Open File Envelope
No. 12,114

EL 4420

BALTA BALTANA CREEK

ANNUAL REPORTS TO LICENCE EXPIRY/FULL SURRENDER, FOR THE PERIOD 21/1/2010 TO 20/1/2015

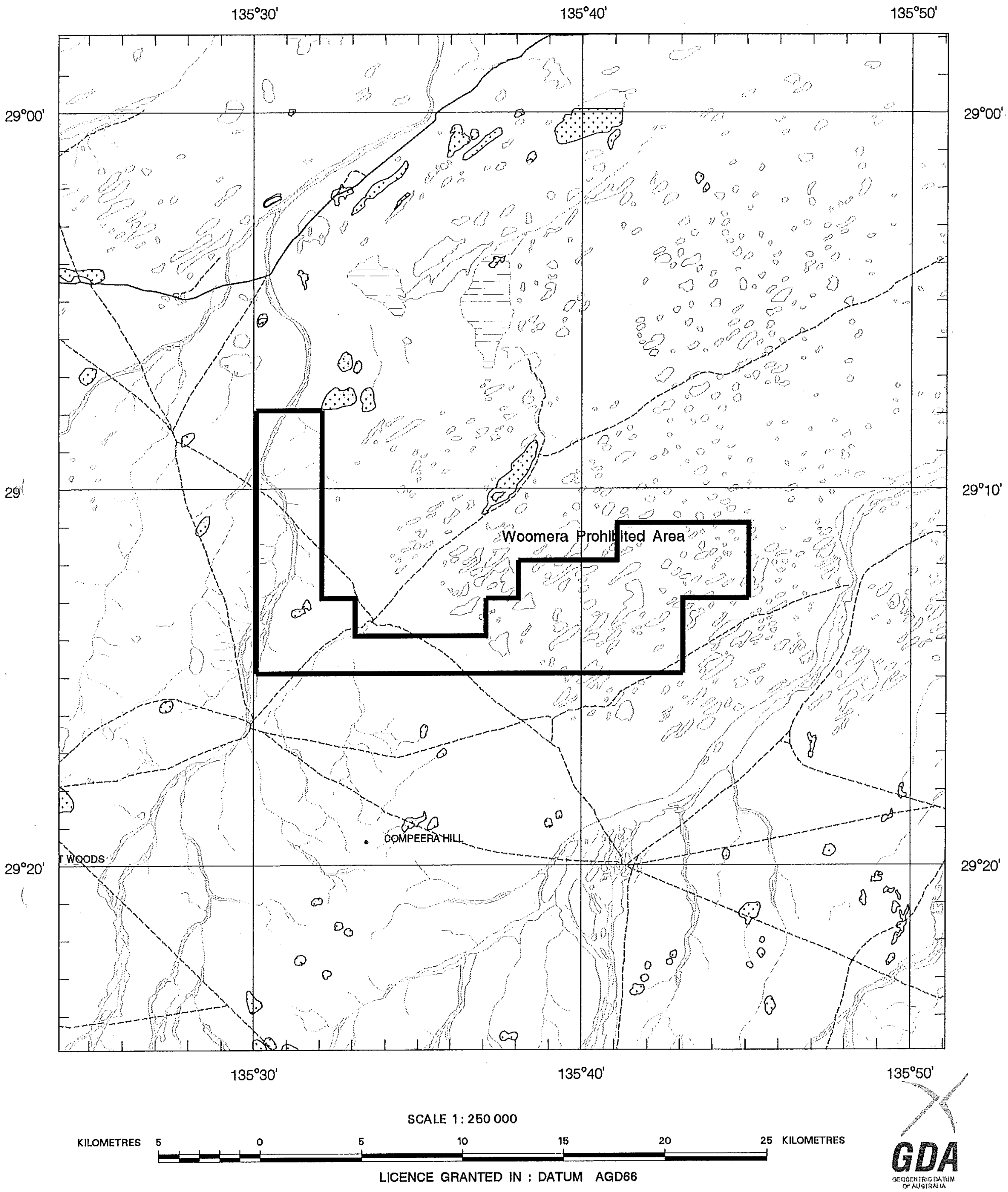
Submitted by
St Barbara Limited
2015

Enquiries: Customer Services
Resources and Energy Group
7th Floor
101 Grenfell Street, Adelaide 5000

Telephone: (08) 8463 3000
Facsimile: (08) 8204 1880

Government of South Australia
Department of State Development

SCHEDULE A



APPLICANT : **ST BARBARA LTD**

FILE REF : **152/09** TYPE : **MINERAL ONLY** AREA : **129** km² (approx.)

1:250000 MAPSHEETS : **BILLA KALINA**

LOCALITY : **BALTA BALTANA CREEK AREA - Approximately 90 km ESE of Coober Pedy**

DATE GRANTED : **21-Jan-2010** DATE EXPIRED : **20-Jan-2011** EL NO : **4420**

St Barbara Limited
ABN 36 009 165 066

BILLA KALINA PROJECT
ANNUAL TECHNICAL REPORT FOR THE PERIOD
21st JANUARY 2010 – 20th JANUARY 2011

TENEMENTS:	EL4420	
HOLDERS:	ST BARBARA LIMITED	
OPERATOR:	ST BARBARA LIMITED PO BOX 1161 WEST PERTH WA 6872	
COMMODITY:	GOLD, COPPER-GOLD	
PREPARED BY:	D. ANDREWS	
DUE DATE:	20/3/2011	
DISTRIBUTION:	ST BARBARA LIMITED PIRSA	(1) (1)
REPORT NO:	0834-2011-01	

TABLE OF CONTENTS

LIST OF TABLES

EXECUTIVE SUMMARY

This report summarises gold and copper-gold exploration activities undertaken by St Barbara Limited (SBM) on the Billa Kalina Project comprising one tenement EL4420, for the period 21st January 2010 to 20th January 2011.

EL4420 is centered approximately 80km east of Coober Pedy. Access to the area is via tracks leading from a secondary E-W unsealed road which runs to the north of the tenement.

The tenement lies within the Mount Woods Inlier, located near the northern margin of the Archaean to Mesoproterozoic Gawler craton. The Mt Woods Inlier hosts the Prominent Hill deposit, a world class IOCG deposit.

Work on EL4420 comprised:

1) open file data compilation and review
2) geological interpretation
3) gravity survey design

A review of open file exploration data indicated that while there are several past exploration drill holes in the region, none occur within the occur within the EL. The past exploration data was used in performing a combined geological geophysical interpretation. The interpretation indicates that the EL lies within an E-W trending, sheared Palaeoproterozoic medium-grade felsic metamorphic belt.

The area has some potential for IOCG mineralisation, but possibly of a lower tenor than that discovered at Prominent Hill and Cairn Hill. Two target areas have been identified for further work; gravity surveys have been designed over these and will commence during 2011, followed by modelling and subsequent drill testing.

1 INTRODUCTION

This report summarises gold and copper-gold exploration activities undertaken by St Barbara Limited (SBM) on the Billa Kalina Project comprising one tenement, EL4420, for the period 21st January 2010 to 20th January 2011.

EL4420 is centered approximately 80km east of Coober Pedy. Access to the area is via tracks leading from a secondary E-W unsealed road which runs to the north of the tenement. The tenement location is shown in Figure 1.

2 TENURE

EL4420 is held and managed by SBM (ACN 009 165 066). Tenement details are shown below:

Table 1 Billa Kalina Project – Tenement Details

Lease	Project	Lease Status	Current Area (Units)	Grant Date	Expiry Date
EL4420	Billa Kalina	Granted	???	21/1/2010	20/1/2011

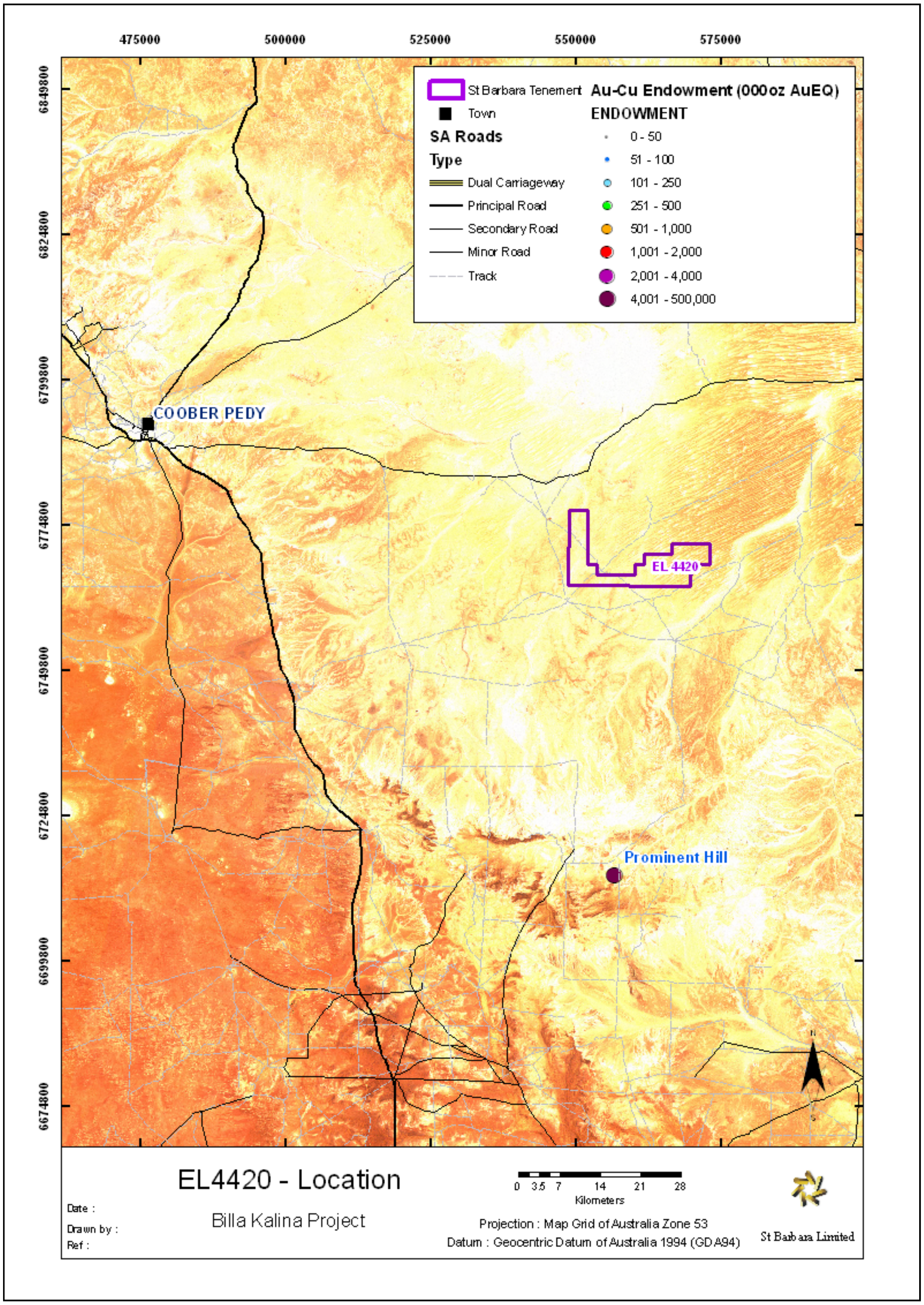


Figure 1: EL4420, Billa Kalina Project - location.

3 WORK COMPLETED

Work on EL4420 during the reporting period comprised:

a) open file data compilation and review
b) geological interpretation
c) gravity survey design

a) Open File Data Review/Previous Exploration

Previous exploration over part or all of the current EL is summarised below:

EL104 - Shell Australia (1974)

Shell targeted shallow surface minable coal in Permian sediments along the southern rim of the Boorthanna trough, which forms part of the Ackaringa Basin. Nine holes were drilled, including some near the southern boundary of the current tenement; none of these holes reached Proterozoic basement. No coal was intersected by the drilling.

EL303 - Newmont (1977)

Newmont targeted Zambian Copper Belt style mineralisation similar to perceived equivalents of the then newly discovered and poorly understood Olympic Dam deposit. Newmont had earlier noted an alignment of known Stuart Shelf copper deposits sub-parallel to the Torrens Hinge Zone, near or coincident with basement highs and often associated with positive magnetic or gravity anomalies.

Newmont conducted ground magnetic and gravity surveys over the Coolawarra anomaly, followed by the drilling of two holes to test geophysical targets. Hole SR2 intersected foliated (Palaeozoic) quartz-biotite-feldspar gneiss from 119-130m whereas hole SR3 was abandoned in Mesozoic sediments at 380m. Hole SR is located ~9km north of the current EL.

EL626 - Aquitane Australia (1981)

Exploration was undertaken for Middle Proterozoic or Adelaidean Cu-U-Au mineralisation similar to that found at Olympic Dam, over a basement high in the Mount Purvis area. One hole was drilled to test a gravity high, but did not intersect the target rocks, instead intersecting Mount Woods type granitic gneisses containing minor pyrite and chalcopyrite at 112m. This hole is located ~2km to the east of the current tenement.

EL1177 and EL1552 - Stockdale Prospecting (1990)

The target was diamonds and source kimberlites within the Boorthanna Trough region. No drilling was undertaken within the region surrounding the current tenement. No diamonds were or kimberlites were found.

EL1765 - BHP Minerals (1995)

Exploration for gold and base metals near Coober Pedy comprised airborne magnetic/radiometric surveys, ground magnetic and EM surveys, and RC drilling (17 holes for 4335m). Elevated gold, base metals and REE in seven of the holes included 28m @ 1428ppm Cu, 614ppm Pb, 2330ppm Zn 2ppm Ag and up to 1% Ce and La.

Three of these holes were drilled within 10km north of the current tenement. Holes NC9203 and NC9204 intersected unmineralised post-orogenic Mesoproterozoic Hiltaba (Balta?) granite from 42m and 50m respectively. Interestingly, later BHP reports referred to these two holes both intersecting quartz-feldspar-biotite-magnetite+/-garnet gneisses, so there is some ambiguity regarding the nature of (and inferred age) of these rocks. Hole NC9301 intersected unmineralised Palaeoproterozoic gneiss (quartz-feldspar-biotite) gneiss with minor zones of quartz-biotite schist.

EL's 2883, 2990 and 3730 - Goldstream Mining/Anglo American (2000-2009)

The target was Olympic Dam style IOCG formed in Palaeoproterozoic basement. During 2001 Anglo-American conducted a regional (400x800m) ground gravity survey across the EL. Subsequent interpretation did not identify any potential IOCG targets.

The review indicated that basement rocks within the tenement are untested.

b) Geophysical/Geological interpretation:

An interpretation of Precambrian basement geology over the tenement and surrounds was undertaken. The results of this work is shown in Figure 2.

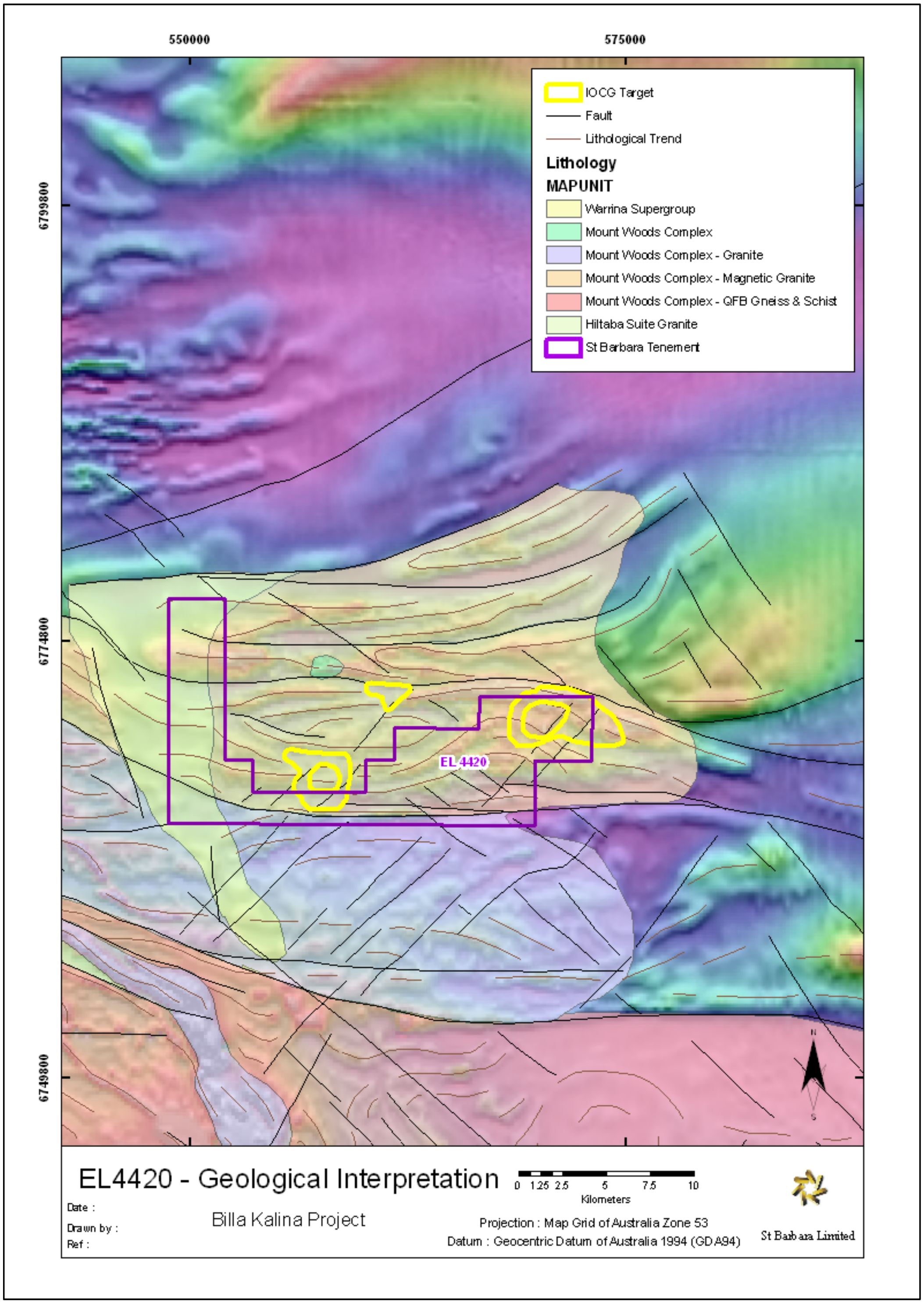


Figure 2: EL4420, Billa Kalina Project - basement geological interpretation over TMI image.

Geology

The EL lies within part of an E-W trending, sheared Palaeoproterozoic, medium-grade felsic metamorphic belt The basement in the area consists of three E-W trending blocks separated by major sinistral shear zones:

- Northern: magnetite-garnet-biotite-feldspar-quartz gneiss and schist (EL4420 lies almost wholly within this block)
- Central: magnetite-bearing gneissic granite
- Southern: inferred granite gneiss

These faulted blocks may represent slices of a belt that encompasses Mount Woods Complex metamorphic rocks (>1736Ma) that are exposed 20km to the south-west; there are similarities between the exposed rocks and those encountered in drill holes located close to the tenement, and both areas occur within (or flank) the same regional gravity "ridge".

The alleged post-tectonic (Hiltaba) felsic (granitic) intrusions drilled by BHP do not have any particular signature in gravity or magnetic data; hence we would lean towards the later BHP interpretation of them being magnetite-garnet-biotite-feldspar-quartz gneiss. Hiltaba intrusions are generally indicated by gravity lows and corresponding discordant magnetisation patterns. Previous interpretations have placed Hiltaba affinity granites in the area, in particular associated with discordant magnetic and gravity lows on the south-western and south-eastern edges of the current EL; we don't preclude their presence in these locations but have not included them in our interpretation. There is also no evidence for an intermediate section of Mesoproterozoic sediments overlying the interpreted Palaeoproterozoic metamorphic rocks.

A small half graben of non-magnetic likely Neoproterozoic (Warrina Supergroup) sediments overlies older rocks in the west of the tenement. These rocks form the southern portion of a 55km long and 5km wide wedge of sediment. Fault control is partly evident and it probably formed during NE-SW extension, contemporaneous with Gairdner Dyke swarm emplacement.

These basement rocks are covered by Mesozoic and Tertiary sediments increasing from 30m thick in the west of the tenement to over 100m in the east. Further to the east of the tenement these sediments increase to >200m thick.

Structure

The structural trend is E-W with shallow double plunging tight folds; magnetic banding reflects late-stage mesoscopic folding of lithological (metamorphic) layering. Structures are dominated by major E-W trending shear zones and shorter-strike length NE and NW-trending faults.

The former represent major crustal structures that are likely long-lived features associated with the northern margin of the craton; during the 1600-1585Ma mineralising event NE extension would have resulted in their transtensional reactivation. The latter may be younger, and are often associated with zones of magnetite destructive alteration. Over EL4420 these "younger" faults are linked to the major E-W structures that run through the EL; these smaller faults may host haematite alteration and mineralisation.

Targets

Two IOCG target areas are identified:

1) In the central area of the EL, target 1 lies on the northern margin of major E-W shear zone, consisting of an annular demagnetised zone about 3km across. The zone contains a moderately magnetised core overlying a gravity low, interpreted to represent a shallow felsic intrusive at depth.
2) In the eastern area of the EL a small gravity low corresponds to a weak discordant magnetic anomaly about 1km wide lying on a NE-trending fault. There is an annular alteration system present; the apparent magnetic enhancement in the core of the target may indicate hydrothermal alteration, while magnetite depletion is often associated short strike-length faults in the region. The zones of magnetic

depletion are of most interest here, possibly representing high level, haematite stable IOCG mineralisation.

Discussion

IOCG deposits have a wide range of styles. On the Gawler Craton and Stuart Shelf they typically are associated with large breccia-hosted replacement/infill systems with strong structural control (e.g. local dilational zones and regional structures that act as fluid pathways and traps). The deposits feature low sulphide, high Fe-oxide content and wide alteration (e.g. phyllic, haematite) halos. Mineralisation is 1590-1450Ma, commonly coinciding with a regional thermal event and post-orogenic magmatism (Hiltaba Suite). The spatial link to granite intrusions and later mafic igneous activity is noted but the role of the intrusions in ore formation is not fully understood.

The geophysical signature of IOCG deposits is often marked by location within broad regional gravity highs and zones of magnetic enhancement, reflecting Fe-oxide enrichment. The is scant evidence in gravity and magnetic data over the EL for any of these regional-scale features. The magnetic pattern present predominantly reflects metamorphic layering and compositional variation within metamorphic rocks. There are no zones of magnetic enhancement apart from the two small identified targets. These features both correspond to small gravity lows that may represent granitic intrusions at depth.

For the above reasons, any potential for IOCG deposits in the EL is probably for smaller tenor deposits than the district analogues. However, given the relatively shallow depths to prospective basement, combined with the proximity to major, craton-bounding E-W structures, the possible proximity to syn-mineralisation granites in the district, it would be worth at least testing the eastern target. Prior to drill testing this target should be subject to an infill gravity survey, as data coverage over the target area is poor. This will enable combined gravity and magnetic modelling to better define any drill target(s).

b) Gravity Survey Design:

During data compilation and interpretation, it was found that gravity data coverage was relatively poor over the north-eastern sector of the tenement, in particular over the eastern IOCG target. A survey has been proposed for 2011 which will correct this, and enable interpretation and modelling at a scale smaller (~400m) than that of the IOCG deposits in the Gawler. The planned survey stations are shown in Figure 3.

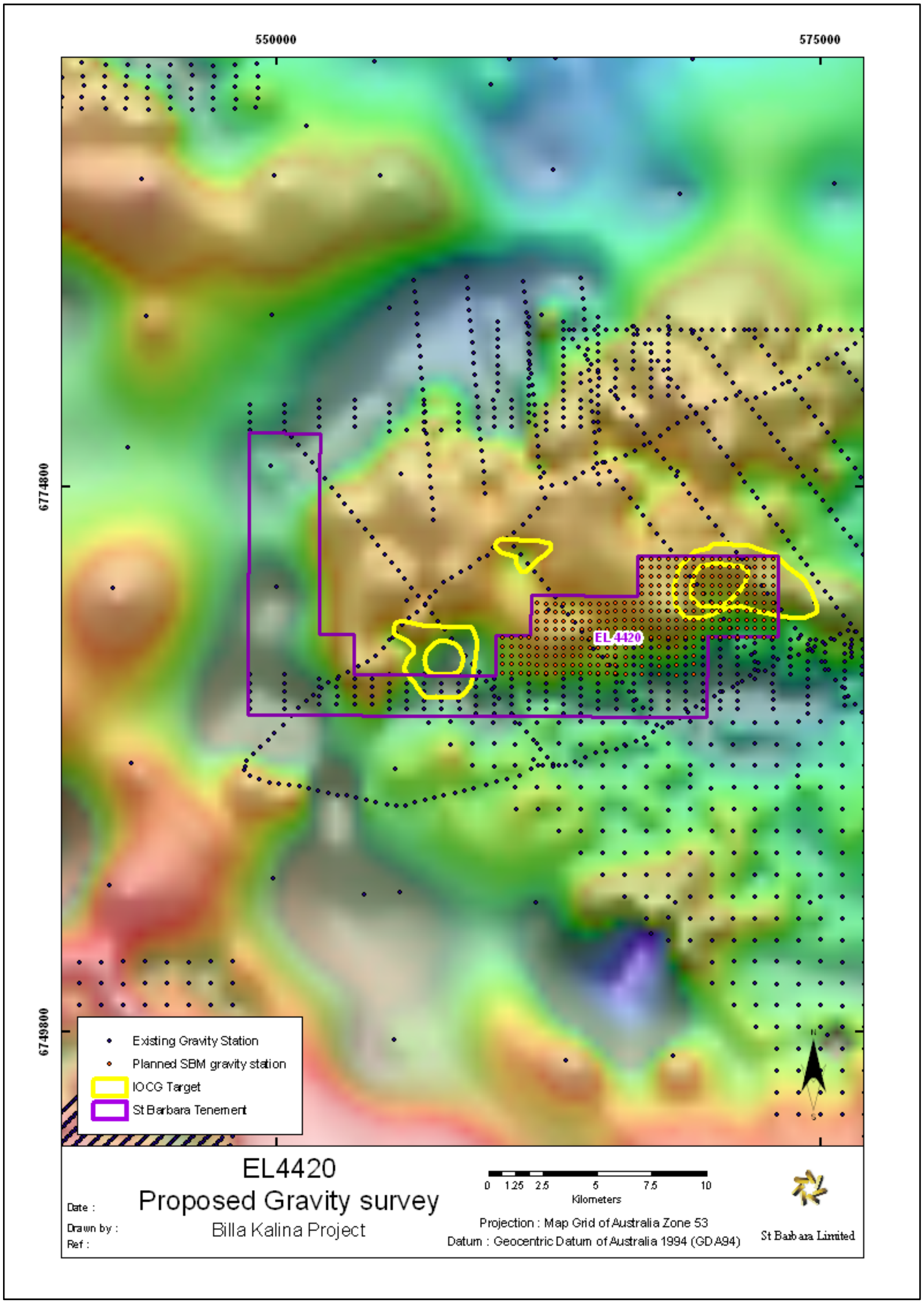


Figure 3: EL4420, Billa Kalina Project - proposed gravity stations.

4 EXPENDITURE

Expenditure incurred on EL7182 between 21st January 2010 and 20th January 2011 is tabled below.

Lease	Expenditure
EL4420	$7,713.88

5 PROPOSED PROGRAMME

Over the 2011 anniversary year and beyond, it is planned to commence ground gravity surveys, as mentioned above. The resultant data will be combined with existing gravity data for interpretation. Combined gravity and magnetic modelling will then be undertaken to define any drill targets. Any targets will be tested by RC pre-collar/diamond tail holes up to a depth of 300m. Selected samples will be analysed for lithogeochemistry and alteration.

6 REFERENCES

Internal Company monthly reports and memoranda.

St Barbara Limited
ABN 36 009 165 066

BILLA KALINA PROJECT

ANNUAL TECHNICAL REPORT FOR THE PERIOD

21st JANUARY 2011 – 20th JANUARY 2012

TENEMENTS:	EL4420	
HOLDERS:	ST BARBARA LIMITED	
OPERATOR:	ST BARBARA LIMITED PO BOX 1161 WEST PERTH WA 6872	
COMMODITY:	GOLD, COPPER-GOLD	
PREPARED BY:	R. HENDERSON	
DUE DATE:	20/2/2012	
DISTRIBUTION:	ST BARBARA LIMITED PIRSA	(1) (1)
REPORT NO:	0834-2012-01	

TABLE OF CONTENTS

LIST OF TABLES

EXECUTIVE SUMMARY

This report summarises gold and copper-gold exploration activities undertaken by St Barbara Limited (SBM) on the Billa Kalina Project comprising one tenement EL4420, for the period 21st January 2011 to 20th January 2012.

EL4420 is centered approximately 80km east of Coober Pedy. Access to the area is via tracks leading from a secondary E-W unsealed road which runs to the north of the tenement.

The tenement lies within the Mount Woods Inlier, located near the northern margin of the Archaean to Mesoproterozoic Gawler craton. The Mt Woods Inlier hosts the Prominent Hill deposit, a world class IOCG deposit.

No on-ground work was conducted during the reporting period. St Barbara was precluded from accessing the tenement due to the land being located within the Woomera Prohibited Area, where a six month moratorium on access was in place from 3 May 2011. St Barbara had planned a ground gravity geophysical survey followed by a campaign of reverse circulation percussion and diamond drilling of defined targets for the reporting period but these programs of work were postponed due to the access moratorium.

The Company is now progressing an Access Deed with the Department of Defence in order to undertake heritage surveys, the planned gravity survey and drilling within the next 12 months.

1 INTRODUCTION

This report summarises gold and copper-gold exploration activities undertaken by St Barbara Limited (SBM) on the Billa Kalina Project comprising one tenement, EL4420, for the period 21st January 2011 to 20th January 2012.

EL4420 is centered approximately 80km east of Coober Pedy. Access to the area is via tracks leading from a secondary E-W unsealed road which runs to the north of the tenement. The tenement location is shown in Figure 1.

2 TENURE

EL4420 is held and managed by SBM (ACN 009 165 066). Tenement details are shown below:

Table 1 Billa Kalina Project – Tenement Details

Lease	Project	Lease Status	Current Area (Units)	Grant Date	Expiry Date
EL4420	Billa Kalina	Granted	???	21/1/2010	20/1/2011

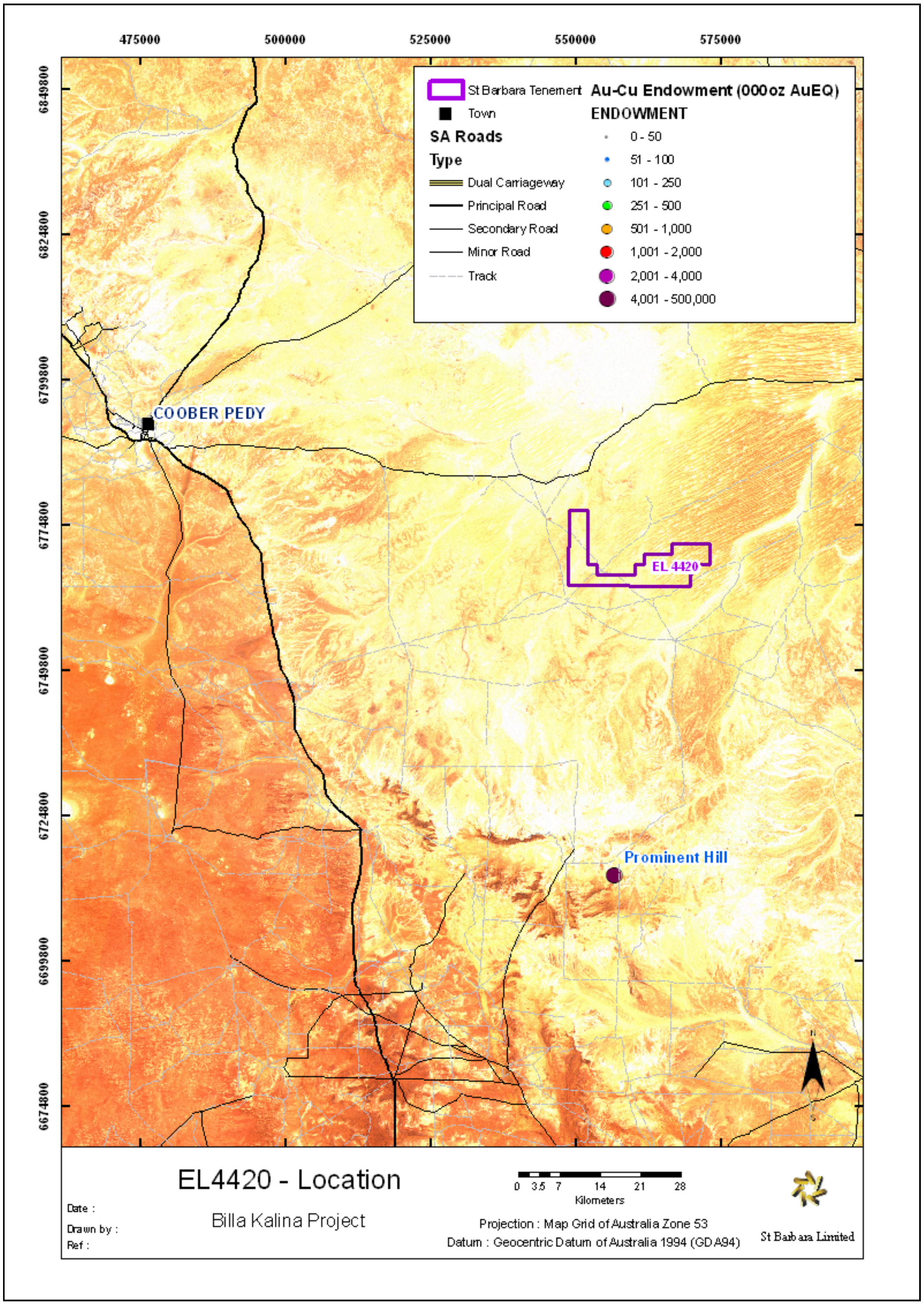


Figure 1: EL4420, Billa Kalina Project - location.

3 PREVIOUS WORK BY ST BARBARA LIMITED

Previous work on EL4420 by St Barbara comprised:

a) open file data compilation and review
b) geological interpretation
c) gravity survey design

a) Open File Data Review/Previous Exploration

Previous exploration over part or all of the current EL is summarised below:

EL104 - Shell Australia (1974)

Shell targeted shallow surface minable coal in Permian sediments along the southern rim of the Boorthanna trough, which forms part of the Ackaringa Basin. Nine holes were drilled, including some near the southern boundary of the current tenement; none of these holes reached Proterozoic basement. No coal was intersected by the drilling.

EL303 - Newmont (1977)

Newmont targeted Zambian Copper Belt style mineralisation similar to perceived equivalents of the then newly discovered and poorly understood Olympic Dam deposit. Newmont had earlier noted an alignment of known Stuart Shelf copper deposits sub-parallel to the Torrens Hinge Zone, near or coincident with basement highs and often associated with positive magnetic or gravity anomalies.

Newmont conducted ground magnetic and gravity surveys over the Coolawarra anomaly, followed by the drilling of two holes to test geophysical targets. Hole SR2 intersected foliated (Palaeozoic) quartz-biotite-feldspar gneiss from 119-130m whereas hole SR3 was abandoned in Mesozoic sediments at 380m. Hole SR is located ~9km north of the current EL.

EL626 - Aquitane Australia (1981)

Exploration was undertaken for Middle Proterozoic or Adelaidean Cu-U-Au mineralisation similar to that found at Olympic Dam, over a basement high in the Mount Purvis area. One hole was drilled to test a gravity high, but did not intersect the target rocks, instead intersecting Mount Woods type granitic gneisses containing minor pyrite and chalcopyrite at 112m. This hole is located ~2km to the east of the current tenement.

EL1177 and EL1552 - Stockdale Prospecting (1990)

The target was diamonds and source kimberlites within the Boorthanna Trough region. No drilling was undertaken within the region surrounding the current tenement. No diamonds were or kimberlites were found.

EL1765 - BHP Minerals (1995)

Exploration for gold and base metals near Coober Pedy comprised airborne magnetic/radiometric surveys, ground magnetic and EM surveys, and RC drilling (17 holes for 4335m). Elevated gold, base metals and REE in seven of the holes included 28m @ 1428ppm Cu, 614ppm Pb, 2330ppm Zn 2ppm Ag and up to 1% Ce and La.

Three of these holes were drilled within 10km north of the current tenement. Holes NC9203 and NC9204 intersected unmineralised post-orogenic Mesoproterozoic Hiltaba (Balta?) granite from 42m and 50m respectively. Interestingly, later BHP reports referred to these two holes both intersecting quartz-feldspar-biotite-magnetite+/-garnet gneisses, so there is some ambiguity regarding the nature of (and inferred age) of these rocks. Hole NC9301 intersected unmineralised Palaeoproterozoic gneiss (quartz-feldspar-biotite) gneiss with minor zones of quartz-biotite schist.

EL's 2883, 2990 and 3730 - Goldstream Mining/Anglo American (2000-2009)

The target was Olympic Dam style IOCG formed in Palaeoproterozoic basement. During 2001 Anglo-American conducted a regional (400x800m) ground gravity survey across the EL. Subsequent interpretation did not identify any potential IOCG targets.

The review indicated that basement rocks within the tenement are untested.

b) Geophysical/Geological interpretation:

An interpretation of Precambrian basement geology over the tenement and surrounds was undertaken. The results of this work is shown in Figure 2.

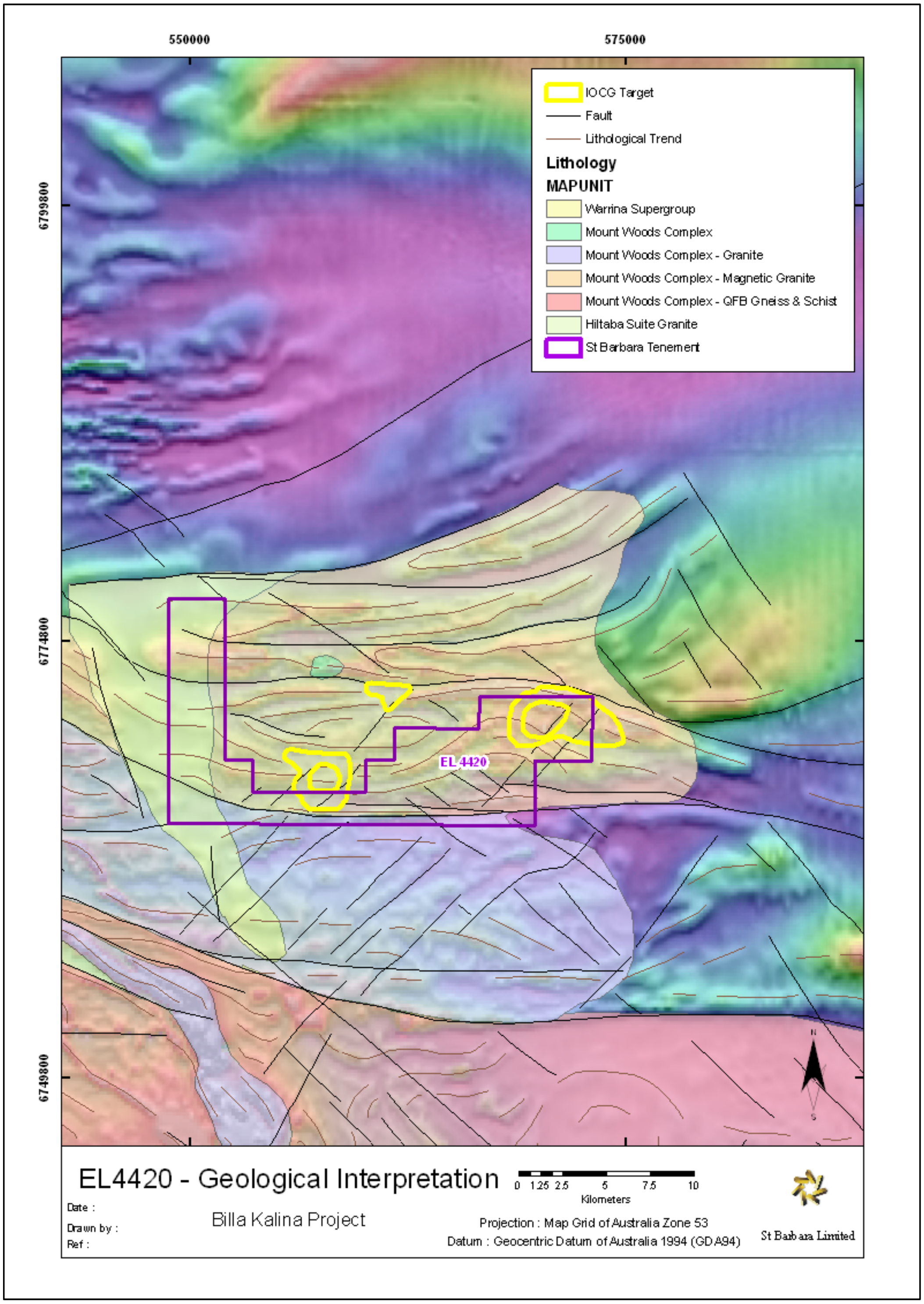


Figure 2: EL4420, Billa Kalina Project - basement geological interpretation over TMI image.

Geology

The EL lies within part of an E-W trending, sheared Palaeoproterozoic, medium-grade felsic metamorphic belt The basement in the area consists of three E-W trending blocks separated by major sinistral shear zones:

- Northern: magnetite-garnet-biotite-feldspar-quartz gneiss and schist (EL4420 lies almost wholly within this block)
- Central: magnetite-bearing gneissic granite
- Southern: inferred granite gneiss

These faulted blocks may represent slices of a belt that encompasses Mount Woods Complex metamorphic rocks (>1736Ma) that are exposed 20km to the south-west; there are similarities between the exposed rocks and those encountered in drill holes located close to the tenement, and both areas occur within (or flank) the same regional gravity "ridge".

The alleged post-tectonic (Hiltaba) felsic (granitic) intrusions drilled by BHP do not have any particular signature in gravity or magnetic data; hence we would lean towards the later BHP interpretation of them being magnetite-garnet-biotite-feldspar-quartz gneiss. Hiltaba intrusions are generally indicated by gravity lows and corresponding discordant magnetisation patterns. Previous interpretations have placed Hiltaba affinity granites in the area, in particular associated with discordant magnetic and gravity lows on the south-western and south-eastern edges of the current EL; we don't preclude their presence in these locations but have not included them in our interpretation. There is also no evidence for an intermediate section of Mesoproterozoic sediments overlying the interpreted Palaeoproterozoic metamorphic rocks.

A small half graben of non-magnetic likely Neoproterozoic (Warrina Supergroup) sediments overlies older rocks in the west of the tenement. These rocks form the southern portion of a 55km long and 5km wide wedge of sediment. Fault control is partly evident and it probably formed during NE-SW extension, contemporaneous with Gairdner Dyke swarm emplacement.

These basement rocks are covered by Mesozoic and Tertiary sediments increasing from 30m thick in the west of the tenement to over 100m in the east. Further to the east of the tenement these sediments increase to >200m thick.

Structure

The structural trend is E-W with shallow double plunging tight folds; magnetic banding reflects late-stage mesoscopic folding of lithological (metamorphic) layering. Structures are dominated by major E-W trending shear zones and shorter-strike length NE and NW-trending faults.

The former represent major crustal structures that are likely long-lived features associated with the northern margin of the craton; during the 1600-1585Ma mineralising event NE extension would have resulted in their transtensional reactivation. The latter may be younger, and are often associated with zones of magnetite destructive alteration. Over EL4420 these "younger" faults are linked to the major E-W structures that run through the EL; these smaller faults may host haematite alteration and mineralisation.

Targets

Two IOCG target areas are identified:

1) In the central area of the EL, target 1 lies on the northern margin of major E-W shear zone, consisting of an annular demagnetised zone about 3km across. The zone contains a moderately magnetised core overlying a gravity low, interpreted to represent a shallow felsic intrusive at depth.
2) In the eastern area of the EL a small gravity low corresponds to a weak discordant magnetic anomaly about 1km wide lying on a NE-trending fault. There is an annular alteration system present; the apparent magnetic enhancement in the core of the target may indicate hydrothermal alteration, while magnetite depletion is often associated short strike-length faults in the region. The zones of magnetic

depletion are of most interest here, possibly representing high level, haematite stable IOCG mineralisation.

Discussion

IOCG deposits have a wide range of styles. On the Gawler Craton and Stuart Shelf they typically are associated with large breccia-hosted replacement/infill systems with strong structural control (e.g. local dilational zones and regional structures that act as fluid pathways and traps). The deposits feature low sulphide, high Fe-oxide content and wide alteration (e.g. phyllic, haematite) halos. Mineralisation is 1590-1450Ma, commonly coinciding with a regional thermal event and post-orogenic magmatism (Hiltaba Suite). The spatial link to granite intrusions and later mafic igneous activity is noted but the role of the intrusions in ore formation is not fully understood.

The geophysical signature of IOCG deposits is often marked by location within broad regional gravity highs and zones of magnetic enhancement, reflecting Fe-oxide enrichment. The is scant evidence in gravity and magnetic data over the EL for any of these regional-scale features. The magnetic pattern present predominantly reflects metamorphic layering and compositional variation within metamorphic rocks. There are no zones of magnetic enhancement apart from the two small identified targets. These features both correspond to small gravity lows that may represent granitic intrusions at depth.

For the above reasons, any potential for IOCG deposits in the EL is probably for smaller tenor deposits than the district analogues. However, given the relatively shallow depths to prospective basement, combined with the proximity to major, craton-bounding E-W structures, the possible proximity to syn-mineralisation granites in the district, it would be worth at least testing the eastern target. Prior to drill testing this target should be subject to an infill gravity survey, as data coverage over the target area is poor. This will enable combined gravity and magnetic modelling to better define any drill target(s).

b) Gravity Survey Design:

During data compilation and interpretation, it was found that gravity data coverage was relatively poor over the north-eastern sector of the tenement, in particular over the eastern IOCG target. A survey has been proposed for 2011 which will correct this, and enable interpretation and modelling at a scale smaller (~400m) than that of the IOCG deposits in the Gawler. The planned survey stations are shown in Figure 3.

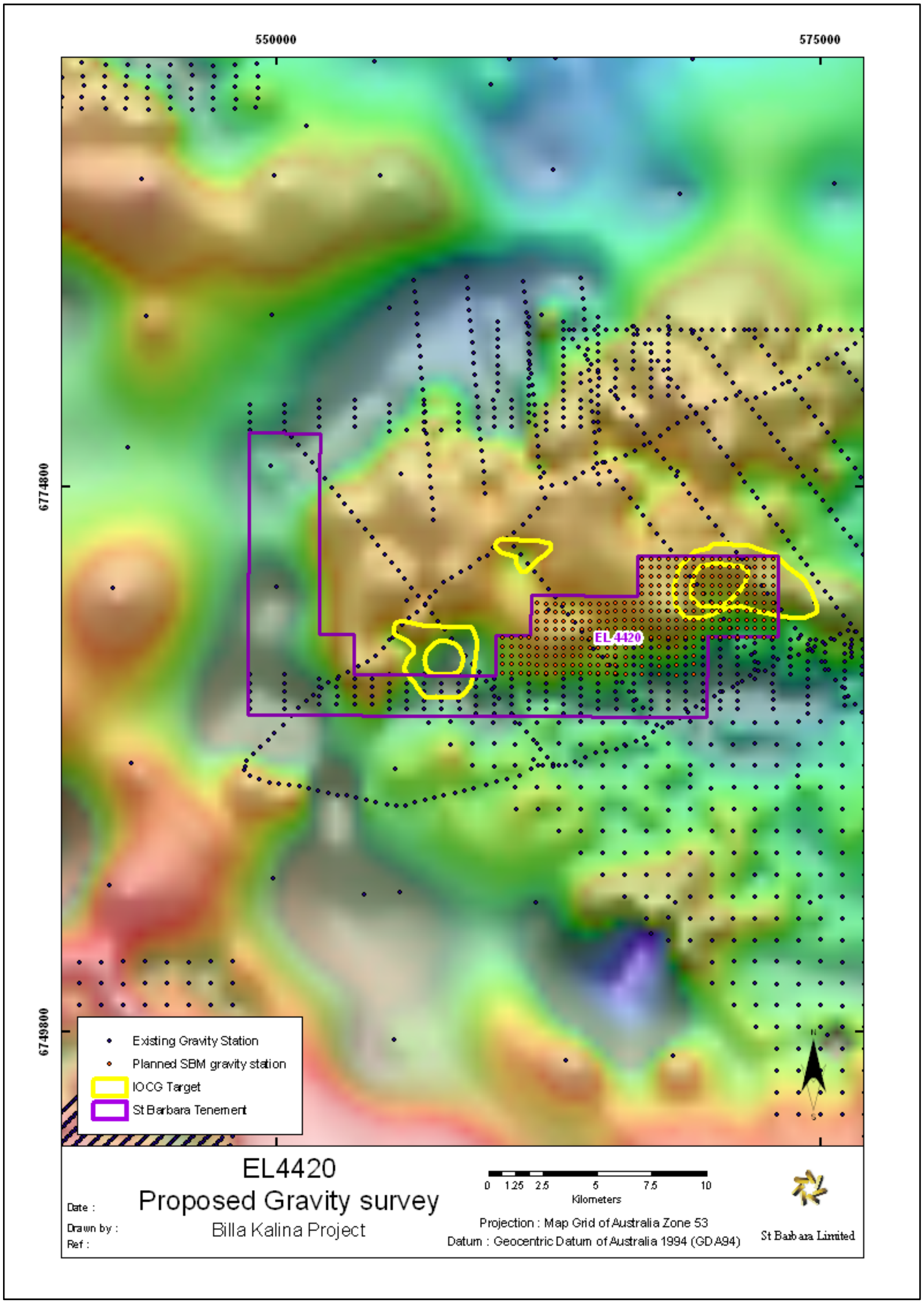


Figure 3: EL4420, Billa Kalina Project - proposed gravity stations.

4 WORK COMPLETED

No on-ground work was conducted during the reporting period. St Barbara was precluded from accessing the tenement due to the land being located within the Woomera Prohibited Area, where a six month moratorium on access was in place from 3 May 2011. St Barbara had planned a ground gravity geophysical survey followed by a campaign of reverse circulation percussion and diamond drilling of defined targets for the reporting period but these programs of work were postponed due to the access moratorium.

The Company is now progressing an Access Deed with the Department of Defence in order to undertake heritage surveys, the planned gravity survey and drilling within the next 12 months.

5 EXPENDITURE

Expenditure incurred on EL4420 between 21st January 2011 and 20th January 2012 is tabled below.

Lease	Expenditure
EL4420	$53,033.10

6 PROPOSED PROGRAMME

During the next reporting period and beyond, it is planned to commence ground gravity surveys, as mentioned above. The resultant data will be combined with existing gravity data for interpretation. Combined gravity and magnetic modelling will then be undertaken to define any drill targets. Any targets will be tested by RC pre-collar/diamond tail holes up to a depth of 300m. Selected samples will be analysed for lithogeochemistry and alteration.

7 REFERENCES

Internal Company monthly reports and memoranda.

St Barbara Limited
ABN 36 009 165 066

BILLA KALINA PROJECT
ANNUAL TECHNICAL REPORT FOR THE PERIOD
21st JANUARY 2012 – 20th JANUARY 2013

TENEMENTS: EL4420

HOLDERS: ST BARBARA LIMITED

OPERATOR: ST BARBARA LIMITED
PO BOX 1161
WEST PERTH WA 6872

COMMODITY: GOLD, COPPER-GOLD

PREPARED BY: B.BOWDEN

DUE DATE: 19/02/2013

DISTRIBUTION: ST BARBARA LIMITED (1)
PIRSA (1)

REPORT NO: 0834-2013-01

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

This report summarises gold and copper-gold exploration activities undertaken by St Barbara Limited (SBM) on the Billa Kalina Project (EL4420), for the period 21st January 2012 to 20th January 2013.

EL4420 is located approximately 90km ESE of Coober Pedy. Access to the area is via tracks leading from a secondary E-W unsealed road which runs north of the tenement.

No on-ground work was conducted during the reporting period. St Barbara was precluded from accessing the tenement due to the land being located within the Woomera Prohibited Area.

SBM have submitted an Access Deed application to the Department of Defence in order to undertake a ground gravity survey, heritage surveys and drilling within the next 12 months.

1 INTRODUCTION

This report summarises gold and copper-gold exploration activities undertaken by St Barbara Limited (SBM) on the Billa Kalina Project (EL4420) for the period 21st January 2012 to 20th January 2013.

EL4420 is located approximately 90km ESE of Coober Pedy. Access to the area is via tracks leading from a secondary E-W unsealed road which runs to the north of the tenement. The tenement location is shown in **Figure 1**.

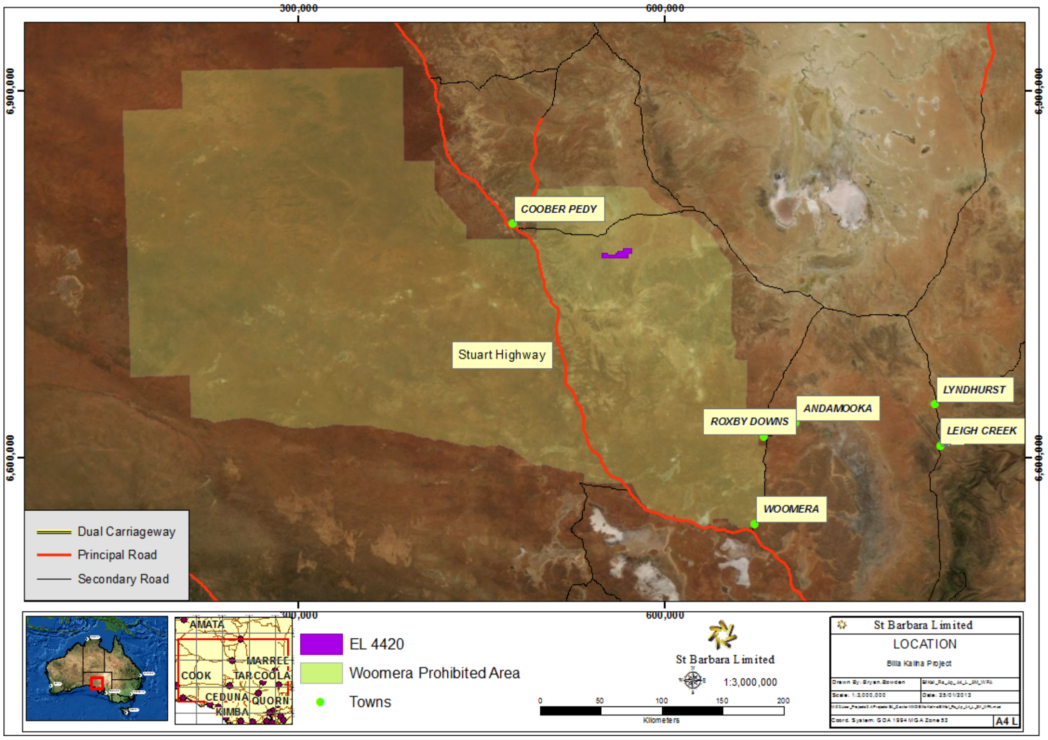


Figure 1: EL4420 location.

2 TENURE

EL4420 is held and managed by SBM (ACN 009 165 066). Tenement details are listed in **Table 1**.

Table 1: EL4420 tenement details

Lease	Project	Lease Status	Current Area (Km^2)	Grant Date	Expiry Date
EL4420	Billa Kalina	Under Renewal	99	21/01/2010	20/01/2013

3 WORK COMPLETED

Work on EL4420 by SBM during the reporting period comprised:

a) Open file data compilation and review;

b) Geophysical data processing and re-interpretation; and

c) Gravity survey design

a) Open File Data Review/Previous Exploration

EL4420 has been pegged almost continuously since 1973. Previous explorers to hold the ground include Shell, Newmont, BHP Billiton Minerals, Anglo American Exploration and Barrick. Initial exploration in the region was for coal but following the discovery of Olympic Dam (in 1975), the focus switched to IOCG deposits. Exploration techniques employed were mostly geophysical (regional magnetics, gravity and radiometrics), with very little drilling. An open file review revealed no drilling within EL 4420 (**Figure 2**).

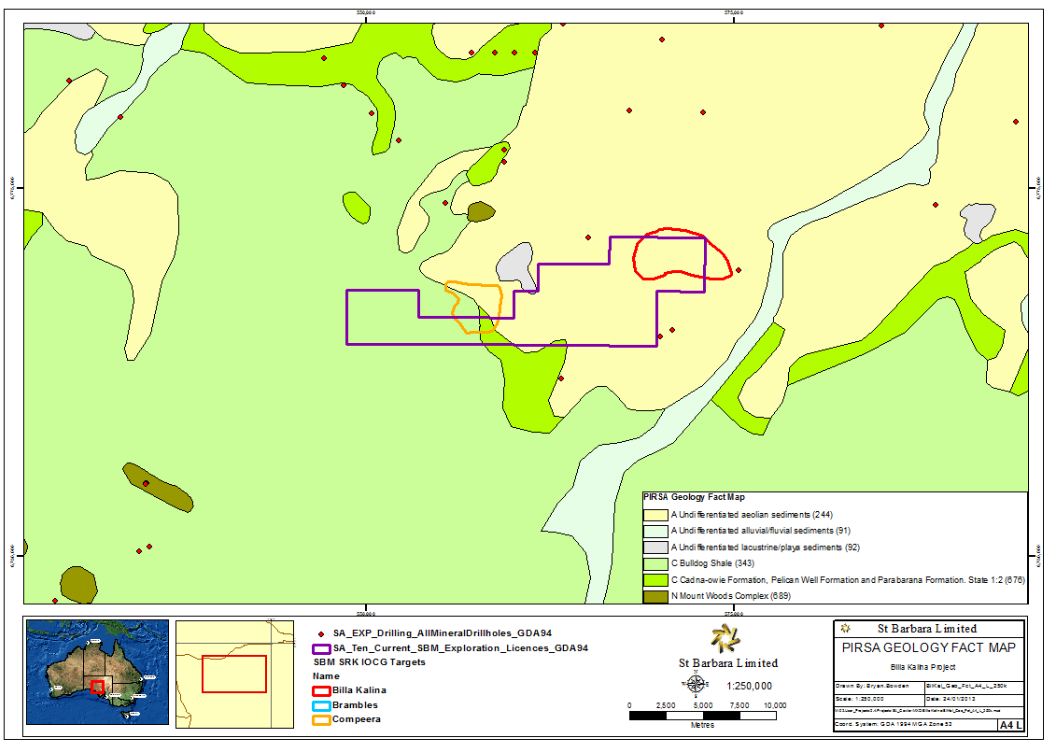


Figure 2: Open file drilling data for the region around EL4420.

b) Geophysical data processing and re-interpretation

The state regional magnetics data was re-processed by SBM's senior geophysicist to aid in structural interpretation and drill target selection. The state gravity data was also interpreted and it was concluded that a ground gravity survey was warranted.

c) Gravity Survey Design:

A ~400 station ground gravity survey has been proposed over selected areas of EL4420 (**Figure 3)**. Quotes have been obtained and a preferred contractor has been selected.

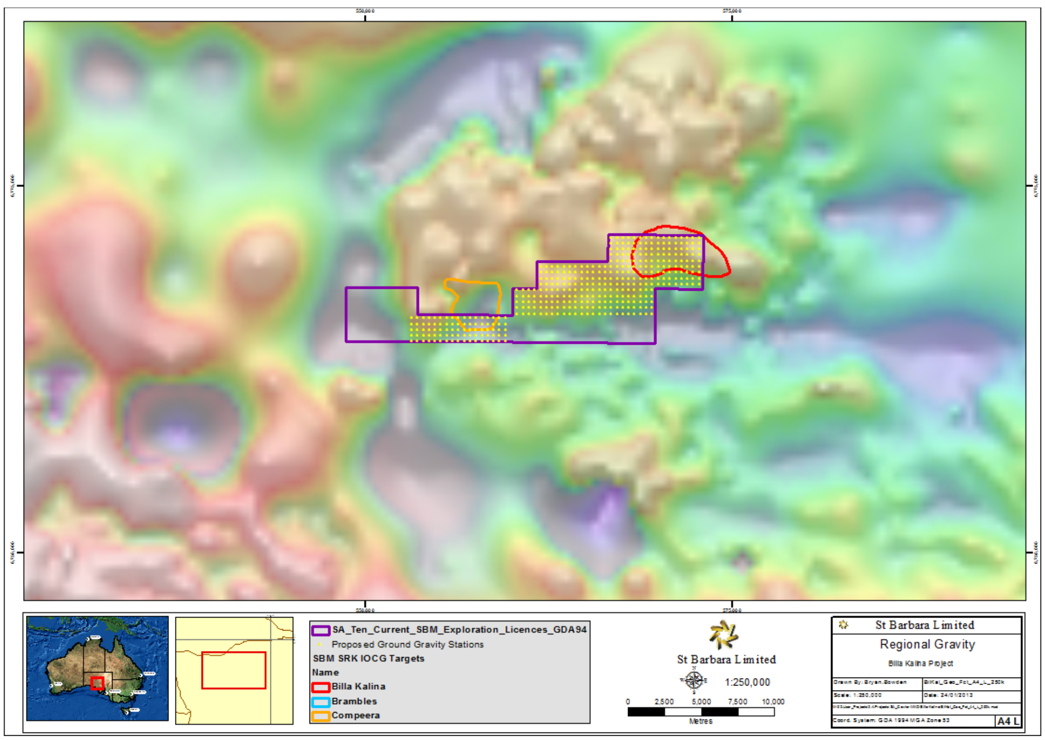


Figure 3: Proposed gravity survey stations.

4 ACCESS

No on-ground work was conducted during the reporting period. SBM was precluded from accessing the tenement due to the land being located within the Woomera Prohibited Area (**Figure 1**).

SBM submitted an Access Deed application (on January 25th 2013) to the Department of Defence in order to undertake the previously described gravity survey, heritage surveys and drilling within the next 12 months.

5 EXPENDITURE

Expenditure incurred on EL4420 between 21st January 2012 and 20th January 2013 is listed in **Table 2**.

Table 2: Expenditure incurred during the reporting period.

Item	Expenditure
Annual Rent	$946.55
Salaries	$4,427.31
Total	**$5,473.86**

6 PROPOSED PROGRAMME

During the next reporting period, it is planned to commence the previously described ground gravity survey. The resultant data will be combined with other geophysical datasets and existing geological interpretations to define drill targets. The defined target areas will undergo heritage surveys prior to drill testing with Reverse Circulation (RC) hammer and diamond drilling.

2014

ST BARBARA LIMITED

Annual Mineral Exploration Report

EL 4420 – Billa Kalina

Reporting Period: 21 January 2013 – 20 January 2014

Title Page and Bibliographic Data Sheet

Project Name:	Billa Kalina
Combined Reporting Number:	N/A
Tenement Numbers:	EL 4420
Tenement Operator:	St Barbara Limited
Tenement Holders(s):	St Barbara Limited
Report Type:	Annual Technical Report
Report Title:	Annual Report for the Period 21 January 2013 to 20 January 2014
Report Period:	21 January 2013 to 20 January 2014
Author:	Bryan Bowden
Date of Report:	14/02/2014
1:250 000 map sheet:	Billa Kalina SH 53-7
1: 100 000 map sheet:	Compeera 6039
Target Commodity:	Gold / Copper
Keywords:	IOCG, Mount Woods Inlier, Prominent Hill, Ground Gravity Survey
Prospects drilled:	NIL
List of Assays:	NIL

Annual Mineral Exploration Report Abstract, Conclusions and Recommendations

Location:	Balta Baltana Creek Area – Approximately 90km ESE of Coober Pedy, South Australia
Geology:	Mount Woods Complex, Warrina Supergroup
Work done:	Ground Gravity Survey, interpretation of geophysical data, reconnaissance visit
Results:	Positive gravity anomalies identified
Conclusions:	Further interpretation of geophysical imagery required to define drill targets

Table of Contents

Introduction, history and exploration rationale

A tenement location map is presented in Figure 1. A tabulation of the Reporting Group tenements is set out in Table 1. Exploration activities completed during the reporting period are summarized in Table 2.

EL 4420 (Billa Kalina) was granted to St Barbara on January 21st 2010 and expires on January 20th 2014. The tenement is located within the Woomera Prohibited Area, approximately 90km ESE of Coober Pedy (Figure 1) and encompasses an area of 99km^2. EL 4420 is accessed via station tracks from the William Creek road to the north or via station tracks from the Stuart Highway to the west. The topography is generally flat and comprises stony desert pavement, except in the NE area of the tenement where sand dunes (up to several metres are high) are interspersed with stony desert pavement and desert scrub.

EL 4420 has been pegged almost continuously since 1973. Previous explorers to hold the ground include Shell, Newmont, BHP Billiton Minerals, Anglo American Exploration and Barrick. Initial exploration in the region was for coal but following the discovery of Olympic Dam (in 1975), the focus switched to IOCG deposits. Exploration techniques employed were mostly geophysical (regional magnetics, gravity and radiometrics), with very little drilling. An open file review revealed no drilling within EL 4420.

EL 4420 was identified as being prospective for IOCG deposits by a targeting study of the Mount Woods Inlier and Olympic Cu-Au province. Given the proximity to Prominent Hill and geophysical signature of the tenement (coincidental magnetic and gravity highs) it was concluded that EL 4420 has potential to host a Prominent Hill-style IOCG deposit.

Geology

EL 4420 is located within the Mount Woods Inlier in the north of the Gawler Craton. A regional geological interpretation concluded that the geology of EL 4420 is dominated by Mount Woods Complex (Paleoproterozoic gneiss), with lesser Warrina Supergroup (Neoproterozoic sediments) in the far west (Figure 2). Interpretation of the publically available aeromagnetic data suggested the presence of several E-W oriented dextral normal faults and several NE-SW oriented transfer faults (Figure 2).

A reconnaissance field visit to EL 4420 revealed no outcrop. Float within the western half of the tenement was interpreted to be weathered felsic gneiss.

Geophysics

Exploration activities during the reporting period were dominated by a 397 station ground gravity survey (Figure 3) and the associated costs of personnel (Senior Exploration Geologist and Senior Geophysicist) for field supervision and data interpretation.

The ground gravity survey was undertaken by Atlas Geophysics. All specific survey details, including processing techniques and results, are given in Villahermosa (2013)/Appendix 1. The resulting imagery (Figure 4 and Figure 5) is currently being interpreted to determine whether a Prominent Hill-style anomaly is present within the tenement.

Remote Sensing

Nothing to report.

Surface Geochemistry

Nothing to report.

Drilling

Nothing to report.

Other studies or work

Northing to report.

Environment

Nothing to report.

Ore reserves and resources

Nothing to report.

Expenditure during the Reporting Period

Expenditure incurred on EL 4420 between 21 January 2013 and 20 January 2014 is listed in Table 3.

Conclusions

Positive gravity anomalies are present within the ground gravity survey results. Further interpretation of the data and comparison of the results with the published data for Prominent Hill and other hematite-dominated IOCG systems is required to determine whether there are Prominent Hill-style drill targets within the tenement.

Proposed Exploration in Next Reporting Period

Assuming a Prominent hill-style target is defined within EL 4420, further exploration will comprise diamond drilling (with RC pre-collars).

Report Figures

Figure 1: Tenement location plan

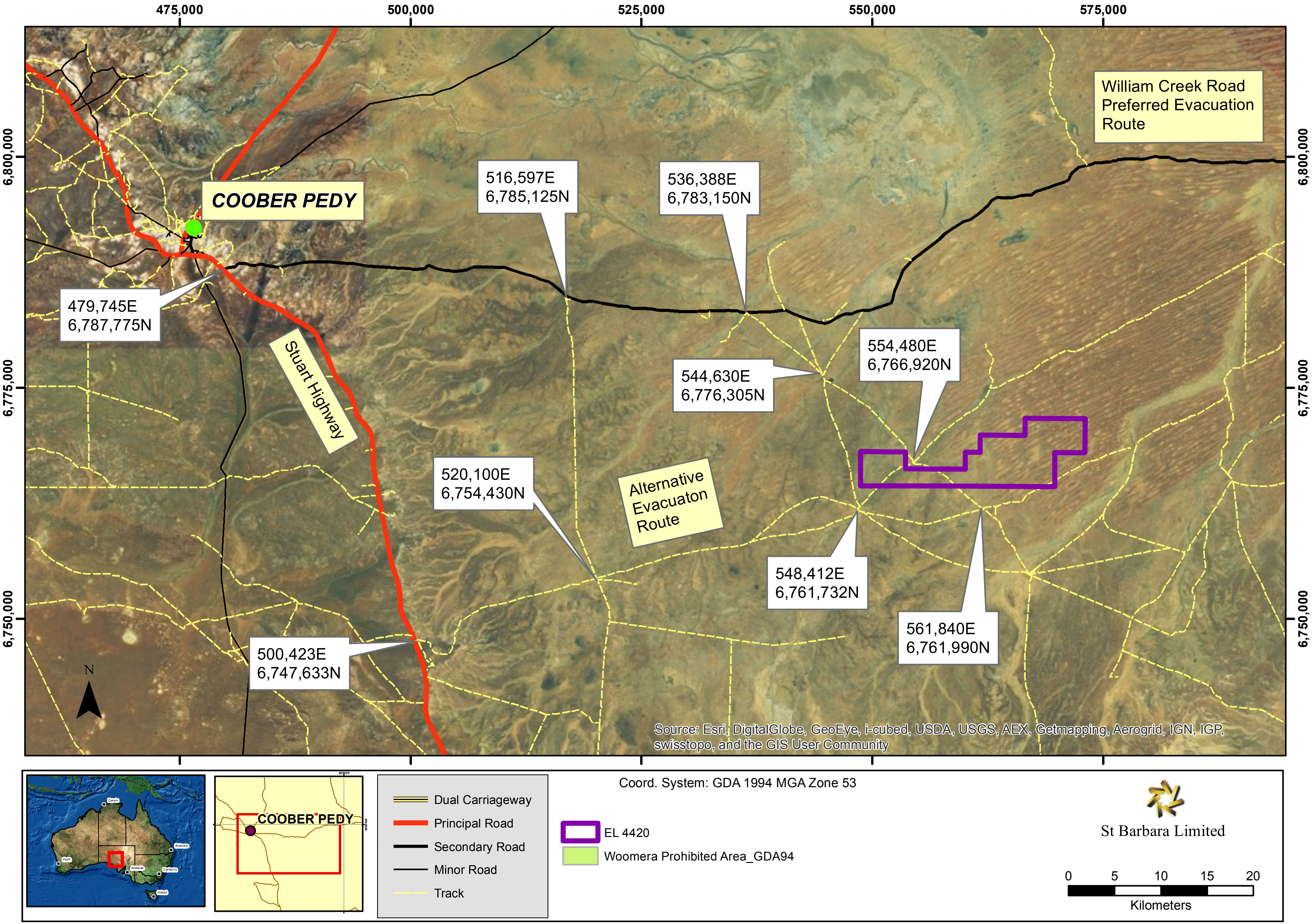
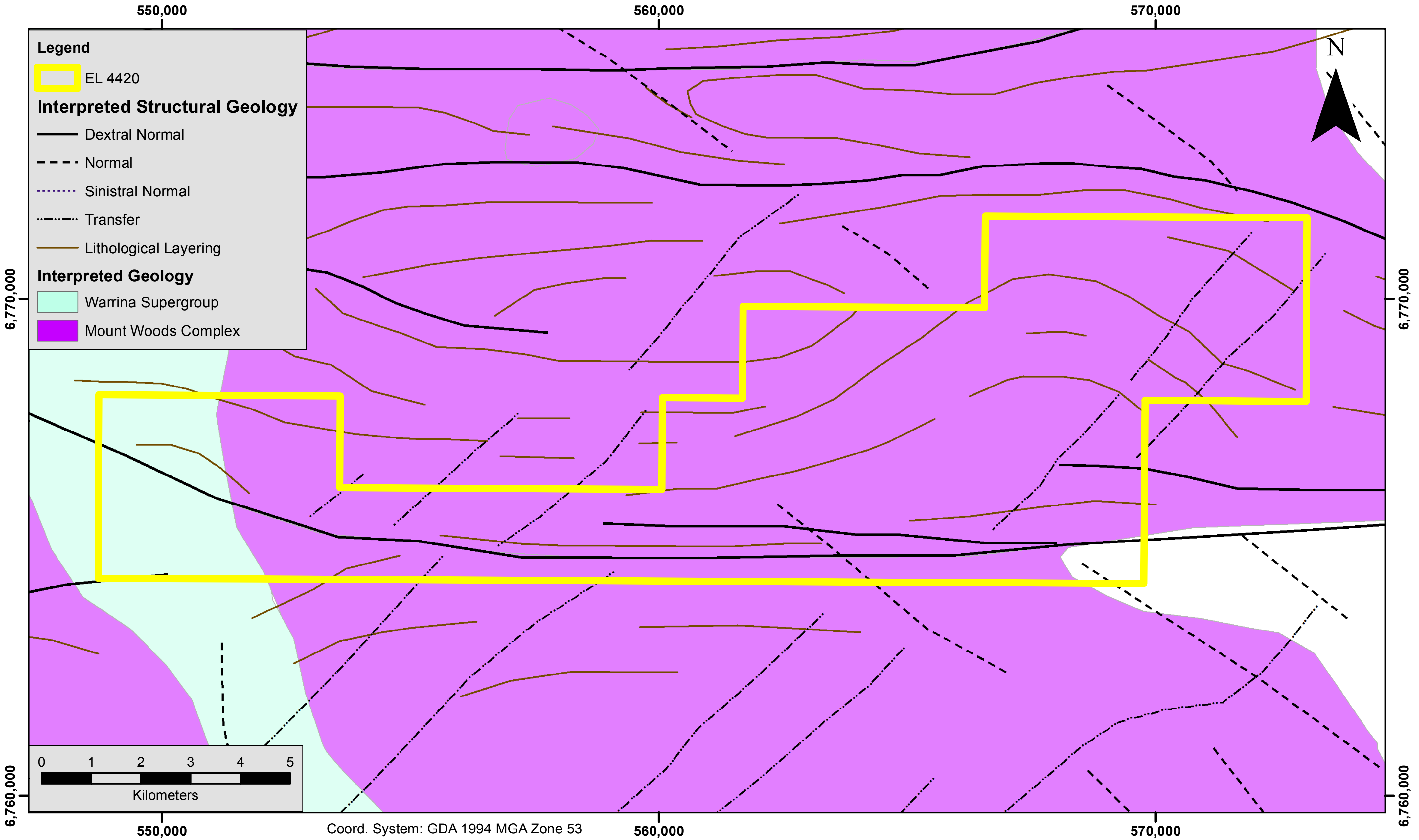
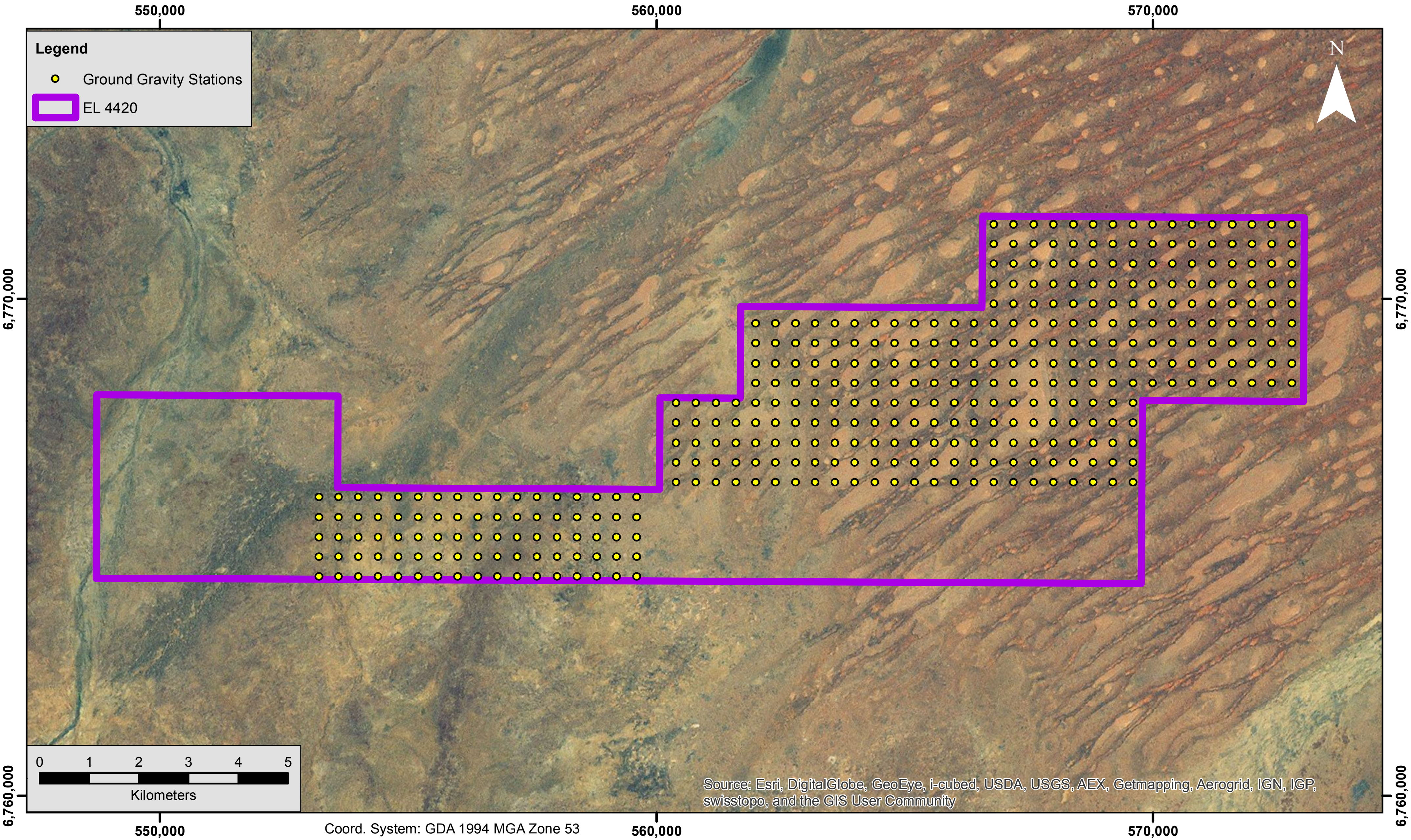

475,000
500,000
525,000
550,000
575,000
6,800,000
6,775,000
6,750,000
COOBER PEDY
516,597E
6,785,125N
536,388E
6,783,150N
William Creek Road
Preferred Evacuation
Route
479,745E
6,787,775N
Stuart Highway
544,630E
6,776,305N
554,480E
6,766,920N
520,100E
6,754,430N
Alternative
Evacuaton
Route
548,412E
6,761,732N
561,840E
6,761,990N
500,423E
6,747,633N
N
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
COOBER PEDY
Dual Carriageway
Principal Road
Secondary Road
Minor Road
Track
Coord. System: GDA 1994 MGA Zone 53
EL 4420
Woomera Prohibited Area_GDA94
St Barbara Limited
0
5
10
15
20
Kilometers

Figure 2: Simplified Geological Map.



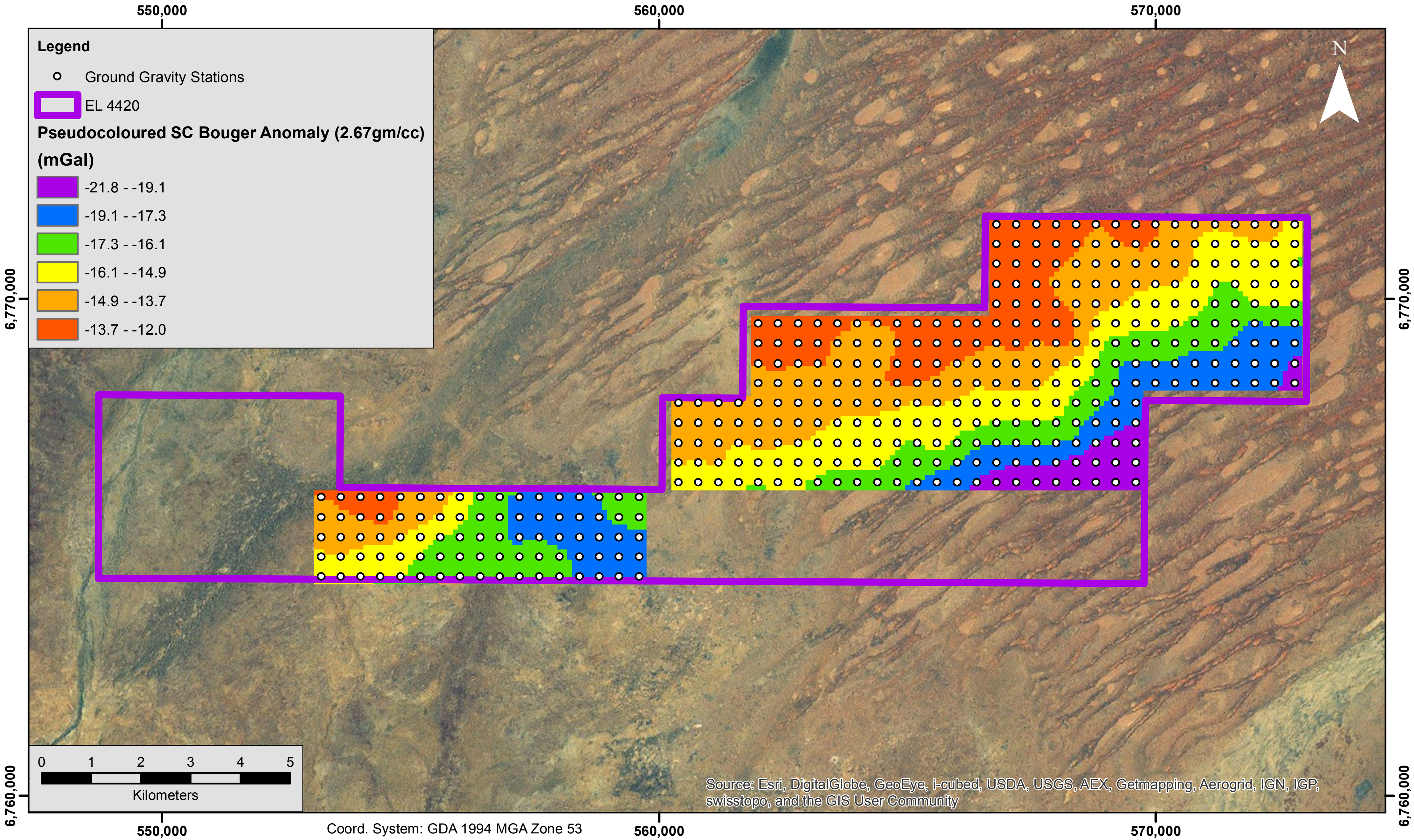
550,000
560,000
570,000
Legend
EL 4420
Interpreted Structural Geology
Dextral Normal
Normal
Sinistral Normal
Transfer
Lithological Layering
Interpreted Geology
Warrina Supergroup
Mount Woods Complex
N
6,770,000
6,760,000
0
1
2
3
4
5
Kilometers
Coord. System: GDA 1994 MGA Zone 53

Figure 3: Ground Gravity Survey Location Map.



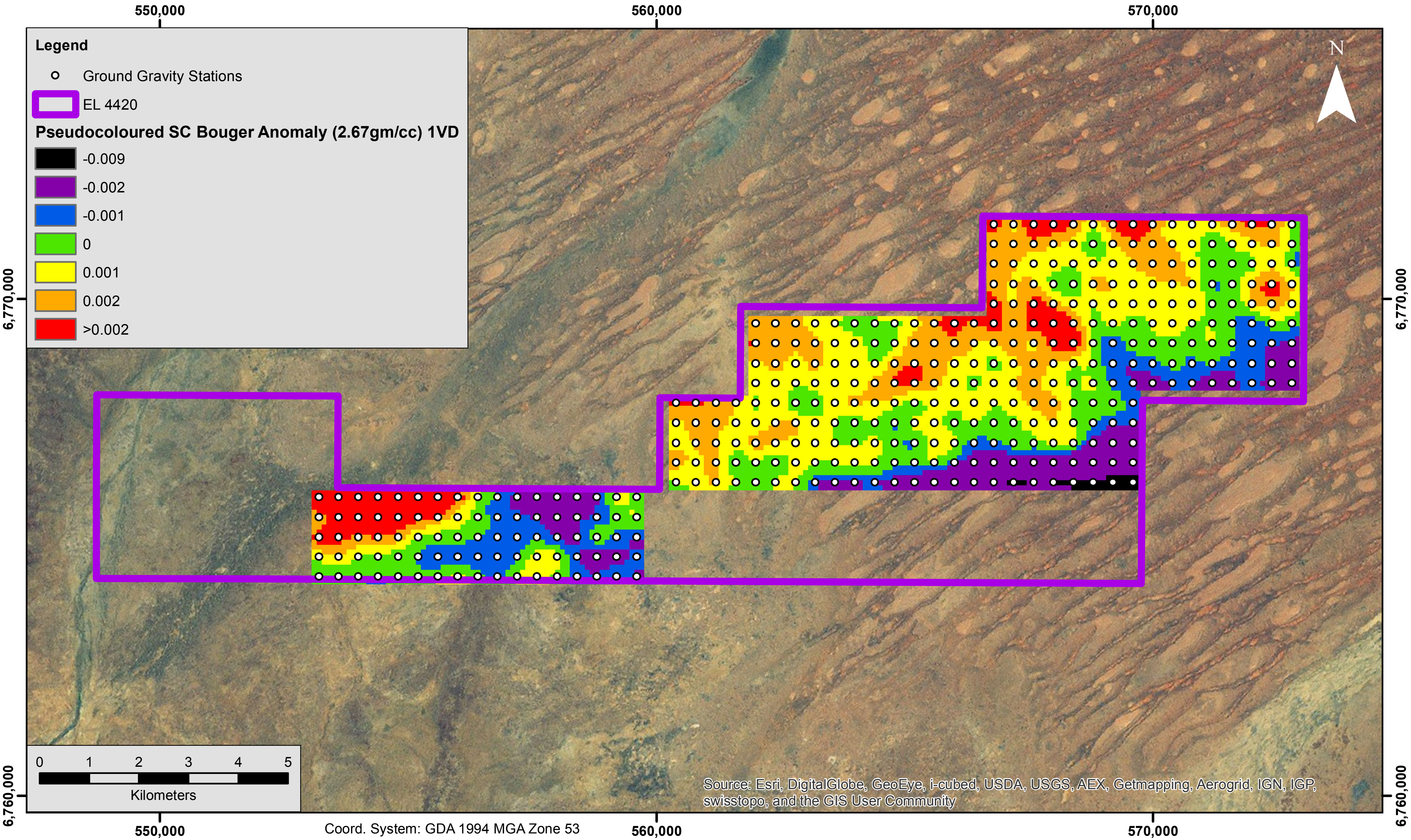
550,000
560,000
570,000
Legend
Ground Gravity Stations
EL 4420
N
6,770,000
6,760,000
0 1 2 3 4 5
Kilometers
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Coord. System: GDA 1994 MGA Zone 53

Figure 4: Results of Ground Gravity Survey (Bouger anomaly) Map.



Legend
Ground Gravity Stations
EL 4420
Pseudocoloured SC Bouger Anomaly (2.67gm/cc) (mGal)
-21.8 - -19.1
-19.1 - -17.3
-17.3 - -16.1
-16.1 - -14.9
-14.9 - -13.7
-13.7 - -12.0
N
550,000
560,000
570,000
6,770,000
6,760,000
0 1 2 3 4 5
Kilometers
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Coord. System: GDA 1994 MGA Zone 53

Figure 5: Results of Ground Gravity Survey (Bouger anomaly – 1VD) Map.



550,000
560,000
570,000
Legend
Ground Gravity Stations
EL 4420
Pseudocoloured SC Bouger Anomaly (2.67gm/cc) 1VD
-0.009
-0.002
-0.001
0
0.001
0.002
>0.002
N
6,770,000
6,760,000
0 1 2 3 4 5
Kilometers
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Coord. System: GDA 1994 MGA Zone 53

Report Tables

Table 1: Tenement Listing

Lease	Area Units	Current Area	Grant Date	Expiry Date	Managing Company
EL 4420	Km2	99	21/01/2010	20/01/2014	St Barbara Limited

Table 2: Tabulated Summary of Exploration Activities.

Activity	Number completed/undertaken	Comments or Detail
Tenements with on ground exploration activities	**1**	
Tenements with mining related activities	0	
Tenements on which no activities were undertaken due to plaints being lodged	0	
Surface exploration RAB/AC holes	0	
Surface exploration RC holes	0	
Surface exploration diamond core holes	0	
Underground exploration diamond core holes	0	
Down hole geophysical surveys in surface exploration drillholes	0	
Down hole geophysical surveys in underground exploration drillholes	0	
Surface geophysical survey programs	**1**	
Assay samples collected from surface and exploration drillholes	0	
Assay samples collected during soil or other surface sampling programs	0	
Heritage surveys completed	0	
Flora/Fauna surveys completed	0	
Surface drillholes rehabilitated	0	

Table 3: Expenditure between 21 Jan 13 to 20 Jan 14

Item	Expenditure
Salaries	$40,607.27
Travel & Accommodation	4,149.18
General Expenses	866.94
Geophysics	$18,040.90
Fees & Permits	$1,172.79
TOTAL	**$64,837.08**

Reference Listing

Villahermosa, B., 2013: Atlas Geophysics Memorandum M2013008 – Billa Kalina Gravity Survey
Included in this report as Appendix One

Atlas Geophysics Memorandum M2013008

Billa Kalina Gravity Survey

St Barbara Limited

Memo completed by:

Bryan Villahermosa
Geophysicist

T 08 6278 2898
F 08 6278 1595
PO BOX 1049
MORLEY WA 6943
AUSTRALIA

info@atlasgeo.com.au

ABN 68 123 110 243

27th September 2013

TABLE OF CONTENTS

APPENDICES

1.0 Project Brief

Atlas Geophysics project P2013008 involved the acquisition and processing of 397 new gravity stations on behalf of St Barbara Limited, over the company's Billa Kalina prospect, 70km south-east of Coober Pedy in the northern South Australia. (Figure 1).

Acquisition for this survey commenced on the 13th September 2013 and was completed on 17th September 2013 with final data delivered shortly thereafter.

Gravity data were acquired using 400m square grid configuration over two separate blocks. Appendix B contains a plot of the locations of acquired gravity stations.

Acquisition was carried out by a single, two man crew using Utility Terrain Vehicle (UTV) methods. The crew was accommodated and messed at an Atlas remote fly camp located between the two blocks.

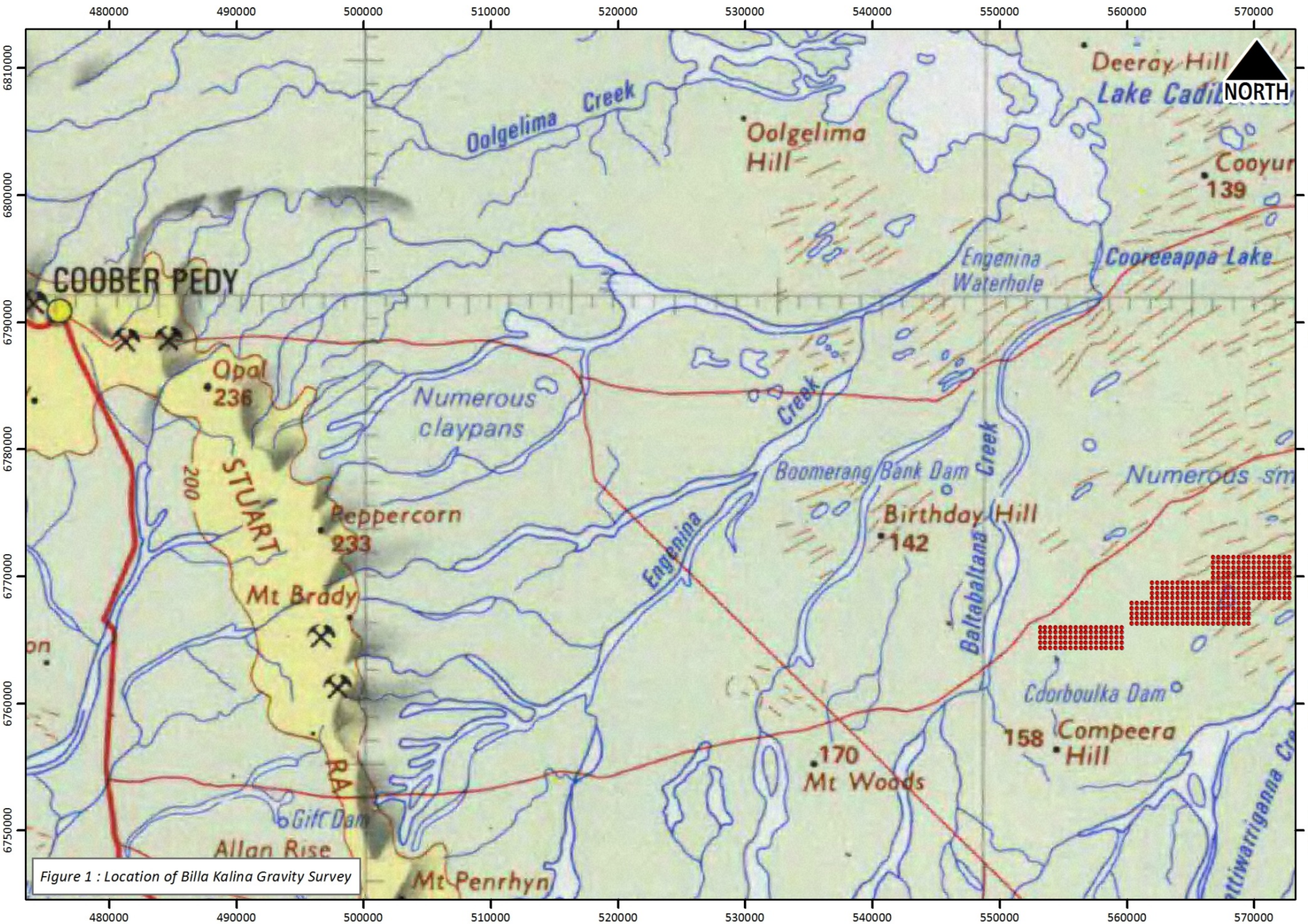


Figure 1 : Location of Billa Kalina Gravity Survey

2.0 Equipment and Instrumentation

The following instrumentation was used for acquisition of the gravity data:

- One CG5 Autograv Gravity Meter (Serial Number 40382, SF 1.000000)
- Two Leica System 1200 GPS-Glonass receivers

Ancillary equipment included:

- Two HP Laptop computers for data download and processing
- Iridium satellite phones for long distance communications
- Personal Protective Equipment for all personnel
- Batteries, battery chargers, solar cells
- Survey consumables
- Tools, engineering and maintenance equipment for vehicle servicing
- First aid and survival kits
- Tyres and recovery equipment

3.0 Calibration and Control

The gravity meters used for survey have been recently calibrated on the Guildford Cemetery – Helena Valley Primary School calibration range (2010990117- 2010990217) in Western Australia. The calibration process has validated the gravity meters scale factor to ensure reduction of the survey data produces correct Observed Gravities from measured dial reading values.

A primary GPS-Gravity control station, 201300800001 'Billa Kalina' was established on 13th September 2013 to control all field observations.

Primary GPS control was established by submitting static data to Geoscience Australia's AUSPOS processing system to produce first-order geodetic coordinates accurate to better than 10mm for the x, y and z observables. Multiple days of static GPS data have been submitted to ensure accuracy and reliability of the solution. The details of the control process have been summarised in a table included in Appendix C.

Primary gravity control was established at the same location as the primary GPS control station. Once tied to the Australian Fundamental Gravity Network (AFGN), the gravity control station allowed all field gravity observations to be tied to the Australian Absolute Gravity Datum 2007 (AAGD07). An accurate observed or absolute gravity value for the control station was established via multiple 'ABA' ties with the project meter to AFGN Station 1992932018 'Coober Pedy Airstrip Terminal' on 18th September 2013. Expected accuracy of the tie survey would be 0.01 mGal (0.1gu).

4.0 GPS-Gravity Acquisition

Gravity data were acquired concurrently with GPS data using a Scintrex CG5 gravity meter, with a minimum of two observations taken at each station of at least 20 seconds duration each. Data were acquired in a single shift of 10-11 hours duration, with each shift consisting of a single loop controlled by observations at the gravity control station. Each loop contained a minimum of two repeated readings so that an interlocking network of closed loops was formed. A total of **3.53%** repeats were acquired for quality control purposes. Repeat readings were evenly distributed on a time-basis throughout each of the gravity loops.

GPS data were acquired with the rover receiver operating in real time kinematic (RTK) mode. When carrying out acquisition with a UTV, the GPS-Glonass sensor is mounted on the roof the UTV (fixed antenna height of 1.810m) and the RTK data are logged by the receiver inside a protective case mounted to the rear tray of the UTV. Static data were logged at the control stations for submission to AUSPOS for delivery of final coordinates.

5.0 GPS Processing and QA

All GPS-Glonass data were recorded in real time so no further post-processing was required aside from projections and geoid correction which were both carried out using the Leica Geo Office Suite. The resulting data (in Atlas Geophysics RTK standard format) were then imported into Atlas Geophysics Reduction and Interpretation Software (AGRIS) for QA and use in the reduction of the gravity data.

Projection from GPS-Glonass derived WGS84/GDA94 coordinates to Map Grid of Australia (MGA) coordinates was performed in Leica Geo Office. For most practical applications where a horizontal accuracy of only a metre or greater is required, GDA94 coordinates can be considered the same as WGS84. MGA coordinates were obtained by projecting the GPS-derived WGS84 coordinates onto MGA Zone 53S using a Universal Transverse Mercator (UTM) projection. Elevations above the Australian Height Datum (AHD) were modelled using Leica Geo Office software and the AUSGEOID09 geoid model.

A module built into AGRIS allows the user to import the positional data from Leica Geo Office and examine quality factors such as station repeatability between multiple control stations, coordinate velocity, dilution of precision, coordinate quality factor and standard error for each gravity station location. The procedure is carried out before merging the positional data with gravity data for final reduction to Bouguer anomaly. Comprehensive statistics, repeatability analysis and histogram plotting are also performed.

QA procedures were applied to the GPS-Glonass data on a daily basis and any gravity stations not conforming to the quoted specifications were repeated by the company at no cost to the client.

6.0 Gravity Processing and QA

The acquired gravity data were processed using the company's in-house gravity pre-processing and reduction software, AGRIS. This software allows for full data pre-processing, reduction to Bouguer Anomaly, repeatability and statistical analysis, as well as full quality analysis of the output dataset.

Once downloaded from the gravity meters, the data are analysed for consistency and preliminary QA is performed to check that observations meet specification for standard deviation, reading rejection, temperature and tilt values. Once the data are verified, the software averages the multiple readings and performs a merge with the GPS data (which it has also previously verified) and performs a linear drift correction and earth tide correction. Any gravity stations not conforming to the quoted specifications were repeated by the company at no cost to the client.

The following corrections were applied to the dataset to produce Spherical Cap Bouguer Anomalies on the GRS80 ellipsoid and AAGD07 gravity datum. For legacy reasons, Geoidal Bouguer Anomalies on the Australian Height Datum (AHD) and ISOGAL84 gravity datum have also been calculated. The formulae below produce data in μms^{-2} or gravity units. To convert to mGal, divide by a factor of 10.

Instrument scale factor: This correction is used to correct a gravity reading (in dial units) to a relative gravity unit value based on the meter calibration.

$$r_c = 10 \cdot (r \cdot S(r))$$

where,

r_c	corrected reading in gravity units
r	gravity meter reading in dial units
$S(r)$	scale factor (dial units/milliGal)

Earth Tide Correction: The earth is subject to variations in gravity due to the gravitational attraction of the Sun and the Moon. These background variations can be corrected for using a predictive formula which utilises the gravity observation position and time of observation. The Scintrex CG5 gravity meter automatically calculates ETC but uses only an approximate position for the gravity observation so is not entirely accurate. For this reason, the Scintrex ETC is subtracted from the reading and a new correction calculated within AGRIS software.

$$r_t = r_c + g_{tide}$$

where,

r_t	tide corrected reading in gravity units
r_c	scale factor corrected reading in gravity units
g_{tide}	Earth Tide Correction (ETC) in gravity units

Instrument Drift Correction: Since all gravity meters are mechanical they are all prone to instrument drift. Drift can be caused by mechanical stresses and strains in the spring mechanism as the meter is moved, knocked, reset, subjected to temperature extremes, subjected to vibration, unclamped etc. The most common cause of instrument drift is due to extension of the sensor spring with changes in temperature (obeying Hooke's law). To calculate and correct for daily instrument drift, the difference between the gravity control station readings (closure error) is used to assume the drift and a linear correction is applied.

$$ID = \frac{r_{cs2} - r_{cs1}}{t_{cs2} - t_{cs1}}$$

where,

ID	Instrument Drift in gu/hour
r_{cs2}	control station 2nd reading in gravity units
r_{cs1}	control station 1st reading in gravity units
t_{cs2}	control station 2 time
t_{cs1}	control station 1 time

Observed Gravity: The preceding corrections are applied to the raw gravity reading to calculate the earth's absolute gravitational attraction at each gravity station. The corrections produced Observed Gravities on the AAGD07 and ISOGAL84 datums.

$$G_o = g_{cs1} + (r_t - r_{cs1}) - (t - t_{cs1}) \cdot ID$$

where,

G_o	Observed Gravity in gravity units (ISOGAL84 or AAGD07)
g_{cs1}	control station 1 known Observed Gravity in gravity units
r_t	tide corrected reading in gravity units
r_{cs1}	control station 1 reading in gravity units
t	reading time
t_{cs1}	control station 1 time
ID	instrument drift in gravity units/hour

Theoretical Gravity 1980: The theoretical (or normal) gravity value at each gravity station is calculated based on the assumption that the Earth is a homogeneous ellipsoid. The closed form of the 1980 International Gravity Formula is used to approximate the theoretical gravity at each station location and essentially produce a latitude correction. Gravity values vary with latitude as the earth is not a perfect sphere and the polar radius is much smaller than the equatorial radius. The effect of centrifugal acceleration is also different at the poles versus the equator.

$$G_{t80} = 9780326.7715((1 + 0.001931851353(sin^2 l)/(SQRT(1 - 0.0066943800229(sin^2 l)))$$

where,

G_{t80}	Theoretical Gravity 1980 in gravity units
l	GDA94 latitude at the gravity station in decimal degrees

Theoretical Gravity 1967: The theoretical (or normal) gravity value at each gravity station is calculated based on the assumption that the Earth is a homogeneous ellipsoid. The 1967 variant of the International Gravity Formula is used to approximate the theoretical gravity at each station location and essentially produce a latitude correction. Gravity values vary with latitude as the earth is not a perfect sphere and the polar radius is much smaller than the equatorial radius. The effect of centrifugal acceleration is also different at the poles versus the equator.

$$G_{t67} = (9780318.456 \cdot (1 + 0.005278895 \cdot sin^2(l) + 0.000023462 \cdot sin^4(l)))$$

where,

G_{t67} Theoretical Gravity 1967 in gravity units
l GDA94 latitude at the gravity station in decimal degrees

Atmospheric Correction: The gravity effect of the atmosphere above the ellipsoid can be calculated with an atmospheric model and is subtracted from the theoretical gravity.

$$AC = 8.74 - 0.00099 \cdot h + 0.0000000356 \cdot h^2$$

where,

AC Atmospheric Correction in gravity units
h elevation above the GRS80 ellipsoid in metres

Ellipsoidal Free Air Correction: Since the gravity field varies inversely with the square of distance, it is necessary to correct for elevation changes from the reference ellipsoid (GRS80). Gravitational attraction decreases as the elevation above the reference ellipsoid increases.

$$EFAC = -(3.087691 - 0.004398\, sin^2 l) \cdot h + 7.2125 \cdot 10^{-7} \cdot h^2$$

where,

$EFAC$ Ellipsoidal Free Air Correction in gravity units
l GDA94 latitude at the gravity station in decimal degrees
h elevation above the GRS80 ellipsoid in metres

Geoidal Free Air Correction: Since the gravity field varies inversely with the square of distance, it is necessary to correct for elevation changes from the reference geoid (AHD). Gravitational attraction decreases as the elevation above the reference geoid increases.

$$GFAC = (3.08768 - 0.00440 sin^2(l)) \cdot h - 0.000001442 \cdot h^2$$

where,

$GFAC$ Free Air Correction in gravity units
l GDA94 latitude at the gravity station in decimal degrees
h elevation above the reference geoid (AHD) in metres

Spherical Cap Bouguer Correction: If a gravity observation is made above the reference ellipsoid, the effect of rock material between the observation and the ellipsoid must be taken into account. The mass of rock makes a positive contribution to the gravity value. The correction is calculated using the closed form equation for the gravity effect of a spherical cap of radius 166.7km, based on a spherical Earth with a mean radius of 6,371.0087714km, height relative the ellipsoid and rock densities of 2.67, 2.40 and 2.20 tm^{-3} (gm/cc).

$$SCBC = 2\pi G\rho((1 + \mu) \cdot h - \lambda R)$$

where,

$SCBC$	Spherical Cap Bouguer Correction in gravity units
G	gravitational constant = $6.67428 \cdot 10^{-11} m^3 kg^{-1} s^{-2}$
ρ	rock density (2.67, 2.40 and 2.20 tm^{-3})
h	elevation above the GRS80 ellipsoid in metres
R	$(R_o + h)$ the radius of the earth at the station
R_o	mean radius of the earth = 6,371.0087714 km (on the GRS80 ellipsoid)
μ & λ	are dimensionless coefficients defined by:

$$\mu = ((1/3) \cdot \eta^2 - \eta)$$

where,

η	h/R

$$\lambda = (1/3)\{(d + f\delta + \delta^2)[(f - \delta)^2 + k]^{\frac{1}{2}} + p + m \cdot ln(n/(f - \delta + [(f - \delta)^2 + k]^{\frac{1}{2}})\}$$

where,

d	$3 \cdot cos^2\alpha - 2$
f	$cos\alpha$
k	$sin^2\alpha$
p	$-6 \cdot cos^2\alpha \cdot \sin(\alpha/2) + 4 \cdot sin^3(\alpha/2)$
δ	(R_o/R)
m	$-3 \cdot k \cdot f$
n	$2 \cdot [sin\,(\alpha/2) - sin^2(\alpha/2)]$
α	S/R_o with S = Bullard B Surface radius = 166.735 km

Geoidal Bouguer Correction: If a gravity observation is made above the reference geoid, the effect of rock material between the observation and the ellipsoid must be taken into account. The mass of rock makes a positive contribution to the gravity value. The slab of rock makes a positive contribution to the gravity value. Rock densities of 2.67, 2.40 and 2.20 t/m^{-3} (gm/cc) were used in the correction.

$$GBC = 0.4191 \cdot \rho \cdot h$$

where,

GBC	Geoidal Bouguer Correction in gravity units
ρ	rock density (2.67, 2.40 and 2.20 tm^{-3})
h	elevation above the reference geoid (AHD) in m

Terrain Correction: The terrain correction accounts for variations in gravity values caused by variations in topography near the observation point. The correction accounts for the attraction of material above the assumed Bouguer slab and for the over-correction made by the Bouguer correction when in valleys. The terrain correction is positive regardless of whether the local topography consists of a mountain or a valley. Terrain corrections were calculated using an SRTM30 DEM extraction and RASTERTC software, but had negligible effect on the data as the survey area was flat and devoid of any appreciable topography. RASTERTC corrections for a density of 2.67 tm^{-3} were used to produce the Complete Bouguer Anomaly (see below).

Ellipsoidal Free Air Anomaly: The Ellipsoidal Free Air Anomaly is the difference between the observed gravity and theoretical gravity that has been computed for latitude and corrected for the elevation of the gravity station above or below the reference ellipsoid.

$$EFAA = G_{oAAGD07} - (G_{t80} - AC) - EFAC$$

where,

$EFAA$ Ellipsoidal Free Air Anomaly in gravity units
G_o Observed Gravity on the AAGD07 datum in gravity units
G_{t80} Theoretical Gravity 1980 in gravity units
AC Atmospheric Correction in gravity units
$EFAC$ Ellipsoidal Free Air Correction in gravity units

Geoidal Free Air Anomaly: The Geoidal Free Air Anomaly is the difference between the observed gravity and theoretical gravity that has been computed for latitude and corrected for the elevation of the gravity station above or below the reference geoid.

$$GFAA = G_{oISOGAL84} - G_{t67} + GFAC$$

where,

$GFAA$ Free Air Anomaly in gravity units
G_o Observed Gravity on the ISOGAL84 datum in gravity units
G_{t67} Theoretical Gravity 1967 in gravity units
$GFAC$ Geoidal Free Air Correction in gravity units

Spherical Cap Bouguer Anomaly: The Spherical Cap Bouguer Anomaly is computed from the Ellipsoidal Free Air Anomaly above by removing the attraction of the spherical cap calculated by the Spherical Cap Bouguer Correction.

$$SCBA = EFAA - SCBC$$

where,

$SCBA$ Spherical Cap Bouguer Anomaly in gravity units
$EFAA$ Ellipsoidal Free Air Anomaly in gravity units
$SCBC$ Bouguer Correction in gravity units

Geoidal Bouguer Anomaly: The Geoidal Bouguer Anomaly is computed from the Geoidal Free Air Anomaly above by removing the attraction of the slab calculated by the Geoidal Bouguer Correction.

$$GBA = GFAA - GBC$$

where,

GBA Geoidal Bouguer Anomaly in gravity units
$GFAA$ Geoidal Free Air Anomaly in gravity units
GBC Geoidal Bouguer Correction in gravity units

Complete Bouguer Anomaly: This is obtained by adding the terrain correction to the Bouguer Anomaly (Spherical Cap or Geoidal). The Complete Bouguer Anomaly is the most interpretable value derived from a gravity survey as changes in the anomaly can be directly attributed to lateral density contrasts within the geology below the observation point.

$$CBA = BA + TC$$

where,

CBA Complete Bouguer Anomaly in gravity units
BA Bouguer Anomaly in gravity units
TC Terrain Correction in gravity units

7.0 Results

The gravity survey was easily completed with just 5 days of acquisition required. An average combined acquisition rate of around 80 stations per day of production was achieved over the duration of the project. Production was hampered predominantly by the terrain which was difficult to negotiate in places. A copy of the full production report is contained on the data DVD.

Final raw data have met and exceeded quoted project specifications. Repeatability of the data was good, with the standard deviation of the elevation repeats at **0.025** m and the standard deviation of the gravity repeats at **0.014** mGal. The production report contains summary statistics and histograms for repeatability.

8.0 Data Formats and Deliverables

Final reduced ASCII data for the project have been delivered in standard Atlas format. Table 2 overleaf details the format of the final gravity database supplied. All fields are comma delimited.

Appendix B contains plots of final station locations, images of GPS Derived Elevation (GRS80), Spherical Cap Bouguer Anomaly and first vertical derivative of Spherical Cap Bouguer Anomaly.

Raw GPS-GNSS and gravity data in their respective native formats have been included on the data DVD as Appendix D. Table 1 below summarises the deliverables.

Final Delivered Data	Format	Data DVD	Hardcopy
Gravity Database	Comma Space Delimited .csv	•	
Gravity Database	Geosoft Database .gdb	•	
Raw Positional Data	AGRIS format, comma delimited	•	
Raw Gravity Data	Scintrex CG5 format	•	
Final Grids	ER Mapper Grids .ers	•	
Final Images	GIS compatible Geotiff .tif	•	•
Acquisition Memo	PDF .pdf	•	•

Table 2: Final Deliverables

Field Header	Field Description	Format	Units
PROJECT	Atlas Geophysics Project Number	A9	None
STATION	Unique Station ID	I8	None
STATIONCODE	Unique Station Code	A13	None
LINE	Line ID	I8	None
TYPE	Observation Type : Base, Field or Repeat	A8	None
MGAEAST	Coordinate Easting MGA94/GDA94	F11.3	M
MGANORTH	Coordinate Northing MGA94/GDA94	F12.3	M
ZONE	MGA Zone Number	F8.0	NA
GDA94LAT	Coordinate Latitude GDA94	F15.10	DD
GDA94LONG	Coordinate Longitude GDA94	F15.10	DD
ORTHOHTM	Coordinate Elevation Orthometric	F9.3	M
GRS80HTM	Coordinate Elevation Ellipsoidal	F9.3	M
NAG09	Geoid Separation	F8.3	M
AMG84EAST	Coordinate Easting AMG84	F11.3	M
AMG84NORTH	Coordinate Northing AMG84	F12.3	M
DATE	Observation Date	I8	None
TIME	Observation Time	I8	None
DIALMGAL	Gravity Dial Reading	F9.3	mGal
ETCMGAL	Earth Tide Correction (Longman)	F8.3	mGal
SCALE	Scale Factor Applied to Dial Reading	F9.6	None
OBSG84MGAL	Observed Gravity ISOGAL84	F11.3	mGal
OBSG84GU	Observed Gravity ISOGAL84	F11.2	Gu
OBSGAAGD07GU	Observed Gravity AAGD07	F13.2	Gu
OBSGAAGD007MGAL	Observed Gravity AAGD07	F16.3	mGal
DRIFTMGAL	Drift Applied to Dial Readings	F10.3	mGal
TGRAV67GU	Theoretical Gravity 1967	F11.2	Gu
TGRAV67MGAL	Theoretical Gravity 1967	F12.3	mGal
TGRAV80GU	Theoretical Gravity 1980	F11.2	Gu
GFACGU	Geoidal Free Air Correction	F8.2	Gu
GFACMGAL	Geoidal Free Air Correction	F9.3	mGal
GFAAGU	Geoidal Free Air Anomaly	F8.2	Gu
GFAAMGAL	Geoidal Free Air Anomaly	F9.3	mGal
GBC267GU	Geoidal Bouguer Correction 2.67 tm^-3	F9.2	Gu
GBC240GU	Geoidal Bouguer Correction 2.40 tm^-3	F9.2	Gu
GBC220GU	Geoidal Bouguer Correction 2.20 tm^-3	F9.2	Gu
GBC267MGAL	Geoidal Bouguer Correction 2.67 tm^-3	F11.3	mGal
GBC240MGAL	Geoidal Bouguer Correction 2.40 tm^-3	F11.3	mGal
GBC220MGAL	Geoidal Bouguer Correction 2.20 tm^-3	F11.3	mGal
GBA267GU	Geoidal Bouguer Anomaly 2.67 tm^-3	F9.2	gu
GBA240GU	Geoidal Bouguer Anomaly 2.40 tm^-3	F9.2	gu
GBA220GU	Geoidal Bouguer Anomaly 2.20 tm^-3	F9.2	gu
GBA267MGAL	Geoidal Bouguer Anomaly 2.67 tm^-3	F11.3	mGal
GBA240MGAL	Geoidal Bouguer Anomaly 2.40 tm^-3	F11.3	mGal
GBA220MGAL	Geoidal Bouguer Anomaly 2.20 tm^-3	F11.3	mGal
TGRAV80ACGU	Theoretical Gravity 1980 Atmospheric Corrected	F11.2	gu
EFACGU	Ellipsoidal Free Air Correction	F9.2	gu
EFAAGU	Ellipsoidal Free Air Anomaly	F8.2	gu
SCBC267GU	Spherical Cap Bouguer Correction 2.67 tm^-3	F10.2	gu
SCBC240GU	Spherical Cap Bouguer Correction 2.40 tm^-3	F10.2	gu
SCBC220GU	Spherical Cap Bouguer Correction 2.20 tm^-3	F10.2	gu
SCBA267GU	Spherical Cap Bouguer Anomaly 2.67 tm^-3	F10.2	gu
SCBA240GU	Spherical Cap Bouguer Anomaly 2.40 tm^-3	F10.2	gu
SCBA220GU	Spherical Cap Bouguer Anomaly 2.20 tm^-3	F10.2	gu
SCBA267MGAL	Spherical Cap Bouguer Anomaly 2.67 tm^-3	F12.3	mGal
SCBA240MGAL	Spherical Cap Bouguer Anomaly 2.40 tm^-3	F12.3	mGal
SCBA220MGAL	Spherical Cap Bouguer Anomaly 2.20 tm^-3	F12.3	mGal
TCINNERGU	Inner Terrain Correction	F8.2	gu
TCINNERMGAL	Inner Terrain Correction	F8.3	mGal
QFINNER	Quality Factor Inner TC	I2	None
TCOUTERGU	Outer Terrain Correction	F8.2	gu
TCOUTERMGAL	Outer Terrain Correction	F8.3	mGal
QFOUTER	Quality Factor Outer TC	F2	None
TCTOTALGU	Total Terrain Correction	F8.2	gu
TCTOTALMGAL	Total Terrain Correction	F8.3	mGal
CGBA267GU	Complete Geiodal Bouguer Anomaly 2.67 tm^-3	F11.3	gu
CGBA267MGAL	Complete Geiodal Bouguer Anomaly 2.67 tm^-3	F11.3	mGal
CSCBA267GU	Complete Spherical Cap Bouguer Anomaly 2.67 tm^-3	F12.2	gu
CSCBA267MGAL	Complete Spherical Cap Bouguer Anomaly 2.67 tm^-3	F12.2	mGal
DIFFEASTM	Repeat Error for Easting Observation	F8.3	m
DIFFNORTHM	Repeat Error for Northing Observation	F8.3	m
DIFFHTM	Repeat Error for Elevation Observation	F8.3	m
DIFFOBSGMGAL	Repeat Error for Observed Gravity	F8.3	mGal
DIFFOBSGGU	Repeat Error for Observed Gravity	F8.2	gu
METERSN	Serial Number of Gravity Instrument	I8	None
CLOSUREGU	Loop Closure in gu	F8.2	gu
CLOSUREMGAL	Loop Closure in mGal	F8.3	mGal
GRVBASE	Gravity Base	A11	None
GPSBASE	GPS Base	A11	None

Table 2: Final Gravity Database Format

9.0 Project Safety

Prior to survey commencement, a Hazard Identification and Risk Assessment (HIRA) was carried out for all new tasks not covered under Atlas Geophysics Standard Operating Procedures (SOP's) or the company's Health Safety Environment (HSE) field manual.

Prior to entering the survey area, a St Barbara induction and equipment inspection was carried out, by the Senior Exploration Geologist, Bryan Bowden.

The weekly toolbox meeting was held on the second night at camp to discuss project safety and address any staff member concerns. No incidents were reported on this project.

APPENDIX A
Control Station Description

201300800001 – Billa Kalina

GDA94/GRS80		MGA Z53		AMG Z53	
Latitude	-29 14 35.9042	*Easting*	559,912.967	*Easting*	559,784.262
Longitude	135 36 59.6393	*Northing*	6,764,900.110	*Northing*	6,764,728.662
Ellipsoidal Height	133.658	*Orthometric Height*	128.979	*Orthometric Height*	128.979

OBSERVED GRAVITY		Date established: 13/09/2013
gu AAGD07	9792213.70	
mGal ISOGAL84	979221.448	

Occupation Method/Location Details

At this control station, the GPS control point consists of a steel picket driven into the ground with approximately 15cm protruding. The gravity control point consists of a small concrete slab set into the ground, north of the GPS control point. The control station is witnessed by an Atlas Geophysics survey plaque (reading 201300800001) attached to a 1.5 metre steel picket placed within 0.5m of the both control points.

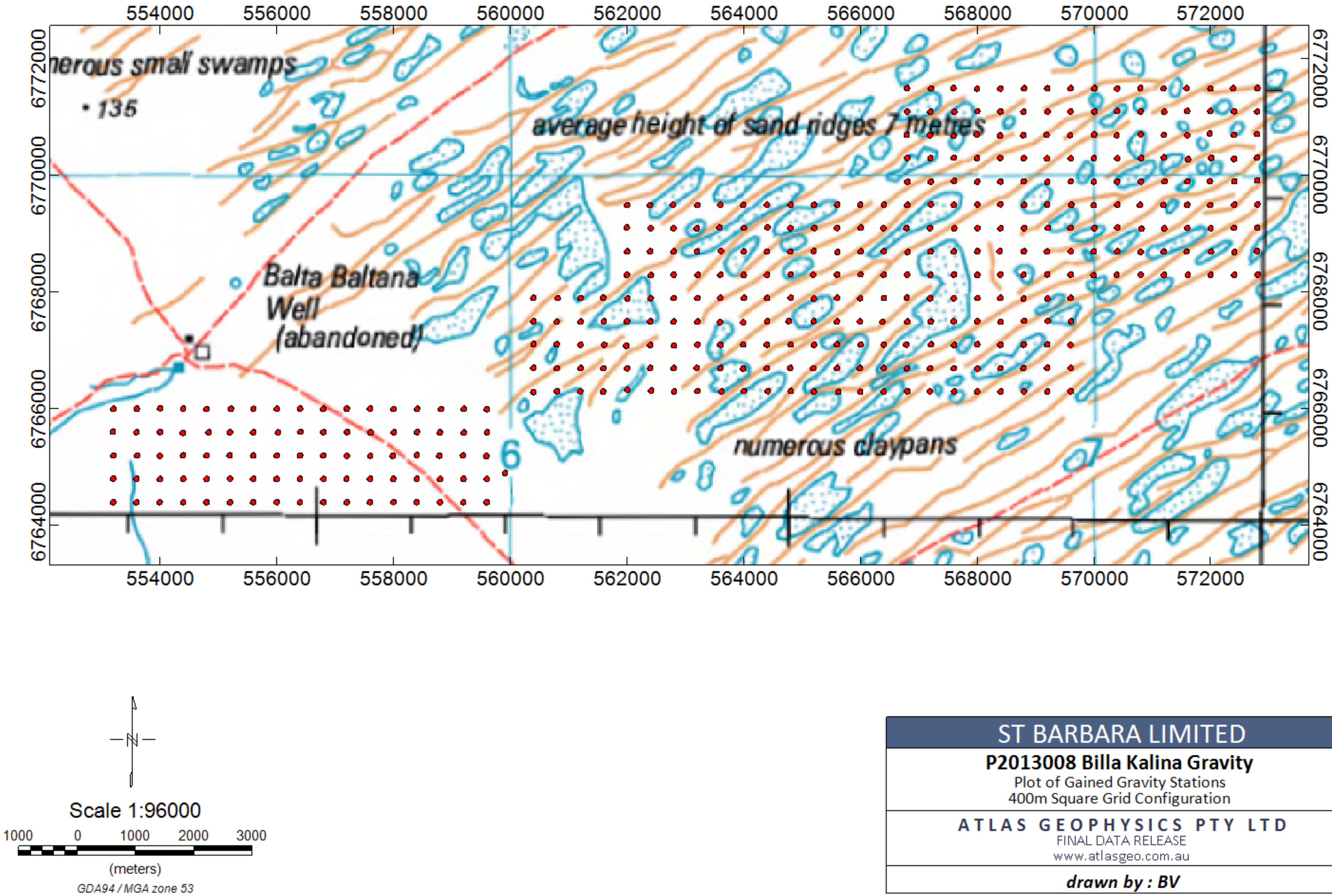
Gravity Control was established via multiple 'ABA' loops with the project meter to AFGN 'Coober Pedy Airstrip Terminal' gravity station 1992932018. Expected accuracy would be better than 0.01 mGal.

GPS Control was established using AUSPOS. Three separate 10 hour sessions were submitted to AUSPOS's online processing systems where returned coordinates were accurate to better than 0.01m.

The station can be reached by the following directions. From Coober Pedy, take the Stuart Highway South for approximately 3km then turn east onto William Creek Rd. Follow William Creek road for approximately 62kms where a southbound track is flagged by a truck tyre on the southern side of William Creek road. Follow the southbound track for about 7kms where the track turns south-east at the Boomerang Bank Dam. Follow the track for another 19kms where vehicle tracks can be seen coming off the track to the east. Continue north for approximately 1km until reaching a small dry salt pan. Another larger dry pan is located east of the smaller dried up lake and the control station can be seen in the north-west corner of the larger dried up lake.

Photograph of Control Station 201300800001 and surrounds

APPENDIX B
Plots and Imagery



ST BARBARA LIMITED

P2013008 Billa Kalina Gravity

Plot of Gained Gravity Stations

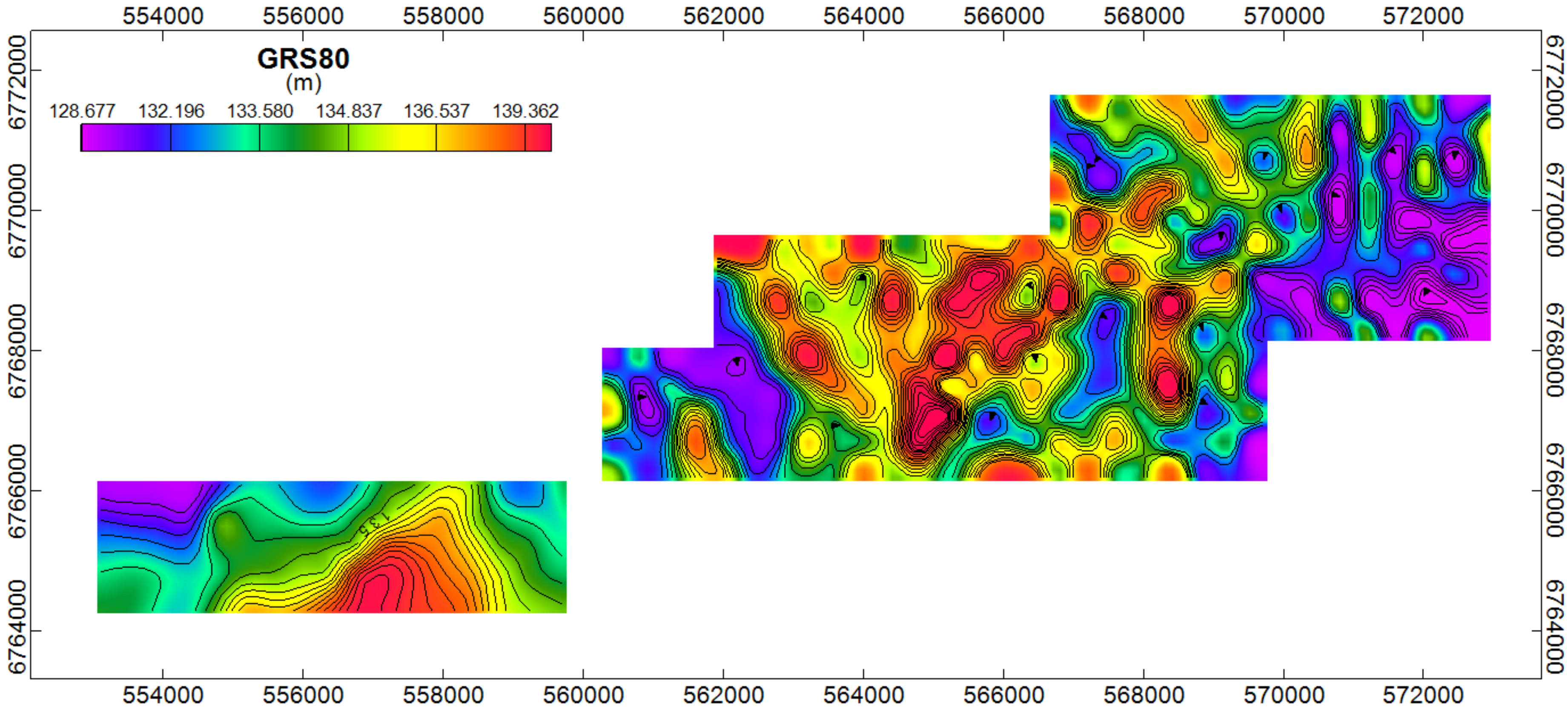
400m Square Grid Configuration

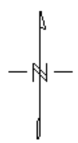
ATLAS GEOPHYSICS PTY LTD

FINAL DATA RELEASE

www.atlasgeo.com.au

drawn by : BV





Scale 1:96000

1000 0 1000 2000 3000

(meters)

GDA94 / MGA zone 53

ST BARBARA LIMITED

P2013008 Billa Kalina Gravity

Pseudocoloured Image of GPS Derived Elevation (GRS80)

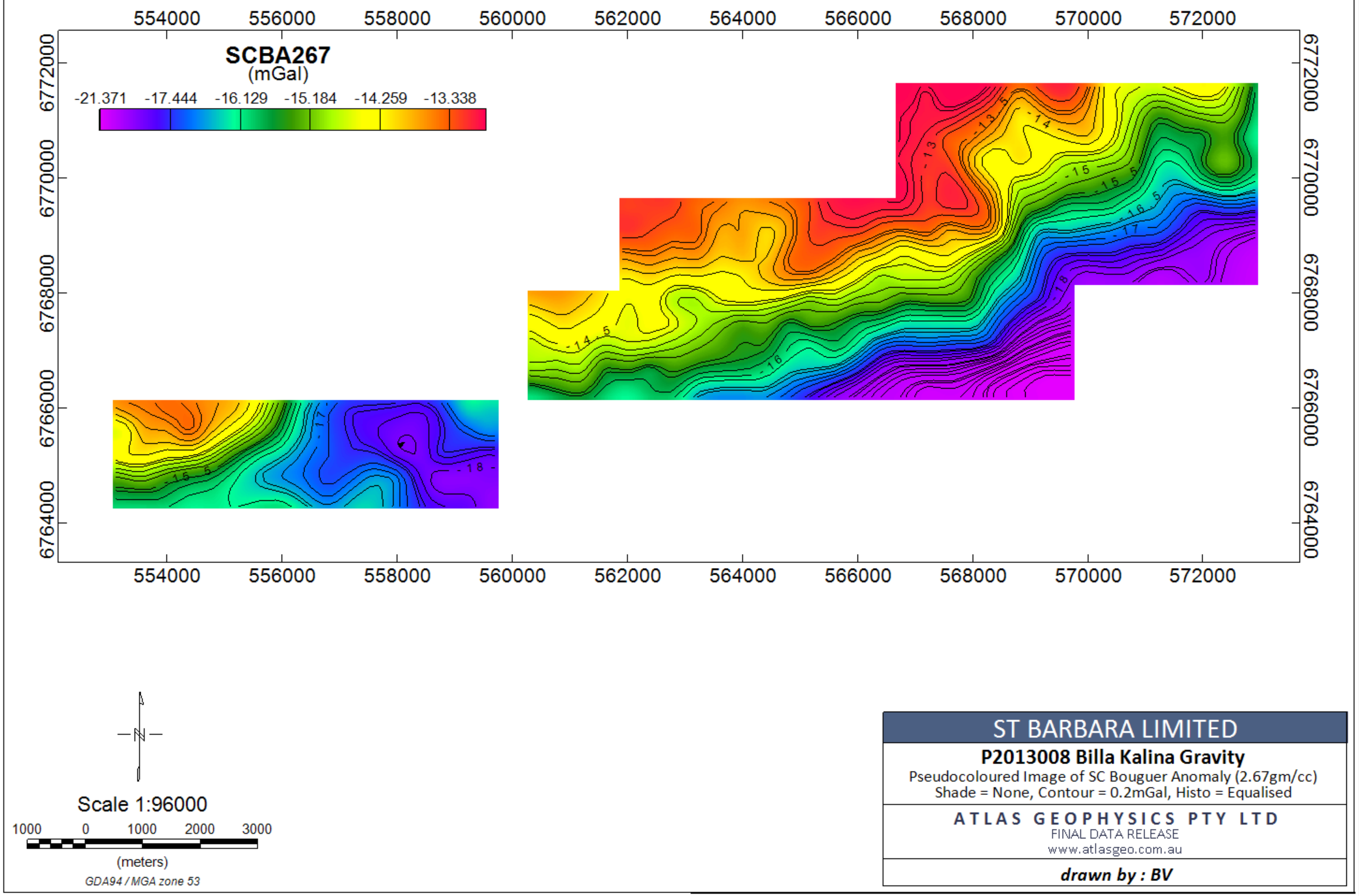
Shade = None, Contour = 0.5m, Histo = Equalised

ATLAS GEOPHYSICS PTY LTD

FINAL DATA RELEASE

www.atlasgeo.com.au

drawn by : BV



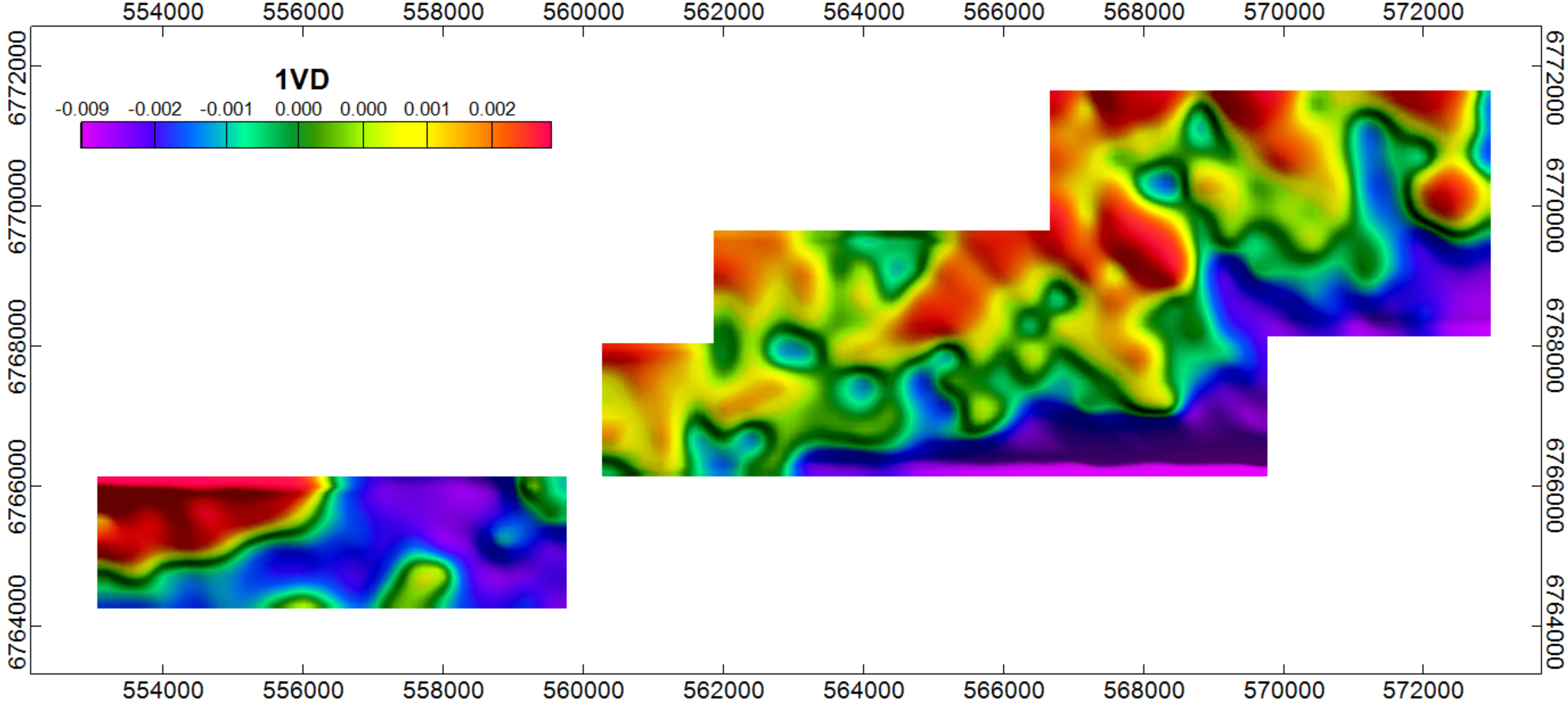
ST BARBARA LIMITED

P2013008 Billa Kalina Gravity

Pseudocoloured Image of SC Bouguer Anomaly (2.67gm/cc)
Shade = None, Contour = 0.2mGal, Histo = Equalised

ATLAS GEOPHYSICS PTY LTD
FINAL DATA RELEASE
www.atlasgeo.com.au

drawn by : BV



Scale 1:96000

1000 0 1000 2000 3000

(meters)

GDA94 / MGA zone 53

ST BARBARA LIMITED

P2013008 Billa Kalina Gravity

Pseudocoloured Image of SC Bouguer Anomaly (2.67gm/cc)

Shade = NE, Contour = None, Histo = Equalised

ATLAS GEOPHYSICS PTY LTD

FINAL DATA RELEASE

www.atlasgeo.com.au

drawn by : BV

APPENDIX C
GPS Control Information

201300800001
1309 -29 14 35.90415 135 36 59.63923 133.656 128.977 GDA94
1309 -29 14 35.90421 135 36 59.63931 133.663 128.984 GDA94
1309 -29 14 35.90420 135 36 59.63934 133.655 128.976 GDA94

GDA94AVE
-29 14 35.9042
135 36 59.6393

-29.24330672
135.61656647

GRS80HT
133.658

AHDHT
128.979

N
4.679

MGA53
559912.967
6764900.110

AMG53
559784.262
6764728.662

Survey Production Report

www.atlasgeo.com.au

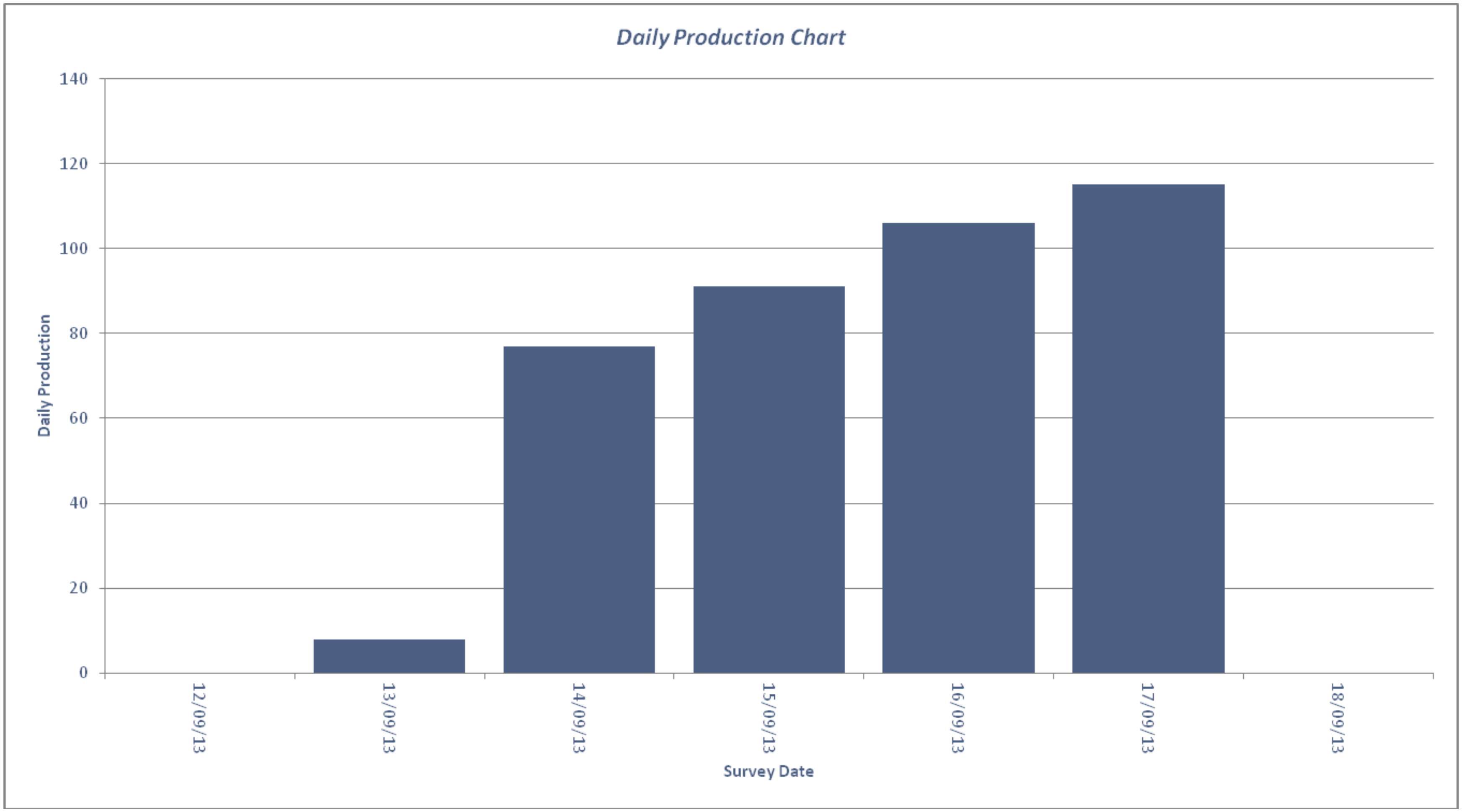
CLIENT	**SBM**
PROJECT AREA	**Billa Kalina**
SUPERVISORS	**BV/JL**
OPERATORS	BV/JL
SURVEY SIZE	397
VEHICLES	1CVF259

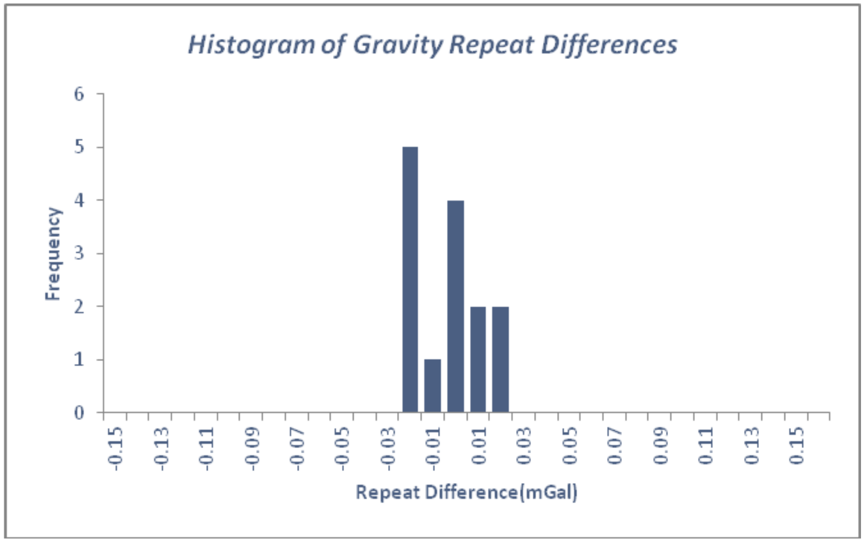
Production Table

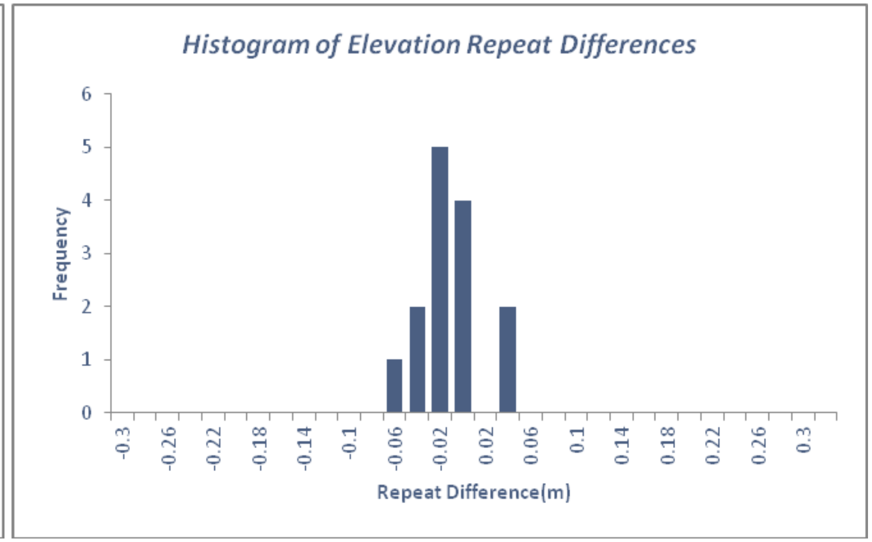
DATE	MOB STANDBY %	SURVEY %	40382 FIELD	40382 REPEAT	40382 %REPEAT	FIELD TOTAL	REPEAT TOTAL	SURVEY TOTAL	SURVEY REMAIN	SURVEY REPEAT	SURVEY %REPEAT	SURVEY % COMPLETE
12/09/13	100%	0%	0	0	0.00%	0	0	0	397	0	0.00%	0.00%
13/09/13	90%	10%	8	1	12.50%	8	1	8	389	1	12.50%	2.02%
14/09/13	0%	100%	77	2	2.60%	77	2	85	312	3	3.53%	21.41%
15/09/13	0%	100%	91	3	3.30%	91	3	176	221	6	3.41%	44.33%
16/09/13	0%	100%	106	3	2.83%	106	3	282	115	9	3.19%	71.03%
17/09/13	0%	100%	115	5	4.35%	115	5	397	0	14	3.53%	100.00%
18/09/13	100%	0%	0	0	0.00%	0	0	397	0	14	3.53%	100.00%

Supervisor Comments:

DATE	COMMENT
12/09/13	Crew drove from Adelaide to Coober Pedy and completed inductions with Bryan from SBM.
13/09/13	The crew started to drive from Coober Pedy out to the grid and set up camp and a base for the survey. The crew then completed a few points to make sure all equipment was working correctly ready for a full day of production tomorrow.
14/09/13	The crew continued surveying on the western block and completed a full day of acquisition. Terrain was fairly flat and open with low lying saltbush and small rocks. At the end of the day the crew returned to camp to complete processing.
15/09/13	After the morning vehicle pre starts, the crew made their way out from camp and began on the eastern block. Crew established a radio repeater which enabled the far eastern point to be reached. The ridges consisted of ferruginous sediment and chest high to head high bushes while further east the sediment on the ridges was more consolidated with ankle high shrub and head high bushes. The survey area also consisted of rocky, dried up lakes and a rusted barb wire fence line was easily crossed with fallen down parts regularly along. The weather was hot and windy. No other issues.
16/09/13	After locking down camp from the wind and completing the pre starts, the crew set out to continue working on the eastern points. Terrain was very similar to yesterday and there were no other issues to report. At the end of the day, crew returned back to camp to clean the gear and process the data.
17/09/13	The crew set out this morning and completed all remaining points to the east. The day was not as warm as the previous days and made a pleasant day for surveying. The terrain encountered throughout the survey area today consisted of: ridges with loose sediment, ankle high shrub, chest high spikey bushes and up to 3m tall trees; dried up, rocky lakes; open plains with ankle high shrubs and undulating dune systems with a lot of dead trees. A brown snake was seen as well as 2 dingos today. At the end of the day the crew returned back to camp to clean the gear and process the data.
18/09/13	Crew demob to Adelaide.


Daily Production Chart
Daily Production
0
20
40
60
80
100
120
140
12/09/13
13/09/13
14/09/13
15/09/13
16/09/13
17/09/13
18/09/13
Survey Date





FIELD	MEAN	SD	MINIMUM	MAXIMUM
DIFFEASTM	0.021	0.050	-0.039	0.138
DIFFNORTHM	0.036	0.102	-0.078	0.284
DIFFHTM	0.001	0.025	-0.053	0.044
DIFFOBSGMGAL	0.003	0.014	-0.014	0.027
DIFFOBSGGU	0.028	0.141	-0.140	0.270

St Barbara
LIMITED
St Barbara Limited ACN 009 165 066
1205 Hay Street, West Perth 6005
PO Box 1161, West Perth, 6872
Tel +61 8 9476 5555 **Fax** +61 8 9476 5500
www.stbarbara.com.au

2 February 2015

EL Reporting Officer
Mineral Resources Division
DMITRE
GPO Box 1264
Adelaide SA 5001

Dear Sir

RE: ANNUAL REPORT EL 4420 (NO WORK)

We wish to advise that during the reporting year 21 January 2014 – 20 January 2015, no exploration field work was undertaken, and there are no reportable results for, EL 4420. An Annual Mineral Exploration Report will therefore not be lodged for the reporting period. Please accept this letter in lieu of an annual report.

St Barbara chose to suspend its Australian exploration in January 2014 and had been in discussions with 3 parties about a potential joint venture but had failed to attract a JV partner. The area which was subject to EL 4420 held by St Barbara Limited was allowed to naturally expire on 20 January 2015.

Should you require any further information please contact me directly via the details below.

Yours faithfully

Sandy Thuel
Senior Land Officer
PH: 08 9476 5536
sandy.thuel@stbarbara.com.au