Final Technical Exploration Report

Exploration Licence EL33138

From 21st July 2023 to 4th March 2025

Northern Territory, Australia

Holder: Mark Allen and Associates Pty Ltd

Operator: Mark Allen and Associates Pty Ltd

Reporting Period: 21st July 2023 to 4th March 2025

Sheet Reference: Bauhinia Downs 1:250,000 (SE53-03)

Due Date: 2nd May 2025

Personal Author: Mark Allen, PhD, MAIG

Corporate Author: Mark Allen and Associates Pty Ltd

Target Commodity: Copper, Zinc, Lead

Date: 18th July 2024

Report No: 01-2024

Copy To: Dept. of Resources – NT

Mark Allen and Associates Pty Ltd

SUMMARY

Mark Allen and Associates Pty Ltd has elected to relinquish EL33138.

This Final Report outlines exploration activities undertaken by the Operator on Exploration Licence EL33138 from 21st July 2023 to 4th March 2025.

The Exploration Licence is situated on the Bauhinia Downs (SE5303) 1:250,000 map sheet in the McArthur Region of the Northern Territory. The tenement is located approximately 30 kilometers southeast of the settlement of Cape Crawford and is accessed via existing sealed and gravel roads.

The target is sediment-hosted base metals (Cu, Zn, Pb, Ag). The target is supported by

- The tenement is in the world famous North Australia Zn Belt, within a basin known to host world-class deposits (Figure 1),
- Favorable regional structural position,
- Interpreted local sub-basin analogous to host rocks in the McArthur River camp,
- Base metal mineral occurrences.

Data compilation and desktop studies were completed during the reporting period.

No work was completed in the reporting period starting 19 July 2024.

Expenditure for the duration of the project was $35,880, including overheads.

COPYRIGHT STATEMENT

INTRODUCTION

Mark Allen and Associates Pty Ltd has elected to relinquish EL33138.

This Final Report outlines exploration activities undertaken by the Operator on Exploration Licence EL33138 between 21st July 2023 to 4th March 2025. The Operator is primarily targeting sediment hosted base metals (Cu, Zn) in the McArthur Basin.

LOCATION AND ACCESS

Exploration Licence EL33138 is situated on the Bauhinia Downs (SE5303) 1:250,000 map sheet in the McArthur Region of the Northern Territory. It is located approximately 30 kilometers southeast of the settlement of Cape Crawford at its closest point and is accessed via existing sealed and gravel roads. A tenement location map is provided as Figure 1.

The Project is situated approximately seven hundred (700) kilometres southeast of Darwin, and less than one hundred (100) kilometres southwest of Borroloola. The project area can be reached from Darwin along the Stuart Highway to Daly Waters, then along the sealed Carpentaria Highway to Cape Crawford. Dirt roads and station tracks service the project area away from the main highways.

LICENCE DETAILS

Details of the Project Tenement which comprised 14 graticular blocks is outlined in Table 1.

The EL application was reduced in area from 16 to 14 blocks at the request of the Top End Aboriginal Corporation to exclude a site of significance to the traditional owners from the ELA. The total area of the granted EL is 14 blocks.

Table 1: Tenement details.

Name	Effective Date	Grant Date	Relinquish Date	Grant Block	Current Blocks	Holder	%
EL33138	21/07/2023	21/07/2023	4/03/2025	14	14	Mark Allen and Associates Pty Ltd	100

ABORIGINAL CLEARANCES

For the purpose of planning future ground disturbing activities, the location of registered Heritage and Sacred Sites including Restricted Work Areas was obtained from the Aboriginal Areas Protection Authority in Darwin (AAPA) for the entire tenement area. No additional on ground Heritage clearances have been undertaken by the Operator.

PHISIOGRAPHY AND CLIMATE

The region has a humid monsoonal climate with a dry season between April and October and a hot, wet season extending from November to March. The “wet” season is characterised by high relative humidity, high temperatures and most of the mean annual rainfall of 804 mm. The “dry” season is characterised by lower humidity and lower temperatures.

EL33138 lies within the Gulf Fall physiographic division and contains north flowing drainages. A marginal scarp forms a drainage divide that separates the Gulf Fall from the Barkly-Birdum Tableland to the south where drainage flows southward. In this area the Gulf Fall division contains two sub-divisions namely the Top Springs Erosion Surface and the Bukalara Plateau.

The Top Springs Erosion Surface is generally flat at elevations of approximately 240 m and contains outcrop of Top Springs Limestone, isolated outcrops of Cretaceous sediments, and Quaternary sediments on flat-lying areas and in drainages. The southern part of the sub-division becomes undulating and slopes up to the scarp of the Barkly-Birdum Tableland.

The Top Springs Erosion Surface descends gently and merges with the Bukalara Plateau to the north. The plateau occurs approximately 10 m below the Top Springs Erosion Surface. It is

dissected by the Glyde River, Lancewood Creek and their tributaries, which has exposed the Bukalara Sandstone.

The Barkly-Birdum Tableland occurs on the southern side of the drainage divide at an elevation of approximately 350 m. It contains flat-lying Cretaceous sediments with an often well-developed laterite profile. Black soil plains occur where the ferruginous zone of the laterite profile has been eroded. The tableland represents the original Tertiary land surface.

GEOLOGY

Regional Geology

EL33138 is in the world class North Australia Zinc Belt (Figure 1).

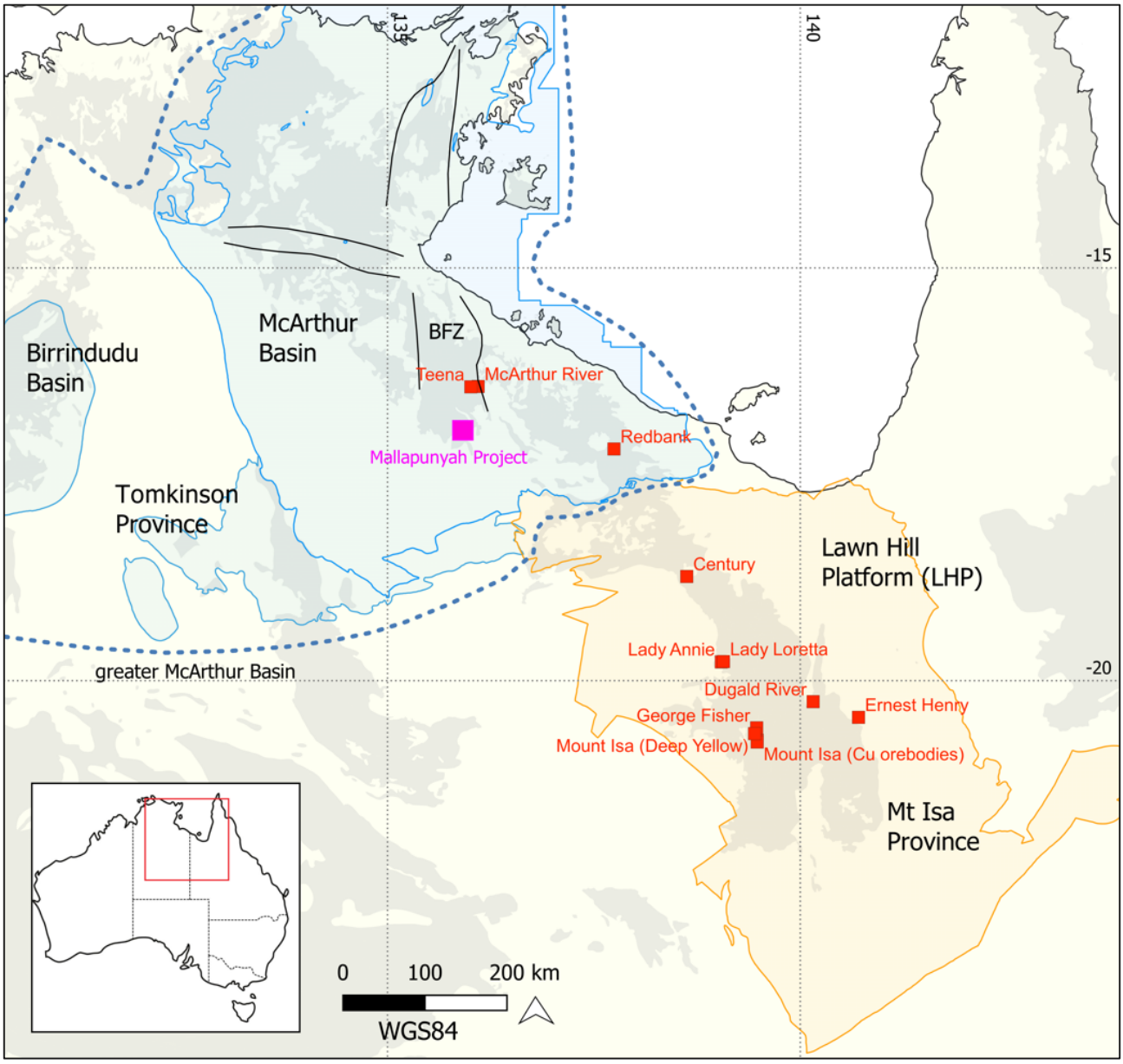

Figure 1: North Australia Zinc Belt with major deposits, showing location of the Mallapunyah Project

The Palaeo- to Meso-Proterozoic Batten Fault Zone (BFZ) of the McArthur Basin in Australia's Northern Territory contains the world-class McArthur River camp of sediment-hosted Zn-Pb-Ag-Cu deposits. The rifted architecture of the Batten Fault Zone is interpreted to have been controlled by NW-trending basement structures and N-S structures (Leaman 1998; McGoldrick et al. 2010).

The major structural control on development of both the host Barney Creek Formation (ca. 1640 Ma) sub-basin architecture and the mineralisation at McArthur River is the N- to NNW-trending Emu Fault. Despite evidence for similar permissive tectono-sedimentary settings and metallogenesis, other major structures in the Batten Fault Zone remain comparatively under-

explored. Key among them is the Mallapunyah Fault (southernmost NW-structure in Figure 2). The Mallapunyah Fault is a major NW structure along which areas of transtension/ extension are interpreted to have facilitated restricted zones of basin growth where shale-rich sub-basins are likely to form. Sediment-hosted base metals deposits frequently occur in these shale sub-basins, the classic example being McArthur River. Thick sequences of reduced shales are ideal 'chemical trap' host rocks, and the growth fault architecture promotes hydrothermal fluid flow.

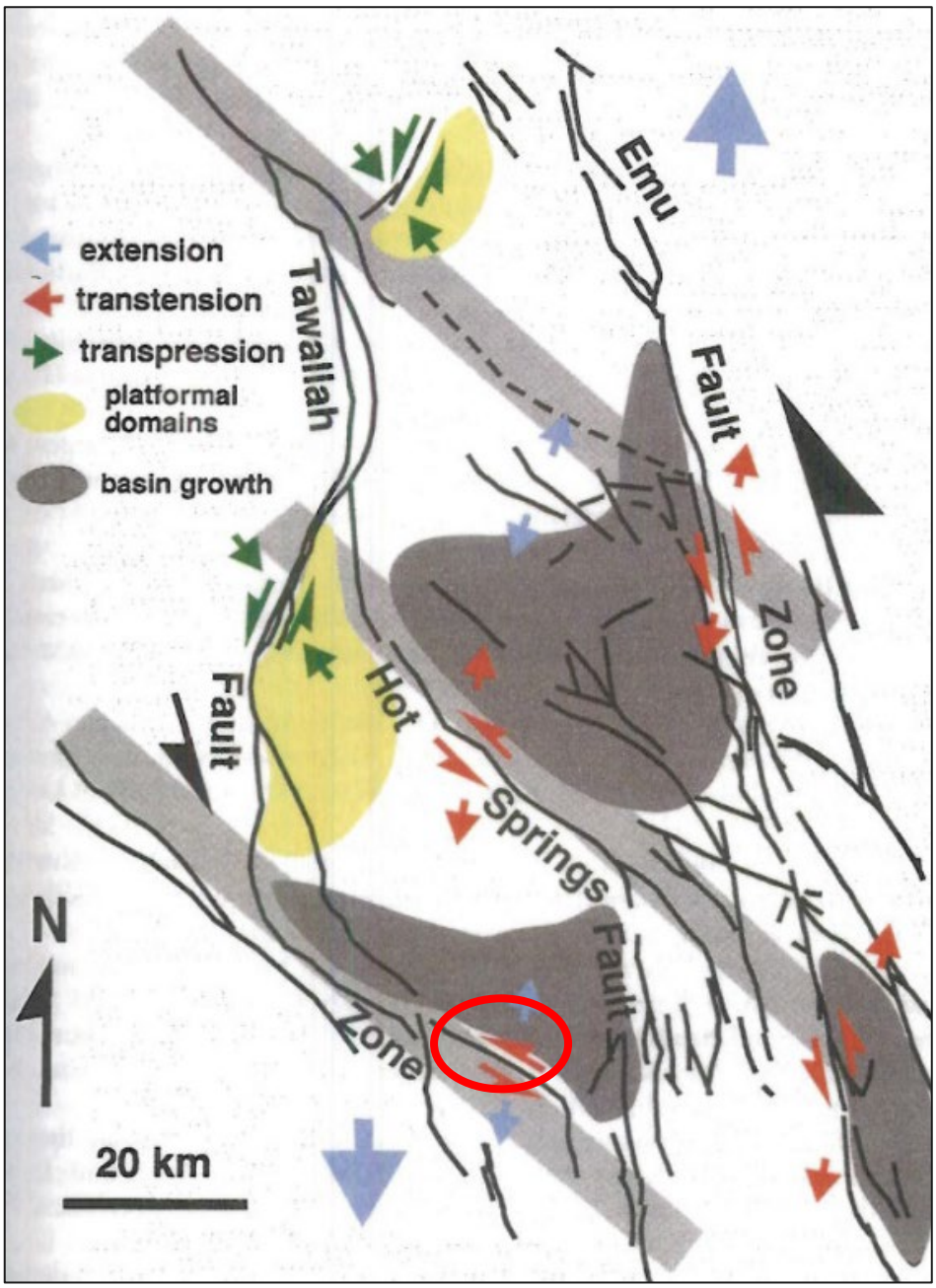

Figure 2: McGoldrick et al. (2010). The general location of EL33138 is circled in red.

Local Geology

The tenement area is 60 km to the southwest of the McArthur River mine. At the regional-scale the tenement area sits in an interpreted transtensional/extensional zone permissive of sub-basin development (Figure 2). At the local-scale government mapping indicates a fault-

bounded and thickened segment of stratigraphy consistent with a sub-basinal setting (Figure 3).

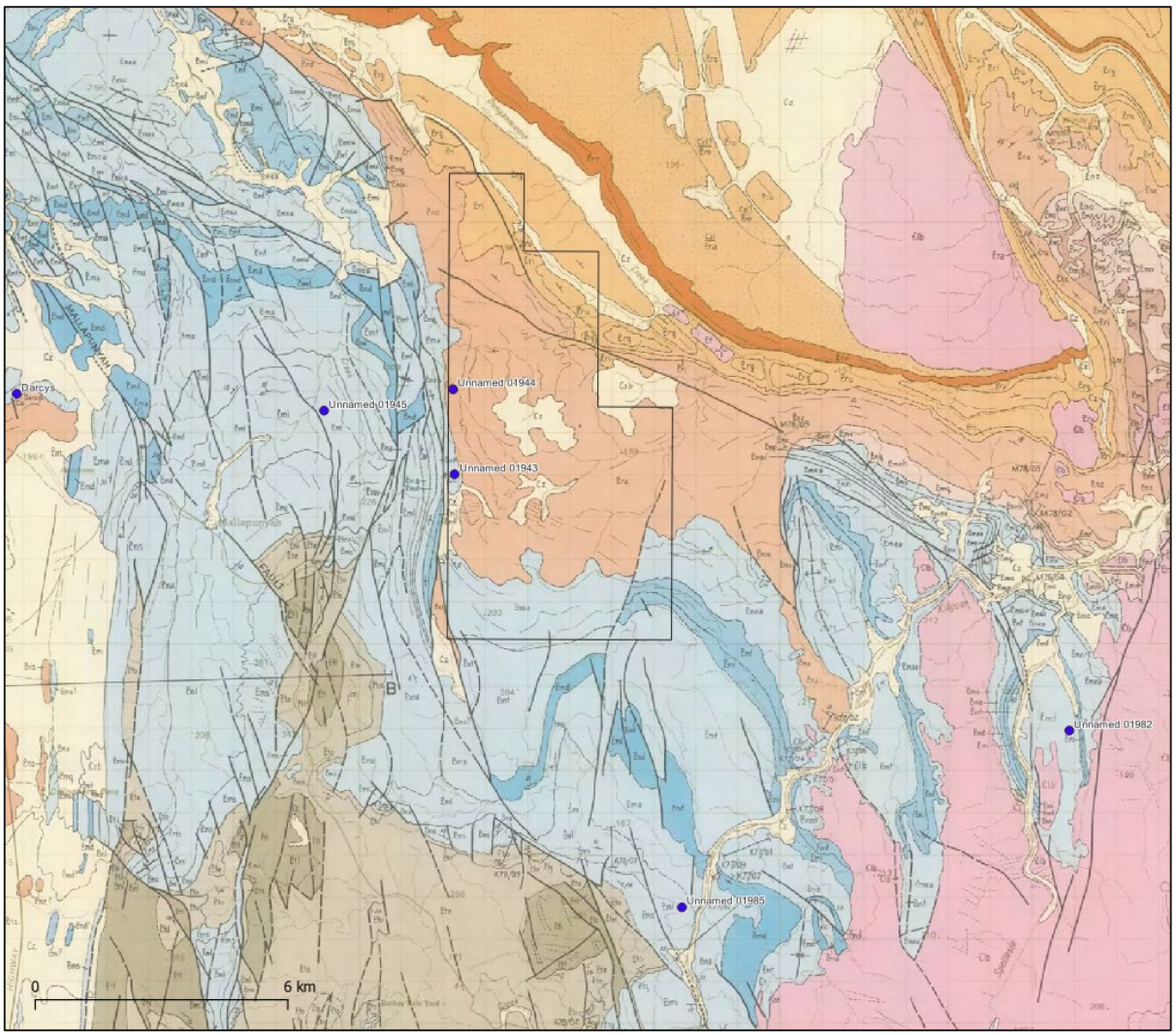

Figure 3 EL33138 on 100k NTGS geology, where the brown that extends across most of the selected area is Balbirini Formation gently dipping to the north, and the blue to the south is underlying Emmerugga Dolostone.

Two potential host strata are considered to be prospective at this location: the Barney Creek Formation and the Balbirini Formation.

The conventional ore host, the Barney Creek Formation, is mapped along strike to the NW and SE of EL33138. In the McArthur Basin it is the dolomitic, shallow facies Barney Creek Formation that outcrops, not the more prospective deep facies carbonaceous black shales. The apparent recessive nature of the Barney Creek Formation within EL33138 is consistent with the sub-basin interpretation.

PREVIOUS EXPLORATION

This area has had no drilling or modern exploration by way of surface sampling or detailed geophysics.

Drillhole MBXDD001 was drilled ~10 km along strike to the east outside EL33138 and intersected an anomalously thick and deep facies sequence of Barney Creek Formation confirming the idea that the general area experienced anomalous basin growth during regional rifting and deposition of the Barney Creek Formation. Minor base metal sulphides are noted within the Barney Creek Formation in this hole (Figure 4) indicating hydrothermal fluid flow at the site. Pb isotope values suggest the sulphides formed in the later stages of the McArthur River hydrothermal event (Figure 5).

The Pb isotope values indicate metallogenesis during deposition of the Balbirini Formation is also viable. The potential of the Balbirini Formation to host significant sediment-hosted mineralisation comes from,

- the unit's age and depositional equivalency to host rocks of the world-class Century Zn deposit in the Lawn Hill Platform
- the tectonically-driven depositional cycles and related reduced black shale units
- the examples of significant mineralisation in this unit across the McArthur Basin

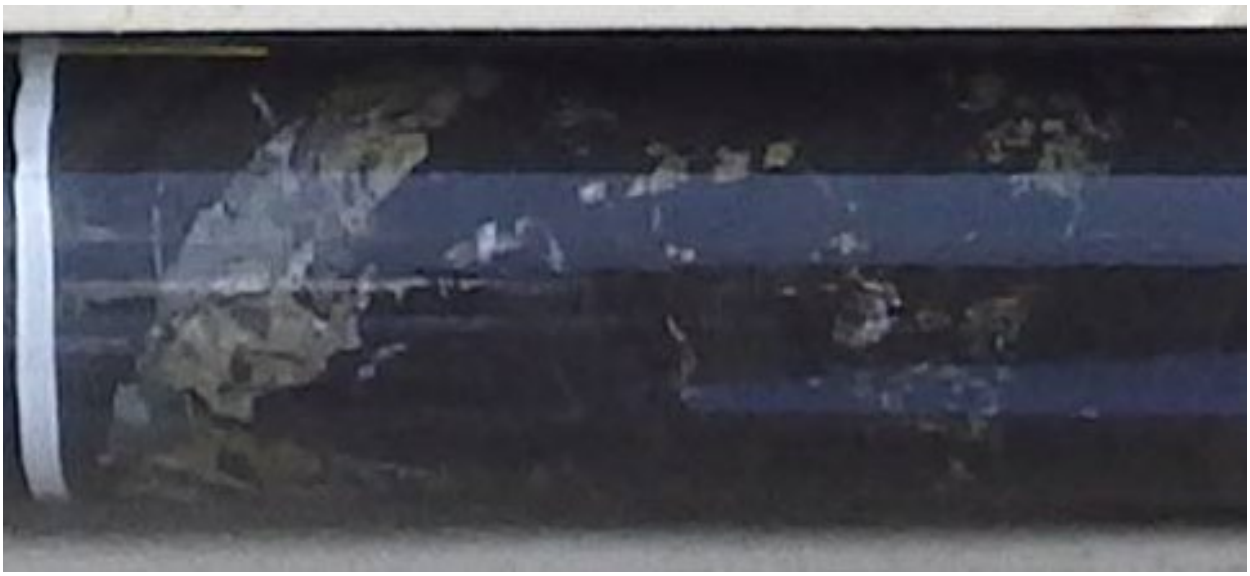

Figure 4: MBXDD001: 140-140.1 m galena + pyrite + sphalerite breccia matrix in shale (MMG, 2015)

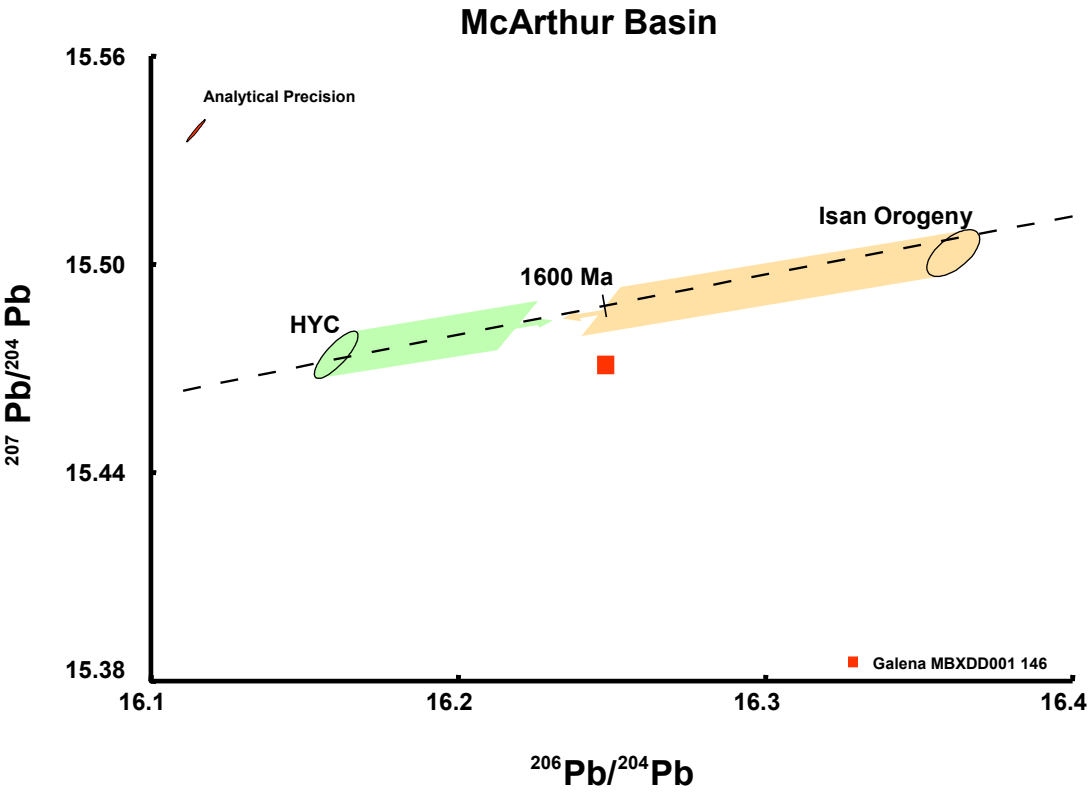

Figure 5: Conventional Pb isotope diagram showing the galena result for the MBXDD001 sample (Red square) in comparison to data fields for the McArthur Basin. Analytical precision for the sample from this study is shown in the top left hand corner (MMG, 2015)

WORK COMPLETED

Data compilation and desktop studies were completed.

In particular, a detailed remote sensing study was undertaken based on Sentinel-2 data.

Remote sensing is the process of detecting and monitoring the physical characteristics of an area by measuring its reflected and emitted radiation from a satellite. These data can be manipulated to emphasise various aspects of the outcropping geology and surficial regolith.

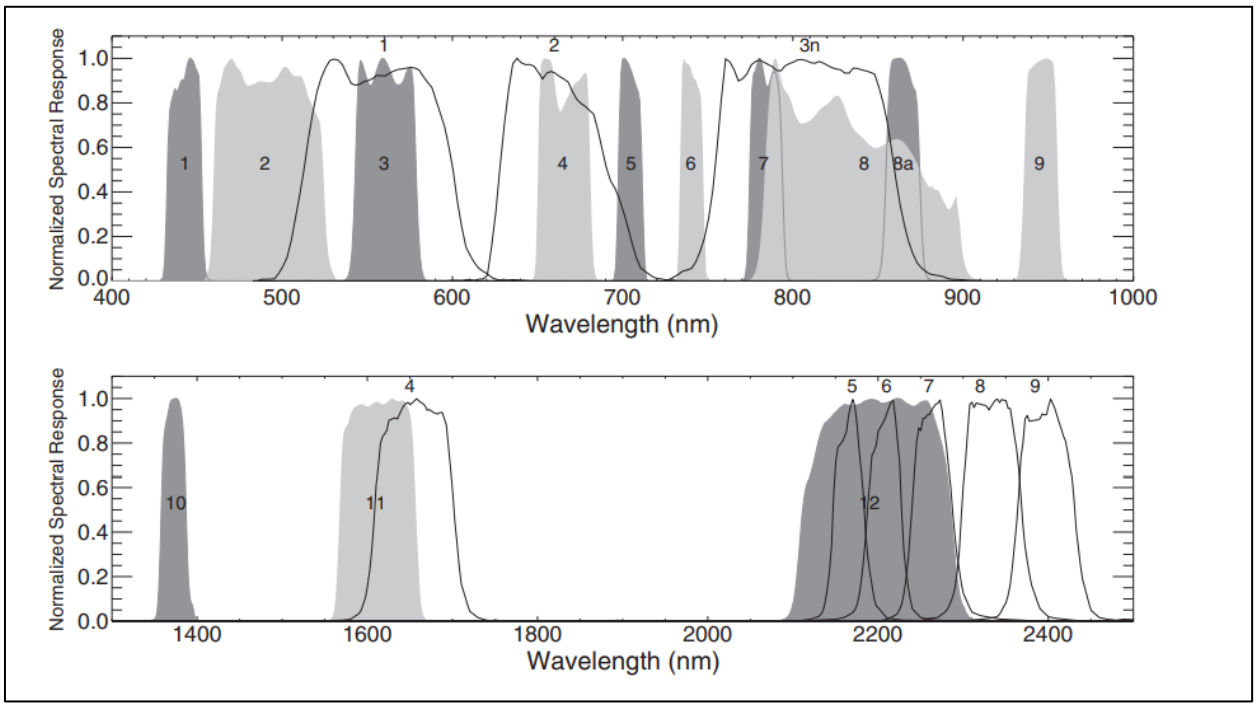

Figure 4: Spectral response of the Sentinel 2 (shaded) and ASTER (line) sensors

In the VNIR (top) and SWIR (bottom) wavelength

Sentinel-2 L2A data (spectra in Figure 4) were downloaded and processed for the area of exposed rock in the west of the Project. Several images were produced selecting RGB band combinations that enhance features such as natural colour (4,3,2) and bedrock geology (12-11-2; figure 5).

An unsupervised classification using the isodata clustering algorithm was applied to the data (figure 6). This process classifies pixels into similar groups using all ten spectra, enhancing definition of similar geological units by eliminating noisy data dimensions.

The results define clearer outcrop boundaries and stratigraphic-structural trends than is represented on the NTGS geological map. It is clear that there are areas in the Project that may be mapped incorrectly. These discrepancies require field checking.

A series of images were produced for band ratios that can be used as proxies for mineralogy (e.g., figure 7). These band ratio images define anomalous units that warrant field checking.

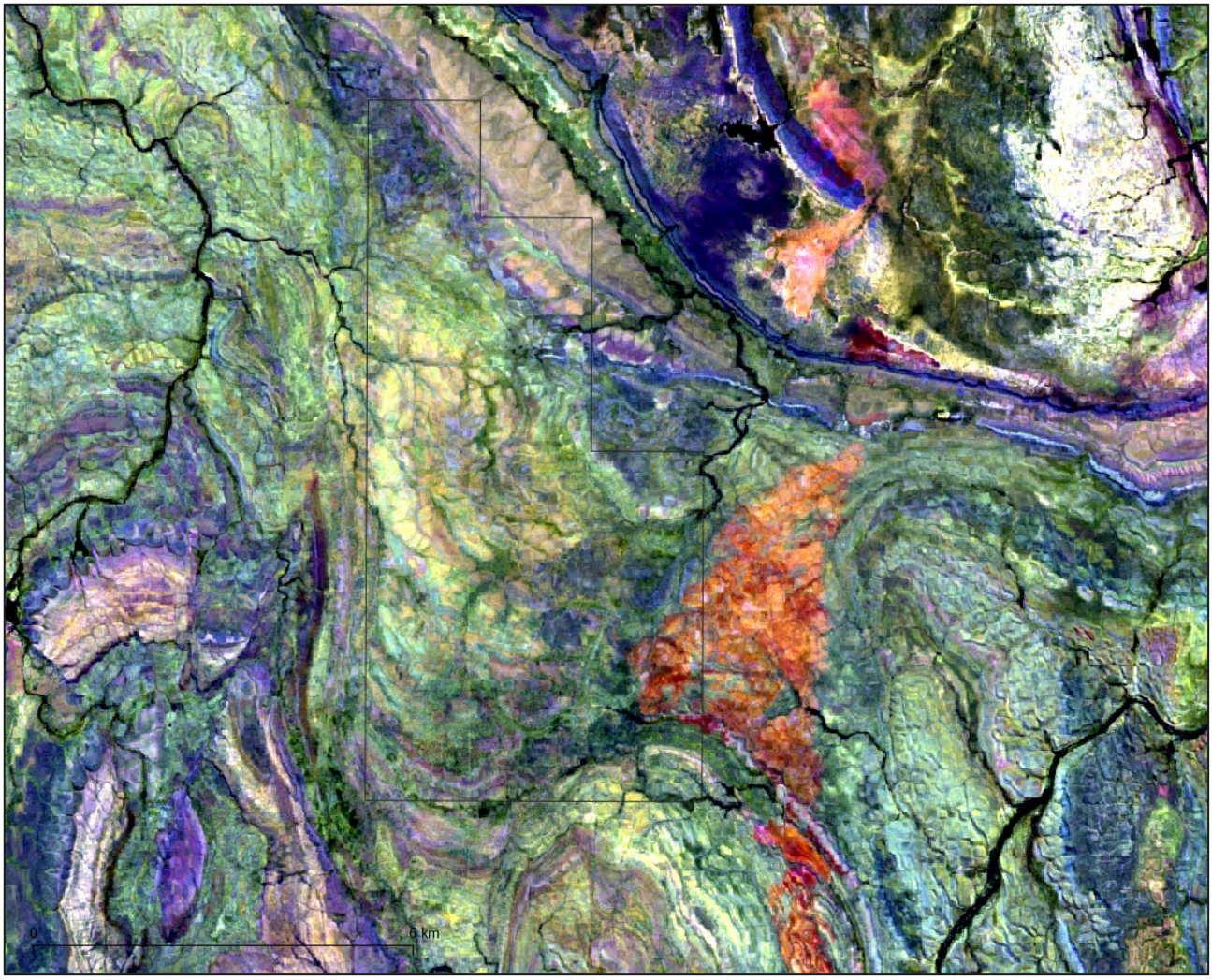

Figure 5: Sentinel 2 RGB= bands 12-11-2

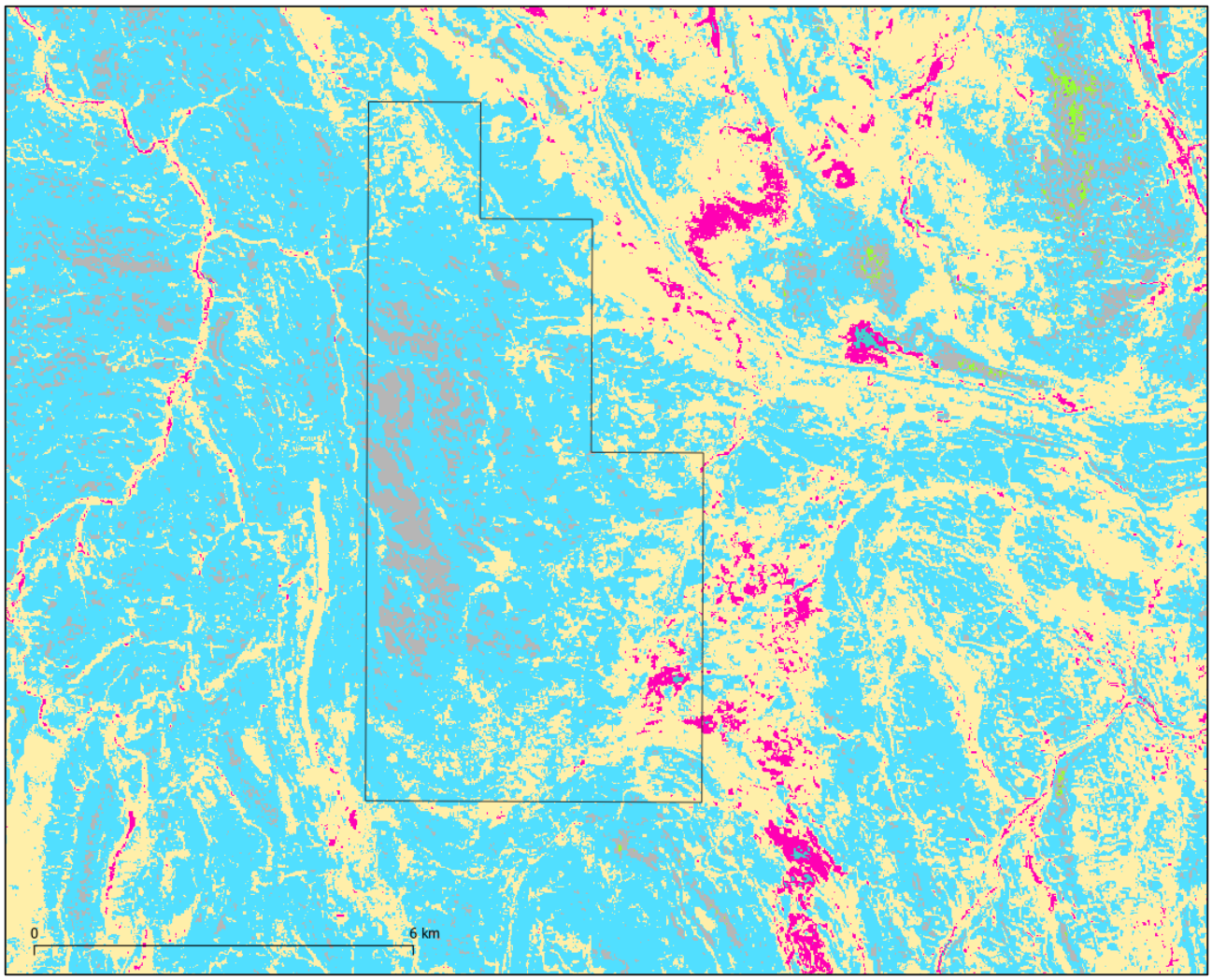

Figure 6: Sentinel 2 Cluster output.

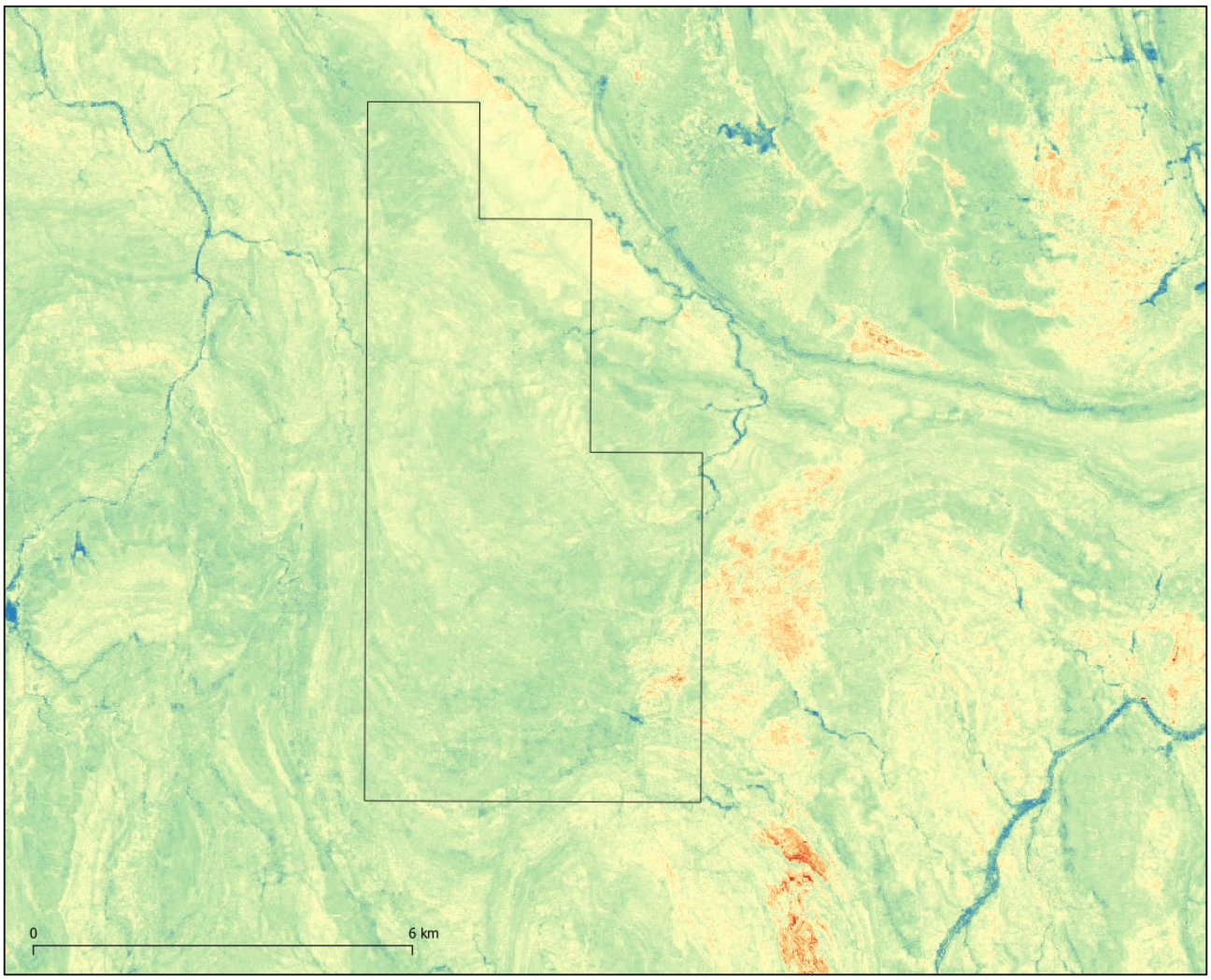

Figure 7: Sentinel 2 ferric oxide (band ratio 11/8).

CONCLUSIONS

Mark Allen and Associates Pty Ltd has elected to relinquish EL33138.

This Final Report outlines exploration activities undertaken by the Operator on Exploration Licence EL33138 from 21st July 2023 to 4th March 2025.

EL33138 is in the McArthur Basin, NT. The target is sediment-hosted base metals (Cu, Zn, Pb, Ag).

Data compilation and desktop studies were completed during the duration of the project.

EXPENDITURE STATEMENT

The exploration expenditure attributed to the Tenement during the duration of the project was a total of $35,880.

REFERENCES

Leaman, D.E. (1998), Sediment-hosted base metal deposits. CODES/AMIRA Project P.384A. Report No. 5, May 1998.

McGoldrick et al. (2010) Sequences, Synsedimentary Structures and Sub-Basins: Where and When of SEDEX Zinc Systems in the Southern McArthur Basin Econ. Geol. Special Publication 15 pp. 367-389.

MMG (2015) Core sampling report for MBXDD001. Report ID: CSR0345.

Pietsch, B.A., Rawlings D.J., Greaser P.M., Kruse P.D., Ahmad M., Ferenzi P.A., and Findhammer T.L.R., 1991: Bauhinia Downs SE5303, 1:250,000 Geological Map Series, Explanatory Notes, Northern Territory Geological Survey, Darwin.