# TECK AUSTRALIA PTY LTD

**ABN 35 091 271 911**

# CARRARA PROJECT (GR329)

# COMBINED FINAL SURRENDER REPORT AND ANNUAL REPORT

## FOR THE PERIOD 21ST JANUARY 2013 TO 22ND OCTOBER 2019

## EL29560, EL29557, EL31538, EL30816

Operator and tenure holder: Teck Australia Pty Ltd, Level 2/35 Ventnor Avenue, West Perth WA 6005, Australia

Compiled by: J. Mander - Teck Australia Pty Ltd

Date: 15 November 2019

Target Commodities: Zinc, Lead, Silver

Distribution: Department of Primary Industries and Resources (Northern Territory)
Teck Australia

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To the best of our knowledge, this document conforms to the format outline for an annual report, as shown by the Northern Territory Geological Survey- Minerals and Energy Division website.

**BIBLIOGRAPHIC DATA**

| | |
|---|---|
| Project Name: | Carrara Project |
| Tenenement Package: | EL29560, EL29557, EL31538, EL 30816 |
| Tenement Operator: | Teck Australia Pty Ltd |
| Tenement Holder: | Teck Australia Pty Ltd |
| Report Type: | Final Surrender Report |
| Report Title: | Carrara Project Combined Final Surrender Report and Annual Report 21st Janurary 2013 to 22nd October 2019 |
| Report Period: | 21st January 2013 to 22nd October 2019 |
| Author: | J.Mander |
| Date of Report: | 15 November 2019 |
| 1:250,000 Map Sheet: | Mt Drummond SE 53-12 |
| 1:100,000 Map Sheet: | Carrara 6460, Mitchiebo 6360 |
| Target Commodities: | Zinc, Lead, Silver |

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**FIGURES**

# 1. SUMMARY

This document is submitted as a Final Surrender Report for EL29557, EL29560, EL30816 and EL31538, which are part of the Carrara Project. The Carrara project is deemed prospective for shale-hosted massive sulphide deposits (SHMS) containing zinc (Zn), lead (Pb) and silver (Ag). The Project area hosts lateral equivalents to the Lawn Hill Platform's Upper McNamara Group members, which hosts the world class Century deposit. Ground was applied for in 2012 following a preliminary desktop study by Teck's Zn Generative team.

Historically exploration on the project has been focused on exploring for SHMS mineralisation around the Carrara Ranges, but excluded EL31538, EL29557, EL29560 and EL30816.

Exploration activites over the relinquished tenements and Carrara project area in the period from 21st January 2013 to October 22nd 2019 comprised a:

- Review of literature and historical data
- Compilation and integration of data into a revised stratigraphic and structural interpretation
- Development of a conceptual basin model and targeting framework
- Re-evaluation of previously identified target areas
- Detailed structural interpretation of the area based on regional geophysical datasets as well as modelling of magnetic data to assess depth to basement and interpret basin development under cover
- Historical drilling and borehole data review to evaluate the depth of Cambrian cover
- A significant geophysical program was completed during the 2015-2016 reporting period comprising Audio-magnetotellurics (AMT), ground gravity, and EM surveys
- 1 drill hole in 2016; 800.42m – (EL30665)
- EM; SMARTEM in 2016; 184 stations – (EL29560, EL29793, EL29794, EL30665)
- Remodelling of gravity dataset
- Interpretation of 5 seismic lines realeased by GA in March 2018

The four Exploration Licences are surrendered in full as the prospective window for the target stratigraphy was deemed to be below the current exploration depth window and therefore no further work was planned.

## 2. LOCATION AND ACCESS

The Carrara project is located 300km northwest of Mt Isa, Queensland, in the Mt Drummond 250K mapsheet. The best way to access the ELs from Camooweal is to drive west on the Barkly highway, turn right on the Ranken road due north west, take the turn off to Alexandria station and use station tracks to head north east towards Mittiebah station (Figure 1). Alternatively dirt tracks due north from Camooweal can be used to access the tenements from the east via Gallipoli.

The nearest sizeable township is Camooweal, which is located approximately 150km to the south-southeast of the project. Camooweal has a permanent population of about 200 people.

Land use in the region is predominantly cattle grazing on large pastoral holdings. The Carrara Project straddles the Mittiebah and Alexandria stations which are both owned by North Australian pastoral Company Pty Ltd.

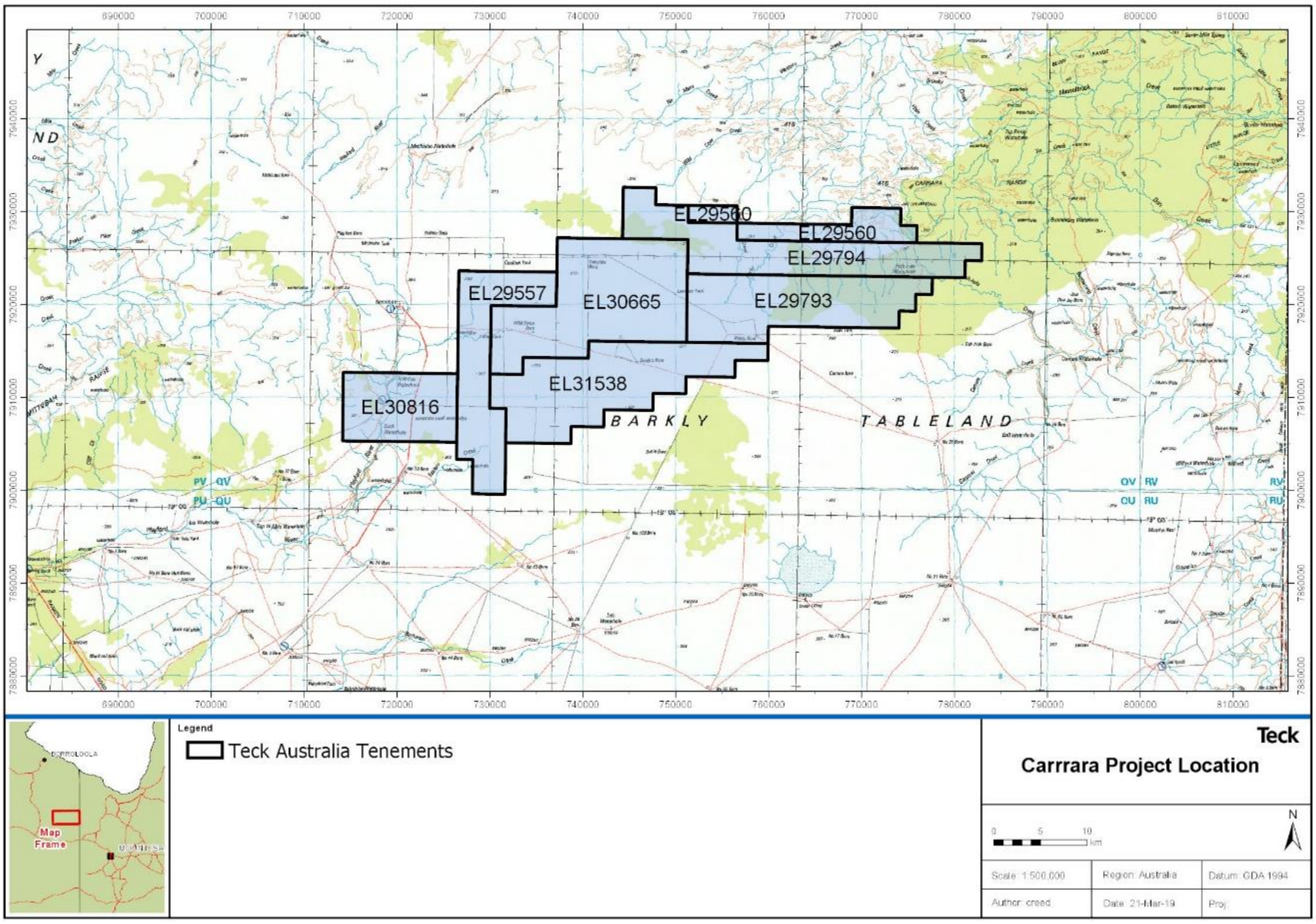


Figure 1: Location Plan of the Carrara Project.

## 3. TENEMENT INFORMATION

The Carrara Project comprised seven granted tenements of which four have been surrendered in full on October 22nd 2019 and one partial reduction on EL30665, with only EL29794 and EL29793 retained in full (Figure 2). Table 1 provides a summary of the current tenement status post the October 22nd 2019 relinquishment.

| Tenement | Grant Date | Expiry Date | Original Sub-block number | Area - 21 Jan 2018 Sub-blocks | Area - 23 Oct 2019 Sub-blocks |
|---|---|---|---|---|---|
| EL29557 | 21/01/2013 | 20/01/2019 | 149 | 37 | Fully Surrendered |
| EL29560 | 21/01/2013 | 20/01/2019 | 17 | 17 | Fully Surrendered |
| EL29793 | 30/07/2013 | 29/07/2019 | 78 | 47 | 47 |
| EL29794 | 30/07/2013 | 29/07/2019 | 56 | 48 | 48 |
| EL30665 | 23/07/2015 | 23/07/2021 | 64 | 64 | 30 (partial surrender) |
| EL30816 | 23/12/2015 | 22/12/2021 | 28 | 28 | Fully Surrendered |
| EL31538 | 1/11/2017 | 30/10/2023 | 56 | 56 | Fully Surrendered |

Table 1: Current Tenement Status

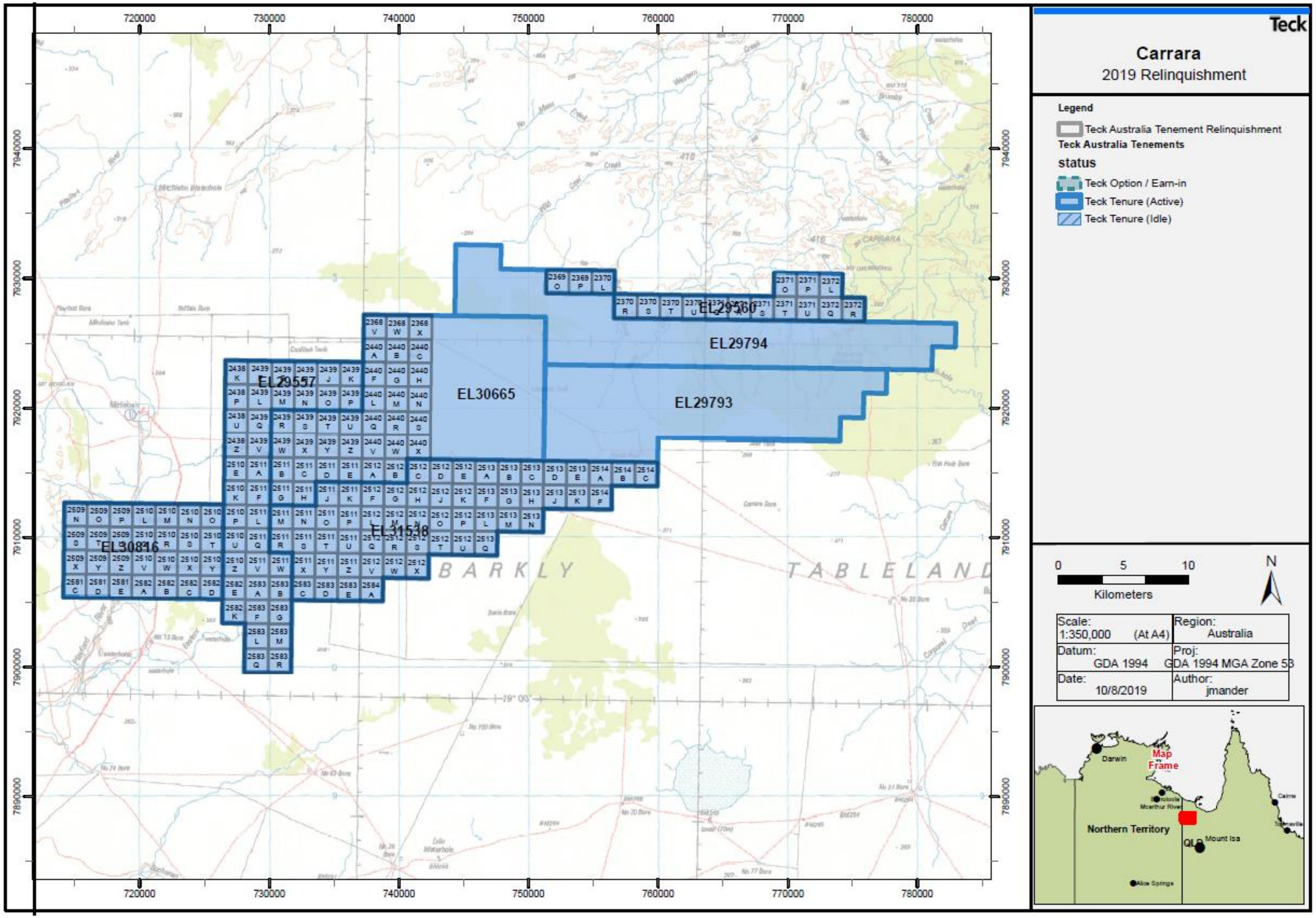


Figure 2: Carrara tenement map highlighting surrendered sub-blocks and EL's October 22nd 2019.

# 4. GEOLOGY

## REGIONAL GEOLOGY

The Carrara Project lies within the MOUNT DRUMMOND 250K map sheet, at the northwestern limit of exposure of Palaeoproterozoic to Mesoproterozoic Mount Isa Inlier (Figure 3). The Murphy Inlier separates the Mount Isa Inlier from the southeastern part of the coeval (Figure 4) McArthur Basin (Rawlings 1999). Both the Mount Isa Inlier and McArthur Basin belong to the extensive 1660 – 1590 Ma Isa Superbasin (Southgate et al., 2000). Rocks of the Isa Superbasin are host to giant sediment-hosted massive sulfide (SHMS) zinc-lead-silver deposits: Mount Isa Lead-Zinc, George Fisher, Hilton, Century Lady Loretta and McArthur River Mine. Figure 4 shows the litho-stratigraphy of the North Australian Proterozoic basins and ages of the key SHMS deposits.

The Carrara Project area is situated on the western limit of the Lawn Hill Platform which is part of the Western Fold Belt of the Mount Isa Inlier. Three distinct cover sequences are recognised within the Mount Isa Inlier. The Eastern and Western Fold Belts are separated by the Kalkadoon-Leichhardt Belt which is regarded as Cover Sequence 1 and mainly consists of granite and coeval felsic volcanic rocks. In the Western Fold Belt, rocks of Cover Sequence 2 are typical of those formed within a rift basin, with mafic volcanic rocks being extruded early in the rifting history and coarse to medium-grained clastic sediments filling the grabens.

Cover Sequence 3 is generally represented by the Mount Isa, McNamara and McArthur Groups which are regarded as coeval. Underlying these sequences are the sediment-dominated Surprise Creek Formation and the more restricted volcanic facies of the Fiery Creek Volcanics and Carters Bore Rhyolite. These sequences were laid down in local grabens and half grabens, unlike the sediments of the McNamara Group which are more widespread and more representative of a sag phase within the rift cycle. Structurally this accumulation of sediments is known as the Lawn Hill Platform.

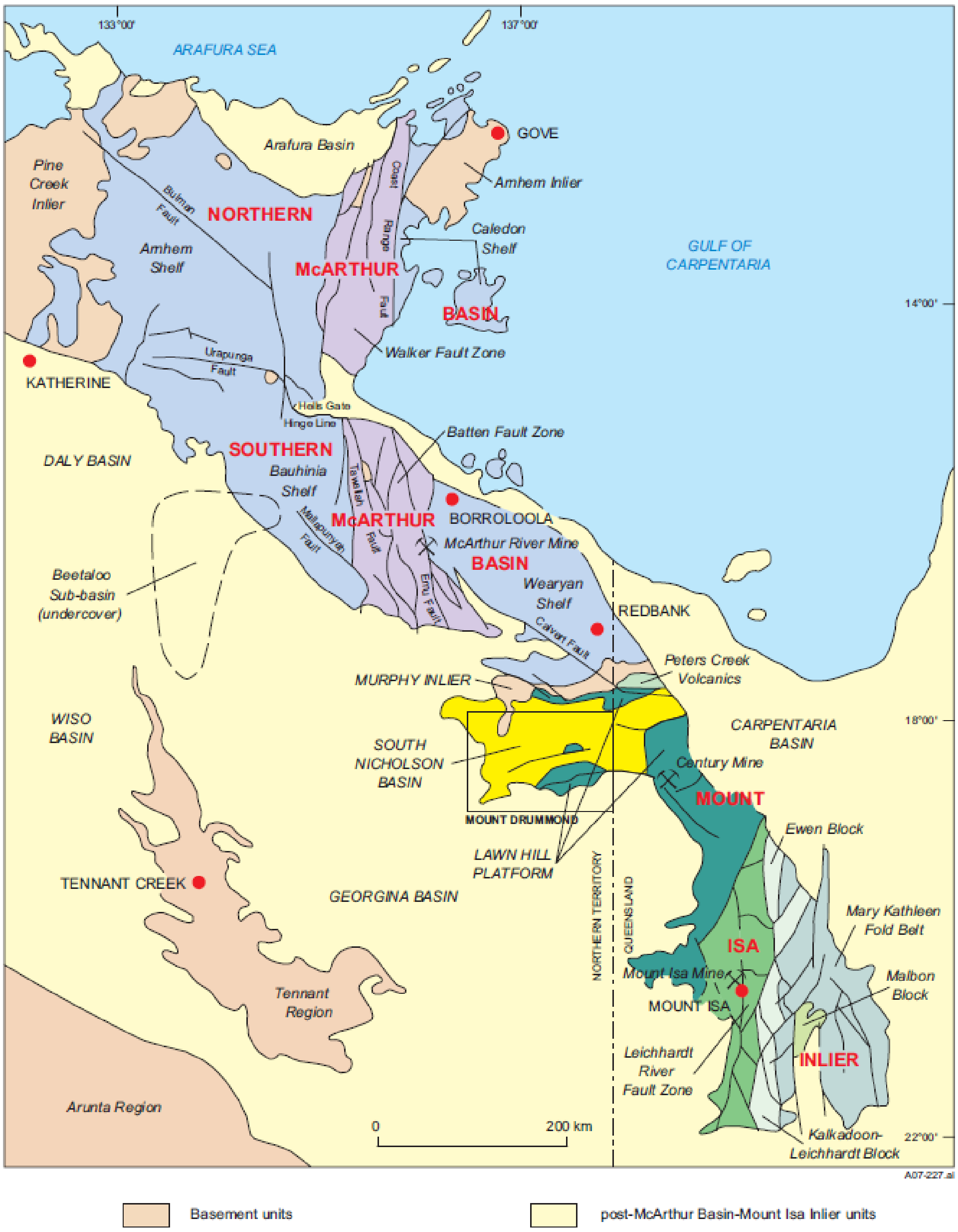


Figure 3: Regional tectonic framework for the North Australian Paleoproterozoic Basins. Source: Rawlings et al. 2004, page 7.

The Lawn Hill Platform comprises a moderately deformed sub-green schist metamorphosed terrain of Palaeoproterozoic to Mesoproterozoic-aged sedimentary and lesser volcanic rocks formed within an intracontinental rift setting. The structural history of the wider Western Fold Belt is dominated by inversion tectonics which essentially defined the start and finish of various rift cycles. The effects of the Isa Orogeny are not as obvious in the Western Fold Belt as they are in the Eastern Fold Belt with both deformation intensity and metamorphic grade decreasing to the northeast, away from the Leichardt River Fault Zone. Structure in the Lawn Hill Platform is generally manifested by northeast growth faults, northwest transfer zones and moderately steep F1 and F2 related to north-south and east-west compression respectively (Andrews, 1998). The northeast growth faults are well documented through surface mapping and constitute the dominant structural fabric on regional magnetic maps of the Lawn Hill Platform. Subsequent inversion events have generally resulted in north side up reverse faulting and dextral strike slip movements.

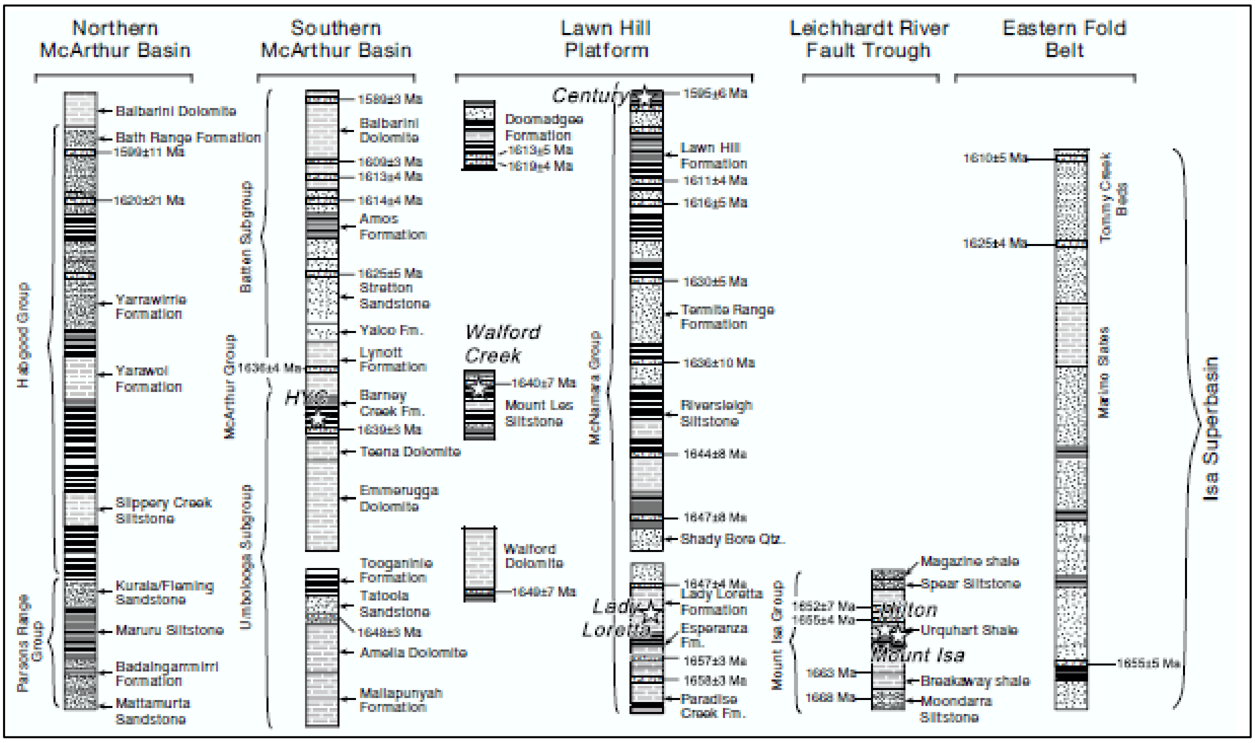


Figure 4: Diagram shows correlated lithostratigraphy across the Northern McArthur Basin, Southern McArthur Basin, Lawn Hill Platform (including McNamara and Fickling Groups), Leichardt River Fault Trough and the Eastern Fold Belt. Source: Fig. 2 Betts, Giles & Lister 2003 p.562.

In contrast, northwest striking faults are rarely discerned on magnetic maps with the exception of the Termite Range - Riversleigh Fault Corridor (Figure 5). Although first considered a transform fault zone, based on mapped strike slip movements, it also controlled basin development as attested by significant documented stratigraphic thickness changes of Isa Super Basin sequences across the fault zone (Andrews 1996). Consequently the Termite Range – Riversleigh Fault Corridor is considered the eastern bounding fault of the Mount Drummond Basin, which is a poorly understood sub-basin of the Lawn Hill Platform.

*MT DRUMMOND LITHO-STRATIGRAPHY*

The lithostratigraphy of the MOUNT DRUMMOND 250K is described by Rawlings et al. (2004) in terms of five principal tectonostratigraphic units – the Murphy Inlier, Lawn Hill Platform, and South Nicholson, Georgina and Dunmarra basins. Stratigraphic columns for seven areas of the map sheet are presented in Figure 6.

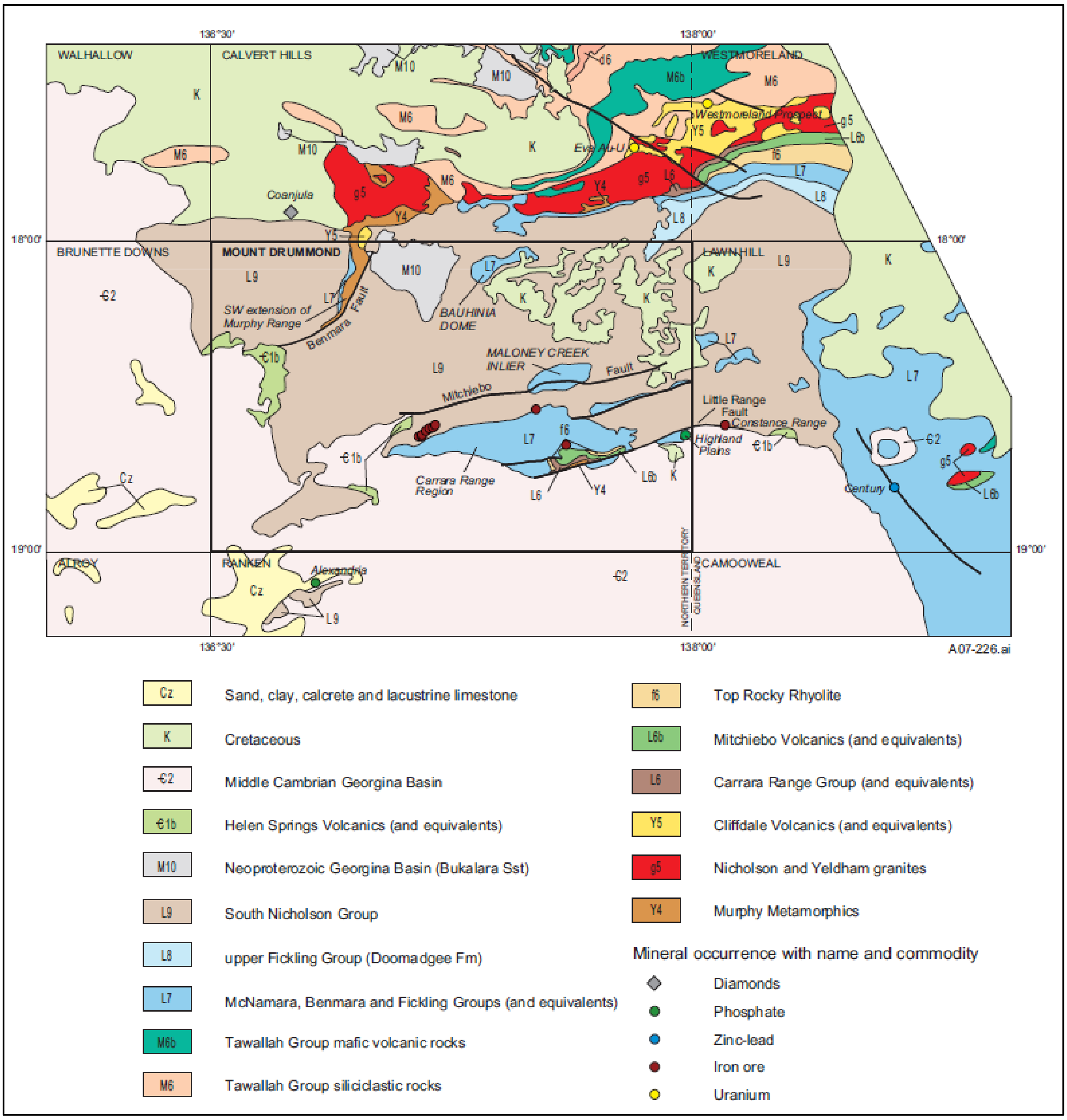


Figure 5: Regional geological setting, showing the Carrara Range, and Little Range Fault in the south. Note the location of Century and the Termite Range Fault to the east. Source: Rawlings et al. 2004, page 6.

Sweet et al. (1984) were the first to recognise the Lawn Hill Formation (LHF) in the southeast area, known as the Carrara Ranges, based on the occurrence of the Widdallion sandstone member. Sweet could not identify other stratigraphic subdivisions, such as prospective Pmh1 and Pmh4 of the Lawn Hill Formation hence making it difficult to compare and contrast this formation on either side of the TRF. The lithostratigraphy of the Carrara Ranges (Figure 6) shows that two common members – namely the Lawn Hill Formation and the Shady Bore Quartzite- with the McNamara Group stratigraphic column in Figure 4.

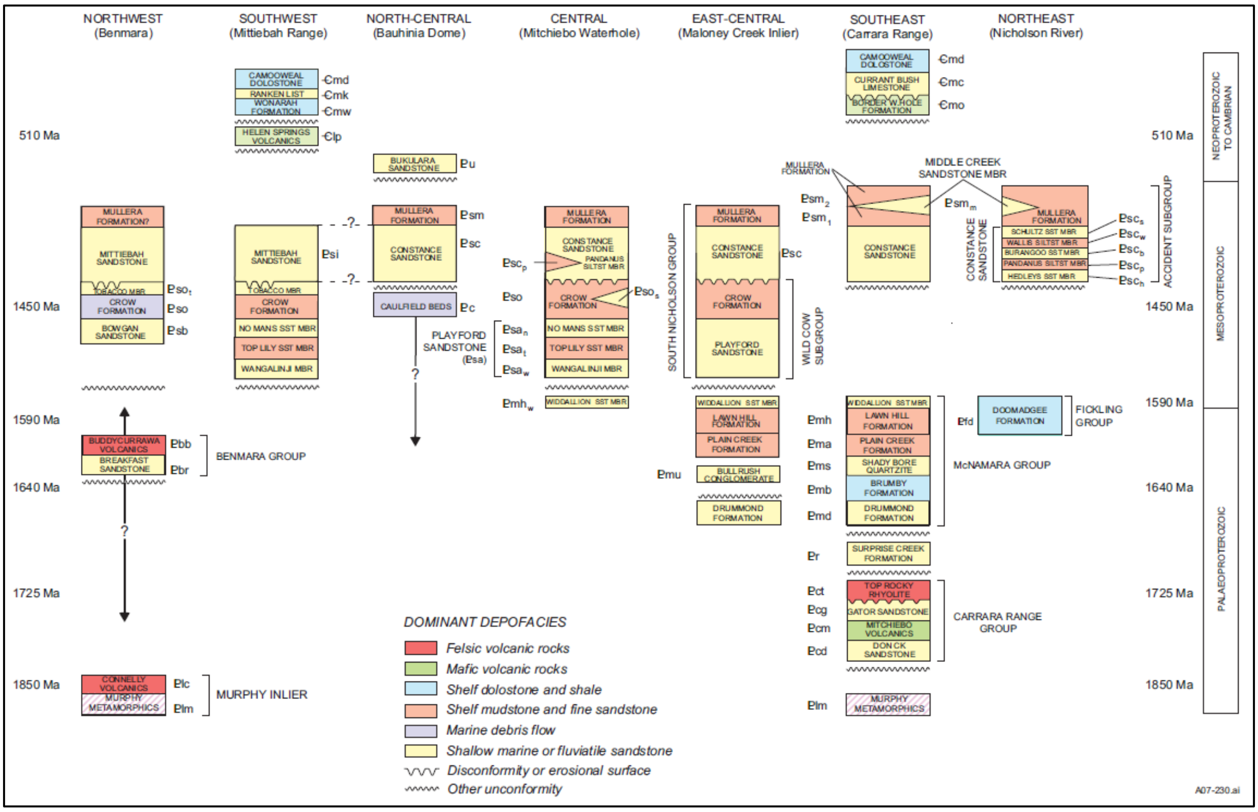


Figure 6: Stratigraphic columns for MT DRUMMOND. Source: Rawlings et al. page 9.

However, work by Krassay and McConachie (1997), suggests the Plain Creek Formation (PCF) is a lateral equivalent of both the Termite Range Formation and the Riversleigh siltstone (Figure 7). Further, the Upper Brumby Formation is interpreted as the equivalent to Lady Loretta Formation, which hosts the the high grade deposit of the same name. Consequently, the Plain Creek and Lady Loretta Formations are considered prospective for McArthur River age and Lady Loretta age mineralisation respectively. Lithological descriptions of these units (Figure 8) shows that dolomitic siltstones and shales were mapped by Rawlings et al. (2004) within these units.

Based on chrono stratigraphic correlations across the Lawn Hill Platform, six units are considered prospective for SHMS deposits within the MT DRUMMOND map sheet:

- Doomadgee Formation
- Walford Dolomite
- Mt Les Siltstone
- Lawn Hill Formation
- Plain Creek Formation
- Upper Brumby Formation

Measured sections of the PCF produced by Rawlings et al. (2004) indicate that it varies in thickness from 400-1000 m. Its interpreted stratigraphic equivalents, the Termite Range Formation and the Riversleigh Siltstone are 200-1300m and 800-2900 m respectively according to Andrews (1998). The difference in thickness confirms sedimentation west of the Termite Range –Riversleigh Fault zone differs significantly from the rest of the Lawn Hill Platform at this time. From an exploration perspective this does suggest the Mt Drummond Basin offered less accommodation than the LHP which potentially could limit the extent of deep water facies lithologies to discrete sub-basins.

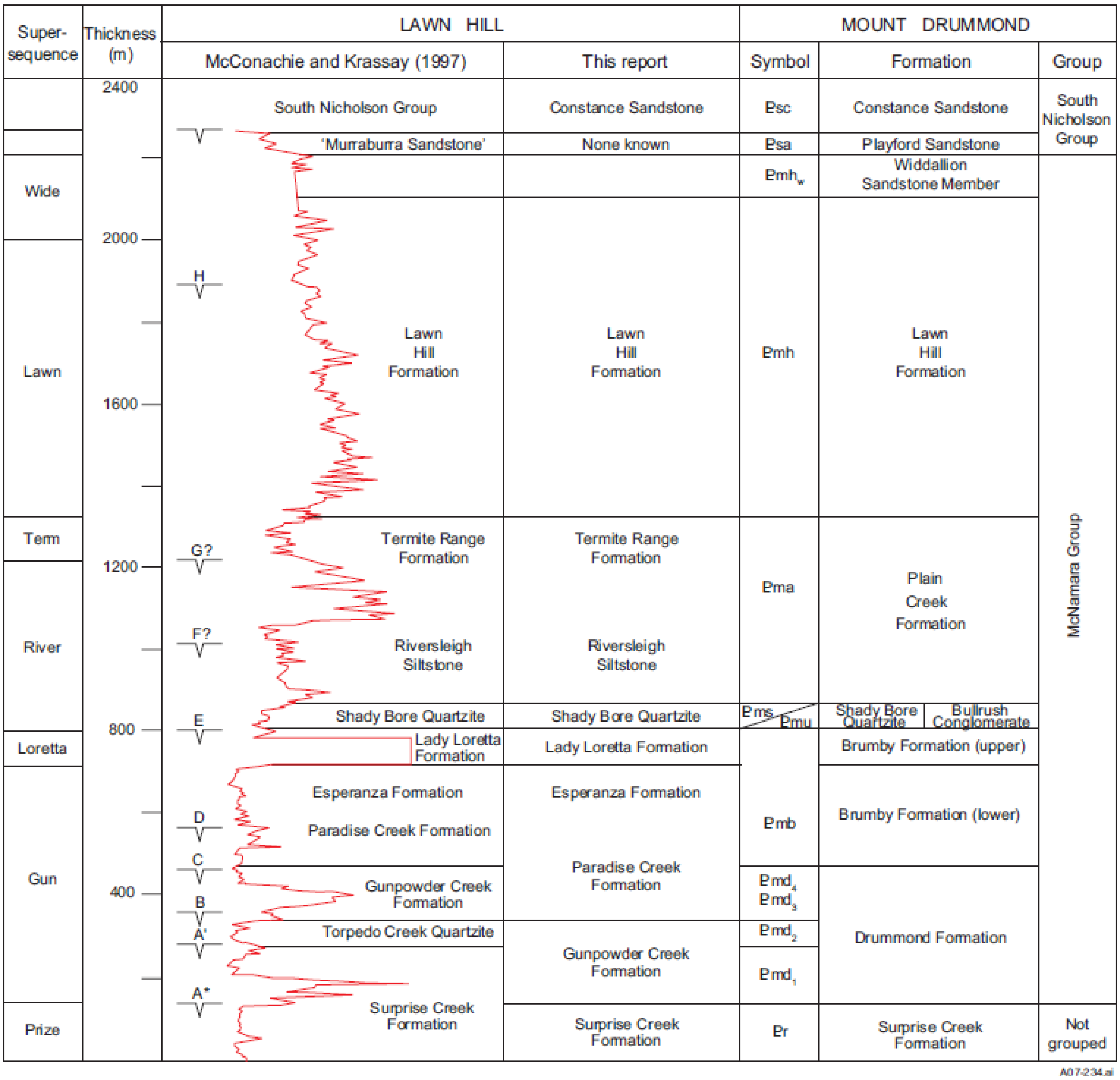


Figure 7: Gamma ray log summary from Carrara Range measured section by McConachie and Krassay (1997), with interpreted correlations with type area for the McNamara Group in Lawn Hill, QLD. On the right columns show Mt Drummond stratigraphy used by Rawlings (2004).

*MT DRUMMOND STRUCTURAL FRAMEWORK*

A number of easterly to east-northeasterly faults are mapped in the eastern half of MT DRUMMOND, and this domiant structural fabric is most abundant in the Carrara Ranges where inversion thusting is mapped extensively. The main easterly faults, including Little Range and Mitchiebo (Figure 5), all show north-side-up movements, but some stratal growth is also documented. The structural geometry is interpreted as compressional inversion of earlier compressional and extensional faults (Rawlings et al. 2004). Fault density and thrusting increase southward towards the Little Range fault and elliptical structural horse blocks are mapped in the south ranges. Additionally, a fence diagram (Figure 9) of measured sections of Carrara Ranges stratigraphy indicates that the Drummond Basin was deepening to the south, towards the Little Range fault, at Lawn Hill and Plain Creek formation times. This suggests the Little Range was a growth fault and based on surface geology and regional magnetic maps it is proposed that it was a basin bounding fault during Lawn hill Platform deposition. Based on this interpretation, the Little Range fault is considered a highly prospective corridor for SHMS Zn-Pb-Ag exploration. The Carrara Project Tenure was secured accordingly.

| Unit, (map symbol), thickness | Lithology | Depositional environment | Stratigraphic relationships |
|---|---|---|---|
| **Fickling Group** | | | |
| **Doomadgee Formation** (Pfd) 200–250 m | Pfd$_3$: Coarsening-up cycles from grey and green carbonaceous? shale, through flaggy red brown to maroon, dolomitic, micaceous, fine-grained sandstone and siltstone, to white to grey sublithic fine-grained sublithic sandstone and medium to coarse sandstone with scattered granules and pebbles; minor lithic sandstone.<br>Thin and medium beds of dololutite, dolarenite and sandy dolarenite; minor dolomitic sandstone and intraclast breccia.<br>Pfd$_2$: Poorly exposed carbonaceous shale and siltstone. | Marine shelf, ranging from basinal, through storm-dominated shoreface to shallow peritidal environments.<br>Deeper-water marine shelf. | Base not seen, but conformable on Mount Les Siltstone to the north in SEIGAL. Overlain disconformably and with low-angle unconformity by South Nicholson Group. |
| **McNamara Group** | | | |
| **Widdallion Sandstone Member** (Pmh$_w$) 50–370 m | Greyish red to brown, purple-weathering, highly lithic and micaceous fine to coarse sandstone; minor glauconite; siltstone and claystone. | Inner shelf – high energy shoreface environment. | Conformable on lower Lawn Hill Formation; overlain disconformably, or locally with angular unconformity, by South Nicholson Group. |
| **Lawn Hill Formation** (excluding Pmh$_w$) (Pmh) 125–2600 m | Interlaminated and thinly interbedded red, grey and brown siltstone and fine-grained sandstone; green to grey shale and siltstone, dolomitic siltstone, laminated and intraclastic dolostone. | Storm-dominated shelf. | Conformable on Plain Creek Formation; overlain conformably by Widdalion Sandstone Member; overlain disconformably or locally with angular unconformity by South Nicholson Group. |
| **Plain Creek Formation** (Pma) 400–1000 m | Micaceous siltstone and shale, fine- to coarse-grained lithic and sublithic sandstone; minor pebble conglomerate, graded sandstone beds, and pebble- to boulder-bearing mudstone–turbidite and mass flow sediments. | Shallow to deep marine basin, including fan deltas. | Both lower and upper contacts concordant and conformable. |
| **Bullrush Conglomerate** (Pmu) 50–500 m | Polymict granule, pebble and cobble conglomerate, cross-bedded sandstone; clasts of quartzite, quartz sandstone, quartz, chert, brown porphyritic rhyolite and claystone set in lithic sand-granule matrix; stromatolitic chert and chert-clast conglomerate, fine-grained lithic sandstone and siltstone. | Alluvial fan to fan delta. | Unconformable on Top Rocky Rhyolite and Drummond Formation; overlain conformably by Plain Creek Formation. |
| **Shady Bore Quartzite** (Pms) up to 50 m | White, very fine- to medium-grained lithic and sublithic sandstone; prominently wave-rippled bedding surfaces. | Shallow marine. | Conformable on Brumby Formation; overlain conformably by Plain Creek Formation. |
| **Brumby Formation** (Pmb) 350–800 m | Interbedded fine- to medium-grained, rarer coarse to granule sandstone; laminated, brecciated and stromatolitic chert; chert-clast breccia and conglomerate with sandstone matrix; siltstone and shale dominate upper part. | Intertidal to supratidal, including sabhka environments; deeper shelf in upper part. | Both lower and upper contacts concordant and conformable. |
| **Drummond Formation** (Pmd) 350–600 m | Pmd$_1$: Thin polymict conglomerate overlain by thin- to medium-bedded, fine-grained lithic sandstone, laminated siltstone, red beds of brown lithic dolomitic sandstone and chertified dolostone; cauliflower chert; dark grey medium-bedded pyritic coarse sandstone. Pmd$_2$ and Pmd$_4$: White to brown, medium- to thick-bedded, fine to medium sublithic to quartzose sandstone; scattered coarse and granule laminae; minor grey chert. Pmd$_3$: Laminated kaolinised and chertified claystone (altered carbonate rocks?), fine ferruginous sandstone, siltstone, and stromatolitic chert; fine, sublithic siltstone and sandstone. | Shallow marine, from shoreface to intertidal; peritidal mud- and carbonate-flats, and fluvial. | Unconformable on Surprise Creek Formation; overlain conformably by Brumby Formation, and unconformably by Bullrush Conglomerate in Maloney Creek Inlier. |
| **Unassigned to group** | | | |
| **Surprise Creek Formation** (Pr) 300 to 450 m | Local pebble to boulder conglomerate at base; clasts of quartz, quartzite and rhyolite in matrix of pink, medium- to coarse-grained sublithic sandstone; remainder is white to pink, thick- to very thick-bedded, medium- to coarse-grained, sublithic to quartz sandstone. | Mainly braided fluvial, with local alluvial fan deposits at base. | Unconformable on Top Rocky Rhyolite, and locally on older formations of Carrara Range Group; unconformably overlain by Drummond Sandstone (McNamara Group). |

Figure 8: Stratigraphy and lithological descriptions of interest. Source: Rawlings et al. (2004).

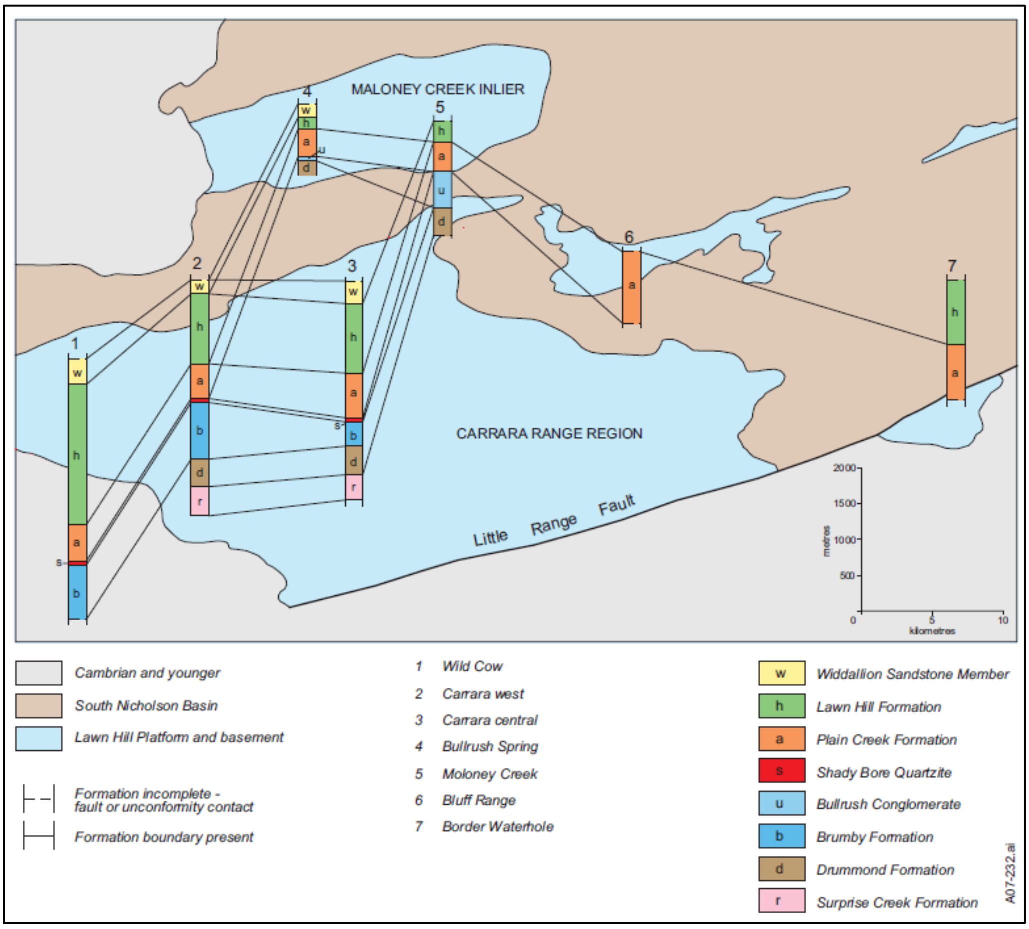


Figure 9: Thickness summary for McNamara Group displayed in fence diagram showing seven sections. Carrara central section based on McConachie and Krassay (1997), other sections calculated from outcrop widths, aerial photographs and measured dips by Rawlings (2004).

## 5. EXPLORATION RATIONALE

The Carrara Basin was originally identified, following an open file review, as prospective for massive sulphide hosted zinc-lead-silver (SEDEX) deposits similar in style to other deposits in the McArthur River-Mount Isa minerals province such as Century, McArthur River, George Fisher, Mount Isa lead-zinc and Lady Loretta.

The basin lies west of the Termite Range Fault and hosts lateral equivalents to the Lawn Hill Platform's Upper McNamara Group members. Six prospective lithologies of the McNamara Group are present in the Carrara basin including the Lawn Hill formation which hosts the Century Zn-Pb-Ag deposit.

Prospective host lithologies:

- Doomadgee Formation
- Walford Dolomite
- Mt Les Siltstone
- Lawn Hill Formation
- Plain Creek Formation
- Brumby Formation

The Little Range Fault in the south of the Carrara Basin is considered to be a key structural feature and as such constitutes a high priority target corridor. Areas covered by Georgina Basin sediments where the depth of cover is poorly constrained were the focus of early stage data research and exploration.

The strategy is to explore for SEDEX mineralisation under cover, and through hanging wall stratigraphies by applying modern geophysical techniques such as detailed gravity, IP, airborne EM and seismic surveys, combined with innovative and best practice surficial geochemical surveys to provide targets that warrant drilling.

## 6. PREVIOUS EXPLORATION

Historical mineral exploration in the MT DRUMMOND has focused on diamonds, phosphate and base metals with only marginal gold and iron ore exploration activities (see Figure 5 and Figure 10). Historical base metal exploration focused on the southern part of MT DRUMMOND in the Carrara Ranges.

CRA explored in the area from 1991 to 1995 and tested two targets defined from GEOTEM surveys with eight reverse circulation drill holes with poor results.

Rio Tinto explored the area from 2000 to 2002 conducting an extensive RAB drilling program of subcropping Lawn Hill Formation. Another target area bound by a significant fault intersection was tested with an IP survey but it was deemed that the moderate response did not warrant drill testing.

Anglo American explored the area south east of the Carrara Ranges from 2003 to 2004, and drill tested a discrete combined EM and magnetic anomaly with one diamond and one RC drill hole. Basement lithologies were intersected and tenure was subsequently relinquished.

Overall, the southern portion of the MT DRUMMOND has been under explored considering the litho-stratigraphic and structural prospectivity of the area for base metals.

In the first two years since the grant of tenure, Teck Australia completed desktop studies of the exploration licence areas, including a detailed structural interpretation based on regional geophysical datasets. Modelling of magnetic data was carried out to assess depth to basement and interpret basin development under cover. Historical drilling and borehole data was reviewed to evaluate the depth of Cambrian cover. As a result of the review the prospectivity, five tenements (EL’s 29558, 29760, 29761, 29791 and 29792) were downgraded and subsequently relinquished.

| Year | Comments | References |
|---|---|---|
| 1950–1960 | Exploration and evaluation of iron deposits in South Nicholson Group in CLEANSKIN and Constance Range in Queensland | Carter and Zimmerman (1960), Harms (1965) |
| 1959–1963 | MOUNT DRUMMOND mapped as part of Bureau of Mineral Resources (BMR) 1958–1963 McArthur Basin mapping project; publication of First Edition MOUNT DRUMMOND 1:250 000 geological map and explanatory notes | Smith and Roberts (1963) |
| 1965–1970 | Data collected from 11 km regional grid of gravity stations in McArthur Basin and environs | Whitworth (1970) |
| 1966–1967 | Base metals exploration in Carrara Range by Australian Geophysical | Dechow (1967) |
| 1967–1976 | Phosphate exploration south of Carrara Range by ICI and Australian Geophysical | McMahon (1969), Perrino (1970), Hackett (1977) |
| 1977–1982 | Geological mapping by BMR in Lawn Hill Platform, including publication of 1:100 000 scale geological map Carrara Range Region | Sweet (1982, 1983, 1984, 1985), Sweet *et al* (1984) |
| 1980 | Base metals and uranium exploration in Carrara Range by Afmeco | Orridge (1981) |
| 1983–present | Diamond exploration throughout MOUNT DRUMMOND and at adjacent Coanjula prospect by Ashton Mining, Australian Diamond Exploration (ADX), Redfire Resources, Aberfoyle Exploration, Stockdale Prospecting, CRA Exploration and BHP Minerals | Ashton Mining (1984, 1989), Mitchell (1988), Ong (1995), Rogers (1996b), Kammermann (1997), Reddicliffe (1998), Pang (1998) and others |
| 1990 | Stream sediment sampling for gold in Canyon Range | Hitchman (1991) |
| 1990–1992 | Assessment of petroleum potential of South Nicholson Group in MOUNT DRUMMOND and drilling of stratigraphic hole DD92SN1 | Lanigan (1993) |
| 1991–1994 | Aerial photo survey flown by NT Government | This report |
| 1990–2000 | Base metals and diamonds exploration in Carrara Range area by CRA Exploration and Rio Tinto, including drilling of numerous RAB holes | Stegman (1992), Moody and Stegman (1993), MacKay (1996), Walker (2000), Walker and Johnson (2001) and others |
| 1995–1997 | Measurement of geological sections in Carrara Range by NABRE project and publication of various articles relating to Lawn Hill Platform | Bradshaw *et al* (1996, 2000), Juodvalkis and Barnett (1997), Page and Sweet (1998), Domagala *et al* (2000), Krassay *et al* (2000), Page *et al* (2000), Southgate *et al* (2000) |
| 2001 | Barkly airborne magnetic and radiometric survey by Tesla Airborne Geoscience for NTGS | Tesla (2001), this report |
| 2001–2003 | Geological mapping of MOUNT DRUMMOND by NTGS | Rawlings and Sweet (2004), this report |

Figure 10: Summary of geoscientific investigations and exploration activities in Mt Drummond. Source: Rawlings et al. 2004, page 4.

During the third year, a significant geophysical program was completed across the group reporting package, including Audio-magnetotellurics (AMT), ground gravity, and EM. This work enabled the prospective Proterozoic strata to be interpreted under the black soils plains and Georgina Basin cover, in addition to providing insights into the structural framework of the covered Proterozoic stratigraphy. This work helped advance the Carrara Project the the next stage of exploration.

During the fourth year a drill hole, CRDD001, testing a prospective sub-basin position proximal to the Little Range Fault and a north-west trending transfer structure was collared. This drill hole was completed to a depth of 800.42m terminating within South Nicholson Group sediments after encountering difficult drilling conditions. An EM survey, a repeat of a 2015 program which failed QA/QC, was also completed successfully but did not return encouraging anomalies.

During the fifth year, CRDD001 was relogged to confirm interpreted units logged in the pervous year, as was vital in assessing the prospectivity of the 3rd order basin.

Remodeling of the gravity datasets also suggested that the South Nicholson Group may not be as thick as first thought and that the hole may have intersected Playford Sandstone placing prospective straigraphy at 1000m below surface not +2,000m.

## 7. EXPLORATION ACTIVITIES

Exploration activities are reported starting January 21st 2013, which is when EL29557 and EL29560 were granted. EL30816 was granted on the 23rd of December 2015 and EL31538 was granted on the 1st November 2017.

During the **2013-2014** reporting period exploration activites were restricted to office studies including, a review of literature and historical data, compilation and integration of data into a revised stratigraphic and structural interpretation, development of a conceptual basin model and targeting framework and re-evaluation of previously identified target areas.

During the **2014-2015** reporting period exploration activities comprised mainly desktop studies of the Carrara exploration licence areas. Work included a detailed structural interpretation of the area based on regional geophysical datasets as well as modelling of magnetic data to assess depth to basement and interpret basin development under cover. Historical drilling and borehole data was reviewed to evaluate the depth of Cambrian cover.

During the **2015-2016** reporting period field-based exploration activites included an Audio-magnetotellurics (AMT) survey with stations within EL29557, a Ground gravity survey with coverage over EL29557 amongst other Carrara permits, an EM (Coil) survey covering also EL29557 as well as EL29560 and an EM (Samson) survey with coverage including EL29557. All data has been lodged previously with the Annual reports.

### 7.1 AUDIO-MAGNETOTELLURICS (AMT)

Teck acquired nine lines of AMT data. Eight of the lines are oriented N-S with one orientated E-W. The program was designed to aid in the definition of the basin architecture along the Little Range Fault.

The early stage acquisition of AMT data at Carrara was considered a cost effective critical step in target generation in such a large region where prospective rocks are obscured by Mesoproterozoic and Georgina Basins. The broad scale data acquisition across the region allowed for subsequent focused exploration through determining depth of target lithologies and defining the extensional and post extensional architecture of the region and 3rd/4th order sub basins.

Location points are shown in Figure 11.

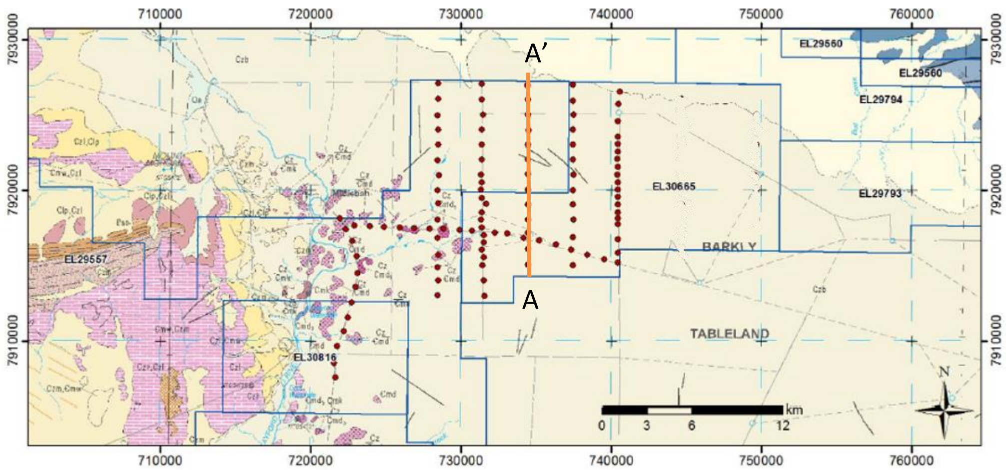


Figure 11: AMT survey location points on surface geology.

Survey parameters are listed below:

| | |
|---|---|
| **Contractor:** | Quantec Geoscience |
| **Dates:** | 9th August 2015 – 5th September 2015 |
| **Lines:** | 9 |
| **Stations:** | 128 |
| **Station spacing:** | 1km (infill to 500metres) |
| **Configuration:** | Full tensor |
| **Dipole length:** | 100 metres |
| **Instrumentation:** | Spartan MT |
| **Receiver:** | RT160Q |
| **Coil (LF):** | Phoenix P50 |
| **Coil (HF):** | Geometrics GHF |
| **Frequency range:** | 10,000 – 0.001 Hz |
| **Reference Station location:** | 767439mE, 7907915mN |

The geophysical contractor, Quantec Geoscience Ltd, provided a full report highlighting, and commenting on the AMT anomalies on each section.

Notably, the AMT survey returned excellent data defining a planar zone of strong to moderate conductors, at a depth of 700 to 1,000m (Figure 11 and Figure 12). The Little Range Fault is imaged well in the data as are NW orientated faults and discrete conductive bodies within the planar zone suggest possible thrusting of the stratigraphy (Figure 13).

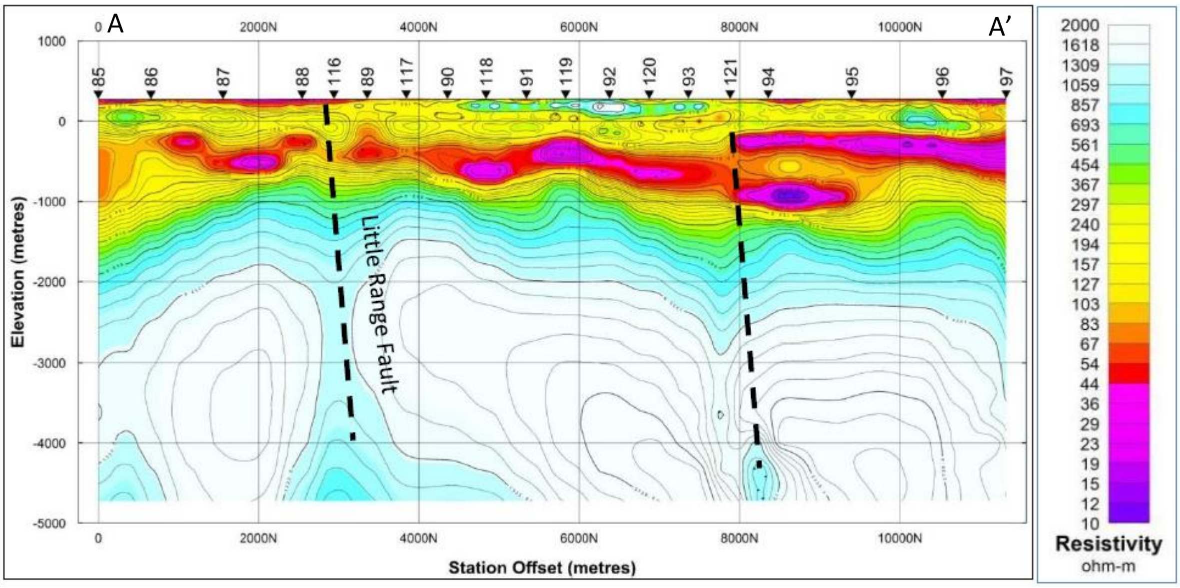


Figure 12: Inversion Section (see Figure 11 for Line of section location).

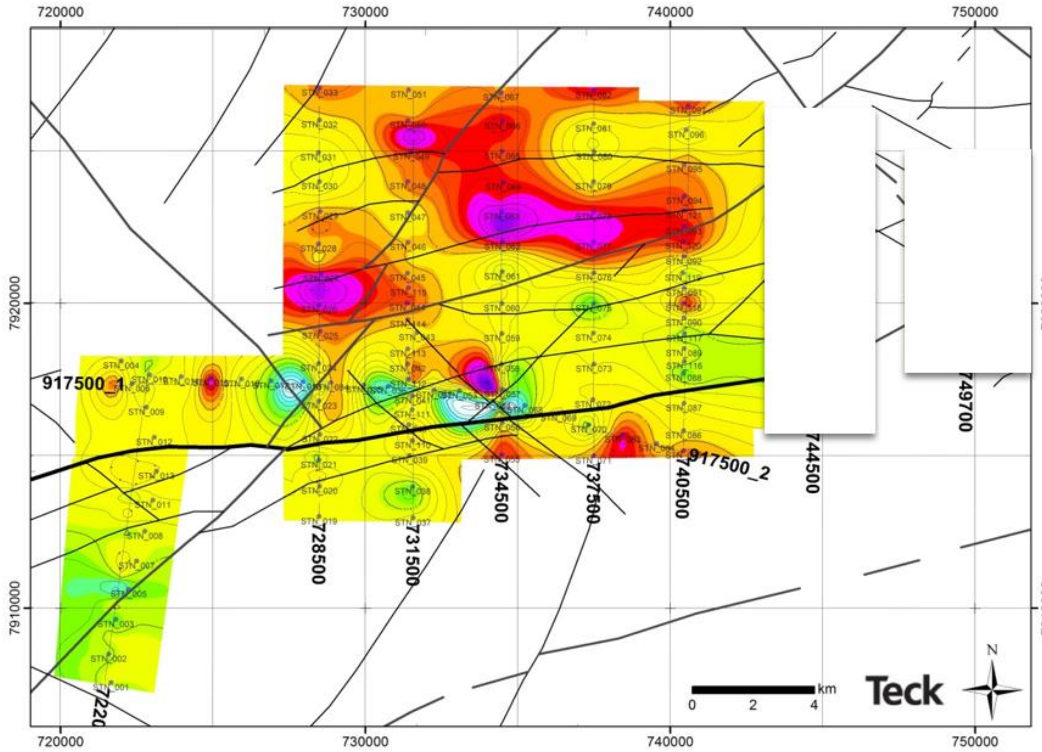


Figure 13: AMT Inversion depth slice 1000m with structural interpretation.

The moderately dipping stratigraphy cropping out to the east of the section lines is interpreted to flatten to the west corresponding to the typically flat nature of the conductive anomalies observed in the 2D inversions. This implied that the survey is imaging the prospective Plain Creek Formation under the recent more conductive alluvial/colluvial cover rocks (Figure 15).

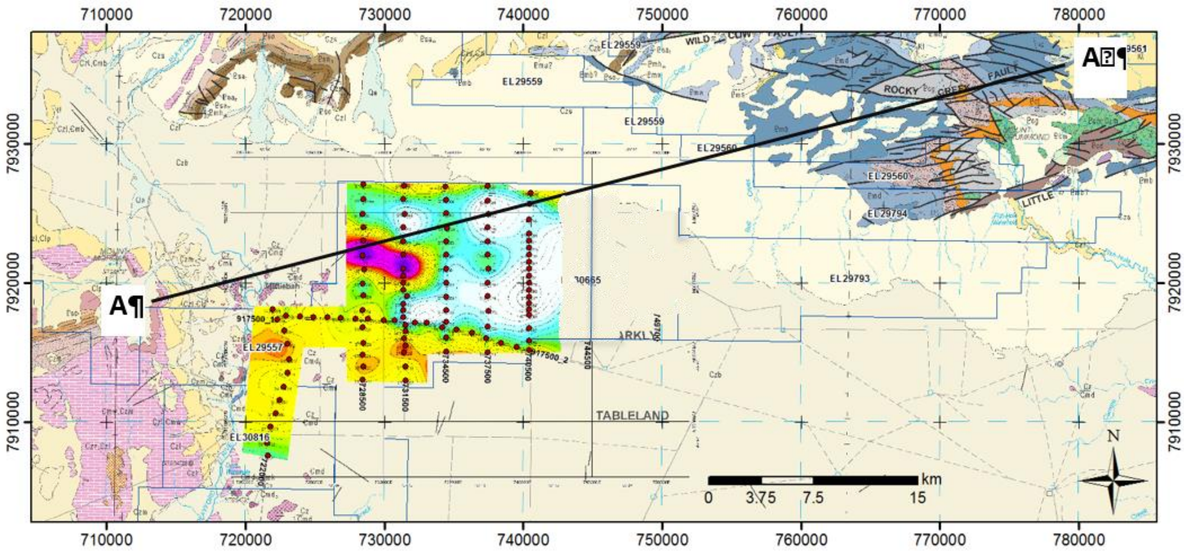


Figure 14: Interpretation section profile A-A' on AMT slice depth (2000m below surface). Underlying image is the government surface geology

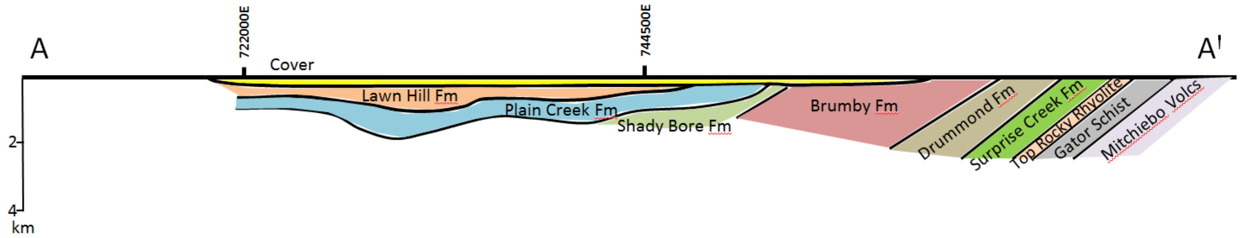


Figure 15: A-A' Interpretation of sub-surface stratigraphy based on AMT results and surface

### 7.2 GROUND GRAVITY

From July to September 2015, an extensive ground gravity survey was carried out over the Carrara tenements (Figure 16). Most of the survey was done on the black soil plains of the Barkley Tablelands, on Mittiebah pastoral station. Gravity coverage, previously very coarse (>10km), has been upgraded to a regular grid of stations spaced at approximately 500 metres.

The objective of the survey was to define significant structures under cover. The gravity dataset was considered to be particularly important due to the very low magnetic response of Proterozoic strata in the area. In the centre of the survey area is the WSW-trending, Little Range Fault. This highly prospective structure can be traced to the east in outcropping rocks, it is defined poorly in the magnetic data.

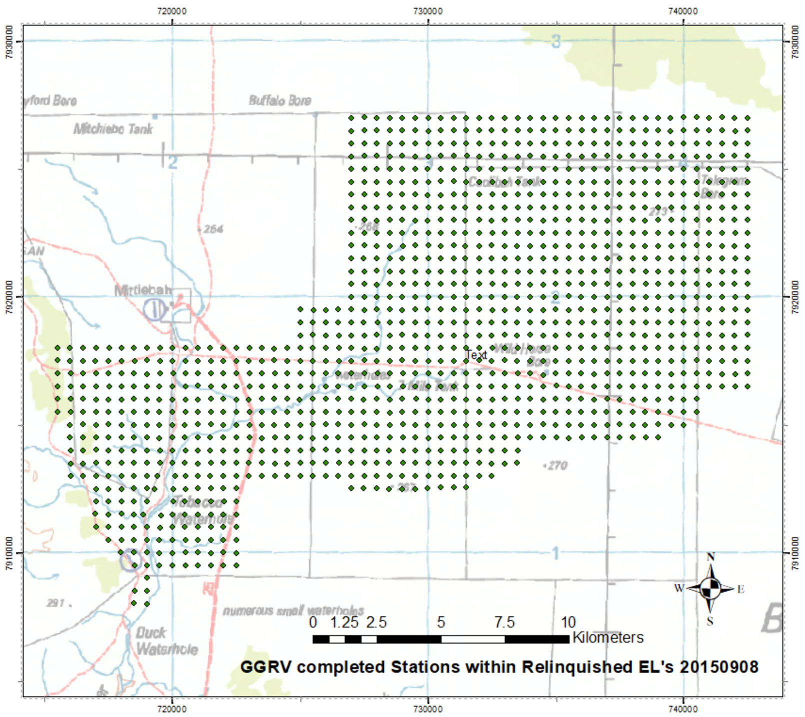


Figure 16: Carrara ground gravity survey station locations.

**Survey Parameters**

| | |
|---|---|
| **Contractor:** | Atlas Geophysics |
| **Dates:** | 9th July – 7th September 2015 |
| **Proj #:** | P2015071 |
| **Total stations:** | 2246 (1204 within relinquished EL's)<br>(606 in original proposal) |
| **Station spacing:** | 500 metres |
| **Instrumentation:** | Scintrex CG-5 |
| **Navigation:** | Leica GS14 Glonass |
| **Repeats:** | 122 (5.4%) |
| **Base Station:** | 731,224.9mE, 7917186.4mN (GDA94, MGA Zone 53) |
| **AFGN:** | Barkly Roadhouse |

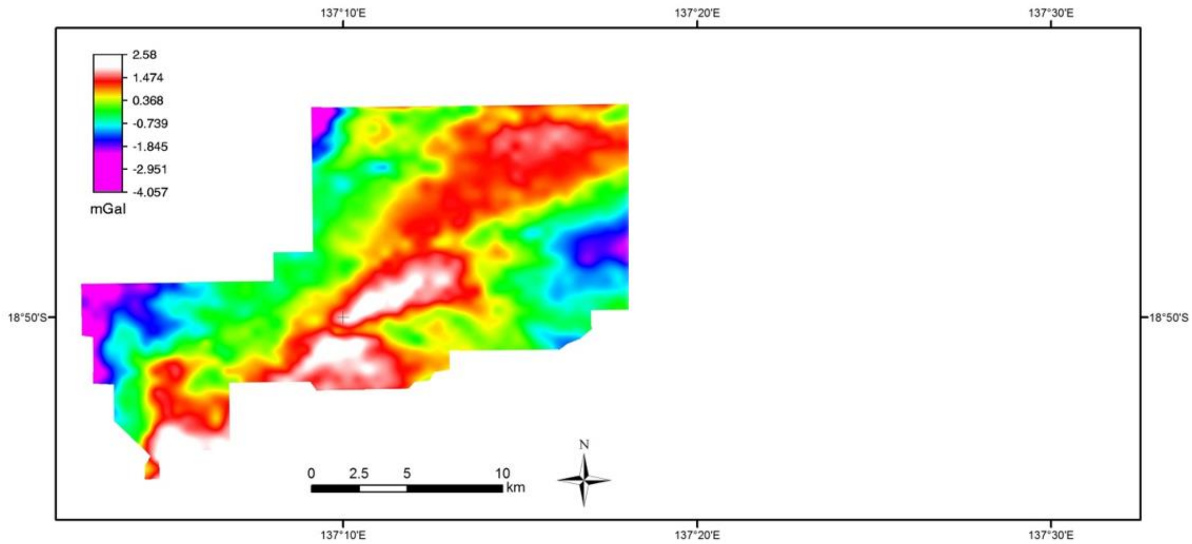


Figure 17: Carrara ground gravity Bouguer anomaly with Gaussian residual (100km) image.

### 7.3 EM – SAMSON, SMARTEM (2015)

During September 2015, an electromagnetic survey was carried at the Carrara project area. This survey followed on from an extensive magnetotelluric survey which was completed earlier in the field season. The MT survey traversed a deeply-covered section of the project, whereas the EM method was chosen to survey an area of the project where the cover was interpreted to be shallower.

The objective of the survey was to define stratigraphic conductors associated with carbonaceous shales of the Lawn Hill formation and/or the Plain Creek formation.

After the survey had been completed, some problems were identified with the data amplitudes. The contractor was not able to rectify the problems by through processing, and it was decided to repeat some sections of the electromagnetic survey in 2016.

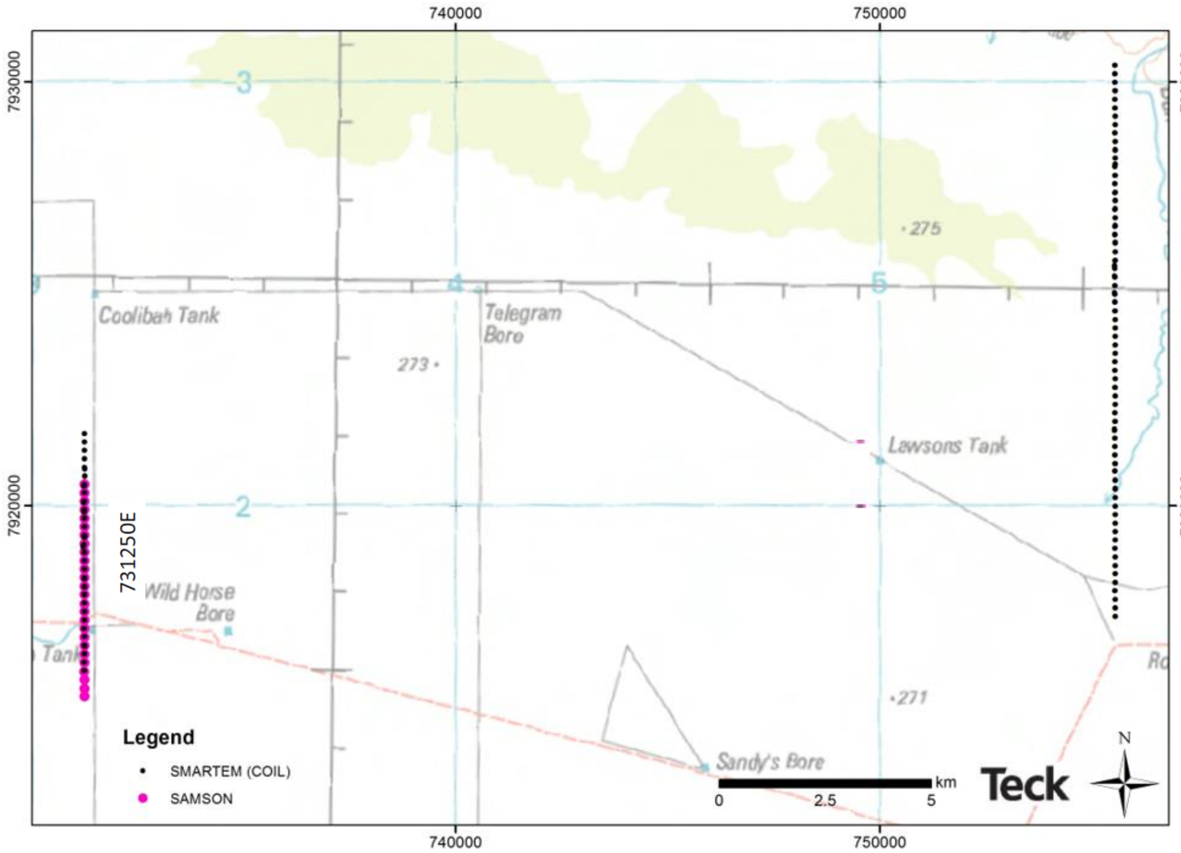


Figure 18: Carrara EM location

**Survey Parameters**

| | |
|---|---|
| **Contractor:** | Gap Geophysics |
| **Dates:** | 14th – 24th September 2015 |
| **Type**: | Moving loop |
| **Configuration**: | Inloop |
| **Current**: | 120 A |
| **Loop Size**: | 200metre x 200metre |
| **Transmitter**: | Geopak MLTX-200 |
| **Station spacing:** | 200 metres |

**Samson**

| | |
|---|---|
| **Instrumentation**: | Samson |
| **Receiver**: | TM-7 |
| **Sensor**: | G-822A Cs-vapour magnetometer (scalar) |
| **Measurement:** | B-field |
| **Ramp:** | 0.054msec |
| **Base Frequency:** | 1Hz |
| **Sampling Rate:** | 2.4 kHz |
| **Stacks:** | 256 |
| **Lines:** | 2 |
| **Total stations**: | 51 |

**SmartEM**

**Instrumentation**: SmartEM
**Receiver:** SmartEM V
**Sensor:** RVR 3-Component
**Measurement:** dB/dt
**Ramp:** 0.044msec
**Base Frequency:** 5 Hz
**Sampling Rate:** 100 kHz
**Stacks:** 512
**Lines:** 3
**Total stations**: 121

During the **2016-2017** reporting period an EM survey which included EL29560 was completed as well as one diamond drill hole outside of the relinquished tenements penetrating EL30665. The EM survey included 184 stations over EL29560, EL29793, EL29794 and EL30665. The EM surveys were initially partially completed in 2015 but repeated during the reporting year due to QA/QC concerns.The objective of the EM surveys was to map conductive sediments in order to map possible sub-basin locations. A secondary objective of the survey was to compare the EM results with the previously-acquired MT data. Line locations are shown in Figure 18.

### 7.4 EM – SAMSON, SMARTEM (2016)

**Survey Parameters**

Contractor: Gap Geophysics
Type: Moving loop
Configuration: Inloop
Current: 120 A
Loop Size: 200metre x 200metre
Transmitter: Geopak MLTX-200
Station spacing: 200 metres

**Samson**
Instrumentation: Samson
Receiver: TM-7
Sensor: G-822A Cs-vapour magnetometer (scalar)
Measurement: B-field
Ramp: 0.054msec
Base Frequency: 1Hz
Sampling Rate: 2.4 kHz
Stacks: 256
Lines: 2
Total stations: 51

**SmartEM**
Instrumentation: SmartEM
Receiver: SmartEM V
Sensor: RVR 3-Component
Measurement: dB/dt
Ramp: 0.044msec

Base Frequency: 5 Hz
Sampling Rate: 100 kHz
Stacks: 512
Lines: 3
Total stations: 121

**Line 731250 (Samson B-field system) 2015**

Shows a variably conductive surficial layer and a horizontal conductive layer ~ 400m deep, which strengthens to the north. This buried layer appears very flat in the CDI sections, in contrast to the MT section which shows some structural complexity to this conductor. It is possible that the EM CDI sections are not resolving the conductor well, as the MT inversion solutions are expected to be much more robust than the CDIs.

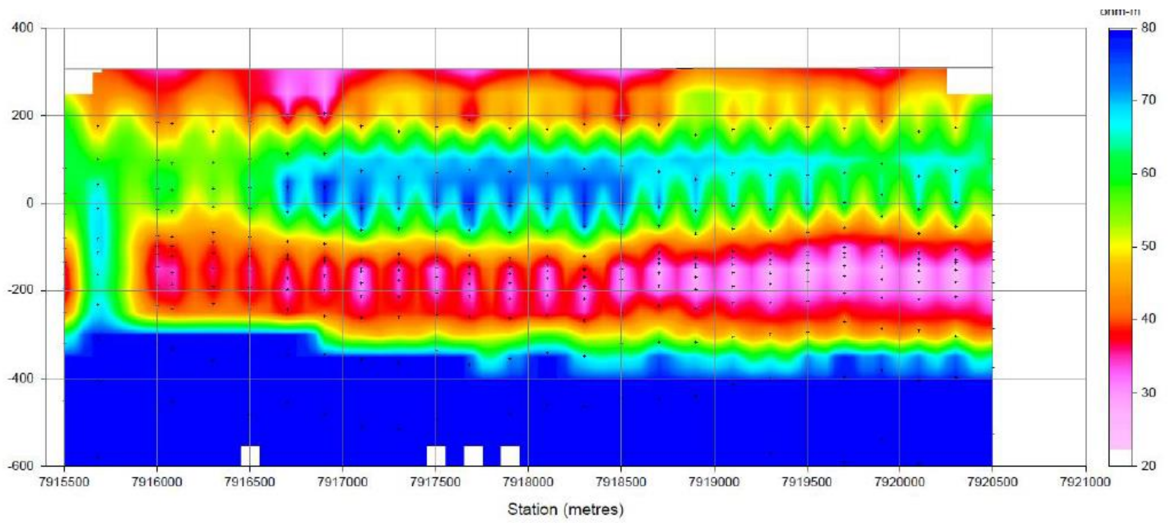


Figure 19: EM profile for line 731250E

The EM surveys did not delineate any prospective sub-basins within the conductive horizons at Carrara. The surveys did confirm the utility of using dBdt EM as an inexpensive alternative to MT where the targets are at moderate depth ~ less than 600 metres.

### 7.5 DIAMOND DRILLING

Partial funding was provided by the Northern Territory – Geophysics and Drilling Collaborations program to complete a single drill hole into an interpreted 4th sub-basin within the Carrara region of the greater McArthur basin. The target was Paleoproterozoic sediments considered prospective for SHMS Zn-Pb mineralization, such as the McArthur River deposit, developed at the intersection of an interpreted major growth fault and transform fault. The drill hole is located at 740425E, 7921000N (MGA53) within the partially surrender section of EL30665 and was drilled to a depth of 800.42m (Figure 20, Figure 22). All relevant data has been logged previously with DPIR.

During the **2017-2018** reporting period, relogging of hole CRDD001 that had been drilled in EL30665 was completed (Figure 20). This was completed to confirm interpreted units logged by Teck in 2016.

Given the hole never penetrated into the Paleoproterozoic sediments considered prospective for SHMS Zn-Pb mineralization, determining the exact rock units was considered vita in assessing the prospectivity of the 3rd order basin.

Remodeling of the gravity datasets also suggested that the South Nicholson group made not be as thick as first thought and that the hole may have intersected Playford Sandstone placing prospective stratigraphy at 1000m below surface not +2,000m.

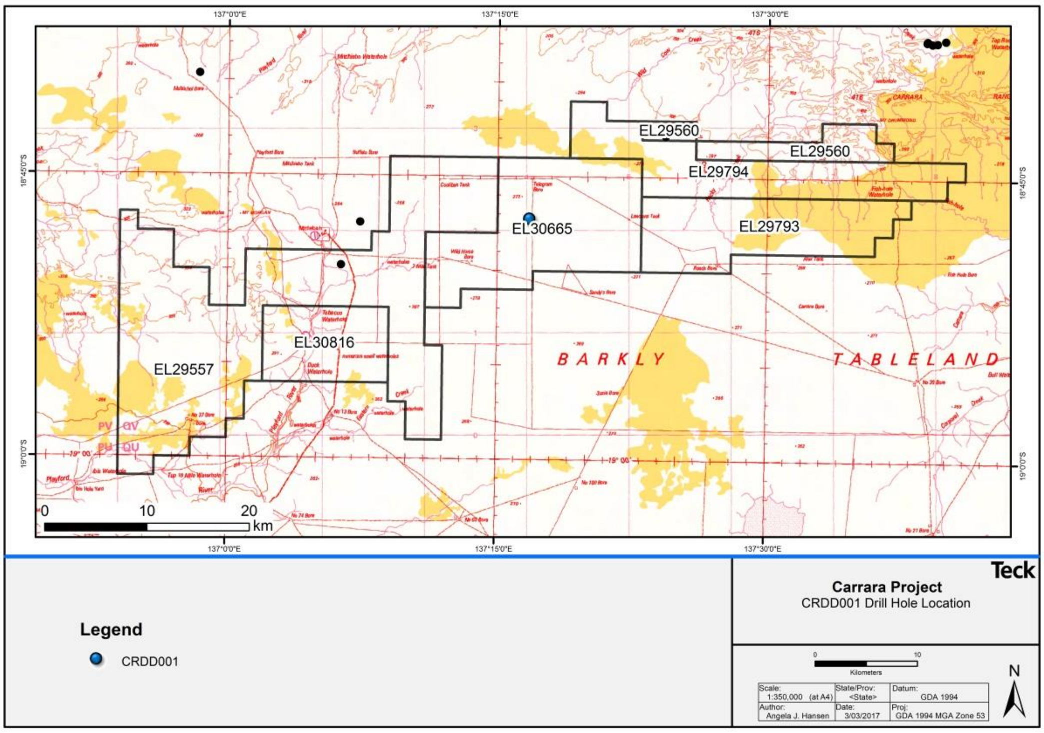


Figure 20: Drill hole CRDD001 location plan

Collared in Camooweal Dolostone, CRDD001 intersected ~569m of the Cambrian Georgina Basin, including 467m of Barkly and Narpa Group, and 101m of underlying Helen Springs Volcanics, before terminating in South Nicholson sandstones at 800.42m (Figure 21). The original interpretation being the bottom unit was that of Mittebah Formation, with another +1km of Wild Cow sub group to Paleoproterozoic rocks. However, an alternative suggestion is that the bottom sandstone intersected is that of Playford Sandstone and thus only <200m of Sotuh Nicholson is present before intersecting Paleoproterozoic units.

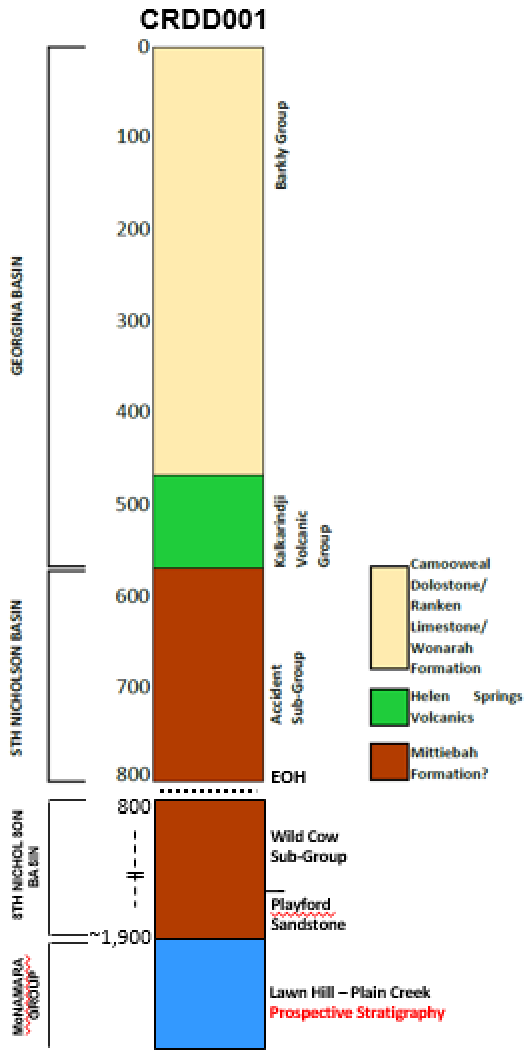


Figure 21: Interpreted stratigraphic units of CRDD001

Based on the MT, EM, gravity and drill data collected over the life of the project, a revised structural architecture, sub-basin interpretation and depth to basement map has been completed. While there are some discrepancies as to what unit the hole terminated in, further work on the project was post poned following the announcement by Geoscience Australia to shoot 2D seismic lines across the Teck tenure.

During the **2018-2019** reporting period no field activities were undertaken and work was limited to the preliminary interpretation of the five seismic lines released by GA in March 2018 across the South Nicholson Basin (Location in Figure 22). Geoscience Australia (GA) completed a five line 2D seismic survey during 2017; two transecting Teck's Carrara Project tenure (EL30816 and EL29557). Following their announcement to shoot the seismic, Teck decided to postpone further exploration activities until after the seismic data was released to the public in Q1 2018. This decision was made, as this dataset was critical in determining the permissiveness of the tenements and needed to be integrated with Teck's architectural framework.

This dataset and the final interpretation were vital to understanding the undercover geology and structure of the Carrara tenements. Diamond drillhole CRDD001 was utilized to interpret the depth to prospective stratigraphy and refining the position of the Little Range Fault (interpreted as a critical growth fault controlling sub-basin formation).

Interpretations from the regional seismic data highlighted areas where favourable stratigraphy is beyond explorable depths (which includes the surrended EL's).

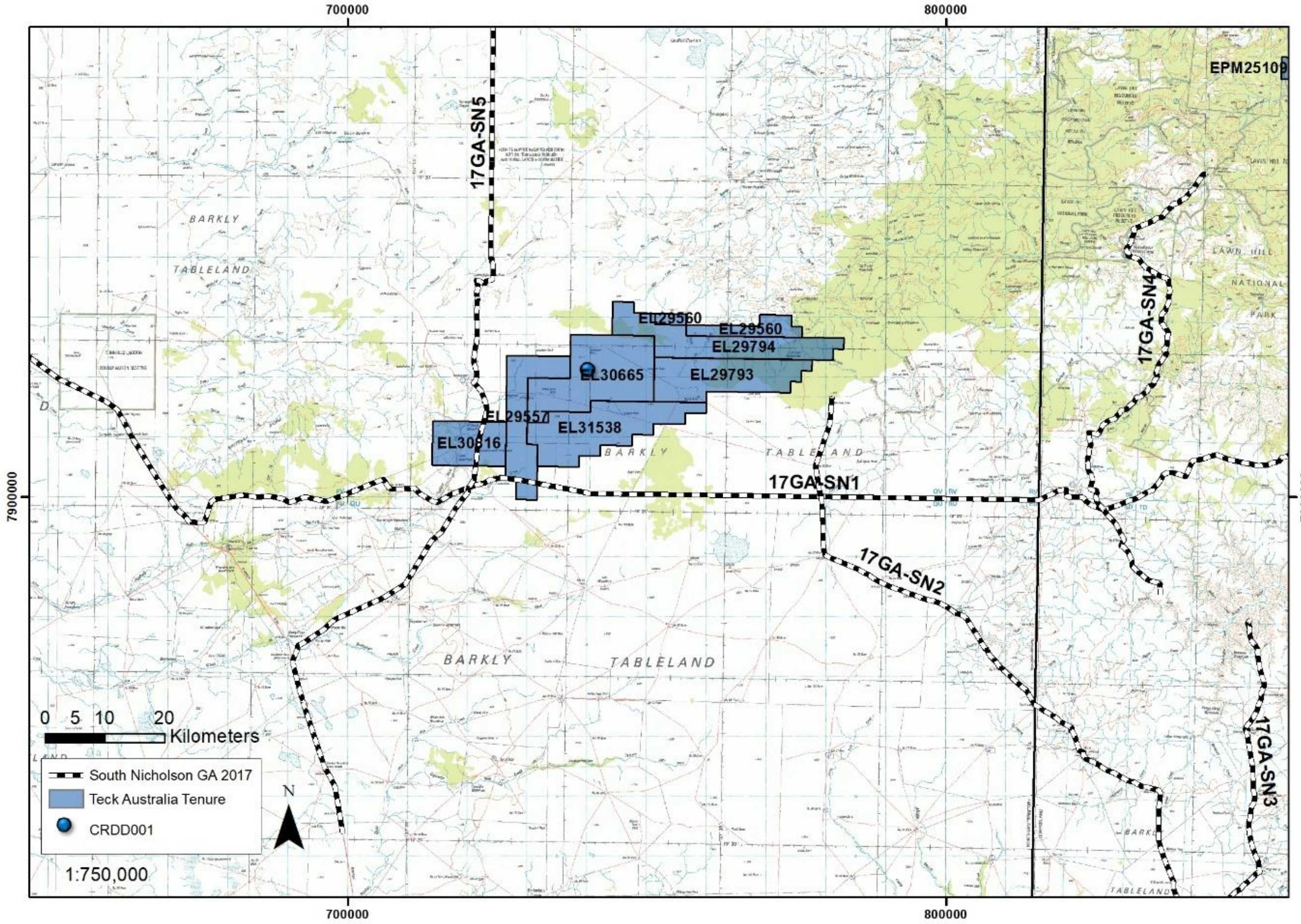


Figure 22 Location of GA 2017 Seismic Lines

## 8 CONCLUSIONS

EL29557, EL29560, EL30816 ans EL31538 have been surrenderd in full the 22nd of October 2019. Surface geology and interpretations from regional seismic released by Geoscience Australia highlighted favourable stratigraphy to be beyond explorable depths within the area surrendered. This reduced the chances of there being an significant, economical Sediment Hosted Massive Sulphide (SHMS) deposit within explorable depths.

Exploration activites over the relinquished tenements and Carrara project area in the period from 21st January 2013 to October 22nd 2019 comprised a:

- Review of literature and historical data;
- Compilation and integration of data into a revised stratigraphic and structural interpretation;
- Development of a conceptual basin model and targeting framework;
- Re-evaluation of previously identified target areas.
- Detailed structural interpretation of the area based on regional geophysical datasets as well as modelling of magnetic data to assess depth to basement and interpret basin development under cover.
- Historical drilling and borehole data review to evaluate the depth of Cambrian cover.
- A significant geophysical program was completed during the 2015-2016 reporting period comprising Audio-magnetotellurics (AMT), ground gravity, and EM surveys.
- 1 drill hole in 2016; 800.42m – (EL30665)
- EM; SMARTEM in 2016; 184 stations – (EL29560, EL29793, EL29794, EL30665)
- Remodelling of gravity dataset
- Interpretation of 5 seismic lines realeased by GA in March 2018

The remaining tenements within the Carrara project area remain prospective for SHMS mineralisation

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