

Title Holder	Element 92 Pty Ltd
Operator	Territory Iron Pty Ltd
Titles / Tenements	EL23506
Mine / Project Details	Frances Creek
Reporting Title	Annual Technical Report EL23506 for the Period 8 <sup>th</sup> May 2017 to 7 <sup>th</sup> May 2018
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Target Commodity	Iron ore, Base Metals, Gold, Uranium, Graphite
Report Date	24 <sup>th</sup> May 2018
Datum / Zone	GDA94 / Zone 52
250k Mapsheet	Pine Creek SD52-08
100k Mapsheet	Pine Creek 5270; McKinlay River 5271
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# THUNDELARRA

And

**TERRITORY IRON PTY LIMITED**

*A.C.N. 125 984 401*

**ANNUAL TECHNICAL REPORT**

**EL23506**

**For The Period**

**8<sup>th</sup> May 2017 – 7<sup>th</sup> May 2018**

**Pine Creek SD52-08**

**1:250,000 Geological Map Sheet**

**Pine Creek 5270**

**1:100,000 Geological Map Sheet**

**McKinley River 5271**

**1:100,000 Geological Map Sheet**

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May 2018

**Distribution:** NT Department of Mines and Energy  
Territory Iron Pty Ltd  
Element 92 Pty Ltd (Thundelarra Ltd)

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## SUMMARY

This report describes exploration activities conducted on Frances Creek East/ Allamber tenement EL23506 by operator Territory Iron Pty Ltd and title holder Element 92 Pty Ltd from 8<sup>th</sup> May 2017 to 7<sup>th</sup> May 2018. Territory Iron Pty Ltd has a Split Commodity Agreement with

Element 92 (wholly owned subsidiary of Thundelarra Pty Ltd) to explore for and develop economical deposits of iron ore and manganese within the tenement.

Exploration activity within EL23506 by Territory Iron Pty Ltd for the reporting year involved rehabilitation of earlier drill sites, field visits by personnel to evaluate the status of remediation, desktop studies and evaluation of earlier acquired data. The remediation status for all drill sites was evaluated in July 2015 and the drill sites are rehabilitating well. Expenditure for the reporting year on EL23506 was \$23,168.

Exploration activity within EL23506 by Element 92 Pty Ltd for the reporting year involved field visits by personnel to evaluate the status of remediation, desktop studies and evaluation of earlier acquired data. Expenditure for the reporting year on EL23506 was \$12,095.

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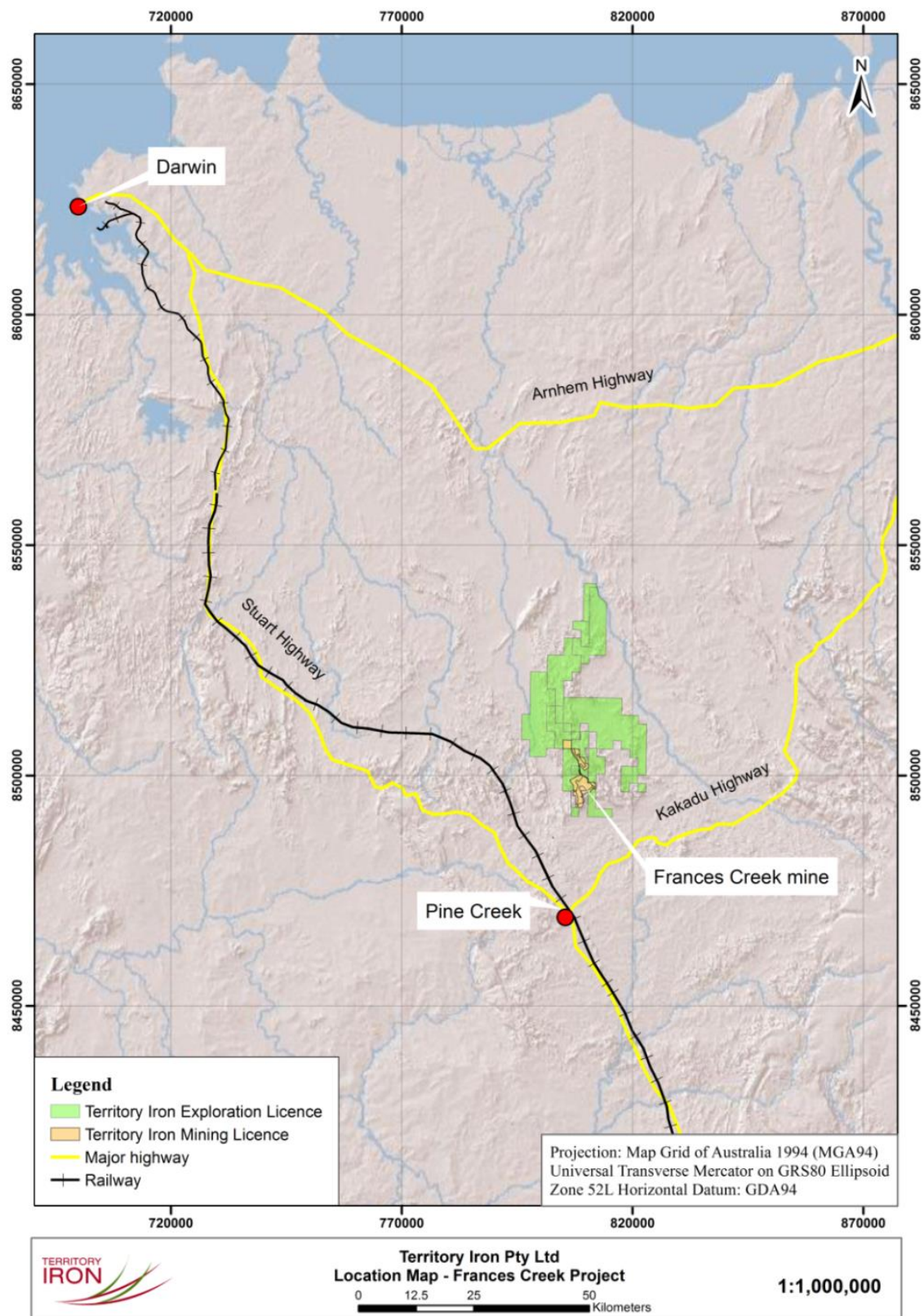
This document and its contents are the copyright of Territory Resources Ltd. and Thundelarra Ltd. The document is intended for submission to the Department of Mines and Energy of the Northern Territory, as part of the tenement reporting requirements of the Minerals Titles Act 2010. Any information included in this report that originates from historical reports or other sources is listed in the 'References' section at the end of this document.

## **Introduction, Location and Access**

This report describes exploration activities conducted on Frances Creek/ Allamber tenement EL23506 by operator Territory Iron Pty Ltd and title holder Element 92 Pty Ltd (wholly owned subsidiary of Thundelarra Limited) from the 8<sup>th</sup> May 2017 to 7<sup>th</sup> May 2018.

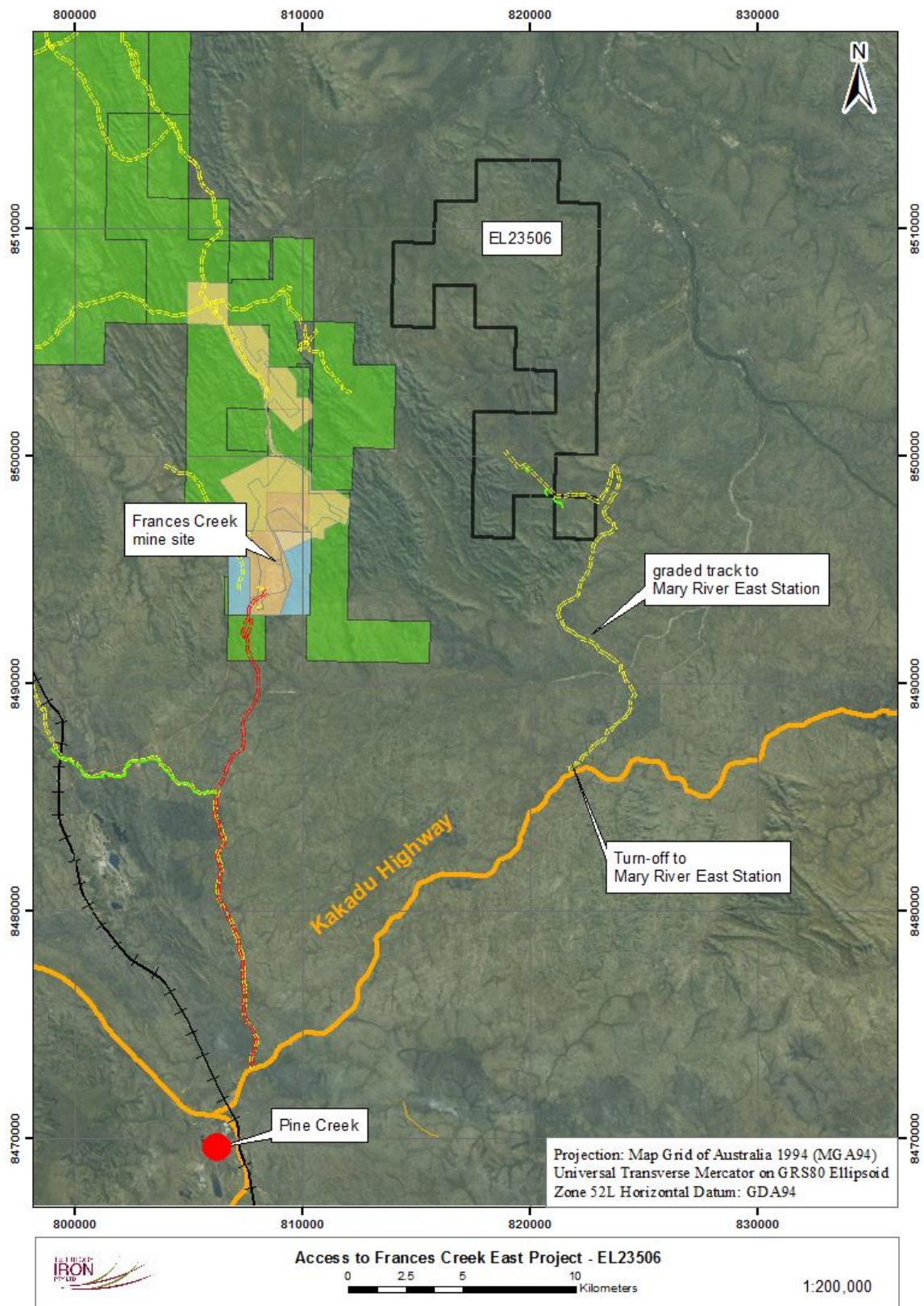
EL23506 is an exploration licence within the Pine Creek Orogen in the Northern Territory. The Frances Creek Project Area is located about 220 km south of Darwin and ~23 km north of Pine Creek town ship, Figure 1.

EL23506 is situated about 16km north-northeast of the current Frances Creek mining operations, Figure 2. Access to the northern area is via unsealed tracks north of the Frances Creek mine operations. The southern area of EL23506 (where Territory Iron has conducted exploration activity) is accessed along the Kakadu Highway (~21km northeast of Pine Creek) and then north via the unsealed Mary River Station road for about 20km. Access to Element 92 Ox-Eyed Herring prospect is also via the Kakadu Highway (~21km northeast of Pine Creek) and then north via the unsealed Mary River Station road for about 35km.



**Figure 1** Location Map of Frances Creek Project with ESRI world shaded relief defining background topographic elevation. Beige polygons represent Frances Creek Mining Leases and green polygons represent Exploration Licences (the remainder of the Frances Creek Project Area)





**Figure 2** Location and access map to southern area of EL23506 (black polygon) relative to the Frances Creek mine site. Mineral Leases are shown in beige, Mineral Authority in blue and Frances Creek Exploration Licences in green. ESRI world satellite imagery defines background relief.

## **Tenure**

Tenement EL23506 was granted on 8<sup>th</sup> May 2003 for a 6 years term with an area of 173.3km<sup>2</sup> covering 52 square blocks. Reduction deferrals were granted on 22/05/2005, 04/04/2006, 02/04/2007, and 17/04/2008. A renewal application was made on 2<sup>nd</sup> February 2009, and granted on 9<sup>th</sup> March 2009.

A request for the reduction of 27 blocks (25 retained) by Element 92 Pty Ltd was approved on the 16<sup>th</sup> July 2015.

## ***Mineral Rights***

Territory Resources Limited holds the exploration rights for iron ore and manganese under a Split Commodity Agreement. This Agreement was originally held with Teelow, Orridge and Clarke (TOC), dating from November 2006. TOC sold their rights to EL23506 to Element 92 Pty Ltd (wholly owned subsidiary of Thundelarra Pty Ltd). Territory Resources Ltd retained the iron and manganese rights to the tenement.

## ***Land Tenure***

Land tenure under the title includes parts of:

- Ban Ban Springs Pastoral Lease, PPL 1111 – NT Portion 695, owned by Ban Ban Springs Station Pty Ltd, PO Box 7207, St Kilda Road, Melbourne, Vic 8004.
- Mary River East Pastoral Lease, PPL 1134 - NT portion 1631, owned by Mary River Wildlife Ranch Pty Ltd, PO Box 137, Pine Creek, NT 0847.

## ***Aboriginal Heritage and Native Title***

Registered native title claims are in place over the pastoral lease:

- DC01/21 (Paddy Huddleston & Ors) – PPL 1111
- DC00/18 (Northern Land Council) – PPL 1134

In July-August 2009, heritage surveying contractor Earthsea Pty Ltd was employed to conduct a detailed heritage survey in the southern portion of the tenement for areas considered prospective for iron mineralisation with the potential to incur drilling activities. A number of archaeological sites protected under the *Heritage Act* 2012 were recorded. More recent heritage surveys by Territory Iron archaeologists in the north-western portion of the tenement recorded additional archaeological sites. All drill programmes and associated land disturbance have been designed to avoid these areas. The remainder of the tenement has not yet been surveyed. Senior Traditional Owners accompanying the archaeological surveys stated that



there were no sacred sites in the survey areas. An Authority Certificate under the *NT Aboriginal Sacred Sites Act 1989* will only be issued should the area ever be mined.

## **Geology**

### ***Regional Geology***

The Frances Creek mine site and adjacent exploration area are located within the Palaeoproterozoic Pine Creek Orogen which forms part of the North Australian Craton. The Pine Creek Orogen covers an area of ~50,000 km<sup>2</sup> and represents a >4 km succession of carbonate, clastic and carbonaceous sedimentary and volcanic rocks, which unconformably overlie Neoarchaeon (~2500 Ma) basement granite and gneiss. Based on the timing of sedimentation, magmatism and metamorphism, the Pine Creek Orogen has been divided into three distinct domains, from west to east; the amphibolite to granulite facies Litchfield Domain, the greenschist facies Central Domain and the amphibolite facies Nimbuwah Domain. The Frances Creek mine site and adjacent exploration area is located within the Central Domain.

The oldest rocks (the Palaeoproterozoic Woodcutters Supergroup) comprise the Namoon Group (Masson Formation) to the east of the Frances Creek project area. They are unconformably overlain by the Mount Partridge Group (Mundogie Sandstone and Wildman Siltstone) which cover the majority of the Frances Creek project. The Mundogie Sandstone (Mount Partridge Group) forms prominent continuous northwest-striking ridges of dominantly coarse, pebbly, feldspathic quartzite and arkosic sandstone (Stuart-Smith *et al.*, 1987). Massive, graded beds of pebble conglomerate are common and units often display graded bedding and lenticular cross-bedding. Subsequent to sedimentation of the Mundogie Sandstone, the Wildman Siltstone (subdivided into two members; the Lower Wildman Siltstone and Upper Wildman Siltstone) were deposited with apparent conformity. The unit mainly comprises metapelitic assemblages with subordinate sandstone. The Lower Wildman Siltstone is host to the majority of the iron mineralisation at Frances Creek.

In the western portion of the Frances Creek project area, the Mt Partridge Group is unconformably overlain by the stratigraphic sequences of the Cosmo Supergroup, comprising the South Alligator Group (Koolpin Formation, Gerowie Tuff and Mt Bonnie Formation) stratigraphic sequence. Subsequent to deposition of these units, pre-orogenic Zamu Dolerite sills intruded these stratigraphic successions.

Syn- to post-orogenic activity is represented by intrusion of the 1835-1800 Ma Cullen Supersuite granitoids. Intrusion of the granite led to contact aureoles in the surrounding pre-orogenic Masson Formation, Mundogie Sandstone and Zamu Dolerite.

Two major episodes of folding are recognised, earlier tight to isoclinal F1 folds followed by younger open (widely spaced) folds (Stuart-Smith *et al.*, 1987). The major structural controls in the tenement area are related to D3 1-3 km scale northwest-trending non-cylindrical folds, which plunge gently to the northwest to form a series of anticlines and synclines pre-dating the intrusion of the Cullen Supersuite, and 1-3 km long northwest and northeast-trending faults.

### ***Local Geology and Mineralisation***

In EL23506 (Frances Creek East) the area mapped includes, (in stratigraphic order), the Palaeoproterozoic Masson Formation (Namoon Group), Mundogie Sandstone (Mount Partridge Group), intrusive, pre-orogenic Zamu Dolerite, all of which are flanked to the east by the intrusive, post-orogenic Frances Creek Leucogranite (Cullen Supersuite), Figure 3. The stratigraphy is structurally controlled by a large northwest-trending anticline, comprising the Mundogie Sandstone which forms prominent ridges to the west and east and the centrally positioned Masson Formation, which forms low-lying valley, floodplain deposits. Resistant ridges within the Masson Formation represent iron and quartz-hematite-goethite mineralised breccias. The iron mineralisation is hosted in the older Masson Formation, which forms the core of the anticline.

The oldest rocks in the Frances Creek East tenement area belong to the Palaeoproterozoic Woodcutters Supergroup. These include the Namoon Group (Masson Formation) and the Mount Partridge Group (Mundogie Sandstone). Although not present in the Frances Creek East region, the Mount Partridge Group also includes the stratigraphically younger Wildman Siltstone which is host to hematite mineralisation in the Frances Creek mine area.

The Masson Formation (Namoon Group) consists of poorly exposed metapelites, minor quartzose sandstone, sandstone, muscovite-tremolite marble (dolomitic schist) and ironstone ridges in the west (Stuart *et al.* 1987). Quaternary alluvium and colluvium covers most of the unit. The Masson Formation is best exposed on slopes close to ridges of the overlying Mundogie Sandstone, where they form interbedded sequences of dominantly metapelite with minor quartzite. The Masson Formation is intruded by Zamu Dolerite sills and the Allamber Springs Granite, where it is extensively hornfelsed at the contact.

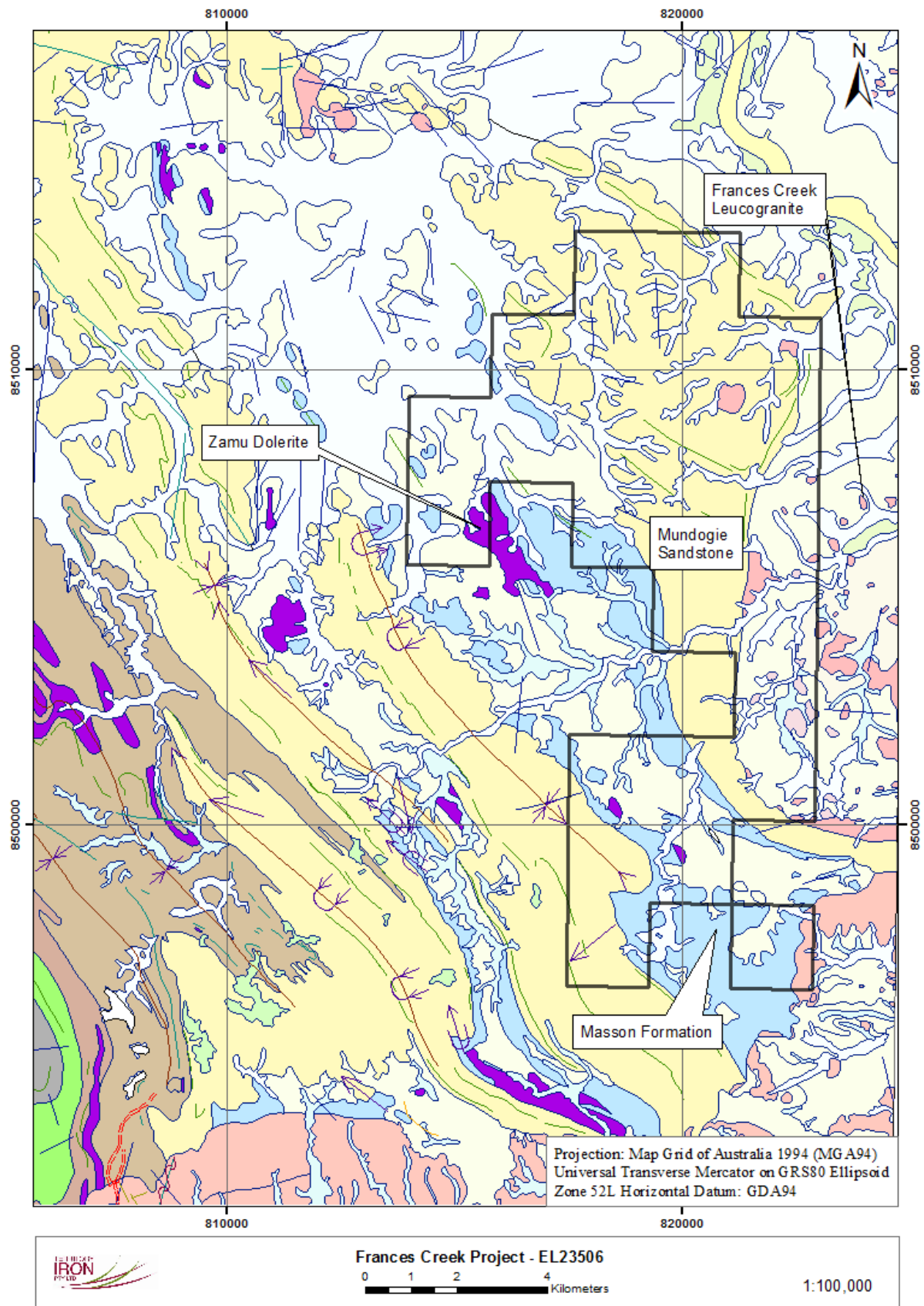
The Mundogie Sandstone (Mount Partridge Group) forms prominent continuous northwest-striking ridges of dominantly coarse, pebbly, feldspathic quartzite and arkosic sandstone (Stuart-Smith et al 1987). Massive, graded beds of pebble conglomerate are common and units often display graded bedding and lenticular cross-bedding. Within the contact aureole with Cullen Supersuite granitoids, the units are recrystallised to micaceous quartzite and metamorphic assemblages include cordierite-mica-hornfels.

Subsequent to sedimentation of the Mundogie Sandstone, the Wildman Siltstone was deposited with apparent conformity. The unit mainly comprises metapelitic assemblages with subordinate sandstone. Although associated with Fe-mineralisation to the east, the stratigraphically younger Wildman Siltstone does not occur in the Frances Creek East tenement area. After deposition of the Namoon Group, pre-orogenic Zamu Dolerite sills intruded the Masson Formation. In dissected valleys, the dolerite has limited outcrop exposure where it subcrops as rounded boulders and rubble. Further to the west in the Frances Creek mine area and surrounds, dolerite(s) intruded the Wildman Siltstone and the overlying South Alligator Group of the Cosmo Supergroup.

Post-orogenic activity is represented by intrusion of the 1835-1800 Ma Cullen Supersuite. The intrusion resulted in contact aureoles in the surrounding pre-orogenic Masson Formation, Mundogie Sandstone and Zamu Dolerite.

Known (outcropping) Fe-mineralisation in Frances Creek East is hosted by the Masson Formation in the southeast portion of the tenement and is documented in Stuart-Smith *et al* (1987). In this region, ironstone ridges are dominantly Fe-breccia with both hematite and goethite, however, goethite-dominated breccias in this region are not deemed to be prospective. The hematite ridges are located on the western boundary of the southern-most portion of EL23506. The local geology is shown in Figure 3.

Iron-bearing oxides include hematite ( $\text{Fe}_2\text{O}_3$ ) and goethite ( $\text{FeO}(\text{OH})$ )  $\pm$  accessory manganese minerals which are associated with goethite. High grade Fe-ore ( $>65\% \text{Fe}$ ) is characterized by hard, grey, massive hematite or friable purple, microplaty hematite. These ores can range from extremely fine grained to coarse grained and bladed with numerous irregularly shaped vugs and skeletal-textures reminiscent of boxworks, in which vugs are often filled with late-crystallising, coarse-grained hematite. Goethite occurs as both ochreous and vitreous forms.



**Figure 3** The tenement boundary for EL23506 (shown as a black polygon) overlying the local geology for EL23506.

## Previous Exploration Activities – 2016-2017

### *Element 92 Pty. Ltd*

#### *Drilling*

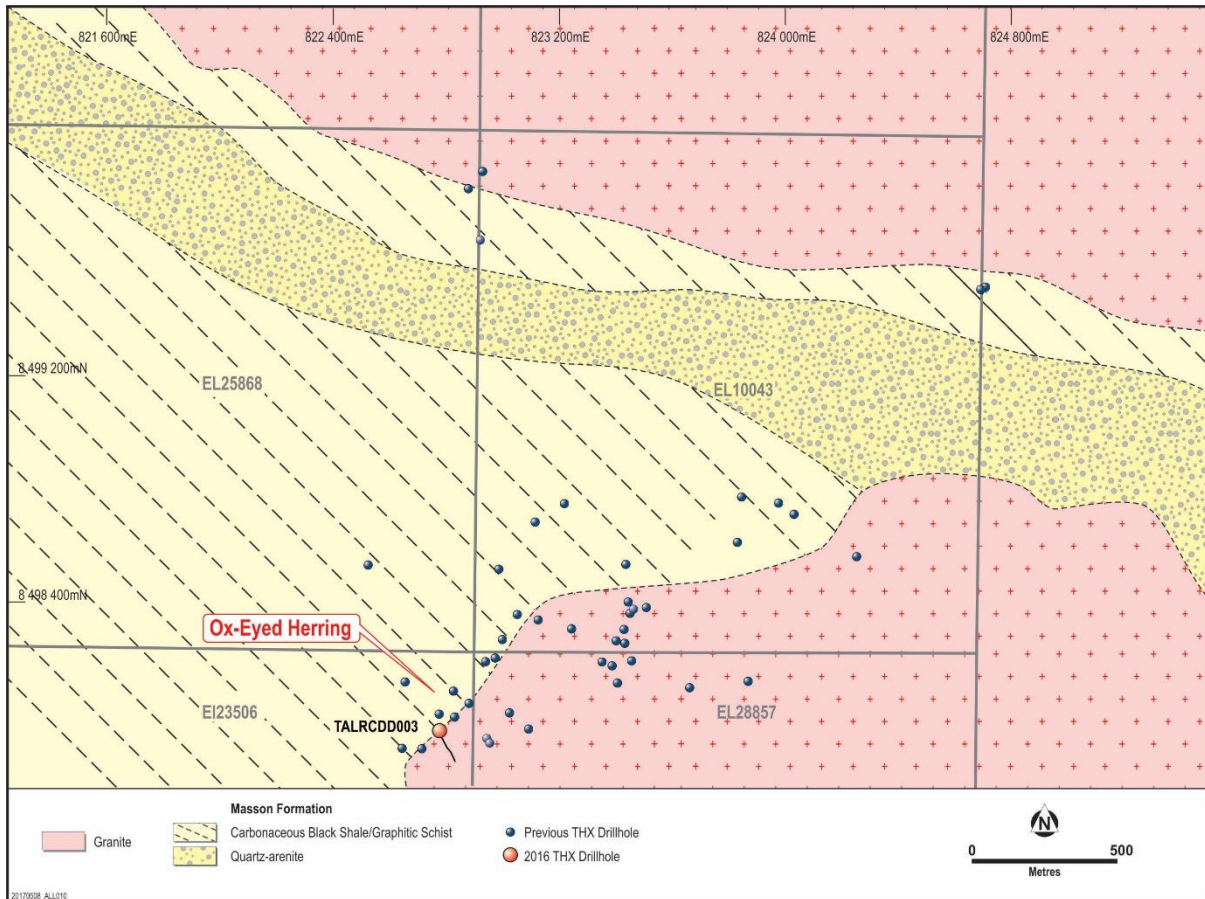
A programme of one diamond (DD) Drillholes (TALRCDD003), for a total advance of 182.7m, was carried out at Allamby, focusing on the Ox-Eyed Herring prospect (**Error! Reference source not found.**). The main objective of the Ox-Eyed Herring drilling was to test the extension at depth of the large conductor previously identified by the FLEM (Fixed Loop ElectroMagnetic) ground survey (purple on **Error! Reference source not found.**).

Drillhole location displayed in Table 2. Rock chip samples from the DD drilling were first tested using hand-held XRF to identify zones of significant anomalism. Zones identified as interesting were sent for laboratory assay.

**TALRCDD003** was drilled south-easterly from the same pad of TALRC136 and aimed a strong off hole conductor from that hole. This hole has intersected the best mineralisation consisting of massive sulphides, mainly pyrrhotite with blebs of chalcopyrite and thin zones of quartz breccia with mostly chalcopyrite. The former appears to be related to later mineralised events. The best mineralisation was intersected between 154.75m to 164m ([9.25m@1.05%Cu](#)) with thin intervals of higher grade copper and is associated with elevated silver, bismuth, tin and tungsten values (**Table 3**).

**Table 2 Drillholes Location**

Hole ID	East	North	RL	Grid ID	Depth	Az	Dip	Tenement
TALRCDD003	822774	8497937	147	GDA94z52	182.7	160	-60	EL23506

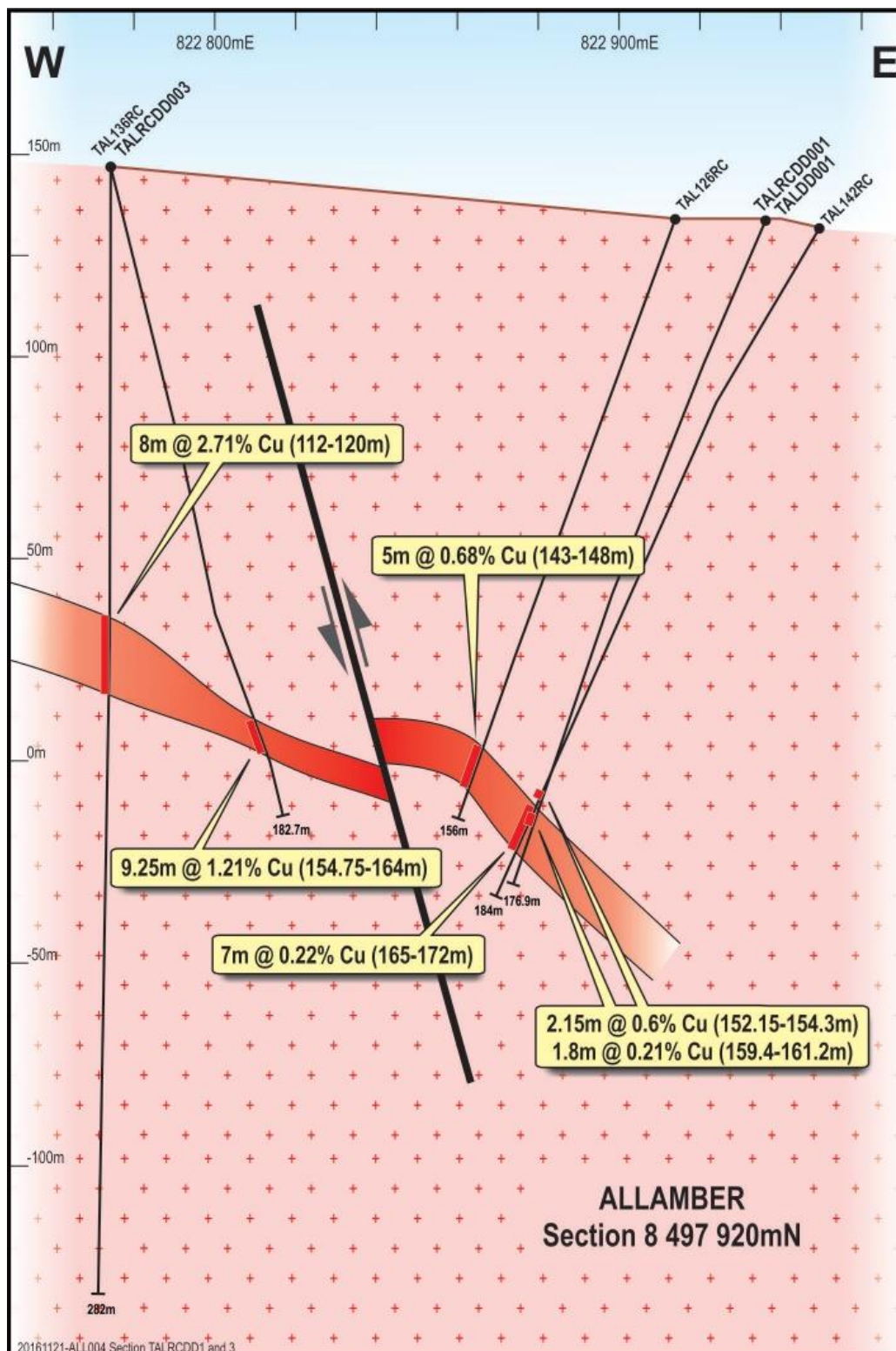


**Table 3 TALRCDD003 best intersects**

Hole ID	From	To	Interval	Cu	Pb	Zn	Ag	Bi	Sn	W
TALRCDD003	154.75	155.6	0.85	4436	101	61	10	9.79	22	15.6
TALRCDD003	155.6	156	0.4	10387	110	52	13	6.22	92.2	10.5
TALRCDD003	156	157	1	19028	106	47	20	8.69	77.3	10.5
TALRCDD003	157	158	1	7512	92	8	10	5.99	24.7	9.81
TALRCDD003	158	159	1	19840	76	23	19	2.65	65.4	5.85
TALRCDD003	159	159.6	0.6	17484	90	20	18	2.33	52.8	114
TALRCDD003	159.6	160.5	0.9	3092	84	L	6	2.09	3.17	7.4
TALRCDD003	160.5	161.5	1	18934	82	26	17	2.75	61.4	13.2
TALRCDD003	161.5	162.3	0.8	1792	89	35	4	3.27	10.3	8.91
TALRCDD003	162.3	162.95	0.65	34134	133	353	40	11.3	121	5.2
TALRCDD003	162.95	164	1.05	1356	58	20	2	2287	16.1	11.7



Figure 6 Drillhole cross section of Ox-Eyed Herring



### *Petrography*

Two petrographic studies on samples from drillhole TALRCDD003 were undertaken: one optical microscopy study on six rock chip samples and one SEM and LA-ICPMS analysis on two samples.

## **Exploration Activities – 2017-2018**

### ***Element 92 Pty. Ltd***

EL23506 lies on the Mary River East station, previously held by Mr Kevin Gleeson who ran a hunting safari operation there under his pastoral lease. He died in 2016 and the station was not sold until mid 2017. Since then we have not been able to establish contact with the new owners to negotiate and implement a land access agreement as required under NT regulations and consequently have not been able to undertake the planned field work.

Exploration activity within EL23506 for the reporting year was limited to field visits by personnel to evaluate the status of remediation, desktop studies and evaluation of earlier acquired data.

## **Conclusions and Recommendations**

### ***Territory Resources Ltd***

Proposed activities for next operational year are a review and digitisation of Element 92 information once acquired stakeholder engagement for development of MMP-exploration, field trips to confirm exploration targets, historical grades, finalise work plans for MMP-exploration surface sampling and re-sampling of drill core and drill samples where possible.

### ***Element 92 Pty. Ltd***

During the reporting period, Element 92 was not able to undertake the planned field work after not been able to establish contact with the new stations owners as required under NT regulations. Consequently, exploration activities were limited to field visit and evaluation of rehabilitation status.

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