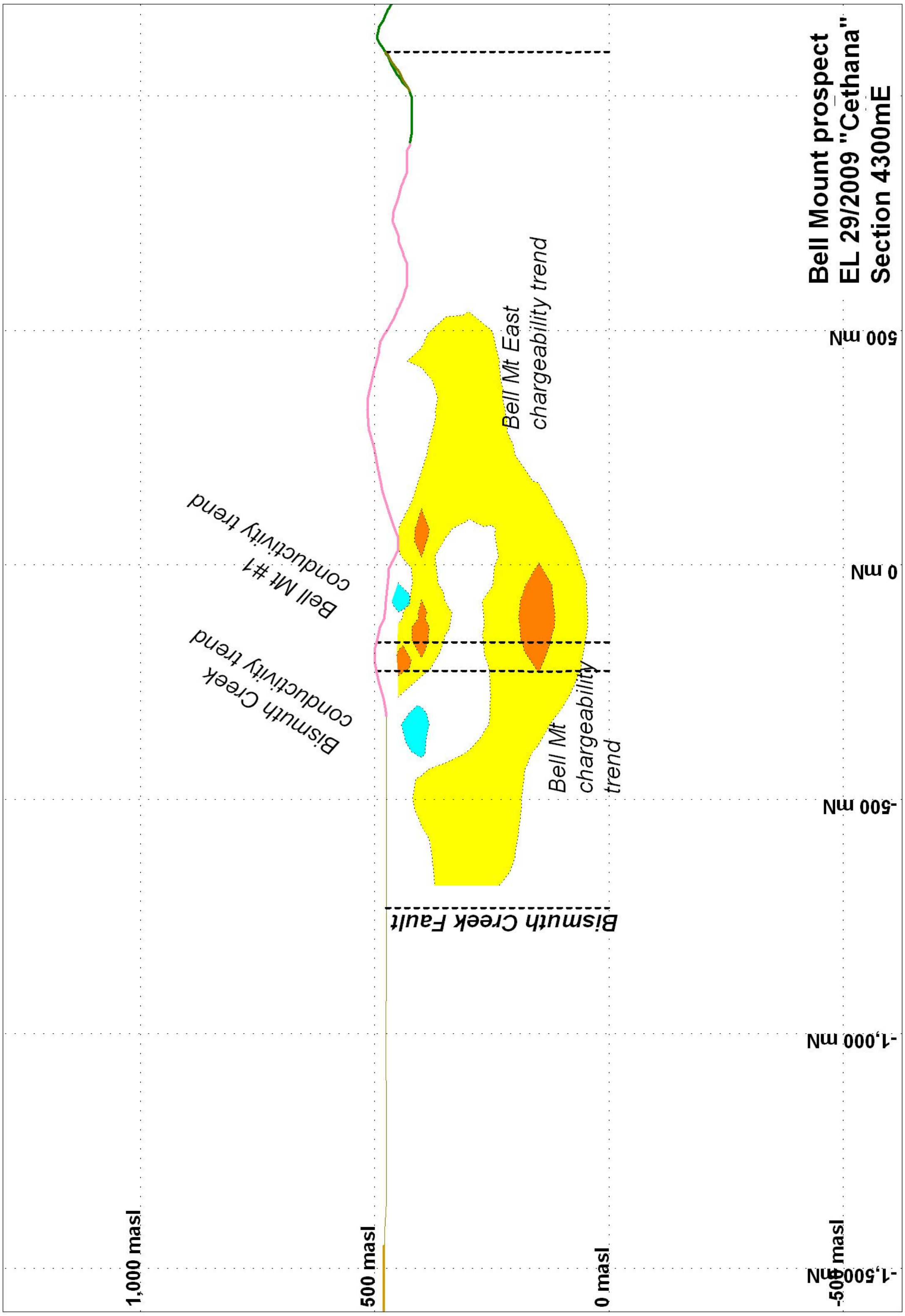

Figure 4.22: Bell Mount goldfield Section 4300mW showing 3D IP conductivity and chargeability anomalies superimposed on known geology.

4.3 Bell Mt. Goldfield Summary

The Bell Mount goldfield has produced over 3000oz's from alluvial workings with large nuggets not uncommon. It continues to produce nuggets up to 3oz in size.

The alluvial (?) gold is found in the base of a thin layer (generally <1m) of Tertiary aged scree and gravel which covers the slopes of the hills which surround and define the basin.

Strong 3D IP chargeability anomalies (Bell Mount, Bell Mount East and Machinery Creek Thrust chargeability trends) underlie the goldfield.

Four 3D IP conductivity/resistivity anomalies (i.e. Bell Mount #1, #2, #3 and Machinery Creek Thrust conductivity trends) can also be seen extending from Higgs/West Higgs in a west-northwesterly direction beneath basalt cover until they re-appear paralleling mapped faults which meet the Bismuth Creek Fault in the vicinity of the Bell Mount alluvial goldfield.

A fifth conductivity anomaly, the Bismuth Creek conductivity trend, appears to be due to a deep Tertiary channel running along the eastern side of the Bismuth creek Fault.

Exploration at Higgs and West Higgs in the Narrawa Creek valley along strike to the southeast has intersected sulphidic mineralisation in two associations or facies. Discrete, stratabound/stratiform, biotite hornfels with variable Pb+Zn+/-gold facies is surrounded by a broader halo of pyritic+/-gold sandstone facies where it has had grades in excess of 20g/t Au. 3D IP conductivity anomalies correspond 1:1 with the former type whilst chargeability anomalies map out the halo of the latter type.

3D IP suggests both rock types are present beneath the Bell Mount alluvial goldfield with the location of the Bell Mount goldfield at the northwestern end of a structural/geophysical corridor with the Higgs and West Higgs deposits/prospects at the southeastern end strongly suggesting a similar genesis between the two.

Pyritic sandstone outcrops along the roadcuts to the Lake Gardner dam and in a quarry used to source rock for the dam. Limited sampling in the old quarry returned up to 0.14g/t Au in pyritic sandstone with elevated lead and zinc but gold grades are also quite variable at Higgs/West Higgs.

Semi-massive base metals in biotite hornfels characterises the mineralisation at the Wilmot mine, the northwesternmost extension of the Bell Mount #3 conductivity trend suggesting that this style of mineralisation does continue beneath the Tertiary scree cover beneath the Bell mount goldfield.

Underpinning the interpretation of the source of the Bell Mount gold is the morphology of the gold and to some degree the shape of the natural basin in which the goldfield lies. Many nuggets were rounded with a flat base and it has been suggested (Reid, 1919) that gold may have been dissolved by groundwater from bedrock and re-precipitated on carbonaceous muds in a Tertiary aged lake. Either of the two facies of sulphide may have been the source of the gold with gold remobilised chemically from underlying bedrock. Alternatively, and favoured herein, the nuggets have been produced by the chemical accumulation of gold as the source rocks have degraded and eroded.

An alternative proposition is that the gold shed from a discrete quartz reef which outcropped on the hills west of the goldfield. Certainly there are a number of mapped faults and as a junction between first (Bismuth Creek Fault) and second order structures is in a favourable structural setting. This might also explain the flat surface on some nuggets with the gold from the margins of the vein with the flat surface representing the vein wall.

5.0 Conclusions and Recommendations

Improved understanding of the nature and setting of mineralisation in the Moina area, added to an extensive regional 3D IP, high resolution helimagnetics and a large soil geochemical database has defined a number of highly prospective drill targets.

Detailed recommendations were made in MacDonald (2014, 2015 and 2016) for further drilling at the Bell Mount goldfield, Tin Spur, Round Mountain and Ti Tree Creek.

Further work has enhanced Sayers and other griesens on the granite margin as drill targets.

The work herein as enhanced the bell Mount goldfield as a drill target.

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