



**EL 23993 'Abner Extended'**  
**MCARTHUR RIVER REGION, NT**

**REPORT ON BLOCKS RELINQUISHED**

**AT CONCLUSION OF  
YEAR THREE OF TENURE  
PERIOD ENDING 6 May 2007**

**Submitted by**

**GRAVITY DIAMONDS LIMITED**  
**(ABN - 72 009 178 689)**  
**Level 7, Exchange Tower**  
**530 Little Collins Street, Melbourne, Victoria, 3000**

EL 23993 'Abner Extended'  
Holder: Gravity Diamonds Ltd  
Grant Date: 6 May 2004  
1:250,000 Sheet: Bauhinia Downs SD53-03  
Minerals Sought: diamonds, base metals

## SUMMARY

EL 23993 ('Abner Extended') was granted to Gravity Diamonds Ltd ('Gravity') on 6 May 2004.

Gravity, through its wholly owned subsidiary, Diamond Mines Australia Ltd (DMA), has an agreement with BHP Billiton to utilise BHP Billiton's Falcon® airborne gravity gradiometer system in diamond exploration in Australia and Gravity has established a number of diamond projects in northern Australia using this technique. The Falcon® system has proven very effective in detecting kimberlite pipes in Canada, Africa and in Australia. The BHP Billiton – DMA 'Falcon Agreement' allows DMA to conduct exploration using Falcon® and BHP Billiton retains certain buy-in rights to major discoveries.

During the first year of tenure, a review of available geophysical and historic sample data was carried out by Gravity and this confirmed the potential for diamondiferous kimberlites to be located within the McArthur River region.

Falcon® airborne gravity data was acquired, processed and interpreted over approximately 20% of the total tenement area. Falcon coverage with regard to the relinquished blocks amounted to 4 km<sup>2</sup>.

During the second year of tenure, exploration undertaken within EL 23993 relevant to this relinquishment report comprised the acquisition of detailed aerial photography over all of EL 23993. Fugro Spatial Solutions flew these surveys at 1:25,000 scale.

During year three of tenure, exploration undertaken within EL 23993 relevant to this relinquishment report comprised the acquisition of detailed helicopter-borne EM data over an area of approximately 68 km<sup>2</sup> within the tenement at a line spacing of 80 metres. Hoistem coverage with regard to the relinquished blocks amounted to approximately 1 km<sup>2</sup> only.

Further details regarding these exploration activities are contained in this report.

At the conclusion of year 3 of tenure, application for partial waiver was lodged with DPIFM with respect to 31 of 43 blocks which were required to be relinquished in accordance with statutory 50% reductions at the conclusion of year 3.

Exploration carried out by Gravity since the grant of EL 23993 suggests limited potential exists for locating an economic diamond deposit within the 12 blocks relinquished.

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## **INTRODUCTION**

EL 23993 'Abner Extended' was granted to Gravity Diamonds Ltd ('Gravity') on 6 May 2004.

Gravity, through its wholly owned subsidiary, Diamond Mines Australia Ltd (DMA), has an agreement with BHP Billiton to utilise BHP Billiton's Falcon® airborne gravity gradiometer system in diamond exploration in Australia and Gravity has established a number of diamond projects in northern Australia using this technique. The Falcon® system has proven very effective in detecting kimberlite pipes in Canada, Africa and in Australia. The BHP Billiton – DMA 'Falcon Agreement' allows DMA to conduct exploration using Falcon® and BHP Billiton retains certain buy-in rights to major discoveries.

While the principal target in the area is diamonds, some interest is also directed toward base metal deposits.

## **LOCATION AND ACCESS**

EL 23993 is located approximately 80 km southwest of Borroloola and 700 km south east of Darwin, Northern Territory, Australia. The EL comprises part of Gravity's McArthur Diamonds Project located approximately 50 km to the west of the Merlin Diamond Mine.

Land use within EL 23993 is predominantly pastoral leasehold, mainly for cattle grazing. Access to the area is provided by the sealed Carpentaria Highway, the Tablelands Highway and then via station tracks. The Tablelands Highway intersects the Carpentaria Highway next to the Abner Range at Cape Crawford (Figure 1).

## GEOLOGICAL SETTING AND ECONOMIC POTENTIAL

EL 23993 overlies a small portion of the Batten Trough of the Mesoproterozoic (1800-1400Ma) McArthur Basin. The project is located proximal to the contact between the Proterozoic McArthur Basin in the north and the unconformably overlying Cambrian Georgina Basin in the south. The 1800-1400Ma stratigraphy and mineralisation of the Batten Trough, from youngest to oldest, can be summarized as follows:

- Roper Group.
- Nathan Group (or Mt Rigg Group).
- McArthur Group.
- Tawallah Group.

EL 23993 overlies the Abner Range syncline that forms a prominent plateau in the surrounding landscape (Figure 2). In the Batten Trough, the older Tawallah and McArthur Groups dominate in outcrop; however, in the Abner Range syncline the younger Nathan Group and lower Roper Group are exposed. The Tawallah and Hot Springs Faults, that trend approximately N-S, lie on the western and eastern margins of the Abner Range syncline, respectively. These two major faults are parallel to, and probably broadly sympathetic to, and coeval with, the Emu Fault that defines the eastern margin of the Batten Trough. The lower Devonian diamond pipes of the Merlin field lie proximal to the Emu Fault.

Remnant outliers of Cambrian sediments are widespread and unconformably overlie the Batten Trough's Proterozoic sequences. In the Abner Range syncline there are mapped remnant outliers of Cambrian Bukalara Sandstone lying on top of the plateau.

Two small, kimberlitic sandstone breccia pipes and 1 kimberlite pipe are known to have intruded the Bukalara Sandstone in the Abner Range. These intrusions are probably of lower Devonian age.

Thin, flat-lying, lateritised Cretaceous sediments belonging to the Dunmarra Basin form outliers on the Abner Range plateau. In the McArthur and Georgina Basins these Cretaceous sediments fill and are locally preserved within karstic sinkholes. They are also known to fill "karst-like" sinkhole depressions overlying kimberlite diatremes. These Cretaceous sediments are also thought to be a potential source of secondary kimberlite indicator minerals.

Cenozoic laterite and transported sediments are widespread over the Abner Range plateau. Lateritisation during the Cenozoic-Quaternary period was widespread in the region but appears to have mainly affected the flat-lying blanket of Cretaceous sediments.

## **PREVIOUS EXPLORATION**

Exploration by Ashton Mining and CRA Exploration during the last two decades for diamondiferous kimberlitic diatremes in the Batten Trough region resulted in the discovery of the low grade EMu kimberlites by CRA in the 1980's and the Merlin kimberlite field by Ashton in the early 1990's. Commercial diamond production from the Merlin kimberlites commenced in 1999.

CRA Exploration originally defined the substantial kimberlitic chromite anomaly that was tracked to a large, fracture-controlled ravine in the Abner Range Plateau, immediately southwest of EL 23993.

More detailed evaluation by Ashton Mining of the Abner Range kimberlitic chromite anomaly revealed a small, circular fracture/breccia geomorphic feature located on the Abner Range Plateau. Additional sampling and then drilling confirmed the feature was a sandstone breccia pipe, 80m in diameter, with an ultramafic component and containing abundant kimberlitic chromite and micro-diamonds.

Limited detailed exploration work has been previously reported within the area currently covered by EL 23993 although coarsely spaced regional gravel sampling for diamond exploration has been undertaken.

## **WORK COMPLETED ON RELINQUISHED BLOCKS**

During the first year of tenure, a review of available geophysical and historic sample data was carried out by Gravity and this confirmed the potential for diamondiferous kimberlites to be located within the McArthur River region.

Falcon® airborne gravity data was acquired, processed and interpreted over approximately 20% of the total tenement area. Falcon coverage with regard to the relinquished blocks amounted to 4 km<sup>2</sup>.

The Falcon® system was developed by BHP Billiton in the late 1990s. The system records gravity gradient data via a system of accelerometers. This gradient data is transformed to produce the vertical gravity gradient ('Gdd') which approximates the first vertical derivative of the vertical component of the gravity field. An integral transformation on 'Gdd' is applied to generate 'Gd', which approximates the vertical component of the gravity field itself. Conventional total magnetic intensity is also acquired as is laser scanner data, which is used to construct a very accurate (1m vertical resolution) digital elevation model.

Field acquisition was done by Fugro Airborne Surveys under a contract with BHP Billiton, with whom Gravity Diamonds has the Falcon® agreement. The survey was flown on north south oriented lines, 100m apart at a height of 80m above ground level. Data was processed by BHP Billiton's Falcon Operations Group and delivered to Gravity in 2004.

Detailed interpretation, anomaly ranking and exploration targeting from the Falcon® data by Gravity was completed in 2004. No targets were selected for follow up within the relinquished portions of EL 23993. Falcon® coverage within the relinquished blocks is illustrated in Figure 4. Falcon® digital data and the acquisition / processing report has previously been submitted to the DPIFM.

During the second year of tenure, exploration undertaken within EL 23993 relevant to this relinquishment report comprised the acquisition of detailed aerial photography over all of EL 23993. Fugro Spatial Solutions flew these surveys at 1:25,000 scale. Digital data received from Fugro Spatial Solutions has recently been submitted to the DPIFM.

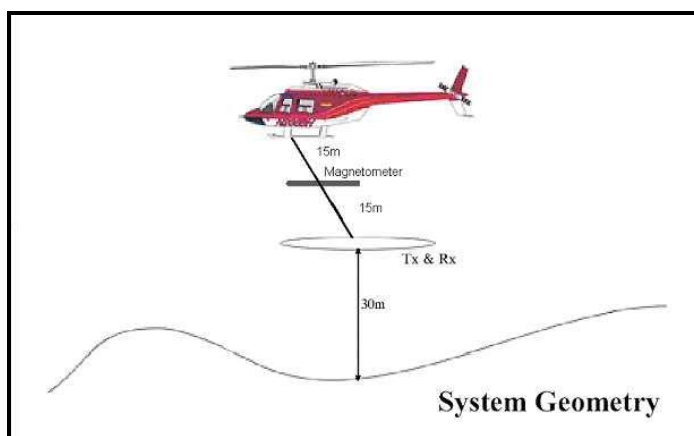
During year three of tenure, exploration undertaken within EL 23993 relevant to this relinquishment report comprised the acquisition of detailed helicopter-borne EM data over an area of approximately 68 km<sup>2</sup> within the tenement at a line spacing of 80 metres. Hoistem coverage with regard to the relinquished blocks amounted to approximately 1 km<sup>2</sup> only and is illustrated in Figure 5.

No targets were selected for follow up within the relinquished portions of EL 23993.

### **Hoistem Survey**

GPX Airborne Pty Ltd were contracted to fly the survey in October 2006. The Hoistem MkII helicopter borne time-domain electromagnetic system comprises 21 channels of electromagnetic data, as well as supplementary magnetic (TMI) and digital terrain (DTM) data.

The transmitter loop operates at a base frequency of 25Hz with a single turn receiver coil co-axial and co-planar with the transmitter coil (in-loop configuration) and is towed approximately 30 m below the helicopter as illustrated below.



The transmitter / receiver configuration has a nominal 35 metre terrain clearance. Helicopter survey speed is between 35 and 45 knots, resulting in an along line sample interval of between 8 and 10 metres for the acquired EM data. The primary waveform used is a 25% duty cycle square wave, with a 5ms current on-time (including 1ms cosine ramp on) and 15 ms current off-time. The receiver measures the Earth's response during the current-off time. The maximum pulse current used is 320 Amps.

The helicopter is also equipped with a bird-mounted Geometrics G822A Cesium vapor, optically pumped magnetometer, continuously sampling at 1200 Hz. Nominal terrain clearance for the bird is 50 metres. The recorded magnetic readings are progressively 'resampled' to produce 25 Hz TMI data in an effort to minimise bias caused by the EM system. The along line sample interval of the acquired magnetic data is 1 metre. Additionally, a Geometrics G856 magnetometer was used as a base station to record diurnal variations in the earth's magnetics field to an accuracy of better than 0.1nT.

## **ENVIRONMENT AND REHABILITATION**

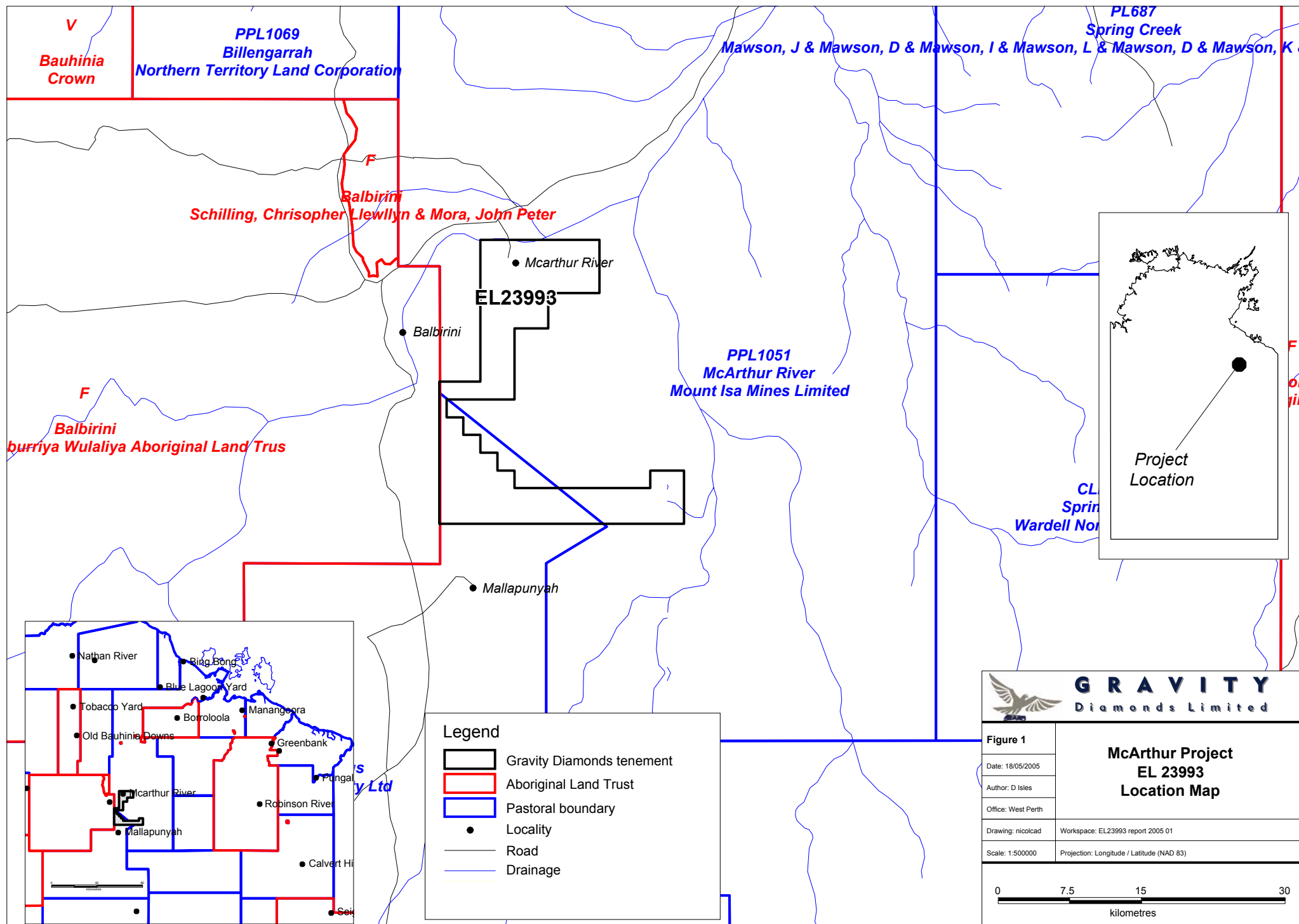
No requirement for rehabilitation arose with regard to the 12 blocks relinquished from EL 23993. Exploration within the relinquished blocks has been limited to the acquisition of airborne geophysical data and aerial photography.

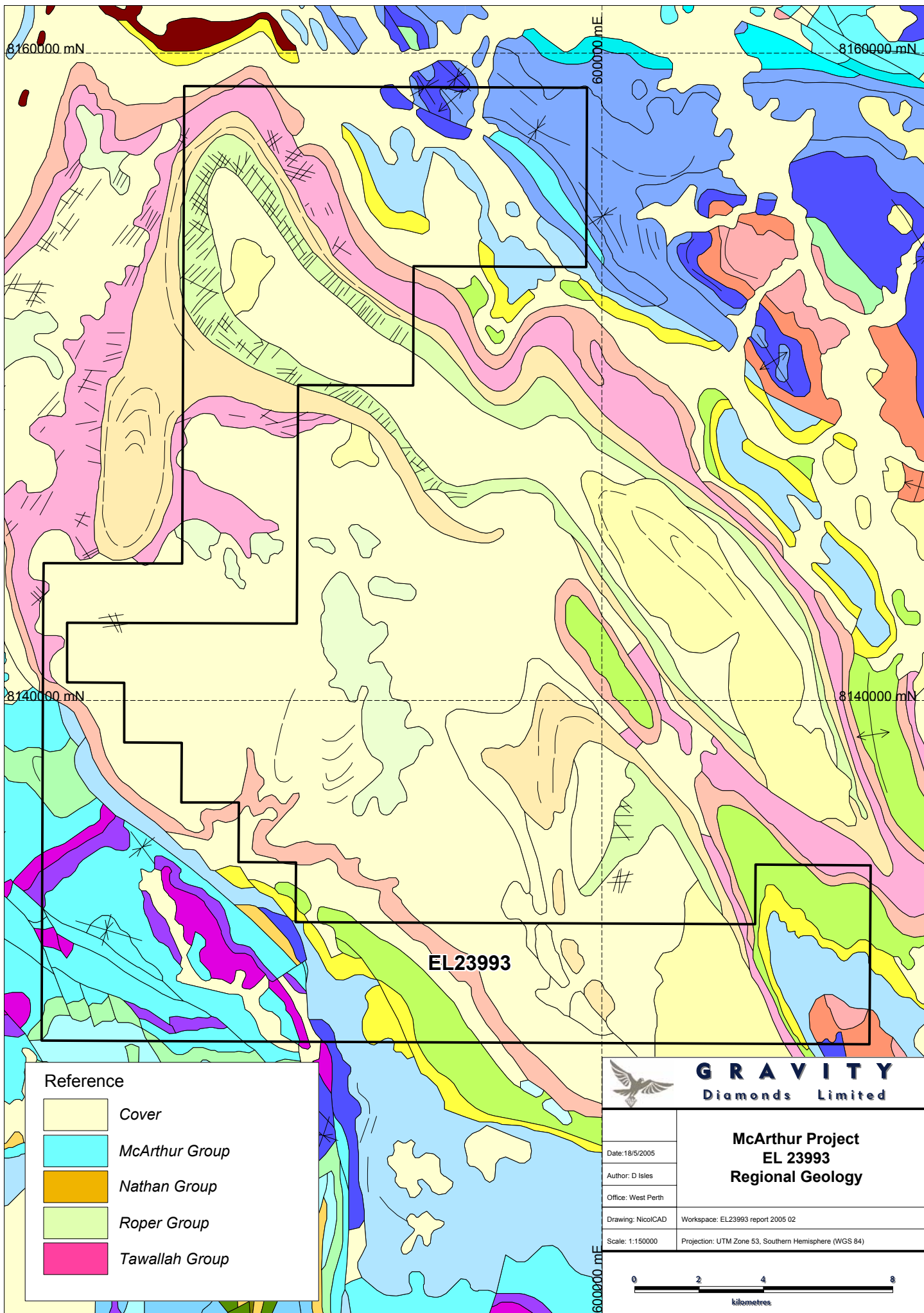
## **CONCLUSIONS AND RECOMMENDATIONS**

EL 23993 lies within an area generally held to be prospective for diamonds. Exploration within the relinquished blocks has comprised reviews of previous exploration and the acquisition of detailed airborne geophysical data and aerial photography.

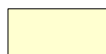
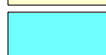



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Reference

-  Cover
-  McArthur Group
-  Nathan Group
-  Roper Group
-  Tawallah Group



**GRAVITY**  
Diamonds Limited

Date: 18/5/2005

Author: D Isles

Office: West Perth

Drawing: NicolCAD

Scale: 1:150000

Workspace: EL23993 report 2005 02

Projection: UTM Zone 53, Southern Hemisphere (WGS 84)

**McArthur Project  
EL 23993  
Regional Geology**



