PARTIAL RELINQUISHMENT REPORT

COOLULLAH NORTH TENEMENT

EPM 18983

FOR THE PERIOD

9 May 2012 to 16 November 2015

Authors:	**R. Bartsch**
Tenement Holder:	**Roseby Copper Pty Ltd**
Date:	**6 December 2016**
Copies To:	**Queensland Department of Natural Resources and Mines, Brisbane**
250K Map Sheets:	**Dobbyn SF54-14**
100K Map Sheets:	**Coolullah 6958**
Submitted By:	**Altona Mining Limited**

This report has been compiled using the Queensland Department of Mines & Energy's Reporting Guidelines version 01-08-1 and complies with the conditions under Section 141 (1)(f) of the Mineral Resources Act 1989 and Mineral Resources Amendment Regulation (No 4) 2008 unless otherwise indicated.

CONTENTS

TABLES

Figures

1. INTRODUCTION

EPM 18983 is part of Altona's Cloncurry Project (previously Roseby Project). A positive definitive feasibility study was completed in 2014 on the main Little Eva, Bedford, Lady Clayre and Ivy Ann Cu-Au resources, all within nearby granted mining leases (except Ivy Ann which is in EPM 8059) held by the company. Altona's focus is now on identifying additional copper resources in its neighbouring exploration tenements; these will be critical to developing a sustainable longer-term mining operation. In 2012 - 2014 the company discovered and drilled out the Turkey Creek deposit which had been largely overlooked by previous explorers. New data and concepts from the Turkey Creek discovery, and new geological models being developed for the established deposits are being used to reassess the area to identify priority targets and established forward exploration work programs.

In November 2015, EPM 18983 – Coolullah North, was conditionally surrendered in favour of EPM 25760, except for one sub-block, which was relinquished in its entirety. This report documents the work conducted upon this sub-block since the grant date.

2. LOCATION AND ACCESS

EPM18983 is part of Altona Mining's Cloncurry Project located 90 km northeast of Mt Isa and 65 km northwest of Cloncurry in the Mt Isa Inlier, Northwest Queensland Mineral Province (Figure 1).

EPM 18983 is located approximately 100km north/northwest of Cloncurry and 100km northeast of Mt Isa. Access is via the Burke Developmental Road (Figure 2) and then using Coollulah pastoral station tracks throughout the tenement.

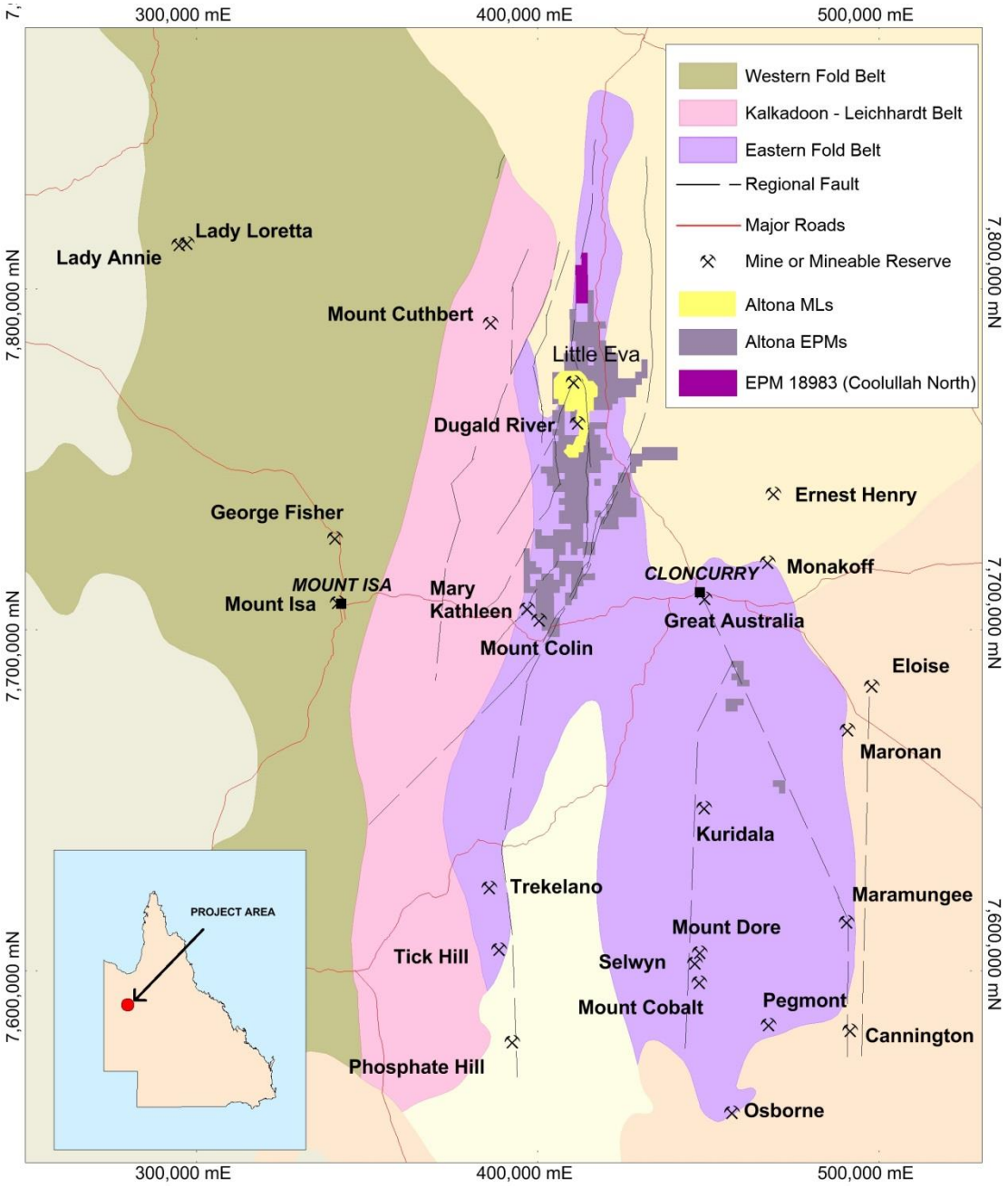

Figure 1: Mount Isa Inlier Geology and Roseby Project Tenements Location. (Datum GDA94, MGA Zone 54).

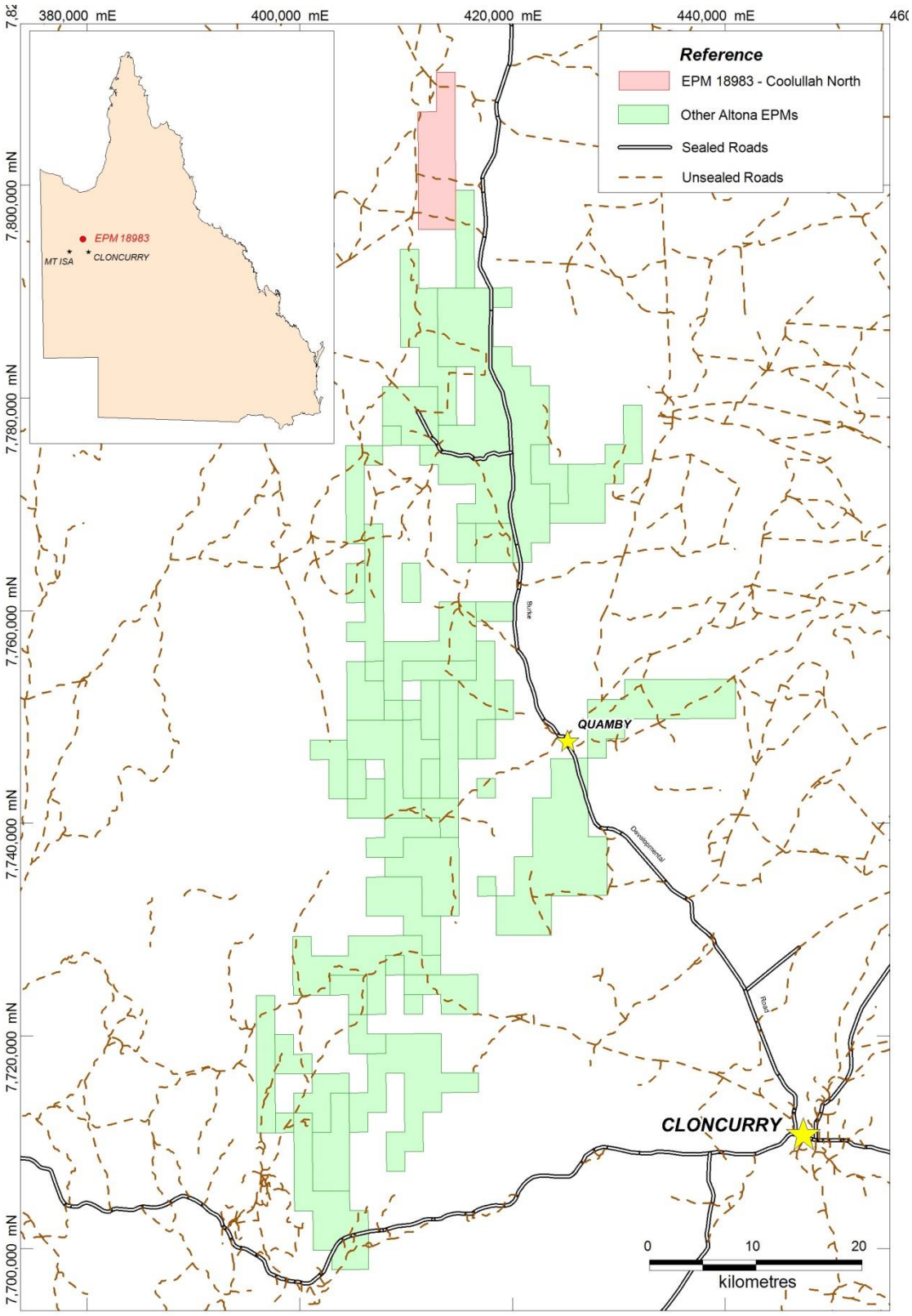

Figure 2: Tenement Location Plan (Datum GDA94, MGA Zone 54).

3. TENURE

On May 9 2012, EPM 18983 was granted to Roseby Copper Pty Ltd a 100% owned subsidiary of Altona Mining Limited. The tenement comprises 14 contiguous sub-blocks (Figure 3) covering approximately 45km^2. A listing of the sub-blocks granted is shown below in Table 1 and the sub-block to be relinquished is listed in Table 2. Both are also plotted in figure 3.

Table 1: EPM 18983 – Sub-blocks granted as of 9 May 2012

BIM	Block	Sub-Block
NORM	3267	Q, V
NORM	3338	E, K, P, U, Z
NORM	3339	A, F, L, Q, V
NORM	3410	E
NORM	3411	A

Table 2: EPM 18983 – Sub-block relinquished as of 16 November 2015

BIM	Block	Sub-Block
NORM	3410	E

Figure 3: EPM 18983 – Coolullah North Sub-block Plan (Datum GDA94, MGA Zone 54).

4. REGIONAL GEOLOGY

4.1. GENERAL GEOLOGY

The Mount Isa Inlier (Figure 1) comprises poly-deformed, metamorphosed and often metasomatised Paleoproterozoic to Mesoproterozoic crystalline and volcano-sedimentary rocks. These form the basement to a relatively thin, undeformed, un-metamorphosed Cambrian to Quaternary platform cover sequence. Tertiary/ Quaternary sediments and distinctive geomorphic landforms resulted from an extended period of sub-aerial weathering.

4.2. TECTONIC EVOLUTION

Most of the following discussion is based upon a publication by Betts *et al*, 2006.

The tectono-metamorphic evolution of the Proterozoic Mt Isa Inlier extended over a 400My period (1900-1500Ma) and included two major orogenic events, the Barramundi and Isan orogenies.

The Inlier is divided into three longitudinal orogenic domains (Figure 1):

- The central (older) Kalkadoon-Leichhardt Belt (KLB);
- The (younger) Western Fold Belt (WFB); and
- The (younger) Eastern Fold Belt (EFB).

The Roseby Copper Project is located within the EFB, which has been sub-divided into the Mary Kathleen Fold Belt (MKFB) and the Cloncurry / Mitakoodi Fold Belt (CMFB).

A synopsis of the development of the super-basins and their metalliferrous associations is provided below:

4.3. KALKADOON LEICHHARDT BELT (KLB)

These crystalline basement rocks result from the Barramundi Orogeny, a period of intense deformation and metamorphism which lasted from 1900 to 1800Ma. Regional metamorphism varied in intensity, ranging from high grade gneisses and migmatites to amphibolite and greenschist facies metamorphic assemblages.

The later stages of the Barramundi Orogeny were marked by a period of extensive intrusion of tonalities, granodiorites and other granitic variants of the Kalkadoon and Ewen batholithic intrusions and the extensive deposition of the coeval Leichhardt felsic volcanics.

Rocks of this age are interpreted to underlie the super-basin volcano-sedimentary sequences in the WFB and EFB but little is known about them since they do not outcrop in these areas.

4.4. LEICHHARDT SUPER-BASIN

The Leichhardt Super-basin developed in both the WFB and EFB as a result of early east-west extensional tectonism, consequent north-south faulting and rift basin development.

The evolution of this basin is stated (Betts *et al*, 2006) to be characterised by widespread bimodal volcanism, commencing in the EFB with the felsic volcanic and sandy sedimentation of the Argylla Formation followed by mafic volcanism, clastic fluvial sedimentation and occasional marine incursions characterising both domains. Throughout this period, dominant rock types within the WFB are quartzites and extensive flood basalts.

The prevailing extensional depositional conditions in the WFB were terminated by basin inversion and crustal shortening, which culminated at the same time as the peak of the Wonga Tectonic Event (WTE) (ca.1740-1730Ma) in the adjacent EFB.

The EFB (CMFB) basin development progressed in this period to banded jaspilitic quartzites of the Mitakoodi Formation and the shallow marine stromatolitic and evaporitic carbonate chemical sedimentation of the Corella and Doherty Formations, which host numerous base metal deposits of mixed origins and ages.

The WTE marks the termination of sedimentation in the Leichhardt Super-basin and was responsible for relatively early disruption of sedimentation in the MKFB.

In Corella Formation rocks, the WTE resulted in the generation and intrusion of a series of Wonga granite batholiths (viz. Burstall, Gin Creek, Levian, Double Crossing, Mt Phillip and Natalie I-type granitoids), the intrusion of the Lunch Creek Gabbro and the generation of the Mt Fort Constantine Volcanics. This intrusive activity, and associated thermally driven hydrothermal fluid flow, led to the formation of the Mary Kathleen skarn within Corella Formation host metasediments. This skarn would later become mineralised with uranium and rare earth elements to form the Mary Kathleen deposit (total production of 9.2Mt at an average grade of 0.12% for 8,882 t. U_3O_8).

The deposition of the Corella Formation in the CMFB continued uninterrupted throughout the WTE intrusive activity and on into the Calvert Super-basin.

4.4.1. CALVERT SUPER-BASIN

Bimodal acid / basic volcanics and acid intrusives dominate the WFB Super-basin development whilst the EFB underwent a ca. 50Ma post-Corella Formation hiatus followed by the onset of deep marine turbidites (Llewellyn Creek Formation) and inter-bedded rift-related mafic volcanics (basalts and dolerites).

This depositional regime continued in the EFB into Isan Super-basin times but was terminated in the WFB by a period of relatively minor acid igneous intrusion and extrusion at the end of Calvert times (ca 1680Ma).There are no significant base metal accumulations associated with the Calvert sequence in either fold belt.

4.4.2. ISA SUPER-BASIN

This time period, 1685-1595Ma, contains all the major stratabound lead-zinc-silver sulphide deposits known in the Mt Isa Inlier. The EFB (CMFB) hosts the Cannington, Dugald River and Pegmont deposits and the WFB is host to the Mt Isa-Hilton, Lady Loretta, HYC and Century deposits.

Strongly contrasting depositional and intrusive regimes prevailed in the EFB and WFB during the development of this super-basin.

EFB

Post-Calvert sedimentation continued unchanged in the EFB with the ongoing deposition of the deep marine Llewellyn Formation, the Mt Norna Quartzite and the Answer Slate.

Deep marine conditions prevailed leading to the deposition of the predominantly mafic Toole Creek Volcanics and inter-bedded iron-rich metasedimentary horizons of chemogenic banded iron affinities and related ferruginous quartzites. Sedimentation continued as a predominantly psammitic suite of sediments forming the Marimo slates, intercalated mudstones and carbonaceous siltstones.

The Tommy Creek Beds, a sequence of siltstones, marbles, graphitic schists, acid and mafic porphyritic lavas, post-date the Marimo Slates and were deposited just prior to the onset of the Isan Orogeny at 1600Ma.

Sporadic granitic and granodioritic intrusive activity is recorded in the EFB from early Mt Toole Volcanics to Tommy Creek Beds time.

WFB

In this domain, the prolonged hiatus in basin development that commenced in late Calvert times continued well into Isa Super-basin times. This depositional hiatus terminated with the emplacement of the S-type Sybella Granite, an event which is broadly synchronous with the formation of the Cannington silicate-facies Ag-Pb-Zn sulphide deposit in the CMFB.

Deposition re-commenced with a succession of shallow marine to deeper water facies rocks, including siltstones, stromatolitic dolomites, carbonaceous shales, and turbiditic sandstones and siltstones. These rocks form the economically important Mt Isa Group and McNamara Group beds, which host major strata-bound zinc-lead-silver mineralisation and associated hydrothermal alteration.

During this period there was a notable shift in axis of the depositional basin from the Leichhardt River Fault Trough west to the Lawn Hill Platform (LHP), leading to the subsequent development of up to 7km stratigraphic thickness of sediments on the LHP.

4.4.3. ISAN OROGENY

The onset of the Isan orogeny at 1600Ma terminated sedimentation over the entire Mt Isa Inlier, and initiated regional-scale polyphase deformation and high temperature metamorphism. High temperature metamorphism affected all areas except for the LHP sub-domain.

Betts *et al* (2006) show that during the first half of the Isan Orogeny (1600-1550Ma), the Mt Isa and Mt Gordon hydrothermal style copper mineralisation was emplaced in the WFB, and in the EFB, IOCG style mineralisation was emplaced at Osborne.
However, the majority of the IOCG mineralisation in the EFB occurred during the latter half of the Isan Orogeny (1550-1500Ma), and was wholly focused within the CMFB. The Mary Kathleen uranium mineralisation is dated mid-orogeny (1550Ma). During this period the emplacement of multiple I-type granitic phases commenced in the CMFB, concluding with the Yellow Waterhole Granite at approximately 1493Ma.

By contrast, no granitic intrusive activity occurred elsewhere in the Mt Isa Inlier during the entire Isan orogeny and no significant copper-gold deposits were generated in these areas.

At approximately 1520-1510Ma, towards the culmination of the major Williams-Naraku granitic intrusion, deposition of the Quamby Conglomerate occurred in highly localised fault-graben settings over the full width of the EFB. This is interpreted as strong evidence for regional extension occurring at this time, associated with re-activation along pre-existing major faults such as the Mt Rose Bee and the Quamby–Fountain (Federal Graben) faults.

4.5. *LOCAL GEOLOGY*

The Cloncurry Copper Project falls within the Eastern succession of Proterozoic Mt Isa Inlier, in the North West Mineral Province of Queensland, Australia (Figure 1). The Inlier comprises an extensive platform of highly deformed Lower to Middle Proterozoic meta-volcano-sedimentary rocks which have undergone two major orogenic deformation events, extensive regional soda-metasomatism and batholithic granite intrusion. Extensive hydrothermal magnetite-haematite-albite-carbonate-silica alteration of the country rock accompanied granite intrusion and related mineralisation during the Mid-Proterozoic Isan Orogeny.

Predominantly north and north-east trending crustal scale faulting transects the region, bounding tectono-stratigraphic domains. Most of the major faults have great longevity and there is geomorphological evidence of recurrent activity to the present day. The Mt Isa Inlier is a locus of major base and/or precious metal mineralisation.

The Eastern succession has been further divided into the older, western Wonga Belt (Mary Kathleen Zone) and younger Quamby-Malbon and Cloncurry-Selwyn zones to the east. The project area is situated across the eastern boundary of the Wonga Belt near the northern limits of outcropping Proterozoic rocks.

The Cloncurry Project lies within the Eastern Succession for the inlier contains units associated with cover sequences 2 and 3. The oldest rocks are the Boomarra Metamorphics, located in the northeast, which comprise predominantly quartzite and biotite schist intruded by mafic dykes and/or sills. This sequence has historically been mapped as Soldiers Cap Group. Metasediments and metavolcanics of the Corella Formation, Mt Roseby Schist and Lady Clayre Dolomite outcrop extensively in most of the tenure area.

Early Wonga Granite occurs in the west with Burstall Granite, Lunch Creek Gabbro, Mt Godkin Granite and Dipvale Granodiorite intruding metasediments in the south and east of the area. Early metadolerite intrusives are widespread throughout sequence 2 units. Several major faults are present within the project area. North-trending structures such as the Mt Rosebee, Coolullah and Pinnacle faults are interpreted to be old (pre-Barramundi Orogeny) thrusts that have been reactivated as strike-slip faults. The Wonga, Cameron, Pilgrim, Fountain Range and Quamby transcurrent faults transect the southern third of the area along a north-northeasterly trend and are associated with post-Barramundi extension and Isan compression.

A general younging of the meta-volcano-sedimentary sequence of the Eastern Fold Belt occurs in the Roseby area from the Argylla Formation in the west, through a central tract of Corella Formation and across to the east-central Soldiers Cap Group.

South of the north-easterly-trending Fountain Range-Quamby Fault, a similar east-younging sequence is present, interrupted only by the development of a major anticlinal structure between the Pilgrim and Mt Dore Faults.

Major northerly trending crustal scale faults transect the Eastern Fold Belt, three of which impact the Cloncurry Copper Project tenements. The Mt Rose Bee Fault, a bounding fault to the Roseby Copper Corridor, is a crustal scale feature that, after merging with the Fountain Range-Quamby Fault, continues south to become the Pilgrim Fault for a total length of some 320km. The Coolullah (also Cabbage Tree Creek) Fault is in the order of 200km long and forms the eastern bounding fault to the Phanerozoic Landsborough Graben, where it abuts Middle Proterozoic rocks to the west of the Roseby Copper Corridor. The Fountain Range-Quamby Fault (also known as the Federal Graben), is a 200km long down-faulted suture that passes north-eastward into the Cameron River tenement (EPM8059), hosting the Ivy Ann copper-gold resource and remnant tracts of the Quamby Conglomerate.

The latter is the youngest (ca 1510-1520Ma) Proterozoic sedimentary formation of the Eastern Fold Belt and was deposited late in the Isan Orogeny in narrow structural repositories, an off-shoot of which lies juxtaposed to the Mt Rose Bee Fault and hosts the Quamby Gold Mine.

The Mt Isa Inlier is an exceptionally well-endowed province and includes several world class base and precious metal deposits. Four main styles of mineralisation account for the majority of the mineral resources in the region (Denaro and Dhnaram, 2009) and are summarised here:

1) **Sediment-hosted Ag-Pb-Zn** – this style accounts of most of the Pb-Zn and a significant proportion of the Ag resources in Queensland. Mineralisation mostly occurs in fine-grained sediments of the later cover sequence in the Western Succession (e.g. Mt Isa Pb-Zn, Century, Lady Loretta). Lead-Zinc mineralisation does occur in older rocks (cover sequence 2) in the Eastern Succession such as at the Dugald River deposit which is hosted in carbonaceous shale of the Dugald River Shale Member (Corella Formation).

2) **Broken Hill-type Ag-Pb-Zn** – this type is essentially the same as (1) above however mineralisation is hosted in more metamorphosed rocks of the Eastern Succession. It includes the Cannington deposit. The Pegmont deposit is also considered to belong to this type and is hosted in ironstone within the Mt Norna Quartzite.

3) **(Brecciated) sediment-hosted Cu** – mostly occurs within sequence 2 and 3 rocks of the Western Succession and includes the Mt Isa copper ore bodies. Mineralisation is commonly hosted in brecciated dolomitic, pyritic and carbonaceous sediments as well as sandstone near regional fault or shear zones. A strong association between northerly trending major faults

and Cu-Au mineralisation is most apparent within the Eastern Succession. The structurally-controlled Cu mineralisation at Lady Clayre could fall within this type.

4) **Hydrothermal Cu-Au-Fe** – this style occurs within higher grade sequences in the Eastern Succession (Selwyn-Cloncurry Zone) and is predominantly associated with chalcopyrite-pyrite- magnetite mineralisation (cf. IOCG-type). Post-orogenic granites (e.g. Naraku) have been associated with this deposit type with more significant mineralisation occurring in thermal aureoles around the intrusions. Such deposits include Osborne, Selwyn and Ernest Henry, which is breccia-hosted, plus the Little Eva deposit within the Roseby project area. In addition to these, several other mineralisation styles are also known in the region.

5) **Skarn-hosted metamorphic-hydrothermal U-REE** – this mineralisation style is characterised by the Mary Kathleen deposit. Mineralisation is hosted in skarns of the Corella Formation, formed during the intrusion of the Burstall Granite, but occurred in a second deformational phase. Regional shear zones have also been proposed as potential fluid conduits that may have introduced the U and REEs.

6) **Stratabound Cu** – this style is known in the Roseby area and is characterised by an extensive low-grade, copper-bearing unit within the Corella Formation containing primary native copper, bornite and chalcocite mineralisation. The Longamundi, Blackard and Scanlan deposits occur along this unit where further copper enrichment can occur in localised zones of increased deformation, particularly tight folding (Porter Geo, 1997).

4.6. LITHOLOGICAL DOMAINS

The **Boomarra Metamorphics** are interpreted as the oldest sequence within the project and are the main group covering the southeastern half of the area. This sequence consist of weakly magnetic and radiogenic metasediments (metasandstone, quartzite and psammitic schist) to the east and moderately to strongly magnetic and corresponds with banded amphibolite schist. The schist domain contains tightly folded dolerite units (now amphibolite) as sills and dykes and corresponds to a broad zone of elevated radiometric response (particularly thorium) on its eastern side.

The contact between the domains is structural and locally tightly folded with the schist domain narrowing and truncating against the Coolullah Fault immediately north of the interpreted area. Both domains show an overall north-northwest trending foliation that runs sub-parallel to several extensive structures. The Boomarra sequence is truncated by a set of northeast to north-northeast trending minor faults and fractures which has been variably intruded by a felsic intrusive phase (pegmatite, aplite, leucogranite) predominantly in the eastern domain. This intrusive phase may be related to the Naraku Granite event and several, moderately magnetic features may represent a larger volume of granitic intrusive beneath Tertiary cover.

The **Corella Formation** is a major sequence occurring as two north-south domains within the eastern and western thirds of the area. The eastern sequence is largely bounded to the west by the extensive Mount Rosebee Fault and truncates in the north against the Coolullah Fault. The western domain is broadly folded around the Mt Godkin Granite in the central area and the Burstall Granite in the southwest. Tight to isoclinal, north-south verging folds are largely mapped out by doleritic sills in the far west between the large granite intrusions. The sequence is variably magnetic. Moderately to strongly magnetic units may be related to mafic intrusives or zones of magnetite alteration. Very strongly magnetic Corella Formation is observed at the Little Eva deposit and is also associated with the Mt Godkin Granite for instance.

A narrow sequence of the **Dugald River Shale Member** occurs on the western edge of the tenement package and shows a distinct moderately magnetic response attributed to strongly sulphidic (pyrrhotitic) units within the sequence, with associated elevated potassium and uranium. This corresponds with a mapped carbonaceous unit. A non- to weakly magnetic unit of the same group is likely to be dolomitic shale, sandstone or chert with normal (background) sulphide content.

The **Mt Roseby Schist** sequence is predominant through the central area adjacent to and within the belts of Corella Formation and trends north-south to north-northwest and north-northeast through the length of the area. The schist sequence is often characterised by reversely magnetised rocks, not seen in other sequences, and may form a separate metamorphic domain. Open to tight folding is evident, particularly north of the Mt Godkin Granite, with numerous thrust surfaces likely developed as accommodation structures.

The **Lady Clayre Dolomite** is the central sequence between the Corella and Mt Roseby units to the east and west. Assuming it is the youngest sequence, these three packages appear to form a regional synform. The Lady Clayre Dolomite is weakly to moderately magnetic with the more magnetic units likely to be pyrrhotite-bearing. Tight folding is evident through the southern belt of this formation.

The **Knapdale Quartzite** package forms a fault-bound, distinct non- to weakly magnetic, bedded north-south sequence in the east, probably a synformal keel.

The **Coocerina Formation** occurs along the western side of the Knapdale Quartzite and shows a generally non- to weakly magnetic response associated with locally very high uranium anomalies near the Iris and Lady Clayre mineral occurrences.

The Coolullah Fault forms a major, generally north-south structure and the eastern boundary of the Landsborough Graben. This basin is filled with non-magnetic sediments of possible **Mt Albert Group** or younger **Cambrian sediments** of the Carpentaria Basin. Some buried magnetic features are evident and may be altered Proterozoic units at depth.

Weakly to moderately magnetic (meta)-sediments of the **Milo Beds** and younger **Quamby Conglomerate** occur in the very east of the area, east of the Fountain Range Fault. Minor **Tommy Creek Granodiorite** is also interpreted in this area and exhibits possible contact (magnetite) alteration of surrounding Corella Formation.

Several phases of mafic and felsic intrusives occur throughout the area. An early phase of **dolerite (amphibolite) dykes and sills** intrude Corella Formation, some Mt Roseby Schist and the older Boomarra Metamorphics in the north, commonly oriented parallel or sub-parallel to the stratigraphy and helping define folding within these sequences. A late swarm of mafic (dolerite) dykes intrude minor east-northeast trending fractures and faults, and some north-south shear zones, predominantly within the central region of the southern sheet. The oldest granitic intrusive in the area is the non-magnetic **Wonga Granite** in the far west.

5. WORK COMPLETED

5.1. SUMMARY OF WORK TO 16 NOVEMBER 2015

Altona undertook a number of regional prospectivity analyses of the tenement, incorporating geophysical, geochemical and geological GIS datasets. No targets were generated and no new data was collected over the sub-block to be relinquished.

6. REFERENCES

Bartsch, R. (2015). Annual Report, Coolulah North Tenement, EPM 18983 for the period 9 May 2014 to 8 May 2015. QDEX Company Report number 92184.

Betts P.G, Giles D, Mark G, Lister G.S, Goleby B.R, (2006): Synthesis of the Proterozoic Evolution of the Mt Isa Inlier. Australian Journal of Earth Sciences (2006) 53, Pp 187-211.

Carrello, F., 2013. Annual Report, River Gum Tenement, EPM 18983, for the Period 9 May 2012 to 8 May 2013. QDEX Company Report number 77704.

Denaro, T. J. and Dhnaram, C. (Compilers), 2009. Queensland Minerals 2009. A summary of major mineral resources, mines and prospects, Department of Mines and Energy, 16p

Greenwood M.L., Dhnaram C.R. (2013): 3D mineral potential of the Quamby area. Queensland Minerals and Energy Review Series, Department of Natural Resources and Mines, Queensland

Impola, J. (2014). Annual Report, Coolullah North EPM 18983 for the period 9 May 2014 to 8 May 2015. DNRM Company Report Number.

Porter GeoConsultancy Pty Ltd, 1997. Roseby Project - Little Eva, Blackard, Scanlan, Longamundi, Legend, Great Southern, Charlie Brown, Queensland, Australia