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<b>AUTHORS</b>	MATTHEW FINN & GREG STREET
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<b>CONTACT (TECHNICAL DETAILS)</b>	M FINN & G STREET 8 MAY AVENUE SUBIACO, WA 6008 08 9388 2839 INFO@INTERGEO.COM.AU
<b>CONTACT (EXPENDITURE DETAILS)</b>	LEEWAY@IINET.NET.AU

Report prepared by



On behalf of

UNIVERSAL SPLENDOUR INVESTMENTS

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Tenement Exploration Report for the period  
November 13 2009 to November 13 2010 for EL  
27/304

23 November 2010

International Geoscience Pty Ltd  
ABN 48 424 195 890

8 May Ave  
Subiaco  
WA 6008  
Australia

Telephone: + 61 8 9388 2839

Email: [info@intergeo.com.au](mailto:info@intergeo.com.au)



Report prepared by:  
Matthew Finn  
Senior Geoscientist

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## **EXECUTIVE SUMMARY**

Universal Splendour Investments (USI) has taken up exploration license EL 27/304 which is located around the Borroloola area in the Northern Territory. This tenement is part of a group of nine tenements collectively referred to as the Gulf project area.

This tenement is prospective for manganese mineralisation similar to that seen at the Masterton Deposit.

To date the Gulf project has had a full background review, including an assessment of previous exploration, manganese mineralisation model, data compilation and a preliminary interpretation of the tenements. Accompanying the background review was a 10 day field visit which aimed to; assess the tenement access, map geology, rock-chip sample and plan future sites for follow-up in 2011. Most of the rock-chip samples were assayed for a suite of elements and several returned favourable results for manganese.

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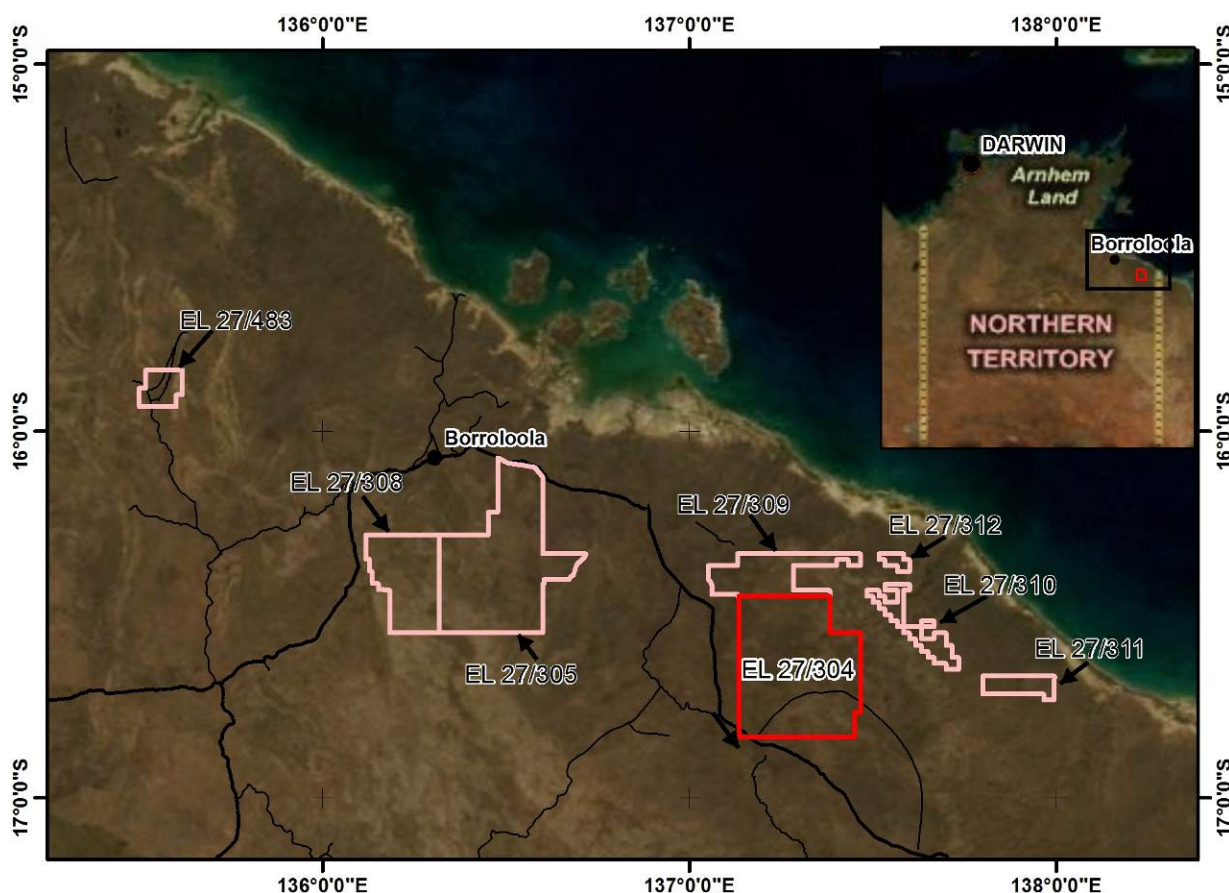
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## 1 PROJECT OVERVIEW

Universal Splendour Investments (USI) have taken up exploration license EL 27/304 which is located around the Borroloola area in the Northern Territory (Figure 1).

The eastern block of tenements, also taken up by USI, around Borroloola are collectively referred to as the Gulf Project and are considered prospective for manganese mineralisation particularly Cretaceous deposits of the style seen at Groote Eylandt and older Proterozoic manganese mineralisation in the McArthur Basin. The latter is type of deposit is expected within EL 27/304.



**Figure 1: Location of Universal Splendour's EL within the Gulf project with EL 27/304 in red. The tenements are overlaid on an orthorectified image from BingTM, 2010.**

### 1.1 GULF PROJECT

CSA Global provided a background desktop study for the Gulf project area, in March of 2010 (Lindsay-Park, 2010b). The report has been included as APPENDIX A in this report.

International Geoscience Pty Ltd was contracted by USI in order to evaluate their Gulf project tenements with respect to their manganese potential. This report is a summary of 3 reports provided to USI at various stages throughout 2010.

The work complete by International Geoscience on the Gulf project tenements consisted of, a detailed desktop study focusing on Mn mineralisation, 10 day field visit and rock-ship sampling.

## 2 GULF PROJECT - MANGANESE BACKGROUND

### 2.1 MANGANESE MINERALISATION STYLE

One of the world's largest deposits of manganese oxides is located on Groote Eylandt off the coast of Australia, approximately 200km north of Borroloola. Groote Eylandt lies to the north and northwest of the Gulf project area owned by Universal Splendor (Figure 2).

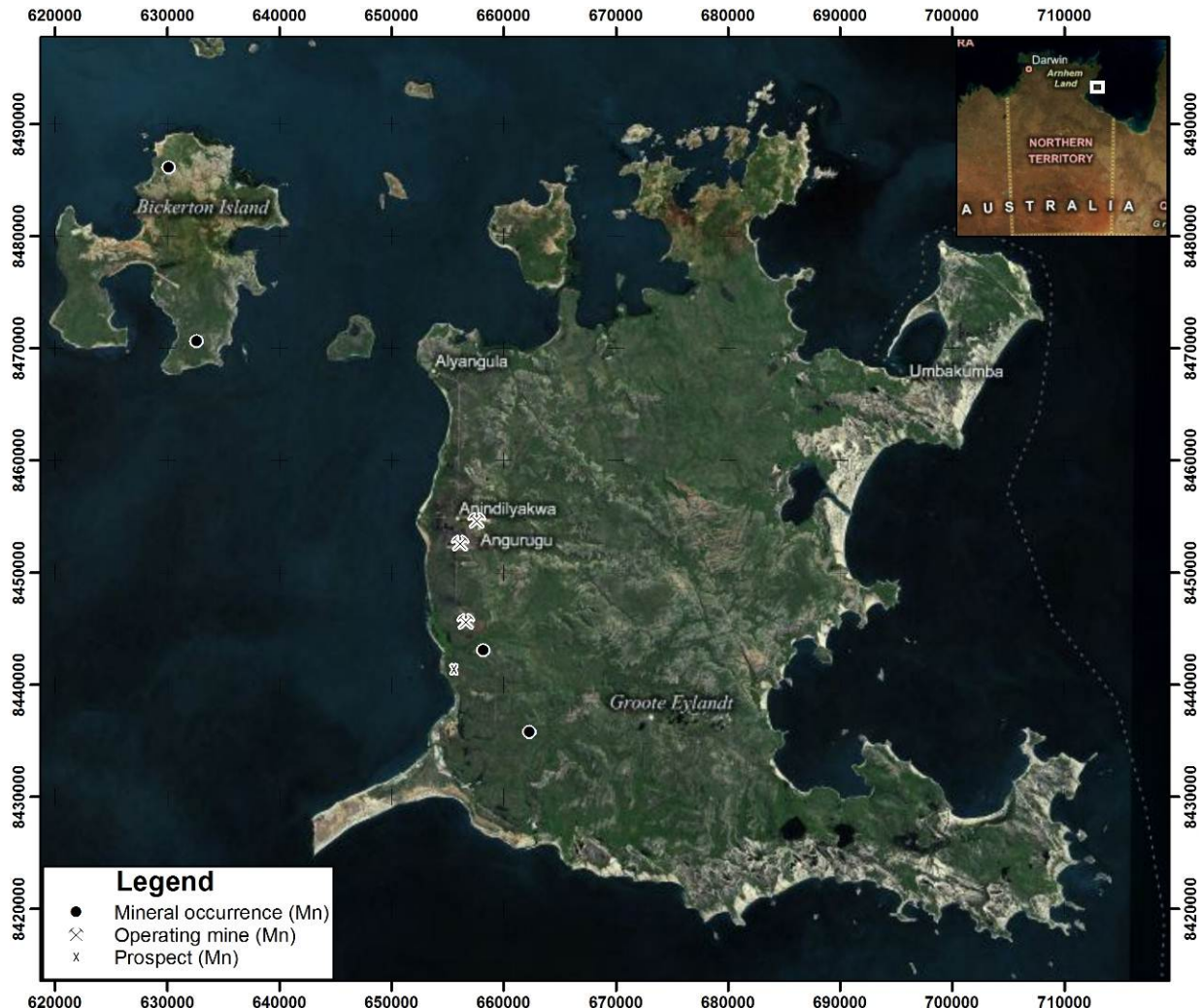
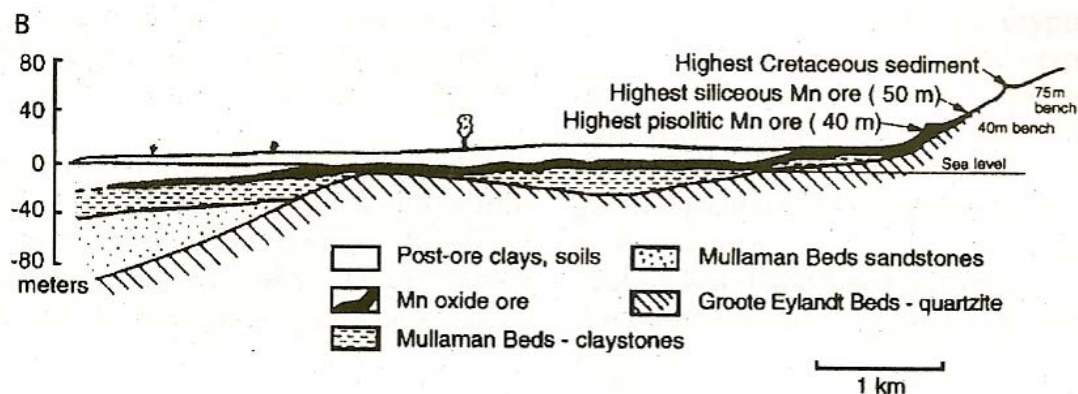


Figure 2: Location of manganese mineralisation on Groote Eylandt.

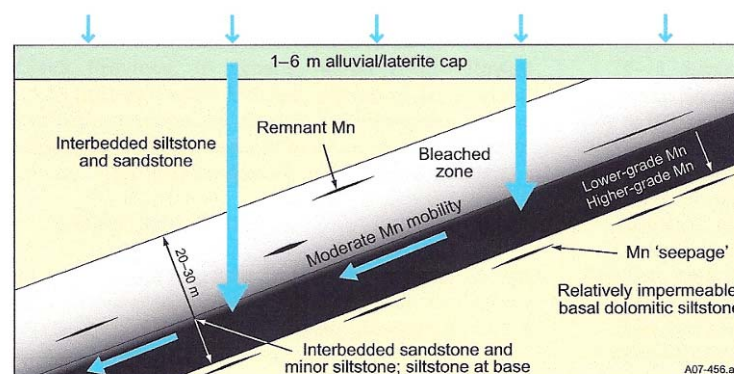
Several other smaller manganese deposits to the northwest of the Gulf project area have been identified by Brumby Resources, BHP and Mineral Resources Limited/Sandfire Resources. The deposit styles at these locations are similar to that at the Groote Eylandt deposit and can be expected to be similar for any deposit located within the Gulf project area, but further investigation into the local geology needs to be undertaken in order to confirm this relationship.

The manganese ore deposit style is sedimentary in origin and consists of pisolites and oolites rich in Mn minerals such as pyrolusite, cryptomelane, romanechite, todorokite and vernadite. Figure 3 is a representative cross-section displaying the Mn mineralization with respect to the lower Cretaceous and basement Proterozoic quartzite for the Groote Eylandt deposit.



**Figure 3: Cross-section at the Groote Eylandt deposit.**

The genesis of the Groote Eylandt deposit is considered to have taken place in three major stages. The first stage involved the deposition of primary Mn minerals in sediments in a shallow-marine near-shore environment, producing thick layers of Mn-bearing pisolites and oolites. The second stage, diagenesis, produced pyrolusite that cemented the pisoliths and oololiths. The third stage was a supergene and pedogenic process that modified the deposit in a terrestrial environment due to intense chemical weathering (Figure 4). The manganese mineral cryptomelane is thought to have formed during this third stage as a result of a large potassium influx into the ores from ground waters during the Tertiary.



**Figure 4: Model for supergene enrichment of manganese orebodies under warm, relatively wet acidic conditions.**

## 2.2 DEPOSITIONAL ENVIRONMENT

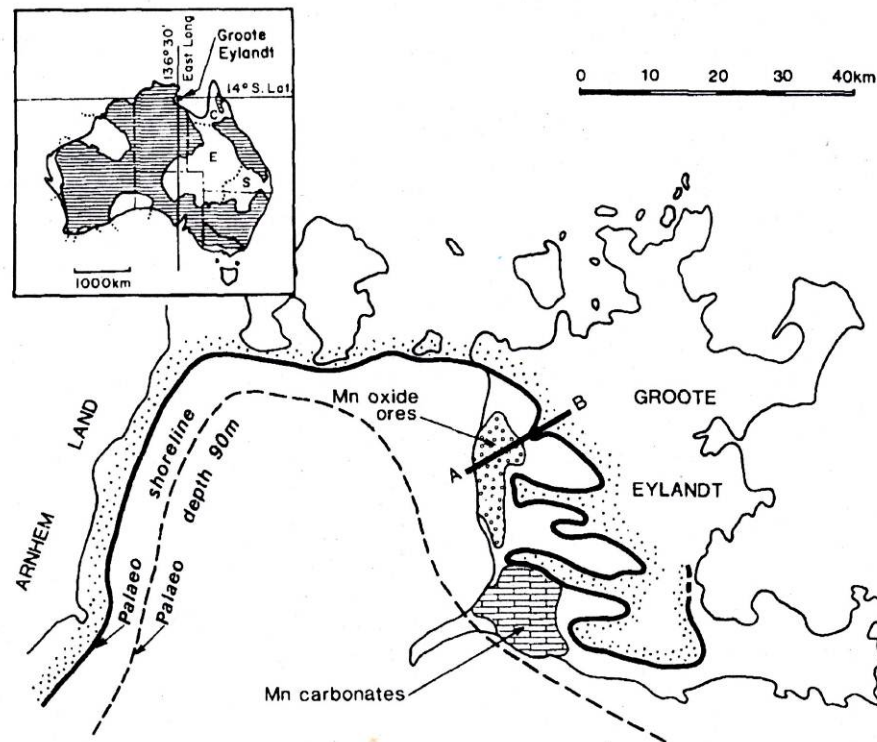
The concentration of manganese in the region may have resulted from anoxic conditions in shallow seas surrounding the island during the Cretaceous Period (Frakes and Bolton, 1984). The oxide orebody consists essentially of flat-lying strata of primary sedimentary manganese oxide pisoliths and oololiths, up to 9m thick, in claystones and sandstones. A number of textural types exist including uncemented pisoliths and oololiths, (the primary sediment), cemented pisoliths and oololiths (resulting from diagenesis) and textureless/concretionary ores (dominated by cryptomelane and essentially the results of secondary supergene processes).

Anoxic conditions in a shallow intra-cratonic basin, which is possibly closed to the main ocean, leads to concentration of Mn and Fe in saline water. Towards the deeper parts of the basin Fe is precipitated as pyrite in carbonaceous mud. Opening of the basin to the sea results in



increased oxidation particularly in more turbid conditions close to shorelines and development of manganese rich nodules.

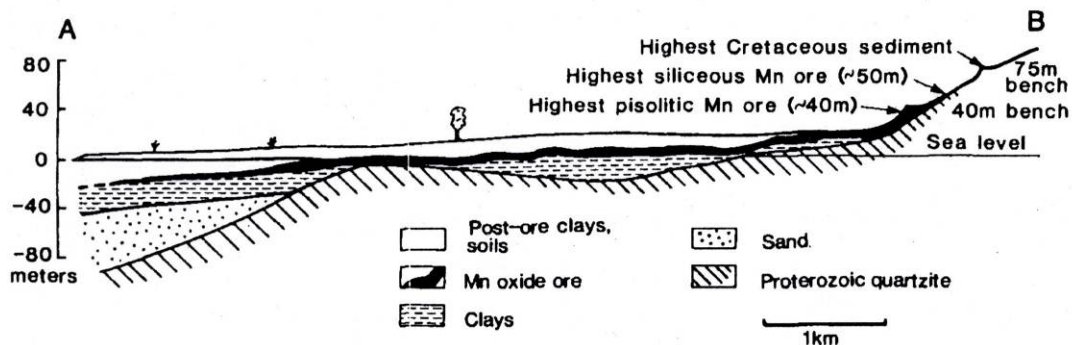
At Groote Eylandt the manganese mineralisation is on the western and southwestern shore line. An embayment of the Carpentaria Basin is envisaged which at times may have been cut off from the ocean (Figure 5). The ore lies within the youngest strata of the Carpentaria Basin. The ore-zone sits at the top of a shallow-marine, glauconitic clay succession of Albian age. The primary ore is pisolitic and oolitic but secondary enrichment and weathering has occurred in later phases.



**Figure 5:** Groote Eylandt and related intracratonic basins. Palaeogeographic map shows location of oxide and carbonate ores, palaeoshoreline at time of manganese accumulation (heavy line) and approximate location of 90m palaeoisobath (dashed line) (Frakes and Bolton, 1984).

The time of formation of the Groote Eylandt manganese orebody was probably late Albian to early Cenomanian or around the boundary between Lower and Upper Cretaceous. The NTGS consider Groote Eylandt and Rosie Creek mineralisation to be contemporaneous.

Cenomanian	99.6 to 93.6 Ma
Albian	112 to 99.6 Ma



**Figure 6:** Cross section through ore deposit at Groote Eylandt showing gentle dip of sequence and location of elevation of benches interpreted as wave cut (From Frakes and Bolton, 1984).

### 2.3 BIOLOGICAL ACTIVITY

There is some speculation that these nodules were formed by biological activity as reported by Ostwald (1990):

“The sedimentary manganese ore deposit of Groote Eylandt, Australia, is an orthoquartzite-glaucanite- clay association, and was formed during a short Cenomanian Age transgression and regression across the Middle Proterozoic sandstone basement of the island. The primary sediment consisted of pisoliths and ooliths of manganese oxide in sandy clay. Petrological studies have shown that these structures are accretions, not concretions. Microscopic studies indicate that these pisoliths and ooliths satisfy specific criteria for biogenic origin and thus they appear to be manganese oxide oncolites. This deduction is consistent with the presence of a variety of manganese-oxide biogenic structures (stromatolites ) in the orebody.”

Marine origin of the Groote Eylandt manganese deposits is confirmed by the presence of marine foraminifera in sediments beneath, within and above the ore (Smith and Gebert, 1969).

### 2.4 GEOCHEMISTRY

At Groote the ore is primarily oxides (pyrolusite and cryptomelane) and minor carbonate (manganocalcite). Maximum thickness is around 9m and it occurs as a stratiform body thinning to westward (or away from palaeoshore) with slight regional dip.

Ostwald (1975) described the mineralogy of the manganese oxides at Groote Eylandt.

“The manganese ores on Groote Eylandt occur in a flat-lying horizon in a series of Lower Cretaceous sands and clays which overly unconformably the Middle Proterozoic sandstone basement. The ore horizon exhibits a variety of textural and compositional ore types. Textural types include pisolites and concretions, either free or cemented into massive, bouldery or pebbly horizons. Compositional variations result from varying degrees of admixture of the manganese materials with the sands and clays of the formation. Six manganese minerals have been identified from Groote Eylandt, pyxolusite, cryptomelane, lithiophorite, psilomelane, nsutit and todorokite. The ore minerals are

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pyrolusite and cryptomelane, and other minerals in minor amounts. Gangue minerals include kaolinite, quartz and goethite. Mineralogical studies indicate that three microtypes of cryptomelane occur. Low levels of cobalt, nickel and zinc in certain of the ore types are associated with the mineral lithiophorite.”

Pyrolusite is a common manganese mineral on Groote Eylandt, where it occurs as:

- Zones in the finely layered pyrolusite and cryptomelane pisolites;
- Zones in the cemented pisolites of the pebbly and bouldery facies;
- Zone replacements of the pisolites, at the expense of the cryptomelane;
- A cementing medium for pisolites. Under these conditions the prisms may attain a size of some millimetres;
- Surface crusts on pisolites and to a lesser degree as surface crusts on pisolitic pebbles; or
- Soft wad - finely divided crystals of pyrolusite mixed with fractured shells of pyrolusite - replaced pisolites.

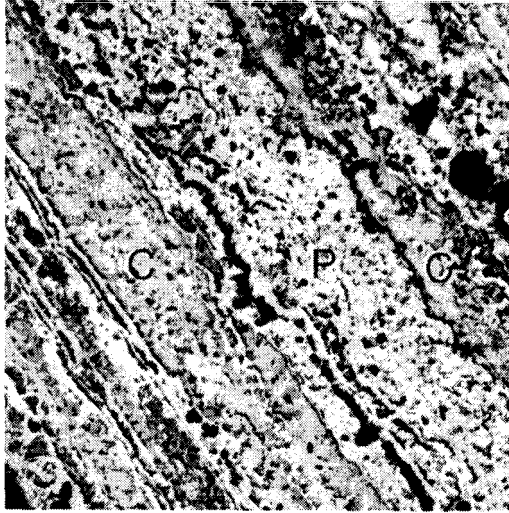
The pyrolusite at Groote is essentially MnO<sub>2</sub> with minor amounts of Fe, K, Ba, Ni Co and P as oxides (Ostwald, 1975).

Cryptomelane at Groote Eylandt is a manganese oxide with partial replacement of Mn<sup>2+</sup> by K<sup>+</sup> and minor substitution by Ba<sup>2+</sup> and Na<sup>+</sup>.

Cryptomelane occurs as;

- layers in the pyrolusite;
- zones and layers in the cemented pisolitic pebbles and cobbles;
- the primary colloidal precipitate of the concretionary ore type. In this form it is often full of ore impurities, as well as quartz grains and clay.
- reticulate veins filling syneresis cracks in the concretions. These veins are purer than host with higher Mn

Lithiophorite is also reported from Groote with Lithium content up to 0.2%



**Figure 7:** Alternating zones of granular pyrolusite (P) and cryptomelane (C) in Grooteylandt pisolites. Reflected light 89x (Ostwald, 1975).

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### 3 PREVIOUS MN EXPLORATION IN THE REGION

#### 3.1 GROOTE EYLANDT

Groote Eylandt lies on the eastern margin of the Proterozoic Gulf Basin and contains several Mn occurrences and operating mines (Figure 2).

Groote Eylandt, the site of the Broken Hill Proprietary Company Limited manganese ore quarries, is in the Gulf of Carpentaria, off the eastern coast of Arnhem Land. Brown (1908) first reported the presence of manganese mineralization. Investigation by Dunn (1962) indicated areas of high grade manganese ore near the Angurugu Mission in the central west of the island. The BHP Co. Ltd. began investigating the area in 1962, and in May 1963 a programme of pitting and drilling was commenced to test the nature and extend of the manganese formation. In 1964 the Groote Eylandt Mining Company was incorporated as a wholly owned subsidiary of the BHP and production of manganese ore commenced in 1965 (Ostwald, 1975). The manganese mineralisation extends over an area of 150 square kilometres on the western side of Groote Eylandt. The deposit occur as a single relatively flat bed of cryptomelane and pyrolusite in a sandy clay matrix deposited during a Cretaceous epeirogenic marine transgression (McIntosh *et al.*, 1975), and is the largest known manganese ore body in Australia. Stanton (1972) describes Groote Eylandt is a sedimentary manganese deposit formed by precipitation on manganese oxide and carbonates from seawater.

The manganese sediments occur in a series of basins in the west and southwest of the Proterozoic quartzite island, which, during the Cretaceous period, were occupied by an epicontinental sea depositing sandy claystones and manganese carbonates (in a deeper water environment to the south termed the Southern Basin) and pisolitic manganese oxides (in a shallow water Northern Basin). The manganese sedimentation was restricted in time, and associated with a short, Cenomanian age (95my) marine transgression and regression.

The northern basin contains un-fossiliferous quartz sandstones derived from the basement quartzites, overlain by a shallow marine glauconitic claystone, the top of which bears the primary pisolitic and oolitic manganese ores, and which are followed by the secondary ores, concretionary manganese and weathering products of variable age. The oxides of the North Basin are either exposed or at shallow depths and are extensively mined.

The southern basin sequence is dominated by sandy siltstone which is calcareous in part and contains manganese carbonate oolites at a deeper stratigraphic level and minor manganese oxide cemented sandstones near surface.

Geologically the uncemented pisoliths and oololiths form the bulk of the deposit. Manganese ores belong chiefly to the cemented and secondary types. Grades are high, with typical analyses being

- Premium lump ore - 50.7% Mn total, 3.1% Fe total, 3.9% SiO<sub>2</sub>, 4% Al<sub>2</sub>O<sub>3</sub>, 0.2% MgO, 0.2% CaO, 1.9% BaO, 1.5% K<sub>2</sub>O, 0.16% P<sub>2</sub>O<sub>5</sub> and 3.3% H<sub>2</sub>O + and
- Premium fines - 51.5% Mn total, 2.8% Fe total, 3.3% SiO<sub>2</sub>, 3.14% Al<sub>2</sub>O<sub>3</sub>, 0.2% MgO, 0.1% CaO, 2.2% BaO, 1.0% K<sub>2</sub>O, 0.2% P<sub>2</sub>O<sub>5</sub> and 3.2% H<sub>2</sub>O +.



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The Groote orebody occurs as an almost continuous layer some 22 km long, 6 km wide and up to 9 m, but averaging 3 m thick within the sandy layers of the Mullaman Formation. The manganese varies from massive oxides, through a mixture of oxides and kaolinitic clays and quartz sands to disseminated oxides in a sandy clay matrix. The major ores are found either at a shallow depth or exposed in a series of WNW trending, joint controlled, partly infilled depressions between elongate inliers of basement quartzite, or they lie directly on broad terraces cut into the basement quartzite, or to the west as an almost continuous sheet that dips gently at 3° W

Irvine and Barents (2000) studied the geophysical characteristics of the manganese ore at Groote to determine whether it would respond to AEM surveys.

Table 1 lists the drill hole conductivities for the two main ore minerals of pyrolusite and cryptomelane. No consistent differences in conductivity between the two minerals are apparent, suggesting that the degree and/or style of supergene alteration are more important than mineralogy in determining the level of EM response.

Location	Pyrolusite	Cryptomelane
F3 Quarry	860-1990	1000-2470
F4 Quarry	370-1980	960
C Quarry	500-5050	690-6830
D Quarry	860-3100	12-3060
B Deposit	530-9010	70-5550

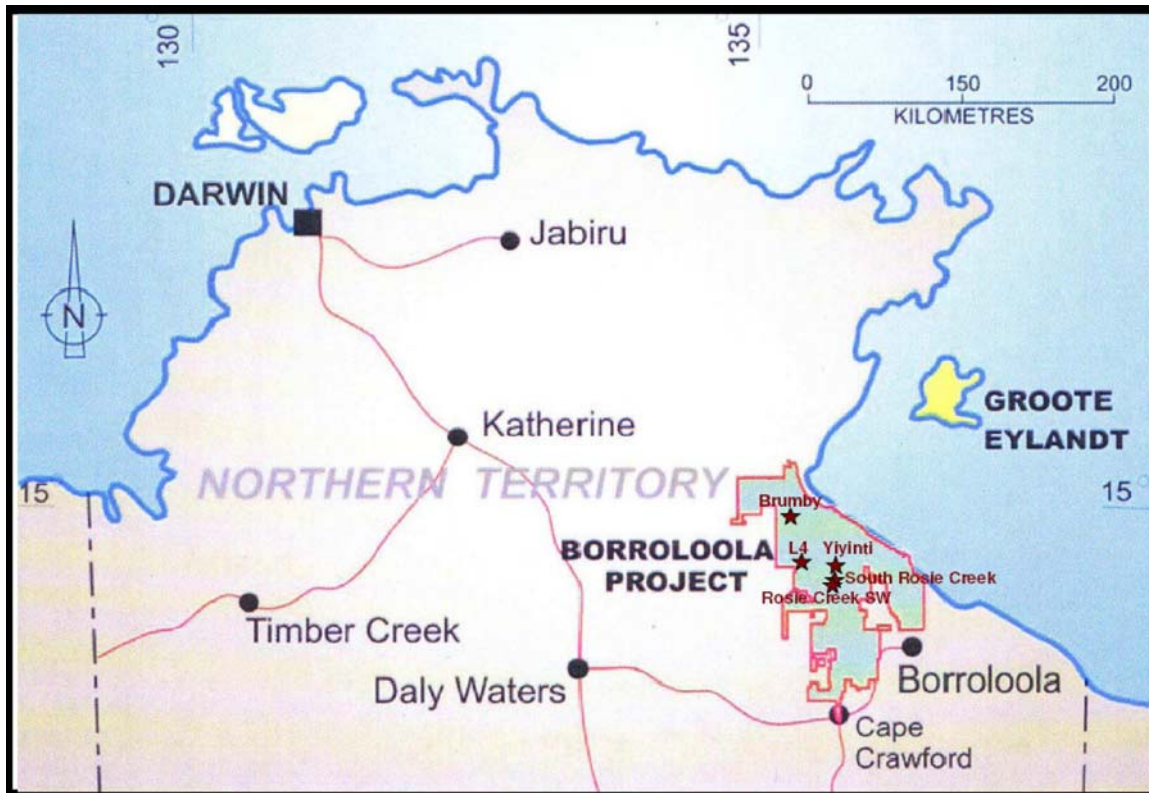
**Table 1: Conductivity (mS/m) for dominant minerals at Groote Eylandt.**

Irvine and Brents (2000) concluded that;

The airborne and drillhole EM surveys demonstrated that the manganese ores at Groote Eylandt are significantly conductive and all the known mineralised areas produced significant responses. These responses were clearly defined because of the resistive nature of the host rocks and the sandstone basement, except where sea water incursions are present.

### **3.2 ROSIE CREEK & TAWALLAH DEPOSITS (SANDFIRE RESOURCES)**

The Rosie Creek deposit sits on the western side of a ridge of outcropping McArthur Basin quartzite (Figure 8). BHP explored along the west side of basement outcrops possibly seeking a replica of Groote Eylandt geological setting with mineralisation located in a basin west of an island. Reanalysis of the data from Rosie Creek suggests the mineralisation dips toward the east from a subsurface basement ridge detected by airborne EM surveys. A small basin lies between the subsurface ridges and the present day outcropping basement ridge.



**Figure 8: Sandfire Resources licences in the Gulf Region.**

Sandfire drilled 435 RAB holes at five prospects west of Borrooloola in the 2008 field season (Rosie Creek, Rosie SW Reconnaissance Area, Tawallah 1 and 2, Yiyintyi Range and Eastern Creek).

The selection of these targets was based on:

- Testing previous work by BHP at Rosie Creek
- Testing previous work at Rosie Creek South with new interpretation of palaeogeography based on airborne electromagnetic surveys.
- Tawallah 1 and 2 were conductive bodies towards the centre of an interpreted palaeobasin
- Yiyintyi was a conductor along the edge of the Yiyintyi Range and considered analogous to Grote Eylandt.
- Eastern Creek was a test of another interpreted palaeobasin.

Nodular manganese mineralisation, interpreted to be at the base of the Cretaceous, was intersected at the Rosie Creek and Rosie SW Reconnaissance prospects where previous drilling by BHP had intersected manganese layers. In total 163 holes intersected Mn mineralisation at the base of the Cretaceous sedimentary sequence. The manganese intervals varied from 1 to 4 metres thick in loose manganiferous sandy and clayey sediments typically at shallow depths. The manganese rich horizon was intersected around 35m below surface.



**Figure 9: Nodules of Manganese oxides from Rosie Creek**

West of Rosie Creek on the Tawallah prospects Sandfire drilled flat lying conductors detected by airborne electromagnetic surveys. Coarse pyritic horizons in clay were intersected and were considered to be the cause of the conductivity anomaly. The pyrite in clay possibly represents deposition from more anoxic conditions towards the centre of the basin. No manganese was indicated at Tawallah and no analysis of samples was carried out.

The AEM surveys did not directly detect manganese mineralisation but could be used to recreate the depositional environment by detecting the anoxic basin and concealed basement ridges.

Sandfire estimated volumes of manganese mineralization of;

*Rosie Creek: **2.1 million cubic metres***

*Rosie Creek SW Reconnaissance: **1.1 million cubic metres***

Assays ranged from **37.7% to 45.6% Mn** (average **40.6% Mn**) from hand-picked nodules.

No description of minerals were provided but in hand-specimen appeared to be oxides and mostly likely pyrolusite and/or cryptomelane.

Sandfire ceased exploration and laid off staff after the Global Financial Crisis and did no more work for manganese. In September 2009 Sandfire entered into an agreement with Mineral Resources Limited (MIN) where MIN would sole fund all exploration and feasibility costs prior to a decision to mine. In returning for funding all exploration, MIN will effectively secure a 70% interest in the manganese rights at Borroloola. SFR will retain a 30% interest in the

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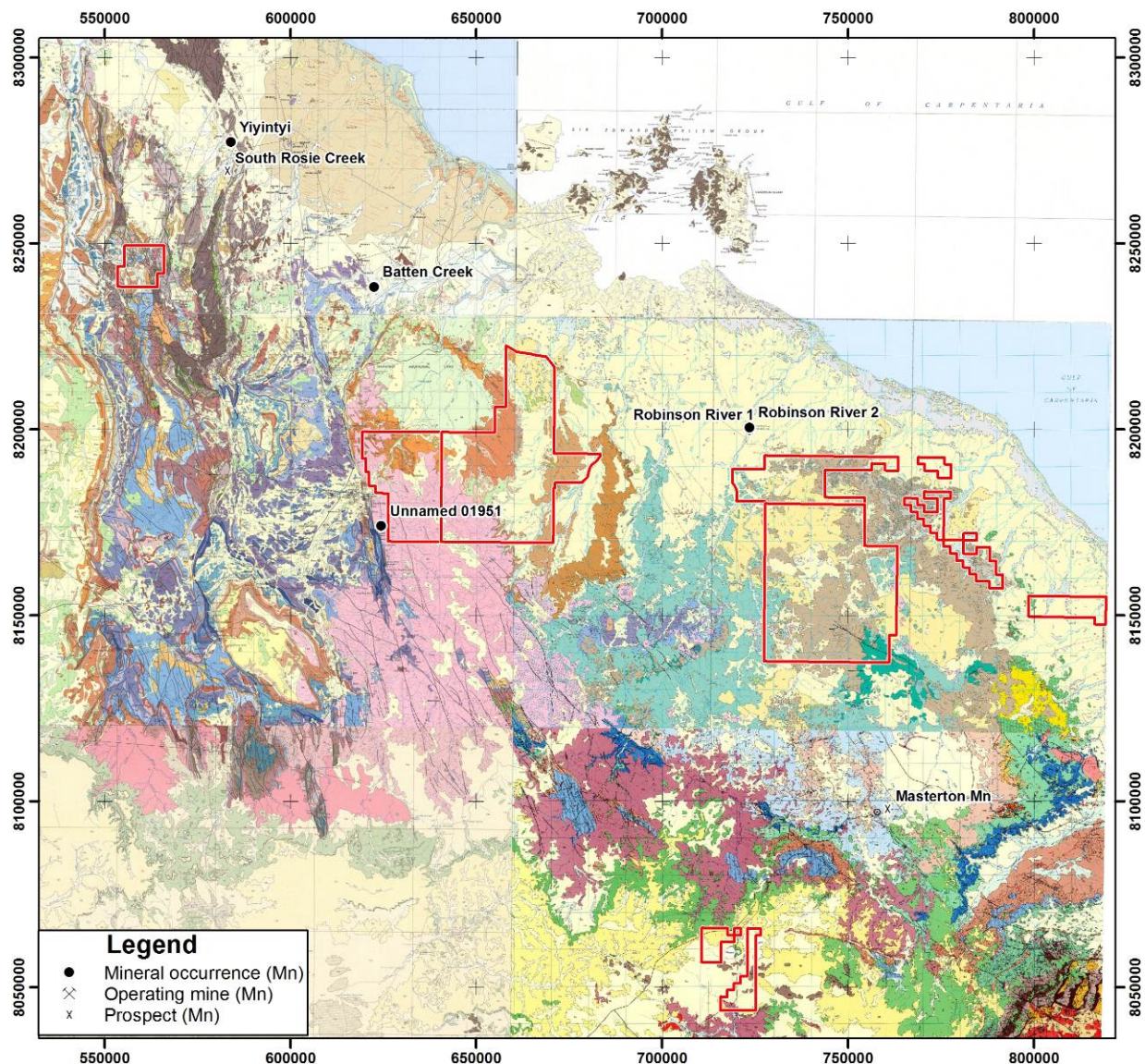
manganese rights and 100% interest in all other metals. MIN has indicated it plans to undertake further drilling to target the Rosie Creek, Brumby, L4 and Yiyintyi deposits with a view to commencing a 500ktpa mining operation within 12-18 months. MIN have not reported any activity at Borrooloola Prospects and there is no mention of any activity in Annual Report.

The deposits around Rosie Creek appears to be similar geological setting to Groote Eylandt. A shallow basin probably cut off from the sea with anoxic conditions (west at Tawallah). Epeirogenic subsidence resulted in marine transgression, increasing oxygen particularly along the palaeoshoreline where oxygenated, turbid conditions result in deposition of manganese oxides and carbonates.

### **3.3 BATTEN CREEK DEPOSIT (BRUMBY RESOURCES)**

The Batten Creek Manganese Project is located approximately 40km north of EL 27/308 (Figure 10). Historical drilling by BHP during 1995 returned a best intersection of 6 metres at 15 per cent manganese from between 30 and 36 metres. The manganese mineralisation is hosted within the younger Cretaceous sedimentary rocks overlying the older Proterozoic rocks, which host the McArthur River Pb-Zn-Ag deposits.





**Figure 10: Location of manganese mineralisation surrounding Universal Splendour's EL's.**

Brumby Resources completed a VTEM survey over the Batten Creek Manganese Project in July 2008 to better delineate the extent of the manganese mineralisation. The survey detected 11 near surface sub-horizontal target zones between surface and 80 metres depth which are targets for manganese mineralisation. The historical BHP intersection from drillhole BCP010 was located in one of the VTEM conductors. Two other BHP holes, BCP009 and BCP011 did not intersect the currently defined VTEM anomaly and did not return any manganese intersections. The controls on the mineralisation at Batten are unclear.

The VTEM survey was undertaken to better define the extent of the known manganese mineralisation and also to identify any basement conductors that may be associated with base metal mineralisation. A total of eleven near surface sub-horizontal manganese-clay target zones (BCM-01 to BCM-11) between surface and 80 metres depth were delineated by the VTEM survey.

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First pass Reverse Circulation (RC) drilling was undertaken in August 2009 on two of the eleven VTEM conductors. Fourteen vertical RC holes for 898 metres were drilled into the 'Batten Creek' prospect conductor and three vertical holes for 369 metres were drilled in to the 'Three Brumbies' prospect conductor.

A total of 12 drill holes out of 14 returned anomalous manganese intersections at the Batten Creek prospect. Drilling intersected multiple stacked sub-horizontal manganese lenses varying in thickness from 1 to 6 metres above 50 metres depth. The manganese lenses are hosted within Cretaceous manganiferous shales, siltstones and associated clays.

The anomalous manganese intersections were wet and associated with clay and are open in all directions, with only 1050 metres of the entire 4000 metre strike length of the conductor being drill tested to date.

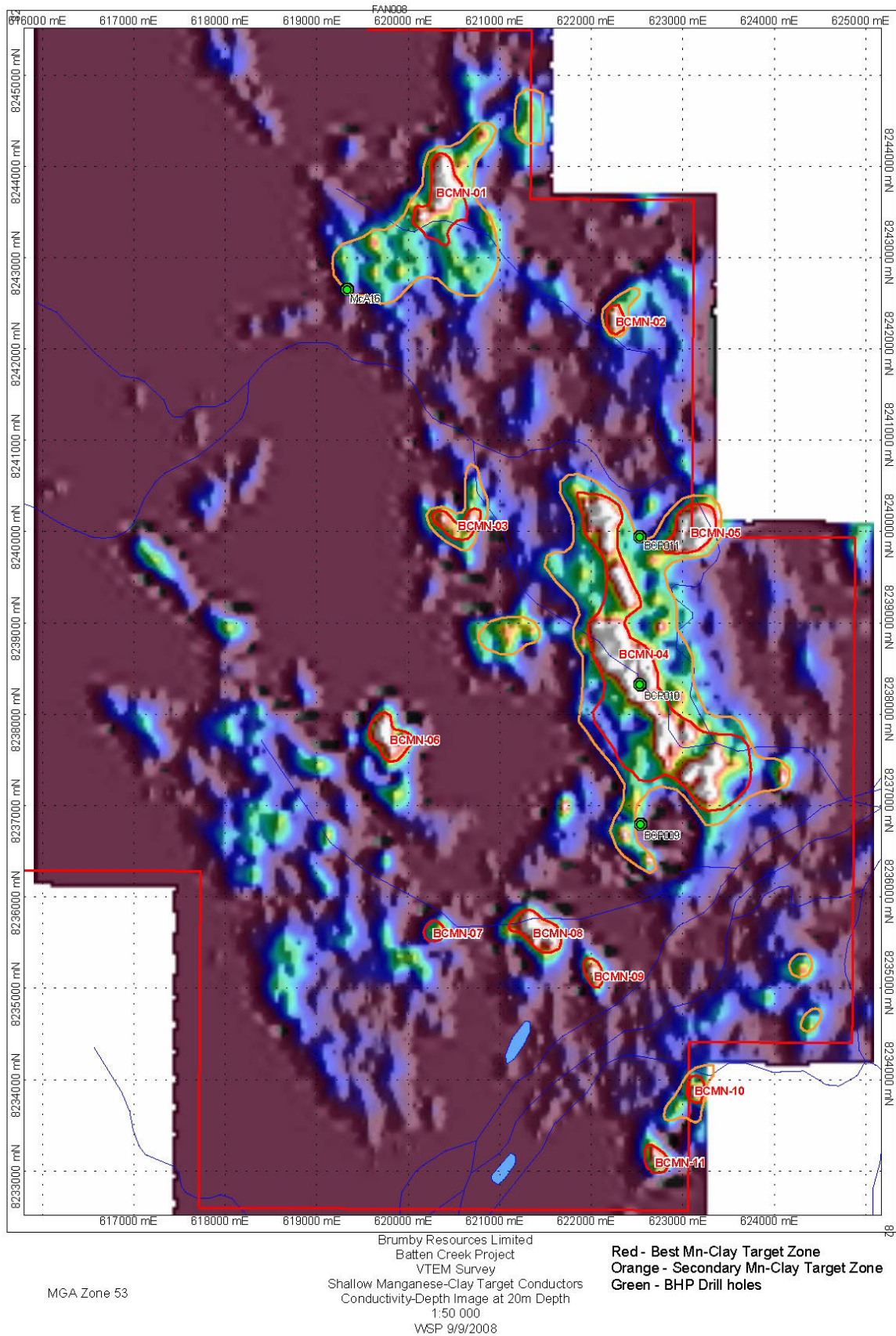
Figure 11 shows the location of all the Batten Creek prospect drill holes and selected manganese intersections in relationship to the outline of the Batten Creek prospect VTEM conductor boundaries.

The best intercepts are tabulated below.

Hole	East	North	From	To	Interval	Mn %	SiO2 %	P2O5 %	Fe2O3 %	Al2O3 %	LOI %	Comment
RC01	622595	8238358	29	34	5	4.7	67.1	0.2	9.3	8.8	4.8	Incl. 1m @ 8.4 % Mn
RC02	622531	8238326	30	35	5	4.6	70.4	0.15	6.8	8.1	4.3	
RC02	622531	8238326	41	42	1	10.9	75.4	0.15	2.8	1.7	3.3	
RC03	622400	8238350	40	42	2	3.8	69.9	0.25	9.2	7.7	3.9	
RC03	622400	8238350	46	48	2	3.3	79.8	0.1	6.4	4.7	2.71	
RC06	622500	8238850	34	37	3	3.8	69.5	0.15	7.9	8.6	3.8	
RC11	622750	8237900	48	42	4	4.5	71.7	0.14	6.9	6.8	3.4	
RC12	623500	8237450	45	46	1	5.9	70.7	0.15	9.8	4.5	3.9	
RC14	622549	8238600	31	33	2	3.5	76.2	0.1	7.6	5.6	3.8	
RC14	622549	8238600	35	39	4	4.7	70.1	0.2	6.7	8.9	4.7	Incl. 2m @ 6.7 % Mn
RC14	622549	8238600	44	46	2	4	74.9	0.1	5.1	7.3	3.7	

**Table 2: Results from Brumby resources drilling at Batten prospect in 2009.**





**Figure 11: VTEM survey over Brumby manganese prospect.**





### 3.4 OTHER DEPOSITS

Surficial manganese deposits are present in the eastern McArthur (eg Masterton No2) and northern Dunmarra (eg McLeans). These deposits are small in tonnage, but may contain patchy high-grade ore material.

Genesis Resources in ASX announcements reported

- *At MastertonNo.2, manganiferous lenses up to1,320 metres in length and averaging10 metres in width have assayed up to 53% manganese and averaged approximately 50% manganese with outcrops assaying up to 63.32% Mn, 7.37% SiO<sub>2</sub>, 1.53% Fe, 0.43% P and 0.51% Al<sub>2</sub>O<sub>3</sub>.*
- *Between 40,000 and 50,000t of high grade Mn (50%) material present over the Masterton No.2 prospect*
- *Recent reconnaissance in the central portion has delineate rock chip assay up to 41% Mn within moderate EM anomalies.*
- *Over approx 7,990m strike length by averaging 600 min width over strong EM anomalies remain untested and are of high priority. All elements required for the formation of dolomite hosted, high grade manganese deposits are present in the area*
- *Follow-up drilling of high priority zones around the high grade manganese outcrops-potential not fully explored*



**Figure 12:** Massive dolomite hoisted Mn from Masterton No2 deposit (Genesis Resources website [www.genesisresources.com.au](http://www.genesisresources.com.au))

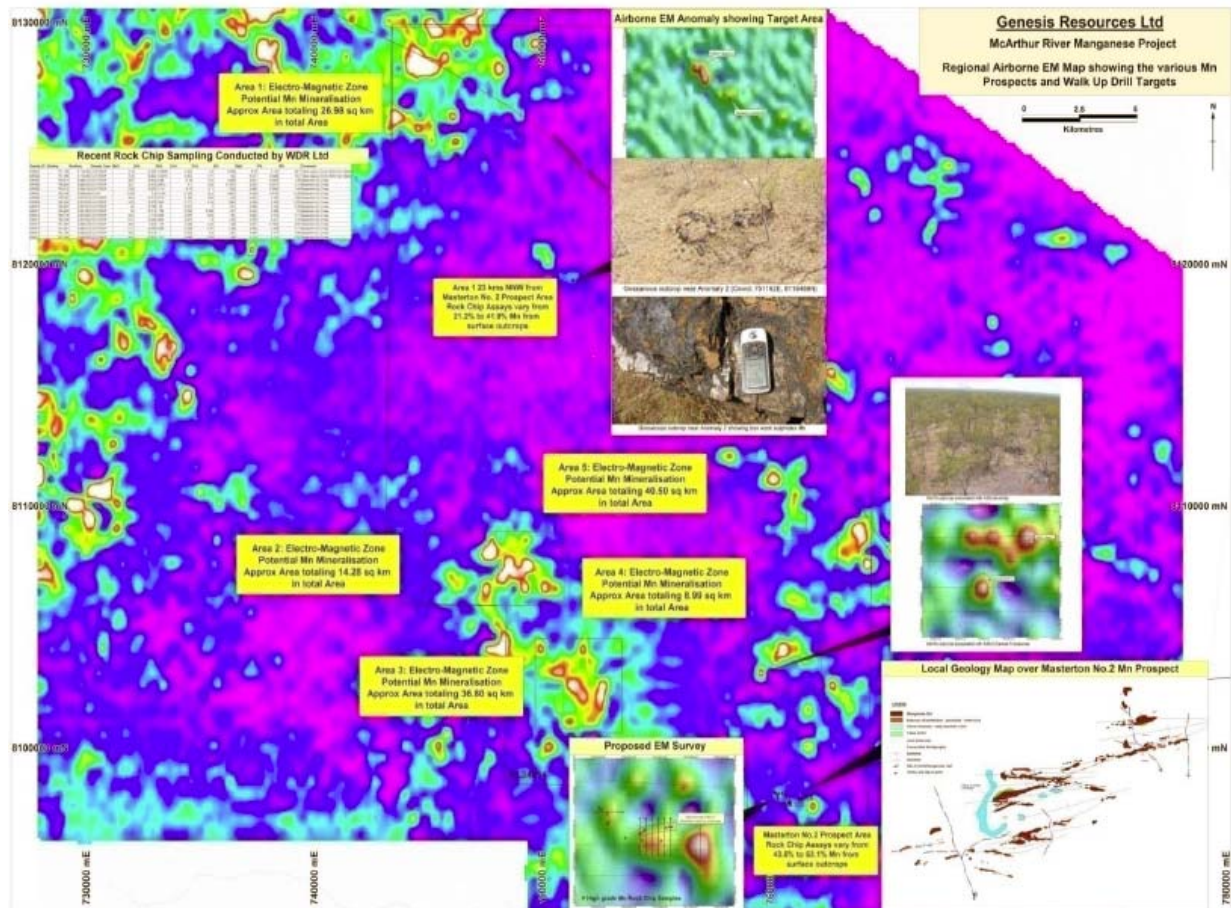
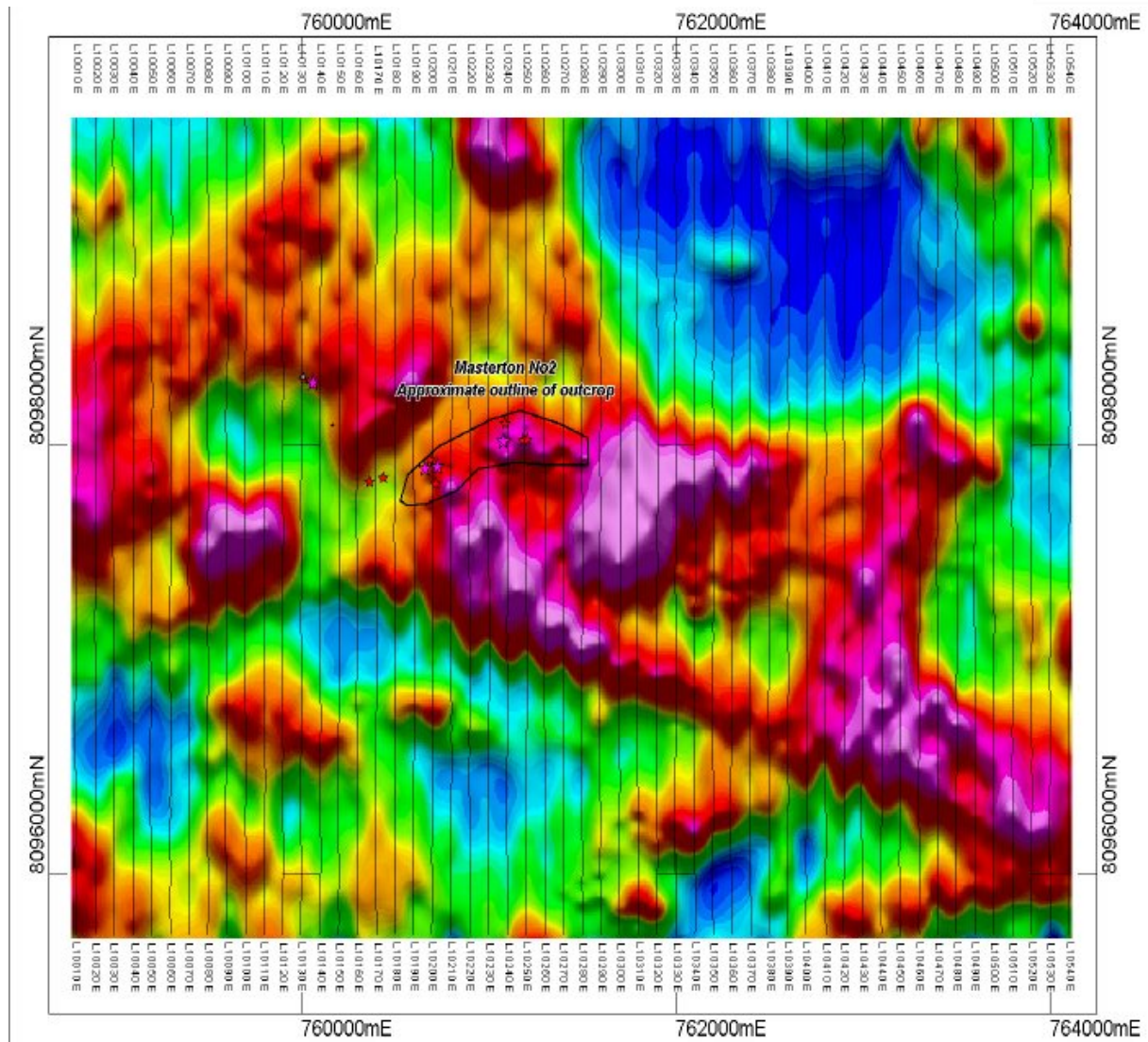


Figure 13: Regional AEM (QUESTEM) survey flown to south of Universal Splendour E27304.



**Figure 14: VTEM survey over Masterton 2 prospect. Genesis has interpreted conductors as possible Mn targets but they are more likely to be conductive clay areas.**





## **4 EXPLORATION STRATEGY FOR THE GULF PROJECT AREA (2009-2010)**

This strategy is aimed primarily at exploration for manganese deposits of similar age and deposition setting to the Groote Eylandt mineralisation. The ongoing phases are each dependant on positive results being achieved from each successive phase.

### **4.1 PRELIMINARY DATA COMPILATION AND ASSESSMENT PHASE**

A detailed compilation of available information including a preliminary desktop interpretation of available satellite multispectral and digital elevation data. This will provide a preliminary assessment of the prospectivity of the Gulf project area with respect to the known mineralisation through the region and provide an initial framework for decision making in regards to advancing the exploration program.

Detailed assessment of the local geology within the Gulf project area. This background study will continue forward from the reports produced by CSA Global and form the basis for the selection and planning of areas for an airborne geophysical survey. Based on existing understanding of the region it is expected that a field program and possible EM airborne survey will be the most effective method to delineate zones of Mn mineralisation.

An integrated interpretation of the acquired geophysical data incorporating all publicly available data (geophysical, remote sensing, historical data, etc). This interpretation phase will narrow the areas of interest to specific target areas for follow up field investigation.

### **4.2 FIELD PROGRAM**

Field visit – establish baseline conditions tenement condition and access, preliminary geological and rock-chip sampling. In addition a preliminary assessment of the nature of the ground can be made for logistical planning future field programs.

The follow up field program would incorporate field mapping, a geochemical sampling program and potentially a ground geophysics program using EM and or IP surveys. It could be expected that at this time a field operations camp would be establishment from which subsequent field operations would be based.



## 5 DATA COMPILATION

To compile all freely available geospatial data, the NT government was contacted and provided a large amount of data. In addition to the NT data, orthorectified images from Bing Maps ([www.bing.com/maps/](http://www.bing.com/maps/)) were used. Below is a summary of the acquired geospatial data.

### 5.1 MAGNETICS

Several individual and regional magnetic airborne surveys cover the EL's. These surveys consisted of the regional surveys, Batten Trough, Bauhinia and Robinson River surveys. All were in GRID format and were able to be imaged to produce the reduced to pole total magnetic intensity image sharpened with the 1<sup>st</sup> vertical derivative (Figure 15).

At this stage of exploration the magnetic data was not use but further stages of exploration may require its use. If this is the case advanced processing of the magnetic data may need to be undertaken in order to fully utilise the freely available data.

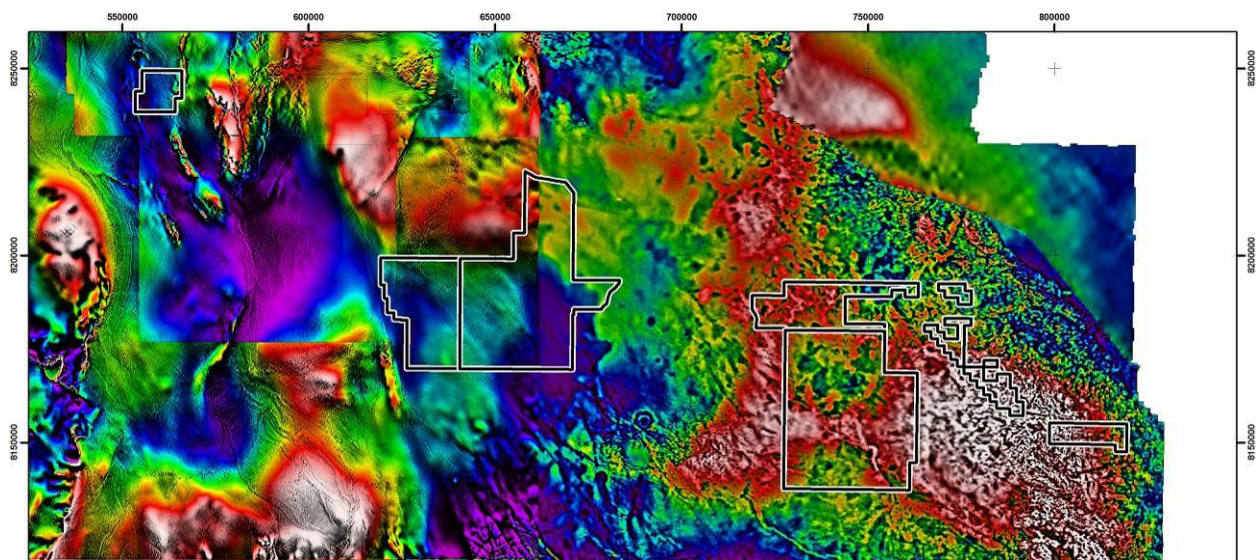
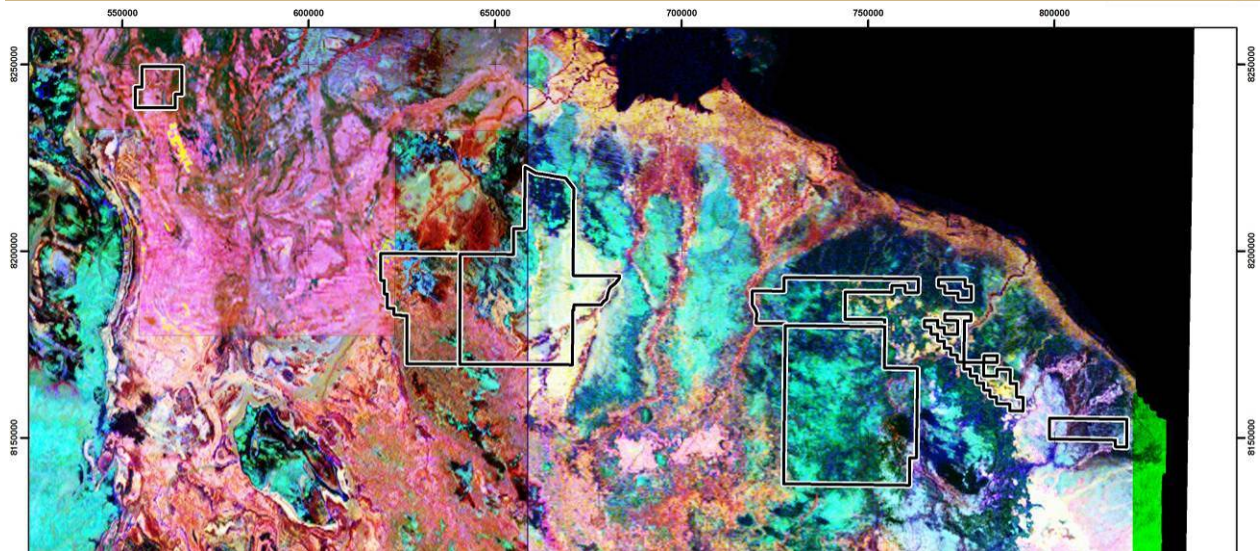


Figure 15: Magnetic image (RTP\_1VD) for various airborne surveys over the US EL's.

### 5.2 RADIOMETRICS

Radiometric data was also freely available as grids of the potassium, thorium, uranium and total count. Figure 16 is a radiometric ternary image representing potassium, thorium and uranium as red, green blue respectively. Although the resolution of the data is not as good as the landsat, ASTER or Bing Maps, it was useful for mapping the outcrop and transported material. Higher resolution radiometrics data may prove useful in later stages of exploration.



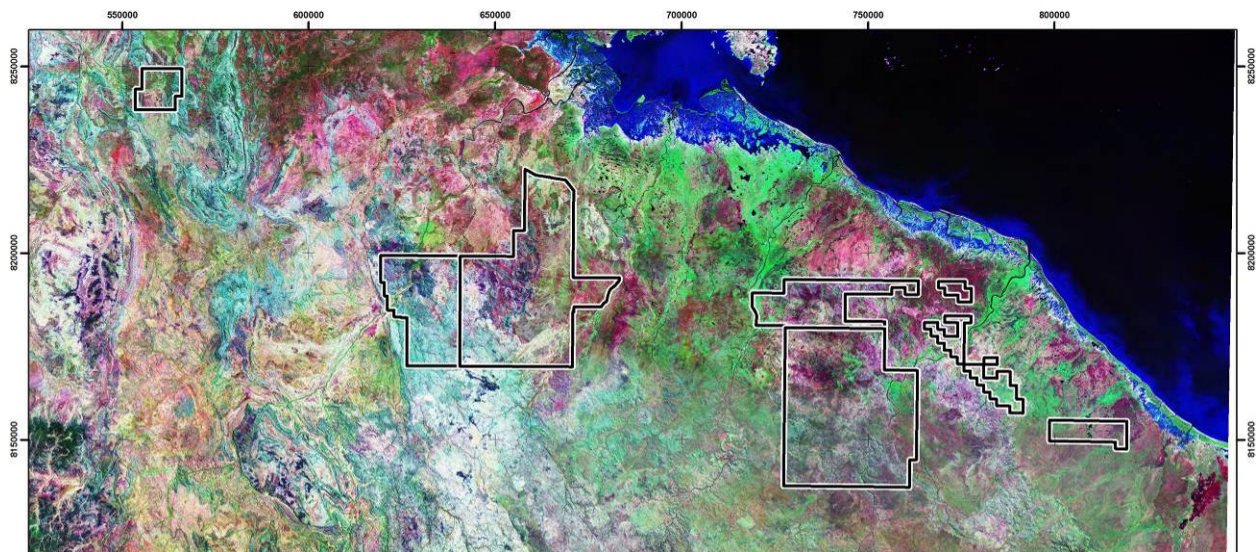


**Figure 16: Radiometric ternary image representing potassium, thorium and uranium as red, green and blue respectively.**

### 5.3 LANDSAT

The NT government provided various forms of Landsat data including; merged grids, merged images, and individual tiles. In an effort procure the best possible and freely available data, other sources of Landsat were acquired and used in the interpretation phase of exploration. The Landsat bands were imaged to produce various composite images which best enhance the geology of the area. For this interpretation two image were most useful, these were 742 (Figure 17) and 741, which are represented by red, green and blue respectively.

Because the resolution of Landsat (30m) is better than the radiometric data (variable but >30m) it was chosen as the primary dataset, except in areas where ASTER data was available as the resolution of this data set was 15m.



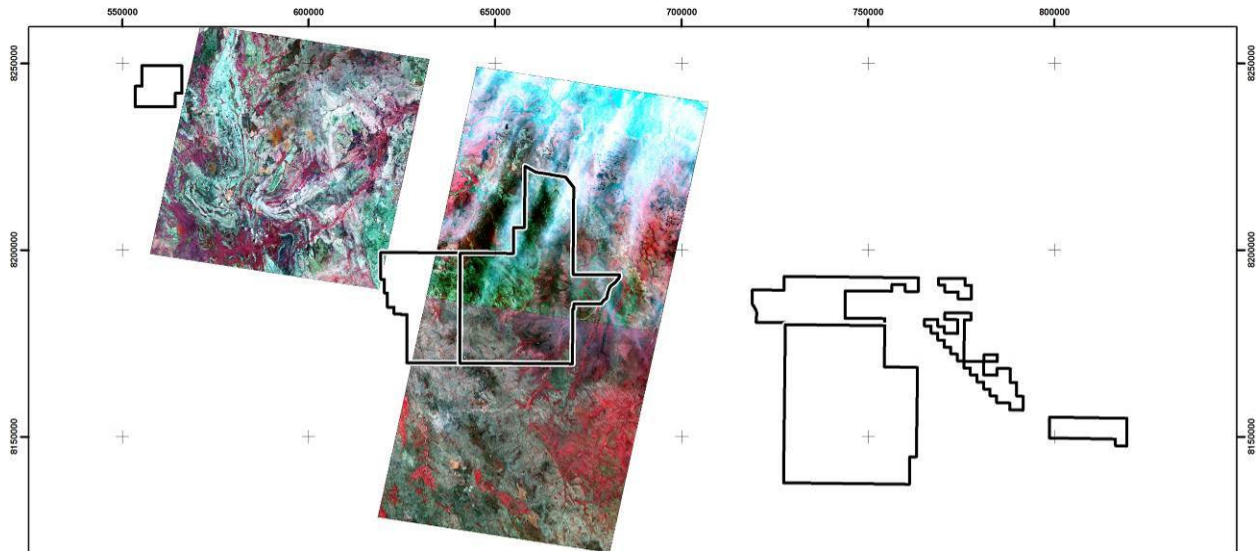
**Figure 17: Landsat image representing bands 7,4,2 as red green and blue respectively.**





## 5.4 ASTER

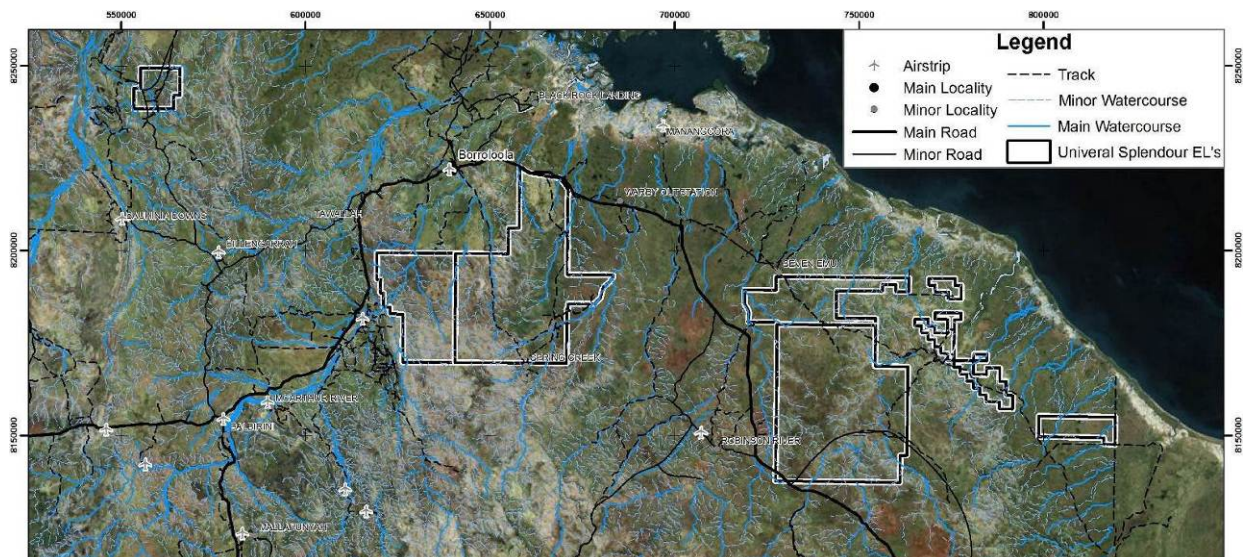
The NT government has ASTER data for a large portion of the state, although only 3 tiles were within the region of the EL's (Figure 18). The ASTER data was processed to produce a 321 image which is represented by red, green and blue respectively. During the interpretation the ASTER data was used in preference to the Landsat as it's spatial resolution was greater.



**Figure 18: Freely available ASTER data within the US EL's. Images represent bands 3,2,1 and red, green, blue respectively.**

## 5.5 GEOGRAPHIC

All geographic data was provided by the NT government. Figure 19 shows the main and minor roads, tracks, main and minor watercourses, airstrips and main and minor localities. This information will be useful for field planning. Any additional information acquired during field visits will be added to this geographic database.

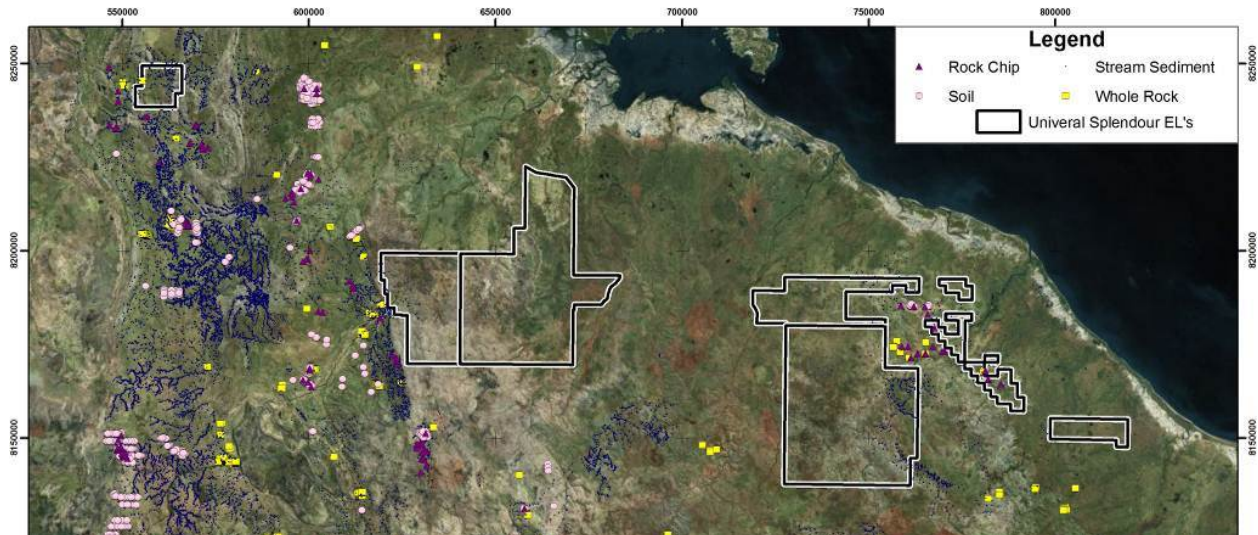


**Figure 19: Geographic data for the NE corner of NT. Base image is an orthorectified image from Bing Maps.**

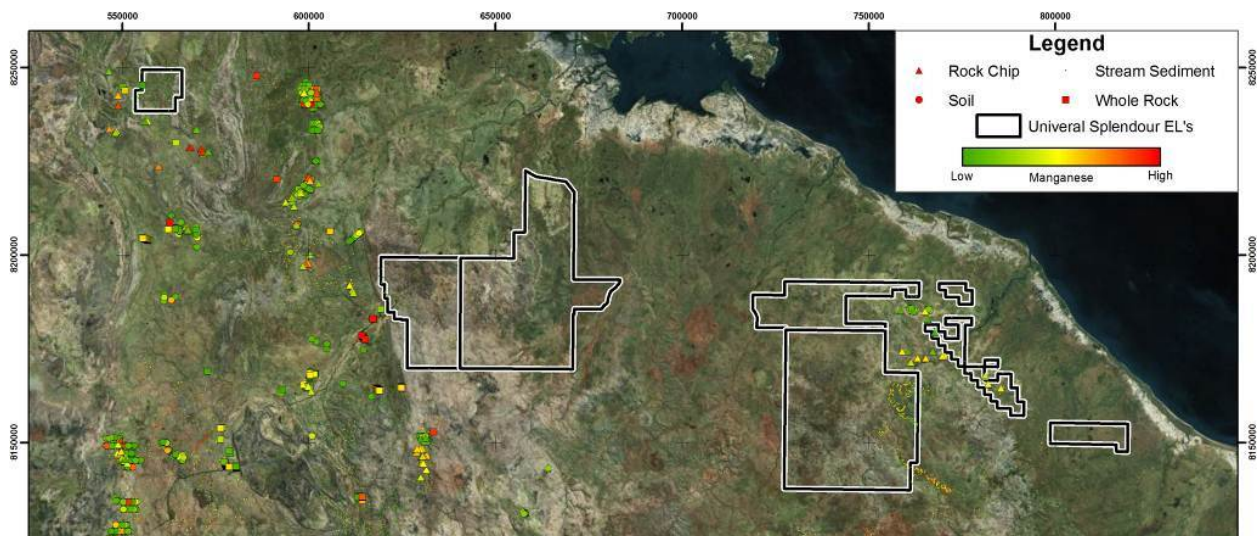


## 5.6 GEOCHEMICAL

A considerable amount of geochemical data are available for the NE corner of NT (Figure 20). Unfortunately the bulk of the samples lie outside the EL's but they provide a regional overview and may prove useful throughout exploration. All samples with recorded Mn assays were extracted from the database and coloured from green to red to represent low to high Mn values (Figure 21).



**Figure 20: Geochemical sample locations for the NE corner of NT.**



**Figure 21: Manganese geochemical assay values for the NE corner of NT.**





## 6 PRELIMINARY INTERPRETATION

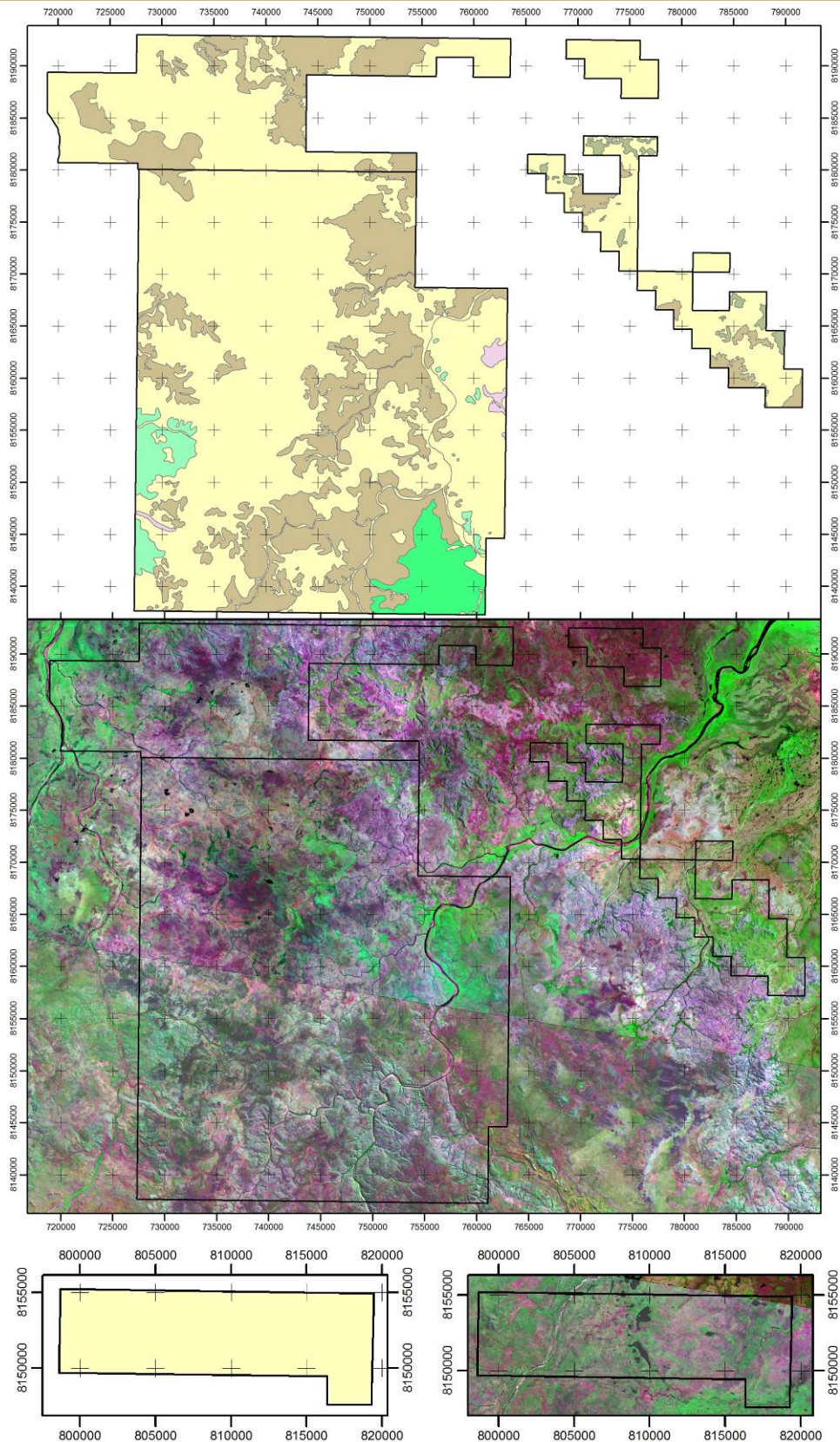
A preliminary geological interpretation was undertaken of the EL's to gain an understanding of the surficial geology. This surficial geology interpretation will significantly aid any field work on the EL's by clearly defining the areas of Cretaceous units from the Palaeozoic and Proterozoic units.

The main data sources used in the interpretation process included Landsat, ASTER, radiometrics, previous mapped geology maps and the regional elevation model. In areas where ASTER was available greater detail was able to be interpreted due to the higher spectral resolution of this dataset. Only outcrop was mapped at this stage in the interpretation and all other surficial sediments were grouped into one category (Cenozoic Material). Further refinement of the interpretation might find it useful to subdivide the Cenozoic Material (i.e. transported, in-situ, etc).

### 6.1 EL 27/304, 27/309, 27/310, 27/311 and 27/312

The geology of EL's 27/304, 309, 310, 311 and 312 is dominated by Cenozoic Material (~65%) as well as Palaeoproterozoic Tawallah Group (Figure 22). Overlying the Tawallah Group are a series of carbonates (Karns Dolomite and the Lower Karns Dolomite), which are uncomfortably overlain by Bukalara Sandstone. The Karns Dolomite are known to host several Mn occurrences one of which is the Masterton occurrence to the south of EL 27/304. These outcrops are potentially prospective.

Although no outcropping Cretaceous has been interpreted, a thorough field visit may provide an idea as to the thickness of the Cenozoic Material and therefore aid in determining if any of the EL's should be further explored for Mn.



**Figure 22: Top: Remote sensing interpretation of EL 27/304, 27/309, 27/310 and 27/312. Legend is shown in Figure 23. Middle and bottom right: Landsat image represented by bands 7:4:1 as red:green:blue respectively. Bottom left: Remote sensing interpretation of EL 27/311.**



Cenozoic  
Cambrian  
Neoproterozoic  
Mesoproterozoic

## LEGEND

### Cenozoic Material

**Cz** Undifferentiated alluvial, colluvial and eluvial deposits, including soil, sand, ferricrete and silcrete

### Bukalara Sandstone

**Pb** Sandstone: Fine to very coarse-grained friable ; thin to very thick-bedded, low-angle cross-stratified; trace fossils

### Karns Dolomite

**Pk** Stromatolitic, evaporitic, intraclastic and ooidal dolostone: minor siltstone and sandstone

### Lower Karns Dolomite

**Plk** White fine- to medium-grained quartzose to lithic sandstone: local basal conglomerate or breccia: local phosphatic horizon: --- -Ptc: Pink, medium-grained, locally pebbly, lithic to quartzose sandstone and minor conglomerate

### Tawallah Group

#### Echo Sandstone

**Pte** Pink, medium-grained, locally pebbly, lithic to quartzose sandstone and minor conglomerate with large trough and planar cross-beds

#### Lower Pungalina Member

**Ptelp** Pink medium-grained lithic sandstone with large planar cross-beds

Figure 23: Legend for Figure 22



## **7 OVERVIEW OF FIELD VISIT**

Phase 2 for the Gulf project area consisted of a 10 day field visit to tenements EL27483, 27308, 27305, 27309, 27304, 27310, 27311, 27312, 27425 and 27426. The focus of the field visit was to evaluate the following: access to tenements, undertake first-pass geological investigation, collect rock-chip samples, consult with local personnel and discuss USI's manganese project with the NTGS.

### **7.1 ACCESS**

Vehicle success was possible for most of the tenements within the amount of time available for this field visit. Only tenements EL27/310-312 and 27/426 were not visited in this field visit. These tenements were considered of low prospectivity and with respect to Mn mineralization and as such were low priority on this field visit.

Several airstrips are located within the project area and it may be necessary to utilise these facilities in future field programs. One additional airstrip was identified which was not included in the NTGS database. This airstrip is located within EL27/304 at the Pungalina Homestead and at time of visit was well marked and in good condition.

Details regarding the route taken in the field visit, access and airstrips has been included in APPENDIX C - TENEMENT ACCESS.

### **7.2 GEOLOGICAL INVESTIGATION AND ASSAY RESULTS**

A day by day account of the field observations can be found in APPENDIX D - FIELD VISIT. Several Cretaceous and Proterozoic outcrops were visited within and outside the tenements.

In areas where the full Cretaceous sequence was observed no Mn mineralisation was recorded. In general, the Cretaceous consisted of a resistive cap of bioturbated and fossiliferous white to grey sandstone with an underlying unit of cross-bedded sandstone. These outcrops were initially considered prospective but have since been removed as a priority for any future work. In areas where only the top of the Cretaceous was mapped, or outcrop was missed due to difficult access, these areas are still considered prospective and are recommended for investigation in the future.

The majority of the Proterozoic was not considered prospective with respect to Mn mineralization except within the Karns Dolomite. This unit was observed in EL27/309 and 27/304. Although this unit was initially considered of low to moderate priority and prospectivity assay results from rock samples were encouraging. Further investigation within these tenements is recommended.

A full record of the assay results along with details for each sample site can be found in APPENDIX E - ASSAY RESULTS.

### **7.3 LOCAL PERSONNEL AND NTGS**

Every effort was made to engage the local owners or operators of the facilities visited throughout the field visit.

The operators of the Lorella Springs and Pungalina Homesteads were very helpful and accommodating. These two homesteads may prove to be very useful for any future field program. Both facilities consisted of showers, toilets, camping areas, cooking areas and electricity.

Attempts were made to contact traditional owners without much success. A Native Title meeting will be needed to be scheduled well in advance before the 2011 program. A short meeting was conducted with Daniel Mullholland the Northern Land Council representative in Borroloola (08 89758848) who gave directions to one of the owners of Spring Creek Station.



Jimmy Mawson a representative of Mawson family who owns Spring Creek was consulted for information and permission to enter Spring Creek.

Owners of Wollogorang and Calvert Hills were also contacted and an attempt made to contact Frank Shadforth of Seven Emus.

On our departure and arrival back into Darwin, various personnel of the NT Mines Department and Geological Survey were contacted. Our initial field plan was discussed with Steve Tatzenko before departing for Katherine. We were provided with hardcopy maps of several of the areas to be visited. Upon returning to Darwin, both Steve Tatzenko and John Dunster were consulted with respect to our field observations. John Dunster was able to provide a detailed unpublished report regarding the Carpentaria Basin which will be utilised to refine the current model for Mn mineralisation in the Gulf project area. Several of the samples submitted for assay were examined. Although the majority of our samples were suspected to be unprospective with respect to Mn, one sample was considered encouraging. This sample (US 015) proved to contain elevated Mn.





## 8 SUMMARY AND RECOMMENDATIONS

The results from this 10 day field program were unexpected and encouraging and the details of this visit have been included in APPENDIX D - FIELD VISIT and APPENDIX E - ASSAY RESULTS.

Areas which previously appeared prospective proved to be disappointing whereas weakly prospective areas showed encouraging signs on Mn mineralisation. Below is a list of the main outcomes (*italicised*) and recommendations (**bolded**) for the tenement:

### 8.1 EL27/304

- *This tenement was considered to be of moderate priority and moderate to low prospectivity.*
- *Several rock-chip samples were collected and provided encouraging results as high as 9.9572 %Mn and 5.1965 %Fe.*
- *Very little time was spent investigating this tenement*
- **It is recommended that the entire tenement be followed-up by geological mapping and rock-chip sampling in order to define the extent and grade variability of the manganiferous unit.**



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## **APPENDIX A – GULF GROUP PROJECT REVIEW**

**Review of Previous Exploration and Work Proposal  
Universal Splendour Investments  
Gulf Group Project  
Northern Territory, Australia**

**By**

**Karl Lindsay-Park**

**10/3/10**





## Introduction

Universal Splendour Investments (USI) Gulf Group project lies along the western side of the Gulf of Carpentaria in the Northern Territory. The majority of the licences were applied for by USI on the 20<sup>th</sup> April 2009 and granted on the 13<sup>th</sup> October 2009. **Figure 1**, shows the location of the licences and their identity number.

Licence Number	Application Date	Grant Date	Size blocks/sqkm	Land Status PPL / NT Por	Owner	Covenant
27304	20/4/09	13/10/09	426 / 1402	Mr F Shadforth, PO Box 412, Borroloola 0854. Aust Wildlife Conserv, 14 Emerald Tce WA 6005. Aust+O'seas Tele Corp, GPO Box 1966 Adel SA	USI	69000
27305	20/4/09	13/10/09	394 / 1274	Mawson Family, PO Box 486, Borroloola 0857. Anderson Family, PO Box 471 Borroloola 0854 Aust+O'seas Tele Corp, GPO Box 1966 Adel SA	USI	64000
27308	20/4/09	13/10/09	160/521.8	Mawson Family, PO Box 486, Borroloola 0857. MIM Ltd, GPO Box 1433, Brisband 4001	USI	31500
27309	20/4/09	13/10/09	116/367.2	Mr F Shadforth, PO Box 412, Borroloola 0854. Aust Wildlife Conserv, 14 Emerald Tce WA 6005.	USI	22500
27310	20/4/09	13/10/09	49/161.2	Mr F Shadforth, PO Box 412, Borroloola 0854. Aust Wildlife Conserv, 14 Emerald Tce WA 6005. Panoy P/L MS 347 Farjoy, Harvey Bay Rd 4655	USI	12500
27311	20/4/09	13/10/09	38/120.7	Panoy P/L MS 347 Farjoy, Harvey Bay Rd 4655	USI	10700
27312	20/4/09	13/10/09	10/32.95	Mr F Shadforth, PO Box 412, Borroloola 0854.	USI	6500
27376	29/5/09			Arnhem Land Aboriginal trust C/- NLC GPO Box 1222 Darwin NT 0801	USI	13500
27377	29/5/09			Arnhem Land Aboriginal trust C/- NLC GPO Box 1222 Darwin NT 0801	USI	22000
27438	21/7/09				USI	11000

An Aboriginal Areas Protection Authority clearance has been undertaken for the granted licence areas. Several sites have been registered with the Authority. Most of the sites identified appear to be associated with waterholes and do not present a problem. The recorded sites will be plotted on maps so the field party will know their location and be able to avoid them.



## Location, Landform and Climate

The exploration Licences can be divided in to two groups referred to as the eastern and western.

The western group consists of ELs 27305, 27308 and the yet to be granted EL 27483. Access to the area is via the Carpentaria Highway that runs to the east from the Stuart Highway. From Darwin it is necessary to travel 560km south along the Stuart Highway and then east along the Carpentaria highway for 360km to reach the Western edge of the licences.

Examination of the Google image, [figure 2](#), shows the area of the western group is dominated by abundant very rugged hills and escarpments. The creeks are deeply incised and rocky outcrops are common. In the mountainous areas vegetation is very sparse and limited to grassland. Vehicle access into these areas is impossible without substantial earthworks. The eastern half of EL 27305 is by contrast very flat and swampy. Several shallow lakes appear in the area on the Google imagery. A track runs from north to south in the flat area and provides good access. Thick vegetation on the flat ground will limit the amount of off-road vehicle travel available.

The eastern group consists of ELs 27304, 27309, 27310, 27311 and 27312. The licences lie much closer to the Gulf of Carpentaria and will require considerable travel to reach. The most direct method to reach the licence area is to proceed as for the western group but continue on past Borroloola along the Wollongorang road for other 160km. [Figure 3](#) shows the Google imagery for the licence area with some of the tracks highlighted. The condition of the tracks is not known but at least they indicate that vehicle access to most of the licences is possible. Access to the area is also possible via the Dunmarra Group licences and it is proposed to use this method for the first field trip.

The licence area, located approximately 50km from the Gulf coast is subject to heavy seasonal rain. During the monsoon months between October and April vehicle access in the area is extremely limited. During the dry period the ground dries out completely and large desiccation cracks develop in the black soil areas. Cross country travel at this time is easy but very rough.

Figures 2 and 3 shows a few tracks and fence lines in the area but it appears they have not been used regularly nor well maintained. Travel within the licence area maybe problematic.

## Accommodation

For the western group of licences accommodation and meals are available from the Cape Crawford (heartbreak) roadhouse which is about 60km to the west of the licences. Accommodation is also available at Borroloola which is located to the north of the western licences. Accommodation options for the eastern group of licences appear to be very limited. For the initial trip camping by the road side may be the only option. Fuel and potable water supply will be an issue. If a project is developed in the area the accommodation and logistics will need to be revisited.

## Geology

At least 50% of the area of EL 27305 is outcrop. The most widely distributed units are sandstones belonging to the Mesoproterozoic Roper Group and the Cambrian Bukalarra Sandstone. Unconformably overlying the Roper Group and the Bukalarra sandstone in the east of the licence are further Sandstones of Cretaceous age. Cainozoic sand, soil, laterite and ferricrete overlies the Cretaceous in the eastern area.

Exploration licence 27308 is essentially all out crop. In the north of the area lies the Abner Sandstone which belongs in the Mesoproterozoic Roper Group. The southern two thirds of the licence consist of the Bukalarra Sandstone. There is very limited Cainozoic cover in the north of the licence.

The geology of EL 27438 is very complex. Fault bounded blocks belonging to four different Groups are present. The oldest material present belongs to the lower half of the



Palaeoproterozoic Tawallah Group which is unconformably overlain by the lower members of the Palaeoproterozoic McArthur Group. Fault bounded blocks belonging to the Nathan group and the Mesoproterozoic Roper Group are also present. There is only a small amount of Cainozoic cover in the licence area.

The geology of the eastern 5 licences is distinctly different from the western group mentioned above.

EL 27304 is the largest licence in the eastern group and consists of a central ridge of Palaeoproterozoic, Echo Sandstone. On both the eastern and western flanks of the ridge lies the Mesoproterozoic Karns Dolomite which is unconformably overlain by Cainozoic sand, soil, ferricrete and silcrete. The Karns Dolomite is known to host several Manganese occurrences. The largest of which is close to USI's Dunmarra Group tenements.

Essentially the same geology is located in EL 27309 which adjoins EL27304 to the north.

The geology of EL 27310 is dominated by outcrops of the Palaeoproterozoic, Echo Sandstone. Several Members of the Sandstone are recognised. The members vary in composition from fine-grained siltstone and dolomite through to coarse boulder conglomerates. The high-energy deposition environment is the more typical for the unit. There is a minor amount of Cainozoic cover present in the central and southern part of the licence.

Based on the geological mapping compiled by the NTGS the only outcrop in EL 27311 belongs to the Gold Creek Volcanics. These are described as Palaeoproterozoic, vesicular to massive basalt, dolomitic sandstone, mudstone and peperite. The Gold Creek Volcanics have been extensively explored for copper-cobalt mineralisation hosted in breccia pipes. The Redbank mine is the typical example in the area. The outcropping Gold Creek Volcanics is restricted to the west of the licence area. Most of the area is masked by Cainozoic cover.

The entire area of EL 27312 is comprised of Cainozoic cover.

The Groote Eylandt-style of manganese mineralisation has the ore lying directly on the Palaeoproterozoic sandstone unit of the Alyangula Sub-group. The mineralisation is considered to be Cretaceous in age and covered by Cainozoic sediments. A similar situation occurs within some parts of the eastern group licences and the eastern half of EL 27305 in the western group. Detailed study of the manganese deposits in the Gulf region has shown that the underlying rocks have no influence on the formation of mineralisation. It is the topographic and marine situation that plays a role in ore formation.

Whilst manganese is the primary commodity sought and is the reason the licences were applied for there is the potential to locate copper-cobalt and potassium mineralisation.

### **Geophysics**

Examination of the NTGS regional geophysical data sets for the western group licences has failed to identify any areas of anomalism. The radiometric data,  $U^2/Th$ , U, Th and K shows responses due to the distribution of outcrop or drainage. There is no record of any electrical surveys being flown over any of USI's western group tenements. In a similar fashion the regional magnetic data responds to the rock types but no anomalous areas are present.

The Google imagery available for the western group of tenements has been thoroughly interrogated and four areas of interest have been defined. One area is located in the northwest corner of EL 27308. The area appears as a dark red-black area near the outwash of a small creek. The site is very small but is close to the main road so a quick inspection is warranted.

The three other areas of interest lie in EL 27305, one in the north and two in the south. It is difficult to say what the features are. They appear as black zones in a generally pale background but there is no obvious suggestion they are related to geology. A field visit is required to resolve the situation.

The regional NTGS geophysical data for the eastern group of licences is similar in its value to the western licences. The radiometric data contains a few highs and lows but these reflect the



underlying geology or drainage and are not considered as anomalous. The airborne magnetic data shows some variation in response to geology, structure and the thickness of the Cainozoic cover. No discrete magnetic anomalies are present. The magnetic data can be revisited if prospect scale areas are defined.

There are no records of any airborne electrical surveys being flown in the area.

Detailed examination of the Google satellite imagery has not located many areas of interest which is not unexpected given that most of the area is either outcropping sandstone or obscured by Cainozoic cover. In all 6 areas that appear distinctly different from their surrounds have been identified. One lies in the west of EL 273112, it appears to be a small iron and manganese? Rich outcrop on the side of a small hill. Five other areas of interest have been defined all of which are in or near to EL 27310. Four of the areas appear as black or black and white patches which may be related to geology. The fifth area lies in the southern part of EL 27310 and is a distinctly round feature. There are many possible explanations for the feature ranging from a meteor crater to an intrusive dyke or a simple topographic effect. A field inspection may shed some light on the cause of the feature.

### Previous Exploration

The western group of three tenements lie close to the Emu Fault and Battern Trough which is the host setting for the McArthur River base metal deposit. As such the tenements have been explored, by way of stream sediment and rock chip sampling for base metals. Copper mineralisation has been located by prospectors in EL 27483. Carpentaria Exploration drilled the area with poor results. Some exploration for diamonds has also been completed.

The eastern group of tenements have been subject to exploration for a wider range of commodities. Principle amongst these is, manganese, copper, base metals, uranium and diamonds. Fortunately for USI most of the work has been poorly performed of very limited scope.

BHP has conducted manganese exploration in the area immediately to the north of EL 27309. Their work consisted of several fences of drill holes running from the outcropping Proterozoic sandstone out into the areas covered by Cainozoic aged sediments. They only obtained modest results, several holes with 1 to 2 % manganese, but it is enough to show the manganese forming processes have been active in the region. They have done no work in ELs 27309 or 27304 both of which contain the same geological setting. Several prospectors have searched for manganese mineralisation in the Karns Dolomite. Numerous deposits have been located but all are too small for USI's interest.

Dampier Mining Company undertook similar drilling on long lines across the area of EL 27312, their work was sufficiently detailed that little prospectivity for manganese remains.

Exploration for uranium has been undertaken by several companies. The most impressive results came from some phosphatic horizons located within the sandstone intervals. None of the material came close to being economically significant.

The Redbank copper mine is located approximately 50 km to the south of USI's eastern tenement group. The Redbank deposit formed in a breccia pipe and is hosted by the Gold Creek Volcanics. These rock units extend to the north and can be found in ELs 27310 and 27311. CRA Exploration drilled four RC and three diamond holes in the vicinity of ELs 27310 and 27311, **Figure ?**. The holes were drilled to measure the thickness of the sediments overlying the Gold Creek Volcanics. Their work failed to produce the results CRA were expecting and they abandoned the project. Fortunately, they did assay their RC holes and one of the diamond holes for a wide range of elements.

Inspection of the assay results from CRA Exploration's hole DD95GC007, located within EL 27310 shows very high levels of potassium almost from surface. Several intervals contain over



5% potassium with the best individual sample returning over 7%. This is potentially ore-grade (potash) material however; a lot of work needs to be done to verify this. Interrogation of the NTGS database shows the core from DD95GC007 is stored in the Darwin core library and is available for inspection and sampling. All of the CRAE data needs to be captured and incorporated into the GIS system.

## Conclusions

The compilation of the existing geophysical, geological and previous exploration data has demonstrated that despite the number of licences held the amount of land with the potential to host manganese is limited. The attractive areas are the eastern half of EL 27305 in the western group of licences parts of EL's 27309, 27304 and 27311 in the eastern group. The work done by BHP has shown that the manganese precipitation process has been active and it is now a question of finding the correct deposition site. The embayments in the Echo Sandstone located to in the north and east of EL 27304 are considered to be ideal locations.

The exploration work completed for base metals in the western group of licences and uranium in the eastern group appears to have been fairly comprehensive and it is unlikely that additional work for those commodities would meet with success.

The exploration work completed mainly by CRA Exploration and some others for Redbank style copper deposits has partially tested the potential of the eastern group licences. Their work has highlighted the areas very high potassium content. It will be necessary to confirm CRA Exploration data prior to assessing the potential of their results.

## Proposed Exploration

As for the Dunmarra Group the exploration of the Gulf Group can proceed along two lines. The licences were acquired because of their potential to host manganese mineralisation and this is still the primary focus of USI. The work done to date has identified the areas that have potential for manganese and the next step in the exploration process is either flying airborne geophysics (Electromagnetics) or drilling.

The discovery of the very high potassium values in the CRA Exploration core is not a key of USI's exploration strategy but may be highly significant. The first step in the assessment of the new information is to accurately capture the drill hole locations, geological logs and the assay data. The core for at least one hole, DD95GC007, is stored in the NTGS's Darwin core library and can be inspected and sampled. The second phase of the data assessment is to collect samples and have them re-assayed to confirm the previous results. If the results are the same a detailed exploration program for potassium will have to be designed and implemented. The key facet of which will be to collect samples (drill) to see if the potassium can be separated from the host rock cost effectively.

The decision to use EM or drilling as the next phase of the exploration for manganese may depend on the results of re-sampling the CRA Exploration core.

As part of the overall assessment of the area a field trip is proposed to visit the sights identified in the examination of the Google satellite imagery and to assess the level of support available to field workers in the area.

## Timing and Budget

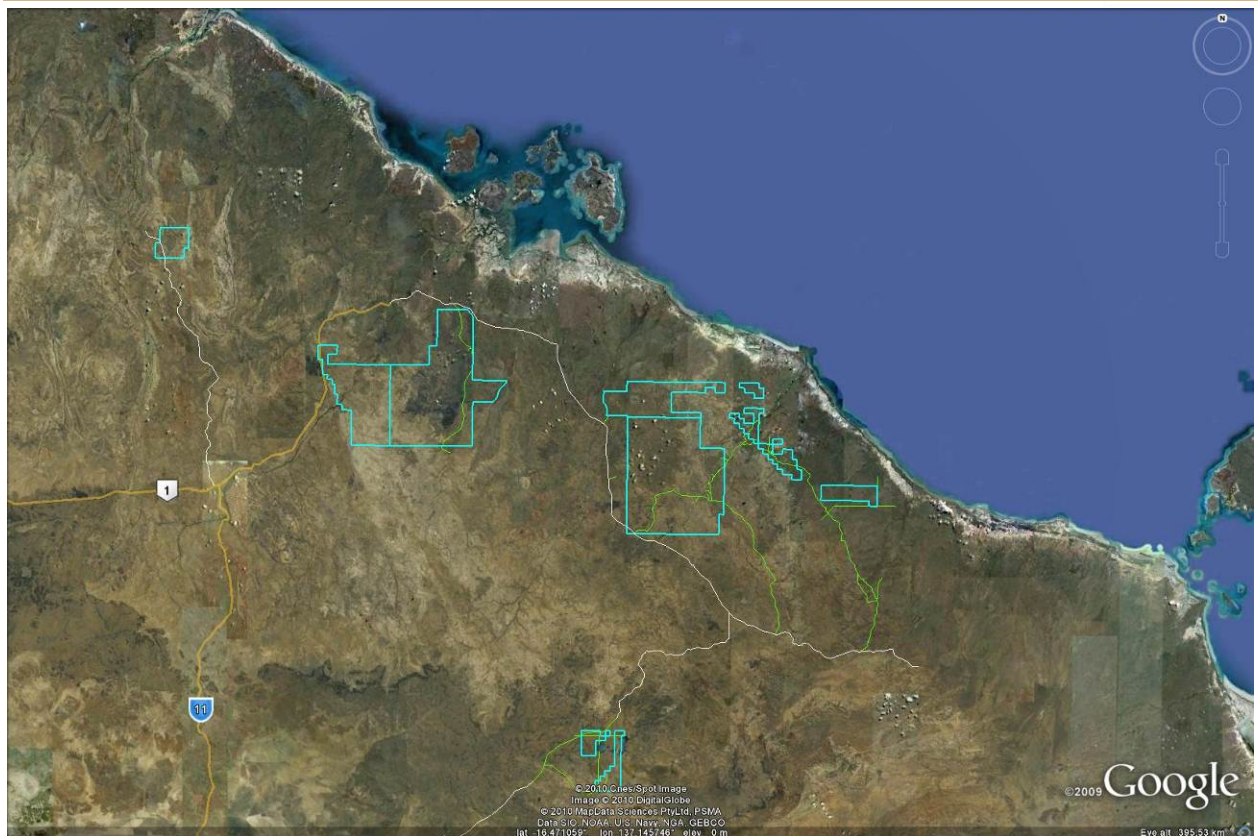
A tentative budget has been prepared to cover the cost of the first visit.

Activity	Unit	Unit	Description	Total
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		cost \$		\$
<b>Laboratory Services</b>				
• Preparation	Sample	5	Dry and pulverise samples (10)	
• Assay	Sample	25	Assay samples for element concentrations	
• Freight	Sample	5	Move heavy samples from the field to the lab	
<b>Technical Services</b>				
• Geologist	Day	1500	Regional prospecting and sampling (2 days)	
• Fieldie	Day	450	Regional prospecting and sampling (2 days)	
<b>Field Costs</b>				
• Accommodation	Night	120	Geo + fieldie, 2 nights each (4 nights)	
• Meals	Day	60	Geo + fieldie, 2 nights each (4 nights)	
• Expenses	Day	10	Geo + fieldie, 2 nights each (4 nights)	
<b>Motor Vehicles</b>				
• Vehicle Hire	Day	160	Travel and on-site (4 Days)	
• Fuel	Litre	1.80	Estimate 500 litres	
<b>Travel</b>				
• Geologist	Day	1500	Drive to site (2 days)	
• Fieldie	Day	450	Drive to site (2 days)	
• Accommodation	Night	120	Geo and Fieldie, one night each way (4 nights)	
• Meals	Man day	60	Geo and Fieldie travelling (2 days)	
• Airfares	Trip	400		
<b>Equipment</b>				
• Purchase	Unit			
• Repairs	Unit			
• Equipment Hire	Unit	100	Spectrometer (4 days)	
• Safety Equipment	Unit	100	Sun Screen / Safety Glasses	
<b>Consumables</b>				
• Bags	Each	1	Hold and protect samples (10)	
• Flagging	Roll	7	Indicate sample sites (1)	
• Pegs	Each			
• Marker Pens	Box	30	Mark sample site pegs, number sample bags(1)	
• Other				
<b>Overheads</b>				
• Reporting	Days	1500	Geologist to compile data, report and planning(1)	
• Plan Printing	Days	25	Pre and Post field trip Large format A1(8)	
• Office Consumables	Each	50	Typing and formatting (3)	
			<b>Total</b>	
<b>Contingency 5%</b>				
			<b>Rounded Total</b>	



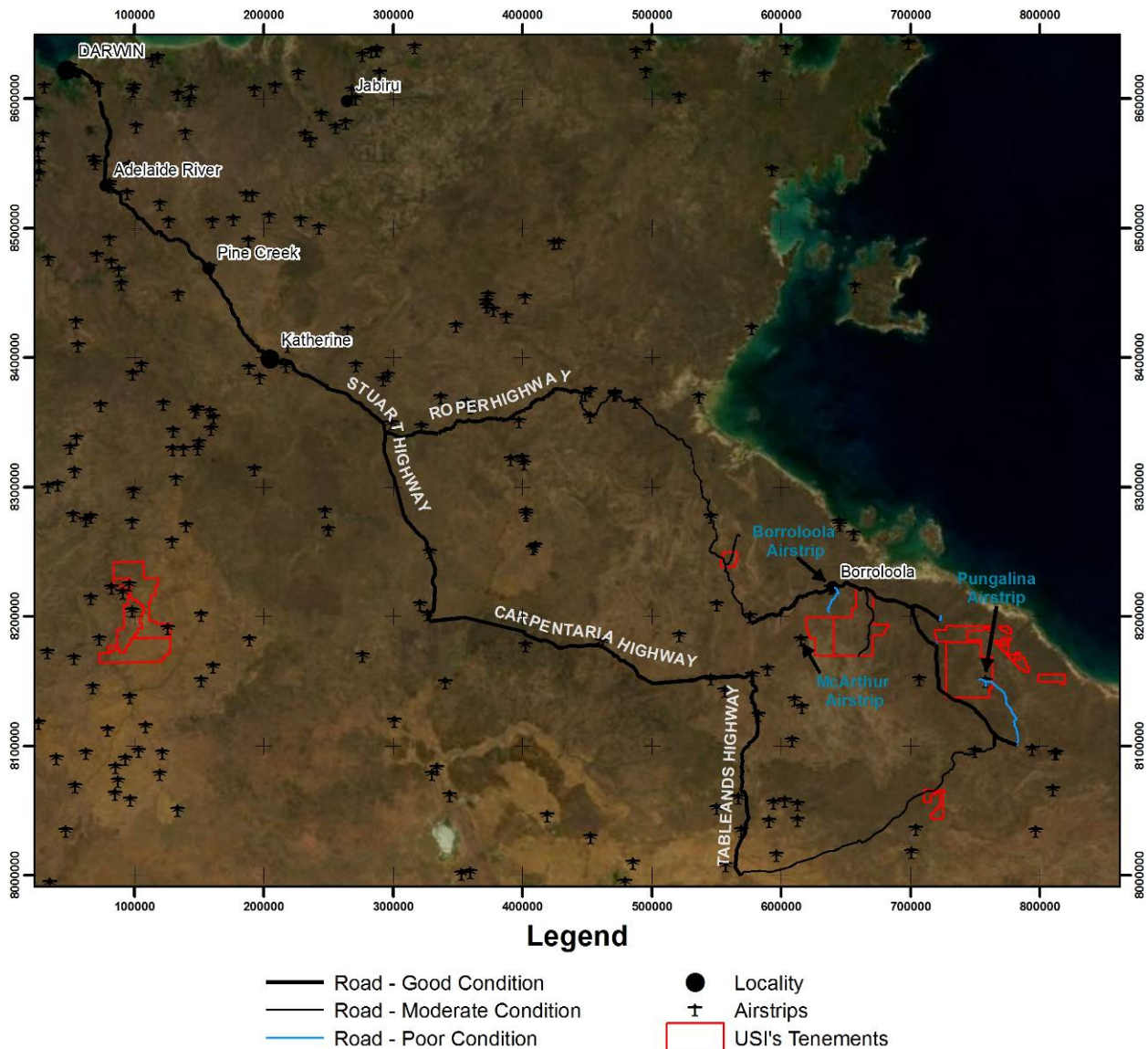




## APPENDIX C - TENEMENT ACCESS

Reaching the tenements from Darwin by vehicle can be achieved by taking the Stuart Highway south and turning left at the Roper Bar Highway and south along the Limmen Bight Road and along Ryans Bend Road to Borroloola. An alternative route is via Daly Waters and along the Carpentaria Highway. Both of these routes will get to Borroloola. The roads driven throughout this field visit, and their condition, have been indicated in Figure 24 along with all of the NT airstrips. The main airstrips within the tenement blocks have been labelled.

The majority of the roads travelled were in good condition and in most cases were paved.



**Figure 24: Road access to the Gulf project tenements during the field visit. All NT airstrips have been included, and the main airstrips have been labelled.**

A regular (twice daily) commercial flights are available to McArthur River with Air North. Borroloola also has a sealed airstrip. McArthur River Mine is a certified aerodrome (1-6DOX) operated by McArthur River Mining Company. Other strips are dirt but strips at Ngukurr, Limmen Bight and Pungalina are all well maintained and suitable for Flying Doctor aircraft. Lorella Springs has two dirt airstrips but they are not as well maintained. There is also an airstrip at Calvert Hills which was not investigated.



## APPENDIX D - FIELD VISIT

Between October 6<sup>th</sup> and October 15<sup>th</sup> 2010 two members from International Geoscience (Matthew Finn and Greg Street) and two members of Universal Splendour Investments (USI) (Dr Xiangzhao Hu and Wei Li) undertook a field visit to USI's Gulf project tenements (Figure 25). The focus of the field visit was to:

1. Identify access to tenements, including road access / conditions, air strips and helicopter access.
2. Investigate local geology within and surrounding the tenements.
3. Collect rock samples of potentially mineralised areas.
4. Consult with local persons and other key members in the tenement areas.
5. Discuss the current exploration strategy and future plans for exploration in the Gulf project area with the NTGS.

Below is a day by day break-down of the field visit.

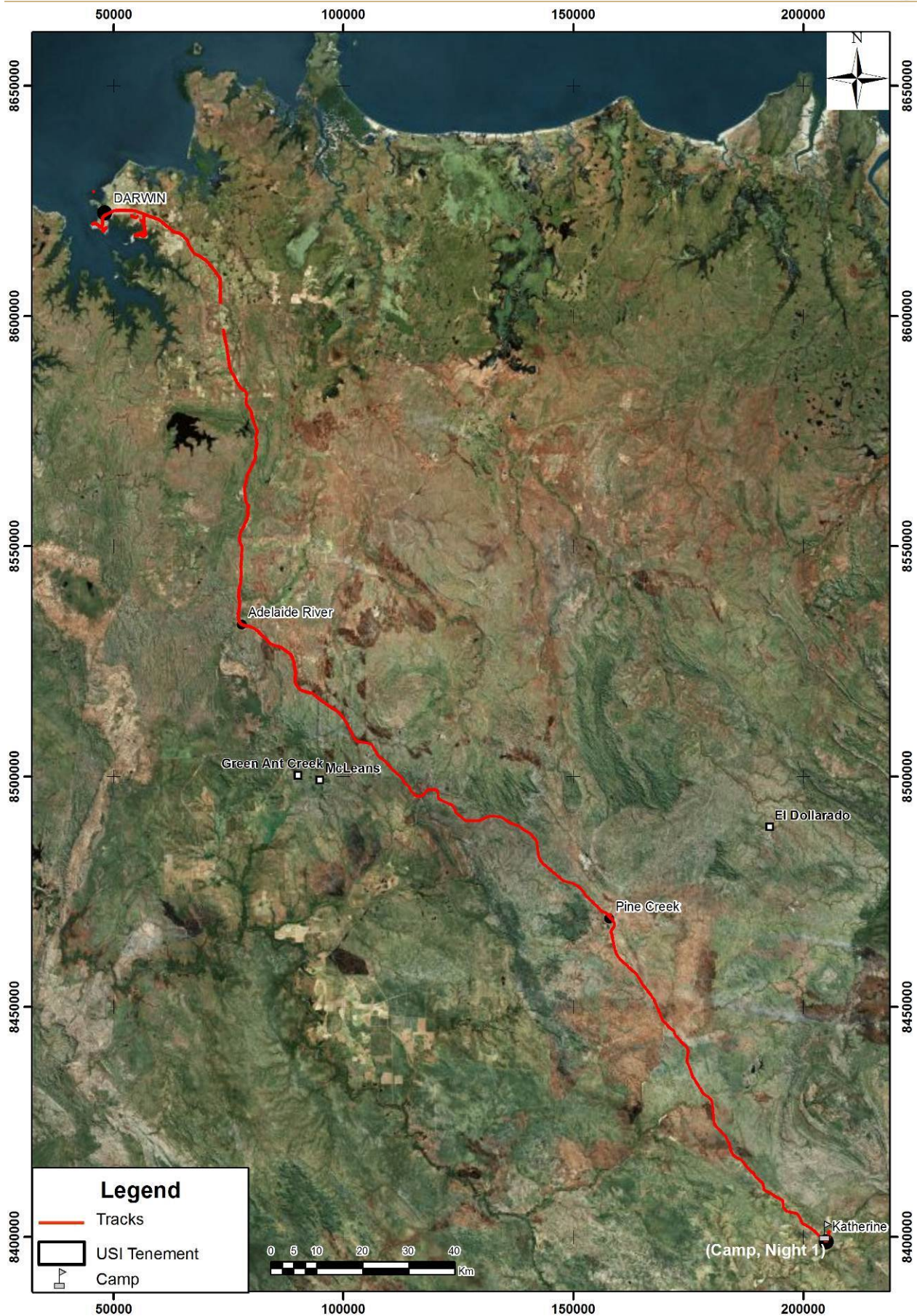


**Figure 25: Location of USI's Gulf project tenements.**

### 9.1 DAY 1 (OCTOBER 6<sup>TH</sup>)

The first day of the field visit consisted of travel from Perth to Katherine via Darwin (Figure 15).





**Figure 26: Distance travelled on Day 1 of field visit (Darwin to Katherine, ~320km).**





## 9.2 DAY 2 (OCTOBER 7<sup>TH</sup>)

The second day required a significant distance to be covered in order to arrive at the western tenement in the Gulf project area (EL27/483). In order to gain an understanding of the local Mn mineralisation style and potential host rocks, the L4 Mn occurrence was investigated (Figure 27).

The location of the L4 occurrence was obtained from the NTGS mineral database and was first reported in 1963 by Marlow. The description of the occurrence is as follows “Possible sedimentary manganese occurrence in Walker River Formation. Location given by Marlow (1963) is approximate only. Marlow (1963) described several lenticular bodies (15 to 100cm wide and 3 to 7m in length) composed of pyrolusite in siltstone.” The description of the occurrence did not fit the rocks observed (vertically dipping brown shale) at the specified location (Longitude=135.412962, Latitude=-15.462553).

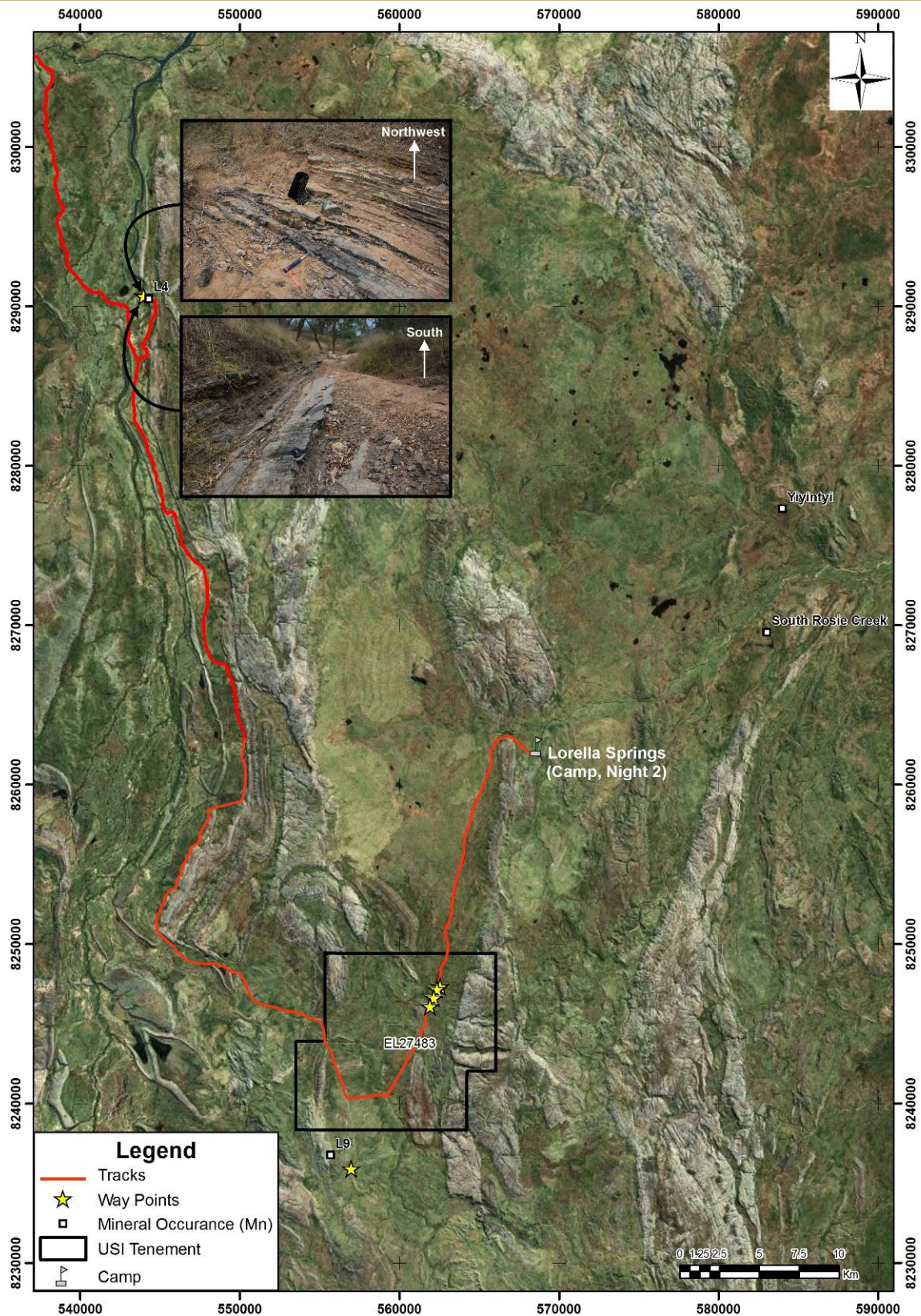
This site allowed for access to four prominent mesas of Cretaceous Walker River Formation, referred to as the Four Archers. The Walker River Formation in this area consists of a sandstone unit with ferricrete caprock overlying a highly bioturbated sandstone unit. The Cretaceous overlies Proterozoic shales, such as the vertically dipping unit at the geographic location of L4.

Further investigation of this occurrence revealed a sedimentary unit to the west of the reported occurrence (Longitude=135.40085, Latitude=-15.46257) which consisted of interbedded black sandstone (1-10cm thick) with mudstone/claystone (1-5cm thick). The outcrop was observed in a dry river bed and extended for >30m (Figure 27). It is unclear if this unit lies towards the base of the Cretaceous sequence, which consists of four prominent outcrops in the area (4 Archers), or towards the top of the Proterozoic rocks. The contact between the two was unable to be identified during this short investigation.

Three samples were submitted for assay in order to confirm any presence of Mn in this unit. The assay results have been included in Table 3 and Table 4 and shows that no significant Mn is present in this black sandstone. It is possible that the occurrence identified by Marlow in 1963 was of a different unit and therefore this area may still have Mn potential.

### 9.2.1 Lorella Springs

The road access into Lorella Springs was of moderate condition. The road is heavily rutted with patches of sand and standing water. Travelling along the road was slow but safe. The facilities at this camp were in good condition and consisted of showers, toilets, bar, hot springs and a covered cooking area. Semi-permanent safari tents are available during the dry season and the camp has a licensed bar.



**Figure 27: Distance travelled on Day 2 of field visit (Katherine to Lorella Springs, ~550km). Location of possible L4 Mn mineral occurrence, with photo, and location of camp for night 2. Way points of various sample locations in EL27/483 are discussed on Day 3.**





### 9.3 DAY 3 (OCTOBER 8<sup>TH</sup>)

After entering EL27/483 from the north several dry riverbeds were investigated. The riverbeds were striking approximately E-W and cut into an upper unit of poorly sorted and weak sandstone conglomerate which showed signs of Fe alteration/weathering. Conformably underlying this unit was white sandstone with minor Fe staining (Figure 17). Mn potential was suspected in the upper conglomerate unit, specifically within the matrix of the conglomerate, although several small black clasts (<2cm) may represent a primary Mn source. Several rock samples from the riverbeds were taken and submitted for assay (Table 3 and Table 4).

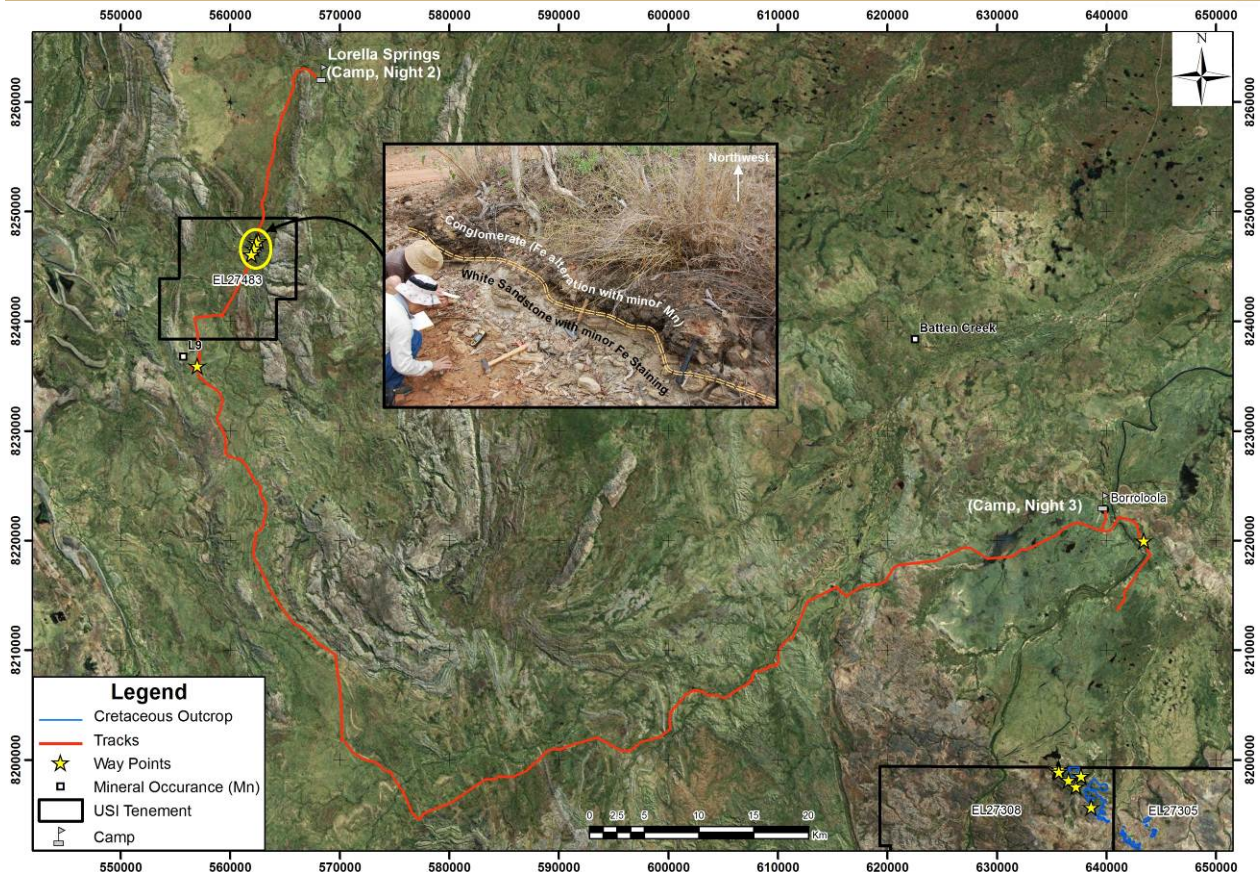
Although most of the samples provided low values of Mn (<3%), one sample (US 0015) returned a value of 7.88650% Mn and 3.3868% Fe. Fe values were relatively high for the other samples (>7.5%). This relatively high Mn sample (US 0015) appeared to differ from the majority of the samples; was more competent and showed fewer clasts. Initial suspicions were that the sample was largely specular haematite but streak test disproved this. John Dunster from the NTGS was consulted on Day 9 and was encouraged by this sample with respect to its Mn potential.

Due to the thin layer of cover over this conglomerate and its dominantly weak nature, this unit may be able to be easily beneficiated in order to be made an economical source of Mn. Further investigation of this area is recommended to delineate the extent of this unit as well as to collect additional samples in order to better define the grade variation.

#### 9.3.2 Borroloola

The road access into Borroloola is in good condition and consisted of paved and well maintained dirt roads. The facilities within Borroloola consist of several accommodations, petrol stations, pubs, and grocery stores. Nights 3, 4 and 5 were spent at the Borroloola Inn where breakfast and dinner were available. Air-conditioned dongas are available at the Inn as well as the guest house opposite and at the caravan park.

The last remaining hour of daylight on Day 3 was spent inspecting the access into EL27/308. The road was found to be in moderate condition and was investigated until sunset before returning to Borroloola for the night.



**Figure 28: Distance travelled on Day 3 of field visit (Lorella Springs to Borroloola, ~170km). Way points within EL27/483 indicated sample locations.**

## 9.4 DAY 4 (OCTOBER 9<sup>TH</sup>)

Road access to the NE corner of EL27/308 was good in most places due to local use but a small portion of the track, the last 2km before entering the EL, needed to be cleared. This made progress into and within EL27/308 slow and difficult. Two attempts were made to access outcrop to the east (Area 2, view to east in Figure 18 C) by vehicle but were unsuccessful. The first attempt ended where the vegetation thickened while approaching a dry riverbed. The second attempt was further north where the vegetation was thinner around the river, but this approach was also terminated within another thick patch of vegetation. This eastern outcrop was traversed on foot.

The Cretaceous outcrop forms prominent mesas similar to the Four Archers at the L4 Mn occurrence.

### 9.4.3 Area 1

The general stratigraphic sequence for Area 1 consisted of a cap rock of white to grey fossiliferous sandstone. This unit appeared to lack any sign of bedding and appeared bioturbated. Burrows and track were common and largely void of sediment and gave the unit an overall vuggy appearance. Bivalves were also observed (Figure 18 A). Pervasive haematite staining was noticed in areas but did not dominate this unit. One sample of haematite stained sandstone was assayed (Figure 18 B, US 016) and provided a % Mn of 0.032 and %Fe of 13.7979.





Underlying the fossiliferous sandstone was a cross-bedded sandstone, approximately 5-10m thick. The base of the Cretaceous was difficult to observe due to significant scree but one location observed a patch of shale scree which may be Proterozoic in age.

Also observed within Area 1 were two black termite mounds. These were sampled (US 017 and 019) and provided %Mn of 0.0157 and 0.0165 and %Fe of 2.0654 and 2.0308 respectively. It is suspected that any shallow concealed Mn source may be able to be identified by analysis of termite mounds as it is known that termites can penetrate tens of metres into the ground (water table) in order to bring wet clay to the surface. A study correlating metal assay values in termite mounds against the bedrock underneath the mounds identified a positive correlation of  $r=0.72$  for Mn (Kebede, 2004). This study did not use many samples for correlation. It was based in Ethiopia and may not be analogous to Northern Territory of Australia.

#### 9.4.4 Area 2

The Cretaceous outcrop to the east of Area 1 was investigated on foot. In the south, the Cretaceous / Proterozoic contact was observed. The Cretaceous in this area consisted entirely of the same caprock of fossiliferous sandstone observed in Area 1. The Proterozoic in this area consisted of a pervasive haematite stained well bedded sandstone with common ripple marks.

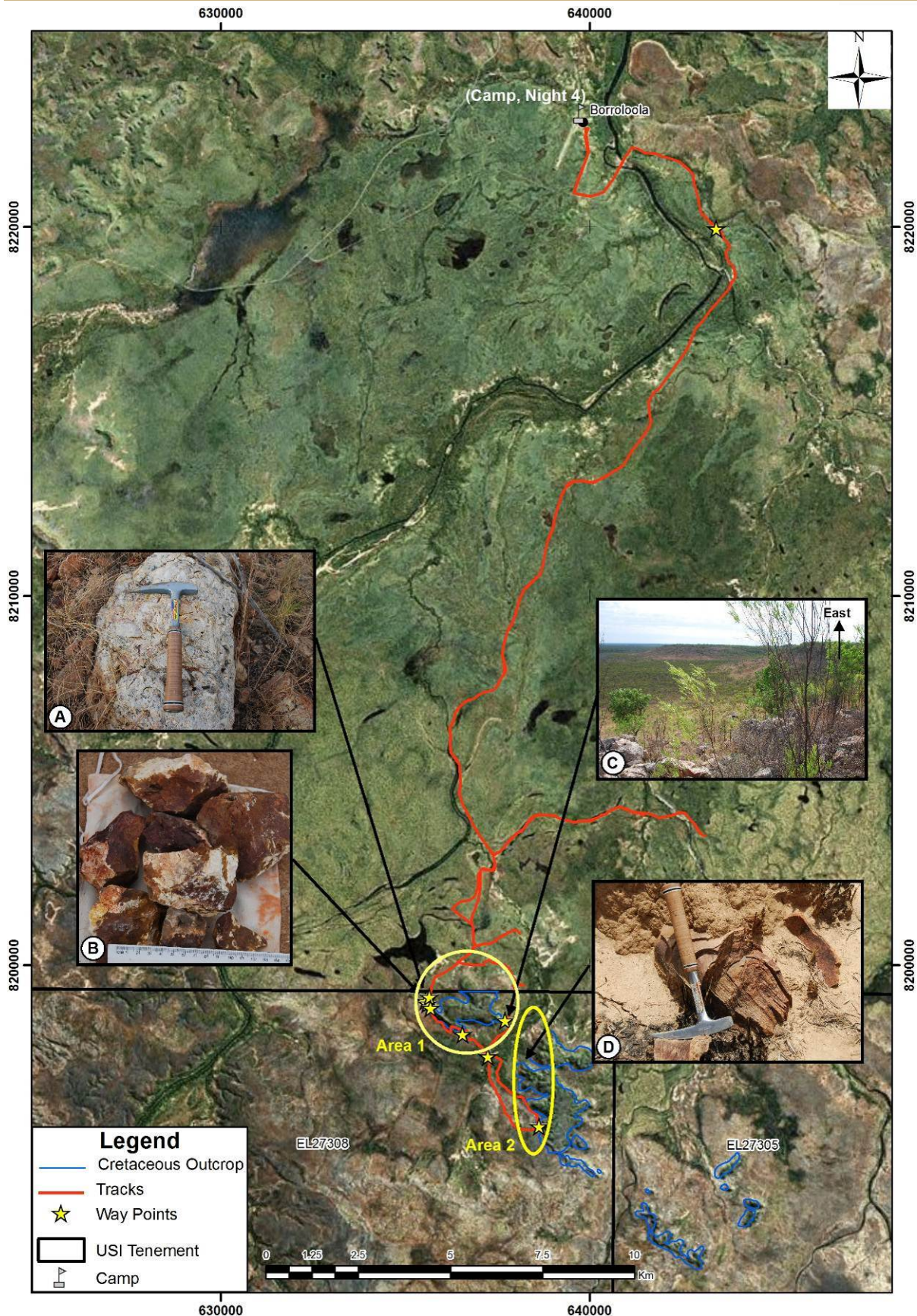
Although no other outcrop lithologies were observed in this part of the Cretaceous, several clasts of quartzite were noticed within the scree around the Cretaceous ridge.

Further to the north within Area 2 was a 20cm thick section of silicified mudstone which was folded in areas (Figure 18 D). Folds were considered to be soft sediment deformation and not due to tectonic activity.

An attempt was made to access the eastern side of Area 2

Although Area 1 and 2 outcrop represents a shallow marine environment, which is the ideal environment for Mn deposition, these two outcrop areas appear to be devoid of Mn mineralisation. No further work is recommended for Mn mineralisation within these outcrop areas.

A more complete investigation for other commodities within the remainder of EL27/308 is recommended.



**Figure 29: Distance travelled on Day 4 of field visit (Borroloola to Area 1 and back to Borroloola, ~75km). Location of investigated Cretaceous rocks in NE corner of EL27/308.**





## 9.5 DAY 5 (OCTOBER 10<sup>TH</sup>)

A significant portion of EL27/305 is covered in Cainozoic material and is potentially preserving a large portion of Cretaceous material.

Road access to EL27/305 consisted of moderate to good condition dirt roads from Borroloola to Spring Creek although direct access to Spring Creek was not possible by vehicle as the river has completely washed-out the road. The river was crossed on foot and facilities consist of a few poorly kept buildings with litter over the premises. A telephone communications tower is located on site and appears to be in good condition, although it is unclear if it is operational.

Cretaceous outcrop was visited as planned in the Phase 1B report (Day 5).

### 9.5.5 Area 1

Area 1 lies just off the main road. The 1-3m thick ironstone cap was excavated for road material exposing the top of the Cretaceous. This outcrop resembled the same fossiliferous sandstone observed within EL27/308 on Day 4.

This site represents a covered and potentially thick Cretaceous sequence which should be investigated, either by drilling or geophysical methods.

### 9.5.6 Area 2 and 3

Areas 2 and 3 were accessed on foot, approximately 1-1.5km east from the main road. The outcrops are resistive to weathering and consist of the same Cretaceous fossiliferous sandstone observed at previous locations (Figure 30 A and B). Also noticed within Area 1 were fragments of well-bedded sandstone with haematite staining. No in-situ outcrop was noticed. A minor black sandstone was observed at Area 3 which resembled the same black sandstone sampled at L4 on Day 2. Assay results for this sample (US 023) revealed low Mn (%Mn = 0.0086) and moderate Fe (%Fe = 10.9845).

Proterozoic ferruginous shale outcrop was also observed underlying the Cretaceous.

### 9.5.7 Area 4

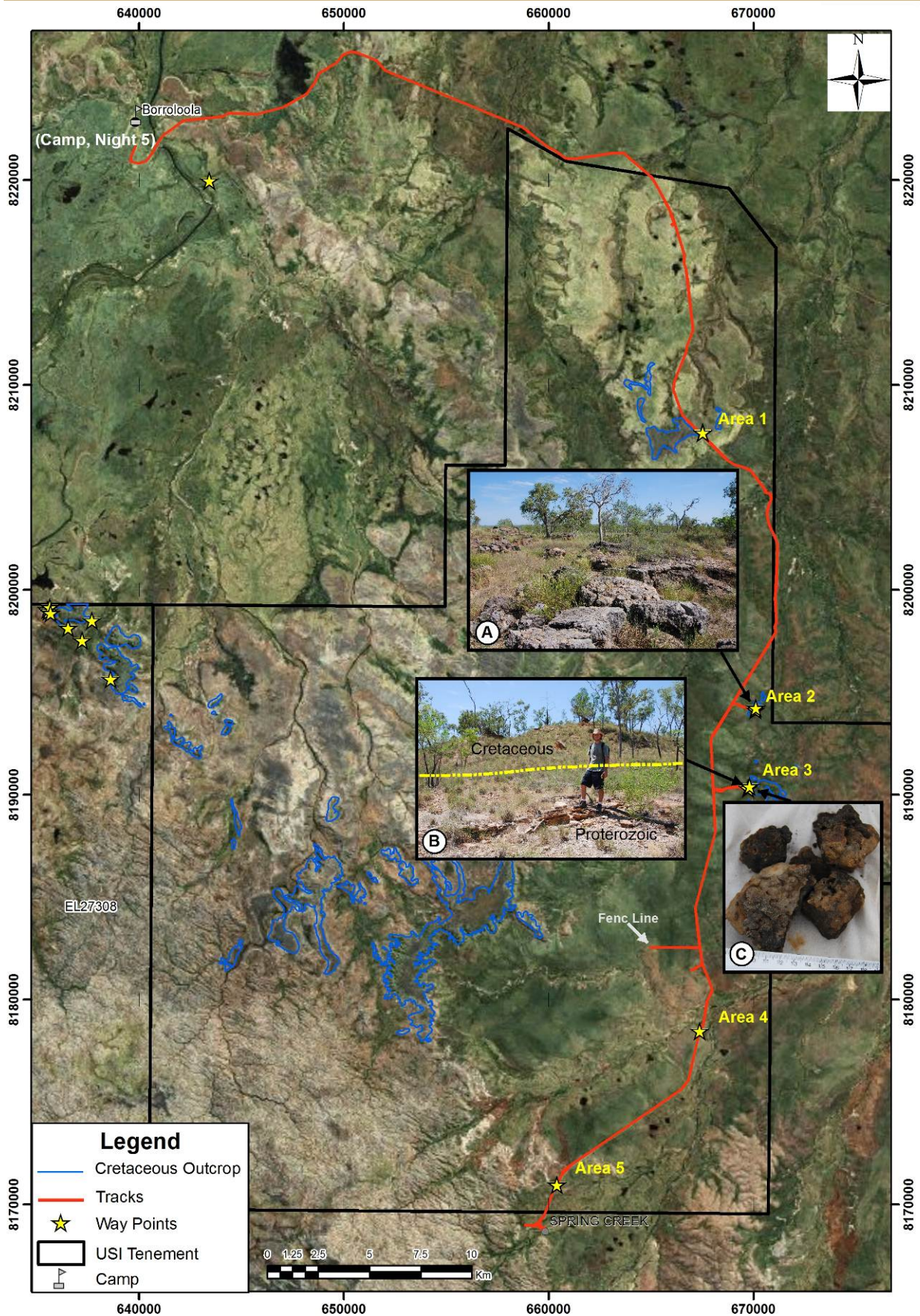
The main road crossed a partially dry riverbed cut into Proterozoic sandstone of the Mainoru Formation. Few small fragments of a black/grey moderately sorted conglomerate were noticed and sampled for assay (US 024). No in-situ outcrop was noticed and the fragments are suspected to be possible reworked Cretaceous. The sample returned 3.218% Mn and 5.3801% Fe.

Although this Mn value is not high, it may be indicating a possible Mn source somewhere in the area. This site is of low priority but should be followed-up in order to identify a source for the Mn.

### 9.5.8 Area 5

A dry river bed crossed the main road and was cut into a well bedded Proterozoic siltstone. Folded fragments of the siltstone were observed, but no in-situ samples were noticed.

Although an attempt was made to access the Cretaceous outcrop scheduled for Day 6, outlined in the Phase 1B report, access was slow and difficult. It was decided that an attempt to access this site be made from the north on the morning of Day 6.



**Figure 30: Distance travelled on Day 5 of field visit (Borroloola to Spring Creek and Back to Borroloola, ~75km). Location of sites visited on Day 5 within EL27/305.**





## 9.6 DAY 6 (OCTOBER 11<sup>TH</sup>)

The morning of Day 6 was spent trying to access the large outcrop outlined for investigation in the Phase 1B (Day 6) report. The area appears to be very difficult to access by vehicle and may have to be accessed by helicopter. If a road is to be cut it would be advised to approach the outcrop from the fence line in EL27/305 (Figure 30).

This area of unmapped Cretaceous is a priority for any future field program.

### 9.6.9 Robinson River Occurrence

The two Robinson River Mn occurrences lie north of EL27/309 and were visited to identify the Mn mineralisation style and collect samples.

This site consists of an ironstone cap. One sample of this ferricrete was assayed (US 029) and provided %Mn of 2.0285 and %Fe of 6.1351.

The lower units appeared to consist of a brecciated silica replaced stromatolitic chert with possible dolomite fragments. The Robinson River is largely controlled by a NNE fault which appears to have acted as the main control in forming this brecciated unit. The fault appears to follow the western boundary of EL27/309. Three samples of this unit were assayed (US025, 026 and 028) and provided %Mn of 3.6152, 3.5154 and 2.0285 respectively. The Mn mineralisation within this area is possibly hydrothermal in origin and may prove to be duplicated elsewhere in USI's tenements.

Based on the trend of the fault which appears to be controlling the brecciation, and possibly the Mn mineralisation, it is recommended that the western boundary of EL27/309 be investigated for any higher grade areas within USI's tenements. In addition to this western boundary, any other areas of faulting may prove to host other hydrothermal Mn mineralisation.

### 9.6.10 Area 1

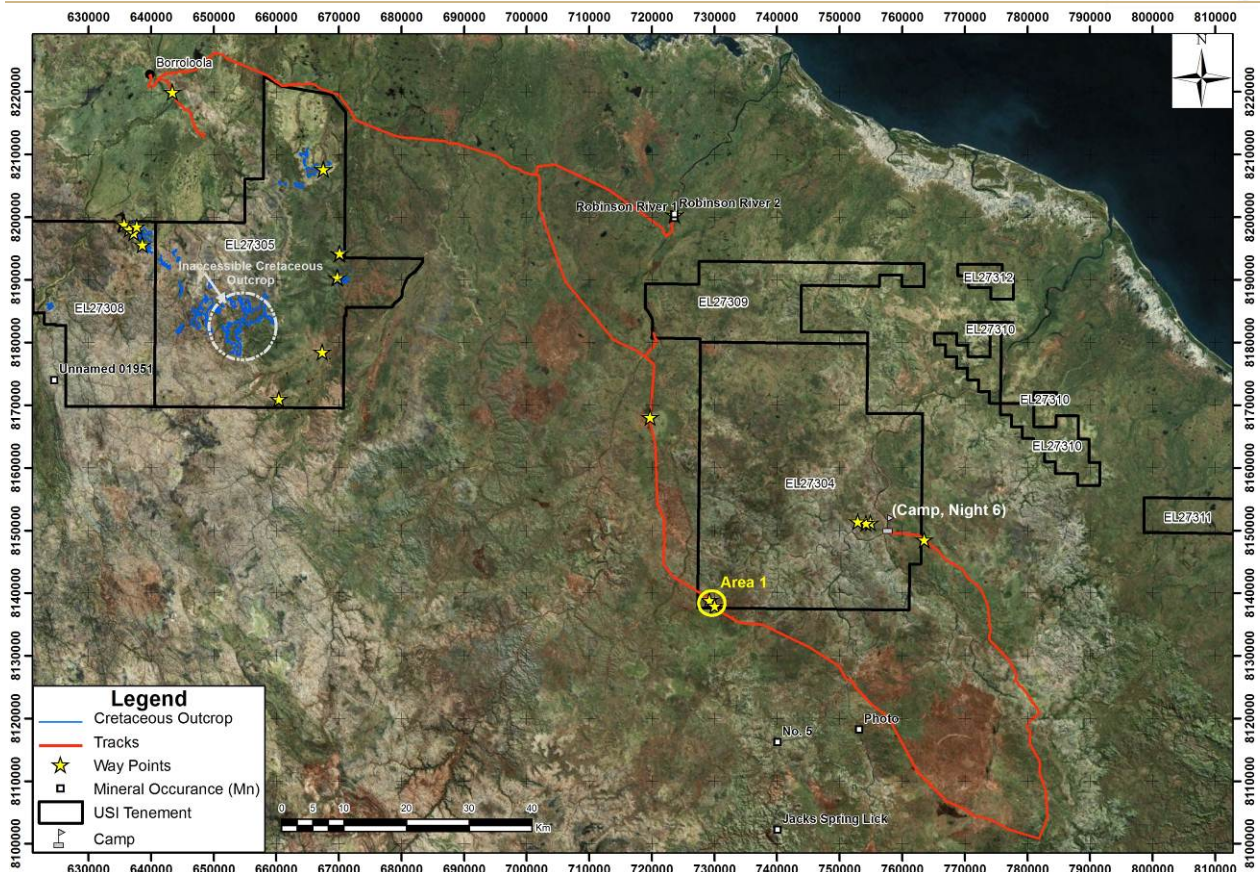
The main road passes through the SW corner of EL37/304 (Area 1). This area consisted of brecciated fragments of possible Kams Dolomite which showed signs of Fe and Mn alteration. Three samples were submitted for assay (US 032, 033 and 034) and provided %Mn values of 0.8175, 7.0792 and 2.6306 respectively.

Although Mn values are relatively low within this portion of the tenement a full field investigation and rock-chip sampling is recommended to evaluate Mn potential.

### 9.6.11 Pungalina Homestead

Access in to the Pungalina Homestead off the main road was slow due to the poor quality of the ~60 km long dirt road. Water crossings, sandy and rutted sections are common along the entire length of the road. The road is blocked by a gate ~10km north after turning off the main road. The gate is locked with a combination which can be obtained by contacting the Homestead.

The Homestead has an operational airstrip, toilets, shower, cooking facilities, running water and electricity. The homestead manager informed us that the only road access to the west was across the river to the north of the main building. This road is not maintained at present but the manager is trying to obtain the use of equipment to improve the river crossing.



**Figure 31: Distance travelled on Day 6 of field visit (Borrooloola to Pungalina Homestead via Robinson River, ~350km). Map of tracks for Day 6. Areas of interest are; Robinson River Mn deposits and Area 1.**

## 9.7 DAY 7 (OCTOBER 12<sup>TH</sup>)

The morning of Day 7 was spent investigating EL27304. Travelling west into the tenement required crossing a river which was moderately flowing and moderately deep (~60 cm). The flood plain west of the river is wide and filled with large to medium sized boulders which made access slow and difficult. Once the flood plain was crossed the road conditions improved. Only a few hours were spent within EL27/304 as a large distance was required to travel in order to arrive at the Heartbreak Hotel in Crawford. The route from the Pungalina Homestead passed through Calvert Hills and EL27/425.

### 9.7.12 Area 1

Several locations within Area 1 contained outcropping ferricrete which displayed possible Mn potential. The ferricrete varied from weakly cemented iron stones to silicified brecciated Karns Dolomite. Six samples were assayed (US 037, 038, 039, 040, 041 and 042) and provided %Mn ranging from 2.414 to 9.4396.

These assay results are encouraging and require following-up to further define the extent and grade variation within EL27304.

There appears to be widespread concentration of Mn and Fe within the ferricrete of this tenement. As Mn carbonate is readily leached from the weathered front it is possible that a higher grade Mn zone lies beneath this weathered cap.

Bateman (1950) reported that low grade ore from Cuba (i.e. Quinto Mine, 18%Mn) was sintered and concentrated to 50-52 %Mn.

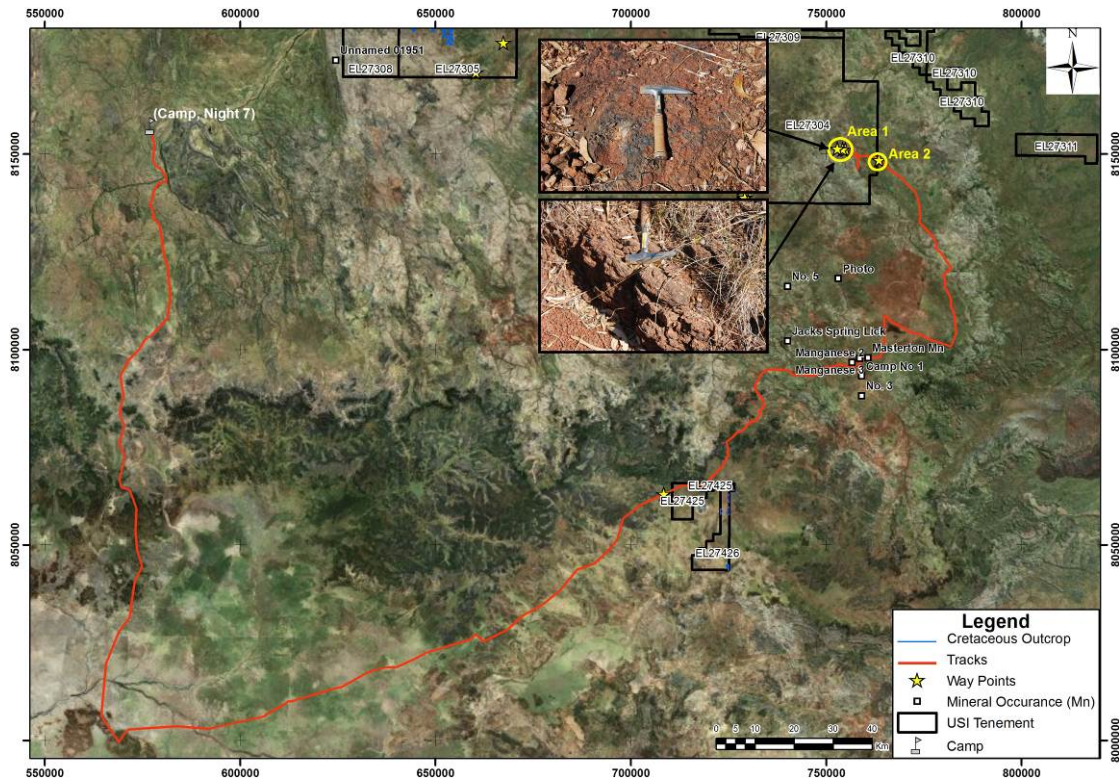




### 9.7.13 Area 2

A section of road rubble was investigated 600m east of EL27304 (Area 2). This area consisted of highly altered Karns Dolomite which showed significant Fe and possible Mn alteration. Two samples were assayed (US 043 and 044) and provided %Mn of 8.0523 and 8.5255 with %Fe of 16.6699 and 15.5246 respectively.

Although these samples lie outside USI's EL they are encouraging and should be followed-up to identify if this unit trends into EL27304.

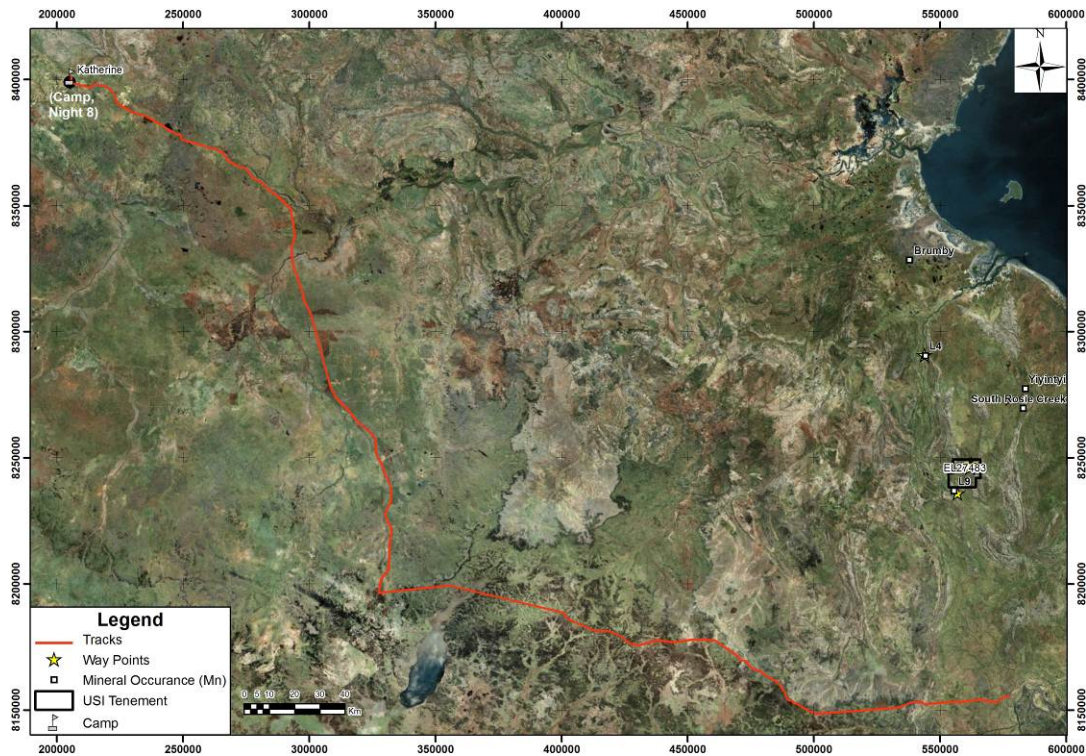


**Figure 32: Distance travelled on Day 7 of field visit (Pungalina Homestead to Heartbreak Hotel, ~525km). Map of tracks for Day 7. Areas of interest are; Area 1 and Area 2 (600m east of EL27304).**



## 9.8 DAY 8 (OCTOBER 13<sup>TH</sup>)

Day 8 was spent travelling from Heartbreak Hotel to Katherine.



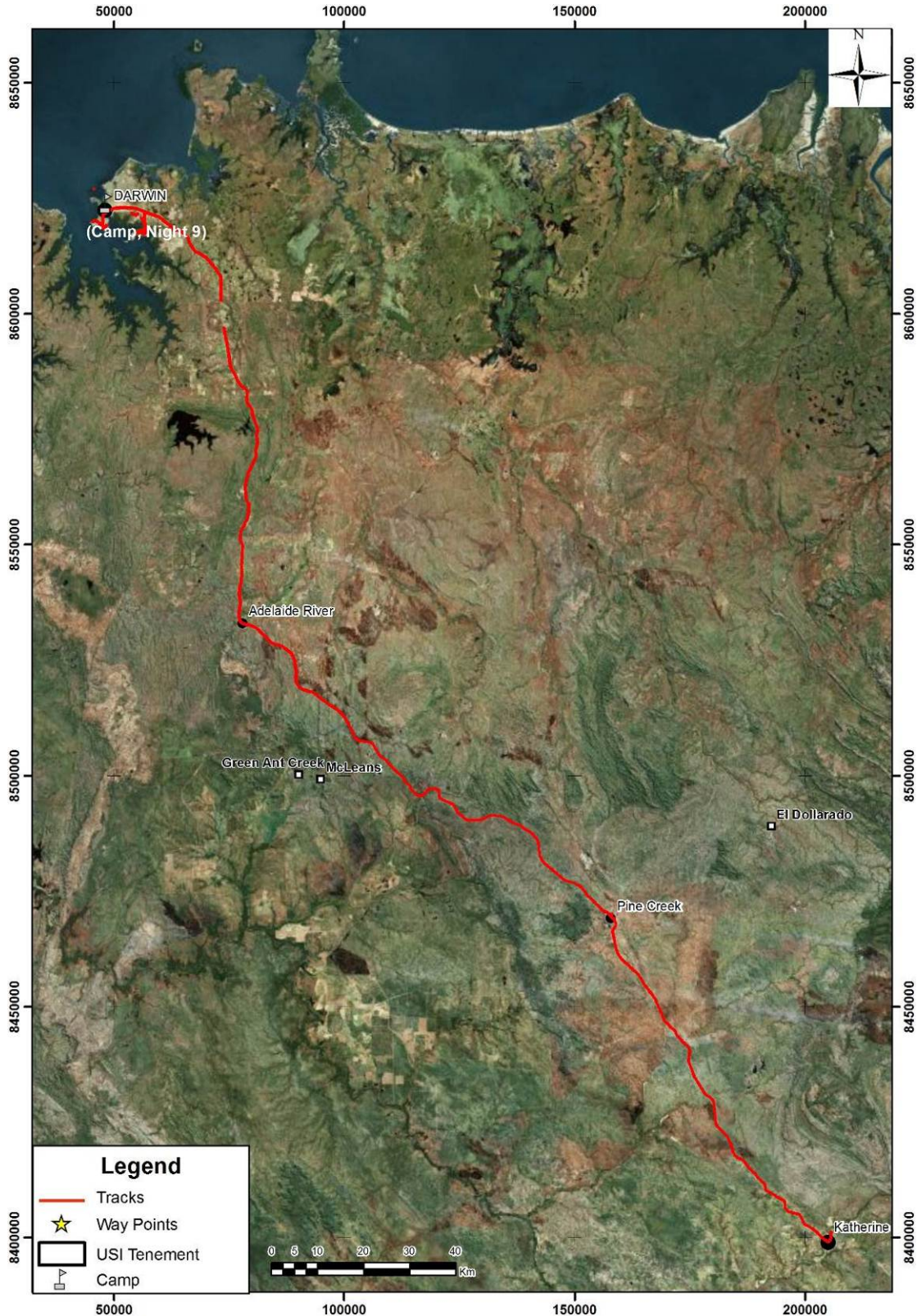
**Figure 33: Distance travelled on Day 8 of field visit (Heartbreak Hotel to Katherine, ~550km). Map of tracks for Day 8, Heartbreak Hotel to Katherine.**





### 9.9 DAY 9 (OCTOBER 14<sup>TH</sup>)

All rock-chip samples were submitted to NT Laboratories in Pine Creek. Each sample was assayed for Au, Ag, Pd, Pt, Mn, Fe, Cu, Pb, Zn, Ni, Mo, Bi and As. Assay results are presented in Table 3.



**Figure 34: Distance travelled on Day 9 of field visit (Katherine to Darwin, ~320km).**





## APPENDIX E - ASSAY RESULTS

Before rock-chip samples were submitted to NT Laboratories each sample was photographed, split into two samples and in a few cases samples were split into again in order to provide Professor Hu with a sample to analyse in China. The original assay results from NT labs are included in Table 3. Table 4 shows the details for all rock samples collected and Figure 35 to Figure 36 show the photos of each sample submitted for assay.

The Au, Pt and Pd were determined by a standard 50 gram, lead collection, fire assay procedure with the individual elements read by Atomic Absorption Spectrometer on the digested dore' prill. The base metal and other elements were determined by ICP-AES using a mixed (G300) of Nitric/Hydrochloric/Perchloric acid digestion.

### 9.10 SAMPLES US 001 – 003

These three (3) samples are from or near the L4 Mn occurrence located NNW of USI's EL27/483. Assay results for all three samples proved disappointing. It is likely these samples were not from the original L4 occurrence and further investigation of this site may prove useful in identifying other types of Mn in the region.

### 9.11 SAMPLES US 004 – 015

These eleven (11) samples are all located within USI's EL27/483 and were all sourced from a conglomerate unit exposed within several dry riverbeds. The assay values returned variable %Mn and %Fe values which can be attributed to the variability in the sandstone clasts within the conglomerate. The %Mn ranged from 0.1742 to 7.8865 with an average of 1.353 and a %Fe range of 8.4989 to 18.4248 and an average of 11.095.

Given that only two (2) samples returned %Mn of >2% this area will require a thorough investigation in order to identify the areas of elevated grade and the grade variation within this area.

The other elements assayed returned variable results with one sample (US 008) returning values in ppm of Pd=0.02, Cu=2,826, As=903, Co=154, Ni=151 and Bi=15 and another sample (US 015) returning values in ppm of Zn=416, Co=192 and Mo=48. These values appear anomalous within the other samples assayed in this area and require further investigation into their significants.

### 9.12 SAMPLES US 016, 017 and 019

These three (3) samples were collected from USI's EL27/308. One (1) of the samples was of sandstone and two (2) were of black termite mounds.

All %Mn values were low (<0.05). Although it is difficult to confirm what an elevated %Mn value should be in termite mounds, based on the study by Kebede (2004) there is a positive correlation ( $r=0.72$ ) between Mn in termite mounds and the underlying bedrock. If this is the case then a termite mounds may prove to be useful in future exploration.

### 9.13 SAMPLES US 023 and 024

Two (2) samples were collected within USI's EL27/305, one of black sandstone (US 023) and one of a lateritic conglomerate (US 024). Although the black sandstone provided a low %Mn value, the lateritic conglomerate returned a %Mn of 3.218. This was unexpected and is encouraging for identifying a possible source of Mn within the SE of this EL. Although this is a low priority area, further work should be undertaken in this area to define the Mn potential.



#### **9.14 SAMPLES US 025, 026, 027 and 029**

These four (4) samples were all collected from the Robinson River Mn occurrence which lies north of the Seven Emus Homestead. The samples ranged from brecciated stromatalitic chert to ferricrete.

The %Mn values are variable but are typically >2%. This is encouraging as this occurrence appears to be related to a NNE fault that trends south along USI's EL27309.

#### **9.15 SAMPLE 31**

This sample was collected along the roadside approximately 8km west of EL27304. This sample was low in %Mn (0.248) and does not need to be investigated further.

#### **9.16 SAMPLES 032 – 039, 041 and 042**

These ten (10) samples were all collected within USI's EL27304 and consist of variously weathered Karns Dolomite.

Although the range in %Mn is large (0.8175 – 9.9572) the average is 5.54 with six (6) of the samples >5%Mn.

These results are encouraging and this area is recommended for follow-up geological mapping and sampling in order to better define the extent of this unit as well as the variation in grade.

#### **9.17 SAMPLES 043 AND 044**

These two (2) samples were collected 600m east of EL27304 from material close to the road. The values of %Mn were relatively high (8.0523 and 8.5244) and %Fe of 16.6699 and 15.5246. The Mn values are encouraging and should be followed-up to see if this unit trends into EL27304.

**Table 3: Assay results provided from NT Laboratories.**

ELEMENT	Au	Au(R)	Pt	Pd	Cu	Pb	Zn	Ag	As	Co	Ni	Bi	Fe	Mn	Mo
UNITS	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
STORE UNITS	0.01	0.01	0.1	0.01	1	5	2	1	10	2	2	5	10	1	2
US001	L		L	L	15	11	86	L	20	19	20	L	33,485	1,070	4
US002	L		L	L	18	10	59	L	119	16	16	L	30,705	2,508	L
US003	L	L	L	L	16	21	54	L	16	11	12	L	26,783	4,007	L
US004	L		L	L	63	24	13	1	49	49	27	L	95,142	4,385	3
US005	L		L	L	71	24	22	1	44	48	34	L	100,478	4,385	L
US006	L		L	L	75	18	5	L	20	27	16	L	76,204	1,742	L
US007	L		L	L	85	31	8	1	51	88	52	5	98,570	5,393	3
US008	L		L	0.02	2,826	12	63	5	903	154	151	15	184,248	25,694	7
US009	L		L	L	133	35	14	1	78	46	26	7	119,593	2,679	6
US010	L		L	L	278	64	48	1	53	60	53	12	103,349	4,501	8
US011	L		L	L	48	12	14	1	L	99	57	5	115,128	7,902	2
US012	L		L	L	53	14	10	1	L	54	49	L	84,989	3,401	L
US013	L	L	L	L	60	19	9	1	L	44	40	L	87,081	4,908	L
US014	L		L	L	379	28	67	1	47	77	47	9	121,779	5,046	L
US015	L		L	L	108	33	416	24	31	192	67	L	33,868	78,865	48
US016	L		L	L	2	5	L	L	46	3	L	7	137,979	320	L
US017	L		L	L	18	5	10	L	L	7	9	L	20,654	157	L
US019	L		L	L	24	L	17	L	L	10	14	L	20,308	165	L
US023	L	L	L	L	7	17	L	L	150	2	L	L	109,845	86	3
US024	L		L	L	16	11	7	5	15	237	27	L	53,801	32,180	L
US025	L		L	L	55	10	22	5	L	22	38	L	99,645	36,152	9
US026	0.01		L	L	56	11	26	4	L	30	38	L	78,177	35,154	7



US027	L	L	L	L	16	L	6	L	L	5	10	L	29,086	1,586	L
US028	I														
US029	0.02		L	L	41	20	14	2	L	85	29	L	61,351	20,285	3
US031	L		L	L	41	29	20	1	L	45	32	10	154,896	2,480	3
US032	L		L	L	115	13	16	1	L	14	11	L	27,571	8,175	L
US033	0.02	L	L	0.02	697	58	120	16	20	259	102	L	68,627	70,792	20
US034	L		L	L	287	33	36	3	29	66	24	L	22,217	26,306	5
US035	L		L	L	259	152	19	9	48	132	101	5	100,953	52,282	17
US036	L		L	L	58	33	23	3	50	60	43	6	125,947	23,992	5
US037	L		L	L	976	36	704	3	193	217	188	8	140,356	24,140	4
US038	L		L	0.01	2,825	192	809	17	15	1,014	182	10	178,073	74,590	20
US039	L		L	0.01	2,788	279	751	27	13	1,432	157	7	147,560	85,206	26
US041	L		L	L	4,612	68	2,270	45	35	1,413	170	L	51,965	99,572	49
US042	L		L	L	2,310	256	2,094	33	52	2,363	825	L	34,630	94,396	32
US043	L		L	L	20	22	165	19	67	172	255	11	166,699	80,523	27
US044	L		L	L	27	23	65	24	L	268	58	8	155,246	85,244	32

**Table 4: Details for all rock samples**

Sample	WGS 1984			GDA 1994		Tenement	Lithology	Assayed	Photo	Mn (%)	Fe (%)
	Zone	Easting	Northing	Latitude	Longitude						
US 001	53	543991	8290629	15° 27' 40.035" S	135° 24' 36.285" E	L4	Black Sandstone	Yes	Yes	0.107	3.3485
US 002	53	543991	8290629	15° 27' 40.035" S	135° 24' 36.285" E	L4	Black Sandstone	Yes	Yes	0.2508	3.0705
US 003	53	543991	8290629	15° 27' 40.035" S	135° 24' 36.285" E	L4	Black Sandstone	Yes	Yes	0.4007	2.6783
US 004	53	562584	8247327	15° 51' 7.891" S	135° 35' 4.225" E	EL27/483	Conglomerate	Yes	Yes	0.4385	9.5142
US 005	53	562584	8247327	15° 51' 7.891" S	135° 35' 4.225" E	EL27/483	Conglomerate	Yes	Yes	0.4385	10.0478
US 006	53	562381	8247171	15° 51' 12.987" S	135° 34' 57.414" E	EL27/483	Conglomerate	Yes	Yes	0.1742	7.6204
US 007	53	562763	8247382	15° 51' 6.085" S	135° 35' 10.238" E	EL27/483	Conglomerate	Yes	Yes	0.5393	9.857
US 008	53	562178	8246616	15° 51' 31.067" S	135° 34' 50.641" E	EL27/483	Conglomerate	Yes	Yes	2.5694	18.4248





US 009	53	562231	8246605	15° 51' 31.420" S	135° 34' 52.424" E	EL27/483	Conglomerate	Yes	Yes	0.2679	11.9593
US 010	53	562231	8246605	15° 51' 31.420" S	135° 34' 52.424" E	EL27/483	Conglomerate	Yes	Yes	0.4501	10.3349
US 011	53	562094	8251654	15° 51' 48.360" S	135° 34' 42.540" E	EL27/483	Conglomerate	Yes	Yes	0.7902	11.5128
US 012	53	562094	8251654	15° 51' 48.360" S	135° 34' 42.540" E	EL27/483	Conglomerate	Yes	Yes	0.3401	8.4989
US 013	53	562231	8246605	15° 51' 31.420" S	135° 34' 52.424" E	EL27/483	Conglomerate	Yes	Yes	0.4908	8.7081
US 014	53	562094	8251654	15° 51' 48.360" S	135° 34' 42.540" E	EL27/483	Conglomerate	Yes	Yes	0.5046	12.1779
US 015	53	562094	8251654	15° 51' 48.360" S	135° 34' 42.540" E	EL27/483	Conglomerate	Yes	Yes	7.8865	3.3868
US 016	53	635666	8199138	16° 17' 5.333" S	136° 16' 11.038" E	EL27/308	Sandstone	Yes	Yes	0.032	13.7979
US 017	53	636562	8198127	16° 17' 38.046" S	136° 16' 41.434" E	EL27/308	Termite mound	Yes	Yes	0.0157	2.0654
US 018	53	667534	8207660	16° 12' 20.891" S	136° 34' 2.316" E	EL27/305	Shale	No	Yes	NA	NA
US 019	53	638637	8195635	16° 18' 58.700" S	136° 17' 51.872" E	EL27/308	Termite mound	Yes	Yes	0.0165	2.0308
US 020	53	637717	8198497	16° 17' 25.771" S	136° 17' 20.266" E	EL27/308	Fossiliferous sandstone	No	Yes	NA	NA
US 021	53	667534	8207682	16° 12' 20.175" S	136° 34' 2.310" E	EL27/305	Sandstone	No	Yes	NA	NA
US 022	53	667534	8207660	16° 12' 20.891" S	136° 34' 2.316" E	EL27/305	Sandstone	No	Yes	NA	NA
US 023	53	669820	8190406	16° 21' 41.627" S	136° 35' 23.805" E	EL27/305	Black Sandstone	Yes	Yes	0.0086	10.9845
US 024	53	667395	8178464	16° 28' 10.736" S	136° 34' 5.206" E	EL27/305	Laterite / Colglomerate	Yes	Yes	3.218	5.3801
US 025	53	723615	8200444	16° 15' 59.316" S	137° 5' 32.733" E	Robinson River	Stromatalitic chert	Yes	Yes	3.6152	9.9645
US 026	53	723615	8200444	16° 15' 59.316" S	137° 5' 32.733" E	Robinson River	Stromatalitic chert	Yes	Yes	3.5154	7.8177
US 027	53	723615	8200444	16° 15' 59.316" S	137° 5' 32.733" E	Robinson River	Bedded chert	Yes	Yes	0.1586	2.9086
US 028	53	723615	8200444	16° 15' 59.316" S	137° 5' 32.733" E	Robinson River	Stromatalitic chert	Yes	Yes	0	0
US 029	53	723615	8200444	16° 15' 59.316" S	137° 5' 32.733" E	Robinson River	Laterite	Yes	Yes	2.0285	6.1351
US 030	53	723680	8200368	16° 16' 1.766" S	137° 5' 34.948" E	Robinson River	Carbonate replaced roots?	No	Yes	NA	NA
US 031	53	719770	8168075	16° 33' 33.326" S	137° 3' 34.345" E	West of EL27/304	Laterite	Yes	Yes	0.248	15.4896
US 032	53	729263	8138815	16° 49' 21.638" S	137° 9' 5.094" E	EL27/304	Karns Dolomite	Yes	Yes	0.8175	2.7571
US 033	53	729263	8138815	16° 49' 21.638" S	137° 9' 5.094" E	EL27/304	Karns Dolomite	Yes	Yes	7.0792	6.8627
US 034	53	729263	8138815	16° 49' 21.638" S	137° 9' 5.094" E	EL27/304	Karns Dolomite	Yes	Yes	2.6306	2.2217
US 035	53	730065	8137905	16° 49' 50.946" S	137° 9' 32.509" E	EL27/304	Karns Dolomite	Yes	Yes	5.2282	10.0953
US 036	53	730065	8137905	16° 49' 50.946" S	137° 9' 32.509" E	EL27/304	Karns Dolomite	Yes	Yes	2.3992	12.5947



US 037	53	754971	8151196	16° 42' 29.476" S	137° 23' 28.020" E	EL27/304	Karns Dolomite?	Yes	Yes	2.414	14.0356
US 038	53	754295	8151179	16° 42' 30.293" S	137° 23' 5.219" E	EL27/304	Karns Laterite	Yes	Yes	7.459	17.8073
US 039	53	754295	8151179	16° 42' 30.293" S	137° 23' 5.219" E	EL27/304	Karns Laterite	Yes	Yes	8.5206	14.756
US 040	53	754295	8151179	16° 42' 30.293" S	137° 23' 5.219" E	EL27/304	Karns Laterite	No	Yes	NA	NA
US 041	53	754295	8151179	16° 42' 30.293" S	137° 23' 5.219" E	EL27/304	Karns Laterite	Yes	Yes	9.9572	5.1965
US 042	53	752934	8151361	16° 42' 24.903" S	137° 22' 19.226" E	EL27/304	Karns Dolomite	Yes	Yes	9.4396	3.463
US 043	53	763597	8148492	16° 43' 53.967" S	137° 28' 20.180" E	East of EL27/304	Karns Laterite	Yes	Yes	8.0523	16.6699
US 044	53	763597	8148492	16° 43' 53.967" S	137° 28' 20.180" E	East of EL27/304	Karns Laterite	Yes	Yes	8.5244	15.5246



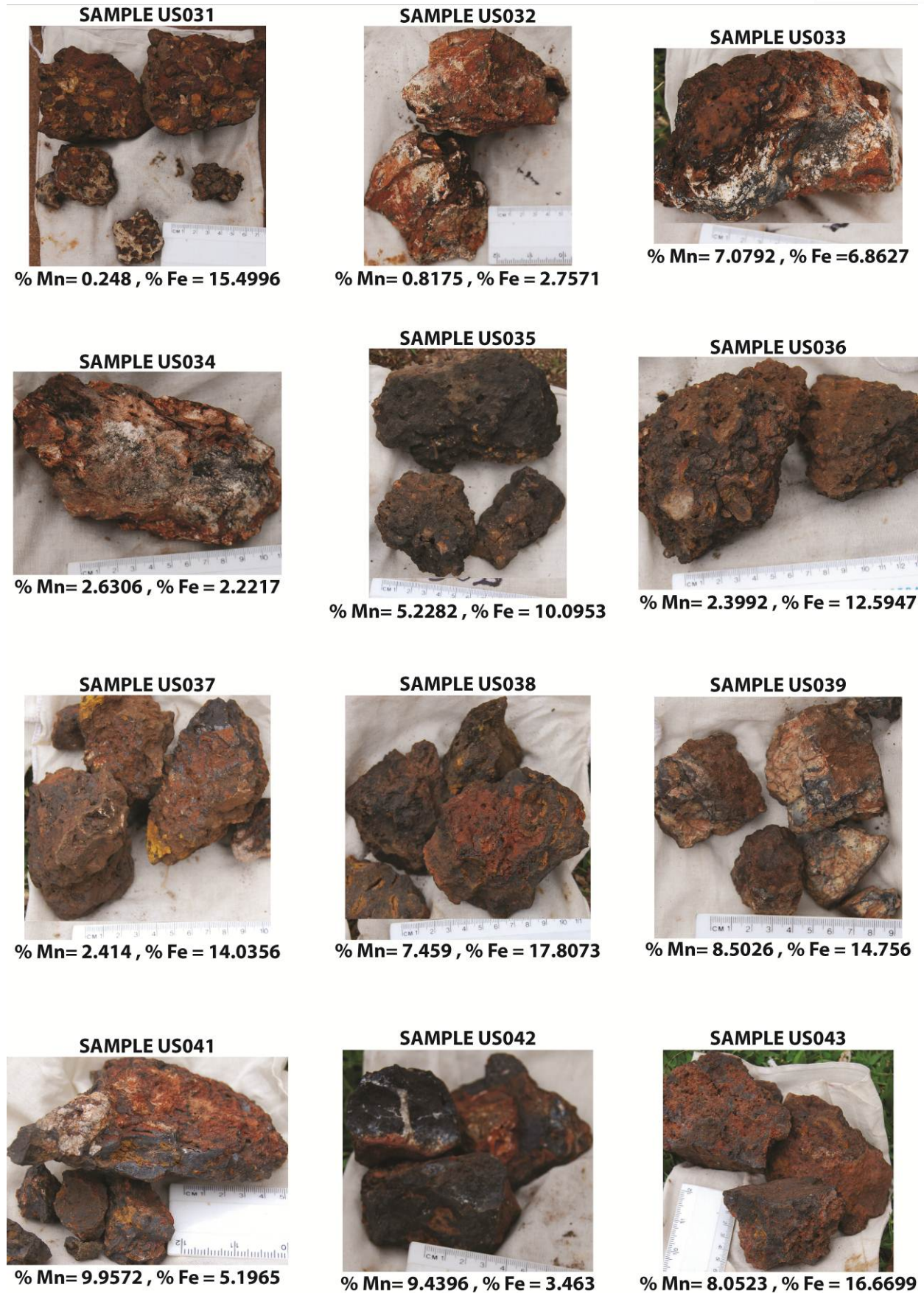
**Figure 35: Photos of rock samples 1-12 submitted for assay with %Mn and %Fe values.**





**Figure 36: Photos of rock samples 13-29 submitted for assay with %Mn and %Fe values.**





**Figure 37: Photos of rock samples 31-43 submitted for assay with %Mn and %Fe values.**



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