



# ANNUAL COMBINED REPORT GR-051/09

## Exploration Licences 23862 & 24329

### Tiwi Islands Northern Territory

### For period 01/04/2017 – 31/03/2018

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Target Commodity: Mineral Sands

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## 1.0 ABSTRACT

This combined annual report covers EL23862 and EL24329 for the period 01/04/2017 to 31/03/2018 for which there is combined reporting status with the reporting date of 30 May 2018. The ELs are located on Melville and Bathurst Islands which form the Tiwi Island group in the Northern Territory (see Figure 1).

In the reporting year the primary focus of MZI Resources has been assessing the existing leases for alignment with the corporate strategy with regards to environmental constraints and the tenor and scale of any future mining development. The Annual Environment Report & Mine Closure Rehabilitation Plan for the 3 MZI Mining Leases adjacent to EL23862 was also submitted to the department in October 2017.

The improved sentiment in concentrate prices has increased the interest in mineral sand exploration and an environmental review and value adding exploration is now relevant to progressing prospects on the two tenements. These activities are planned in the next period.

## 2.0 INTRODUCTION

MZI entered into an agreement to purchase the Tiwi Island tenements and assets from Stirling Zircon Pty Ltd in 2009. Stirling Zircon had obtained the titles and assets from the receiver manager of Matilda Minerals 'Matilda' in June 2009, following Matilda being placed into administration in late September 2008. The collapse of the wharf at Garden Point prevented Matilda Minerals from shipping out a large tonnage of concentrate and therefore the company could not meet its financial obligations and had little choice except to appoint an administrator to the company. The islands are wholly within the Tiwi Island Aboriginal Land Trust administered by the Tiwi Land Council ("TLC"). Matilda signed an agreement with the TLC on 19 December 2003 which set conditions for the exploration and mining development activity. The 2003 agreement has been the basis for the exploration and operational activities of MZI Resources since it took ownership of the assets.

Since 2009 MZI has conducted mining at Andranangoo (ML24510), Lethbridge West (ML24511) and Lethbridge South (ML27438). These ML's were identified from exploration within EL23862. The heavy mineral grades and mineral assemblages along the north coast of Melville Island are very attractive economically however the small size of orebodies is a major impediment to justifying a mining project.

### 3.0 PHYSIOGRAPHY

The climate of the Tiwi Islands is tropical monsoonal, with warm dry winters and hot wet summers. The annual average rainfall is 1200mm – 1400mm in the eastern part of Melville Island to 1800mm – 2000mm in the north-west of Melville Island and north of Bathurst Island. The majority of the rain falls between December and April under the influence of the northwest monsoons. Temperatures range from a mean of 35°C to 21°C in summer, and 26°C to 18°C in winter.

The topography of the islands is characterised by relatively low relief, dominated by partially dissected plateau rising to 100m above sea level, interspersed with broad valleys, riverine lagoons and estuarine tidal flats. The coastline varies from more exposed low cliffs and beaches to large estuaries and extensive tidal flats.

The vegetation is consistent with a tropical savannah regime, dominated by dense eucalypt and acacia woodland in the hinterland and more prominent coastal fringe, while melaleuca (paperbark) forests predominate along the watercourses. Mangroves proliferate around tidal flats, while casuarina trees and pandanus palms fringe the coastline.

### 4.0 TENURE

This report covers the following Exploration Licenses:

Table 1 Tenements

Tenement number	Date granted	Date expiry	Blocks	Commitment Past 12 months	Expenditure past 12 months
EL23862	1/04/2004	31/03/2020	39	\$59,000	\$22,000
EL24329	24/01/2005	23/01/2019	28	\$63,000	\$21,000
Total				\$122,000	\$43,000

The tenements have combined reporting status as follows:

Combined report start	Combined report end	Report due
1 April	31 March	30 May

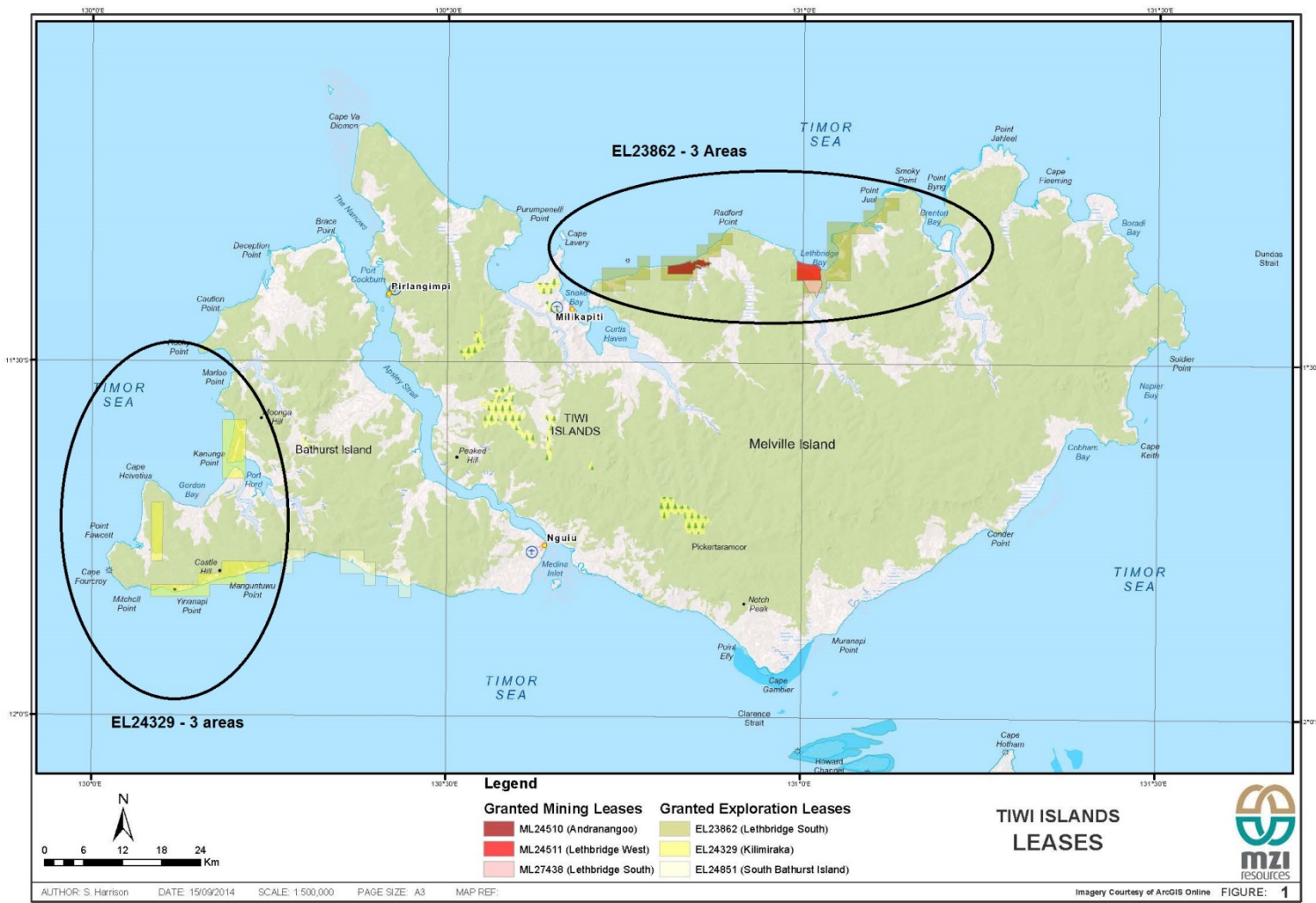


Figure 1. Tiwi Islands – Tenement and Prospect Locations with reference to EL23862 and EL24329

## 5.0 GEOLOGY AND GEOMORPHOLOGY

### 5.1 Geology

The oldest rocks exposed on Bathurst and Melville Islands are represented by the Upper Cretaceous Moonkinu Member (Hughes, 1977). This formation consists of fine to very fine sub-labile sandstone, along with interbedded grey carbonaceous mudstone and siltstone, of shallow marine to deltaic derivation. The Moonkinu Member is exposed at the base of coastal cliffs (figure 2), particularly along the southern coastline of Bathurst and Melville Islands, and in lower lying portions of the hinterland.



Figure 2. Book leaves of kaolin (Moonkinu Member) at high tide mark on the south coast of Bathurst Island EL24329.

The Moonkinu Member is unconformably overlain by the Tertiary Van Diemen Sandstone, which dominates the geology of the Tiwi Islands. This formation comprises a friable, white to yellow, medium to coarse-grained quartzose sandstone with subordinate intercalations of grey carbonaceous mudstone and siltstone of fluvial to paralic derivation. The Van Diemen Sandstone broadly dips very gently to the north, becoming thicker in the process, with the unit exposed over a 60m vertical interval at Cape Van Diemen at the extreme north-western tip of Melville Island.

Both the Moonkinu Member and Van Diemen Sandstone are unconformably overlain by unconsolidated Quaternary fluvial, paralic, deltaic and littoral deposits. The most economically significant of these are the Pleistocene age littoral quartzose sands associated with the palaeo-shoreline. Holocene (recent) littoral deposits have accumulated along the present coastline, variously abutting or transgressing the Cretaceous, Tertiary and Pleistocene deposits.

## 5.2 Geomorphology

The Van Diemen Sandstone dominates the geomorphology of both Bathurst and Melville Island, forming low partially dissected and lateritised plateau, which are frequently capped by ferruginous to bauxitic pisolitic laterite accumulations. Low red cliffs, nick-points and platforms of Van Diemen Sandstone are developed along or adjacent to the more exposed portions of the coastline.

In many instances the Tertiary sea cliffs are preserved from further erosion by accumulations of Pleistocene and/or Holocene littoral deposits. The Pleistocene sands are distinguishable from their Holocene counterparts by a mild orange, pink or red discoloration, and are invariably developed as one or more low amplitude, but strike persistent strandlines, with a wavelength characteristically in tens, rather than hundreds, of metres. However an exception to this is the Kilimiraka Sand dunes on the South Coast of Bathurst Island which due to the significant wind regime has a series of large barchan dunes of Pleistocene age.



Figure 3. Pleistocene age barchan dunes at Kilimiraka EL24329

The Holocene deposits generally appear to be cleaner and marginally finer grained than their Pleistocene equivalents, incorporating a more significant proportion of coquina and coralline debris. Along the north coast of the islands the present day beaches appear to have accumulated as strandlines directly against the Tertiary escarpment or as a composite strand plain successively comprising both the Holocene and Pleistocene deposits. Holocene dune deposits transgress the older strandlines on several beaches that are more exposed to the prevailing north-westerly monsoonal winds.

Heavy mineral ("HM") sand accumulations are present within both the Pleistocene and Holocene strands. The immediate provenance of the HM is the Van Diemen Sandstone itself, which contains thin laminae of HM identical in composition to the mineral sands. The Pleistocene and Holocene deposits have therefore been subjected to two cycles of erosion and deposition, being originally derived from the Lower Proterozoic igneous and metamorphic complexes of the Pine Creek Geosyncline on the mainland to the south.

Heavy mineral accumulations, be they Pleistocene or Holocene, appear to be best developed immediately adjacent to the Tertiary Van Diemen Sandstone escarpment from whence they are derived, with successive strandlines being considerably and progressively more depleted in HM away from the scarp. This preferential accumulation of HM immediately adjacent to the Van Diemen Sandstone can be readily witnessed in the present day environment near Cape Fourcroy, located at the extreme south-western tip of Bathurst Island. Here, although limited in extent, HM species represent the only sand preserved on a wave-cut platform at the base of an extensive cliff of Van Diemen Sandstone.

Recent dating of the underlying shelly coquina at the Lethbridge South deposit on Melville Island has recorded a carbon date of 2000 years old.



## 6.0 PREVIOUS EXPLORATION BY MATILDA MINERALS

The following tables summarise exploration carried out by Matilda Minerals on the Tiwi Islands Exploration Licences in 2004-2008.

**Table 2 – Summary of Exploration Activity 2004-2008**

<b>Exploration activity - 2004</b>	<b>Comments</b>
Data compilation	Compilation of all previous exploration
Aerial photography and Digital Terrain Mapping	Stereo air photo coverage of the coastal plains at $\pm 1:15000$ scale DGPS surveying; production of orthophotos for Andranangoo Creek West and Lethbridge Bay West
Ground magnetic mapping	Andranangoo Creek West and Lethbridge Bay West
Helicopter-supported reconnaissance	Reconnaissance sampling – 153 samples, EL 24330, EL24332, EL24333 and others
Air core drilling	Andranangoo Creek West – 171 holes 669m Lethbridge Bay West – 172 holes 895m
Modal analyses	Andranangoo Creek West – 7 Lethbridge Bay West – 5
Bulk sampling and metallurgical test work	1 x 1000kg ACW 1 x 1000kg LBW

<b>Exploration activity - 2005</b>	<b>Comments</b>
Ground magnetic mapping	Puwanapi; Wangati North; Wangati South, Atauini Point; Murrow Point, Deception Point; Brace Point; Kili Impini
Air core drilling 2787 holes – 9134.9 metres	Andranangoo Creek West - 1916 holes; 5827m Lethbridge Bay West - 98 holes; 313m Andranangoo Creek East - 248 holes; 723.5m Radford Point - 28 holes; 66.4m Lethbridge Bay South - 139 holes; 447m Cache Point – 30 holes; 90m Puwanapi – 310 holes; 1596m Wangati North – 18 holes; 72m
Reconnaissance sampling	584 auger holes; 243 sampling using a spade
Auguring (shell)	145 holes – 266.8 metres

<u>Table 2 (cont)</u>	
Modal analyses of heavy mineral concentrates	Total samples= 27 consisting: Andranangoo Creek West – 18 Andranangoo Creek East – 4 Radford Point – 1 Goose Creek West – 1 Robinson Inlet East – 2 Lethbridge Bay South – 1
Costeaming	Andranangoo Creek West - 6 costeams
Bulk sampling and metallurgical test work	Andranangoo Creek West - BSA C- 4 & BSA C - 6
Ore Reserve/Resource estimation	Andranangoo Creek West and Lethbridge Bay West; Puwanapi
Surveying	Drill hole pick - up
Feasibility and ore reserve estimation	Andranangoo Creek West and Lethbridge Bay West

**Exploration activity – 2006-2008**

Prospect	Date	Number of holes	Sample # start	Sample # end
Andranangoo Creek East	June	28	13316	13343
Goose Creek East	May	1	13070	13070
Lethbridge Bay South	April	47	13000 13047	13024 13068
Lethbridge Bay South	June	164	13374	13537

<u>Table 2 (cont.)</u>	Date	Number of holes	Sample # start	Sample # end
Lethbridge Bay South	July	25	13639	13663
Lethbridge Bay South	July	99	14005	14103
Lethbridge Bay South	August	80 40	14104 17019	14183 17058
Robinson East	July	46	13593	13638
<b>Totals</b>		<b>530</b>		

Prospect	Date	Number of holes	Sample # start	Sample # end
Wangati North	July	228 21	13664 13912	13891 13932
Atauini Point (Wangeroo)	July	64	13933	13996
Wangati South	July	20	13892	13911
One Tree Point	July	8	13997	14004
One Tree Point	Oct	19	17990	18008
<b>Totals</b>		<b>360</b>		

Note: not all Wangati North and Wangati South samples were analysed.

Prospect	Date	Number of holes	Sample # start	Sample # end
One Tree Point (Bathurst South)	Feb 2007	81	18283	18363
<b>Totals</b>		<b>81</b>		

All digital data has been previously provided to the department by Matilda Minerals.

## 7.0 EXPLORATION ACTIVITIES

In the reporting year the primary focus of MZI Resources 'MZI' has been in formulating an exploration strategy which is consistent with a mature environmental approach and is of a relevant scale to suit the tenor of currently known mineralisation.

In addition the Annual Environment Report & Mine Closure Rehabilitation Plan for the 3 MZI Mining Leases adjacent to EL23862 was also completed in October 2017 and has been filed with the department.



Figure 4. Tingati Barchaan Dunes – South West Bathurst Island – an environmental and logistically challenging prospecting target

The minimum benchmarks for expenditure in the next period are as in Table 3.

Table 3. Exploration Expenditure Minimum guideline 2018/19

Licence	Grant Date	Blocks Held	Proposed Covenant
EL24329	24/1/2005	28	\$45,000
EL23862	1/4/2004	39	\$35,000

## 8.0 DISCUSSION AND RECOMMENDATIONS

The current two pronged strategy is to ensure a proactive approach is taken to managing environmental risk prior to exploration and also to ensure exploration expenditure is directed at value adding activities. Two activities are recommended:

- a) An environmental review is recommended for EL23862 (Lethbridge)
- b) A geochemical auger program is recommended for EL24329 (Kilimiraka).

## 9.0 REFERENCES

**Baxter J and Cox S, (2009). *Tiwi Island Review. Matilda Zircon unpubl report.***

**Hall R, (2009). *Puwanapi and Radford Point Mineral Leases, Environmental Assessment, Olympia Resources unpubl report.***

**Hughes, R. J. (1977). *The geology and mineral occurrences of Bathurst Island, Cobourg Peninsula Northern Territory.* Canberra: AGPS.**

**Reilly, T and Brady, C, (2017) Mine Rehabilitation and Closure Plan**